

# ECSTA1V0504

## Automotive grade SMT current sense transformer



### Product features

- AEC-Q200 qualified
- EE4.4 SMT package (4.8 mm x 3.65 mm x 3.55 mm)
- Very low DC resistance
- Wide selection of turns ratios
- Sensed current – primary rated for 7 A
- Frequency range: 50 kHz to 1 MHz
- Moisture sensitivity level (MSL): 1

### Applications

- Motor drive
- On-board chargers
- DC/DC converters
- Wireless chargers
- Battery management systems (BMS)
- EV charging
- Feedback control
- Overload sensing

### Environmental compliance and general specifications

- Storage temperature (component): -40 °C to +125 °C
- Operating temperature range: -40 °C to +125 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant



## Product specifications

| Part number <sup>3</sup> | Turns ratio<br>sec :pri | Secondary<br>inductance (μH)<br>@ 100 kHz 0.1 V<br>minimum | DCR sec (Ω)<br>maximum | DCR pri (mΩ)<br>reference | Hi-pot pri to sec<br>@ 2 mA 3 seconds<br>50 Hz | Sensed<br>current <sup>1</sup> (A)<br>maximum |
|--------------------------|-------------------------|------------------------------------------------------------|------------------------|---------------------------|------------------------------------------------|-----------------------------------------------|
| ECSTA1V0504-1020-R       | 20:1                    | 33                                                         | 0.35                   | 3                         | 500 Vac                                        | 7                                             |
| ECSTA1V0504-1030-R       | 30:1                    | 74                                                         | 0.8                    | 3                         | 500 Vac                                        | 7                                             |
| ECSTA1V0504-1040-R       | 40:1                    | 132                                                        | 1.6                    | 3                         | 500 Vac                                        | 7                                             |
| ECSTA1V0504-1050-R       | 50:1                    | 205                                                        | 2.5                    | 3                         | 500 Vac                                        | 7                                             |
| ECSTA1V0504-1060-R       | 60:1                    | 295                                                        | 3.6                    | 3                         | 500 Vac                                        | 7                                             |
| ECSTA1V0504-1070-R       | 70:1                    | 400                                                        | 4.6                    | 3                         | 500 Vac                                        | 7                                             |
| ECSTA1V0504-1100-R       | 100:1                   | 820                                                        | 9.5                    | 3                         | 500 Vac                                        | 7                                             |
| ECSTA1V0504-1125-R       | 125:1                   | 1280                                                       | 13                     | 3                         | 500 Vac                                        | 7                                             |
| ECSTA1V0504-1150-R       | 150:1                   | 1800                                                       | 21                     | 3                         | 500 Vac                                        | 7                                             |

1. Primary current of 7 A causes less than 40°C temperature rise @ +25°C ambient. Higher current causes a greater temperature rise

2. Electrical specifications at +25 °C

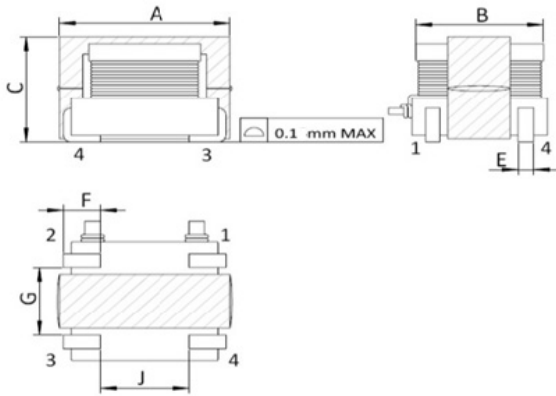
3. Part Number Definition: ECSTA1V0504-1xxx-R

ECSTA1V0504 = Product code and size

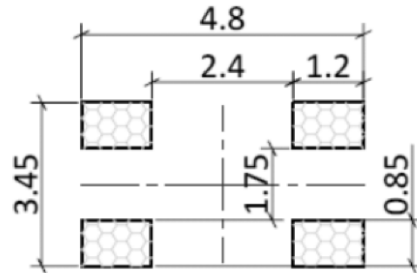
1xxx= Turns ratio sec:pri 1=pri, xxx=sec; 1020= 20:1

-R suffix = RoHS compliant

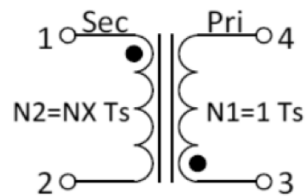
## Mechanical parameters, schematic, pad layout (mm)



### Recommended PCB Layout



### Schematic



| Dimension | Value        |
|-----------|--------------|
| A         | 4.80 maximum |
| B         | 3.65 maximum |
| C         | 3.55 maximum |
| E         | 0.4          |
| F         | 0.85         |
| G         | 2.10         |
| J         | 2.50         |

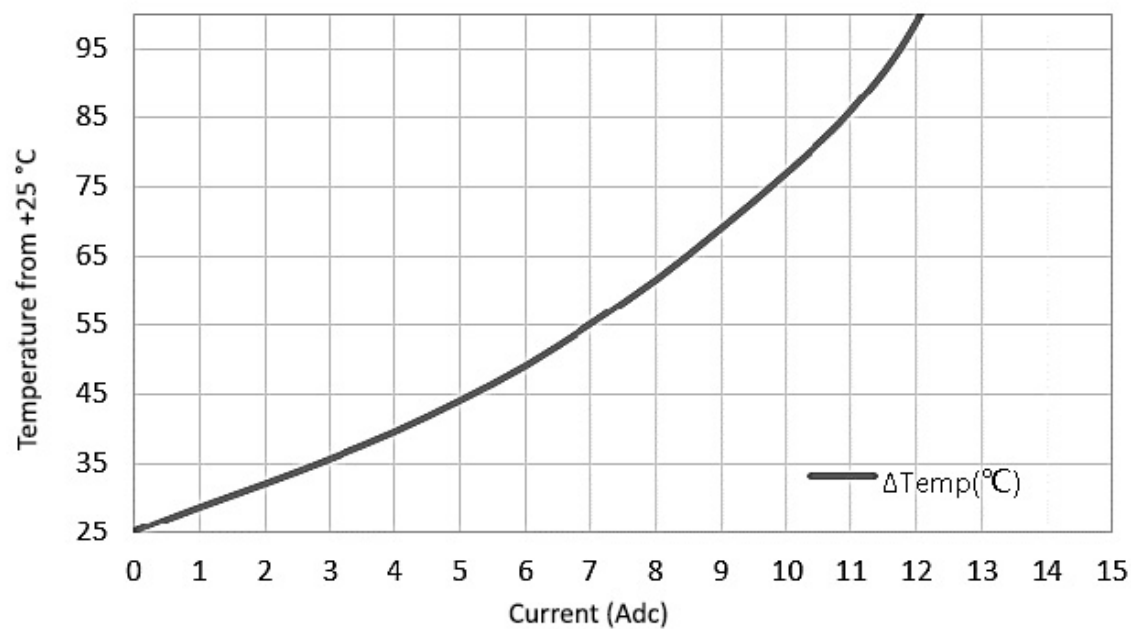
Part marking: White dot, Pin 1 indicator

All soldering surfaces to be coplanar within 0.1 millimeters

Tolerances are ±0.1 millimeters unless stated otherwise

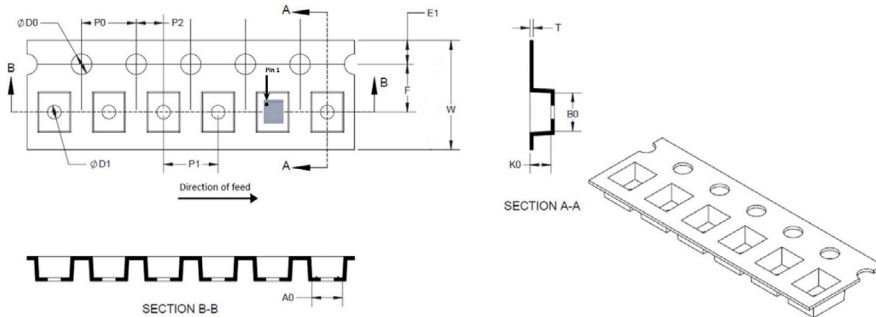
Traces or vias underneath the inductor is not recommended

Temperature rise vs current

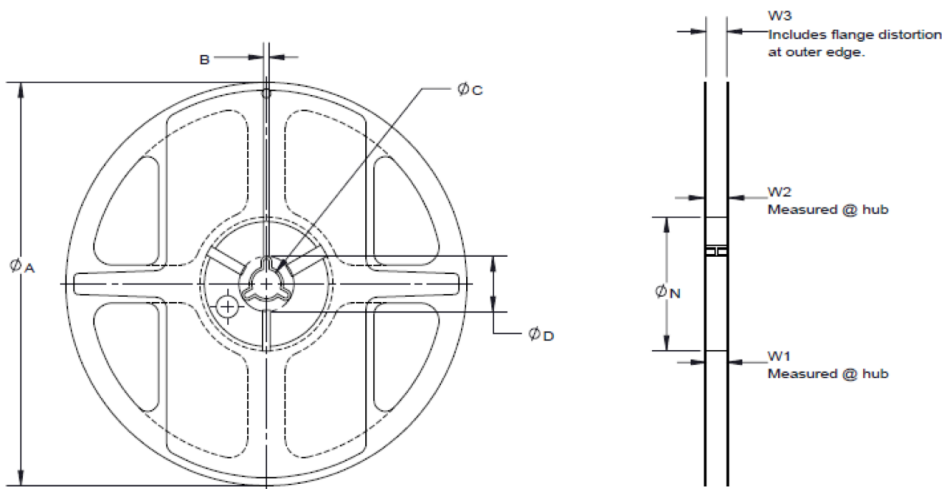


### Packaging information (mm)

Supplied in tape and reel packaging, 13" diameter reel (EIA-481 compliant)  
2000 parts per reel



| Dimension | Value           |
|-----------|-----------------|
| W         | 12.0 $\pm$ 0.3  |
| P1        | 8.0 $\pm$ 0.1   |
| E1        | 1.75 $\pm$ 0.1  |
| F         | 5.50 $\pm$ 0.05 |
| P2        | 2.0 $\pm$ 0.05  |
| D0        | 1.5 +0.1/-0     |
| D1        | 1.5 +0.1/-0     |
| B0        | 4.4 $\pm$ 0.1   |
| A0        | 4.8 $\pm$ 0.1   |
| K0        | 3.5 $\pm$ 0.1   |
| P0        | 4.0 $\pm$ 0.1   |
| T         | 0.35 $\pm$ 0.05 |



| Dimension | Value          |
|-----------|----------------|
| A         | 330 $\pm$ 3.0  |
| B         | 2.6 $\pm$ 0.3  |
| N         | 100 $\pm$ 1.0  |
| C         | 13+0.5/-0.2    |
| D         | 21.5 $\pm$ 0.5 |
| W1        | 12.4+2.0/-0.0  |
| W2        | 18.4 max       |
| W3        | na             |

## Solder reflow profile

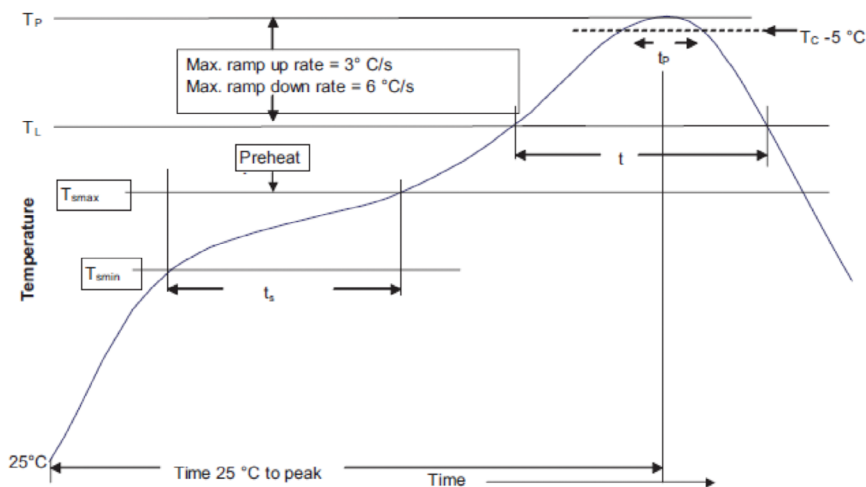


Table 1 - Standard SnPb solder ( $T_C$ )

| Package Thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> ≥350 |
|-------------------|-----------------------------|-----------------------------|
| <2.5 mm)          | 235 °C                      | 220 °C                      |
| ≥2.5 mm           | 220 °C                      | 220 °C                      |

Table 2 - Lead (Pb) free solder ( $T_C$ )

| Package thickness | Volume mm <sup>3</sup> <350 | Volume mm <sup>3</sup> 350 - 2000 | Volume mm <sup>3</sup> >2000 |
|-------------------|-----------------------------|-----------------------------------|------------------------------|
| <1.6 mm           | 260 °C                      | 260 °C                            | 260 °C                       |
| 1.6 – 2.5 mm      | 260 °C                      | 250 °C                            | 245 °C                       |
| >2.5 mm           | 250 °C                      | 245 °C                            | 245 °C                       |

## Reference J-STD-020

| Profile feature                                                                   | Standard SnPb solder | Lead (Pb) free solder |
|-----------------------------------------------------------------------------------|----------------------|-----------------------|
| Preheat and soak                                                                  |                      |                       |
| • Temperature min. ( $T_{smin}$ )                                                 | 100 °C               | 150 °C                |
| • Temperature max. ( $T_{smax}$ )                                                 | 150 °C               | 200 °C                |
| • Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )                                     | 60-120 seconds       | 60-120 seconds        |
| Ramp up rate $T_L$ to $T_p$                                                       | 3 °C/ second max.    | 3 °C/ second max.     |
| Liquidous temperature ( $T_L$ )                                                   | 183 °C               | 217 °C                |
| Time ( $t_L$ ) maintained above $T_L$                                             | 60-150 seconds       | 60-150 seconds        |
| Peak package body temperature ( $T_p$ )*                                          | Table 1              | Table 2               |
| Time ( $t_p$ )* within 5 °C of the specified classification temperature ( $T_C$ ) | 20 seconds*          | 30 seconds*           |
| Ramp-down rate ( $T_p$ to $T_L$ )                                                 | 6 °C/ second max.    | 6 °C/ second max.     |
| Time 25 °C to peak temperature                                                    | 6 minutes max.       | 8 minutes max.        |

\* Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.

## Manual solder

30 W soldering iron. +350 °C ±10 °C, 3 seconds maximum. Do not touch product with iron.  
Generally manual, hand soldering is not recommended.

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