



# ATT050K065FQC

## 主要参数 MAIN CHARACTERISTICS

I <sub>c</sub>	50A
V <sub>CEs</sub>	650V
V <sub>cesat-typ</sub>	1.35V

### 用途

- 充电桩
- UPS 电源
- 光伏
- 储能

### APPLICATIONS

- Charging pile
- UPS
- Solar converters
- Energy Storage

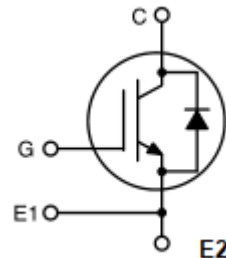
### 产品特性

- 低栅极电荷
- Trench FS 技术,
- RoHS 产品
- 快开关速度
- 低开关损耗
- VCE(sat)正温度系数
- 内置 SiC 肖特基二极管

### FEATURES

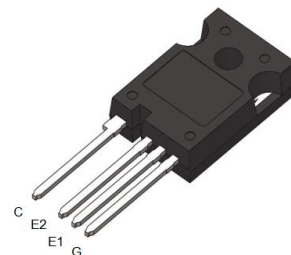
- Low gate charge
- Trench FS Technology,
- RoHS product
- Fast switching speed
- Low switching losses
- VCE(sat) with positive temperature coefficient
- Built in SiC SBD

## 封装 Package



E1: Kelvin Emitter  
E2: Power Emitter

Built in SiC SBD



## 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		
ATT050K065FQC-GH-BR	ATT050K065FQC	T0-247-4L

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-Emmitter 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
		65( $T_C=100^{\circ}\text{C}$ )	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
		65 ( $T_C=100^{\circ}\text{C}$ )	A
二极管正向不重复峰值电流(浪涌电流) Surge non repetitive forward current $t_p=10\text{ms}$ sinusoidal	$I_{FSM}$	200	A
最高栅极发射极电压 Gate-Emmitter Voltage	$V_{GES}$	$\pm 20$	V
瞬态栅极发射极电压 Transient Gate-emitter voltage( $t_p \leq 10\mu\text{s}$ , $D < 0.010$ )	$V_{GES}$	$\pm 30$	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	$P_D$ $T_C=25^{\circ}\text{C}$	394	W
工作结温 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.

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
<b>关态特性 Off –Characteristics</b>						
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	$I_{CES}$	$V_{CE}=650V, V_{GE}=0V, T_{vj}=25^\circ C$ $V_{CE}=650V, V_{GE}=0V, T_{vj}=175^\circ C$	- -	- -	500 2000	$\mu A$
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
<b>通态特性 On-Characteristics</b>						
阈值电压 Gate Threshold Voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C=1mA$	3.5	4.5	5.5	V
饱和压降 Collector-Emmitter saturation Voltage	$V_{CESAT}$	$V_{GE}=15V, I_C=50A$ $T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	- -	1.35 1.65	1.7 -	V
<b>动态特性 Dynamic Characteristics</b>						
输入电容 Input capacitance	$C_{ies}$	$V_{CE}=25V$ $V_{GE}=0V$ $f=1.0MHz$	-	2643	-	pF
输出电容 Output capacitance	$C_{oes}$		-	325	-	pF
反向传输电容 Reverse transfer capacitance	$C_{res}$		-	58	-	pF
栅极电荷总量 Total Gate Charge	$Q_g$	$V_{CC}=520V, I_C=50A, V_{GE}=15V$	-	153	-	nC
栅极-发射极 Gate to emitter charge	$Q_{ge}$		-	19	-	
栅极-集电极 Gate to collector charge	$Q_{gc}$		-	85	-	



## 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	$t_{d(on)}$	$V_{CC}=400V, I_c=50A, R_G=9\Omega$ $V_{GE}=15V$ $T_{vj}=25^\circ C$	-	22	-	ns
上升时间 Turn-On rise time	$t_r$		-	52	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	196	-	ns
下降时间 Turn-Off Fall time	$t_f$		-	75	-	ns
开通损耗 Turn-On energy	Eon		-	0.73	-	mJ
关断损耗 Turn-off energy	Eoff		-	1.3	-	mJ
总开关损耗 Total switching energy	Etot		-	2.03	-	mJ
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V, I_c=50A, R_G=9\Omega$ $V_{GE}=15V$ $T_{vj}=150^\circ C$	-	16	-	ns
上升时间 Turn-On rise time	$t_r$		-	50	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	210	-	ns
下降时间 Turn-Off Fall time	$t_f$		-	130	-	ns
开通损耗 Turn-On energy	Eon		-	0.85	-	mJ
关断损耗 Turn-off energy	Eoff		-	1.5	-	mJ
总开关损耗 Total switching energy	Etot		-	2.35	-	mJ
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V, I_c=25A, R_G=9\Omega$ $V_{GE}=15V$ $T_{vj}=25^\circ C$	-	20	-	ns
上升时间 Turn-On rise time	$t_r$		-	32	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	215	-	ns
下降时间 Turn-Off Fall time	$t_f$		-	74	-	ns
开通损耗 Turn-On energy	Eon		-	0.21	-	mJ
关断损耗 Turn-off energy	Eoff		-	0.7	-	mJ
总开关损耗 Total switching energy	Etot		-	0.91	-	mJ
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V, I_c=25A, R_G=9\Omega$ $V_{GE}=15V$ $T_{vj}=150^\circ C$	-	8	-	ns
上升时间 Turn-On rise time	$t_r$		-	32	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	265	-	ns
下降时间 Turn-Off Fall time	$t_f$		-	141	-	ns
开通损耗 Turn-On energy	Eon		-	0.23	-	mJ
关断损耗 Turn-off energy	Eoff		-	0.92	-	mJ
总开关损耗 Total switching energy	Etot		-	1.15	-	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 Drain-Source Diode Forward Voltage	$V_F$	$I_F=40A, T_{vj}=25^\circ C$ $T_{vj}=175^\circ C$	- -	1.55 2.3	1.8 -	V
反向恢复电荷 Diode Reverse recovery charge	$Q_{rr}$	$V_R=400V, I_F=40A$ $di_F/dt=200A/\mu s$ $T_{vj}=25^\circ C$	-	19	-	nC



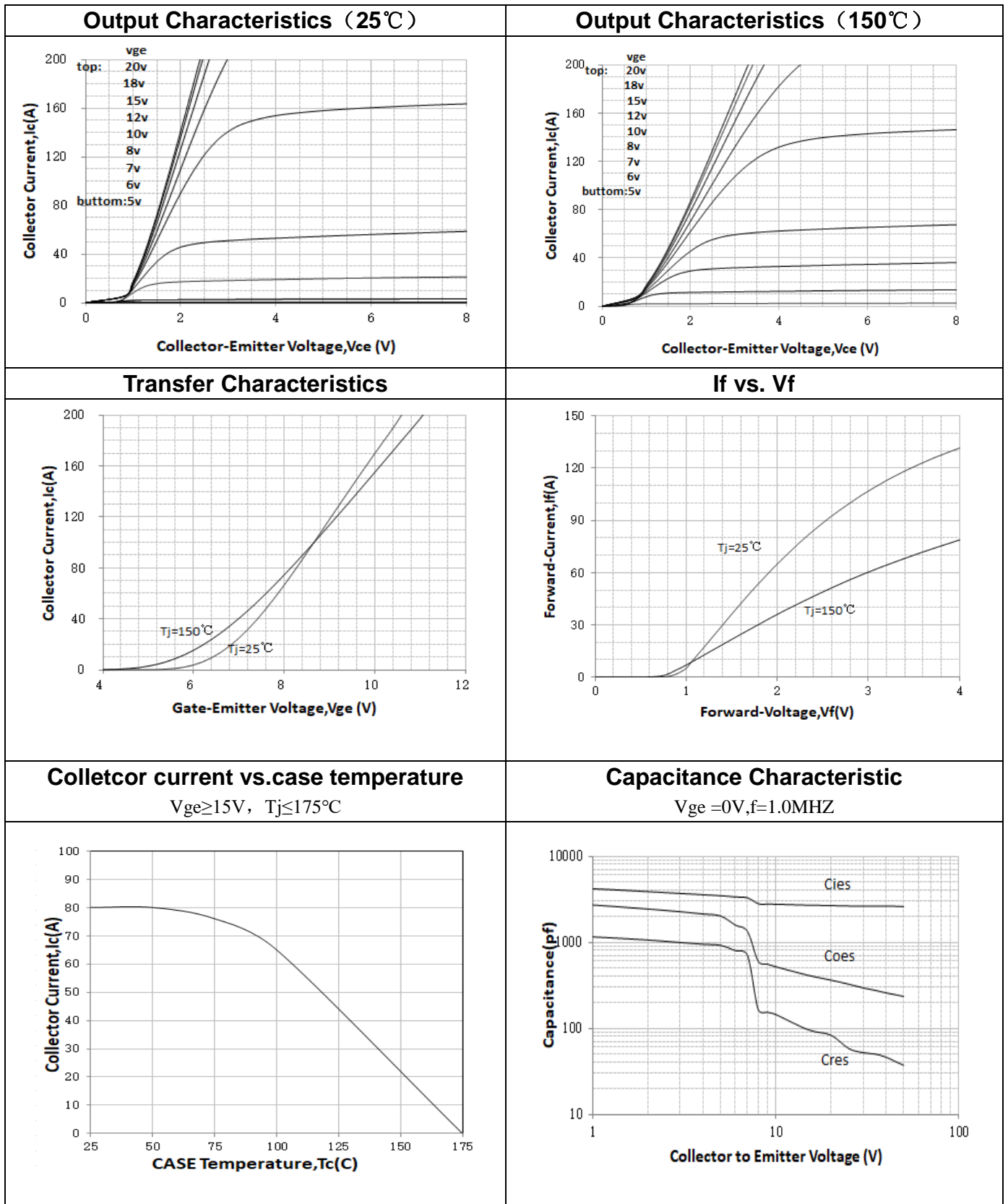


项 目 Parameter	符 号 Symbol	MAX	单 位 Unit
结到管壳的热阻 Junction to Case IGBT	$R_{th(j-c)}$	0.38	$^{\circ}C/W$
结到管壳的热阻 Junction to Case Diode	$R_{th(j-c)}$	0.75	$^{\circ}C/W$
结到环境的热阻 Junction to Ambient	$R_{th(j-A)}$	40	$^{\circ}C/W$





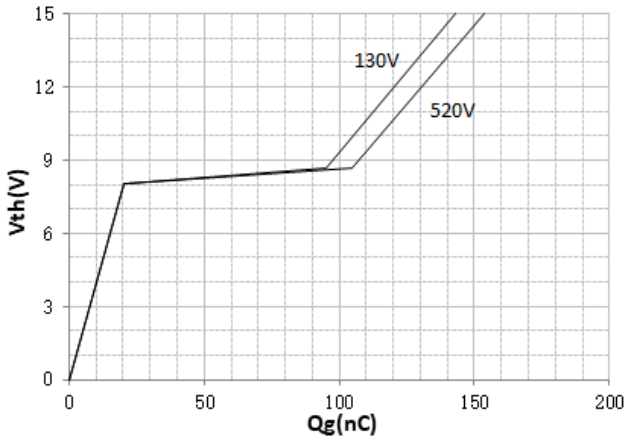
## 特征曲线 ELECTRICAL CHARACTERISTICS (curves)





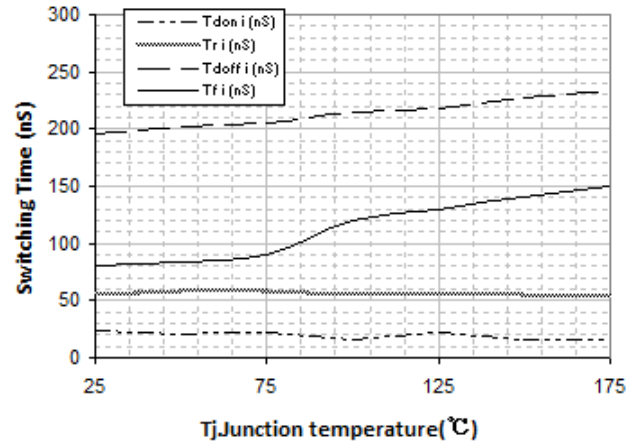
**Gate Charge Characteristics**

V<sub>ge</sub>=15V, I<sub>c</sub>=50A



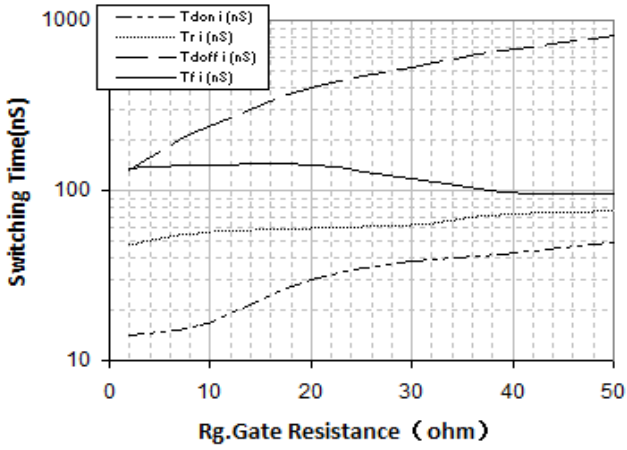
**Switching Time vs. Tj**

V<sub>ge</sub>=15V, V<sub>ce</sub>=400V, I<sub>c</sub>=50A, R<sub>g</sub>=9Ω



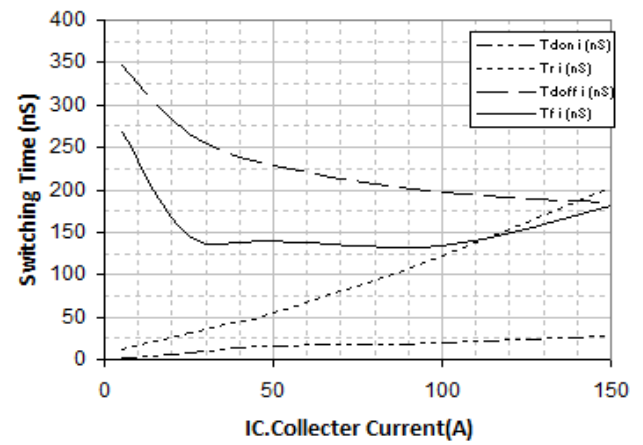
**Switching Time vs. Rg(150°C)**

V<sub>ge</sub>=15V, V<sub>ce</sub>=400V, I<sub>c</sub>=50A



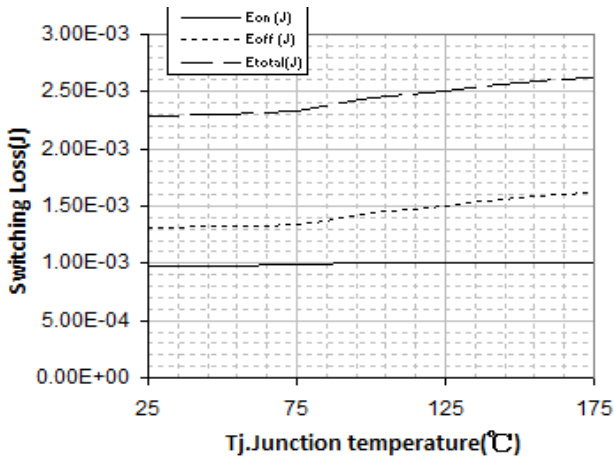
**Switching Time vs. IC(150°C)**

V<sub>ce</sub>=400V, V<sub>ge</sub>=15V, R<sub>g</sub>=9Ω



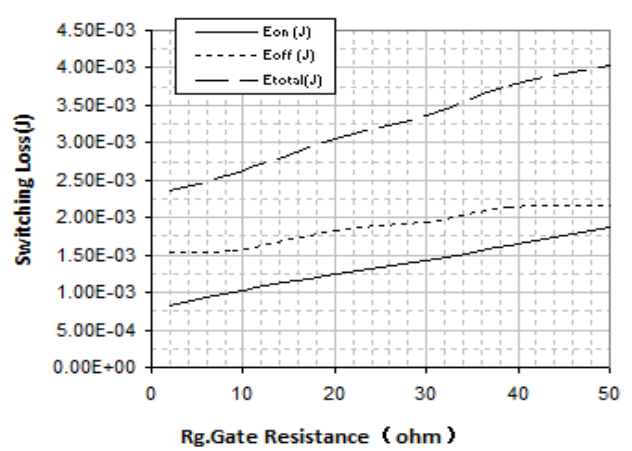
**Switching Loss vs. Tj**

V<sub>ge</sub>=15V, V<sub>ce</sub>=400V, I<sub>c</sub>=50A, R<sub>g</sub>=9Ω



**Switching Loss vs. Rg(150°C)**

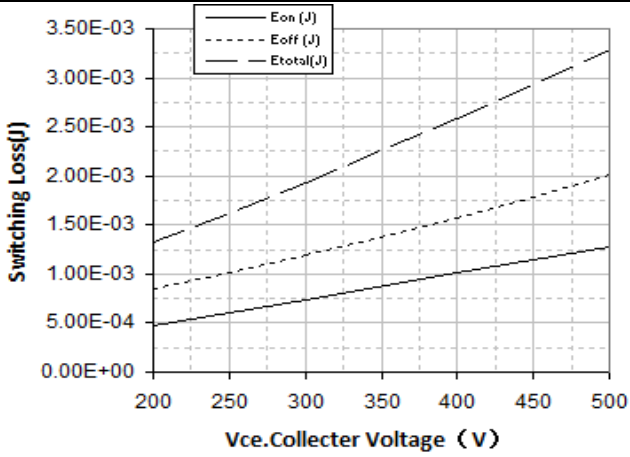
V<sub>ge</sub>=15V, V<sub>ce</sub>=400V, I<sub>c</sub>=50A



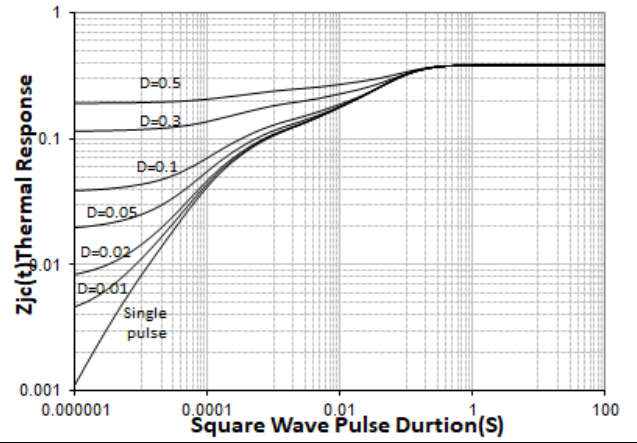


### Switching Loss vs. VCE(150°C)

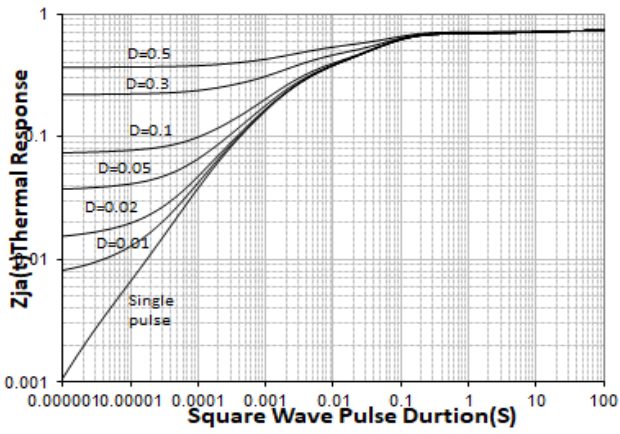
V<sub>ge</sub>=15V, I<sub>c</sub>=50A, R<sub>g</sub>=9Ω



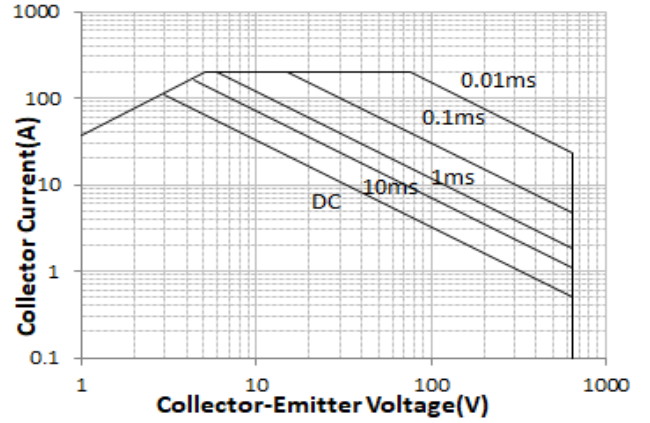
### Transient Thermal Impedance for IGBT



### Transient Thermal Impedance for Diode



### Safe Operating Area



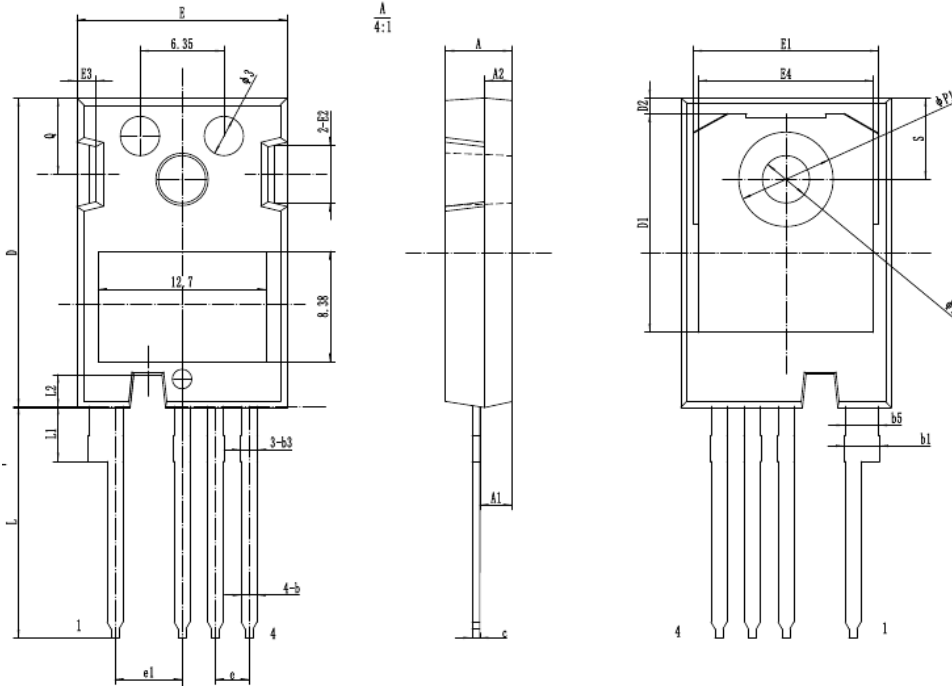




外形尺寸 PACKAGE MECHANICAL DATA

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
*φP	3.51	3.61	3.65
*φP1		7.19REF	
*Q	5.49	5.79	6.00
S	6.04	6.17	6.30



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