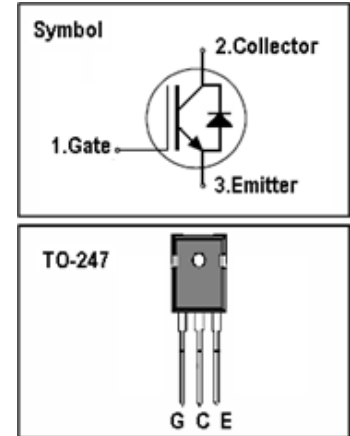


## IGBT

### Features

- 1200V,15A
- $V_{CE(sat)(typ.)}=1.7V@V_{GE}=15V,I_C=15A$
- 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	$\pm 30$	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)	45	A
$I_F$	Diode Continuous Forward Current ( $T_C=100^\circ C$ )	15	A
$I_{FM}$	Diode Maximum Forward Current (Note 1)	45	A
$t_{sc}$	Short Circuit Withstand Time	10	us
$P_D$	Maximum Power Dissipation ( $T_C=25^\circ C$ )	236	W
	Maximum Power Dissipation ( $T_C=100^\circ C$ )	118	W
$T_J$	Operating Junction Temperature Range	-55 to +175	$^\circ C$
$T_{STG}$	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	0.64	$^\circ C/W$
$R_{th\ j-c}$	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	$V_{GE}=0V, I_C=250\mu A$	1200	-	-	V
$I_{CES}$	Collector-Emitter Leakage Current	$V_{CE}=1200V, V_{GE}=0V$	-	-	100	$\mu A$
$I_{GES}$	Gate Leakage Current, Forward	$V_{GE}=\pm 30V, V_{CE}=0V$	-	-	$\pm 100$	nA
$V_{GE(th)}$	Gate Threshold Voltage	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	-	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=15A$	-	1.7		V
$Q_g$	Total Gate Charge	$V_{CC}=960V$ $V_{GE}=15V$ $I_C=15A$	-	81		nC
$Q_{ge}$	Gate-Emitter Charge		-	24.3		nC
$Q_{gc}$	Gate-Collector Charge		-	44.8		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V$ $V_{GE}=15V$ $I_C=15A$ $R_G=15\Omega$ Inductive Load $T_C=25^\circ\text{C}$	-	25	-	ns
$t_r$	Turn-on Rise Time		-	29	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	150	-	ns
$t_f$	Turn-off Fall Time		-	98	-	ns
$E_{on}$	Turn-on Switching Loss		-	0.7	-	mJ
$E_{off}$	Turn-off Switching Loss		-	0.5	-	mJ
$E_{ts}$	Total Switching Loss		-	1.2	-	mJ
$C_{ies}$	Input Capacitance	$V_{CE}=25V$	-	1340	-	pF
$C_{oes}$	Output Capacitance	$V_{GE}=0V$	-	71	-	pF
$C_{res}$	Reverse Transfer Capacitance	$f=1\text{MHz}$	-	17	-	pF

**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	$I_F=15A$	-	2.2	2.6	V
$t_{rr}$	Diode Reverse Recovery Time	$V_{CE}=600V$	-	252		ns
$I_{rr}$	Diode peak Reverse Recovery Current	$I_F=15A$	-	16		A
$Q_{rr}$	Diode Reverse Recovery Charge	$dI_F/dt=800A/\mu s$	-	1137		nC

**Notes:**

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

**Typical Performance Characteristics**

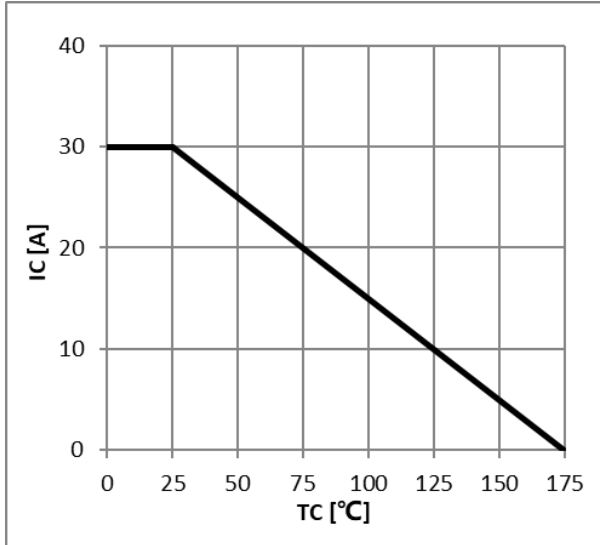


Figure 1: Maximum DC Collector Current VS. case temperature

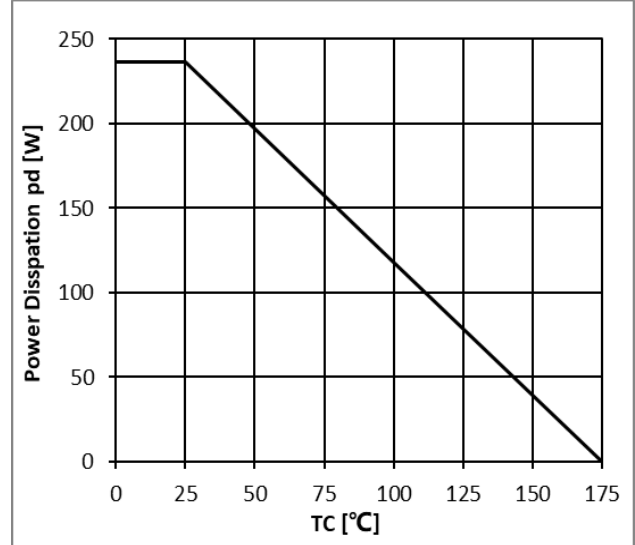


Figure 2: Power Dissipation VS. Case Temperature

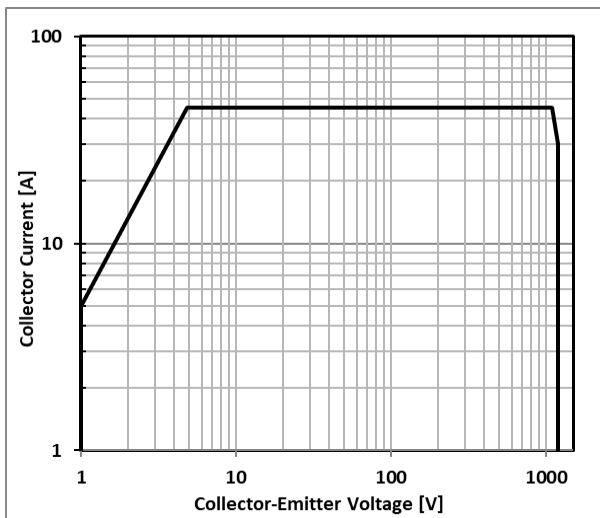


Figure 3: Reverse Bias SOA,  $T_J=125^{\circ}\text{C}$ ,  $V_{GE}=15\text{V}$

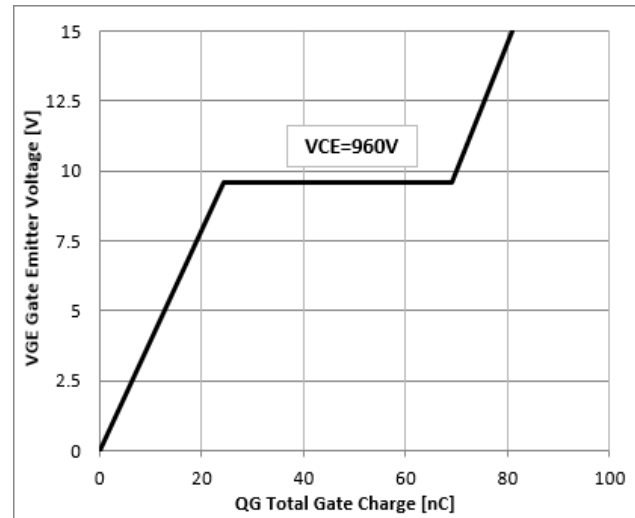


Figure 4: Typical Gate charge VS.  $V_{GE}$ ,  $I_C=15\text{A}$

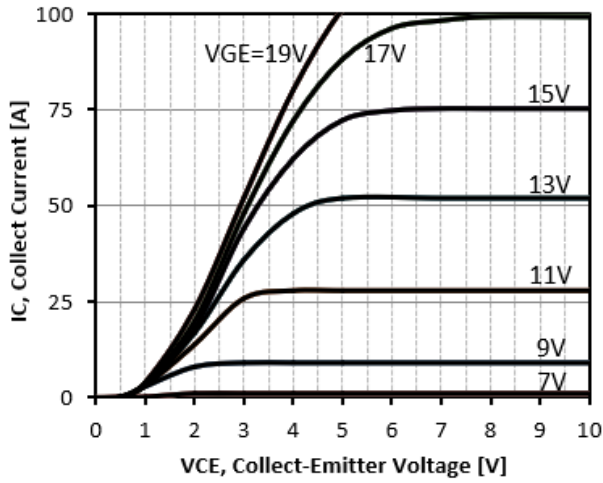


Figure 5: Typical IGBT Output characteristics,  
 $T_C=25^{\circ}\text{C}; t_p=300\mu\text{s}$

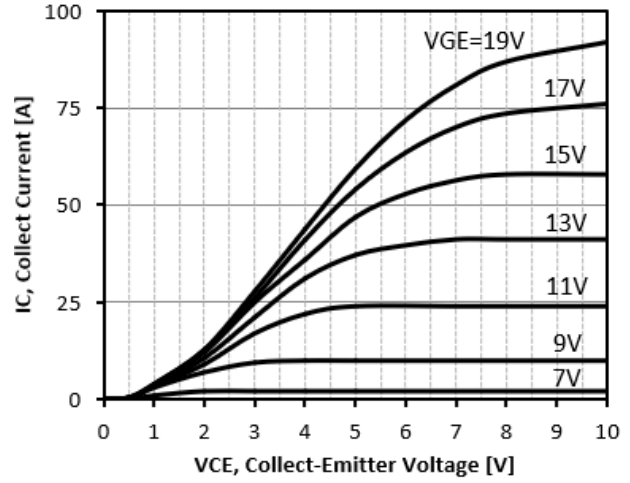


Figure 6: Typical IGBT Output characteristics,  
 $C=150^{\circ}\text{C}; t_p=300\mu\text{s}$

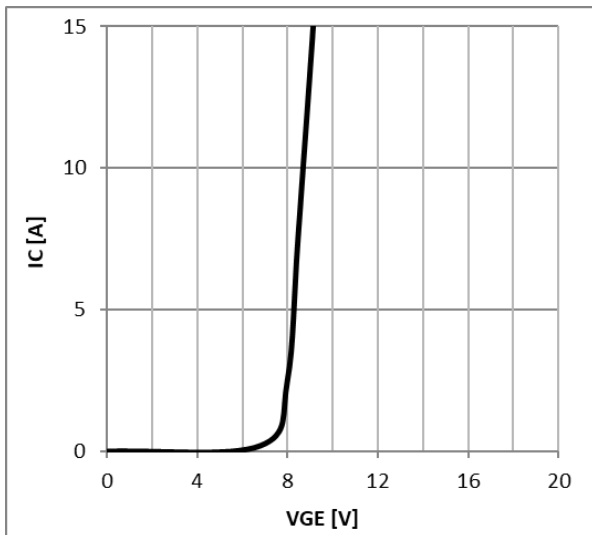


Figure 7: Typical Gate Threshold Voltage

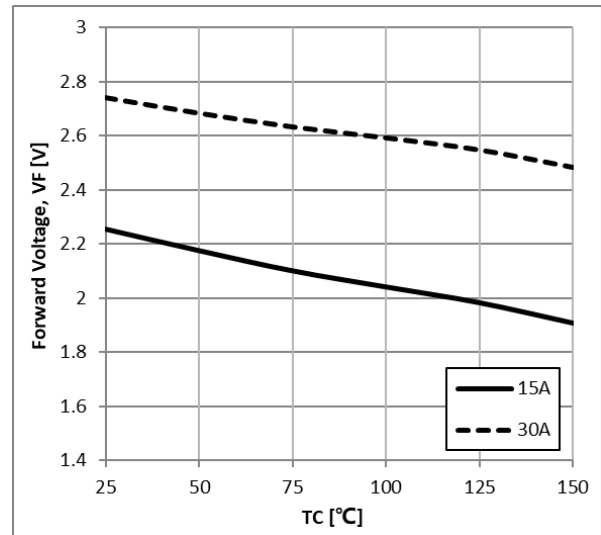


Figure 8: Typical Forward Voltage vs  $I_F$

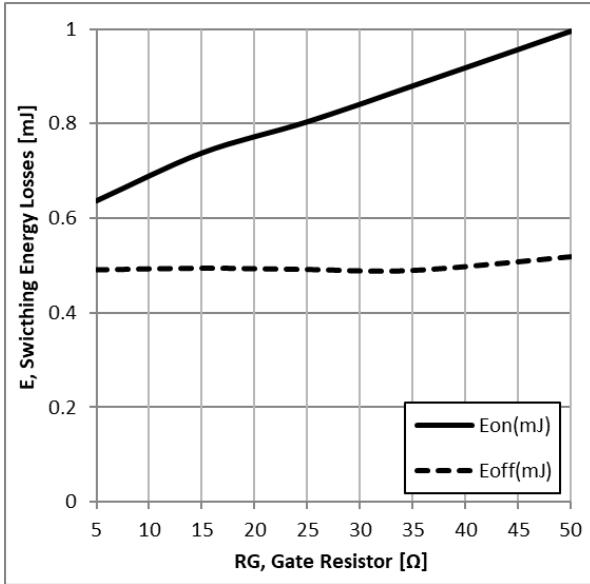


Figure 9: Typical Energy Loss VS. RG, TC=25°C, L=200uH, VCE=600V, VGE=15V, IC=15A

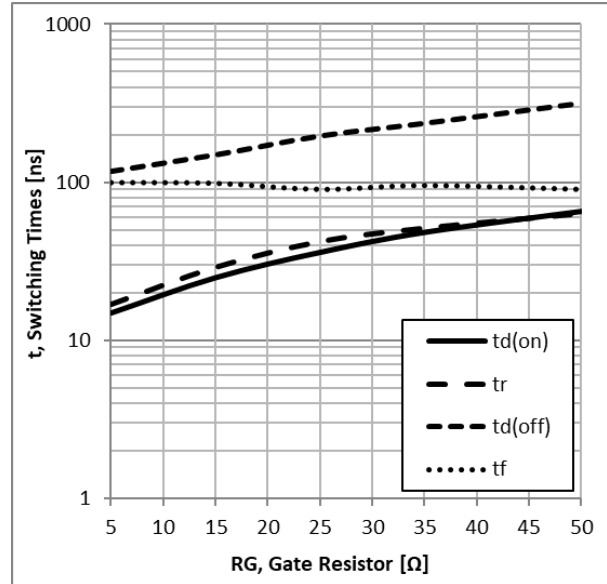


Figure 10: Typical Switching Time VS. RG, TC=25°C, L=200uH, VCE=600V, VGE=15V, IC=15A

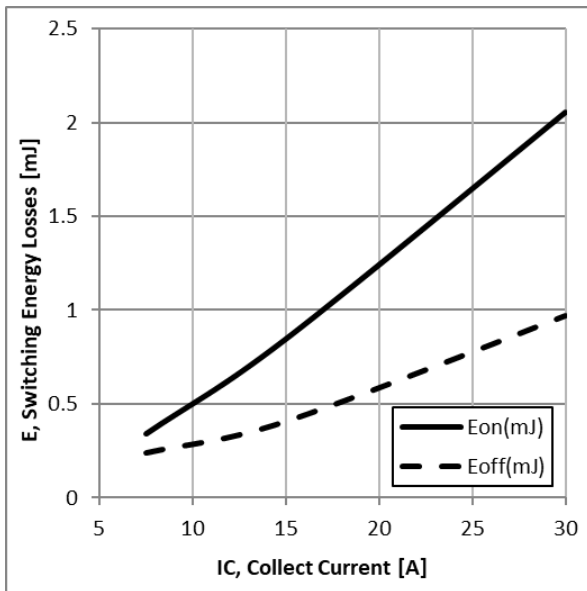


Figure 11: Typical Energy Loss VS. IC, TC=25°C, L=200uH, VCE=600V, VGE=15V, RG=15Ω

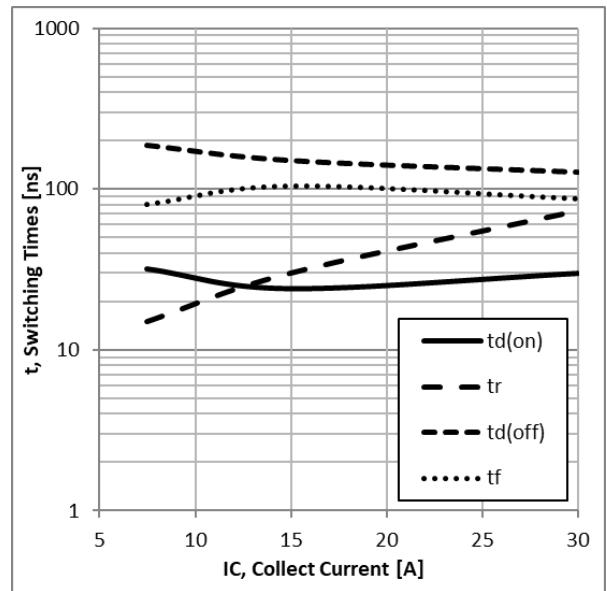


Figure 12: Typical Switching Time VS. IC, TC=25°C, L=200uH, VCE=600V, VGE=15V, RG=15Ω

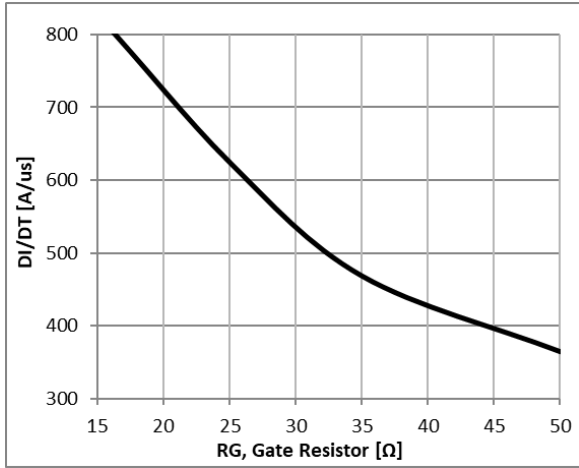


Figure 13: Typical Diode DI/DT VS. RG, TC=25°C  
VCC=600V, VGE=15V, IF=15A

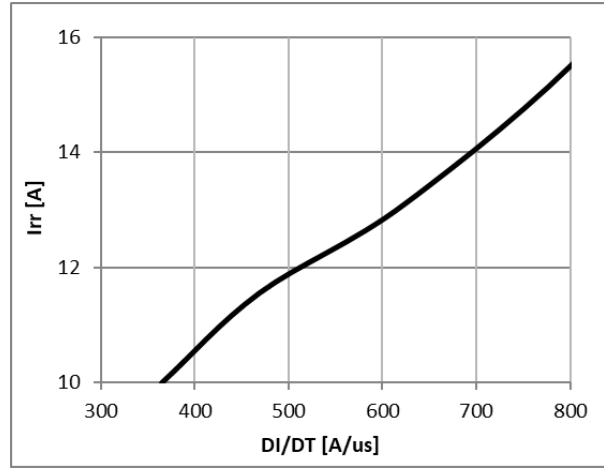


Figure 14: Typical Diode IRR VS. DI/DT, TC=25°C  
VCC=600V, VGE=15V, IF=15A

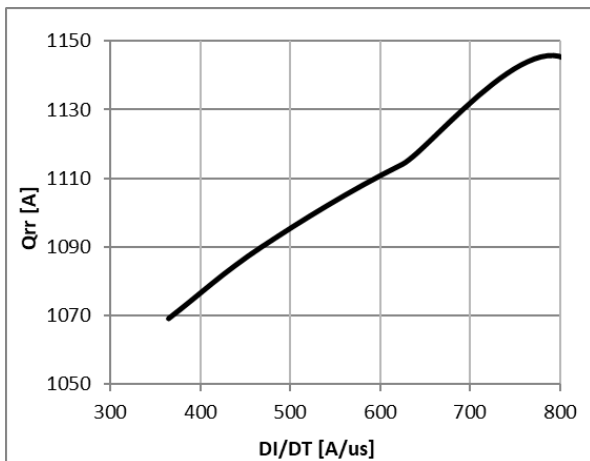


Figure 15: Typical Diode Qrr VS. DI/DT, TC=25°C  
VCC=600V, VGE=15V, IF=15A

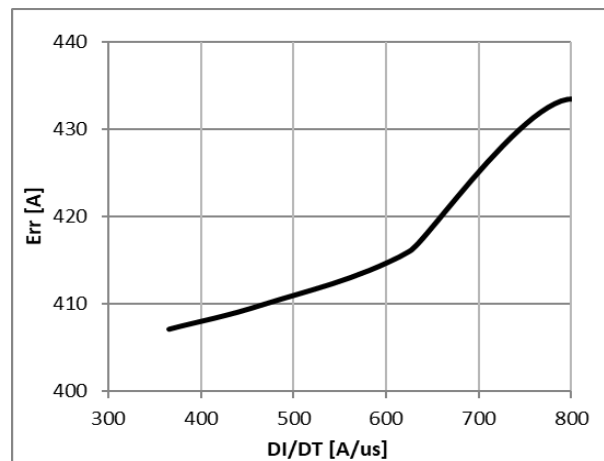


Figure 16: Typical Diode Err VS. DI/DT, TC=25°C  
VCC=600V, VGE=15V, IF=15A

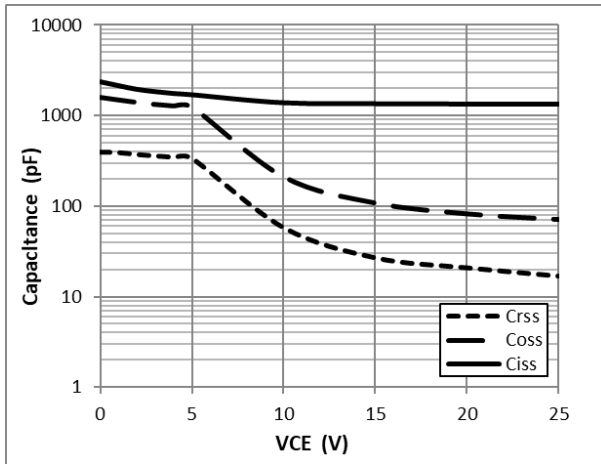


Figure 17: Typical Capacitance VS. VCE,  
VGE=0V,f=1MHz

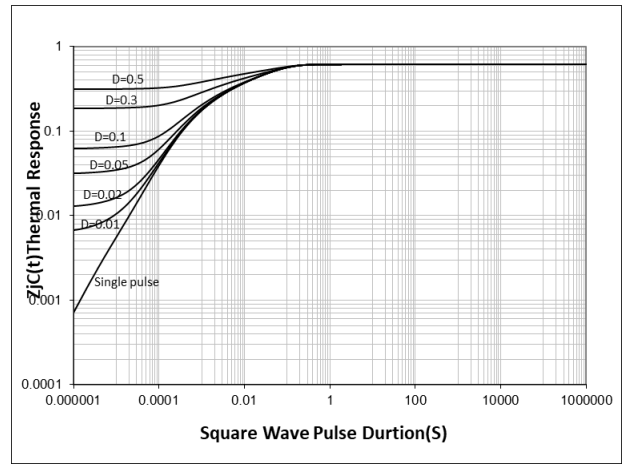
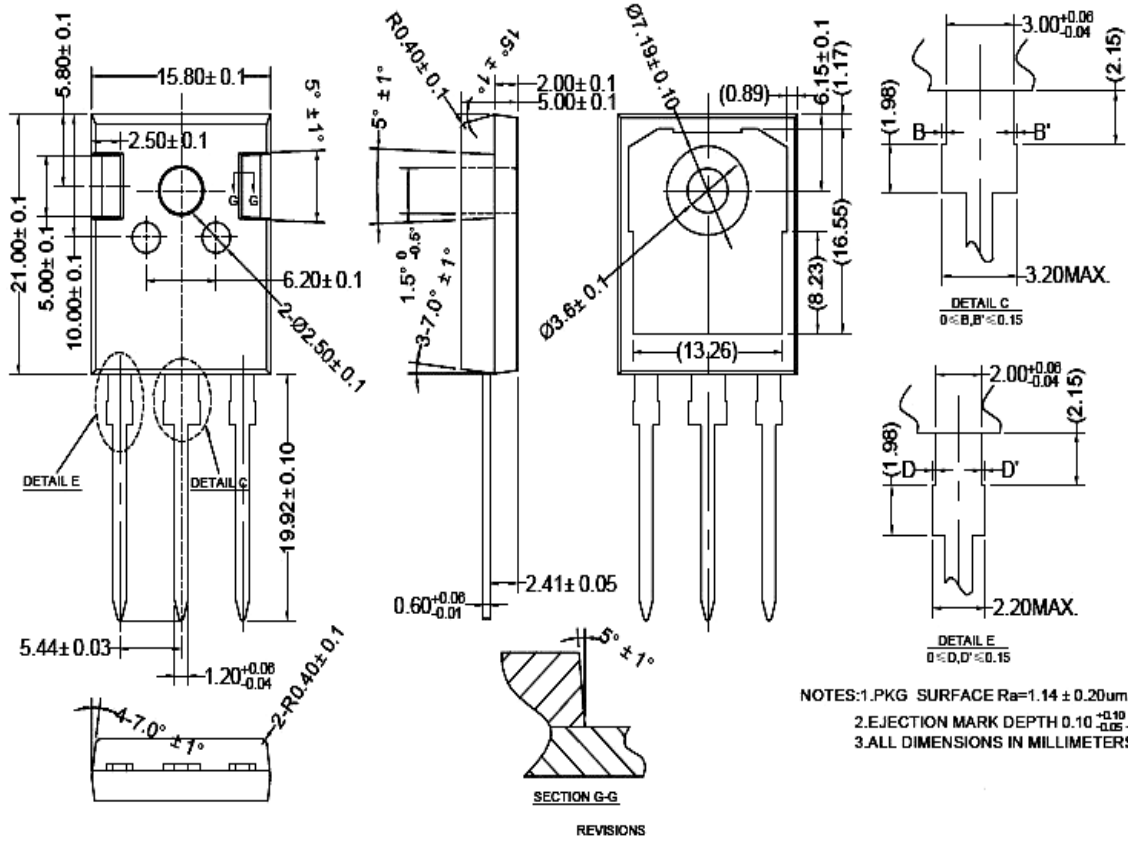


Figure 18: Normalized transient thermal impedance  
junction-to-case

**TO247 PACKAGE OUTLINE**



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.

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.

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



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