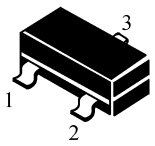
FEATURES

NPN Switching Transistor

SOT—23

1. BASE
2. EMITTER
3. COLLECTOR



MAXIMUM RATINGS

Characteristic	Symbol	MMBT2222	MMBT2222A	Unit
Collector-Emitter Voltage	V_{CEO}	30	40	Vdc
Collector-Base Voltage	V_{CBO}	60	75	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	6.0	Vdc
Collector Current-Continuous	Ic	600	600	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board(1) T_A=25℃ Derate above25℃	P_D	225 1.8	mW mW/℃
Total Device Dissipation Alumina Substrate,(2)T_A=25℃ Derate above25℃	P_D	300 2.4	mW mW/℃
Thermal Resistance Junction to Ambient	$R_{\Theta JA}$	417	℃/W
Solder Temperature/Solder Time	T/t	260/10	℃/S
Junction & Storage Temperature	T_J,T_{stg}	-55to+150℃	

ELECTRICAL CHARACTERISTICS

(T_A=25℃ unless otherwise noted)

Characteristic	Symbol		Min	Max	Unit
Collector-Emitter Breakdown Voltage(3) (Ic=10mAdc,I_B=0)	$V_{(BR)CEO}$	MMBT2222 MMBT2222A	30 40	— —	Vdc
Collector-Base Breakdown Voltage (Ic=10 μ Adc,I_E=0)	$V_{(BR)CBO}$	MMBT2222 MMBT2222A	60 75	— —	Vdc
Emitter-Base Breakdown Voltage (I_E=10 μ Adc,Ic=0)	$V_{(BR)EBO}$	MMBT2222 MMBT2222A	5.0 6.0	—	Vdc
Collector Cutoff Current (V_{CE}=60Vdc, $V_{EB(off)}$=3.0Vdc)	I_{CEX}	MMBT2222A	—	10	nAdc
Collector Cutoff Current (V_{CB}=50Vdc,I_E=0) (V_{CB}=60Vdc,I_E=0) (V_{CB}=50Vdc,I_E=0,T_A=125℃) (V_{CB}=60Vdc,I_E=0,T_A=125℃)	I_{CBO}	 MMBT2222 MMBT2222A MMBT2222 MMBT2222A	 — — — —	 0.01 0.01 10.0 10.0	 μ Adc
Emitter Cutoff Current (V_{EB}=3.0Vdc, I_C=0)	I_{EBO}	MMBT2222A	—	100	nAdc
Base Cutoff Current (V_{CE}=60Vdc, $V_{EB(off)}$=3.0Vdc)	I_{BL}	MMBT2222A	—	20	nAdc
DC Current Gain	H_{FE}				—
(I_c=0.1mAdc,V_{CE}=10.0Vdc)			35	—	
(I_c=1.0mAdc,V_{CE}=10.0Vdc)			50	—	
(I_c=10mAdc,V_{CE}=10.0Vdc)			75	—	
(I_c=10mAdc,V_{CE}=10.0Vdc,T_A=-55℃)		MMBT2222A	35	—	
(I_c=150mAdc,V_{CE}=10.0Vdc)(3)			100	300	
(I_c=150mAdc,V_{CE}=1.0Vdc)(3)			50	—	
(I_c=500mAdc,V_{CE}=10.0Vdc)(3)		MMBT2222 MMBT2222A	30 40	— —	
Collector-Emitter Saturation Voltage (I_c=150mAdc, I_B=15mAdc) (I_c=500mAdc, I_B=50mAdc)	$V_{CE(sat)}$	MMBT2222 MMBT2222A MMBT2222 MMBT2222A	— — — —	0.4 0.3 1.6 1.0	Vdc
Base-Emitter Saturation Voltage (I_c=150mAdc, I_B=15mAdc) (I_c=500mAdc, I_B=50mAdc)	$V_{BE(sat)}$	MMBT2222 MMBT2222A MMBT2222 MMBT2222A	— 0.6 — —	1.3 1.2 2.6 2.0	Vdc

SMALL-SIGNAL CHARACTERISTICS

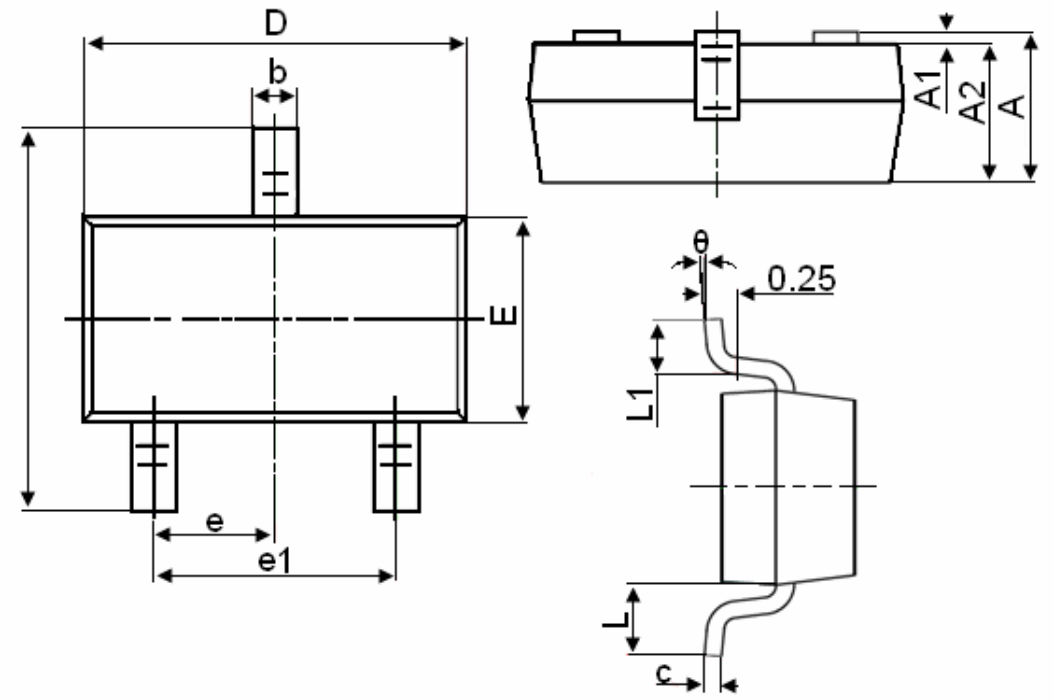
Characteristic	Symbol	Min	Max	Unit
Current-Gain-Bandwidth Product (I_C=20mAdc,V_{CE}=20Vdc,f=100MHz)	f_T MMBT2222 MMBT2222A	250 300	— —	MHz
Output Capacitance (V_{CB}=10.0Vdc, I_E=0, f=1.0MHz)	C_{obo}	—	80	pF
Intput Capacitance (V_{EB}=0.5Vdc, I_C=0, f=1.0MHz)	C_{ibo} MMBT2222 MMBT2222A	— —	30 25	pF
Intput Impedance (I_C=1.0mAdc,V_{CE}=10Vdc,f=1.0kHz) (I_C=10mAdc,V_{CE}=10Vdc,f=1.0kHz)	hie MMBT2222A MMBT2222A	 2.0 0.25	 8.0 1.25	kQ
Voltage Feedback Radio (I_C=1.0mAdc,V_{CE}=10Vdc,f=1.0kHz) (I_C=10mAdc,V_{CE}=10Vdc,f=1.0kHz)	hre MMBT2222A MMBT2222A	 — —	 8.0 4.0	$\times10^{-4}$
Small-Signal Current Gain (I_C=1.0mAdc,V_{CE}=10Vdc,f=1.0kHz) (I_C=10mAdc,V_{CE}=10Vdc,f=1.0kHz)	hfe MMBT2222A MMBT2222A	 50 75	 300 375	—
Output Admittance (I_C=1.0mAdc,V_{CE}=10Vdc,f=1.0kHz) (I_C=10mAdc,V_{CE}=10Vdc,f=1.0kHz)	hoe MMBT2222A MMBT2222A	 5.0 25	 35 200	μmhos
Collector-Base Time Constant (I_E=20mAdc,V_{CB}=20Vdc,f=31.8MHz)	rb,Cc MMBT2222A	—	150	ps
Noise Figure (I_C=100uAdc,V_{CE}=10Vdc,Rs=1.0kQ,f=1.0kHz)	NF MMBT2222A	—	4.0	dB

SWITCHING CHARACTERISTICS

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

1. FR-5=1.0×0.75×0.062in.
2. Alumina=0.4×0.3×0.024in.99.5%alumina.
3. Pulse Width≤300us;Duty Cycle≤2.0%.
4. f_T is defined as the frequency at which (h_{fe}) extrapolates to unity.

SOT-23 Package Information



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°

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