

# MMBT6517L, NSVMMBT6517L

## High Voltage Transistor

### NPN Silicon

#### Features

- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector – Emitter Voltage	$V_{CEO}$	350	V
Collector – Base Voltage	$V_{CBO}$	350	V
Emitter – Base Voltage	$V_{EBO}$	5.0	V
Base Current	$I_B$	25	mA
Collector Current – Continuous	$I_C$	100	mA

#### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	225	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300	mW
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

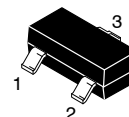
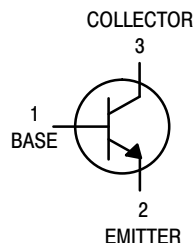
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.
2. Alumina =  $0.4 \times 0.3 \times 0.024$  in. 99.5% alumina.



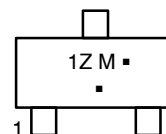
ON Semiconductor®

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

#### MARKING DIAGRAM



1Z = 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†
MMBT6517LT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel
MMBT6517LT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
NSVMMBT6517LT1G	SOT-23 (Pb-Free)	3,000 / 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.

# MMBT6517L, NSVMMBT6517L

## 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> = 1.0 mA)	V <sub>(BR)CEO</sub>	350	–	V
Collector – Base Breakdown Voltage (I <sub>C</sub> = 100 μA)	V <sub>(BR)CBO</sub>	350	–	V
Emitter – Base Breakdown Voltage (I <sub>E</sub> = 10 μA)	V <sub>(BR)EBO</sub>	6.0	–	V
Collector Cutoff Current (V <sub>CB</sub> = 250 V)	I <sub>CBO</sub>	–	50	nA
Emitter Cutoff Current (V <sub>EB</sub> = 5.0 V)	I <sub>EBO</sub>	–	50	nA
<b>ON CHARACTERISTICS</b>				
DC Current Gain (I <sub>C</sub> = 1.0 mA, V <sub>CE</sub> = 10 V) (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 10 V) (I <sub>C</sub> = 30 mA, V <sub>CE</sub> = 10 V) (I <sub>C</sub> = 50 mA, V <sub>CE</sub> = 10 V) (I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 10 V)	h <sub>FE</sub>	20 30 30 20 15	– – 200 200 –	–
Collector – Emitter Saturation Voltage (Note 3) (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1.0 mA) (I <sub>C</sub> = 20 mA, I <sub>B</sub> = 2.0 mA) (I <sub>C</sub> = 30 mA, I <sub>B</sub> = 3.0 mA) (I <sub>C</sub> = 50 mA, I <sub>B</sub> = 5.0 mA)	V <sub>CE(sat)</sub>	– – – –	0.30 0.35 0.50 1.0	V
Base – Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1.0 mA) (I <sub>C</sub> = 20 mA, I <sub>B</sub> = 2.0 mA) (I <sub>C</sub> = 30 mA, I <sub>B</sub> = 3.0 mA)	V <sub>BE(sat)</sub>	– – –	0.75 0.85 0.90	V
Base – Emitter On Voltage (I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 10 V)	V <sub>BE(on)</sub>	–	2.0	V
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
Current Gain – Bandwidth Product (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 20 V, f = 20 MHz)	f <sub>T</sub>	40	200	MHz
Collector–Base Capacitance (V <sub>CB</sub> = 20 V, f = 1.0 MHz)	C <sub>cb</sub>	–	6.0	pF
Emitter–Base Capacitance (V <sub>EB</sub> = 0.5 V, f = 1.0 MHz)	C <sub>eb</sub>	–	80	pF

3. Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

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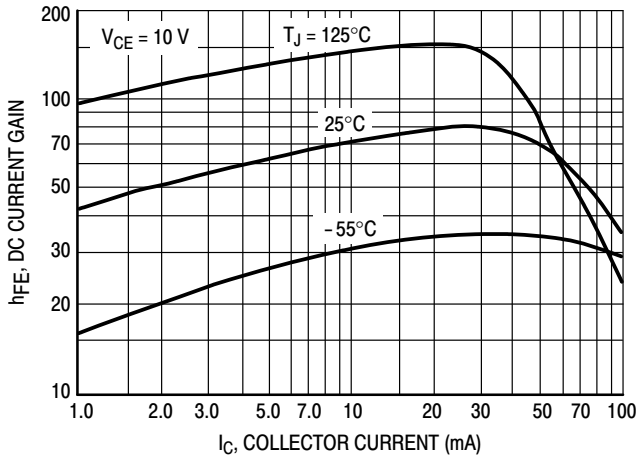


Figure 1. DC Current Gain

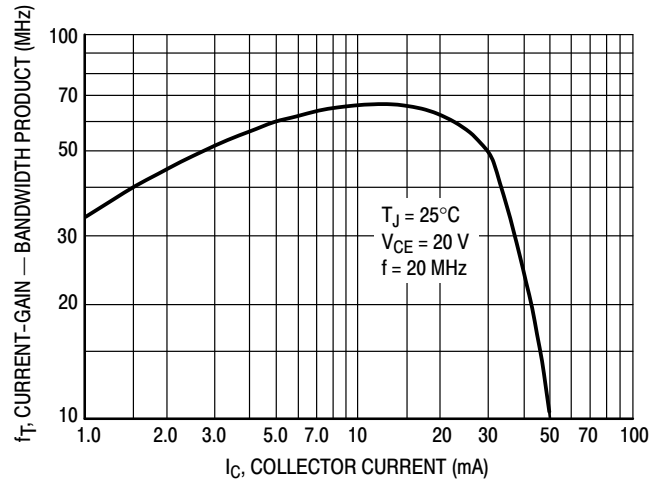


Figure 2. Current-Gain — Bandwidth Product

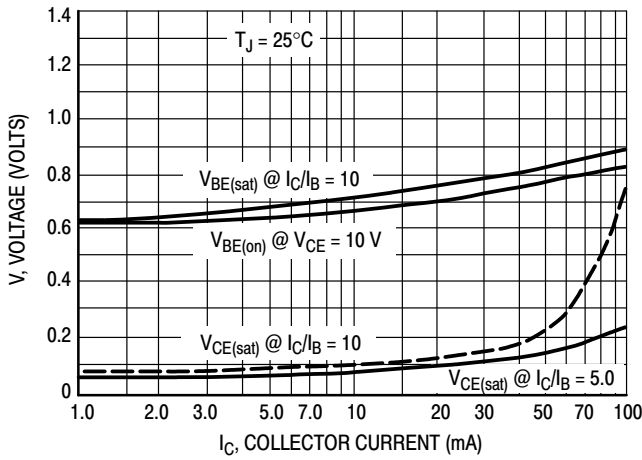


Figure 3. "On" Voltages

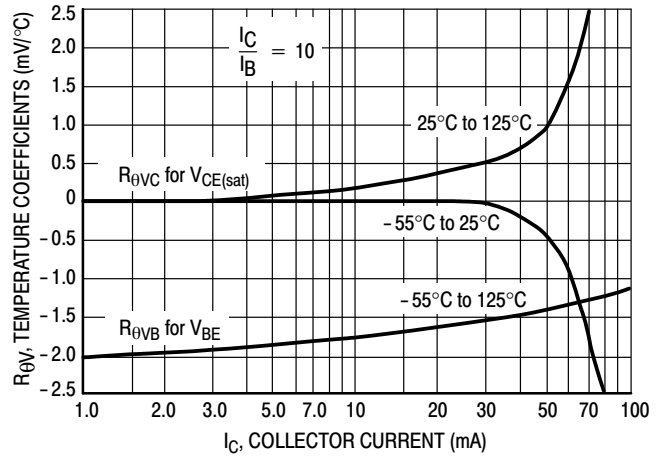


Figure 4. Temperature Coefficients

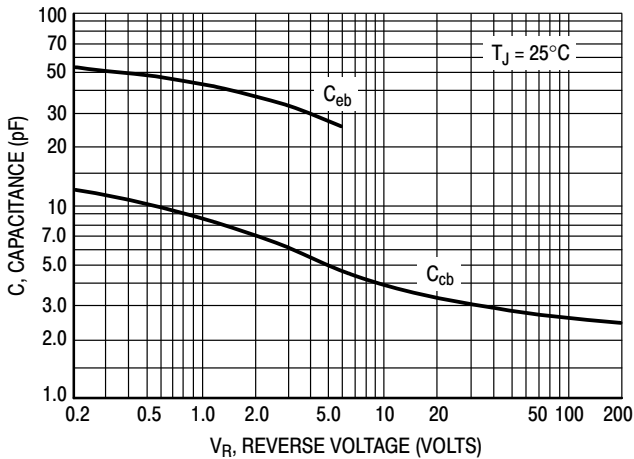


Figure 5. Capacitance

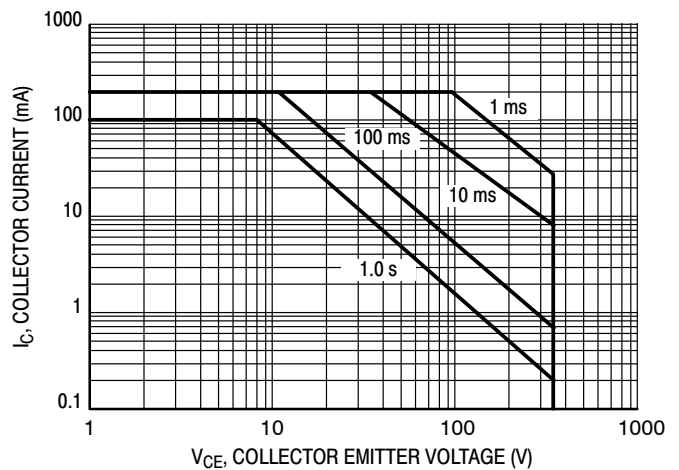


Figure 6. Safe Operating Area

# MMBT6517L, NSVMMBT6517L

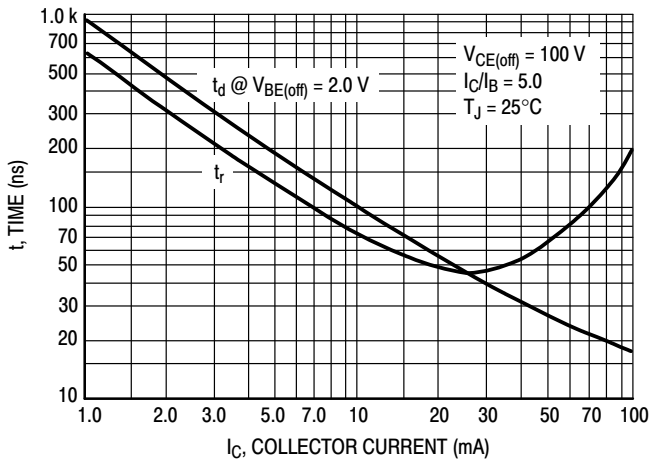


Figure 7. Turn-On Time

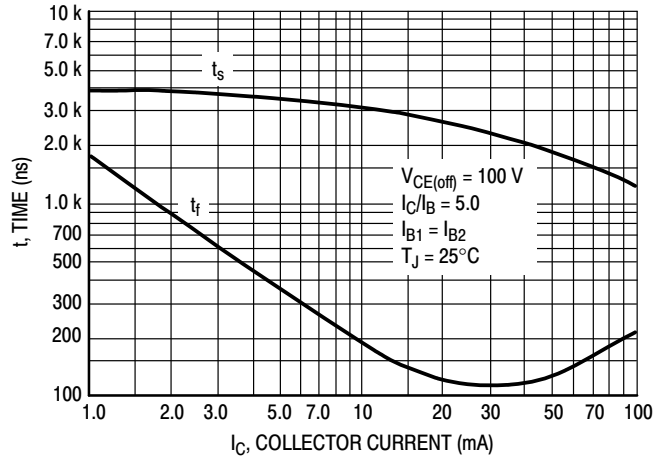


Figure 8. Turn-Off Time

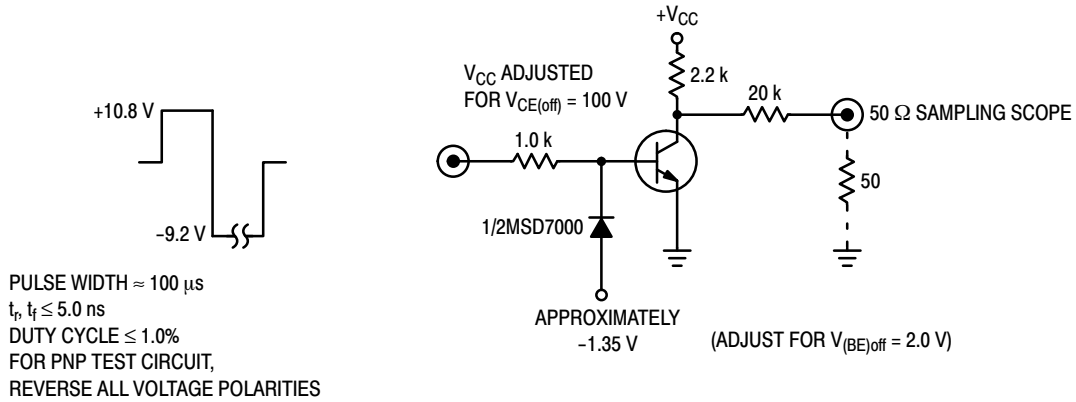


Figure 9. Switching Time Test Circuit

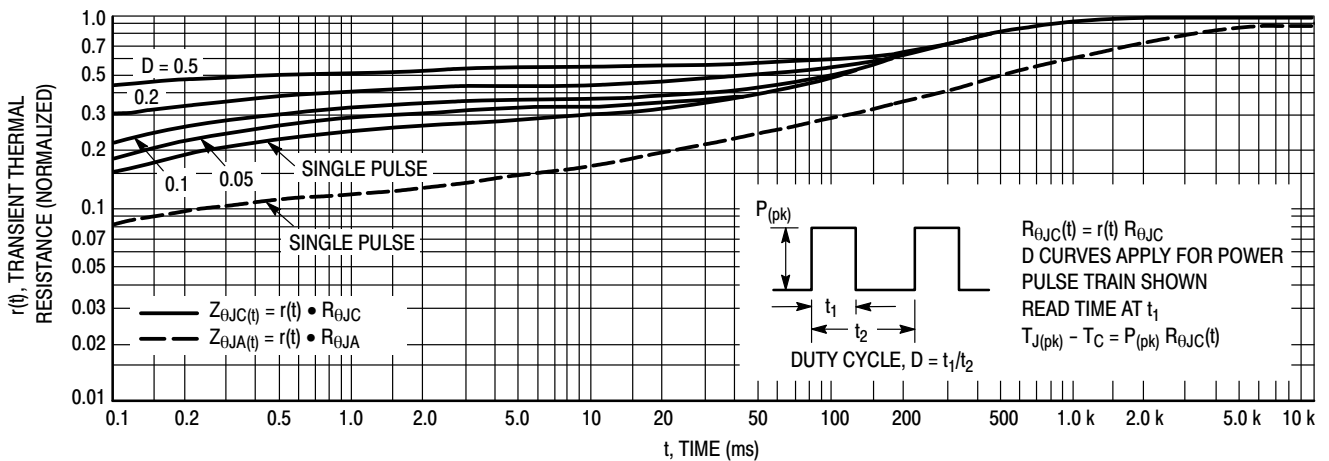
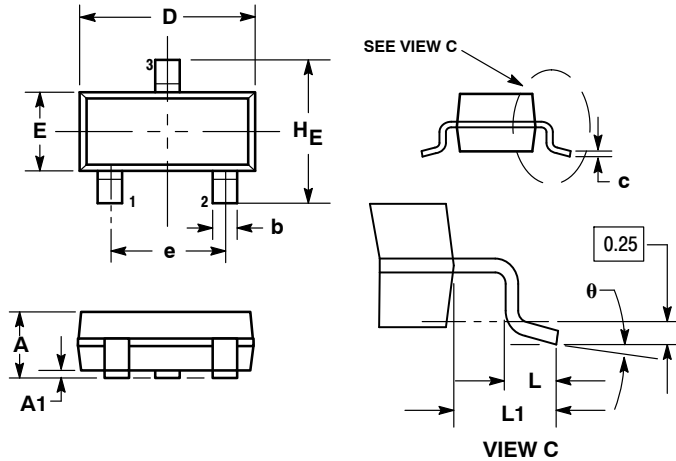


Figure 10. Thermal Response

# MMBT6517L, NSVMMBT6517L

## PACKAGE DIMENSIONS

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



NOTES:

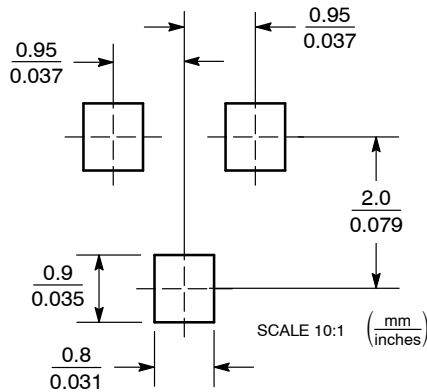
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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
θ	0°	---	10°	0°	---	10°

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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