FAIRCHILD SEMICONDUCTOR®

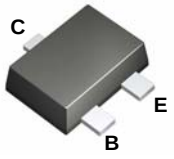
February 2008

MMBT3904T

NPN Epitaxial Silicon Transistor

Features

- General purpose amplifier transistor.
- Ultra-Small Surface Mount Package for all types.
- Suitable for general switching & amplification
- Well suited for portable application
- As complementary type, PNP MMBT3906T is recommended



Marking : A04

SOT-523F

Absolute Maximum Ratings T_a = 25°C unless otherwise noted

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Base Voltage	60	V
V_{CEO}	Collector-Emitter Voltage	40	V
V_{EBO}	Emitter-Base Voltage	6	V
I_C	Collector Current	200	mA
T_J	Junction Temperature	150	°C
T_{STG}	Storage Temperature Range	-55 ~ 150	°C

* 1. These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.
2. These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Thermal Characteristics* T_a=25°C unless otherwise noted

Symbol	Parameter	Max	Unit
P_C	Collector Power Dissipation, by $R_{\theta JA}$	250	mW
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	500	°C/W

* Minimum land pad.

Electrical Characteristics* T_a=25°C unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Max.	Unit
BV_{CBO}	Collector-Base Breakdown Voltage	I_C = 10μA, I_E = 0	60		V
BV_{CEO}	Collector-Emitter Breakdown Voltage	I_C = 1mA, I_B = 0	40		V
BV_{EBO}	Emitter-Base Breakdown Voltage	I_E = 10μA, I_C = 0	6		V
I_{CEX}	Collector Cut-off Current	V_{CE} = 60V, $V_{EB(OFF)}$ = 3V		50	nA
h_{FE}	DC Current Gain	V_{CE} = 1V, I_C = 0.1mA V_{CE} = 1V, I_C = 1mA V_{CE} = 1V, I_C = 10mA V_{CE} = 1V, I_C = 50mA V_{CE} = 1V, I_C = 100mA	40 70 100 60 30	 300 	
V_{CE} (sat)	Collector-Emitter Saturation Voltage	I_C = 10mA, I_B = 1mA I_C = 50mA, I_B = 5mA		0.2 0.3	V V
V_{BE} (sat)	Base-Emitter Saturation Voltage	I_C = 10mA, I_B = 1mA I_C = 50mA, I_B = 5mA	0.65	0.85 0.95	V V
f_T	Current Gain Bandwidth Product	V_{CE} = 20V, I_C = 10mA, f = 100MHz	300		MHz
C_{ob}	Output Capacitance	V_{CB} = 5V, I_E = 0, f = 1MHz		6	pF
C_{ib}	Input Capacitance	V_{EB} = 0.5V, I_C = 0, f = 1MHz		15	pF
t_d	Delay Time	V_{CC} = 3V, I_C = 10mA I_{B1} =- I_{B2} = 1mA		35	ns
t_r	Rise Time			35	ns
t_s	Storage Time			200	ns
t_f	Fall Time			50	ns

* DC Item are tested by Pulse Test : Pulse Width≤300us, Duty Cycle≤2%

Typical Performance Characteristics

Figure 1. DC Current Gain

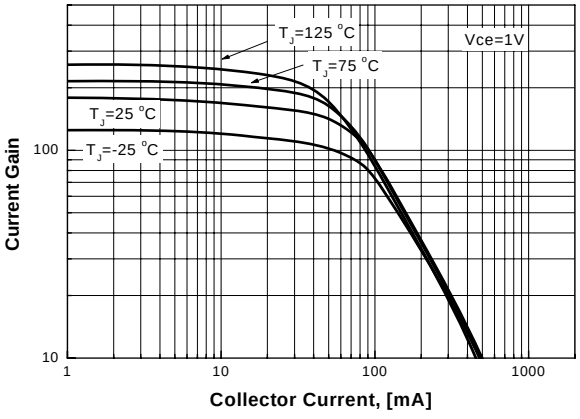


Figure 2. Collector-Emitter Saturation Voltage

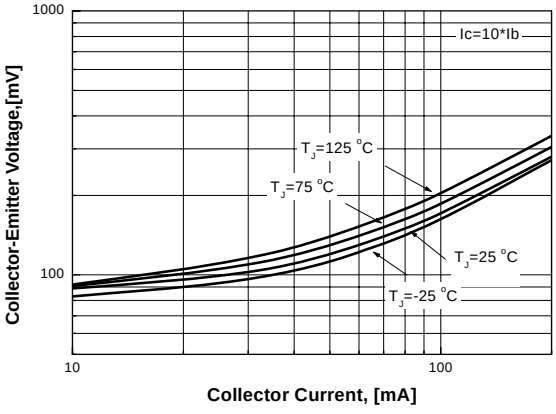


Figure 3. Base- Emitter Saturation Voltage

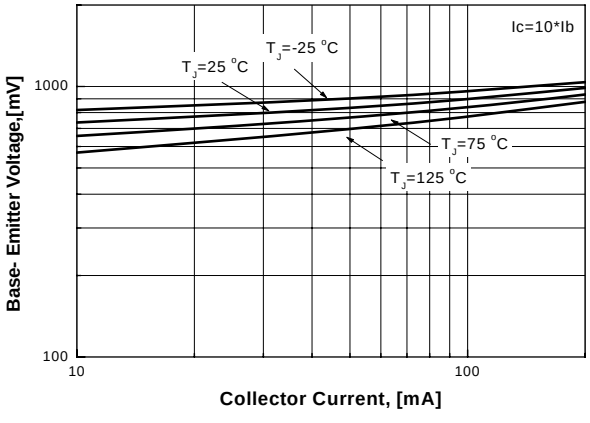


Figure 4. Collector- Base Leakage Current

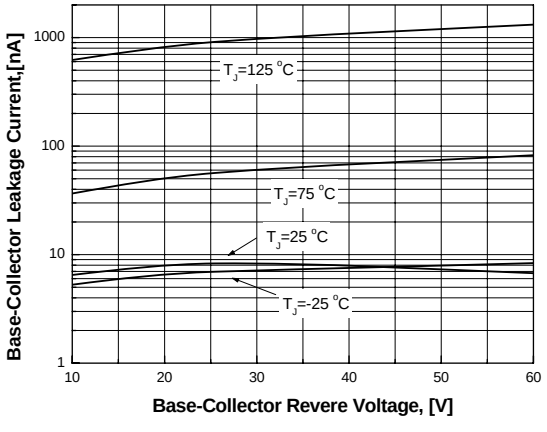


Figure 5. Collector- Base Capacitance

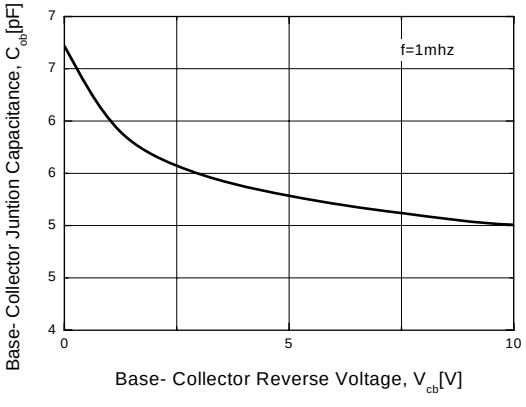
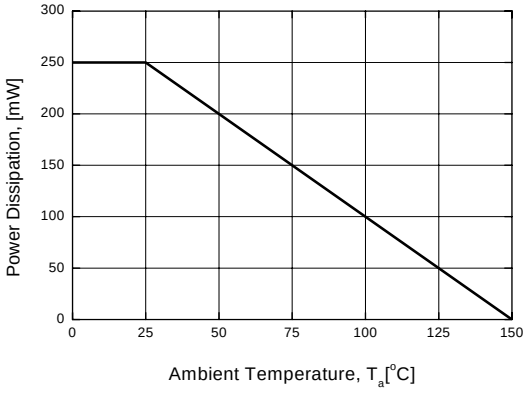


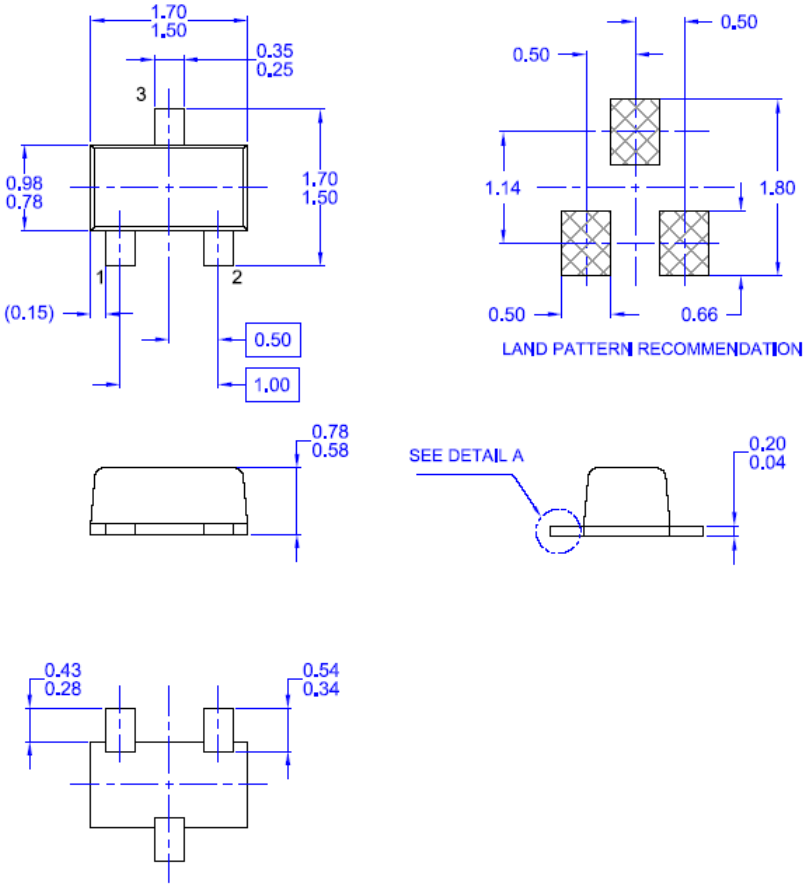
Figure 6. Power Derating



Package Dimensions

SOT-523F

- Case : SOT-523F
- Case Material(Molded Plastic): KTMC1060SC
- UL Flammability classification rating : “V0”
- Moisture Sensitivity level per JESD22-A1113B : MSL 1
- Lead terminals solderable per MIL-STD7502026 /JESD22A121
- Lead Free Plating : Pure Tin(Matte)



Dimensions in Millimeters

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