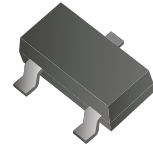


MMBT2222A-G (NPN)

RoHS Device

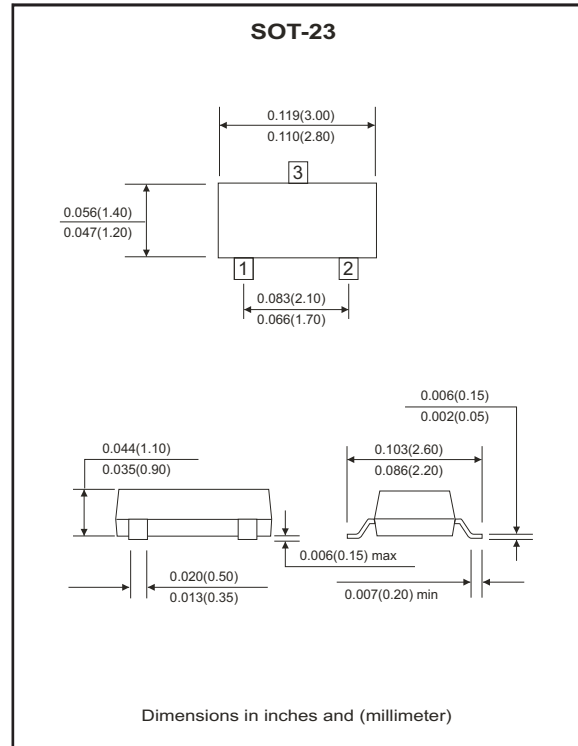


Features

-NPN silicon epitaxial planar transistor for switching and amplifier application.

Mechanical data

- Case: SOT-23, molded plastic.
- Terminals: solderable per MIL-STD-750, method 2026.
- Approx. weight: 0.008 grams



Maximum Ratings and Thermal Characteristics

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

Parameter	Symbol	Value	Units
Collector-Base voltage	V_{CBO}	75	V
Collector-Emitter voltage	V_{CEO}	40	V
Emitter-Base voltage	V_{EBO}	6.0	V
Collector current	I_C	600	mA
Power dissipation on FR-5 board(1), $T_A=25\text{ }^\circ\text{C}$ Derate above $25\text{ }^\circ\text{C}$	P_{tot}	225 1.9	mW mW/ $^\circ\text{C}$
Power dissipation on aluminum substrate(2), $T_A=25\text{ }^\circ\text{C}$ Derate above $25\text{ }^\circ\text{C}$	P_{tot}	300 2.4	mW mW/ $^\circ\text{C}$
Thermal resistance, junction to ambient air	$R_{\theta JA}$	FR-5 board Aluminum substrate 556 417	$^\circ\text{C}/\text{mW}$
Junction temperature	T_J	150	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to +150	$^\circ\text{C}$

Notes:

- FR-5=1.0×0.75×0.062 in.
- Alumina=0.4×0.3×0.024 in. 99.5% alumina.

Electrical Characteristics (@TA=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Max.	Units
DC current gain	h_{FE}	$V_{CE}=10V, I_C=0.1mA$	35		
		$V_{CE}=10V, I_C=1mA$	50		
		$V_{CE}=10V, I_C=10mA$	75		
		$V_{CE}=10V, I_C=10mA, T_A=-55\text{ }^{\circ}C$	35		
		$V_{CE}=10V, I_C=150mA$	100	300	
		$V_{CE}=10V, I_C=500mA$	40		
		$V_{CE}=1V, I_C=150mA$	50		
Collector-Base breakdown voltage	$V_{(BR)CBO}$	$I_C=10\mu A, I_E=0$	75		V
Collector-Emitter breakdown voltage	$V_{(BR)CEO}$	$I_C=10mA, I_B=0$	40		V
Emitter-Base breakdown voltage	$V_{(BR)EBO}$	$I_C=10\mu A, I_C=0$	6		V
Collector-Emitter saturation voltage	V_{CEsat}	$I_C=150mA, I_B=15mA$ $I_C=500mA, I_B=50mA$		0.3 1	V
Base-Emitter saturation voltage	V_{BEsat}	$I_C=150mA, I_B=15mA$ $I_C=500mA, I_B=50mA$	0.6	1.2 2	V
Collector cut-off current	I_{CEX}	$V_{EB}=3V, V_{CE}=60V$		10	nA
Collector cut-off current	I_{CBO}	$V_{CB}=60V, I_E=0$ $V_{CB}=50V, I_C=0, T_A=125\text{ }^{\circ}C$		10 10	nA μA
Base cut-off current	I_{BL}	$V_{EB}=3V, V_{CE}=60V$		20	nA
Emitter cut-off current	I_{EBO}	$V_{EB}=3V_{DC}, I_C=0$		100	nA
Current gain-bandwidth product	f_T	$V_{CE}=20V, I_C=20mA, f=100MHz$	300		MHz
Output capacitance	C_{obo}	$V_{CB}=10V, f=1MHz, I_E=0$		8	pF
Input capacitance	C_{ibo}	$V_{EB}=0.5V, f=1MHz, I_C=0$		25	pF
Noise figure	NF	$V_{CE}=10V, I_C=100\mu A, R_s=1k\Omega,$ $f=1kHz$		4	dB
Input impedance	h_{ie}	$V_{CE}=10V, I_C=1mA, f=1kHz$ $V_{CE}=10V, I_C=10mA, f=1kHz$	2 0.25	8 1.25	k Ω
Small signal current gain	h_{fe}	$V_{CE}=10V, I_C=1mA, f=1kHz$ $V_{CE}=10V, I_C=10mA, f=1kHz$	50 75	300 375	
Voltage feedback ratio	h_{re}	$V_{CE}=10V, I_C=1mA, f=1kHz$ $V_{CE}=10V, I_C=10mA, f=1kHz$		8 4	$\times 10^{-4}$
Output admittance	h_{oe}	$V_{CE}=10V, I_C=1mA, f=1kHz$ $V_{CE}=10V, I_C=10mA, f=1kHz$	5 25	35 200	μS
Collector base time constant	τ_b/C_C	$I_E=20mA, V_{CB}=20V, f=31.8MHz$		150	pS
Delay time (see fig.1)	t_d	$I_{B1}=15mA, I_C=150mA, V_{CC}=30V,$ $V_{BE}=-0.5V$		10	nS
Rise time (see fig.1)	t_r	$I_{B1}=15mA, I_C=150mA, V_{CC}=30V,$ $V_{BE}=-0.5V$		25	nS
Storage time (see fig.2)	t_s	$I_{B1}=I_{B2}=15mA, I_C=150mA,$ $V_{CC}=30V$		225	nS
Fall time (see fig.2)	t_f	$I_{B1}=I_{B2}=15mA, I_C=150mA,$ $V_{CC}=30V$		60	nS

Switching time equivalent test circuit

Figure 1. Turn-on Time

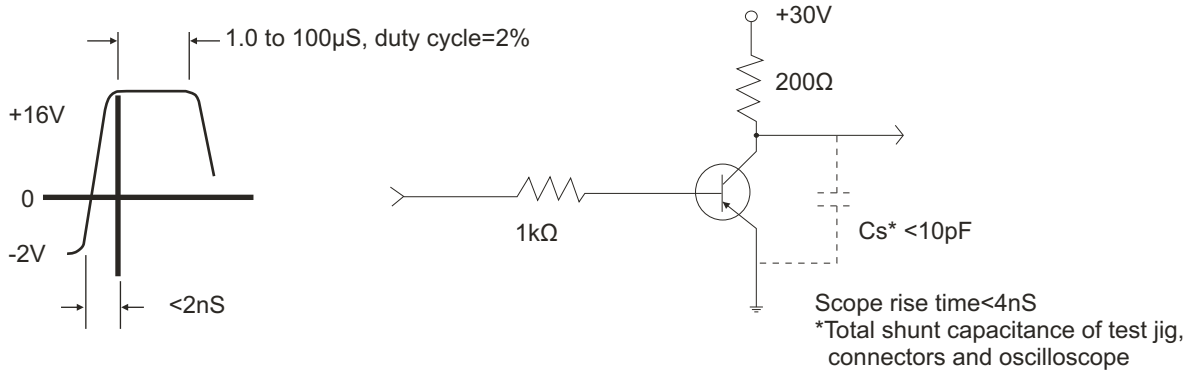


Figure 2. Turn-off Time

