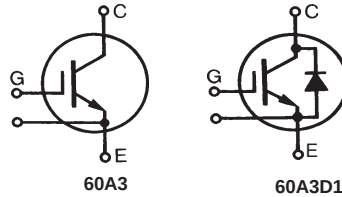


GenX3™ 600V IGBT

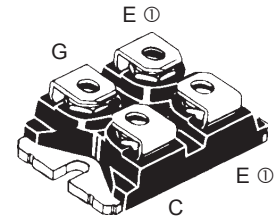
IXGN120N60A3 IXGN120N60A3D1

Ultra-low V_{sat} PT IGBTs for up to 5kHz switching



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

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}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}$	600	V
V_{CGR}	$T_J = 25^\circ\text{C to } 150^\circ\text{C}, R_{GE} = 1\text{M}\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ\text{C}$	200	A
I_{C110}	$T_C = 110^\circ\text{C}$	120	A
I_{F110}	$T_C = 110^\circ\text{C}$ IXGN120N60A3D1	36	A
I_{CM}	$T_C = 25^\circ\text{C}, 1\text{ms}$	800	A
SSOA	$V_{GE} = 15\text{V}, T_{VJ} = 125^\circ\text{C}, R_G = 1.5\Omega$	$I_{CM} = 200$	A
(RBSOA)	Clamped Inductive Load	@ $V_{CES} \leq 600$	V
P_C	$T_C = 25^\circ\text{C}$	595	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
V_{ISOL}	50/60Hz $t = 1\text{min}$ $I_{ISOL} \leq 1\text{mA}$ $t = 1\text{s}$	2500 3000	V~ 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	Characteristic Values		
	$(T_J = 25^\circ\text{C}, \text{ Unless Otherwise Specified})$	Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 500\mu\text{A}, V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}, V_{GE} = 0\text{V}, \text{ Note 3}$ $T_J = 125^\circ\text{C}$			50 μA 650 μA 1 mA 5 mA
I_{GES}	$V_{CE} = 0\text{V}, V_{GE} = \pm 20\text{V}$			± 400 nA
$V_{CE(sat)}$	$I_C = 100\text{A}, V_{GE} = 15\text{V}, \text{ Note 1}$		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

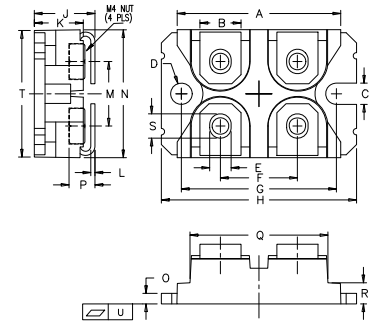
Advantages

- 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 ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$I_C = 60\text{A}$, $V_{CE} = 10\text{V}$, Note 1	65	108	S
C_{ies}	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$		14.8	nF
C_{oes}			800	pF
C_{res}			140	pF
$Q_{g(on)}$	$I_C = I_{C110}$, $V_{GE} = 15\text{V}$, $V_{CE} = 0.5 \cdot V_{CES}$		450	nC
Q_{ge}			67	nC
Q_{gc}			130	nC
$t_{d(on)}$	Inductive Load, $T_J = 25^\circ\text{C}$ $I_C = 100\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$, $R_G = 1.5\Omega$, Note 2		39	ns
t_{ri}			82	ns
E_{on}			2.7	mJ
$t_{d(off)}$			295	ns
t_{fi}			260	ns
E_{off}			6.6	mJ
$t_{d(on)}$	Inductive Load, $T_J = 125^\circ\text{C}$ $I_C = 100\text{A}$, $V_{GE} = 15\text{V}$ $V_{CE} = 480\text{V}$, $R_G = 1.5\Omega$, Note 2		40	ns
t_{ri}			83	ns
E_{on}			3.5	mJ
$t_{d(off)}$			420	ns
t_{fi}			410	ns
E_{off}			10.4	mJ
R_{thJC}				0.21 $^\circ\text{C/W}$
R_{thCK}			0.05	$^\circ\text{C/W}$

SOT-227B miniBLOC


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	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 ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min	Typ.	Max.
V_F	$I_F = 60\text{A}$, Note 1 $V_{GE} = 0\text{V}$			2.1 V
	$T_J = 150^\circ\text{C}$		1.4	V
I_{RM}	$I_F = 60\text{A}$, $V_{GE} = 0\text{V}$, $-di_F/dt = 100\text{A}/\mu\text{s}$ $V_R = 300\text{V}$, $T_J = 100^\circ\text{C}$			8.0 A
t_{rr}				175 ns
R_{thJC}				0.85 $^\circ\text{C/W}$

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

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

Fig. 1. Output Characteristics
@ 25°C

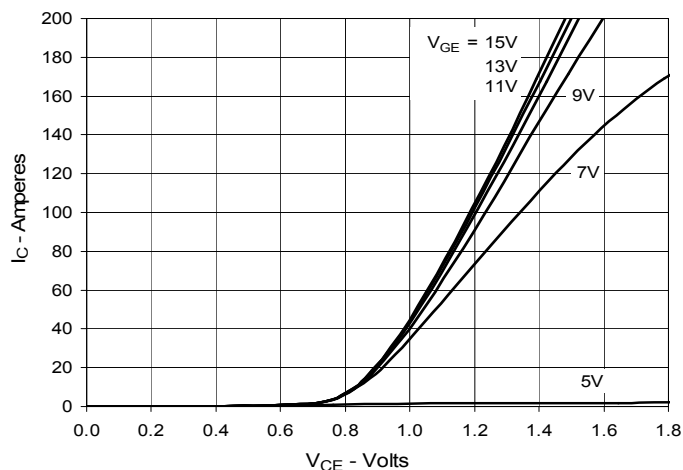


Fig. 2. Extended Output Characteristics
@ 25°C

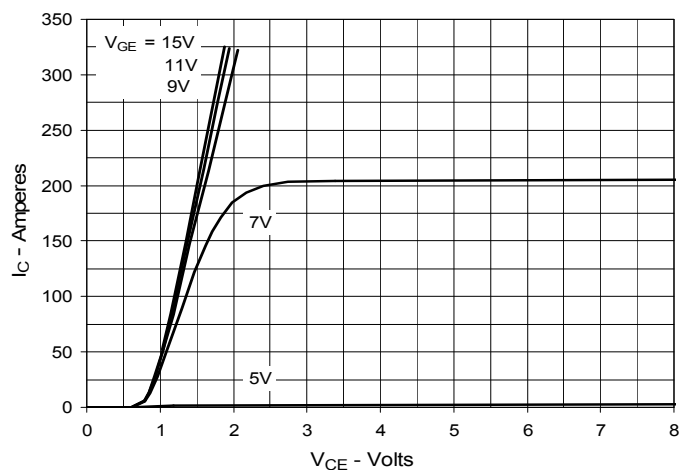


Fig. 3. Output Characteristics
@ 125°C

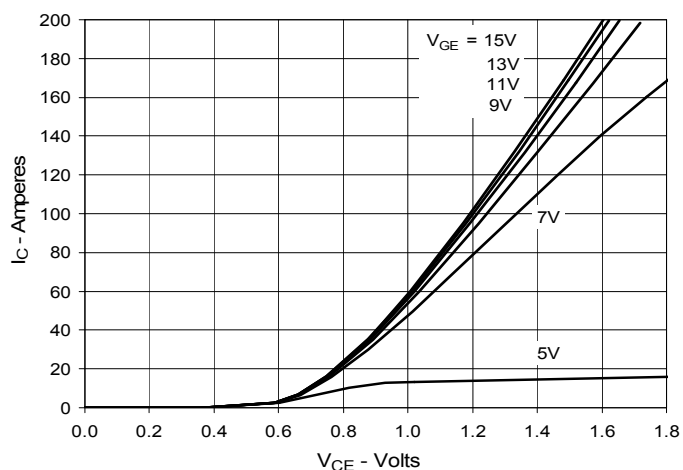


Fig. 4. Dependence of $V_{CE(sat)}$ on
Junction Temperature

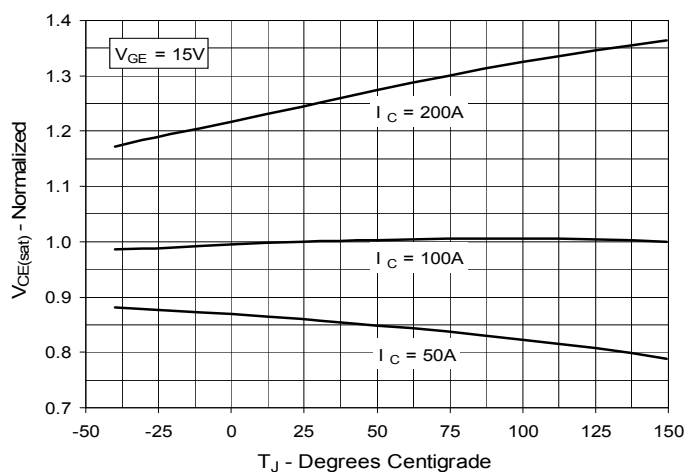


Fig. 5. Collector-to-Emitter Voltage
vs. Gate-to-Emitter Voltage

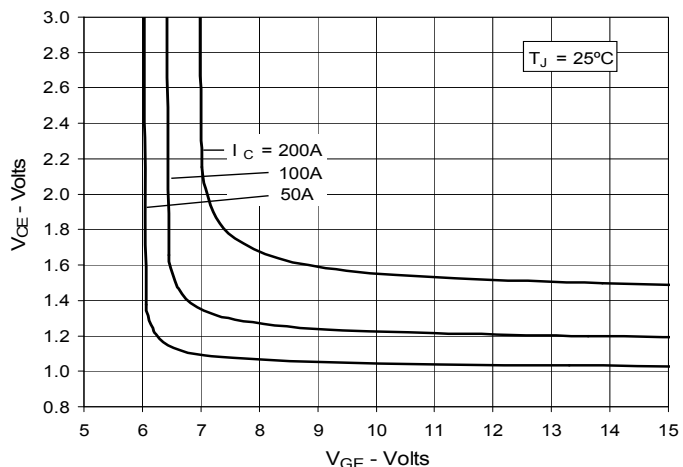


Fig. 6. Input Admittance

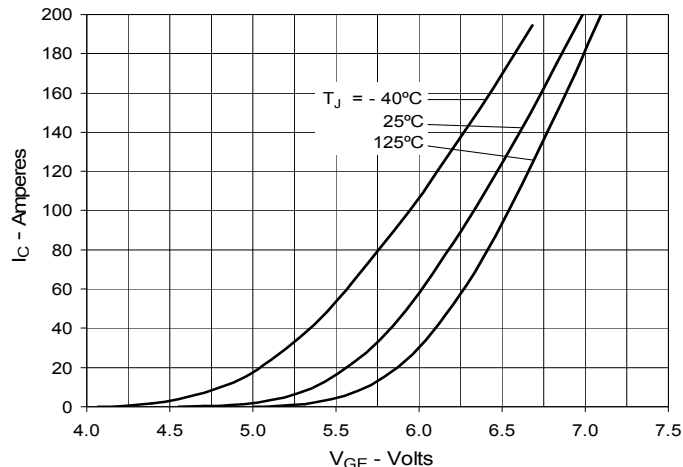


Fig. 7. Transconductance

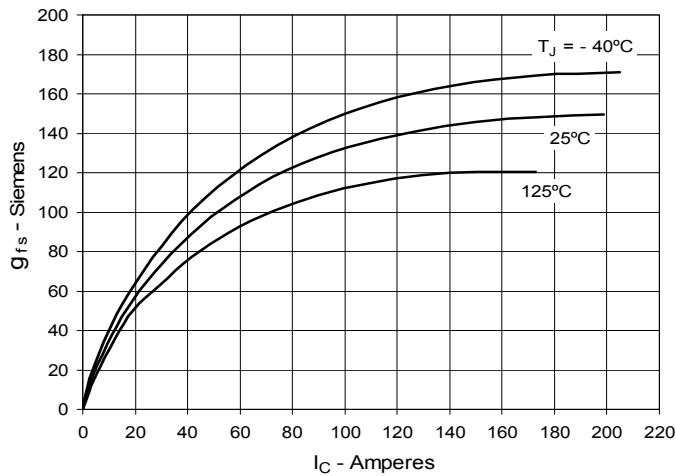


Fig. 8. Gate Charge

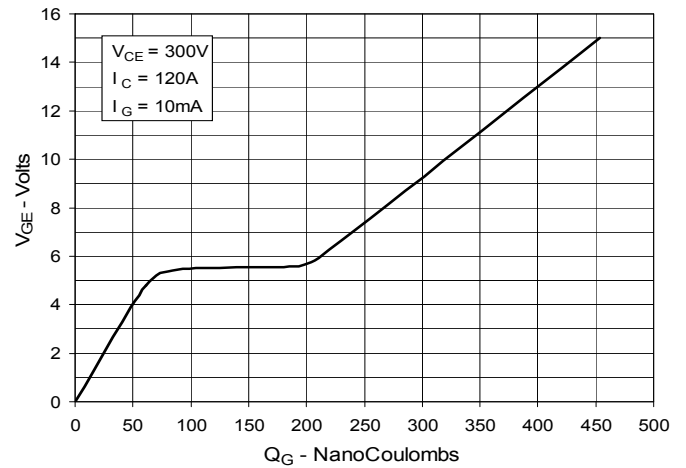


Fig. 9. Capacitance

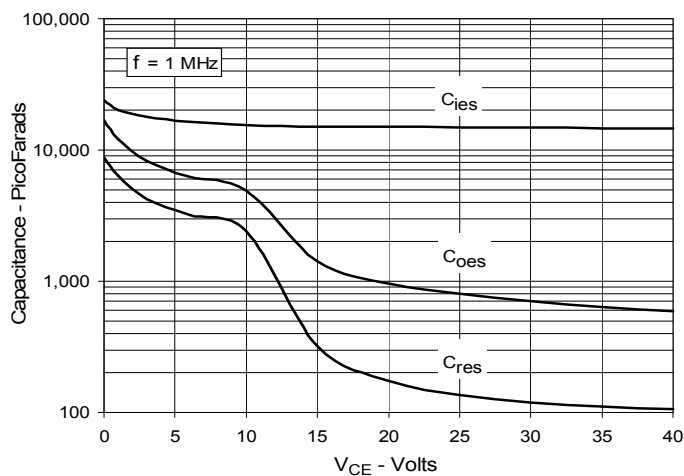


Fig. 10. Reverse-Bias Safe Operating Area

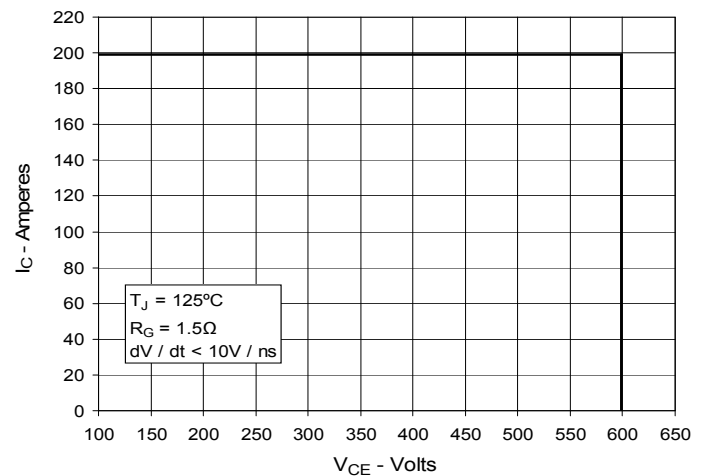
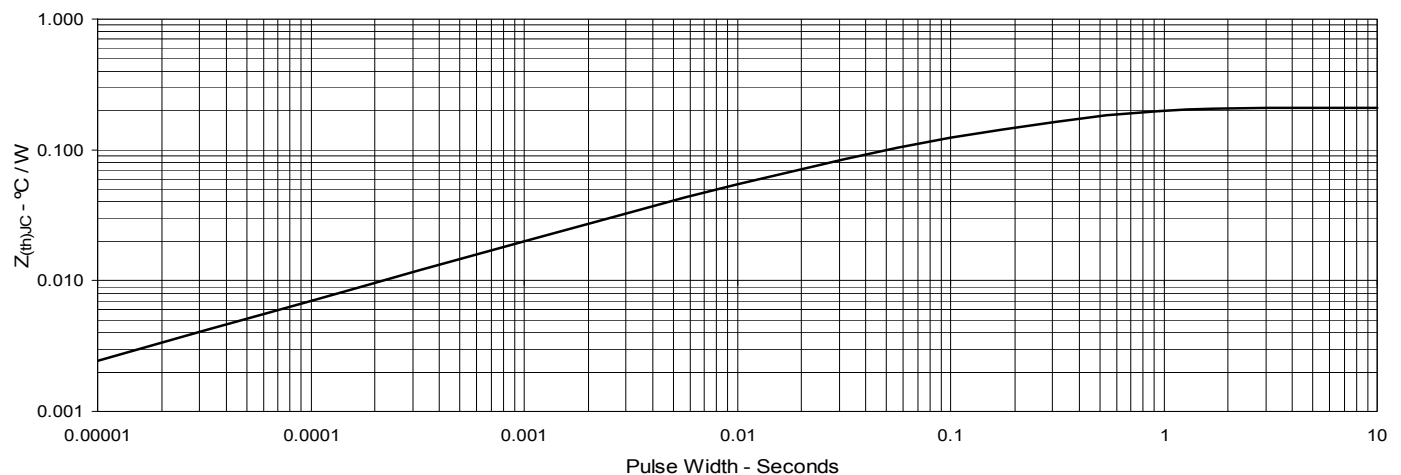
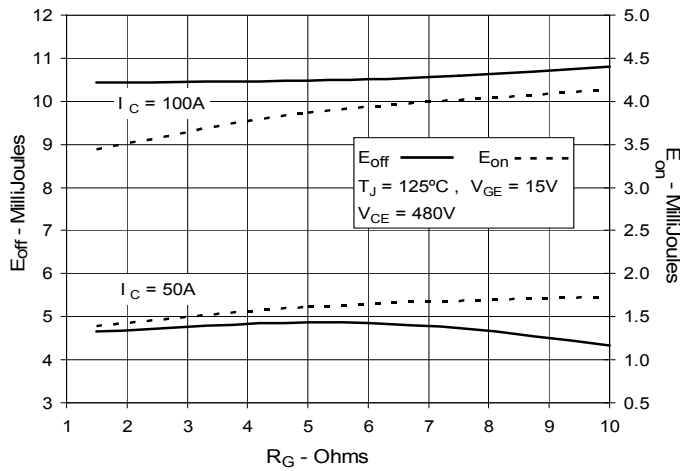


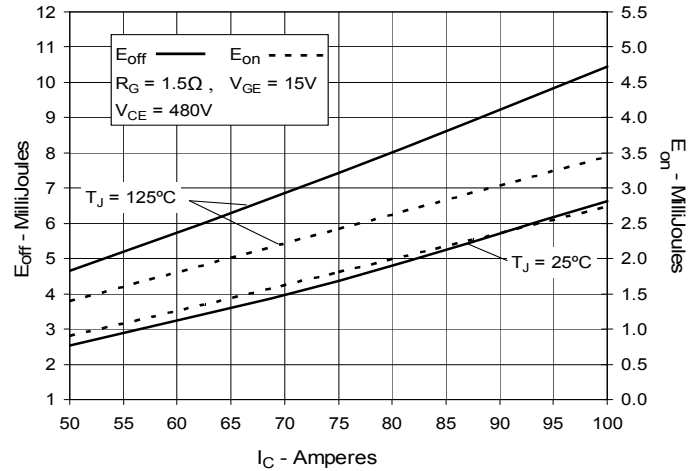
Fig. 11. Maximum Transient Thermal Impedance



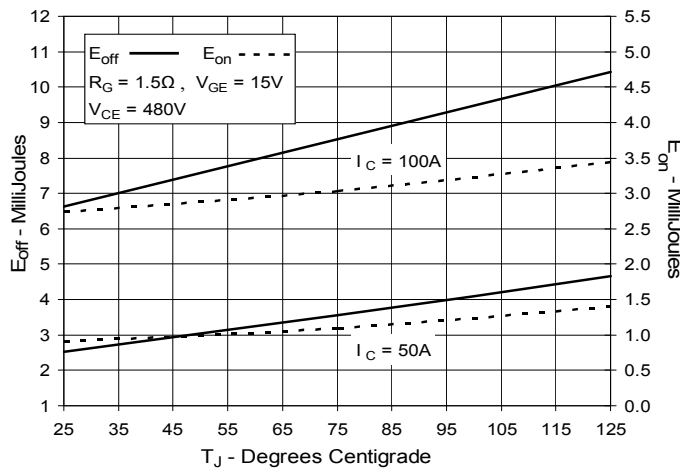
**Fig. 12. Inductive Switching
Energy Loss vs. Gate Resistance**



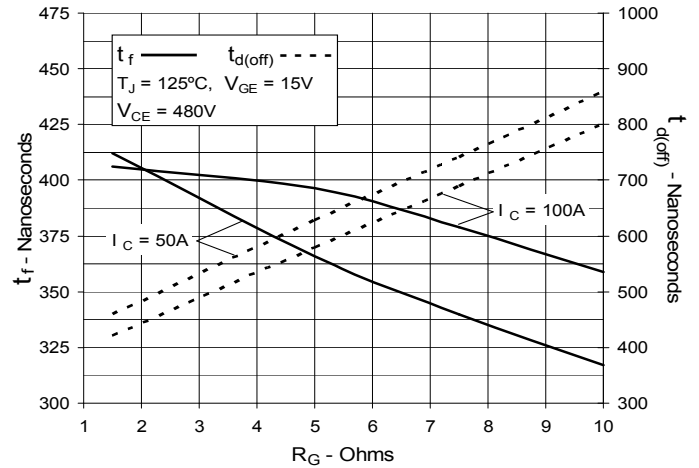
**Fig. 13. Inductive Switching
Energy Loss vs. Collector Current**



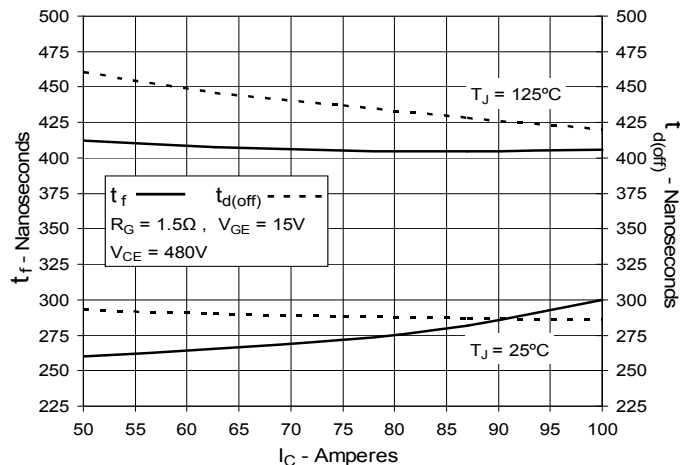
**Fig. 14. Inductive Switching
Energy Loss vs. Junction Temperature**



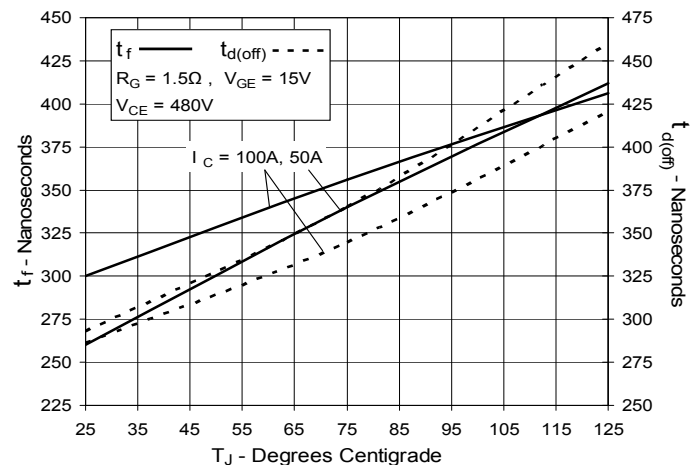
**Fig. 15. Inductive Turn-off
Switching Times vs. Gate Resistance**



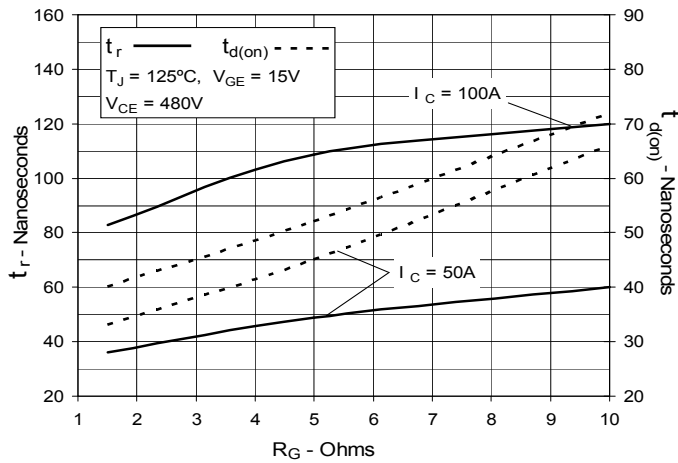
**Fig. 16. Inductive Turn-off
Switching Times vs. Collector Current**



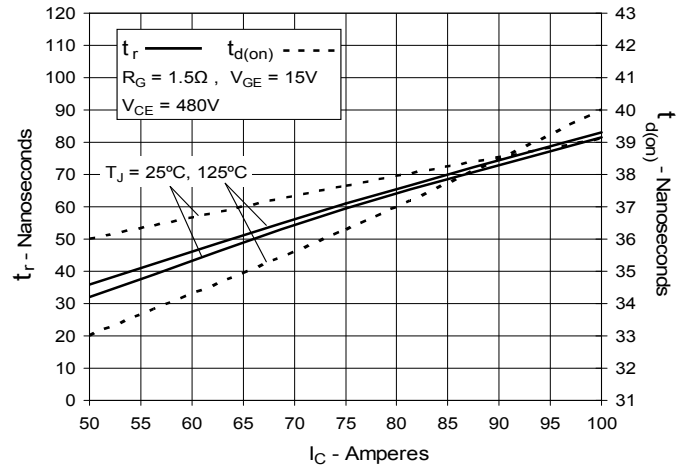
**Fig. 17. Inductive Turn-off
Switching Times vs. Junction Temperature**



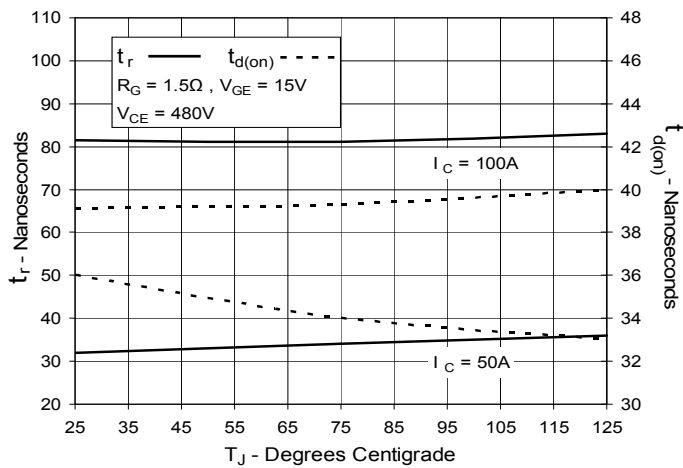
**Fig. 18. Inductive Turn-on
Switching Times vs. Gate Resistance**



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



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



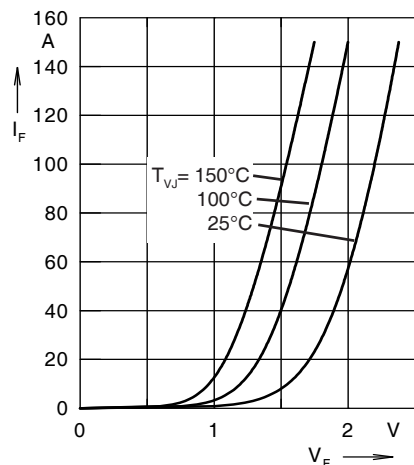


Fig. 21. Forward Current I_F Versus V_F

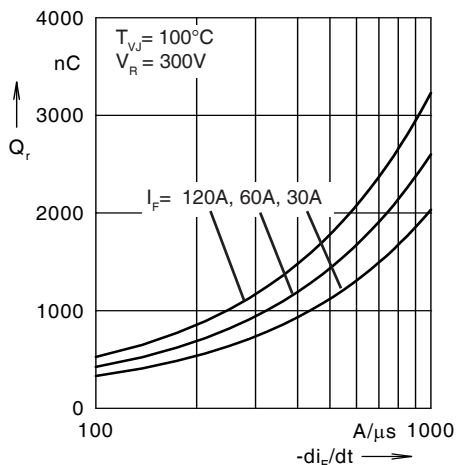


Fig. 22. Reverse Recovery Charge Q_r Versus $-di_F/dt$

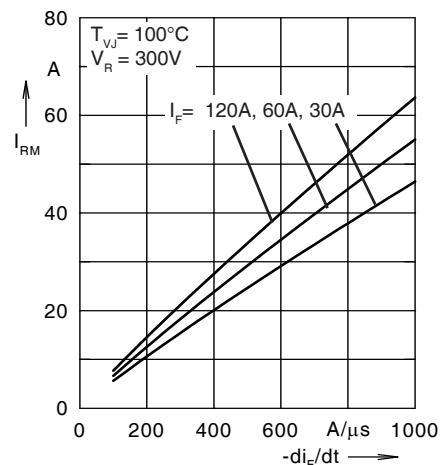


Fig. 23. Peak Reverse Current I_{RM} Versus $-di_F/dt$

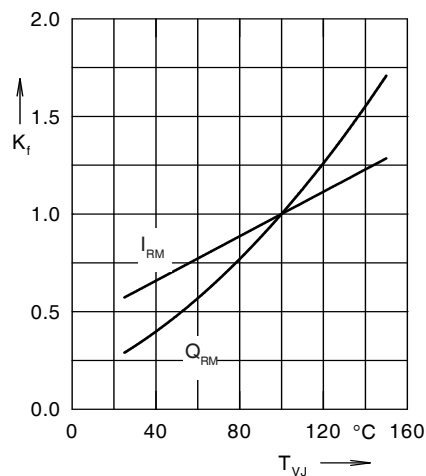


Fig. 24. Dynamic Parameters Q_r , I_{RM} Versus T_{VJ}

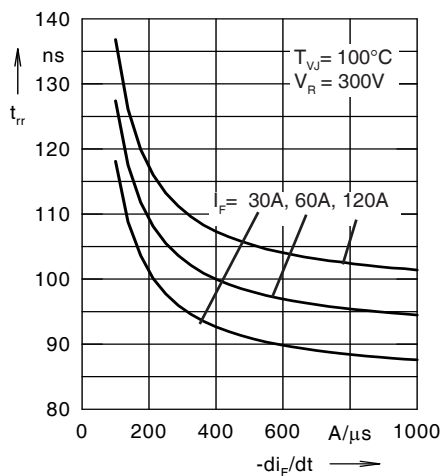


Fig. 25. Recovery Time t_{rr} Versus $-di_F/dt$

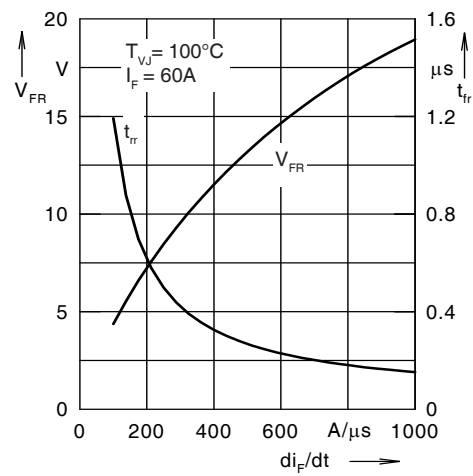


Fig. 26. Peak Forward Voltage V_{FR} and t_{rr} Versus $-di_F/dt$

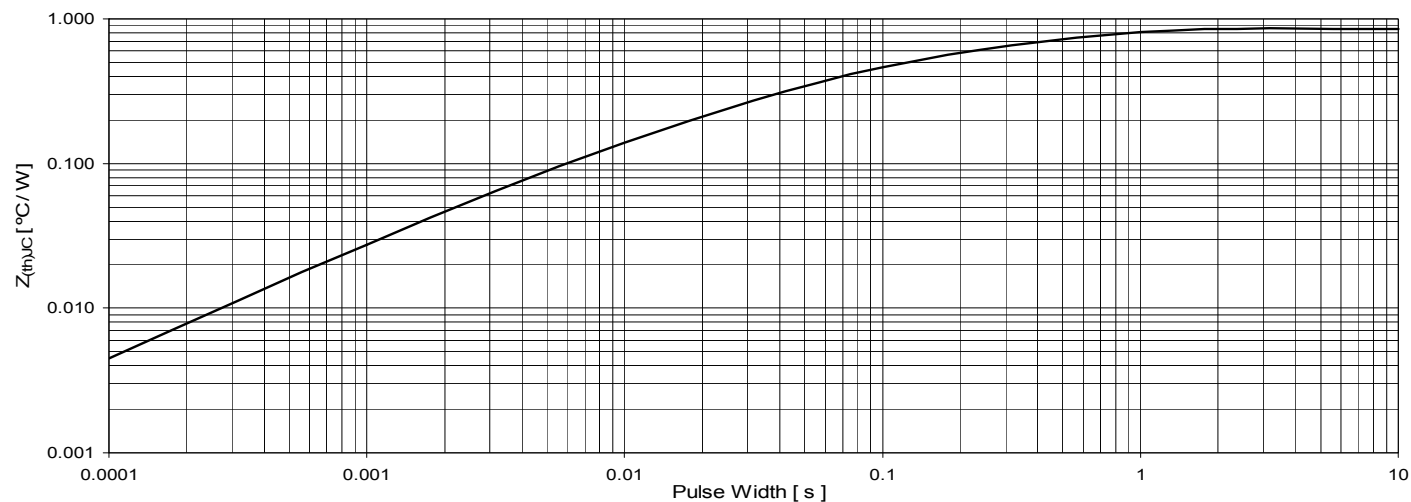


Fig. 27. Maximum Transient Thermal Impedance (for Diode)