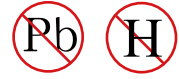


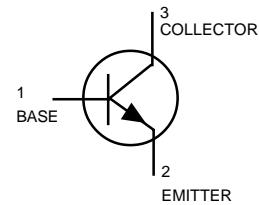
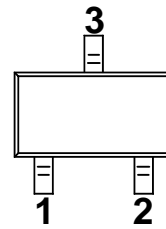


General Purpose Transistors

**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.

SOT-323



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

MMBT2222AW = 1P

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

Characteristic	Symbol	Min	Max	Unit
----------------	--------	-----	-----	------

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 $\leq 2.0\%$.

DEVICE CHARACTERISTICS

MMBT2222AW

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS (1)				
DC Current Gain (1)	h_{FE}			—
(I _C = 0.1 mA _{dc} , V _{CE} = 10 V _{dc})		35	—	
(I _C = 1.0 mA _{dc} , V _{CE} = 10 V _{dc})		50	—	
(I _C = 10 mA _{dc} , V _{CE} = 10 V _{dc})		75	—	
(I _C = 150 mA _{dc} , V _{CE} = 10 V _{dc})		100	—	
(I _C = 500 mA _{dc} , V _{CE} = 10 V _{dc})		40	—	
Collector–Emitter Saturation Voltage(1)	V _{CE(sat)}			V _{dc}
(I _C = 150 mA _{dc} , I _B = 15 mA _{dc})		—	0.3	
(I _C = 500 mA _{dc} , I _B = 50 mA _{dc})		—	1.0	
Base–Emitter Saturation Voltage(1)	V _{BE(sat)}			V _{dc}
(I _C = 150 mA _{dc} , I _B = 15 mA _{dc})		0.6	1.2	
(I _C = 500 mA _{dc} , I _B = 50 mA _{dc})		—	2.0	

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product (I _C = 20 mA _{dc} , V _{CE} = 20V _{dc} , f = 100 MHz)	f _T	300	—	MHz
Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f = 1.0 MHz)	C _{obo}	—	8.0	pF
Input Capacitance (V _{EB} = 0.5 V _{dc} , I _C = 0, f = 1.0 MHz)	C _{ibo}	—	30	pF
Input Impedance (V _{CE} = 10 V _{dc} , I _C = 10 mA _{dc} , f = 1.0 kHz)	h _{ie}	0.25	1.25	k Ω
Voltage Feedback Ratio (V _{CE} = 10 V _{dc} , I _C = 10 mA _{dc} , f = 1.0 kHz)	h _{re}	—	4.0	X 10 ⁻⁴
Small–Signal Current Gain (V _{CE} = 10 V _{dc} , I _C = 10 mA _{dc} , f = 1.0 kHz)	h _{fe}	75	375	—
Output Admittance (V _{CE} = 10 V _{dc} , I _C = 10 mA _{dc} , f = 1.0 kHz)	h _{oe}	25	200	μmhos
Noise Figure (V _{CE} = 10 V _{dc} , I _C = 100 μA _{dc} , R _S = 1.0 kΩ, f = 1.0 kHz)	NF	—	4.0	dB

SWITCHING CHARACTERISTICS

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

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

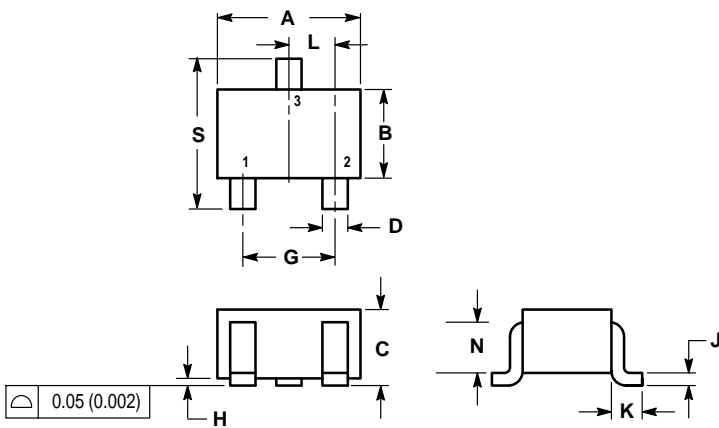
PACKAGE OUTLINE & DIMENSIONS

MMBT2222AW

SC-70 / SOT-323

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.032	0.040	0.80	1.00
D	0.012	0.016	0.30	0.40
G	0.047	0.055	1.20	1.40
H	0.000	0.004	0.00	0.10
J	0.004	0.010	0.10	0.25
K	0.017 REF		0.425 REF	
L	0.026 BSC		0.650 BSC	
N	0.028 REF		0.700 REF	
S	0.079	0.095	2.00	2.40

