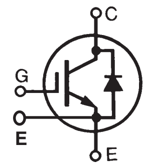
XPT™ 650V GenX4™ w/ Sonic Diode

IXXN110N65C4H1

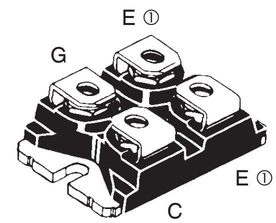
V_{CES} = 650V
I_{C110} = 110A
$V_{CE(sat)}$ ≤ 2.35V
$t_{fi(typ)}$ = 35ns

Extreme Light Punch Through IGBT for 20-60kHz Switching



SOT-227B, miniBLOC

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 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)		210	A
I_{C25}	Terminal Current Limit		200	A
I_{C110}	T_C = 110°C		110	A
I_{F110}	T_C = 110°C		70	A
I_{CM}	T_C = 25°C, 1ms		670	A
SSOA (RBSOA)	V_{GE} = 15V, T_{VJ} = 150°C, R_G = 2Ω Clamped Inductive Load		I_{CM} = 220 @$V_{CE} \le V_{CES}$	A
t_{sc} (SCSOA)	V_{GE} = 15V, V_{CE} = 360V, T_J = 150°C R_G = 82Ω, Non Repetitive		10	μs
P_C	T_C = 25°C		750	W
T_J			-55 ... +175	°C
T_{JM}			175	°C
T_{stg}			-55 ... +175	°C
V_{ISOL}	50/60Hz	t = 1min	2500	V~
	$I_{ISOL} \le$ 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	650			V
$V_{GE(th)}$	I_C = 4mA, V_{CE} = V_{GE}	4.0		6.5	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 = 110A, V_{GE} = 15V, Note 1		2.06	2.35	V
	T_J = 150°C		2.50		V

Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- 2500V~ Isolation Voltage
- Anti-Parallel Sonic Diode
- Optimized for 20-60kHz Switching
- Square RBSOA
- Short Circuit Capability
- High Current Handling Capability

Advantages

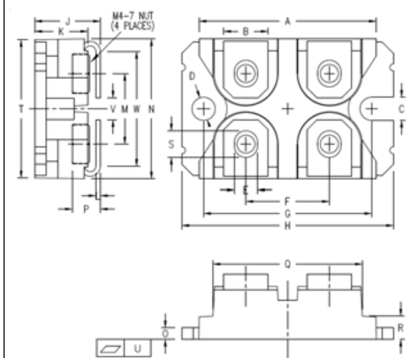
- High Power Density
- Low Gate Drive Requirement

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}	$I_C = 60A$, $V_{CE} = 10V$, Note 1	30	52		S
C_{ies}	$V_{CE} = 25V$, $V_{GE} = 0V$, f = 1MHz		5500		pF
C_{oes}			440		pF
C_{res}			80		pF
$Q_{g(on)}$	$I_C = 110A$, $V_{GE} = 15V$, $V_{CE} = 0.5 \bullet V_{CES}$		167		nC
Q_{ge}			44		nC
Q_{gc}			63		nC
$t_{d(on)}$	**Inductive load, $T_J = 25°C$**		30		ns
t_{ri}	$I_C = 55A$, $V_{GE} = 15V$		45		ns
E_{on}	$V_{CE} = 400V$, $R_G = 2\Omega$		2.50		mJ
$t_{d(off)}$	Note 2		110		ns
t_{fi}			35		ns
E_{off}			0.63	1.05	mJ
$t_{d(on)}$	**Inductive load, $T_J = 150°C$**		26		ns
t_{ri}	$I_C = 55A$, $V_{GE} = 15V$		45		ns
E_{on}	$V_{CE} = 400V$, $R_G = 2\Omega$		3.55		mJ
$t_{d(off)}$	Note 2		120		ns
t_{fi}			40		ns
E_{off}			0.90		mJ
R_{thJC}				0.20	°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	1.489	1.505	37.80	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
V	.130	.180	3.30	4.57
W	.780	.830	19.81	21.08

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		1.7	2.3	V
	$T_J = 150°C$		1.8		V
I_{RM}	$I_F = 100A$, $V_{GE} = 0V$, $T_J = 150°C$		95		A
t_{rr}	$-di_F/dt = 1500A/\mu s$, $V_R = 300V$		100		ns
R_{thJC}				0.42	°C/W

Notes:

1. Pulse test, $t \leq 300\mu s$, duty cycle, $d \leq 2\%$.
2. Switching times & energy losses may increase for higher V_{CE}(clamp), T_J or R_G.

Fig. 1. Output Characteristics @ T_J = 25ºC

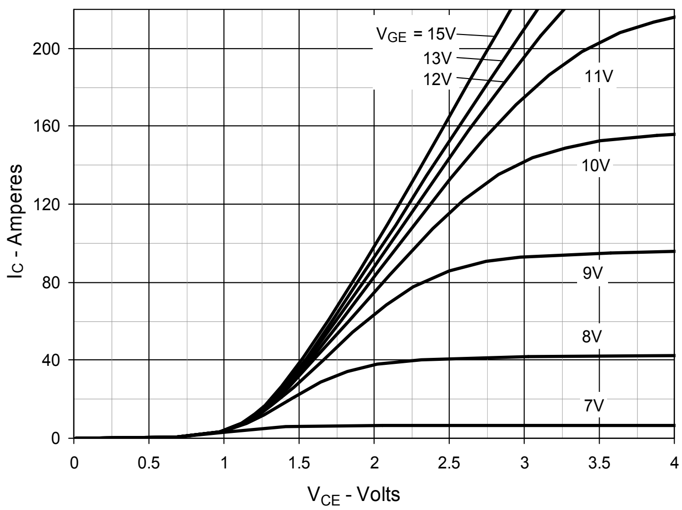


Fig. 2. Extended Output Characteristics @ T_J = 25ºC

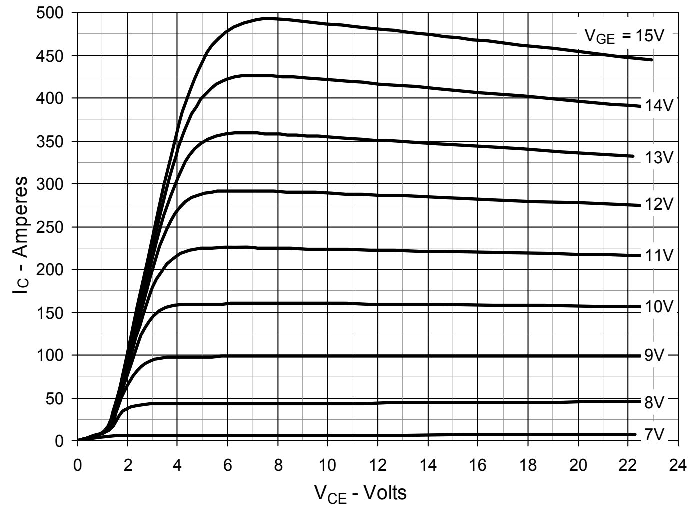


Fig. 3. Output Characteristics @ T_J = 150ºC

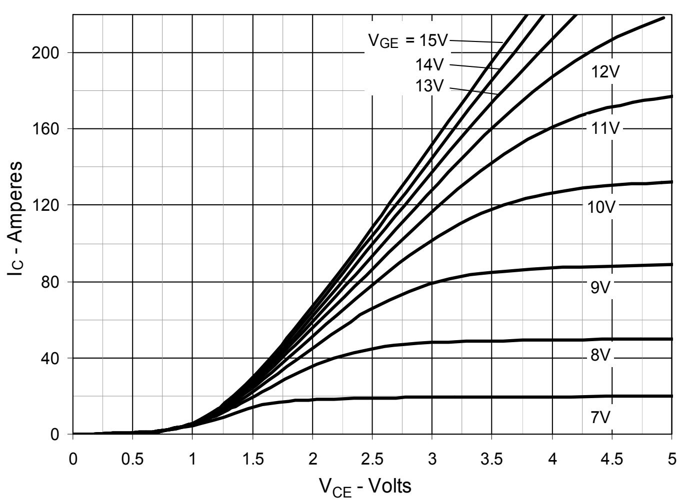


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

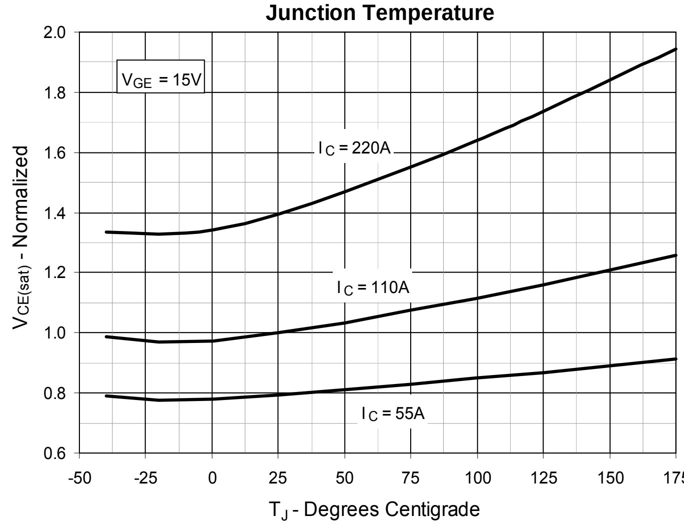


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

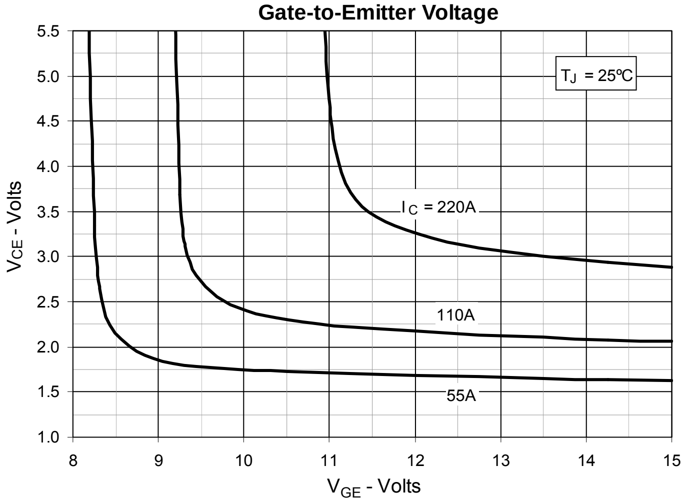


Fig. 6. Input Admittance

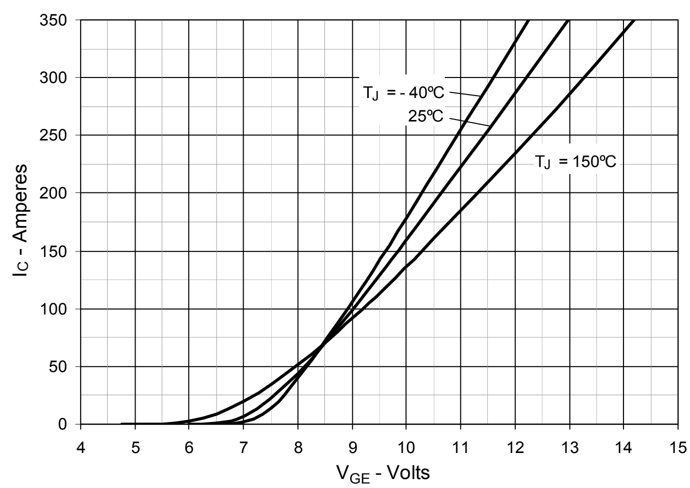


Fig. 7. Transconductance

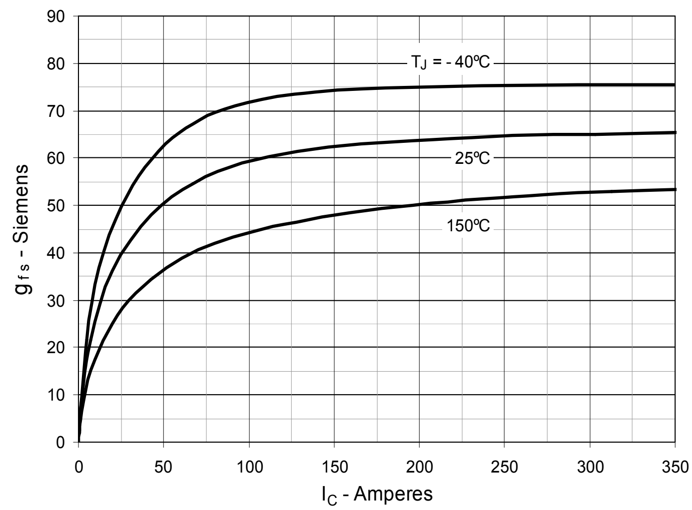


Fig. 8. Gate Charge

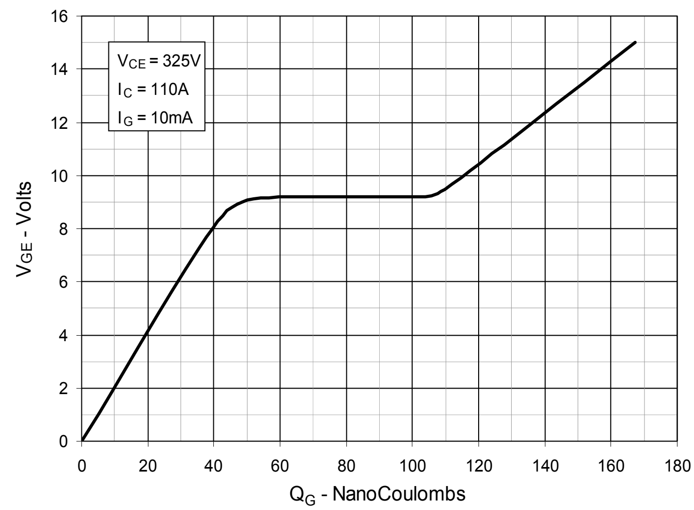


Fig. 9. Capacitance

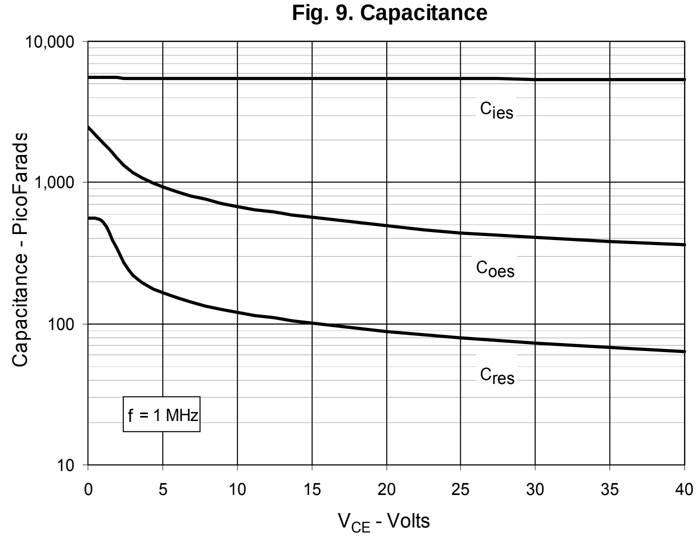


Fig. 10. Reverse-Bias Safe Operating Area

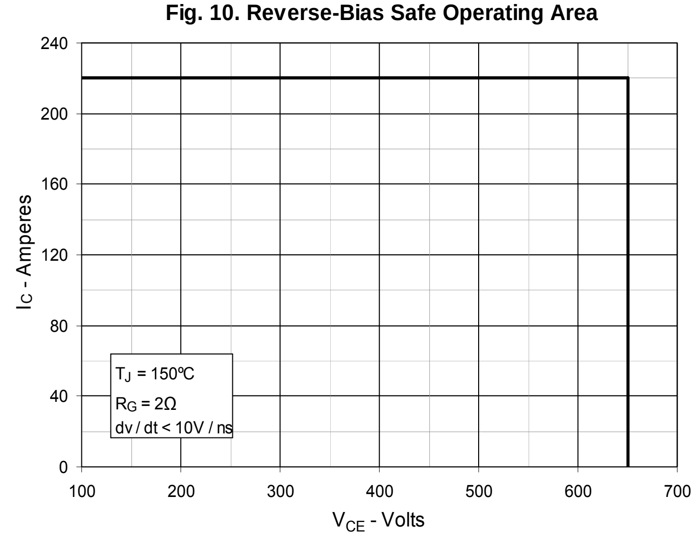


Fig. 11. Maximum Transient thermal Impedance (IGBT)

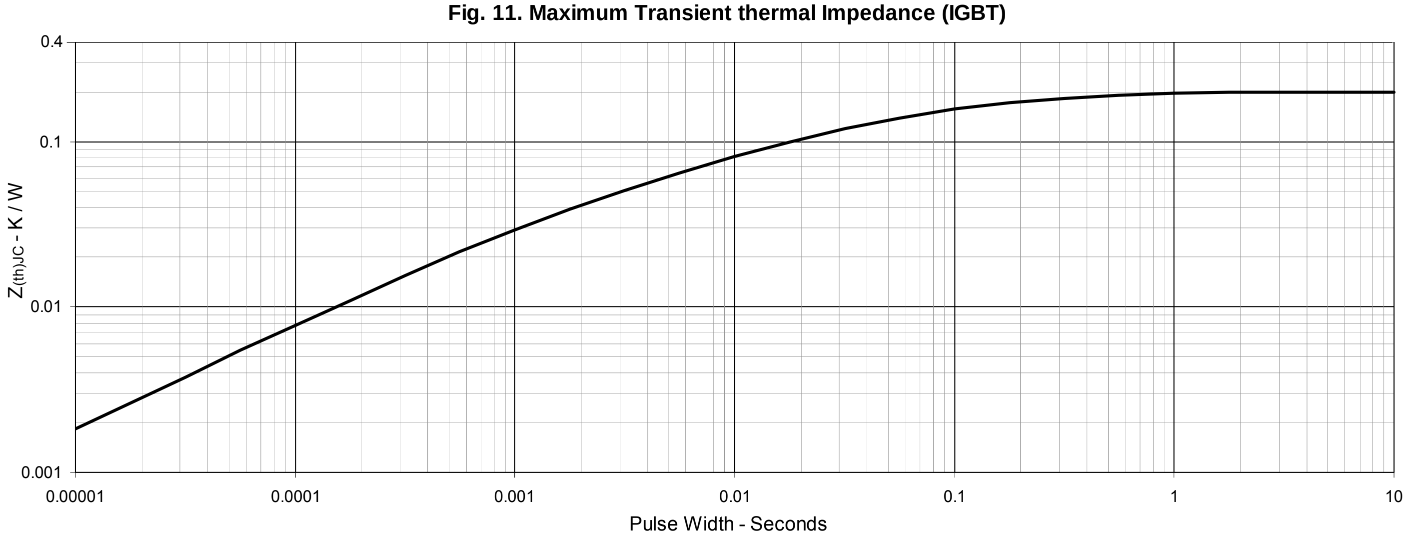


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance

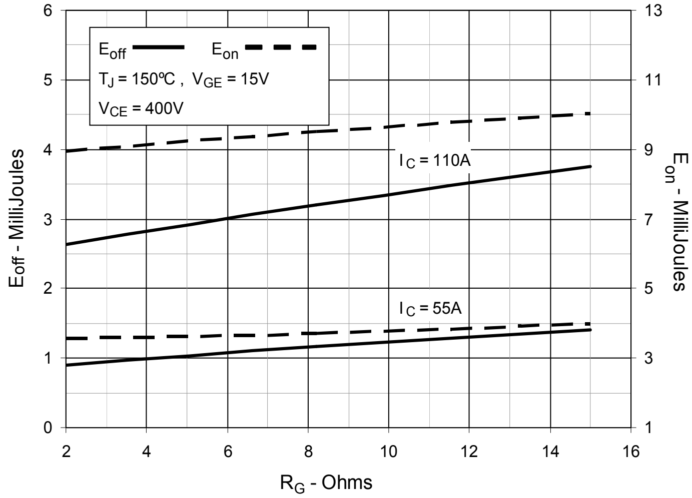


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

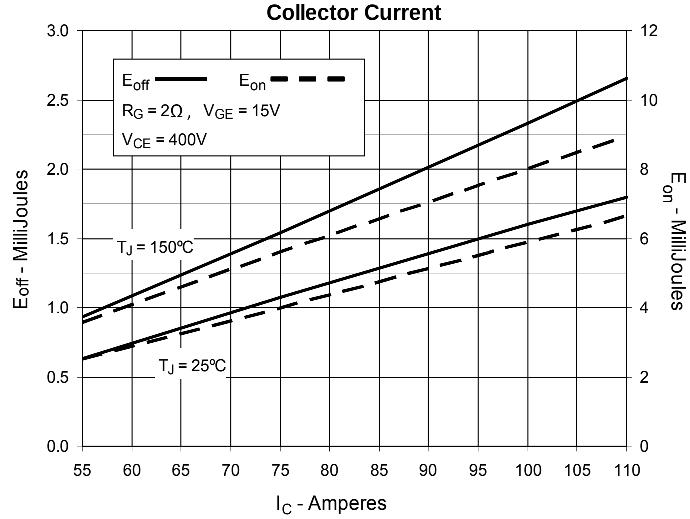


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

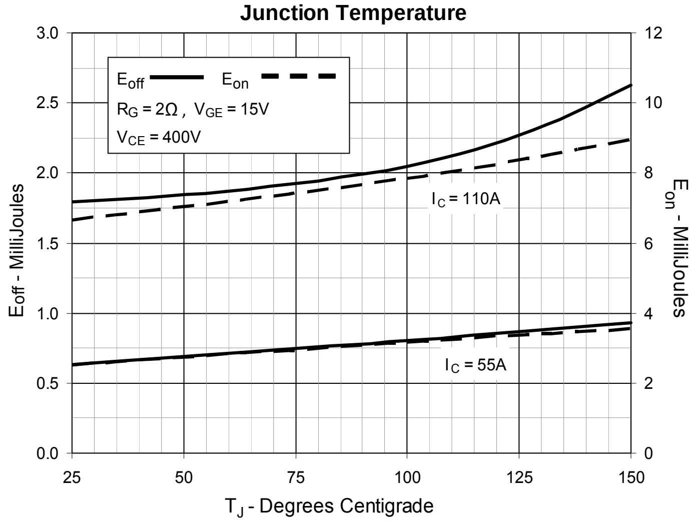


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

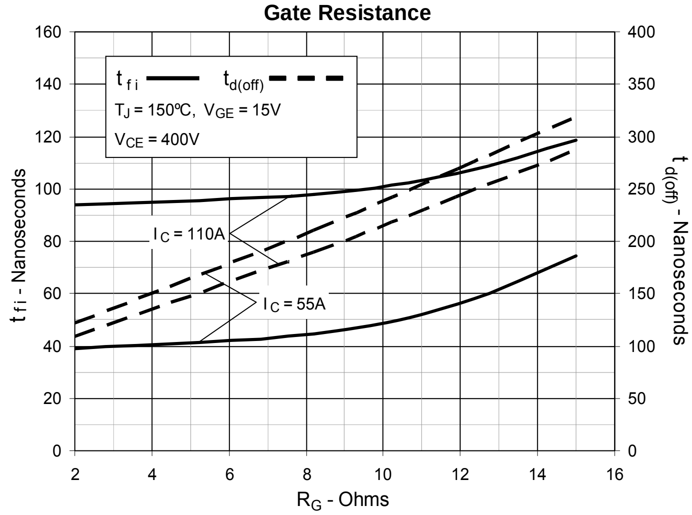


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

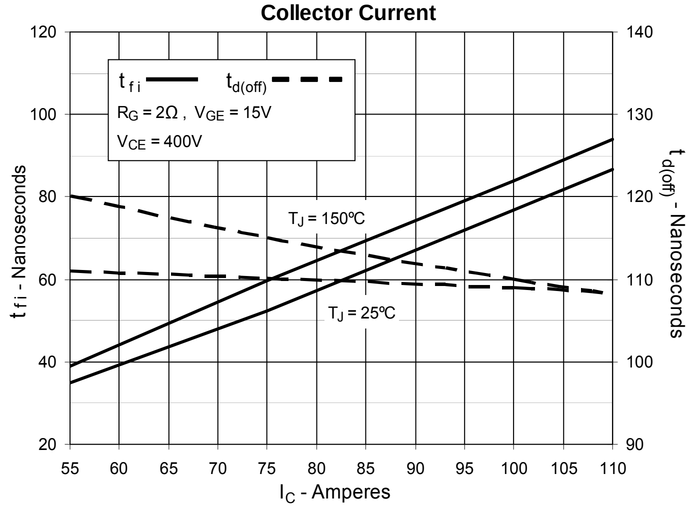


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

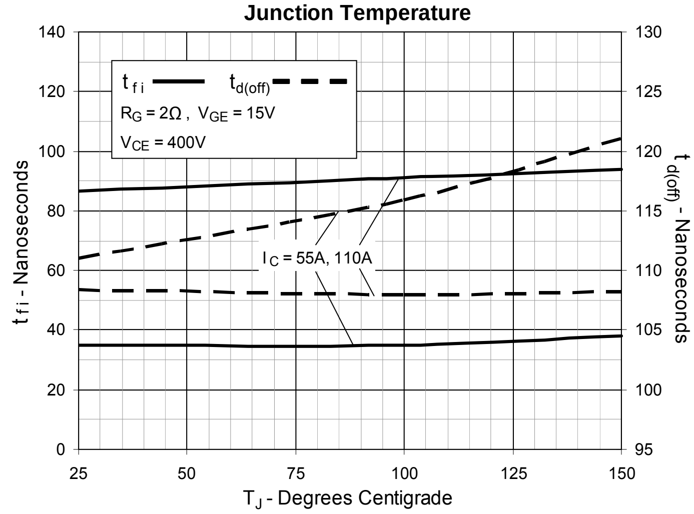


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

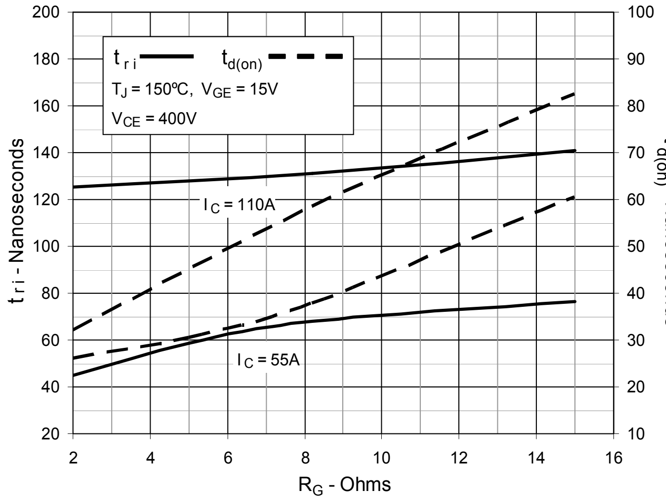


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

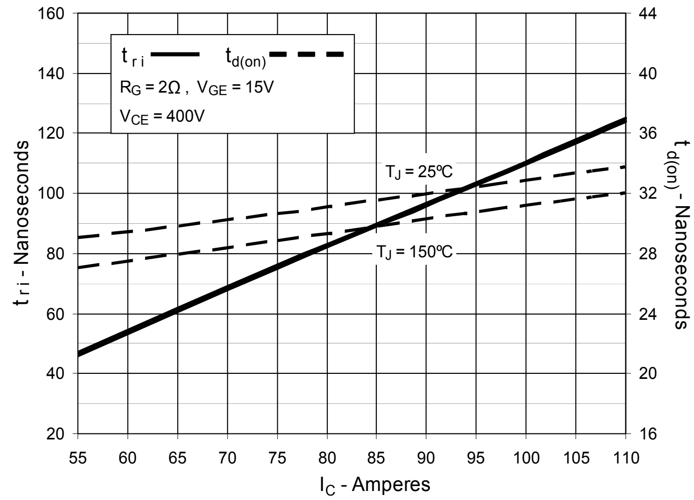


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature

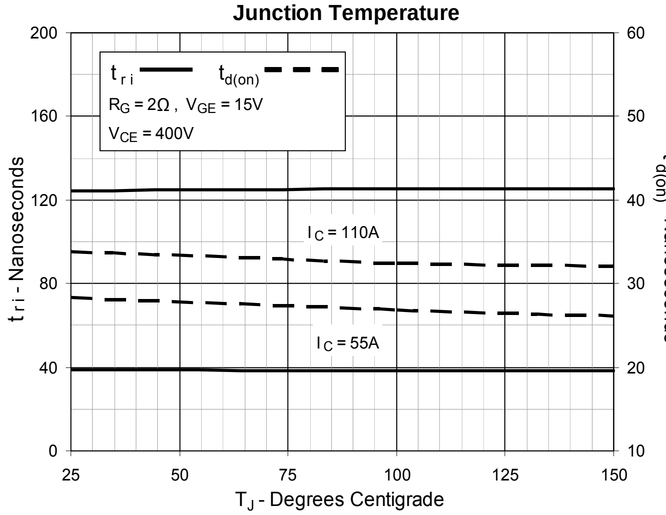


Fig. 21. Typ. Forward characteristics

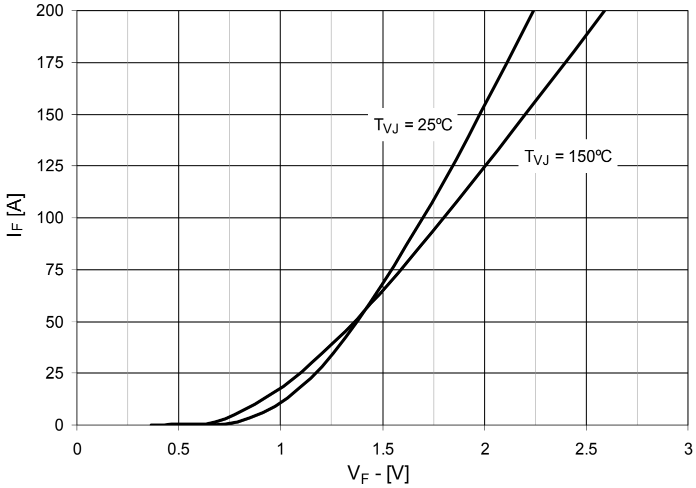


Fig. 22. Typ. Reverse Recovery Charge Q_{rr} vs. $-di_F/dt$

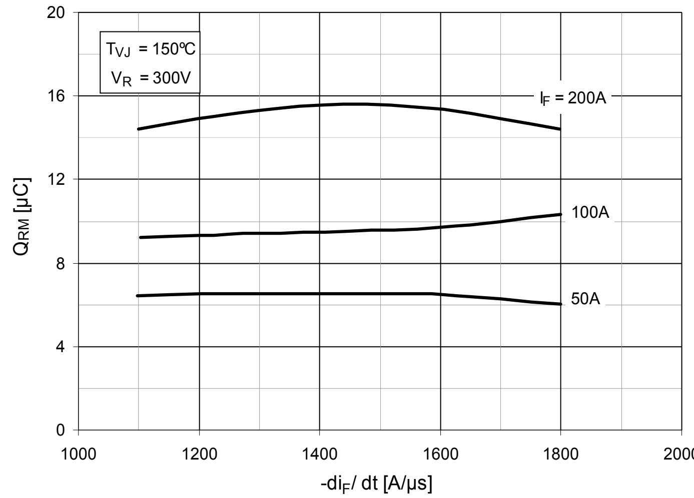


Fig. 23. Typ. Peak Reverse Current I_{RM} vs. $-di_F/dt$

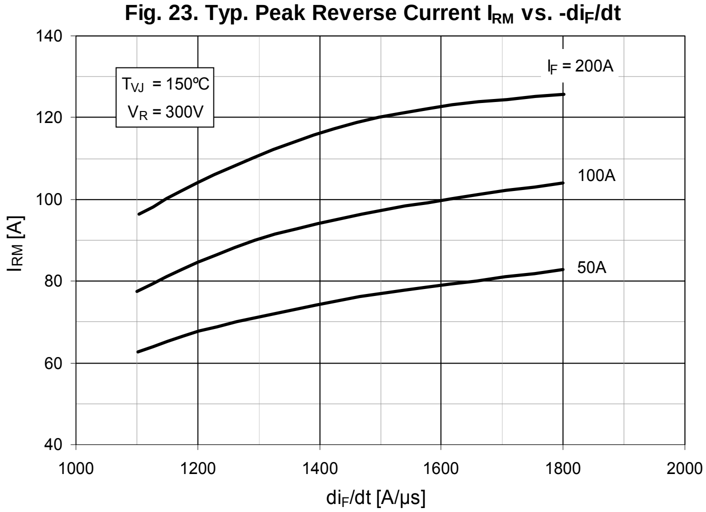


Fig. 24. Typ. Recovery Time t_{rr} vs. $-di_F/dt$

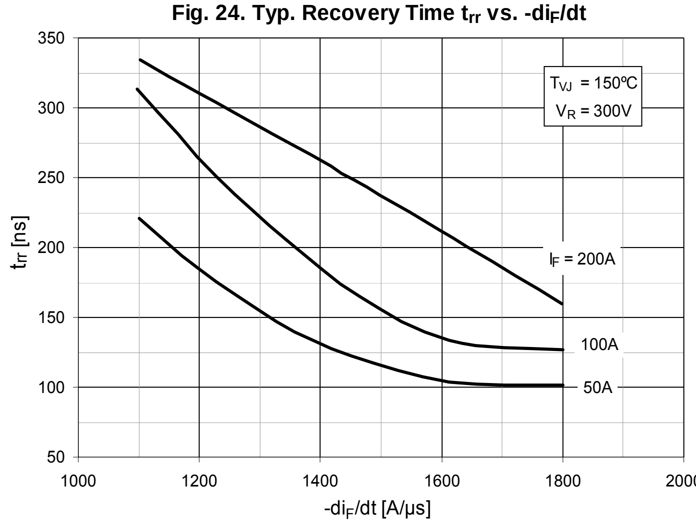


Fig. 25. Typ. Recovery Energy E_{rec} vs. $-di_F/dt$

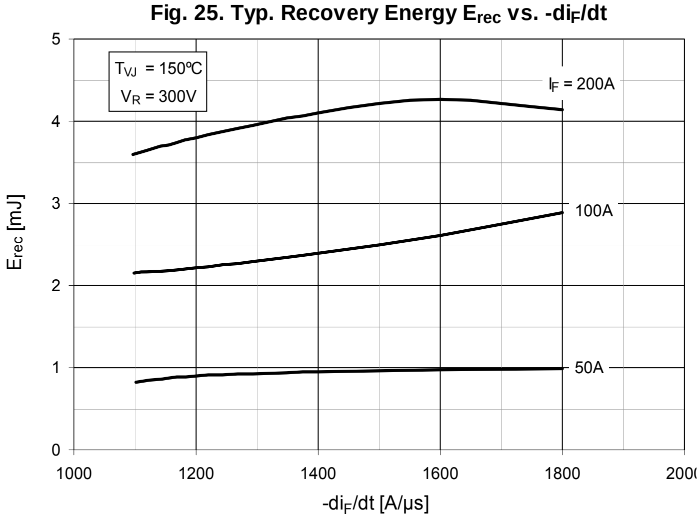


Fig. 26. Maximum Transient Thermal Impedance (Diode)