



**THE DATASHEET OF  
IXTH48P20P**



# PolarP™ Power MOSFET

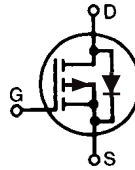
## IXTH48P20P IXTT48P20P

$$V_{DSS} = -200V$$

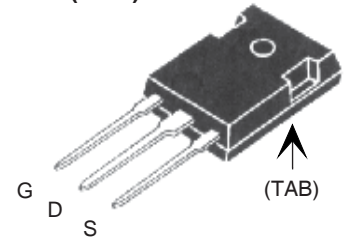
$$I_{D25} = -48A$$

$$R_{DS(on)} \leq 85m\Omega$$

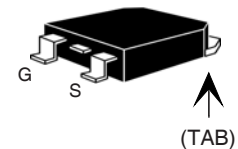
P-Channel Enhancement Mode  
Avalanche Rated



TO-247 (IXTH)



TO-268 (IXTT)



G = Gate      D = Drain  
S = Source      TAB = Drain

Symbol	Test Conditions	Maximum Ratings	
$V_{DSS}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$	- 200	V
$V_{DGR}$	$T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ , $R_{GS} = 1M\Omega$	- 200	V
$V_{GSS}$	Continuous	$\pm 20$	V
$V_{GSM}$	Transient	$\pm 30$	V
$I_{D25}$	$T_C = 25^\circ\text{C}$	- 48	A
$I_{DM}$	$T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$	-144	A
$I_{AR}$	$T_C = 25^\circ\text{C}$	- 48	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
$P_D$	$T_C = 25^\circ\text{C}$	462	W
$T_J$		- 55 ... +150	$^\circ\text{C}$
$T_{JM}$		150	$^\circ\text{C}$
$T_{stg}$		- 55 ... +150	$^\circ\text{C}$
$T_L$	1.6mm (0.062 in.) from case for 10s	300	$^\circ\text{C}$
$T_{SOLD}$	Plastic body for 10s	260	$^\circ\text{C}$
$M_d$	Mounting torque (TO-247, TO-3P)	1.13 / 10	Nm/lb.in.
$F_c$	Mounting force (PLUS220)	11..65 / 2.5..14.6	N/lb.
Weight	TO-247	6	g
	TO-268	5	g

### Features:

- International standard packages
- Avalanche Rated
- Rugged PolarP™ process
- Low package inductance
  - easy to drive and to protect

### Applications:

- High side switching
- Push-pull amplifiers
- DC Choppers
- Current regulators
- Automatic test equipment

### Advantages:

- Low gate charge results in simple drive requirement
- High power density
- Fast switching
- Easy to parallel

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$BV_{DSS}$	$V_{GS} = 0V$ , $I_D = -250 \mu\text{A}$	- 200		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -250 \mu\text{A}$	- 2.5		V
$I_{GSS}$	$V_{GS} = \pm 20V$ , $V_{DS} = 0V$			$\pm 100$ nA
$I_{DSS}$	$V_{DS} = V_{DSS}$			- 25 $\mu\text{A}$
	$V_{GS} = 0V$ $T_J = 125^\circ\text{C}$			- 200 $\mu\text{A}$
$R_{DS(on)}$	$V_{GS} = -10V$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1			85 m $\Omega$

Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$g_{fs}$	$V_{DS} = -10\text{V}$ , $I_D = 0.5 \cdot I_{D25}$ , Note 1	19	32	S
$C_{iss}$	$V_{GS} = 0\text{V}$ , $V_{DS} = -25\text{V}$ , $f = 1\text{MHz}$		5400	pF
$C_{oss}$			1040	pF
$C_{rss}$			170	pF
$t_{d(on)}$	<b>Resistive Switching Times</b> $V_{GS} = -10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$ $R_G = 3\Omega$ (External)		30	ns
$t_r$			46	ns
$t_{d(off)}$			67	ns
$t_f$			27	ns
$Q_{g(on)}$	$V_{GS} = -10\text{V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 \cdot I_{D25}$		103	nC
$Q_{gs}$			23	nC
$Q_{gd}$			40	nC
$R_{thJC}$				$0.27^\circ\text{C/W}$
$R_{thCS}$		0.21		$^\circ\text{C/W}$

### Source-Drain Diode

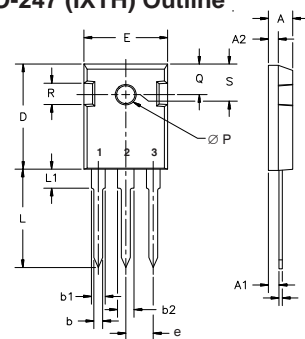
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$I_S$	$V_{GS} = 0\text{V}$			- 48 A
$I_{SM}$	Repetitive, pulse width limited by $T_{JM}$			- 192 A
$V_{SD}$	$I_F = -24\text{A}$ , $V_{GS} = 0\text{V}$ , Note 1			- 3.3 V
$t_{rr}$	$I_F = -24\text{A}$ , $-di/dt = -100\text{A}/\mu\text{s}$ $V_R = -100\text{V}$ , $V_{GS} = 0\text{V}$		260	ns
$Q_{RM}$			4.2	$\mu\text{C}$
$I_{RM}$			- 32.2	A

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

### PRELIMINARY TECHNICAL INFORMATION

The product presented herein is under development. The Technical Specifications offered are derived from data gathered during objective characterizations of preliminary engineering lots; but also may yet contain some information supplied during a pre-production design evaluation. IXYS reserves the right to change limits, test conditions, and dimensions without notice.

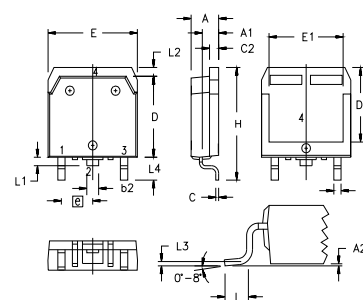
### TO-247 (IXTH) Outline



Terminals: 1 - Gate 2 - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A <sub>1</sub>	2.2	2.54	.087	.102
A <sub>2</sub>	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b <sub>1</sub>	1.65	2.13	.065	.084
b <sub>2</sub>	2.87	3.12	.113	.123
C	.4	.8	.016	.031
D	20.80	21.46	.819	.845
E	15.75	16.26	.610	.640
e	5.20	5.72	0.205	0.225
L	19.81	20.32	.780	.800
L1		4.50		.177
∅P	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216

### TO-268 (IXTT) Outline

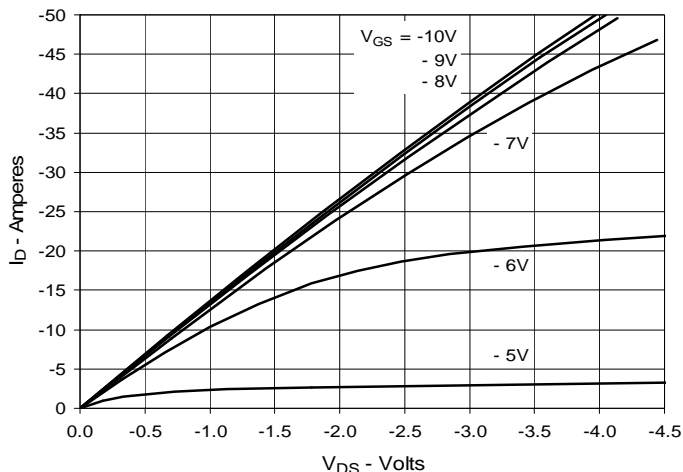


SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
A2	.001	.010	0.02	0.25
b	.045	.057	1.15	1.45
b2	.075	.083	1.90	2.10
C	.016	.026	0.40	0.65
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	.736	.752	18.70	19.10
L	.094	.106	2.40	2.70
L1	.047	.055	1.20	1.40
L2	.039	.045	1.00	1.15
L3	.010 BSC		0.25 BSC	
L4	.150	.161	3.80	4.10

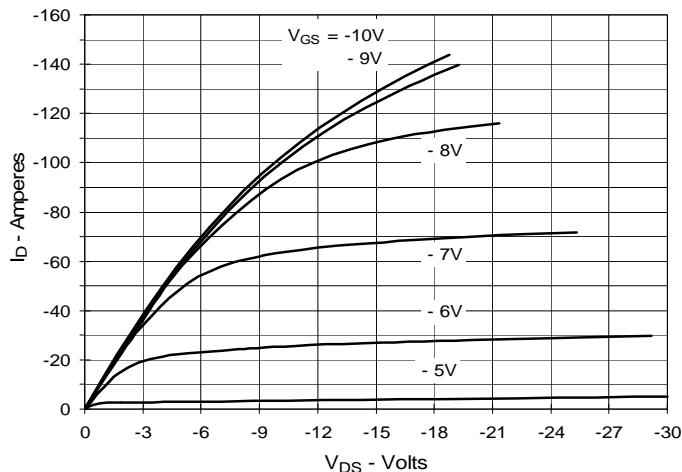
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered 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  
by one or more of the following U.S. patents: 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

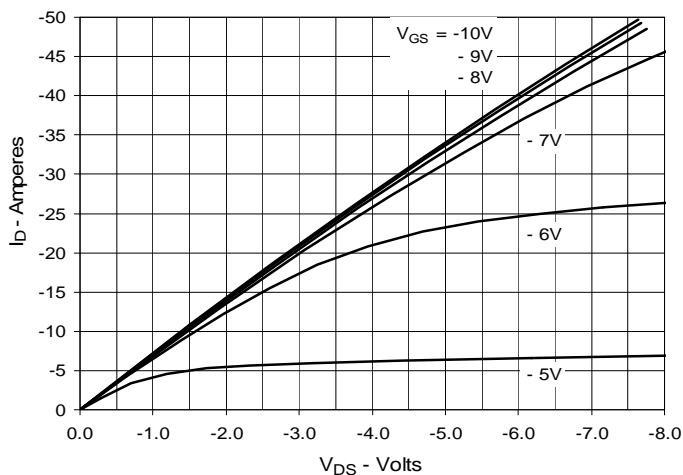
**Fig. 1. Output Characteristics @ 25°C**



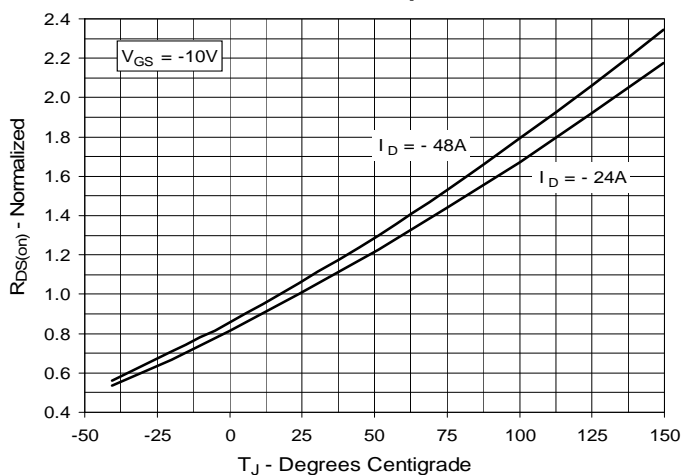
**Fig. 2. Extended Output Characteristics @ 25°C**



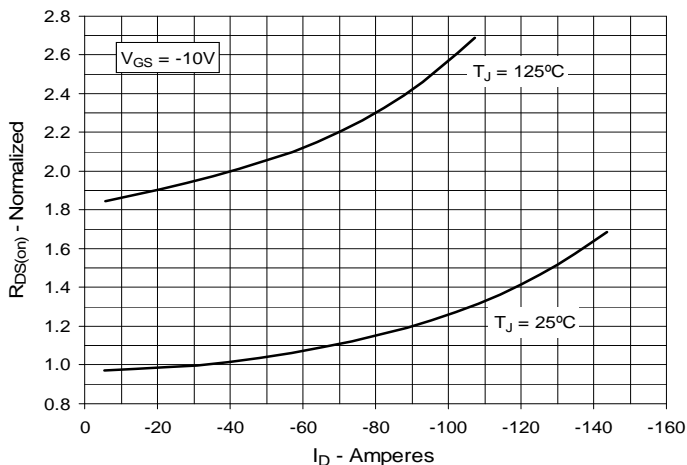
**Fig. 3. Output Characteristics @ 125°C**



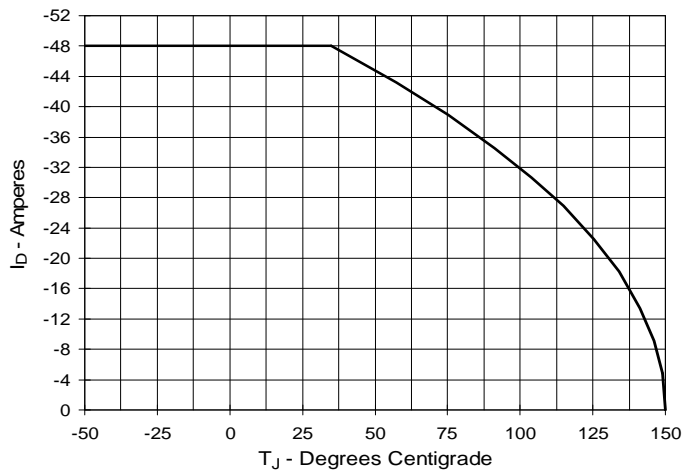
**Fig. 4.  $R_{DS(on)}$  Normalized to  $I_D = -24A$  vs. Junction Temperature**



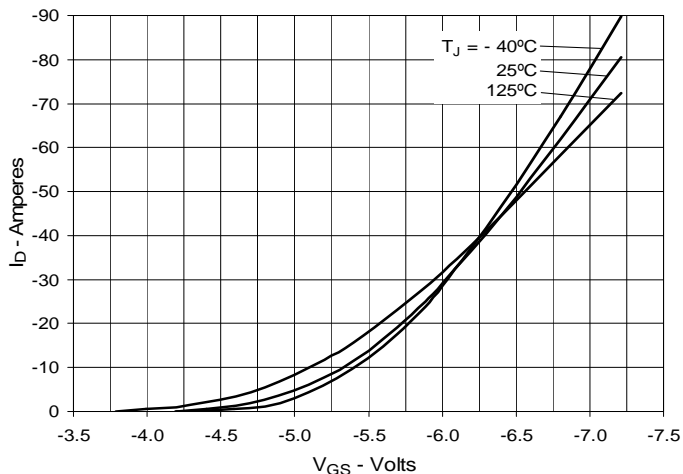
**Fig. 5.  $R_{DS(on)}$  Normalized to  $I_D = -24A$  vs. Drain Current**



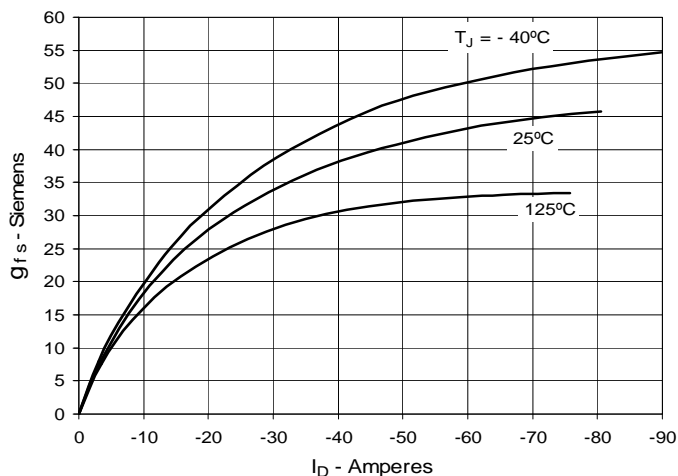
**Fig. 6. Maximum Drain Current vs. Case Temperature**



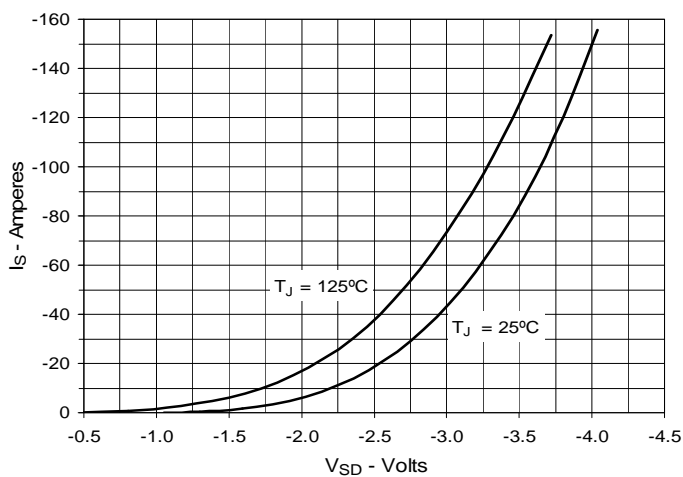
**Fig. 7. Input Admittance**



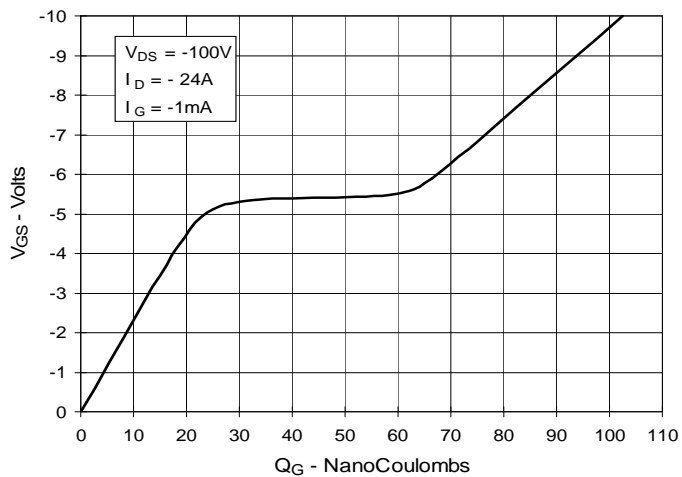
**Fig. 8. Transconductance**



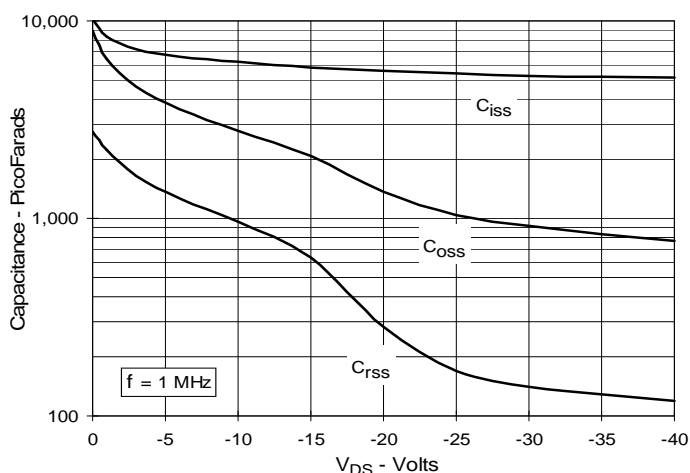
**Fig. 9. Forward Voltage Drop of Intrinsic Diode**



**Fig. 10. Gate Charge**



**Fig. 11. Capacitance**



**Fig. 12. Forward-Bias Safe Operating Area**

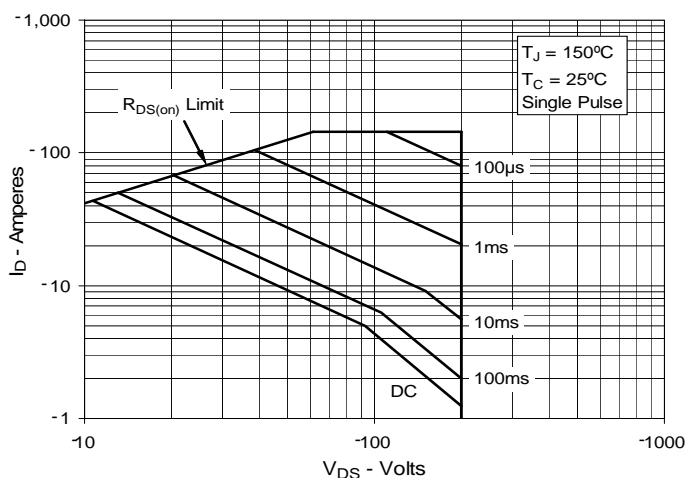
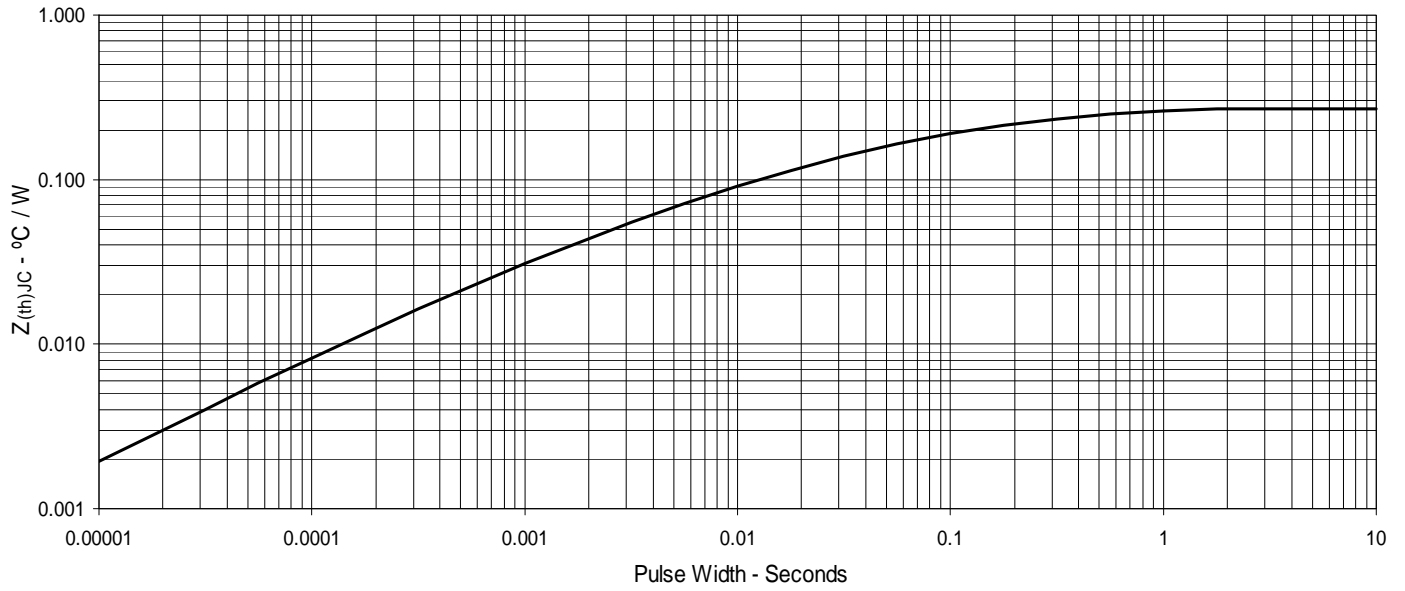


Fig. 13. Maximum Transient Thermal Impedance



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