

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°C	P_D	225 1.8	mW mW/ $^\circ\text{C}$
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°C	P_D	300 2.4	mW mW/ $^\circ\text{C}$
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	$^\circ\text{C}$

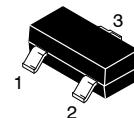
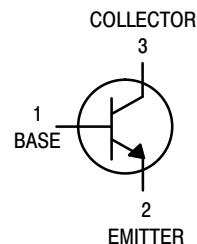
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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.



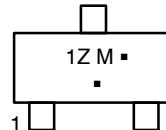
ON Semiconductor®

<http://onsemi.com>



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.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector – Emitter Breakdown Voltage ($I_C = 1.0 \text{ mA}$)	$V_{(\text{BR})\text{CEO}}$	350	–	V
Collector – Base Breakdown Voltage ($I_C = 100 \mu\text{A}$)	$V_{(\text{BR})\text{CBO}}$	350	–	V
Emitter – Base Breakdown Voltage ($I_E = 10 \mu\text{A}$)	$V_{(\text{BR})\text{EBO}}$	6.0	–	V
Collector Cutoff Current ($V_{\text{CB}} = 250 \text{ V}$)	I_{CBO}	–	50	nA
Emitter Cutoff Current ($V_{\text{EB}} = 5.0 \text{ V}$)	I_{EBO}	–	50	nA
ON CHARACTERISTICS				
DC Current Gain ($I_C = 1.0 \text{ mA}, V_{\text{CE}} = 10 \text{ V}$) ($I_C = 10 \text{ mA}, V_{\text{CE}} = 10 \text{ V}$) ($I_C = 30 \text{ mA}, V_{\text{CE}} = 10 \text{ V}$) ($I_C = 50 \text{ mA}, V_{\text{CE}} = 10 \text{ V}$) ($I_C = 100 \text{ mA}, V_{\text{CE}} = 10 \text{ V}$)	h_{FE}	20 30 30 20 15	– – 200 200 –	–
Collector – Emitter Saturation Voltage (Note 3) ($I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$) ($I_C = 20 \text{ mA}, I_B = 2.0 \text{ mA}$) ($I_C = 30 \text{ mA}, I_B = 3.0 \text{ mA}$) ($I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$)	$V_{\text{CE}(\text{sat})}$	– – – –	0.30 0.35 0.50 1.0	V
Base – Emitter Saturation Voltage ($I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$) ($I_C = 20 \text{ mA}, I_B = 2.0 \text{ mA}$) ($I_C = 30 \text{ mA}, I_B = 3.0 \text{ mA}$)	$V_{\text{BE}(\text{sat})}$	– – –	0.75 0.85 0.90	V
Base – Emitter On Voltage ($I_C = 100 \text{ mA}, V_{\text{CE}} = 10 \text{ V}$)	$V_{\text{BE}(\text{on})}$	–	2.0	V
SMALL-SIGNAL CHARACTERISTICS				
Current Gain – Bandwidth Product ($I_C = 10 \text{ mA}, V_{\text{CE}} = 20 \text{ V}, f = 20 \text{ MHz}$)	f_T	40	200	MHz
Collector–Base Capacitance ($V_{\text{CB}} = 20 \text{ V}, f = 1.0 \text{ MHz}$)	C_{cb}	–	6.0	pF
Emitter–Base Capacitance ($V_{\text{EB}} = 0.5 \text{ V}, f = 1.0 \text{ MHz}$)	C_{eb}	–	80	pF

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

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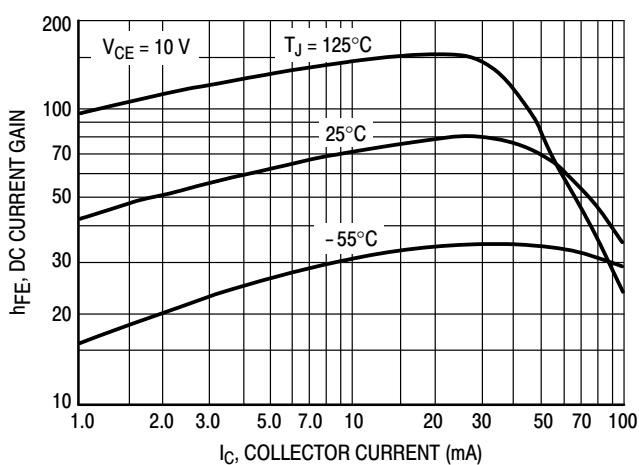


Figure 1. DC Current Gain

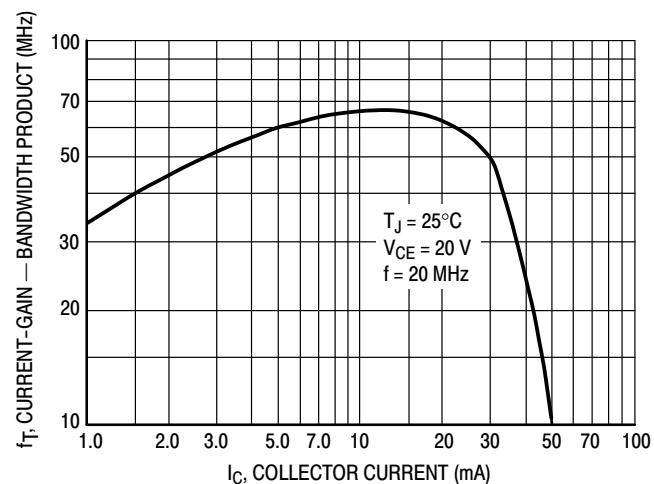


Figure 2. Current-Gain — Bandwidth Product

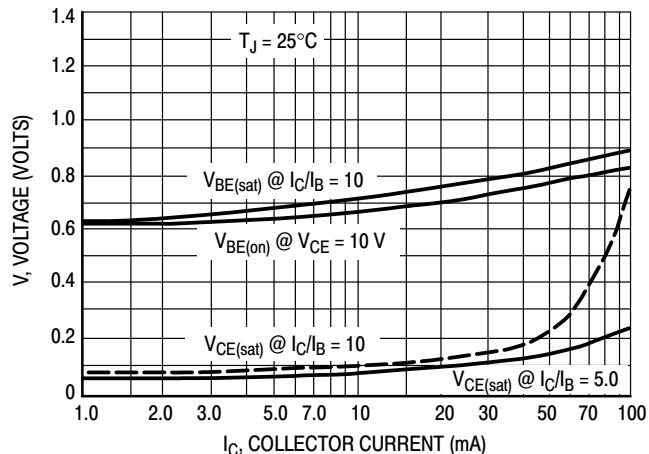


Figure 3. "On" Voltages

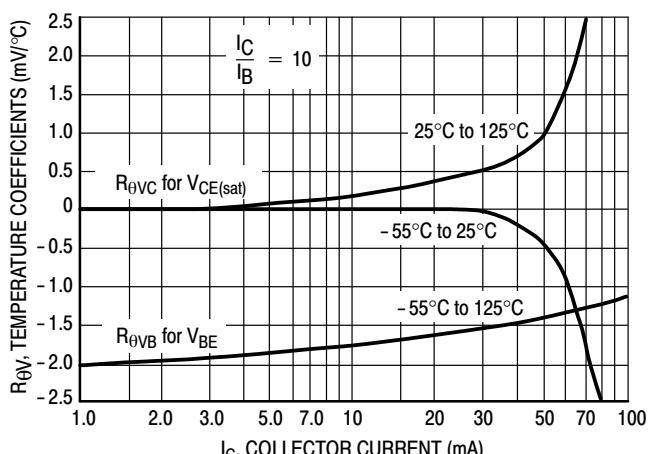


Figure 4. Temperature Coefficients

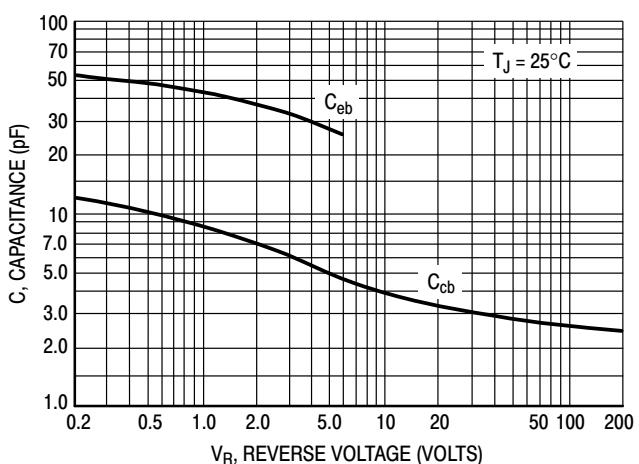


Figure 5. Capacitance

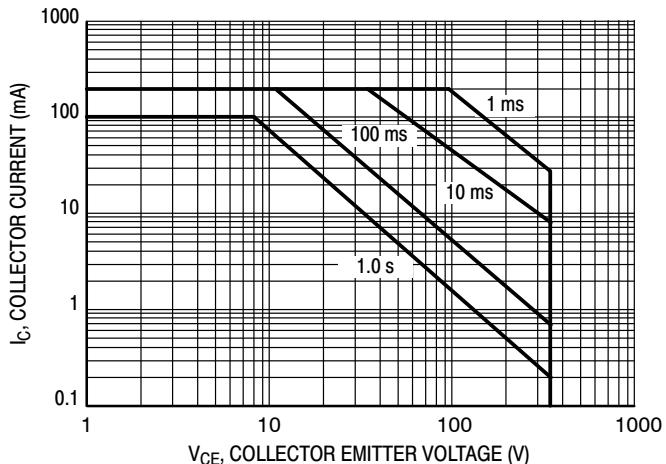


Figure 6. Safe Operating Area

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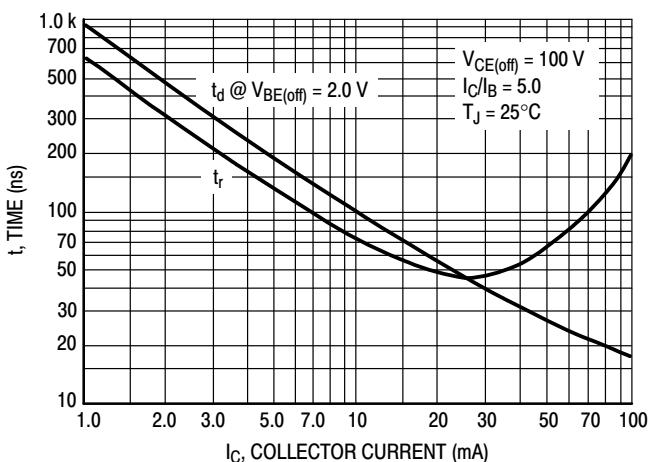


Figure 7. Turn-On Time

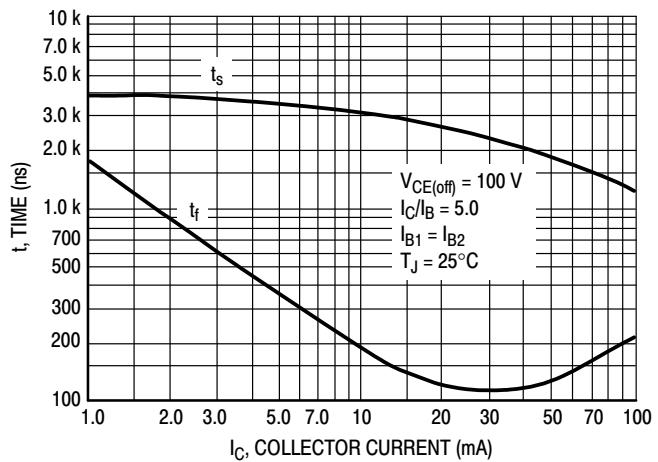


Figure 8. Turn-Off Time

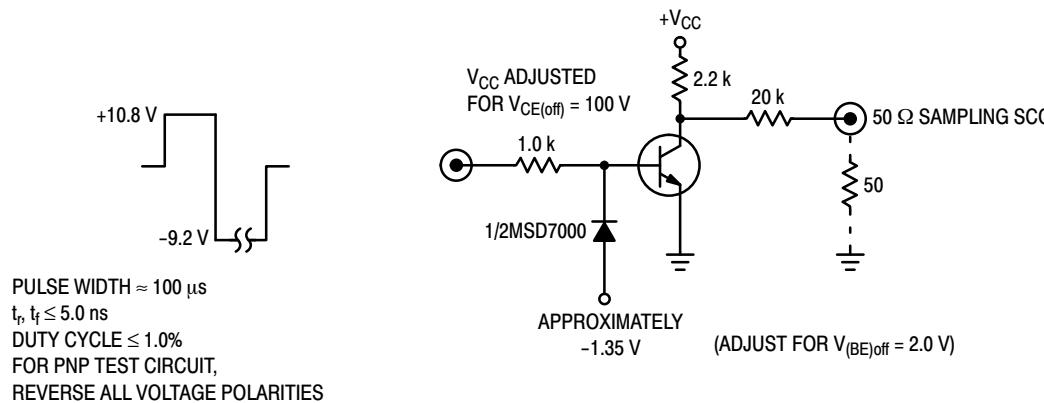


Figure 9. Switching Time Test Circuit

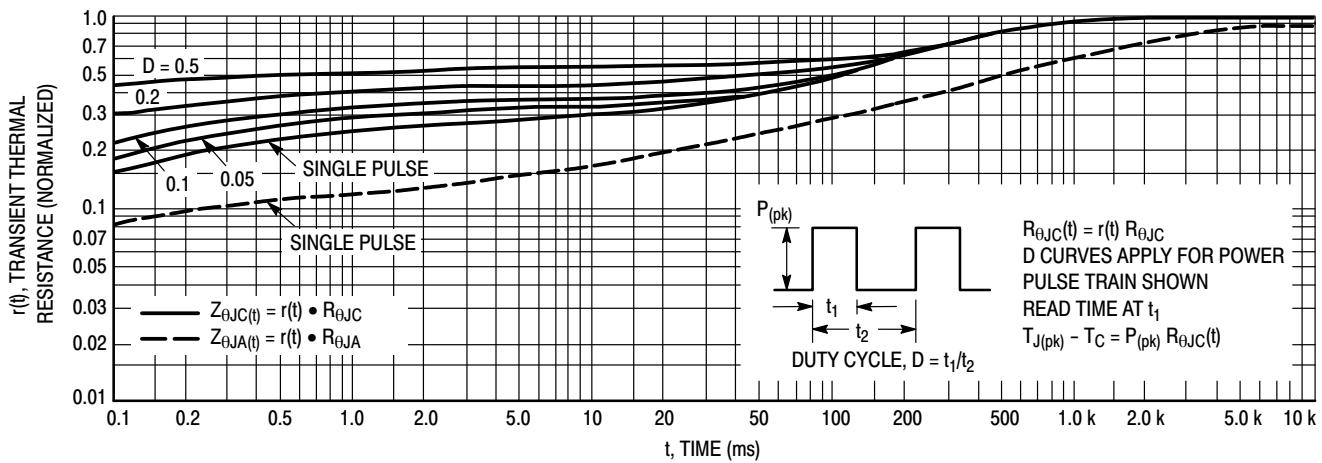
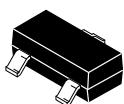


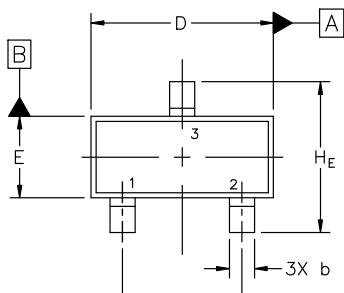
Figure 10. Thermal Response



SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

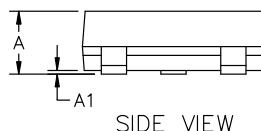
DATE 14 AUG 2024



TOP VIEW

DETAIL "A"

Scale 3:1

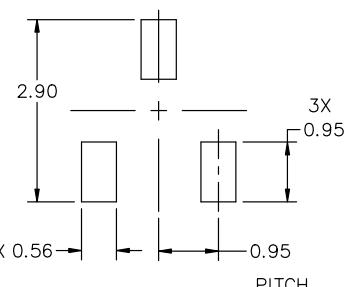


SIDE VIEW

DETAIL "A"

END VIEW

SEATING PLANE

GENERIC
MARKING DIAGRAM*

XXX = Specific Device Code
M = Date Code
■ = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "■", may or may not be present. Some products may not follow the Generic Marking.

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
HE	2.10	2.40	2.64
T	0°	---	10°

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

RECOMMENDED
MOUNTING FOOTPRINT

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

STYLES ON PAGE 2

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STYLE 1 THRU 5:
CANCELLEDSTYLE 6:
PIN 1. BASE
2. Emitter
3. CollectorSTYLE 7:
PIN 1. Emitter
2. Base
3. CollectorSTYLE 8:
PIN 1. Anode
2. No Connection
3. CathodeSTYLE 9:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 10:
PIN 1. Drain
2. Source
3. GateSTYLE 11:
PIN 1. Anode
2. Cathode
3. Cathode-AnodeSTYLE 12:
PIN 1. Cathode
2. Cathode
3. AnodeSTYLE 13:
PIN 1. Source
2. Drain
3. GateSTYLE 14:
PIN 1. Cathode
2. Gate
3. AnodeSTYLE 15:
PIN 1. Gate
2. Cathode
3. AnodeSTYLE 16:
PIN 1. Anode
2. Cathode
3. CathodeSTYLE 17:
PIN 1. No Connection
2. Anode
3. CathodeSTYLE 18:
PIN 1. No Connection
2. Cathode
3. AnodeSTYLE 19:
PIN 1. Cathode
2. Anode
3. Cathode-AnodeSTYLE 20:
PIN 1. Cathode
2. Anode
3. GateSTYLE 21:
PIN 1. Gate
2. Source
3. DrainSTYLE 22:
PIN 1. Return
2. Output
3. InputSTYLE 23:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 24:
PIN 1. Gate
2. Drain
3. SourceSTYLE 25:
PIN 1. Anode
2. Cathode
3. GateSTYLE 26:
PIN 1. Cathode
2. Anode
3. No ConnectionSTYLE 27:
PIN 1. Cathode
2. Cathode
3. CathodeSTYLE 28:
PIN 1. Anode
2. Anode
3. Anode

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