

GenX3™ 600V IGBT w/ Diode

IXGR72N60B3H1

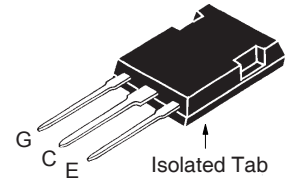
(Electrically Isolated Tab)

Medium Speed Low V_{sat} PT IGBT
for 5-40 kHz Switching



$V_{CES} = 600V$
 $I_{C110} = 40A$
 $V_{CE(sat)} \leq 1.80V$
 $t_{fi(typ)} = 92ns$

ISOPLUS247™



G = Gate C = Collector
E = Emitter

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ C$ to $150^\circ C$	600	V
V_{CGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	80	A
I_{C110}	$T_C = 110^\circ C$	40	A
I_{F110}	$T_C = 110^\circ C$	34	A
I_{CM}	$T_C = 25^\circ C$, 1ms	450	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 3\Omega$ Clamped Inductive Load	$I_{CM} = 240$ $V_{CE} \leq V_{CES}$	A
P_C	$T_C = 25^\circ C$	200	W
T_J		-55 ... +150	$^\circ C$
T_{JM}		150	$^\circ C$
T_{stg}		-55 ... +150	$^\circ C$
V_{ISOL}	50/60 Hz, 1 Minute	2500	V~
F_C	Mounting Force	20..120/4.5..27	N/lb
T_L	Maximum Lead Temperature for Soldering	300	$^\circ C$
T_{SOLD}	1.6mm (0.062 in.) from Case for 10s	260	$^\circ C$
Weight		5	g

Features

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

Advantages

- High Power Density
- Low Gate Drive Requirement

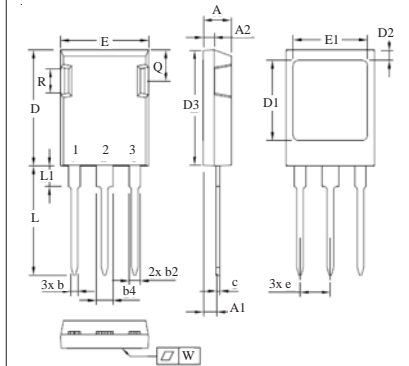
Applications

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

Symbol	Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$			300 μA 5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 60A$, $V_{GE} = 15V$, Note 1 $I_C = 120A$		1.50 1.75	V V

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 50\text{A}$, $V_{CE} = 10\text{V}$, Note 1	45	76	S
C_{ies}	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$		6800	pF
C_{oes}			576	pF
C_{res}			80	pF
Q_g	$I_C = 60\text{A}$, $V_{GE} = 15\text{V}$, $V_{CE} = 0.5 \cdot V_{CES}$		225	nC
Q_{ge}			40	nC
Q_{gc}			82	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 50\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$, $R_G = 3\Omega$ Note 2		31	ns
t_{ri}			33	ns
E_{on}			1.4	mJ
$t_{d(off)}$			152	240 ns
t_{fi}			92	150 ns
E_{off}			1.0	2.0 mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 50\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$, $R_G = 3\Omega$ Note 2		29	ns
t_{ri}			34	ns
E_{on}			2.7	mJ
$t_{d(off)}$			228	ns
t_{fi}			142	ns
E_{off}			2.2	mJ
R_{thJC}			0.62	$^\circ\text{C/W}$
R_{thCS}		0.15		$^\circ\text{C/W}$

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

Reverse Diode (FRED)

(Symbol)	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
V_F	$I_F = 60\text{A}$, $V_{GE} = 0\text{V}$, Note 1			2.45 V
	$T_J = 150^\circ\text{C}$		1.40	1.80 V
I_{RM}	$I_F = 60\text{A}$, $V_{GE} = 0\text{V}$, $-di_F/dt = 200\text{A}/\mu\text{s}$, $V_R = 300\text{V}$		8.3	A
t_{rr}	$I_F = 60\text{A}$, $-di/dt = 200\text{A}/\mu\text{s}$, $V_R = 300\text{V}$, $T_J = 100^\circ\text{C}$		140	ns
R_{thJC}				0.80 $^\circ\text{C/W}$

Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Switching times & energy losses may increase for higher V_{CE} (Clamp), T_J or R_G .

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	

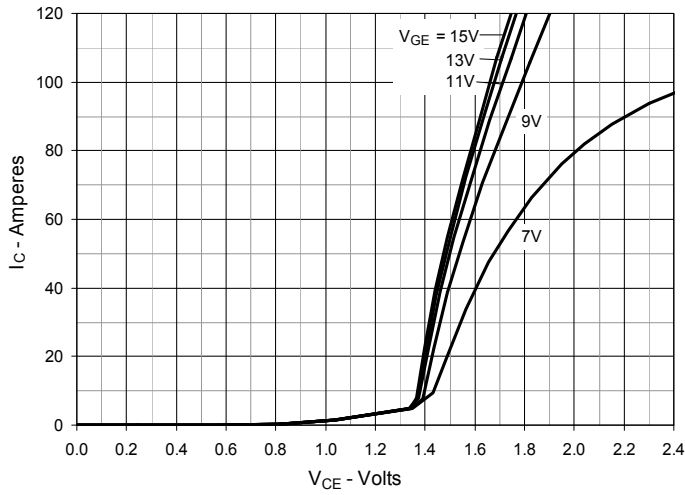
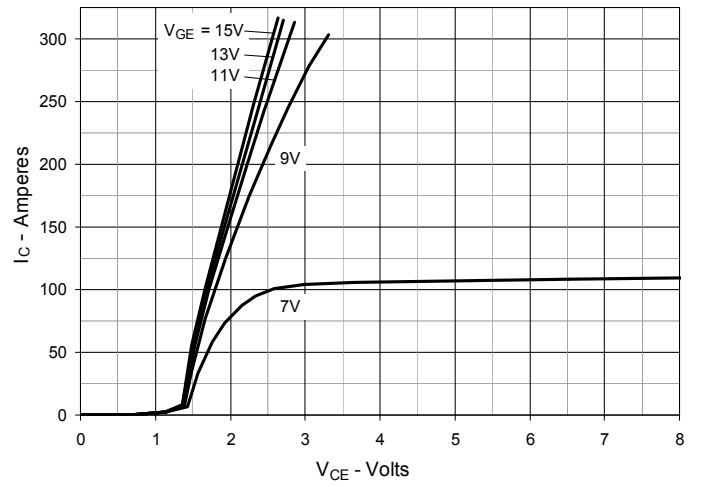
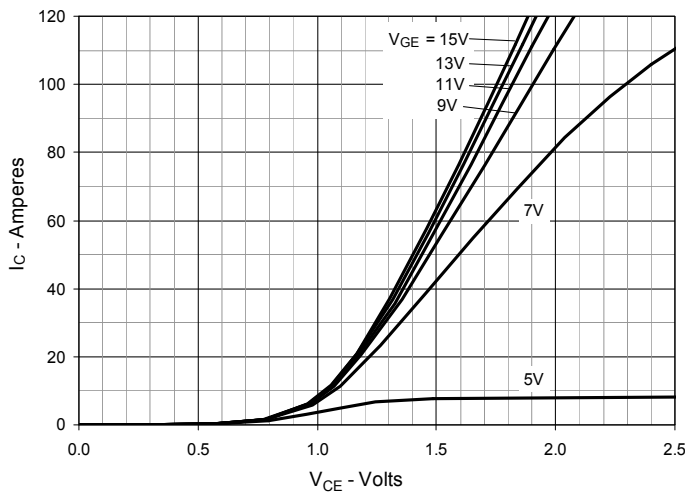
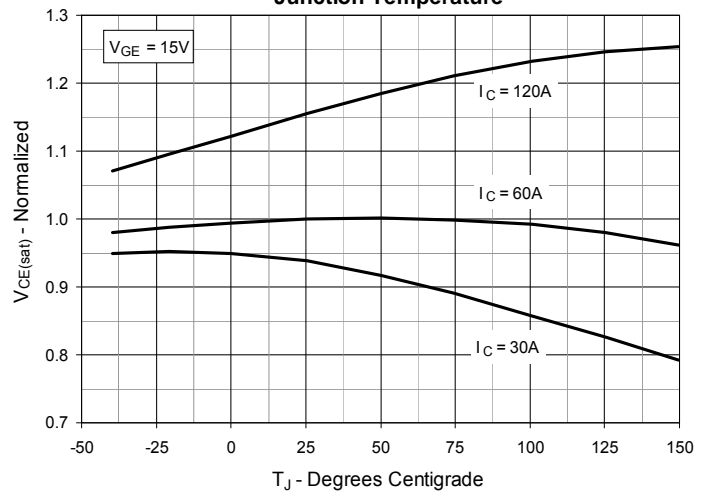
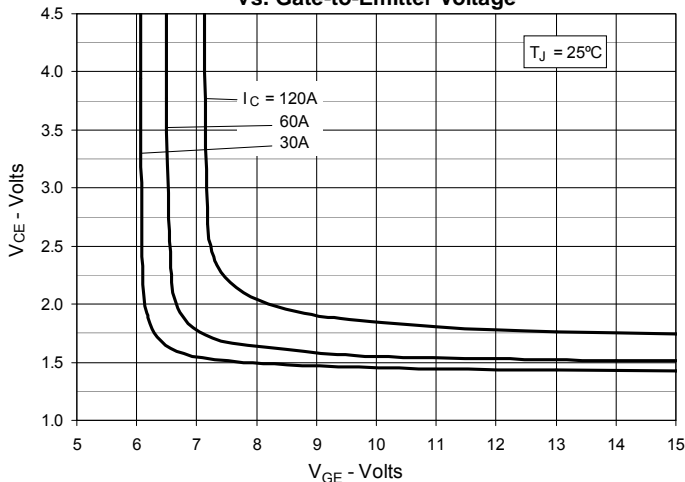
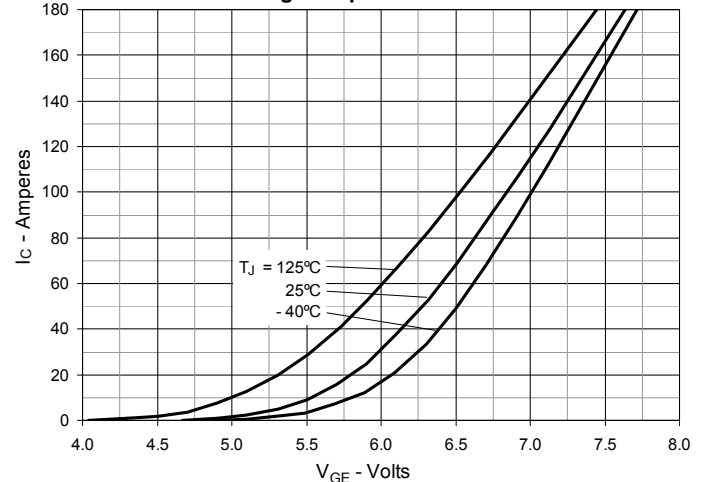
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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


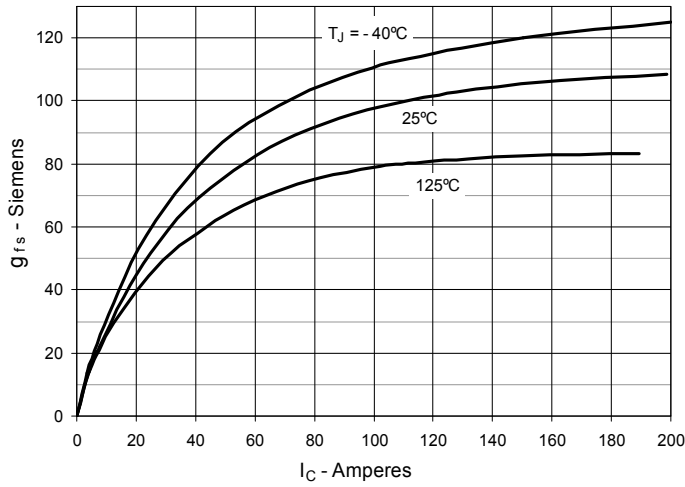
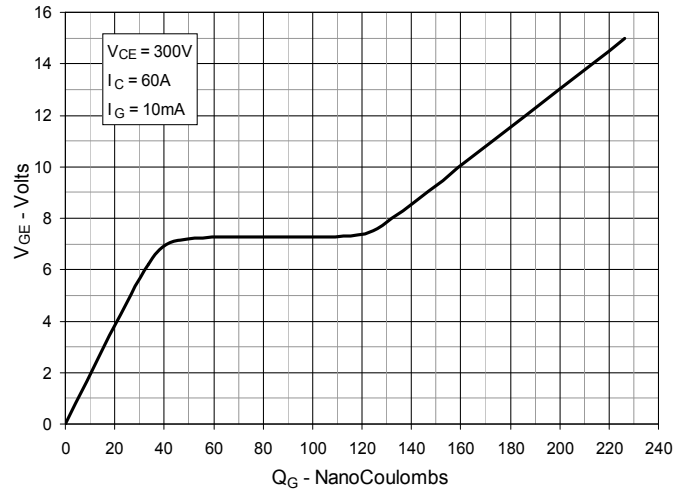
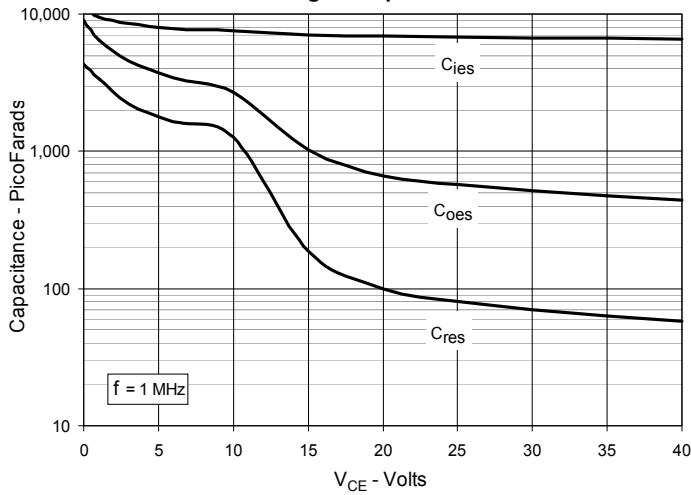
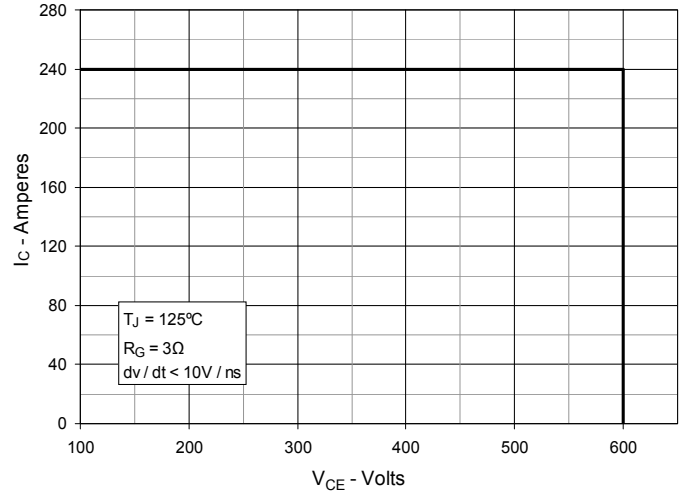
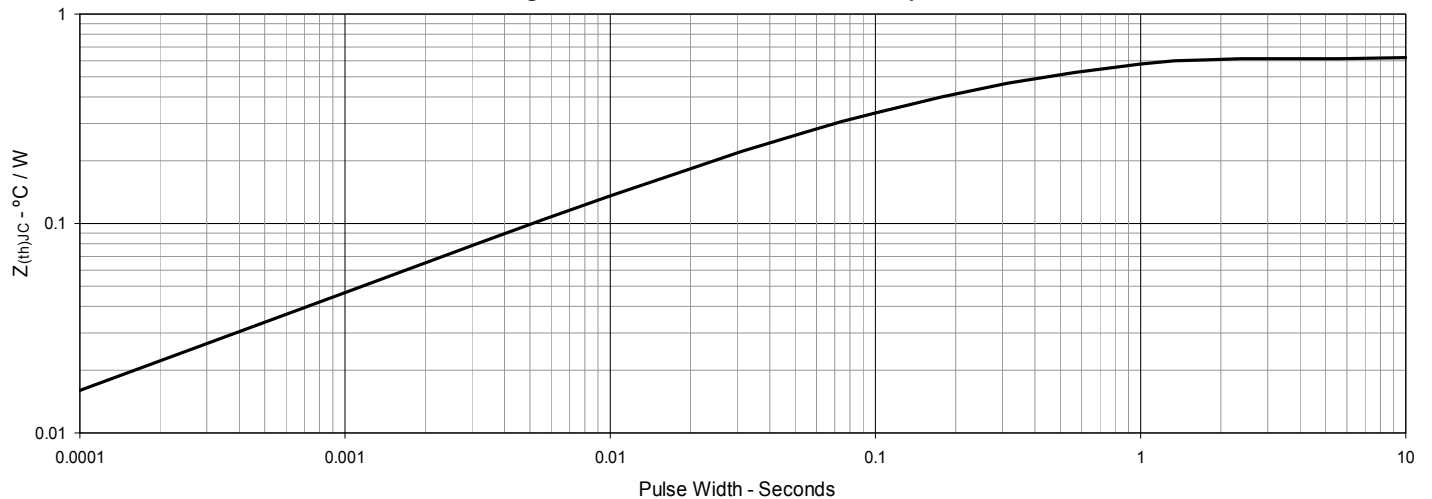
Fig. 7. Transconductance

Fig. 8. Gate Charge

Fig. 9. Capacitance

Fig. 10. Reverse-Bias Safe Operating Area

Fig. 11. Maximum Transient Thermal Impedance


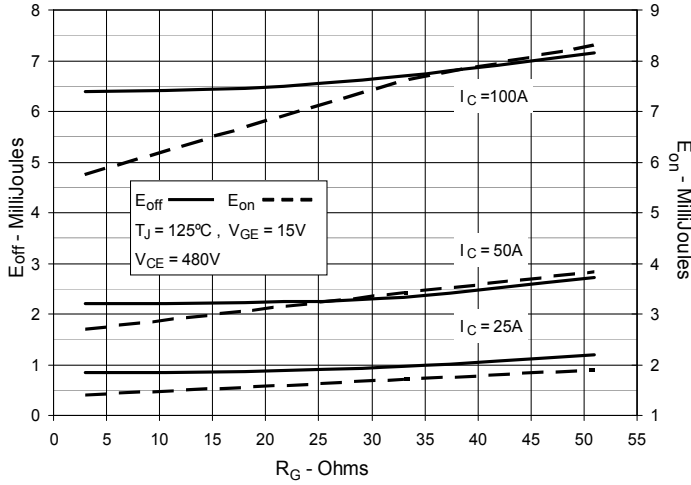
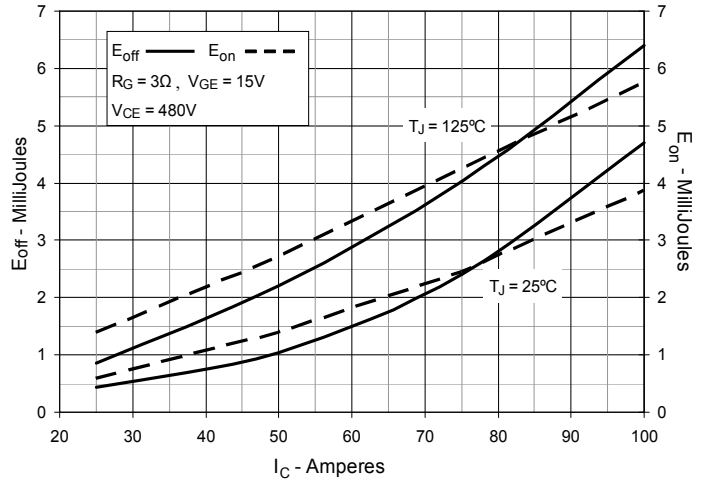
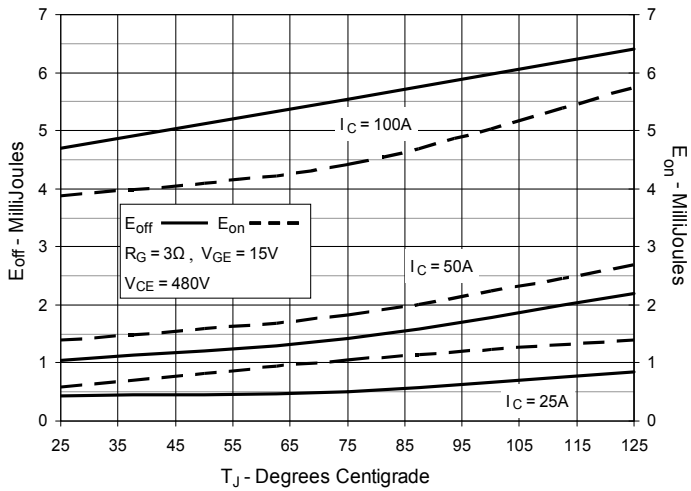
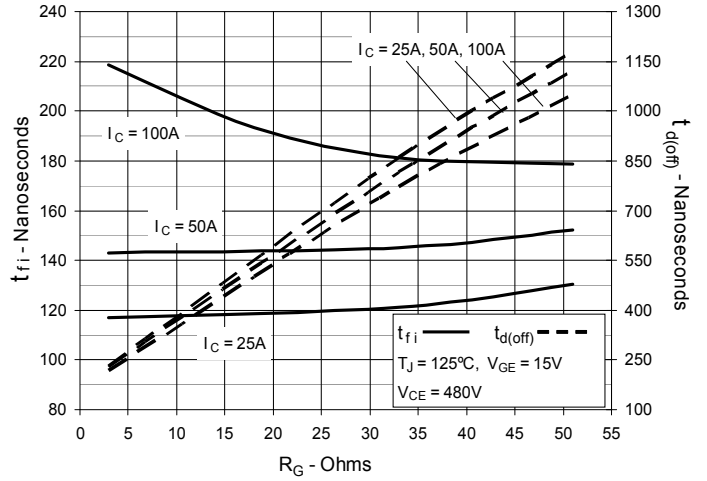
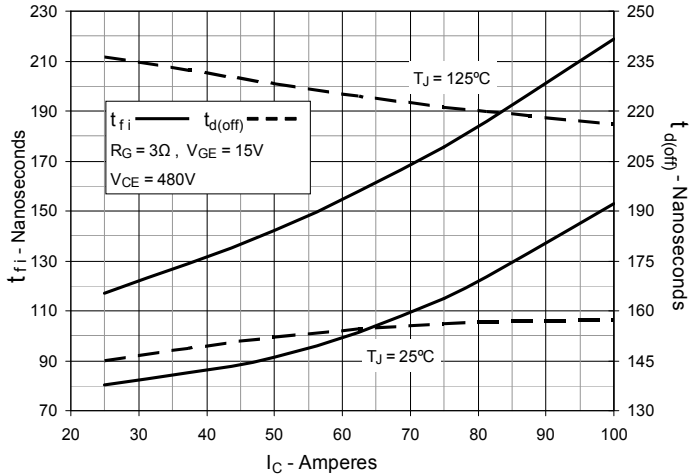
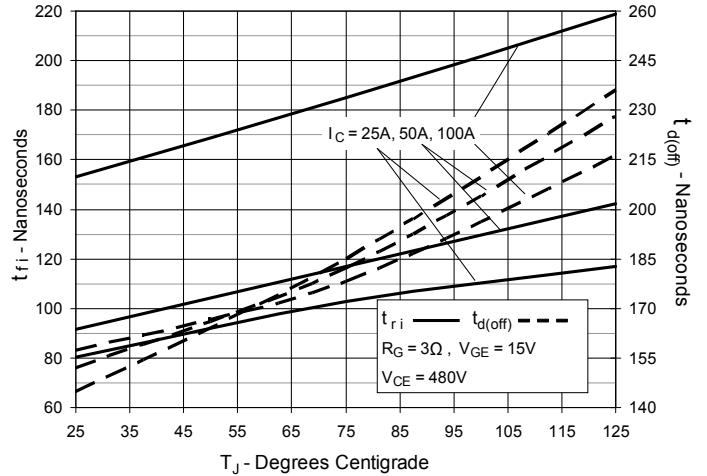
Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

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

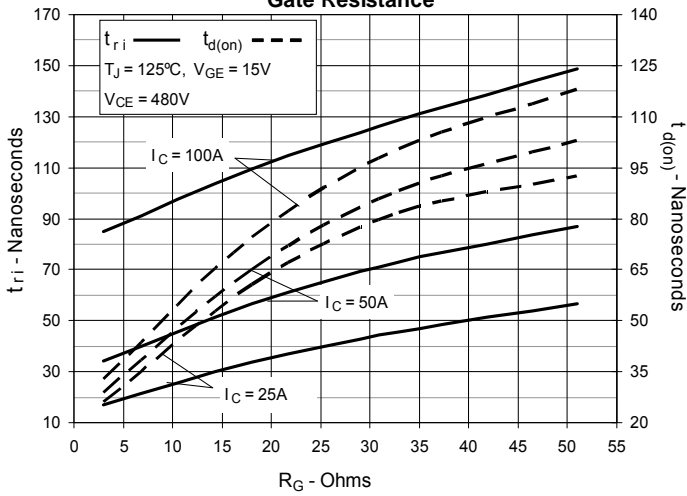


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

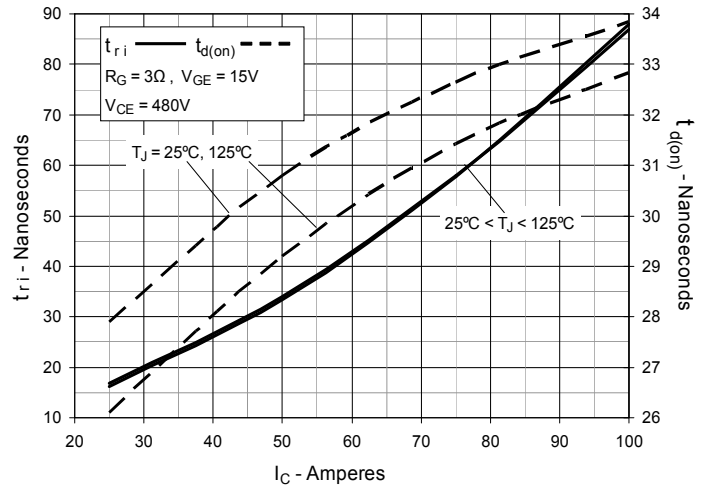
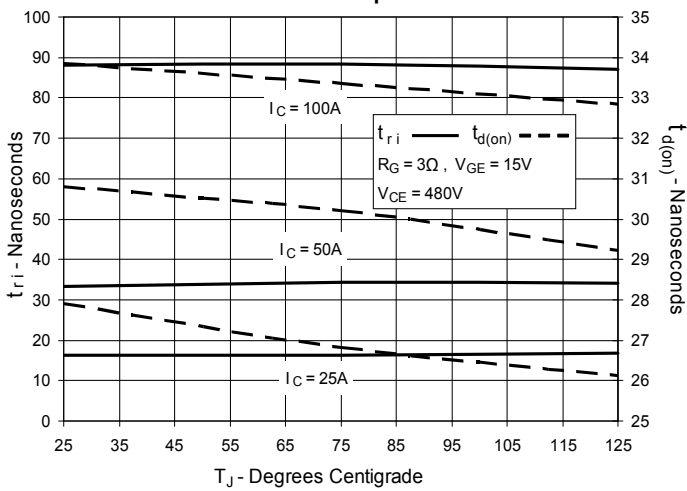


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



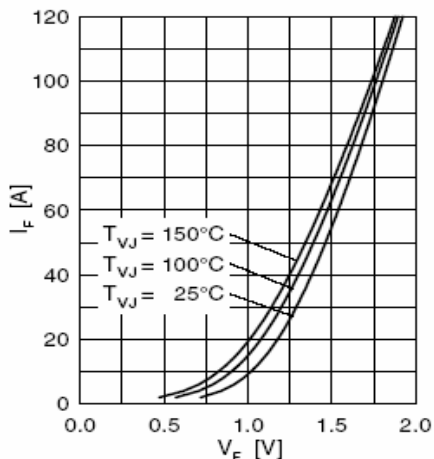


Fig. 21 Forward Current I_F vs. V_F

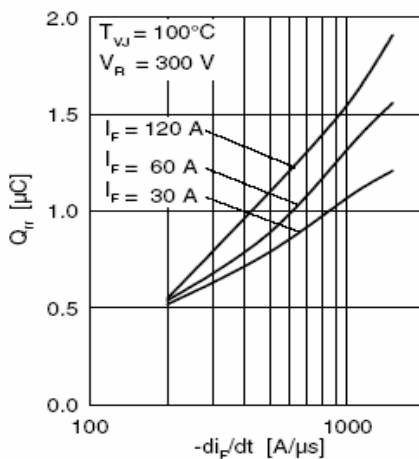


Fig. 22 Typ. Reverse Recovery Charge Q_{rr}

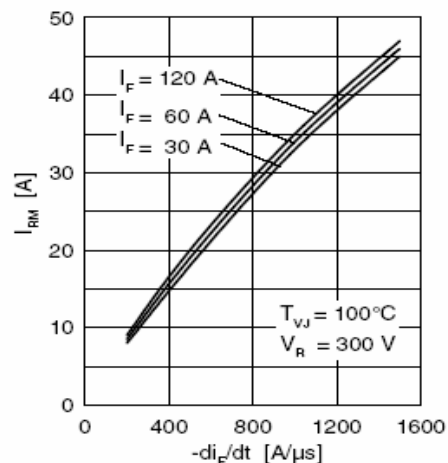


Fig. 23 Typ. Peak Reverse Current I_{RM}

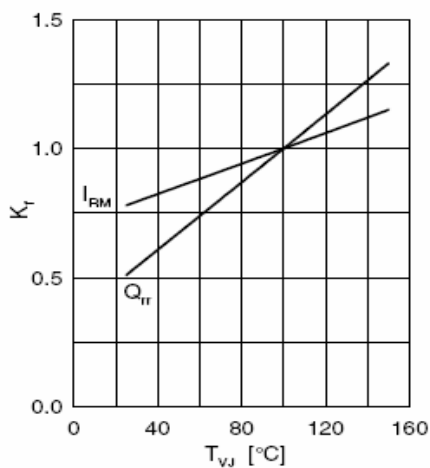


Fig. 24 Typ. Dynamic Parameters Q_{rr} , I_{RM}

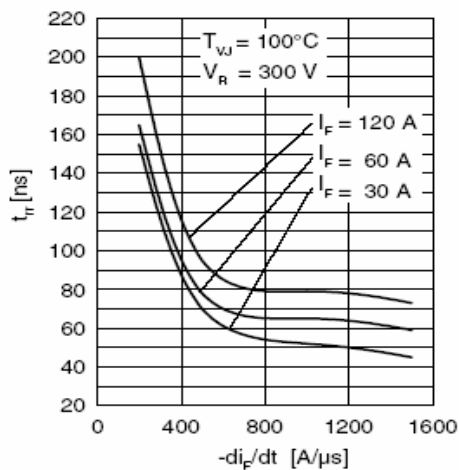


Fig. 25 Typ Recovery Time t_{rr}



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