

»Features

- Excellent clamping capability
- Low leakage current
- Low capacitance
- High surge capability
- Glass passivated chip
- Epoxy resin package
- Built-in strain relief
- Will not fatigue
- RoHS Compliant
- Fast response time:
typically less than 1.0ps from 0 Volts to V_{BR} min



SMA (DO-214AC)

»Mechanical Characteristics

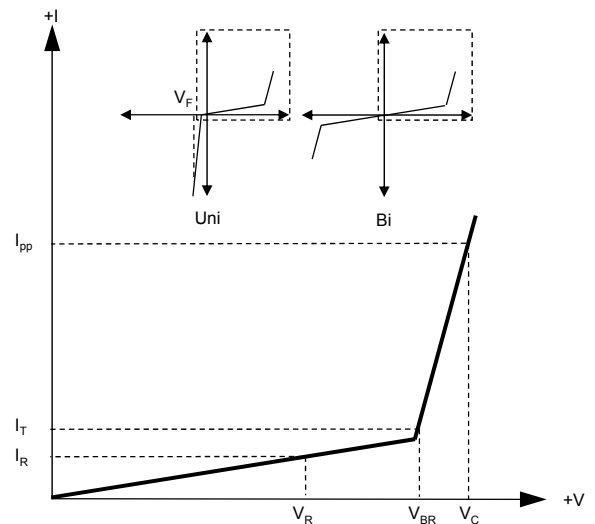
- Package: SMA plastic package.
- Lead Finish: Matte Tin
- Case Material: Epoxy Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020

»Applications

- Telecom
- Computer
- Industrial electronic
- Consumer electronic

»Electrical Parameters

| Parameter | Definition |
|-----------|--|
| C_J | Junction Capacitance - typical capacitance measured with 0V or V_R bias |
| I_{PP} | Peak Pulse Current - maximum rated peak impulse current |
| V_C | Clamping Voltage - Peak voltage measured across the suppressor at a specified I_{ppm} (peak impulse current) |
| V_{BR} | Breakdown Voltage - Maximum voltage that flows through the TVS at a specified test current (I_T) |
| I_R | Leakage Current - maximum peak off-state current measured at V_R |
| V_R | Peak Off-state Voltage - maximum voltage that can be applied while maintaining off state |



»Summary of Packing Options

| Package | Packing Description | Packing Quantity | Industry Standard |
|---------|---------------------|------------------|-------------------|
| SMA | Tape/Reel, 13" reel | 5000 | EIA-481-1 |
| | Tape/Reel, 7" reel | 2000 | EIA-481-1 |

»Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Parameter | Symbol | Value | Units | Remarks |
|--|-----------------|------------|-----------------------------|----------------|
| Peak Pulse Power Dissipation | P_{PPM} | 400 | W | (Note1)(Note2) |
| Steady State Power Dissipation | P_D | 3.3 | W | (Note3) |
| Peak Forward Surge Current | I_{FSM} | 40 | A | (Note4) |
| Maximum Instantaneous Forward Voltage at 20A | V_{FM} | 3.5/6.5 | V | (Note5) |
| Typical Thermal Resistance Junction to Lead | $R_{\theta JL}$ | 30 | $^{\circ}\text{C}/\text{W}$ | |
| Typical Thermal Resistance Junction to Ambient | $R_{\theta JA}$ | 120 | $^{\circ}\text{C}/\text{W}$ | |
| Operating Temperature Range | T_J | -55 to 150 | $^{\circ}\text{C}$ | |
| Storage Temperature Range | T_{STG} | -55 to 150 | $^{\circ}\text{C}$ | |

Notes1: Non-repetitive current pulse , 10/1000us Waveform.

Notes2: Mounted on copper pad area of 5×5mm to each terminal.

Notes3: Infinite HeatSink at $T_A=50^{\circ}\text{C}$

Notes4: Measured on 8.3ms single half sine wave or equivalent square wave, duty cycle=4 perminute maximum.

Notes5: For UnidirectionalOnly, $V_{FM}<3.5\text{V}$ for $V_{BR} \leq 200\text{V}$ and $V_{FM}<6.5\text{V}$ for $V_{BR} \geq 201\text{V}$.

»Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Part Number (Uni) | Part Number (Bi) | Marking Code | | Reverse Stand off Voltage V_R (V) | Breakdown Voltage $V_{BR} @ I_T$ (V) | | Test Current I_T (mA) | Maximum Clamping Voltage $V_C @ I_{PP}$ (V) | Maximum Peak Pulse Current I_{PP} (A) | Maximun Reverse Leakage $I_R @ V_R$ (μA) |
|-------------------|------------------|--------------|----|-------------------------------------|--------------------------------------|------|-------------------------|---|---|---|
| | | Uni | Bi | | Min | Max | | | | |
| SMAJ5.0A | SMAJ5.0CA | HE | TE | 5 | 6.4 | 7 | 10 | 9.2 | 43.5 | 800 |
| SMAJ6.0A | SMAJ6.0CA | HG | TG | 6 | 6.67 | 7.37 | 10 | 10.3 | 38.8 | 800 |
| SMAJ6.5A | SMAJ6.5CA | HK | TK | 6.5 | 7.22 | 7.98 | 10 | 11.2 | 35.7 | 500 |
| SMAJ7.0A | SMAJ7.0CA | HM | TM | 7 | 7.78 | 8.6 | 10 | 12 | 33.3 | 200 |
| SMAJ7.5A | SMAJ7.5CA | HP | TP | 7.5 | 8.33 | 9.21 | 1 | 12.9 | 31 | 100 |
| SMAJ8.0A | SMAJ8.0CA | HR | TR | 8 | 8.89 | 9.83 | 1 | 13.6 | 29.4 | 50 |
| SMAJ8.5A | SMAJ8.5CA | HT | TT | 8.5 | 9.44 | 10.4 | 1 | 14.4 | 27.8 | 20 |
| SMAJ9.0A | SMAJ9.0CA | HV | TV | 9 | 10 | 11.1 | 1 | 15.4 | 26 | 10 |
| SMAJ10A | SMAJ10CA | HX | TX | 10 | 11.1 | 12.3 | 1 | 17 | 23.5 | 5 |
| SMAJ11A | SMAJ11CA | HZ | TZ | 11 | 12.2 | 13.5 | 1 | 18.2 | 22 | 1 |
| SMAJ12A | SMAJ12CA | IE | UE | 12 | 13.3 | 14.7 | 1 | 19.9 | 20.1 | 1 |
| SMAJ13A | SMAJ13CA | IG | UG | 13 | 14.4 | 15.9 | 1 | 21.5 | 18.6 | 1 |
| SMAJ14A | SMAJ14CA | IK | UK | 14 | 15.6 | 17.2 | 1 | 23.2 | 17.2 | 1 |
| SMAJ15A | SMAJ15CA | IM | UM | 15 | 16.7 | 18.5 | 1 | 24.4 | 16.4 | 1 |
| SMAJ16A | SMAJ16CA | IP | UP | 16 | 17.8 | 19.7 | 1 | 26 | 15.4 | 1 |
| SMAJ17A | SMAJ17CA | IR | UR | 17 | 18.9 | 20.9 | 1 | 27.6 | 14.5 | 1 |
| SMAJ18A | SMAJ18CA | IT | UT | 18 | 20 | 22.1 | 1 | 29.2 | 13.7 | 1 |
| SMAJ20A | SMAJ20CA | IV | UV | 20 | 22.2 | 24.5 | 1 | 32.4 | 12.3 | 1 |
| SMAJ22A | SMAJ22CA | IX | UX | 22 | 24.4 | 26.9 | 1 | 35.5 | 11.3 | 1 |
| SMAJ24A | SMAJ24CA | IZ | UZ | 24 | 26.7 | 29.5 | 1 | 38.9 | 10.3 | 1 |

»Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

| Part Number (Uni) | Part Number (Bi) | Marking Code | | Reverse Stand off Voltage V_R (V) | Breakdown Voltage $V_{BR} @ I_T$ (V) | | Test Current I_T (mA) | Maximum Clamping Voltage $V_C @ I_{PP}$ (V) | Maximum Peak Pulse Current I_{PP} (A) | Maximun Reverse Leakage $I_R @ V_R$ (μA) |
|-------------------|------------------|--------------|----|-------------------------------------|--------------------------------------|------|-------------------------|---|---|---|
| | | Uni | Bi | | Min | Max | | | | |
| SMAJ26A | SMAJ26CA | JE | VE | 26 | 28.9 | 31.9 | 1 | 42.1 | 9.5 | 1 |
| SMAJ28A | SMAJ28CA | JG | VG | 28 | 31.1 | 34.4 | 1 | 45.4 | 8.8 | 1 |
| SMAJ30A | SMAJ30CA | JK | VK | 30 | 33.3 | 36.8 | 1 | 48.4 | 8.3 | 1 |
| SMAJ33A | SMAJ33CA | JM | VM | 33 | 36.7 | 40.6 | 1 | 53.3 | 7.5 | 1 |
| SMAJ36A | SMAJ36CA | JP | VP | 36 | 40 | 44.2 | 1 | 58.1 | 6.9 | 1 |
| SMAJ40A | SMAJ40CA | JR | VR | 40 | 44.4 | 49.1 | 1 | 64.5 | 6.2 | 1 |
| SMAJ43A | SMAJ43CA | JT | VT | 43 | 47.8 | 52.8 | 1 | 69.4 | 5.8 | 1 |
| SMAJ45A | SMAJ45CA | JV | VV | 45 | 50 | 55.3 | 1 | 72.7 | 5.5 | 1 |
| SMAJ48A | SMAJ48CA | JX | VX | 48 | 53.3 | 58.9 | 1 | 77.4 | 5.2 | 1 |
| SMAJ51A | SMAJ51CA | JZ | VZ | 51 | 56.7 | 62.7 | 1 | 82.4 | 4.9 | 1 |
| SMAJ54A | SMAJ54CA | RE | WE | 54 | 60 | 66.3 | 1 | 87.1 | 4.6 | 1 |
| SMAJ58A | SMAJ58CA | RG | WG | 58 | 64.4 | 71.2 | 1 | 93.6 | 4.3 | 1 |
| SMAJ60A | SMAJ60CA | RK | WK | 60 | 66.7 | 73.7 | 1 | 96.8 | 4.1 | 1 |
| SMAJ64A | SMAJ64CA | RM | WM | 64 | 71.1 | 78.6 | 1 | 103 | 3.9 | 1 |
| SMAJ70A | SMAJ70CA | RP | WP | 70 | 77.8 | 86 | 1 | 113 | 3.5 | 1 |
| SMAJ75A | SMAJ75CA | RR | WR | 75 | 83.3 | 92.1 | 1 | 121 | 3.3 | 1 |
| SMAJ78A | SMAJ78CA | RT | WT | 78 | 86.7 | 95.8 | 1 | 126 | 3.2 | 1 |
| SMAJ85A | SMAJ85CA | RV | WV | 85 | 94.4 | 104 | 1 | 137 | 2.9 | 1 |
| SMAJ90A | SMAJ90CA | RX | WX | 90 | 100 | 111 | 1 | 146 | 2.7 | 1 |
| SMAJ100A | SMAJ100CA | RZ | WZ | 100 | 111 | 123 | 1 | 162 | 2.5 | 1 |
| SMAJ110A | SMAJ110CA | SE | XE | 110 | 122 | 135 | 1 | 177 | 2.3 | 1 |
| SMAJ120A | SMAJ120CA | SG | XG | 120 | 133 | 147 | 1 | 193 | 2.1 | 1 |
| SMAJ130A | SMAJ130CA | SK | XK | 130 | 144 | 159 | 1 | 209 | 1.9 | 1 |
| SMAJ150A | SMAJ150CA | SM | XM | 150 | 167 | 185 | 1 | 243 | 1.6 | 1 |
| SMAJ160A | SMAJ160CA | SP | XP | 160 | 178 | 197 | 1 | 259 | 1.5 | 1 |
| SMAJ170A | SMAJ170CA | SR | XR | 170 | 189 | 209 | 1 | 275 | 1.5 | 1 |
| SMAJ180A | SMAJ180CA | ST | XT | 180 | 201 | 222 | 1 | 292 | 1.4 | 1 |
| SMAJ200A | SMAJ200CA | SX | XX | 200 | 224 | 247 | 1 | 324 | 1.2 | 1 |
| SMAJ220A | SMAJ220CA | ZE | YE | 220 | 246 | 272 | 1 | 356 | 1.1 | 1 |
| SMAJ250A | SMAJ250CA | ZG | YG | 250 | 279 | 309 | 1 | 405 | 1 | 1 |
| SMAJ300A | SMAJ300CA | ZK | YK | 300 | 335 | 371 | 1 | 486 | 0.8 | 1 |
| SMAJ350A | SMAJ350CA | ZM | YM | 350 | 391 | 432 | 1 | 567 | 0.7 | 1 |
| SMAJ400A | SMAJ400CA | ZP | YP | 400 | 447 | 494 | 1 | 648 | 0.6 | 1 |
| SMAJ440A | SMAJ440CA | ZR | YR | 440 | 492 | 543 | 1 | 713 | 0.6 | 1 |

»Rating And Characteristic Curves ($T_A=25^\circ\text{C}$ unless otherwise noted)

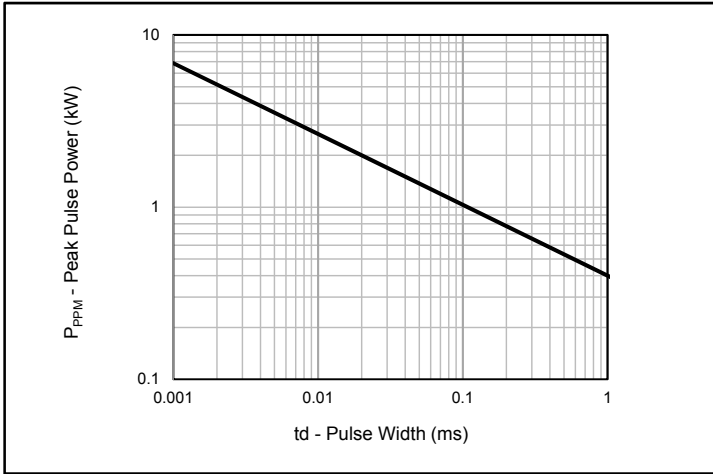


Fig.1 - Peak Pulse Power Rating

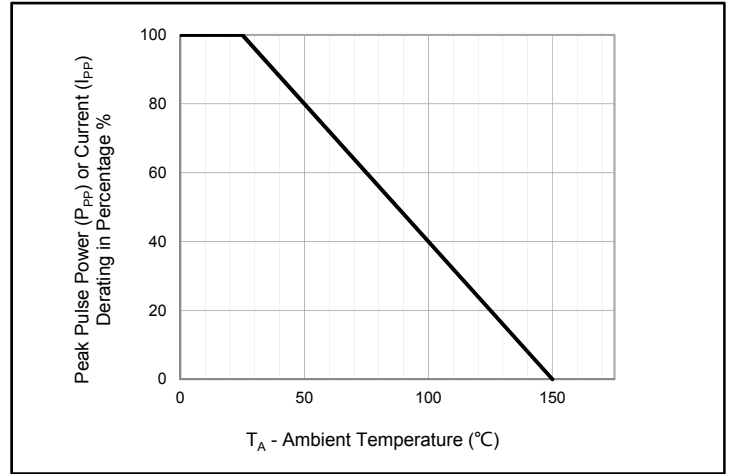


Fig.2 - Pulse Derating Curve

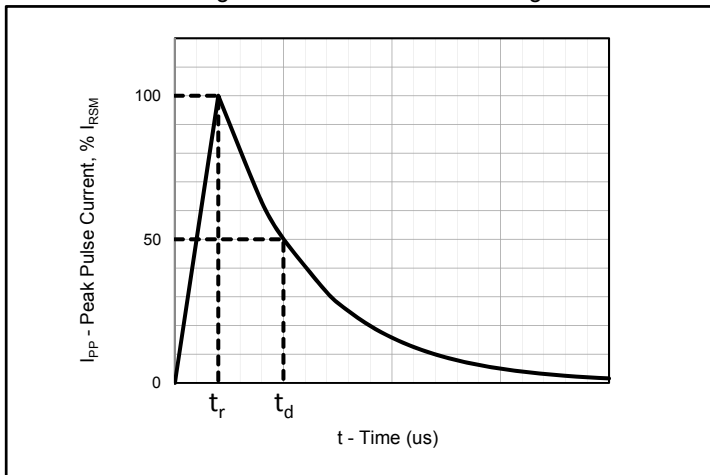


Fig.3 - Pulse Waveform

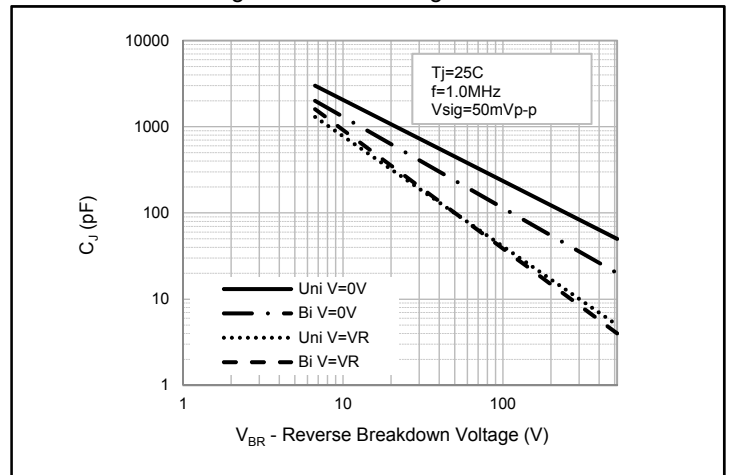


Fig.4 - Typical Junction Capacitance

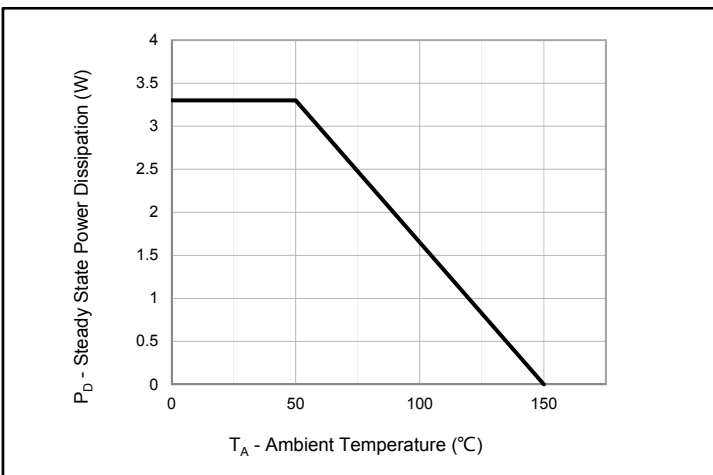


Fig.5 - Steady State Power Dissipation Derating Curve

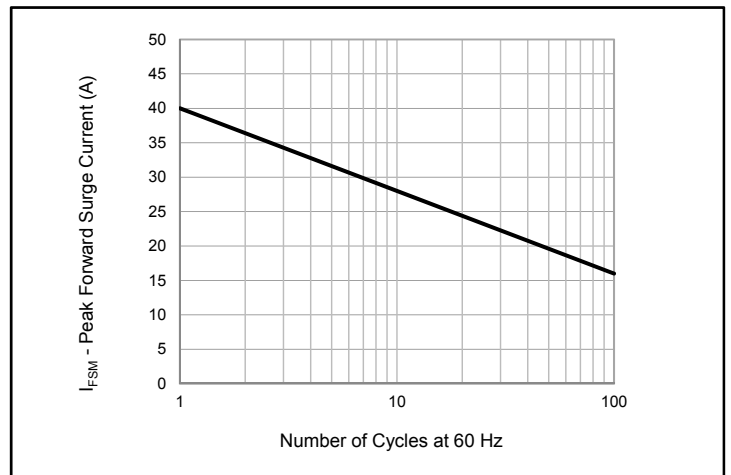
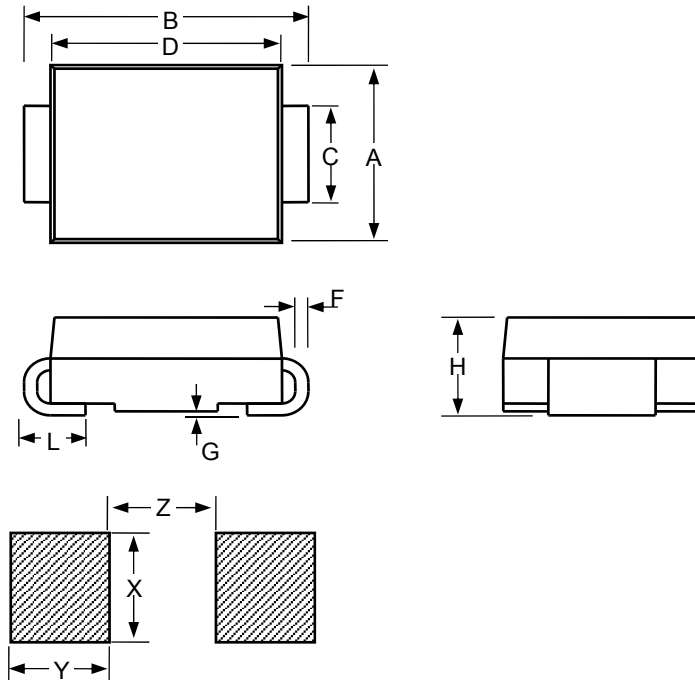


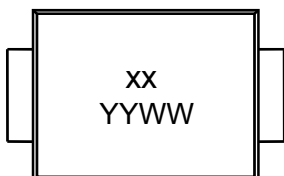
Fig.6 - Maximum Non-Repetitive Peak Forward Surge Current
Uni-Directional Only

»Package Dimensions

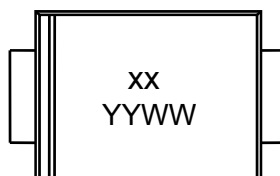


| SMA | | | | | | |
|-----------|--------|-------|-------|-------------|------|-------|
| Dimension | Inches | | | Millimeters | | |
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.1 | | 0.11 | 2.54 | | 2.8 |
| B | 0.194 | | 0.223 | 4.93 | | 5.66 |
| C | 0.051 | | 0.067 | 1.3 | | 1.7 |
| D | 0.157 | | 0.177 | 3.99 | | 4.5 |
| F | 0.006 | | 0.012 | 0.152 | | 0.305 |
| G | - | | 0.008 | - | | 0.203 |
| H | 0.078 | | 0.095 | 1.98 | | 2.42 |
| L | 0.03 | | 0.06 | 0.76 | | 1.52 |
| X | | 0.085 | | | 2.16 | |
| Y | | 0.07 | | | 1.78 | |
| Z | | 0.079 | | | 2 | |

»Marking Information

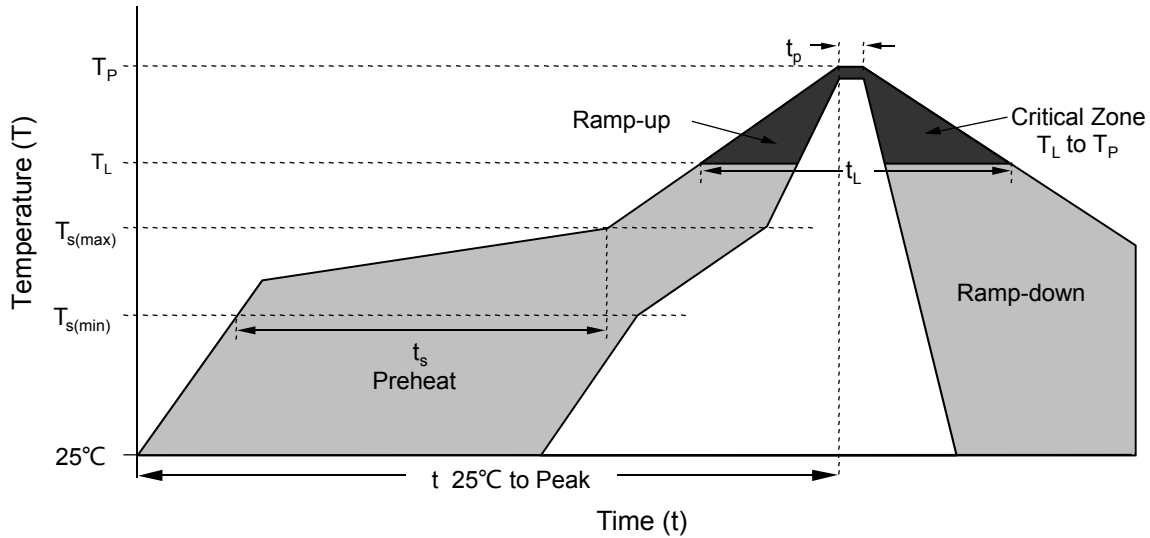


xx = Type Code
YYWW = Date Code



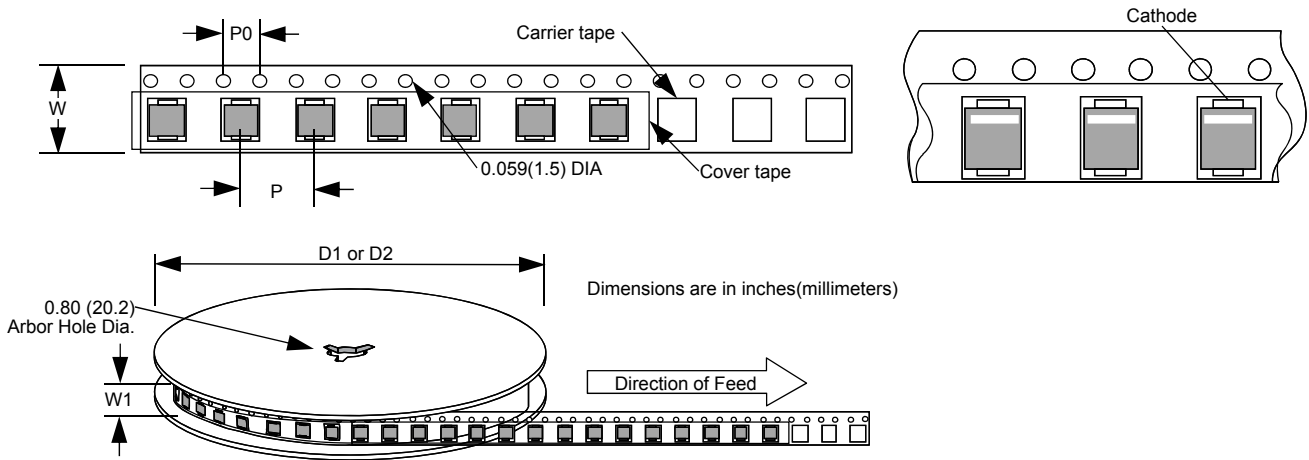
xx = Type Code
YYWW = Date Code

»Soldering Parameters



| Reflow Condition | | Lead-free assembly |
|--|------------------------------------|-------------------------|
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (min to max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus Temp (T_L) to peak) | | 3°C/second max |
| $T_{s(max)}$ to T_L - Ramp-up Rate | | 3°C/second max |
| Reflow | - Temperature (T_L) (Liquidus) | 217°C |
| | - Time (t_L) | 60 – 150 secs |
| Peak Temperature (T_P) | | 260 ^{+0/-5} °C |
| Time within 5°C of actual peak Temperature (t_p) | | 20 – 40 secs |
| Ramp-down Rate | | 6°C/second max |
| Time 25°C to peak Temperature (t) | | 8 minutes Max. |
| Do not exceed | | 260°C |

»Tape and Reel Specification



| Dimension | Inches | | | Millimeters | | |
|-----------|--------|-------|-----|-------------|-------|-----|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| P | | 0.157 | | | 4 | |
| P0 | | 0.157 | | | 4 | |
| W | | 0.472 | | | 12 | |
| W1 | | 0.492 | | | 12.5 | |
| D1 | | 7 | | | 177.8 | |
| D2 | | 13 | | | 330.2 | |

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