



TT160U065GQ

主要参数 MAIN CHARACTERISTICS

IC	160A
VCE	650V
VCEsat-typ	1.5V

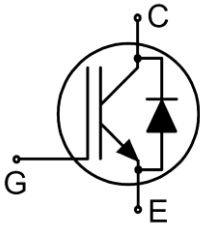
用途

- PFC
- 储能
- 光伏

APPLICATIONS

- Power factor corrector
- Energy storage
- Solar inverters

封装 Package



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

FEATURES

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

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		
TT160U065GQ-GP-BR	TT160U065GQ	TO-247PLUS



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_{CE}	650	V
*连续集电极电流 Collector current-continuous	I_C	180 ($T_c=25^{\circ}\text{C}$)	A
		160 ($T_c=100^{\circ}\text{C}$)	A
最大脉冲集电极电流 (注 1) Collector current - pulse (note 1)	I_{CM}	600	A
*二极管正向测试电流 Diode RMS forward current	I_F	180 ($T_c=25^{\circ}\text{C}$)	A
		160 ($T_c=100^{\circ}\text{C}$)	A
二极管正向不重复峰值电流 Surge non repetitive forward current	I_{FSM}	600	A
最高栅极发射极电压 Gate-emitter voltage	V_{GE}	± 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_{GE}	± 30	V
耗散功率 Power dissipation	P_D $T_c=25^{\circ}\text{C}$	1071	W
	P_D $T_c=100^{\circ}\text{C}$	535	
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.

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.

2: 过载工况时, 允许在最高结温 $T_{vjop}=175^{\circ}\text{C}$ 下运行, 最大占空比 $< 20\%$ (最多持续 60s)

2: Under overload condition, it is allowed to operate at the maximum junction temperature $T_{vjop}=175^{\circ}\text{C}$, and the maximum duty ratio is less than 20% (lasting for 60 s at most)





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-emitter 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}	$V_{CE}=650V, V_{GE}=0V, T_{vj}=25^{\circ}C$	-	-	100	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	$V_{GE(th)}$	$V_{CE} = V_{GE}, I_C=2.4mA$	3.5		5.5	V
饱和压降 Collector-emitter saturation voltage	V_{CESAT}	$V_{GE}=15V, I_C=160A$ $T_{vj}=25^{\circ}C$ $T_{vj}=150^{\circ}C$	- -	1.5 1.8	2.0 -	V
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1.0MHz$	-	9589	-	pF
输出电容 Output capacitance	C_{oes}		-	510	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	60	-	pF
栅极电荷总量 Total gate charge	Q_g	$V_{CC}=520V, I_C=160A, V_{GE}=15V$	-	318	-	nC
栅极-发射极 Gate to emitter charge	Q_{ge}		-	62	-	
栅极-集电极 Gate to collector charge	Q_{gc}		-	96	-	





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	$t_{d(on)}$	$V_{CC}=400V, I_c=160A, R_G=10\Omega \quad V_{GE}=15V$ $T_{vj}=25^\circ C$	-	75	-	ns
上升时间 Turn-on rise time	t_r		-	106	-	ns
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	349	-	ns
下降时间 Turn-off fall time	t_f		-	123	-	ns
开通损耗 Turn-on energy	E_{on}		-	7.55	-	mJ
关断损耗 Turn-off energy	E_{off}		-	6.3	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	13.85	-	mJ
开启延迟时间 Turn-on delay time	$t_{d(on)}$	$V_{CC}=400V, I_c=160A, R_G=10\Omega$ $V_{GE}=15V$ $T_{vj}=150^\circ C$	-	70	-	ns
上升时间 Turn-on rise time	t_r		-	106	-	ns
关断延迟时间 Turn-off delay time	$t_{d(off)}$		-	388	-	ns
下降时间 Turn-off fall time	t_f		-	124	-	ns
开通损耗 Turn-on energy	E_{on}		-	7.8	-	mJ
关断损耗 Turn-off energy	E_{off}		-	6.52	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	14.32	-	mJ

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

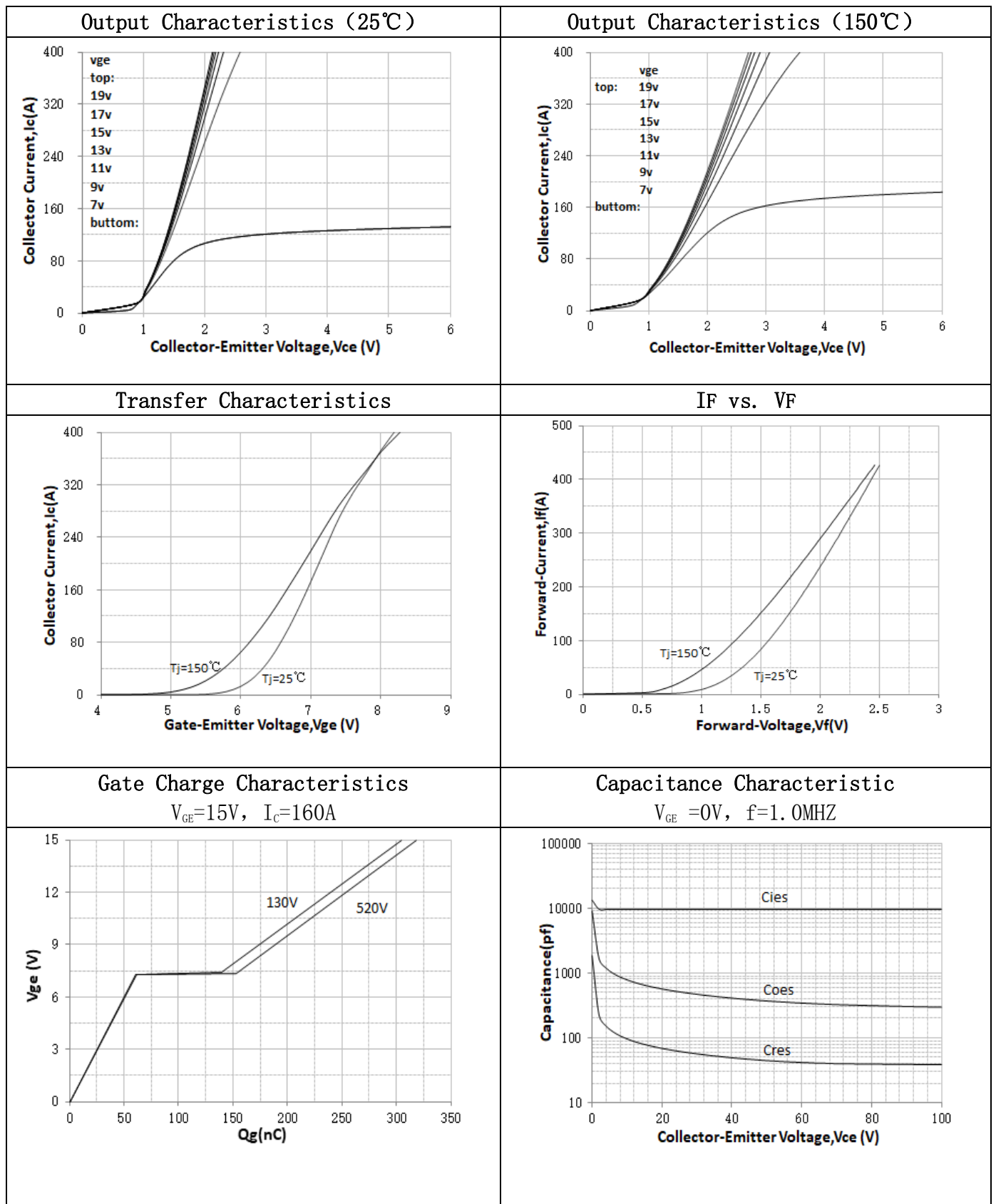
正向压降 Diode forward voltage	V_F	$I_F=160A, T_{vj}=25^\circ C$	-	1.75	2.3	V
反向恢复时间 Diode reverse recovery time	t_{rr}	$V_R=400V, I_F=160A$ $dI_F/dt=100A/\mu s$ $T_{vj}=25^\circ C$	-	150	-	ns
反向恢复电荷 Diode reverse recovery charge	Q_{rr}		-	430	-	nC
反向恢复电流 Diode reverse recovery current	I_{rrm}		-	6.3	-	A
反向恢复时间 Diode reverse recovery time	t_{rr}	$V_R=400V, I_F=160A$ $dI_F/dt=100A/\mu s$ $T_{vj}=150^\circ C$	-	369	-	ns
反向恢复电荷 Diode reverse recovery charge	Q_{rr}		-	2.9	-	μC
反向恢复电流 Diode reverse recovery current	I_{rrm}		-	14.8	-	A

项 目 Parameter	符 号 Symbol	Max.	单 位 Unit
结到管壳的热阻 Junction to case IGBT	$R_{th(j-c)}$	0.14	$^\circ C/W$
结到管壳的热阻 Junction to case Diode	$R_{th(j-c)}$	0.3	$^\circ C/W$
结到环境的热阻 Junction to ambient	$R_{th(j-a)}$	40	$^\circ C/W$



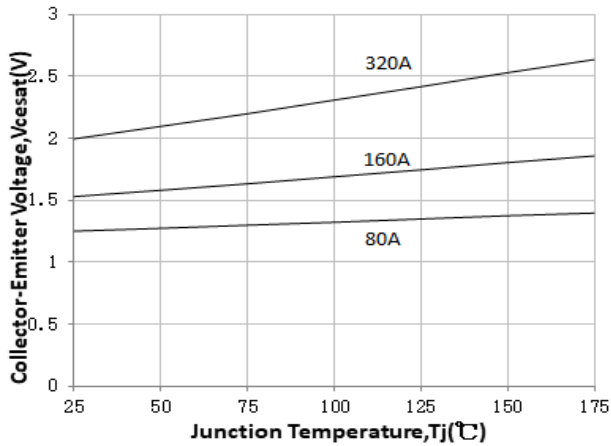


特征曲线 ELECTRICAL CHARACTERISTICS (curves)

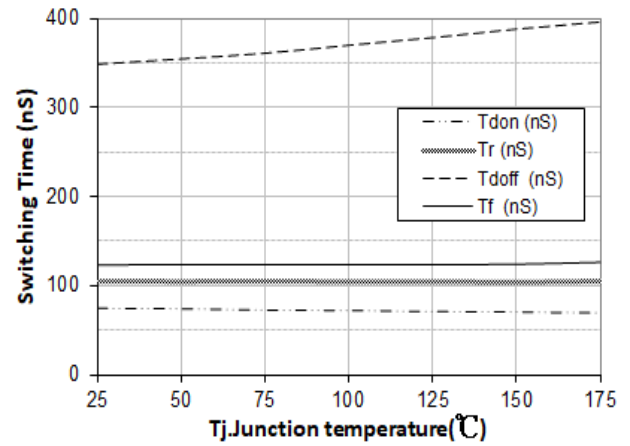




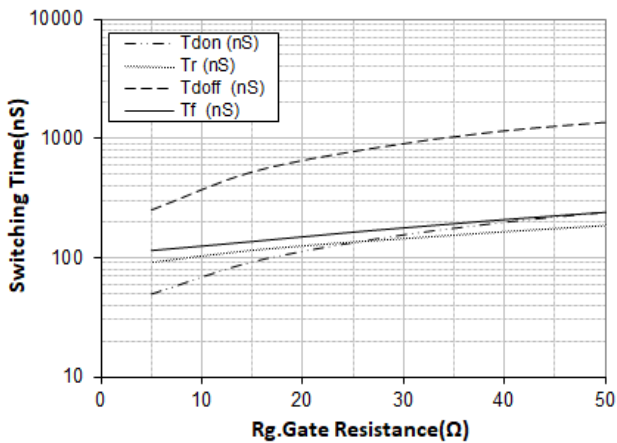
Vcesat vs. Tj

 $V_{GE}=15V$, $I_C=80A$, $160A$, $320A$ 

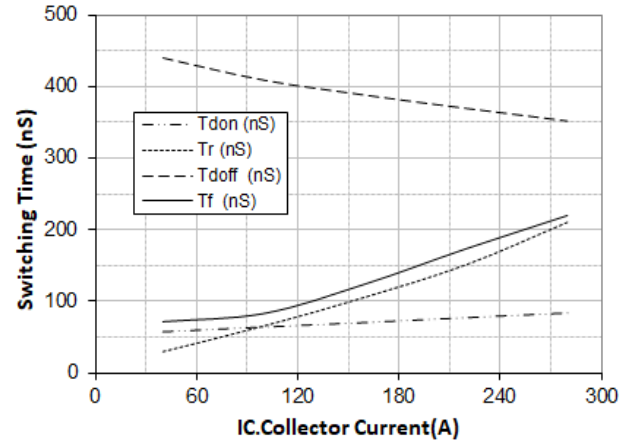
Switching Time vs. Tj

 $V_{GE}=15V$, $V_{CE}=400V$, $I_C=160A$, $R_G=10\Omega$ 

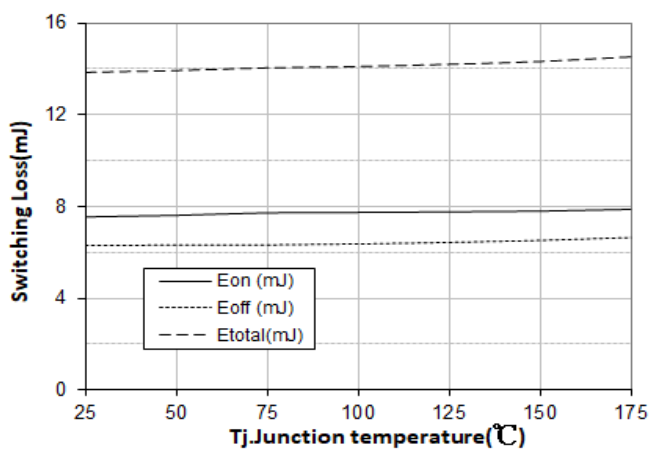
Switching Time vs. Rg (150°C)

 $V_{GE}=15V$, $V_{CE}=400V$, $I_C=160A$ 

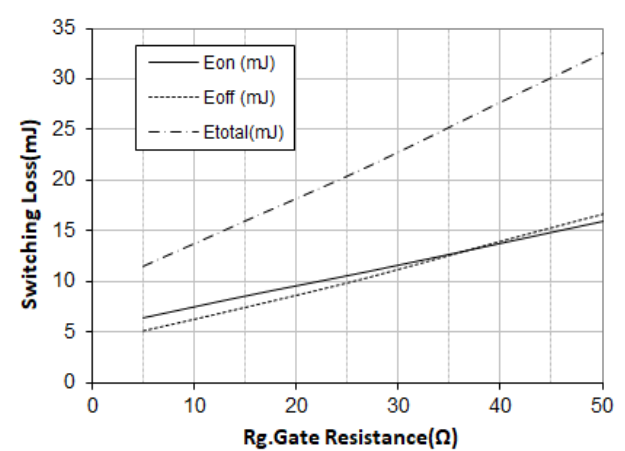
Switching Time vs. Ic (150°C)

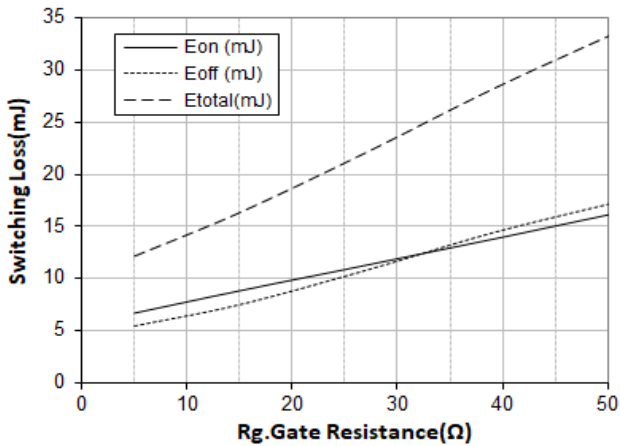
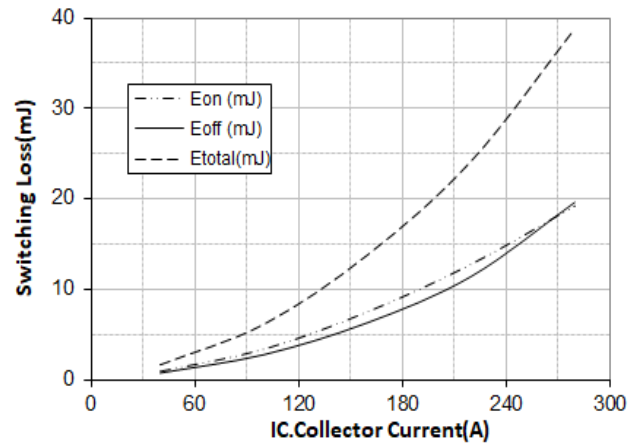
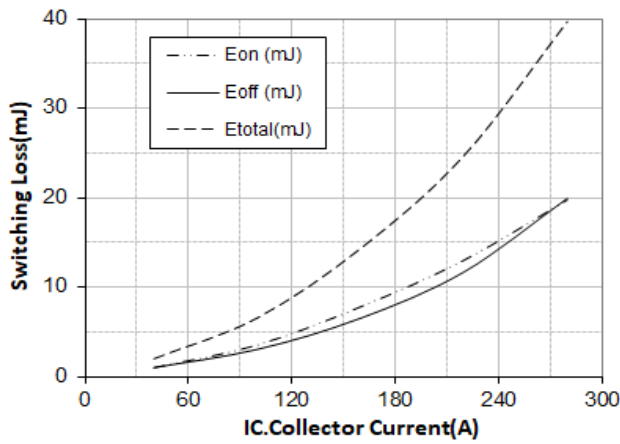
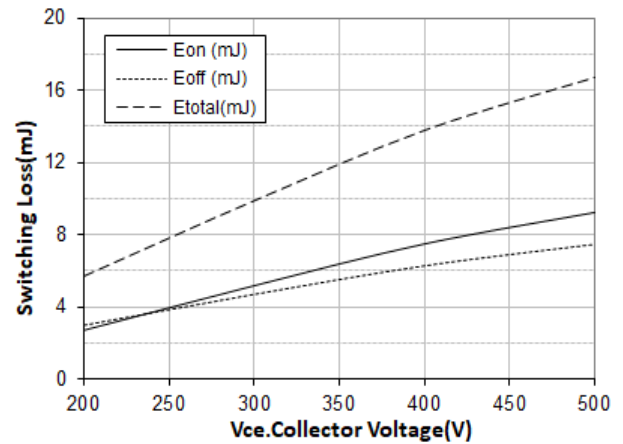
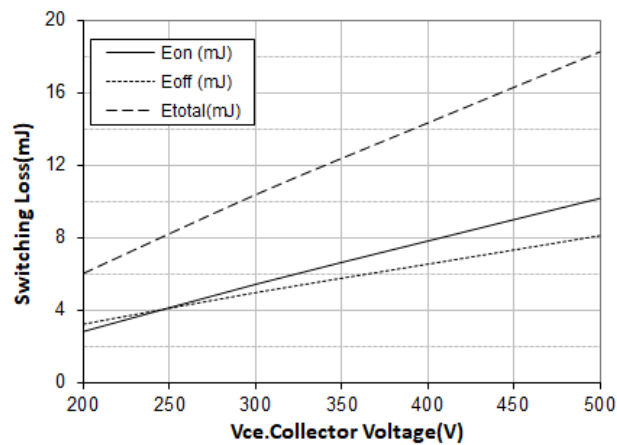
 $V_{CE}=400V$, $V_{GE}=15V$, $R_G=10\Omega$ 

Switching Loss vs. Tj

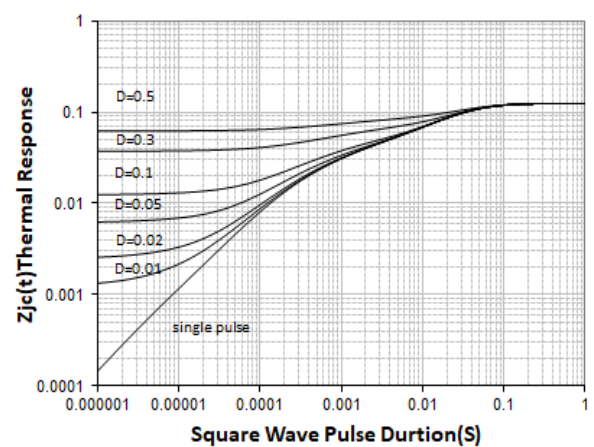
 $V_{GE}=15V$, $V_{CE}=400V$, $I_C=160A$, $R_G=10\Omega$ 

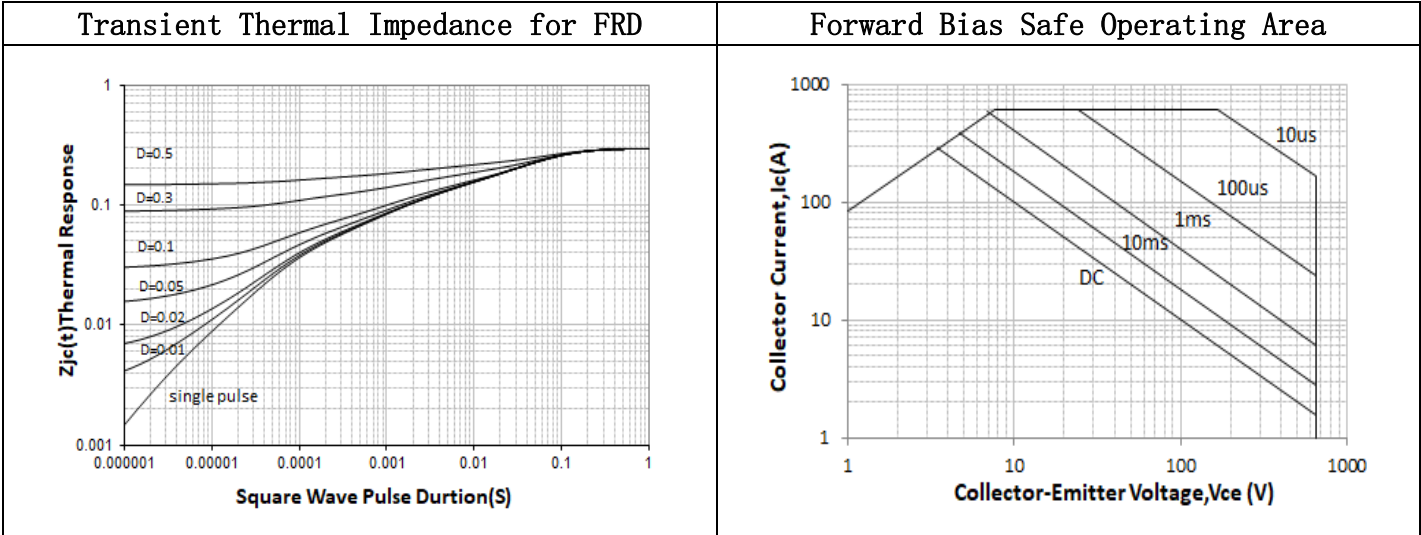
Switching Loss vs. Rg (25°C)

 $V_{GE}=15V$, $V_{CE}=400V$, $I_C=160A$ 

Switching Loss vs. $R_g(150^{\circ}\text{C})$ $V_{GE}=15\text{V}$, $V_{CE}=400\text{V}$, $I_C=160\text{A}$ Switching Loss vs. $I_C(25^{\circ}\text{C})$ $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $R_g=10\Omega$ Switching Loss vs. $I_C(150^{\circ}\text{C})$ $V_{CE}=400\text{V}$, $V_{GE}=15\text{V}$, $R_g=10\Omega$ Switching Loss vs. $V_{CE}(25^{\circ}\text{C})$ $V_{GE}=15\text{V}$, $I_C=160\text{A}$, $R_g=10\Omega$ Switching Loss vs. $V_{CE}(150^{\circ}\text{C})$ $V_{GE}=15\text{V}$, $I_C=160\text{A}$, $R_g=10\Omega$ 

Transient Thermal Impedance for IGBT



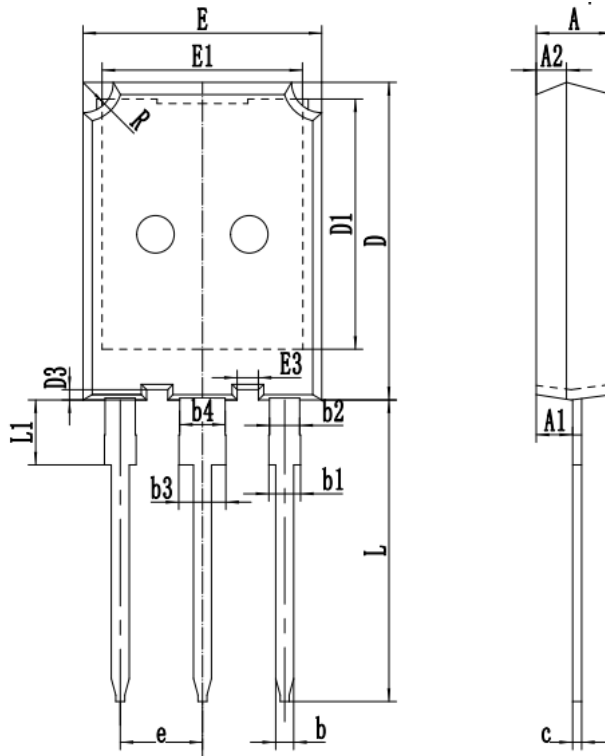




外形尺寸 PACKAGE MECHANICAL DATA

T0-247PLUS

单位 Unit : mm



SYMBOL	mm	
	MIN	MAX
A	4.70	5.30
A1	2.10	2.70
A2	1.70	2.30
b	0.95	1.45
b1	1.75	2.40
b2	1.75	2.25
b3	2.75	3.40
b4	2.75	3.25
c	0.40	0.83
D	20.70	21.30
D1	16.05	17.05
D3	0.40	0.95
E	15.55	16.10
E1	12.90	13.70
E3	1.15	1.75
e	5.44(TYP)	
L	19.60	21.30
L1	-	4.50
R	1.70	2.30





注意事项

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3. 在电路设计时请不要超过器件的绝对最大额定值，否则会影响整机的可靠性。
4. 本说明书如有版本变更不另外告知。

NOTE

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