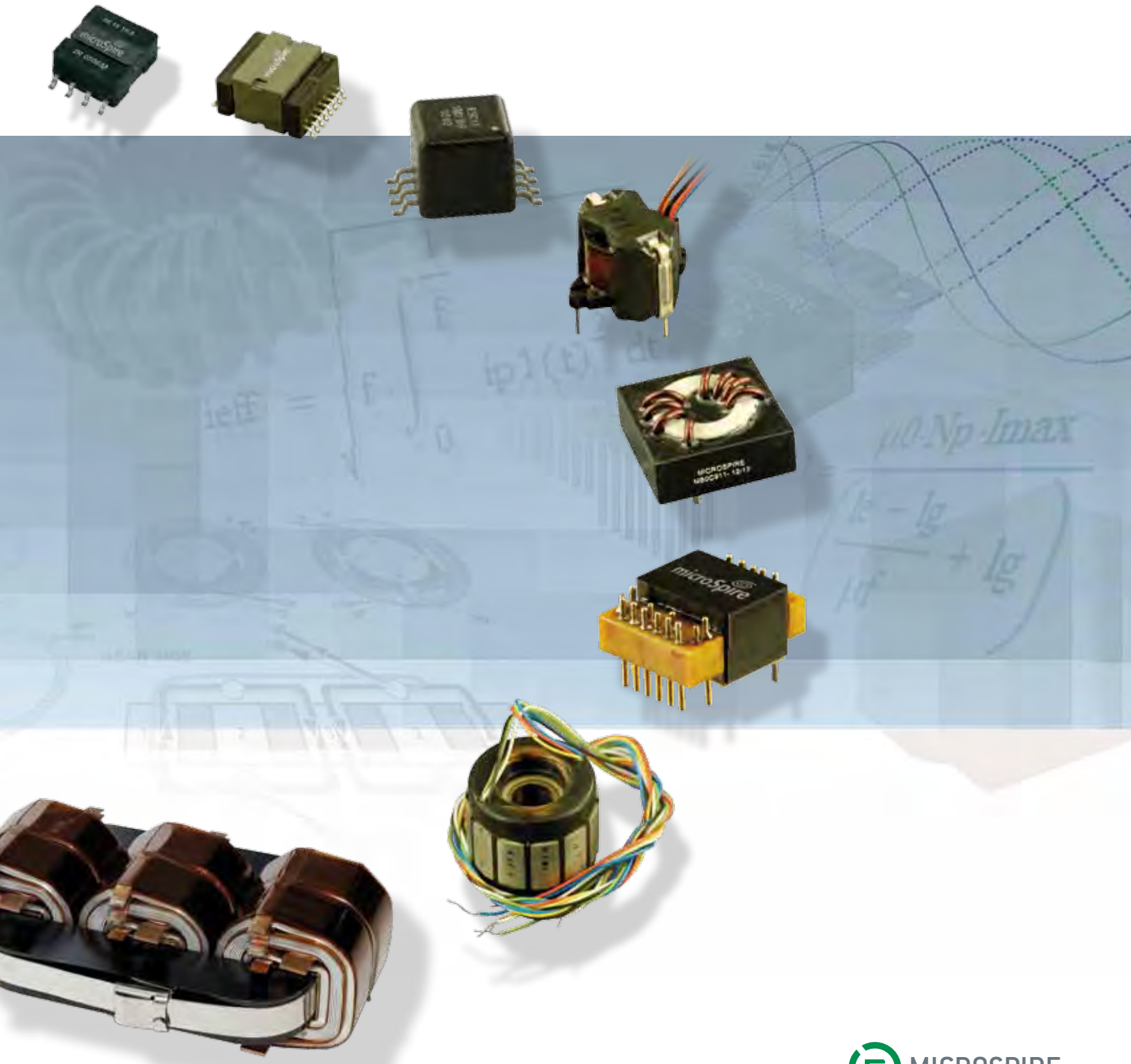
Wound Magnetics Technologies

from Design to Production



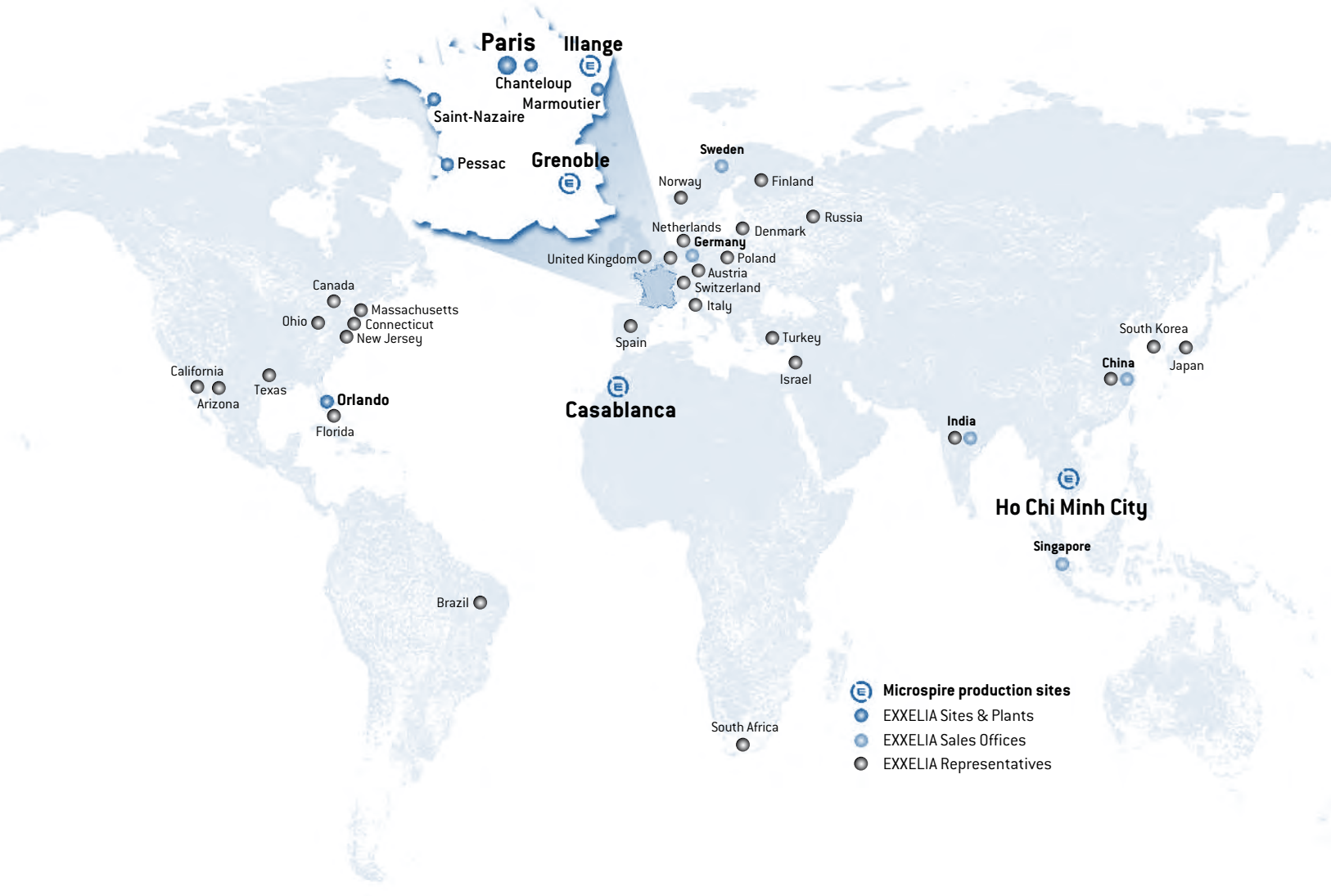
MICROSPIRE

EXXELIA

Wound Magnetics Technologies

MICROSPIRE
EXXELIA

A Worldwide presence



Specifications are subject to change without notice. All statements, information and data given herein are presented without guarantee, warranty or responsability of any kind, expressed or implied.

Summary

High Grade Technologies

High Grade Products

Standard Technologies

Standard Products

Built-to-Print

Engineering Support

Selection Guide

Standard Technologies

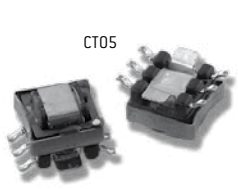
High Grade Technologies

COTS (Components Off The Shelves)

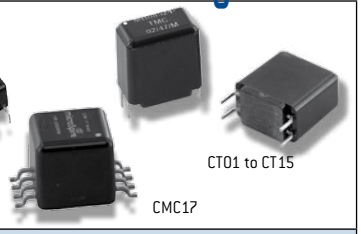
Power Magnetics

Power inductors
Common mode Choke (CMC)
Gate drive Transformers (GDT)
Current Transformers (CT)


CMESC17


CTO5

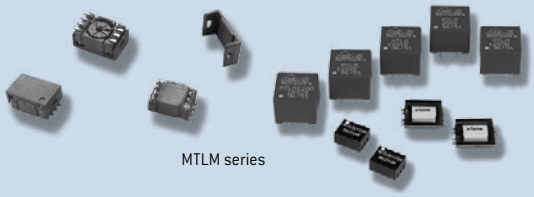
SESI 9.1 to 32


CTO1 to CT15

CMC17

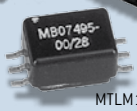
Line Matching Data RF

Chip inductors
Wide Band transformers
Data Interface Bus Transformers
Line matching transformers
Common mode chokes


MTLM series


MPCI series
WRTF 4x

MIL STD 1553
DBIT(A) series

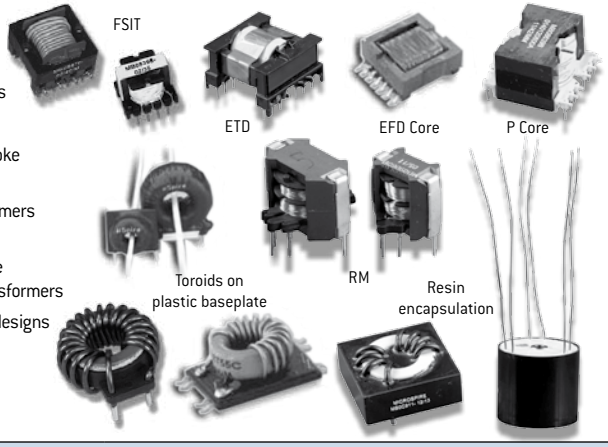

MTLM1234 mil


HCESC, DLEF42

CUSTOM

Switching Power supply < 500W

Power Transformers
Power inductors
Common mode Choke (CMC)
Gate drive Transformers (GDT)
Current and Voltage measurement transformers
High temperature designs Up to 210°C




SESI technology

TT technology molded toroids

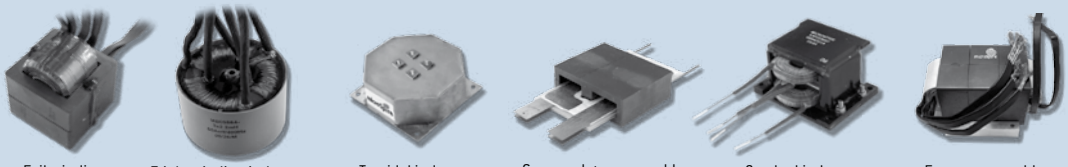

CCM technology


Winding toroids on ceramic substrate (HTCC, LTCC)


Planar PCB transformers

Medium Power

Power Transformers
Power inductors
Up to 600 A
Common mode Choke (CMC)



50-400Hz

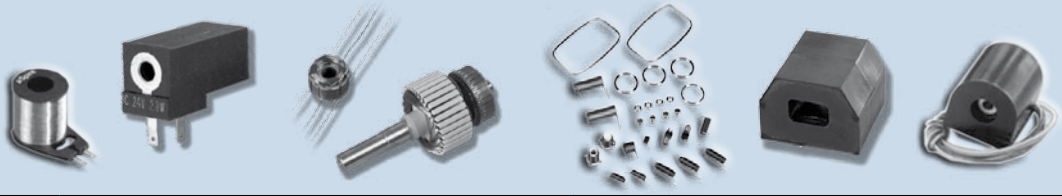
12 pulse transformers interphase inductors
current transformers


Aluminium Foil winding inductors and transformers

Double C laminated steel cores

Built-to-Print

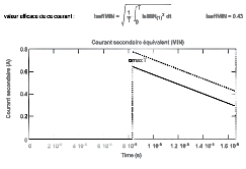
Bobbin actuators
Stators/rotors
Antennas
Position sensors

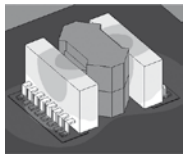


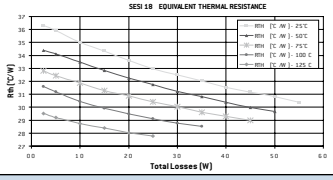
ENGINEERING SUPPORT

Mastering Design

Mathcad software design tools
Raw material or components obsolescence mamagement
Thermal simulations and Rth







Applications

SMPS transformers :
- Flyback
- forward
- push pull
- half bridge, full bridge

- Power inductors
- Common mode chokes
- PFC inductors
- Current and voltage transformers,....

- Parallel Multicellular Converters
- Integrated Magnetics
- 12 pulse transformers
- Interphase inductors

About Microspire

Microspire is an **Exxelia company. Exxelia** core competencies are the design and manufacturing of passive components including capacitors, filters, precision mechanics, precision potentiometers, slip rings and wound magnetics components (transformers, inductors, sensors) for high tech markets. **Microspire** has more than 35 years experience in the design, industrialization and manufacturing of magnetics for Space, Avionics, Defense, Oil&Gas, Medical, Railways and Industrial markets. **Microspire** has several production sites including a recently set up low COTS factory. **Microspire** can therefore offer the most competitive solution to the customer.

Microspire know how includes linear and toroidal winding standard technologies as well as specific technologies developed for demanding markets. **Microspire** has also a strong manufacturing heritage. The customer benefits of this know how for their built-to-print requests : **Microspire** actively work in partnership with the customer from prototype to production ramp. Both cots and custom products are available. The qualification of the technological innovation and the definition of the related design rules allow **Microspire** to offer cost effective optimized solutions.

Main advantages of the proposed designs are :

- Qualified technologies (shock, vibration, burn in tests),
- Strong Heritage well renowned with customers requiring high precision in harsh environment,
- Obsolescence management of materials and toolings,
- No Non Recurrent Cost for custom product in the qualified design.

Microspire has a highly skilled engineering team with good knowledge of the applications. The team works in partnership with the customers from the very beginning of their project through completion by using its expertise. **Microspire** continuously improves its understanding of the new power application architectures, strengthens its key competencies in magnetic component design by the utilization of software design tools and invests in research to continuously improve the customer support.

Quality System & Validation Capabilities

Microspire masters, fully implements and maintains all the main international and customer standards, specifications, regulations and requirements for the design, manufacture, inspection and testing of magnetic components and for EHS and quality management :

Space magnetics :

Europe : ESA : ESCC 3201 family of specifications, ESCC 20400, ESCC 20500, ESCC 23500

CNES : RNC-CNES-Q-ST-60102, RNC-CNES-Q-60103

USA - Japan : MIL-STD-981, MIL-PRF-27

Aeronautics and Military magnetics :

USA : MIL-STD-981, MIL-PRF-27, MIL-HDBK-1553, MIL-PRF-15305, MIL-PRF-21038, MIL-PRF-39010, MIL-PRF-83446.

Environmental conditions and tests :

Europe : EUROCAE ED-14, ,

USA : RTCA DO-160, MIL-STD-202.

Environment, health and safety :

EC 1907/2006 (REACH), 2002/95/EC (RoHS)

Microspire is manufacturing RoHS products by default. Non RoHS should be specifically requested.
Microspire maintains a comprehensive and up to date data base of all the chemicals to closely follow up the REACH status.

Quality management :

EN/AS9100 family of standards

Major aerospace customers standards.

Microspire know how

Cleaning procedure

The cleaning of the PCB boards is evolving from solvent (as isopropylic alcohol, ...) to highly alkaline water based cleaning medium.

Microspire has performed an extensive study to offer robust technologies withstanding these current cleaning processes. The qualification procedure has included thermal shocks, burn in and mechanical testings.

Microspire has defined gluing, marking, varnishing processes that allow the products to go through more than 5 cleaning cycles and operating up to 180°C.

Processes compliant to ESA and NASA outgassing standards have also been defined for products specified up to 140°C.

Wire integrity

Microspire has qualified specific processes to ensure wire integrity for a better insulation. The wire undergoes mechanical, chemical and thermal stresses during the winding and cabling process steps. **Microspire** has set up a dedicated process to reduce the impact of these manufacturing steps and improve the overall reliability of the wires and products.

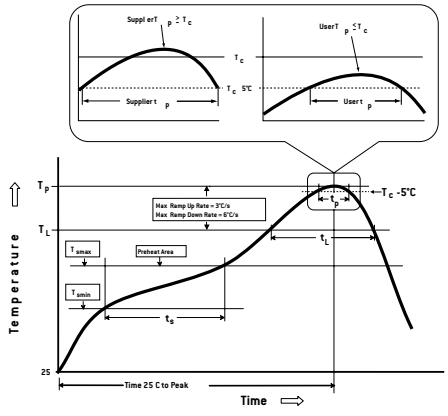
Finishing

Microspire offers several types of components : Surface Mounted Device, Through Hole or lead terminations products, system integrated components.

Packaging

Products are available on trays and, upon request, on reels for easy pick and place, ESD compliant

Microspire products offer components compliant to IPC/JEDEC standard J-STD-020 with T_P = 260°C and t_P = 30 seconds.



Selecting Microspire components you guarantee your customer to get :

- High quality product, high reliability,
- Excellent customer service - Flexibility,
  - OTD,
- Up to date technologies,
- Cost effective solutions,
- Benefits of the strong know how from design to manufacturing.

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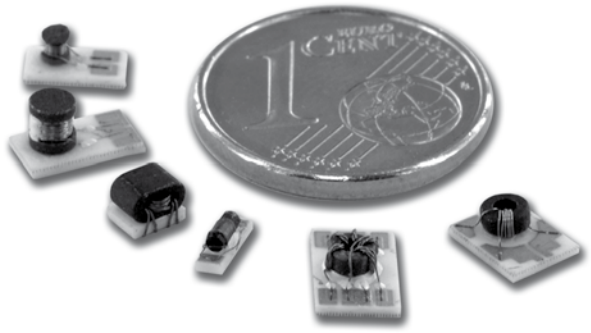
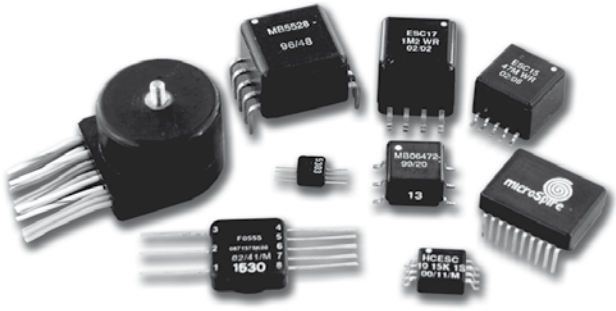
High Grade Technologies

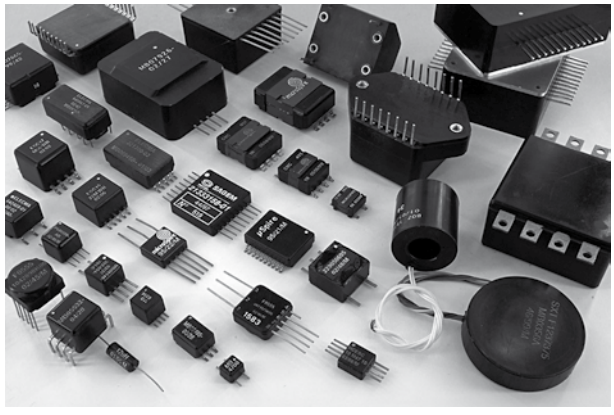
Custom Design Technologies

Hybrid Magnetics

These mini and micro wound toroids on ceramic substrates show an excellent Q factor as well as highly stable electrical and dimensional characteristics. They are delivered with either copper or gold terminations, ultra-thin wire down to 20 μm, bonded wire and their operating range is −55 °C to +125 °C.







Transfer-Molded Components

Our transfer-molded inductive components are designed to meet the most stringent space and military requirements. The transfer-molded, lead-frame with epoxy resin construction can withstand shock, moisture and vibration tests of MIL-T–55631 standard.

Main technology advantages :

- Improved Rth due to copper wire and magnetic core overmoulded
- Connections integrity and solderability
- Temperature range : –55°C +125°C (+190°C upon request)
- Material meet UL94-V0
- Possibility to have multiple electrical functions in the same casing (Common Mode Choke + Differential Mode Choke +...)

Main technology possibilities :

- Mechanical Inserts
- Custom standoff
- Pin through Hole or SMD connections or lead frame with hole or leaded wire connections
- Cold baseplate

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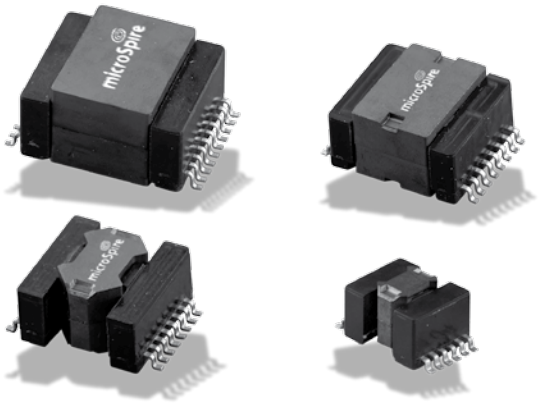


CCM Technology (Chameleon Concept Magnetics)

- Applied standards : MIL-STD202, ECSS-Q-70, DO-160D,
- Pick and place compatible
- Materials meet UL94-V0 rating
- Temperature range : –55°C + 125°C
- RoHS by default, non RoHS upon request
- Meets solderability tests per MIL-STD 202-Method 208
- Optional tape and reel packaging
- Space : Capability Approval running

Features

- Designed to withstand severe environment as space, avionics,
- Bobbin winding Technology using standard profiles (RM, EQ,..)
- Epoxy Transfer molding technology
- SMD package
- Multiple pins
- Ferrite core External assembly

Benefits

- Withstand high shocks and vibration (MIL STD 202 Method 213 & 204)
- Good repeatability of electrical characteristics, allow good regulation of multiple outputs power supply
- Higher power density up to + 30% compared to standard package
- Easy to pick and place
- Flexibility of use
- No stress on the Ferrite

Indicative Electrical Data (25°C)

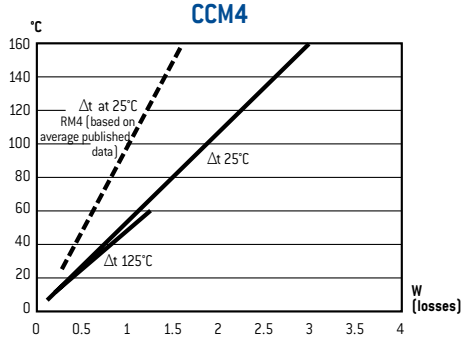
Platform	Inductor Range (I_{DC} + 20% ripple)	Transformer for SMPS *
CCM4	18mH/50mA → 3µH/6A	Up to 18W
CCM5	29mH/80mA → 4.2µH/8A	Up to 40W
CCM6	120mH/30mA → 3µH/10A	Up to 50W
CCM20	240mH/30mA → 2.6µH/21A	Up to 120W
CCM25	480mH/40mA → 4µH/25A	Up to 150W

* based on a push pull architecture, at f = 200kHz @85°C without cooling

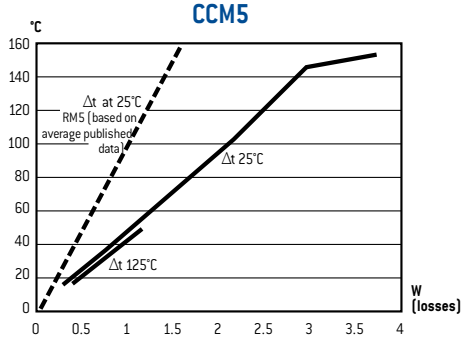
Overview of custom Electrical functions in this technology

- Common mode chokes
- PFC chokes
- Gate Drive transformers
- SMD filtering chokes
- Current transformers
- Flyback transformers
- Forward transformers
- Push-Pull transformers
- ...

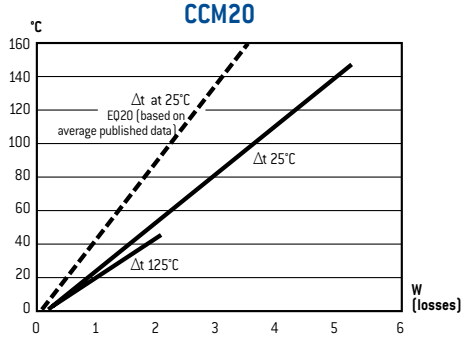
CCM4



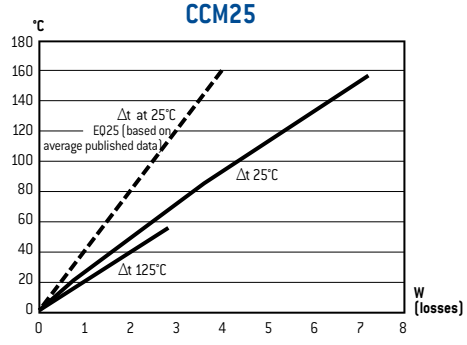
CCM5



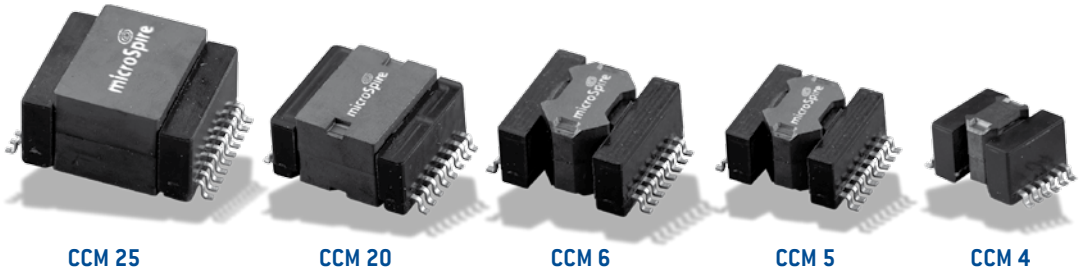
CCM20



CCM25

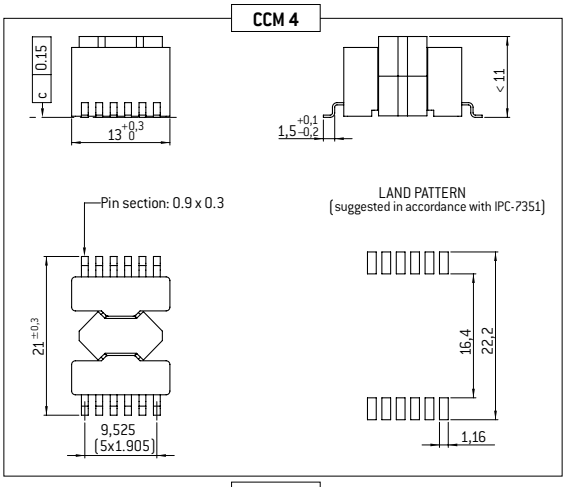


CCM Technology

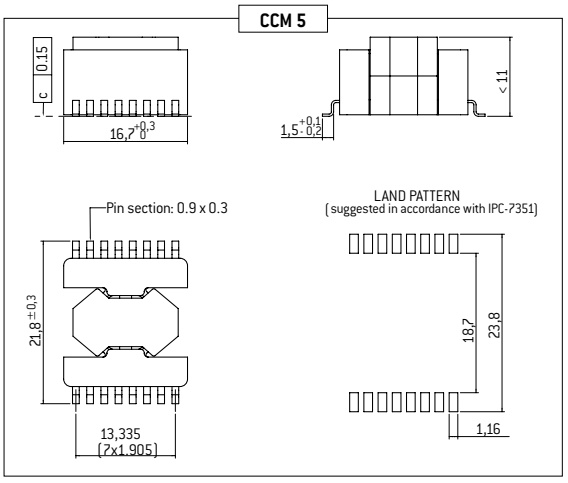


CCM 25 CCM 20 CCM 6 CCM 5 CCM 4

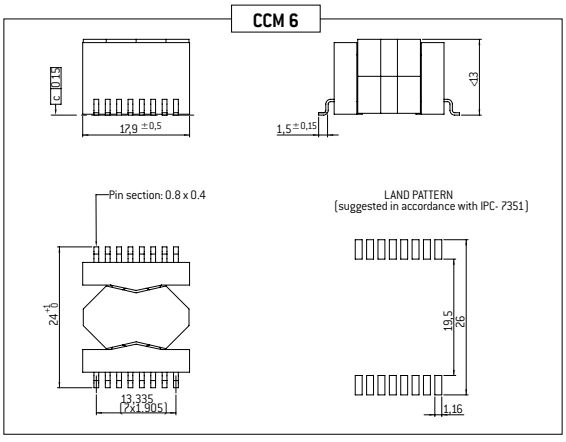
CCM 4



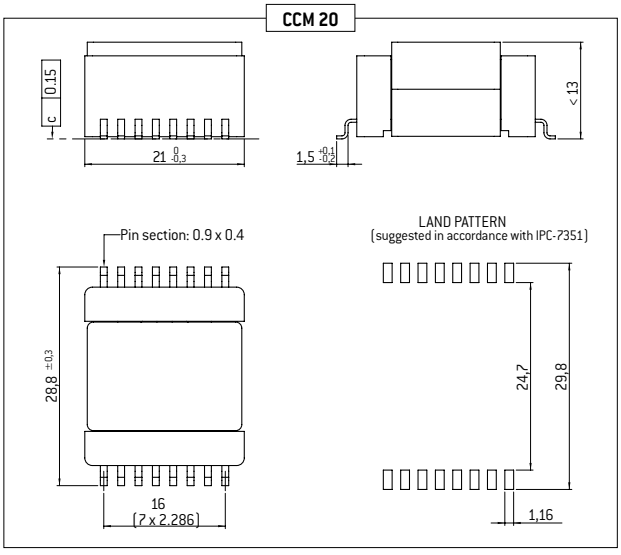
CCM 5



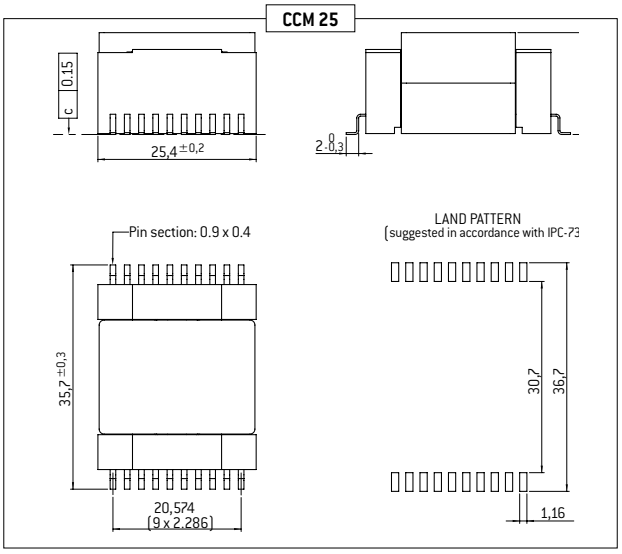
CCM 6



CCM 20



CCM 25



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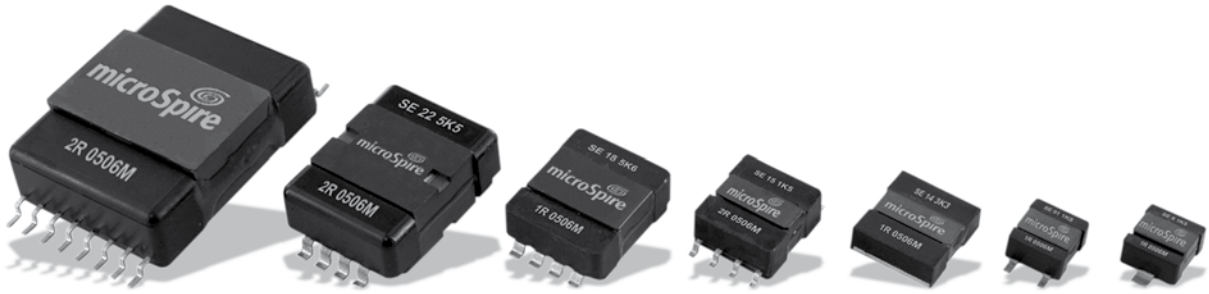
SESI Custom Technologies

Upon request our Engineers can design custom transformers and inductors in the standard SESI 9, 15, 18, 22 and 32 packages. These magnetics can be either surface mount or through-hole and can have up to 8 windings in the SESI 32 package.

This design approach offers faster response, no tooling cost and competitve prices because of low materials costs obtained from high-volume standard parts production.

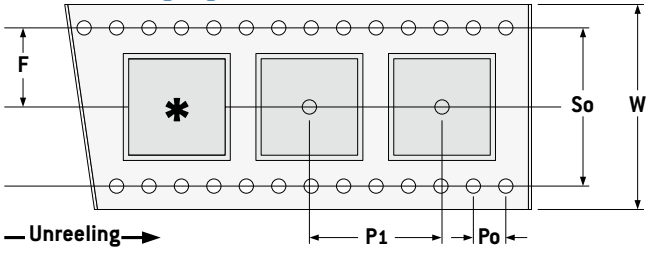


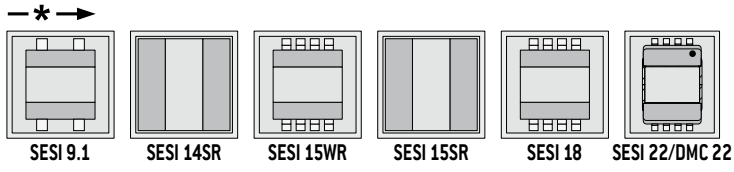
SESI 32 SESI 22 SESI 18 SESI 15 SESI 14 SESI 9.1 SESI 9

Tape and Reel Dimensions

Platform	F (mm)	P1 (mm)	Po (mm)	W (mm)	So (mm)	Rel Ø (mm)	N° pieces
SESI 9.1 / 9.2	11.5	16.0	4.0	24	none	330	700
SESI 14SR	11.5	20.0	4.0	24	none	330	400
SESI 15SR	11.5	20.0	4.0	24	none	330	400
SESI 15WR	20.2	20.0	4.0	44.0	40.4	330	400
SESI 18	20.2	24.0	4.0	44.0	40.4	330	300
SESI 22	26.2	36.0	4.0	56.0	52.4	330	100

Packaging

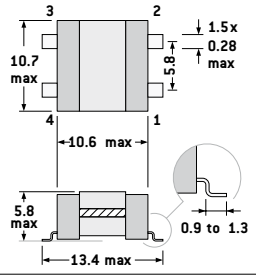




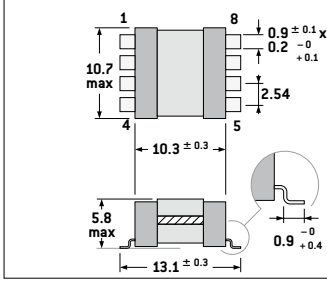
SESI 9.1 SESI 14SR SESI 15WR SESI 15SR SESI 18 SESI 22/DMC 22

SESI Custom Technologies

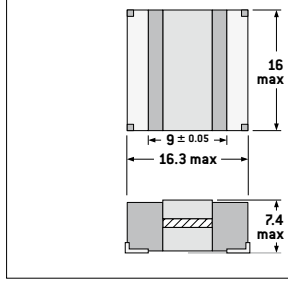
SESI 9.1



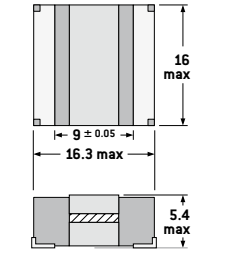
SESI 9.2



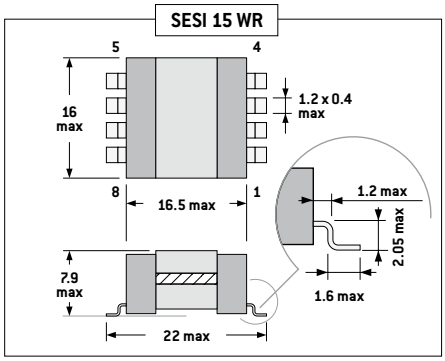
SESI 14



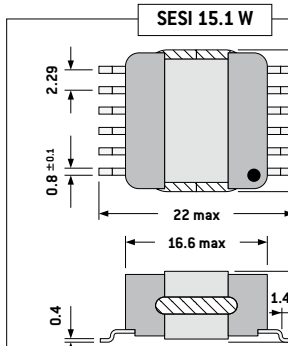
SESI 15 SR



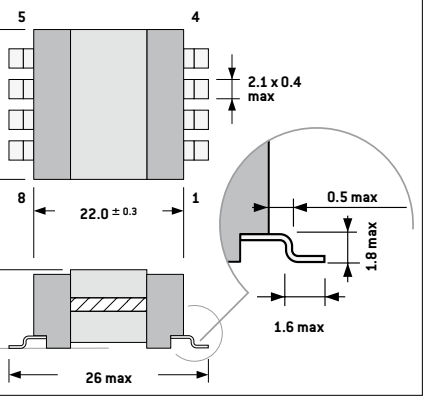
SESI 15 WR



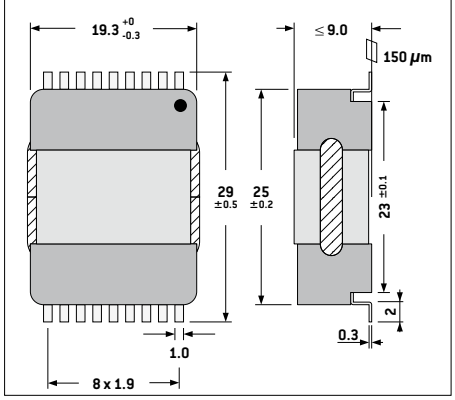
SESI 15.1 W



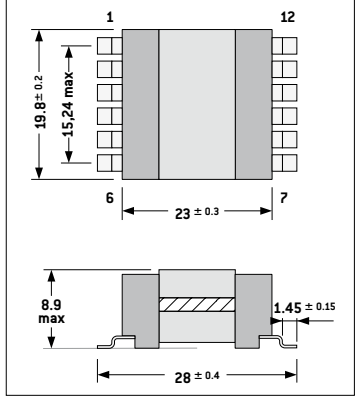
SESI 18 WR



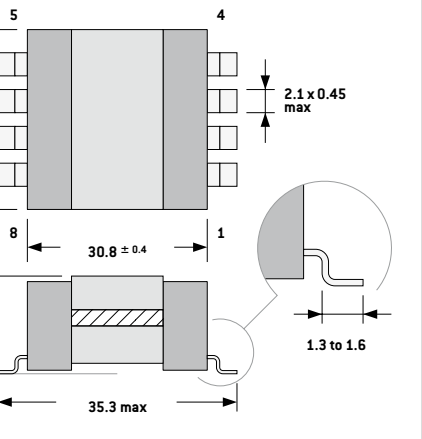
SESI 18.1 W



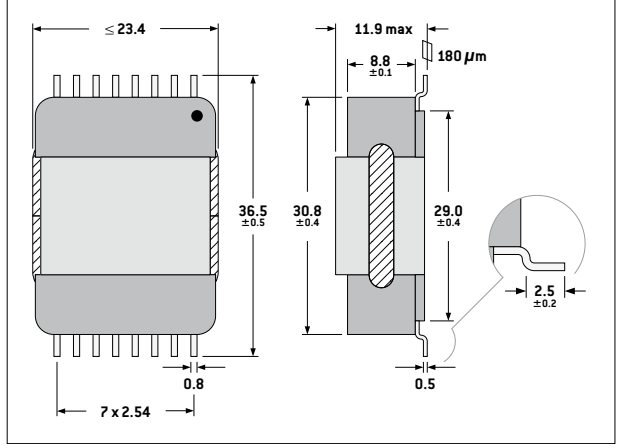
SESI 18.2 WR



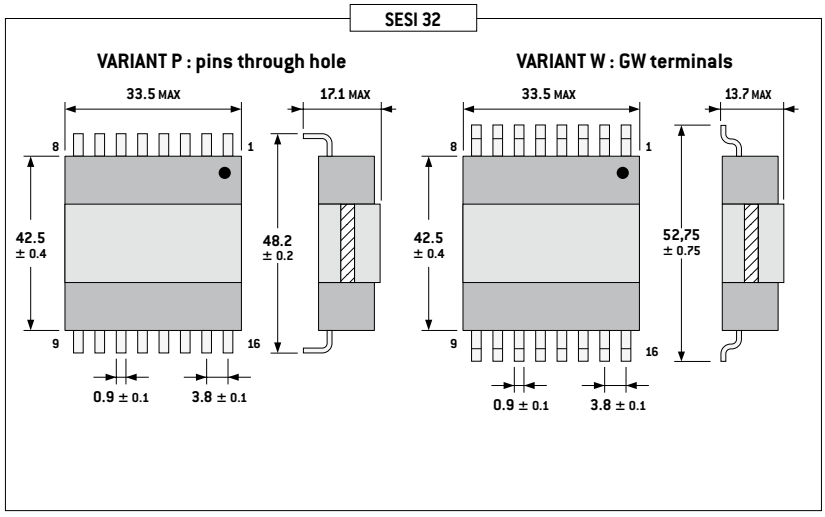
SESI 22 WR

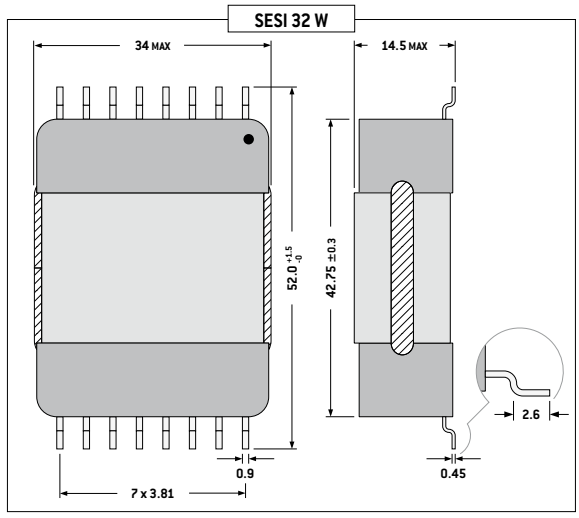


SESI 22.1 W



Custom packages with additional terminations



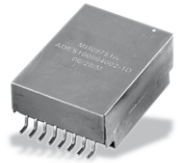


Shielded versions

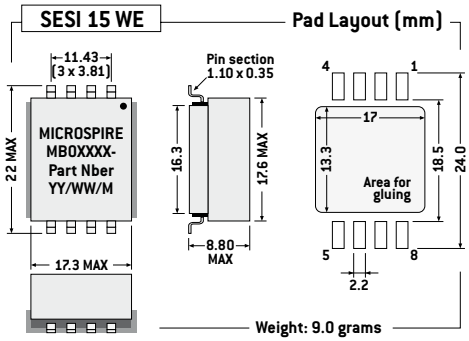
SESI 15 WE

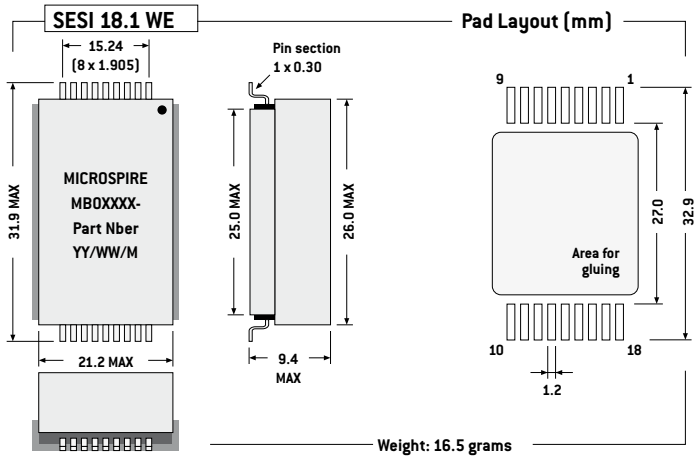
SESI 18.1 WE

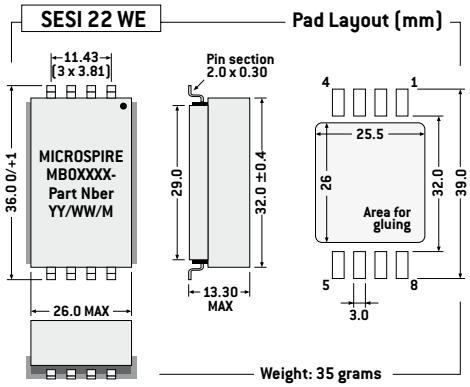
SESI 22 WE

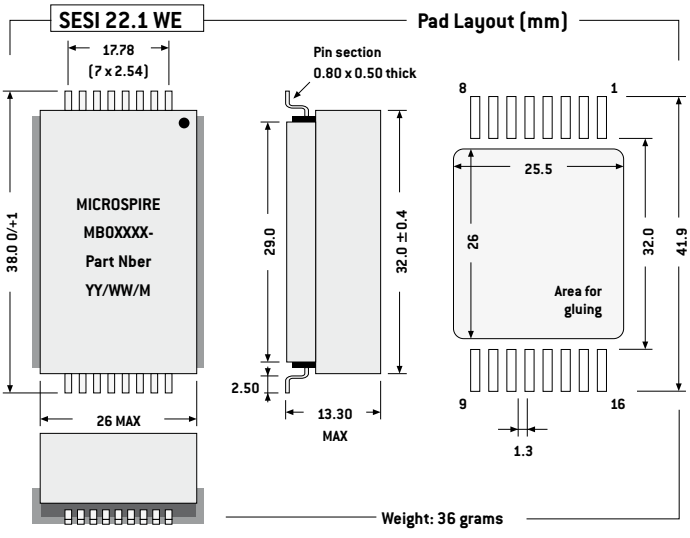


SESI 22.1 WE





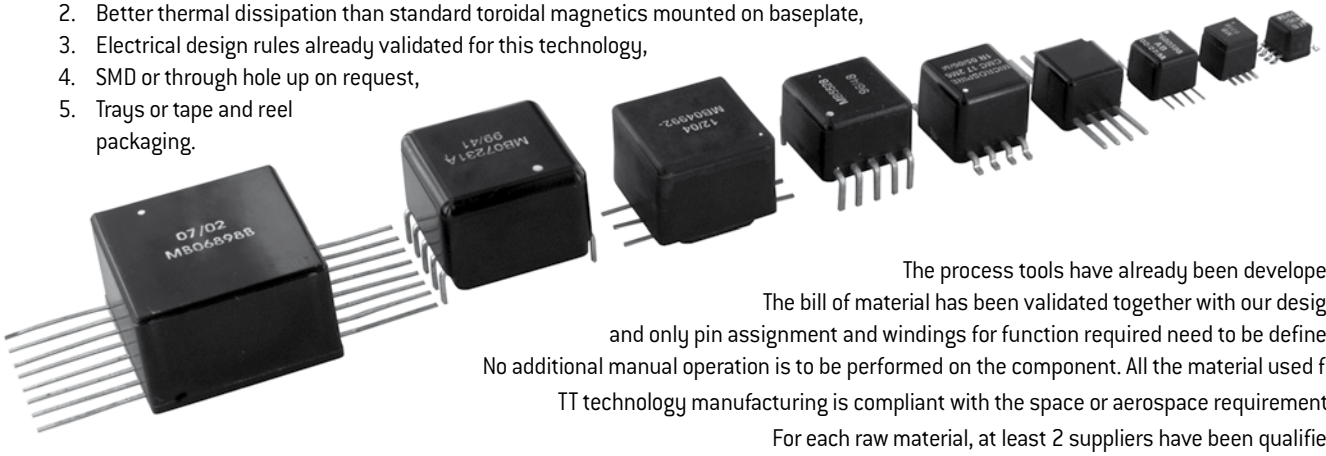




Toroidal Transfer Custom Magnetics

Toroidal **T**ransfer, the short time answer to your custom design with technology already qualified, without Non Recurent Cost

1. Strong space and aerospace history,
2. Better thermal dissipation than standard toroidal magnetics mounted on baseplate,
3. Electrical design rules already validated for this technology,
4. SMD or through hole up on request,
5. Trays or tape and reel packaging.



The process tools have already been developed.
The bill of material has been validated together with our design,
and only pin assignment and windings for function required need to be defined.
No additional manual operation is to be performed on the component. All the material used for TT technology manufacturing is compliant with the space or aerospace requirements.
For each raw material, at least 2 suppliers have been qualified.

All these packages have been undergoing to Microspire test programs:

1. Thermal shock, life tests, overload ;
2. Vibration and shock tests.

Technology characteristics

Operating/storage temperature: −55 °C/+125 °C

Soldering temperature: 260 °C (10s max)

Burn-in: +125 °C (+0/-3 °C) during 168H

Life test: +125 °C (+0/-3 °C) during 1000-2000H

Thermal shocks:
25-100 cycles −55 °C/+125 °C with 15 min/stage

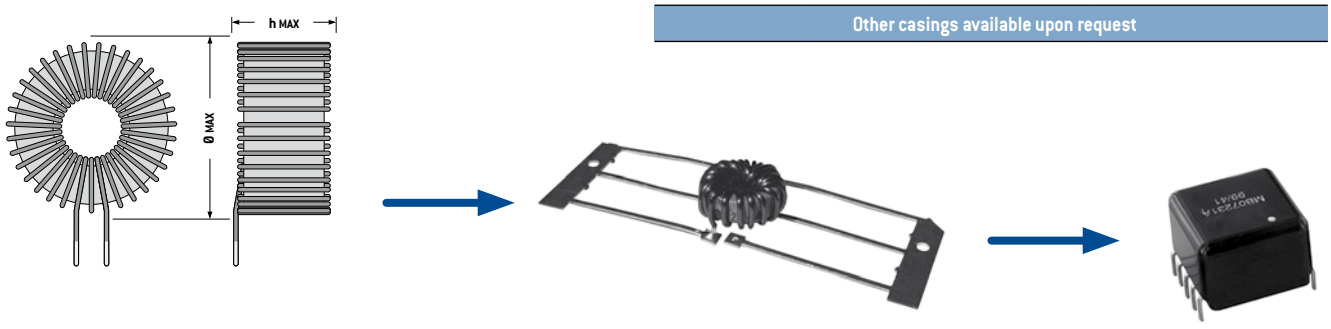
Moisture resistance: > in accordance to MIL-STD-202 method 106

Applied standards : ESCC 3201 generic specification for space products

Max dimensions of your custom toroidal core into TT technology

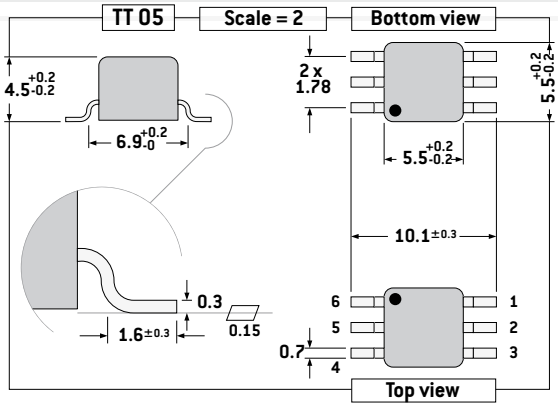
Platform	Pin number	Connections	Wound core dimensions (max in mm) Ø x h
TT 05	6	SMD	4.1 x 2.3
TT 07	8	J, SMD	5.6 x 5.3
TT 08	4	SMD, Through-hole	13.8 x 6.3
TT 09	12	SMD	6.9 x 4.7
TT 12	8	SMD	9.35 x 4.9
TT 14	8	SMD	11.3 x 8.9
TT 17	8	SMD	14.2 x 11.6
TT 19	8	SMD	16.3 x 11.1
TT 20	16	SMD	16.5 x 11.1
TT 25	16	SMD	21.8 x 10.2
TT 26	12	Through-hole	21.8 x 23
TT 29	10	Through-hole	23.8 x 13.9

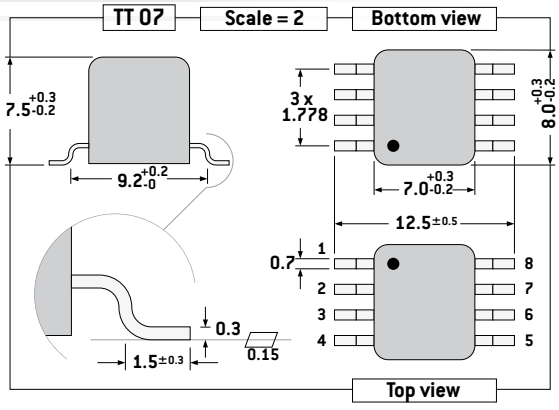
Other casings available upon request

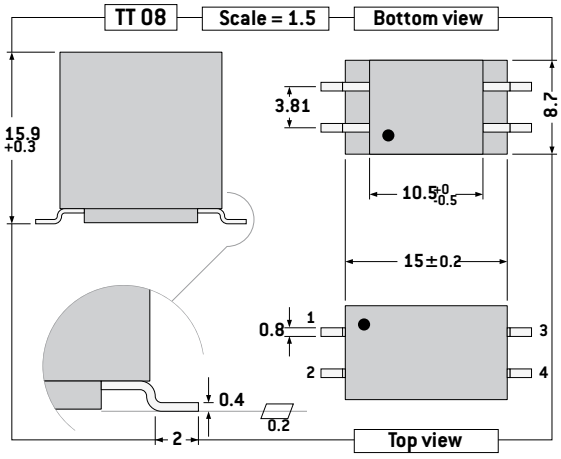


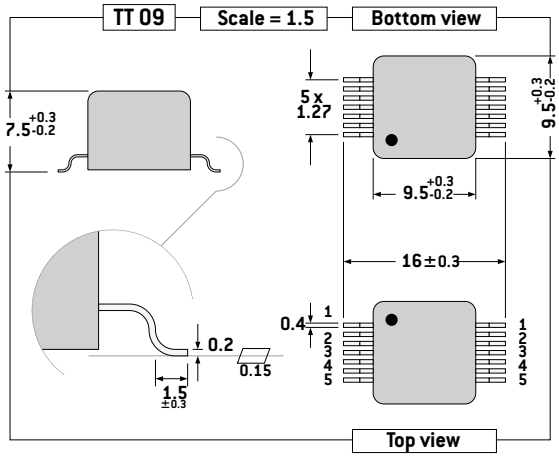
Standard functions in TT technology

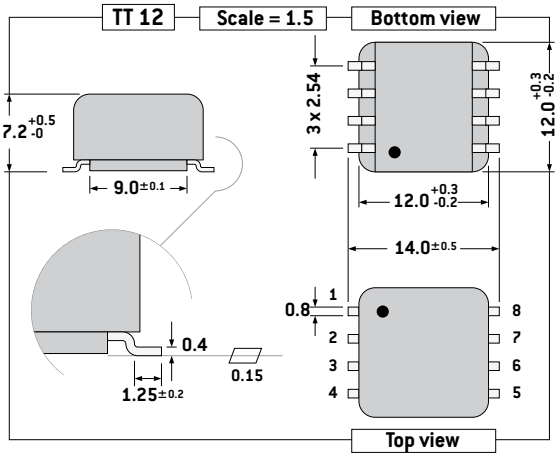
Casing	Standard functions	Family	Characteristics	
TT 05	Common mode chokes	DLEF42	-10dB @ 10MHz	-23dB @ 100MHz
TT 05	Wide band RF transformers	WRFT4x	50Ω : 50Ω	50Ω : 800Ω
TT 07	SMD energy storage inductors	ESI01	2,6µH / 2A	150µH / 0.25A
TT 08	Current Transformer	CT08	8A / 200kHz / 2%	-
TT 14	Common mode chokes	CMC14	140µH / 7.2A	2.2mH / 2.2A
TT 17	Common mode chokes	CMC17	0.45mH / 11.7A	69mH / 1.1A

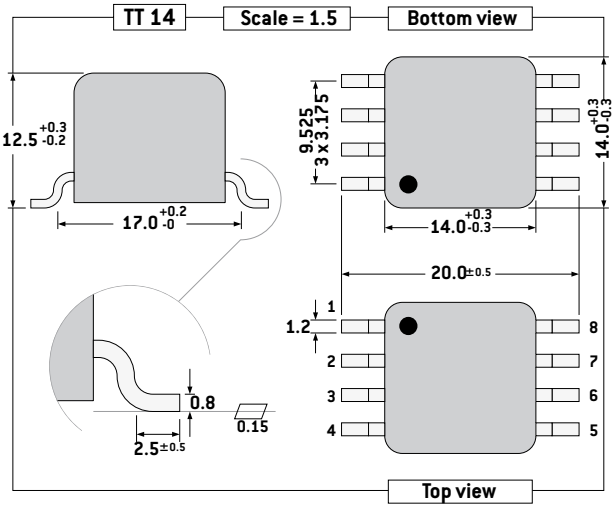

TT 05
Scale = 2
Bottom view
Top view

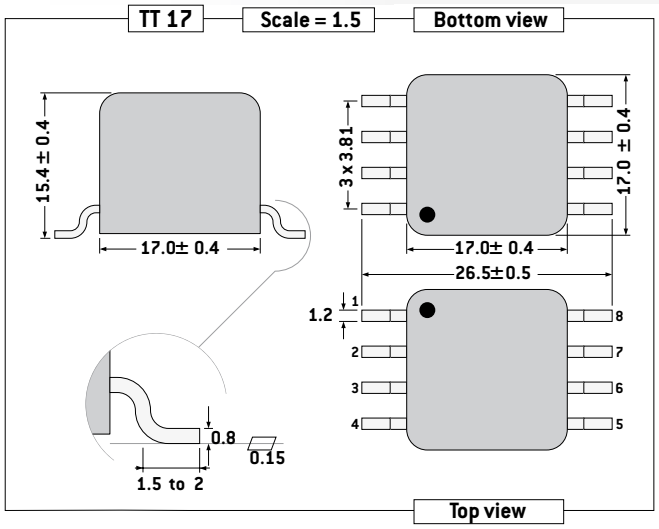

TT 07
Scale = 2
Bottom view
Top view

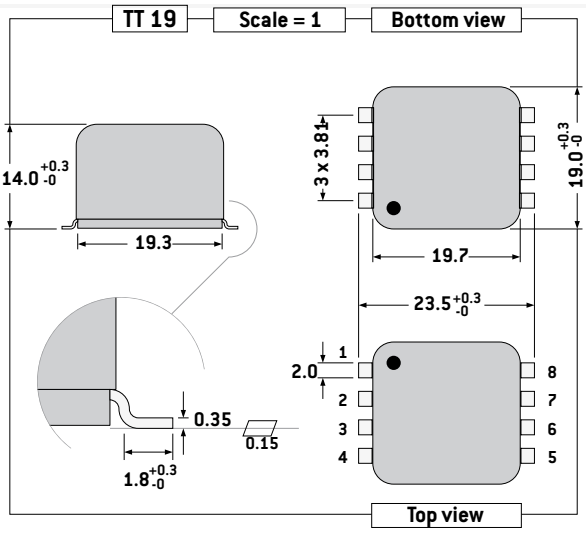

TT 08
Scale = 1.5
Bottom view
Top view

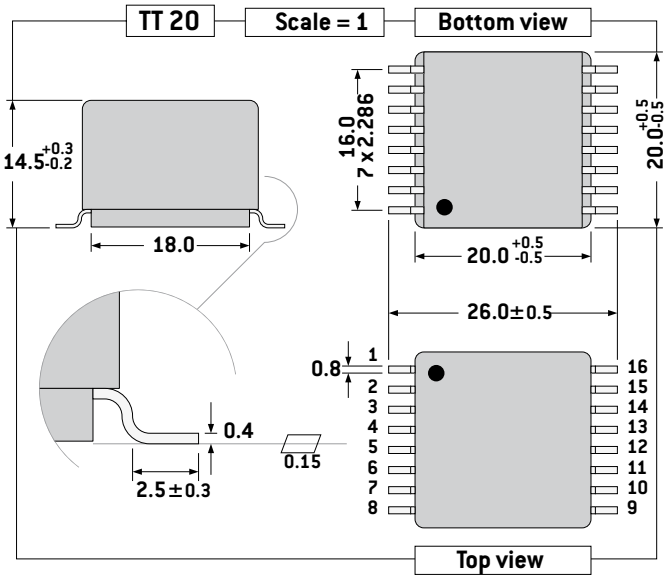

TT 09
Scale = 1.5
Bottom view
Top view

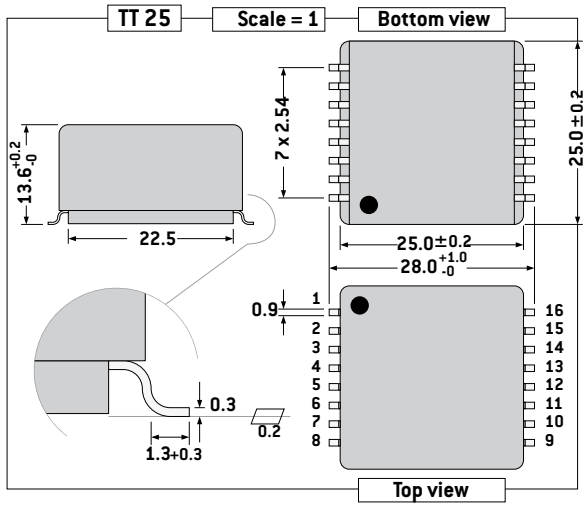

TT 12
Scale = 1.5
Bottom view
Top view

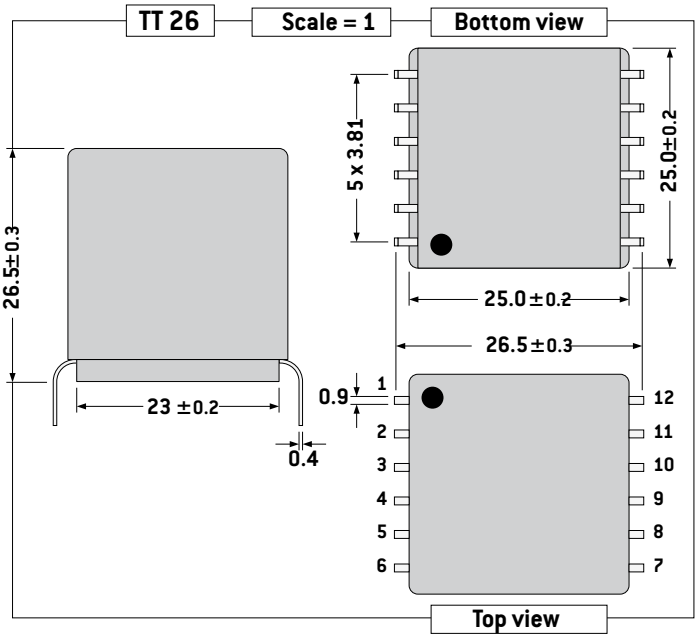

TT 14
Scale = 1.5
Bottom view
Top view

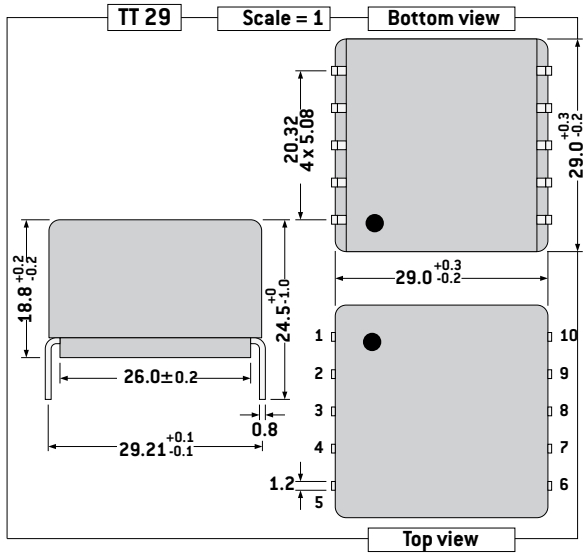

TT 17
Scale = 1.5
Bottom view
15.4 ± 0.4
17.0± 0.4
3 x 3.81
17.0 ± 0.4
17.0± 0.4
26.5±0.5
1.2
0.8
0.15
1.5 to 2
Top view


TT 19
Scale = 1
Bottom view
14.0 +0.3 -0
19.3
3 x 3.81
19.0 +0.3 -0
19.7
23.5 +0.3 -0
2.0
0.35
0.15
1.8 +0.3 -0
Top view

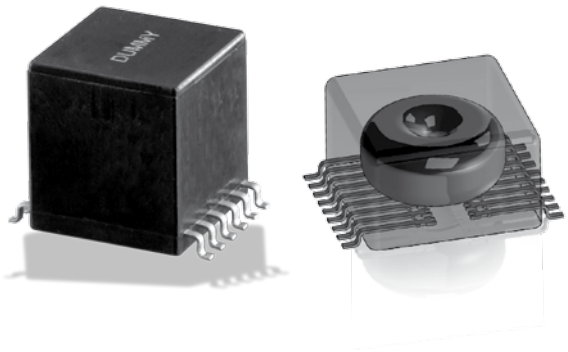

TT 20
Scale = 1
Bottom view
14.5 +0.3 -0.2
18.0
16.0
7 x 2.286
20.0 +0.5 -0.5
20.0 +0.5 -0.5
26.0±0.5
0.8
0.4
0.15
2.5±0.3
Top view


TT 25
Scale = 1
Bottom view
13.6 +0.2 -0
22.5
7 x 2.54
25.0±0.2
25.0±0.2
28.0 +1.0 -0
0.9
0.3
0.2
1.3+0.3
Top view


TT 26
Scale = 1
Bottom view
26.5±0.3
5 x 3.81
25.0±0.2
25.0±0.2
26.5±0.3
23 ±0.2
0.9
0.4
Top view


TT 29
Scale = 1
Bottom view
20.32
4 x 5.08
29.0 +0.3 -0.2
18.8 +0.2 -0.2
24.5 +0 -1.0
29.0 +0.3 -0.2
26.0±0.2
0.8
29.21 +0.1 -0.1
1.2
Top view

TO xx ASF Capability approval



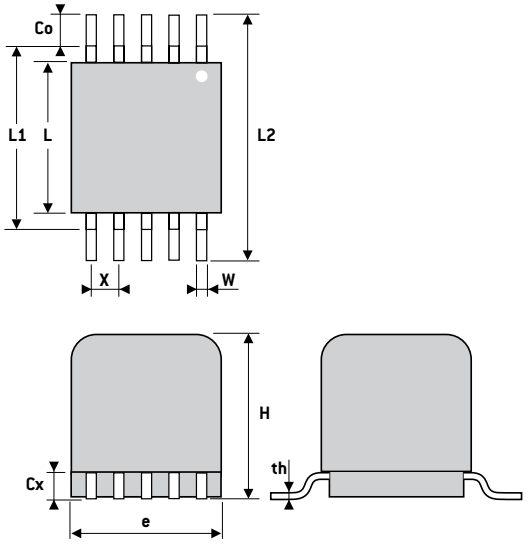
Technology characteristics

Outgassing compliance	:	TML< 1 % CVCM < 0.1 %
Operating temperature	:	–55 / +125°C
Thermal index	:	140°C to 180°C
Storage temperature	:	–55 / +140°C
Applied standards	:	ECSS-Q-70-02

Dimensions (mm)

Platform	L	L2	H	e	L1	X	Co	Cx	W x th	Nb pins
TO 10	10.5	17.0	11.5	10.5	13.0	2.032	2.0	1.75	0.7x0.3	2x5
TO 12	12.5	19.0	13.8	12.5	15.0	2.54	2.0	1.9	0.9x0.3	2x5
TO 16	16.0	22.5	17.6	16.0	18.5	2.54	2.0	2.0	0.9x0.3	2x6
TO 20	20.0	26.5	21.0	20.0	22.5	2.54	2.0	2.2	1.0x0.3	2x7
TO 25	25.4	32.4	25.4	25.4	28.0	2.54	2.0	2.4	1.0x0.4	2x9
TO 30	30.0	37.0	30.0	30.0	33.0	2.54	2.0	2.7	1.2x0.4	2x11
TO 36	36.0	43.0	36.0	36.0	39.0	2.54	2.0	3.0	1.2x0.4	2x12

Typical Dimensions (mm)



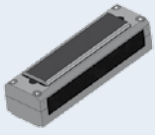
High Temperature Inductors and Transformers

Microspire has a long heritage in manufacturing High Temperature (HT) products withstanding up to 230°C.

The expertise in design and technologies was primarily developed for downhole applications which require high temperature and mechanically robust components. Products are withstanding high temperature, shocks and vibration.

- Continuous Operating Temperature up to 230°C.

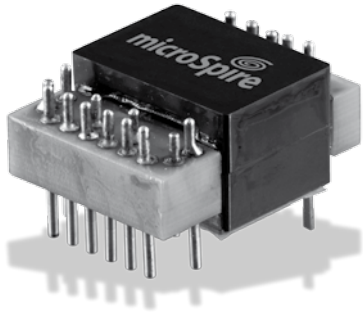
Overview of High Temperature

	Technology / Casing Platform	Applications	Operating Temperature Range (component temperature)	Examples of Microspire Heritage
	**MPCI233** **MPCI 233 H01**	RF Inductors Filtering inductors	– 55°C +175°C	For details see page 26 and 42
	**Toroidal Transfer Moulded**	Inductors & Transformers	– 55°C +200°C	Common Mode Choke 16 µH - 0.25 A, ...
	**HT SESI**	Inductors & Transformers	– 55°C +175°C	Filtering Inductors : 2 mH - 0.125 A 100 µH - 1.1 A ... Gate Drive Transformer,
	**Impregnated Bare Toroid**	Inductors & Transformers	– 40°C +200°C	Flyback up to 200 kHz with low iron losses, Forward, Current Sense Transformer, ...
	**Potted Toroid**	Inductors & Transformers	– 40°C +200°C	Transformers, ...
	**Metallic Bobbin**	SMPS transformers	– 40°C +190°C	Push Pull Transformers
	**Ceramics – HTCC**	Inductors & Transformers	– 55°C +230°C	Flyback, Filtering inductors Benefits : No pollution : chloride and sulfur free,
	**Cut core technology**	Inductors & Transformers	– 40°C +175°C	50/60 Hz transformers, inductors 100 H - 25 mA, ...

Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

High Grade Custom Planar Magnetics



- Low profile construction
- Best repeatability of electric parameters
- Low leakage inductance
- Easy to cool with heatsink
- Multiple Topologies
- High efficiency and reliability
- High insulation between windings
- Excellent thermal characteristics
- Dimensional accuracy
- Customized pin positions

Electrical Data

Transformers and inductors will be designed and manufactured for all types of SMPS within these characteristics

- Power rating : up to 10 kWatts
- Input voltage : 12 Vdc to 240 – 400 Vdc
- Output voltage : 3 Vdc to 60 Vdc
- Frequency range : 50 kHz to 1 MHz
- Typical efficiency : 96 - 99 %
- Temperature range : – 40 °C to + 125 °C
- Dielectric strength : up to 4000 V_{RMS}

SMPS Topologies

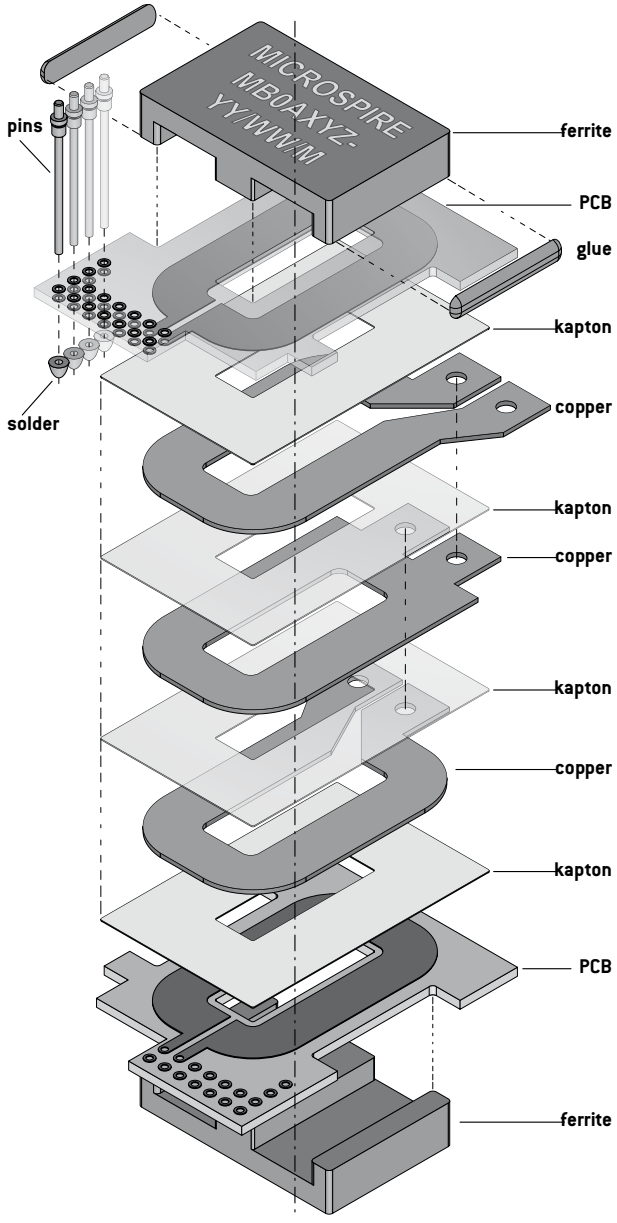
- Transformers : Full bridge, Half bridge, Push-pull, Forward, Flyback,
- Buck, Boost, output filtering inductors.

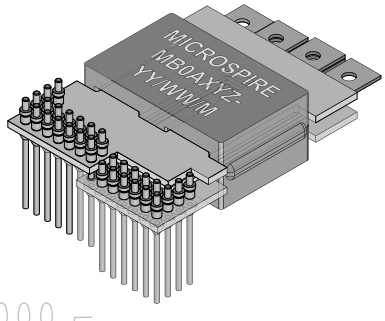
Construction

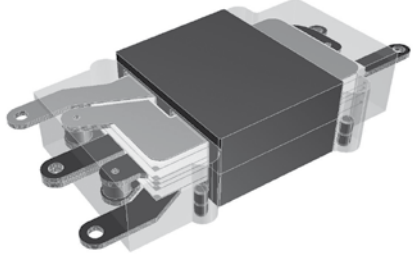
- Electrical circuit : Flat copper foil or spirals
- Multi-layer : up to 24 layers
- Multi-PCB : up to 5 boards
- Insulation : Kapton or Mylar
- Planar Core : E14 to E64 (E-E combination) ferrite
  PLT14 to PLT64 (E-PLT combination) ferrite
  RM4 / ILP to RM14 / ILP
- Cooling : heatsink or thermal pad
- Overmolding : epoxy resin
- Mechanical fixure : molded inserts

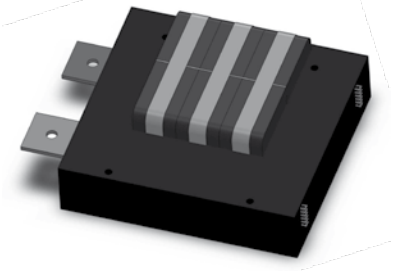
Mounting, Connections

Through-hole, SMD, strips for cable shoes, eyelet sleeved leads.









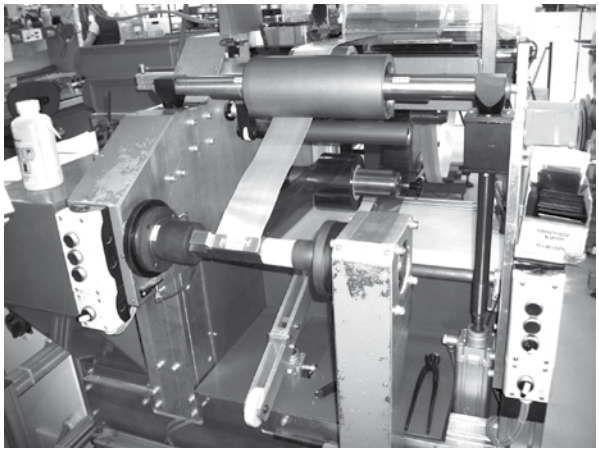
Aluminium and Copper Foil Technologies

MICROSPIRE has developed competencies and set up production means to design and manufacture medium power custom magnetic components with the Aluminium or Copper Foil technologies.

Design and manufacture of :

- Interphase Inductance and twelve pulse transformers,
- filtering chokes up to 400 A
- Active or Passive Power Factor Correction chokes
- Power Transformers up to several kW at f < 1 MHz for standard SMPS and specific architectures.

Materials and processing	Benefits
Anodized aluminium foil winding	Low weight No need for insulator, dielectric isolation between turns, up to 100 V Good heat transfer
Cold Press Welding	Quick process
Vacuum and Pressure Impregnation from 10 mbar up to 5 bar	High Electrical Insulation Mechanical strenght Varnish withstanding up to 200°C
Soldering	High Mechanical strength
Connections	Choice between several options : crimped nut, drilled copper bar, braid and lug



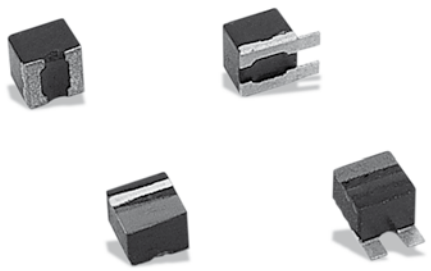
Winding process

Material	Microspire Experience			Machine capability
	Thickness (mm)	Width (mm)	Section (mm²)	Section (mm²)
Copper foil	1	100	100	200
Aluminium foil	1	110	110	200

Tel : + 33 (0) 3 82 59 13 33 www.exxelia.com
Specifications may change without prior notice - Revised 03/14

High Grade Products

Chip Inductors - MPCI 10000 Series



- esa qualified 3201/008 and in accordance to Mil Spec M83446/5
- Excellent Q values even at high frequencies
- Very high self-resonant frequencies (SFRs)
- Extremely stable inductance values from –55 °C to +125 °C
- With or without tab terminations
- Tin / lead (non RoHS) or gold plated (RoHS) terminations
- Frequency range: 7.9 MHz to 500 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 0.07 gram

Electrical Data (25°C)

ID Code	Inductance* µH	Q Min.	Q Typ.	Test Freq. MHz	SFR Min. MHz	DCR Max. Ω	DC Curr. mA max	Tol** %
MPCI 10 000 010	0.010	50	55	150	2000	0.025	750	10
MPCI 10 000 012	0.012	50	55	150	2000	0.025	750	
MPCI 10 000 015	0.015	50	55	150	1800	0.040	750	
MPCI 10 000 018	0.018	50	55	150	1500	0.040	750	
MPCI 10 000 022	0.022	45	50	100	1400	0.040	750	5-10
MPCI 10 000 027	0.027	45	50	100	1200	0.040	750	
MPCI 10 000 033	0.033	47	55	100	1200	0.050	640	
MPCI 10 000 039	0.039	47	55	100	1200	0.070	600	
MPCI 10 000 047	0.047	47	55	100	1000	0.080	550	
MPCI 10 000 056	0.056	47	55	100	900	0.090	520	
MPCI 10 000 068	0.068	47	55	100	900	0.10	480	
MPCI 10 000 082	0.082	47	55	100	750	0.11	470	
MPCI 10 000 100	0.100	47	55	50	700	0.11	470	10
MPCI 10 000 120	0.120	47	55	50	600	0.11	470	
MPCI 10 000 150	0.150	47	55	50	500	0.12	450	
MPCI 10 000 180	0.180	51	60	50	450	0.14	430	
MPCI 10 000 220	0.220	51	60	50	420	0.20	350	
MPCI 10 000 270	0.270	51	60	50	400	0.25	310	
MPCI 10 000 330	0.330	51	60	50	320	0.30	280	
MPCI 10 000 390	0.390	47	55	50	270	0.45	240	
MPCI 10 000 470	0.470	47	55	25	250	0.50	230	5-10
MPCI 10 000 560	0.560	52	60	25	200	0.55	220	
MPCI 10 000 680	0.680	52	60	25	180	0.58	210	
MPCI 10 000 820	0.820	52	60	25	150	0.60	200	5-10
MPCI 10 001 000	1.00	52	60	25	120	0.65	190	
MPCI 10 001 200	1.20	42	50	7.90	110	0.75	180	
MPCI 10 001 500	1.50	42	50	7.90	100	1.10	160	
MPCI 10 001 800	1.80	48	55	7.90	95	1.20	150	
MPCI 10 002 200	2.20	48	55	7.90	90	1.30	140	
MPCI 10 002 700	2.70	48	55	7.90	65	1.50	130	
MPCI 10 003 300	3.30	48	55	7.90	55	1.80	120	2
MPCI 10 003 900	3.90	48	55	7.90	45	2.00	110	5-10
MPCI 10 004 700	4.70	48	55	7.90	43	2.30	100	
MPCI 10 005 600	5.60	48	55	7.90	40	2.50	100	
MPCI 10 006 800	6.80	46	53	7.90	38	2.60	98	
MPCI 10 008 200	8.20	46	53	7.90	35	2.80	95	
MPCI 10 010 000	10.0	46	53	7.90	33	3.30	87	

* **Standard inductance tolerance: ± 10 %**

** Available tolerances.

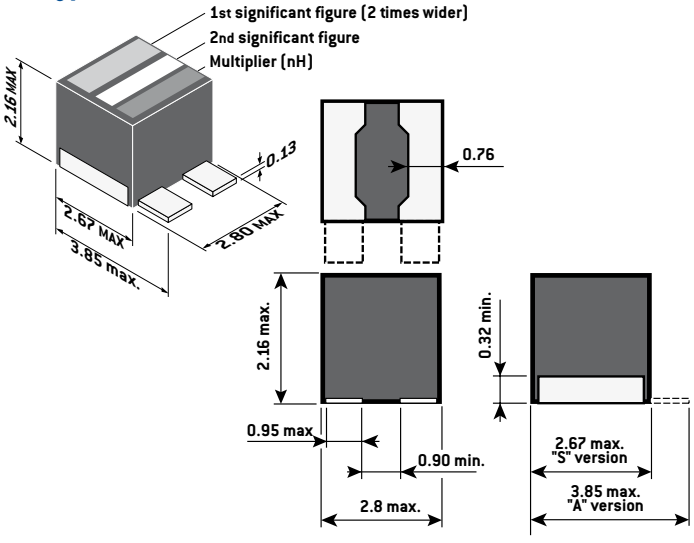
Other inductance values on request.

Inductance variation: 35 PPM/°C max. in the range 0.01 to 12 H
80 PPM/°C max. in the range 1.5 to 10 µH

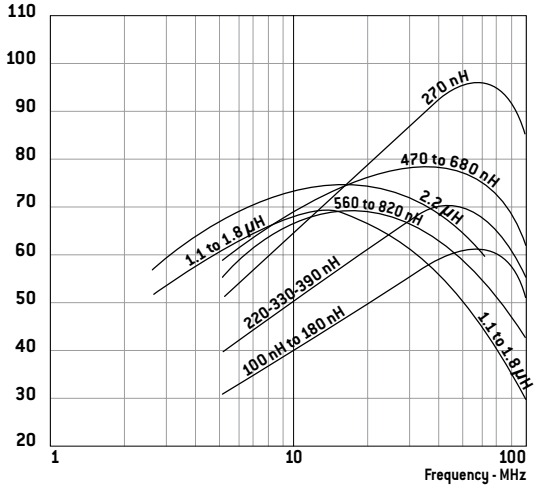
Packaging

Tape and Reel (with or without tab): 100 pieces min. up to 500 pieces
or Tray: 81 pieces without tab, 49 pieces with tab

Typical Dimensions (mm)



Q vs frequency



Miniature Chip Inductors MSCI 10000

esa QPL Components

MPCI 10000 series are usually installed on Military applications and breadboards for Space applications.
Since January 2003, Microspire has been manufacturing Radio Frequency Fixed Coils, MPCI 10000 series fulfilling ESA ESCC Generic specification N° 3201 and detail specification N° 3201/008.
This range is named MSCI (S for space applications).
This qualification approval includes final production tests Chart II, burn-in and electrical measurements to testing level B Chart III and qualification testing Chart IV.
For procurement, different quality levels are offered :

- Final production tests Chart II
- Burn-in and electrical measurements Chart III with level B or C (as required)
- Lot acceptance testing Chart V if required

Components delivered through this specification need to be processed and inspected in accordance with the Microspire Process Identification Document (P.I.D.).
Each component delivered is traceable to its production lot.
Max. 500 pieces per lots.

Cross reference chart

Microspire Non - QPL ID Code	Microspire QPL ID Code	ESA SCC Component Part Number	In accordance to MIL-PRx 83446 Part Number	
			* Tin lead (F) or * Gold lead (A) with tab	* Tin lead (F) or * Gold lead (A) without tab
MPCI 10 000 010 x y 10	MSCI 10 000 010 x y 10	3201008 aa b L010 K	M83446/5-01*	M83446/5-38*
MPCI 10 000 012 x y 10	MSCI 10 000 012 x y 10	3201008 aa b L012 K	M83446/5-02*	M83446/5-39*
MPCI 10 000 015 x y 10	MSCI 10 000 015 x y 10	3201008 aa b L015 K	M83446/5-03*	M83446/5-40*
MPCI 10 000 018 x y 10	MSCI 10 000 018 x y 10	3201008 aa b L018 K	M83446/5-04*	M83446/5-41*
MPCI 10 000 022 x y 10/5	MSCI 10 000 022 x y 10/5	3201008 aa b L022 K/J	M83446/5-05*	M83446/5-42*
MPCI 10 000 027 x y 10/5	MSCI 10 000 027 x y 10/5	3201008 aa b L027 K/J	M83446/5-06*	M83446/5-43*
MPCI 10 000 033 x y 10/5	MSCI 10 000 033 x y 10/5	3201008 aa b L033 K/J	M83446/5-07*	M83446/5-44*
MPCI 10 000 039 x y 10/5	MSCI 10 000 039 x y 10/5	3201008 aa b L039 K/J	M83446/5-08*	M83446/5-45*
MPCI 10 000 047 x y 10/5	MSCI 10 000 047 x y 10/5	3201008 aa b L047 K/J	M83446/5-09*	M83446/5-46*
MPCI 10 000 056 x y 10/5	MSCI 10 000 056 x y 10/5	3201008 aa b L056 K/J	M83446/5-10*	M83446/5-47*
MPCI 10 000 068 x y 10/5	MSCI 10 000 068 x y 10/5	3201008 aa b L068 K/J	M83446/5-11*	M83446/5-48*
MPCI 10 000 082 x y 10/5	MSCI 10 000 082 x y 10/5	3201008 aa b L082 K/J	M83446/5-12*	M83446/5-49*
MPCI 10 000 100 x y 10	MSCI 10 000 100 x y 10	3201008 aa b L10 K	M83446/5-13*	M83446/5-50*
MPCI 10 000 120 x y 10	MSCI 10 000 120 x y 10	3201008 aa b L12 K	M83446/5-14*	M83446/5-51*
MPCI 10 000 150 x y 10	MSCI 10 000 150 x y 10	3201008 aa b L15 K	M83446/5-15*	M83446/5-52*
MPCI 10 000 180 x y 10	MSCI 10 000 180 x y 10	3201008 aa b L18 K	M83446/5-16*	M83446/5-53*
MPCI 10 000 220 x y 10	MSCI 10 000 220 x y 10	3201008 aa b L22 K	M83446/5-17*	M83446/5-54*
MPCI 10 000 270 x y 10	MSCI 10 000 270 x y 10	3201008 aa b L27 K	M83446/5-18*	M83446/5–55*
MPCI 10 000 330 x y 10	MSCI 10 000 330 x y 10	3201008 aa b L33 K	M83446/5-19*	M83446/5-56*
MPCI 10 000 390 x y 10	MSCI 10 000 390 x y 10	3201008 aa b L39 K	M83446/5-20*	M83446/5-57*
MPCI 10 000 470 x y 10/5	MSCI 10 000 470 x y 10/5	3201008 aa b L47 K/J	M83446/5-21*	M83446/5-58*
MPCI 10 000 560 x y 10/5	MSCI 10 000 560 x y 10/5	3201008 aa b L56 K/J	M83446/5-22*	M83446/5-59*
MPCI 10 000 680 x y 10/5	MSCI 10 000 680 x y 10/5	3201008 aa b L68 K/J	M83446/5-23*	M83446/5-60*
MPCI 10 000 820 x y 10/5	MSCI 10 000 820 x y 10/5	3201008 aa b L82 K/J	M83446/5-24*	M83446/5-61*
MPCI 10 001 000 x y 10/5	MSCI 10 001 000 x y 10/5	3201008 aa b 1L0 K/J	M83446/5-25*	M83446/5-62*
MPCI 10 001 200 x y 10/5/2	MSCI 10 001 200 x y 10/5/2	3201008 aa b 1L2 K/J/G	M83446/5-26*	M83446/5-63*
MPCI 10 001 500 x y 10/5/2	MSCI 10 001 500 x y 10/5/2	3201008 aa b 1L5 K/J/G	M83446/5-27*	M83446/5-64*
MPCI 10 001 800 x y 10/5/2	MSCI 10 001 800 x y 10/5/2	3201008 aa b 1L8 K/J/G	M83446/5-28*	M83446/5-65*
MPCI 10 002 200 x y 10/5/2	MSCI 10 002 200 x y 10/5/2	3201008 aa b 2L2 K/J/G	M83446/5-29*	M83446/5-66*
MPCI 10 002 700 x y 10/5/2	MSCI 10 002 700 x y 10/5/2	3201008 aa b 2L7 K/J/G	M83446/5-30*	M83446/5-67*
MPCI 10 003 300 x y 10/5/2	MSCI 10 003 300 x y 10/5/2	3201008 aa b 3L3 K/J/G	M83446/5-31*	M83446/5-68*
MPCI 10 003 900 x y 10/5/2	MSCI 10 003 900 x y 10/5/2	3201008 aa b 3L9 K/J/G	M83446/5-32*	M83446/5-69*
MPCI 10 004 700 x y 10/5/2	MSCI 10 004 700 x y 10/5/2	3201008 aa b 4L7 K/J/G	M83446/5-33*	M83446/5-70*
MPCI 10 005 600 x y 10/5/2	MSCI 10 005 600 x y 10/5/2	3201008 aa b 5L6 K/J/G	M83446/5-34*	M83446/5-71*
MPCI 10 006 800 x y 10/5/2	MSCI 10 006 800 x y 10/5/2	3201008 aa b 6L8 K/J/G	M83446/5-35*	M83446/5-72*
MPCI 10 008 200 x y 10/5/2	MSCI 10 008 200 x y 10/5/2	3201008 aa b 8L2 K/J/G	M83446/5-36*	M83446/5-73*
MPCI 10 010 000 x y 10/5/2	MSCI 10 010 000 x y 10/5/2	3201008 aa b 100 K/J/G	M83446/5-37*	M83446/5-74*

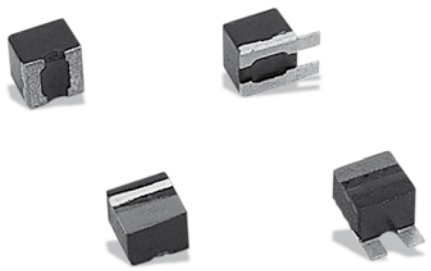
aa	b	K/J/G (tolerance)
aa = **01** for Au Termination aa = **02** for SnPb Termination	b = **B** for Chart III level B b = **C** for Chart III level C	**K** for ±10% **J** for ±5% **G** for ±2%

To Order

MPCI 10 ### ### x y z

MPCI	10	### ###	x	y	z
Radio Frequency Fixed Coils	Size	Inductance Value (nH) from 000 010 to 010 000	Terminations x = **G** for Gold x = **T** for SnPb	Terminations shape y = **S** without tab y = **A** with tab (Not valid for space use)	Tolerance : z = **10** ±10% z = **5** ±5% z = **2** ±2%

Chip Inductors - MPCI 12000 Series



- esa qualified 3201/008 and in accordance to Mil Spec M83446/6
- Excellent Q values even at high frequencies
- Very high self-resonant frequencies (SFRs)
- Extremely stable inductance values from –55 °C to +125 °C
- With or without tab terminations
- Tin / lead or gold plated terminations
- Frequency range: 790 KHz to 30 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 0.07 gram

Electrical Data (25°C)

ID Code	Inductance* µH	Q Min	Test Freq. MHz	SFR Min. MHz	DCR Max. Ω	DC Current mA max	Tol** %
MPCI 12 012 000	12	42	2.5	26	2.0	110	2 5-10
MPCI 12 015 000	15	44	2.5	24	2.2	105	
MPCI 12 018 000	18	44	2.5	21	2.8	100	
MPCI 12 022 000	22	48	2.5	20	3.5	85	
MPCI 12 027 000	27	49	2.5	19	4.3	75	
MPCI 12 033 000	33	50	2.5	14	5.5	68	
MPCI 12 039 000	39	52	2.5	12	6.5	61	
MPCI 12 047 000	47	53	2.5	11	8.5	54	
MPCI 12 056 000	56	56	2.5	10	12	46	
MPCI 12 068 000	68	53	2.5	9.0	13	42	
MPCI 12 082 000	82	49	2.5	8.0	15	40	
MPCI 12 100 000	100	49	2.5	7.0	18	36	
MPCI 12 120 000	120	37	0.79	6.0	21	34	5-10
MPCI 12 150 000	150	30	0.79	5.0	26	31	
MPCI 12 180 000	180	30	0.79	5.0	28	29	
MPCI 12 220 000	220	26	0.79	4.5	32	29	

ID Code	Inductance* µH	Q Min	Test Freq. MHz	SFR Min. MHz	DCR Max. Ω	DC Current mA max	Tol** %
MPCI 12 270 000	270	26	0.79	4.0	36	26	5-10
MPCI 12 330 000	330	24	0.79	3.7	42	24	
MPCI 12 390 000	390	24	0.79	3.5	46	23	
MPCI 12 470 000	470	24	0.79	3.0	68	19	
MPCI 12 560 000	560	22	0.79	2.8	77	18	
MPCI 12 680 000	680	20	0.79	2.5	85	17	
MPCI 12 820 000	820	16	0.79	2.0	100	16	
MPCI 12 1000 000	1000	12	0.79	1.5	120	15	

* **Standard inductance tolerance: ± 10 %**

** Available tolerances.

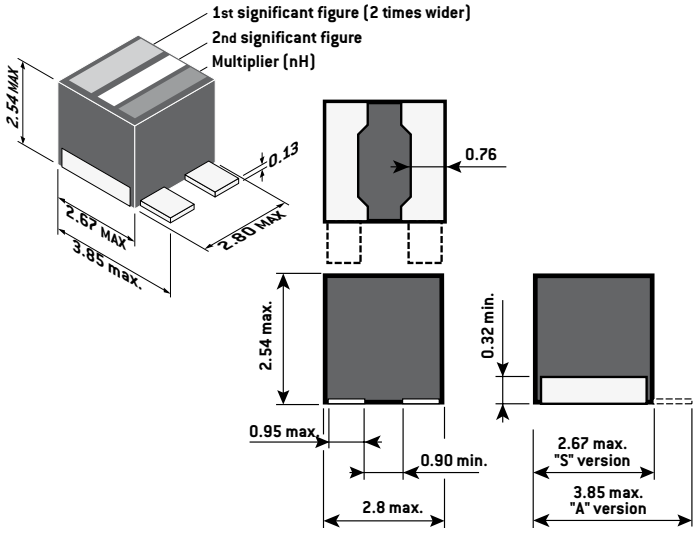
Other inductance values on request.

Inductance variation: 80 PPM/°C max. in the range 12 to 100 µH
35 PPM/°C max. in the range 120 to 1000 µH

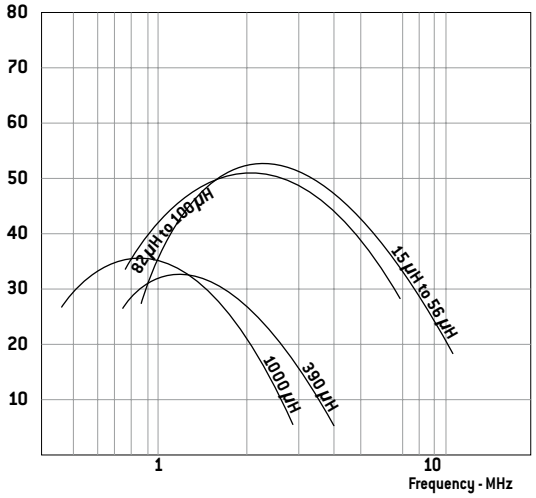
Packaging

Tape and Reel (with or without tab): 100 pieces min. up to 500 pieces
or Tray: 81 pieces without tab, 49 pieces with tab

Typical Dimensions (mm)



Q vs frequency



Miniature Chip Inductors MSCI 12000

esa QPL Components

MPCI 12000 series are usually installed on Military applications and breadboards for Space applications.

Since January 2003, Microspire has been manufacturing Radio Frequency Fixed Coils, MPCI 12000 series fulfilling ESA ESCC Generic specification N° 3201 and detail specification N° 3201/008.

This range is named MSCI (S for space applications).

This qualification approval includes final production tests Chart II, burn-in and electrical measurements to testing level B Chart III and qualification testing Chart IV.

For procurement, different quality levels are offered :

- Final production tests Chart II
- Burn-in and electrical measurements Chart III with level B or C (as required)
- Lot acceptance testing Chart V if required

Components delivered through this specification need to be processed and inspected in accordance with the Microspire Process Identification Document (P.I.D.).

Each component delivered is traceable to its production lot.

Cross reference chart

Microspire Non-QPL ID Code	Microspire QPL ID Code	ESA SCC Component Part Number	In accordance to MIL Spec M 83446/6 Part Number	
			Dash number With tabs	Dash number Without tab
MPCI 12 012 000 x y 10/5/2	MSCI 12 012 000 x y 10/5/2	3201008 aa b 120 K/J/G	M83446/06-01	M83446/06-25
MPCI 12 015 000 x y 10/5/2	MSCI 12 015 000 x y 10/5/2	3201008 aa b 150 K/J/G	M83446/06-02	M83446/06-26
MPCI 12 018 000 x y 10/5/2	MSCI 12 018 000 x y 10/5/2	3201008 aa b 180 K/J/G	M83446/06-03	M83446/06-27
MPCI 12 022 000 x y 10/5/2	MSCI 12 022 000 x y 10/5/2	3201008 aa b 220 K/J/G	M83446/06-04	M83446/06-28
MPCI 12 027 000 x y 10/5/2	MSCI 12 027 000 x y 10/5/2	3201008 aa b 270 K/J/G	M83446/06-05	M83446/06-29
MPCI 12 033 000 x y 10/5/2	MSCI 12 033 000 x y 10/5/2	3201008 aa b 330 K/J/G	M83446/06-06	M83446/06-30
MPCI 12 039 000 x y 10/5/2	MSCI 12 039 000 x y 10/5/2	3201008 aa b 390 K/J/G	M83446/06-07	M83446/06-31
MPCI 12 047 000 x y 10/5/2	MSCI 12 047 000 x y 10/5/2	3201008 aa b 470 K/J/G	M83446/06-08	M83446/06-32
MPCI 12 056 000 x y 10/5/2	MSCI 12 056 000 x y 10/5/2	3201008 aa b 560 K/J/G	M83446/06-09	M83446/06-33
MPCI 12 068 000 x y 10/5/2	MSCI 12 068 000 x y 10/5/2	3201008 aa b 680 K/J/G	M83446/06-10	M83446/06-34
MPCI 12 082 000 x y 10/5/2	MSCI 12 082 000 x y 10/5/2	3201008 aa b 820 K/J/G	M83446/06-11	M83446/06-35
MPCI 12 100 000 x y 10/5/2	MSCI 12 100 000 x y 10/5/2	3201008 aa b 101 K/J/G	M83446/06-12	M83446/06-36
MPCI 12 120 000 x y 10/5	MSCI 12 120 000 x y 10/5	3201008 aa b 121 K/J	M83446/06-13	M83446/06-37
MPCI 12 150 000 x y 10/5	MSCI 12 150 000 x y 10/5	3201008 aa b 151 K/J	M83446/06-14	M83446/06-38
MPCI 12 180 000 x y 10/5	MSCI 12 180 000 x y 10/5	3201008 aa b 181 K/J	M83446/06-15	M83446/06-39
MPCI 12 220 000 x y 10/5	MSCI 12 220 000 x y 10/5	3201008 aa b 221 K/J	M83446/06-16	M83446/06-40
MPCI 12 270 000 x y 10/5	MSCI 12 270 000 x y 10/5	3201008 aa b 271 K/J	M83446/06-17	M83446/06-41
MPCI 12 330 000 x y 10/5	MSCI 12 330 000 x y 10/5	3201008 aa b 331 K/J	M83446/06-18	M83446/06-42
MPCI 12 390 000 x y 10/5	MSCI 12 390 000 x y 10/5	3201008 aa b 391 K/J	M83446/06-19	M83446/06-43
MPCI 12 470 000 x y 10/5	MSCI 12 470 000 x y 10/5	3201008 aa b 471 K/J	M83446/06-20	M83446/06-44
MPCI 12 560 000 x y 10/5	MSCI 12 560 000 x y 10/5	3201008 aa b 561 K/J	M83446/06-21	M83446/06-45
MPCI 12 680 000 x y 10/5	MSCI 12 680 000 x y 10/5	3201008 aa b 681 K/J	M83446/06-22	M83446/06-46
MPCI 12 820 000 x y 10/5	MSCI 12 820 000 x y 10/5	3201008 aa b 821 K/J	M83446/06-23	M83446/06-47
MPCI 12 1000 000 x y 10/5	MSCI 12 1000 000 x y 10/5	3201008 aa b 102 K/J	M83446/06-24	M83446/06-48

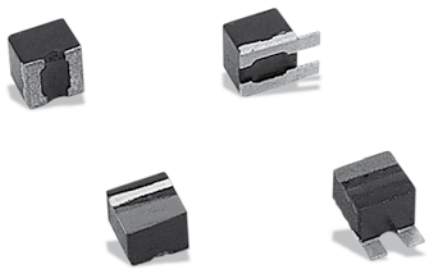
aa	b	K/J/G (tolerance)
aa = **01** for Au Termination	b = **B** for Chart III level B	**K** for ±10%
aa = **02** for SnPb Termination	b = **C** for Chart III level C	**J** for ±5%
		G for ±2%

To Order

MPCI 12 ### ### x y z

MPCI	12	######	x	y	z
Radio Frequency Fixed Coils	Size	Inductance Value (nH) from 012 000 to 1000 000	Terminations x = **G** for Gold x = **T** for SnPb	Terminations shape y = **S** without tab y = **A** with tab (Not valid for space use)	Tolerance : z = **10** for ±10% z = **5** for ±5% z = **2** for ±2%

Chip Inductors - MPCI 20000 Series



- esa qualified 3201/008 and in accordance to Mil Spec M83446/10
- Excellent Q values even at high frequencies
- Very high self-resonant frequencies (SFRs)
- Extremely stable inductance values from –55 °C to +125 °C
- With or without tab terminations
- Tin / lead or gold plated terminations
- Frequency range: 790 KHz to 500 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 0.15 gram

Electrical Data (25°C)

ID Code	Induct. µH	Q Min	Q Typ.	Test Freq. MHz	SFR Min. MHz	DCR Max. Ω	DC Curr. mA max	Tol %
MPCI 20 000 010	0.010	60	65	150	2000	0.04	1000	10
MPCI 20 000 012	0.012	70	82	150	1800	0.04	1000	
MPCI 20 000 015	0.015	75	87	150	1500	0.04	1000	
MPCI 20 000 018	0.018	75	87	150	1500	0.04	1000	
MPCI 20 000 022	0.022	60	65	100	1300	0.05	1000	
MPCI 20 000 027	0.027	60	70	100	1300	0.05	1000	
MPCI 20 000 033	0.033	60	70	100	1000	0.05	1000	
MPCI 20 000 039	0.039	60	70	100	1000	0.06	900	
MPCI 20 000 047	0.047	65	75	100	800	0.06	900	
MPCI 20 000 056	0.056	65	75	100	760	0.06	900	
MPCI 20 000 068	0.068	65	75	100	700	0.07	840	
MPCI 20 000 082	0.082	65	75	100	650	0.07	840	
MPCI 20 000 100	0.100	65	77	50	570	0.07	840	
MPCI 20 000 120	0.120	65	77	50	520	0.07	840	
MPCI 20 000 150	0.150	75	87	50	400	0.08	790	
MPCI 20 000 180	0.180	75	87	50	360	0.08	790	
MPCI 20 000 220	0.220	70	80	50	320	0.08	790	
MPCI 20 000 270	0.270	70	80	50	270	0.10	700	
MPCI 20 000 330	0.330	70	80	50	240	0.10	700	
MPCI 20 000 390	0.390	70	80	50	220	0.10	700	
MPCI 20 000 470	0.470	70	80	25	190	0.14	590	
MPCI 20 000 560	0.560	70	82	25	170	0.19	510	
MPCI 20 000 680	0.680	70	83	25	160	0.26	430	
MPCI 20 000 820	0.820	75	84	25	150	0.30	400	
MPCI 20 001 000	1.00	75	87	25	130	0.34	380	
MPCI 20 001 200	1.20	65	73	7.9	120	0.45	330	
MPCI 20 001 500	1.50	65	73	7.9	110	0.57	290	
MPCI 20 001 800	1.80	65	73	7.9	100	0.72	260	
MPCI 20 002 200	2.20	65	73	7.9	80	0.9	230	
MPCI 20 002 700	2.70	65	73	7.9	60	1.1	210	
MPCI 20 003 300	3.30	60	70	7.9	50	1.2	200	
MPCI 20 003 900	3.90	60	70	7.9	45	1.4	180	
MPCI 20 004 700	4.70	60	70	7.9	42	1.6	170	
MPCI 20 005 600	5.60	65	75	7.9	40	1.8	160	
MPCI 20 006 800	6.80	65	75	7.9	37	2.4	140	

ID Code	Induct. µH	Q Min	Q Typ.	Test Freq. MHz	SFR Min. MHz	DCR Max. Ω	DC Curr. mA max	Tol % Min
MPCI 20 008	8.20	65	75	7.9	34	3.0	130	10
MPCI 20 010 000	10.0	65	75	7.9	29	3.5	120	
MPCI 20 012 000	12.0	60	70	2.5	27	3.6	118	
MPCI 20 015 000	15.0	60	70	2.5	22	3.7	115	
MPCI 20 018 000	18.0	60	72	2.5	17	3.8	114	
MPCI 20 022 000	22.0	60	72	2.5	16	3.9	113	
MPCI 20 027 000	27.0	65	75	2.5	15	4.0	110	
MPCI 20 033 000	33.0	65	75	2.5	14	5.0	100	
MPCI 20 039 000	39.0	65	75	2.5	13	7.0	84	
MPCI 20 047 000	47.0	70	78	2.5	12	8.0	79	
MPCI 20 056 000	56.0	70	78	2.5	11	10.0	70	
MPCI 20 068 000	68.0	65	75	2.5	10	11.0	67	
MPCI 20 082 000	82.0	60	72	2.5	9	12.0	64	
MPCI 20 100 000	100.0	60	70	2.5	8	13.0	62	
MPCI 20 120 000	120.0	40	48	0.79	7	14.0	59	
MPCI 20 150 000	150.0	40	48	0.79	6	16.0	56	
MPCI 20 180 000	180.0	40	48	0.79	5	18.0	52	
MPCI 20 220 000	220.0	40	48	0.79	4	24.0	45	
MPCI 20 270 000	270.0	40	48	0.79	3.3	25.0	44	
MPCI 20 330 000	330.0	40	48	0.79	3.1	29.0	41	
MPCI 20 390 000	390.0	40	48	0.79	2.9	32.0	39	
MPCI 20 470 000	470.0	35	45	0.79	2.4	35.0	37	
MPCI 20 560 000	560.0	35	45	0.79	2.1	45.0	33	
MPCI 20 680 000	680.0	35	40	0.79	1.9	55.0	30	
MPCI 20 820 000	820.0	30	36	0.79	1.8	70.0	26	
MPCI 20 1000 000	1000.0	30	36	0.79	1.7	80.0	25	

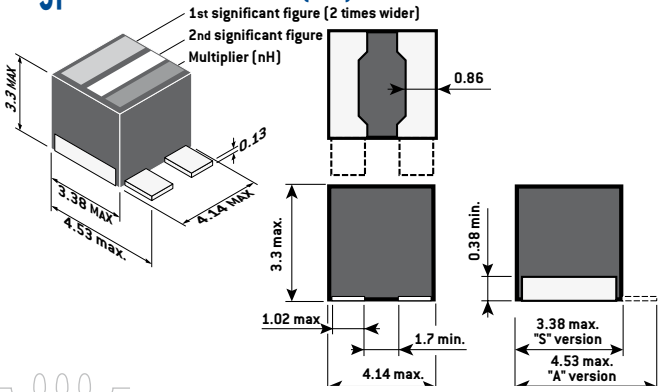
Other inductance values on request.

Inductance variation: 60 PPM/°C max. in the range 0.01 to 1 µH
80 PPM/°C max. in the range 1.2 to 10 µH
150 PPM/°C max. in the range 12 to 100 µH
300 PPM/°C max. in the range 120 to 1000 µH

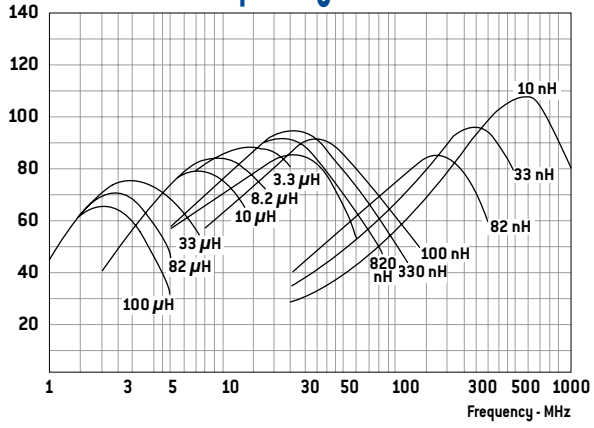
Packaging

Tape and Reel (with or without tab): 100 to 500 pieces
or Tray: 49 pieces

Typical Dimensions (mm)



Q vs frequency



Tel: + 33 (0) 3 82 59 13 33 www.exxelia.com
Specifications may change without prior notice - Revised 03/14

Miniature Chip Inductors MSCI 20000

esa QPL Components

MPCI 20000 series are usually installed on Military applications and breadboards for Space applications.
Since January 2003, Microspire has been manufacturing Radio Frequency Fixed Coils, MPCI 20000 series fulfilling ESA ESCC Generic specification N° 3201 and detail specification N° 3201/008.
This range is named MSCI (S for space applications).
This qualification approval includes final production tests Chart II, burn-in and electrical measurements to testing level B Chart III and qualification testing Chart IV.
For procurement, different quality levels are offered :

- Final production tests Chart II
- Burn-in and electrical measurements Chart III with level B or C (as required)
- Lot acceptance testing Chart V if required

Components delivered through this specification need to be processed and inspected in accordance with the Microspire Process Identification Document (P.I.D.).
Each component delivered is traceable to its production lot.

Cross reference chart

Microspire ID Code *MPCI (Non-QPL) * MSCI (QPL)	ESA SCC Component Part Number	In accordance to MIL-PRF-83446 Part Number	
		** Tin lead (F) or ** Gold lead (A) with tab	** Tin lead (F) or ** Gold lead (A) without tab
* 20 000 010 x y 10	3201008 aa b L010 K	M83446/10-01**	M83446/10-62**
* 20 000 012 x y 10	3201008 aa b L012 K	M83446/10-02**	M83446/10-63**
* 20 000 015 x y 10	3201008 aa b L015 K	M83446/10-03**	M83446/10-64**
* 20 000 018 x y 10	3201008 aa b L018 K	M83446/10-04**	M83446/10-65**
* 20 000 022 x y 10	3201008 aa b L022 K	M83446/10-05**	M83446/10-66**
* 20 000 027 x y 10	3201008 aa b L027 K	M83446/10-06**	M83446/10-67**
* 20 000 033 x y 10	3201008 aa b L033 K	M83446/10-07**	M83446/10-68**
* 20 000 039 x y 10	3201008 aa b L039 K	M83446/10-08**	M83446/10-69**
* 20 000 047 x y 10	3201008 aa b L047 K	M83446/10-09**	M83446/10-70**
* 20 000 056 x y 10	3201008 aa b L056 K	M83446/10-10**	M83446/10-71**
* 20 000 068 x y 10	3201008 aa b L068 K	M83446/10-11**	M83446/10-72**
* 20 000 082 x y 10	3201008 aa b L082 K	M83446/10-12**	M83446/10-73**
* 20 000 100 x y 10	3201008 aa b L10 K	M83446/10-13**	M83446/10-74**
* 20 000 120 x y 10	3201008 aa b L12 K	M83446/10-14**	M83446/10-75**
* 20 000 150 x y 10	3201008 aa b L15 K	M83446/10-15**	M83446/10-76**
* 20 000 180 x y 10	3201008 aa b L18 K	M83446/10-16**	M83446/10-77**
* 20 000 220 x y 10	3201008 aa b L22 K	M83446/10-17**	M83446/10-78**
* 20 000 270 x y 10	3201008 aa b L27 K	M83446/10-18**	M83446/10-79**
* 20 000 330 x y 10	3201008 aa b L33 K	M83446/10-19**	M83446/10-80**
* 20 000 390 x y 10	3201008 aa b L39 K	M83446/10-20**	M83446/10-81**
* 20 000 470 x y 10	3201008 aa b L47 K	M83446/10-21**	M83446/10-82**
* 20 000 560 x y 10	3201008 aa b L56 K	M83446/10-22**	M83446/10-83**
* 20 000 680 x y 10	3201008 aa b L68 K	M83446/10-23**	M83446/10-84**
* 20 000 820 x y 10	3201008 aa b L82 K	M83446/10-24**	M83446/10-85**
* 20 001 000 x y 10	3201008 aa b L10 K	M83446/10-25**	M83446/10-86**
* 20 001 200 x y 10	3201008 aa b 1L2 K	M83446/10-26**	M83446/10-87**
* 20 001 500 x y 10	3201008 aa b 1L5 K	M83446/10-27**	M83446/10-88**
* 20 001 800 x y 10	3201008 aa b 1L8 K	M83446/10-28**	M83446/10-89**
* 20 002 200 x y 10	3201008 aa b 2L2 K	M83446/10-29**	M83446/10-90**
* 20 002 700 x y 10	3201008 aa b 2L7 K	M83446/10-30**	M83446/10-91**
* 20 003 300 x y 10	3201008 aa b 3L3 K	M83446/10-31**	M83446/10-92**
* 20 003 900 x y 10	3201008 aa b 3L9 K	M83446/10-32**	M83446/10-93**
* 20 004 700 x y 10	3201008 aa b 4L7 K	M83446/10-33**	M83446/10-94**

Microspire ID Code *MPCI (Non-QPL) *MSCI (QPL)	ESA SCC Component Part Number	In accordance to MIL-PRF-83446 Part Number	
		** Tin lead (F) or ** Gold lead (A) with tab	** Tin lead (F) or ** Gold lead (A) without tab
* 20 005 600 x y 10	3201008 aa b 5L6 K	M83446/10-34**	M83446/10-95**
* 20 006 800 x y 10	3201008 aa b 6L8 K	M83446/10-35**	M83446/10-96**
* 20 008 200 x y 10	3201008 aa b 8L2 K	M83446/10-36**	M83446/10-97**
* 20 010 000 x y 10	3201008 aa b 100 K	M83446/10-37**	M83446/10-98**
* 20 012 000 x y 10	3201008 aa b 120 K	M83446/10-38**	M83446/10-99**
* 20 015 000 x y 10	3201008 aa b 150 K	M83446/10-39**	M83446/10-100**
* 20 018 000 x y 10	3201008 aa b 180 K	M83446/10-40**	M83446/10-101**
* 20 022 000 x y 10	3201008 aa b 220 K	M83446/10-41**	M83446/10-102**
* 20 027 000 x y 10	3201008 aa b 270 K	M83446/10-42**	M83446/10-103**
* 20 033 000 x y 10	3201008 aa b 330 K	M83446/10-43**	M83446/10-104**
* 20 039 000 x y 10	3201008 aa b 390 K	M83446/10-44**	M83446/10-105**
* 20 047 000 x y 10	3201008 aa b 470 K	M83446/10-45**	M83446/10-106**
* 20 056 000 x y 10	3201008 aa b 560 K	M83446/10-46**	M83446/10-107**
* 20 068 000 x y 10	3201008 aa b 680 K	M83446/10-47**	M83446/10-108**
* 20 082 000 x y 10	3201008 aa b 820 K	M83446/10-48**	M83446/10-109**
* 20 100 000 x y 10	3201008 aa b 101 K	M83446/10-49**	M83446/10-110**
* 20 120 000 x y 10	3201008 aa b 121 K	M83446/10-50**	M83446/10-111**
* 20 150 000 x y 10	3201008 aa b 151 K	M83446/10-51**	M83446/10-112**
* 20 180 000 x y 10	3201008 aa b 181 K	M83446/10-52**	M83446/10-113**
* 20 220 000 x y 10	3201008 aa b 221 K	M83446/10-53**	M83446/10-114**
* 20 270 000 x y 10	3201008 aa b 271 K	M83446/10-54**	M83446/10-115**
* 20 330 000 x y 10	3201008 aa b 331 K	M83446/10–55**	M83446/10-116**
* 20 390 000 x y 10	3201008 aa b 391 K	M83446/10-56**	M83446/10-117**
* 20 470 000 x y 10	3201008 aa b 471 K	M83446/10-57**	M83446/10-118**
* 20 560 000 x y 10	3201008 aa b 561 K	M83446/10-58**	M83446/10-119**
* 20 680 000 x y 10	3201008 aa b 681 K	M83446/10-59**	M83446/10-120**
* 20 820 000 x y 10	3201008 aa b 821 K	M83446/10-60**	M83446/10-121**
* 20 1000 000 x y 10	3201008 aa b 102 K	M83446/10-61**	M83446/10-122**

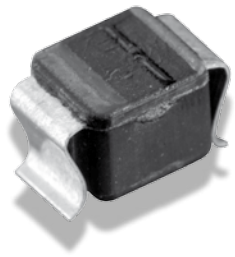
aa	b	K/J/G (tolerance)
aa = **03** for Au Termination aa = **04** for SnPb Termination	b = **B** for Chart III level B b = **C** for Chart III level C	**K** for ± 10% **J** for ± 5% **G** for ± 2%

To Order

MPCI 20 ### ### x y 10

MPCI	20	### ###	x	y	z
Radio Frequency Fixed Coils	Size	Inductance Value (nH) from 000 010 to 010 000	Terminations x = **T** for SnPb x = **G** for Gold	Terminations shape y = **S** without tab y = **A** with tab (Not valid for space use)	Tolerance : **10** for ± 10%

High Temperature Chip Inductors - MPCI 233 Series



- High temp. RF inductances
- Excellent Q values even at high frequencies
- Very high self-resonant frequencies (SFRs)
- Tinned or gold plated terminations
- Frequency range : 790 kHz to 500 MHz
- Operating temperature range : – 55 °C to + 175 °C
- Weight : 0.15 gram

Electrical Data (25°C)

ID Code	Inductance µH	Q Min	Test Freq. MHz	SFR Min. MHz	DCR Max. Ω	DC Current mA max	Tol %
MPCI 233 000 010	0.010	60	150	1000	0.04	1000	
MPCI 233 000 012	0.012	70	150	1000	0.04	1000	
MPCI 233 000 015	0.015	75	150	1000	0.04	1000	
MPCI 233 000 018	0.018	75	150	1000	0.04	1000	
MPCI 233 000 022	0.022	60	100	1000	0.05	1000	
MPCI 233 000 027	0.027	60	100	1000	0.05	1000	
MPCI 233 000 033	0.033	60	100	1000	0.05	1000	
MPCI 233 000 039	0.039	60	100	1000	0.06	900	
MPCI 233 000 047	0.047	65	100	800	0.06	900	
MPCI 233 000 056	0.056	65	100	760	0.06	900	
MPCI 233 000 068	0.068	65	100	700	0.07	840	
MPCI 233 000 082	0.082	65	100	650	0.07	840	
MPCI 233 000 100	0.100	65	50	570	0.07	840	
MPCI 233 000 120	0.120	65	50	520	0.07	840	
MPCI 233 000 150	0.150	75	50	400	0.08	790	
MPCI 233 000 180	0.180	75	50	360	0.08	790	
MPCI 233 000 220	0.220	70	50	320	0.08	790	
MPCI 233 000 270	0.270	70	50	270	0.10	700	
MPCI 233 000 330	0.330	70	50	240	0.10	700	
MPCI 233 000 390	0.390	70	50	220	0.10	700	10
MPCI 233 000 470	0.470	70	25	190	0.14	590	
MPCI 233 000 560	0.560	70	25	170	0.19	510	
MPCI 233 000 680	0.680	70	25	160	0.26	430	
MPCI 233 000 820	0.820	75	25	150	0.30	400	
MPCI 233 001 000	1.00	75	25	130	0.34	380	
MPCI 233 001 200	1.20	65	7.9	120	0.45	330	
MPCI 233 001 500	1.50	65	7.9	110	0.57	290	
MPCI 233 001 800	1.80	65	7.9	100	0.72	260	
MPCI 233 002 200	2.20	65	7.9	80	0.90	230	
MPCI 233 002 700	2.70	65	7.9	60	1.10	210	
MPCI 233 003 300	3.30	60	7.9	50	1.20	200	
MPCI 233 003 900	3.90	60	7.9	45	1.40	180	
MPCI 233 004 700	4.70	60	7.9	42	1.60	170	
MPCI 233 005 600	5.60	65	7.9	40	1.80	160	
MPCI 233 006 800	6.80	65	7.9	37	2.40	140	
MPCI 233 008 200	8.20	65	7.9	34	3.00	130	
MPCI 233 010 000	10.0	65	7.9	29	3.50	120	
MPCI 233 012 000	12.0	60	2.5	27	3.60	118	
MPCI 233 015 000	15.0	60	2.5	22	3.70	115	
MPCI 233 018 000	18.0	60	2.5	17	3.80	114	
MPCI 233 022 000	22.0	60	2.5	16	3.90	113	
MPCI 233 027 000	27.0	65	2.5	15	4.00	110	
MPCI 233 033 000	33.0	65	2.5	14	5.00	100	
MPCI 233 039 000	39.0	65	2.5	13	7.00	84	
MPCI 233 047 000	47.0	70	2.5	12	8.00	79	
MPCI 233 056 000	56.0	70	2.5	11	10.0	70	
MPCI 233 068 000	68.0	65	2.5	10	11.0	67	
MPCI 233 082 000	82.0	60	2.5	9	12.0	64	
MPCI 233 100 000	100	60	2.5	8	13.0	62	
MPCI 233 120 000	120	40	0.79	7	14.0	59	10
MPCI 233 150 000	150	40	0.79	6	16.0	56	
MPCI 233 180 000	180	40	0.79	5	18.0	52	
MPCI 233 220 000	220	40	0.79	4	24.0	45	
MPCI 233 270 000	270	40	0.79	3.3	25.0	44	
MPCI 233 330 000	330	40	0.79	3;1	29.0	41	
MPCI 233 390 000	390	40	0.79	2.9	32.0	39	
MPCI 233 470 000	470	35	0.79	2.4	35.0	37	
MPCI 233 560 000	560	35	0.79	2.1	45.0	33	
MPCI 233 680 000	680	35	0.79	1.9	55.0	30	
MPCI 233 820 000	820	30	0.79	1.8	70.0	26	
MPCI 233 1000 000	1000	30	0.79	1.7	80.0	25	

Other inductance values on request.

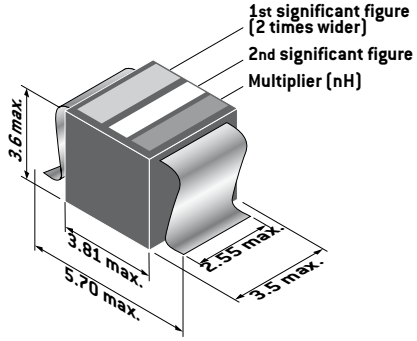
Inductance variation : 60 PPM / °C max. in the range 0.01 to 1 µH
80 PPM / °C max. in the range 1.2 to 10 µH
150 PPM / °C max. in the range 12 to 100 µH
300 PPM / °C max. in the range 120 to 1000 µH

To Order

MPCI 233 ### ### x 10

MPCI 233	### ###	x	y
Range	Inductance Value	Terminations x = **G** for Gold x = **T** for Tinned	Tolerance : **10** for ± 10%

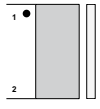
Typical Dimensions (mm)



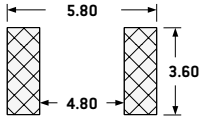
Packaging

Tray : 24 pieces / tray
Upon request : tape (lot 150 pieces) or tape & reel

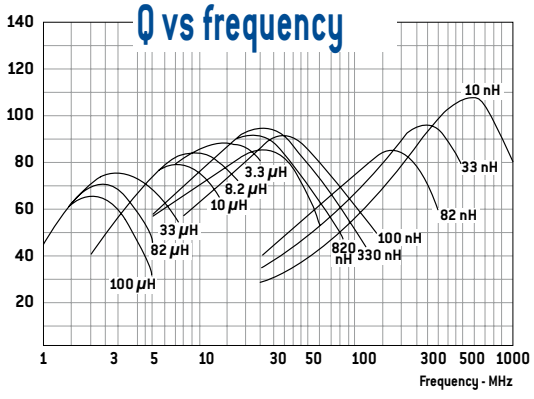
Connections



PCB Layout (suggested)



Q vs frequency



Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

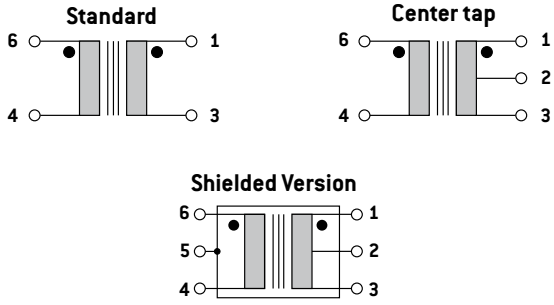
Wide Band RF Transformers - WRFT 4x Series

- Applied standards: ECSS-Q-ST-70-02C, MIL-STD-202, DO-160 and ESCC 3201 generic specification for space products
- Power input max. 250 mW
- Isolation prim. to sec. 500 V_{DC} minimum
- Suitable for IR and vapor reflow soldering
- SMD or through-hole cases
- Bandwidth: 100 KHz to 400 MHz
- Operating temperature –55 °C to +125 °C
- Weight: 1 gram
- Shielded version upon request

Electrical Data (25°C)

ID Code	Impedance ratio (Ω)	Bandwidth (MHz) 3 dB	2 dB	1 dB
WRFT41 1R0 1X	50 : 50	0.35 – 400	0.35 - 200	2 - 50
WRFT41 2R0 1X	50 : 100	0.30 - 300	0.5 - 250	2 - 230
WRFT42 2R0 1X	50 : 100 center tap	0.10 - 200	0.5 - 100	2 - 50
WRFT41 2R5 1X	50 : 125	0.10 - 100	0.1 - 50	0.1 - 20
WRFT41 4R0 1X	50 : 200	0.20 - 350	0.35 - 300	2 - 100
WRFT42 5R0 1X	50 : 250 center tap	0.30 - 300	0.6 - 200	0.5 - 100
WRFT42 8R0 1X	50 : 400 center tap	0.10 - 140	0.1 - 90	1 - 60
WRFT41 12R 1X	50 : 600	0.20 - 110	0.5 - 80	1 - 50
WRFT41 13R 1X	50 : 650	0.30 - 130	0.4 - 85	1 - 65
WRFT42 13R 1X	50 : 650 center tap	0.30 - 120	0.7 - 80	5 - 20
WRFT41 16R 1X	50 : 800	0.30 - 120	0.7 - 80	5 - 20
WRFT42 16R 1X	50 : 800 center tap	0.10 - 75	0.2 - 30	0.3 - 20

Connections

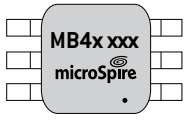


To Order

WRFT4 # ### 1x

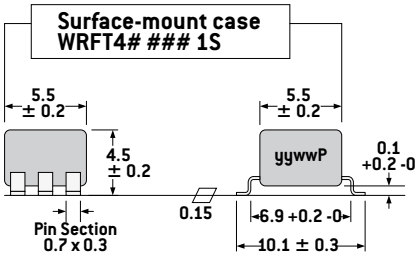
WRFT4	#	###	1	x
Range	1 = without center tap 2 = with center tap	Impedance ratio	Version	x = **S** surface mount x = **P** through hole x = **Q** Shielded

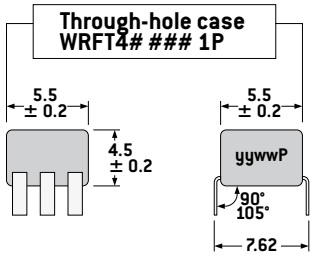
Marking

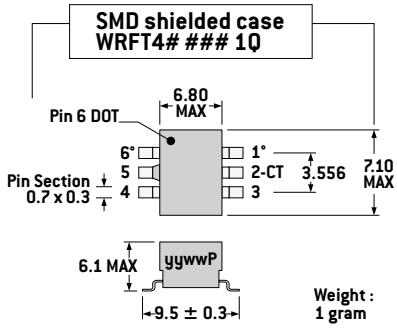


MB4x xxx:
Microspire part number
yyww : Date code

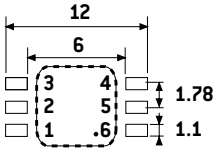
Typical Dimensions (mm)

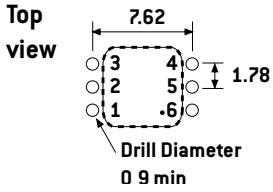


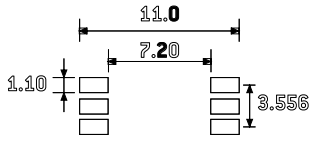




PCB Layout (suggested)







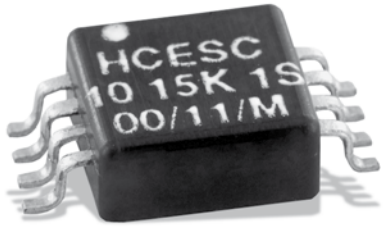
Applications

Impedance matching, DC isolation, balanced-unbalanced mixing, power splitting, coupling and signal inversion

Packaging

Individually packed in a 160 x 137 x 55 cardboard box.
40 parts on 2 layers

Common-Mode Chokes - HCESC Series



These common-mode chokes provide excellent attenuation of asymetric EMI on signal lines as well as in DC-DC converters, switch-mode power supplies and other high frequency applications

- Applied standards: ECSS-Q-ST-70-02C, MIL-STD-202, DO-160 and ESCC 3201 generic specification for space products
- Surface-mount and through-hole packages
- Suited for IR and vapor reflow soldering
- Frequency range up to 100 MHz
- Operation temperature range: –55 °C to + 125 °C
- Weight: 0.7 gram

Electrical Data (25°C)

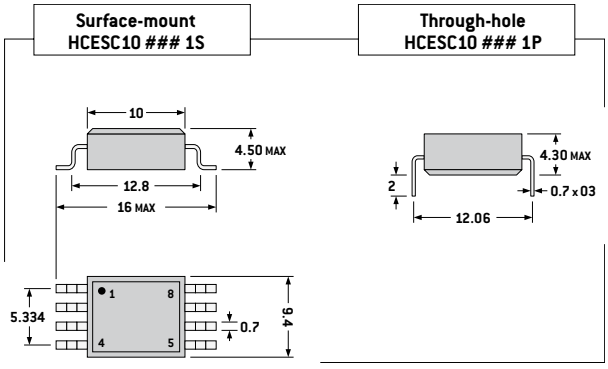
ID Code	Inductance (at 100kHz) µH	Rdc Max (at 80°C) mΩ	Impedance (at 100kHz) Ω	Rated Current max A	Isolation between windings Vrms	Max attenuation on 50Ω dB
HCESC10 15K 1x	15	15	115	2.5	1500	7 (10MHz)
HCESC10 56K 1x	56	55	350	1	1500	15 (8MHz)
HCESC10 M47 1x	470	400	440	0.4	1500	33 (5MHz)

To Order

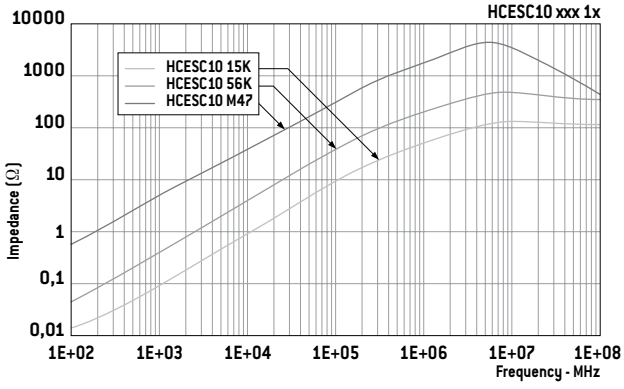
HCESC10 ### 1x

HCESC10	###	1	x
Range	Inductance Value	Version	x = **SR** for Surface mount x = **PR** for through hole

Typical Dimensions (mm)

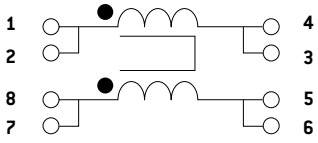


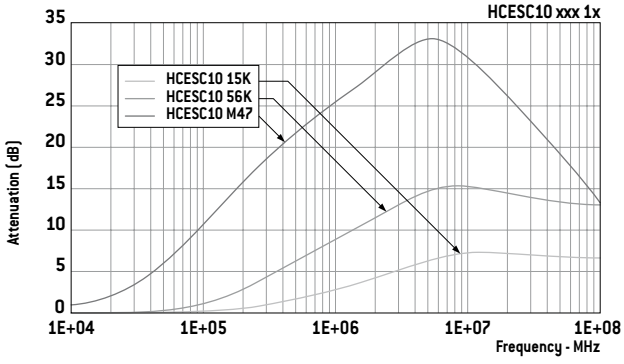
Response Curves



Typical Impedance versus Frequency (@100mV)

Connections





Typical Attenuation versus Frequency on 50 Ohms(@100mV)

Packaging

Individually packed in a 160 x 137 x 55 cardboard box.
40 parts on 2 layers

Data Line EMI Filters - DLEF 42 Series

These filters virtually eliminate conducted EMI in data lines. They provide excellent common-mode noise attenuation from 15 MHz to 300 MHz whilst passing data signals below 300 MHz without attenuation.

- Applied standards: ECSS-Q-ST-70-02C, MIL-STD-202, DO-160 and ESCC 3201 generic specification for space products
- Suited for IR and vapor reflow soldering
- Materials meet UL94-V0 rating
- Operation temperature range: – 55 °C to + 110 °C
- Weight: 1.5 gram

Electrical Data

ID Code	Number of lines	Max. Current mA	L/winding µH	RDC max mΩ	Isolation Vrms
DLEF42 020 1S	2	100	5	250	250

Application

Digital video signal filtering for CCD acquisition

To Order

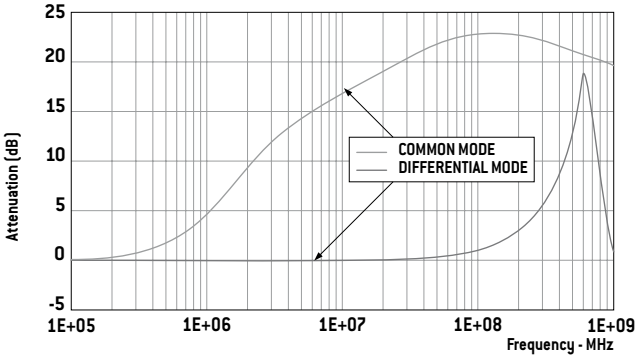
DLEF42 020 1S

DLEF42	020	1	S
Range	Number of windings	Version	S = for surface mount

Packaging

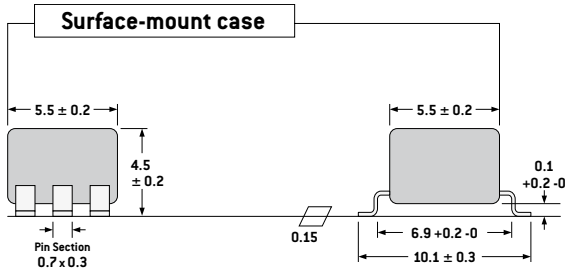
Individually packed in a 160 x 137 x 55 mm cardboard box. 40 parts on 2 layers

Response Curves

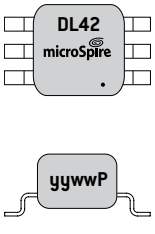


Typical Attenuation versus Frequency on 50hms (@100mV)

Typical Dimensions (mm)

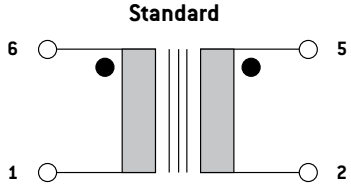


Marking

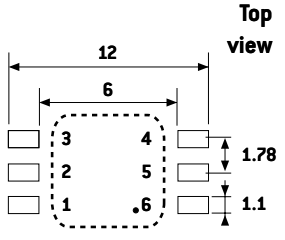


DL42 02 01 :
Microspire part number
yyww : Date code

Connections



PCB Layout (suggested)



Line-Matching Transformer - MTLM 1234 Mil

- Line isolation and impedance matching
- Transfer-moulded encapsulation
- Materials meet UL94-V0 rating
- Surface-mount package
- Frequency range 100 Hz to 10 kHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 2.5 grams

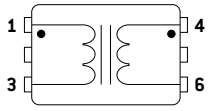
Electrical Data (25°C)

Parameter	Value
Primary Impedance (pins 1 - 3)	600Ω
Secondary Impedance (pins 4 - 6)	600Ω
Turns Ratio at 1kHz	1/1 ± 1%
Shunt Inductance at 200Hz, 0.15V	≥ 2.2 H
Shunt Resistance at 200Hz, 0.15V	≥ 4700Ω
Leakage Inductance (1kHz)	≤ 5.5mH
Primary Winding Resistance	115Ω ± 15%
Secondary Winding Resistance	115Ω ± 15%
Insertion Loss (at 1kHz; 600Ω)	1.75 dB ± 0.25
Frequency Response (0.1 - 4kHz)	± 0.25dB
Return Loss (0.2 - 4kHz)	≥ 24dB
Distorsion (600Hz; 10 dBm; 600Ω)	- 82dBm
Dielectric Stength (2s)	1.5kVrms
Isolation	1.5kVdc
Operating Temperature Range	–55°C to + 125°C
Storage Temperature Range	–55°C to + 125°C

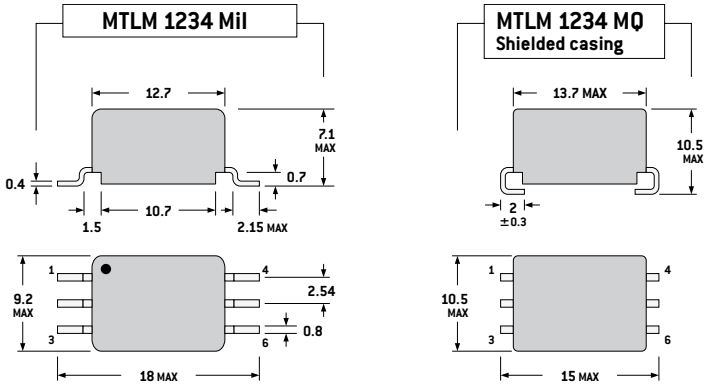
Application

Line isolation and impedance matching

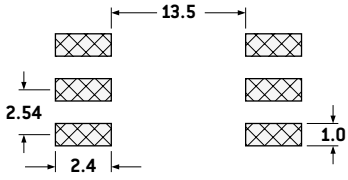
Connections



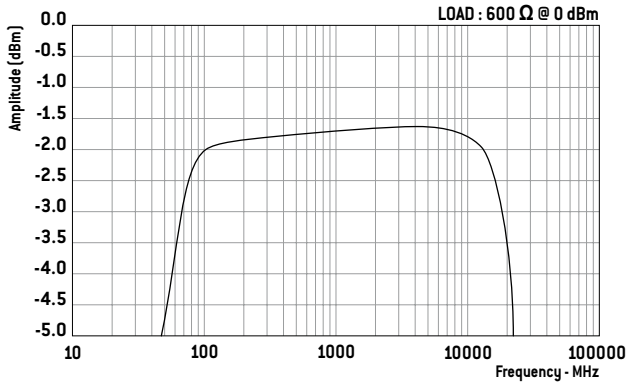
Typical Dimensions (mm)



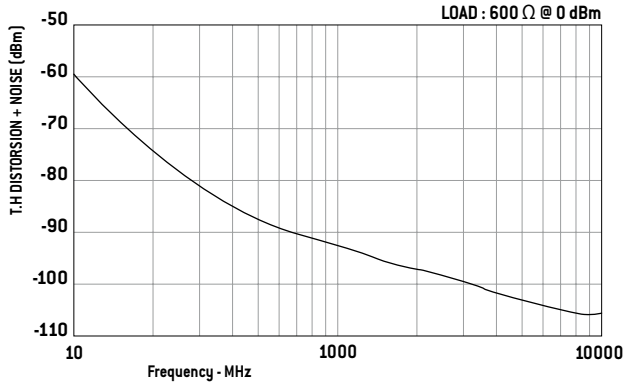
PCB Layout
(suggested - only MTLM 1234 Mil)



Frequency Response



Distorsion



Tel : + 33 (0) 3 82 59 13 33
www.exxelia.com
Specifications may change without prior notice - Revised 03/14

MIL-STD 1553 Interface Transformers - DBIT x 3 S

- In accordance to MIL-STD 1553 A & B
- Meet all the electrical requirements of Manchester II serial bi-phase data transmission, 1 MHz operation
- Epoxy molding in accordance with outgassing requirements of ECSS-Q-ST-70-02C
- Qualified EPPL issue 22 2012-12-17
- Open-circuit impedance greater than 3 kΩ (4 kΩ typical value) from 75 KHz to 1 MHz
- Frequency range 75 KHz to 1 MHz
- Operating temperature range : – 55 °C to + 125 °C
- Weight : 3 to 3.5 grams

Electrical Data (25°C)

ID Code	Turn ratio 1-3 : 4-8	Turn ratio 1-3 : 5-7	DCR MAX (Ω) (1-3)	DCR MAX (Ω) (4-8)	Primary Inductance (mH) min at 75 kHz-1V
DBIT 1 3S	1.4 : 1	2 : 1	3	2.3	Lp (1-3) ?
DBIT 2 3S	1 : 1	1 : 0.707	3	3.3	Lp (1-3) ?
DBIT 3 3S	1.2 : 1	1.67 : 1	3	2.7	Lp (1-3) ?
DBIT 4 3S	1 : 2.5	1 : 1.74	1.5	3.5	Lp (4-8) ?
DBIT 5 3S	1 : 2.5	1 : 1.79	1.5	3.5	Lp (4-8) ?
DBIT 6 3S	2.3 : 1	3.2 : 1	3	1.5	Lp (1-3) ?
DBIT 7 3S	1.25 : 1	1.66 : 1	3	3.3	Lp (1-3) ?
DBIT 8 3S	1 : 2.12	1 : 1.5	1.8	3.5	Lp (4-8) ?

Notes

Common mode rejection : 45 dB min.

Dielectric withstanding voltage : 100 Vrms.

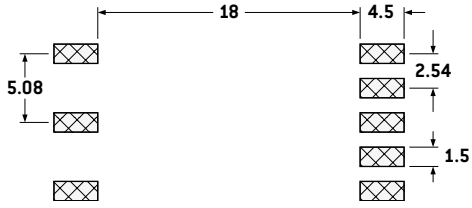
Insulation resistance : 1000 MΩ min.

tolerance ratio ± 3 %.

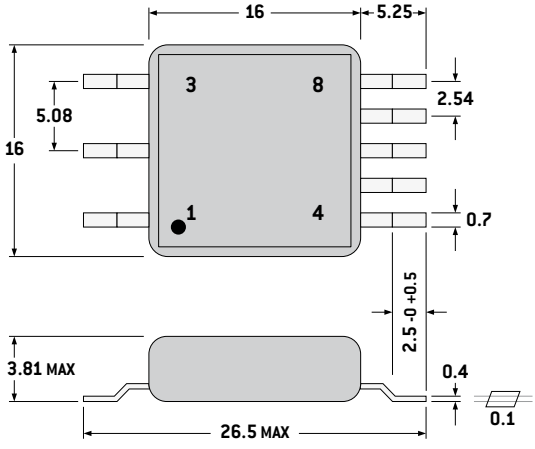
To Order

DBIT	#	3	DBIT # 3S S
Range	Transceiver type	Case height 3	S SMD

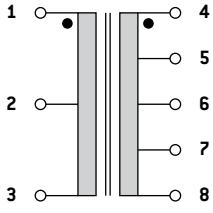
PCB Layout (suggested)



Typical Dimensions
(mm, top view)

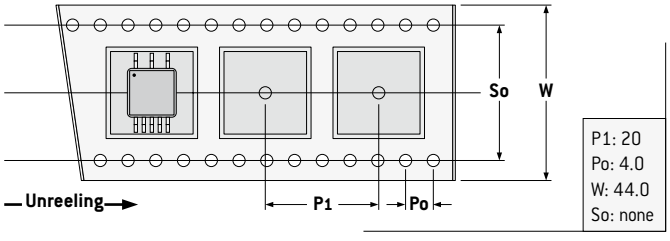


Connections



Packaging

Individually packed : 32 parts on 2 layers.
Tape and Reel:
700 units per reel of diameter 330 mm



Marking

yyww :
Date code

MIL-STD 1553 Interface Transformers - DBIT xx 4 S

- Miniature package, less board space
- In accordance to MIL-STD 1553 A&B
- Meet all the electrical requirements of Manchester II serial bi-phase data transmission, 1 MHz operation
- Epoxy molding in accordance with outgassing requirements of ECSS-Q-ST-70-02C
- Applied standards: ESCC 3201 generic specification for space products
- Frequency range 75 KHz to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 1.5 grams

Electrical Data (25°C)

ID Code	Turns ratio (±3%) P : S	Connections	DCR max. (1-3)(Ω)	DCR max. (4 8)(Ω)	DCR MAX (5-7)(Ω)	OUTPUT RISE TIME ns (MAX)	Impedance Ω (MIN) 75 kHz to 249 kHz	Impedance Ω (MIN) 250 kHz to 1 MHz
DBIT 91 4S	1 : 3.75	A	0.25	3.00	-	250 ns	(4-8) 4000	(4-8) 4000
DBIT 50 4S	1 : 2.50	A	1.5	3.5	-	250 ns	(4-8) 3000	(4-8) 4000
DBIT 70 4S	1.25 : 1	A	2.4	2.1	-	150 ns	(1-3) 3000	(1-3) 4000
DBIT 12 4S	1.41 : 1	A	2.7	2.2	-	150 ns	(1-3) 5000	(1-3) 7200
DBIT 90 4S	1 : 2.70	B	0.25	-	2.00	250 ns	(5-7) 2000	(5-7) 3000
DBIT 51 4S	1 : 1.79	B	1.5	-	2.5	150 ns	(5-7) 2000	(5-7) 4000
DBIT 71 4S	1.66 : 1	B	2.4	-	1.5	150 ns	(1-3) 3000	(1-3) 4000
DBIT 11 4S	2.00 : 1	B	2.6	-	1.3	150 ns	(1-3) 5000	(1-3) 7200

To Order

DBIT	##	4	DBIT ## 4S S
Range	Code Turn Ratio	Case height 4.7	**S** SMD

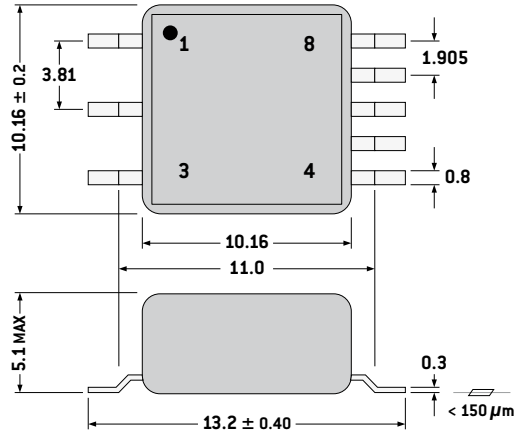
Notes

Common mode rejection: 45 dB min.

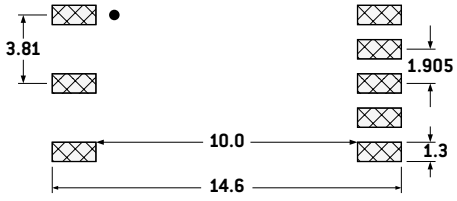
Dielectric withstanding voltage: 100 Vrms.

Insulation resistance: 1000 MΩ min.

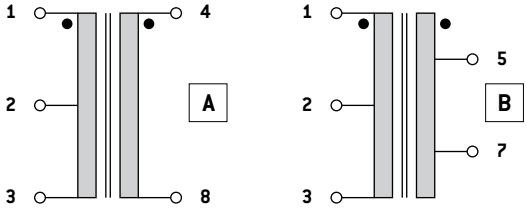
Typical Dimensions
(mm, top view)



PCB Layout (suggested)

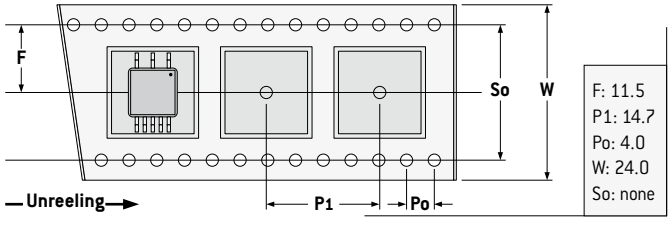


Connections

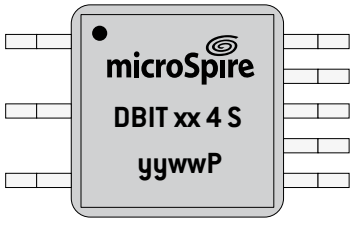


Packaging

Individually packed: 32 parts on 2 layers.
Tape and Reel:
700 units per reel of diameter 330 mm



Marking



yyww :
Date code

Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

MIL-STD 1553 Interface Transformers - DBIT x 5 S(A)

- In accordance to MIL-STD 1553 A&B
- Meet all the electrical requirements of Manchester II serial bi-phase data transmission, 1 MHz operation
- Epoxy molding in accordance with outgassing requirements of ECSS-Q-ST-70-02C
- Qualified EPPL
- Open-circuit impedance greater than 4 kΩ over 75 KHz to 1 MHz working frequency
- Frequency range 75 KHz to 1 MHz
- Operating temperature range: –55°C up to +150°C
- Weight: 3 to 3.5 grams

Electrical Data (25°C)

ID Code	Turn ratio 1-3 : 4 8	Turn ratio 1-3 : 5-7	DCR max. (Ω) 1-3	DCR max. (Ω) 4-8	Primary Inductance (mH) min at 75 kHz-1V	Open Circuit Impedance Min (kΩ)	Operating temperature range
DBIT 1 5S*	1,4:1	2:1	2,2	1,2	7 (1-3)	3	–55°C +125°C
DBIT 2 5S*	1:1	1:0,707	2,2	2,4	7 (1-3)	3	–55°C +125°C
DBIT 3 5S*	1,2:1	1,67:1	2,2	2	7 (1-3)	3	–55°C +125°C
DBIT 4 5S*	1:2,5	1:1,74	1,2	2,7	7 (4-8)	3	–55°C +125°C
DBIT 5 5S*	1:2,5	1:1,79	1,2	2,7	7 (4-8)	3	–55°C +125°C
DBIT 6 5S*	2,3:1	3,2:1	2,2	1,2	7 (1-3)	3	–55°C +125°C
DBIT 7 5S*	1,25:1	1,66:1	2,2	2	7 (1-3)	3	–55°C +125°C
DBIT 8 5S*	1:2,12	1:1,5	1,2	2,7	7 (4-8)	3	–55°C +125°C
DBIT 1 5SA	1,4:1	2:1	1,23	1,1	7 (1-3)	4	–55°C +150°C
DBIT 2 5SA	1:1	1:0,707	1,23	1,6	7 (1-3)	4	–55°C +150°C
DBIT 3 5SA	1,2:1	1,67:1	1,23	1,4	7 (1-3)	4	–55°C +150°C
DBIT 5 5SA	1:2,5	1:1,79	0,6	1,4	7 (4-8)	4	–55°C +150°C
DBIT 6 5SA	2,3:1	3,2:1	1,23	0,8	7 (1-3)	4	–55°C +150°C
DBIT 7 5SA	1,25:1	1,66:1	1,23	1,25	7 (1-3)	4	–55°C +150°C
DBIT 8 5SA	1:2,12	1:1,5	0,7	1,4	7 (4-8)	4	–55°C +150°C

*** EPPL products - Detail Specifications MSP003**

Notes

Common mode rejection : 45 dB min.

Dielectric withstanding voltage : 500 Vrms.

Insulation resistance : 1,3 - 4,8 500 V_{DC} >1000 MΩ

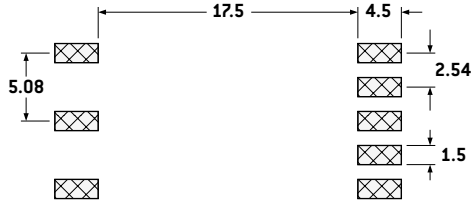
tolerance ratio ± 3 %.

To Order

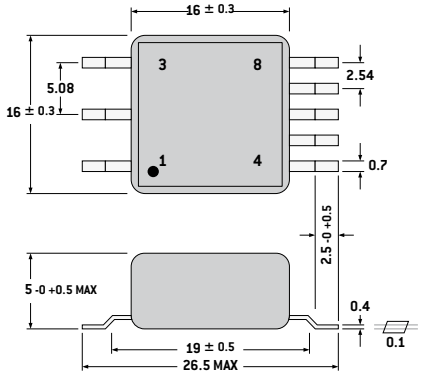
DBIT # 5SA

DBIT	#	5	S	A
Range	Part 1 to 8	Case height 5	**S** SMD	New version

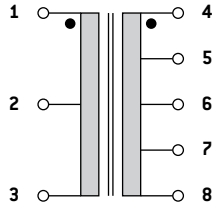
PCB Layout (suggested)



Typical Dimensions (mm, top view)

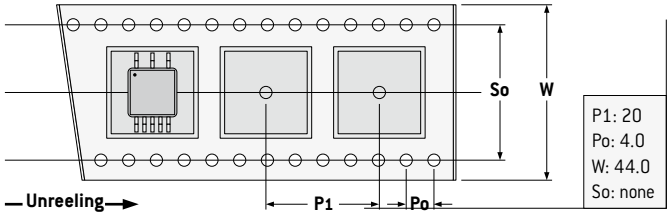


Connections



Packaging

Individually packed: 32 parts on 2 layers.
Tape and Reel:
200 units per reel of diameter 330 mm



Marking

yyww :
Date code

MIL-STD 1553 Interface Transformers - DBIT x 7 P(A)

- In accordance to MIL-STD 1553 A & B
- Meet all the electrical requirements of Manchester II serial bi-phase data transmission, 1 MHz operation
- Epoxy molding in accordance with outgassing requirements of ECSS-Q-ST-70-02C
- Qualified EPPL
- Open-circuit impedance greater than 4 kΩ over 75 KHz to 1 MHz working frequency
- Frequency range 75 KHz to 1 MHz
- Operating temperature range: –55 °C up to +150 °C
- Weight: < 5 grams

Electrical Data (25°C)

ID Code	Turn ratio 1-3 : 4-8	Turn ratio 1-3 : 5-7	DCR max. (Ω) 1-3	DCR max. (Ω) 4-8	Primary Inductance (mH) min at 75 kHz-1V	Open Circuit Impedance Min (kΩ)	Operating temperature range
DBIT 1 7P*	1,4:1	2:1	2	1,6	7 (1-3)	3	–55°C +125°C
DBIT 2 7P*	1:1	1:0,707	2	2,2	7 (1-3)	3	–55°C +125°C
DBIT 3 7P*	1,2:1	1,67:1	2	2	7 (1-3)	3	–55°C +125°C
DBIT 4 7P*	1:2,5	1:1,74	1	2,2	7 (4-8)	3	–55°C +125°C
DBIT 5 7P*	1:2,5	1:1,79	1	2,2	7 (4-8)	3	–55°C +125°C
DBIT 6 7P*	2,3:1	3,2:1	2	1	7 (1-3)	3	–55°C +125°C
DBIT 7 7P*	1,25:1	1,66:1	2	2	7 (1-3)	3	–55°C +125°C
DBIT 8 7P*	1:2,12	1:1,5	1	2,2	7 (4-8)	3	–55°C +125°C
DBIT 1 7PA	1,4:1	2:1	1,23	1,1	7 (1-3)	4	–55°C +150°C
DBIT 2 7PA	1:1	1:0,707	1,23	1,6	7 (1-3)	4	–55°C +150°C
DBIT 3 7PA	1,2:1	1,67:1	1,23	1,4	7 (1-3)	4	–55°C +150°C
DBIT 5 7PA	1:2,5	1:1,79	0,6	1,4	7 (4-8)	4	–55°C +150°C
DBIT 6 7PA	2,3:1	3,2:1	1,23	0,8	7 (1-3)	4	–55°C +150°C
DBIT 7 7PA	1,25:1	1,66:1	1,23	1,25	7 (1-3)	4	–55°C +150°C
DBIT 8 7PA	1:2,12	1:1,5	0,7	1,4	7 (4-8)	4	–55°C +150°C

*** EPPL products - Detail Specifications MSP003**

To Order

DBIT # 7PA

DBIT	#	7	P	A
Range	Part 1 to 8	Case height 7	x = **P** Pins	New version

Notes

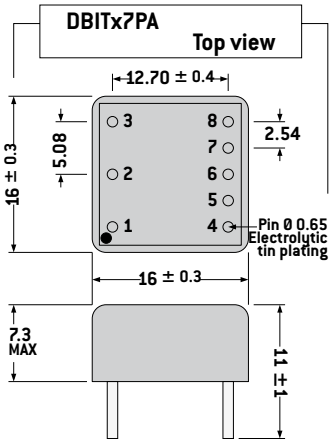
Common mode rejection: 45 dB min.

Dielectric withstanding voltage: 500 Vrms.

Insulation resistance: 1,3 - 4,8 500 V_{DC} >1000 MΩ

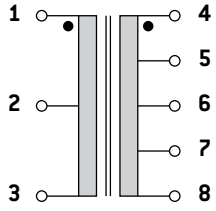
tolerance ratio ± 3 %.

Typical Dimensions (mm)

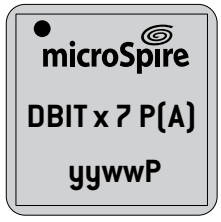


Connections

Dot for pin "1"



Marking



yyww :
Date code

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Specifications may change without prior notice - Revised 03/14

MIL-STD 1553 Interface Transformers - DBIT x 7 P10(A)

- In accordance to MIL-STD 1553 A & B
- Meet all the electrical requirements of Manchester II serial bi-phase data transmission, 1 MHz operation
- Epoxy molding in accordance with outgassing requirements of ECSS-Q-ST-70-02C
- Qualified EPPL
- Open-circuit impedance greater than 4 kΩ over 75 KHz to 1 MHz working frequency
- Frequency range 75 KHz to 1 MHz
- Operating temperature range : –55 °C up to +150 °C
- Weight : < 5 grams

Electrical Data (25°C)

ID Code	Turn ratio 1-3 : 4-8	Turn ratio 1-3 : 5-7	DCR max. (Ω) 1-3	DCR max. (Ω) 4-8	Primary Inductance (mH) min at 75 kHz-1V	Open Circuit Impedance Min (kΩ)	Operating temperature range
DBIT 1 7P10*	1,4:1	2:1	2	1,6	7 (1-3)	3	–55°C +125°C
DBIT 2 7P10*	1:1	1:0,707	2	2,2	7 (1-3)	3	–55°C +125°C
DBIT 3 7P10*	1,2:1	1,67:1	2	2	7 (1-3)	3	–55°C +125°C
DBIT 4 7P10*	1:2,5	1:1,74	1	2	7 (4-8)	3	–55°C +125°C
DBIT 5 7P10*	1:2,5	1:1,79	1	2,2	7 (4-8)	3	–55°C +125°C
DBIT 6 7P10*	2,3:1	3,2:1	2	1	7 (1-3)	3	–55°C +125°C
DBIT 7 7P10*	1,25:1	1,66:1	2	2	7 (1-3)	3	–55°C +125°C
DBIT 8 7P10*	1:2,12	1:1,5	1	2,2	7 (4-8)	3	–55°C +125°C
DBIT 9 7P10*	1:2,38	1:1,666	1	2,2	7 (1-3)	3	–55°C +125°C
DBIT 10 7P10*	1:3,0	1:2,14	1	2,2	7 (4-8)	3	–55°C +125°C
DBIT 1 7P10A	1,4:1	2:1	1,23	1,1	7 (1-3)	4	–55°C +150°C
DBIT 2 7P10A	1:1	1:0,707	1,23	1,6	7 (1-3)	4	–55°C +150°C
DBIT 3 7P10A	1,2:1	1,67:1	1,23	1,4	7 (1-3)	4	–55°C +150°C
DBIT 5 7P10A	1:2,5	1:1,79	0,6	1,4	7 (4-8)	4	–55°C +150°C
DBIT 6 7P10A	2,3:1	3,2:1	1,23	0,8	7 (1-3)	4	–55°C +150°C
DBIT 7 7P10A	1,25:1	1,66:1	1,23	1,25	7 (1-3)	4	–55°C +150°C
DBIT 8 7P10A	1:2,12	1:1,5	0,7	1,4	7 (4-8)	4	–55°C +150°C

*** EPPL products - Detail Specifications MSP003**

To Order

DBIT # 7 P10A

DBIT	#	7	P10	A
Range	Part 1 to 10	Case height 7	x = **P10** Pins (10 mm)	New version

Notes

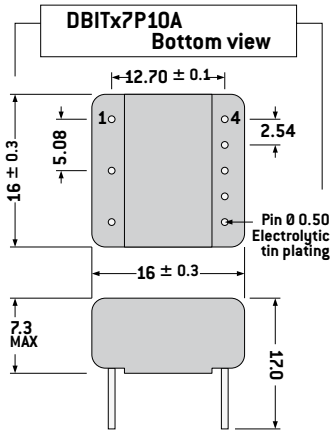
Common mode rejection : 45 dB min.

Dielectric withstanding voltage : 500 Vrms.

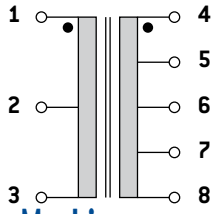
Insulation resistance : 1,3 - 4,8 500 V_{DC} >1000 MΩ

tolerance ratio ± 3 %.

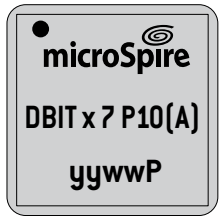
Typical Dimensions (mm)



Connections



Marking



yyww :
Date code

MIL-STD 1553 Interface Transformers - DBIT x 7 S(A)

- In accordance to MIL-STD 1553 A & B
- Meet all the electrical requirements of Manchester II serial bi-phase data transmission, 1 MHz operation
- Epoxy molding in accordance with outgassing requirements of ECSS-Q-ST-70-02C
- Qualified EPPL
- Open-circuit impedance greater than 4 kΩ over 75 KHz to 1 MHz working frequency
- Frequency range 75 KHz to 1 MHz
- Operating temperature range: –55 °C up to +150 °C
- Weight: < 5 grams

Electrical Data (25°C)

ID Code	Turn ratio 1-3 : 4-8	Turn ratio 1-3 : 5-7	DCR max (Ω) 1-3	DCR max (Ω) 4-8	Primary Inductance (mH) min 75 kHz-1V	Open Circuit Impedance min (kΩ)	Operating temperature range
DBIT 1 7S*	1,4:1	2:1	2	1,6	7 (1-3)	3	–55°C - 125°C
DBIT 2 7S*	1:1	1:0,707	2	2,2	7 (1-3)	3	–55°C - 125°C
DBIT 3 7S*	1,2:1	1,67:1	2	2	7 (1-3)	3	–55°C - 125°C
DBIT 4 7S*	1:2,5	1,67:1	2	2	7 (1-3)	3	–55°C - 125°C
DBIT 5 7S*	1:2,5	1:1,74	1	2	7 (4-8)	3	–55°C - 125°C
DBIT 6 7S*	2,3:1	3,2:1	2	1	7 (1-3)	3	–55°C - 125°C
DBIT 7 7S*	1,25:1	1,66:1	2	2	7 (1-3)	3	–55°C - 125°C
DBIT 8 7S*	1:2,12	1:1,5	1	2,2	7 (4-8)	3	–55°C - 125°C
DBIT 1 7SA	1,4:1	2:1	1,23	1,1	7 (1-3)	4	–55°C-150°C
DBIT 2 7SA	1:1	1:0,707	1,23	1,6	7 (1-3)	4	–55°C-150°C
DBIT 3 7SA	1,2:1	1,67:1	1,23	1,4	7 (1-3)	4	–55°C-150°C
DBIT 5 7SA	1:2,5	1:1,74	0,6	1,4	7 (4-8)	4	–55°C-150°C
DBIT 6 7SA	2,3:1	3,2:1	1,23	0,8	7 (1-3)	4	–55°C-150°C
DBIT 7 7SA	1,25:1	1,66:1	1,23	1,25	7 (1-3)	4	–55°C-150°C
DBIT 8 7SA	1:2,12	1:1,5	0,7	1,4	7 (4-8)	4	–55°C-150°C

*** EPPL products - Detail Specifications MSP003**

Notes

Common mode rejection : 45 dB min.

Dielectric withstanding voltage : 100 Vrms.

Insulation resistance : 1,3 - 4,8 500 V_{DC} >1000 MΩ

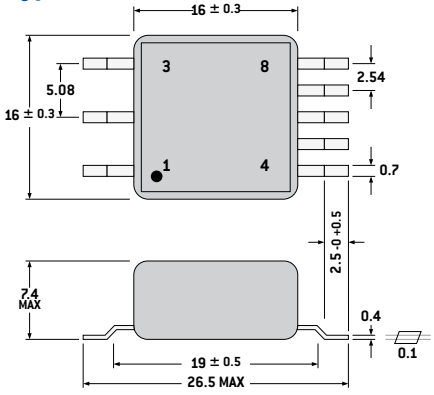
tolerance ratio ± 3 %.

To Order

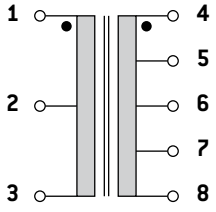
DBIT # 7 SA

DBIT	#	7	x	A
Range	Part 1 to 8	Case height 7	x = **S** SMD	New version

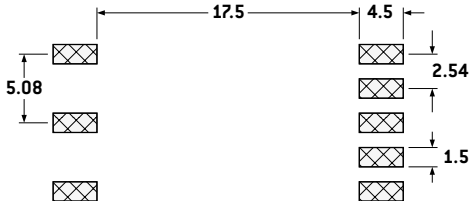
Typical Dimensions (mm)



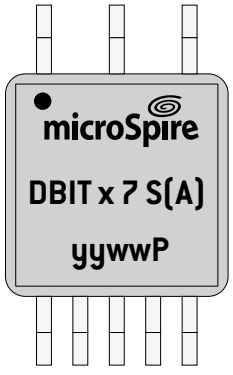
Connections



PCB Layout (suggested, DBIT x 7 S)



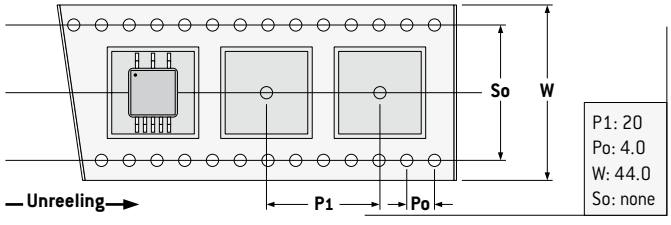
Marking



yyww :
Date code

Packaging

Individually packed: 32 parts on 2 layers.
Tape and Reel (DBIT x 7S) :
300 units per reel of diameter 330 mm



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Specifications may change without prior notice - Revised 03/14

MIL-STD 1553 Interface Transformers - DBIT 5 7 x 400

- In accordance to MIL-STD 1553 A & B
- Meet all the electrical requirements of Manchester II serial bi-phase data transmission, 1 MHz operation
- Waveform integrity :
  27 Vptop level at 250 KHz - droop < 20 % into the lowest turn's wdg
- Encapsulated in accordance with MIL-T-21038 (DAP box)
- Applied standards : ESCC 3201 generic specification for space products
- Open-circuit impedance greater than 4 kΩ from 75 KHz to 1 MHz
- Operating temperature range : –40 °C to + 125 °C
- Weight : 3 to 3.5 grams

Electrical Data (25°C)

ID Code	Turn ratio 1-3 : 4-8	Turn ratio 1-3 : 5-7	DCR max. (Ω) (1-3)	DCR max. (Ω) (4-8)	Primary Inductance (mH) min at 75 kHz-1V
DBIT 5 7x400	1 : 2.5	1 : 1.79	1	3.5	Lp (4-8) 8.5

Notes

Common mode rejection : 45 dB min.

Dielectric withstanding voltage : 500 Vrms.

Insulation resistance : 1000 MΩ min - 500 VDC

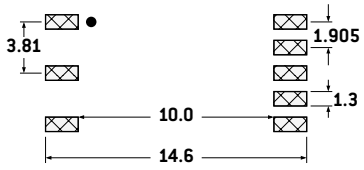
tolerance ratio ± 2 %.

To Order

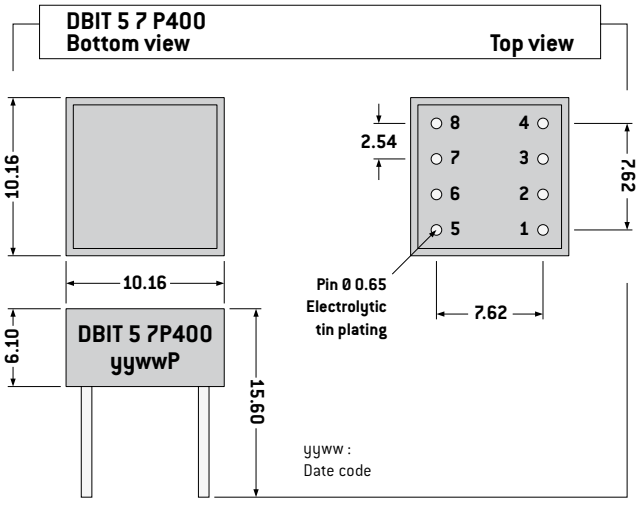
DBIT 5 7x400

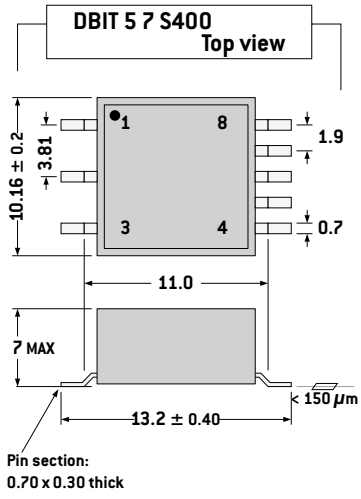
DBIT	5	7	P400
Range	Code turn ratio	Case height 7	x = **P** for Pin through hole x = **S** for SMD

PCB Layout
(suggested, DBIT 5 7 S400)



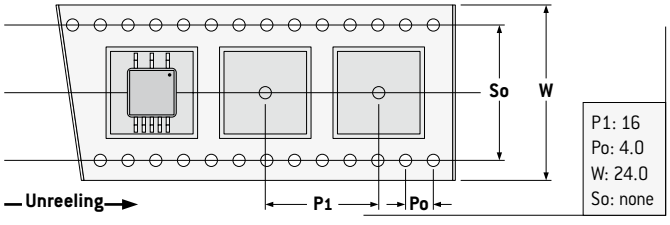
Typical Dimensions (mm)



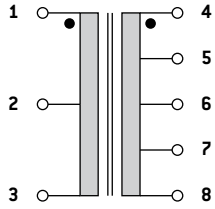


Packaging

Individually packed : 32 parts on 2 layers.
Tape and Reel (DBIT 5 7 S400):
400 units per reel of diameter 330 mm



Connections



Dual staked MIL-STD 1553 Interface Transformers - SBIT x 7.5S

- In accordance to MIL-STD 1553 B
- Meet all the electrical requirements of Manchester II serial bi-phase data transmission, 1 MHz operation
- Epoxy molding in accordance with outgassing requirements of ECSS-Q-ST-70-02C
- Applied standards : ESCC 3201 generic specification for space products
- Open-circuit impedance greater than 3 kΩ (4 kΩ typical value) from 75 KHz to 1 MHz
- Frequency range 75 KHz to 1 MHz
- Operating temperature range : – 55 °C to + 125 °C
- Weight : < 5 grams

Electrical Data (25°C)

Parameter	Unit	SBIT 1 7.5S	SBIT 2 7.5S	SBIT 3 7.5S	SBIT 4 7.5S	SBIT 5 7.5S	SBIT 6 7.5S	SBIT 7 7.5S	SBIT 8 7.5S
Frequency Response									
Operating Range	kHz	75 to 1000	75 to 1000	75 to 1000	75 to 1000	75 to 1000	75 to 1000	75 to 1000	75 to 1000
Common-Mode Rejection (min)	dB	45	45	45	45	45	45	45	45
Electrical Requirements									
Terminal Winding Resistance Rdc									
• 1-3 / (11-13) (max)	Ω	3.5	3	1.9	1	1	1.2	3.2	1
• 4-8 / (14-18) (max)	Ω	3	3	1.9	3	3	3	3	3
Interwinding Capacitance (max)	pF	70	30	70	45	45	70	70	70
Winding Inductance									
• LM (min)	mH	7.5	7.5	7.5	6.0	6.0	8.0	8.0	6.0
• LL (max)	µH	6.0	6.0	6.0	8.0	6.0	8.0	6.0	7.0
Peak-to-Peak Voltage (max)									
Terminals 1-3 primary	Vpp	60	60	60	38	38	39	60	44
Droop (max)									
3 ms Pulse Duration									
140 Ω Load Across Terminals 4-8	%	10	10	10	10	10	10	10	10
Decay Time (max)									
140 Ω Load Across Terminals 4-8	ns	25	25	25	25	25	25	25	25
Backswing									
140 Ω Load Across Terminals 4-8	%	none	none	none	none	none	none	none	none
Turns Ratios									
Terminals									
• 1-3 : 4-8 / 11-13 : 14-18		1.4 : 1	1 : 1	1.20 : 1	1 : 2.5	1 : 2.5	1 : 3.2	1.25 : 1	1 : 2.12
• 1-3 : 5-7 / 11-13 : 15-13		2 : 1	1 : 0.707	1.67 : 1	1 : 1.75	1 : 1.79	1 : 2.3	1.66 : 1	1 : 1.5

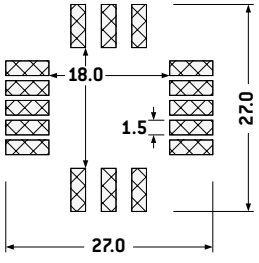
To Order

SBIT	#	7.5	SBIT # 7.5S S
Range	Part 1 to 8	Case height 7.5	**S** SMD

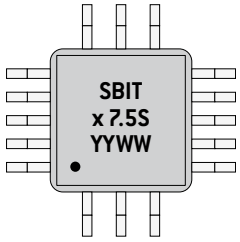
Notes

Interwinding insulation : 500 Vrms - 500 Hz.
Flammability compliance : UL94V0.

PCB Layout (suggested)

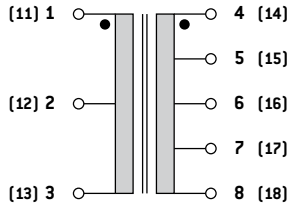


Marking

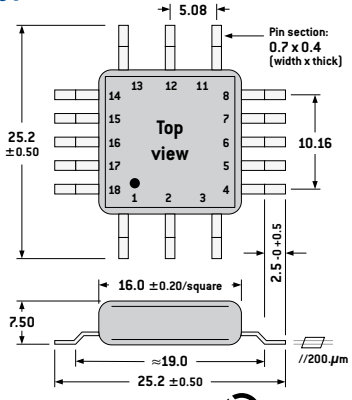


yyww :
Date code

Connections



Typical Dimensions (mm)



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Specifications may change without prior notice - Revised 12/14

Dual staked MIL-STD 1553 Interface Transformers - SBIT x 7.8P

- In accordance to MIL-STD 1553 B
- Meet all the electrical requirements of Manchester II serial bi-phase data transmission, 1 MHz operation
- Epoxy molding in accordance with outgassing requirements of ECSS-Q-70-02, MILT 21038
- Open-circuit impedance greater than 3 kΩ (4 kΩ typical value) from 75 KHz to 1 MHz
- Frequency range 75 KHz to 1 MHz
- Operating temperature range : – 55 °C to + 125 °C
- Weight : < 5 grams

Electrical Data (25°C)

Parameter	Unit	SBIT 1 7.8P	SBIT 2 7.8P	SBIT 3 7.8P	SBIT 5 7.8P	SBIT 7 7.8P	SBIT 8 7.8P
Frequency Response							
Operating Range	kHz	75 to 1000	75 to 1000	75 to 1000	75 to 1000	75 to 1000	75 to 1000
Common-Mode Rejection (min)	dB	45	45	45	45	45	45
Electrical Requirements							
Terminal Winding Resistance Rdc							
• 1-3 (max)	Ω	2.8	2.8	2.8	2	2.8	2.2
• 4-8 (max)	Ω	3	3.5	3	3.5	3	3.5
Interwinding Capacitance (max)	pF	50	50	50	50	50	50
Winding Inductance							
• LM (min) (1-3)	mH	7.0	7.0	7.0	7.0 (4-8)	8.0	7.0 (4-8)
• LL (max)	µH	6.0	6.0	6.0	6.0	6.0	6.0
Turns Ratios							
Terminals							
• 1-3 : 4-8		1.4 : 1	1 : 1	1.20 : 1	1 : 2.5	1.25 : 1	1 : 2.12
• 1-3 : 5-7		2 : 1	1 : 0.707	1.67 : 1	1 : 1.79	1.66 : 1	1 : 1.5

To Order

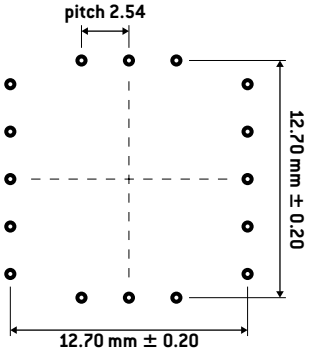
SBIT # 7.8P

SBIT	#	7.8	P
Range	Part 1 to 8 except 4 and 6	Case height 7.8	**P** pins through hole

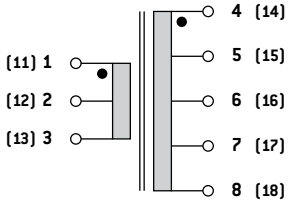
Notes

Interwinding insulation : 500 Vrms - 500 Hz.
Flammability compliance : UL94V0

PCB Layout (suggested)



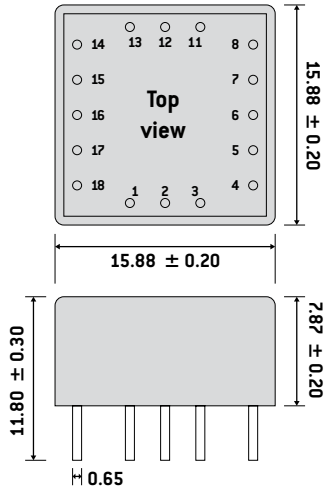
Connections



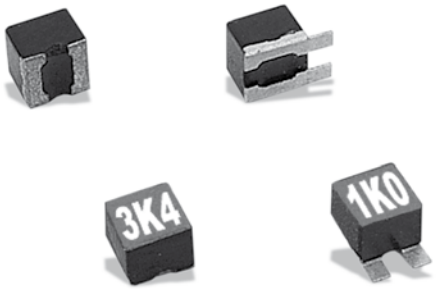
Marking

yyww :
Date code

Typical Dimensions (mm)



Miniature Fixed Chip Inductors - H01 Series



- esa qualified 3201/008
- With or without tab terminations
- Terminations with tin-lead coating
- Q factor ≥ 30 at 1 MHz
- SRF ≥ 8 MHz
- ΔL/L ± 1000 ppm/°C
- Materials meet UL94-V0 rating
- Operating temperature range: –55 °C to +125 °C
- Weight: 0.12 gram

Electrical Data (25°C)

ID Code	Inductance µH ±15%	IDC* Amps	DCR mΩ ±15%
MPCI H01 K38 1xy	0.38	1.5	29
MPCI H01 K67 1xy	0.67	1.25	39
MPCI H01 1K0 1xy	1.0	1.0	54
MPCI H01 1K5 1xy	1.5	0.85	73
MPCI H01 2K0 1xy	2.0	0.70	100
MPCI H01 2K7 1xy	2.7	0.62	120
MPCI H01 3K4 1xy	3.4	0.55	150
MPCI H01 4K6 1xy	4.6	0.49	190
MPCI H01 5K6 1xy	5.6	0.44	230
MPCI H01 7K1 1xy	7.1	0.41	270
MPCI H01 10K 1xy	10.0	0.34	390
MPCI H01 12K 1xy	12.0	0.29	530
MPCI H01 27K 1xy	27.0	0.20	1040
MPCI H01 M10 1xy	100.0	0.10	3800

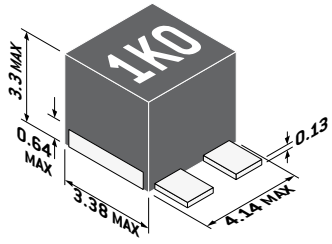
* Max permanent DC current at + 125 °C.

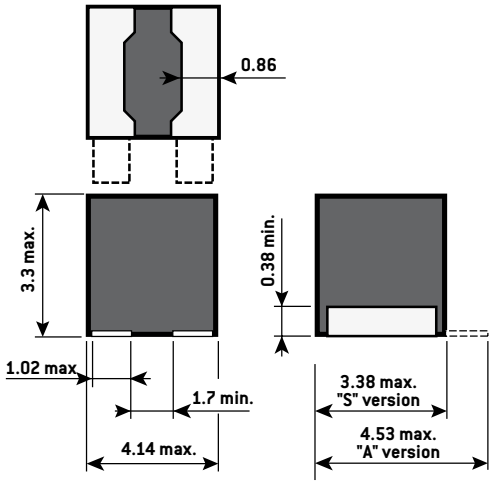
Operating temperature: –55 °C/+ 125 °C
Storage temperature : –55 °C/+ 140 °C

Application

Output filtering in low power DC / DC conversion

Typical Dimensions (mm)





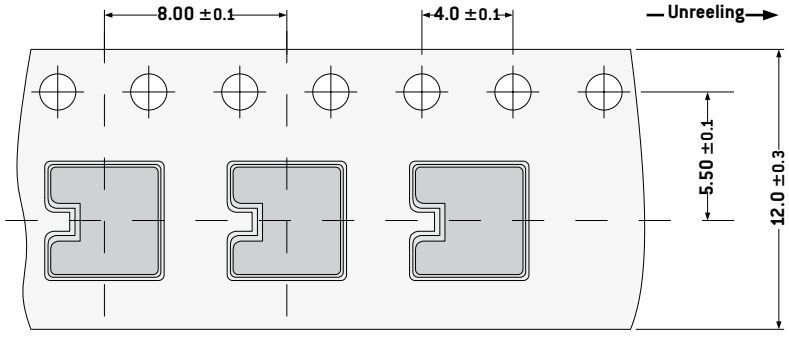
To Order

MPCI H01 ### 1xy

MPCI H01	###	1	x	y
Range	Inductance value	Version	Terminations x = **G** for Gold x = **T** for Tinned	y = **S** without tab y = **A** with tab

Packaging

Tape and Reel (without tab):
500 pieces ; or Tray: 49 pieces



Miniature Chip Inductors MSCI H01
QPL Components

MPCI H01 series are usually installed on Military applications and breadboards for Space applications.

Since January 2003, Microspire has been manufacturing Filtering Inductor, MPCI H01 series fulfilling ESA ESCC Generic specification N° 3201 and detail specification N° 3201/008.

This range is named MSCI (S for space applications).

This qualification approval includes final production tests Chart II, burn-in and electrical measurements to testing level B Chart III and qualification testing Chart IV.

For procurement, different quality levels are offered :

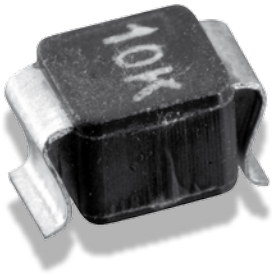
- Final production tests Chart II
- Burn-in and electrical measurements Chart III with level B or C (as required)
- Lot acceptance testing Chart V if required

Components delivered through this specification need to be processed and inspected in accordance with the Microspire Process Identification Document (P.I.D.).

Each component delivered is traceable to its production lot.

Microspire Non QPL ID Code	Microspire QPL ID Code	ESA SCC Component Part Number
MPCI H01 K38 1TS 15	MSCI H01 K38 1TS 15	3201008 05 b L38 L
MPCI H01 K67 1TS 15	MSCI H01 K67 1TS 15	3201008 05 b L67 L
MPCI H01 1K0 1TS 15	MSCI H01 1K0 1TS 15	3201008 05 b 1L0 L
MPCI H01 1K5 1TS 15	MSCI H01 1K5 1TS 15	3201008 05 b 1L5 L
MPCI H01 2K0 1TS 15	MSCI H01 2K0 1TS 15	3201008 05 b 2L0 L
MPCI H01 2K7 1TS 15	MSCI H01 2K7 1TS 15	3201008 05 b 2L7 L
MPCI H01 3K4 1TS 15	MSCI H01 3K4 1TS 15	3201008 05 b 3L4 L
MPCI H01 4K6 1TS 15	MSCI H01 4K6 1TS 15	3201008 05 b 4L6 L
MPCI H01 5K6 1TS 15	MSCI H01 5K6 1TS 15	3201008 05 b 5L6 L
MPCI H01 7K1 1TS 15	MSCI H01 7K1 1TS 15	3201008 05 b 7L1 L
MPCI H01 10K 1TS 15	MSCI H01 10K 1TS 15	3201008 05 b 100 L
MPCI H01 12K 1TS 15	MSCI H01 12K 1TS 15	3201008 05 b 120 L
MPCI H01 27K 1TS 15	MSCI H01 27K 1TS 15	3201008 05 b 270 L
MPCI H01 M10 1TS 15	MSCI H01 M10 1TS 15	3201008 05 b 101 L
05	**b**	**L (tolerance)**
05 for SnPb Termination	b = **B** for Chart III level B b = **C** for Chart III level C	**L** for ± 15%

Miniature Fixed Chip Inductors - 233 H01 Series



- With or without tab terminations
- Terminations with tin-lead coating
- Q factor ≥ 30 at 1 MHz
- SRF ≥ 8 MHz
- ΔL/L ± 1000 ppm/°C
- Materials meet UL94-V0 rating
- Operating temperature range: –55 °C to +175 °C
- Weight: 0.12 gram
- RoHS

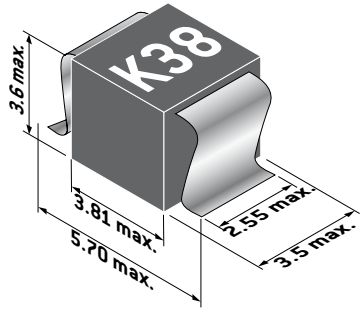
Electrical Data (25°C)

ID Code	Inductance µH ±15%	IDC* Amps	DCR mΩ ±15%
MPCI 233 K38 H01 1x	0.38	1.5	16.0
MPCI 233 K67 H01 1x	0.67	1.25	25.0
MPCI 233 1K0 H01 1x	1.0	1.0	38.0
MPCI 233 1K5 H01 1x	1.5	0.85	54.0
MPCI 233 2K0 H01 1x	2.0	0.70	79.0
MPCI 233 2K7 H01 1x	2.7	0.62	100
MPCI 233 3K4 H01 1x	3.4	0.55	129
MPCI 233 4K6 H01 1x	4.6	0.49	160
MPCI 233 5K6 H01 1x	5.6	0.44	200
MPCI 233 7K1 H01 1x	7.1	0.41	228
MPCI 233 10K H01 1x	10.0	0.34	335
MPCI 233 12K H01 1x	12.0	0.29	460
MPCI 233 27K H01 1x	27.0	0.20	900
MPCI 233 M10 H01 1x	100.0	0.10	3300

* Max permanent DC current at + 125 °C.

Operating temperature: –55°C/+175°C
Storage temperature : –55°C/+200°C

Typical Dimensions (mm)

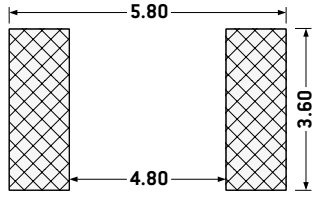


To Order

MPCI 233 ### H01 1x

MPCI 233	###	H01	1	x
Range	Inductance value	Technology	Version	Terminations x = **G** for Gold x = **T** or **S** for Tinned

PCB Layout (suggested)



Application

Output filtering in low power DC / DC conversion

Packaging

Tray

Tel : + 33 (0) 3 82 59 13 33

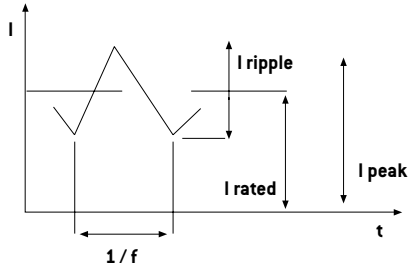
Specifications may change without prior notice - Revised 03/15

SMD Power Inductors - ESI 01

- Energy storage, smoothing, filtering
- Applied standards: ECSS-Q-ST-70-02C, MIL-STD-202, DO-160 and ESCC 3201 generic specification for space products
- Materials meet UL94-V0 rating
- Suited for IR and vapor reflow soldering
- Frequency range up to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: < 2 grams

Electrical Data (25°C)

ID Code	Inductance no load (µH)	Rated current (ADC)	Inductance at rated current (µH)	DCR at 25°C (mΩ)	Tol. (%)
ESI 01 2K7 1x	2.69	2.10	1.72	27	20
ESI 01 4K2 1x	4.20	1.70	2.69	39	
ESI 01 7K1 1x	7.10	1.20	4.54	73	
ESI 01 12K 1x	12.10	1.10	7.77	96	
ESI 01 17K 1x	16.8	0.93	11.15	139	
ESI 01 22K 1x	22.2	0.76	14.75	206	
ESI 01 31K 1x	30.62	0.63	20.33	302	
ESI 01 48K 1x	48.56	0.49	33.02	493	15
ESI 01 64K 1x	63.90	0.41	43.44	706	
ESI 01 81K 1x	81.30	0.39	55.29	795	
ESI 01 M10 1x	100.85	0.33	71	1120	
ESI 01 M15 1x	151.20	0.26	106.45	1736	

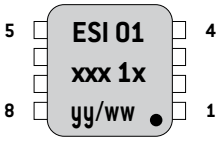


To Order

ESI01 ### 1x

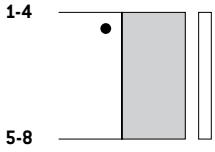
ESI01	###	1	x
SMD Energy Storage Inductor	Value code 2K7 = 2,7 µH M10 = 100 µH	Version	x = **J** J leaded x = **W** W Terminals

Marking

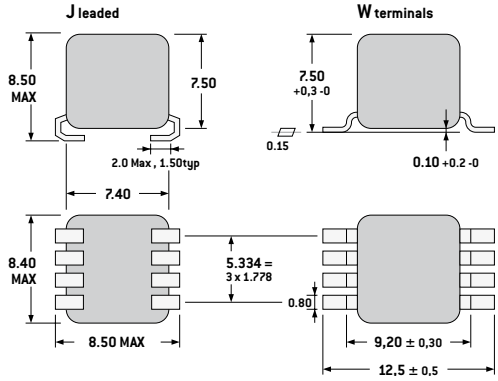


yyww :
Date code

Connections



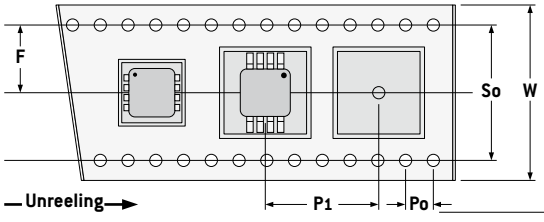
Dimensions (mm)



Packaging

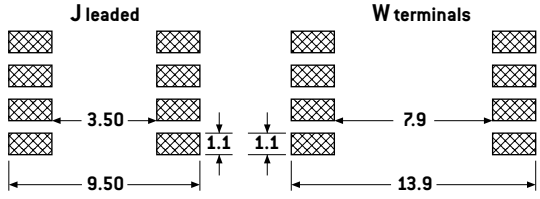
Tape and Reel:

J leaded - 600 units per reel of diameter 330 mm
W terminals – 400 units per reel of diameter 330 mm



J leaded	W terminals
F: 11.5 P1: 12 Po: 4.0 W: 24.0 So: none	F: 11.5 P1: 18 Po: 4.0 W: 24.0 So: none

PCB Layout (suggested)



SMD Power Inductors - ESI7

- Energy storage, smoothing, filtering
- Applied standards: ECSS-Q-ST-70-02C, MIL-STD-202, DO-160 and ESCC 3201 generic specification for space products
- Materials meet UL94-V0 rating
- Suited for IR and vapor reflow soldering
- Frequency range up to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: ≤2 grams

Electrical Data (25°C)

ID Code	Inductance (µH)	permanent (ADC)	Ipeak A	DCR at 25°C (mΩ)	Tol.
ESI 7 K42 1S	0.42	2.9	6.0	7.5	25
ESI 7 K65 1S	0.65	2.4	5.0	11	
ESI 7 1K2 1S	1.27	1.6	3.6	23	
ESI 7 2K1 1S	2.10	1.3	2.8	36	
ESI 7 3K7 1S	3.74	1.0	2.0	59	
ESI 7 5K0 1S	5.09	0.78	1.8	107	
ESI 7 8K4 1S	8.42	0.60	1.4	177	

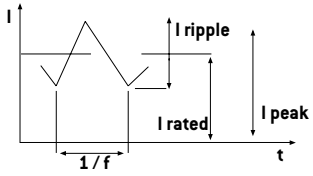
To Order

ESI 7 ### 1S

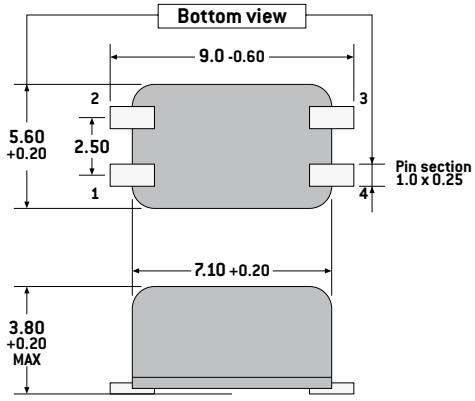
ESI7	###	1	S
SMD Energy Storage Inductor	Value code K42 = 0,42 µH 2K1 = 2.1 µH	Version	SMD Terminals

Notes

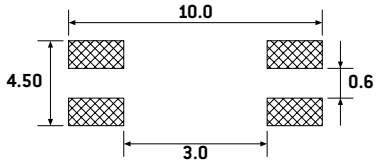
1. Inductance at 10 mV, 10 kHz with WK 3260B impedance analyzer
2. Typical inductance value at recommended full load
3. I peak max = maximum peak value of current at +125 °C; L value not guaranted
4. 10 % admissible I ripple over I rated at f = 200 kHz
5. Isolation voltage 150 Vdc - 1 min - Ri > 100 MΩ between winding and magnetic core



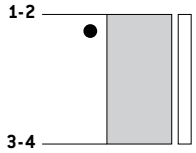
Dimensions (mm)



PCB Layout (suggested)

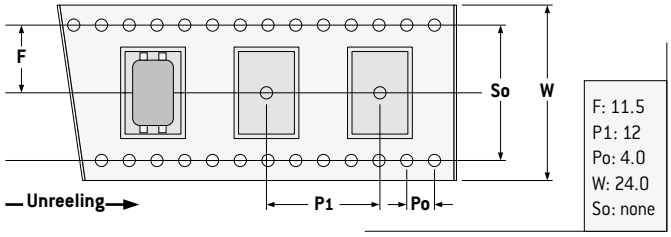


Connections

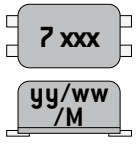


Packaging

Tape and Reel:
1300 units per reel of diameter 330 mm



Marking

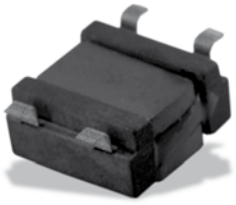


yyww : Date code
M : Microspire

Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

SMD Power Inductors - SESI 9.1WR High Reliability Applications



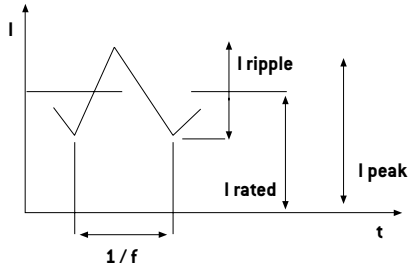
- Energy storage, smoothing, filtering
- Applied standards: ECSS-Q-70-02, MIL-STD-202, DO-160
- esa ESCC 3201/009 versions upon request
- Materials meet UL94-V0 rating
- Suited for IR and vapor reflow soldering
- Frequency range up to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 2 grams

Electrical Data (25°C)

ID Code	L[1] no load µH	I[2,4] rated A	L[3] at rated I µH	I[4,5] peak max A	Rdc at 25°C mΩ Max	Tol.
SESI 9.1 1K0 1WR	1.0	6.0	0.6	11.0	8.5	30
SESI 9.1 1K5 1WR	1.5	5.4	0.9	9.5	11.5	
SESI 9.1 2K0 2WR	2.0	4.3	1.4	8.2	17	
SESI 9.1 2K6 2WR	2.6	3.6	1.8	7.0	23	20
SESI 9.1 3K4 2WR	3.4	3.0	2.4	6.2	35	
SESI 9.1 4K3 2WR	4.3	2.8	3.0	5.5	40	
SESI 9.1 6K2 2WR	6.2	2.3	4.3	4.3	59	
SESI 9.1 8K5 2WR	8.5	1.9	6.0	3.7	87	
SESI 9.1 10K 2WR	10	1.85	7.0	3.4	93	
SESI 9.1 15K 2WR	15	1.5	10.5	2.8	140	
SESI 9.1 18K 2WR	18	1.27	12.6	2.5	192	
SESI 9.1 22K 2WR	22	1.21	15.4	2.3	215	
SESI 9.1 26K 2WR	26	1.03	18.2	2.14	290	
SESI 9.1 33K 2WR	33	0.92	23.1	1.9	350	10
SESI 9.1 47K 2WR	47	0.8	32.9	1.6	470	
SESI 9.1 66K 2WR	66	0.73	46.2	1.3	565	
SESI 9.1 81K 2WR	81	0.63	56.7	1.21	745	
SESI 9.1 M10 2WR	100	0.6	70	1.1	795	
SESI 9.1 M15 1WR	150	0.53	105	0.8	750	
SESI 9.1 M22 1WR	220	0.43	154	0.7	1165	
SESI 9.1 M33 1WR	330	0.36	231	0.6	1475	
SESI 9.1 M47 1WR	470	0.3	329	0.5	2220	
SESI 9.1 M68 1WR	680	0.25	477	0.4	3255	
SESI 9.1 1M0 1WR	1000	0.2	700	0.34	5865	
SESI 9.1 6M8 1WR	6800	0.045	5440	0.067	28000	

Notes

1. Inductance at 0.25 V, 100 kHz
2. I rated (permanent DC) without heatsink ; with heatsink I = I rated x 1.4
3. Typical inductance value at recommended full load
4. I peak max = maximum peak value of current at +125 °C; L value not guaranted
5. 10 % admissible I ripple over I rated at f = 200 kHz
6. Isolation voltage 150 Vdc
   - 1 min - Ri > 100 MΩ between winding and magnetic core



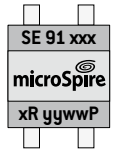
To Order

SESI 9.1 ### #WR

SESI	9.1	###	#	W	R
SMD Energy Storage Inductor	Size	Value code 4K3 = 4,3 µH M10 = 100 µH 1M0 = 1000 µH	Version	GW Terminals	High reliability

Connections

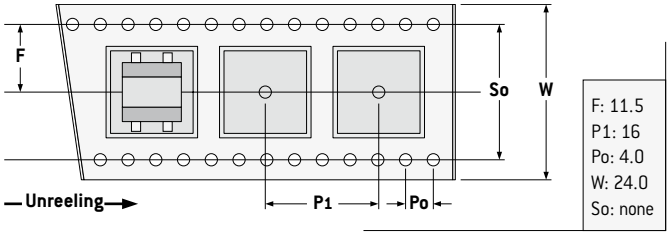
Marking



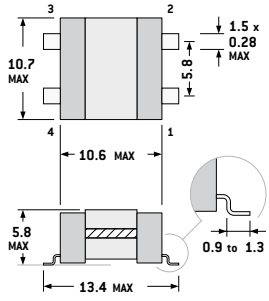
yyww : Date code

Packaging

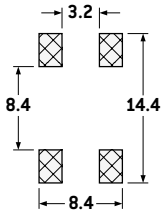
Tape and Reel:
700 pieces per reel of diameter 330 mm



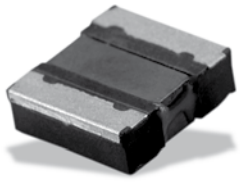
Dimensions (mm, top view)



PCB Layout (suggested)



SMD Power Inductors - SESI 14SR High Reliability Applications



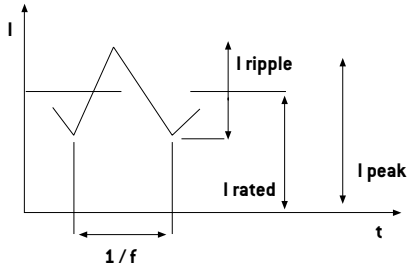
- Energy storage, smoothing, filtering
- Applied standards: ECSS-Q-70-02, MIL-STD-202, DO-160
- esa ESCC 3201/009 versions upon request
- Materials meet UL94-V0 rating
- Suited for IR and vapor reflow soldering
- Frequency range up to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 3.2 grams

Electrical Data (25°C)

ID Code	L[1] no load µH	I[2,4] rated A	L[3] at rated I µH	I[4,5] peak max A	Rdc at 25°C mΩ Max	Tol.
SESI 14 3K3 1SR	3.3	5.8	2.3	8.0	15.0	20
SESI 14 4K7 1SR	4.7	5.4	3.3	6.9	17.5	
SESI 14 6K0 1SR	6.0	4.3	4.2	5.7	26.5	
SESI 14 8K2 1SR	8.2	3.7	5.7	5.2	42	
SESI 14 10K 1SR	10	3.3	7.0	4.6	47	
SESI 14 15K 1SR	15	2.7	10.5	3.8	90	
SESI 14 22K 1SR	22	2.2	15.4	3.0	110	
SESI 14 33K 1SR	33	1.8	23.1	2.5	170	
SESI 14 47K 1SR	47	1.6	32.9	2.1	200	10
SESI 14 56K 1SR	56	1.5	39.2	1.9	240	
SESI 14 68K 1SR	68	1.3	47.6	1.7	290	
SESI 14 82K 1SR	82	1.2	57.4	1.5	315	
SESI 14 M10 1SR	100	1.1	70	1.4	440	
SESI 14 M12 1SR	120	1.0	84	1.3	500	
SESI 14 M15 1SR	150	0.9	105	1.1	645	
SESI 14 M18 1SR	180	0.83	126	1.0	740	
SESI 14 M22 1SR	220	0.72	154	1.0	980	
SESI 14 M33 1SR	330	0.57	231	0.8	1575	

Notes

1. Inductance at 0.25 V, 100 kHz
2. I rated (permanent DC) without heatsink ; with heatsink I = I rated x 1.4
3. Typical inductance value at recommended full load
4. I peak max = maximum peak value of current at +125 °C; L value not guaranteed
5. 40 % admissible I ripple over I rated at f = 200 kHz
6. Isolation voltage 500 Vdc - 1 min - Ri > 1 GΩ between winding and magnetic core



To Order

SESI 14 ### 1SR

SESI	14	###	1	S	R
SMD Energy Storage Inductor	Size	Value code 4K7 = 4,7 µH M10 = 100 µH 1M0 = 1000 µH	Version	SMD Terminals	High reliability

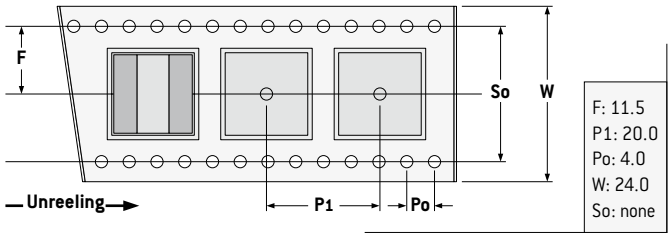
Connections

Marking

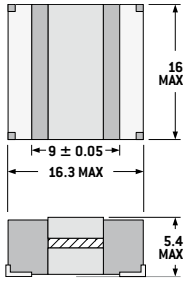
yyww : Date code

Packaging

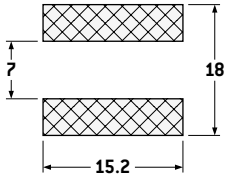
Tape and Reel:
400 pieces per reel of diameter 330 mm



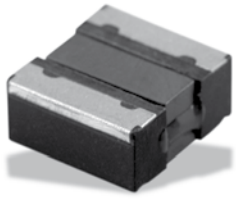
Dimensions (mm, bottom view)



PCB Layout (suggested)



SMD Power Inductors - SESI 15SR High Reliability Applications



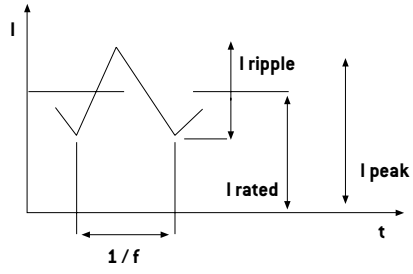
- Energy storage, smoothing, filtering
- Applied standards: ECSS-Q-70-02, MIL-STD-202, DO-160
- esa ESCC 3201/009 versions upon request
- Materials meet UL94-V0 rating
- Suited for IR and vapor reflow soldering
- Frequency range up to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 5 grams

Electrical Data (25°C)

ID Code	L[1] no load µH	I[2,4] rated A	L[3] at rated I µH	I[4,5] peak max A	Rdc at 25°C mΩ Max	Tol.
SESI 15 1K5 2SR	1.5	14	0.9	19	5.0	30
SESI 15 1K8 1SR	1.8	10	1.05	14	5.0	
SESI 15 2K7 1SR	2.7	8.2	1.9	11.5	6.5	20
SESI 15 4K9 1SR	4.9	6.0	3.4	8.5	11	
SESI 15 6K4 1SR	6.4	5.3	4.5	7.5	12	
SESI 15 8K0 1SR	8.0	4.8	5.6	6.5	16	
SESI 15 12K 1SR	12	4.0	8.4	5.5	23	
SESI 15 16K 1SR	16	3.4	11.2	4.5	27	
SESI 15 18K 1SR	18	3.1	12.6	4.2	29	
SESI 15 21K 1SR	21	2.9	14.7	4.0	36	
SESI 15 27K 1SR	27	2.6	18.9	3.5	44	
SESI 15 29K 2SR	30	2.6	20	3.5	72	
SESI 15 33K 1SR	33	2.3	23	3.2	59	
SESI 15 48K 1SR	48	1.9	33	2.7	72	10
SESI 15 56K 1SR	56	1.8	39	2.5	82	
SESI 15 68K 1SR	68	1.6	47	2.2	110	
SESI 15 82K 1SR	82	1.5	57	2.1	120	
SESI 15 M10 1SR	100	1.35	70	1.9	155	
SESI 15 M12 1SR	120	1.2	84	1.7	180	
SESI 15 M15 1SR	150	1.1	105	1.5	230	
SESI 15 M22 1SR	220	0.9	154	1.3	355	
SESI 15 M33 1SR	330	0.74	231	1.0	630	
SESI 15 1M0 1SR	1000	0.38	800	0.5	2127.5	
SESI 15 2M3 1SR	2290	0.28	1900	0.36	4400	

Notes

1. Inductance at 0.25 V, 100 kHz
2. I rated (permanent DC) without heatsink ; with heatsink I = I rated x 1.4
3. Typical inductance value at recommended full load
4. I peak max = maximum peak value of current at +125 °C; L value not guaranted
5. 40 % admissible I ripple over I rated at f = 200 kHz
6. Isolation voltage 500 Vdc - 1 min - Ri > 1 GΩ between winding and magnetic core



To Order

SESI 15 ### #SR

SESI	15	###	#	S	R
SMD Energy Storage Inductor	Size	Value code 4K9 = 4,9 µH M10 = 100 µH 1M0 = 1000 µH	Version	GW Terminals	High reliability

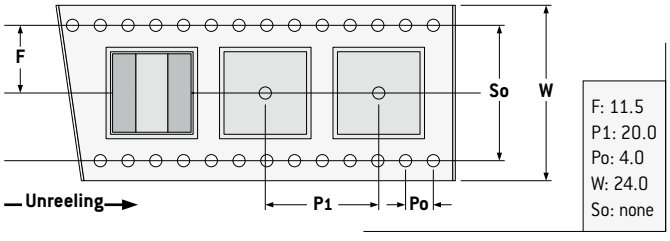
Connections

Marking

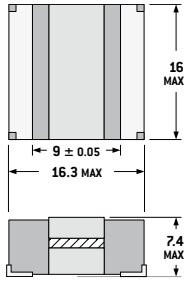
yyww : Date code

Packaging

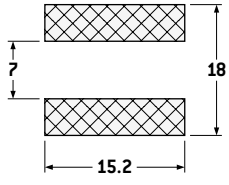
Tape and Reel:
400 pieces per reel of diameter 330 mm



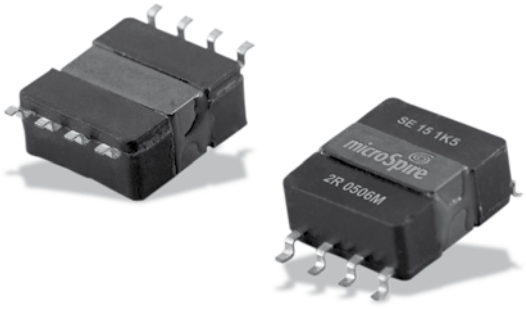
Dimensions (mm, bottom view)



PCB Layout (suggested)



SMD Power Inductors - SESI 15WR High Reliability Applications



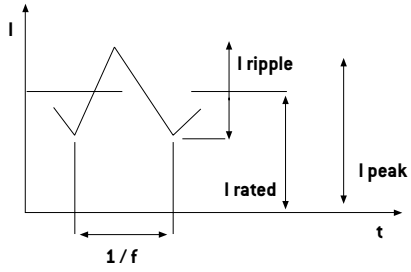
- Energy storage, smoothing, filtering
- Applied standards: ECSS-Q-70-02, MIL-STD-202, DO-160
- esa ESCC 3201/009 versions upon request
- Materials meet UL94-V0 rating
- Suited for IR and vapor reflow soldering
- Frequency range up to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 5 grams
- Shielded version upon request

Electrical Data (25°C)

ID Code	L[1] no load µH	I[2,4] rated A	L[3] at rated I µH	I[4,5] peak max A	Rdc at 25°C mΩ Max	Tol.
SESI 15 1K5 2WR	1.5	14	0.9	19	5.0	30
SESI 15 1K8 1WR	1.8	10	1.05	14	5.0	
SESI 15 2K7 1WR	2.7	8.2	1.9	11.5	6.5	20
SESI 15 4K9 1WR	4.9	6.0	3.4	8.5	11	
SESI 15 6K4 1WR	6.4	5.3	4.5	7.5	12	
SESI 15 8K0 1WR	8.0	4.8	5.6	6.5	16	
SESI 15 12K 1WR	12	4.0	8.4	5.5	23	
SESI 15 16K 1WR	16	3.4	11.2	4.5	27	
SESI 15 18K 1WR	18	3.1	12.6	4.2	29	
SESI 15 21K 1WR	21	2.9	14.7	4.0	36	
SESI 15 27K 1WR	27	2.6	18.9	3.5	44	
SESI 15 29K 2WR	30	2.6	20	3.5	72	
SESI 15 33K 1WR	33	2.3	23	3.2	59	
SESI 15 48K 1WR	48	1.9	33	2.7	72	10
SESI 15 56K 1WR	56	1.8	39	2.5	82	
SESI 15 68K 1WR	68	1.6	47	2.2	110	
SESI 15 82K 1WR	82	1.5	57	2.1	120	
SESI 15 M10 1WR	100	1.35	70	1.9	155	
SESI 15 M12 1WR	120	1.2	84	1.7	180	
SESI 15 M15 1WR	150	1.1	105	1.5	230	
SESI 15 M22 1WR	220	0.9	154	1.3	355	
SESI 15 M33 1WR	330	0.74	231	1.0	630	
SESI 15 1M0 1WR	1000	0.38	800	0.5	2127.5	
SESI 15 2M3 1WR	2290	0.28	1900	0.36	4400	

Notes

2. Inductance at 0.25 V, 100 kHz
3. I rated (permanent DC) without heatsink ; with heatsink I = I rated x 1.4
4. Typical inductance value at recommended full load
5. I peak max = maximum peak value of current at +125 °C; L value not guaranteed
6. 40 % admissible I ripple over I rated at f = 200 kHz
7. Isolation voltage 500 Vdc - 1 min - Ri > 1 GΩ between winding and magnetic core

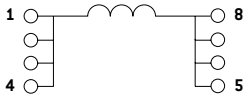


To Order

SESI 15 ### #WR

SESI	15	###	-	W	R
SMD Energy Storage Inductor	Size	Value code 4K9 = 4,9 µH M10 = 100 µH 1M0 = 1000 µH	Version	GW Terminals	High reliability

Connections

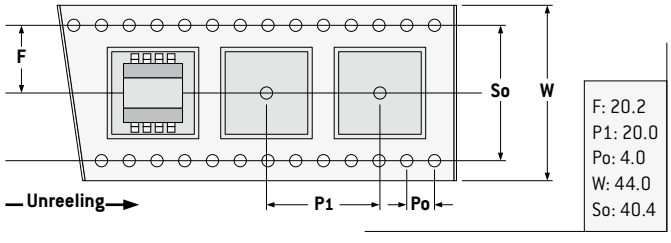


Marking

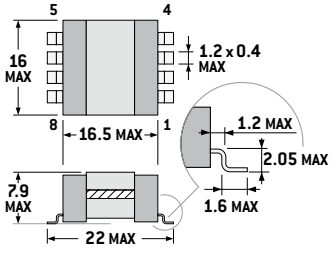
yyww : Date code

Packaging

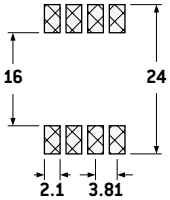
Tape and Reel:
400 pieces per reel of diameter 330 mm



Dimensions (mm, top view)



PCB Layout (suggested)



Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

SMD Power Inductors - SESI 18WR High Reliability Applications

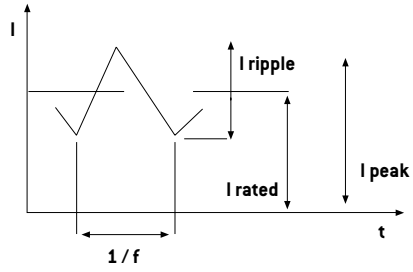
- Energy storage, smoothing, filtering
- Applied standards: ECSS-Q-70-02, MIL-STD-202, DO-160
- esa ESCC 3201/009 versions upon request
- Materials meet UL94-V0 rating
- Suited for IR and vapor reflow soldering
- Frequency range up to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 10 grams
- Shielded version upon request

Electrical Data (25°C)

ID Code	L[1] no load µH	I[2,4] rated A	L[3] at rated I µH	I[4,5] peak max A	Rdc at 25°C mΩ Max	Tol.
SESI 18 6K8 1WR	6.8	9.8	4.2	13.6	7.5	20
SESI 18 8K2 1WR	8.2	8.3	5.7	11.5	9.0	
SESI 18 11K 1WR	11	7.2	7.7	10	12	
SESI 18 15K 1WR	15	6.35	10.5	8.9	15	
SESI 18 18K 1WR	18	5.7	12.6	7.9	17	
SESI 18 22K 1WR	22	5.1	15.4	7.2	20	
SESI 18 22K 2WR	22.2	5.6	15.4	7.3	33	
SESI 18 27K 1WR	27	4.7	18.9	6.5	25	
SESI 18 37K 1WR	37	4.0	25.9	5.6	29	10
SESI 18 49K 1WR	49	3.5	34.3	4.8	45	
SESI 18 56K 1WR	56	3.3	39	4.6	48	
SESI 18 70K 1WR	70	2.9	49	4.1	65	
SESI 18 86K 1WR	86	2.6	60	3.7	72	
SESI 18 M10 1WR	100	2.4	70	3.3	75	
SESI 18 M12 1WR	120	2.2	84	3.1	115	
SESI 18 M15 1WR	150	1.95	105	2.7	125	
SESI 18 M18 1WR	180	1.8	126	2.6	175	
SESI 18 M22 1WR	220	1.6	154	2.3	210	
SESI 18 M33 1WR	330	1.34	231	1.9	250	
SESI 18 M47 1WR	470	0.9	376	1.35	600	

Notes

1. Inductance at 0.25 V, 100 kHz
2. I rated (permanent DC) without heatsink ; with heatsink I = I rated x 1.4
3. Typical inductance value at recommended full load
4. I peak max = maximum peak value of current at +125 °C; L value not guaranteed
5. 40 % admissible I ripple over I rated at f = 200 kHz
6. Isolation voltage 500 Vdc - 1 min - Ri > 1 GΩ between winding and magnetic core

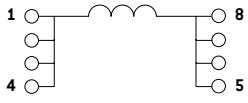


To Order

SESI 18 ### #WR

SESI	18	###	#	W	R
SMD Energy Storage Inductor	Size	Value code 4K9 = 4,9 µH M10 = 100 µH 1M0 = 1000 µH	Version	GW Terminals	High reliability

Connections

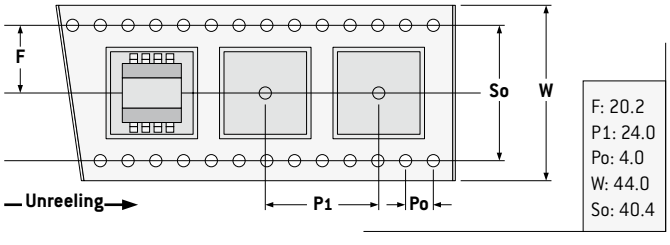


Marking

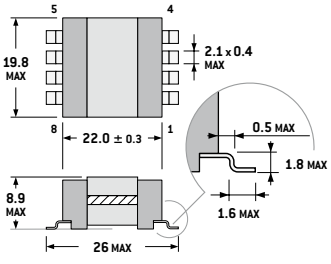
yyww : Date code

Packaging

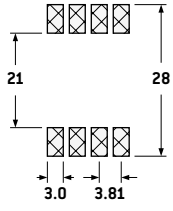
Tape and Reel:
300 pieces per reel of diameter 330 mm



Dimensions (mm, top view)



PCB Layout (suggested)



SMD Power Inductors - SESI 22WR High Reliability Applications

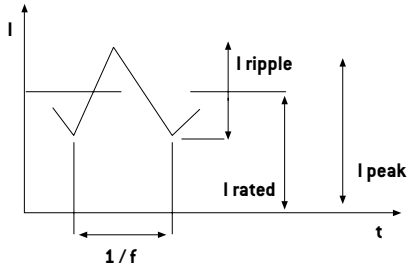
- Energy storage, smoothing, filtering
- Applied standards: ECSS-Q-70-02, MIL-STD-202, DO-160
- esa ESCC 3201/009 version upon request
- Materials meet UL94-V0 rating
- Suited for IR and vapor reflow soldering
- Frequency range up to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 26 grams
- Shielded version upon request

Electrical Data (25°C)

ID Code	L[1] no load µH	I[2,4] rated A	L[3] at rated I µH	I[4,5] peak max A	Rdc at 25°C mΩ Max	Tol.
SESI 22 7K0 2WR	7	18.9	3.8	24.0	5.0	20
SESI 22 7K7 2WR	7.7	16.0	5.4	20.0	4.5	
SESI 22 10K 2WR	10.0	13.8	7.0	17.7	5.5	
SESI 22 13K 2WR	13.0	12.0	9.1	15.6	7.0	
SESI 22 19K 2WR	19.2	10.9	11.5	14.0	11	
SESI 22 24K 2WR	24.0	8.4	16.8	11.5	13	
SESI 22 33K 2WR	33.0	7.7	23.0	9.8	20	
SESI 22 47K 1WR	47.0	5.7	37.6	8.0	16	10
SESI 22 64K 1WR	64.0	5.0	51.2	7.0	21	
SESI 22 82K 1WR	82.0	4.3	65.6	6.1	24	
SESI 22 M10 1WR	100	3.9	80	5.5	30	
SESI 22 M15 1WR	150	3.2	120	4.7	44	
SESI 22 M21 1WR	210	2.7	168	3.8	70	
SESI 22 M34 1WR	340	2.1	272	3.0	120	
SESI 22 M47 1WR	470	1.8	376	2.5	180	
SESI 22 M68 1WR	680	1.5	544	2.1	220	
SESI 22 M82 1WR	820	1.4	656	2.0	300	
SESI 22 1M0 1WR	1000	1.2	800	1.8	330	
SESI 22 1M5 1WR	1500	1.1	1200	1.4	500	
SESI 22 2M2 1WR	2200	0.8	1760	1.2	760	

Notes

1. Inductance at 0.25 V, 100 kHz
2. I rated (permanent DC) without heatsink ; with heatsink I = I rated x 1.4
3. Typical inductance value at recommended full load
4. I peak max = maximum peak value of current at +125 °C; L value not guaranted
5. 35 % admissible I ripple over I rated at f = 200 kHz
6. Isolation voltage 500 Vdc - 1 min - Ri > 1 GΩ between winding and magnetic core

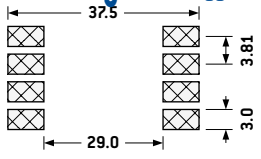


To Order

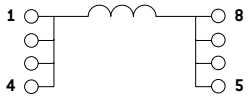
SESI 22 ### #WR

SESI	22	###	#	S	R
SMD Energy Storage Inductor	Size	Value code 7K7 = 7,7 µH M10 = 100 µH 1M0 = 1000 µH	Version	GW Terminals	High reliability

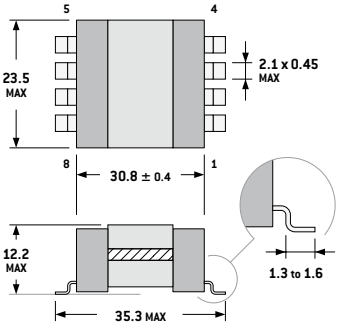
PCB Layout (suggested)



Connections

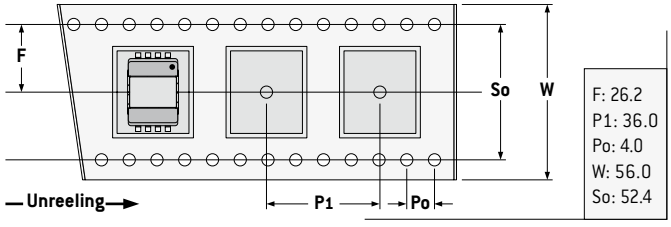


Dimensions (mm, top view)



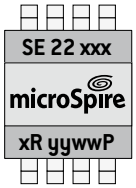
Packaging

Tape and Reel:
100 units per reel of diameter 330 mm



F: 26.2
P1: 36.0
Po: 4.0
W: 56.0
So: 52.4

Marking



yyww :
Date code

Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

SMD Power Inductors - SESI 32W/PR High Reliability Applications

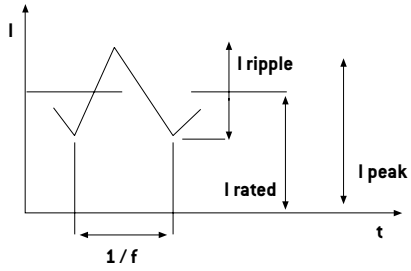
- esa ESCC 3201/009 version upon request
- Inductance values: 4.7 µH to 4700 µH
- Current up to 27 Arms and 38 A peak
- Through-hole design
- Materials meet UL94-V0 rating
- Suited for IR and vapor reflow soldering
- Frequency range up to 1 MHz
- Operating temperature range: –55 °C to +125 °C
- Weight: 56 grams
- Shielded version upon request

Electrical Data (25°C)

ID Code	L[1] no load µH	I[2,4] rated A	L[3] at rated I µH	I[4,5] peak max A	Rdc at 25°C mΩ Max	Tol.
SESI 32 4K9 1#R	4.9	24.0	3.0	27.6	1.9	
SESI 32 12K 1#R	12.1	15.5	7.3	17.8	4.4	30
SESI 32 22K 1#R	22.5	11.5	13.5	13.2	7.8	
SESI 32 36K 1#R	36.1	9.2	21. 75	10.6	13	20
SESI 32 53K 1#R	52.9	7.6	34.2	8.7	18	
SESI 32 73K 1#R	72.9	6.5	47.2	7.5	25	
SESI 32 84K 1#R	84.1	6.0	68.0	6.9	29	
SESI 32 M11 1#R	109	5.3	88.0	6.1	38.5	
SESI 32 M15 1#R	152	4.5	123	5.2	54.5	
SESI 32 M20 1#R	202	3.9	163	4.5	70	
SESI 32 M26 1#R	260	3.4	210	3.9	89.5	
SESI 32 M35 1#R	348	3.0	281	3.4	117.5	10
SESI 32 M45 1#R	476	2.5	385	2.9	160	
SESI 32 M62 1#R	624	2.2	505	2.5	221	
SESI 32 M83 1#R	828	1.9	670	2.2	254	
SESI 32 1M0 1#R	1020	1.7	826	2.0	353	
SESI 32 2M0 1#R	2045	1.2	1650	1.4	665	
SESI 32 4M7 1#R	4709	0.8	3760	0.92	1300	

Notes

1. Inductance at 0.25 V, 100 kHz
2. I rated (permanent DC) without heatsink ; with heatsink I = I rated x 1.4
3. Typical inductance value at recommended full load
4. I peak max = maximum peak value of current at +85 °C; L value not guaranteed
5. 35 % admissible I ripple over I rated at f = 200 kHz
6. Isolation voltage 500 Vdc - 1 min - Ri > 1 GΩ between winding and magnetic core



To Order

SESI 32 ### 1#R

SESI	32	###	1	#	R
SMD Energy Storage Inductor	Size	Value code 35K = 35 µH	Version	**P** : Pins through hole **W** : GW terminals	High reliability

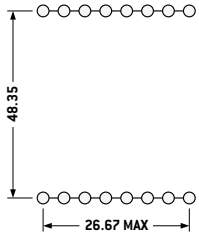
Packaging

Individually packed 20 parts on 2 layers.

Applications

Energy storage, smoothing, filtering.

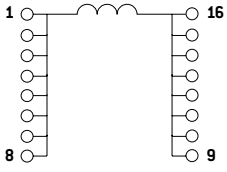
PCB Layout (suggested)



Marking

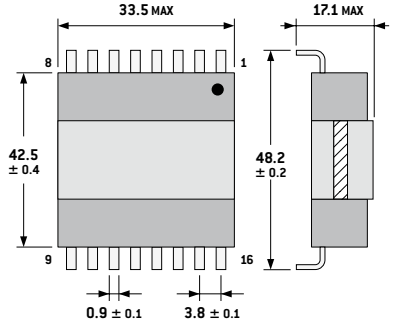
yyww :
Date code

Connections

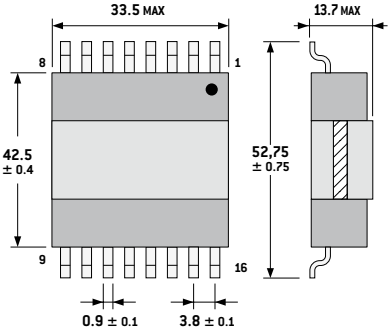


Dimensions (mm)

VARIANT P : pins through hole



VARIANT W : GW terminals



SMD Power Inductors SESI xx

esa QPL Components

SESI series are usually installed on Military applications and breadboards for Space applications.

Since January 2003, Microspire has been manufacturing Radio Frequency Fixed Coils, SESI series fulfilling ESA ESCC Generic specification N°3201 and detail specification N°3201/009.

This qualification approval includes final production tests Chart II, burn-in and electrical measurements to testing level B Chart III and qualification testing Chart IV.

For procurement, different quality levels are offered :

- Final production tests Chart II
- Burn-in and electrical measurements Chart III with level B or C (as required)
- Lot acceptance testing Chart V if required

Components delivered through this specification need to be processed and inspected in accordance with the Microspire Process Identification Document (P.I.D.).

Each component delivered is traceable to its production lot.

The finish will be Sn60Pb40.

Cross reference chart

Microspire Non-QPL ID Code	ESA SCC Component Part Number
SESI 9.1 1K0 1WR	3201009 05 x 1L0 N
SESI 9.1 1K5 1WR	3201009 05 x 1L5 N
SESI 9.1 2K0 2WR	3201009 05 x 2L0 N
SESI 9.1 2K6 2WR	3201009 05 x 2L6 M
SESI 9.1 3K4 2WR	3201009 05 x 3L4 M
SESI 9.1 4K3 2WR	3201009 05 x 4L3 M
SESI 9.1 6K2 2WR	3201009 05 x 6L2 M
SESI 9.1 8K5 2WR	3201009 05 x 8L5 M
SESI 9.1 10K 2WR	3201009 05 x 100 M
SESI 9.1 15K 2WR	3201009 05 x 150 M
SESI 9.1 18K 2WR	3201009 05 x 180 M
SESI 9.1 22K 2WR	3201009 05 x 220 M
SESI 9.1 26K 2WR	3201009 05 x 260 M
SESI 9.1 33K 2WR	3201009 05 x 330 K
SESI 9.1 47K 2WR	3201009 05 x 470 K
SESI 9.1 66K 2WR	3201009 05 x 660 K
SESI 9.1 81K 2WR	3201009 05 x 810 K
SESI 9.1 M10 2WR	3201009 05 x 101 K
SESI 9.1 M15 1WR	3201009 05 x 151 K
SESI 9.1 M22 1WR	3201009 05 x 221 K
SESI 9.1 M33 1WR	3201009 05 x 331 K
SESI 9.1 M47 1WR	3201009 05 x 471 K
SESI 9.1 M68 1WR	3201009 05 x 681 K
SESI 9.1 1M0 1WR	3201009 05 x 102 K

3201009 05 x ### y

x = **B** for Chart III level B x = **C** for Chart III level C	Tolerance : y = **N** for ±30% y = **M** for ±20% y = **K** for ±10%

Cross reference chart

Microspire Non-QPL ID Code	ESA SCC Component Part Number
SESI 14 3K3 1SR	3201009 01 x 3L3 M
SESI 14 4K7 1SR	3201009 01 x 4L7 M
SESI 14 6K0 1SR	3201009 01 x 6L0 M
SESI 14 8K2 1SR	3201009 01 x 8L2 M
SESI 14 10K 1SR	3201009 01 x 100 M
SESI 14 15K 1SR	3201009 01 x 150 M
SESI 14 22K 1SR	3201009 01 x 220 M
SESI 14 33K 1SR	3201009 01 x 330 M
SESI 14 47K 1SR	3201009 01 x 470 K
SESI 14 56K 1SR	3201009 01 x 560 K
SESI 14 68K 1SR	3201009 01 x 680 K
SESI 14 82K 1SR	3201009 01 x 820 K
SESI 14 M10 1SR	3201009 01 x 101 K
SESI 14 M12 1SR	3201009 01 x 121 K
SESI 14 M15 1SR	3201009 01 x 151 K
SESI 14 M18 1SR	3201009 01 x 181 K
SESI 14 M22 1SR	3201009 01 x 221 K
SESI 14 M33 1SR	3201009 01 x 331 K

3201009 01 x ### y

x = **B** for Chart III level B x = **C** for Chart III level C	Tolerance : y = **M** for ±20% y = **K** for ±10%

SMD Power Inductors SESI xx
esa QPL Components

Cross reference chart

Microspire Non-QPL ID Code	ESA SCC Component Part Number
SESI 15 1K5 2SR	3201009 02 x 1L5 N
SESI 15 1K8 1SR	3201009 02 x 1L8 N
SESI 15 2K7 1SR	3201009 02 x 2L7 M
SESI 15 4K9 1SR	3201009 02 x 4L9 M
SESI 15 6K4 1SR	3201009 02 x 6L4 M
SESI 15 8K0 1SR	3201009 02 x 8L0 M
SESI 15 12K 1SR	3201009 02 x 120 M
SESI 15 16K 1SR	3201009 02 x 160 M
SESI 15 18K 1SR	3201009 02 x 180 M
SESI 15 21K 1SR	3201009 02 x 210 M
SESI 15 27K 1SR	3201009 02 x 270 M
SESI 15 33K 1SR	3201009 02 x 330 M
SESI 15 48K 1SR	3201009 02 x 480 K
SESI 15 56K 1SR	3201009 02 x 560 K
SESI 15 68K 1SR	3201009 02 x 680 K
SESI 15 82K 1SR	3201009 02 x 820 K
SESI 15 M10 1SR	3201009 02 x 101 K
SESI 15 M12 1SR	3201009 02 x 121 K
SESI 15 M15 1SR	3201009 02 x 151 K
SESI 15 M22 1SR	3201009 02 x 221 K
SESI 15 M33 1SR	3201009 02 x 331 K
SESI 15 1M0 1SR	3201009 02 x 102 K
SESI 15 2M3 1SR	3201009 02 x 232 K

3201009 02 x ### y

x = B for Chart III level B
x = C for Chart III level C

Tolerance :
y = **N** for ±30%
y = **M** for ±20%
y = **K** for ±10%

Cross reference chart

Microspire Non-QPL ID Code	ESA SCC Component Part Number
SESI 15 1K5 2WR	3201009 03 x 1L5 N
SESI 15 1K8 1WR	3201009 03 x 1L8 N
SESI 15 2K7 1WR	3201009 03 x 2L7 M
SESI 15 4K9 1WR	3201009 03 x 4L9 M
SESI 15 6K4 1WR	3201009 03 x 6L4 M
SESI 15 8K0 1WR	3201009 03 x 8L0 M
SESI 15 12K 1WR	3201009 03 x 120 M
SESI 15 16K 1WR	3201009 03 x 160 M
SESI 15 18K 1WR	3201009 03 x 180 M
SESI 15 21K 1WR	3201009 03 x 210 M
SESI 15 27K 1WR	3201009 03 x 270 M
SESI 15 33K 1WR	3201009 03 x 330 M
SESI 15 48K 1WR	3201009 03 x 480 K
SESI 15 56K 1WR	3201009 03 x 560 K
SESI 15 68K 1WR	3201009 03 x 680 K
SESI 15 82K 1WR	3201009 03 x 820 K
SESI 15 M10 1WR	3201009 03 x 101 K
SESI 15 M12 1WR	3201009 03 x 121 K
SESI 15 M15 1WR	3201009 03 x 151 K
SESI 15 M22 1WR	3201009 03 x 221 K
SESI 15 M33 1WR	3201009 03 x 331 K
SESI 15 1M0 1WR	3201009 03 x 102 K
SESI 15 2M3 1WR	3201009 03 x 232 K

3201009 03 x ### y

x = B for Chart III level B
x = C for Chart III level C

Tolerance :
y = **N** for ±30%
y = **M** for ±20%
y = **K** for ±10%

Cross reference chart

Microspire Non QPL ID Code	ESA SCC Component Part Number
SESI 18 6K8 1WR	3201009 04 x 6L8 M
SESI 18 8K2 1WR	3201009 04 x 8L2 M
SESI 18 11K 1WR	3201009 04 x 110 M
SESI 18 15K 1WR	3201009 04 x 150 M
SESI 18 18K 1WR	3201009 04 x 180 M
SESI 18 22K 1WR	3201009 04 x 220 M
SESI 18 27K 1WR	3201009 04 x 270 M
SESI 18 37K 1WR	3201009 04 x 370 K
SESI 18 49K 1WR	3201009 04 x 490 K
SESI 18 56K 1WR	3201009 04 x 560 K
SESI 18 70K 1WR	3201009 04 x 700 K
SESI 18 86K 1WR	3201009 04 x 860 K
SESI 18 M10 1WR	3201009 04 x 101 K
SESI 18 M12 1WR	3201009 04 x 121 K
SESI 18 M15 1WR	3201009 04 x 151 K
SESI 18 M18 1WR	3201009 04 x 181 K
SESI 18 M22 1WR	3201009 04 x 221 K
SESI 18 M33 1WR	3201009 04 x 331 K

3201009 04 x ### y

x = B for Chart III level B
x = C for Chart III level C

Tolerance :
y = **M** for ±20%
y = **K** for ±10%

SMD Power Inductors SESI xx

esa QPL Components

Cross reference chart

Microspire Non-QPL ID Code	ESA SCC Component Part Number
SESI 22 7K0 2WR	3201009 06 x 7L0 M
SESI 22 7K7 2WR	3201009 06 x 7L7 M
SESI 22 10K 2WR	3201009 06 x 100 M
SESI 22 13K 2WR	3201009 06 x 130 M
SESI 22 19K 2WR	3201009 06 x 190 M
SESI 22 24K 2WR	3201009 06 x 240 M
SESI 22 33K 2WR	3201009 06 x 330 M
SESI 22 47K 1WR	3201009 06 x 470 K
SESI 22 64K 1WR	3201009 06 x 640 K
SESI 22 82K 1WR	3201009 06 x 820 K
SESI 22 M10 1WR	3201009 06 x 101 K
SESI 22 M15 1WR	3201009 06 x 151 K
SESI 22 M21 1WR	3201009 06 x 211 K
SESI 22 M34 1WR	3201009 06 x 341 K
SESI 22 M47 1WR	3201009 06 x 471 K
SESI 22 M68 1WR	3201009 06 x 681 K
SESI 22 M82 1WR	3201009 06 x 821 K
SESI 22 1M0 1WR	3201009 06 x 102 K
SESI 22 1M5 1WR	3201009 06 x 152 K
SESI 22 2M2 1WR	3201009 06 x 222 K

3201009 06 x ### y

x = B for Chart III level B
x = C for Chart III level C

Tolerance :
y = **M** for ±20%
y = **K** for ±10%

Cross reference chart

Microspire Non-QPL ID Code	ESA SCC Component Part Number
SESI 32 4K9 1WR	3201009 07 x 4L9 N
SESI 32 12K 1WR	3201009 07 x 120 N
SESI 32 22K 1WR	3201009 07 x 220 N
SESI 32 36K 1WR	3201009 07 x 360 M
SESI 32 53K 1WR	3201009 07 x 530 M
SESI 32 73K 1WR	3201009 07 x 730 K
SESI 32 84K 1WR	3201009 07 x 840 K
SESI 32 M11 1WR	3201009 07 x 111 K
SESI 32 M15 1WR	3201009 07 x 151 K
SESI 32 M20 1WR	3201009 07 x 201 K
SESI 32 M26 1WR	3201009 07 x 261 K
SESI 32 M35 1WR	3201009 07 x 351 K
SESI 32 M45 1WR	3201009 07 x 451 K
SESI 32 M62 1WR	3201009 07 x 621 K
SESI 32 M83 1WR	3201009 07 x 831 K
SESI 32 1M0 1WR	3201009 07 x 102 K
SESI 32 2M0 1WR	3201009 07 x 202 K
SESI 32 4M7 1WR	3201009 07 x 472 K

3201009 07 x ### y

x = B for Chart III level B
x = C for Chart III level C

Tolerance :
y = **M** for ±20%
y = **K** for ±10%
y = **N** for ±30%

Cross reference chart

Microspire Non-QPL ID Code	ESA SCC Component Part Number
SESI 32 4K9 1PR	3201009 08 x 4L9 N
SESI 32 12K 1PR	3201009 08 x 120 N
SESI 32 22K 1PR	3201009 08 x 220 N
SESI 32 36K 1PR	3201009 08 x 360 M
SESI 32 53K 1PR	3201009 08 x 530 M
SESI 32 73K 1PR	3201009 08 x 730 K
SESI 32 84K 1PR	3201009 08 x 840 K
SESI 32 M11 1PR	3201009 08 x 111 K
SESI 32 M15 1PR	3201009 08 x 151 K
SESI 32 M20 1PR	3201009 08 x 201 K
SESI 32 M26 1PR	3201009 08 x 261 K
SESI 32 M35 1PR	3201009 08 x 351 K
SESI 32 M45 1PR	3201009 08 x 451 K
SESI 32 M62 1PR	3201009 08 x 621 K
SESI 32 M83 1PR	3201009 08 x 831 K
SESI 32 1M0 1PR	3201009 08 x 102 K
SESI 32 2M0 1PR	3201009 08 x 202 K
SESI 32 4M7 1PR	3201009 08 x 472 K

3201009 07 x ### y

x = B for Chart III level B
x = C for Chart III level C

Tolerance :
y = **M** for ±20%
y = **K** for ±10%
y = **N** for ±30%

Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

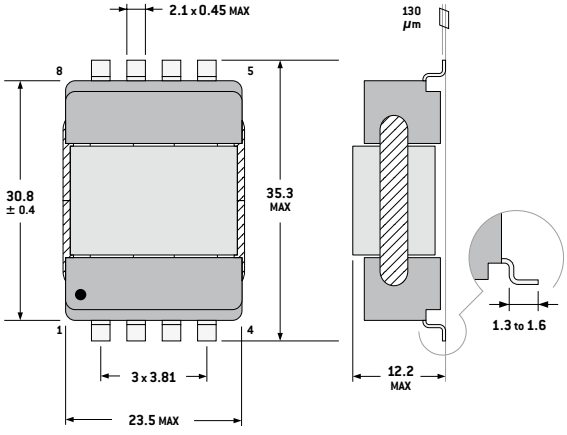
Differential Mode Chokes for DC/DC Embedded Applications
DMC 22 xxx 1WR Series

- Based on Microspire's «SESI22 Planar Technology»
- Low-profile SMD package (2x4 pins)
- Applied standards: MIL-STD-202, ECSS-Q-70-02, DO-160
- Dielectric strength test up to 500 V (50 Hz - 1 min)
- Materials meet UL94-V0 rating
- Thermal index according to IEC85: H (180 °C)
- Operating/storage temperature range: – 55 °C to + 125 °C
- Approx weight: 26 grams

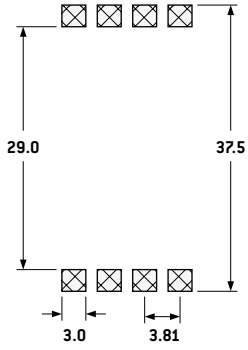
Electrical Data

ID Code	Inductance Value at 25°C (±40%) $L_{1-3} = L_{5-7}$	DC Current MAX	MAX RMS Current for ΔT = 40°C Heating	MAX DC Resistance (25°C)	Dielectric Strength (50Hz - 1min)
DMC22 M25 1WR	25 µH	4 A	1 A	60 mΩ	500 Vrms

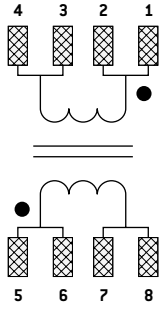
Typical Dimensions
(mm, top view)



PCB Layout
(suggested)

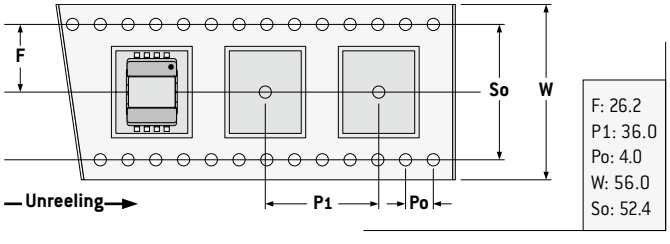


Connections
(Top view)

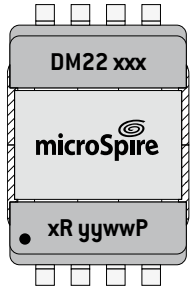


Packaging

Tape and Reel:
100 units per reel of diameter 330 mm



Marking



yyww :
Date code

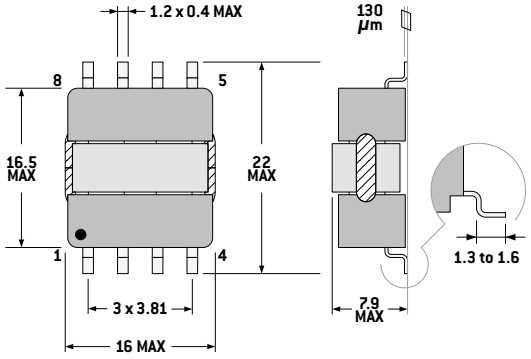
Common Mode Chokes for DC/DC Embedded Applications
CMC 15 xxx 2WR Series

- Based on Microspire's «SESI15 Planar Technology»
- Low-profile SMD package (2x4 pins)
- Applied standards: MIL-STD-202, ECSS-Q-70-02, DO-160
- esa ESCC 3201/009 version upon request
- RMS current range: from 0.6 A to 6.7 A for 40 °C heating above 25 °C
- Excellent impedance attenuation > 100 Ω from 300 kHz to 65 MHz
- Dielectric strength test up to 500 V (50 Hz - 1 min)
- Materials meet UL94-V0 rating
- Thermal index according to IEC85: H (180 °C)
- Operating/storage temperature range: –55 °C to +125 °C
- Approx weight: 5 grams

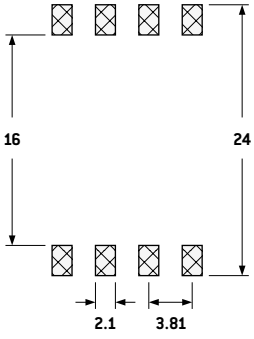
Electrical Data

ID Code	Inductance Value at 25°C (±40%)	Typical SRF	Max Impedance (Typical)	Max Attenuation (Z = 50Ω)	MAX RMS Current for ΔT = 40°C	MAX DC Resistance (25°C)	Dielectric Strength (50Hz - 1min)
CMC15 52K 2WR	0.05 mH	7.3 MHz	1.6 kΩ	25 dB	6.7 A	15 mΩ	500 Vrms
CMC15 M11 2WR	0.11 mH	5.8 MHz	3.7 kΩ	32 dB	4.4 A	35 mΩ	500 Vrms
CMC15 M22 2WR	0.22 mH	3.9 MHz	7.3 kΩ	37 dB	3.3 A	65 mΩ	500 Vrms
CMC15 M47 2WR	0.47 mH	2.4 MHz	15 kΩ	44 dB	2.2 A	150 mΩ	500 Vrms
CMC15 1M0 2WR	1.0 mH	1.8 MHz	33.5 kΩ	51 dB	1.4 A	350 mΩ	500 Vrms
CMC15 2M0 2WR	2.0 mH	1.2 MHz	66.9 kΩ	57 dB	0.95 A	770 mΩ	500 Vrms
CMC15 4M0 2WR	4.0 mH	0.9 MHz	151 kΩ	64 dB	0.55 A	1750 mΩ	500 Vrms

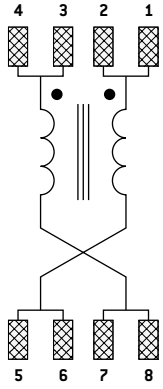
Typical Dimensions
(mm, top view)



PCB Layout
(suggested)



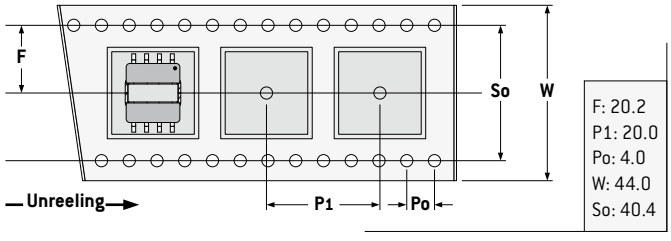
Connections
(top view)



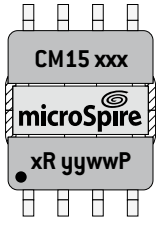
internal crossing for correct connection

Packaging

Tape and Reel:
400 units per reel of diameter 330 mm



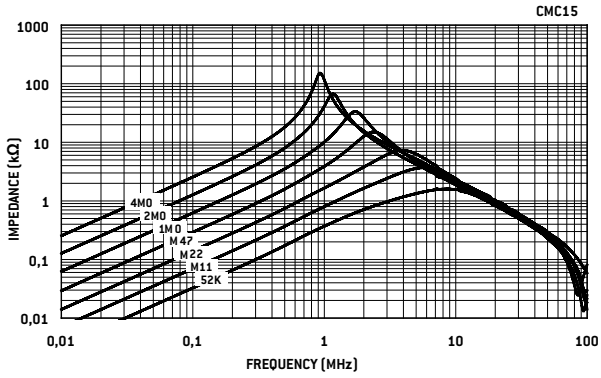
Marking



yyww :
Date code

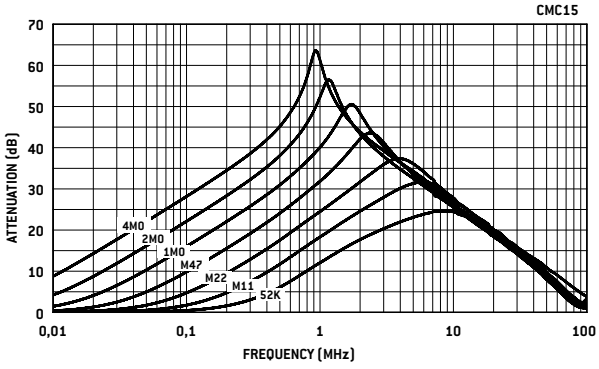
Common Mode Chokes for DC/DC Embedded Applications
CMC 15 xxx 2WR Series

Impedance



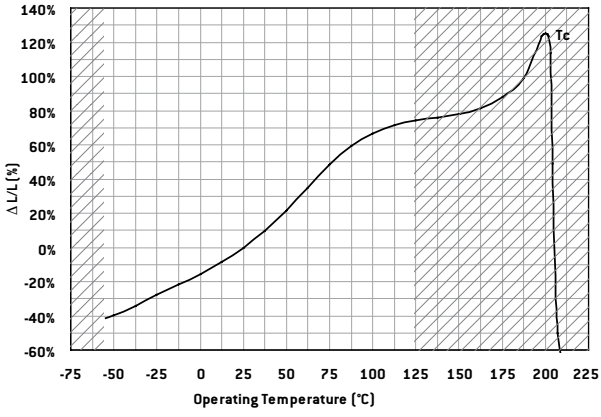
Typical values at 25°C with 1 mT at 10 kHz

Attenuation



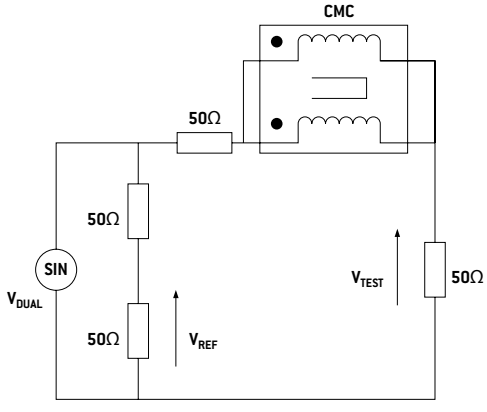
Typical values (Z = 50 Ω) at 25°C with 1 mT at 10 kHz

Variation vs Temperature



Change in inductance value (< 1 mT at 10 kHz)

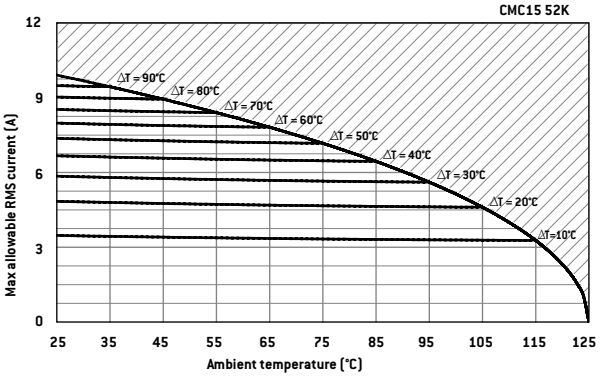
Attenuation Measurement Circuit

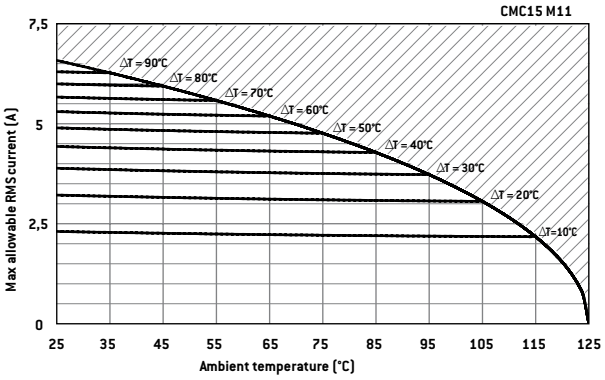


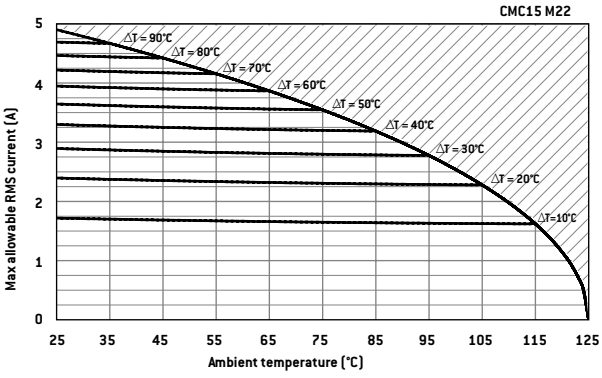
$$Att.\ (dB) = 20 \log_{10} \frac{V_{TEST}}{V}$$

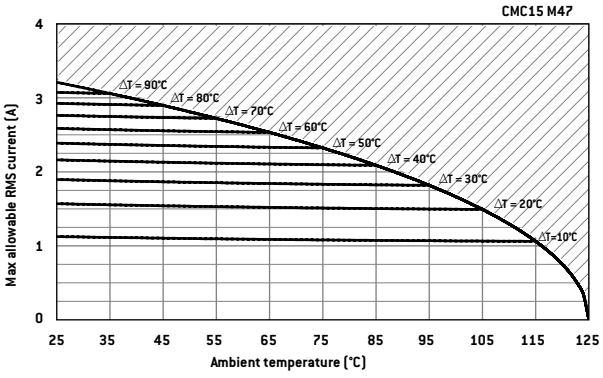
Common Mode Chokes for DC/DC Embedded Applications
CMC 15 xxx 2WR Series

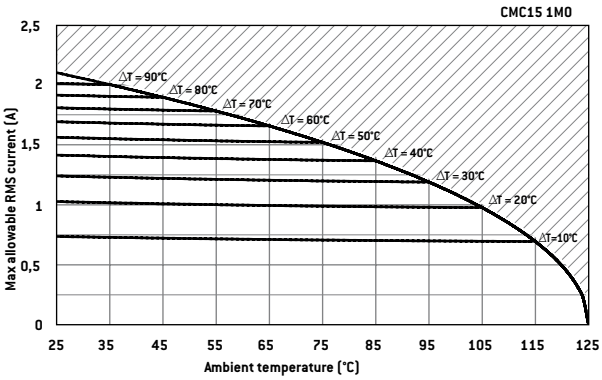
Derating Curves

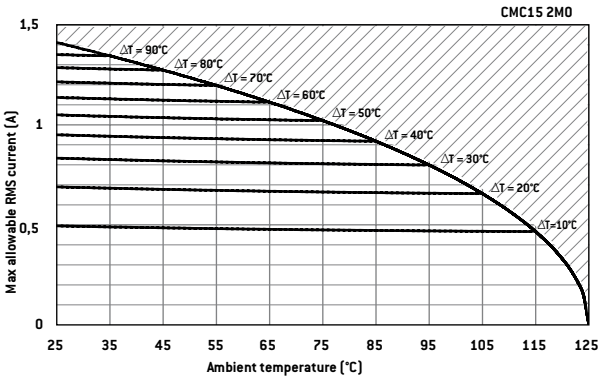


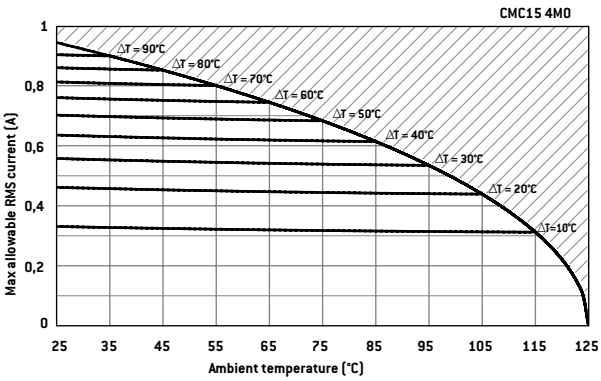












All thermal measurements under atmospheric conditions with component mounted on 1 dm^2 PCB without cooling device.

All above graphs indicate maximum RMS current allowed through component v. ambient temperature for a defined ΔT.

Maximum operating temperature is + 125 °C.

Example:

CMC15 52K for application with Tamb = + 85 °C Max current allowed is < 6.5 Arms with $\Delta T < 40$ °C.

If temp increase allowed in application is limited to $\Delta T < 20$ °C, current must be reduced to 4.5 Arms.

Tel : + 33 (0) 3 82 59 13 33 www.exxelia.com
Specifications may change without prior notice - Revised 03/14

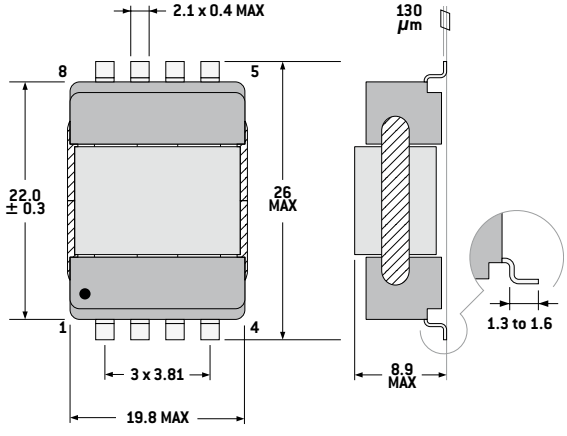
Common Mode Chokes for DC/DC Embedded Applications
CMC 18 xxx 2WR Series

- Based on Microspire's «SESI18 Planar Technology»
- Low-profile SMD package (2x4 pins)
- Applied standards: MIL-STD-202, ECSS-Q-70-02, DO-160
- esa ESCC 3201/009 version upon request
- RMS current range: from 0.9 A to 9.9 A for 40 °C heating above 25 °C
- Excellent impedance attenuation > 100 Ω from 300 kHz to 45 MHz
- Dielectric strength test up to 500 V (50 Hz - 1 min)
- Materials meet UL94-V0 rating
- Thermal index according to IEC85: H (180 °C)
- Operating/storage temperature range: – 55 °C to + 125 °C
- Approx weight: 10 grams

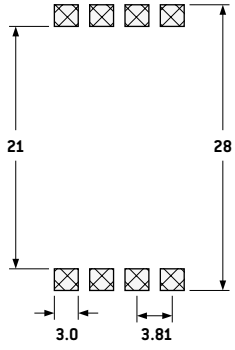
Electrical Data

ID Code	Inductance Value at 25°C (±40%)	Typical SRF	Max Impedance (Typical)	Max Attenuation (Z = 50Ω)	MAX RMS Current for ΔT = 40°C	MAX DC Resistance (25°C)	Dielectric Strength (50Hz - 1min)
CMC18 60K 2WR	0.06 mH	4.5 MHz	1.4 kΩ	23 dB	9.9 A	7 mΩ	500 Vrms
CMC18 M13 2WR	0.13 mH	3.7 MHz	3 kΩ	30 dB	6.9 A	15 mΩ	500 Vrms
CMC18 M27 2WR	0.27 mH	2.5 MHz	6.3 kΩ	36 dB	4.5 A	35 mΩ	500 Vrms
CMC18 M54 2WR	0.54 mH	2 MHz	13.2 kΩ	42 dB	3 A	75 mΩ	500 Vrms
CMC18 1M1 2WR	1.1 mH	1.4 MHz	33.7 kΩ	51 dB	2 A	175 mΩ	500 Vrms
CMC18 2M4 2WR	2.4 mH	0.8 MHz	96.8 kΩ	60 dB	1.3 A	415 mΩ	500 Vrms
CMC18 4M9 2WR	4.9 mH	0.55 MHz	325 kΩ	70 dB	0.9 A	920 mΩ	500 Vrms

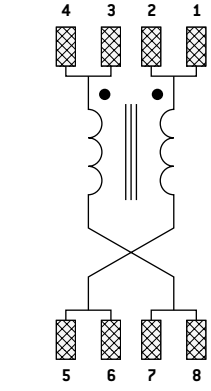
Typical Dimensions
(mm, top view)



PCB Layout
(suggested)



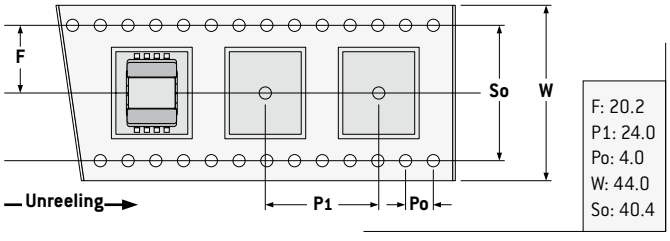
Connections
(top view)



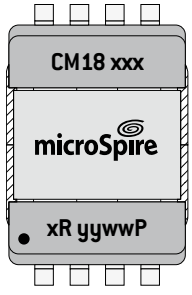
internal crossing
for correct connection

Packaging

Tape and Reel:
300 pieces per reel of diameter 330 mm



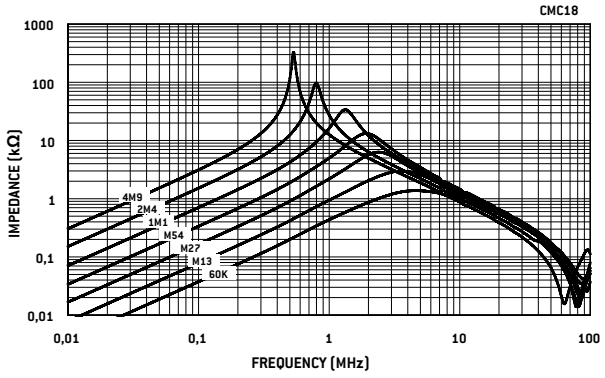
Marking



yyww :
Date code

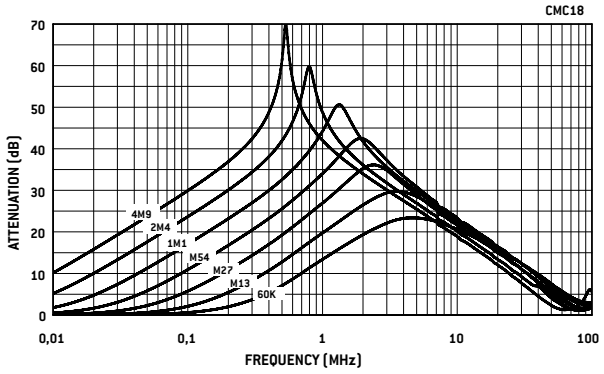
Common Mode Chokes for DC/DC Embedded Applications
CMC 18 xxx 2WR Series

Impedance



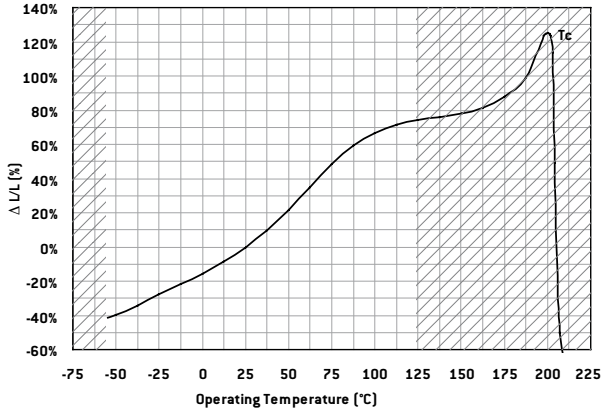
Typical values at 25 °C with 1 mT at 10 kHz

Attenuation



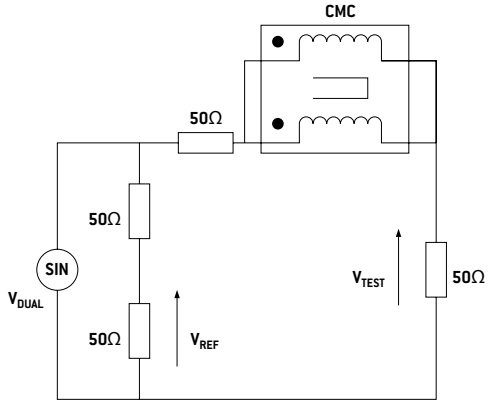
Typical values (Z = 50 Ω) at 25 °C with 1 mT at 10 kHz

Variation vs Temperature



Change in inductance value (< 1 mT at 10 kHz)

Attenuation Measurement Circuit



$$Att.\,(dB) = 20 \log_{10} \frac{V_{TEST}}{V}$$

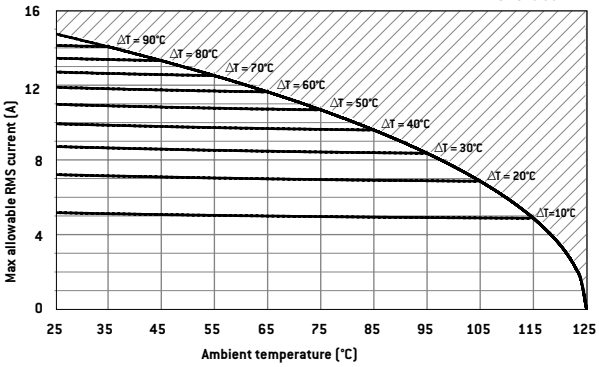
Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

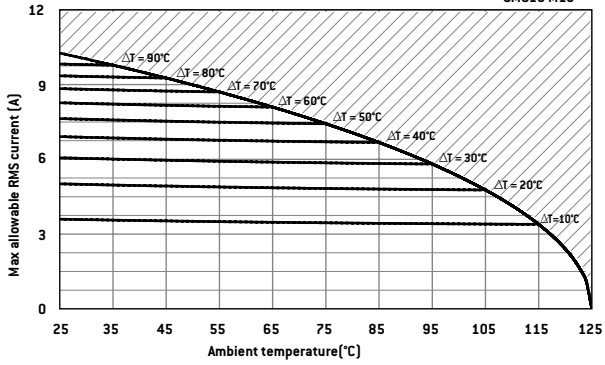
Common Mode Chokes for DC/DC Embedded Applications
CMC 18 xxx 2WR Series

Derating Curves

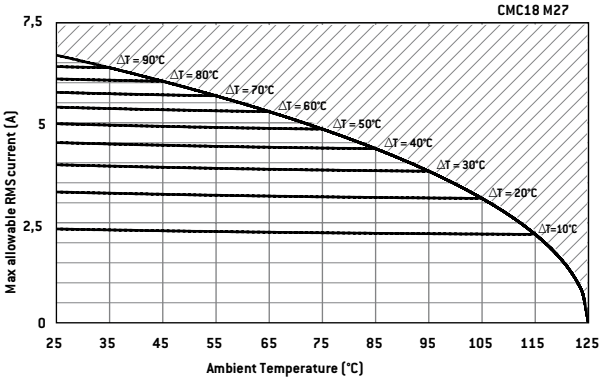
CMC18 60K



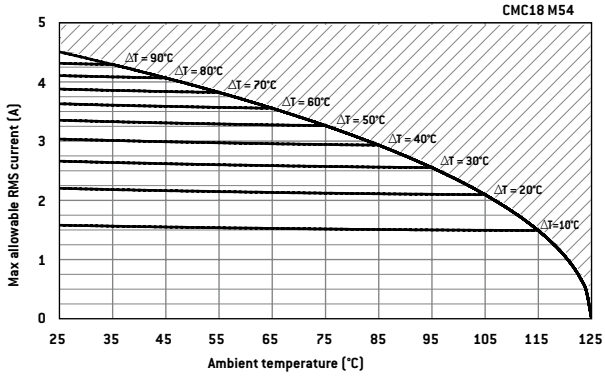
CMC18 M13



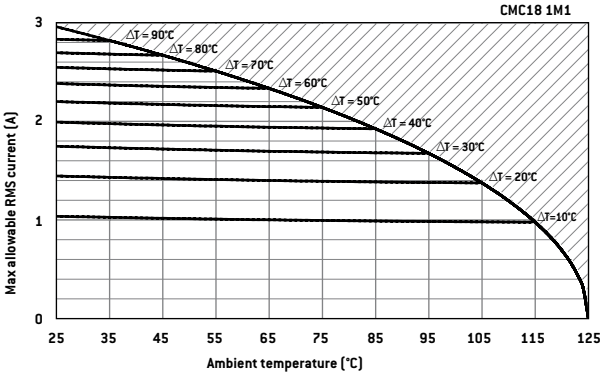
CMC18 M27



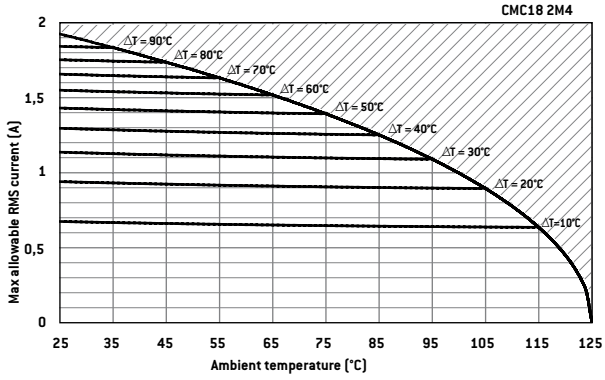
CMC18 M54



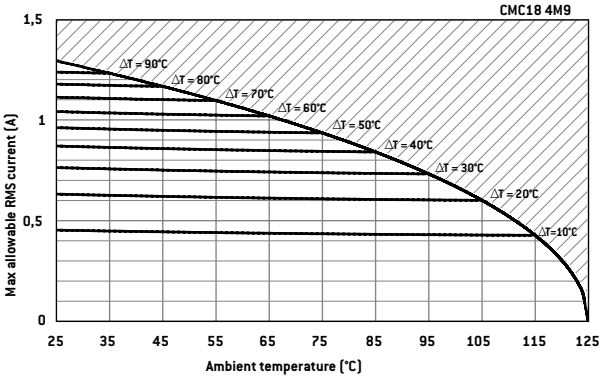
CMC18 1M1



CMC18 2M4



CMC18 4M9



All thermal measurements under atmospheric conditions with component mounted on 1 dm^2 PCB without cooling device.

All above graphs indicate maximum RMS current allowed through component v. ambient temperature for a defined ΔT.

Maximum operating temperature is + 125 °C.

Example :

CMC18 60K for application with Tamb = + 85 °C Max current allowed is < 9.6 Arms with $\Delta T < 40$ °C.

If temp increase allowed in application is limited to $\Delta T < 20$ °C, current must be reduced to 7 Arms.

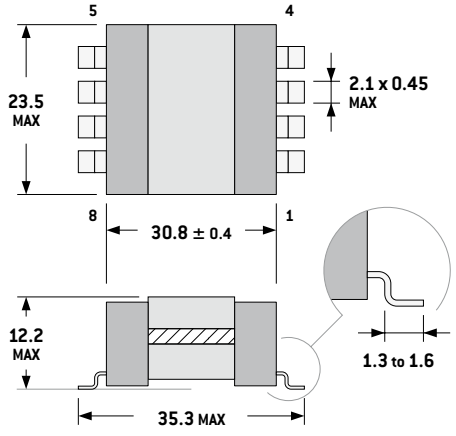
Common Mode Chokes for DC/DC Embedded Applications
CMC 22 xxx 2WR Series

- Based on Microspire's «SESI22 Planar Technology»
- Low-profile SMD package (2x4 pins)
- Applied standards: MIL-STD-202, ECSS-Q-70-02, DO-160
- esa ESCC 3201/009 version upon request
- RMS current range: from 1.9 A to 14.3 A for 40 °C heating above 25 °C
- Excellent impedance attenuation > 100 Ω from 300 kHz to 35 MHz
- Dielectric strength test up to 500 V (50 Hz - 1 min)
- Materials meet UL94-V0 rating
- Thermal index according to IEC85: H (180 °C)
- Operating/storage temperature range: – 55 °C to + 125 °C
- Approx weight: 26 grams

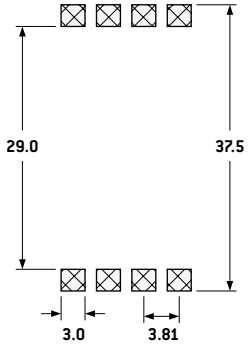
Electrical Data

ID Code	Inductance Value at 25°C (±40%)	Typical SRF	Max Impedance (Typical)	Max Attenuation (Z = 50Ω)	MAX RMS Current for ΔT = 40°C Heating	MAX DC Resistance (25°C)	Dielectric Strength (50Hz - 1min)
CMC22 58K 2WR	0.06 mH	3 MHz	1.1 kΩ	22 dB	14.3 A	5 mΩ	500 Vrms
CMC22 M14 2WR	0.14 mH	2 MHz	2.9 kΩ	30 dB	9.1 A	10 mΩ	500 Vrms
CMC22 M34 2WR	0.34 mH	1.5 MHz	9.1 kΩ	39 dB	5.8 A	20 mΩ	500 Vrms
CMC22 M74 2WR	0.74 mH	1.1 MHz	21.8 kΩ	47 dB	4.3 A	40 mΩ	500 Vrms
CMC22 1M6 2WR	1.6 mH	0.7 MHz	64.6 kΩ	56 dB	2.8 A	95 mΩ	500 Vrms
CMC22 3M3 2WR	3.3 mH	0.65 MHz	250 kΩ	68 dB	1.9 A	205 mΩ	500 Vrms

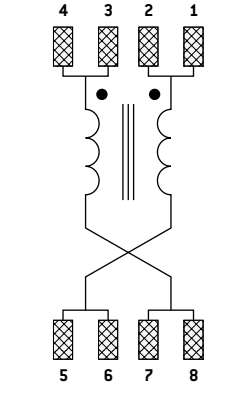
Typical Dimensions
(mm, top view)



PCB Layout
(suggested)



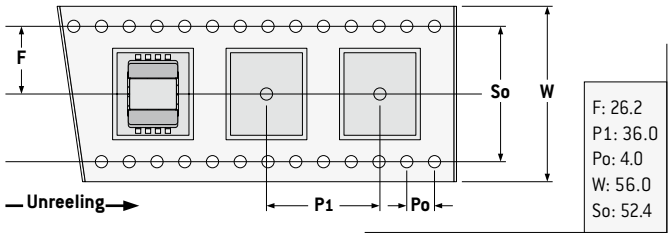
Connections
(top view)



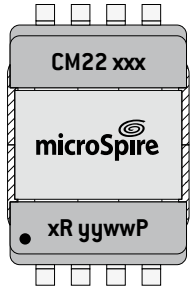
internal crossing
for correct connection

Packaging

Tape and Reel:
100 units per reel of diameter 330 mm



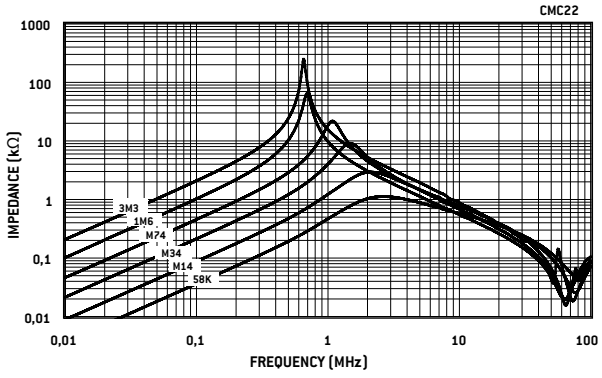
Marking



yyww :
Date code

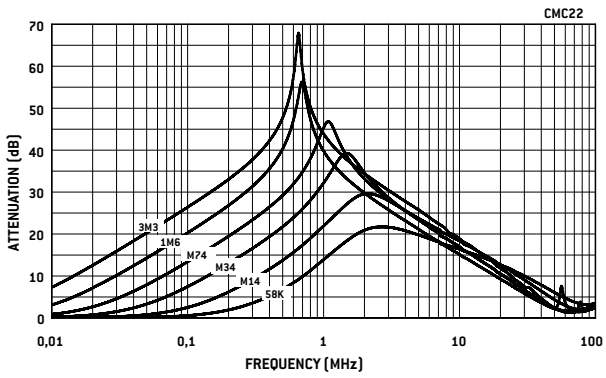
Common Mode Chokes for DC/DC Embedded Applications
CMC 22 xxx 2WR Series

Impedance



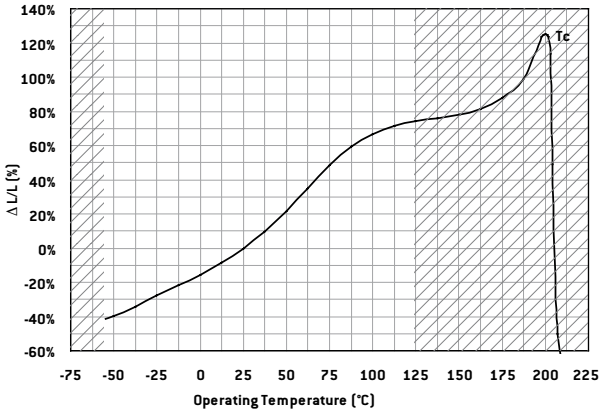
Typical values at 25°C with 1 mT at 10 kHz

Attenuation



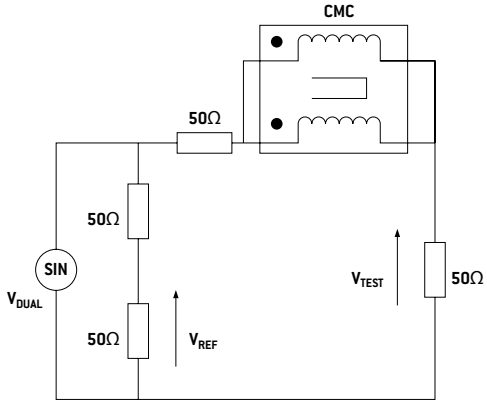
Typical values (Z = 50 Ω) at 25°C with 1 mT at 10 kHz

Variation vs Temperature



Change in inductance value (< 1 mT at 10 kHz)

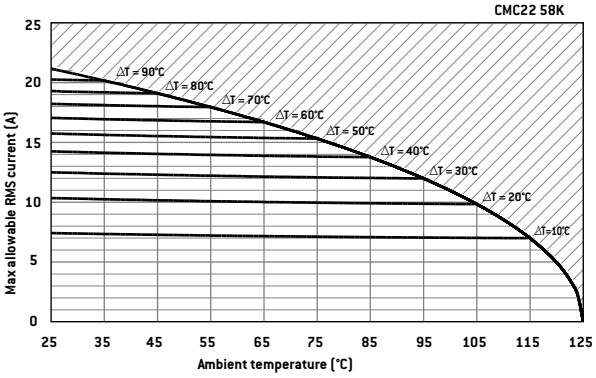
Attenuation Measurement Circuit

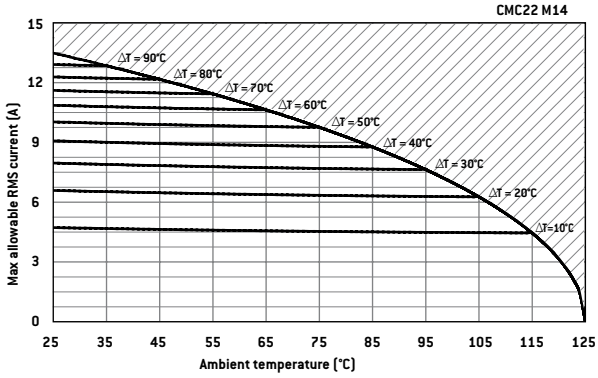


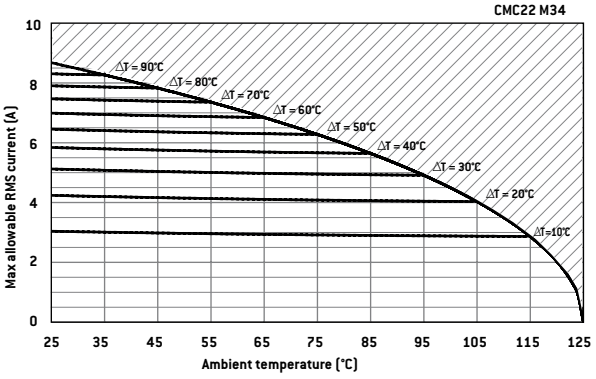
$$Att.\,(dB) = 20 \log 10 \frac{V_{TEST}}{V}$$

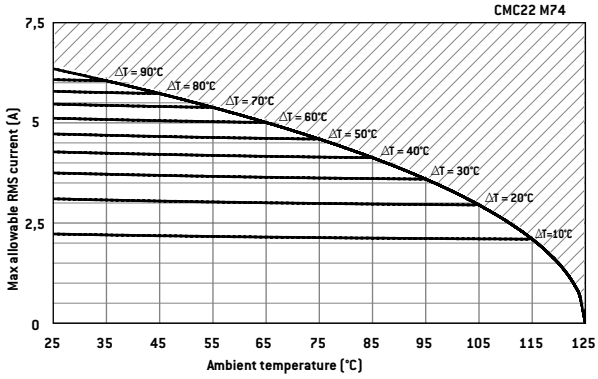
Common Mode Chokes for DC/DC Embedded Applications
CMC 22 xxx 2WR Series

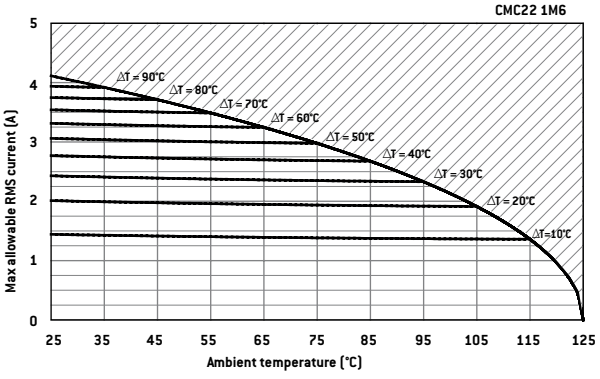
Derating Curves

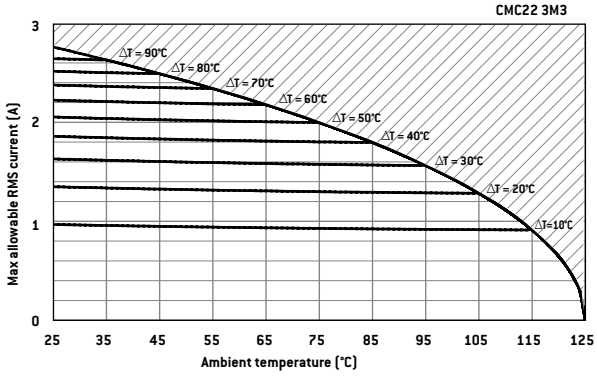












All thermal measurements under atmospheric conditions with component mounted on 1 dm^2 PCB without cooling device.
All above graphs indicate maximum RMS current allowed through component v. ambient temperature for a defined ΔT.
Maximum operating temperature is + 125 °C.

Example :
CMC22 58K for application with Tamb = + 85 °C. Max current allowed is < 14 Arms with $\Delta T < 40$ °C.
If temp increase allowed in application is limited to $\Delta T < 20$ °C, current must be reduced to 10 Arms.

SMD Power Inductors CMC 15WR - 18WR - 22WR

esa QPL Components

Since 2013, Microspire has been manufacturing Common Mode Chokes, CMC15/18/22 WR series fulfilling ESA ESCC Generic specification N° 3201 and detail specification N° 32010-10.

This qualification approval includes final production tests Chart II, burn-in and electrical measurements to testing level B Chart III and qualification testing Chart IV.

For procurement, different quality levels are offered :

- Final production tests Chart II
- Burn-in and electrical measurements Chart III with level B or C (as required)
- Lot acceptance testing Chart V if required

Components delivered through this specification need to be processed and inspected in accordance with the Microspire Process Identification Document (P.I.D.).

Each component delivered is traceable to its production lot.

The terminal material and finish shall be brass, plated with 2 to 4 μm of Nickel, the finish shall be either Sn60Pb40 or Sn90Pb10.

Cross reference chart

Microspire Non-QPL ID Code	ESA SCC Component Part Number
CMC 15 52K 2WR	3201010 01 x 520
CMC 15 M11 2WR	3201010 01 x 111
CMC 15 M22 2WR	3201010 01 x 221
CMC 15 M47 2WR	3201010 01 x 471
CMC 15 1M0 2WR	3201010 01 x 102
CMC 15 2M0 2WR	3201010 01 x 202
CMC 15 4M0 2WR	3201010 01 x 402
CMC 18 60K 2WR	3201010 03 x 600
CMC 18 M13 2WR	3201010 03 x 131
CMC 18 M27 2WR	3201010 03 x 271
CMC 18 M54 2WR	3201010 03 x 541
CMC 18 1M1 2WR	3201010 03 x 112
CMC 18 2M4 2WR	3201010 03 x 242
CMC 18 4M9 2WR	3201010 03 x 492
CMC 22 58K 2WR	3201010 05 x 580
CMC 22 M14 2WR	3201010 05 x 141
CMC 22 M34 2WR	3201010 05 x 341
CMC 22 M74 2WR	3201010 05 x 741
CMC 22 1M6 2WR	3201010 05 x 162
CMC 22 3M3 2WR	3201010 05 x 332

3201010 0 x ### y

x = B for Chart III level B
x = C for Chart III level C

Tolerance : ±40%

CMC 14 Common Mode Chokes Series
High Grade - Improved Temperature Stability

- Less than 20 % performance variations versus temperature (–55 °C/ +125 °C)
- Minimum impedance attenuation: 100 Ω from 100 kHz to 30 MHz
- Compact SMD package (2x4 pins)
- Applied standards: MIL-STD-202, ECSS-Q-ST-70-02C, DO-160 and ESCC 3201 generic specification for space products
- Materials meet UL94-V0 rating
- Thermal index according to IEC85 : H (180 °C)
- Operating/storage temperature range: –55 °C to +125 °C
- Approx weight: 5 grams

Electrical Data

ID Code	Inductance Value at 25°C (-40/+35%)	MAX RMS Current for ΔT = 40°C	MAX DC Resistance (25°C)
CMC14 M14 xWR	140 µH	7.2 A	3.0 mΩ
CMC14 M25 xWR	248 µH	6.4 A	3.5 mΩ
CMC14 M39 xWR	387 µH	5.7 A	4.4 mΩ
CMC14 M56 xWR	558 µH	5.4 A	5.0 mΩ
CMC14 M76 xWR	760 µH	4.5 A	7.0 mΩ
CMC14 M99 xWR	992 µH	3.8 A	10.0 mΩ
CMC14 1M2 xWR	1255 µH	3.2 A	14.0 mΩ
CMC14 1M5 xWR	1550 µH	2.6 A	20.0 mΩ
CMC14 2M2 xWR	2232 µH	2.2 A	29.0 mΩ

Notes

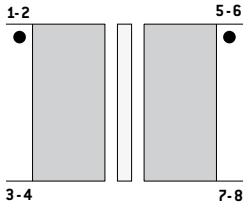
1. Dielectric strength test: 500v (50Hz - 1min)
2. Max power dissipation at +125°C: 400mW
3. Heat increase at Max current ≤25°C
4. 1:1 ratio (sector wound construction)
5. Interwinding capacitances < 15 pF
6. Variation of «L» values over the working temperature range ≤15 %
7. Admissible temp. during reflow soldering : +260°C / 30 seconds

To Order

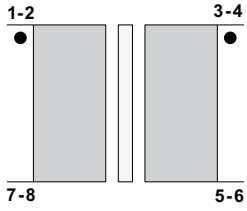
CMC 14 ### xWR

CMC 14	###	x
Range	Inductance value	Connections x = **2** connection 2 x = **3** connection 3

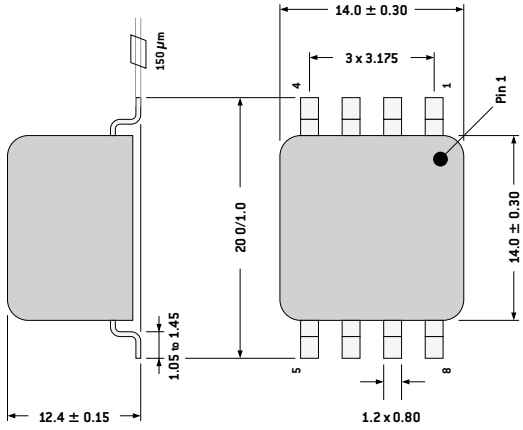
Connection 2



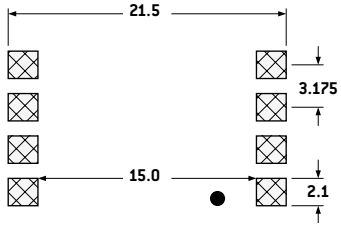
Connection 3



Typical Dimensions
(mm, top view)

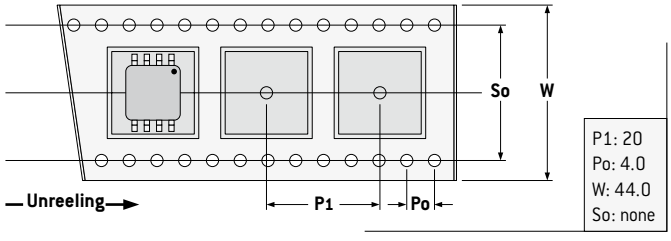


PCB Layout
(suggested)

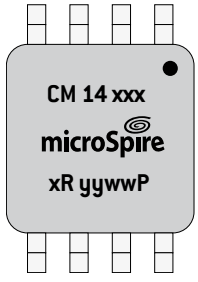


Packaging

Tape and Reel:
200 units per reel of diameter 330 mm



Marking



yyww :
Date code

Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

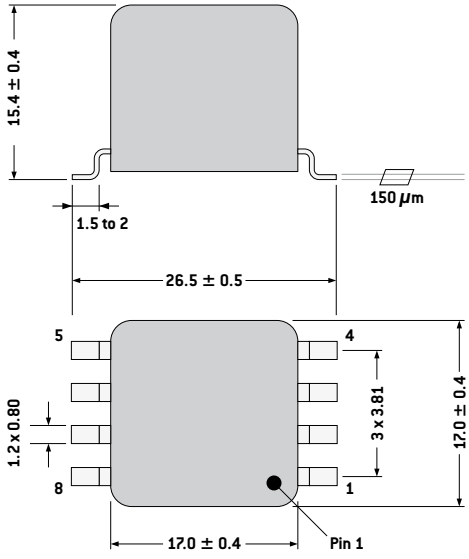
CMC 17 Common Mode Chokes Series
High Grade - Improved Temperature Stability

- Less than 20 % performance variations versus temperature (−55 °C/+125 °C)
- Minimum impedance attenuation: 100 Ω from 100 kHz to 30 MHz
- Compact SMD package (2x4 pins)
- Applied standards: MIL-STD-202, ECSS-Q-ST-70-02C, DO-160 and ESCC 3201 generic specification for space products
- RMS current range: from 1.1 A to 11.7 A for 40 °C heating above 25 °C
- Materials meet UL94-V0 rating
- Thermal index according to IEC85: H (180 °C)
- Operating/storage temperature range: −55 °C to +125 °C
- Approx weight: 10 grams

Electrical Data

ID Code	Inductance Value at 25°C (-40/+35%)	Typical SRF	Max Impedance (Typical)	Max Attenuation (Z = 50Ω)	MAX RMS Current for ΔT = 40°C	MAX DC Resistance (25°C)	Typical Leakage Inductance (100kHz)
CMC17 M45 1WR	0.45 mH	32 MHz	1 kΩ	20 dB	11.7 A	5 mΩ	0.5 µH
CMC17 1M2 1WR	1.15 mH	15 MHz	1.9 kΩ	26 dB	8.3 A	10 mΩ	1.1 µH
CMC17 2M6 1WR	2.59 mH	8 MHz	3.7 kΩ	32 dB	6 A	18 mΩ	2.3 µH
CMC17 5M8 1WR	5.83 mH	1.5 MHz	5.3 kΩ	35 dB	4 A	40 mΩ	6.3 µH
CMC17 13M 1WR	13.1 mH	0.6 MHz	9.4 kΩ	40 dB	2.7 A	90 mΩ	13.4 µH
CMC17 30M 1WR	30.3 mH	0.3 MHz	15.8 kΩ	44 dB	1.7 A	220 mΩ	32 µH
CMC17 69M 1WR	69.2 mH	0.1 MHz	29 kΩ	49 dB	1.1 A	500 mΩ	70 µH

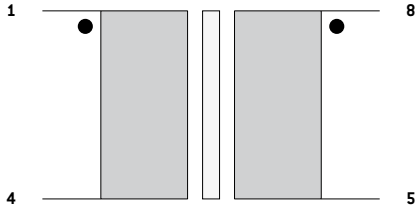
Typical Dimensions
(mm, top view)



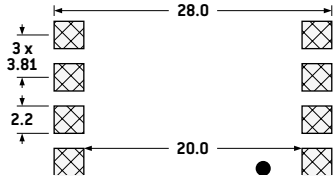
Notes

1. Dielectric strength test: 500v (50Hz - 1min)
2. 1:1 ratio (sector wound construction)

Connections

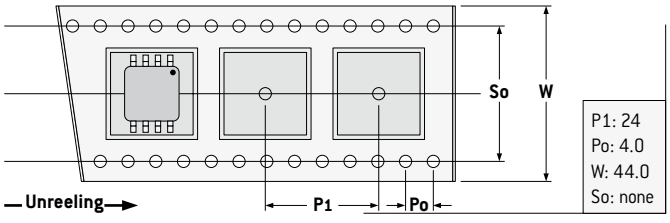


PCB Layout (suggested)

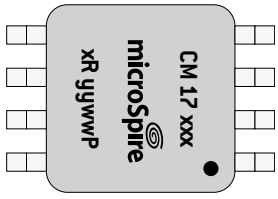


Packaging

Tape and Reel:
150 units per reel of diameter 330 mm



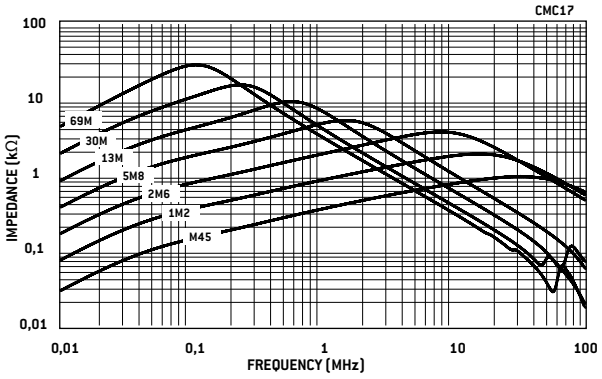
Marking



yyww :
Date code

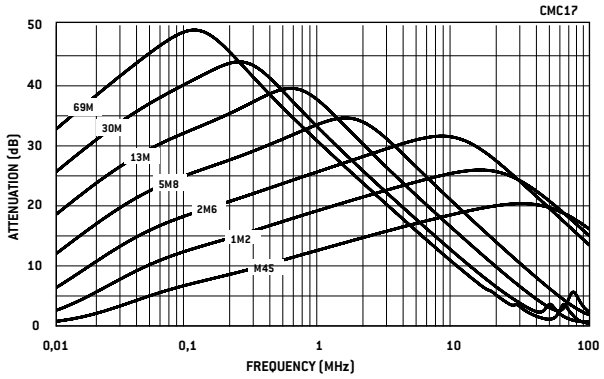
CMC 17 Common Mode Chokes Series
High Grade - Improved Temperature Stability

Impedance



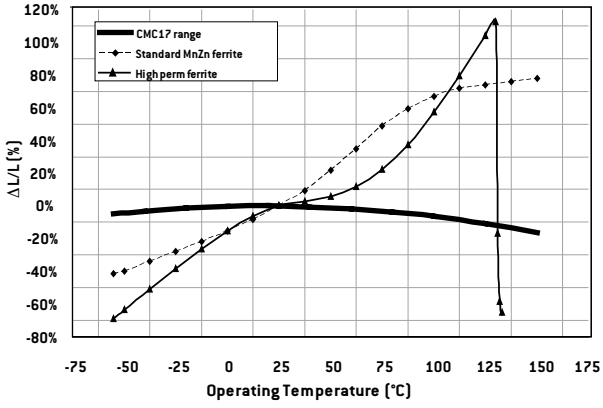
Typical values at 25 °C with 1 mT at 10 kHz

Attenuation



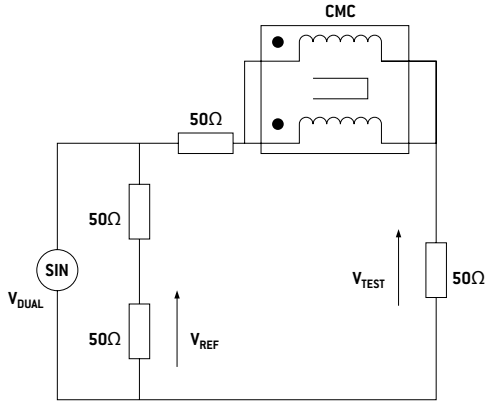
Typical values (Z = 50 Ω) at 25 °C with 1 mT at 10 kHz

Variation vs Temperature



Change in inductance value (< 1 mT at 10 kHz)

Attenuation Measurement Circuit

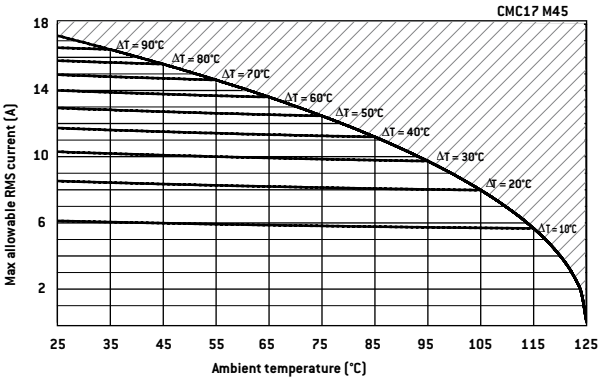


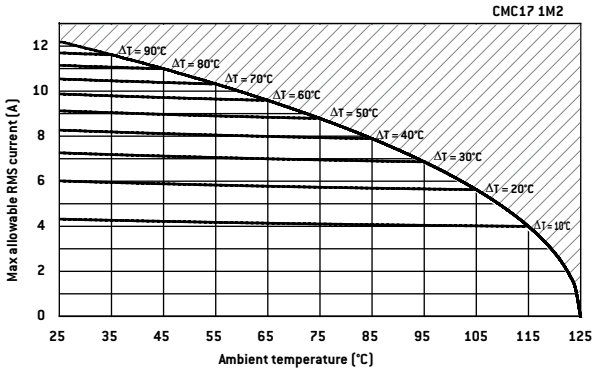
$$Att.\,(dB) = 20 \log 10 \frac{V_{TEST}}{V}$$

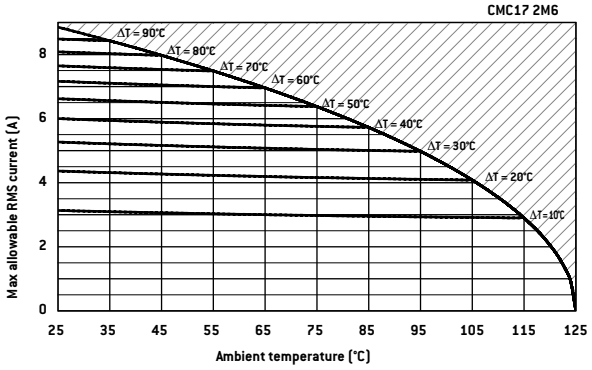
CMC17 range uses very high performance materials and therefore, offers remarkable temperature stability figures compared to standard or high-perm ferrite cores.

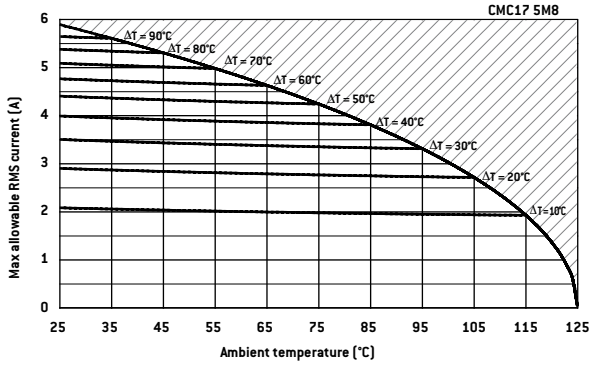
CMC 17 Common Mode Chokes Series
High Grade - Improved Temperature Stability

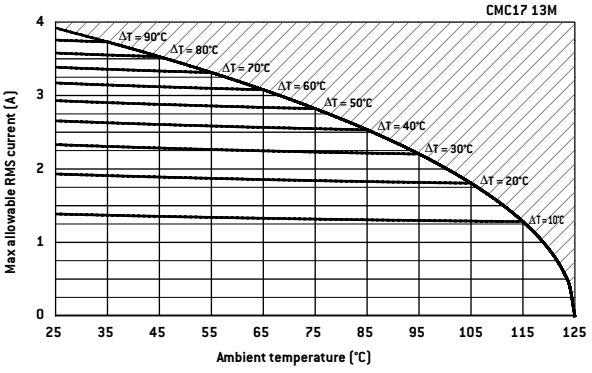
Derating Curves

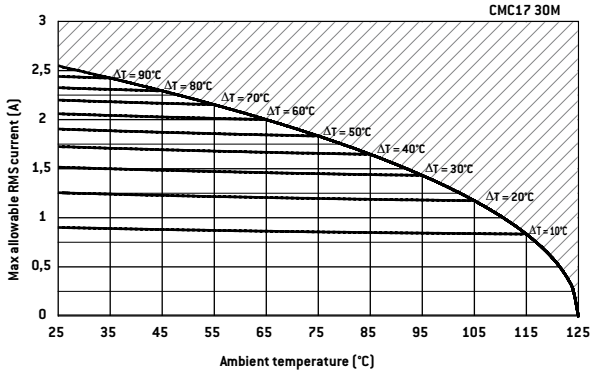


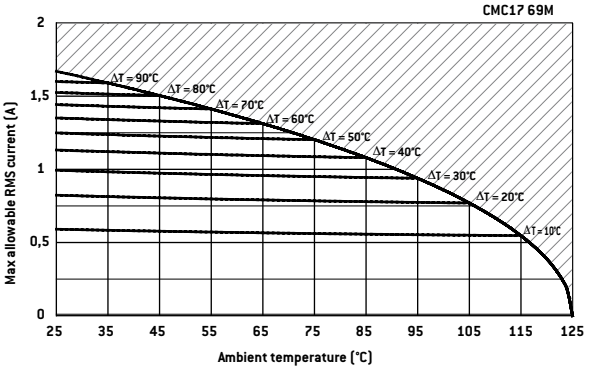












All thermal measurements under atmospheric conditions with component mounted on 1 dm^2 PCB without cooling device.

All above graphs indicate maximum RMS current allowed through component v. ambient temperature for a defined ΔT.

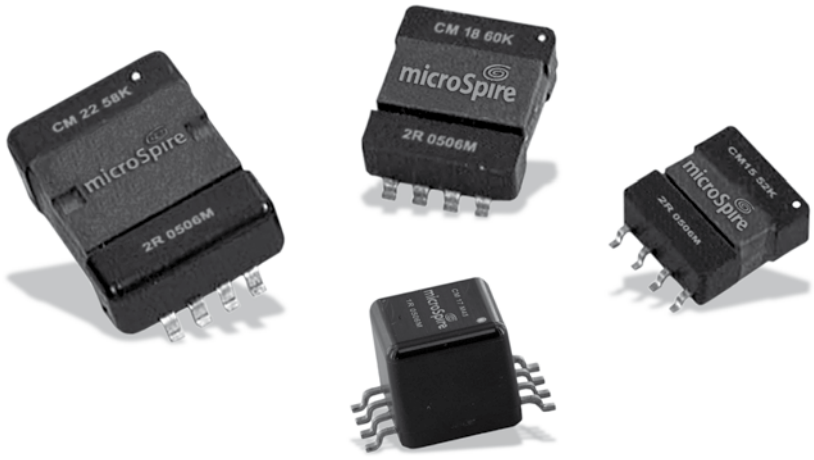
Maximum operating temperature is + 125 °C.

Example :

CMC17 M45 for application with Tamb = + 85 °C Max current allowed is < 11 Arms with $\Delta T < 40$ °C.

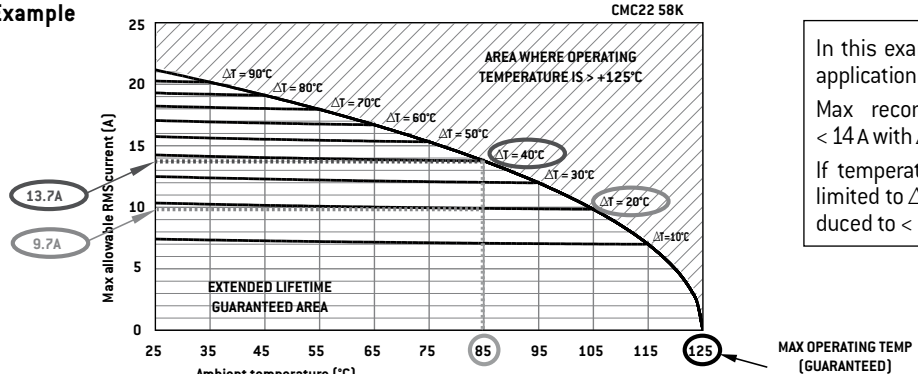
If temp increase allowed in application is limited to $\Delta T < 20$ °C, current must be reduced to 8 Arms.

Technical note - Appendix
CMC 15 - 18 - 22 & CMC 17 Temperature Application



- The operating temperature announced in the datasheets takes into account maximum ambient temperature around the component + its self heating temperature in operation.
- Typical T° range is – 55 °C + 125 °C for usual embedded applications (avionics, defence, space...) in order to ensure a good ageing of the products.
- Microspire guarantees an extended lifetime in this operational T° range, because only high temperature class materials are used and offer sufficient safety margin: all plastic materials used are H class according to IEC85 standard (180 °C during 20.000 hours) and magnetic cores show a high Curie temperature value (Tc > 200 °C).
- Typical values for admissible current at + 25 °C ambient for a 40 °C nominal temperature increase are defined without any heatsink in our litterature.
- When using an appropriate cooling device, these values can be slightly increased
- The associated derating curves allow to check maximum current possible in the component versus acceptable temperature increase above ambient temperature of the application.

Example



In this example, CMC22 58K is chosen for an application at Tamb = + 85 °C.

Max recommended RMS current is then < 14 A with ΔT < 40 °C.

If temperature increase in the application is limited to ΔT < 20 °C. current value must be reduced to < 10 A.

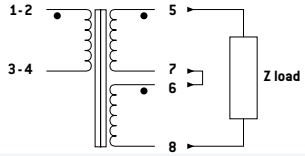
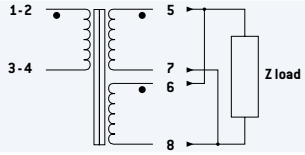
- With the above data, it is clear that the « theoretical » maximum possible current reaches zero for + 125 °C ambient temperature (because heating above is not recommended) !
- However, it still remains possible to load the component with current leading to operating temperature greater than + 125 °C but in this case, extended lifetime for the product is not guaranteed any longer.
- Heating values versus current above + 125 °C operating temperature can still be calculated upon request.

Current sense Transformer - CT01 100 261x

- Materials meet UL94V-0 rating
- Global accuracy ± 10 %
- Applied standards :
  ESCC-3201 generic (including MIL-STD-202) / ECSS-Q-ST-70-02C
  and ESCC 3201 generic specification for space products
- Frequency range 10 kHz to 250 kHz
- Operating temperature range : – 55 °C to + 125 °C
- Suited for IR and vapor reflow soldering
- Weight : < 2 grams

Electrical Data (25°C)

ID Code	$DCR_{1-3/2-4}$ mΩ ±15%	$DCR_{5-7/6-8}$ Ω ±15%	$L_{1/1-3}$ µH ±40%	Insulation 500VDC
CT01 100 261 x	2.5	1	3.9	>16Ω

Turn ratio	Schematic	I_p	I_S (Vs=1V)	Z load
1/100		3,5 A	35 mA	33 Ω
1/50		3,5 A	70 mA	15 Ω

Notes

Typical performances at + 25 °C
Storage Temperature – 55 °C to + 170 °C - 10 mn Max

Application

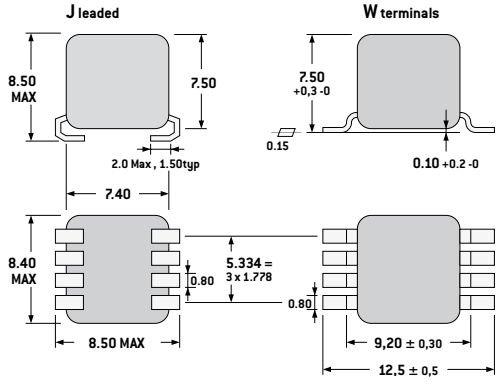
Current detection/measurement for PWM control
(Isense) in High-Rel. SMPS

To Order

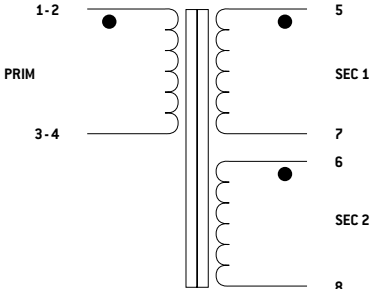
CT01 100 261 x

CT01 100	261	x
Range	Range	x = **J** J leaded x = **W** W Terminals

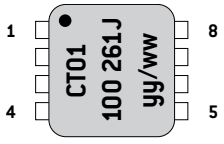
Dimensions (mm)



Connections



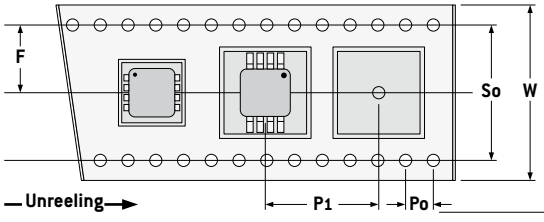
Marking



yyww :
Date code

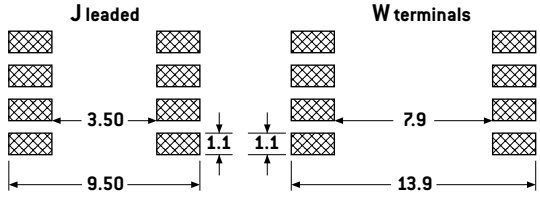
Packaging

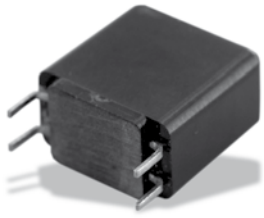
Tape and Reel:
J leaded - 600 units per reel of diameter 330 mm
W terminals – 400 units per reel of diameter 330 mm



J leaded	W terminals
F: 11.5 P1: 12 Po: 4.0 W: 24.0 So: none	F: 11.5 P1: 18 Po: 4.0 W: 24.0 So: none

PCB Layout (mm)





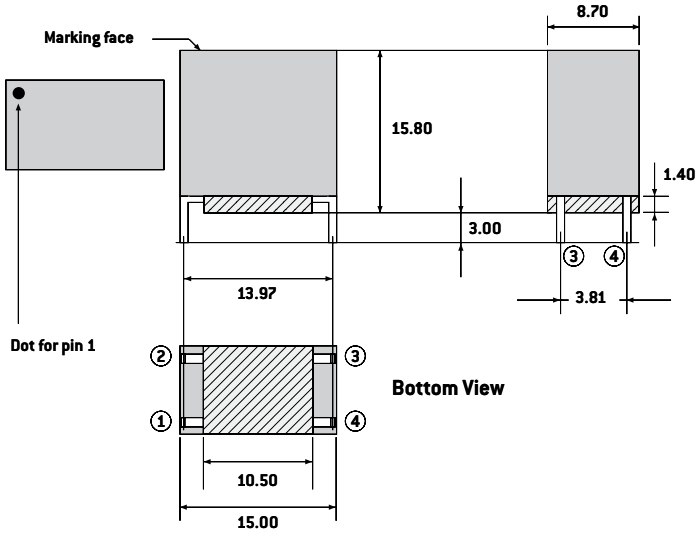
Current Transformer for DC/DC Applications
CT08 200 221 PR

- Designed for DC/DC Converter Applications
- Measurement up to 5.4 A_{RMS} (8 A_{PEAK} - 3.6 A_{DC} MAX) from 100 to 200 KHz with 2 % Accuracy
- Applied standards:
  MIL-STD-202, ECSS-Q-70-02
  ESCC-3201, DO-160

Electrical Data (25°C)

ID Code	Accuracy (-40°C / +110°C)	Transformer ratio	Secondary Inductance	Secondary DC Resistance	Insulation
CT08 200 221R	< 2% with R_L = 113Ω theoretical < 2% with R_L = 113Ω at 1% (E96)	V_{OUT} / I_{IN} = 0.56 (Np / Ns = 1 : 200)	L_{3-4} = 11.0 mH (± 25%) (100 kHz - 1V_{RMS})	R_{3-4} = 5.8 Ω (± 10%)	500 V_{DC} - 1 min (RI ≥ 100 MΩ) between windings

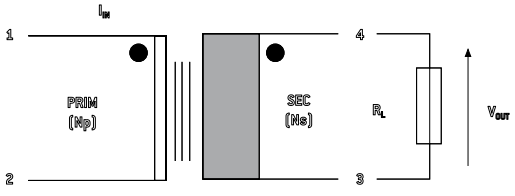
Typical Dimensions (mm)



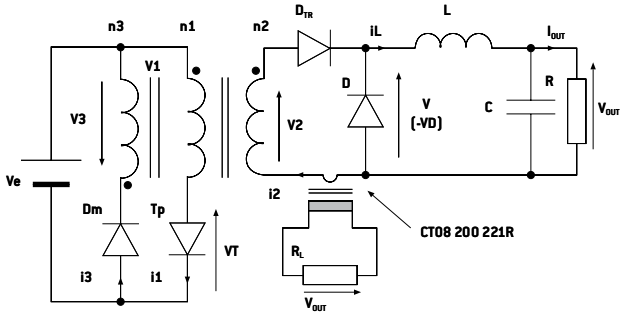
Notes

- The component is dedicated to measure RMS current up to I_{IN} = 5.4 A_{RMS} (8 A_{PEAK} and 3.6 A_{DC} MAX) for a wavform of working frequency from 100 to 200 KHz.
  Image of this current is the voltage (V_{OUT} = 3 V_{RMS} MAX) picked on a resistive load R_L = 113 Ω at 1 % (E96 series).
- The component can also make the measurement keeping the same accuracy but with a ratio V_{OUT}/I_{IN} = 1.00.
  In this case, image of the current is the voltage (Vs = 5.4 V_{RMS} MAX) picked on a resistive load R_L = 200 Ω at 1 % (E96 series).
- Flammability compliance : UL94V0
- Insulation class (windings) : H (180 °C)
- Operating temperature : – 40 °C to + 110 °C
- Storage temperature : – 55 °C to + 125 °C

Connections



Application Schema



CT08 200 221R can be used for measurement of secondary current (i2) of a DC/DC forward converter (3.3 V / 8 A output and 100 KHz working frequency example) for regulation and surveillance operations.

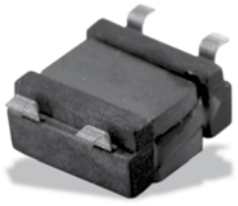
Marking

yyww :
Date code

Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

Current sense Transformer, up to 10Apk - CT91 xxx 231 WR



- Vout/Ipk ratio: 1 V/8 A
- Global accuracy ± 5 % on E96 series load resistor
- Low profile and light
- Materials meet UL94V-0 rating
- Applied standards:
  ESCC-3201 generic (including MIL-STD-202) / ECSS-Q-70-02
- Frequency range 6 kHz to 500 kHz triangle wave
- Operating temperature range: – 55 °C to + 125 °C
- Suited for IR and vapor reflow soldering
- Weight: 2 grams

Electrical Data (25°C)

ID Code	Turn ratio	DCR_{1-2} mΩ	DCR_{3-4} Ω ±15%	L_{3-4} mH ±15%	Frequency range triangle wave	$Ipk = I_{DC}+\Delta I/2$ max	Z Load 1% 1/4W	Insulation 500VDC
CT91 050 231 WR	1/50	<2	0.95	0.4	22kHz to 500kHz	10	6.81Ω	>1GΩ
CT91 075 231 WR	1/75	<2	2.15	0.9	15kHz to 300kHz	10	10.2Ω	>1GΩ
CT91 100 231 WR	1/100	<2	3.70	1.6	9kHz to 200kHz	10	13.7Ω	>1GΩ
CT91 200 231 WR	1/200	<2	14.6	6.4	6kHz to 70kHz	10	27.4Ω	>1GΩ

To Order

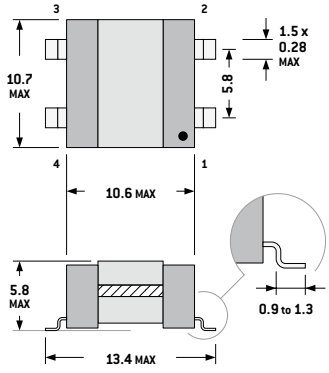
CT91 ### 231 WR

CT91	###	231	WR
Range	Turn ratio	Range	Gull wing highrel

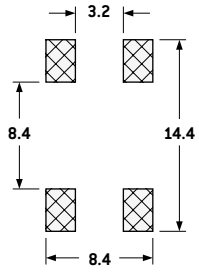
Notes

Typical performances at + 25 °C
Storage Temperature – 55 °C to + 140 °C

Dimensions
(mm, top view)

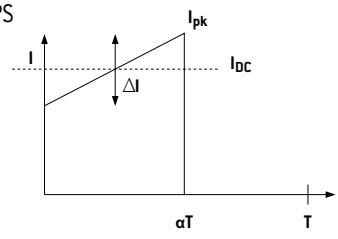


PCB Layout
(suggested)

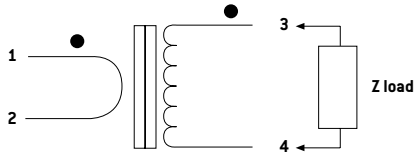


Application

Current detection/measurement for PWM control (Isense) in High-Rel. SMPS

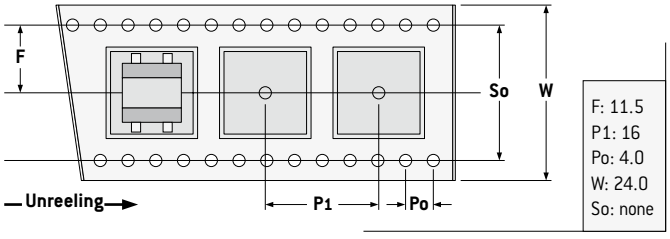


Connections

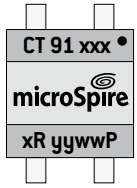


Packaging

Tape and Reel:
700 units per reel of diameter 330 mm



Marking



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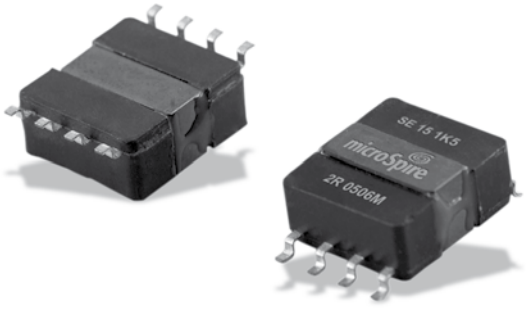
Date code

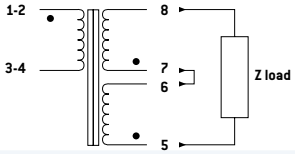
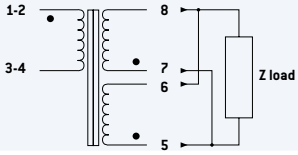
Current sense Transformer, 1/200/200 up to 17Apk - CT15 200 231 WR



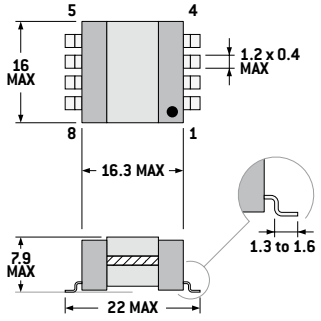
- Global accuracy ± 5 %
- Low profile and light
- Materials meet UL94V-0 rating
- Applied standards :
  ESCC-3201 generic (including MIL-STD-202) / ECSS-Q-70-02
- Frequency range 6 kHz to 100 kHz triangle wave
- Operating temperature range : – 55 °C to + 125 °C
- Suited for IR and vapor reflow soldering
- Weight : 6 grams

Electrical Data (25°C)

ID Code	DCR_{1-2} mΩ	$DCR_{5-6/7-8}$ Ω ±15%	$L_{5-6/7-8}$ mH ±10%	Insulation 500VDC
CT15 200 231 WR	1.1	21.8	6.4	>1GΩ

Turn ratio	Schematic	I_P	I_S	Z load
1/400		17 A	42.5 mA	27 Ω
1/200		17 A	85 mA	15 Ω

Dimensions
(mm, top view)



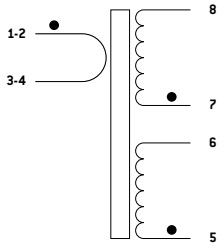
Notes

Typical performances at + 25 °C

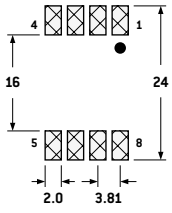
Storage Temperature : – 55 °C to + 140 °C

Thermal index : 180 °C

Connections



PCB Layout
(suggested)



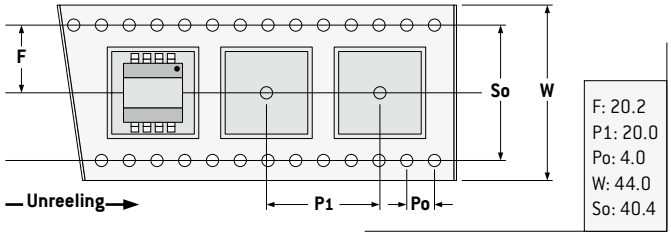
To Order

CT15 200 231 WR

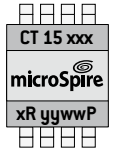
CT15	200	231	WR
Range	Turn ratio	Range	Gull wing highrel

Packaging

Tape and Reel:
700 units per reel of diameter 330 mm



Marking



yyww :
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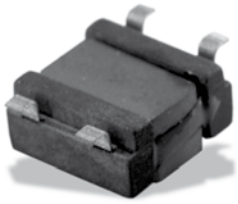
Specifications may change without prior notice - Revised 03/14

Gate Drive Transformer GDT91 Series



- Excellent performances in low profile package
- Suited for Avionics and Space applications
- Working frequency (duty cycle 50%) : up to 500 Khz Max.
- Applied standards : ECSS-Q-70-02 / ESCC-3201 screening flow applied / MIL-STD-202
- Materials meet UL94V-0 rating
- Weight : 2 grams

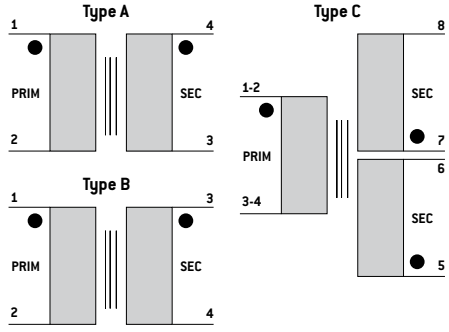
Electrical Data (25°C)

ID Code	ET (Vμs)	Primary Inductance Max	Turn ratio ± 0,5%	DC Resistances	Admissible current	Leakage Inductance	Working frequency (duty cycle 50%)	Withstanding voltage P/S	Connection Type
GDT91 M50 50 1WR	50	L_{1-2} > 500μH (10kHz - 1V_{RMS})	N_{1-2} / N_{4-3} = 1	R_{1-2} R_{4-3} ≤ 1.25 Ω	150 mA	Lf_{1-2} < 1μH ($_{3-4}$ in short circuit)	500 kHz	500 V_{RMS} 50 Hz 3 sec.	A
GDT91 6M0 135 1WR	135	L_{1-2} > 6 mH	N_{1-2} / N_{4-3} = 1	R_{1-2} R_{3-4} ≤ 10.5 Ω	15 mA	Lf_{1-2} < 20μH ($_{3-4}$ in short circuit)	100 kHz	500 V_{RMS} 50 Hz 3 sec.	B
GDT91 M90 50 2WR	50	$L_{1-2-3-4}$ > 600μH	1/1/1 ±2%	$R_{1-2, 3-4}$ < 900 mΩ $R_{5-6\&7-8}$ < 1900 mΩ	I_p = 100 mA I_S = 50 mA	$Lf_{1-2-3-4}$ < 2μH (secondaries in short circuit)	500 kHz	250 V_{RMS}	C

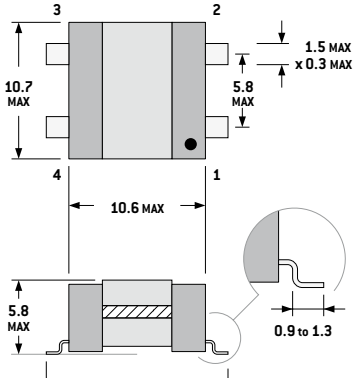
Notes

- CuZn36 terminations with Ni+Sn for RoHS variant and Cu+SnPb60/40 for space variant.
- Operating temperature : –55°C to +125°C
- Storage temperature : –55°C to +140°C
- Reflow soldering oven compliant +260°C -10 sec. admissible peak temperature
- Dielectric withstanding voltage P/S : 500 V_{RMS} 50 Hz 3 sec.
- Rth@ 125°C : 62°C/W
- Thermal index : +155 °C

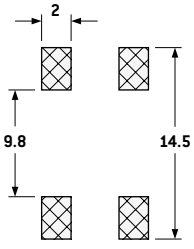
Connections



Dimensions (mm, top view)

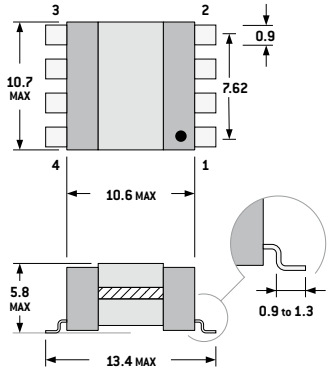


PCB Layout (suggested)

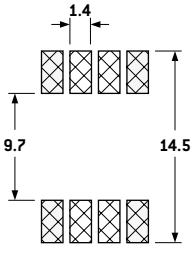


Type A & B

Dimensions (mm, top view)



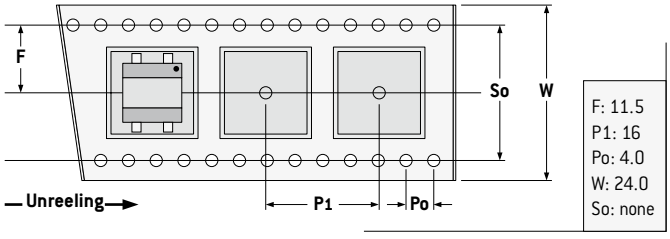
PCB Layout (suggested)



Type C

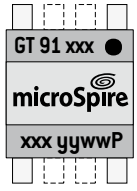
Packaging

Tape and Reel:
700 pieces per reel of diameter 330 mm



F: 11.5
P1: 16
Po: 4.0
W: 24.0
So: none

Marking



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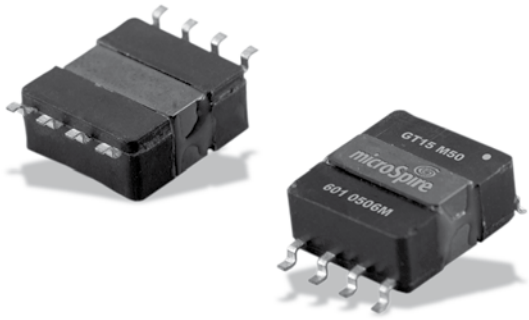
Date code

Gate Drive Transformer GDT15 Series



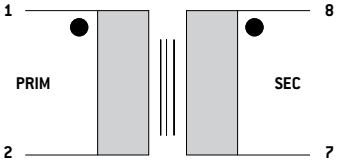
- Excellent performances in low profile package
- Suited for Avionics and Space applications
- Frequency range : 50 Khz - 500 Khz
- Applied standards : ECSS-Q-70-71 / ESCC-3201 screening flow applied / ABD-0100 / DO-160
- Materials meet UL94-V0 rating
- Approx. weight : 5 grams

Electrical Data (25°C)

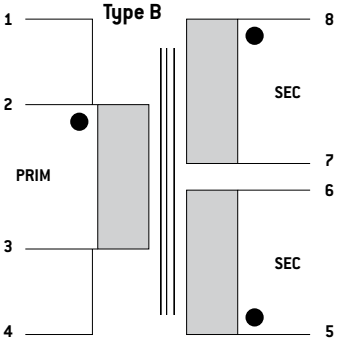
ID Code	ET (Vμs)	Primary Inductance Max	Turn ratio ± 1%	DC Resistances ± 15% (mΩ)	Leakage Inductance	Interwinding Capacitance	Connection Type
GDT15 M50 60 1WR	60	L_{1-4} > 500μH (10kHz - 1V_{RMS})	N_{7-6} / N_{1-4} = 1.52	R_{1-4} = 170 R_{6-7} = 400	Lf_{1-4} < 2.0μH ($_{6-7}$ in short circuit)	$C_{1-4/6-7}$ < 150 pF	A
GDT15 M85 80 2WR	80	L_{1-4} > 850μH (10kHz - 1V_{RMS})	1/1/1	R_{1-3} = 400 R_{8-7} = 400 R_{6-5} = 400	$Lf_{1-2/3-4}$ < 25μH	$C_{1-4/6-7}$ < 150 pF	B

Connections

Type A



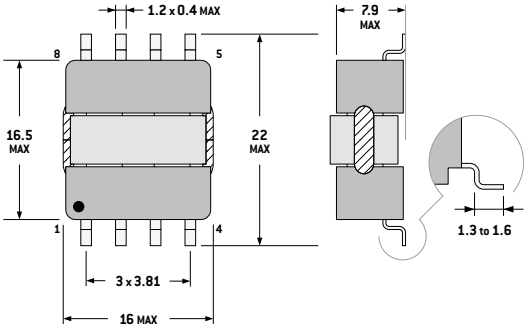
Type B



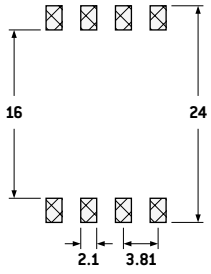
Notes

- Insulation class (windings) : Classe H
- Operating temperature : –55 °C to +125 °C
- Storage temperature : –55 °C to +140 °C
- Dielectric Strength : 500 V_{RMS} - 50 Hz
- Isolation Voltage : 500 VDC - 50 min (Ri ≥ 100 MΩ)

Dimensions (mm, top view)

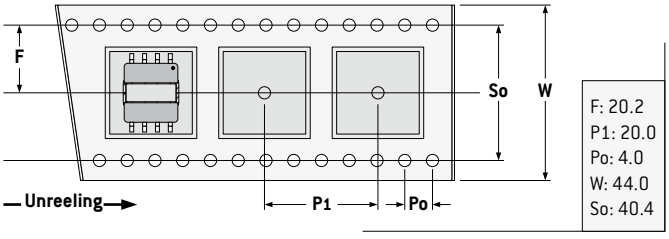


PCB Layout (suggested)



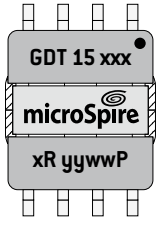
Packaging

Tape and Reel:
400 units per reel of diameter 330 mm



F: 20.2
P1: 20.0
Po: 4.0
W: 44.0
So: 40.4

Marking

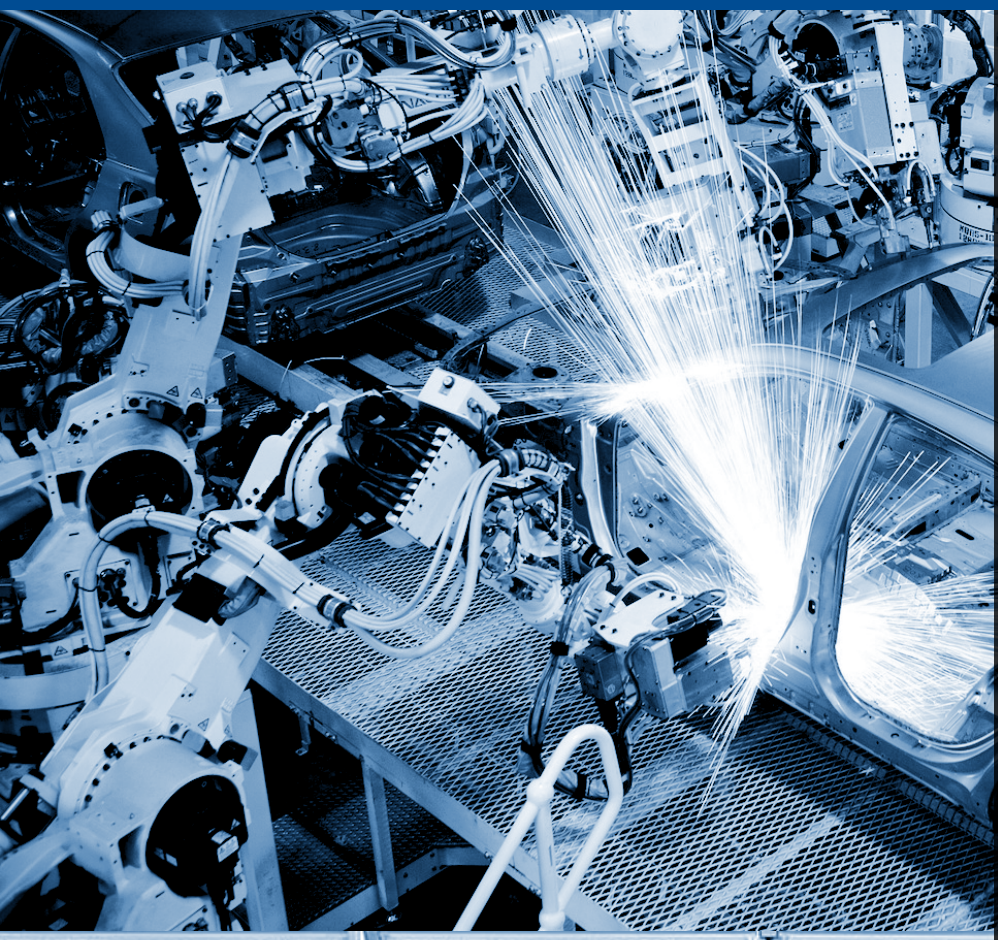


yyww :
Date code

Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

Standard Technologies



Toroidal Magnetic Core Platform

Toroidal magnetic core primary purpose is power conversion in electronic applications as inductors, common modes chokes, power transformers, current or voltage measurement transformers, gate drive transformers, ...
There are three types of soft magnetic cores : powder cores, ferrite cores, and tape wound cores.

Powder Core :

- Distributed air gap cores with high resistivity, low hysteresis and eddy current losses, excellent inductance stability DC and AC current
- Primarily used in power inductor applications,differential inductors, boost inductors, buck inductors, and flyback transformers.
- Main materials used: Molypermalloy (MPP), High Flux, Kool Mμ®,...

Ferrite cores :

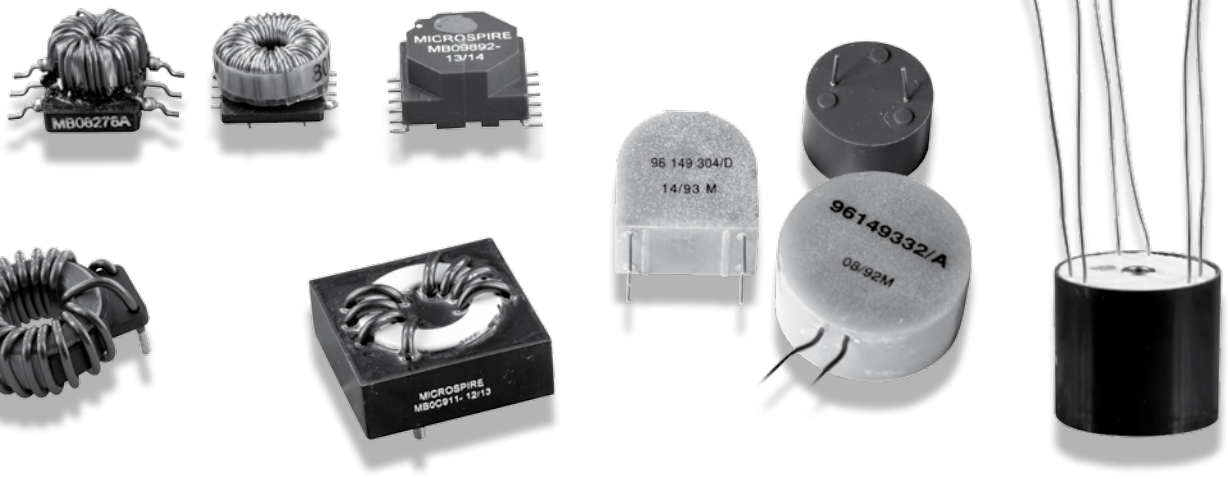
- Low losses at high frequencies,
- Low cost and wide variety of available shapes and sizes
- Extensively used in switched-mode power supply (SMPS) and radio frequency (RF) transformers, inductors and common mode chokes.
- Uncoated, epoxy or parylene coated
- All available materials are used

Tape wound cores

- Higher B (saturation flux density)
- Design can be smaller
- Primarily used for common-mode chokes, current measurement transformers, power transformer,...
- Materials: nickel-iron alloys, grain oriented silicon steel, amorphous materials or nanocrystalline,...

Mounting and packaging technologies

- Header for positioning the direct connection winding to the PCB.
- Horizontal or vertical toroid mount with terminal as an intermediate connection to the PCB
- Molded casing with direct connection through the casing to the PCB
- Leaded molded casing with blind rivet nuts, brass inserts or hexagonal threaded spacers.
- Custom high temperature technlogy
- Under pressure and vaccum varnish impregnation

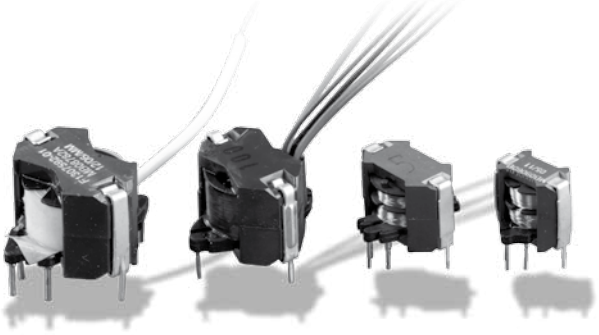


Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

RM Platform

Based on standard RM magnetic cores, Microspire manufactures a full range of built-to- print or custom design products



- Compact and well suited for PCB mounting
- They are used as filters in resonant circuits, as interface and matching transformers, as power transformers and inductors in SMP power supplies
- Possible terminations : SMD, Through Hole, on plate..
- Meet Solderability test MIL STD-202 Method 208
- RoHS by default, non RoHS upon request
- Compatible with Vigon cleaning
- Typical Operating Temperature – 40°C +100°C (–55°C +125°C upon request)

Indicative Electrical Data (25°C)

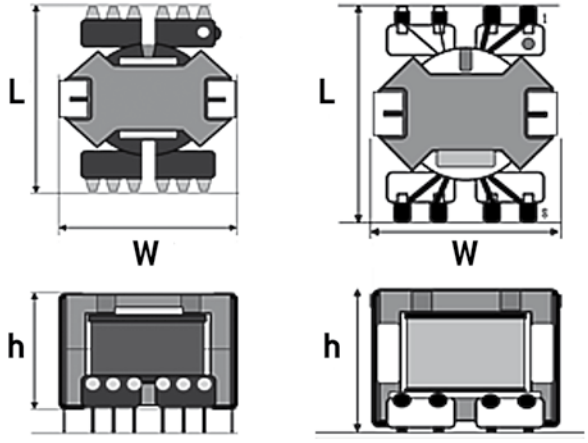
	Inductor Range (IDC + 20% ripple)	Transformer for SMPS*
RM4	17mH/50mA 5µH/4A	Up to 12W
RM5	60mH / 40mA 8µH / 4A	Up to 25W
RM6	300mH / 20mA 5µH / 6A	Up to 35W
RM8	500mH / 30mA 5µH / 10A	Up to 45W
RM10	900mH / 30mA 10µH / 12A	Up to 60W
RM12	2H / 30mA 15µH / 16A	Up to 100W
RM14	7H / 20mA 20µH / 20A	Up to 150W

* Based on a push pull architecture, at f = 200kHz @85°C without cooling

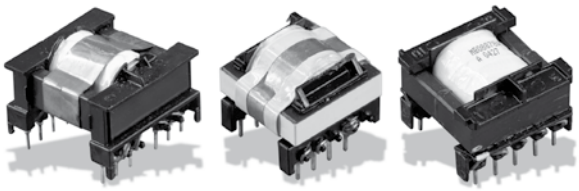
Some Typical Dimensions (mm)

	TH			SMD		
	W* max (mm)	h max (mm)	L max (mm)	W* max (mm)	h max (mm)	L max (mm)
RM4	11	10.5	15			
RM5	14.9	10.5	17	14.9	11.1	18.9
RM6	17.9	12.5	25	17.9	13.2	21.5
RM8	23.2	16.5	30.5			
RM10	28.5	18.7	41			
RM12	37.4	24.6	45.2			
RM14	42.2	30.2	48.4			

* Without clamp (+ 2 mm if clamps)



ETD Platform



- E cores have the advantages of easy winding, easy assembly, compactness and wide opening on each side
- ETD cores have the additional benefit of an almost constant cross section along the magnetic path
- ETD cores are suitable for designing transformers in forward and push-pull SMPS.
- Typical Operating Temperature – 40°C +100°C (–55°C +125°C upon request)

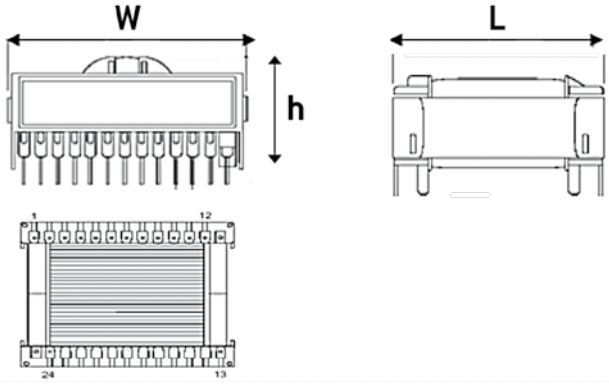
Indicative Electrical Data

Examples	Transformer for SMPS*
ETD 29	Up to 65W
ETD 44	Up to 150W
ETD 59	Up to 450W

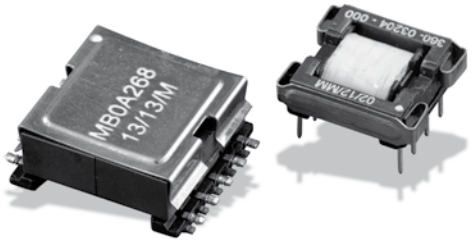
* Based on a push pull architecture, at f = 200kHz @85°C without cooling

Some Typical Dimensions (mm)

	W max (mm)	h max (mm)	L max (mm)
ETD 29	35.5	25.5	35.5
ETD 44	49.6	38.1	52.2
ETD 59	66.9	49.4	66.4



EFD Platform



- EFD cores with their optimized cross section are used to design compact transformers for DC-DC converters, isolation and pulse application
- Meet solderability test MIL STD-202 Method 208
- RoHS by default, non RoHS upon request
- Surface Mount or Through Hole package
- Operating temperature –55°C +125°C

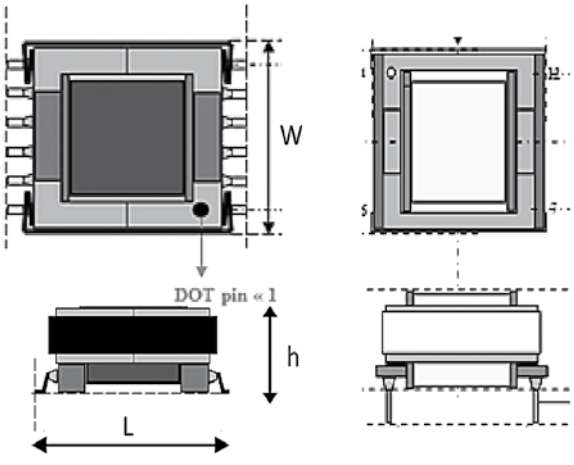
Indicative Electrical Data

Examples	Transformer for SMPS*
EFD 15	Up to 20W
EFD 20	Up to 40W
EFD 25	Up to 60W
EFD 30	Up to 100W

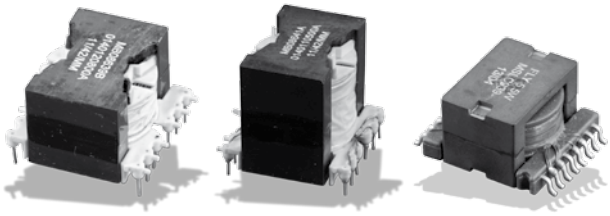
* Based on a fly-back architecture, at f = 200kHz @85°C without cooling

Some Typical Dimensions (mm)

	W max (mm)	h max (mm)	L max (mm)
EFD 15 SMD	16.7	9.3	23
EFD 20 SMD	21.8	12.5	28
EFD 25 SMD	30	14	32
EFD 30 SMD	32	17	34



EQ Platform



- Compact package
- They are used as power transformers in SMP power supplies
- Solderability MIL STD-202 Method 208
- Typical Operating Temperature – 40°C +100°C
  (–55°C +125°C upon request)
- Surface Mount Device (SMD)

Indicative Electrical Data (25°C)

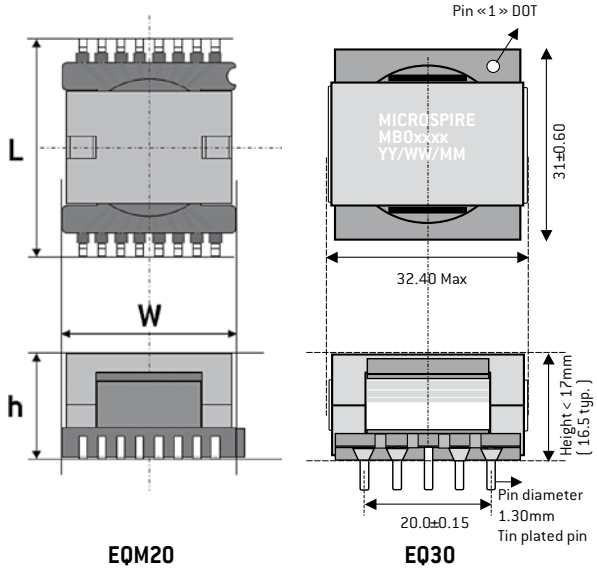
	Inductor Range (IDC + 20% ripple)	Transformer for SMPS*	Operating temperature
EQM20	175mH/30mA 2.5µH/20A	Up to 100W	–55°C+125°C
EQ30		Up to 130W	–40°C+100°C

* Based on a push pull architecture, at f = 200kHz @85°C without cooling

Some Typical Dimensions (mm)

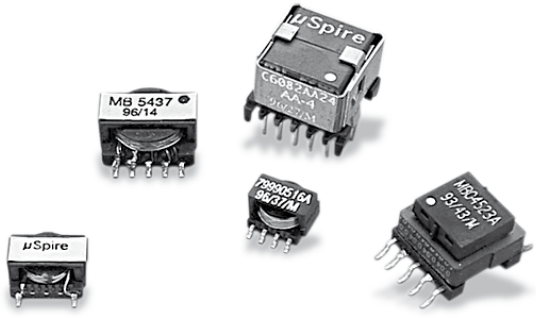
	W max (mm)	h max (mm)	L max (mm)
EQM20	21.2	13.5	27.5
EQ30	32.4	17	31.6

These are only examples.Microspire has design know how and manufacturing capabilities for other EFD, EQ but also EP, PQ and ER packages.



EQM20 **EQ30**

ER and EP Platform



These are only examples. Microspire has design know how and manufacturing capabilities for other but also EP and ER platforms.

Custom Power Magnetics

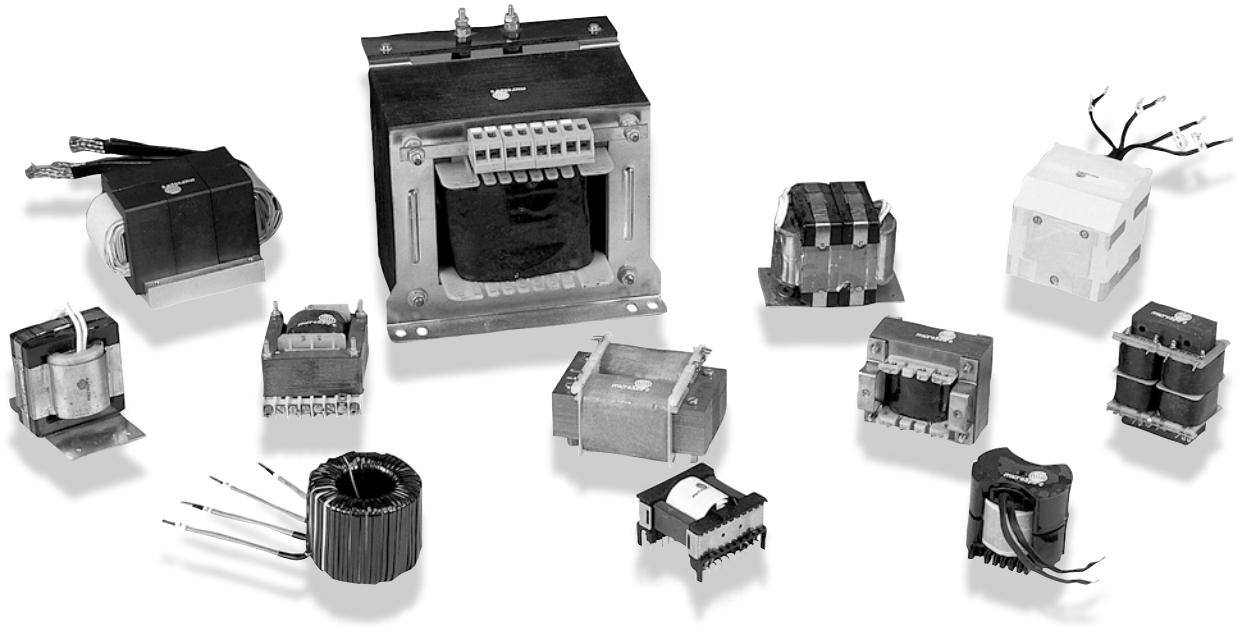
Microspire design optimized powerful magnetics for a wide range of applications:

- All designs up to 10 kVA
- All designs up to 1 kHz
- All designs up to 500 A peak

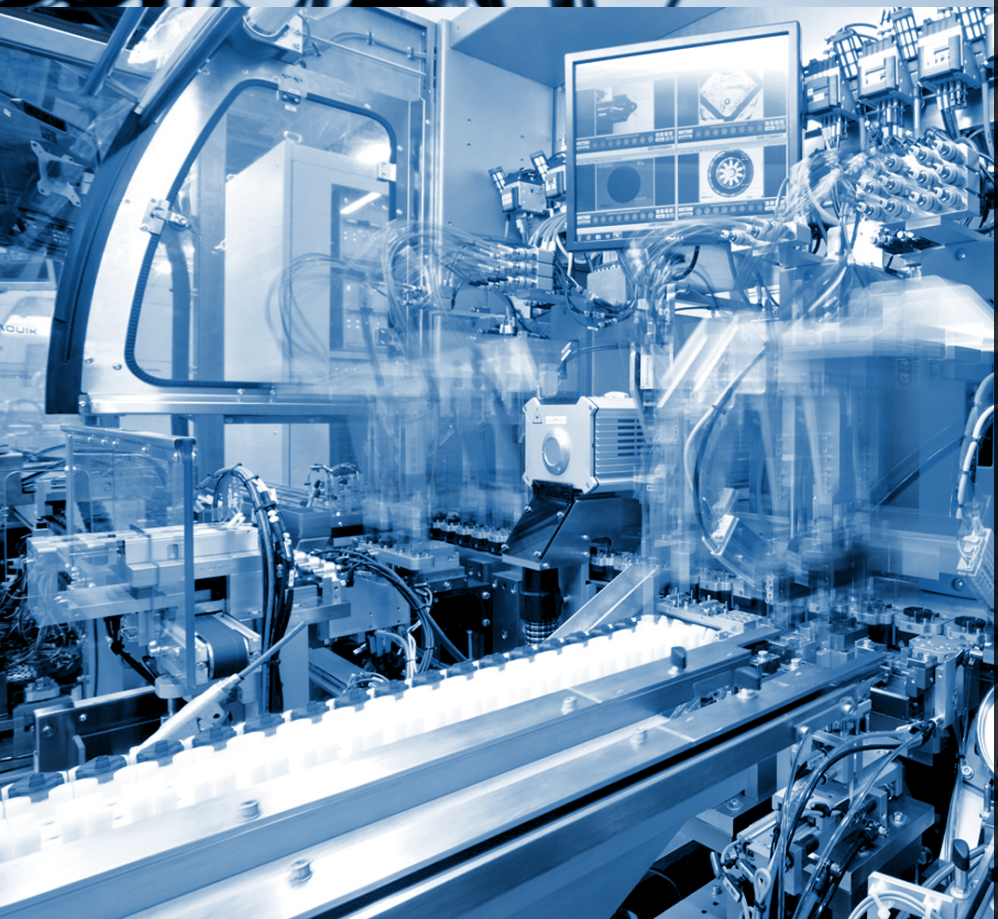
220A **96A** **74A** **46A**

Microspire manufacture custom power magnetics using all materials and available technologies:

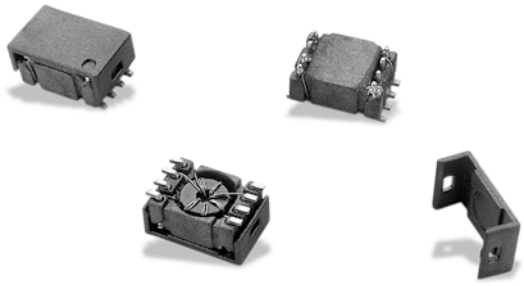
- Copper wire, flat, foil
- EI, EE, UI and C-cores



Standard Products



EMI Suppression Chokes - ESC Series



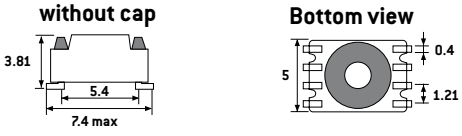
These common-mode chokes provide excellent attenuation of asymmetric EMI on signal lines and in switch-mode power supplies.

- Surface-mount package
- Suited for IR and vapor reflow soldering
- Materials meet UL94-V0 rating
- Frequency range up to 100 MHz
- Operating temperature range : –40 °C to + 125 °C
- Weight : 0.5 gram

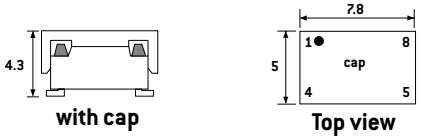
Electrical Data

Part Number (typical values)	Inductance at 100 kHz µH	Rdc Max (at 80°C) m	Impedance at 100 MHz Ω	Attenuation 50Ω at 10MHz dB	Rated Current max mA	Isolation between windings Vrms
ESC X1 15K 1S	15	20	100	6,5	750	250
ESC X1 56K 1S	56	35	250	12	600	250
ESC X1 M47 1S	470	470	1200	27,5	250	250

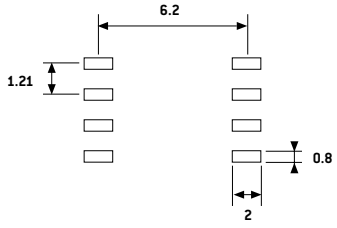
ESC0x xxx xS



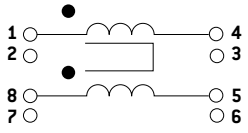
ESC1x xxx xS



PCB Layout (suggested)

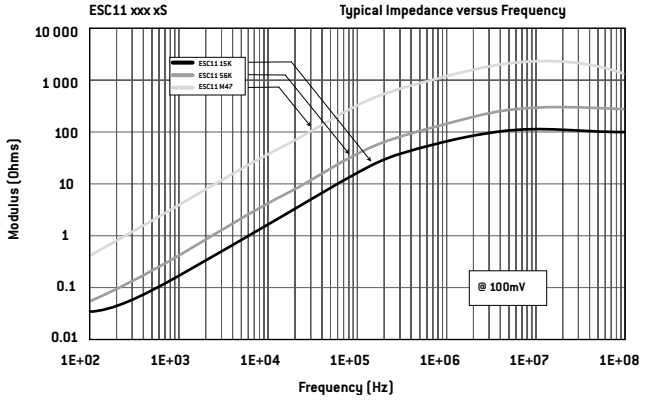


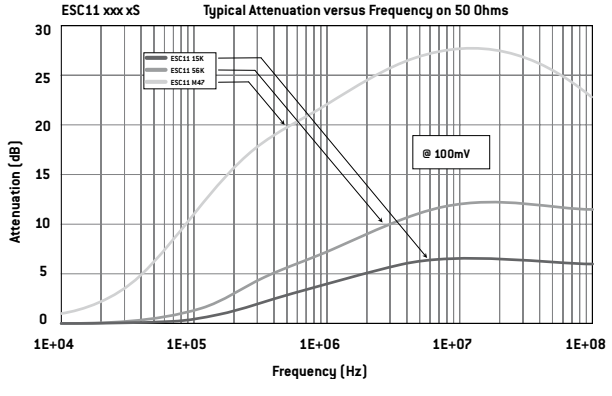
Connections



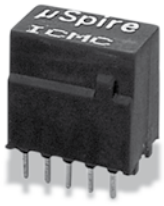
Packaging

Tape and Reel : 2200 pieces





Common-Mode Chokes - ICMC Series



- 2-fo ld current-compensated chokes
- 4-fold current-compensated chokes
- High insertion loss over a wide frequency range
- High inductance values
- Low total losses
- Amorphous and ferrite toroids, encapsulated in polymer materials listed in UL94-V0
- Flat or upright cases
- Operating temperature range -25 °C +70 °C

Electrical Data

Part Number	Ln mH	In A eff	LF µH	Rdc Ω
				2-fold chokes
ICMC12 1M0 1X	2x1	0.5	0.2	0.1
ICMC12 1M7 1X	2x1.7	0.5	0.2	0.15
ICMC12 3M3 1X	1x3.3	0.4	0.25	0.2
ICMC12 4M7 1X	2x4.7	0.4	0.3	0.25
ICMC12 6M8 1X	2x6.8	0.3	0.4	0.3
ICMC12 10M 1X	2x10	0.3	0.45	0.4
ICMC12 12M 1X	2x12.5	0.3	0.5	0.45
ICMC12 28M 1X	2x28	0.25	1	0.8
ICMC12 39M 1X	2x39	0.25	1.1	1
ICMC12 50M 1X	2x50	0.25	1.2	1.1
ICMC12 70M 1X	2x70	0.2	1.4	1.2
				4-fold chokes
ICMC14 1M0 1X	4x1	0.5	0.2	0.1
ICMC14 1M7 1X	4x1.7	0.5	0.25	0.15
ICMC14 3M6 1X	3x3.6	0.4	0.4	0.2
ICMC14 5M0 1X	4x5	0.3	0.45	0.25
ICMC14 6M0 1X	4x6	0.3	0.45	0.3
ICMC14 7M8 1X	4x7.8	0.25	0.5	0.4
ICMC14 10M 1X	4x10	0.25	0.5	0.45
ICMC14 11M 1X	4x11.5	0.2	0.5	0.6
ICMC14 40M 1X	4x40	0.15	0.9	1.2
ICMC14 58M 1X	4x58	0.15	0.5	0.9
ICMC14 90M 1X	4x90	0.15	0.5	1.4

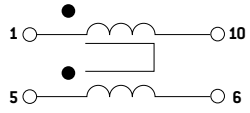
Dielectric strength 500 Vrms for 2 seconds.

Symbols

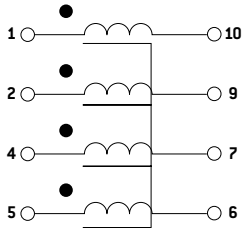
In = permissible rated current of a winding
Ln = rated inductance of a winding
(tol. +50 %/-30 % ; f = 10 kHz ; U = 100 mVrms)
LF = leakage inductance of a winding when all other windings short circuit (nominal value)
Rdc = DC resistance of winding (nominal value)

Connections

2-fold chokes ICMC12 xxx xx

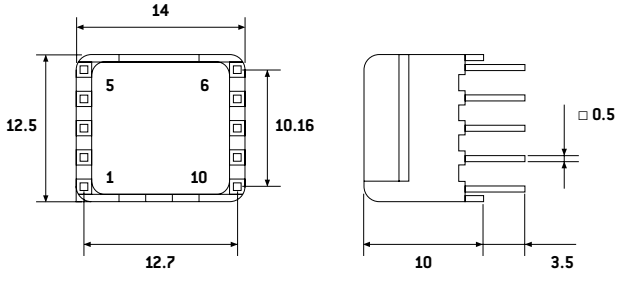


4-fold chokes ICMC14 xxx xx

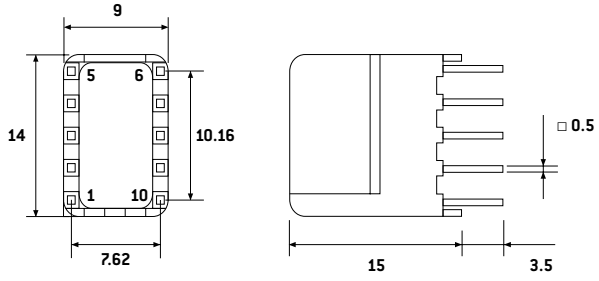


Typical Dimensions (mm)

Horizontal design ICMCxx xxx xH



Vertical design ICMCxx xxx xV



Line Common Mode Choke - LCMC

- Improved EMI performance for FCC class B applications
- Maximum common mode attenuation at 1 MHz
- Well suited for many telecom applications
- Surface mount package
- Materials meet UL94-V0 rating
- Temperature range: 0°C to +70°C
- Weight < 1 gram

Electrical Data

Part Number	OCL (mH +30%/-40%)	Common Mode Attenuation (db typ. @ 100kHz)	Common Mode Attenuation (db typ. @ 1MHz)	Common Mode Attenuation (db typ. @ 10MHz)	I max eff (mA)	Isolation (Vrms min)	DCR (Ω max)
LCMC 20 4M7 1S	2 x 4.7	29	40	24	35	500	1.15

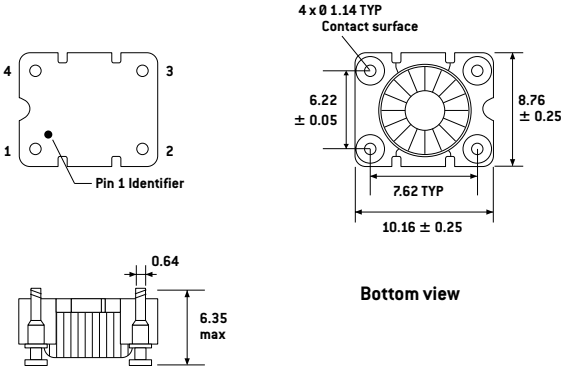
Note: values measured at 10 kHz, 100 mVRMS at 25°C. Dielectric strength : 500VRMS - 50Hz - 1min

To Order

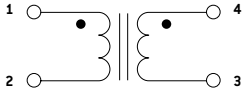
LCMC 20 4M7 1S

LCMC	20	4M7	1	S
Line Common Mode Chokes	Size	Value code 4M7 = 4,7 mH	Version	SMD

Typical Dimensions (mm)



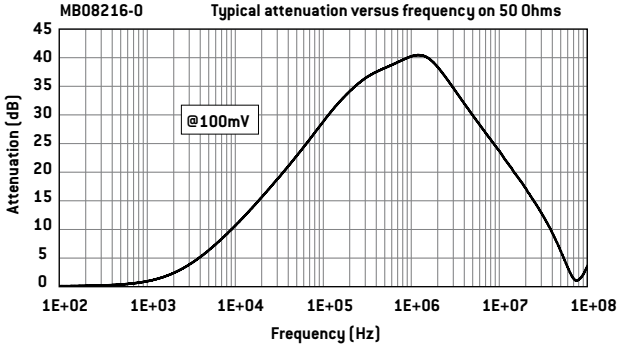
Connections



Marking

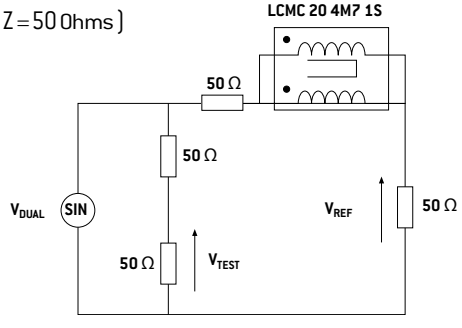
yyww :
Date code

Frequency Response



Measurement Circuit

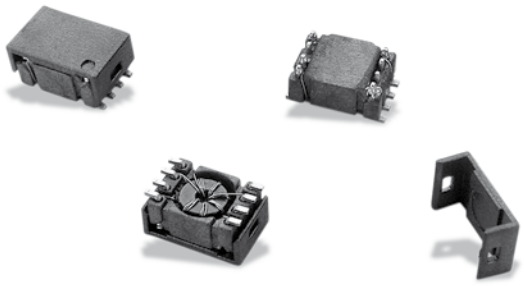
Attenuation measured with
HP4194A at 100 mVrms
(Z = 50 Ohms)



Standard Technologies
RF and Data Magnetics / Filtering & EMI Suppression Chokes

Tel : + 33 (0) 3 82 59 13 33 www.exxelia.com
Specifications may change without prior notice - Revised 03/14

Wide Band RF Transformers - WRFT Series



- Frequency bandpass 100 kHz to 500 MHz
- Power input max. 250 mW
- Isolation prim. to sec. 500 Vrms minimum
- Suited for IR and vapor reflow soldering
- Materials meet UL94-V0 rating
- Operating temperature range : –40 °C to +125 °C
- Weight : 0.5 gram

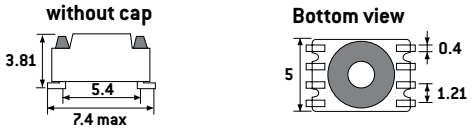
Electrical Data

ID Code	Impedance ratio (Ω)	Bandwidth (MHz) 3 dB	2 dB	1 dB
WRFTX1 1R0 1X	50:50	0.15-400	0.35-200	2-50
WRFTX1 2R0 1X	50:100	0.30-300	0.5-250	2-230
WRFTX2 2R0 1X	50:100 center tap	0.10-200	0.5-100	2-50
WRFTX1 2R5 1X	50:125	0.10-100	0.1-50	0.1-20
WRFTX1 4R0 1X	50:200	0.20-350	0.35-300	2-100
WRFTX2 5R0 1X	50:250 center tap	0.30-300	0.6-200	0.5-100
WRFTX2 8R0 1X	50:400 center tap	0.10-140	0.1-90	1-60
WRFTX1 12R 1X	50:600	0.20-110	0.5-80	1-50
WRFTX1 13R 1X	50:650	0.30-130	0.4-85	1-65
WRFTX2 13R 1X	5:650 center tap	0.30-120	0.7-80	5-20
WRFTX1 16R 1X	50:800	0.30-120	0.7-80	5-20
WRFTX2 16R 1X	50:800 center tap	0.10-75	0.2-30	0.3-20

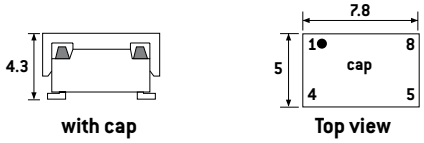
Typical Dimensions (mm)

Surface-mount case

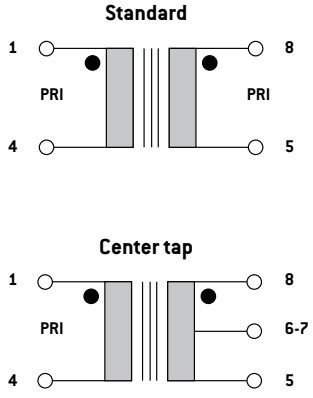
WRFT0x xxx xS



WRFT1x xxx xS



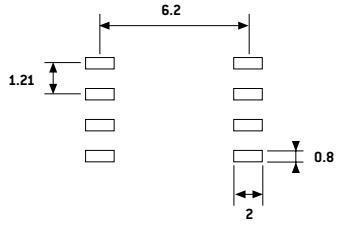
Connections



Packaging

Tape and Reel : 400 pieces

PCB Layout (suggested)



Common-Mode Chokes - CMESC 10-14

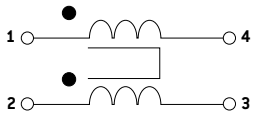
- Operating single phase voltage 250 Vrms
- Low strayfield winding structure
- Thermoplastic cases.
- Materials meet with UL94-V0 rating
- Through hole design
- Operating temperature range : –40 °C to +70 °C

Electrical Data

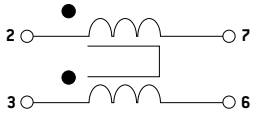
ID Code	In A	Ln mH ± 30%	Rdc Typ Ω
CMESC10 47M 1X	0.3	47	1.60
CMESC10 39M 1X	0.4	39	1.20
CMESC10 27M 1X	0.5	27	0.60
CMESC10 18M 1X	0.55	18	0.50
CMESC10 15M 1X	0.6	15	0.45
CMESC10 10M 1X	0.8	10	0.20
CMESC10 6M8 1X	1.2	6.8	0.15
CMESC10 3M3 1X	1.5	3.3	0.09
CMESC10 2M0 1X	2.0	2.0	0.06
CMESC11 47M 1X	0.4	47	1.20
CMESC11 39M 1X	0.5	39	0.90
CMESC11 27M 1X	0.8	27	0.60
CMESC11 18M 1X	0.9	18	0.50
CMESC11 15M 1X	1.0	15	0.30
CMESC11 10M 1X	1.2	10	0.20
CMESC11 6M8 1X	1.5	6.8	0.10
CMESC11 3M3 1X	2.5	3.3	0.07
CMESC11 2M0 1X	3.0	2.0	0.04
CMESC12 47M 1X	0.6	47	0.90
CMESC12 39M 1X	0.7	39	0.70
CMESC12 27M 1X	0.8	27	0.50
CMESC12 18M 1X	1.0	18	0.35
CMESC12 15M 1X	1.2	15	0.25
CMESC12 10M 1X	1.5	10	0.15
CMESC12 6M8 1X	2.0	6.8	0.10
CMESC12 3M3 1X	4.0	3.3	0.04
CMESC12 2M0 1X	6.0	2.0	0.02
CMESC13 47M 1X	0.8	47	0.70
CMESC13 39M 1X	1.0	39	0.60
CMESC13 27M 1X	1.4	27	0.30
CMESC13 18M 1X	1.5	18	0.25
CMESC13 15M 1X	1.7	18	0.20
CMESC13 10M 1X	1.8	10	0.15
CMESC13 6M8 1X	2.2	6.8	0.10
CMESC13 3M3 1X	4.0	3.3	0.04
CMESC13 2M0 1X	6.0	2.0	0.02
CMESC14 47M 1X	2.0	47	0.35
CMESC14 39M 1X	2.3	39	0.25
CMESC14 27M 1X	2.5	27	0.20
CMESC14 18M 1X	3.0	18	0.15
CMESC14 15M 1X	3.5	15	0.10
CMESC14 10M 1X	4.0	10	0.09
CMESC14 6M8 1X	5.0	6.8	0.05
CMESC14 3M3 1X	8.0	3.3	0.02
CMESC14 2M0 1X	10.0	2.0	0.01

Connections

Horizontal design

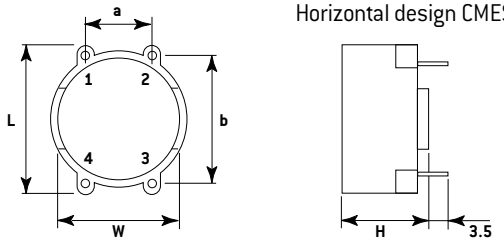


Vertical design



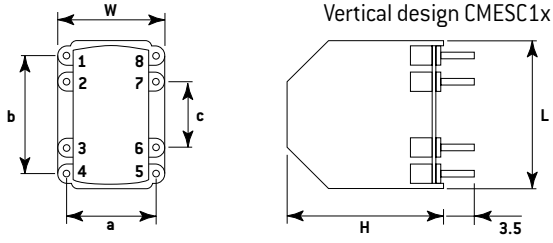
Typical Dimensions (mm)

Horizontal design CMESC1x xxx xH



ID Code	L	H	W	A	B	pins
CMESC10 xxx xH	17.5	12.5	17	10	15	0.9 x 0.6
CMESC11 xxx xH	22.5	15.0	22	12.5	20	0.9 x 0.6
CMESC12 xxx xH	27.5	17.5	27	15	25	0.9 x 0.6
CMESC13 xxx xH	33.5	19.2	33	20	30	0.7 x 0.7
CMESC14 xxx xH	42.5	24.3	42	15	40	0.7 x 0.7

Vertical design CMESC1x xxx xV



ID Code	L	H	W	A	B	C	pins
CMESC10 xxx xV	17.8	20	12.8	10	15	5	0.9 x 0.6
CMESC11 xxx xV	23	25	15.5	12.5	20	10	0.9 x 0.6
CMESC12 xxx xV	27	30	18	15	22.5	12.5	0.9 x 0.6
CMESC13 xxx xV	32	35	18	15	27.5	12.5	0.9 x 0.6
CMESC14 xxx xV	42	45	28	25	40	25	1.1 x 0.8

Applications

Suppress asymmetric EMI voltages from 10 kHz to 10 MHz

Common-Mode Chokes - CMESC 17

- Less than 20 % performance variations versus temperature (−40 °C/+125 °C)
- Minimum impedance attenuation: 100 Ω from 100 kHz to 30 MHz
- RMS current range: from 1.1 A to 11.7 A for 40 °C heating above 25 °C
- All plastics used meet UL94V-0 rating
- Operating/storage temperature range: −40 °C to +125 °C
- Approx weight: 10 grams

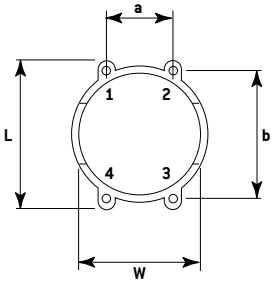
Electrical Data

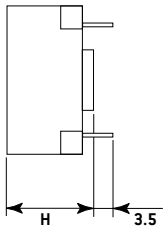
ID Code	Inductance Value at 25°C (-40/+35%)	Typical SRF	Max Impedance (Typical)	MAX Attenuation (Z = 50Ω)	MAX RMS Current for ΔT = 40°C	MAX DC Resistance (25°C)	Typical Leakage Inductance (100kHz)
CMESC17 69M 1H	69.2 mH	0.1 MHz	29 kΩ	49 dB	1.1 A	500 mΩ	70 µH
CMESC17 30M 2H	30.3 mH	0.3 MHz	15.8 kΩ	44 dB	1.7 A	220 mΩ	32 µH
CMESC17 13M 1H	13.1 mH	0.6 MHz	9.4 kΩ	40 dB	2.7 A	90 mΩ	13.4 µH
CMESC17 5M8 1H	5.83 mH	1.5 MHz	5.3 kΩ	35 dB	4 A	40 mΩ	6.3 µH
CMESC17 2M6 1H	2.59 mH	8 MHz	3.7 kΩ	32 dB	6 A	18 mΩ	2.3 µH
CMESC17 1M2 1H	1.15 mH	15 MHz	1.9 kΩ	26 dB	8.3 A	10 mΩ	1.1 µH
CMESC17 M45 1H	0.45 mH	32 MHz	1 kΩ	20 dB	11.7 A	5 mΩ	0.5 µH

Dielectric strength test: 500 V (50 Hz - 1 min)

Typical Dimensions (mm)

Horizontal design CMESC1x xxx xH

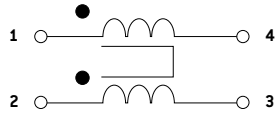




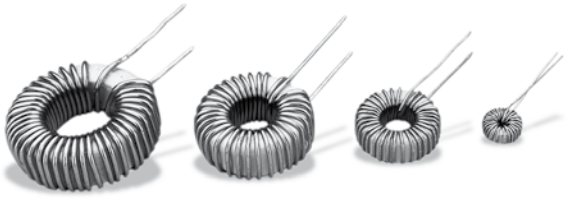
ID Code	L	H	W	A	B	pins
CMESC17 xxx xH	17.5	12.5	17	10	15	0.9 x 0.6

Connections

Horizontal design



Toroidal Chokes - TC Series



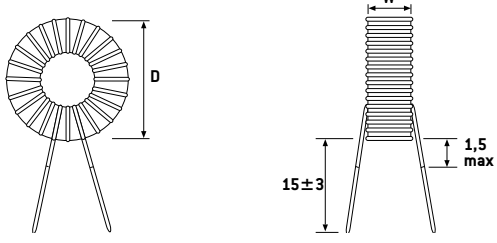
- Inductance range from 4,9μH to 1130μH
- Inductance tolerance : M: $\pm$ 20 %, K: $\pm$ 10 %
- Iron powder core material
- Operating temperature range : – 55 °C to + 105 °C
- Weight : 0.2 to 82 grams

Electrical Data

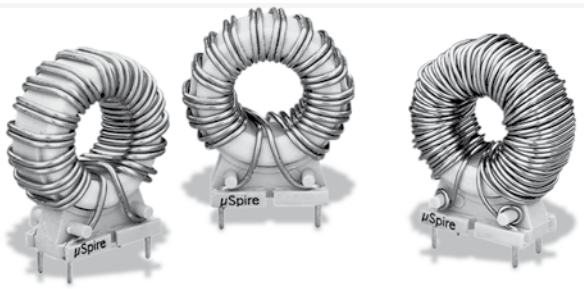
ID Code	DC Current (A)	Inductance (μH) Idc : 0	Inductance (μH) rated Idc	Rdc (mΩ)	Dimensions D x W (mm)
TC-270M-0.1A-2026	0.1	27	27.0	33	7.5 x 4.5
TC-200M-0.2A-2026	0.2	20	19.8	198	7.5 x 4
TC-9R0M-0.3A-2026	0.3	9	8.8	11	8 x 4.5
TC-270M-0.3A-2026	0.3	27	25.5	31	8 x 4.5
TC-5R0M-0.5A-2026	0.5	5	4.9	7	7.5 x 4.5
TC-150M-0.5A-2026	0.5	15	13.5	70	7.5 x 4.5
TC-370M-0.5A-3026	0.5	37	33.7	134	10 x 5.5
TC-560M-0.5A-3726	0.5	56	53.0	181	12.5 x 5.5
TC-111M-0.5A-4426	0.5	110	100.0	250	14 x 6.5
TC-141M-0.5A-3026	0.5	140	107.0	265	10 x 6
TC-241M-0.5A-3726	0.5	240	190.0	360	13 x 6.5
TC-361M-0.5A-4426	0.5	360	285.0	460	14.5 x 7.5
TC-120M-1A-3026	1.0	12	10.7	40	10.5 x 6
TC-240M-1A-3726	1.0	24	22.0	55	13.5 x 6
TC-320M-1A-3026	1.0	32	25.0	65	12 x 7
TC-430M-1A-4426	1.0	43	37.0	74	14.5 x 7
TC-680M-1A-3726	1.0	68	53.0	95	13.5 x 6.5
TC-131M-1A-6026	1.0	130	60.0	101	16 x 7.5
TC-141M-1A-4426	1.0	140	116.0	146	19 x 9
TC-151M-1A-6826	1.0	150	104.0	140	15 x 7.5
TC-221M-1A-5026	1.0	220	137.0	159	21.5 x 7.5
TC-471M-1A-6026	1.0	470	162.0	190	16.5 x 8
TC-471M-1A-9026	1.0	470	310.0	286	21 x 11
TC-471M-1A-9426	1.0	470	398.0	354	26.5 x 13
TC-501M-1A-6826	1.0	500	400.0	342	27.5 x 11.5
TC-961M-1A-8026	1.0	960	355.0	300	22 x 9
TC-132M-1A-9426	1.0	1300	625.0	438	25 x 11
TC-182M-1A-9026	1.0	1800	933.0	585	28.5 x 12.5
TC-8R2M-2A-3726	2.0	8.2	1130.0	680	27.5 x 14
TC-100M-2A-3026	2.0	10	7.2	17	14.5 x 7
TC-120M-2A-3026	2.0	12	7.7	17	12 x 7
TC-150M-2A-4426	2.0	15	12.6	23	15.5 x 7.5
TC-220M-2A-3726	2.0	22	17	30	14.5 x 7.5
TC-300M-2A-5026	2.0	30	25.0	35	17 x 8.5
TC-580M-2A-6026	2.0	58	45.0	61	20 x 10
TC-650M-2A-6826	2.0	65	55.0	55	22 x 9
TC-680M-2A-4426	2.0	68	42.0	56	15.5 x 9
TC-101M-2A-5026	2.0	100	63.0	81	17 x 9
TC-111M-2A-6026	2.0	110	79.0	69	19.5 x 10
TC-111M-2A-8026	2.0	110	90.0	74	25 x 10
TC-201M-2A-9026	2.0	200	154.0	114	28 x 14
TC-221M-2A-9426	2.0	220	170.0	121	28.5 x 12
TC-231M-2A-6826	2.0	230	148.0	108	22.5 x 9.5
TC-301M-2A-10626	2.0	300	250.0	142	31.5 x 15.5
TC-321M-2A-8026	2.0	320	193.0	131	25 x 10.5
TC-431M-2A-8026	2.0	430	246.0	150	25 x 11
TC-451M-2A-9026	2.0	450	280.0	174	28 x 14
TC-781M-2A-9426	2.0	780	428.0	225	28.5 x 13.5
TC-851M-2A-10626	2.0	850	567.0	211	32.5 x 16.5
TC-200M-2A-5026	3.0	20	15.0	21	17.5 x 9
TC-350M-3A-6026	3.0	35	28.0	26	20.5 x 10.5
TC-430M-3A-6826	3.0	43	30.0	30.0	23 x 9.5

ID Code	DC Current (A)	Inductance (μH) Idc : 0	Inductance (μH) rated Idc	Rdc (mΩ)	Dimensions D x W (mm)
TC-600M-3A-5026	3	60	30	38	18 x 10
TC-750M-3A-8026	3	75	54	39	25.5 x 11
TC-820M-3A-8026	3	82	60	42	24.5 x 10.5
TC-900M-3A-6026	3	90	52.5	44	20.5 x 12.5
TC-131M-3A-6826	3	130	77	55	23 x 10.5
TC-131M-3A-9426	3	130	96	61	29 x 13
TC-141M-3A-9026	3	140	98	64	28 x 14.5
TC-201M-3A-10626	3	200	157	78	32 x 16
TC-271M-3A-8026	3	270	140	81	26 x 12
TC-471M-3A-9026	3	470	225	118	28.5 x 15.5
TC-501M-3A-9426	3	500	242	124	29 x 14
TC-290M-4A-6026	4	29	20	20	21 x 11
TC-320M-4A-6826	4	32	24	21	23.5 x 10
TC-600M-4A-8026	4	60	42	30	26.5 x 11.5
TC-101M-4A-9426	4	100	69	42	29.5 x 13.5
TC-111M-4A-6826	4	110	56	42	23.5 x 11
TC-151M-4A-10626	4	150	110	53	32.5 x 16.5
TC-221M-4A-8026	4	220	105	59	26.5 x 13
TC-391M-4A-9426	4	390	165	88	29.5 x 15
TC-220M-5A-6026	5	22	15	14	21.5 x 11.5
TC-250M-5A-6826	5	25	18	16	24 x 10.5
TC-500M-5A-8026	5	50	33	22	26.5 x 12
TC-820M-5A-9426	5	82	52	33	31 x 15.5
TC-900M-5A-9026	5	90	54	34	29.5 x 15.5
TC-101M-5A-8026	5	100	53	33	26.5 x 12.5
TC-101M-5A-10626	5	100	75	36	33.5 x 17
TC-151M-5A-8026	5	150	68	42	27 x 13.5
TC-201M-5A-13026	5	200	134	56	39 x 17
TC-301M-5A-9426	5	300	120	64	30 x 15.5
TC-321M-5A-9026	5	320	120	68	29.5 x 17
TC-681M-5A-13026	5	680	295	105	39 x 18.5
TC-560M-7A-10626	7	56	41.5	20	34 x 18
TC-680M-7A-10626	7	68	46	21	34 x 18
TC-820M-7A-10626	7	82	53	23	34 x 18
TC-131M-7A-13026	7	130	79	31	41 x 18
TC-471M-7A-13026	7	470	190	64	40.5 x 19.5
TC-300M-10A-10626	10	30	21	9	36 x 19.5
TC-350M-10A-10626	10	35	25	10	36 x 19.5
TC-750M-10A-13026	10	75	43	14	42 x 19.5
TC-251M-10A-13026	10	250	105	27	42.5 x 21.5

Typical Dimensions (mm - see tables)



Energy Storage Inductors - ESI Series

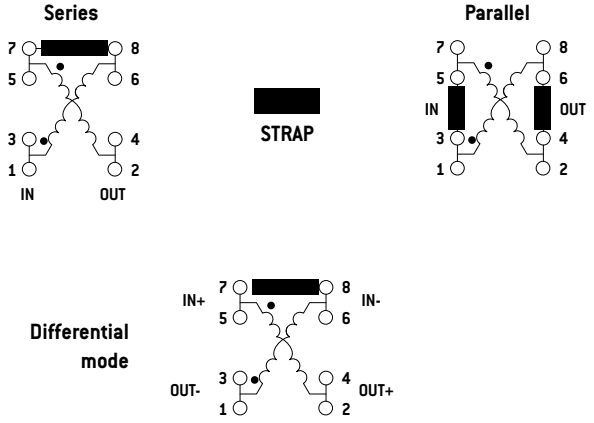


- Power energy storage, smoothing, filtering
- Low drop in inductance under load
- Low leakage and high efficiency
- Thermoplastic materials compliant with UL94-V0
- Frequency range up to 200 kHz
- Operating temperature range: –40 °C to +125 °C
- Possibility to use 2 differencial mode chokes without strap

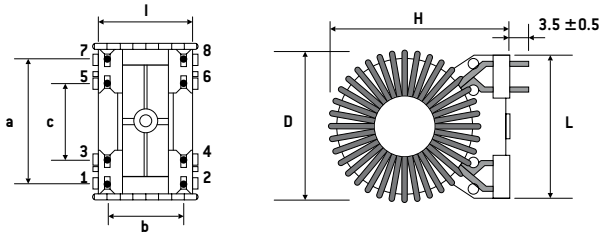
Electrical Data

ID Code	In Adc	Ln µH	Lo µH	Rdc Ω	Pin Ø mm	S series
						500µJ
ESI10 M37 1V	1.5	372	550	140	0.71	S
ESI10 M23 1V	2	230	348	112	0.71	S
ESI10 M14 1V	2.5	140	208	84	0.71	S
ESI10 M37 1V	3	93	137	35	0.71	P
ESI10 M10 1V	3	100	150	60	0.8	S
ESI10 45K 1V	4	45	64	26	1	S
ESI10 M23 1V	4	57	87	28	0.71	P
ESI10 M14 1V	5	35	52	21	0.71	P
ESI10 M10 1V	6	25	38	15	0.80	P
ESI10 45K 1V	8	11	16	6	1	P
						1500µJ
ESI20 M72 1V	2	720	1140	192	0.80	S
ESI20 M47 1V	2.5	475	755	136	0.85	S
ESI20 M63 1V	2.8	632	1300	200	0.8	S
ESI20 M31 1V	3	310	476	78	1	S
ESI20 M42 1V	3.5	420	875	130	0.90	S
ESI20 M17 1V	4	170	262	48	1.12	S
ESi20 M72 1V	4	180	285	48	0.8	P
ESI20 M25 1V	4.5	254	540	84	1	S
ESI20 M47 1V	5	119	190	34	0.85	P
ESI20 M63 1V	5.6	158	325	50	0.80	P
ESI20 M31 1V	6	77	120	19	1	P
ESI20 M14 1V	6	144	310	52	1.12	S
ESI20 M42 1V	7	105	219	32	0.9	P
ESI20 M17 1V	8	42	66	12	1.12	P
ESI20 M25 1V	9	63	135	21	1	P
ESI20 M14 1V	12	36	77	13	1.12	P
						2500µJ
ESI30 80K 1V	6	80	128	21	1	S
ESI30 48K 1V	7.5	48	84	13	1.12	S
ESI30 70K 1V	8.5	70	144	17	1	S
ESI30 46K 1V	10.5	46	96	14	1.12	S
ESI30 80K 1V	12	20	32	5	1	P
ESI30 48K 1V	15	12	20	3	1.12	P
ESI30 70K 1V	17	17.5	36	4	1	P
ESI30 46K 1V	21	11.5	24	3.5	1.12	P

Connections



Typical Dimensions (mm)

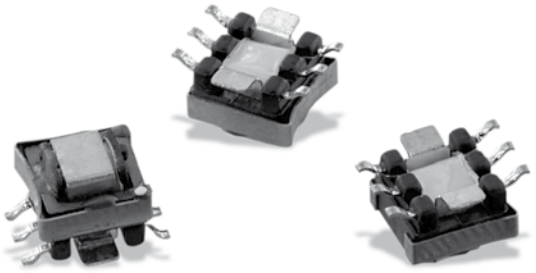


ID Code	L	I	H	D	a	b	c
ESI10	19.1	14	31.5	28	15.24	7.62	5.08
ESI20	29.1	22	40	36	25.4	15.24	15.24
ESI30	29.1	24	42	36	25.4	15.24	15.24

Symbols

S = two single windings in series
P = two single windings in parallel
In = Rated DC currrent
Ln = Inductance under DC bias by In
Lo = Inductance without DC bias
Rdc = DC resistance of windings
Pin Ø = Diameter of connection pin

Current sense Transformer up to 2.2A
CT05 xxx 231 W

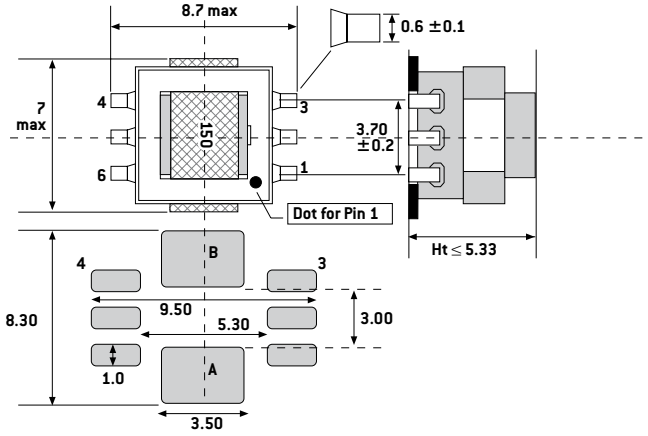


- Materials meet UL94-V0 rating
- Thermal index : classe B
- Max admissible current through primary winding : 2.2 A (1.5 A TYP)
- Insulation : Ri > 100 MΩ between A-B / 1-3 at 200 VDC
- Dielectric strength : 150 Vrms - 50 Hz between A-B / 1-3
- Operating temperature range : –40 °C to + 100 °C
- Suited for IR and vapor reflow soldering
- Weight : 1 gram

Electrical Data (25°C)

ID Code	Turn ratio ± 1% (A-B / 1-3)	DCR (A-B) mΩ ± 15%	DCR (1-3) Ω ± 15%	L1-3
CT05 150 231W	1 : 150	6	9.6	≥ 4.8 mH
CT05 100 231W	1 : 100	6	4	≥ 2 mH
CT05 075 231W	1 : 75	6	2.8	≥ 1.2 mH
CT05 050 231W	1 : 50	6	1	≥ 540 µH

Typical Dimensions (mm)



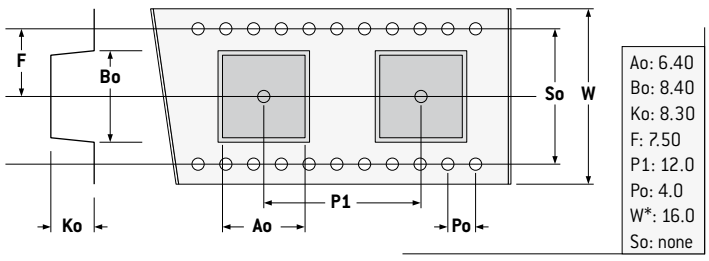
Notes

Typical performances at + 25 °C

Storage Temperature – 40 °C to + 85 °C

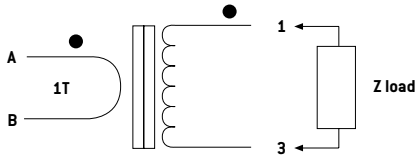
Packaging

Tape and Reel : 750 pieces per reel



general tolerances : ± 0.1 mm / * ± 0.3 mm

Connections



Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

Line-Matching Transformers - MTLM Series

MTLM 2001

MTLM 1200

Features

- Industry standards
- Low profile packages
- Meet EN 41003, EN 60950 except where indicated (◊)
- Operating temperature range -25 to +70° C
- Storage temperature range -40 to +85° C

Applications

- Modems, Fax, PABX
- EFTPOS terminals
- Multi-media cards
- Alarm communicators
- Instrumentation

Electrical Data

Encapsulated Transformers

V. series	ID Code	Impedance prim./sec Ω	Insertion loss, max dB	Frequency response ± dB	Return loss, min dB	Distortion max %	Balance min dB	Power max dB	Vd kVrms	Rdc prim/sec ± 15 % Ω	Ls max mH	Lp min H
V.22bis	**MTLM1200**	600 / 600	1.5	0.4	24	0.1	80	10	4	56 / 56	19	2.8 / 1.6
V.22bis	**MTLM1201**	600 / 600CT	1.5	0.4	24	0.1	80	10	4	56 / 56	17	2.8 / 1.6
V.22bis	**MTLM1200E**	600 / 600	1.5	0.4	24	0.1	80	10	4	66 / 66	17	2.8 / 1.6
V.22bis	**MTLM1201E**	600 / 600CT	1.5	0.4	24	0.1	80	10	4	66 / 66	17	2.8 / 1.6
V.22bis	**MTLM1200C**	600 / 600	1.5	0.4	24	0.1	80	10	4	62 / 62	16	2.8 / 1.6
V.22bis	**MTLM1201B**	600 / 600CT	1.5	0.4	24	0.1	80	10	4	62 / 62	16	2.8 / 1.6
V.22bis	**MTLM3027M**	600 / 600	1.0	0.25	24	0.3	70	5	4	34 / 34	7	1.7 / 1.7
V.22bis	**MTLM6259**	600 / 600	2.0	1	14	0.3	70	20	8	64 / 64	40	0.8 / 0.8

Fast Data-Rate Transformers

V.32bis	**MTLM1165**	600 / 600	1.5	0.4	24	0.1	80	10	4	66 / 66	7	2.8 / 1.6
V.32bis	**MTLM2010**	600 / 600	1	0.25	20	0.1	80	10	4	25 / 25	7	2 min.
V.34	**MTLM2001**	600 / 600	1.5	0.5	24	0.1	80	20	4	56 / 56	19	4 / 3
V.34	**MTLM3400**	600 / 600	2	0.25	24	0.1	80	20	4	105 / 105	20	16 / 6
V.90	**MTLM2056**	600 / 600	1.5 ± 0.25	0.5	16	– 75 dB	–	–	4	100 / 86	25	7
V.90	**MTLM2056C**	600 / 600	1.25 ± 0.25	0.1	24	– 75 dB	–	–	3	100 / 108	25	9
V.34 SMD	**MTLM1234**	600 / 600	2	0.25	24	0.1	80	3	4	115 / 115	5.5	3
V.34	**MTLMA756**	600 / 600	1	0.1	–	0.1	80	50 mW	1	72 / 59	7	7
V.34	**MTLMB819**	600 / 600	–	–	–	–	–	3	12	55 / 55	37	5

DC Current Transformers

	MTLM4498	600 / 2x150	1	– 2.5	14	–	45	–	3	91 / 2x8	8	0.45 min.
	MTLM4763	600 / 2x150	2	– 2.5	14	–	45	–	3	115 / 2x51	8	0.4 min.

MTLM4498: Idc = 90 mA with a turns ratio 2/1: 1

MTLM4763: Idc = 60 mA with turns ratio 2/1: 1

Symbols

Vd = AC voltage insulation rating
Ls = Leakage inductance
Rdc = DC resistance of primary/secondary windings
Lp = Shunt inductance of windings at 0.2 and 1kHz

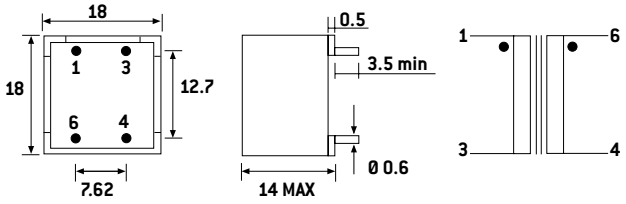
Approval Status

V. series	Part Number	Meets EN 41003 EN 60950	LCIE approved France	VDE certified Germany
V.22bis	**MTLM1200**	yes	yes	yes
V.22bis	**MTLM1200C**	yes	no	no
V.22bis	**MTLM3027M**	yes	yes	no
V.32bis	**MTLM1165**	yes	yes	yes
V.32bis	**MTLM2010**	yes	yes	yes
V.34	**MTLM2001**	yes	yes	yes
V.34	**MTLM4763**	yes	yes	no
V.34	**MTLM1234**	yes	yes	no
V.90	**MTLM2056**	yes	no	no
V.90	**MTLM2056C**	yes	no	no

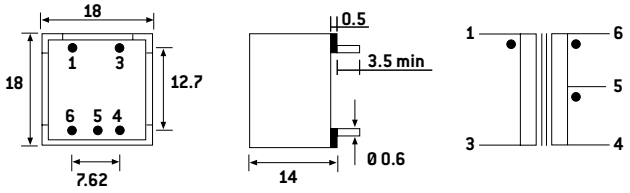
Line-Matching Transformers - MTLM Series

Dimensions and Connections

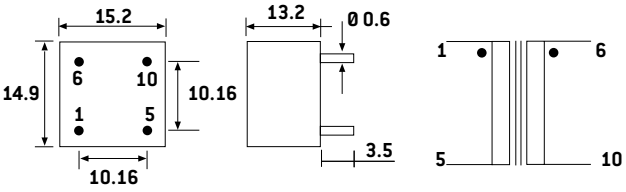
MTLM 1200 / 1200 E / 1200 C / 2001 / 2010



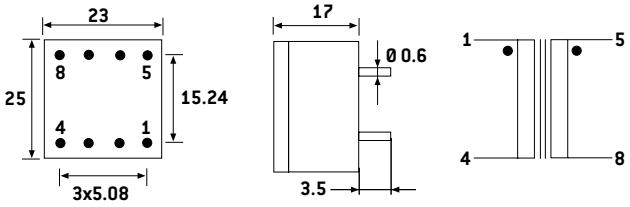
MTLM 1201 / 1201E / 1201B

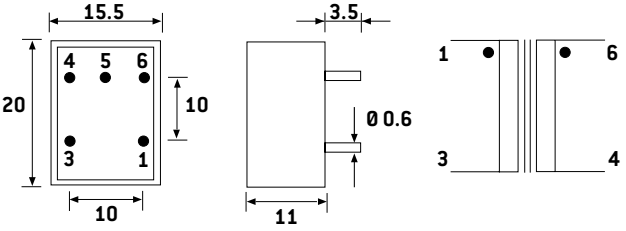


MTLM 3027M / 3034M

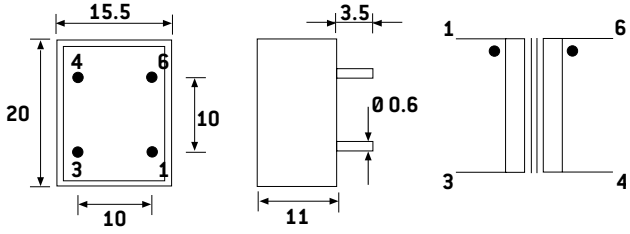


MTLM 6259

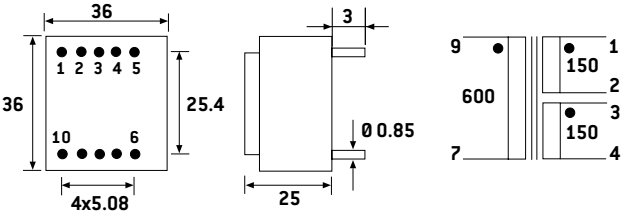




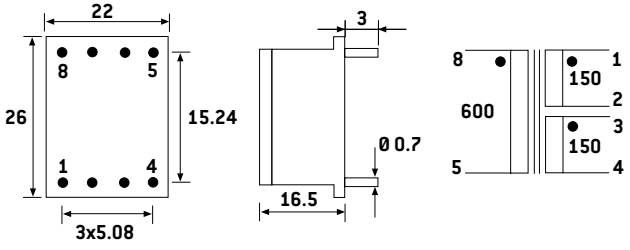
MTLM 3400



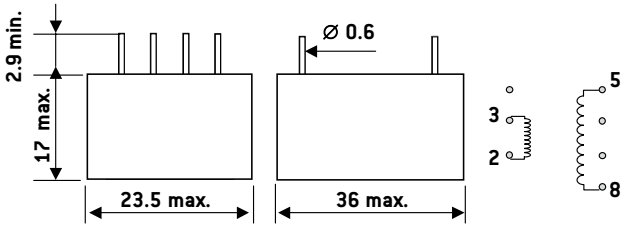
MTLM 4498



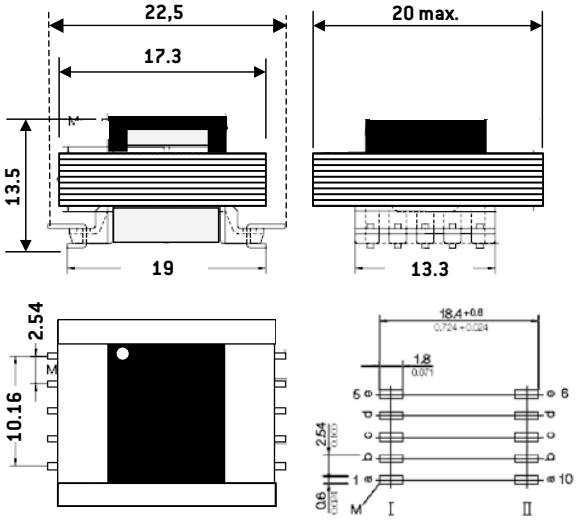
MTLM 4763



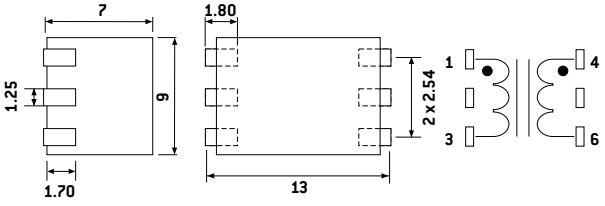
MTLM B819



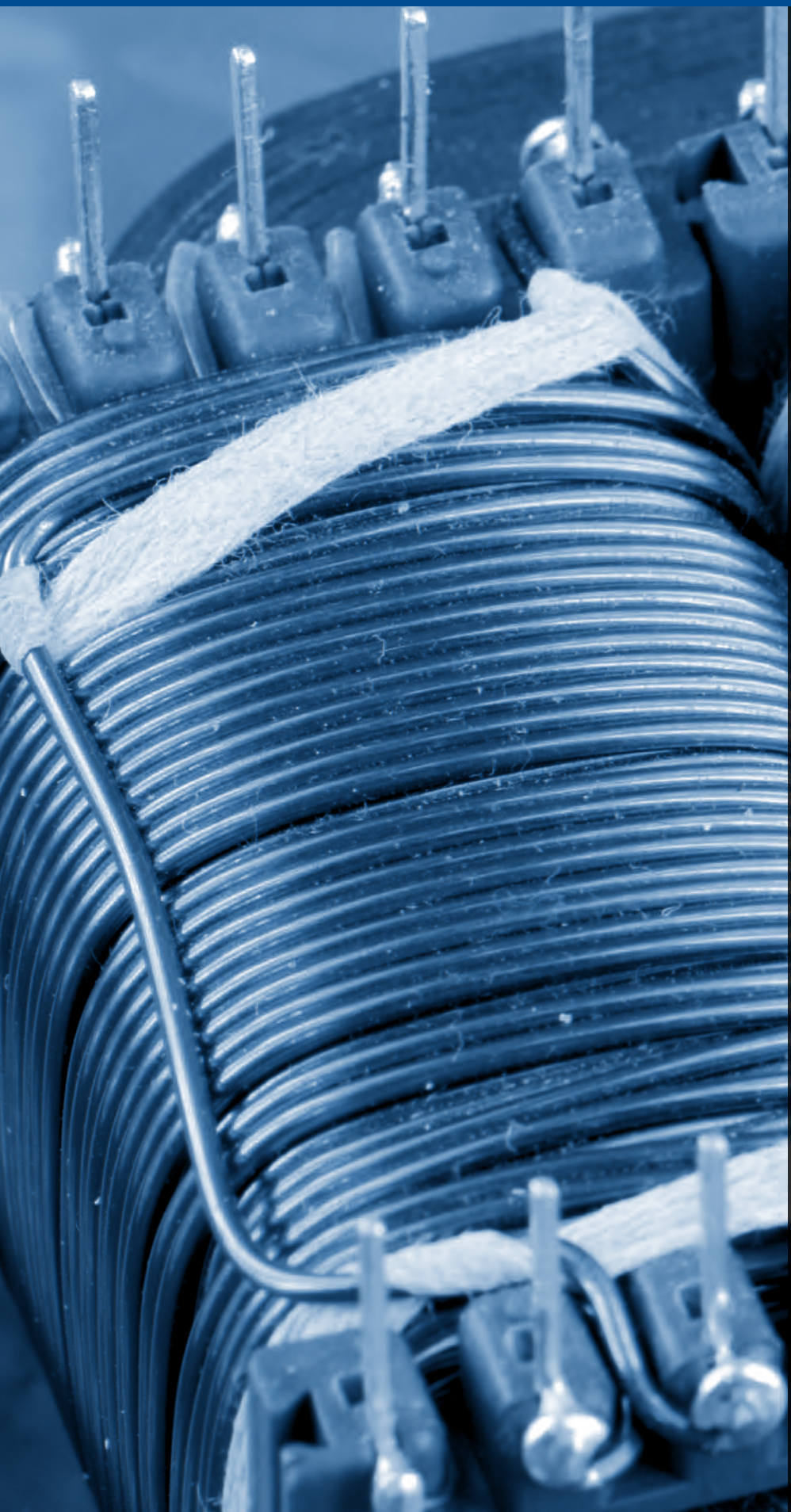
MTLM A756



MTLM 1234



Built-to-Print



Built-to-Print Bobbins for Actuators, Antennas & Sensors

You design the best bobbins, Microspire industrializes and manufactures them.

Microspire Built-to-Print capabilities coupled with its engineering experience, its winding, magnetics, moulding expertise and its manufacturing core competencies will be key to offer you optimized solutions at the right quality and the right cost.

Microspire has more than 20 years heritage in Built- to-Print bobbins.

Microspire can support your project, from the design phase to mass production

Microspire has an existing panel of automated production lines to cover 1000 to 3 millions pieces quantities .

Our experience in high volumes manufacturing enables us to adapt automated lines and to develop toolings for leads insertion, terminations forming over moulding, soldering, testing and marking.

Our expertise includes :

Right choice of the critical raw materials as :

- Terminals,
- Bobbin core : PBT, PP, PET,
  or for high temperature DAP, PPS, LCP, LCP or PEEK
- Overmoulding resins : Epoxy or polyamide,
- Magnet wire.

Bobbin definition :

- Press fit terminal shape,
- Terminal positioning on the flange, bending possibility,
- Insulated start slots,
- Flange shape design for a robust product.

Processes optimization as :

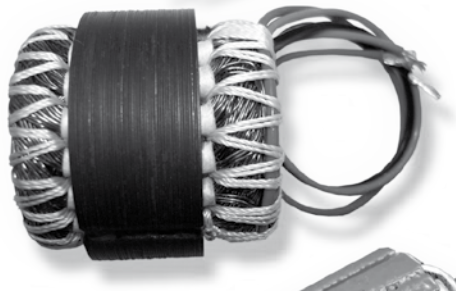
- Overmolding : Epoxy transfer, plastic injection...
- Mold definition,
- Assembly, thin wire (down to 20μm) processing,
- Fast Mockup with stereo lithography and pre series mould-machining, prototypes manufacturing, release, test equipements, production launching, First Article Inspection (FAI)...

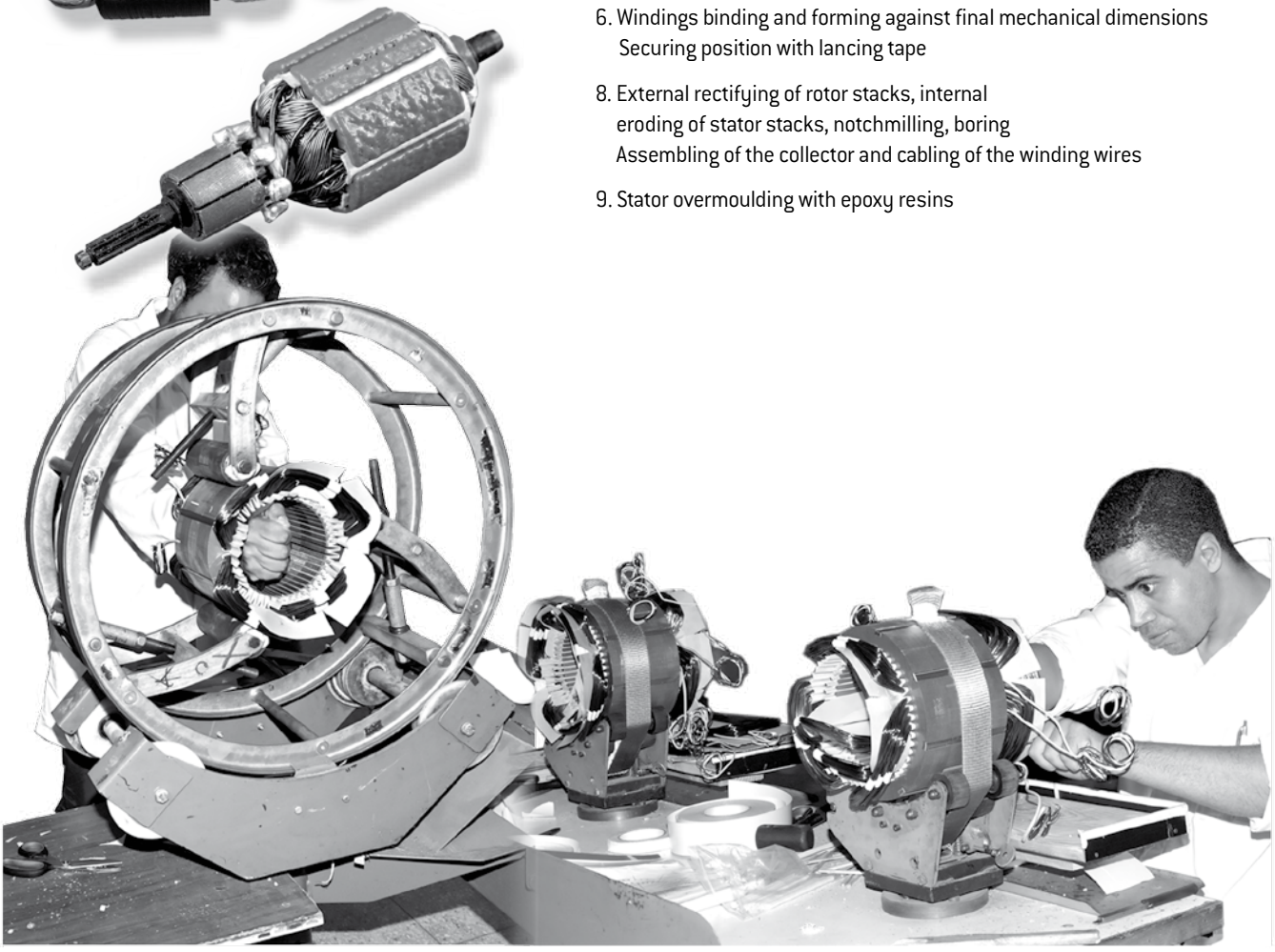
High grade application

For severe environments (shocks, vibration, temperature up to 240°C,good chemical resistance…), Microspire uses specific technologies as :

- Molded-in terminals for better terminal integrity by custom leadframe design and optimized process for terminal insertion
- Metal bobbin and specific dielectric insulation process
- Epoxy transfer moulding,
- Pressure and vacuum impregnation

Built-to-print Rotors and Stators manufacturing





- Stators diameter from 10 to 500mm and weight up to 250Kg
- Up to h igh temperature 220°C products:
- Raw Material
- Impregnation Process
- Therma securities
- Class F or H insulation
- compactness of th stator windings
- stator winding overmolded

Operations

Design and manufacturing of the specific armature tools Armatures or stator stacks gluing under pressure and varnishing laminations on stacking fixtures.

Sets of coil winding operations

4. Slot insulation positioning, winding insertion into the armature slot, cutting down and folding slot insulation and inserting wedges as each slot is filled.

5. Cabling of leadwire with Teflon isolated and flexible sleeve wire, inter-connection of several windings

6. Windings binding and forming against final mechanical dimensions Securing position with lancing tape

8. External rectifying of rotor stacks, internal eroding of stator stacks, notchmilling, boring Assembling of the collector and cabling of the winding wires

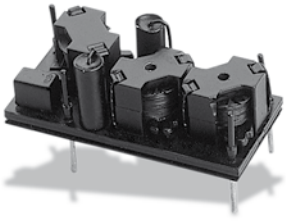
9. Stator overmoulding with epoxy resins

Built-To-Print High Performance Passive Filters

MicroSpire designs and manufactures passive filters with a high performances and thermal stability for diverse applications such as ADSL telecom, public telephones, railway systems, home automation and so on.

ADSL Central Office Splitters

The ACOPS splitter cards separate voice and ADSL data at the Central Office side. These cards have either 1, 4, 8 or 16 channels, each channel having a low-pass and a high-pass filter. All ADSL (TRT1) outputs have a supplementary 1500 Vrms isolation with respect to the line voltage (TRT3) and the voice signal in accordance with the norm EN60950. The filters' impedances are adaptable hence they can operate with other ADSL equipment on the market.



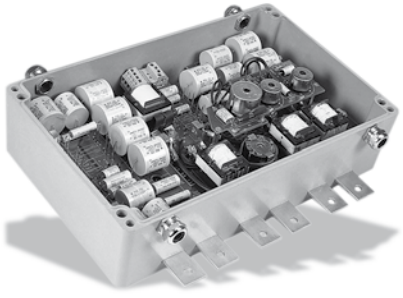
Public Telephone Filters

These filters are used to block either the 12, 18 or 22kHz billing count frequencies found in public telephones. They are highly selective with a – 55 dB attenuation at the centre frequency whilst passing without distortion the voice signals outside their narrow rejection band. As they are used in outdoor public telephones, these filters are of a rugged construction and operate between - 25 °C to + 70 °C.

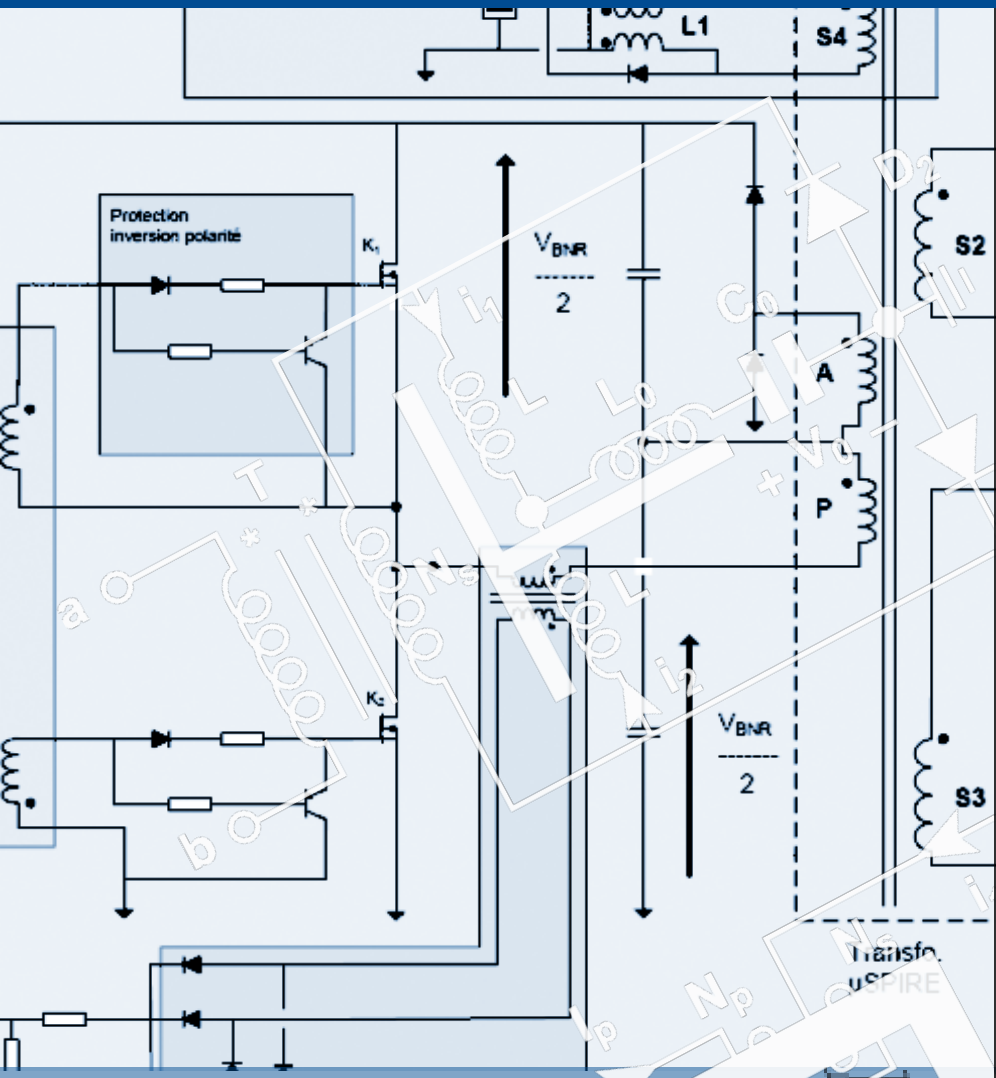
Train Detection Filters

These medium-frequency filters are connected to rail tracks to detect the passage of trains by sensing the change in the impedance of a track segment at a given frequency.

These passive filters tune to and block frequencies as matched pairs to enable their operation in contiguous rail tracks. The filters are rugged to withstand train vibrations and outdoor temperatures between - 25 °C and + 70 °C.



Engineering Support



Flyback Transformers for DC/DC Embedded Applications
FLYT Series

- Microspire's «SESI Technology» planar solution for DC/DC flyback converters
- Seven standard packages in a qualified technology for extreme working conditions
- Compliant with MIL-STD-202, ECSS-Q-70-02 (aerospace) and DO-160 (avionics) standards
- Already evaluated by the CNES for space applications (ESCC Capability Approval in process
- Low profile and light, highly efficient and reliable
- Extended operating temperature range from –55 °C to +125 °C
- SMD versions suited for IR and vapor reflow soldering
- Packaging in Tape&Reel upon request for SMD versions

Package	Indicative Max Output Power at 100KHz (W)	Max Dimensions (LxWxH in mm)	Number of Pins	Weight (grams)	Permitted Losses * for 25°C heating above 100°C (W)
SESI 15 W – FLYT 15	5	22 x 16 x 8	2 x 4 SMD	5	0.6
SESI 15.1 W – FLYT 15.1	5	22 x 16 x 8	2 x 6 SMD	5	0.6
SESI 18 W – FLYT 18	15	26 x 20 x 8,9	2 x 4 SMD	10	0.8
SESI 18.1 W – FLYT 18.1	15	36 x 20 x 8,9	2 x 9 SMD	12	0.8
SESI 22 – FLYT 22	30	37 x 24 x 11,9	2 x 4 SMD	26	1.1
SESI 22.1 W – FLYT 22.1	30	39 x 24 x 11,9	2 x 8 SMD	26	1.1
SESI 32 W/P – FLYT 32	65	49 x 34 x 13,7	2 x 8 PTH**	56	1.7

* Values without heatsink ; these values can be increased with appropriate cooling device
** Through-hole terminations only

Electrical Data Examples

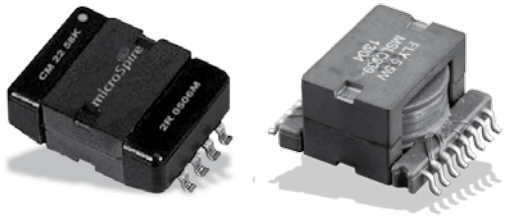
Package	DC Input Voltage Range (Vdc)	Output Power (W)	Designed Outputs	Working Frequency	Primary Inductance	Insulation > 100 MΩ
SESI 15 / 15.1 W	12 - 20.5V (2° - 1)	1.5W	5V / 280mA -5V / 20mA	80 - 120kHz	90µF	500Vdc
	26 - 29V (2° - 1)	1.1W - 2.2W	5.2V / 400mA	130kHz	256µF	500Vdc
	26 - 29V (2° - 1)	2.1W - 2.4W	9V / 250mA	130kHz	231µF	500Vdc
	18 – 40V (1° - 2)	2.4W	48V / 50mA	500kHz	23µF	1500Vdc
	18 – 40V (1° - 2)	3.3W	2x3.3V / 0.5A	500kHz	17.9µF	1500Vdc
	18 – 40V (1° - 2)	4.5W	15V / 5.2V / 1A	500kHz	13µF	1500Vdc
	18 – 40V (1° - 2)	10.5W	2x5.2V / 1A	500kHz	6.2µF	1500Vdc
SESI 18 / 18.1 W	23 - 37V (2° - 1)	3.85W	3.5V / 1A	100kHz	152.5µF	500Vdc
	23 - 37V (2° - 1)	4.56W	-15.25V / 300mA 15.25V / 50mA	100kHz	126µF	500Vdc
	23 - 37V (2° - 1)	5.25W	5.25V / 1A	100kHz	113.7µF	500Vdc
	23 - 37V (2° - 1)	9.45W	5.25V / 1.8A	100kHz	61.7µF	1500Vdc
SESI 22 / 22.1 W	12 - 20.5V (2° - 1)	18.5W	5V / 450mA 22V / 600mA	90 - 130kHz	13µF	500Vdc
	12 - 20.5V (3° - 4)	19.5W	5V / 340mA 12V / 1.2mA	90 - 130kHz	13µF	500Vdc

Each Flyback Transformer shall be the result of a common definition after technical agreement between both engineering teams

Tel : + 33 (0) 3 82 59 13 33

Specifications may change without prior notice - Revised 03/14

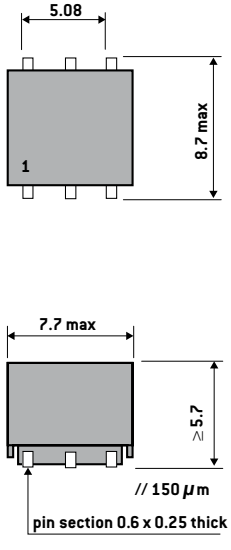
Push Pull Transformers for DC/DC Converters



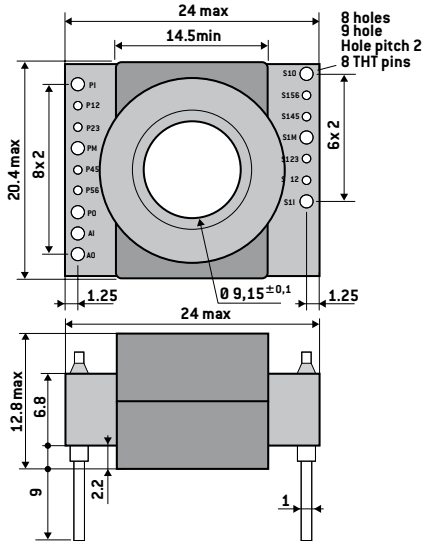
Each Push Pull Transformer shall be the result of a common definition after technical agreement between both engineering teams.

Electrical Data Examples

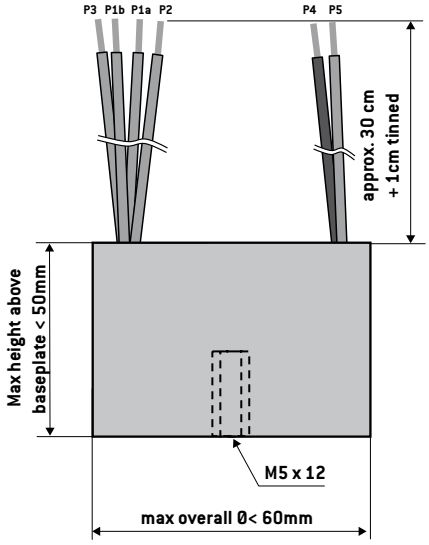
DC Input Voltage Range (Vdc)	Output Power (W)	DC Output Voltage Range (Vdc)	Working Frequency	Environment Temperature (°C)	Casing / Platform	Comments
6,6	0,3	8,6	500KHz	–55/+100	A/E6.3 smd	for MAX845
4,8	0,3	4,8	500KHz	–55/+100	A /E6.3 smd	for MAX845
28	2	252	250KHz	–55/+100	SESI15	
53-63	3,4	2x13/2x6.5	83KHz	-40/+100	SESI22	2x shields
5,25	4,5	85	83KHz	-40/+70	RM5	smd
28	5	33/2.7	5KHz		RM8	Self oscillating
2 x 22	6,6	50/4,2	100KHz		SESI 18	shielded
24 min	12	5.3/3.6/2.4/211	150KHz	-40/+70	EQM20	
26-44	41	-5+5/16/13	500KHz	–55/+125	SESI22	
12-34	48	15	100KHz		RM10	
18-58	50	+5/-5/+15/-15	85KHz	-40/+85	SESI22.1	
16-42	60	5/14,7	125KHz	-40/+100	EFD25	
17-32	60	-15/+15	200KHz	-40/+110	SESI 22	
14-50	65	10/10	300KHz	-40/+110	B/EEQ20	Planar PCB
22	66	5,5/14/2x(+12/-12)	130KHz	-25/+75	TT25	
24	68	170	40KHz	-40 /+70	RM8+shield	
18	70	24/21/12	65KHz	–55/+125	SESI 22	With 2 mechanical inserts
120-375	100	26/28	70KHz	–55/+85	SESI32	Pin Through Hole
26-43	104	22/18	500KHz	-40/+125	SESI32	Pin Through Hole
2 x 24-60	120	2x18	400KHz	-40/+85	EQM20	
10-40	190	28	300KHz	-40/+90	SESI32	
15	550	80	100KHz	-40/+85	C/Overmolded toroid	



Casing A



Casing B



Casing C

400 Hz Current Measurement Transformer Custom Designs

Main characteristics

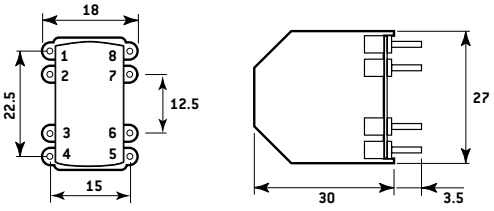
- I Max, up to 2000A
- I min depending on the magnetic core raw material
- Operating Frequency between 10 Hz and 500KHz
- Maximum Acurracy 0.1% over all current / Temperature ranges
- Iout/Vin Phase shift can be evaluated

Applications

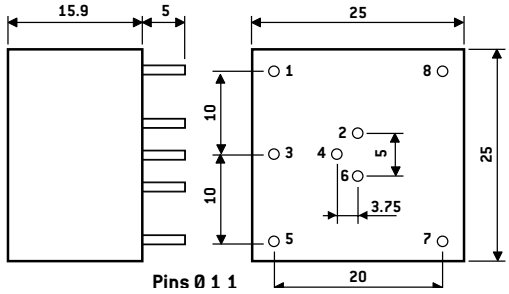
- Single phase measurement
- Ground Fault Measurement (homopolar current)
- With or without test windings

Electrical Data Examples (25°C)

Nominal Primary Current (A)	Turn Ratio or V / A	Overload Current (A)	Working Frequency (Hz)	Load Resistance (Ω)	Measurement Accuracy ± %	Ambiant Temperature (°C)	Casing
25A homopolar	3 x 41 mV/A	500	380 - 420	17	5	– 40 to +100	A
5A Tri Winding	0.2 V/A		360 - 800	100	5	– 40 to +125	B
5	2 V/A	10	360 - 800	2020	1	– 55 to +70	C
15	0.04 V/A	30	360 - 800	10	2.5	– 40 to +115	D
35	0.04 V/A	60	360 - 800	10	2.5	– 40 to +115	E
75	2 x 1.33 mV/A	750	360 - 720	2 x 2.2	1	– 55 to +125	F
170	5.5 mV/A	1000	360 - 720	9.1	1	– 55 to +125	F
260	5.5 mV/A	920	380 - 420	6	0.5 with Δ 1 to 2°	– 55 to +110	F
275	2 x 0.72 mV/A	1800	360 - 720	2 x 2.2	1	– 55 to +125	F

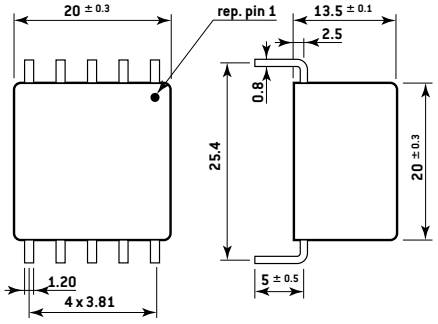


Casing A

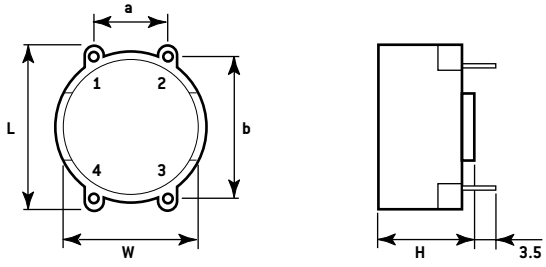


Pins Ø 1 1

Casing B

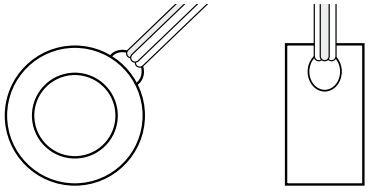


Casing C



Casing D - E

Package	L	H	W	a	b	pins
Casing D	22.5	15	22	12.5	20	0.9 x 0.6
Casing E	27.5	17.5	27	15	25	0.9 x 0.6



Impregnated leaded toroids

Casing F

Casing F

Leaded Toroids Nominal current	External diameter (mm)	Internal diameter (mm)	High (mm)
75 A	25	11	16
170 A	36	22	10
260 A	38.5	33	10
275 A	36	22	19

400 Hz Voltage Measurement Transformer Custom Designs

Main characteristics

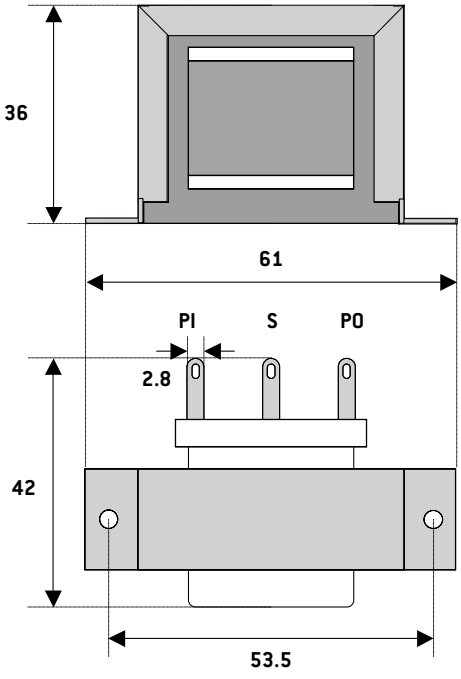
- VMax, up to 2000V
- Operating Frequency between 10 Hz and 500KHz
- Maximum Acurracy 1% over all current / Temperature ranges
- Vin/Vout Phase shift can be evaluated

Applications

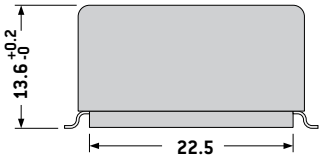
- Single phase measurement
- Electrical Power measurement
- Security systems

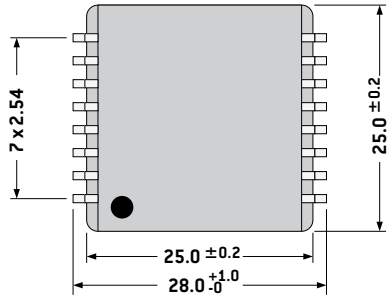
Electrical Data Examples (25°C)

Nominal Primary Current (A)	Measurement Ratio	Primary Voltage Range (V)	Working Frequency (Hz)	Load Resistance mini. (kΩ)	Measurement Accuracy ± %	Ambiant Temperature (°C)	Casing
26	0.5 V/V	0 - 29	360 - 600	10	1	0 to +55	A
115	0.1 V/V	0 - 127	360 - 600	10	1	0 to +55	A
200	1 / 100	122 - 280	360 - 600	1	1	– 40 to +85	B
260	0.05 V/V	160 - 360	360 - 600	20	5	– 40 to +115	C
	47 mV/V	100 - 230	380 - 420	100	1	– 55 to +110	C

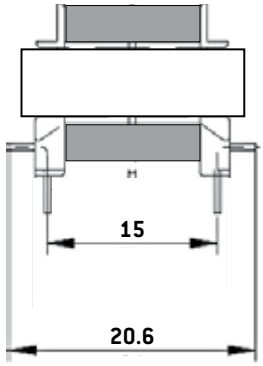


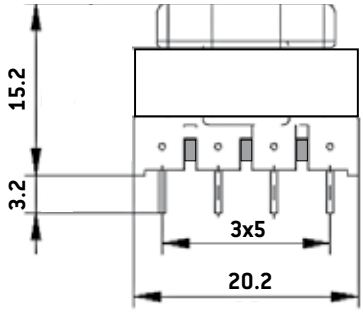
Casing A





Casing B





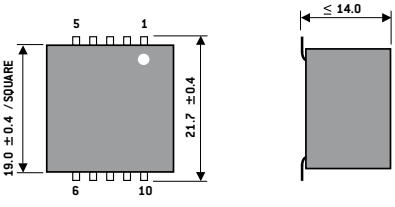
Casing C

400 Hz Power Transformer Custom Designs

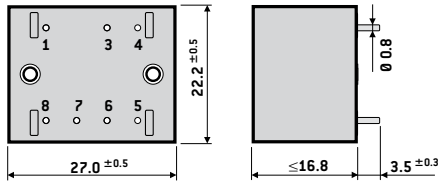
We design and manufacture 400Hz power transformers for step down or elevators applications. Single phase or three phases transformers, from 0.05VA to 500 VA,usually hermetically sealed or semi encapsulated products for harsh environnement. We have to do the best technical compromise with optimisation for weight and/or dimensions.

Electrical Data Examples (25°C)

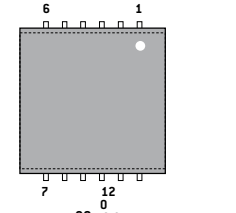
Primary Voltage (A)	Output Voltage (V)	Nominal Power (VA)	Working Frequency (Hz)	Ambiant Temperature (°C)	Weight (g)	Casing
12	5	0.01	400	– 55 to +125	20	A
130	5	0.05	400	– 55 to +125	20	A
200	12	0.6	400	– 55 to +125	35	B
26	2 x 12 + 6	2	400	– 55 to +125	45	C
166 - 225	28	8	400	– 55 to +125	90	D
108 - 122	2 x 9	20	360 - 800	– 40 to +85	190	E
Tri 115 - Y coupling (98-132V)	22-Y coupling	33	360 - 440	– 45 to +105	250	F
Tri 115 - Y coupling (98-132V)	33-Δ coupling	110	380 - 420	0 to +85	450	G



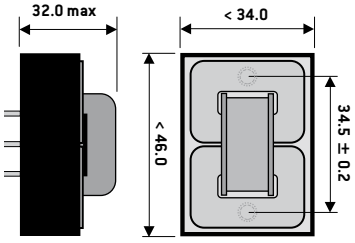
Casing A



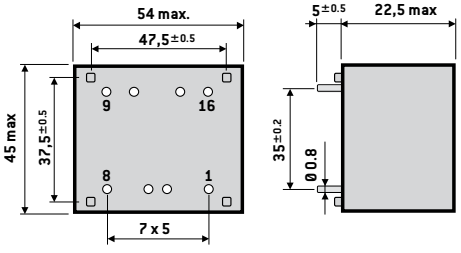
Casing B



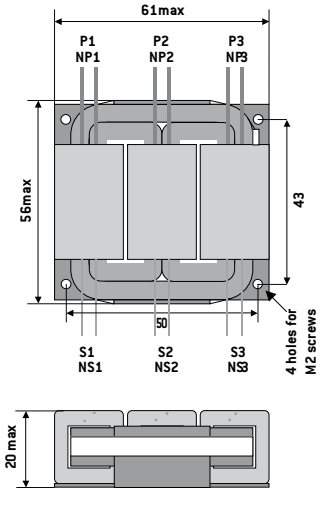
Casing C



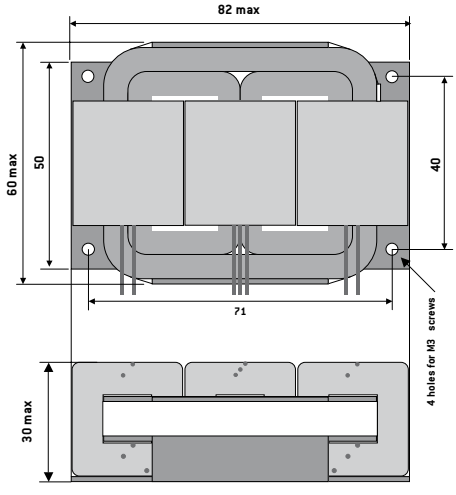
Casing D



Casing E



Casing F

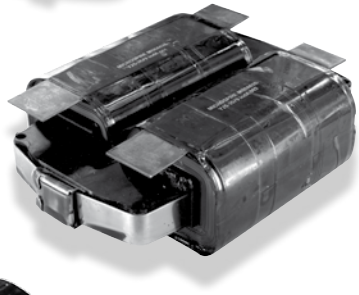


Casing G

Magnetic Design Support for Multi Pulses Transformers

Aluminium Foil Winding technology

Interphase reactor



Copper wire technology

The multi-pulse architecture (12/18/24 /36) is an optimal solution for power applications, enabling low harmonics distortion, improved EMC atenuation through a natural power factor correction.

The basic configuration is a transformer with one primary and 2 secondaries, one in delta and one in wye. The output rectifiers may be placed in series or in parallel depending on the load characteristics.

The multiple converters may be designed with or without galvanic insulation and with or without interphase inductors.

Microspire has a particular experience in the design of 12 pulse step down autotransformer with two interphase reactors.

The benefits of the autotransformer structure are as follows :

- Better EMC behavior: in these topologies, low harmonic components are eliminated. The higher the number of pulses, the higher is the number of mitigated harmonics.
- Better power density: the autotransformer is designed only for a low ratio of the power. This percentage depends on the pulse number.

The interphase inductor design is special as it is operated under a DC current and a triangular voltage.

The autotransformer design must take into account both the magnitude of the harmonics and the component losses.

Microspire can choose the best technology to fit the customer requirements and specifications due to its expertise in design and production (weight, current levels, cooling...).

Common Technologies are :

- C core
- Anodised aluminum foil
- Copper wire or copper foil winding

Examples

Architecture	Primary Voltage (V)	Output DC Voltage (Vdc)	Power / Output Current	Interphase reactor / Comments
Autotransformer 12 pulses	230	540	8 kW transitory	8 mH 17,5 Adc 100 VppΔ 1200 Hz
Autotransformer 12 pulses	115	270	11 kW transitory	6 mH 30 Adc 115 VppΔ 1200 Hz
Autotransformer 12 pulses	115	28	20 Adc	none

MICROSPIRE does understand the added values of these topologies.

The company has already invested in :

- Understanding how this topology works on and the role of the two magnetic components.
- Making two Mathcad® engineering design tools dedicated to each component.

MICROSPIRE is willing to develop variants of theses architectures with others phase numbers.

MICROSPIRE development goals are :

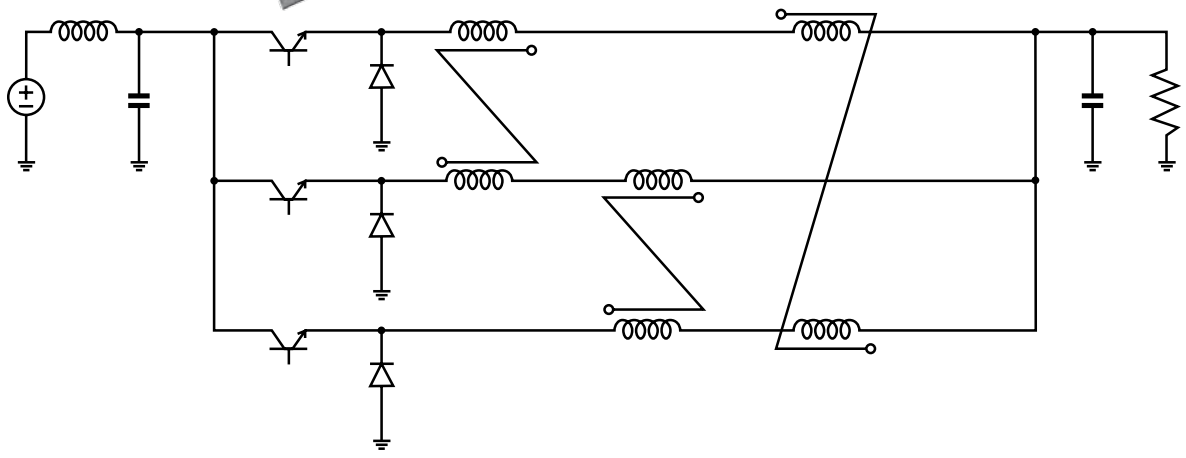
- To optimize power to volume and power to weight ratios
- Evaluate accuratly iron and copper losses and component temperature rise
- Be able to offer operating prototypes at first shot (first time right way of working)
- Offer industrial solutions at an optimised cost

Design Support for Parallel Multicellular Converters Inductors

Making a real breakthrough in power converters is only possible by having an innovative approach challenging the classical topologies.

Parallel Multicellar Converters (PMC) are more and more used to increase power to volume ratio and EMC behavior

Application examples	Inductance (mH)	DC Current (A)	AC Current (A)	Frequence (kHz)
3 cells	4	80	15	300



MICROSPIRE does understand the added values of these topologies. The company has already invested in :

- Understanding how the magnetics component works on during each working phase of the PMC.
- Making a Mathcad® engineering design software tool for this type of component. logiciel d'aide à la conception sous Mathcad

Microspire is willing to develop other applications based on PMC architectures with variant on the number of cells or on base cell topology (Buck, Boost,...).

Microspire development goals are :

- To optimize power to volume and power to weight ratios
- Evaluate accuratly iron and copper losses and component temperature rise
- Be able to offer operating prototypes at first shot (first time right way of working)
- Offer industrial solutions at an optimised cost

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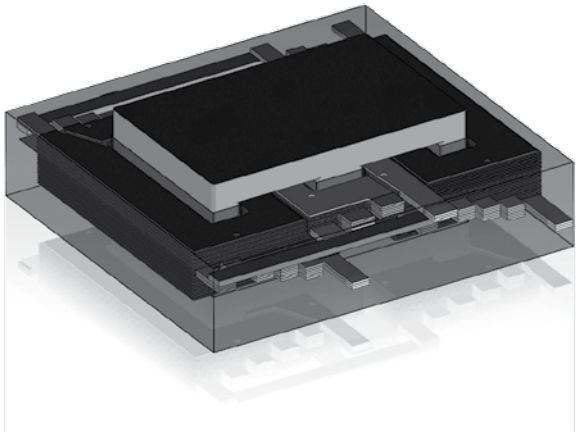
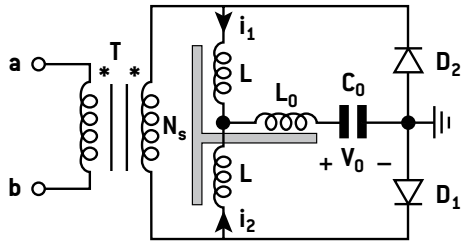
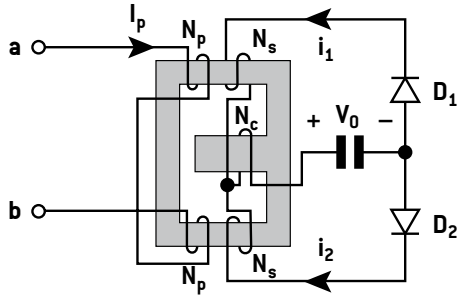
Specifications may change without prior notice - Revised 03/14

Design Support For Integrated Magnetics







One approach to increase power density and efficiency of converters is to realise transformer and output filtering inductor(s) with a single magnetic component. That reduces the number of components and the number of interconnections.

One of the most secondary topology used is the current doubler rectifier with Half or full bridge primary topology.

Our market applications lead us to use a high grade technology :

- EE cores with bobbins when we have to use cooper wires
- EE cores with PCB windings for low currents
- EE cores with coper plates for higher currents

We can also mix the above technogies and are able to overmold windings to have a better Rth and better mechanical behavior.

Our mastership makes us able to do a good compromise beetwen :

- electrical specifications
- available dimensions
- technology construction
- cost
- long term life time

Application examples	Power (W)	Input Voltage (V)	Outputs	Frequence (kHz)
Capacitive half bridge	35	100	3 Vdc 10 Adc	400
Full bridge IMC	300	100	40 Vdc 7.5 Adc	250

MICROSPIRE understands the added values of these topologies.

The company has already invested in :

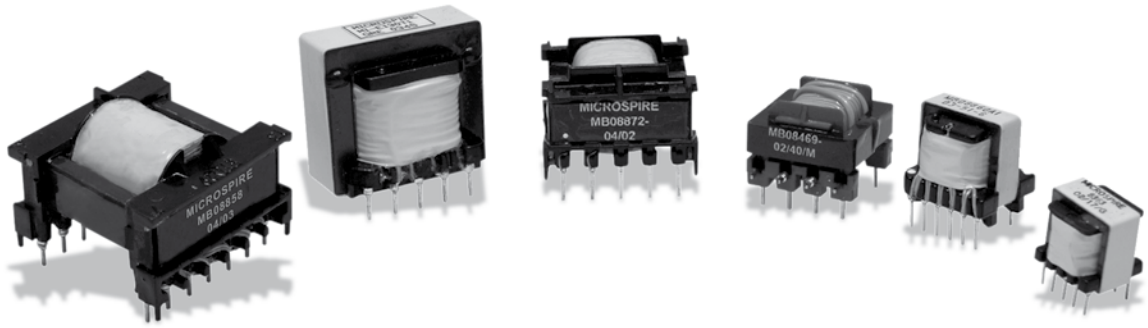
- Understanding how magnetic component works during each converter phase.
- Making a Mathcad® engineering design software tool to design this IMC component

MICROSPIRE is willing to develop other applications based on IMC architectures with variant primary/secondary topologies.

MICROSPIRE development goals are :

- To optimize power to volume and power to weight ratios
- Evaluate accuratly iron and copper losses and component temperature rise
- Be able to offer operating prototypes at first shot (first time right way of working)
- Offer industrial solutions at an optimised cost

Flyback Safety Insulating Transformers
FSIT Series



Output Power (W)	Max Dimensions (LxWxH in mm)	Number of pins (through hole)	Connected ICs
0-6	16 x 15 x 15,5	2 x 5	LNK501, TNY253-254-255, TNY264P/G, TOP242P/G, ICE3A/B0365, VIPer12A, NCP1200
0-10	19 x 17 x 19,5	6 + 4	LNK501, TNY253-254-255, TNY264-266P/G, TOP242P/G, ICE3A/B0365, VIPer12A-20A, NCP1200
10-20	22 x 21,5 x 16,5	2 x 4	TOP242-243Y/F, ICE3A/B1065-1565, VIPer22A-50A, NCP1200
10-20	22 x 21,5 x 17	2 x 5	TOP242-243Y/F, ICE3A/B1065-1565, VIPer22A-50A, NCP1200
20-35	28 x 28,5 x 20,5	2 x 5	TOP242-244Y/F, ICE3A/B2065-2565, VIPer50A-53-100A, NCP1200
35-70	35,5 x 35,5 x 25,5	6 + 7	TOP244-245-246Y/F, ICE3A/B3065-4065P, VIPer100A, NCP1200

- Thermal index according to IEC85 : from* class A (105 °C) to F (155 °C)

Other packages and connections available on demand according to your specification for power range up to 250 W

- Applied standards : EN60950-1, EN61558-1/-2-17, EN60335-1, EN60065
- Materials meet UL94-V0 rating
- Ambiant temperature range : -25 °C +50 °C (+70 °C/+85 °C**)
- Storage temperature range : –40 °C +85 °C
- Associated to latest generation ICs, they replace with competitive pricing and lower size old linear power supplies
- Six standard packages for catalog or custom designs
- Compliant with basic/supplementary to reinforced insulation from the mains according to common applied standards
- Optimized construction of primary winding for low switching losses and low EMI
- Low leakage inductance for improved converter efficiency
- Utilization of triple insulated wire and high performance ferrites
- Increased performances based on optimized designs on accurate automatic software tools linked to transformer datasheets proposed by ICs manufacturers
- Manufacturing in low-cost country

Our transformers can be associated to input common mode filtering chokes and output filtering chokes

* Depending on winding technique used for insulation requirements
** Depending on component heating and thermal class

Packaging to be defined according to batch size.

Flyback Safety Insulating Transformers
FSIT 13 Series & FSIT 16 Series

- 0 to 6 W transformers for AC/DC converters connected to the mains
- Low cost and small package 2 x 5 pin through hole version
- Compliant with basic/supplementary insulation up to 265 Vrms
- Clearance and creepage distance up to 4 mm
- Dielectric strength up to 2 kV (50 Hz - 1 min)
- Approx weight : 5 grams

Electrical Data - FSIT 13

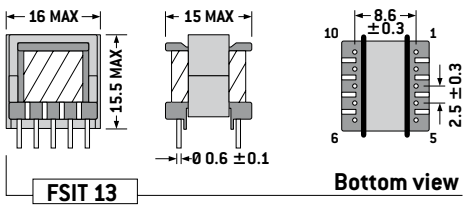
Mains Input Voltage Range (Vrms)	Output Power (W)	Designed Outputs	Connected IC(s)	Working Frequency	Applied standard(s)	Standard Requirements
185 - 265V (5° - 1)	0.85W	5V / 50mA (8° - 6) 12V / 50mA (10° - 6)	LNK501	42kHz	EN60950	Basic / Supplementary 1500Vrms
85 - 265V (5° - 4)	2.44W	5V / 200mA (7° - 6) 15V / 80mA (8° - 6) 8V / 30mA (10° - 9)	TNY264	132kHz	-	Operationnal 1500Vrms
85V - 265V (4° - 2)	5.95W	5V / 350mA (8° - 6) 12V / 350mA (10° - 6)	TNY264, TNY266	132kHz	-	Operationnal 1500Vrms

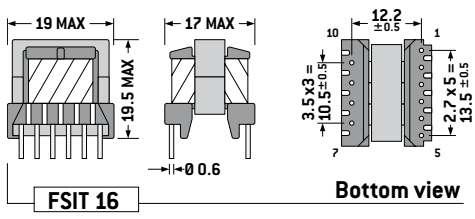
- 0 to 10 W transformers for AC/DC converters connected to the mains (50/60 Hz)
- Low cost and small package 6 + 4 pin through hole version (EE-16)
- Compliant with reinforced insulation up to 265 Vrms working voltage
- Clearance and creepage distance up to 8 mm
- Dielectric strength up to 4 kV (50 Hz - 1 min)
- Approx weight : 7 grams

Electrical Data - FSIT 16

Mains Input Voltage Range (Vrms)	Output Power (W)	Designed Outputs	Connected IC(s)	Working Frequency	Applied standard(s)	Standard Requirements
180 - 265V (8° - 9)	0,8W	8V / 100mA (5° - 2)	LNK501	42kHz	EN60950	Reinforced 3750Vrms
180 - 265V (8° - 9)	1,2W	24V / 50mA (5° - 2)	LNK501	42kHz	EN60950	Reinforced 3750Vrms
90 - 264 (10° - 8)	2,35W	5V / 200mA (2° - 1) 15V / 80mA (3° - 1) -5V / 30mA (6° - 5) BIAS (3° - 1)	VIPer12A	60kHz	EN60335-1	Operationnal 1500Vrms
85 - 265V (9° - 10)	4,4W	1,8V / 600mA (2° - 1) 3,3V / 400mA (4° - 1) 6V / 300mA (5° - 1) 12V / 15mA (6° - 1) BIAS (7° - 8)	TOP242	132kHz	EN60950	Reinforced 4000Vrms
85 - 265V (9° - 10)	5,86W	12V / 80mA (2° - 1) 5V / 80mA (4° - 3) 5V / 900mA (6° - 5) BIAS (7° - 8)	VIPer12A	60kHz	EN60950	Reinforced 3750Vrms
85 - 265V (4° - 6)	8,3W	24V / 200mA (7° - 10) 15V / 200mA (8° - 10) 5V / 100mA (9° - 10) BIAS (2° - 1)	VIPer22A	60kHz	EN60950	Reinforced 3000Vrms
85 - 265V (10° - 9)	9W	6V / 1,5A (5° - 2)	TNY268	132kHz	EN60950	Reinforced 3750Vrms
85 - 265V (9° - 10)	5W	12V / 420mA (4° - 3) BIAS (7° - 8)	VIPer22A	50kHz	-	Operational 1500Vrms

Typical Dimensions (mm)



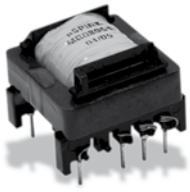


Flyback Safety Insulating Transformers
FSIT 20 Series & FSIT 20.1 Series

- 10 to 20 W transformers for AC/DC converters connected to the mains
- 2 x 4 pin through hole version (EF20)
- Compliant with reinforced insulation up to 265 Vrms working voltage
- Clearance and creepage distance up to 8 mm
- Dielectric strength up to 4 kV (50 Hz - 1 min)
- Approx weight : 20 grams

Electrical Data FSIT 20

Mains Input Voltage Range (Vrms)	Output Power (W)	Designed Outputs	Connected IC(s)	Working Frequency	Applied standard(s)	Standard Requirements
85 - 265V (3° - 4)	20W	15V / 1.35A (5° - 8) BIAS (2° - 1)	TOP244G	132kHz	EN60950	Reinforced 4000Vrms
85V - 265V (2° - 3)	20W	15V / 1.35A (5° - 8)	NCP1200	60kHz	EN60950	Reinforced 4000Vrms

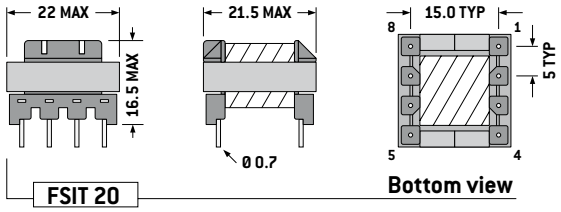


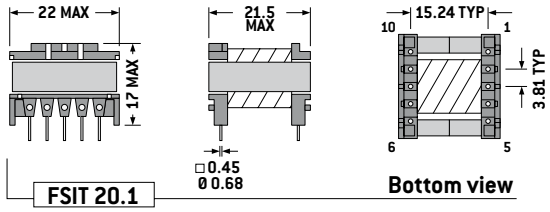
- 10 to 20 W transformers for AC/DC converters connected to the mains (50/60 Hz)
- 2 x 5 pin through hole version (EF20)
- Compliant with reinforced insulation up to 265 Vrms working voltage
- Clearance and creepage distance up to 8 mm
- Dielectric strength up to 4 kV (50 Hz - 1 min)
- Approx weight : 20 grams

Electrical Data FSIT 20.1

Mains Input Voltage Range (Vrms)	Output Power (W)	Designed Outputs	Connected IC(s)	Working Frequency	Applied standard(s)	Standard Requirements
50 - 500V (4° - 5)	3,35W	21V / 70mA (10° - 9) 10V / 100mA (7° - 6) 35V / 25mA (2° - 1)	TNY255 + external MOS	130kHz	EN60950	Reinforced 4000Vrms
180 - 265V (3° - 2)	7,2W	4,4V / 150mA (10° - 9) -35V / 80mA (8° - 7) -61,8V / 60mA (8° - 6) BIAS (5° - 4)	TOP243	132kHz	EN60950	Reinforced 4000Vrms
85 - 265V (3° - 1)	12,5W	5V / 1,25A (8° - 7) 5V / 1,25A (9° - 6)	TNY268	132kHz	EN60950	Reinforced 3750Vrms
85 - 265V (3° - 1)	12,9W	48V / 270mA (10° - 6)	TNY268	132kHz	EN60950	Reinforced 3750Vrms
185 - 265V (2° - 1)	19,25W	5V / 0,8A (9° - 10) 7,5V / 0,9A (8° - 10) 12V / 30mA (7° - 10) 65V / 125mA (6° - 10) BIAS (5° - 4)	VIPer20ASP	120kHz	EN60950	Reinforced 3000Vrms

Typical Dimensions (mm)





Flyback Safety Insulating Transformers
FSIT 25 Series & FSIT 29 Series

- 20 to 35 W transformers for AC/DC converters connected to the mains
- 2 x 5 pin through hole version
- Compliant with reinforced insulation up to 265 Vrms working voltage
- Clearance and creepage distance up to 8 mm
- Dielectric strength up to 4 kV (50 Hz - 1 min)
- Approx weight : 25 grams

Electrical Data FSIT 25

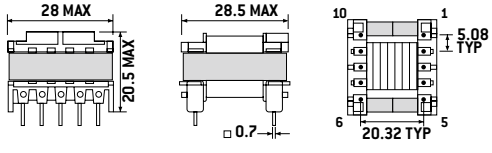
Mains Input Voltage Range (Vrms)	Output Power (W)	Designed Outputs	Connected IC(s)	Working Frequency	Applied standard(s)	Standard Requirements
85 - 265V (2° - 1)	14W	14,5V / 0.95A (10° - 9) 20V / 15mA (7° - 6) BIAS (4° - 5)	VIPer50	100kHz	EN60950	Reinforced 4000Vrms
180V - 265V (3° - 1)	14,5W	2,4V / 1A (9° - 10) 3,3V / 2A (8° - 10) 5,1V / 300mA (7° - 10) 32,6V / 120mA (6° - 10) BIAS (5° - 4)	TOP242 TOP243	132kHz	EN60950	Reinforced 4000Vrms
180 - 480V (2° - 1)	25W	19V / 300mA (9° - 10) 24V / 800mA (6° - 7)	NCP1200	40kHz	EN60950	Reinforced 4000Vrms
185 - 265V (2° - 1)	35W	6,8V / 5A (6 / 7° - 9 / 10) BIAS (5° - 4)	TOP244	132kHz	EN60950	Reinforced 4000Vrms

- 35 to 70 W transformers for AC/DC converters connected to the mains (50/60 Hz)
- 6 + 7 pin through hole version (ETD29)
- Compliant with reinforced insulation up to 265 Vrms working voltage
- Clearance and creepage distance up to 8 mm
- Dielectric strength up to 4 kV (50 Hz - 1 min)
- Approx weight : 50 grams

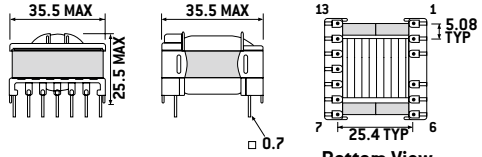
Electrical Data FSIT 29

Mains Input Voltage Range (Vrms)	Output Power (W)	Designed Outputs	Connected IC(s)	Working Frequency	Applied standard(s)	Standard Requirements
85 - 265V (3° - 1)	48W	48V / 1A (11° - 13) BIAS (5° - 4)	VIPer53	100Hz	EN60950	Reinforced 4000Vrms
85 - 265V (3° - 1)	48W	24V / 1A (11° - 12) 24V / 1A (10° - 13) BIAS (5° - 4)	VIPer53	100Hz	EN60950	Reinforced 4000Vrms
85 - 265V (3° - 1)	55,5W	20,5V / 1,5A (12/13°- 10/11) 60V / 400mA (8° - 7) 180V / 4mA (9° - 7) BIAS (5° - 6)	ICE2B765P2	67kHz	EN60950	Reinforced 4000Vrms
85 - 480V (3° - 1)	60W	24V / 1,1A (13° - 12) 10V / 1,1A (11° - 10) 15V / 1,5A (9° - 8) -15V / 250mA (8° - 7) BIAS (5° - 6)	VIPer100	70kHz	EN60950	Reinforced 4000Vrms
185 - 265V (4° - 6)	70W	14V / 2,5A (7° - 9) 14V / 2,5A (10° - 12) BIAS (3° - 2)	TOP245Y	132kHz	EN60950	Reinforced 4000Vrms

Typical Dimensions (mm)



FSIT 25 — Bottom View



FSIT 29 — Bottom View

Engineering support

Electrical Modelling of Magnetics

Our 10 phd engineers, engineers and technicians use advanced engineering tools to model, analyse and optimise the electrical characteristics of wound magnetics.

Our electrical equivalent circuits are based on measurements of either a prototype or a production part and are compatible with simulation software such as PSPICE, SIMPLORER, SABER and CIRCUIT.

Modelling Principles

- Valid for wound magnetics up to 3 windings
- Independent of geometry and technology
- Assumption of linear materials behaviour
- Comparison of measured and model plots

Characteristics of an Electrical Model

- Composed of R, L, C and perfect couplers
- Taking into account :
  - magnetic coupling (magnetizing and leakage)
  - LF and HF copper and iron losses (Eddy currents)
  - electrical coupling (parasitic capacitances)
- Modelling at operating temperatures

Uses

- Simulation of electronic circuits
- Computation of gains, losses, efficiencies
- Analysis of characteristics dispersion
- Approval of equivalent alternative parts
- Diagnosis of defective magnetics
- Optimisation of a part in its environment
- Design of passive filters

Applications

- Telecom and signal transformers
- Current and voltage measurement transformers
- Power supply inductors and transformers
- Inductive sensors

Obsolescence management

For Microspire, the wound magnetic components obsolecence is mainly coming from raw materials availability.

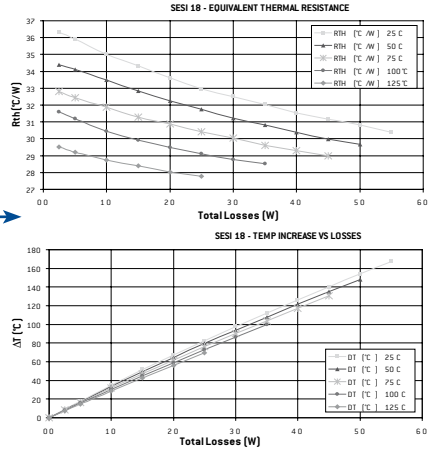
How does it work at Microspire.

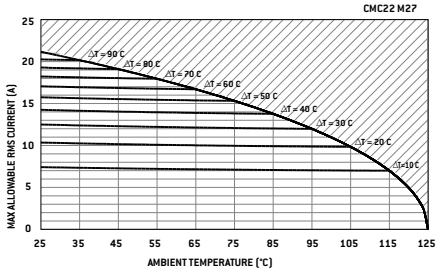
- Notifications and direct relationship with suppliers
- Standards raw material look-out
- Knowledge of raw material counterparts
- Continous development of raw material new process
- As much as possible development of new products through Microspire Technologies

Microspire Technologies means TOTS (Technology Off The Shelves) for custom designs :

- Microspire development technology strategy is focused on niche markets for harsh environnement
- Counterpart for most of raw material used
- Tools maintenability
- Technology already qualified for harsh environnement
- Continuous technology improvement
- new custom products with huge heritage

Thermal characterization of components/packages





Engineering support

Electromagnetic Characteristics of Magnetics

Our Engineers use advanced finite-element simulation software such as Flux2D and Flux3D to model, analyse and optimise the electromagnetic behaviour of existing or to be designed magnetics.

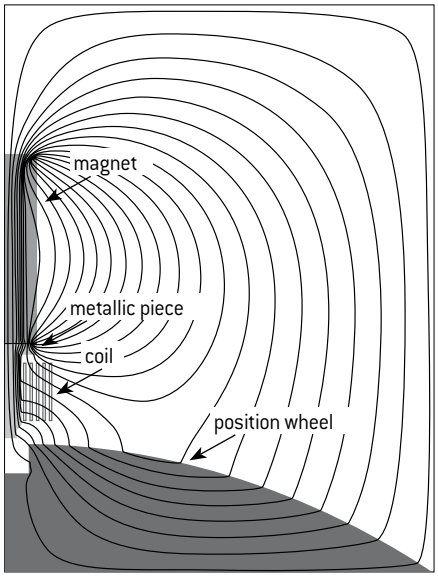
Typically, a given part optimisation project undergoes the following:

1- **Definition** of the mathematical problem: Taking into account the geometry and physical properties of the part

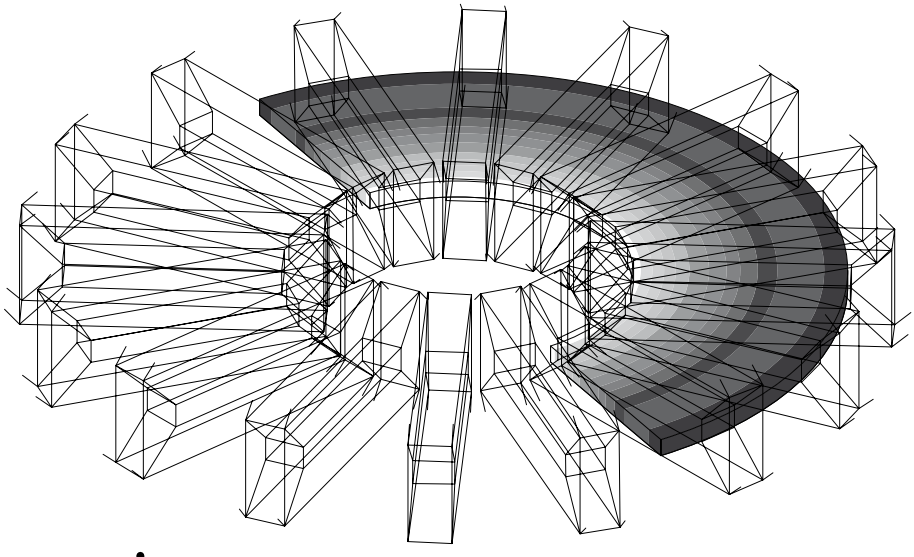
2- **Simulation** of the device's electromagnetic behaviour: Verification of the simulated device by comparison of results with experimental measurements

3- **Optimisation** of the simulated device: Functional analysis of the simulated model adjustments of its parameters

4- **Validation** of the model: Definition, making and test of prototypes
Examples of applications: Pulse detector for energy metering. Induction heating system. High-sensitivity presence detector in an EMI environment. Neutral position transducer for fuel injection.



Component optimisation through 2D/3D simulation



EXXELIA MICROSPIRE	**DESIGN SPECIFICATION FORM**	Date : ..... / ..... / ..... Page N° : ..... / .....

GENERAL INPUTS REQUIRED FOR A CUSTOM REQUEST

Company : **Project :** .....

Adress : .....

Sales Contact :

Ms/Mr. ..... **Tel. :** ..... **Email :** .....

Technical Contact :

Ms/Mr. ..... **Tel. :** ..... **Email :** .....

MARKET : ☐ SPACE ☐ COMMERCIAL AVIONICS ☐ MILITARY AVIONICS ☐ DEFENSE
☐ DOWNHOLE ☐ RAILWAYS ☐ INDUSTRY ☐ MEDICAL

Applied Standards *(ESA, Mil, ...)* **:** .....

RoHS Statues : ☐ Non RoHS ☐ RoHS

Outgassing Satus : .....

Environmental Constraints : .....

Ambient Temperature Range (°C) : Min. : ..... Max. : .....

Storage Temperature (°C) : Min. : ..... Max. : .....

VRT-Thermal shocks : .....

Moisture : .....

Salt Spray Resistance : .....

Fungi Resistance : .....

Other *(specify)* **:** .....

MECHANICAL CONSTRAINTS : ☐ Shocks ☐ Vibration ☐ Robustness of connections

Partial Discharge : ..... (pC)

MOUNTING : ☐ SMD ☐ TH ☐ Wire
☐ Other *(specify)* : .....

PACKING : ☐ Individual package ESD : ☐ Yes ☐ No
☐ Tray
☐ Reel
☐ Other *(specify)* : .....

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INDUCTOR / CHOKE

Company name : ..... **Project :** .....

Product reference : ..... **Yearly Quantities :** .....

INDUCTOR TYPE : ☐ Common Mode Choke (CMC) ☐ Differential Choke (DMC)

Phase number : .....

INDUCTANCE : ..... (µH) Min. Value (with rated current) ..... (µH) Min. Value (no load)

OPERATING FREQUENCY OR FREQUENCY RANGE (CMC) : .....

CURRENT DATA : I_{DC} : ..... (A) I_{AC} : ..... (A)

Current Waveform Description : .....

Irms : ..... (A) **Ipeak :** ..... (Ap)

Harmonic Amplitudes : H_1 ..... (A) H_2 ..... (A) H_3 ..... (A)

If Rf choke, confirm min. Q factor and frequency : .....

DIELECTRIC WITHSTANDING VOLTAGE : W_1 / W_2 : ..... W_2 / W_3 : .....

Insulation resistance : W_1 / W_2 : ..... W_2 / W_3 : .....

MAXIMUM DIMENSION : Length : ..... (mm) Width : ..... (mm) Height : ..... (mm)

Finishing : ☐ Case ☐ Molding ☐ None ☐ Impregnation

MARKING : ..... **WEIGHT :** ..... (g)

MECHANICAL DRAWING

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SIGNAL TRANSFORMERS

Company name : ..... **Project :** .....

Product reference : ..... **Yearly Quantities :** .....

APPLICATION : ☐ Audio transformer

☐ Other (*specify*) **:** .....

PRIMARY VOLTAGE : ..... (Vrms) Min. ..... (Vrms) Max.

SECONDARY CHARACTERISTICS :

Output power range : ..... (W) THN+N : ..... dB Working frequency : ..... (Hz) Bandwidth : .....

Output voltage (V_{AC} RMS) : ..... Vs 1 : ..... Vs 2 : ..... Vs 3 : ..... Vs 4 : .....

Output current (A_{AC} RMS) : ..... Is 1 : ..... Is 2 : ..... Is 3 : ..... Is 4 : .....

SHIELD : Prim./Sec. : ..... (V) Sec./Sec. : ..... (V)

Insulation resistance : Prim./Sec. : ..... (Ω) Sec./Sec. : ..... (Ω)

Winding/Shields : ..... (V) Winding/Ground : ..... (V)

MAXIMUM DIMENSION : Length : ..... (mm) Width : ..... (mm) Height : ..... (mm)

Finishing : ☐ Case ☐ Molding

☐ None ☐ Impregnation

MARKING : ..... **WEIGHT :** ..... (g)

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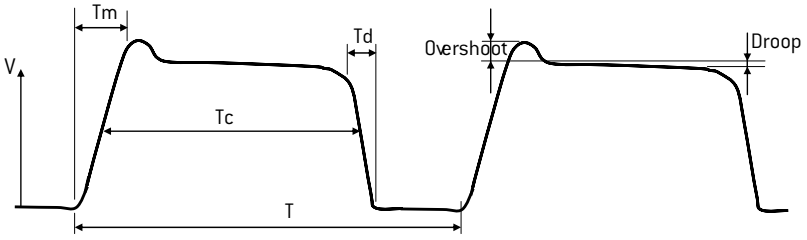
PULSE TRANSFORMERS (suitable for Gate Drive Transformer, Data Bus Transformers...)

Company name : ..... **Project :** .....

Product reference : ..... **Yearly Quantities :** .....

Pulse Drawing :



PULSE DESCRIPTION : **Conduction time (Tc) :** ..... (µA) **Rise time (Tm) :** ..... (µs)

Falling time (Td) : ..... (µs) **Droop :** ..... (V) **Overshoot :** ..... (V)

Volt time constant ET : ..... (Vµs) **Pulse repetition Rate (Max.) / Frequency (Min.) :** ..... (µs/Hz)

MAGNETISING INDUCTANCE :

Secondary load Impedance : ..... (Ω) **Max. acceptable interwinding capacitance :** ..... (pF)

Input Voltage : ..... (V) **Secondary Voltage :** ..... (V) **Turn ratio :** .....

DIELECTRIC WITHSTANDING VOLTAGE : Prim./Sec. : ..... (V) Sec./Sec. : ..... (V)

Insulation resistance : Prim./Sec. : ..... (Ω) Sec./Sec. : ..... (Ω)

Winding/Shields : ..... Winding/Ground : .....

MAXIMUM DIMENSION : Length : ..... (mm) Width : ..... (mm) Height : ..... (mm)

Finishing : ☐ Case ☐ Molding

☐ None ☐ Impregnation

MARKING : ..... **WEIGHT :** ..... (g)

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CURRENT MEASUREMENT TRANSFORMERS / SENSORS

Company name : ..... **Project :** .....

Product reference : ..... **Yearly Quantities :** .....

Vs / Ie Turn-ratio : .....(Vrms / Irms)

Measured Current Range :..... (A) Min. ..... (A) Max.

ACCURACY : ± ..... (%)

Working frequency range : ..... (Hz) Min. .....(Hz) Max.

Max. loaded resistance admissible :.....(Ω)

DIELECTRIC WITHSTANDING VOLTAGE : Prim./Sec. :..... (V) *Indicate if RMS or DC* Sec./Sec. : ..... (V) *Indicate if RMS or DC*

Insulation resistance : Prim./Sec. :..... (Ω) Sec./Sec. : ..... (Ω)

MAXIMUM DIMENSION : Length :..... (mm) Width : .....(mm) Height : ..... (mm)

If Toroidal magnetic core : External Ø Max. ..... (mm) Internal Ø Min. ..... (mm)

Finishing : ☐ Case ☐ Molding ☐ None ☐ Impregnation

MARKING : ..... **WEIGHT :** .....(g)

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FLYBACK TRANSFORMERS

Company name : ..... **Project :** .....

Product reference : ..... **Yearly Quantities :** .....

MODE : ☐ CONTINUOUS ☐ DISCONTINUOUS ☐ OTHERS

Power value for switching from discontinuous to continuous mode : ..... (W)

Switching frequency : ..... (Hz) **Max. peak primary current :** ..... (Ap)

Magnetizing Inductance : ..... (μH)

Vp Max. Primary voltage : ..... (V) **Vp Min. :** ..... (V)

Duty cycle Max. : ..... **(%)** **Duty cycle Min. :** ..... **(%)** **Chip duty cycle Max :**..... **(%)**

RECTIFIED VOLTAGE (V_{DC}) : Vs 1 :..... Vs 2 : .....Vs 3 :..... Vs 4 :..... Vs 5 :.....

CURRENT (I_{DC}) : Vs 1 :..... Vs 2 : .....Vs 3 :..... Vs 4 :..... Vs 5 :.....

Diode voltage drop : ..... (V)

DIELECTRIC WITHSTANDING VOLTAGE : Prim./Sec. :.....(V) *Indicate if RMS or DC* Sec./Sec. : .....(V) *Indicate if RMS or DC*

Insulation resistance : Prim./Sec. :.....(Ω) Sec./Sec. : .....(Ω)

Winding/Shields :.....(V) Winding/Ground : .....(V)

MAXIMUM DIMENSION : Length : ..... (mm) Width :..... (mm) Height : .....(mm)

Finishing : ☐ Case ☐ Molding ☐ None ☐ Impregnation

MARKING : ..... **WEIGHT :** .....(g)

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