

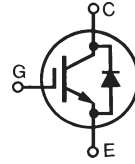
**XPT™ 650V IGBT  
GenX3™ w/ Diode**
**IXYK100N65C3D1  
IXYX100N65C3D1**

$$V_{CES} = 650V$$

$$I_{C110} = 100A$$

$$V_{CE(sat)} \leq 2.3V$$

$$t_{fi(typ)} = 60ns$$

 Extreme Light Punch Through  
IGBT for 20-60kHz Switching


Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ C$ to $175^\circ C$	650	V
$V_{CGR}$	$T_J = 25^\circ C$ to $175^\circ C$ , $R_{GE} = 1M\Omega$	650	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$ (Chip Capability)	200	A
$I_{LRMS}$	Terminal Current Limit	160	A
$I_{C110}$	$T_C = 110^\circ C$	100	A
$I_{F110}$	$T_C = 110^\circ C$	67	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	420	A
$I_A$	$T_C = 25^\circ C$	50	A
$E_{AS}$	$T_C = 25^\circ C$	600	mJ
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15V$ , $T_{VJ} = 150^\circ C$ , $R_G = 3\Omega$ Clamped Inductive Load	$I_{CM} = 200$ @ $V_{CE} \leq V_{CES}$	A
$t_{sc}$ <b>(SCSOA)</b>	$V_{GE} = 15V$ , $V_{CE} = 360V$ , $T_J = 150^\circ C$ $R_G = 10\Omega$ , Non Repetitive	7	$\mu s$
$P_C$	$T_C = 25^\circ C$	830	W
$T_J$		-55 ... +175	$^\circ C$
$T_{JM}$		175	$^\circ C$
$T_{stg}$		-55 ... +175	$^\circ C$
$T_L$	Maximum Lead Temperature for Soldering	300	$^\circ C$
$T_{SOLD}$	1.6 mm (0.062in.) from Case for 10s	260	$^\circ C$
$M_d$	Mounting Torque (TO-264)	1.13/10	Nm/lb.in
$F_c$	Mounting Force (PLUS247)	20..120 / 4.5..27	N/lb
<b>Weight</b>	TO-264	10	g
	PLUS247	6	g

TO-264 (IXYK)



PLUS247 (IXYX)


 G = Gate  
C = Collector

 E = Emitter  
Tab = Collector

**Features**

- International Standard Packages
- Optimized for 20-60kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- Anti-Parallel Ultra Fast Diode
- High Current Handling Capability

**Advantages**

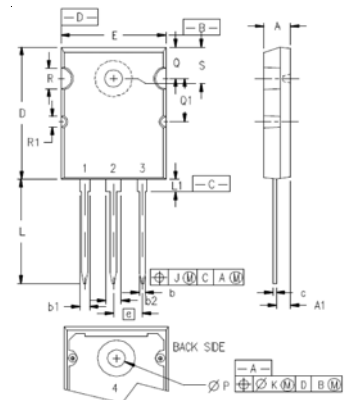
- High Power Density
- Low Gate Drive Requirement

**Applications**

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

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu A$ , $V_{GE} = 0V$	650		V
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.5		6.0 V
$I_{CES}$	$V_{CE} = V_{CES}$ , $V_{GE} = 0V$ $T_J = 150^\circ C$			50 $\mu A$ 3 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 70A$ , $V_{GE} = 15V$ , Note 1 $T_J = 150^\circ C$		1.8 2.2	V V

Symbol Test Conditions		Characteristic Values		
(T <sub>J</sub> = 25°C Unless Otherwise Specified)		Min.	Typ.	Max.
<b>g<sub>fs</sub></b>	I <sub>C</sub> = 60A, V <sub>CE</sub> = 10V, Note 1	30	55	S
<b>C<sub>ies</sub></b>	V <sub>CE</sub> = 25V, V <sub>GE</sub> = 0V, f = 1MHz		4800	pF
<b>C<sub>oes</sub></b>			475	pF
<b>C<sub>res</sub></b>			102	pF
<b>Q<sub>g(on)</sub></b>	I <sub>C</sub> = 100A, V <sub>GE</sub> = 15V, V <sub>CE</sub> = 0.5 • V <sub>CES</sub>		172	nC
<b>Q<sub>ge</sub></b>			30	nC
<b>Q<sub>gc</sub></b>			80	nC
<b>t<sub>d(on)</sub></b>	<b>Inductive load, T<sub>J</sub> = 25°C</b> I <sub>C</sub> = 50A, V <sub>GE</sub> = 15V V <sub>CE</sub> = 400V, R <sub>G</sub> = 3Ω Note 2		23	ns
<b>t<sub>ri</sub></b>			42	ns
<b>E<sub>on</sub></b>			1.30	mJ
<b>t<sub>d(off)</sub></b>			107	ns
<b>t<sub>fi</sub></b>			60	ns
<b>E<sub>off</sub></b>			0.83	1.30 mJ
<b>t<sub>d(on)</sub></b>	<b>Inductive load, T<sub>J</sub> = 150°C</b> I <sub>C</sub> = 50A, V <sub>GE</sub> = 15V V <sub>CE</sub> = 400V, R <sub>G</sub> = 3Ω Note 2		24	ns
<b>t<sub>ri</sub></b>			38	ns
<b>E<sub>on</sub></b>			2.55	mJ
<b>t<sub>d(off)</sub></b>			134	ns
<b>t<sub>fi</sub></b>			66	ns
<b>E<sub>off</sub></b>			1.15	mJ
<b>R<sub>thJC</sub></b>				0.18 °C/W
<b>R<sub>thCS</sub></b>		0.15		°C/W

**TO-264 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	.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)**

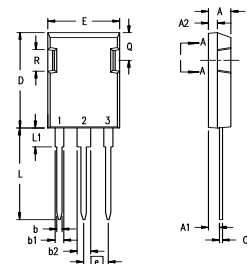
Symbol Test Conditions		Characteristic Values		
(T <sub>J</sub> = 25°C Unless Otherwise Specified)		Min.	Typ.	Max.
<b>V<sub>F</sub></b>	I <sub>F</sub> = 100A, V <sub>GE</sub> = 0V, Note 1 T <sub>J</sub> = 150°C		1.7 1.4	V V
<b>I<sub>RM</sub></b>	I <sub>F</sub> = 100A, V <sub>GE</sub> = 0V, T <sub>J</sub> = 150°C, -di <sub>F</sub> /dt = 700A/µs, V <sub>R</sub> = 400V		42	A
<b>t<sub>rr</sub></b>			150	ns
<b>R<sub>thJC</sub></b>				0.36 °C/W

Notes:

1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.
2. Switching times & energy losses may increase for higher V<sub>CE</sub>(clamp), T<sub>J</sub> or R<sub>G</sub>.

**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 - Collector  
 3 - Emitter

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A <sub>1</sub>	2.29	2.54	.090	.100
A <sub>2</sub>	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b <sub>1</sub>	1.91	2.13	.075	.084
b <sub>2</sub>	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	0.244
R	4.32	4.83	.170	.190

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
	4,860,072	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	

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

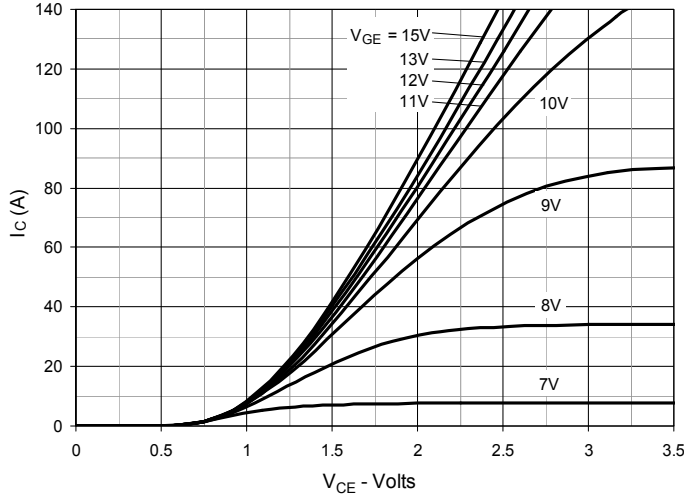


Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$

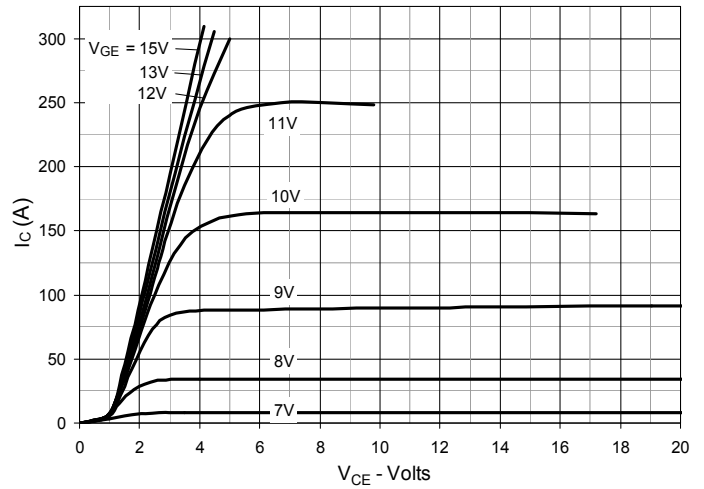


Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$

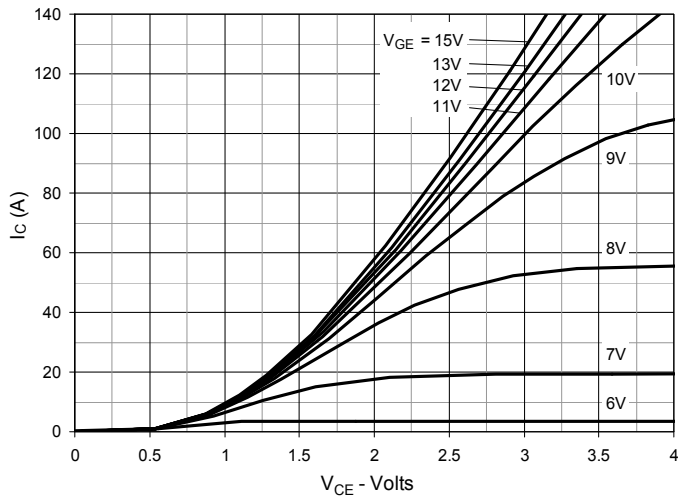


Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature

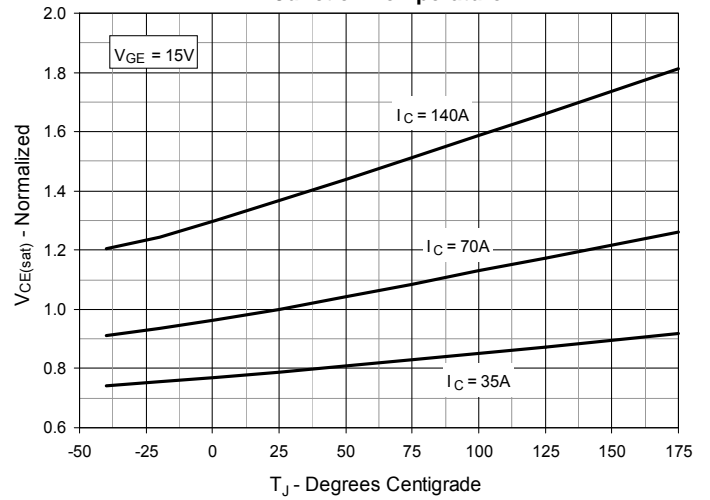


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

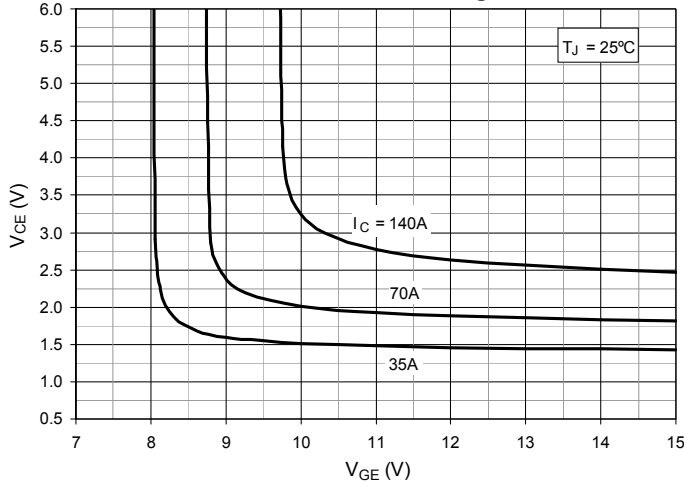


Fig. 6. Input Admittance

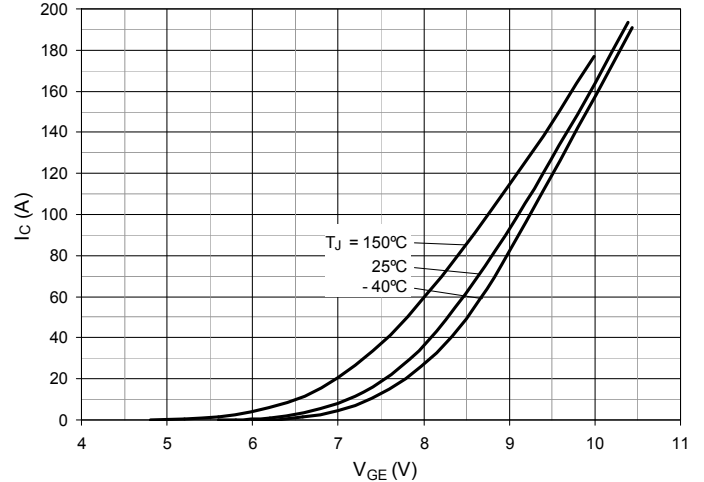


Fig. 7. Transconductance

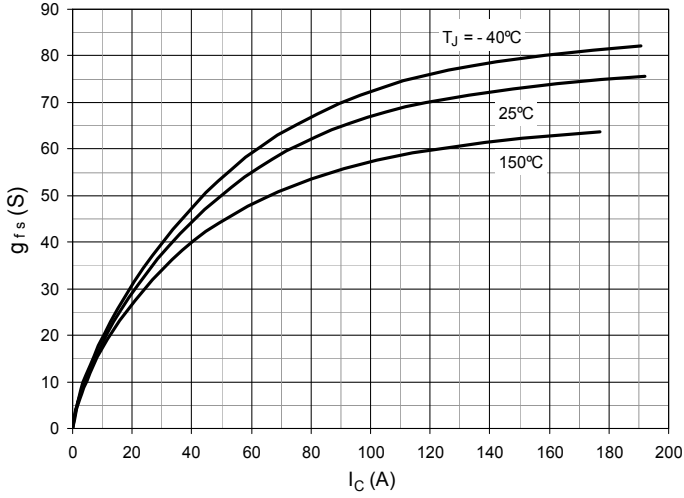


Fig. 8. Gate Charge

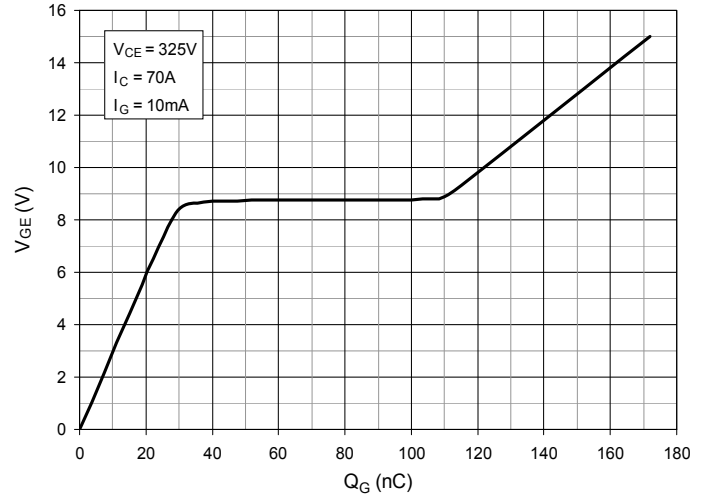


Fig. 9. Capacitance

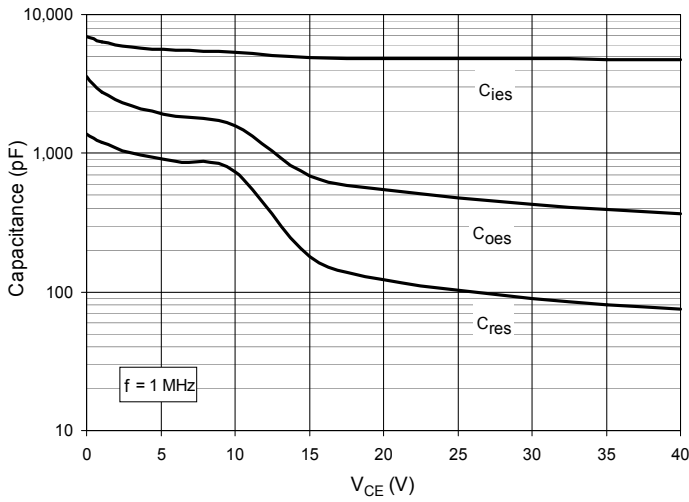


Fig. 10. Reverse-Bias Safe Operating Area

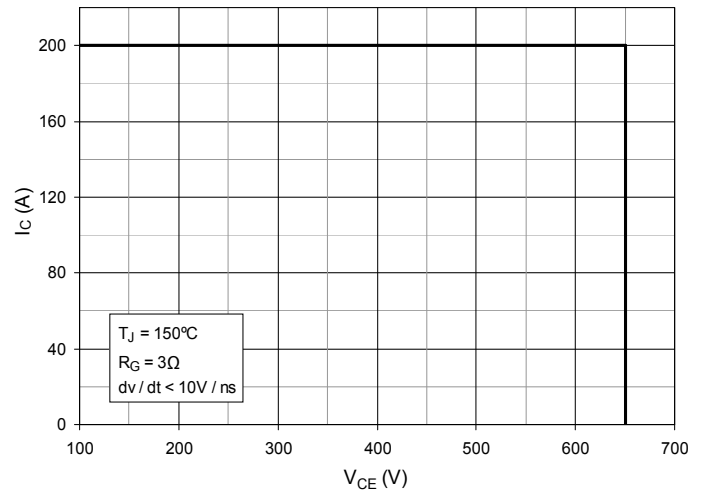


Fig. 11. Forward-Bias Safe Operating Area

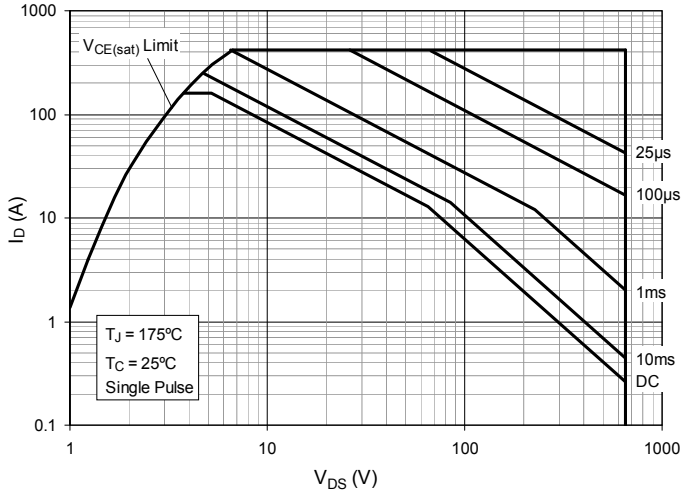
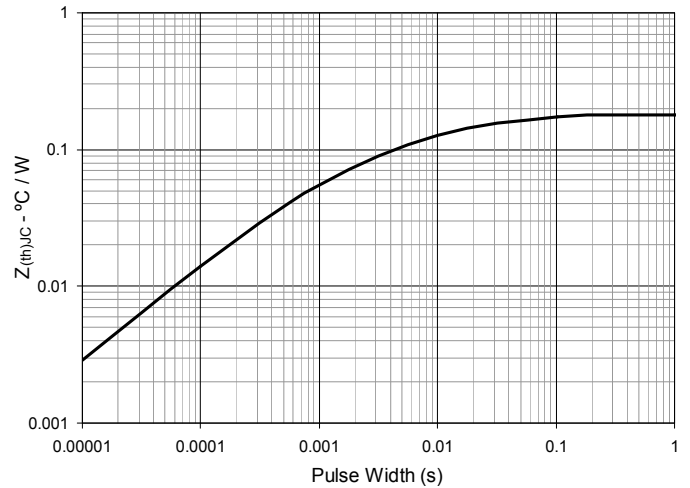
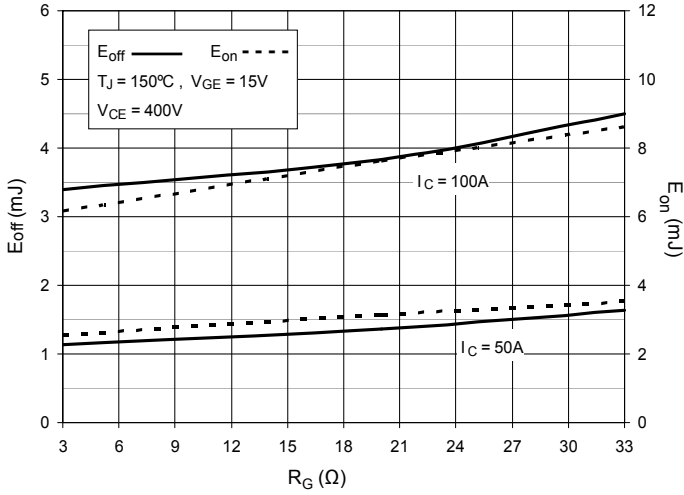


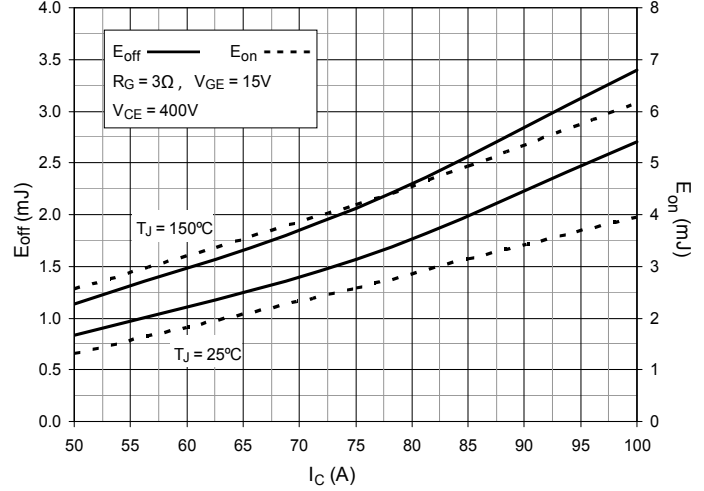
Fig. 12. Maximum Transient Thermal Impedance (IGBT)



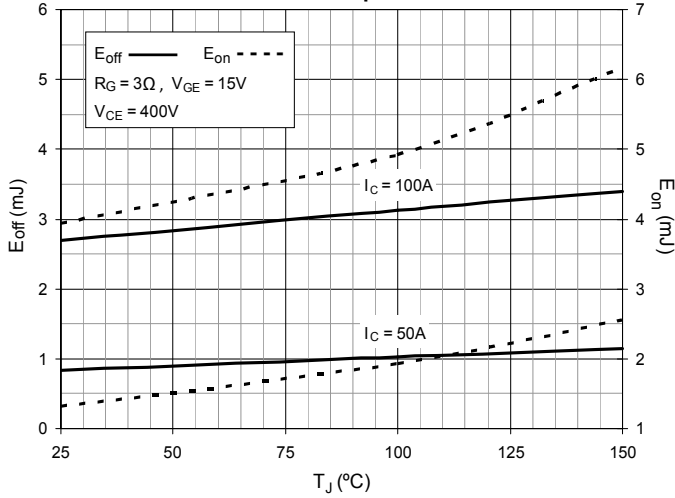
**Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance**



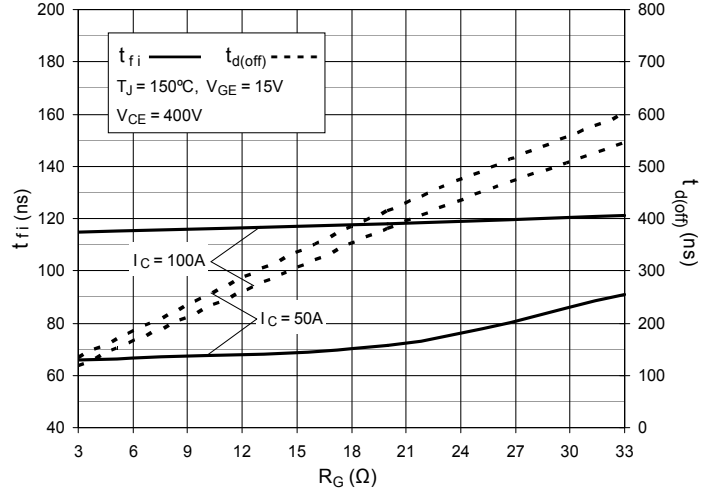
**Fig. 14. Inductive Switching Energy Loss vs. Collector Current**



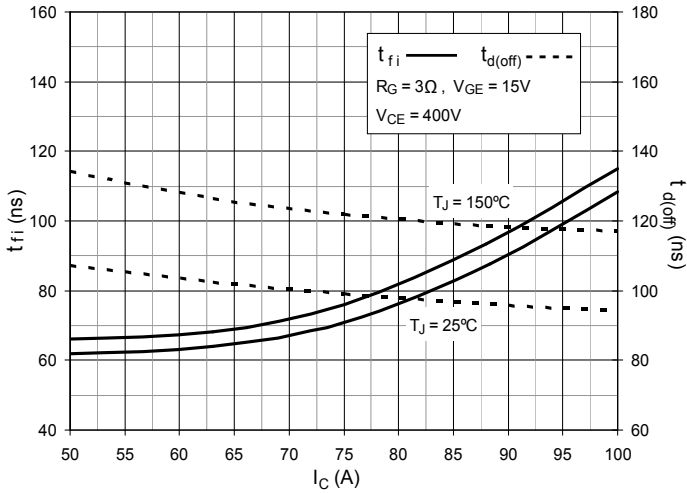
**Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature**



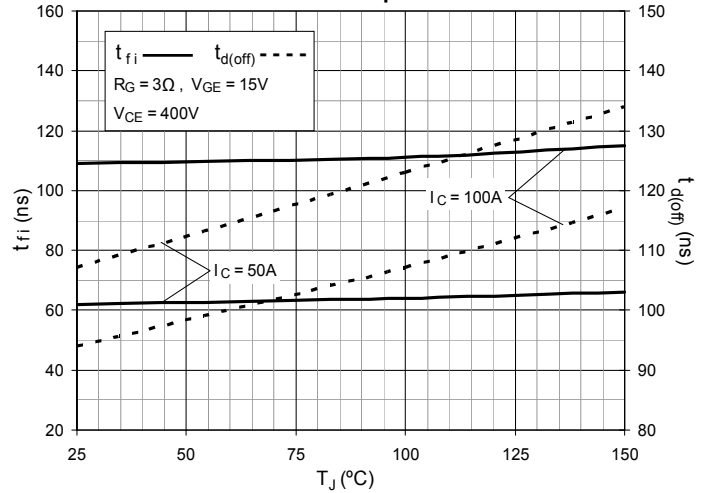
**Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance**



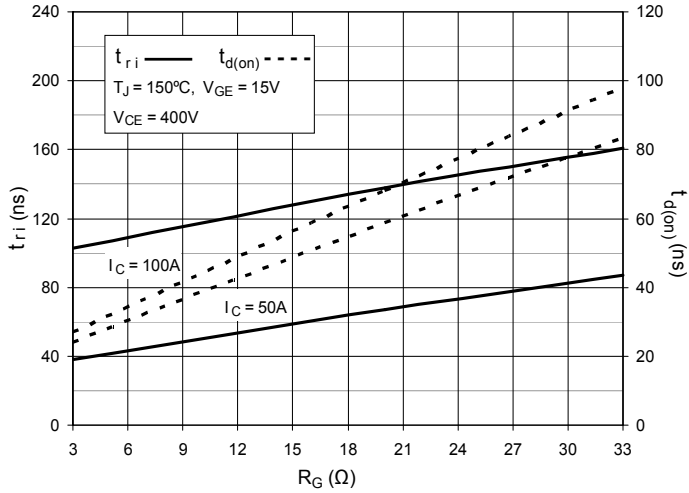
**Fig. 17. Inductive Turn-off Switching Times vs. Collector Current**



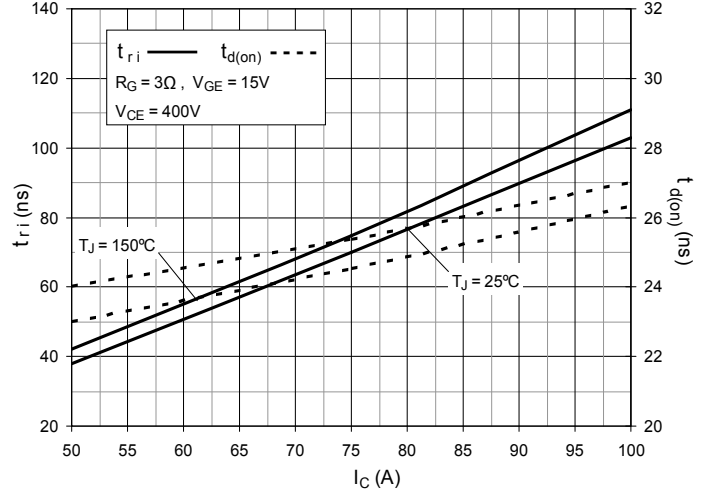
**Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature**



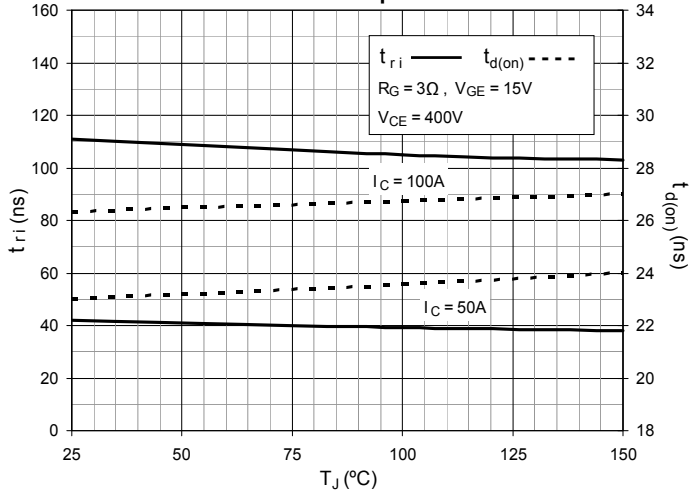
**Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance**



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



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



**Fig. 22. Maximum Peak Load Current vs. Frequency**

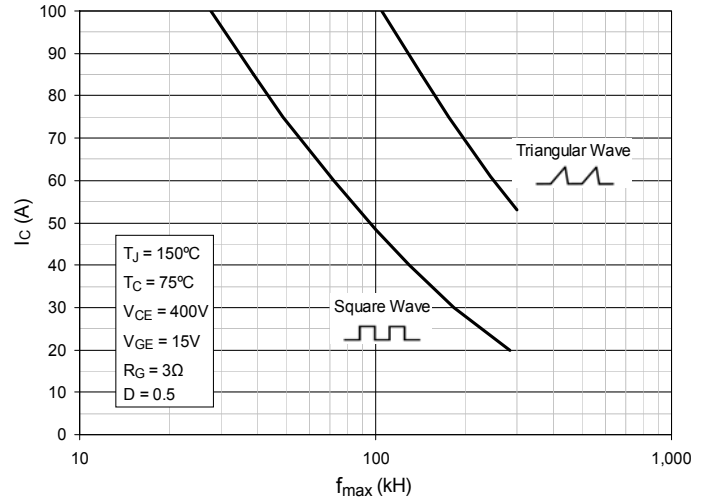


Fig. 23. Diode Forward Characteristics

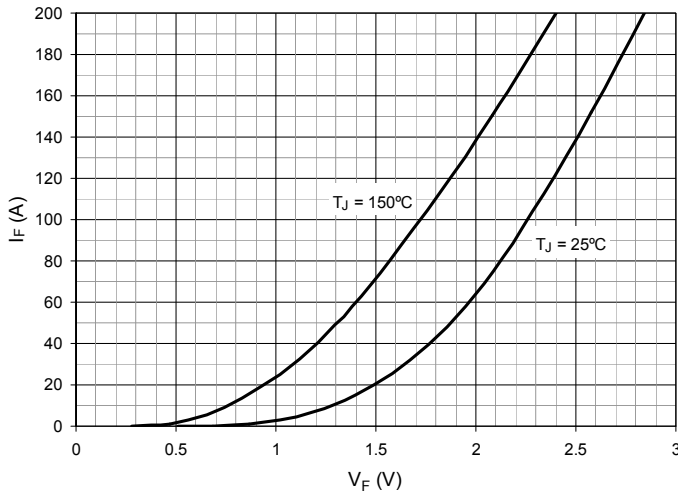


Fig. 24. Reverse Recovery Charge vs.  $-di_F/dt$

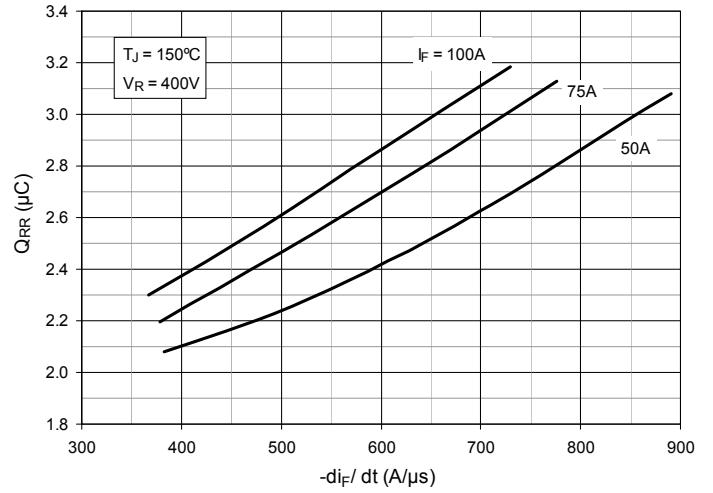


Fig. 25. Reverse Recovery Current vs.  $-di_F/dt$

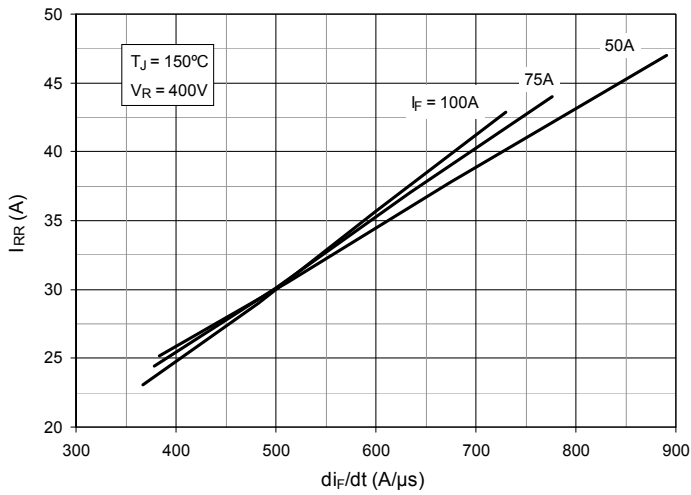


Fig. 26. Reverse Recovery Time vs.  $-di_F/dt$

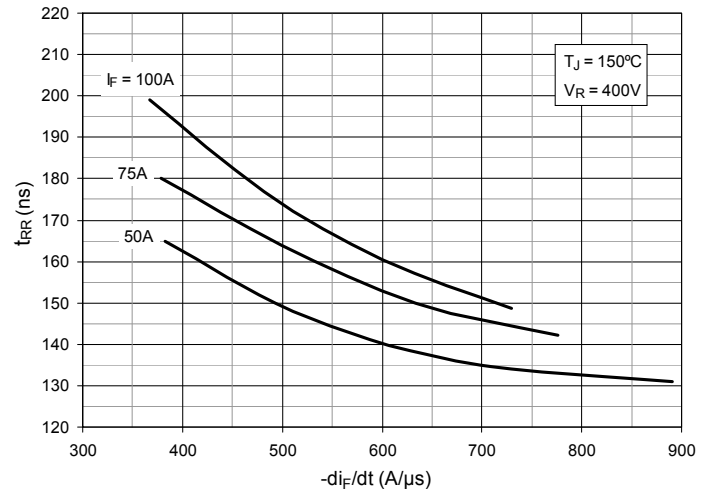


Fig. 27. Dynamic Parameters  $Q_{RR}$ ,  $I_{RR}$  vs. Junction Temperature

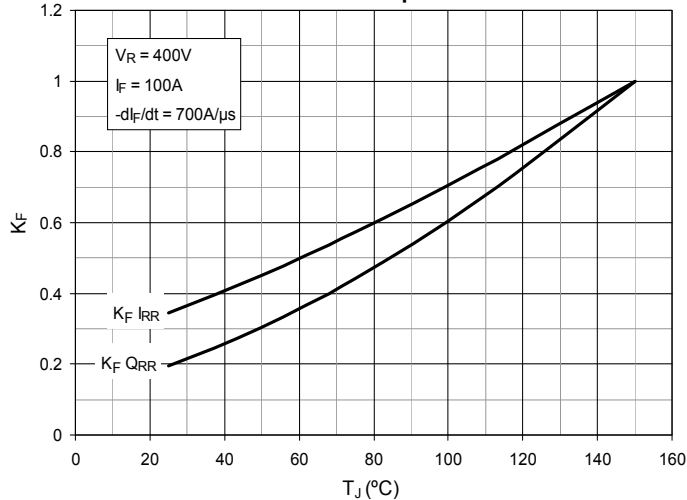
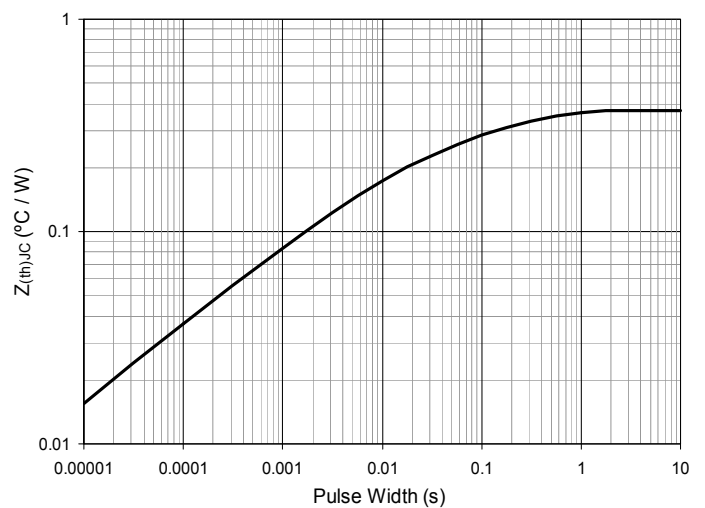


Fig. 28. Maximum Transient Thermal Impedance (Diode)





---

Disclaimer Notice - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).