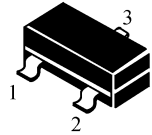


SOT-23

- 1. BASE
- 2. EMITTER
- 3. COLLECTOR



■ MAXIMUM RATINGS 最大額定值

Characteristic 特性參數	Symbol 符號	MMBT2222	MMBT2222A	Unit 單位
Collector-Emitter Voltage 集電極-發射極電壓	V_{CEO}	30	40	Vdc
Collector-Base Voltage 集電極-基極電壓	V_{CBO}	60	75	Vdc
Emitter-Base Voltage 發射極-基極電壓	V_{EBO}	5.0	6.0	Vdc
Collector Current-Continuous 集電極電流-連續	I_c	600	600	mAdc

■ THERMAL CHARACTERISTICS 熱特性

Characteristic 特性參數	Symbol 符號	Max 最大值	Unit 單位
Total Device Dissipation 總耗散功率 FR-5 Board(1) $T_A=25^{\circ}\text{C}$ 溫度為 25°C Derate above 25°C 超過 25°C 遞減	P_D	225 1.8	mW mW/ $^{\circ}\text{C}$
Total Device Dissipation 總耗散功率 Alumina Substrate 氧化鋁襯底,(2) $T_A=25^{\circ}\text{C}$ Derate above 25°C 超過 25°C 遞減	P_D	300 2.4	mW mW/ $^{\circ}\text{C}$
Thermal Resistance Junction to Ambient 熱阻	$R_{\theta JA}$	417	$^{\circ}\text{C}/\text{W}$
Junction and Storage Temperature 結溫和儲存溫度	T_J, T_{stg}	-55to+150 $^{\circ}\text{C}$	

■ DEVICE MARKING 打標

MMBT2222=1B;MMBT2222A=1P



MMBT2222

■ELECTRICAL CHARACTERISTICS 電特性

($T_A=25^{\circ}\text{C}$ unless otherwise noted 如無特殊說明，溫度為 25°C)

Characteristic 特性參數	Symbol 符號	Min 最小值	Max 最大值	Unit 單位
Collector-Emitter Breakdown Voltage(3) 集電極-發射極擊穿電壓($I_C=10\text{mA}$, $I_B=0$)	$V_{(BR)CEO}$ MMBT2222 MMBT2222A	30 40	— —	Vdc
Collector-Base Breakdown Voltage 集電極-基極擊穿電壓($I_C=10\mu\text{A}$, $I_E=0$)	$V_{(BR)CBO}$ MMBT2222 MMBT2222A	60 75	— —	Vdc
Emitter-Base Breakdown Voltage 發射極-基極擊穿電壓($I_E=10\mu\text{A}$, $I_C=0$)	$V_{(BR)EBO}$ MMBT2222 MMBT2222A	5.0 6.0	—	Vdc
Collector Cutoff Current 集電極截止電流 ($V_{CE}=60\text{Vdc}$, $V_{EB(off)}=3.0\text{Vdc}$)	I_{CEX} MMBT2222A	—	10	nA
Collector Cutoff Current 集電極截止電流 ($V_{CB}=50\text{Vdc}$, $I_E=0$) ($V_{CB}=60\text{Vdc}$, $I_E=0$) ($V_{CB}=50\text{Vdc}$, $I_E=0$, $T_A=125^{\circ}\text{C}$) ($V_{CB}=60\text{Vdc}$, $I_E=0$, $T_A=125^{\circ}\text{C}$)	I_{CBO} MMBT2222 MMBT2222A MMBT2222 MMBT2222A	— — — —	0.01 0.01 10.0 10.0	μ A
Emitter Cutoff Current 發射極截止電流 ($V_{EB}=3.0\text{Vdc}$, $I_C=0$)	I_{EBO} MMBT2222A	—	100	nA
Base Cutoff Current 基極截止電流 ($V_{CE}=60\text{Vdc}$, $V_{EB(off)}=3.0\text{Vdc}$)	I_{BL} MMBT2222A	—	20	nA
DC Current Gain 直流電流增益	H_{FE}			—
($I_C=0.1\text{mA}$, $V_{CE}=10.0\text{Vdc}$)		35	—	
($I_C=1.0\text{mA}$, $V_{CE}=10.0\text{Vdc}$)		50	—	
($I_C=10\text{mA}$, $V_{CE}=10.0\text{Vdc}$)		75	—	
($I_C=10\text{mA}$, $V_{CE}=10.0\text{Vdc}$, $T_A=-55^{\circ}\text{C}$)	MMBT2222A	35	—	
($I_C=150\text{mA}$, $V_{CE}=10.0\text{Vdc}$)(3)		100	300	
($I_C=150\text{mA}$, $V_{CE}=1.0\text{Vdc}$)(3)		50	—	
($I_C=500\text{mA}$, $V_{CE}=10.0\text{Vdc}$)(3)	MMBT2222 MMBT2222A	30 40	— —	
Collector-Emitter Saturation Voltage 集電極發射極飽和壓降 ($I_C=150\text{mA}$, $I_B=15\text{mA}$) ($I_C=500\text{mA}$, $I_B=50\text{mA}$)	$V_{CE(sat)}$ MMBT2222 MMBT2222A MMBT2222 MMBT2222A	— — — —	0.4 0.3 1.6 1.0	Vdc
Base-Emitter Saturation Voltage 基極發射極飽和壓降 ($I_C=150\text{mA}$, $I_B=15\text{mA}$) ($I_C=500\text{mA}$, $I_B=50\text{mA}$)	$V_{BE(sat)}$ MMBT2222 MMBT2222A MMBT2222 MMBT2222A	— 0.6 — —	1.3 1.2 2.6 2.0	Vdc



MMBT2222

■SMALL-SIGNAL CHARACTERISTICS 小信號特性

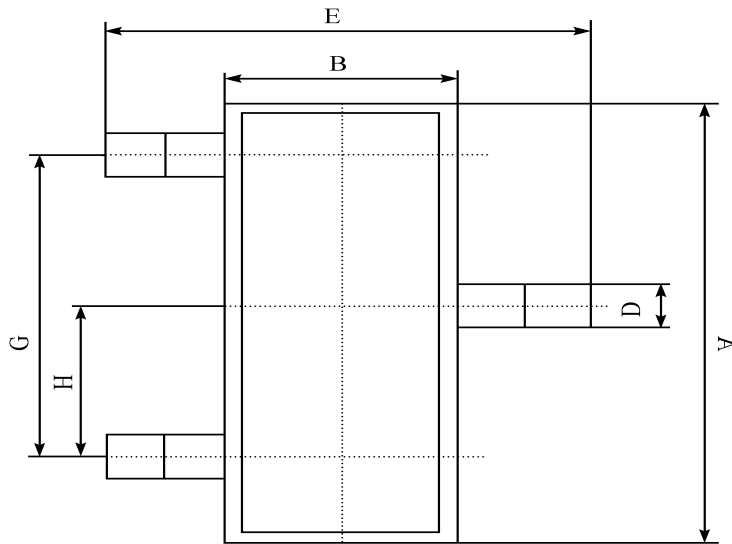
Characteristic 特性參數	Symbol 符號	Min 最小值	Max 最大值	Unit 單位
Current-Gain-Bandwidth Product 電流增益-帶寬乘積 ($I_C=20\text{mA}$, $V_{CE}=20\text{Vdc}$, $f=100\text{MHz}$)	f_T MMBT2222 MMBT2222A	250 300	— —	MHz
Output Capacitance 輸出電容 ($V_{CB}=10.0\text{Vdc}$, $I_E=0$, $f=1.0\text{MHz}$)	C_{obo}	—	80	pF
Input Capacitance 輸入電容 ($V_{EB}=0.5\text{Vdc}$, $I_C=0$, $f=1.0\text{MHz}$)	C_{ibo} MMBT2222 MMBT2222A	— —	30 25	pF
Input Impedance 輸入阻抗 ($I_C=1.0\text{mA}$, $V_{CE}=10\text{Vdc}$, $f=1.0\text{kHz}$) ($I_C=10\text{mA}$, $V_{CE}=10\text{Vdc}$, $f=1.0\text{kHz}$)	h_{ie} MMBT2222A MMBT2222A	2.0 0.25	8.0 1.25	k Ω
Voltage Feedback Ratio 電壓反饋係數 ($I_C=1.0\text{mA}$, $V_{CE}=10\text{Vdc}$, $f=1.0\text{kHz}$) ($I_C=10\text{mA}$, $V_{CE}=10\text{Vdc}$, $f=1.0\text{kHz}$)	h_{re} MMBT2222A MMBT2222A	— —	8.0 4.0	$\times 10^{-4}$
Small-Signal Current Gain 小信號電流增益 ($I_C=1.0\text{mA}$, $V_{CE}=10\text{Vdc}$, $f=1.0\text{kHz}$) ($I_C=10\text{mA}$, $V_{CE}=10\text{Vdc}$, $f=1.0\text{kHz}$)	h_{fe} MMBT2222A MMBT2222A	50 75	300 375	—
Output Admittance 輸出導納 ($I_C=1.0\text{mA}$, $V_{CE}=10\text{Vdc}$, $f=1.0\text{kHz}$) ($I_C=10\text{mA}$, $V_{CE}=10\text{Vdc}$, $f=1.0\text{kHz}$)	h_{oe} MMBT2222A MMBT2222A	5.0 25	35 200	μmhos
Collector-Base Time Constant 集電極基極時間 ($I_E=20\text{mA}$, $V_{CB}=20\text{Vdc}$, $f=31.8\text{MHz}$)	r_b, C_c MMBT2222A	—	150	ps
Noise Figure 雜訊係數 ($I_C=100\mu\text{A}$, $V_{CE}=10\text{Vdc}$, $R_s=1.0\text{k}\Omega$, $f=1.0\text{kHz}$)	NF MMBT2222A	—	4.0	dB

■SWITCHING CHARACTERISTICS 開關特性

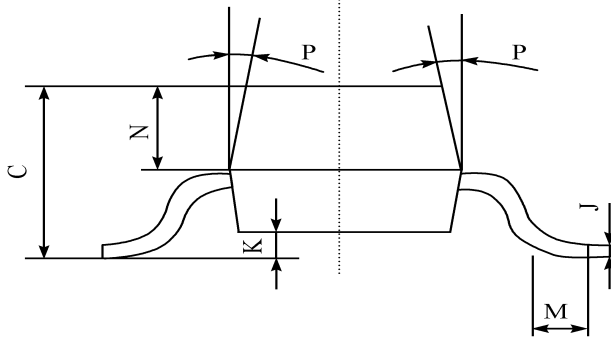
Characteristic 特性參數	Symbol 符號	Min 最小值	Max 最大值	Unit 單位
Delay Time 延遲時間	(V _{cc} =30Vdc, V _{BE(off)} =-0.5Vdc I _c =150mA, I _{B1} =15mA)	t_d	—	ns
Rise Time 上升時間		t_r	25	
Storage Time 儲存時間	(V _{cc} =30Vdc, I _c =150mA, I _{B1} =I _{B2} =15mA)	t_s	—	ns
Fall Time 下降時間		t_f	60	

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

■ DIMENSION 外形封裝尺寸



序號	數值及公差
A	2.90 ± 0.10
B	1.30 ± 0.10
C	1.00 ± 0.10
D	0.40 ± 0.10
E	2.40 ± 0.20
G	1.90 ± 0.10
H	0.95 ± 0.05
J	0.13 ± 0.05
K	$0.00 - 0.10$
M	≥ 0.2
N	0.60 ± 0.10
P	$7 \pm 2^\circ$



This datasheet presents technical data of Tak Cheong's Silicon Rectifier Diodes. Complete specifications for the individual devices are provided in the form of datasheets. A comprehensive Selector Guide is included to simplify the task of choosing the best set of components required for a specific application. For additional information, please visit our website <http://www.takcheong.com>.

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