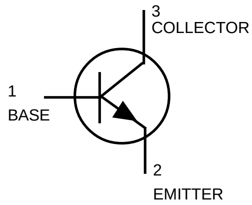
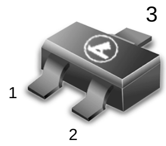
Preliminary Information
General Purpose Transistors

NPN Silicon

MMBT2222AWT1

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.





CASE 419–02, STYLE 3
SOT–323 /SC – 70

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°C	P_D	150	mW
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	833	°C/W
Junction and Storage Temperature	T_J , T_{stg}	–55 to +150	°C

DEVICE MARKING

MMBT2222AWT1 = 1P

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector–Emitter Breakdown Voltage (1) (I_C = 1.0 mAdc, I_B = 0)	$V_{(BR)CEO}$	40	—	Vdc
Collector–Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	$V_{(BR)CBO}$	75	—	Vdc
Emitter–Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	$V_{(BR)EBO}$	6.0	—	Vdc
Base Cutoff Current (V_{CE} = 60 Vdc, V_{EB} = 3.0 Vdc)	I_{BL}	—	20	nAdc
Collector Cutoff Current (V_{CE} = 60 Vdc, V_{EB} = 3.0 Vdc)	I_{CEX}	—	10	nAdc

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

MMBT2222AWT1

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 mAdc, V_{CE} = 10 Vdc)		35	—	
(I_C = 1.0 mAdc, V_{CE} = 10 Vdc)		50	—	
(I_C = 10 mAdc, V_{CE} = 10 Vdc)		75	—	
(I_C = 150 mAdc, V_{CE} = 10 Vdc)		100	—	
(I_C = 500 mAdc, V_{CE} = 10 Vdc)		40	—	
Collector–Emitter Saturation Voltage(1)	$V_{CE(sat)}$			Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)		—	0.3	
(I_C = 500 mAdc, I_B = 50 mAdc)		—	1.0	
Base–Emitter Saturation Voltage(1)	$V_{BE(sat)}$			Vdc
(I_C = 150 mAdc, I_B = 15 mAdc)		0.6	1.2	
(I_C = 500 mAdc, I_B = 50 mAdc)		—	2.0	

SMALL–SIGNAL CHARACTERISTICS

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

SWITCHING CHARACTERISTICS

Characteristic	Conditions	Symbol	Min	Max	Unit
Delay Time	(V_{CC} = 3.0 Vdc, V_{BE}= – 0.5 Vdc	t_d	—	10	
Rise Time	I_C = 150 mAdc, I_{B1} = 15 mAdc)	t_r	—	25	ns
Storage Time	(V_{CC} = 30 Vdc, I_C = 150 mAdc	t_s	—	225	ns
Fall Time	I_{B1} = I_{B2} = 15 mAdc)	t_f	—	60	

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