

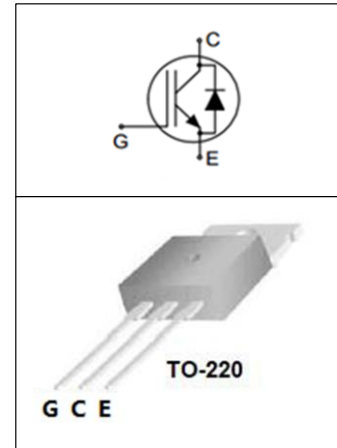
IGBT

Features

- 600V,30A
- $V_{CE(sat)(typ.)}=1.9V@V_{GE}=15V,I_C=30A$
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms

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	± 30	V
I_C	Continuous Collector Current ($T_C=25^\circ C$)	80	A
	Continuous Collector Current ($T_C=100^\circ C$)	30	A
I_{CM}	Pulsed Collector Current (Note 1)	120	A
I_F	Diode Continuous Forward Current ($T_C=100^\circ C$)	30	A
I_{FM}	Diode Maximum Forward Current (Note 1)	120	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation ($T_C=25^\circ C$)	300	W
	Maximum Power Dissipation ($T_C=100^\circ C$)	120	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	62	$^\circ C/W$

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	$V_{CE}=600V, V_{GE}=0V$	-	-	100	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	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	-	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$V_{GE}=15V, I_C=30A$	-	1.9	2.3	V
Q_g	Total Gate Charge	$V_{CC}=480V$ $V_{GE}=15V$ $I_C=30A$	-	105		nC
Q_{ge}	Gate-Emitter Charge		-	33		nC
Q_{gc}	Gate-Collector Charge		-	72		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=300V$ $V_{GE}=15V$ $I_C=30A$ $R_G=28\Omega$ 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	$V_{CE}=25V$ $V_{GE}=0V$ $f=100\text{kHz}$	-	1395	-	pF
C_{oes}	Output Capacitance		-	68	-	pF
C_{res}	Reverse Transfer Capacitance		-	26	-	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	$I_F=30A$	-	1.4	2.4	V
t_{rr}	Diode Reverse Recovery Time	$V_{CE}=300V$ $I_F=30A$ $dI_F/dt=200A/\mu s$	-	75		ns
I_{rr}	Diode peak Reverse Recovery Current		-	6		A
Q_{rr}	Diode Reverse Recovery Charge		-	220		nC

Notes:

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

Typical Performance Characteristics

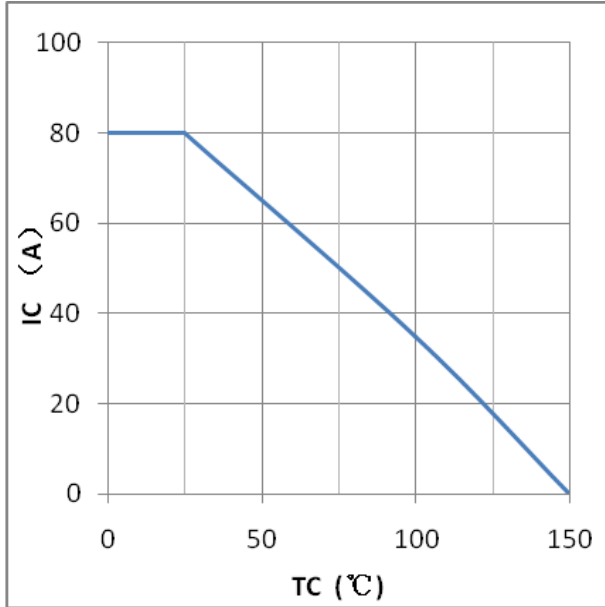


Figure1:maximum DC collector current VS. case temperature

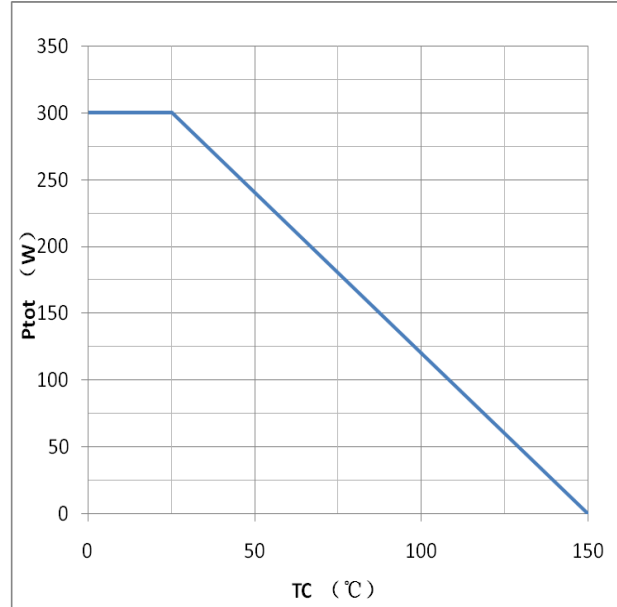


Figure2:power dissipation VS. case temperature

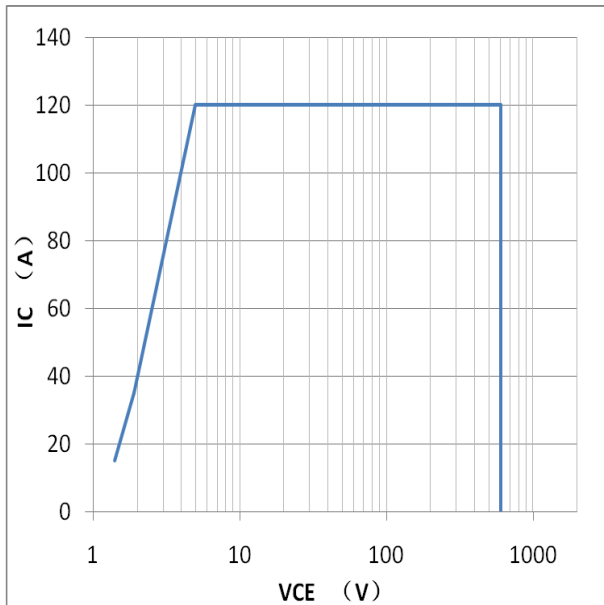


Figure3:reverse bias SOA, $T_J=150^{\circ}\text{C}$, $V_{GE}=15\text{V}$

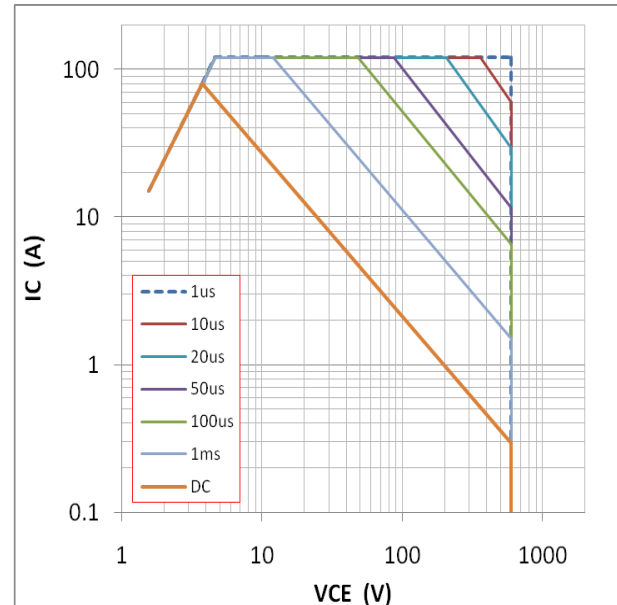


Figure4:forward SOA, $T_C=25^{\circ}\text{C}$, $T_J \leq 150^{\circ}\text{C}$

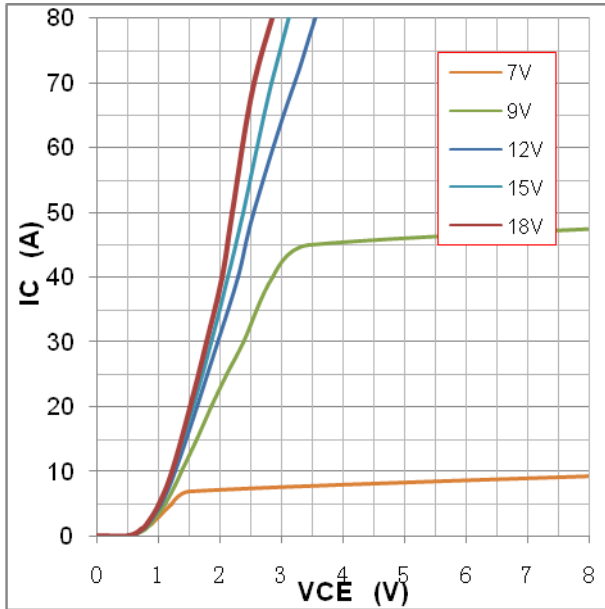


Figure5: typical IGBT output characteristics,
 $T_J=25^{\circ}\text{C}; t_p=300\mu\text{s}$

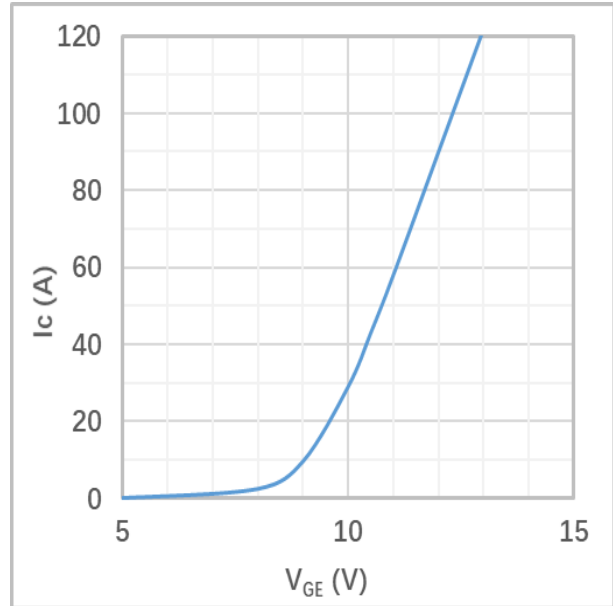


Figure6: typical trans characteristics, $V_{CE}=20\text{V}, t_p=20\mu\text{s}$

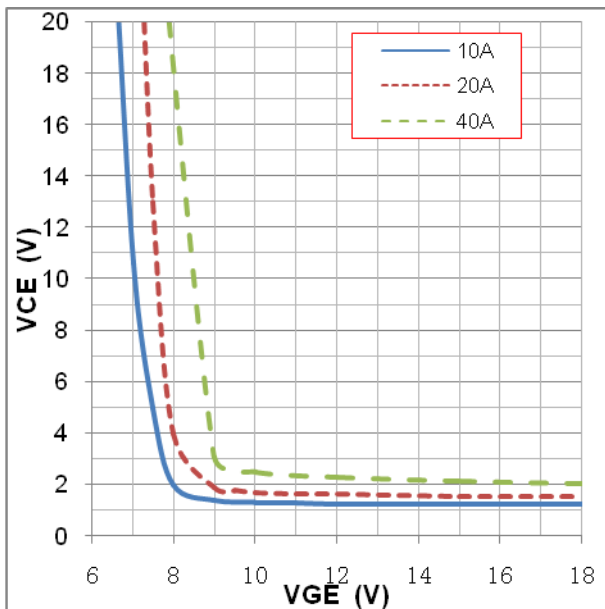


Figure7: typical V_{CE} VS. V_{GE} , $T_J=25^{\circ}\text{C}$

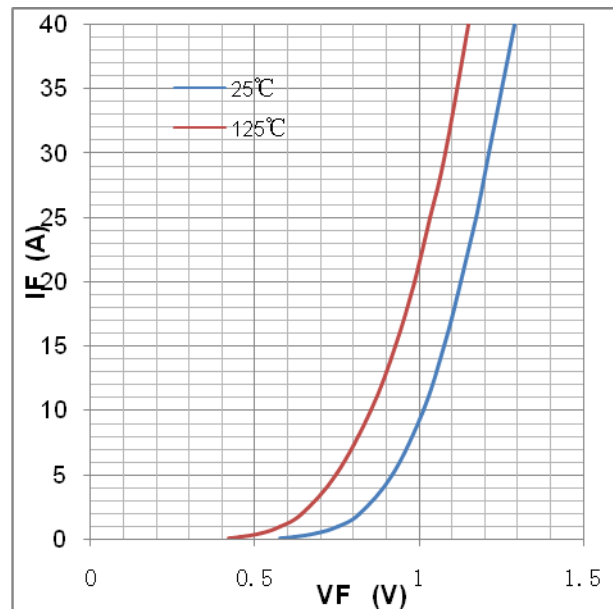


Figure8: typical diode forward characteristic, $t_p=300\mu\text{s}$

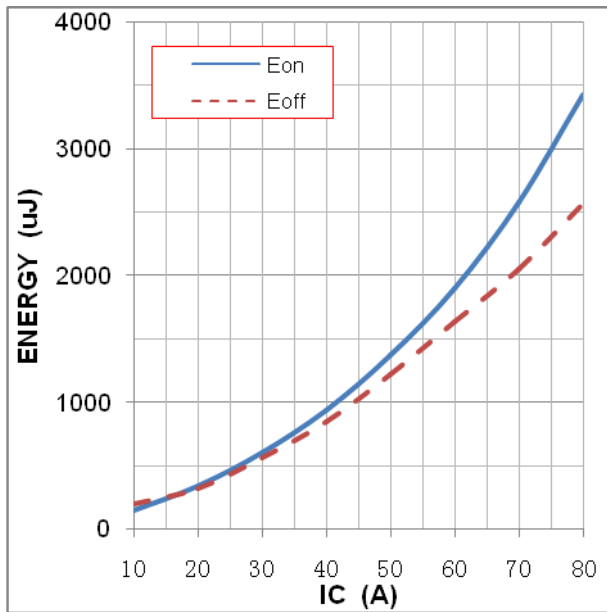


Figure9: typical energy loss VS. IC, TC=25°C,
L=500uH, VCE=300V, VGE=15V, Rg=28 Ω,

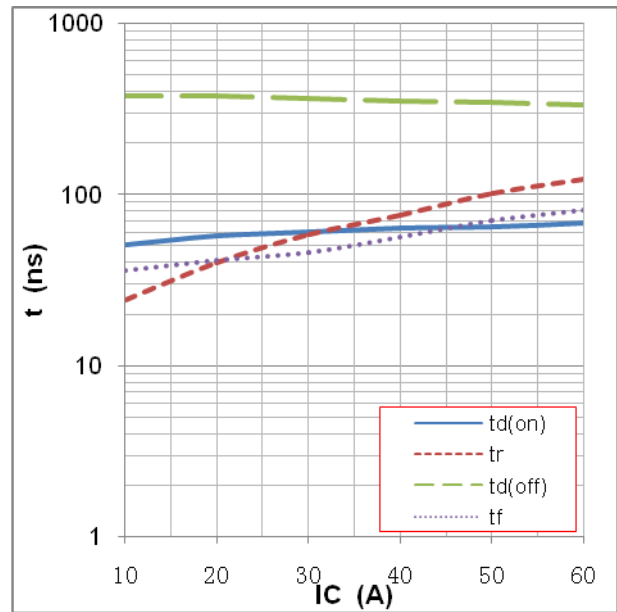


Figure10: typical switching time VS. IC, TC=25°C,
L=500uH, VCE=300V, VGE=15V, Rg=28 Ω,

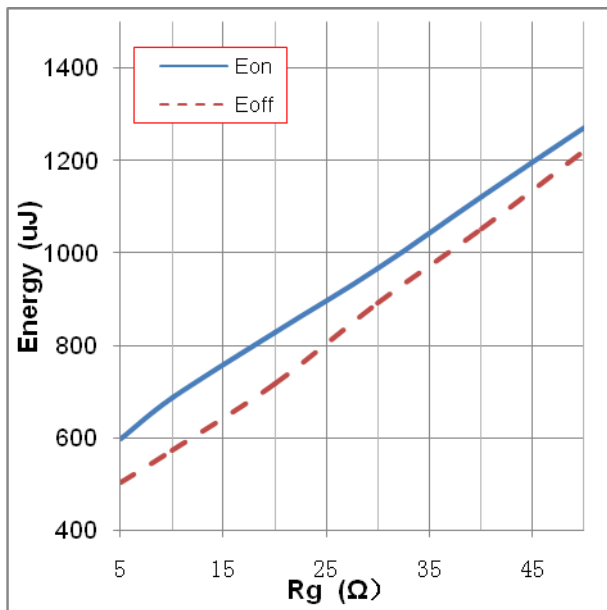


Figure11: typical energy loss VS. Rg, TC=25°C,
L=500uH, VCE=300V, VGE=15V, IC=30A

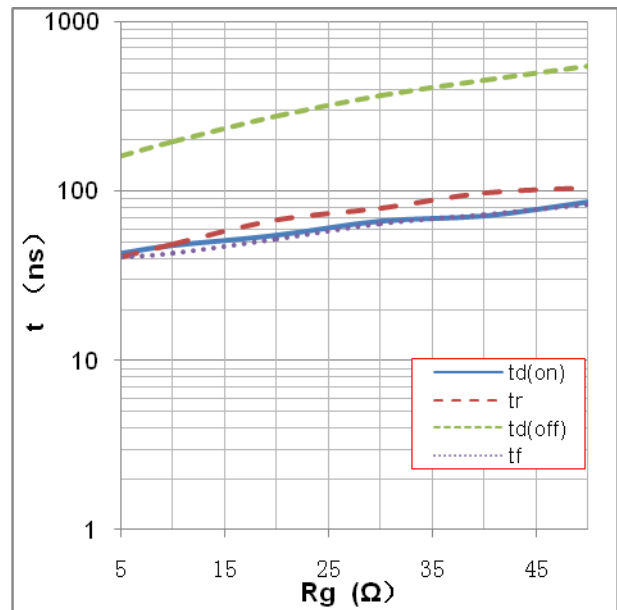


Figure12: typical switching time VS. Rg, TC=25°C,
L=500uH, VCE=300V, VGE=15V, IC=30A

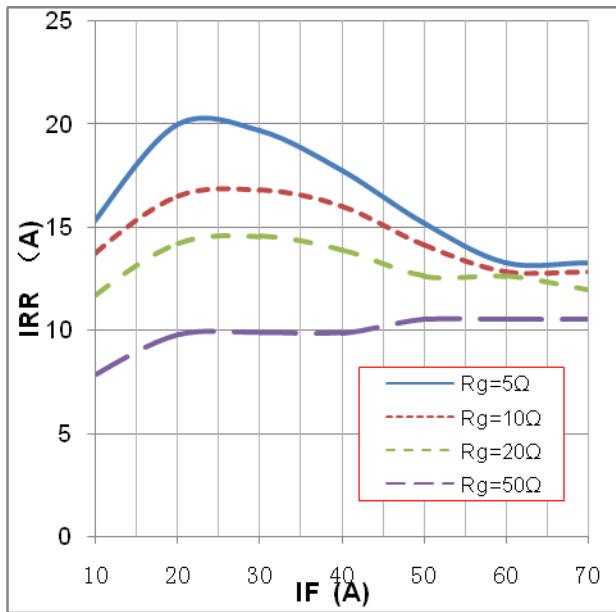


Figure13: typical diode IRR VS. IF, TC=25°C
VCC=300V, VGE=15V

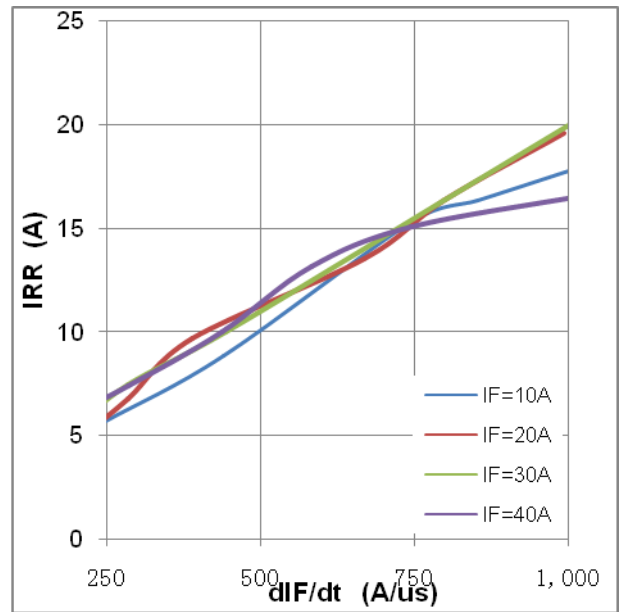


Figure14: typical diode IRR VS. dIF/dt
VCC=300V, VGE=15V

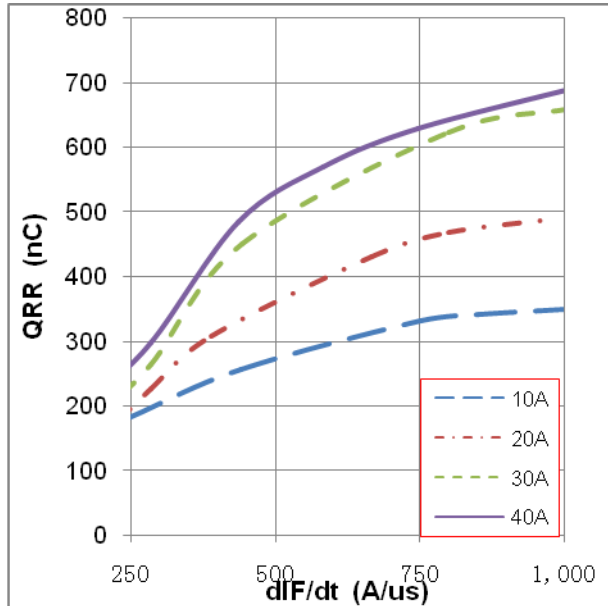


Figure15: typical diode QRR VS. dIF/dt
VCC=300V, VGE=15V

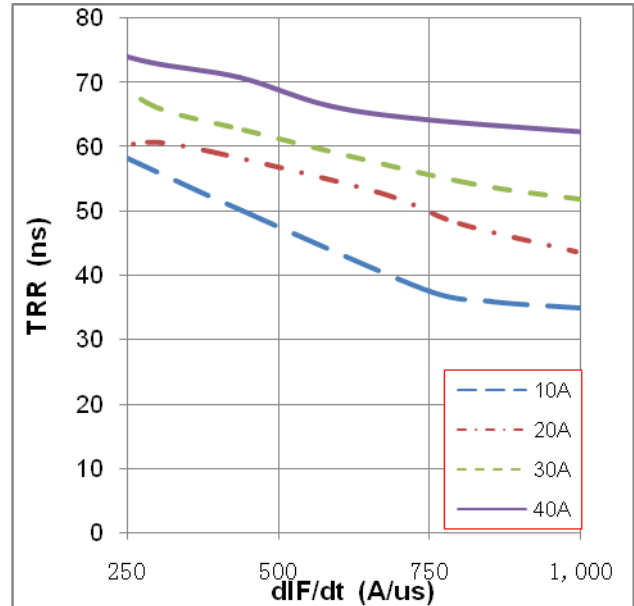


Figure16: typical diode TRR VS. dIF/dt,
VCC=300V, VGE=15V

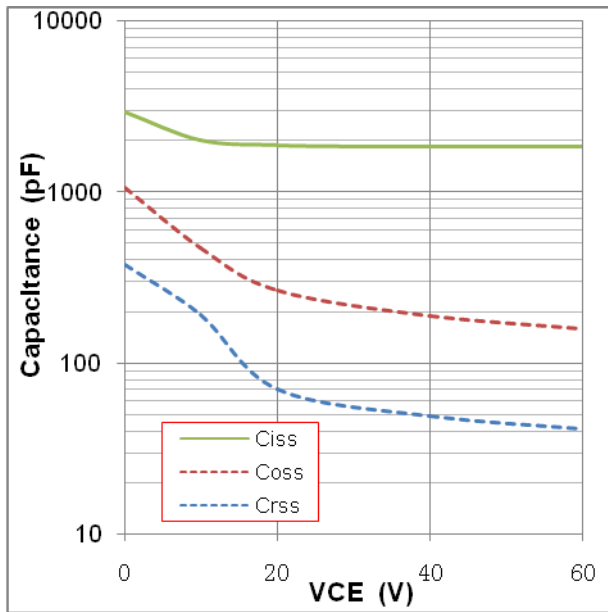


Figure17:typical capacitance VS. VCE,VGE=0V,f=100kHz

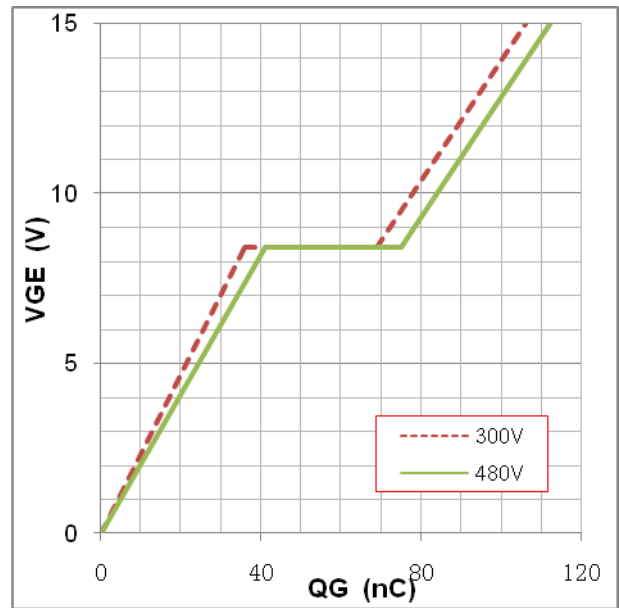


Figure18:typical gate charge VS. VGE,IC=30

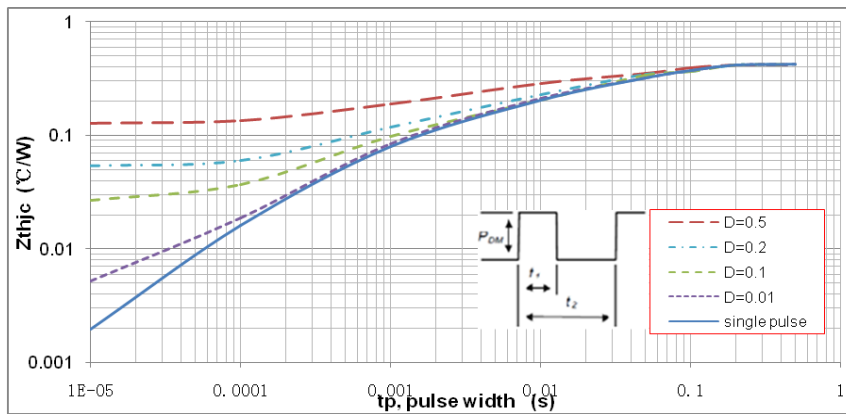
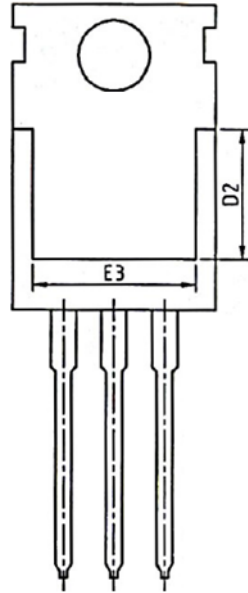


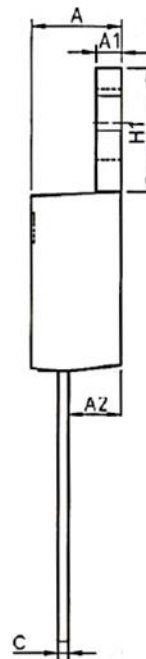
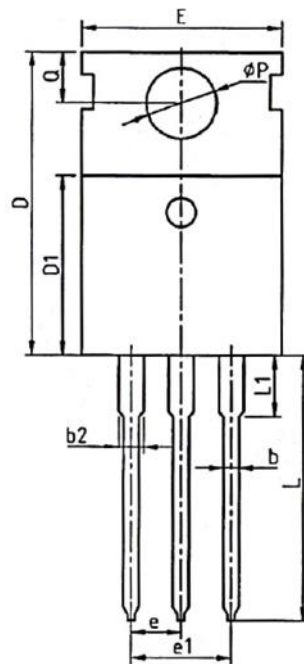
Figure19:normalised transient thermal impedance, junction-to-case

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

TO247 PACKAGE OUTLINE



SYMBOL	MIN	NOM	MAX
A	4.37	4.57	4.7
A1	1.25	1.3	1.4
A2	2.2	2.4	2.6
b	0.7	0.8	0.95
b2	1.17	1.27	1.47
c	0.45	0.5	0.6
D	15.1	15.6	16.1
D1	8.8	9.1	9.4
D2	5.5	-	-
E	9.7	10	10.3
E3	7	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.5	6.85
L	12.75	13.5	13.8
L1	-	3.1	3.4
ΦP	3.4	3.6	3.8
Q	2.6	2.8	3



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