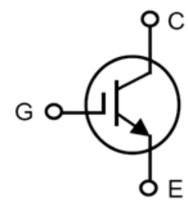
IXYS

XPT™ 650V IGBT GenX3™

IXYK300N65A3 IXYX300N65A3

Ultra Low-Vsat PT IGBT

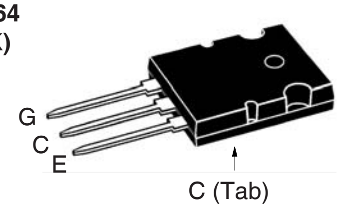


V_{CES}	=	650V
I_{C110}	=	300A
$V_{CE(sat)}$	≤	1.60V
$t_{fi(typ)}$	=	160ns

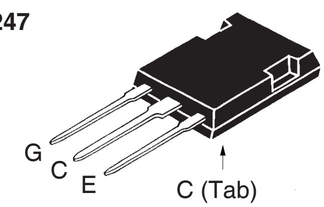
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	650	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	650	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C (Chip Capability)	600	A
I_{LRMS}	Terminal Current Limit	160	A
I_{C110}	T_C = 110°C	300	A
I_{CM}	T_C = 25°C, 1ms	1460	A
I_A	T_C = 25°C	100	A
E_{AS}	T_C = 25°C	2	J
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 1Ω Clamped Inductive Load	I_{CM} = 600 @$V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 10Ω, Non Repetitive	8	µs
P_C	T_C = 25°C	2300	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-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}	3.5		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			25	µA
	T_J = 150°C			1	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±200	nA
$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V, Note 1		1.32	1.60	V
	T_J = 150°C		1.35		V

TO-264 (IXYK)



PLUS247 (IXYX)



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

Features

- International Standard Packages
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- 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

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	60	100	S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		14	nF
C_{oes}			836	pF
C_{res}			310	pF
$Q_{g(on)}$	I_C = 300A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		565	nC
Q_{ge}			83	nC
Q_{gc}			230	nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		42	ns
t_{ri}	I_C = 100A, V_{GE} = 15V		125	ns
E_{on}	V_{CE} = 400V, R_G = 1Ω		7.8	mJ
$t_{d(off)}$	Note 2		190	ns
t_{fi}			160	ns
E_{off}			4.7	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		40	ns
t_{ri}	I_C = 100A, V_{GE} = 15V		115	ns
E_{on}	V_{CE} = 400V, R_G = 1Ω		8.8	mJ
$t_{d(off)}$	Note 2		260	ns
t_{fi}			175	ns
E_{off}			7.3	mJ
R_{thJC}				0.065 °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.

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

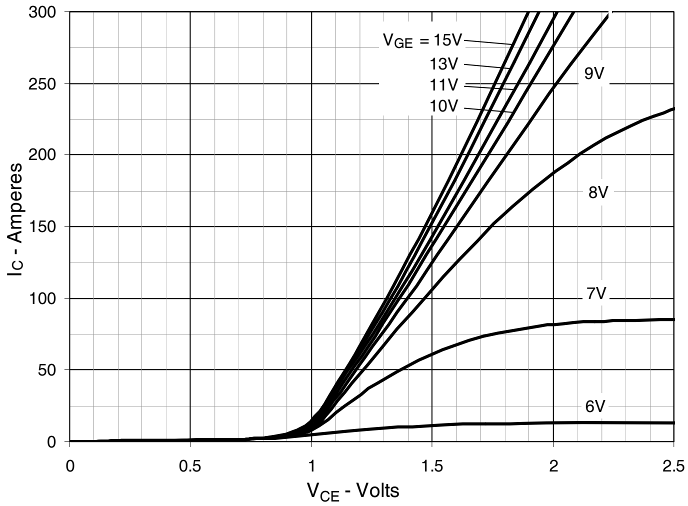


Fig. 2. Extended Output Characteristics @ $T_J = 25^oC$

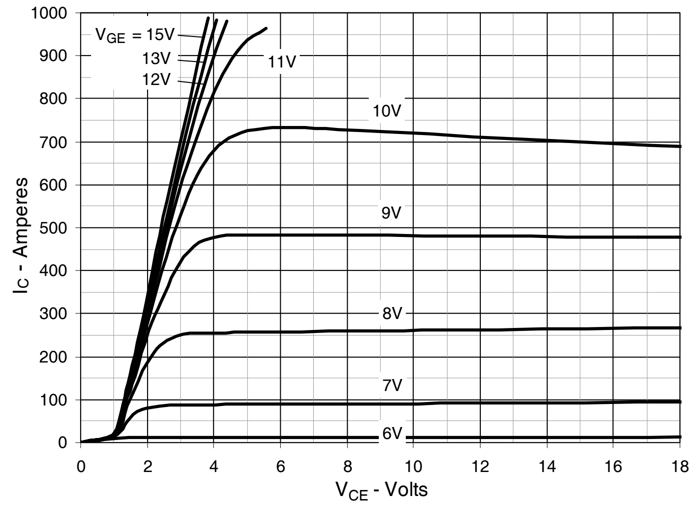


Fig. 3. Output Characteristics @ $T_J = 150^oC$

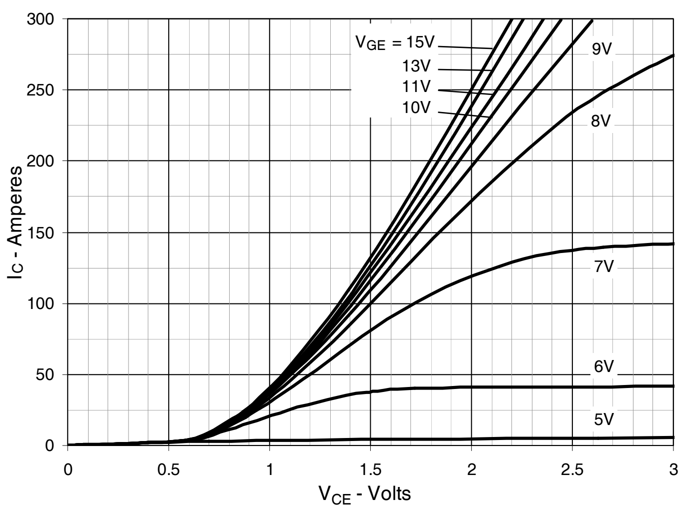


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

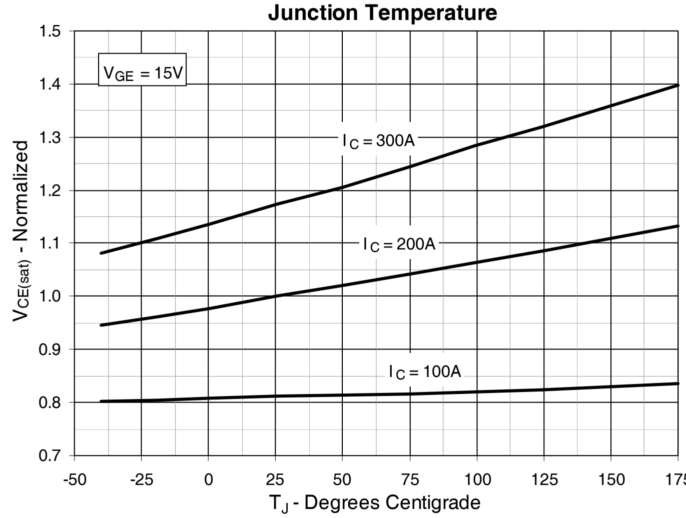


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

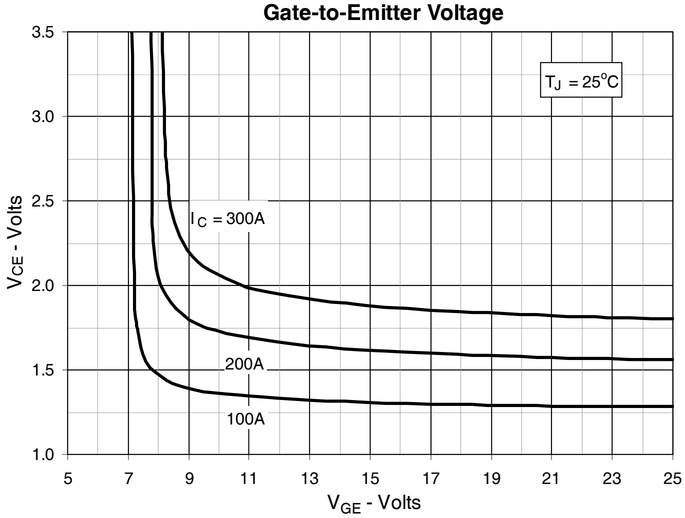


Fig. 6. Input Admittance

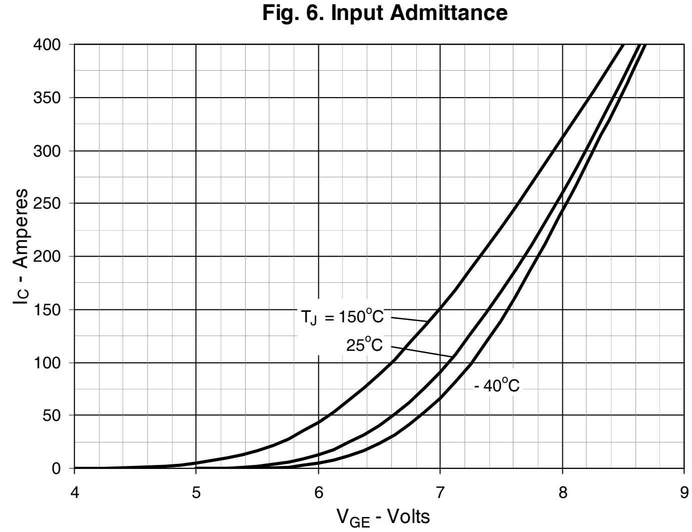


Fig. 7. Transconductance

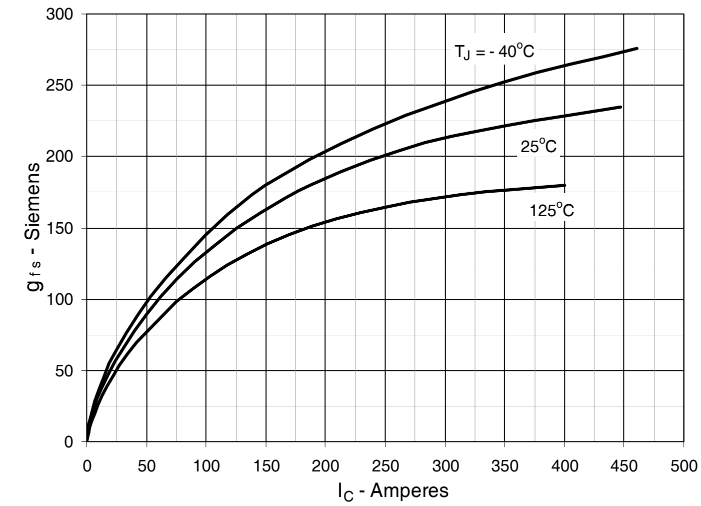


Fig. 8. Gate Charge

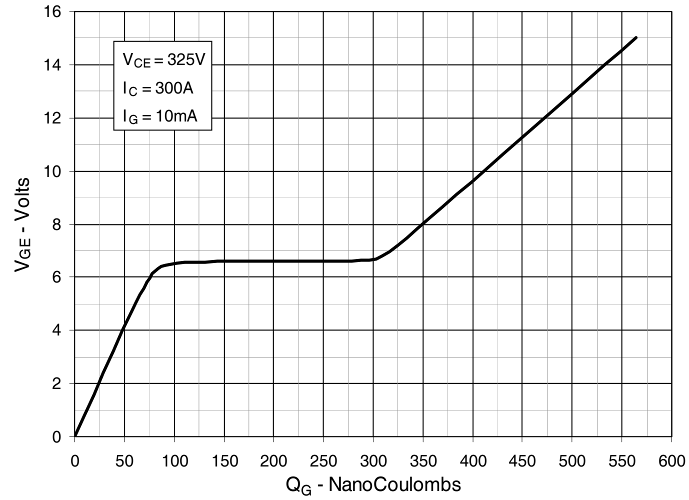


Fig. 9. Capacitance

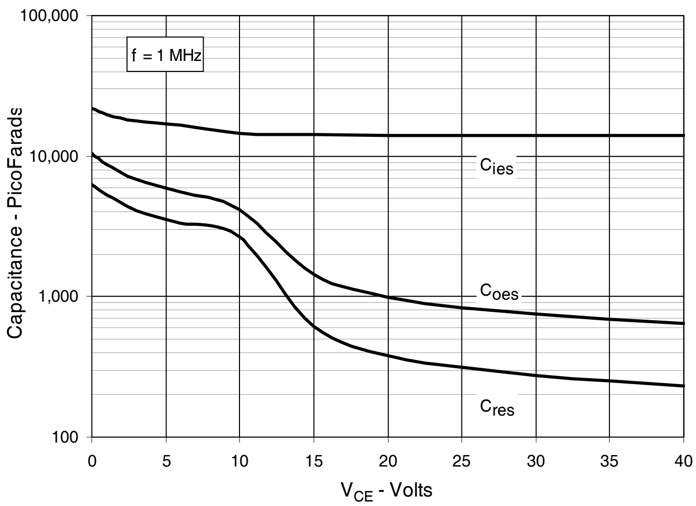


Fig. 10. Reverse-Bias Safe Operating Area

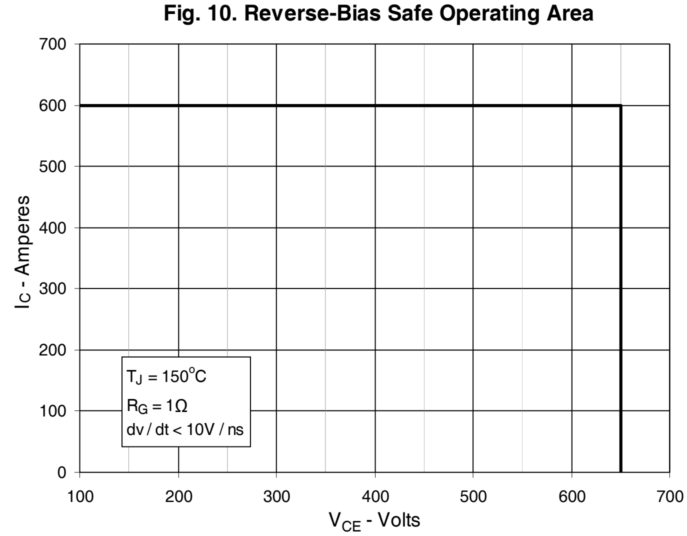


Fig. 11. Maximum Transient Thermal Impedance

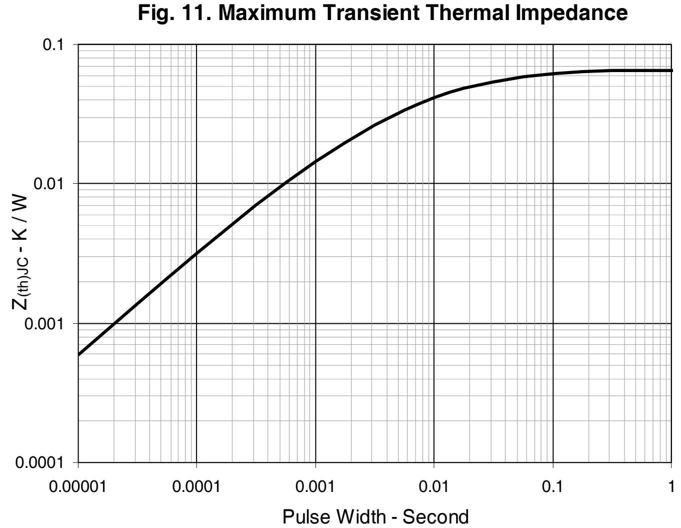


Fig. 12. Forward-Bias Safe Operating Area

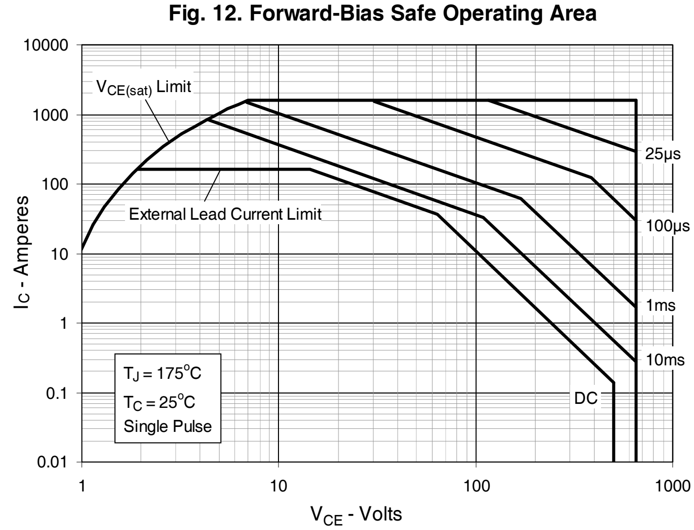


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

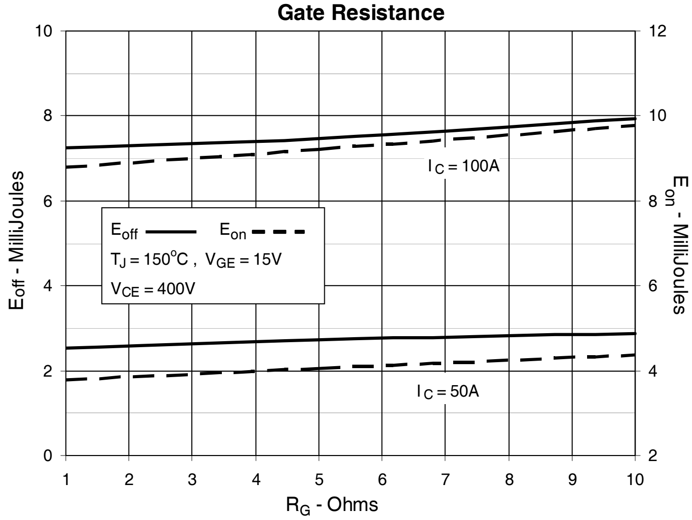


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

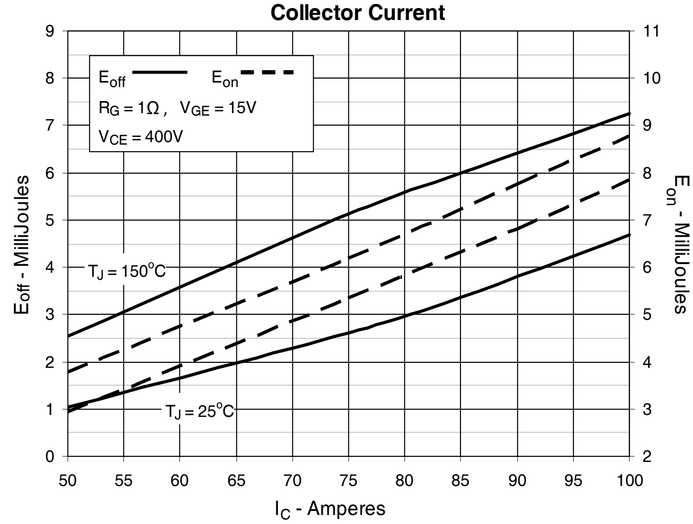


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

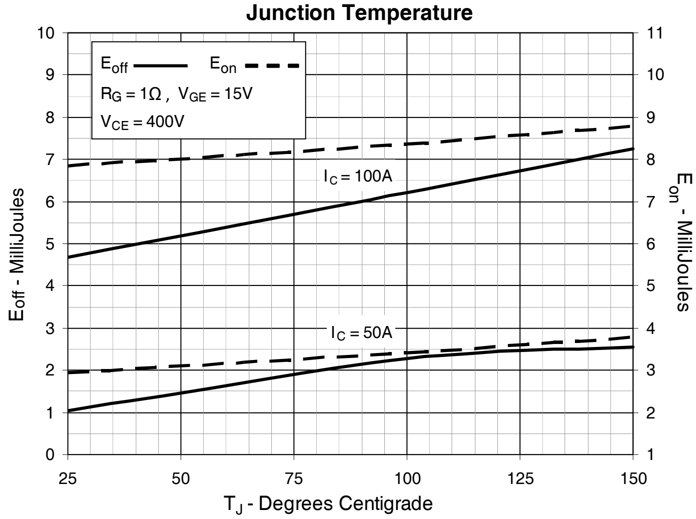


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

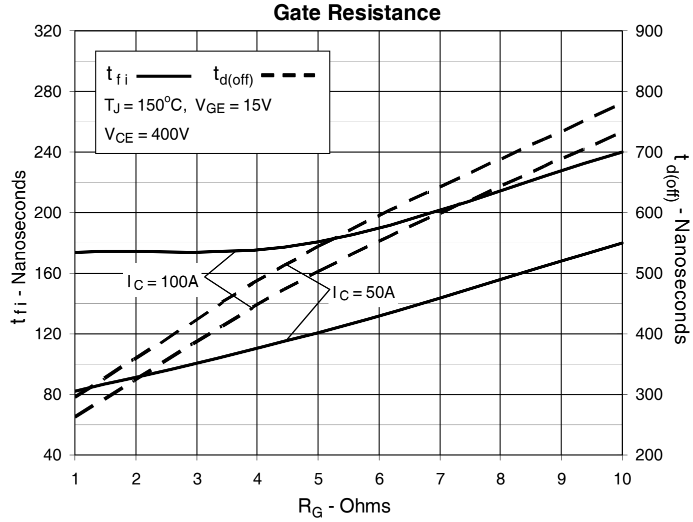


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

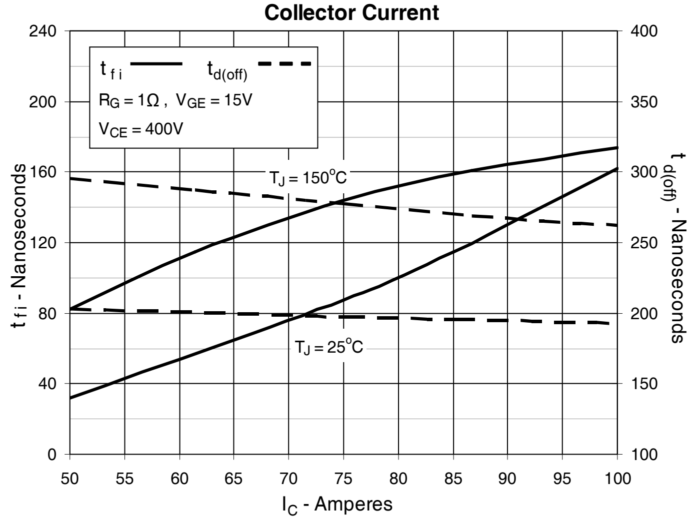


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

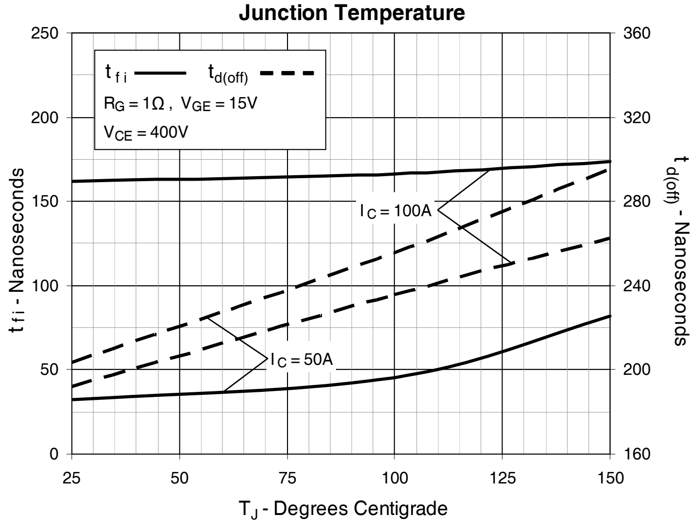


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

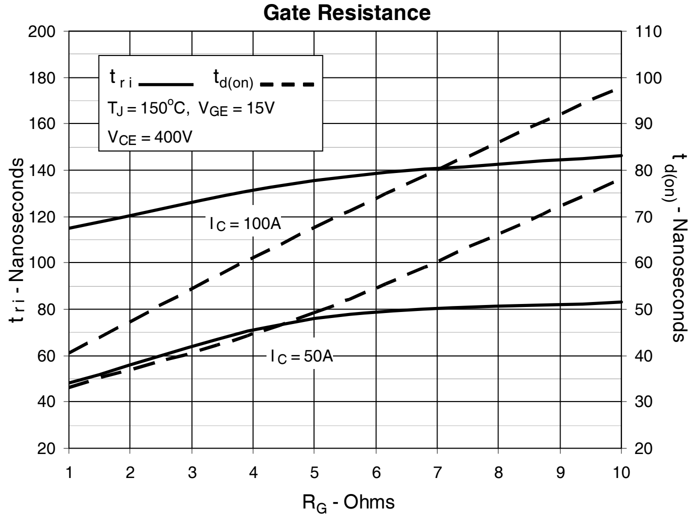


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

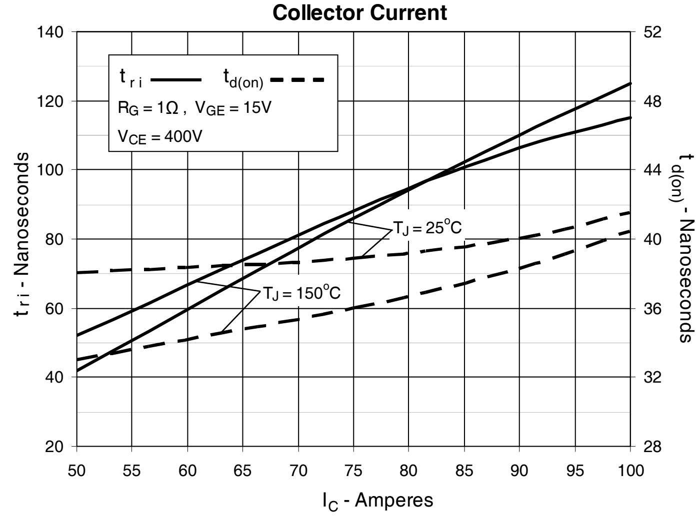
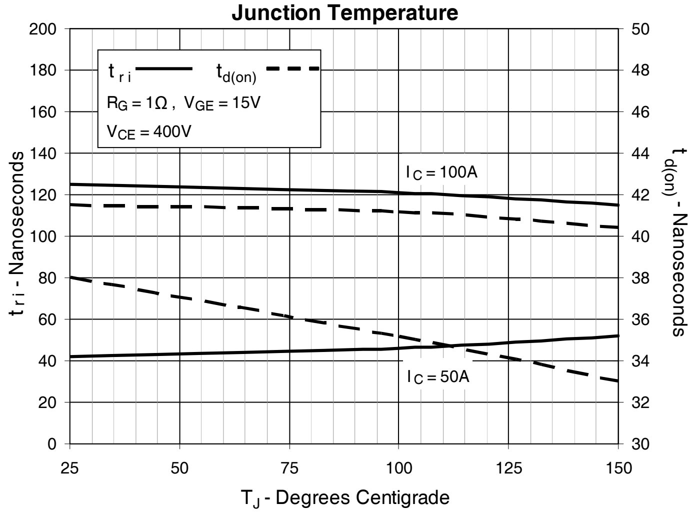
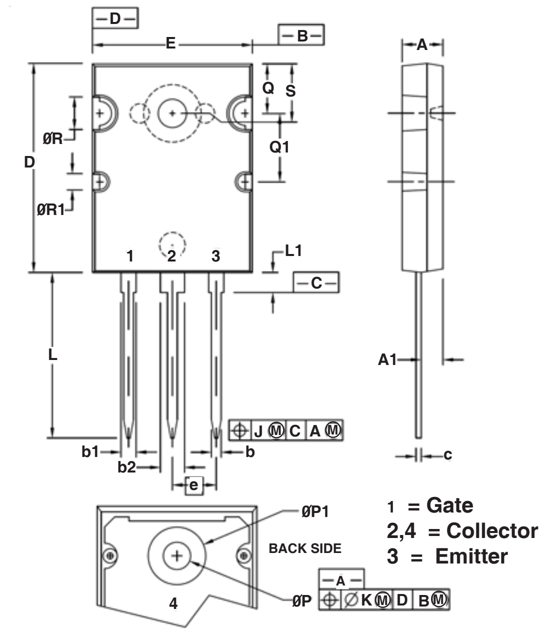


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature



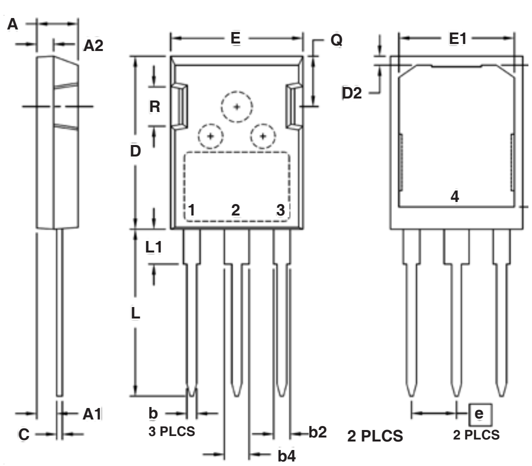
TO-264 Outline



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



1 = Gate
2,4 = Collector
3 = Emitter

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