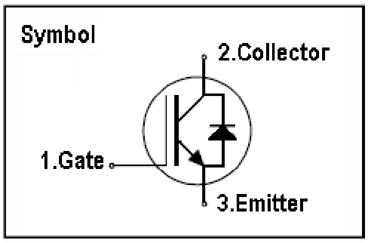
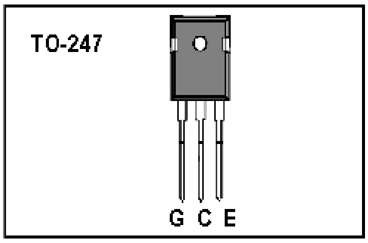
IGBT

Features

- 600V,60A
- $V_{CE(sat)(typ.)}$=2.4V@V_{GE}=15V,I_C=60A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA using NPT technology





General Description

JIAEN Trench IGBTs offer lower losses and higher energy efficiency for application such as SMPS, general inverter and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	$\pm$ 30	V
I_C	Continuous Collector Current (T_C=25 ℃)	120	A
	Continuous Collector Current (T_C=100℃)	60	A
I_{CM}	Pulsed Collector Current (Note 1)	180	A
I_F	Diode Continuous Forward Current (T_C=100 ℃)	60	A
I_{FM}	Diode Maximum Forward Current (Note 1)	180	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation (T_C=25 ℃)	310	W
	Maximum Power Dissipation (T_C=100℃)	120	W
T_J	Operating Junction Temperature Range	-55 to +150	℃
T_{STG}	Storage Temperature Range	-55 to +150	℃

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j-c}$	Thermal Resistance, Junction to case for IGBT	0.4	℃/ W
$R_{th\ j-c}$	Thermal Resistance, Junction to case for Diode	0.5	℃/ W
$R_{th\ j-a}$	Thermal Resistance, Junction to Ambient	40	℃/ W

Electrical Characteristics (Tc=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}= 0V, I_C= 250uA	600	-	-	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 600V, V_{GE}= 0V	-	-	100	uA
I_{GES}	Gate Leakage Current, Forward	V_{GE}= 30V, V_{CE}= 0V	-	-	100	nA
	Gate Leakage Current, Reverse	V_{GE}= -30V, V_{CE}= 0V	-	-	100	nA
$V_{GE(th)}$	Gate Threshold Voltage	V_{GE}= V_{CE}, I_C= 250uA	4.5	-	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}= 15V, I_C= 60A	-	2.4	3.0	V
Q_g	Total Gate Charge	V_{CC}=400V V_{GE}=15V I_C=60A	-	115		nC
Q_{ge}	Gate-Emitter Charge		-	28		nC
Q_{gc}	Gate-Collector Charge		-	42		nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=400V V_{GE}=15V I_C=60A R_G=10Ω Inductive Load 100uH T_C=25 ℃	-	60	-	ns
t_r	Turn-on Rise Time		-	298	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	100	-	ns
t_f	Turn-off Fall Time		-	146	-	ns
Eon	Turn-on Switching Loss		-	5.3	-	mJ
Eoff	Turn-off Switching Loss		-	1.8	-	mJ
Ets	Total Switching Loss		-	7.1	-	mJ
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=400V V_{GE}=15V I_C=60A R_G=10Ω Inductive Load 100uH T_C=125 ℃		56		ns
t_r	Turn-on Rise Time			256		ns
$t_{d(off)}$	Turn-off Delay Time			114		ns
t_f	Turn-off Fall Time			160		ns
Eon	Turn-on Switching Loss			5.7		mJ
Eoff	Turn-off Switching Loss			2.4		mJ
Ets	Total Switching Loss			8.1		mJ
C_{ies}	Input Capacitance	V_{CE}=25V V_{GE}=0V f = 1MHz	-	2460	-	pF
C_{oes}	Output Capacitance		-	140	-	pF
C_{res}	Reverse Transfer Capacitance		-	34	-	pF

Electrical Characteristics of Diode (Tc=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F= 60A	-	1.5	2.0	V
t_{rr}	Diode Reverse Recovery Time	V_{CE} = 400V I_F= 60A dI_F/dt = 200A/us	-	135		ns
I_{rr}	Diode peak Reverse Recovery Current		-	5		A
Q_{rr}	Diode Reverse Recovery Charge		-	310		nC

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature

Typical Performance Characteristics

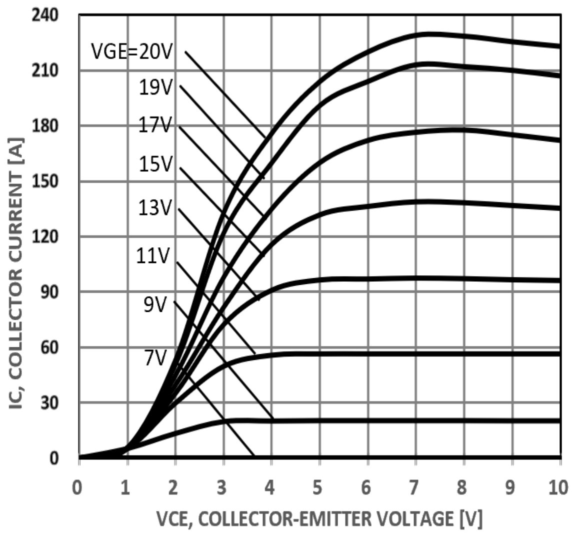


Figure 1. Typical Output Characteristics,

Tc=25℃

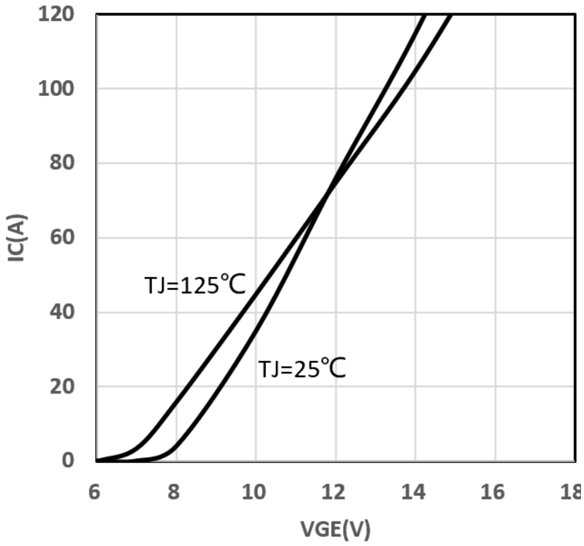


Figure 2. Transfer Characteristcs

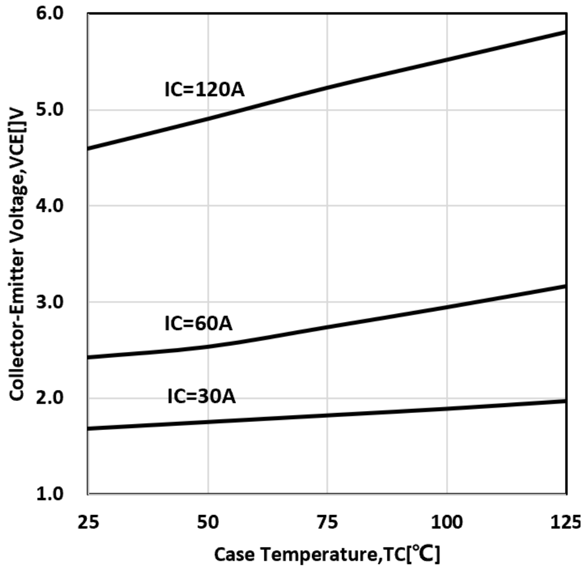


Figure 3. Saturation Voltage

vs. Case Temperature,

Common Emitter, VGE=15V

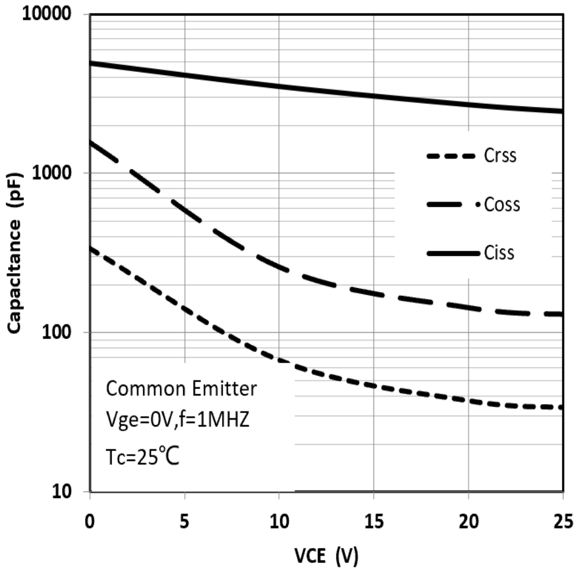


Figure 4. Capacitance Characteristics,

Comment Emitter, VGE=0V,f=1MHz,Tc=25℃

Typical Performance Characteristics

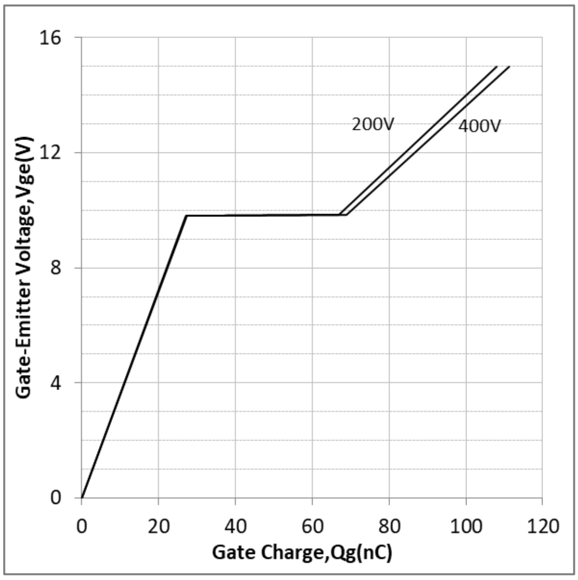


Figure 5. Gate charge Characteristics,

Common Emitter Tc=25℃

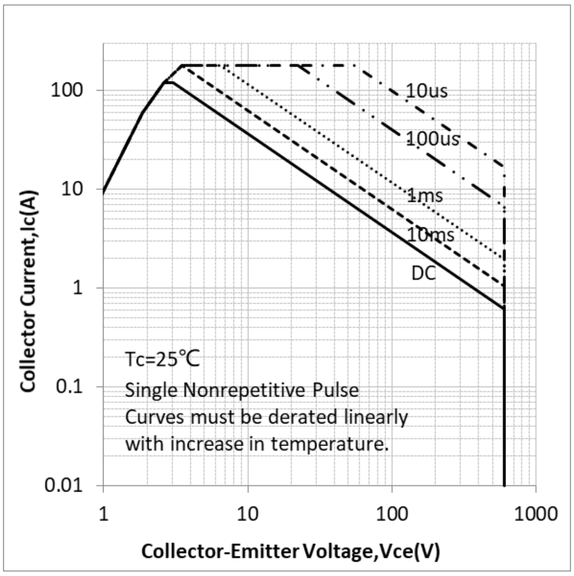


Figure 6. SOA Characteristics

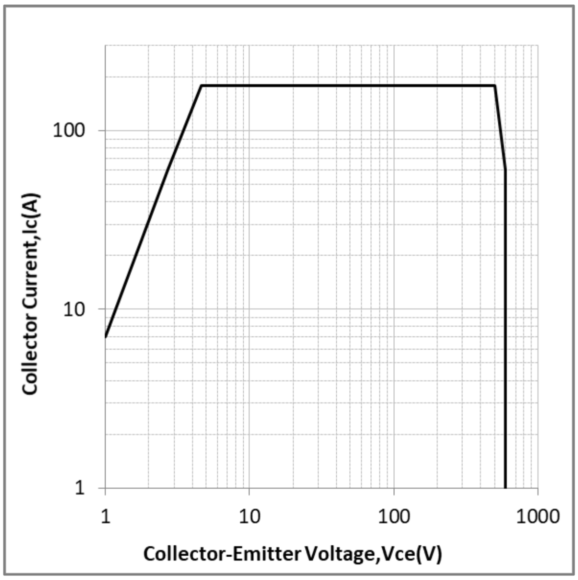


Figure 7. Turn Off Switch SOA

Characteristics , VGE=15V Tc=125℃

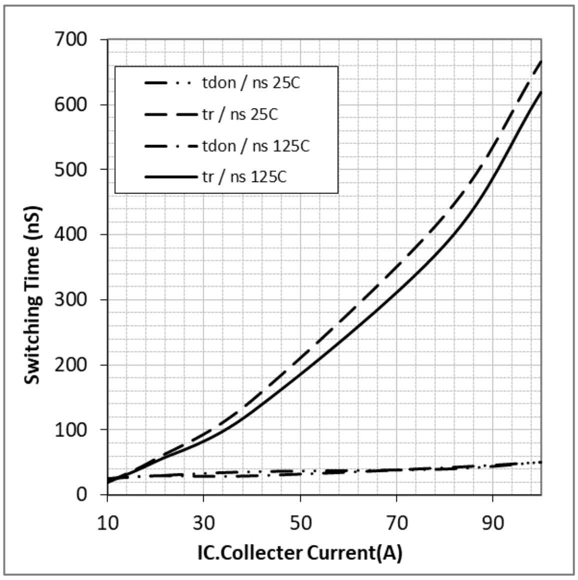


Figure 8. Turn-on Characteristcs vs.

Collector Current, Comment Emitter

Vge=15V RG=5Ω Vcc=400V

Typical Performance Characteristics

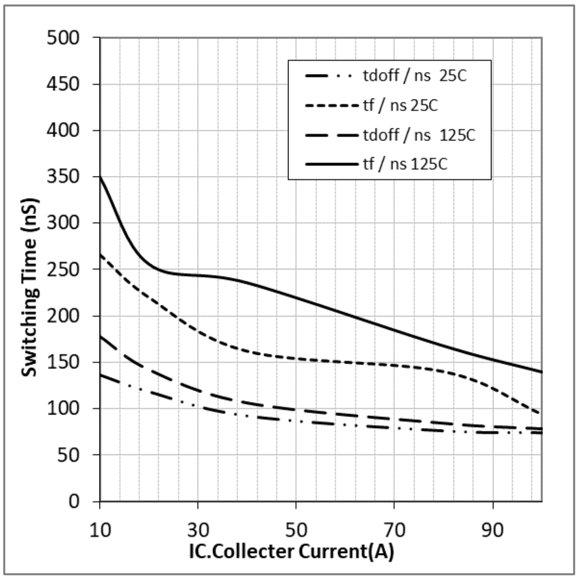


Figure 9. Turn-off Characteristcs vs.

Collector Current, Comment Emitter

Vge=15V RG=5Ω Vcc=400V

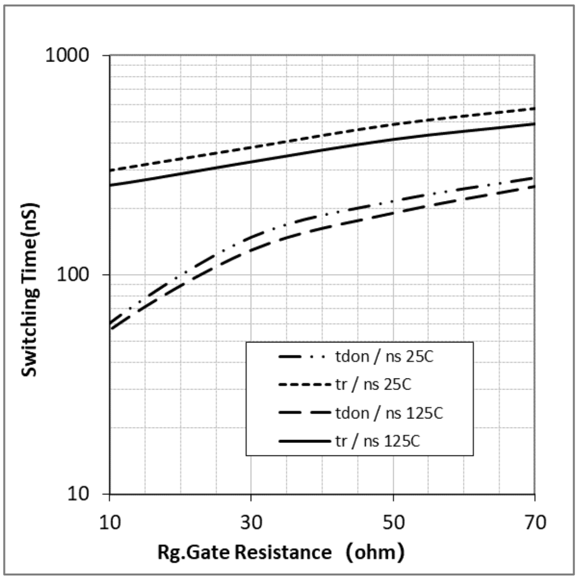


Figure 10. Turn-on Characteristcs vs.

Gate Resistance , Comment Emitter

Vge=15V Ic=60A Vcc=400V

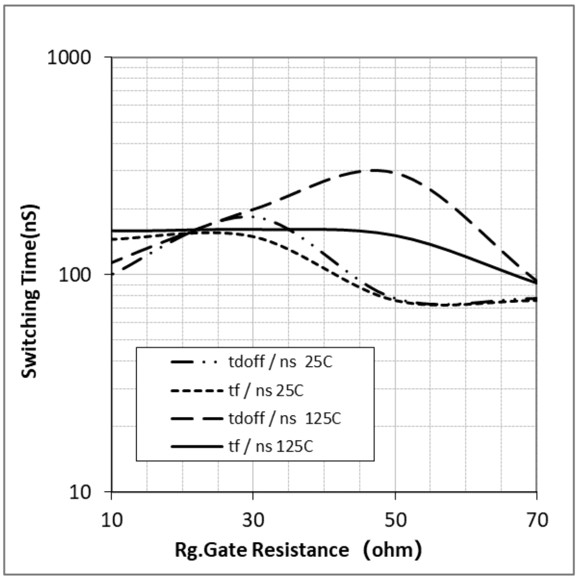


Figure 11. Turn-off Characteristcs vs.

Gate Resistance , Comment Emitter

Vge=15V Ic=60A Vcc=400V

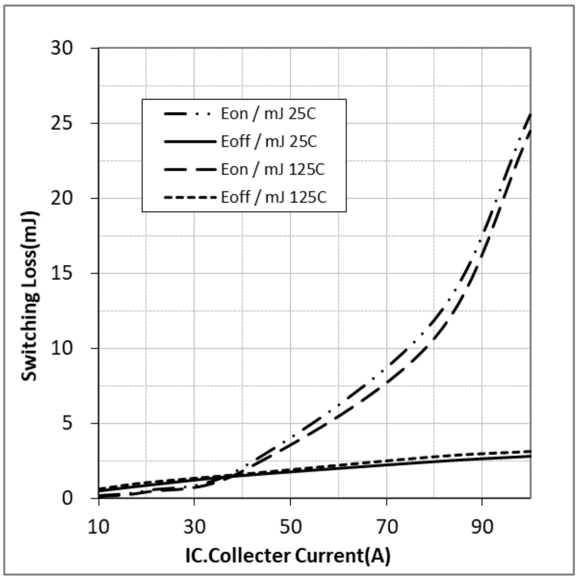


Figure 12. Switch Loss vs Collector Current ,

Comment Emitter Vge=15V

Vcc=400V Rg=5Ω

Typical Performance Characteristics

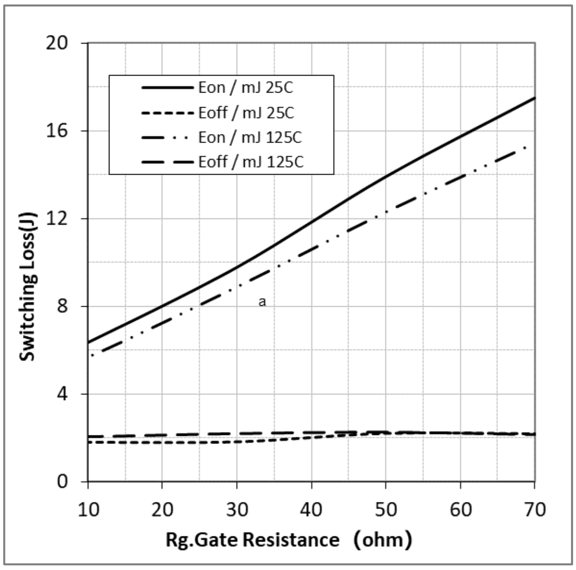


Figure 13. Switch Loss vs Gate Resistance ,

Comment Emitter Vge=15V

Vcc=400V Ic=60A

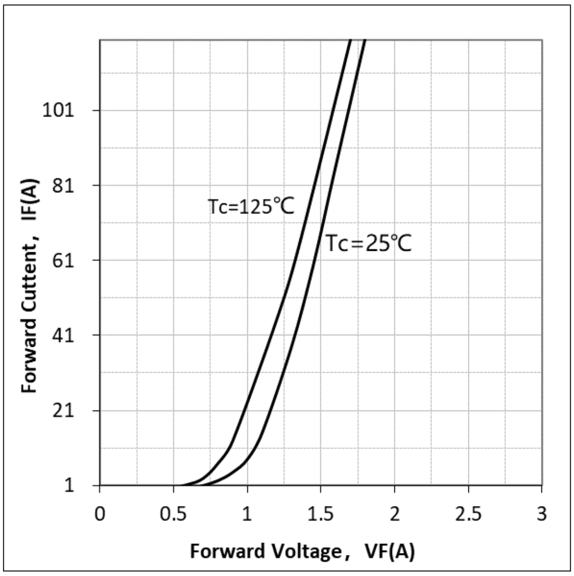


Figure 14. Forward Characteristcs

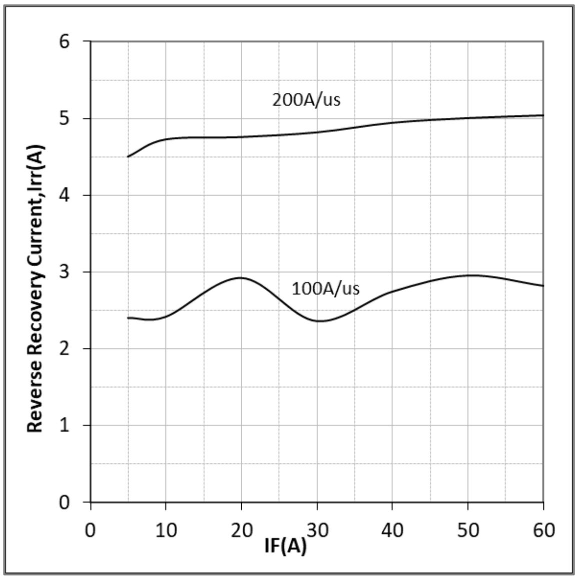


Figure 15. Reverse Recovery Current,

Tc=25℃

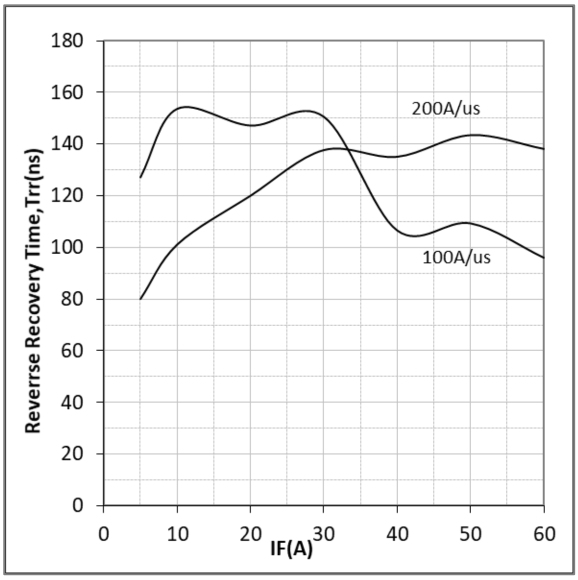


Figure 16. Reverse Recovery Time,

Tc=25℃

Typical Performance Characteristics

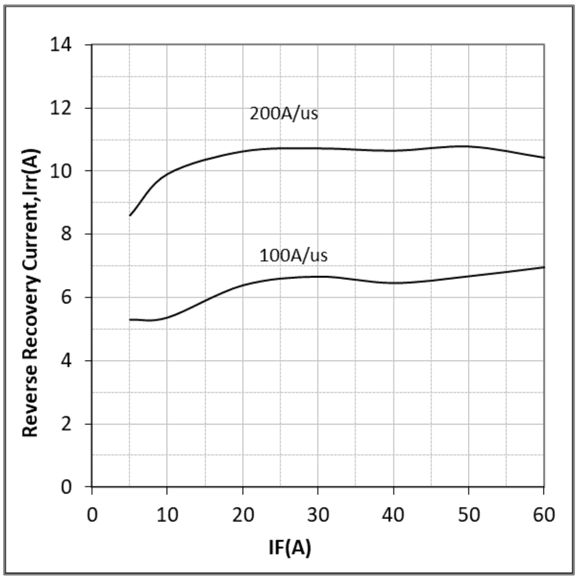


Figure 17. Reverse Recovery Current,

Tc=125℃

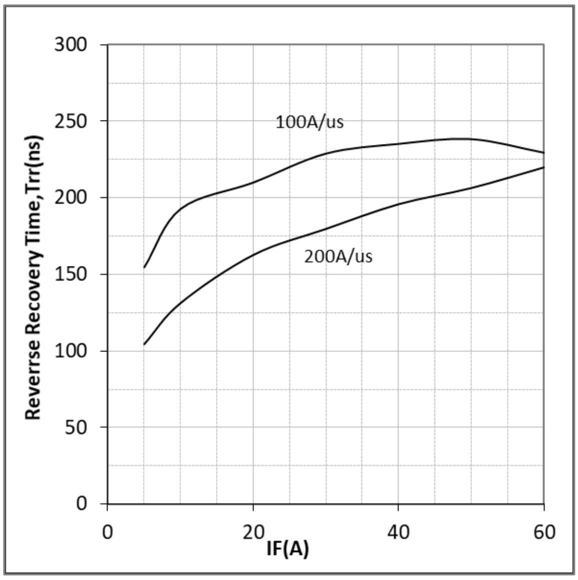


Figure 18. Reverse Recovery Time,

Tc=125℃

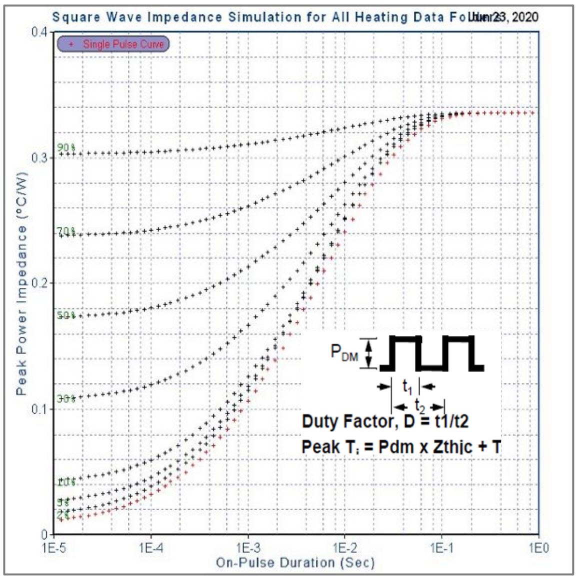


Figure 19. Transient Thermal Impedance of IGBT

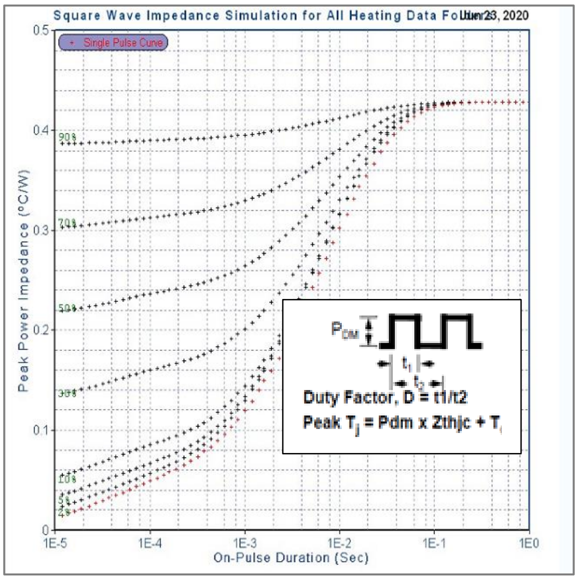
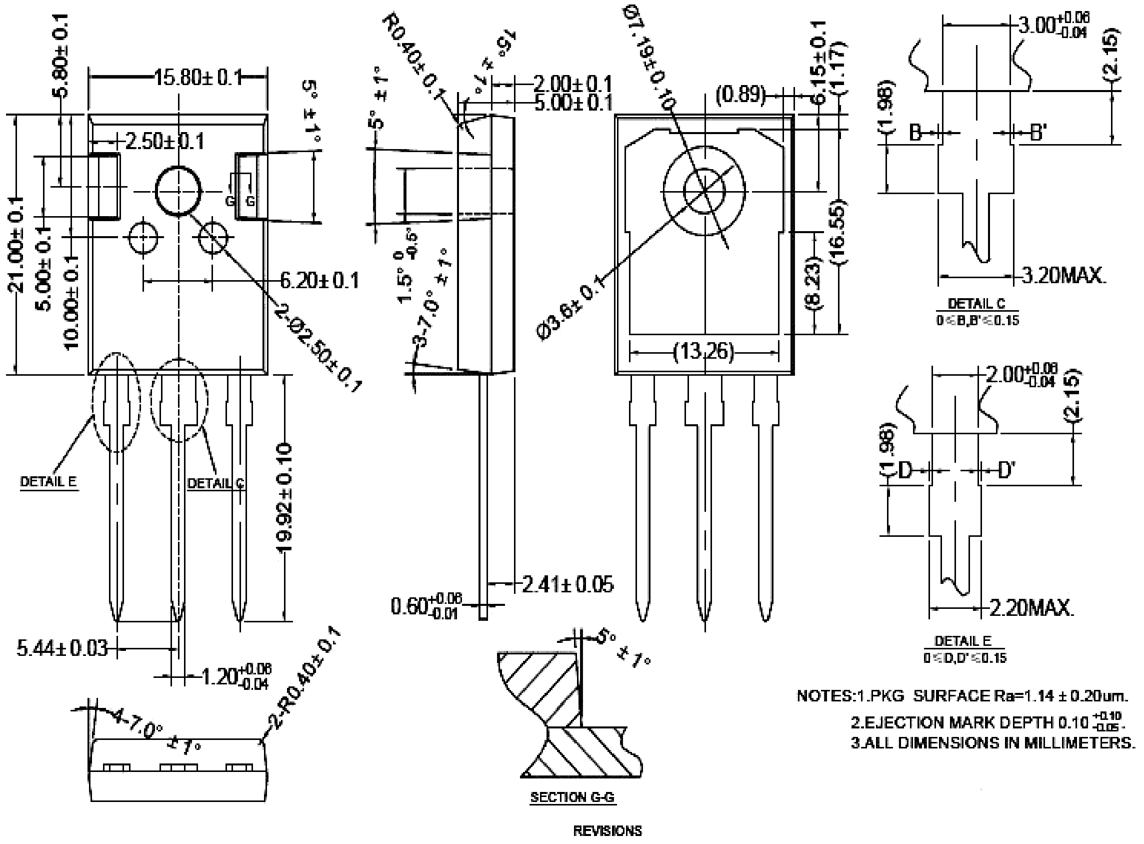


Figure 20. Transient Thermal Impedance of FRD

TO247 PACKAGE OUTLINE



公差标注	公差值	表面粗糙度
0	±0.2	Ra3.2~6.3
0.0	±0.1	Ra1.6~3.2
0.00	±0.01	Ra0.8~1.6
0.000	±0.005	Ra0.4~0.8
0.0000	±0.002	Ra0.2~0.4

0≤D,D'≤0.15

NOTES:1.PKG SURFACE Ra=1.14 ± 0.20um.
2.EJECTION MARK DEPTH 0.10 $^{+0.10}_{-0.05}$
3.ALL DIMENSIONS IN MILLIMETERS.

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