

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

IXBF20N360



$$V_{CES} = 3600V$$

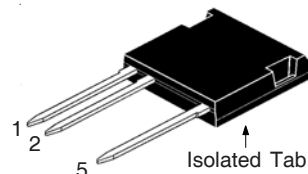
$$I_{C110} = 18A$$

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

(Electrically Isolated Tab)

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	$T_J = 25^\circ C$ to $150^\circ C$	3600	V
V_{CGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$	3600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	45	A
I_{C110}	$T_C = 110^\circ C$	18	A
I_{CM}	$T_C = 25^\circ C$, 1ms	220	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 10\Omega$ 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	$T_C = 25^\circ C$	230	W
T_J		-55 ... +150	$^\circ C$
T_{JM}		150	$^\circ C$
T_{stg}		-55 ... +150	$^\circ C$
T_L	Maximum Lead Temperature for Soldering	300	$^\circ C$
T_{SOLD}	Plastic Body for 10s	260	$^\circ C$
F_C	Mounting Force with Clip	20..120 / 4.5..27	N/lb
V_{ISOL}	50/60Hz, 5 Seconds	4000	V~
Weight		8	g

ISOPLUS i4-Pak™



1 = Gate
2 = Emitter
5 = Collector

Features

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

Advantages

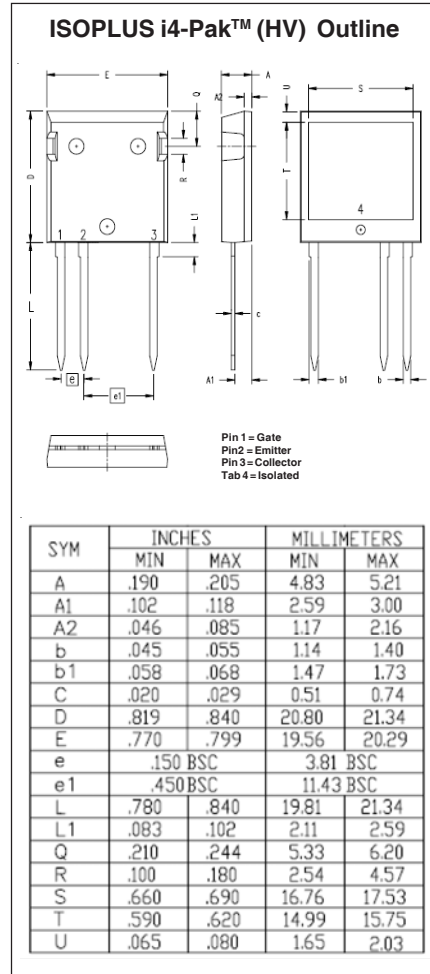
- Low Gate Drive Requirement
- High Power Density

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- Laser Generators
- Capacitor Discharge Circuits
- AC Switches

Symbol	Test Conditions ($T_J = 25^\circ C$ Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	3600		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = 3000V$, $V_{GE} = 0V$ Note 2, $T_J = 125^\circ C$		125	25 μA μA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 200 nA
$V_{CE(SAT)}$	$I_C = 20A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$		2.9 3.6	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	10	17	S
C_{ies}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		2045	pF
C_{oes}			110	pF
C_{res}			50	pF
$Q_{g(on)}$	$I_C = 20\text{A}, V_{GE} = 15\text{V}, V_{CE} = 1000\text{V}$		110	nC
Q_{ge}			13	nC
Q_{gc}			43	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ\text{C}$ $I_C = 20\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 1500\text{V}, R_G = 10\Omega$ Note 3		18	ns
t_{ri}			14	ns
E_{on}			15.50	mJ
$t_{d(off)}$			238	ns
t_{fi}			206	ns
E_{off}			4.30	mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ\text{C}$ $I_C = 20\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 1500\text{V}, R_G = 10\Omega$ Note 3		20	ns
t_{ri}			22	ns
E_{on}			16.10	mJ
$t_{d(off)}$			247	ns
t_{fi}			216	ns
E_{off}			4.15	mJ
$t_{d(on)}$	Resistive load, $T_J = 25^\circ\text{C}$ $I_C = 20\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 960\text{V}, R_G = 10\Omega$		30	ns
t_r			325	ns
$t_{d(off)}$			165	ns
t_f			1045	ns
t_t				ns
$t_{d(on)}$	Resistive load, $T_J = 125^\circ\text{C}$ $I_C = 20\text{A}, V_{GE} = 15\text{V}$ $V_{CE} = 960\text{V}, R_G = 10\Omega$		32	ns
t_r			890	ns
$t_{d(off)}$			185	ns
t_f			1100	ns
t_t				ns
R_{thJC}				0.54 $^\circ\text{C/W}$
R_{thCS}		0.15		$^\circ\text{C/W}$



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			3.5 V
t_{rr}	$I_F = 10\text{A}, V_{GE} = 0\text{V}, -di_F/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}, V_{GE} = 0\text{V}$		1.7	μs
I_{RM}			35	A
Q_{RM}			30	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} (clamp), T_J or R_G .

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	

PRELIMINARY 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.

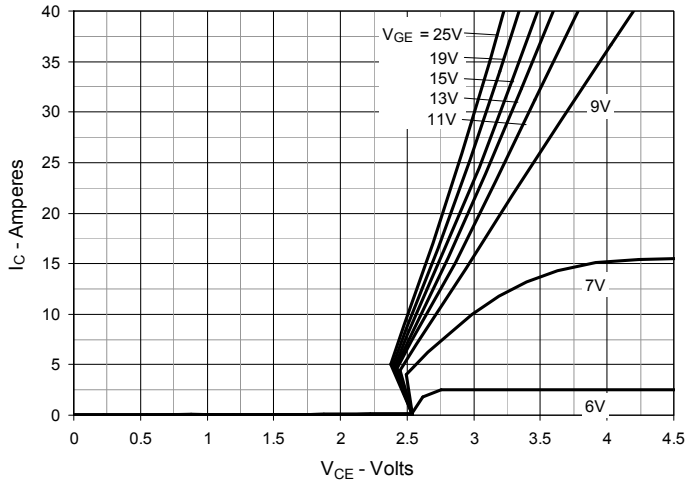
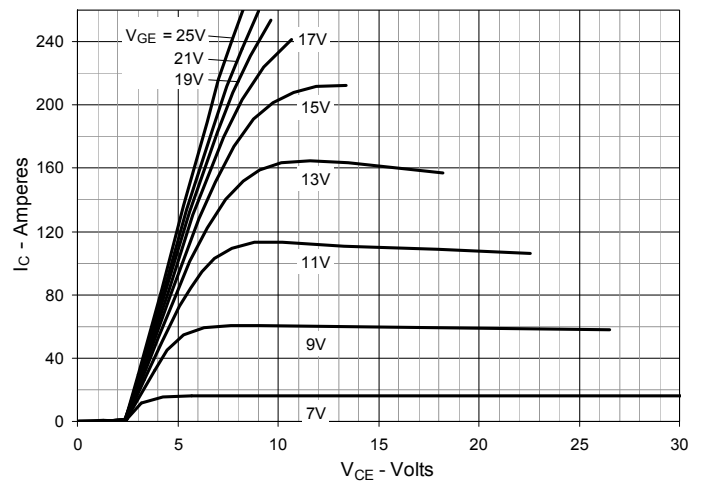
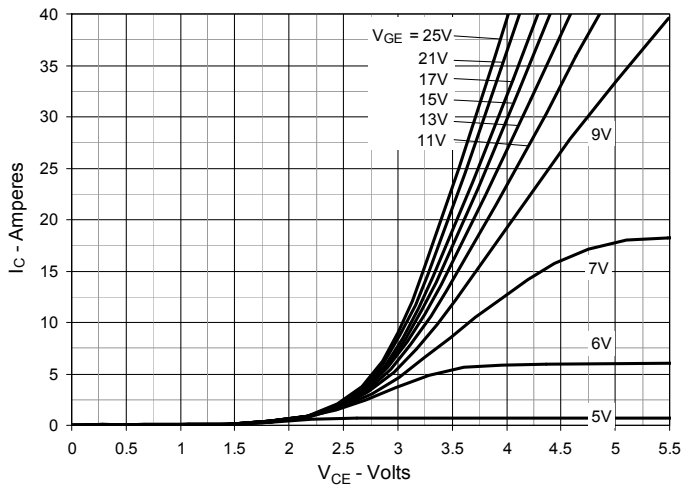
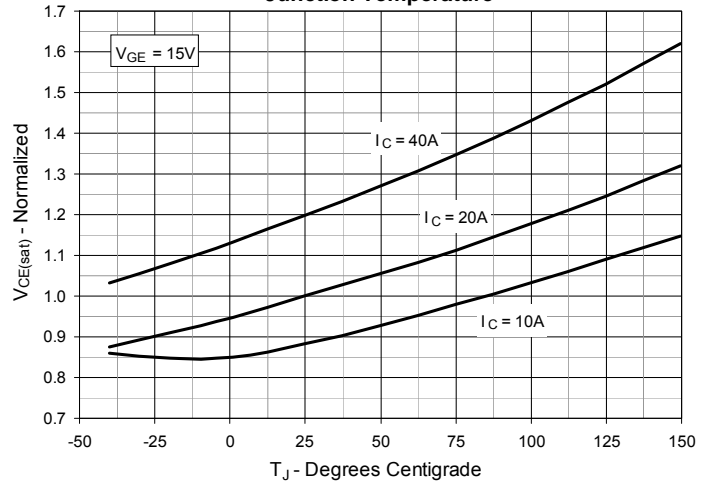
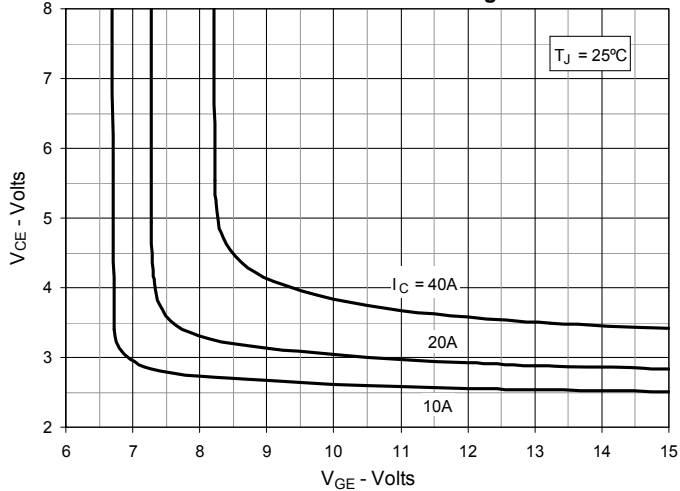
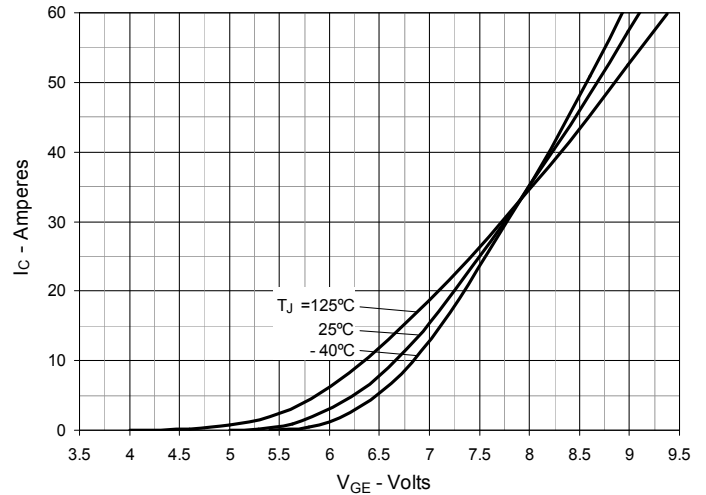
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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

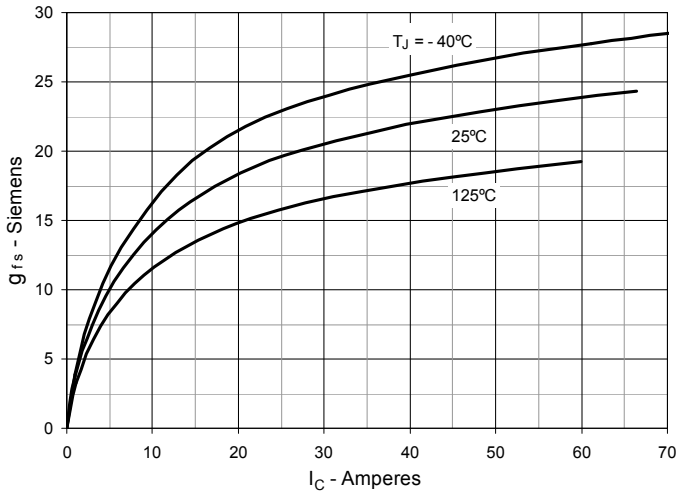


Fig. 8. Gate Charge

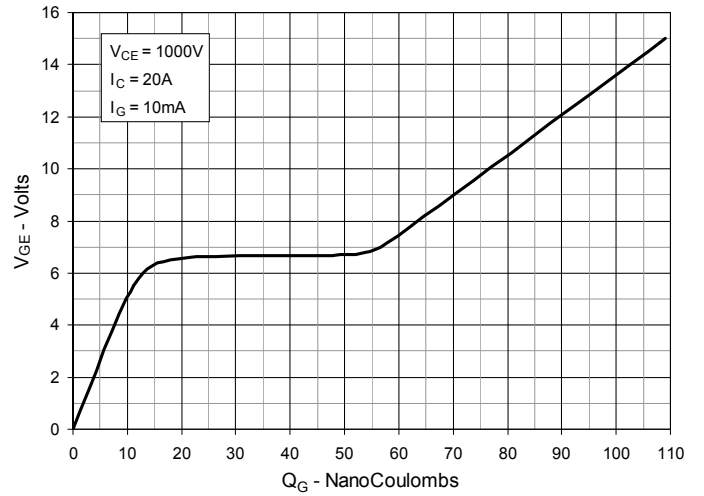


Fig. 9. Forward Voltage Drop of Intrinsic Diode

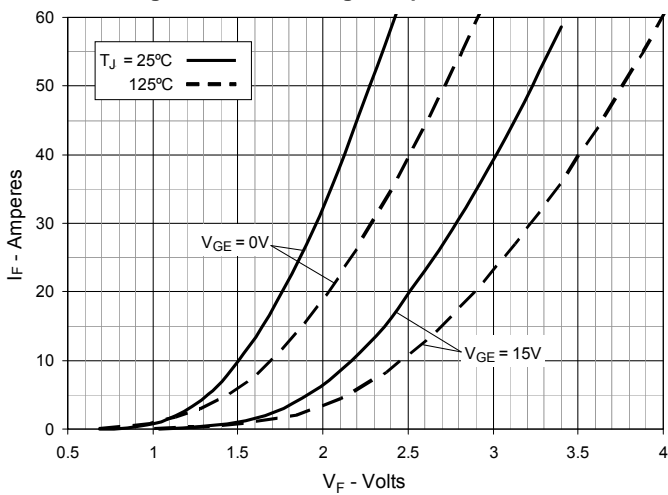


Fig. 10. Capacitance

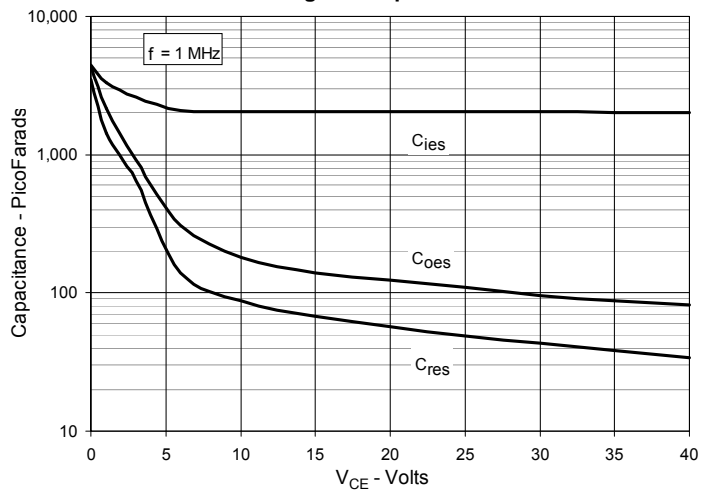


Fig. 11. Reverse-Bias Safe Operating Area

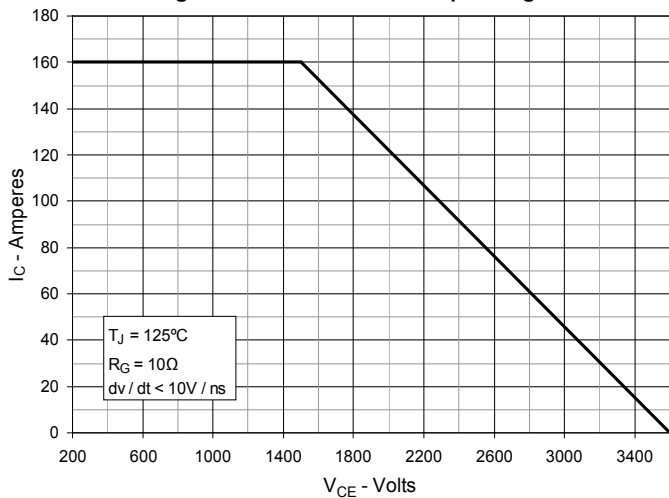


Fig. 12. Maximum Transient Thermal Impedance

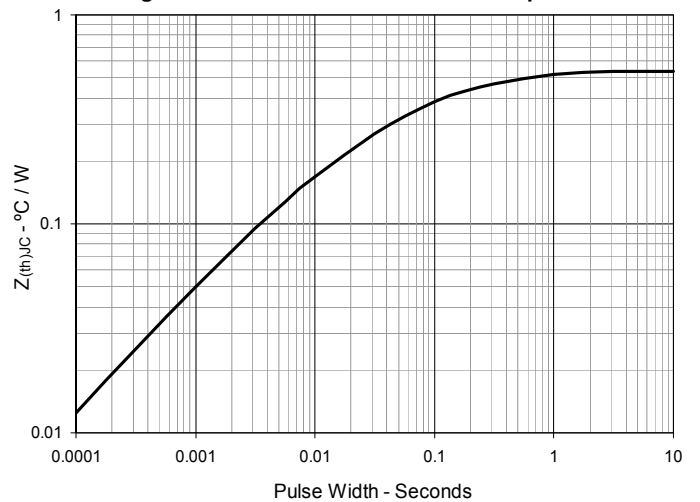


Fig. 13. Forward-Bias Safe Operating Area @ $T_C = 25^\circ\text{C}$

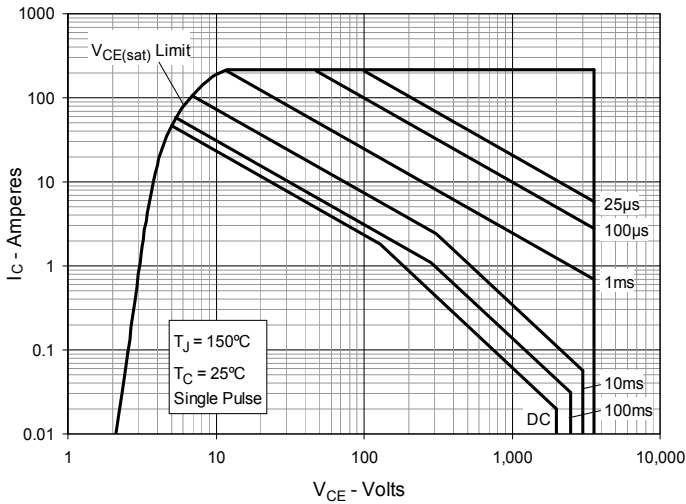


Fig. 14. Forward-Bias Safe Operating Area @ $T_C = 75^\circ\text{C}$

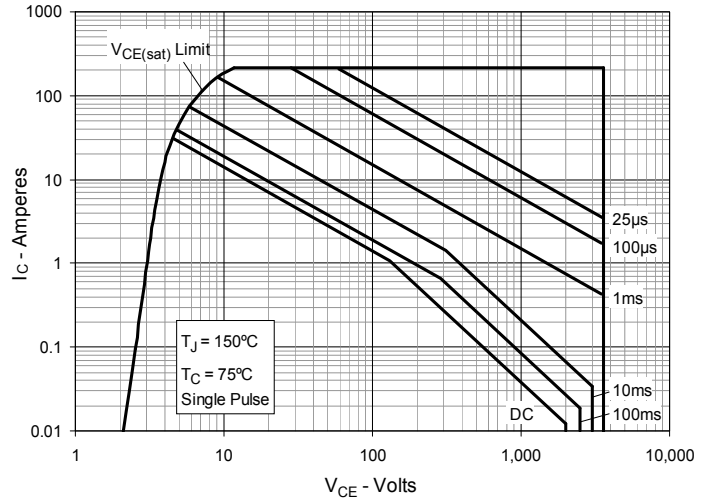


Fig. 15. Inductive Switching Energy Loss vs. Gate Resistance

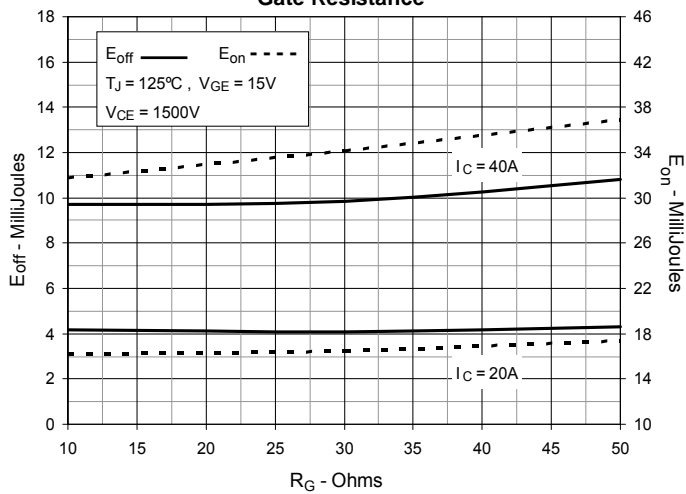


Fig. 16. Inductive Switching Energy Loss vs. Collector Current

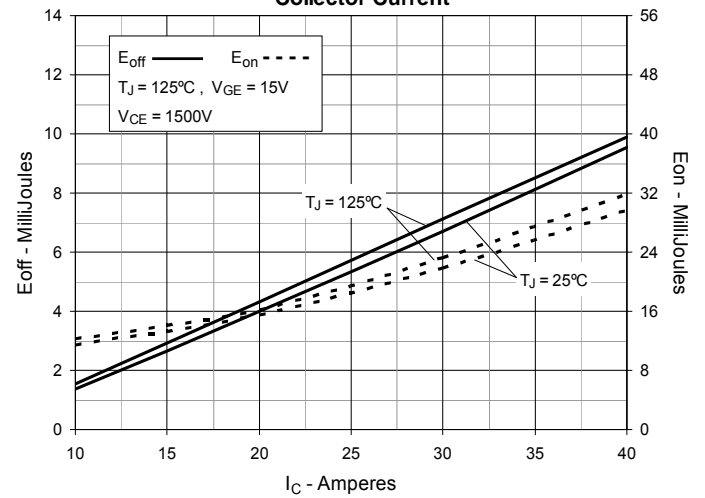


Fig. 17. Inductive Switching Energy Loss vs. Junction Temperature

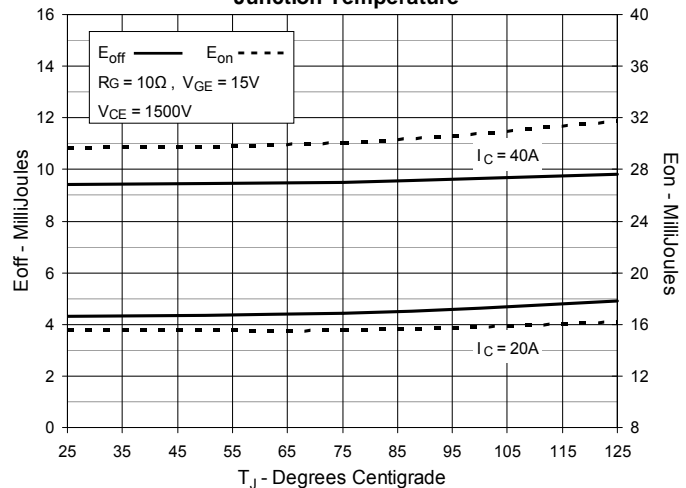


Fig. 18. Inductive Turn-off Switching Times vs. Gate Resistance

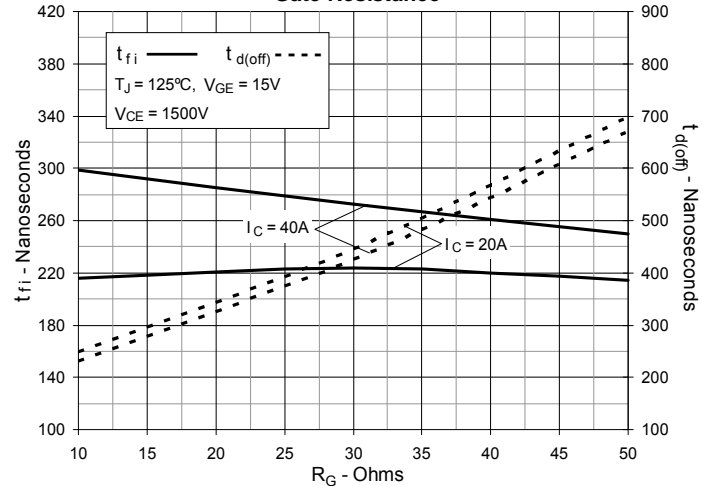
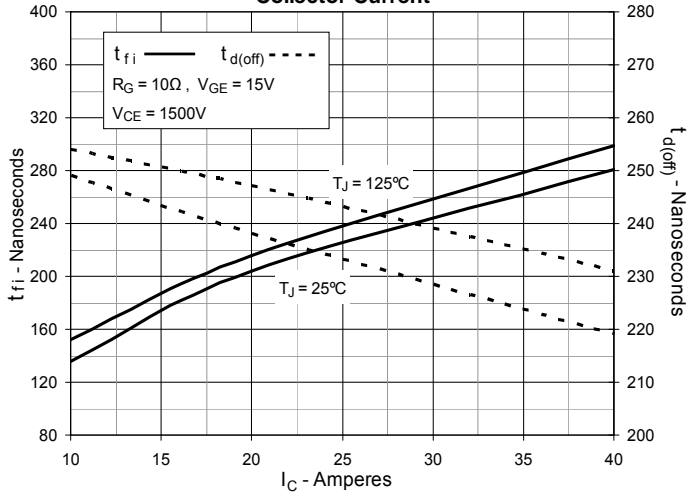
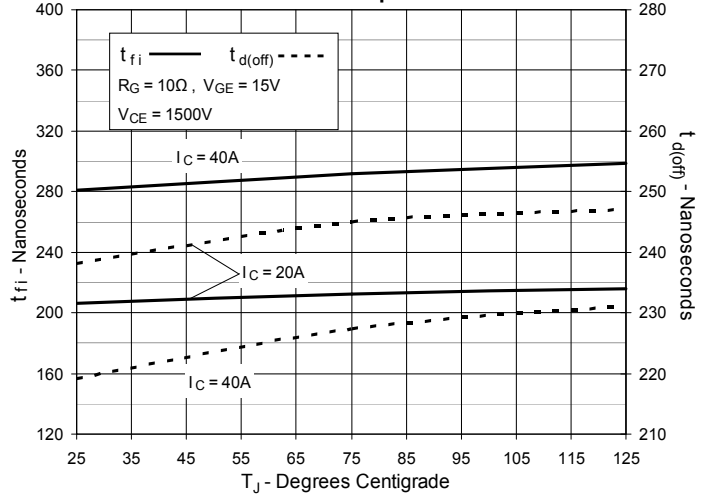
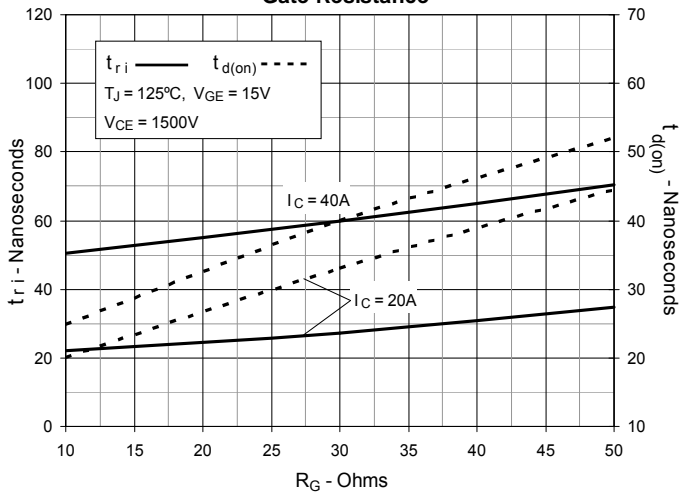
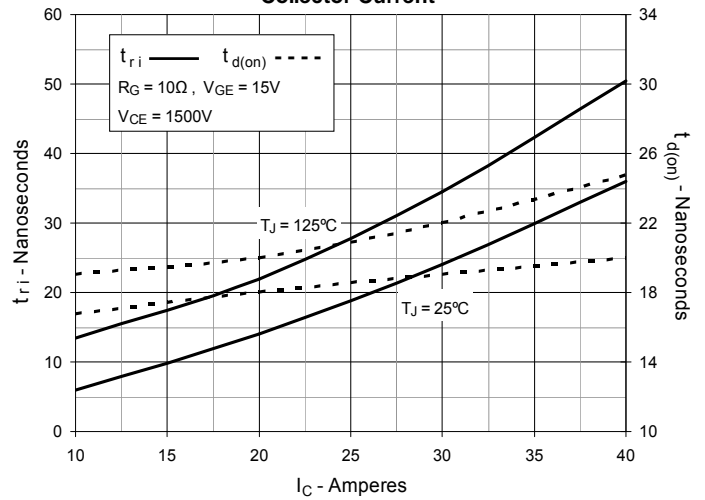
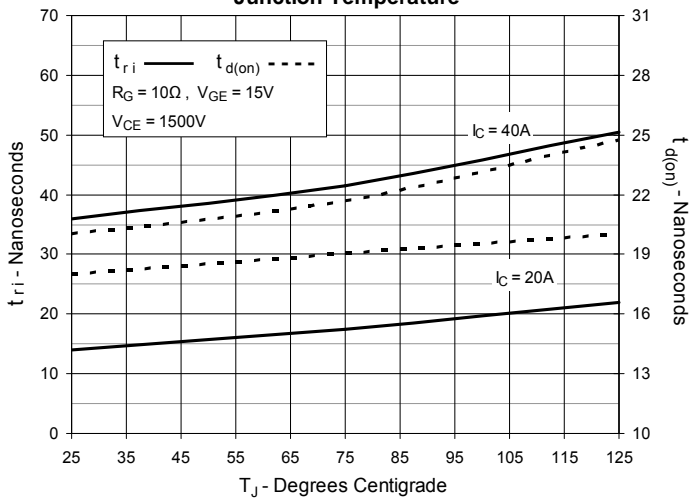


Fig. 19. Inductive Turn-off Switching Times vs. Collector Current

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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