

High Voltage IGBT w/ Sonic Diode

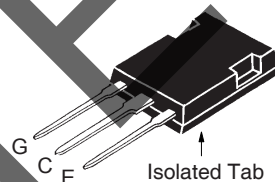
IXGR16N170AH1

$V_{CES} = 1700V$
 $I_{C90} = 8A$
 $V_{CE(sat)} \leq 5.0V$
 $t_{fi(typ)} = 35ns$

(Electrically Isolated Tab)



ISOPLUS247™



G = Gate
E = Emitter
C = Collector

Symbol	Test Conditions	Maximum Ratings	
		Value	Unit
V_{CES}	$T_J = 25^\circ C$ to $150^\circ C$	1700	V
V_{CGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$	1700	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	16	A
I_{C90}	$T_C = 90^\circ C$	8	A
I_{F90}	$T_C = 90^\circ C$	15	A
I_{CM}	$T_C = 25^\circ C$, 1ms	40	A
SSOA (RBSOA)	$V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 10\Omega$ Clamped Inductive Load	$I_{CM} = 40$ $0.8 \cdot V_{CES}$	A
t_{sc} (SCSOA)	$V_{GE} = 15V$, $V_{CE} = 1200V$, $T_J = 125^\circ C$ $R_G = 22\Omega$, Non Repetitive	10	μs
P_C	$T_C = 25^\circ C$	120	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	$^\circ C$
V_{ISOL}	50/60 Hz, 1 Minute	2500	V~
F_C	Mounting Force	20..120/4.5..27	N/lb
Weight		5	g

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- Isolated Mounting Surface
- 2500V~ Electrical Isolation
- Anti-Parallel Sonic Diode
- International Standard Package

Advantages

- High Power Density
- Low Gate Drive Requirement

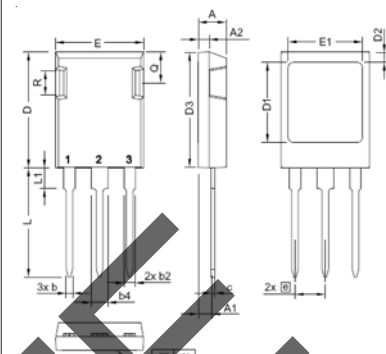
Applications

- Capacitor Discharge & Pulser Circuits
- DC Choppers
- UPS
- Switch-Mode and Resonant-Mode Power Supplies
- DC Servo and Robot Drives
- AC Motor Drives
- Robotics and Servo Controls

Symbol	Test Conditions ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{CES}	$I_C = 250\mu A$, $V_{GE} = 0V$	1700		V
$V_{GE(th)}$	$I_C = 250\mu A$, $V_{CE} = V_{GE}$	3.0		V
I_{CES}	$V_{CE} = 0.8 \cdot V_{CES}$, $V_{GE} = 0V$ Note 2, $T_J = 125^\circ C$			100 μA 1.5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 100 nA
$V_{CE(sat)}$	$I_C = 8A$, $V_{GE} = 15V$, Note 1 $T_J = 125^\circ C$		3.5 4.0	V V

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 16A, V_{CE} = 10V$, Note 1	6.0	12.5	S
C_{ies}	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		1500	pF
C_{oes}			110	pF
C_{res}			33	pF
$Q_{g(on)}$	$I_C = 8A, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$		70	nC
Q_{ge}			9	nC
Q_{gc}			32	nC
$t_{d(on)}$	Inductive load, $T_J = 25^\circ C$ $I_C = 16A, V_{GE} = 15V$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 10\Omega$ Note 2		12	ns
t_{ri}			22	ns
E_{on}			2.35	mJ
$t_{d(off)}$			200	300 ns
t_{fi}			35	150 ns
E_{off}			0.38	1.50 mJ
$t_{d(on)}$	Inductive load, $T_J = 125^\circ C$ $I_C = 16A, V_{GE} = 15V$ $V_{CE} = 0.5 \cdot V_{CES}, R_G = 10\Omega$ Note 2		13	ns
t_{ri}			22	ns
E_{on}			2.80	mJ
$t_{d(off)}$			210	ns
t_{fi}			88	ns
E_{off}			0.67	mJ
R_{thJC}			1.04	$^\circ C/W$
R_{thCS}		0.15		$^\circ C/W$

ISOPLUS247 (IXGR) Outline



- 1 - Gate
- 2 - Collector
- 3 - Emitter

Dim.	Millimeter		Inches	
	min	max	min	max
A	4.83	5.21	0.190	0.205
A1	2.29	2.54	0.090	0.100
A2	1.91	2.16	0.075	0.085
B	1.14	1.40	0.045	0.055
b2	1.91	2.20	0.075	0.087
b4	2.92	3.24	0.115	0.128
c	0.61	0.83	0.024	0.033
D	20.80	21.34	0.819	0.840
D1	15.75	16.26	0.620	0.640
D2	1.65	2.15	0.065	0.085
D3	20.30	20.70	0.799	0.815
E	15.75	16.13	0.620	0.635
E1	13.21	13.72	0.520	0.540
e	5.45 BSC		0.215 BSC	
L	19.81	20.60	0.780	0.811
L1	3.81	4.38	0.150	0.172
Q	5.59	6.20	0.220	0.244
R	4.25	5.50	0.167	0.217
W	-	0.10	-	0.004

Reverse Sonic Diode (FRD)

Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
V_F	$I_F = 20A, V_{GE} = 0V$, Note 1			3.4 V
t_{rr}	$I_F = 10A, V_{GE} = 0V,$ $-di/dt = 250A/\mu s, V_R = 900V$	$T_J = 125^\circ C$	2.8	
I_{RM}		$T_J = 125^\circ C$	300	ns
		$T_J = 125^\circ C$	550	ns
R_{thJC}		13	A	
		15	A	
R_{thJC}			2.3 $^\circ C/W$	

Notes:

1. Pulse test, $t \leq 300\mu s$, 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	

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

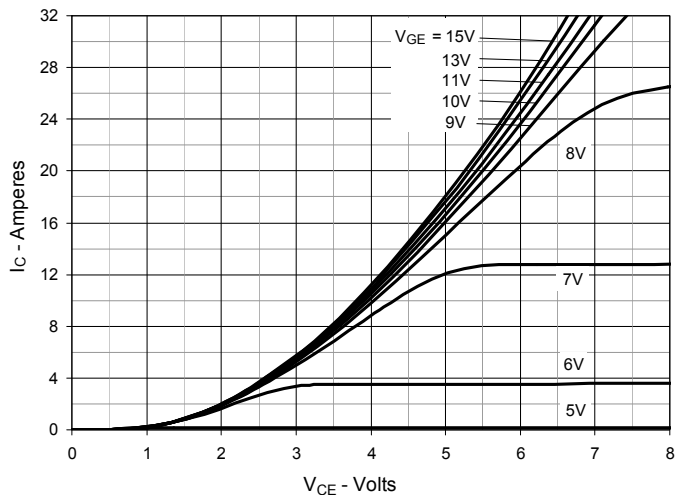


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

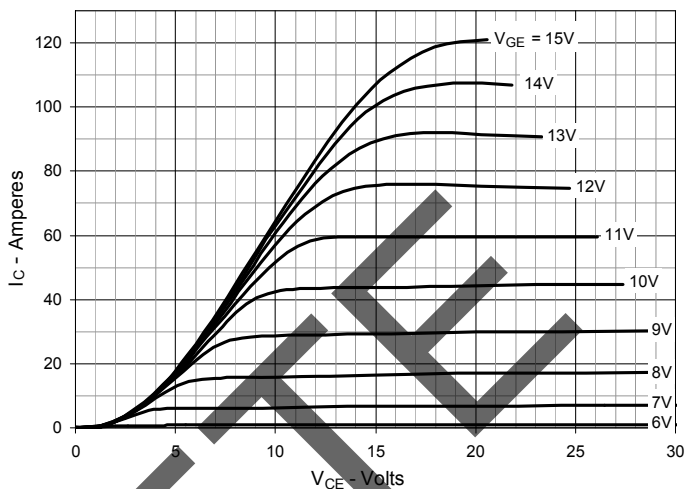


Fig. 3. Output Characteristics @ $T_J = 125^\circ\text{C}$

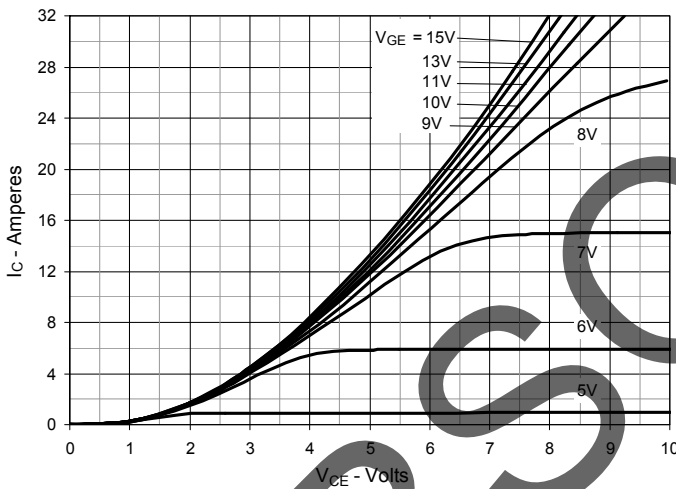


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

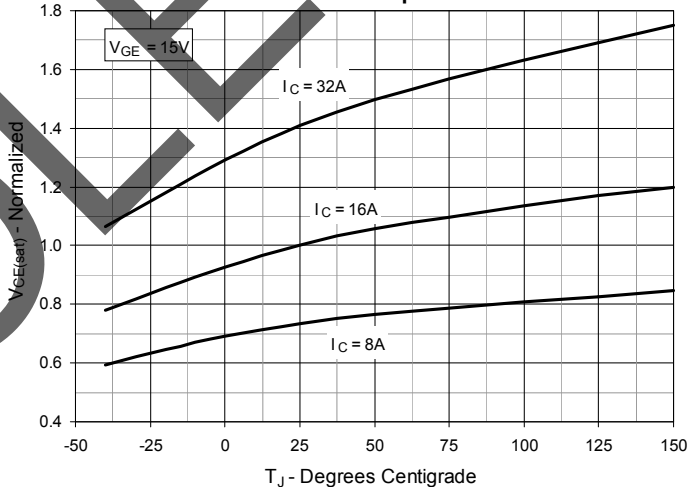


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

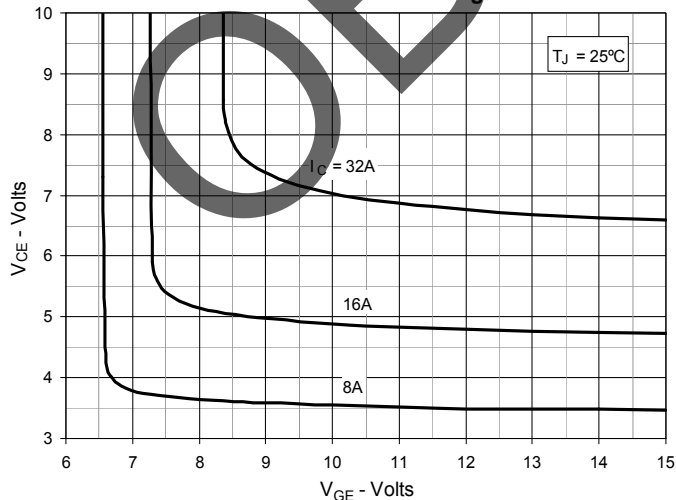


Fig. 6. Input Admittance

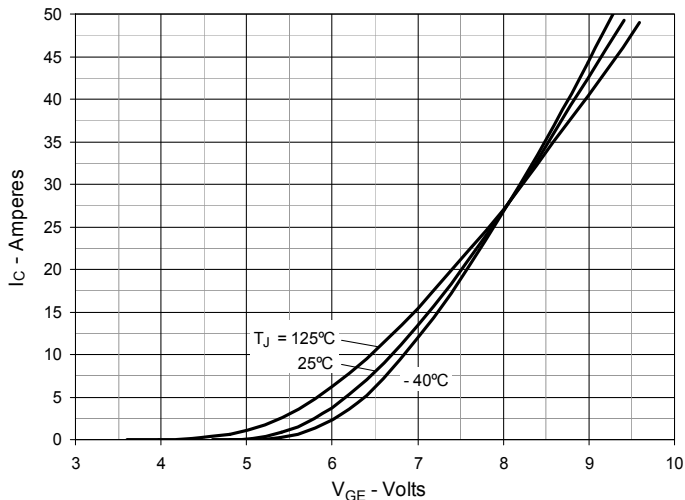


Fig. 7. Transconductance

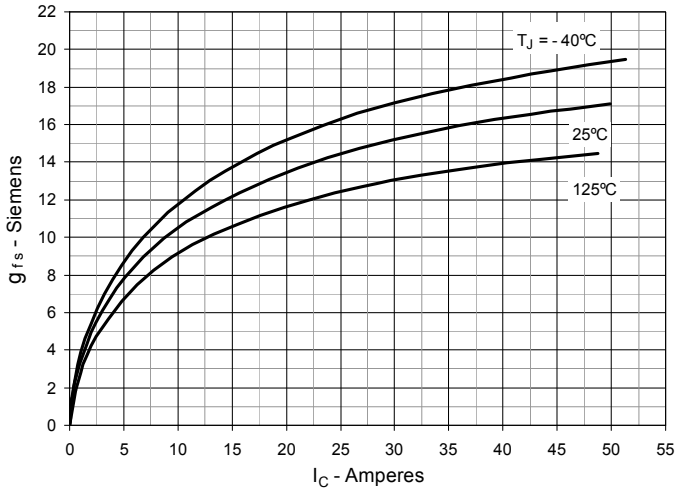


Fig. 8. Gate Charge

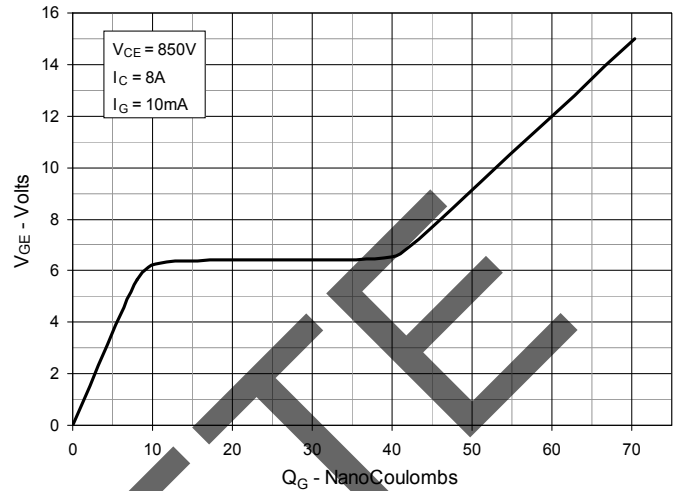


Fig. 9. Capacitance

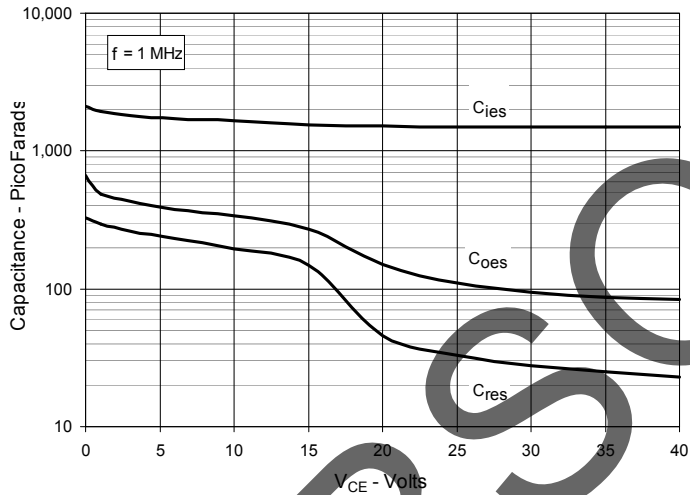


Fig. 10. Reverse-Bias Safe Operating Area

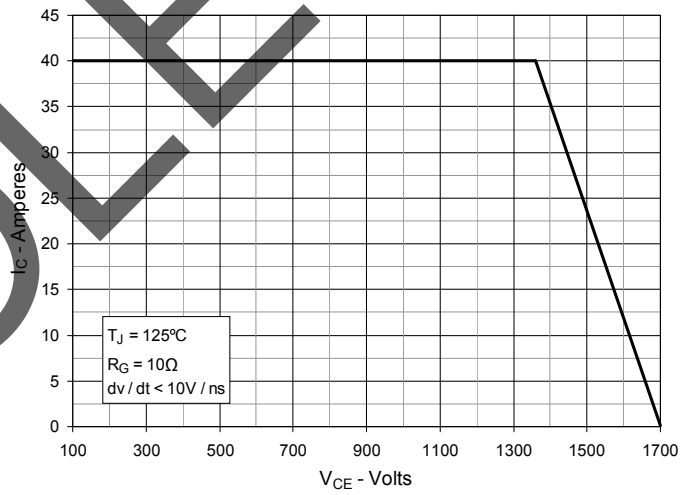


Fig. 11. Maximum Transient Thermal Impedance (IGBT)

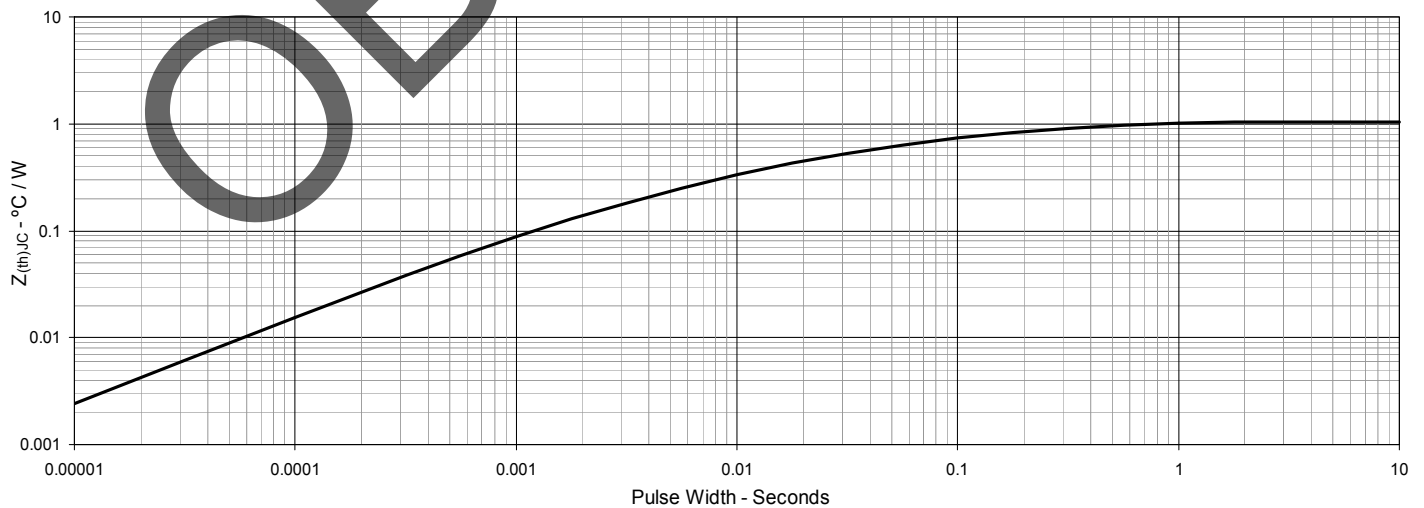


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

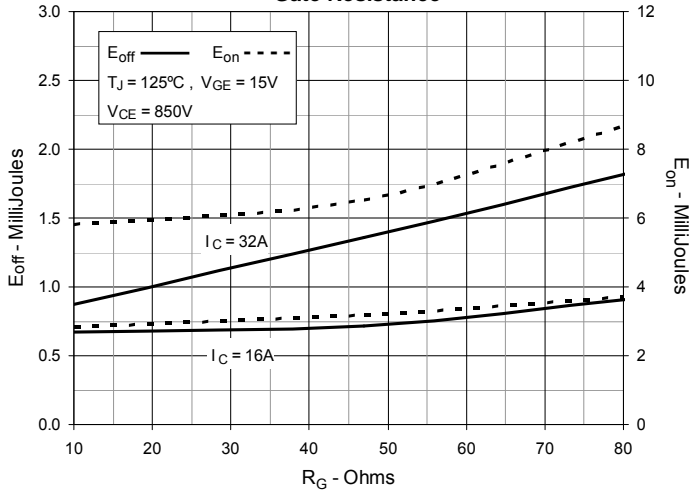


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

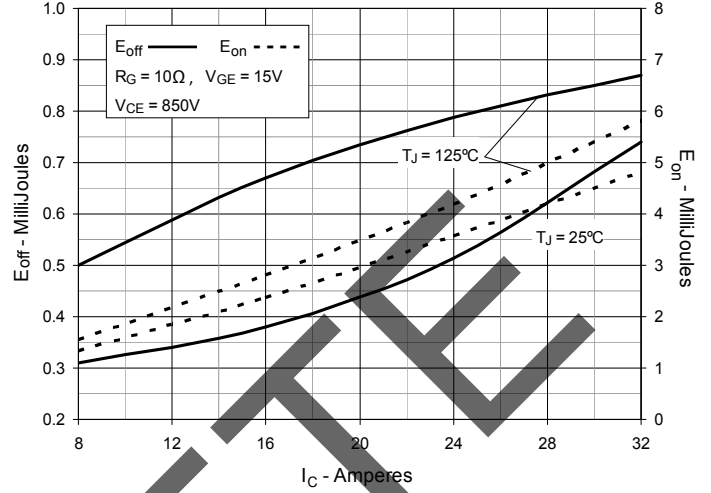


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

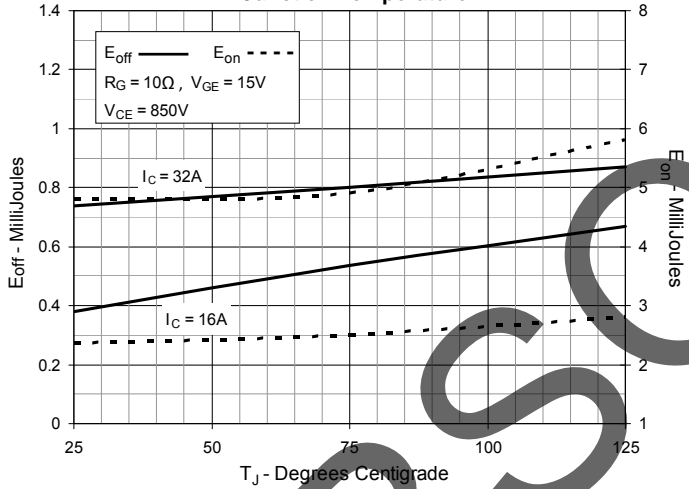


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

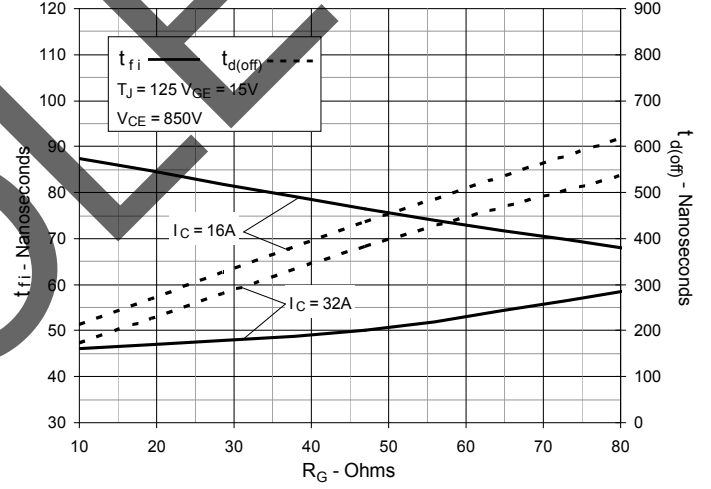


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

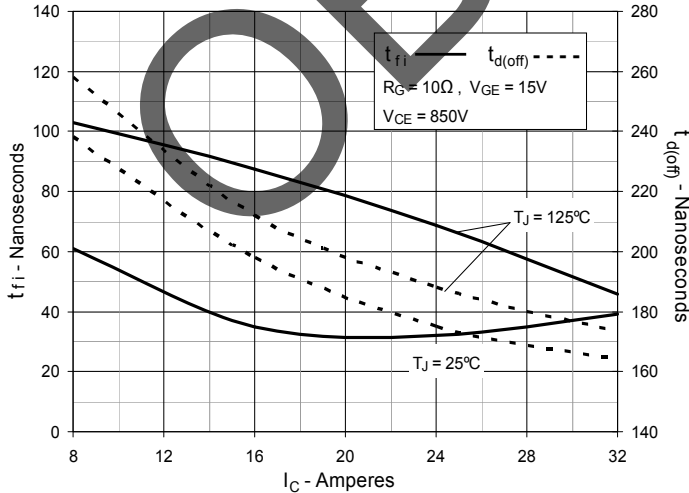


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

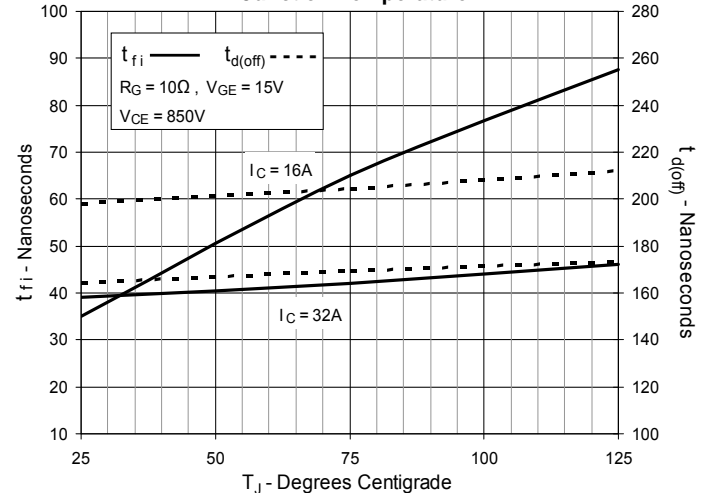


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

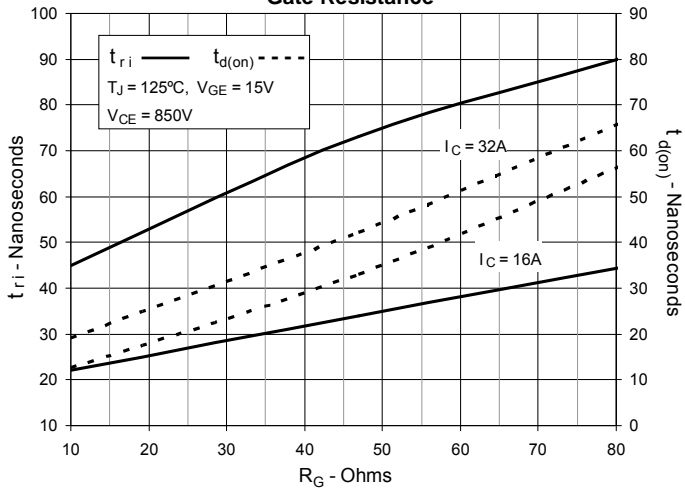


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

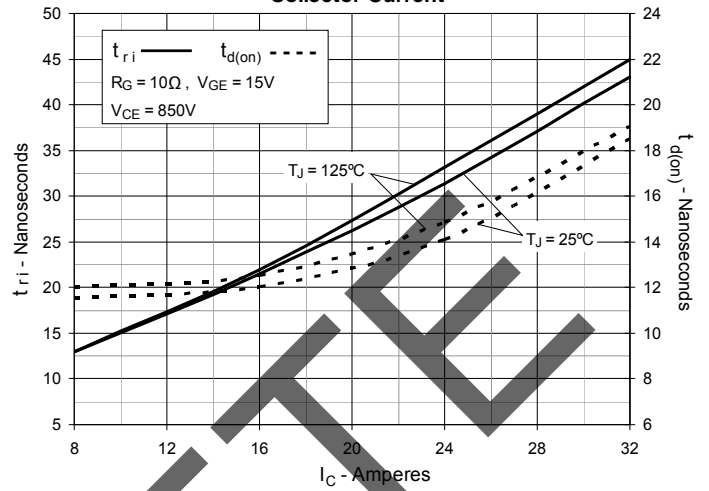


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

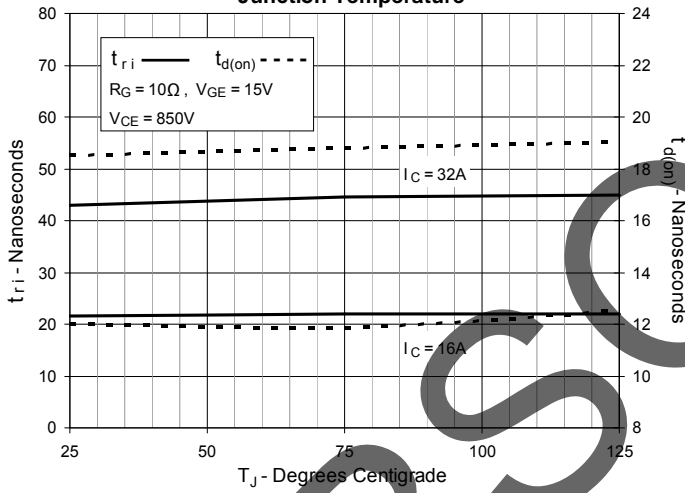
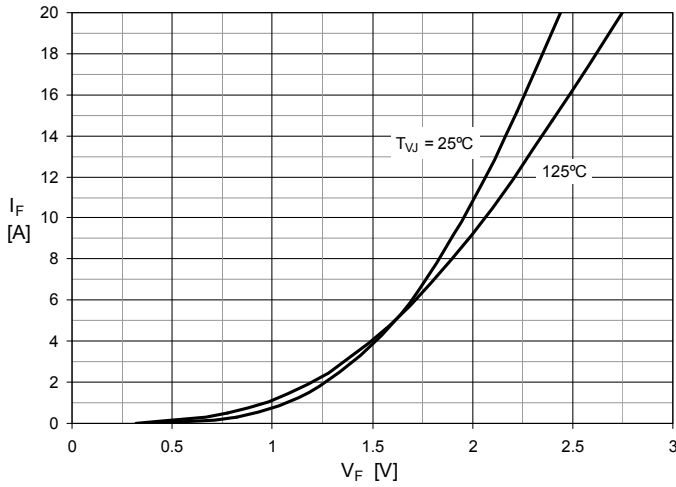
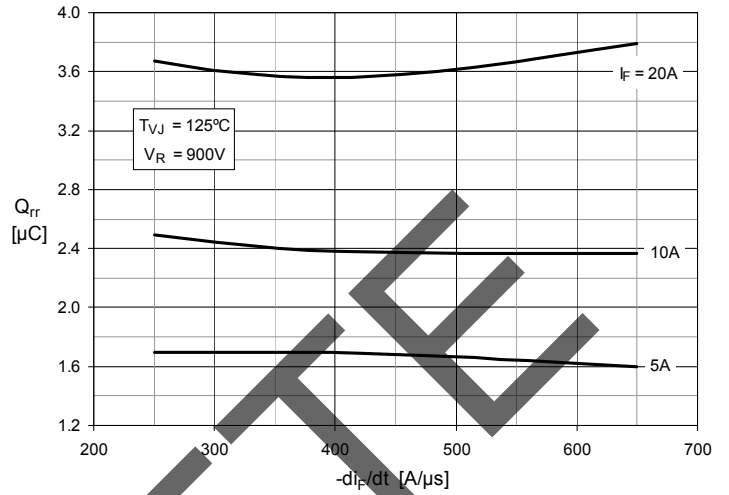
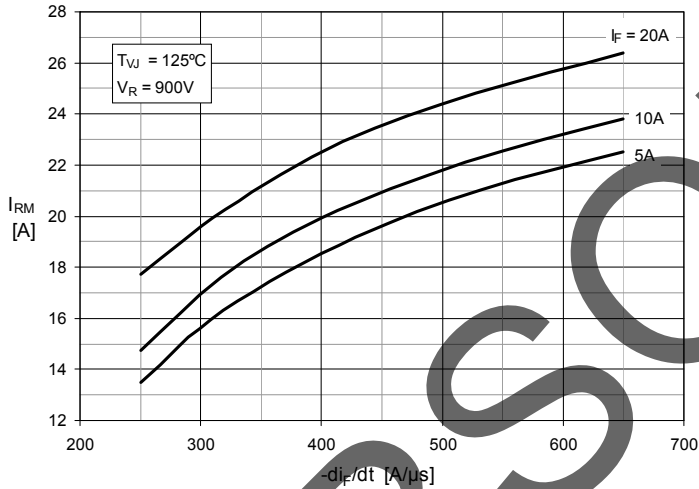
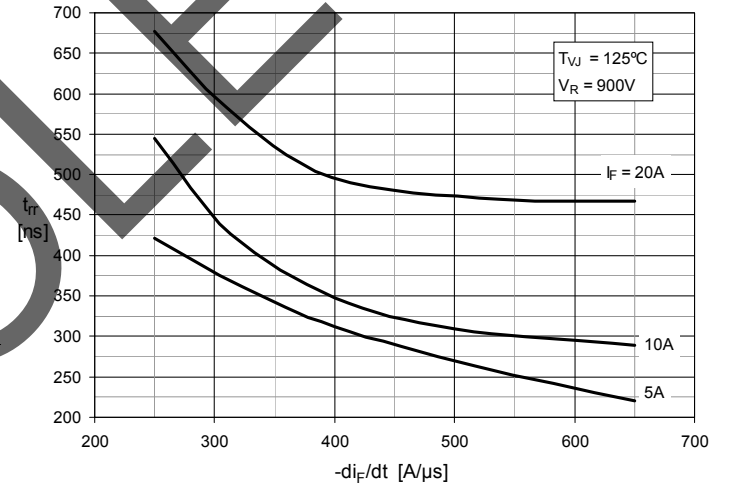
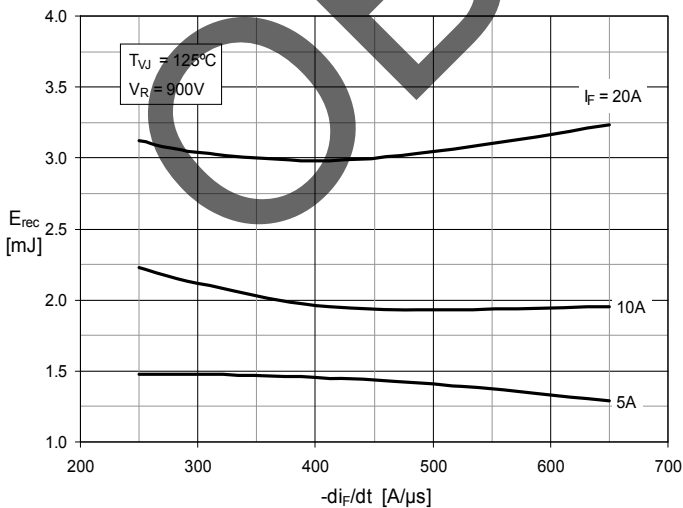
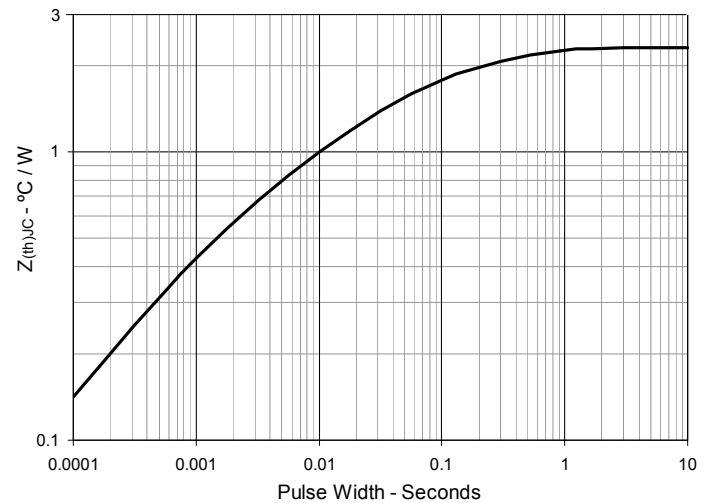


Fig. 21. Forward Current I_F vs V_F

Fig. 22. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

Fig. 23. Peak Reverse Current I_{RM} vs. $-di_F/dt$

Fig. 24. Recovery Time t_{rr} vs. $-di_F/dt$

Fig. 25. Recovery Energy E_{rec} vs $-di_F/dt$

Fig. 26. Maximum Transient Thermal Impedance (Diode)


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