

## SMBJ SERIES

Surface Mount Unidirectional and Bidirectional Transient Voltage Suppressors

### Features

- Voltage Range 5.0V - 440V
- 600W Peak Pulse Power Dissipation
- For surface mounted applications
- Reliable low cost construction utilizing molded plastic technique
- Response Time is Typically < 1 ns
- Uni-direction, less than 5.0ns for Bi-direction, from 0 Volts to BV min
- ESD Rating of above 16 kV per Human Body Model
- ESD Rating of above 30 kV (Contact Discharge) per IEC61000-4-2
- EFT (Electrical Fast Transients) Rating of 40 A per IEC61000-4-4
- 4kW (8/20 $\mu$ s ) Peak Pulse Power Dissipation per IEC61000-4-5
- Plastic material has UL flammability classification 94V-0
- Typical IR less than 1uA above 10V
- Meets MSL 1 Requirements
- Solid-state silicon avalanche technology



**SMB**

### Ordering Information

| Device      | Qty per Reel | Reel Size |
|-------------|--------------|-----------|
| SMBJxxA(CA) | 3000         | 13Inch    |

“xx” = Working Peak Reverse Voltage

### Complies with the following standards

- IEC 61000-4-2 level 4:
  - 30 kV (air discharge)
  - 30 kV (contact discharge)
- IEC 61000-4-5
- MIL STD 883G, method 3015-7: class 3B
- Resin meets UL 94, V0
- ROHS compliant

### Maximum Ratings and Electrical Characteristics

| Characteristics                                                                     | Symbols   | Value         | Unit             |
|-------------------------------------------------------------------------------------|-----------|---------------|------------------|
| Peak Power Dissipation At $T_j = 25^\circ\text{C}$ , $T_p = 1\text{ms}$ (Note 1,2 ) | $P_{PK}$  | 600           | W                |
| Peak Forward Surge Current 8.3ms single half sine-wave super                        | $I_{FSM}$ | 100           | A                |
| Lead Soldering Temperature                                                          | $T_L$     | 260 (10 sec.) | $^\circ\text{C}$ |
| Operating Temperature Range                                                         | $T_j$     | -55 to +155   | $^\circ\text{C}$ |
| Storage Temperature Range                                                           | $T_{STG}$ | -55 to +175   | $^\circ\text{C}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

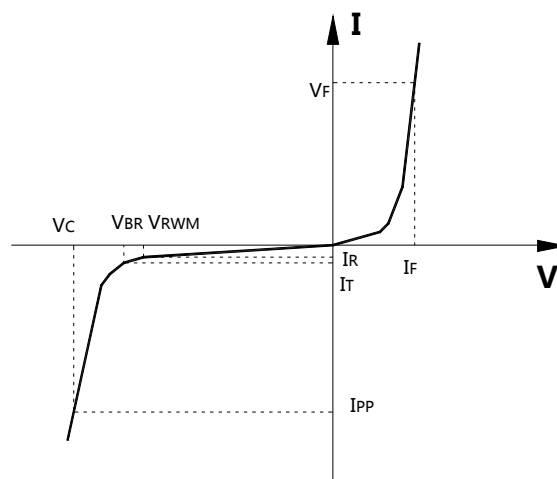
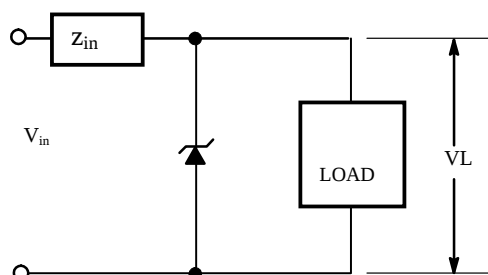
1. Non-repetitive current pulse, per fig. 4 and derated above  $T_A = 25^\circ\text{C}$  per fig.1.
2. Thermal Resistance junction to Lead
3. 8.3ms single half-sine wave duty cycle= 4 pulses maximum per minute (unidirectional units only).
4. Ratings at  $25^\circ\text{C}$  ambient temperature unless otherwise specified.
5. Single phase, half wave, 60Hz, resistive or inductive load.
6. For Capacitive Load, Derate Current By 20%

| Electrical Characteristics ( Tamb=25℃ Unless Otherwise Specified) |           |                 |    |      |              |       |      |              |         |          |
|-------------------------------------------------------------------|-----------|-----------------|----|------|--------------|-------|------|--------------|---------|----------|
| SMBJ<br>PART NUMBER                                               |           | MARKING<br>CODE |    | VRWM | VBR @ IT (V) |       | IT   | IR @<br>VRWM | VC(Max) | IPP(Max) |
| Uni-polar                                                         | Bi-polar  | Uni             | Bi | (V)  | Min          | Max   | (mA) | (uA)         | (V)     | (A)      |
| SMBJ5.0A                                                          | SMBJ5.0CA | KE              | AE | 5    | 6.38         | 7.35  | 10   | 800          | 9.2     | 65.3     |
| SMBJ6.0A                                                          | SMBJ6.0CA | KG              | AG | 6    | 6.67         | 7.89  | 10   | 800          | 10.3    | 58.3     |
| SMBJ6.5A                                                          | SMBJ6.5CA | KK              | AK | 6.5  | 7.22         | 8.3   | 10   | 500          | 11.2    | 53.6     |
| SMBJ7.0A                                                          | SMBJ7.0CA | KM              | AM | 7    | 7.78         | 8.95  | 10   | 200          | 12      | 50       |
| SMBJ7.5A                                                          | SMBJ7.5CA | KP              | AP | 7.5  | 8.33         | 9.58  | 1    | 100          | 12.9    | 46.5     |
| SMBJ8.0A                                                          | SMBJ8.0CA | KR              | AR | 8    | 8.89         | 10.23 | 1    | 50           | 13.6    | 44.1     |
| SMBJ8.5A                                                          | SMBJ8.5CA | KT              | AT | 8.5  | 9.44         | 10.82 | 1    | 20           | 14.4    | 41.7     |
| SMBJ9.0A                                                          | SMBJ9.0CA | KV              | AV | 9    | 10           | 11.5  | 1    | 10           | 15.4    | 39       |
| SMBJ10A                                                           | SMBJ10CA  | KX              | AX | 10   | 11.1         | 12.8  | 1    | 5            | 17      | 35.3     |
| SMBJ11A                                                           | SMBJ11CA  | KZ              | AZ | 11   | 12.2         | 14    | 1    | 5            | 18.2    | 33       |
| SMBJ12A                                                           | SMBJ12CA  | LE              | BE | 12   | 13.3         | 15.3  | 1    | 5            | 19.9    | 30.2     |
| SMBJ13A                                                           | SMBJ13CA  | LG              | BG | 13   | 14.4         | 16.5  | 1    | 5            | 21.5    | 27.9     |
| SMBJ14A                                                           | SMBJ14CA  | LK              | BK | 14   | 15.6         | 17.9  | 1    | 5            | 23.2    | 25.9     |
| SMBJ15A                                                           | SMBJ15CA  | LM              | BM | 15   | 16.7         | 19.2  | 1    | 5            | 24.4    | 24.6     |
| SMBJ16A                                                           | SMBJ16CA  | LP              | BP | 16   | 17.8         | 20.5  | 1    | 5            | 26      | 23.1     |
| SMBJ17A                                                           | SMBJ17CA  | LR              | BR | 17   | 18.9         | 21.7  | 1    | 5            | 27.6    | 21.7     |
| SMBJ18A                                                           | SMBJ18CA  | LT              | BT | 18   | 20           | 23.3  | 1    | 5            | 29.2    | 20.5     |
| SMBJ20A                                                           | SMBJ20CA  | LV              | BV | 20   | 22.2         | 25.5  | 1    | 5            | 32.4    | 18.5     |
| SMBJ22A                                                           | SMBJ22CA  | LX              | BX | 22   | 24.4         | 28    | 1    | 5            | 35.5    | 16.9     |
| SMBJ24A                                                           | SMBJ24CA  | LZ              | BZ | 24   | 26.7         | 30.7  | 1    | 5            | 38.9    | 15.4     |
| SMBJ26A                                                           | SMBJ26CA  | ME              | CE | 26   | 28.9         | 33.2  | 1    | 5            | 42.1    | 14.3     |
| SMBJ28A                                                           | SMBJ28CA  | MG              | CG | 28   | 31.1         | 35.8  | 1    | 5            | 45.4    | 13.2     |
| SMBJ30A                                                           | SMBJ30CA  | MK              | CK | 30   | 33.3         | 38.3  | 1    | 5            | 48.4    | 12.4     |
| SMBJ33A                                                           | SMBJ33CA  | MM              | CM | 33   | 36.7         | 42.2  | 1    | 5            | 53.3    | 11.3     |
| SMBJ36A                                                           | SMBJ36CA  | MP              | CP | 36   | 40           | 46    | 1    | 5            | 58.1    | 10.3     |
| SMBJ40A                                                           | SMBJ40CA  | MR              | CR | 40   | 44.4         | 51.1  | 1    | 5            | 64.5    | 9.3      |
| SMBJ43A                                                           | SMBJ43CA  | MT              | CT | 43   | 47.8         | 54.9  | 1    | 5            | 69.4    | 8.6      |
| SMBJ45A                                                           | SMBJ45CA  | MV              | CV | 45   | 50           | 57.5  | 1    | 5            | 72.7    | 8.3      |
| SMBJ48A                                                           | SMBJ48CA  | MX              | CX | 48   | 53.3         | 61.3  | 1    | 5            | 77.4    | 7.8      |
| SMBJ51A                                                           | SMBJ51CA  | MZ              | CZ | 51   | 56.7         | 65.2  | 1    | 5            | 82.4    | 7.3      |
| SMBJ54A                                                           | SMBJ54CA  | NE              | DE | 54   | 60           | 69    | 1    | 5            | 87.1    | 6.9      |
| SMBJ58A                                                           | SMBJ58CA  | NG              | DG | 58   | 64.4         | 74.1  | 1    | 5            | 93.6    | 6.4      |
| SMBJ60A                                                           | SMBJ60CA  | NK              | DK | 60   | 66.7         | 76.7  | 1    | 5            | 96.8    | 6.2      |
| SMBJ64A                                                           | SMBJ64CA  | NM              | DM | 64   | 71.1         | 81.8  | 1    | 5            | 103     | 5.8      |
| SMBJ70A                                                           | SMBJ70CA  | NP              | DP | 70   | 77.8         | 89.5  | 1    | 5            | 113     | 5.3      |
| SMBJ75A                                                           | SMBJ75CA  | NR              | DR | 75   | 83           | 95.8  | 1    | 5            | 121     | 5        |
| SMBJ78A                                                           | SMBJ78CA  | NT              | DT | 78   | 86           | 99.7  | 1    | 5            | 126     | 4.8      |
| SMBJ85A                                                           | SMBJ85CA  | NV              | DV | 85   | 94           | 108.2 | 1    | 5            | 137     | 4.4      |
| SMBJ90A                                                           | SMBJ90CA  | NX              | DX | 90   | 100          | 115.5 | 1    | 5            | 146     | 4.1      |

**Electrical Characteristics (  $T_{amb}=25^{\circ}\text{C}$  Unless Otherwise Specified)**

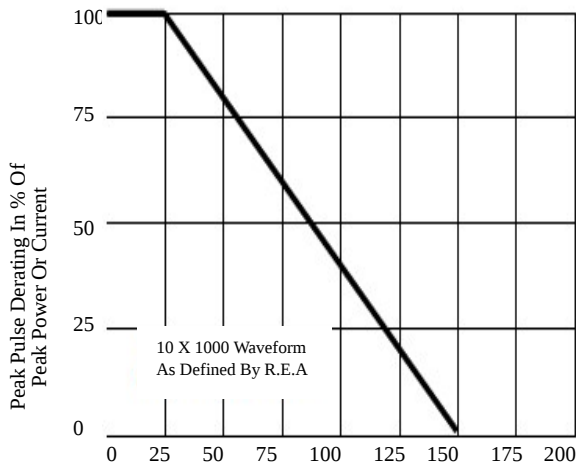
| SMBJ<br>PART NUMBER |           | MARKING<br>CODE |    | VRWM | VBR @ IT (V) |       | IT   | IR @<br>VRWM | VC(Max) | IPP(Max) |
|---------------------|-----------|-----------------|----|------|--------------|-------|------|--------------|---------|----------|
| Uni-polar           | Bi-polar  | Uni             | Bi | (V)  | Min          | Max   | (mA) | (uA)         | (V)     | (A)      |
| SMBJ100A            | SMBJ100CA | NZ              | DZ | 100  | 111          | 128   | 1    | 5            | 162     | 3.7      |
| SMBJ110A            | SMBJ110CA | PE              | EE | 110  | 122          | 140.5 | 1    | 5            | 177     | 3.4      |
| SMBJ120A            | SMBJ120CA | PG              | EG | 120  | 133          | 153   | 1    | 5            | 193     | 3.1      |
| SMBJ130A            | SMBJ130CA | PK              | EK | 130  | 144          | 165.5 | 1    | 5            | 209     | 2.9      |
| SMBJ150A            | SMBJ150CA | PM              | EM | 150  | 167          | 192.5 | 1    | 5            | 243     | 2.5      |
| SMBJ160A            | SMBJ160CA | PP              | EP | 160  | 178          | 205   | 1    | 5            | 259     | 2.3      |
| SMBJ170A            | SMBJ170CA | PR              | ER | 170  | 189          | 217.5 | 1    | 5            | 275     | 2.2      |
| SMBJ180A            | SMBJ180CA | PT              | ET | 180  | 200          | 230.4 | 1    | 5            | 290     | 2.1      |
| SMBJ190A            | SMBJ190CA | PV              | EV | 190  | 211          | 243.2 | 1    | 5            | 306     | 2        |
| SMBJ200A            | SMBJ200CA | PX              | EX | 200  | 222          | 256   | 1    | 5            | 322     | 1.9      |
| SMBJ210A            | SMBJ210CA | PZ              | EZ | 210  | 233          | 268.8 | 1    | 5            | 339     | 1.8      |
| SMBJ220A            | SMBJ220CA | QE              | FE | 220  | 244          | 281.6 | 1    | 5            | 355     | 1.7      |
| SMBJ250A            | SMBJ250CA | QG              | FG | 250  | 278          | 309   | 1    | 5            | 403     | 1.5      |
| SMBJ300A            | SMBJ300CA | QK              | FK | 300  | 333          | 371   | 1    | 5            | 484     | 1.2      |
| SMBJ350A            | SMBJ350CA | QM              | FM | 350  | 389          | 432   | 1    | 5            | 565     | 1.1      |
| SMBJ400A            | SMBJ400CA | QP              | FP | 400  | 444          | 494   | 1    | 5            | 645     | 0.9      |
| SMBJ440A            | SMBJ440CA | QR              | FR | 440  | 489          | 543   | 1    | 5            | 710     | 0.8      |

| Symbol    | Parameter                    |
|-----------|------------------------------|
| $V_{RWM}$ | Working Peak Reverse Voltage |
| $V_{BR}$  | Breakdown Voltage @ IT       |
| $V_C$     | Clamping Voltage @ IPP       |
| $I_T$     | Test Current                 |
| $I_R$     | Leakage current at VRWM      |
| $I_{PP}$  | Peak pulse current           |

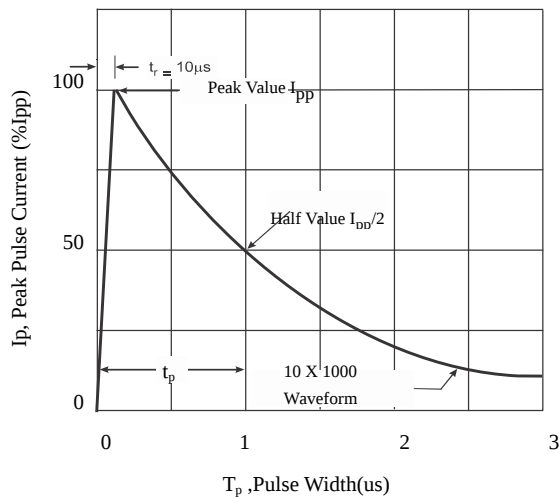

**Typical Protection Circuit**


### Typical Electrical Characteristics Applications

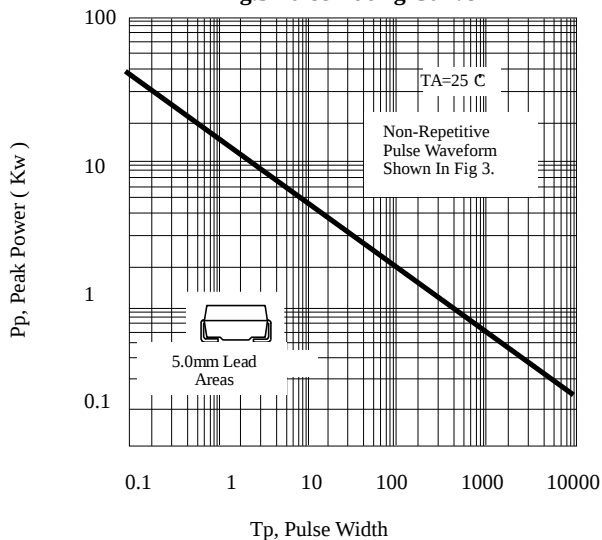
#### Rating and Characteristics Curves



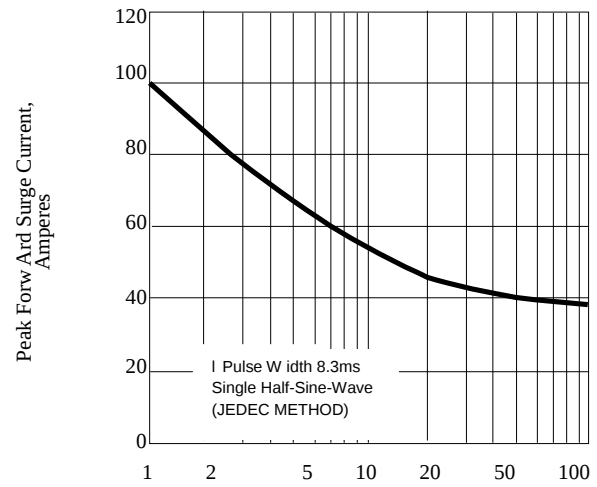
**Fig. 1 Pulse Derating Curve**



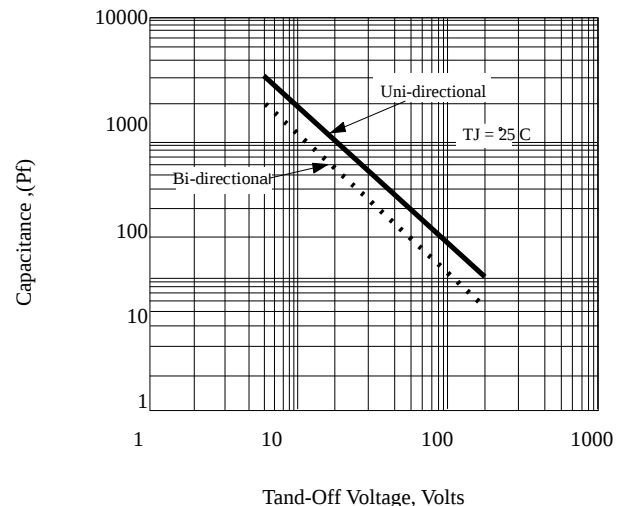
**Fig. 3 Pulse Rating Curve**



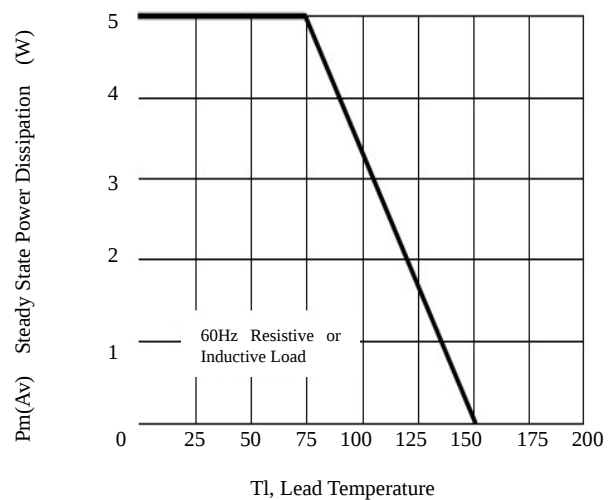
**Fig. 5 Pulse Rating Curve**



**Fig. 2 Maximum Non-Repetitive Surge Current**



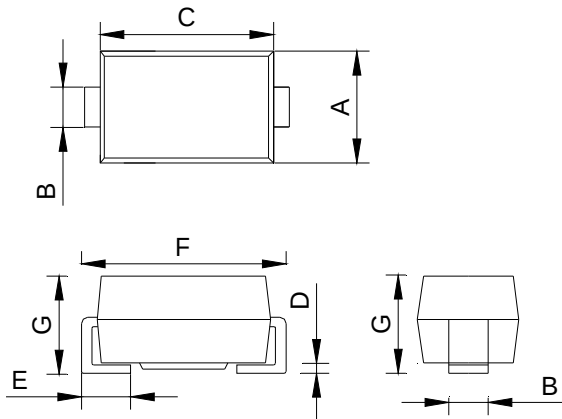
**Fig. 4 Typical Junction Capacitance**



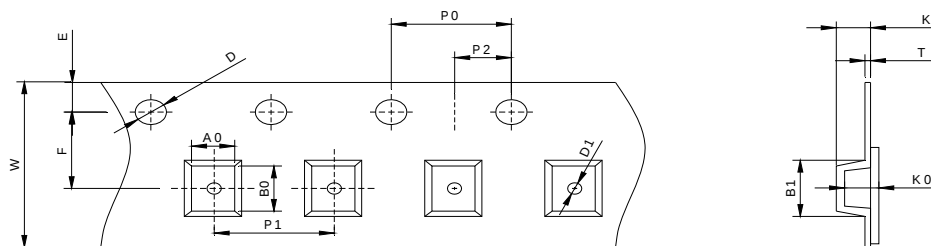
**Fig. 6 Steady State Power Derating Curve**

**Package information**
**SMB**
**SMB Mechanical Data**

- Case: SMB
- Case Material: Molded Plastic. UL Flammability
- Classification Rating 94V-0
- Polarity Indicator: Cathode Band (Note: Bi-directional devices have no polarity indicator.)
- Weight: 0.003 ounces, 0.096 gram

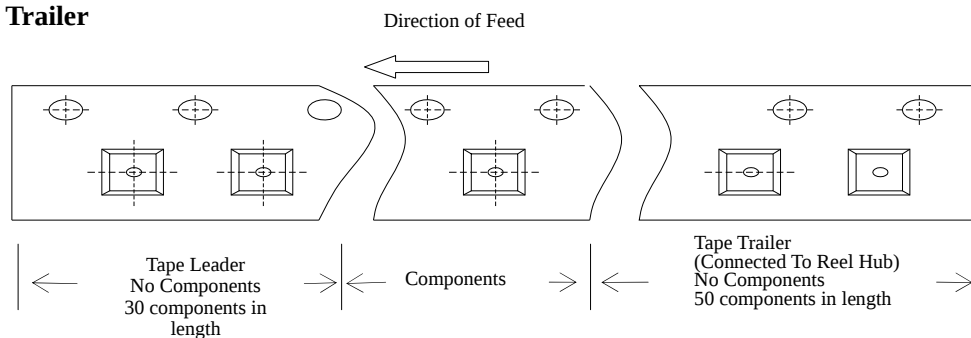


| DIM | Millimeters |      |       | Inches |       |       |
|-----|-------------|------|-------|--------|-------|-------|
|     | Min         | Nom  | Max   | Min    | Nom   | Max   |
| A   | 3.30        | 3.62 | 3.94  | 0.130  | 0.142 | 0.155 |
| B   | 1.95        | 2.08 | 2.20  | 0.077  | 0.082 | 0.087 |
| C   | 4.06        | 4.40 | 4.57  | 0.160  | 0.173 | 0.180 |
| D   | 0.125       | 0.20 | 0.305 | 0.005  | 0.008 | 0.012 |
| E   | 0.76        | 1.14 | 1.52  | 0.030  | 0.045 | 0.06  |
| F   | 4.95        | 5.40 | 5.59  | 0.194  | 0.213 | 0.22  |
| G   | 2.05        | 2.30 | 2.50  | 0.080  | 0.090 | 0.098 |

**SMB**
**SMB Reel Dim**


| A0  | B0  | B1  | D   | D1  | E    | F   | K0  | T    | W    | P0  | P1  | P2  |
|-----|-----|-----|-----|-----|------|-----|-----|------|------|-----|-----|-----|
| 4.0 | 5.9 | 6.1 | 1.5 | 1.5 | 1.75 | 5.5 | 3.0 | 0.50 | 12.0 | 4.0 | 8.0 | 2.0 |

Dimension is in mm

**Leader and Trailer**


The LEADER is a minimum of 30 components in length and it consists of empty cavities with sealed cover tape  
The TRAILER is a minimum of 50 components in length and it consists of empty cavities with sealed cover tape.