IXYS

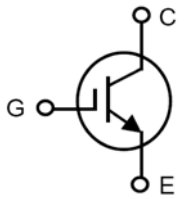
Advance Technical Information

1200V XPT™ GenX4™ IGBT

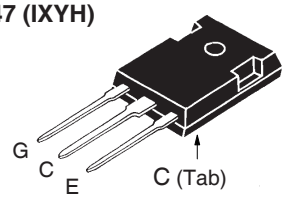
IXYH40N120C4

V_{CES} = 1200V
I_{C110} = 40A
$V_{CE(sat)}$ ≤ 2.50V
$t_{fi(typ)}$ = 80ns

High Speed IGBT
for 20-50kHz Switching



TO-247 (IXYH)



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	1200	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	1200	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	120	A
I_{C110}	T_C = 110°C	40	A
I_{CM}	T_C = 25°C, 1ms	230	A
SSOA	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 5Ω	I_{CM} = 80	A
(RBSOA)	Clamped Inductive Load	$V_{CE} \leq 0.8 \bullet V_{CES}$	
P_C	T_C = 25°C	680	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
M_d	Mounting Torque	1.13 / 10	Nm/lb.in
Weight		6	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	1200			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	4.0		6.5	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			10	μA
	T_J = 150°C			750	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 32A, V_{GE} = 15V, Note 1		2.05	2.50	V
	T_J = 150°C		2.50		V

Features

- Optimized for Low Switching Losses
- Positive Thermal Coefficient of Vce(sat)
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

©2019 IXYS CORPORATION, All Rights Reserved

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.
g_{fs}	I_C = 32A, V_{CE} = 10V, Note 1	13	22	S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		1665	pF
C_{oes}			105	pF
C_{res}			63	pF
$Q_{g(on)}$	I_C = 32A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		92	nC
Q_{ge}			11	nC
Q_{gc}			37	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		21	ns
t_{ri}	I_C = 32A, V_{GE} = 15V		55	ns
E_{on}	V_{CE} = 0.8 • V_{CES}, R_G = 5Ω		5.55	mJ
$t_{d(off)}$	Note 2		140	ns
t_{fi}			80	ns
E_{off}			1.55	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		18	ns
t_{ri}	I_C = 32A, V_{GE} = 15V		45	ns
E_{on}	V_{CE} = 0.8 • V_{CES}, R_G = 5Ω		7.80	mJ
$t_{d(off)}$	Note 2		190	ns
t_{fi}			80	ns
E_{off}			2.65	mJ
R_{thJC}				0.22 °C/W
R_{thCS}			0.21	°C/W

Notes:

1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 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 by one or more of the following U.S. patents: 4,835,592 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ $T_J = 25^oC$

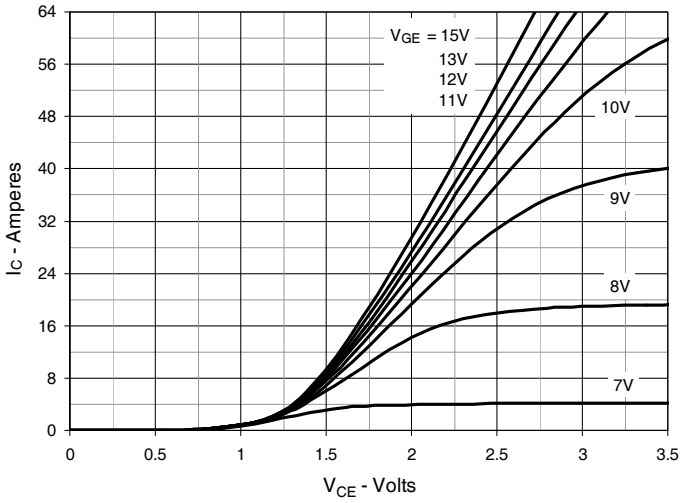


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

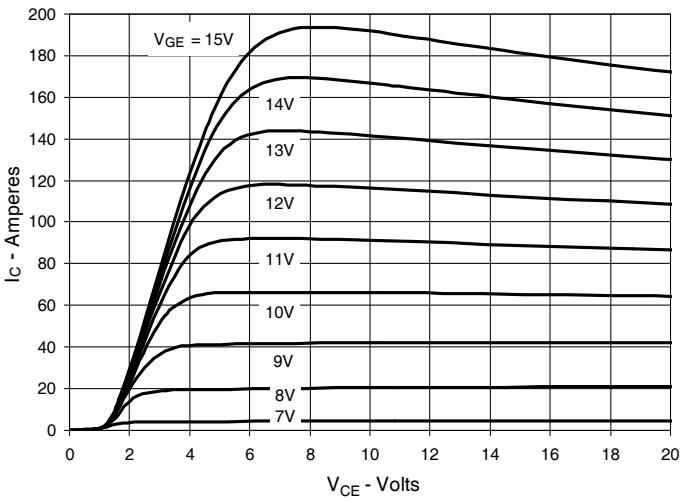


Fig. 3. Output Characteristics @ $T_J = 150^oC$

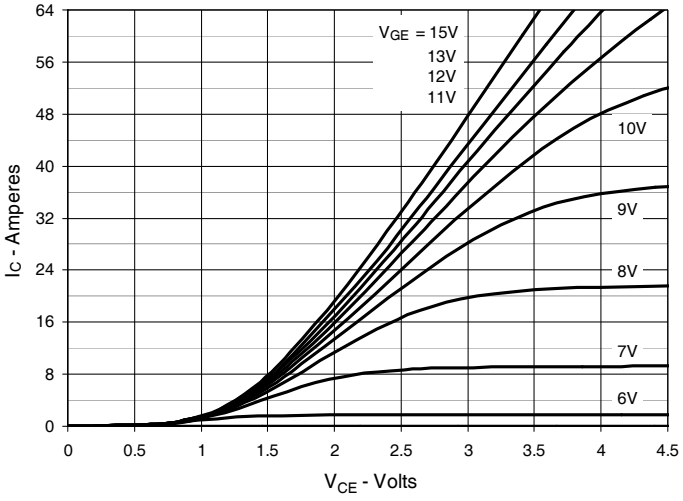


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

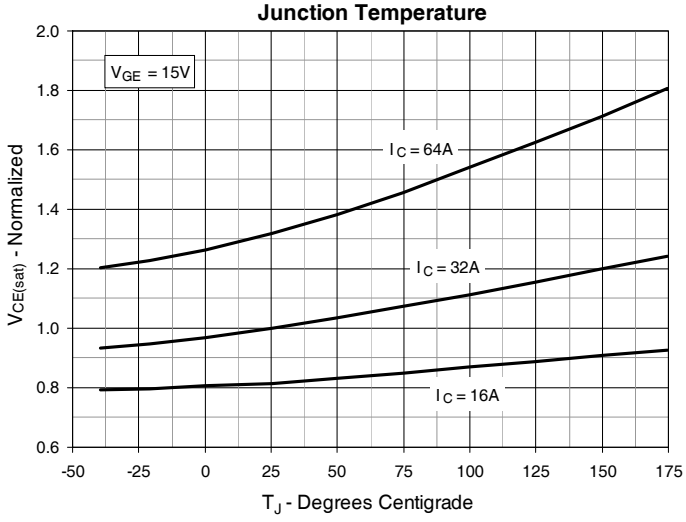


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

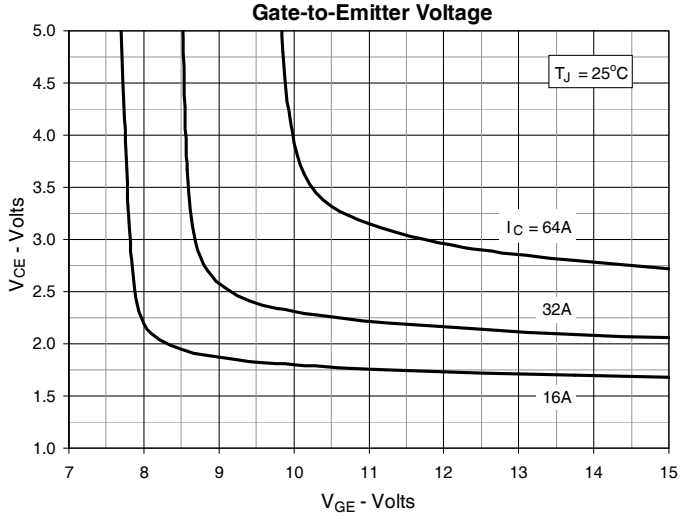
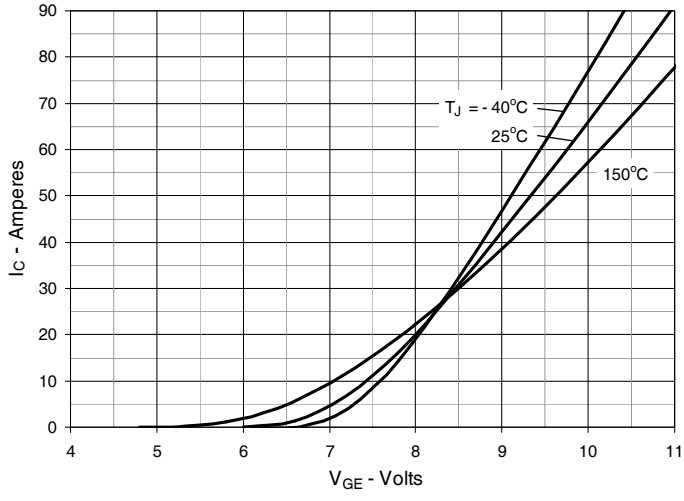


Fig. 6. Input Admittance



©2019 IXYS CORPORATION, All Rights Reserved

Fig. 7. Transconductance

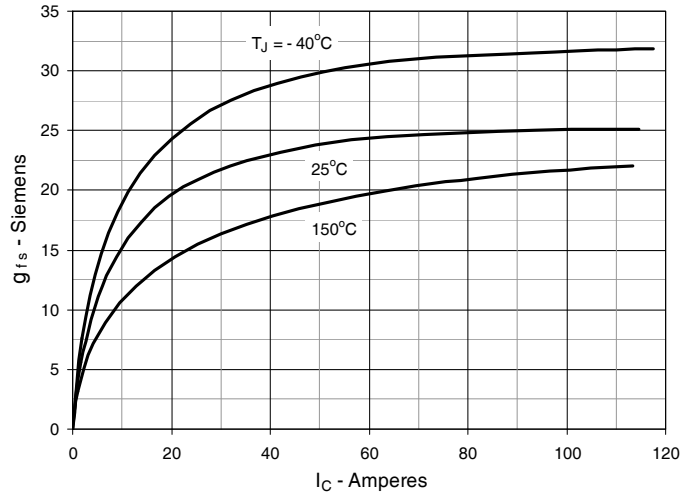


Fig. 8. Gate Charge

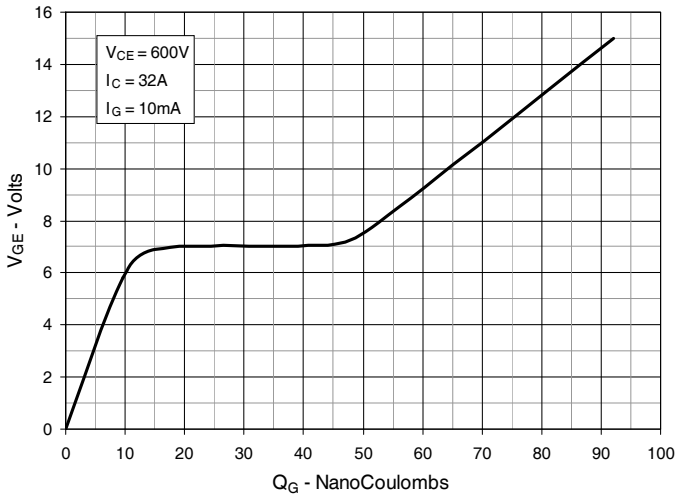


Fig. 9. Capacitance

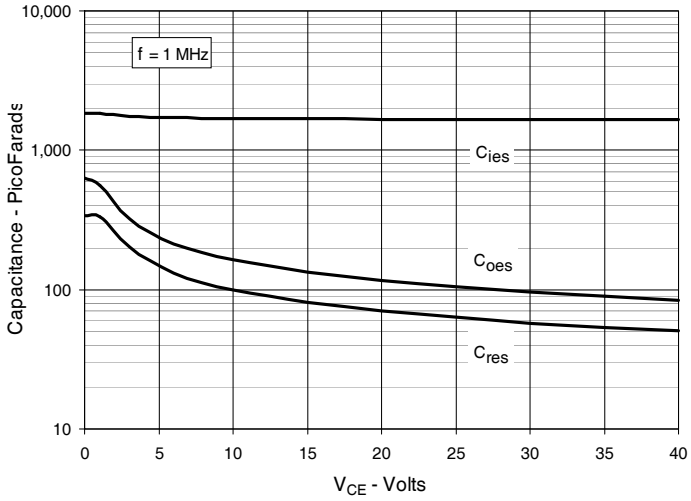


Fig. 10. Reverse-Bias Safe Operating Area

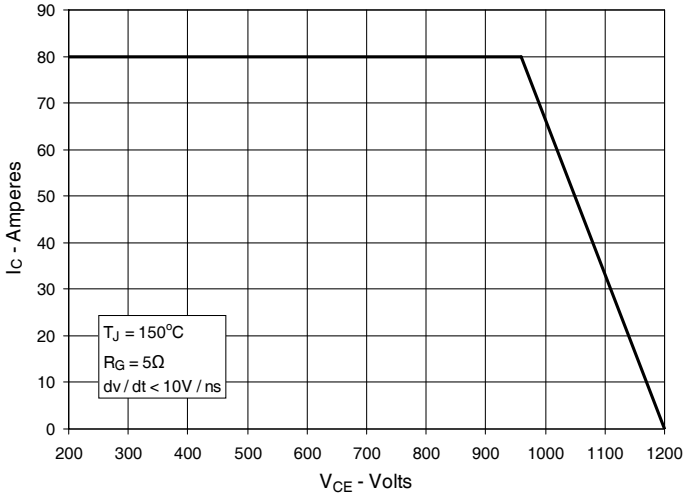
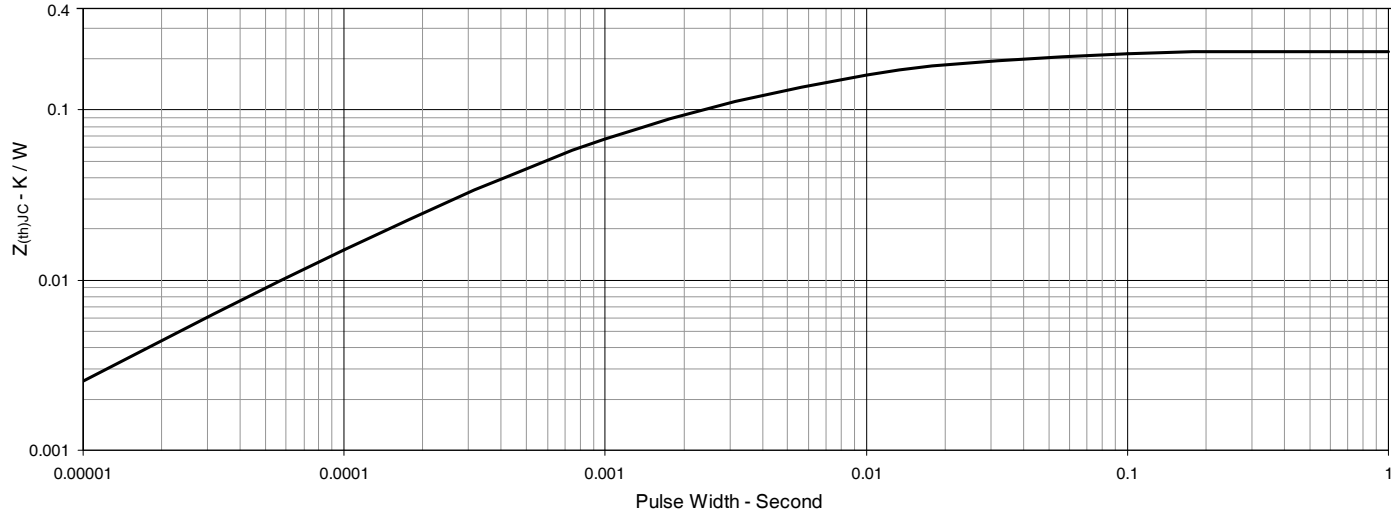


Fig. 11. Maximum Transient Thermal Impedance



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

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

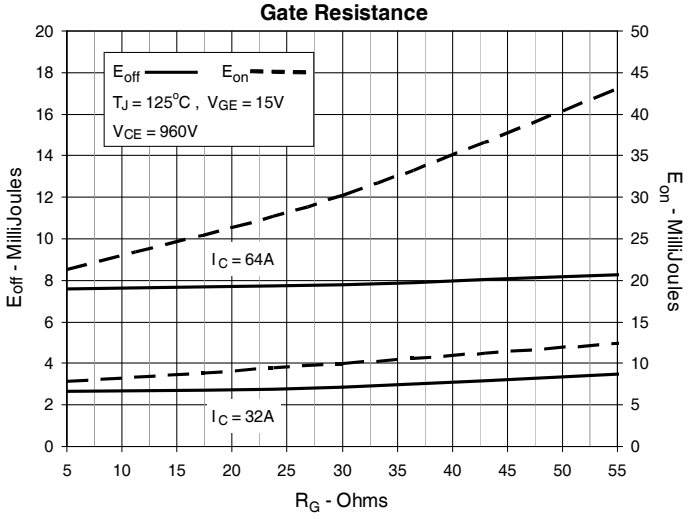


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

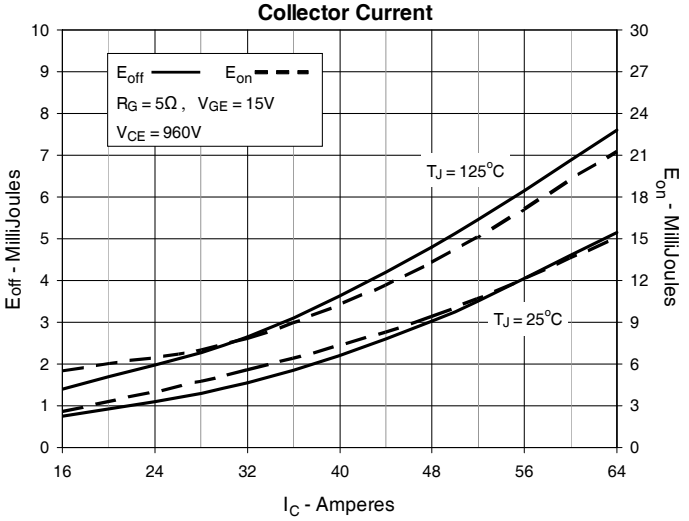


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

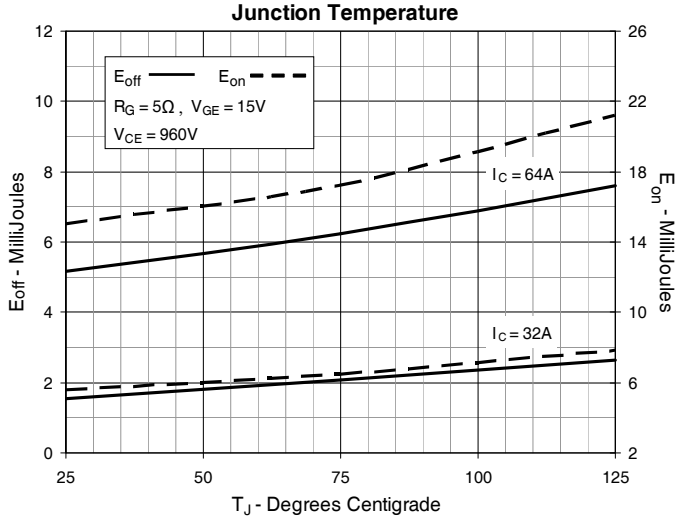


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

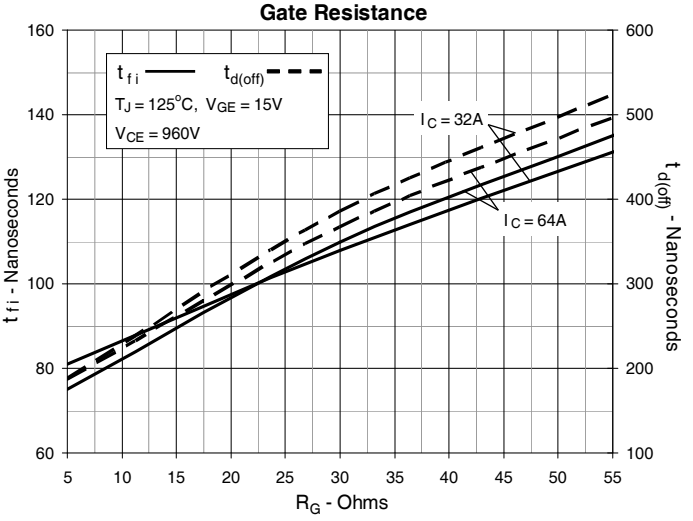


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

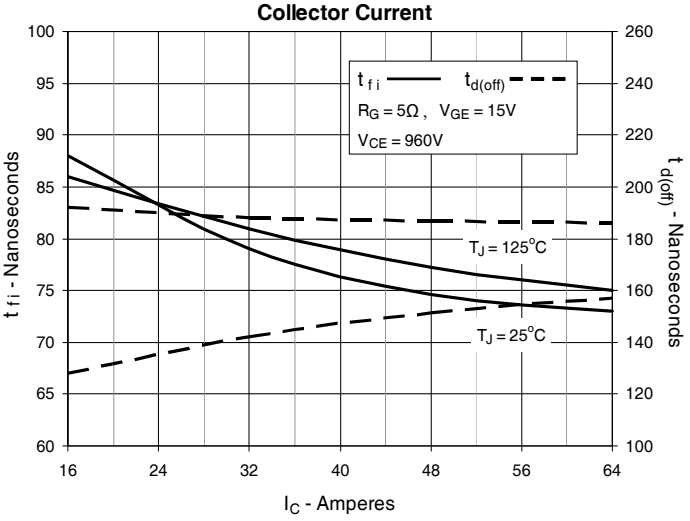
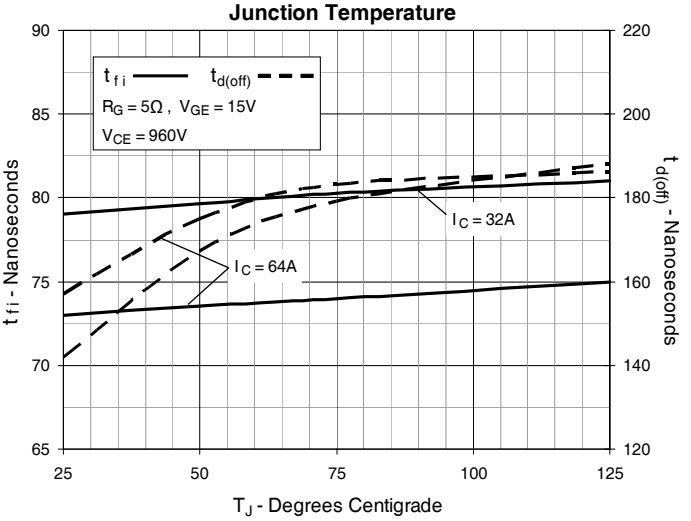


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



©2019 IXYS CORPORATION, All Rights Reserved

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

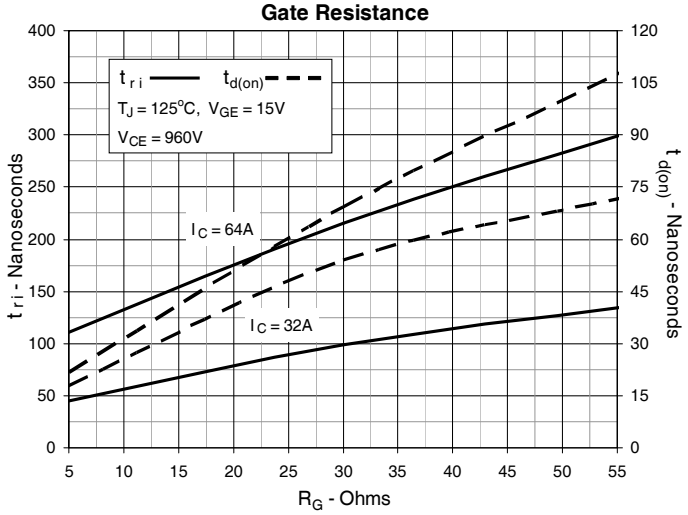


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

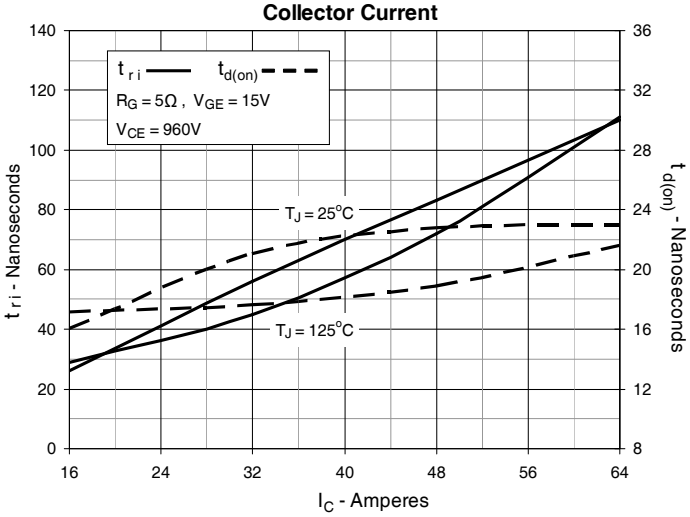
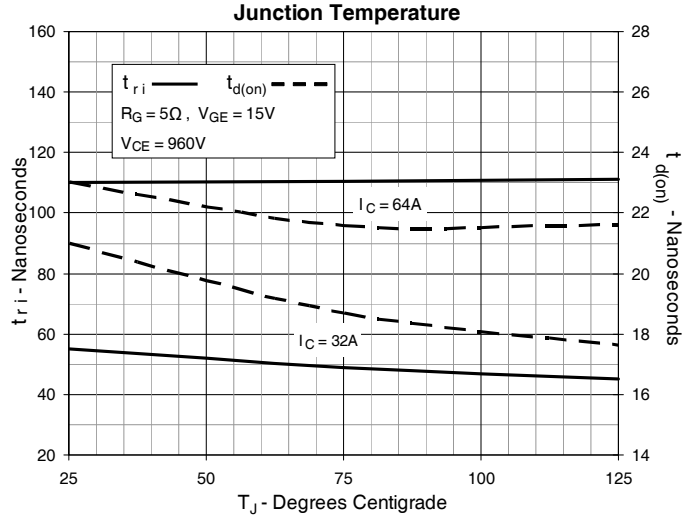
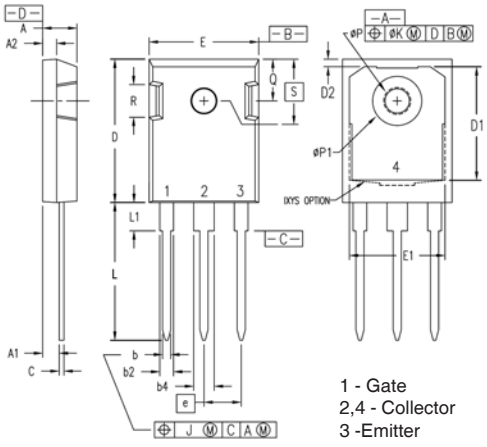


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



TO-247 (IXYH) 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
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	.545	.565	13.84	14.35
e	.215 BSC		5.45 BSC	
J	--	.010	--	0.25
K	--	.025	--	0.64
L	.780	.810	19.81	20.57
L1	.150	.170	3.81	4.32
øP	.140	.144	3.55	3.65
øP1	.275	.290	6.99	7.37
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.242 BSC		6.15 BSC	

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

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.

©2019 IXYS CORPORATION, All Rights Reserved