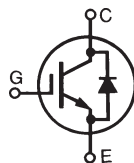


High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

IXBT20N360HV IXBH20N360HV



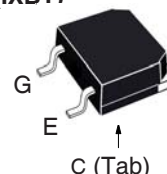
$$V_{CES} = 3600V$$

$$I_{C110} = 20A$$

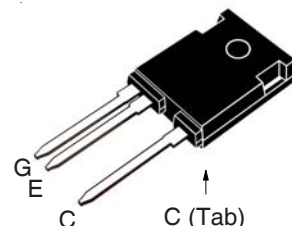
$$V_{CE(sat)} \leq 3.4V$$

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}	$T_C = 25^\circ C$	70	A
I_{C110}	$T_C = 110^\circ C$	20	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	$I_{CM} = 160$	A
		$V_{CES} \leq 1500$	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	$T_C = 25^\circ C$	430	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	$^\circ C$
M_d	Mounting Torque (TO-247HV)	1.13/10	Nm/lb.in
Weight	TO-268HV	4	g
	TO-247HV	6	g

TO-268HV (IXBT)



TO-247HV (IXBH)



G = Gate C = Collector
E = Emitter Tab = Collector

Features

- High Voltage Packages
- High Blocking Voltage
- High Peak Current Capability
- Low Saturation Voltage

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}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$ $T_J = 125^\circ C$			25 μA 500 μA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 20A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$		2.9 3.6	3.4 V V

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}			14	ns
E_{on}		I _C = 20A, V _{GE} = 15V	15.50	mJ
t_{d(off)}		V _{CE} = 1500V, R _G = 10Ω	238	ns
t_{fi}		Note 2	206	ns
E_{off}			4.30	mJ
t_{d(on)}	Inductive load, T _J = 125°C		20	ns
t_{ri}			22	ns
E_{on}		I _C = 20A, V _{GE} = 15V	16.10	mJ
t_{d(off)}		V _{CE} = 1500V, R _G = 10Ω	247	ns
t_{fi}		Note 2	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}				0.29°C/W
R_{thCS}	TO-247HV	0.21		°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}			35	A
Q_{RM}			30	μC

Note: 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

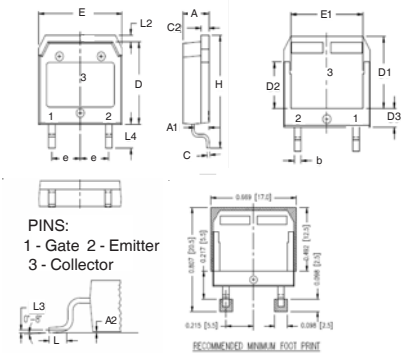
2. Switching times & energy losses may increase for higher V_{CE}(clamp), T_J or R_G.

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.

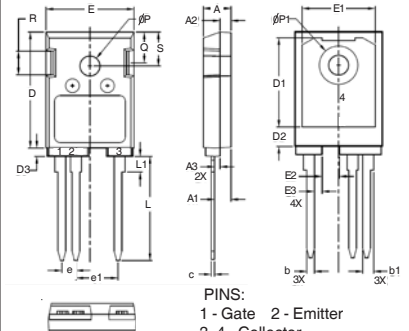
TO-268HV Outline



PINS:
1 - Gate 2 - Emitter
3 - Collector

SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.465	.476	11.80	12.10
D2	.295	.307	7.50	7.80
D3	.114	.126	2.90	3.20
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
E2	.215	BSC	5.45	BSC
H	.736	.752	18.70	19.10
L	.067	.079	1.70	2.00
L2	.039	.045	1.00	1.15
L3	.010	BSC	0.25	BSC
L4	.150	.161	3.80	4.10

TO-247HV Outline



PINS:
1 - Gate 2 - Emitter
3, 4 - Collector

SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.114	.122	2.90	3.10
A2	.075	.083	1.90	2.10
A3	.035	.043	0.90	1.10
b	.053	.059	1.35	1.50
b1	.075	.083	1.90	2.10
c	.022	.030	0.55	0.75
D	.819	.843	20.80	21.40
D1	.638	.646	16.20	16.40
D2	.134	.146	3.40	3.70
D3	.055	.063	1.40	1.60
E	.622	.638	15.80	16.20
E1	.520	.528	13.20	13.40
E2	.118	.126	3.00	3.20
E3	.051	.059	1.30	1.50
e	.100	BSC	2.54	BSC
e1	.300	BSC	7.62	BSC
L	.732	.748	18.60	19.00
L1	.106	.118	2.70	3.00
øP	.138	.142	3.50	3.60
øP1	.272	.280	6.90	7.10
Q	.216	.224	5.50	5.70
R	.165	.169	4.20	4.30
S	.240	.248	6.10	6.30

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	

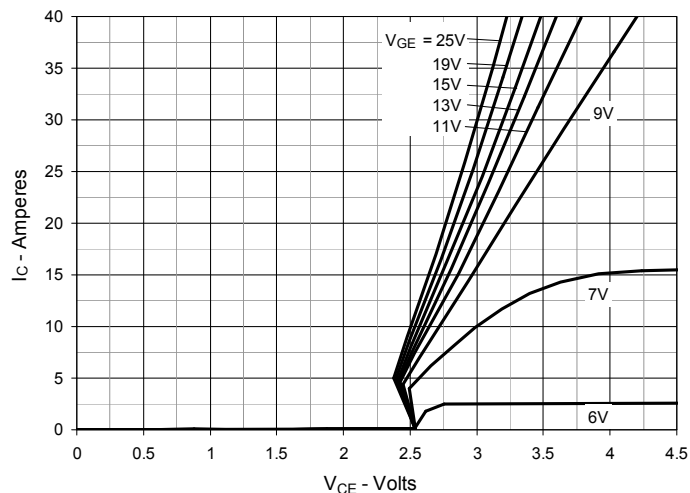
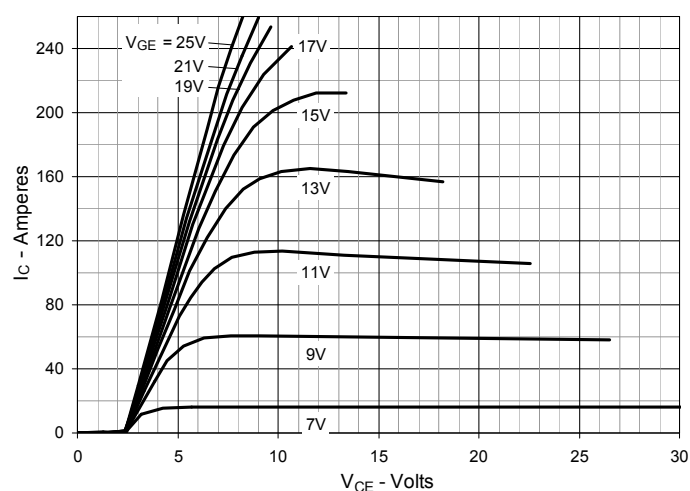
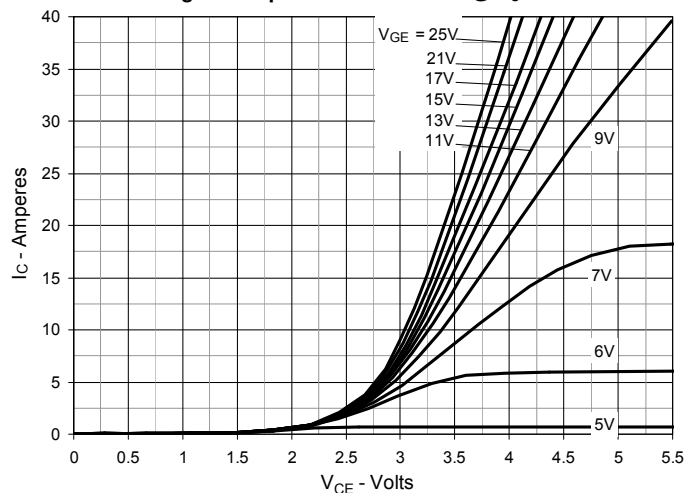
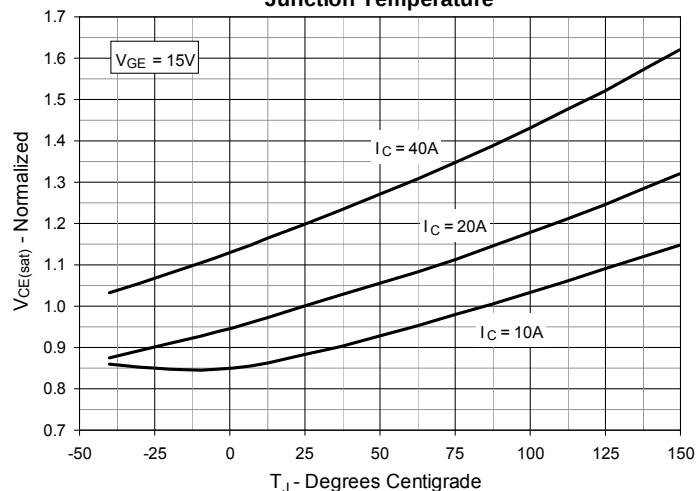
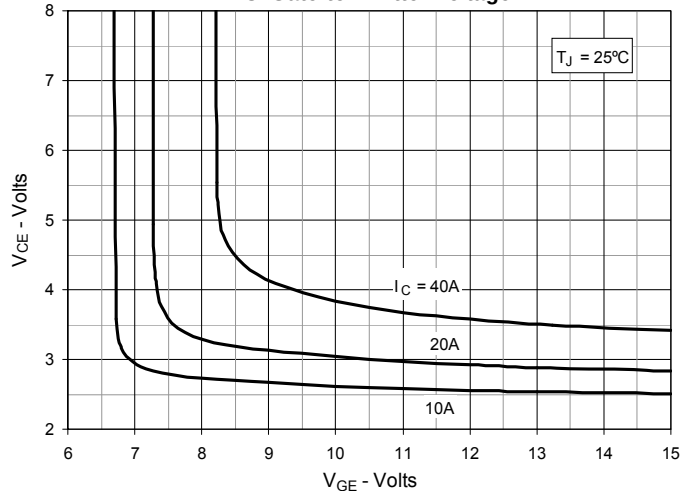
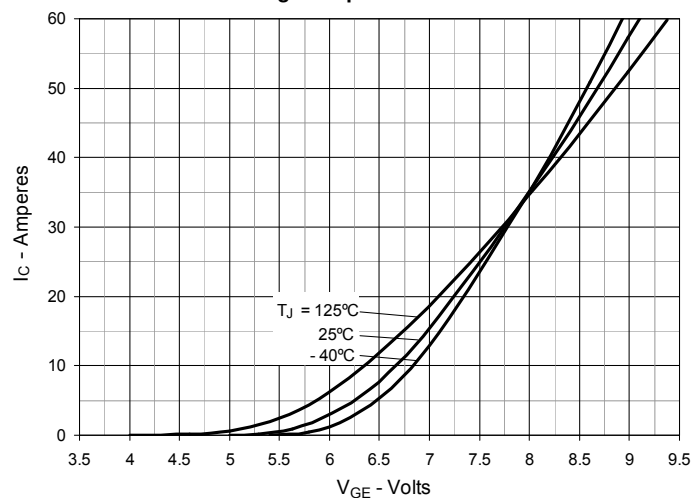
Fig. 1. Output Characteristics @ $T_J = 25^\circ\text{C}$

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


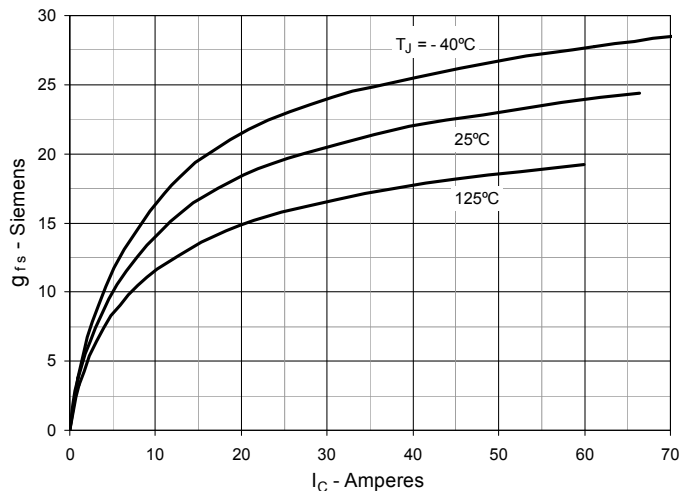
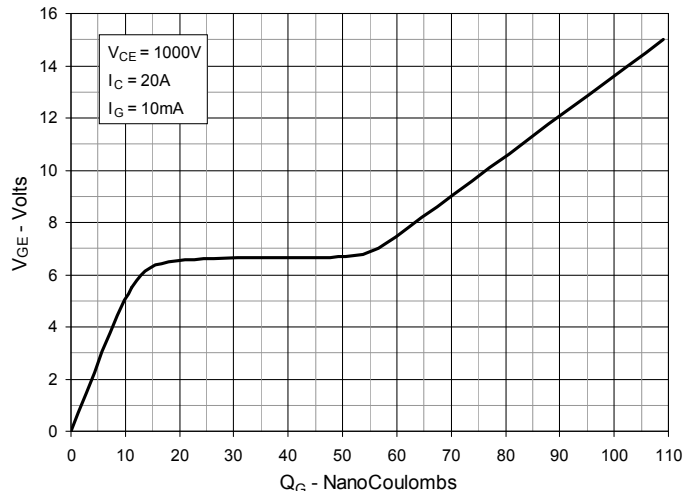
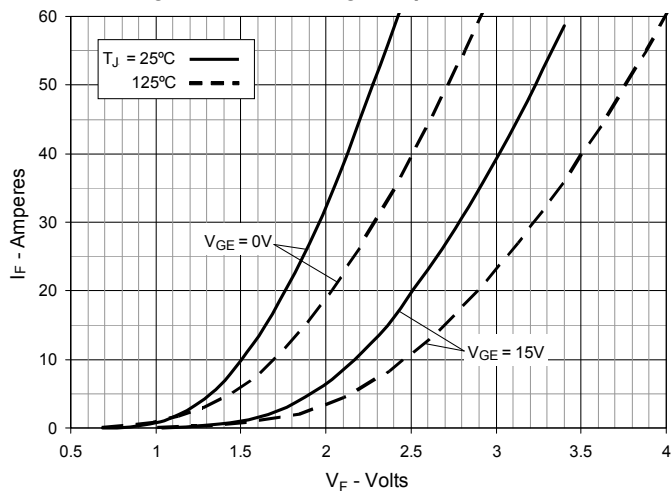
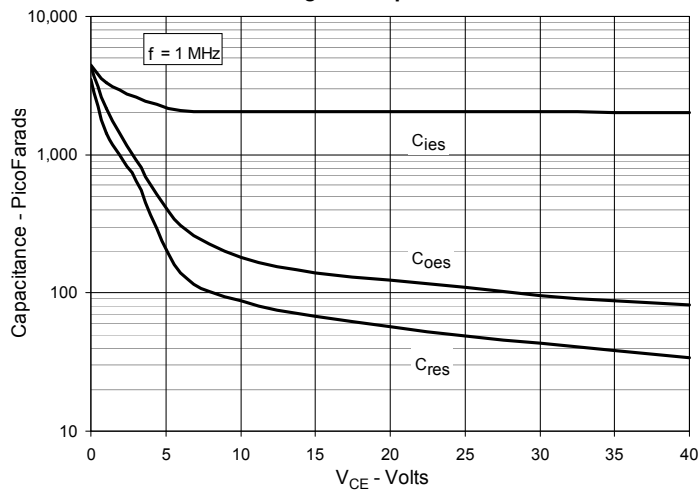
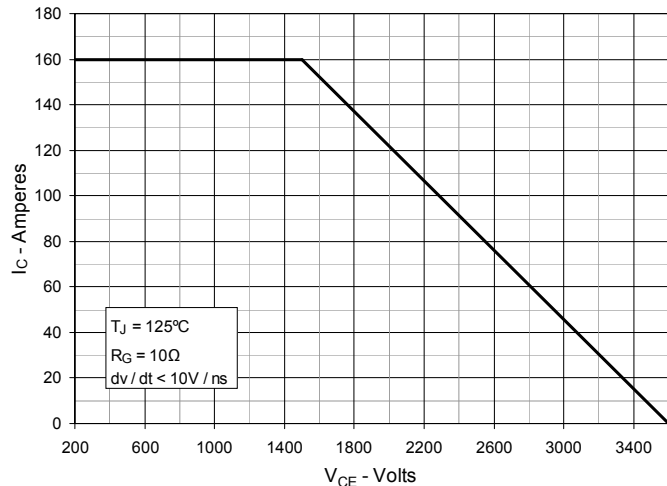
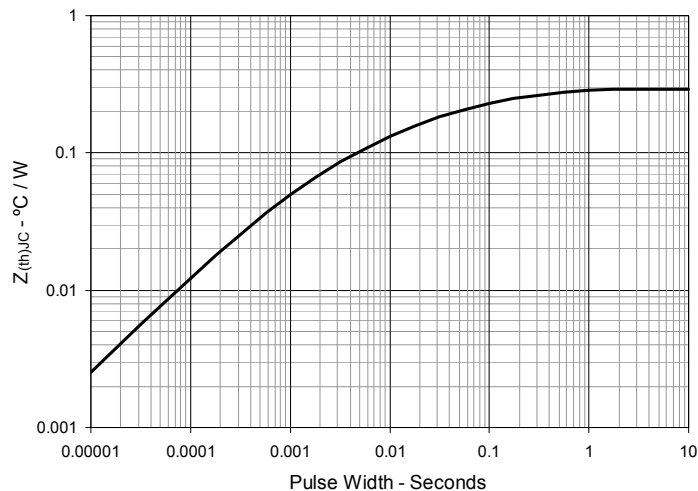
Fig. 7. Transconductance

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 @ $T_C = 25^\circ\text{C}$

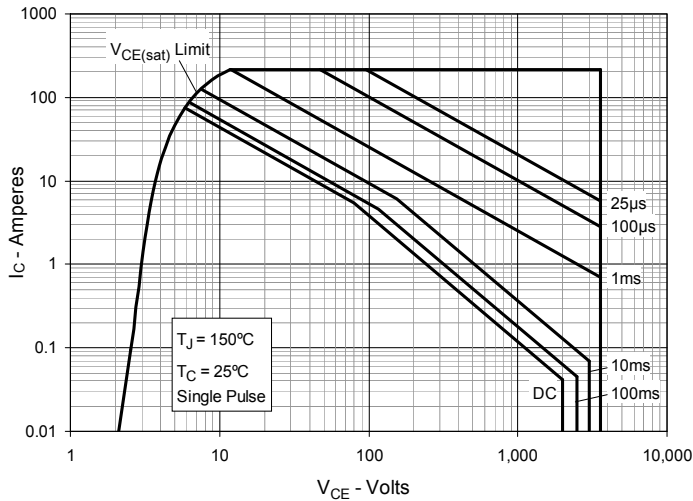


Fig. 14. Forward-Bias Safe Operating Area @ $T_C = 75^\circ\text{C}$

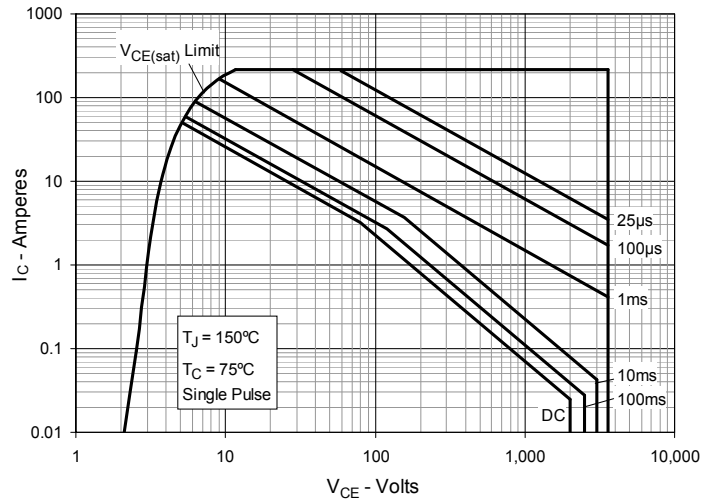


Fig. 15. Inductive Switching Energy Loss vs. Gate Resistance

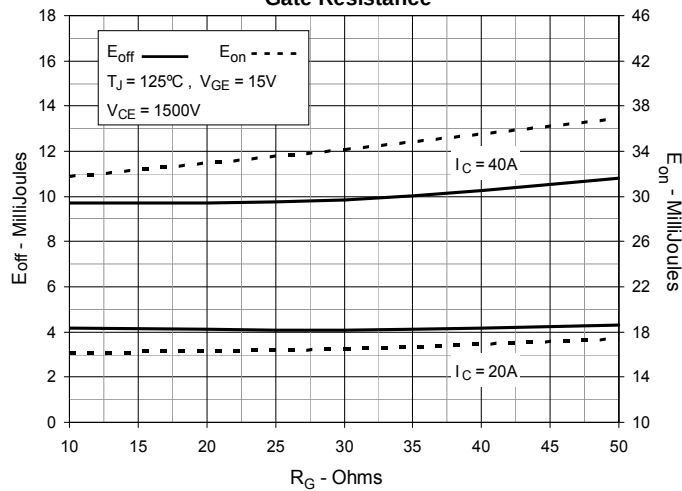


Fig. 16. Inductive Switching Energy Loss vs. Collector Current

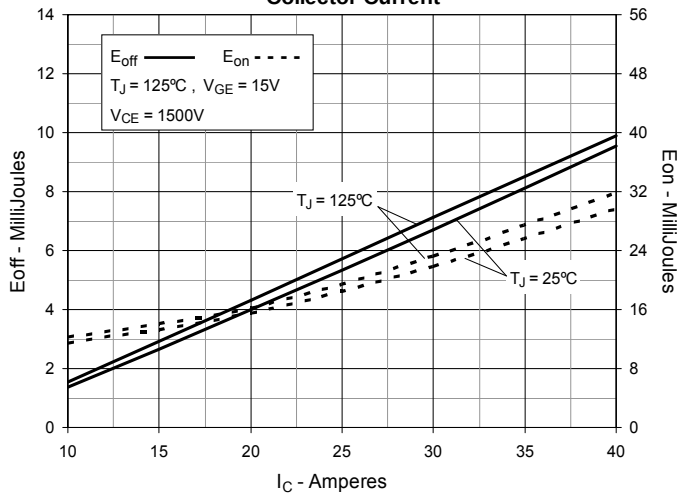


Fig. 17. Inductive Switching Energy Loss vs. Junction Temperature

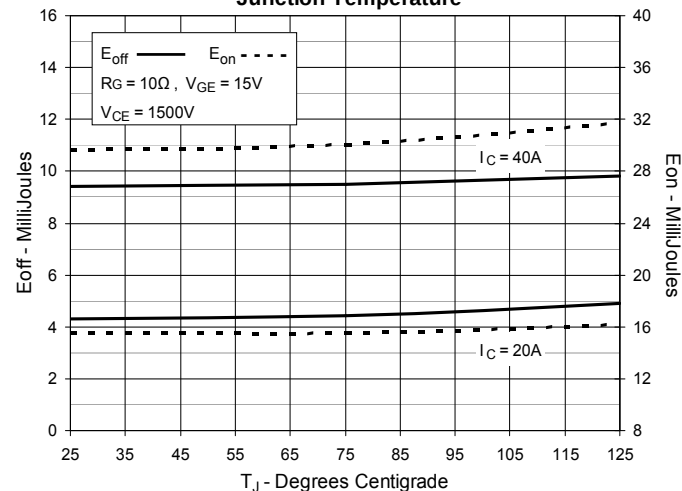


Fig. 18. Inductive Turn-off Switching Times vs. Gate Resistance

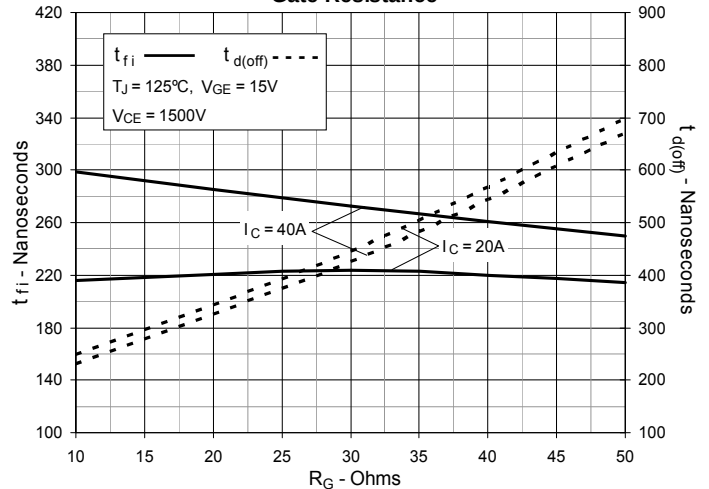
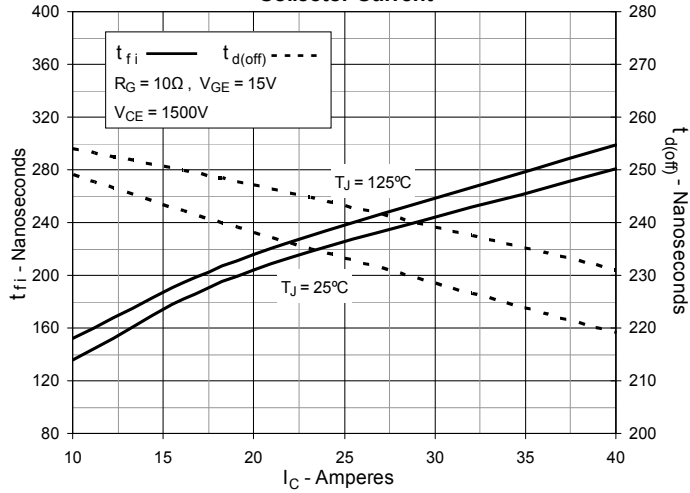
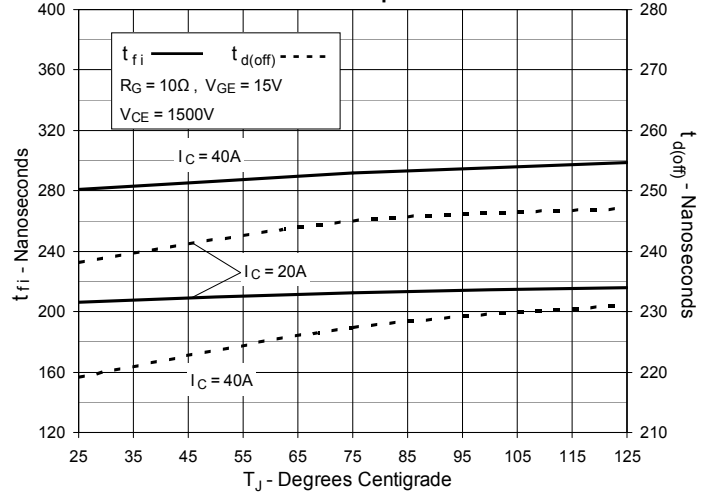
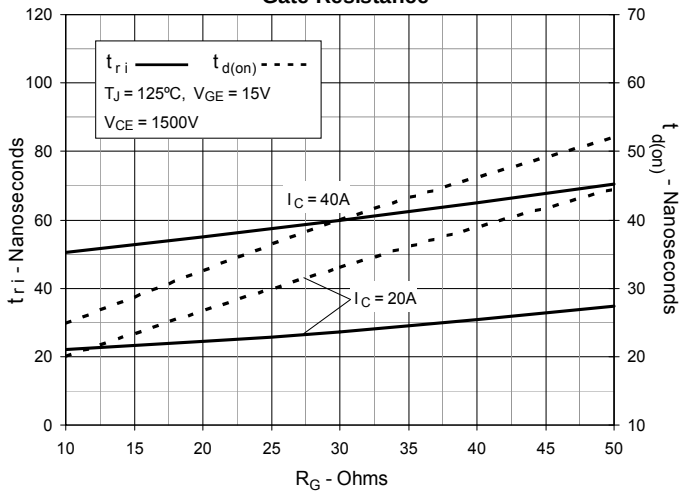
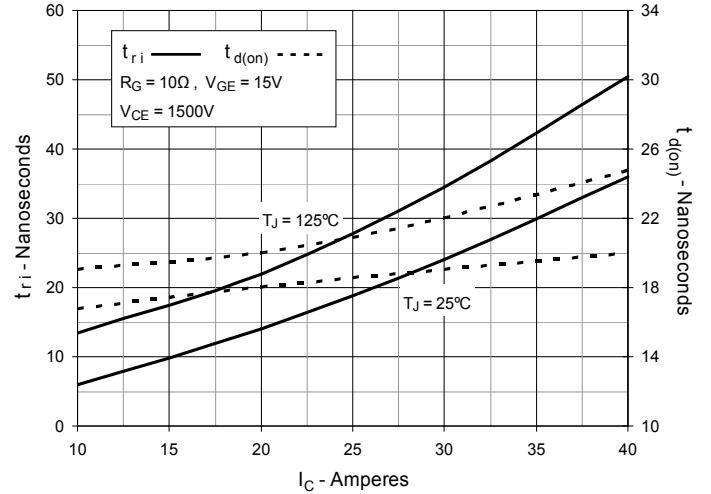
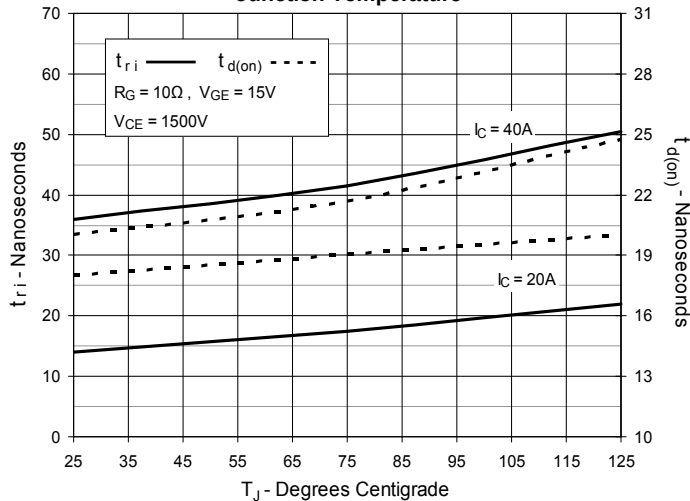


Fig. 19. Inductive Turn-off Switching Times vs. Collector Current

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




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