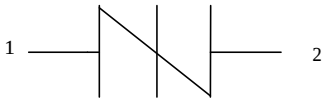
## DESCRIPTION:

TSS-SMB series thyristors are a type of semi-conduct component. They are designed in applications, modems, telephones, line cards, answering machines, FAX machines, SLICs, T1/E1, xDSL, PBXs and more.

SMB

## FEATURES:

- ✧ Lower capacitance
- ✧ Excellent capability of absorbing transient surge
- ✧ Quick response to surge voltage (ns Level)
- ✧ Eliminates overvoltage caused by fast rising transients
- ✧ Moisture sensitivity level: Level 1
- ✧ Non degenerative



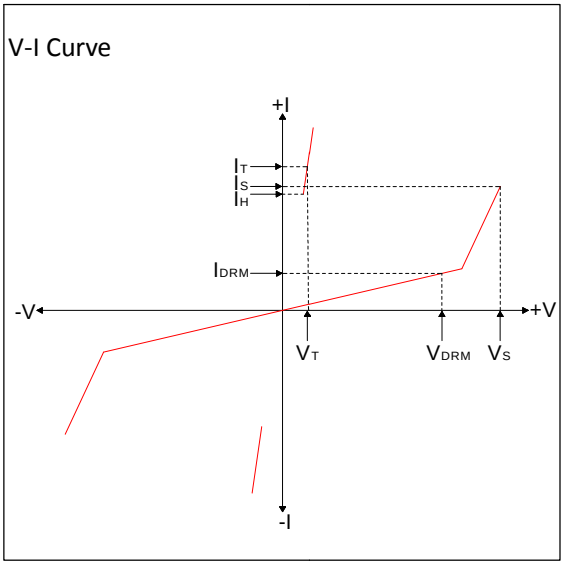

Symbol

## ABSOLUTE MAXIMUM RATINGS ($T_A$=25ºC, RH=45%-75%, unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Storage temperature range | $T_{stg}$ | -60 to +150 | ℃ |
| Operating junction temperature range | $T_j$ | -40 to +150 | ℃ |
| Repetitive peak pulse current | $I_{PP}$ | 80 | A |

## ELECTRICAL CHARACTERISTICS ($T_A$=25℃)

| Symbol | Parameter |
|---|---|
| $V_{DRM}$ | Peak off-state voltage |
| $I_{DRM}$ | Off-state current |
| $V_S$ | Switching voltage |
| $I_S$ | Switching current |
| $V_T$ | On-state voltage |
| $I_T$ | On-state current |
| $I_H$ | Holding current |
| $C_O$ | Off-state capacitance |



## ELECTRICAL CHARACTERISTICS ($T_A$=25℃, continued)

| Part Number | $I_{DRM}$@$V_{DRM}$ | | $V_S$①@$I_S$ | | $V_T$@ $I_T$ | | $I_H$ | $C_O$② |
|---|---|---|---|---|---|---|---|---|
| | μA | V | V | mA | V | A | mA | pF |
| | max | | max | max | max | max | min | max |
| BEP0080SB | 5 | 6 | 25 | 800 | 4 | 2.2 | 30 | 45 |
| BEP0080SB-MC | 5 | 6 | 25 | 800 | 4 | 2.2 | 30 | 30 |
| BEP0220SB | 5 | 18 | 30 | 800 | 4 | 2.2 | 30 | 100 |
| BEP0220SB-MC | 5 | 18 | 30 | 800 | 4 | 2.2 | 30 | 50 |
| BEP0300SB | 5 | 25 | 40 | 800 | 4 | 2.2 | 30 | 100 |
| BEP0300SB-MC | 5 | 25 | 40 | 800 | 4 | 2.2 | 30 | 50 |
| BEP0640SB | 5 | 58 | 77 | 800 | 4 | 2.2 | 120 | 80 |
| BEP0640SB-MC | 5 | 58 | 77 | 800 | 4 | 2.2 | 120 | 40 |
| BEP0720SB | 5 | 66 | 87 | 800 | 4 | 2.2 | 120 | 75 |
| BEP0720SB-MC | 5 | 66 | 87 | 800 | 4 | 2.2 | 120 | 40 |
| BEP0900SB | 5 | 75 | 98 | 800 | 4 | 2.2 | 120 | 70 |
| BEP0900SB-MC | 5 | 75 | 98 | 800 | 4 | 2.2 | 120 | 40 |
| BEP1100SB | 5 | 90 | 130 | 800 | 4 | 2.2 | 120 | 70 |
| BEP1100SB-MC | 5 | 90 | 130 | 800 | 4 | 2.2 | 120 | 35 |
| BEP1300SB | 5 | 120 | 160 | 800 | 4 | 2.2 | 120 | 60 |
| BEP1300SB-MC | 5 | 120 | 160 | 800 | 4 | 2.2 | 120 | 35 |
| BEP1500SB | 5 | 140 | 180 | 800 | 4 | 2.2 | 120 | 55 |
| BEP1500SB-MC | 5 | 140 | 180 | 800 | 4 | 2.2 | 120 | 35 |
| BEP1800SB | 5 | 170 | 220 | 800 | 4 | 2.2 | 120 | 50 |
| BEP1800SB-MC | 5 | 170 | 220 | 800 | 4 | 2.2 | 120 | 35 |
| BEP2300SB | 5 | 190 | 260 | 800 | 4 | 2.2 | 120 | 50 |
| BEP2300SB-MC | 5 | 190 | 260 | 800 | 4 | 2.2 | 120 | 30 |
| BEP2600SB | 5 | 220 | 300 | 800 | 4 | 2.2 | 120 | 45 |
| BEP2600SB-MC | 5 | 220 | 300 | 800 | 4 | 2.2 | 120 | 30 |
| BEP3100SB | 5 | 275 | 350 | 800 | 4 | 2.2 | 120 | 45 |
| BEP3100SB-MC | 5 | 275 | 350 | 800 | 4 | 2.2 | 120 | 25 |
| BEP3500SB | 5 | 320 | 400 | 800 | 4 | 2.2 | 120 | 45 |
| BEP3500SB-MC | 5 | 320 | 400 | 800 | 4 | 2.2 | 120 | 25 |
| BEP3800SB | 5 | 340 | 450 | 800 | 4 | 2.2 | 120 | 45 |
| BEP3800SB-MC | 5 | 340 | 450 | 800 | 4 | 2.2 | 120 | 25 |
| BEP4200SB | 5 | 340 | 450 | 800 | 4 | 2.2 | 120 | 45 |
| BEP4200SB-MC | 5 | 340 | 450 | 800 | 4 | 2.2 | 120 | 25 |

## ELECTRICAL CHARACTERISTICS ($T_A$=25℃, continued)

| Part Number | $I_{DRM}$@$V_{DRM}$ | | $V_S$①@$I_S$ | | $V_T$@ $I_T$ | | $I_H$ | $C_O$② |
|---|---|---|---|---|---|---|---|---|
| | μA | V | V | mA | V | A | mA | pF |
| | max | | max | max | max | max | min | max |
| BEP0080SC | 5 | 6 | 25 | 800 | 4 | 2.2 | 30 | 80 |
| BEP0080SC-MC | 5 | 6 | 25 | 800 | 4 | 2.2 | 30 | 45 |
| BEP0220SC | 5 | 18 | 30 | 800 | 4 | 2.2 | 30 | 80 |
| BEP0220SC-MC | 5 | 18 | 30 | 800 | 4 | 2.2 | 30 | 45 |
| BEP0300SC | 5 | 25 | 40 | 800 | 4 | 2.2 | 30 | 80 |
| BEP0300SC-MC | 5 | 25 | 40 | 800 | 4 | 2.2 | 30 | 45 |
| BEP0640SC | 5 | 58 | 77 | 800 | 4 | 2.2 | 120 | 80 |
| BEP0640SC-MC | 5 | 58 | 77 | 800 | 4 | 2.2 | 120 | 45 |
| BEP0720SC | 5 | 66 | 87 | 800 | 4 | 2.2 | 120 | 75 |
| BEP0720SC-MC | 5 | 66 | 87 | 800 | 4 | 2.2 | 120 | 40 |
| BEP0900SC | 5 | 75 | 98 | 800 | 4 | 2.2 | 120 | 75 |
| BEP0900SC-MC | 5 | 75 | 98 | 800 | 4 | 2.2 | 120 | 40 |
| BEP1100SC | 5 | 90 | 130 | 800 | 4 | 2.2 | 120 | 75 |
| BEP1100SC-MC | 5 | 90 | 130 | 800 | 4 | 2.2 | 120 | 40 |
| BEP1300SC | 5 | 120 | 160 | 800 | 4 | 2.2 | 120 | 75 |
| BEP1300SC-MC | 5 | 120 | 160 | 800 | 4 | 2.2 | 120 | 40 |
| BEP1500SC | 5 | 140 | 180 | 800 | 4 | 2.2 | 120 | 70 |
| BEP1500SC-MC | 5 | 140 | 180 | 800 | 4 | 2.2 | 120 | 35 |
| BEP1800SC | 5 | 170 | 220 | 800 | 4 | 2.2 | 120 | 70 |
| BEP1800SC-MC | 5 | 170 | 220 | 800 | 4 | 2.2 | 120 | 35 |
| BEP2300SC | 5 | 190 | 260 | 800 | 4 | 2.2 | 120 | 70 |
| BEP2300SC-MC | 5 | 190 | 260 | 800 | 4 | 2.2 | 120 | 35 |
| BEP2600SC | 5 | 220 | 300 | 800 | 4 | 2.2 | 120 | 70 |
| BEP2600SC-MC | 5 | 220 | 300 | 800 | 4 | 2.2 | 120 | 35 |
| BEP3100SC | 5 | 275 | 350 | 800 | 4 | 2.2 | 120 | 65 |
| BEP3100SC-MC | 5 | 275 | 350 | 800 | 4 | 2.2 | 120 | 30 |
| BEP3500SC | 5 | 320 | 400 | 800 | 4 | 2.2 | 120 | 65 |
| BEP3500SC-MC | 5 | 320 | 400 | 800 | 4 | 2.2 | 120 | 30 |
| BEP3800SC | 5 | 340 | 450 | 800 | 4 | 2.2 | 120 | 65 |
| BEP3800SC-MC | 5 | 340 | 450 | 800 | 4 | 2.2 | 120 | 30 |
| BEP4200SC | 5 | 340 | 450 | 800 | 4 | 2.2 | 120 | 65 |
| BEP4200SC-MC | 5 | 340 | 450 | 800 | 4 | 2.2 | 120 | 30 |

## ELECTRICAL CHARACTERISTICS ($T_A$=25℃, continued)

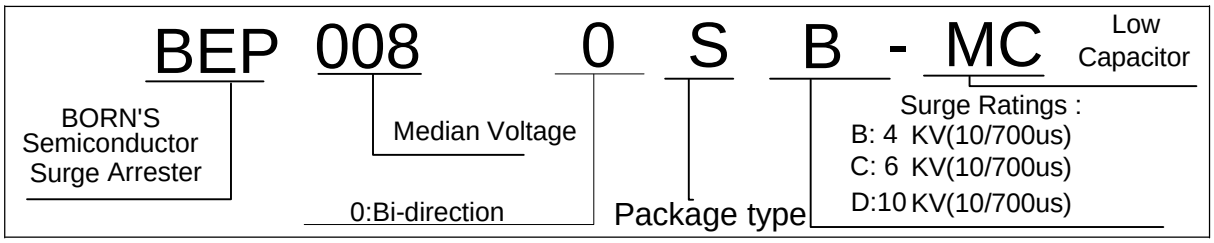
| Part Number | $I_{DRM}$@$V_{DRM}$ | | $V_S$①@$I_S$ | | $V_T$@ $I_T$ | | $I_H$ | $C_O$② |
|---|---|---|---|---|---|---|---|---|
| | μA | V | V | mA | V | A | mA | pF |
| | max | | max | max | max | max | min | max |
| BEP0080SD | 5 | 6 | 25 | 800 | 4 | 2.2 | 50 | 150 |
| BEP0640SD | 5 | 58 | 77 | 800 | 4 | 2.2 | 50 | 150 |
| BEP0720SD | 5 | 65 | 87 | 800 | 4 | 2.2 | 50 | 150 |
| BEP0900SD | 5 | 75 | 98 | 800 | 4 | 2.2 | 50 | 140 |
| BEP1100SD | 5 | 90 | 130 | 800 | 4 | 2.2 | 50 | 110 |
| BEP1300SD | 5 | 120 | 160 | 800 | 4 | 2.2 | 50 | 100 |
| BEP1500SD | 5 | 140 | 180 | 800 | 4 | 2.2 | 50 | 90 |
| BEP1800SD | 5 | 170 | 220 | 800 | 4 | 2.2 | 50 | 90 |
| BEP2300SD | 5 | 190 | 260 | 800 | 4 | 2.2 | 50 | 80 |
| BEP2600SD | 5 | 220 | 300 | 800 | 4 | 2.2 | 50 | 70 |
| BEP3100SD | 5 | 275 | 350 | 800 | 4 | 2.2 | 50 | 60 |
| BEP3500SD | 5 | 320 | 400 | 800 | 4 | 2.2 | 50 | 60 |
| BEP3800SD | 5 | 340 | 450 | 800 | 4 | 2.2 | 50 | 60 |
| BEP4200SD | 5 | 400 | 520 | 800 | 4 | 2.2 | 100 | 35 |

① Vs is measured at 100KV/s
② Off-state capacitance is measured in $V_{DC}$=2V, $V_{RMS}$=1V, f=1MHz

## SURGE RATINGS

| Series | $I_{PP}$ (A) min | | | |
|---|---|---|---|---|
| | 2×10us | 8×20us | 10×360us | 10×1000us |
| B | 250 | 250 | 125 | 80 |
| C | 500 | 400 | 175 | 100 |
| D | 1000 | 800 | --- | 200 |

## ORDERING INFORMATION




## SOLDERING PARAMETERS

| | | |
|---|---|---|
| Reflow Condition | | Pb-Free assembly (see FIG.2) |
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150℃ |
| | -Temperature Max($T_{s(max)}$) | +200℃ |
| | -Time (Min to Max) (ts) | 60-180 secs. |
| Average ramp up rate (Liquid us Temp ($T_L$) to peak) | | 3℃/sec. Max |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate | | 3℃/sec. Max |
| Reflow | -Temperature($T_L$) (Liquid us) | +217℃ |
| | -Temperature($t_L$) | 60-150 secs. |
| Peak Temp ($T_p$) | | +260(+0/-5)℃ |
| Time within 5℃ of actual Peak Temp ($t_p$) | | 30 secs. Max |
| Ramp-down Rate | | 6℃/sec. Max |
| Time 25℃ to Peak Temp ($T_P$) | | 8 min. Max |
| Do not exceed | | +260℃ |

**FIG.1:** tr × td pulse waveform

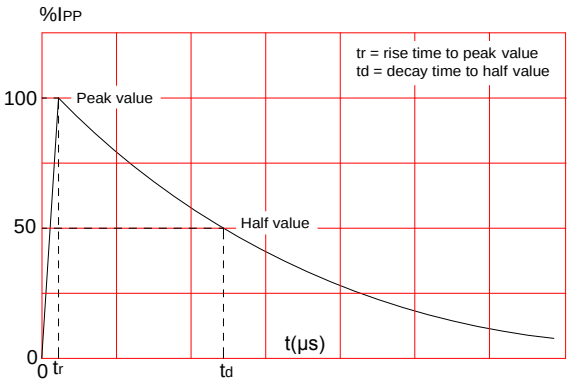



**FIG.2:** Reflow condition

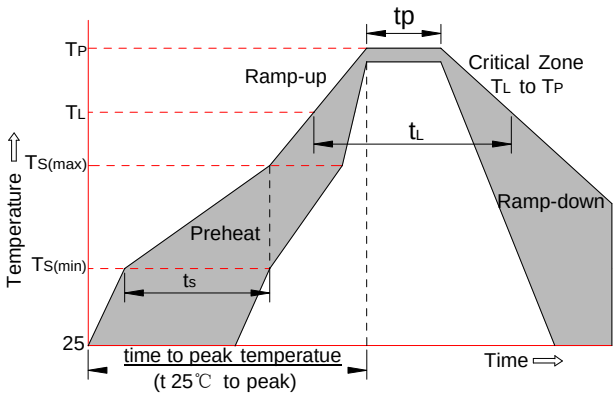



**FIG.3:** Normalized Vs change vs. junction temperature

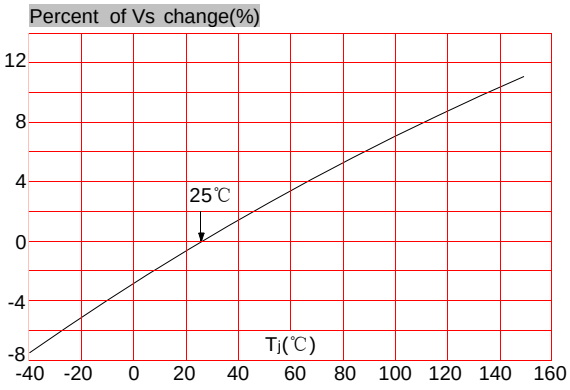
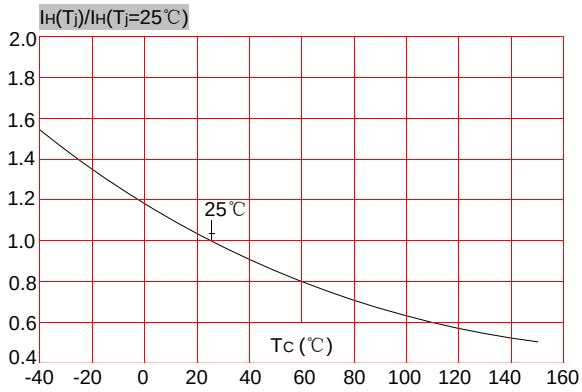
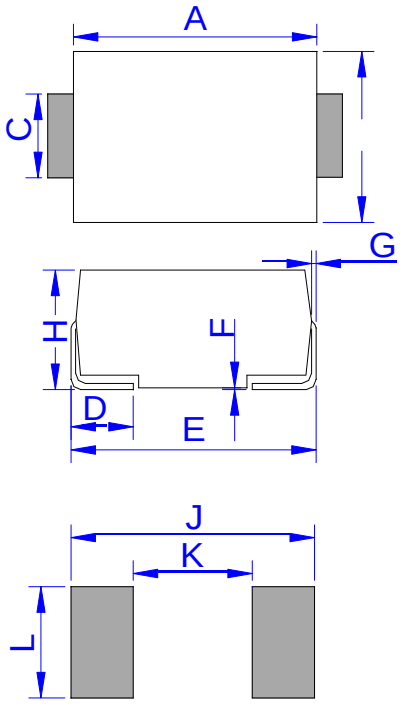



**FIG.4:** Normalized DC holding current vs. case temperature




## PACKAGE MECHANICAL DATA




DO-214AA(SMB)

| Ref. | Dimensions | | | |
|---|---|---|---|---|
| | Millimeters | | Inches | |
| | Min. | Max. | Min. | Max. |
| A | 4.25 | 4.75 | 0.167 | 0.187 |
| B | 3.30 | 3.94 | 0.130 | 0.155 |
| C | 1.85 | 2.21 | 0.073 | 0.087 |
| D | 0.76 | 1.52 | 0.030 | 0.060 |
| E | 5.08 | 5.59 | 0.200 | 0.220 |
| F | 0.051 | 0.203 | 0.002 | 0.008 |
| G | 0.15 | 0.31 | 0.006 | 0.012 |
| H | 2.11 | 2.44 | 0.083 | 0.096 |
| J | 6.80 | | 0.270 | |
| K | | 2.60 | | 0.100 |
| L | 2.40 | | 0.090 | |

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