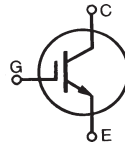


### GenX3™ 600V IGBT

**IXGA36N60A3**  
**IXGP36N60A3**  
**IXGH36N60A3**

Ultra Low V<sub>sat</sub> PT IGBT for  
 up to 5kHz switching



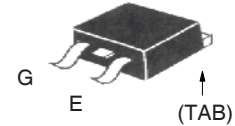
$$V_{CES} = 600V$$

$$I_{C110} = 36A$$

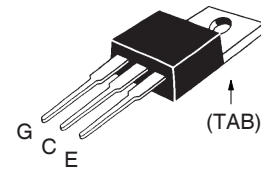
$$V_{CE(sat)} \leq 1.4V$$

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_C = 25^\circ C$ 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
$I_{C110}$	$T_C = 110^\circ C$	36	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	200	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 5\Omega$ Clamped inductive load @ $\leq 600V$	$I_{CM} = 60$	A
$P_C$	$T_C = 25^\circ C$	220	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$T_L$	1.6mm (0.062 in.) from case for 10s	300	$^\circ C$
$T_{SOLD}$	Plastic body for 10 seconds	260	$^\circ C$
$M_d$	Mounting torque (TO-247 & TO-220)	1.13/10	Nm/lb.in.
<b>Weight</b>	TO-263	2.5	g
	TO-220	3.0	g
	TO-247	6.0	g

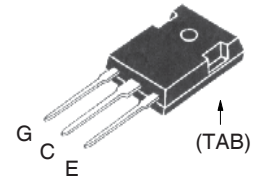
TO-263 (IXGA)



TO-220 (IXGP)



TO-247 (IXGH)



G = Gate      C = Collector  
 E = Emitter      TAB = Collector

### Features

- Optimized for low conduction losses
- International standard packages

### Advantages

- High power density
- Low gate drive requirement

### Applications

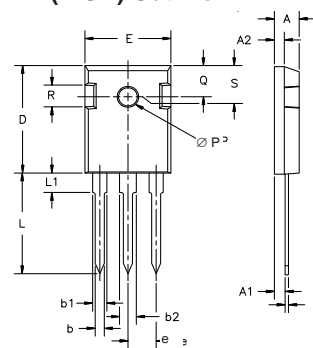
- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- Inrush Current Protection Circuits

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		5.0 V
$I_{CES}$	$V_{CE} = V_{CES}$ $V_{GE} = 0V$ $T_J = 125^\circ C$			25 $\mu A$
				250 $\mu A$
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 30A$ , $V_{GE} = 15V$ , Note 1			1.4 V

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 30A, V_{CE} = 10V$ , Note 1	25	42	S
$C_{ies}$	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		2380	pF
$C_{oes}$			115	pF
$C_{res}$			30	pF
$Q_g$	$I_C = 30A, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$		80	nC
$Q_{ge}$			12	nC
$Q_{gc}$			36	nC
$t_{d(on)}$	<b>Inductive Load, <math>T_J = 25^\circ C</math></b> $I_C = 30A, V_{GE} = 15V$ $V_{CE} = 400V, R_G = 5\Omega$		18	ns
$t_{ri}$			23	ns
$E_{on}$			0.74	mJ
$t_{d(off)}$			330	ns
$t_{fi}$			325	ns
$E_{off}$			3.00	mJ
$t_{d(on)}$	<b>Inductive Load, <math>T_J = 25^\circ C</math></b> $I_C = 30A, V_{GE} = 15V$ $V_{CE} = 400V, R_G = 5\Omega$		18	ns
$t_{ri}$			25	ns
$E_{on}$			1.50	mJ
$t_{d(off)}$			500	ns
$t_{fi}$			500	ns
$E_{off}$			5.30	mJ
$R_{thJC}$			0.56	$^\circ C/W$
$R_{thCS}$	(TO-247)	0.25		$^\circ C/W$
	(TO-220)	0.50		$^\circ C/W$

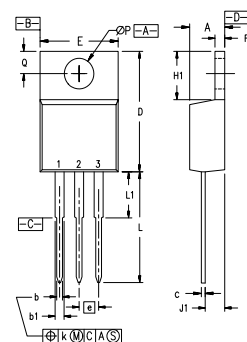
Note 1: Pulse test,  $t \leq 300\mu s$ ; duty cycle,  $d \leq 2\%$ .

**TO-247 (IXGH) Outline**



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15	BSC	242	BSC

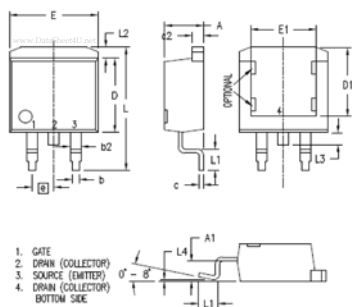
**TO-220 (IXGP) Outline**



Pins: 1 - Gate 2 - Drain  
3 - Source 4 - Drain

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.170	.190	4.32	4.83
b	.025	.040	0.64	1.02
b <sub>1</sub>	.045	.065	1.15	1.65
c	.014	.022	0.35	0.56
D	.580	.630	14.73	16.00
E	.390	.420	9.91	10.66
e	.100 BSC		2.54 BSC	
F	.045	.055	1.14	1.40
H1	.230	.270	5.85	6.85
J1	.090	.110	2.29	2.79
k	0	.015	0	0.38
L	.500	.550	12.70	13.97
L1	.110	.230	2.79	5.84
∅P	.139	.161	3.53	4.08
Q	.100	.125	2.54	3.18

**TO-263 (IXGA) Outline**



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.160	.190	4.06	4.83
A <sub>1</sub>	.080	.110	2.03	2.79
b	.020	.039	0.51	0.99
b <sub>2</sub>	.045	.055	1.14	1.40
c	.016	.029	0.40	0.74
c <sub>2</sub>	.045	.055	1.14	1.40
D	.340	.380	8.64	9.65
D <sub>1</sub>	.315	.350	8.00	8.89
E	.380	.410	9.65	10.41
E <sub>1</sub>	.245	.320	6.22	8.13
e	.100 BSC		2.54 BSC	
L	.575	.625	14.61	15.88
L <sub>1</sub>	.090	.110	2.29	2.79
L <sub>2</sub>	.040	.055	1.02	1.40
L <sub>3</sub>	.050	.070	1.27	1.78
L <sub>4</sub>	0	.005	0	0.13

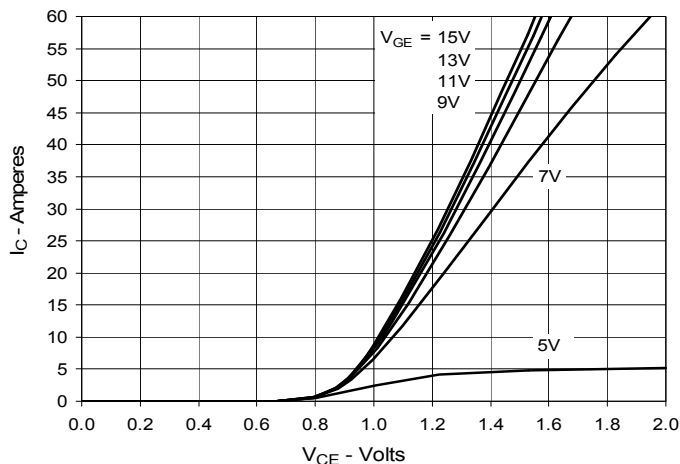
**PRELIMINARY TECHNICAL INFORMATION**

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

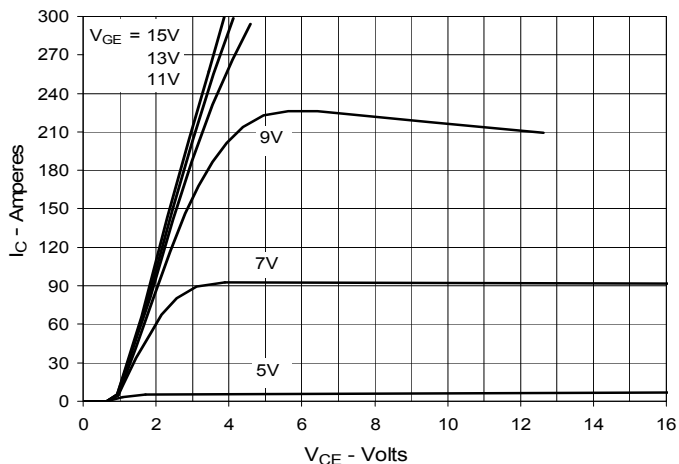
IXYS reserves the right to change limits, test conditions and dimensions.

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	

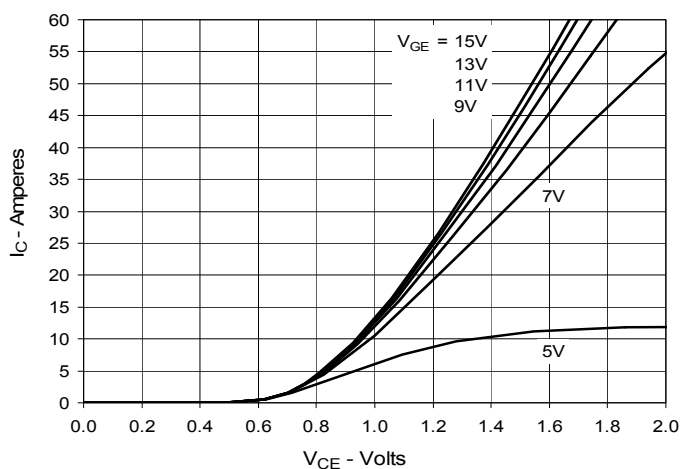
**Fig. 1. Output Characteristics @ 25°C**



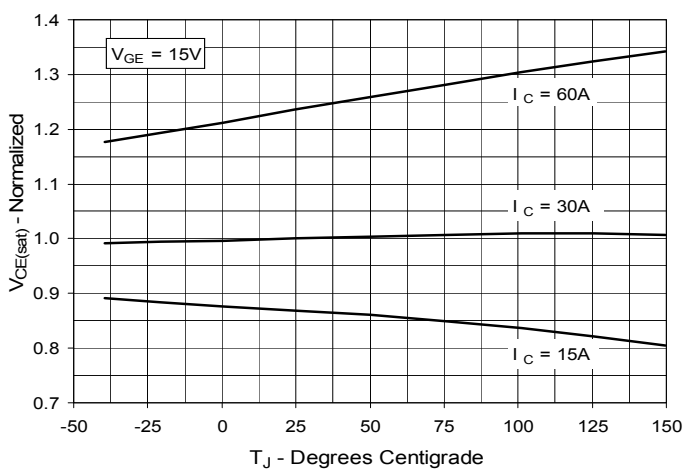
**Fig. 2. Extended Output Characteristics @ 25°C**



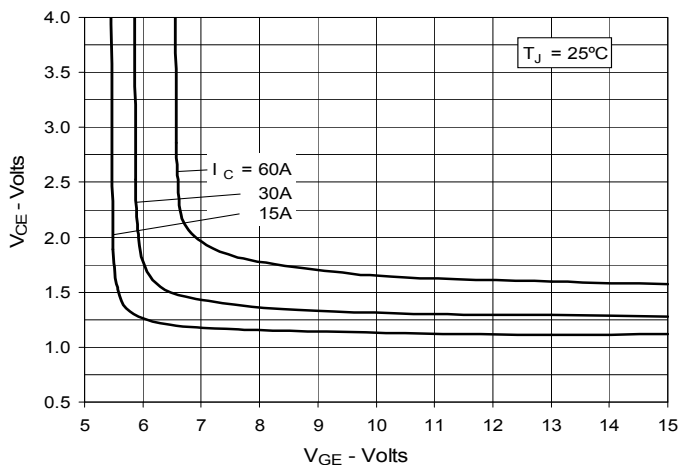
**Fig. 3. Output Characteristics @ 125°C**



**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**

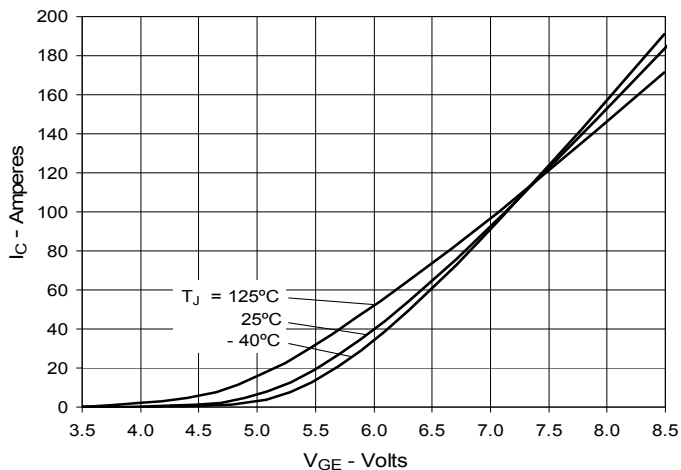


Fig. 7. Transconductance

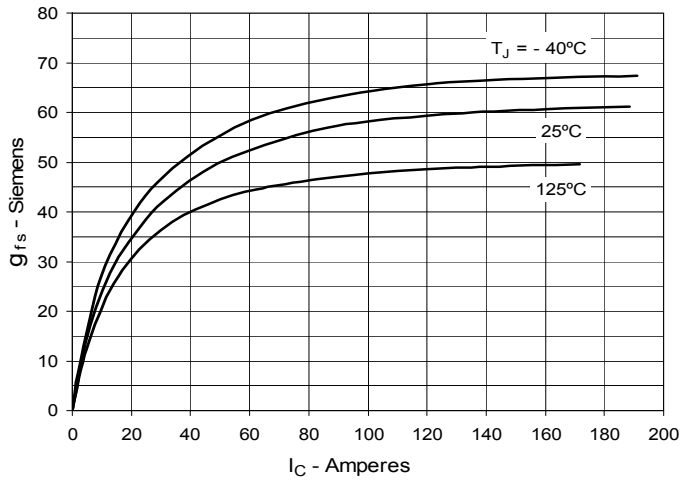


Fig. 17. Gate Charge

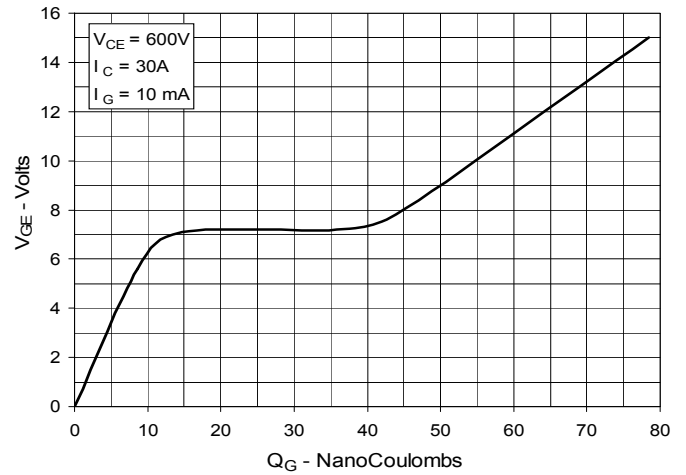


Fig. 19. Reverse-Bias Safe Operating Area

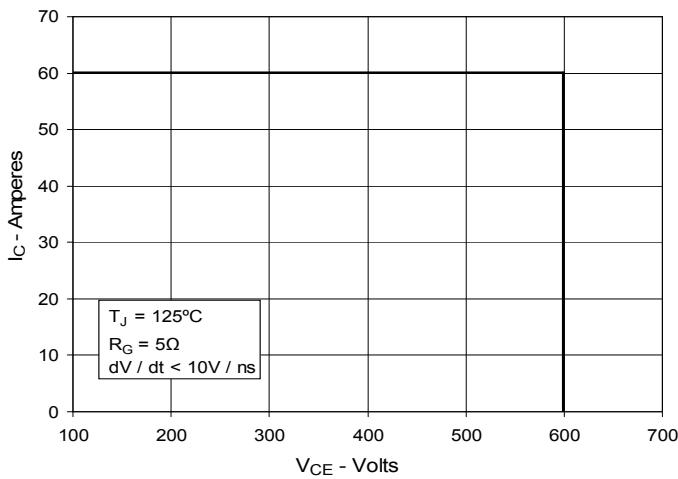


Fig. 18. Capacitance

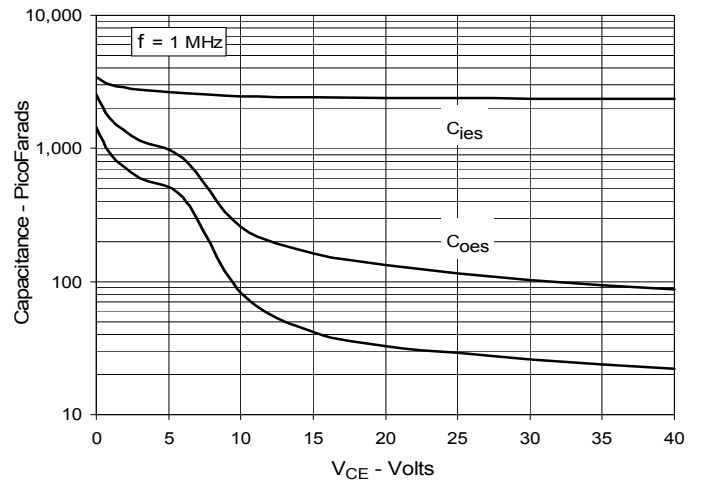
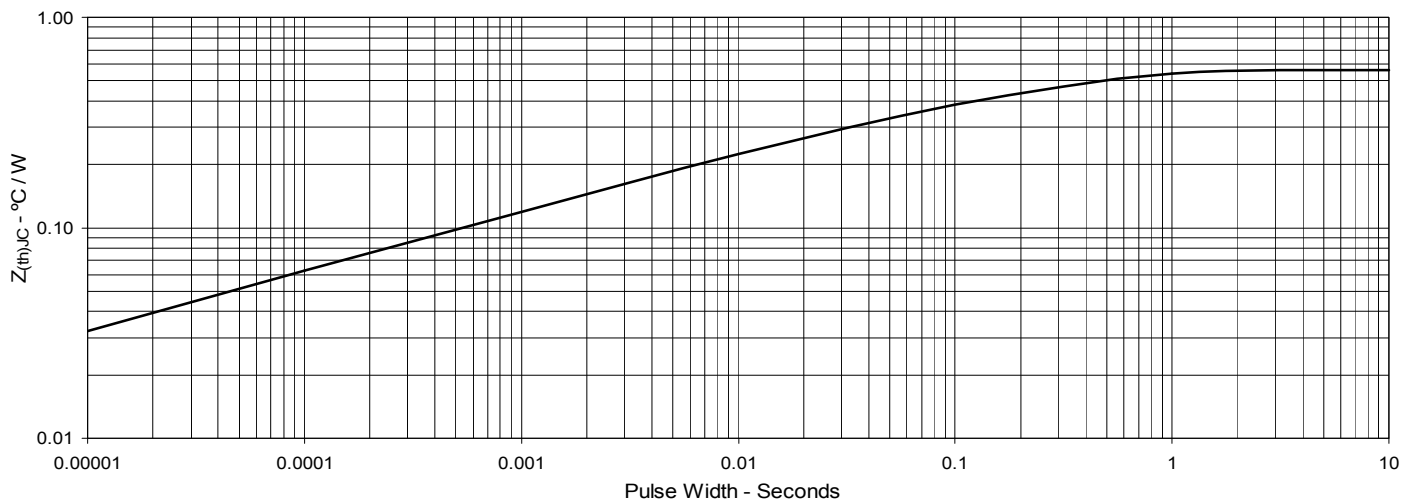
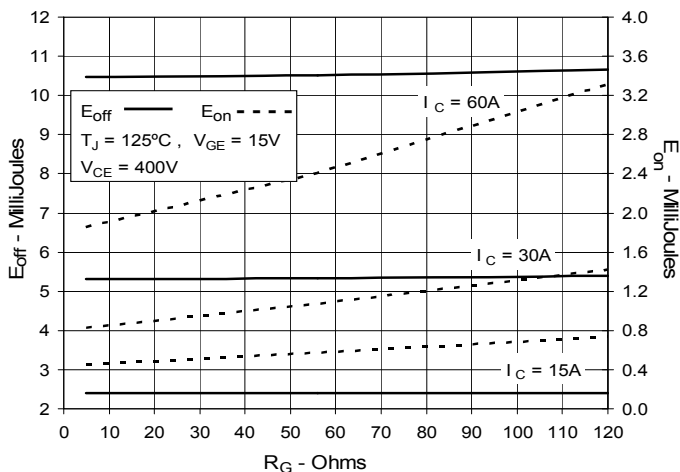


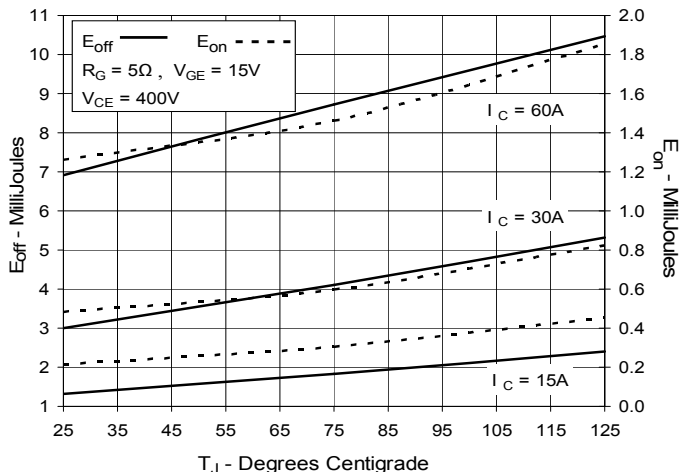
Fig. 11. Maximum Transient Thermal Impedance



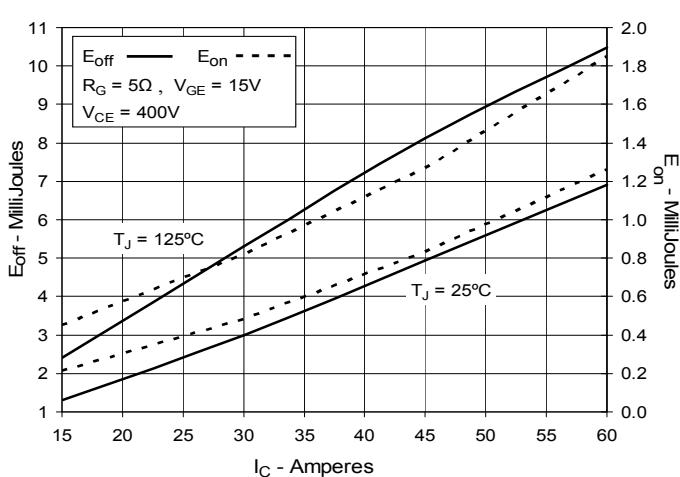
**Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance**



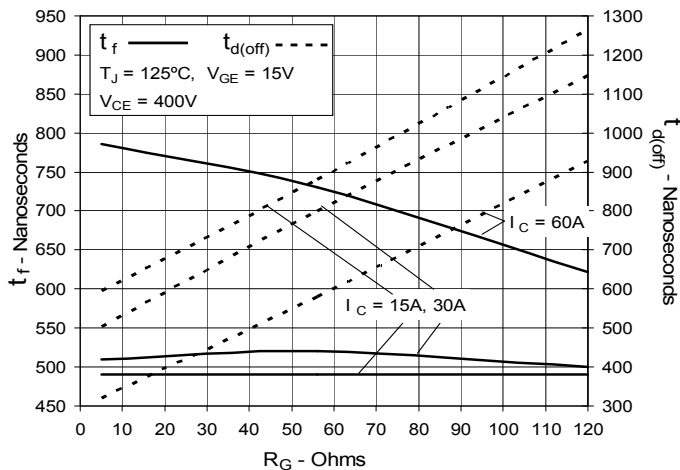
**Fig. 13. Inductive Switching Energy Loss vs. Junction Temperature**



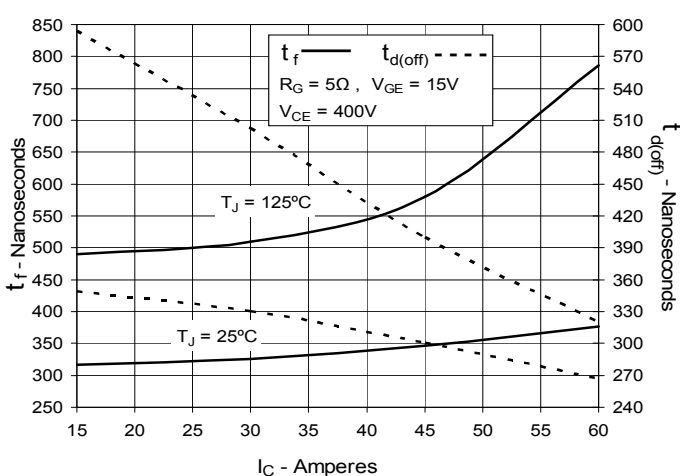
**Fig. 14. Inductive Switching Energy Loss vs. Collector Current**



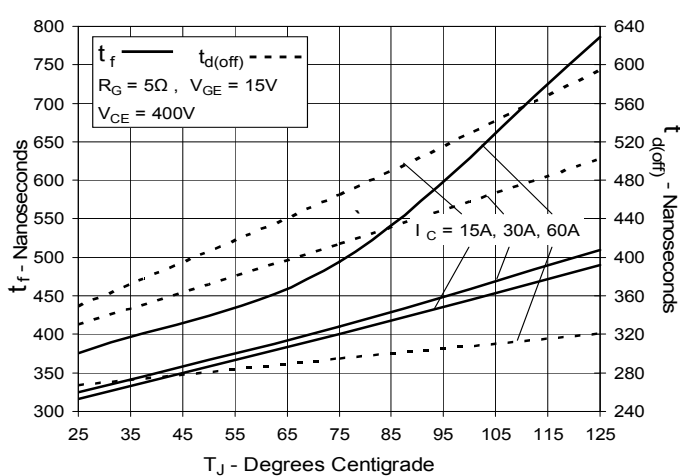
**Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance**



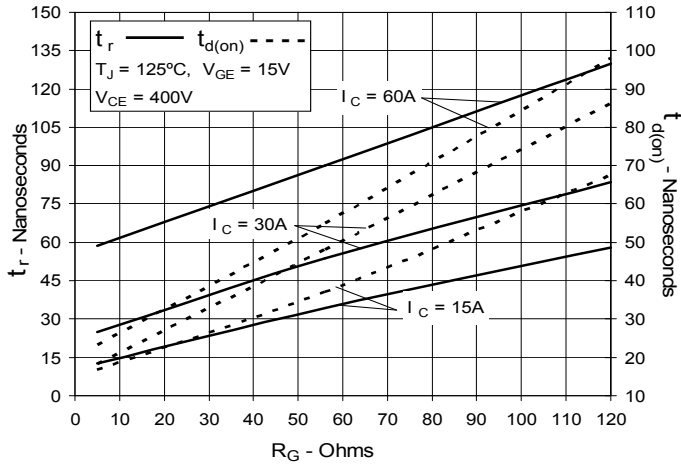
**Fig. 16. Inductive Turn-off Switching Times vs. Collector Current**



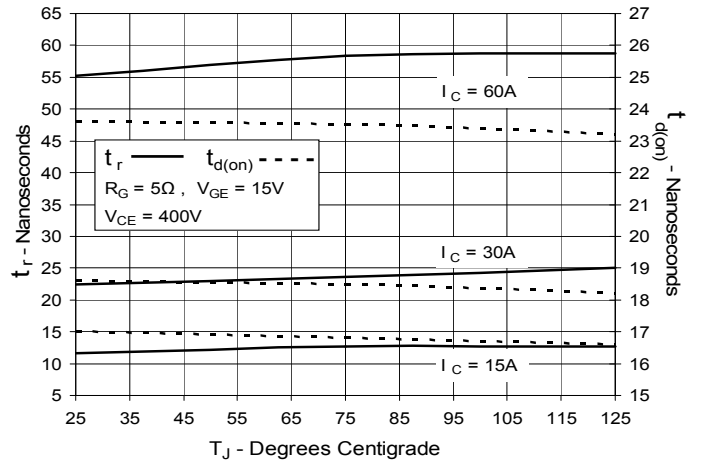
**Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature**



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



**Fig. 19. Inductive Turn-on Switching Times vs. Junction Temperature**



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

