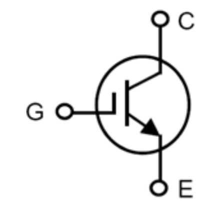
IXYS Preliminary Technical Information

XPT™ 650V IGBT GenX3™

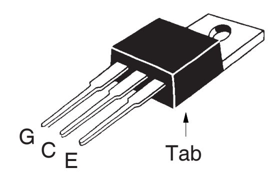
IXYP15N65C3

V_{CES} = 650V
I_{C110} = 15A
$V_{CE(sat)}$ ≤ 2.5V
$t_{fi(typ)}$ = 28ns

Extreme Light Punch Through IGBT for 20-60kHz Switching



TO-220



G = Gate   C = Collector
E = Emitter   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	38	A
I_{C110}	T_C = 110°C	15	A
I_{CM}	T_C = 25°C, 1ms	80	A
I_A	T_C = 25°C	5	A
E_{AS}	T_C = 25°C	100	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 20Ω Clamped Inductive Load	I_{CM} = 30 @$V_{CE} \leq V_{CES}$	A
t_{sc} **(SCSOA)**	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 82Ω, Non Repetitive	8	μs
P_C	T_C = 25°C	200	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	1.13/10	Nm/lb.in.
Weight		3	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		6.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			10	μA
	T_J = 150°C			150	μA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 15A, V_{GE} = 15V, Note 1		1.96	2.50	V
	T_J = 150°C		2.45		V

Features

- Optimized for 20-60kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- International Standard Package

Advantages

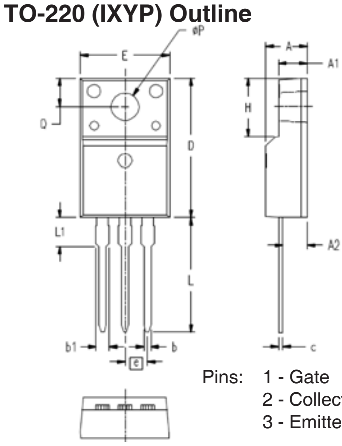
- High Power Density
- Extremely Rugged
- Low Gate Drive Requirement

Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- High Frequency Power Inverters

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 15A, V_{CE} = 10V, Note 1	5.0	8.5		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		583		pF
C_{oes}			37		pF
C_{res}			13		pF
$Q_{g(on)}$	I_C = 15A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		19		nC
Q_{ge}			4		nC
Q_{gc}			10		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C** I_C = 15A, V_{GE} = 15V V_{CE} = 400V, R_G = 20Ω Note 2		15		ns
t_{ri}			20		ns
E_{on}			0.27		mJ
$t_{d(off)}$			68		ns
t_{fi}			28		ns
E_{off}			0.23	0.40	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C** I_C = 15A, V_{GE} = 15V V_{CE} = 400V, R_G = 20Ω Note 2		15		ns
t_{ri}			21		ns
E_{on}			0.53		mJ
$t_{d(off)}$			80		ns
t_{fi}			42		ns
E_{off}			0.24		mJ
R_{thJC}				0.75	°C/W
R_{thCS}			0.50		°C/W

TO-220 (IXYP) Outline



Pins: 1 - Gate
2 - Collector
3 - Emitter

Dim.	Millimeters min	Millimeters max	Inches min	Inches max
A	4.50	4.90	0.177	0.193
A1	2.34	2.74	0.092	0.108
A2	2.56	2.96	0.101	0.117
b	0.70	0.90	0.028	0.035
b1	1.27	1.47	0.050	0.058
c	0.45	0.60	0.018	0.024
D	15.67	16.07	0.617	0.633
E	9.96	10.36	0.392	0.408
e	2.54 BSC		0.100 BSC	
H	6.48	6.88	0.255	0.271
L	12.68	13.28	0.499	0.523
L1	3.03	3.43	0.119	0.135
Ø P	3.08	3.28	0.121	0.129
Q	3.20	3.40	0.126	0.134

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.

PRELIMANARY 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 = 25ºC

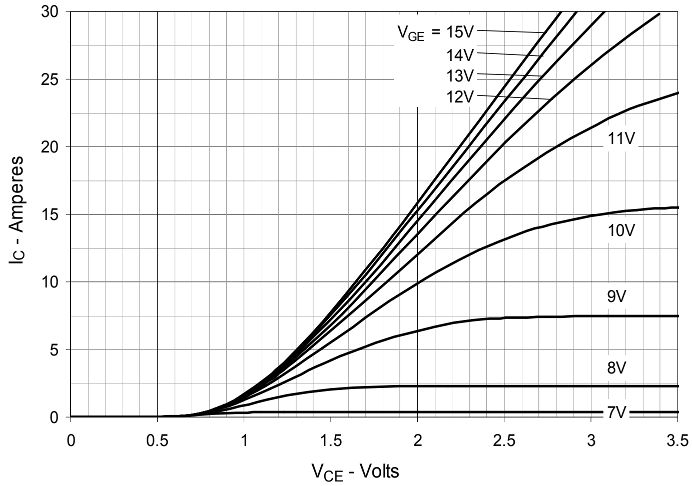


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

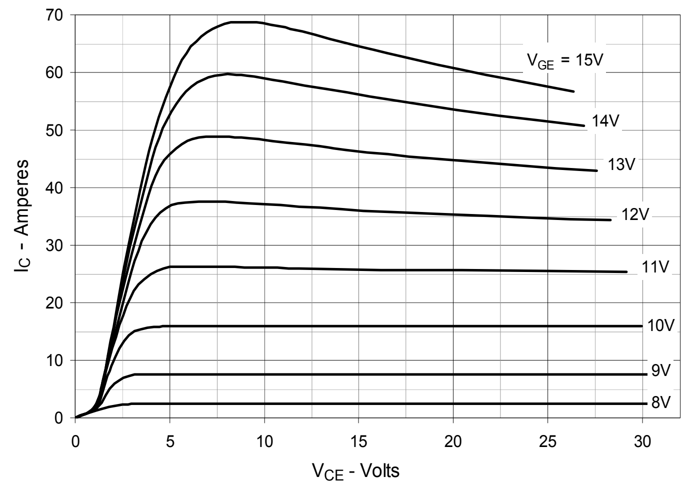


Fig. 3. Output Characteristics @ T_J = 150ºC

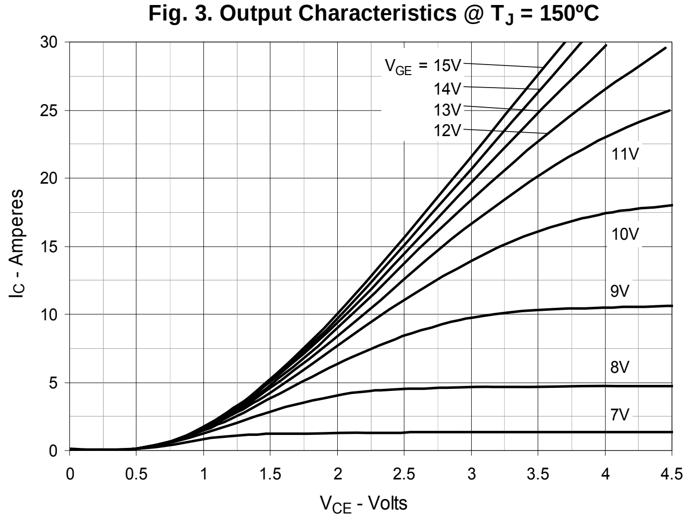


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

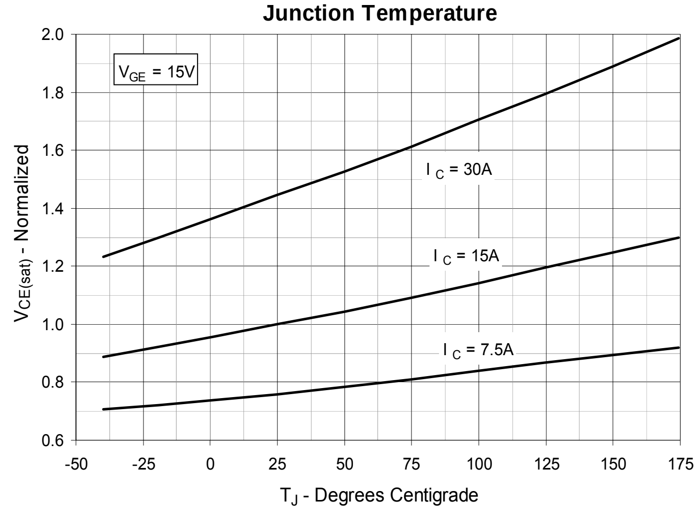


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

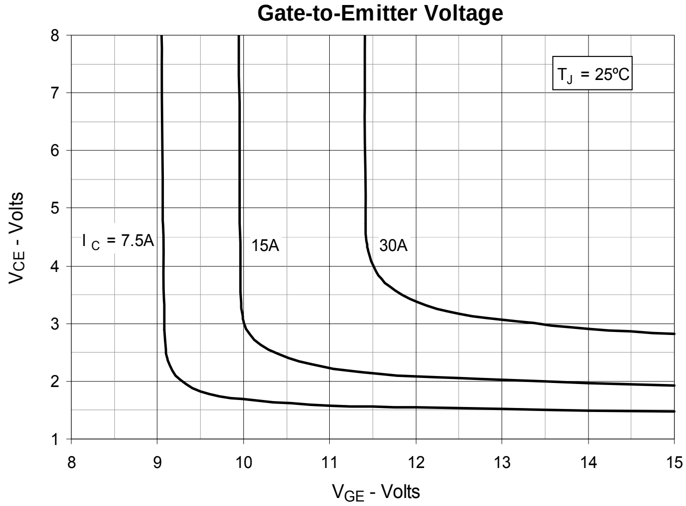


Fig. 6. Input Admittance

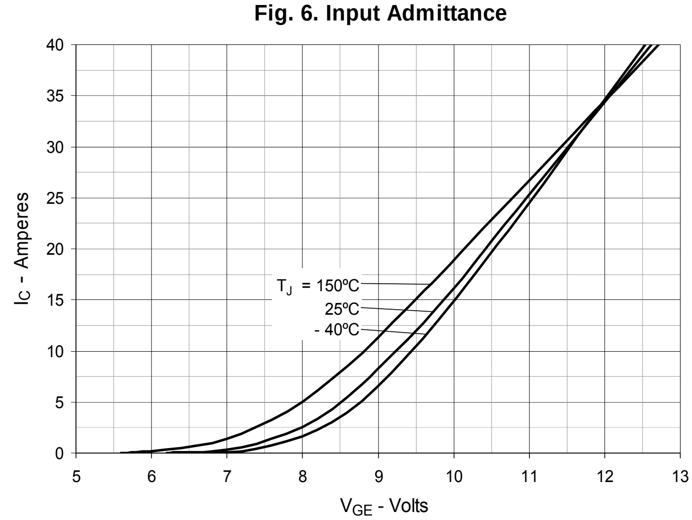


Fig. 7. Transconductance

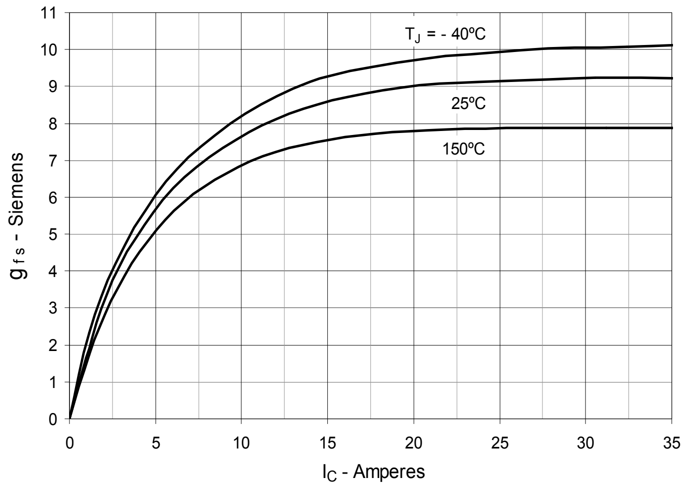


Fig. 8. Gate Charge

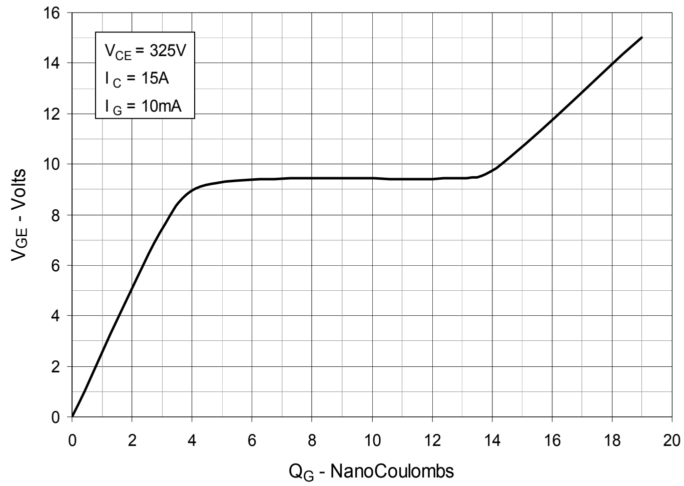


Fig. 9. Capacitance

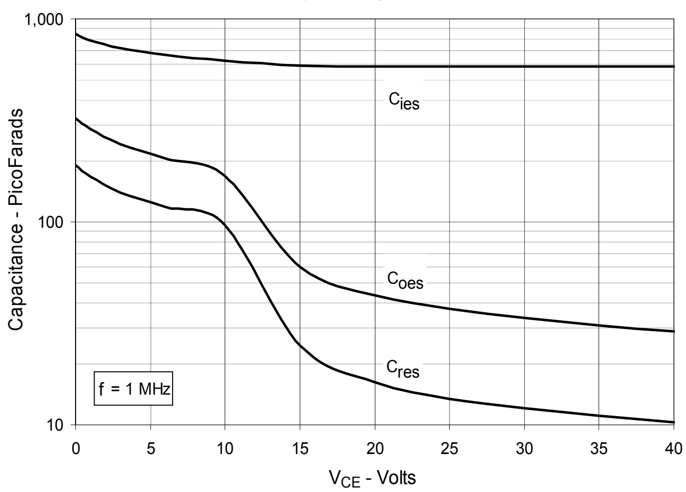


Fig. 10. Reverse-Bias Safe Operating Area

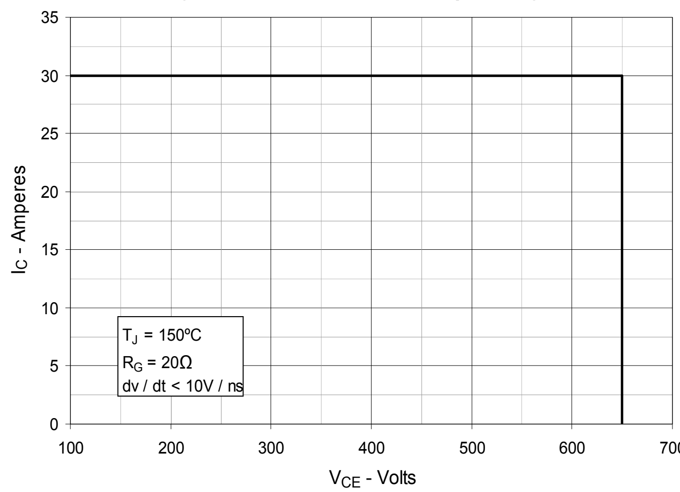


Fig. 11. Maximum Transient Thermal Impedance

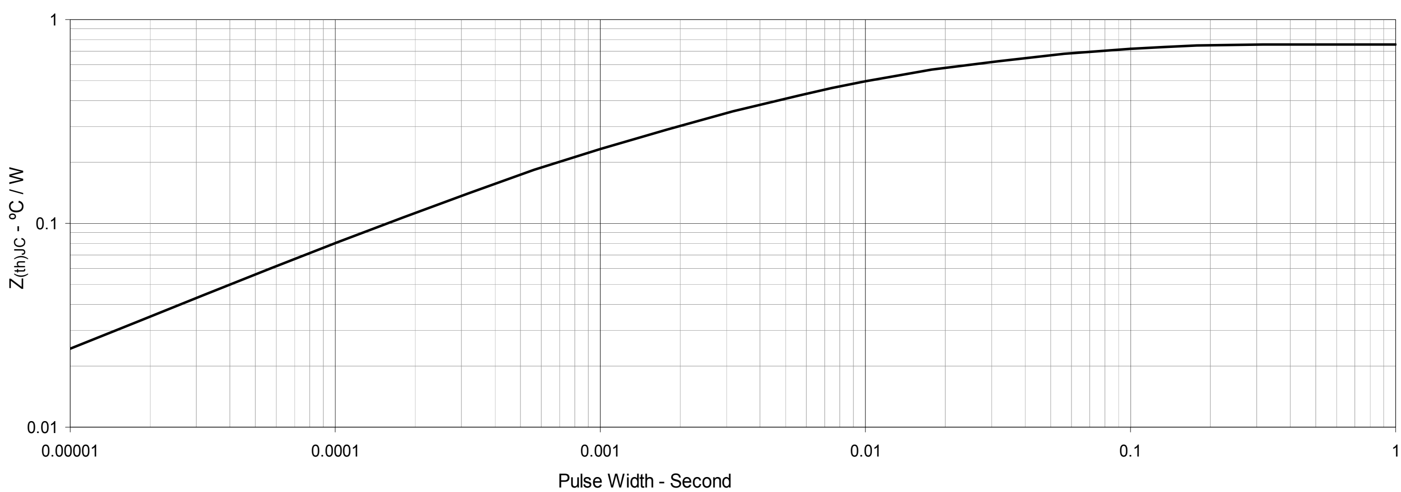


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

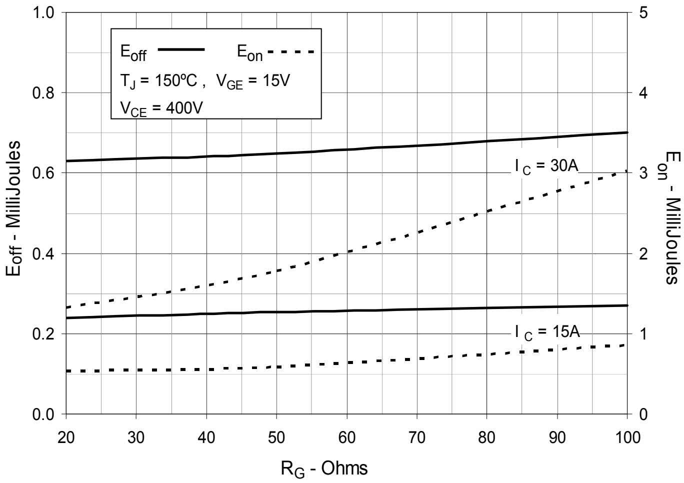


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

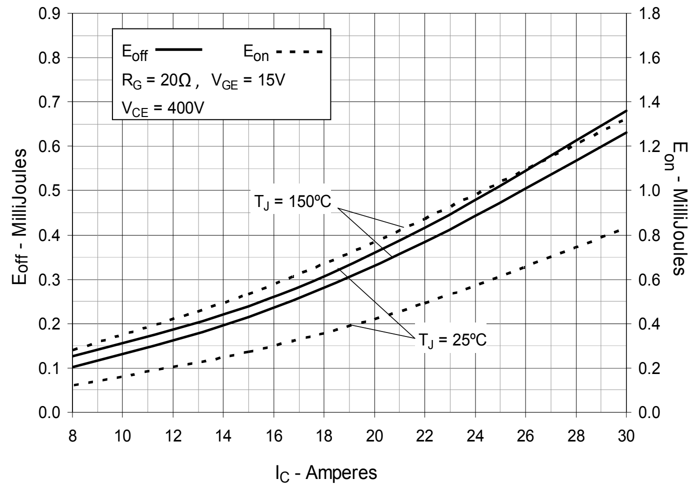


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

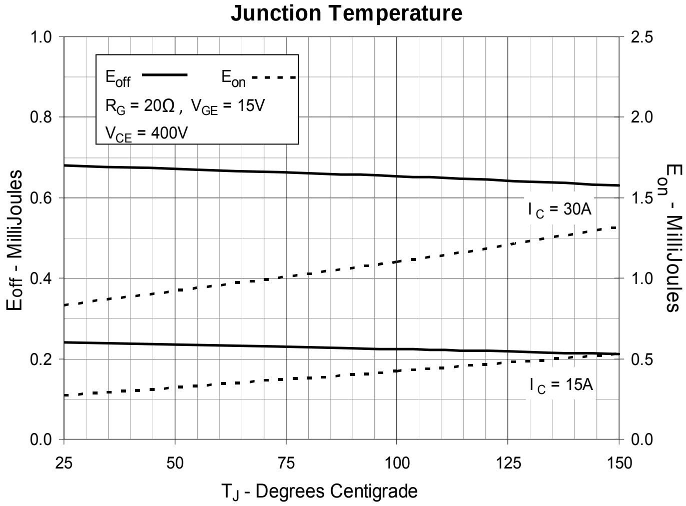


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

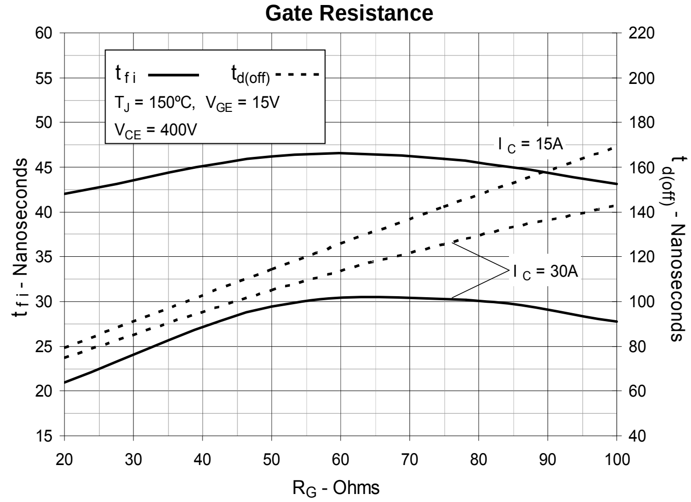


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

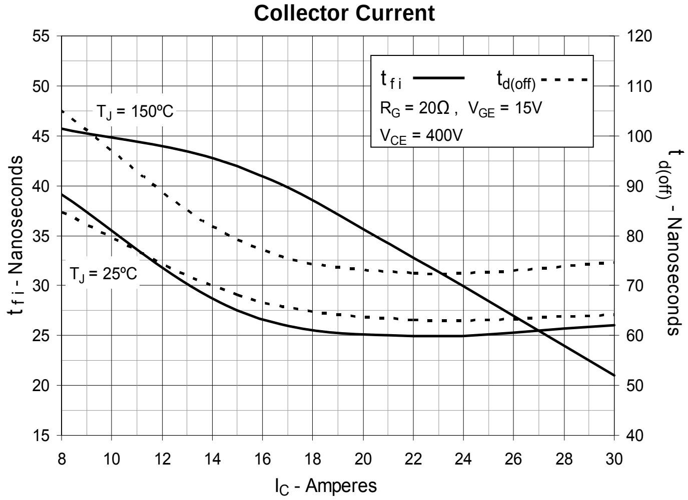


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

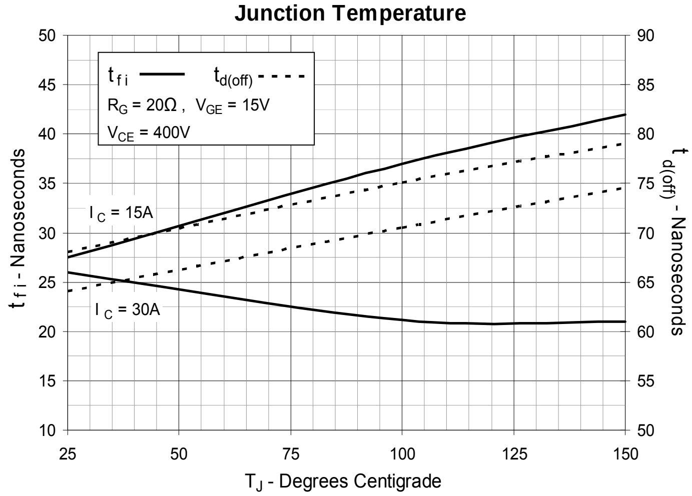


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

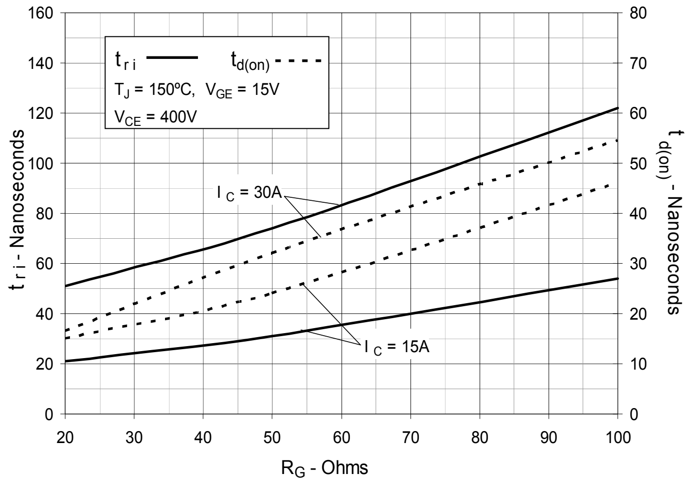


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

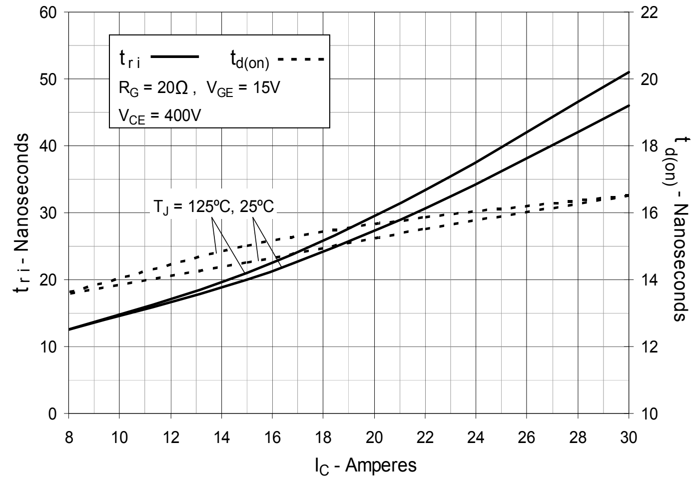


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature