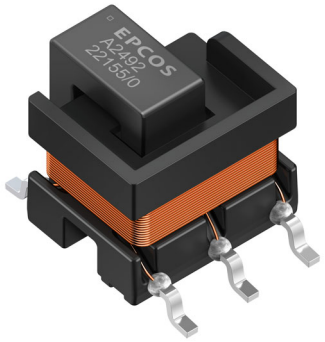
SMT gate-drive transformers

InsuGate series

Series/Type: **B78541A**

Date: February 2025

Construction



- Ferrite core MnZn
- SMD gullwing pins
- Triple insulated wire class F (155 °C)
- Plastic bobbin (UL94-V0)

Features

- Height <10 mm
- Small SMD package
- Flat L vs. temperature curve
- Coupling capacity typ. 4 pF
- Partial discharge capability
- RoHS compatible
- Qualified to AEC-Q200 Rev. E
- Wide temperature range up to 150 °C

Applications

- Galvanic-isolated single-channel IGBT/SiC driver IC

Insulation characteristics

- (N1,core) / N2 creepage ≥ 9 mm, clearance ≥ 8.14 mm[1)]
- Insulated wire acc. IEC 61558-1 annex K, temp. class F (155 °C)

Marking

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

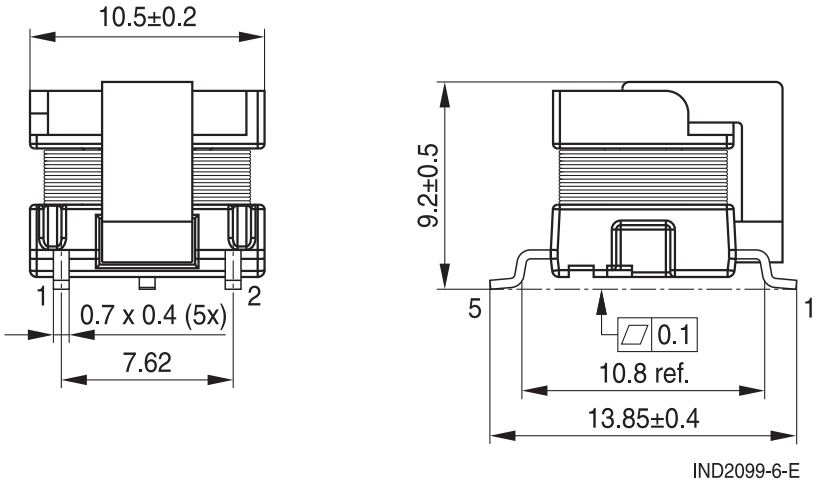
Delivery mode

- Blister tape 330 mm diameter
- Packing unit: 270 pcs per reel

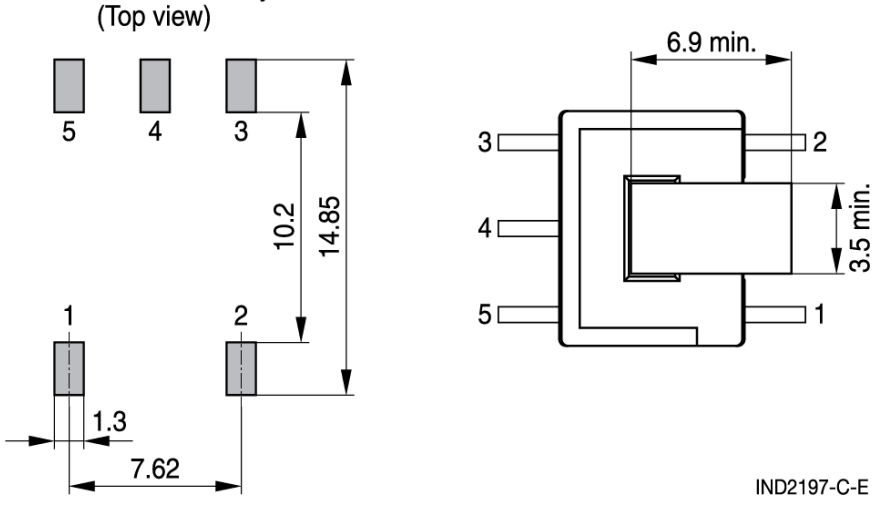
1) Refer to IEC 61558-1/2-16:2020: Basic insulation (N1,core) / N2, V_{op} 700 … 1000 V DC, max transients 2500 V_{peak} P2, altitude 5500 m. Reinforced insulation (N1,core) / N2, V_{op} 300 V AC, OVCII, P2, altitude 4000 m.

Dimensional drawing and recommendation

Dimensions in mm



Recommended PCB layout
(Top view)



Technical data and measuring conditions

Specified at 25 °C if not mentioned otherwise, all values without tolerances are typical values.

Typical operational frequency	100 ... 500 kHz
Nominal inductance, L_{N1}	≥ 50 µH (75 µH typ.) at 100 kHz, 0.1 V
Voltage Time product N1, E*dt	15 µVs (unipolar mode) 30 µVs (bipolar mode)
Coupling capacity N1/N2, Cp	4 pF at 100 kHz, 0.1 V
Turns Ratio	N1 : N2 or N1 : N2a : N2b; voltage method
Leakage Inductance, L_{LEAK}	measured at 100 kHz, 0.1 V, short all secondary pins
DC resistance, R_{DC}	mΩ, typical values
High voltage test AC (N1, core) / N2, HV_{AC}	3 kV_{RMS}, 50 Hz, 1 sec
High voltage type test AC, (N1, core) / N2, $HV_{AC\ TYP}$	3 kV_{RMS}, 50 Hz, 60 sec
Insulation resistance R_{ISO} (N1, core) / N2	>100 MΩ
Partial discharge extinction voltage (N1, core) / N2 *, V_{PD_ext}	V_{peak} (type test)
Working voltage DC for basic insulation, V_{OP_BASIC}	V DC
Working voltage AC for reinforced insulation, $V_{OP\_REINFORCED}$	300 V AC
Storage conditions	–25 °C ... +40 °C, humidity ≤75% RH
Resistance to reflow soldering heat	In accordance with JEDEC J-STD-020F +245 °C (T_{peak} –5 °C for 30 seconds)
Solderability (lead-free)	Sn96.5Ag3.0Cu0.5: +(245 ±3) °C, (3 ±0.3) s Wetting of soldering area ≥ 95% (to IEC 60068-2-58, test Td1, method 1)
Operating temperature range	–40 °C ... +150 °C (component)
Weight	Approx. 2 g

Color of materials may vary.

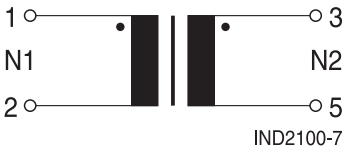
Characteristics and ordering codes

Turns ratio	L_{leak} µH	$R_{DC,N1}$ mΩ	$R_{DC,N2a}$ mΩ	$R_{DC,N2b}$ mΩ	V_{PD_EXT} (V_{peak})	V_{OP_BASIC} (V_{DC})	Ordering code
1 : 1.08	0.6	250	250	–	>840	700	B78541A2467A003
1 : 1.07 : 0.6	0.7	250	350	240			B78541A2492A003
1 : 0.91	0.7	420	350	–	>1200	>1000	B78541A2528A003
1 : 0.91 : 0.36	0.7	420	350	240			B78541A2525A003
1 : 0.81 : 0.45	0.7	420	320	300			B78541A2526A003

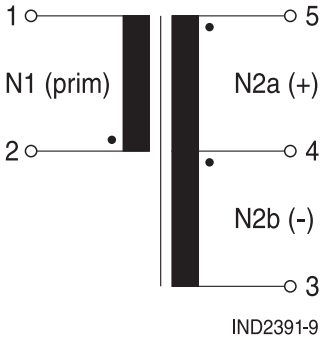
Circuit diagram	Typical application	Application with driver IC	Ordering code
A1	IGBT		B78541A2467A003
A2	SiC		B78541A2492A003
A1			B78541A2528A003
A2	Fusion Switch (SiC, IGBT)	1EDI3035AS	B78541A2525A003
A2	IGBT		B78541A2526A003

Circuit diagrams

A1

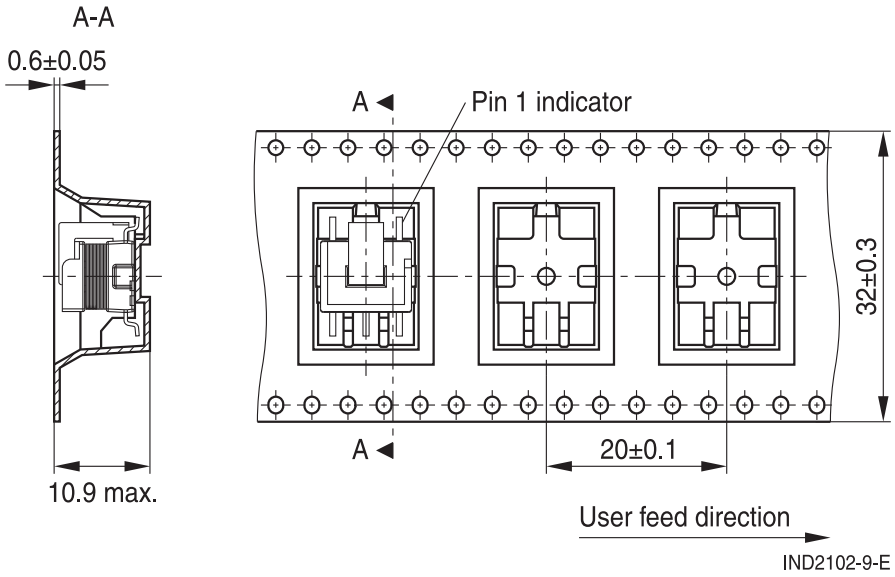


A2

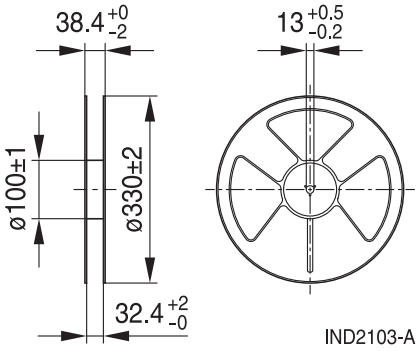


Taping and packing

Blister tape

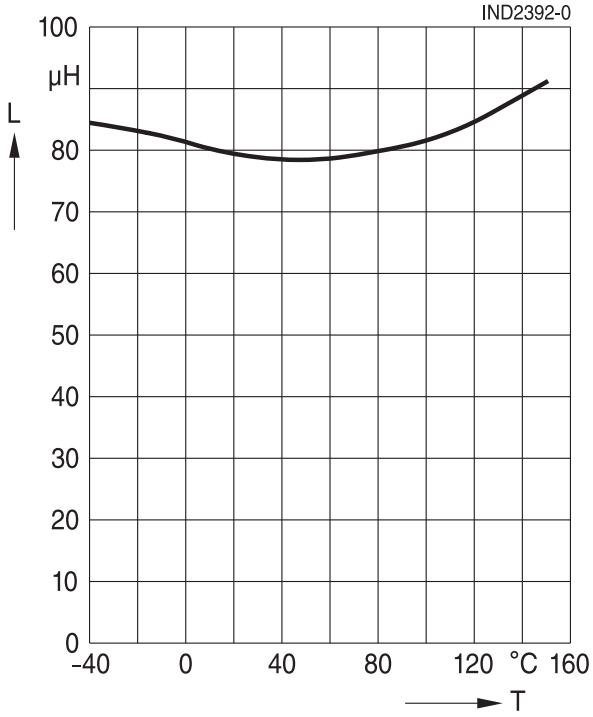


Reel

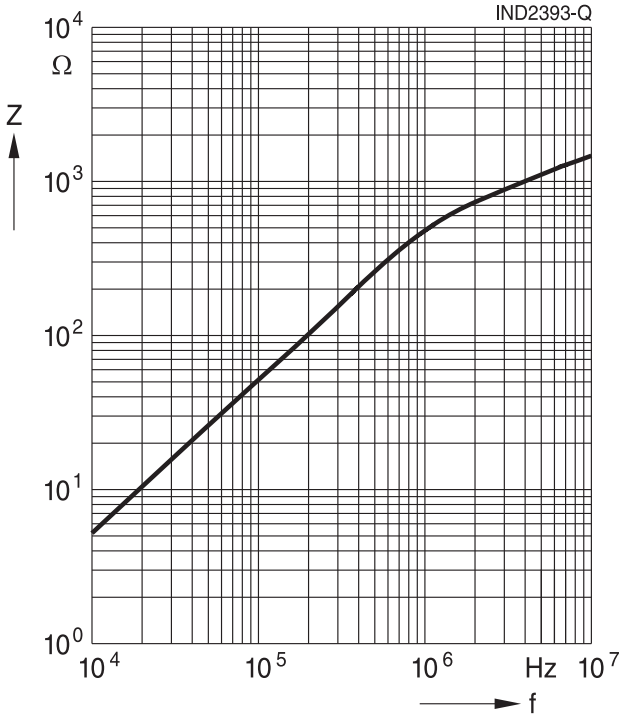


Typical curves

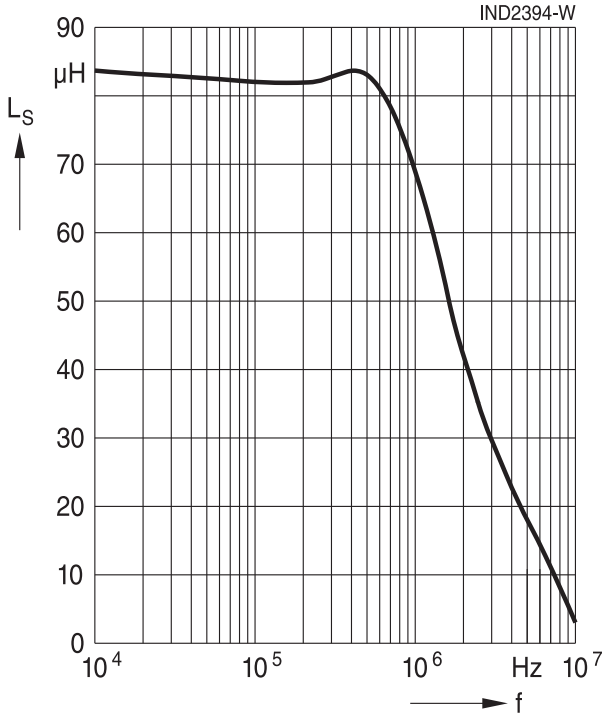
Inductance L versus temperature



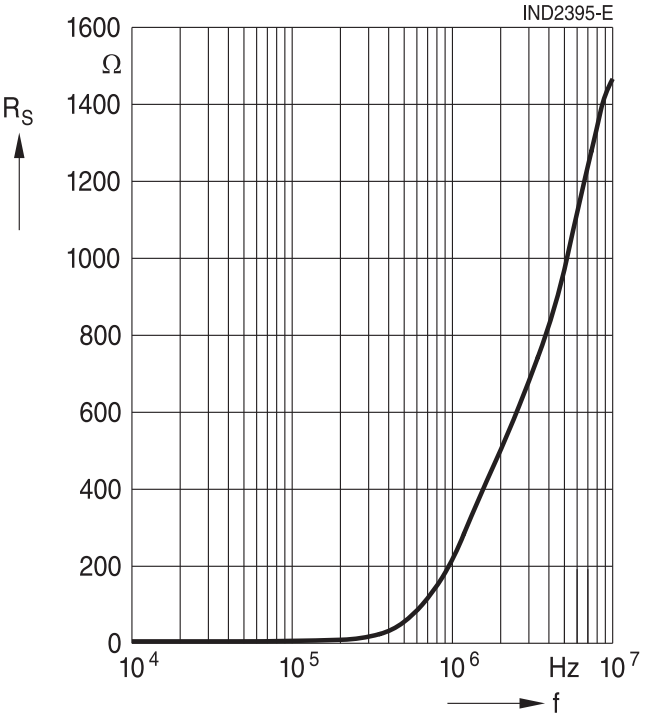
Impedance Z versus frequency f



Inductance L_S versus frequency f



Resistance R_S versus frequency



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.

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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**.

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Important notes

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