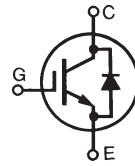
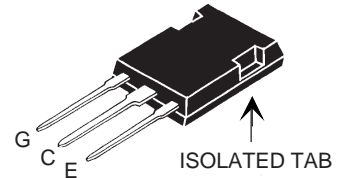


**GenX3™ 1200V IGBT**
**IXGR24N120C3D1**
**High speed PT IGBTs for  
20-50kHz Switching**


$$\begin{aligned}
 V_{CES} &= 1200V \\
 I_{C25} &= 48A \\
 V_{CE(sat)} &\leq 4.2V \\
 t_{fi(typ)} &= 110ns
 \end{aligned}$$

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	1200	V
$V_{CGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GE} = 1M\Omega$	1200	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ\text{C}$	48	A
$I_{C100}$	$T_C = 100^\circ\text{C}$	24	A
$I_{CM}$	$T_C = 25^\circ\text{C}$ , 1ms	96	A
$I_A$	$T_C = 25^\circ\text{C}$	20	A
$E_{AS}$	$T_C = 25^\circ\text{C}$	250	mJ
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15V$ , $T_J = 125^\circ\text{C}$ , $R_G = 5\Omega$ Clamped inductive load @ $V_{CE} \leq 1200V$	$I_{CM} = 48$	A
$P_C$	$T_C = 25^\circ\text{C}$	200	W
$T_J$		-55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		-55 ... +150	$^\circ\text{C}$
$F_C$	Mounting force	20..120/4.5..27	N/lb.
$T_L$	Maximum lead temperature for soldering	300	$^\circ\text{C}$
$T_{SOLD}$	1.6mm (0.062 in.) from case for 10s	260	$^\circ\text{C}$
$V_{ISOL}$	50/60 Hz RMS, $t = 1\text{min}$	2500	V
	$I_{ISOL} < 1\text{mA}$ , $t = 20\text{seconds}$	3000	V
<b>Weight</b>		5	g

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{CES}$	$I_C = 250\mu\text{A}$ , $V_{GE} = 0V$	1200		V
$V_{GE(th)}$	$I_C = 250\mu\text{A}$ , $V_{CE} = V_{GE}$	2.5		V
$I_{CES}$	$V_{CE} = V_{CES}$ $V_{GE} = 0V$ $T_J = 125^\circ\text{C}$			100 $\mu\text{A}$ 1.5 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 20A$ , $V_{GE} = 15V$ , Note 2 $T_J = 125^\circ\text{C}$		3.6 3.1	V V

**ISOPLUS 247™ (IXGR)**


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

**Features**

- DCB Isolated mounting tab
- Meets TO-247AD package outline
- High current handling capability
- Latest generation HDMOS™ process
- MOS Gate turn-on -drive simplicity
- Avalanche Rated

**Applications**

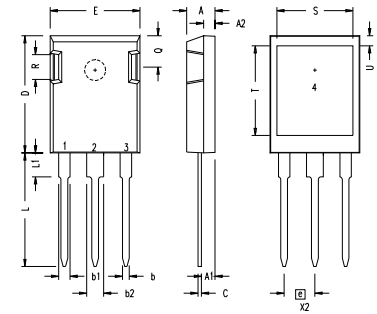
- Switch-mode and resonant-mode power supplies
- Uninterruptible power supplies (UPS)
- DC choppers
- AC motor speed control
- DC servo and robot drives

**Advantages**

- Space savings
- Easy assembly
- High power density
- Very fast switching speeds for high frequency applications

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = 24\text{A}, V_{CE} = 10\text{V}$ , Note 2	10	17	S
$C_{ies}$ $C_{oes}$ $C_{res}$	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		1620	pF
			179	pF
			52	pF
$Q_g$ $Q_{ge}$ $Q_{gc}$	$I_C = 24\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		79	nC
			12	nC
			36	nC
$t_{d(on)}$ $t_{ri}$ $E_{on}$ $t_{d(off)}$ $t_{fi}$ $E_{off}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = 20\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 600\text{V}, R_G = 5\Omega$ Note 1		16	ns
			26	ns
			1.37	mJ
			93	ns
			110	ns
			0.47	0.85 mJ
$t_{d(on)}$ $t_{ri}$ $E_{on}$ $t_{d(off)}$ $t_{fi}$ $E_{off}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = 20\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 600\text{V}, R_G = 5\Omega$ Note 1		17	ns
			37	ns
			2.90	mJ
			125	ns
			305	ns
			1.18	2.00 mJ
$R_{thJC}$ $R_{thCK}$			1.00 $^\circ\text{C/W}$ 0.15 $^\circ\text{C/W}$	

### ISOPLUS247 (IXGR) 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 - DRAIN (COLLECTOR)
- 3 - SOURCE (EMITTER)
- 4 - NO CONNECTION

NOTE: This drawing will meet all dimensions requirement of JEDEC outline TO-247AD except screw hole.

### Reverse Diode (FRED)

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_F$	$I_F = 30\text{A}, V_{GE} = 0\text{V}$ $I_F = 30\text{A}, V_{GE} = 0\text{V}$ $T_J = 125^\circ\text{C}$			2.75 V 1.80 V
$I_{RM}$ $t_{rr}$	$I_F = 50\text{A}, -di_F/dt = 100\text{A}/\mu\text{s}, V_R = 600\text{V}$ $V_{GE} = 0\text{V}, T_J = 100^\circ\text{C}$		5.5	11 A
			220	ns
$R_{thJC}$				1.5 $^\circ\text{C/W}$

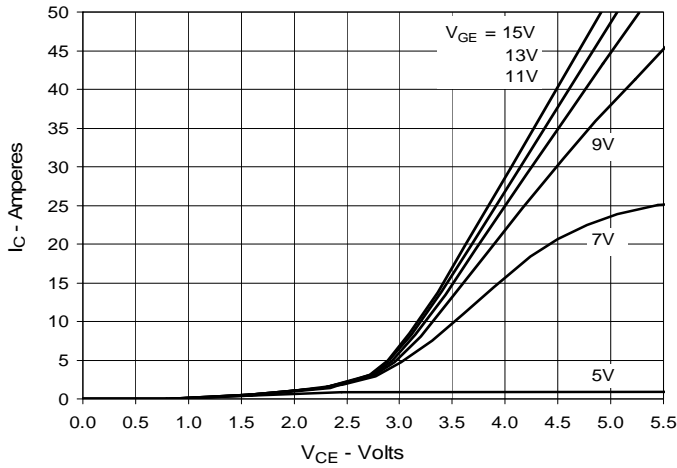
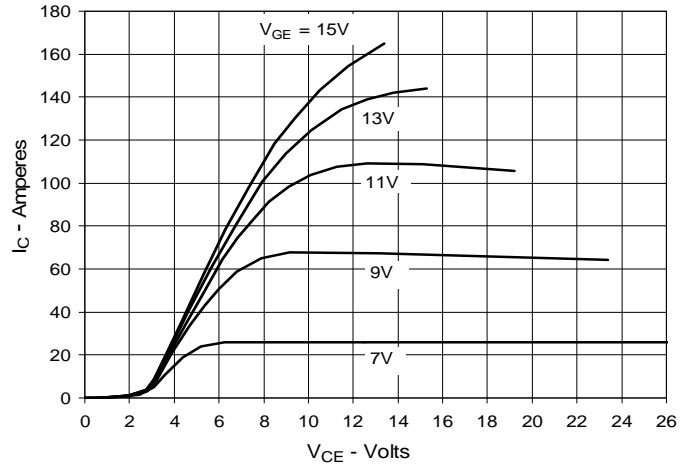
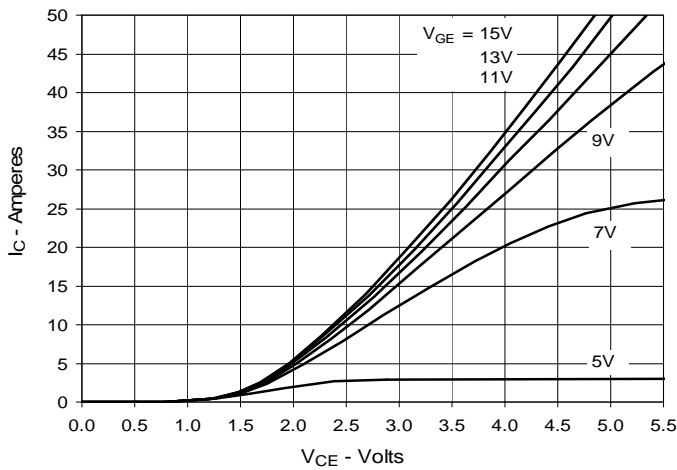
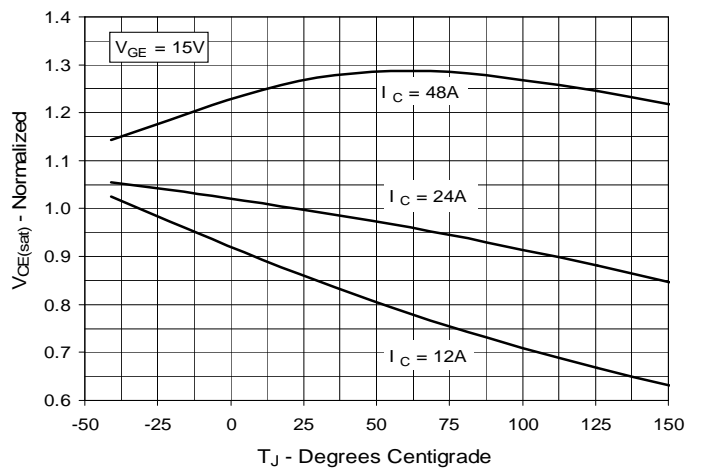
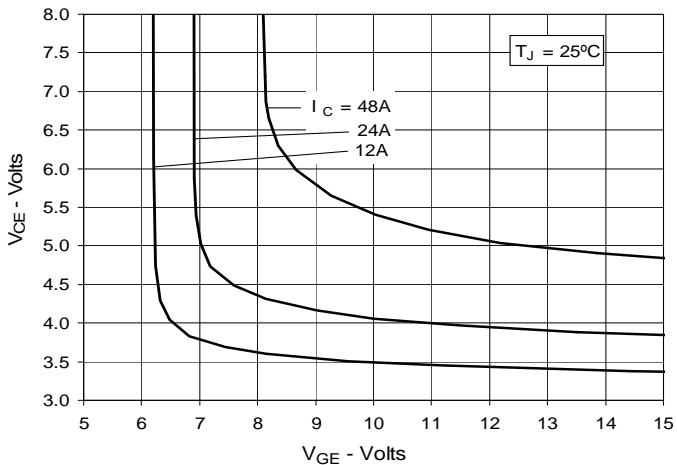
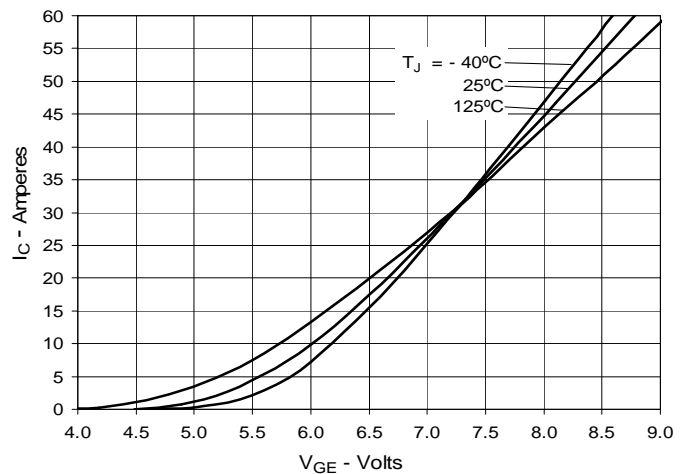
- Notes:
- Switching times may increase for  $V_{CE}$  (Clamp)  $> 0.8 \cdot V_{CES}$ , higher  $T_J$  or increased  $R_G$ .
  - Pulse test,  $t \leq 300\mu\text{s}$ ; duty cycle,  $d \leq 2\%$ .

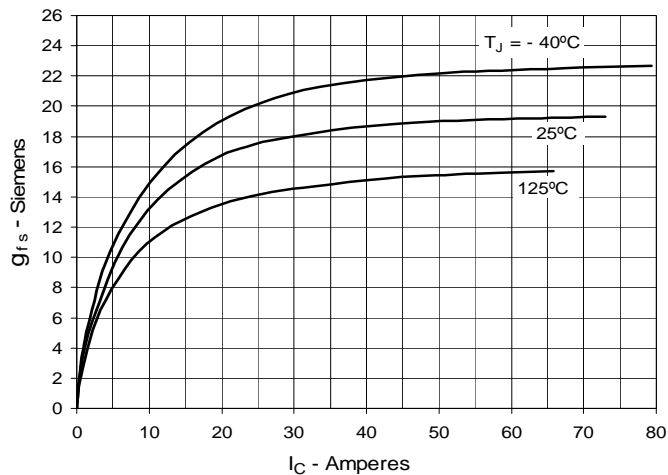
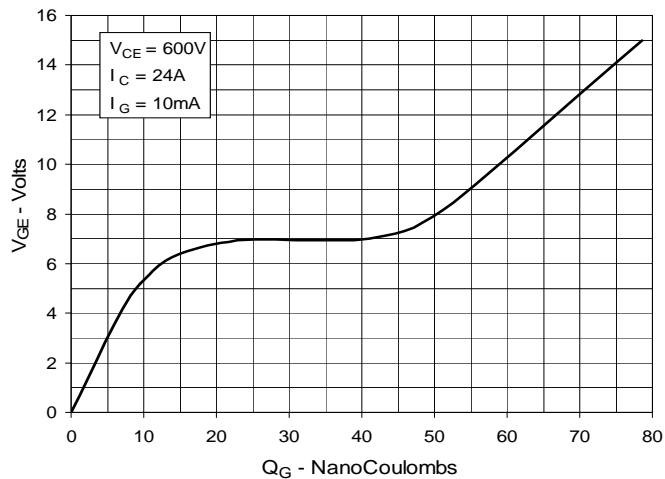
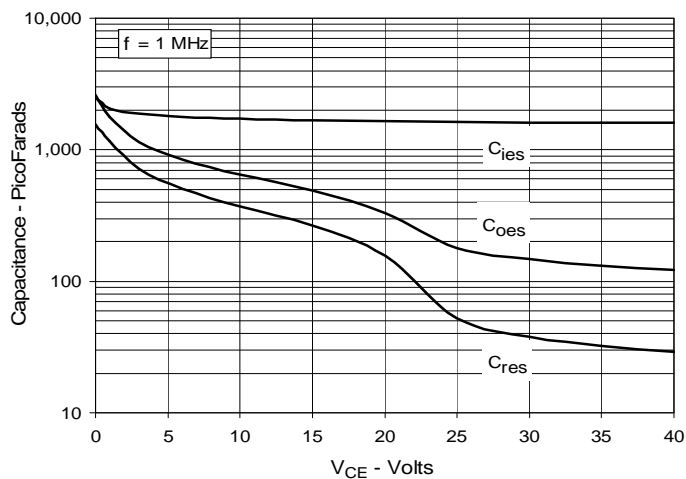
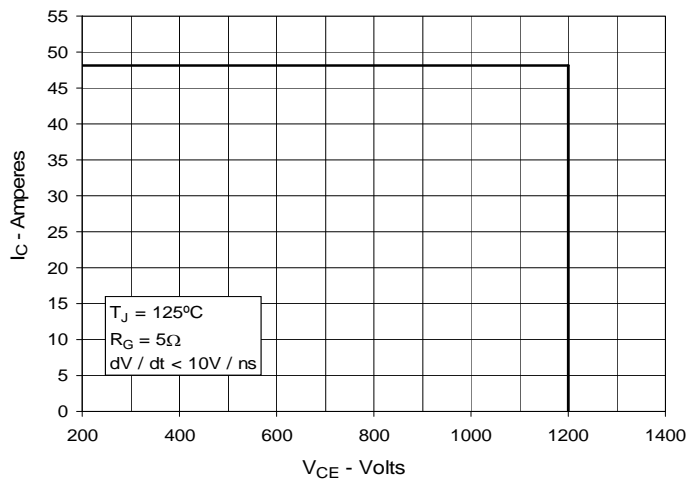
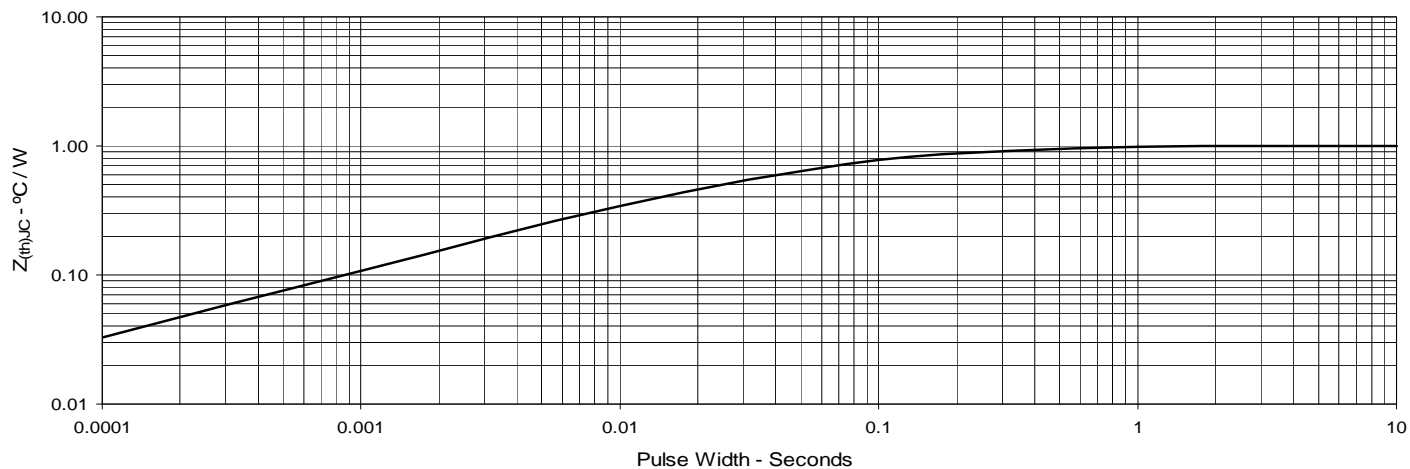
### PRELIMINARY TECHNICAL INFORMATION

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.

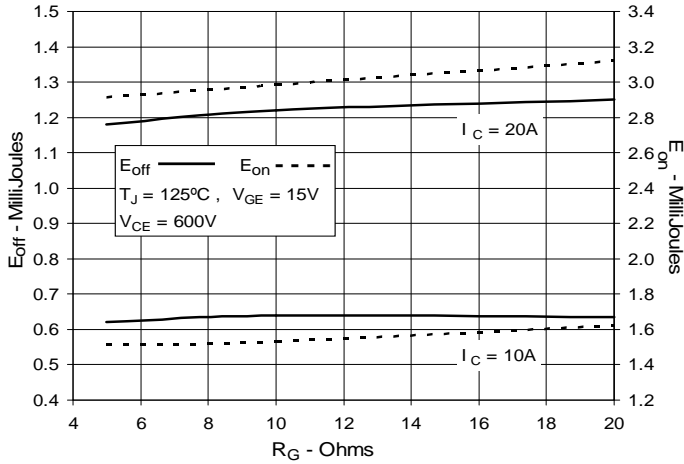
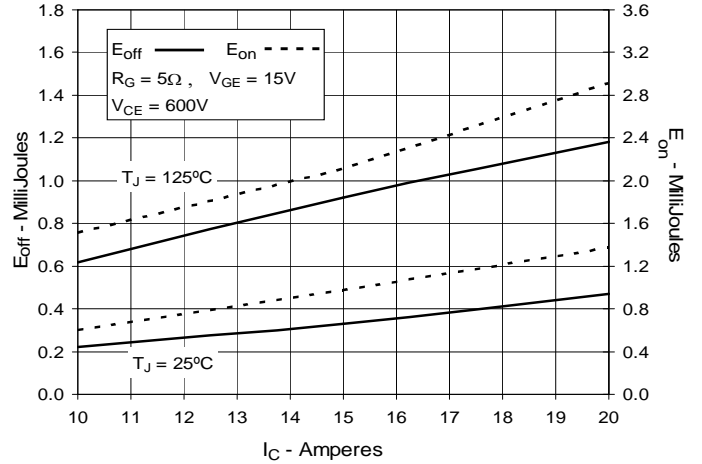
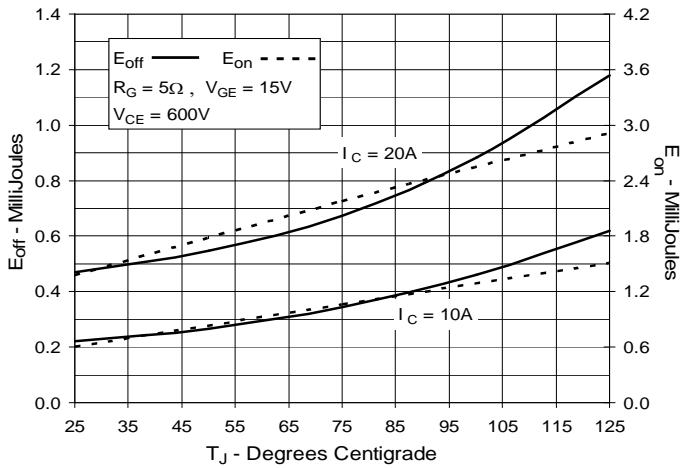
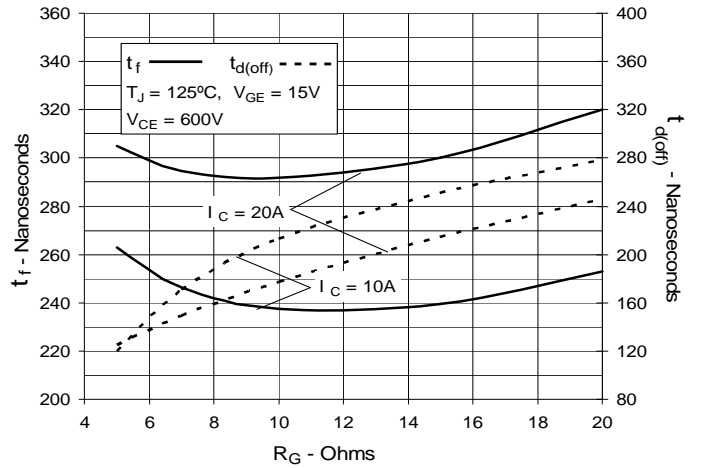
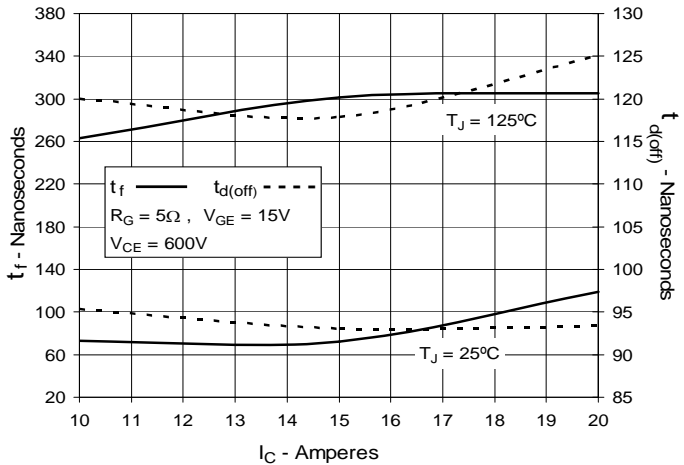
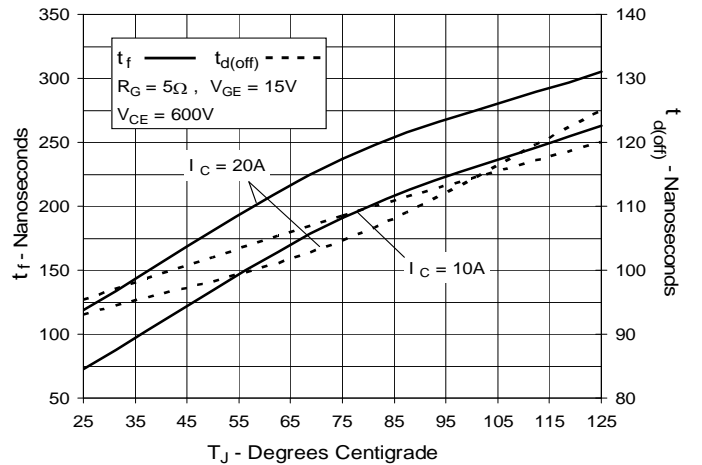
IXYS reserves the right to change limits, test conditions, and dimensions.

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	

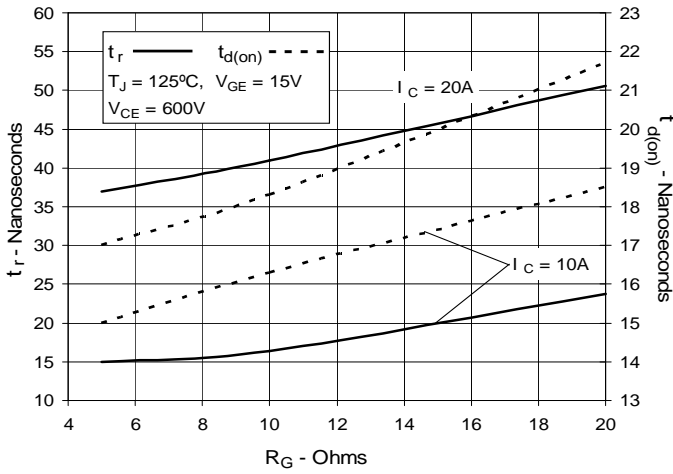
**Fig. 1. Output Characteristics  
@ 25°C**

**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. 8. Gate Charge**

**Fig. 9. Capacitance**

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

**Fig. 11. Maximum Transient Thermal Impedance**


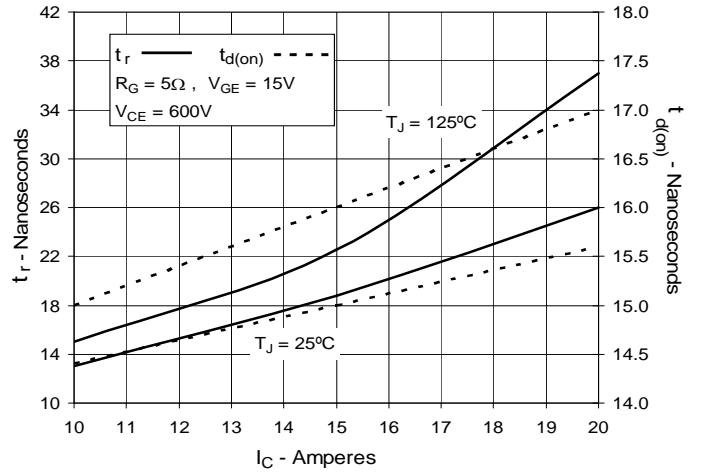
IXYS reserves the right to change limits, test conditions, and dimensions.

**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**


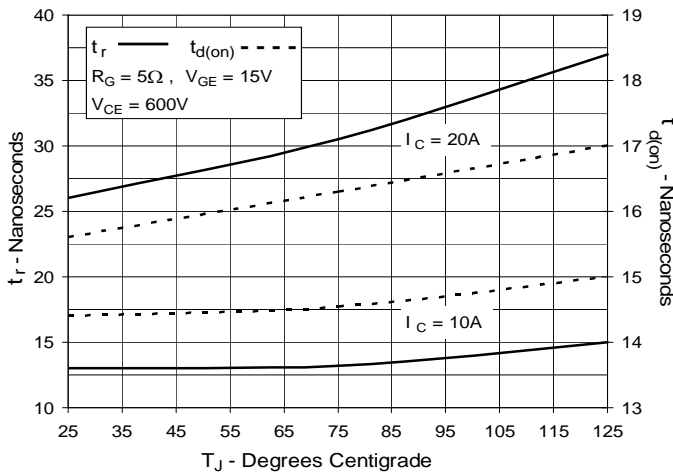
**Fig. 18. Inductive Turn-on  
Switching Times vs. Gate Resistance**



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



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



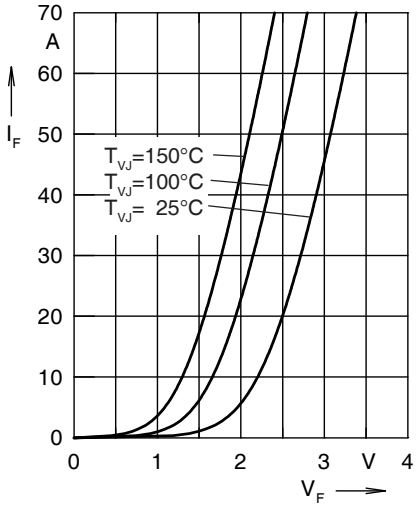
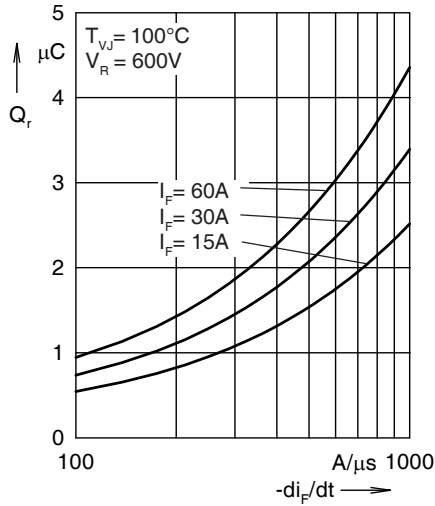
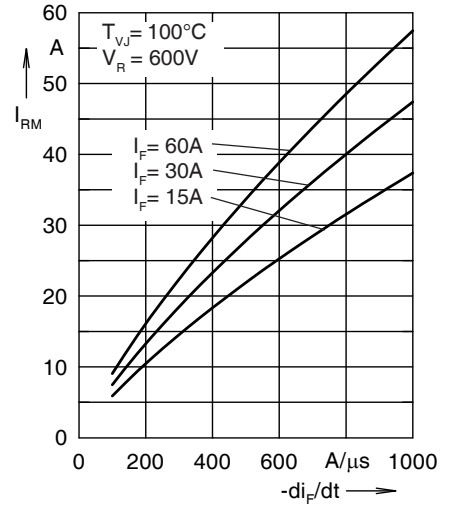
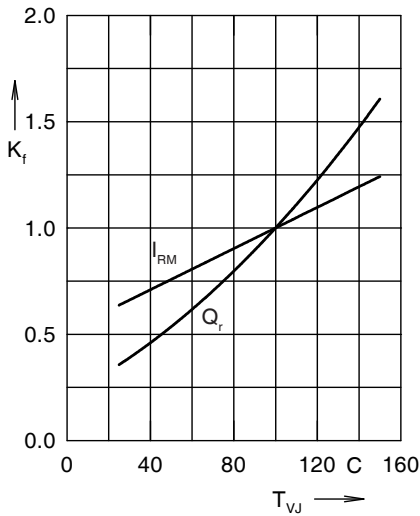
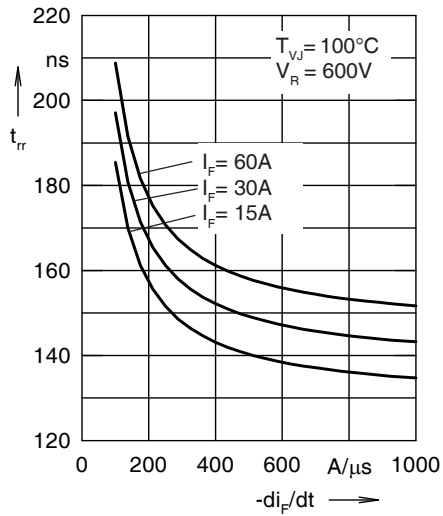
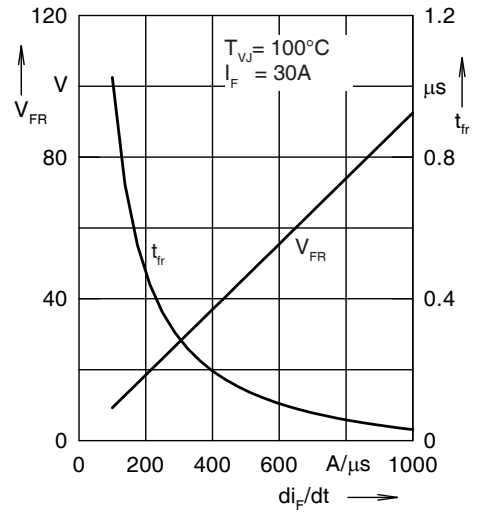
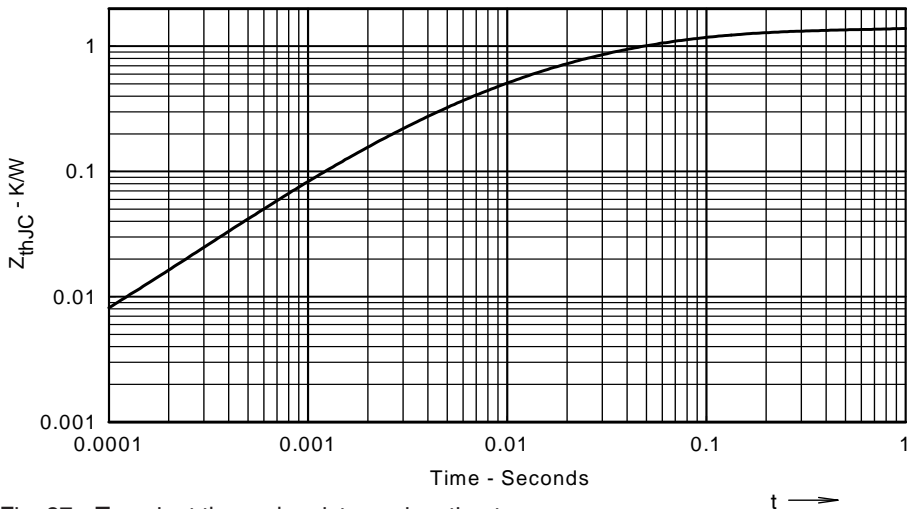

 Fig. 21. Forward current  $I_F$  versus  $V_F$ 

 Fig. 22. Reverse recovery charge  $Q_r$ 

 Fig. 23. Peak reverse current  $I_{RM}$ 

 Fig. 24. Dynamic Parameters  $Q_r$ ,  $I_{RM}$ 

 Fig. 25. Recovery time  $t_{rr}$  versus  $-di_F/dt$ 

 Fig. 26. Peak forward voltage  $V_{FR}$  and  $t_{rr}$ 


Fig. 27. Transient thermal resistance junction to case



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