

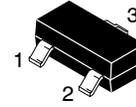
# High Voltage Transistor

## PNP Silicon

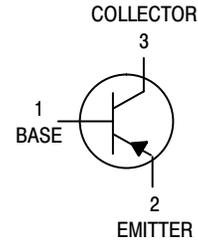
# MMBT6520L, NSVMMBT6520L

### 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



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



### 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

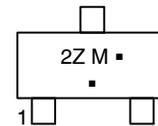
### THERMAL CHARACTERISTICS

Symbol	Characteristic	Max	Unit
$P_D$	Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	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 $25^\circ\text{C}$	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.

### 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 <sup>†</sup>
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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<sup>†</sup>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 ( $I_C = -100\ \mu\text{A}$ )	-350	-	Vdc
$V_{(BR)EBO}$	Emitter–Base Breakdown Voltage ( $I_E = -10\ \mu\text{A}$ )	-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.

# MMBT6520L, NSVMMBT6520L

## TYPICAL CHARACTERISTICS

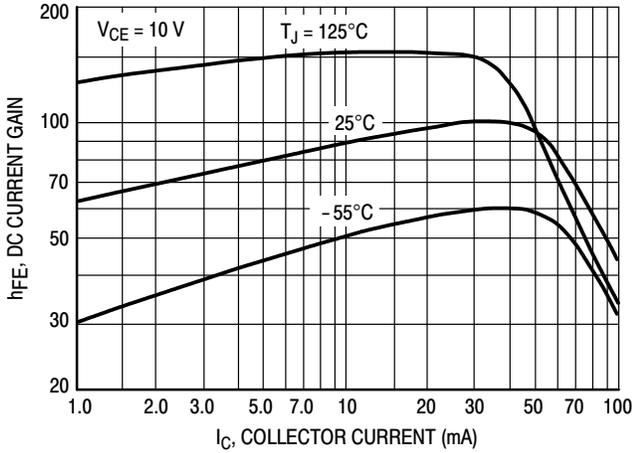


Figure 1. DC Current Gain

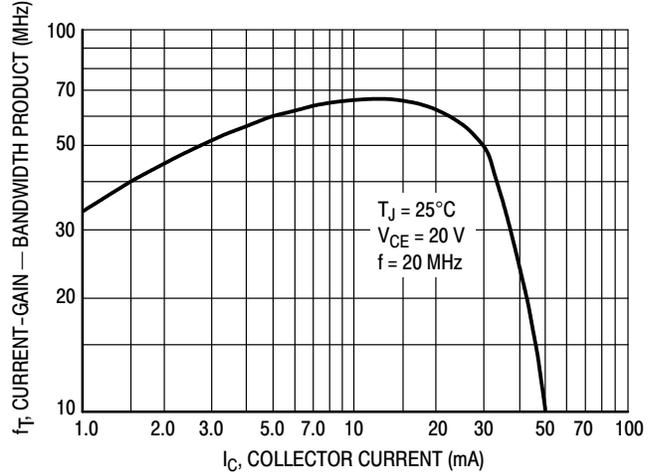


Figure 2. Current-Gain — Bandwidth Product

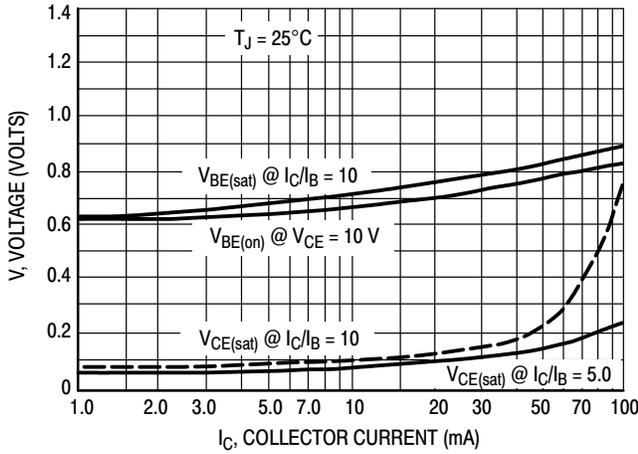


Figure 3. "On" Voltages

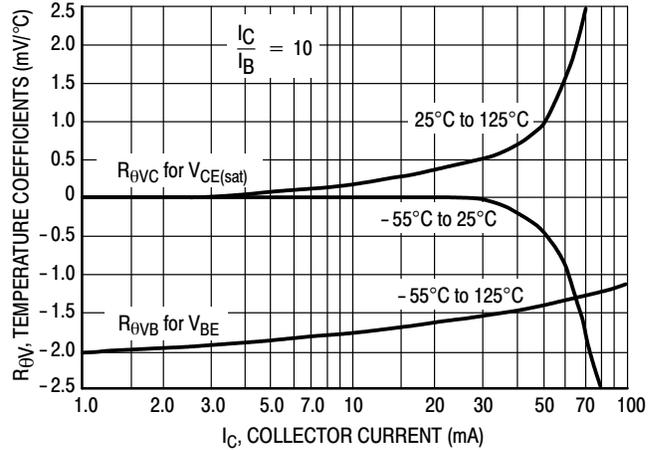


Figure 4. Temperature Coefficients

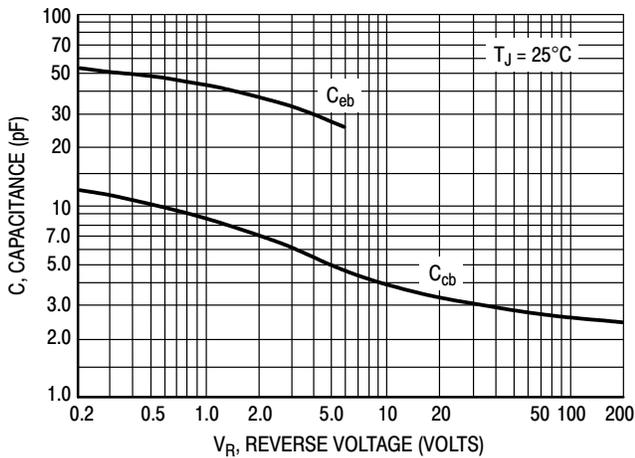


Figure 5. Capacitance

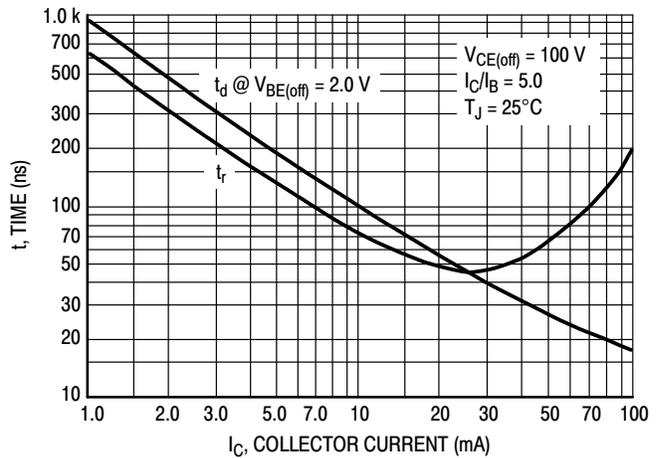
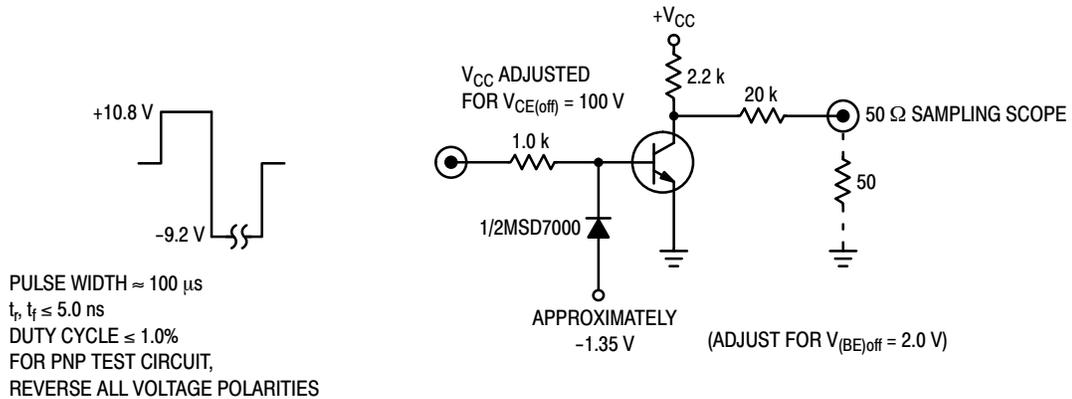
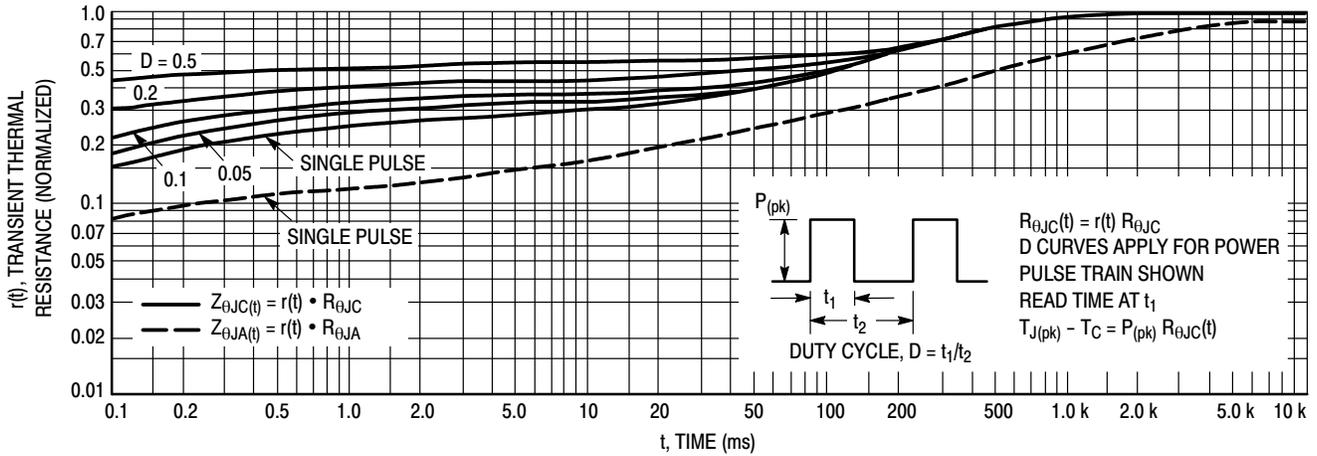
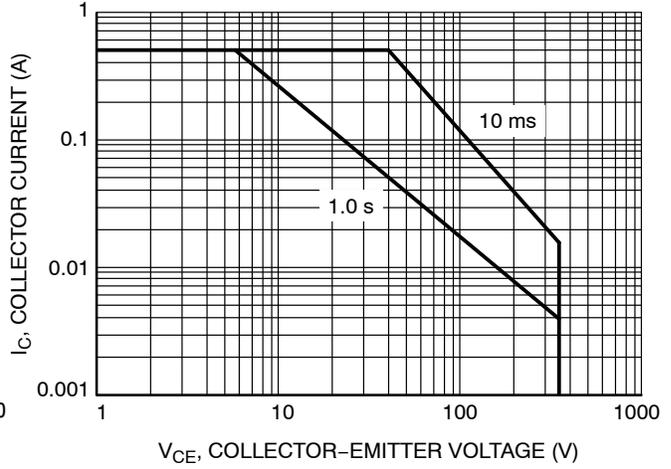
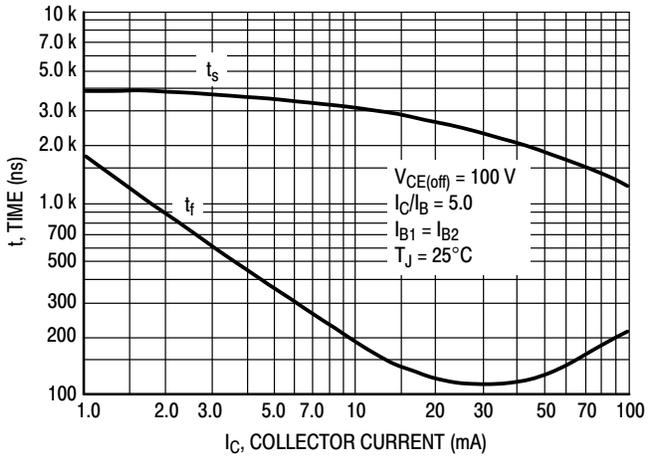
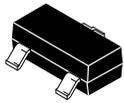


Figure 6. Turn-On Time

# MMBT6520L, NSVMMBT6520L

## TYPICAL CHARACTERISTICS (continued)

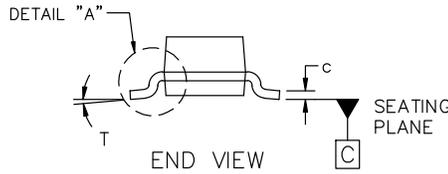
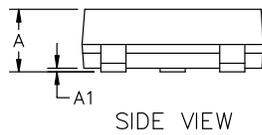
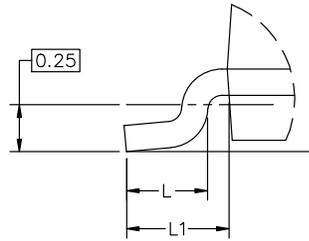
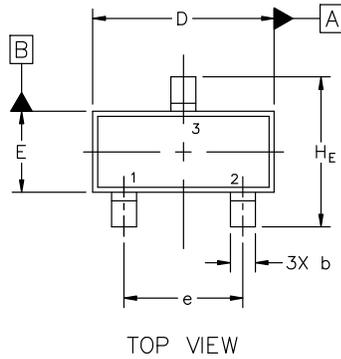




SCALE 4:1

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

DATE 14 AUG 2024

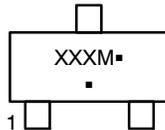


MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
HE	2.10	2.40	2.64
T	0°	---	10°

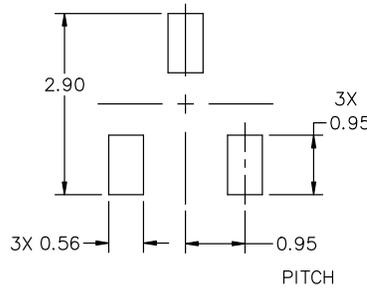
NOTES:

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



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

\*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.

**STYLES ON PAGE 2**

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

DATE 14 AUG 2024

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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