

60GU60N2

主要参数 Main Characteristics

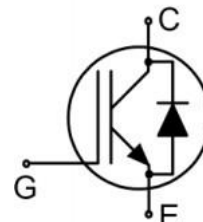
IC	60A
Vces	600 V
Vcesat-typ	2.4V

用途

- 光伏逆变器
- UPS 电源
- 电焊机
- 中高频率逆变器

Applications

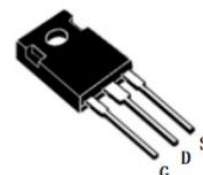
- Solar Converters
- Uninterrupted Power Supply
- Welding Converters
- Mid to High Range Switching
Frequency Converters



TO-247

产品特性

- 600V, 60A
- $V_{CE(sat)(typ.)} = 2.4V @ V_{GE} = 15V, I_C = 60A$
- Maximum Junction Temperature 150°C
- Pb-free Lead Plating; RoHS Compliant



产品中有毒有害物质或元素的名称及含量

部件名称 含量要求	有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
	≤0.1%	≤0.1%	≤0.01%	≤0.1%	≤0.1%	≤0.1%
引线框	○	○	○	○	○	○
塑封树脂	○	○	○	○	○	○
管 芯	○	○	○	○	○	○
内引线	○	○	○	○	○	○
焊 料	×	○	○	○	○	○
说 明	○：表示该元素的含量在 SJ/T11363-2006 标准的限量要求以下。 ×：表示该元素的含量超出 SJ/T11363-2006 标准的限量要求。 目前产品的焊料中含有铅 (Pb) 成分，但属于欧盟 RoHS 指令豁免范围。					

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}	600	V
最高栅极发射极电压 Gate-Emmitter Voltage	V_{GES}	± 30	V
连续集电极电流 Collector Current-continuous	I_C $T_C=25^{\circ}\text{C}$	120	A
	I_C $T_C=100^{\circ}\text{C}$	60	A
最大脉冲集电极极电流（注 1） Collector Current – pulse （note 1）	I_{CM}	180	A
二极管正向电流 Diode Continuous Forward Current	I_F $T_C=100^{\circ}\text{C}$	60	A
二极管最大正向电流 Diode Maximum Forward Current (Note 1)	I_{FM}	180	A
短路时间 Short Circuit Withstand Time ($T_J \leq 150^{\circ}\text{C}$)	t_{sc}	10	μs
耗散功率 Power Dissipation	P_D $T_C=25^{\circ}\text{C}$	310	W
	P_D $T_C=100^{\circ}\text{C}$	120	W
最高结温 Operating Junction Temperature	T_J	$-55 \sim +150$	$^{\circ}\text{C}$
存储温度 Storage Temperature Range	T_{STG}	$-55 \sim +150$	$^{\circ}\text{C}$

热特性 **Electrical Characteristics**

项 目 Parameter	符 号 Symbol	数 值 Value	单位 Unit
IGBT结到管壳的热阻 Thermal Resistance, Junction to case for IGBT	$R_{th\ j-c}$	0.4	$^{\circ}\text{C}/\text{W}$
FRD结到管壳的热阻 Thermal Resistance, Junction to case for Diode	$R_{th\ j-c}$	0.5	$^{\circ}\text{C}/\text{W}$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th\ j-a}$	40	$^{\circ}\text{C}/\text{W}$

IGBT电特性 Electrical Characteristics of IGBT($T_c=25^{\circ}\text{C}$ unless otherwise noted)

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	600	-	-	V
零栅压下集电极漏电流 Collector-Emitter Leakage Current	I_{CES}	$V_{CE}=600V, V_{GE}=0V$	-	-	100	μA
正向栅极体漏电流 Gate Leakage Current	I_{GES}	$V_{GE}=\pm 30V, V_{CE}=0V$	-	-	± 100	nA
阈值电压 Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	-	6.5	V
饱和压降 Collector-Emmitter saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=60A$		2.4	3.0	V
栅极电荷总量 Total Gate Charge	Q_g	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=60A$	-	115	-	nC
栅极-反射极 Gate to emitter charge	Q_{ge}		-	28	-	nC
栅极-集电极 Gate to collector charge	Q_{gc}		-	42	-	nC
开启延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=60A$ $R_G=10\Omega$ Inductive Load 100 μH $T_C=25^{\circ}\text{C}$	-	60	-	ns
上升时间 Turn-On rise time	t_r		-	298	-	ns
关断延迟时间 Turn-Off delay time	$t_{d(off)}$		-	100	-	ns
下降时间 Turn-Off Fall time	t_f		-	146	-	ns
开通损耗 Turn-On energy	E_{on}		-	5.3	-	mJ
关断损耗 Turn-off energy	E_{off}		-	1.8	-	mJ
总开关损耗 Total switching energy	E_{tot}		-	7.1	-	mJ
输入电容 Input capacitance	C_{ies}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1\text{MHz}$	-	2460	-	pF
输出电容 Output capacitance	C_{oes}		-	140	-	pF
反向传输电容 Reverse transfer capacitance	C_{res}		-	34	-	pF

二极管电特性 Electrical Characteristics of Diode ($T_c=25^{\circ}\text{C}$ unless otherwise noted)

正向压降 Diode Forward Voltage	V_F	$I_F=60A$	-	1.5	2.0	V
反向恢复时间 Diode Reverse Recovery Time	t_{rr}	$V_{CE}=400V$ $I_F=60A$ $dI_F/dt=200A/\mu s$	-	135		ns
反向恢复电流 Diode peak Reverse Recovery Current	I_{rr}		-	5		A
反向恢复电荷 Diode Reverse Recovery Charge	Q_{rr}		-	310		nC

Note1: Repetitive rating, pulse width limited by maximum junction temperature

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

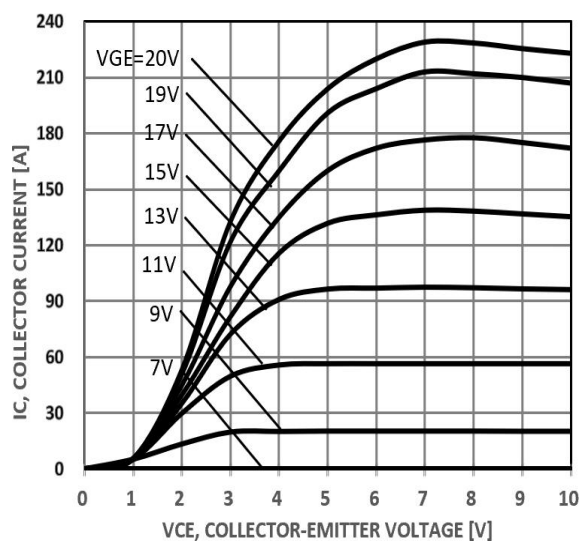


Figure 1. Typical Output Characteristics,
 $T_c = 25^\circ\text{C}$

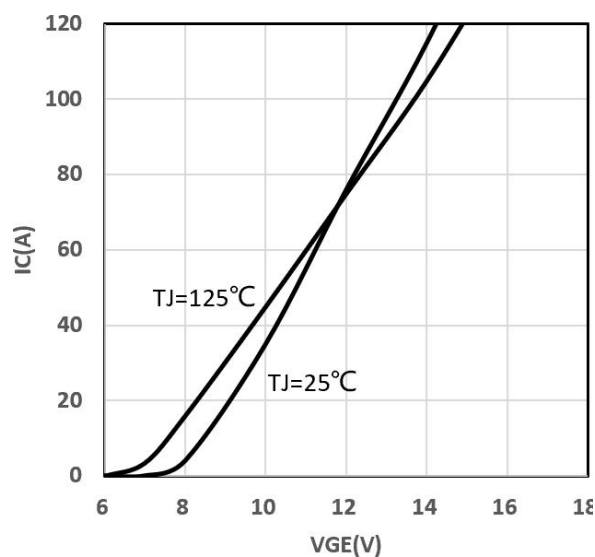


Figure 2. Transfer Characteristics

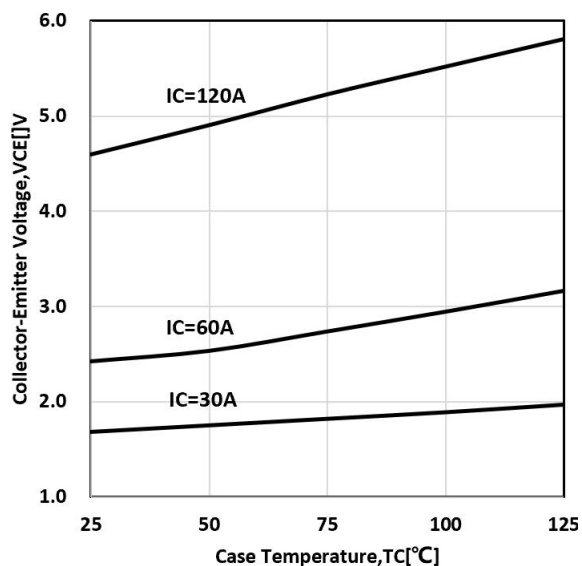


Figure 3. Saturation Voltage
vs. Case Temperature,
Common Emitter, $V_{GE} = 15\text{V}$

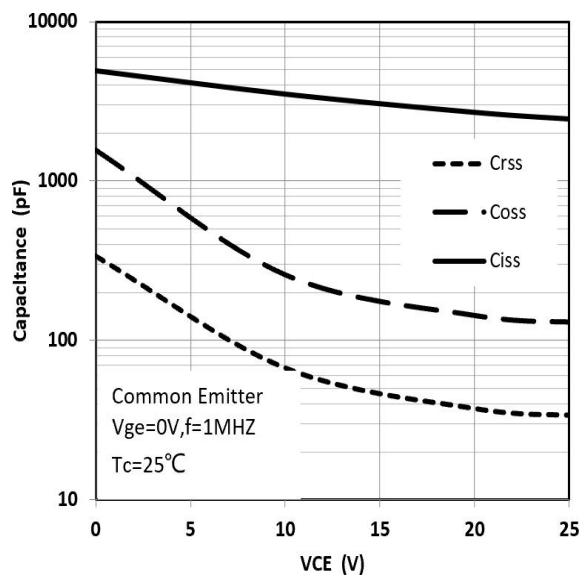


Figure 4. Capacitance Characteristics,
Common Emitter, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_c = 25^\circ\text{C}$

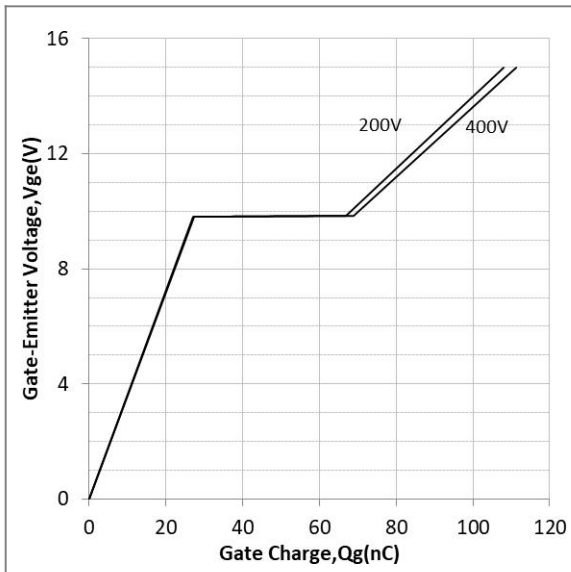


Figure 5. Gate charge Characteristics,
Common Emitter $T_c=25^\circ\text{C}$

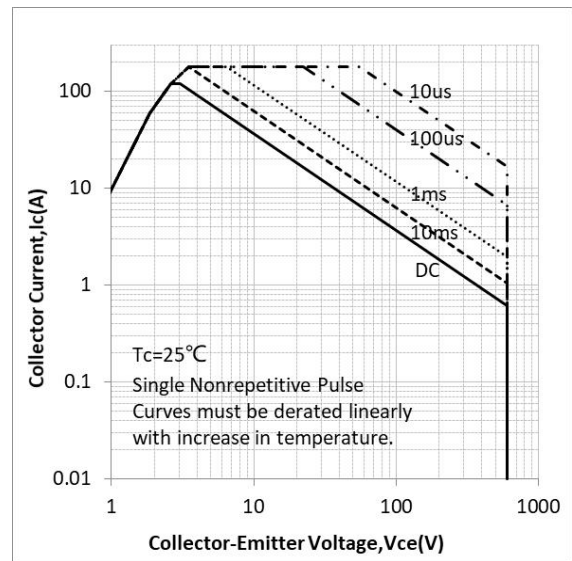


Figure 6. SOA Characteristics

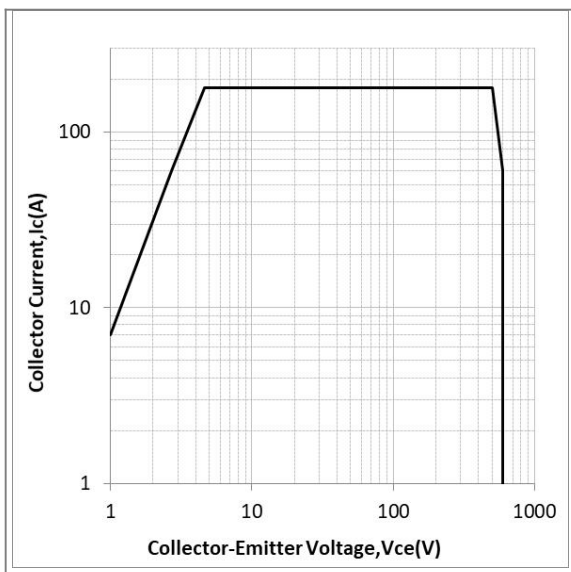


Figure 7. Turn Off Switch SOA
Characteristics, $V_{GE}=15\text{V}$ $T_c=125^\circ\text{C}$

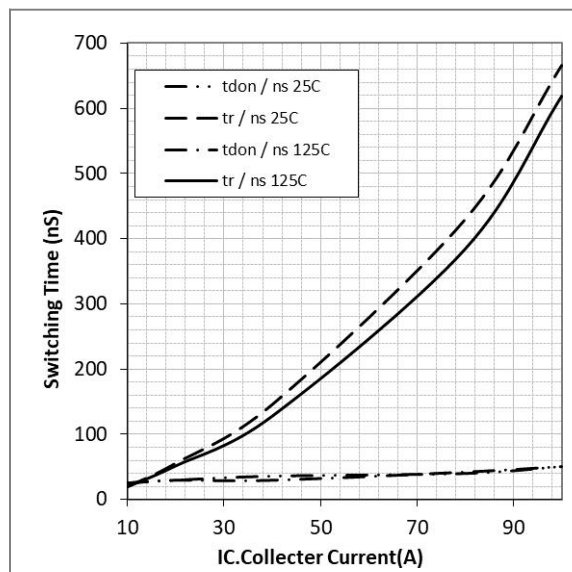


Figure 8. Turn-on Characteristics vs.
Collector Current, Common Emitter
 $V_{GE}=15\text{V}$ $R_G=5\Omega$ $V_{CC}=400\text{V}$

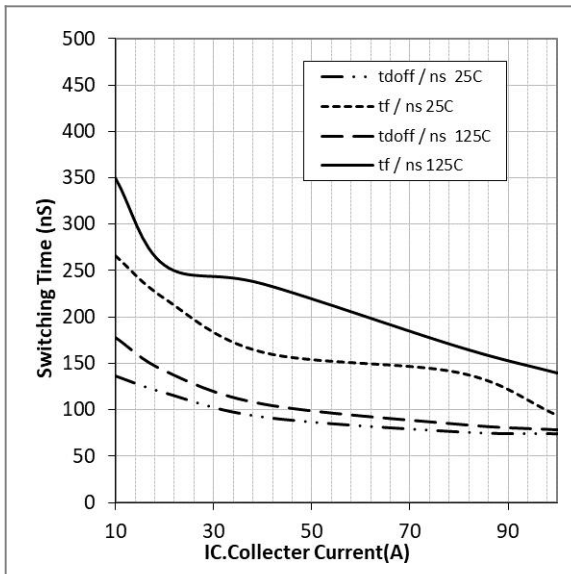


Figure 9. Turn-off Characteristics vs.
Collector Current, Comment Emitter
 $V_{ge}=15V$ $R_g=5\Omega$ $V_{cc}=400V$

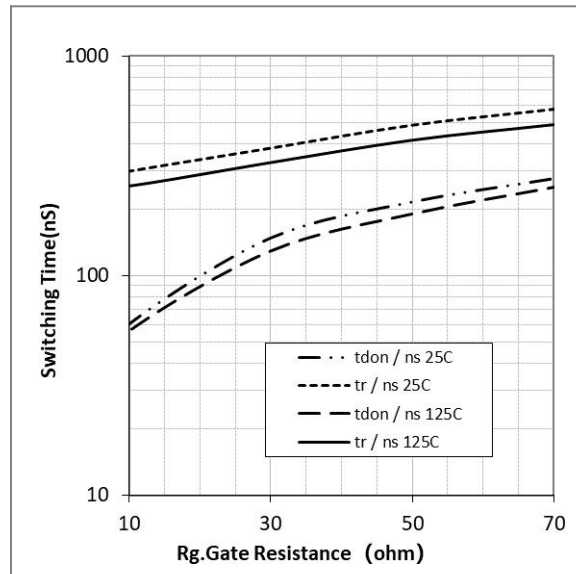


Figure 10. Turn-on Characteristics vs.
Gate Resistance, Comment Emitter
 $V_{ge}=15V$ $I_c=60A$ $V_{cc}=400V$

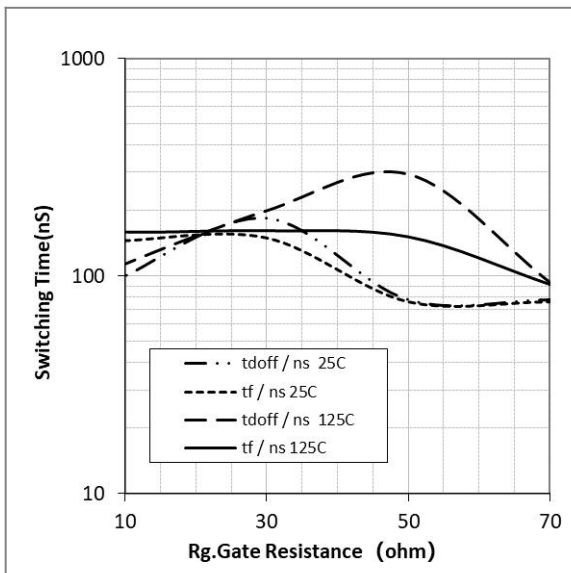


Figure 11. Turn-off Characteristics vs.
Gate Resistance, Comment Emitter
 $V_{ge}=15V$ $I_c=60A$ $V_{cc}=400V$

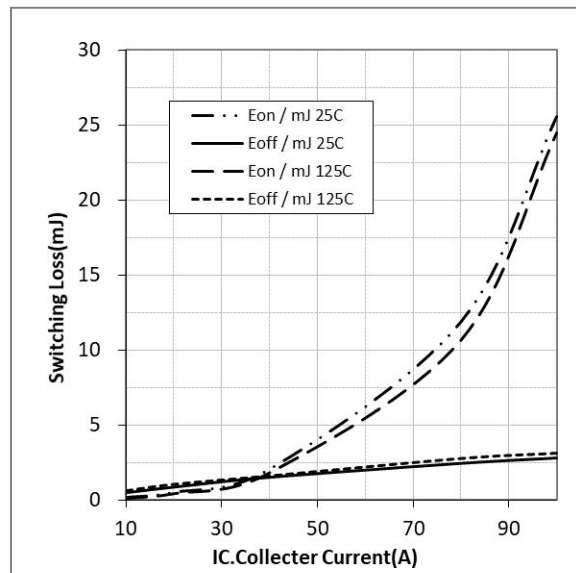


Figure 12. Switch Loss vs Collector Current,
Comment Emitter $V_{ge}=15V$
 $V_{cc}=400V$ $R_g=5\Omega$

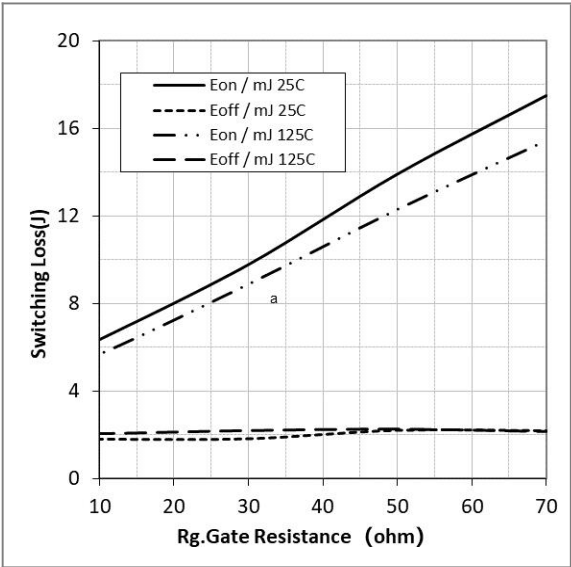


Figure 13. Switch Loss vs Gate Resistance ,
Comment Emitter Vge=15V
Vcc=400V Ic=60A

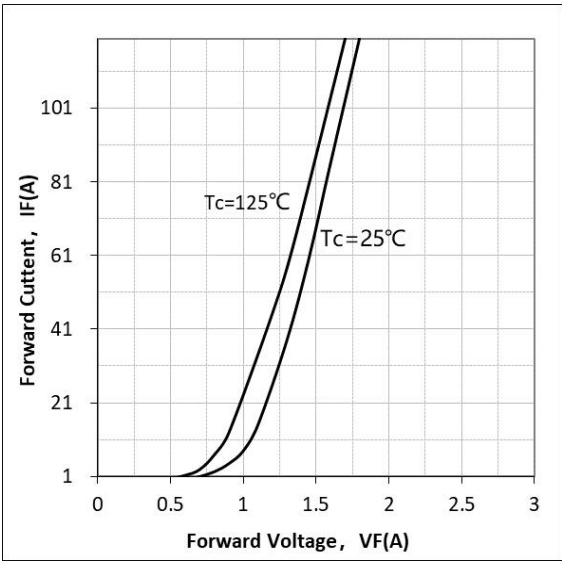


Figure 14. Forward Characteristics

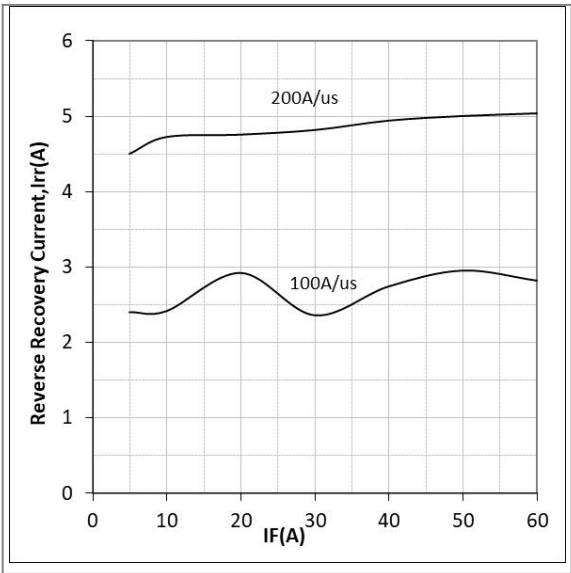


Figure 15. Reverse Recovery Current,
Tc=25°C

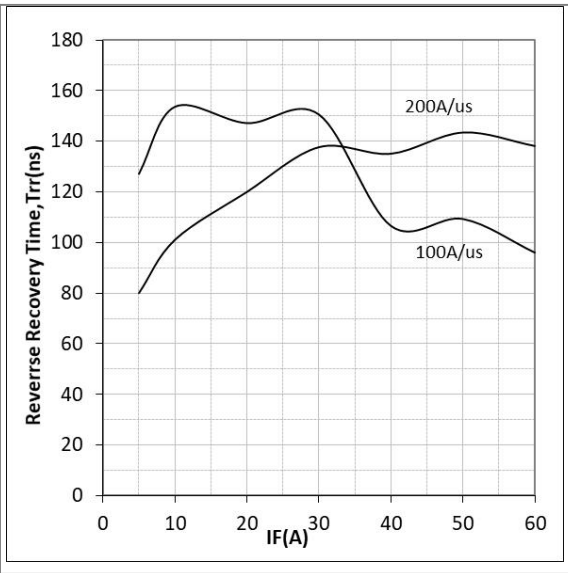


Figure 16. Reverse Recovery Time,
Tc=25°C

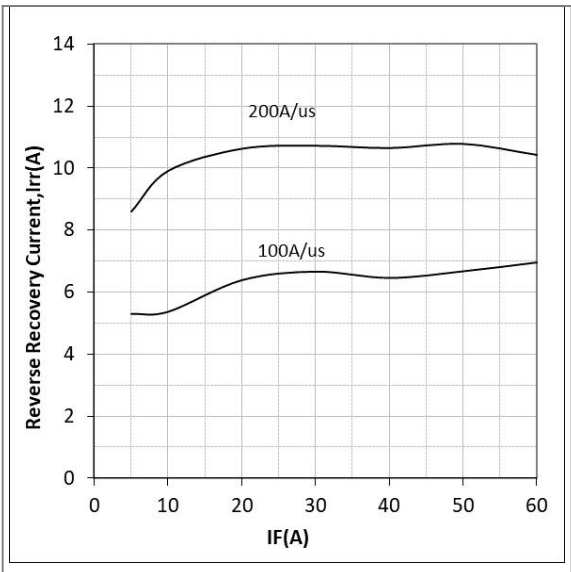


Figure 17. Reverse Recovery Current,
 $T_c=125^{\circ}C$

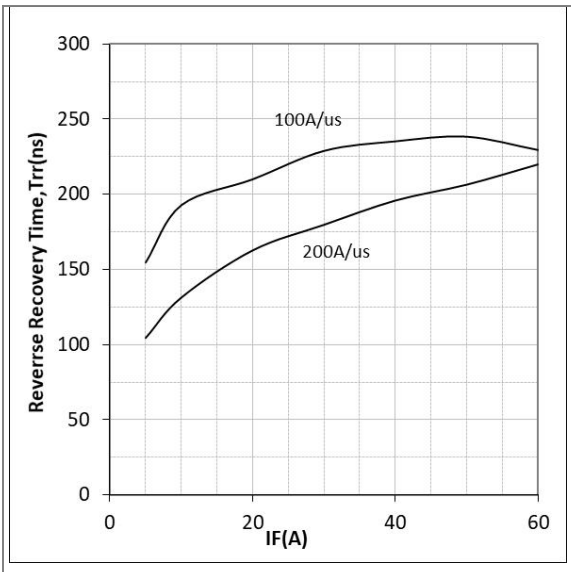


Figure 18. Reverse Recovery Time,
 $T_c=125^{\circ}C$

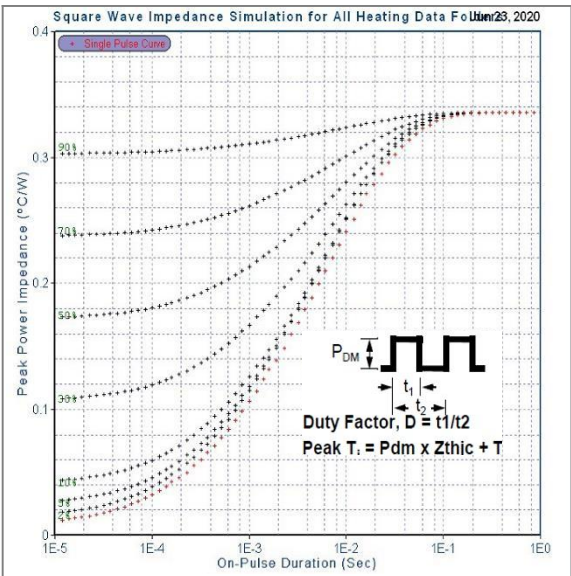


Figure 19. Transient Thermal Impedance of
IGBT

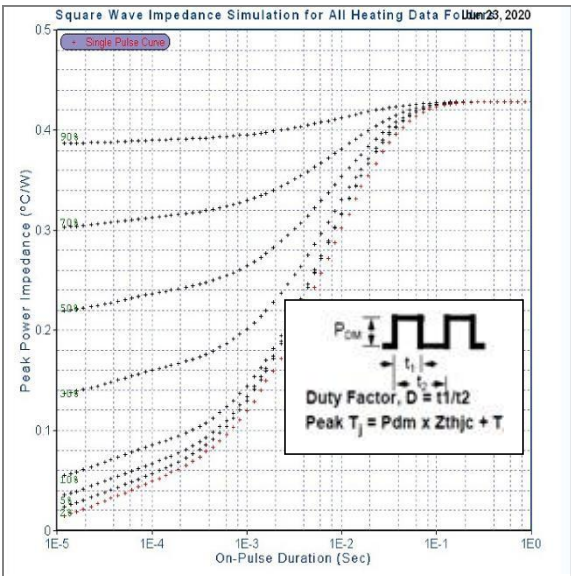


Figure 20. Transient Thermal Impedance of
FRD

外形尺寸 PACKAGE MECHANICAL DATA

TO-247

