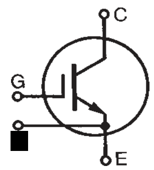
IXYS

GenX3™ 600V IGBT

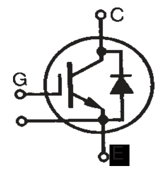
IXGN120N60A3
IXGN120N60A3D1

V_{CES} = 600V
I_{C110} = 120A
$V_{CE(sat)} \leq$ 1.35V

Ultra-low Vsat PT IGBTs for up to 5kHz switching

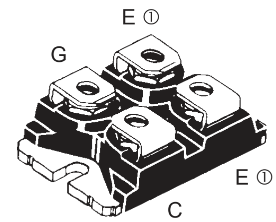


60A3



60A3D1

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 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		200	A
I_{C110}	T_C = 110°C		120	A
I_{F110}	T_C = 110°C	IXGN120N60A3D1	36	A
I_{CM}	T_C = 25°C, 1ms		800	A
SSOA	V_{GE}= 15V, T_{VJ} = 125°C, R_G = 1.5Ω		I_{CM} = 200	A
(RBSOA)	Clamped Inductive Load		@ $V_{CES} \leq$ 600	V
P_C	T_C = 25°C		595	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 (M4)		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.	
$V_{GE(th)}$	I_C = 500µA, V_{CE} = V_{GE}			3.0		5.0	V
I_{CES}	V_{CE} = V_{CES}, V_{GE} = 0V, Note 3		120N60A3			50	µA
			120N60A3D1			650	µA
		T_J = 125°C	120N60A3			1	mA
			120N60A3D1			5	mA
I_{GES}	V_{CE} = 0V, V_{GE} = ±20V					±400	nA
$V_{CE(sat)}$	I_C = 100A, V_{GE} = 15V, Note 1				1.20	1.35	V

Features

- Optimized for Low Conduction Losses
- Square RBSOA
- Anti-Parallel Ultra Fast Diode
- International Standard Package miniBLOC
- UL Recognized
- Aluminium Nitride Isolation
- Isolation Voltage 3000 V~
- Low $V_{CE(sat)}$ for Minimum On-State

Advantages

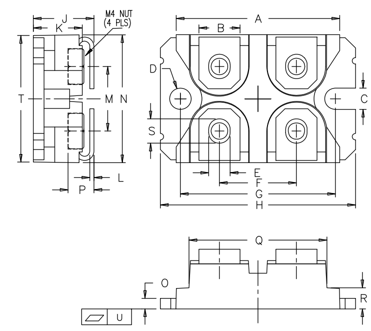
- High Power Density
- Low Gate Drive Requirement

Applications

- Power Inverters
- UPS
- Motor Drives
- SMPS
- PFC Circuits
- Battery Chargers
- Welding Machines
- Lamp Ballasts
- Inrush Current Protection Circuits
- High Power Density

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	65	108		S
C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz		14.8		nF
C_{oes}			800		pF
C_{res}			140		pF
$Q_{g(on)}$	$I_C = I_{C110}$, V_{GE} = 15V, V_{CE} = 0.5 • V_{CES}		450		nC
Q_{ge}			67		nC
Q_{gc}			130		nC
$t_{d(on)}$	**Inductive Load, T_J = 25°C**		39		ns
t_{ri}	I_C = 100A, V_{GE} = 15V		82		ns
E_{on}	V_{CE} = 480V, R_G = 1.5Ω, Note 2		2.7		mJ
$t_{d(off)}$			295		ns
t_{fi}			260		ns
E_{off}			6.6		mJ
$t_{d(on)}$	**Inductive Load, T_J = 125°C**		40		ns
t_{ri}	I_C = 100A, V_{GE} = 15V		83		ns
E_{on}	V_{CE} = 480V, R_G = 1.5Ω, Note 2		3.5		mJ
$t_{d(off)}$			420		ns
t_{fi}			410		ns
E_{off}			10.4		mJ
R_{thJC}				0.21	°C/W
R_{thCK}			0.05		°C/W

SOT-227B miniBLOC



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 Diode (FRED)

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min	Typ.	Max.	
V_F	I_F = 60A, Note 1			2.1	V
	V_{GE}= 0V T_J = 150°C		1.4		V
I_{RM}	I_F = 60A, V_{GE} = 0V, -di_F/dt = 100A/µs			8.0	A
t_{rr}	V_R=300V, T_J = 100°C			175	ns
R_{thJC}				0.85	°C/W

Note: 1. Pulse Test, t ≤ 300µs; Duty Cycle, d ≤ 2%.
2. Remarks: Switching Times may Increase for V_{CE} (Clamp) > 0.8 • V_{CES}, Higher T_J or Increased R_G.
3. Parts must be HeatSunk for High Temperature I_{CES} Measurements.

Fig. 1. Output Characteristics @ 25ºC

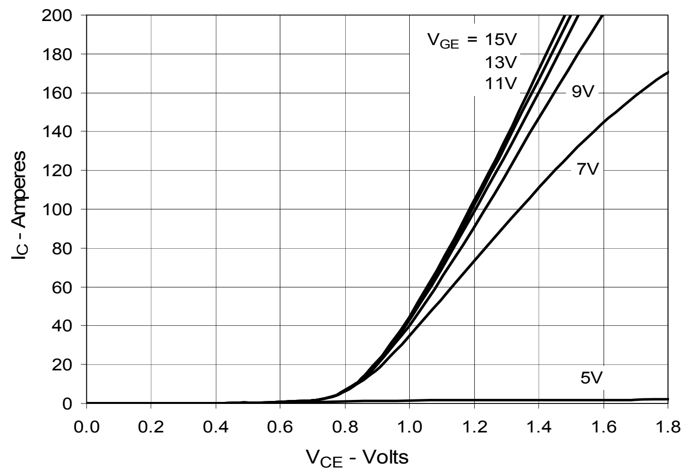


Fig. 2. Extended Output Characteristics @ 25ºC

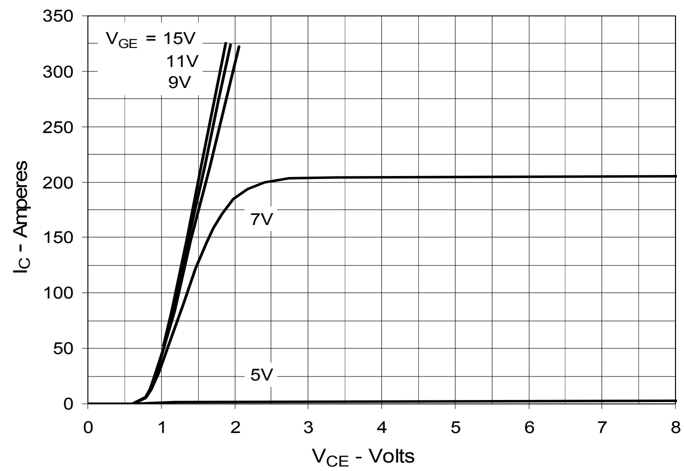


Fig. 3. Output Characteristics @ 125ºC

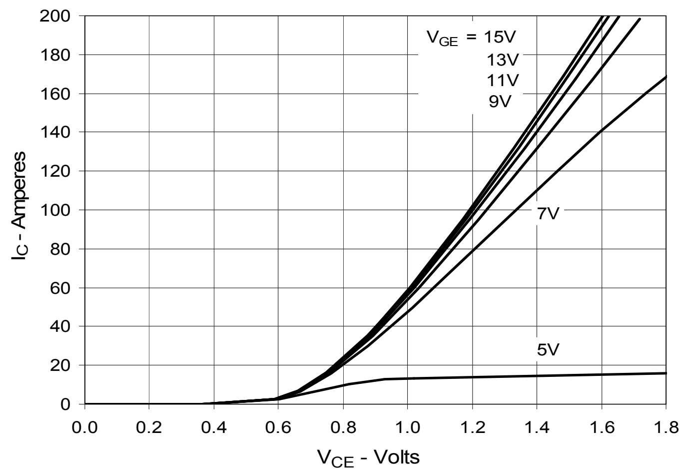


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

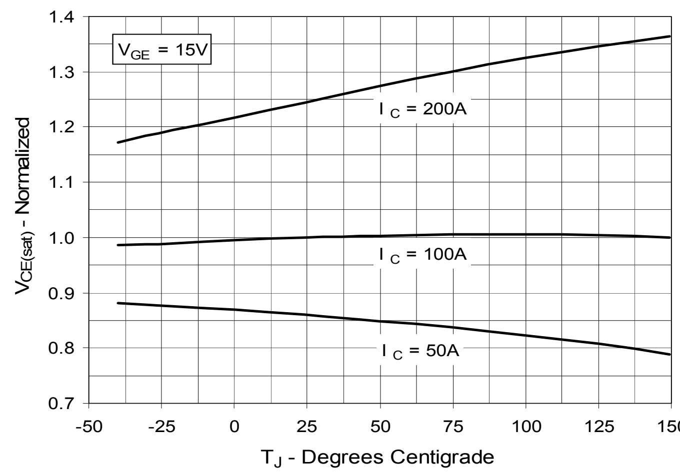


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

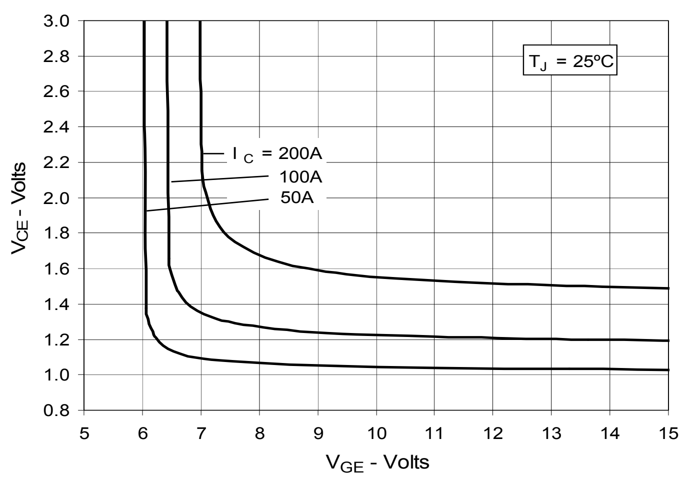
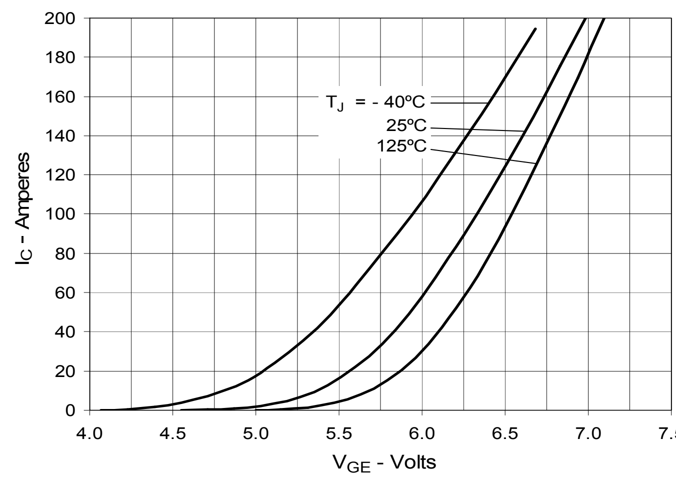


Fig. 6. Input Admittance



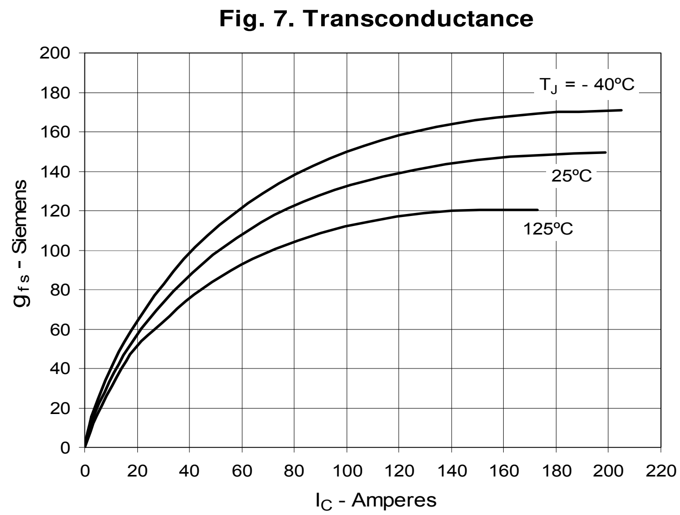


Fig. 7. Transconductance
T_J = - 40ºC
25ºC
125ºC
g_fs - Siemens
I_C - Amperes
0
20
40
60
80
100
120
140
160
180
200
220

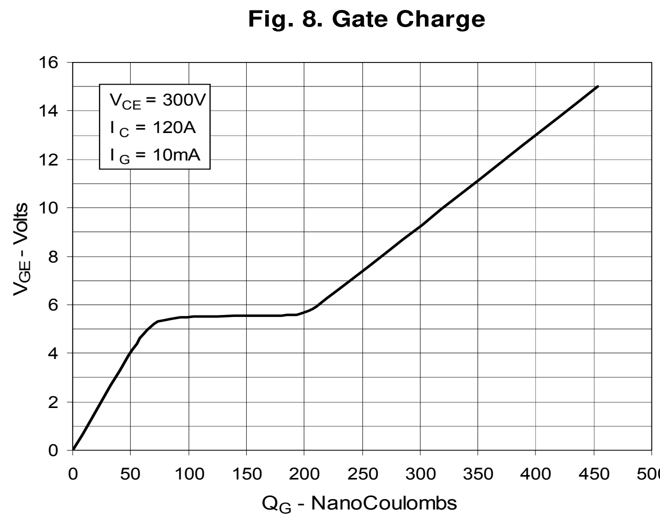


Fig. 8. Gate Charge
V_CE = 300V
I_C = 120A
I_G = 10mA
V_GE - Volts
Q_G - NanoCoulombs

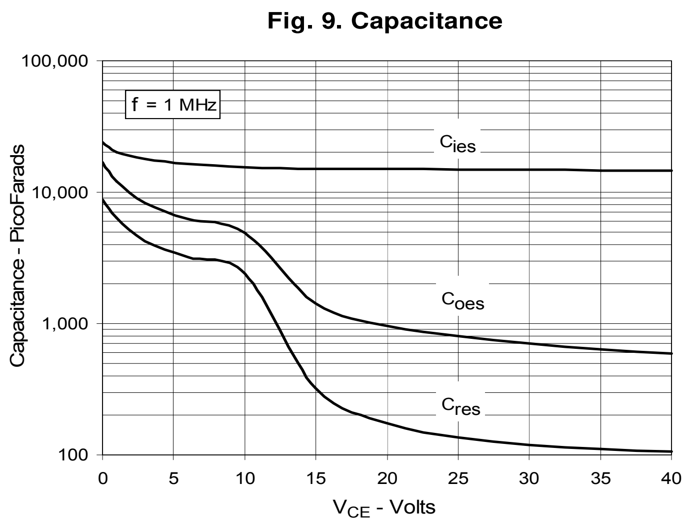


Fig. 9. Capacitance
f = 1 MHz
C_ies
C_oes
C_res
Capacitance - PicoFarads
V_CE - Volts
100,000
10,000
1,000
100

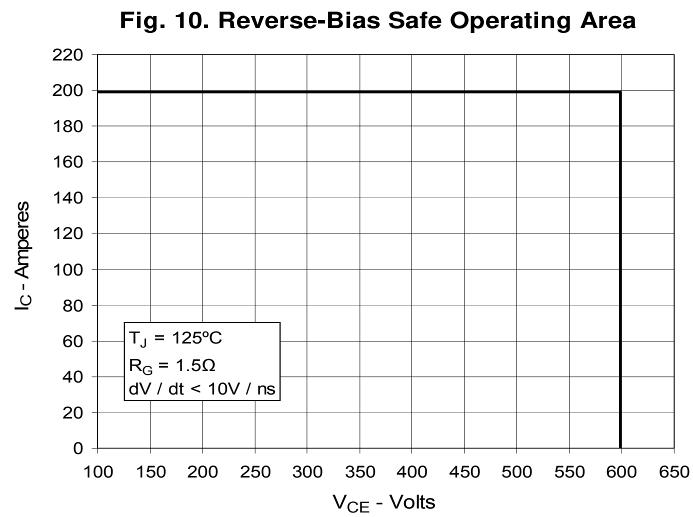


Fig. 10. Reverse-Bias Safe Operating Area
T_J = 125ºC
R_G = 1.5Ω
dV / dt < 10V / ns
I_C - Amperes
V_CE - Volts

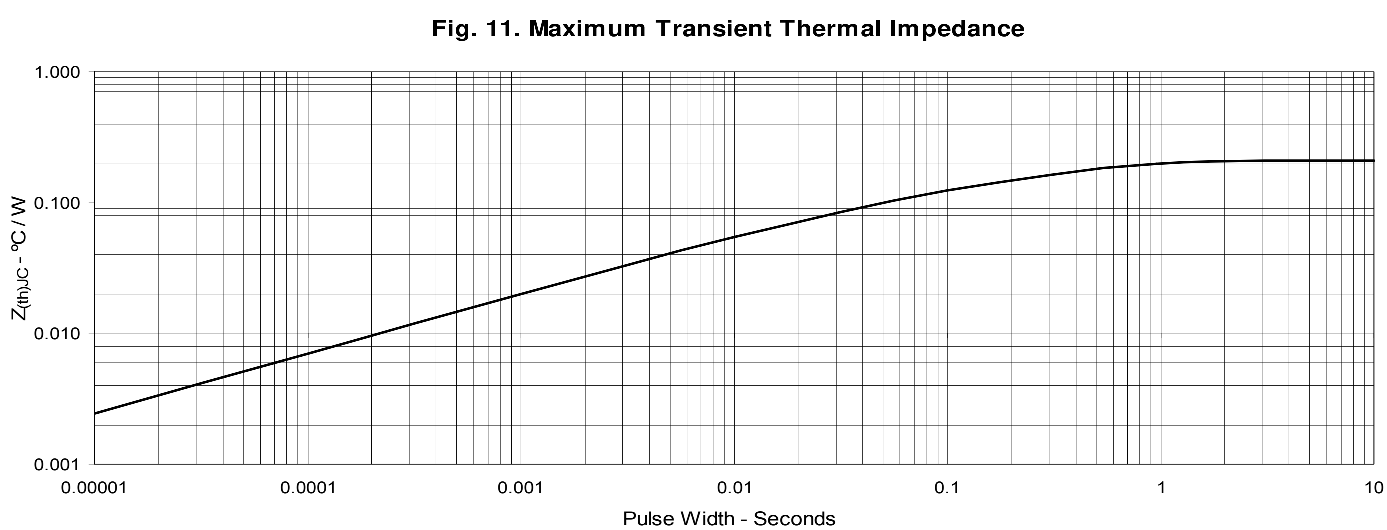


Fig. 11. Maximum Transient Thermal Impedance
Z_(th)JC - ºC / W
Pulse Width - Seconds
1.000
0.100
0.010
0.001
0.00001
0.0001
0.001
0.01
0.1
1
10

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

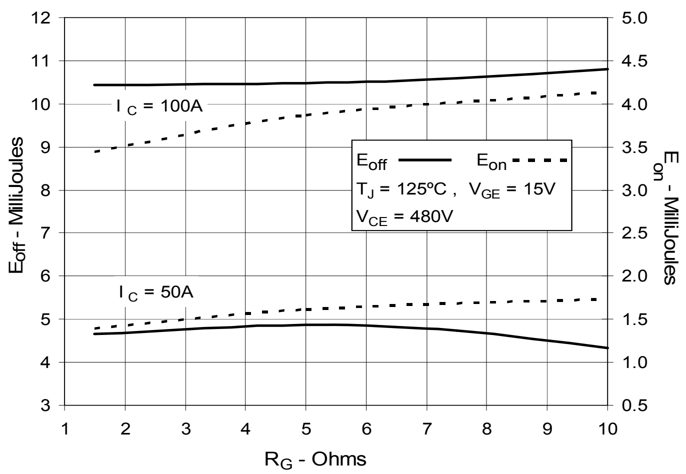


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

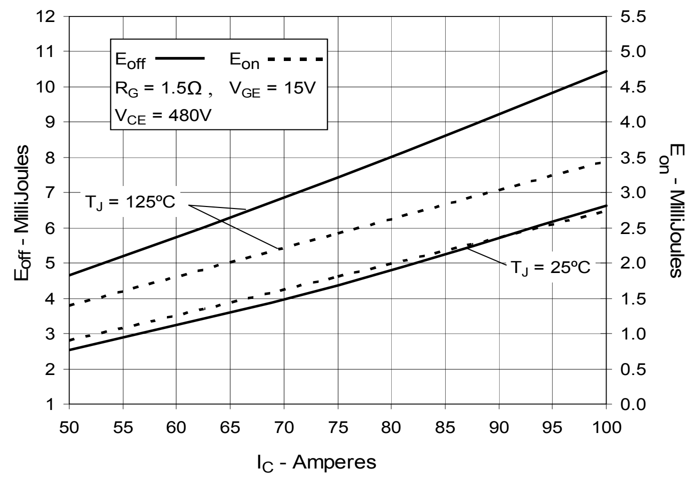


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

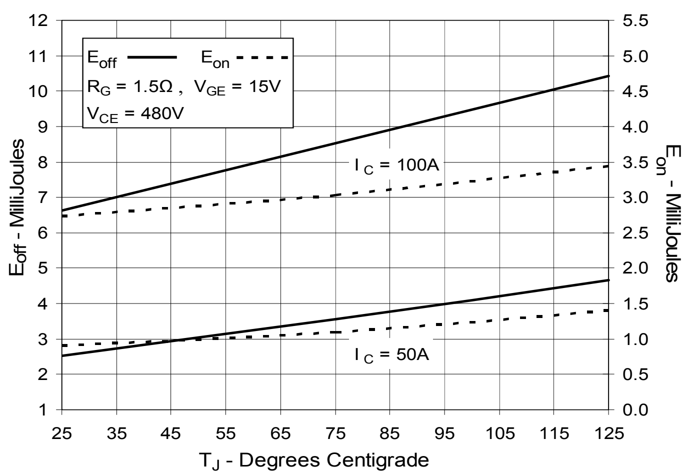


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

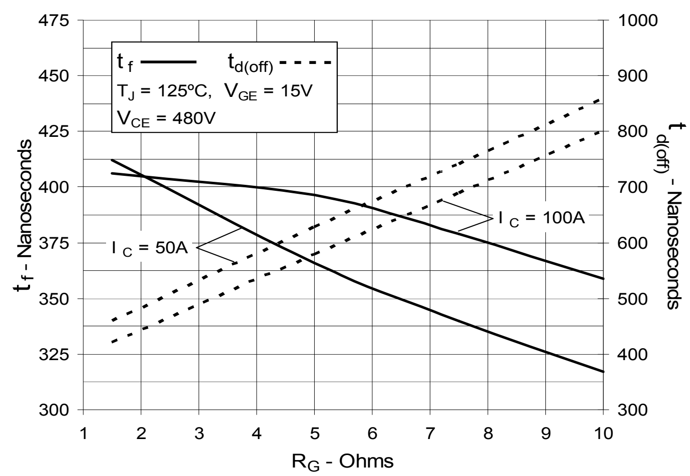


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

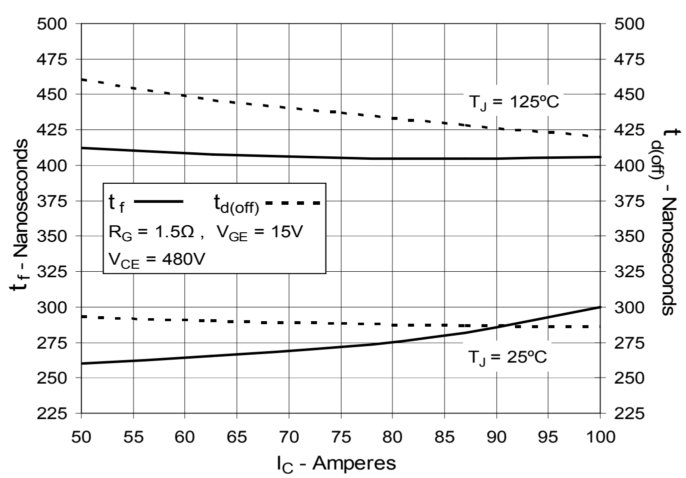


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

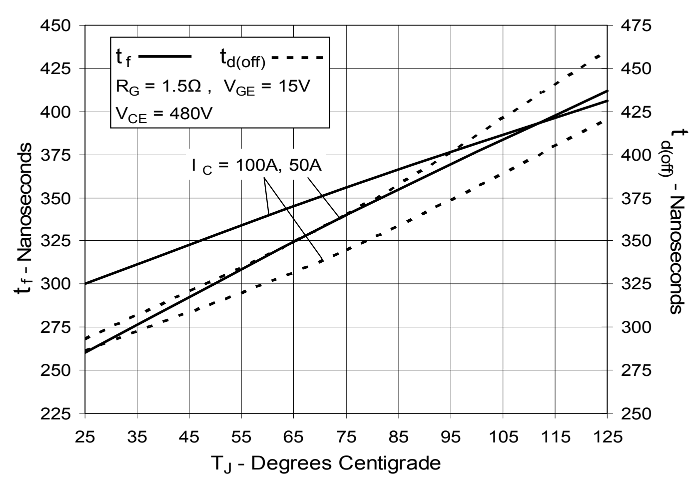


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

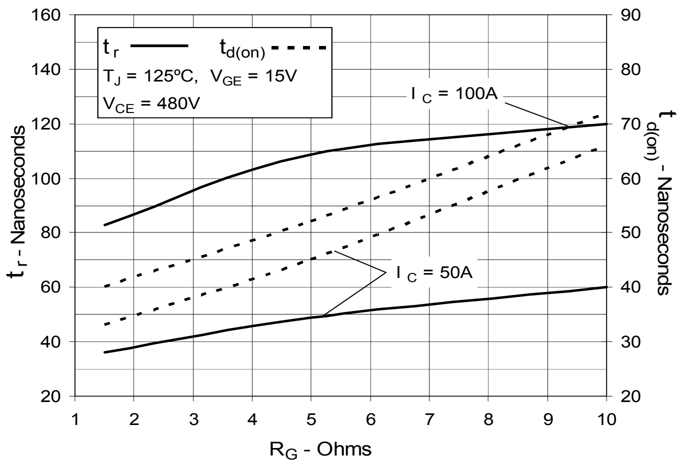


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

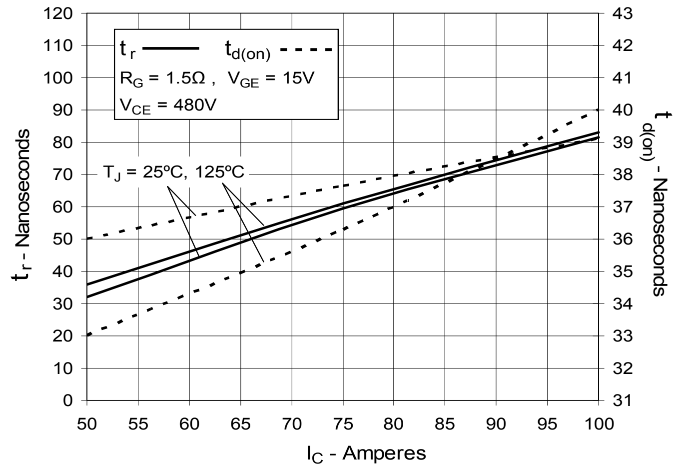
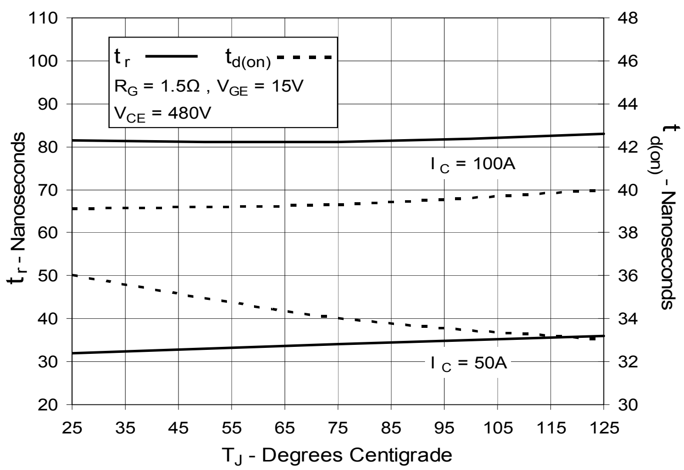


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



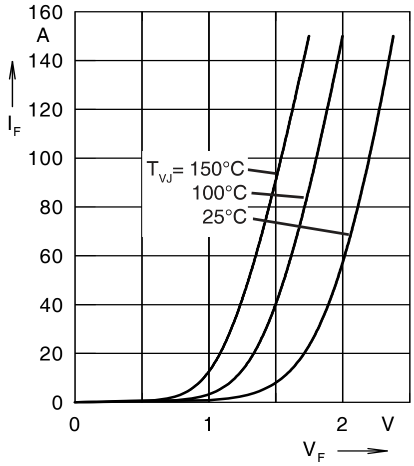


Fig. 21. Forward Current I_F Versus V_F

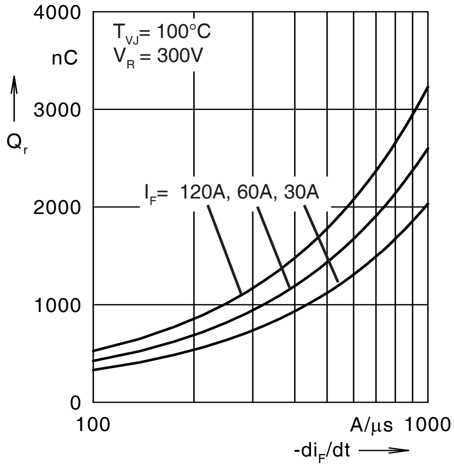


Fig. 22. Reverse Recorvery Charge Q_r Versus $-di_F/dt$

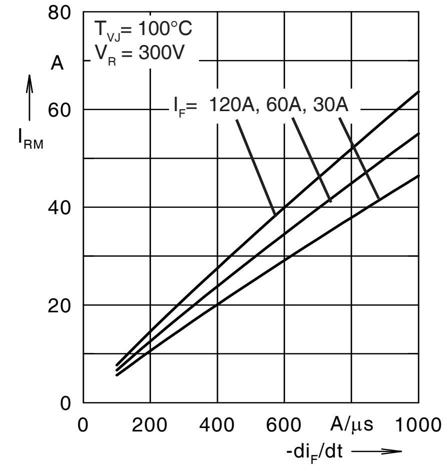


Fig. 23. Peak Reverse Current I_{RM} Versus $-di_F/dt$

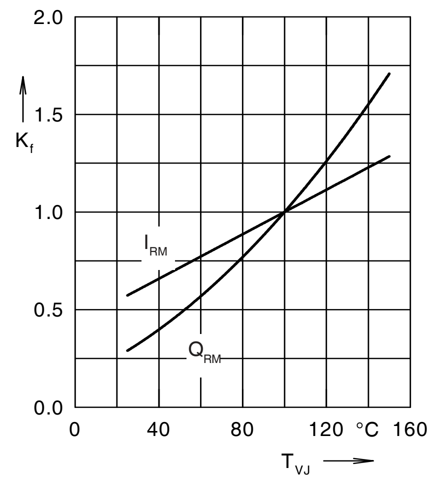


Fig. 24. Dynamic Paraments Q_r, I_{RM} Versus T_{vJ}

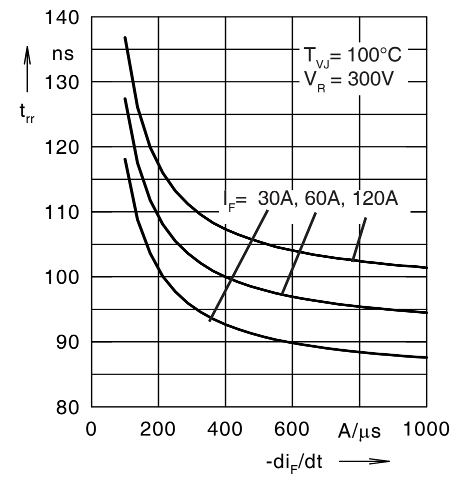


Fig. 25. Recorvery Time t_{rr} Versus $-di_F/dt$

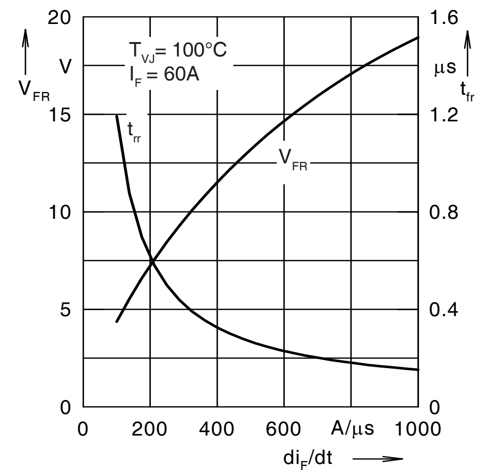


Fig. 26. Peak Forward Voltage V_{RM} and t_{rr} Versus $-di_F/dt$

Fig. 27. Maximum Transient Thermal Impedance (for Diode)