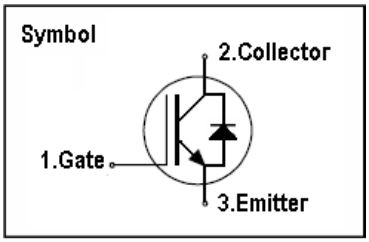
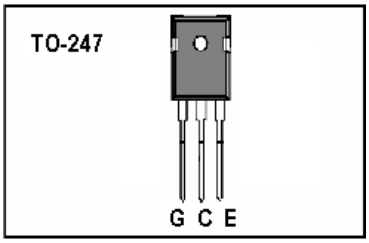
IGBT

Features





- 1200V,40A
- $V_{CE(sat)(typ.)}$=2.1V@V_{GE}=15V,I_C=40A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA

General Description

JIAEN FS-IGBTs offer lower losses and higher energy efficiency for application such as IH (induction heating),UPS, general inverter and other soft switching applications.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	1200	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current (T_C=25℃)	80	A
	Continuous Collector Current (T_C=100℃)	40	A
I_{CM}	Pulsed Collector Current (Note 1)	120	A
I_F	Diode Continuous Forward Current (T_C=100℃)	40	A
I_{FM}	Diode Maximum Forward Current (Note 1)	120	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation (T_C=25℃)	300	W
	Maximum Power Dissipation (T_C=100℃)	110	W
T_J	Operating Junction Temperature Range	-55 to +175	℃
T_{STG}	Storage Temperature Range	-55 to +150	℃

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for IGBT	0.42	℃/ W
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for Diode	0.8	℃/ W
$R_{th\ j\text{-}a}$	Thermal Resistance, Junction to Ambient	40	℃/ W

Electrical Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}= 0V, I_C= 250uA	1200	-	-	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 1200V, 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= 40A	-	2.1		V
Qg	Total Gate Charge	V_{CC}=600V V_{GE}=15V I_C=40A	-	175		nC
Qge	Gate-Emitter Charge		-	52.5		nC
Qgc	Gate-Collector Charge		-	107.5		nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V V_{GE}=15V I_C=40A R_G=15Ω Inductive Load T_C=25 ℃	-	58	-	ns
t_r	Turn-on Rise Time		-	86	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	235	-	ns
t_f	Turn-off Fall Time		-	136	-	ns
Eon	Turn-on Switching Loss		-	2.5	-	mJ
Eoff	Turn-off Switching Loss		-	1.7	-	mJ
Ets	Total Switching Loss		-	4.2	-	mJ
Cies	Input Capacitance	V_{CE}=25V V_{GE}=0V f = 1MHz	-	4000	-	pF
Coes	Output Capacitance		-	200	-	pF
Cres	Reverse Transfer Capacitance		-	150	-	pF

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=40A	-	2.2	3.2	V
t_{rr}	Diode Reverse Recovery Time	V_{CE} = 600V I_F= 40A dIF/dt = 200A/us	-	250		ns
I_{rr}	Diode peak Reverse Recovery Current		-	10		A
Q_{rr}	Diode Reverse Recovery Charge		-	1350		nC

Notes:

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

Typical Performance Characteristics

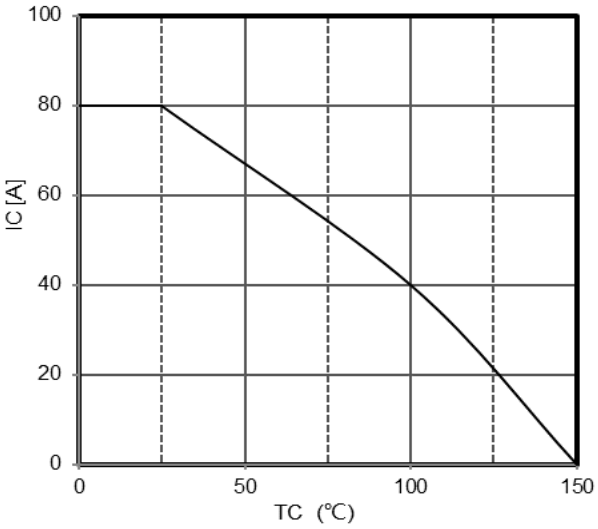


Figure1:maximum DC collector current VS. case temprature

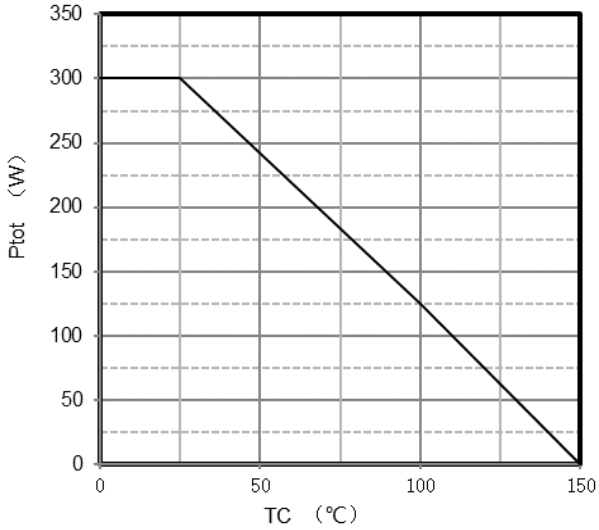


Figure2:power dissipation VS. case temprature

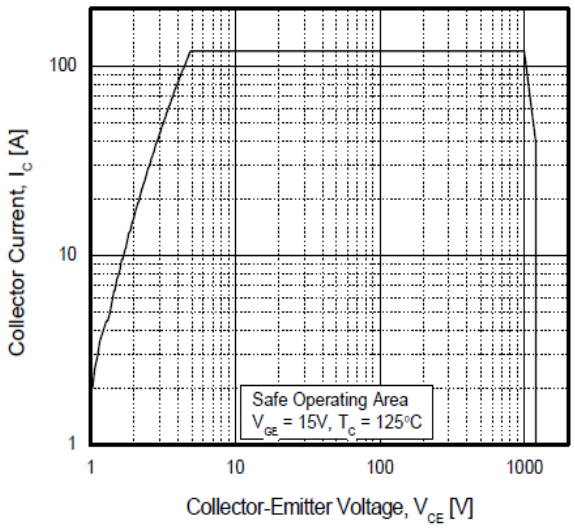


Figure3:reverse bias SOA,TJ=125℃,VGE=15V

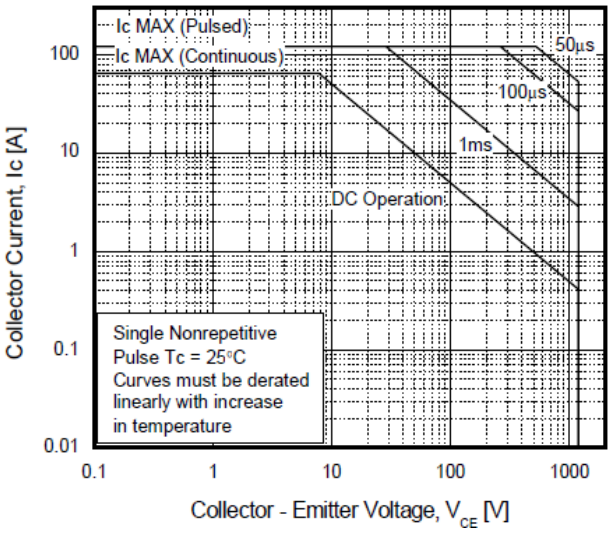


Figure4:forward SOA,TC=25℃,TJ≤150℃

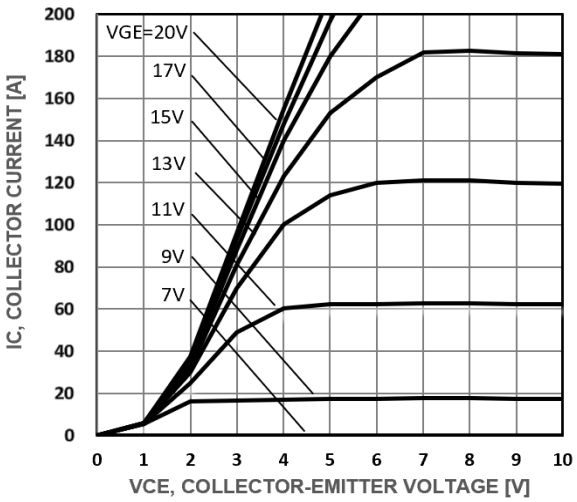


Figure5:typical IGBT output characteristics,

TJ=25℃;tp=300us

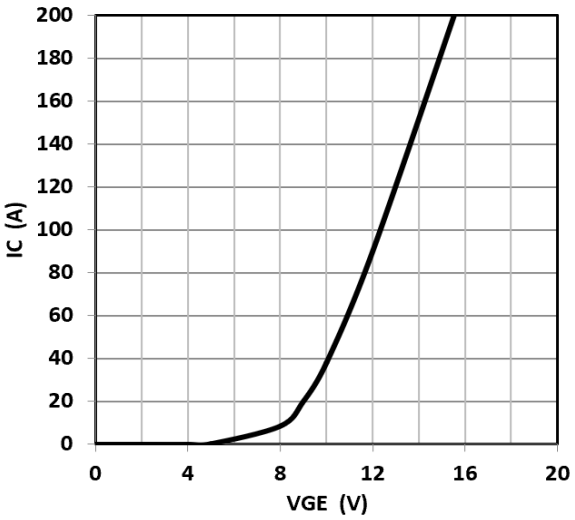


Figure6:typical trans characteristics,

VCE=20V,tp=20us

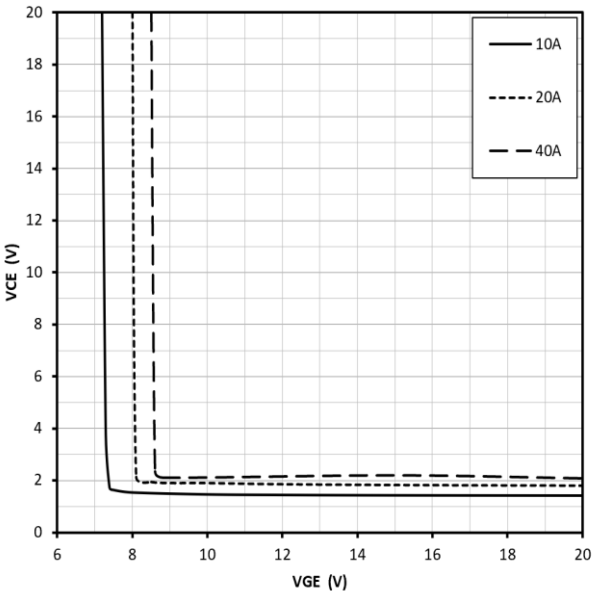


Figure7: typical VCE VS. VGE,TJ=25℃

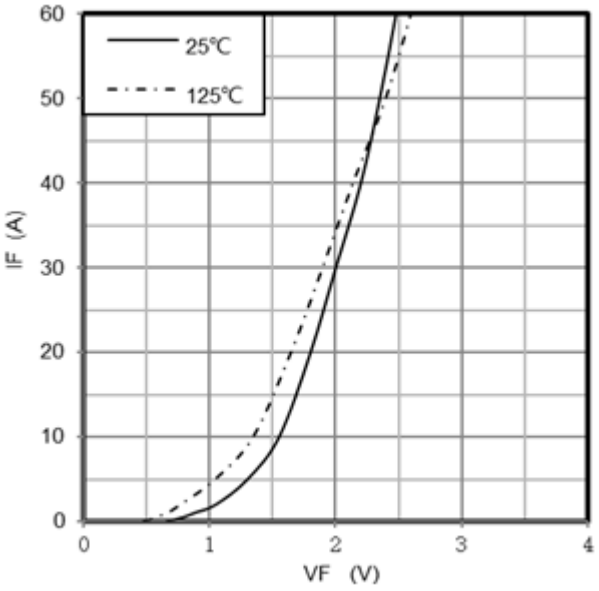


Figure8:typical diode forward characteristic,tp=300us

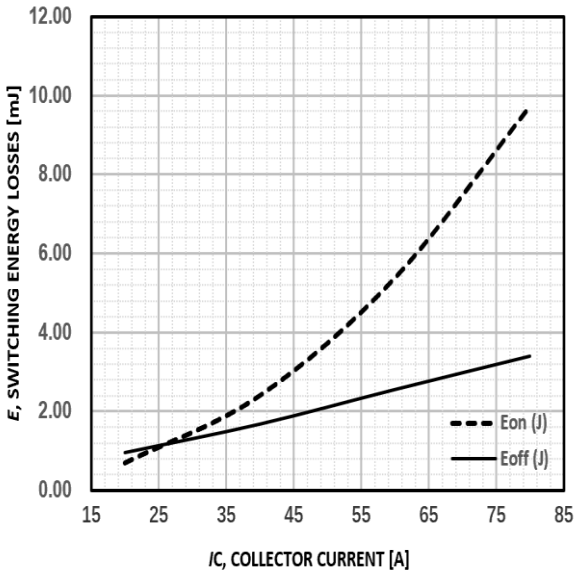


Figure9: typical energy loss VS. IC, TC=25℃,

L=500uH， VCE=600V,VGE=15V,Rg=15Ω

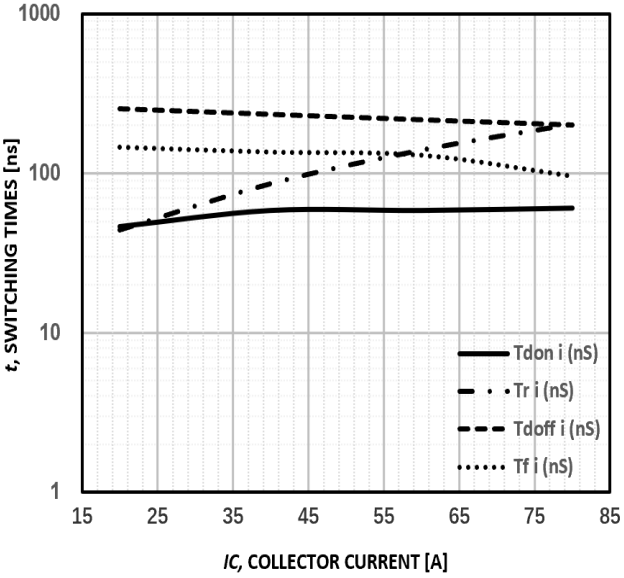


Figure10: typical switching time VS. IC, TC=25℃,

L=500uH, VCE=600V,VGE=15V,Rg=15Ω

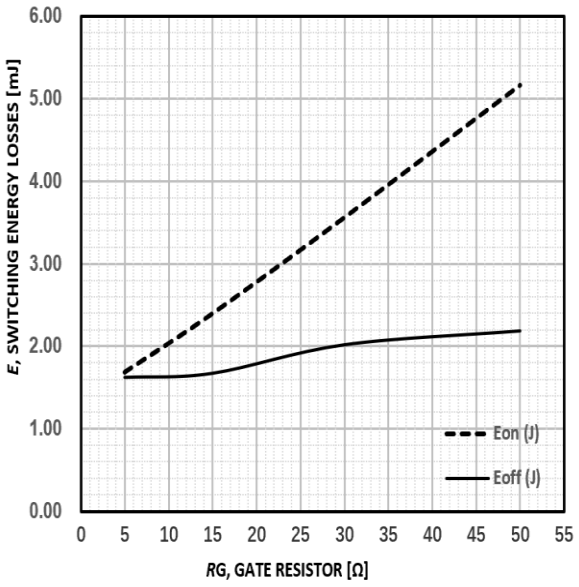


Figure11: typical energy loss VS. Rg,TC=25℃,

L=500uH, VCE=600V, VGE=15V ,IC=40A

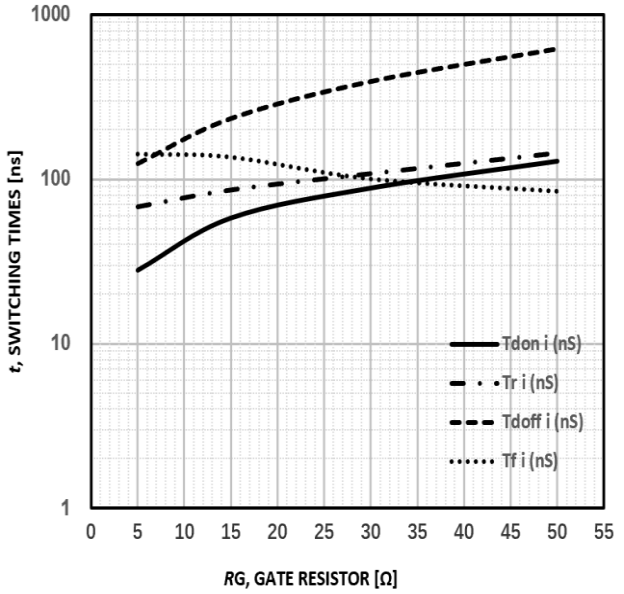


Figure12: typical switching time VS. Rg,TC=25℃,

L=500uH,VCE=600V,VGE=15V,IC=40A

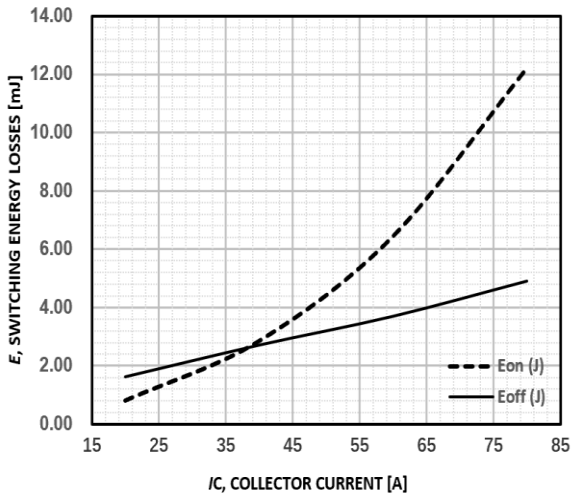


Figure13: typical energy loss VS. IC, TC=175℃,
L=500uH， VCE=600V,VGE=15V,Rg=15Ω

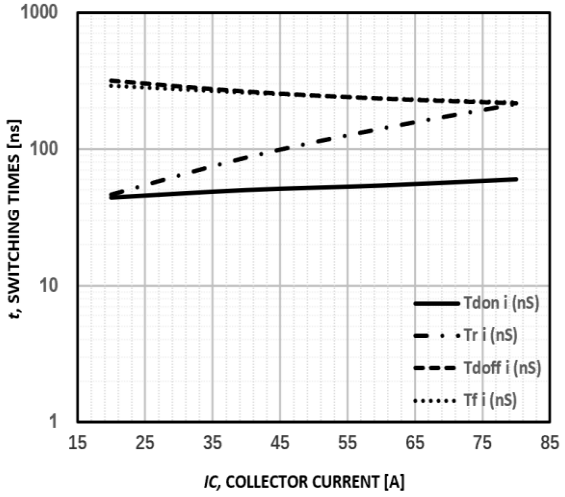


Figure14: typical switching time VS. IC, TC=175℃,
L=500uH, VCE=600V,VGE=15V,Rg=15Ω

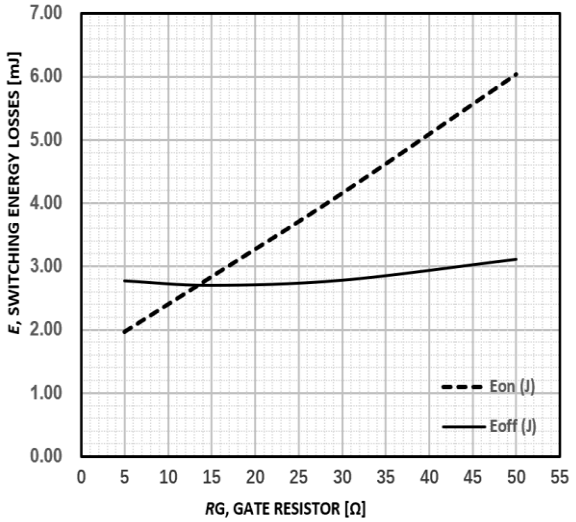


Figure15: typical energy loss VS. Rg,TC=175℃,
L=500uH, VCE=600V, VGE=15V ,IC=40A

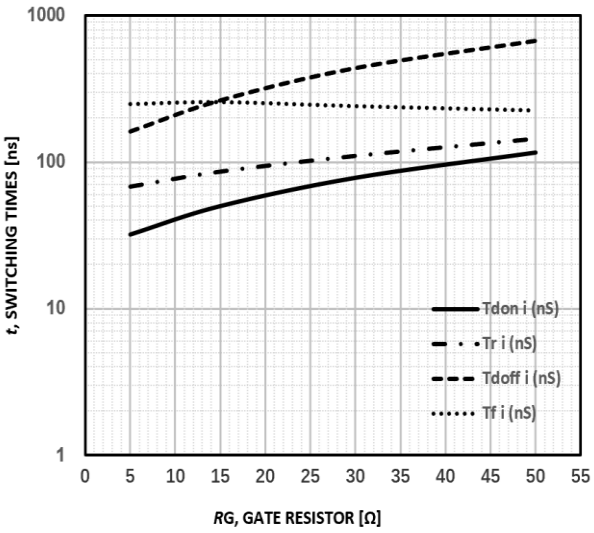


Figure16: typical switching time VS. Rg,TC=175℃,
L=500uH,VCE=600V,VGE=15V,IC=40A

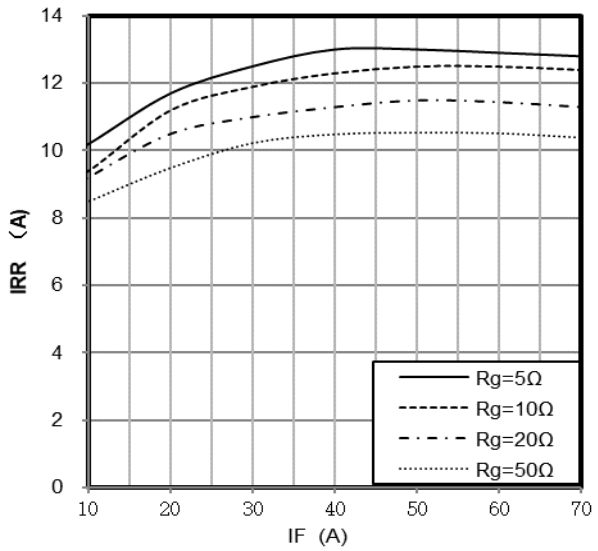


Figure17: typical diode IRR VS. IF, TC=25℃

VCC=600V, VGE=15V

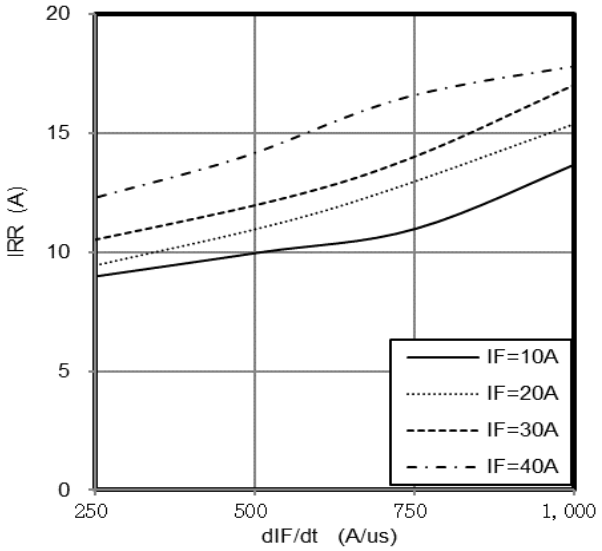


Figure18:typical diode IRR VS. dIF/dt

VCC=600V,VGE=15V

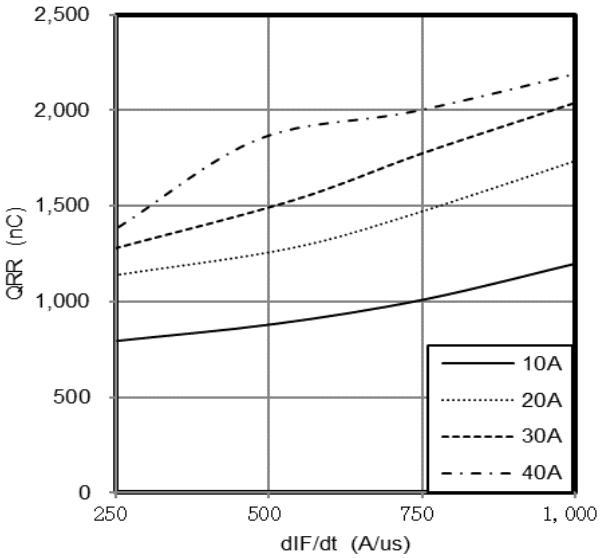


Figure19: typical diode QRR VS. dIF/dt

VCC=600V , VGE=15V

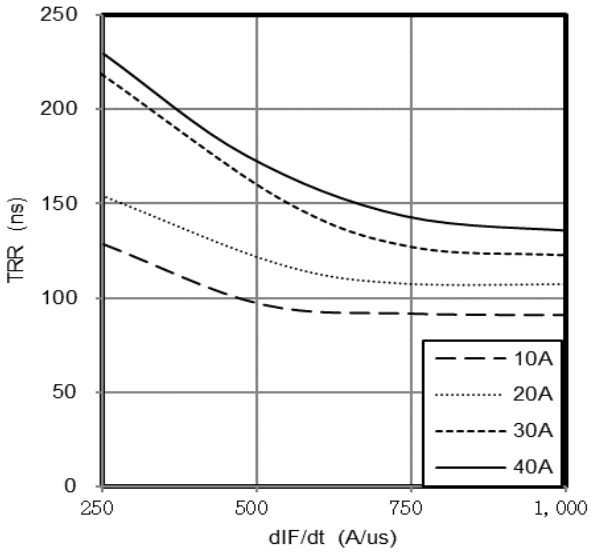


Figure20: typical diode TRR VS. dIF/dt,

VCC=600V,VGE=15V

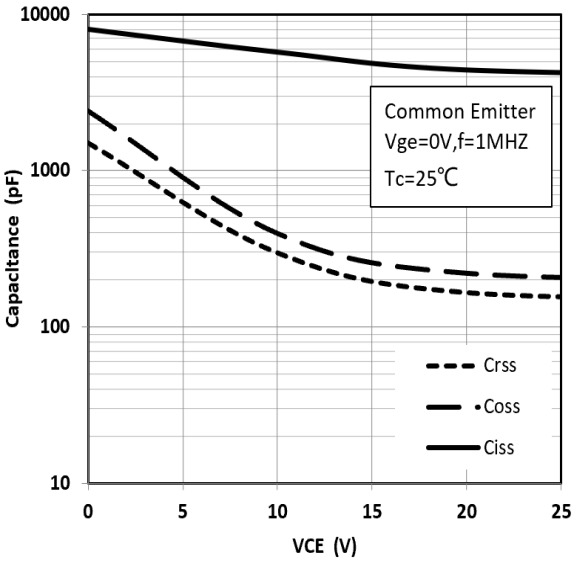


Figure21:typical capacitance VS. VCE, VGE=0V,f=100kHz

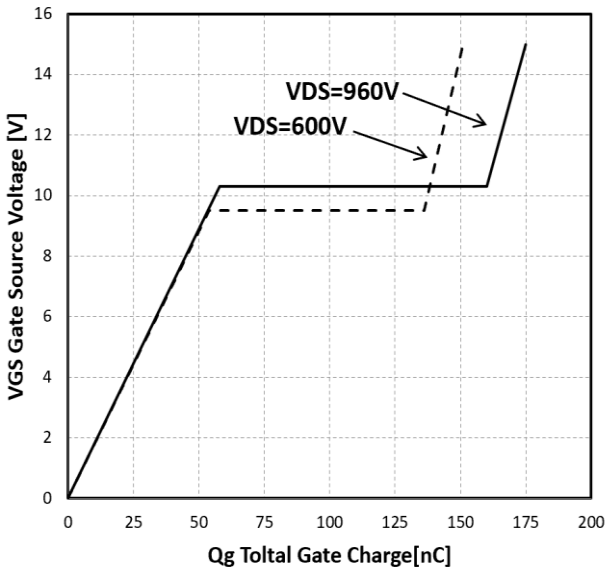


Figure22:typical gate charge VS. VGE,IC=40A

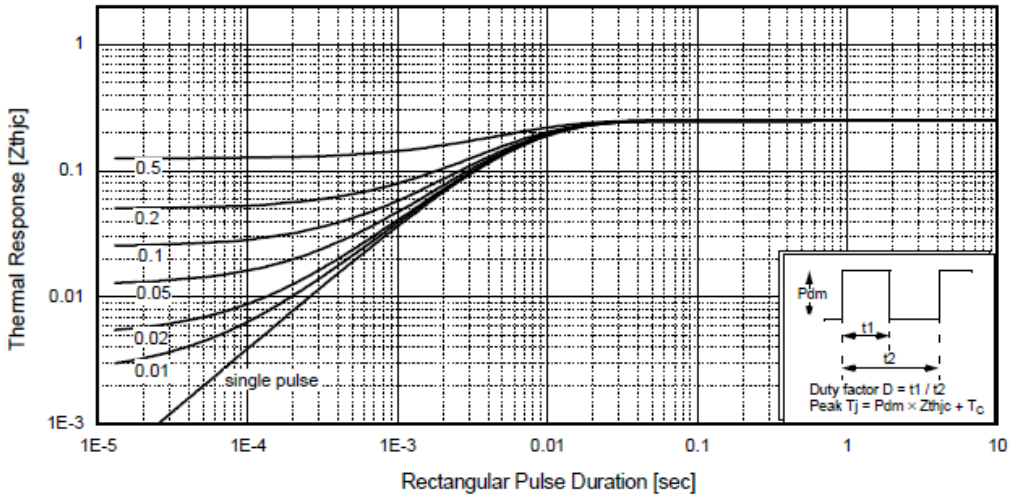
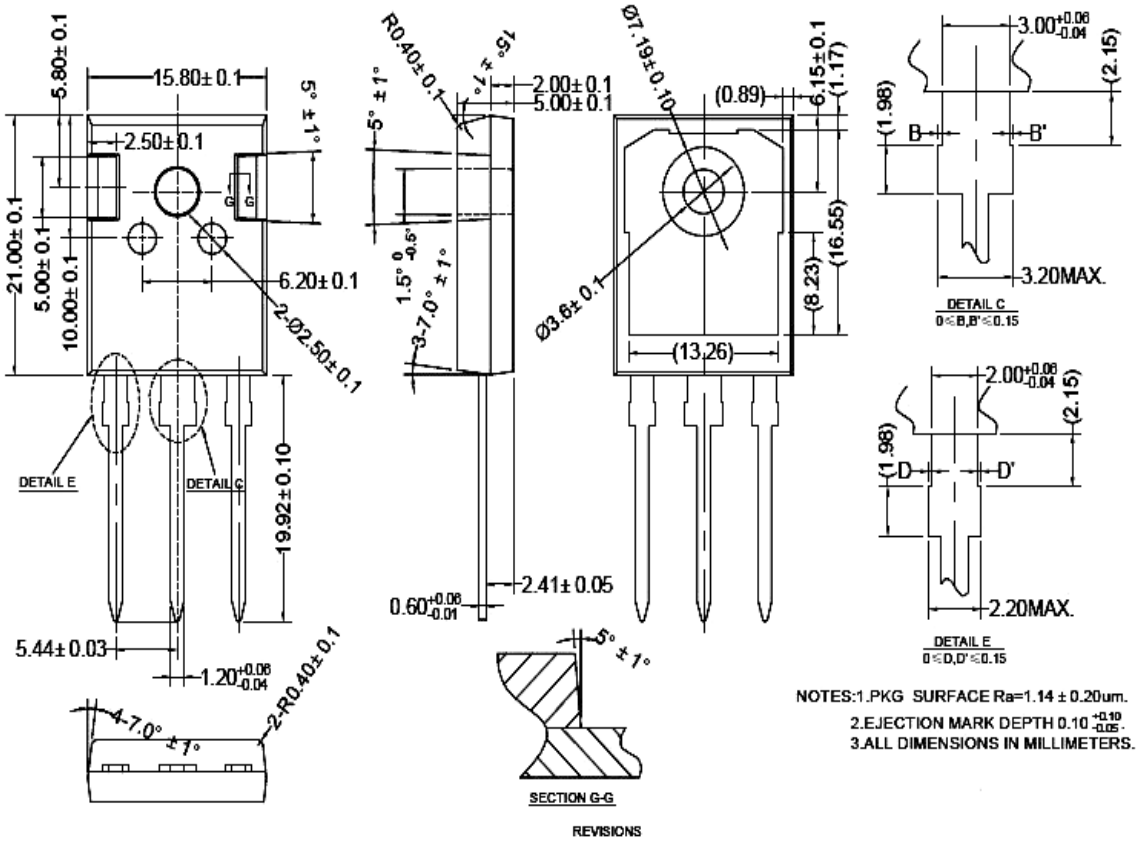


Figure23: normalized transient thermal impedance, junction-to-case

Note1.Duty factor D=t1/t2 Note2: peak TJ=PDM × Zthjc + TC

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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