

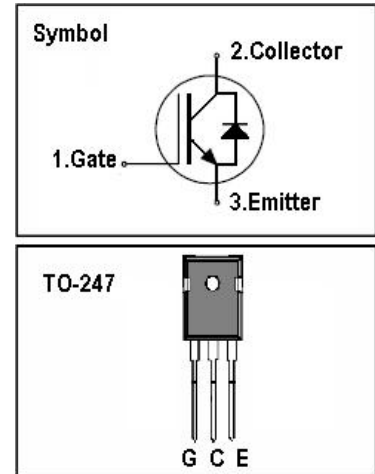
## IGBT

### Features

- 1200V, 15A
- $V_{CE(sat)}(typ.)=2.2V@V_{GE}=15V, I_C=15A$
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA using NPT technology

### General Description

KEDA NPT 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	$\pm 30$	V
$I_C$	Continuous Collector Current ( $T_C=25^\circ C$ )	30	A
	Continuous Collector Current ( $T_C=100^\circ C$ )	15	A
$I_{CM}$	Pulsed Collector Current (Note 1)	60	A
$I_F$	Diode Continuous Forward Current ( $T_C=100^\circ C$ )	15	A
$I_{FM}$	Diode Maximum Forward Current (Note 1)	60	A
$t_{sc}$	Short Circuit Withstand Time	10	us
$P_D$	Maximum Power Dissipation ( $T_C=25^\circ C$ )	170	W
	Maximum Power Dissipation ( $T_C=100^\circ C$ )	68	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	0.51	$^\circ C / W$
$R_{th j-c}$	Thermal Resistance, Junction to case for Diode	0.85	$^\circ C / W$
$R_{th j-a}$	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	$V_{GE}=0V, I_C=250\mu A$	1200	-	-	V
$I_{CES}$	Collector-Emitter Leakage Current	$V_{CE}=1200V, V_{GE}=0V$	-	-	250	$\mu A$
$I_{GES}$	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	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	-	5.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=15A$	-	2.2		V
$Q_g$	Total Gate Charge	$V_{CC}=960V$ $V_{GE}=15V$ $I_C=15A$	-	68		nC
$Q_{ge}$	Gate-Emitter Charge		-	22		nC
$Q_{gc}$	Gate-Collector Charge		-	23		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V$ $V_{GE}=15V$ $I_C=15A$ $R_G=28\Omega$ Inductive Load $T_C=25^{\circ}\text{C}$	-	32	-	ns
$t_r$	Turn-on Rise Time		-	38	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	223	-	ns
$t_f$	Turn-off Fall Time		-	74	-	ns
$E_{on}$	Turn-on Switching Loss		-	1.6	-	mJ
$E_{off}$	Turn-off Switching Loss		-	0.6	-	mJ
$E_{ts}$	Total Switching Loss		-	2.2	-	mJ
$C_{ies}$	Input Capacitance	$V_{CE}=25V$ $V_{GE}=0V$ $f=100\text{kHz}$	-	481	-	pF
$C_{oes}$	Output Capacitance		-	89	-	pF
$C_{res}$	Reverse Transfer Capacitance		-	28	-	pF
$R_{Gint}$	Integrated gate resistor			3.8		$\Omega$

## **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	$I_F=15A$	-	2.0	2.4	V
$t_{rr}$	Diode Reverse Recovery Time	$V_{CE}=600V$ $I_F=15A$ $dI_F/dt=500A/\mu s$	-	110		ns
$I_{rr}$	Diode peak Reverse Recovery Current		-	16		A
$Q_{rr}$	Diode Reverse Recovery Charge		-	1060		nC

### **Notes:**

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

## Typical Performance Characteristics

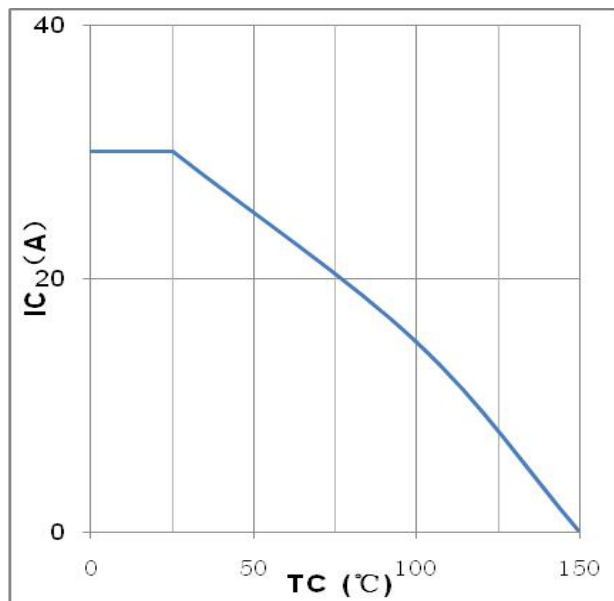


Figure1:maximum DC collector current  
VS. case temperature

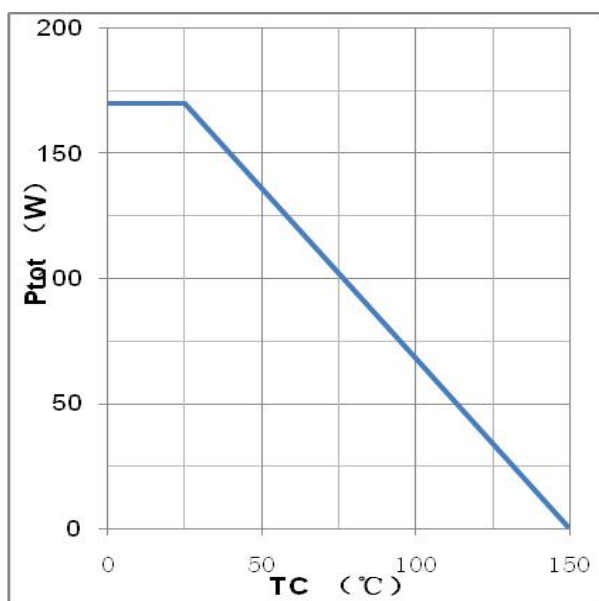


Figure2:power dissipation VS. case temperature

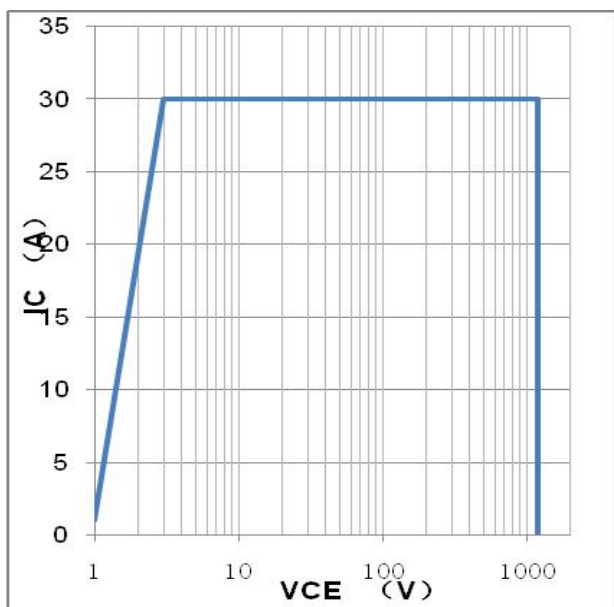


Figure3:reverse bias SOA,  $T_J=150^{\circ}C$ ,  $V_{GE}=15V$

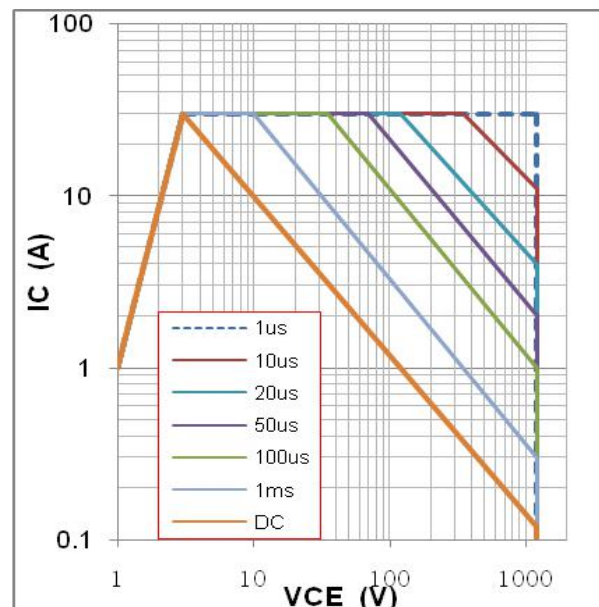


Figure4:forward SOA,  $T_C=25^{\circ}C$ ,  $T_J \leq 150^{\circ}C$

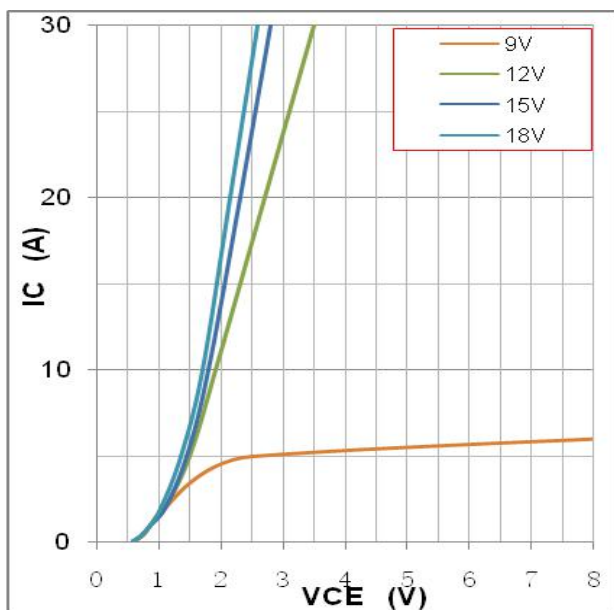


Figure5: typical IGBT output characteristics,  
 $T_J = 25^\circ\text{C}$ ;  $t_p = 300\mu\text{s}$

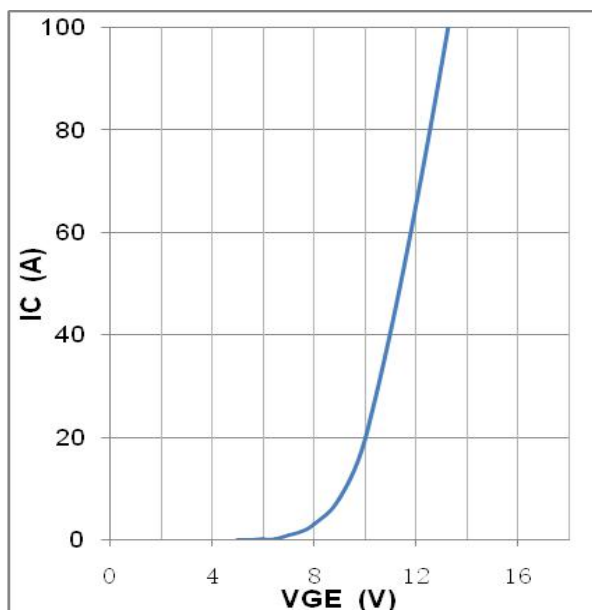


Figure6: typical trans characteristics,  $V_{CE} = 20V$ ,  $t_p = 20\mu\text{s}$

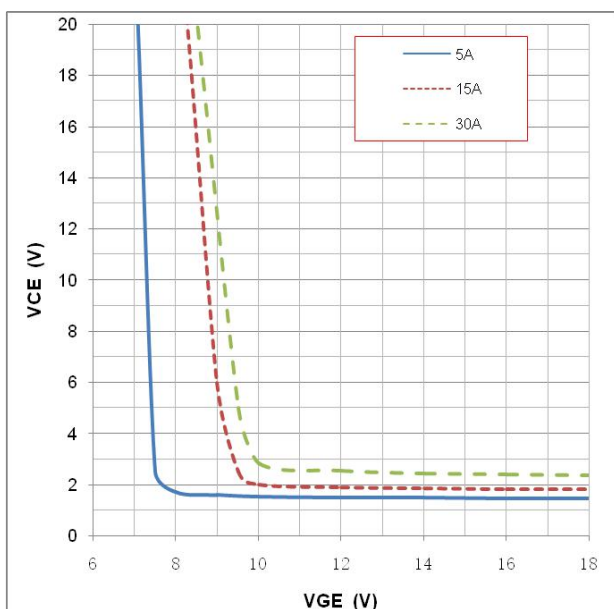


Figure7: typical  $V_{CE}$  VS.  $V_{GE}$ ,  $T_J = 25^\circ\text{C}$

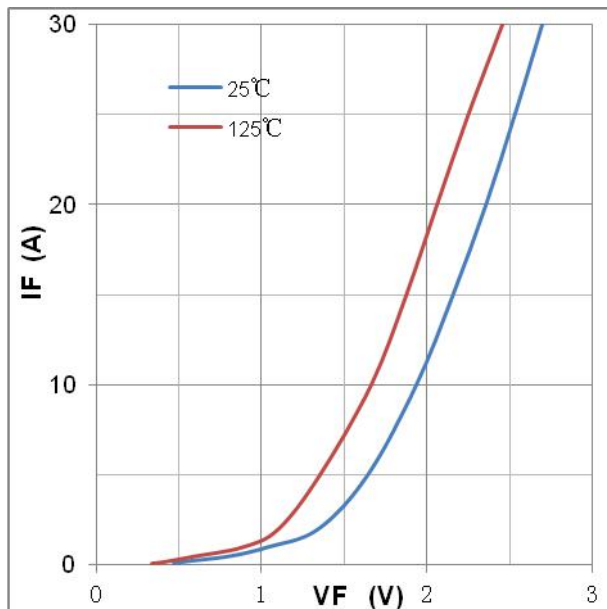


Figure8: typical diode forward characteristic,  $t_p = 300\mu\text{s}$

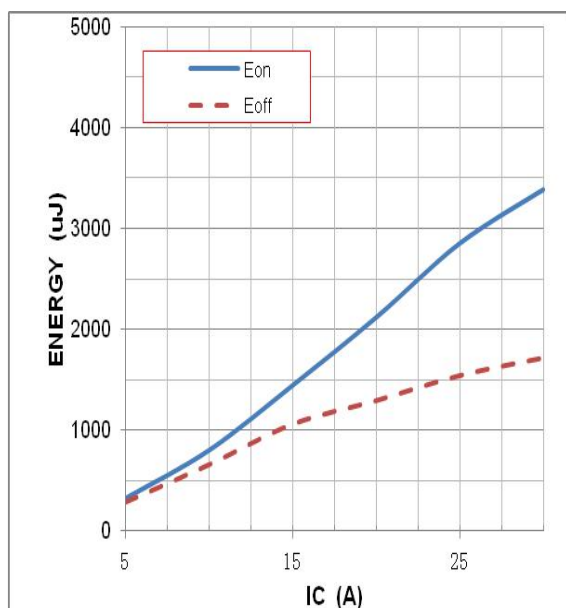


Figure9: typical energy loss VS. IC, TC=25°C,  
L=500uH, VCE=600V, VGE=15V, Rg=28Ω,

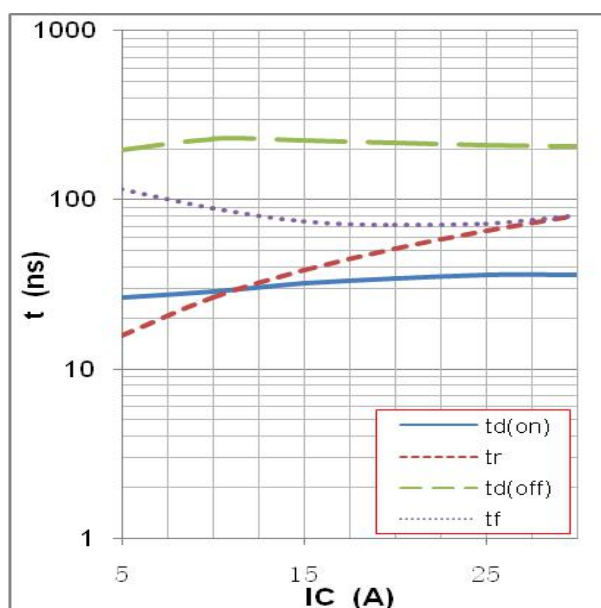


Figure10: typical switching time VS. IC, TC=25°C,  
L=500uH, VCE=600V, VGE=15V, Rg=28Ω,

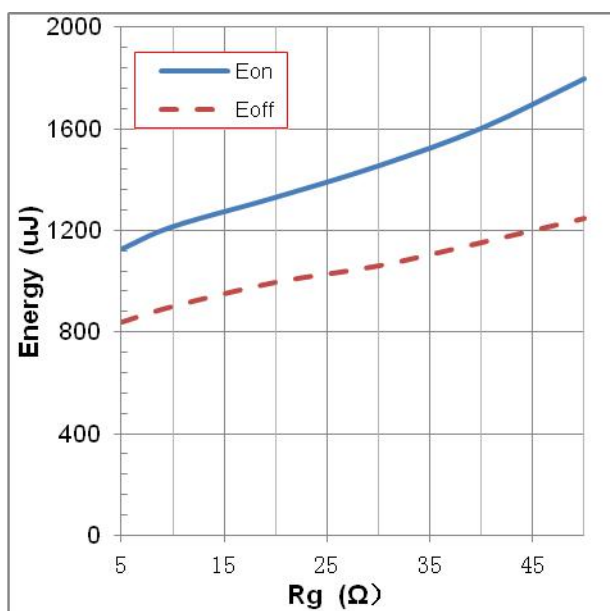


Figure11: typical energy loss VS. Rg, TC=25°C,  
L=500uH, VCE=600V, VGE=15V, IC=15A

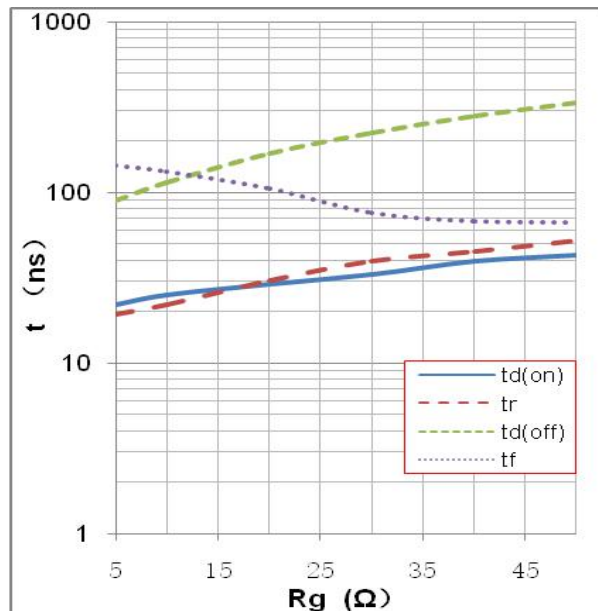


Figure12: typical switching time VS. Rg, TC=25°C,  
L=500uH, VCE=600V, VGE=15V, IC=15A

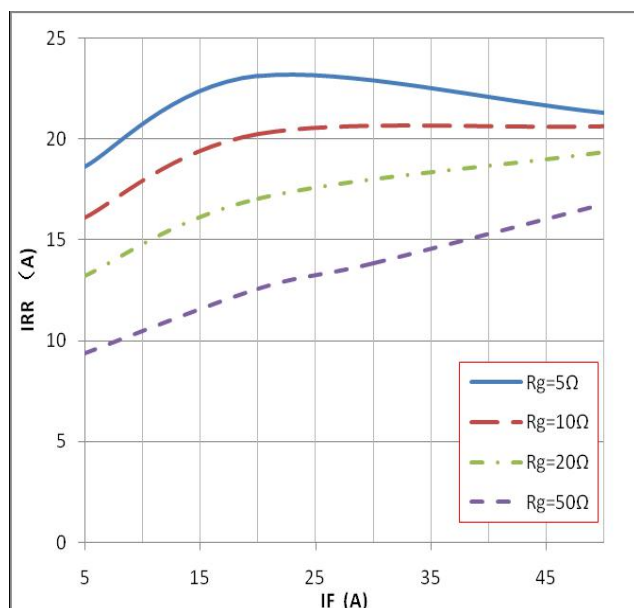


Figure13: typical diode IRR VS. IF, TC=25°C

VCC=600V, VGE=15V

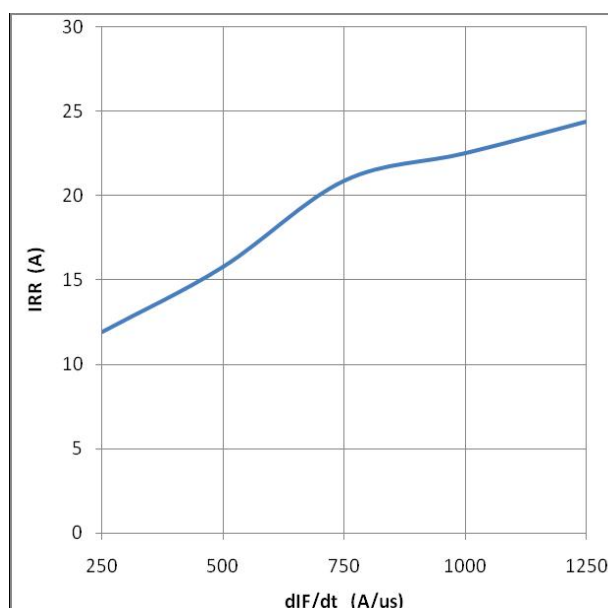


Figure14: typical diode IRR VS. dIF/dt

VCC=600V, VGE=15V IF=15A

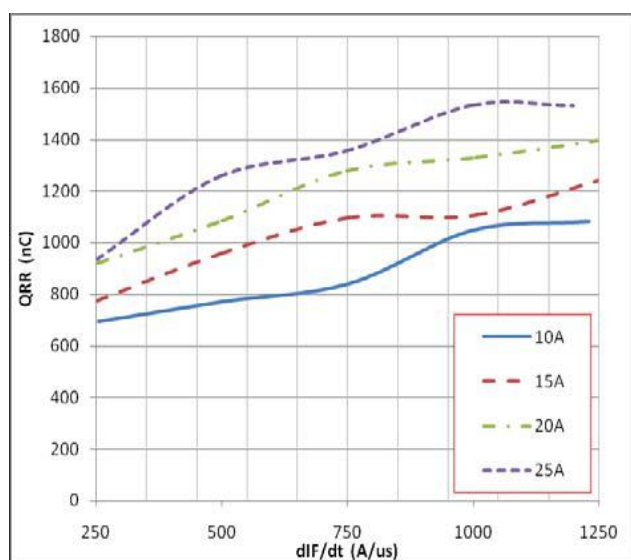


Figure15: typical diode QRR VS. dIF/dt

VCC=600V, VGE=15V

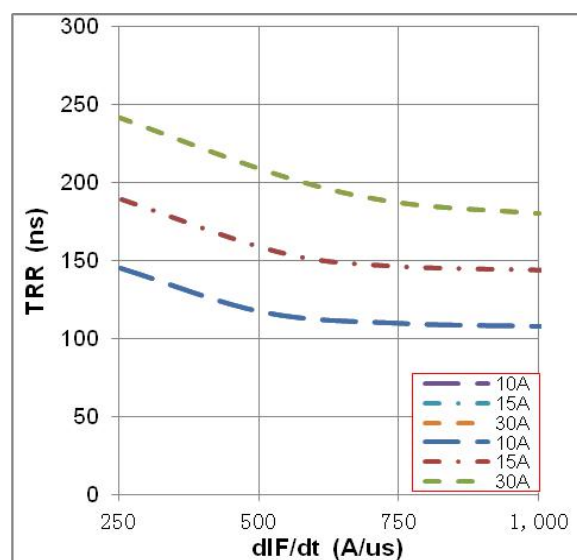


Figure16: typical diode TRR VS. dIF/dt,

VCC=600V, VGE=15V

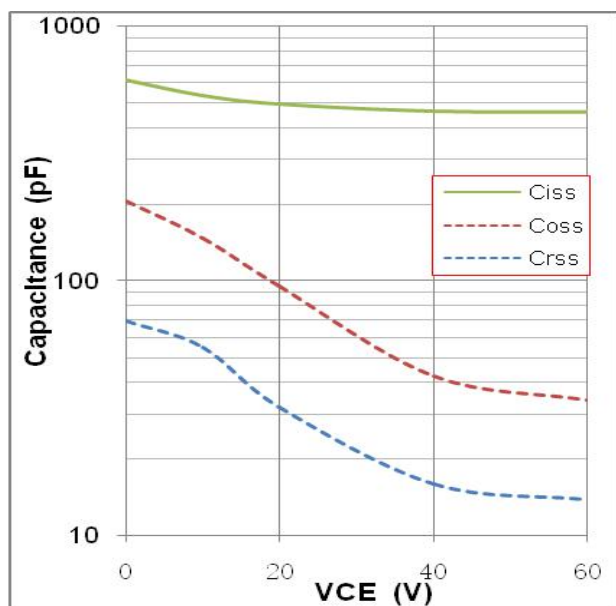


Figure17:typical capacitance VS. VCE,VGE=0V,f=100kHz

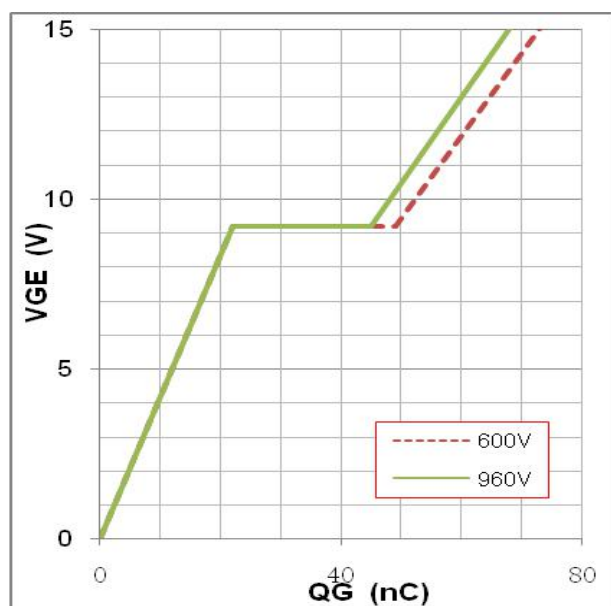


Figure18:typical gate charge VS. VGE,IC=15A

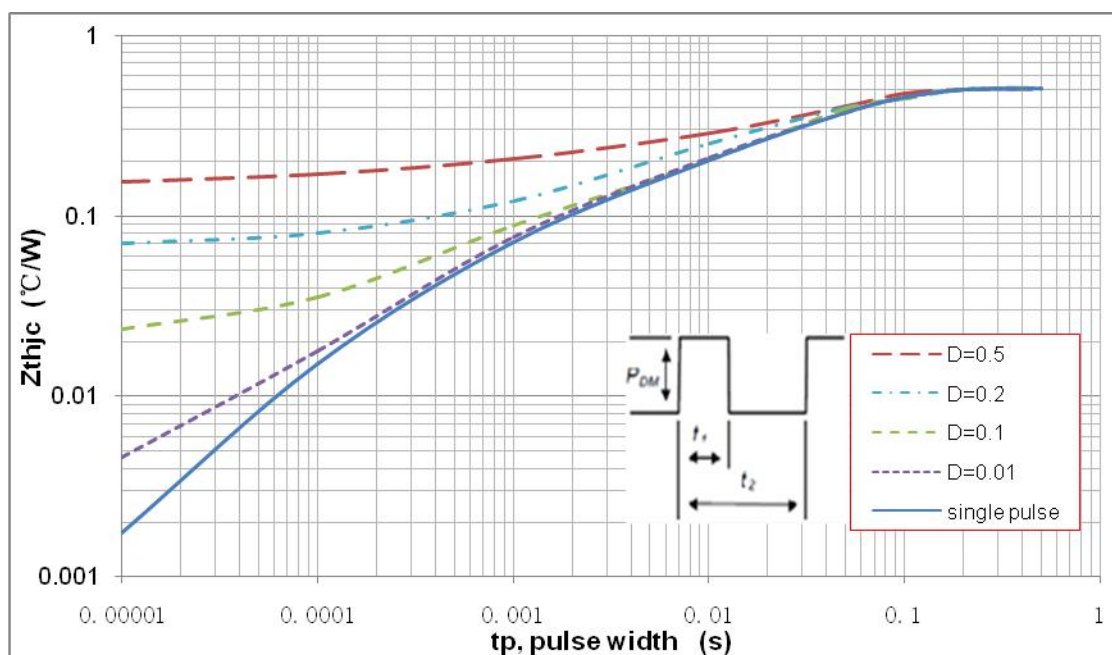


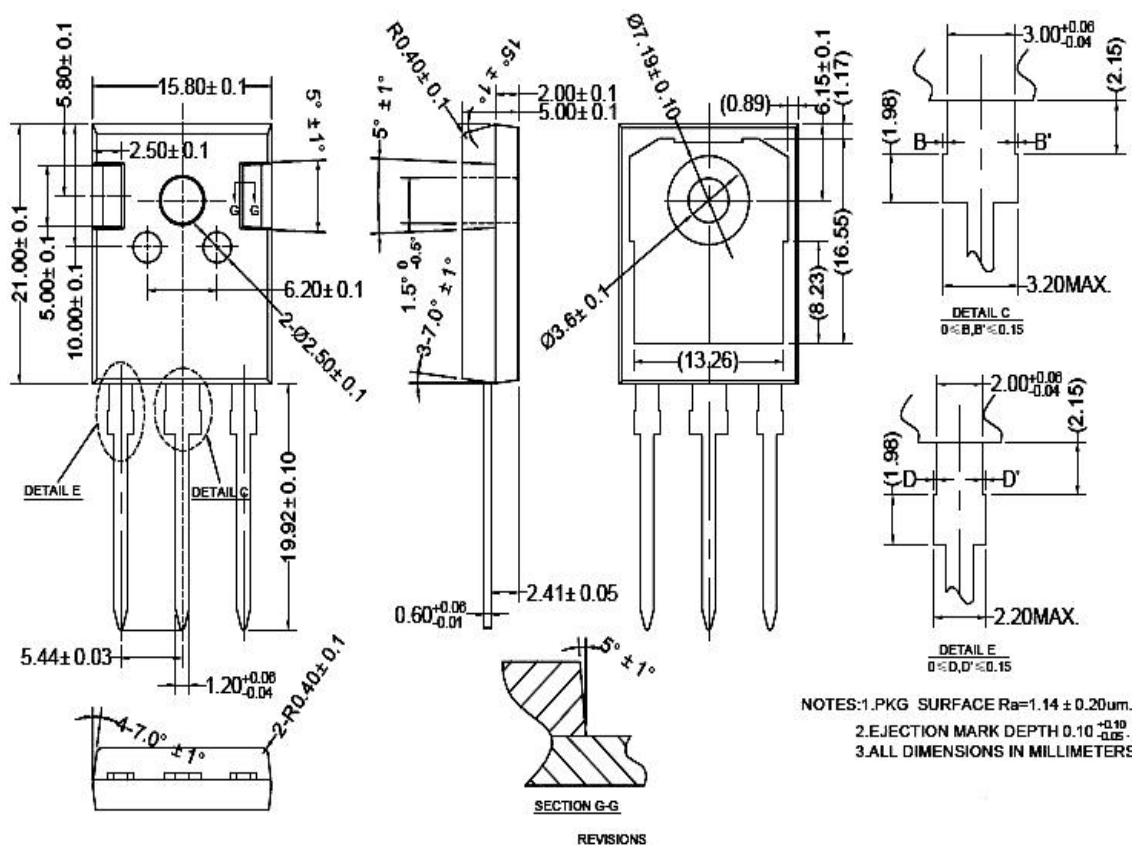
Figure19:normalised transient thermal impedance, junction-to-case

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 ≤ D, D' ≤ 0.15

NOTES: 1. PKG SURFACE Ra=1.14 ± 0.20µm.  
2. EJECTION MARK DEPTH 0.10<sup>+0.10</sup>/<sub>-0.05</sub>.  
3. ALL DIMENSIONS IN MILLIMETERS.