

# MMBT489LT1

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

### Features

- Pb-Free Package is Available

### MAXIMUM RATINGS (T<sub>A</sub> = 25°C)

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V <sub>CEO</sub>	30	Vdc
Collector-Base Voltage	V <sub>CBO</sub>	50	Vdc
Emitter-Base Voltage	V <sub>EBO</sub>	5.0	Vdc
Collector Current – Continuous	I <sub>C</sub>	1.0	A
Collector Current – Peak	I <sub>CM</sub>	2.0	A

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation (Note 1) @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	310 2.5	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 1)	R <sub>θJA</sub>	403	°C/W
Total Device Dissipation (Note 2) @ T <sub>A</sub> = 25°C Derate above 25°C	P <sub>D</sub>	710 5.7	mW mW/°C
Thermal Resistance, Junction-to-Ambient (Note 2)	R <sub>θJA</sub>	176	°C/W
Total Device Dissipation (Single Pulse < 10 s)	P <sub>Dsingle</sub>	575	mW
Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

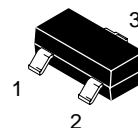
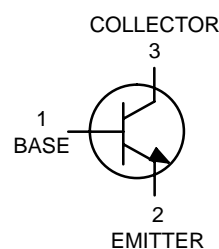
- FR-4 @ Minimum Pad
- FR-4 @ 1.0 X 1.0 inch Pad



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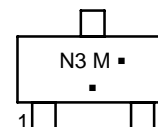
<http://onsemi.com>

## 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†
MMBT489LT1	SOT-23	3000/Tape & Reel
MMBT489LT1G	SOT-23 (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.

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

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

## ON CHARACTERISTICS

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

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

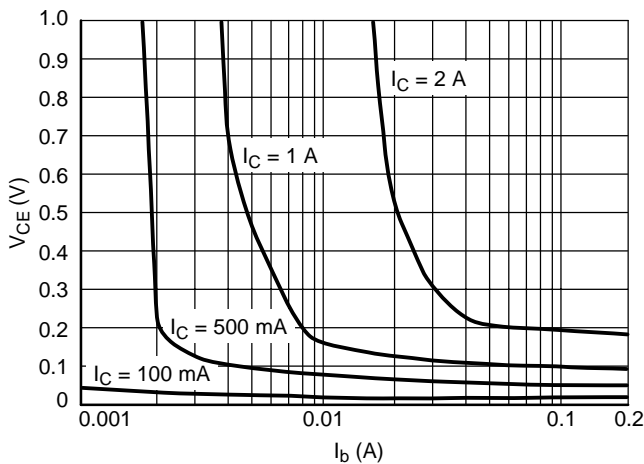


Figure 1. V<sub>CE</sub> versus I<sub>b</sub>

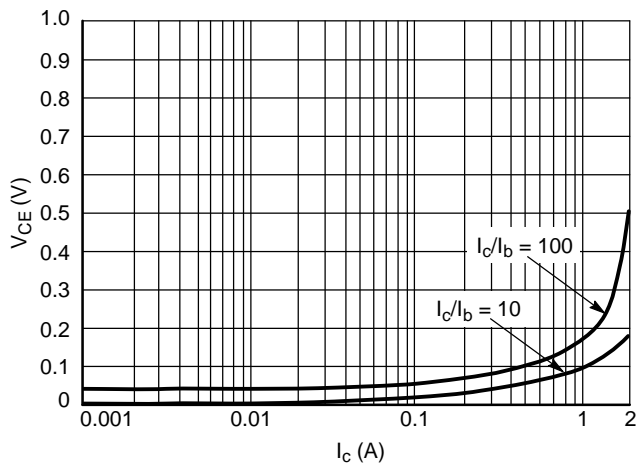


Figure 2. V<sub>CE</sub> versus I<sub>c</sub>

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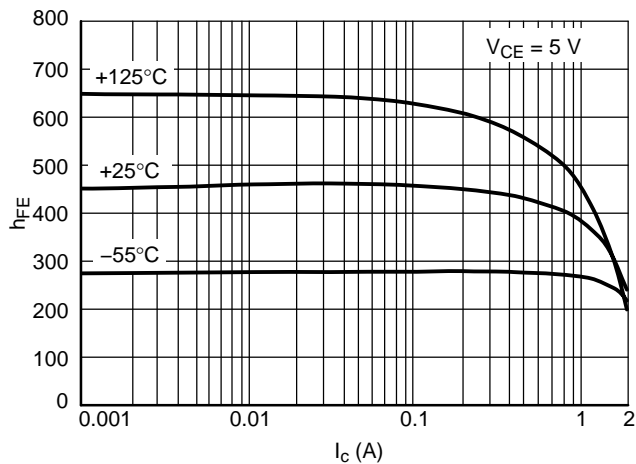


Figure 3.  $h_{FE}$  versus  $I_c$

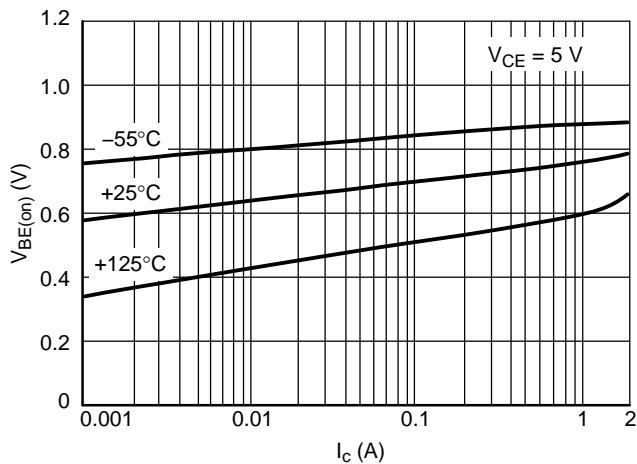


Figure 4.  $V_{BE(on)}$  versus  $I_c$

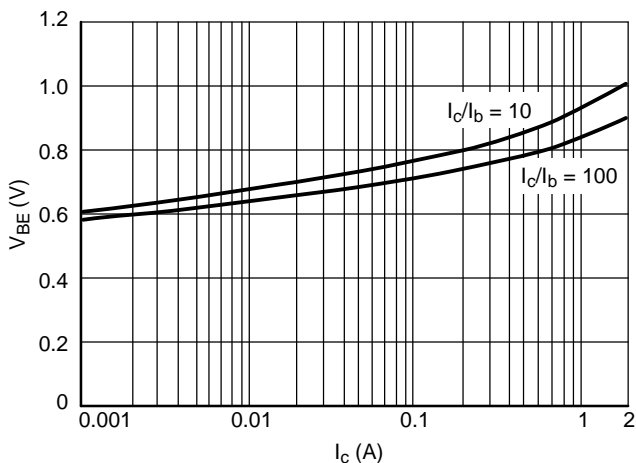


Figure 5.  $V_{BE(sat)}$  versus  $I_c$

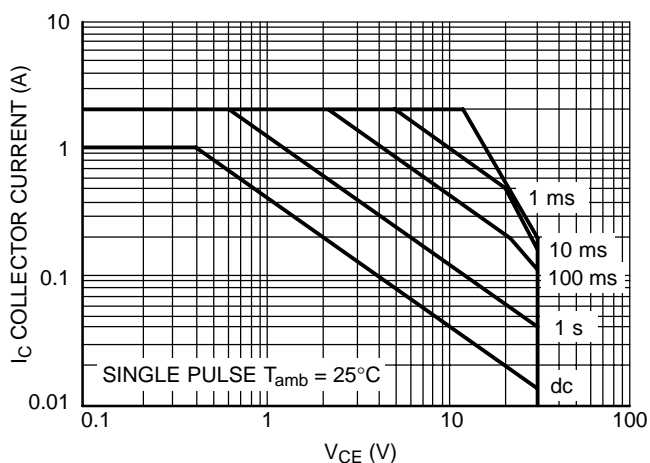


Figure 6. Safe Operating Area

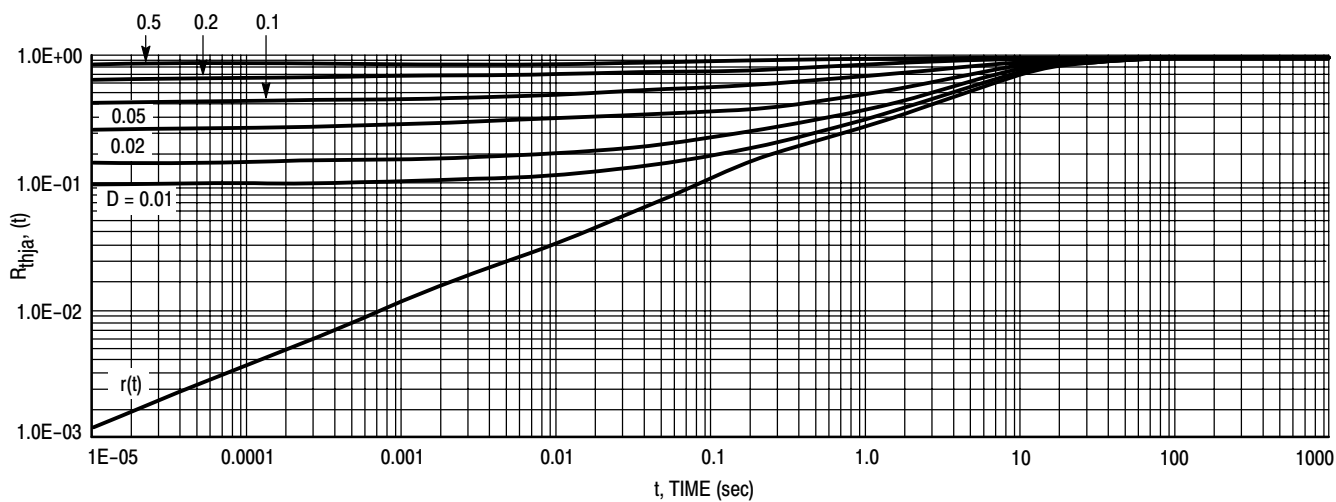
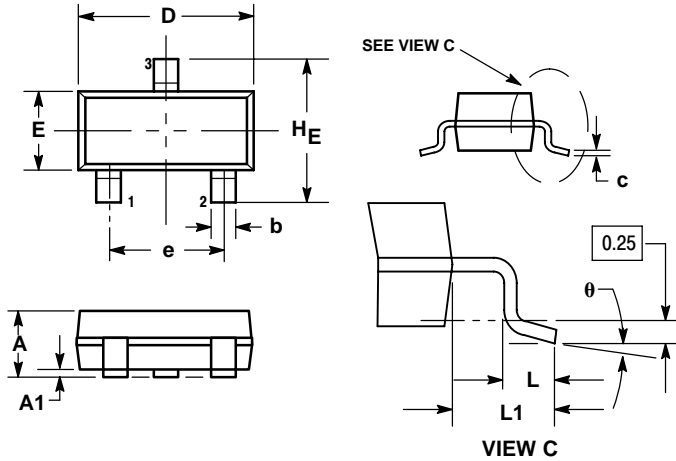


Figure 7. Normalized Thermal Response

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## PACKAGE DIMENSIONS

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



NOTES:

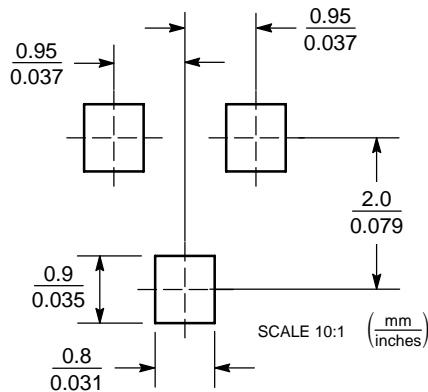
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

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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