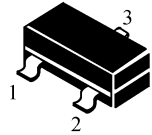


# KEL<sup>®</sup>

MMBT4401

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	$V_{CBO}$	60	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	$I_c$	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) $T_A=25^{\circ}\text{C}$ 環境溫度為 $25^{\circ}\text{C}$ Derate above $25^{\circ}\text{C}$ 超過 $25^{\circ}\text{C}$ 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 $25^{\circ}\text{C}$ Derate above $25^{\circ}\text{C}$ 超過 $25^{\circ}\text{C}$ 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

MMBT4401=2X

KEL MMBT4401



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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  $25^{\circ}\text{C}$ )

**■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( $I_C=0.1\text{mA}$ , $I_E=0$ )	$V_{(BR)CBO}$	60	—	Vdc
Emitter-Base Breakdown Voltage 發射極基極擊穿電壓( $I_E=0.1\text{mA}$ , $I_C=0$ )	$V_{(BR)EBO}$	6.0	—	Vdc
Base Cutoff Current 基極截止電流 ( $V_{CE}=35\text{Vdc}$ , $V_{EB}=0.4\text{Vdc}$ )	$I_{BEV}$	—	0.1	$\mu\text{A}$
Collector Cutoff Current 集電極截止電流 ( $V_{CE}=35\text{Vdc}$ , $V_{EB}=0.4\text{Vdc}$ )	$I_{CEX}$	—	0.1	$\mu\text{A}$

- 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%.

**■ON CHARACTERISTICS 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	$H_{FE}$			—
( $I_C=0.1\text{mA}$ , $V_{CE}=1.0\text{Vdc}$ )		20	—	
( $I_C=1.0\text{mA}$ , $V_{CE}=1.0\text{Vdc}$ )		40	—	
( $I_C=10\text{mA}$ , $V_{CE}=1.0\text{Vdc}$ )		80	—	
( $I_C=150\text{mA}$ , $V_{CE}=1.0\text{Vdc}$ )		100	300	
( $I_C=500\text{mA}$ , $V_{CE}=2.0\text{Vdc}$ )		40	—	
Collector-Emitter Saturation Voltage 集電極發射極飽和壓降	$V_{CE(sat)}$			
( $I_C=150\text{mA}$ , $I_B=15\text{mA}$ )		—	0.4	
( $I_C=500\text{mA}$ , $I_B=50\text{mA}$ )		—	0.75	Vdc
Base-Emitter Saturation Voltage 基極發射極飽和壓降	$V_{BE(sat)}$			
( $I_C=150\text{mA}$ , $I_B=15\text{mA}$ )		0.75	0.95	
( $I_C=500\text{mA}$ , $I_B=50\text{mA}$ )		—	1.2	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 ( $I_C=20\text{mA}$ , $V_{CE}=20\text{V}$ , $f=100\text{MHz}$ )	$f_T$	250	—	MHz
Collector-Base Capacitance 集電極基極電容 ( $V_{CB}=5.0\text{V}$ , $I_E=0$ , $f=1.0\text{MHz}$ )	$C_{cb}$	—	6.5	pF
Emitter-Base Capacitance 發射極基極電容 ( $V_{EB}=0.5\text{V}$ , $I_C=0$ , $f=1.0\text{MHz}$ )	$C_{eb}$	—	30	pF
Input Impedance 輸入阻抗 ( $I_C=1.0\text{mA}$ , $V_{CE}=10\text{V}$ , $f=1.0\text{kHz}$ )	$h_{ie}$	1.0	15	k $\Omega$
Voltage Feedback Ratio 電壓反饋係數 ( $I_C=1.0\text{mA}$ , $V_{CE}=10\text{V}$ , $f=1.0\text{kHz}$ )	$h_{re}$	0.1	8.0	$\times 10^{-4}$
Small-Signal Current Gain 小信號電流增益 ( $I_C=1.0\text{mA}$ , $V_{CE}=10\text{V}$ , $f=1.0\text{kHz}$ )	$h_{fe}$	40	500	—
Output Admittance 輸出導納 ( $I_C=1.0\text{mA}$ , $V_{CE}=10\text{V}$ , $f=1.0\text{kHz}$ )	$h_{oe}$	1.0	30	$\mu\text{mhos}$

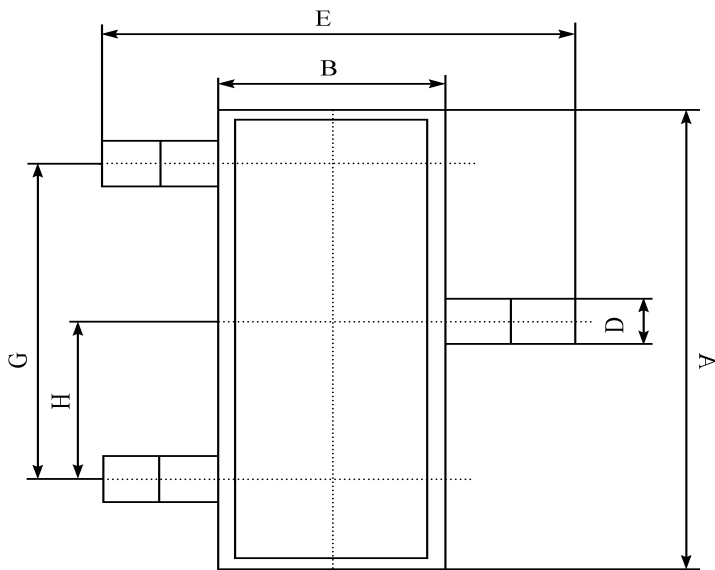
■SWITCHING CHARACTERISTICS 開關特性

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	$t_d$ ( $V_{CC}=30\text{V}$ , $V_{EB}=2.0\text{V}$ , $I_C=150\text{mA}$ , $I_{B1}=15\text{mA}$ )	—	15	ns
Rise Time 上升時間		$t_r$	—	
Storage Time 儲存時間	$t_s$ ( $V_{CC}=30\text{V}$ , $I_C=150\text{mA}$ , $I_{B1}=I_{B2}=15\text{mA}$ )	—	225	ns
Fall Time 下降時間		$t_f$	—	

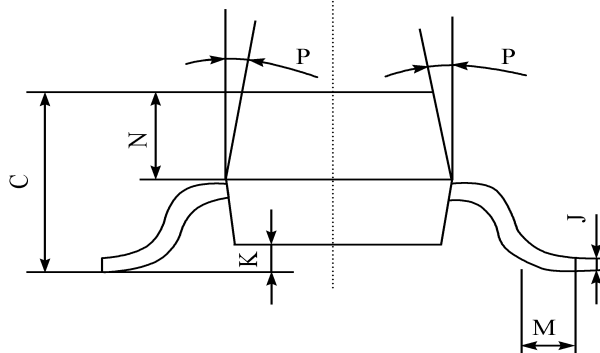


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■DIMENSION 外形封裝尺寸



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