

**SOT-23 BIPOLAR TRANSISTORS
TRANSISTOR(NPN)**

FEATURES

- * Power dissipation
 P_{CM} 0.3 W($T_{amb}=25^{\circ}C$)
- * Collector current
 I_{CM} 0.6 A
- * Collector-base voltage
 $V_{(BR)CBO}$ 60 V
- * Operating and storage junction temperature range
 T_J, T_{stg} : $-55^{\circ}C$ to $+150^{\circ}C$

MECHANICAL DATA

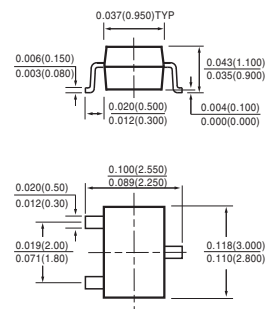
- * Case: Molded plastic
- * Epoxy: UL 94V-O rate flame retardant
- * Lead: MIL-STD-202E method 208C guaranteed
- * Mounting position: Any
- * Weight: 0.008 gram

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at $25^{\circ}C$ ambient temperature unless otherwise specified.



SOT-23



Dimensions in inches and (millimeters)

RATINGS	SYMBOL	VALUE	UNITS
Zener Current (see Table "Characteristics")	-	-	-
Max. Steady State Power Dissipation ⁽¹⁾ @ $T_A=25^{\circ}C$ Derate above $25^{\circ}C$	P_D	300	mW
Max. Operating Temperature Range	T_J	-55 to $+150$	$^{\circ}C$
Storage Temperature Range	T_{STG}	-55 to $+150$	$^{\circ}C$

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

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	-	-	417	$^{\circ}C/W$
Max. Instantaneous Forward Voltage at $I_F = 10mA$	V_F	-	-	-	Volts

NOTES : 1. Alumina=0.4*0.3*0.024in. 99.5% alumina.

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ELECTRICAL CHARACTERISTICS (@TA=25°C unless otherwise noted)

Chatacteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage ($I_C= 10\text{mA}_{dc}$, $I_B= 0$)	$V_{(BR)CEO}$	30	-	Vdc
Collector-Base Breakdown Voltage ($I_C= 10\mu\text{A}_{dc}$, $I_E= 0$)	$V_{(BR)CBO}$	60	-	Vdc
Emitter-Base Breakdown Voltage ($I_E= 10\mu\text{A}_{dc}$, $I_C= 0$)	$V_{(BR)EBO}$	5.0	-	Vdc
Collector Cutoff Current ($V_{CE}= 60\text{Vdc}$, $V_{EB(off)}= 3.0\text{Vdc}$)	I_{CEX}	-	0.1	μA_{dc}
Collector Cutoff Current ($V_{CB}= 60\text{Vdc}$, $I_E= 0$)	I_{CBO}	-	0.01	μA_{dc}
($V_{CB}= 60\text{Vdc}$, $I_E= 0$, $T_A= 125^\circ\text{C}$)		-	10	

ON CHARACTERISTICS

DC Current Gain ($I_C= 0.1\text{mA}_{dc}$, $V_{CE}= 10\text{Vdc}$) ($I_C= 1.0\text{mA}_{dc}$, $V_{CE}= 10\text{Vdc}$) ($I_C= 10\text{mA}_{dc}$, $V_{CE}= 10\text{Vdc}$) ($I_C= 150\text{mA}_{dc}$, $V_{CE}= 10\text{Vdc}$) (2) ($I_C= 500\text{mA}_{dc}$, $V_{CE}= 10\text{Vdc}$) (2)	h_{FE}	35 50 75 100 30	- - - - -	-
Collector-Emitter Saturation Voltage (2) ($I_C= 150\text{mA}_{dc}$, $I_B= 15\text{mA}_{dc}$) ($I_C= 500\text{mA}_{dc}$, $I_B= 50\text{mA}_{dc}$)	$V_{CE(sat)}$	- -	0.4 1.6	Vdc
Base-Emitter Saturation Voltage (2) ($I_C= 150\text{mA}_{dc}$, $I_B= 15\text{mA}_{dc}$) ($I_C= 500\text{mA}_{dc}$, $I_B= 50\text{mA}_{dc}$)	$V_{BE(sat)}$	- -	1.3 2.6	Vdc

SMALL-SIGNAL CHARACTERISTICS

Current-Gain-Bandwidth Product (3) ($I_C= 20\text{mA}_{dc}$, $V_{CE}= 20\text{Vdc}$, $f= 100\text{MHz}$)	f_T	250	-	MHz
Input Capacitance ($V_{EB}=0.5\text{Vdc}$, $I_C= 0$, $f= 1.0\text{MHz}$)	C_{ibo}	-	30	pF

NOTES : 2. Pulse Test: Pulse Width≤300μs,Duty Cycle≤2.0%
3. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity

RATING AND CHARACTERISTICS CURVES (MMBT2222LT1)

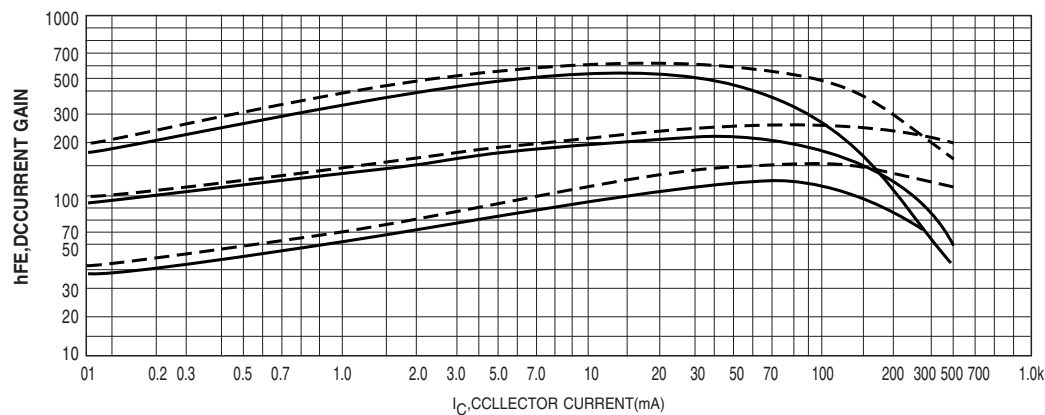


Figure 1. DC Current Gain

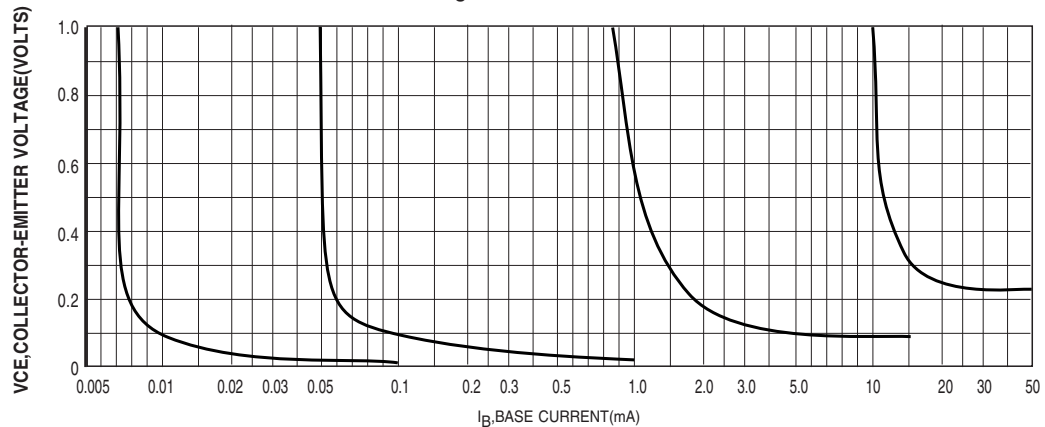


Figure 2. Collector Saturation Region

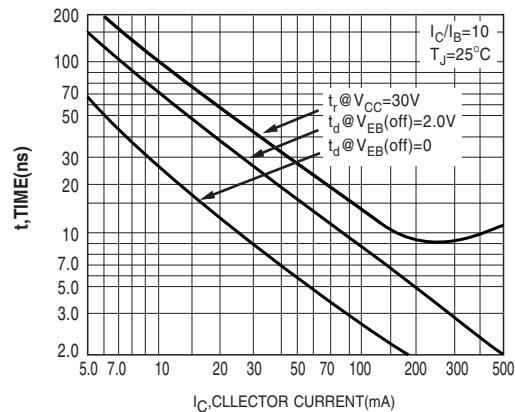


Figure 3. Turn-On Time

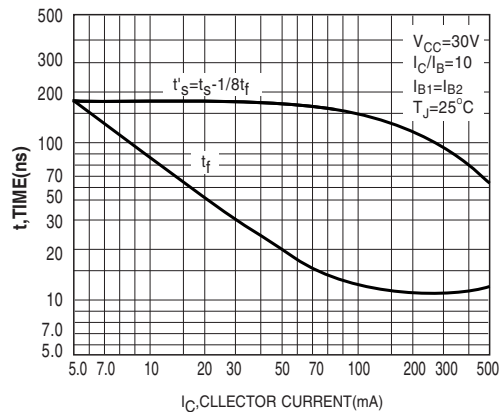


Figure 4. Turn-Off Time

RATING AND CHARACTERISTICS CURVES (MMBT2222LT1)

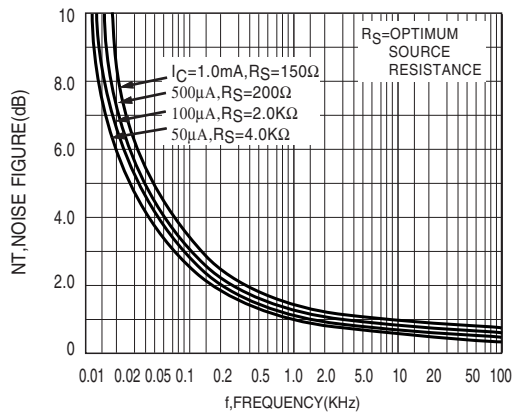


Figure 5.Frequency Effects

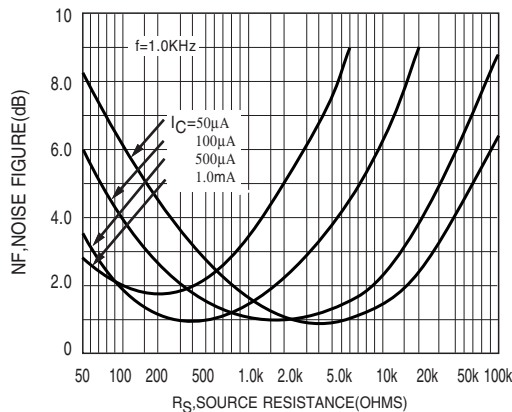


Figure 6.Source Resistance Effects

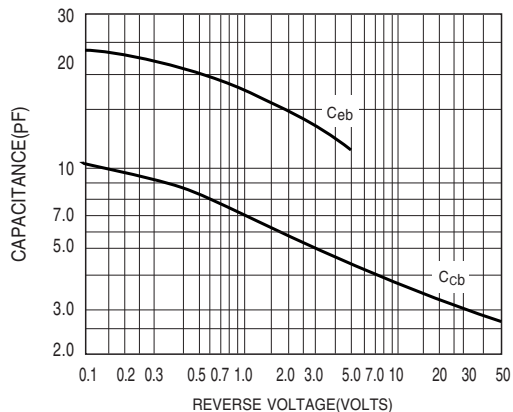


Figure 7.Capacitances

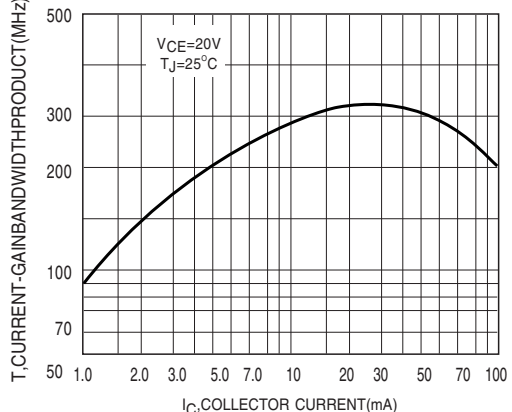


Figure 8.Currunt-Gain Bandwidth Product

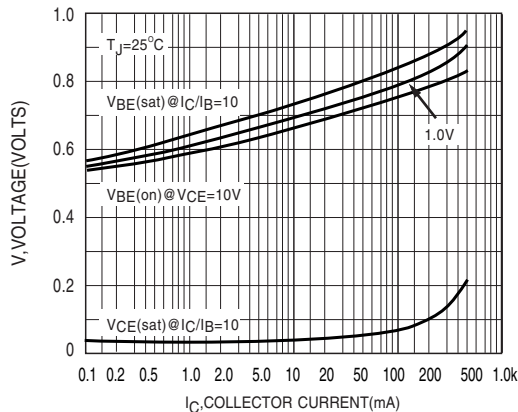


Figure 9."On" Voltages

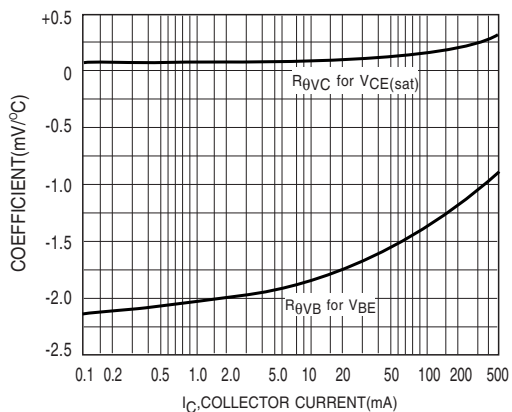


Figure 10.Temperature Coefficients