

# HCM1A0805

## Automotive grade High current power inductors



### Product features

- AEC-Q200 Grade 1 qualified
- High current carrying capacity
- Magnetically shielded, low EMI
- Frequency range up to 1 MHz
- Inductance range from 3.3  $\mu$ H to 100  $\mu$ H
- Current range from 1.5 A to 10 A
- 8.3 mm x 8.0 mm footprint surface mount package in a 5.4 mm height
- Alloy powder core material
- Moisture Sensitivity Level (MSL): 1

### Applications

- Body electronics
  - Central body control module
  - Vehicle access control system
  - Headlamps, tail lamps and interior lighting
  - Heating ventilation and air conditioning controllers (HVAC)
  - Doors, window lift and seat control
- Advanced driver assistance systems
  - Adaptive cruise control (ACC)
  - Automatic parking control
  - Collision avoidance system/ Car black box system
- Infotainment and cluster electronics
  - Audio subsystem: head unit and trunk amp
  - Digital instrument cluster
  - In-vehicle infotainment (IVI) and navigation
  - Port power/USB HUB for front and rear passengers
- Chassis and safety electronics
  - Airbag control unit
  - Electronic stability control system (ESC)
- Engine and Powertrain Systems
  - Electric pumps, motor control and auxiliaries
  - Powertrain control module (PCU)/Engine Control unit (ECU)
  - Transmission Control Unit (TCU)

### Environmental Data

- Storage temperature range (Component): -55 °C to +155 °C
- Operating temperature range: -55 °C to +155 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant



**Product Specifications**

Part Number <sup>6</sup>	OCL <sup>1</sup> ( $\mu\text{H}$ ) $\pm 20\%$	FLL <sup>2</sup> ( $\mu\text{H}$ ) minimum	$I_{\text{rms}}$ <sup>3</sup> (A)	$I_{\text{sat}}$ <sup>4</sup> (A)	DCR (m $\Omega$ ) typical @ +20 °C	DCR (m $\Omega$ ) maximum @ +20 °C	K-factor <sup>5</sup>
HCM1A0805-3R3-R	3.3	2.1	8.0	8.0	9.0	10	180
HCM1A0805-4R7-R	4.7	3.0	5.7	10	17	20	87
HCM1A0805-100-R	10	6.4	2.8	8.0	50	55	48
HCM1A0805-150-R	15	9.6	2.5	6.0	64	71	48
HCM1A0805-220-R	22	14	2.0	3.8	100	110	39
HCM1A0805-470-R	47	30	1.8	3.2	145	160	31
HCM1A0805-101-R	100	64	1.5	2.7	240	265	20

1. Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 V<sub>rms</sub>, 0.0 Adc, +25 °C

2. Full Load Inductance (FLL) Test Parameters: 100 kHz, 0.25 V<sub>rms</sub>, I<sub>rms</sub>, +25 °C

3. I<sub>rms</sub>: DC current for an approximate temperature rise of 30 °C without core loss. Derating is necessary for AC currents.

PCB layout, trace thickness and width, air-flow, and proximity of other heat generating components will affect the temperature rise. It is recommended that the temperature of the part not exceed 155 °C under worst case operating conditions verified in the end application.

4. I<sub>sat</sub>: Peak current for approximately 20% rolloff @ +25 °C

5. K-factor: Used to determine B<sub>pp</sub> for core loss (see graph). B<sub>p-p</sub> = K \* L \*  $\Delta I$ . B<sub>pp</sub>: (Gauss), K: (K-factor from table).

L: (Inductance in  $\mu\text{H}$ ),  $\Delta I$  (Peak to peak ripple current in Amps).

6. Part Number Definition: HCM1A0805-xxx-R

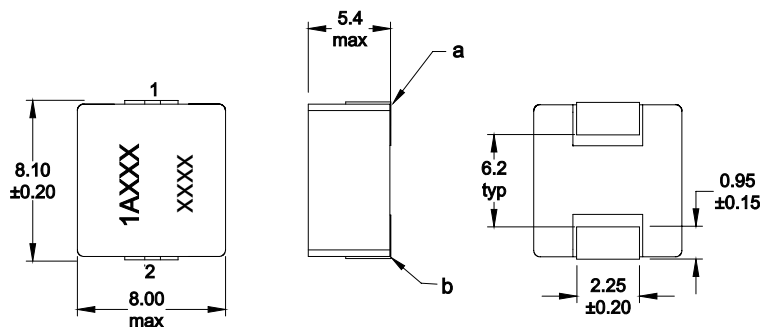
HCM1A0805 = Product code and size

xxx = inductance value in  $\mu\text{H}$ , R = decimal point,

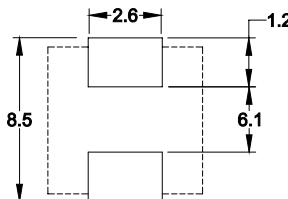
If no R is present then last character equals number of zeros

-R suffix = RoHS compliant

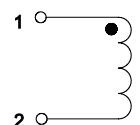
**Dimensions (mm)**



**Recommended Pad Layout**



**Schematic**



Part marking: 1AXXX=automotive grade, XXX=inductance value in uH, R=decimal point. If no R is present then last character equals number of zeros.

xxxx=Lot code

All soldering surfaces to be coplanar within 0.1 millimeters

Tolerances are ±0.3 millimeters unless stated otherwise

DCR measured from point "a" to point "b"

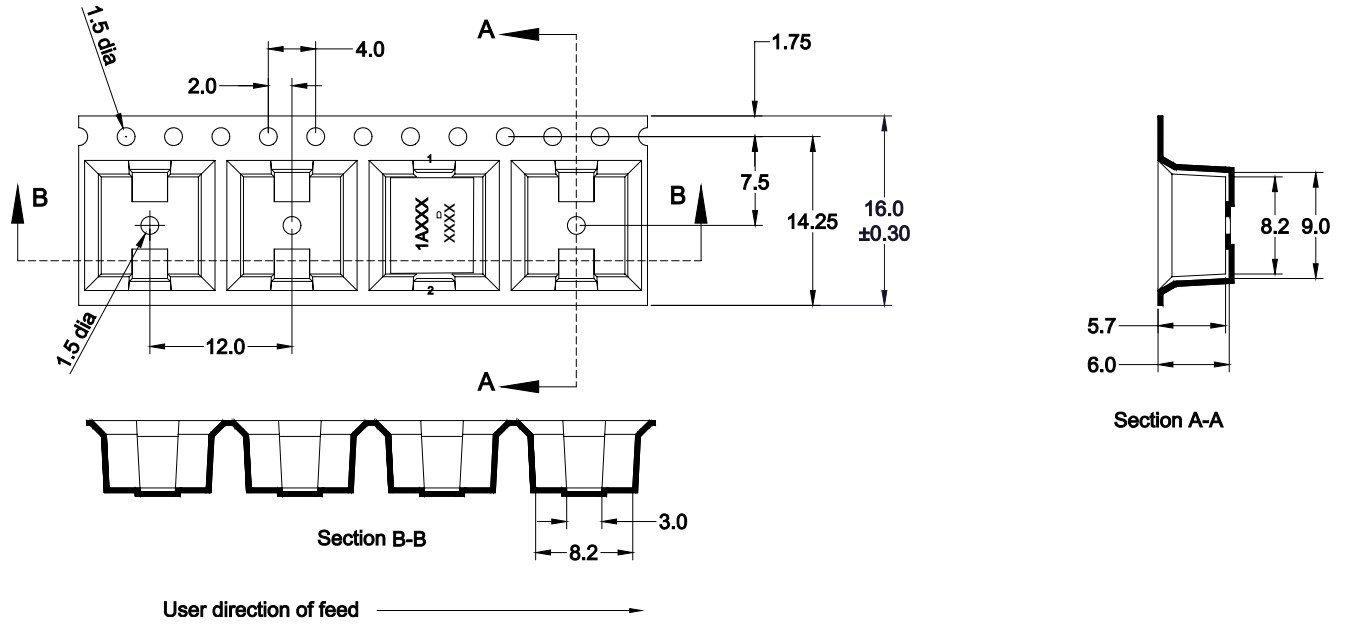
Color: Grey

Do not route traces or vias underneath the inductor

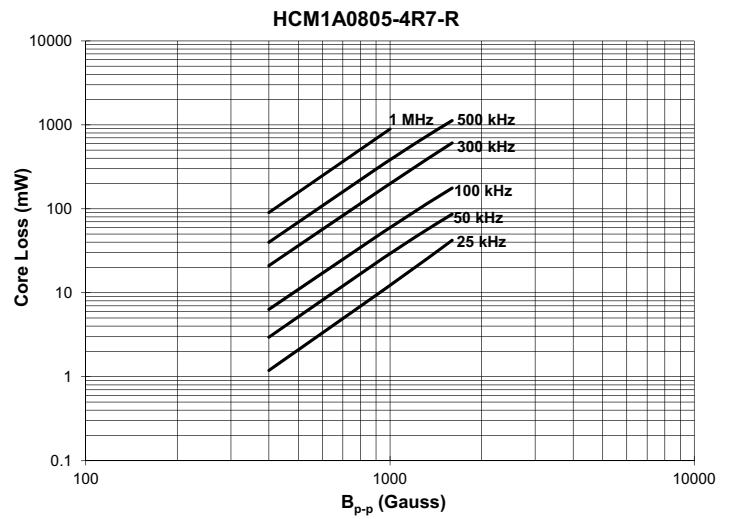
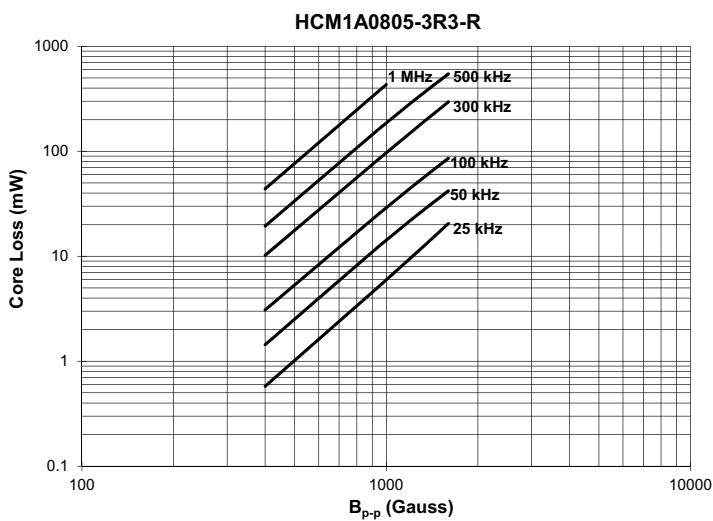
**Packaging information (mm)**

Drawing not to scale

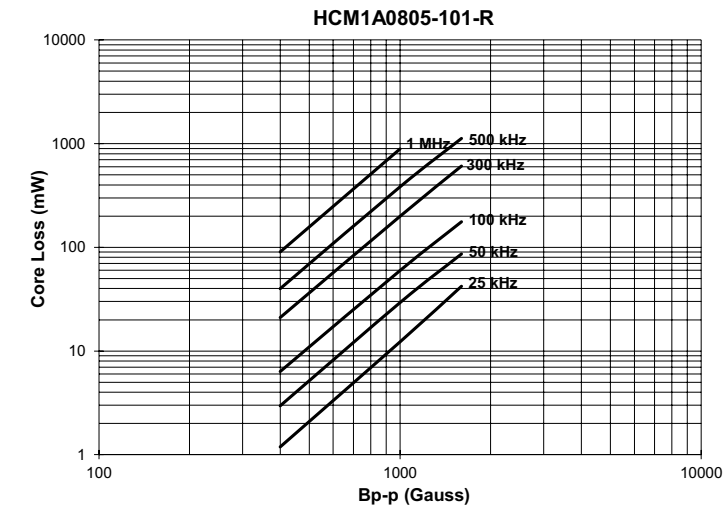
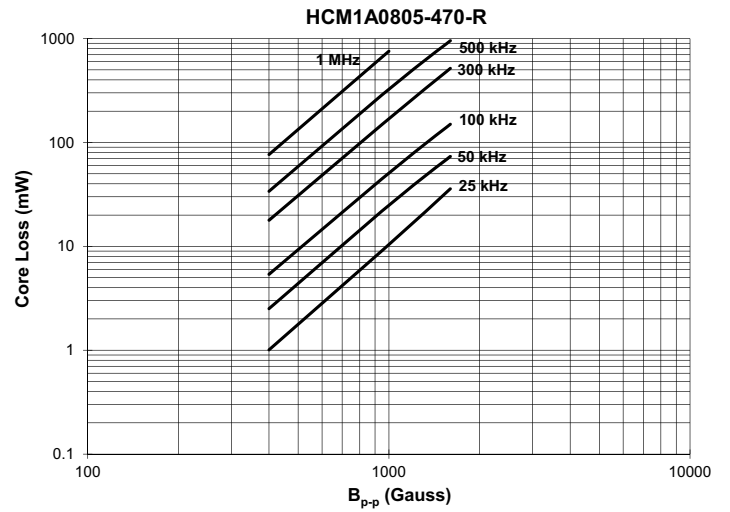
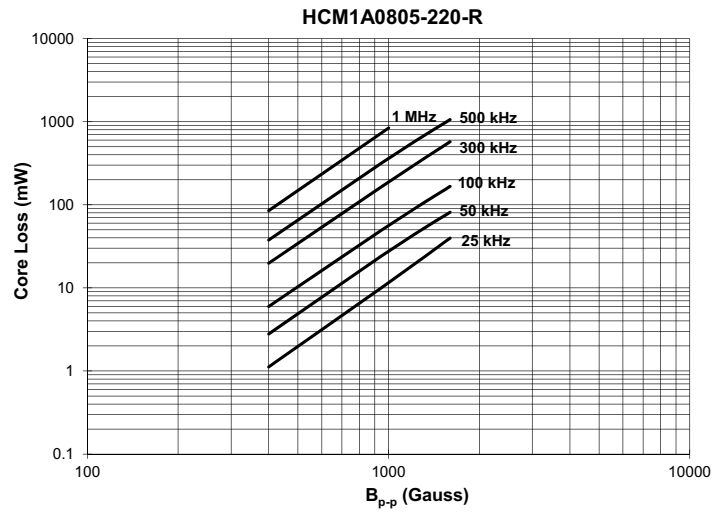
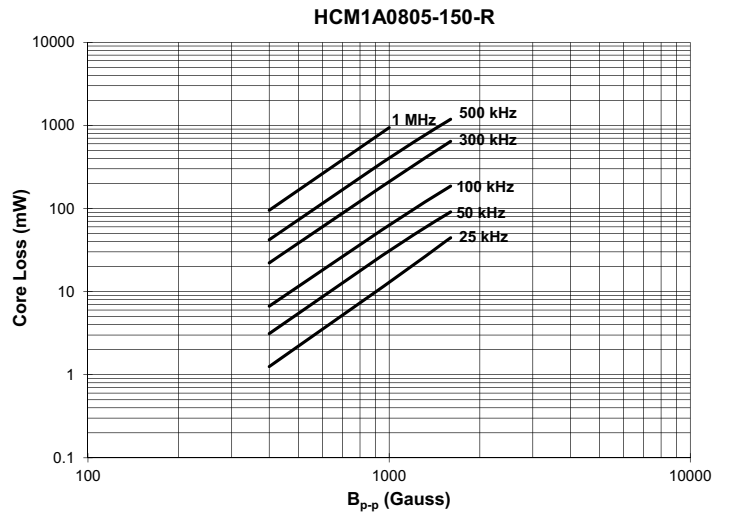
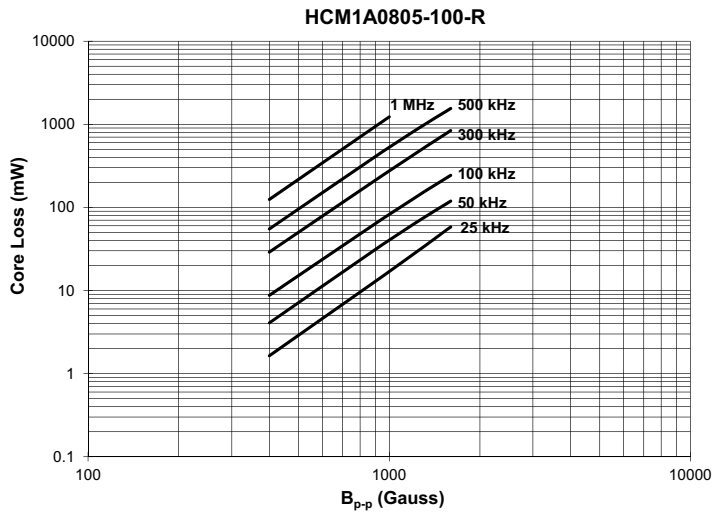
Supplied in tape and reel packaging ,500 parts per 13" diameter reel



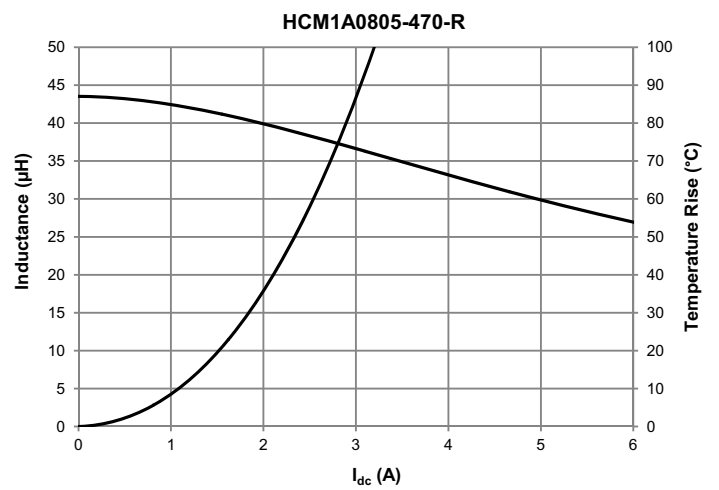
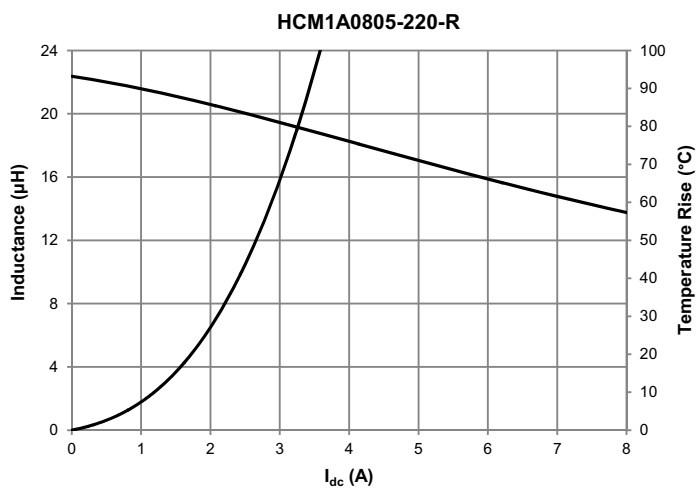
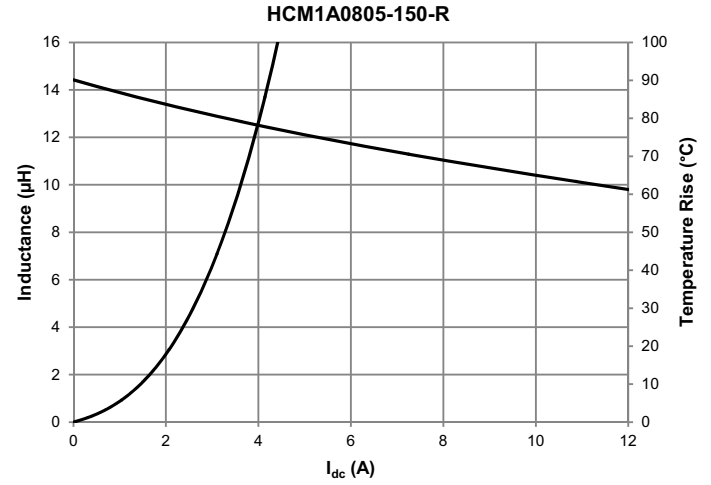
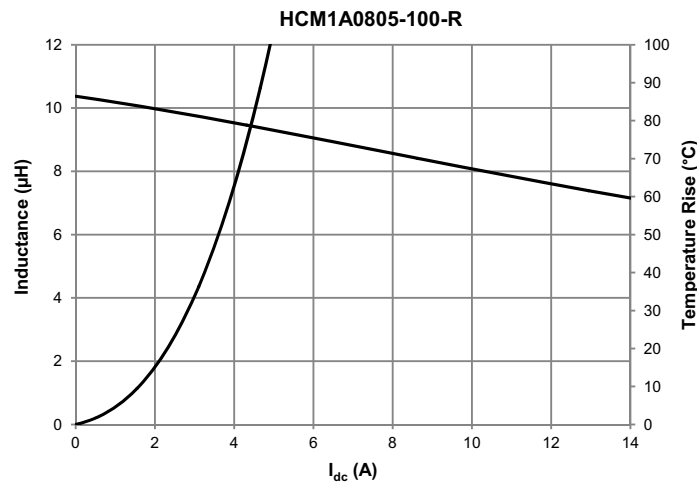
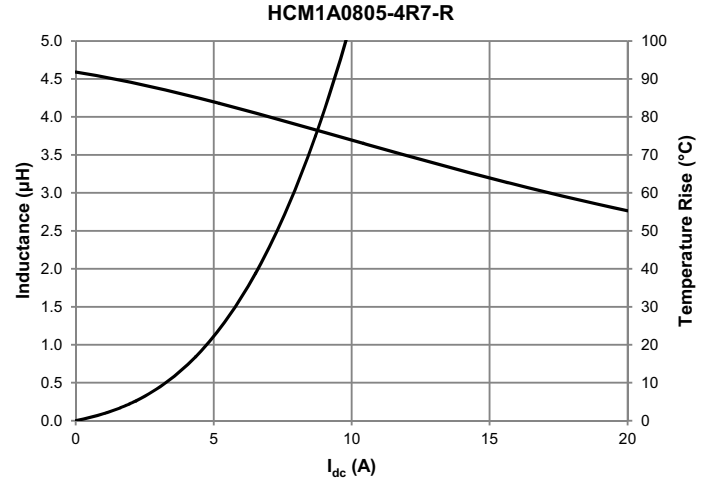
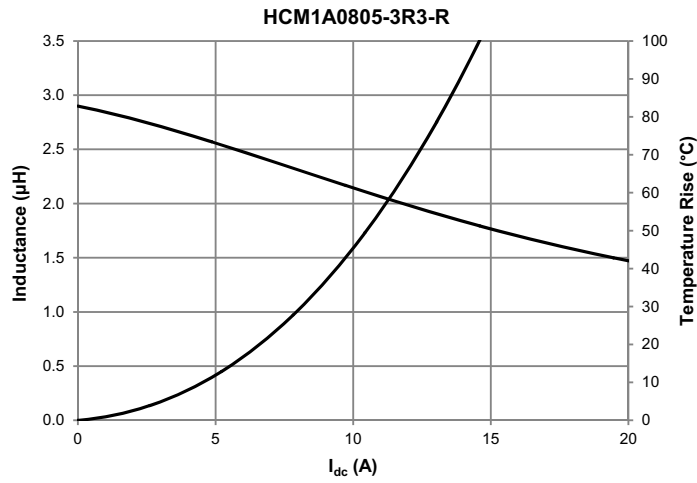
**Core loss vs Bp-p**



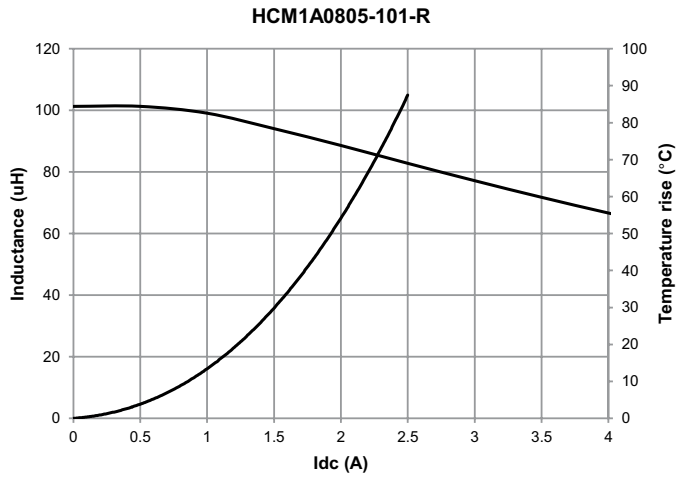
Core loss vs Bp-p



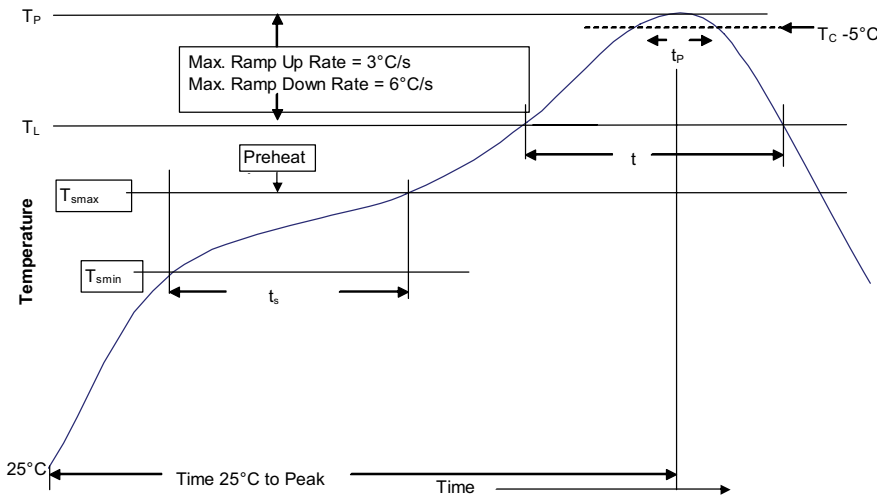
Inductance and temperature rise vs. current



**Inductance and temperature rise vs. current**



**Solder reflow profile**



**Table 1 - Standard SnPb Solder ( $T_c$ )**

Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5mm)	235°C	220°C
≥2.5mm	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
<1.6mm	260°C	260°C	260°C
1.6 – 2.5mm	260°C	250°C	245°C
>2.5mm	250°C	245°C	245°C

**Reference JDEC 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
Average ramp up rate $T_{smax}$ to $T_p$	3°C/ Second Max.	3°C/ Second Max.
Liquidous temperature ( $T_L$ )	183°C	217°C
Time at liquidous ( $t_L$ )	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**
Average ramp-down rate ( $T_p$ to $T_{smax}$ )	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.  
\*\* Tolerance for time at peak profile temperature ( $t_p$ ) is defined as a supplier minimum and a user maximum.

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