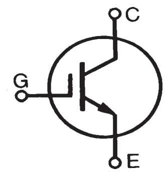
IXYS Advance Technical Information

1000V XPT™ GenX4™ IGBT

IXYA24N100C4HV
IXYP24N100C4

V_{CES} = 1000V
I_{C110} = 24A
$V_{CE(sat)}$ ≤ 2.3V
$t_{fi(typ)}$ = 40ns

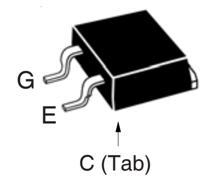
High Speed IGBT
for 20-50kHz Switching



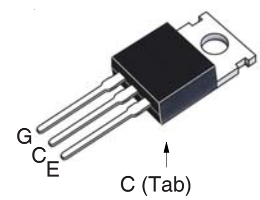
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	1000	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	1000	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	76	A
I_{C110}	T_C = 110°C	24	A
I_{CM}	T_C = 25°C, 1ms	132	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 48 V_{CE} ≤ 0.8 • V_{CES}	A
t_{sc} (SCSOA)	V_{GE} = 15V, V_{CE} = 660V, T_J = 150°C R_G = 50Ω, Non Repetitive	8	μs
P_C	T_C = 25°C	375	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 (TO-220)	1.13/10	Nm/lb.in
F_C	Mounting Force (TO-263HV)	10..65 / 22..14.6	N/lb
Weight	TO-263HV	2.5	g
	TO-220	3.0	g

Symbol	Test Conditions	Characteristic Values			
(T_J = 25°C, Unless Otherwise Specified)		Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	1000			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			25	μA
	T_J = 150°C			500	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 24A, V_{GE} = 15V, Note 1		1.86	2.30	V
	T_J = 150°C		2.30		V

TO-263HV (IXYA..HV)



TO-220 (IXYP)



G = Gate D = Collector
e = Emitter Tab = Collector

Features

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

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Min.	Typ.	Max.	Unit
g_{fs}	I_C = 24A, V_{CE} = 10V, Note 1	8	13		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		880		pF
C_{oes}			62		pF
C_{res}			35		pF
$Q_{g(on)}$	I_C = 24A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		43		nC
Q_{ge}			8		nC
Q_{gc}			20		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		15		ns
t_{ri}	I_C = 24A, V_{GE} = 15V		43		ns
E_{on}	V_{CE} = 0.8 • V_{CES}, R_G = 10Ω		3.6		mJ
$t_{d(off)}$	Note 2		147		ns
t_{fi}			40		ns
E_{off}			1.0		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		15		ns
t_{ri}	I_C = 24A, V_{GE} = 15V		35		ns
E_{on}	V_{CE} = 0.8 • V_{CES}, R_G = 10Ω		4.2		mJ
$t_{d(off)}$	Note 2		190		ns
t_{fi}			53		ns
E_{off}			1.6		mJ
R_{thJC}				0.40	°C/W
R_{thCS}	TO-220		0.50		°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.

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

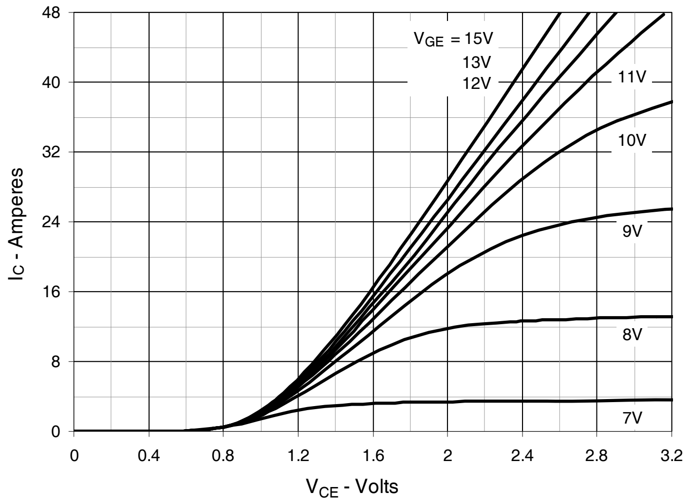


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

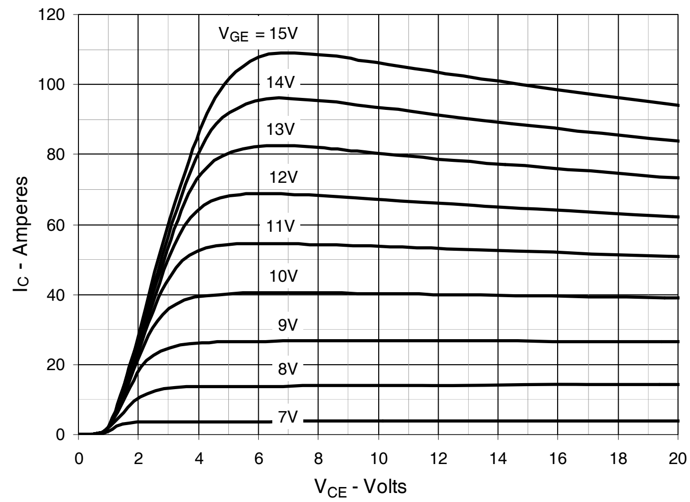


Fig. 3. Output Characteristics @ $T_J = 150^oC$

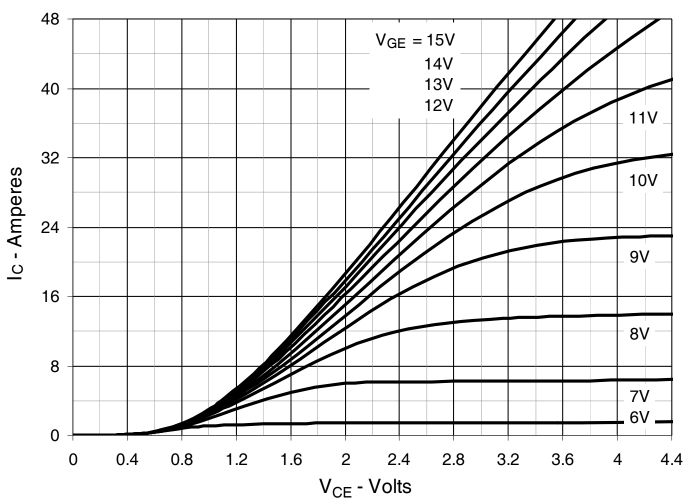


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

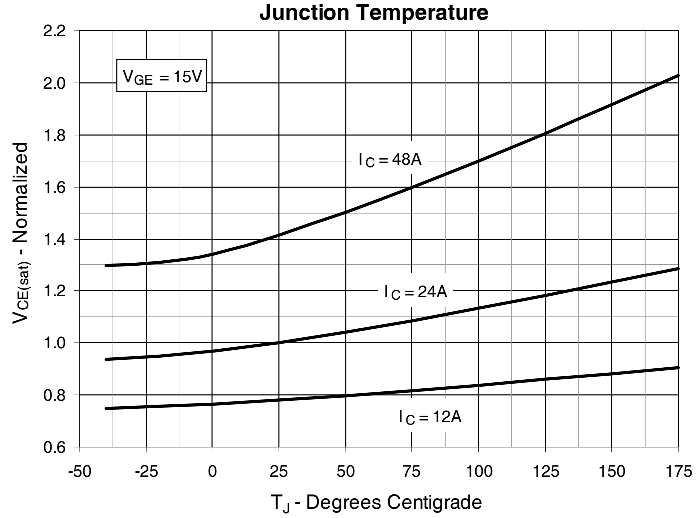


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

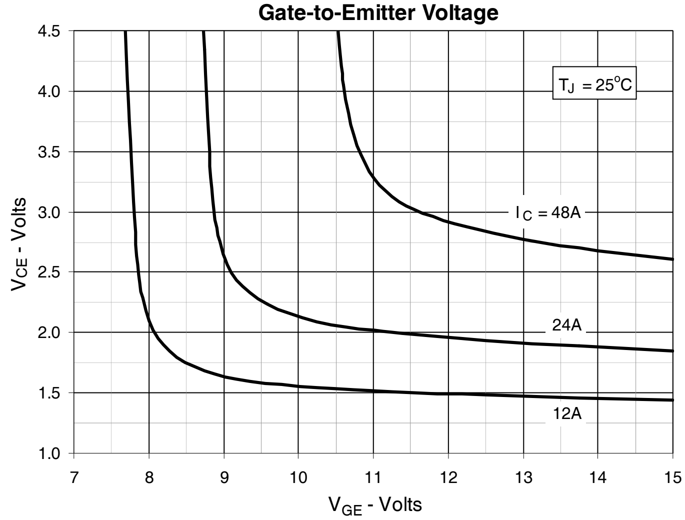


Fig. 6. Input Admittance

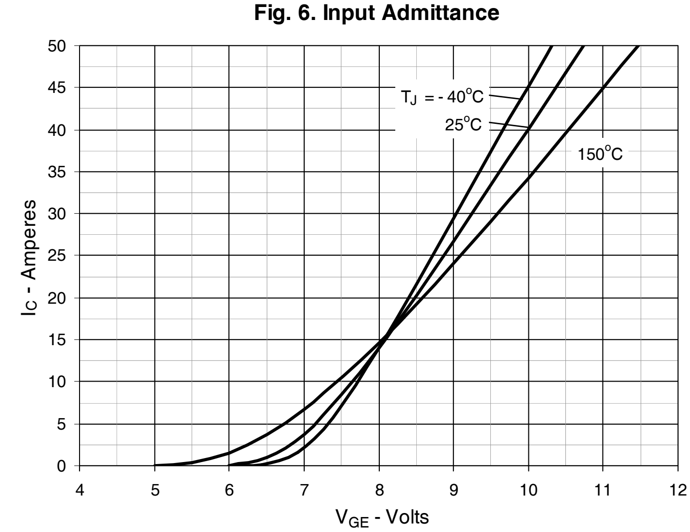


Fig. 7. Transconductance

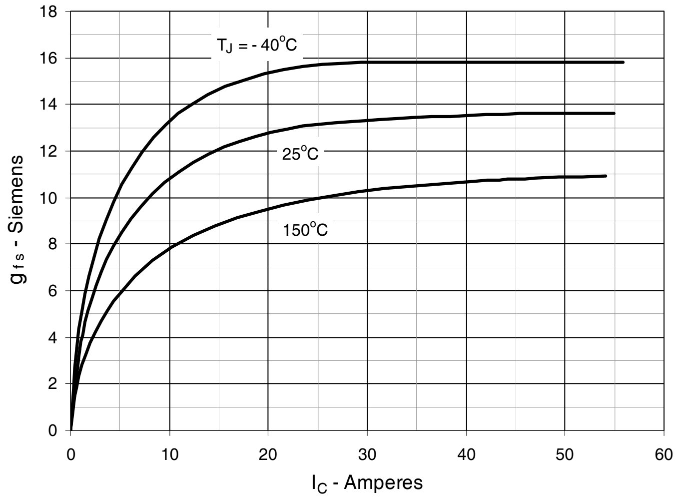


Fig. 8. Gate Charge

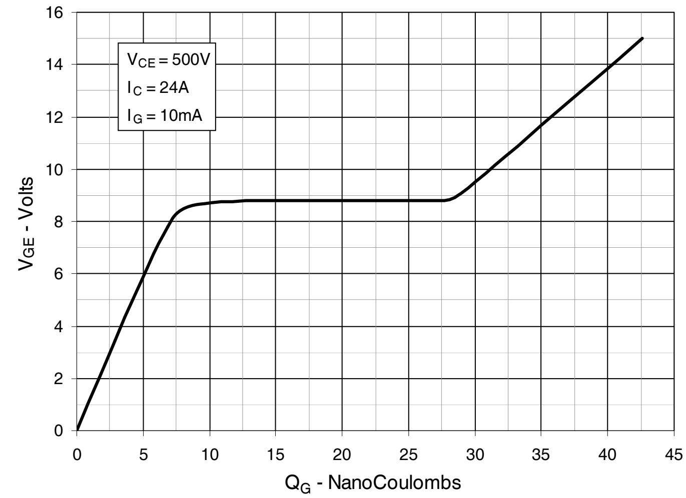


Fig. 9. Capacitance

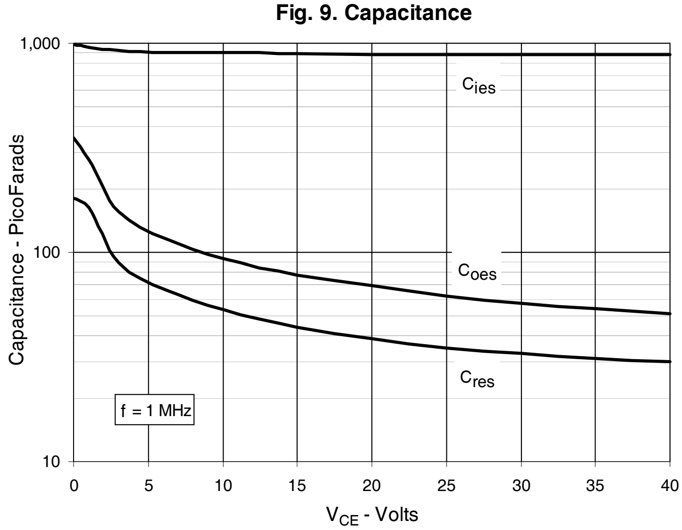


Fig. 10. Reverse-Bias Safe Operating Area

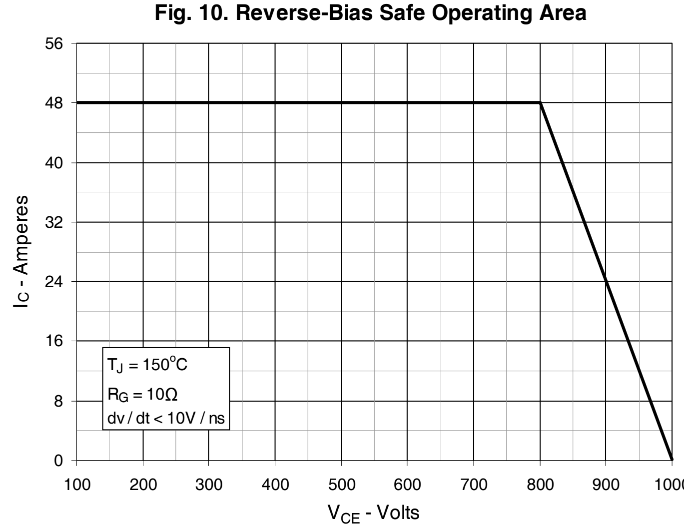


Fig. 11. Maximum Transient Thermal Impedance

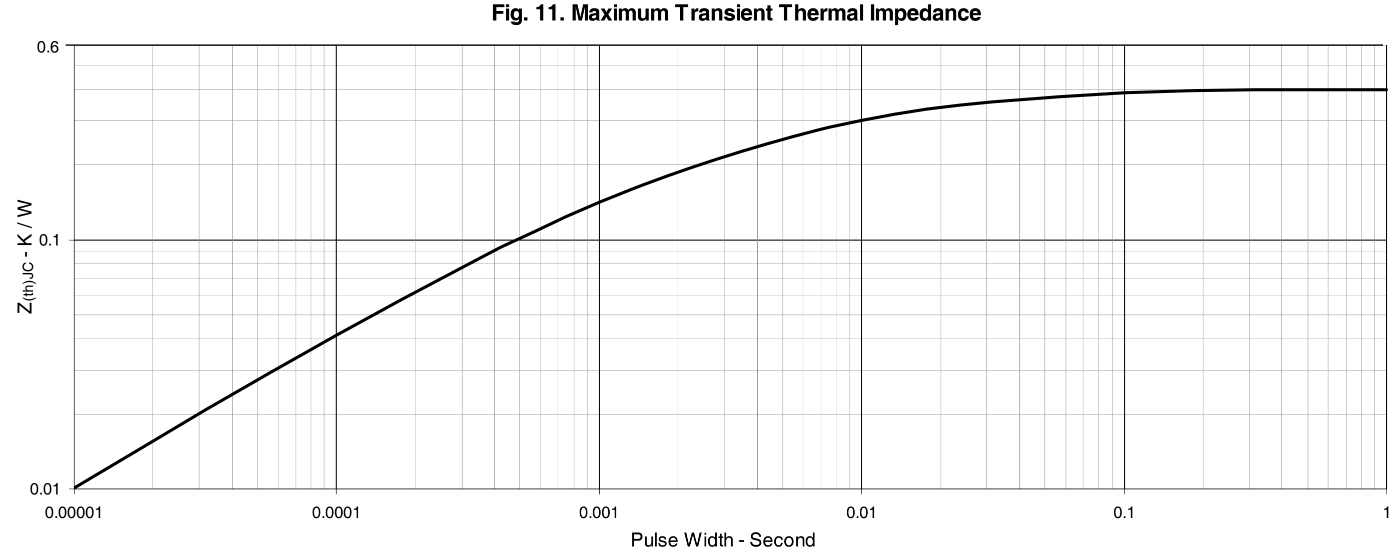


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

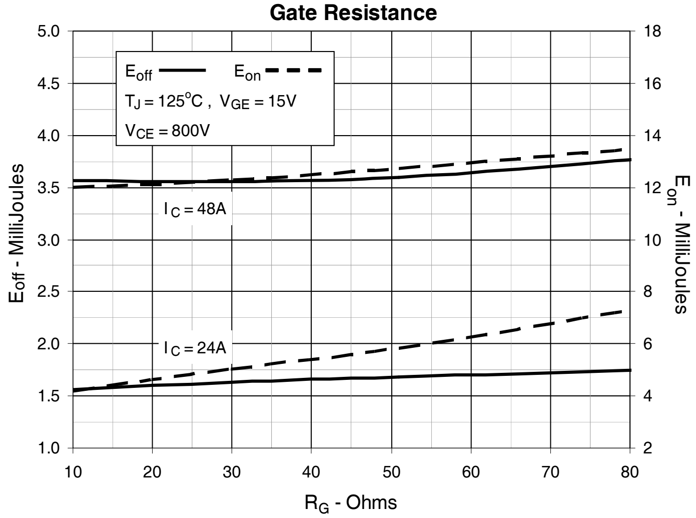


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

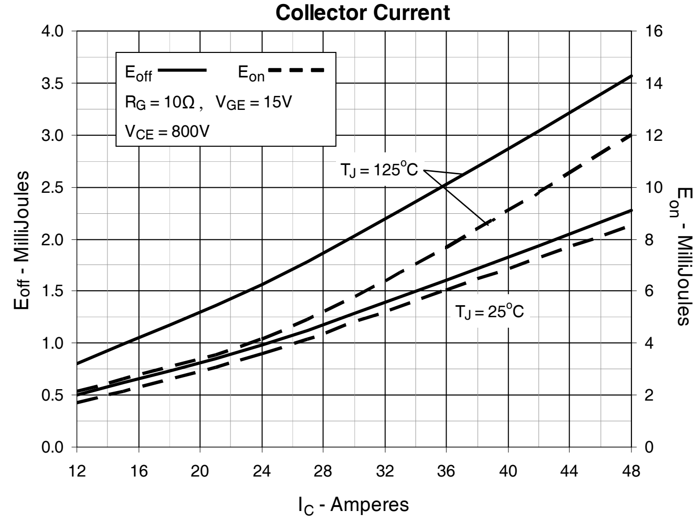


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

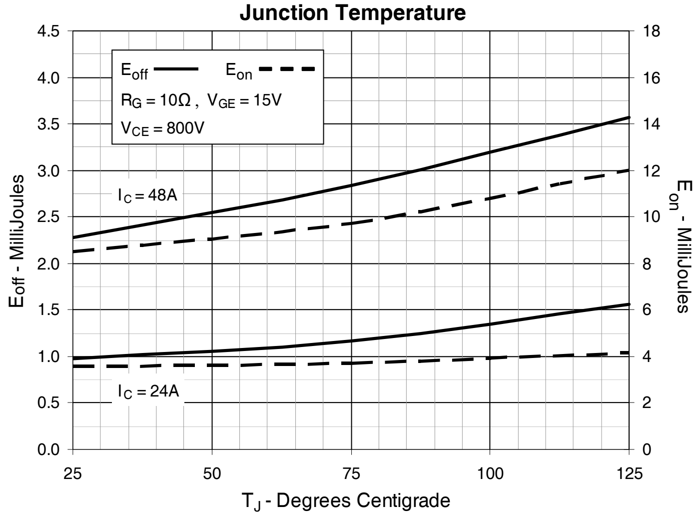


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

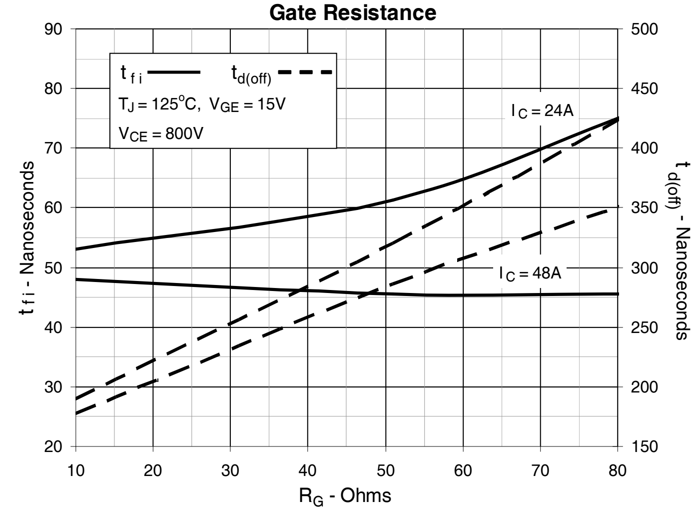


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

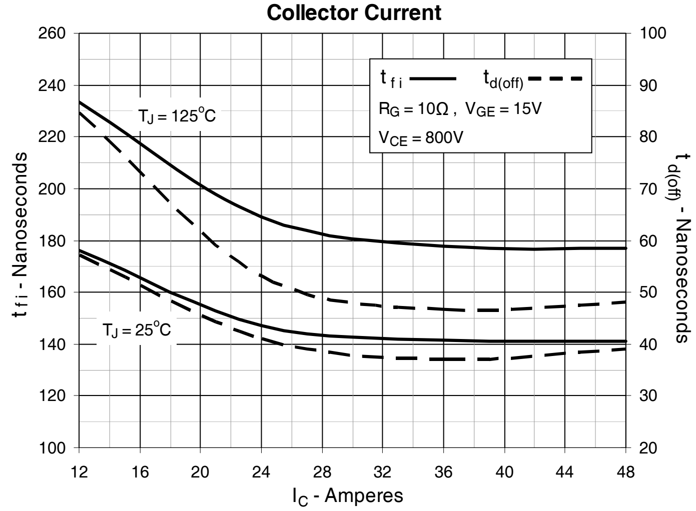


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

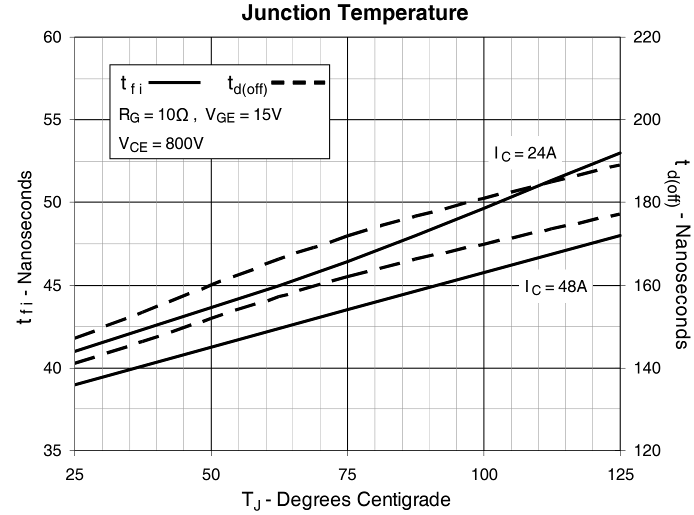


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

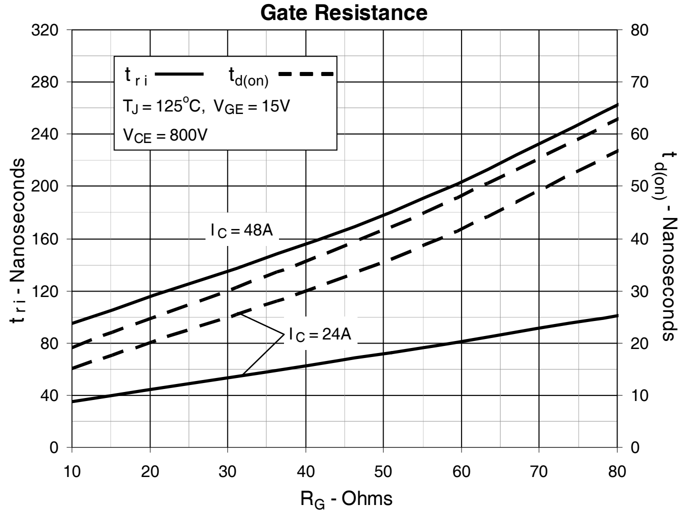


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

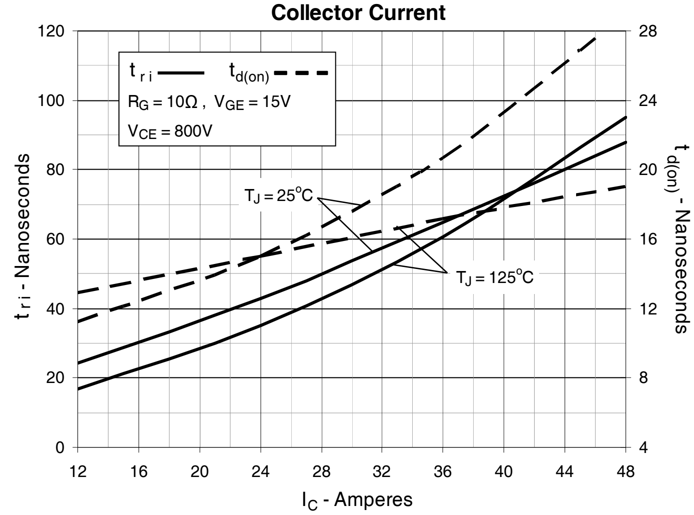
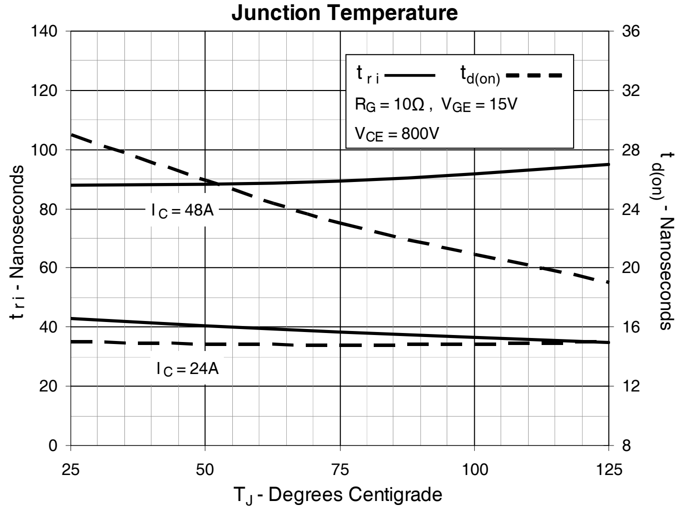
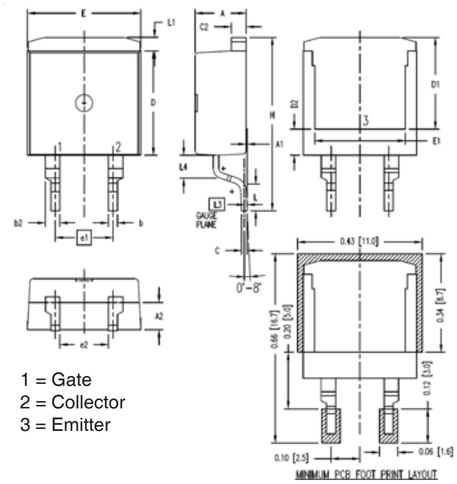


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



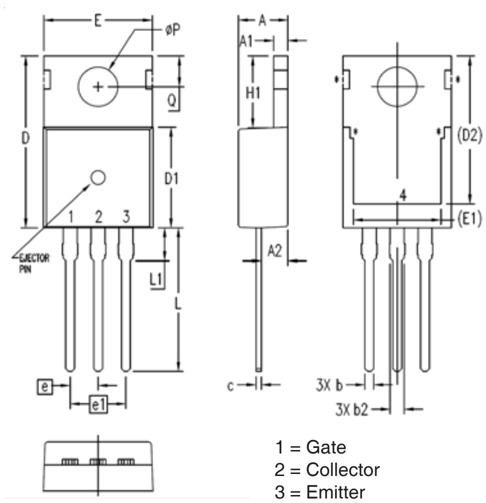
TO-263HV Outline



1 = Gate
2 = Collector
3 = Emitter

SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.170	.185	4.30	4.70
A1	.000	.008	0.00	0.20
A2	.091	.098	2.30	2.50
b	.028	.035	0.70	0.90
b2	.046	.054	1.18	1.38
C	.018	.024	0.45	0.60
C2	.049	.055	1.25	1.40
D	.354	.370	9.00	9.40
D1	.311	.327	7.90	8.30
D2	.083	.098	2.10	2.50
E	.386	.402	9.80	10.20
E1	.307	.323	7.80	8.20
e1	.200 BSC		5.08 BSC	
(e2)	.163	.174	4.13	4.43
H	.591	.614	15.00	15.60
L	.079	.102	2.00	2.60
L1	.039	.055	1.00	1.40
L3	.010 BSC		0.254 BSC	
(L4)	.071	.087	1.80	2.20

TO-220 Outline



1 = Gate
2 = Collector
3 = Emitter

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.169	.185	4.30	4.70
A1	.047	.055	1.20	1.40
A2	.079	.106	2.00	2.70
b	.024	.039	0.60	1.00
b2	.045	.057	1.15	1.45
c	.014	.026	0.35	0.65
D	.587	.626	14.90	15.90
D1	.335	.370	8.50	9.40
(D2)	.500	.531	12.70	13.50
E	.382	.406	9.70	10.30
(E1)	.283	.323	7.20	8.20
e	.100 BSC		2.54 BSC	
e1	.200 BSC		5.08 BSC	
H1	.244	.268	6.20	6.80
L	.492	.547	12.50	13.90
L1	.110	.154	2.80	3.90
ØP	.134	.150	3.40	3.80
Q	.106	.126	2.70	3.20