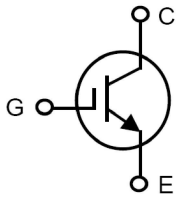
XPT™ 650V IGBTs GenX4™

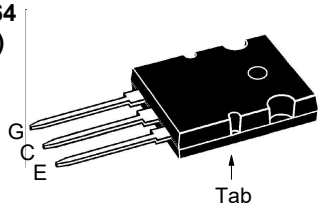
IXXK160N65B4
IXXX160N65B4

V_{CES} = 650V
I_{C110} = 160A
$V_{CE(sat)}$ ≤ 1.80V
$t_{fi(typ)}$ = 90ns

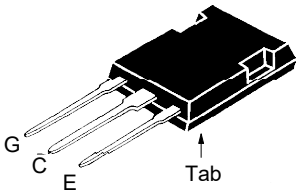
Extreme Light Punch Through
IGBT for 10-30kHz Switching



TO-264 (IXXK)



PLUS247 (IXXX)



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	650	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	650	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C= 25°C (Chip Capability)	310	A
I_{LRMS}	Leads Current Limit	160	A
I_{C110}	T_C = 110°C	160	A
I_{CM}	T_C = 25°C, 1ms	860	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 1Ω Clamped Inductive Load	I_{CM} = 320 @$V_{CE} \leq V_{CES}$	A
t_{sc} **(SCSOA)**	V_{GE}= 15V, V_{CE} = 360V, T_J = 150°C R_G = 10Ω, Non Repetitive	10	µs
P_C	T_C = 25°C	940	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering 1.6 mm (0.062 in.) from Case for 10s	300	°C
M_d	Mounting Torque (TO-264)	1.13/10	Nm/lb.in.
F_C	Mounting Force (PLUS247)	20..120 /4.5..27	N/lb.
Weight	TO-264 PLUS247	10 6	g g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250µA, V_{GE} = 0V	650			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			1.5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±200	nA
$V_{CE(sat)}$	I_C = 160A, V_{GE} = 15V, Note 1		1.54	1.80	V
	T_J = 150°C		1.85		V

Features

- Optimized for 10-30kHz Switching
- Square RBSOA
- Short Circuit Capability
- International Standard Packages
- High Current Handling Capability

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- 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 = 60A, V_{CE} = 10V, Note 1	40	70		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		8220		pF
C_{oes}			500		pF
C_{res}			295		pF
$Q_{g(on)}$	I_C = 160A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		425		nC
Q_{ge}			82		nC
Q_{gc}			193		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		52		ns
t_{ri}	I_C = 80A, V_{GE} = 15V		64		ns
E_{on}	V_{CE} = 400V, R_G = 1Ω		3.30		mJ
$t_{d(off)}$	Note 2		220		ns
t_{fi}			90		ns
E_{off}			1.88	3.00	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		43		ns
t_{ri}	I_C = 80A, V_{GE} = 15V		50		ns
E_{on}	V_{CE} = 400V, R_G = 1Ω		4.30		mJ
$t_{d(off)}$	Note 2		220		ns
t_{fi}			160		ns
E_{off}			2.36		mJ
R_{thJC}				0.16	°C/W
R_{thCS}			0.15		°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.

Littelfuse 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 = 25ºC

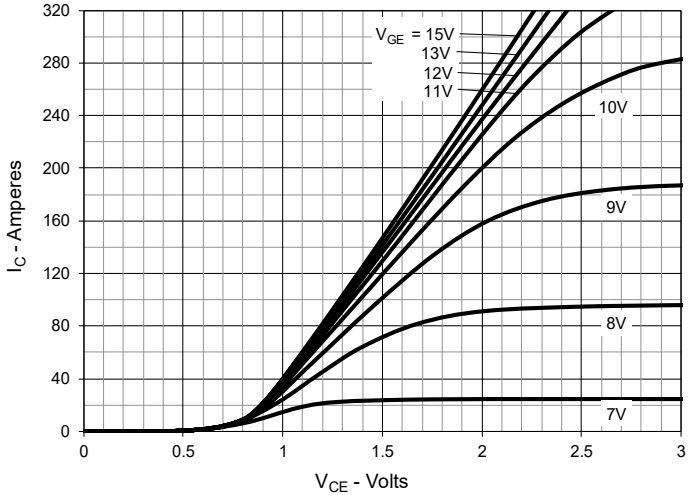


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

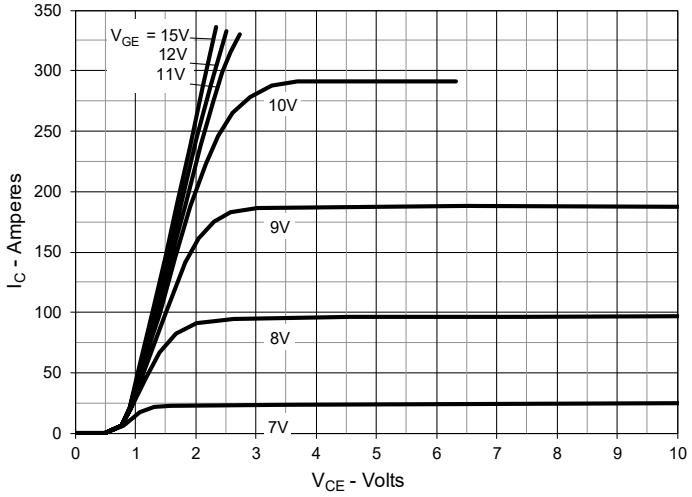


Fig. 3. Output Characteristics @ T_J = 150ºC

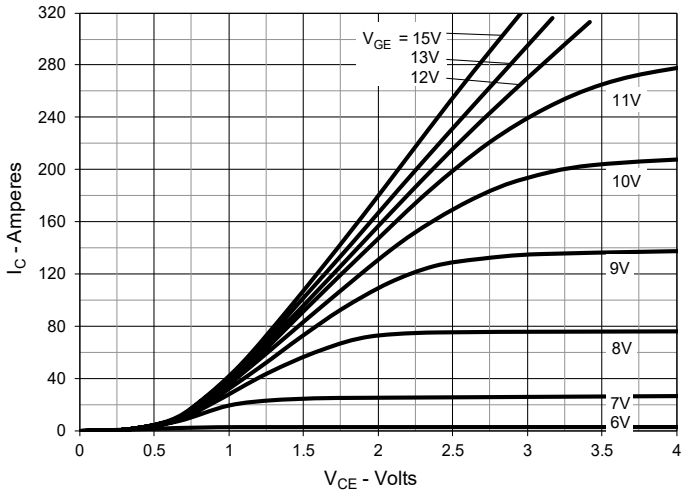


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

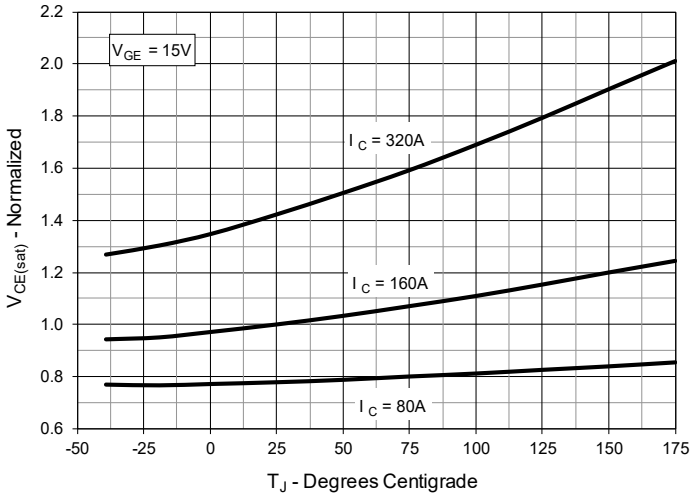


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

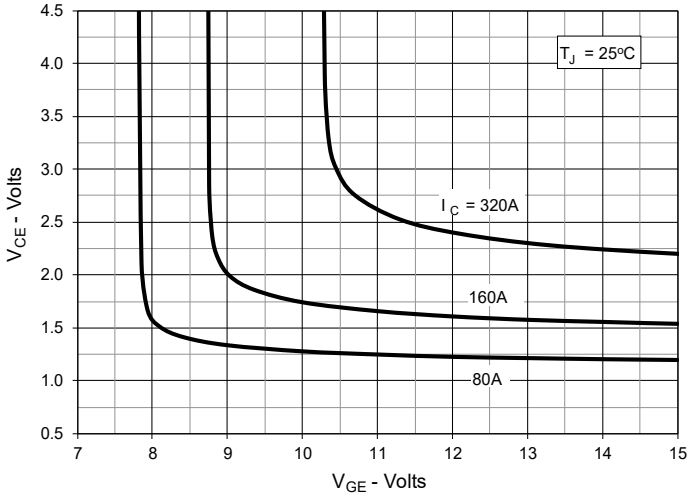
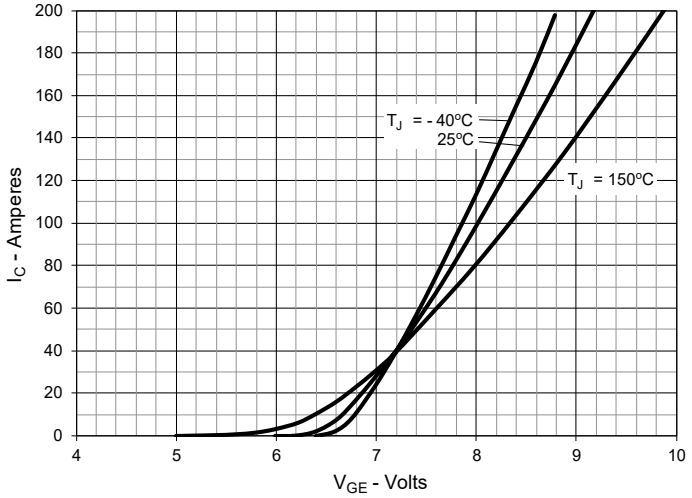


Fig. 6. Input Admittance



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Fig. 7. Transconductance

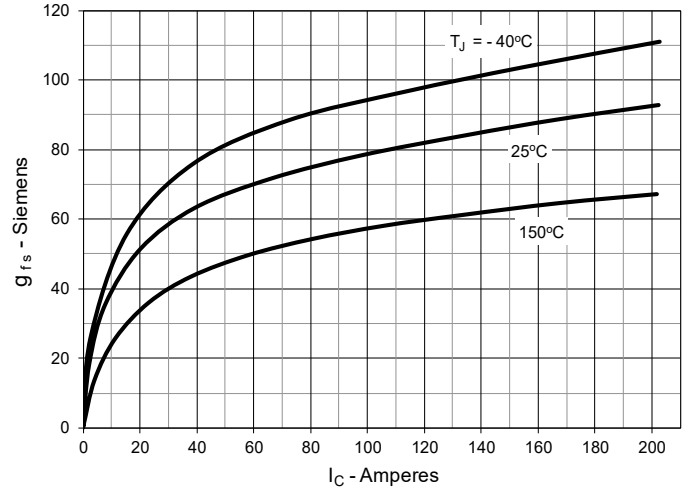


Fig. 8. Gate Charge

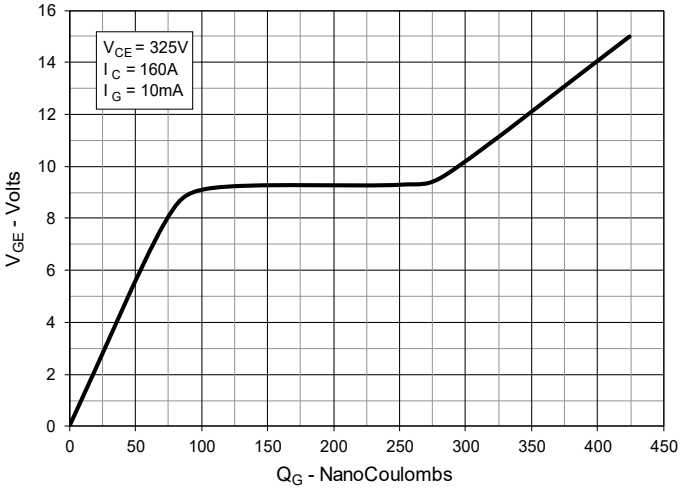


Fig. 9. Capacitance

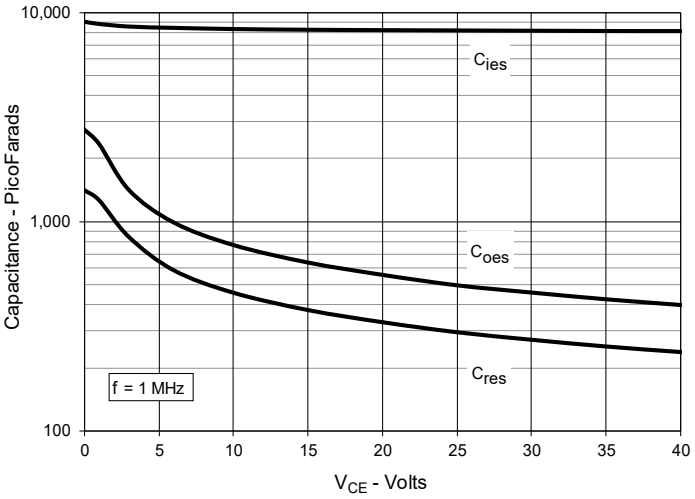


Fig. 10. Reverse-Bias Safe Operating Area

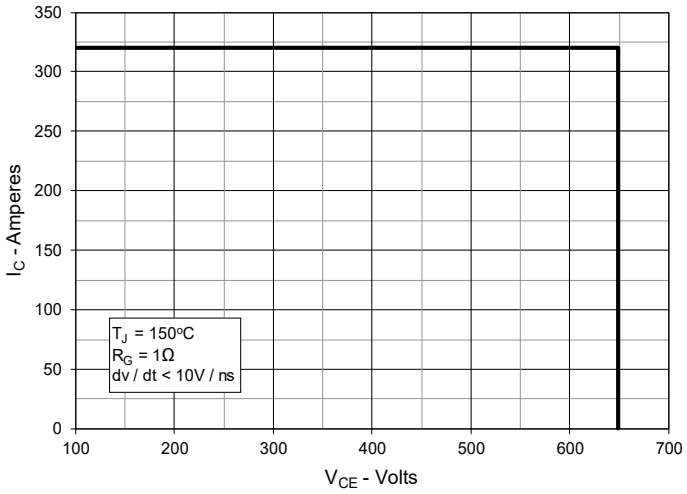
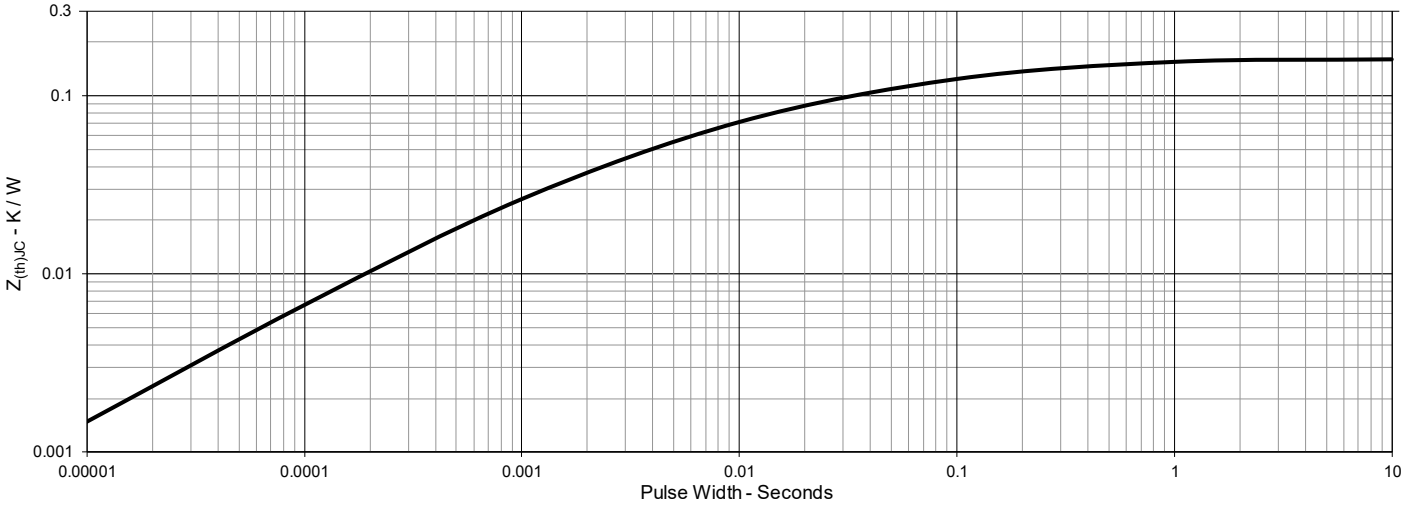


Fig. 11. Maximum Transient Thermal Impedance



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

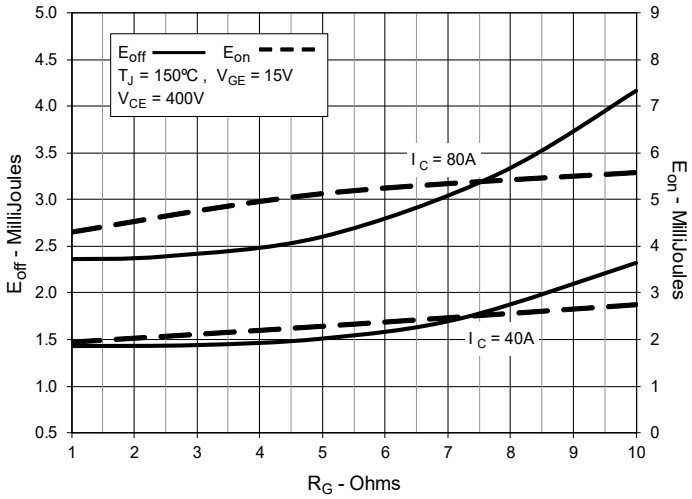


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

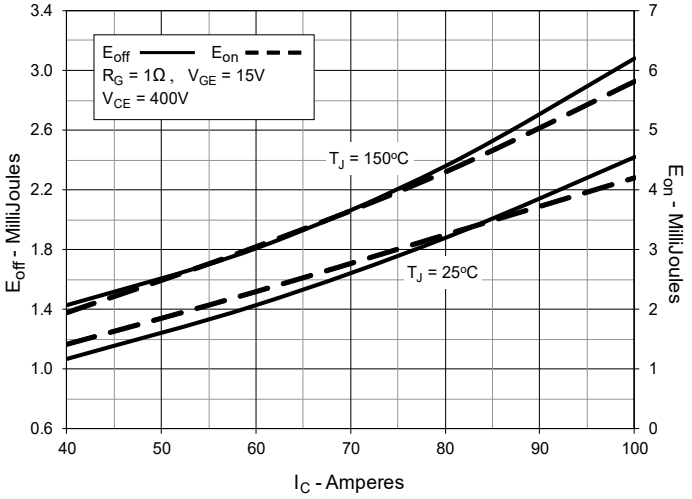


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

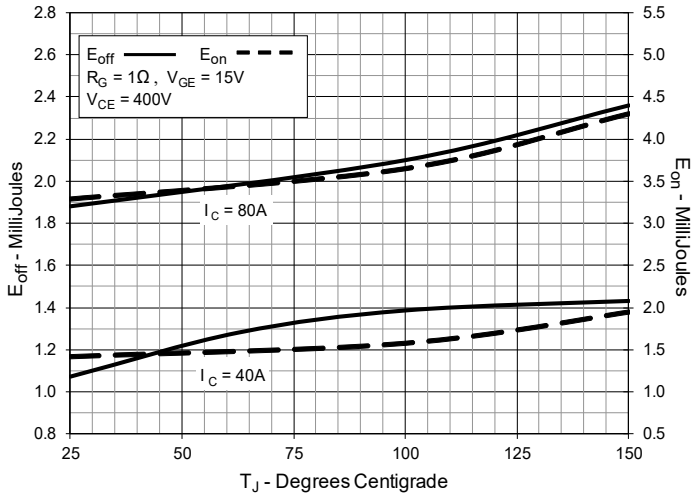


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

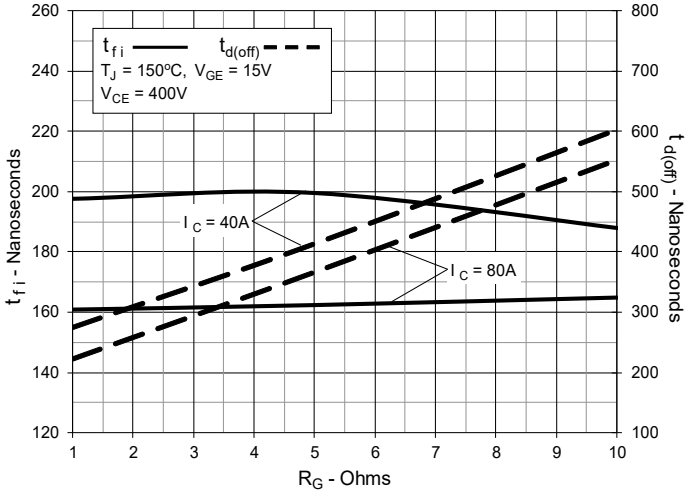


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

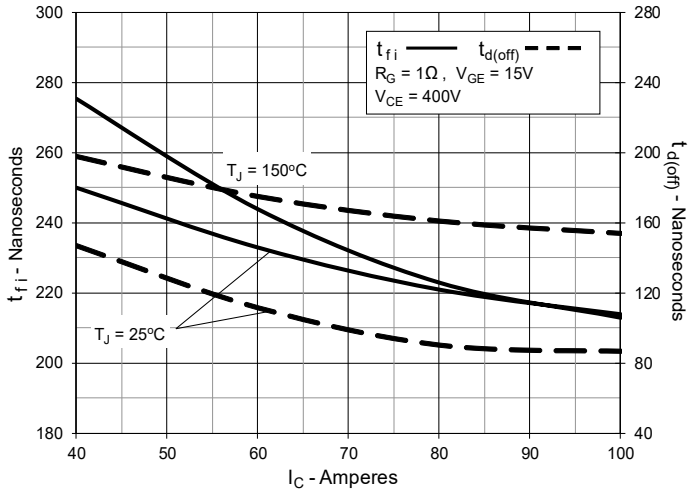
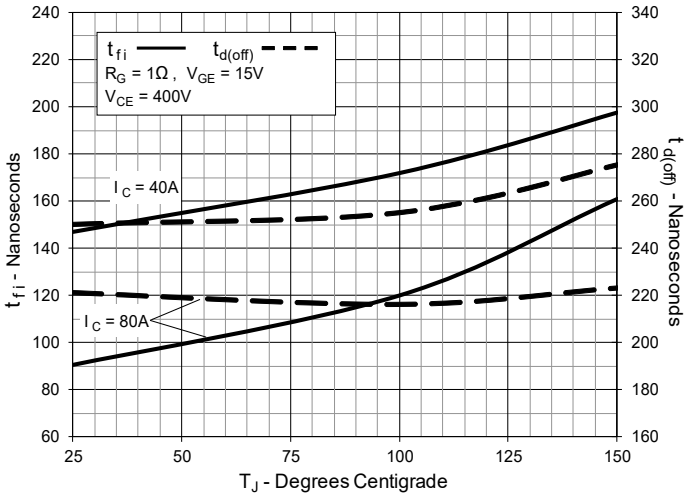


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



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

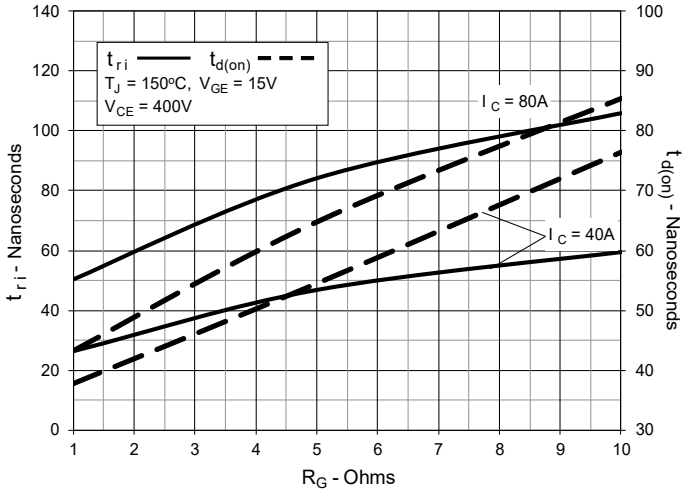


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

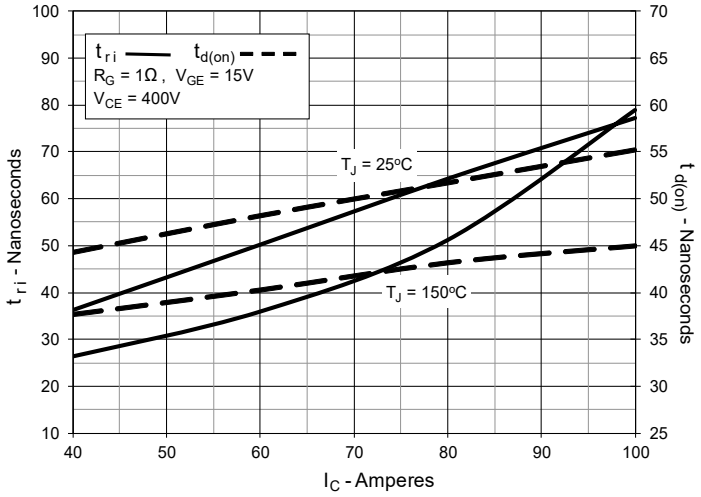
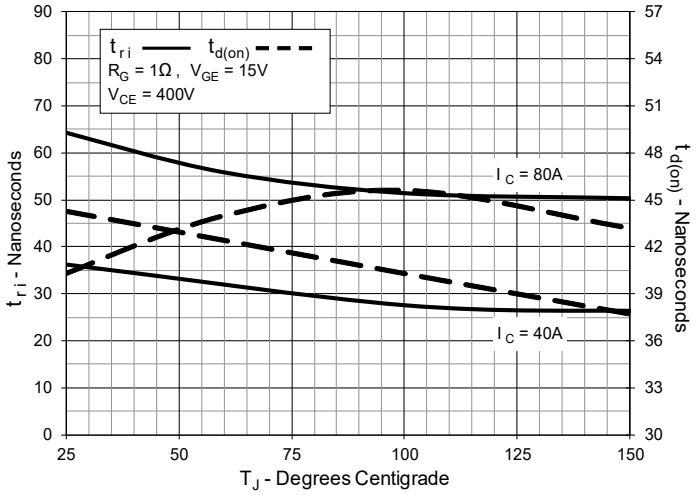
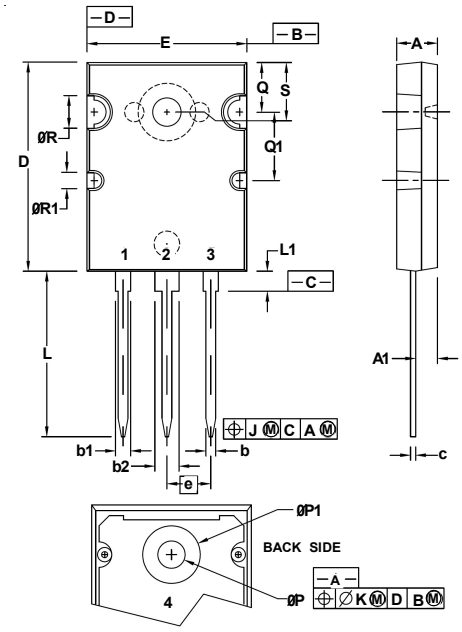


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



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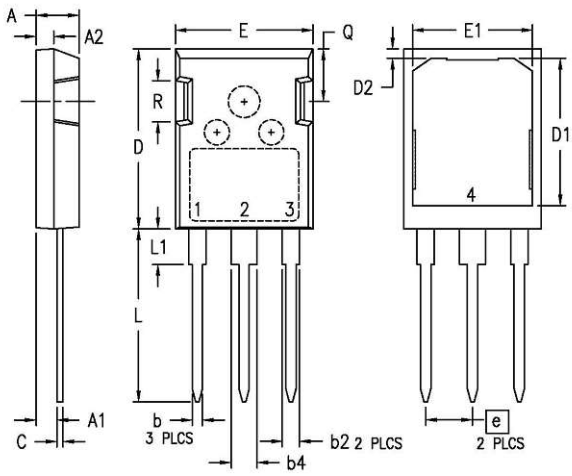
TO-264 Outline



1 = Gate
2,4 = Collector
3 = Emitter

SYMBOL	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.185	.209	4.70	5.31
A1	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b1	.087	.102	2.21	2.59
b2	.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	.215BSC		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
ØP1	.270	.290	6.86	7.37
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

PLUS247 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	.520	.560	13.08	14.22
e	.215 BSC		5.45 BSC	
L	.780	.810	19.81	20.57
L1	.150	.170	3.81	4.32
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83

1 - Gate
2,4 - Collector
3 - Emitter

NOTE:
1. This drawing will meet all dimensions requirement of JEDEC outline TO-247 AD (R-PSIP-F3) except screw mounting hole.
2. Pin #2 is connected to the bottom heatsink (#4).
3. Lead finish – One of the following depending on the packaging plants.
   3.1 Matte pure tin plating on the leads and back heatsink.
   3.2 Pb free solder dip on the leads and pre Ni plated back heatsink.

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