IXYS

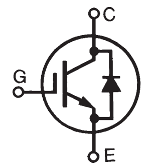
Preliminary Technical Information

XPT™ 650V IGBT GenX3™ w/ Sonic Diode

IXYH75N65C3H1

V_{CES} = 650V
I_{C110} = 75A
$V_{CE(sat)}$ ≤ 2.3V
$t_{fi(typ)}$ = 50ns

Extreme Light Punch through IGBT for 20-60kHz Switching



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 (Chip Capability)	170	A
I_{LRMS}	Terminal Current Limit	160	A
I_{C110}	T_C = 110°C	75	A
I_{F110}	T_C = 110°C	62	A
I_{CM}	T_C = 25°C, 1ms	360	A
I_A	T_C = 25°C	30	A
E_{AS}	T_C = 25°C	300	mJ
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 3Ω Clamped Inductive Load	I_{CM} = 150 $V_{CE} \leq V_{CES}$	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	750	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			4	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±100	nA
$V_{CE(sat)}$	I_C = 60A, V_{GE} = 15V, Note 1		1.8	2.3	V
	T_J = 150°C		2.2		V

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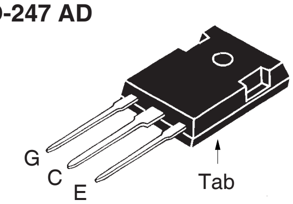


G = Gate　　C = Collector
E = Emitter　　Tab = Collector

Features

- International Standard Package
- Optimized for 20-60kHz Switching
- Square RBSOA
- Avalanche Rated
- Short Circuit Capability
- High Current Handling Capability
- Anti-Parallel Sonic Diode

Advantages

- High Power Density
- Low Gate Drive Requirement

Applications

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

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)	Min.	Typ.	Max.	
g_{fs}	$I_C = 60A$, $V_{CE} = 10V$, Note 1	25	42		S
C_{ies}	$V_{CE} = 25V$, $V_{GE} = 0V$, f = 1MHz		3450		pF
C_{oes}			307		pF
C_{res}			70		pF
$Q_{g(on)}$	$I_C = 75A$, $V_{GE} = 15V$, $V_{CE} = 0.5 \bullet V_{CES}$		123		nC
Q_{ge}			24		nC
Q_{gc}			60		nC
$t_{d(on)}$	**Inductive load, $T_J = 25°C$**		27		ns
t_{ri}	$I_C = 60A$, $V_{GE} = 15V$		67		ns
E_{on}	$V_{CE} = 400V$, $R_G = 3\Omega$		2.8		mJ
$t_{d(off)}$	Note 2		93		ns
t_{fi}			50		ns
E_{off}			1.0		mJ
$t_{d(on)}$	**Inductive load, $T_J = 150°C$**		26		ns
t_{ri}	$I_C = 60A$, $V_{GE} = 15V$		57		ns
E_{on}	$V_{CE} = 400V$, $R_G = 3$		3.3		mJ
$t_{d(off)}$	Note 2		108		ns
t_{fi}			58		ns
E_{off}			1.3		mJ
R_{thJC}				0.20	°C/W
R_{thCS}			0.21		°C/W

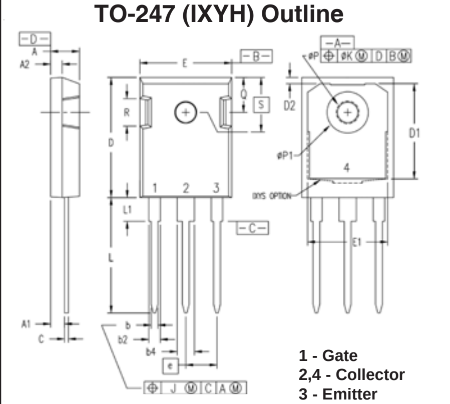
Reverse Sonic Diode (FRD)

Symbol	Test Conditions ($T_J = 25°C$ Unless Otherwise Specified)		Min.	Typ.	Max.	
V_F	$I_F = 50A$, $V_{GE} = 0V$, Note 1				2.5	V
		$T_J = 150°C$		1.8		V
I_{RM}	$I_F = 50A$, $V_{GE} = 0V$, $-di_F/dt = 900A/\mu s$,	$T_J = 150°C$		45		A
t_{rr}	$V_R = 300V$	$T_J = 150°C$		150		ns
R_{thJC}					0.45	°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-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	

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

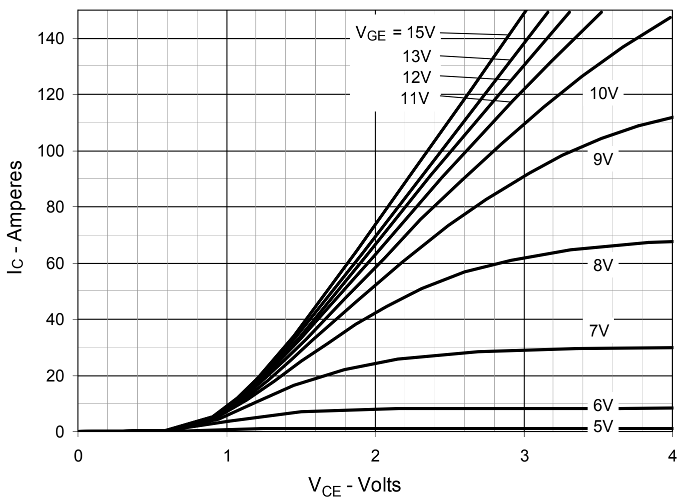


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

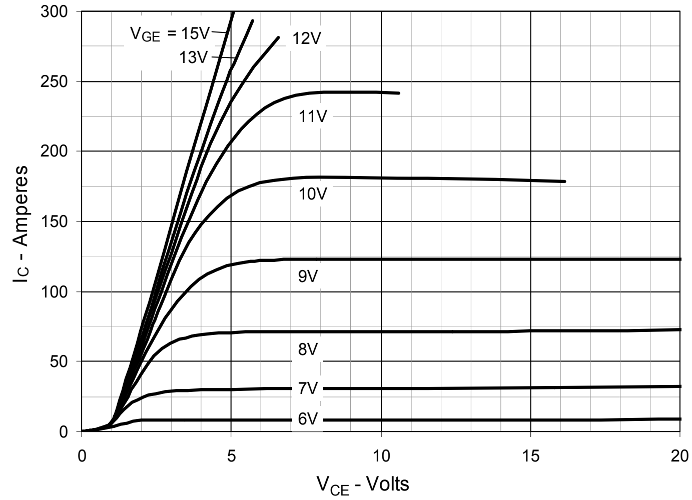


Fig. 3. Output Characteristics @ T_J = 150ºC

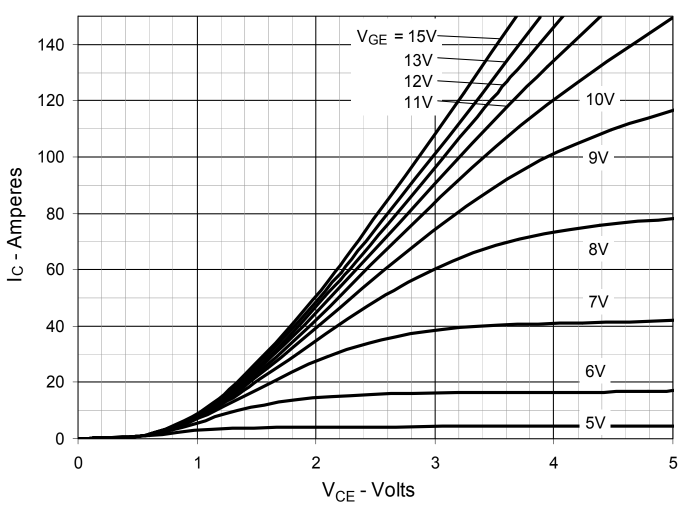


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

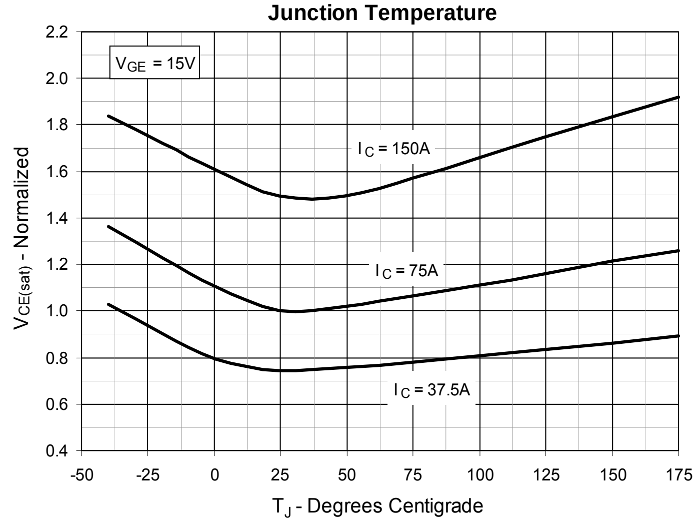


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

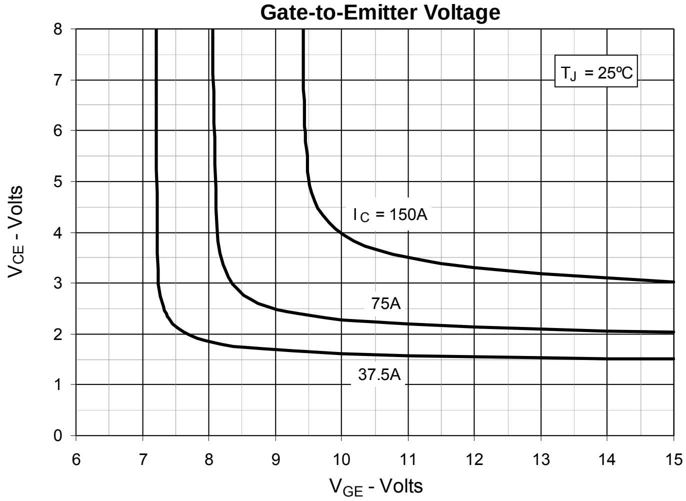


Fig. 6. Input Admittance

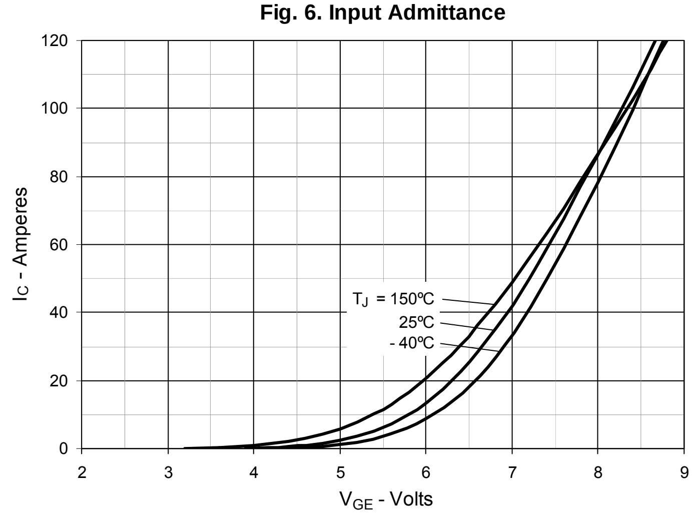


Fig. 7. Transconductance

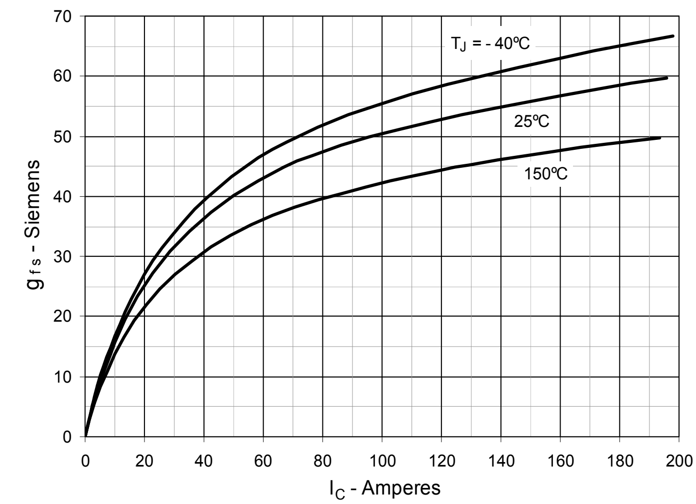


Fig. 8. Gate Charge

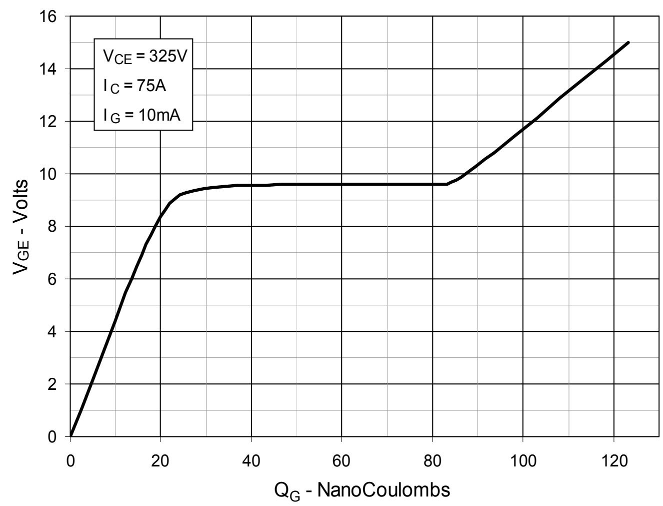


Fig. 9. Capacitance

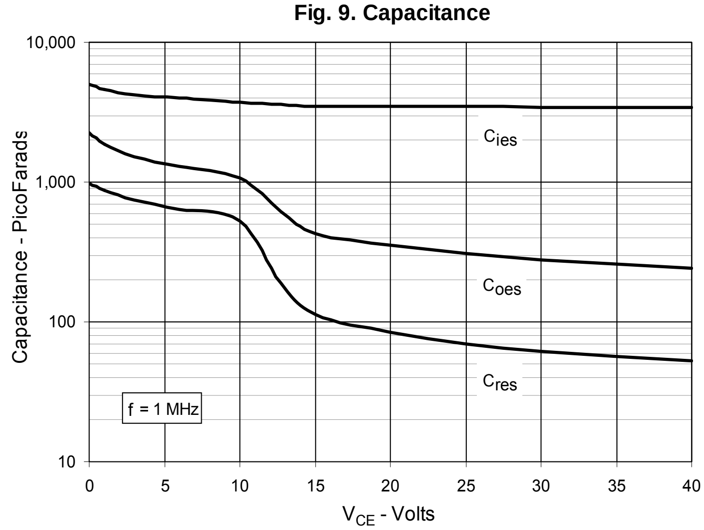


Fig. 10. Reverse-Bias Safe Operating Area

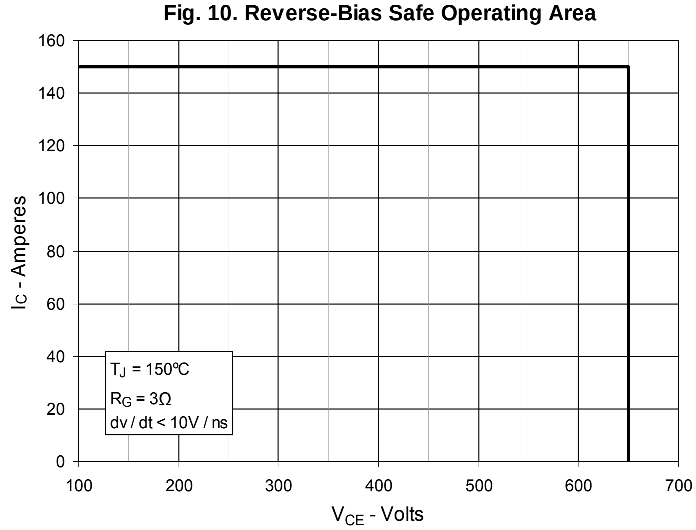


Fig. 11. Maximum Transient Thermal Impedance

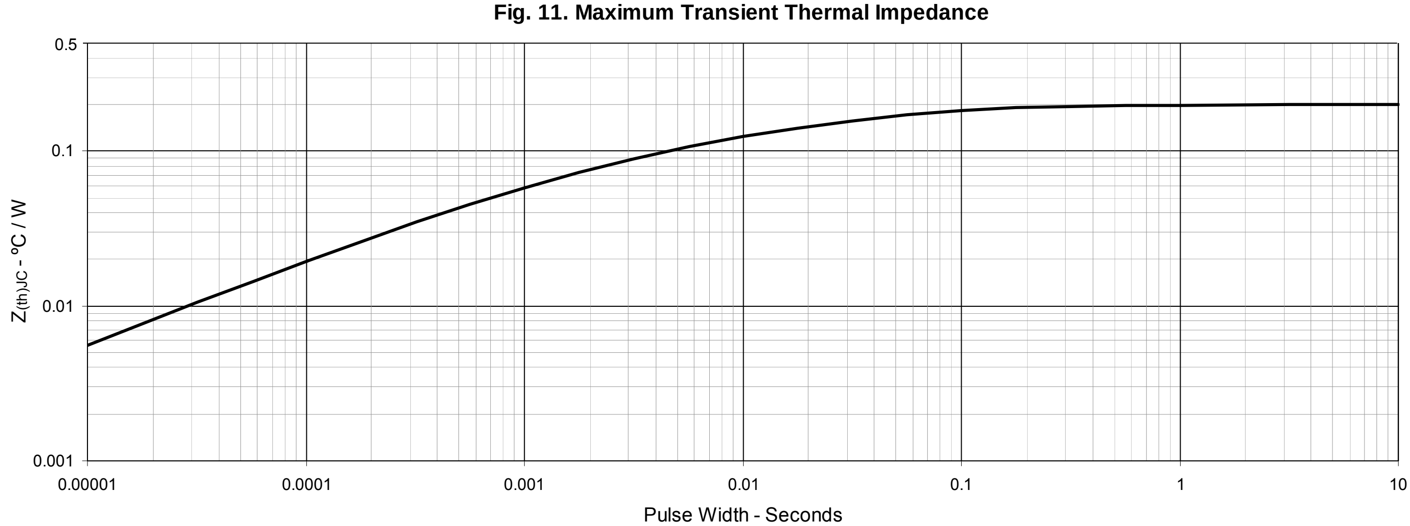


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

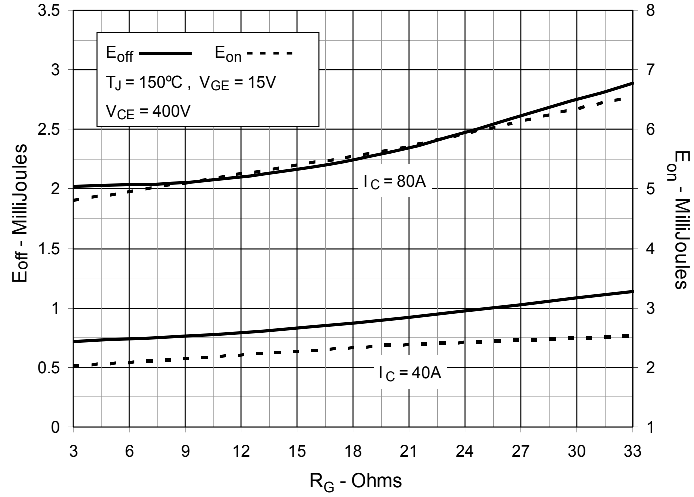


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

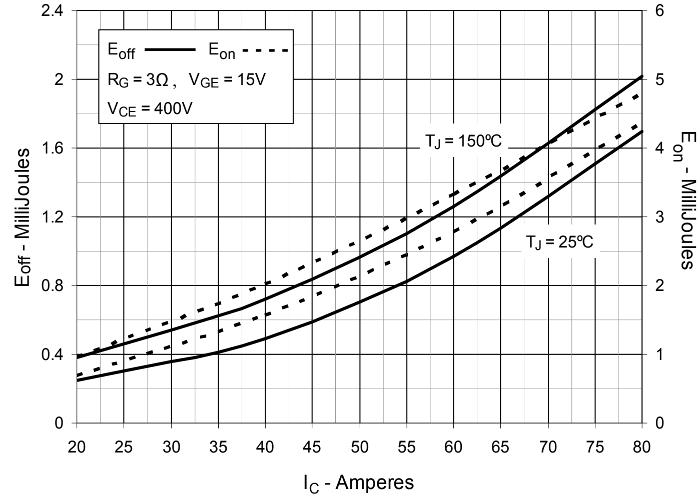


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

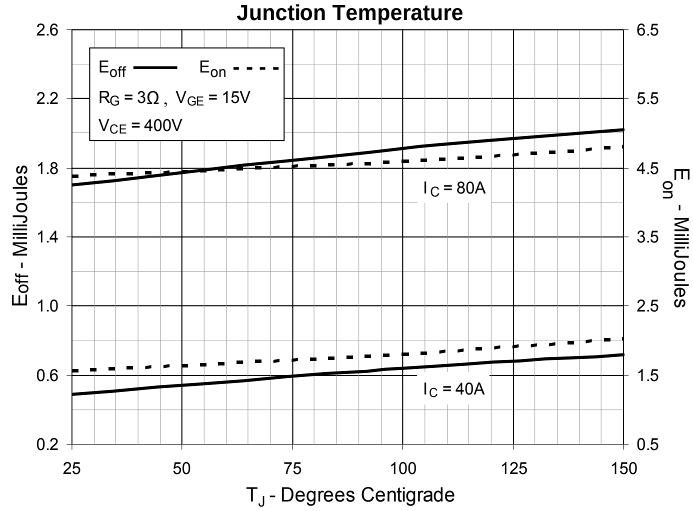


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

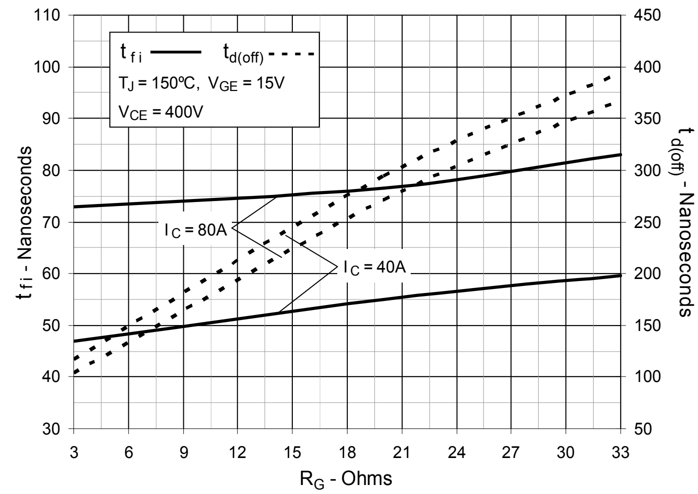


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

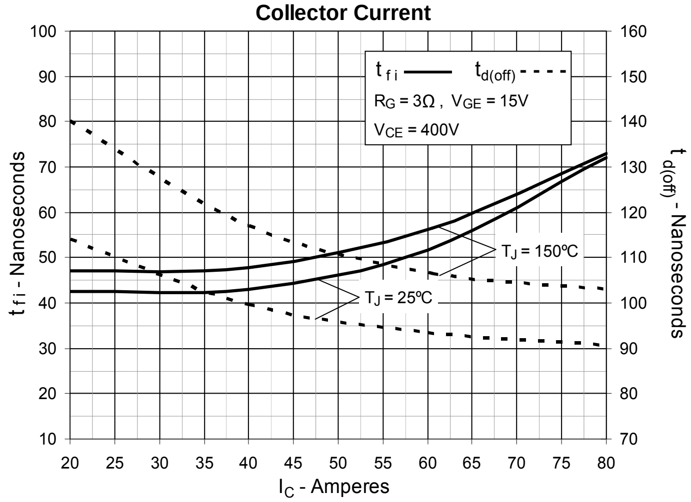
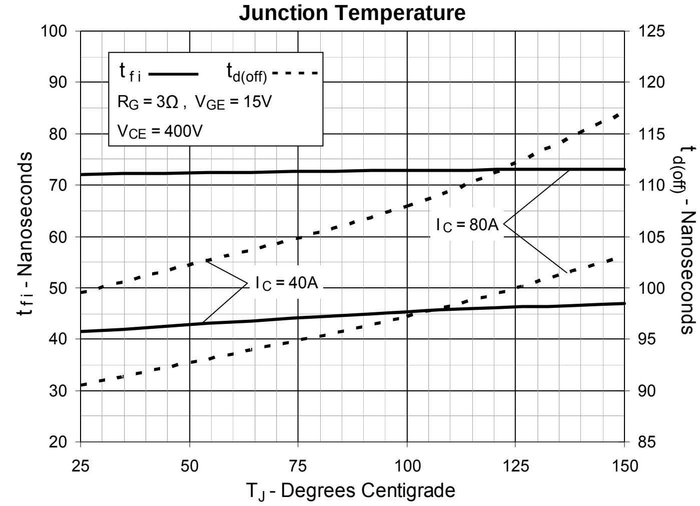


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



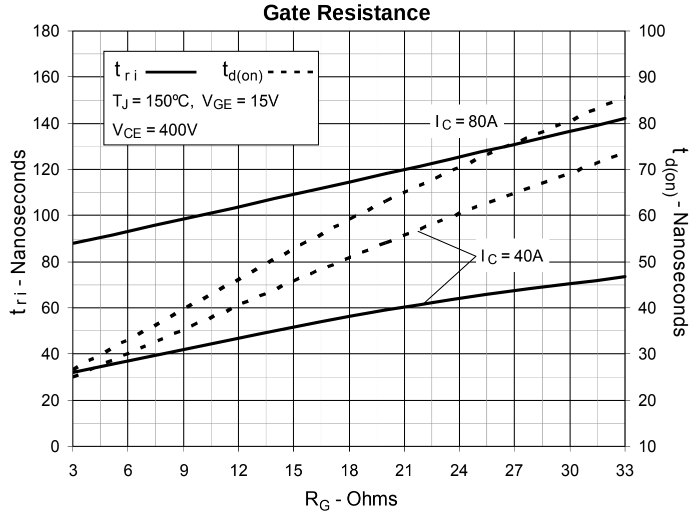


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

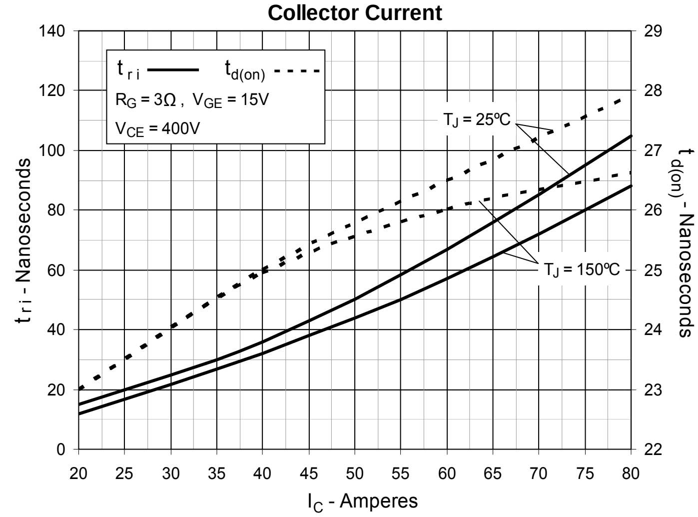


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

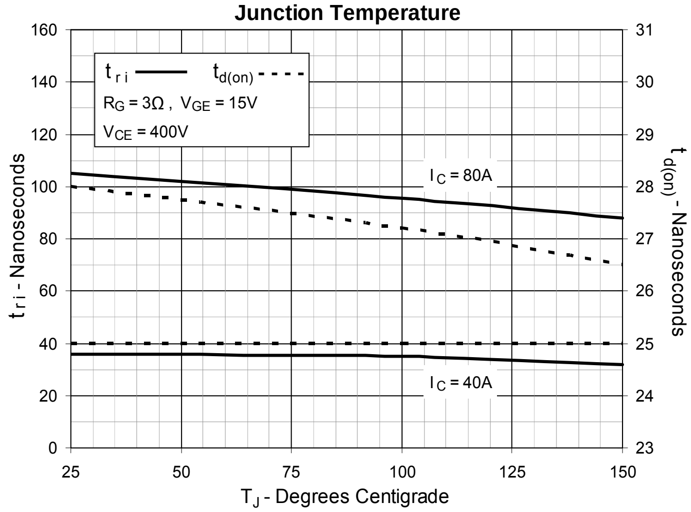


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

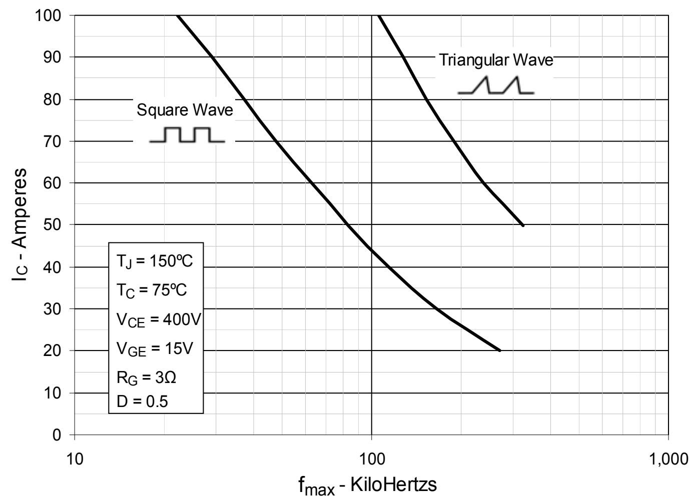


Fig. 21. Maximum Peak Load Current vs. Frequency

Fig. 22. Typ. Forward characteristics

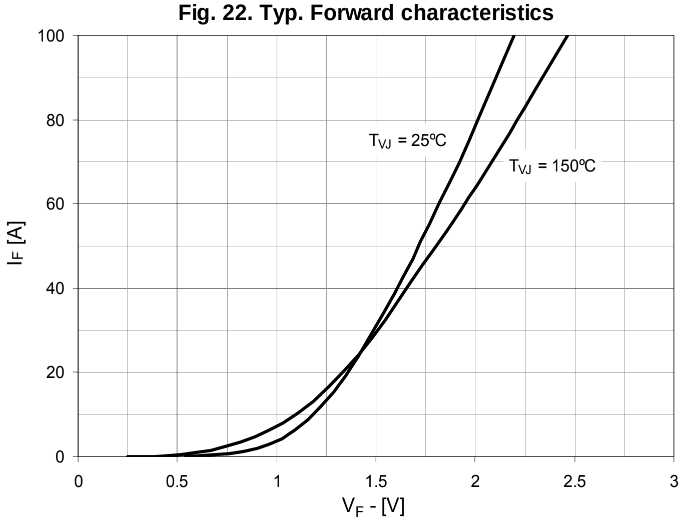


Fig. 23. Typ. Reverse Recovery Charge Q_{rr} vs. -di_F/dt

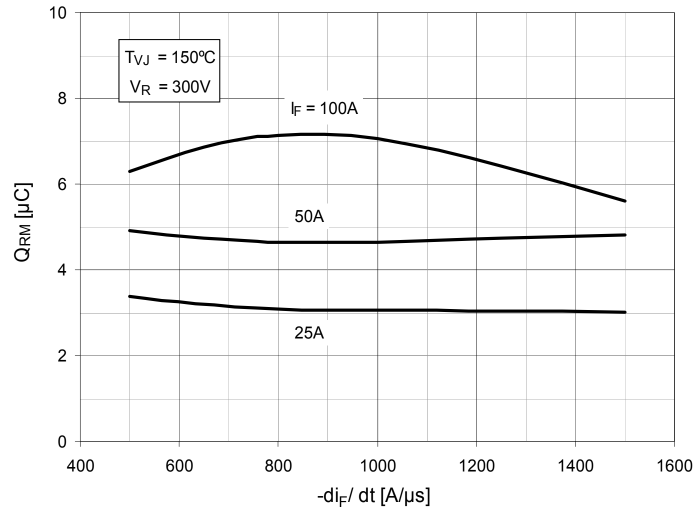


Fig. 24. Typ. Peak Reverse Current I_{RM} vs. -di_F/dt

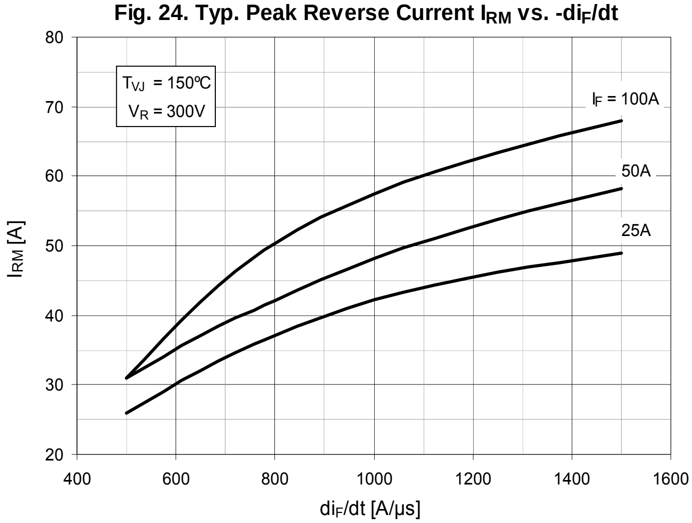


Fig. 25. Typ. Recovery Time t_{rr} vs. -di_F/dt

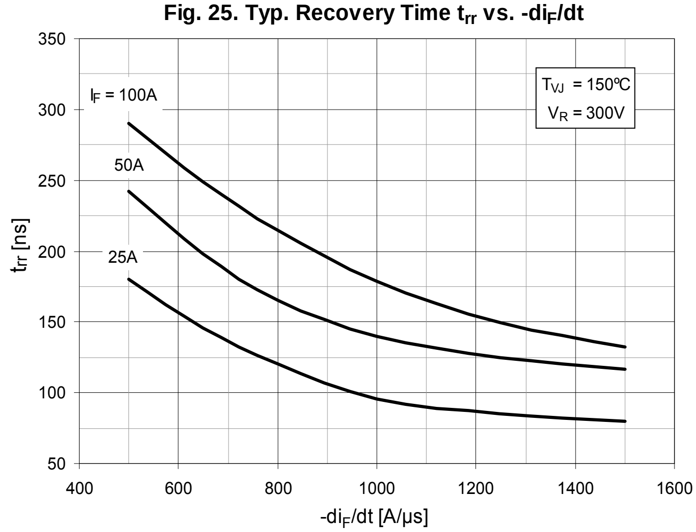


Fig. 26. Typ. Recovery Energy E_{rec} vs. -di_F/dt

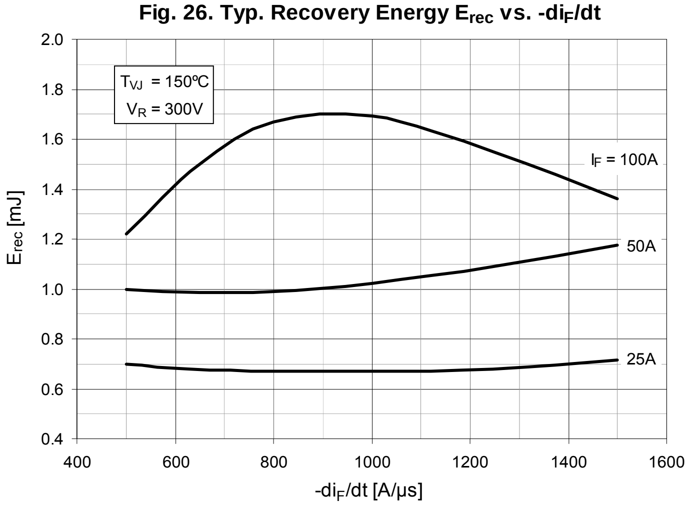


Fig. 27. Maximum Transient Thermal Impedance