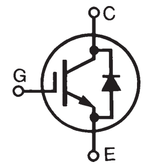
Preliminary Technical Information

XPT™ 650V IGBT GenX3™ w/ Sonic Diode

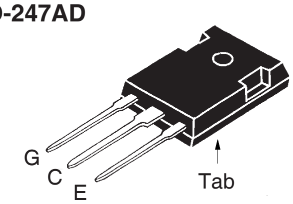
IXYH50N65C3H1

V_{CES} = 650V
I_{C110} = 50A
$V_{CE(sat)}$ ≤ 2.10V
$t_{fi(typ)}$ = 27ns

Extreme Light Punch Through IGBT for 20-60kHz Switching



TO-247AD



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

Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 175°C	650	V
V_{CGR}	T_J = 25°C to 175°C, R_{GE} = 1MΩ	650	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	130	A
I_{C110}	T_C = 110°C	50	A
I_{F110}	T_C = 110°C	40	A
I_{CM}	T_C = 25°C, 1ms	250	A
I_A	T_C = 25°C	20	A
E_{AS}	T_C = 25°C	300	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 5Ω Clamped Inductive Load	I_{CM} = 100 $V_{CE} \leq V_{CES}$	A
t_{sc} **(SCSOA)**	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 82Ω, Non Repetitive	8	µs
P_C	T_C = 25°C	600	W
T_J		-55 ... +175	°C
T_{JM}		175	°C
T_{stg}		-55 ... +175	°C
T_L	Maximum Lead Temperature for Soldering	300	°C
T_{SOLD}	1.6 mm (0.062in.) from Case for 10s	260	°C
M_d	Mounting Torque	1.13/10	Nm/lb.in
Weight		6	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250µA, V_{GE} = 0V	650			V
$V_{GE(th)}$	I_C = 250µA, V_{CE} = V_{GE}	3.5		6.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V			50	µA
	T_J = 150°C			3	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 36A, V_{GE} = 15V, Note 1		1.74	2.10	V
	T_J = 150°C		2.00		V

Features

- Optimized for 20-60kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- International Standard Package

Advantages

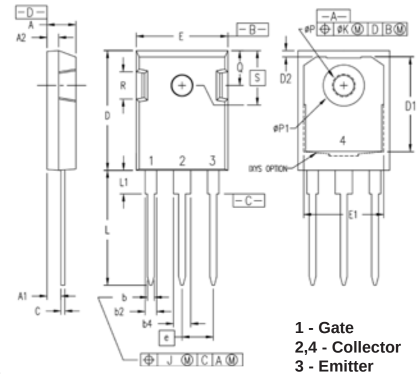
- High Power Density
- Extremely Rugged
- Low Gate Drive Requirement

Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- High Frequency Power Inverters

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 36A, V_{CE} = 10V, Note 1	19	28		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		2346		pF
C_{oes}			230		pF
C_{res}			50		pF
$Q_{g(on)}$	I_C = 36A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		80		nC
Q_{ge}			15		nC
Q_{gc}			40		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		22		ns
t_{ri}	I_C = 36A, V_{GE} = 15V		35		ns
E_{on}	V_{CE} = 400V, R_G = 5Ω		1.30		mJ
$t_{d(off)}$	Note 2		80		ns
t_{fi}			27		ns
E_{off}			0.37		mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		23		ns
t_{ri}	I_C = 36A, V_{GE} = 15V		33		ns
E_{on}	V_{CE} = 400V, R_G = 5Ω		1.70		mJ
$t_{d(off)}$	Note 2		100		ns
t_{fi}			42		ns
E_{off}			0.56		mJ
R_{thJC}				0.25	°C/W
R_{thCS}			0.21		°C/W

TO-247 (IXYH) Outline



1 - Gate
2,4 - Collector
3 - Emitter

Dim.	Millimeter min	Millimeter max	Inches min	Inches max
A	4.70	5.30	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
b	0.99	1.40	0.039	0.055
b2	1.65	2.39	0.065	0.094
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	20.79	21.45	0.819	0.845
D1	13.07	-	0.515	-
D2	0.51	1.35	0.020	0.053
E	15.48	16.24	0.610	0.640
E1	13.45	-	0.53	-
E2	4.31	5.48	0.170	0.216
e	5.45 BSC		0.215 BSC	
L	19.80	20.30	0.078	0.800
L1	-	4.49	-	0.177
Ø P	3.55	3.65	0.140	0.144
Ø P1	-	7.39	-	0.290
Q	5.38	6.19	0.212	0.244
S	6.14 BSC		0.242 BSC	

Reverse Sonic Diode (FRD)

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)		Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 30A, V_{GE} = 0V, Note 1				2.5	V
		T_J = 150°C		2.15		V
I_{RM}	I_F = 30A, V_{GE} = 0V,	T_J = 150°C		25		A
t_{rr}	$-di_F/dt$ = 500A/μs, V_R = 300V	T_J = 150°C		120		ns
R_{thJC}					0.60	°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.

PRELIMANARY 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 = 25ºC

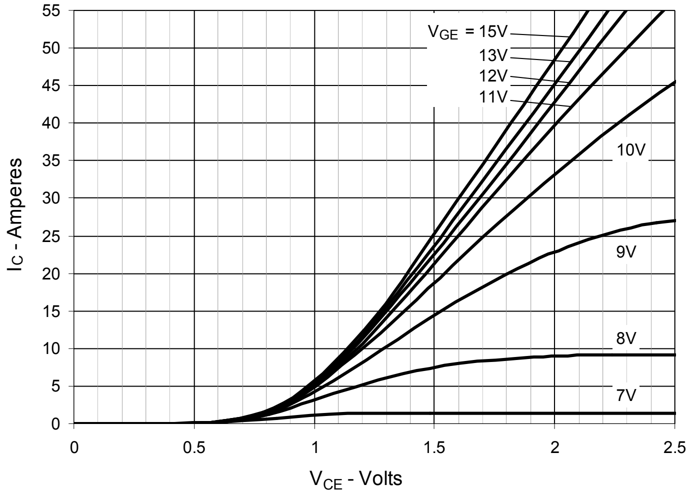


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

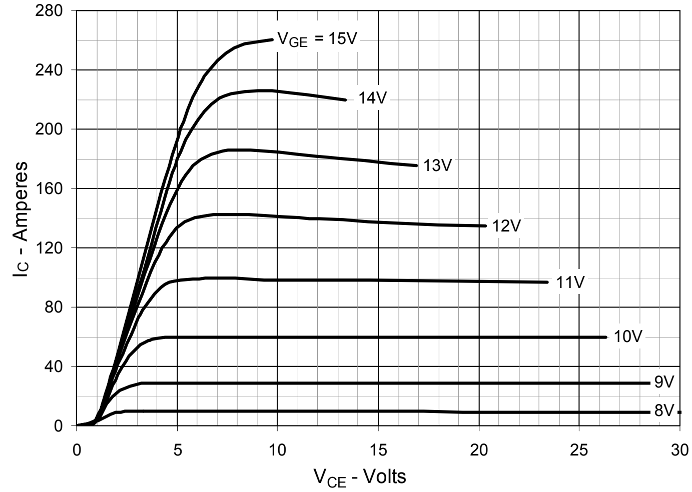


Fig. 3. Output Characteristics @ T_J = 150ºC

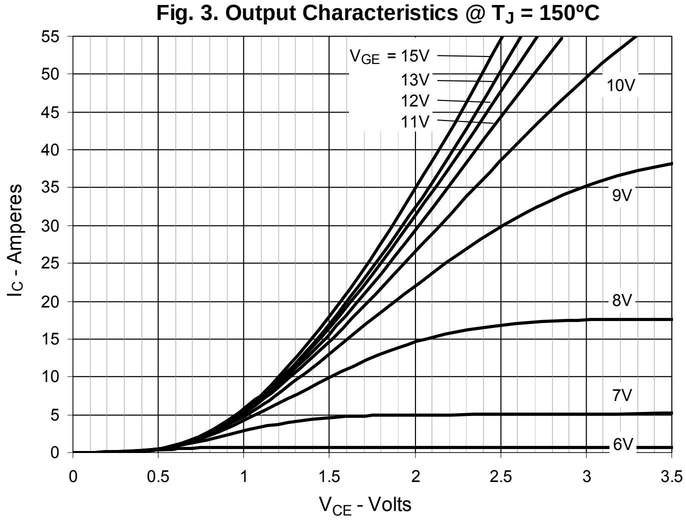


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

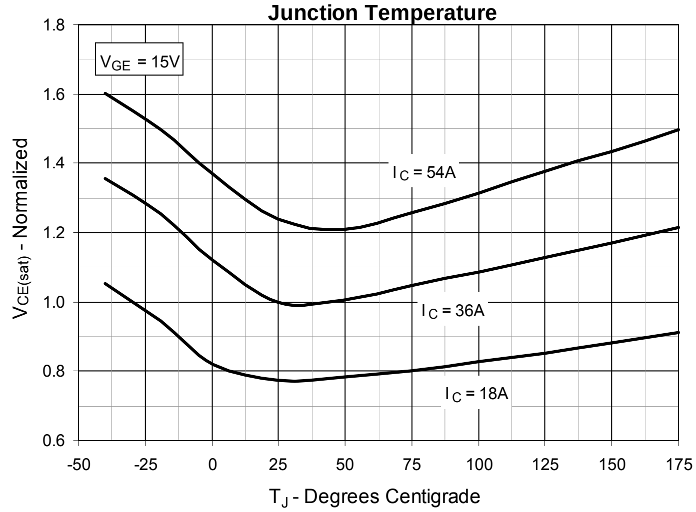


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

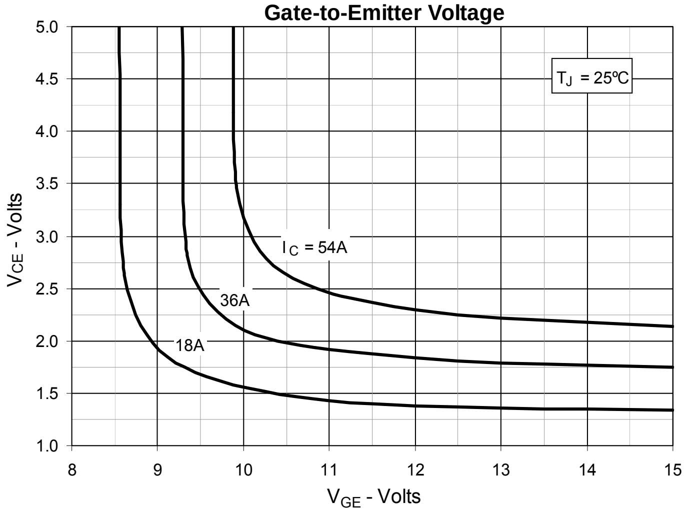


Fig. 6. Input Admittance

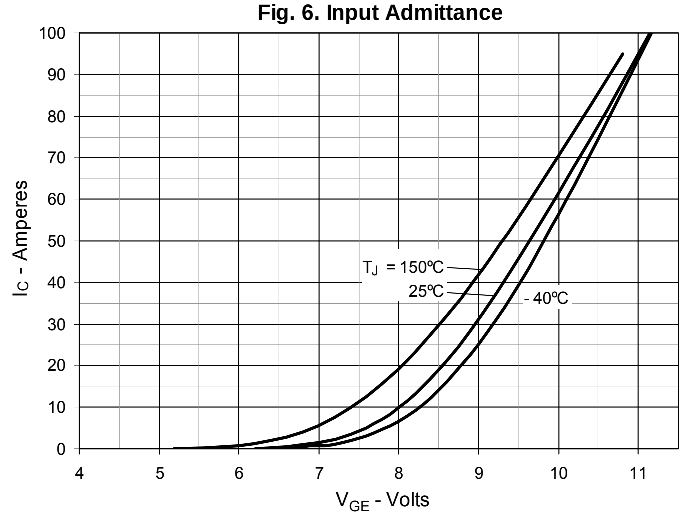


Fig. 7. Transconductance

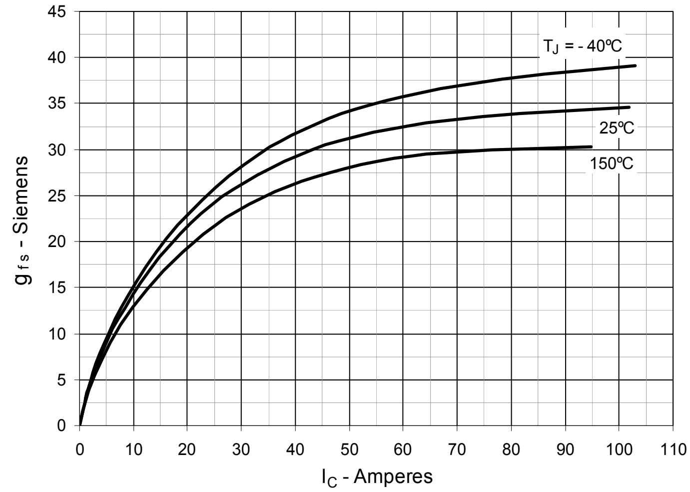


Fig. 8. Gate Charge

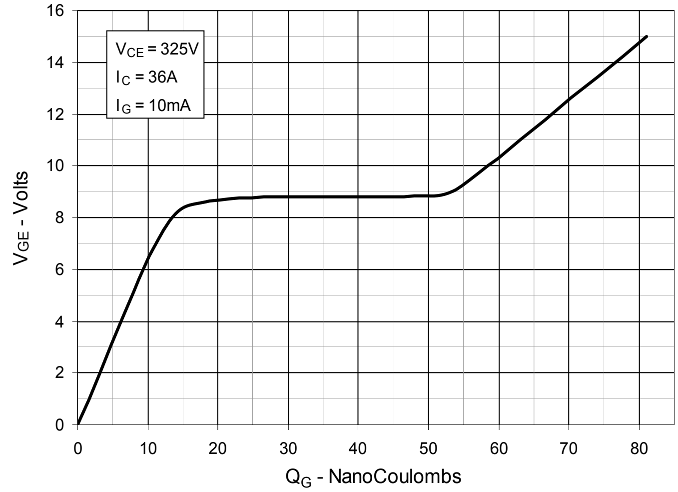


Fig. 9. Capacitance

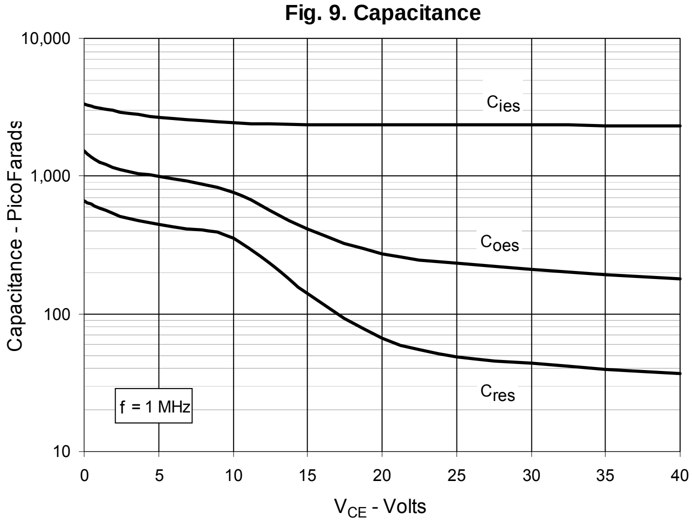


Fig. 10. Reverse-Bias Safe Operating Area

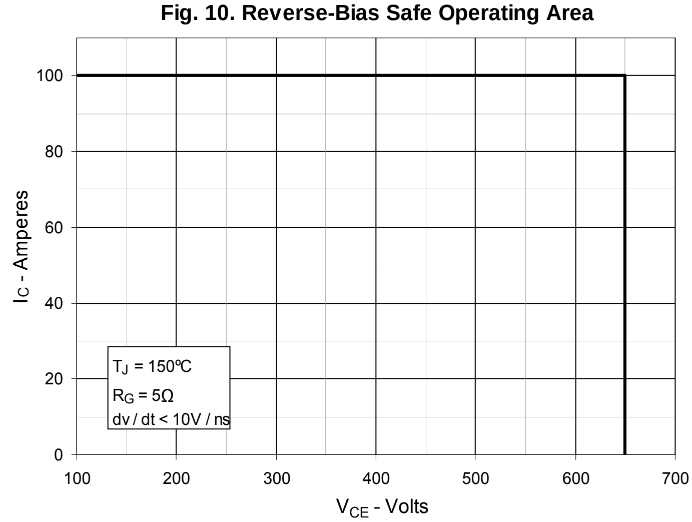


Fig. 11. Forward-Bias Safe Operating Area

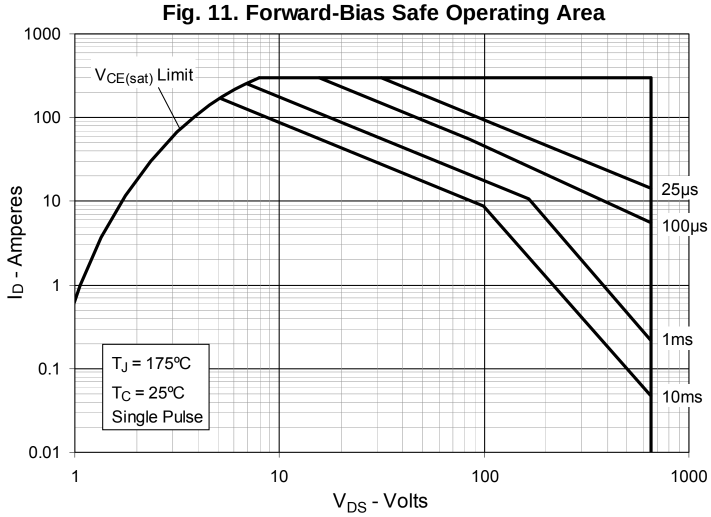


Fig. 12. Maximum Transient Thermal Impedance

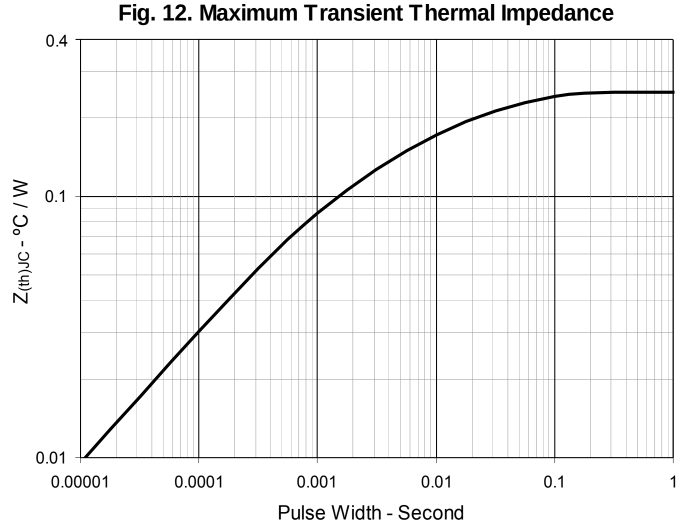


Fig. 13. Inductive Switching Energy Loss vs. Gate Resistance

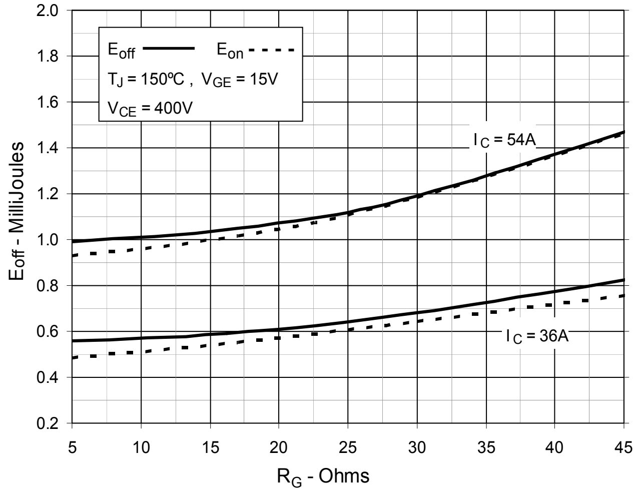


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

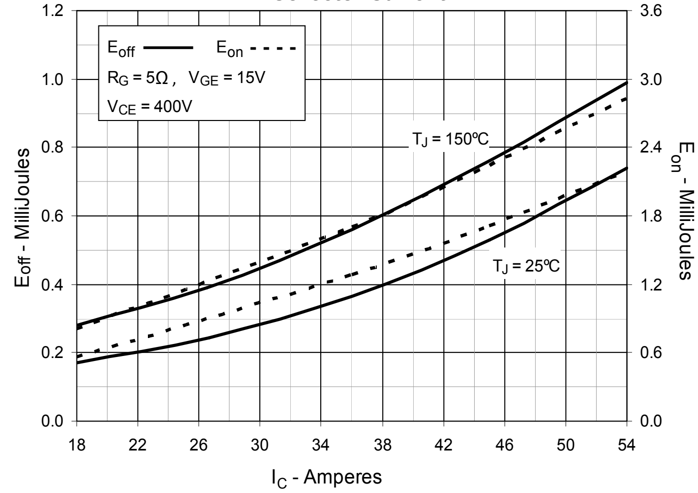


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

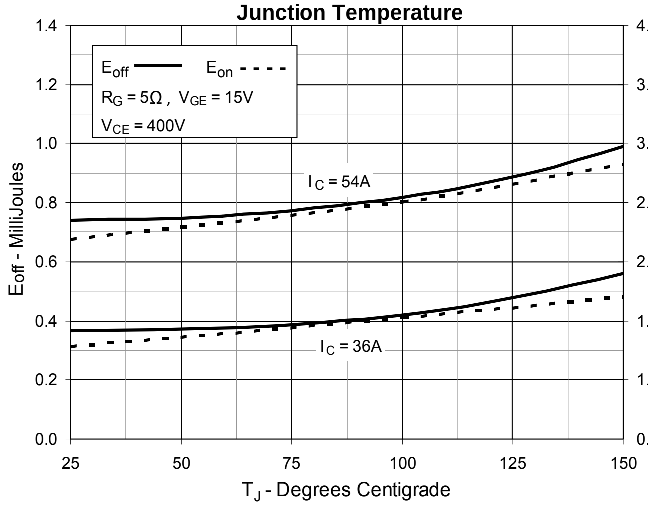


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

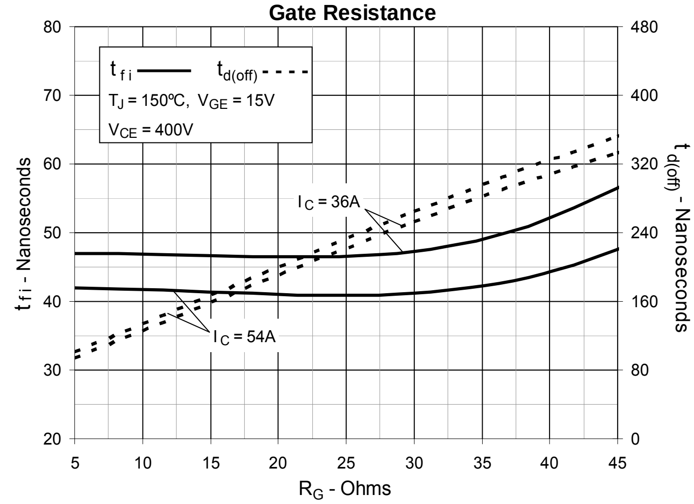


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

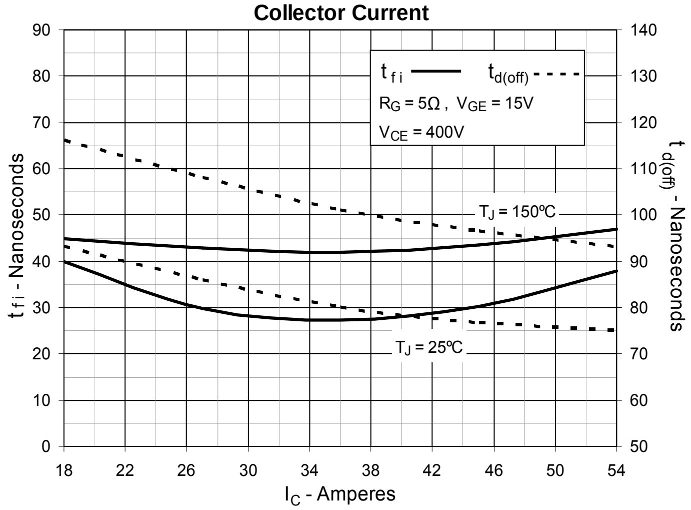


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

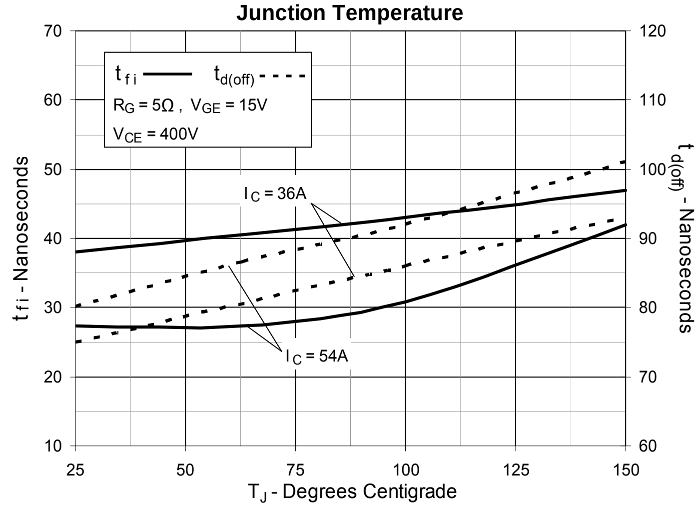


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

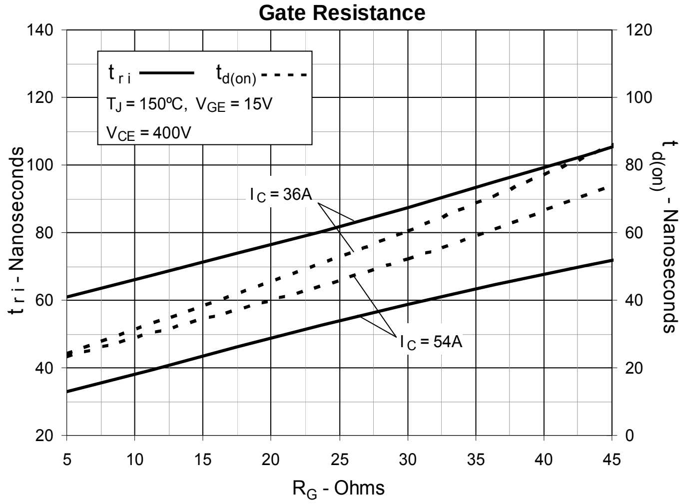


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

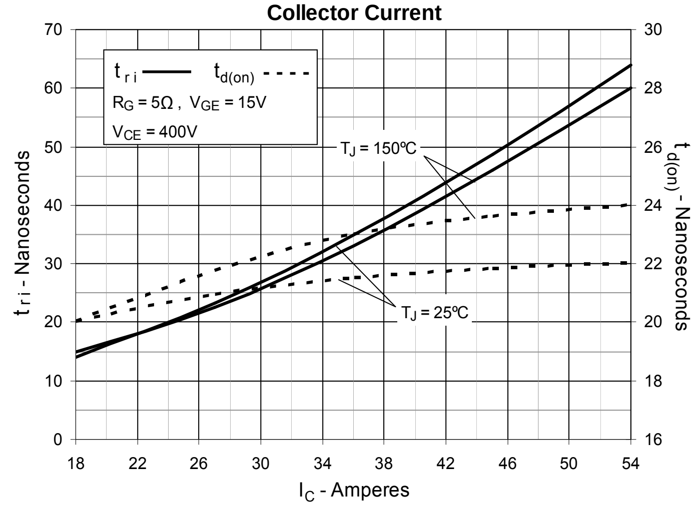


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature

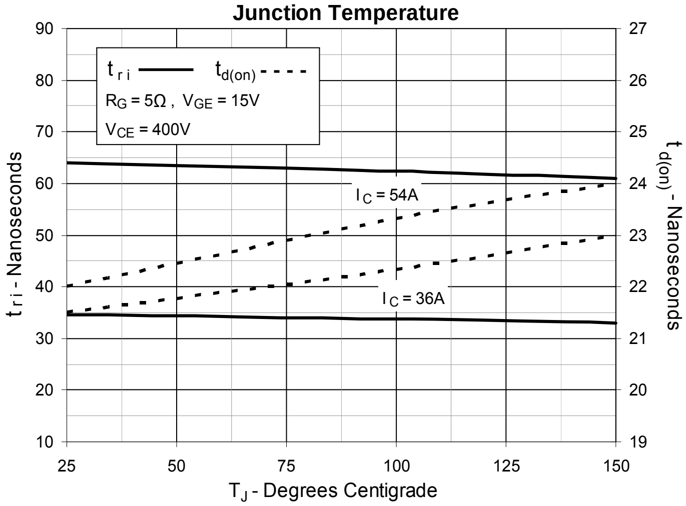


Fig. 22. Maximum Peak Load Current vs. Frequency

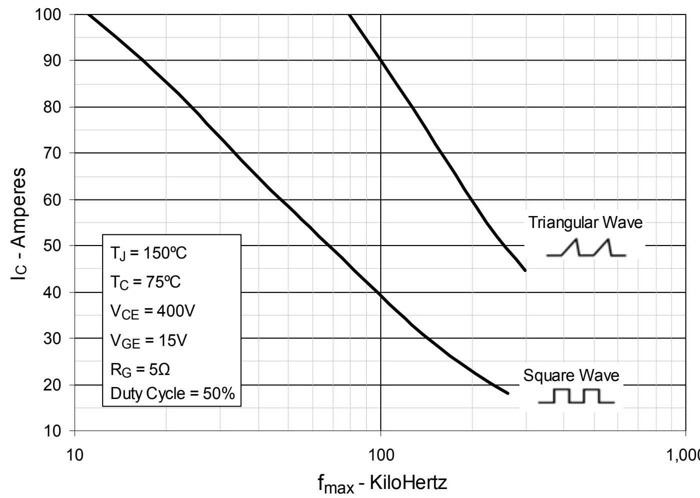


Fig. 23. Forward Current vs. Forward Voltage

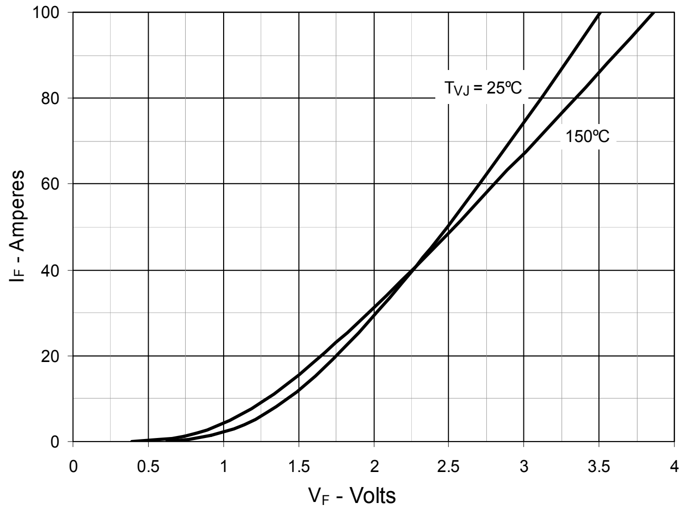


Fig. 24. Reverse Recovery Charge Q_{RR} vs. -di$_F$/dt

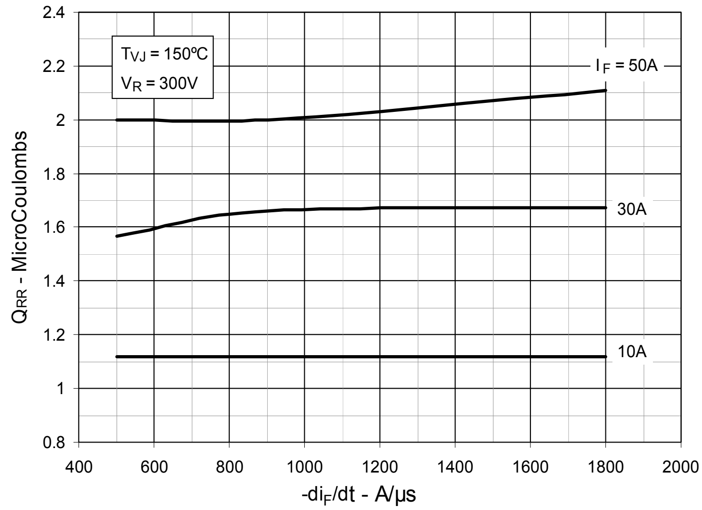


Fig. 25. Peak Reverse Current I_{RM} vs. -di$_F$/dt

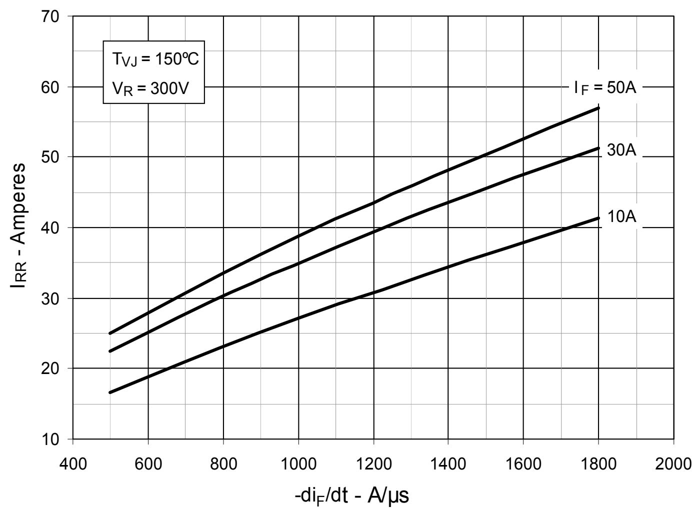


Fig. 26. Recover Time t_{RR} vs. -di$_F$/dt

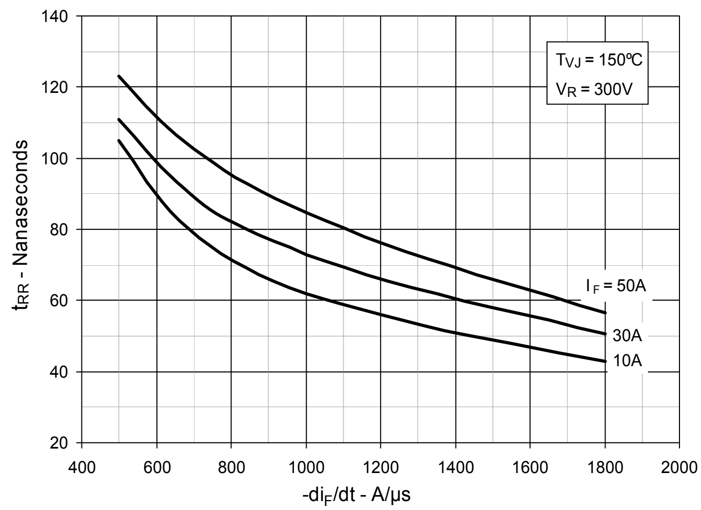


Fig. 27. Recovery Energy E_{REC} vs. -di$_F$/dt

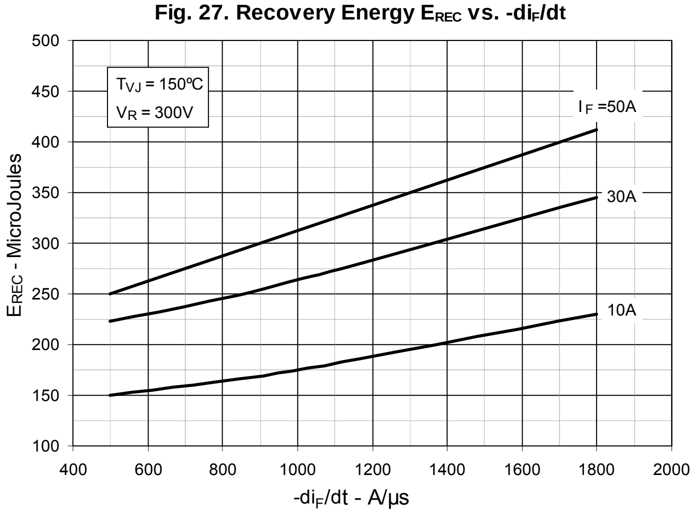


Fig. 28. Dynamic Parameters Q_{RR}, I_{RM} vs. Virtual Junction Temperature T_{VJ}

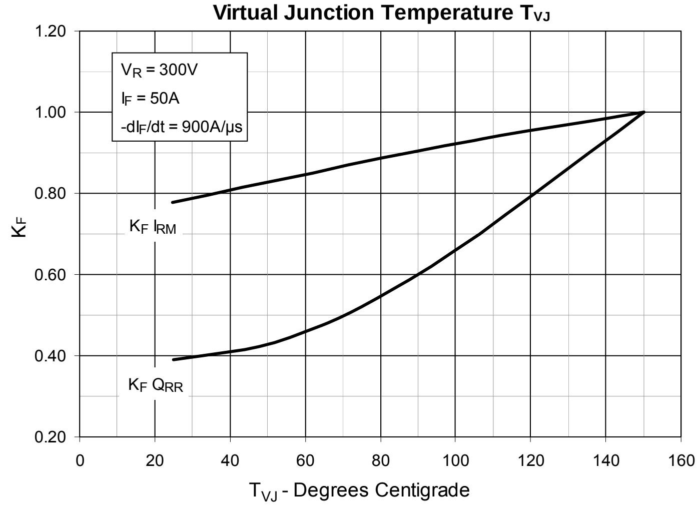
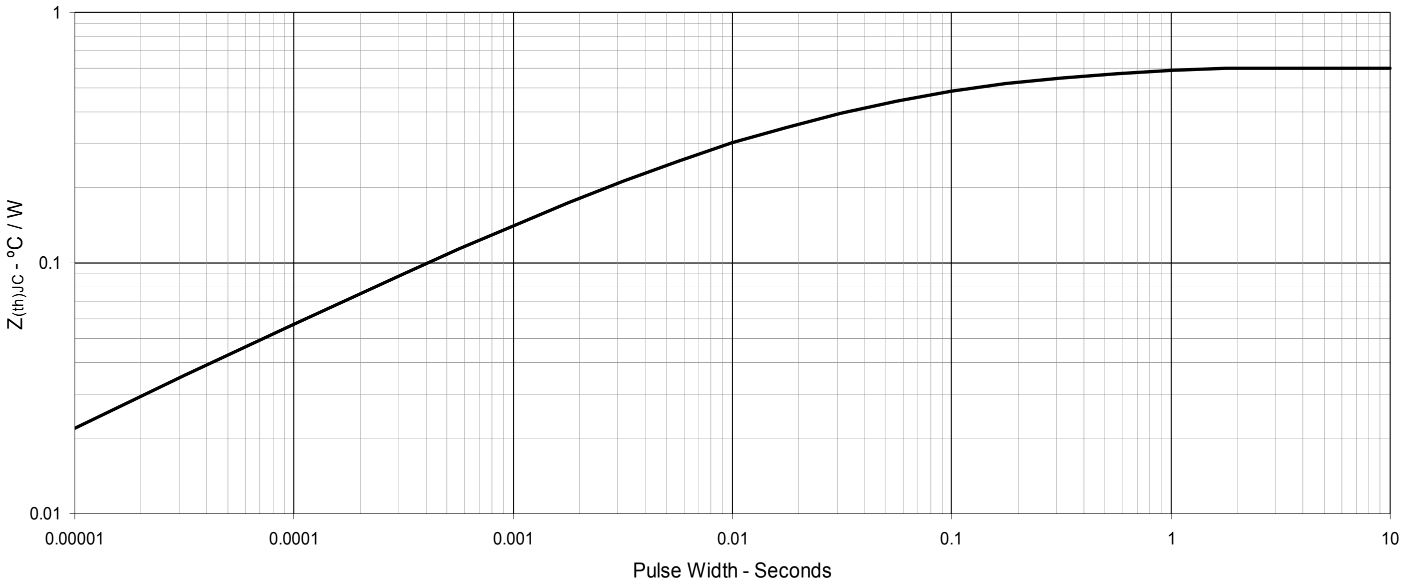


Fig. 29. Maximum Transient Thermal Impedance (Diode)



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