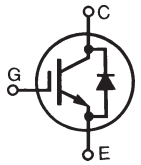
IXYS

GenX3™ 600V IGBT w/ Diode

IXGR72N60B3H1

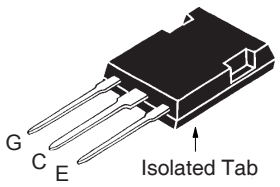
V_{CES} = 600V
I_{C110} = 40A
$V_{CE(sat)}$ ≤ 1.80V
$t_{fi(typ)}$ = 92ns

(Electrically Isolated Tab)



Medium Speed Low Vsat PT IGBT for 5-40 kHz Switching

ISOPLUS247™



G = Gate C = Collector
E = Emitter

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	600	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	600	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	80	A
I_{C110}	T_C = 110°C	40	A
I_{F110}	T_C = 110°C	34	A
I_{CM}	T_C = 25°C, 1ms	450	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 3Ω Clamped Inductive Load	I_{CM} = 240 $V_{CE} \le V_{CES}$	A
P_C	T_C = 25°C	200	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°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	°C
T_{SOLD}	1.6mm (0.062 in.) from Case for 10s	260	°C
Weight		5	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			300	μA
	T_J = 125°C			5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 60A, V_{GE} = 15V, Note 1		1.50	1.80	V
	I_C = 120A		1.75		V

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

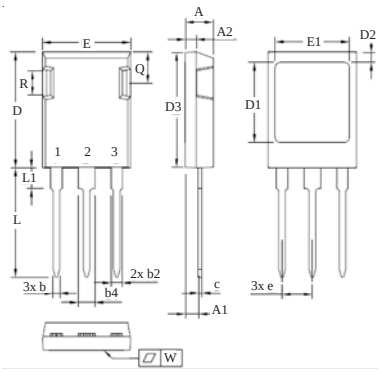
- High Power Density
- Low Gate Drive Requirement

Applications

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

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

ISOPLUS247 (IXGR) Outline



1 - Gate
2 - Collector
3 - Emitter

Dim.	Millimeter min	Millimeter max	Inches min	Inches 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°C, Unless Otherwise Specified)		Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 60A, V_{GE} = 0V, Note 1				2.45	V
		T_J = 150°C		1.40	1.80	V
I_{RM}	I_F = 60A, V_{GE} = 0V, $-di_F/dt$ = 200A/μs, V_R = 300V	T_J = 100°C		8.3		A
t_{rr}	I_F = 60A, -di/dt = 200A/μs, V_R = 300V, T_J = 100°C			140		ns
R_{thJC}					0.80	°C/W

Notes:

1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V_{CE}(Clamp), T_J or R_G.

Fig. 1. Output Characteristics @ T_J = 25ºC

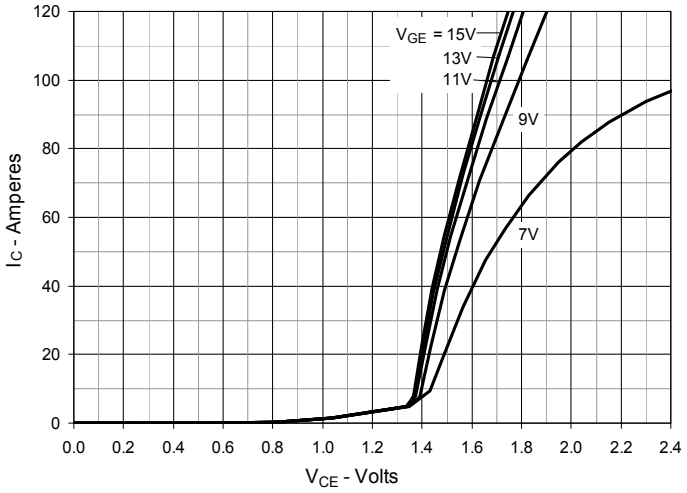


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

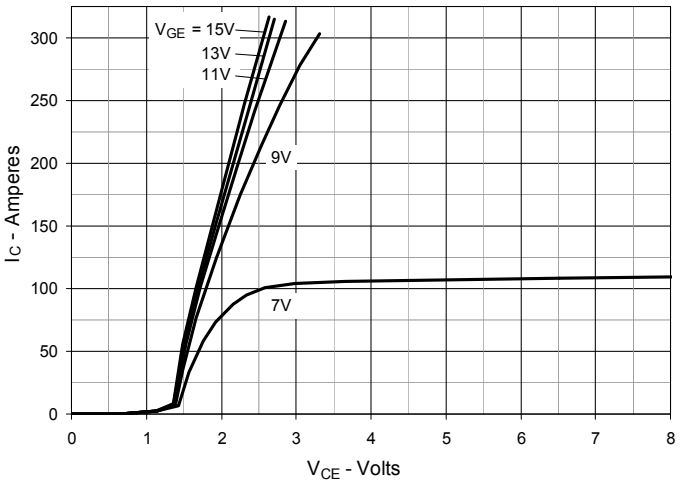


Fig. 3. Output Characteristics @ T_J = 125ºC

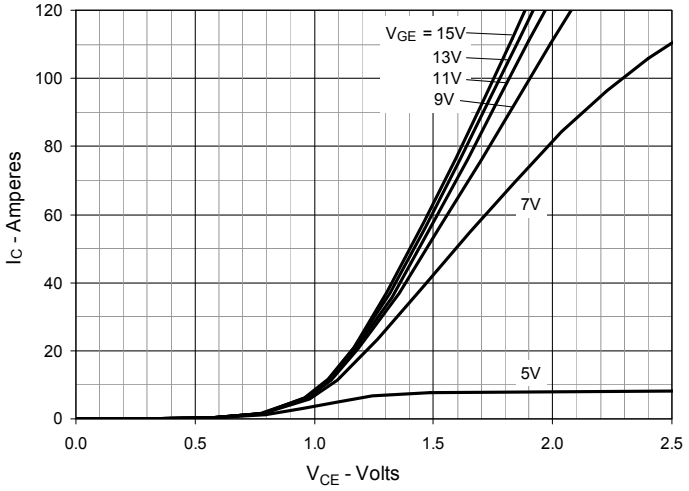


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

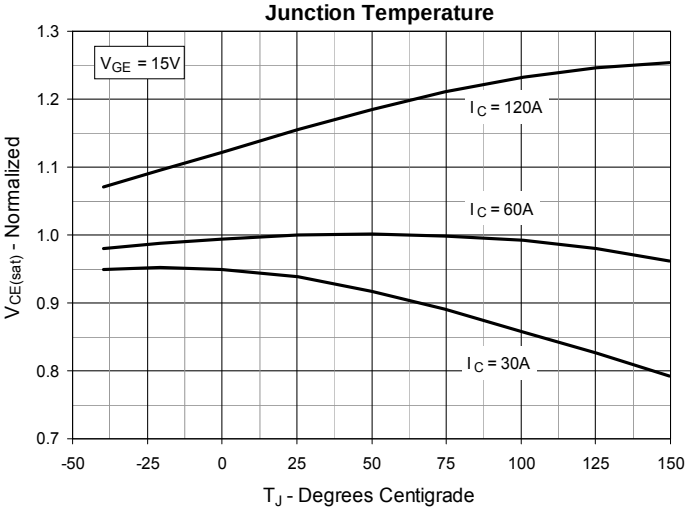


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

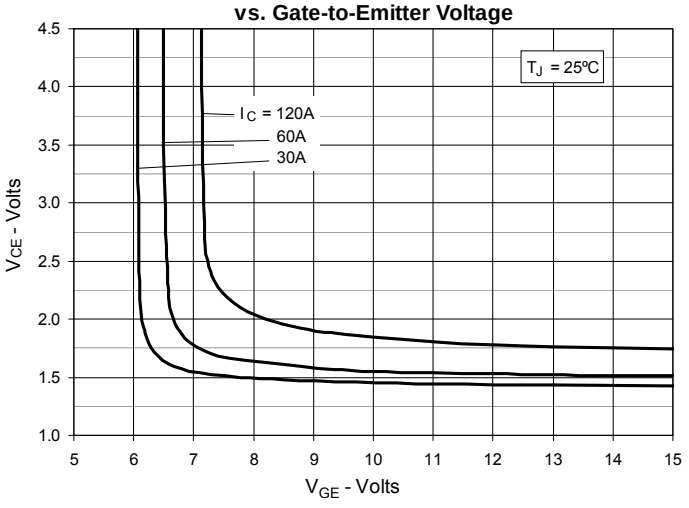


Fig. 6. Input Admittance

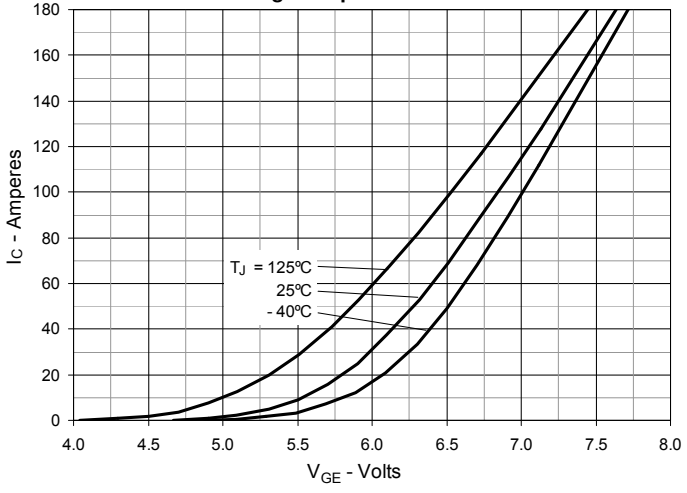


Fig. 7. Transconductance

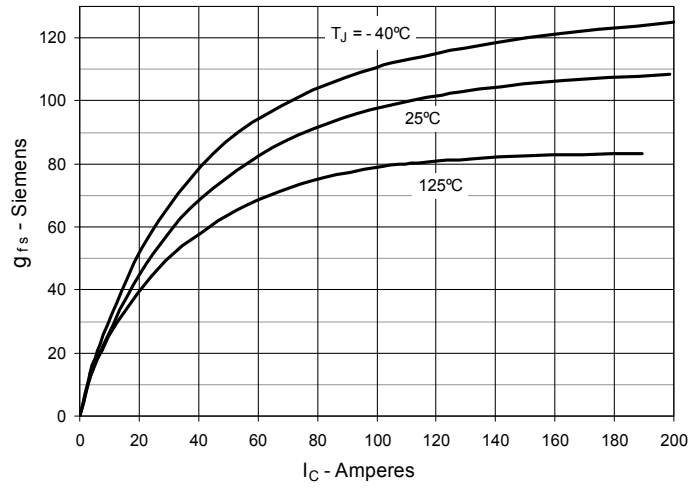


Fig. 8. Gate Charge

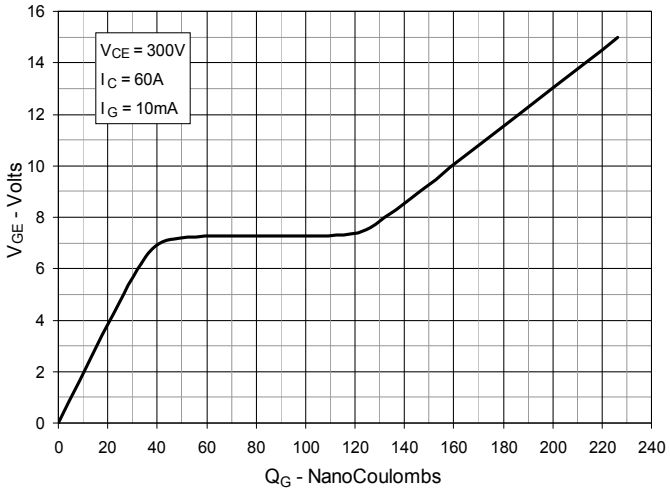


Fig. 9. Capacitance

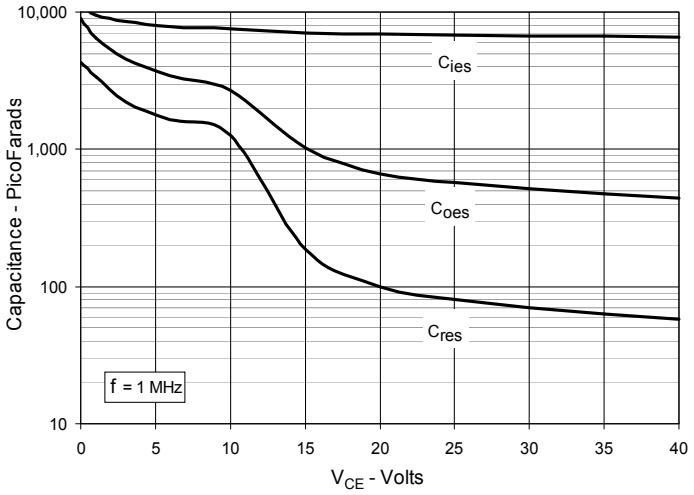


Fig. 10. Reverse-Bias Safe Operating Area

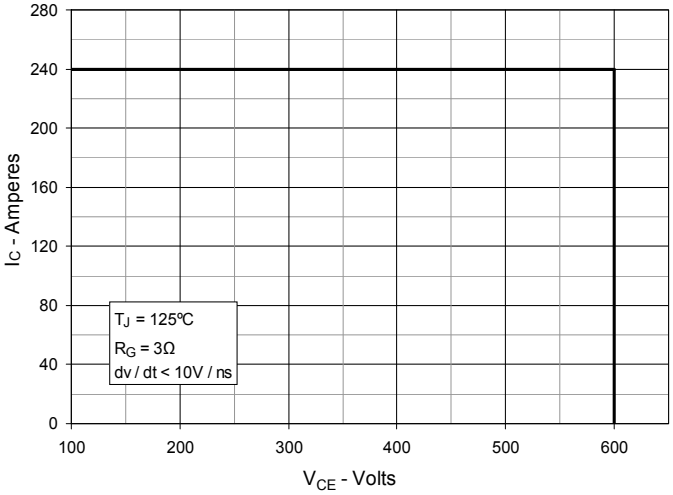


Fig. 11. Maximum Transient Thermal Impedance

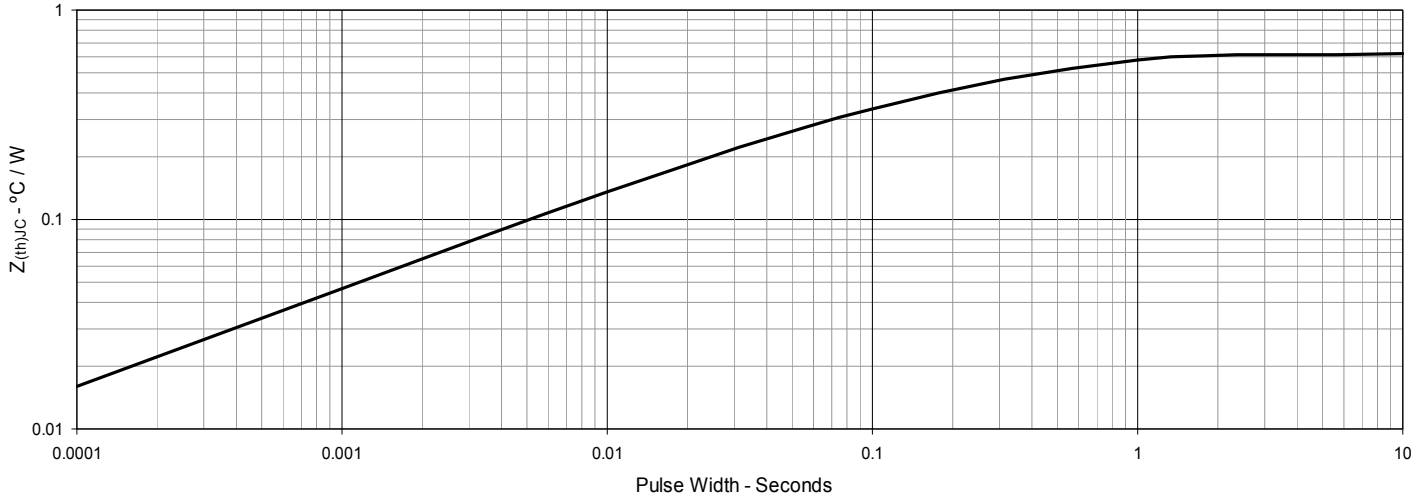


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

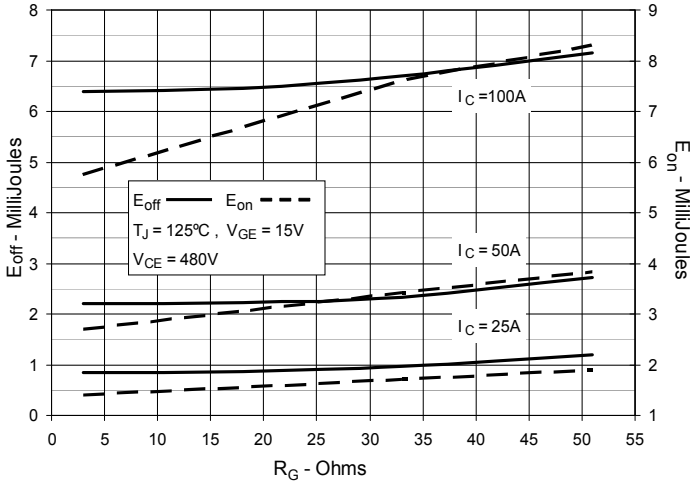


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

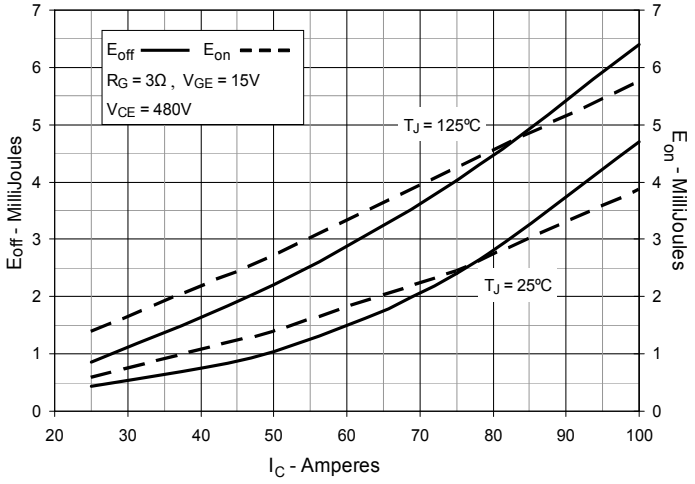


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

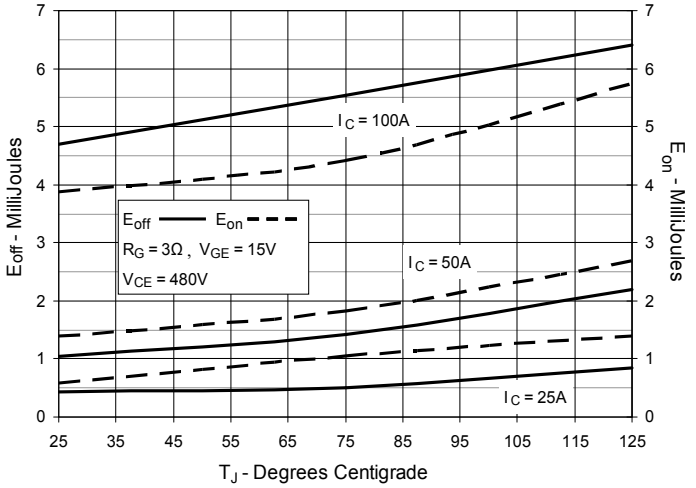


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

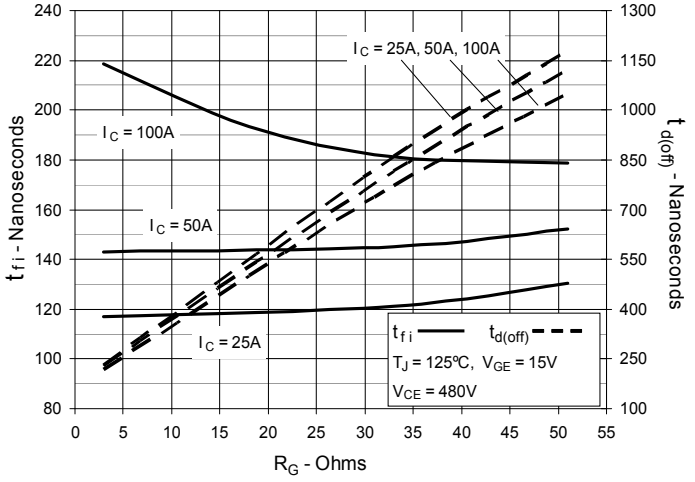


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

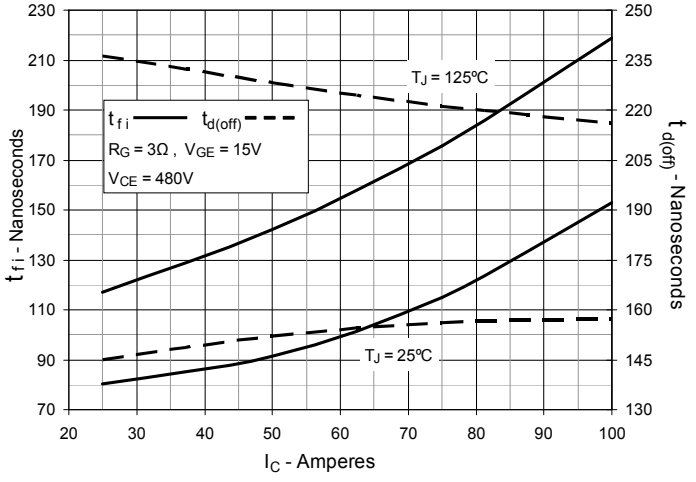


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

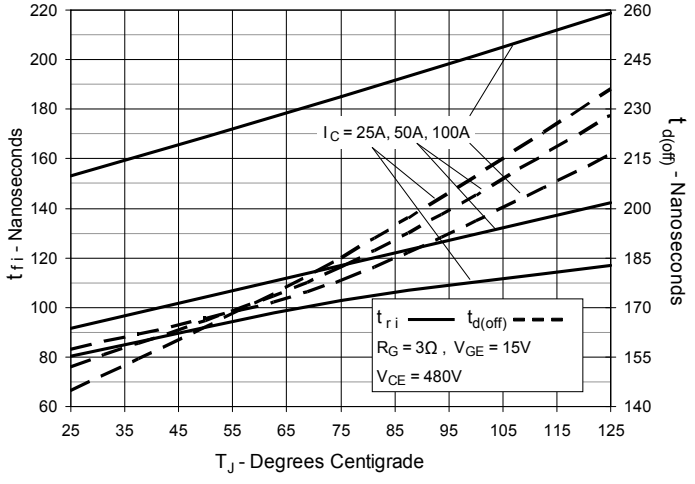


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

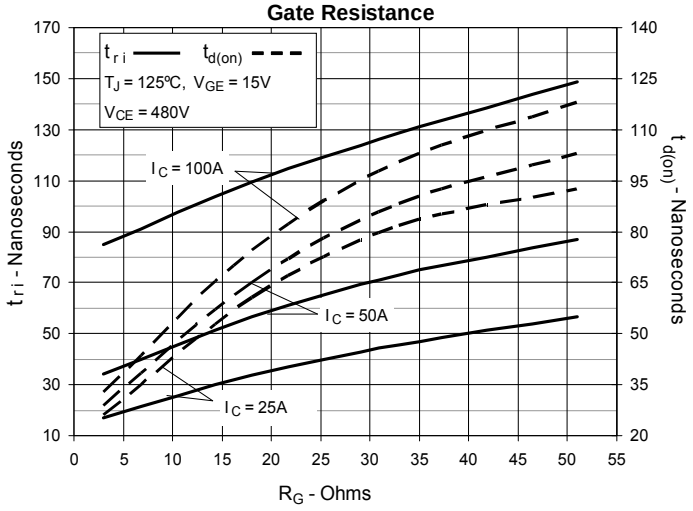


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

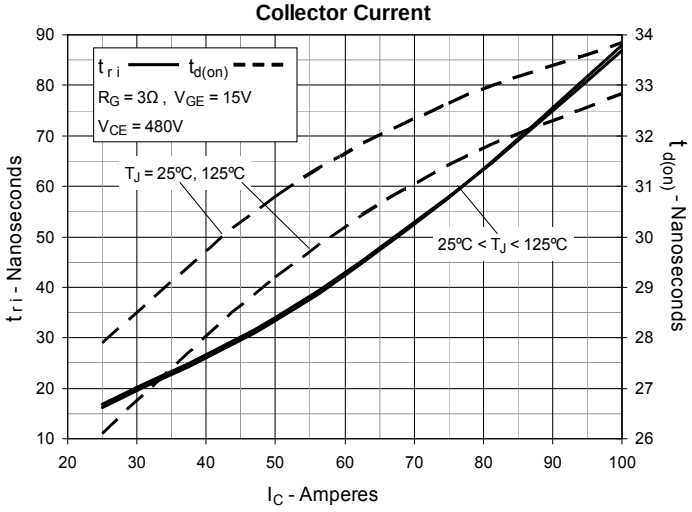
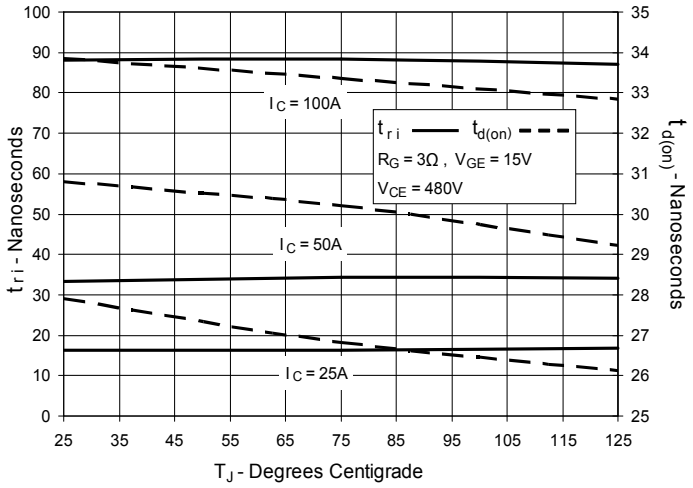


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



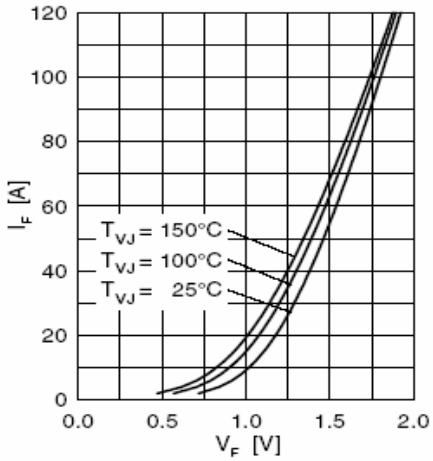


Fig. 21 Forward Current I_F vs. V_F

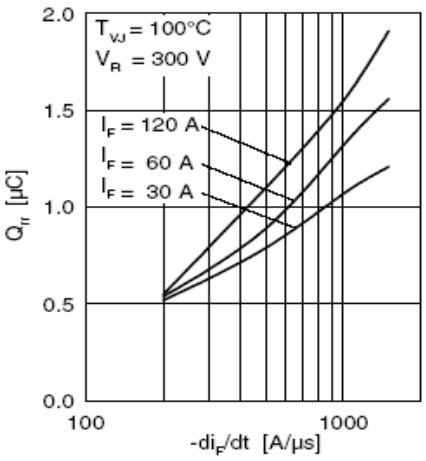


Fig. 22 Typ. Reverse Recovery Charge Q_{rr}

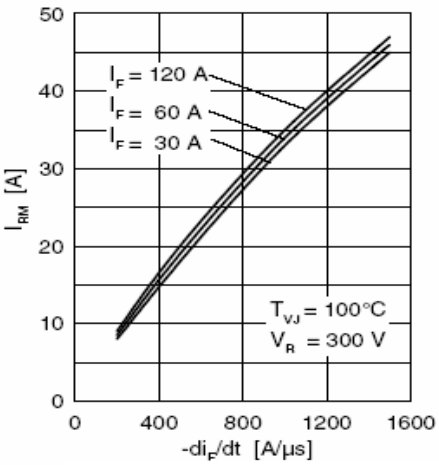


Fig. 23 Typ. Peak Reverse Current I_{RM}

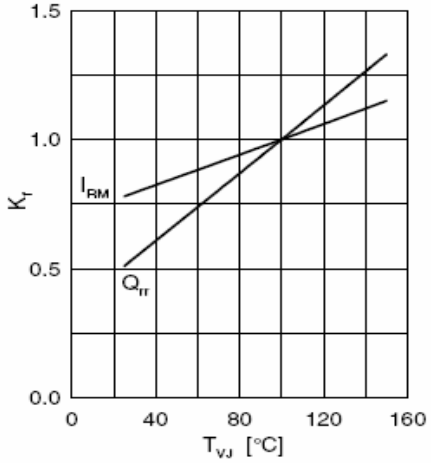


Fig. 24 Typ. Dynamic Parameters Q_{rr}, I_{RM}

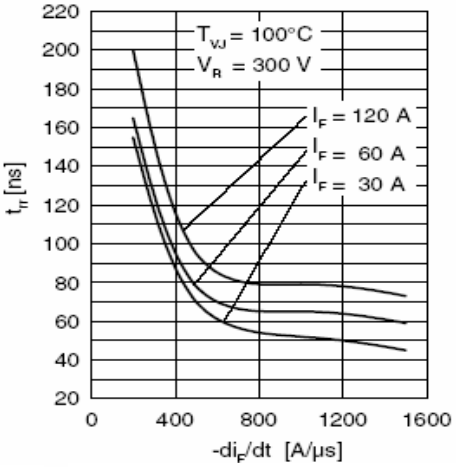


Fig. 25 Typ Recovery Time t_{rr}

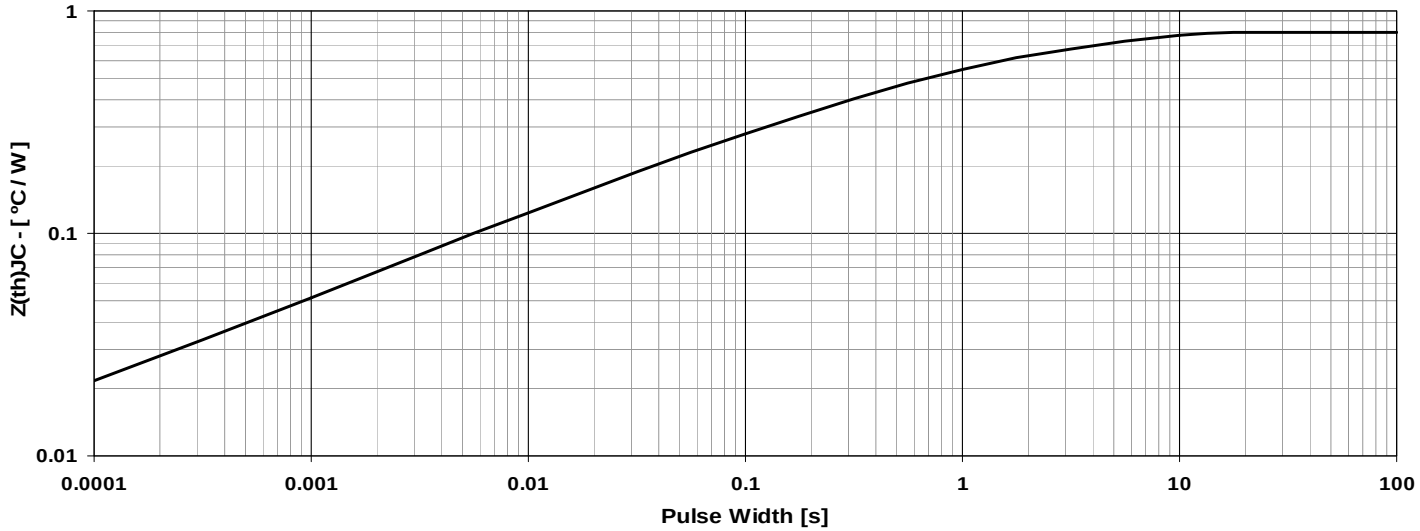


Fig. 26 Maximum Transient Thermal Impedance Junction to Case (for Diode)