

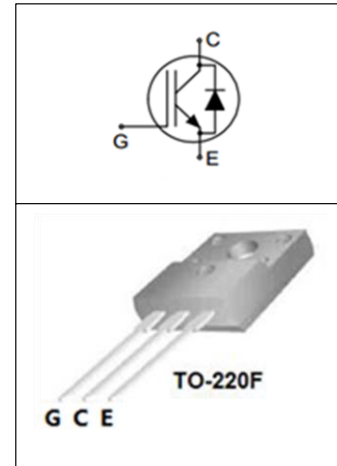
## IGBT

### 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	$\pm 30$	V
$I_C$	Continuous Collector Current ( $T_C=25^\circ C$ )	60	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 ( $T_C=25^\circ C$ )	35	W
	Maximum Power Dissipation ( $T_C=100^\circ C$ )	15	W
$T_J$	Operating Junction Temperature Range	-45 to +150	$^\circ C$
$T_{STG}$	Storage Temperature Range	-45 to +150	$^\circ C$

### Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j-c}$	Thermal Resistance, Junction to case for IGBT	3.4	$^\circ C/W$
$R_{th\ j-c}$	Thermal Resistance, Junction to case for Diode	4.2	$^\circ C/W$
$R_{th\ j-a}$	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	$\mu A$
$I_{GES}$	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	-	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

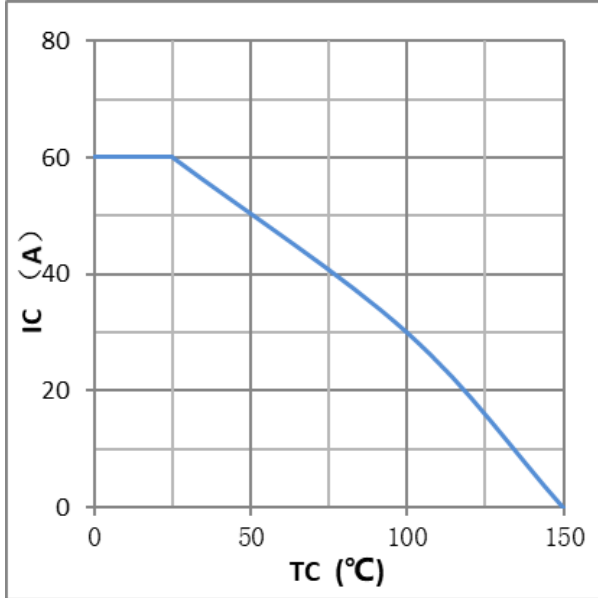


Figure1:maximum DC collector current VS. case temprature

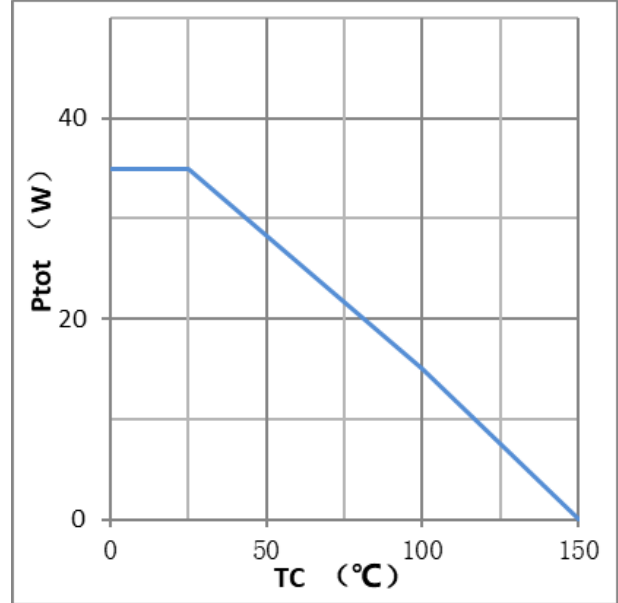


Figure2:power dissipation VS. case temprature

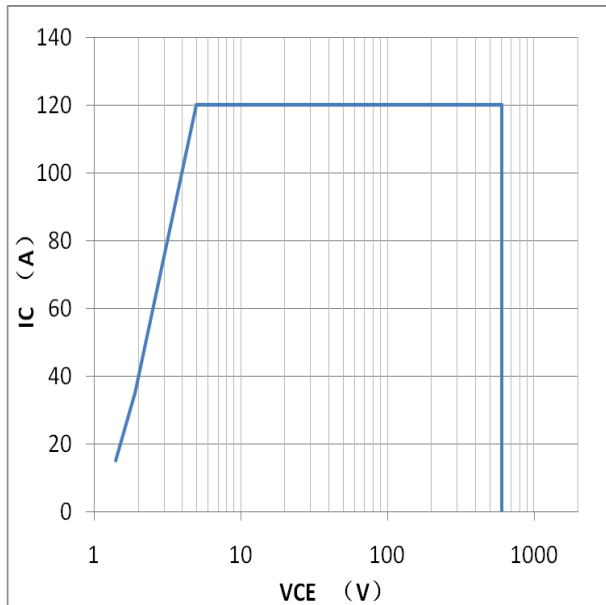


Figure3:reverse bias SOA,TJ=150°C,VGE=15V

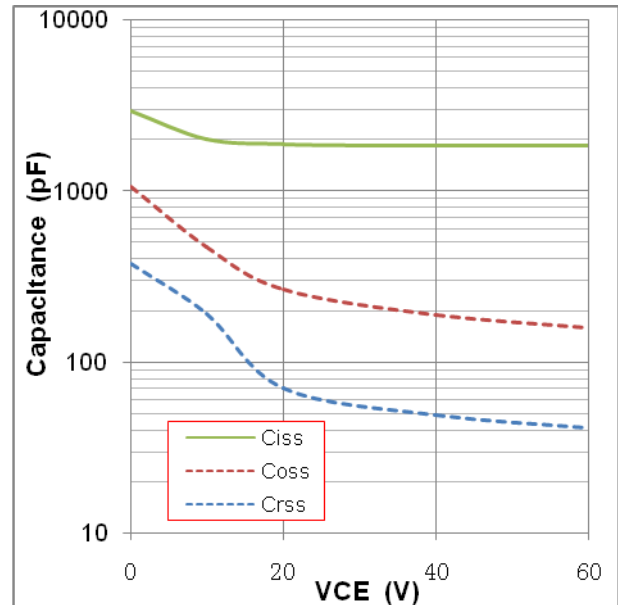


Figure4: typical capacitance VS. VCE,VGE=0V,f=100kHz

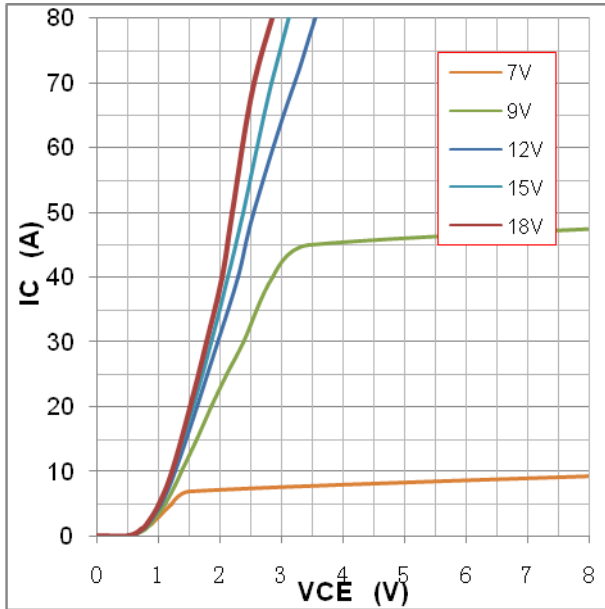


Figure5: typical IGBT output characteristics,  
 $T_J=25^{\circ}\text{C}; t_p=300\mu\text{s}$

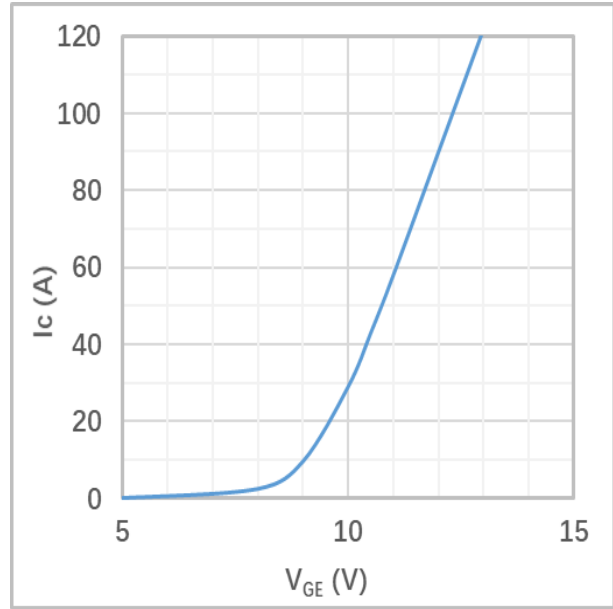


Figure6: typical trans characteristics,  $V_{CE}=20\text{V}, t_p=20\mu\text{s}$

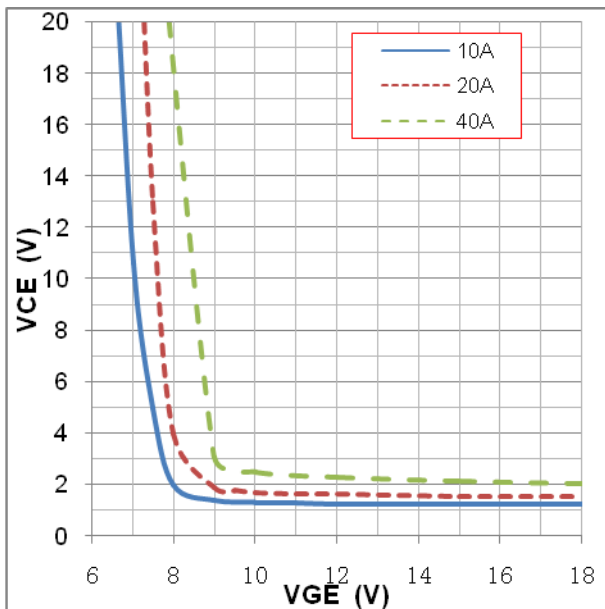


Figure7: typical VCE VS. VGE,  $T_J=25^{\circ}\text{C}$

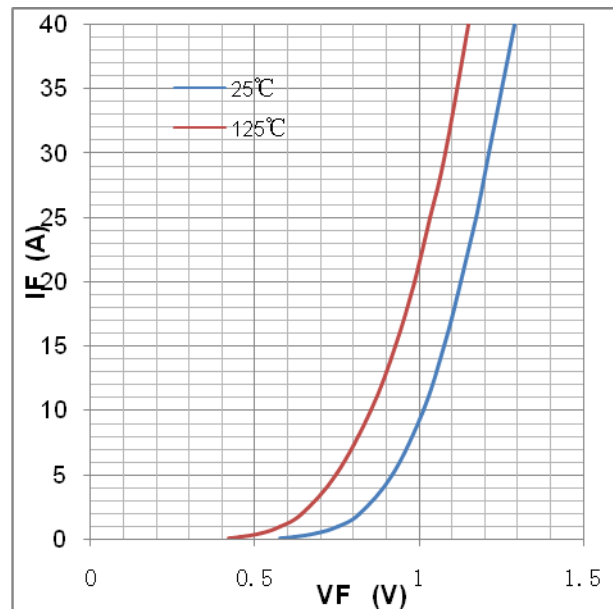


Figure8: typical diode forward characteristic,  $t_p=300\mu\text{s}$

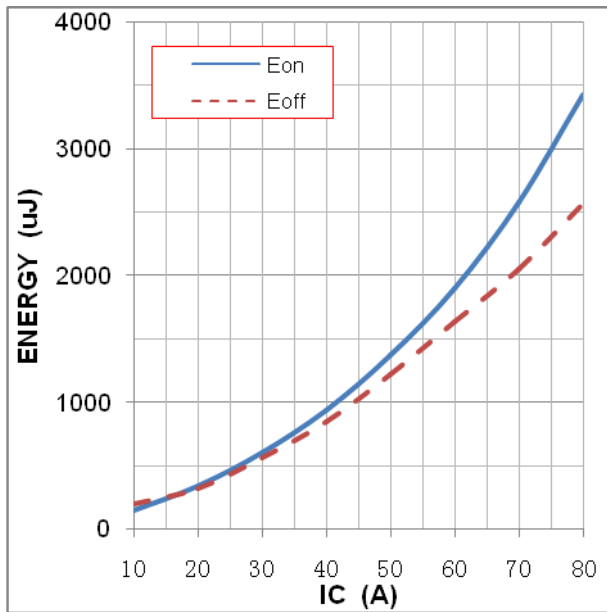


Figure9: typical energy loss VS. IC, TC=25°C,  
L=500uH, VCE=300V, VGE=15V, Rg=28 Ω,

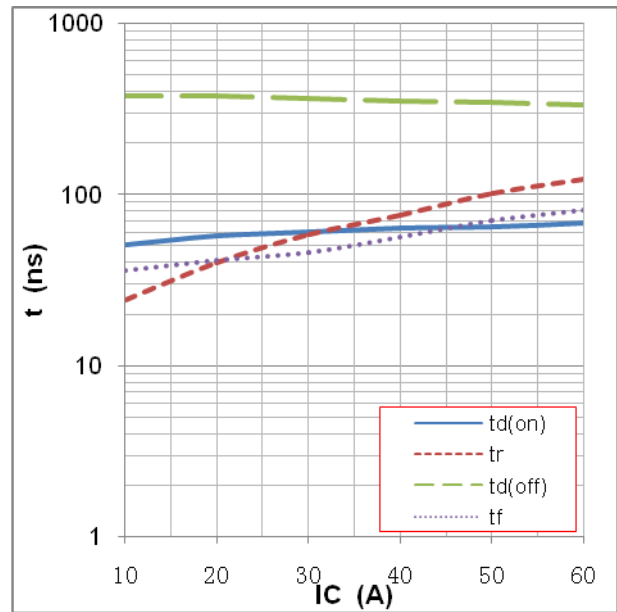


Figure10: typical switching time VS. IC, TC=25°C,  
L=500uH, VCE=300V, VGE=15V, Rg=28 Ω,

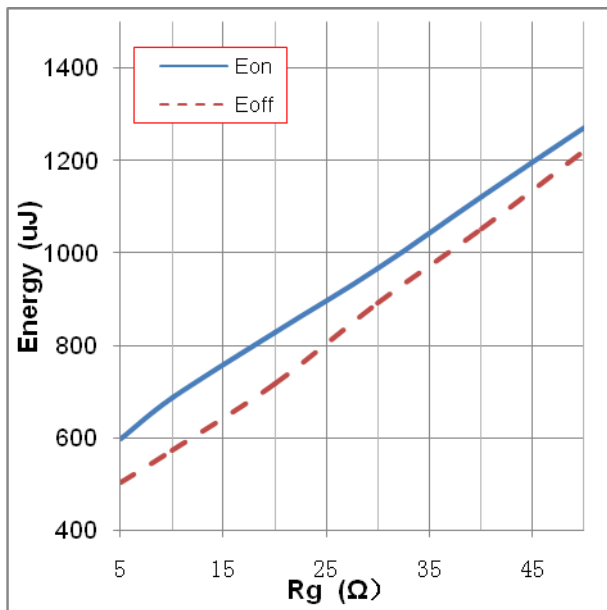


Figure11: typical energy loss VS. Rg, TC=25°C,  
L=500uH, VCE=300V, VGE=15V, IC=30A

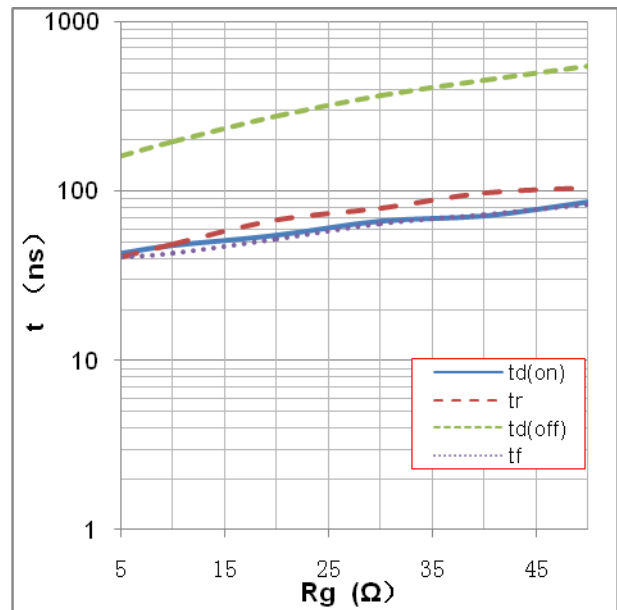


Figure12: typical switching time VS. Rg, TC=25°C,  
L=500uH, VCE=300V, VGE=15V, IC=30A

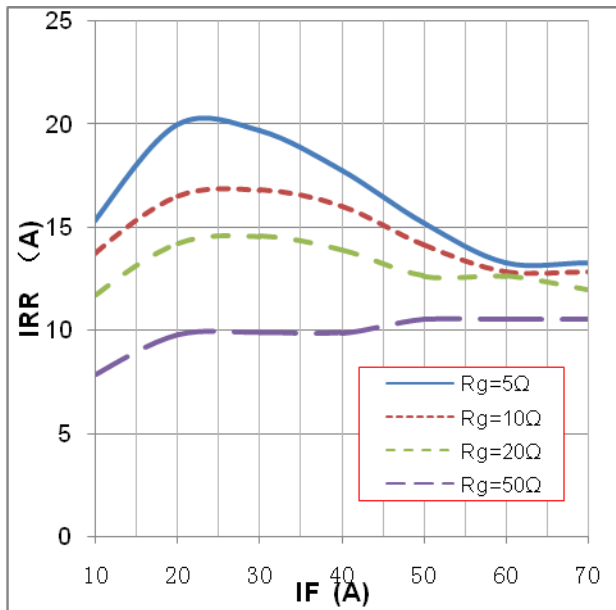


Figure13: typical diode IRR VS. IF, TC=25°C  
VCC=300V, VGE=15V

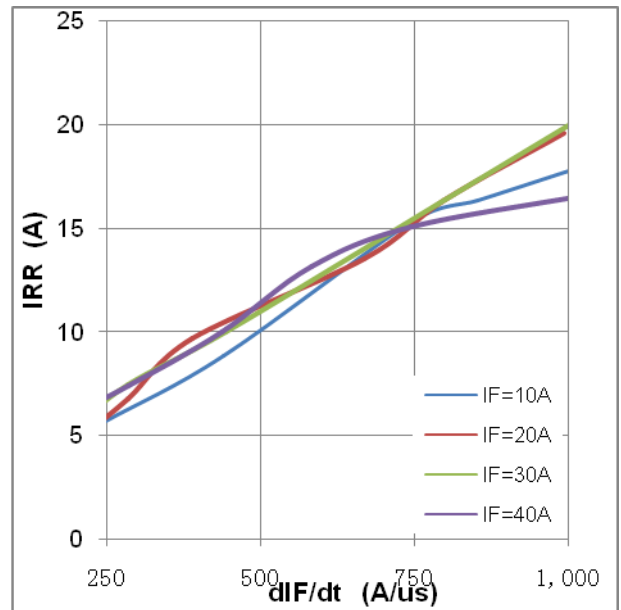


Figure14: typical diode IRR VS. dIF/dt  
VCC=300V, VGE=15V

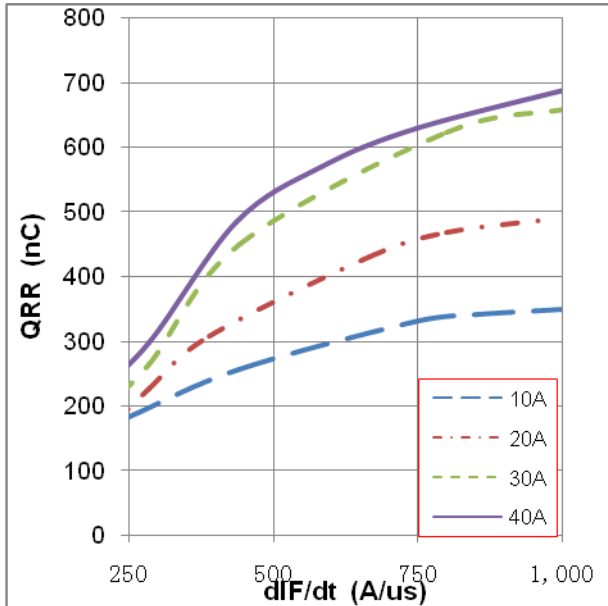


Figure15: typical diode QRR VS. dIF/dt  
VCC=300V, VGE=15V

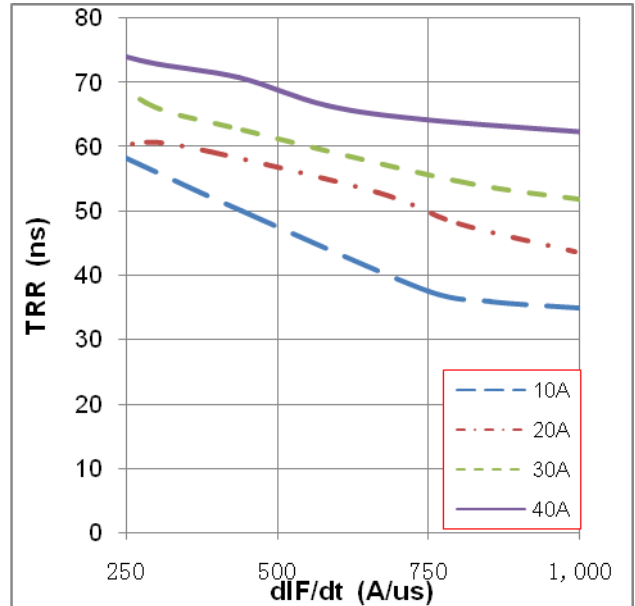


Figure16: typical diode TRR VS. dIF/dt,  
VCC=300V, VGE=15V

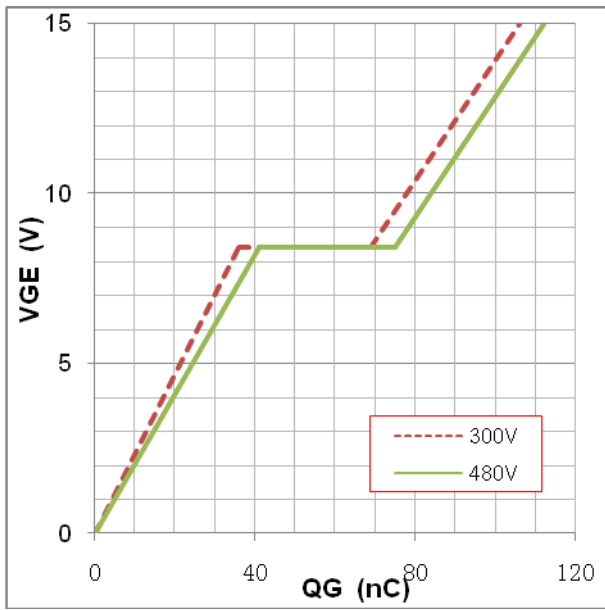
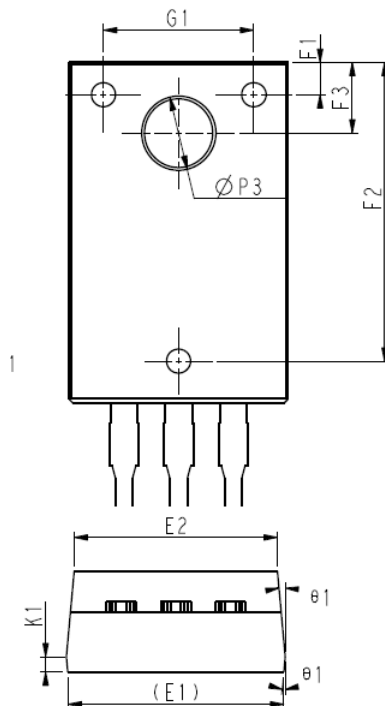
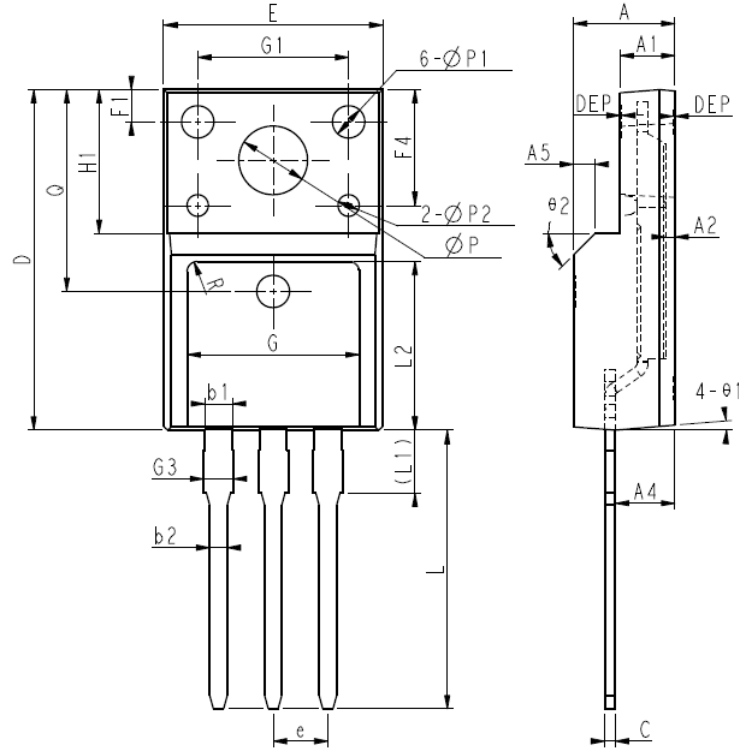


Figure17: Figure18:typical gate charge VS. VGE,IC=30

PACKAGE OUTLINE



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
E	10.00	10.16	10.32
E1	9.94	10.04	10.14
E2	9.36	9.46	9.56
A	4.50	4.70	4.90
A1	2.34	2.54	2.74
A2	0.43	-	0.48
A4	2.66	2.76	2.86
A5	1.00REF		
c	0.45	0.50	0.60
D	15.67	15.87	16.07
Q	9.40REF		
H1	6.70REF		
e	2.54BSC		
ØP	3.18REF		
L	12.78	12.98	13.18
L1	2.83	2.93	3.03
L2	7.70	7.80	7.90
ØP1	1.40	1.50	1.60
ØP2	0.95	1.00	1.05
ØP3	3.45REF		
Ø1	3°	5°	7°
Ø2	-	45°	-
DEP	0.05	0.10	0.15
F1	1.00	1.50	2.00
F2	13.80	13.90	14.00
F3	3.20	3.30	3.40
F4	5.30	5.40	5.50
G	7.80	8.00	8.20
G1	6.90	7.00	7.10
G3	1.25	1.35	1.45
b1	1.23	1.28	1.38
b2	0.75	0.80	0.90
K1	0.65	0.70	0.75
R	0.50REF		



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