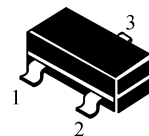


KEL[®]

MMBT3904

SOT-23

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



■ MAXIMUM RATINGS 最大額定值

Characteristic 特性參數	Symbol 符號	Rating 額定值	Unit 單位
Collector-Emitter Voltage 集電極-發射極電壓	V_{CEO}	40	Vdc
Collector-Base Voltage 集電極-基極電壓	V_{CBO}	40	Vdc
Emitter-Base Voltage 發射極-基極電壓	V_{EBO}	6.0	Vdc
Collector Current-Continuous 集電極電流-連續	I_c	200	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) $T_A=25^{\circ}\text{C}$ 環境溫度為 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) $T_A=25^{\circ}\text{C}$ 環境溫度為 25°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}	150 $^{\circ}\text{C}$, -55to+150 $^{\circ}\text{C}$	

■ DEVICE MARKING 打標

MMBT3904=1AM

$H_{FE}(1)3904(100 \sim 200)$, 3904(100~300)

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■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)

■OFF CHARACTERISTICS 截止電特性

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($I_C=1.0\text{mA}$, $I_B=0$)	$V_{(BR)CEO}$	40	—	Vdc
Collector-Base Breakdown Voltage 集電極-基極擊穿電壓($I_C=10\mu\text{A}$, $I_E=0$)	$V_{(BR)CBO}$	40	—	Vdc
Emitter-Base Breakdown Voltage 發射極-基極擊穿電壓($I_E=10\mu\text{A}$, $I_C=0$)	$V_{(BR)EBO}$	6.0	—	Vdc
Base Cutoff Current 基極截止電流($V_{CE}=30\text{Vdc}$, $V_{EB}=3.0\text{Vdc}$)	I_{BEX}	—	50	nA
Collector Cutoff Current 集電極截止電流($V_{CE}=30\text{Vdc}$, $V_{EB}=3.0\text{Vdc}$)	I_{CEX}	—	50	nA

■ON CHARACTERISTICS(2)導通電特性

Characteristic 特性參數	Symbol 符號	Min 最小值	Max 最大值	Unit 單位
DC Current Gain 直流電流增益	h_{PE}			—
($I_C=0.1\text{mA}$, $V_{CE}=1.0\text{Vdc}$)		40	—	
($I_C=1.0\text{mA}$, $V_{CE}=1.0\text{Vdc}$)		70	—	
($I_C=10\text{mA}$, $V_{CE}=1.0\text{Vdc}$)		100	300	
($I_C=50\text{mA}$, $V_{CE}=1.0\text{Vdc}$)		60	—	
($I_C=100\text{mA}$, $V_{CE}=1.0\text{Vdc}$)		30	—	
Collector-Emitter Saturation Voltage 集電極-發射極飽和壓降 ($I_C=10\text{mA}$, $I_B=1.0\text{mA}$) ($I_C=50\text{mA}$, $I_B=5.0\text{mA}$)	$V_{CE(sat)}$	— —	0.25 0.4	Vdc
Base-Emitter Saturation Voltage 基極發射極飽和壓降 ($I_C=10\text{mA}$, $I_B=1.0\text{mA}$) ($I_C=50\text{mA}$, $I_B=5.0\text{mA}$)	$V_{BE(sat)}$	0.65 —	0.85 0.95	Vdc



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■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 ($I_C=10\text{mA}$, $V_{CE}=-20\text{Vdc}$, $f=100\text{MHz}$)	f_T	300	—	MHz
Output Capacitance 輸出電容 ($V_{CB}=5.0\text{Vdc}$, $I_E=0$, $f=1.0\text{MHz}$)	C_{obo}	—	4.0	pF
Input Capacitance 輸入電容 ($V_{EB}=0.5\text{Vdc}$, $I_C=0$, $f=1.0\text{MHz}$)	C_{ibo}	—	8.0	pF
Input Impedance 輸入阻抗 ($V_{CE}=10\text{Vdc}$, $I_C=1.0\text{mA}$, $f=1.0\text{KHz}$)	h_{ie}	1.0	10	$k\Omega$
Voltage Feedback Ratio 電壓反饋係數 ($V_{CE}=10\text{Vdc}$, $I_C=1.0\text{mA}$, $f=1.0\text{KHz}$)	h_{re}	0.5	8.0	$\times 10^{-4}$
Small-Signal Current Gain 小信號電流增益 ($V_{CE}=10\text{Vdc}$, $I_C=1.0\text{mA}$, $f=1.0\text{KHz}$)	h_{fe}	100	400	—
Output Admittance 輸出導納 ($V_{CE}=10\text{Vdc}$, $I_C=1.0\text{mA}$, $f=1.0\text{KHz}$)	h_{oe}	1.0	40	μmhos
Noise Figure 噪声係數 ($V_{CE}=5.0\text{Vdc}$, $I_C=100\mu\text{A}$, $R_s=1.0k\Omega$, $f=1.0\text{KHz}$)	NF	—	5.0	dB

■SWITCHING CHARACTERISTICS 開關特性

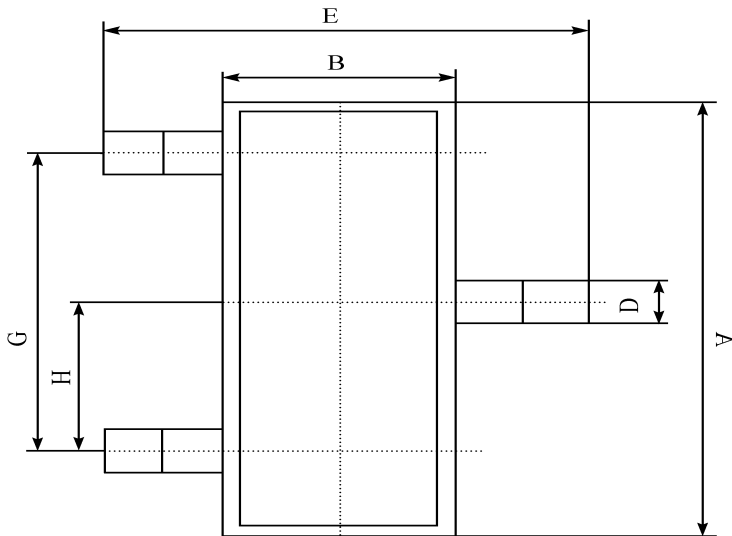
Characteristic 特性參數	Symbol 符號	Min 最小值	Max 最大值	Unit 單位
Delay Time 延遲時間	t_d ($V_{CC}=3.0\text{Vdc}$, $V_{BE}=0.5\text{Vdc}$, $I_C=10\text{mA}$, $I_{B1}=1.0\text{mA}$)	—	35	ns
Rise Time 上升時間		t_r	—	
Storage Time 儲存時間	t_s ($V_{CC}=3.0\text{Vdc}$, $I_C=10\text{mA}$, $I_{B1}=I_{B2}=1.0\text{mA}$)	—	225	ns
Fall Time 下降時間		t_f	—	

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. Pulse Test: Pulse Width≤300us;Duty Cycle≤2.0%.

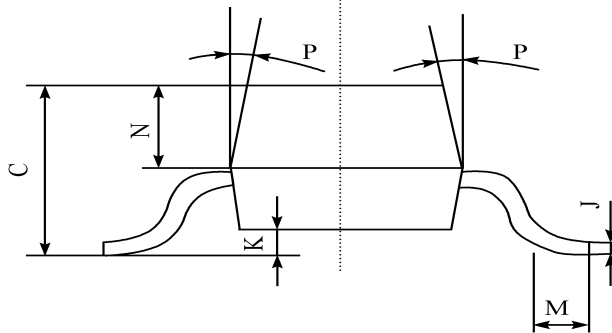


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■DIMENSION 外形封裝尺寸



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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