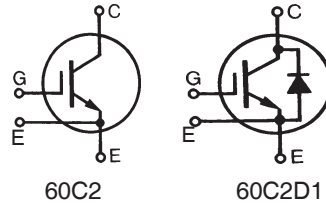


# HiPerFAST™ IGBTs with Diode

## IXGN60N60C2 IXGN60N60C2D1

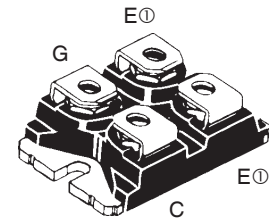
$V_{CES} = 600V$   
 $I_{C110} = 60A$   
 $V_{CE(sat)} \leq 2.5V$   
 $t_{rr} = 35ns$

### C2-Class High Speed IGBTs



SOT-227B, miniBLOC

E153432



G = Gate, C = Collector, E = Emitter  
 ⊕ 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 $150^\circ C$ , $R_{GE} = 1 M\Omega$	600	V
$V_{GES}$	Continuous	$\pm 20$	V
$V_{GEM}$	Transient	$\pm 30$	V
$I_{C25}$	$T_C = 25^\circ C$ (Limited by Leads)	75	A
$I_{C110}$	$T_C = 110^\circ C$	60	A
$I_{CM}$	$T_C = 25^\circ C$ , 1 ms	300	A
<b>SSOA</b>	$V_{GE} = 15 V$ , $T_{VJ} = 125^\circ C$ , $R_G = 10 \Omega$	$I_{CM} = 100$	A
<b>(RBSOA)</b>	Clamped Inductive Load	@ $V_{CE} \leq 600$	V
$P_C$	$T_C = 25^\circ C$	480	W
$T_J$		-55 ... +150	$^\circ C$
$T_{JM}$		150	$^\circ C$
$T_{stg}$		-55 ... +150	$^\circ C$
$V_{ISOL}$	50/60 Hz	$t = 1$ min	2500 V~
	$I_{ISOL} \leq 1$ mA	$t = 1$ s	3000 V~
$M_d$	Mounting Torque	1.5/13	Nm/lb.in.
	Terminal Connection Torque (M4)	1.3/11.5	Nm/lb.in.
<b>Weight</b>		30	g

### Features

- International Standard Package miniBLOC
- Aluminium Nitride Isolation - High Power Dissipation
- Anti-Parallel Ultra Fast Diode
- Isolation Voltage 3000 V~
- Low  $V_{CE(sat)}$  for Minimum On-State Conduction Losses
- MOS Gate Turn-on - Drive Simplicity
- Low Collector-to-Case Capacitance (< 50 pF)
- Low Package Inductance (< 5 nH) - Easy to Drive and to Protect

### Applications

- AC Motor Speed Control
- DC Servo and Robot Drives
- DC Choppers
- Uninterruptible Power Supplies (UPS)
- Switch-Mode and Resonant-Mode Power Supplies

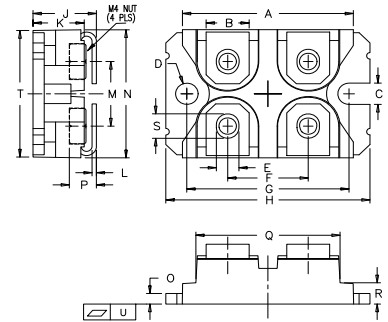
### Advantages

- Easy to Mount with 2 Screws
- Space Savings
- High Power Density

Symbol	Test Conditions ( $T_J = 25^\circ C$ , Unless Otherwise Specified)	Characteristic Values		
		Min.	Typ.	Max.
$V_{GE(th)}$	$I_C = 250\mu A$ , $V_{CE} = V_{GE}$	3.0		5.0 V
$I_{CES}$	$V_{CE} = V_{CES}$ $V_{GE} = 0V$ $T_J = 125^\circ C$			650 $\mu A$
				5 mA
$I_{GES}$	$V_{CE} = 0V$ , $V_{GE} = \pm 20V$			$\pm 100$ nA
$V_{CE(sat)}$	$I_C = 50A$ , $V_{GE} = 15V$ , Note 1 $T_J = 125^\circ C$		2.1	2.5 V
			1.8	V

Symbol	Test Conditions	Characteristic Values			
		Min.	Typ.	Max.	
$g_{fs}$	$I_C = 50A, V_{CE} = 10V, \text{Note 1}$	40	58	S	
$C_{ies}$	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$		4750	pF	
$C_{oes}$			530	pF	
$C_{res}$			65	pF	
$Q_g$	$I_C = 50A, V_{GE} = 15V, V_{CE} = 0.5 \cdot V_{CES}$		146	nC	
$Q_{ge}$			28	nC	
$Q_{gc}$			50	nC	
$t_{d(on)}$	<b>Inductive load, <math>T_J = 25^\circ C</math></b> $I_C = 50A, V_{GE} = 15V$ $V_{CE} = 400V, R_G = 2\Omega$		18	ns	
$t_{ri}$			25	ns	
$t_{d(off)}$			95	150	ns
$t_{fi}$			35	ns	
$E_{off}$			0.48	0.80	mJ
$t_{d(on)}$	<b>Inductive load, <math>T_J = 125^\circ C</math></b> $I_C = 50A, V_{GE} = 15V$ $V_{CE} = 400V, R_G = 2\Omega$		18	ns	
$t_{ri}$			25	ns	
$E_{on}$			0.90	mJ	
$t_{d(off)}$			130	ns	
$t_{fi}$			80	ns	
$E_{off}$			1.20	mJ	
$R_{thJC}$			0.26	$^\circ C/W$	
$R_{thCS}$		0.05		$^\circ C/W$	

### 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)

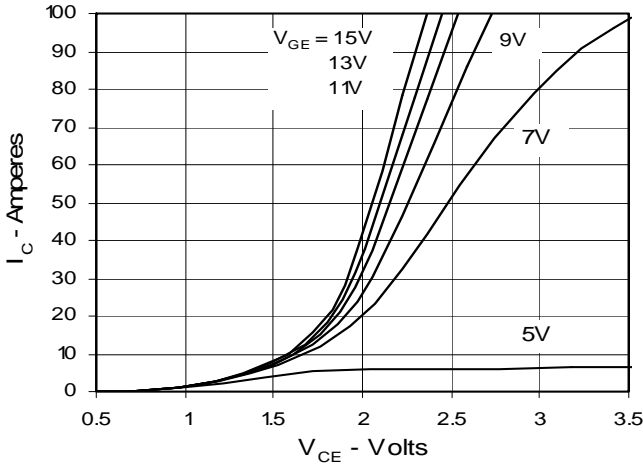
Symbol	Test Conditions	Characteristic Values		
		Min.	Typ.	Max.
$V_F$	$I_F = 60A, V_{GE} = 0V, \text{Note 1}$ $T_J = 150^\circ C$		1.4	2.1 V
$I_{RM}$	$I_F = 60A, -di/dt = 100A/\mu s, T_J = 100^\circ C$ $V_R = 100V, V_{GE} = 0V,$			8.3 A
$t_{rr}$	$I_F = 1A, -di/dt = 200A/\mu s, V_R = 30V, V_{GE} = 0V$		35	ns
$R_{thJC}$				0.85 $^\circ C/W$

Note 1: PulseTest,  $t \leq 300\mu s$ , Duty Cycle,  $d \leq 2\%$ .

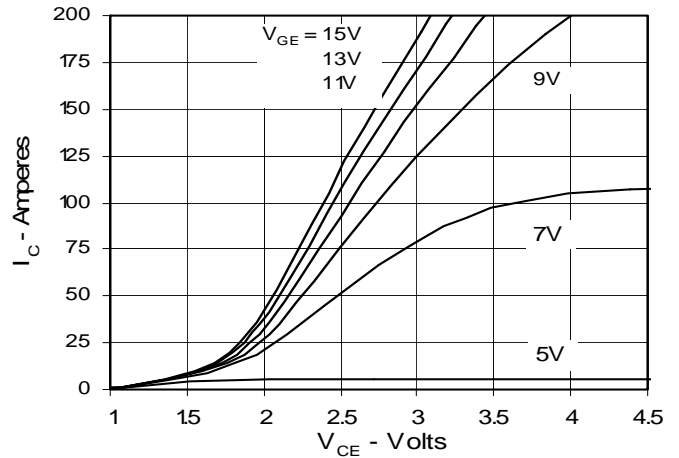
IXYS Reserves the Right to Change Limits, Test Conditions and Dimensions.

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	

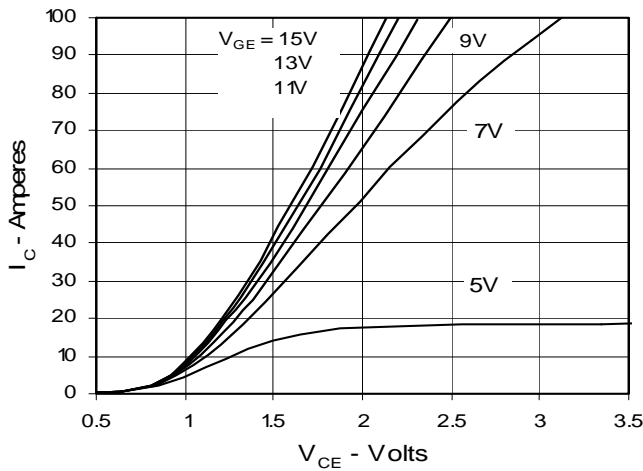
**Fig. 1. Output Characteristics**  
@ 25 Deg. C



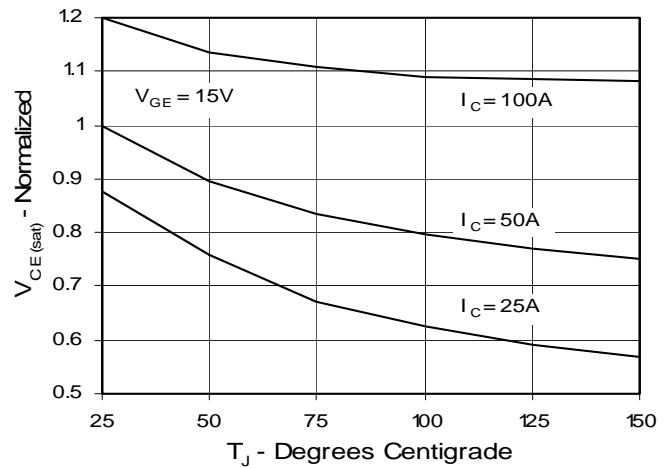
**Fig. 2. Extended Output Characteristics**  
@ 25 deg. C



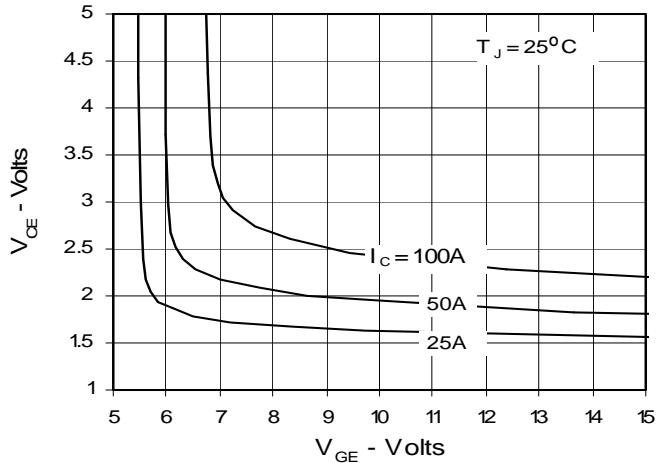
**Fig. 3. Output Characteristics**  
@ 125 Deg. C



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



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



**Fig. 6. Input Admittance**

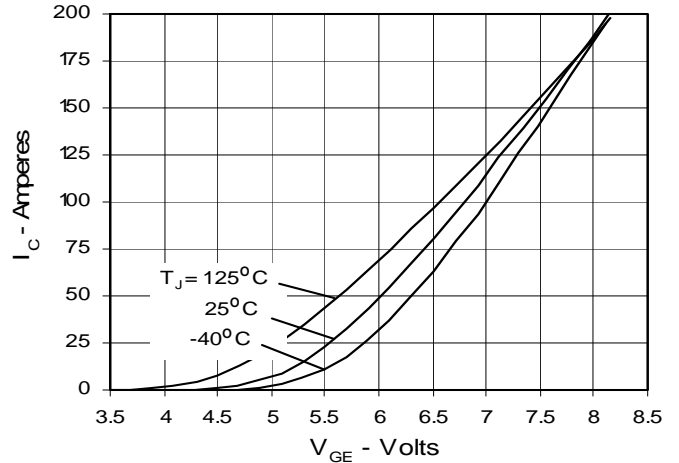


Fig. 7. Transconductance

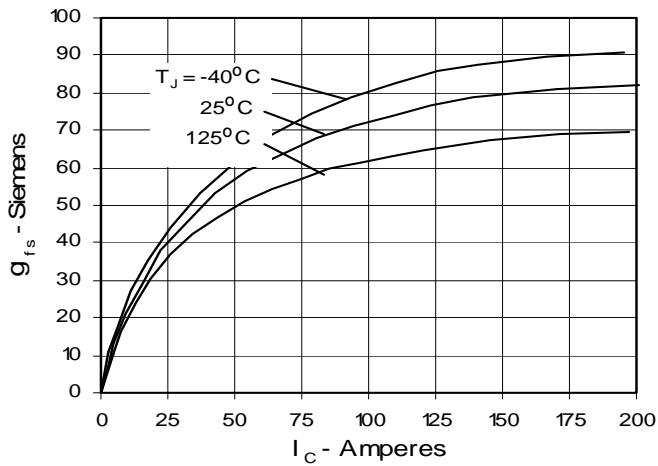


Fig. 8. Dependence of  $E_{off}$  on  $R_G$

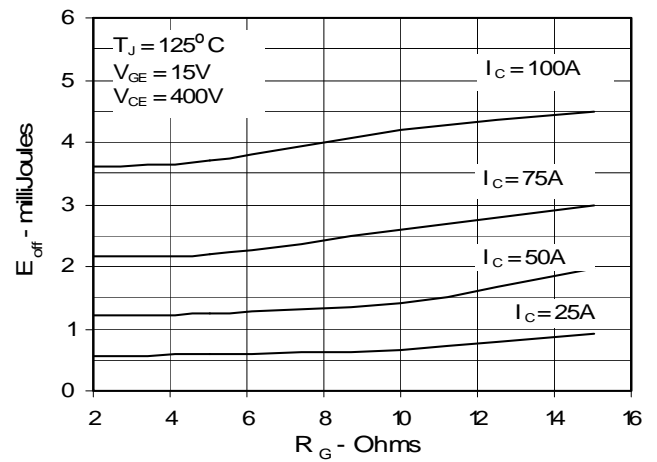


Fig. 9. Dependence of  $E_{off}$  on  $I_C$

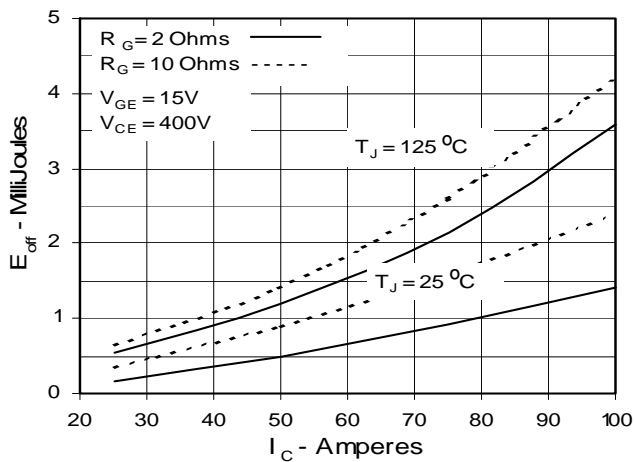


Fig. 10. Dependence of  $E_{off}$  on Temperature

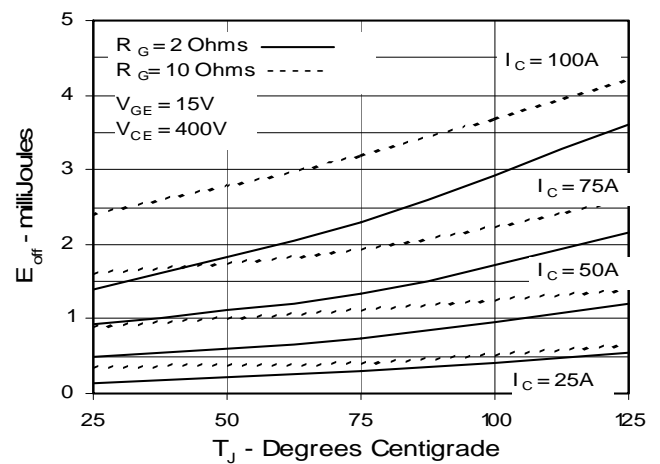


Fig. 11. Gate Charge

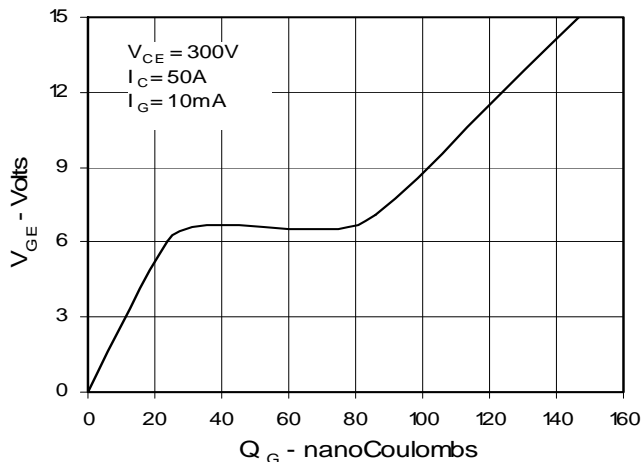
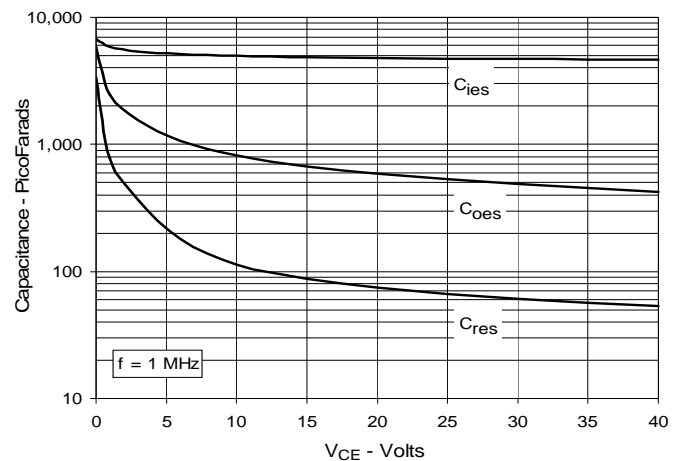


Fig. 12. Capacitance



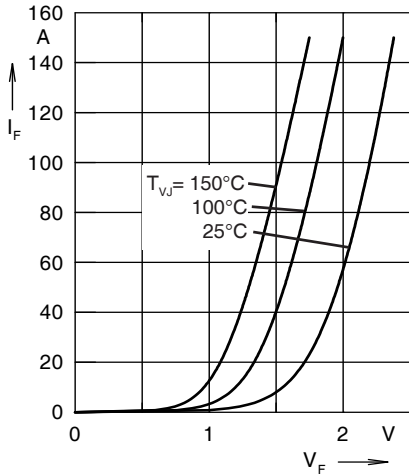


Fig. 13. Forward Current  $I_F$  Versus  $V_F$

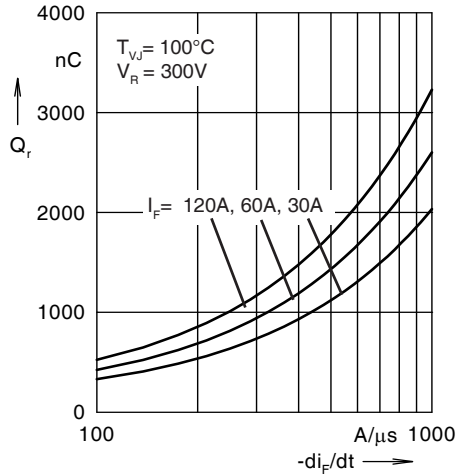


Fig. 14. Reverse Recovery Charge  $Q_r$  Versus  $-di_F/dt$

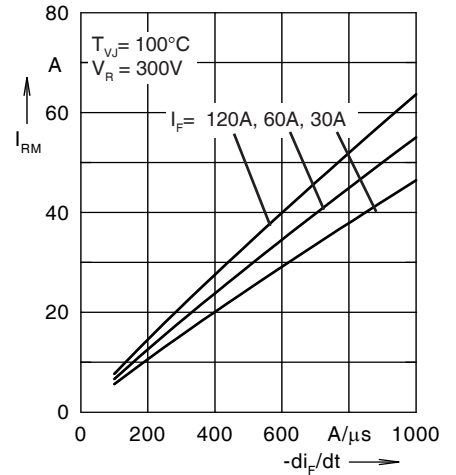


Fig. 15. Peak Reverse Current  $I_{RM}$  Versus  $-di_F/dt$

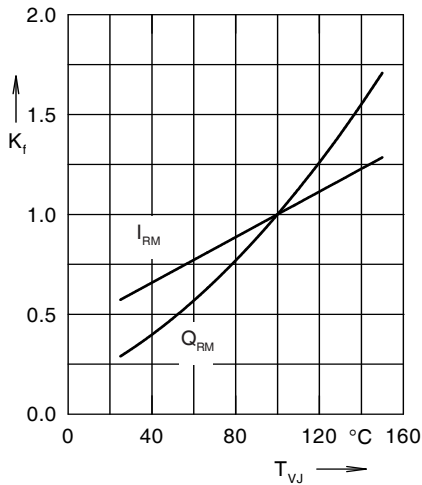


Fig. 16. Dynamic Parameters  $Q_r, I_{RM}$  Versus  $T_{VJ}$

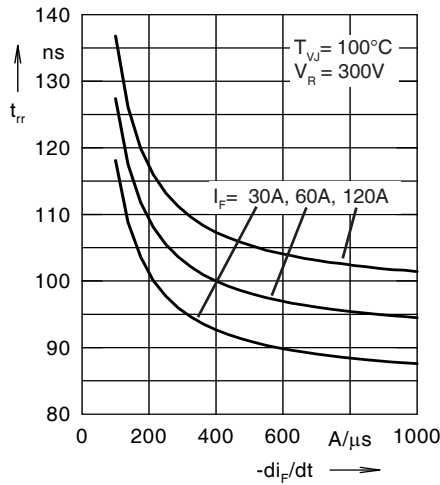


Fig. 17. Recovery Time  $t_{rr}$  Versus  $-di_F/dt$

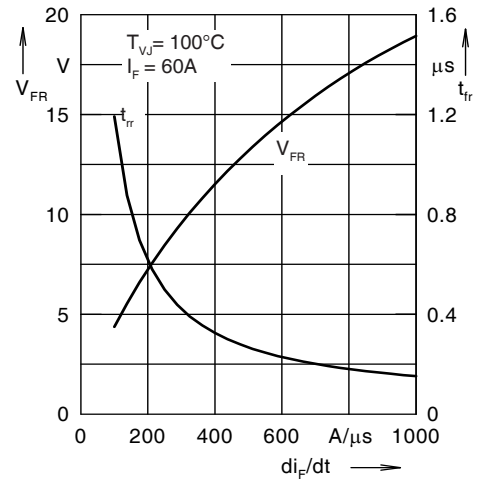


Fig. 18. Peak Forward Voltage  $V_{FR}$  and  $t_{rr}$  Versus  $-di_F/dt$

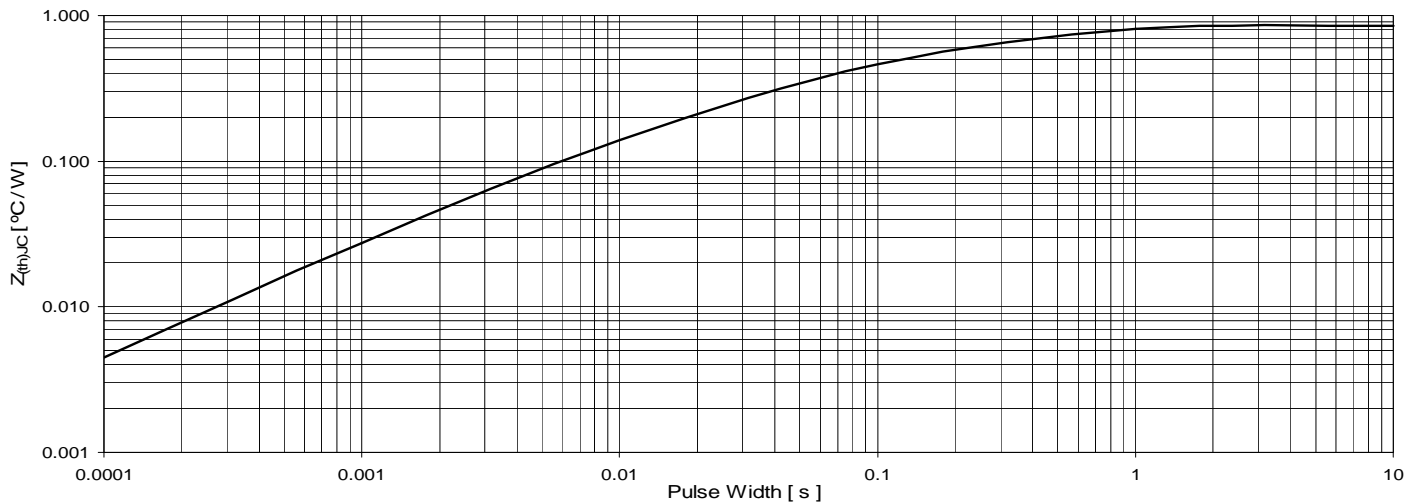


Fig. 27. Maximum Transient Thermal Impedance (for diode)