IXYS

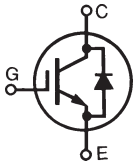
Advance Technical Information

XPT™ 750V IGBT GenX4™ w/Diode

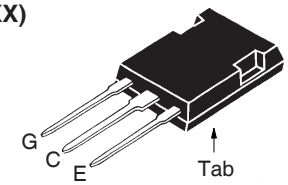
IXXX100N75B4H1
IXXK100N75B4H1

V_{CES} = 750V
I_{C110} = 100A
$V_{CE(sat)}$ ≤ 2.10V
$t_{fi(typ)}$ = 110ns

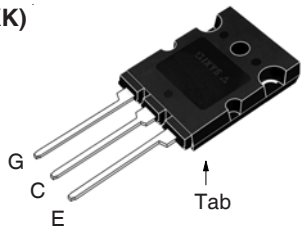
Extreme Light Punch Through
IGBT for 10-30kHz Switching



PLUS247
(IXXX)



TO-264
(IXXK)



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	750	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	750	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Chip Capability)	240	A
I_{LRMS}	Terminal Current Limit	160	A
I_{C110}	T_C = 110°C	100	A
I_{F110}	T_C = 110°C	120	A
I_{CM}	T_C = 25°C, 1ms	580	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 2Ω Clamped Inductive Load	I_{CM} = 200 $V_{CE} \le V_{CES}$	A
t_{SC} (SCSOA)	V_{GE} = 15V, T_J = 150°C, R_G = 20Ω, V_{CE} = 400V, Non-Repetitive	10	μs
P_C	T_C = 25°C	880	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°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 (TO-264)	1.13/10	Nm/lb.in
F_C	Mounting Force (PLUS247)	20..120 /4.5..27	N/lb
Weight	PLUS247	6	g
	TO-264	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	750			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	4.0		6.5	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			25	μA
	T_J = 125°C			5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V, Note 1		1.74	2.10	V
	T_J = 150°C		2.07		V

Features

- Optimized for 10-30kHz Switching
- Square RBSOA
- High Current Handling Capability
- International Standard Packages

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

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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	32	54		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		4420		pF
C_{oes}			415		pF
C_{res}			98		pF
$Q_{g(on)}$	I_C = 100A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		165		nC
Q_{ge}			43		nC
Q_{gc}			62		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		27		ns
t_{ri}	I_C = 50A, V_{GE} = 15V		44		ns
E_{on}	V_{CE} = 400V, R_G = 2Ω		2.75		mJ
$t_{d(off)}$	Note 2		155		ns
t_{fi}			110		ns
E_{off}			1.75		mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		24		ns
t_{ri}	I_C = 50A, V_{GE} = 15V		43		ns
E_{on}	V_{CE} = 400V, R_G = 2Ω		4.00		mJ
$t_{d(off)}$	Note 2		190		ns
t_{fi}			236		ns
E_{off}			3.00		mJ
R_{thJC}				0.17	°C/W
R_{thCS}			0.15		°C/W

Reverse Diode (FRD)

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 100A, V_{GE} = 0V, Note 1		1.5	2.2	V
	T_J = 150°C		1.7		V
I_{RM}	I_F = 100A, V_{GE} = 0V, T_J = 150°C		37		A
t_{rr}	$-di_F/dt$ = 500A/μs, V_R = 400V		245		ns
R_{thJC}				0.20	°C/W

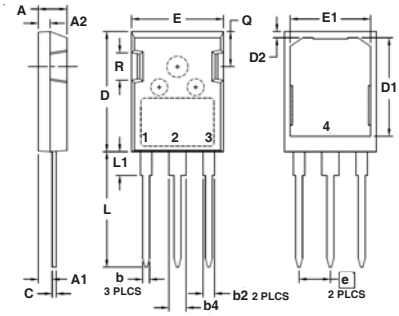
Notes:

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.

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.

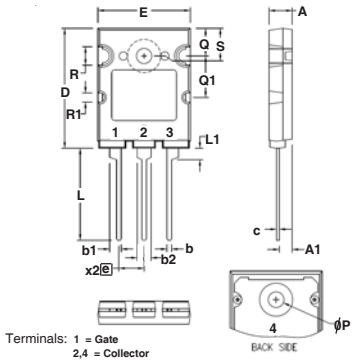
PLUS247™ Outline



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

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b2	.075	.087	1.91	2.20
b4	.115	.126	2.92	3.20
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
D1	.650	.690	16.51	17.53
D2	.035	.050	0.89	1.27
E	.620	.635	15.75	16.13
E1	.520	.560	13.08	14.22
e	.215 BSC		5.45 BSC	
L	.780	.810	19.81	20.57
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83

TO-264 Outline



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

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.185	.209	4.70	5.30
A1	.102	.118	2.60	3.00
b	.035	.049	0.90	1.25
b1	.091	.106	2.30	2.70
b2	.110	.126	2.80	3.20
c	.020	.033	0.50	0.85
D	1.012	1.035	25.70	26.30
E	.776	.799	19.70	20.30
e	.215BSC		5.46 BSC	
L	.768	.807	19.50	20.50
L1	.091	.106	2.30	2.70
øP	.122	.138	3.10	3.50
Q	.228	.244	5.80	6.20
Q1	.346	.362	8.80	9.20
øR	.150	.165	3.80	4.20
øR1	.071	.087	1.80	2.20
S	.228	.244	5.80	6.20

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 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ T_J = 25°C

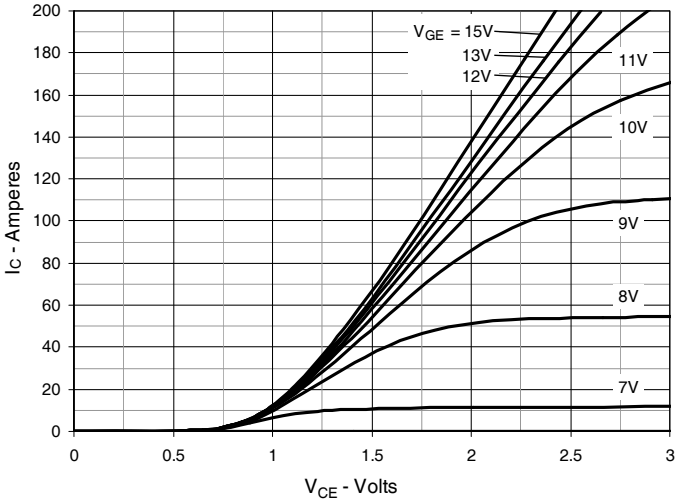


Fig. 2. Extended Output Characteristics @ T_J = 25°C

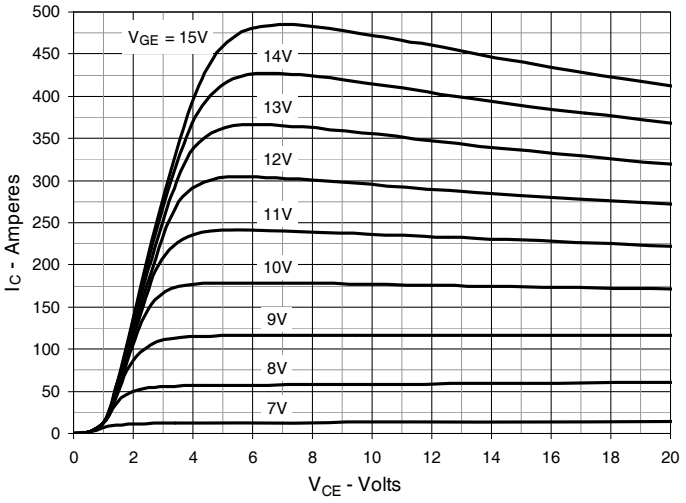


Fig. 3. Output Characteristics @ T_J = 150°C

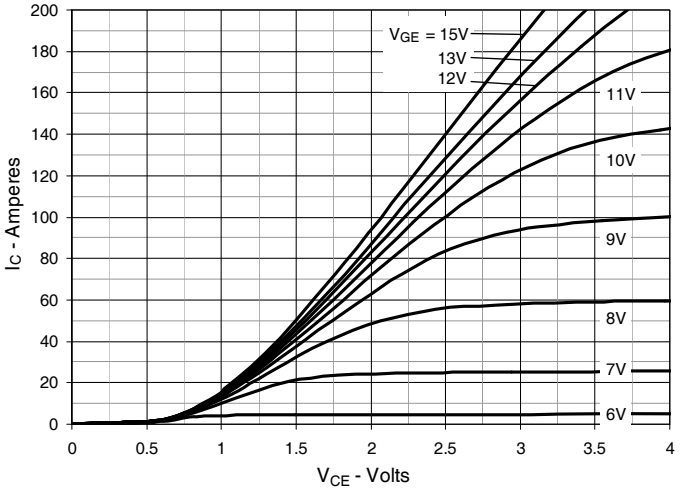


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

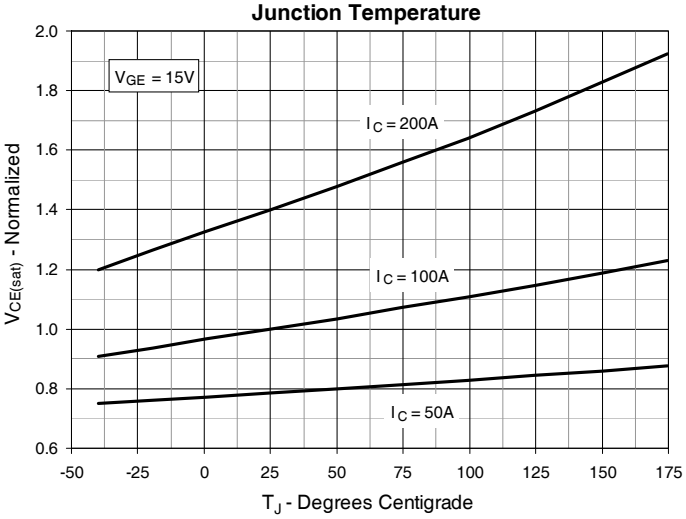


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

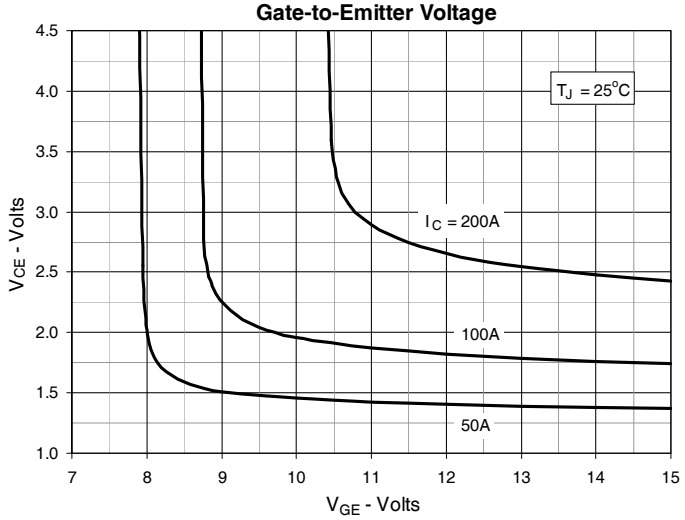
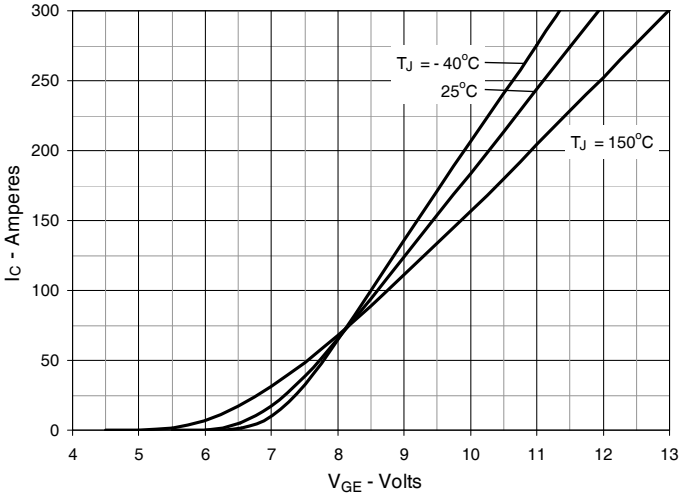


Fig. 6. Input Admittance



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Fig. 7. Transconductance

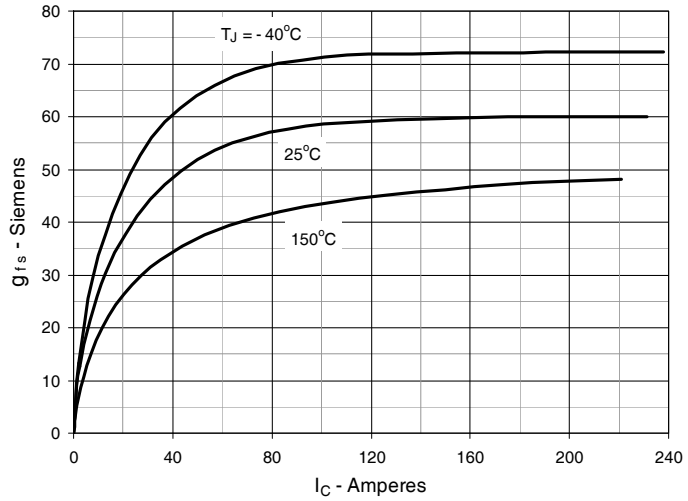


Fig. 8. Gate Charge

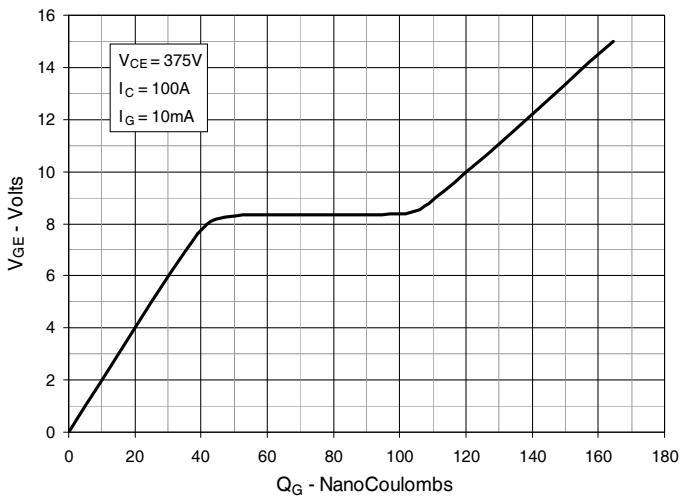


Fig. 9. Capacitance

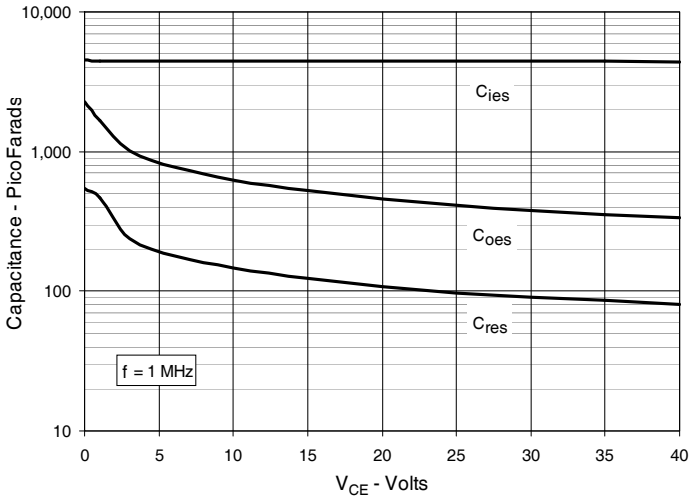


Fig. 10. Reverse-Bias Safe Operating Area

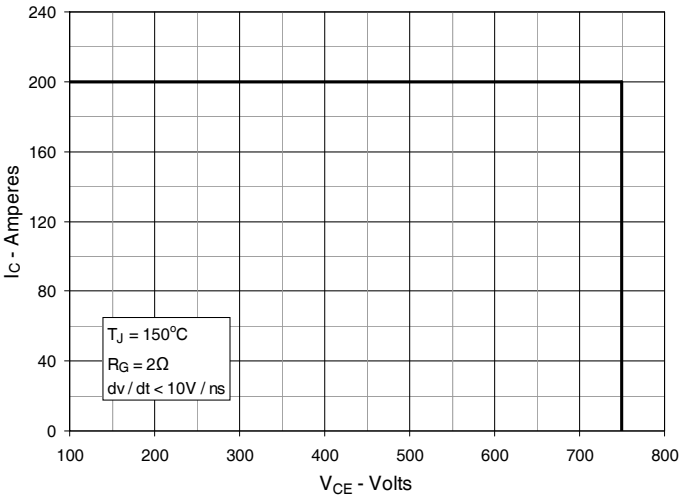
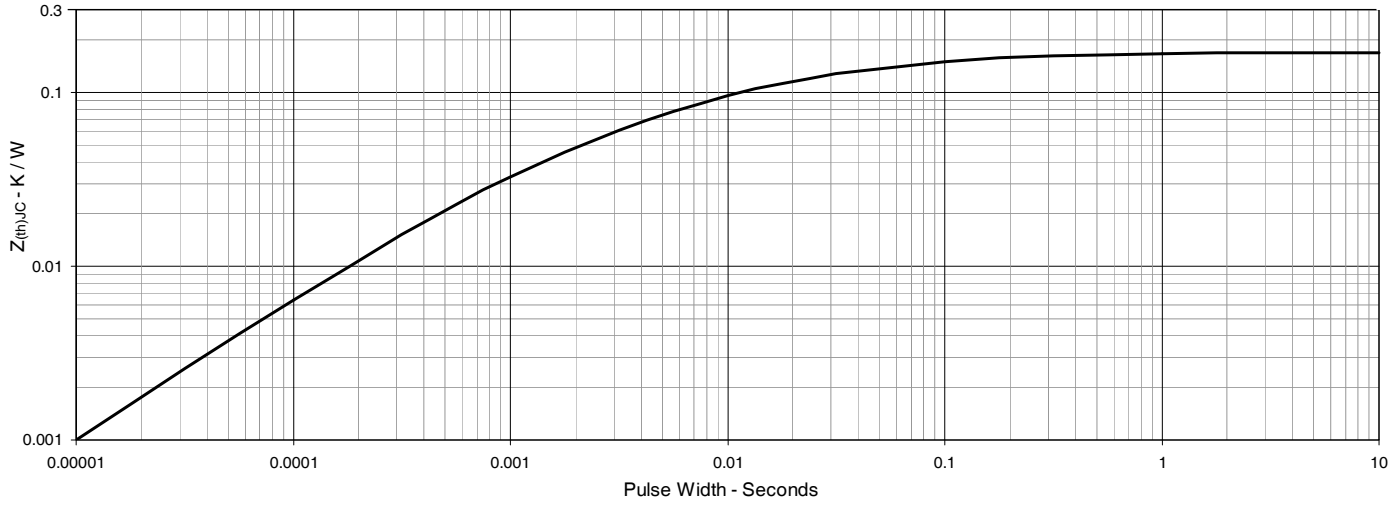


Fig. 11. Maximum Transient Thermal Impedance (IGBT)



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

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

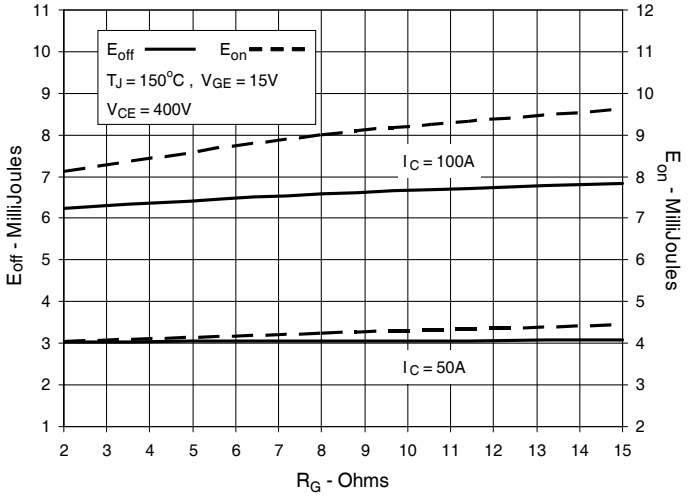


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

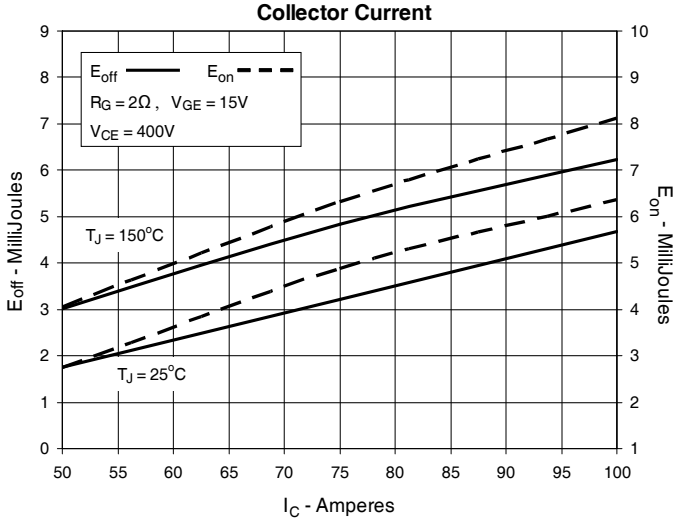


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

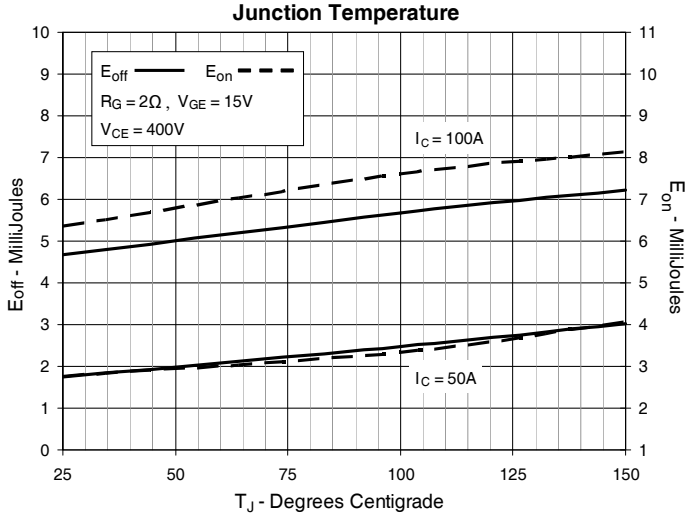


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

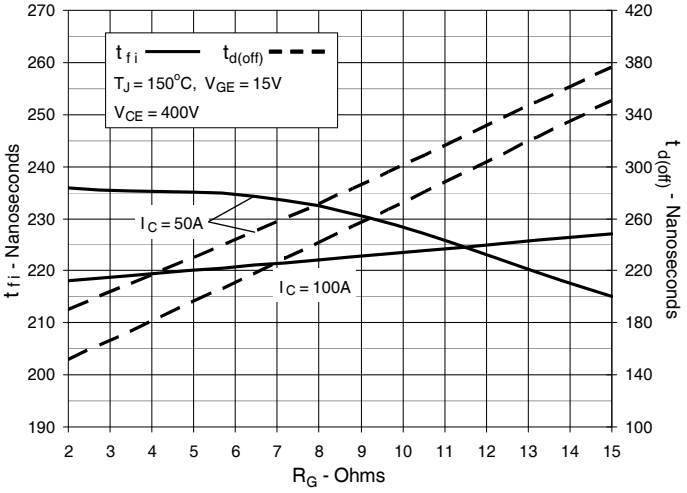


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

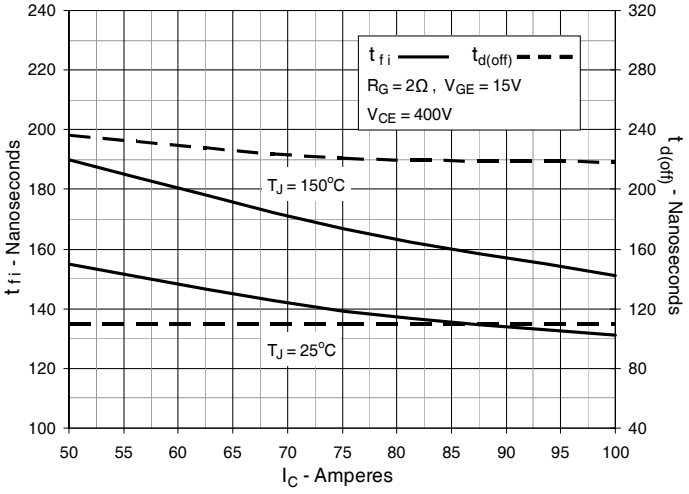
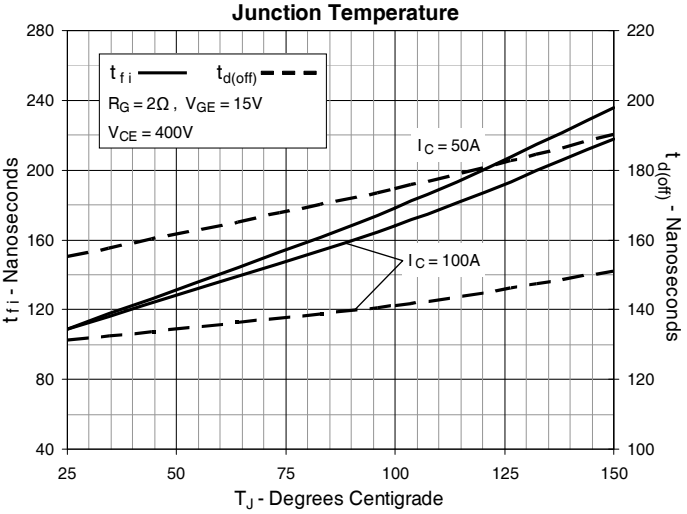


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



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

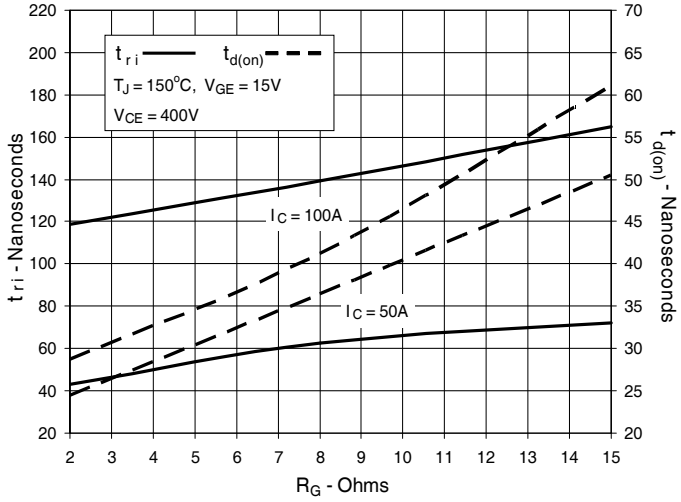


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

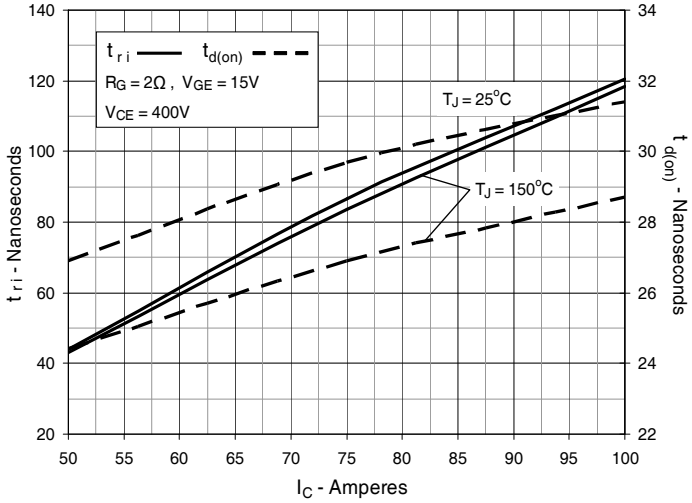


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

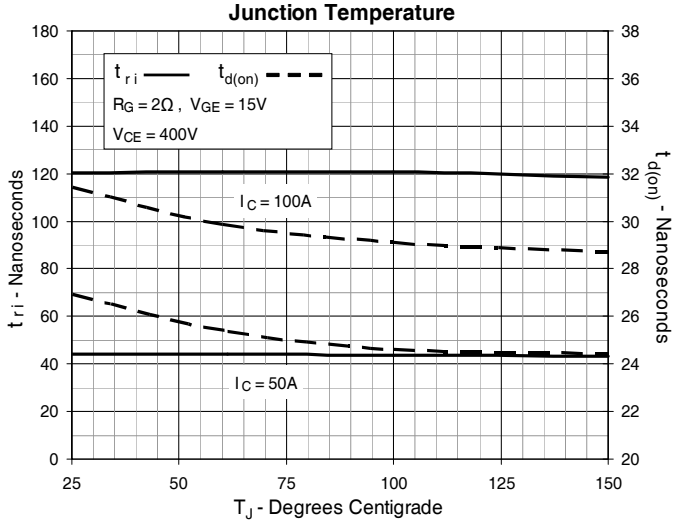


Fig. 21. Diode Forward Characteristics

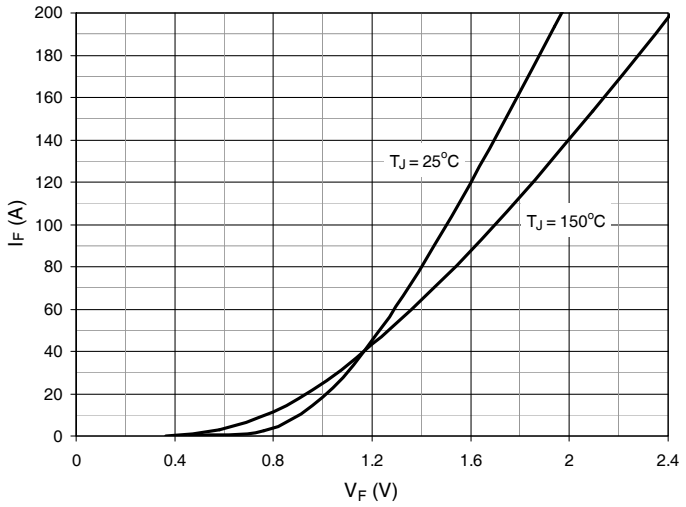


Fig. 22. Reverse Recovery Charge vs. -di_F/dt

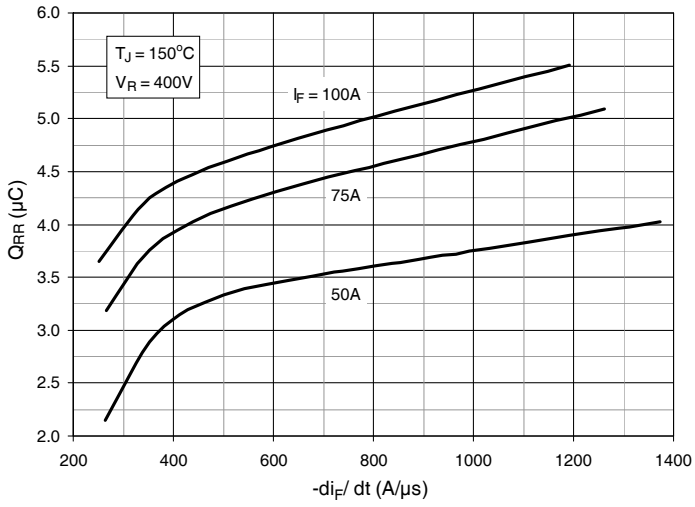


Fig. 23. Reverse Recovery Current vs. -di_F/dt

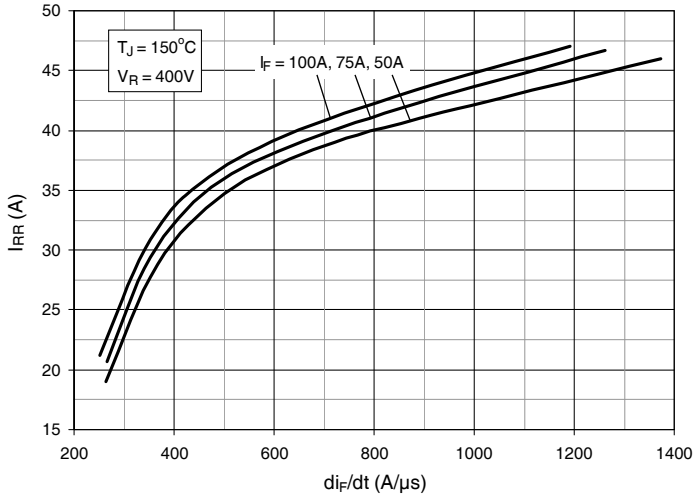


Fig. 24. Reverse Recovery Time vs. -di_F/dt

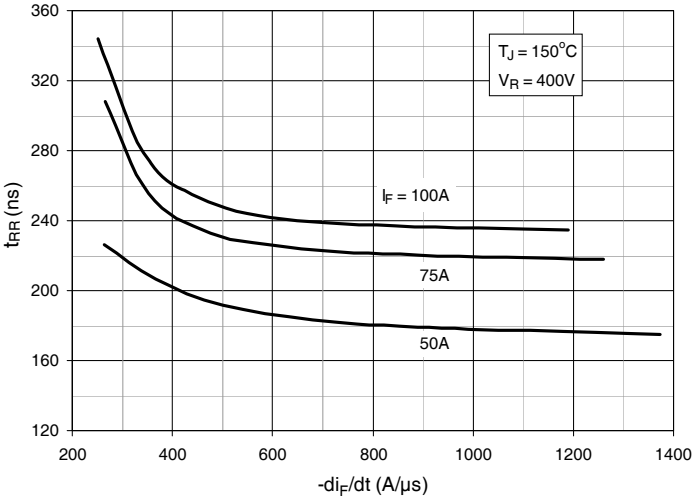


Fig. 25. Dynamic Parameters Q_{RR}, I_{RR} vs. Junction Temperature

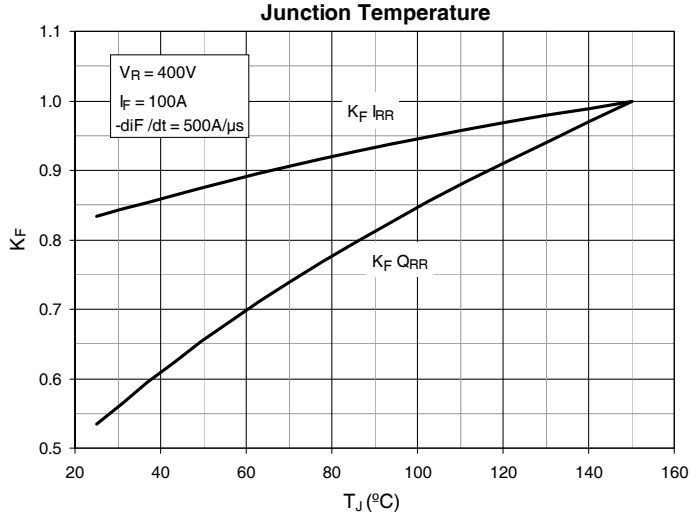
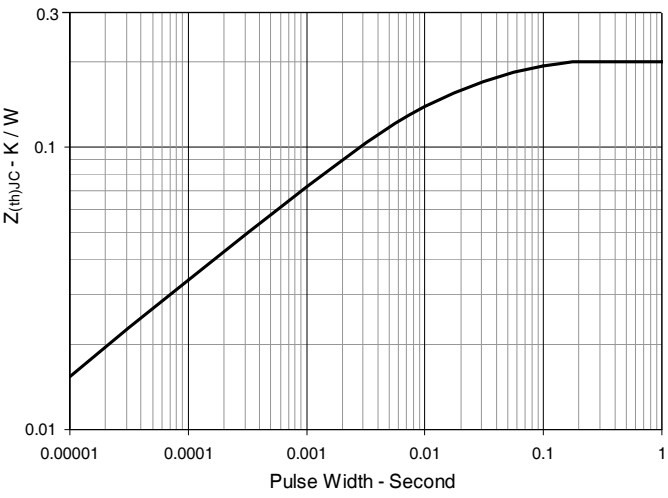


Fig. 26. Maximum Transient Thermal Impedance (Diode)



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