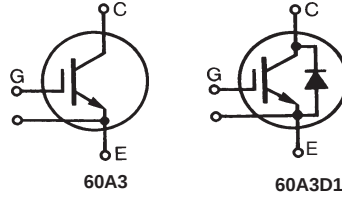


GenX3™ 600V IGBT

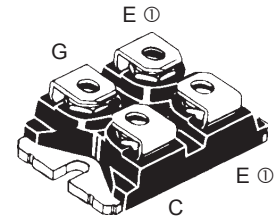
IXGN120N60A3 IXGN120N60A3D1

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

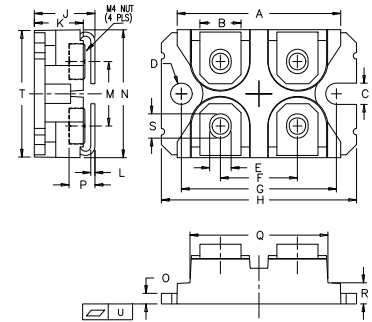
Advantages

- 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 $V_{GE} = 0\text{V}$, $T_J = 150^\circ\text{C}$		1.4	2.1 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.

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:	4,835,592	4,931,844	5,049,961	5,237,481	6,162,665	6,404,065 B1	6,683,344	6,727,585	7,005,734 B2	7,157,338B2
	4,850,072	5,017,508	5,063,307	5,381,025	6,259,123 B1	6,534,343	6,710,405 B2	6,759,692	7,063,975 B2	
	4,881,106	5,034,796	5,187,117	5,486,715	6,306,728 B1	6,583,505	6,710,463	6,771,478 B2	7,071,537	

Fig. 1. Output Characteristics
@ 25°C

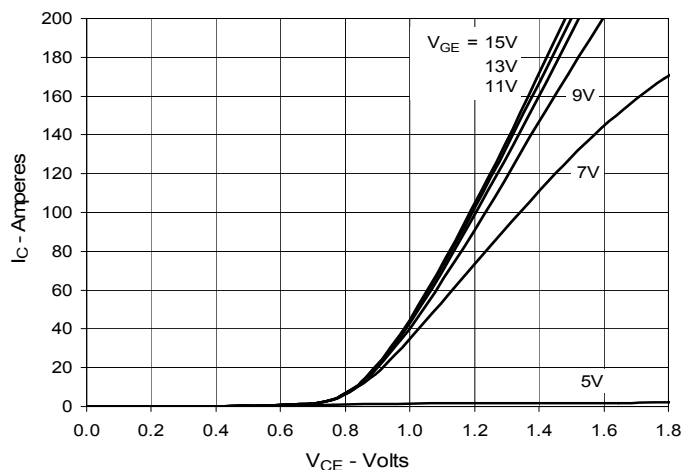


Fig. 2. Extended Output Characteristics
@ 25°C

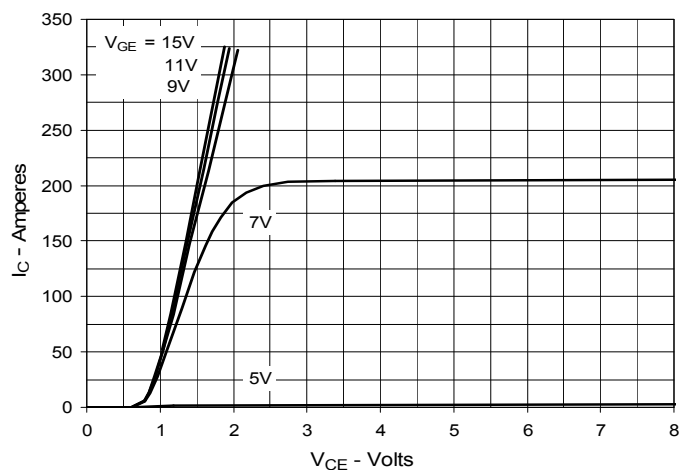


Fig. 3. Output Characteristics
@ 125°C

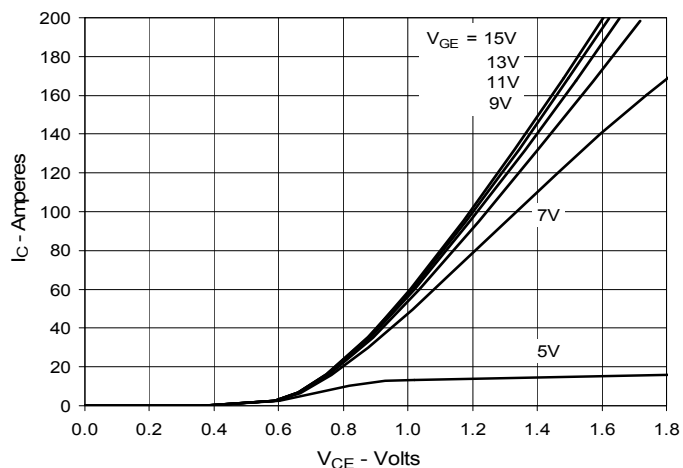


Fig. 4. Dependence of $V_{CE(sat)}$ on
Junction Temperature

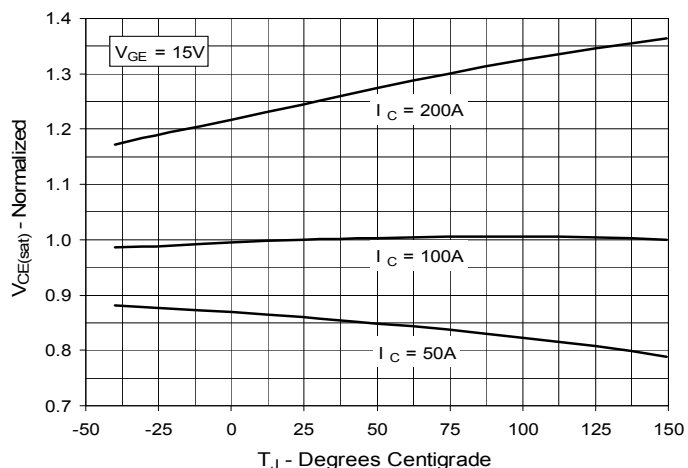


Fig. 5. Collector-to-Emitter Voltage
vs. Gate-to-Emitter Voltage

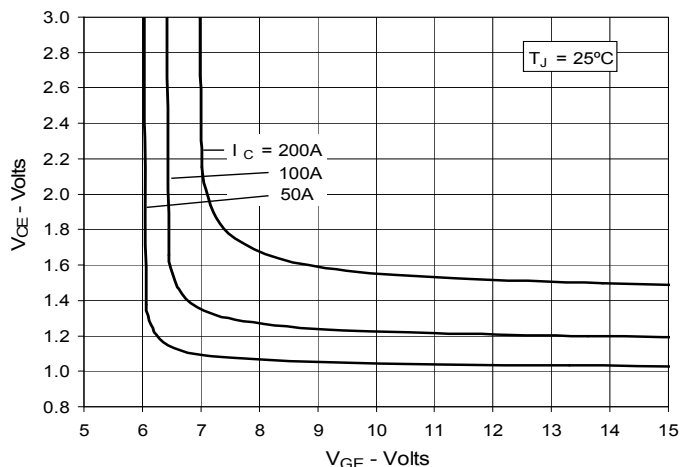


Fig. 6. Input Admittance

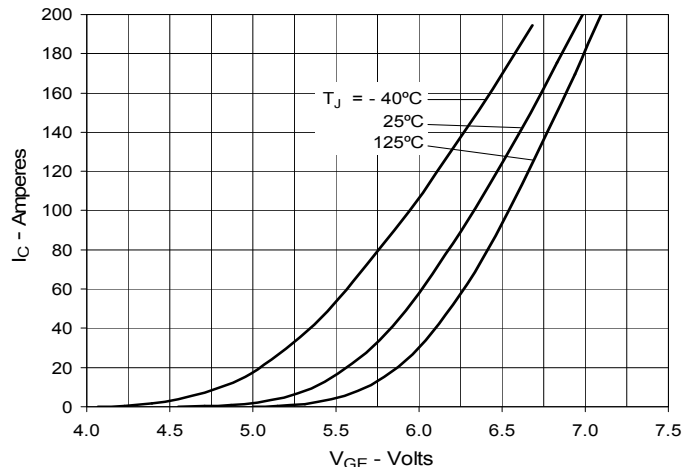


Fig. 7. Transconductance

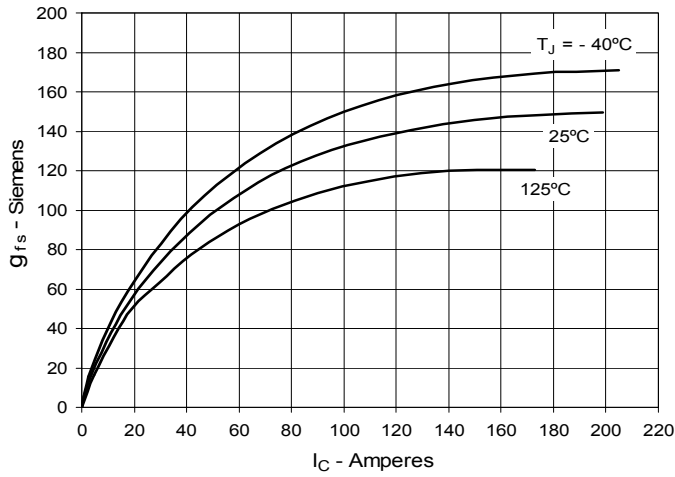


Fig. 8. Gate Charge

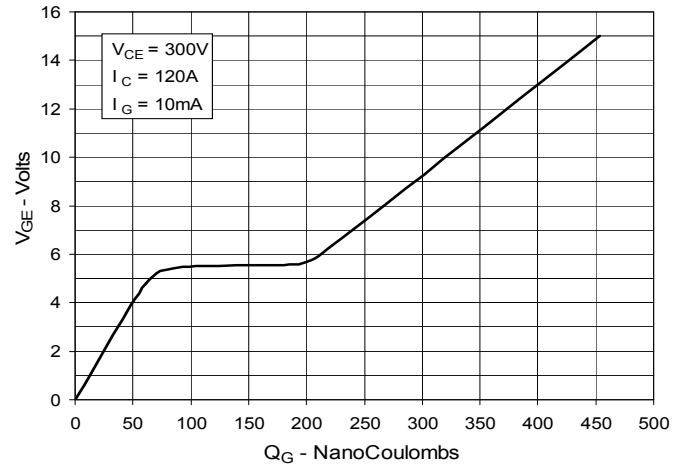


Fig. 9. Capacitance

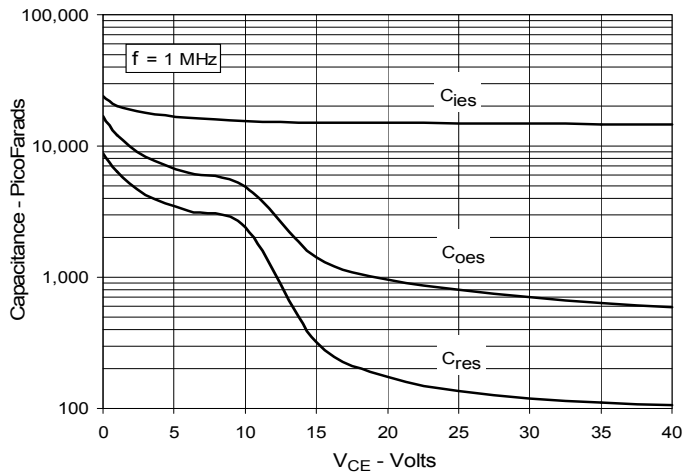


Fig. 10. Reverse-Bias Safe Operating Area

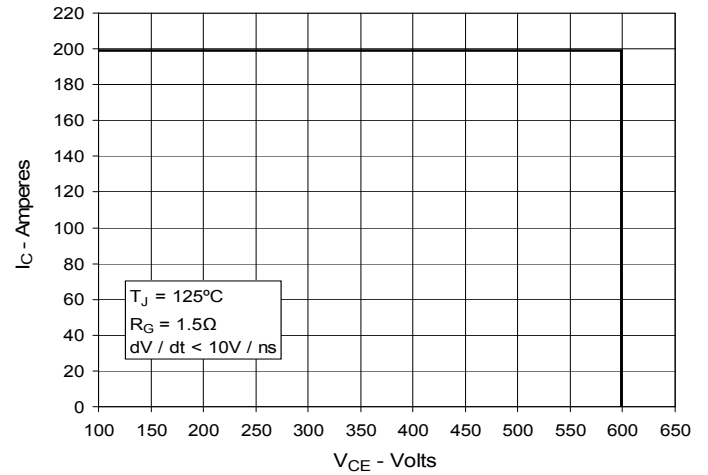
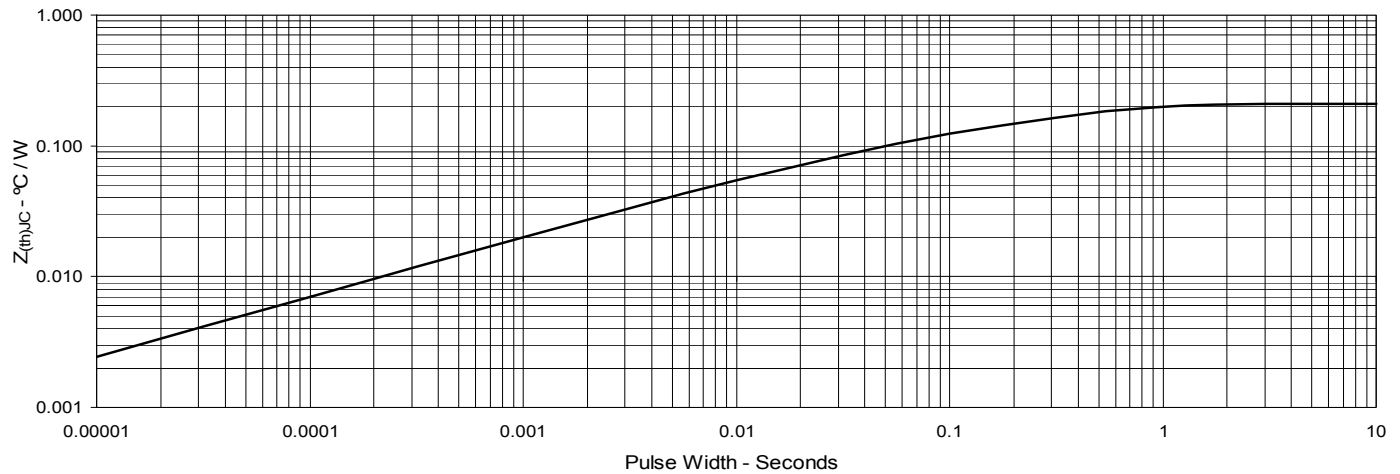
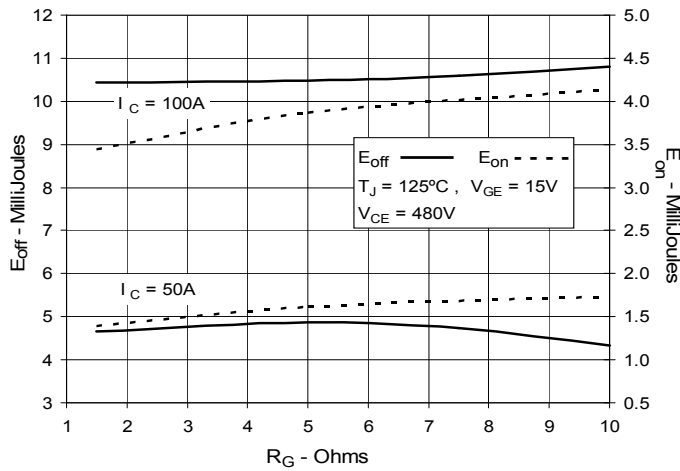


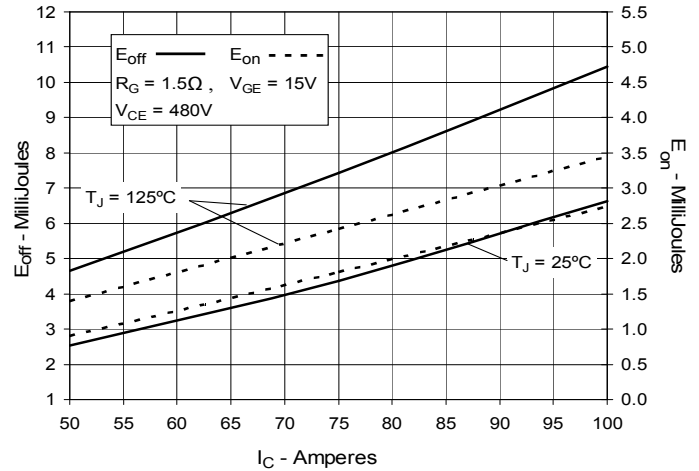
Fig. 11. Maximum Transient Thermal Impedance



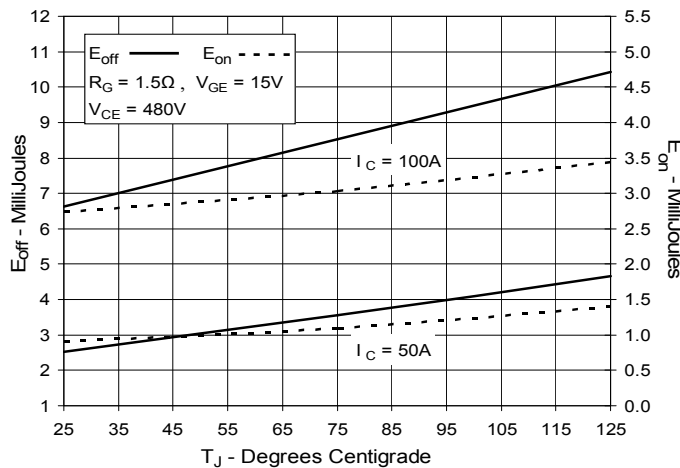
**Fig. 12. Inductive Switching
Energy Loss vs. Gate Resistance**



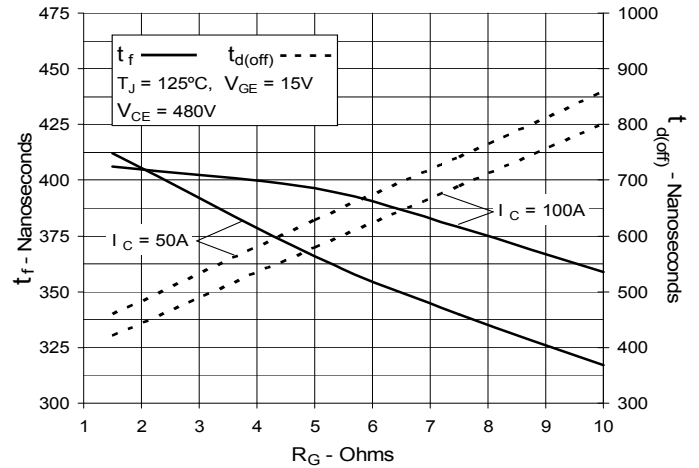
**Fig. 13. Inductive Switching
Energy Loss vs. Collector Current**



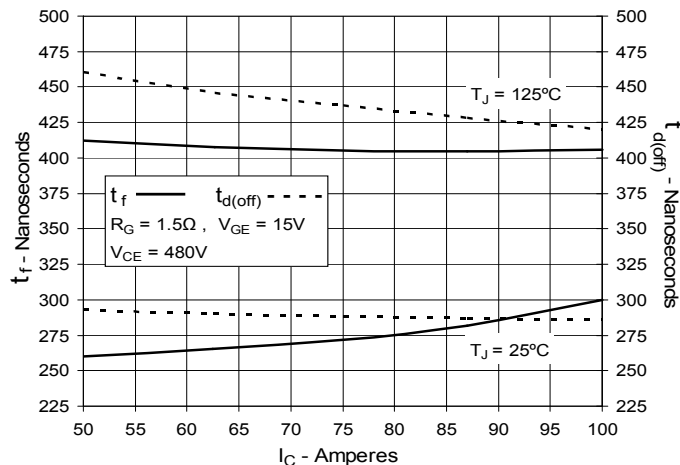
**Fig. 14. Inductive Switching
Energy Loss vs. Junction Temperature**



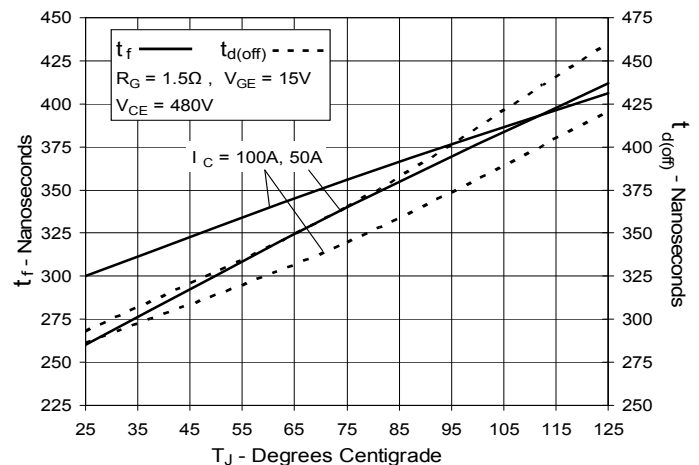
**Fig. 15. Inductive Turn-off
Switching Times vs. Gate Resistance**



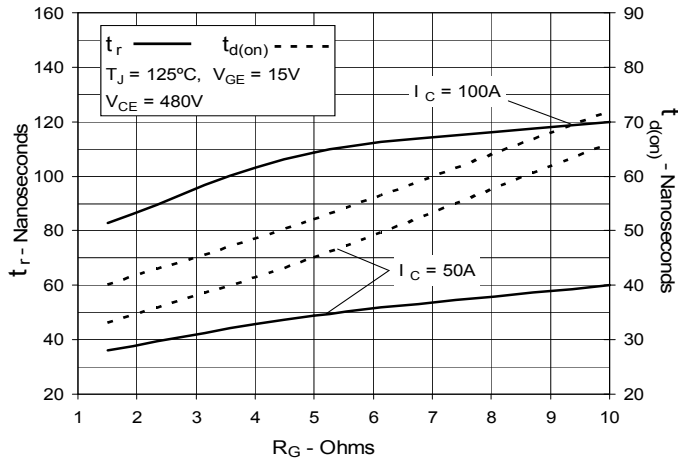
**Fig. 16. Inductive Turn-off
Switching Times vs. Collector Current**



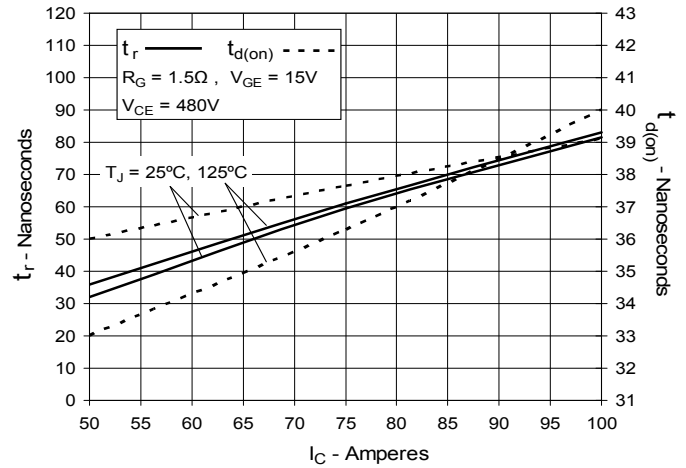
**Fig. 17. Inductive Turn-off
Switching Times vs. Junction Temperature**



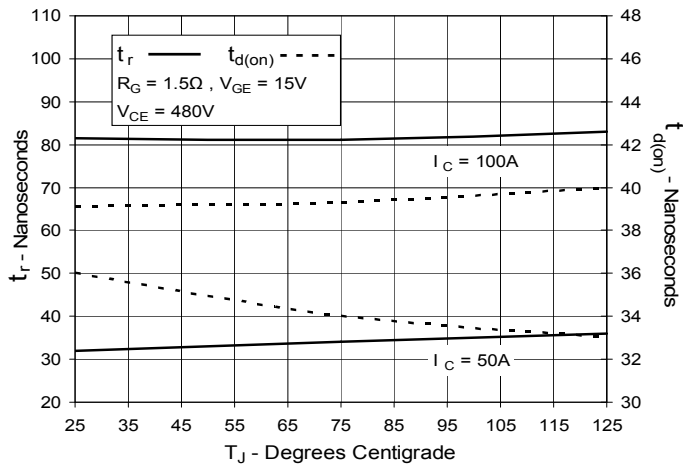
**Fig. 18. Inductive Turn-on
Switching Times vs. Gate Resistance**



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



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



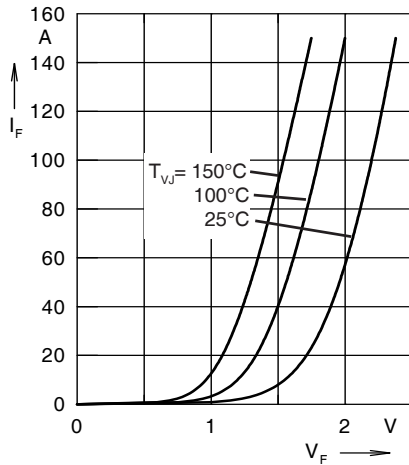


Fig. 21. Forward Current I_F Versus V_F

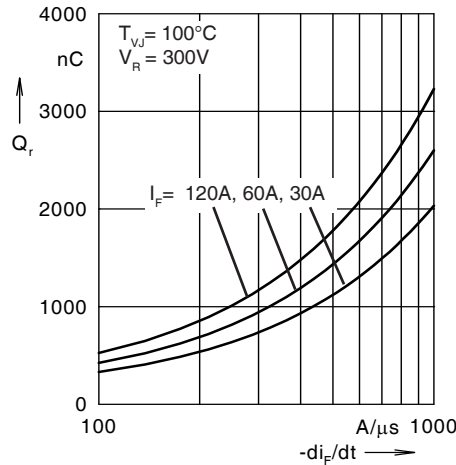


Fig. 22. Reverse Recovery Charge Q_r Versus $-di_F/dt$

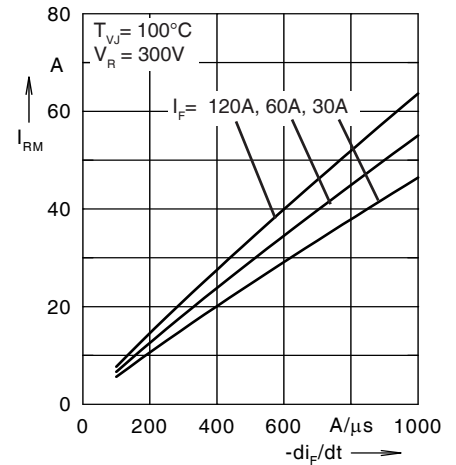


Fig. 23. Peak Reverse Current I_{RM} Versus $-di_F/dt$

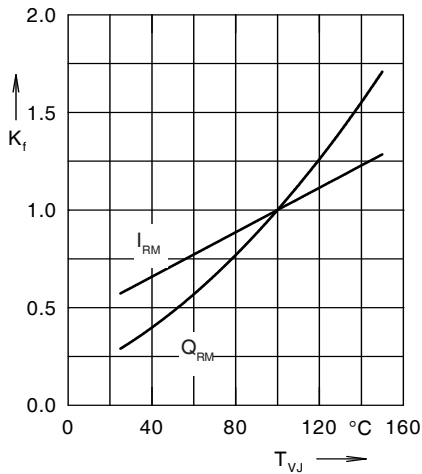


Fig. 24. Dynamic Parameters Q_r , I_{RM} Versus T_{VJ}

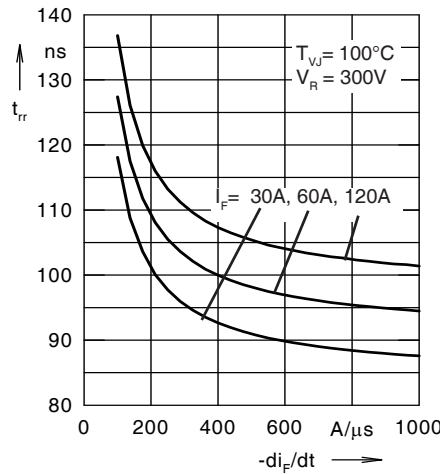


Fig. 25. Recovery Time t_{rr} Versus $-di_F/dt$

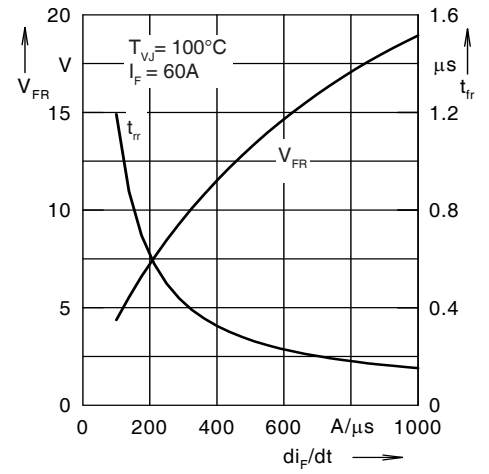


Fig. 26. Peak Forward Voltage V_{FR} and t_{rr} Versus $-di_F/dt$

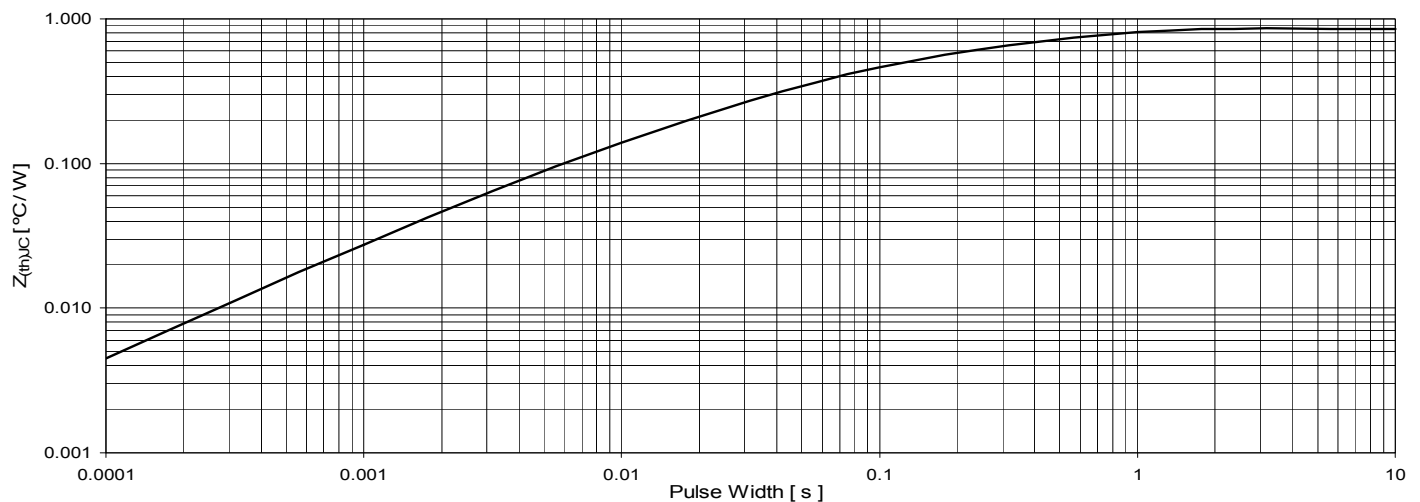


Fig. 27. Maximum Transient Thermal Impedance (for Diode)



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