

General Purpose Transistor

NPN Silicon

These transistors are designed for general purpose amplifier applications. They are housed in the SC-89 package which is designed for low power surface mount applications.

Features

- We declare that the material of product compliance with RoHS requirements.
Pb-Free package is available
 RoHS product for packing code suffix "G"
 Halogen free product for packing code suffix "H"

ORDERING INFORMATION

Device	Maring	Shipping
MMBT2222ATT1	1P	3000 / Tape & Reel

MAXIMUM RATINGS (T_A = 25°C)

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	V _{CEO}	40	V _{dc}
Collector-Base Voltage	V _{CBO}	75	V _{dc}
Emitter-Base Voltage	V _{EBO}	6.0	V _{dc}
Collector Current - Continuous	I _C	600	mAdc

THERMAL CHARACTERISTICS

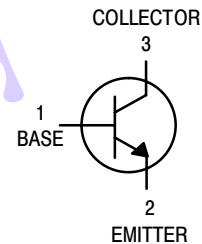
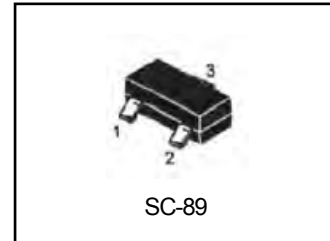
Characteristic	Symbol	Max	Unit
Total Device Dissipation (Note 1) T _A = 25°C	P _D	150	mW
Thermal Resistance, Junction-to-Ambient	R _{θJA}	833	°C/W
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-55 to +150	°C

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

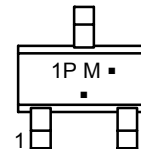
Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage (Note 1) (I _C = 1.0 mAdc, I _B = 0)	V _{(BR)CEO}	40	-	V _{dc}
Collector-Base Breakdown Voltage (I _C = 10 μAdc, I _E = 0)	V _{(BR)CBO}	75	-	V _{dc}
Emitter-Base Breakdown Voltage (I _E = 10 μAdc, I _C = 0)	V _{(BR)EBO}	6.0	-	V _{dc}
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}	-	100	nAdc



MARKING DIAGRAM



1P = Specific Device Code
 M = Date Code
 ■ = Pb-Free Package

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ON CHARACTERISTICS (Note 2)

DC Current Gain ($I_C = 0.1 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 1.0 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 10 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 150 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 500 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$)	H_{FE}	35 50 75 100 40	– – – – –	–
Collector–Emitter Saturation Voltage ($I_C = 150 \text{ mA}$, $I_B = 15 \text{ mA}$) ($I_C = 500 \text{ mA}$, $I_B = 50 \text{ mA}$)	$V_{CE(sat)}$	– –	0.3 1.0	Vdc
Base–Emitter Saturation Voltage ($I_C = 150 \text{ mA}$, $I_B = 15 \text{ mA}$) ($I_C = 500 \text{ mA}$, $I_B = 50 \text{ mA}$)	$V_{BE(sat)}$	0.6 –	1.2 2.0	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current–Gain – Bandwidth Product ($I_C = 20 \text{ mA}$, $V_{CE} = 20 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	250	–	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 ($V_{CE} = 10 \text{ Vdc}$, $I_C = 100 \mu\text{A}$, $R_S = 1.0 \text{ k ohms}$, $f = 1.0 \text{ kHz}$)	NF	–	4.0	dB

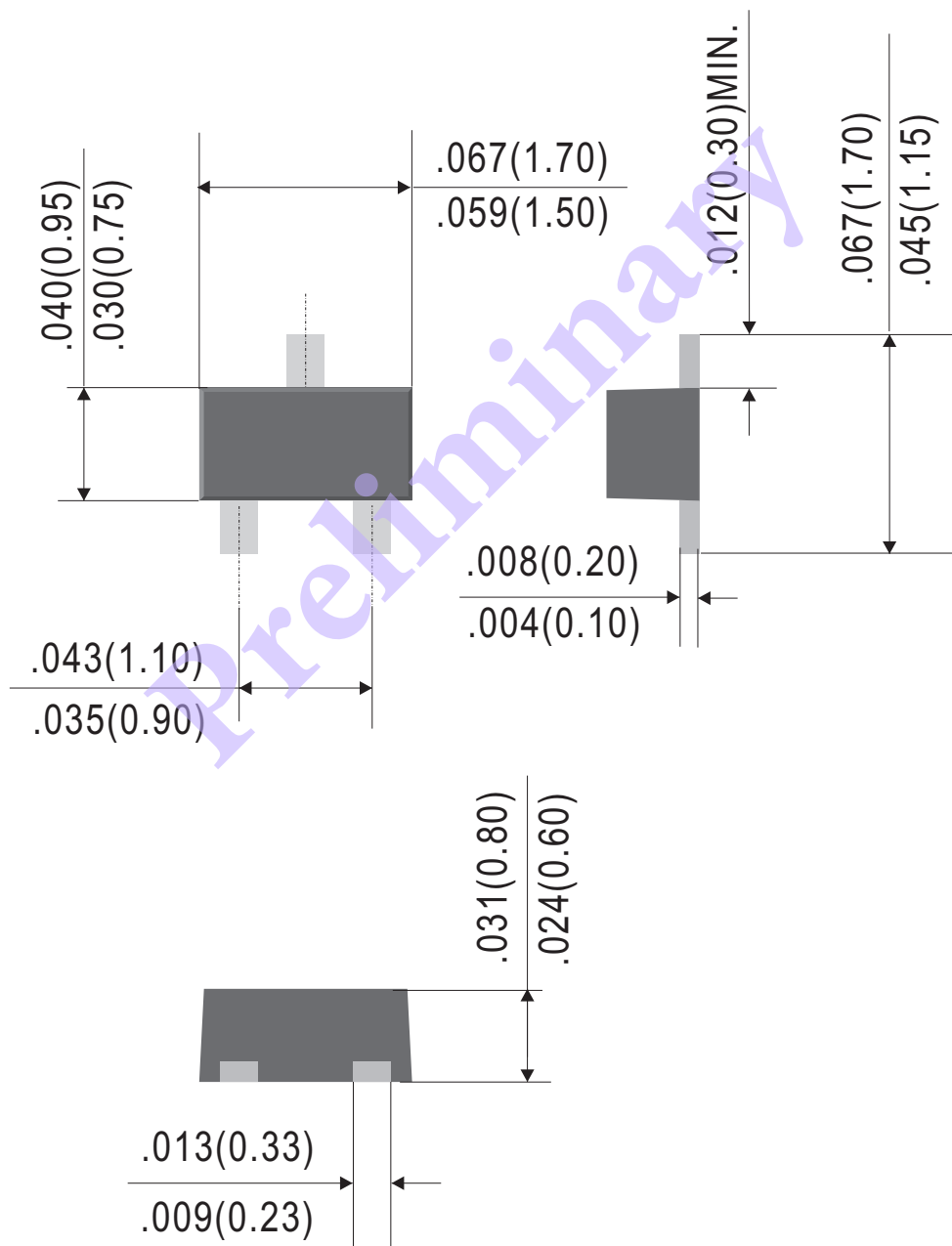
SWITCHING CHARACTERISTICS

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	

- Device mounted on FR4 glass epoxy printed circuit board using the minimum recommended footprint.
- Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

Outline Drawing

SC-89



Dimensions in inches and (millimeters)