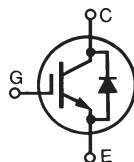


GenX3™ 600V IGBT w/Diode

IXGR72N60A3H1

(Electrically Isolated Tab)

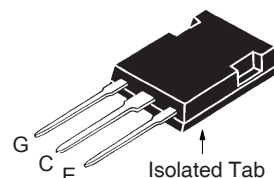
Ultra-Low V_{sat} PT IGBT for up to
5kHz Switching



$$\begin{aligned} V_{CES} &= 600V \\ I_{C110} &= 52A \\ V_{CE(sat)} &\leq 1.45V \\ t_{fi(typ)} &= 250ns \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	600	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C , $R_{GE} = 1M\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	75	A
I_{C110}	$T_C = 110^\circ\text{C}$	52	A
I_{F110}	$T_C = 110^\circ\text{C}$	32	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1ms	400	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 3\Omega$ Clamped Inductive Load	$I_{CM} = 150$ $V_{CE} \leq V_{CES}$	A
P_C	$T_C = 25^\circ\text{C}$	200	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
V_{ISOL}	50/60 Hz, RMS, $t = 1\text{minute}$	2500	V~
F_C	Mounting Force	20..120/4.5..27	N/lb
T_L	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
T_{SOLD}	1.6mm (0.062 in.) from Case for 10s	260	$^\circ\text{C}$
Weight		5	g

ISOPLUS247™



G = Gate C = Collector
E = Emitter

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V Electrical Isolation
- Optimized for Low Conduction Losses
- Square RBSOA
- Anti-Parallel Ultra Fast Diode
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- Inrush Current Protection Circuits

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 250\mu\text{A}$, $V_{CE} = V_{GE}$	3.0		5.0
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ\text{C}$			300 5
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100
$V_{CE(sat)}$	$I_C = 60A$, $V_{GE} = 15V$, Note 1			1.45

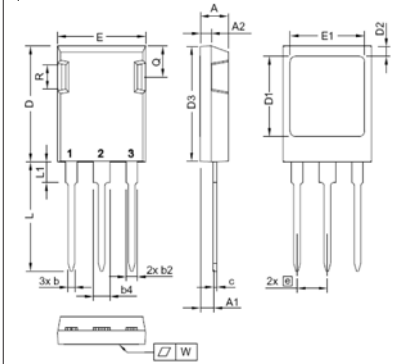
Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 60A, V_{CE} = 10V$, Note 1	48	75	S
C_{ies}	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		6600	pF
C_{oes}			360	pF
C_{res}			80	pF
Q_g	$I_C = 60A, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$		230	nC
Q_{ge}			40	nC
Q_{gc}			80	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ C$ $I_C = 50A, V_{GE} = 15V$ $V_{CE} = 480V, R_G = 3\Omega$		31	ns
t_{ri}			34	ns
E_{on}			1.4	mJ
$t_{d(off)}$			320	ns
t_{fi}			250	ns
E_{off}			3.5	mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ C$ $I_C = 50A, V_{GE} = 15V$ $V_{CE} = 480V, R_G = 3\Omega$		29	ns
t_{ri}			34	ns
E_{on}			2.6	mJ
$t_{d(off)}$			510	ns
t_{fi}			375	ns
E_{off}			6.5	mJ
R_{thJC}			0.15	$0.62^\circ C/W$
R_{thCS}				$^\circ C/W$

Reverse Diode (FRED)

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
V_F	$I_F = 60A, V_{GE} = 0V$, Note 1 $T_J = 150^\circ C$		1.6 1.4	2.3 V 1.8 V
I_{RM}	$I_F = 60A, V_{GE} = 0V$, $-di_F/dt = 200A/\mu s, V_R = 300V$ $T_J = 100^\circ C$		8.3	A
t_{rr}	$I_F = 60A, -di_F/dt = 200A/\mu s, V_R = 300V, T_J = 100^\circ C$		140	ns
R_{thJC}				$0.8^\circ C/W$

Note 1. Pulse test, $t \leq 300\mu s$, duty cycle, $d \leq 2\%$.

ISOPLUS247 (IXGR) Outline



- 1 - Gate
- 2 - Collector
- 3 - Emitter

Dim.	Millimeter		Inches	
	min	max	min	max
A	4.83	5.21	0.190	0.205
A1	2.29	2.54	0.090	0.100
A2	1.91	2.16	0.075	0.085
b	1.14	1.40	0.045	0.055
b2	1.91	2.20	0.075	0.087
b4	2.92	3.24	0.115	0.128
c	0.61	0.83	0.024	0.033
D	20.80	21.34	0.819	0.840
D1	15.75	16.26	0.620	0.640
D2	1.65	2.15	0.065	0.085
D3	20.30	20.70	0.799	0.815
E	15.75	16.13	0.620	0.635
E1	13.21	13.72	0.520	0.540
e	5.45 BSC		0.215 BSC	
L	19.81	20.60	0.780	0.811
L1	3.81	4.38	0.150	0.172
Q	5.59	6.20	0.220	0.244
R	4.25	5.50	0.167	0.217
W	-	0.10	-	0.004

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
	4,860,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	

Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

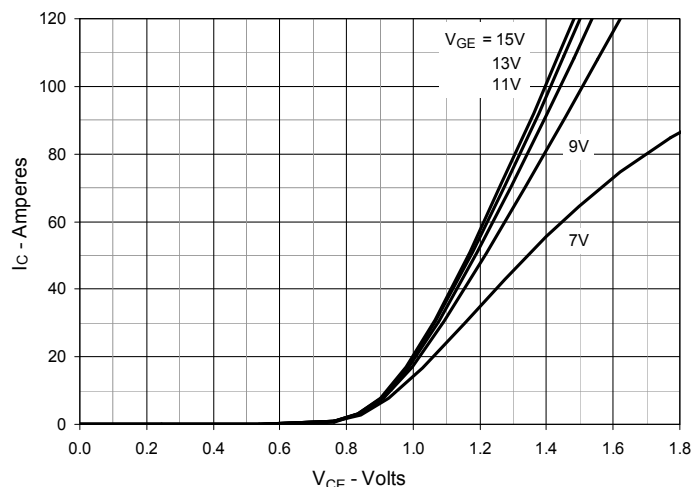


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

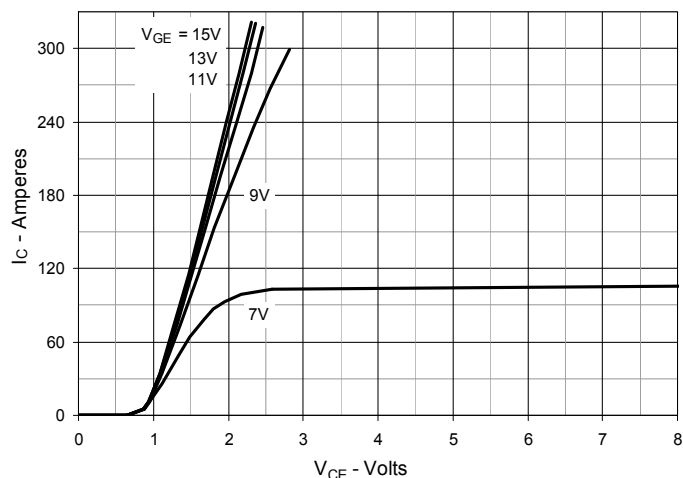


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

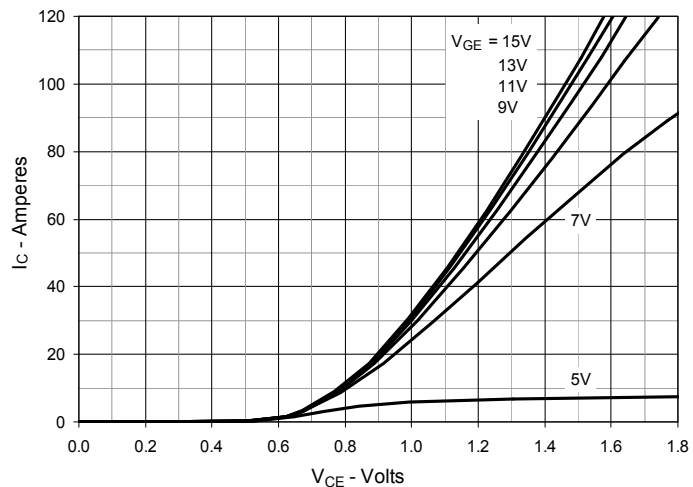


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

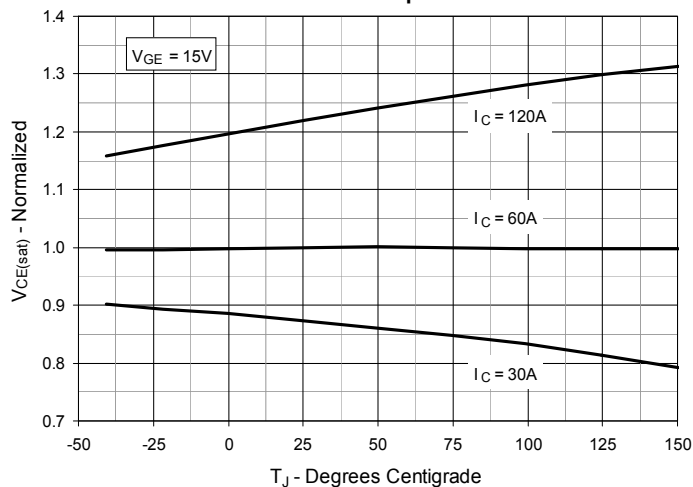


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

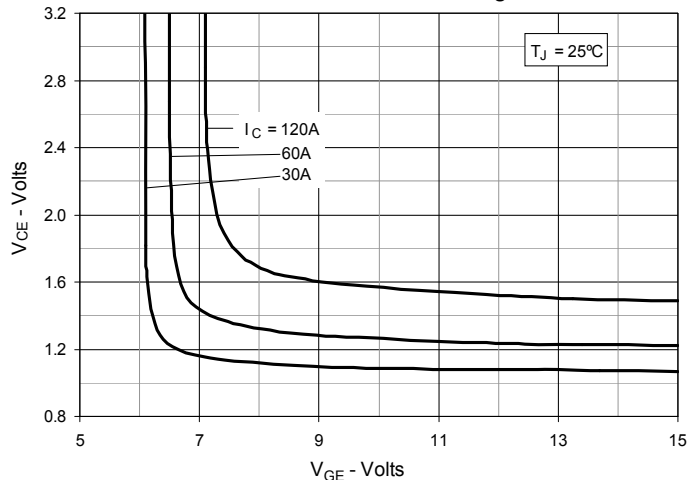


Fig. 6. Input Admittance

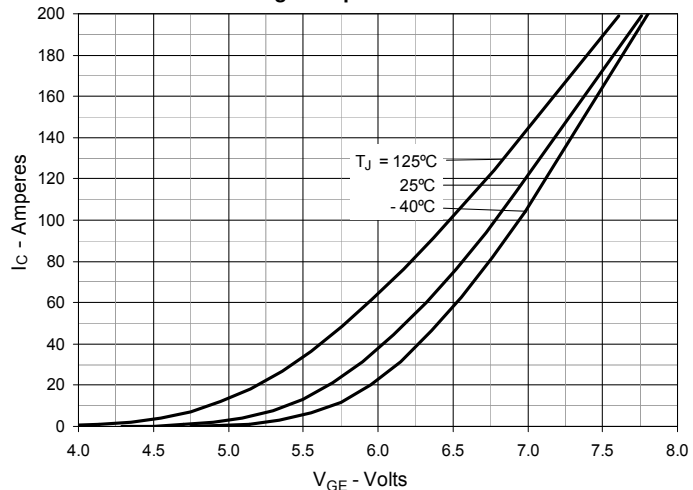


Fig. 7. Transconductance

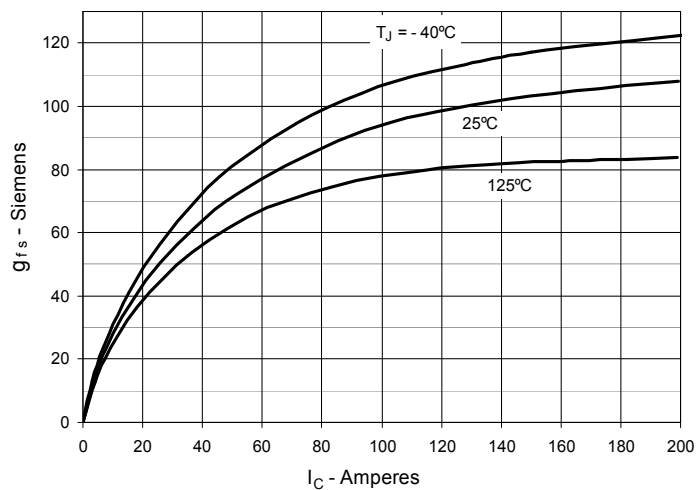


Fig. 8. Gate Charge

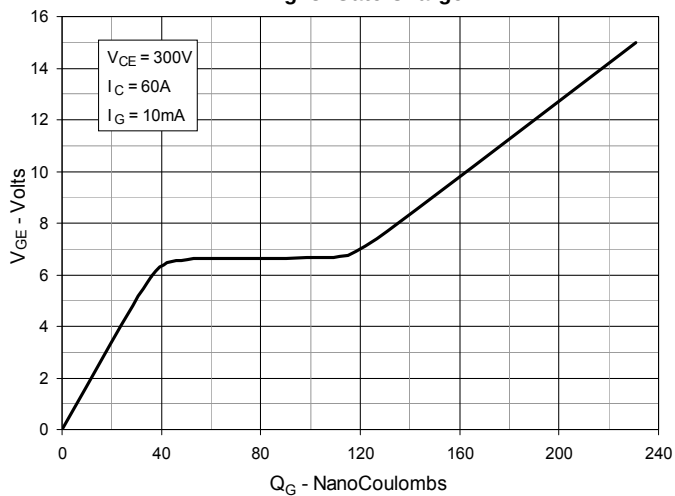


Fig. 9. Capacitance

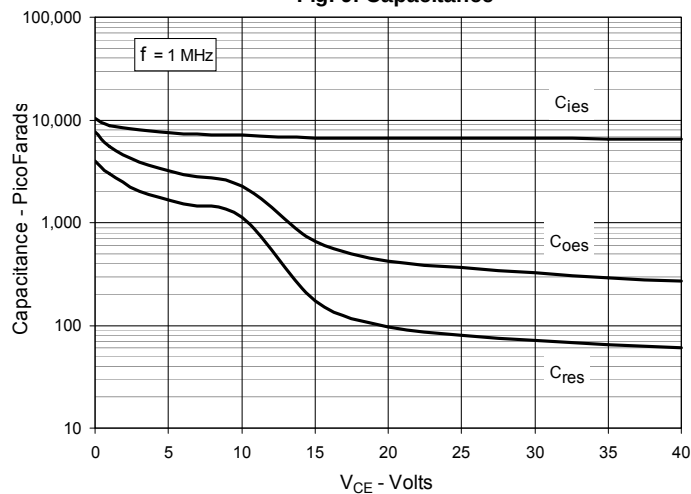


Fig. 10. Reverse-Bias Safe Operating Area

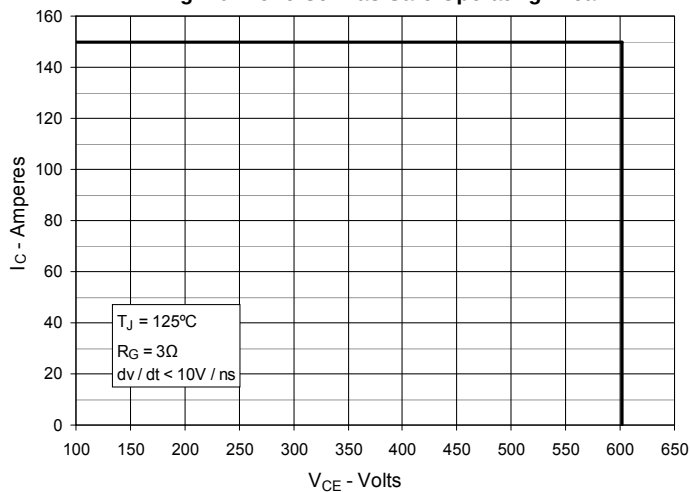


Fig. 11. Maximum Transient Thermal Impedance

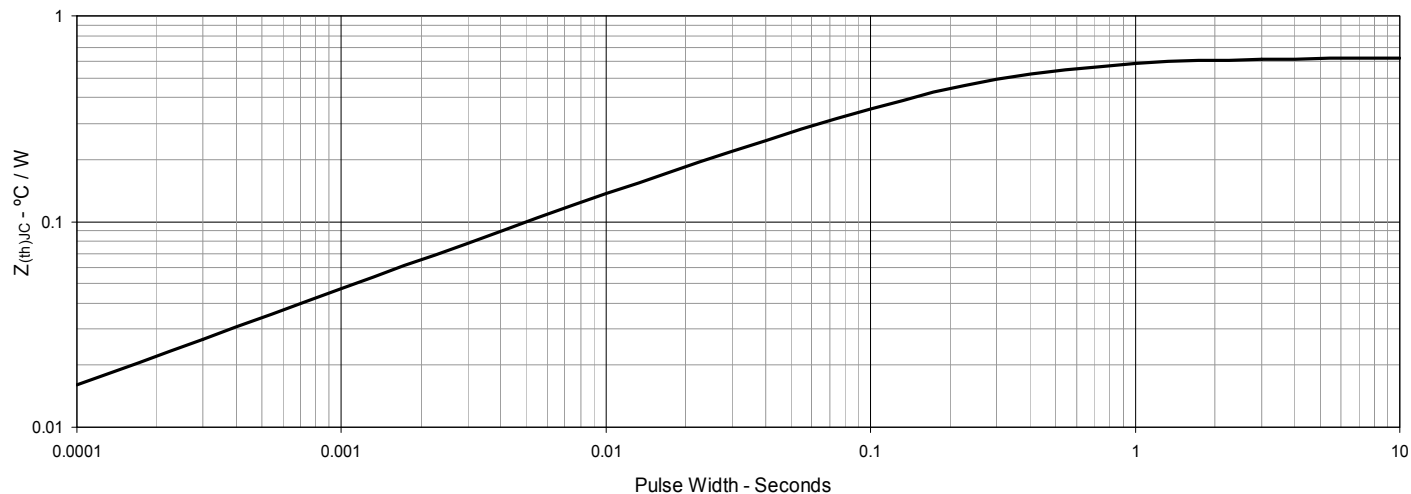


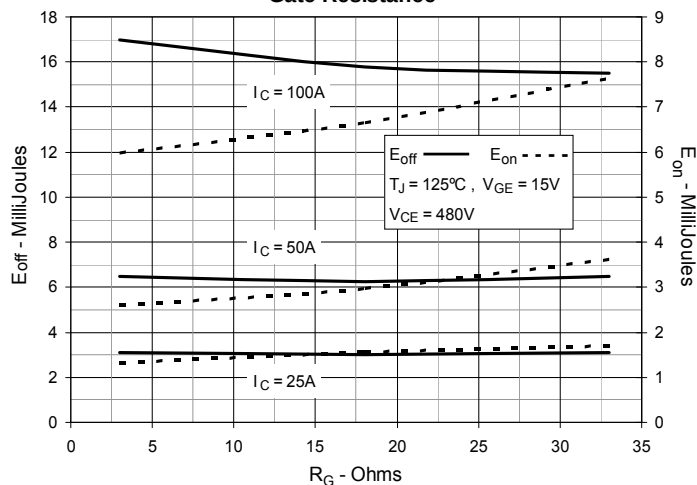
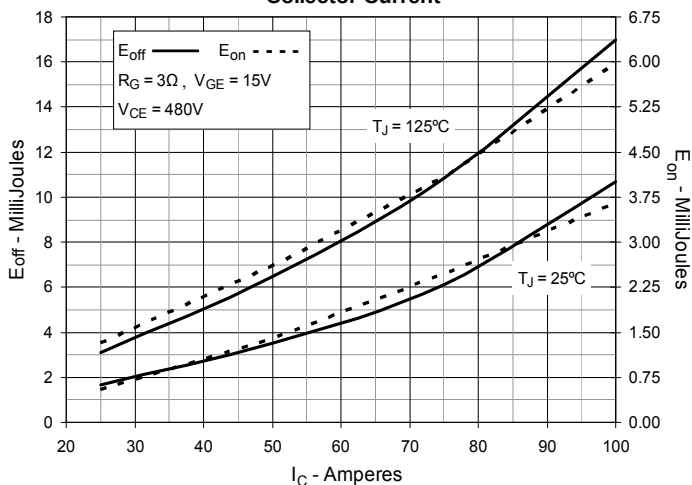
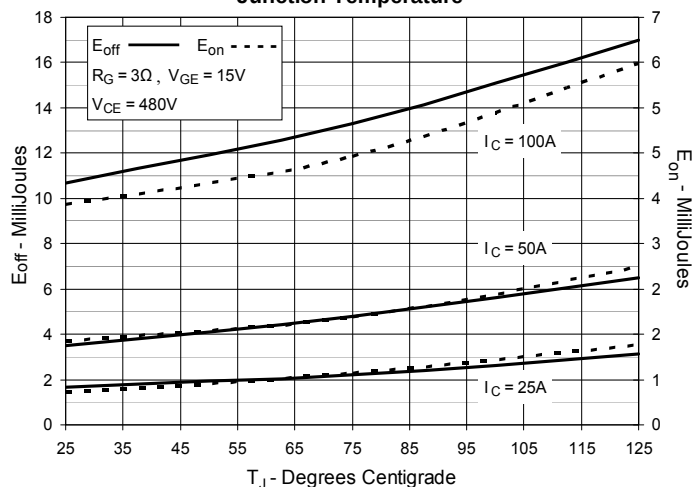
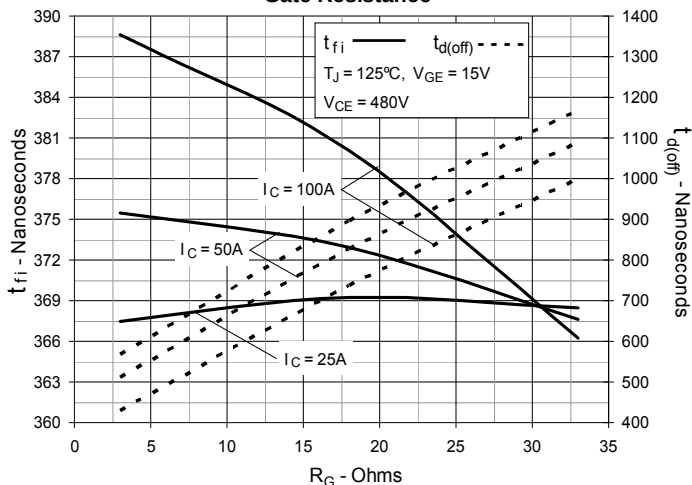
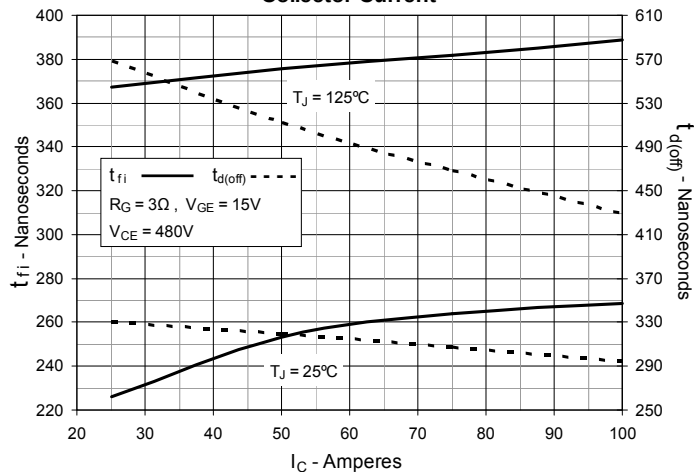
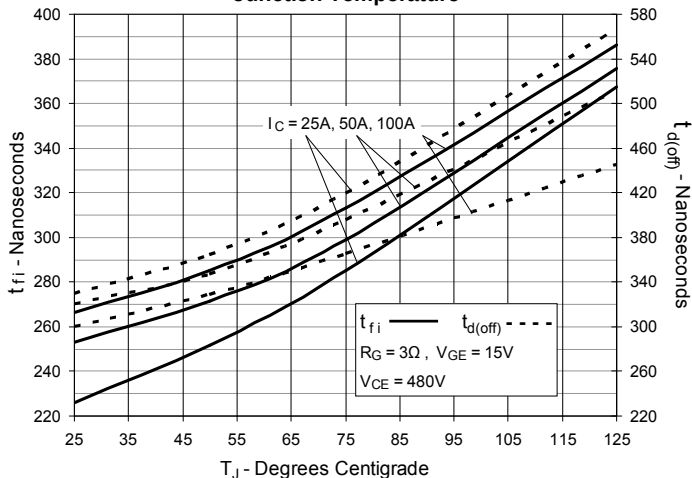
Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

Fig. 13. Inductive Switching Energy Loss vs. Collector Current

Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

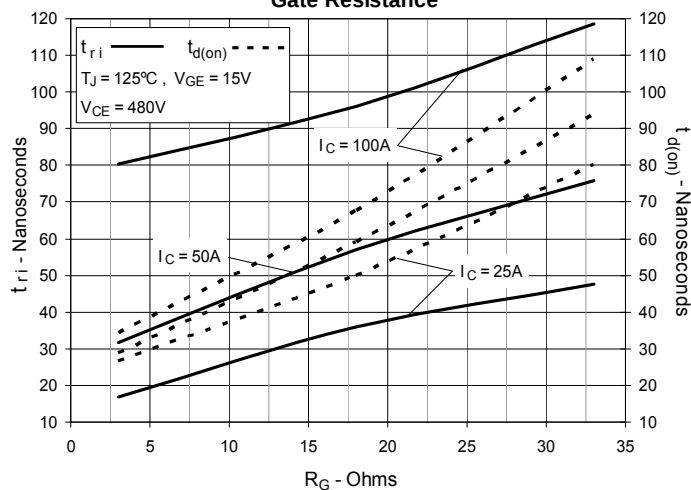


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

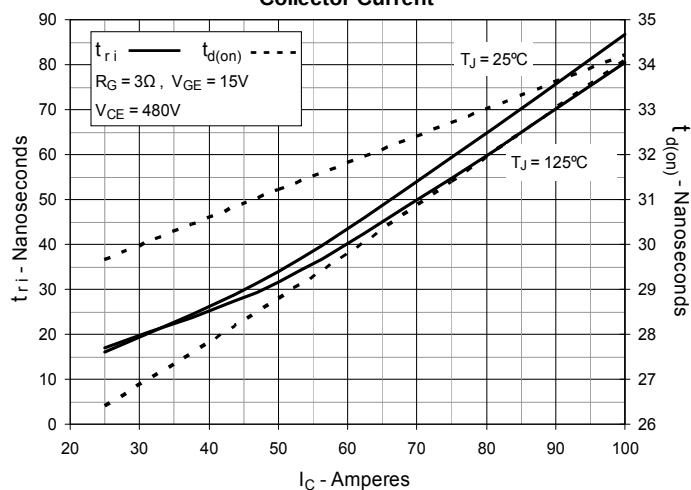
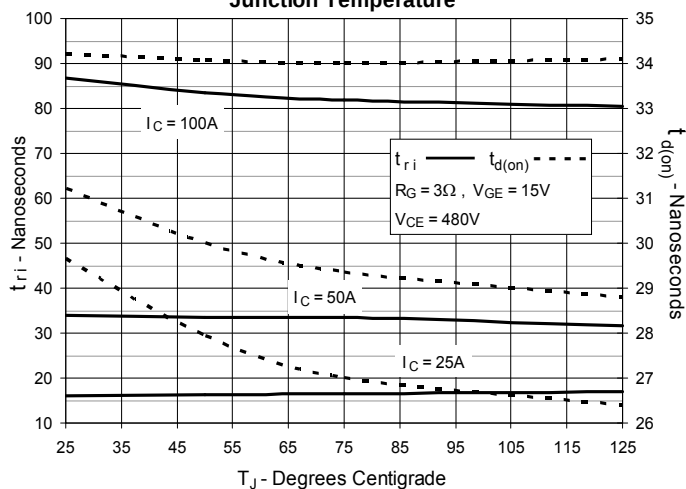


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



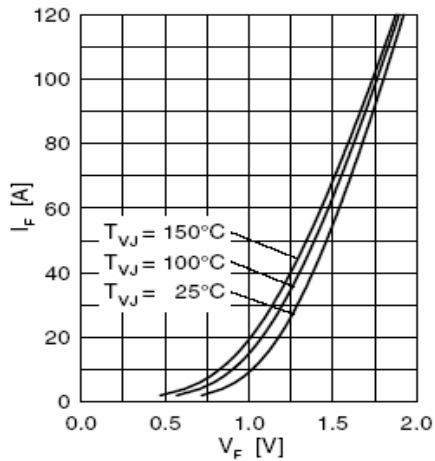


Fig. 21 Forward Current I_F vs. V_F

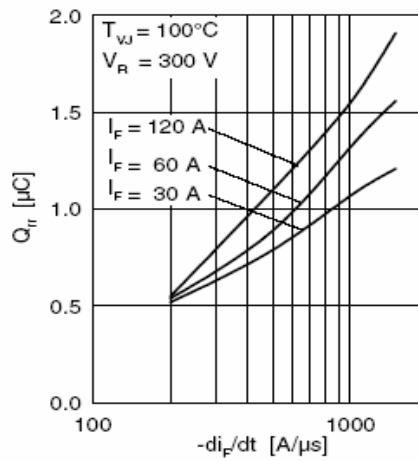


Fig. 22 Typ. Reverse Recovery Charge Q_{rr}

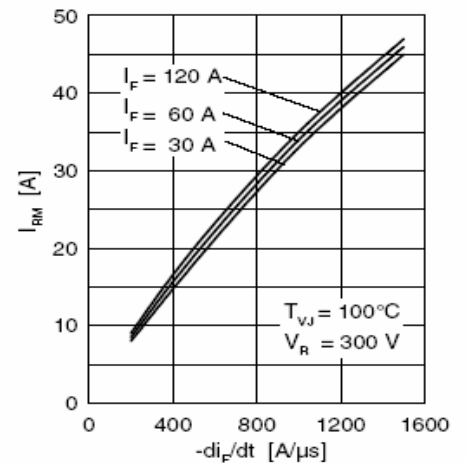


Fig. 23 Typ. Peak Reverse Current I_{RM}

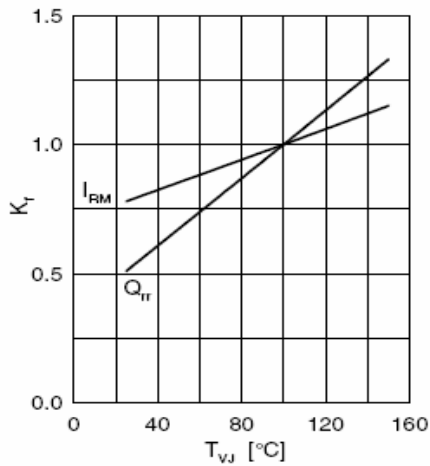


Fig. 24 Typ. Dynamic Parameters Q_{rr} , I_{RM}

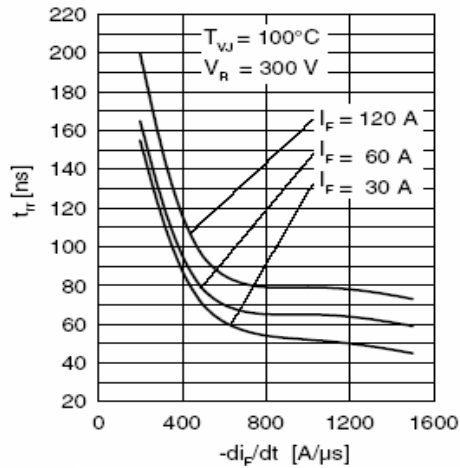


Fig. 25 Typ. Recovery Time t_{rr}

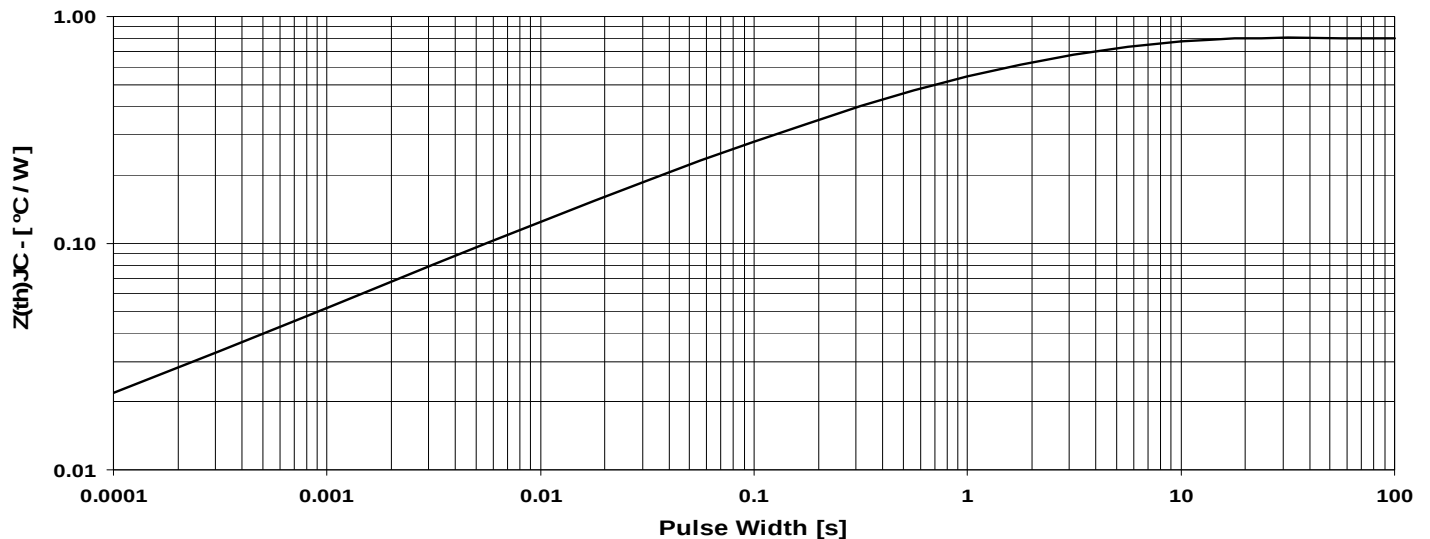


Fig. 26 Maximum Transient Thermal Impedance Junction to Case (for Diode)



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