



THE DATASHEET OF SMBJ12



Transient Voltage Suppressors DO-214AA/SMB Package

SMBJ Series

MERITEK

FEATURE

- Breakdown Voltage from 5.0 to 440V
- 600W peak pulse power capability with a 10/1000 μ s waveform, repetitive rate (duty cycle): 0.01%
- Glass passivated chip
- Excellent clamping capability, fast response time.
- Low incremental surge resistance, Low profile package
- Terminal: Solderable per MIL-STD-750, Method 2026
- Epoxy: UL 94V-0 rate flame retardant
- UL/cUL safety approved: certification No: E223045



ELECTRICAL CHARACTERISTICS



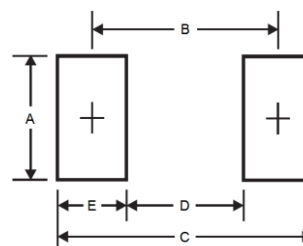
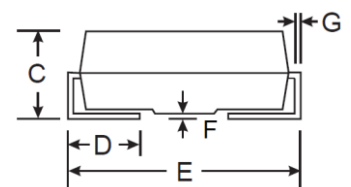
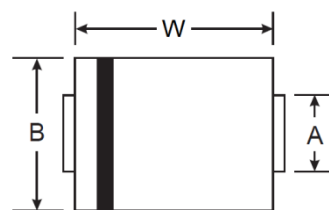
| Parameter | Symbols | Value | Unit |
|--|----------------|----------------|------------------|
| Peak power dissipation with a 10/1000 μ s waveform(1) | P_{PP} | 600 | Watts |
| Peak pulse current with a 10/1000 μ s waveform(1) | I_{PP} | See Next Table | Amps |
| Power dissipation on infinite heatsink at $T_L = 75^\circ\text{C}$ | P_D | 5.0 | Watts |
| Peak forward surge current, 8.3 ms single half sine-wave unidirectional only. Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum. | I_{FSM} | 100 | Amps |
| Maximum instantaneous forward voltage at 25 A for unidirectional only. $V_F < 3.5\text{V}$ for devices of $V_{BR} < 200\text{V}$ and $V_F < 5.0\text{V}$ for devices of $V_{BR} > 201\text{V}$ | V_F | 3.5/5.0 | Volts |
| Operating junction and storage temperature range | T_J, T_{STG} | -55 to +150 | $^\circ\text{C}$ |

Rating at 25 $^\circ\text{C}$, ambient temperature unless otherwise specified. Single phase, half wave, 60 Hz, resistive or inductive load. For capacitive load, derate current by 20%.

1. Non-repetitive current pulse per Fig.5 and derated above $T_A = 25^\circ\text{C}$ per Fig.1

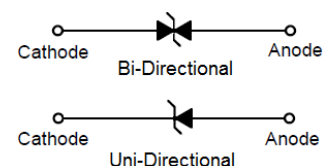
DIMENSIONS

| Item | DO-214AA(SMB) | |
|------|---------------|-------|
| | Millimeters | |
| | Min. | Max. |
| W | 4.02 | 4.85 |
| A | 1.91 | 2.20 |
| B | 3.26 | 3.94 |
| C | 2.11 | 2.44 |
| D | 0.76 | 1.52 |
| E | 5.08 | 5.59 |
| F | - | 0.203 |
| G | 0.152 | 0.305 |



SOLDERING PAD LAYOUT

| A | B | C | D | E |
|-----|-----|-----|-----|-----|
| 2.3 | 4.3 | 6.7 | 1.8 | 2.5 |



Transient Voltage Suppressors DO-214AA/SMB Package

SMBJ Series

MERITEK

ELECTRICAL CHARACTERISTICS(Continued)

| Device Type (Uni) | Device Type (Bi) | Marking Code | | Breakdown Voltage VBR@IT | | | Working Peak Reverse Voltage VRWM(V) | Maximum Reverse Leakage IR @ VRWM(V) | Maximum Reverse Surge Current Ipp(A) | Maximum Clamping Voltage VC@Ipp |
|-------------------|------------------|--------------|----|--------------------------|--------|--------|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------|
| | | Uni | Bi | Min(V) | Max(V) | IT(mA) | | | | |
| SMBJ5.0 | SMBJ5.0C | KD | AD | 6.40 | 7.30 | 10 | 5.0 | 800 | 62.50 | 9.6 |
| SMBJ5.0A | SMBJ5.0CA | KE | AE | 6.40 | 7.00 | 10 | 5.0 | 800 | 65.22 | 9.2 |
| SMBJ6.0 | SMBJ6.0C | KF | AF | 6.67 | 8.15 | 10 | 6.0 | 800 | 52.63 | 11.4 |
| SMBJ6.0A | SMBJ6.0CA | KG | AG | 6.67 | 7.37 | 10 | 6.0 | 800 | 58.25 | 10.3 |
| SMBJ6.5 | SMBJ6.5C | KH | AH | 7.22 | 8.82 | 10 | 6.5 | 500 | 48.78 | 12.3 |
| SMBJ6.5A | SMBJ6.5CA | KK | AK | 7.22 | 7.98 | 10 | 6.5 | 500 | 53.57 | 11.2 |
| SMBJ7.0 | SMBJ7.0C | KL | AL | 7.78 | 9.51 | 10 | 7.0 | 200 | 45.11 | 13.3 |
| SMBJ7.0A | SMBJ7.0CA | KM | AM | 7.78 | 8.60 | 10 | 7.0 | 200 | 50.00 | 12.0 |
| SMBJ7.5 | SMBJ7.5C | KN | AN | 8.33 | 10.20 | 1 | 7.5 | 100 | 41.96 | 14.3 |
| SMBJ7.5A | SMBJ7.5CA | KP | AP | 8.33 | 9.21 | 1 | 7.5 | 100 | 46.51 | 12.9 |
| SMBJ8.0 | SMBJ8.0C | KQ | AQ | 8.89 | 10.90 | 1 | 8.0 | 50 | 40.00 | 15.0 |
| SMBJ8.0A | SMBJ8.0CA | KR | AR | 8.89 | 9.83 | 1 | 8.0 | 50 | 44.12 | 13.6 |
| SMBJ8.5 | SMBJ8.5C | KS | AS | 9.44 | 11.50 | 1 | 8.5 | 10 | 37.74 | 15.9 |
| SMBJ8.5A | SMBJ8.5CA | KT | AT | 9.44 | 10.40 | 1 | 8.5 | 10 | 41.67 | 14.4 |
| SMBJ9.0 | SMBJ9.0C | KU | AU | 10.00 | 12.20 | 1 | 9.0 | 5 | 35.50 | 16.9 |
| SMBJ9.0A | SMBJ9.0CA | KV | AV | 10.00 | 11.10 | 1 | 9.0 | 5 | 38.96 | 15.4 |
| SMBJ10 | SMBJ10C | KW | AW | 11.10 | 13.60 | 1 | 10.0 | 5 | 31.91 | 18.8 |
| SMBJ10A | SMBJ10CA | KX | AX | 11.10 | 12.30 | 1 | 10.0 | 5 | 35.29 | 17.0 |
| SMBJ11 | SMBJ11C | KY | AY | 12.20 | 14.90 | 1 | 11.0 | 5 | 29.85 | 20.1 |
| SMBJ11A | SMBJ11CA | KZ | AZ | 12.20 | 13.50 | 1 | 11.0 | 5 | 32.97 | 18.2 |
| SMBJ12 | SMBJ12C | LD | BD | 13.30 | 16.30 | 1 | 12.0 | 5 | 27.27 | 22.0 |
| SMBJ12A | SMBJ12CA | LE | BE | 13.30 | 14.70 | 1 | 12.0 | 5 | 30.15 | 19.9 |
| SMBJ13 | SMBJ13C | LF | BF | 14.40 | 17.60 | 1 | 13.0 | 5 | 25.21 | 23.8 |
| SMBJ13A | SMBJ13CA | LG | BG | 14.40 | 15.90 | 1 | 13.0 | 5 | 27.91 | 21.5 |
| SMBJ14 | SMBJ14C | LH | BH | 15.60 | 19.10 | 1 | 14.0 | 5 | 23.26 | 25.8 |
| SMBJ14A | SMBJ14CA | LK | BK | 15.60 | 17.20 | 1 | 14.0 | 5 | 25.86 | 23.2 |
| SMBJ15 | SMBJ15C | LL | BL | 16.70 | 20.40 | 1 | 15.0 | 5 | 22.30 | 26.9 |
| SMBJ15A | SMBJ15CA | LM | BM | 16.70 | 18.50 | 1 | 15.0 | 5 | 24.59 | 24.4 |
| SMBJ16 | SMBJ16C | LN | BN | 17.80 | 21.80 | 1 | 16.0 | 5 | 20.83 | 28.8 |
| SMBJ16A | SMBJ16CA | LP | BP | 17.80 | 19.70 | 1 | 16.0 | 5 | 23.08 | 26.0 |
| SMBJ17 | SMBJ17C | LQ | BQ | 18.90 | 23.10 | 1 | 17.0 | 5 | 19.67 | 30.5 |
| SMBJ17A | SMBJ17CA | LR | BR | 18.90 | 20.90 | 1 | 17.0 | 5 | 21.74 | 27.6 |
| SMBJ18 | SMBJ18C | LS | BS | 20.00 | 24.40 | 1 | 18.0 | 5 | 18.63 | 32.2 |
| SMBJ18A | SMBJ18CA | LT | BT | 20.00 | 22.10 | 1 | 18.0 | 5 | 20.55 | 29.2 |
| SMBJ19 | SMBJ19C | LA | BA | 21.10 | 25.76 | 1 | 19.0 | 5 | 17.64 | 34.0 |
| SMBJ19A | SMBJ19CA | LB | BB | 21.10 | 23.30 | 1 | 19.0 | 5 | 19.49 | 30.8 |
| SMBJ20 | SMBJ20C | LU | BU | 22.20 | 27.10 | 1 | 20.0 | 5 | 16.76 | 35.8 |
| SMBJ20A | SMBJ20CA | LV | BV | 22.20 | 24.50 | 1 | 20.0 | 5 | 18.52 | 32.4 |
| SMBJ22 | SMBJ22C | LW | BW | 24.40 | 29.80 | 1 | 22.0 | 5 | 15.23 | 39.4 |
| SMBJ22A | SMBJ22CA | LX | BX | 24.40 | 26.90 | 1 | 22.0 | 5 | 16.90 | 35.5 |
| SMBJ24 | SMBJ24C | LY | BY | 26.70 | 32.60 | 1 | 24.0 | 5 | 13.95 | 43.0 |
| SMBJ24A | SMBJ24CA | LZ | BZ | 26.70 | 29.50 | 1 | 24.0 | 5 | 15.42 | 38.9 |
| SMBJ26 | SMBJ26C | MD | CD | 28.90 | 35.30 | 1 | 26.0 | 5 | 12.88 | 46.6 |
| SMBJ26A | SMBJ26CA | ME | CE | 28.90 | 31.90 | 1 | 26.0 | 5 | 14.25 | 42.1 |
| SMBJ28 | SMBJ28C | MF | CF | 31.10 | 38.00 | 1 | 28.0 | 5 | 12.00 | 50.0 |
| SMBJ28A | SMBJ28CA | MG | CG | 31.10 | 34.40 | 1 | 28.0 | 5 | 13.22 | 45.4 |
| SMBJ30 | SMBJ30C | MH | CH | 33.30 | 40.70 | 1 | 30.0 | 5 | 11.21 | 53.5 |
| SMBJ30A | SMBJ30CA | MK | CK | 33.30 | 36.80 | 1 | 30.0 | 5 | 12.40 | 48.4 |
| SMBJ33 | SMBJ33C | ML | CL | 36.70 | 44.90 | 1 | 33.0 | 5 | 10.17 | 59.0 |

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ELECTRICAL CHARACTERISTICS(Continued)

| Device Type (Uni) | Device Type (Bi) | Marking Code | | Breakdown Voltage VBR@IT | | | Working Peak Reverse Voltage VRWM(V) | Maximum Reverse Leakage IR @ VRWM(V) | Maximum Reverse Surge Current Ipp(A) | Maximum Clamping Voltage VC@Ipp |
|-------------------|------------------|--------------|----|--------------------------|--------|--------|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------|
| | | Uni | Bi | Min(V) | Max(V) | IT(mA) | | | | |
| SMBJ33A | SMBJ33CA | MM | CM | 36.70 | 40.60 | 1 | 33.0 | 5 | 11.26 | 53.3 |
| SMBJ36 | SMBJ36C | MN | CN | 40.00 | 48.90 | 1 | 36.0 | 5 | 9.33 | 64.3 |
| SMBJ36A | SMBJ36CA | MP | CP | 40.00 | 44.20 | 1 | 36.0 | 5 | 10.33 | 58.1 |
| SMBJ40 | SMBJ40C | MQ | CQ | 44.40 | 54.30 | 1 | 40.0 | 5 | 8.40 | 71.4 |
| SMBJ40A | SMBJ40CA | MR | CR | 44.40 | 49.10 | 1 | 40.0 | 5 | 9.30 | 64.5 |
| SMBJ43 | SMBJ43C | MS | CS | 47.80 | 58.40 | 1 | 43.0 | 5 | 7.82 | 76.7 |
| SMBJ43A | SMBJ43CA | MT | CT | 47.80 | 52.80 | 1 | 43.0 | 5 | 8.65 | 69.4 |
| SMBJ45 | SMBJ45C | MU | CU | 50.00 | 61.10 | 1 | 45.0 | 5 | 7.47 | 80.3 |
| SMBJ45A | SMBJ45CA | MV | CV | 50.00 | 55.30 | 1 | 45.0 | 5 | 8.25 | 72.7 |
| SMBJ48 | SMBJ48C | MW | CW | 53.30 | 65.10 | 1 | 48.0 | 5 | 7.02 | 85.5 |
| SMBJ48A | SMBJ48CA | MX | CX | 53.30 | 58.90 | 1 | 48.0 | 5 | 7.75 | 77.4 |
| SMBJ51 | SMBJ51C | MY | CY | 56.70 | 69.30 | 1 | 51.0 | 5 | 6.59 | 91.1 |
| SMBJ51A | SMBJ51CA | MZ | CZ | 56.70 | 62.70 | 1 | 51.0 | 5 | 7.28 | 82.4 |
| SMBJ54 | SMBJ54C | ND | DD | 60.00 | 73.30 | 1 | 54.0 | 5 | 6.23 | 96.3 |
| SMBJ54A | SMBJ54CA | NE | DE | 60.00 | 66.30 | 1 | 54.0 | 5 | 6.89 | 87.1 |
| SMBJ58 | SMBJ58C | NF | DF | 64.40 | 78.70 | 1 | 58.0 | 5 | 5.83 | 103.0 |
| SMBJ58A | SMBJ58CA | NG | DG | 64.40 | 71.20 | 1 | 58.0 | 5 | 6.41 | 93.6 |
| SMBJ60 | SMBJ60C | NH | DH | 66.70 | 81.50 | 1 | 60.0 | 5 | 5.61 | 107.0 |
| SMBJ60A | SMBJ60CA | NK | DK | 66.70 | 73.70 | 1 | 60.0 | 5 | 6.20 | 96.8 |
| SMBJ64 | SMBJ64C | NL | DL | 71.10 | 86.90 | 1 | 64.0 | 5 | 5.26 | 114.0 |
| SMBJ64A | SMBJ64CA | NM | DM | 71.10 | 78.60 | 1 | 64.0 | 5 | 5.83 | 103.0 |
| SMBJ70 | SMBJ70C | NN | DN | 77.80 | 95.10 | 1 | 70.0 | 5 | 4.80 | 125.0 |
| SMBJ70A | SMBJ70CA | NP | DP | 77.80 | 86.00 | 1 | 70.0 | 5 | 5.31 | 113.0 |
| SMBJ75 | SMBJ75C | NQ | DQ | 83.30 | 102.00 | 1 | 75.0 | 5 | 4.48 | 134.0 |
| SMBJ75A | SMBJ75CA | NR | DR | 83.30 | 92.10 | 1 | 75.0 | 5 | 4.96 | 121.0 |
| SMBJ78 | SMBJ78C | NS | DS | 86.70 | 106.00 | 1 | 78.0 | 5 | 4.32 | 139.0 |
| SMBJ78A | SMBJ78CA | NT | DT | 86.70 | 95.80 | 1 | 78.0 | 5 | 4.76 | 126.0 |
| SMBJ80 | SMBJ80C | NA | DA | 88.96 | 108.80 | 1 | 80.0 | 5 | 4.19 | 143.2 |
| SMBJ80A | SMBJ80CA | NB | DB | 88.80 | 97.60 | 1 | 80.0 | 5 | 4.63 | 129.6 |
| SMBJ85 | SMBJ85C | NU | DU | 94.40 | 115.00 | 1 | 85.0 | 5 | 3.97 | 151.0 |
| SMBJ85A | SMBJ85CA | NV | DV | 94.40 | 104.00 | 1 | 85.0 | 5 | 4.38 | 137.0 |
| SMBJ90 | SMBJ90C | NW | DW | 100.00 | 122.00 | 1 | 90.0 | 5 | 3.75 | 160.0 |
| SMBJ90A | SMBJ90CA | NX | DX | 100.00 | 111.00 | 1 | 90.0 | 5 | 4.11 | 146.0 |
| SMBJ100 | SMBJ100C | NY | DY | 111.00 | 136.00 | 1 | 100.0 | 5 | 3.35 | 179.0 |
| SMBJ100A | SMBJ100CA | NZ | DZ | 111.00 | 123.00 | 1 | 100.0 | 5 | 3.70 | 162.0 |
| SMBJ110 | SMBJ110C | PD | ED | 122.00 | 149.00 | 1 | 110.0 | 5 | 3.06 | 196.0 |
| SMBJ110A | SMBJ110CA | PE | EE | 122.00 | 135.00 | 1 | 110.0 | 5 | 3.39 | 177.0 |
| SMBJ120 | SMBJ120C | PF | EF | 133.00 | 163.00 | 1 | 120.0 | 5 | 2.80 | 214.0 |
| SMBJ120A | SMBJ120CA | PG | EG | 133.00 | 147.00 | 1 | 120.0 | 5 | 3.11 | 193.0 |
| SMBJ130 | SMBJ130C | PH | EH | 144.00 | 176.00 | 1 | 130.0 | 5 | 2.60 | 231.0 |
| SMBJ130A | SMBJ130CA | PK | EK | 144.00 | 159.00 | 1 | 130.0 | 5 | 2.87 | 209.0 |
| SMBJ140 | SMBJ140C | PA | EA | 155.68 | 190.40 | 1 | 140.0 | 5 | 2.39 | 250.6 |
| SMBJ140A | SMBJ140CA | PB | EB | 155.00 | 171.00 | 1 | 140.0 | 5 | 2.65 | 226.8 |
| SMBJ150 | SMBJ150C | PL | EL | 167.00 | 204.00 | 1 | 150.0 | 5 | 2.24 | 268.0 |
| SMBJ150A | SMBJ150CA | PM | EM | 167.00 | 185.00 | 1 | 150.0 | 5 | 2.47 | 243.0 |
| SMBJ160 | SMBJ160C | PN | EN | 178.00 | 218.00 | 1 | 160.0 | 5 | 2.09 | 287.0 |
| SMBJ160A | SMBJ160CA | PP | EP | 178.00 | 197.00 | 1 | 160.0 | 5 | 2.32 | 259.0 |
| SMBJ170 | SMBJ170C | PQ | EQ | 189.00 | 231.00 | 1 | 170.0 | 5 | 1.97 | 304.0 |
| SMBJ170A | SMBJ170CA | PR | ER | 189.00 | 209.00 | 1 | 170.0 | 5 | 2.18 | 275.0 |

Transient Voltage Suppressors DO-214AA/SMB Package

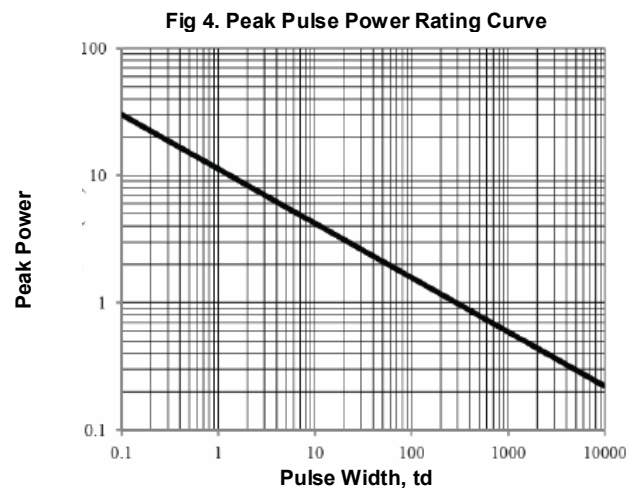
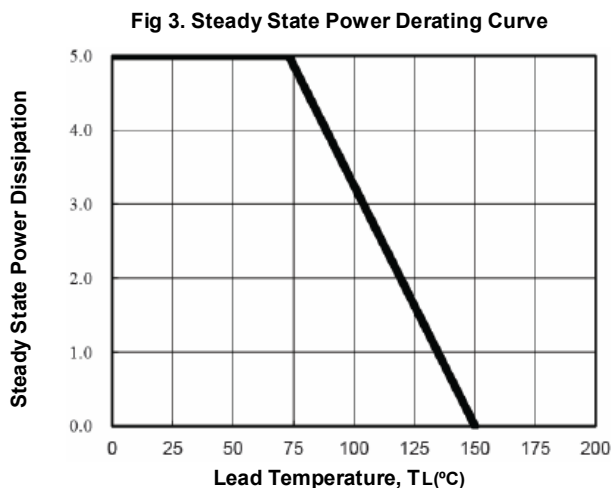
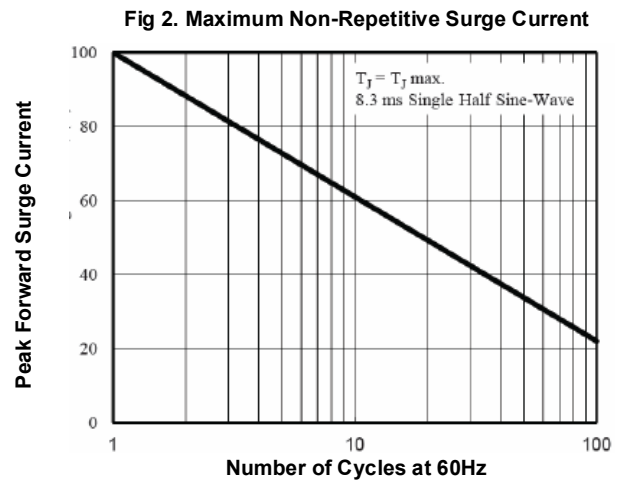
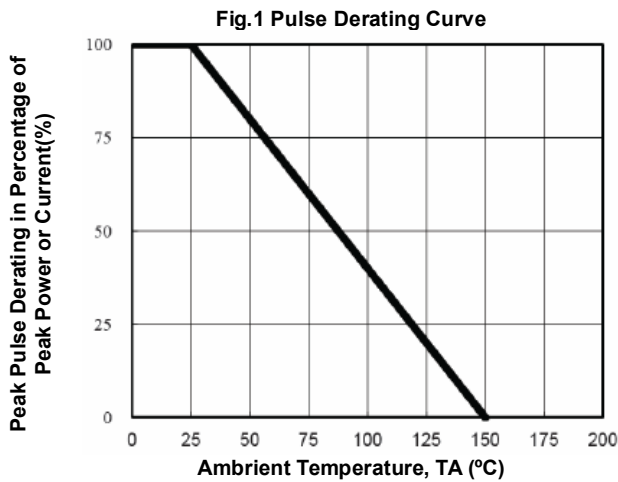
SMBJ Series

MERITEK

ELECTRICAL CHARACTERISTICS(Continued)

| Device Type (Uni) | Device Type (Bi) | Marking Code | | Breakdown Voltage VBR@IT | | | Working Peak Reverse Voltage VRWM(V) | Maximum Reverse Leakage IR @ VRWM(V) | Maximum Reverse Surge Current Ipp(A) | Maximum Clamping Voltage VC@Ipp |
|-------------------|------------------|--------------|----|--------------------------|--------|--------|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------|
| | | Uni | Bi | Min(V) | Max(V) | IT(mA) | | | | |
| SMBJ180 | SMBJ180C | PS | ES | 200.16 | 244.80 | 1 | 180.0 | 5 | 1.86 | 322.2 |
| SMBJ180A | SMBJ180C A | PT | ET | 200.00 | 220.00 | 1 | 180.0 | 5 | 2.06 | 291.6 |
| SMBJ190 | SMBJ190C | PU | EU | 211.00 | 258.00 | 1 | 190.0 | 5 | 1.76 | 340.1 |
| SMBJ190A | SMBJ190C A | PV | EV | 211.00 | 232.00 | 1 | 190.0 | 5 | 1.95 | 307.8 |
| SMBJ200A | SMBJ200C A | PW | EW | 224.00 | 247.00 | 1 | 200.0 | 5 | 1.85 | 324.0 |
| SMBJ220A | SMBJ220C A | PX | EX | 246.00 | 272.00 | 1 | 220.0 | 5 | 1.69 | 356.0 |
| SMBJ250A | SMBJ250C A | PZ | EZ | 279.00 | 309.00 | 1 | 250.0 | 5 | 1.48 | 405.0 |
| SMBJ300A | SMBJ300C A | QE | FE | 335.00 | 371.00 | 1 | 300.0 | 5 | 1.23 | 486.0 |
| SMBJ350A | SMBJ350C A | QG | FG | 391.00 | 432.00 | 1 | 350.0 | 5 | 1.06 | 567.0 |
| SMBJ400A | SMBJ400C A | QK | FK | 447.00 | 494.00 | 1 | 400.0 | 5 | 0.93 | 648.0 |
| SMBJ440A | SMBJ440C A | QM | FM | 492.00 | 543.00 | 1 | 440.0 | 5 | 0.84 | 713.0 |

CHARACTERISTICS CURVES



CHARACTERISTICS CURVES(Continued)

Fig 5. Pulse Waveform

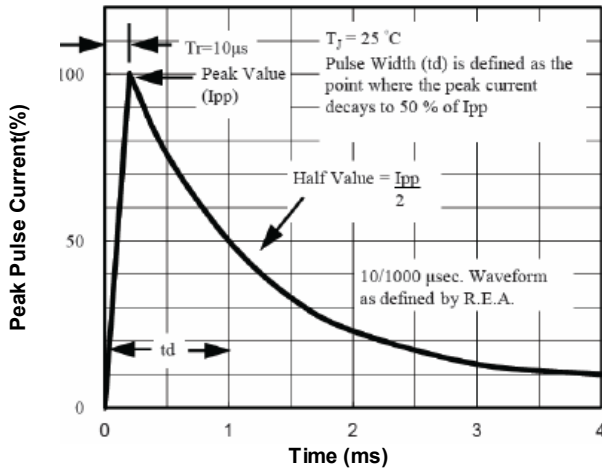
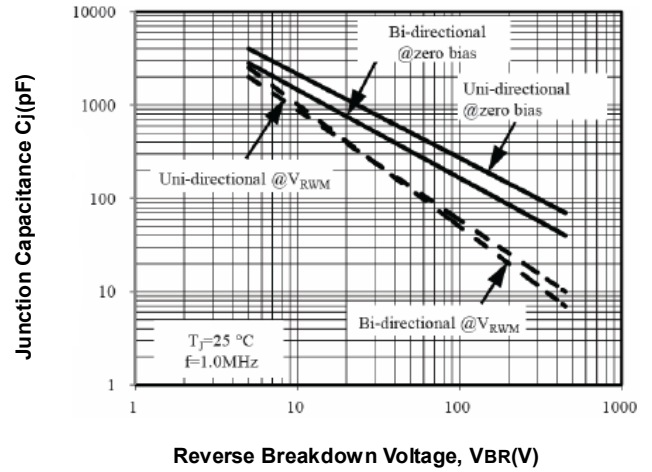
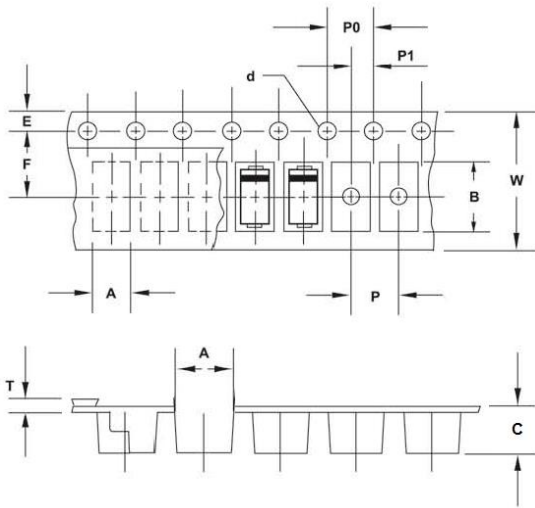


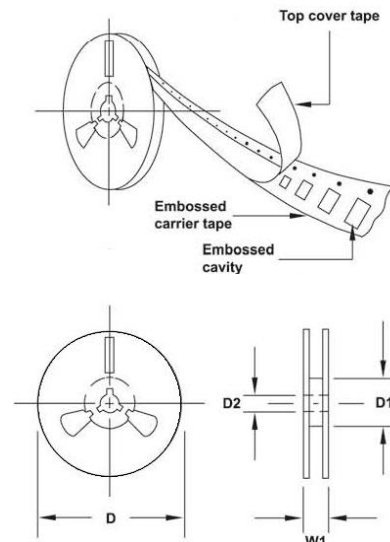
Fig 6. Typical Junction Capacitance



PACKAGING SPECIFICATION- DO214AA (SMB) - Tape Carrier and Reel



DO-214AA(SMB) - Tape carrier



DO-214AA(SMB) - Reel

| Item | Symbol | DO-214AC (SMB) | Item | Symbol | DO-214AC (SMB) |
|------------------------|--------|----------------|------------------------|--------|----------------|
| Carrier width | A | 3.77 ± 0.10 | Punch hole position | F | 5.50 ± 0.05 |
| Carrier length | B | 5.70 ± 0.10 | Punch hole pitch | P | 8.00 ± 0.10 |
| Carrier depth | C | 2.40 ± 0.10 | Sprocket hole pitch | P0 | 4.00 ± 0.10 |
| Sprocket hole | d | 1.55 ± 0.10 | Embossment center | P1 | 2.00 ± 0.05 |
| Reel outside diameter | D | 330.0 ± 2.0 | Overall tape thickness | T | Max 0.4 |
| Reel inner diameter | D1 | Min 50 | Tape width | W | 12.00 ± 0.30 |
| Feed hole diameter | D2 | 13.00 ± 0.50 | Reel width | W1 | Max 18.40 |
| Sprocket hole position | E | 1.75 ± 0.10 | | | |

Unit: mm

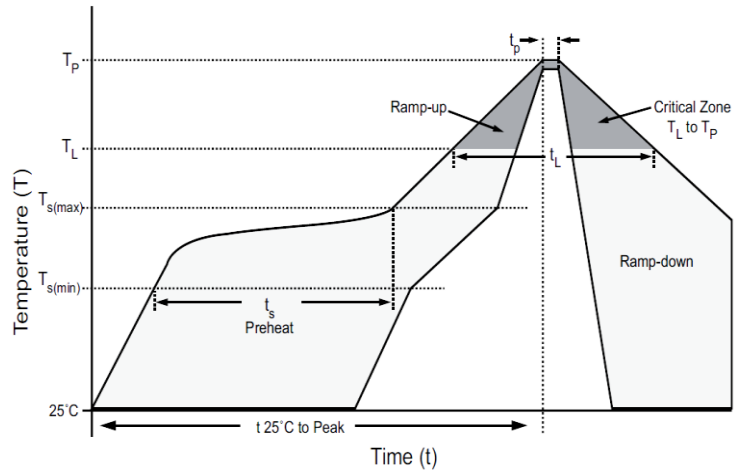
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SMBJ Series

MERITEK



RECOMMENDED SOLDERING PROFILES

| Reflow Condition | | |
|--|-------------------------------|-------------------------|
| Average Ramp-up Rate T_L to T_P | | 3°C/second max. |
| Pre Heat | Temp. Min $T_{s(min)}$ | 150°C |
| | Tempe. Max $T_{s(max)}$ | 200°C |
| | Time (min. to max.) (t_s) | 60-120 seconds |
| Ramp-up Rate $T_{s(max)}$ to T_L | | 3°C/second max. |
| Reflow | Temp. (T_L) | 217°C |
| | Time (t_L) | 60-260 seconds |
| Peak Temperature (T_P) | | 255 ^{-0/+5} °C |
| Time within 5°C of actual peak Temperature (t_p) | | 10-30 seconds |
| Ramp-down Rate | | 6°C/second max. |
| Time 25°C to peak Temp. (T_P) | | 6 minutes max. |







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