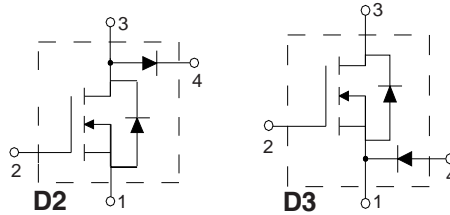


# PolarHV™ HiPerFET Power MOSFET

# IXFN64N50PD2 IXFN64N50PD3

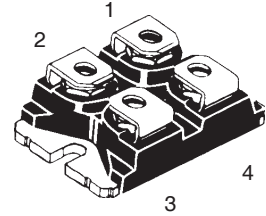
Boost & Buck Configurations  
(Ultra-fast FRED Diode)

N-Channel Enhancement Mode  
Avalanche Rated  
Fast Intrinsic Diode



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

miniBLOC, SOT-227 B  
 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	
$V_{DSS}$	$T_J = 25^\circ C$ to $150^\circ C$	500	V
$V_{DGR}$	$T_J = 25^\circ C$ to $150^\circ C$ , $R_{GS} = 1M\Omega$	500	V
$V_{GSS}$	Continuous	$\pm 30$	V
$V_{GSM}$	Transient	$\pm 40$	V
$I_{D25}$	$T_C = 25^\circ C$	50	A
$I_{DM}$	$T_C = 25^\circ C$ , Pulse Width Limited by $T_{JM}$	200	A
$I_A$	$T_C = 25^\circ C$	64	A
$E_{AS}$	$T_C = 25^\circ C$	2.5	J
$dV/dt$	$I_S \leq I_{DM}$ , $V_{DD} \leq V_{DSS}$ , $T_J \leq 150^\circ C$	10	V/ns
$P_D$	$T_C = 25^\circ C$	625	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$M_d$	Mounting Torque	1.5/13	Nm/lb.in.
	Terminal Connection Torque	1.3/11.5	Nm/lb.in.
<b>Weight</b>		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)
- Switched-Mode and Resonant-Mode Power Supplies
- AC and DC Motor Drives
- High Speed Power Switching Applications
- Robotics and Servo Controls

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

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
$t_{d(on)}$	<b>Resistive Switching Times</b> $V_{GS} = 10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 32\text{A}$ $R_G = 2\Omega$ (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	$^\circ\text{C/W}$
$R_{thCS}$		0.05		$^\circ\text{C/W}$

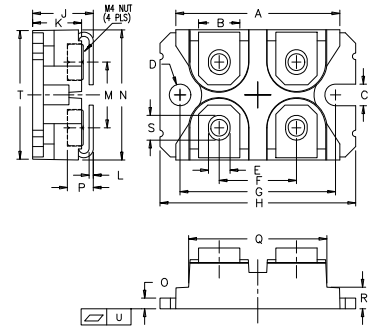
**Source-Drain Diode**

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	$\mu\text{C}$
$I_{RM}$			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		2.5	2.75 V
	$T_{VJ} = 150^\circ\text{C}$		1.8	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 $^\circ\text{C/W}$
$R_{thCS}$	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 (IXFN) Outline**


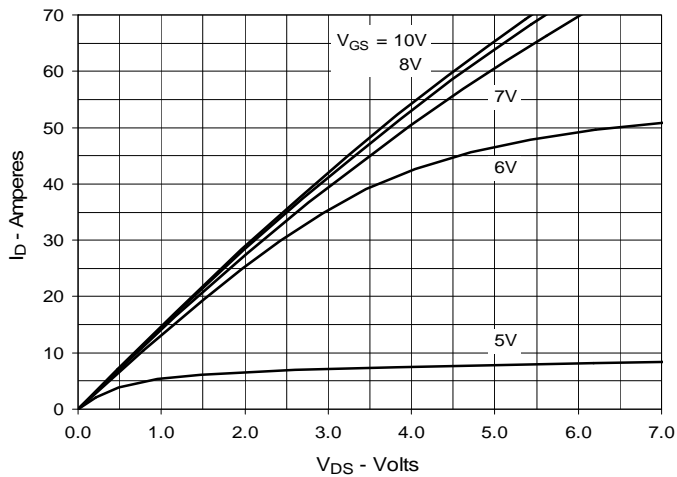
(M4 screws (4x) supplied)

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

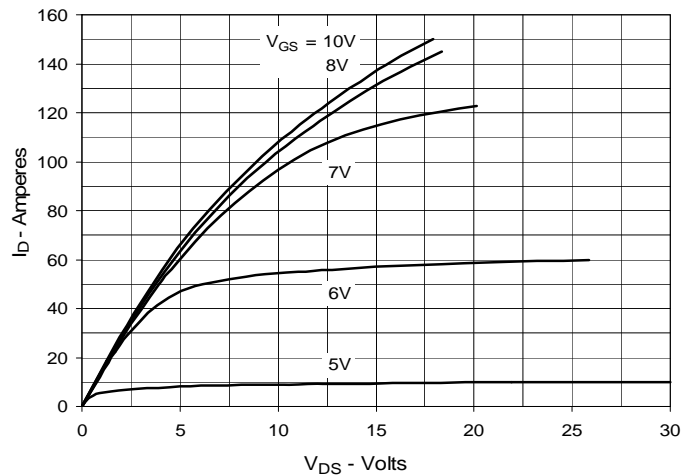
IXYS Reserves the Right to Change Limits, Test Conditions, and Dimensions.

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	

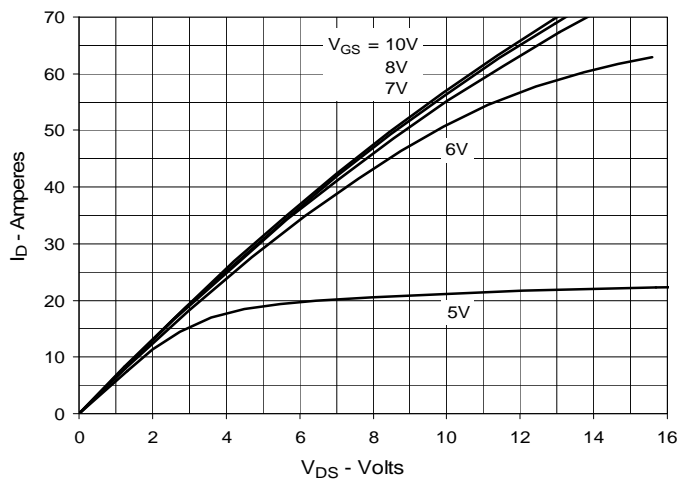
**Fig. 1. Output Characteristics @ 25°C**



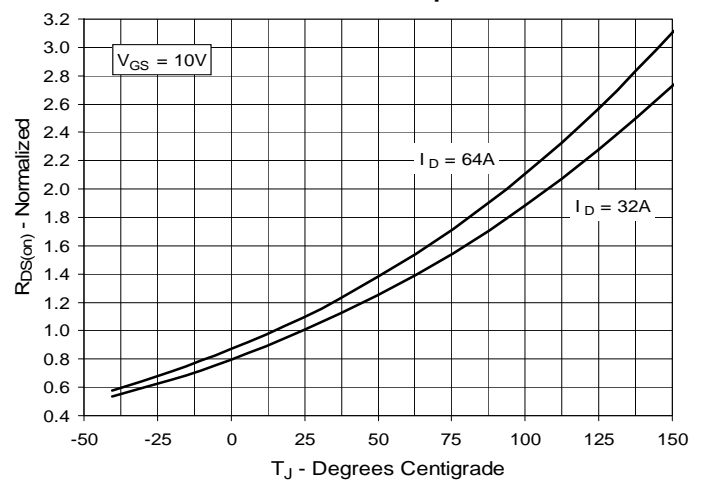
**Fig. 2. Extended Output Characteristics @ 25°C**



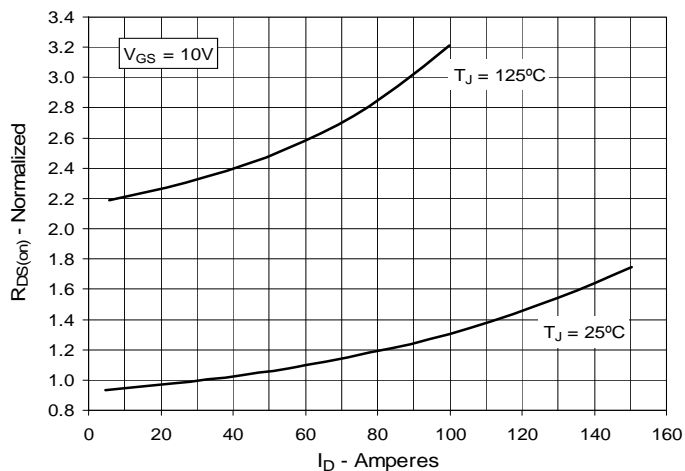
**Fig. 3. Output Characteristics @ 125°C**



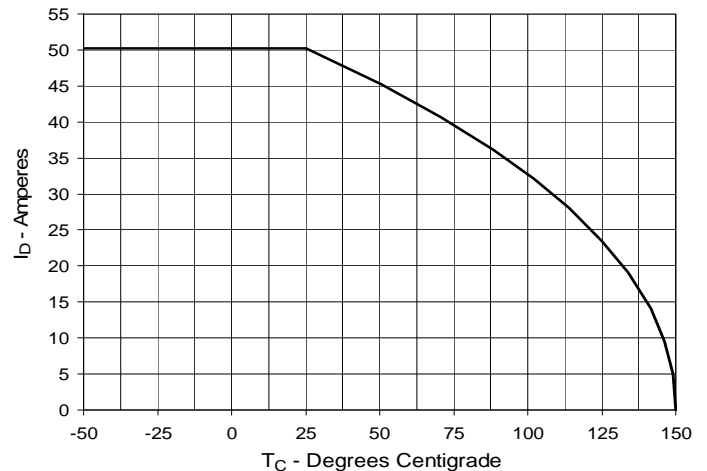
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = 32A$  Value vs. Junction Temperature**



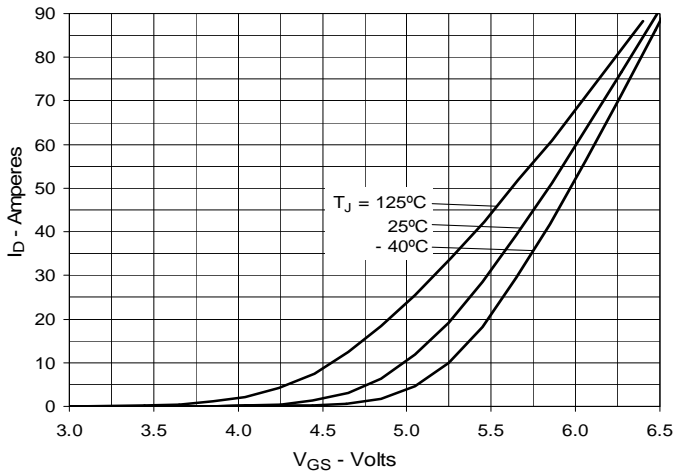
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = 32A$  Value vs. Drain Current**



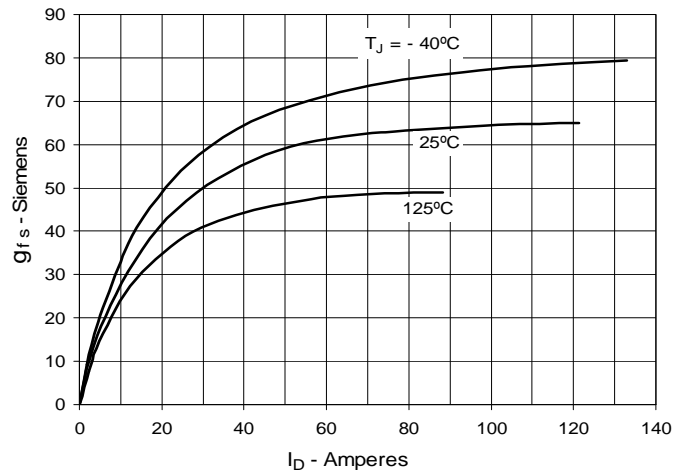
**Fig. 6. Maximum Drain Current vs. Case Temperature**



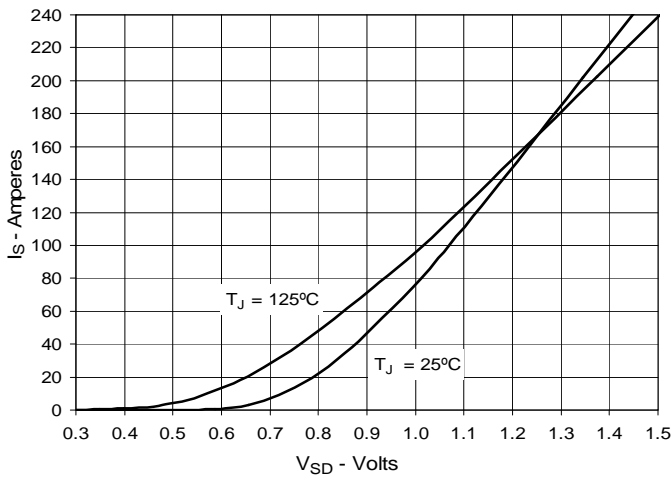
**Fig. 7. Input Admittance**



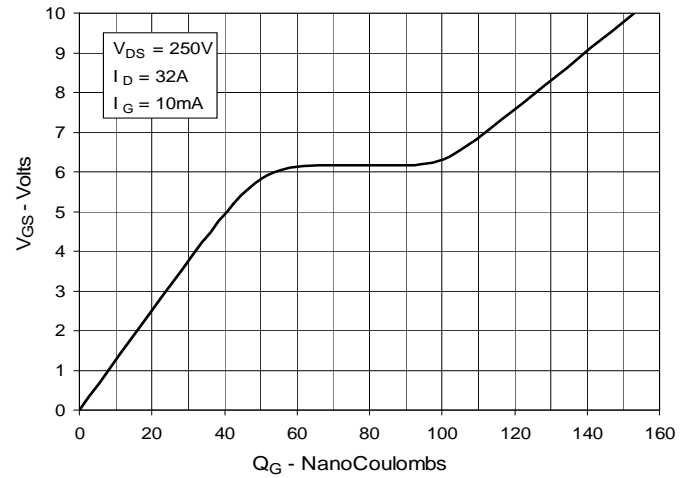
**Fig. 8. Transconductance**



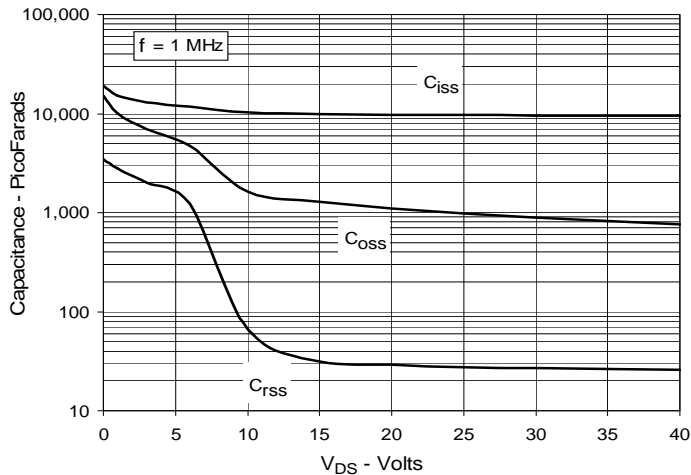
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



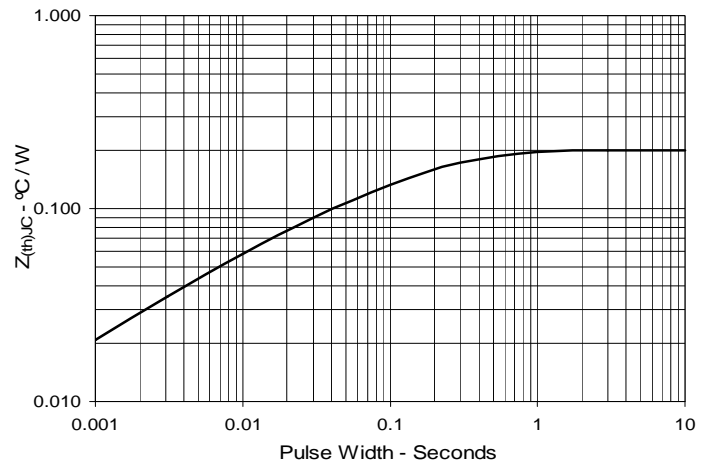
**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Maximum Transient Thermal Impedance**



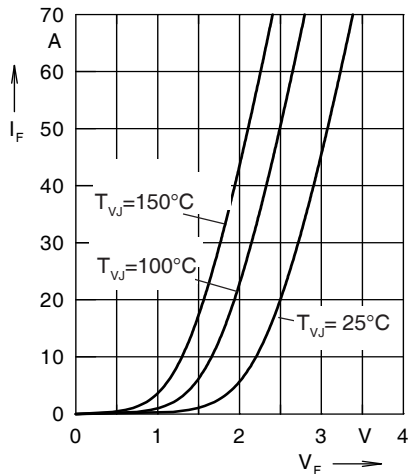


Fig. 13. Forward current  $I_F$  versus  $V_F$

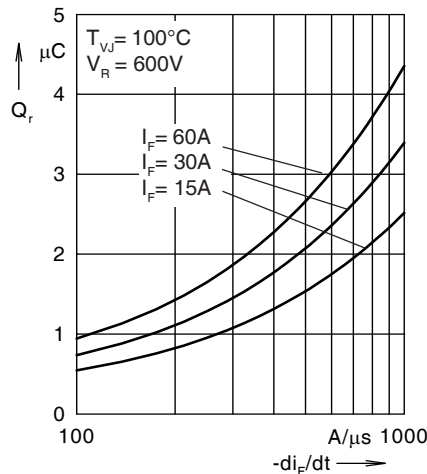


Fig. 14. Reverse recovery charge  $Q_r$  versus  $-di_F/dt$

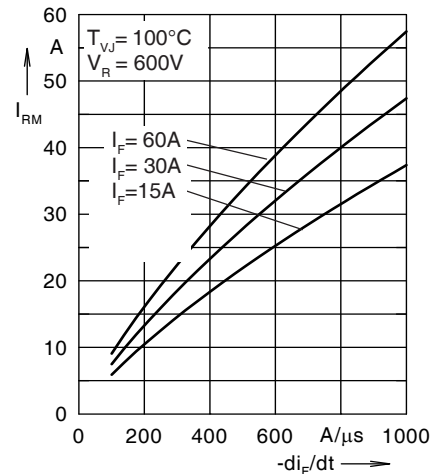


Fig. 15. Peak reverse current  $I_{RM}$  versus  $-di_F/dt$

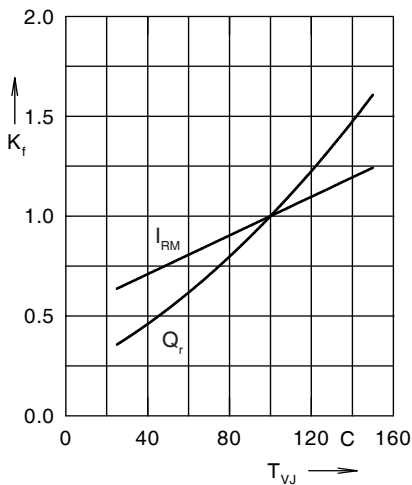


Fig. 16. Dynamic parameters  $Q_r$ ,  $I_{RM}$  versus  $T_{VJ}$

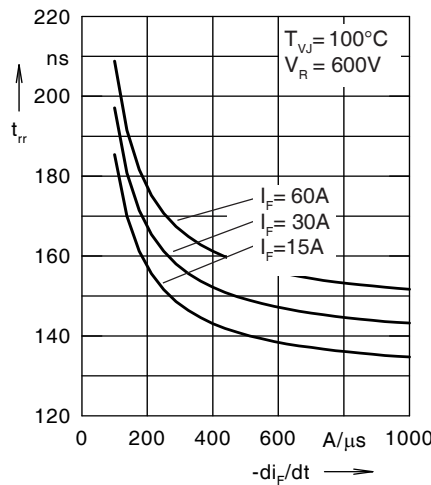


Fig. 17. Recovery time  $t_{rr}$  versus  $-di_F/dt$

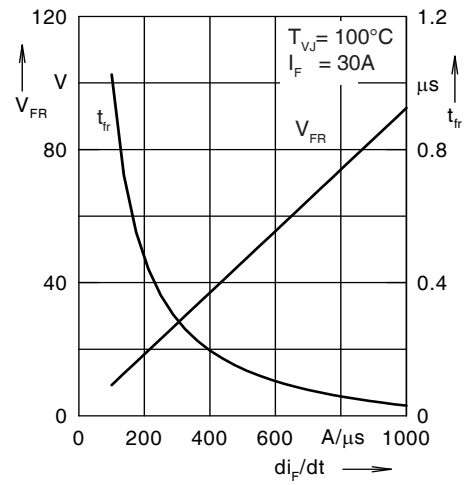


Fig. 18. Peak forward voltage  $V_{FR}$  and  $t_{rr}$  versus  $di_F/dt$

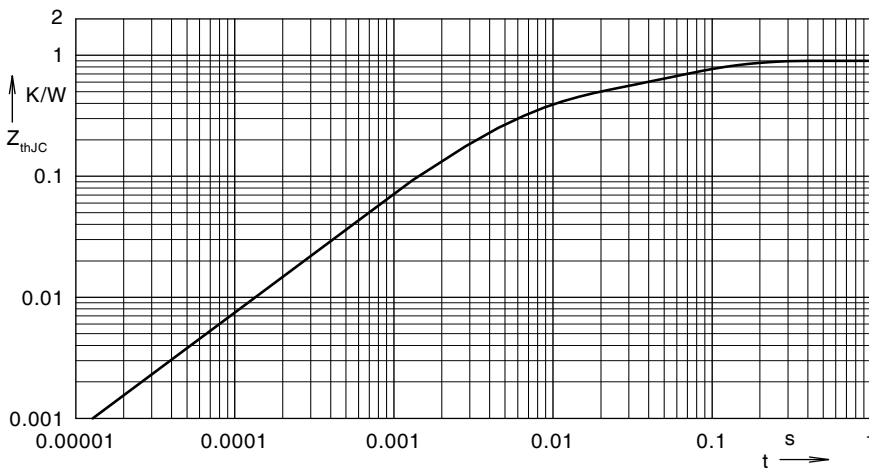


Fig. 19 Transient thermal resistance junction to case

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