

# HCMA1707

## Automotive grade High current power inductors



### Product features

- AEC-Q200 qualified
- High current carrying capacity
- Magnetically shielded, low EMI
- Frequency range up to 1 MHz
- Inductance range from 1.5  $\mu$ H to 68  $\mu$ H
- Current range from 5.2 A to 40 A
- 17.5 mm x 17.2 mm footprint surface mount package in a 7.0 mm height
- Iron powder core material

### Applications

- Body electronics
  - Central body control module
  - 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
- Chassis and safety electronics
  - Airbag control unit
  - Electronic stability control system (ESC)
  - Electric parking brake
  - Electronic Power Steering (EPS)
  - Anti-Lock Braking System (ABS)

### Environmental Data

- Storage temperature range (Component): -55 °C to +125 °C
- Operating temperature range: -55 °C to +125 °C (ambient plus self-temperature rise)
- Solder reflow temperature: J-STD-020 (latest revision) compliant



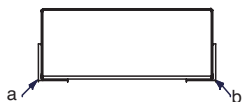
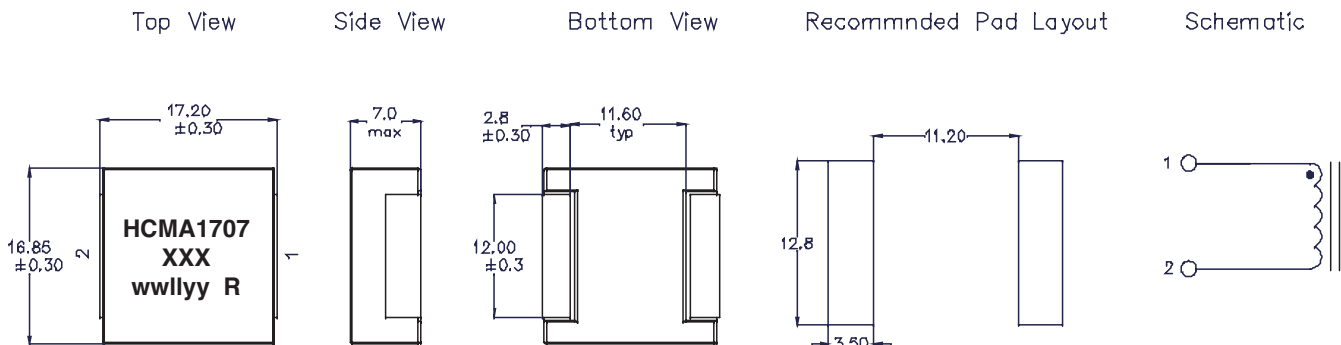
**Product Specifications**

Part Number <sup>6</sup>	OCL <sup>1</sup> ±20% (μH)	FLL min. <sup>2</sup> (μH)	I <sub>rms</sub> <sup>3</sup> (A)	I <sub>sat</sub> <sup>4</sup> (A)	DCR (mΩ) @ +20 °C (typical)	DCR (mΩ) @ +20 °C (maximum)	K-factor <sup>5</sup>
HCMA1707-1R5-R	1.5	0.96	40	40	1.85	2.15	124
HCMA1707-2R2-R	2.2	1.41	37	34	2.15	2.50	103
HCMA1707-4R7-R	4.7	3.01	27	24	4.12	4.72	76
HCMA1707-6R8-R	6.8	4.35	20	22	6.55	7.55	60
HCMA1707-8R2-R	8.2	5.25	16	20	8.10	8.70	55
HCMA1707-100-R	10	6.40	14	18	9.30	10	47
HCMA1707-150-R	15	9.60	12	13	14.5	15.5	43
HCMA1707-220-R	22	14.1	9.5	11	21	23	37
HCMA1707-330-R	33	21.1	9.0	10	35	37	28
HCMA1707-470-R	47	30.1	6.8	7.5	41	47	25
HCMA1707-680-R	68	43.5	5.2	6.5	74	85	20

- Open Circuit Inductance (OCL) Test Parameters: 100 kHz, 0.25 V<sub>rms</sub>, 0.0 Adc, +25 °C.
- Full Load Inductance (FLL): Test parameters: 100 kHz, 0.25 V<sub>rms</sub>, I<sub>sat</sub> +25 °C.
- I<sub>rms</sub>: DC current for an approximate temperature rise of 40 °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 +125 °C under worst case operating conditions verified in the end application.
- I<sub>sat</sub>: Peak current for approximately 20% rolloff at +25 °C.

- K-factor: Used to determine B<sub>pp</sub> for core loss (see graph). B<sub>pp</sub> = K \* L \* ΔI. B<sub>pp</sub>:(Gauss), K: (K-factor from table), L: (Inductance in μH), ΔI (Peak to peak ripple current in amps).
- Part Number Definition: HCMA1707-yyy-R  
 - HCMA1707 = Product code and size  
 yyy= Inductance value in uH, R = decimal point,  
 if no R is present then third character = number of zeros.  
 - "-R" suffix = RoHS compliant

**Dimensions (mm)**

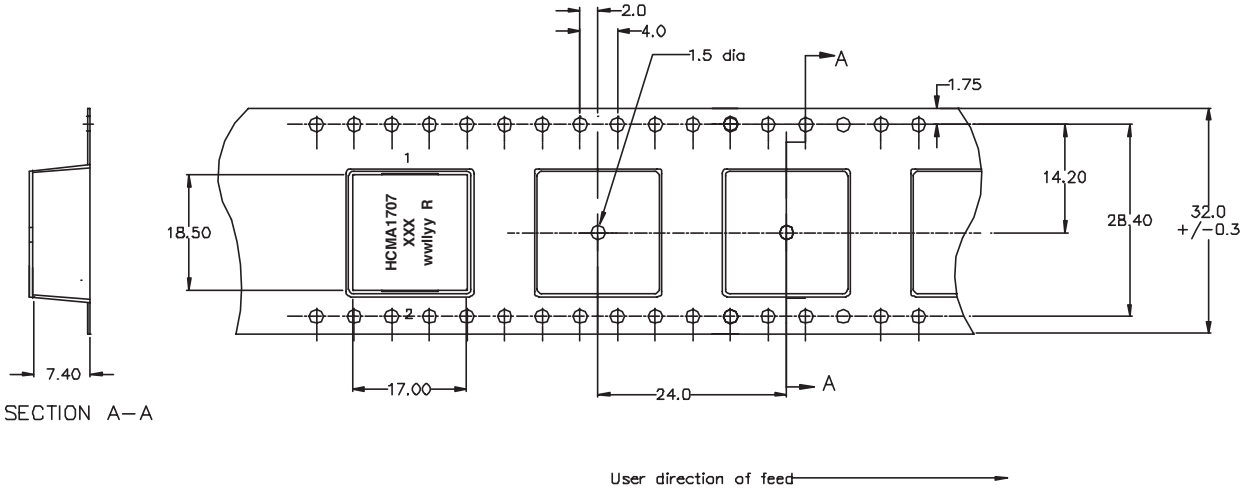


DCR measured between point "a" and point "b"

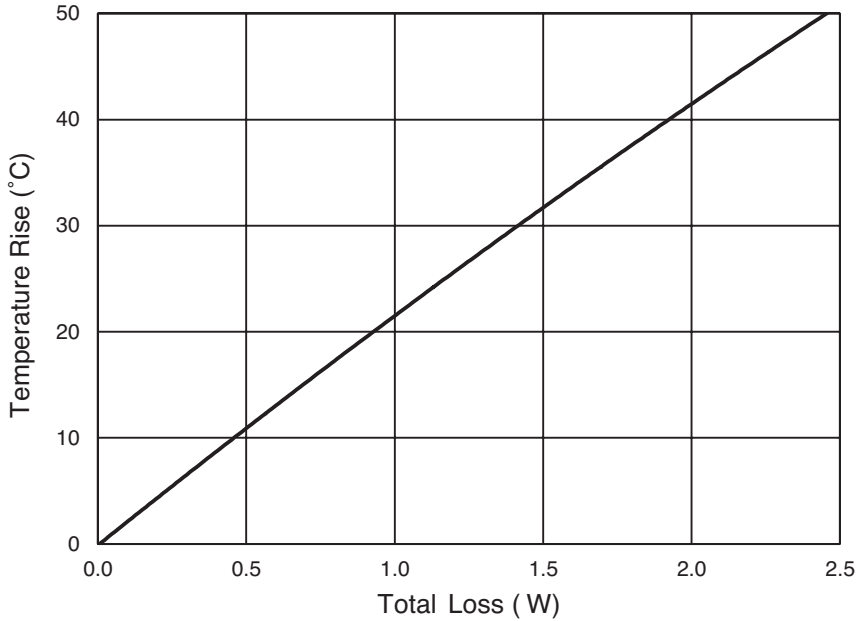
All soldering surfaces coplanar within 0.10 millimeters.  
 Part marking: HCMA1707; A = Automotive grade, XXX = initial inductance in μH, R = decimal point;  
 if no R is present, last digit equals number of zeros.  
 wwlllyy = date code, R = revision level  
 Color: Grey  
 Do not route traces or vias underneath the inductor

**Packaging information (mm)**

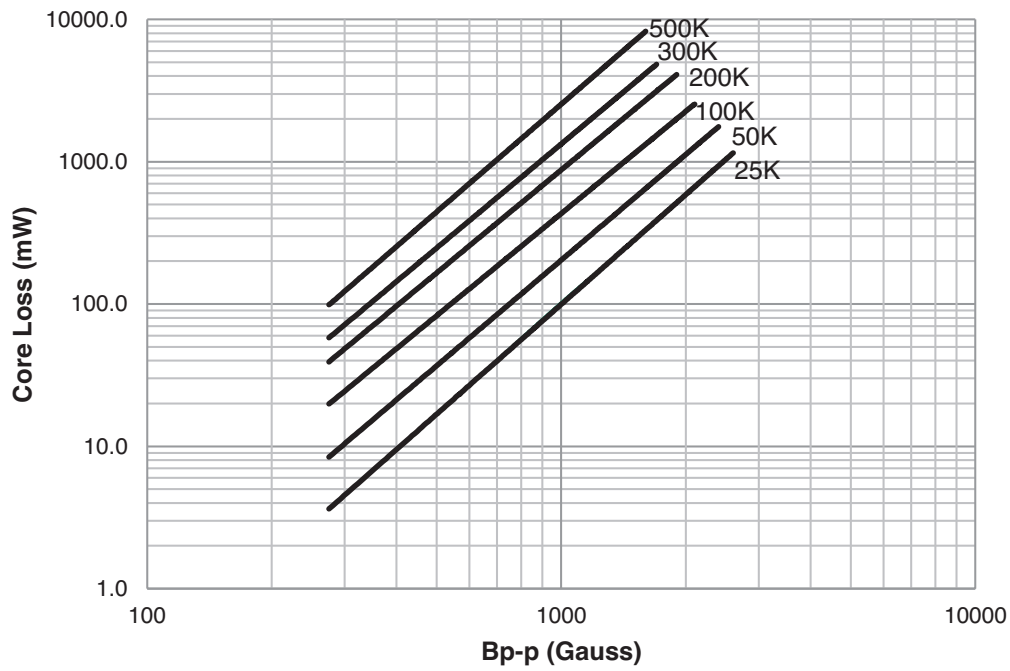
Supplied in tape and reel packaging , 350 parts per 13" diameter reel



**Temperature rise vs. total loss**

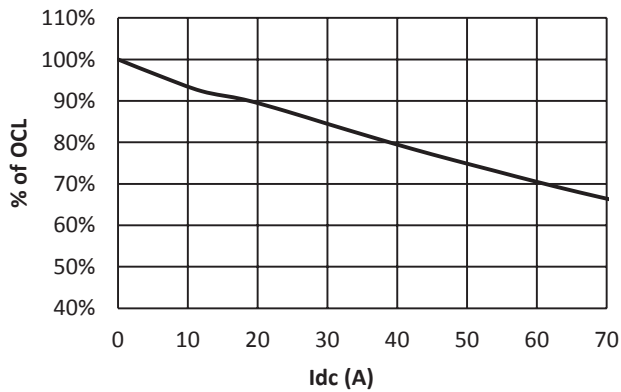


Core loss vs.  $B_{p-p}$

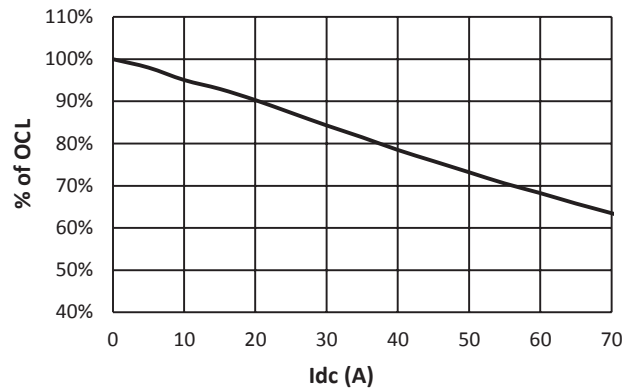


Inductance characteristics

HCMA1707 -1R5-R

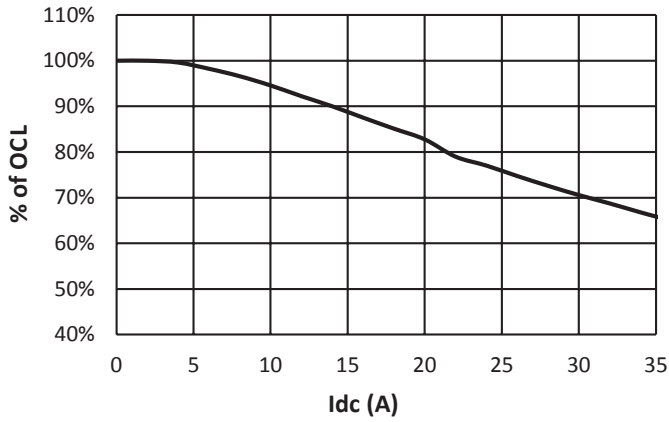


HCMA1707 -2R2-R

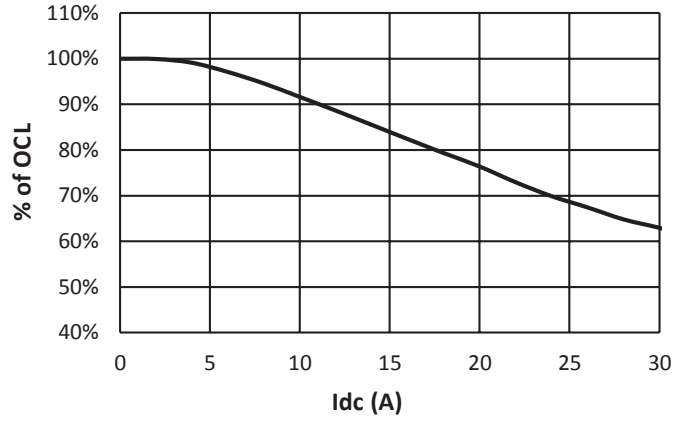


Inductance characteristics

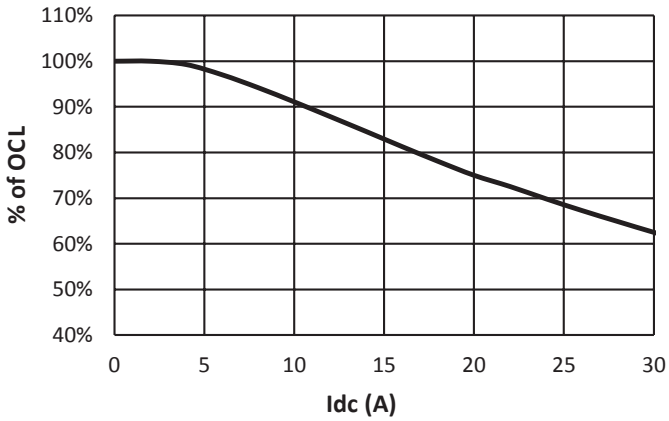
HCMA1707 -4R7-R



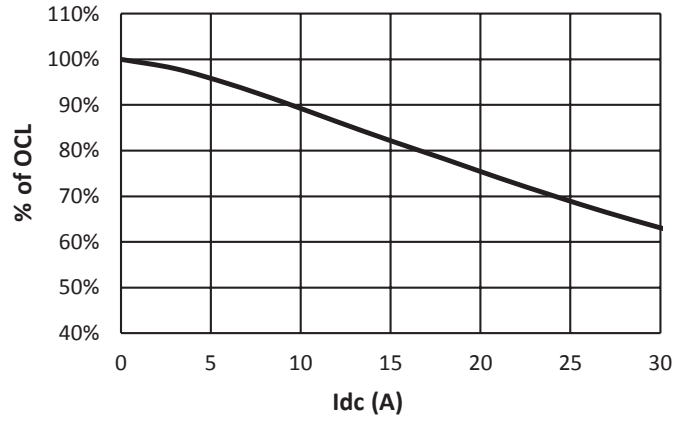
HCMA1707 -6R8-R



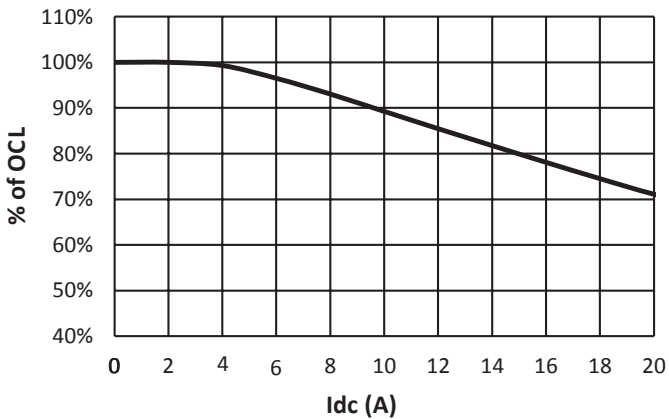
HCMA1707 -8R2-R



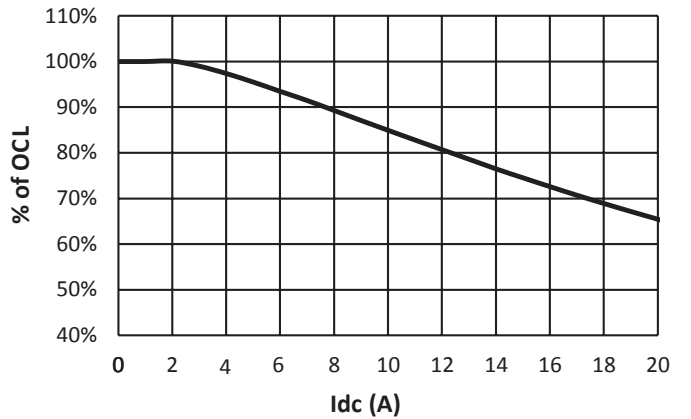
HCMA1707 -100-R



HCMA1707 -150-R

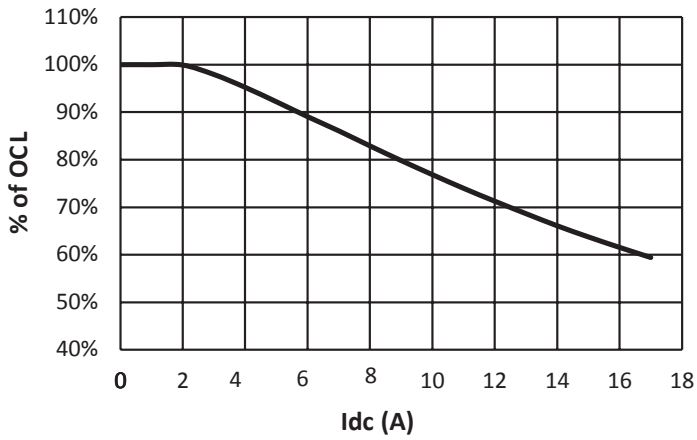


HCMA1707 -220-R

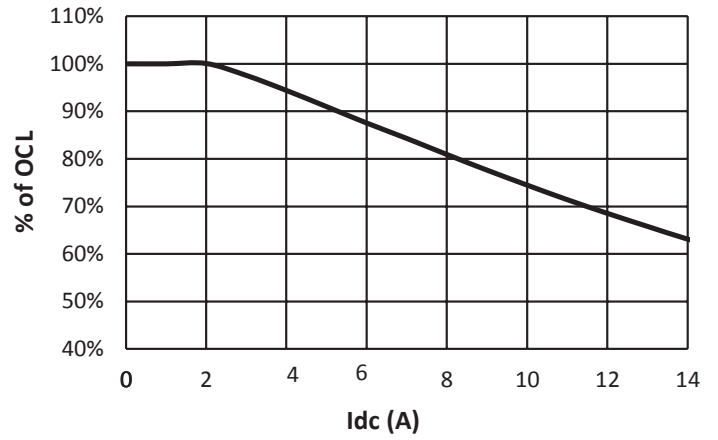


Inductance characteristics

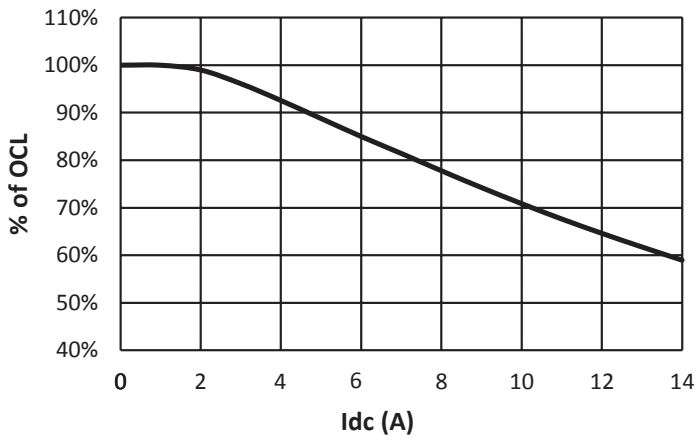
HCMA1707-330-R



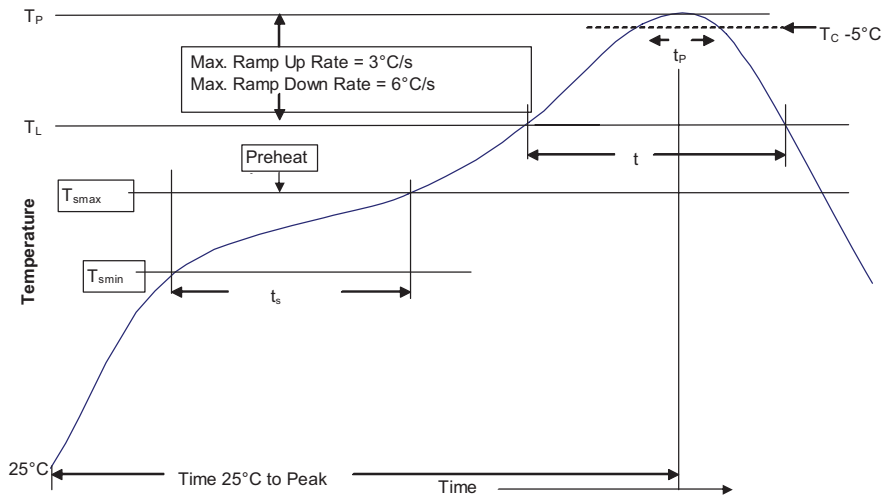
HCMA1707-470-R



HCMA1707-680-R



**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 JEDEC 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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