IXYS

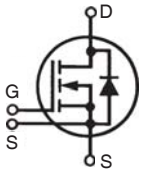
Advance Technical Information

X3-Class HiPerFET™ Power MOSFET

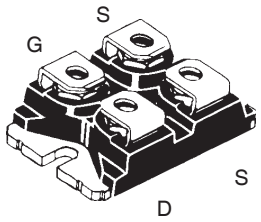
IXFN170N25X3

V_{DSS} = 250V
I_{D25} = 146A
$R_{DS(on)}$ ≤ 7.4mΩ

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode



miniBLOC, SOT-227
E153432



G = Gate D = Drain
S = Source

Symbol	Test Conditions		Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C		250	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ		250	V
V_{GSS}	Continuous		± 20	V
V_{GSM}	Transient		± 30	V
I_{D25}	T_C = 25°C		146	A
I_{DM}	T_C = 25°C, Pulse Width Limited by T_{JM}		400	A
I_A	T_C = 25°C		85	A
E_{AS}	T_C = 25°C		2.3	J
P_D	T_C = 25°C		390	W
dv/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$		20	V/ns
T_J			-55 ... +150	°C
T_{JM}			150	°C
T_{stg}			-55 ... +150	°C
V_{ISOL}	50/60 Hz, RMS	t = 1 minute	2500	V~
	$I_{ISOL} \le$ 1mA	t = 1 second	3000	V~
M_d	Mounting Torque		1.5/13	Nm/lb.in
	Terminal Connection Torque		1.3/11.5	Nm/lb.in
Weight			30	g

Symbol	Test Conditions (T_J = 25°C Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 1mA	250			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 4mA	2.5		4.5	V
I_{GSS}	V_{GS} = ± 20V, V_{DS} = 0V			± 100	nA
I_{DSS}	$V_{DS} = V_{DSS}$, V_{GS} = 0V			10	μA
	T_J = 125°C			1	mA
$R_{DS(on)}$	V_{GS} = 10V, I_D = 85A, Note 1		6.1	7.4	mΩ

Features

- International Standard Package
- miniBLOC, with Aluminium Nitride Isolation
- Isolation Voltage 2500 V~
- High Current Handling Capability
- Fast Intrinsic Diode
- Avalanche Rated
- Low $R_{DS(on)}$

Advantages

- High Power Density
- Easy to Mount
- Space Savings

Applications

- Switch-Mode and Resonant-Mode Power Supplies
- DC-DC Converters
- PFC Circuits
- AC and DC Motor Drives
- Robotics and Servo Controls

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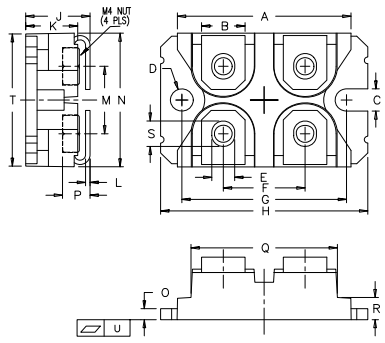
Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max
g_{fs}	V_{DS} = 10V, I_D = 60A, Note 1	66	110	S
R_{Gi}	Gate Input Resistance		1.3	Ω
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		13.5	nF
C_{oss}			2.3	nF
C_{rss}			1.6	pF
	Effective Output Capacitance			
$C_{o(er)}$	Energy related: V_{GS} = 0V, V_{DS} = 0.8 • V_{DSS}		800	pF
$C_{o(tr)}$	Time related: V_{GS} = 0V, V_{DS} = 0.8 • V_{DSS}		3280	pF
$t_{d(on)}$	**Resistive Switching Times**		18	ns
t_r	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 85A		10	ns
$t_{d(off)}$	R_G = 5Ω (External)		62	ns
t_f			7	ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 85A		190	nC
Q_{gs}			55	nC
Q_{gd}			45	nC
R_{thJC}				0.32 °C/W
R_{thCS}			0.05	°C/W

Source-Drain Diode

Symbol	Test Conditions (T_J = 25°C, Unless Otherwise Specified)	Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0V			170	A
I_{SM}	Repetitive, Pulse Width Limited by T_{JM}			680	A
V_{SD}	I_F = 100A, V_{GS} = 0V, Note 1			1.4	V
t_{rr}	I_F = 85A, -di/dt = 100A/μs		135		ns
Q_{RM}	V_R = 100V, V_{GS} = 0V		980		nC
I_{RM}			13		A

Note 1. Pulse test, t ≤ 300μs, duty cycle, d ≤ 2%.

SOT-227B (IXFN) Outline



(M4 screws (4x) supplied)

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS 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

ADVANCE TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from a subjective evaluation of the design, based upon prior knowledge and experience, and constitute a "considered reflection" of the anticipated result. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

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 4,860,072 4,881,106 4,931,844 5,017,508 5,034,796 5,049,961 5,063,307 5,187,117 5,237,481 5,381,025 5,486,715 6,162,665 6,259,123 B1 6,306,728 B1 6,404,065 B1 6,534,343 6,583,505 6,683,344 6,710,405 B2 6,710,463 6,727,585 6,759,692 6,771,478 B2 7,005,734 B2 7,063,975 B2 7,071,537 7,157,338B2

Fig. 1. Output Characteristics @ T_J = 25°C

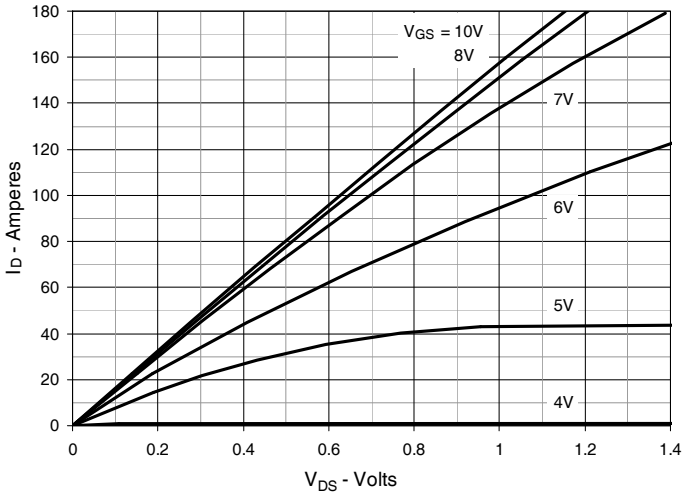


Fig. 2. Extended Output Characteristics @ T_J = 25°C

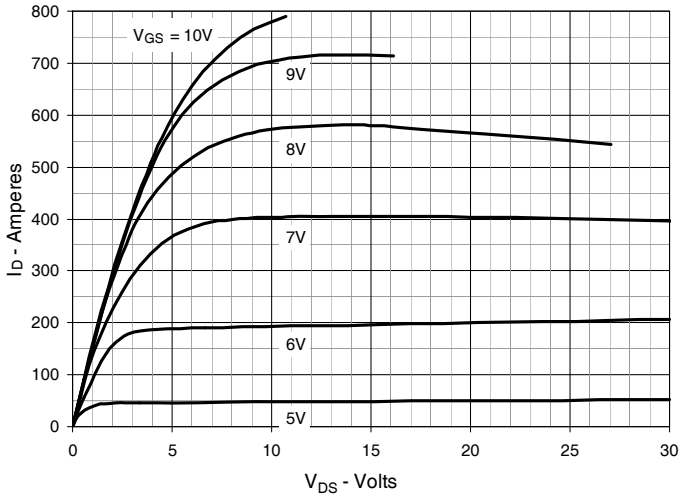


Fig. 3. Output Characteristics @ T_J = 125°C

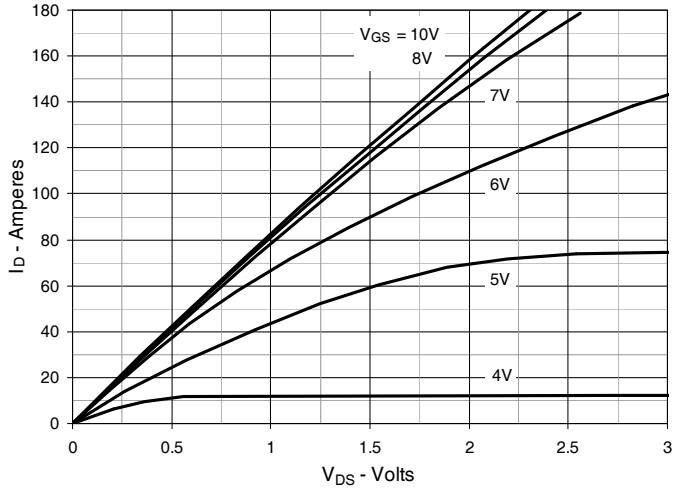


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 85A Value vs. Junction Temperature

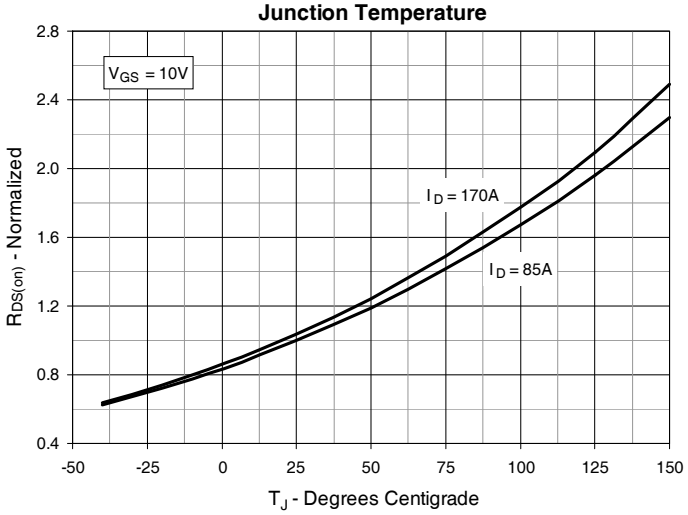


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 85A Value vs. Drain Current

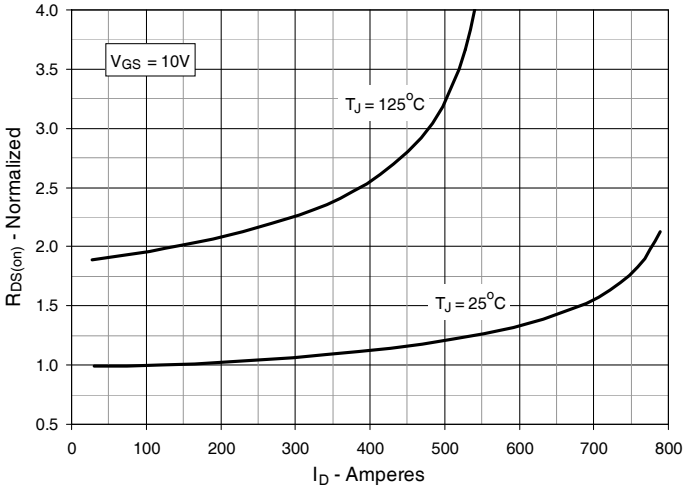


Fig. 6. Normalized Breakdown & Threshold Voltages vs. Junction Temperature

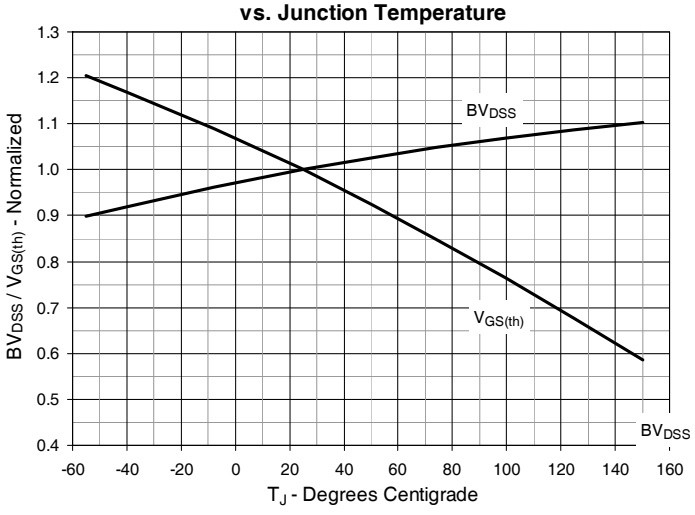


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Fig. 7. Maximum Drain Current vs. Case Temperature

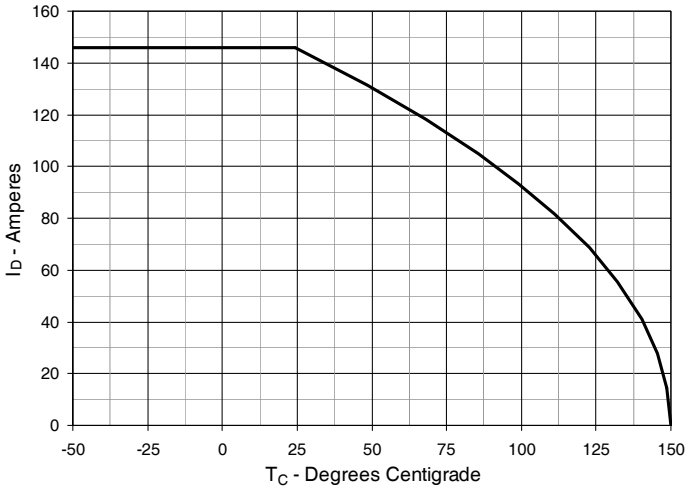

Fig. 8. Input Admittance

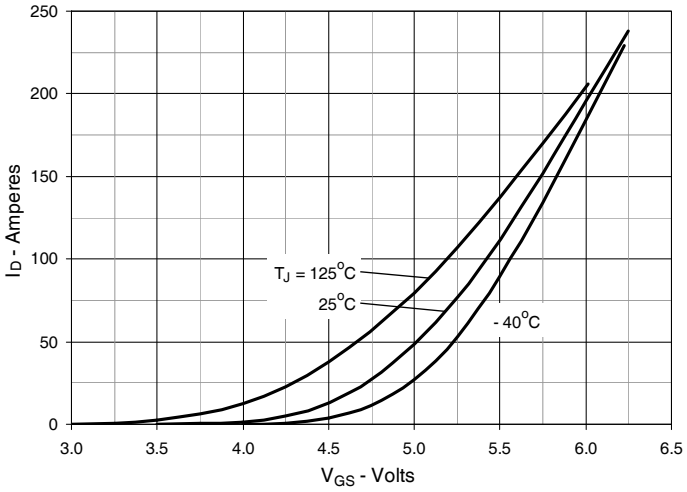

Fig. 9. Transconductance

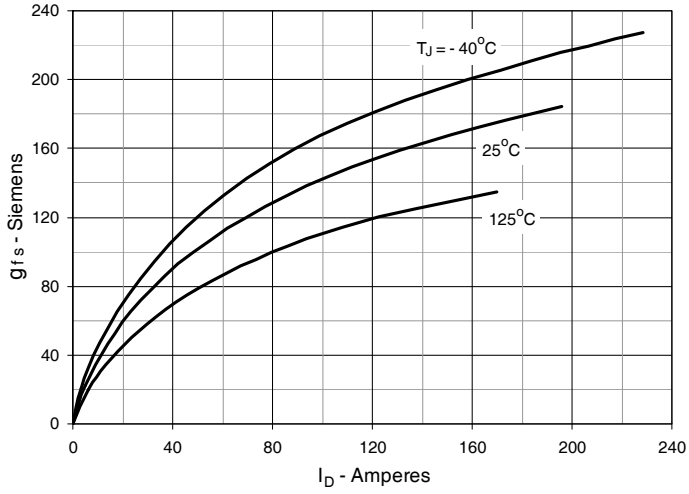

Fig. 10. Forward Voltage Drop of Intrinsic Diode

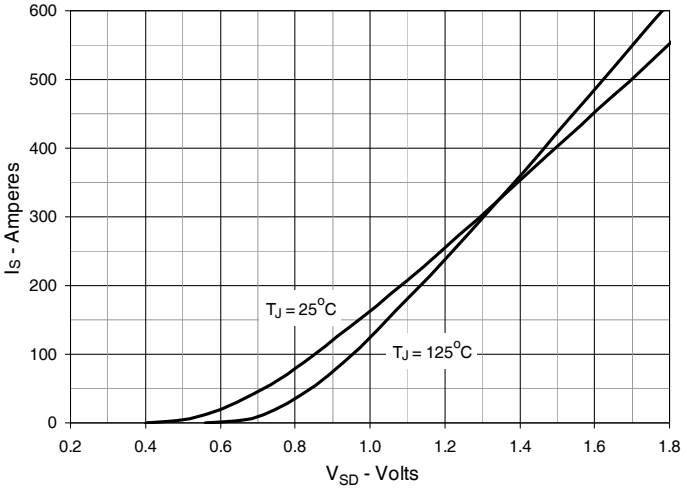

Fig. 11. Gate Charge

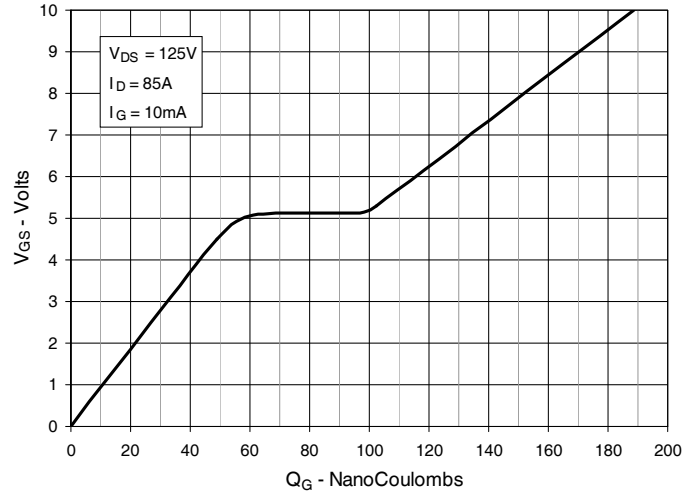

Fig. 12. Capacitance

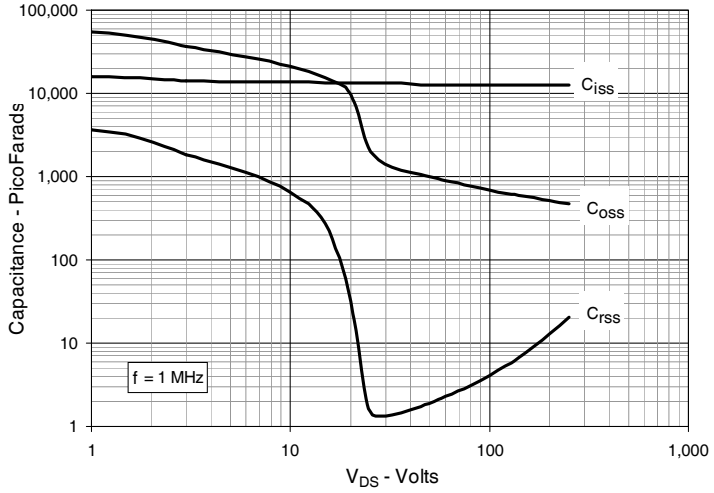

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Fig. 13. Output Capacitance Stored Energy

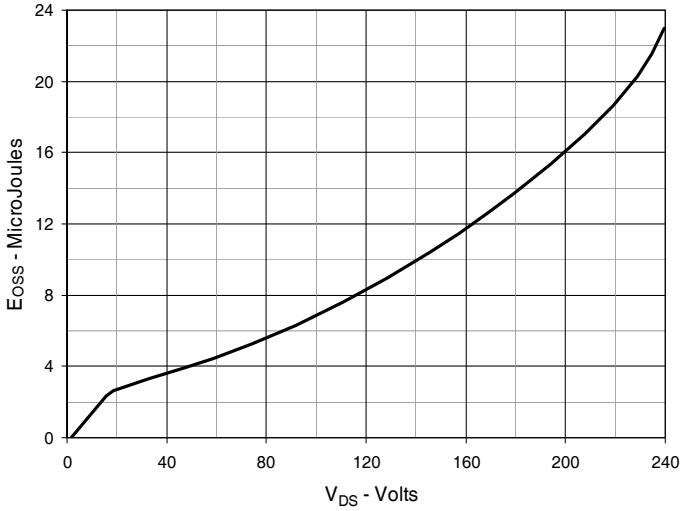


Fig. 14. Forward-Bias Safe Operating Area

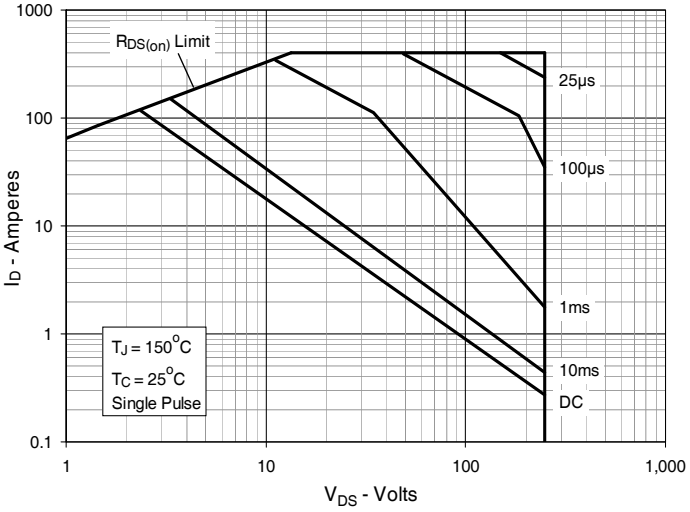
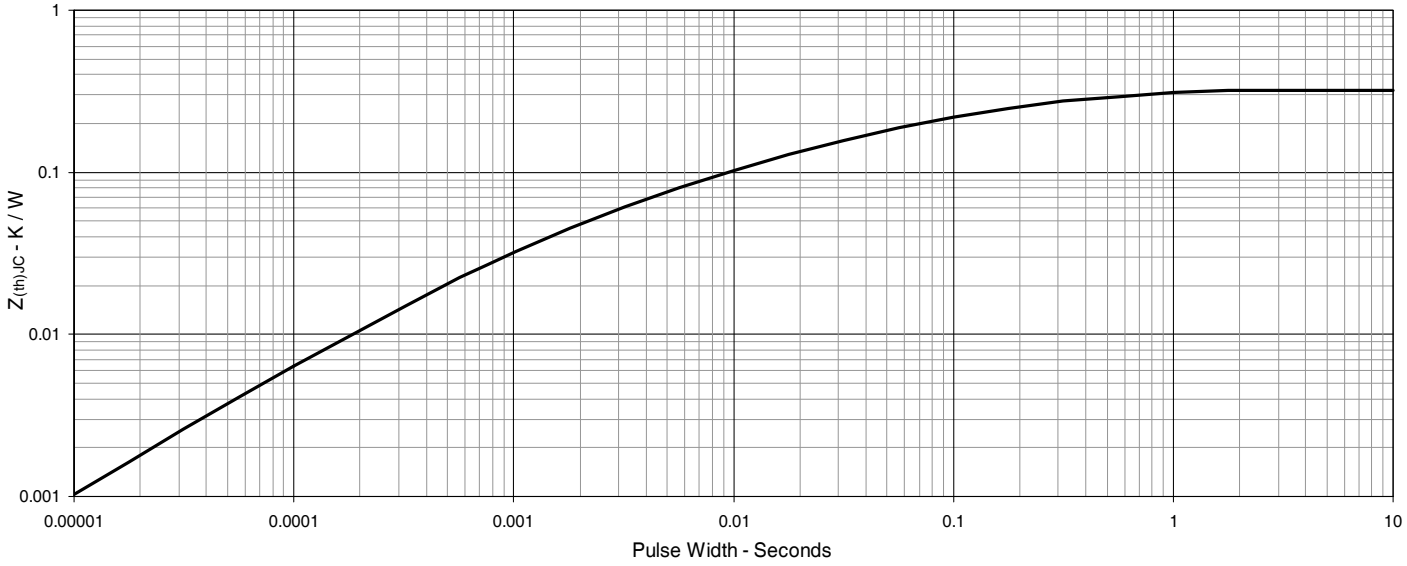


Fig. 15. Maximum Transient Thermal Impedance



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