

High Voltage Transistor

PNP Silicon

MMBT6520L, NSVMMBT6520L

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

Symbol	Rating	Value	Unit
V_{CEO}	Collector – Emitter Voltage	–350	Vdc
V_{CBO}	Collector – Base Voltage	–350	Vdc
V_{EBO}	Emitter – Base Voltage	–5.0	Vdc
I_B	Base Current	–250	mA
I_C	Collector Current – Continuous	–500	mAdc

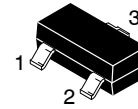
THERMAL CHARACTERISTICS

Symbol	Characteristic	Max	Unit
P_D	Total Device Dissipation FR–5 Board, (Note 1) $T_A = 25^\circ\text{C}$ Derate above 25°C	225 1.8	mW mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	556	$^\circ\text{C}/\text{W}$
P_D	Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ Derate above 25°C	300 2.4	mW mW/ $^\circ\text{C}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	417	$^\circ\text{C}/\text{W}$
T_J, T_{stg}	Junction and Storage Temperature	–55 to +150	$^\circ\text{C}$

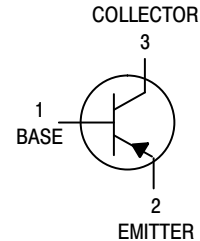
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR–5 = 1.0 x 0.75 x 0.062 in.

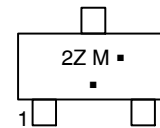
2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.



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



MARKING DIAGRAM



2Z = 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 [†]
MMBT6520LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
NSVMMBT6520LT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel

DISCONTINUED (Note 1)

MMBT6520LT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
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[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

1. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.

MMBT6520L, NSVMMBT6520L

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

Symbol	Characteristic	Min	Max	Unit
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OFF CHARACTERISTICS

$V_{(BR)CEO}$	Collector–Emitter Breakdown Voltage ($I_C = -1.0\text{ mA}$)	-350	–	Vdc
$V_{(BR)CBO}$	Collector–Base Breakdown Voltage ($I_C = -100\text{ }\mu\text{A}$)	-350	–	Vdc
$V_{(BR)EBO}$	Emitter–Base Breakdown Voltage ($I_E = -10\text{ }\mu\text{A}$)	-5.0	–	Vdc
I_{CBO}	Collector Cutoff Current ($V_{CB} = -250\text{ V}$)	–	-50	nA
I_{EBO}	Emitter Cutoff Current ($V_{EB} = -4.0\text{ V}$)	–	-50	nA

ON CHARACTERISTICS

h_{FE}	DC Current Gain ($I_C = -1.0\text{ mA}$, $V_{CE} = -10\text{ V}$) ($I_C = -10\text{ mA}$, $V_{CE} = -10\text{ V}$) ($I_C = -30\text{ mA}$, $V_{CE} = -10\text{ V}$) ($I_C = -50\text{ mA}$, $V_{CE} = -10\text{ V}$) ($I_C = -100\text{ mA}$, $V_{CE} = -10\text{ V}$)	20 30 30 20 15	– – 200 200 –	–
$V_{CE(sat)}$	Collector–Emitter Saturation Voltage ($I_C = -10\text{ mA}$, $I_B = -1.0\text{ mA}$) ($I_C = -20\text{ mA}$, $I_B = -2.0\text{ mA}$) ($I_C = -30\text{ mA}$, $I_B = -3.0\text{ mA}$) ($I_C = -50\text{ mA}$, $I_B = -5.0\text{ mA}$)	– – – –	-0.30 -0.35 -0.50 -1.0	Vdc
$V_{BE(sat)}$	Base–Emitter Saturation Voltage ($I_C = -10\text{ mA}$, $I_B = -1.0\text{ mA}$) ($I_C = -20\text{ mA}$, $I_B = -2.0\text{ mA}$) ($I_C = -30\text{ mA}$, $I_B = -3.0\text{ mA}$)	– – –	-0.75 -0.85 -0.90	Vdc
$V_{BE(on)}$	Base–Emitter On Voltage ($I_C = -100\text{ mA}$, $V_{CE} = -10\text{ V}$)	–	-2.0	Vdc

SMALL–SIGNAL CHARACTERISTICS

f_T	Current–Gain – Bandwidth Product ($I_C = -10\text{ mA}$, $V_{CE} = -20\text{ V}$, $f = 20\text{ MHz}$)	40	200	MHz
C_{cb}	Collector–Base Capacitance ($V_{CB} = -20\text{ V}$, $f = 1.0\text{ MHz}$)	–	6.0	pF
C_{eb}	Emitter–Base Capacitance ($V_{EB} = -0.5\text{ V}$, $f = 1.0\text{ MHz}$)	–	100	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS

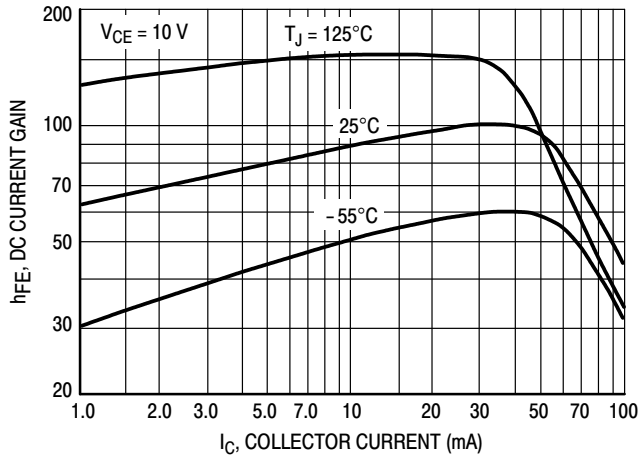


Figure 1. DC Current Gain

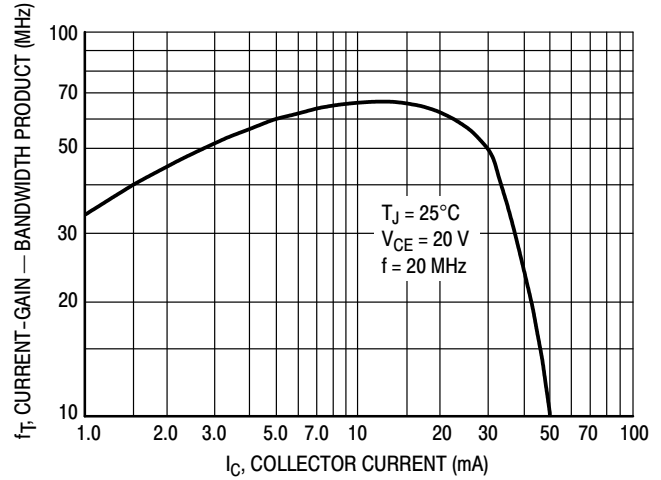


Figure 2. Current-Gain — Bandwidth Product

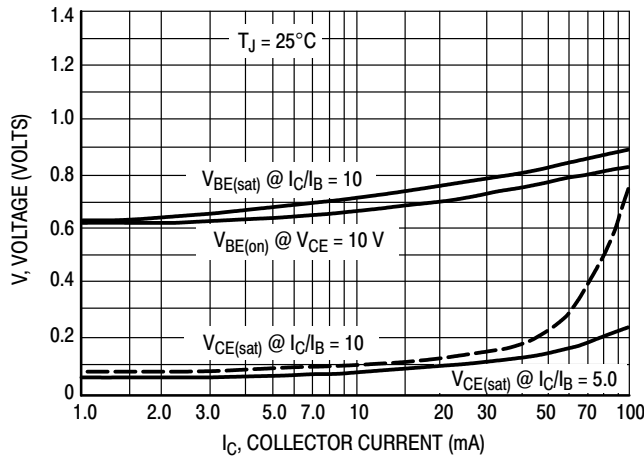


Figure 3. "On" Voltages

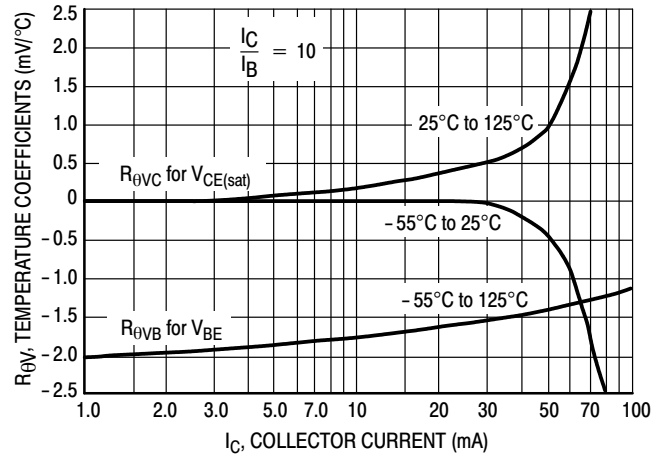


Figure 4. Temperature Coefficients

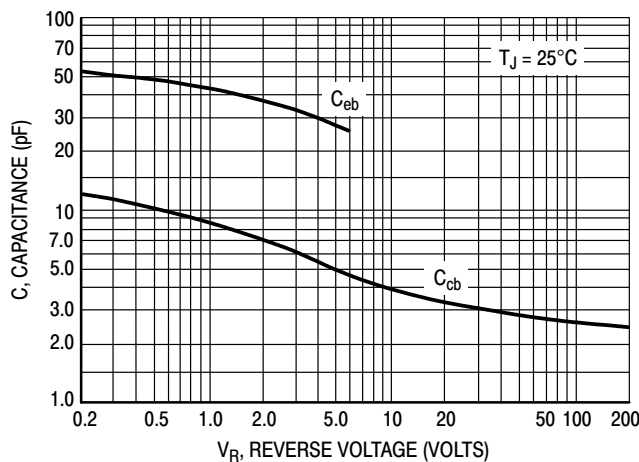


Figure 5. Capacitance

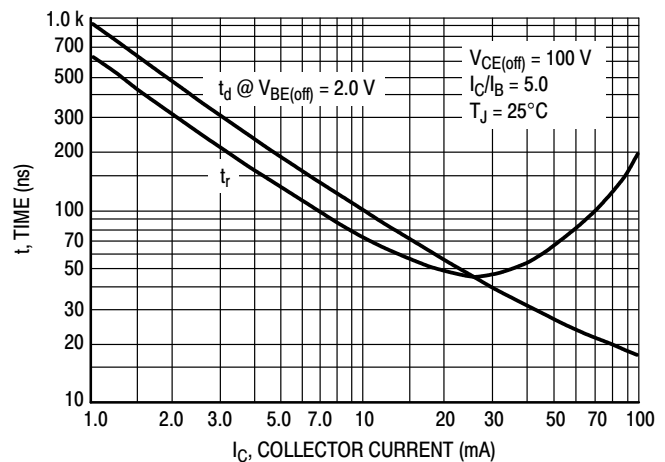


Figure 6. Turn-On Time

MMBT6520L, NSVMMBT6520L

TYPICAL CHARACTERISTICS (continued)

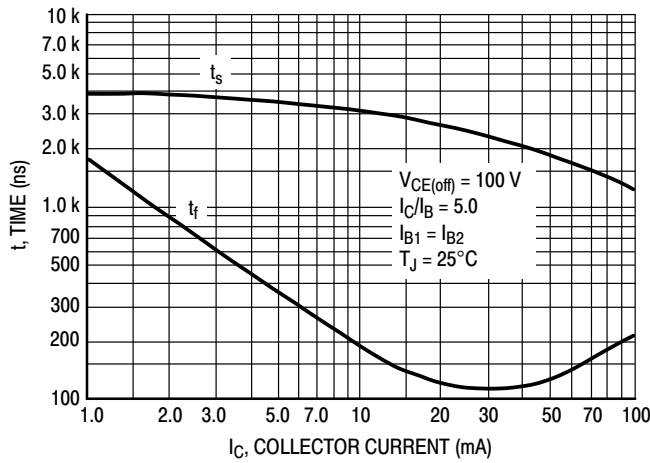


Figure 7. Turn-Off Time

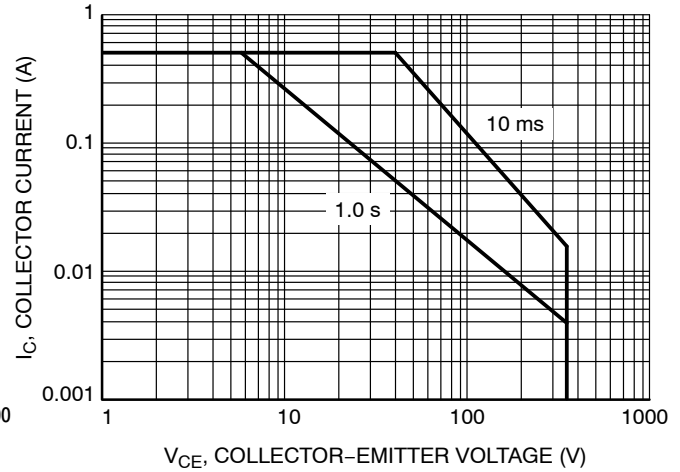


Figure 8. Safe Operating Area

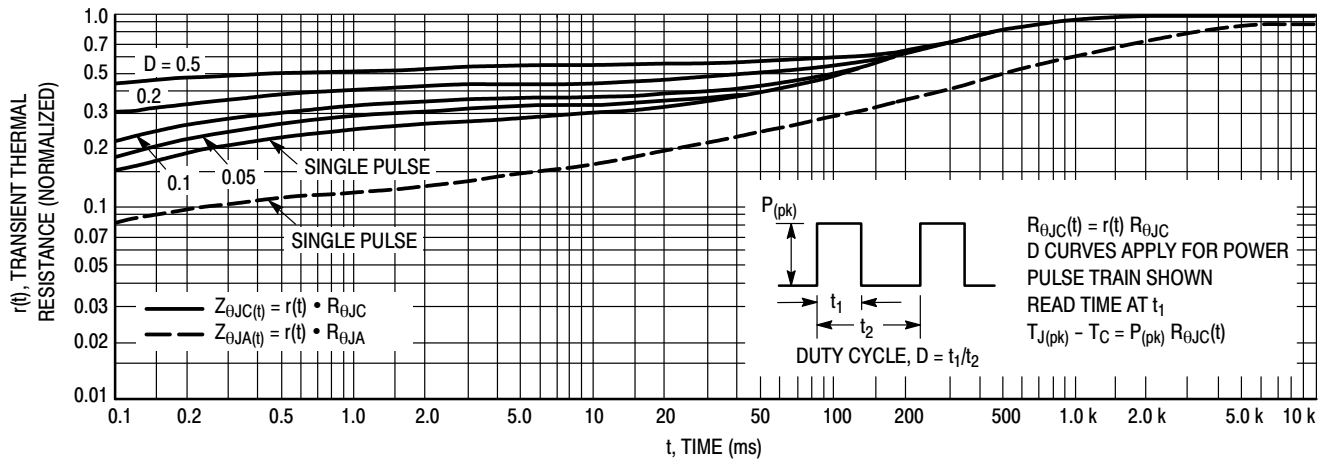


Figure 9. Thermal Response

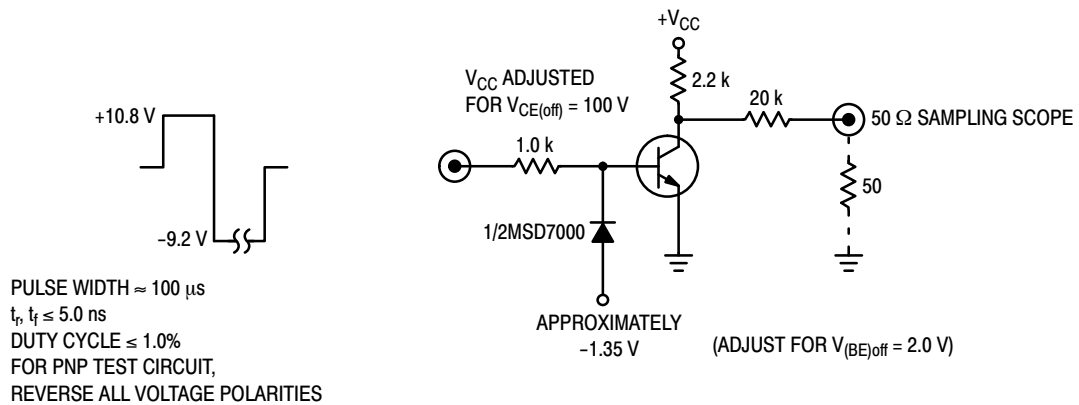


Figure 10. Switching Time Test Circuit



SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P
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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.

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.



RECOMMENDED MOUNTING FOOTPRINT

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

STYLES ON PAGE 2

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STYLE 1 THRU 5: CANCELLED	STYLE 6: PIN 1. BASE 2. EMITTER 3. COLLECTOR	STYLE 7: PIN 1. EMITTER 2. BASE 3. COLLECTOR	STYLE 8: PIN 1. ANODE 2. NO CONNECTION 3. CATHODE		
STYLE 9: PIN 1. ANODE 2. ANODE 3. CATHODE	STYLE 10: PIN 1. DRAIN 2. SOURCE 3. GATE	STYLE 11: PIN 1. ANODE 2. CATHODE 3. CATHODE-ANODE	STYLE 12: PIN 1. CATHODE 2. CATHODE 3. ANODE	STYLE 13: PIN 1. SOURCE 2. DRAIN 3. GATE	STYLE 14: PIN 1. CATHODE 2. GATE 3. ANODE
STYLE 15: PIN 1. GATE 2. CATHODE 3. ANODE	STYLE 16: PIN 1. ANODE 2. CATHODE 3. CATHODE	STYLE 17: PIN 1. NO CONNECTION 2. ANODE 3. CATHODE	STYLE 18: PIN 1. NO CONNECTION 2. CATHODE 3. ANODE	STYLE 19: PIN 1. CATHODE 2. ANODE 3. CATHODE-ANODE	STYLE 20: PIN 1. CATHODE 2. ANODE 3. GATE
STYLE 21: PIN 1. GATE 2. SOURCE 3. DRAIN	STYLE 22: PIN 1. RETURN 2. OUTPUT 3. INPUT	STYLE 23: PIN 1. ANODE 2. ANODE 3. CATHODE	STYLE 24: PIN 1. GATE 2. DRAIN 3. SOURCE	STYLE 25: PIN 1. ANODE 2. CATHODE 3. GATE	STYLE 26: PIN 1. CATHODE 2. ANODE 3. NO CONNECTION
STYLE 27: PIN 1. CATHODE 2. CATHODE 3. CATHODE	STYLE 28: PIN 1. ANODE 2. ANODE 3. ANODE				

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