IXYS

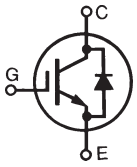
Advance Technical Information

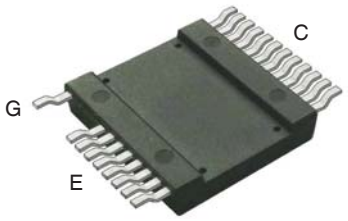
High Voltage, High Frequency, BiMOSFET™ Monolithic Bipolar MOS Transistor

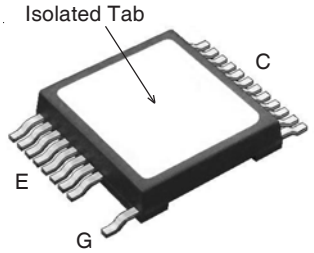
(Electrically Isolated Tab)

MMIX1B15N300C

V_{CES} = 3000V
I_{C110} = 15A
$V_{CE(sat)}$ ≤ 6.0V







G = Gate E = Emitter
C = Collector

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	3000	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	3000	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	T_C = 25°C	37	A
I_{C110}	T_C = 110°C	15	A
I_{CM}	T_C = 25°C, 1ms	300	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 120 V_{CES} ≤ 1500	A V
t_{SC} (SCSOA)	V_{GE} = 15V, T_J = 125°C, R_G = 52Ω, V_{CE} = 1500V, Non-Repetitive	10	μs
P_C	T_C = 25°C	300	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	Plastic Body for 10s	260	°C
F_C	Mounting Force	50..200/11..45	N/lb
V_{ISOL}	50/60Hz, 5 Seconds	4000	V~
Weight		8	g

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	3000			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			25	μA
	Note 2, T_J = 125°C			5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			±200	nA
$V_{CE(sat)}$	I_C = 15A, V_{GE} = 15V, Note 1		4.7	6.0	V
	T_J = 125°C		5.0		V

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 4000V~ Electrical Isolation
- High Blocking Voltage
- High Frequency Operation

Advantages

- Low Gate Drive Requirement
- High Power Density

Applications

- Switch-Mode and Resonant-Mode Power Supplies

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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	18	30		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		6230		pF
C_{oes}			260		pF
C_{res}			93		pF
$Q_{g(on)}$	I_C = 15A, V_{GE} = 15V, V_{CE} = 1000V		267		nC
Q_{ge}			33		nC
Q_{gc}			99		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		40		ns
t_{ri}	I_C = 15A, V_{GE} = 15V		23		ns
E_{on}	V_{CE} = 1500V, R_G = 10Ω		9.15		mJ
$t_{d(off)}$	Note 3		455		ns
t_{fi}			90		ns
E_{off}			1.40		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		38		ns
t_{ri}	I_C = 15A, V_{GE} = 15V		20		ns
E_{on}	V_{CE} = 1500V, R_G = 10Ω		9.15		mJ
$t_{d(off)}$	Note 3		515		ns
t_{fi}			150		ns
E_{off}			2.75		mJ
R_{thJC}				0.42	°C/W
R_{thCS}			0.05		°C/W

Reverse Diode

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max	
V_F	I_F = 15A, V_{GE} = 0V, Note 1			5.0	V
t_{rr}	I_F = 15A, V_{GE} = 0V, -di_F/dt = 100A/µs		706		ns
I_{RM}	V_R = 100V, V_{GE} = 0V		26		A
Q_{RM}			9.2		µC

Notes:

1. Pulse test, t ≤ 300µs, duty cycle, d ≤ 2%.
2. Device must be heatsunk for high-temperature leakage current measurements to avoid thermal runaway.
3. Switching times & energy losses may increase for higher V_{CE}(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 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ T_J = 25ºC

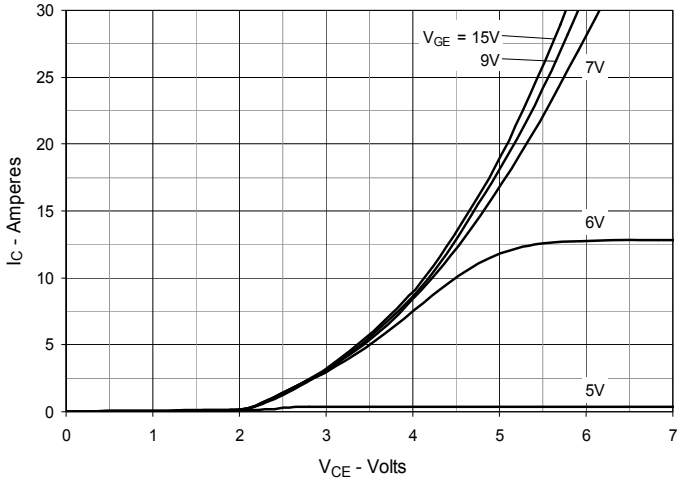


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

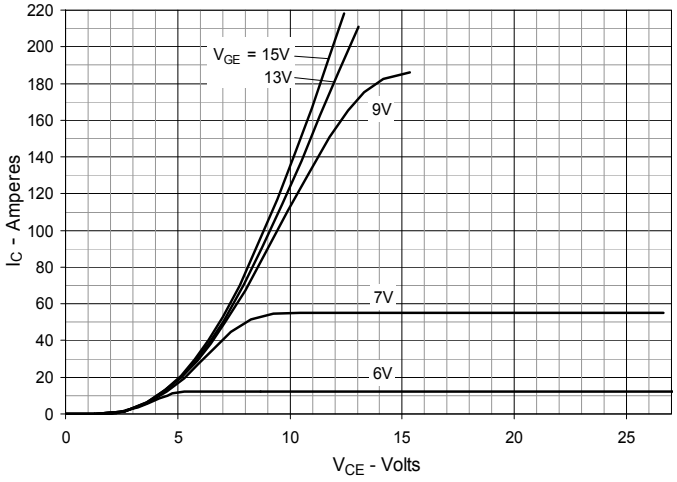


Fig. 3. Output Characteristics @ T_J = 125ºC

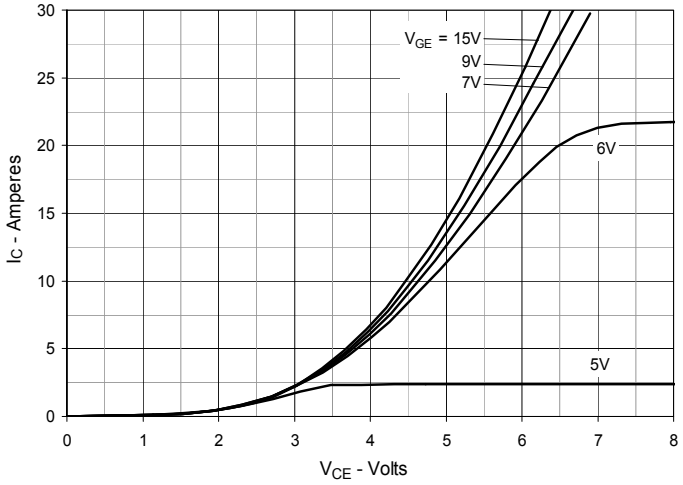


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

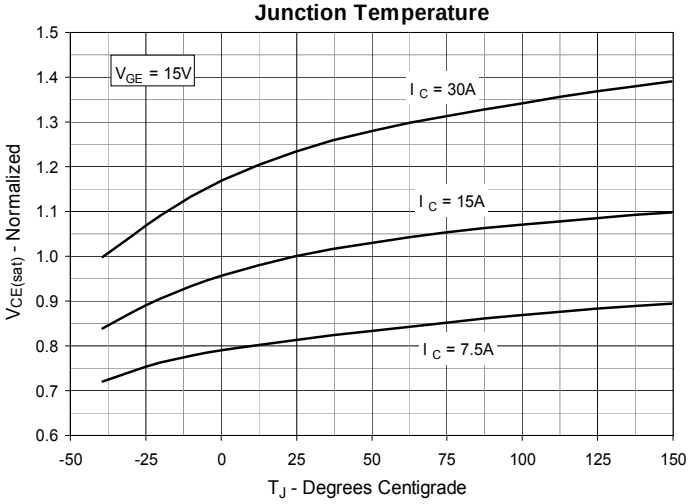


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

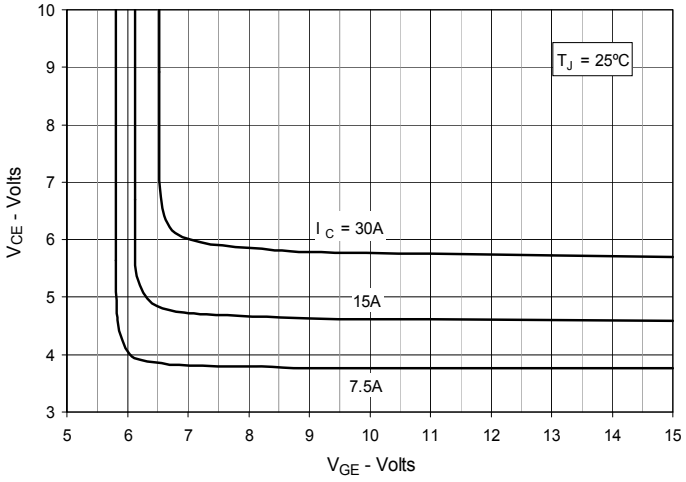
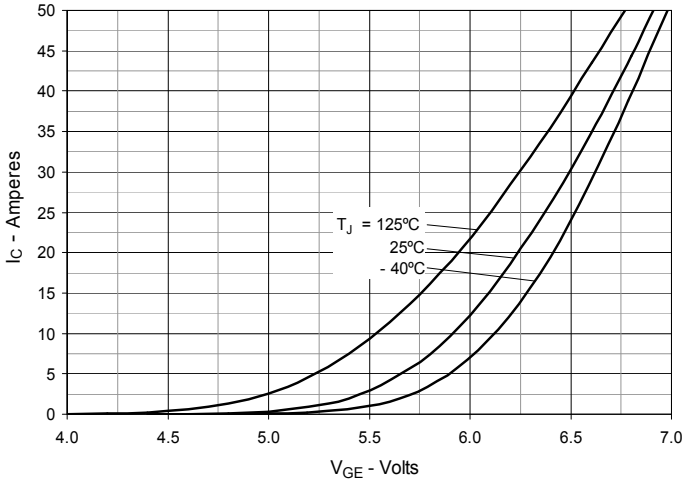


Fig. 6. Input Admittance



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Fig. 7. Transconductance

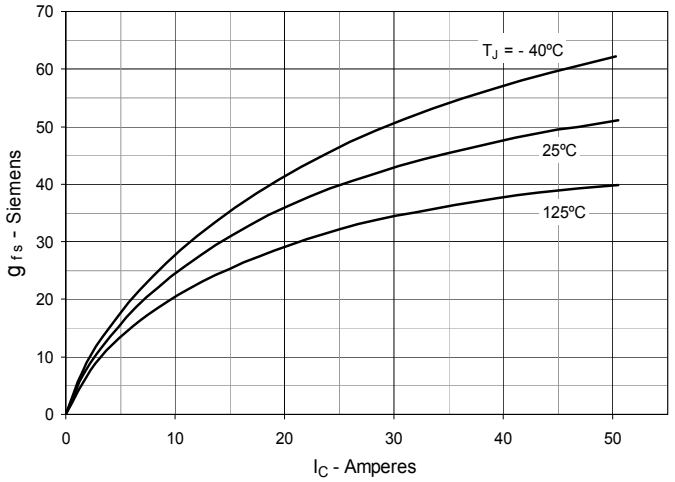


Fig. 8. Gate Charge

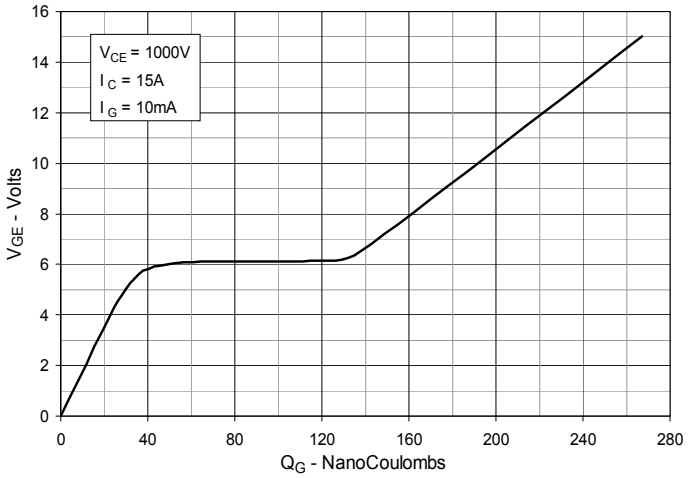


Fig. 9. Forward Voltage Drop of Intrinsic Diode

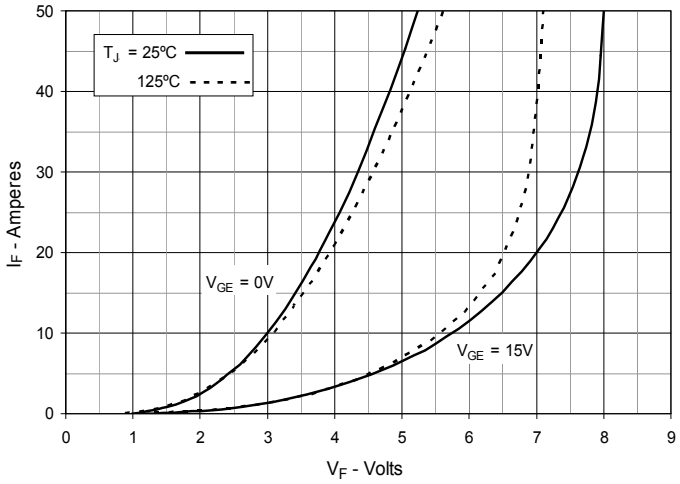


Fig. 10. Capacitance

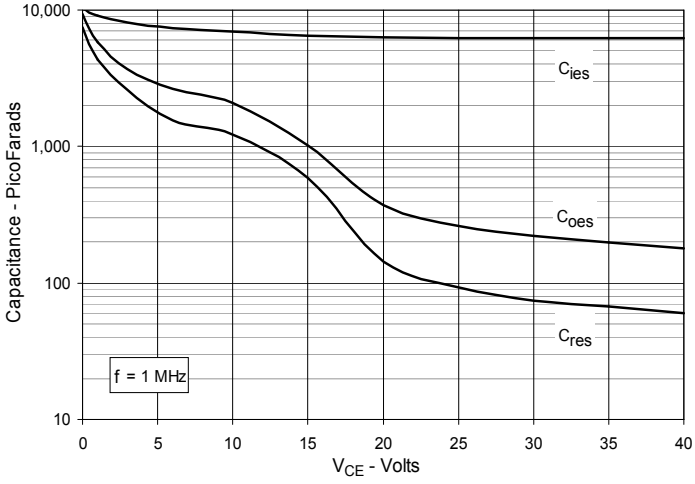


Fig. 11. Reverse-Bias Safe Operating Area

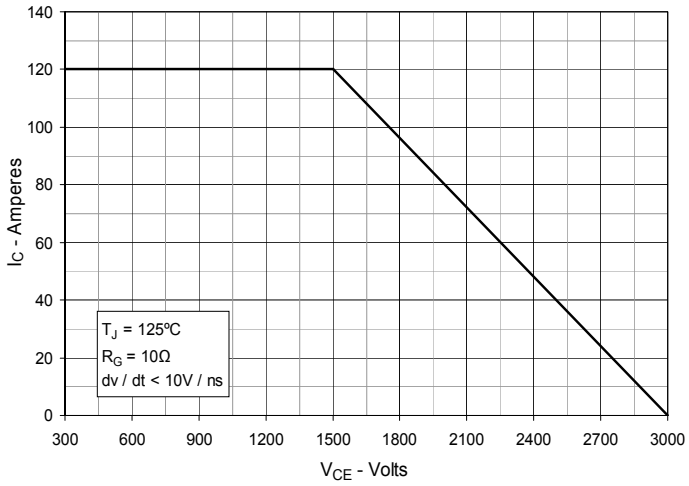
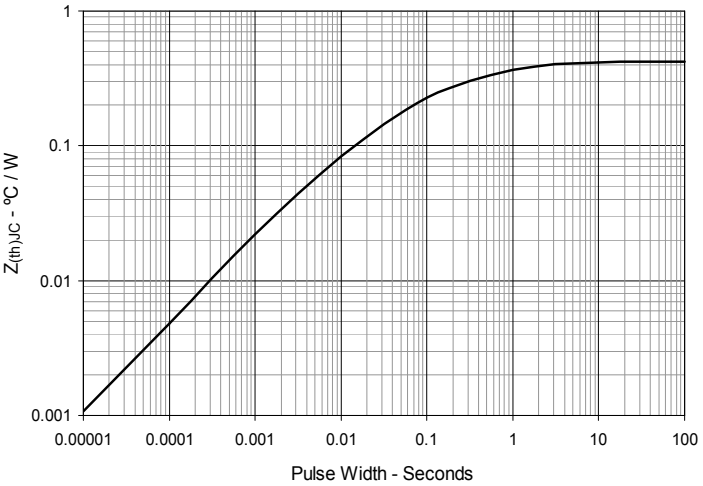


Fig. 12. Maximum Transient Thermal Impedance



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Fig. 13. Forward-Bias Safe Operating Area @ T_C = 25ºC

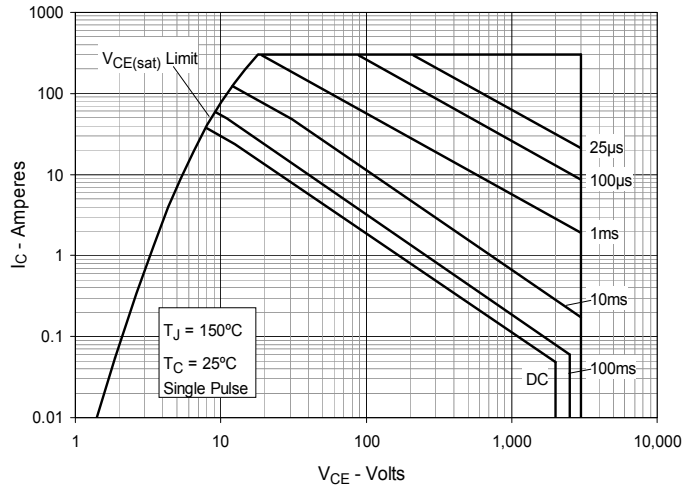


Fig. 14. Forward-Bias Safe Operating Area @ T_C = 75ºC

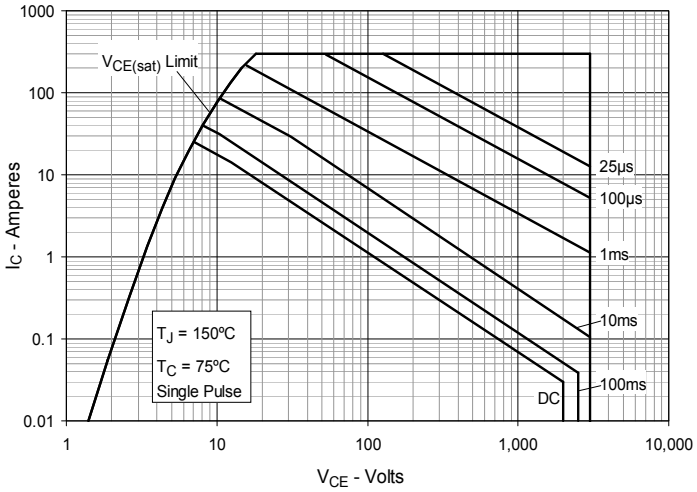


Fig. 15. Inductive Switching Energy Loss vs. Gate Resistance

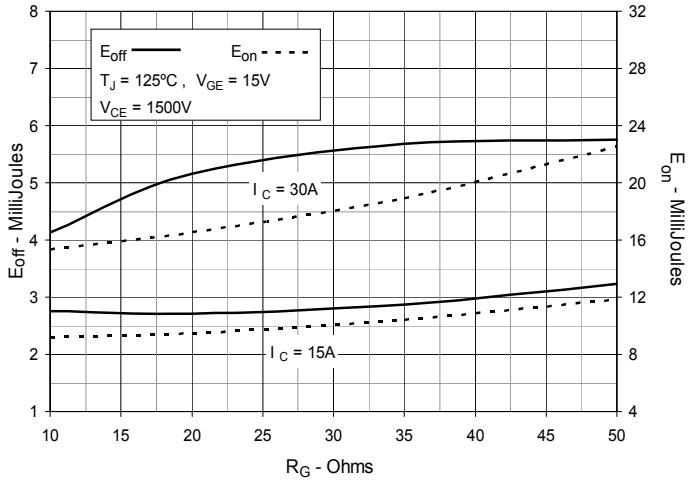


Fig. 16. Inductive Switching Energy Loss vs. Collector Current

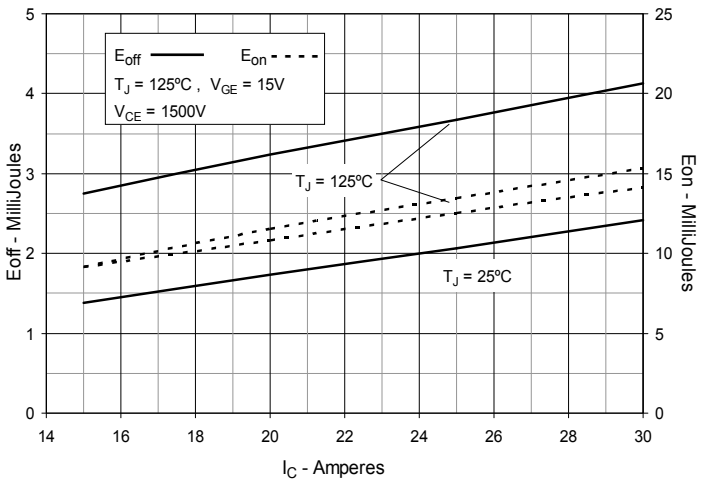


Fig. 17. Inductive Switching Energy Loss vs. Junction Temperature

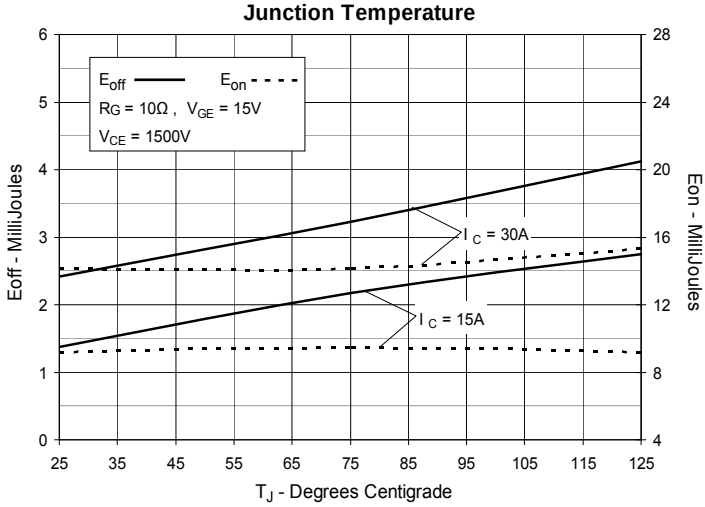
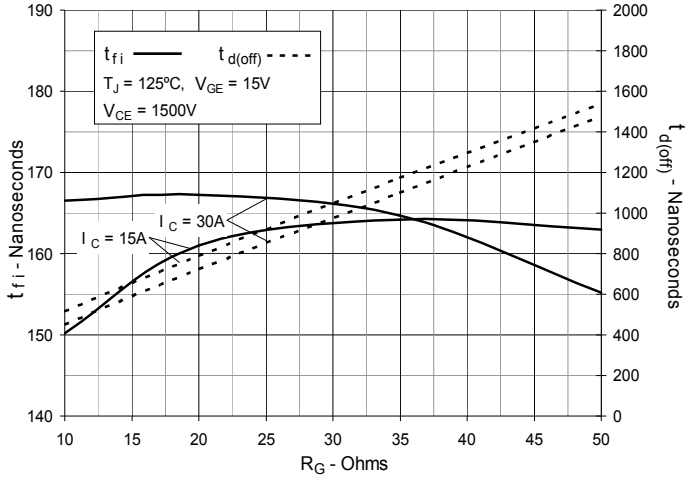


Fig. 18. Inductive Turn-off Switching Times vs. Gate Resistance



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

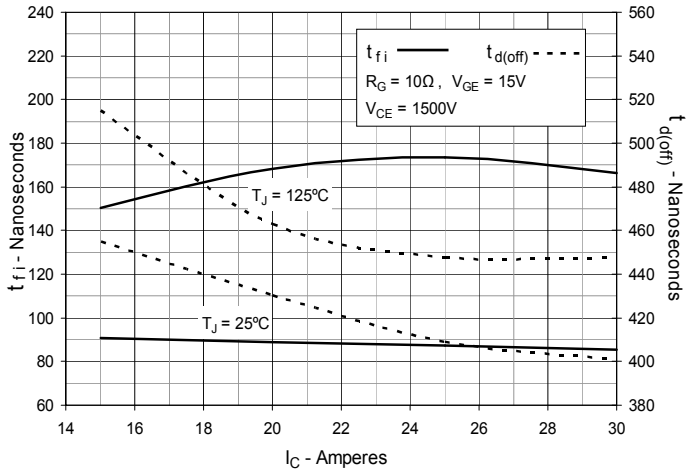


Fig. 20. Inductive Turn-off Switching Times vs. Junction Temperature

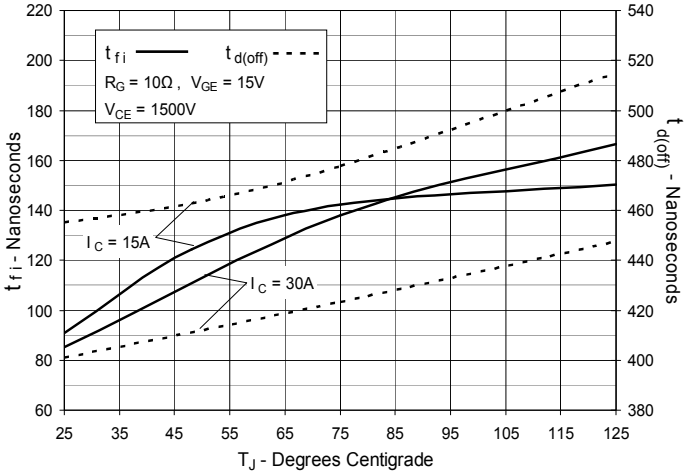


Fig. 21. Inductive Turn-on Switching Times vs. Gate Resistance

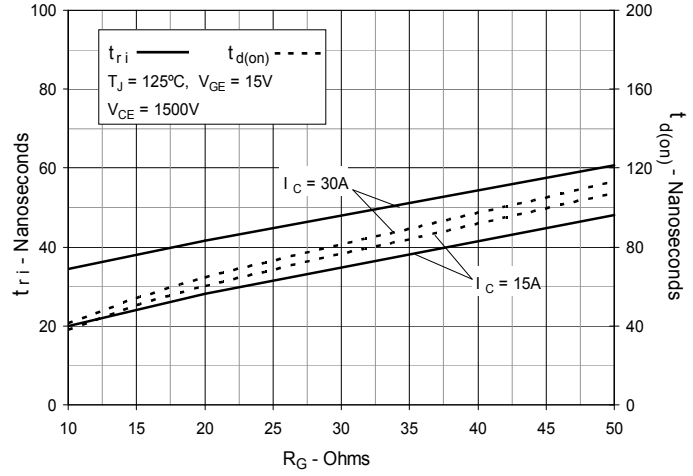


Fig. 22. Inductive Turn-on Switching Times vs. Collector Current

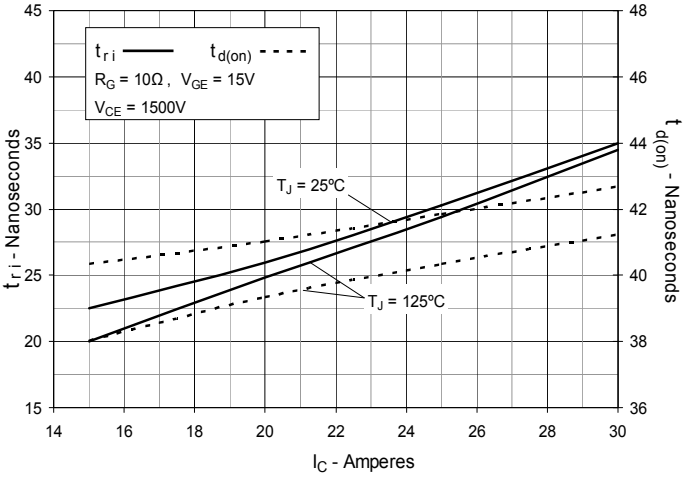
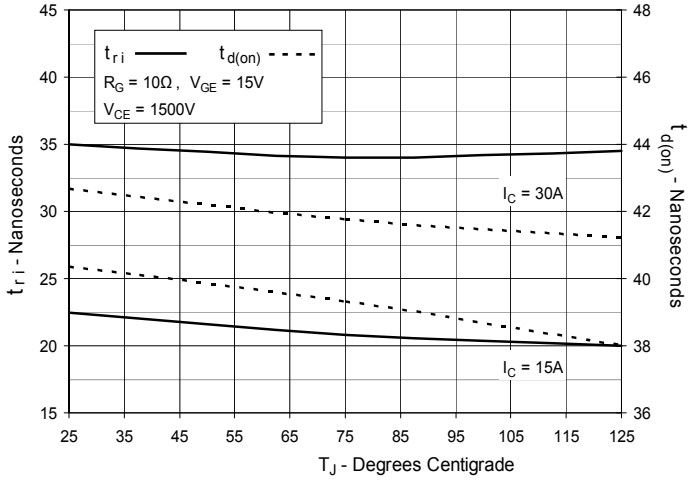
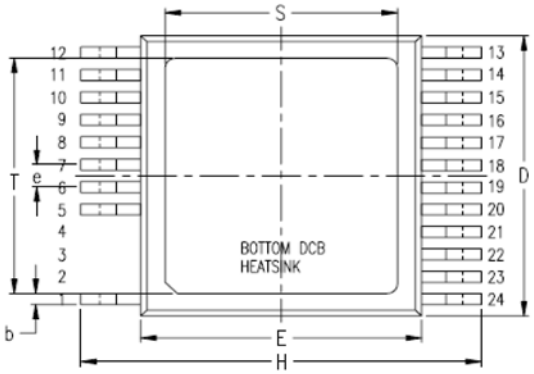


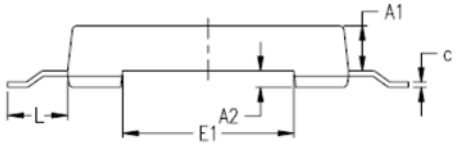
Fig. 23. Inductive Turn-on Switching Times vs. Junction Temperature

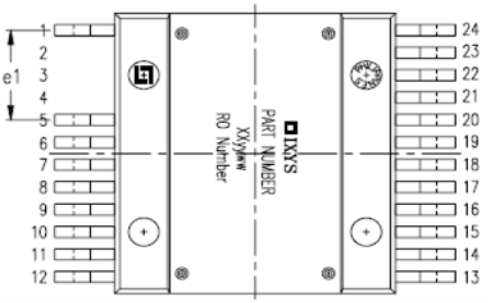


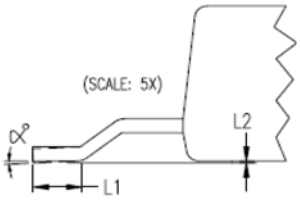
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SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.209	.224	5.30	5.70
A1	.154	.161	3.90	4.10
A2	.055	.063	1.40	1.60
b	.035	.045	0.90	1.15
c	.018	.026	0.45	0.65
D	.976	.994	24.80	25.25
E	.898	.915	22.80	23.25
E1	.543	.559	13.80	14.20
e	.079 BSC		2.00 BSC	
e1	.315 BSC		8.00 BSC	
H	1.272	1.311	32.30	33.30
L	.181	.209	4.60	5.30
L1	.051	.067	1.30	1.70
L2	.000	.006	0.00	0.15
S	.736	.760	18.70	19.30
T	.815	.839	20.70	21.30
α	0	4°	0	4°

PIN: 1 = Gate
5-12 = Emitter
13-24 = Collector

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