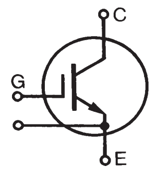
IXYS

GenX3™ 600V IGBT

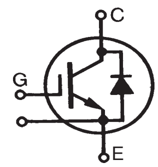
IXGN120N60A3
IXGN120N60A3D1

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

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

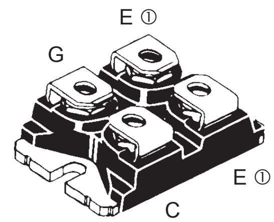


60A3



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} ≤ 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} ≤ 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

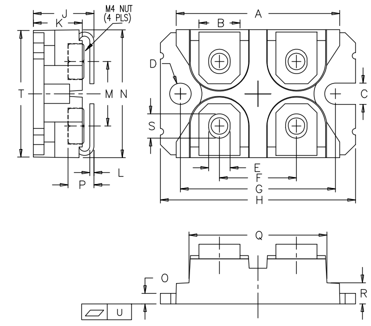
- High Power Density
- Low Gate Drive Requirement

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
$Q_{g(on)}$	$I_C = I_{C110}$, $V_{GE} = 15V$, $V_{CE} = 0.5 \bullet V_{CES}$		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}	$V_{CE} = 480V$, $R_G = 1.5\Omega$, 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}	$V_{CE} = 480V$, $R_G = 1.5\Omega$, 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}	$I_F = 60A$, $V_{GE} = 0V$, $-di_F/dt = 100A/\mu s$			8.0	A
t_{rr}	V_R=300V, $T_J = 100°C$			175	ns
R_{thJC}				0.85	°C/W

Note: 1. Pulse Test, $t \leq 300\mu s$; Duty Cycle, $d \leq 2\%$.
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

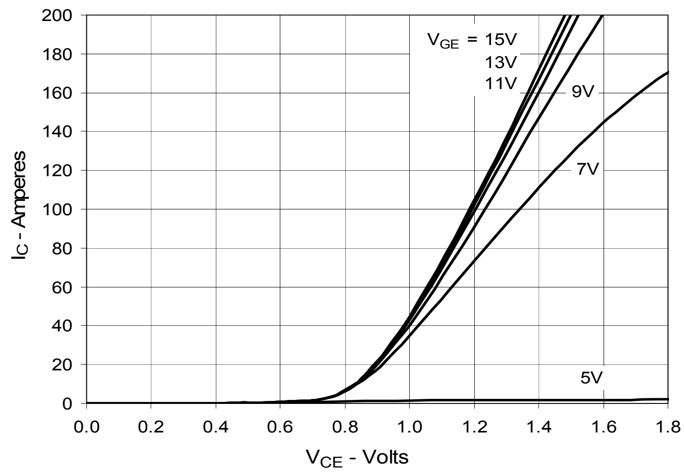


Fig. 2. Extended Output Characteristics @ 25ºC

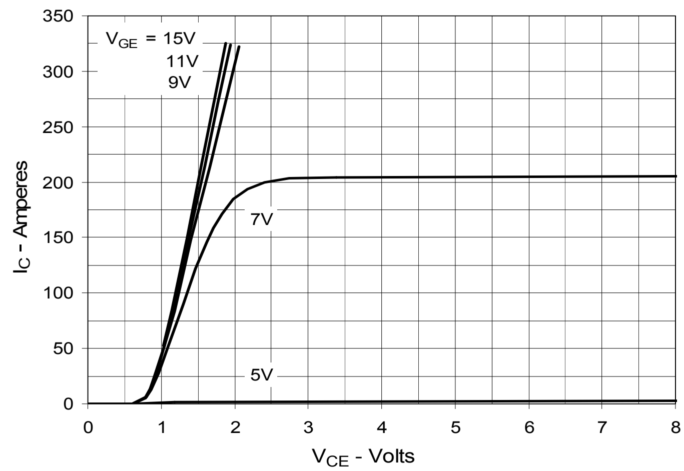


Fig. 3. Output Characteristics @ 125ºC

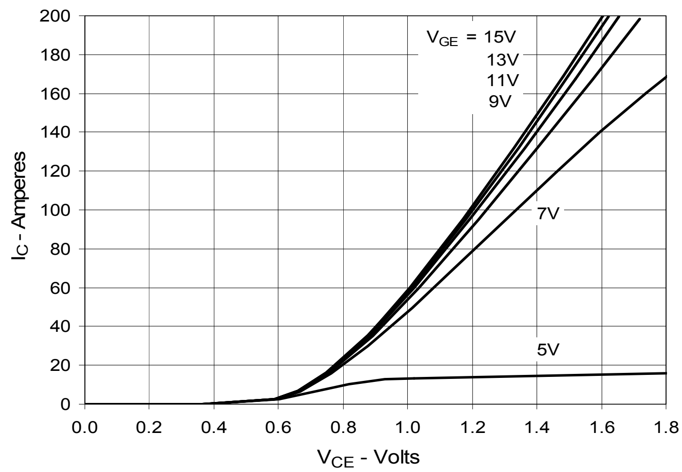


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

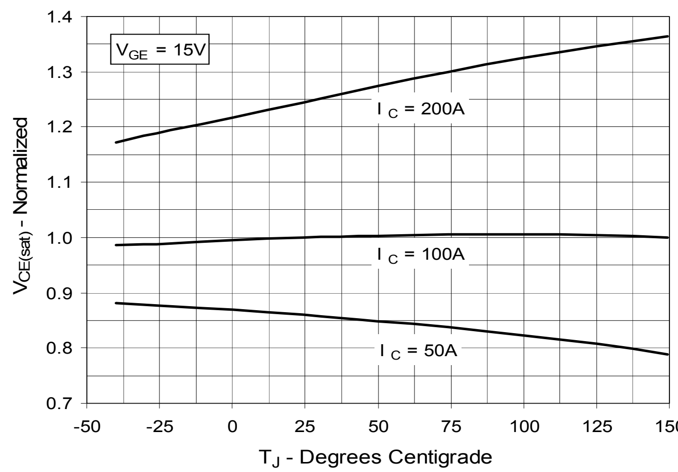


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

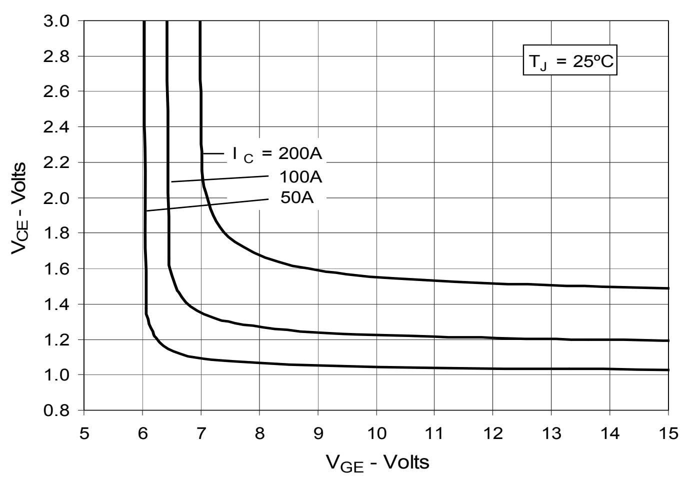


Fig. 6. Input Admittance

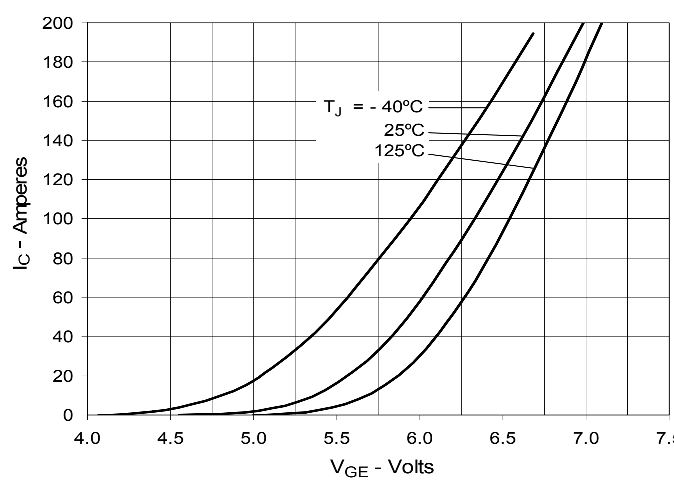


Fig. 7. Transconductance

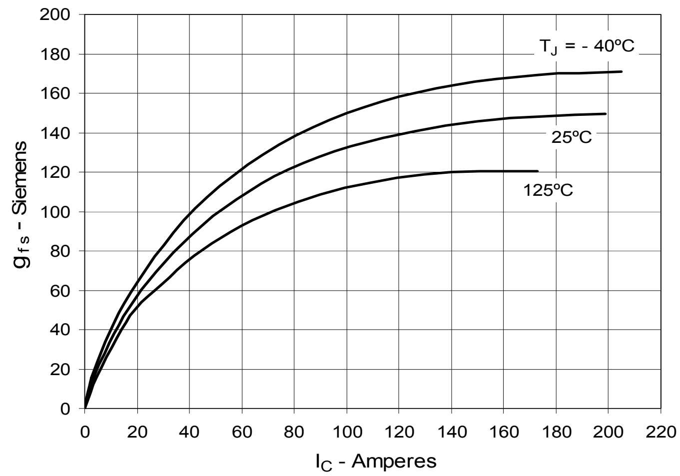


Fig. 8. Gate Charge

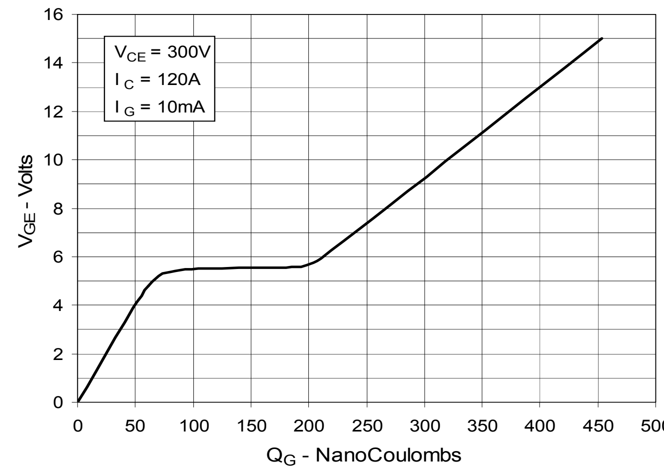


Fig. 9. Capacitance

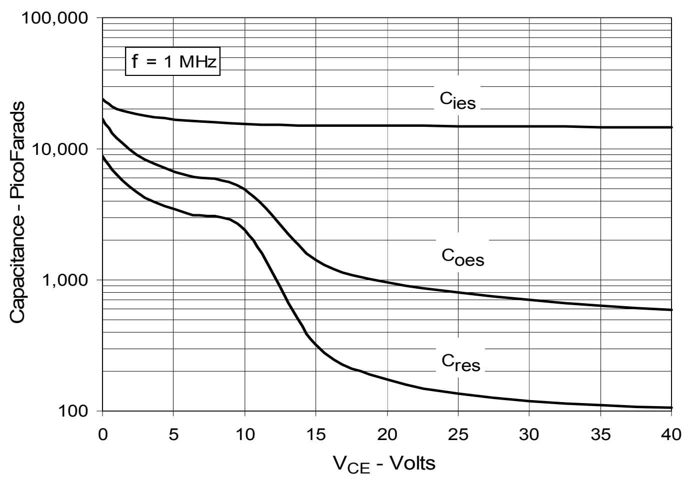


Fig. 10. Reverse-Bias Safe Operating Area

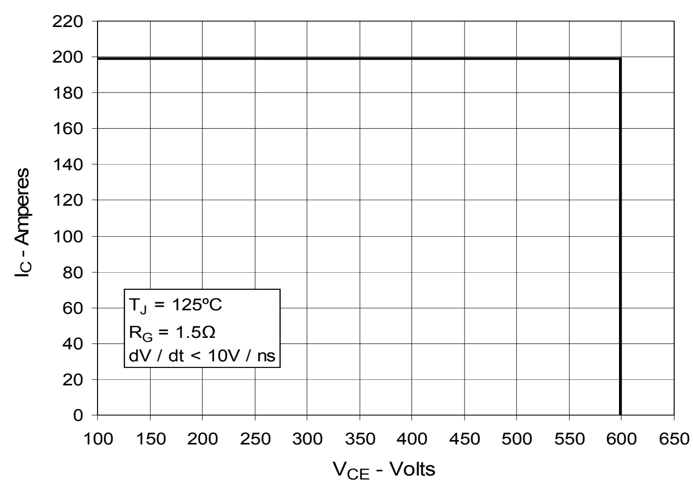
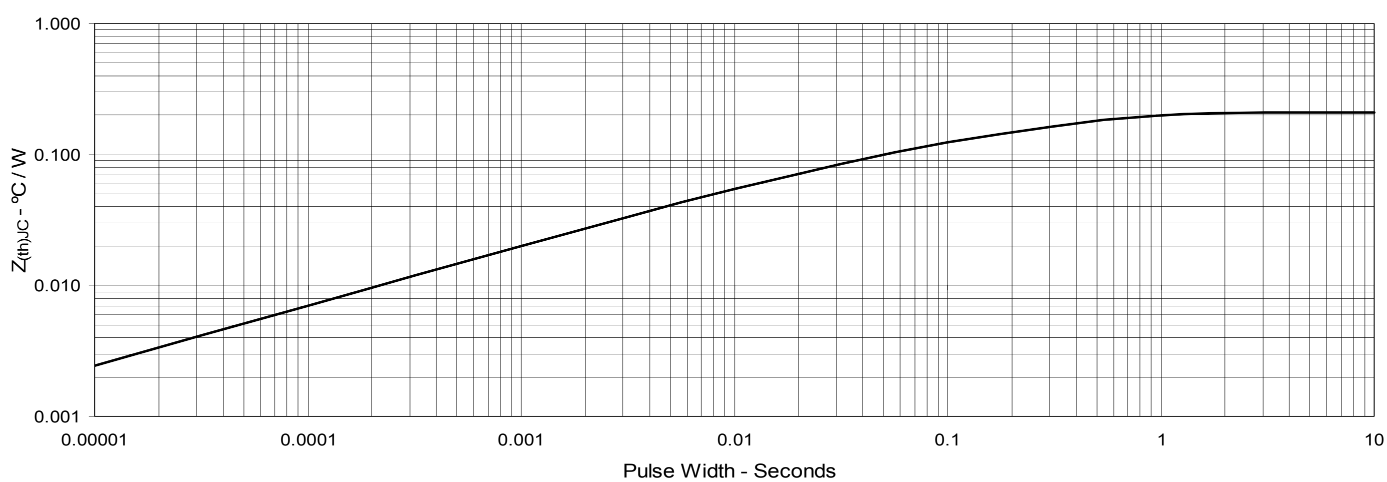


Fig. 11. Maximum Transient Thermal Impedance



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

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

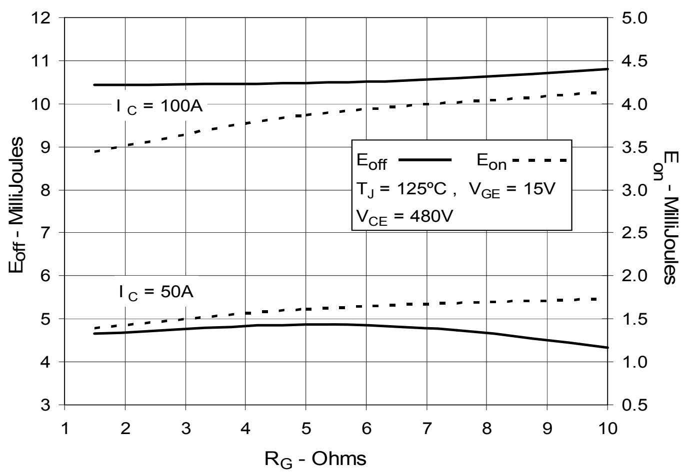


Fig. 13. Inductive Switching Energy Loss vs. Collector Current

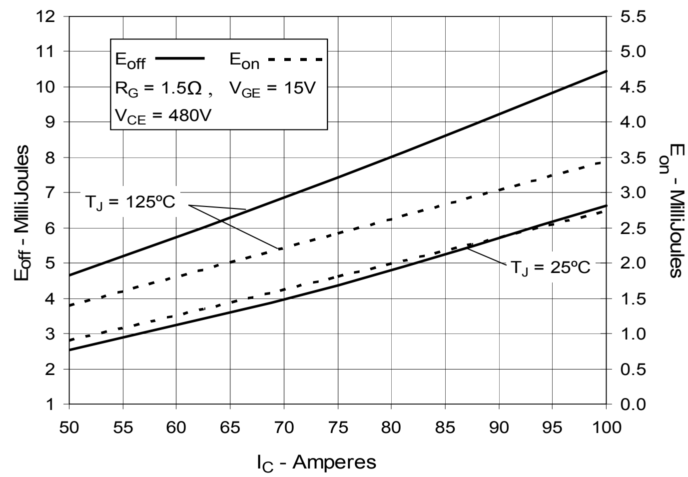


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature

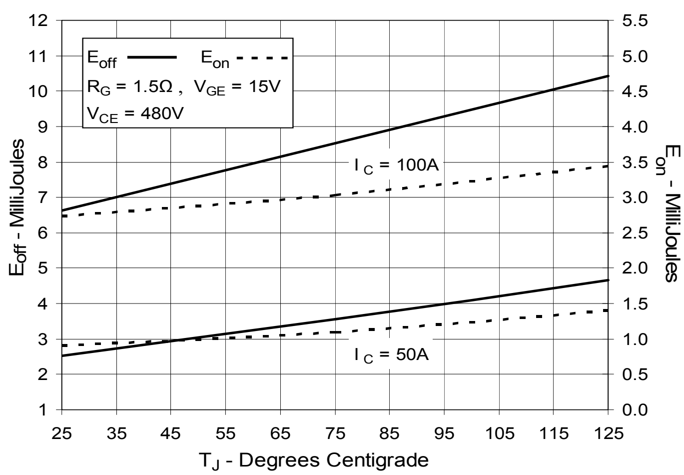


Fig. 15. Inductive Turn-off Switching Times vs. Gate Resistance

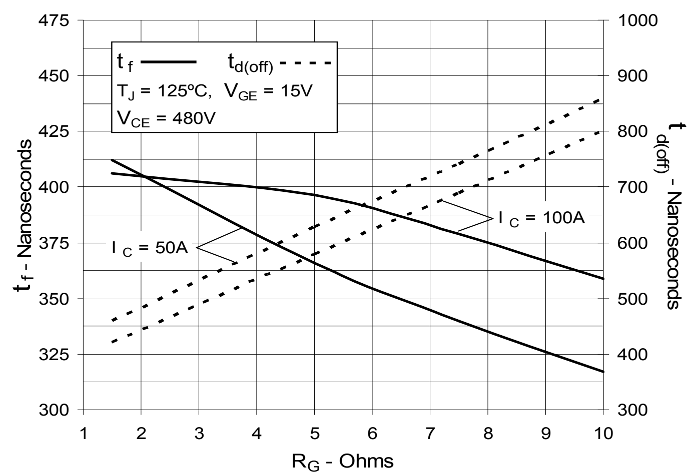


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

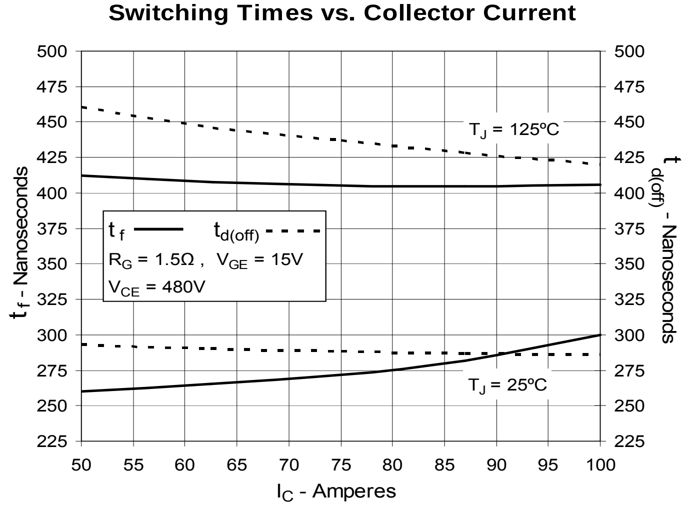


Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature

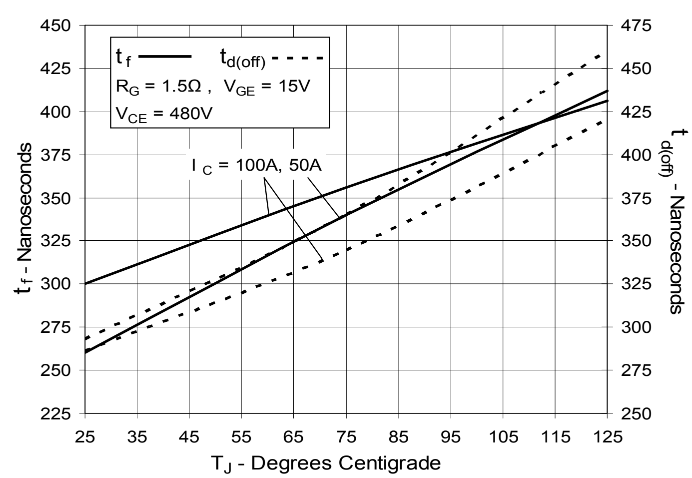


Fig. 18. Inductive Turn-on Switching Times vs. Gate Resistance

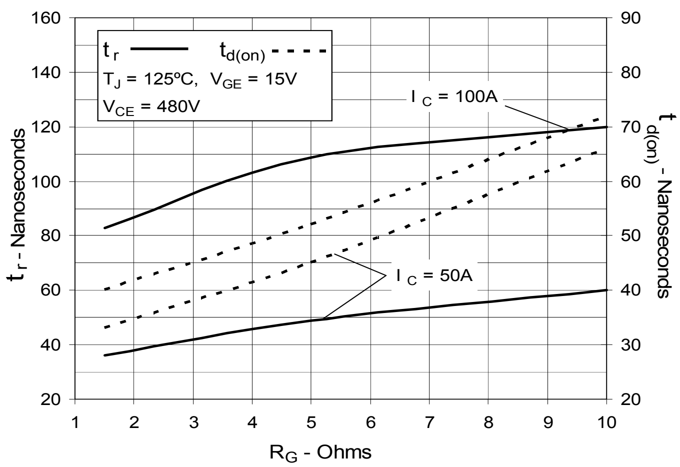


Fig. 19. Inductive Turn-on Switching Times vs. Collector Current

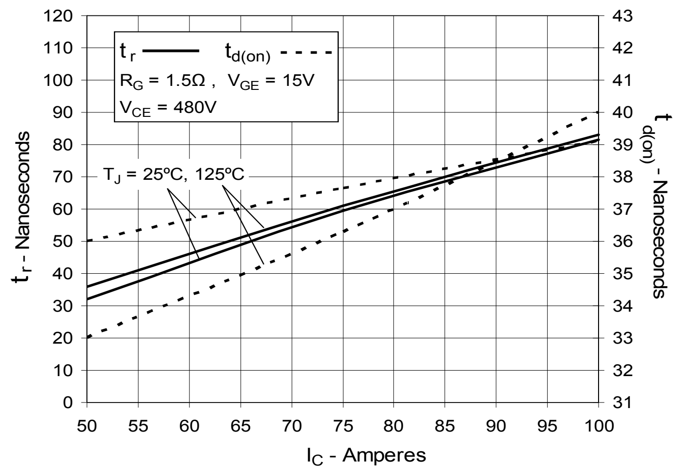
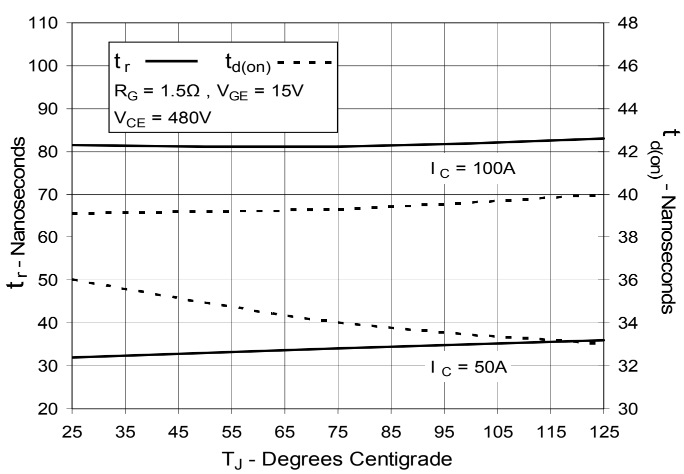


Fig. 20. Inductive Turn-on Switching Times vs. Junction Temperature



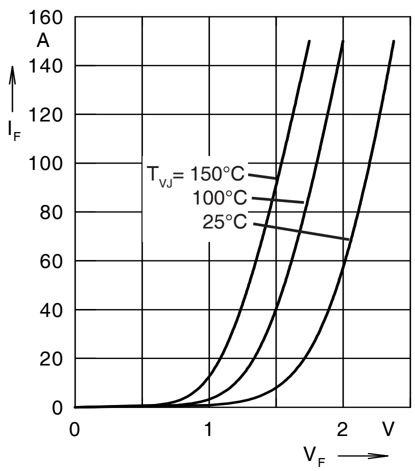


Fig. 21. Forward Current I_F Versus V_F

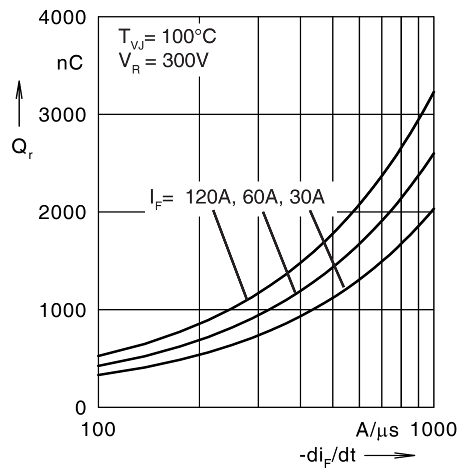


Fig. 22. Reverse Recorvery Charge Q_r Versus $-di_F/dt$

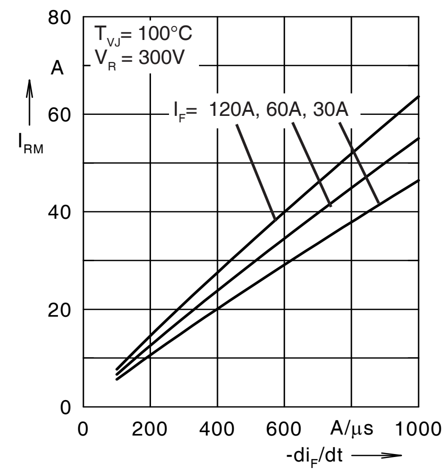


Fig. 23. Peak Reverse Current I_{RM} Versus $-di_F/dt$

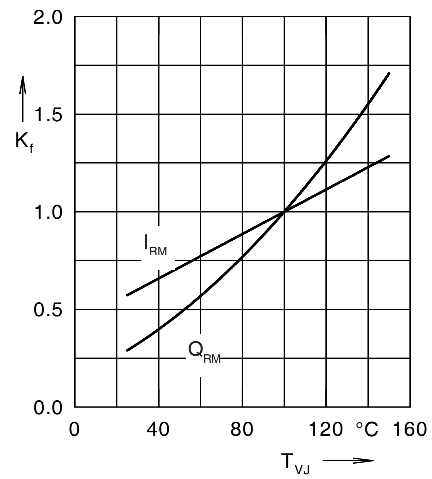


Fig. 24. Dynamic Paraments Q_r, I_{RM} Versus T_{vJ}

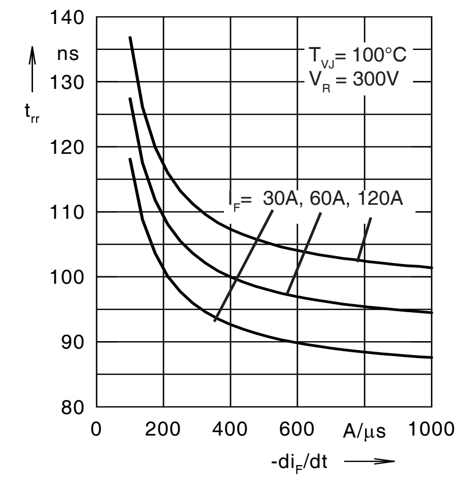


Fig. 25. Recorvery Time t_{rr} Versus $-di_F/dt$

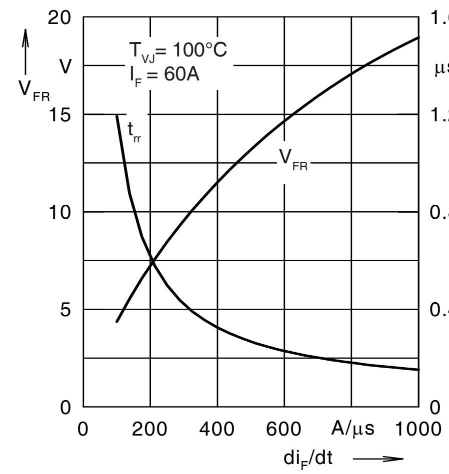


Fig. 26. Peak Forward Voltage V_{RM} and t_{rr} Versus $-di_F/dt$

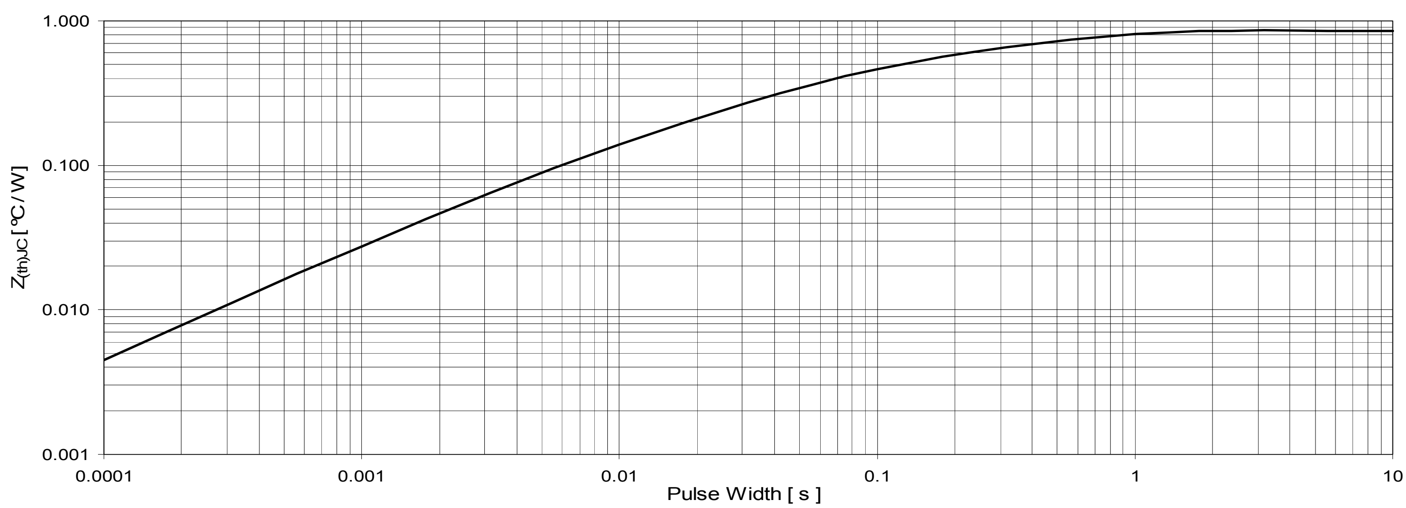


Fig. 27. Maximum Transient Thermal Impedance (for Diode)