

High Voltage XPT™ IGBT

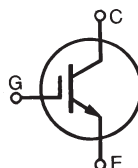
IXYX50N170C

$$V_{CES} = 1700V$$

$$I_{C110} = 50A$$

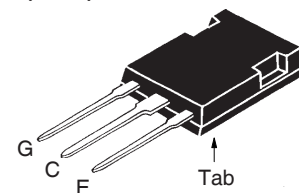
$$V_{CE(sat)} \leq 3.7V$$

$$t_{fi(typ)} = 95ns$$



Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^{\circ}C$ to $175^{\circ}C$	1700	V
V_{CGR}	$T_J = 25^{\circ}C$ to $175^{\circ}C$, $R_{GE} = 1M\Omega$	1700	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^{\circ}C$	178	A
I_{C110}	$T_C = 110^{\circ}C$	50	A
I_{CM}	$T_C = 25^{\circ}C$, 1ms	460	A
SSOA	$V_{GE} = 15V$, $T_{VJ} = 150^{\circ}C$, $R_G = 1\Omega$	$I_{CM} = 200$	A
(RBSOA)	Clamped Inductive Load	$V_{CE} \leq 1360$	V
P_C	$T_C = 25^{\circ}C$	1500	W
T_J		-55 ... +175	$^{\circ}C$
T_{JM}		175	$^{\circ}C$
T_{stg}		-55 ... +175	$^{\circ}C$
T_L	Maximum Lead Temperature for Soldering	300	$^{\circ}C$
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	$^{\circ}C$
F_C	Mounting Force	20..120 / 4.5..27	N/lb
Weight		6	g

PLUS247 (IXYX)



G = Gate
C = Collector

E = Emitter
Tab = Collector

Features

- High Voltage Package
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

Advantages

- Low Gate Drive Requirement
- High Power Density

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

Symbol	Test Conditions ($T_J = 25^{\circ}C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	1700		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 150^{\circ}C$			25 μA 3.5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 50A$, $V_{GE} = 15V$, Note 1 $T_J = 150^{\circ}C$		2.8 3.9	3.7 V V

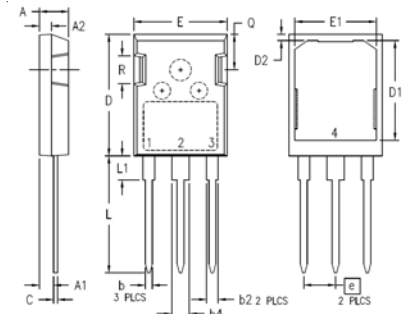
Symbol Test Conditions

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

Characteristic Values

		Min.	Typ.	Max.
g_{fs}	$I_C = 50\text{A}$, $V_{CE} = 10\text{V}$, Note 1	30	50	S
R_{Gi}	Gate Input Resistance		2.0	Ω
C_{ies}	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$		5500	pF
C_{oes}			276	pF
C_{res}			105	pF
$Q_{g(on)}$	$I_C = 50\text{A}$, $V_{GE} = 15\text{V}$, $V_{CE} = 0.5 \cdot V_{CES}$		260	nC
Q_{ge}			28	nC
Q_{gc}			110	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 50\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}$, $R_G = 1\Omega$ Note 2		20	ns
t_{ri}			44	ns
E_{on}			8.7	mJ
$t_{d(off)}$			180	ns
t_{fi}			95	ns
E_{off}			5.6	mJ
$t_{d(on)}$	Inductive load, $T_J = 150^\circ\text{C}$ $I_C = 50\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}$, $R_G = 1\Omega$ Note 2		22	ns
t_{ri}			40	ns
E_{on}			11.9	mJ
$t_{d(off)}$			236	ns
t_{fi}			160	ns
E_{off}			8.2	mJ
R_{thJC}				0.10 $^\circ\text{C/W}$
R_{thCS}			0.15	$^\circ\text{C/W}$

PLUS247™ Outline



Terminals: 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

Notes:

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

ADVANCE 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.

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	4,931,844	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
	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	

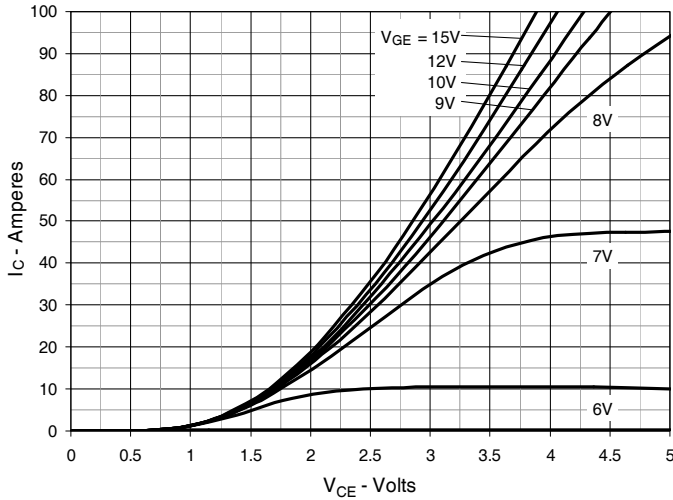
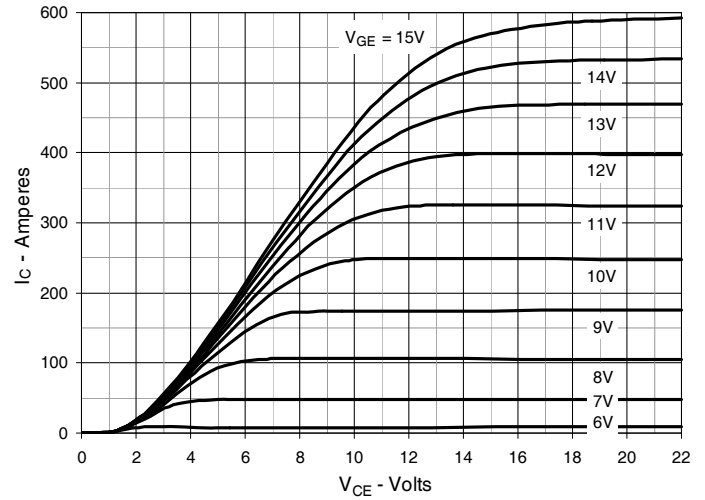
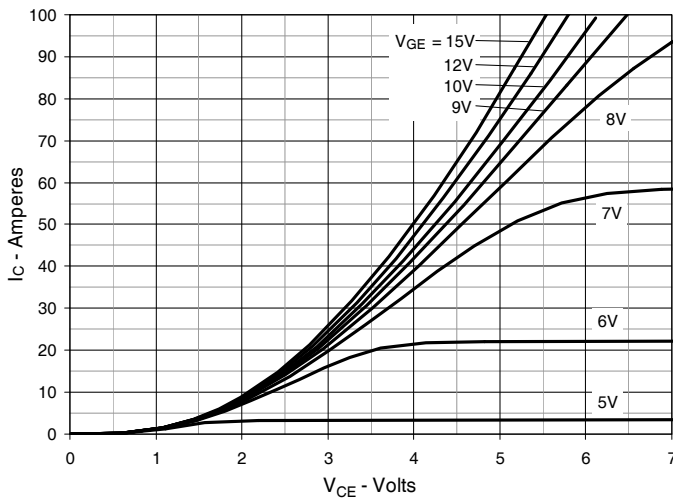
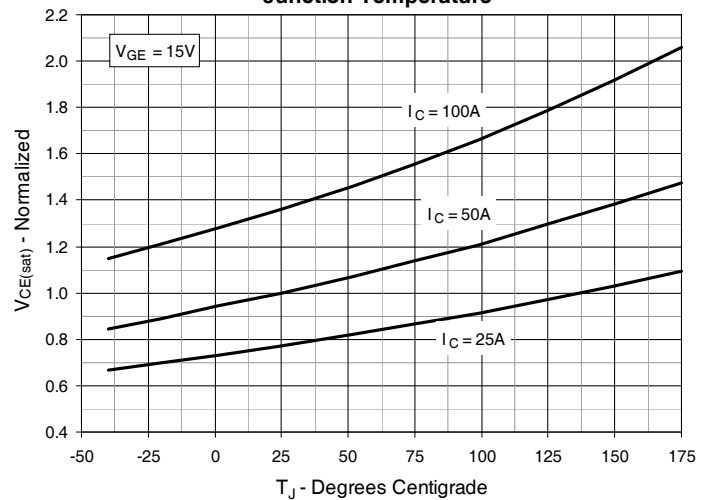
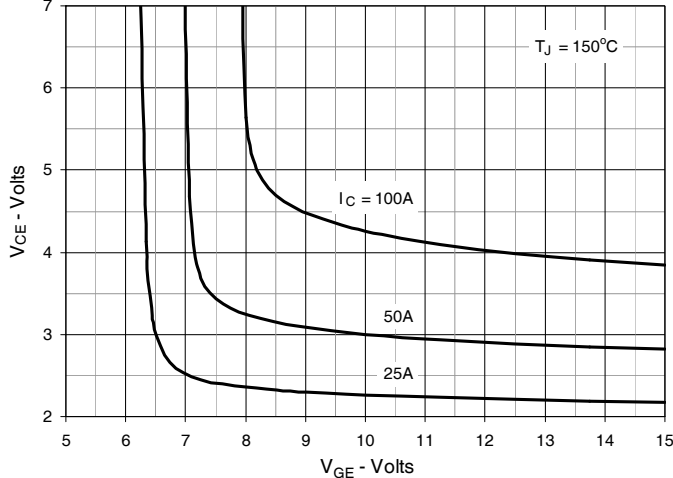
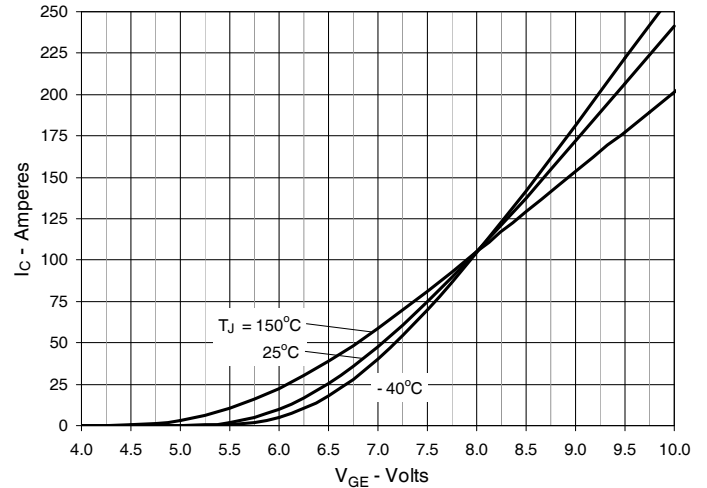
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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


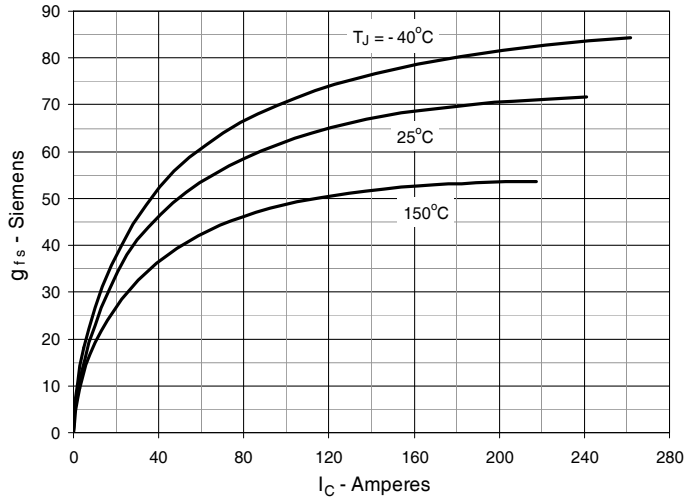
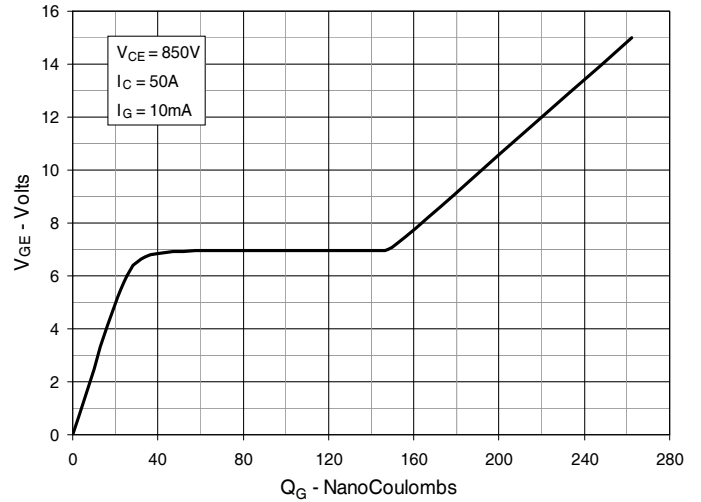
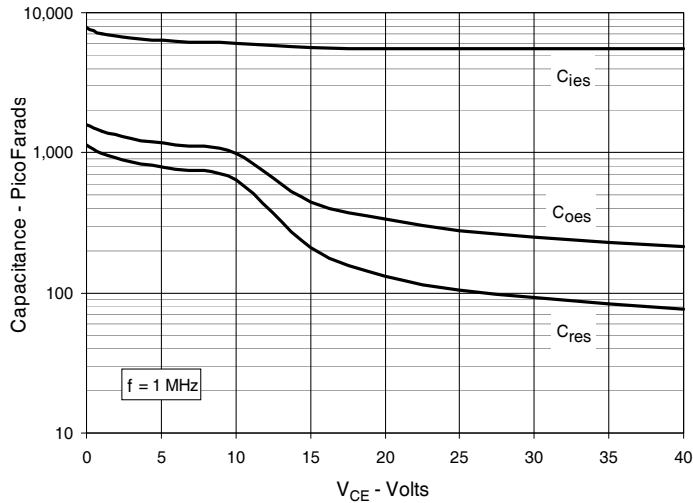
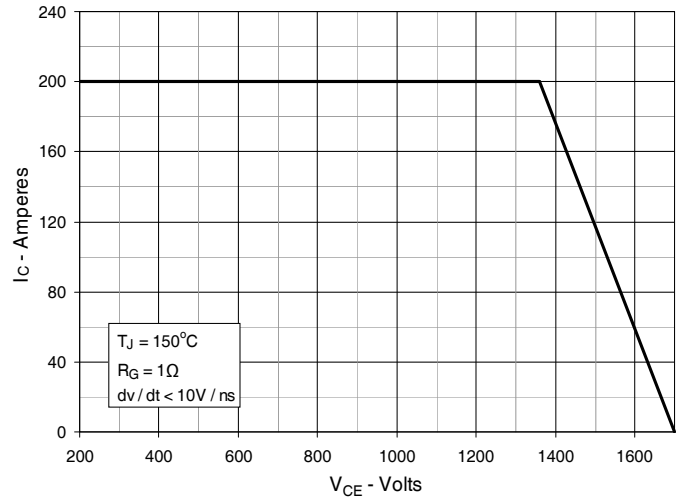
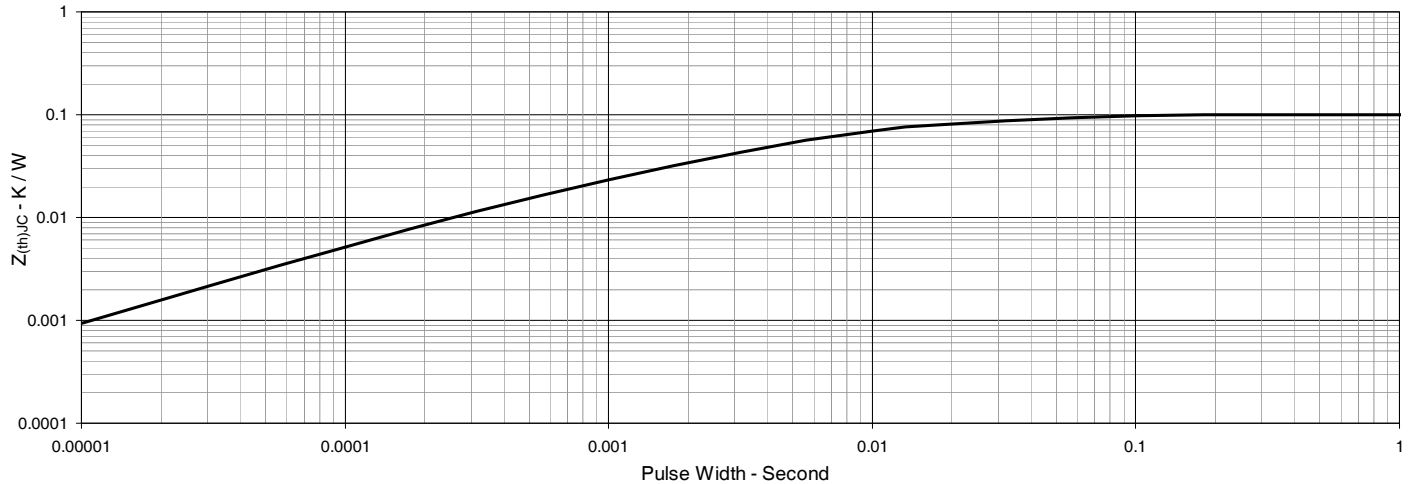
Fig. 7. Transconductance

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

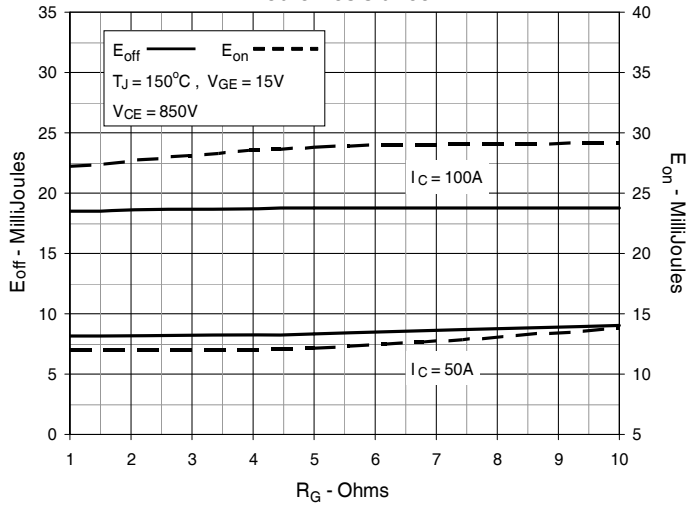


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

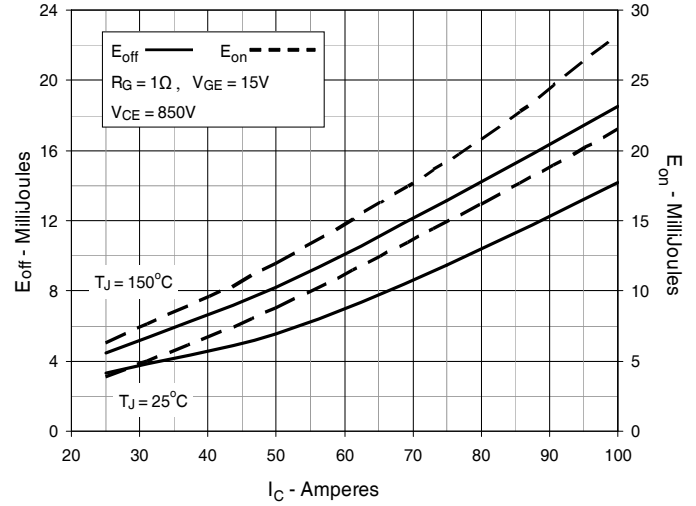


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

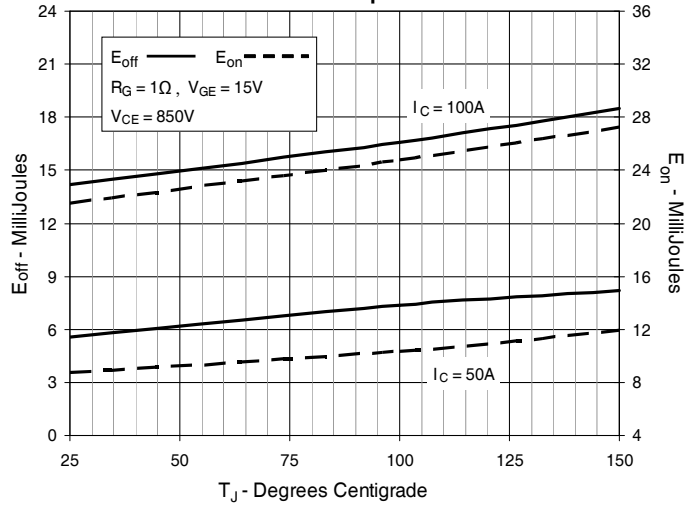


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

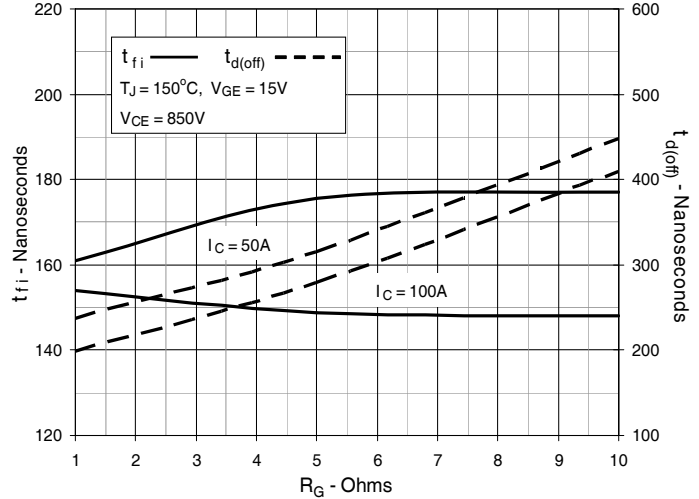


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

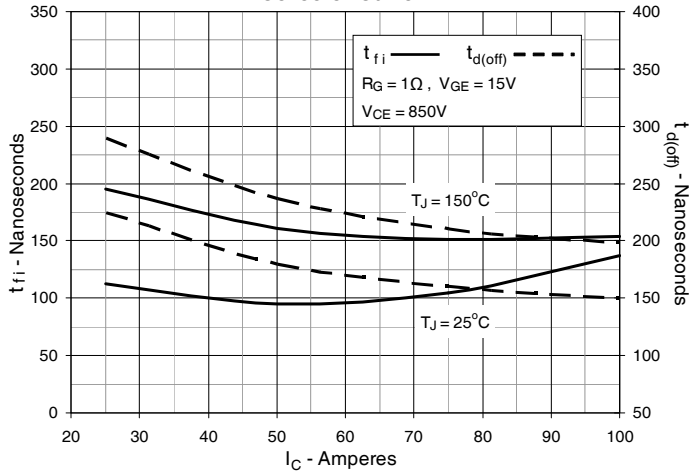


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

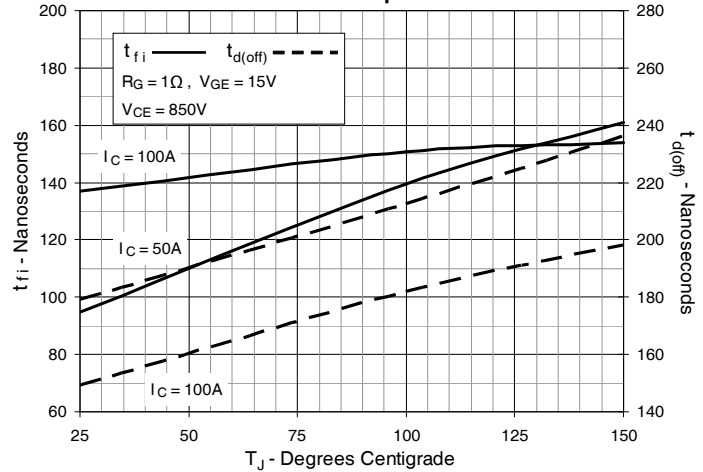


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

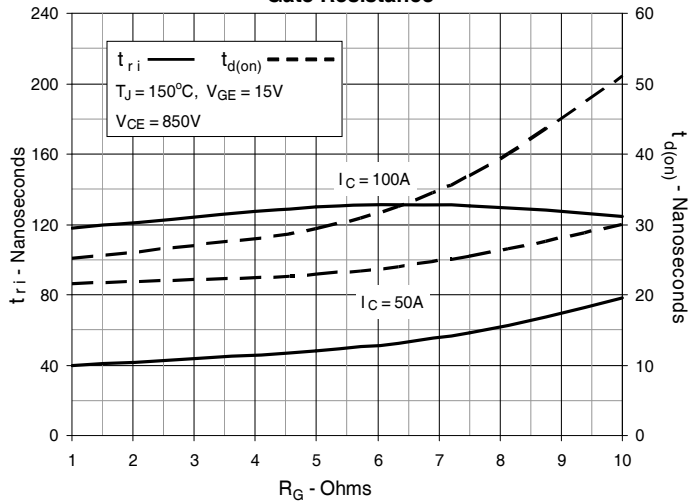


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

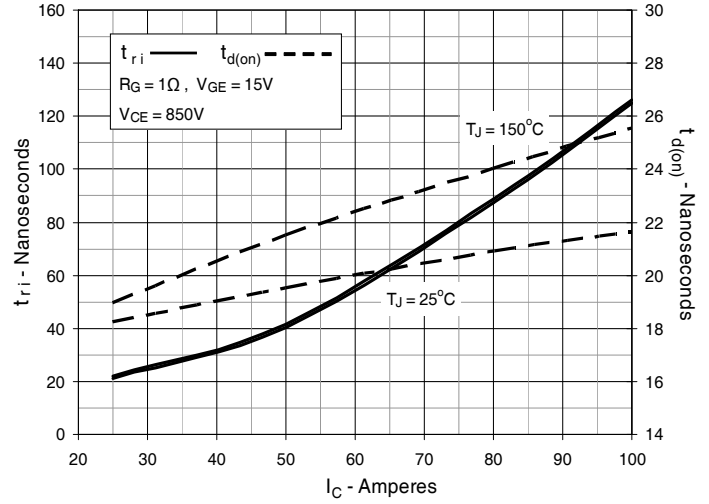
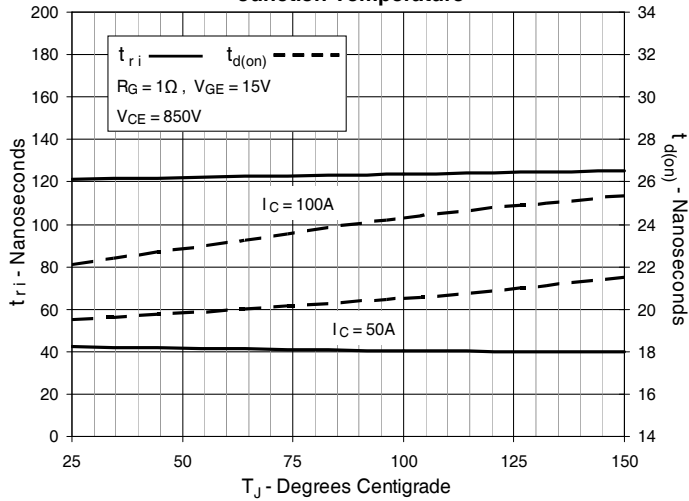


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature



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