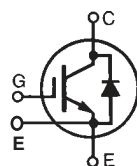


# High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

## IXBN42N170A



$$V_{CES} = 1700V$$

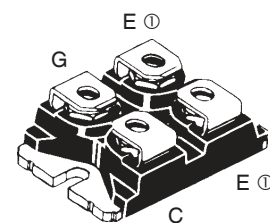
$$I_{C90} = 21A$$

$$V_{CE(sat)} \leq 6.0V$$

$$t_{fi} = 20ns$$

SOT-227B, miniBLOC

E153432



G = Gate, C = Collector, E = Emitter

① either emitter terminal can be used as Main or Kelvin Emitter

Symbol	Test Conditions	Maximum Ratings	
$V_{CES}$	$T_C = 25^\circ C$ to $150^\circ C$	1700	V
$V_{CGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GE} = 1M\Omega$	1700	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$	38	A
$I_{C90}$	$T_C = 90^\circ C$	21	A
$I_{CM}$	$T_C = 25^\circ C$ , 1ms	265	A
<b>SSOA</b> <b>(RBSOA)</b>	$V_{GE} = 15V$ , $T_{VJ} = 125^\circ C$ , $R_G = 10\Omega$ Clamped Inductive Load	$I_{CM} = 84$ 1360	A V
<b><math>T_{SC}</math></b> <b>(SCSOA)</b>	$V_{GE} = 15V$ , $V_{CES} = 1200V$ , $T_J = 125^\circ C$ $R_G = 10\Omega$ , non repetitive	10	$\mu s$
$P_C$	$T_C = 25^\circ C$	313	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$V_{ISOL}$	50/60Hz $I_{ISOL} \leq 1mA$	$t = 1min$ $t = 1s$	2500 3000 V~ V~
$M_d$	Mounting Torque Terminal Connection Torque	1.5/13 1.3/11.5	Nm/lb.in. Nm/lb.in.
<b>Weight</b>		30	g

### Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- Square RBSOA
- 2500V~ Isolation Voltage
- High Blocking Voltage
- International Standard Package
- Anti-Parallel Diode
- Low Conduction Losses

### Advantages

- Low Gate Drive Requirement
- High Power Density

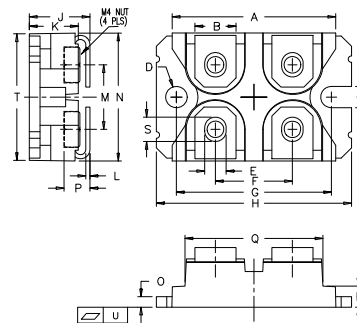
### Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- AC Motor Drives
- 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
$V_{GE(th)}$	$I_C = 750\mu A$ , $V_{CE} = V_{GE}$	2.5		V
$I_{CES}$	$V_{CE} = 0.8 \cdot V_{CES}$ , $V_{GE} = 0V$ $T_J = 125^\circ C$			50 $\mu A$ 1.5 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = I_{C90}$ , $V_{GE} = 15V$ , Note 1 $T_J = 125^\circ C$		5.2 5.3	6.0 V

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$I_C = I_{C90}, V_{CE} = 10\text{V}$ , Note 1	14	23	S
$C_{ies}$	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$		3920	pF
$C_{oes}$			275	pF
$C_{res}$			107	pF
$Q_{g(on)}$	$I_C = I_{C90}, V_{GE} = 15\text{V}$ , $V_{CE} = 0.5 \cdot V_{CES}$		188	nC
$Q_{ge}$			23	nC
$Q_{gc}$			80	nC
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ\text{C}</math></b> $I_C = I_{C90}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$ Diode Type = DH40-18A Note 2		19	ns
$t_{ri}$			17	ns
$E_{on}$			3.43	mJ
$t_{d(off)}$			200	ns
$t_{fi}$			20	ns
$E_{off}$			0.43	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ\text{C}</math></b> $I_C = I_{C90}, V_{GE} = 15\text{V}$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 1\Omega$ Diode Type = DH40-18A Note 2		19	ns
$t_{ri}$			14	ns
$E_{on}$			5.40	mJ
$t_{d(off)}$			226	ns
$t_{fi}$			82	ns
$E_{off}$			0.83	mJ
$R_{thJC}$			0.40	$^\circ\text{C/W}$
$R_{thCS}$		0.05		$^\circ\text{C/W}$

### SOT-227B miniBLOC (IXXN)



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	1.240	1.255	31.50	31.88
B	.307	.323	7.80	8.20
C	.161	.169	4.09	4.29
D	.161	.169	4.09	4.29
E	.161	.169	4.09	4.29
F	.587	.595	14.91	15.11
G	1.186	1.193	30.12	30.30
H	1.496	1.505	38.00	38.23
J	.460	.481	11.68	12.22
K	.351	.378	8.92	9.60
L	.030	.033	0.76	0.84
M	.496	.506	12.60	12.85
N	.990	1.001	25.15	25.42
O	.078	.084	1.98	2.13
P	.195	.235	4.95	5.97
Q	1.045	1.059	26.54	26.90
R	.155	.174	3.94	4.42
S	.186	.191	4.72	4.85
T	.968	.987	24.59	25.07
U	-.002	.004	-0.05	0.1

### Reverse Diode

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_F$	$I_F = I_{C90}, V_{GE} = 0\text{V}$			5.0 V
$t_{rr}$	$I_F = 25\text{A}$ , $V_{GE} = 0\text{V}$ , $-di_F/dt = 50\text{A}/\mu\text{s}$		330	ns
$I_{RM}$		$V_R = 100\text{V}$ , $V_{GE} = 0\text{V}$	15	

Note 1: Pulse test,  $t \leq 300\mu\text{s}$ , duty cycle,  $d \leq 2\%$ .

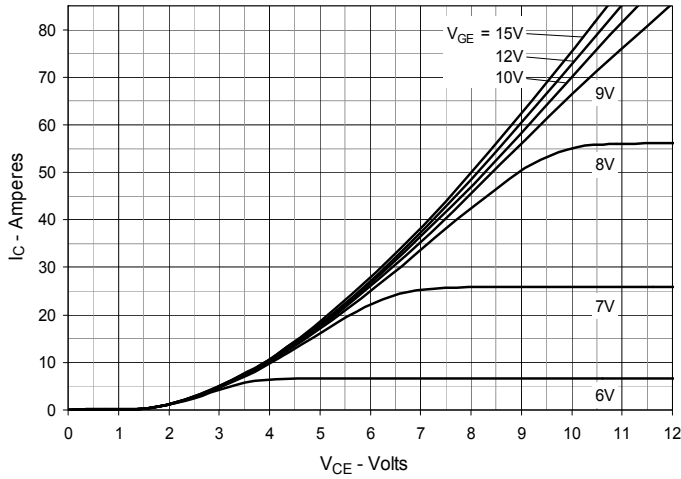
### PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

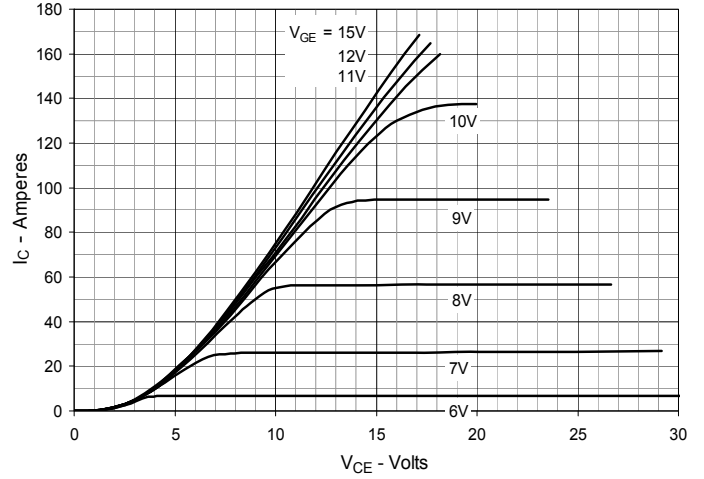
IXYS Reserves the Right to Change Limits, Test Conditions and Dimensions.

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	

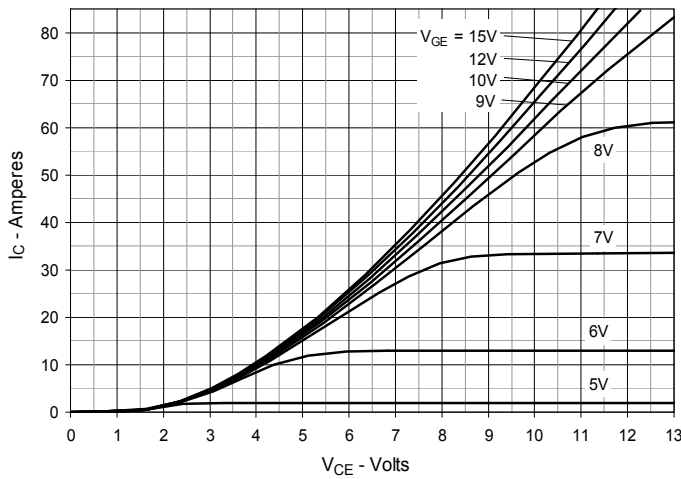
**Fig. 1. Output Characteristics @  $T_J = 25^\circ\text{C}$**



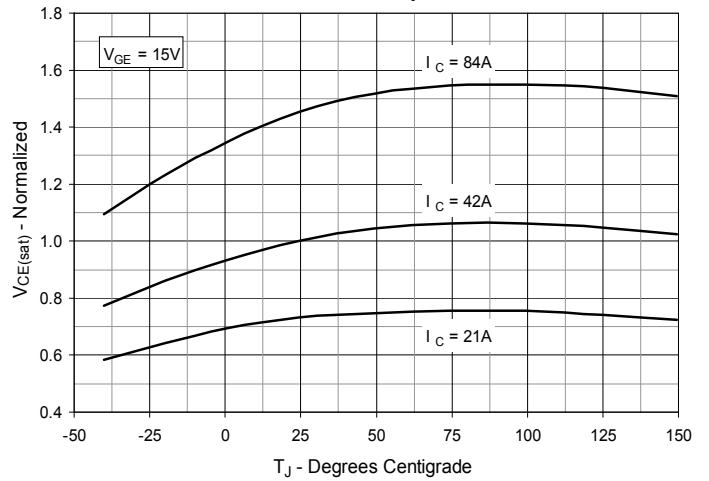
**Fig. 2. Extended Output Characteristics @  $T_J = 25^\circ\text{C}$**



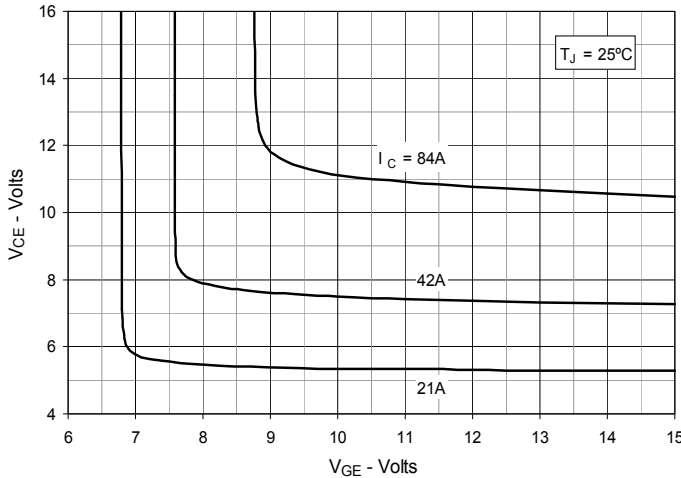
**Fig. 3. Output Characteristics @  $T_J = 125^\circ\text{C}$**



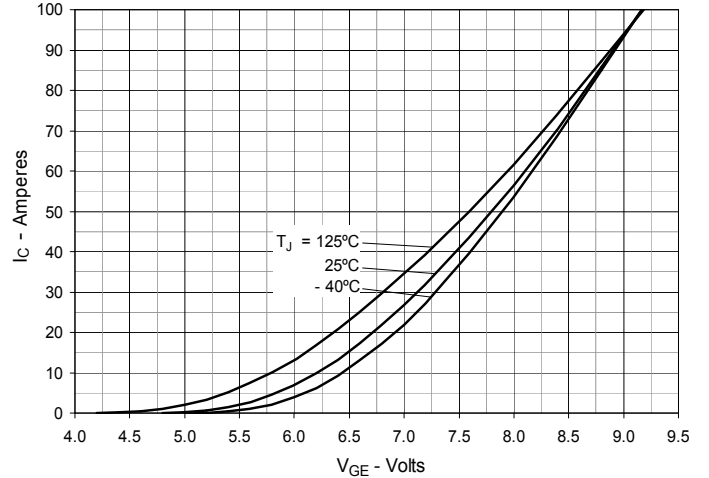
**Fig. 4. Dependence of  $V_{CE(sat)}$  on Junction Temperature**

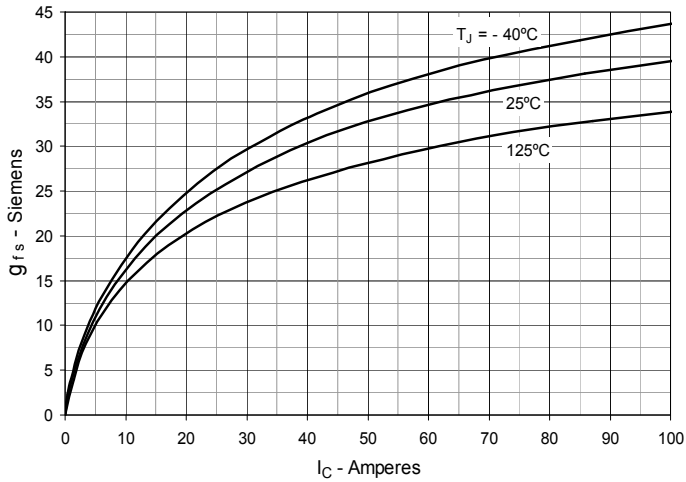
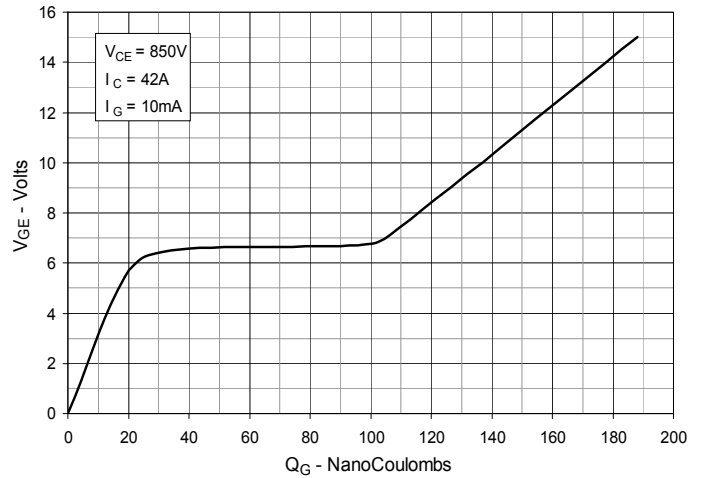
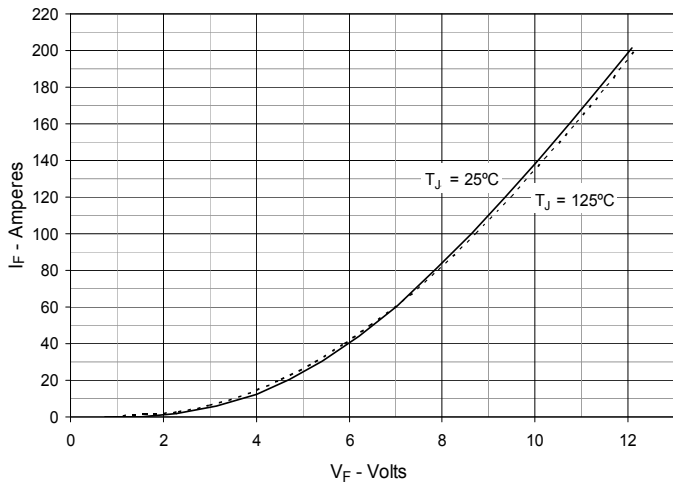
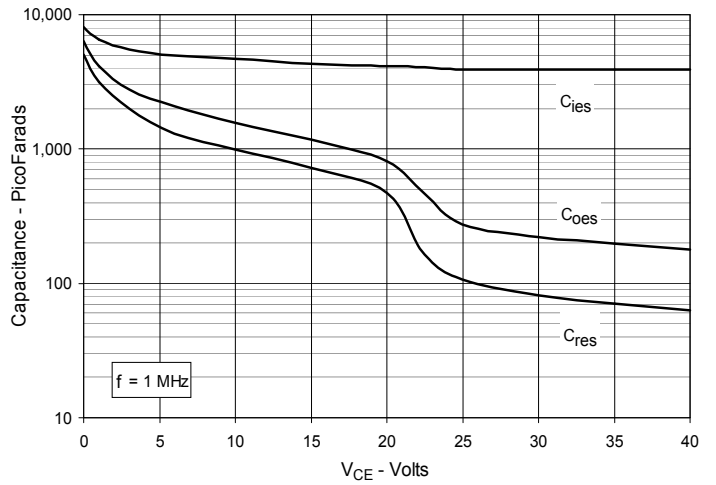
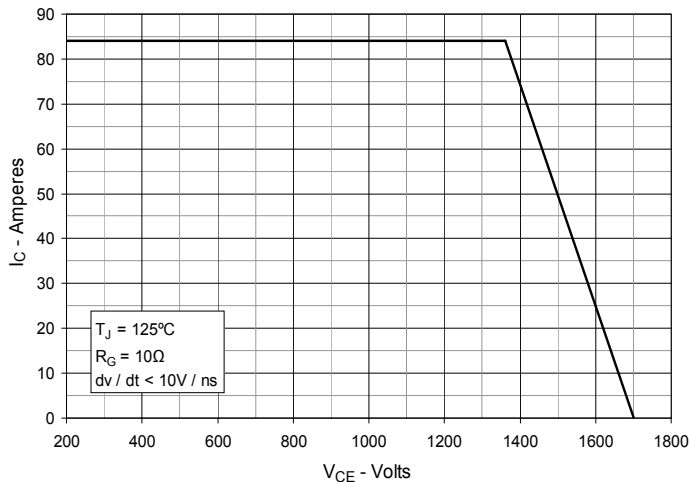
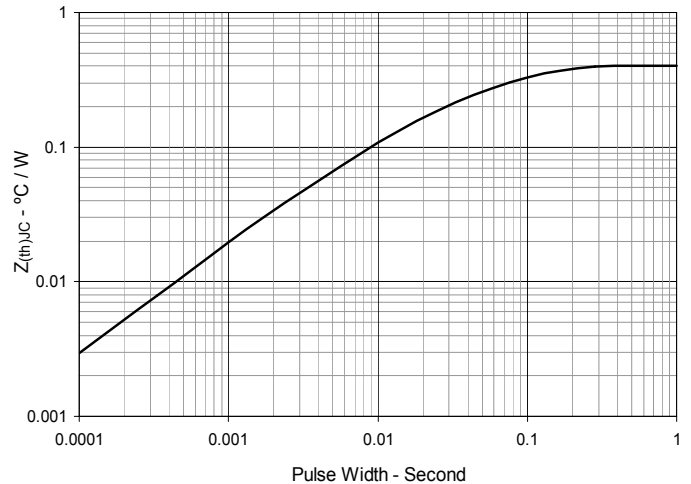


**Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage**

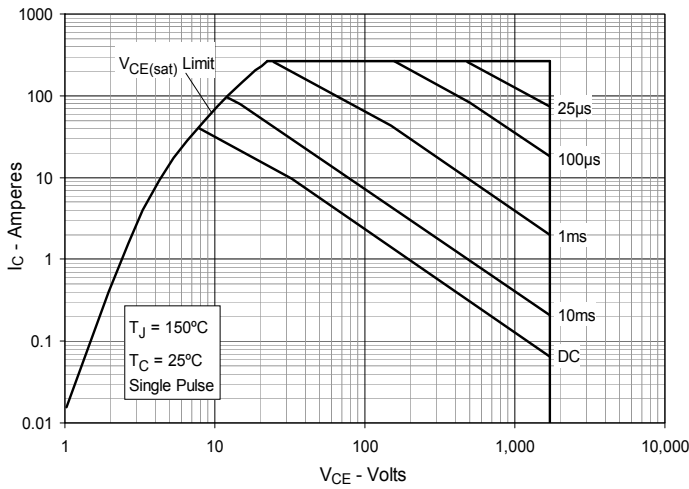


**Fig. 6. Input Admittance**

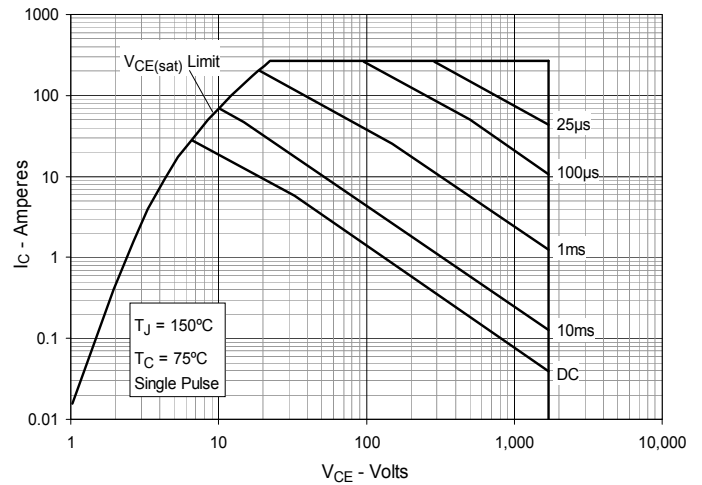


**Fig. 7. Transconductance**

**Fig. 8. Gate Charge**

**Fig. 9. Forward Voltage Drop of Intrinsic Diode**

**Fig. 10. Capacitance**

**Fig. 11. Reverse-Bias Safe Operating Area**

**Fig. 12. Maximum Transient Thermal Impedance**


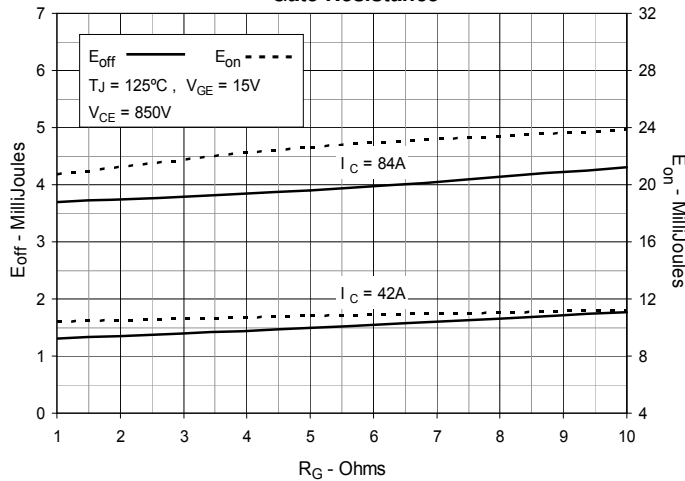
**Fig. 13. Forward-Bias Safe Operating Area @  $T_C = 25^\circ\text{C}$**



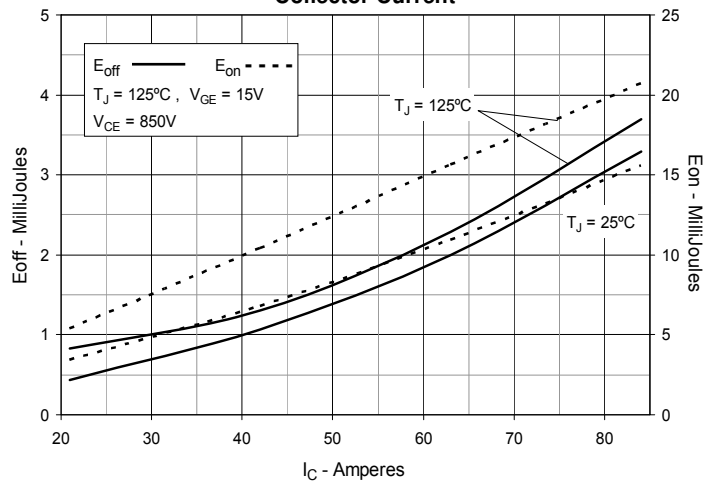
**Fig. 14. Forward-Bias Safe Operating Area @  $T_C = 75^\circ\text{C}$**



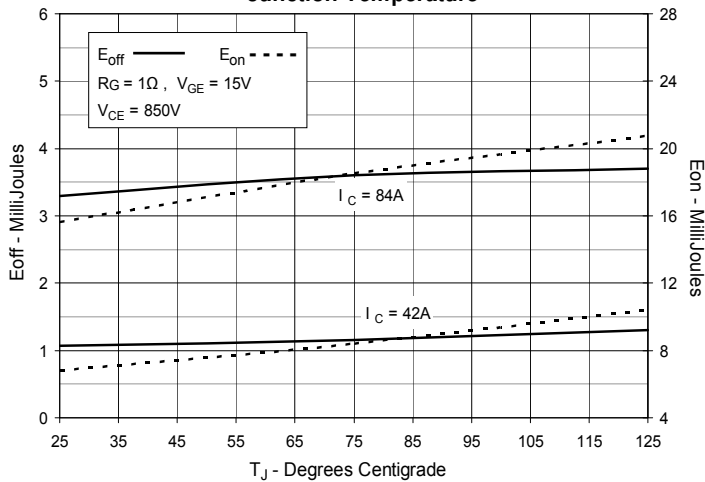
**Fig. 15. Inductive Switching Energy Loss vs. Gate Resistance**



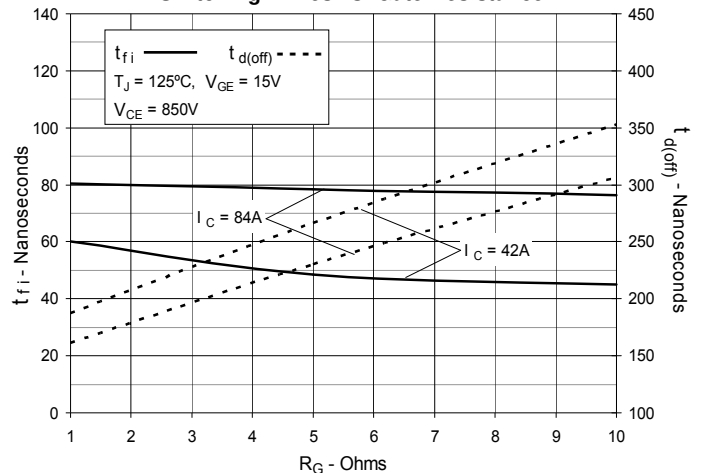
**Fig. 16. Inductive Switching Energy Loss vs. Collector Current**



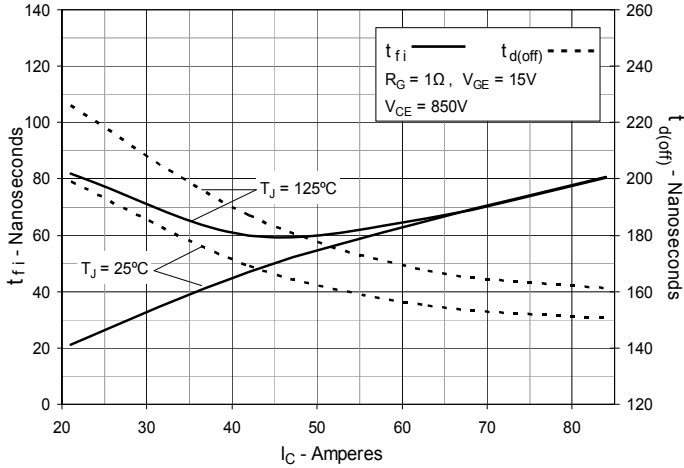
**Fig. 17. Inductive Switching Energy Loss vs. Junction Temperature**



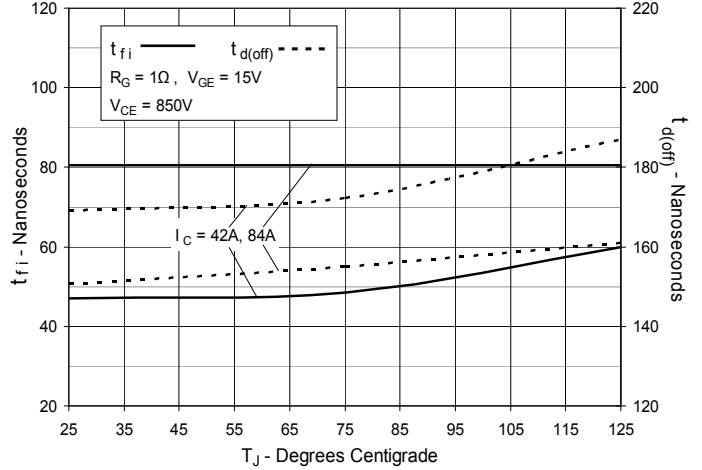
**Fig. 18. Inductive Turn-off Switching Times vs. Gate Resistance**



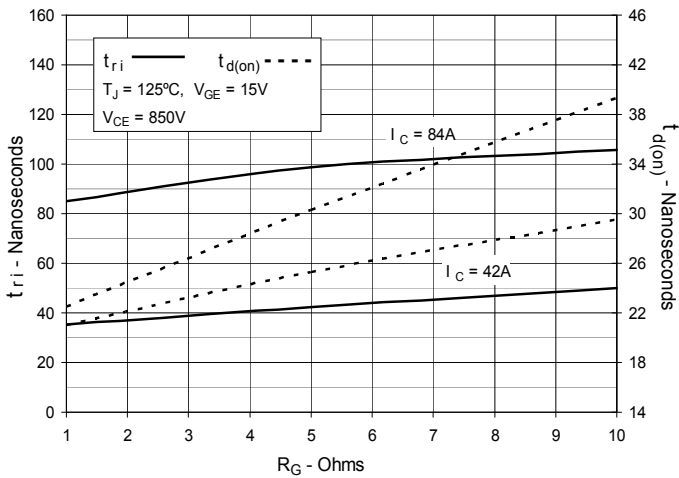
**Fig. 19. Inductive Turn-off Switching Times vs. Collector Current**



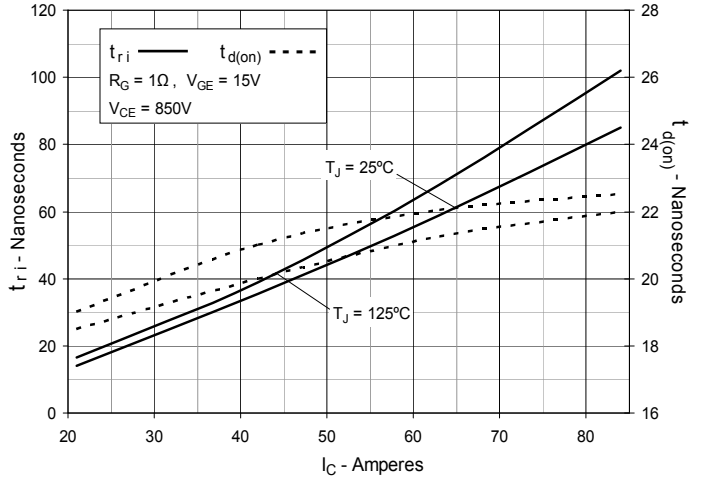
**Fig. 20. Inductive Turn-off Switching Times vs. Junction Temperature**



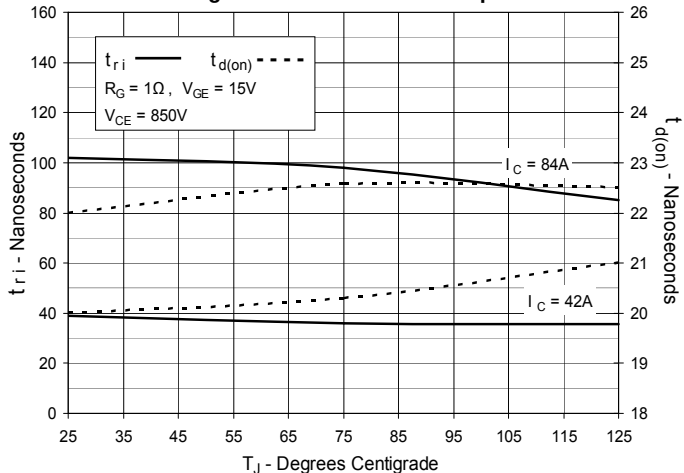
**Fig. 21. Inductive Turn-on Switching Times vs. Gate Resistance**



**Fig. 22. Inductive Turn-on Switching Times vs. Collector Current**



**Fig. 23. Inductive Turn-on Switching Times vs. Junction Temperature**





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