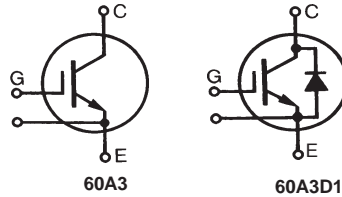


GenX3™ 600V IGBT

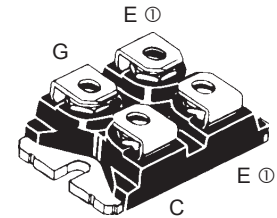
IXGN120N60A3 IXGN120N60A3D1

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

Ultra-low V_{sat} PT IGBTs for up to 5kHz 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}	$T_J = 25^\circ C$ to $150^\circ C$	600	V
V_{CGR}	$T_J = 25^\circ C$ to $150^\circ C$, $R_{GE} = 1M\Omega$	600	V
V_{GES}	Continuous	± 20	V
V_{GEM}	Transient	± 30	V
I_{C25}	$T_C = 25^\circ C$	200	A
I_{C110}	$T_C = 110^\circ C$	120	A
I_{F110}	$T_C = 110^\circ C$ IXGN120N60A3D1	36	A
I_{CM}	$T_C = 25^\circ C$, 1ms	800	A
SSOA	$V_{GE} = 15V$, $T_{VJ} = 125^\circ C$, $R_G = 1.5\Omega$	$I_{CM} = 200$	A
(RBSOA)	Clamped Inductive Load	@ $V_{CES} \leq 600$	V
P_C	$T_C = 25^\circ C$	595	W
T_J		-55 ... +150	$^\circ C$
T_{JM}		150	$^\circ C$
T_{stg}		-55 ... +150	$^\circ C$
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

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 ($T_J = 25^\circ C$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 500\mu A$, $V_{CE} = V_{GE}$	3.0		5.0 V
I_{CES}	$V_{CE} = V_{CES}$, $V_{GE} = 0V$, Note 3 $T_J = 125^\circ C$	120N60A3		50 μA
		120N60A3D1		650 μA
		120N60A3		1 mA
		120N60A3D1		5 mA
I_{GES}	$V_{CE} = 0V$, $V_{GE} = \pm 20V$			± 400 nA
$V_{CE(sat)}$	$I_C = 100A$, $V_{GE} = 15V$, Note 1	1.20	1.35	V

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

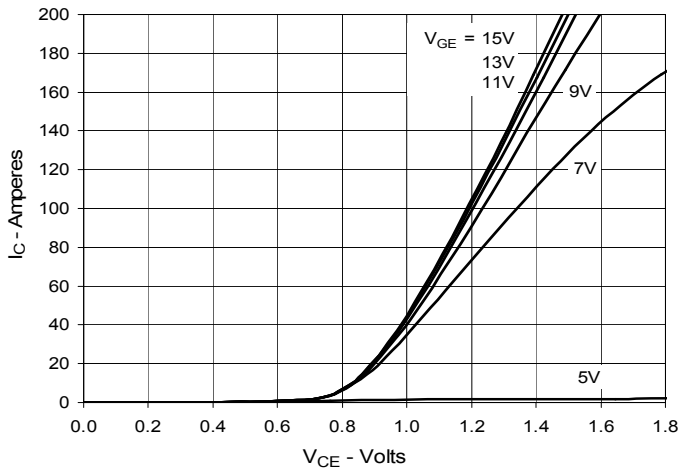


Fig. 2. Extended Output Characteristics @ 25°C

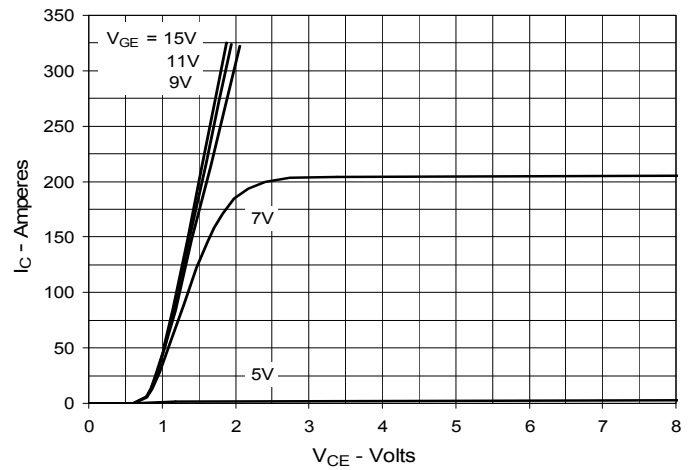


Fig. 3. Output Characteristics @ 125°C

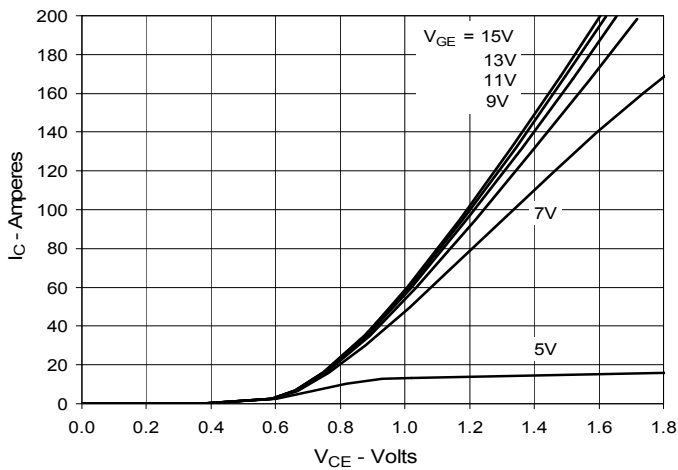


Fig. 4. Dependence of $V_{CE(sat)}$ on Junction Temperature

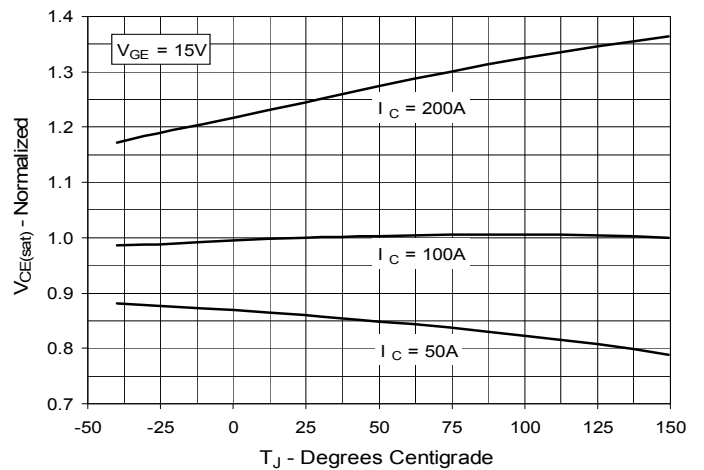


Fig. 5. Collector-to-Emitter Voltage vs. Gate-to-Emitter Voltage

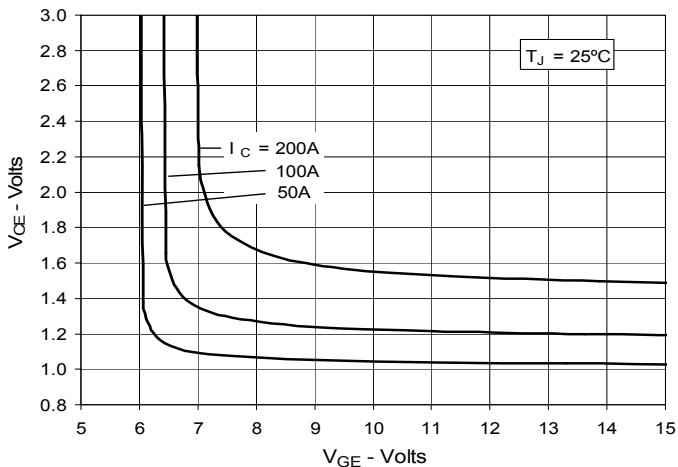


Fig. 6. Input Admittance

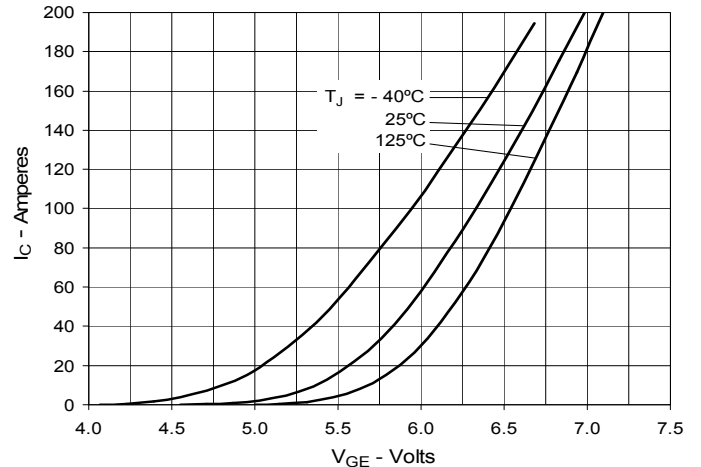


Fig. 7. Transconductance

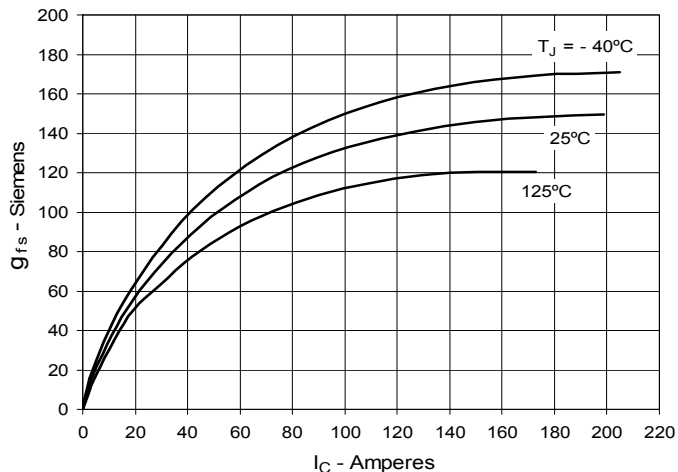


Fig. 8. Gate Charge

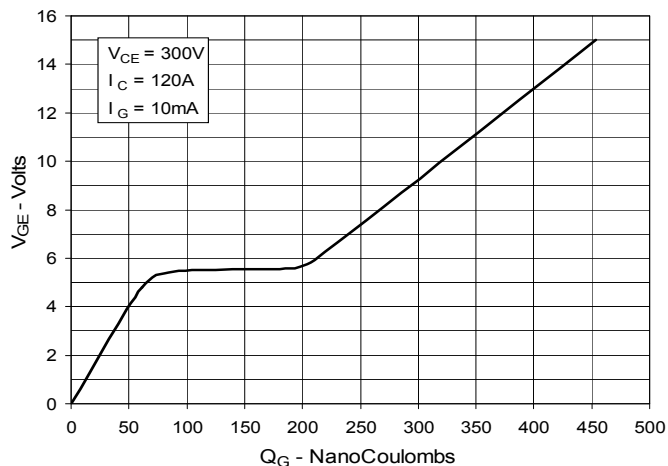


Fig. 9. Capacitance

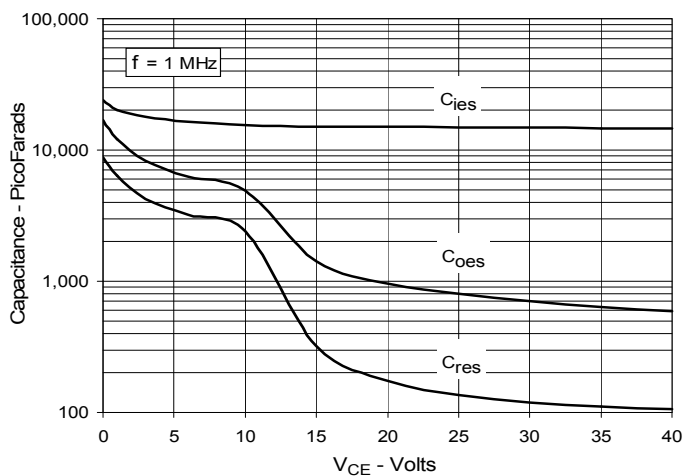


Fig. 10. Reverse-Bias Safe Operating Area

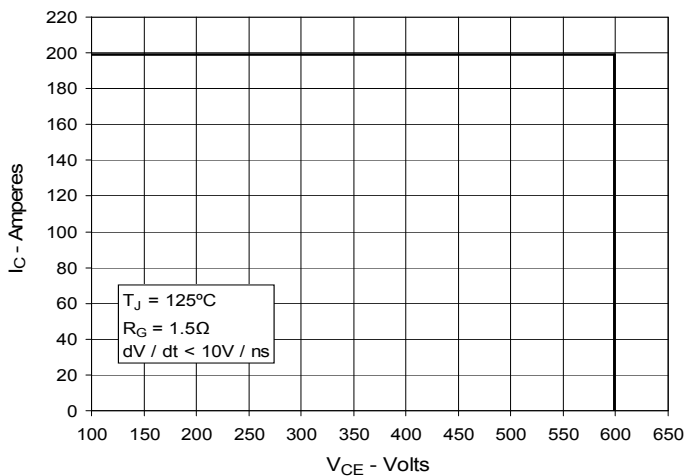


Fig. 11. Maximum Transient Thermal Impedance

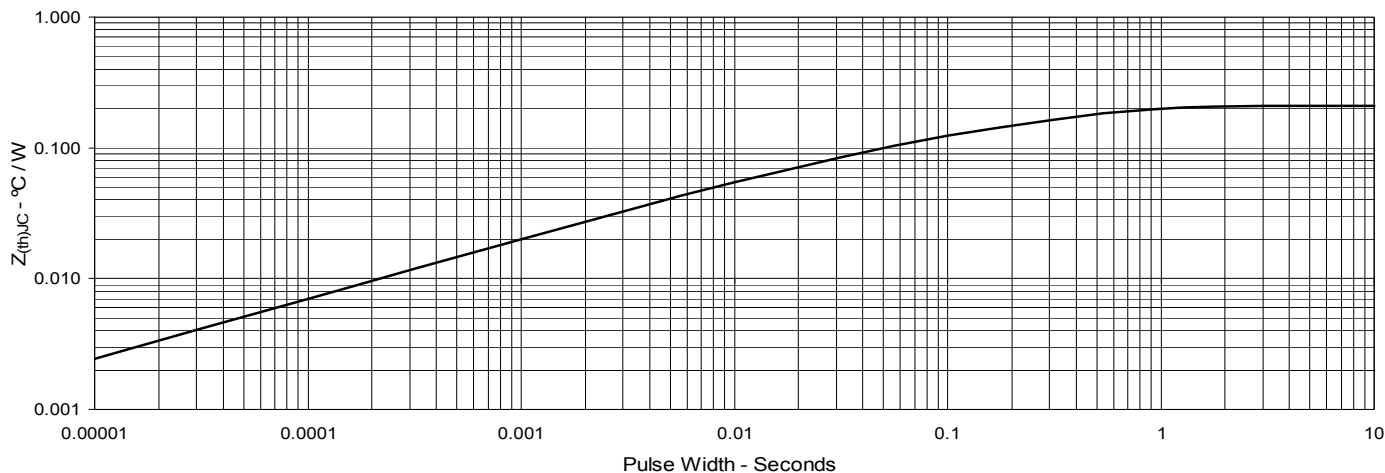


Fig. 12. Inductive Switching Energy Loss vs. Gate Resistance



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

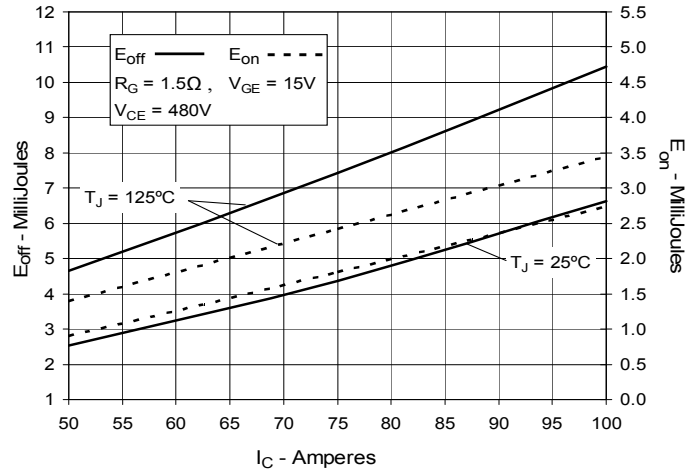


Fig. 14. Inductive Switching Energy Loss vs. Junction Temperature



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

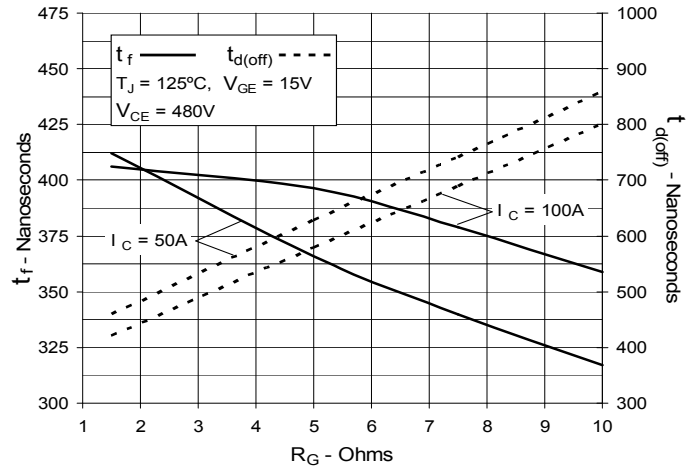


Fig. 16. Inductive Turn-off Switching Times vs. Collector Current

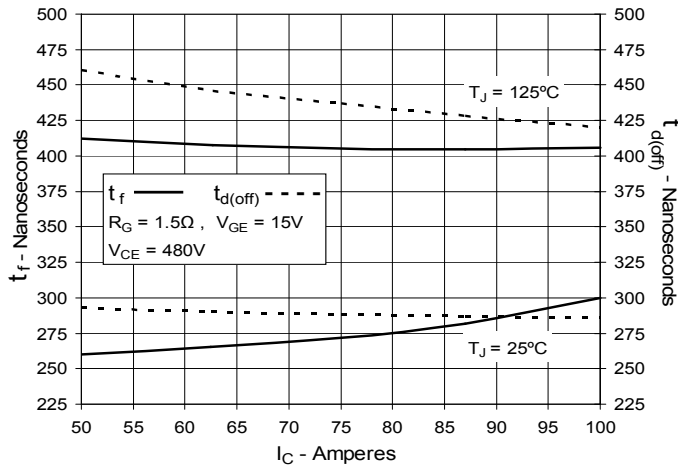
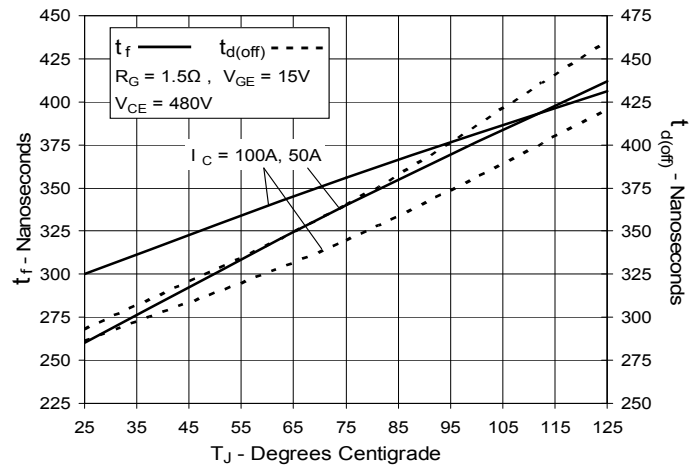
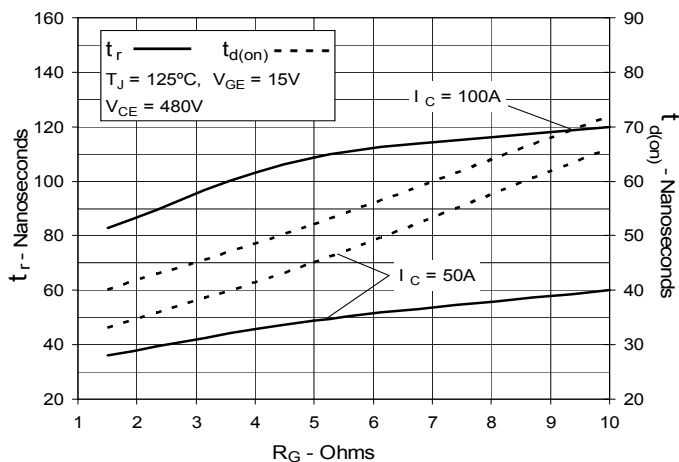


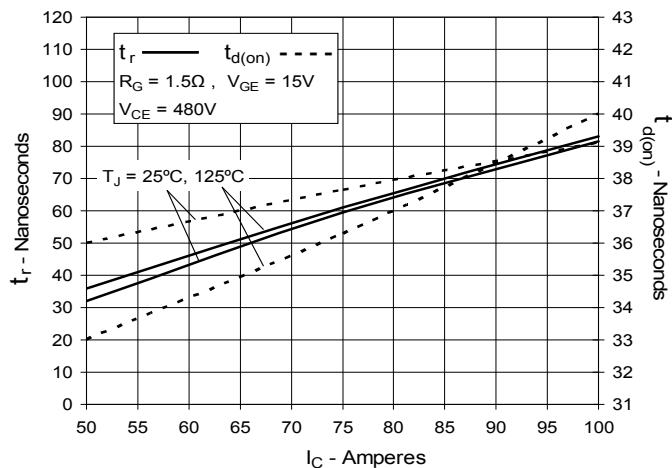
Fig. 17. Inductive Turn-off Switching Times vs. Junction Temperature



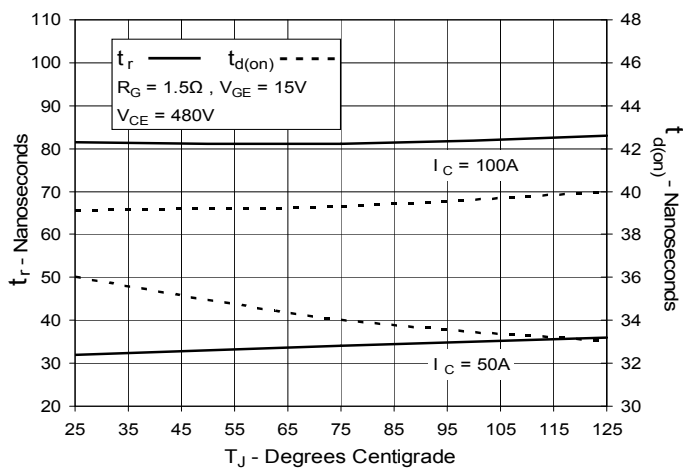
**Fig. 18. Inductive Turn-on
Switching Times vs. Gate Resistance**



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



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



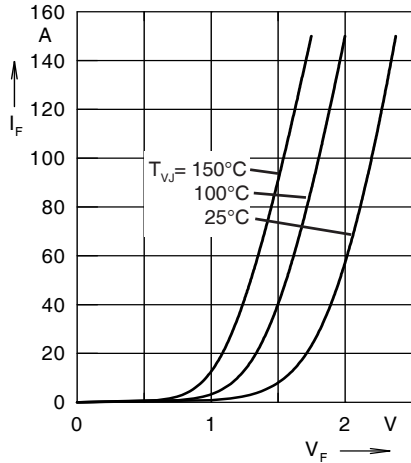


Fig. 21. Forward Current I_F Versus V_F

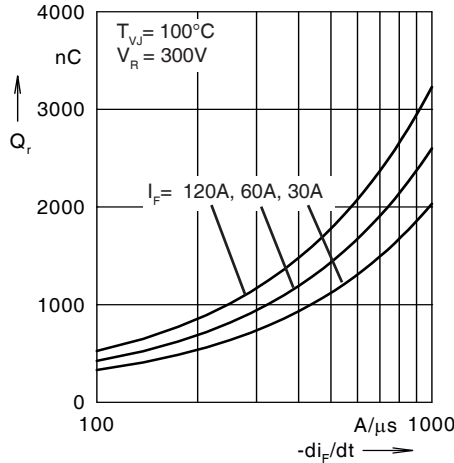


Fig. 22. Reverse Recovery Charge Q_r Versus $-di_F/dt$

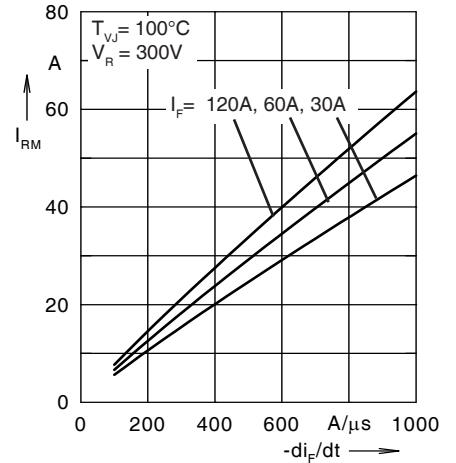


Fig. 23. Peak Reverse Current I_{RM} Versus $-di_F/dt$

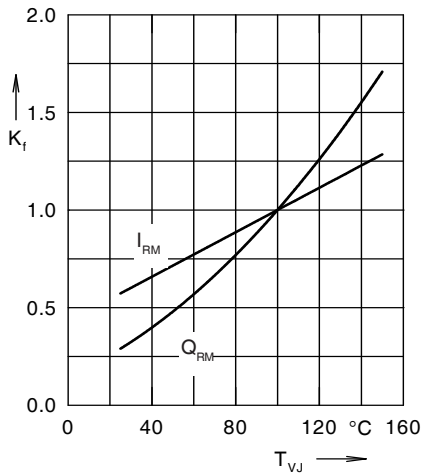


Fig. 24. Dynamic Parameters Q_r, I_{RM} Versus T_{VJ}

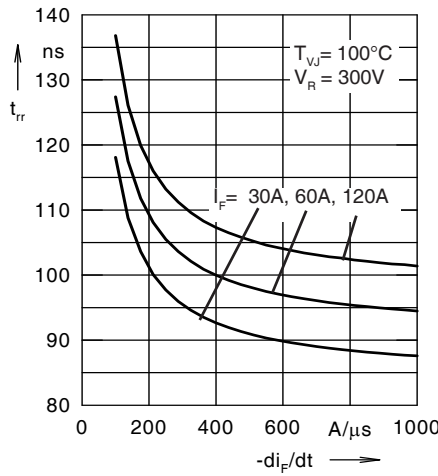


Fig. 25. Recovery Time t_{rr} Versus $-di_F/dt$

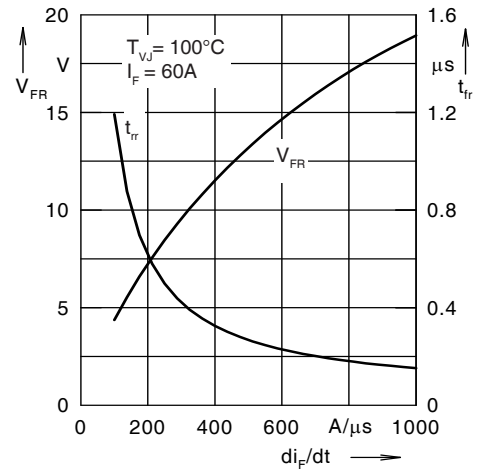


Fig. 26. Peak Forward Voltage V_{FR} and t_{rr} Versus $-di_F/dt$

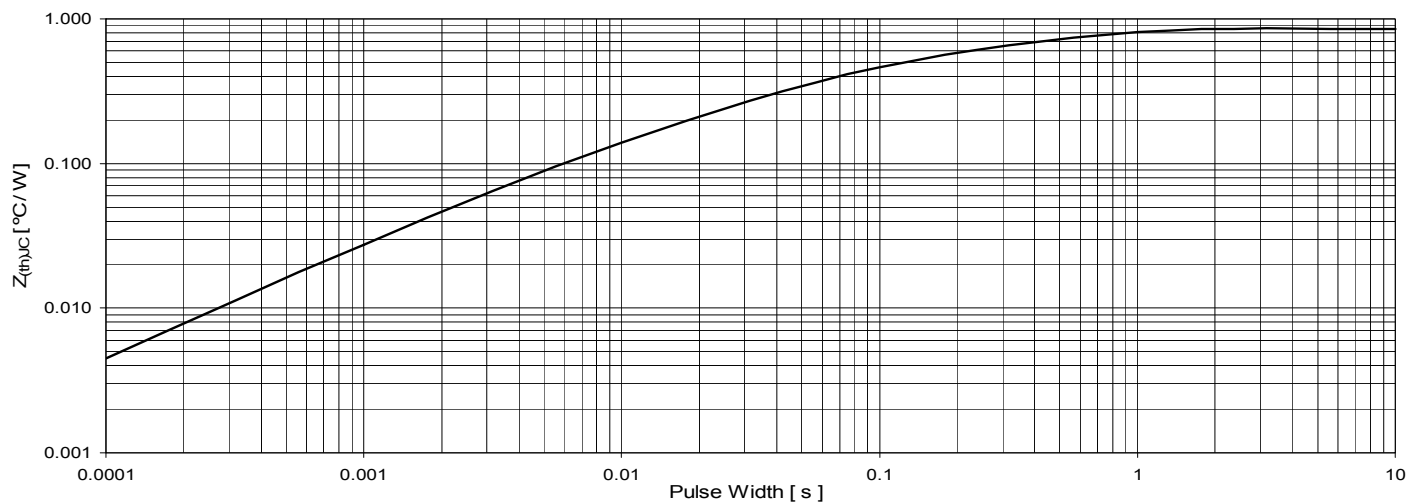


Fig. 27. Maximum Transient Thermal Impedance (for Diode)



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