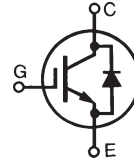


High Voltage Co-Pack IGBT

IXGH28N140B3H1
IXGK28N140B3H1
IXGX28N140B3H1

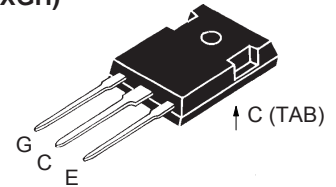
$V_{CES} = 1400 \text{ V}$
 $I_{C25} = 60 \text{ A}$
 $V_{CE(sat)} \leq 3.6 \text{ V}$

Avalanche Rated

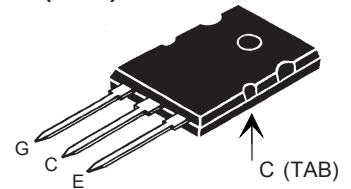


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C}$ to 150°C	1400	V
V_{CGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GE} = 1 \text{ M}\Omega$	1400	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$ (limited by leads)	60	A
I_{C110}	$T_C = 110^\circ\text{C}$ (IGBT)	28	A
I_{F110}	$T_C = 110^\circ\text{C}$ (Diode)	15	A
I_{CM}	$T_C = 25^\circ\text{C}$, 1 ms	150	A
SSOA (RBSOA)	$V_{GE} = 15 \text{ V}$, $T_{VJ} = 125^\circ\text{C}$, $R_G = 10 \Omega$ Clamped inductive load @1400V	$I_{CM} = 120$	A
I_{AS}	$T_C = 25^\circ\text{C}$	28	A
E_{AS}		360	mJ
P_C	$T_C = 25^\circ\text{C}$	300	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	1.6 mm (0.062 in.) from case for 10 s	300	$^\circ\text{C}$
T_{SOLD}	Plastic body for 10 seconds	260	$^\circ\text{C}$
M_d	Mounting torque (TO-247, TO-264)	1.13/10Nm/lb.in.	
F_C	Mounting force (PLUS247)	20..120 / 4.5..25 N/lb	
Weight	TO-247 & PLUS247	6	g
	TO-264	10	g

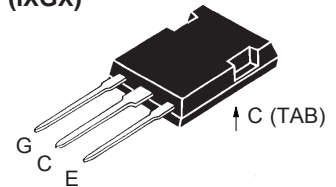
TO-247 (IXGH)



TO-264 (IXGK)



PLUS247 (IXGX)



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

Features

- High frequency IGBT
- High current handling capability
- MOS Gate turn-on
- drive simplicity

Applications

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

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250 \mu\text{A}$	1400		V
$V_{GE(th)}$	$I_C = 250 \mu\text{A}$, $V_{CE} = V_{GE}$	3.0		V
I_{CES}	$V_{CE} = V_{CES}$ $V_{GE} = 0 \text{ V}$ $T_J = 125^\circ\text{C}$		50 1	μA mA
I_{GES}	$V_{CE} = 0 \text{ V}$, $V_{GE} = \pm 20 \text{ V}$		± 100	nA
$V_{CE(sat)}$	$I_C = I_{C110}$, $V_{GE} = 15 \text{ V}$, Note 1 $T_J = 125^\circ\text{C}$	3.0 3.05	3.6	V V

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = I_{C110}; V_{CE} = 10\text{ V, Note 1}$	12	19	S
C_{ies}	$V_{CE} = 25\text{ V, } V_{GE} = 0\text{ V, } f = 1\text{ MHz}$		2060	pF
C_{oes}			160	pF
C_{res}			60	pF
Q_g	$I_C = I_{C110}, V_{GE} = 15\text{ V, } V_{CE} = 0.5 V_{CES}$		88	nC
Q_{ge}			12	nC
Q_{gc}			38	nC
$t_{d(on)}$	Inductive load $I_C = I_{C110}, V_{GE} = 15\text{ V}$ $V_{CE} = 960\text{ V, } R_G = R_{off} = 5\ \Omega$		16	ns
t_{ri}			36	ns
E_{on}			3.6	mJ
$t_{d(off)}$			190	400 ns
t_{fi}			360	ns
E_{off}			3.9	6.5 mJ
$t_{d(on)}$		Inductive load, $T_J = 125^\circ\text{C}$ $I_C = I_{C110}, V_{GE} = 15\text{ V}$ $V_{CE} = 960\text{ V, } R_G = R_{off} = 5\ \Omega$		16
t_{ri}			50	ns
E_{on}			7.3	mJ
$t_{d(off)}$			215	ns
t_{fi}			700	ns
E_{off}			6.5	mJ
R_{thJC}			0.42	$^\circ\text{C/W}$
R_{thCS}	TO-247	0.21		$^\circ\text{C/W}$
	TO-264 & PLUS247	0.15		$^\circ\text{C/W}$

Diode

Symbol	Conditions ($T_J = 25^\circ\text{C}$ unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
V_F	$I_F = 20\text{ A; Note 1}$ $T_{VJ} = 150^\circ\text{C}$		2.65	3.0 V
I_{RM}	$I_F = 20\text{ A; } di_F/dt = -200\text{ A}/\mu\text{s; } T_{VJ} = 125^\circ\text{C}$		18.5	A
t_{rr}	$V_R = 1200\text{ V; } V_{GE} = 0\text{ V}$		350	ns
R_{thJC}				0.9 $^\circ\text{C/W}$

Note 1: Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$

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	6,404,065B1	6,683,344	6,727,585	7,005,734B2
	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123B1	6,534,343	6,710,405B2	6,759,692	7,063,975B2
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728B1	6,583,505	6,710,463	6,771,478B2	7,071,537

Fig. 1. Output Characteristics @ 25°C

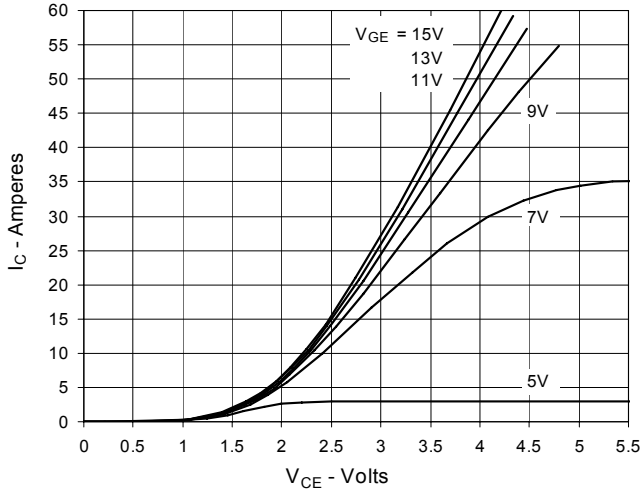


Fig. 2. Extended Output Characteristics @ 25°C

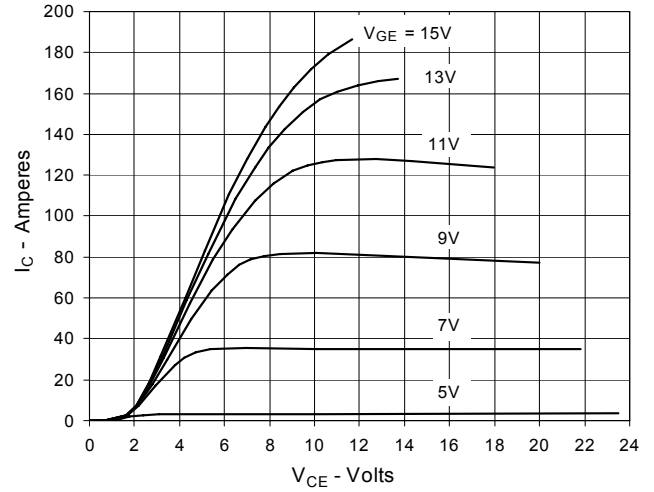


Fig. 3. Output Characteristics @ 125°C

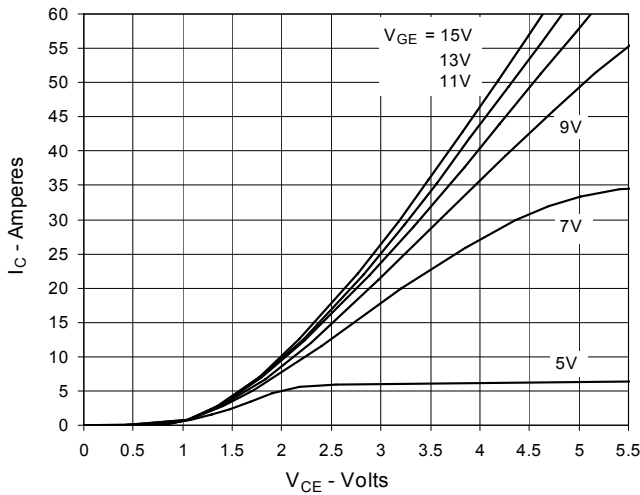


Fig. 4. Dependence of Vce(sat) on Junction Temperature

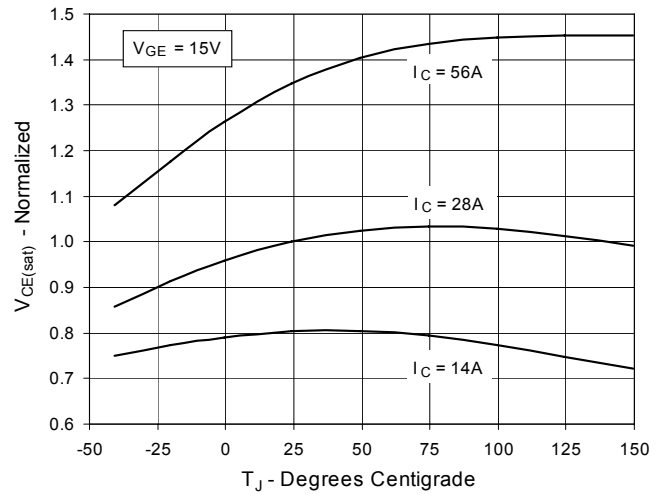


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

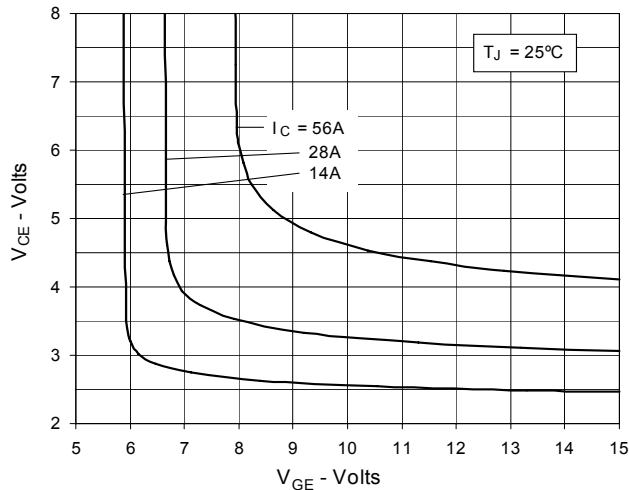


Fig. 6. Input Admittance

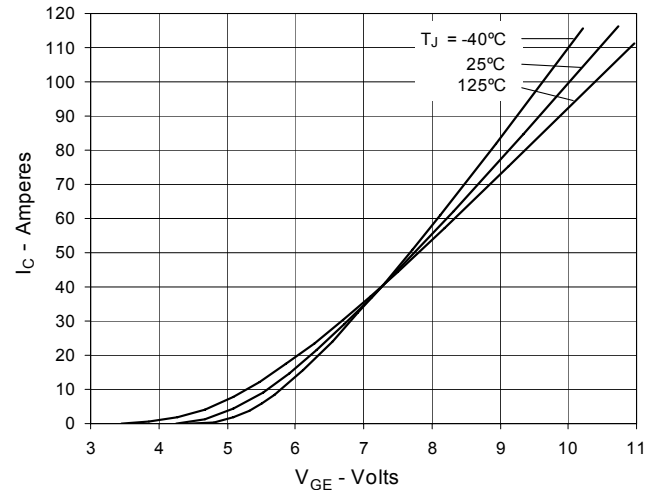


Fig. 7. Transconductance

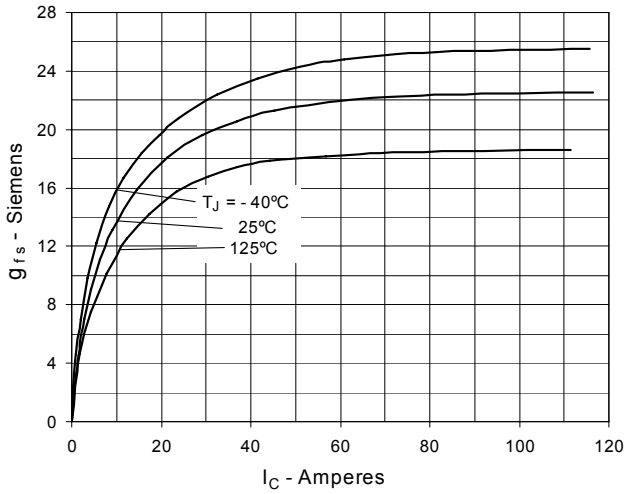


Fig. 8. Gate Charge

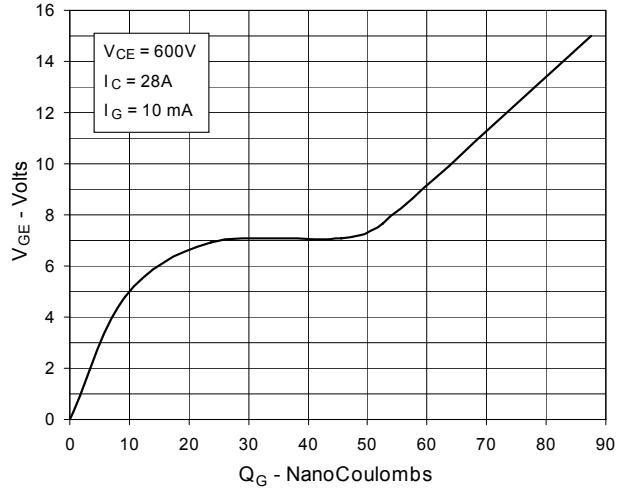


Fig. 9. Capacitance

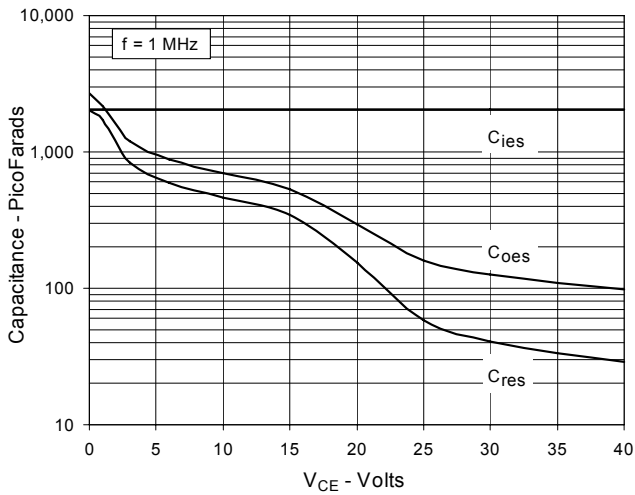


Fig. 10. Reverse-Bias Safe Operating Area

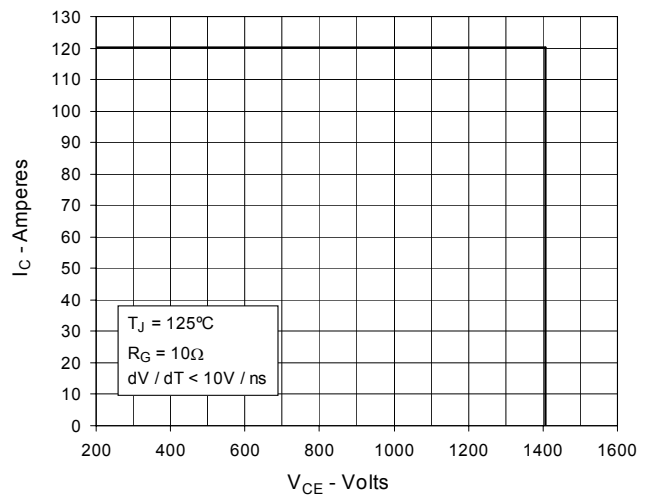


Fig. 11. Maximum Transient Thermal Resistance

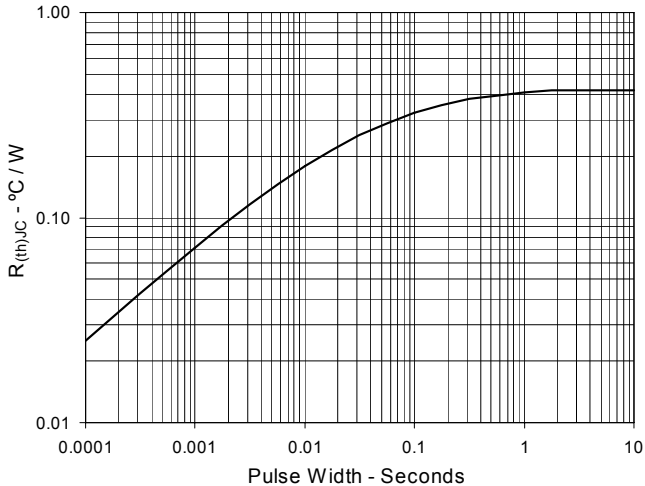


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

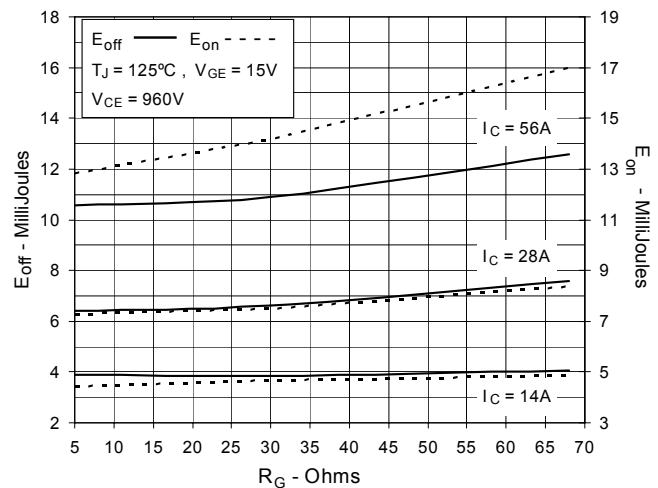


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

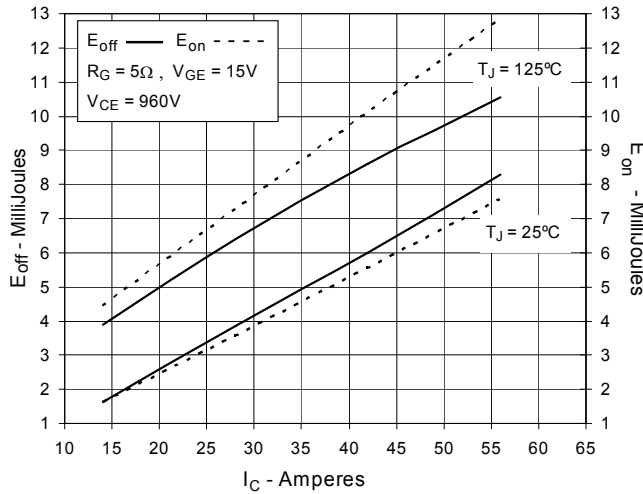


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

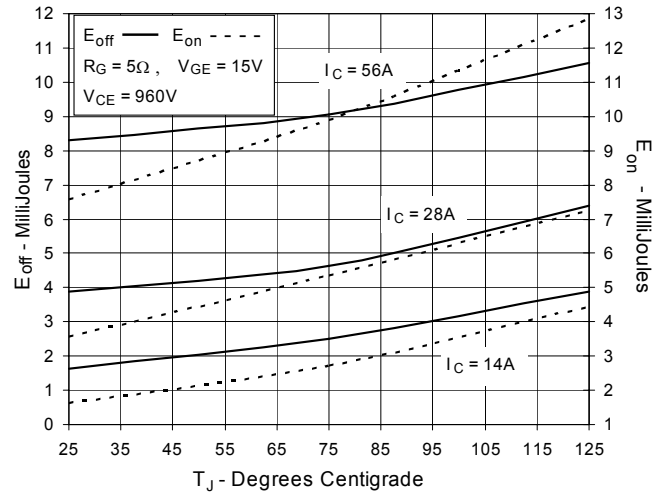


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

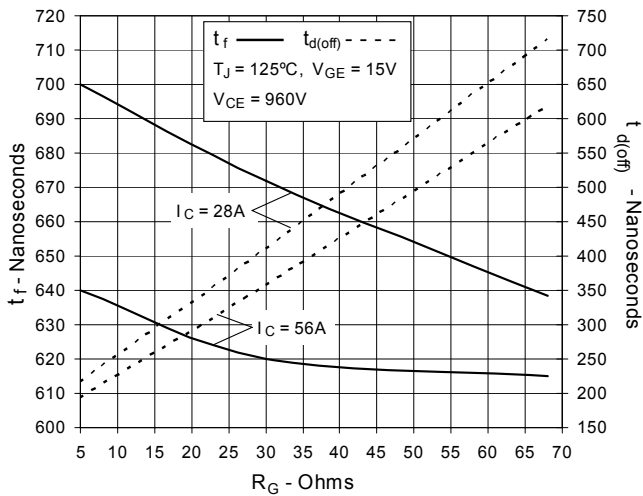


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

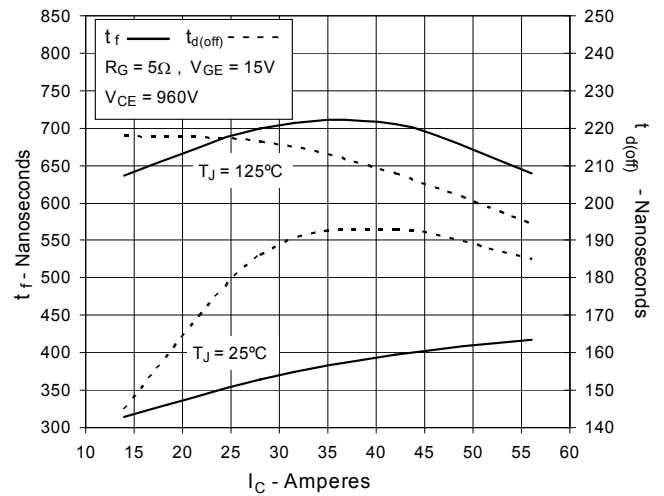


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

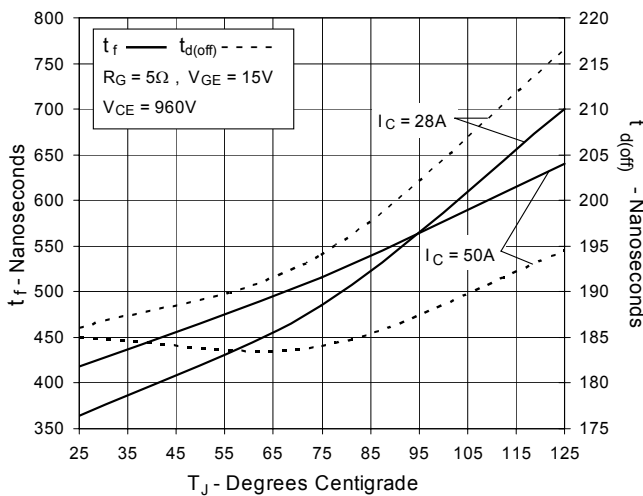


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

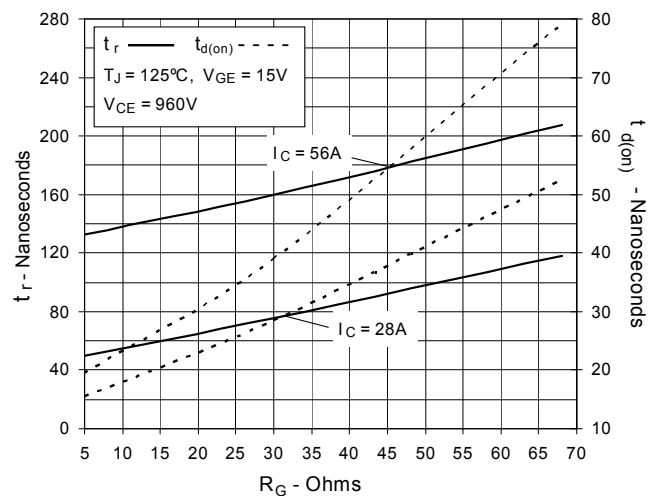


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

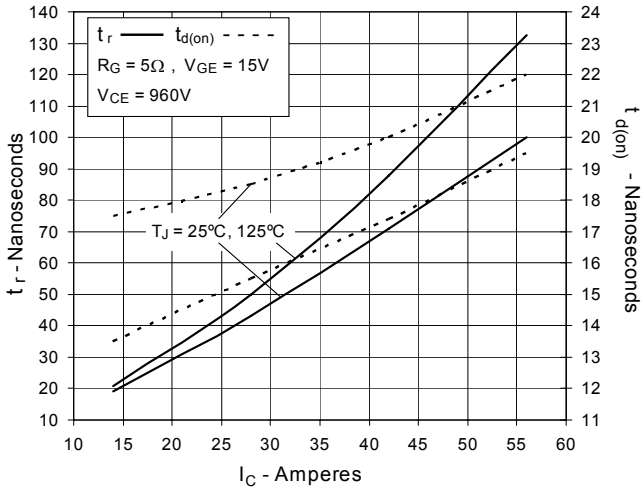
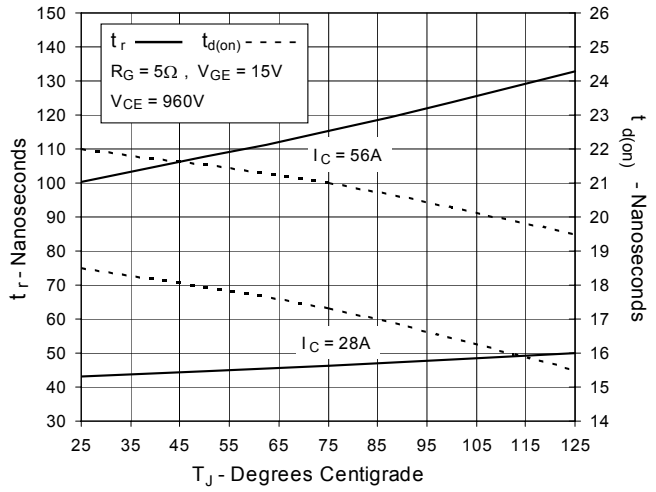
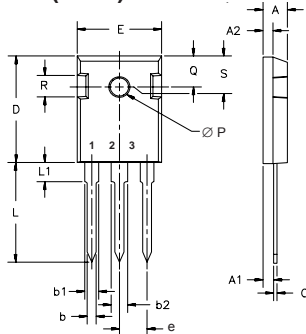


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



Package Outlines

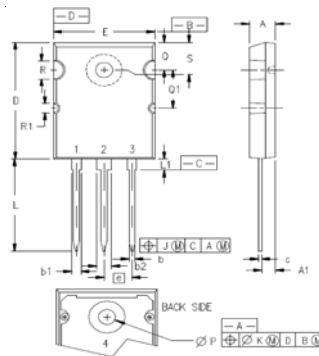
TO-247 (IXGH) Outline



Terminals: 1 - Gate
2 - Drain
3 - Source
Tab - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A ₁	2.2	2.54	.087	.102
A ₂	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b ₁	1.65	2.13	.065	.084
b ₂	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
ØP	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

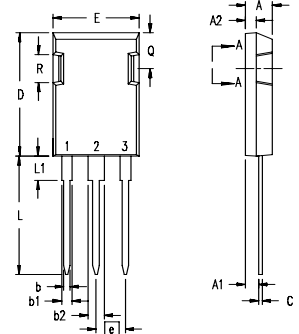
TO-264 (IXGK) Outline



1 - GATE
2, 4 - DRAIN (COLLECTOR)
3 - SOURCE (EMITTER)

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.70	5.31
A ₁	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b ₁	.087	.102	2.21	2.59
b ₂	.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	.215 BSC		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

PLUS 247™ (IXGX) Outline



Terminals: 1 - Gate
2 - Drain (Collector)
3 - Source (Emitter)
4 - Drain (Collector)

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	.190	.205
A ₁	2.29	2.54	.090	.100
A ₂	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b ₁	1.91	2.13	.075	.084
b ₂	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