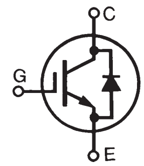
Advance Technical Information

XPT^{TM} 600V GenX3^{TM} w/ Diode

IXXK100N60B3H1

V_{CES} = 600V
I_{C90} = 100A
$V_{CE(sat)}$ ≤ 1.80V
$t_{fi(typ)}$ = 150ns

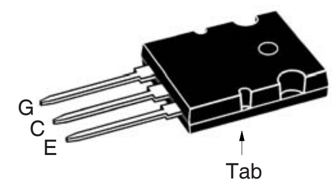
Extreme Light Punch Through
IGBT for 10-30kHz Switching



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 (Chip Capability)	190	A
I_{LRMS}	Terminal Current Limit	120	A
I_{C90}	T_C = 90°C	100	A
I_{F110}	T_C = 110°C	65	A
I_{CM}	T_C = 25°C, 1ms	370	A
I_A	T_C = 25°C	50	A
E_{AS}	T_C = 25°C	600	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 2Ω Clamped Inductive Load	I_{CM} = 200 @$V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	V_{GE}= 15V, V_{CE} = 360V, T_J = 150°C R_G = 10Ω, Non Repetitive	10	μs
P_C	T_C = 25°C	695	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
M_d	Mounting Torque	1.13/10	Nm/lb.in.
Weight		10	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	600			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.5	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			50	μA
	T_J = 125°C			4	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 70A, V_{GE} = 15V, Note 1		1.50	1.80	V
	T_J = 150°C		1.77		V

TO-264



G = Gate
C = Collector
E = Emitter
Tab = Collector

Features

- Optimized for 10-30kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- Anti-Parallel Ultra Fast Diode
- High Current Handling Capability
- International Standard Package

Advantages

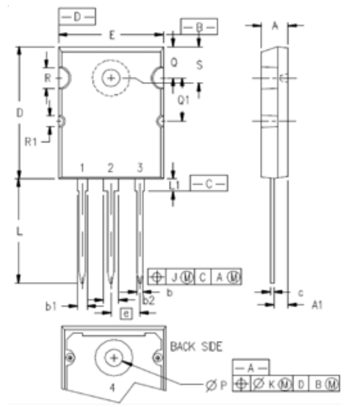
- High Power Density
- Low Gate Drive Requirement

Applications

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

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	$I_C = 60A$, $V_{CE} = 10V$, Note 1	22	40		S
C_{ies}	$V_{CE} = 25V$, $V_{GE} = 0V$, f = 1MHz		4860		pF
C_{oes}			475		pF
C_{res}			83		pF
Q_g	$I_C = 70A$, $V_{GE} = 15V$, $V_{CE} = 0.5 \bullet V_{CES}$		143		nC
Q_{ge}			37		nC
Q_{gc}			60		nC
$t_{d(on)}$	**Inductive load, $T_J = 25°C$**		30		ns
t_{ri}	$I_C = 70A$, $V_{GE} = 15V$		70		ns
E_{on}	$V_{CE} = 360V$, $R_G = 2\Omega$		1.9		mJ
$t_{d(off)}$	Note 2		120		ns
t_{fi}			150		ns
E_{off}			2.0	2.8	mJ
$t_{d(on)}$	**Inductive load, $T_J = 150°C$**		32		ns
t_{ri}	$I_C = 70A$, $V_{GE} = 15V$		60		ns
E_{on}	$V_{CE} = 360V$, $R_G = 2\Omega$		2.3		mJ
$t_{d(off)}$	Note 2		150		ns
t_{fi}			200		ns
E_{off}			2.8		mJ
R_{thJC}				0.18	°C/W
R_{thCS}			0.15		°C/W

TO-264 (IXXK) Outline



Terminals: **1 = Gate**
2,4 = Collector
3 = Emitter

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.185	.209	4.70	5.31
A1	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b1	.087	.102	2.21	2.59
b2	.110	.126	2.79	3.20
c	.017	.029	0.43	0.74
D	1.007	1.047	25.58	26.59
E	.760	.799	19.30	20.29
e	.215BSC		5.46 BSC	
J	.000	.010	0.00	0.25
K	.000	.010	0.00	0.25
L	.779	.842	19.79	21.39
L1	.087	.102	2.21	2.59
ØP	.122	.138	3.10	3.51
Q	.240	.256	6.10	6.50
Q1	.330	.346	8.38	8.79
ØR	.155	.187	3.94	4.75
ØR1	.085	.093	2.16	2.36
S	.243	.253	6.17	6.43

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		1.6	2.0	V
	$T_J = 150°C$		1.4	1.8	V
I_{RM}	$I_F = 60A$, $V_{GE} = 0V$, $T_J = 100°C$		8.3		A
t_{rr}	$-di_F/dt = 200A/\mu s$, $V_R = 300V$		140		ns
R_{thJC}				0.30	°C/W

Notes:

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

ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

Fig. 1. Output Characteristics @ T_J = 25ºC

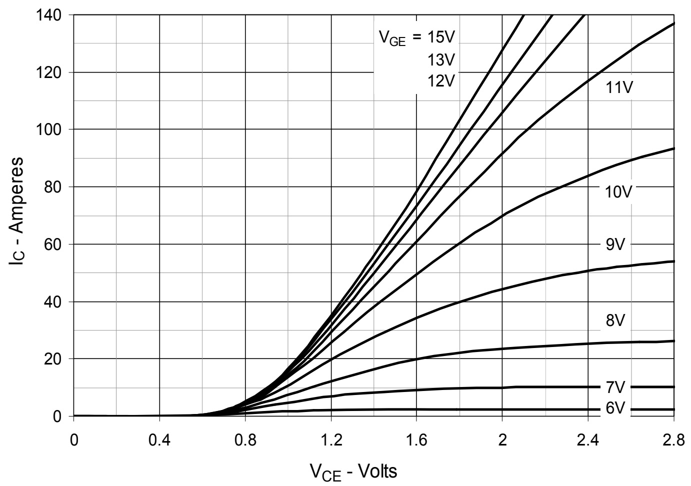


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

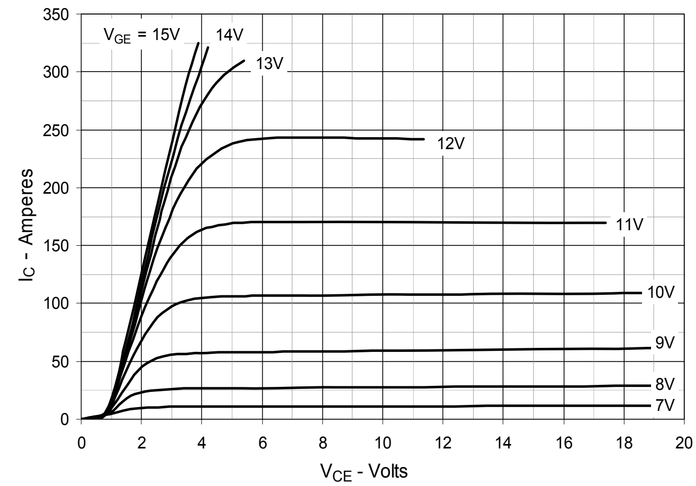


Fig. 3. Output Characteristics @ T_J = 150ºC

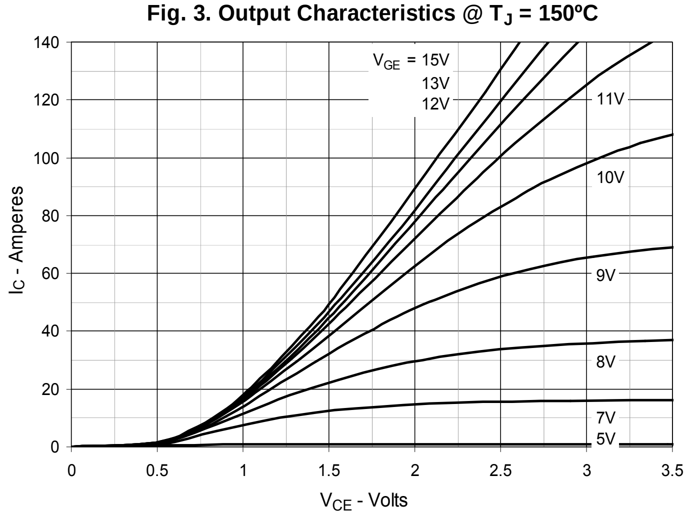


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

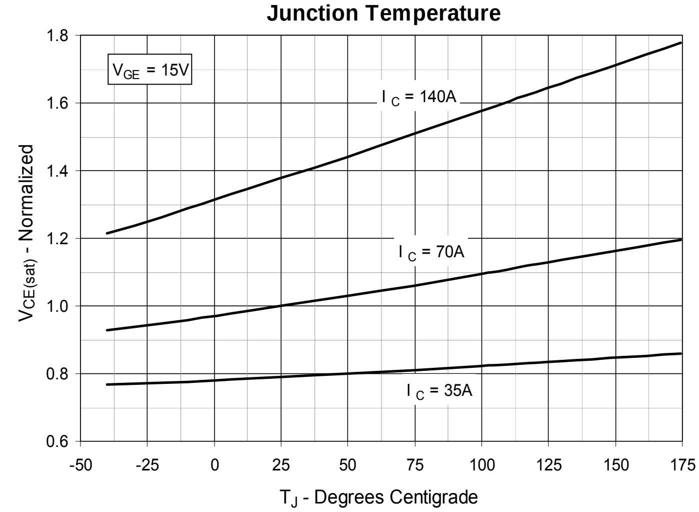


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

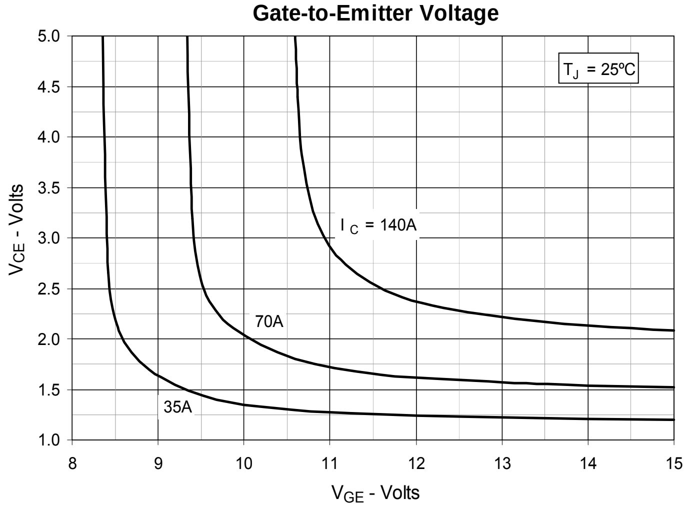


Fig. 6. Input Admittance

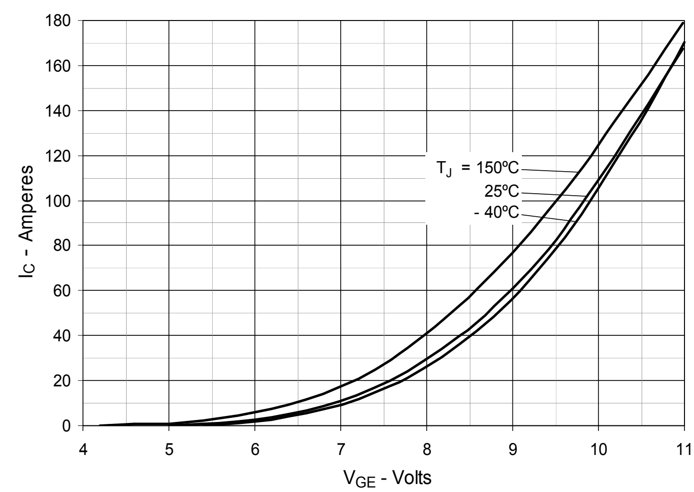


Fig. 7. Transconductance

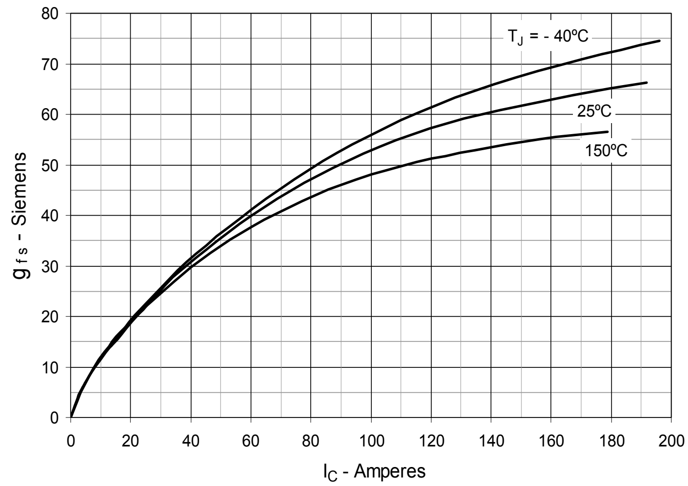


Fig. 8. Gate Charge

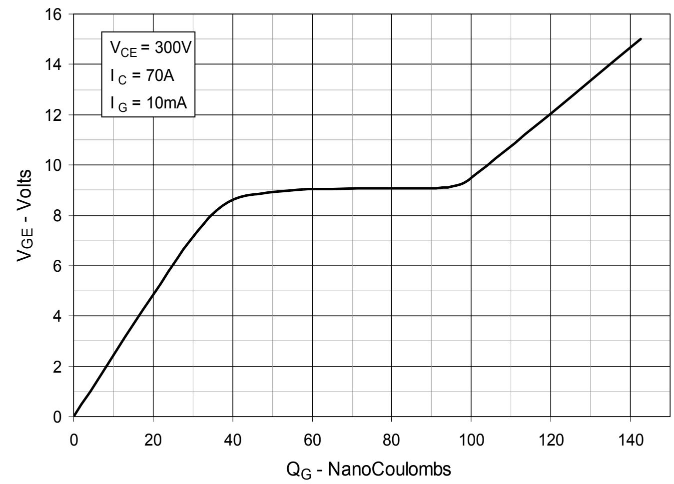


Fig. 9. Capacitance

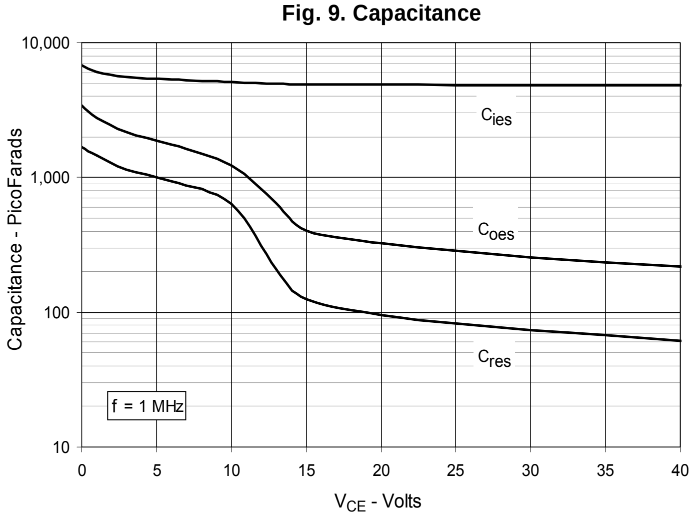


Fig. 10. Reverse-Bias Safe Operating Area

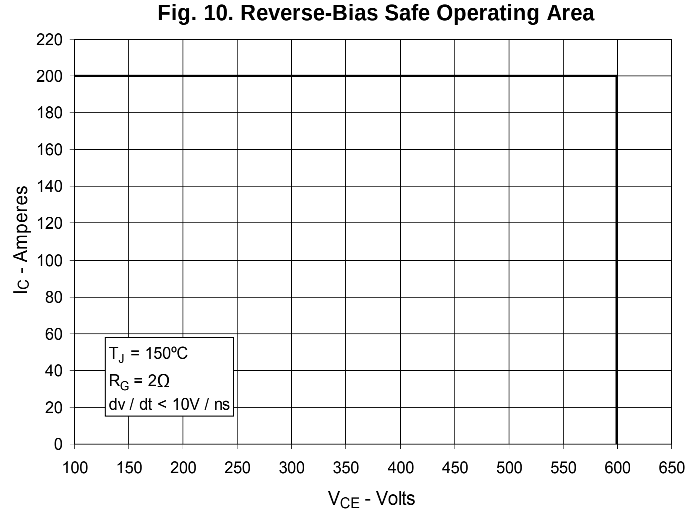


Fig. 11. Forward-Bias Safe Operating Area

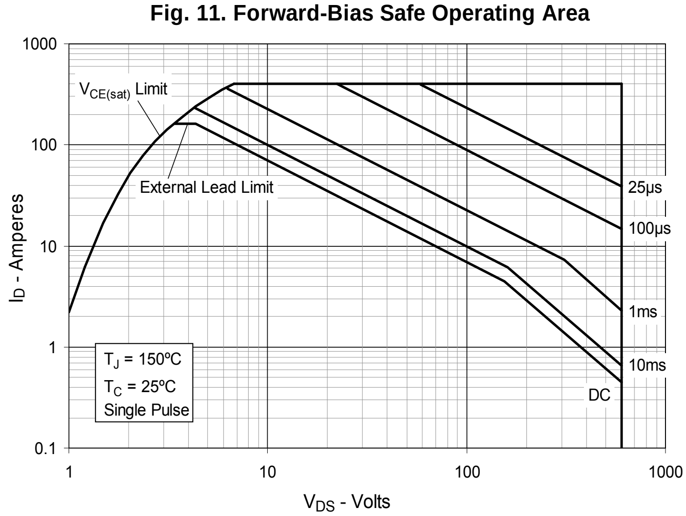


Fig. 12. Maximum Transient Thermal Impedance

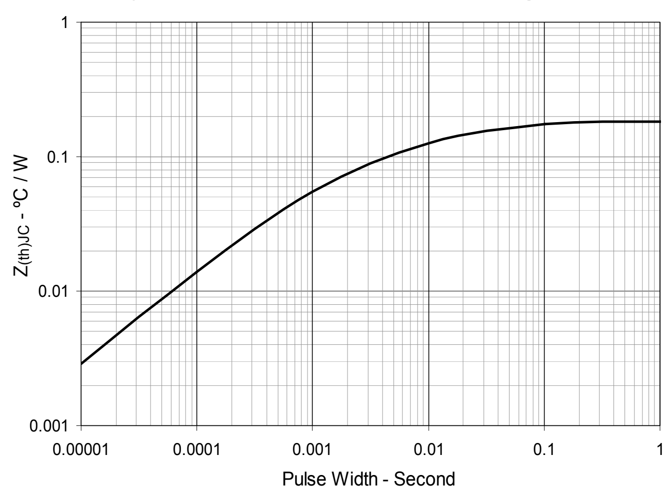


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

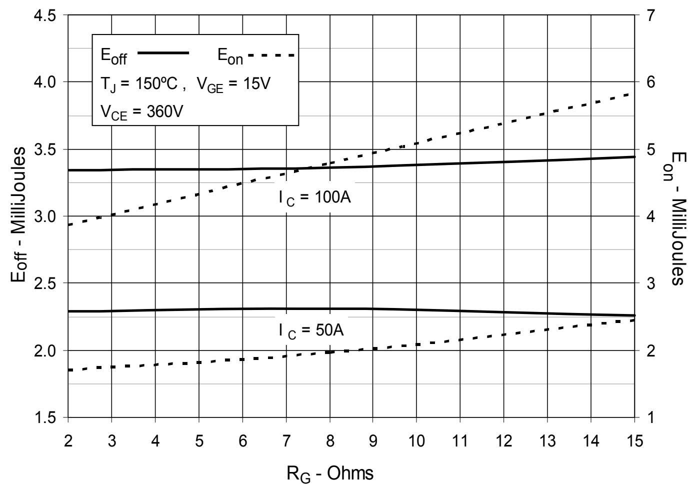


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

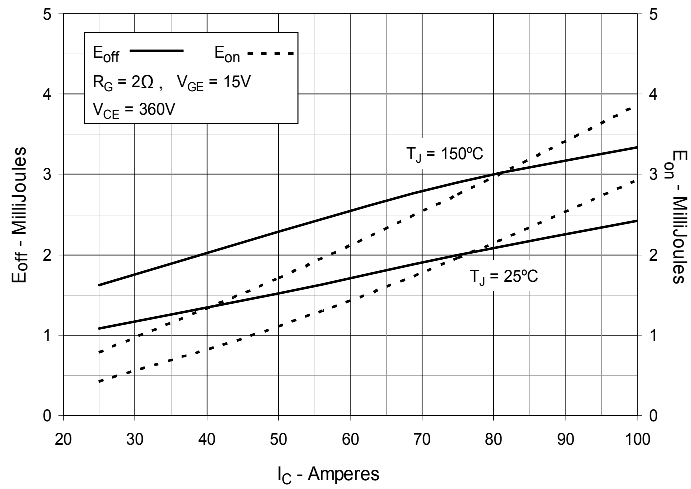


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

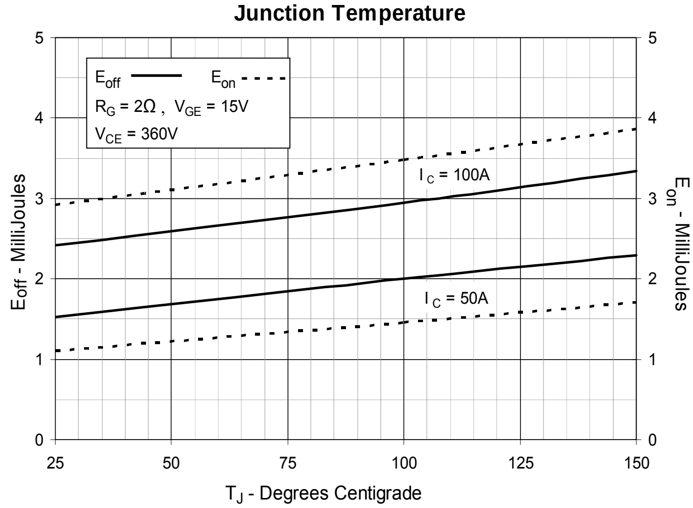


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

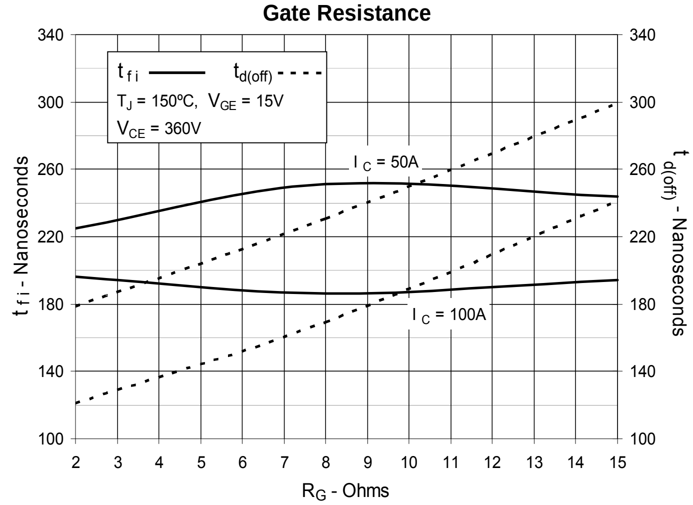


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

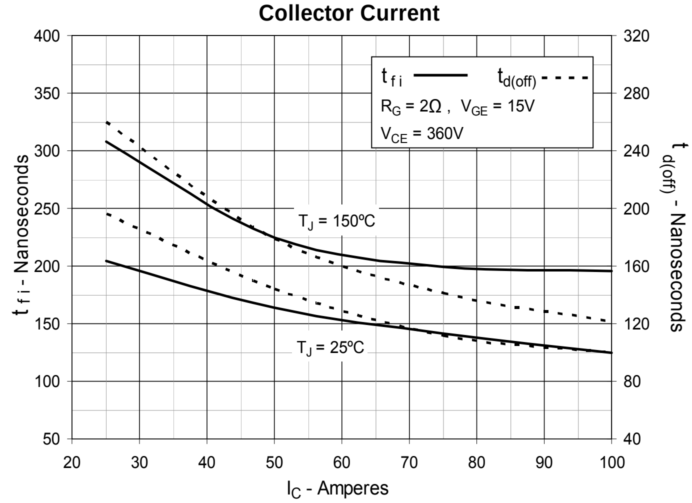


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

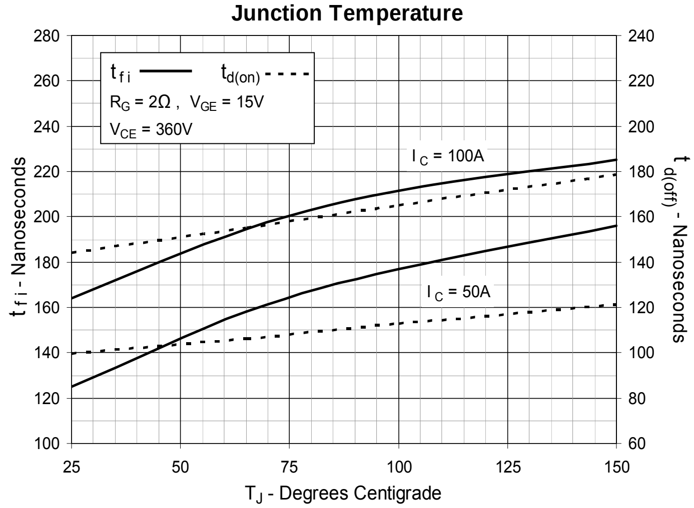


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

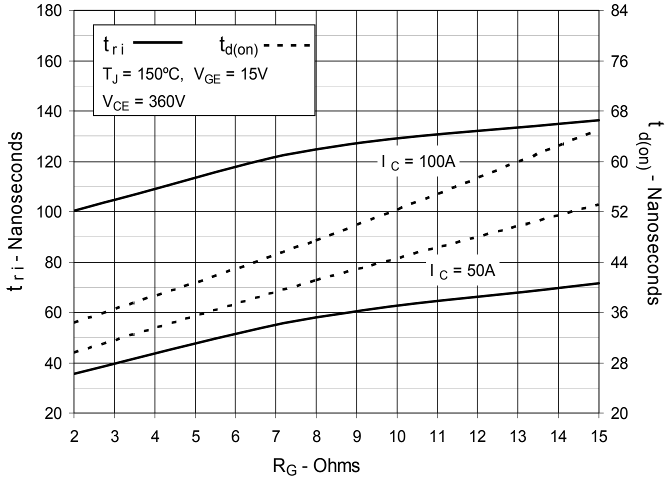


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

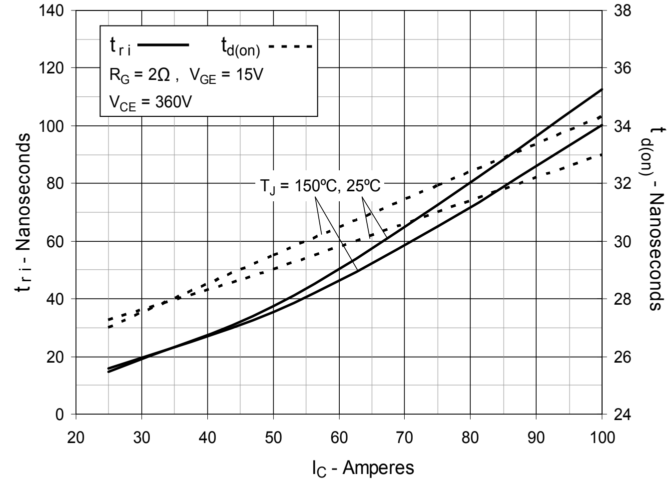
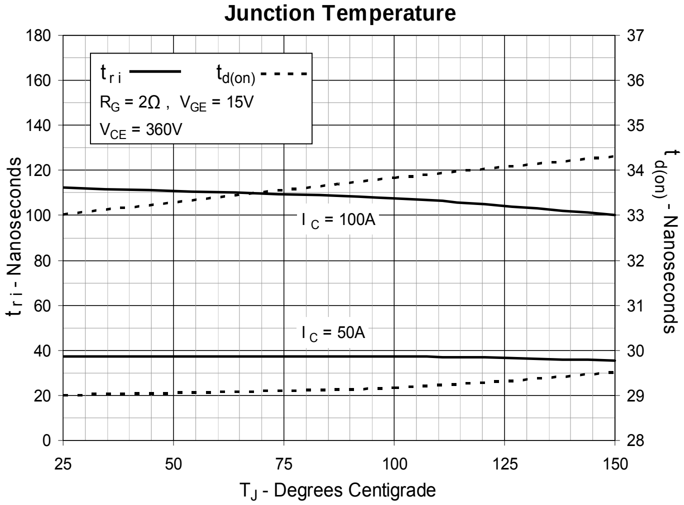


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature



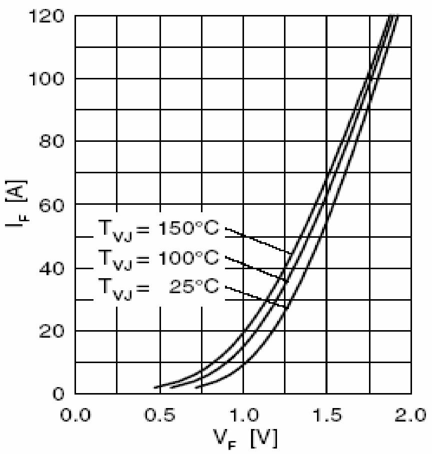


Fig. 22. Forward Current I_F Versus V_F

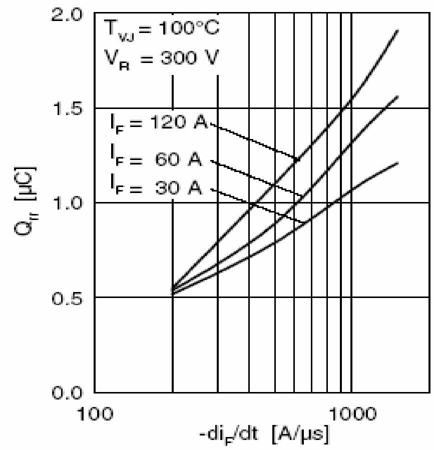


Fig. 23. Reverse Recovery Charge Q_r Versus -di_F/dt

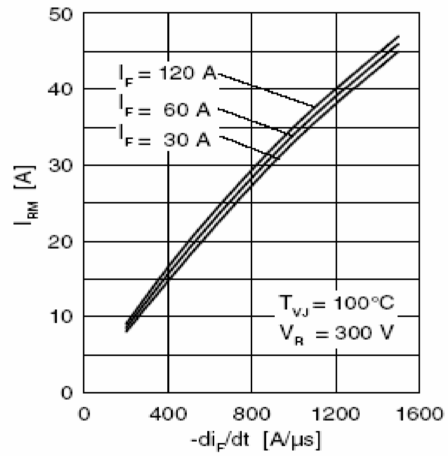


Fig. 24. Peak Reverse Current I_{RM} Versus -di_F/dt

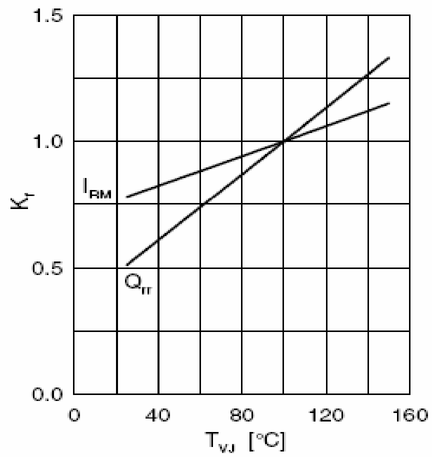


Fig. 25. Dynamic Parameters Q_r, I_{RM} Versus T_{VJ}

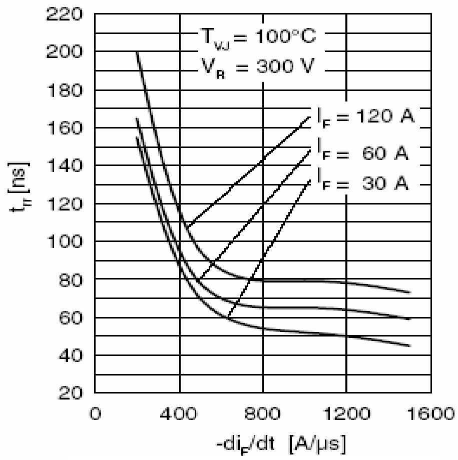


Fig. 26. Recovery Time t_{rr} Versus -di_F/dt

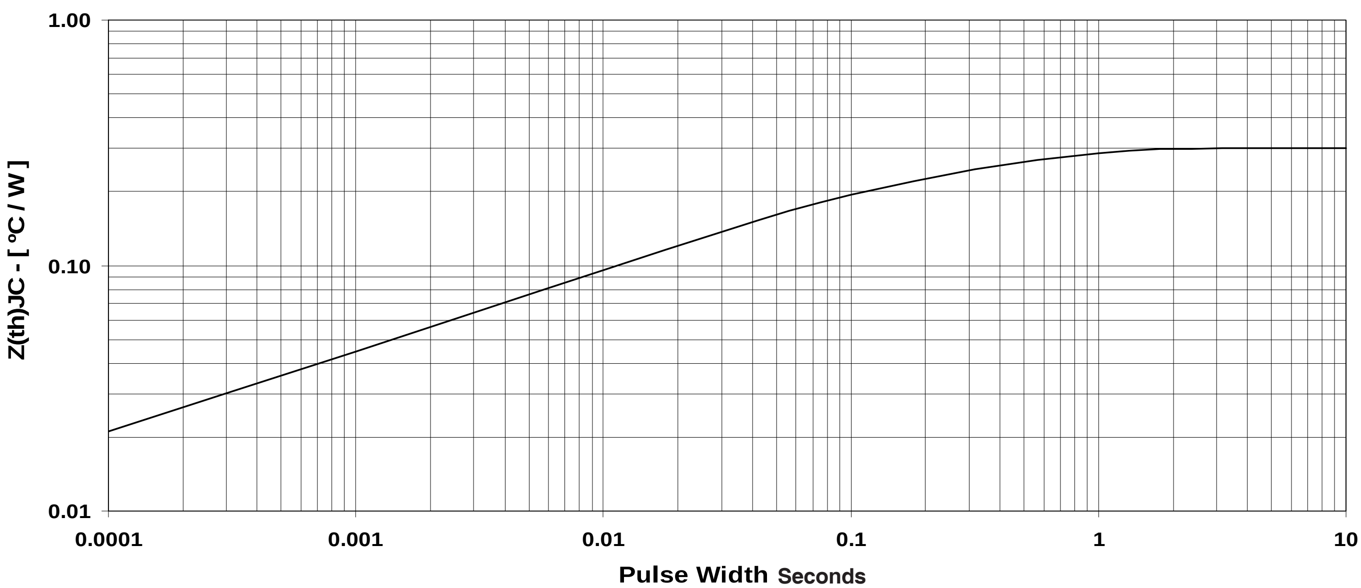


Fig. 27. Maximum transient thermal impedance junction to case (for diode)