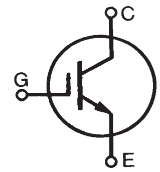
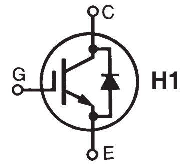
IXYS

High Voltage IGBT w/ Sonic Diode

IXGT16N170A
IXGH16N170A
IXGT16N170AH1
IXGH16N170AH1

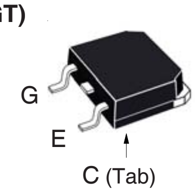
V_{CES}	=	1700V
I_{C90}	=	11A
$V_{CE(sat)}$	≤	5.0V
$t_{fi(typ)}$	=	35ns



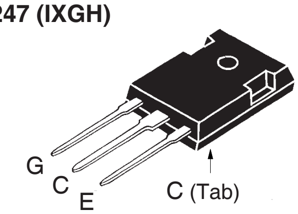


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1700	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ	1700	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	16	A
I_{C90}	T_C = 90°C	11	A
I_{F90}	T_C = 90°C	17	A
I_{CM}	T_C = 25°C, 1ms	40	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 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	190	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
M_d	Mounting Torque (TO-247)	1.13/10	Nm/lb.in
Weight	TO-268	4	g
	TO-247	6	g

TO-268 (IXGT)



TO-247 (IXGH)



G = Gate　　C = Collector
E = Emiiter　　Tab = Collector

Features

- High Blocking Voltage
- International Standard Packages
- Low Conduction Losses
- Anti-Parallel Sonic Diode
- High Blocking Voltage
- High Currect Handling Capability

Advantages

- Low Gate Drive Requirement
- High Power Density

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- Uninterruptible Power Supplies (UPS)
- AC Choppers
- Capacitor Discharge Circuits
- AC Motor Drives
- DC Servo & Robot Drives

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	16N170A			50	μA
		16N170AH1			100	μA
	T_J = 125°C	16N170A			750	μA
		16N170AH1			1.5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V				±100	nA
$V_{CE(sat)}$	I_C = 11A, V_{GE} = 15V, Note 1			4.0	5.0	V
	T_J = 125°C			4.5		V

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}				1500		pF
C_{oes}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	16N170A		99		pF
		16N170AH1		110		pF
C_{res}				33		pF
$Q_{g(on)}$				70		nC
Q_{ge}	I_C = 11A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}			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}					0.65	°C/W
R_{thCS}				0.21		°C/W

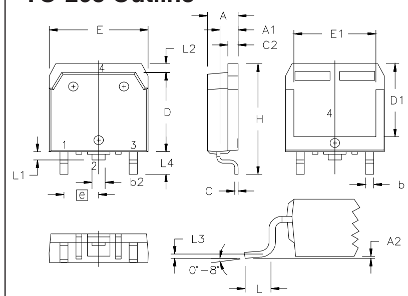
Reverse Sonic Diode (FRD)

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}					1.5	°C/W

Notes:

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.

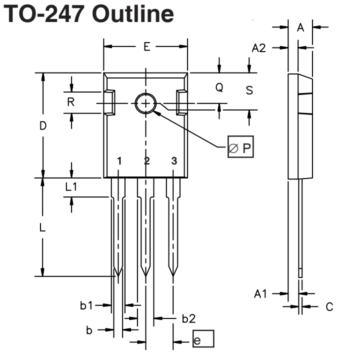
TO-268 Outline



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

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

TO-247 Outline



Terminals: 1 - Gate 2 - Collector
3 - Emitter

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15 BSC		242 BSC	

Fig. 1. Output Characteristics @ T_J = 25ºC

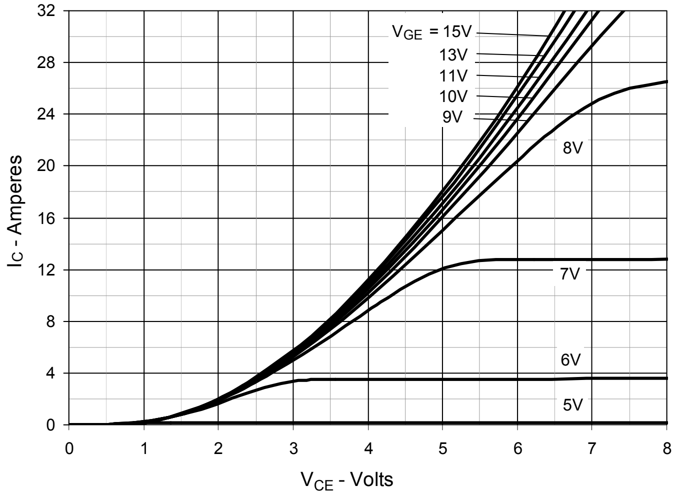


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

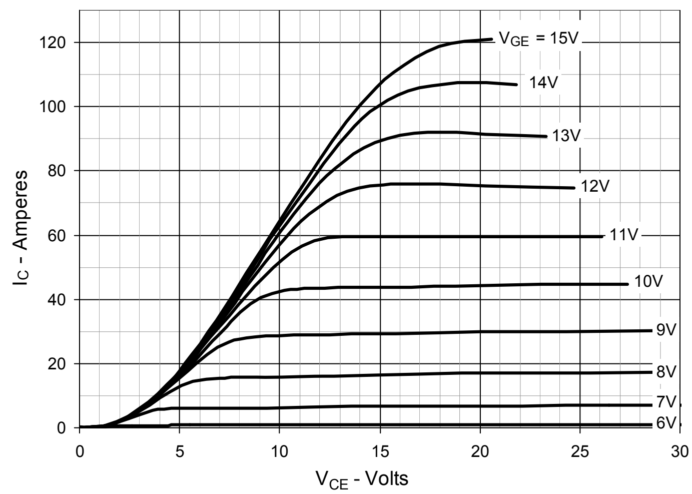


Fig. 3. Output Characteristics @ T_J = 125ºC

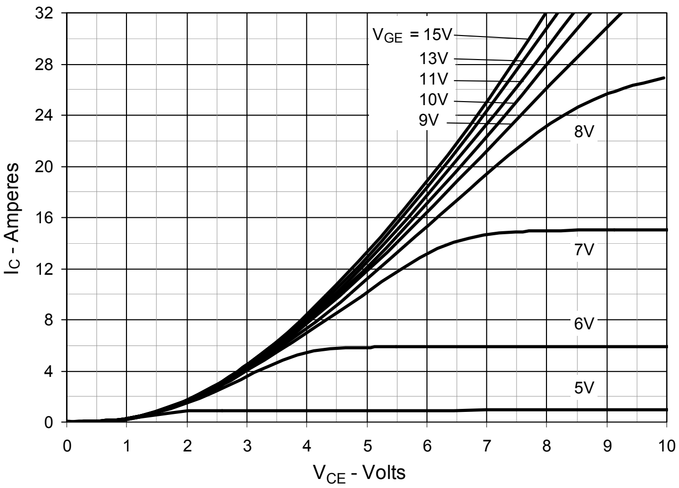


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

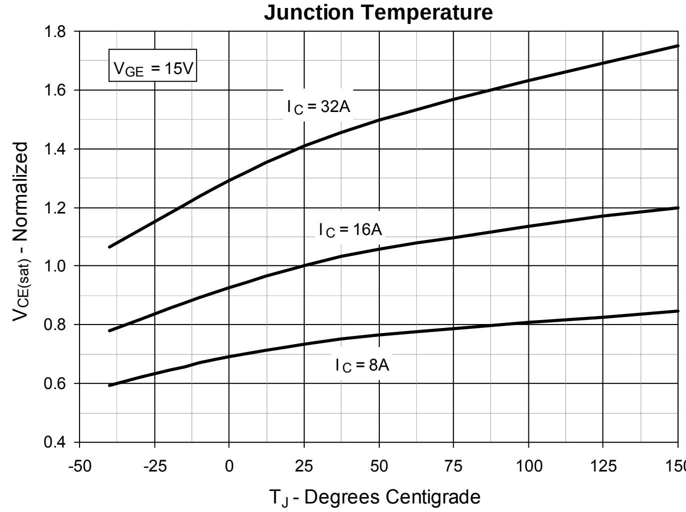


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

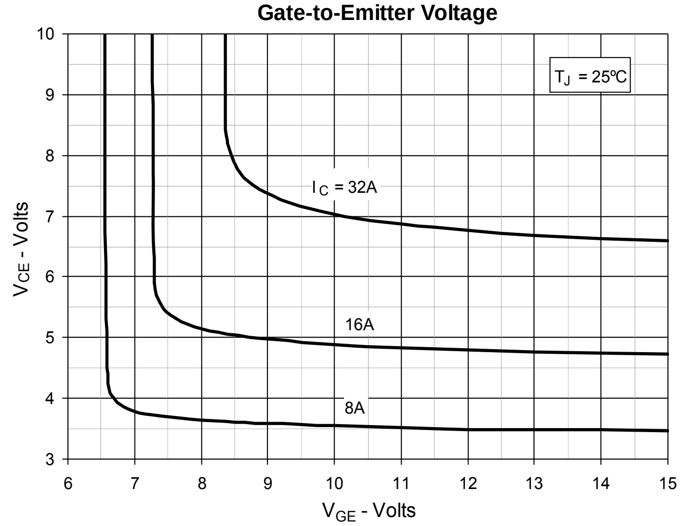


Fig. 6. Input Admittance

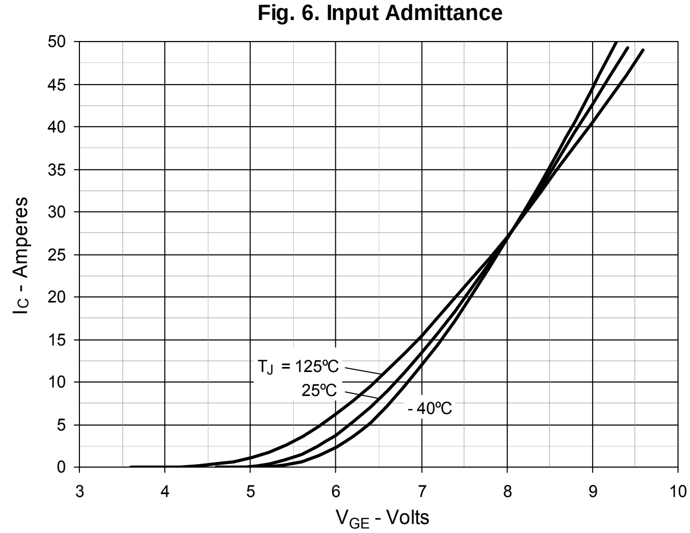


Fig. 7. Transconductance

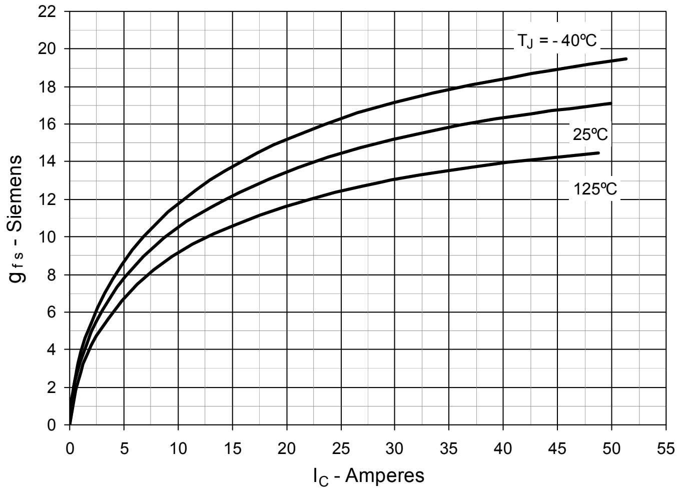


Fig. 8. Gate Charge

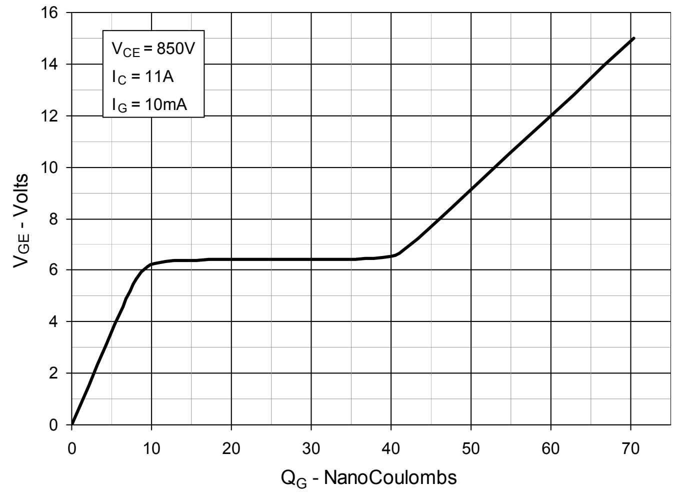


Fig. 9. Capacitance

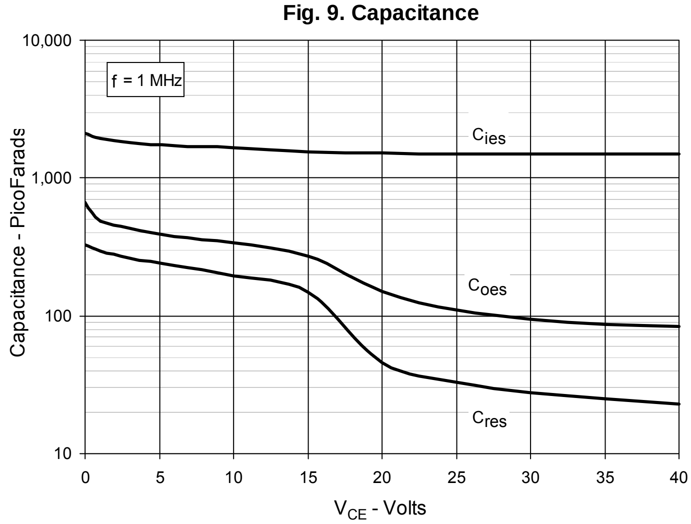


Fig. 10. Reverse-Bias Safe Operating Area

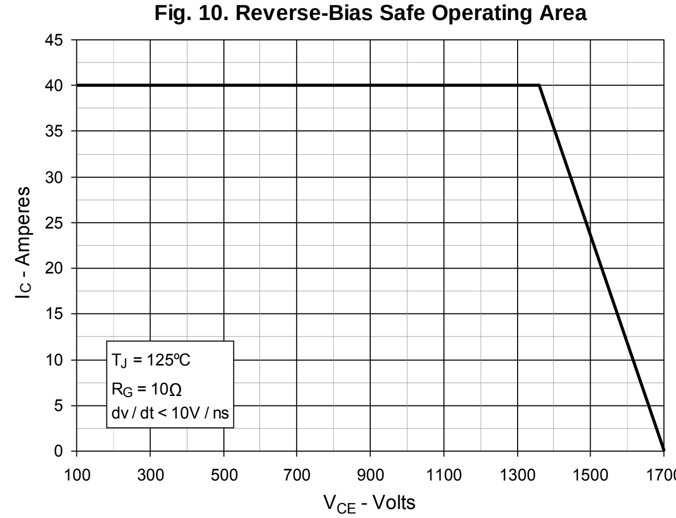


Fig. 11. Maximum Transient Thermal Impedance (IGBT)

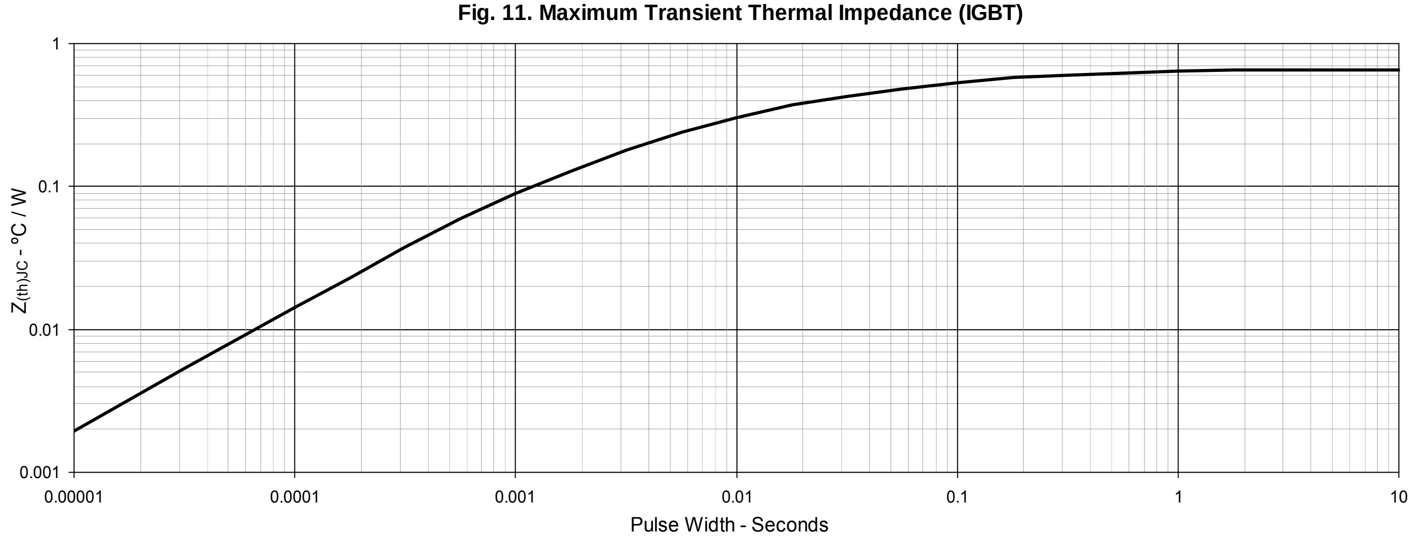


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

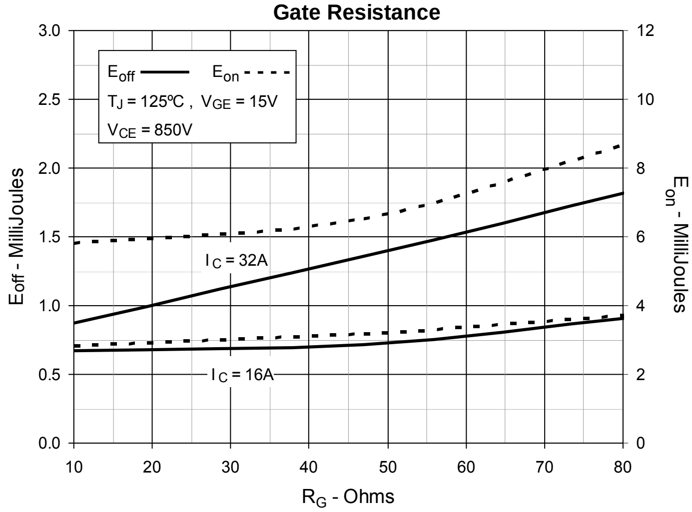


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

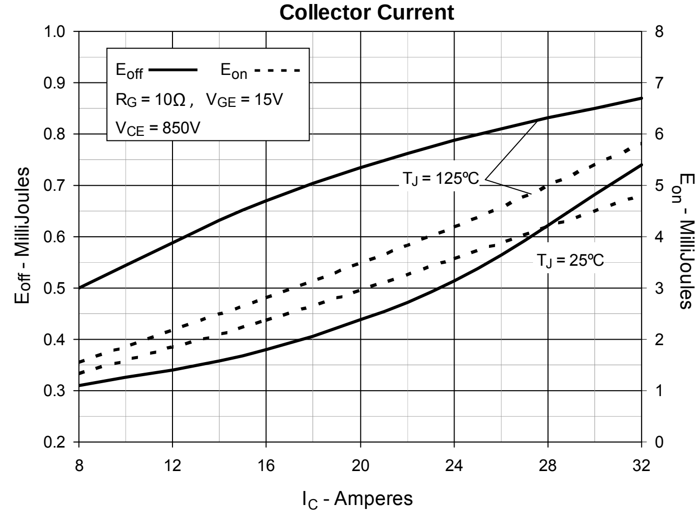


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

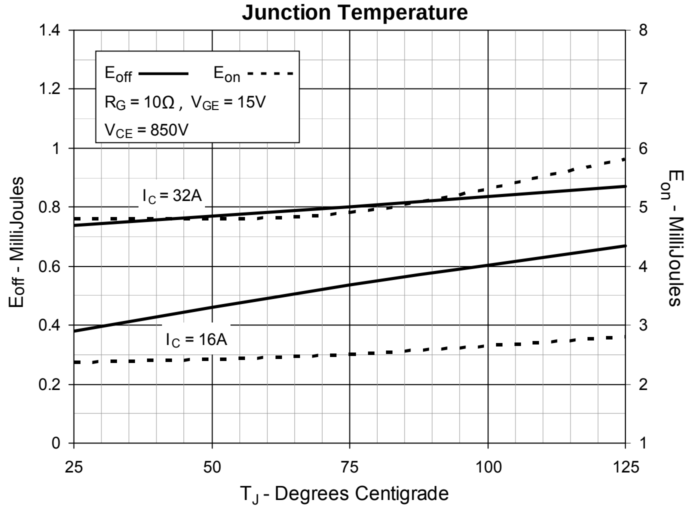


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

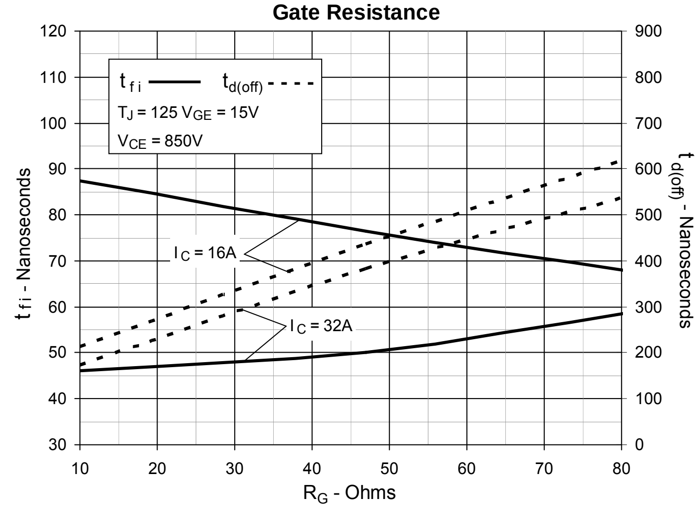


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

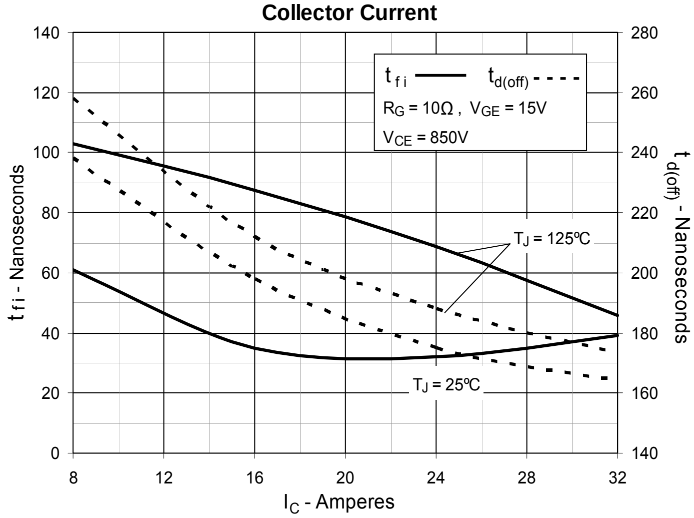


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

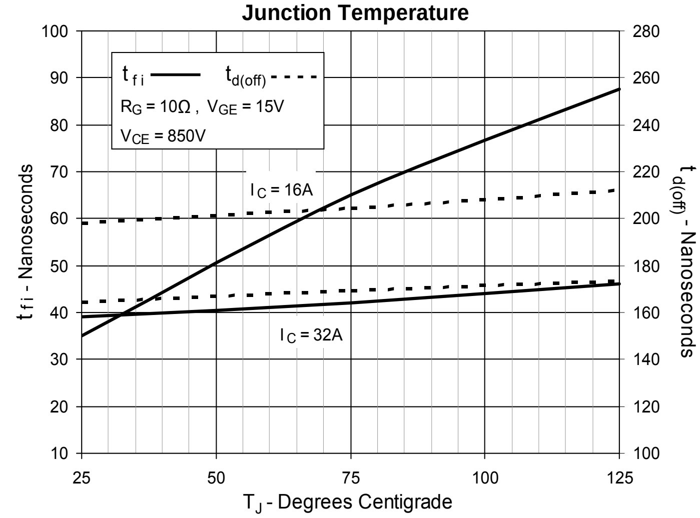


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

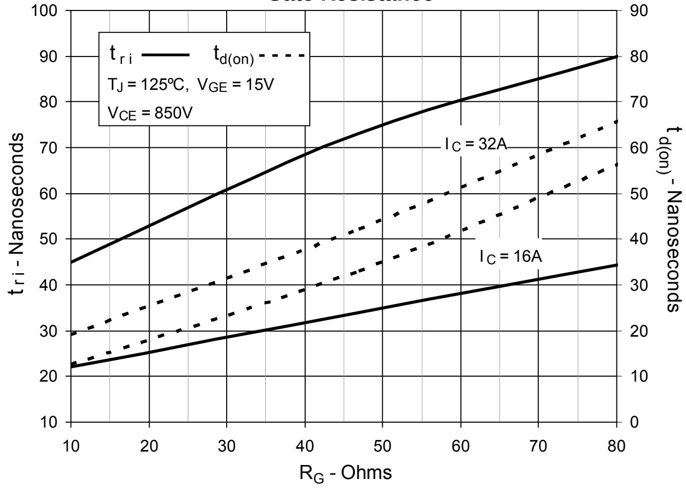


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

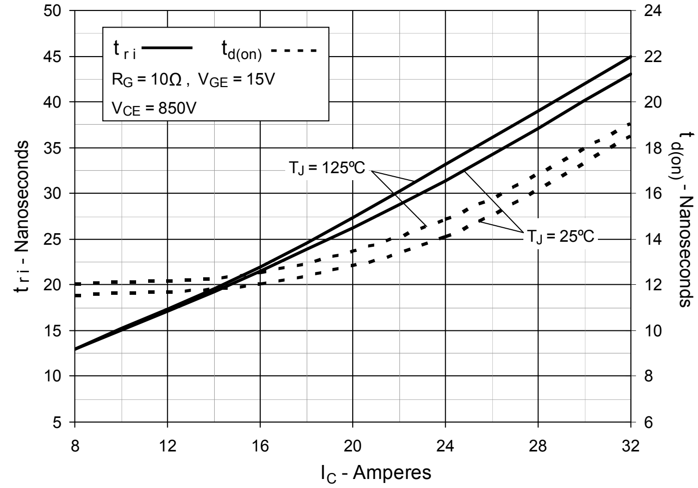


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

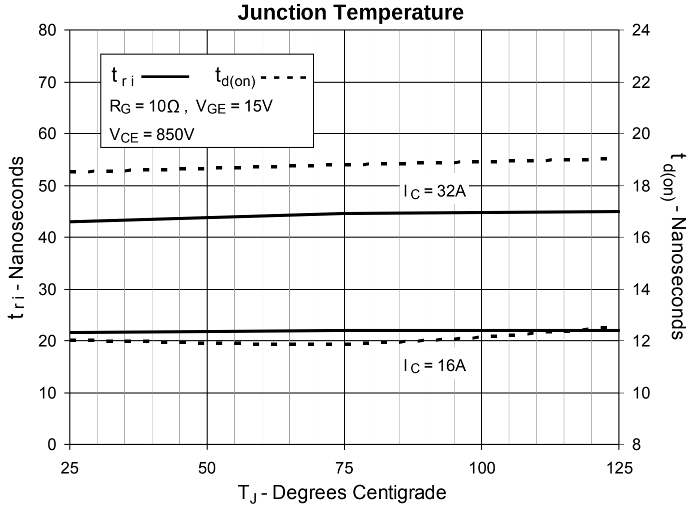


Fig. 21. Forward Current I_F vs V_F

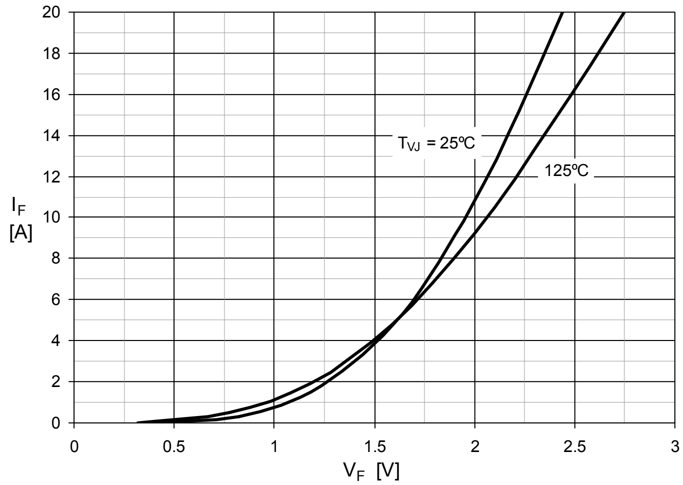


Fig. 22. Reverse Recovery Charge Q_{rr} vs. -di_F/dt

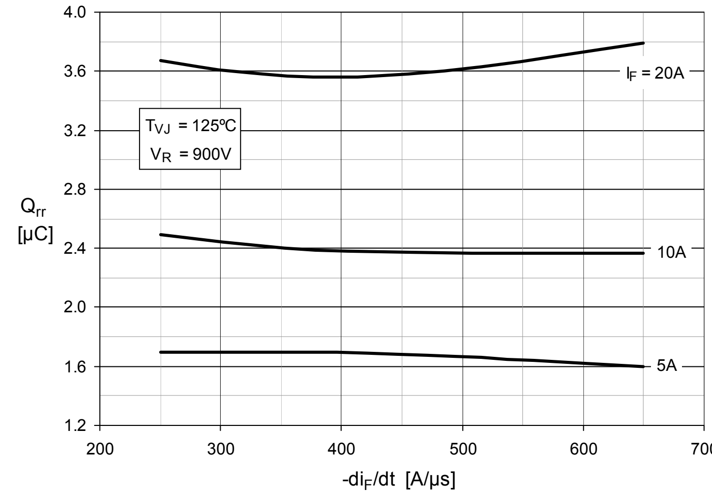


Fig. 23. Peak Reverse Current I_{RM} vs. -di_F/dt

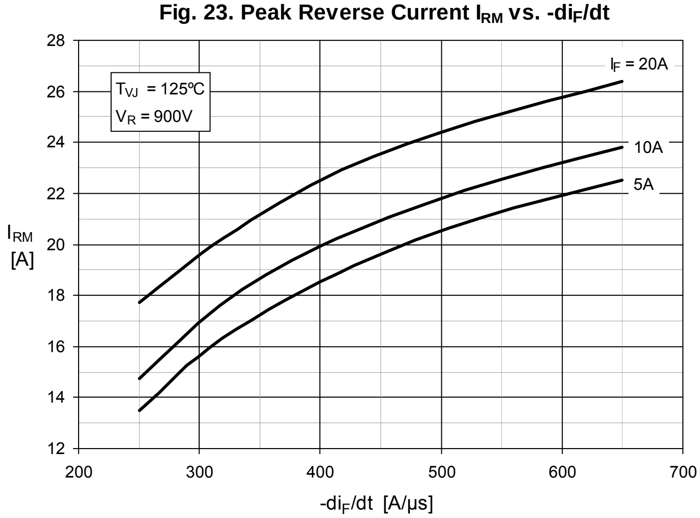


Fig. 24. Recovery Time t_{rr} vs. -di_F/dt

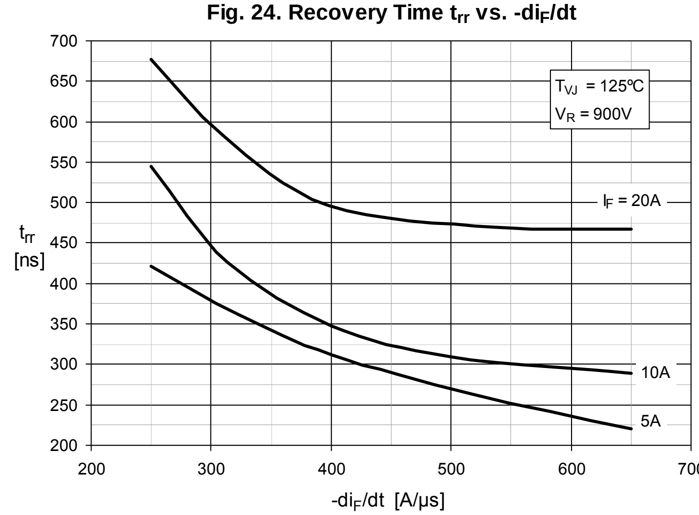


Fig. 25. Recovery Energy E_{rec} vs -di_F/dt

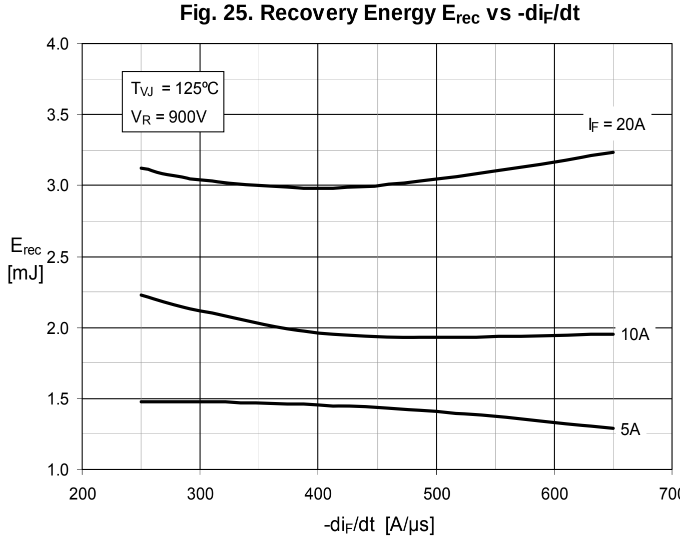


Fig. 26. Maximum Transient Thermal Impedance (Diode)