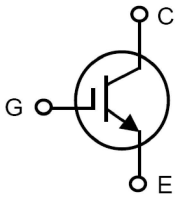
IXYS

1200V XPT™ GenX4™ IGBT

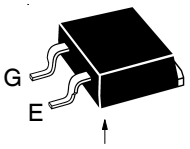
IXYA20N120B4HV
IXYP20N120B4

V_{CES} = 1200V
I_{C110} = 20A
$V_{CE(sat)}$ ≤ 2.1V
$t_{fi(typ)}$ = 90ns

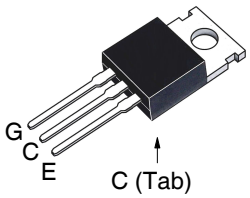
Extreme Light Punch Through
IGBT for up to 5 - 30kHz Switching



TO-263HV (IXYA..HV)



TO-220 (IXYP)



G = Gate D = 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	76	A
I_{C110}	T_C = 110°C	20	A
I_{CM}	T_C = 25°C, 1ms	130	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 40 $V_{CE} \leq 0.8 \bullet V_{CES}$	A
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 (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			25	μA
	T_J = 150°C			5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 20A, V_{GE} = 15V, Note 1		1.83	2.10	V
	T_J = 150°C		2.18		V

Features

- Optimized for 5-30kHz Switching
- 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

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Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.
g_{fs}	I_C = 20A, V_{CE} = 10V, Note 1	7.5	12.5	S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		890	pF
C_{oes}			58	pF
C_{res}			33	pF
$Q_{g(on)}$	I_C = 20A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		44	nC
Q_{ge}			8	nC
Q_{gc}			20	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		15	ns
t_{ri}	I_C = 20A, V_{GE} = 15V		47	ns
E_{on}	V_{CE} = 0.8 • V_{CES}, R_G = 10Ω		3.9	mJ
$t_{d(off)}$	Note 2		200	ns
t_{fi}			90	ns
E_{off}			1.6	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		13	ns
t_{ri}	I_C = 20A, V_{GE} = 15V		35	ns
E_{on}	V_{CE} = 0.8 • V_{CES}, R_G = 10Ω		4.6	mJ
$t_{d(off)}$	Note 2		270	ns
t_{fi}			170	ns
E_{off}			2.7	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.

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°C

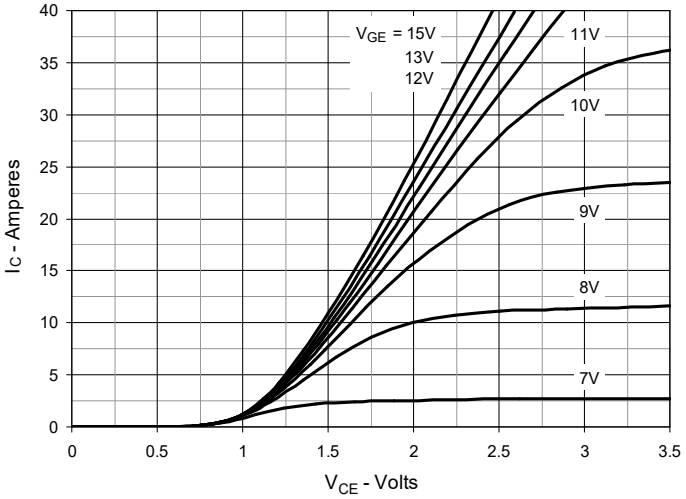

Fig. 2. Extended Output Characteristics @ T_J = 25°C

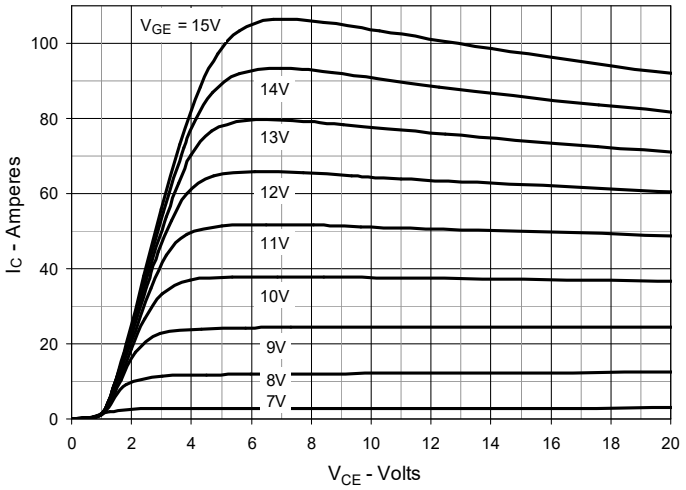

Fig. 3. Output Characteristics @ T_J = 150°C

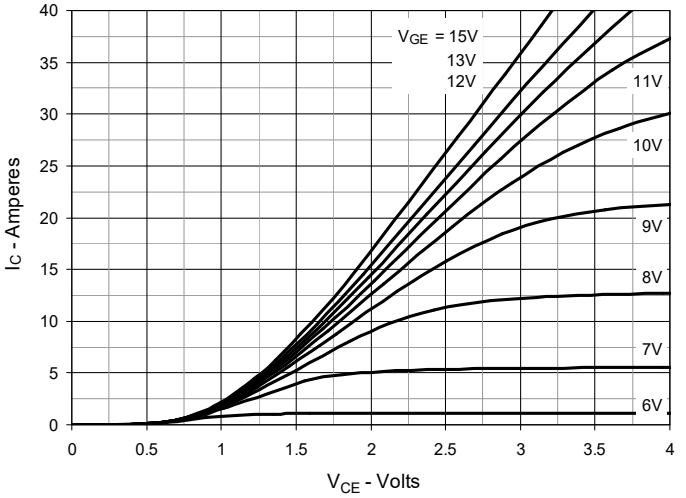

Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

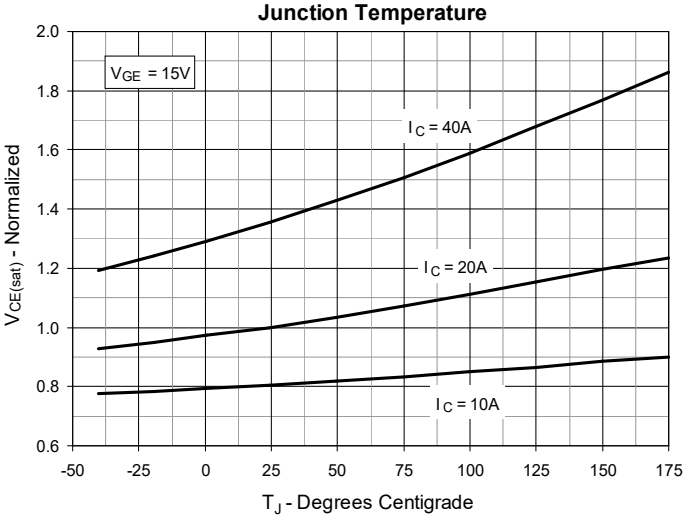

Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

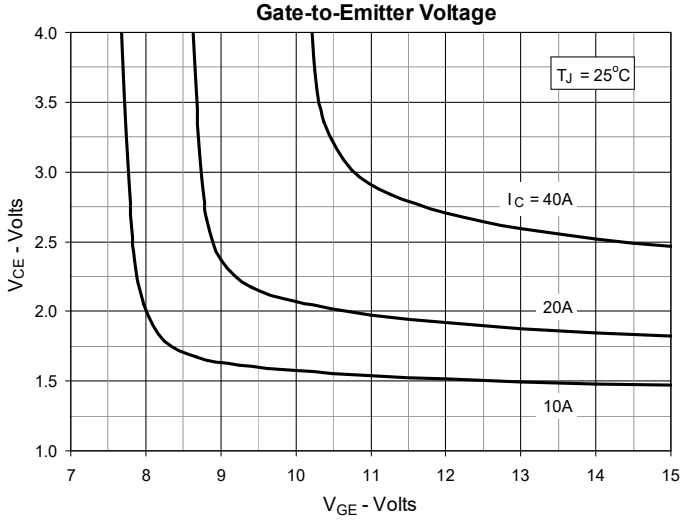

Fig. 6. Input Admittance

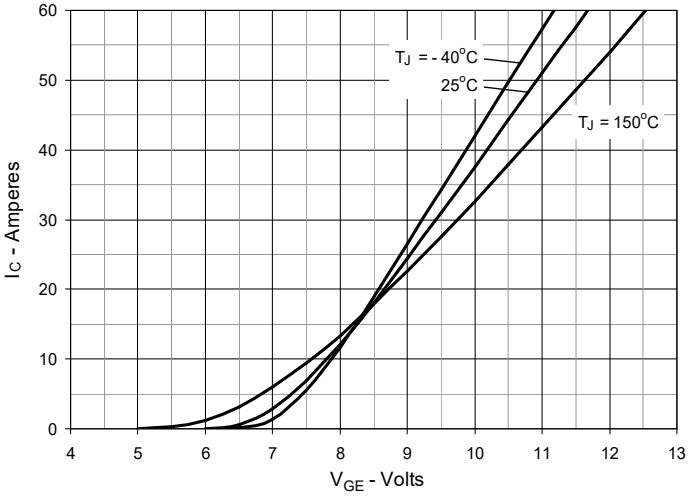

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Fig. 7. Transconductance

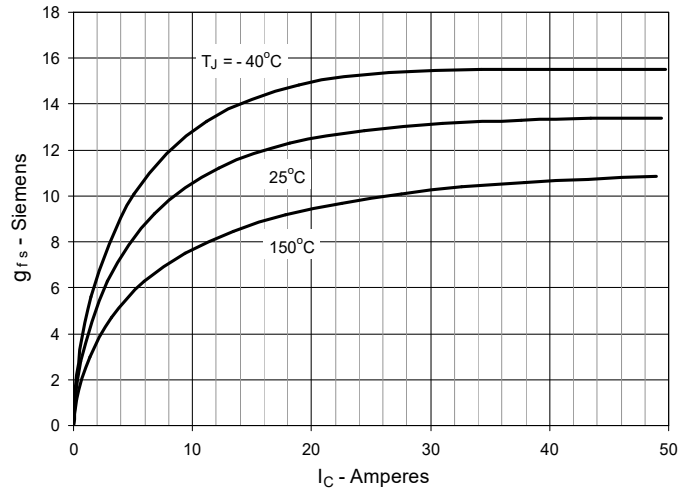

Fig. 8. Gate Charge

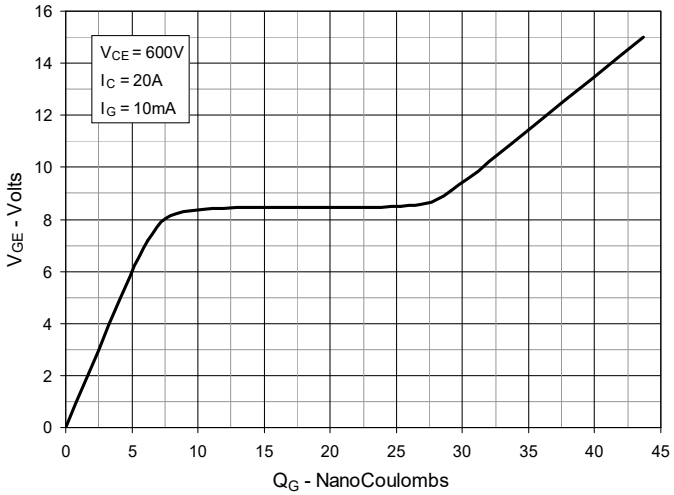

Fig. 9. Capacitance

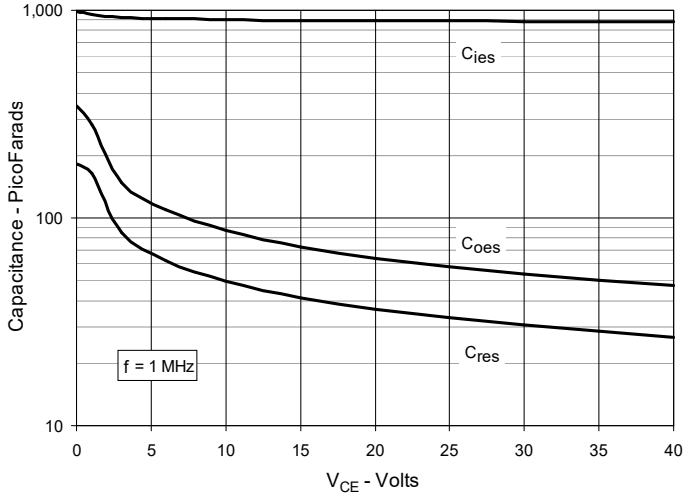

Fig. 10. Reverse-Bias Safe Operating Area

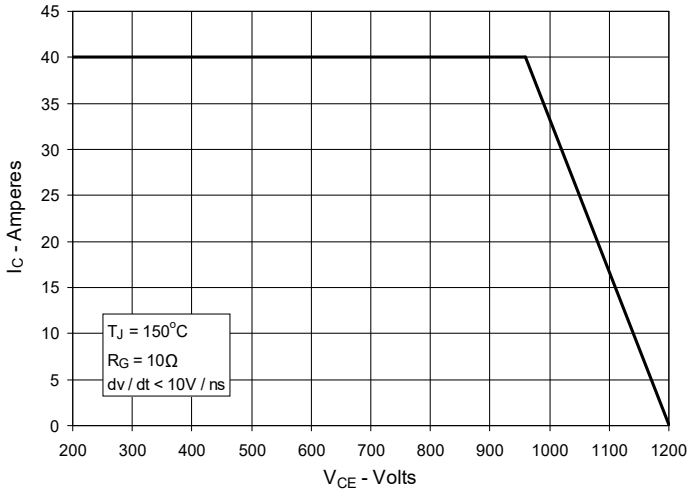

Fig. 11. Maximum Transient Thermal Impedance

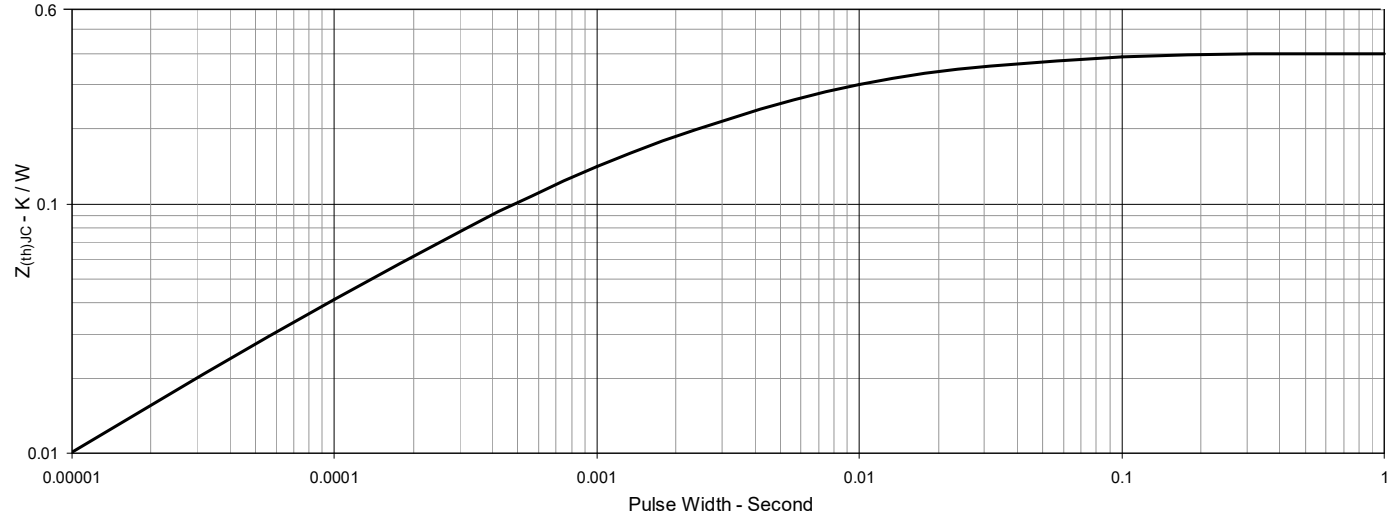

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Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

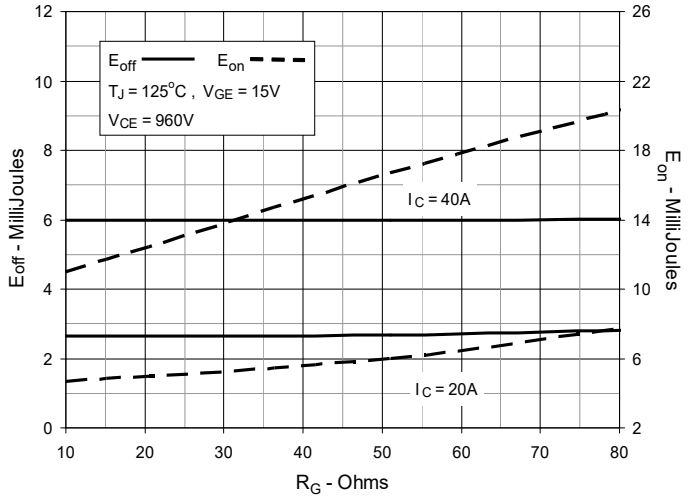

Fig. 13. Inductive Switching Energy Loss vs. Collector Current

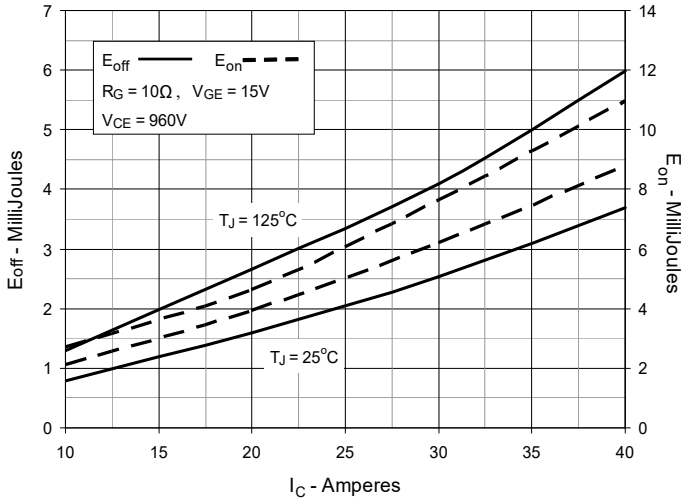

Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

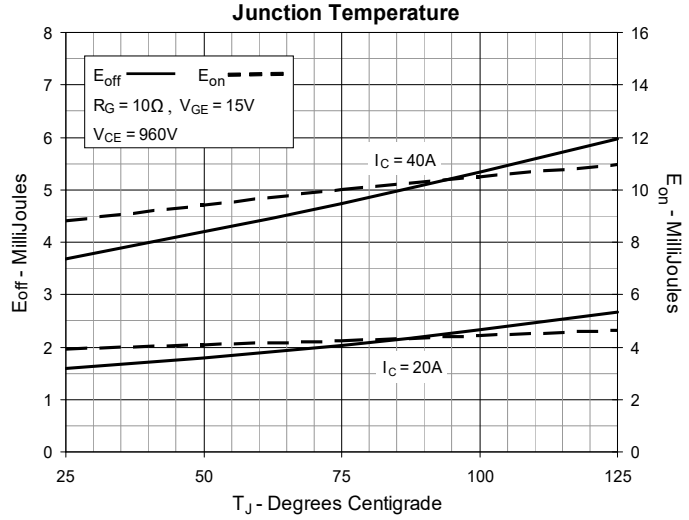

Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

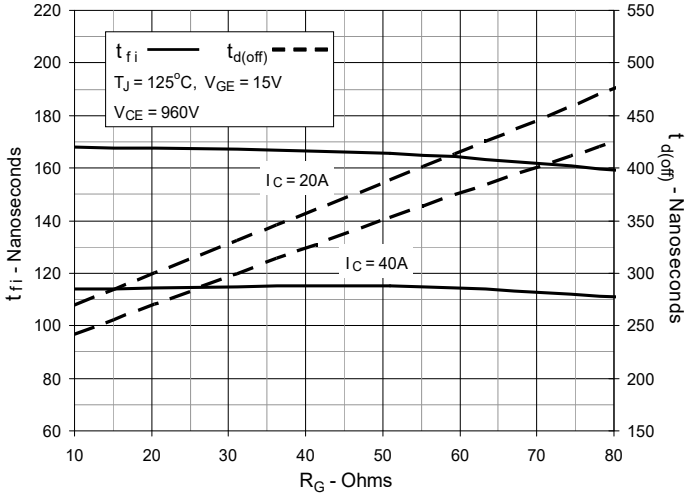

Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

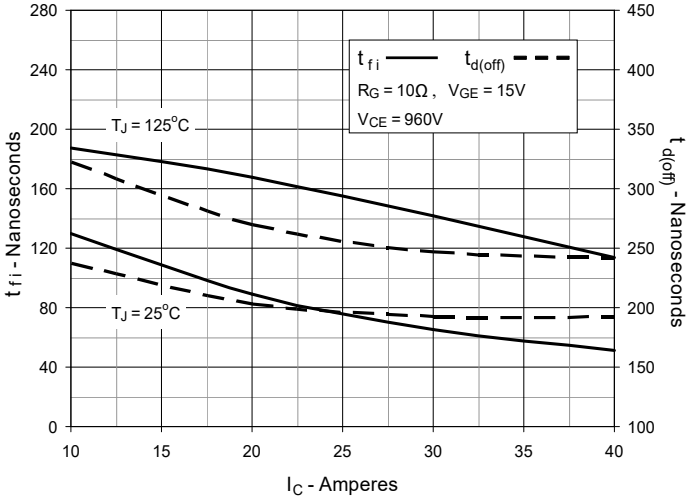

Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

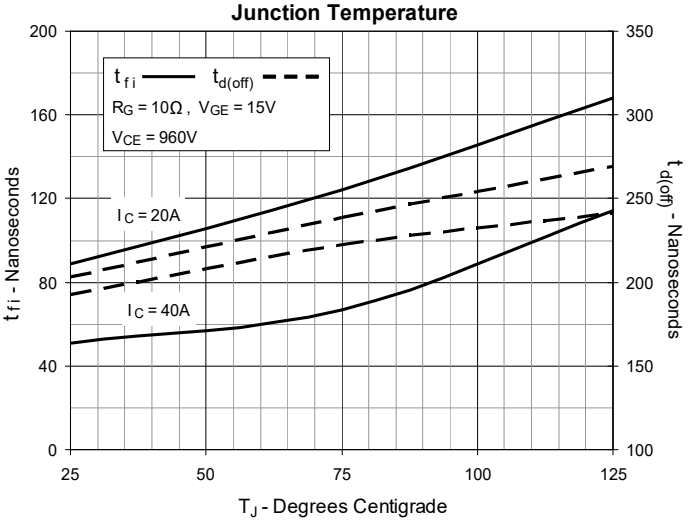

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Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

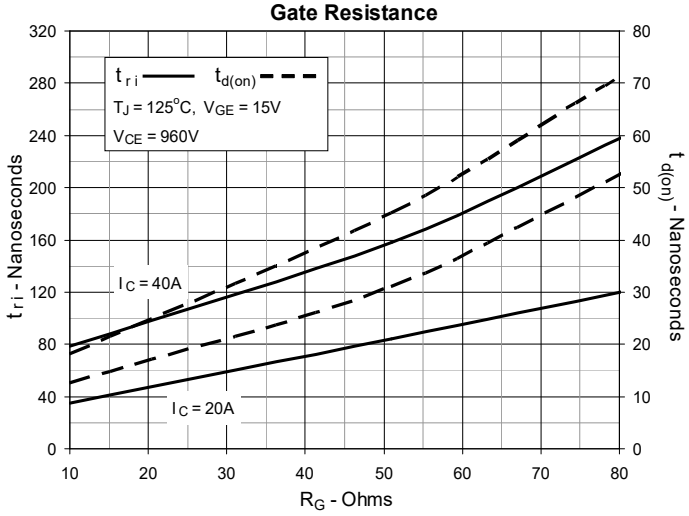


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

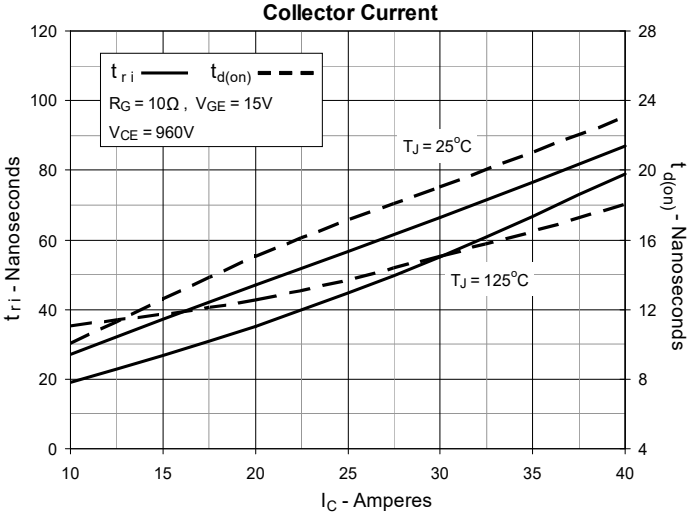
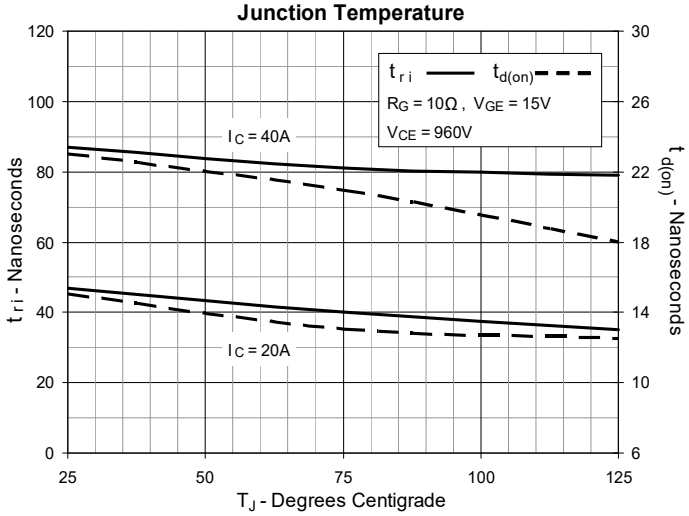
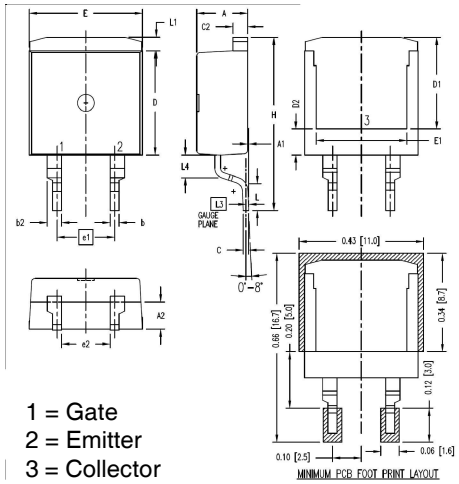


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



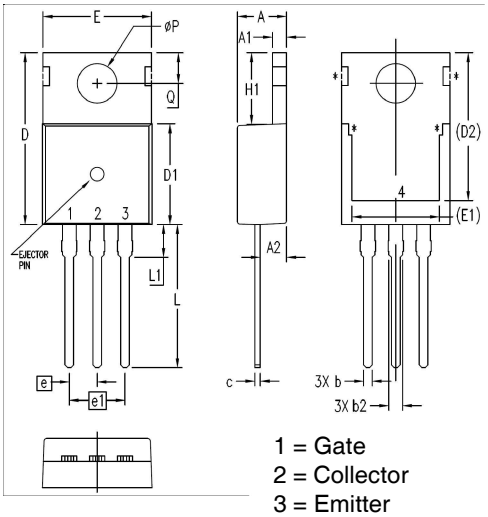
TO-263HV Outline



1 = Gate
2 = Emitter
3 = Collector

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

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