

**XPT™ 750V IGBT  
GenX4™ w/Diode**
**IXXX100N75B4H1  
IXXK100N75B4H1**

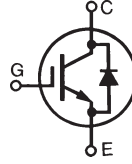
$$V_{CES} = 750V$$

$$I_{C110} = 100A$$

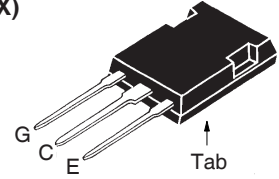
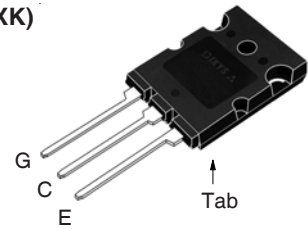
$$V_{CE(sat)} \leq 2.10V$$

$$t_{fi(typ)} = 110ns$$

Extreme Light Punch Through  
IGBT for 10-30kHz Switching



Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ C$ to $175^\circ C$	750	V
$V_{CGR}$	$T_J = 25^\circ C$ to $175^\circ C$ , $R_{GE} = 1M\Omega$	750	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$ (Chip Capability)	240	A
$I_{LRMS}$	Terminal Current Limit	160	A
$I_{C110}$	$T_C = 110^\circ C$	100	A
$I_{F110}$	$T_C = 110^\circ C$	120	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	580	A
<b>SSOA (RBSOA)</b>	$V_{GE} = 15V$ , $T_{VJ} = 150^\circ C$ , Clamped Inductive Load	$I_{CM} = 200$ $V_{CE} \leq V_{CES}$	A
<b><math>T_{SC}</math> (SCSOA)</b>	$V_{GE} = 15V$ , $T_J = 150^\circ C$ , $R_G = 20\Omega$ , $V_{CE} = 400V$ , Non-Repetitive	10	$\mu s$
<b><math>P_C</math></b>	$T_C = 25^\circ C$	880	W
<b><math>T_J</math></b>		-55 ... +175	$^\circ C$
<b><math>T_{JM}</math></b>		175	$^\circ C$
<b><math>T_{stg}</math></b>		-55 ... +175	$^\circ C$
<b><math>T_L</math></b>	Maximum Lead Temperature for Soldering	300	$^\circ C$
<b><math>T_{SOLD}</math></b>	1.6 mm (0.062in.) from Case for 10s	260	$^\circ C$
<b><math>M_d</math></b>	Mounting Torque (TO-264)	1.13/10	Nm/lb.in
<b><math>F_C</math></b>	Mounting Force (PLUS247)	20..120 / 4.5..27	N/lb
<b>Weight</b>	PLUS247	6	g
	TO-264	10	g

**PLUS247  
(IXXX)**

**TO-264  
(IXXK)**


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

**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

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
<b><math>BV_{CES}</math></b>	$I_C = 250\mu A$ , $V_{GE} = 0V$	750		V
<b><math>V_{GE(th)}</math></b>	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	4.0		6.5 V
<b><math>I_{CES}</math></b>	$V_{CE} = V_{CES}$ , $V_{GE} = 0V$ $T_J = 125^\circ C$			25 $\mu A$ 5 mA
<b><math>I_{GES}</math></b>	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
<b><math>V_{CE(sat)}</math></b>	$I_C = 100A$ , $V_{GE} = 15V$ , Note 1 $T_J = 150^\circ C$		1.74 2.07	2.10 V V

**Symbol Test Conditions**

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

**Characteristic Values**

		Min.	Typ.	Max.	
$g_{fs}$	$I_C = 60\text{A}, V_{CE} = 10\text{V}$ , Note 1	32	54		S
$C_{ies}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		4420		pF
$C_{oes}$			415		pF
$C_{res}$			98		pF
$Q_{g(on)}$	$I_C = 100\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		165		nC
$Q_{ge}$			43		nC
$Q_{gc}$			62		nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 50\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 2\Omega$ Note 2		27		ns
$t_{ri}$			44		ns
$E_{on}$			2.75		mJ
$t_{d(off)}$			155		ns
$t_{fi}$			110		ns
$E_{off}$			1.75		mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 150^\circ\text{C}</math></b> $I_C = 50\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 2\Omega$ Note 2		24		ns
$t_{ri}$			43		ns
$E_{on}$			4.00		mJ
$t_{d(off)}$			190		ns
$t_{fi}$			236		ns
$E_{off}$			3.00		mJ
$R_{thJC}$				0.17	$^\circ\text{C/W}$
$R_{thCS}$		0.15			$^\circ\text{C/W}$

**Reverse Diode (FRD)**
**Symbol Test Conditions**

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

**Characteristic Values**

		Min.	Typ.	Max.	
$V_F$	$I_F = 100\text{A}, V_{GE} = 0\text{V}$ , Note 1		1.5	2.2	V
	$T_J = 150^\circ\text{C}$		1.7		V
$I_{RM}$	$I_F = 100\text{A}, V_{GE} = 0\text{V},$ $-di_F/dt = 500\text{A}/\mu\text{s}, V_R = 400\text{V}$		37		A
$t_{rr}$			245		ns
$R_{thJC}$				0.20	$^\circ\text{C/W}$

**Notes:**

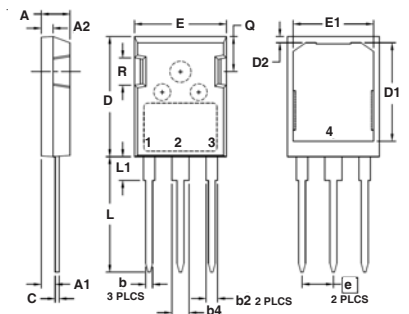
1. Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .
2. Switching times & energy losses may increase for higher  $V_{CE}$  (Clamp),  $T_J$  or  $R_G$ .

**ADVANCE TECHNICAL INFORMATION**

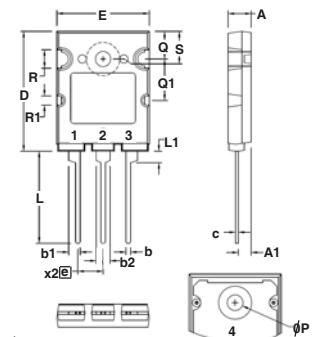
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test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

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

IXYS MOSFETs and IGBTs are covered 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  
 by one or more of the following U.S. patents: 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

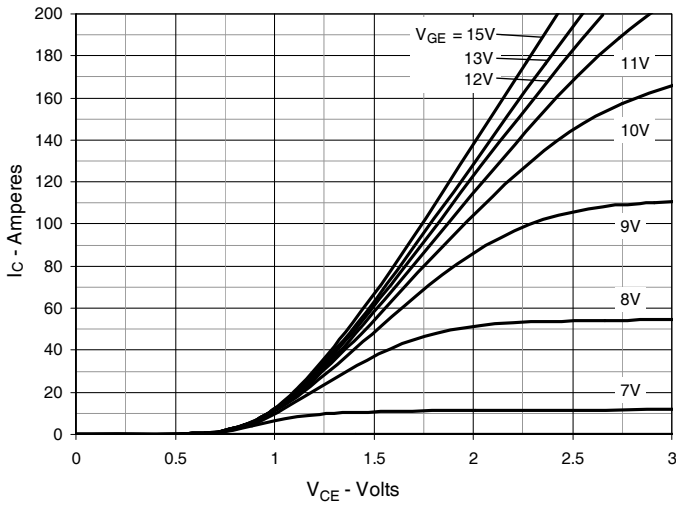
**PLUS247™ Outline**

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

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	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

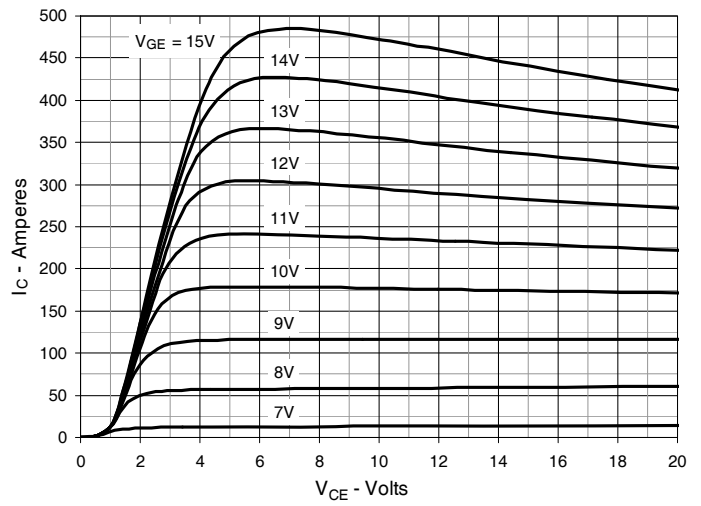
**TO-264 Outline**

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

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	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
phi P	.122	.138	3.10	3.50
Q	.228	.244	5.80	6.20
Q1	.346	.362	8.80	9.20
phi R	.150	.165	3.80	4.20
phi R1	.071	.087	1.80	2.20
S	.228	.244	5.80	6.20

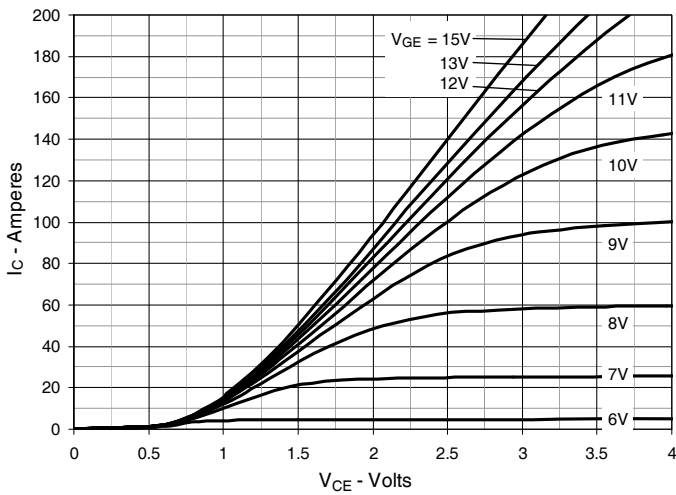
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



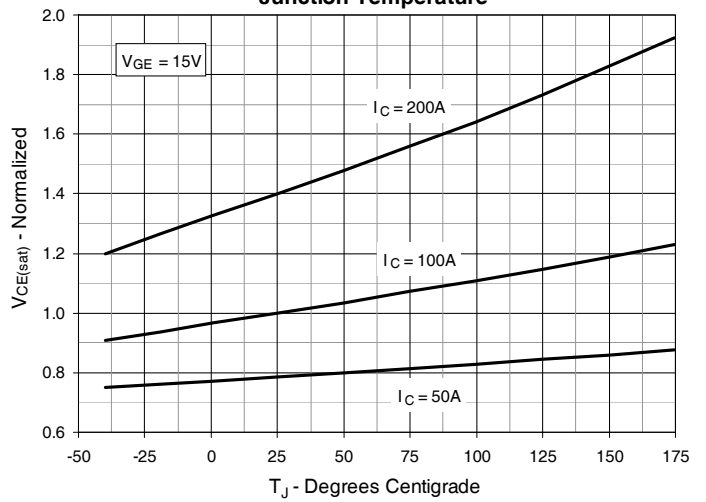
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



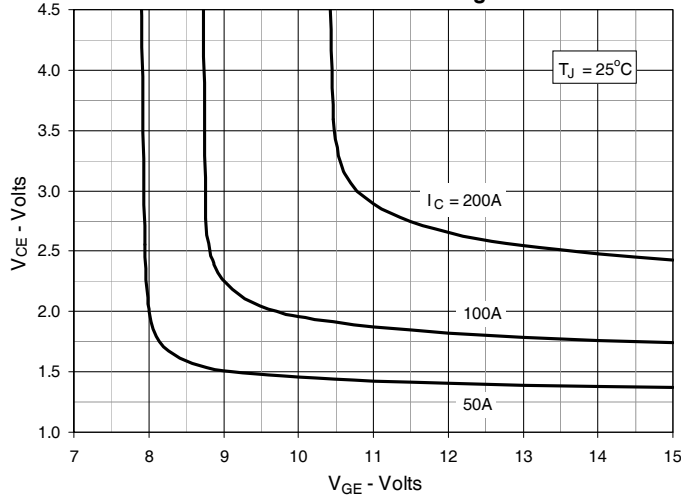
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



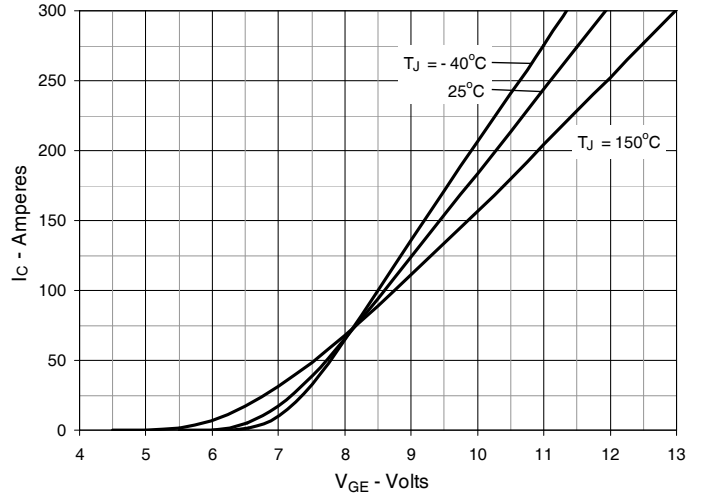
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



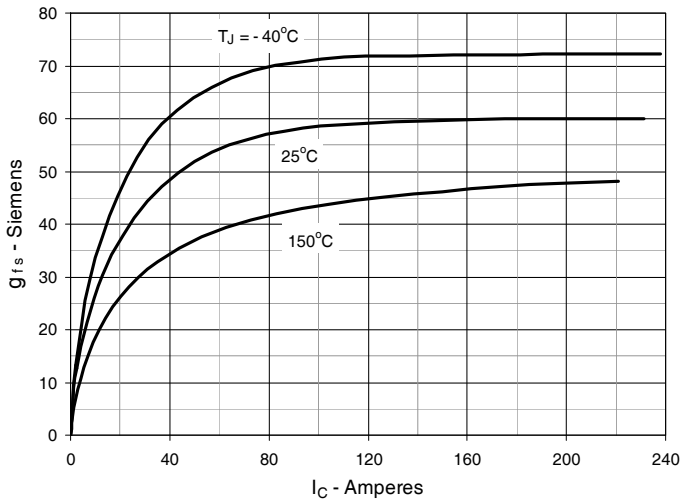
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



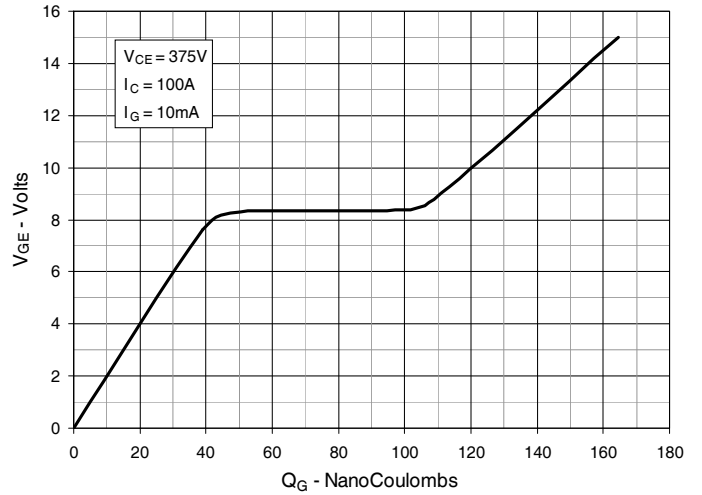
**Fig. 6. Input Admittance**



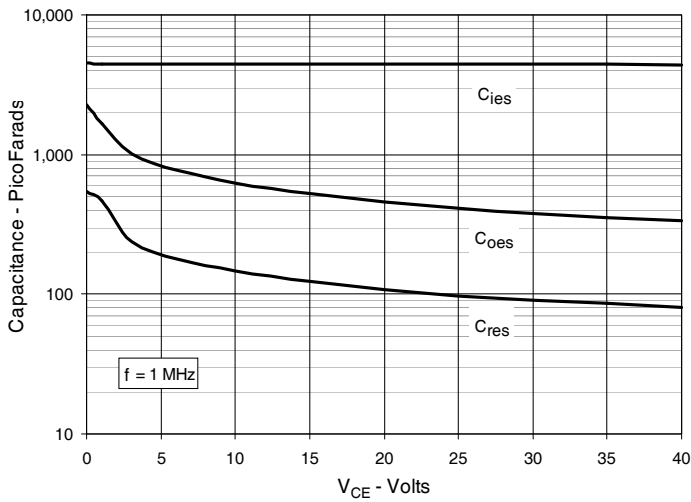
**Fig. 7. Transconductance**



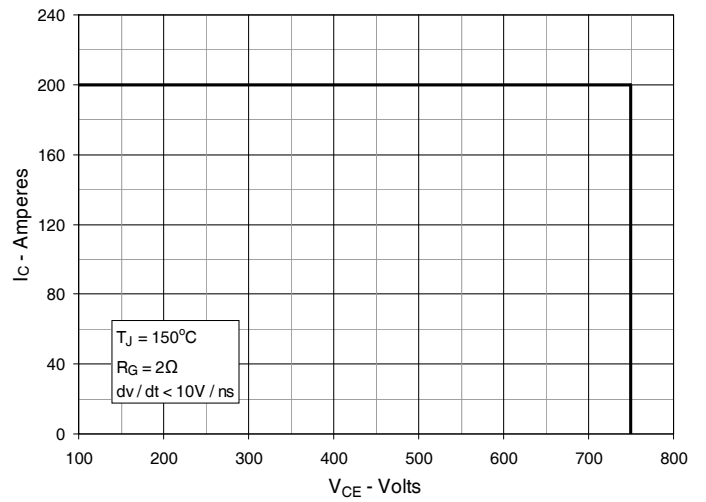
**Fig. 8. Gate Charge**



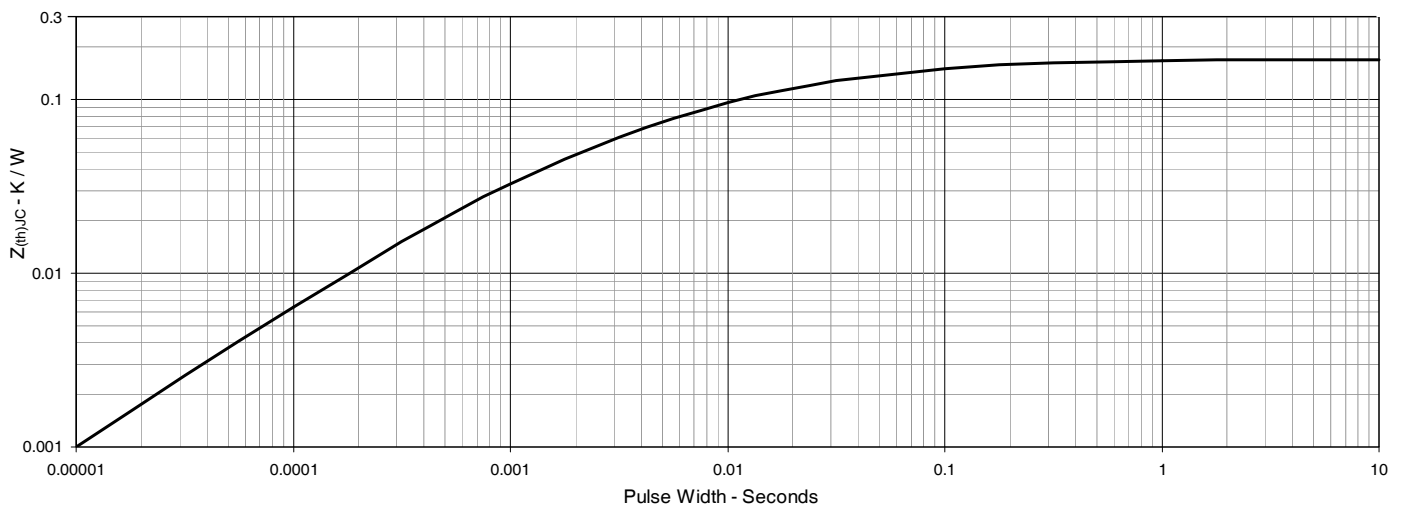
**Fig. 9. Capacitance**



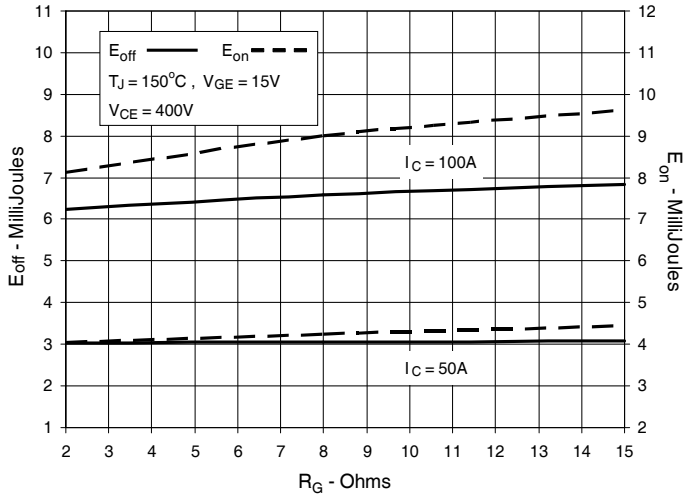
**Fig. 10. Reverse-Bias Safe Operating Area**



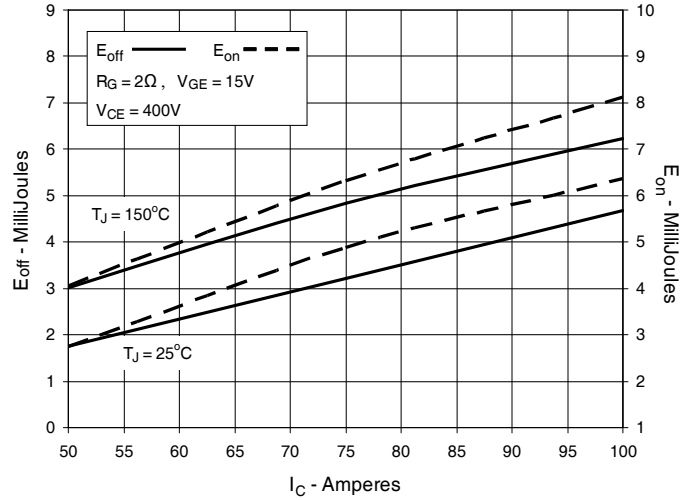
**Fig. 11. Maximum Transient Thermal Impedance (IGBT)**



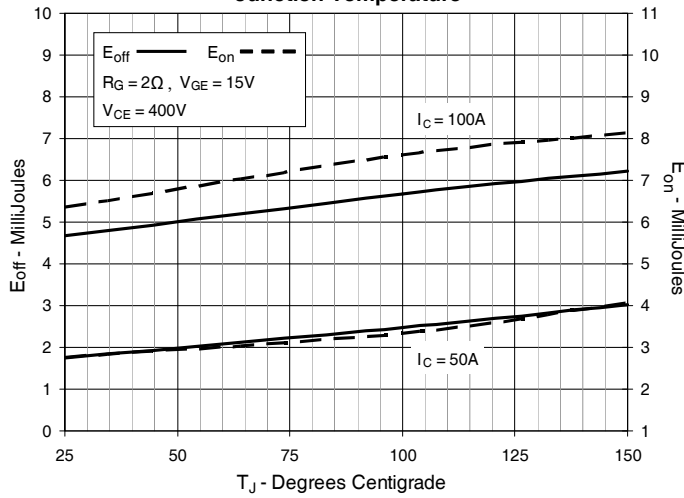
**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**



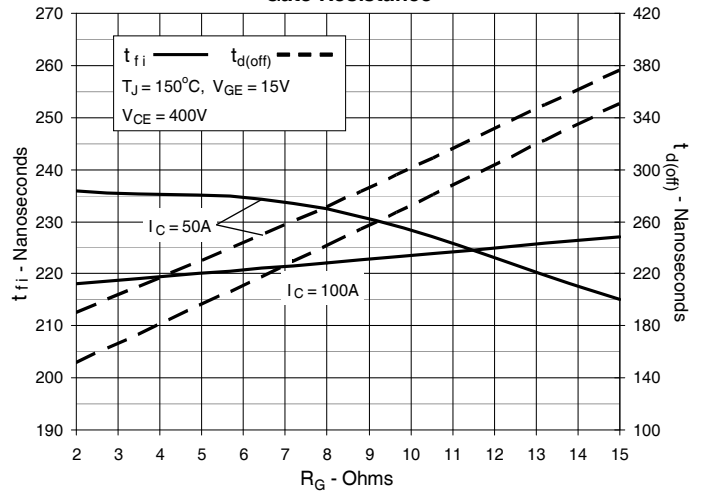
**Fig. 13. Inductive Switching Energy Loss vs. Collector Current**



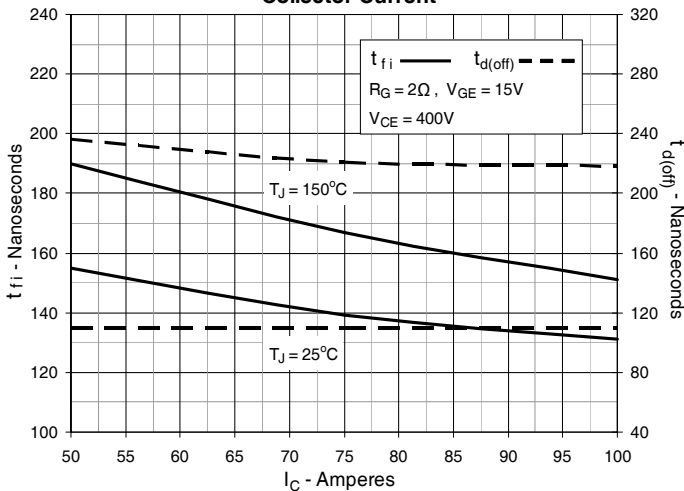
**Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature**



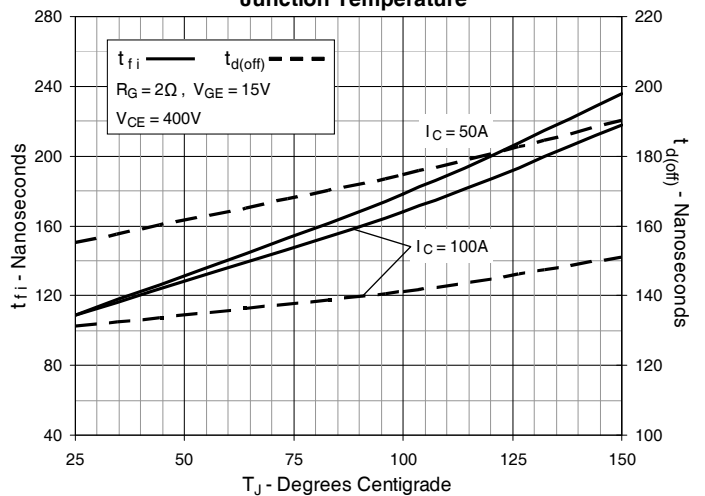
**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**



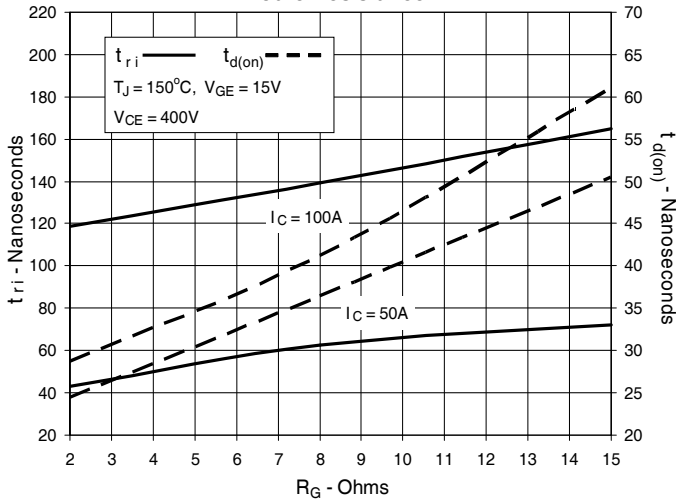
**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**



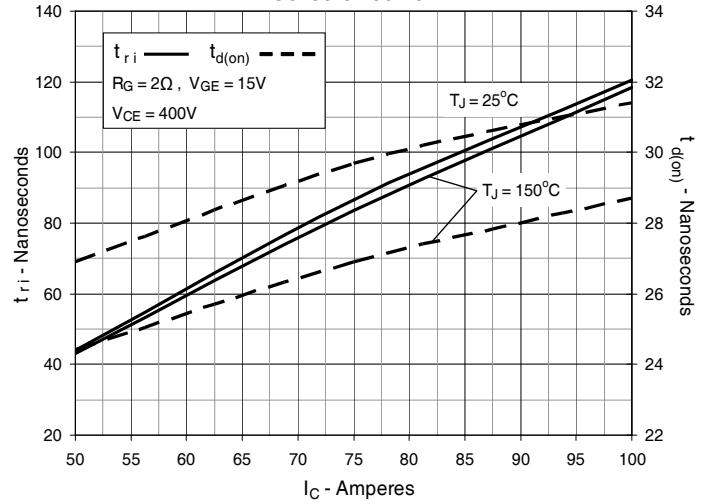
**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**



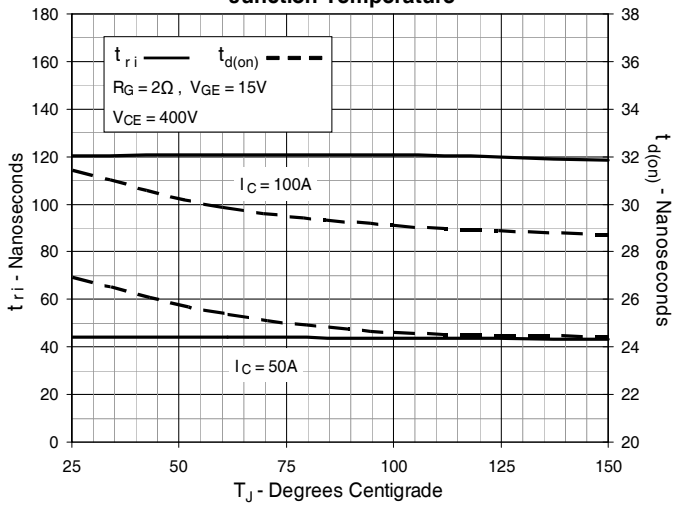
**Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance**



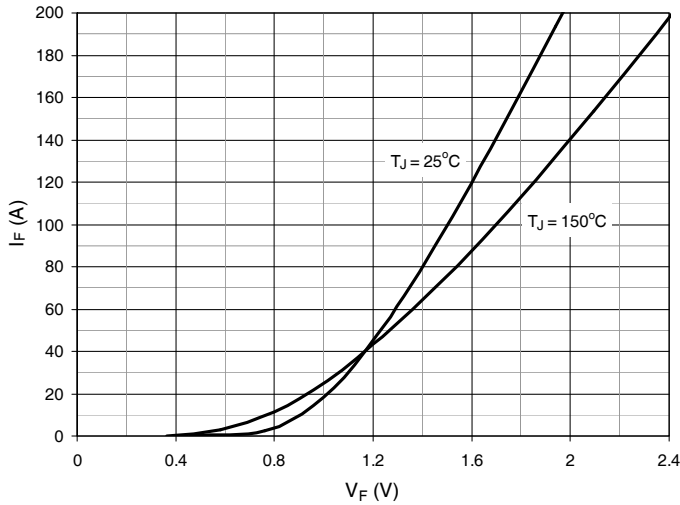
**Fig. 19. Inductive Turn-on Switching Times vs. Collector Current**



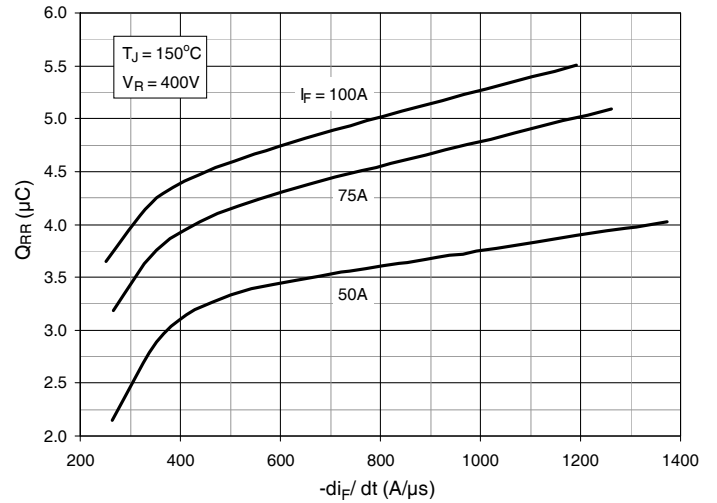
**Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature**



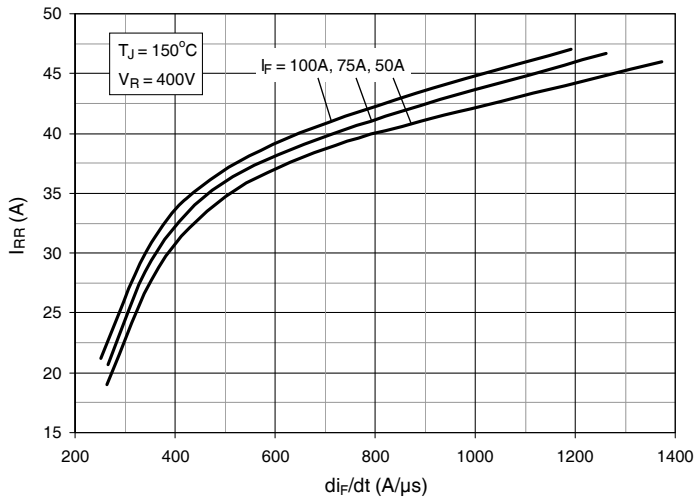
**Fig. 21. Diode Forward Characteristics**



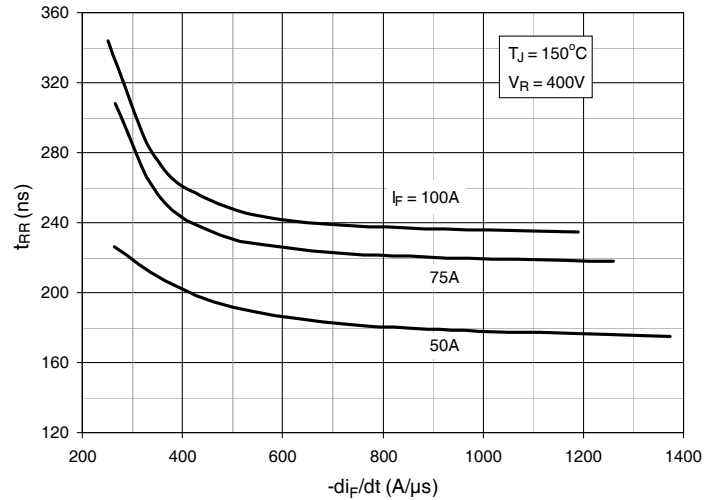
**Fig. 22. Reverse Recovery Charge vs.  $-di_F/dt$**



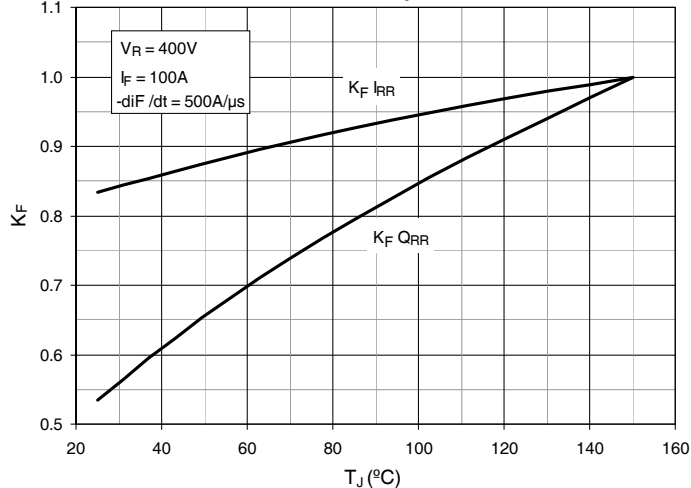
**Fig. 23. Reverse Recovery Current vs.  $-di_F/dt$**



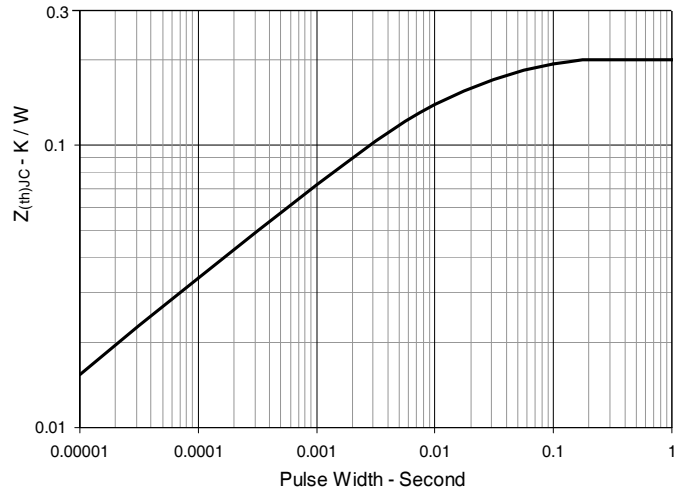
**Fig. 24. Reverse Recovery Time vs.  $-di_F/dt$**



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



**Fig. 26. Maximum Transient Thermal Impedance (Diode)**





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