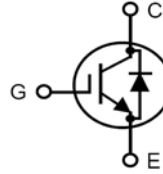


XPT™ 650V IGBT
GenX3™ w/Diode
IXYA15N65C3D1
IXYP15N65C3D1

$$\begin{aligned} V_{CES} &= 650V \\ I_{C110} &= 15A \\ V_{CE(sat)} &\leq 2.5V \\ t_{fi(typ)} &= 28ns \end{aligned}$$

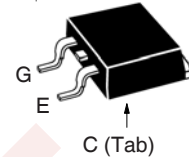
Extreme Light Punch Through
IGBT for 20-60kHz Switching



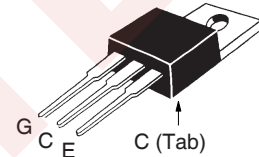
Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ\text{C to } 175^\circ\text{C}$	650	V
V_{CGR}	$T_J = 25^\circ\text{C to } 175^\circ\text{C}, R_{GE} = 1M\Omega$	650	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	38	A
I_{C110}	$T_C = 110^\circ\text{C}$	15	A
I_{F110}	$T_C = 110^\circ\text{C}$	23	A
I_{CM}	$T_C = 25^\circ\text{C}, 1\text{ms}$	80	A
I_A	$T_C = 25^\circ\text{C}$	5	A
E_{AS}	$T_C = 25^\circ\text{C}$	100	mJ
SSOA (RBSOA)	$V_{GE} = 15V, T_{VJ} = 150^\circ\text{C}, R_G = 20\Omega$ Clamped Inductive Load	$I_{CM} = 30$ $@ V_{CE} \leq V_{CES}$	A
t_{sc} (SCSOA)	$V_{GE} = 15V, V_{CE} = 360V, T_J = 150^\circ\text{C}$ $R_G = 82\Omega, \text{Non Repetitive}$	8	μs
P_C	$T_C = 25^\circ\text{C}$	200	W
T_J		-55 ... +175	$^\circ\text{C}$
T_{JM}		175	$^\circ\text{C}$
T_{stg}		-55 ... +175	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ\text{C}$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^\circ\text{C}$
M_d F_C	Mounting Torque (TO-220) Mounting Force (TO-263)	1.13/10 10..65 / 2.2..14.6	Nm/lb.in N/lb
Weight	TO-263 TO-220	2.5 3.0	g g

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu\text{A}, V_{GE} = 0V$	650		V
$V_{GE(th)}$	$I_C = 250\mu\text{A}, V_{CE} = V_{GE}$	3.5		6.0 V
I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0V$ $T_J = 150^\circ\text{C}$			10 μA 400 μA
I_{GES}	$V_{CE} = 0V, V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 15A, V_{GE} = 15V, \text{Note 1}$ $T_J = 150^\circ\text{C}$	1.96 2.45		2.50 V V

TO-263 AA (IXYA)



TO-220AB (IXYP)



G = Gate
E = Emitter

C = Collector
Tab = Collector

Features

- Optimized for 20-60kHz Switching
- Square RBSOA
- Avalanche Rated
- Anti-Parallel Fast Diode
- Short Circuit Capability
- International Standard Packages

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



IXYA15N65C3D1
IXYP15N65C3D1

Symbol Test Conditions

($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Characteristic Values

		Min.	Typ.	Max.
g_{fs}	$I_C = 15\text{A}, V_{CE} = 10\text{V}$, Note 1	5.0	8.5	S
C_{ies}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		583	pF
C_{oes}			52	pF
C_{res}			13	pF
$Q_{g(on)}$	$I_C = 15\text{A}, V_{GE} = 15\text{V}, V_{CE} = 0.5 \cdot V_{CES}$		19	nC
Q_{ge}			4	nC
Q_{gc}			10	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 15\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 20\Omega$ 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	mJ
$t_{d(on)}$	Inductive load, $T_J = 150^\circ\text{C}$ $I_C = 15\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 400\text{V}, R_G = 20\Omega$ 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}	TO-220		0.75	$^\circ\text{C/W}$
R_{thCS}				$^\circ\text{C/W}$

Reverse Diode (FRED)

Symbol Test Conditions

($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)

Characteristic Values

		Min.	Typ.	Max.
V_F	$I_F = 10\text{A}, V_{GE} = 0\text{V}$, Note 1 $T_J = 125^\circ\text{C}$		1.7	3.0 V
I_{RM}	$I_F = 12\text{A}, V_{GE} = 0\text{V}$, $-di_F/dt = 100\text{A}/\mu\text{s}, V_R = 100\text{V}, T_J = 125^\circ\text{C}$		2.5	A
t_{rr}			110	ns
t_{rr}	$I_F = 1\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 100\text{A}/\mu\text{s}, V_R = 30\text{V}$		30	ns
R_{thJC}			1.85	$^\circ\text{C/W}$

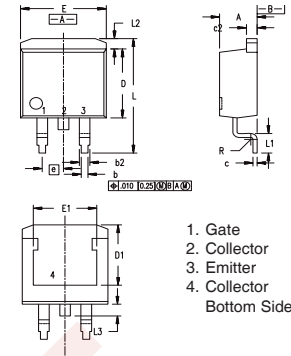
Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Switching times & energy losses may increase for higher V_{CE} (clamp), T_J or R_G .

PRELIMINARY TECHNICAL INFORMATION

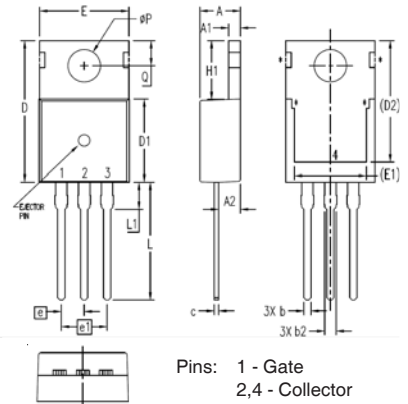
The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

TO-263 Outline



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.06	4.83	.160	.190
b	0.51	0.99	.020	.039
b2	1.14	1.40	.045	.055
c	0.40	0.74	.016	.029
c2	1.14	1.40	.045	.055
D	8.64	9.65	.340	.380
D1	8.00	8.89	.280	.320
E	9.65	10.41	.380	.405
E1	6.22	8.13	.270	.320
e	2.54	BSC	.100	BSC
L	14.61	15.88	.575	.625
L1	2.29	2.79	.090	.110
L2	1.02	1.40	.040	.055
L3	1.27	1.78	.050	.070
L4	0	0.13	0	.005

TO-220 Outline



Pins: 1 - Gate
2,4 - 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

IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

IXYS MOSFETs and IGBTs are covered 4,835,592 4,931,844 5,049,961 5,237,481 6,162,665 6,404,065 B1 6,683,344 6,727,585 7,005,734 B2 7,157,338B2
by one or more of the following U.S. patents: 4,860,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405 B2 6,759,692 7,063,975 B2
4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463 6,771,478 B2 7,071,537

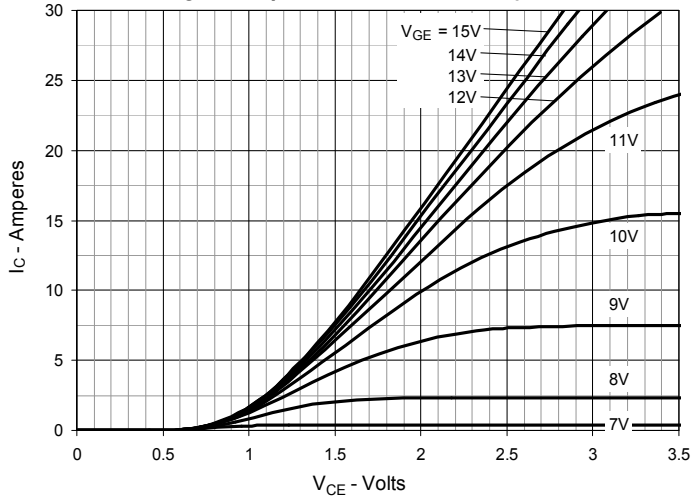
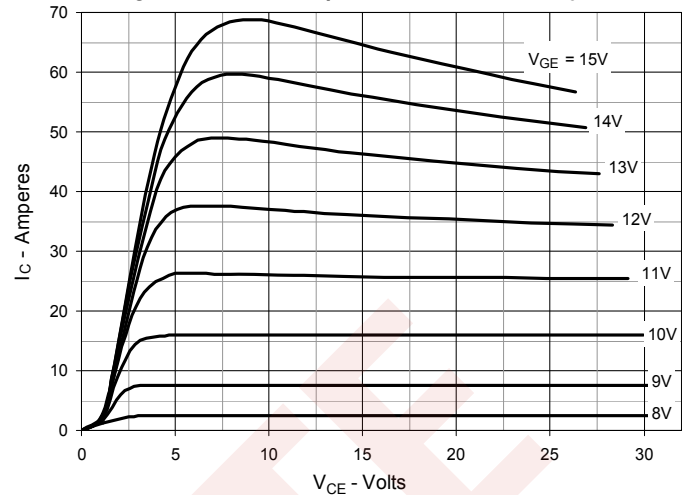
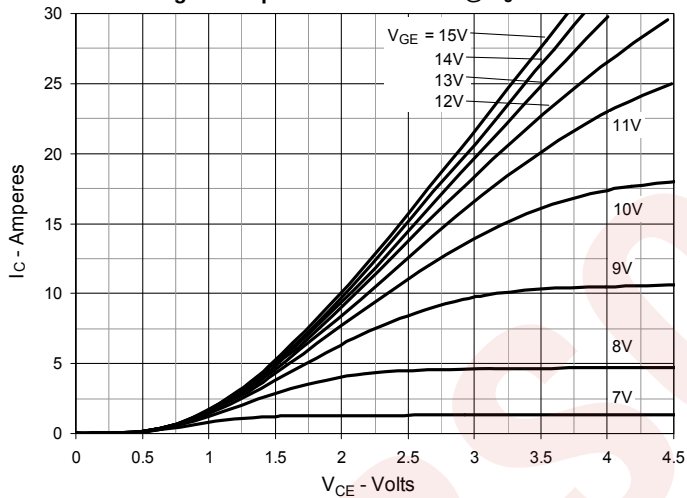
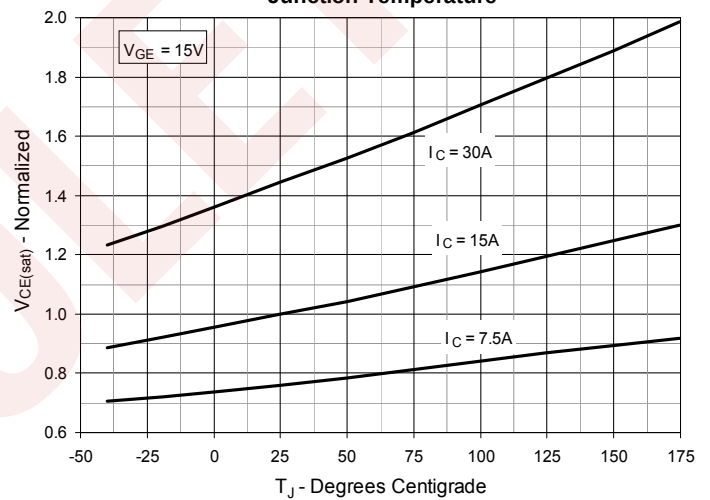
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$ Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$ Fig. 3. Output Characteristics @ $T_J = 150^\circ\text{C}$ Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

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

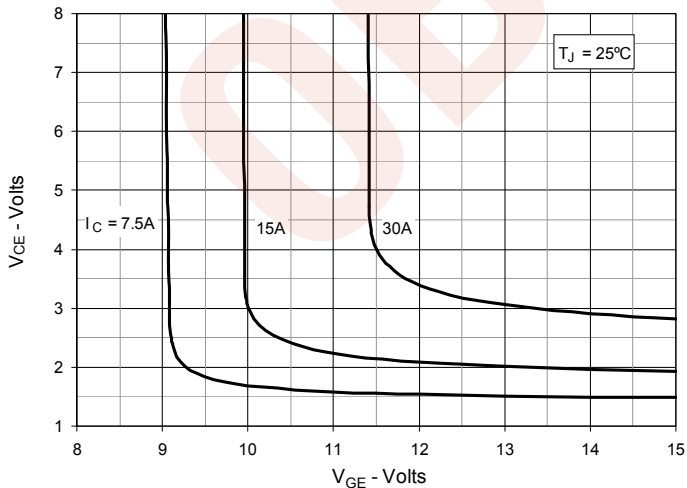


Fig. 6. Input Admittance

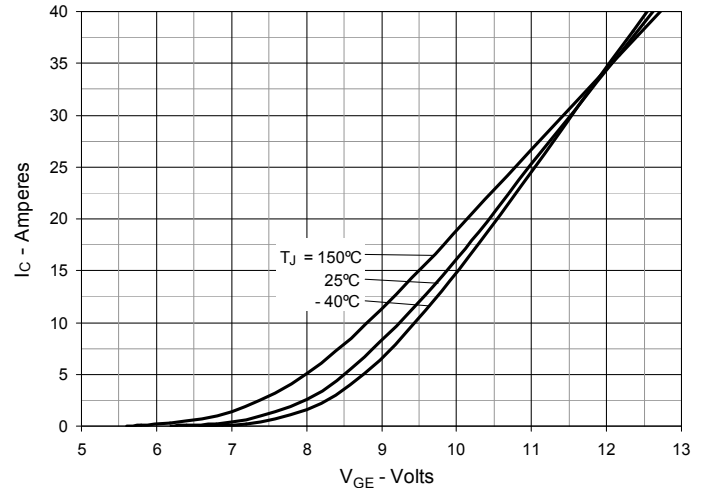


Fig. 7. Transconductance

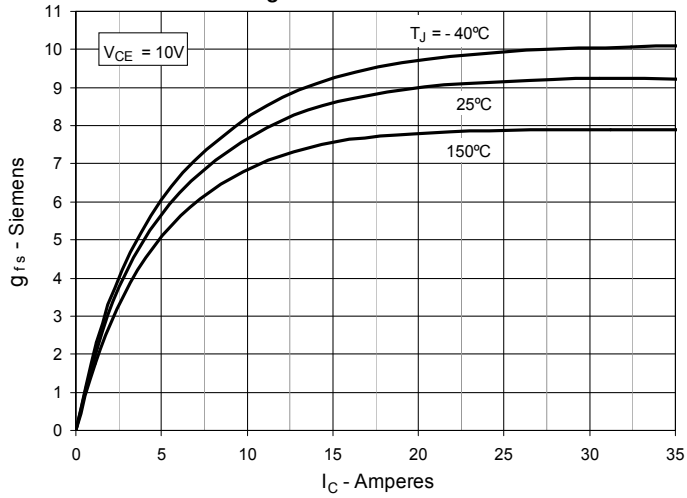


Fig. 8. Gate Charge

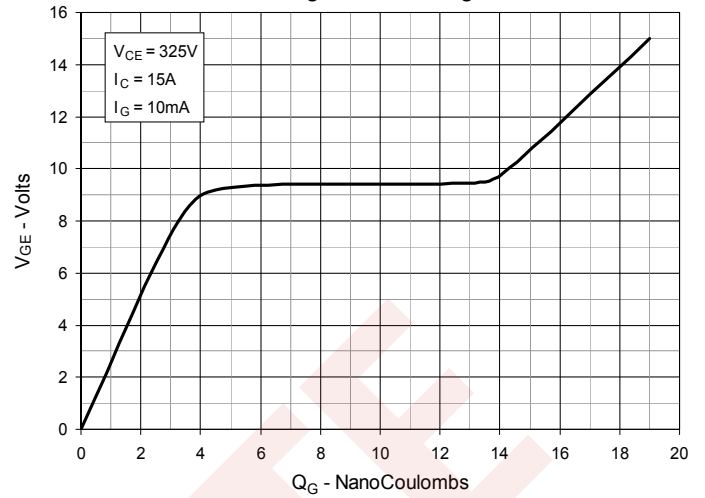


Fig. 9. Capacitance

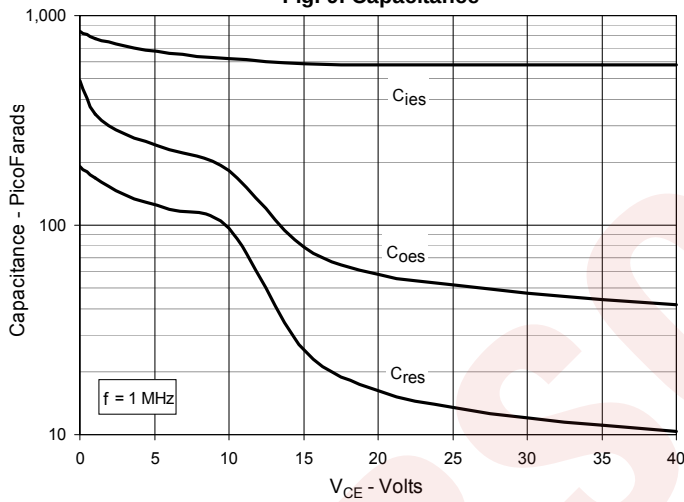


Fig. 10. Reverse-Bias Safe Operating Area

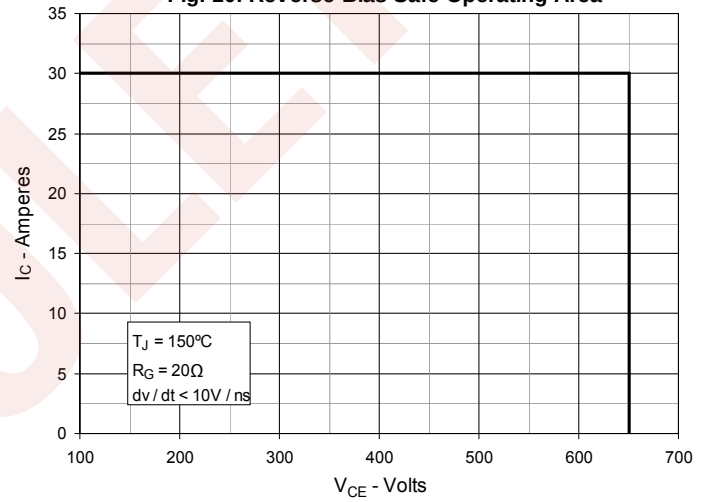


Fig. 11. Maximum Transient Thermal Impedance

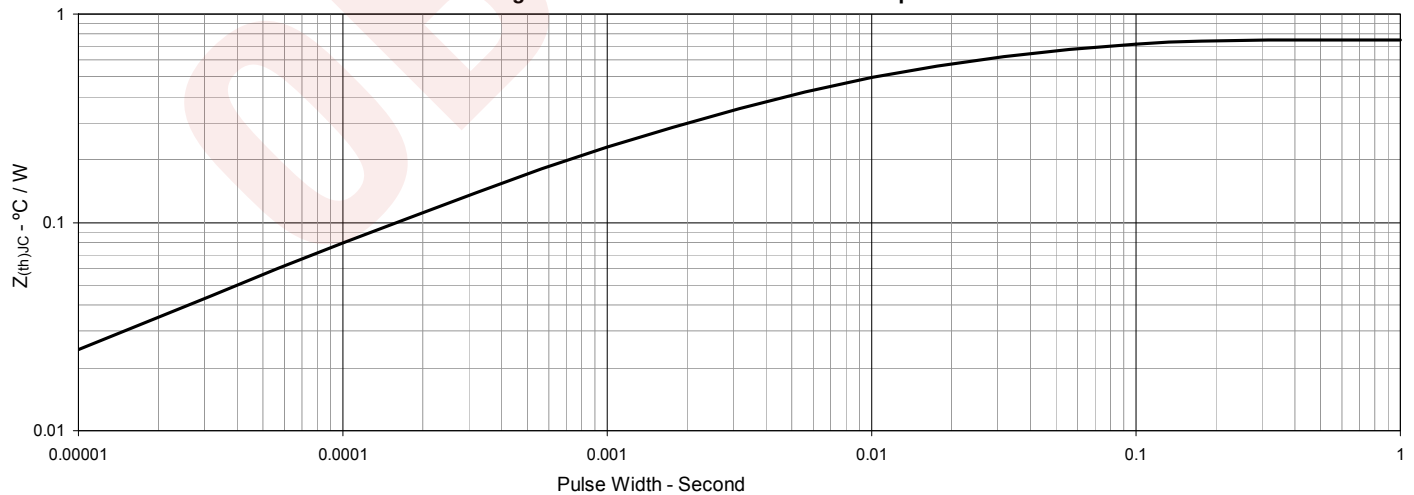


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

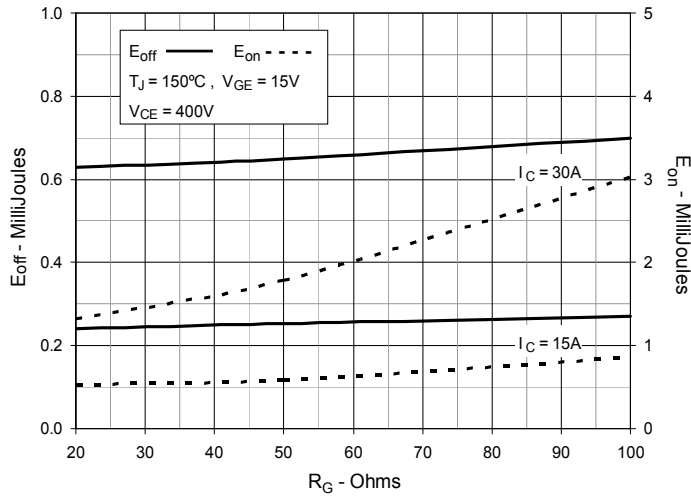


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

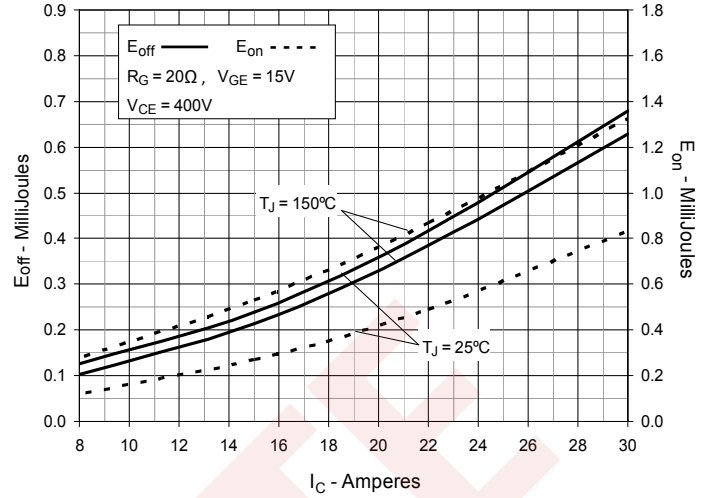


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

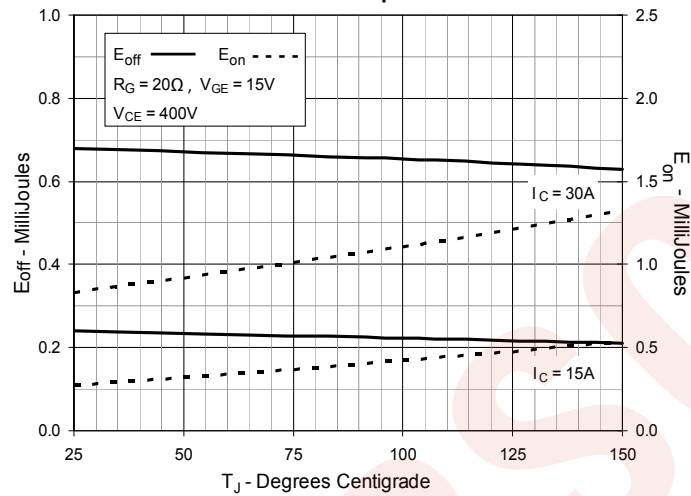


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

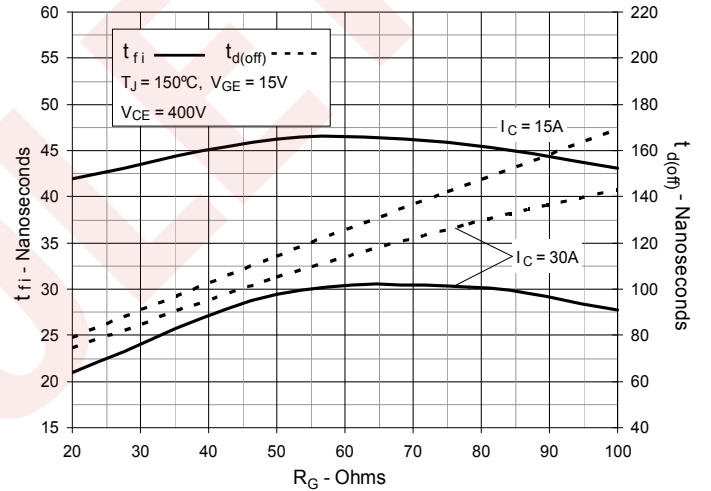


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

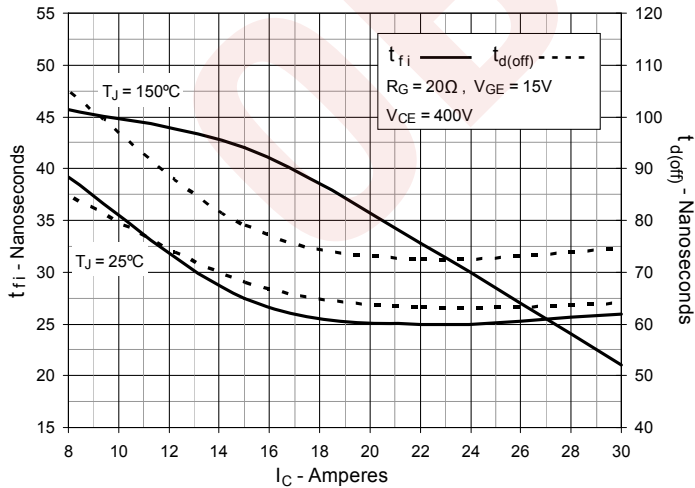


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

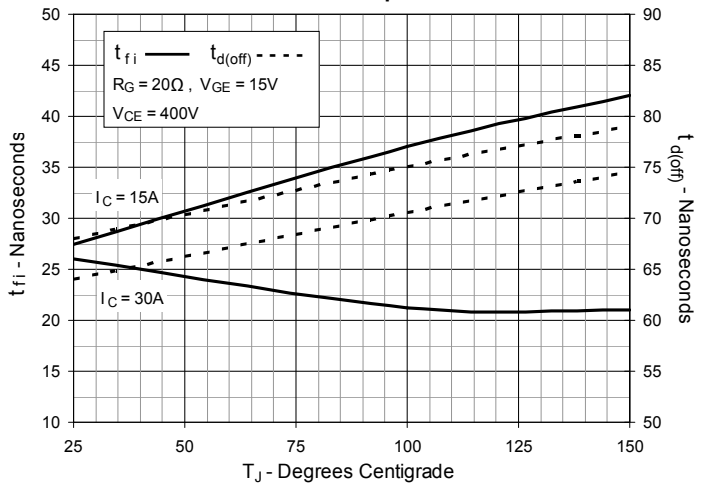


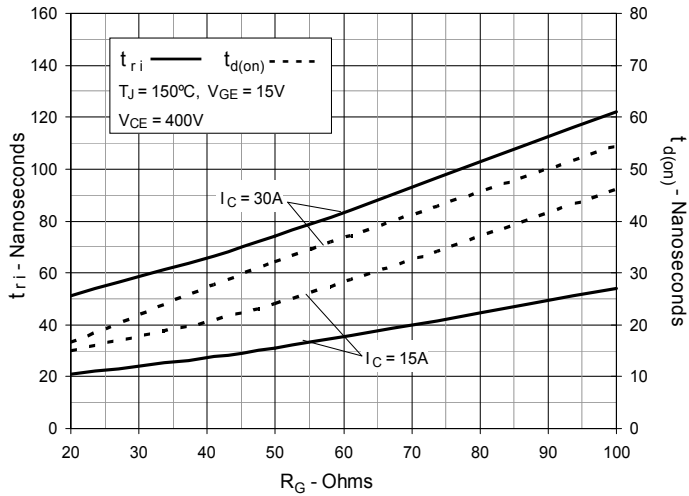
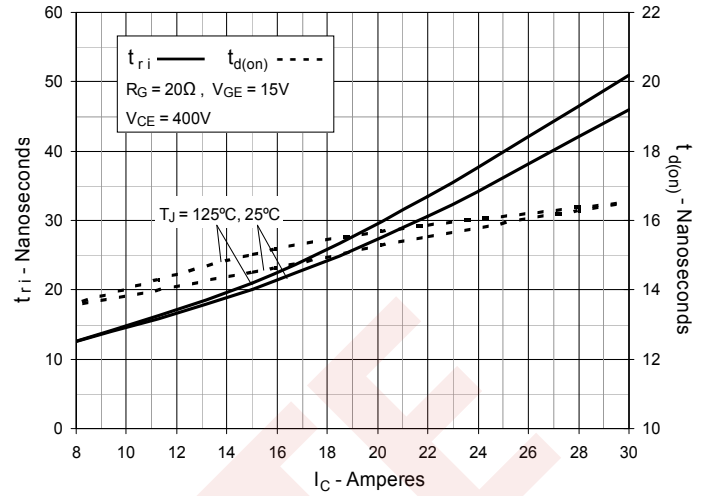
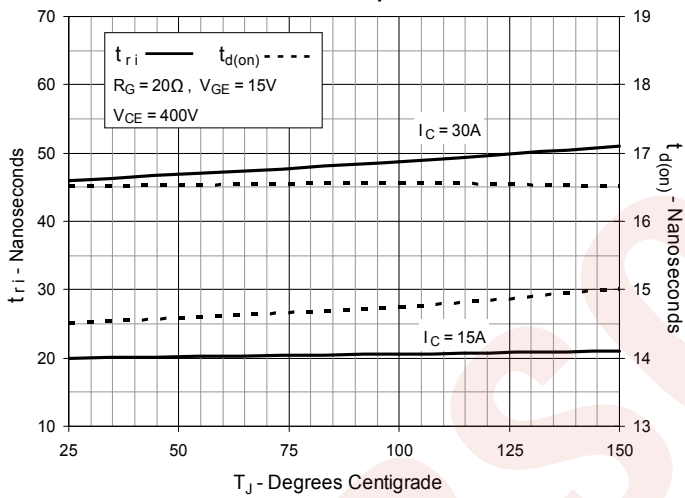
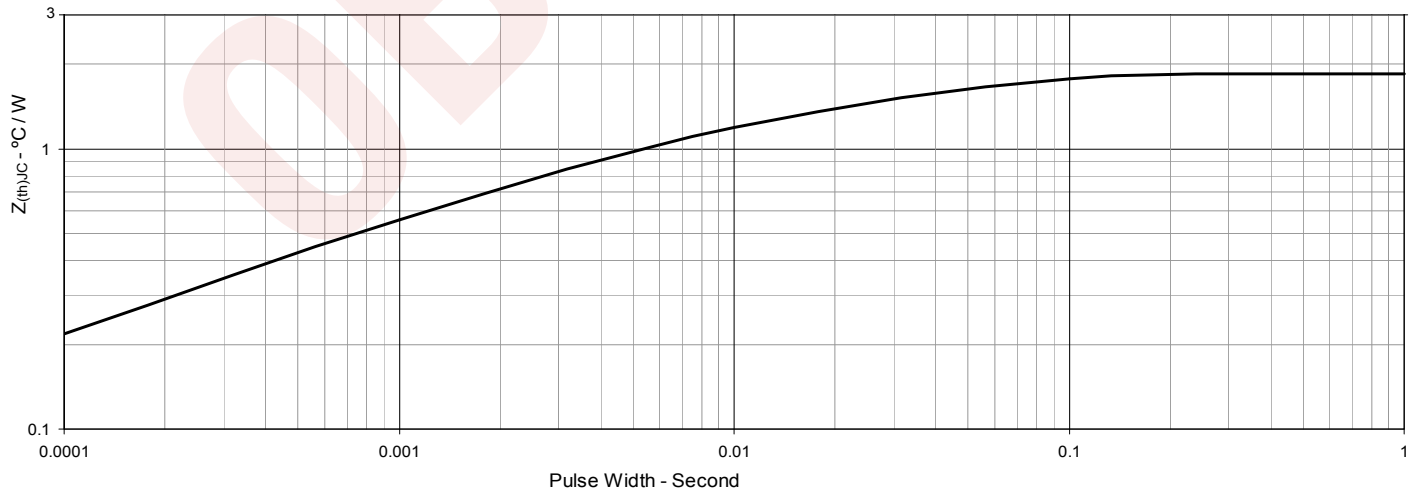
Fig. 18. Inductive Turn-on Switching Times vs.
Gate ResistanceFig. 19. Inductive Turn-on Switching Times vs.
Collector CurrentFig. 20. Inductive Turn-on Switching Times vs.
Junction Temperature

Fig. 21. Maximum Transient Impedance for Diode



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