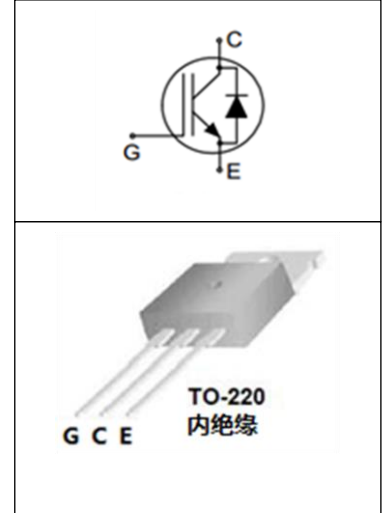


IGBT

Features

- 600V,15A 内绝缘
- $V_{CE(sat)(typ.)}=1.8V@V_{GE}=15V,I_C=15A$
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA



General Description

JIAEN trench 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	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Continuous Collector Current ($T_C=25^\circ C$)	22	A
	Continuous Collector Current ($T_C=100^\circ C$)	12	A
I_{CM}	Pulsed Collector Current (Note 1)	45	A
I_F	Diode Continuous Forward Current ($T_C=100^\circ C$)	12	A
I_{FM}	Diode Maximum Forward Current (Note 1)	45	A
t_{sc}	Short Circuit Withstand Time	10	us
P_D	Maximum Power Dissipation ($T_C=25^\circ C$)	52	W
	Maximum Power Dissipation ($T_C=100^\circ C$)	20	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	2.4	$^\circ C/W$
$R_{th\ j-c}$	Thermal Resistance, Junction to case for Diode	3.7	$^\circ C/W$
$R_{th\ j-a}$	Thermal Resistance, Junction to Ambient	65	$^\circ C/W$

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	$V_{GE}=20V, V_{CE}=0V$	-	-	100	nA
	Gate Leakage Current, Reverse	$V_{GE}=-20V, V_{CE}=0V$	-	-	-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	$V_{GE}=15V, I_C=15A$	-	1.8	2.2	V
Q_g	Total Gate Charge	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=15A$	-	70		nC
Q_{ge}	Gate-Emitter Charge		-	23		nC
Q_{gc}	Gate-Collector Charge		-	24		nC
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=400V$ $V_{GE}=15V$ $I_C=15A$ $R_G=10\Omega$ Inductive Load 500 μH $T_C=25^\circ\text{C}$	-	21	-	ns
t_r	Turn-on Rise Time		-	20	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	89	-	ns
t_f	Turn-off Fall Time		-	57	-	ns
E_{on}	Turn-on Switching Loss		-	0.327	-	mJ
E_{off}	Turn-off Switching Loss		-	0.234	-	mJ
E_{ts}	Total Switching Loss		-	0.562	-	mJ
C_{ies}	Input Capacitance	$V_{CE}=30V$ $V_{GE}=0V$ $f=1\text{MHz}$	-	634	-	pF
C_{oes}	Output Capacitance		-	84	-	pF
C_{res}	Reverse Transfer Capacitance		-	48	-	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	$I_F=15A$	-	1.45	1.9	V
t_{rr}	Diode Reverse Recovery Time	$V_{CE}=300V$ $I_F=15A$	-	115		ns
I_{rr}	Diode peak Reverse Recovery Current		-	13		A
Q_{rr}	Diode Reverse Recovery Charge	$dI_F/dt=500A/\mu s$	-	620		nC

Notes:

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

Typical Performance Characteristics

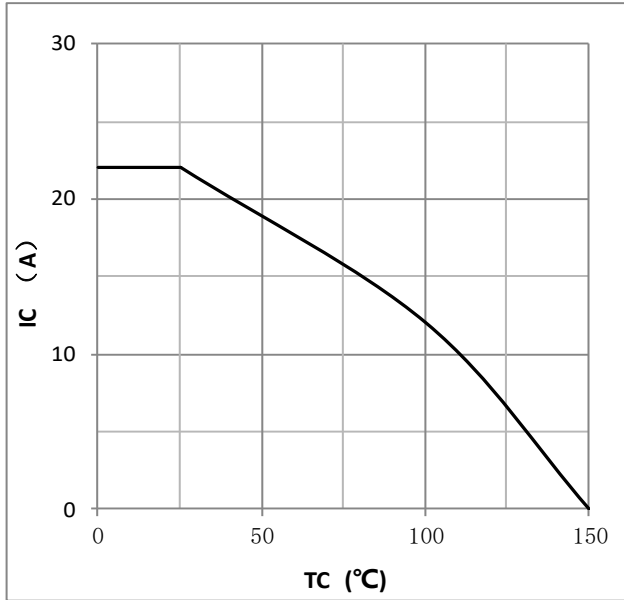


Figure 1. maximum DC collector current VS. case temperature

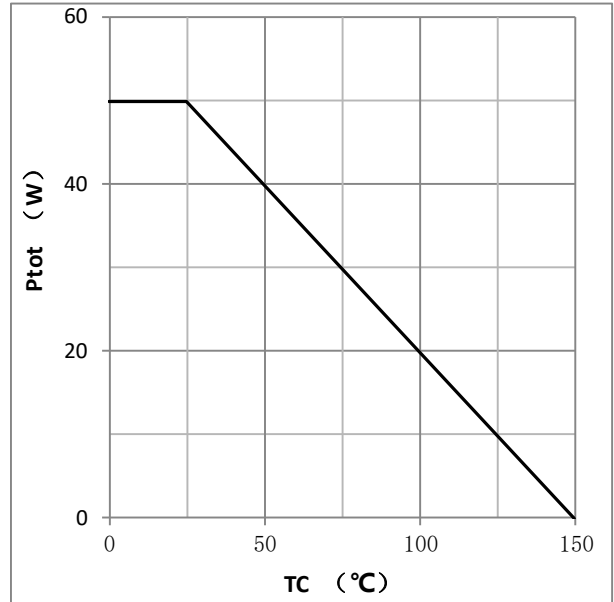


Figure 2. Power dissipation VS. case temperature

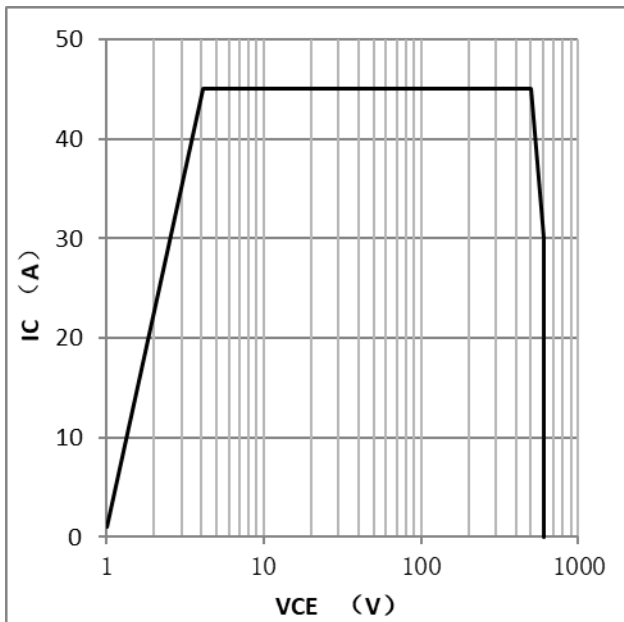


Figure 3. reverse bias SOA,
Tj=125°C, Vge=15V

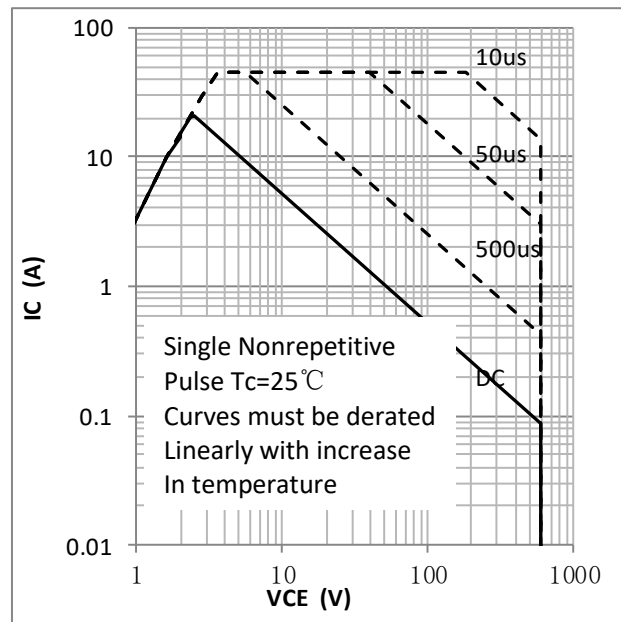


Figure 4. forward SOA
Tc=25°C Tj≤150°C

Typical Performance Characteristics

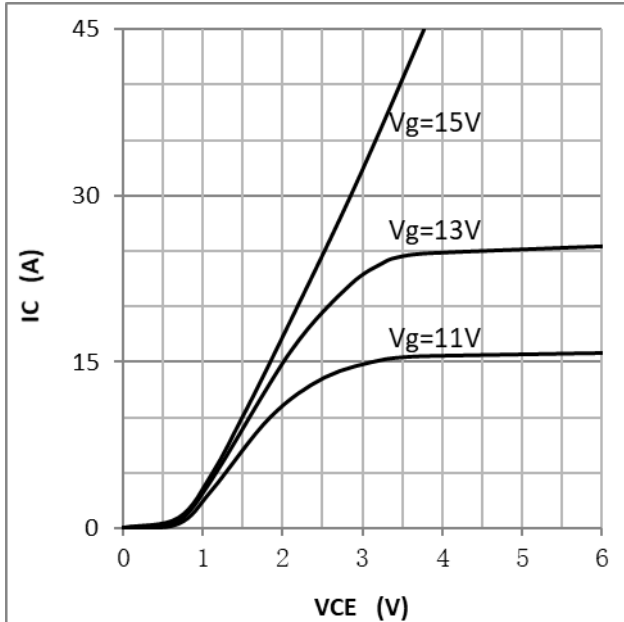


Figure 5. typical output characteristics

$T_c=25^\circ\text{C}$ $t_p=300\mu\text{s}$

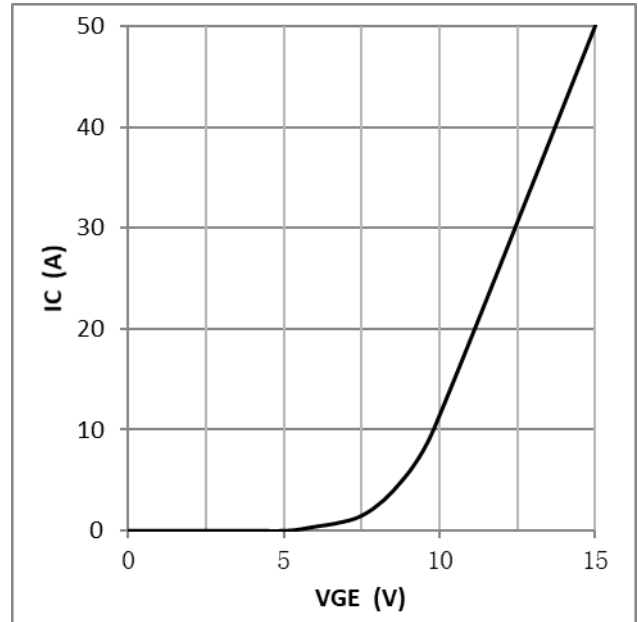


Figure 6. transfer characteristics

$T_c=25^\circ\text{C}$ $V_{CE}=20\text{V}$

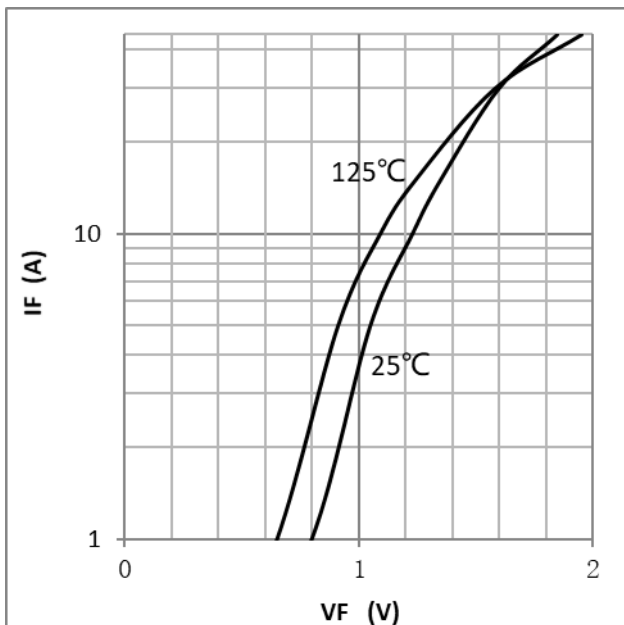


Figure 7. typical diode forward characteristics

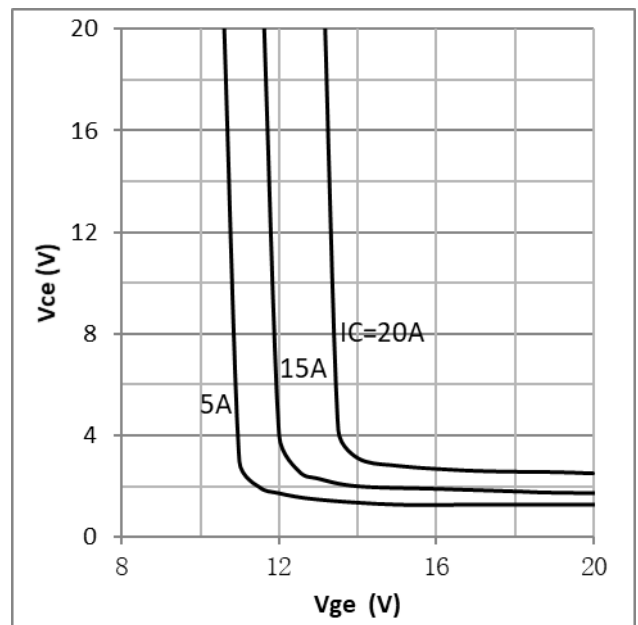


Figure 8. typical Saturation Voltage vs. V_{ge}

$T_c=25^\circ\text{C}$

Typical Performance Characteristics

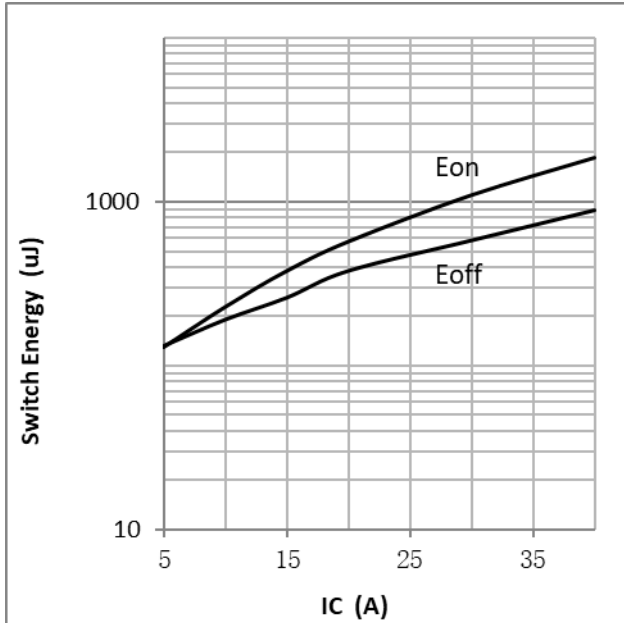


Figure 9. switch energy loss vs. I_c $T_c=25^\circ\text{C}$

$T_c=25^\circ\text{C}$ $L=500\mu\text{H}$ $V_{cc}=400\text{V}$ $V_{ge}=15\text{V}$ $R_g=20\Omega$

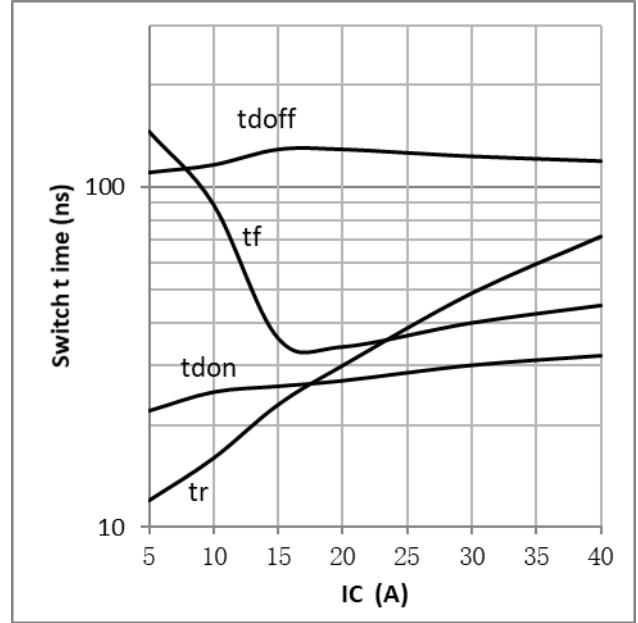


Figure 10. typical switch time vs. I_c $T_c=25^\circ\text{C}$

$L=500\mu\text{H}$ $V_{cc}=400\text{V}$ $V_{ge}=15\text{V}$ $R_g=20\Omega$

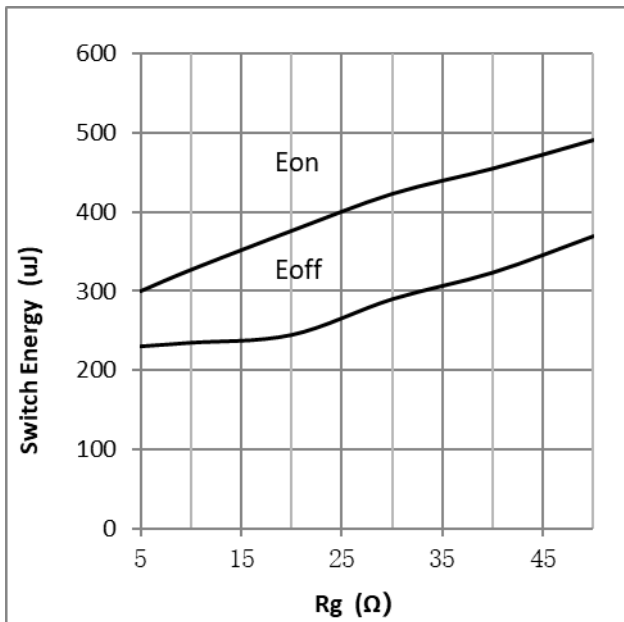


Figure 11. typical switch energy loss vs. R_g

$T_c=25^\circ\text{C}$ $L=500\mu\text{H}$ $V_{cc}=400\text{V}$ $V_{ge}=15\text{V}$ $I_c=15\text{A}$

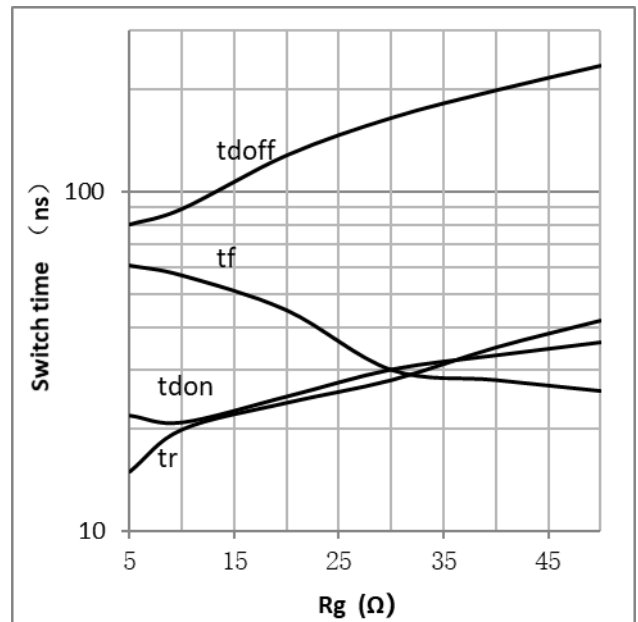


Figure 12. typical switch time vs. R_g

$T_c=25^\circ\text{C}$ $L=500\mu\text{H}$ $V_{cc}=400\text{V}$ $V_{ge}=15\text{V}$ $I_c=15\text{A}$

Typical Performance Characteristics

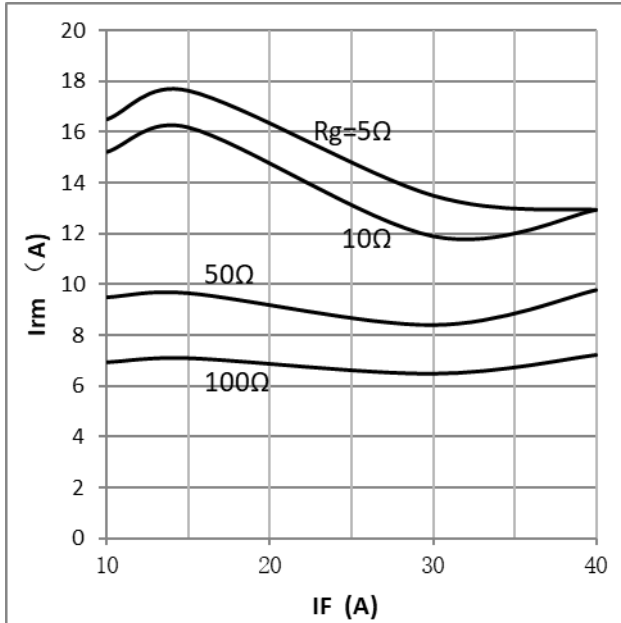


Figure 13. typical diode Irm vs. IF
Tc=25°C Vcc=300V Vge=15V

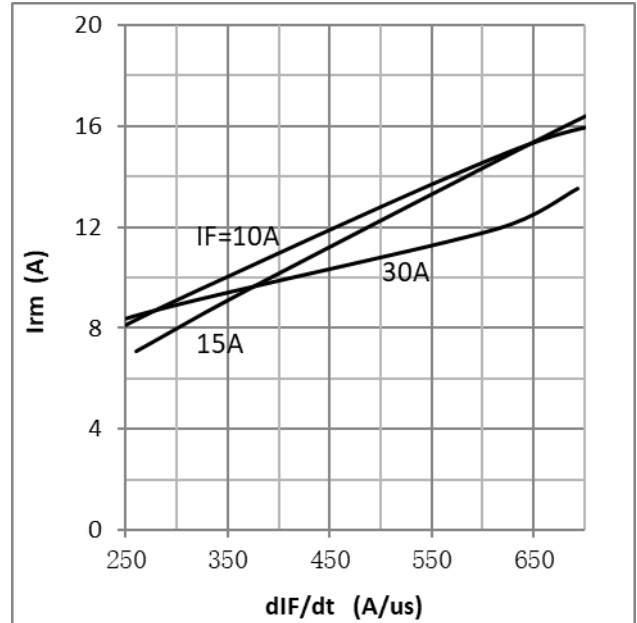


Figure 14. typical diode Irm vs. dIF/dt
Tc=25°C Vcc=300V Vge=15V

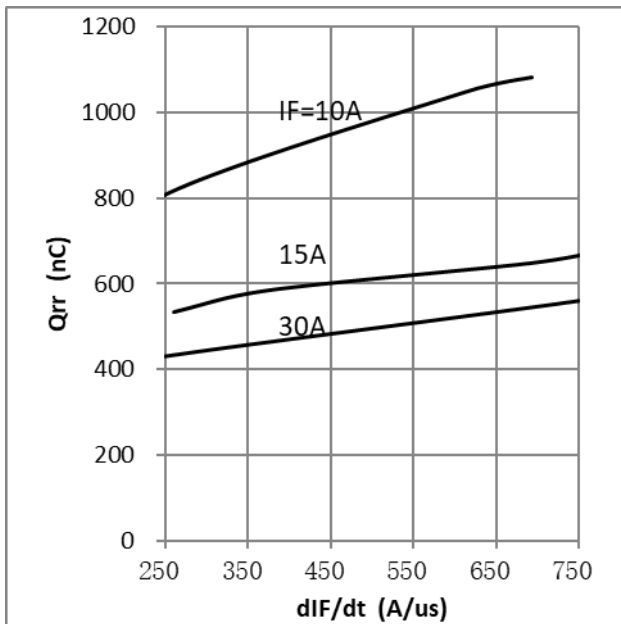


Figure 15. typical diode Qrr vs. dIF/dt
Tc=25°C Vcc=300V Vge=15V

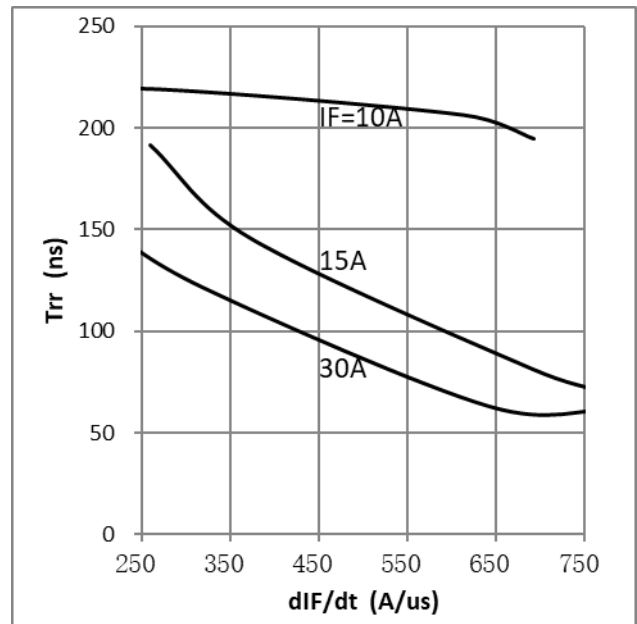


Figure 16. typical diode trr vs. dIF/dt
Tc=25°C Vcc=300V Vge=15V

Typical Performance Characteristics

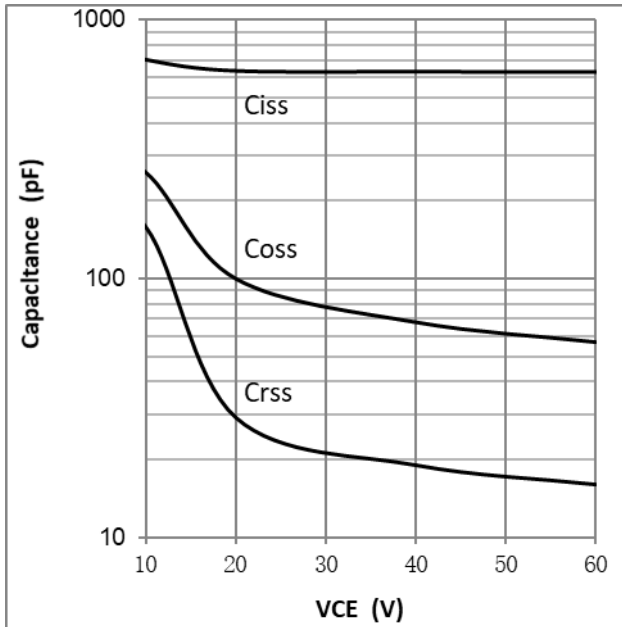


Figure 17. typical Capacitance vs. VCE
Tc=25°C f=1MHz Vge=0V

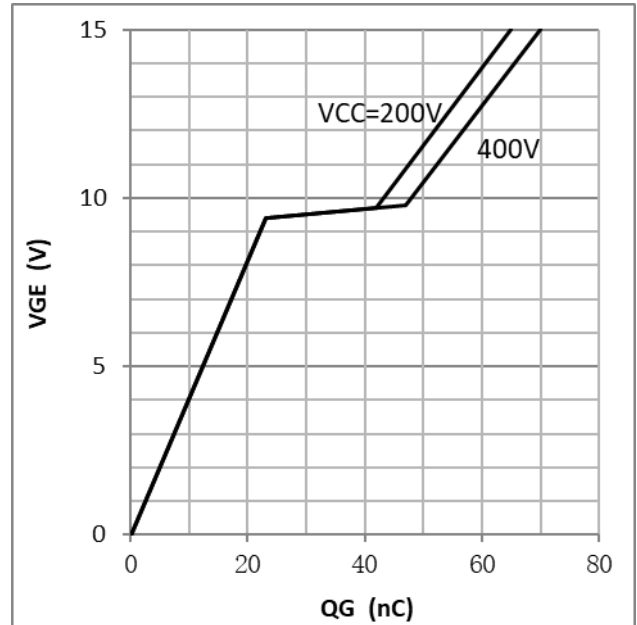


Figure 18. typical gate charge vs. VGE
Tc=25°C Ic=15A

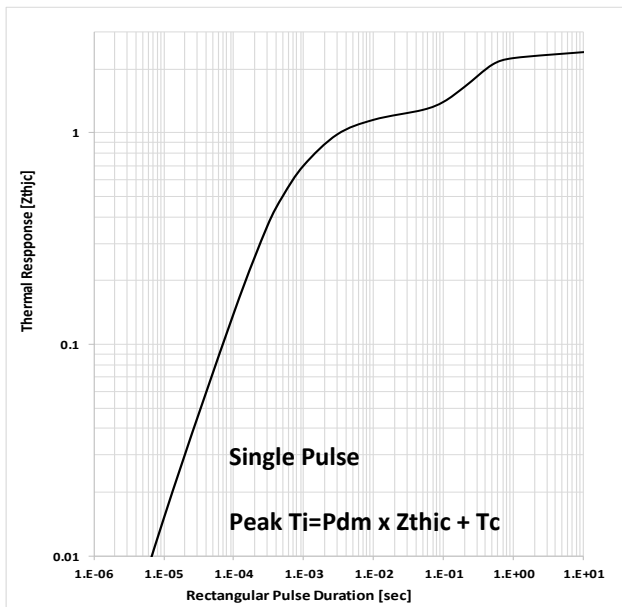
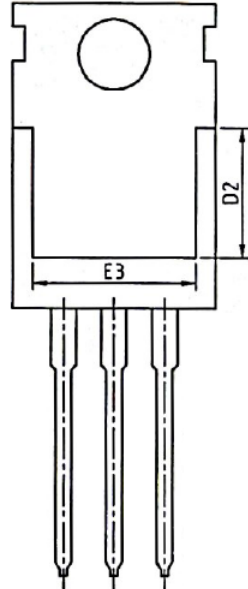
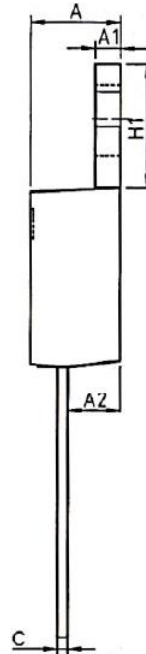
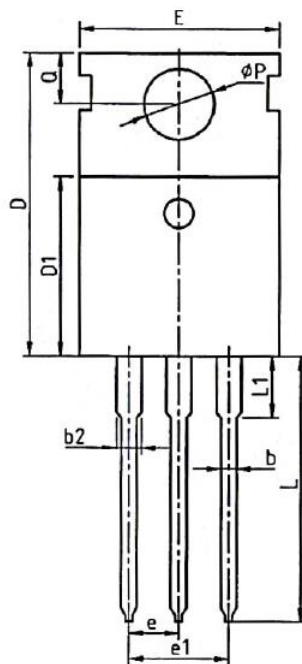


Figure19. normalized transient thermal impedance,
junction-to-case

Mechanical Dimensions



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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