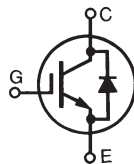


# XPT™ 600V IGBT GenX3™ w/ Diode

## IXXR100N60B3H1

(Electrically Isolated Tab)

Extreme Light Punch Through  
IGBT for 10-30kHz Switching



$$V_{CES} = 600V$$

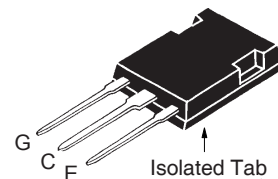
$$I_{C110} = 68A$$

$$V_{CE(sat)} \leq 1.80V$$

$$t_{fi(typ)} = 150ns$$

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ C$ to $150^\circ C$	600	V
$V_{CGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$ (Chip Capability)	145	A
$I_{C110}$	$T_C = 110^\circ C$	68	A
$I_{F90}$	$T_C = 90^\circ C$	54	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	440	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>	$V_{GE} = 15V$ , $T_{VJ} = 150^\circ C$ , $R_G = 2\Omega$ 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	10	$\mu s$
$P_C$	$T_C = 25^\circ C$	400	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$T_L$ $T_{SOLD}$	Maximum Lead Temperature for Soldering Plastic Body for 10s	300 260	$^\circ C$ $^\circ C$
$V_{ISOL}$	50/60 Hz, 1 Minute	2500	V~
$F_C$	Mounting Force	20..120/4.5..27	N/lb.
<b>Weight</b>		5	g

### ISOPLUS247™



G = Gate      C = Collector  
E = Emitter

### Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Optimized for 10-30kHz 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

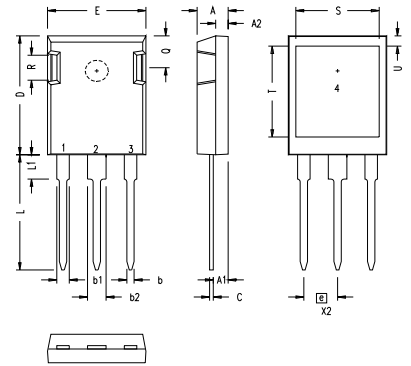
### Applications

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

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

Symbol Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)		Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 60\text{A}, V_{CE} = 10\text{V}, \text{Note 1}$	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
$Q_{g(on)}$	$I_C = 70\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		143	nC
$Q_{ge}$			37	nC
$Q_{gc}$			60	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 70\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 360\text{V}, R_G = 2\Omega$ 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	2.8 mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 150^\circ\text{C}</math></b> $I_C = 70\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 360\text{V}, R_G = 2\Omega$ 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
$R_{thJC}$			0.31	$^\circ\text{C/W}$
$R_{thCS}$		0.15		$^\circ\text{C/W}$

## ISOPLUS247 (IXXR) Outline



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
b1	.075	.084	1.91	2.13
b2	.115	.123	2.92	3.12
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.520	.540	13.21	13.72
T	.620	.640	15.75	16.26
U	.065	.080	1.65	2.03

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

## Reverse Diode (FRED)

Symbol Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)		Characteristic Values		
		Min.	Typ.	Max.
$V_F$	$I_F = 60\text{A}, V_{GE} = 0\text{V}, \text{Note 1}$		1.6	2.5 V
	$T_J = 150^\circ\text{C}$		1.4	1.8 V
$I_{RM}$	$I_F = 60\text{A}, V_{GE} = 0\text{V},$ $-di_F/dt = 200\text{A}/\mu\text{s}, V_R = 300\text{V}$		8.3	A
$t_{rr}$			140	ns
$R_{thJC}$			0.62	$^\circ\text{C/W}$

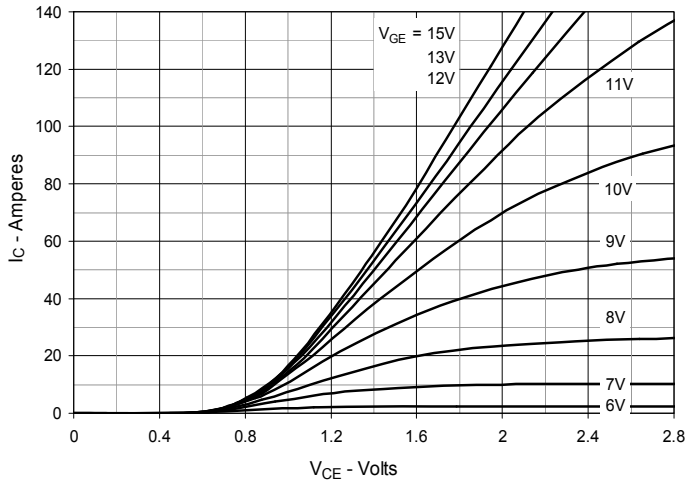
## Notes:

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

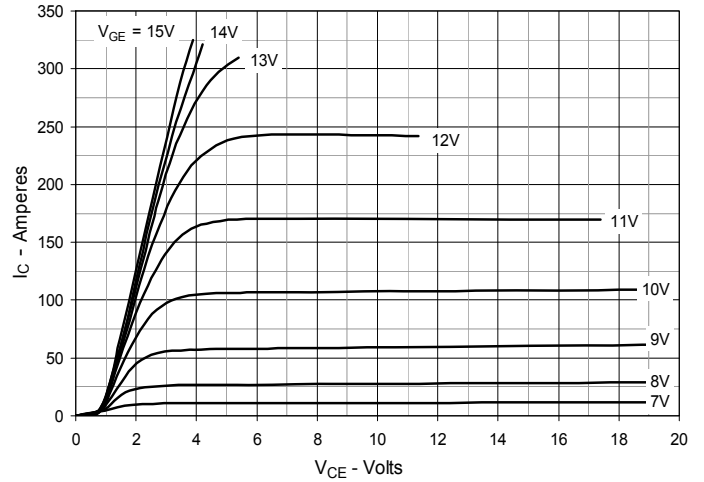
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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	

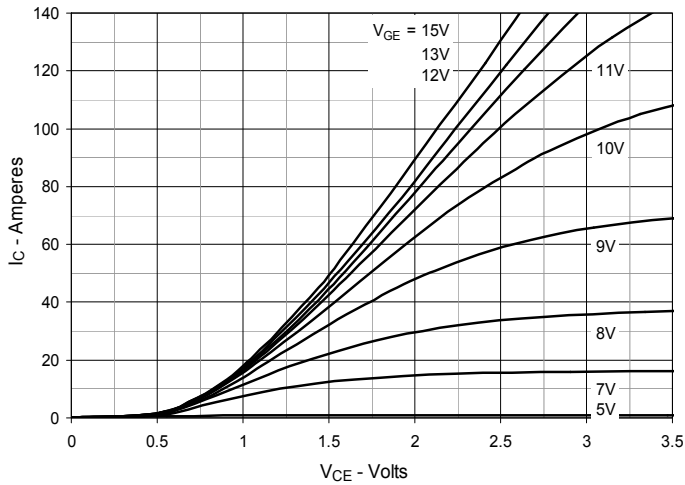
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



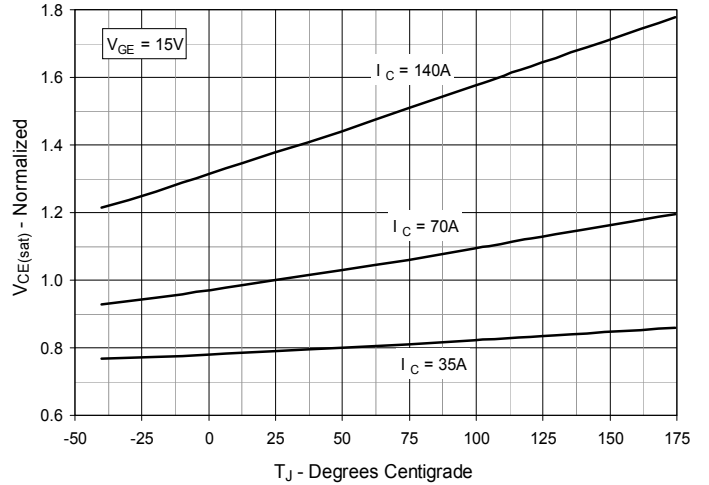
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



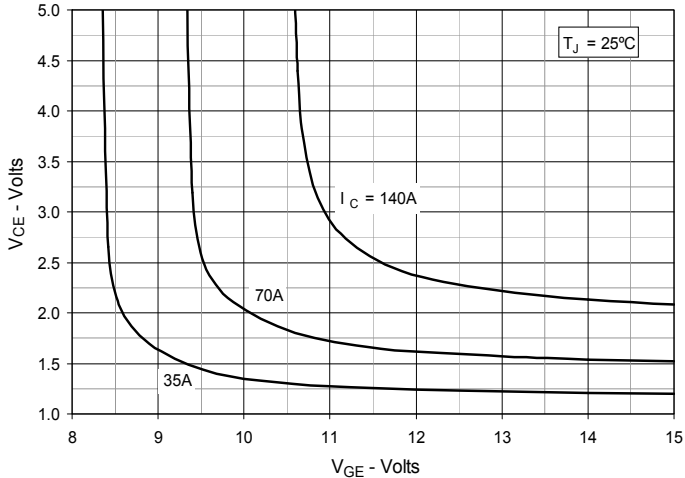
**Fig. 3. Output Characteristics @  $T_J = 150^\circ\text{C}$**



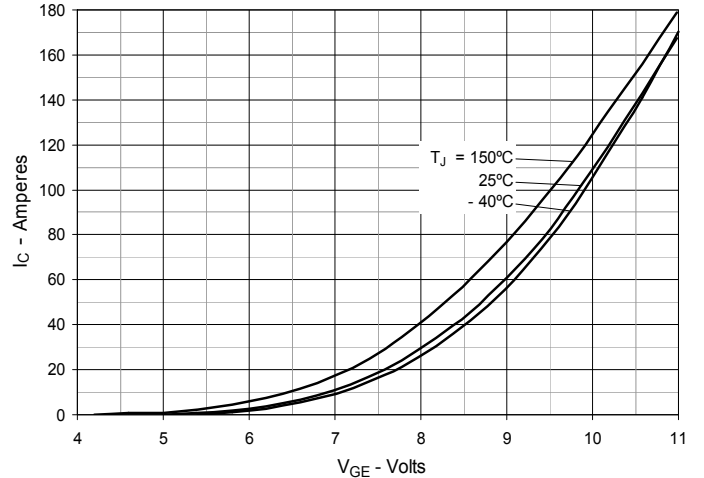
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**



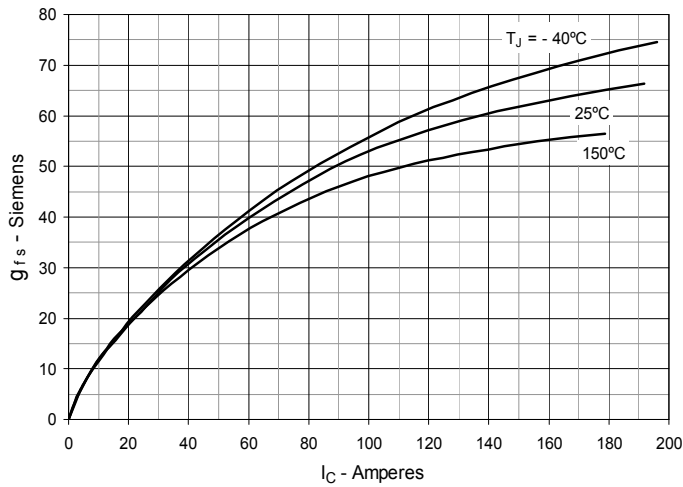
**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**



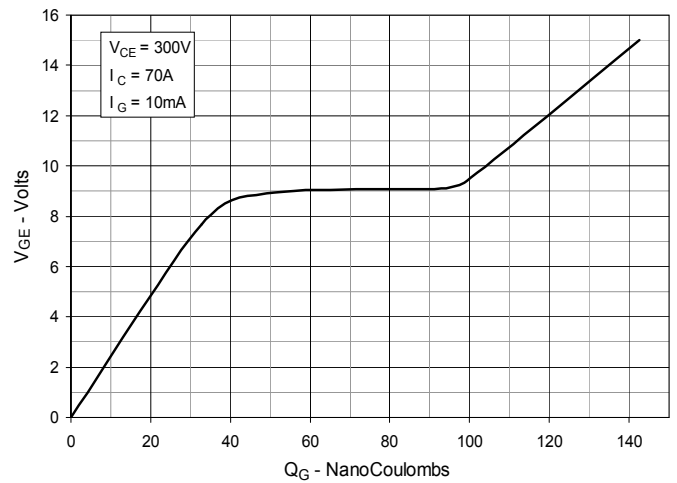
**Fig. 6. Input Admittance**



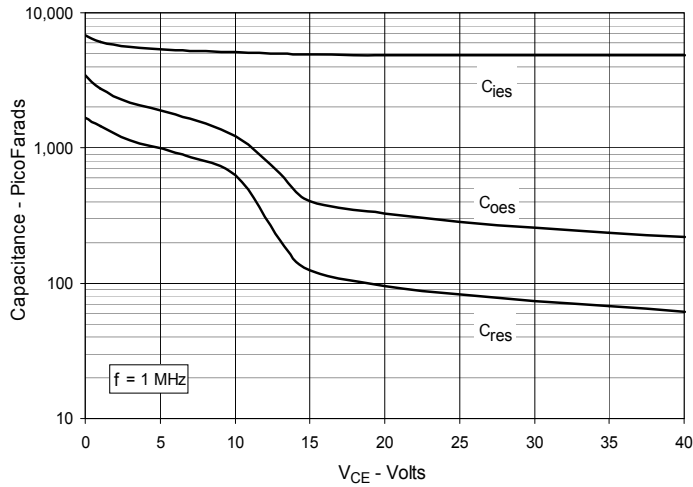
**Fig. 7. Transconductance**



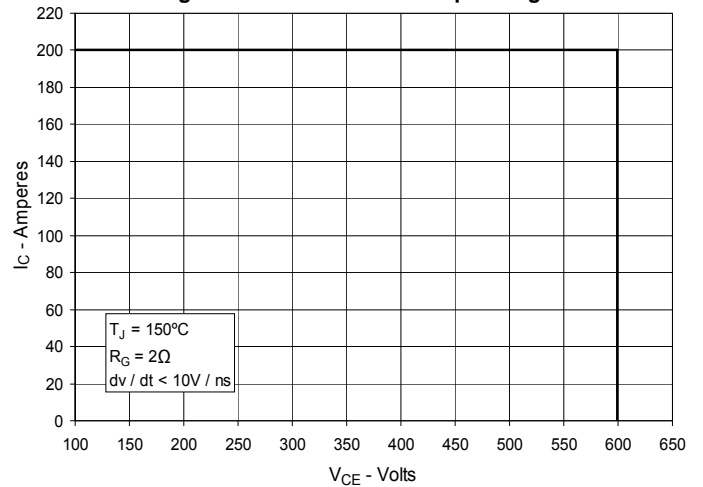
**Fig. 8. Gate Charge**



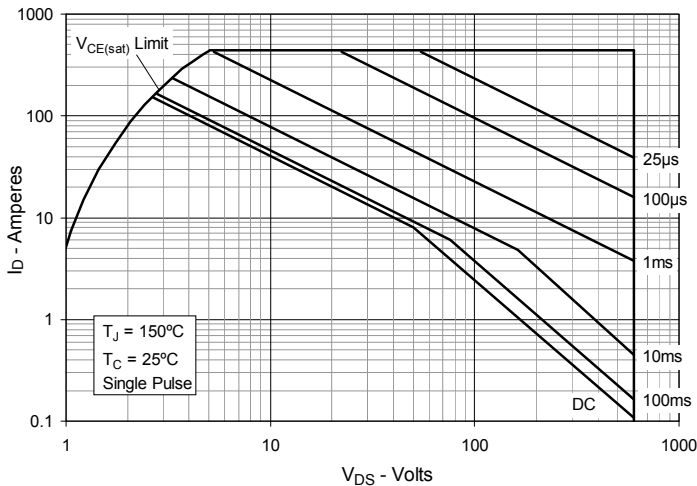
**Fig. 9. Capacitance**



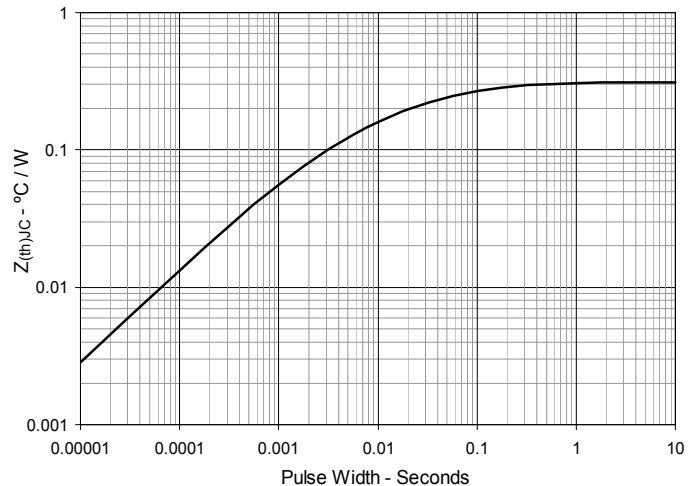
**Fig. 10. Reverse-Bias Safe Operating Area**



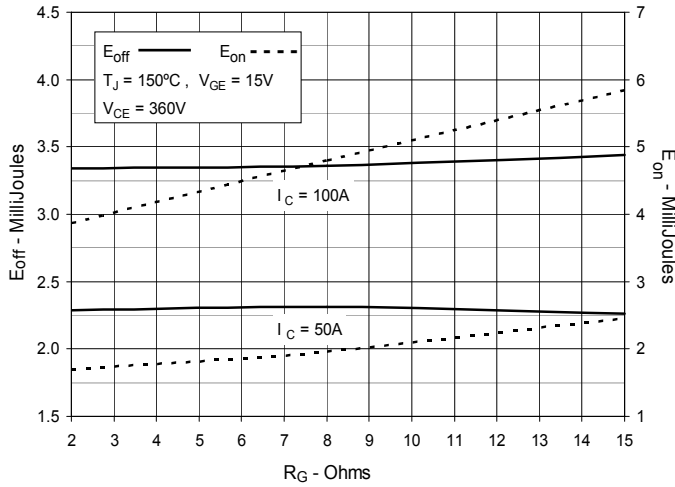
**Fig. 11. Forward-Bias Safe Operating Area**



**Fig. 12. Maximum Transient Thermal Impedance**



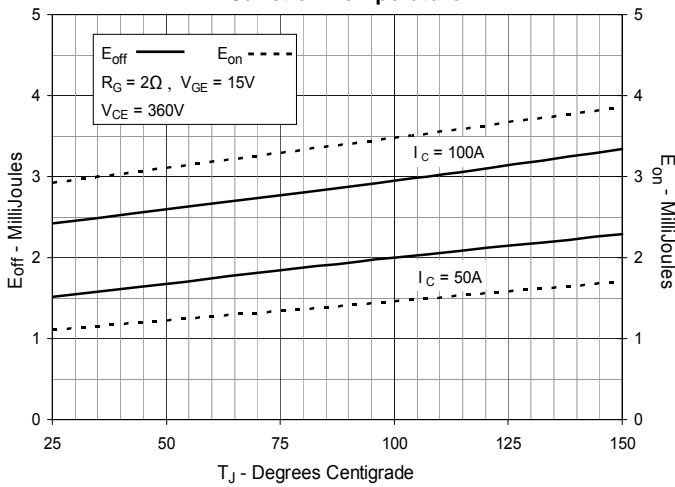
**Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance**



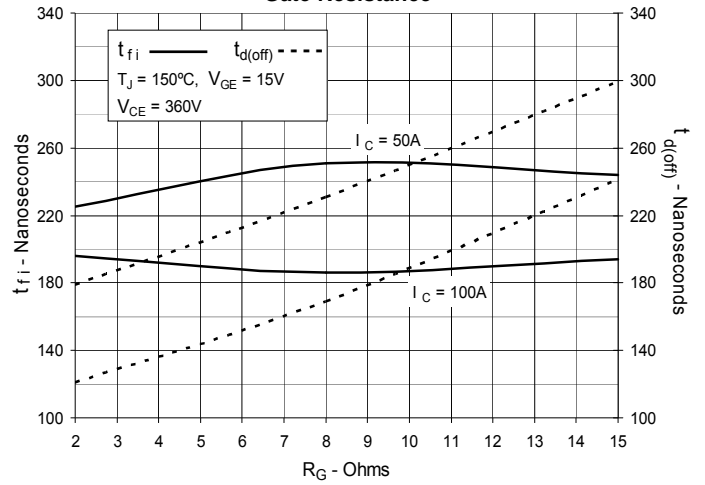
**Fig. 14. Inductive Switching Energy Loss vs. Collector Current**



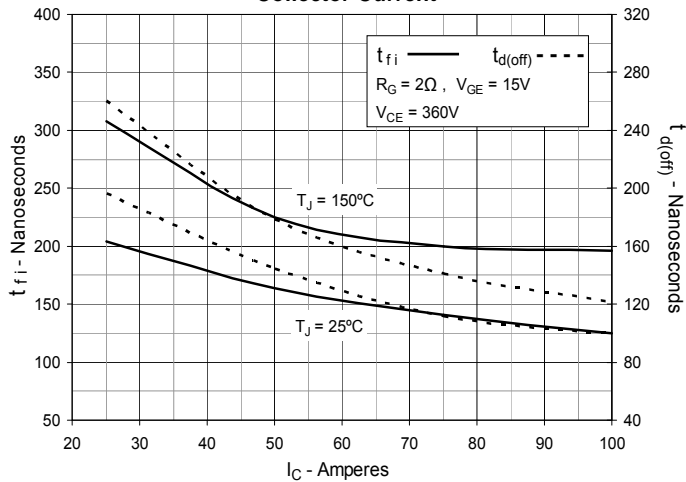
**Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature**



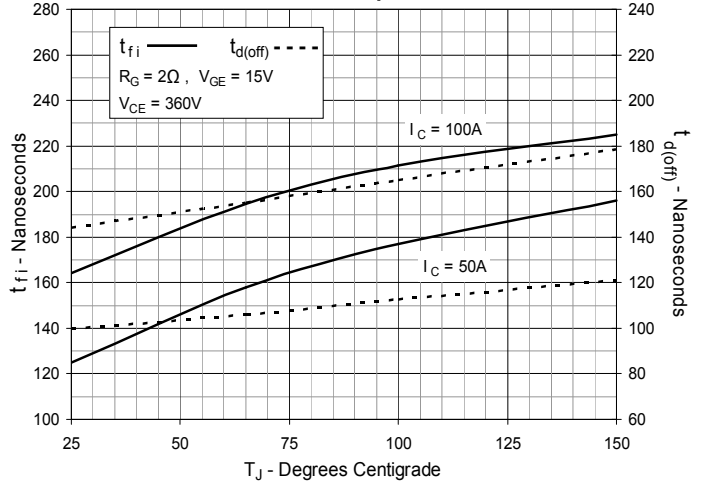
**Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance**



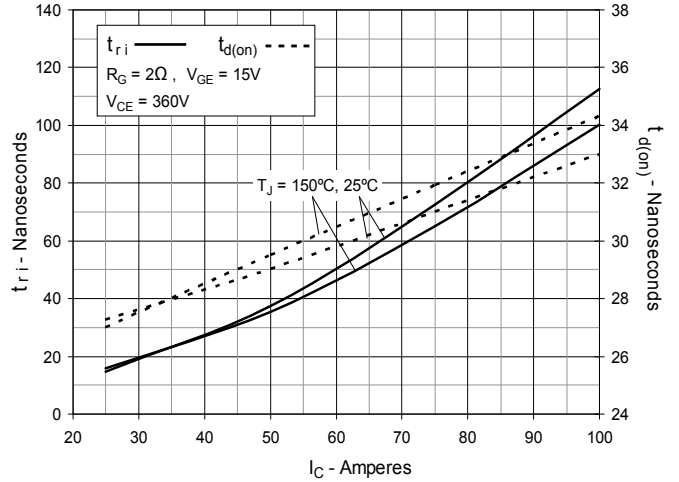
**Fig. 17. Inductive Turn-off Switching Times vs. Collector Current**

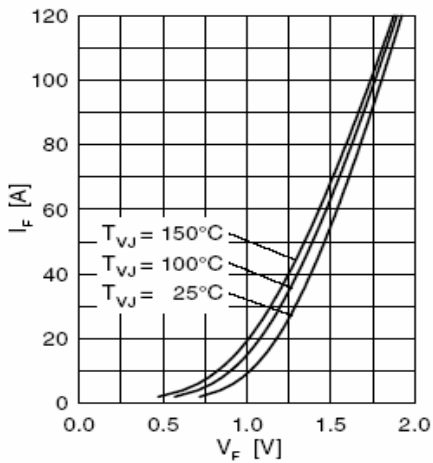


**Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature**

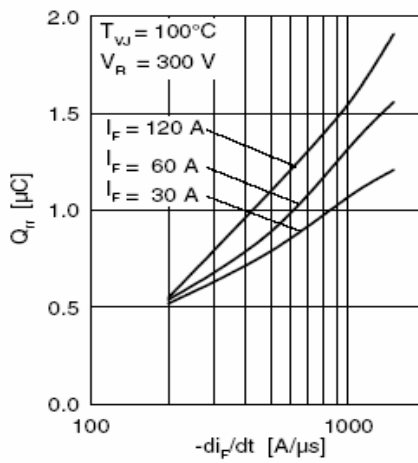


**Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance**

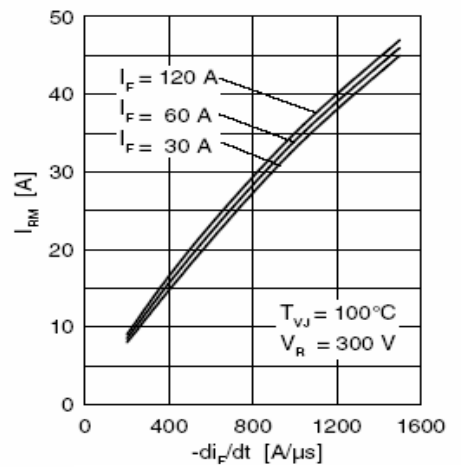
**Fig. 20. Inductive Turn-on Switching Times vs. Collector Current**

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

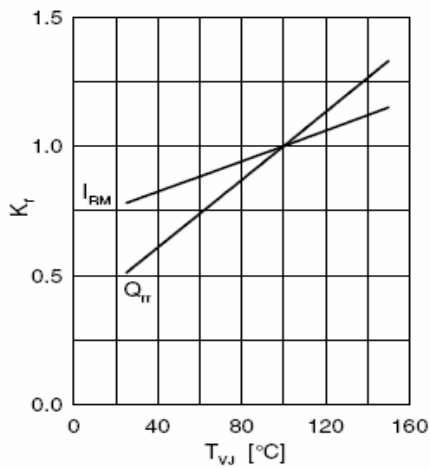
**Fig. 22 Forward Current  $I_F$  vs.  $V_F$**



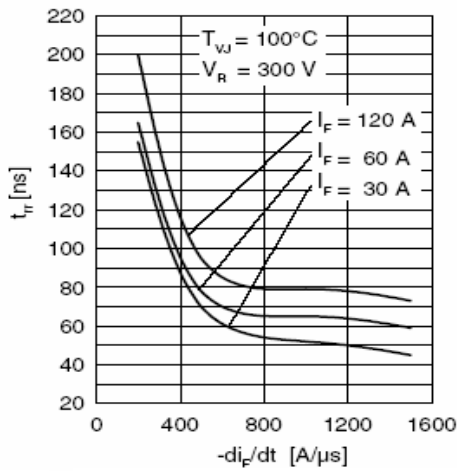
**Fig. 23 Typ. Reverse Recovery Charge  $Q_{rr}$**



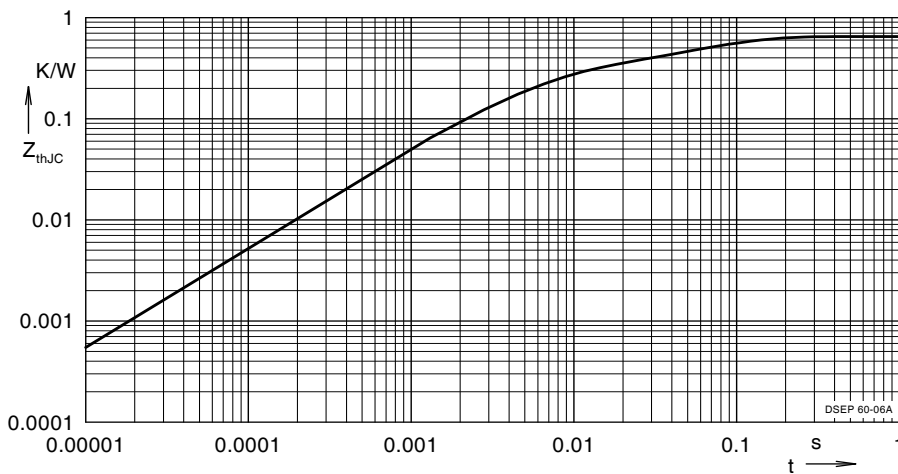
**Fig. 24 Typ. Peak Reverse Current  $I_{RM}$**



**Fig. 25 Typ. Dynamic Parameters  $Q_{rr}$ ,  $I_{RM}$**



**Fig. 26 Typ. Recovery Time  $t_{tr}$**



**Fig. 27. Maximum Transient Thermal Impedance**



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