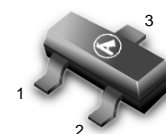
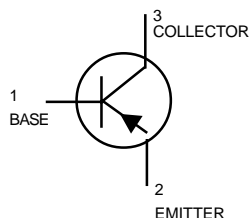


# High Voltage Transistor

PNP Silicon

**MMBT5401LT1**



CASE 318-08, STYLE 6  
SOT- 23 (TO-236AB)

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	- 150	Vdc
Collector-Base Voltage	$V_{CBO}$	- 160	Vdc
Emitter-Base Voltage	$V_{EBO}$	- 5.0	Vdc
Collector Current — Continuous	$I_C$	- 500	mAdc

## THERMAL CHARACTERISTICS

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

## DEVICE MARKING

MMBT5401LT1=2L

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

Characteristic	Symbol	Min	Max	Unit
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## OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ( $I_C = -1.0\text{ mAdc}, I_B = 0$ )	$V_{(BR)CEO}$	- 150	—	Vdc
Collector-Base Breakdown Voltage ( $I_C = -100\ \mu\text{Adc}, I_E = 0$ )	$V_{(BR)CBO}$	- 160	—	Vdc
Emitter-Base Breakdown Voltage ( $I_E = -10\ \mu\text{Adc}, I_C = 0$ )	$V_{(BR)EBO}$	-5.0	—	Vdc
Collector Cutoff Current ( $V_{CB} = -120\text{ Vdc}, I_E = 0$ )	$I_{CES}$	—	- 50	nAdc
( $V_{CB} = -120\text{ Vdc}, I_E = 0, T_A = 100^\circ\text{C}$ )		—	- 50	$\mu\text{Adc}$

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.

**MMBT5401LT1**
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
<b>ON CHARACTERISTICS (2)</b>				
DC Current Gain	$h_{FE}$			—
( $I_C = -1.0\text{mA}$ , $V_{CE} = -5.0\text{Vdc}$ )		50	—	
( $I_C = -10\text{mA}$ , $V_{CE} = -5.0\text{Vdc}$ )		60	240	
( $I_C = -50\text{mA}$ , $V_{CE} = -5.0\text{Vdc}$ )		50	—	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$			Vdc
( $I_C = -10\text{mA}$ , $I_B = -1.0\text{mA}$ )		—	-0.2	
( $I_C = -50\text{mA}$ , $I_B = -5.0\text{mA}$ )		—	-0.5	
Base–Emitter Saturation Voltage	$V_{BE(sat)}$			Vdc
( $I_C = -10\text{mA}$ , $I_B = -1.0\text{mA}$ )		—	-1.0	
( $I_C = -50\text{mA}$ , $I_B = -5.0\text{mA}$ )		—	-1.0	
<b>SMALL–SIGNAL CHARACTERISTICS</b>				
Current–Gain — Bandwidth Product	$f_T$			MHz
( $I_C = -10\text{mA}$ , $V_{CE} = -10\text{Vdc}$ , $f = 100\text{MHz}$ )		100	300	
Output Capacitance	$C_{obo}$			pF
( $V_{CB} = -10\text{Vdc}$ , $I_E = 0$ , $f = 1.0\text{MHz}$ )		—	6.0	
Small–Signal Current Gain	$h_{fe}$			—
( $I_C = -1.0\text{mA}$ , $V_{CE} = -10\text{Vdc}$ , $f = 1.0\text{kHz}$ )		40	200	
Noise Figure	NF			dB
( $I_C = -200\mu\text{A}$ , $V_{CE} = -5.0\text{Vdc}$ , $R_s = 10\Omega$ , $f = 1.0\text{kHz}$ )		—	8.0	

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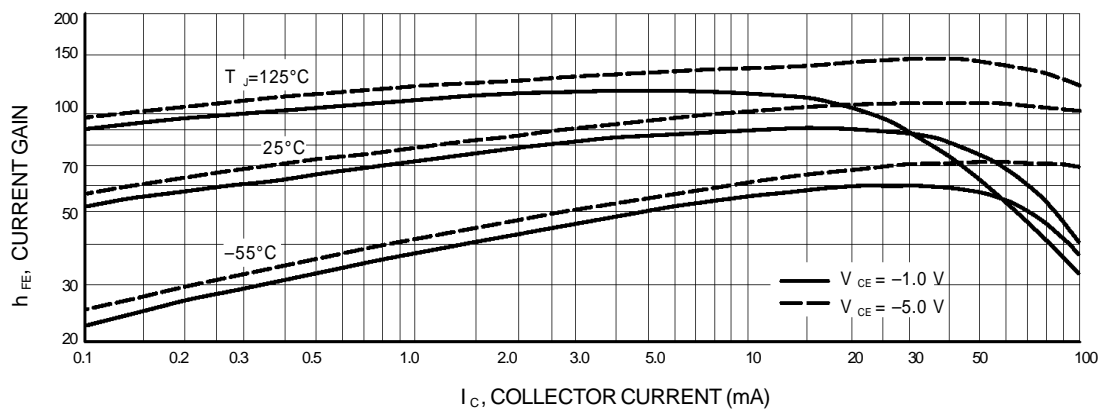


Figure 1. DC Current Gain

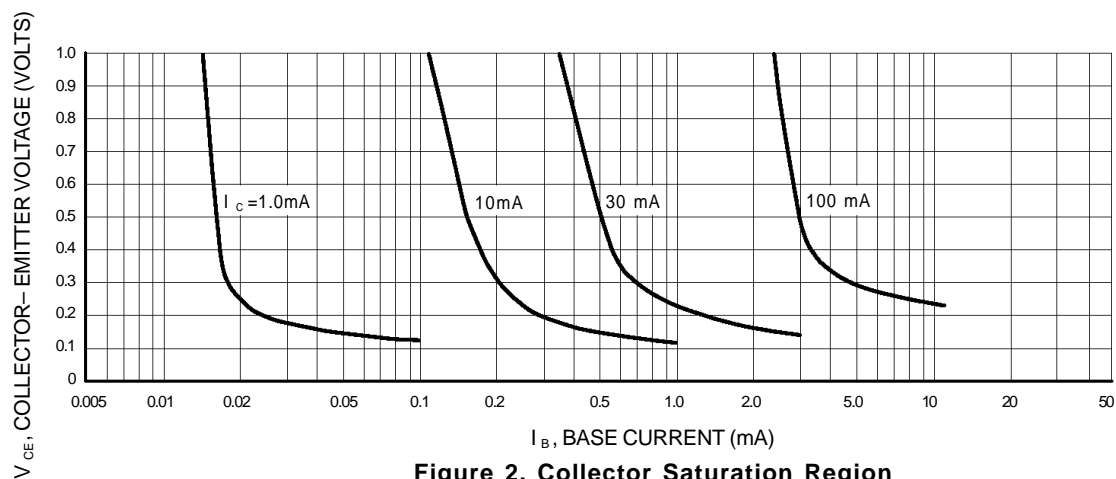


Figure 2. Collector Saturation Region

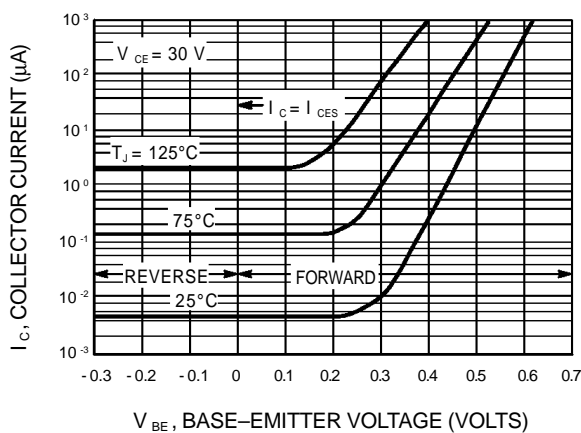
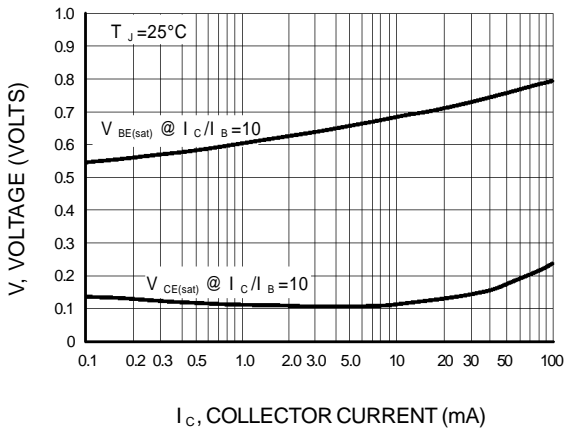
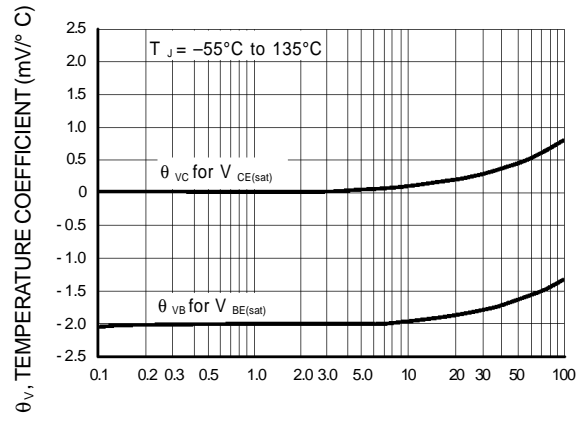


Figure 3. Collector Cut-Off Region

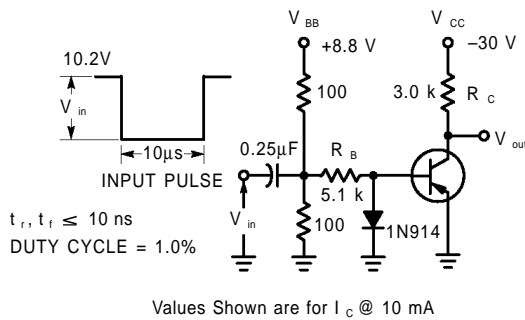
**MMBT5401LT1**



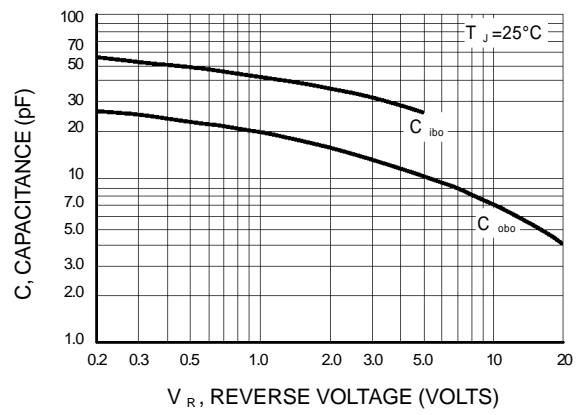
**Figure 4. "On" Voltages**



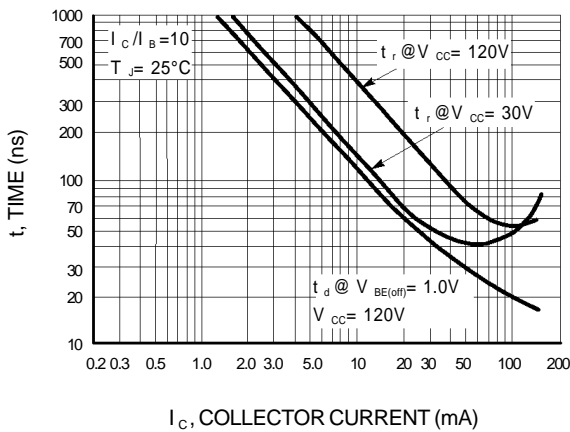
**Figure 5. Temperature Coefficients**



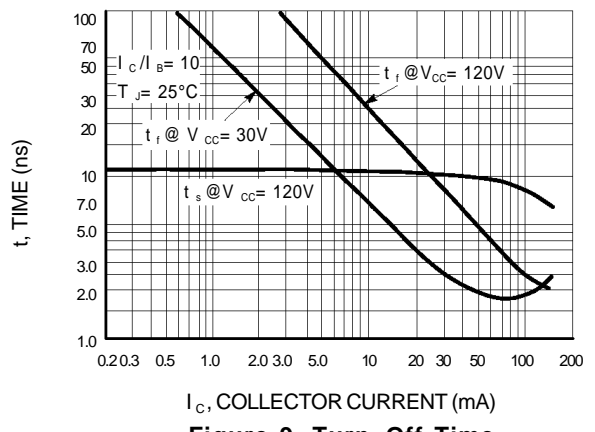
**Figure 6. Switching Time Test Circuit**



**Figure 7. Capacitances**



**Figure 8. Turn-On Time**



**Figure 9. Turn-Off Time**