

## SMAG Plastic-Encapsulate Diodes

### Transient Voltage Suppressor Diodes

#### Features

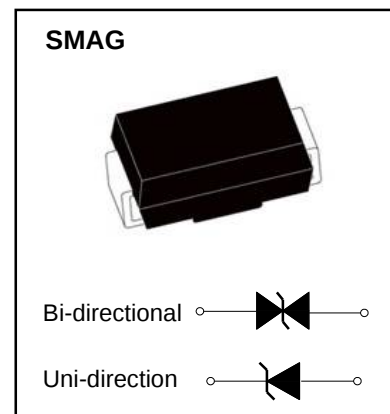
- $P_{PPM}$  400W
- $V_{RWM}$  5.8V- 513V
- Low power loss, high efficiency
- Excellent clamping capability

#### Applications

- Protect sensitive circuit from damage by high voltage transients
- Lighting, ESD transient voltage protection of IC, system
- Inductive switching load protection of IC, system
- Electrical Fast Transient Immunity protection of IC, system

#### Mechanical Data

- Case: JEDEC DO-214AC molded plastic
- Molding compound: UL flammability classification rating 94V-0
- Terminals: Solder plated, solderable per MIL- STD-202, Method 208
- Polarity: Color band denotes cathode end



### Limiting Values (Absolute Maximum Rating)

| Item                                             | Symbol         | Unit               | Conditions                                        | Max            |
|--------------------------------------------------|----------------|--------------------|---------------------------------------------------|----------------|
| Peak pulse power dissipation                     | $P_{PPM}$      | W                  | with a 10/1000us waveform                         | 400            |
| Peak pulse current(1)                            | $I_{PPM}$      | A                  | with a 10/1000us waveform                         | See Next Table |
| Power dissipation                                | $P_D$          | W                  | On infinite heat sink at $T_L=75^{\circ}\text{C}$ | 1.0            |
| Peak forward surge current(2)                    | $I_{FSM}$      | A                  | 8.3 ms single half sine-wave unidirectional only  | 40             |
| Operating junction and storage temperature range | $T_J, T_{STG}$ | $^{\circ}\text{C}$ |                                                   | -55 to +150    |

### Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ Unless otherwise specified)

| Item                                      | Symbol          | Unit                        | Conditions                     | Max     |
|-------------------------------------------|-----------------|-----------------------------|--------------------------------|---------|
| Maximum instantaneous forward Voltage (3) | $V_F$           | V                           | at 25A for unidirectional only | 3.5/5.0 |
| Thermal resistance                        | $R_{\theta JL}$ | $^{\circ}\text{C}/\text{W}$ | Between junction and lead      | 30      |
|                                           | $R_{\theta JA}$ | $^{\circ}\text{C}/\text{W}$ | Between junction and Ambient   | 120     |
|                                           | $R_{\theta JC}$ | $^{\circ}\text{C}/\text{W}$ | Between junction and Case      | 20      |

#### Notes:

- (1) Non-repetitive current pulse, per Fig. 3 and derated above  $T_A=25^{\circ}\text{C}$  per Fig.2.
- (2) Mounted on 0.2 x 0.2" (5.0 x 5.0 mm) copper pads to each terminal
- (3)  $V_F < 3.5\text{V}$  for devices of  $V_{BR} < 200\text{V}$  and  $V_F < 5.0\text{V}$  for devices of  $V_{BR} > 201\text{V}$

## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| Part Number |            | Working Peak<br>Reverse Voltage<br><br>V <sub>RWM</sub><br>(V) | Breakdown Voltage V <sub>BR</sub> @I <sub>T</sub> |         | Test<br>Current<br><br>I <sub>r</sub><br>(mA) | Maximum<br>Clamping<br>Voltage V <sub>c</sub><br>@ I <sub>PP</sub><br>(V) | Maximum<br>Reverse Surge<br>Current IPP<br>(A) | Maximum<br>Reverse<br>Leakage I <sub>R</sub> @<br>V <sub>WM</sub><br>(μA) |
|-------------|------------|----------------------------------------------------------------|---------------------------------------------------|---------|-----------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------|
| Uni         | Bi         |                                                                | Min(V)                                            | Max (V) |                                               |                                                                           |                                                |                                                                           |
| P4SMA6.8A   | P4SMA6.8CA | 5.8                                                            | 6.46                                              | 7.14    | 10                                            | 10.5                                                                      | 38.10                                          | 1000                                                                      |
| P4SMA7.5A   | P4SMA7.5CA | 6.4                                                            | 7.13                                              | 7.88    | 10                                            | 11.3                                                                      | 35.40                                          | 500                                                                       |
| P4SMA8.2A   | P4SMA8.2CA | 7.0                                                            | 7.79                                              | 8.61    | 10                                            | 12.1                                                                      | 33.06                                          | 200                                                                       |
| P4SMA9.1A   | P4SMA9.1CA | 7.8                                                            | 8.65                                              | 9.56    | 1                                             | 13.4                                                                      | 29.85                                          | 50                                                                        |
| P4SMA10A    | P4SMA10CA  | 8.6                                                            | 9.50                                              | 10.50   | 1                                             | 14.5                                                                      | 27.59                                          | 10                                                                        |
| P4SMA11A    | P4SMA11CA  | 9.4                                                            | 10.45                                             | 11.55   | 1                                             | 15.6                                                                      | 25.64                                          | 5                                                                         |
| P4SMA12A    | P4SMA12CA  | 10.2                                                           | 11.40                                             | 12.60   | 1                                             | 16.7                                                                      | 23.95                                          | 5                                                                         |
| P4SMA13A    | P4SMA13CA  | 11.1                                                           | 12.35                                             | 13.65   | 1                                             | 18.2                                                                      | 21.98                                          | 1                                                                         |
| P4SMA15A    | P4SMA15CA  | 12.8                                                           | 14.25                                             | 15.75   | 1                                             | 21.2                                                                      | 18.87                                          | 1                                                                         |
| P4SMA16A    | P4SMA16CA  | 13.6                                                           | 15.20                                             | 16.80   | 1                                             | 22.5                                                                      | 17.78                                          | 1                                                                         |
| P4SMA18A    | P4SMA18CA  | 15.3                                                           | 17.10                                             | 18.90   | 1                                             | 25.2                                                                      | 15.87                                          | 1                                                                         |
| P4SMA20A    | P4SMA20CA  | 17.1                                                           | 19.00                                             | 21.00   | 1                                             | 27.7                                                                      | 14.44                                          | 1                                                                         |
| P4SMA22A    | P4SMA22CA  | 18.8                                                           | 20.90                                             | 23.10   | 1                                             | 30.6                                                                      | 13.07                                          | 1                                                                         |
| P4SMA24A    | P4SMA24CA  | 20.5                                                           | 22.80                                             | 25.20   | 1                                             | 33.2                                                                      | 12.05                                          | 1                                                                         |
| P4SMA27A    | P4SMA27CA  | 23.1                                                           | 25.65                                             | 28.35   | 1                                             | 37.5                                                                      | 10.67                                          | 1                                                                         |
| P4SMA30A    | P4SMA30CA  | 25.6                                                           | 28.50                                             | 31.50   | 1                                             | 41.4                                                                      | 9.66                                           | 1                                                                         |
| P4SMA33A    | P4SMA33CA  | 28.2                                                           | 31.35                                             | 34.65   | 1                                             | 45.7                                                                      | 8.75                                           | 1                                                                         |
| P4SMA36A    | P4SMA36CA  | 30.8                                                           | 34.20                                             | 37.80   | 1                                             | 49.9                                                                      | 8.02                                           | 1                                                                         |
| P4SMA39A    | P4SMA39CA  | 33.3                                                           | 37.05                                             | 40.95   | 1                                             | 53.9                                                                      | 7.42                                           | 1                                                                         |
| P4SMA43A    | P4SMA43CA  | 36.8                                                           | 40.85                                             | 45.15   | 1                                             | 59.3                                                                      | 6.75                                           | 1                                                                         |
| P4SMA47A    | P4SMA47CA  | 40.2                                                           | 44.65                                             | 49.35   | 1                                             | 64.8                                                                      | 6.17                                           | 1                                                                         |
| P4SMA51A    | P4SMA51CA  | 43.6                                                           | 48.45                                             | 53.55   | 1                                             | 70.1                                                                      | 5.71                                           | 1                                                                         |
| P4SMA56A    | P4SMA56CA  | 47.8                                                           | 53.20                                             | 58.80   | 1                                             | 77.0                                                                      | 5.19                                           | 1                                                                         |
| P4SMA62A    | P4SMA62CA  | 53.0                                                           | 58.90                                             | 65.10   | 1                                             | 85.0                                                                      | 4.71                                           | 1                                                                         |
| P4SMA68A    | P4SMA68CA  | 58.1                                                           | 64.60                                             | 71.40   | 1                                             | 92.0                                                                      | 4.35                                           | 1                                                                         |
| P4SMA75A    | P4SMA75CA  | 64.1                                                           | 71.25                                             | 78.75   | 1                                             | 103.0                                                                     | 3.88                                           | 1                                                                         |
| P4SMA82A    | P4SMA82CA  | 70.1                                                           | 77.90                                             | 86.10   | 1                                             | 113.0                                                                     | 3.54                                           | 1                                                                         |
| P4SMA91A    | P4SMA91CA  | 77.8                                                           | 86.45                                             | 95.55   | 1                                             | 125.0                                                                     | 3.20                                           | 1                                                                         |
| P4SMA100A   | P4SMA100CA | 85.5                                                           | 95.00                                             | 105.00  | 1                                             | 137.0                                                                     | 2.92                                           | 1                                                                         |
| P4SMA110A   | P4SMA110CA | 94.0                                                           | 104.50                                            | 115.50  | 1                                             | 152.0                                                                     | 2.63                                           | 1                                                                         |
| P4SMA120A   | P4SMA120CA | 102.0                                                          | 114.00                                            | 126.00  | 1                                             | 165.0                                                                     | 2.42                                           | 1                                                                         |
| P4SMA130A   | P4SMA130CA | 111.0                                                          | 123.50                                            | 136.50  | 1                                             | 179.0                                                                     | 2.23                                           | 1                                                                         |
| P4SMA150A   | P4SMA150CA | 128.0                                                          | 142.50                                            | 157.50  | 1                                             | 207.0                                                                     | 1.93                                           | 1                                                                         |
| P4SMA160A   | P4SMA160CA | 136.0                                                          | 152.00                                            | 168.00  | 1                                             | 219.0                                                                     | 1.83                                           | 1                                                                         |
| P4SMA170A   | P4SMA170CA | 145.0                                                          | 161.50                                            | 178.50  | 1                                             | 234.0                                                                     | 1.71                                           | 1                                                                         |
| P4SMA180A   | P4SMA180CA | 154.0                                                          | 171.00                                            | 189.00  | 1                                             | 246.0                                                                     | 1.63                                           | 1                                                                         |
| P4SMA200A   | P4SMA200CA | 171.0                                                          | 190.00                                            | 210.00  | 1                                             | 274.0                                                                     | 1.46                                           | 1                                                                         |
| P4SMA220A   | P4SMA220CA | 185.0                                                          | 209.00                                            | 231.00  | 1                                             | 328.0                                                                     | 1.22                                           | 1                                                                         |
| P4SMA250A   | P4SMA250CA | 214.0                                                          | 237.50                                            | 262.50  | 1                                             | 344.0                                                                     | 1.16                                           | 1                                                                         |
| P4SMA300A   | P4SMA300CA | 256.0                                                          | 285.00                                            | 315.00  | 1                                             | 414.0                                                                     | 0.97                                           | 1                                                                         |
| P4SMA350A   | P4SMA350CA | 299.3                                                          | 332.50                                            | 367.50  | 1                                             | 482.0                                                                     | 0.83                                           | 1                                                                         |
| P4SMA380A   | P4SMA380CA | 324.9                                                          | 361.00                                            | 399.00  | 1                                             | 524.4                                                                     | 0.76                                           | 1                                                                         |
| P4SMA400A   | P4SMA400CA | 342.0                                                          | 380.00                                            | 420.00  | 1                                             | 552.0                                                                     | 0.72                                           | 1                                                                         |
| P4SMA440A   | P4SMA440CA | 376.2                                                          | 418.00                                            | 462.00  | 1                                             | 607.2                                                                     | 0.66                                           | 1                                                                         |
| P4SMA500A   | P4SMA500CA | 427.5                                                          | 475.00                                            | 525.00  | 1                                             | 690.0                                                                     | 0.58                                           | 1                                                                         |
| P4SMA520A   | P4SMA520CA | 444.6                                                          | 494.00                                            | 546.00  | 1                                             | 717.6                                                                     | 0.56                                           | 1                                                                         |
| P4SMA550A   | P4SMA550CA | 470.3                                                          | 522.50                                            | 577.50  | 1                                             | 759.0                                                                     | 0.53                                           | 1                                                                         |
| P4SMA600A   | P4SMA600CA | 513.0                                                          | 570.00                                            | 630.00  | 1                                             | 828.0                                                                     | 0.48                                           | 1                                                                         |

### Note:

1. Suffix 'A' denotes 5% tolerance device. Without 'A' denotes 10% tolerance device
2. Add suffix 'C' or 'CA' after part number to specify Bi-directional devices
3. For Bi-Directional devices having V<sub>R</sub> of 10 volts and under, the I<sub>R</sub> limit is double

## Typical Characteristics

FIG. 1-PEAK PULSE POWER RATING CURVE

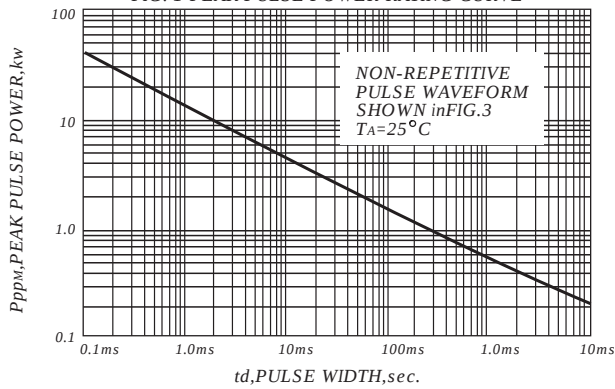


FIG. 3-PULSE WAVEFORM

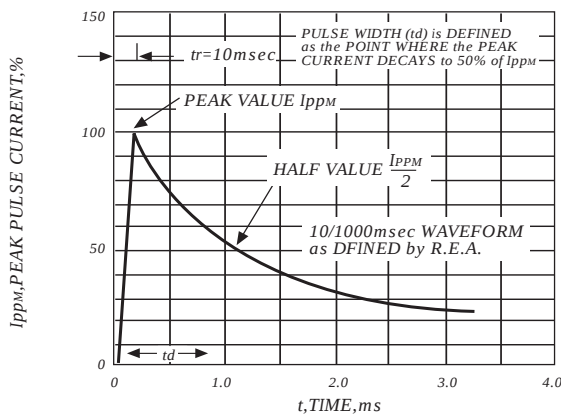


FIG. 5-STEADY STATE POWER DERATING CURVE

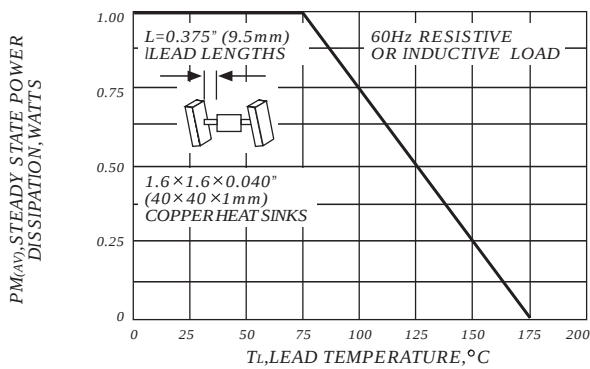


FIG. 7-TYPICAL REVERSE LEAKAGE CHARACTERISTICS

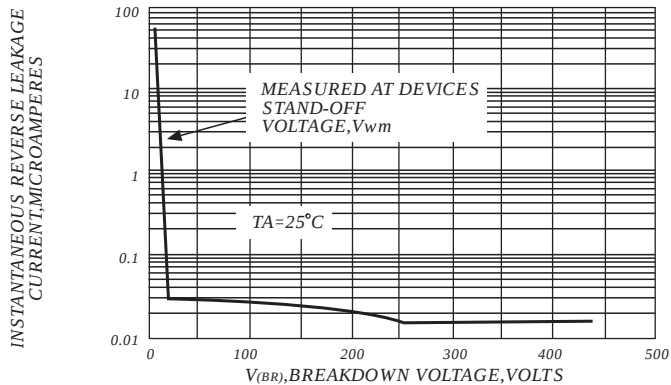


FIG. 2-PULSE DERATING CURVE

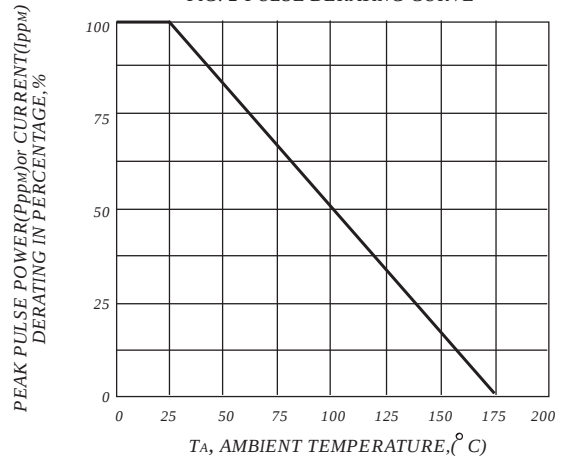


FIG. 4-TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL

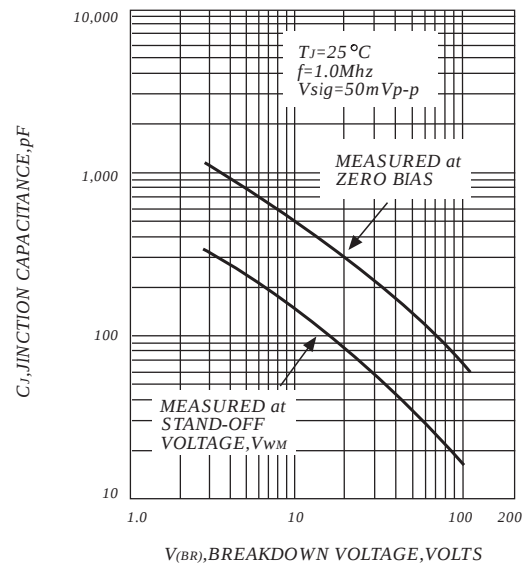
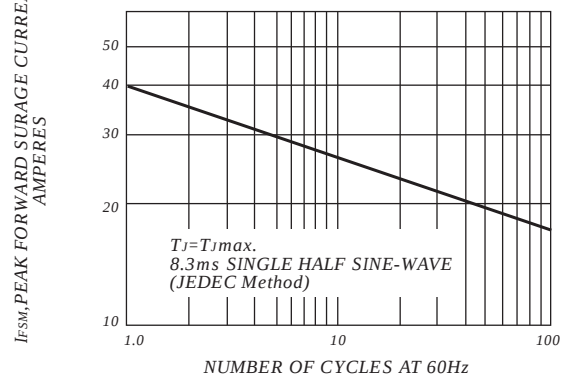
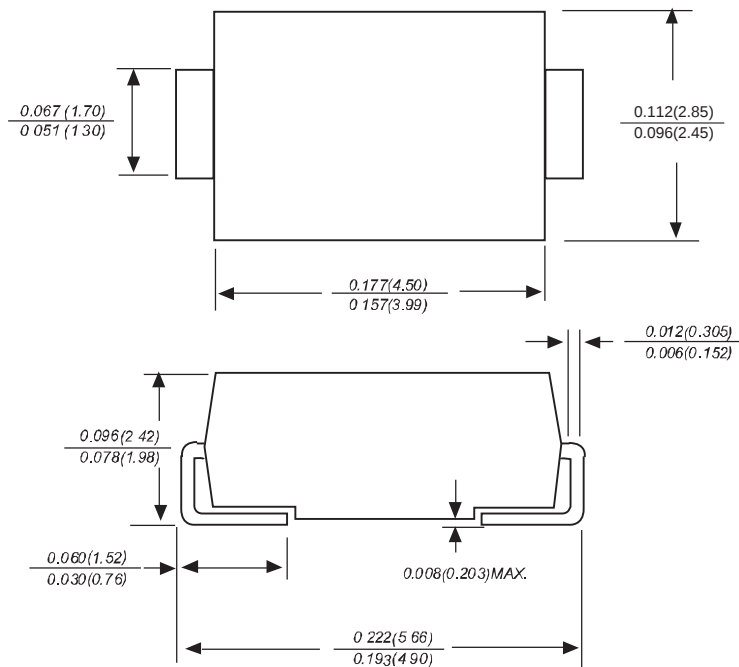


FIG. 6-MAXIMUM NON-REPETITIVE FORWARD SURGE CURRENT UNIDIRECTIONAL ONLY

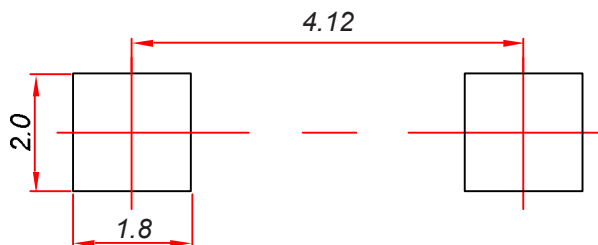


## SMAG Package Outline Dimensions



Dimensions in inches and (millimeters)

## SMAG Suggested Pad Layout



### Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05 \text{ mm}$ .
3. The pad layout is for reference purposes only.

## Ordering Information

| Part Number                   | Package | Shipping Quantity |
|-------------------------------|---------|-------------------|
| P4SMA6.8(C)A-<br>P4SMA600(C)A | SMAG    | 5000/tape&Reel    |

## Marking Diagram

Uni-direction

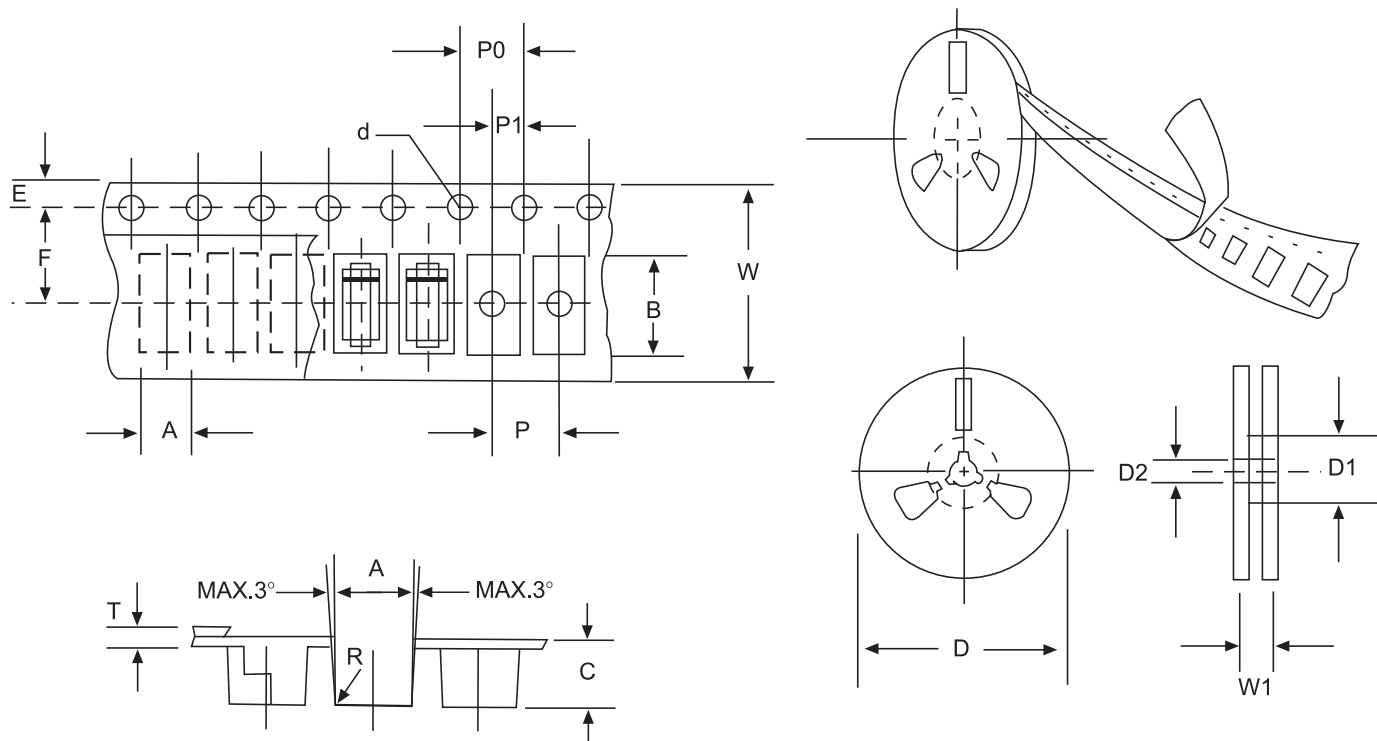


XX: From 6.8 To 600

Bi-directional



## Reel Taping Specifications For Surface Mount Devices- SMAG



**Fig:CONFIGURATION OF FLAT MELF TAPING**

| ITEM                   | SYMBOL | SMAG mm(inch)             |
|------------------------|--------|---------------------------|
| Carrier width          | A      | 2.79±0.1(0.110±0.004)     |
| Carrier length         | B      | 5.33±0.1(0.210±0.004)     |
| Carrier depth          | C      | 2.36±0.1(0.093±0.004)     |
| Sprocket hole          | d      | 1.55±0.05 (0.061±0.002)   |
| Reel outside diameter  | D      | 279±2.0 (11± 0.079)       |
| Reel inner diameter    | D1     | 75 ±1.0 ( 2.95 ±0.039)    |
| Feed hole diameter     | D2     | 13±0.5(0.512±0.020)       |
| Sprocket hole position | E      | 1.75±0.1(0.069±0.004)     |
| Punch hole position    | F      | 5.5±0.05(0.217±0.002)     |
| Punch hole pitch       | P      | 4.0±0.1(0.157±0.004)      |
| Sprocket hole pitch    | P0     | 4.0±0.1(0.157±0.004)      |
| Embossment center      | P1     | 2.0±0.1(0.079±0.004)      |
| Total tape thickness   | T      | 0.28±0.02(0.011 ±0.0008 ) |
| Tape width             | W      | 12.0±0.2(0.472±0.008)     |
| Reel width             | W1     | 16.8±2.0(0.661±0.079)     |

NOTE: Devices are packed in accordance with EIA standard RS-481-A and specification given above.