

### »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

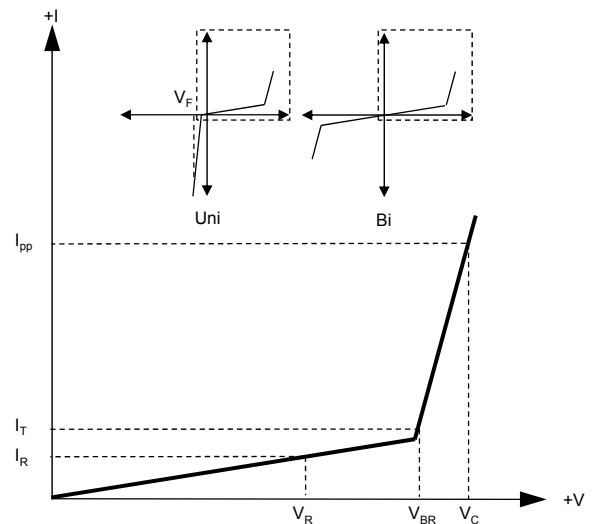
- Package: SMA plastic package.
- Lead Finish: Matte Tin
- Case Material: Epoxy Molding Compound.
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020

### »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 $I_R @ V_R$ ( $\mu\text{A}$ ) |
|-------------------|------------------|--------------|----|-------------------------------------|--------------------------------------|------|-------------------------|---------------------------------------------|-----------------------------------------|-------------------------------------------------------|
|                   |                  | 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 $I_R @ V_R$ ( $\mu\text{A}$ ) |
|-------------------|------------------|--------------|----|-------------------------------------|--------------------------------------|------|-------------------------|---------------------------------------------|-----------------------------------------|-------------------------------------------------------|
|                   |                  | 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)

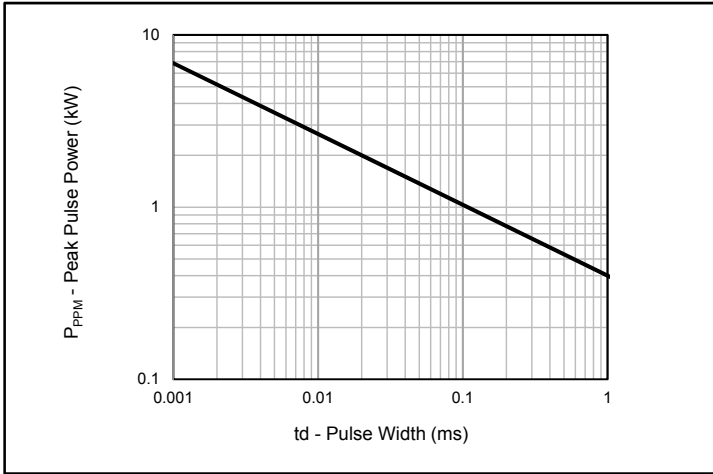


Fig.1 - Peak Pulse Power Rating



Fig.2 - Pulse Derating Curve

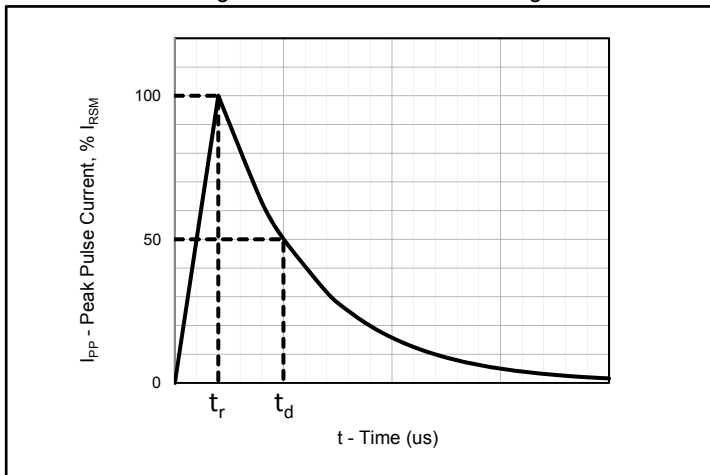


Fig.3 - Pulse Waveform

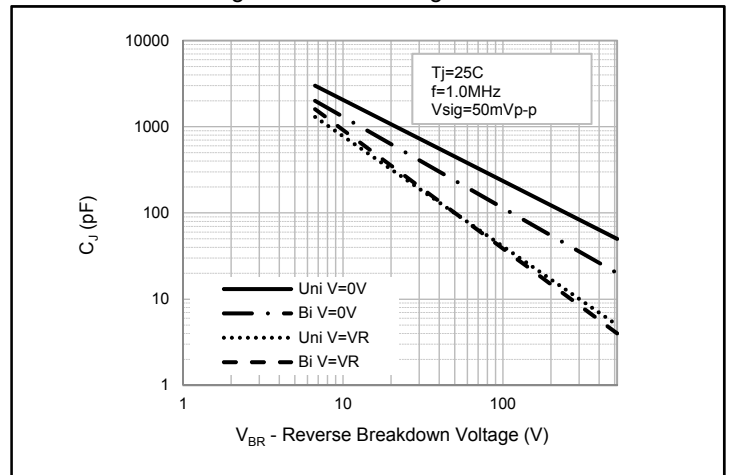


Fig.4 - Typical Junction Capacitance

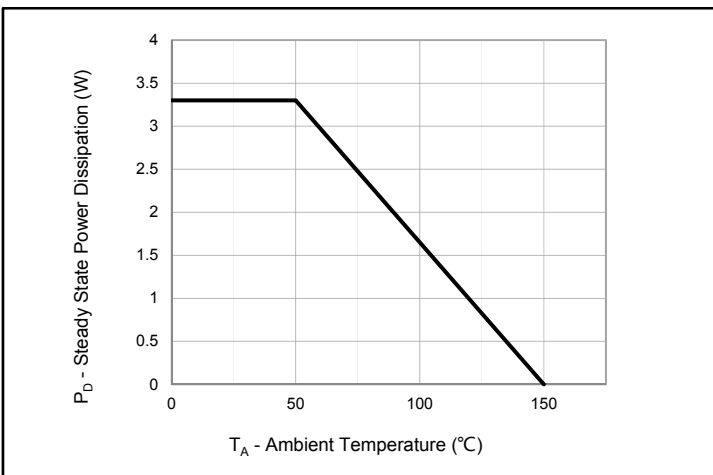


Fig.5 - Steady State Power Dissipation Derating Curve

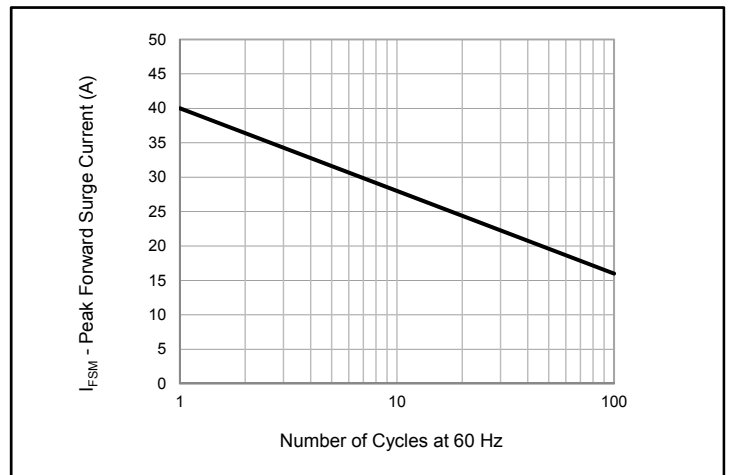
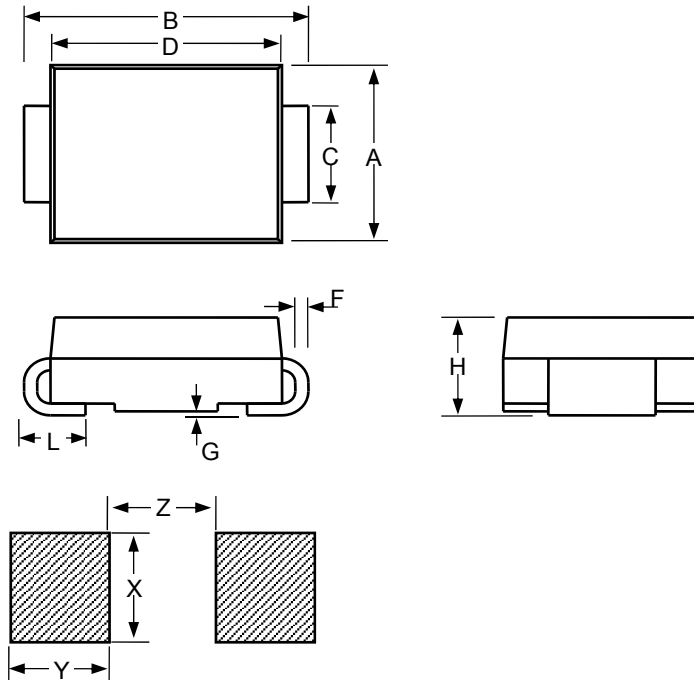


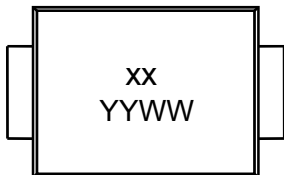
Fig.6 - Maximum Non-Repetitive Peak Forward Surge Current  
Uni-Directional Only

»Package Dimensions

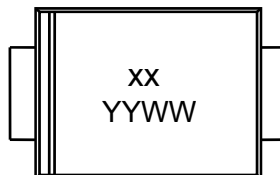


| SMA       |        |       |       |             |      |       |
|-----------|--------|-------|-------|-------------|------|-------|
| Dimension | Inches |       |       | Millimeters |      |       |
|           | MIN    | NOM   | MAX   | MIN         | NOM  | MAX   |
| A         | 0.1    |       | 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



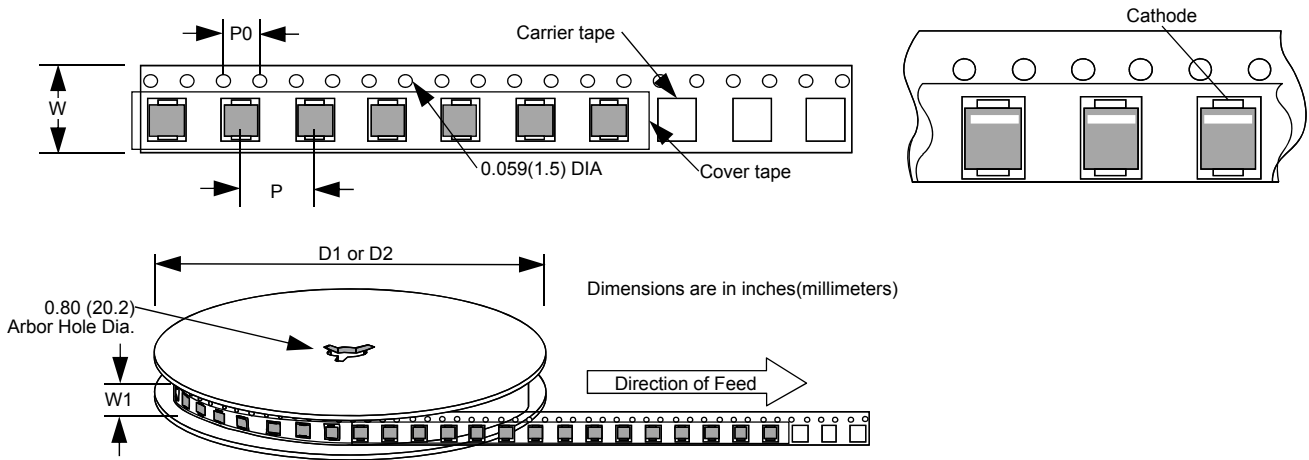
xx = Type Code  
YYWW = Date Code

»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 <sup>+0/-5</sup> °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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