



TT050K065FQ

主要参数 MAIN CHARACTERISTICS

I _c	50A
V _{CEs}	650V
V _{cesat-typ}	1.55V

用途

- PFC
- 储能

APPLICATIONS

- Power factor corrector (PFC)
- Energy Storage

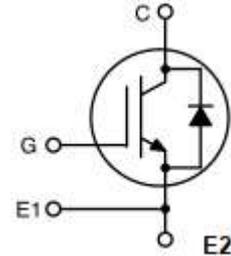
产品特性

- 低栅极电荷
- Trench FS 技术,
- RoHS 产品
- 快开关速度
- 低开关损耗
- V_{CE(sat)}正温度系数

FEATURES

- Low gate charge
- Trench FS Technology,
- RoHS product
- Fast switching speed
- Low switching losses
- V_{CE(sat)} with positive temperature coefficient

封装 Package



E1: Kelvin Emitter
E2: Power Emitter



TO-247-4L

订货信息 ORDER MESSAGE

订货型号 Order codes	印 记 Marking	封 装 Package
无卤-条管 Halogen-Free-Tube		
TT050K065FQ-GH-BR	TT050K065FQ	TO-247-4L

绝对最大额定值 ABSOLUTE RATINGS ($T_C=25^\circ\text{C}$)

项 目 Parameter	符 号 Symbol	数 值 Value	单 位 Unit
最高集电极—发射极直流电压 Collector-Emitter Voltage	V_{CES}	650	V
*连续集电极电流 Collector Current-continuous	I_C	80($T_C=25^\circ\text{C}$)	A
		60($T_C=100^\circ\text{C}$)	A
最大脉冲集电极极电流 (注1) Collector Current – pulse (note 1)	I_{CM}	200	A
*二极管正向测试电流 Diode RMS forward current	I_F	80 ($T_C=25^\circ\text{C}$)	A
		50 ($T_C=100^\circ\text{C}$)	A
二极管正向不重复峰值电流 (浪涌电流) Surge non repetitive forward current $t_p=10$ ms sinusoidal	I_{FSM}	200	A
最高栅极发射极电压 Gate-Emitter Voltage	V_{GES}	± 20	V
瞬态栅极发射极电压 Transient Gate-emitter voltage ($t_p \leq 10\mu\text{s}$, $D < 0.010$)	V_{GES}	± 30	V
安全工作区 Turn-off safe area $V_{CE} \leq 650\text{V}$, $T_{vj} \leq 175^\circ\text{C}$, $t_p = 1\mu\text{s}$	-	200	A
耗散功率 Power Dissipation	P_D $T_C=25^\circ\text{C}$	500	W
	P_D $T_C=100^\circ\text{C}$	250	
工作结温 (注2) Operating Junction Temperature Range	T_{VJ}	$-40 \sim +175$	$^\circ\text{C}$
存储温度 Storage Temperature	T_{STG}	$-55 \sim +150$	$^\circ\text{C}$
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T_L	260	$^\circ\text{C}$

*连续集电极电流由最高结温限制。

*Collector current limited by maximum junction temperature.,and $T_C=25^\circ\text{C}$ limited by bondwire.

For optimum lifetime and reliability, JSMC recommends operating conditions that do not exceed 80% of the maximum ratings stated in this datasheet

注释:

Notes:

1: 脉冲宽度由最高结温限制。

1: Pulse width limited by maximum junction temperature.



电特性 ELECTRICAL CHARACTERISTICS

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
关态特性 Off –Characteristics						
集电极-发射极击穿电压 Collector-Emmitter Voltage	BV_{CES}	$I_C=250\mu A, V_{GE}=0V$	650	-	-	V
零栅压下集电极漏电流 Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_{vj}=25^\circ C$	-	-	50	μA
正向栅极体漏电流 Gate-body leakage current, forward	I_{GESF}	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^\circ C$	-	-	200	nA
反向栅极体漏电流 Gate-body leakage current, reverse	I_{GESR}	$V_{CE}=0V, V_{GE}=-20V, T_{vj}=25^\circ C$	-	-	-200	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C=0.5mA$	3.5	4.5	5.5	V
饱和压降 Collector-Emmitter saturation Voltage	V_{CESAT}	$V_{GE}=15V, I_C=50A$ $T_{vj}=25^\circ C$ $T_{vj}=150^\circ C$	- -	1.55 1.75	1.9 -	V
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1.0MHz$	-	2062	-	pF
输出电容 Output capacitance	C_{oes}		-	213	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	36	-	pF
栅极电荷总量 Total Gate Charge	Q_g	$V_{CC}=520V, I_C=50A, V_{GE}=15V$	-	118	-	nC



电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V, I_c=50A, R_G=5\Omega$ $V_{GE}=15V$ $T_{vj}=25^\circ C$	-	11	-	ns
上升时间 Turn-On rise time	t_r		-	65	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	110	-	ns
下降时间 Turn-Off Fall time	t_f		-	72	-	ns
开通损耗 Turn-On energy	Eon		-	0.85	-	mJ
关断损耗 Turn-off energy	Eoff		-	1.15	-	mJ
总开关损耗 Total switching energy	Etot		-	2.0	-	mJ
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V, I_c=50A, R_G=5\Omega$ $V_{GE}=15V$ $T_{vj}=150^\circ C$	-	12	-	ns
上升时间 Turn-On rise time	t_r		-	66	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	130	-	ns
下降时间 Turn-Off Fall time	t_f		-	110	-	ns
开通损耗 Turn-On energy	Eon		-	0.96	-	mJ
关断损耗 Turn-off energy	Eoff		-	1.56	-	mJ
总开关损耗 Total switching energy	Etot		-	2.52	-	mJ

反并联二极管特性及最大额定值 Anti-Parallel Diode Characteristics and Maximum Ratings

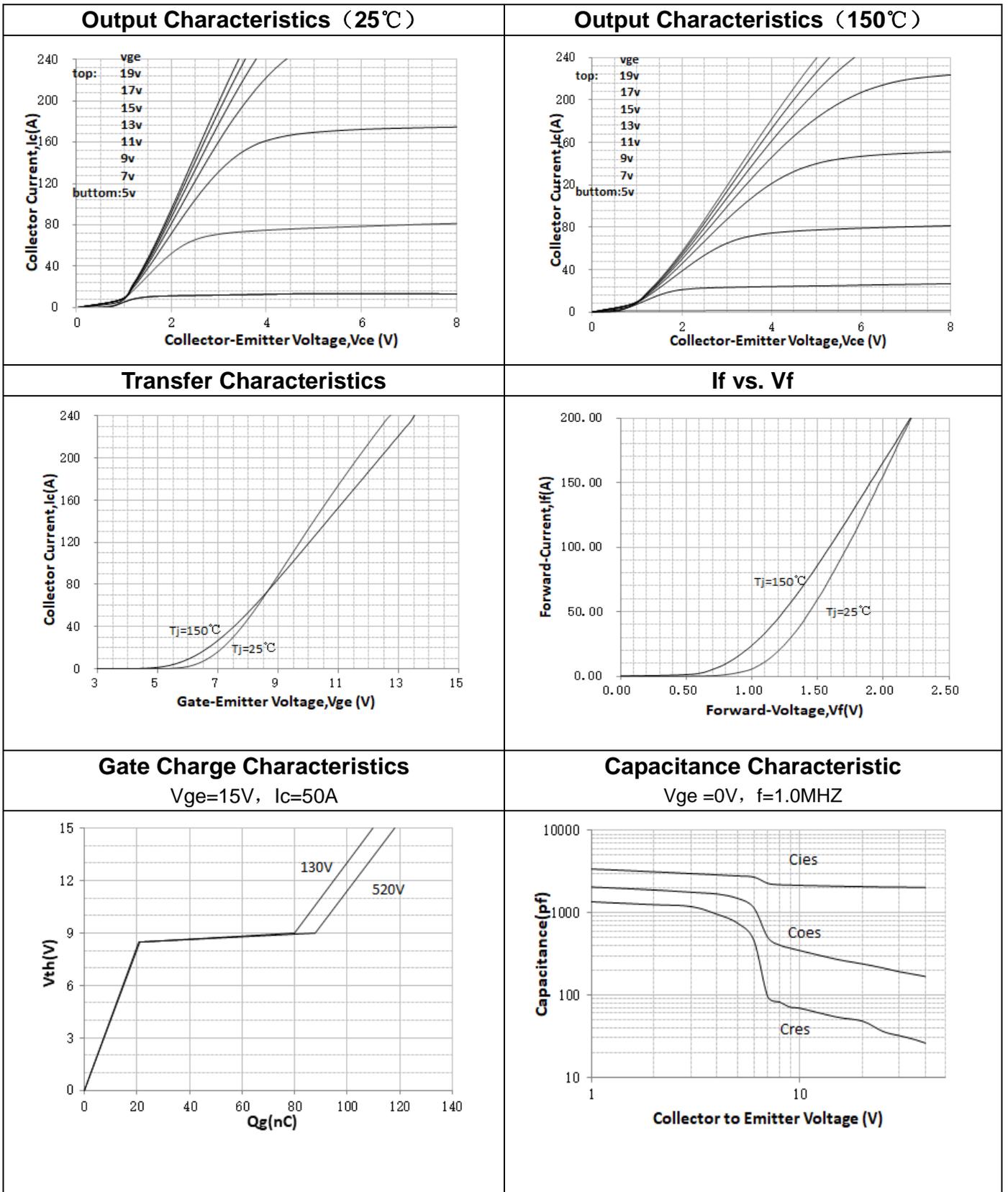
正向压降 Diode Forward Voltage	V_F	$I_F=50A, T_{vj}=25^\circ C$ $T_{vj}=150^\circ C$	-	1.5 1.3	1.8 -	V
反向恢复时间 Reverse recovery time	t_{rr}	$V_R=200V, I_F=50A$ $dI_F/dt=200A/\mu s$ $T_{vj}=25^\circ C$	-	160	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q_{rr}		-	0.79	-	nC
反向恢复电流 Diode Reverse recovery Current	I_{rrm}		-	8.0	-	A
反向恢复时间 Diode Reverse recovery time	t_{rr}	$V_R=200V, I_F=50A$ $dI_F/dt=200A/\mu s$ $T_{vj}=150^\circ C$	-	270	-	ns
反向恢复电荷 Diode Reverse recovery charge	Q_{rr}		-	3.1	-	nC
反向恢复电流 Diode Reverse recovery Current	I_{rrm}		-	17	-	A

项 目 Parameter	符 号 Symbol	MAX	单 位 Unit
结到管壳的热阻 Junction to Case IGBT	$R_{th(j-c)}$	0.3	$^\circ C/W$
结到管壳的热阻 Junction to Case Diode	$R_{th(j-c)}$	0.47	$^\circ C/W$
结到环境的热阻 Junction to Ambient	$R_{th(j-A)}$	40	$^\circ C/W$





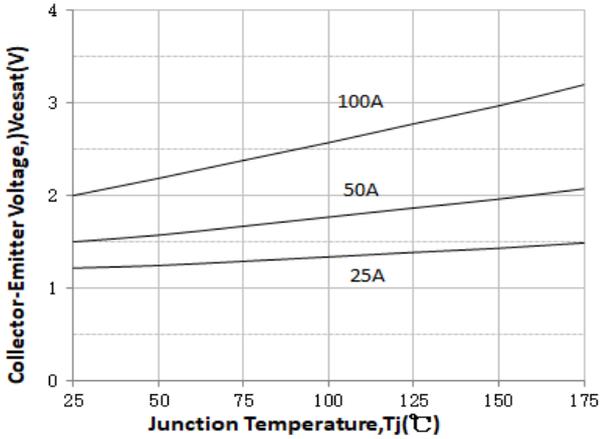
特征曲线 ELECTRICAL CHARACTERISTICS (curves)





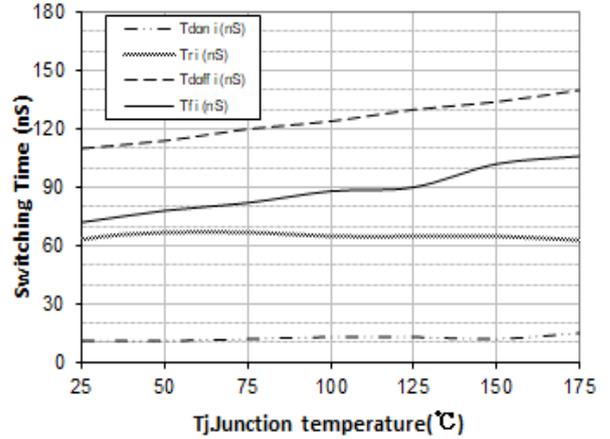
Vcesat vs. Tj

Vge=15V, Ic=25A, 50A, 100A



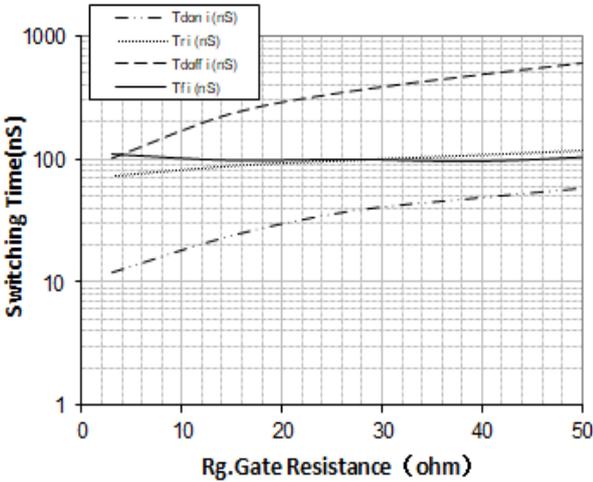
Switching Time vs. Tj

Vge=15V, Vce=400V, Ic=50A, Rg=5Ω



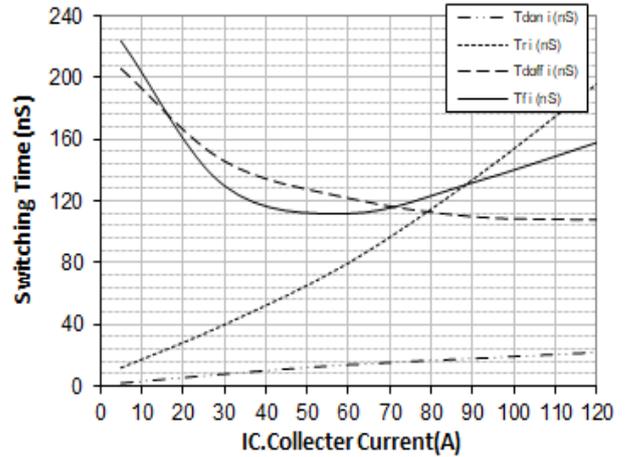
Switching Time vs. Rg(150°C)

Vge=15V, Vce=400V, Ic=50A



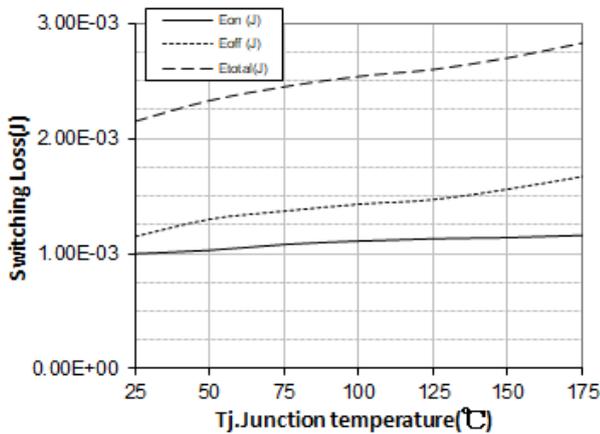
Switching Time vs. Ic(150°C)

Vce=400V, Vge=15V, Rg=5Ω



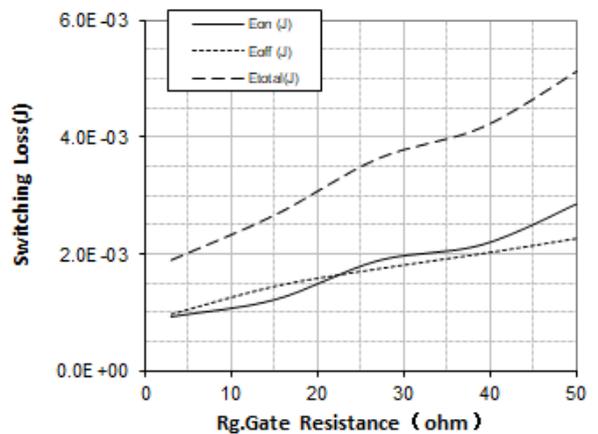
Switching Loss vs. Tj

Vge=15V, Vce=400V, Ic=50A, Rg=5Ω



Switching Loss vs. Rg(150°C)

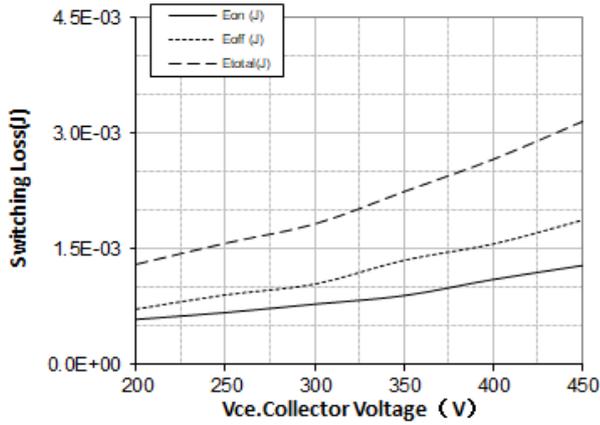
Vge=15V, Vce=400V, Ic=50A





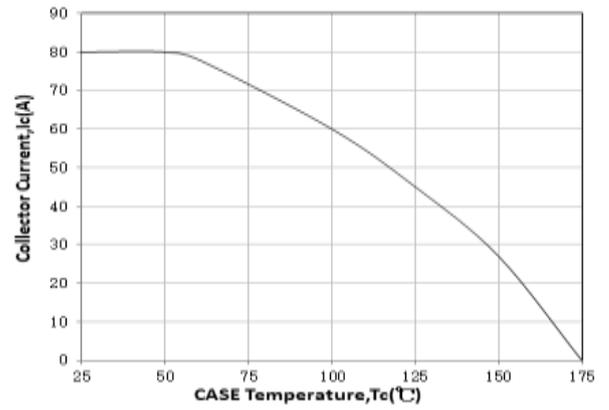
Switching Loss vs. VCE(150°C)

Vge=15V, Ic=50A, Rg=5Ω

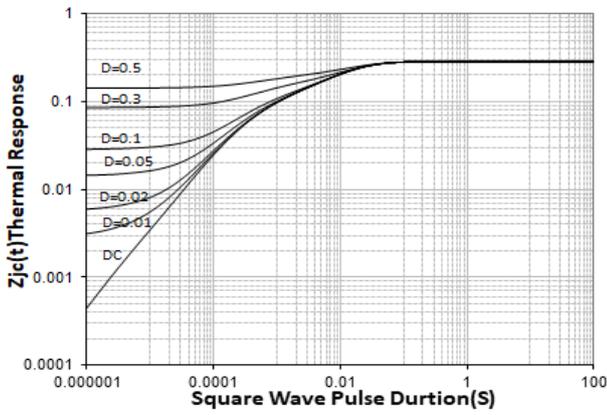


Collector current vs. case temperature

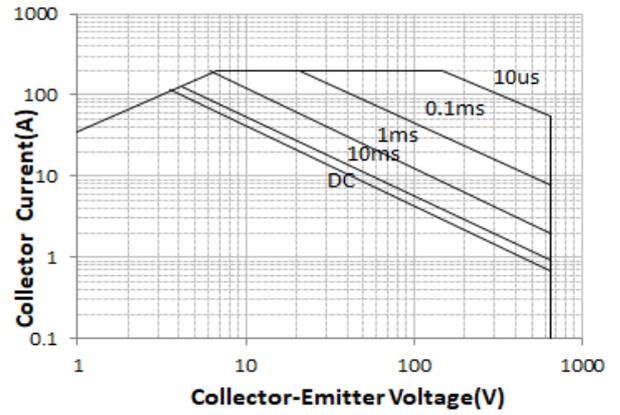
VGE≥15V, Tvj≤175°C



Transient Thermal Impedance for IGBT



Forward Bias Safe Operating Area

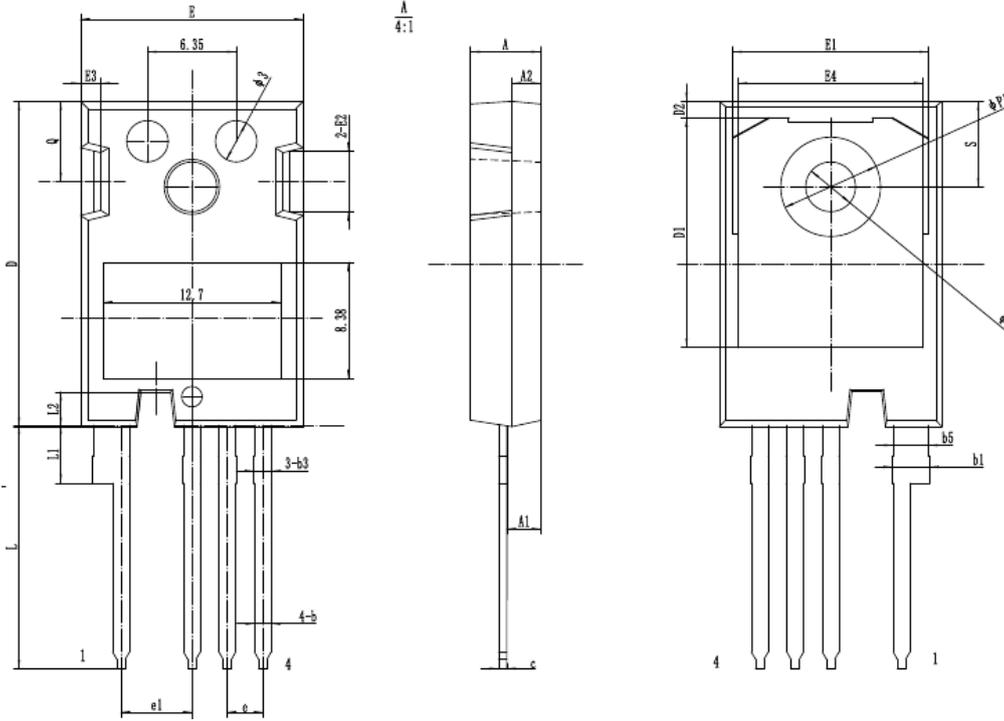




外形尺寸 PACKAGE MECHANICAL DATA

TO-247-4L

单位 Unit: mm



SYMBOL	mm		
	MIN	NOM	MAX
*A	4.83	5.02	5.21
A1	2.29	2.41	2.54
A2	1.91	2.00	2.16
*b	1.07	1.20	1.33
b1	2.39	2.67	2.94
b3	1.07	1.30	1.60
b5	2.39	2.53	2.69
*c	0.55	0.60	0.68
*D	23.30	23.45	23.60
D1	16.25	16.55	17.65
D2	0.95	1.19	1.25
*E	15.75	15.94	16.13
E1	13.10	14.02	14.15
E2	3.68	4.40	5.10
E3	1.00	1.45	1.90
E4	12.38	13.26	13.43
*e		2.54BSC	
e1		5.08BSC	
*L	17.31	17.57	17.82
*L1	3.97	4.19	4.37
*L2	2.30	2.50	2.65
* ϕ P	3.51	3.61	3.65
* ϕ P1		7.19REF	
*Q	5.49	5.79	6.00
S	6.04	6.17	6.30



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