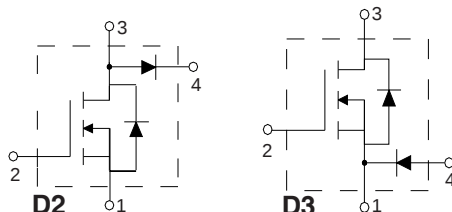


PolarHV™ HiPerFET Power MOSFETs

Boost & Buck Configurations
(Ultra-fast FRED Diode)

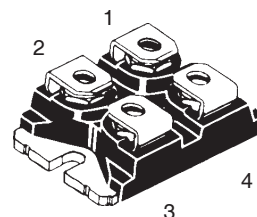
N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode

IXFN64N50PD2 IXFN64N50PD3



$$\begin{aligned} V_{DSS} &= 500V \\ I_{D25} &= 50A \\ R_{DS(on)} &\leq 85m\Omega \\ t_{rr} &\leq 200ns \end{aligned}$$

miniBLOC
E153432



D2 Pin Out:
1 = Source 3 = Drain / Diode anode
2 = Gate 4 = Diode cathode

D3 Pin Out:
1 = Source / Diode Cathode 2 = Gate
3 = Drain 4 = Diode cathode

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ\text{C}$ to 150°C	500	V
V_{DGR}	$T_J = 25^\circ\text{C}$ to 150°C , $R_{GS} = 1M\Omega$	500	V
V_{GSS}	Continuous	± 30	V
V_{GSM}	Transient	± 40	V
I_{D25}	$T_C = 25^\circ\text{C}$	50	A
I_{DM}	$T_C = 25^\circ\text{C}$, Pulse Width Limited by T_{JM}	200	A
I_A	$T_C = 25^\circ\text{C}$	64	A
E_{AS}	$T_C = 25^\circ\text{C}$	2.5	J
dv/dt	$I_S \leq I_{DM}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$	10	V/ns
P_D	$T_C = 25^\circ\text{C}$	625	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
V_{ISOL}	50/60 Hz, RMS, $t = 1\text{minute}$	2500	V~
	$I_{ISOL} \leq 1\text{mA}$, $t = 1\text{s}$	3000	V~
M_d	Mounting Torque for Base Plate	1.5/13	Nm/lb.in
	Terminal Connection Torque	1.3/11.5	Nm/lb.in
Weight		30	g

Features

- Fast Intrinsic Diode in Boost Configuration
- International Standard Package
- Encapsulating Epoxy Meets UL 94 V-0, Flammability Classification
- miniBLOC with Aluminium Nitride Isolation
- Avalanche Rated
- Low Package Inductance

Advantages

- Easy To Mount
- Space Savings
- Tightly Coupled FRED Diode
- High Power Density

Applications

- PFC Circuits
- Uninterruptible Power Supplies (UPS)
- Switch-Mode and Resonant-Mode Power Supplies
- AC and DC Motor Drives
- High Speed Power Switching Applications
- Robotics and Servo Controls

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0V$, $I_D = 500\mu\text{A}$	500		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 8\text{mA}$	3.0		5.5 V
I_{GSS}	$V_{GS} = \pm 30V$, $V_{DS} = 0V$			± 200 nA
I_{DSS}	$V_{DS} = V_{DSS}$, $V_{GS} = 0V$			50 μA 1 mA
	$T_J = 125^\circ\text{C}$			
$R_{DS(on)}$	$V_{GS} = 10V$, $I_D = 32A$, Note 1			85 m Ω

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
g_{fs}	$V_{DS} = 20\text{V}$, $I_D = 32\text{A}$, Note 1	30	50	S
C_{iss}	$V_{GS} = 0\text{V}$, $V_{DS} = 25\text{V}$, $f = 1\text{MHz}$		9700	pF
C_{oss}			970	pF
C_{rss}			30	pF
$t_{d(on)}$	Resistive Switching Times $V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 32\text{A}$ $R_G = 2\Omega$ (External)		30	ns
t_r			25	ns
$t_{d(off)}$			85	ns
t_f			22	ns
$Q_{g(on)}$	$V_{GS} = 10\text{V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 32\text{A}$		150	nC
Q_{gs}			50	nC
Q_{gd}			50	nC
R_{thJC}				0.20°C/W
R_{thCS}		0.05		$^\circ\text{C/W}$

Source-Drain Diode

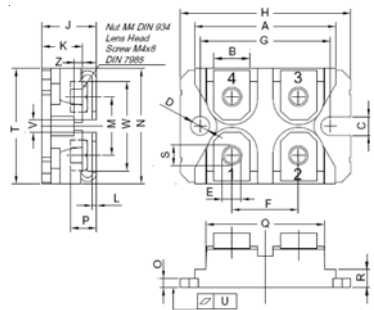
Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
I_S	$V_{GS} = 0\text{V}$			64 A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			250 A
V_{SD}	$I_F = I_S$, $V_{GS} = 0\text{V}$, Note 1			1.5 V
t_{rr}	$I_F = 25\text{A}$, $-di/dt = 100\text{A}/\mu\text{s}$ $V_R = 100\text{V}$, $V_{GS} = 0\text{V}$			200 ns
Q_{RM}			0.6	μC
I_{RM}			6.0	A

FRED Diode

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
I_{F25}	$T_C = 115^\circ\text{C}$			30 A
V_F	$I_F = 30\text{A}$, Note 1 $T_{VJ} = 150^\circ\text{C}$		2.5 1.8	2.75 V V
I_{RM}	$I_F = 10\text{A}$, $di_F/dt = -100\text{A}/\mu\text{s}$, $T_{VJ} = 100^\circ\text{C}$		5.5	11.5 A
t_{rr}	$V_R = 100\text{V}$, $V_{GE} = 0\text{V}$		200	ns
R_{thJC}				0.9°C/W
R_{thCS}	with Heat Transfer Paste		0.25	$^\circ\text{C/W}$

Note 1. Pulse test, $t \leq 300\mu\text{s}$, duty cycle, $d \leq 2\%$.

SOT-227B miniBLOC (IXFN)



(M4 screws (4x) supplied)

Dim.	Millimeter		Inches	
	min	max	min	max
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.488	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.74	0.84	0.029	0.033
M	12.50	13.10	0.492	0.516
N	25.15	25.42	0.990	1.001
O	1.95	2.13	0.077	0.084
P	4.95	6.20	0.195	0.244
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.174
S	4.55	4.85	0.179	0.191
T	24.59	25.25	0.968	0.994
U	-0.05	0.10	-0.002	0.004
V	3.20	5.50	0.126	0.217
W	19.81	21.08	0.780	0.830
Z	2.50	2.70	0.098	0.106

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	7,157,338 B2
4,860,072	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 @ $T_J = 25^\circ\text{C}$

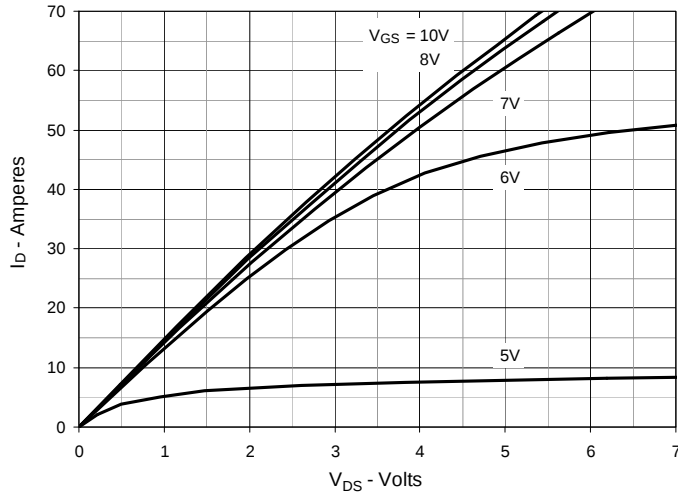


Fig. 2. Extended Output Characteristics @ $T_J = 25^\circ\text{C}$

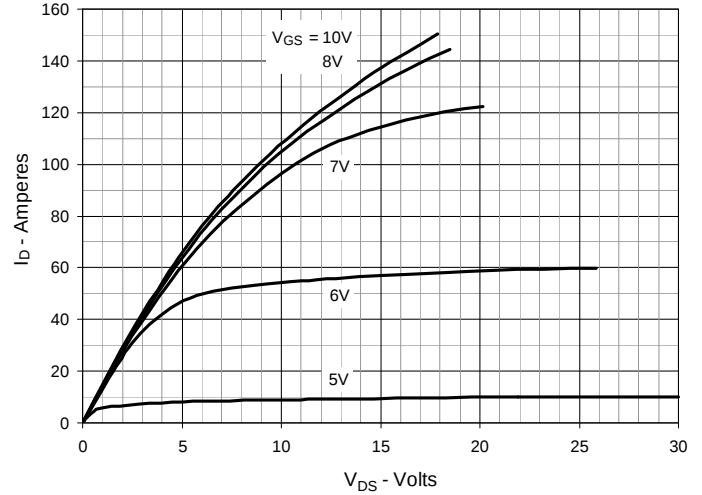


Fig. 3. Output Characteristics @ 125°C

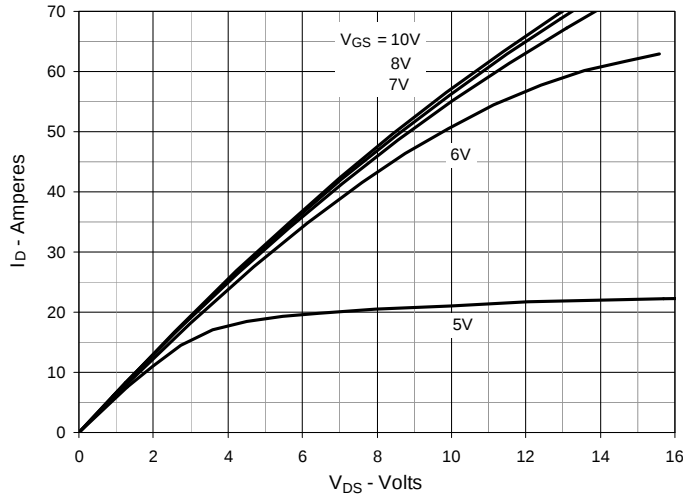


Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 32\text{A}$ Value vs. Junction Temperature

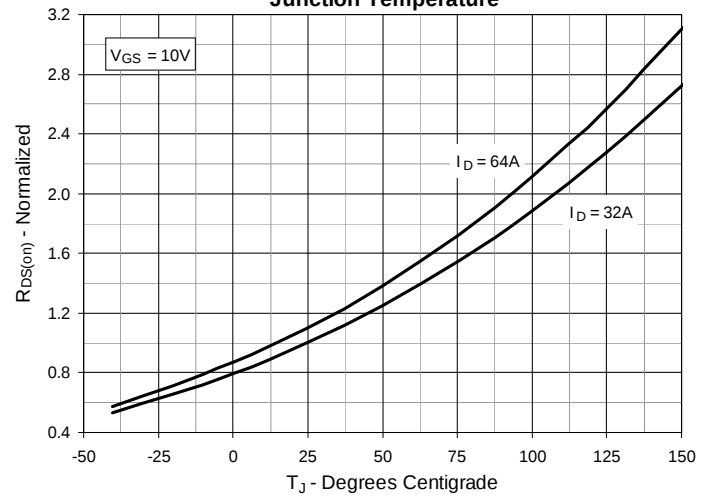


Fig. 5. $R_{DS(on)}$ Normalized to $I_D = 32\text{A}$ Value vs. Drain Current

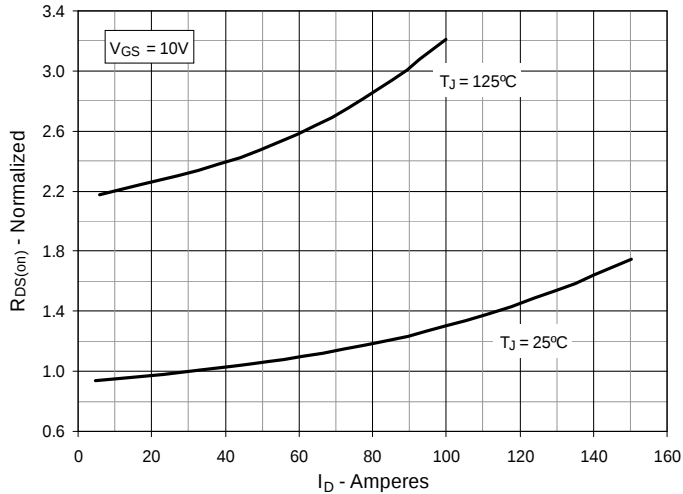


Fig. 6. Maximum Drain Current vs. Case Temperature

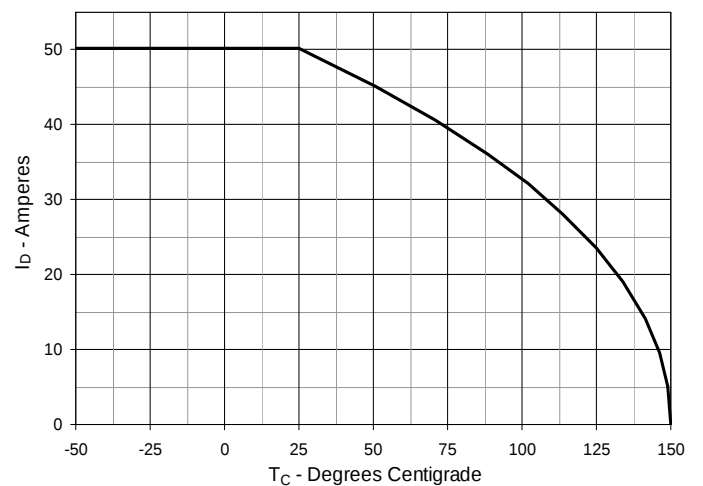


Fig. 7. Input Admittance

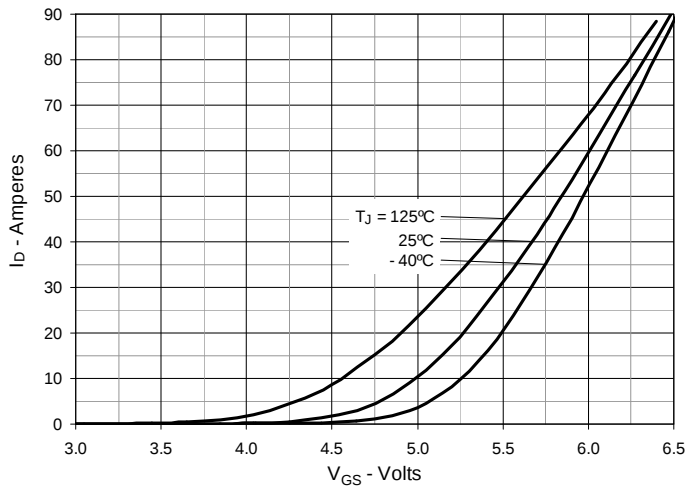


Fig. 8. Transconductance

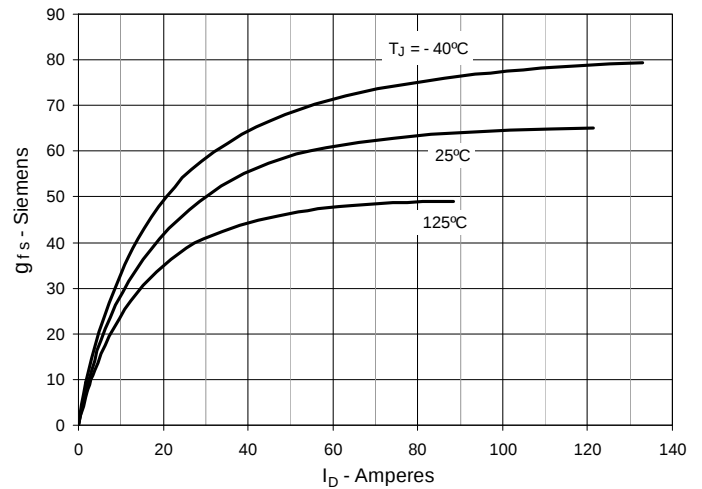


Fig. 9. Forward Voltage Drop of Intrinsic Diode

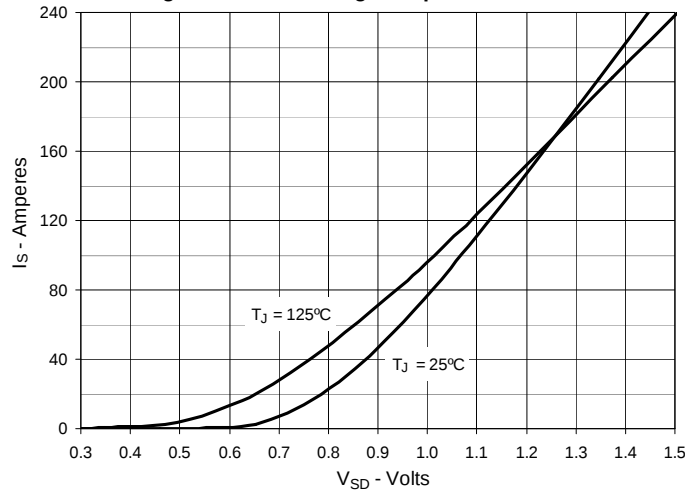


Fig. 10. Gate Charge

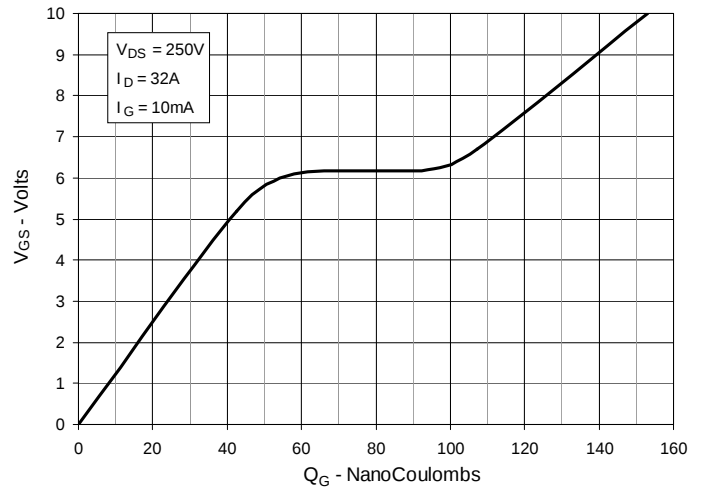


Fig. 11. Capacitance

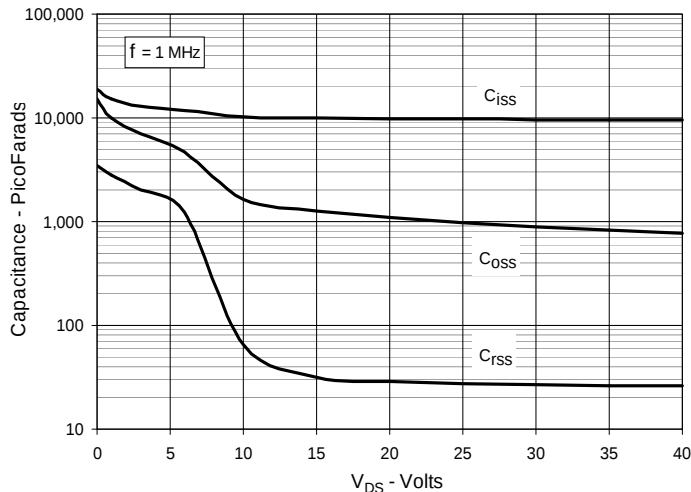
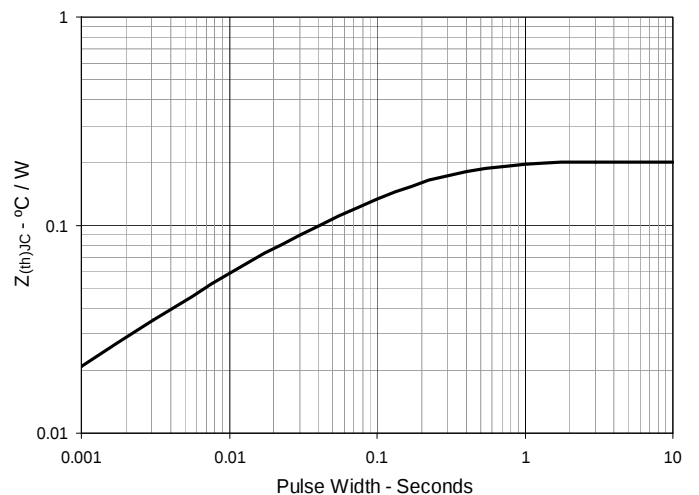


Fig. 12. Maximum Transient Thermal Impedance



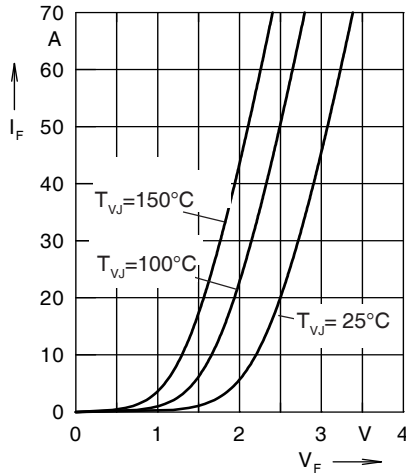


Fig. 13. Forward current I_F versus V_F

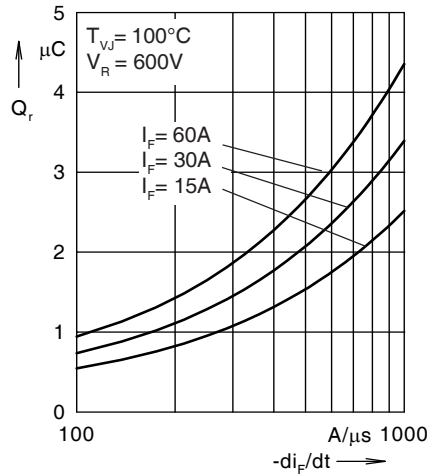


Fig. 14. Reverse recovery charge Q_r versus $-di_F/dt$

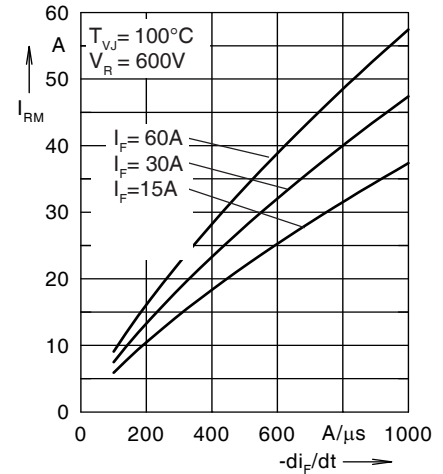


Fig. 15. Peak reverse current I_{RM} versus $-di_F/dt$

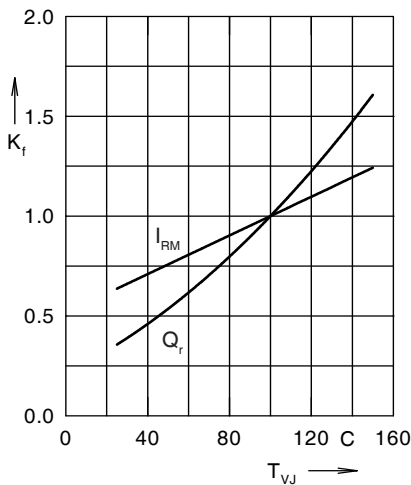


Fig. 16. Dynamic parameters Q_r , I_{RM} versus T_{VJ}

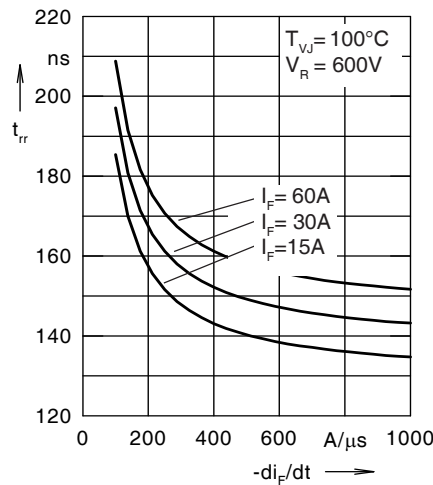


Fig. 17. Recovery time t_{rr} versus $-di_F/dt$

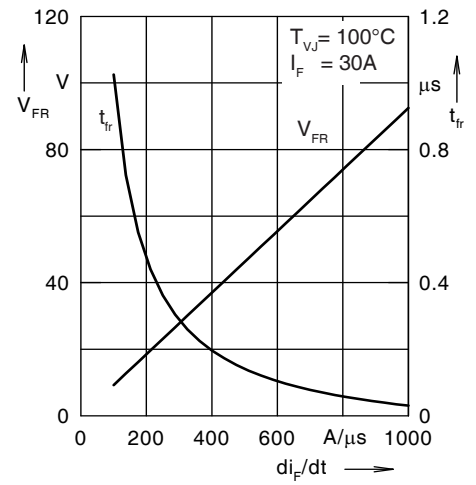


Fig. 18. Peak forward voltage V_{FR} and t_{fr} versus di_F/dt

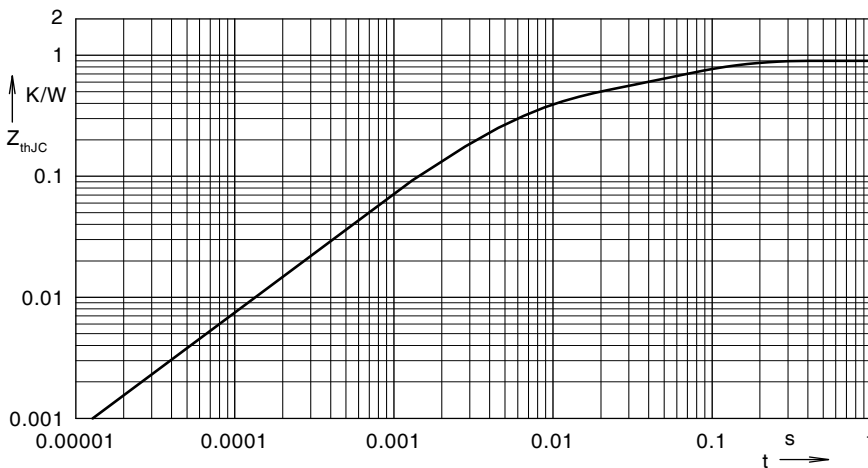


Fig. 19 Transient thermal resistance junction to case

Constants for Z_{thJC} calculation:

i	R_{thi} (K/W)	t_i (s)
1	0.465	0.0052
2	0.179	0.0003
3	0.256	0.0397