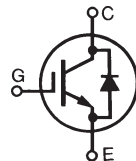


High Voltage, High Frequency, BiMOSFET™ Monolithic Bipolar MOS Transistor

MMIX1B20N300C

(Electrically Isolated Tab)

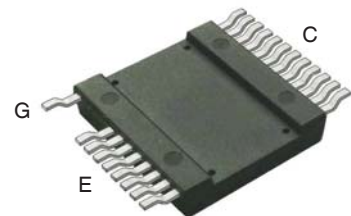


$$V_{CES} = 3000V$$

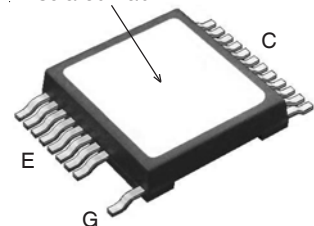
$$I_{C110} = 20A$$

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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ C$ to $150^\circ C$	3000	V
V_{CGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$	3000	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	50	A
I_{C110}	$T_C = 110^\circ C$	20	A
I_{CM}	$T_C = 25^\circ C$, 1ms	430	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 3\Omega$ Clamped Inductive Load	$I_{CM} = 160$ $V_{CES} \leq 1500$	A V
T_{SC} (SCSOA)	$V_{GE} = 15V$, $T_J = 125^\circ C$, $R_G = 52\Omega$, $V_{CE} = 1500V$, Non-Repetitive	10	μs
P_C	$T_C = 25^\circ C$	417	W
T_J		-55 ... +150	$^\circ C$
T_{JM}		150	$^\circ C$
T_{stg}		-55 ... +150	$^\circ C$
T_L T_{SOLD}	Maximum Lead Temperature for Soldering Plastic Body for 10s	300 260	$^\circ C$ $^\circ C$
F_C	Mounting Force	50..200/11..45	N/lb
V_{ISOL}	50/60Hz, 5 Seconds	4000	V~
Weight		8	g



Isolated Tab



G = Gate
C = Collector

E = Emitter

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

Symbol	Test Conditions ($T_J = 25^\circ C$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	3000		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ Note 2, $T_J = 125^\circ C$			25 μA 6.5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 200 nA
$V_{CE(sat)}$	$I_C = 20A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$		4.5 5.1	6.0 V V

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 20\text{A}, V_{CE} = 10\text{V}$, Note 1	25	43	S
C_{ies}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		10	nF
C_{oes}			440	pF
C_{res}			160	pF
$Q_{g(on)}$	$I_C = 20\text{A}, V_{GE} = 15\text{V}, V_{CE} = 1000\text{V}$		425	nC
Q_{ge}			53	nC
Q_{gc}			160	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 20\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 1500\text{V}, R_G = 3\Omega$ Note 3		33	ns
t_{ri}			12	ns
E_{on}			23.0	mJ
$t_{d(off)}$			370	ns
t_{fi}			110	ns
E_{off}			2.6	mJ
$t_{d(on)}$		Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 20\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 1500\text{V}, R_G = 3\Omega$ Note 3		33
t_{ri}			14	ns
E_{on}			23.0	mJ
$t_{d(off)}$			435	ns
t_{fi}			175	ns
E_{off}			3.7	mJ
R_{thJC}				0.30 $^\circ\text{C/W}$
R_{thCS}		0.05	$^\circ\text{C/W}$	

Reverse Diode

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max
V_F	$I_F = 20\text{A}, V_{GE} = 0\text{V}$, Note 1			5.0 V
t_{rr}	$I_F = 20\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}, V_{GE} = 0\text{V}$		864	ns
I_{RM}			31	A
Q_{RM}			13.5	μC

Notes:

1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.
2. Device must be heatsunk for high-temperature leakage current measurements to avoid thermal runaway.
3. Switching times & energy losses may increase for higher $V_{CE}(\text{clamp})$, 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 @ $T_J = 25^\circ\text{C}$

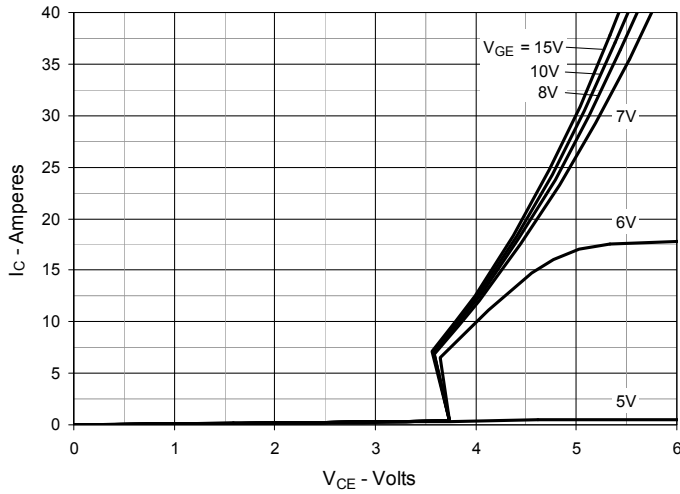


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

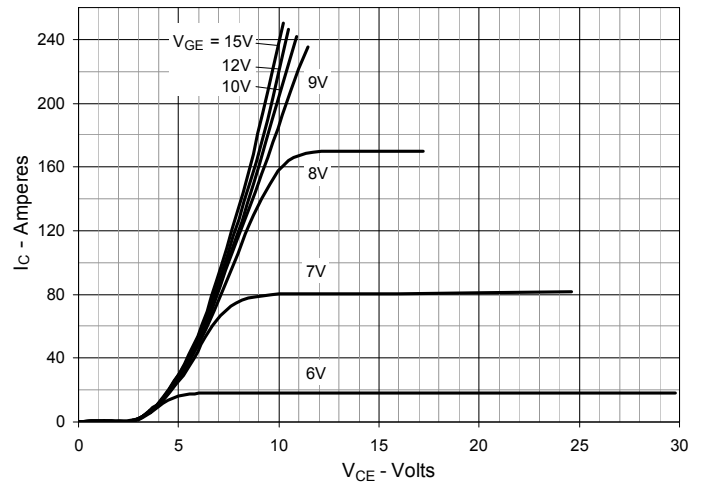


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

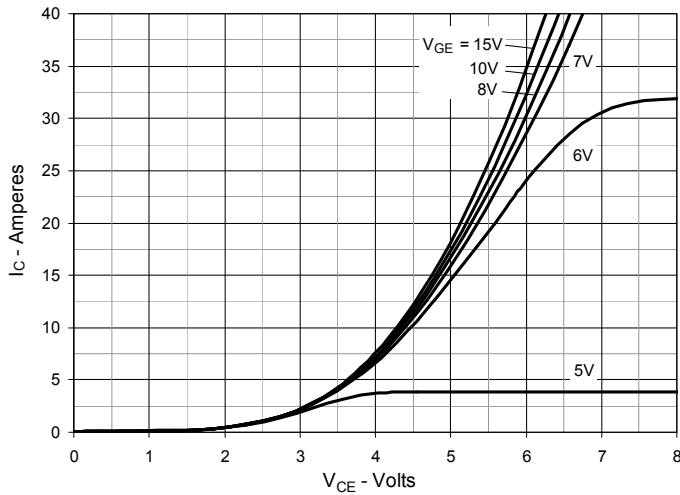


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

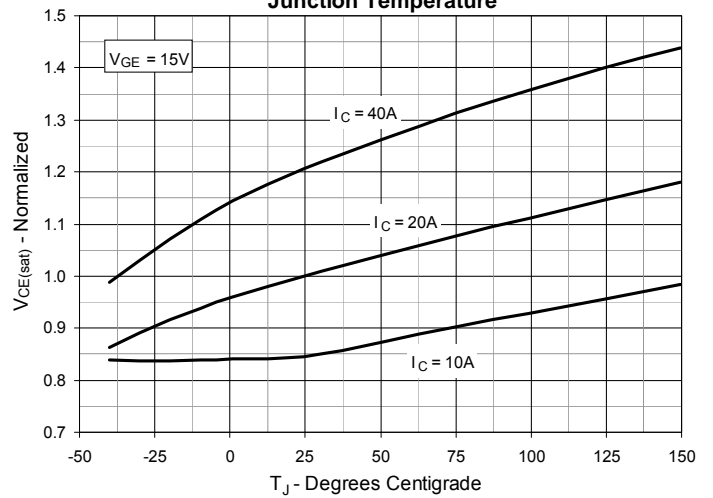


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

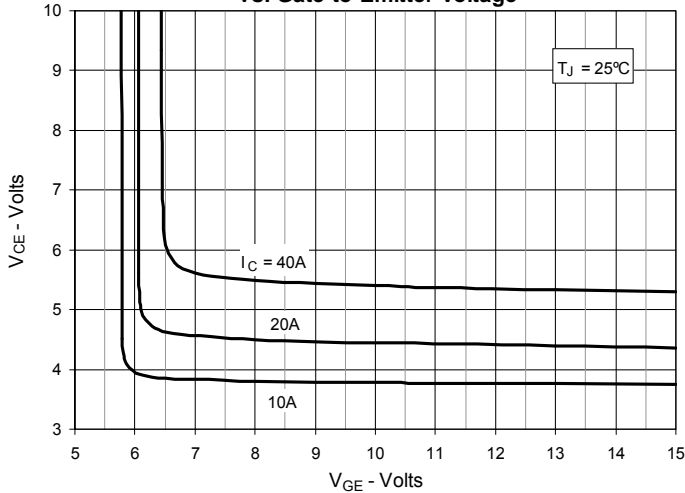


Fig. 6. Input Admittance

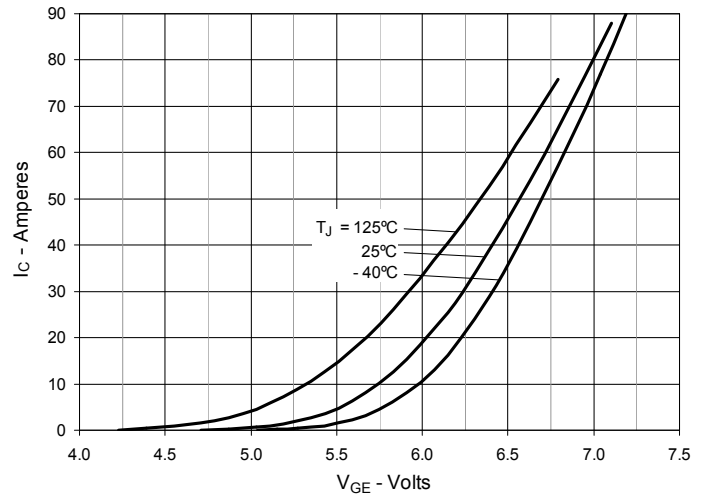


Fig. 7. Transconductance

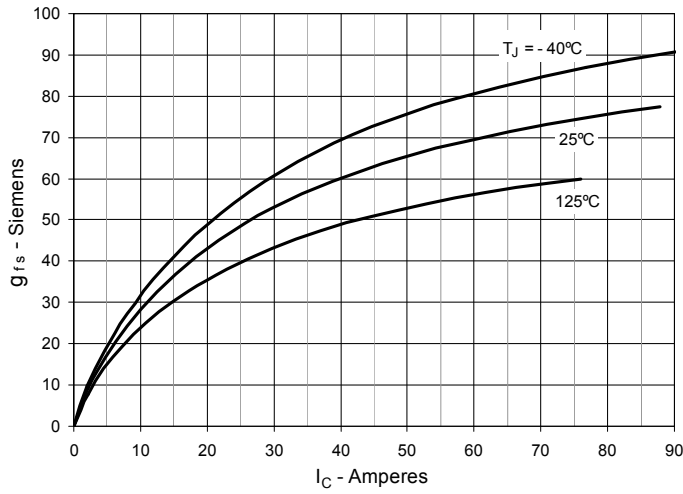


Fig. 8. Gate Charge

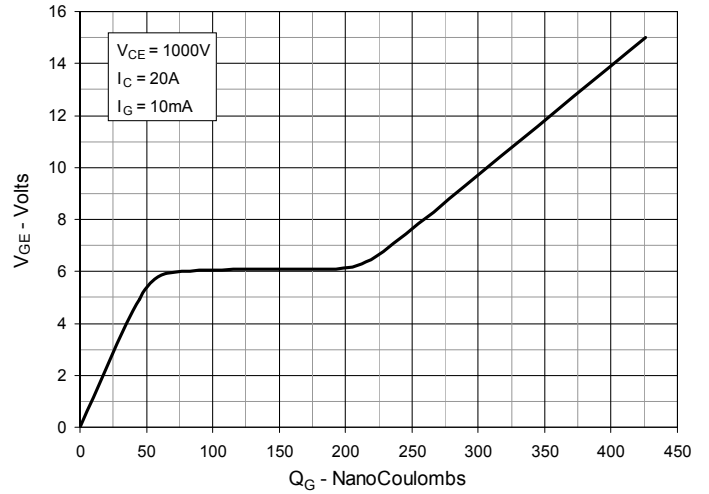


Fig. 9. Forward Voltage Drop of Intrinsic Diode

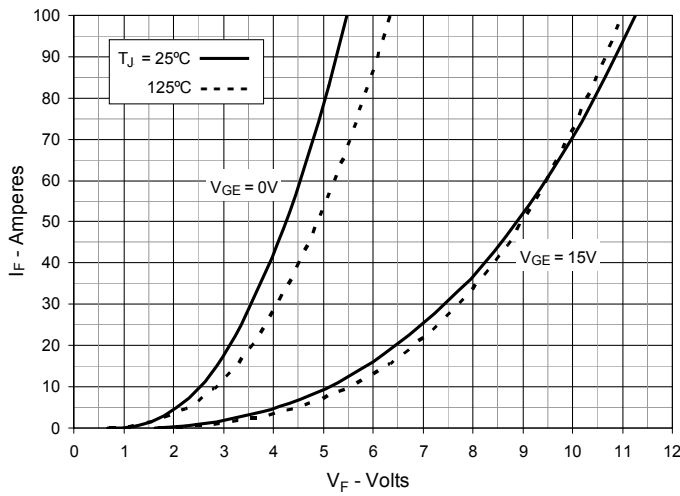


Fig. 10. Capacitance

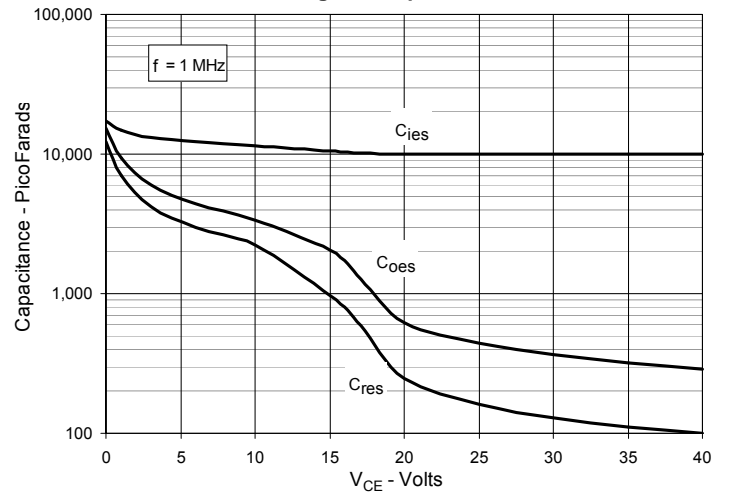


Fig. 11. Reverse-Bias Safe Operating Area

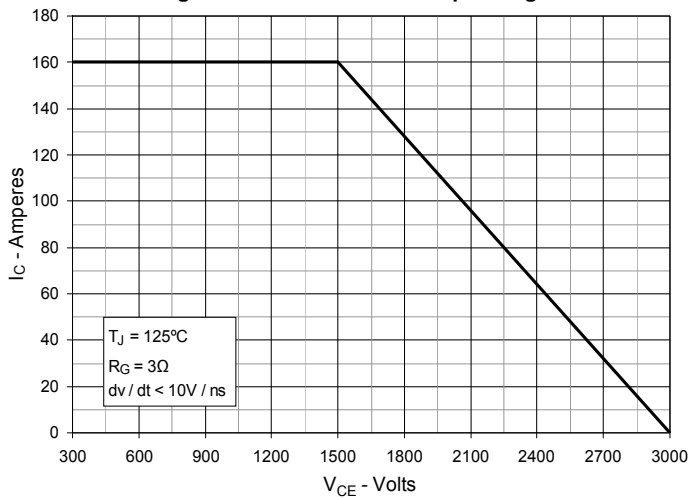


Fig. 12. Maximum Transient Thermal Impedance

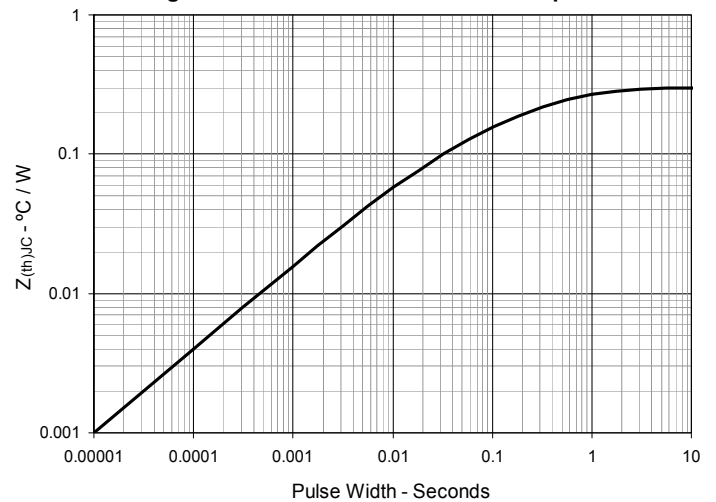


Fig. 13. Forward-Bias Safe Operating Area @ $T_C = 25^\circ\text{C}$

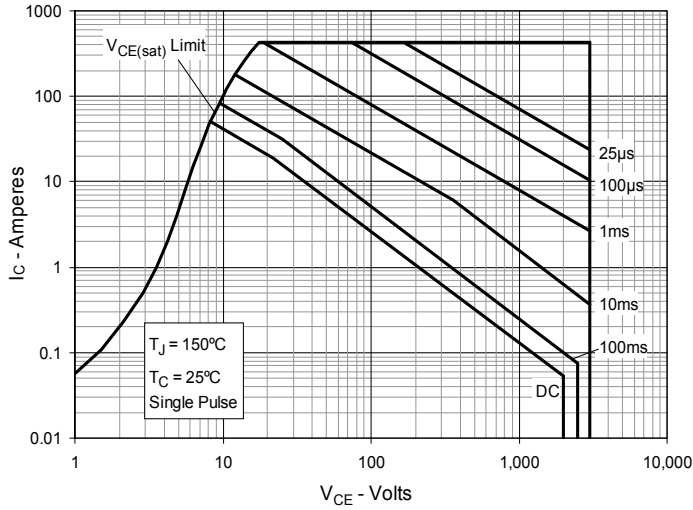


Fig. 14. Forward-Bias Safe Operating Area @ $T_C = 75^\circ\text{C}$

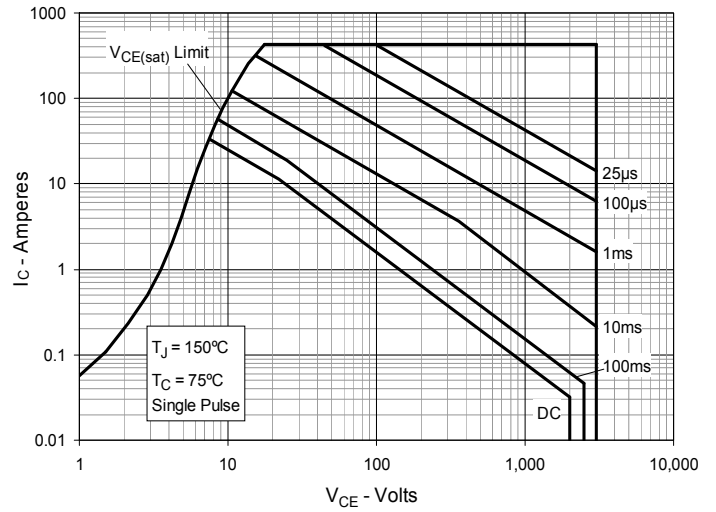


Fig. 15. Inductive Switching Energy Loss vs. Gate Resistance

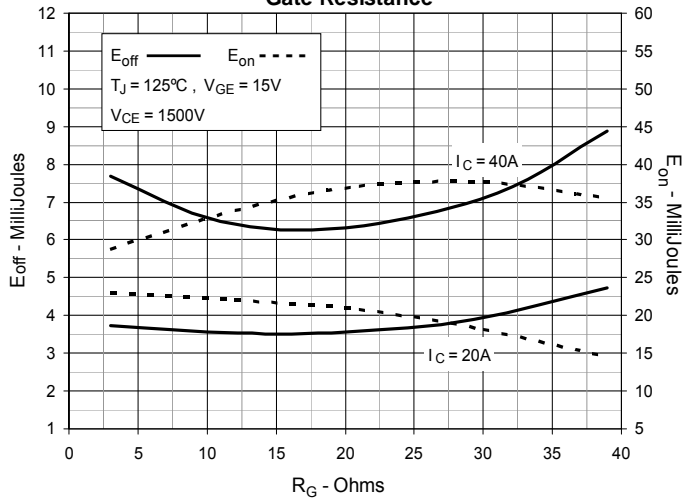


Fig. 16. Inductive Switching Energy Loss vs. Collector Current

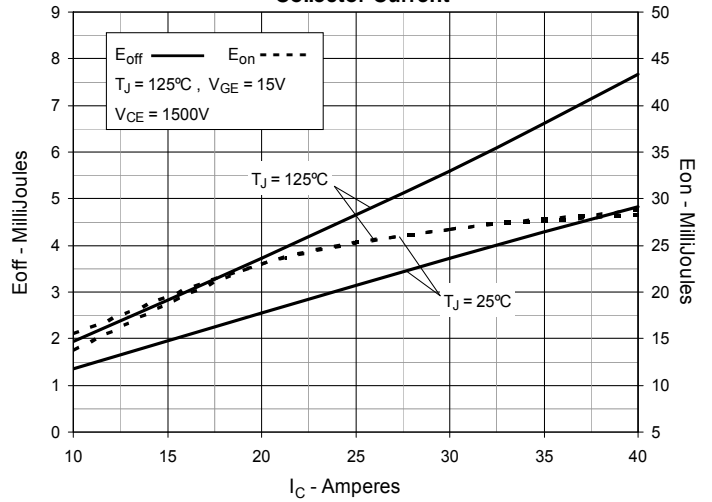


Fig. 17. Inductive Switching Energy Loss vs. Junction Temperature

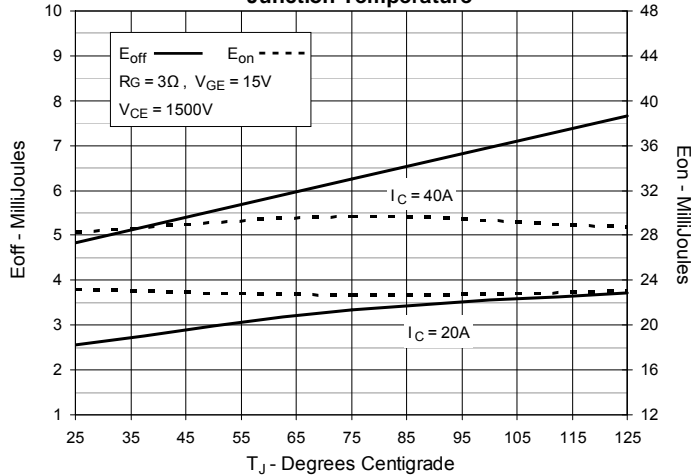


Fig. 18. Inductive Turn-off Switching Times vs. Gate Resistance

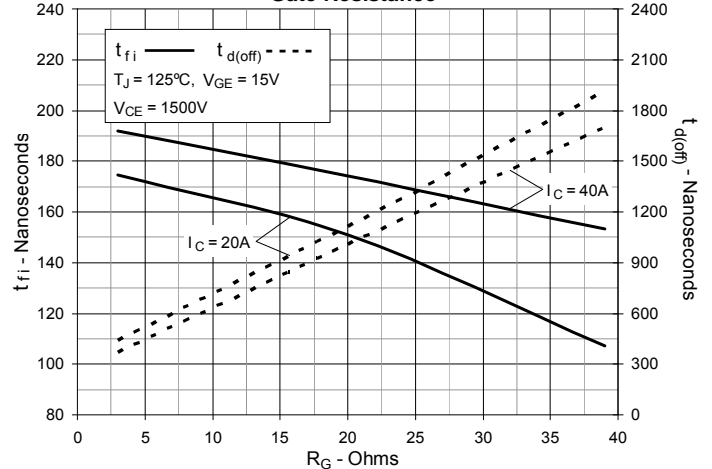
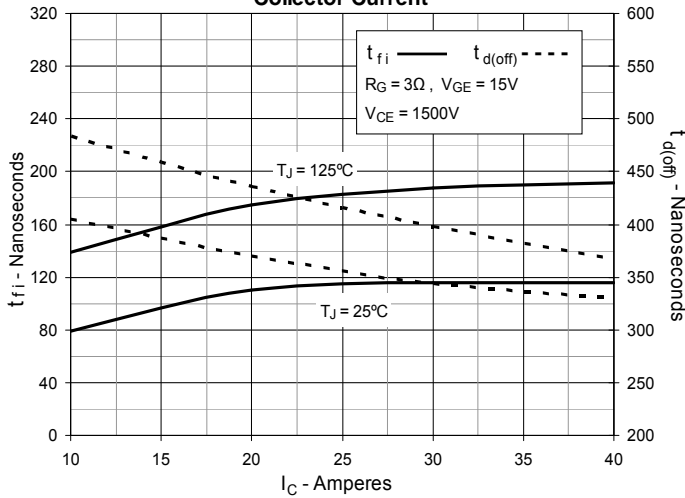
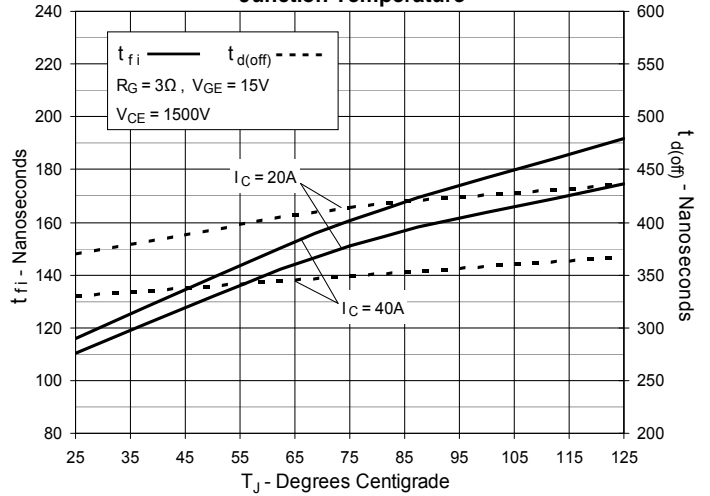
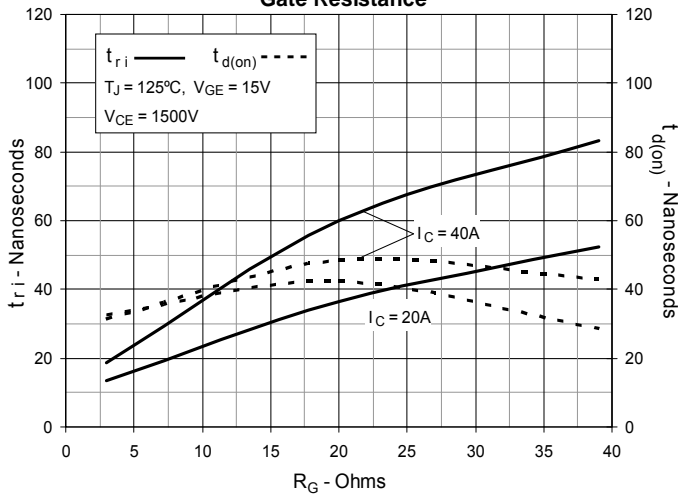
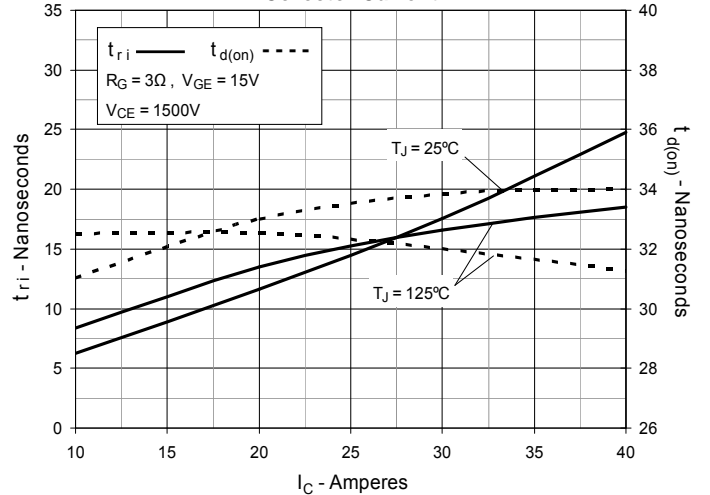
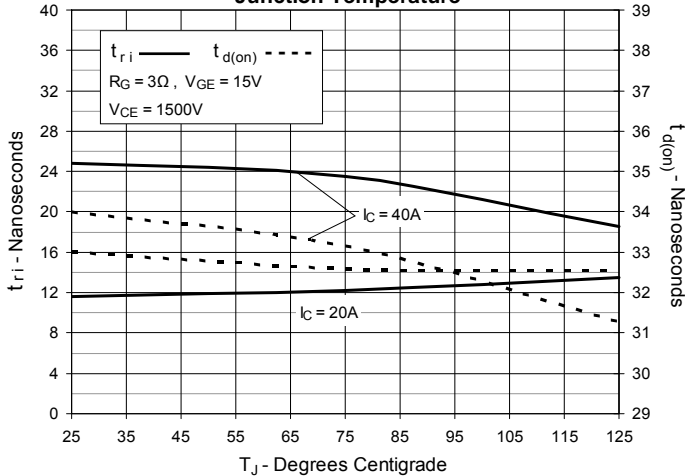
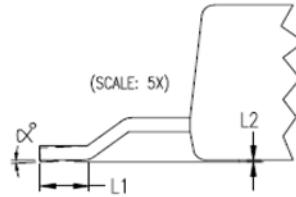
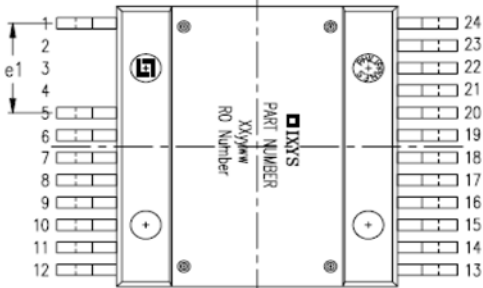
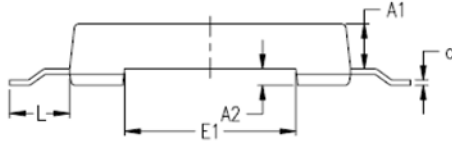
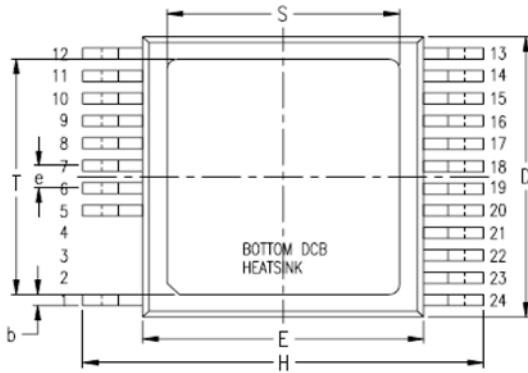


Fig. 19. Inductive Turn-off Switching Times vs. Collector Current

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




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