

## **SMT Current Sense Transformers**

EP 10 Core

**Series/Type:**        **B78419**

**Date:**                2017-02-02

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## SMT Current Sense Transformers

### EP 10 Core


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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  $N_p/\text{core}$  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

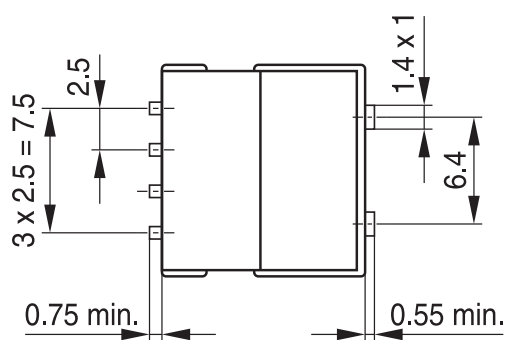
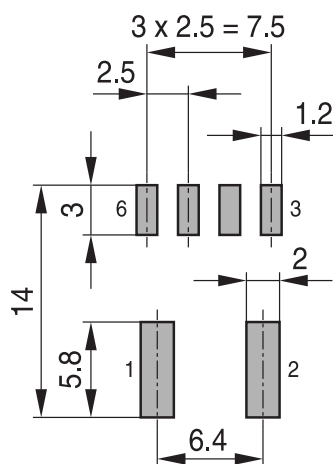
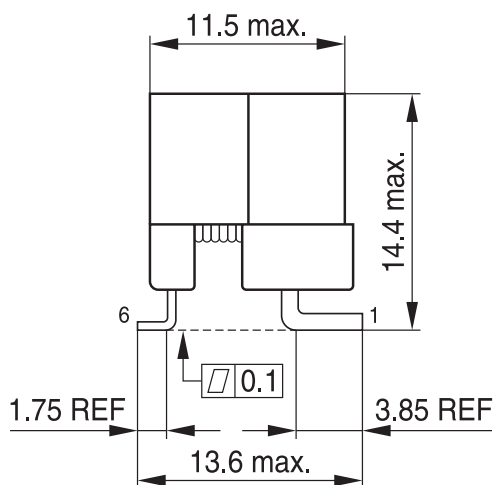
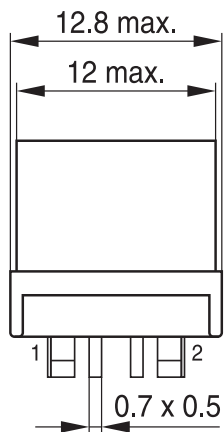
- L-Pins

### 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

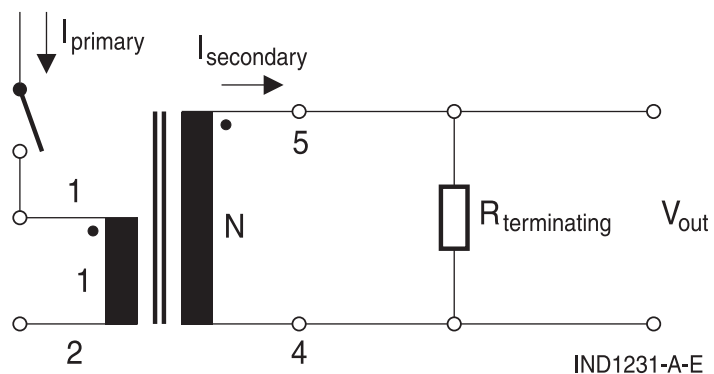


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### Application circuit and pinning



### 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 $R_{\text{max}}$ (1-2)	Measured at +25 °C
DC resistance $R_{\text{max}}$ (5-4)	Measured at +25 °C
Sensed current: $I_{\text{prim,RMS}}$	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)

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

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

$\delta_{\max}$  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

$f_{\text{osc}}$  Operating frequency of the switching operator IC

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

Typical  $B_{\max}$ :  $< 220 \text{ mT}$

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

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

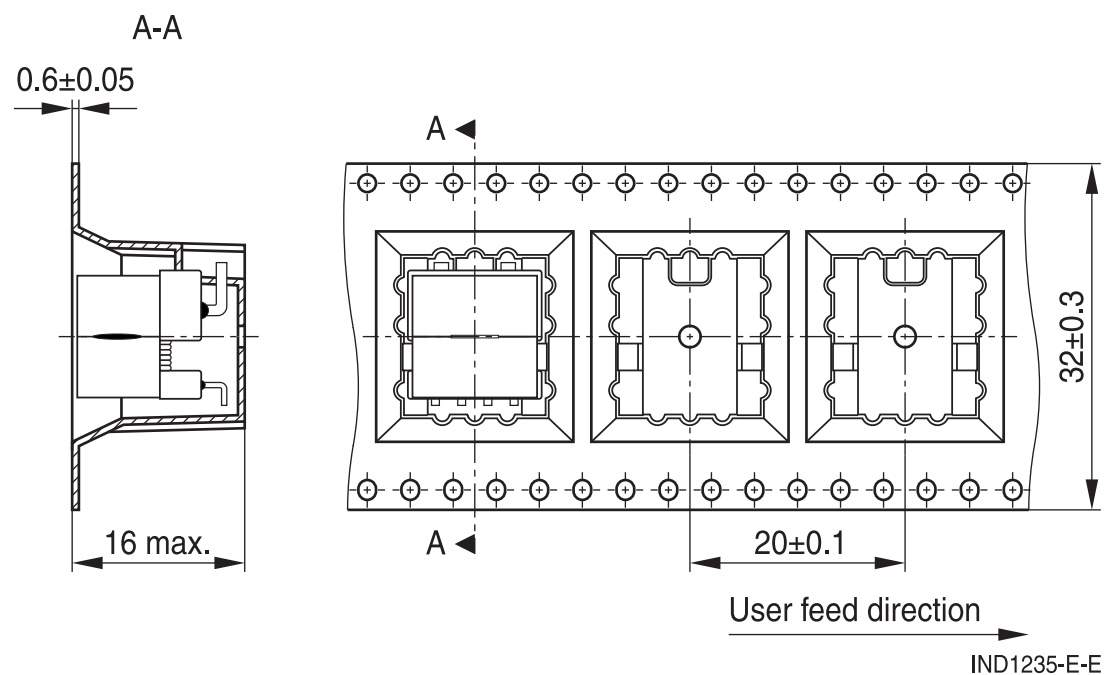
$I_{\text{prim,max}}$  Maximum primary current (peak current)

## Characteristics and ordering codes

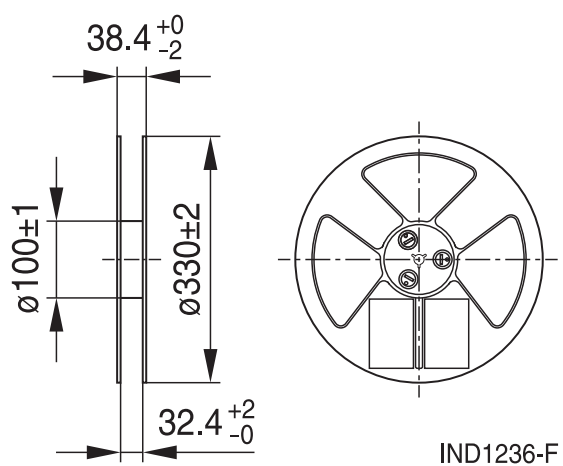
$L_{\min}$ (5-4)	Turns Ratio	Voltage- time product +120 °C	$C_p$	$R_{\max}$ (1-2)	$R_{\max}$ (4-5)	Recommended $R_T$	Ordering Code
mH	$N_p : N_s$	$V \cdot \mu s$	pF	mΩ	Ω	Ω	
1.7	1:50	117	4	0.5	1.5	50	B78419A2288A003
3.0	1:70	164	4	0.5	2.1	70	B78419A2289A003
7.0	1:100	235	4	0.5	3.1	100	B78419A2251A003
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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