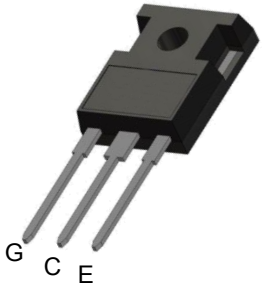
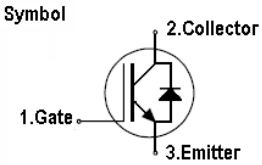
IGBT in TO-247

Features

- 1200V 20A, $V_{CE(sat)(typ.)}$ = 2.05 V@20A
- High speed switching
- Higher system efficiency
- Soft current turn-off waveforms
- Square RBSOA





Mechanical Data

- **Case:** TO-247 (plastic package). Lead free; RoHS compliant
- **Molding Compound Flammability Rating:** UL 94 V-0
- **Terminals:** High temperature soldering guaranteed: 260 °C/10 sec. at terminals

Benefits

- High Efficiency for Motor Control
- Rugged Performance
- Excellent Current Sharing in Parallel Operation

Applications

CREATEK's IGBTs offer lower losses and higher energy for application such as motor drive ,UPS, 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	30	V
I_C	Continuous Collector Current (T_C=25℃)	40	A
	Continuous Collector Current (T_C=100℃)	20	A
I_{CM}	Pulsed Collector Current (Note 1)	80	A
I_F	Diode Continuous Forward Current (T_C=100℃)	15	A
I_{FM}	Diode Maximum Forward Current (Note 1)	80	A
t_{sc}	Short Circuit Withstand Time	10	us
$t_{sc\ (Max)}$	Maximum Short Circuit Withstand Time	>23	us
I_{sc}	Short Circuit Current	140	A
P_D	Maximum Power Dissipation (T_C=25℃)	190	W
	Maximum Power Dissipation (T_C=100℃)	75	W
T_J	Operating Junction Temperature Range	-55 to +150	℃
T_{STG}	Storage Temperature Range	-55 to +150	℃

Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for IGBT	0.45	℃/ W
$R_{th\ j\text{-}c}$	Thermal Resistance, Junction to case for Diode	0.85	℃/W
$R_{th\ j\text{-}a}$	Thermal Resistance, Junction to Ambient	40	℃/W

Electrical Characteristics (TC=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{CES}	Collector-Emitter Breakdown Voltage	V_{GE}= 0V, I_C= 250uA	1200	-	-	V
I_{CES}	Collector-Emitter Leakage Current	V_{CE}= 1200V, V_{GE}= 0V	-	-	250	uA
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= 250uA	4.5	5.0	5.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=15V, I_C= 20A	-	2.1	2.3	V
Q_g	Total Gate Charge	V_{CC}=960V V_{GE}=15V I_C=15A	-	195		nC
Q_{ge}	Gate-Emitter Charge		-	90		nC
Q_{gc}	Gate-Collector Charge		-	105		nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=600V V_{GE}=15V I_C=20A R_G=10Ω Inductive Load T_C=25℃	-	21	-	ns
t_r	Turn-on Rise Time		-	32	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	280	-	ns
t_f	Turn-off Fall Time		-	220	-	ns
Eon	Turn-on Switching Loss		-	1.05	-	mJ
Eoff	Turn-off Switching Loss		-	1.7	-	mJ
Ets	Total Switching Loss		-	2.75	-	mJ
C_{ies}	Input Capacitance	V_{CE}=25V V_{GE}=0V f = 100kHz	-	1080	-	pF
C_{oes}	Output Capacitance		-	175	-	pF
C_{res}	Reverse Transfer Capacitance		-	120	-	pF
R_{Gint}	Integrated gate resistor	f=1M;Vpp=1V	-	8.8	-	Ω

Electrical Characteristics of Diode (TC=25℃ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_F	Diode Forward Voltage	I_F=15A	-	2.1	2.3	V
t_{rr}	Diode Reverse Recovery Time	V_{CE} = 600V I_F= 15A dIF/dt = 500A/us	-	110		ns
I_{rr}	Diode peak Reverse Recovery Current		-	15		A
Q_{rr}	Diode Reverse Recovery Charge		-	1050		nC

Notes:

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

Typical Characteristics

Fig 1. maximum DC collector current VS. case temprature

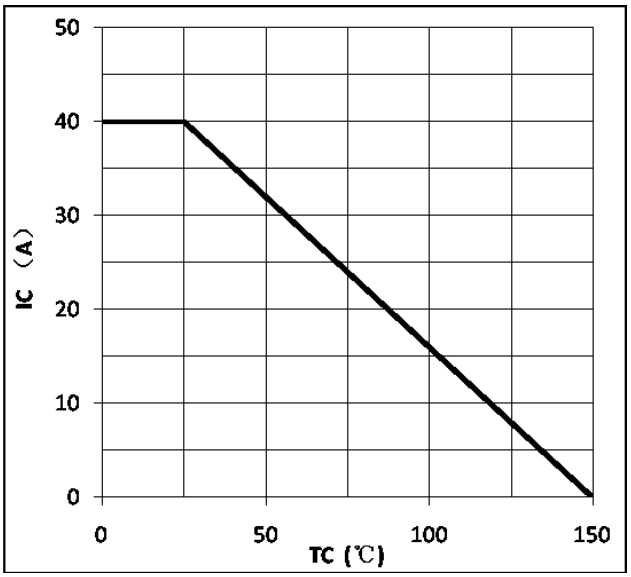


Fig 2. power dissipation VS. case temprature

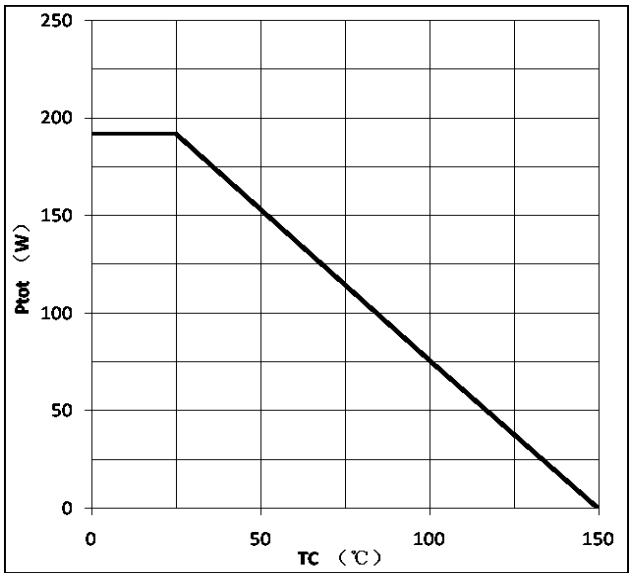


Fig 3. Forward SOA,TC=25℃,TJ≤150℃

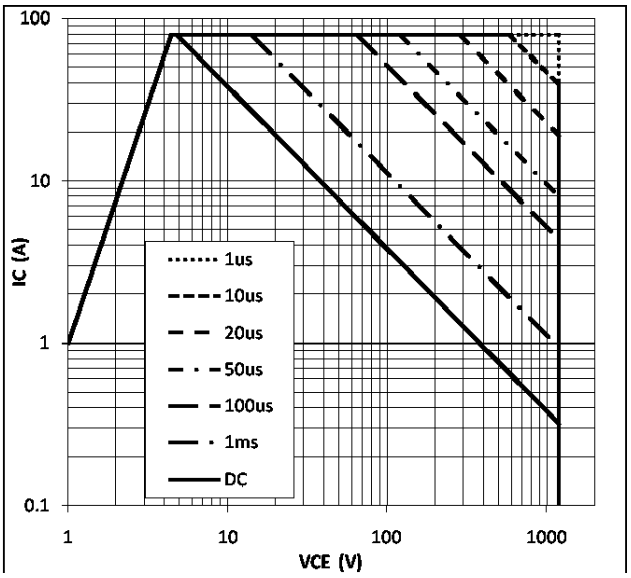
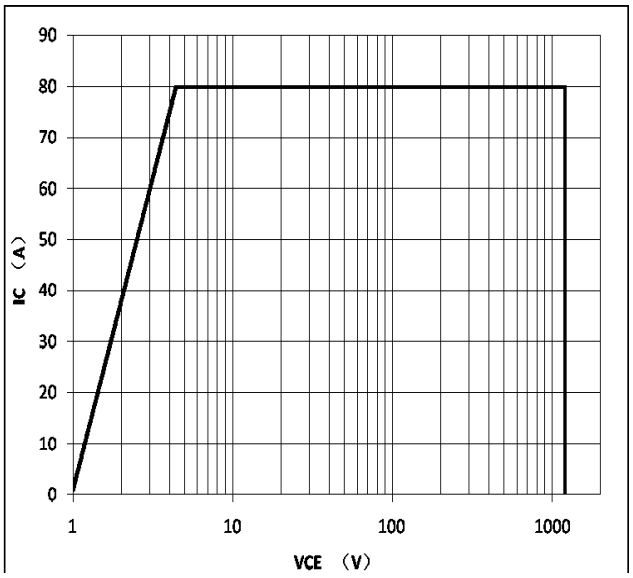


Fig 4. Reverse bias SOA,TJ=150℃,VGE=15V



Typical Characteristics

Fig 5. Typical IGBT output characteristic （Tj=25℃）

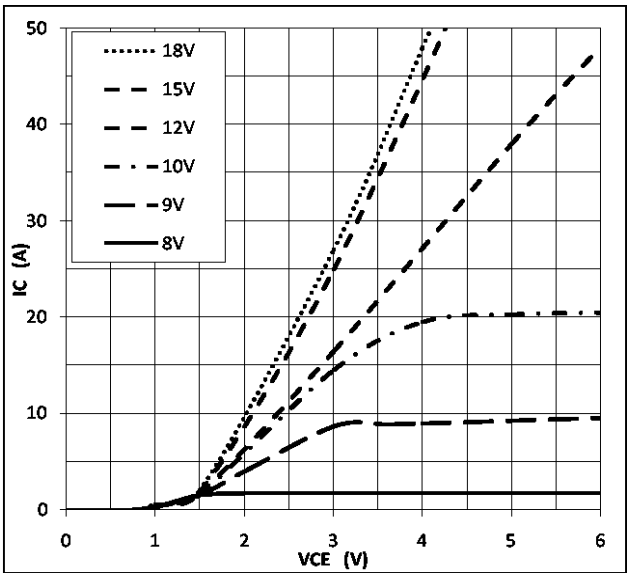


Fig 6. Typical trans characteristics,VCE=20V,tp=20us

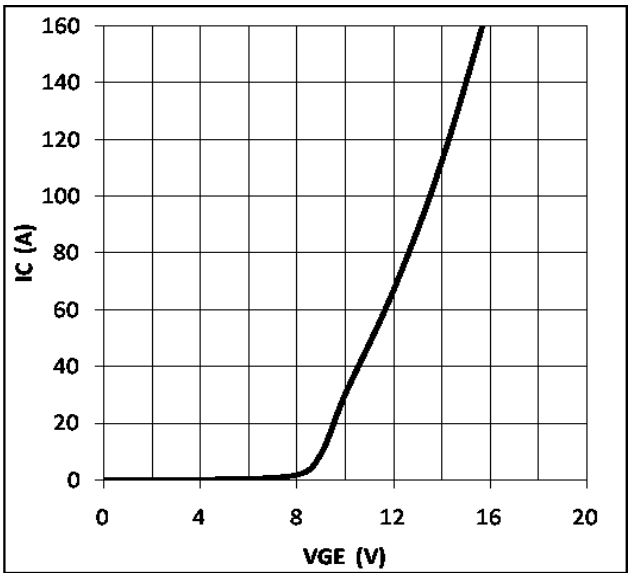


Fig 7. Typical diode forward characteristic,tp=300us

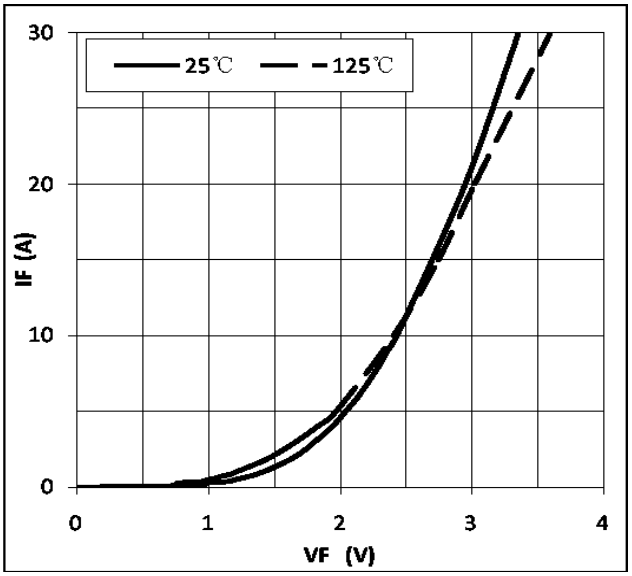
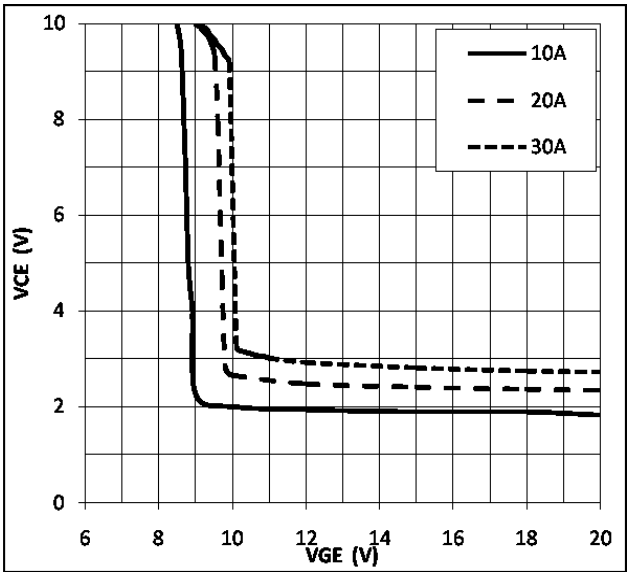


Fig 8. Typical VCE VS. VGE,TJ=25℃



Typical Characteristics

Fig 9. Typical VCE VS. VGE,TJ=125℃

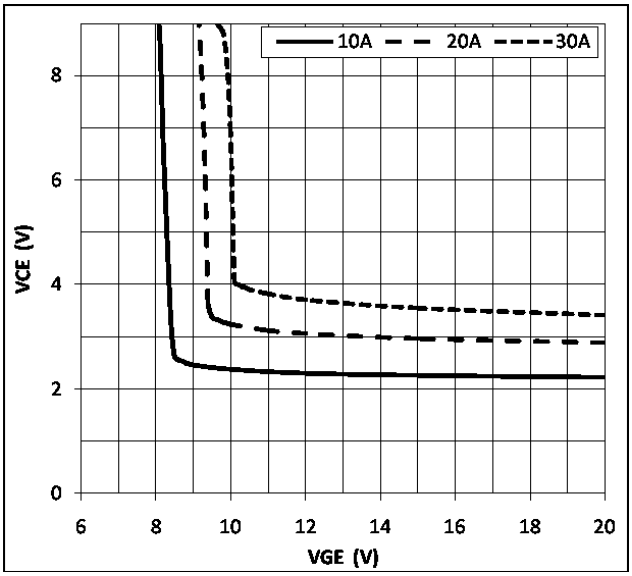


Fig 10. Typical energy loss VS. IC TC=25℃,L=500uH, VCE=600V,VGE=15V,Rg=28Ω

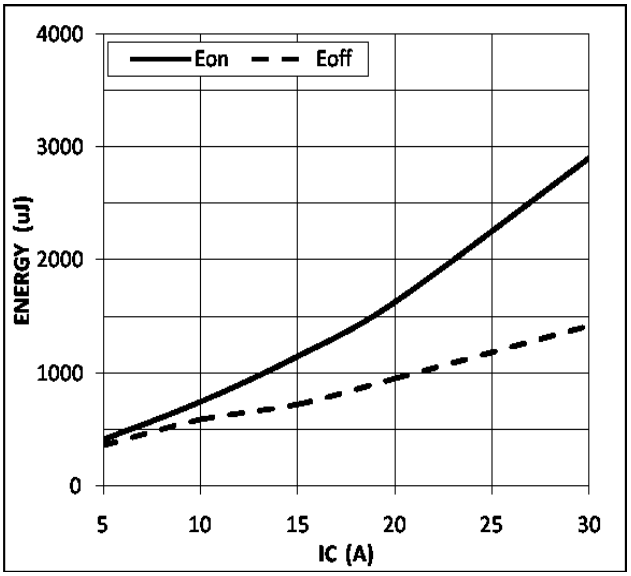


Fig 11. Typical switching time VS. IC, TC=25℃, L=500uH, VCE=600V,VGE=15V,Rg=28Ω

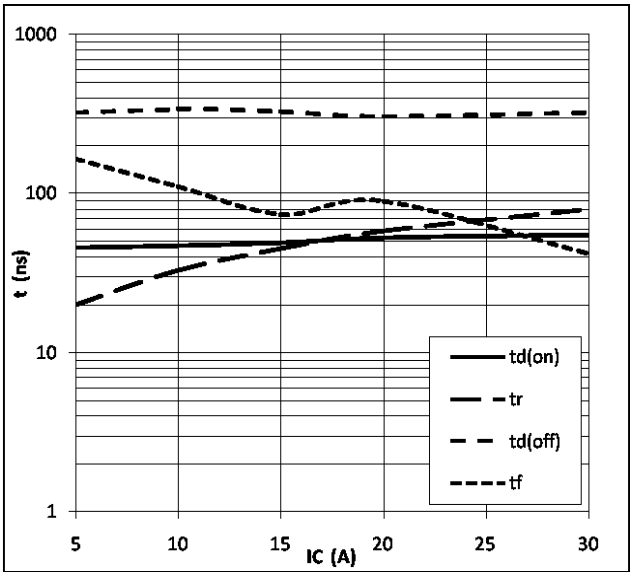
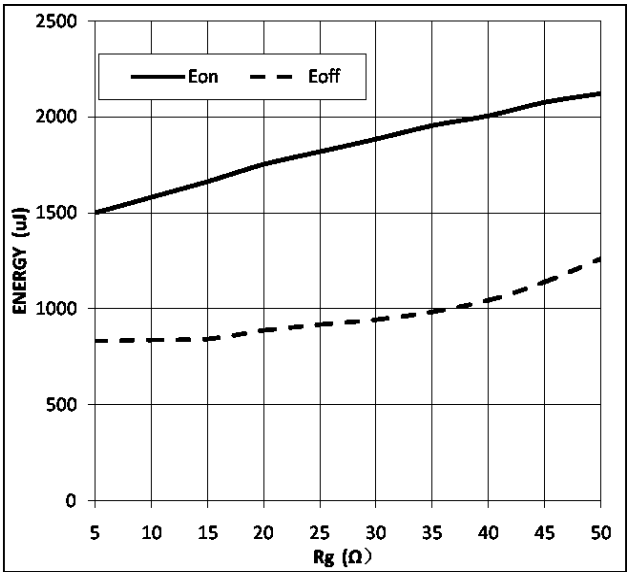


Fig 12. Typical energy loss VS. Rg,TC=25℃, L=500uH,VCE=600V,VGE=15V,IC=20A



Typical Characteristics

Fig 13. Typical switching time VS. Rg,TC=25℃,
L=500uH,VCE=600V,VGE=15V,IC=20A

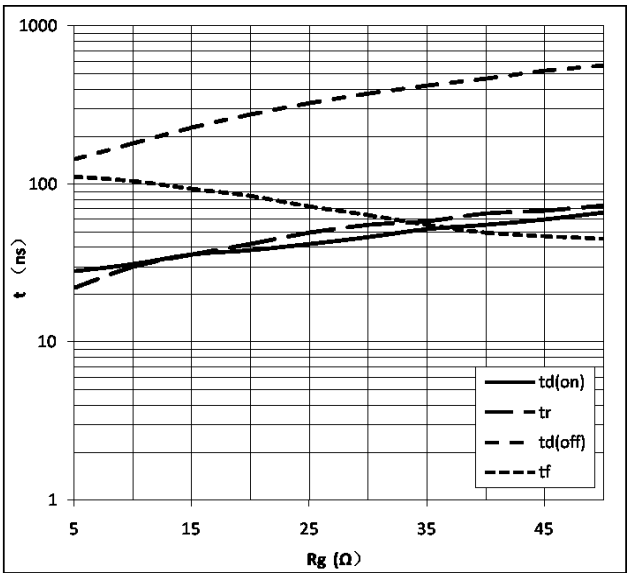


Fig 14. Typical diode Irrm VS. IF, TC=25℃
VCC=600V,VGE=15V

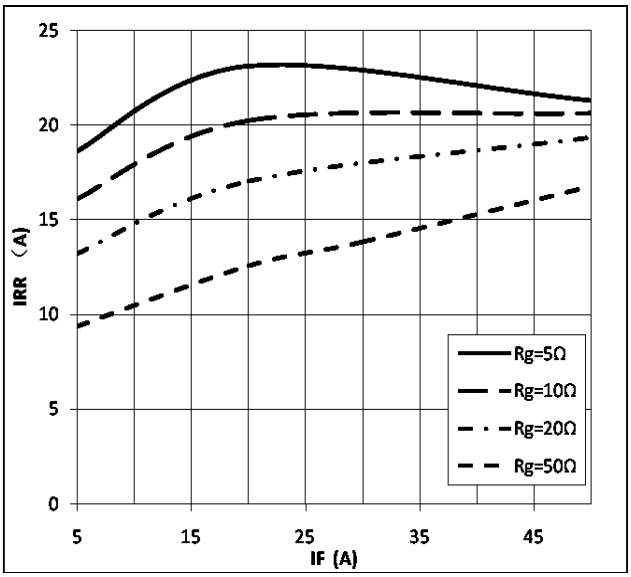


Fig 15. Typical diode Irrm VS. dIF/dt
VCC=600V,VGE=15V,IF=20A

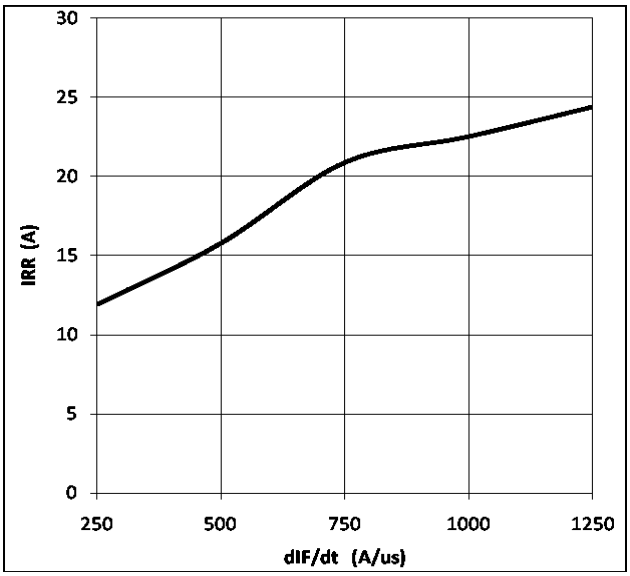
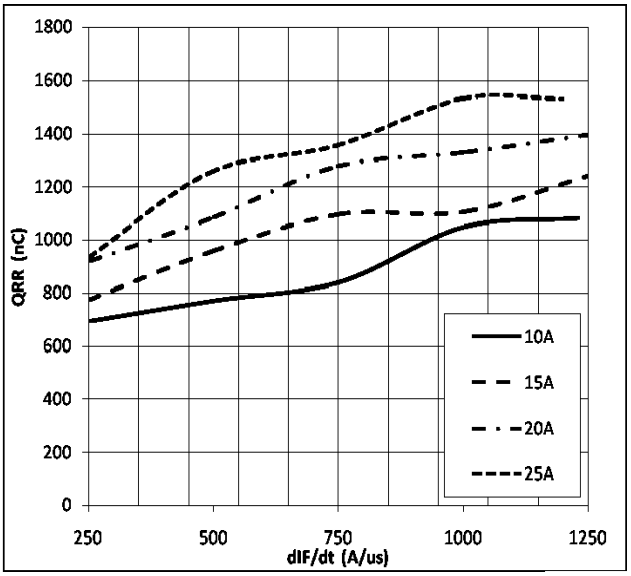


Fig 16. Typical diode QRR VS. dIF/dt
VCC=600V,VGE=15V



Typical Characteristics

Fig 17. Typical capacitance VS. VCE,VGE=0V,f=100kHz

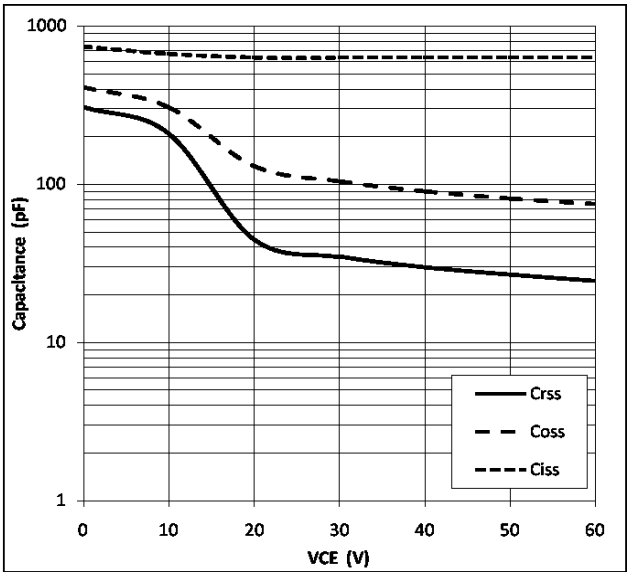


Fig 18. Typical gate charge VS. VGE,IC=20A

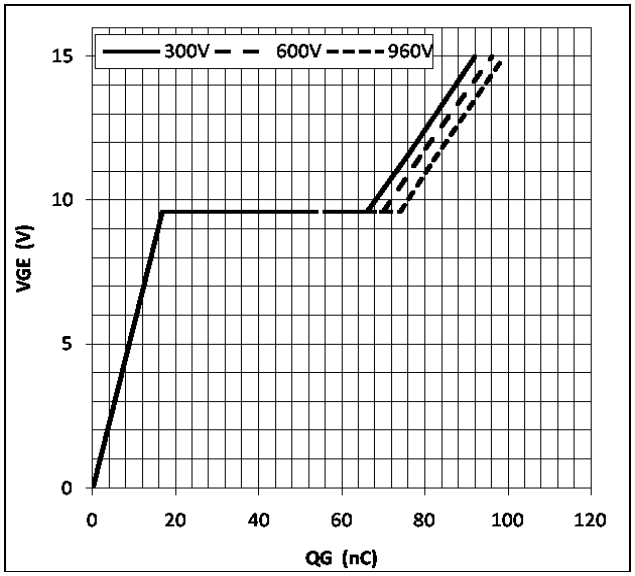
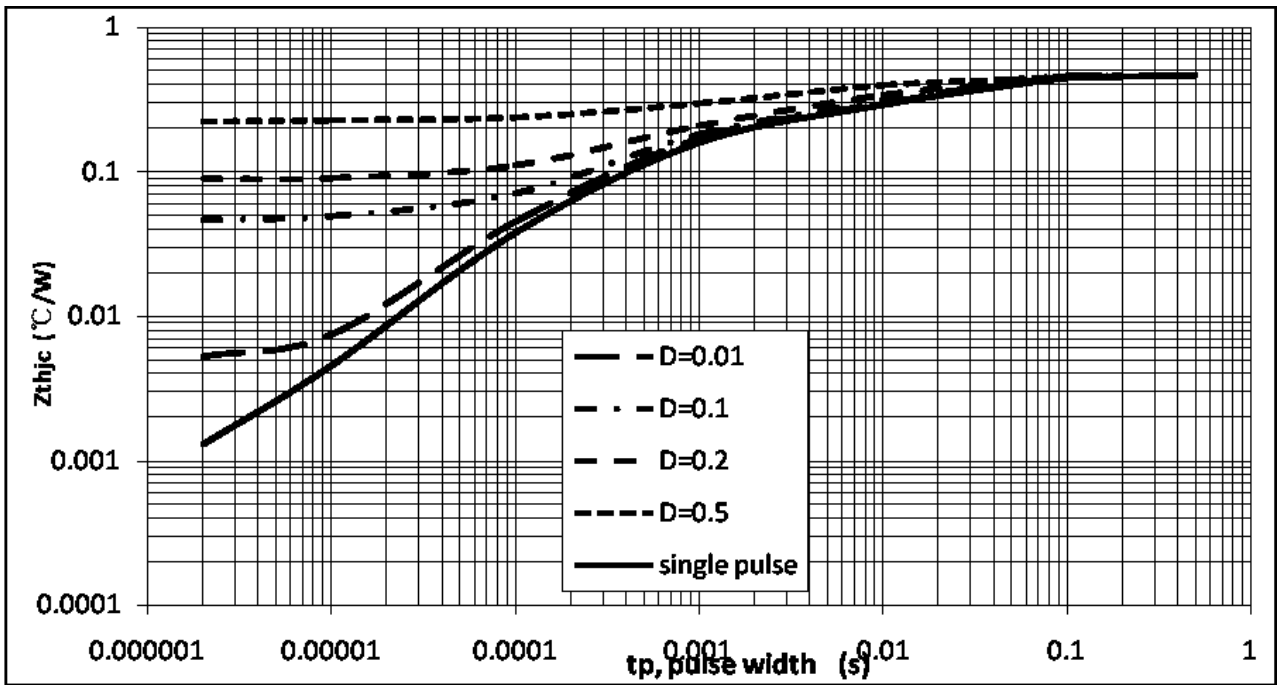
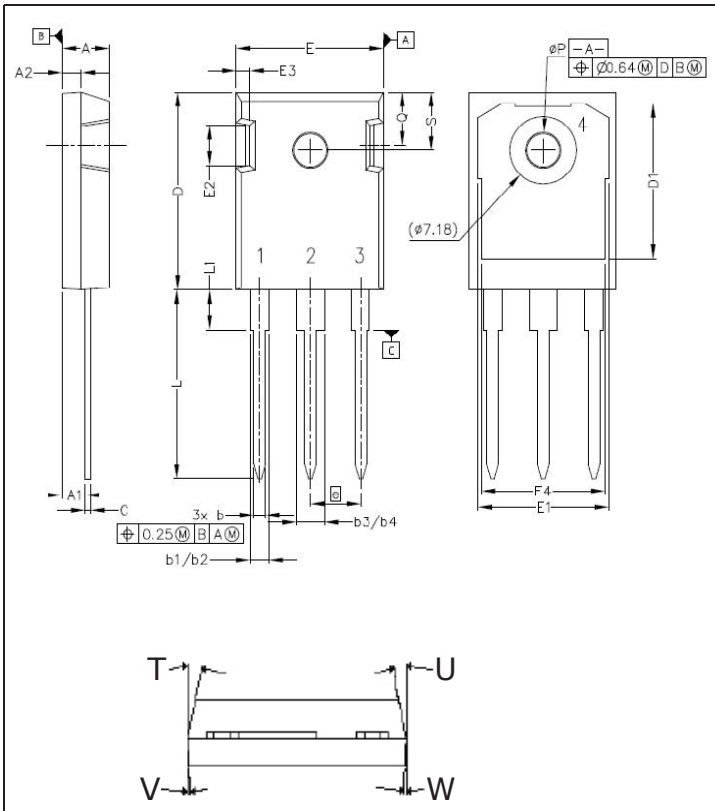


Fig 19. Normalized transient trermal impedance,junction-to-case
Note1.Duty factor D=t1/t2; Note2:peak TJ=PDM×Zthjc+TC

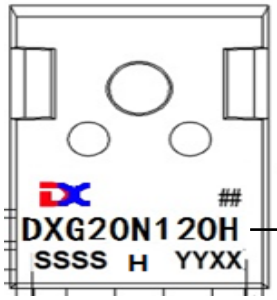


Package Dimensions



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.042	.052	1.07	1.33
b1	.075	.095	1.91	2.41
b2	.075	.085	1.91	2.16
b3	.113	.133	2.87	3.38
b4	.113	.123	2.87	3.13
c	.022	.027	0.55	0.68
D	.819	.831	20.80	21.10
D1	.640	.695	16.25	17.65
D2	.037	.049	0.95	1.25
E	.620	.635	15.75	16.13
E1	.516	.557	13.10	14.15
E2	.145	.201	3.68	5.10
E3	.039	.075	1.00	1.90
E4	.487	.529	12.38	13.43
e	.214 BSC		5.44 BSC	
N	3		3	
L	.780	.800	19.81	20.32
L1	.161	.173	4.10	4.40
ØP	.138	.144	3.51	3.65
Q	.216	.236	5.49	6.00
S	.238	.248	6.04	6.30
T	9°	11°	9°	11°
U	9°	11°	9°	11°
V	2°	8°	2°	8°
W	2°	8°	2°	8°

Marking



Marking (DXG20N120H)

Ordering information

Order code	Package	Packaging option	Base quantity	Packaging specification
CXG20N120H	TO-247	Tube/BOX	2000pcs / BOX	EIA STD RS-481

Revision history

Date	Revision	Changes
23-May-2012	1.0	Initial release
11-Nov.-2019	1.1	Add Marking

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