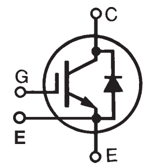
IXYS

Preliminary Technical Information

XPT™ 600V IGBT GenX3™ w/ Sonic Diode

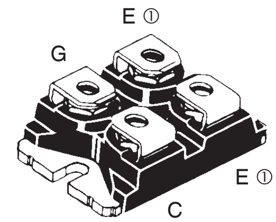
IXXN200N60C3H1

Extreme Light Punch Through
IGBT for 20-60kHz Switching



V_{CES}	=	600V
I_{C110}	=	98A
$V_{CE(sat)}$	≤	2.1V
$t_{fi(typ)}$	=	80ns

SOT-227B
E153432



G = Gate, C = Collector, E = Emitter
① either emitter terminal can be used as Main or Kelvin Emitter

Symbol	Test Conditions		Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C		600	V
V_{CGR}	T_J = 25°C to 150°C, R_{GE} = 1MΩ		600	V
V_{GES}	Continuous		±20	V
V_{GEM}	Transient		±30	V
I_{C25}	T_C = 25°C (Chip Capability)		200	A
I_{C110}	T_C = 110°C		98	A
I_{F110}	T_C = 110°C		30	A
I_{CM}	T_C = 25°C, 1ms		1000	A
I_A	T_C = 25°C		100	A
E_{AS}	T_C = 25°C		1	J
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 1Ω Clamped Inductive Load		I_{CM} = 400 @$V_{CE} \leq V_{CES}$	A
t_{sc} **(SCSOA)**	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 10Ω, Non Repetitive		10	μs
P_C	T_C = 25°C		780	W
T_J			-55 ... +150	°C
T_{JM}			150	°C
T_{stg}			-55 ... +150	°C
V_{ISOL}	50/60Hz	t = 1min	2500	V~
	$I_{ISOL} \leq$ 1mA	t = 1s	3000	V~
M_d	Mounting Torque		1.5/13	Nm/lb.in.
	Terminal Connection Torque		1.3/11.5	Nm/lb.in.
Weight			30	g

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{CES}	I_C = 250μA, V_{GE} = 0V	600			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
	Note 1, T_J = 125°C			3	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V			±200	nA
$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V, Note 1		1.60	2.10	V
	T_J = 150°C		1.93		V

Features

- Silicon Chip on Direct-Copper Bond (DCB) Substrate
- miniBLOC, with Aluminium Nitride Isolation
- Optimized for Low Switching Losses
- Isolated Mounting Surface
- Anti-Parallel Sonic Diode
- 2500V~ Electrical Isolation
- Optimized for 20-60kHz Switching
- Avalanche Rated
- Short Circuit Capability
- Very High Current Capability
- Square RBSOA

Advantages

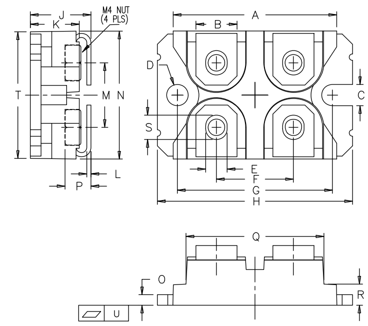
- High Power Density
- Low Gate Drive Requirement

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)	Characteristic Values Min.	Typ.	Max.	
g_{fs}	I_C = 60A, V_{CE} = 10V, Note 1	20	35		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		9900		pF
C_{oes}			570		pF
C_{res}			185		pF
$Q_{g(on)}$	I_C = 200A, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		315		nC
Q_{ge}			134		nC
Q_{gc}			98		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		47		ns
t_{ri}	I_C = 100A, V_{GE} = 15V		100		ns
E_{on}	V_{CE} = 360V, R_G = 1Ω		3.0		mJ
$t_{d(off)}$	Note 2		125		ns
t_{fi}			80		ns
E_{off}			1.7	2.6	mJ
$t_{d(on)}$	**Inductive load, T_J = 150°C**		47		ns
t_{ri}	I_C = 100A, V_{GE} = 15V		96		ns
E_{on}	V_{CE} = 360V, R_G = 1Ω		4.0		mJ
$t_{d(off)}$	Note 2		150		ns
t_{fi}			90		ns
E_{off}			2.1		mJ
R_{thJC}				0.16	°C/W
R_{thCS}			0.05		°C/W

SOT-227B miniBLOC (IXXN)



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	1.240	1.255	31.50	31.88
B	.307	.323	7.80	8.20
C	.161	.169	4.09	4.29
D	.161	.169	4.09	4.29
E	.161	.169	4.09	4.29
F	.587	.595	14.91	15.11
G	1.186	1.193	30.12	30.30
H	1.496	1.505	38.00	38.23
J	.460	.481	11.68	12.22
K	.351	.378	8.92	9.60
L	.030	.033	0.76	0.84
M	.496	.506	12.60	12.85
N	.990	1.001	25.15	25.42
O	.078	.084	1.98	2.13
P	.195	.235	4.95	5.97
Q	1.045	1.059	26.54	26.90
R	.155	.174	3.94	4.42
S	.186	.191	4.72	4.85
T	.968	.987	24.59	25.07
U	-.002	.004	-0.05	0.1

Reverse Sonic Diode (FRD)

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
V_F	I_F = 100A, V_{GE} = 0V, Note 1			2.5	V
	T_J = 150°C		2.3		V
I_{RM}	I_F = 100A, V_{GE} = 0V, T_J = 150°C		95		A
t_{rr}	$-di_F/dt$ = 1500A/μs, V_R = 300V		100		ns
R_{thJC}				0.70	°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.

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Fig. 1. Output Characteristics @ T_J = 25ºC

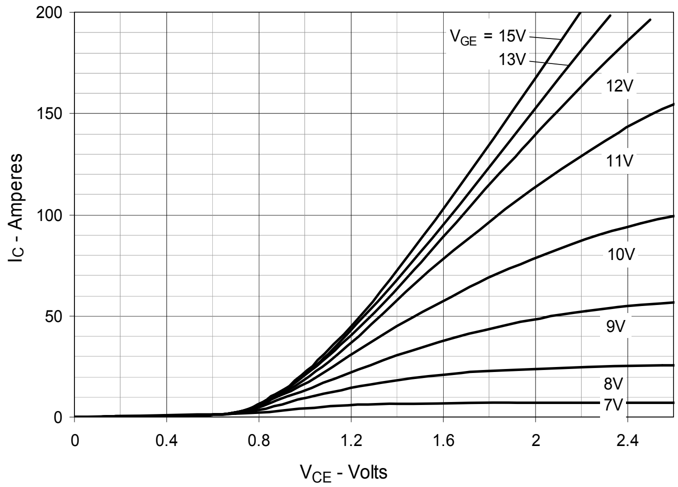


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

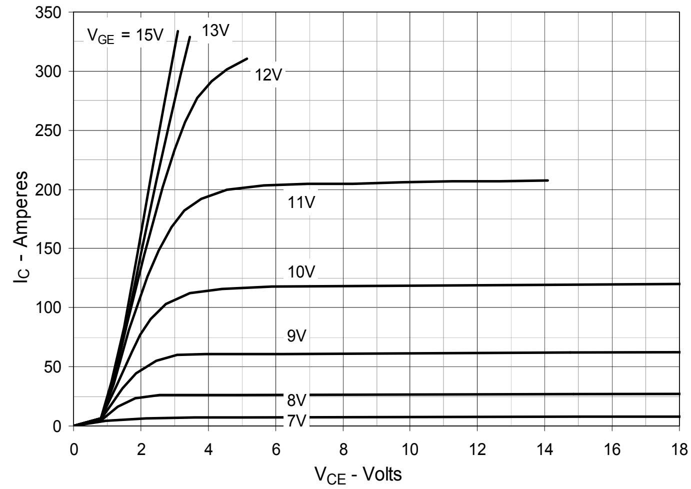


Fig. 3. Output Characteristics @ T_J = 150ºC

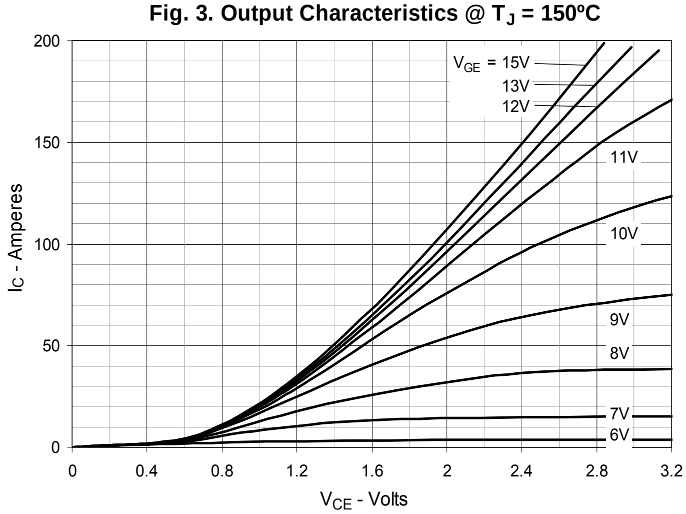


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

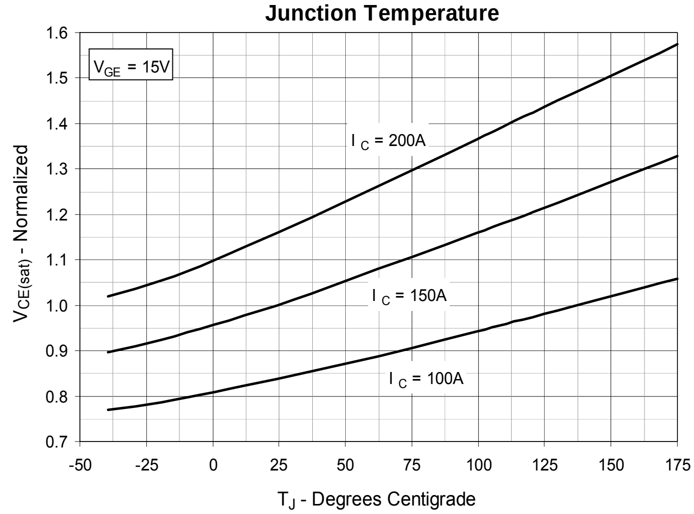


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

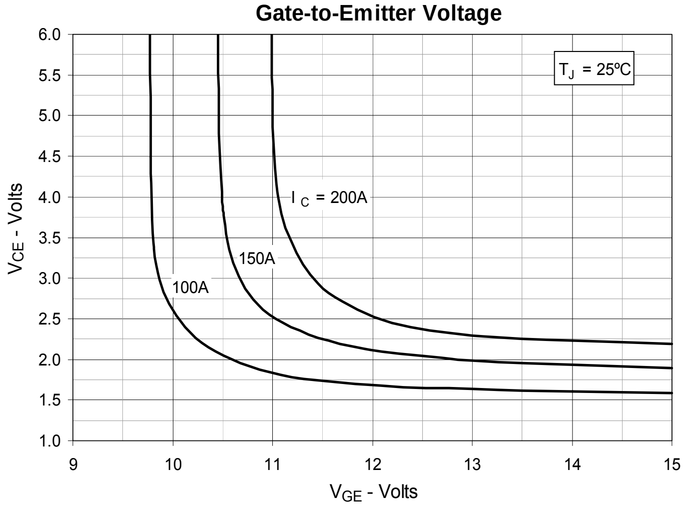


Fig. 6. Input Admittance

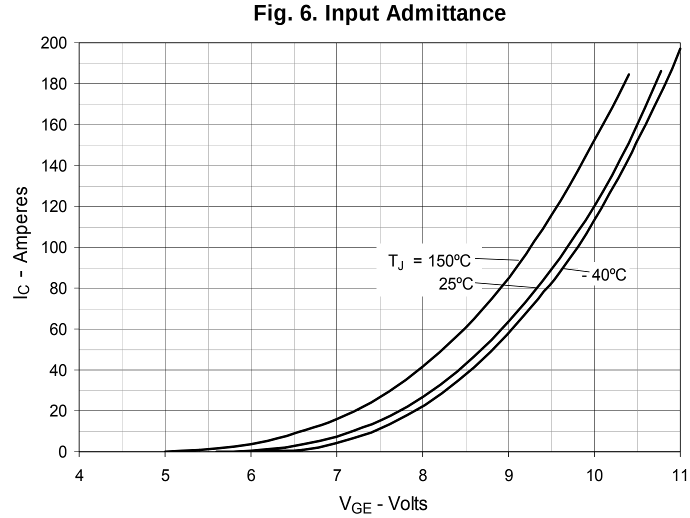


Fig. 7. Transconductance

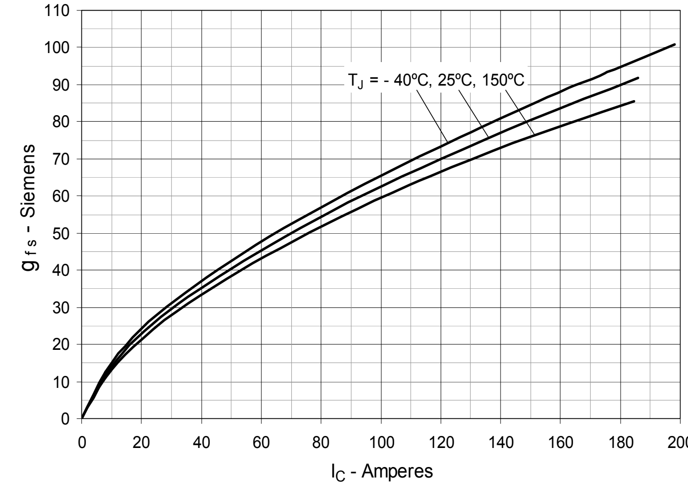


Fig. 8. Gate Charge

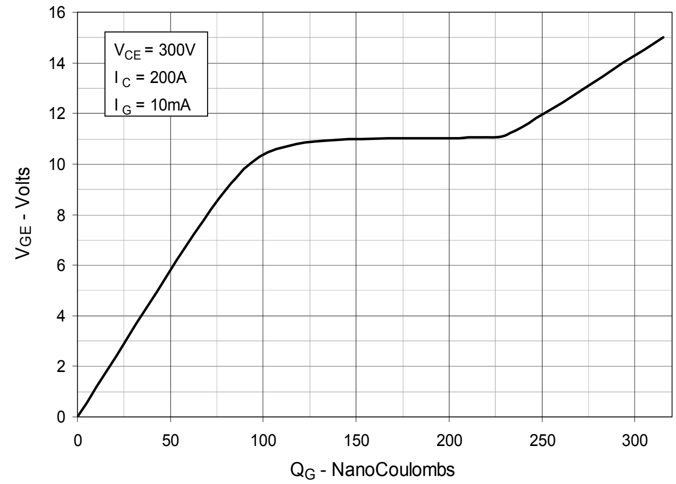


Fig. 9. Capacitance

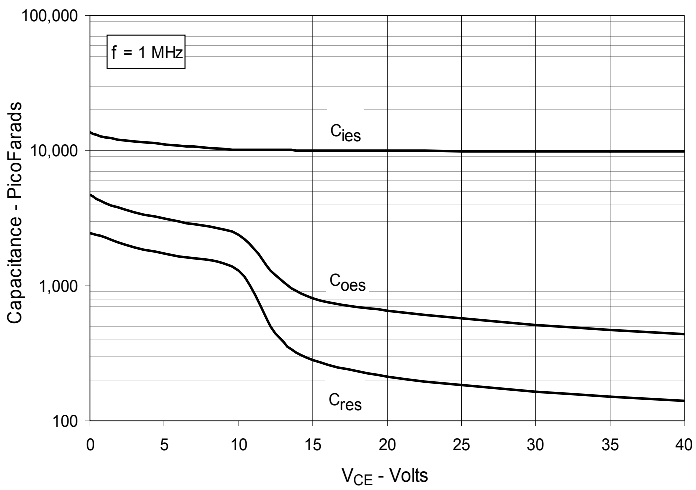


Fig. 10. Reverse-Bias Safe Operating Area

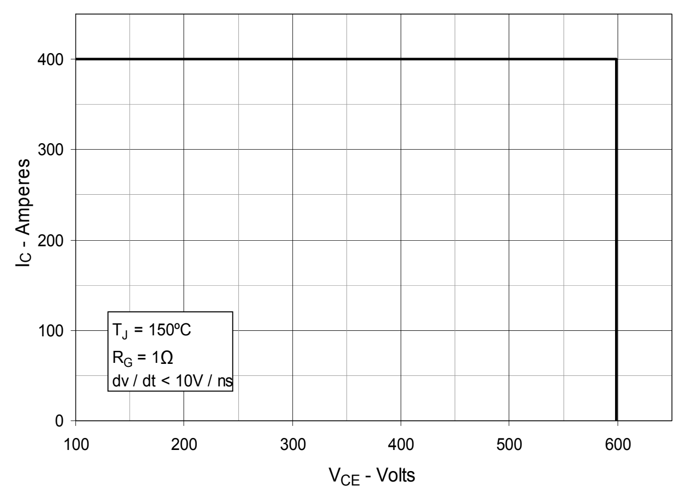


Fig. 11. Forward-Bias Safe Operating Area

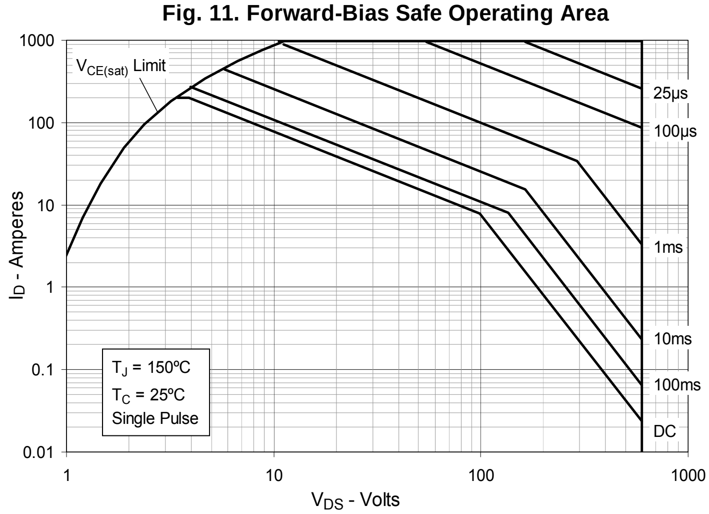
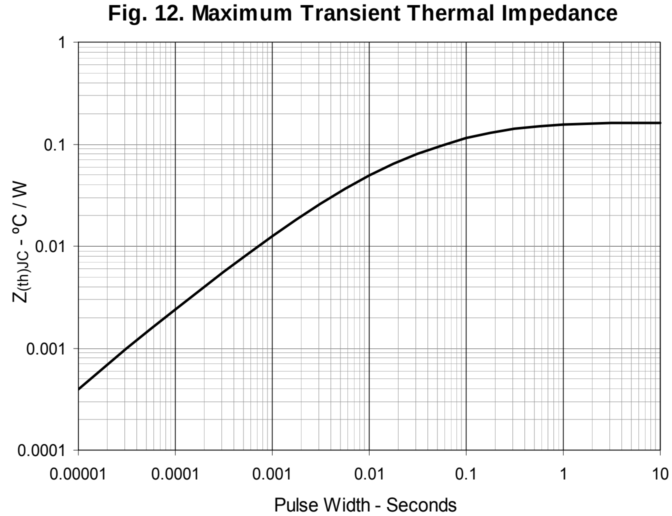


Fig. 12. Maximum Transient Thermal Impedance



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

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

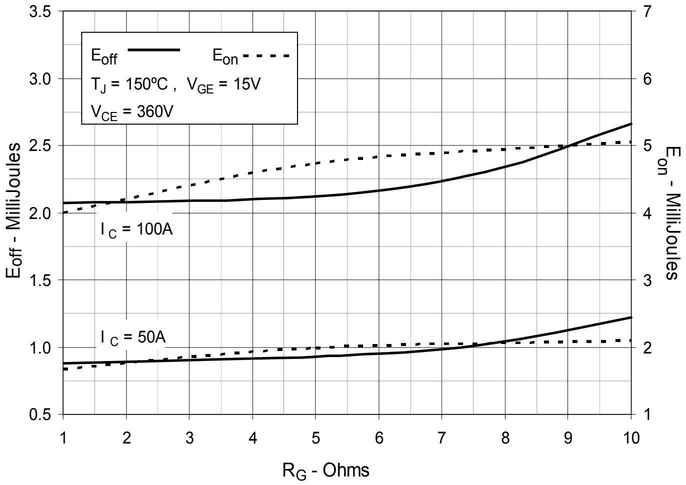


Fig. 14. Inductive Switching Energy Loss vs. Collector Current

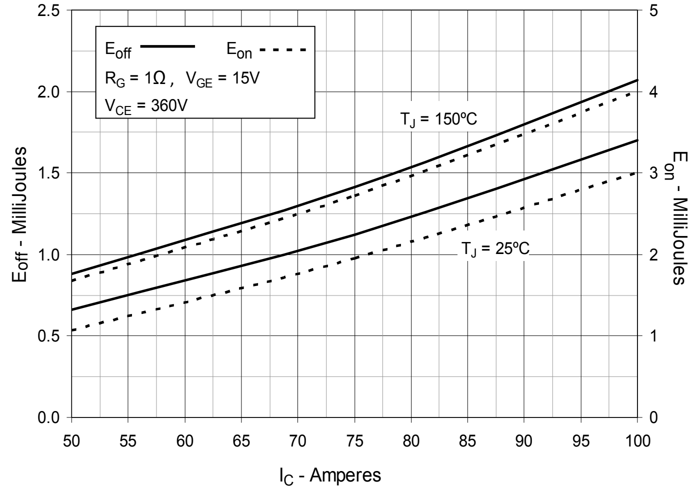


Fig. 15. Inductive Switching Energy Loss vs. Junction Temperature

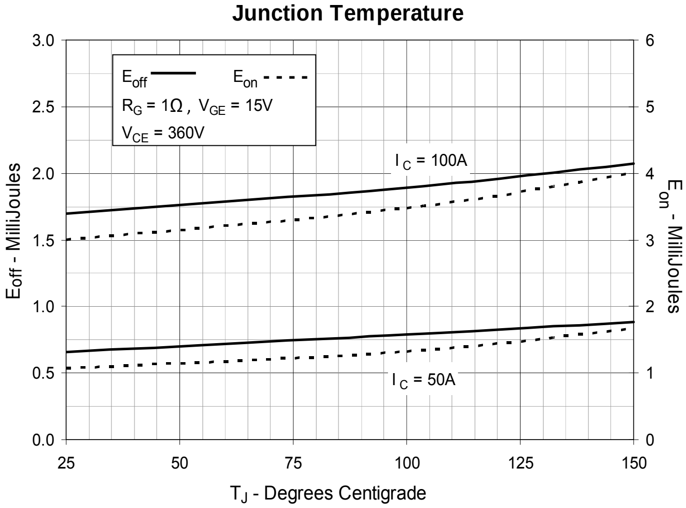


Fig. 16. Inductive Turn-off Switching Times vs. Gate Resistance

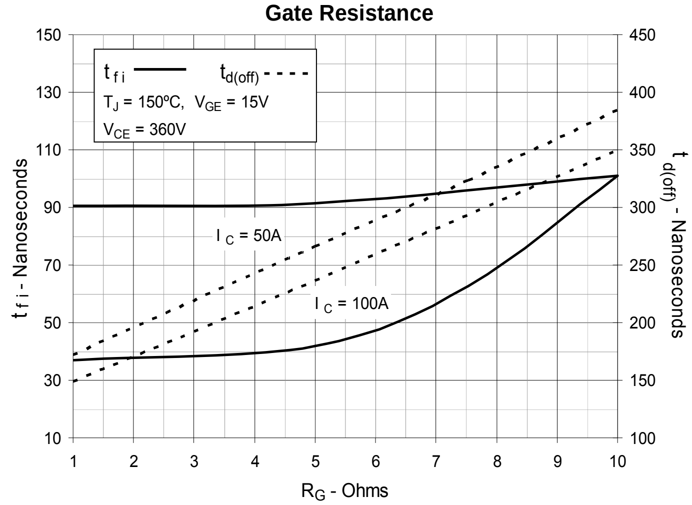


Fig. 17. Inductive Turn-off Switching Times vs. Collector Current

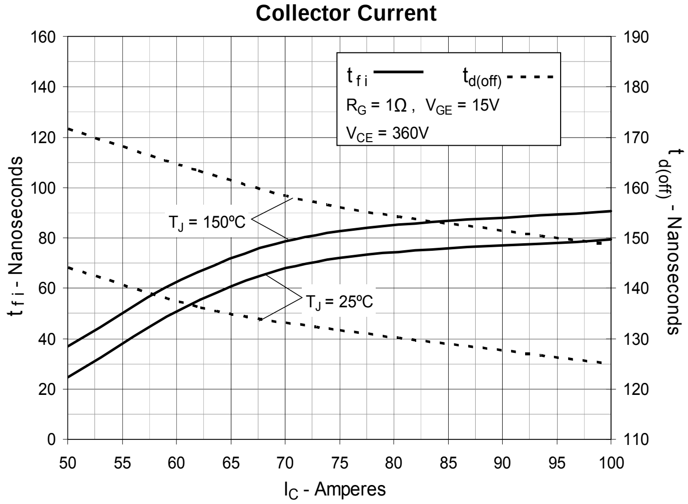


Fig. 18. Inductive Turn-off Switching Times vs. Junction Temperature

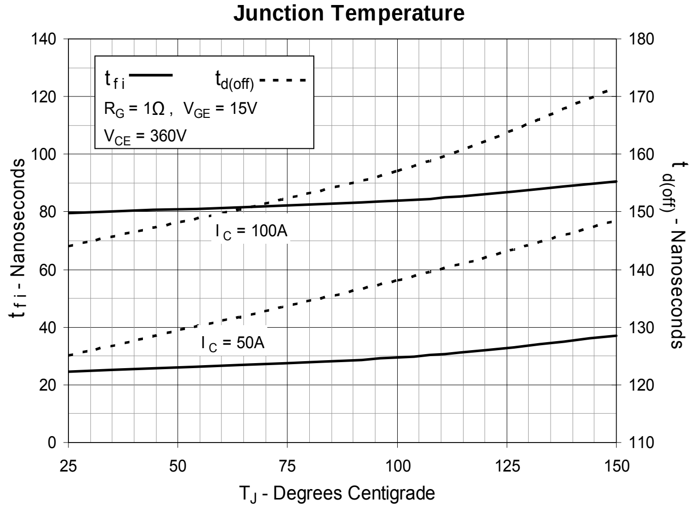


Fig. 19. Inductive Turn-on Switching Times vs. Gate Resistance

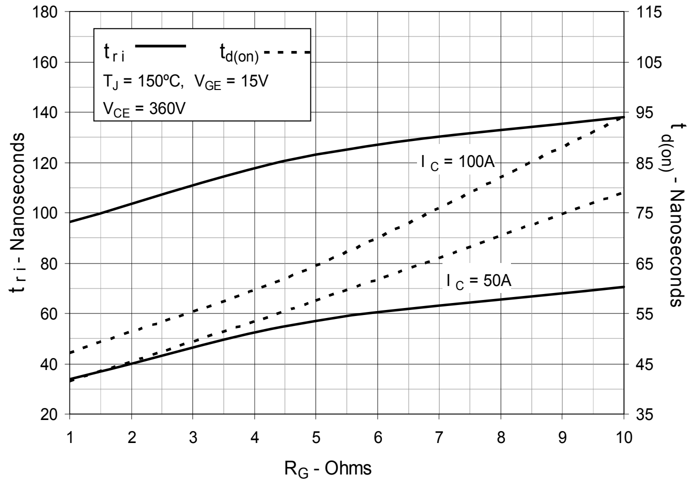


Fig. 20. Inductive Turn-on Switching Times vs. Collector Current

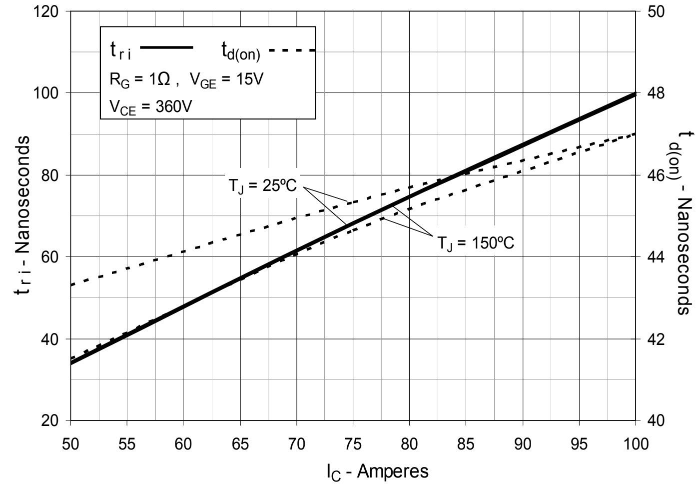


Fig. 21. Inductive Turn-on Switching Times vs. Junction Temperature

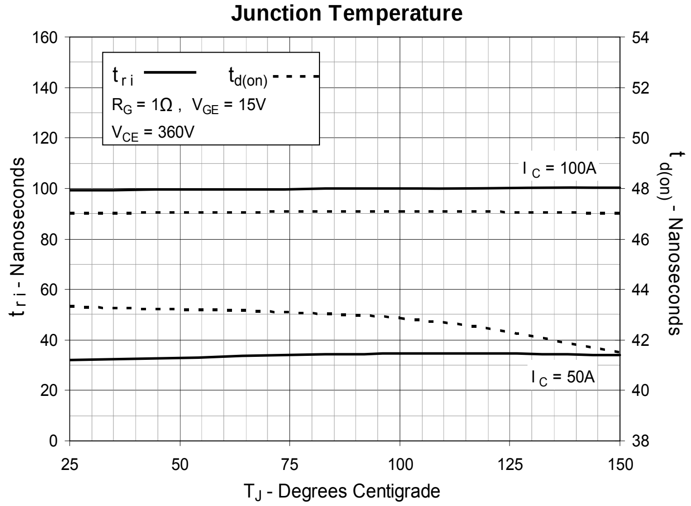


Fig. 22. Typ. Forward characteristics

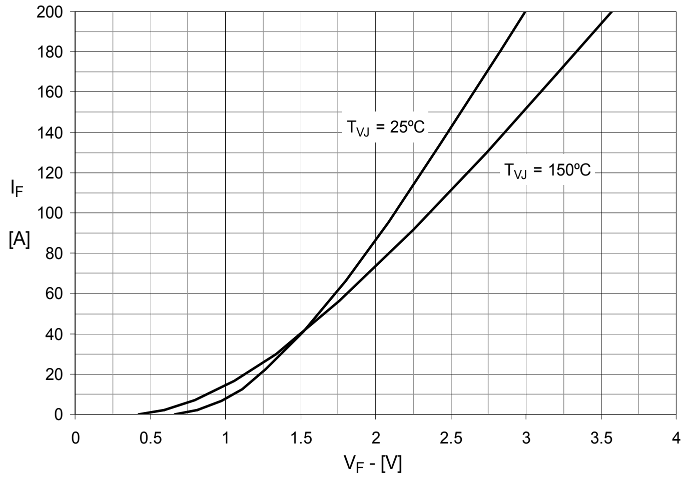


Fig. 23. Typ. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

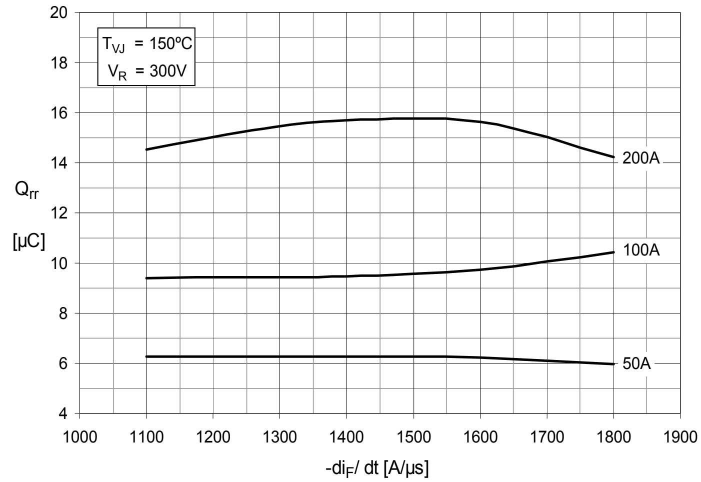


Fig. 24. Typ. Peak Reverse Current I_{RM} vs. $-di_F/dt$

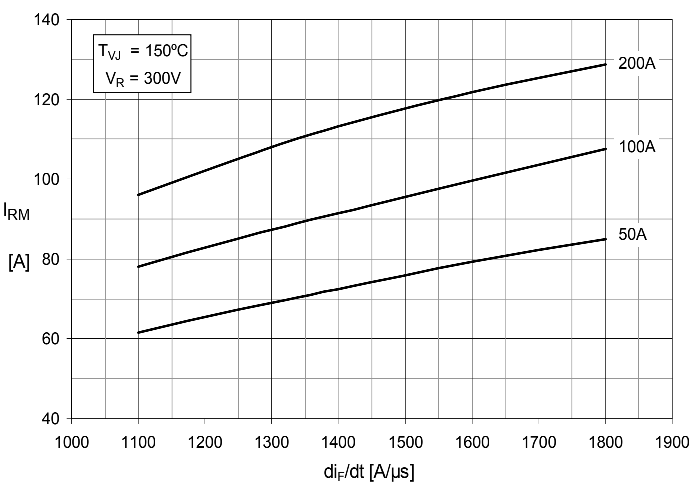


Fig. 25. Typ. Recovery Time t_{rr} vs. $-di_F/dt$

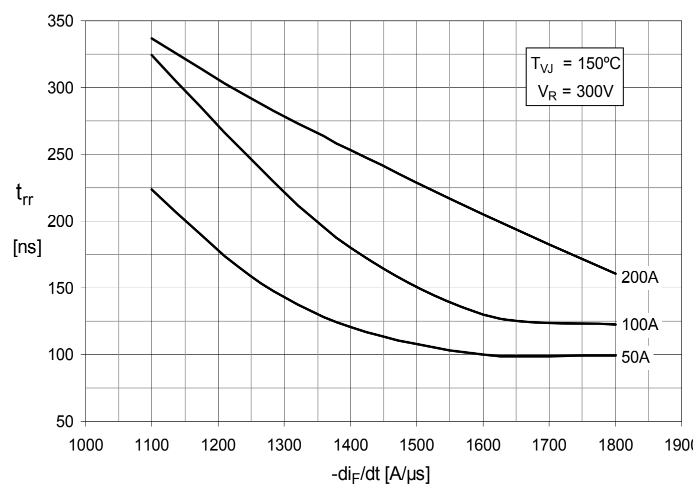


Fig. 26. Typ. Recovery Energy E_{rec} vs. $-di_F/dt$