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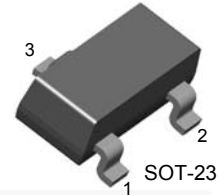
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MMBT3646 NPN Switching Transistor

Features

- NPN High Speed Switching Transistor
- Process 22



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 $T_C = 25^\circ\text{C}$ 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	$^\circ\text{C}$

Thermal Characteristics⁽¹⁾

Values are at $T_C = 25^\circ\text{C}$ unless otherwise noted.

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

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 $T_C = 25^\circ\text{C}$ unless otherwise noted.

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

Note:

2. Pulse test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2.0\%$.

Physical Dimensions

SOT-23



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

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