IXYS

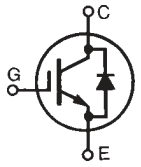
Advance Technical Information

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

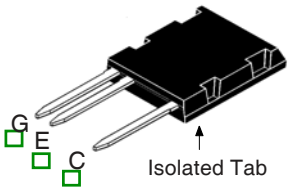
(Electrically Isolated Tab)

IXBL20N300C

V_{CES} = 3000V
I_{C110} = 20A
$V_{CE(sat)} \leq$ 6.0V



ISOPLUS i5-Pak™



G = Gate C = Collector
E = Emitter

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	50	A
I_{C110}	T_C = 110°C	20	A
I_{CM}	T_C = 25°C, 1ms	430	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 3Ω 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	417	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	30..170 / 7..36	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			6.5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ± 20V			±200	nA
$V_{CE(sat)}$	I_C = 20A, V_{GE} = 15V, Note 1		4.5	6.0	V
	T_J = 125°C		5.1		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

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	25	43		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		10		nF
C_{oes}			440		pF
C_{res}			160		pF
$Q_{g(on)}$	I_C = 20A, V_{GE} = 15V, V_{CE} = 1000V		425		nC
Q_{ge}			53		nC
Q_{gc}			160		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		33		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		12		ns
E_{on}	V_{CE} = 1500V, R_G = 3Ω		23.0		mJ
$t_{d(off)}$	Note 3		370		ns
t_{fi}			110		ns
E_{off}			2.6		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		33		ns
t_{ri}	I_C = 20A, V_{GE} = 15V		14		ns
E_{on}	V_{CE} = 1500V, R_G = 3Ω		23.0		mJ
$t_{d(off)}$	Note 3		435		ns
t_{fi}			175		ns
E_{off}			3.7		mJ
R_{thJC}				0.30	°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			5.0	V
t_{rr}	I_F = 20A, V_{GE} = 0V, -di_F/dt = 100A/µs		864		ns
I_{RM}	V_R = 100V, V_{GE} = 0V		31		A
Q_{RM}			13.5		µC

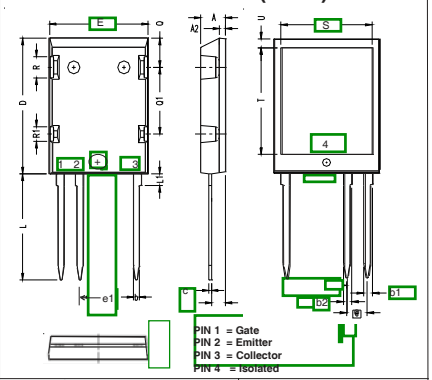
Notes:

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.

ISOPLUS i5-Pak™ HV (IXBL) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETER MIN	MILLIMETER MAX
A	0.190	0.205	4.83	5.21
A1	0.102	0.118	2.59	3.00
A2	0.046	0.055	1.17	1.40
b	0.045	0.055	1.14	1.40
b1	0.063	0.072	1.60	1.83
b2	0.058	0.068	1.47	1.73
c	0.020	0.029	0.51	0.74
D	1.020	1.040	25.91	26.42
E	0.770	0.799	19.56	20.29
e	0.150 BSC		3.81 BSC	
e1	0.450 BSC		11.43 BSC	
L	0.780	0.820	19.81	20.83
L1	0.080	0.102	2.03	2.59
Q	0.210	0.235	5.33	5.97
Q1	0.490	0.513	12.45	13.03
R	0.150	0.180	3.81	4.57
R1	0.100	0.130	2.54	3.30
S	0.668	0.690	16.97	17.53
T	0.801	0.821	20.34	20.85
U	0.065	0.080	1.65	2.03

Fig. 1. Output Characteristics @ T_J = 25ºC

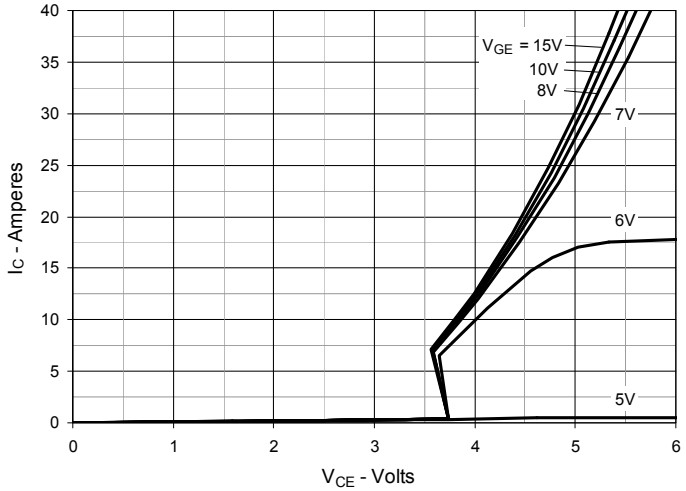


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

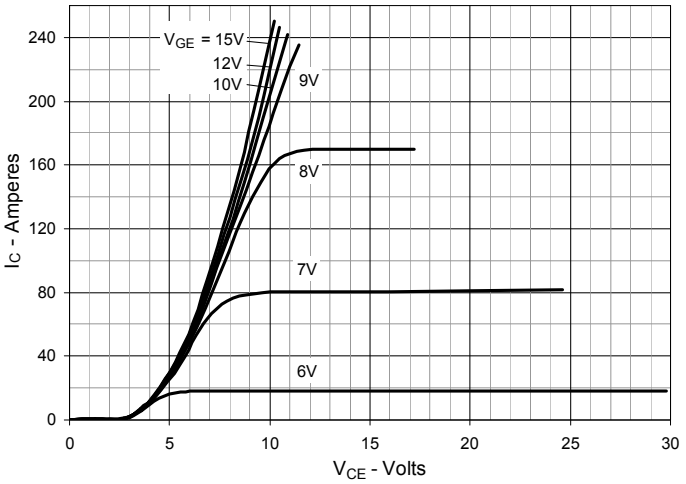


Fig. 3. Output Characteristics @ T_J = 125ºC

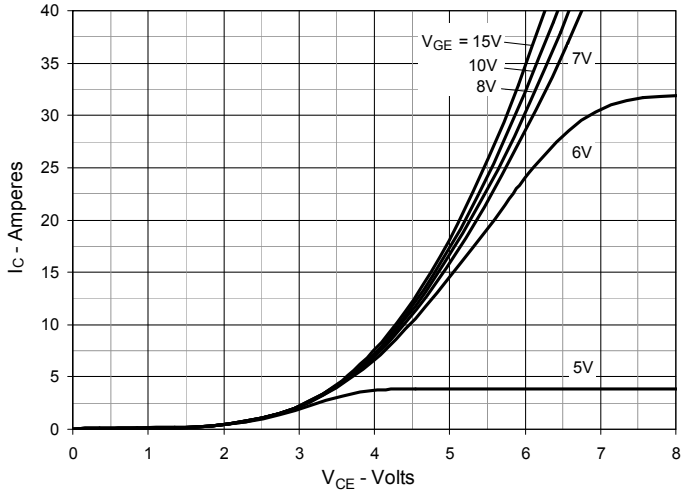


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

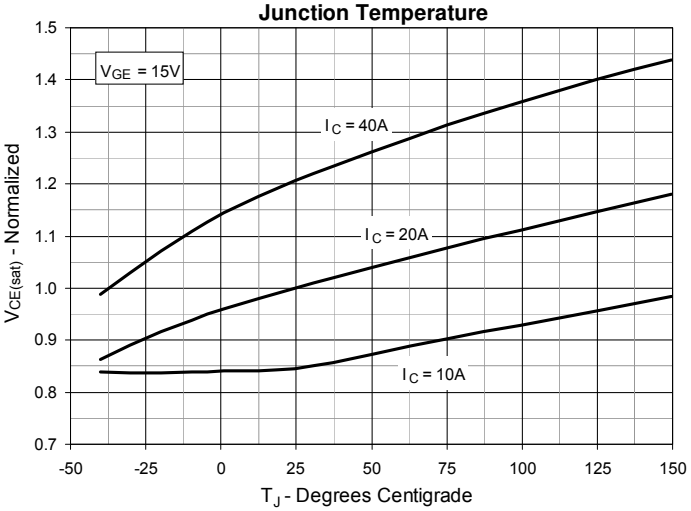


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

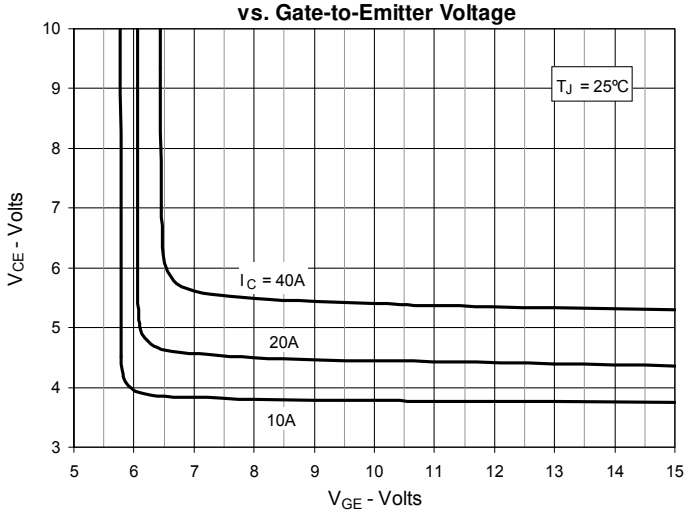


Fig. 6. Input Admittance

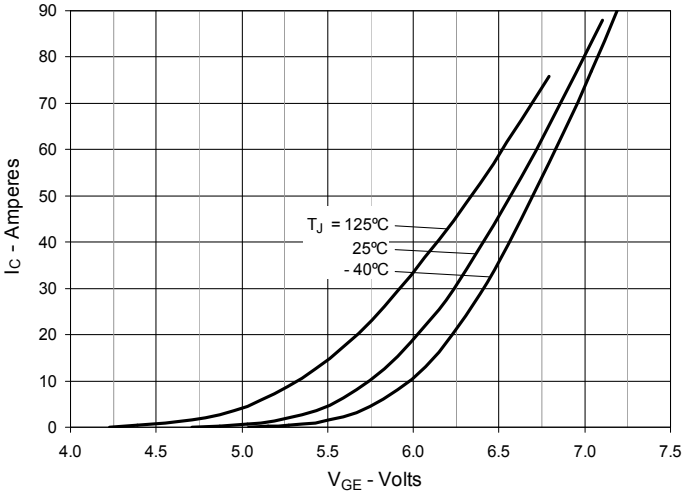


Fig. 7. Transconductance

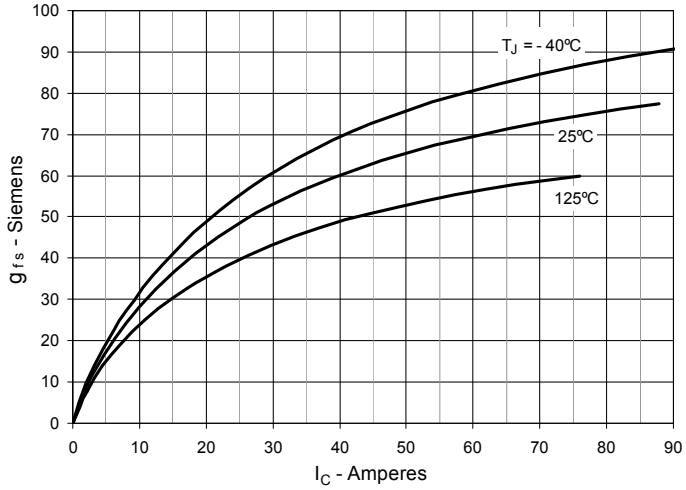


Fig. 8. Gate Charge

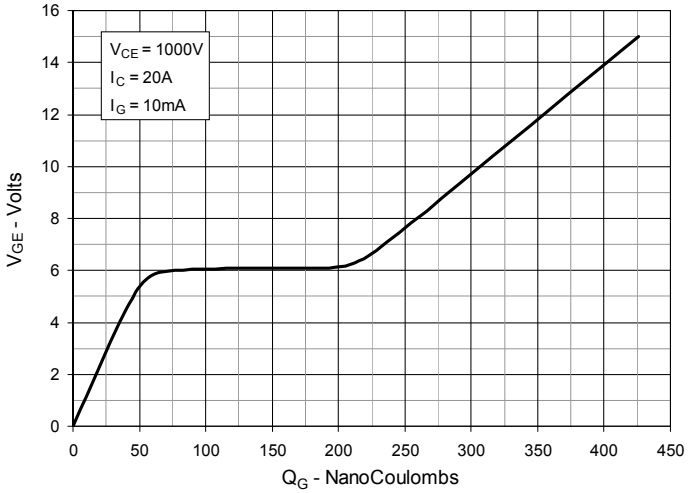


Fig. 9. Forward Voltage Drop of Intrinsic Diode

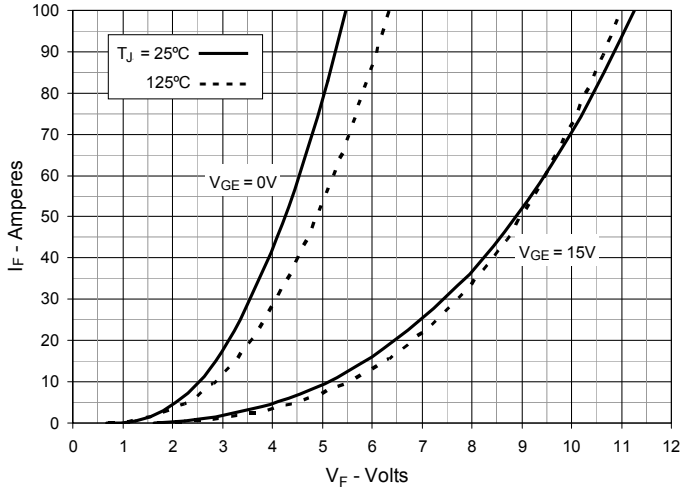


Fig. 10. Capacitance

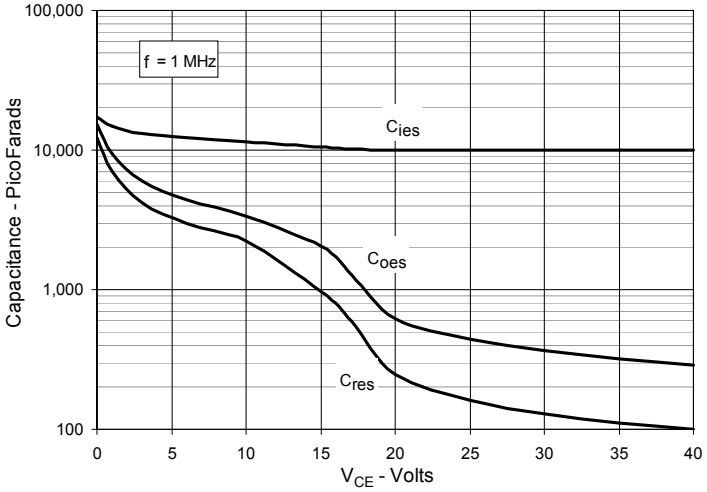


Fig. 11. Reverse-Bias Safe Operating Area

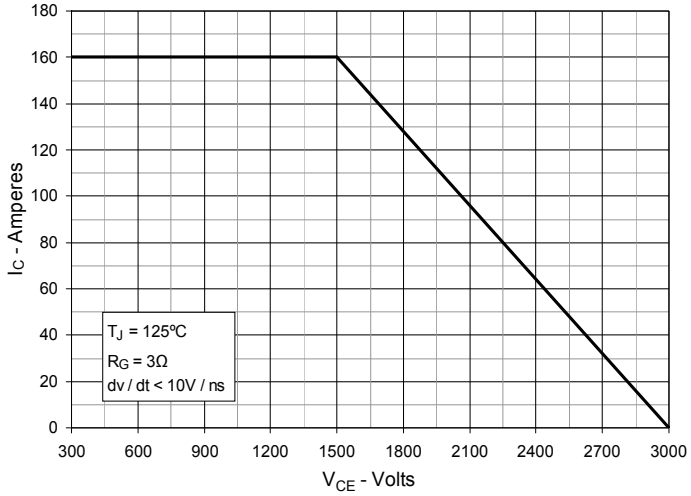


Fig. 12. Maximum Transient Thermal Impedance

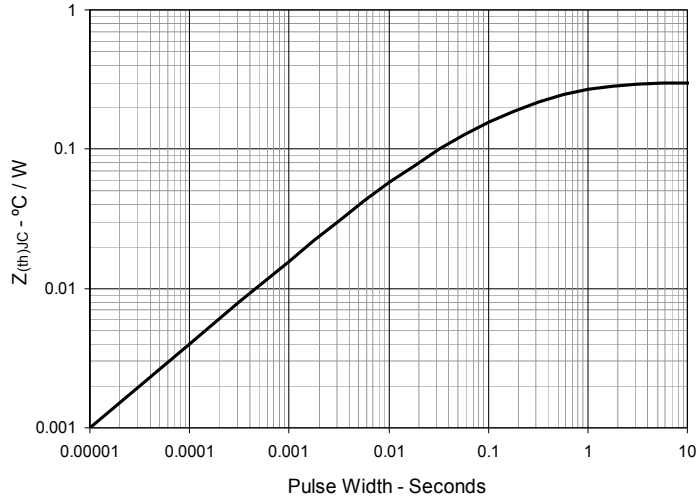


Fig. 13. Forward-Bias Safe Operating Area @ T_C = 25ºC

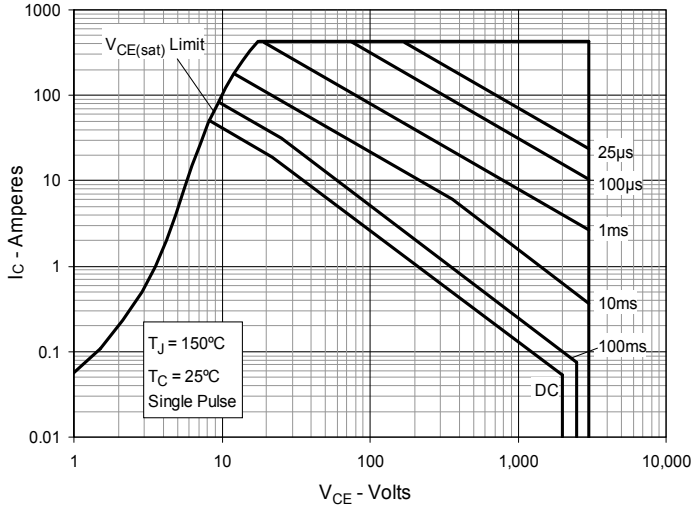


Fig. 14. Forward-Bias Safe Operating Area @ T_C = 75ºC

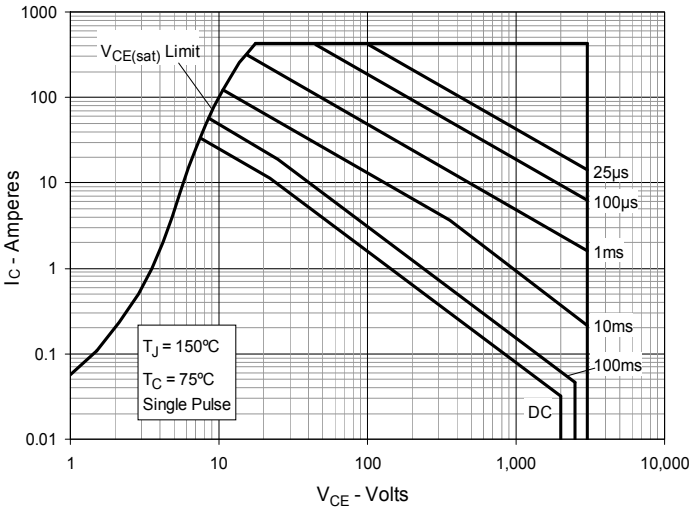


Fig. 15. Inductive Switching Energy Loss vs. Gate Resistance

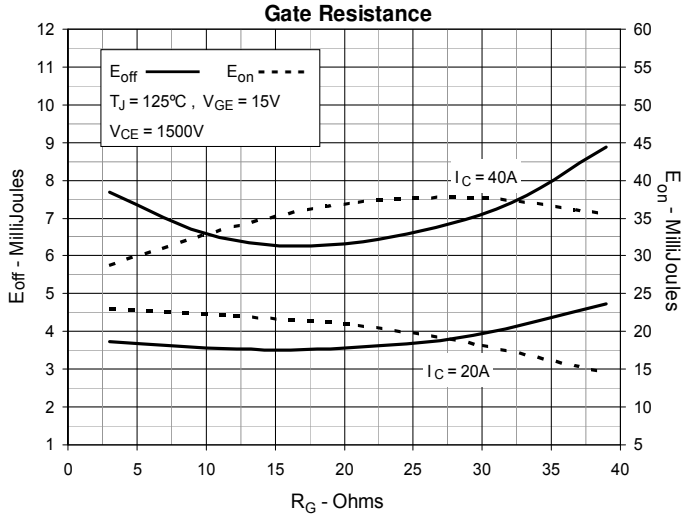


Fig. 16. Inductive Switching Energy Loss vs. Collector Current

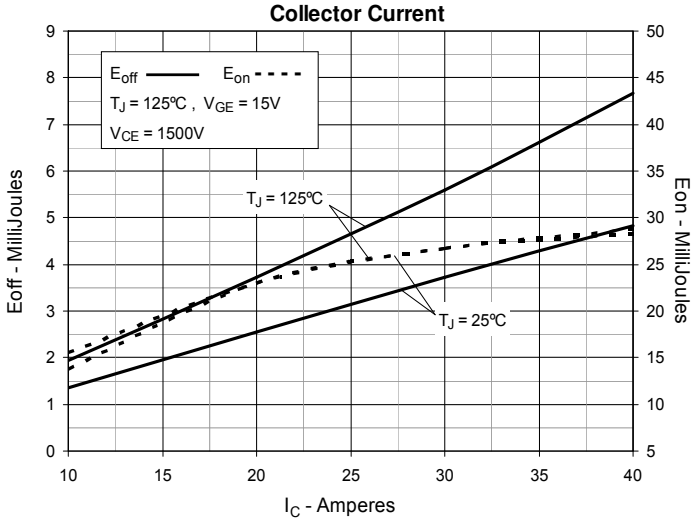


Fig. 17. Inductive Switching Energy Loss vs. Junction Temperature

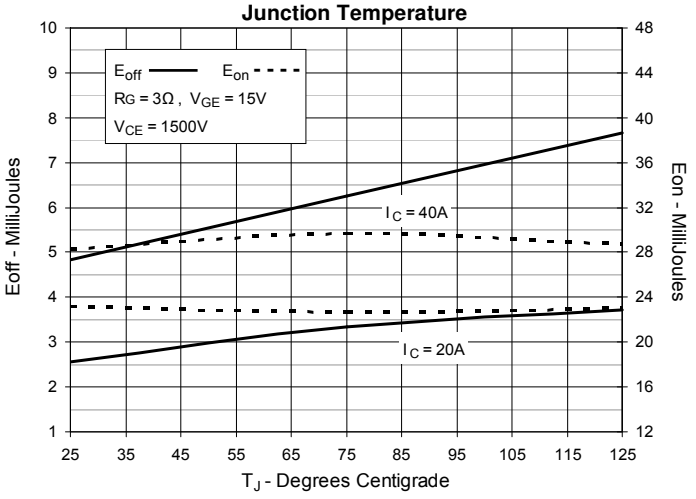


Fig. 18. Inductive Turn-off Switching Times vs. Gate Resistance

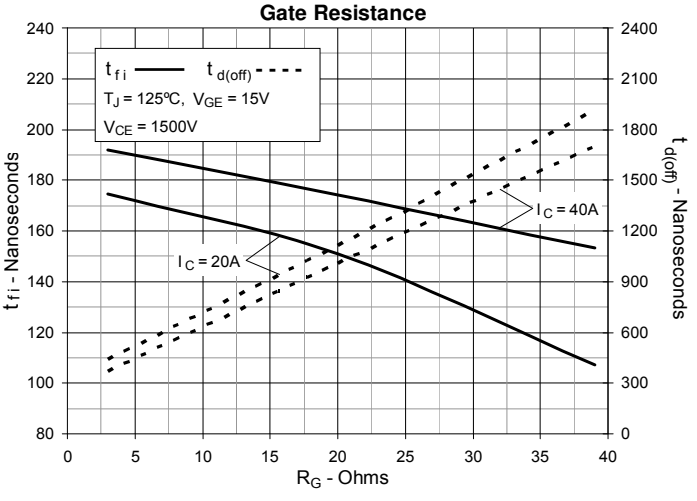


Fig. 19. Inductive Turn-off Switching Times vs. Collector Current

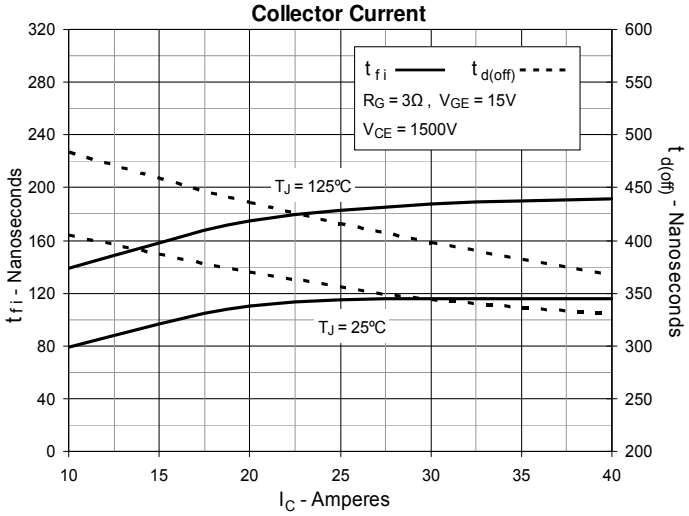


Fig. 20. Inductive Turn-off Switching Times vs. Junction Temperature

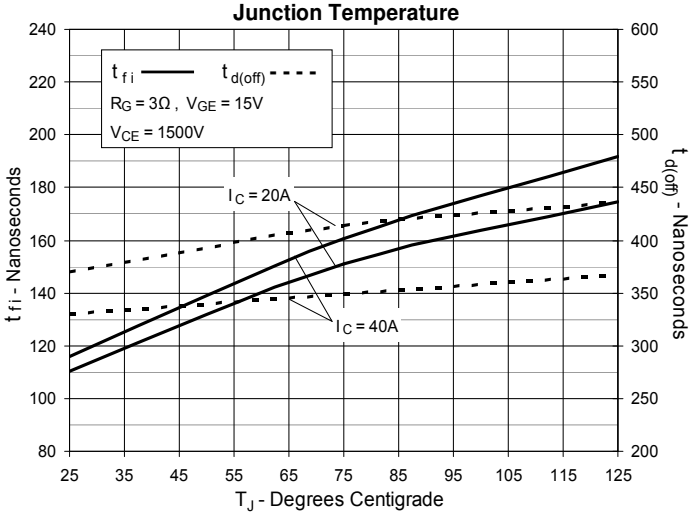


Fig. 21. Inductive Turn-on Switching Times vs. Gate Resistance

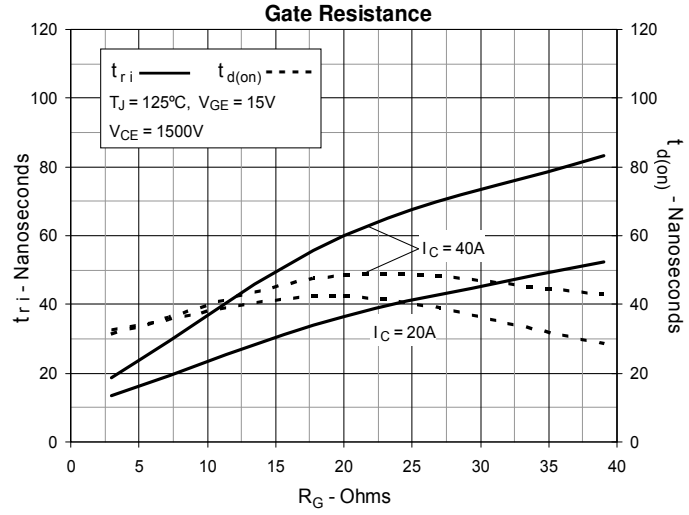


Fig. 22. Inductive Turn-on Switching Times vs. Collector Current

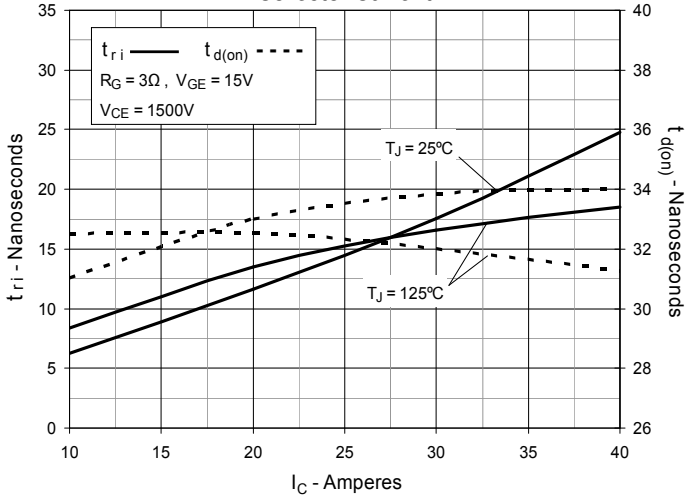


Fig. 23. Inductive Turn-on Switching Times vs. Junction Temperature