

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

**FEATURES**

- \* Power dissipation  
P<sub>CM</sub>: 0.3 W(T<sub>amb</sub>=25°C)
- \* Collector current  
I<sub>CM</sub>: -0.6 A
- \* Collector-base voltage  
V<sub>(BR)CBO</sub>: -160 V
- \* Operating and storage junction temperature range  
T<sub>J</sub>, T<sub>stg</sub>: -55°C to +150°C

**MECHANICAL DATA**

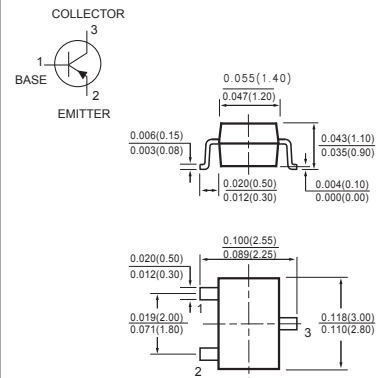
- \* Case: Molded plastic
- \* Epoxy: UL 94V-O rate flame retardant
- \* Lead: MIL-STD-202E method 208C guaranteed
- \* Mounting position: Any
- \* Weight: 0.008 gram

**MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS**

Ratings at 25°C ambient temperature unless otherwise specified.  
Single phase, half wave, 60 Hz, resistive or inductive load.  
For capacitive load, derate current by 20%.



**SOT-23**



**MAXIMUM RATINGS (@ T<sub>A</sub> = 25°C unless otherwise noted)**

RATINGS	SYMBOL	VALUE	UNITS
Max. Steady State Power Dissipation <sup>(1)</sup> @T <sub>A</sub> =25°C Derate above 25°C	P <sub>D</sub>	300	mW
Max. Operating Temperature Range	T <sub>J</sub>	150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C

**ELECTRICAL CHARACTERISTICS (@ T<sub>A</sub> = 25°C unless otherwise noted)**

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNITS
Thermal Resistance Junction to Ambient	R <sub>θJA</sub>	-	-	417	°C/W

Notes : 1. Alumina=0.4\*0.3\*0.024in.99.5% alumina  
2. "Fully ROHS Compliant", "100% Sn plating (Pb-free)".

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

Characteristic	Symbol	Min	Max	Unit
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**OFF CHARACTERISTICS**

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

**ON CHARACTERISTICS**

DC Current Gain ( $I_C = -1.0 \text{ mA}$ , $V_{CE} = -5.0 \text{ Vdc}$ )	hFE	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 ( $I_C = -10 \text{ mA}$ , $I_B = -1.0 \text{ mA}$ )	$V_{CE(sat)}$	-	-0.2	Vdc
( $I_C = -50 \text{ mA}$ , $I_B = -5.0 \text{ mA}$ )		-	-0.5	
Base-Emitter Saturation Voltage ( $I_C = -10 \text{ mA}$ , $I_B = -1.0 \text{ mA}$ )	$V_{BE(sat)}$	-	-1.0	Vdc
( $I_C = -50 \text{ mA}$ , $I_B = -5.0 \text{ mA}$ )		-	-1.0	

**SMALL-SIGNAL CHARACTERISTICS**

Current-Gain-Bandwidth Product ( $I_C = -10 \text{ mA}$ , $V_{CE} = -10 \text{ Vdc}$ , $f = 100 \text{ MHz}$ )	$f_T$	100	300	MHz
Output Capacitance ( $V_{CB} = -10 \text{ Vdc}$ , $I_E = 0$ , $f = 1.0 \text{ MHz}$ )	$C_{obo}$	-	6.0	pF
Small-Signal Current Gain ( $V_{CE} = -10 \text{ Vdc}$ , $I_C = -1.0 \text{ mA}$ , $f = 1.0 \text{ kHz}$ )	$h_{fe}$	40	200	-
Noise Figure ( $V_{CE} = -5.0 \text{ Vdc}$ , $I_C = -200 \mu\text{A}$ , $R_S = 10 \Omega$ , $f = 1.0 \text{ kHz}$ )	NF	-	8.0	dB

## RATING AND CHARACTERISTICS CURVES ( MMBT5401 )

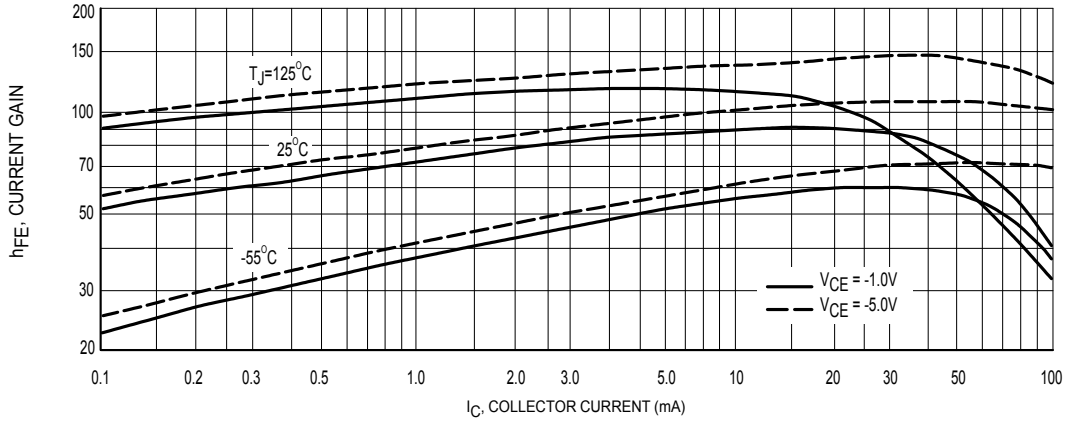


Figure 1. DC Current Gain

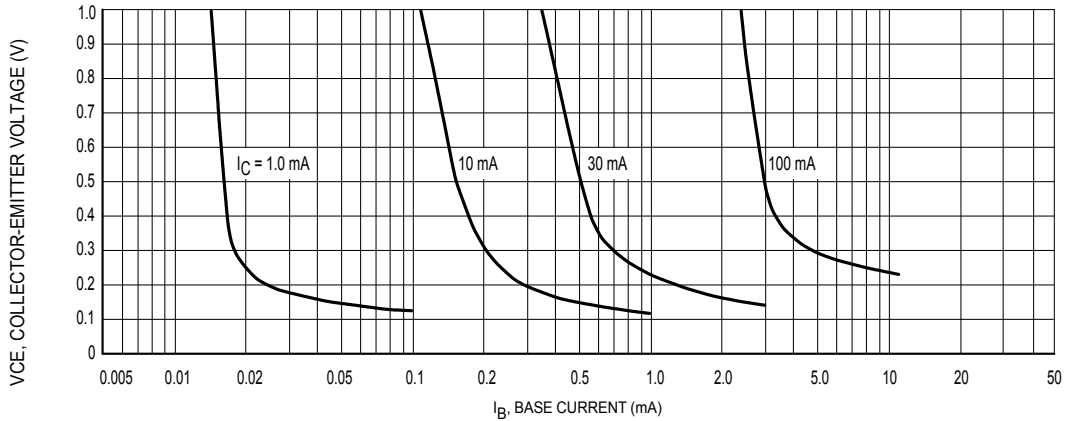


Figure 2. Collector Saturation Region

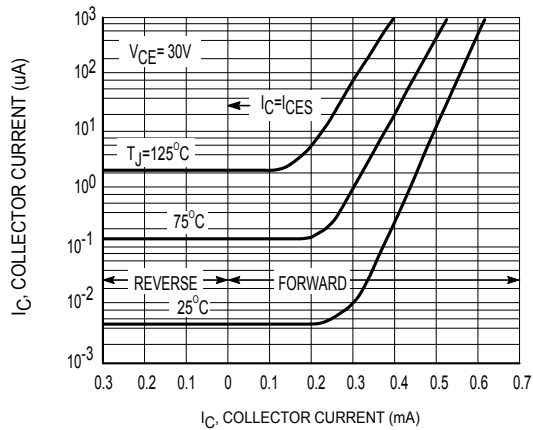


Figure 3. Collector Cut-Off Region

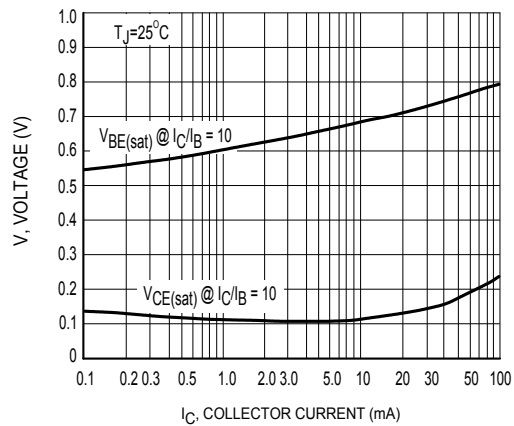


Figure 4. "On" Voltages

## RATING AND CHARACTERISTICS CURVES ( MMBT5401 )

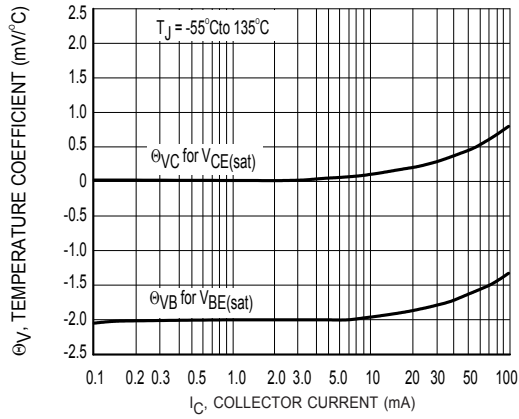


Figure 5. Temperature Coefficients

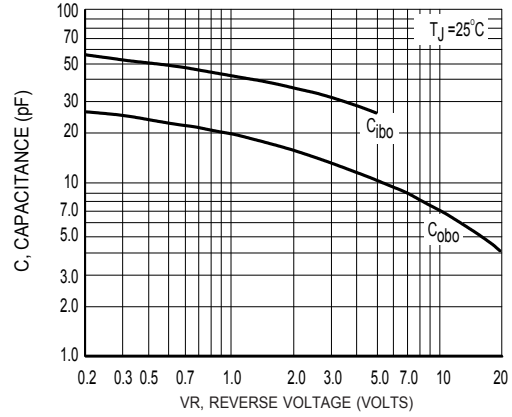


Figure 6. Capacitances

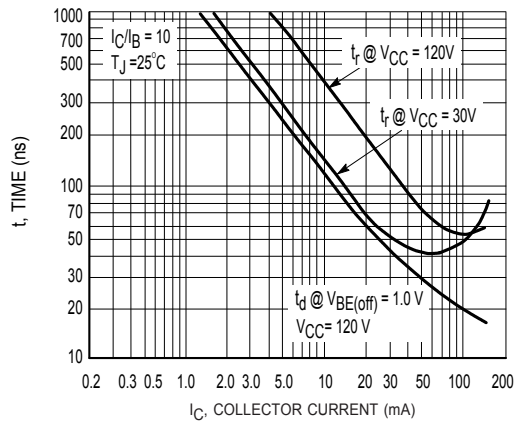


Figure 7. Turn-On Time

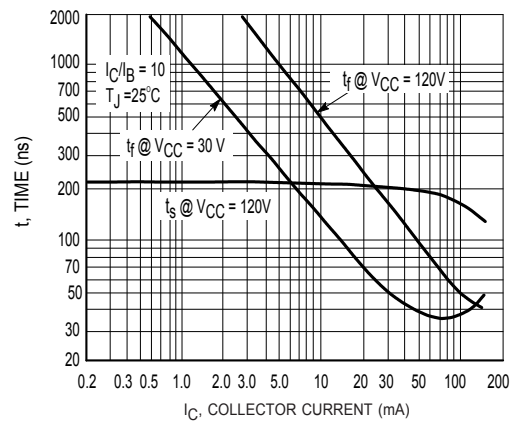


Figure 8. Turn-Off Time

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