

# MMBT2222ATB

## NPN GENERAL PURPOSE SWITCHING TRANSISTOR

**VOLTAGE** 40 Volt    **POWER** 225 mWatt

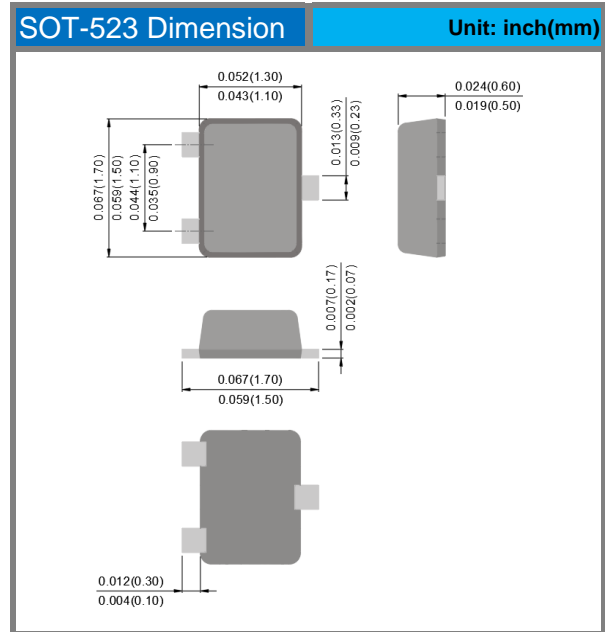
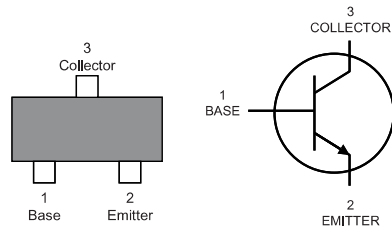
**SOT-523 Dimension**    **Unit: inch(mm)**

### FEATURES

- NPN epitaxial silicon, planar design
- Collector-emitter voltage  $V_{CE} = 40V$
- Collector current  $I_C = 600mA$
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 standard

### MECHANICAL DATA

- Case : SOT-523, Plastic
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.002 grams
- Marking : MY



### ABSOLUTE RATINGS

PARAMETER	Symbol	Value	Units
Collector - Emitter Voltage	$V_{CE0}$	40	V
Collector - Base Voltage	$V_{CBO}$	75	V
Emitter - Base Voltage	$V_{EBO}$	6.0	V
Collector Current - Continuous	$I_C$	600	mA

### THERMAL CHARACTERISTICS

PARAMETER	Symbol	Value	Units
Max Power Dissipation (Note 1)	$P_{TOT}$	225	mW
Thermal Resistance , Junction to Ambient	$R_{\theta JA}$	833	$^{\circ}C/W$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^{\circ}C$

Note 1 : Transistor mounted on FR-5 board 1 x 0.75 x 0.062 in.

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## ELECTRICAL CHARACTERISTICS

PARAMETER	Symbol	Test Condition	MIN.	TYP.	MAX.	Units
Collector - Emitter Breakdown Voltage	$V_{(BR)CEO}$	$I_C=1.0mA, I_B=0$	40	-	-	V
Collector - Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C=10\mu A, I_E=0$	75	-	-	V
Emitter - Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E=10\mu A, I_C=0$	6.0	-	-	V
Base Cutoff Current	$I_{BL}$	$V_{CE}=60V, V_{EB}=3.0V$	-	-	20	nA
Collector Cutoff Current	$I_{CEX}$	$V_{CE}=60V, V_{EB}=3.0V$	-	-	10	nA
	$I_{CBO}$	$V_{CE}=60V, I_E=0, V_{CE}=60V, I_E=0, T_J=125^\circ C$	-	-	10 10	nA uA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB}=3.0V, I_C=0,$	-	-	100	nA
DC Current Gain	$h_{FE}$	$I_C=0.1mA, V_{CE}=10V$	35	-	-	-
		$I_C=1.0mA, V_{CE}=10V$	50	-	-	
		$I_C=10mA, V_{CE}=10V$	75	-	-	
		$I_C=10mA, V_{CE}=10V, T_J=125^\circ C$	35	-	-	
		$I_C=150mA, V_{CE}=10V$ (Note 2)	100	-	300	
		$I_C=150mA, V_{CE}=1V$ (Note 2)	50	-	-	
Collector - Emitter Saturation Voltage (Note 2)	$V_{CE(SAT)}$	$I_C=150mA, I_B=15mA$	-	-	0.3	V
		$I_C=500mA, I_B=50mA$	-	-	1.0	
Base - Emitter Saturation Voltage (Note 2)	$V_{BE(SAT)}$	$I_C=150mA, I_B=15mA$	0.6	-	1.2	V
		$I_C=500mA, I_B=50mA$	-	-	2.0	
Collector - Base Capacitance	$C_{CBO}$	$V_{CB}=10V, I_E=0, f=1MHz$	-	-	8.0	pF
Emitter - Base Capacitance	$C_{EBO}$	$V_{CB}=0.5V, I_C=0, f=1MHz$	-	-	25	pF
Delay Time	$t_d$	$V_{CC}=3V, V_{BE}=-5V, I_C=150mA, I_B=15mA$	-	-	10	ns
Rise Time	$t_r$	$V_{CC}=3V, V_{BE}=-5V, I_C=150mA, I_B=15mA$	-	-	25	ns
Storage Time	$t_s$	$V_{CC}=30V, I_C=150mA, I_B1=I_B2=15mA$	-	-	225	ns
Fall Time	$t_f$	$V_{CC}=30V, I_C=150mA, I_B1=I_B2=15mA$	-	-	60	ns

Note 2: Pulse Test: Pulse Width < 300 us, Duty Cycle < 2.0%.

### SWITCHING TIME EQUIVALENT TEST CIRCUITS

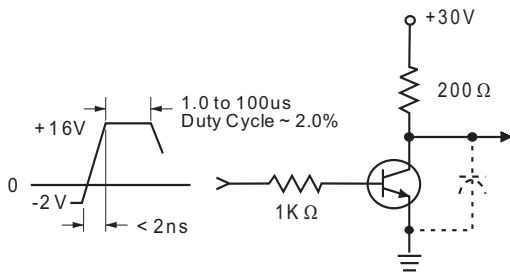


Fig. 1 Turn-On Time

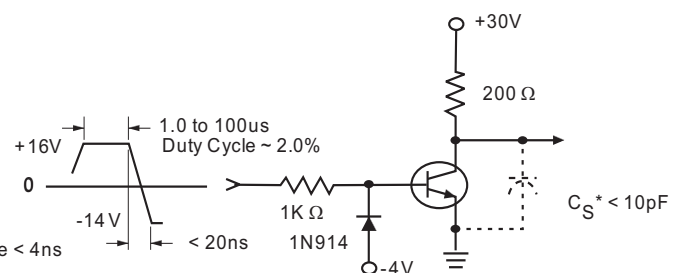
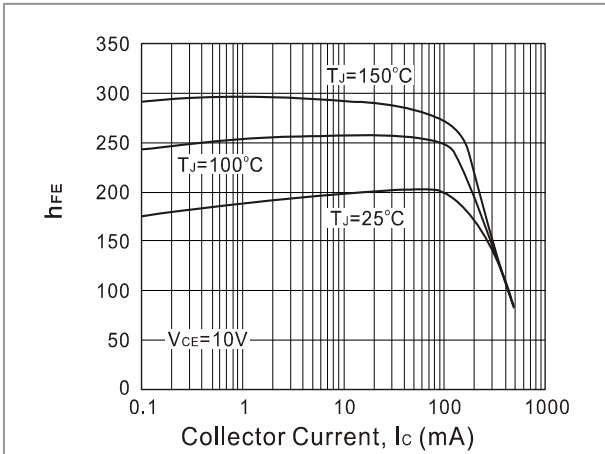


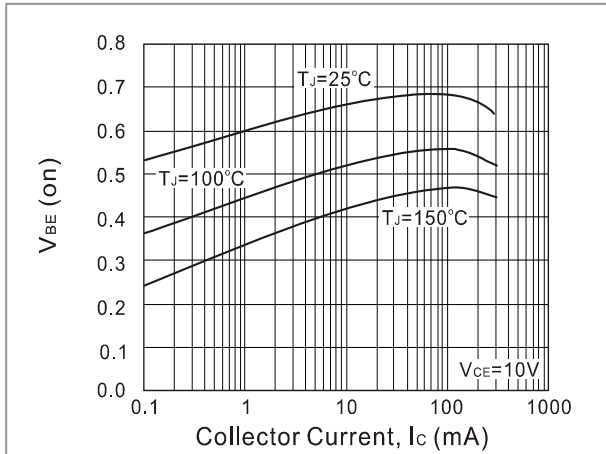
Fig. 2 Turn-Off Time

\* Total shunt capacitance of test jig, connectors, and oscilloscope

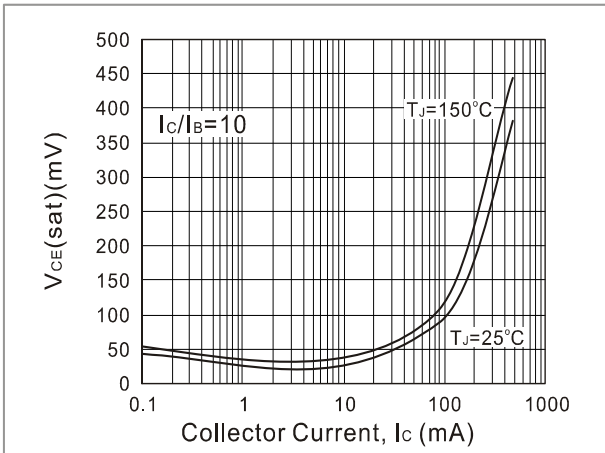
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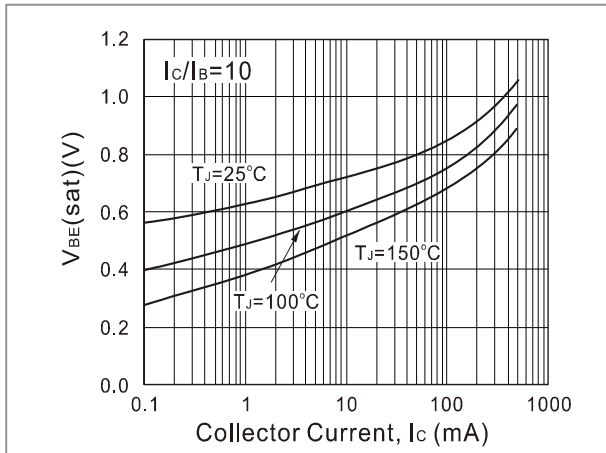
**Fig. 3. Typical  $h_{FE}$  vs Collector Current**



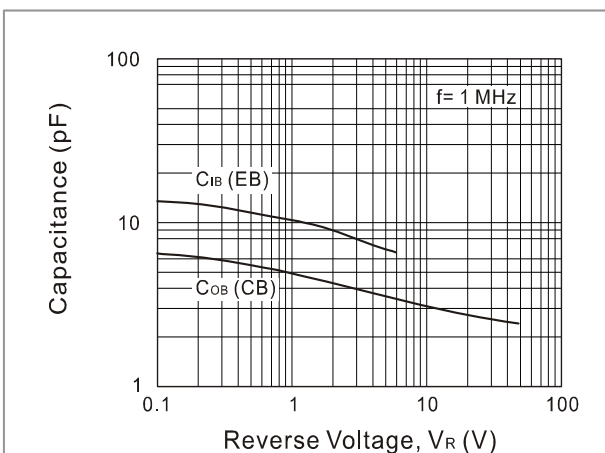
**Fig. 4. Typical  $V_{BE}$  vs Collector Current**



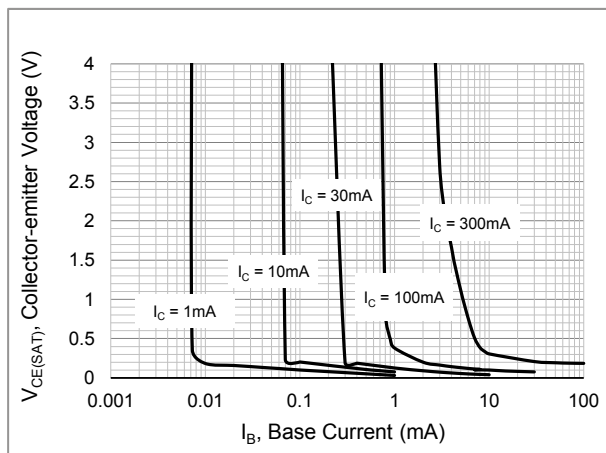
**Fig. 5. Typical  $V_{CE(sat)}$  vs Collector Current**



**Fig. 6. Typical  $V_{BE(sat)}$  vs Collector Current**



**Fig. 7. Typical Capacitances vs Reverse Voltage**



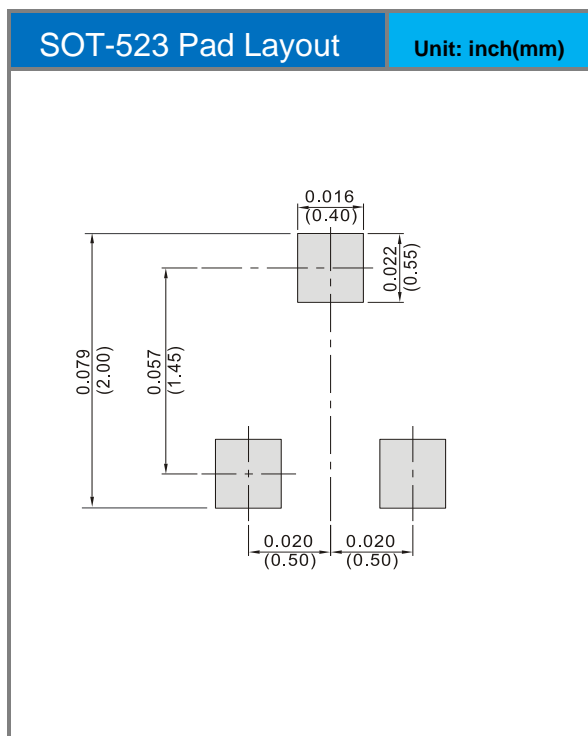
**Fig. 8. Typical Collector Saturation Region**

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## Product and Packing Information

Part No.	Package Type	Packing Type	Marking
MMBT2222ATB	SOT-523	4K pcs / 7" reel	MY

## Mounting Pad Layout



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