

# MMBT489LT1G

## High Current Surface Mount NPN Silicon Switching Transistor for Load Management in Portable Applications

### Features

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

| Rating                         | Symbol    | Max | Unit |
|--------------------------------|-----------|-----|------|
| Collector-Emitter Voltage      | $V_{CEO}$ | 30  | Vdc  |
| Collector-Base Voltage         | $V_{CBO}$ | 50  | Vdc  |
| Emitter-Base Voltage           | $V_{EBO}$ | 5.0 | Vdc  |
| Collector Current – Continuous | $I_C$     | 1.0 | A    |
| Collector Current – Peak       | $I_{CM}$  | 2.0 | A    |

### THERMAL CHARACTERISTICS

| Characteristic   | Symbol               | Max         | Unit                       |
|--|----------------------|-------------|----------------------------|
| Total Device Dissipation (Note 1)<br>@ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$                | 310<br>2.5  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient<br>(Note 1)  | $R_{\theta JA}$      | 403         | $^\circ\text{C}/\text{W}$  |
| Total Device Dissipation (Note 2)<br>@ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$                | 710<br>5.7  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient<br>(Note 2)  | $R_{\theta JA}$      | 176         | $^\circ\text{C}/\text{W}$  |
| Total Device Dissipation (Single Pulse < 10 s)   | $P_{D\text{single}}$ | 575         | mW                         |
| Junction and Storage Temperature Range   | $T_J, T_{stg}$       | -55 to +150 | $^\circ\text{C}$           |

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.

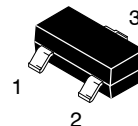
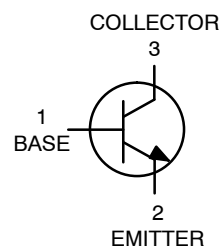
1. FR-4 @ Minimum Pad
2. FR-4 @ 1.0 X 1.0 inch Pad



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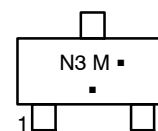
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## 30 VOLTS, 2.0 AMPERES NPN TRANSISTOR



SOT-23 (TO-236)  
CASE 318  
STYLE 6

### MARKING DIAGRAM



N3 = Specific Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)  
\*Date Code orientation and/or overbar may vary depending upon manufacturing location.

### ORDERING INFORMATION

| Device      | Package             | Shipping†        |
|-------------|---------------------|------------------|
| MMBT489LT1G | SOT-23<br>(Pb-Free) | 3000/Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

# MMBT489LT1G

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

| Characteristic  | Symbol               | Min | Max | Unit |
|---|----------------------|-----|-----|------|
| <b>OFF CHARACTERISTICS</b>  |                      |     |     |      |
| Collector - Emitter Breakdown Voltage<br>(I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0) | V <sub>(BR)CEO</sub> | 30  | -   | Vdc  |
| Collector - Base Breakdown Voltage<br>(I <sub>C</sub> = 0.1 mA, I <sub>E</sub> = 0)   | V <sub>(BR)CBO</sub> | 50  | -   | Vdc  |
| Emitter - Base Breakdown Voltage<br>(I <sub>E</sub> = 0.1 mA, I <sub>C</sub> = 0)     | V <sub>(BR)EBO</sub> | 5.0 | -   | Vdc  |
| Collector Cutoff Current<br>(V <sub>CB</sub> = 30 Vdc, I <sub>E</sub> = 0)            | I <sub>CBO</sub>     | -   | 0.1 | μAdc |
| Collector - Emitter Cutoff Current<br>(V <sub>CES</sub> = 30 Vdc)                     | I <sub>CES</sub>     | -   | 0.1 | μAdc |
| Emitter Cutoff Current<br>(V <sub>EB</sub> = 4.0 Vdc)                                 | I <sub>EBO</sub>     | -   | 0.1 | μAdc |

## ON CHARACTERISTICS

|   |                      |                   |                         |     |
|---|----------------------|-------------------|-------------------------|-----|
| DC Current Gain (Note 3)<br>(I <sub>C</sub> = 50 mA, V <sub>CE</sub> = 5.0 V)<br>(I <sub>C</sub> = 0.5 A, V <sub>CE</sub> = 5.0 V)<br>(I <sub>C</sub> = 1.0 A, V <sub>CE</sub> = 5.0 V)                       | h <sub>FE</sub>      | 300<br>300<br>200 | -<br>900<br>-           |     |
| Collector - Emitter Saturation Voltage (Note 3)<br>(I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 100 mA)<br>(I <sub>C</sub> = 0.5 A, I <sub>B</sub> = 50 mA)<br>(I <sub>C</sub> = 0.1 A, I <sub>B</sub> = 1.0 mA) | V <sub>CE(sat)</sub> | -<br>-<br>-       | 0.200<br>0.125<br>0.075 | V   |
| Base - Emitter Saturation Voltage (Note 3)<br>(I <sub>C</sub> = 1.0 A, I <sub>B</sub> = 0.1 A)  | V <sub>BE(sat)</sub> | -                 | 1.1                     | V   |
| Base - Emitter Turn-on Voltage (Note 3)<br>(I <sub>C</sub> = 1.0 mA, V <sub>CE</sub> = 2.0 V)   | V <sub>BE(on)</sub>  | -                 | 1.1                     | V   |
| Cutoff Frequency<br>(I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 5.0 V, f = 100 MHz)   | f <sub>T</sub>       | 100               | -                       | MHz |
| Output Capacitance<br>(f = 1.0 MHz)   | C <sub>obo</sub>     | -                 | 15                      | pF  |

3. Pulsed Condition: Pulse Width = 300 μsec, Duty Cycle ≤ 2%

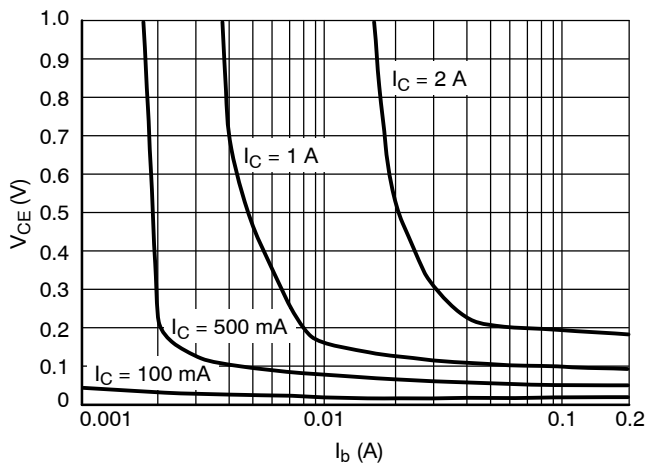


Figure 1. V<sub>CE</sub> versus I<sub>b</sub>

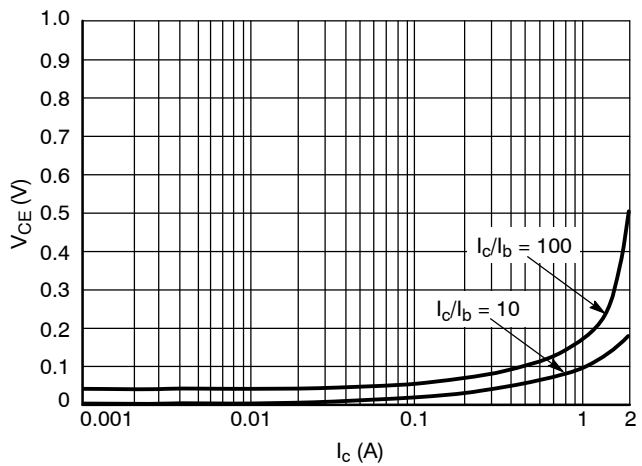


Figure 2. V<sub>CE</sub> versus I<sub>c</sub>

# MMBT489LT1G

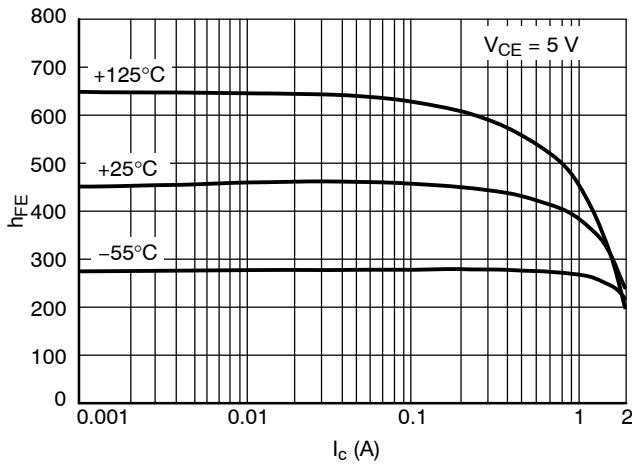


Figure 3.  $h_{FE}$  versus  $I_c$

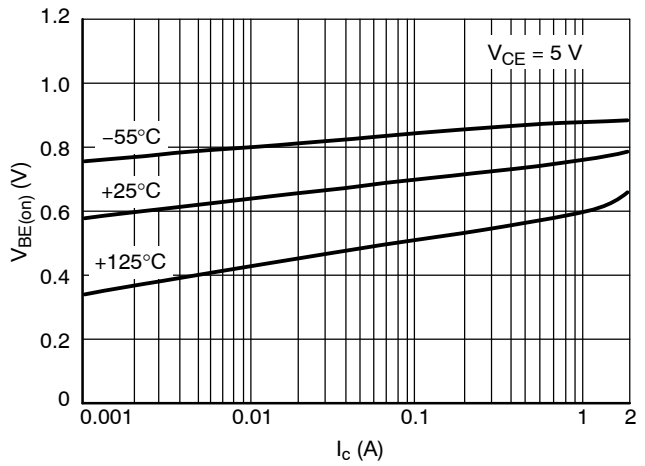


Figure 4.  $V_{BE(on)}$  versus  $I_c$

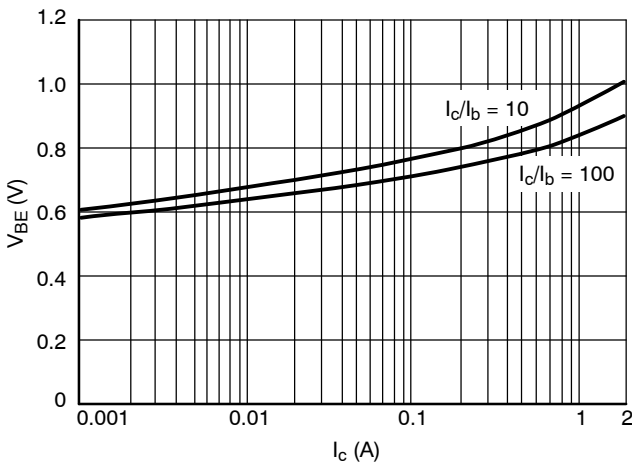


Figure 5.  $V_{BE(sat)}$  versus  $I_c$

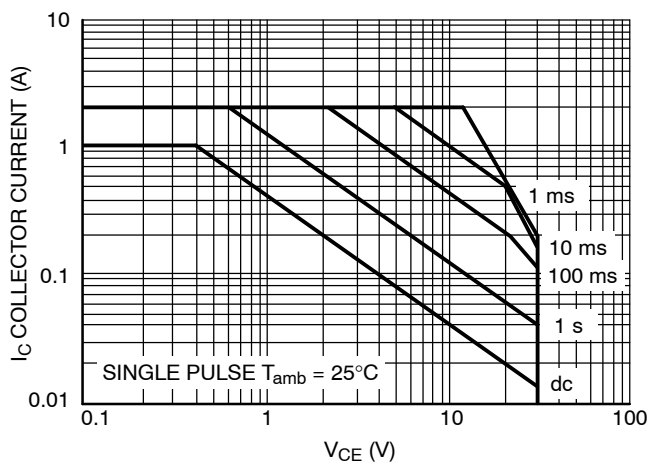


Figure 6. Safe Operating Area

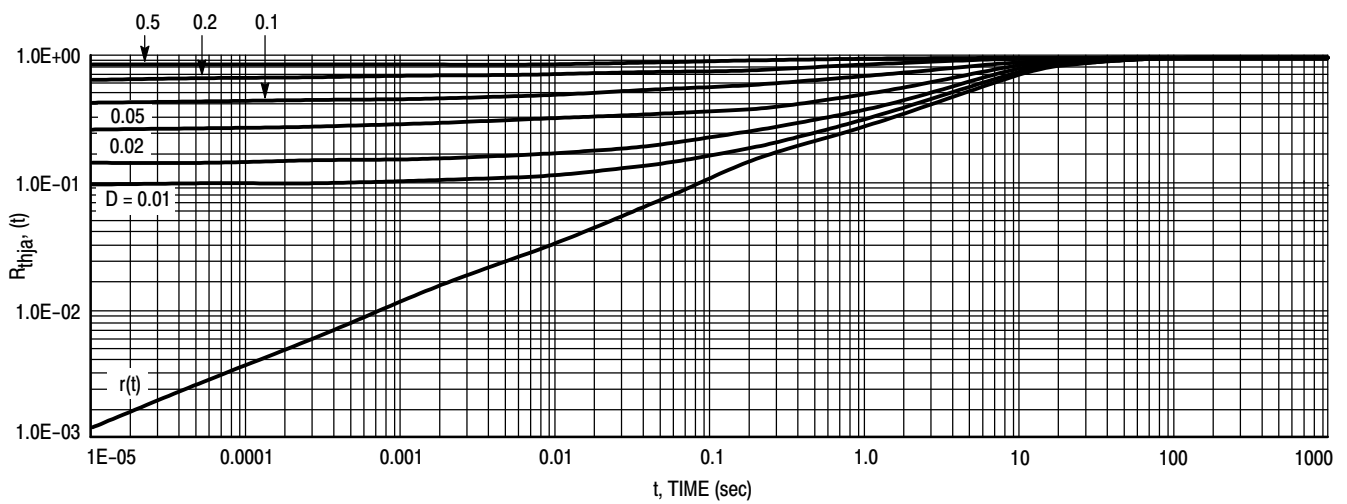
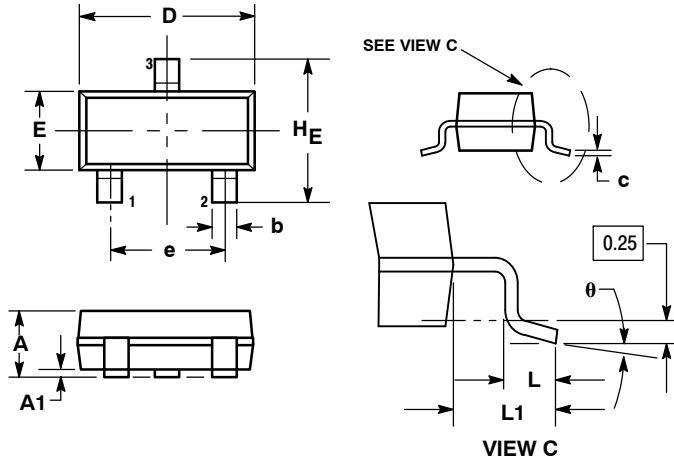


Figure 7. Normalized Thermal Response

# MMBT489LT1G

## PACKAGE DIMENSIONS

SOT-23 (TO-236)  
CASE 318-08  
ISSUE AN



**NOTES:**

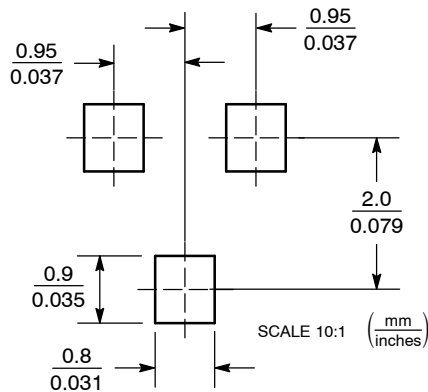
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.89        | 1.00 | 1.11 | 0.035  | 0.040 | 0.044 |
| A1  | 0.01        | 0.06 | 0.10 | 0.001  | 0.002 | 0.004 |
| b   | 0.37        | 0.44 | 0.50 | 0.015  | 0.018 | 0.020 |
| c   | 0.09        | 0.13 | 0.18 | 0.003  | 0.005 | 0.007 |
| D   | 2.80        | 2.90 | 3.04 | 0.110  | 0.114 | 0.120 |
| E   | 1.20        | 1.30 | 1.40 | 0.047  | 0.051 | 0.055 |
| e   | 1.78        | 1.90 | 2.04 | 0.070  | 0.075 | 0.081 |
| L   | 0.10        | 0.20 | 0.30 | 0.004  | 0.008 | 0.012 |
| L1  | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.029 |
| HE  | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |

**STYLE 6:**

1. BASE
2. EMITTER
3. COLLECTOR

### SOLDERING FOOTPRINT\*



\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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