

## TRANSIENT VTAGE SUPPRESSOR

### Features

- ◆ For surface mounted applications in order to optimize board space
- ◆ Low profile package
- ◆ Built-in strain relief
- ◆ Glass passivated junction
- ◆ Low inductance
- ◆ Excellent clamping capability
- ◆ 400W peak pulse power capability at 10/1000μs waveform,
- ◆ Repetition rate (duty cycle): 0.01%
- ◆ Fast response time
- ◆ Typical IR less than 1μA above 10V
- ◆ High Temperature soldering: 260°C/10 seconds at terminals
- ◆ Plastic package has underwriters laboratory flammability 94V-0

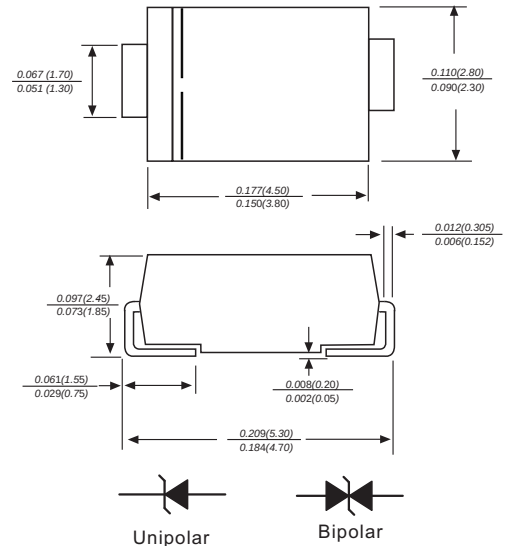
### Mechanical Data

Case : JEDEC DO-214AC/SMA molded plastic body  
 Terminals : Solderable per MIL-STD-750, Method 2026  
 Polarity : Polarity symbol marking on body  
 Mounting Position : Any  
 Weight : 0.07 grams  
 Marking : Date Code and Marking Code See Page 3

### Applications

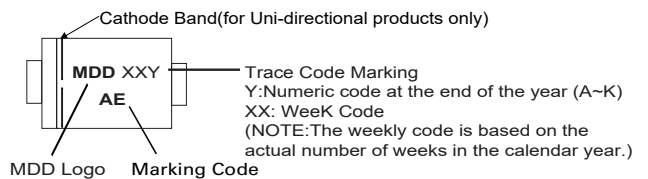
- ◆ I/O interface ◆ AC/DC power supply
- ◆ Low frequency signal transmission line (RS232, RS485, etc.)

#### DO-214AC/SMA

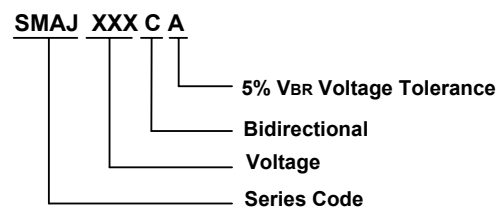


Dimensions in inches and (millimeters)

### Marking Code



### Part Number Code



### MAXIMUM RATINGS AND CHARACTERISTICS

| MAXIMUM RATINGS AND CHARACTERISTICS                                                                               |                                   |             |      |
|-------------------------------------------------------------------------------------------------------------------|-----------------------------------|-------------|------|
| Ratings at 25°C ambient temperature unless otherwise specified.                                                   |                                   |             |      |
| Peak pulse power dissipation at 10/1000μs waveform (Note1, Note2, Fig.1)                                          | P <sub>PPM</sub>                  | Minimum 400 | W    |
| Peak pulse current of at 10/1000μs waveform (Note 1, Fig.3)                                                       | I <sub>PPM</sub>                  | See Table   | A    |
| Steady state power dissipation at T <sub>A</sub> =50°C (Fig.5)                                                    | P <sub>M(AV)</sub>                | 3.3         | W    |
| Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note3, Fig.6) | I <sub>FSM</sub>                  | 40          | A    |
| Operating junction and Storage Temperature Range.                                                                 | T <sub>J</sub> , T <sub>STG</sub> | -65 to +150 | °C   |
| Typical thermal resistance junction to lead                                                                       | R <sub>θJL</sub>                  | 30          | °C/W |
| Typical thermal resistance junction to ambient                                                                    | R <sub>θJA</sub>                  | 120         | °C/W |

Notes: 1. Non-repetitive current pulse, per Fig.3 and derated above T<sub>A</sub>=25°C per Fig.2.  
 2. Mounted on 5.0mm×5.0mm (0.03mm thick) copper pads to each terminal.  
 3. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.



# SMAJ5.0(C)A THRU SMAJ440(C)A

Stand-off Voltage - 5.0 to 440 Volts Peak Pulse Power: 400 Watts

## Electrical Characteristics (TA=25°C)

| Part Number    |               | Device Marking Code |    | Reverse Stand-Off Voltage | Breakdown Voltage @IT | Test Current | Maximum Clamping Voltage @IPP | Peak Pulse Current | Reverse Leakage @VRWM |
|----------------|---------------|---------------------|----|---------------------------|-----------------------|--------------|-------------------------------|--------------------|-----------------------|
| Unidirectional | Bidirectional | UNI                 | BI | VRWM(V)                   | VBR(V)                | IT(mA)       | VC(V)                         | IPP(A)             | IR(μA)                |
| SMAJ5.0A       | SMAJ5.0CA     | AE                  | WE | 5.0                       | 6.40~7.00             | 10           | 9.2                           | 43.5               | 800                   |
| SMAJ6.0A       | SMAJ6.0CA     | AG                  | WG | 6.0                       | 6.67~7.37             | 10           | 10.3                          | 38.8               | 800                   |
| SMAJ6.5A       | SMAJ6.5CA     | AK                  | WK | 6.5                       | 7.22~7.98             | 10           | 11.2                          | 35.7               | 500                   |
| SMAJ7.0A       | SMAJ7.0CA     | AM                  | WM | 7.0                       | 7.78~8.60             | 10           | 12.0                          | 33.3               | 200                   |
| SMAJ7.5A       | SMAJ7.5CA     | AP                  | WP | 7.5                       | 8.33~9.21             | 1            | 12.9                          | 31.0               | 100                   |
| SMAJ8.0A       | SMAJ8.0CA     | AR                  | WR | 8.0                       | 8.89~9.83             | 1            | 13.6                          | 29.4               | 50                    |
| SMAJ8.5A       | SMAJ8.5CA     | AT                  | WT | 8.5                       | 9.44~10.40            | 1            | 14.4                          | 27.8               | 20                    |
| SMAJ9.0A       | SMAJ9.0CA     | AV                  | WV | 9.0                       | 10.00~11.10           | 1            | 15.4                          | 26.0               | 10                    |
| SMAJ10A        | SMAJ10CA      | AX                  | WX | 10.0                      | 11.10~12.30           | 1            | 17.0                          | 23.5               | 5                     |
| SMAJ11A        | SMAJ11CA      | AZ                  | WZ | 11.0                      | 12.20~13.50           | 1            | 18.2                          | 22.0               | 1                     |
| SMAJ12A        | SMAJ12CA      | BE                  | XE | 12.0                      | 13.30~14.70           | 1            | 19.9                          | 20.1               | 1                     |
| SMAJ13A        | SMAJ13CA      | BG                  | XG | 13.0                      | 14.40~15.90           | 1            | 21.5                          | 18.6               | 1                     |
| SMAJ14A        | SMAJ14CA      | BK                  | XK | 14.0                      | 15.60~17.20           | 1            | 23.2                          | 17.2               | 1                     |
| SMAJ15A        | SMAJ15CA      | BM                  | XM | 15.0                      | 16.70~18.50           | 1            | 24.4                          | 16.4               | 1                     |
| SMAJ16A        | SMAJ16CA      | BP                  | XP | 16.0                      | 17.80~19.70           | 1            | 26.0                          | 15.4               | 1                     |
| SMAJ17A        | SMAJ17CA      | BR                  | XR | 17.0                      | 18.90~20.90           | 1            | 27.6                          | 14.5               | 1                     |
| SMAJ18A        | SMAJ18CA      | BT                  | XT | 18.0                      | 20.00~22.10           | 1            | 29.2                          | 13.7               | 1                     |
| SMAJ20A        | SMAJ20CA      | BV                  | XV | 20.0                      | 22.20~24.50           | 1            | 32.4                          | 12.3               | 1                     |
| SMAJ22A        | SMAJ22CA      | BX                  | XX | 22.0                      | 24.40~26.90           | 1            | 35.5                          | 11.3               | 1                     |
| SMAJ24A        | SMAJ24CA      | BZ                  | XZ | 24.0                      | 26.70~29.50           | 1            | 38.9                          | 10.3               | 1                     |
| SMAJ26A        | SMAJ26CA      | CE                  | YE | 26.0                      | 28.90~31.90           | 1            | 42.1                          | 9.5                | 1                     |
| SMAJ28A        | SMAJ28CA      | CG                  | YG | 28.0                      | 31.10~34.40           | 1            | 45.4                          | 8.8                | 1                     |
| SMAJ30A        | SMAJ30CA      | CK                  | YK | 30.0                      | 33.30~36.80           | 1            | 48.4                          | 8.3                | 1                     |
| SMAJ33A        | SMAJ33CA      | CM                  | YM | 33.0                      | 36.70~40.60           | 1            | 53.3                          | 7.5                | 1                     |
| SMAJ36A        | SMAJ36CA      | CP                  | YP | 36.0                      | 40.00~44.20           | 1            | 58.1                          | 6.9                | 1                     |
| SMAJ40A        | SMAJ40CA      | CR                  | YR | 40.0                      | 44.40~49.10           | 1            | 64.5                          | 6.2                | 1                     |
| SMAJ43A        | SMAJ43CA      | CT                  | YT | 43.0                      | 47.80~52.80           | 1            | 69.4                          | 5.8                | 1                     |
| SMAJ45A        | SMAJ45CA      | CV                  | YV | 45.0                      | 50.00~55.30           | 1            | 72.7                          | 5.5                | 1                     |
| SMAJ48A        | SMAJ48CA      | CX                  | YX | 48.0                      | 53.30~58.90           | 1            | 77.4                          | 5.2                | 1                     |
| SMAJ51A        | SMAJ51CA      | CZ                  | YZ | 51.0                      | 56.70~62.70           | 1            | 82.4                          | 4.9                | 1                     |
| SMAJ54A        | SMAJ54CA      | RE                  | ZE | 54.0                      | 60.00~66.30           | 1            | 87.1                          | 4.6                | 1                     |
| SMAJ58A        | SMAJ58CA      | RG                  | ZG | 58.0                      | 64.40~71.20           | 1            | 93.6                          | 4.3                | 1                     |
| SMAJ60A        | SMAJ60CA      | RK                  | ZK | 60.0                      | 66.70~73.70           | 1            | 96.8                          | 4.1                | 1                     |
| SMAJ64A        | SMAJ64CA      | RM                  | ZM | 64.0                      | 71.10~78.60           | 1            | 103.0                         | 3.9                | 1                     |
| SMAJ70A        | SMAJ70CA      | RP                  | ZP | 70.0                      | 77.80~86.00           | 1            | 113.0                         | 3.5                | 1                     |
| SMAJ75A        | SMAJ75CA      | RR                  | ZR | 75.0                      | 83.30~92.10           | 1            | 121.0                         | 3.3                | 1                     |
| SMAJ78A        | SMAJ78CA      | RT                  | ZT | 78.0                      | 86.70~95.80           | 1            | 126.0                         | 3.2                | 1                     |
| SMAJ85A        | SMAJ85CA      | RV                  | ZV | 85.0                      | 94.40~104.00          | 1            | 137.0                         | 2.9                | 1                     |
| SMAJ90A        | SMAJ90CA      | RX                  | ZX | 90.0                      | 100.00~111.00         | 1            | 146.0                         | 2.7                | 1                     |
| SMAJ100A       | SMAJ100CA     | RZ                  | ZZ | 100.0                     | 111.00~123.00         | 1            | 162.0                         | 2.5                | 1                     |
| SMAJ110A       | SMAJ110CA     | SE                  | VE | 110.0                     | 122.00~135.00         | 1            | 177.0                         | 2.3                | 1                     |
| SMAJ120A       | SMAJ120CA     | SG                  | VG | 120.0                     | 133.00~147.00         | 1            | 193.0                         | 2.1                | 1                     |

## Electrical Characteristics (TA=25°C)

| Part Number    |               | Device Marking Code |    | Reverse Stand-Off Voltage | Breakdown Voltage @IT | Test Current | Maximum Clamping Voltage @IPP | Peak Pulse Current | Reverse Leakage @VRWM |
|----------------|---------------|---------------------|----|---------------------------|-----------------------|--------------|-------------------------------|--------------------|-----------------------|
| Unidirectional | Bidirectional | UNI                 | BI | VRWM(V)                   | VBR(V)                | IT(mA)       | VC(V)                         | IPP(A)             | IR(μA)                |
| SMAJ120A       | SMAJ120CA     | SG                  | VG | 120.0                     | 133.00~147.00         | 1            | 193.0                         | 2.1                | 1                     |
| SMAJ130A       | SMAJ130CA     | SK                  | VK | 130.0                     | 144.00~159.00         | 1            | 209.0                         | 1.9                | 1                     |
| SMAJ150A       | SMAJ150CA     | SM                  | VM | 150.0                     | 167.00~185.00         | 1            | 243.0                         | 1.6                | 1                     |
| SMAJ160A       | SMAJ160CA     | SP                  | VP | 160.0                     | 178.00~197.00         | 1            | 259.0                         | 1.5                | 1                     |
| SMAJ170A       | SMAJ170CA     | SR                  | VR | 170.0                     | 189.00~209.00         | 1            | 275.0                         | 1.5                | 1                     |
| SMAJ180A       | SMAJ180CA     | ST                  | VT | 180.0                     | 201.00~222.00         | 1            | 292.0                         | 1.4                | 1                     |
| SMAJ190A       | SMAJ190CA     | SU                  | YU | 190.0                     | 211.00~233.00         | 1            | 308.0                         | 1.3                | 1                     |
| SMAJ200A       | SMAJ200CA     | SV                  | VV | 200.0                     | 224.00~247.00         | 1            | 324.0                         | 1.2                | 1                     |
| SMAJ210A       | SMAJ210CA     | SW                  | YW | 210.0                     | 237.00~263.00         | 1            | 340.0                         | 1.2                | 1                     |
| SMAJ220A       | SMAJ220CA     | GE                  | VX | 220.0                     | 246.00~272.00         | 1            | 356.0                         | 1.1                | 1                     |
| SMAJ250A       | SMAJ250CA     | SZ                  | VZ | 250.0                     | 279.00~309.00         | 1            | 405.0                         | 1.0                | 1                     |
| SMAJ300A       | SMAJ300CA     | TE                  | UE | 300.0                     | 335.00~371.00         | 1            | 486.0                         | 0.8                | 1                     |
| SMAJ350A       | SMAJ350CA     | TG                  | UG | 350.0                     | 391.00~432.00         | 1            | 567.0                         | 0.7                | 1                     |
| SMAJ400A       | SMAJ400CA     | TK                  | UK | 400.0                     | 447.00~494.00         | 1            | 648.0                         | 0.6                | 1                     |
| SMAJ440A       | SMAJ440CA     | TM                  | UM | 440.0                     | 492.00~543.00         | 1            | 713.0                         | 0.6                | 1                     |

Notes: For bidirectional type having VRWM of 10V and less, the IR limit is double.

Figure 1. Peak Pulse Power Rating Curve

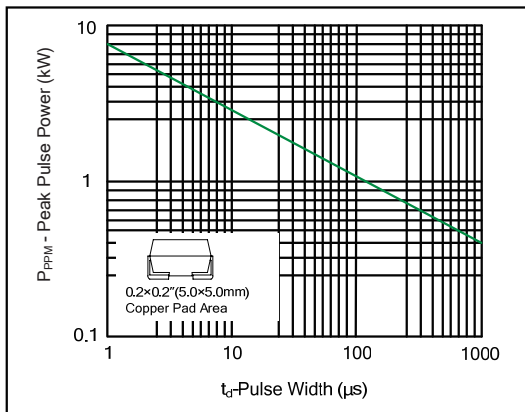


Figure 2. Pulse Derating Curve

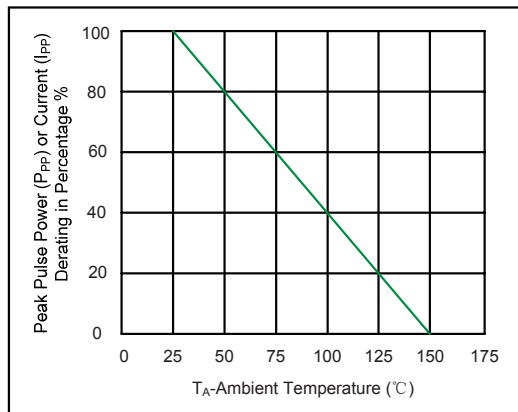


Figure 3. Pulse Waveform

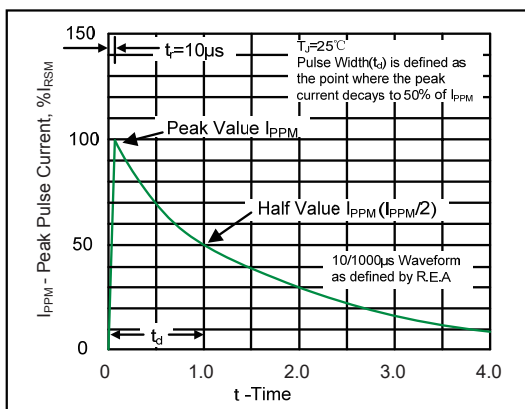


Figure 4. Typical Junction Capacitance

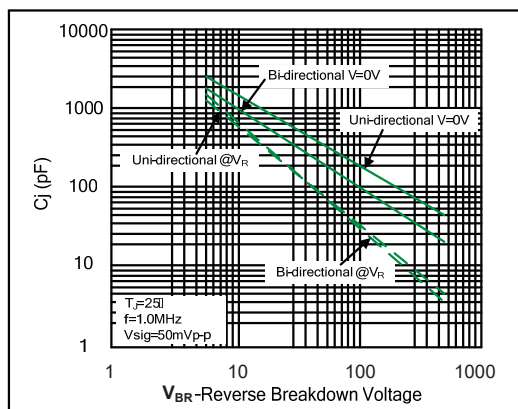


Figure 5. Steady State Power Dissipation Derating Curve

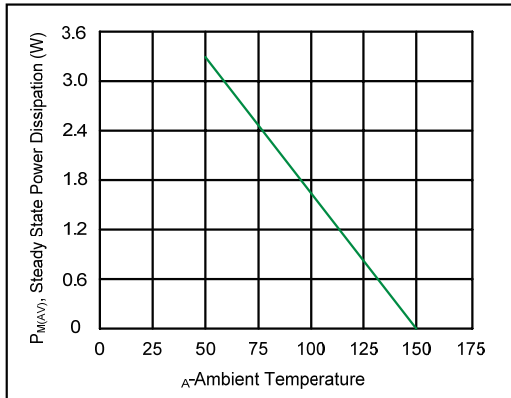
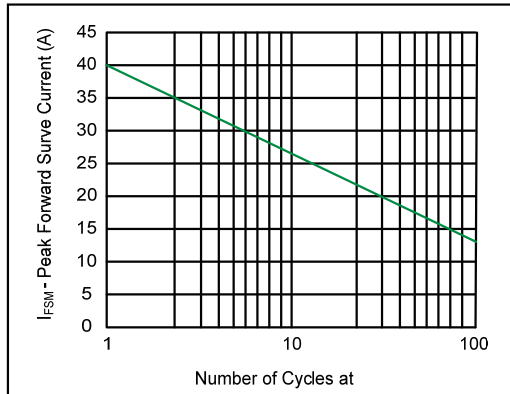
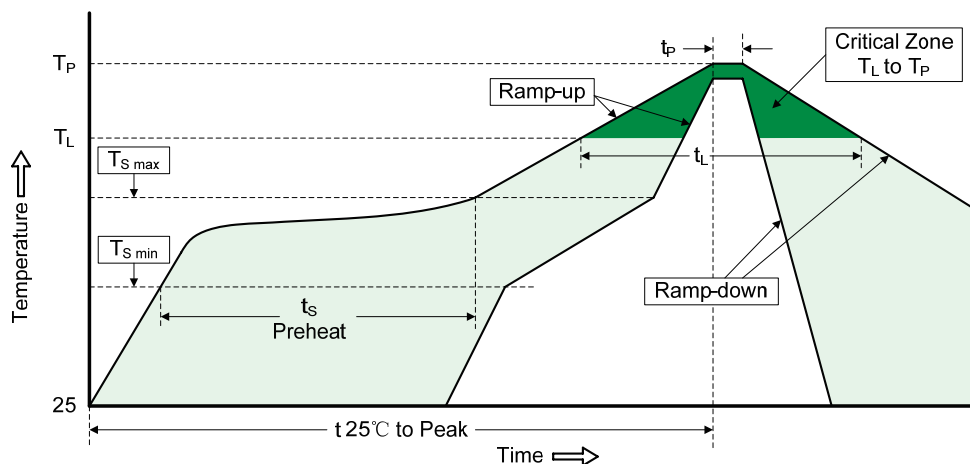


Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



## Reflow Soldering

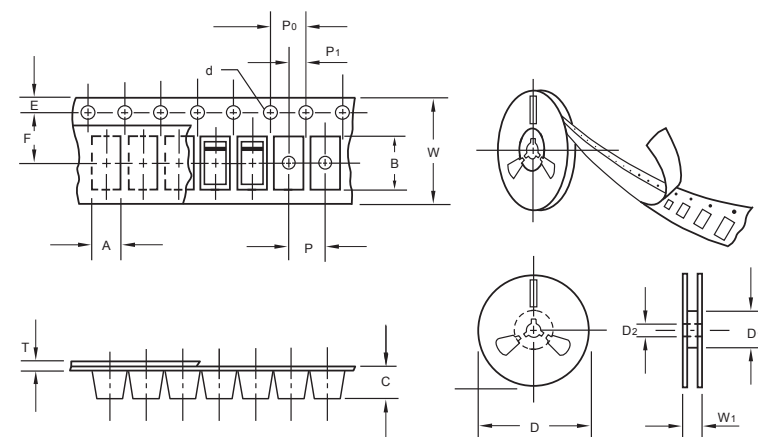


## Recommended Conditions

| Profile Feature                                                                                                                                                                                         | Pb-Free Assembly                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Average ramp-up rate ( $T_L$ to $T_P$ )                                                                                                                                                                 | 3°C/second max.                  |
| Preheat <ul style="list-style-type: none"> <li>-Temperature Min (<math>T_{S\ min}</math>)</li> <li>-Temperature Max (<math>T_{S\ max}</math>)</li> <li>-Time (min to max) (<math>t_s</math>)</li> </ul> | 150°C<br>200°C<br>60-180 seconds |
| $T_{S\ max}$ to $T_L$ <ul style="list-style-type: none"> <li>-Ramp-up Rate</li> </ul>                                                                                                                   | 3°C/second max.                  |
| Time maintained above: <ul style="list-style-type: none"> <li>-Temperature (<math>T_L</math>)</li> <li>-Time (<math>t_L</math>)</li> </ul>                                                              | 217°C<br>60-150 seconds          |
| Peak Temperature ( $T_P$ )                                                                                                                                                                              | 260°C                            |
| Time within 5°C of actual Peak Temperature ( $t_p$ )                                                                                                                                                    | 20-40 seconds                    |
| Ramp-down Rate                                                                                                                                                                                          | 6°C/second max.                  |
| Time 25°C to Peak Temperature                                                                                                                                                                           | 8 minutes max.                   |

The curve above is for reference only.

## Packing information



unit:mm

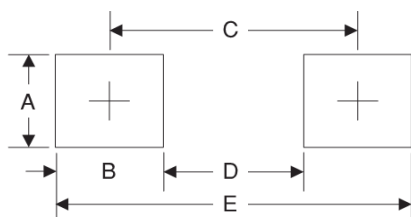
| Item                      | Symbol         | Tolerance | SMA    |
|---------------------------|----------------|-----------|--------|
| Carrier width             | A              | 0.1       | 2.80   |
| Carrier length            | B              | 0.1       | 5.33   |
| Carrier depth             | C              | 0.1       | 2.36   |
| Sprocket hole             | d              | 0.05      | 1.50   |
| 13" Reel outside diameter | D              | 2.0       | 330.00 |
| 13" Reel inner diameter   | D <sub>1</sub> | min       | 50.00  |
| 7" Reel outside diameter  | D              | 2.0       | 178.00 |
| 7" Reel inner diameter    | D <sub>1</sub> | min       | 62.00  |
| Feed hole diameter        | D <sub>2</sub> | 0.5       | 13.00  |
| Sprocket hole position    | E              | 0.1       | 1.75   |
| Punch hole position       | F              | 0.1       | 5.50   |
| Punch hole pitch          | P              | 0.1       | 4.00   |
| Sprocket hole pitch       | P <sub>0</sub> | 0.1       | 4.00   |
| Embossment center         | P <sub>1</sub> | 0.1       | 2.00   |
| Overall tape thickness    | T              | 0.1       | 0.28   |
| Tape width                | W              | 0.3       | 12.00  |
| Reel width                | W <sub>1</sub> | 1.0       | 18.00  |

Note: Devices are packed in accordance with EIA standard RS-481-A and specifications listed above.

## Reel packing

| PACKAGE | REEL SIZE | REEL (pcs) | COMPONENT SPACING (m/m) | BOX (pcs) | INNER BOX (m/m) | REEL DIA, (m/m) | CARTON SIZE (m/m) | CARTON (pcs) | APPROX. GROSS WEIGHT (kg) |
|---------|-----------|------------|-------------------------|-----------|-----------------|-----------------|-------------------|--------------|---------------------------|
| SMA     | 7"        | 2,000      | 4.0                     | 4,000     | 183*155*183     | 178             | 382*356*392       | 160,000      | 16.0                      |
| SMA     | 11"       | 5,000      | 4.0                     | 10,000    | 290*290*38      | 330             | 310*310*360       | 80,000       | 11.0                      |
| SMA     | 13"       | 7,500      | 4.0                     | 15,000    | 335*335*38      | 330             | 350*330*360       | 120,000      | 14.5                      |

## Suggested Pad Layout



| Symbol | Unit (mm) | Unit (inch) |
|--------|-----------|-------------|
| A      | 1.68      | 0.066       |
| B      | 1.52      | 0.060       |
| C      | 3.93      | 0.155       |
| D      | 2.41      | 0.095       |
| E      | 5.45      | 0.215       |