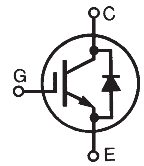
IXYS

High Voltage IGBT w/ Sonic Diode

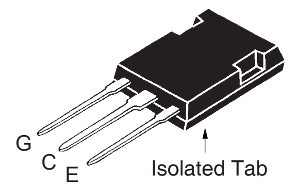
IXGR16N170AH1

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

(Electrically Isolated Tab)



ISOPLUS247™



G = Gate C = Collector
E = Emitter

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1700	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1700	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	16	A
I_{C90}	T_C = 90°C	8	A
I_{F90}	T_C = 90°C	15	A
I_{CM}	T_C = 25°C, 1ms	40	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 125°C, R_G = 10Ω Clamped Inductive Load	I_{CM} = 40 0.8 • V_{CES}	A
t_{sc} **(SCSOA)**	V_{GE} = 15V, V_{CE} = 1200V, T_J = 125°C R_G = 22Ω, Non Repetitive	10	μs
P_C	T_C = 25°C	120	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
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

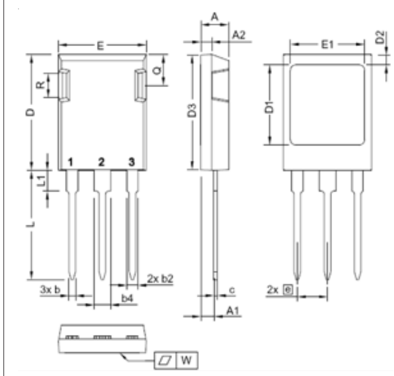
- Capacitor Discharge & Pulser Circuits
- DC Choppers
- UPS
- Switch-Mode and Resonant-Mode Power Supplies
- DC Servo and Robot Drives
- AC Motor Drives
- Robotics and Servo Controls

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	1700			V
$V_{GE(th)}$	I_C = 250μA, V_{CE} = V_{GE}	3.0		5.0	V
I_{CES}	V_{CE} = 0.8 • V_{CES}, V_{GE} = 0V			100	μA
	Note 2, T_J = 125°C			1.5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 8A, V_{GE} = 15V, Note 1		3.5	5.0	V
	T_J = 125°C		4.0		V

IXYS IXGR16N170AH1

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	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 • V_{CES}		70		nC
Q_{ge}			9		nC
Q_{gc}			32		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		12		ns
t_{ri}	I_C = 16A, V_{GE} = 15V		22		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 10Ω		2.35		mJ
$t_{d(off)}$	Note 2		200	300	ns
t_{fi}			35	150	ns
E_{off}			0.38	1.50	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		13		ns
t_{ri}	I_C = 16A, V_{GE} = 15V		22		ns
E_{on}	V_{CE} = 0.5 • V_{CES}, R_G = 10Ω		2.80		mJ
$t_{d(off)}$	Note 2		210		ns
t_{fi}			88		ns
E_{off}			0.67		mJ
R_{thJC}				1.04	°C/W
R_{thCS}			0.15		°C/W

ISOPLUS247 (IXGR) Outline



1 - Gate
2 - Collector
3 - Emitter

Dim.	Millimeter min	max	Inches 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 (T_J = 25°C, Unless Otherwise Specified)		Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 20A, V_{GE} = 0V, Note 1				3.4	V
		T_J = 125°C		2.8		
t_{rr}	I_F = 10A, V_{GE} = 0V,			300		ns
	-di_F/dt = 250A/μs, V_R = 900V	T_J = 125°C		550		ns
I_{RM}				13		A
		T_J = 125°C		15		A
R_{thJC}					2.3	°C/W

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.

Fig. 1. Output Characteristics @ T_J = 25ºC

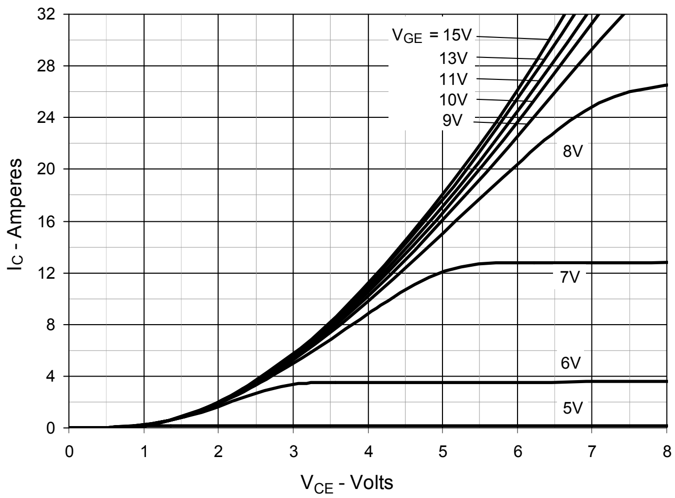


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

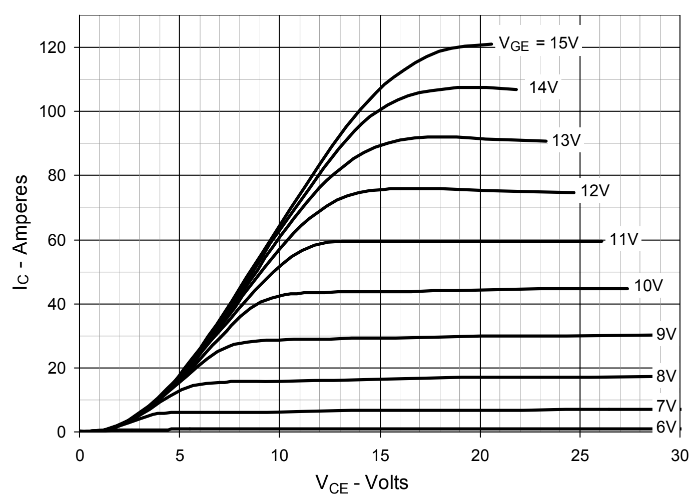


Fig. 3. Output Characteristics @ T_J = 125ºC

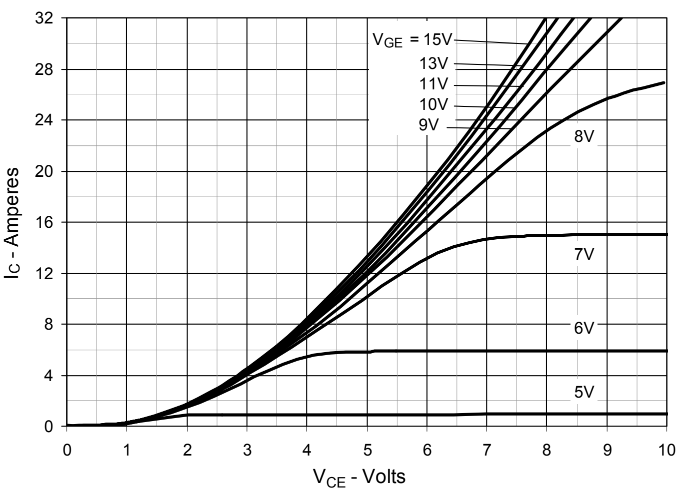


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

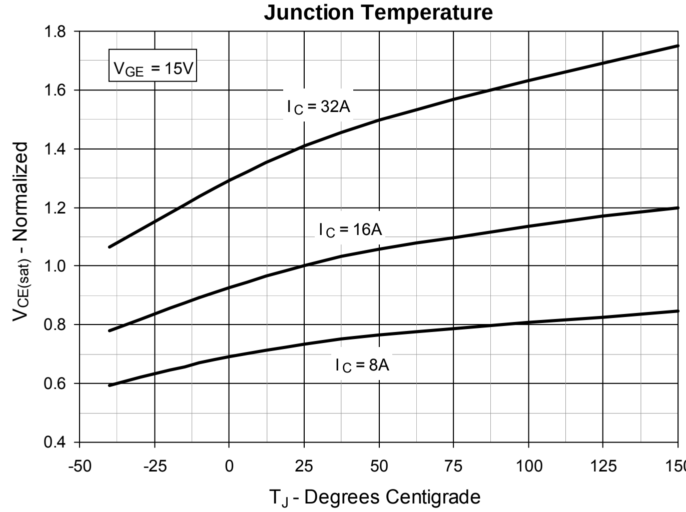


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

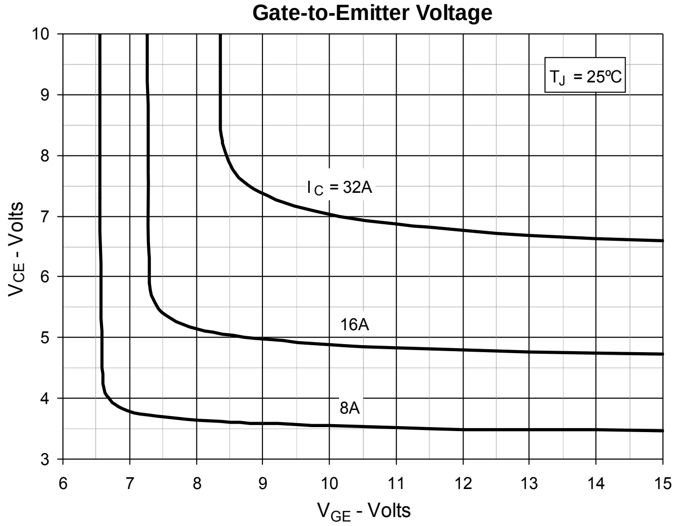


Fig. 6. Input Admittance

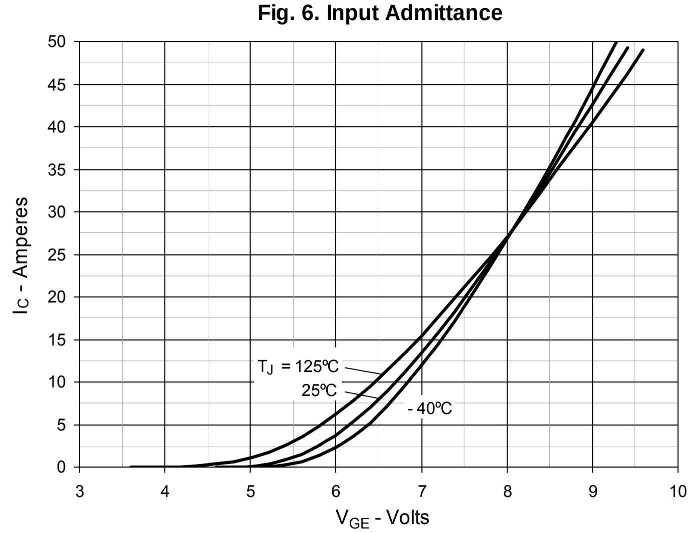


Fig. 7. Transconductance

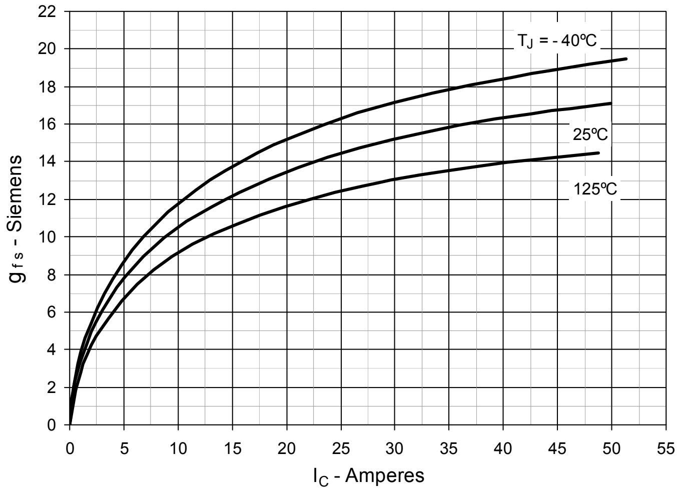


Fig. 8. Gate Charge

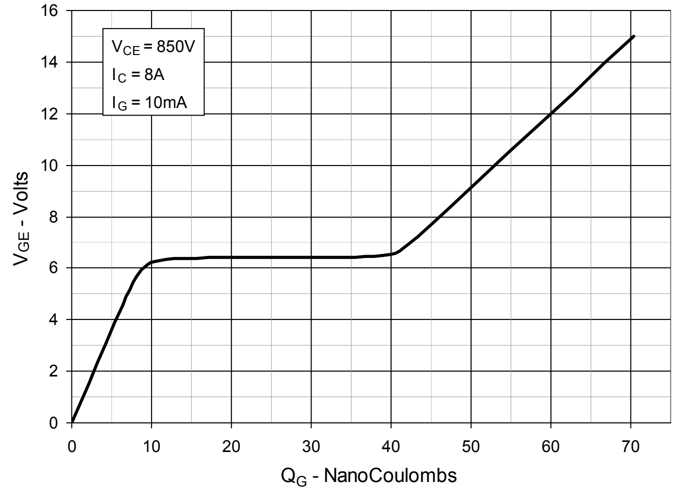


Fig. 9. Capacitance

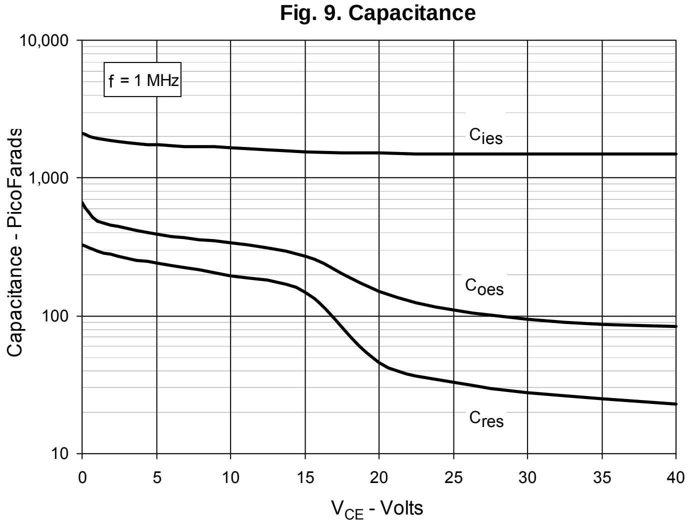


Fig. 10. Reverse-Bias Safe Operating Area

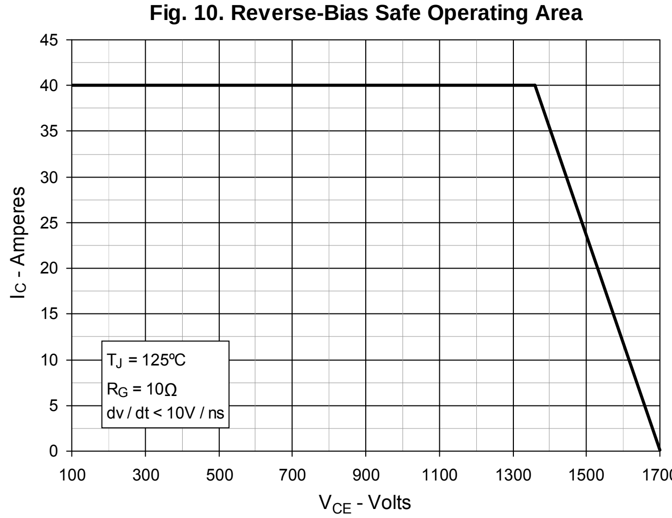
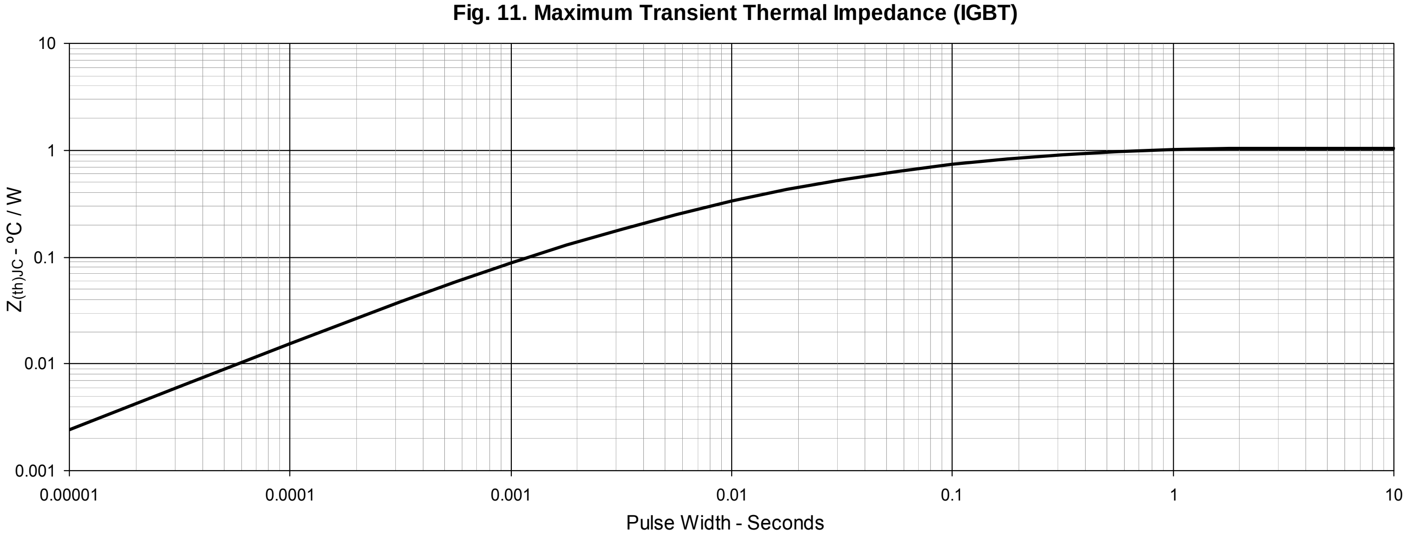


Fig. 11. Maximum Transient Thermal Impedance (IGBT)



IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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

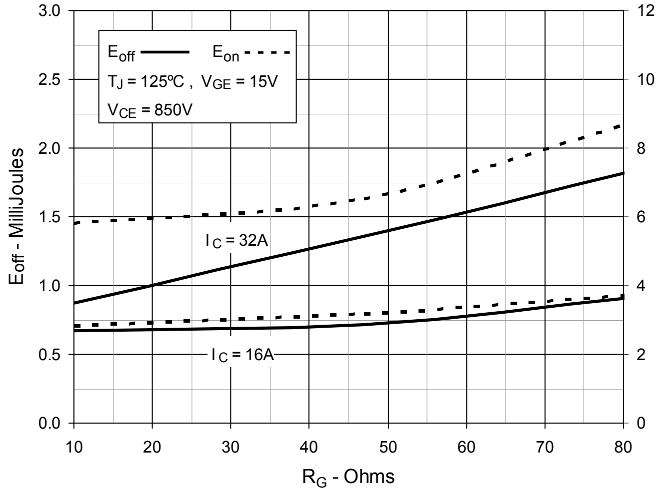


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

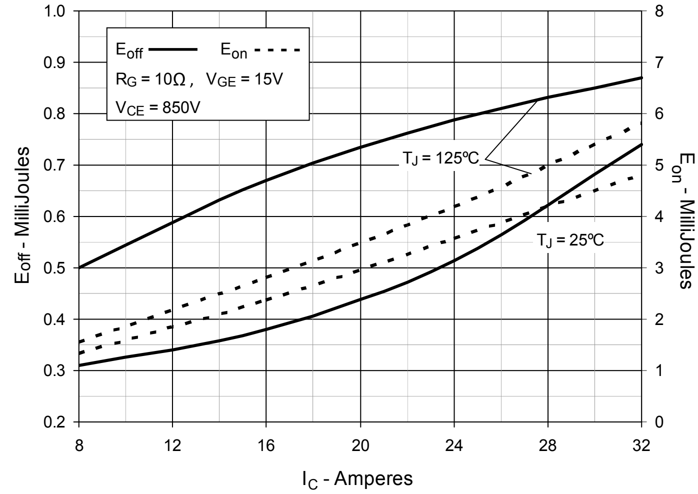


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

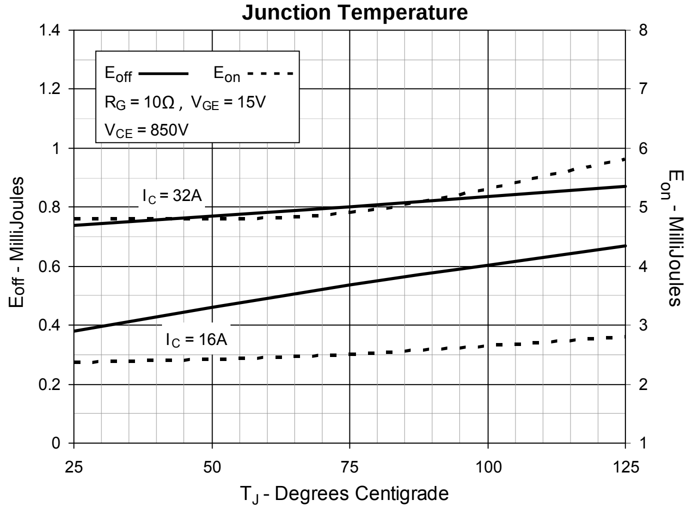


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

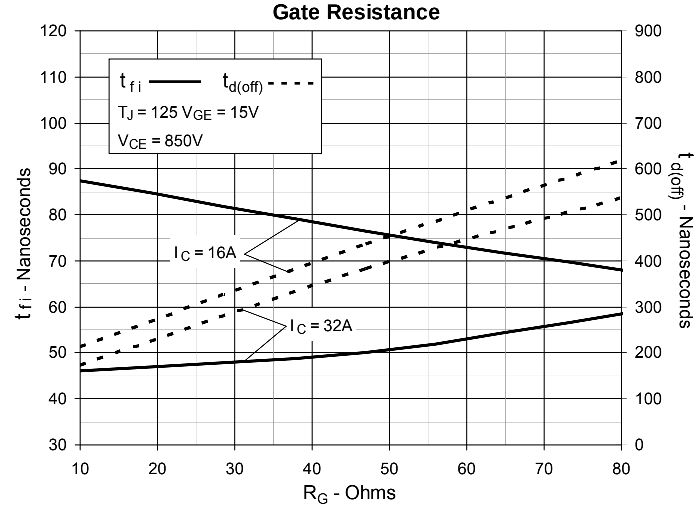


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

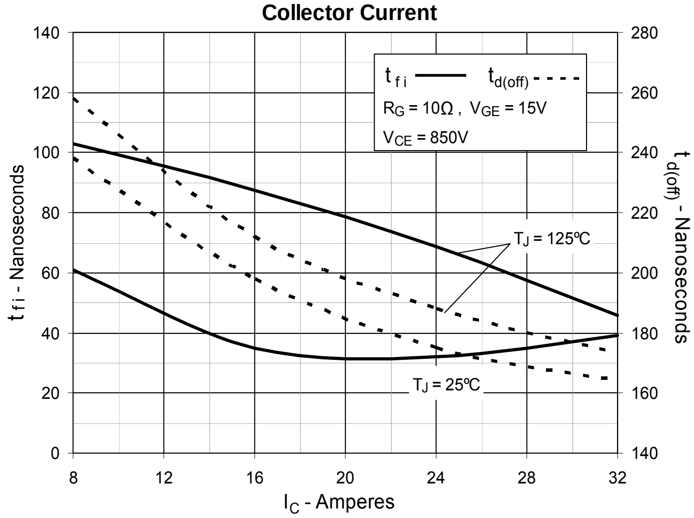


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

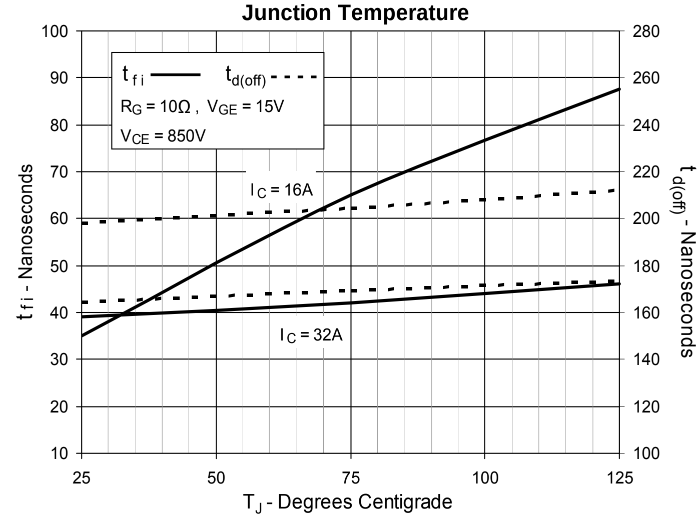


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

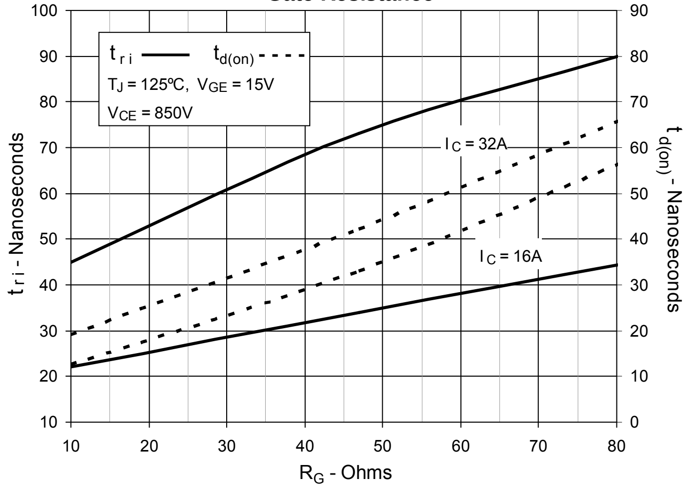


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

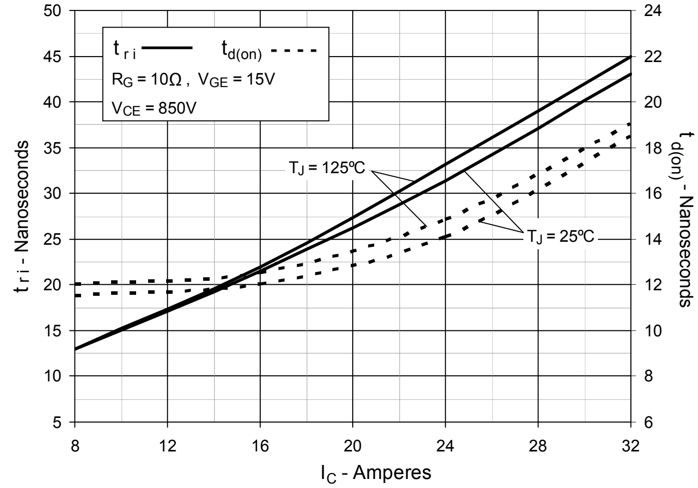


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

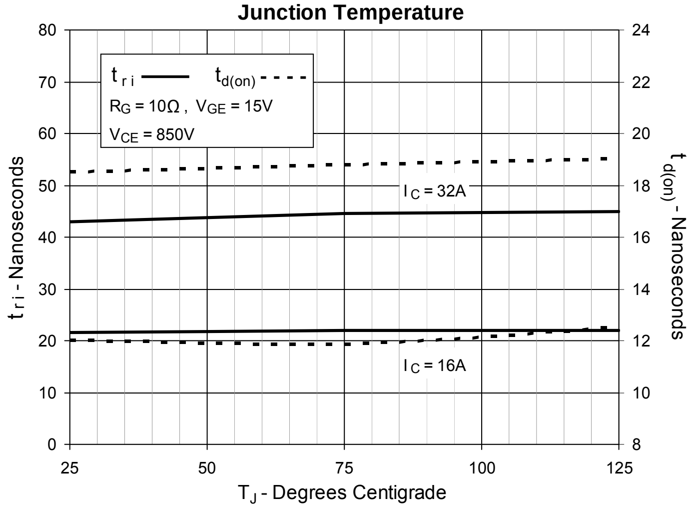


Fig. 21. Forward Current I_F vs V_F

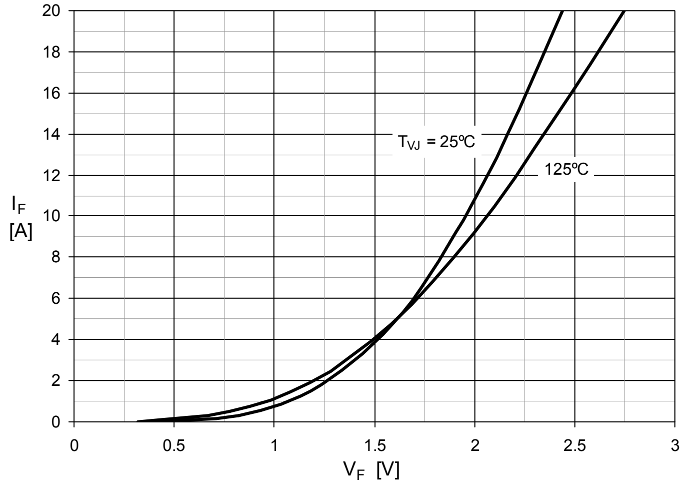


Fig. 22. Reverse Recovery Charge Q_{rr} vs. -di_F/dt

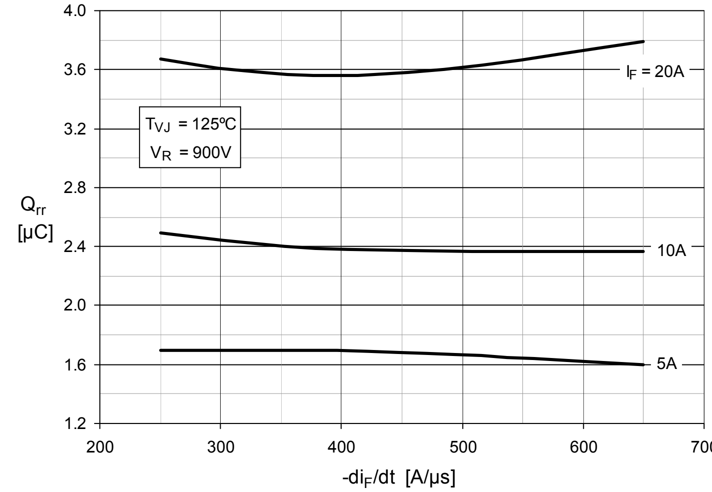


Fig. 23. Peak Reverse Current I_{RM} vs. -di_F/dt

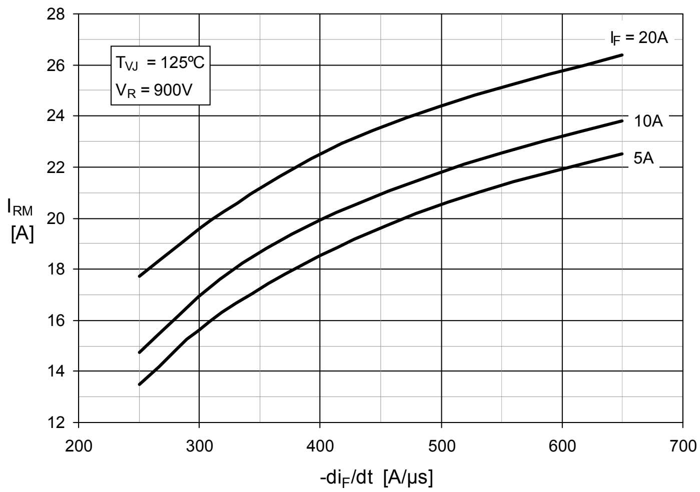


Fig. 24. Recovery Time t_{rr} vs. -di_F/dt

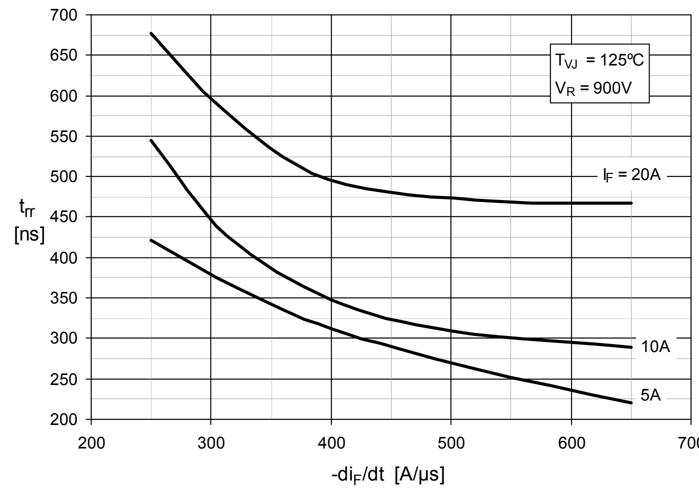


Fig. 25. Recovery Energy E_{rec} vs -di_F/dt

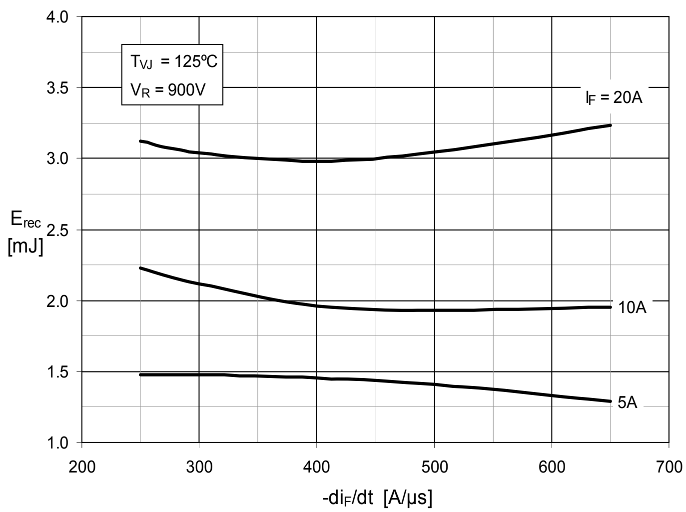


Fig. 26. Maximum Transient Thermal Impedance (Diode)