



SMT Current Sense Transformers

EP 10 Core

Series/Type: **B78419**

Date: 2017-02-02

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Construction

- Ferrite core
- Primary winding: frame molded in
- Secondary winding: copper wire
- Creepage distance $N_p/(N_s, \text{core})$ 6 mm
- Clearance distance N_p/N_s (CuL) 3.5 mm
- Clearance distance N_p/core 5.3 mm
- Plastic bobbin (UL94-V0, CTI \geq 175)



Features

- Very low DC resistance
- Different turn ratios
- Small SMD package
- RoHS compatible
- Qualified to AEC-Q200
- Design complies with IEC 61558-2-16 (Basic insulation, working voltage rms 500 V)
- Insulation distances in compliance with IEC 60664 (Basic insulation, working voltage rms 500 V)
- UL 1446 Class 155 (F) electrical insulation system 

Applications

- Switch-mode power supplies
- Feedback control
- Overload sensing
- Load drop/shut down detection

Terminals

- L-Pins

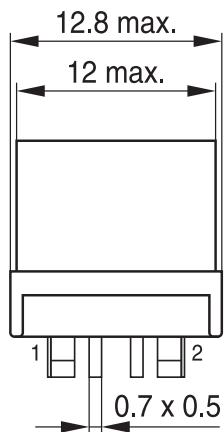
Marking

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

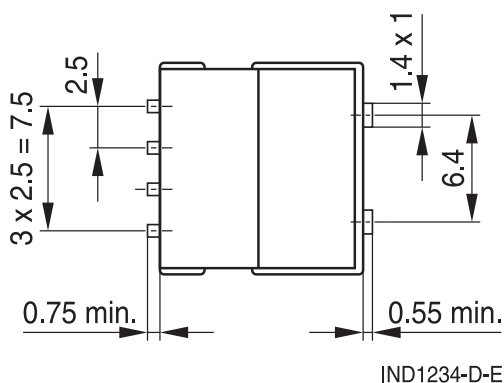
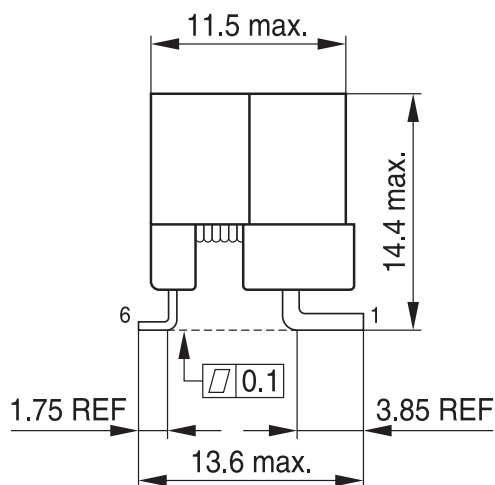
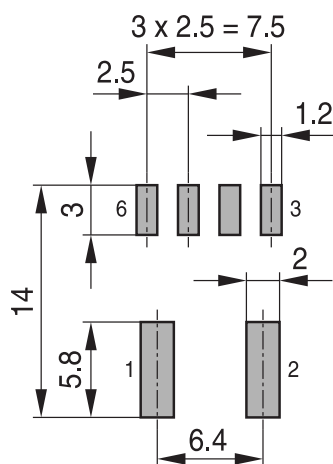
Delivery mode and packing unit

- Blister tape
- Packing unit 200 pcs

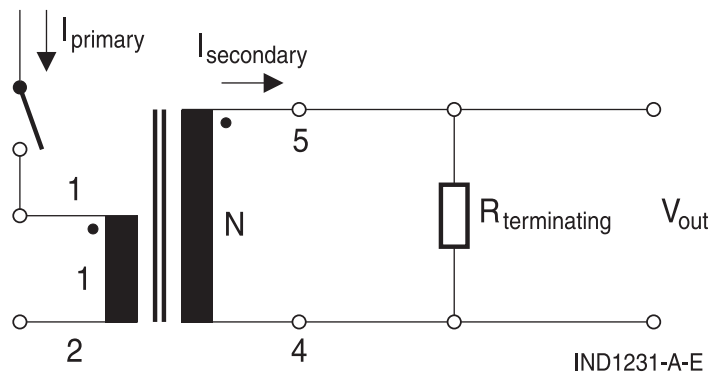
Dimensional drawing



Recommended PCB layout
(Top view)



IND1234-D-E

Application circuit and pinning

Technical data and measuring conditions

| | |
|-------------------------------------|--|
| Typical Frequency range | 50 ... 250 kHz |
| High Voltage | 2400 V AC, 50 Hz, 1 s (winding to winding) Type test 60 s |
| Inductance L (5-4) | Measured at 20 kHz, 10 mV, +25 °C |
| DC resistance R_{max} (1-2) | Measured at +25 °C |
| DC resistance R_{max} (5-4) | Measured at +25 °C |
| Sensed current: $I_{prim,RMS}$ | The max. primary current of 30 A causes approx. +40 °C temperature rise |
| Couple capacitance C_p (1-5) | Measured at 10 kHz, 1 V, +25 °C |
| Resistance to reflow soldering heat | In accordance with JEDEC J-STD-020D +245 °C for 20 seconds |
| Operating temperature range | -40 °C ... +150 °C (component) |
| Pollution degree | P2 (to IEC 61558-1, 60664) |
| Insulation thermal class | +155 °C (F) (to IEC 60085) |
| Weight | Approx. 5 g |
| Approvals | UL 1446 class 155 (F) (E320370) |

$$B_{\max} = \frac{V_{\text{out,max}} \times \delta_{\max}}{N_s \times A_e \times f_{\text{osc}}}$$

With:

B_{\max} Maximum magnetic flux density in the ferrite core of the current sense transformer

$V_{\text{out,max}}$ Maximum output voltage of the measurement signal

δ_{\max} Maximum duty cycle

N_s Number of turns of the secondary winding of the current sense transformer

A_e Effective magnetic area of the ferrite core

f_{osc} Operating frequency of the switching operator IC

Typical value for A_e : $10.7 \times 10^{-6} \text{ m}^2$

Typical B_{\max} : < 220 mT

$$R_T = \frac{V_{\text{out,max}} \times N_s}{I_{\text{prim,max}}}$$

With:

R_T Resistance of burden resistor

$V_{\text{out,max}}$ Maximum output voltage of the measurement signal

N_s Number of turns on the secondary side of the CST

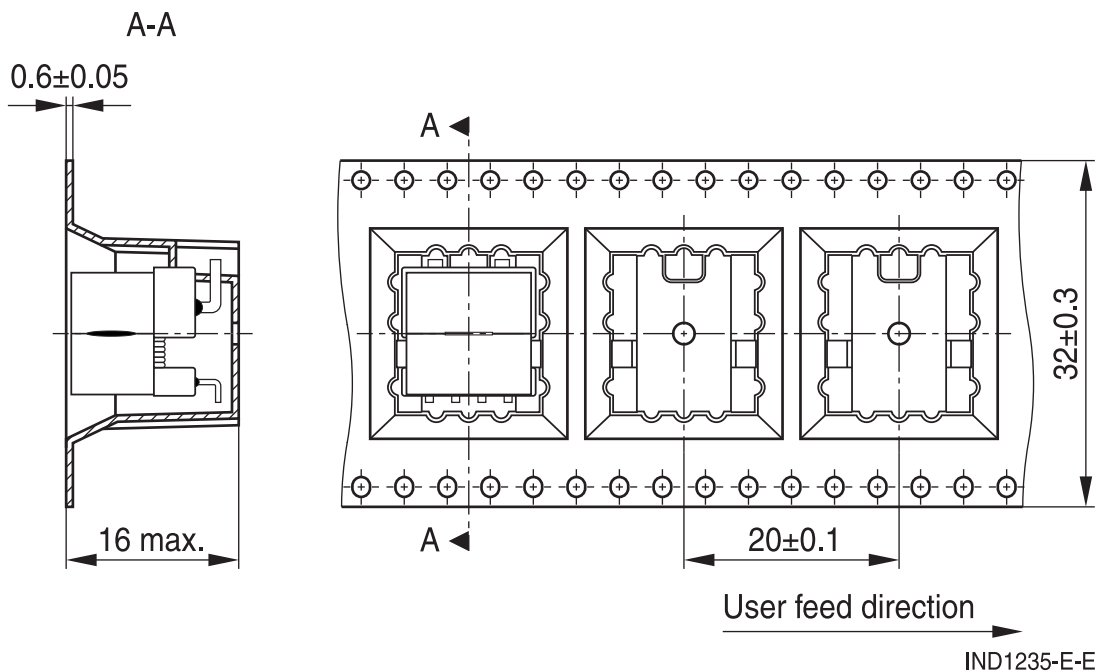
$I_{\text{prim,max}}$ Maximum primary current (peak current)

Characteristics and ordering codes

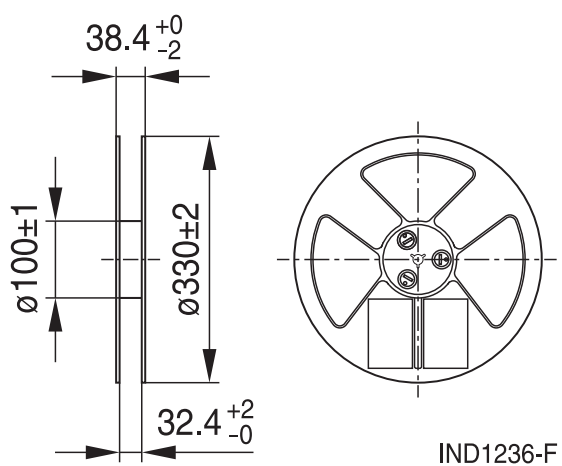
| L_{\min} (5-4) | Turns Ratio | Voltage- time product +120 °C | C_p | R_{\max} (1-2) | R_{\max} (4-5) | Recommended R_T | Ordering Code |
|---------------------|----------------|-------------------------------------|-------|---------------------|---------------------|----------------------|-----------------|
| mH | $N_p : N_s$ | $V \cdot \mu\text{s}$ | pF | m Ω | Ω | Ω | |
| 1.7 | 1:50 | 117 | 4 | 0.5 | 1.5 | 50 | B78419A2288A003 |
| 3.0 | 1:70 | 164 | 4 | 0.5 | 2.1 | 70 | B78419A2289A003 |
| 7.0 | 1:100 | 235 | 4 | 0.5 | 3.1 | 100 | B78419A2251A003 |
| 11.0 | 1:125 | 294 | 4 | 0.5 | 4.0 | 125 | B78419A2290A003 |
| 25.0 | 1:180 | 423 | 4 | 0.5 | 7.4 | 180 | B78419A2271A003 |

Taping and packing

Blister tape



Reel



Cautions and warnings

- Please note the recommendations in our Inductors data book (latest edition) and in the data sheets.
 - Particular attention should be paid to the derating curves given there.
 - The soldering conditions should also be observed. Temperatures quoted in relation to wave soldering refer to the pin, not the housing.
- 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. In particular, 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 in customer applications:
 - Many potting 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 material used attacks or destroys the wire insulation, plastics or glue.
 - The effect of the potting material can change the high-frequency behaviour of the components.
- Ferrites are sensitive to direct impact. This can cause the core material to flake, or lead to breakage of the core.
- 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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