IXYS

Preliminary Technical Information

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

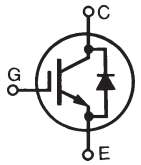
(Electrically Isolated Tab)

IXBF20N360

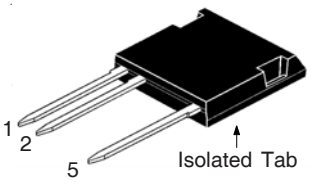
V_{CES} = 3600V

I_{C110} = 18A

$V_{CE(sat)} \leq$ 3.4V



ISOPLUS i4-Pak™



1 = Gate 5 = Collector
2 = Emitter

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	3600	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	3600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	T_C = 25°C	45	A
I_{C110}	T_C = 110°C	18	A
I_{CM}	T_C = 25°C, 1ms	220	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 160 $V_{CES} \leq$ 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	230	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 with Clip	20..120 / 4.5..27	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	3600			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = 3000V, V_{GE} = 0V			25	μA
	Note 2, T_J = 125°C		125		μA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			±200	nA
$V_{CE(SAT)}$	I_C = 20A, V_{GE} = 15V, Note 1		2.9	3.4	V
	T_J = 125°C		3.6		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
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 20A, V_{CE} = 10V, Note 1	10	17		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		2045		pF
C_{oes}			110		pF
C_{res}			50		pF
$Q_{g(on)}$	I_C = 20A, V_{GE} = 15V, V_{CE} = 1000V		110		nC
Q_{ge}			13		nC
Q_{gc}			43		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		18		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		14		ns
E_{on}	V_{CE} = 1500V, R_G = 10Ω		15.50		mJ
$t_{d(off)}$	Note 3		238		ns
t_{fi}			206		ns
E_{off}			4.30		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		20		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		22		ns
E_{on}	V_{CE} = 1500V, R_G = 10Ω		16.10		mJ
$t_{d(off)}$	Note 3		247		ns
t_{fi}			216		ns
E_{off}			4.15		mJ
$t_{d(on)}$	**Resistive load, T_J = 25°C**		30		ns
t_r	I_C = 20A, V_{GE} = 15V		325		ns
$t_{d(off)}$	V_{CE} = 960V, R_G = 10Ω		165		ns
t_f			1045		ns
$t_{d(on)}$	**Resistive load, T_J = 125°C**		32		ns
t_r	I_C = 20A, V_{GE} = 15V		890		ns
$t_{d(off)}$	V_{CE} = 960V, R_G = 10Ω		185		ns
t_f			1100		ns
R_{thJC}				0.54	°C/W
R_{thCS}			0.15		°C/W

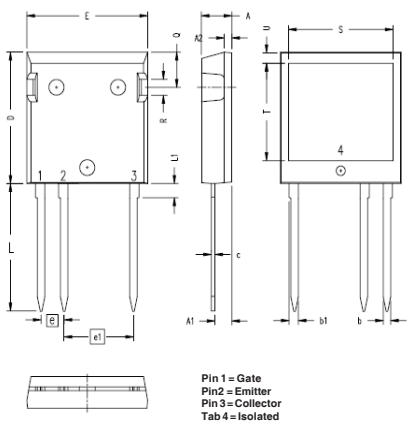
Reverse Diode

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max	
V_F	I_F = 20A, V_{GE} = 0V, Note 1			3.5	V
t_{rr}	I_F = 10A, V_{GE} = 0V, -di$_F$/dt = 100A/µs		1.7		µs
I_{RM}	V_R = 100V, V_{GE} = 0V		35		A
Q_{RM}			30		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.

ISOPLUS i4-Pak™ (HV) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.102	.118	2.59	3.00
A2	.046	.085	1.17	2.16
b	.045	.055	1.14	1.40
b1	.058	.068	1.47	1.73
C	.020	.029	0.51	0.74
D	.819	.840	20.80	21.34
E	.770	.799	19.56	20.29
e	.150 BSC		3.81 BSC	
e1	.450 BSC		11.43 BSC	
L	.780	.840	19.81	21.34
L1	.083	.102	2.11	2.59
Q	.210	.244	5.33	6.20
R	.100	.180	2.54	4.57
S	.660	.690	16.76	17.53
T	.590	.620	14.99	15.75
U	.065	.080	1.65	2.03

PRELIMANARY 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.

Fig. 1. Output Characteristics @ T_J = 25ºC

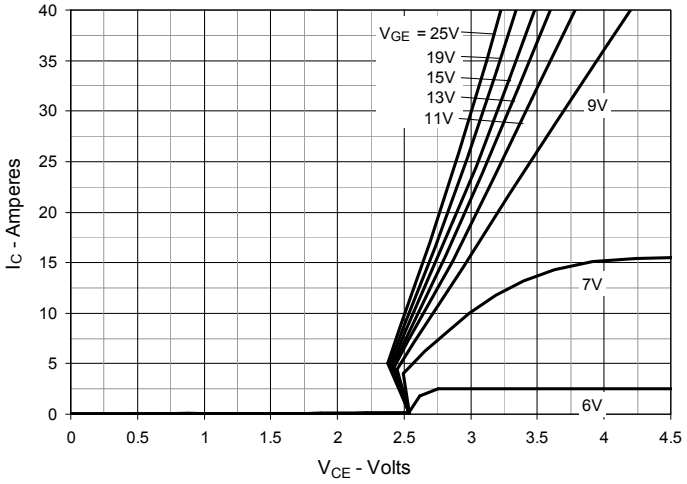


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

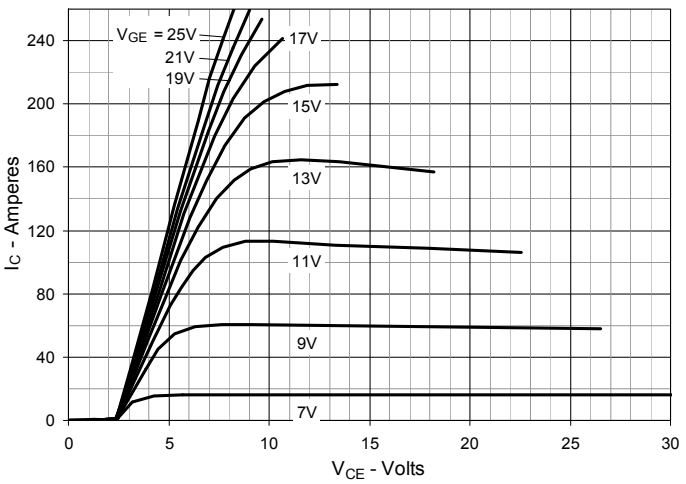


Fig. 3. Output Characteristics @ T_J = 125ºC

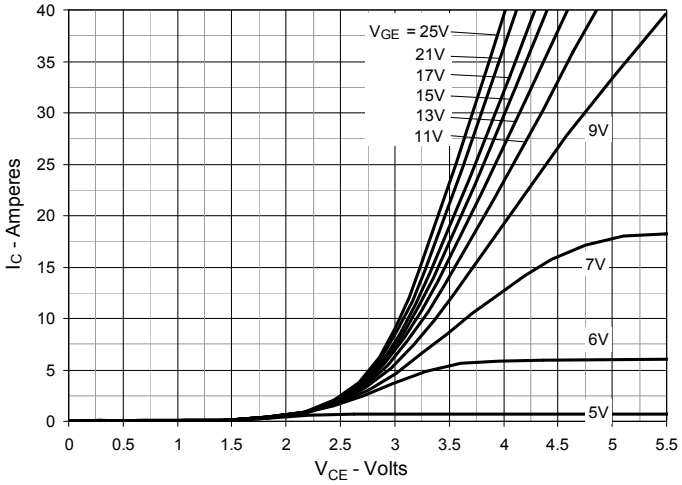


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

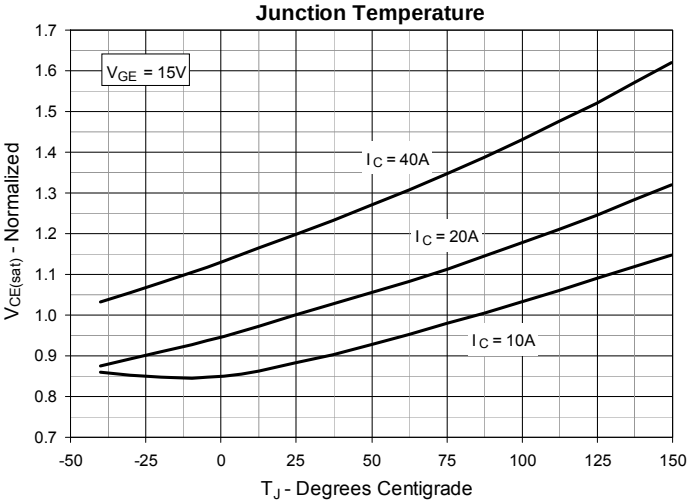


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

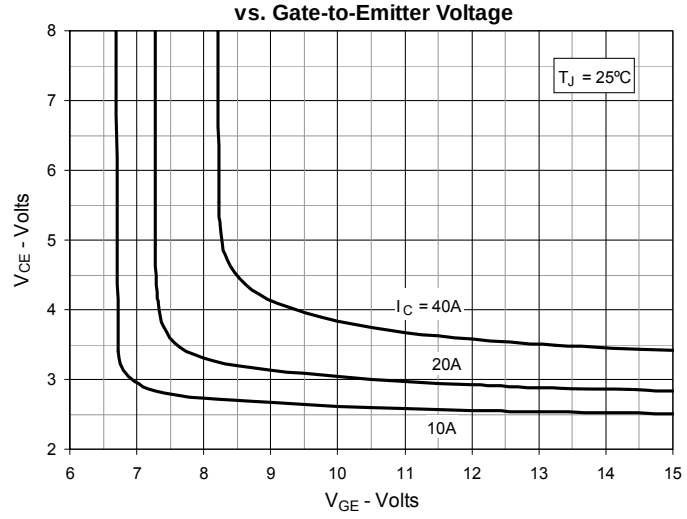


Fig. 6. Input Admittance

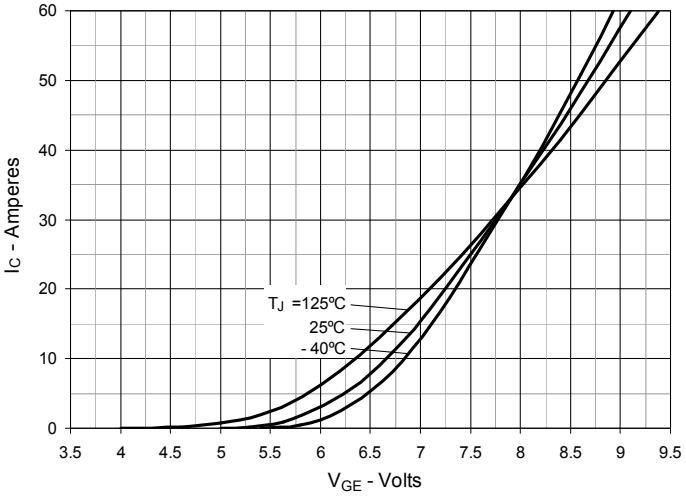


Fig. 7. Transconductance

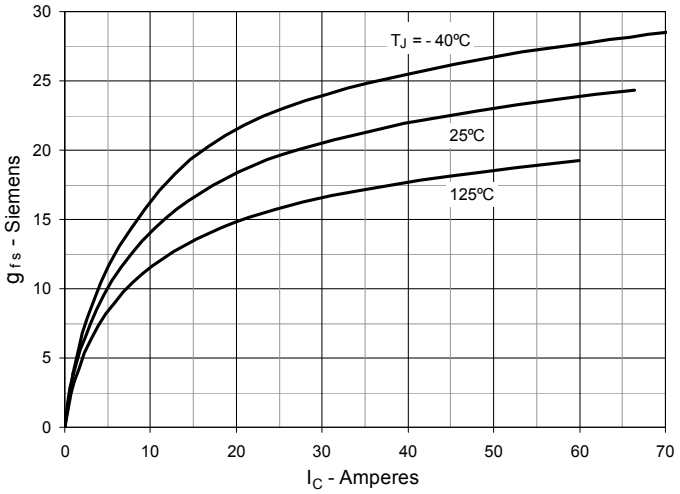


Fig. 8. Gate Charge

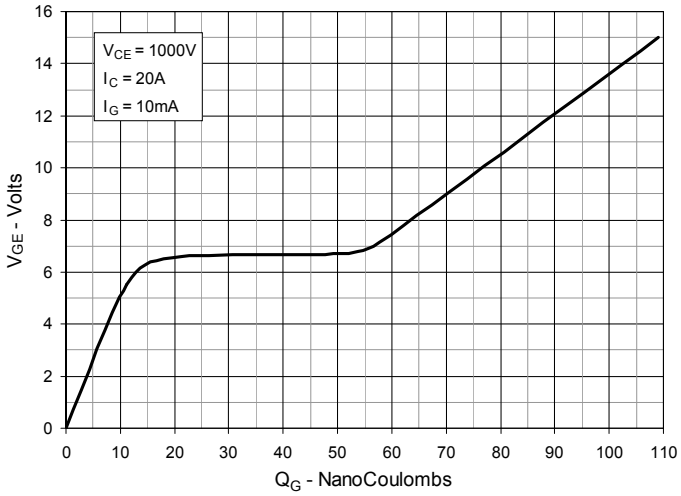


Fig. 9. Forward Voltage Drop of Intrinsic Diode

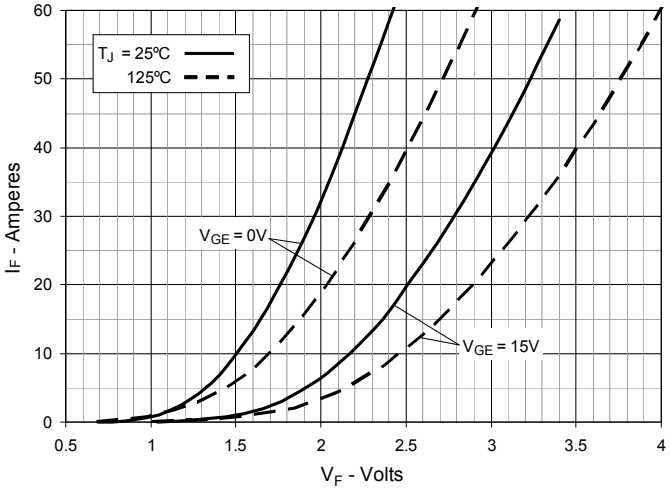


Fig. 10. Capacitance

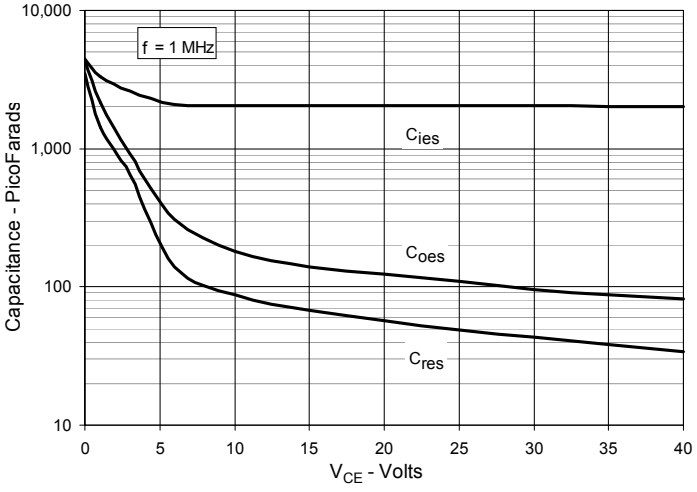


Fig. 11. Reverse-Bias Safe Operating Area

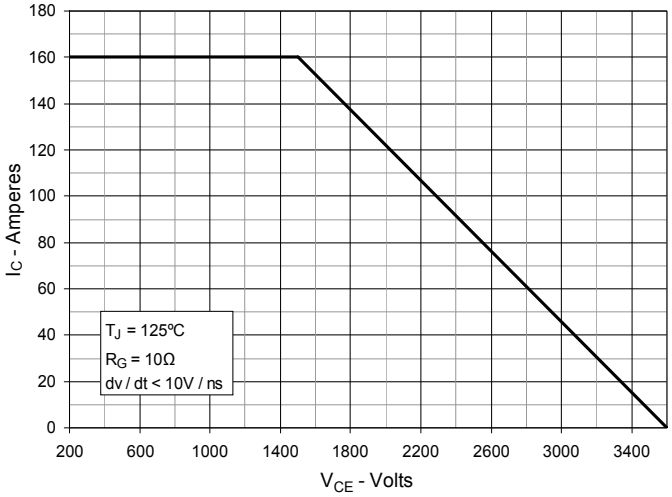


Fig. 12. Maximum Transient Thermal Impedance

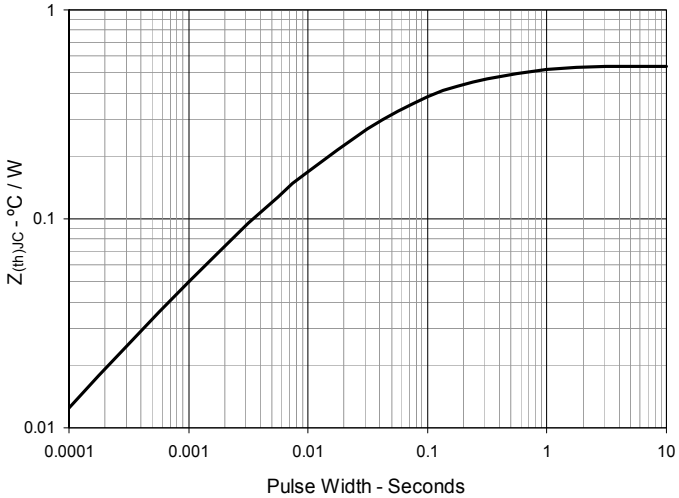


Fig. 13. Forward-Bias Safe Operating Area @ T_C = 25ºC

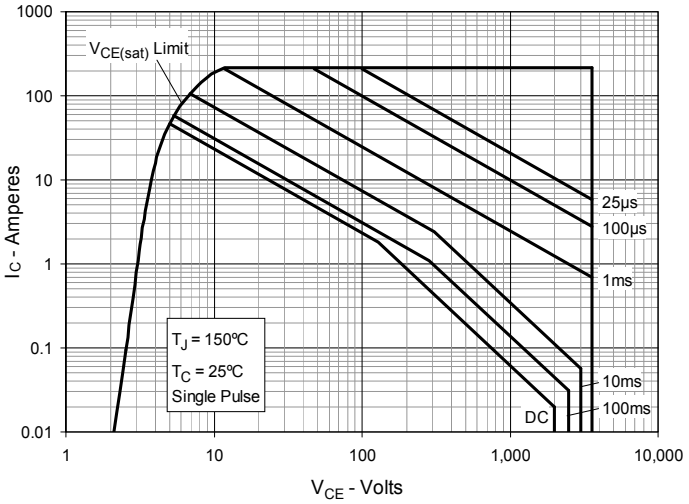


Fig. 14. Forward-Bias Safe Operating Area @ T_C = 75ºC

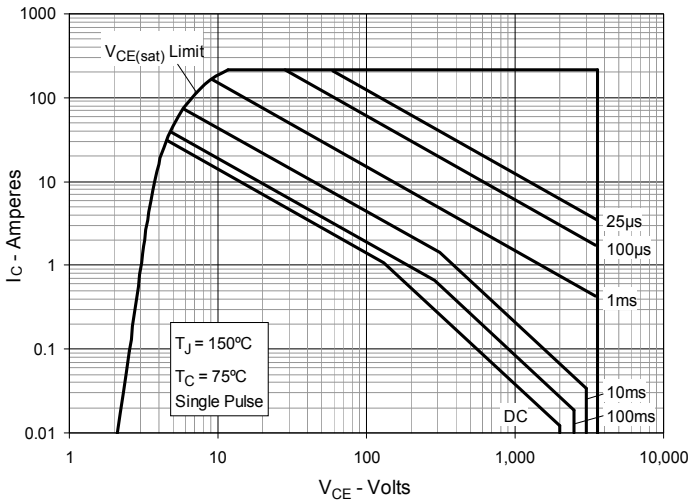


Fig. 15. Inductive Switching Energy Loss vs. Gate Resistance

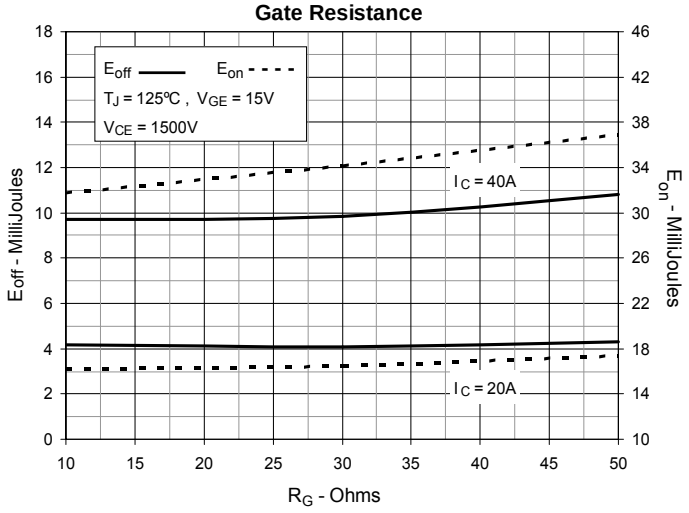


Fig. 16. Inductive Switching Energy Loss vs. Collector Current

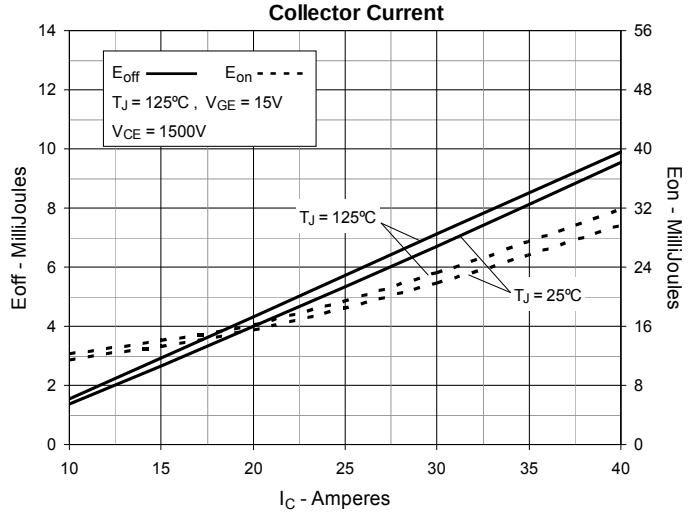


Fig. 17. Inductive Switching Energy Loss vs. Junction Temperature

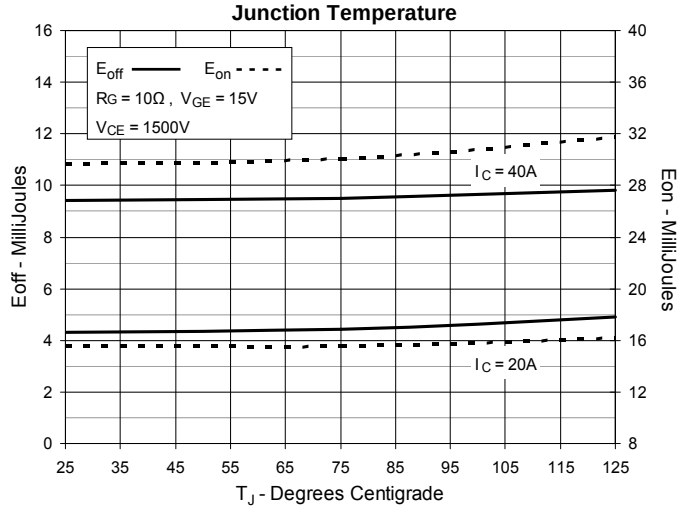


Fig. 18. Inductive Turn-off Switching Times vs. Gate Resistance

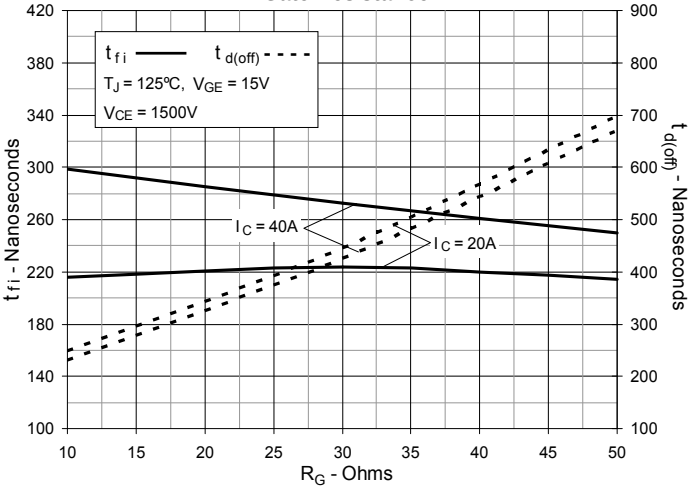


Fig. 19. Inductive Turn-off Switching Times vs. Collector Current

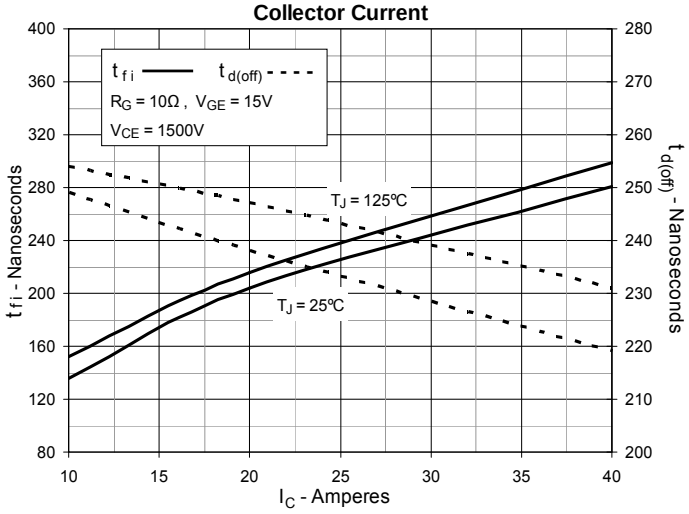


Fig. 20. Inductive Turn-off Switching Times vs. Junction Temperature

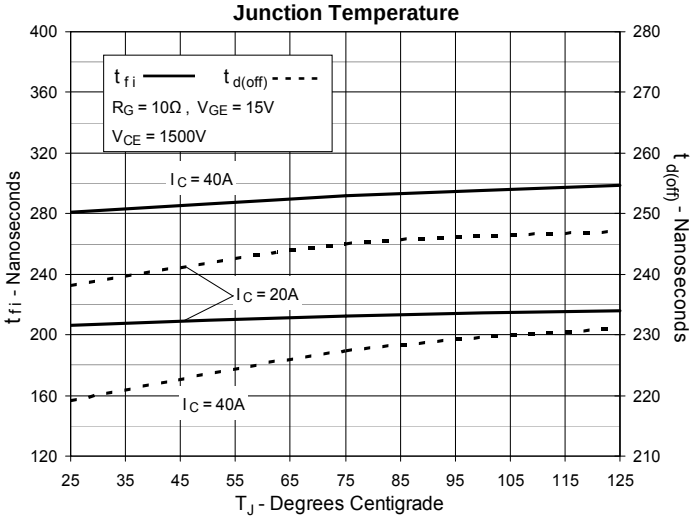


Fig. 21. Inductive Turn-on Switching Times vs. Gate Resistance

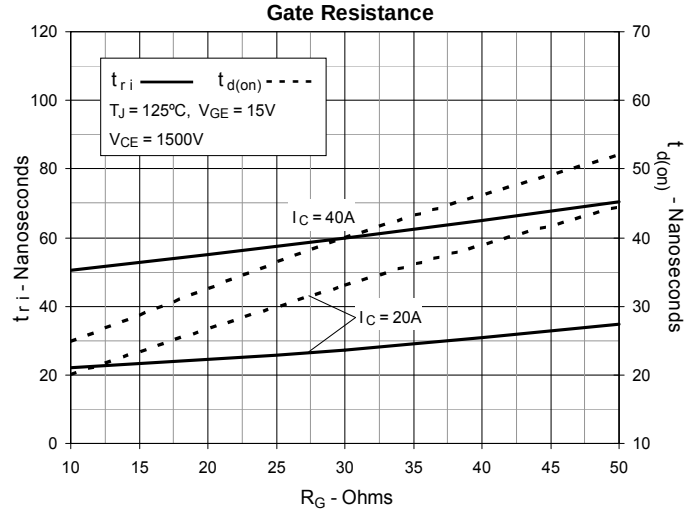


Fig. 22. Inductive Turn-on Switching Times vs. Collector Current

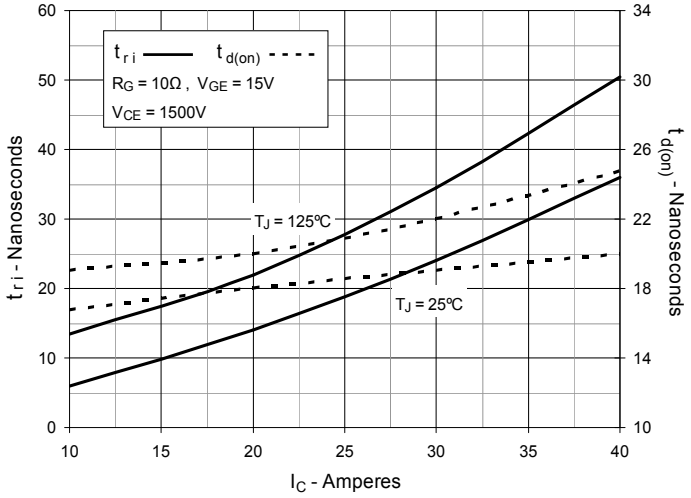


Fig. 23. Inductive Turn-on Switching Times vs. Junction Temperature