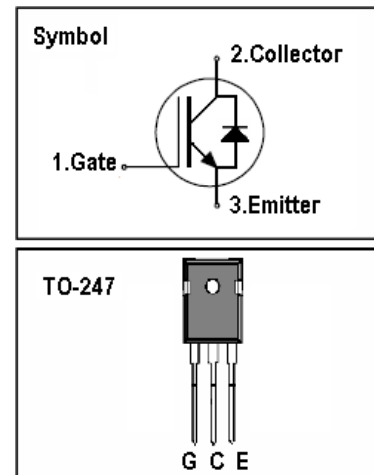


600V, 40A, Trench NPT IGBT

Features

- 600V,40A
- $V_{CE(sat)(typ.)}=2.15V @ V_{GE}=15V, I_C=40A$
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA using NPT technology



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	± 30	V
I_C	Continuous Collector Current ($T_C=25^\circ C$)	80	A
	Continuous Collector Current ($T_C=100^\circ C$)	40	A
I_{CM}	Pulsed Collector Current (Note 1)	110	A
I_F	Diode Continuous Forward Current ($T_C=100^\circ C$)	40	A
I_{FM}	Diode Maximum Forward Current (Note 1)	75	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation ($T_C=25^\circ C$)	300	W
	Maximum Power Dissipation ($T_C=100^\circ C$)	150	W
T_J	Operating Junction Temperature Range	-55 to +150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j-c}$	Thermal Resistance, Junction to case for IGBT	0.42	$^\circ C / W$
$R_{th\ j-c}$	Thermal Resistance, Junction to case for Diode	1.5	$^\circ C / W$
$R_{th\ j-a}$	Thermal Resistance, Junction to Ambient	40	$^\circ C / W$

Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	$V_{GE}=0V, I_C=250\mu A$	600	-	-	V
I_{CES}	Collector-Emitter Leakage Current	$V_{CE}=1200V, V_{GE}=0V$	-	-	250	μA
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	$V_{GE}=V_{CE}, I_C=250\mu A$	3.5	-	5.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=40A$	-	2.15		V
Q_g	Total Gate Charge	$V_{CC}=480V$ $V_{GE}=15V$ $I_C=40A$	-	110		nC
Q_{ge}	Gate-Emitter Charge		-	40		nC
Q_{gc}	Gate-Collector Charge		-	35		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=300V$ $V_{GE}=15V$ $I_C=40A$ $R_G=28\Omega$ Inductive Load $T_C=25^\circ\text{C}$	-	64	-	ns
t_r	Turn-on Rise Time		-	76	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	354	-	ns
t_f	Turn-off Fall Time		-	56	-	ns
E_{on}	Turn-on Switching Loss		-	0.9	-	mJ
E_{off}	Turn-off Switching Loss		-	0.85	-	mJ
E_{ts}	Total Switching Loss		-	1.75	-	mJ
C_{ies}	Input Capacitance	$V_{CE}=25V$ $V_{GE}=0V$ $f=100\text{kHz}$	-	1850	-	pF
C_{oes}	Output Capacitance		-	230	-	pF
C_{res}	Reverse Transfer Capacitance		-	60	-	pF
R_{gint}	Integrated gate resistor			39		Ω

Electrical Characteristics of Diode ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	$I_F=40A$	-	1.3	1.7	V
t_{rr}	Diode Reverse Recovery Time	$V_{CE}=300V$	-	75		ns
I_{rr}	Diode peak Reverse Recovery Current	$I_F=40A$	-	6		A
Q_{rr}	Diode Reverse Recovery Charge	$di_F/dt=200A/\mu s$	-	220		nC

Notes:

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

Typical Performance Characteristics

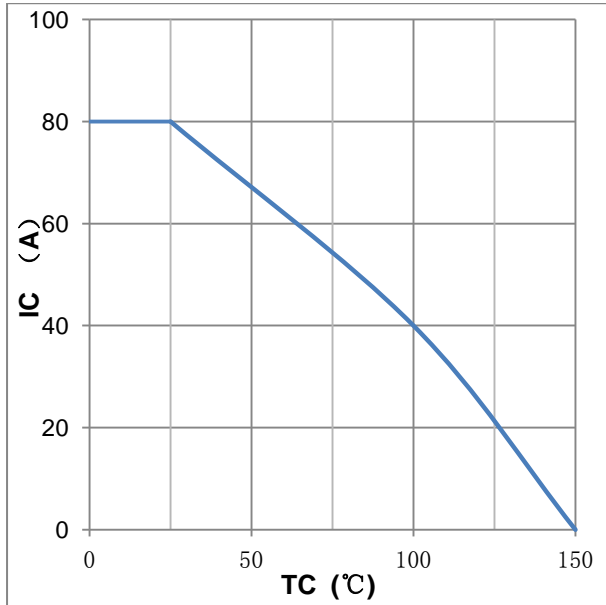


Figure1:maximum DC collector current VS. case temperature

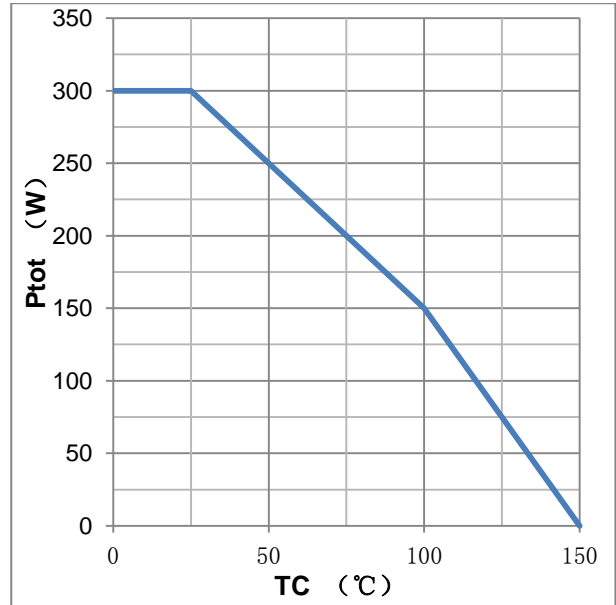


Figure2:power dissipation VS. case temprature

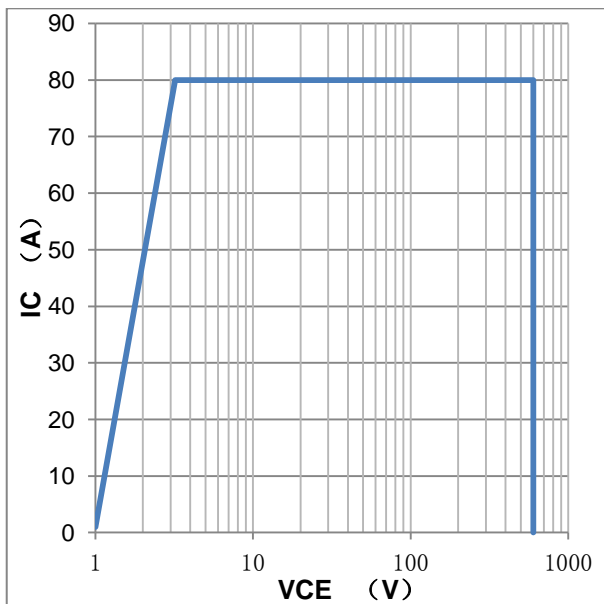


Figure3:reverse bias SOA,TJ=150°C,VGE=15V

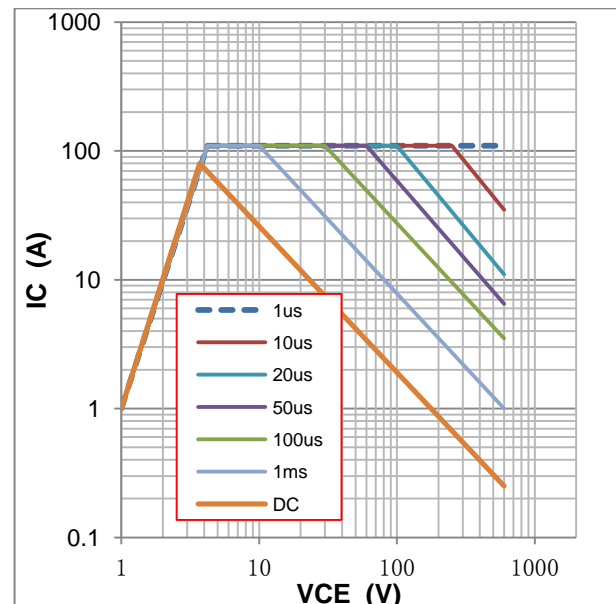


Figure4:forward SOA,TC=25°C,TJ≤150°C

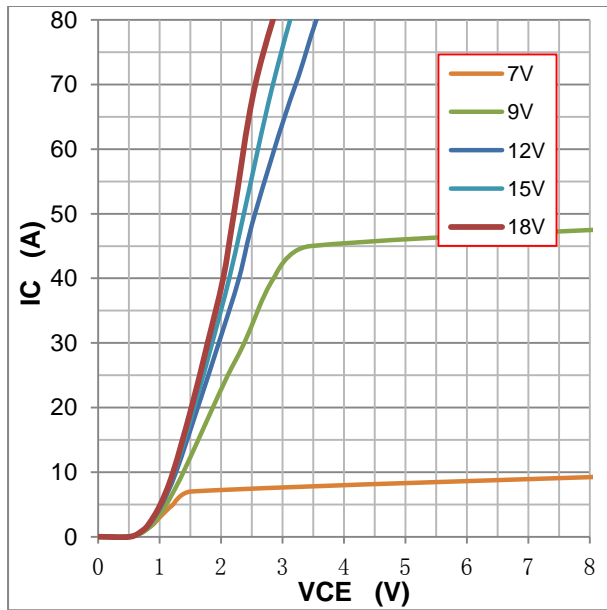


Figure5: typical IGBT output characteristics,
 $T_J=25^{\circ}\text{C}; t_p=300\mu\text{s}$

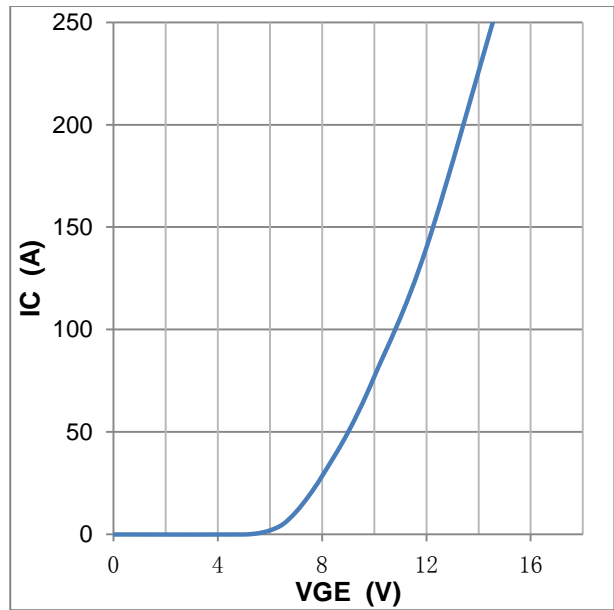


Figure6: typical trans characteristics, $V_{CE}=20\text{V}, t_p=20\mu\text{s}$

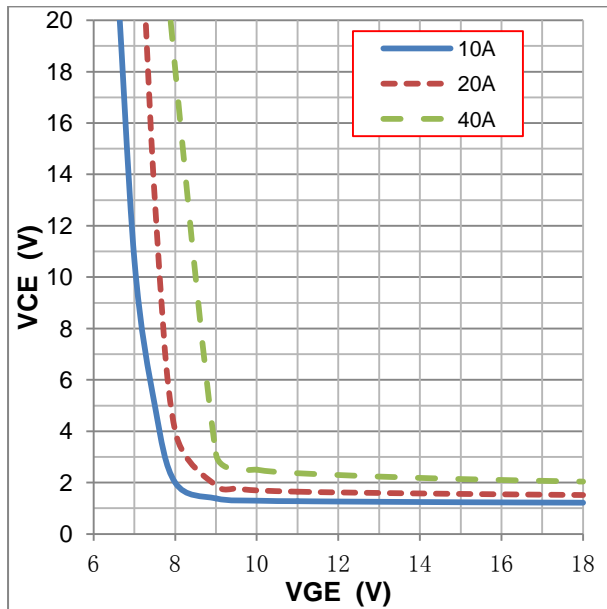


Figure7: typical VCE VS. VGE, $T_J=25^{\circ}\text{C}$

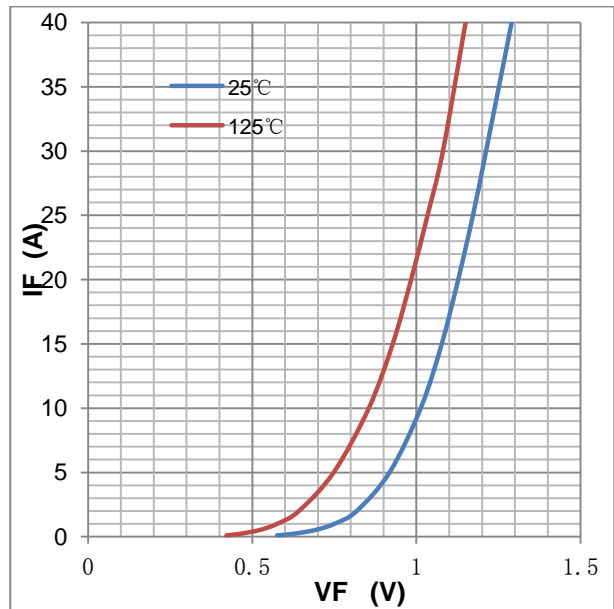


Figure8: typical diode forward characteristic, $t_p=300\mu\text{s}$

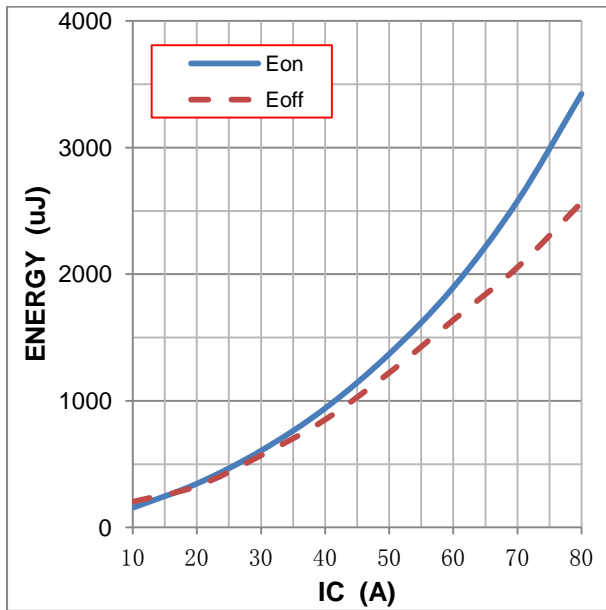


Figure9: typical energy loss VS. IC, TC=25°C,
L=500uH, VCE=300V, VGE=15V, Rg=28Ω,

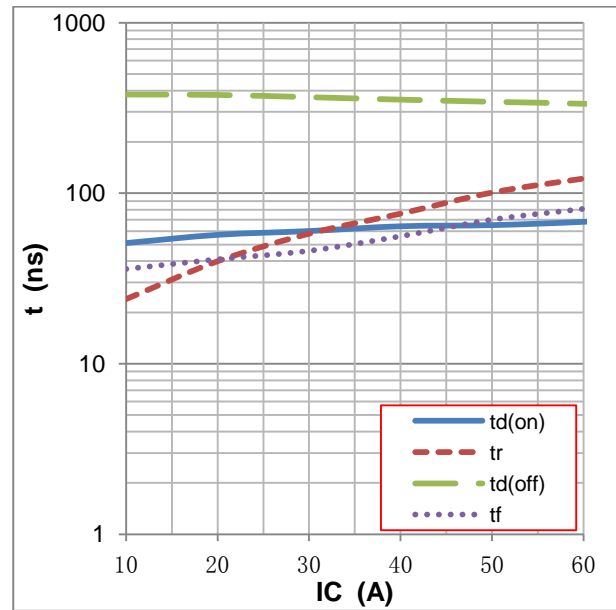


Figure10: typical switching time VS. IC, TC=25°C,
L=500uH, VCE=300V, VGE=15V, Rg=28Ω,

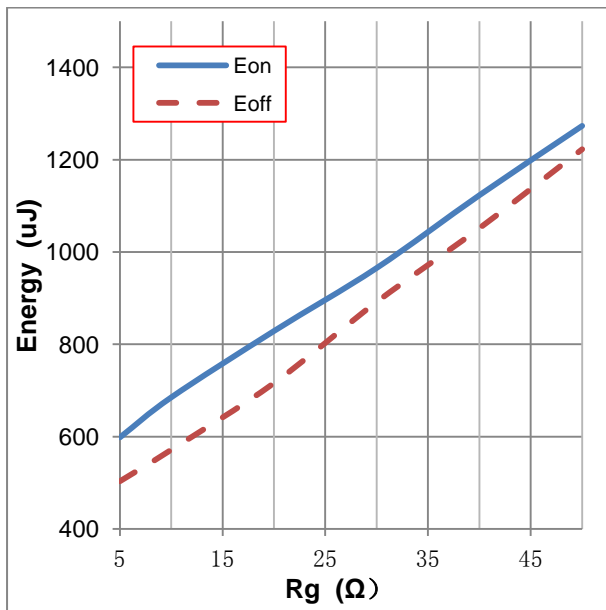


Figure11: typical energy loss VS. Rg, TC=25°C,
L=500uH, VCE=300V, VGE=15V, IC=40A

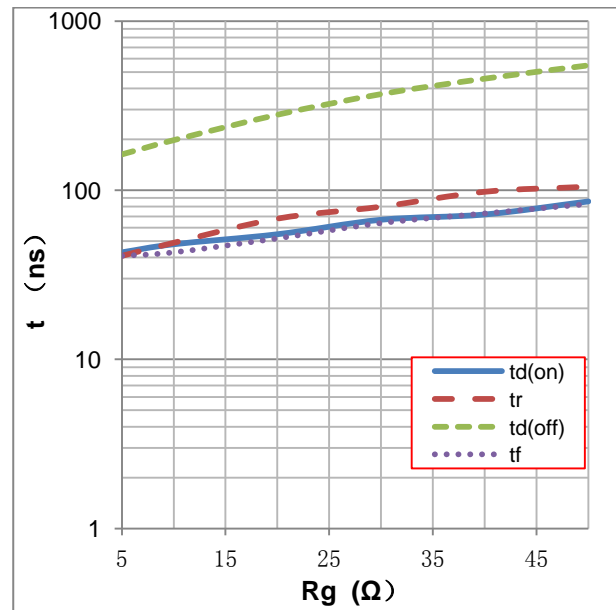


Figure12: typical switching time VS. Rg, TC=25°C,
L=500uH, VCE=300V, VGE=15V, IC=40A

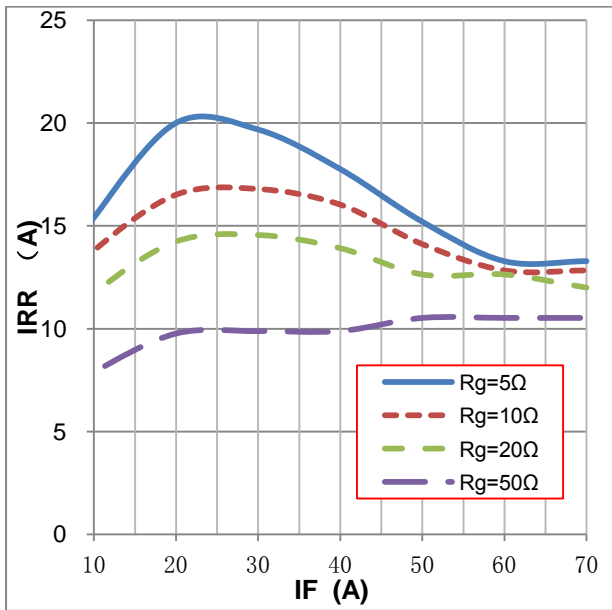


Figure13: typical diode IRR VS. IF, TC=25°C

VCC=300V, VGE=15V

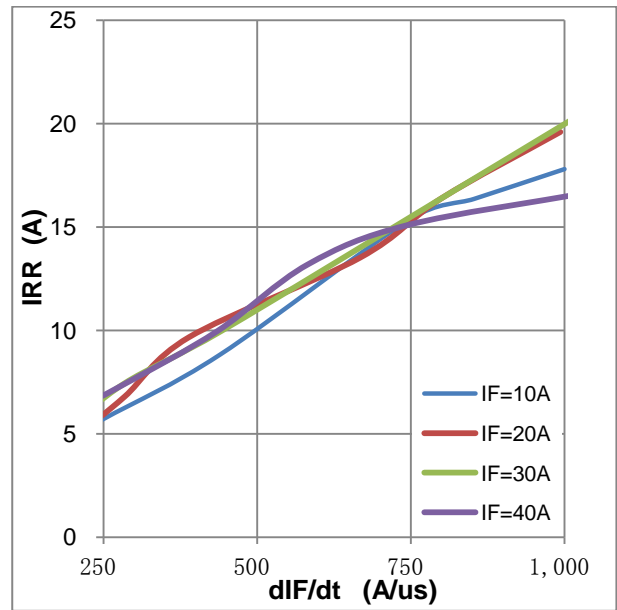


Figure14: typical diode IRR VS. dIF/dt

VCC=300V, VGE=15V

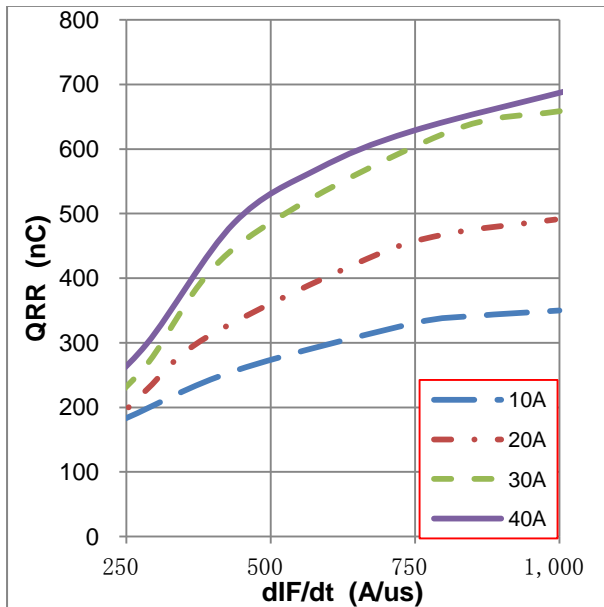


Figure15: typical diode QRR VS. dIF/dt

VCC=300V, VGE=15V

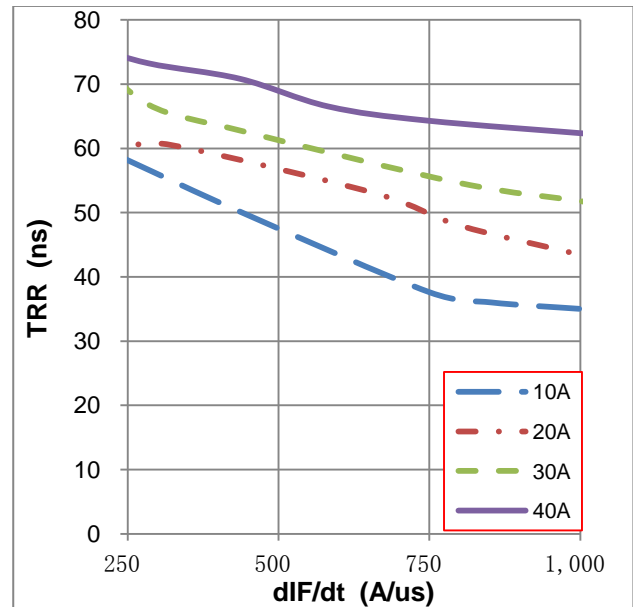


Figure16: typical diode TRR VS. dIF/dt,

VCC=300V, VGE=15V

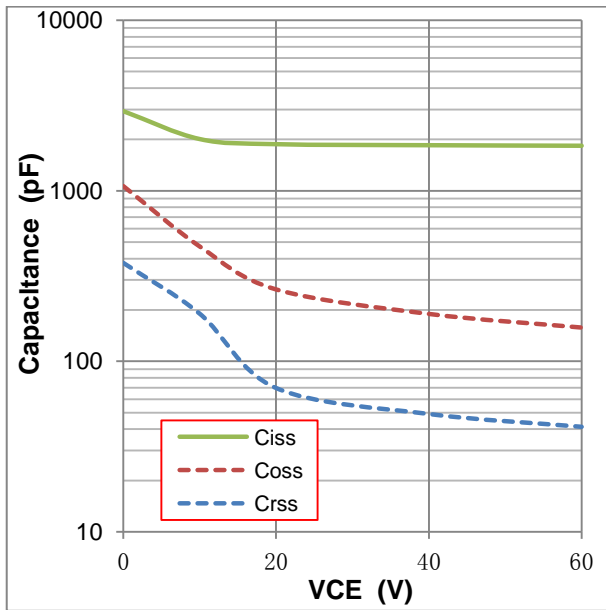


Figure17:typical capacitance VS. VCE,VGE=0V,f=100kHz

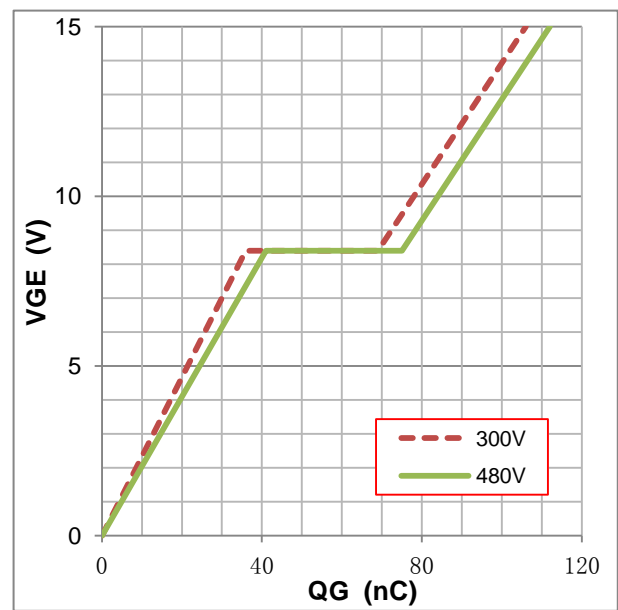


Figure18:typical gate charge VS. VGE,IC=40A

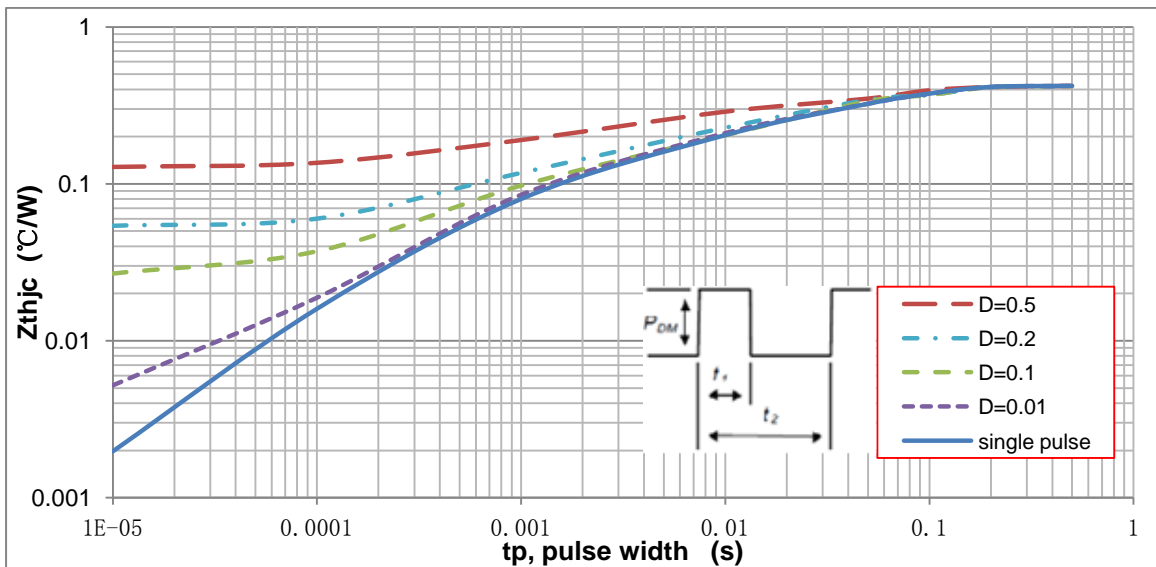
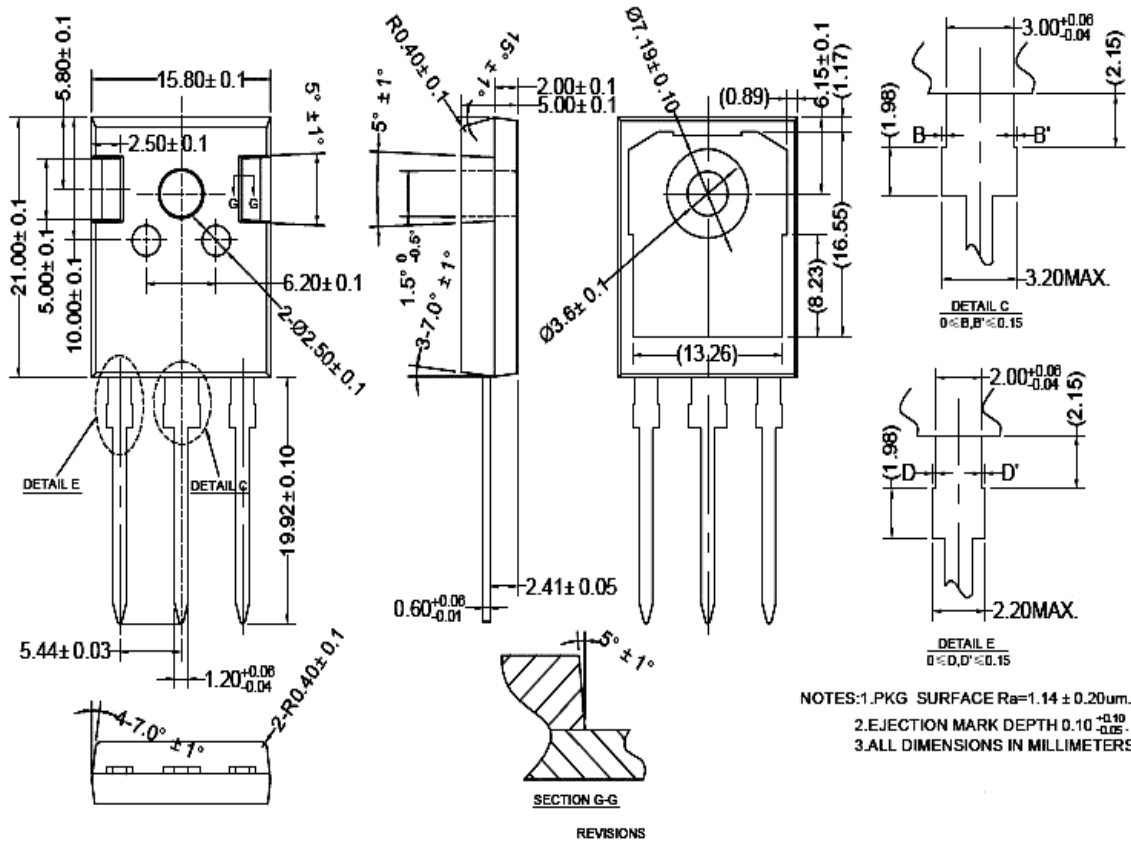


Figure19:normalised transient thermal impedance, junction-to-case

Note1.Duty factor $D=t_1/t_2$; Note2:peak $T_J=P_{DM} \times Z_{thjc} + T_C$

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

$0 \leq D, D' \leq 0.15$

NOTES:

- 1.PKG SURFACE Ra=1.14 ± 0.20um.
- 2.EJECTION MARK DEPTH 0.10 $\begin{matrix} +0.10 \\ -0.05 \end{matrix}$.
- 3.ALL DIMENSIONS IN MILLIMETERS.