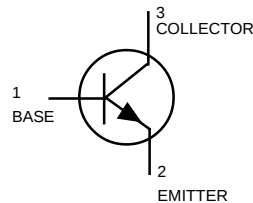


Preliminary Information

General Purpose Transistors

NPN Silicon

These transistors are designed for general purpose amplifier applications. They are housed in the SOT-323/SC-70 package which is designed for low power surface mount applications.



MMBT2222AWT1



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Base Voltage	V_{CBO}	75	Vdc
Emitter-Base Voltage	V_{EBO}	6.0	Vdc
Collector Current — Continuous	I_C	600	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, $T_A = 25^\circ\text{C}$	P_D	150	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	833	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

DEVICE MARKING

MMBT2222AWT1 = 1P

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (1) ($I_C = 1.0 \text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	40	—	Vdc
Collector-Base Breakdown Voltage ($I_C = 10 \mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	75	—	Vdc
Emitter-Base Breakdown Voltage ($I_E = 10 \mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	6.0	—	Vdc
Base Cutoff Current ($V_{CE} = 60 \text{ Vdc}, V_{EB} = 3.0 \text{ Vdc}$)	I_{BL}	—	20	nAdc
Collector Cutoff Current ($V_{CE} = 60 \text{ Vdc}, V_{EB} = 3.0 \text{ Vdc}$)	I_{CEX}	—	10	nAdc

1. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

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ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS (1)				
DC Current Gain (1) ($I_C = 0.1\text{ mA}$, $V_{CE} = 10\text{ Vdc}$)	h_{FE}	35	—	—
($I_C = 1.0\text{ mA}$, $V_{CE} = 10\text{ Vdc}$)		50	—	
($I_C = 10\text{ mA}$, $V_{CE} = 10\text{ Vdc}$)		75	—	
($I_C = 150\text{ mA}$, $V_{CE} = 10\text{ Vdc}$)		100	—	
($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ Vdc}$)		40	—	
Collector–Emitter Saturation Voltage(1) ($I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$)	$V_{CE(sat)}$	—	0.3	Vdc
($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$)		—	1.0	
Base–Emitter Saturation Voltage(1) ($I_C = 150\text{ mA}$, $I_B = 15\text{ mA}$)	$V_{BE(sat)}$	0.6	1.2	Vdc
($I_C = 500\text{ mA}$, $I_B = 50\text{ mA}$)		—	2.0	

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product ($I_C = 20\text{ mA}$, $V_{CE} = 20\text{ Vdc}$, $f = 100\text{ MHz}$)	f_T	300	—	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{obo}	—	8.0	pF
Input Capacitance ($V_{EB} = 0.5\text{ Vdc}$, $I_C = 0$, $f = 1.0\text{ MHz}$)	C_{ibo}	—	30	pF
Input Impedance ($V_{CE} = 10\text{ Vdc}$, $I_C = 10\text{ mA}$, $f = 1.0\text{ kHz}$)	h_{ie}	0.25	1.25	k Ω
Voltage Feedback Ratio ($V_{CE} = 10\text{ Vdc}$, $I_C = 10\text{ mA}$, $f = 1.0\text{ kHz}$)	h_{re}	—	4.0	$\times 10^{-4}$
Small–Signal Current Gain ($V_{CE} = 10\text{ Vdc}$, $I_C = 10\text{ mA}$, $f = 1.0\text{ kHz}$)	h_{fe}	75	375	—
Output Admittance ($V_{CE} = 10\text{ Vdc}$, $I_C = 10\text{ mA}$, $f = 1.0\text{ kHz}$)	h_{oe}	25	200	μmhos
Noise Figure ($V_{CE} = 10\text{ Vdc}$, $I_C = 100\text{ }\mu\text{A}$, $R_S = 1.0\text{ k}\Omega$, $f = 1.0\text{ kHz}$)	NF	—	4.0	dB

SWITCHING CHARACTERISTICS

Delay Time	(V _{CC} = 3.0 Vdc, V _{BE} = –0.5 Vdc I _C = 150 mA, I _{B1} = 15 mA)	t _d	—	10	ns
Rise Time		t _r	—	25	
Storage Time	(V _{CC} = 30 Vdc, I _C = 150 mA I _{B1} = I _{B2} = 15 mA)	t _s	—	225	ns
Fall Time		t _f	—	60	

1. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$.