

We declare that material of product compliance with ROHS requirements.

S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

MAXIMUM RATINGS

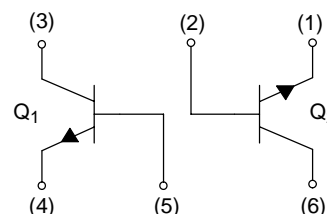
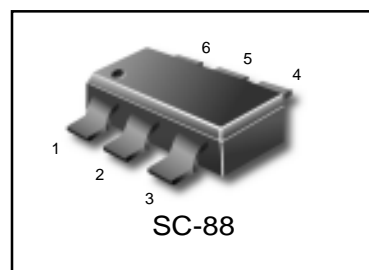
| Rating | Symbol | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector-Emitter Voltage | V_{CEO} | 40 | Vdc |
| Collector-Base Voltage | V_{CBO} | 75 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 6.0 | Vdc |
| Collector Current – Continuous | I_C | 600 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|-----------------|-------------|--------------------|
| Total Package Dissipation (Note 1) $T_A = 25^\circ\text{C}$ | P_D | 150 | mW |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 833 | $^\circ\text{C/W}$ |
| Junction and Storage Temperature | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

ORDERING INFORMATION

| Device | Marking | Shipping |
|------------------------------------|---------|-------------------|
| MBT2222ADW1T1G S-MBT2222ADW1T1G | XX | 3000/Tape & Reel |
| MBT2222ADW1T3G S-MBT2222ADW1T3G | XX | 10000/Tape & Reel |



ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|--|---------------|--------|------------|-----------------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Breakdown Voltage ($I_C = 10\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | 40 | – | Vdc |
| Collector–Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$, $I_E = 0$) | $V_{(BR)CBO}$ | 75 | – | Vdc |
| Emitter–Base Breakdown Voltage ($I_E = 10\text{ }\mu\text{A}$, $I_C = 0$) | $V_{(BR)EBO}$ | 6.0 | – | Vdc |
| Collector Cutoff Current ($V_{CE} = 60\text{ Vdc}$, $V_{EB(off)} = 3.0\text{ Vdc}$) | I_{CEX} | – | 10 | nAdc |
| Collector Cutoff Current ($V_{CB} = 60\text{ Vdc}$, $I_E = 0$) ($V_{CB} = 60\text{ Vdc}$, $I_E = 0$, $T_A = 125^\circ\text{C}$) | I_{CBO} | – – | 0.01 10 | μAdc |
| Emitter Cutoff Current ($V_{EB} = 3.0\text{ Vdc}$, $I_C = 0$) | I_{EBO} | – | 100 | nAdc |
| Base Cutoff Current ($V_{CE} = 60\text{ Vdc}$, $V_{EB(off)} = 3.0\text{ Vdc}$) | I_{BL} | – | 20 | nAdc |

ON CHARACTERISTICS

| | | | | |
|---|---------------|---|-----------------------------------|-----|
| DC Current Gain ($I_C = 0.1\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 1.0\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 10\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) ($I_C = 10\text{ mA}$, $V_{CE} = 10\text{ Vdc}$, $T_A = -55^\circ\text{C}$) ($I_C = 150\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) (Note 2) ($I_C = 150\text{ mA}$, $V_{CE} = 1.0\text{ Vdc}$) (Note 2) ($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ Vdc}$) (Note 2) | h_{FE} | 35 50 75 35 100 50 40 | – – – – 300 – – | – |
| Collector–Emitter Saturation Voltage (Note 2) ($I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$) ($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$) | $V_{CE(sat)}$ | – – | 0.3 1.0 | Vdc |
| Base–Emitter Saturation Voltage (Note 2) ($I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$) ($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$) | $V_{BE(sat)}$ | 0.6 – | 1.2 2.0 | Vdc |

2. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.

SMALL-SIGNAL CHARACTERISTICS

| | | | | |
|--|------------|-------------|-------------|------------------|
| Current-Gain – Bandwidth Product (Note 3) ($I_C = 20 \text{ mAdc}$, $V_{CE} = 20 \text{ Vdc}$, $f = 100 \text{ MHz}$) | f_T | 300 | – | MHz |
| Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$) | C_{obo} | – | 8.0 | pF |
| Input Capacitance ($V_{EB} = 0.5 \text{ Vdc}$, $I_C = 0$, $f = 1.0 \text{ MHz}$) | C_{ibo} | – | 25 | pF |
| Input Impedance ($I_C = 1.0 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$) ($I_C = 10 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$) | h_{ie} | 2.0 0.25 | 8.0 1.25 | $k\Omega$ |
| Voltage Feedback Ratio ($I_C = 1.0 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$) ($I_C = 10 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$) | h_{re} | – – | 8.0 4.0 | $\times 10^{-4}$ |
| Small-Signal Current Gain ($I_C = 1.0 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$) ($I_C = 10 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$) | h_{fe} | 50 75 | 300 375 | – |
| Output Admittance ($I_C = 1.0 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$) ($I_C = 10 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$) | h_{oe} | 5.0 25 | 35 200 | μmhos |
| Collector Base Time Constant ($I_E = 20 \text{ mAdc}$, $V_{CB} = 20 \text{ Vdc}$, $f = 31.8 \text{ MHz}$) | r_b, C_C | – | 150 | ps |
| Noise Figure ($I_C = 100 \mu\text{Adc}$, $V_{CE} = 10 \text{ Vdc}$, $R_S = 1.0 \text{ k}\Omega$, $f = 1.0 \text{ kHz}$) | NF | – | 4.0 | dB |

SWITCHING CHARACTERISTICS

| | | | | | |
|--------------|--|-------|---|-----|----|
| Delay Time | $(V_{CC} = 30 \text{ Vdc}$, $V_{BE(off)} = -0.5 \text{ Vdc}$, $I_C = 150 \text{ mAdc}$, $I_{B1} = 15 \text{ mAdc}$) | t_d | – | 10 | ns |
| Rise Time | | t_r | – | 25 | |
| Storage Time | $(V_{CC} = 30 \text{ Vdc}$, $I_C = 150 \text{ mAdc}$, $I_{B1} = I_{B2} = 15 \text{ mAdc}$) | t_s | – | 225 | ns |
| Fall Time | | t_f | – | 60 | |

3. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.

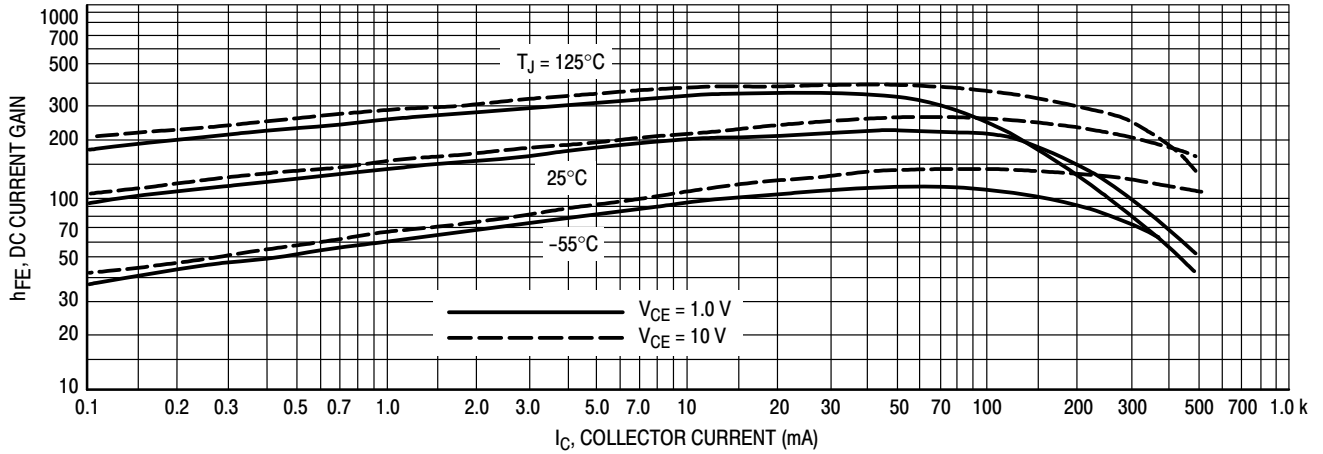


Figure 1. DC Current Gain

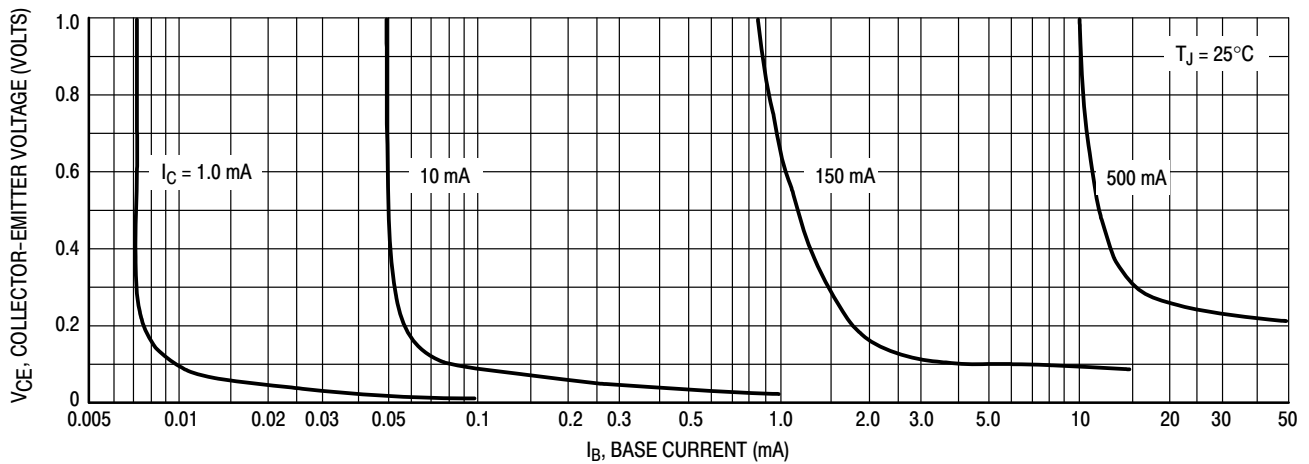


Figure 2. Collector Saturation Region

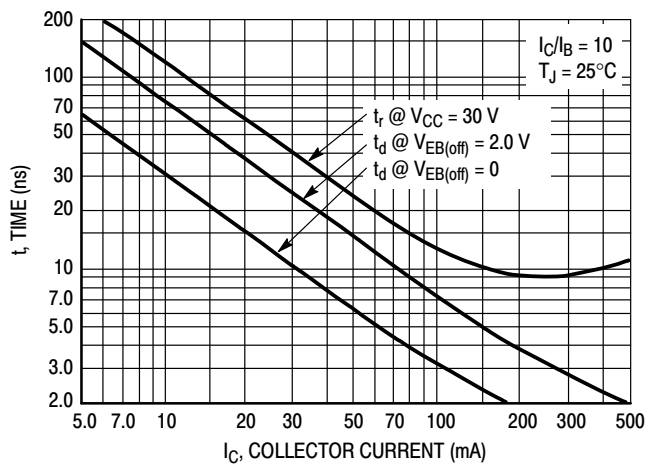


Figure 3. Turn-On Time

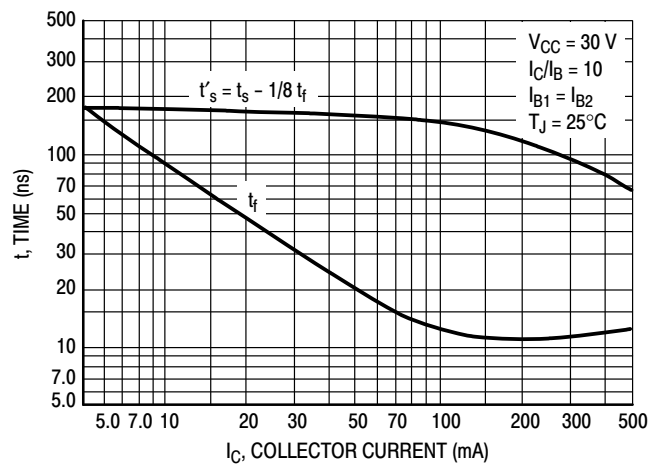


Figure 4. Turn-Off Time

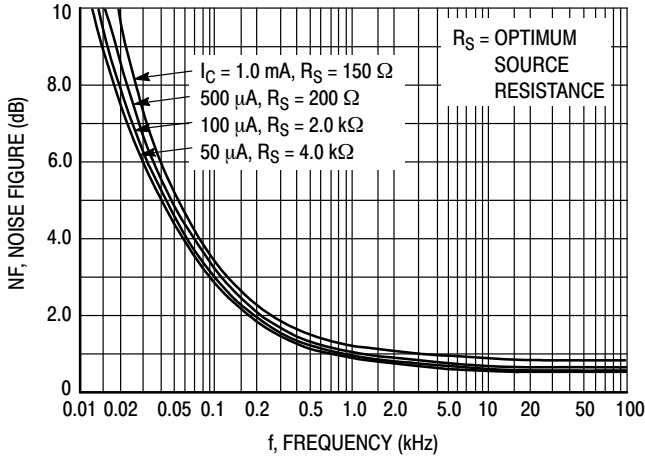


Figure 5. Frequency Effects

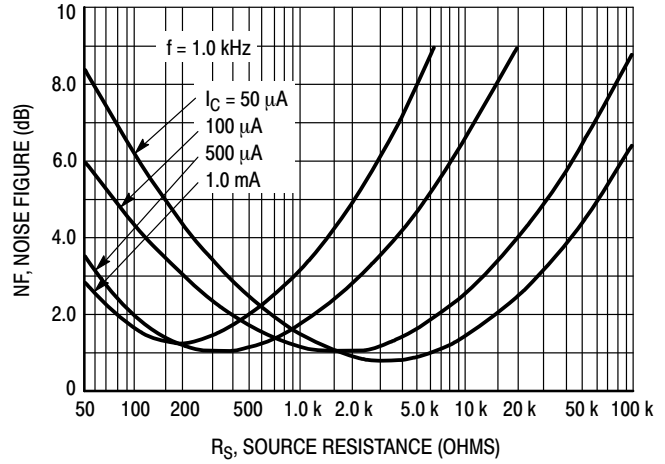


Figure 6. Source Resistance Effects

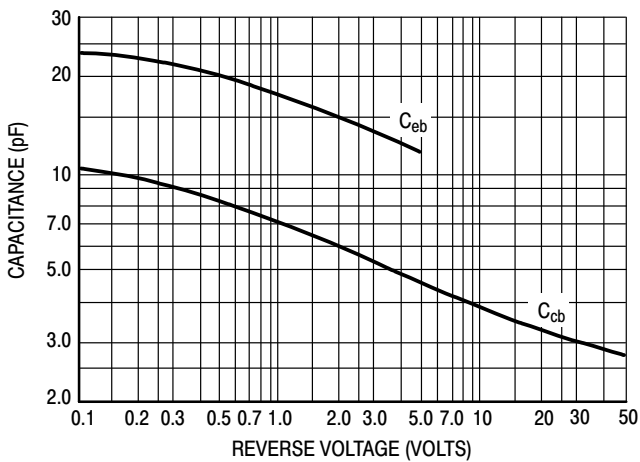


Figure 7. Capacitances

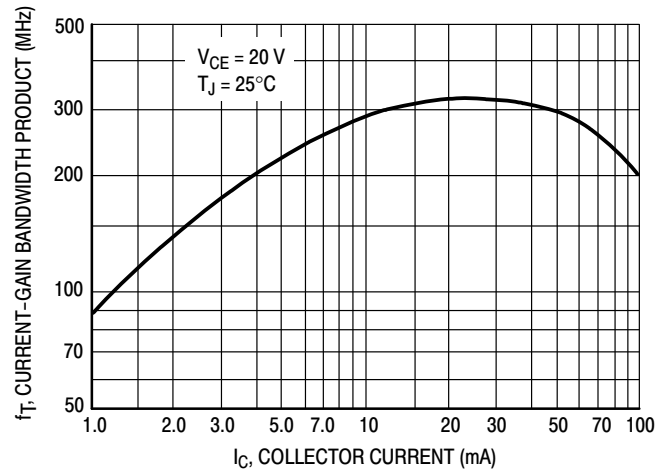


Figure 8. Current-Gain Bandwidth Product

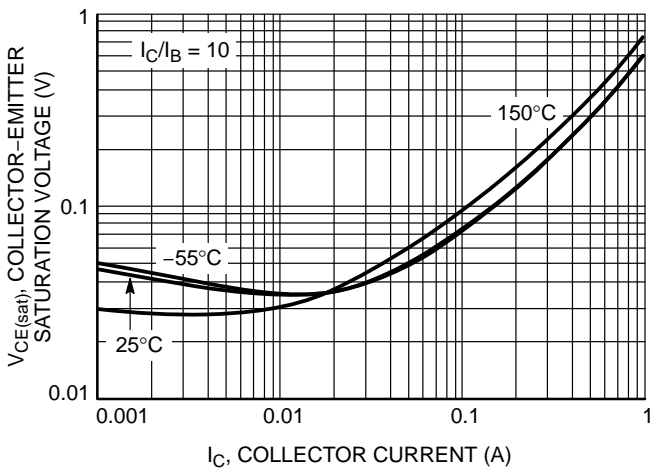


Figure 9. Collector Emitter Saturation Voltage vs. Collector Current

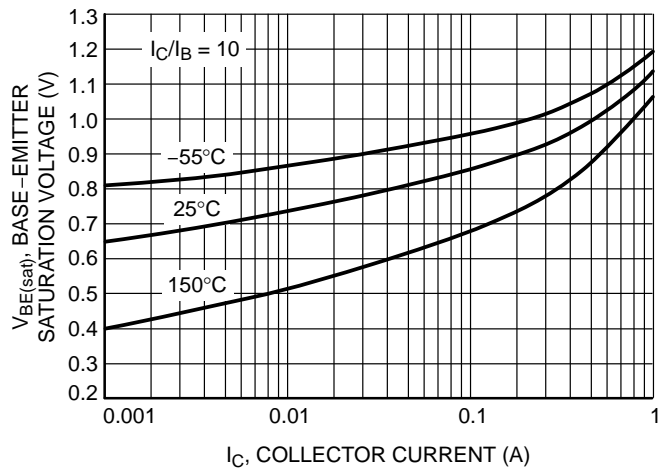


Figure 10. Base Emitter Saturation Voltage vs. Collector Current

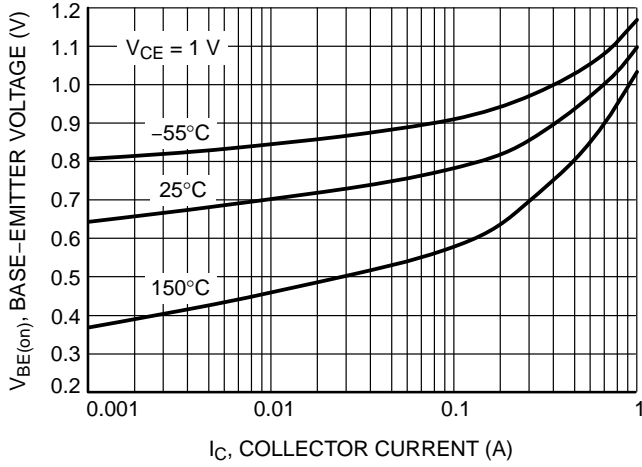


Figure 11. Base Emitter Voltage vs. Collector Current

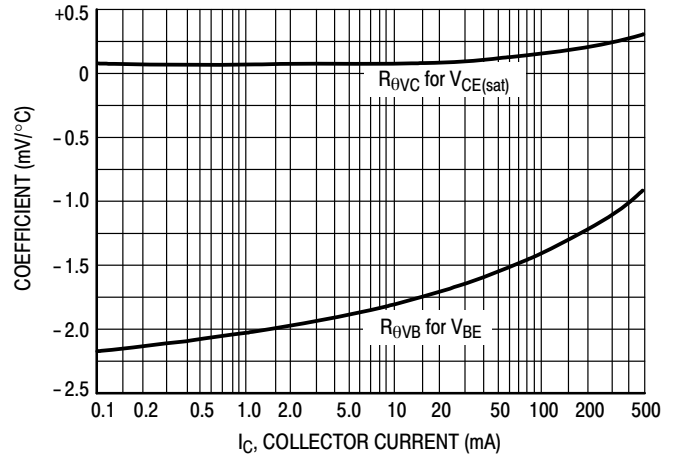


Figure 12. Temperature Coefficients

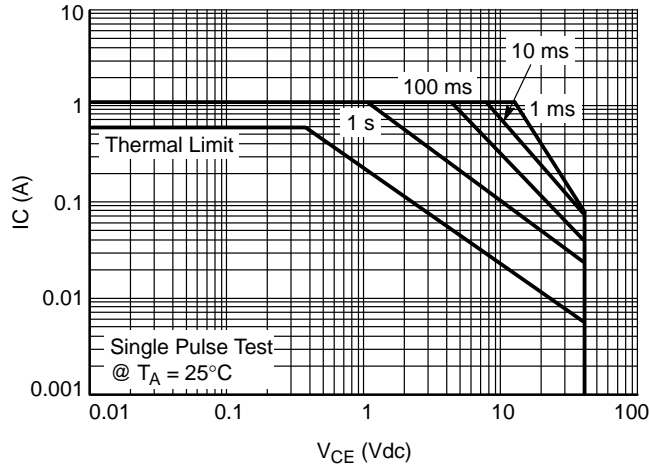
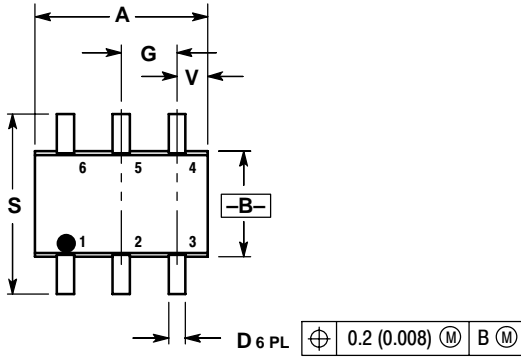


Figure 13. Safe Operating Area

SOT-363/SC-88



| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.071 | 0.087 | 1.80 | 2.20 |
| B | 0.045 | 0.053 | 1.15 | 1.35 |
| C | 0.031 | 0.043 | 0.80 | 1.10 |
| D | 0.004 | 0.012 | 0.10 | 0.30 |
| G | 0.026 BSC | | 0.65 BSC | |
| H | --- | 0.004 | --- | 0.10 |
| J | 0.004 | 0.010 | 0.10 | 0.25 |
| K | 0.004 | 0.012 | 0.10 | 0.30 |
| N | 0.008 REF | | 0.20 REF | |
| S | 0.079 | 0.087 | 2.00 | 2.20 |
| V | 0.012 | 0.016 | 0.30 | 0.40 |

