

SM8S

Automotive grade 6600 W Transient voltage suppressor



Product features

- Automotive grade (AEC-Q101 qualified)
- Low profile DO-218AB package
- Excellent clamping capability
- High surge capability
- 6600 W peak pulse power capability at 10/1000 μ s waveform
- Typical I_R less than 5 μ A
- Plastic package meets UL 94 V-0 flammability rating
- Meets moisture sensitivity level (MSL) level 1
- Terminal: tin plated, solderable per J-STD-002

Applications

- Automotive chassis and safety systems
- Advanced driver assistance systems (ADAS)
- Communication and infotainment systems
- Network systems and body electronics
- Power Train controls
- xEV and battery systems

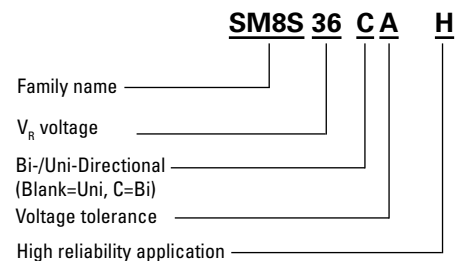
Environmental compliance and general specifications

- ISO16750-2 P5A: 12 V system*
- ISO16750-2 P5A: 24 V system*
- AEC-Q101 qualified

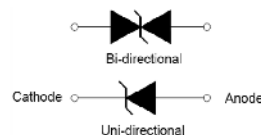
*= Varies by test condition. Bi-polar not recommended



Ordering part number



PIN configuration



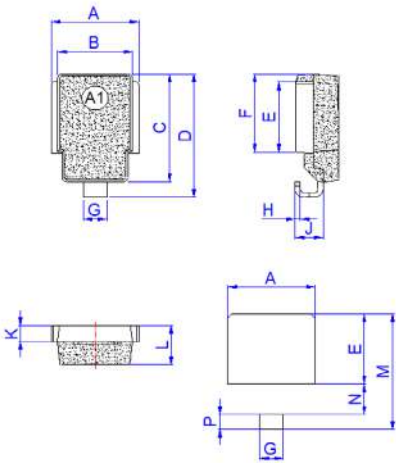
Absolute maximum ratings

(+25 °C, RH=45%-75%, unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|-----------------|-------------|------|
| Storage operating junction temperature range | T_{STG}/T_J | -55 to +175 | °C |
| Steady state power dissipation at $T_C=+25\text{ °C}$ | P_D | 8 | W |
| Peak pulse power dissipation on 10/1000 μs waveform | P_{PP} | 6600 | W |
| Peak pulse power dissipation on 10/10000 μs waveform | P_{PP} | 5200 | W |
| Peak forward surge current, 8.3 ms single half sine wave ¹ | I_{FSM} | 700 | A |
| Typical thermal resistance junction to case | $R_{\theta JC}$ | 0.9 | °C/W |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 12 | °C/W |

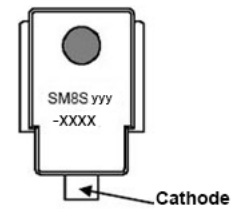
1. Measured on 8.3 ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle = 4 per minute maximum

Mechanical parameters, pad layout- mm/inches



| Dimension | Millimeters | | Inches | |
|-----------|-------------|---------|---------|---------|
| | Minimum | Maximum | Minimum | Maximum |
| A | 9.5 | 10.5 | 0.374 | 0.413 |
| B | 8.3 | 8.7 | 0.327 | 0.342 |
| C | 13.3 | 13.7 | 0.524 | 0.539 |
| D | 15.0 | 16.0 | 0.592 | 0.628 |
| E | 8.5 | 9.1 | 0.335 | 0.358 |
| F | 9.5 | 10.1 | 0.374 | 0.398 |
| G | 2.4 | 3.0 | 0.094 | 0.118 |
| H | 0.5 | 0.7 | 0.020 | 0.028 |
| J | 2.7 | 3.7 | 0.106 | 0.146 |
| K | 1.9 | 2.1 | 0.075 | 0.083 |
| L | 4.7 | 5.1 | 0.185 | 0.201 |
| M | 14.2 | 14.8 | 0.559 | 0.583 |
| N | 3.5 | 4.1 | 0.138 | 0.161 |
| P | 1.6 | 2.2 | 0.063 | 0.087 |

Part marking

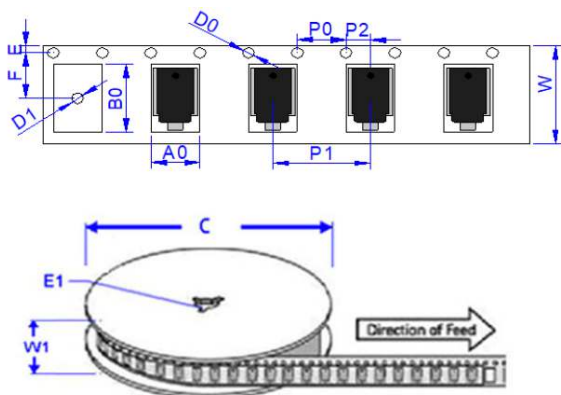


Part marking:
-xxxx = Date code
yyy- Refer to marking designator listed in Electrical characteristics table

Packaging information - mm/inches

Drawing not to scale.

Supplied in tape and reel packaging, 750 parts per 13" diameter reel (EIA-481 compliant)



| Dimensions | Millimeters | Inches |
|------------|-------------|---------------|
| A0 | 10.80 ± 0.3 | 0.425 ± 0.012 |
| B0 | 16.13 ± 0.3 | 0.635 ± 0.012 |
| C | 330.0 | 13.0 ± 0.012 |
| D0 | 1.55 ± 0.2 | 0.061 ± 0.008 |
| D1 | 1.55 ± 0.2 | 0.061 ± 0.008 |
| E | 1.75 ± 0.2 | 0.069 ± 0.008 |
| E1 | 13.30 ± 0.2 | 0.524 ± 0.008 |
| F | 11.50 ± 0.2 | 0.453 ± 0.008 |
| P0 | 4.00 ± 0.2 | 0.157 ± 0.008 |
| P1 | 16.00 ± 0.2 | 0.630 ± 0.008 |
| P2 | 2.00 ± 0.2 | 0.079 ± 0.008 |
| W | 24.00 ± 0.2 | 0.945 ± 0.008 |
| W1 | 25.85 ± 0.2 | 1.018 ± 0.008 |

Electrical specifications (+25 °C)

| Part number | | Marking | | V_R (V) | $I_R @ V_R$ $\mu A @ +25^\circ C$ | $I_R @ V_R$ $\mu A @ +175^\circ C$ | $V_{BR} @ I_T$ | | I_T (mA) | $V_C @ I_{PP}$ max (V) | I_{PP} (A) |
|-------------|-----------|---------|---------|--------------|--------------------------------------|---------------------------------------|----------------|---------|---------------|---------------------------|-----------------|
| Uni-polar | Bi-polar | Uni | Bi | | | | min (V) | max (V) | | | |
| SM8S10AH | / | SM8S10A | / | 10 | 5 | 250 | 11.1 | 12.3 | 5 | 17 | 388 |
| SM8S11AH | / | SM8S11A | / | 11 | 5 | 150 | 12.2 | 13.5 | 5 | 18.2 | 363 |
| SM8S12AH | SM8S12CAH | SM8S12A | SM8S12C | 12 | 5 | 150 | 13.3 | 14.7 | 5 | 19.9 | 332 |
| SM8S13AH | SM8S13CAH | SM8S13A | SM8S13C | 13 | 5 | 150 | 14.4 | 15.9 | 5 | 21.5 | 307 |
| SM8S14AH | SM8S14CAH | SM8S14A | SM8S14C | 14 | 5 | 150 | 15.6 | 17.2 | 5 | 23.2 | 284 |
| SM8S15AH | SM8S15CAH | SM8S15A | SM8S15C | 15 | 5 | 150 | 16.7 | 18.5 | 5 | 24.4 | 270 |
| SM8S16AH | SM8S16CAH | SM8S16A | SM8S16C | 16 | 5 | 150 | 17.8 | 19.7 | 5 | 26 | 253 |
| SM8S17AH | SM8S17CAH | SM8S17A | SM8S17C | 17 | 5 | 150 | 18.9 | 20.9 | 5 | 27.6 | 239 |
| SM8S18AH | SM8S18CAH | SM8S18A | SM8S18C | 18 | 5 | 150 | 20 | 22.1 | 5 | 29.2 | 226 |
| SM8S20AH | SM8S20CAH | SM8S20A | SM8S20C | 20 | 5 | 150 | 22.2 | 24.5 | 5 | 32.4 | 204 |
| SM8S22AH | SM8S22CAH | SM8S22A | SM8S22C | 22 | 5 | 150 | 24.4 | 26.9 | 5 | 35.5 | 186 |
| SM8S24AH | SM8S24CAH | SM8S24A | SM8S24C | 24 | 5 | 150 | 26.7 | 29.5 | 5 | 38.9 | 170 |
| SM8S26AH | SM8S26CAH | SM8S26A | SM8S26C | 26 | 5 | 150 | 28.9 | 31.9 | 5 | 42.1 | 157 |
| SM8S28AH | SM8S28CAH | SM8S28A | SM8S28C | 28 | 5 | 150 | 31.1 | 34.4 | 5 | 45.4 | 145 |
| SM8S30AH | SM8S30CAH | SM8S30A | SM8S30C | 30 | 5 | 150 | 33.3 | 36.8 | 5 | 48.4 | 136 |
| SM8S33AH | SM8S33CAH | SM8S33A | SM8S33C | 33 | 5 | 150 | 36.7 | 40.6 | 5 | 53.3 | 124 |
| SM8S36AH | SM8S36CAH | SM8S36A | SM8S36C | 36 | 5 | 150 | 40 | 44.2 | 5 | 58.1 | 114 |
| SM8S40AH | / | SM8S40A | / | 40 | 5 | 150 | 44.4 | 49.1 | 5 | 64.5 | 102 |
| SM8S43AH | / | SM8S43A | / | 43 | 5 | 150 | 47.8 | 52.8 | 5 | 69.4 | 95.1 |

Surge waveform: 10/1000 μs

V_R : Stand-off voltage – Maximum voltage that can be applied

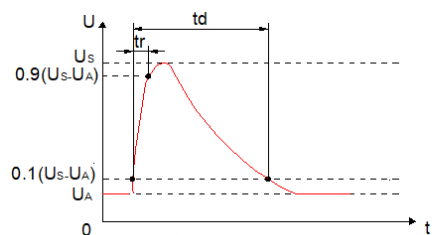
V_{BR} : Breakdown voltage

V_C : Clamping voltage – Peak voltage measured across the suppressor at a specified I_{PP}

I_R : Reverse leakage current

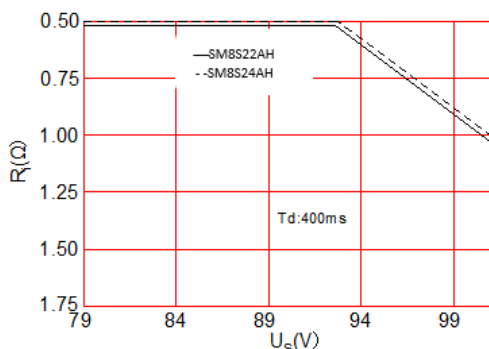
I_T : Test current

ISO16750-2 Test pulse 5A

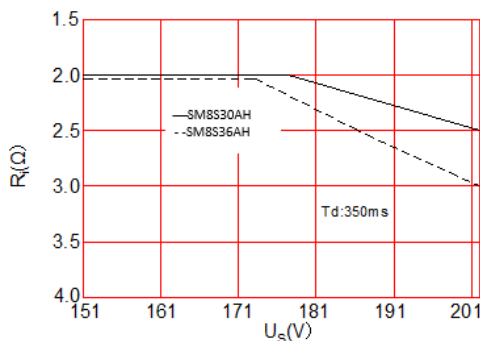


| Parameter | 12V system | 24V system |
|-----------|----------------|--------------|
| U_s | 79~101V | 151~202V |
| R_i | 0.5~4 Ω | 1~8 Ω |
| t_d | 40~400ms | 100~350ms |
| t_r | 5~10ms | 5~10ms |

ISO16750-2 5 A 12 V system

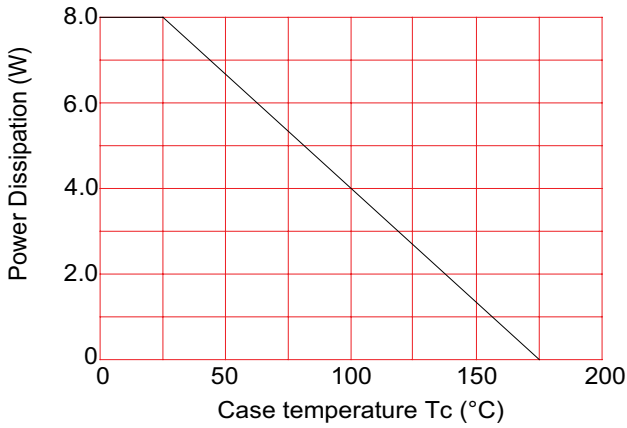


ISO16750-2 5 A 24 V system

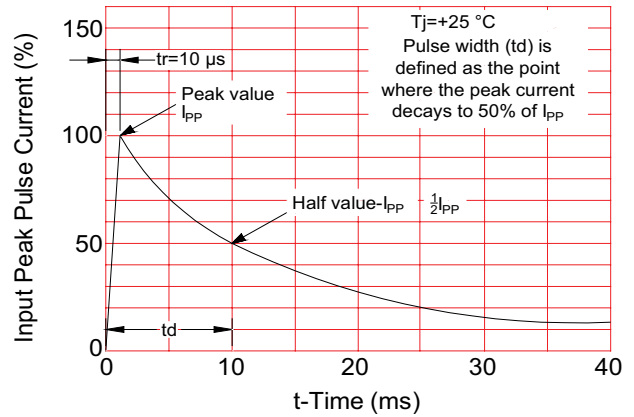


Ratings and V-I characteristic curves (+25 °C unless otherwise noted)
Uni-polar curves

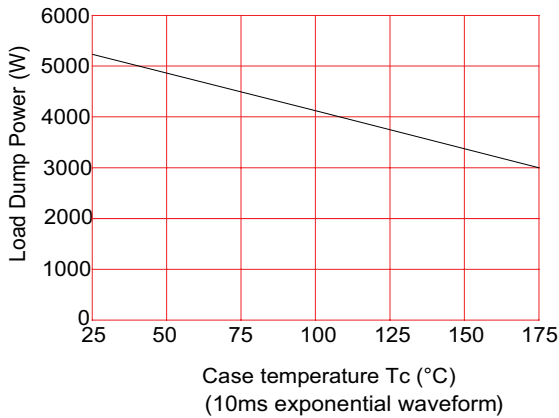
Power derating curve



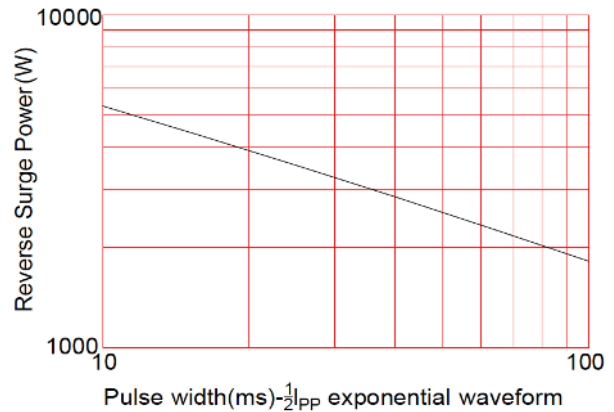
Pulse waveform



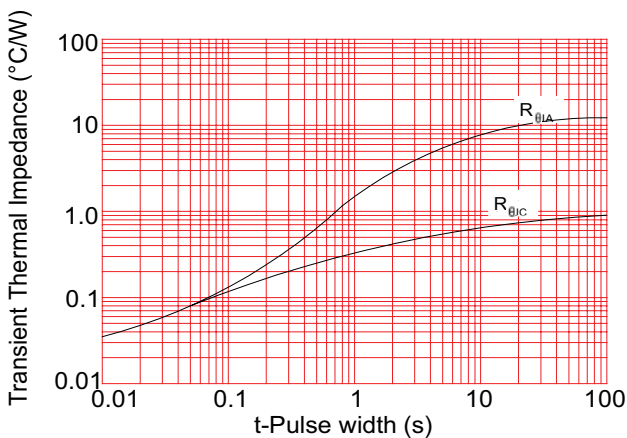
Load dump power characteristics



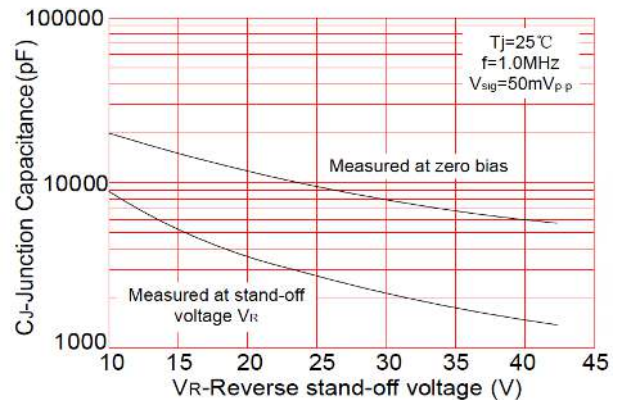
Reverse surge power



Typical transient thermal impedance

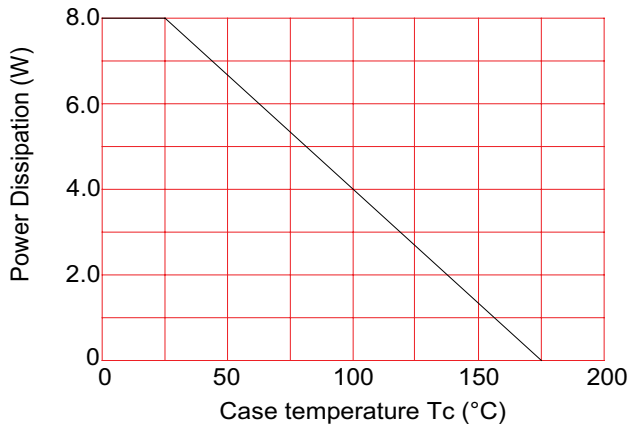


Typical junction capacitance

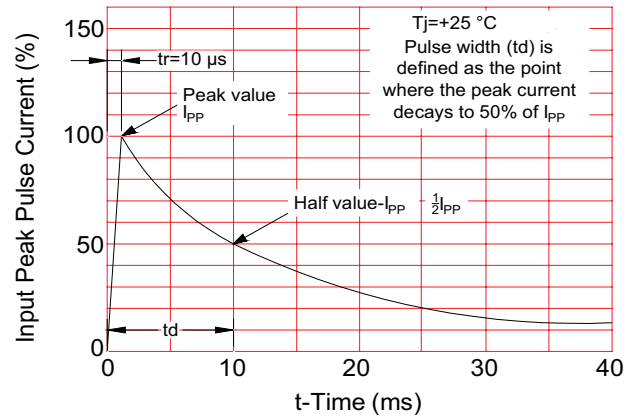


Ratings and V-I characteristic curves (+25 °C unless otherwise noted)
Bi-polar curves

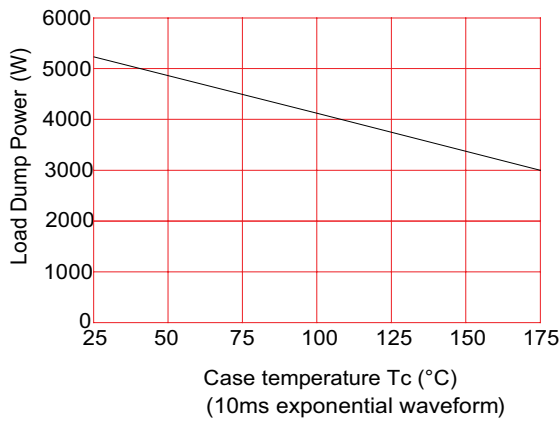
Power derating curve



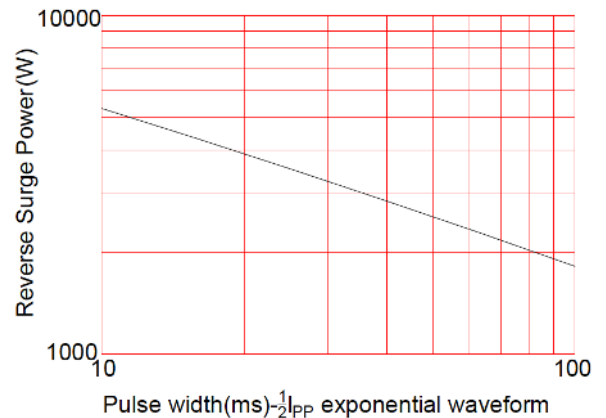
Pulse waveform



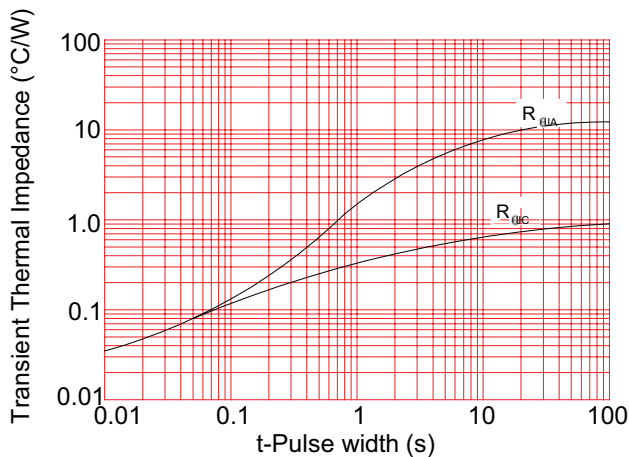
Load dump power characteristics



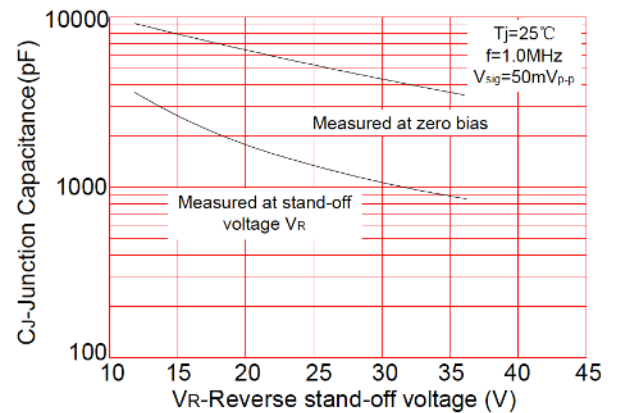
Reverse surge power



Typical transient thermal impedance



Typical junction capacitance



Solder reflow profile

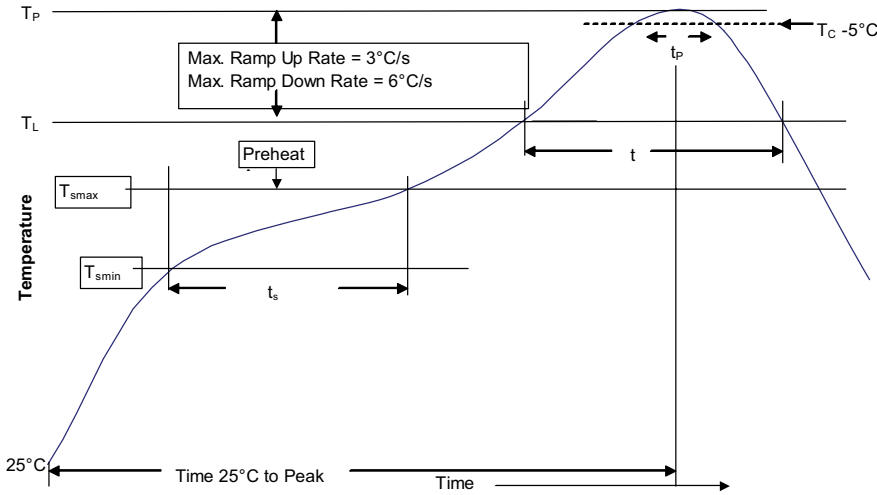


Table 1 - Standard SnPb solder (T_C)

| Package thickness | Volume mm ³ <350 | Volume mm ³ ≥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 ³ <350 | Volume mm ³ 350 - 2000 | Volume mm ³ >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 - 180 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 (+0, -5 °C) |
| Time (t_p)* within 5 °C of the specified classification temperature (T_C) | 20 seconds* | 40 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.

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