



Transformer

Transformer for IGBT/FET

Series/Type: E13 EM series
Ordering Code: B8280*F

Date: October 2025

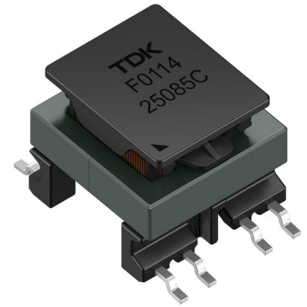
SMD

Construction

- Ferrite core MnZn
- SMD gullwing pins
- Non-conductive pick-and-place cap on top
- Triple insulated wire

Features

- Height: 12 mm max
- Footprint: 18.6 mm x 14.6 mm
- Wide temperature range from -40°C up to +150 °C
- Qualified to AEC-Q200 REV E
- RoHS compatible
- Suitable for lead-free reflow soldering as referenced in JEDEC-J-STD 020F
- Color of materials may vary



Applications

- DC/DC power supplies
- Isolated DC/DC Converters [Flyback or Push Pull topology]
- Gate drive transformers for IGBT/MOSFET

Insulation characteristics

- [1,2,3,4] / [5,6,7,8] creepage = 6.3 mm, clearance = 5.5mm
(cumulative, core is conductive, free floated between [1,2,3,4] / [5,6,7,8])
- [Winding] / [core] creepage = 3.15 mm, clearance = 2.5 mm
- Top surface / core creepage and clearance = 2.5 mm
- Plastic materials UL94-V0, CTI IIIa
- Insulation distances sufficient for basic insulation working voltage 500 V_{DC} ,
Transient over voltage 2500 V_{PEAK}, P2, CTI IIIa, 5000 m altitude
- Insulation distances sufficient for reinforced insulation according to IEC 60664-1, 61558-2-16
for working voltage 300 V, OVC II , P2, CTI IIIa, 5000 m altitude

Marking

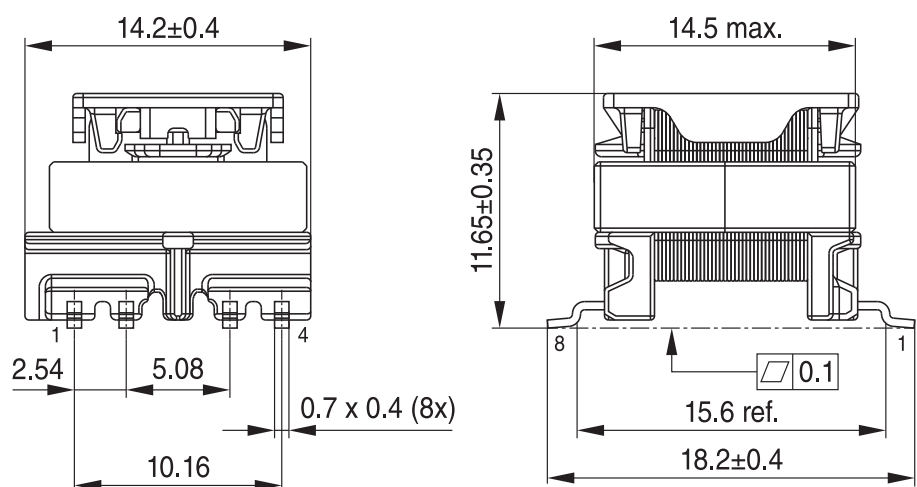
Product brand, middle block of ordering code, date code, pin 1 marker, production place identification code

Delivery mode

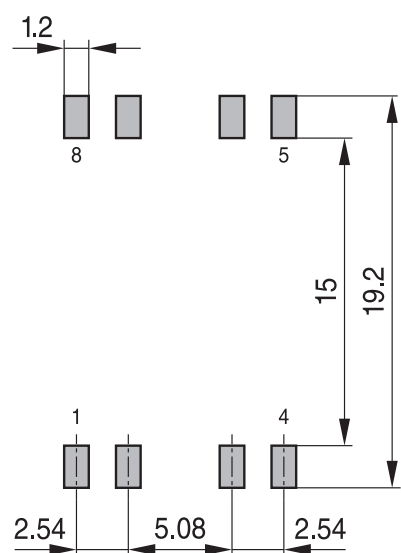
- Blister tape 13" mm diameter
- Packing unit 180 pcs per reel

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Dimensional drawing and layout recommendation



IND2498-9



IND2499-A

Dimensions in mm

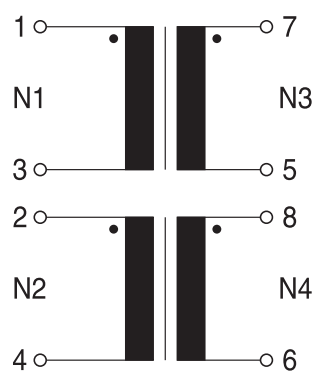
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Technical data and measuring conditions

Specified @ +25 °C if not mentioned otherwise, all values without tolerance are typical values.

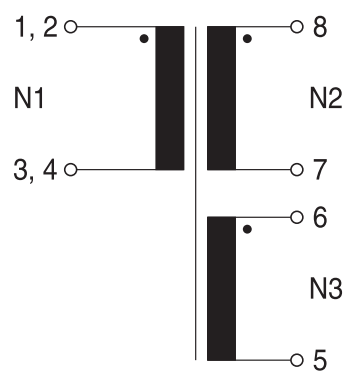
	Units	B82802F0007A213	B82802F0004A213	B82802F0005A113
Type		Flyback	Flyback	Flyback
Figure No.		F1	F2	F3
Turns ratio		1 : 1 : 0.5 (N1+N2) : N3 : N4	1 : 2 : 2 N1 : N2 : N3	1 : 1 N1 : N2
Typical operational frequency	kHz	100 ... 400		
L_{N1}	μH	$30 \pm 10\%$ (N1+N2)	$14.4 \pm 15\%$	$1.8 \pm 10\%$
$L_{\text{LEAK},N1}$	μH	0.5	0.10	0.12
I_{SAT}	A	2	1.6	9
$R_{\text{DC},N1}$	$\text{m}\Omega$	220	65	50
$R_{\text{DC},N2}$	$\text{m}\Omega$	250	220	50
$R_{\text{DC},N3}$	$\text{m}\Omega$	445	250	—
$R_{\text{DC},N4}$	$\text{m}\Omega$	263	—	—

F1



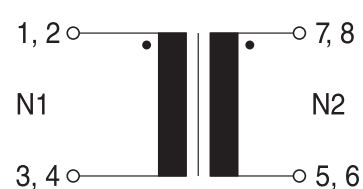
Short 2,3 ; 6,7 on PCB

F2



Short 1,2 ; 3,4 on PCB

F3

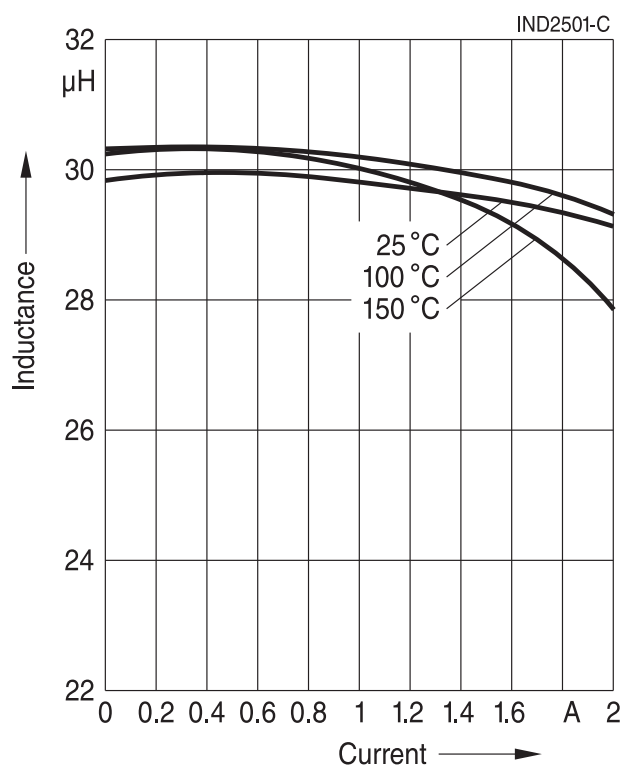


Short 1,2 ; 3,4 ; 5,6 ; 7,8 on PCB

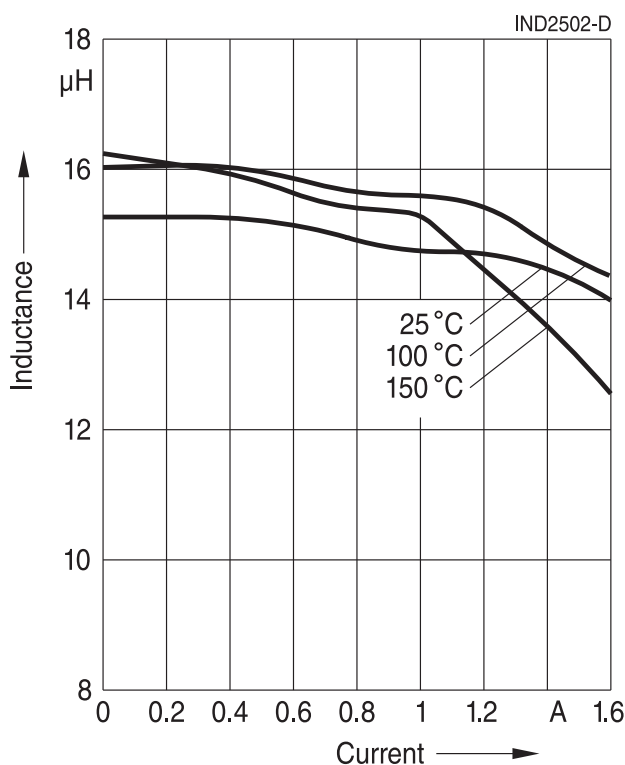
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Typical Inductance L_{N1} vs temperature vs saturation current

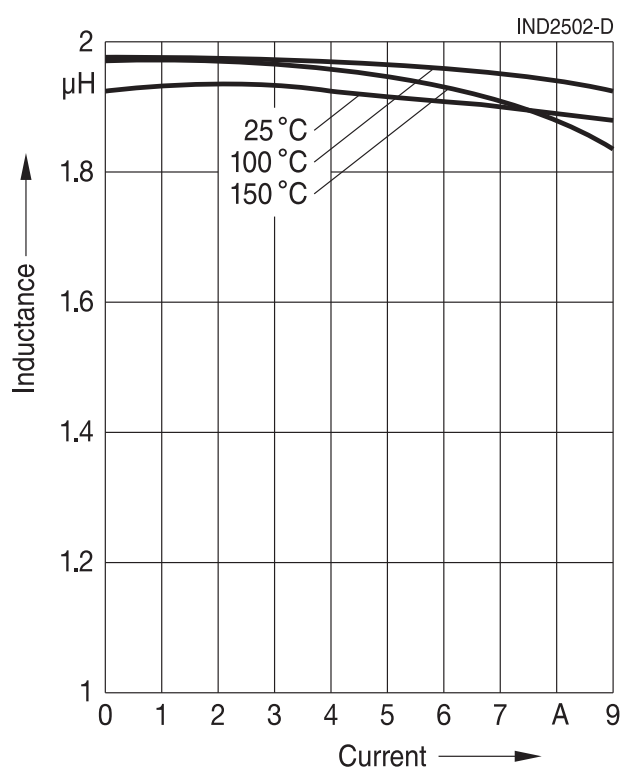
B82802F0007A213



B82802F0005A21



B82802F0005A113



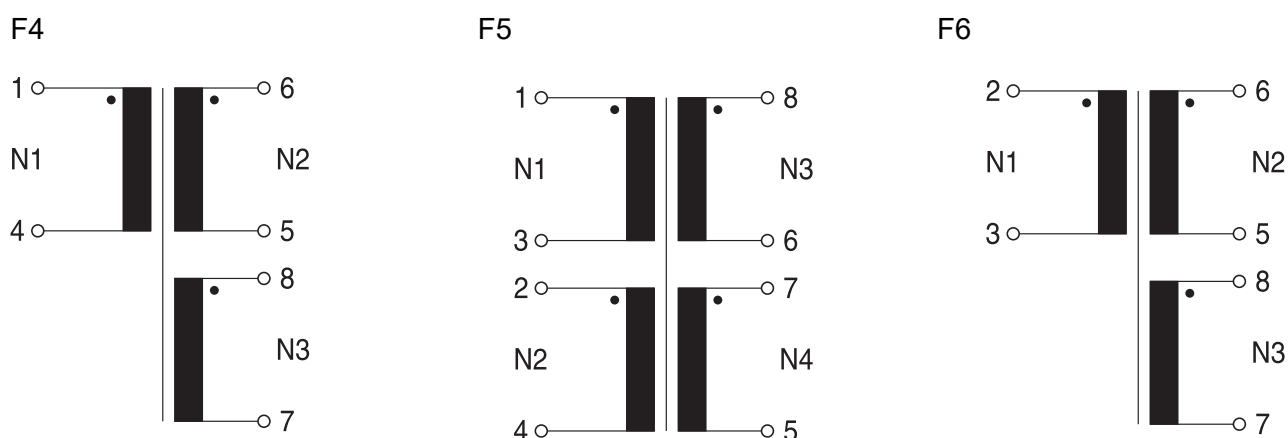
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Technical data and measuring conditions

Specified @ +25 °C if not mentioned otherwise, all values without tolerance are typical values.

	Units	B82804F0503A200	B82804F0114A200	B82804F0244A210
Type		Pushpull	Pushpull	Pushpull
Figure No.		F4	F5	F6
Turns ratio		1 : 3.78 : 1.55 N1 : N2 : N3	1 : 1 : 1.5 : 1.5 N1 : N2 : N3 : N4	1 : 1 : 1 N1 : N2 : N3
Typical operational frequency	kHz	100 ... 400		
$L_{N1,min}$	μH	50	110	240
$L_{LEAK,N1}$	μH	0.15	0.4	0.7
$R_{DC,N1}$	$m\Omega$	140	340	450
$R_{DC,N2}$	$m\Omega$	430	345	500
$R_{DC,N3}$	$m\Omega$	200	435	500
$R_{DC,N4}$	$m\Omega$	—	445	—
$E \cdot dt_{N1}^{1)}$ (max, unipolar/bipolar)	μVs	24/48	38/75	50/100

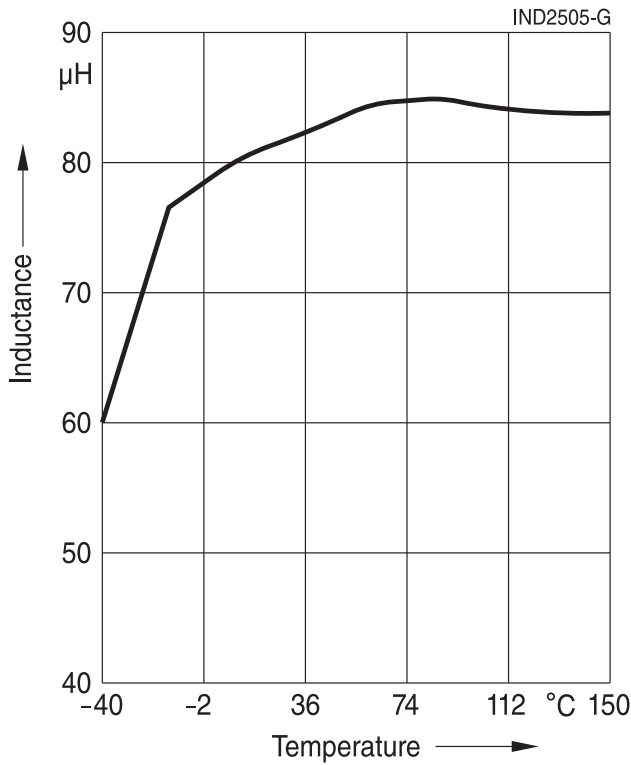
1) $T \leq 150$ °C, $\hat{B} = 200$ mT, $\Delta B = 400$ mT (bipolar mode). The maximum volt-sec rating limits the peak flux density to $\hat{B} = 200$ mT when used in an unipolar drive application. For bipolar drive applications, a maximum volt-sec of two times is acceptable ($\Delta B = 400$ mT).



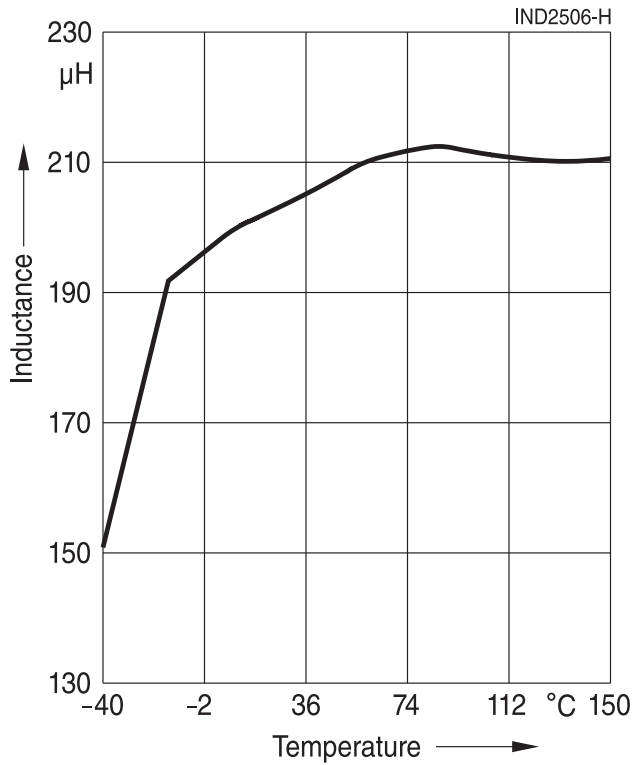
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Typical Inductance L_{N1} vs temperature vs saturation current

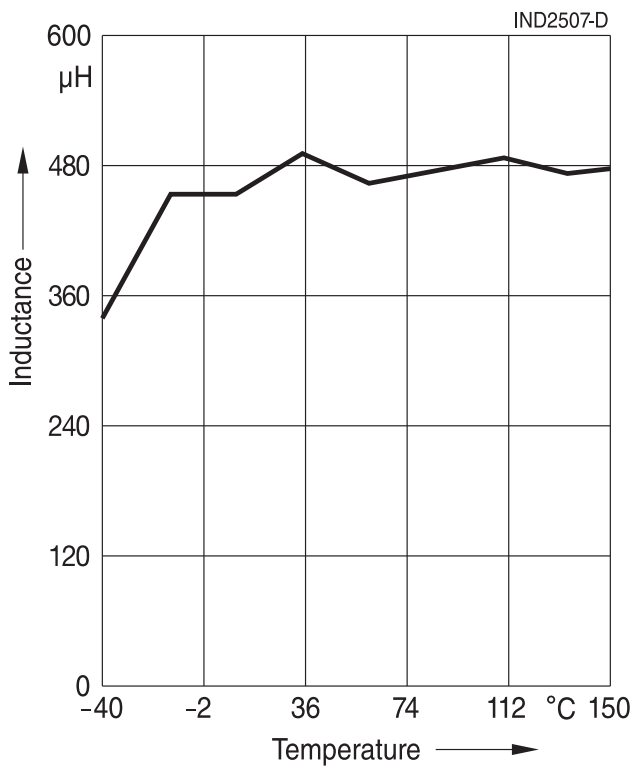
B82804F0503A200



B82804F0114A200



B82804F0244A210



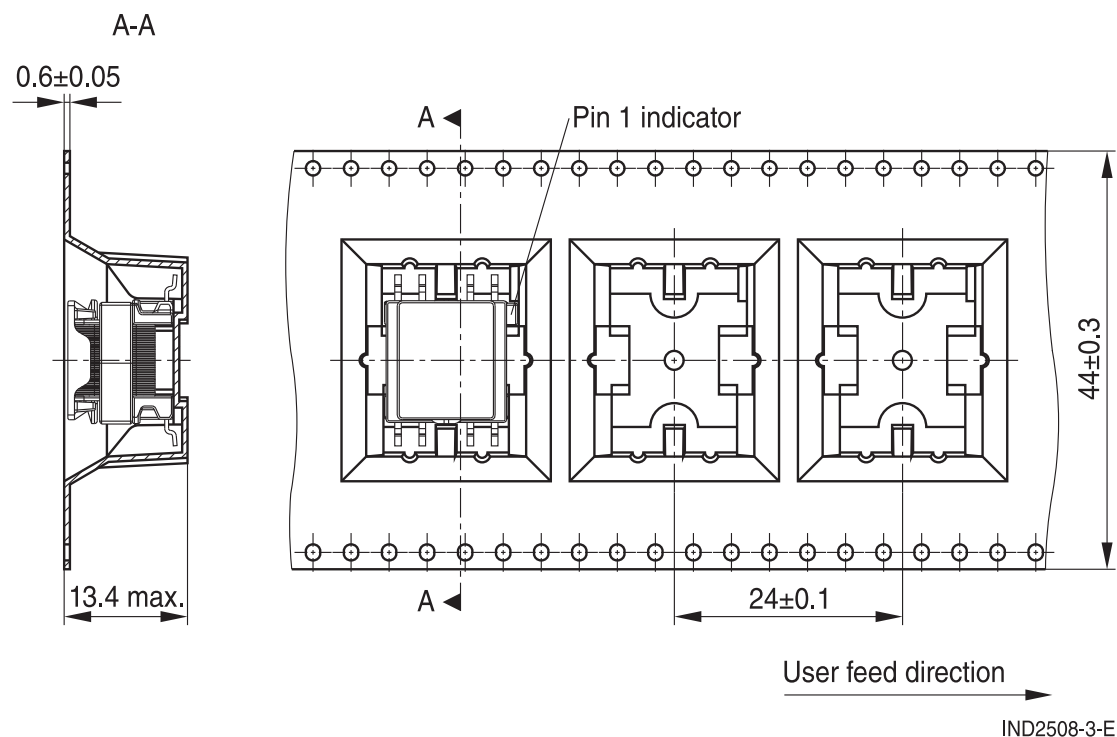
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High voltage capability data

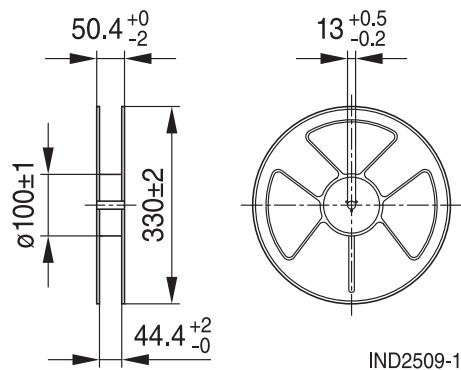
HV - primary / secondary routine test: 50 Hz, 1 sec type test: 50 Hz, 60 sec	V_{AC}	2500
Partial discharge extinction voltage - primary / secondary discharge < 10pC type test	V_{peak}	900
R iso at 500 V_{DC} , 1 min	$M\Omega$	100
Storage conditions		−25 ... +40 °C, humidity ≤ 75% RH
Resistance to reflow soldering heat		In accordance with JEDEC J-STD-020F $T_{peak} = +245\text{ °C}$ ($T_{peak} -5\text{ °C}$ for 30 seconds)
Operating temperature range		−40 ... +150 °C (component)
Weight		Approx. 3.2 g

SMD

Blister tape



Reel



Cautions and warnings

- Please note the recommendations in our Inductors data book (latest edition), online catalogs and in the data sheets.
 - Particular attention should be paid to the derating curves, if given. Derating applies in the case the ambient temperature in application exceeds the rated temperature of the component.
 - Ensure the operation temperature of the component in application not to exceed the maximum specified value or the upper climatic category temperature.
 - The soldering conditions should also be observed. Temperatures quoted in relation to wave soldering refer to the pins only. Temperatures specified in relation to reflow soldering can also refer to the pins or terminals for products with larger thermal mass, as in such cases, the temperature difference to the top of the component is too big (e.g., high proportion of core within the component).
- If the components are to be washed varnished it is necessary to check whether the washing varnish agent that is used has a negative effect on the wire insulation, any plastics that are used, or on glued joints. It is possible for washing varnish agent residues to have a negative effect in the long-term on wire insulation.

Washing processes may damage the product due to the possible static or cyclic mechanical loads (e.g., ultrasonic cleaning). They may cause cracks to develop on the product and its parts, which might lead to reduced reliability or lifetime.
- The following points must be observed if the components are potted, sealed, or varnished in customer applications:
 - Many potting, sealing, or varnishing materials shrink as they harden. They therefore exert a pressure on the plastic housing or core. This pressure can have a deleterious effect on electrical properties, and in extreme cases can damage the core or plastic housing mechanically.
 - It is necessary to check whether the potting, sealing or varnishing materials used attack or destroy the wire insulation, plastics, or glue.
 - The effect of the potting, sealing, or varnishing materials may change the high-frequency behavior of the components.
- Magnetic core materials such as ferrites are sensitive to direct impact. This can cause the core material to flake or lead to breakage of the magnetic core material.
- Any type of tension or pressure on the product may result in damage and affect its functionality and reliability.
 - The products are only to be attached to fixings or mounting holes provided for this purpose in accordance with the data sheet.
 - If additional mechanical forces are applied to the component, e.g., application of gap pads, it is necessary to check whether they attack or destroy any part of the component.
 - It is not permitted for the product specified in the data sheet to assume a mechanical function in the final application.
- Inductance value can drop if external metallic or magnetic parts will be put close to the coil or into the air gap of the coil or core or magnetic material.
- Even for customer-specific products, conclusive validation of the component in the circuit can only be carried out by the customer.

Release 2024-08-08

Display of ordering codes for TDK Electronics products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications, on the company website, or in order-related documents such as shipping notes, order confirmations and product labels. **The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products.** Detailed information can be found on the Internet under www.tdk-electronics.tdk.com/orderingcodes.

Symbols and terms

Symbol	English	German
α	Insertion loss	Einfügungsdämpfung
C_R	Rated capacitance	Bemessungskapazität
C_X	Capacitance X capacitor	Kapazität X-Kondensator
C_Y	Capacitance Y capacitor	Kapazität Y-Kondensator
ΔV	Voltage drop (input to output)	Spannungsabfall (Eingang zu Ausgang)
dv/dt	Rate of voltage rise	Spannungsanstiegsgeschwindigkeit
f	Frequency	Frequenz
f_M	Converter output frequency	Motorfrequenz
f_P	Pulse frequency	Pulsfrequenz
f_R	Rated frequency	Bemessungsfrequenz
f_{res}	Resonant frequency	Resonanzfrequenz
I_C	Current through capacitor	Strom durch Kondensator
I_{LK}	Filter leakage current	Filter-Ableitstrom
I_{max}	Maximum current	Maximalstrom
I_N	Nominal current	Nennstrom
I_{op}	Operating current (design current)	Betriebsstrom
I_{pk}	Rated peak withstand current	Bemessungsstoßstromfestigkeit
I_q	Capacitive reactive current	Kapazitiver Blindstrom
I_R	Rated current	Bemessungsstrom
I_S	Interference current	Störstrom
L	Inductance	Induktivität
L_R	Rated inductance	Bemessungsinduktivität
L_{stray}	Stray inductance	Streuinduktivität
P_L	Power loss	Verlustleistung
R	Resistance	Widerstand
R_{is}	Insulation resistance	Isolationswiderstand
R_{typ}	DC resistance, typical value	Gleichstromwiderstand typisch
T_A	Ambient temperature	Umgebungstemperatur
T_{max}	Upper category temperature	Obere Kategorietemperatur

Symbol	English	German
$T_{\min}$	Lower category temperature	Untere Kategorietemperatur
T_R	Rated temperature	Bemessungstemperatur
v_k	Referred voltage drop in %	Bezogener Spannungsabfall in %
V_{eff}	RMS voltage	Effektivspannung
V_K	Voltage drop	Spannungsabfall
V_{LE}	Voltage line to earth; voltage line to ground	Spannung Phase zu Erdpotential
V_N	Nominal voltage	Nennspannung
V_R	Rated voltage	Bemessungsspannung
V_{peak}	Peak voltage	Spitzenspannung
V_{test}	Test voltage	Prüfspannung
V_X	Voltage over X capacitor	Spannung über X-Kondensator
V_Y	Voltage over Y capacitor	Spannung über Y-Kondensator
X_L	Inductive reactance	Induktiver Blindwiderstand
Z	Impedance	Scheinwiderstand
$ Z $	Impedance, absolute value	Scheinwiderstand (Betragswert)

Important notes

The following applies to all products named in this publication:

- 1 Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule we are either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether a product with the properties described in the product specification is suitable for use in a particular customer application.
- 2 We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
- 3 **The warnings, cautions and product-specific notes must be observed.**
- 4 In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.tdk-electronics.tdk.com/material). Should you have any more detailed questions, please contact our sales offices.
- 5 We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.
We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
- 6 Unless otherwise agreed in individual contracts, **all orders are subject to our General Terms and Conditions of Supply**.
- 7 **Our manufacturing sites serving the automotive business apply the IATF 16949 standard**. The IATF certifications confirm our compliance with requirements regarding the quality management system in the automotive industry. Referring to customer requirements and customer specific requirements ("CSR") TDK always has and will continue to have the policy of respecting individual agreements. Even if IATF 16949 may appear to support the acceptance of unilateral requirements, we hereby like to emphasize that **only requirements mutually agreed upon can and will be implemented in our Quality Management System**. For clarification purposes we like to point out that obligations from IATF 16949 shall only become legally binding if individually agreed upon.

Important notes

- 8 The trade names EPCOS, CarXield, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, FilterCap, FormFit, InsuGate, LeaXield, MediPlas, MiniBlue, MiniCell, MKD, MKK, ModCap, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PiezoBrush, PlasmaBrush, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SurfIND, ThermoFuse, WindCap, XieldCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.tdk-electronics.tdk.com/trademarks.

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