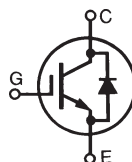


XPT™ 600V GenX3™ w/ Diode

IXXK100N60B3H1

Extreme Light Punch Through
IGBT for 10-30kHz Switching

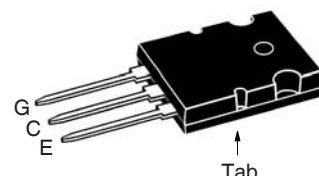


$$\begin{aligned} V_{CES} &= 600V \\ I_{C90} &= 100A \\ V_{CE(sat)} &\leq 1.80V \\ t_{fi(typ)} &= 150ns \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	600	V
V_{CGR}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GE} = 1M\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$ (Chip Capability)	190	A
I_{LRMS}	Terminal Current Limit	120	A
I_{C90}	$T_C = 90^\circ\text{C}$	100	A
I_{F110}	$T_C = 110^\circ\text{C}$	65	A
I_{CM}	$T_C = 25^\circ\text{C}, 1\text{ms}$	370	A
I_A	$T_C = 25^\circ\text{C}$	50	A
E_{AS}	$T_C = 25^\circ\text{C}$	600	mJ
SSOA (RBSOA)	$V_{GE} = 15V, T_{VJ} = 150^\circ\text{C}, R_G = 2\Omega$ Clamped Inductive Load	$I_{CM} = 200$ $@ V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	$V_{GE} = 15V, V_{CE} = 360V, T_J = 150^\circ\text{C}$ $R_G = 10\Omega, \text{Non Repetitive}$	10	μs
P_C	$T_C = 25^\circ\text{C}$	695	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^\circ\text{C}$
M_d	Mounting Torque	1.13/10	Nm/lb.in.
Weight		10	g

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

TO-264



G = Gate E = Emitter
C = Collector 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

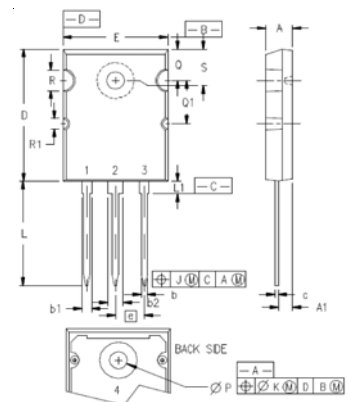
($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

Min. Typ. Max.

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

TO-264 (IXXK) Outline



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

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	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	.215 BSC		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
P	.122	.138	3.10	3.51
Q	.240	.256	6.10	6.50
Q1	.330	.346	8.38	8.79
R	.155	.187	3.94	4.75
R1	.085	.093	2.16	2.36
S	.243	.253	6.17	6.43

Reverse Diode (FRED)

Symbol Test Conditions

($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

Min. Typ. Max.

V_F	$I_F = 60\text{A}, V_{GE} = 0\text{V}, \text{Note 1}$	$T_J = 150^\circ\text{C}$	1.6	2.0	V
			1.4	1.8	V
I_{RM}	$I_F = 60\text{A}, V_{GE} = 0\text{V},$ $-di_F/dt = 200\text{A}/\mu\text{s}, V_R = 300\text{V}$	$T_J = 100^\circ\text{C}$	8.3		A
t_{rr}			140		ns
R_{thJC}				0.30	$^\circ\text{C/W}$

Notes:

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

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
	4,850,072	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	

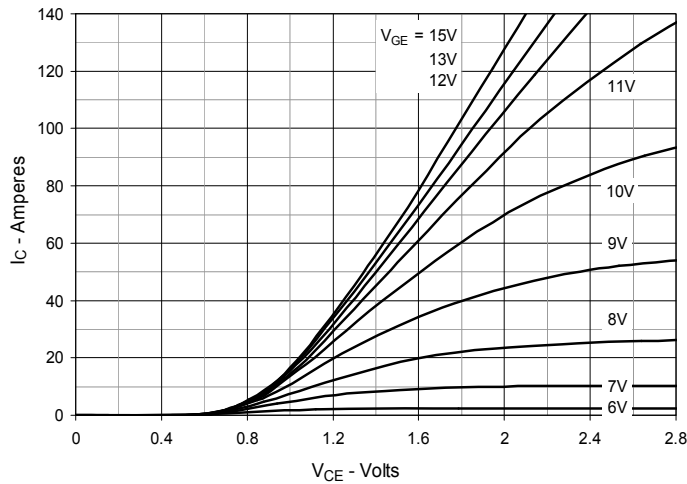
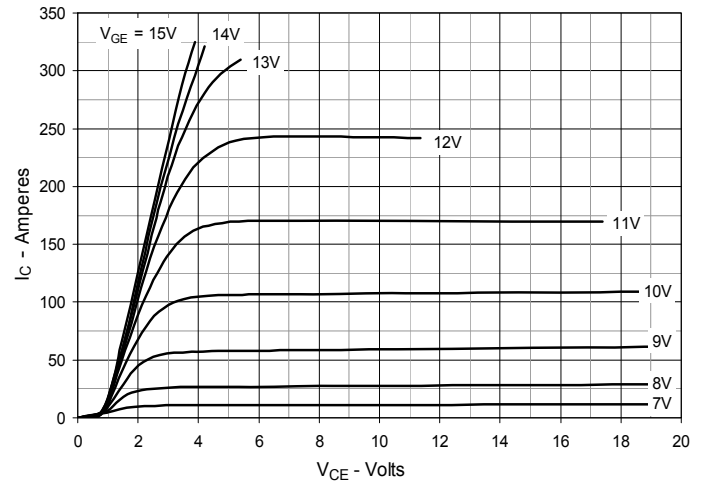
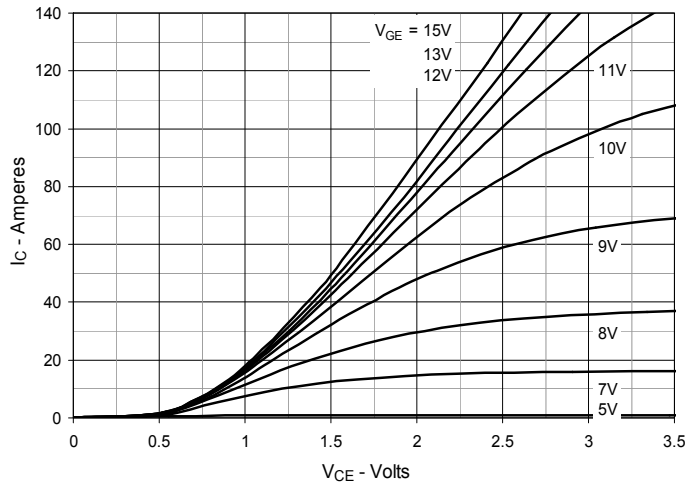
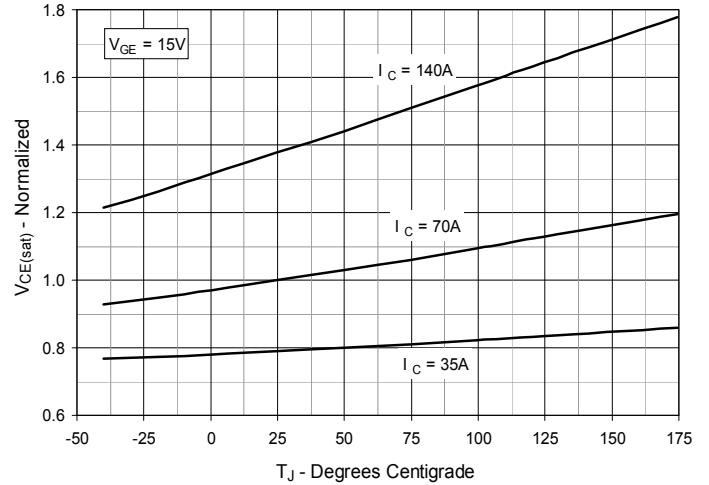
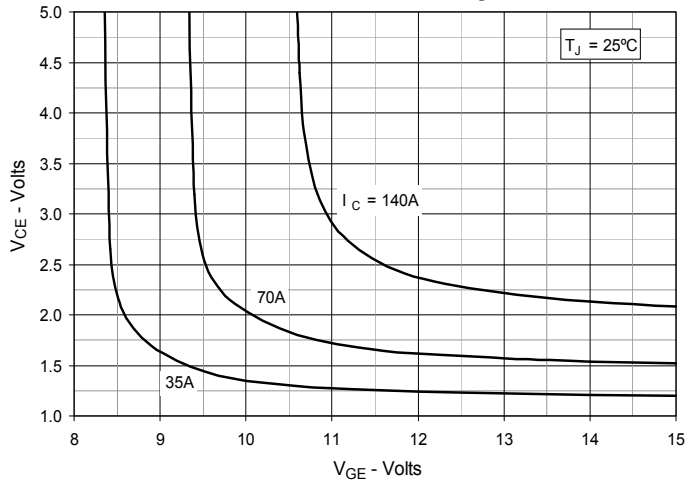
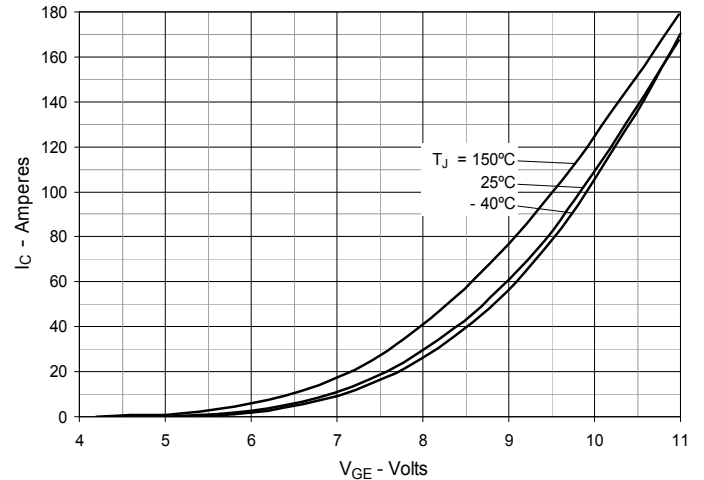
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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

Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$

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

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

Fig. 6. Input Admittance


Fig. 7. Transconductance

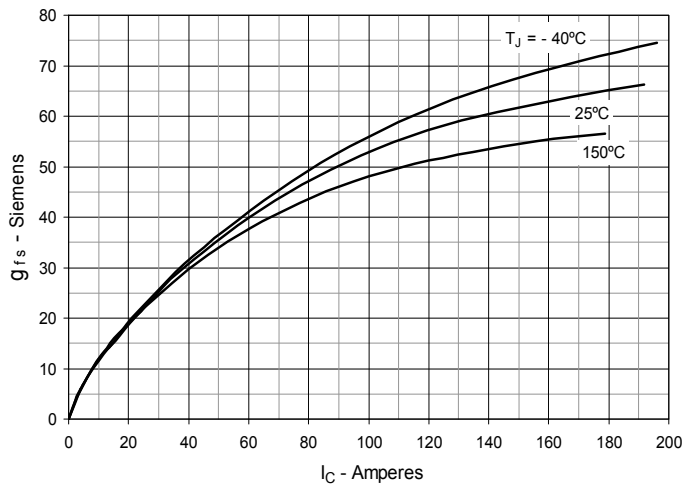


Fig. 8. Gate Charge

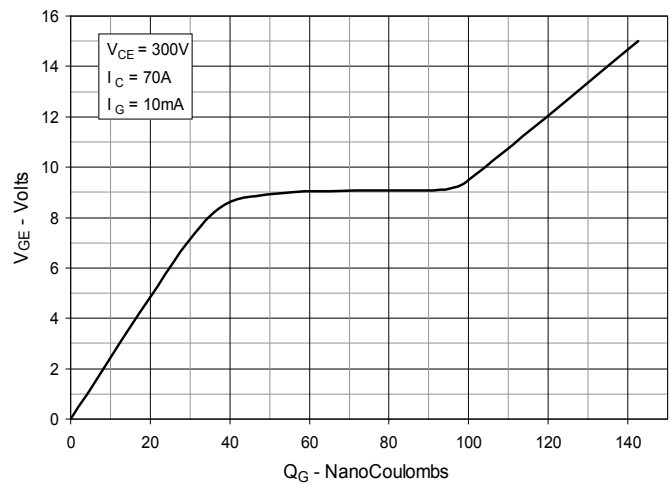


Fig. 9. Capacitance

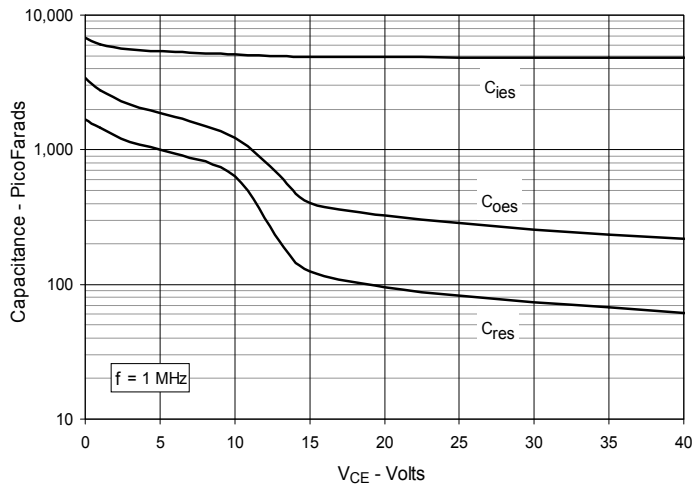


Fig. 10. Reverse-Bias Safe Operating Area

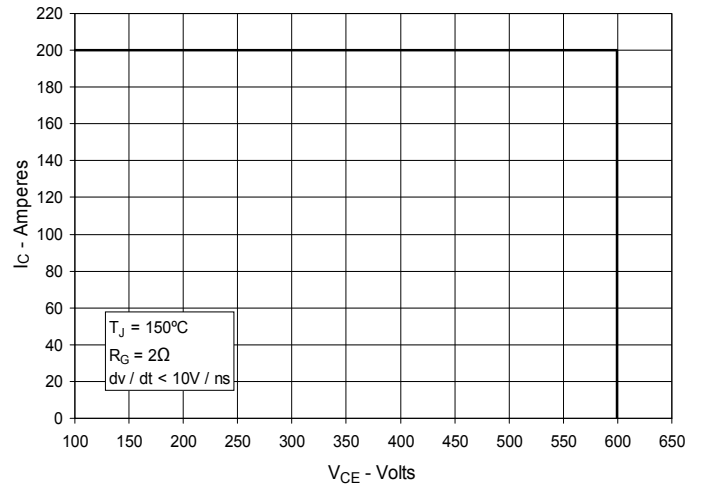


Fig. 11. Forward-Bias Safe Operating Area

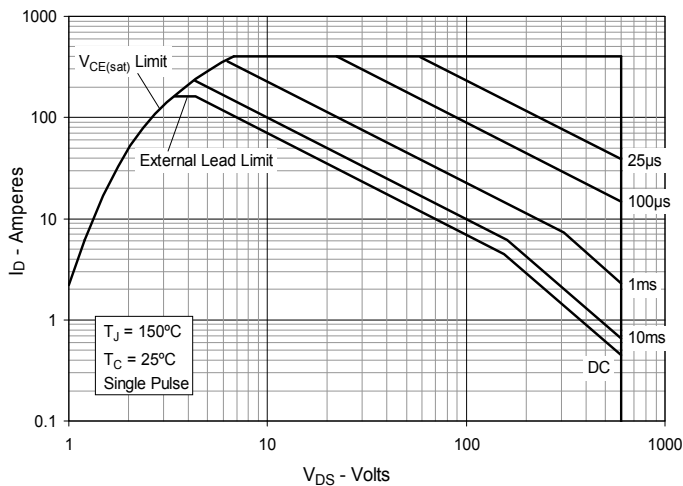


Fig. 12. Maximum Transient Thermal Impedance

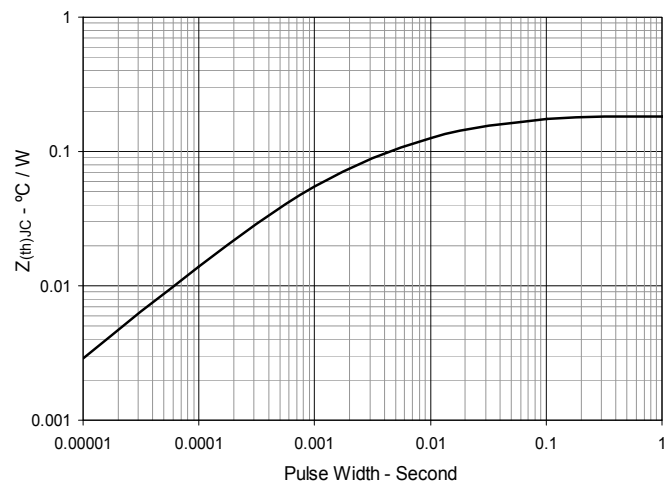


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

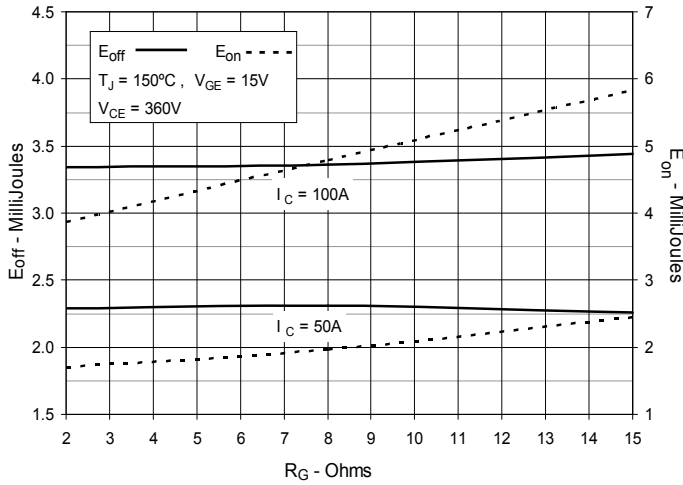


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

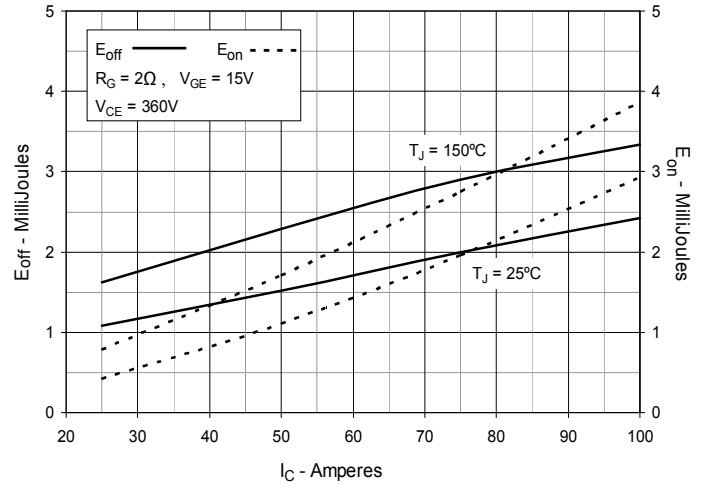


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

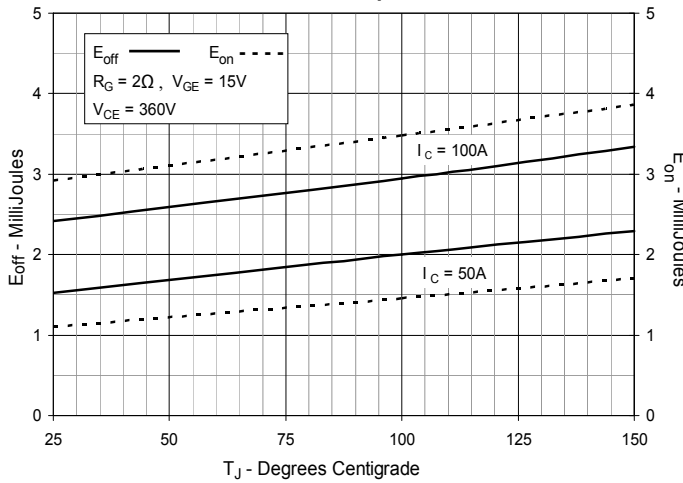


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

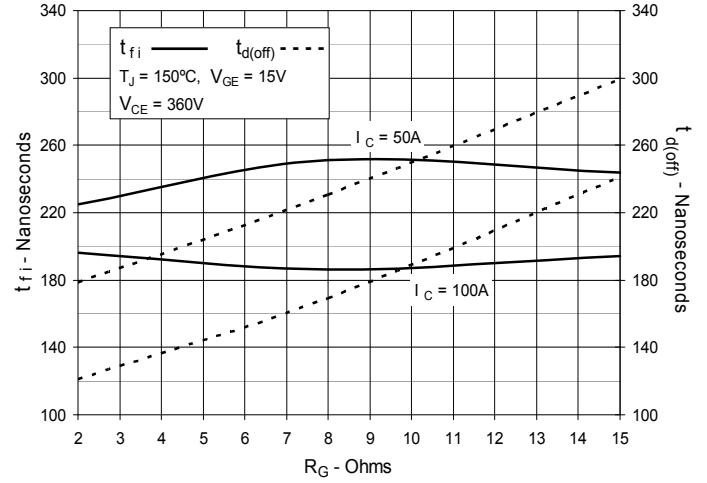


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

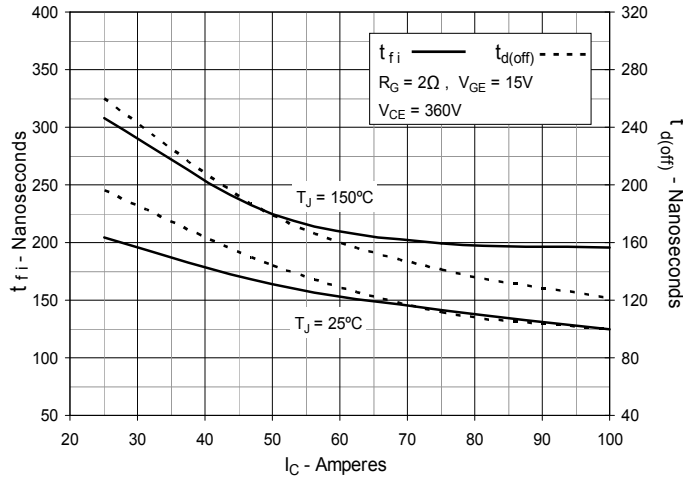


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

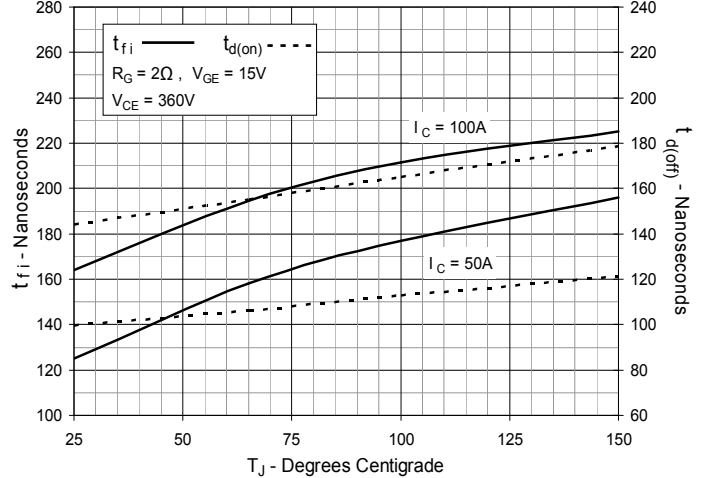
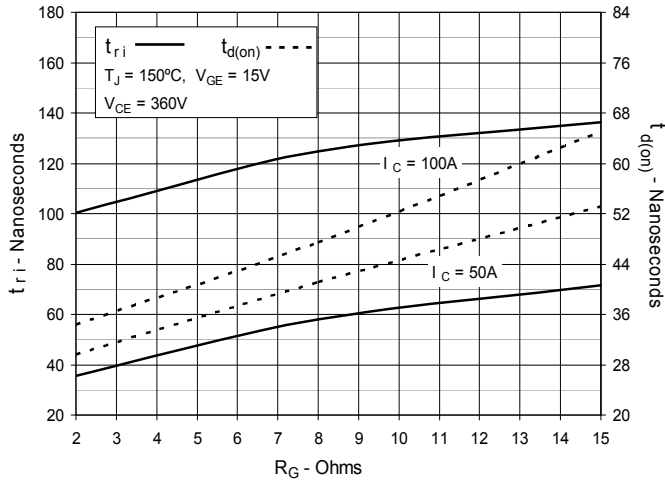
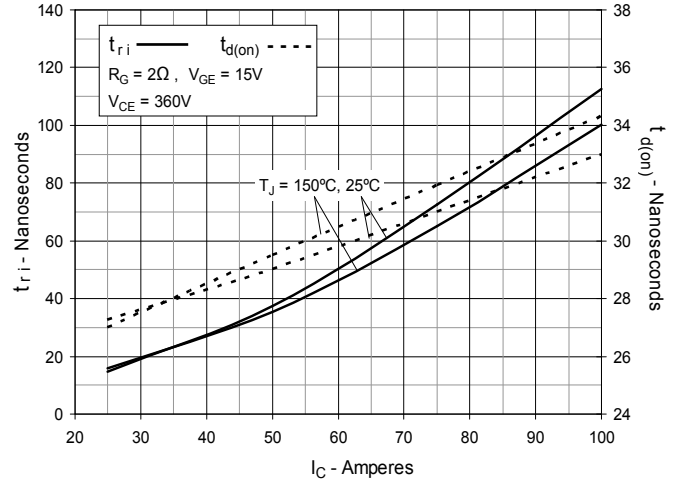
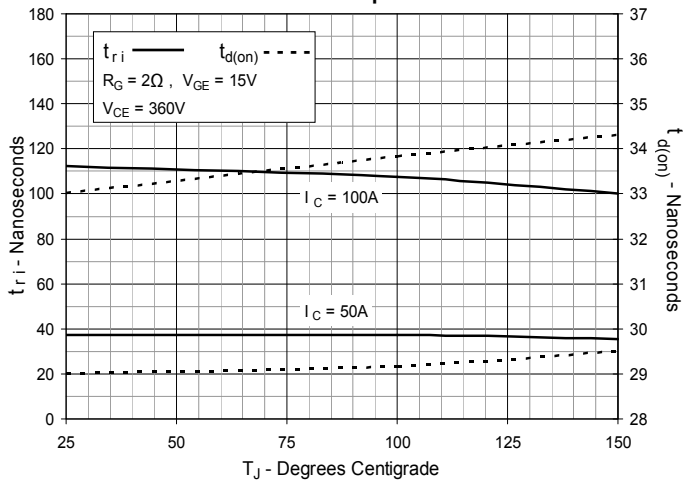


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

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

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


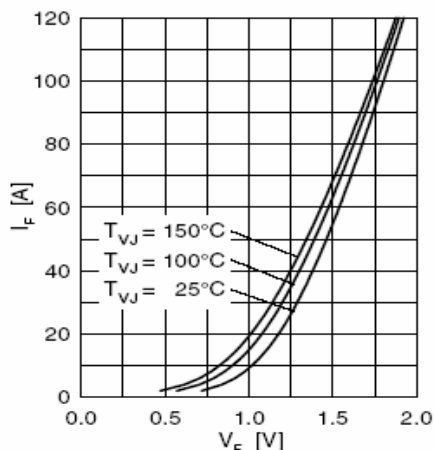
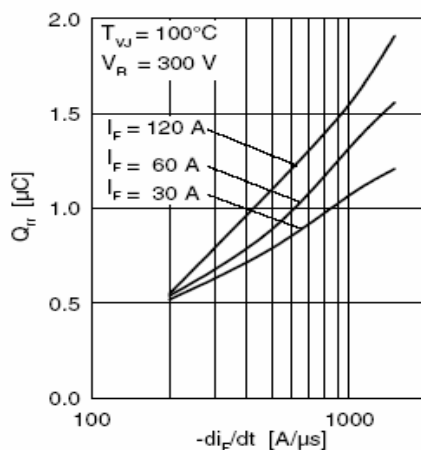
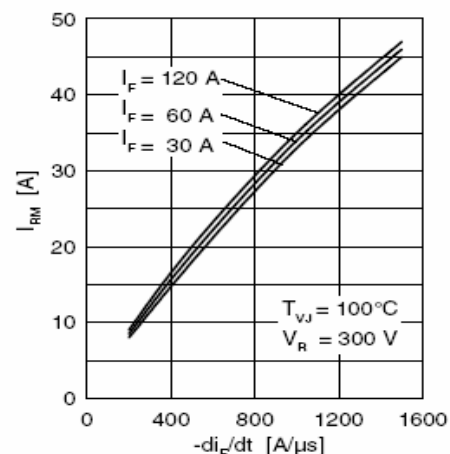
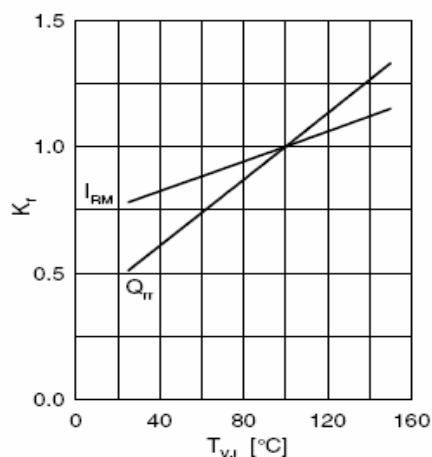
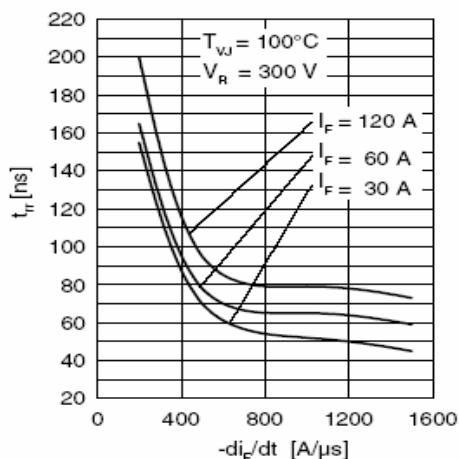
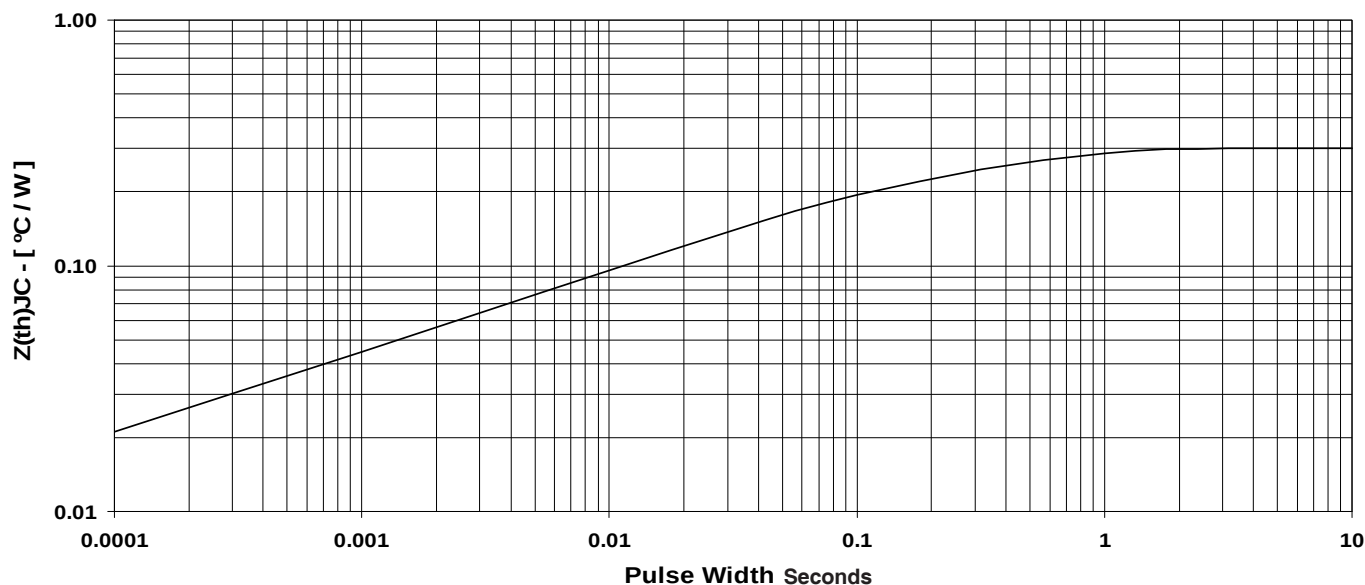

 Fig. 22. Forward Current I_F Versus V_F

 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)