



# MMBT3904TB

## NPN General Purpose Switching Transistor

**Voltage**

**40V**

**Current**

**200mA**

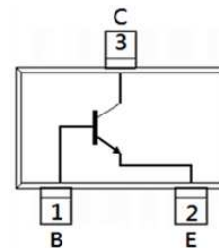
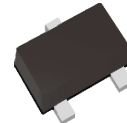
### Features

- Silicon NPN planar design
- Collector-Emitter Voltage  $V_{CE} = 40V$
- Collector Current  $I_C = 200mA$
- Lead free in compliance with EU RoHS 2.0
- Green molding compound as per IEC 61249 Standard

### Mechanical Data

- Case : SOT-523 Package
- Terminals : Solderable per MIL-STD-750, Method 2026
- Approx. Weight : 0.00007 ounces, 0.002 grams

SOT-523



### Maximum Ratings and Thermal Characteristics ( $T_A=25^\circ C$ unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNITS
Collector-Base Voltage	$V_{CBO}$	60	V
Collector-Emitter Voltage	$V_{CEO}$	40	V
Emitter-Base Voltage	$V_{EBO}$	6	V
Collector Current (DC)	$I_C$	200	mA
Collector Power Dissipation	$P_D$	150	mW
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~150	$^\circ C$
Thermal Resistance from Junction to Ambient <sup>(Note 1)</sup>	$R_{\theta JA}$	833	$^\circ C/W$

Note 1 : Mounted on FR4 PCB at 1 inch square copper pad.



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## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNITS
<b>OFF Characteristics</b>						
Collector-Emitter Breakdown Voltage	BV <sub>CEO</sub>	I <sub>C</sub> = 1mA, I <sub>B</sub> = 0A	40	-	-	V
Collector-Base Breakdown Voltage	BV <sub>CBO</sub>	I <sub>C</sub> = 10uA, I <sub>E</sub> = 0A	60	-	-	V
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	I <sub>E</sub> = 10uA, I <sub>C</sub> = 0A	6	-	-	V
Base Cutoff Current	I <sub>BL</sub>	V <sub>CE</sub> = 30V, V <sub>EB</sub> = 3V	-	-	50	nA
Collector Cutoff Current	I <sub>CEX</sub>	V <sub>CE</sub> = 30V, V <sub>EB</sub> = 3V	-	-	50	nA
<b>ON characteristics</b>						
DC Current Gain <sup>(Note 2)</sup>	h <sub>FE</sub>	V <sub>CE</sub> = 1V, I <sub>C</sub> = 0.1mA	40	-	-	-
		V <sub>CE</sub> = 1V, I <sub>C</sub> = 1mA	70	-	-	
		V <sub>CE</sub> = 1V, I <sub>C</sub> = 10mA	100	-	300	
		V <sub>CE</sub> = 1V, I <sub>C</sub> = 50mA	60	-	-	
		V <sub>CE</sub> = 1V, I <sub>C</sub> = 100mA	30	-	-	
Collector-Emitter Saturation Voltage <sup>(Note 2)</sup>	V <sub>CE(SAT)</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA	-	-	200	mV
		I <sub>C</sub> = 50mA, I <sub>B</sub> = 5mA	-	-	300	
Base-Emitter Saturation voltage <sup>(Note 2)</sup>	V <sub>BE(SAT)</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA	650	-	850	mV
		I <sub>C</sub> = 50mA, I <sub>B</sub> = 5mA	-	-	950	
Collector-Base Capacitance	C <sub>CB0</sub>	V <sub>CB</sub> = 5V I <sub>E</sub> = 0A, f=1MHz	-	-	4	pF
Emitter-Base Capacitance	C <sub>EBO</sub>	V <sub>EB</sub> = 0.5V I <sub>C</sub> = 0A, f=1MHz	-	-	8	pF
Delay Time	T <sub>d</sub>	V <sub>CC</sub> = 3V, V <sub>BE</sub> = 0.5V	-	-	35	nS
Rise Time	T <sub>r</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 1mA	-	-	35	nS
Storage Time	T <sub>s</sub>	V <sub>CC</sub> = 3V, I <sub>C</sub> = 10mA	-	-	200	nS
Fall Time	T <sub>f</sub>	I <sub>B1</sub> = I <sub>B2</sub> = 1mA	-	-	50	

Note 2 : Pulse Test: Pulse Width < 300uS , Duty Cycle < 2%



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## TYPICAL CHARACTERISTIC CURVES

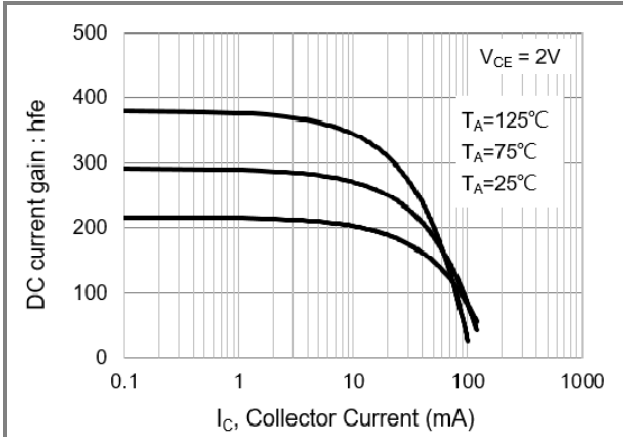


Fig.1 DC Current Gain

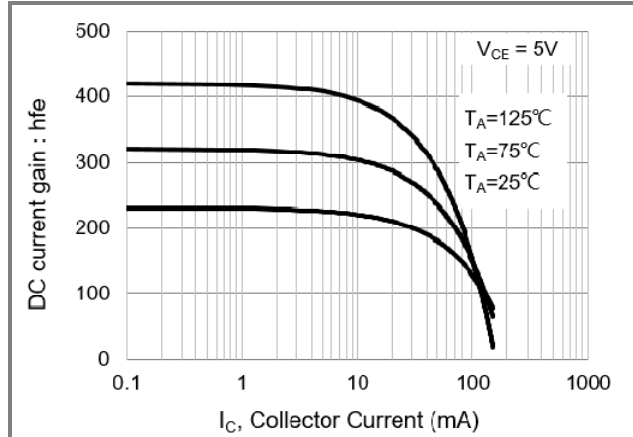


Fig.2 DC Current Gain

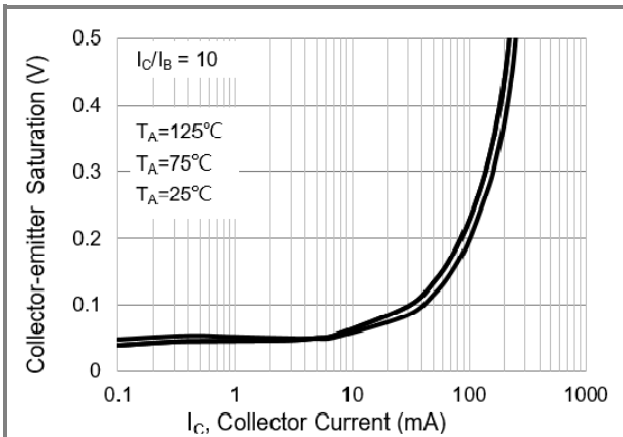


Fig.3 Collector-Emitter Saturation Voltage

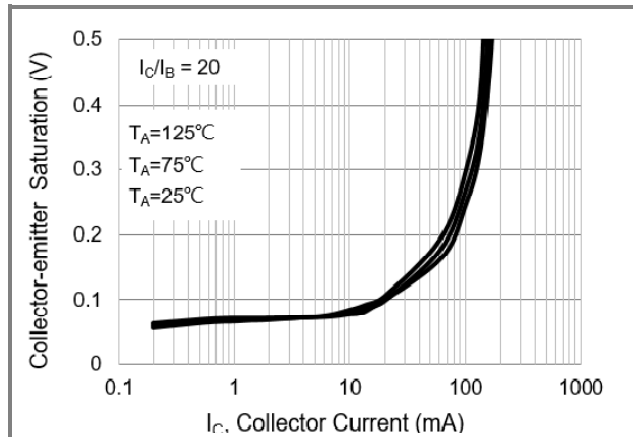


Fig.4 Collector-Emitter Saturation Voltage

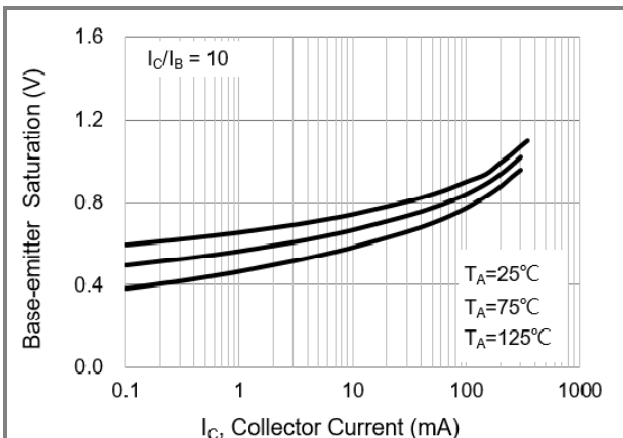


Fig.5 Base-Emitter Saturation Voltage

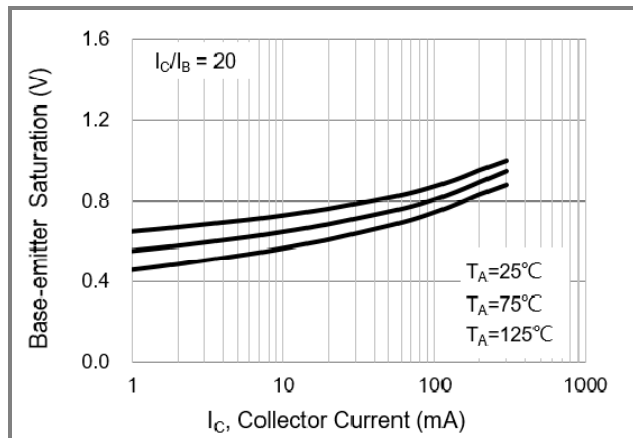


Fig.6 Base-Emitter Saturation Voltage



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## TYPICAL CHARACTERISTIC CURVES

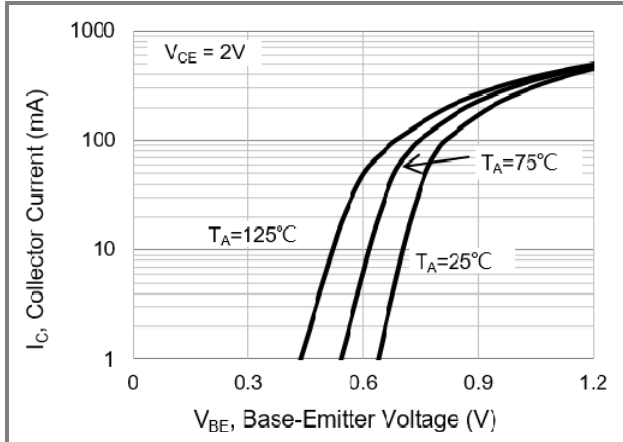


Fig.7 Base-Emitter Voltage

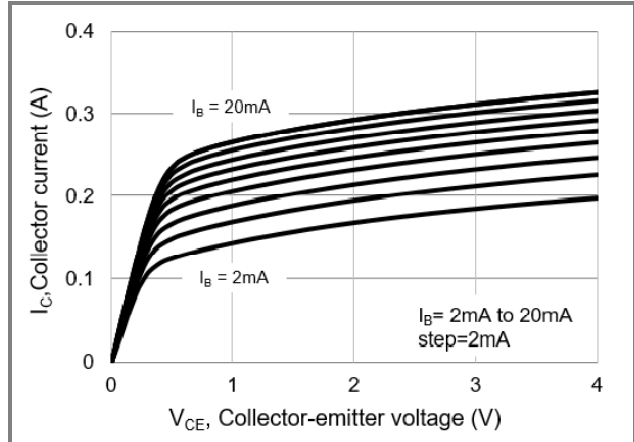


Fig.8 Collector Current

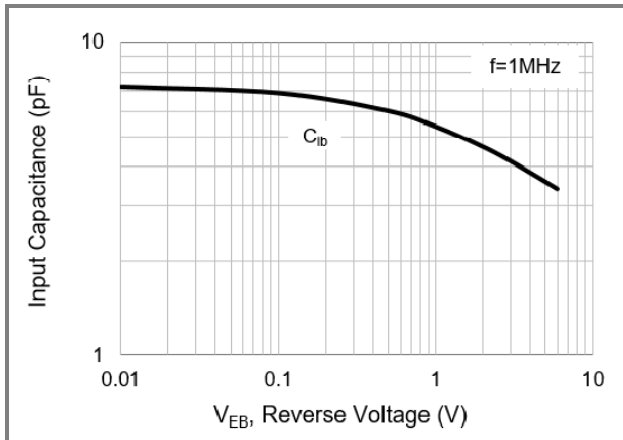


Fig.9 Input Capacitance

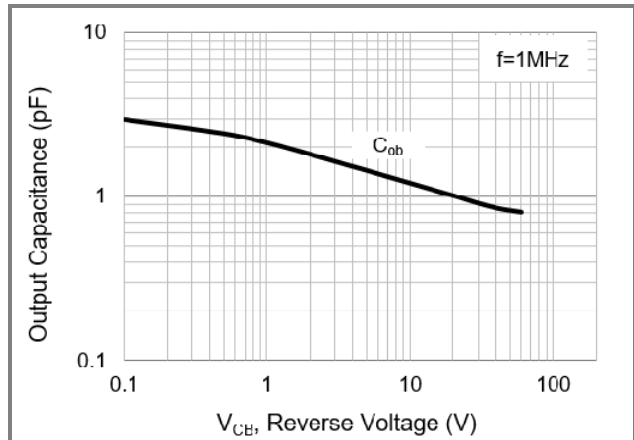


Fig.10 Output Capacitance

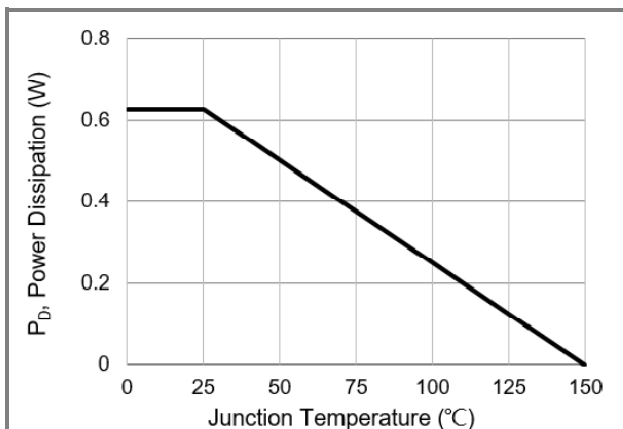


Fig.11 Power Derating Curve

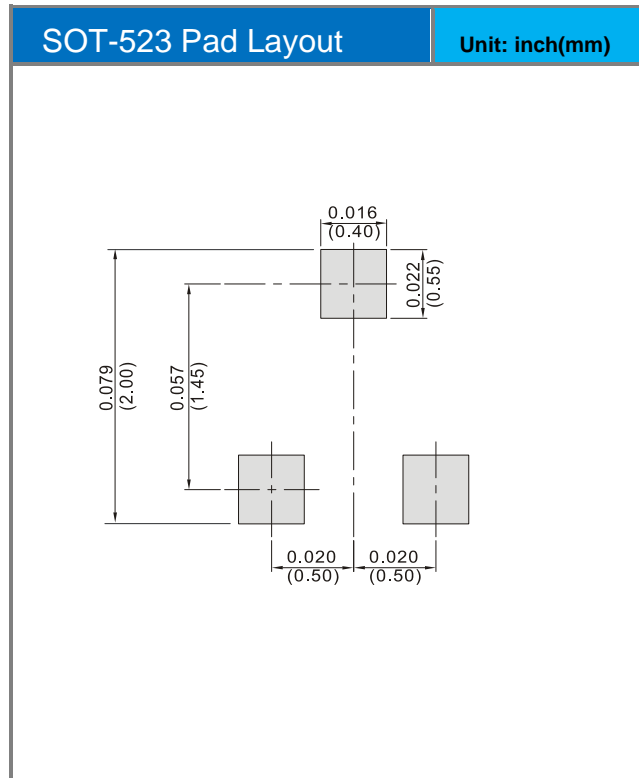
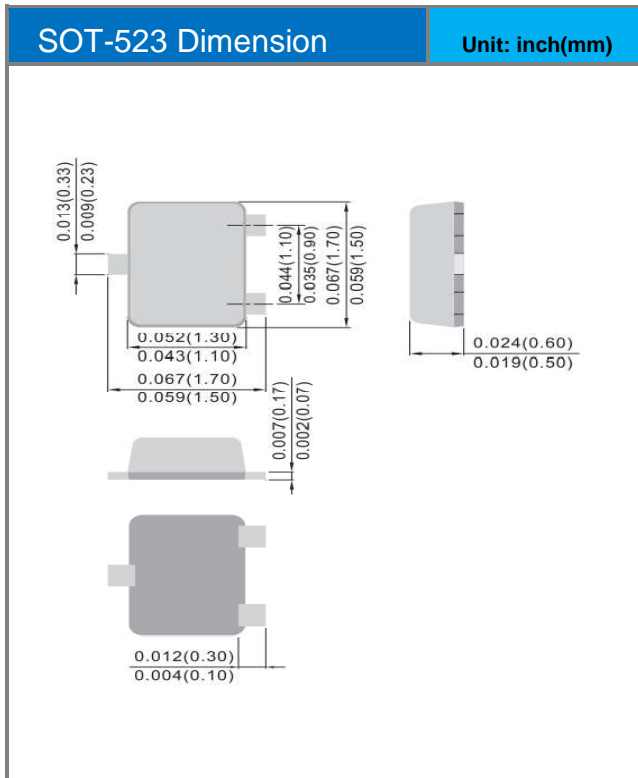


# MMBT3904TB

## Part No. Packing Code Version

Part No. Packing Code	Package Type	Packing Type	Marking	Version
MMBT3904TB_R1_00001	SOT-523	4K pcs / 7" reel	4E	Halogen free

## Packaging Information & Mounting Pad Layout





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