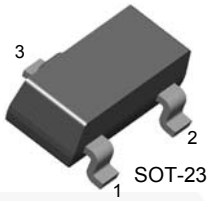
FAIRCHILD SEMICONDUCTOR®

December 2013

MMBT3646
NPN Switching Transistor

Features

- NPN High Speed Switching Transistor
- Process 22



SOT-23

1. Base 2. Emitter 3. Collector

Ordering Information

Part Number	Top Mark	Package	Packing Method
MMBT3646	23	SOT-23 3L	Tape and Reel

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at T_C = 25°C unless otherwise noted.

Symbol	Parameter	Value	Unit
V_{CEO}	Collector-Emitter Voltage	15	V
V_{CES}	Collector-Emitter Voltage	40	V
V_{CBO}	Collector-Base Voltage	40	V
V_{EBO}	Emitter-Base Voltage	5	V
I_C	Collector Current (DC) - Continuous	300	mA
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C

Thermal Characteristics[1]

Values are at T_C = 25°C unless otherwise noted.

Symbol	Parameter	Value	Unit
P_D	Total Device Dissipation at T_A = 25°C	625	mW
	Derate Above 25°C	5	mW/°C
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	°C/W

Note:

1. PCB size: FR-4 trace width is 50 mil / 25 mil /15 mil, thickness: 2 OZ, minimum land pattern size.

Electrical Characteristics

Values are at T_C = 25°C unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	I_C = 100 μA, V_{BE} = 0	40			V
$V_{CEO(SUS)}$	Collector-Emitter Sustaining Voltage[2]	I_C = 10 mA, I_B = 0	15			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 100 μA, I_E = 0	40			V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 100 μA, I_C = 0	5			V
I_{CES}	Collector Cut-Off Current	V_{CE} = 20 V, V_{BE} = 0			0.5	μA
		V_{CE} = 20 V, V_{BE} = 0, T_A = 65°C			3.0	
h_{FE}	DC Current Gain[2]	V_{CE} = 0.4 V, I_C = 30 mA	30		120	
		V_{CE} = 0.5 V, I_C = 100 mA	25			
		V_{CE} = 1.0 V, I_C = 300 mA	15			
V_{CE}(sat)	Collector-Emitter Saturation Voltage[2]	I_C = 30 mA, I_B = 3 mA			0.20	V
		I_C = 100 mA, I_B = 10 mA			0.28	
		I_C = 300 mA, I_B = 30 mA			0.50	
		I_C = 30 mA, I_B = 3 mA, T_A =65°C			0.30	
V_{BE}(sat)	Base-Emitter Saturation Voltage[2]	I_C = 30 mA, I_B = 3 mA	0.73		0.95	V
		I_C = 100 mA, I_B = 10 mA			1.20	
		I_C = 300 mA, I_B = 30 mA			1.70	
C_{ob}	Output Capacitance	V_{CE} = 5 V, I_E = 0, f = 1MHz			5	pF
C_{ib}	Input Capacitance	V_{EB} = 0.5 V, I_C = 0, f = 1MHz			8	pF
t_{on}	Turn-On Time	V_{CC} = 10 V, I_C = 300 mA, I_{B1} = 30 mA, V_{CE}(off) = 3 V			18	ns
t_d	Delay Time				10	ns
t_r	Rise Time				15	ns
t_{off}	Turn-Off Time	V_{CC} = 10 V, I_C = 300 mA, I_{B1} = I_{B2} = 30 mA			28	ns
t_f	Fall Time				15	ns
t_s	Storage Time				20	ns

Note:

2. Pulse test: pulse width ≤ 300 μs, duty cycle ≤ 2.0%.

Physical Dimensions

SOT-23

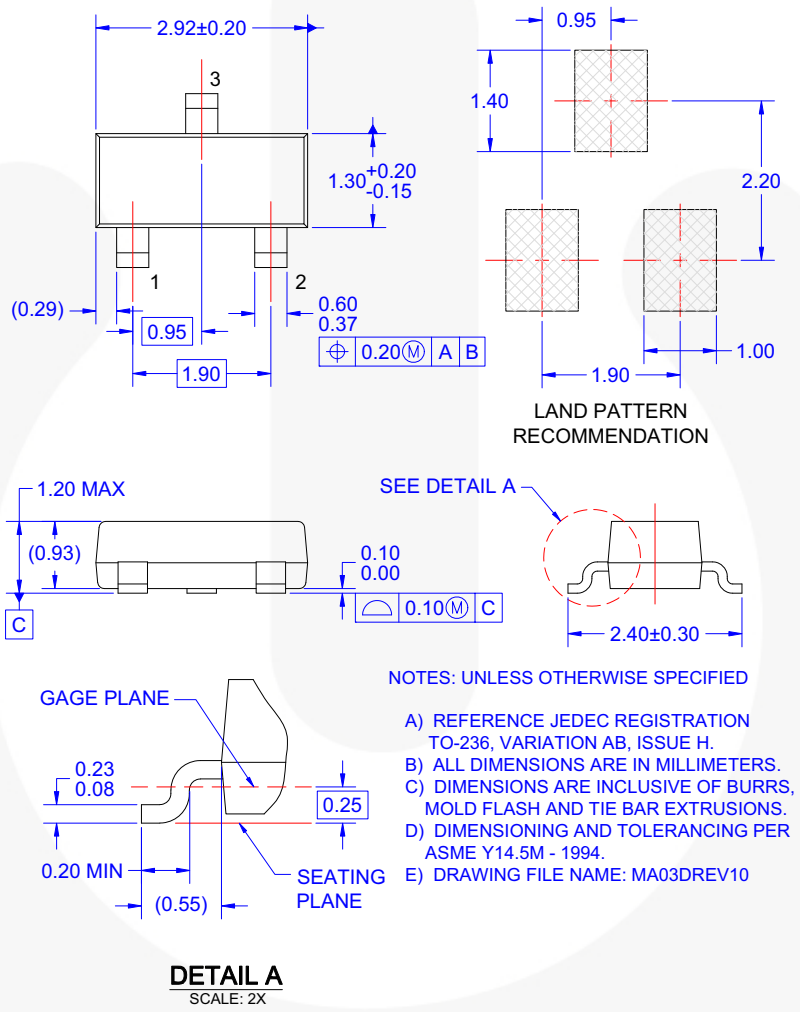


Figure 1. 3-LEAD, SOT-23, JEDEC TO-236, LOW PROFILE (ACTIVE)

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