IXYS

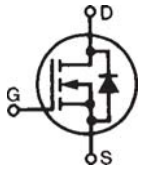
Preliminary Technical Information

Linear Power MOSFET With Extended FBSOA

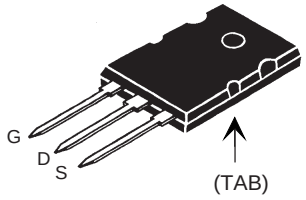
IXTK46N50L
IXTX46N50L

N-Channel Enhancement Mode

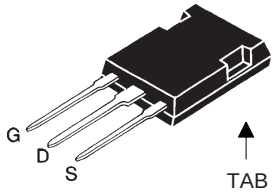
V_{DSS}	=	500	V
I_{D25}	=	46	A
$R_{DS(on)}$	≤	0.16	Ω



TO-264 (IXTK)



PLUS247 (IXTX)



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

Symbol	Test Conditions		Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C		500	V
V_{DGR}	T_J = 25°C to 150°C; R_{GS} = 1 MΩ		500	V
V_{GS}	Continuous		±30	V
V_{GSM}	Transient		±40	V
I_{D25}	T_C = 25°C		46	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}		100	A
I_{AR}	T_C = 25°C		46	A
E_{AR}	T_C = 25°C		60	mJ
E_{AS}			1.5	J
P_D	T_C = 25°C		700	W
T_J			-55 to +150	°C
T_{JM}			150	°C
T_{stg}			-55 to +150	°C
T_L	1.6 mm (0.063 in) from case for 10 s		300	°C
T_{SOLD}	Plastic body for 10 s		260	°C
M_d	Mounting torque	(TO-264)	1.13/10	Nm/lb.in.
F_c	Mounting force	(PLUS247™)	20...120/4.5...27	N/lb.
Weight	PLUS247		6	g
	TO-264		10	g

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0 V, I_D = 1 mA		500			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA		3		6	V
I_{GSS}	V_{GS} = ±30 V, V_{DS} = 0 V				±200	nA
I_{DSS}	V_{DS} = V_{DSS}	T_J = 25°C			50	µA
	V_{GS} = 0 V	T_J = 125°C			1	mA
$R_{DS(on)}$	V_{GS} = 20 V, I_D = 0.5 I_{D25}, Note 1				0.16	Ω

Features

- Designed for linear operation
- International standard package
- Unclamped Inductive switching (UIS) rated
- Molding epoxies meet UL 94 V-0 flammability classification

Applications

- Programmable loads
- Current regulators
- DC-DC converters
- Battery chargers
- DC choppers
- Temperature and lighting controls

Advantages

- Easy to mount
- Space savings
- High power density

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Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
g_{fs}	V_{DS} = 10 V; I_D = 0.5 • I_{D25}, Note 1	7	10	13	S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		7000		pF
C_{oss}			900		pF
C_{rss}			170		pF
$t_{d(on)}$	V_{GS} = 15 V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}, R_G = 2 Ω (External),		40		ns
t_r			50		ns
$t_{d(off)}$			80		ns
t_f			42		ns
$Q_{g(on)}$	V_{GS} = 15 V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		260		nC
Q_{gs}			85		nC
Q_{gd}			125		nC
R_{thJC}				0.18	°C/W
R_{thCS}			0.15		°C/W

Safe Operating Area Specification

Symbol	Test Conditions	Min.	Typ.	Max.	
SOA	V_{DS} = 400 V, I_D = 0.6 A, T_C = 90°C	240			W

Source-Drain Diode

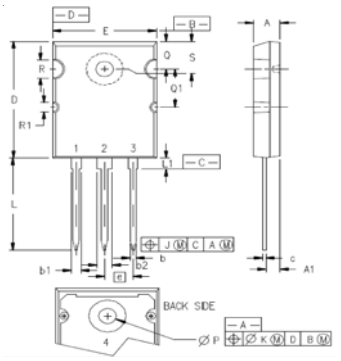
Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
I_S	V_{GS} = 0 V			46	A
I_{SM}	Repetitive; pulse width limited by T_{JM}			100	A
V_{SD}	I_F = I_S, V_{GS} = 0 V, Note 1			1.5	V
t_{rr}	I_F = I_S, -di/dt = 100 A/µs, V_R = 100V		600		ns

Note 1: Pulse test, t < 300 µs, duty cycle, d ≤ 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.

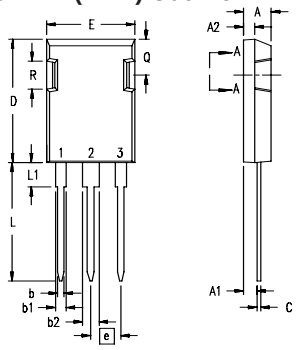
TO-264 (IXTK) Outline



1 – GATE
2, 4 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.185	.209	4.70	5.31
A1	.102	.118	2.59	3.00
b	.037	.055	0.94	1.40
b1	.087	.102	2.21	2.59
b2	.110	.126	2.79	3.20
c	.017	.029	0.43	0.74
D	1.007	1.047	25.58	26.59
E	.760	.799	19.30	20.29
e	.215BSC		5.46 BSC	
J	.000	.010	0.00	0.25
K	.000	.010	0.00	0.25
L	.779	.842	19.79	21.39
L1	.087	.102	2.21	2.59
ØP	.122	.138	3.10	3.51
Q	.240	.256	6.10	6.50
Q1	.330	.346	8.38	8.79
ØR	.155	.187	3.94	4.75
ØR1	.085	.093	2.16	2.36
S	.243	.253	6.17	6.43

PLUS247™ (IXTX) Outline



Terminals: 1 - Gate
2 - Drain (Collector)
3 - Source (Emitter)
4 - Drain (Collector)

Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	4.83	5.21	.190	.205
A_1	2.29	2.54	.090	.100
A_2	1.91	2.16	.075	.085
b	1.14	1.40	.045	.055
b_1	1.91	2.13	.075	.084
b_2	2.92	3.12	.115	.123
C	0.61	0.80	.024	.031
D	20.80	21.34	.819	.840
E	15.75	16.13	.620	.635
e	5.45 BSC		.215 BSC	
L	19.81	20.32	.780	.800
L1	3.81	4.32	.150	.170
Q	5.59	6.20	.220	0.244
R	4.32	4.83	.170	.190

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

IXYS MOSFETs and IGBTs are covered by one or moreof 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 @ 25ºC

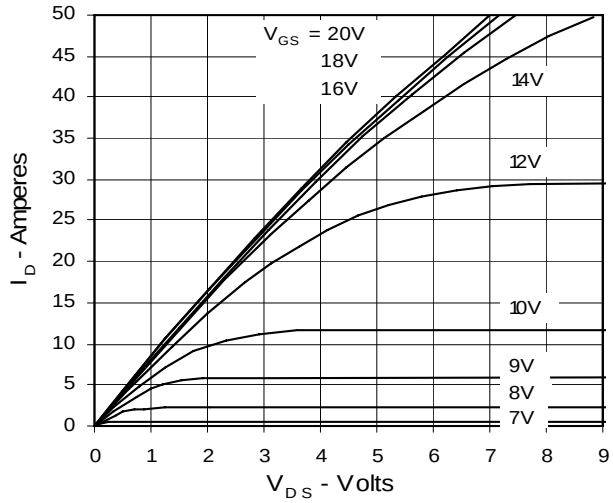


Fig. 2. Extended Output Characteristics @ 25ºC

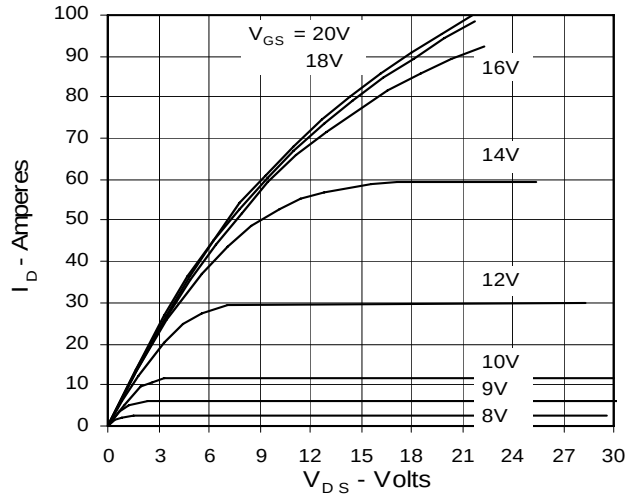


Fig. 3. Output Characteristics @ 125ºC

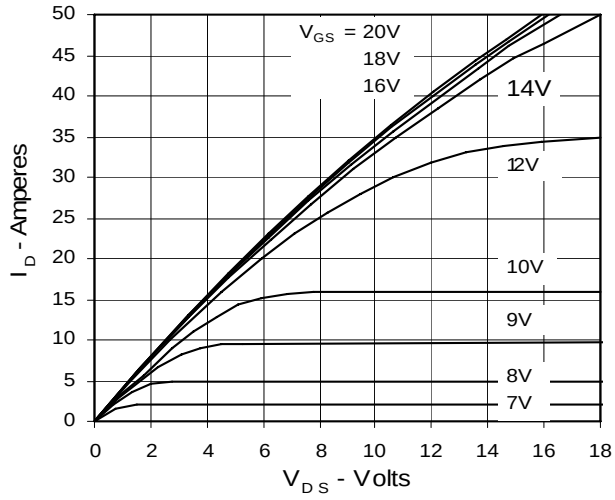


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

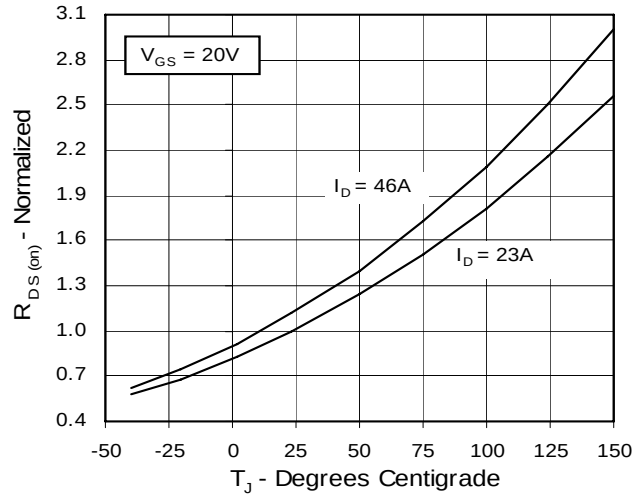


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

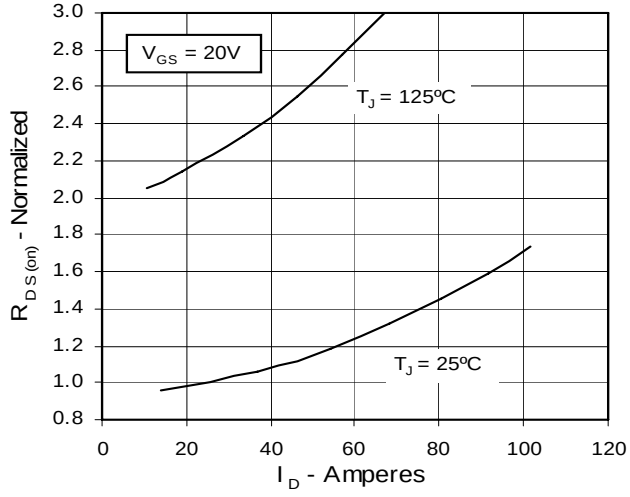


Fig. 6. Drain Current vs. Case Temperature

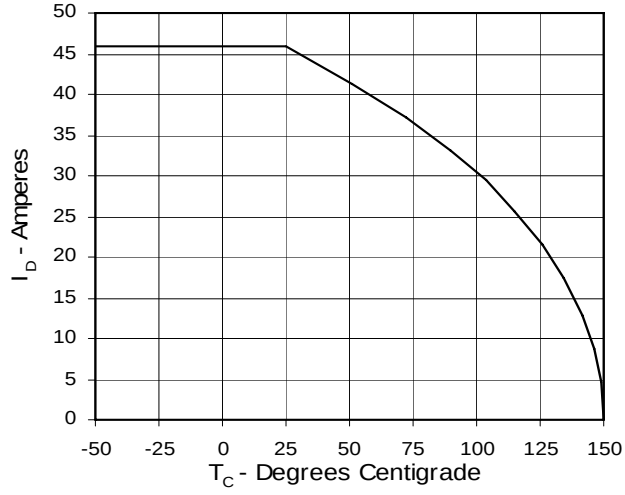


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Fig. 7. Input Admittance

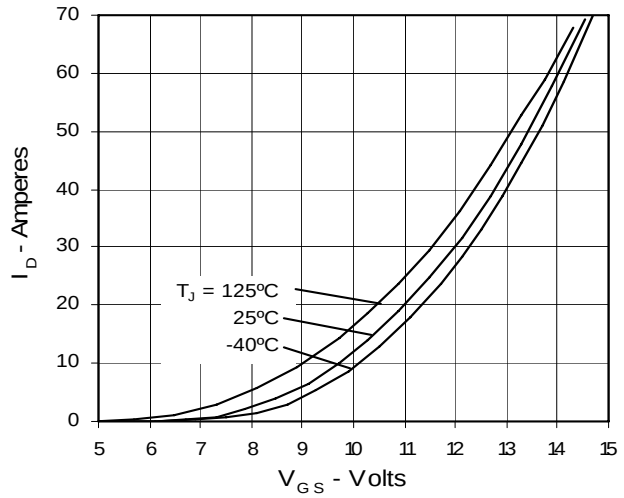

Fig. 8. Transconductance

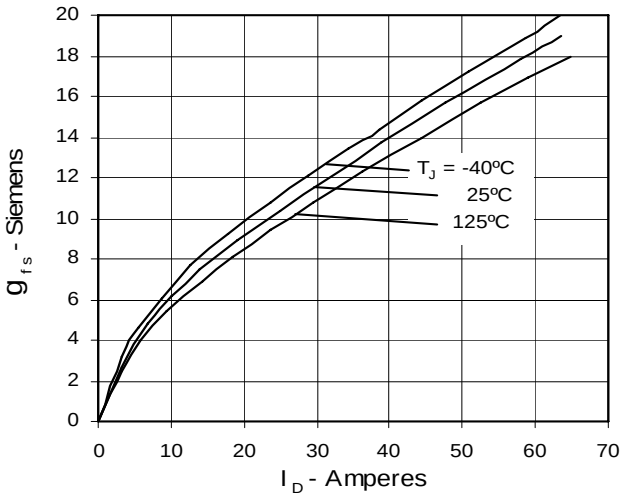

Fig. 9. Source Current vs. Source-To-Drain Voltage

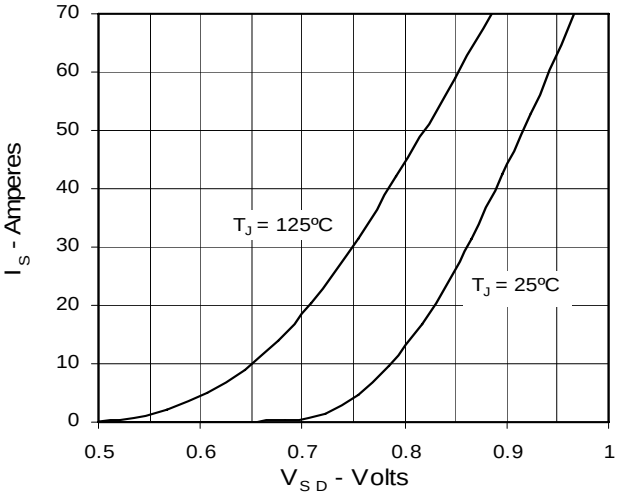

Fig. 10. Gate Charge

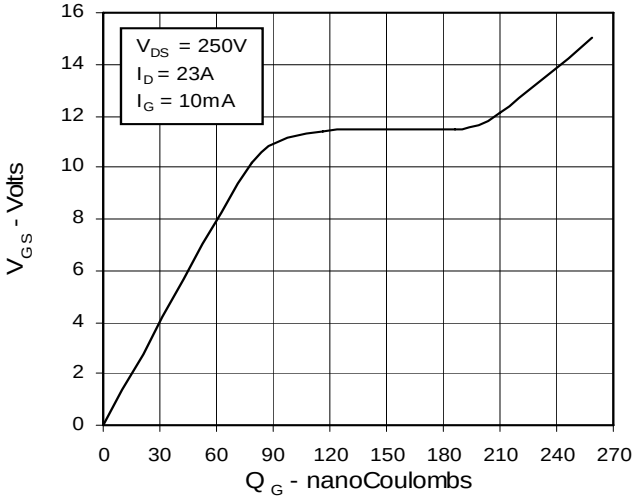

Fig. 11. Capacitance

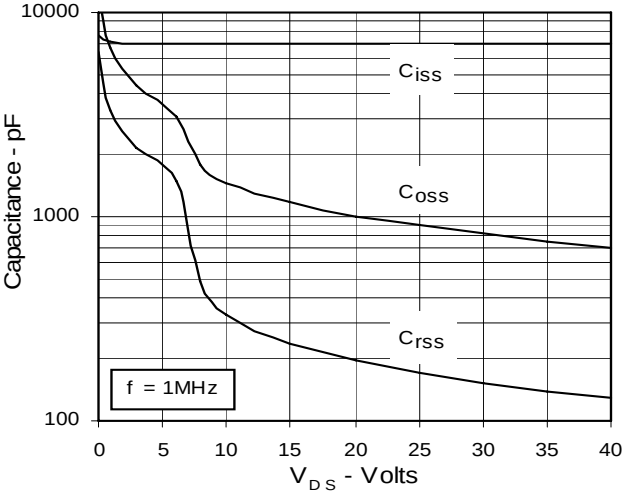

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Fig. 12. Forward-Bias Safe Operating Area @ T_C = 25ºC

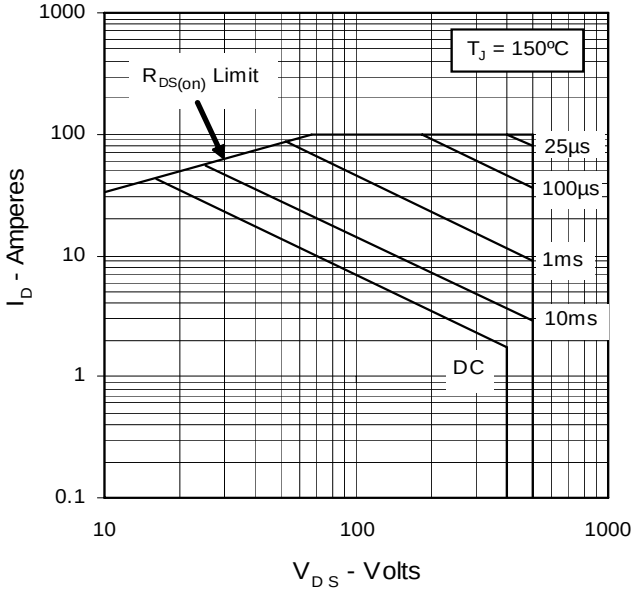


Fig. 13. Forward-Bias Safe Operating Area @ T_C = 90ºC

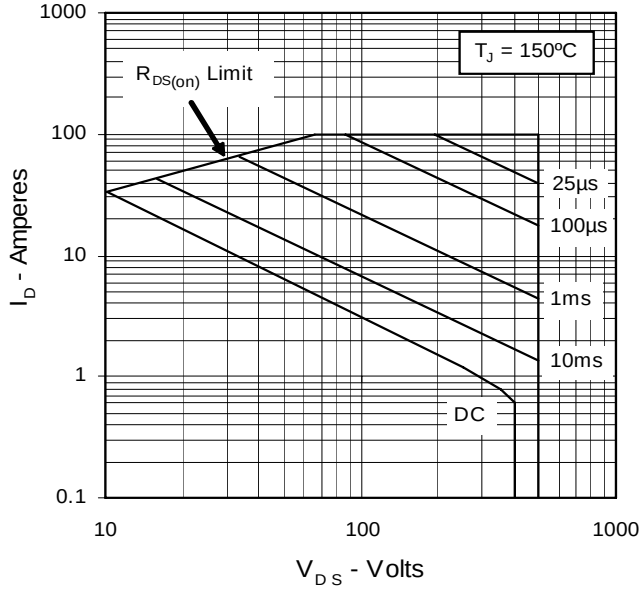
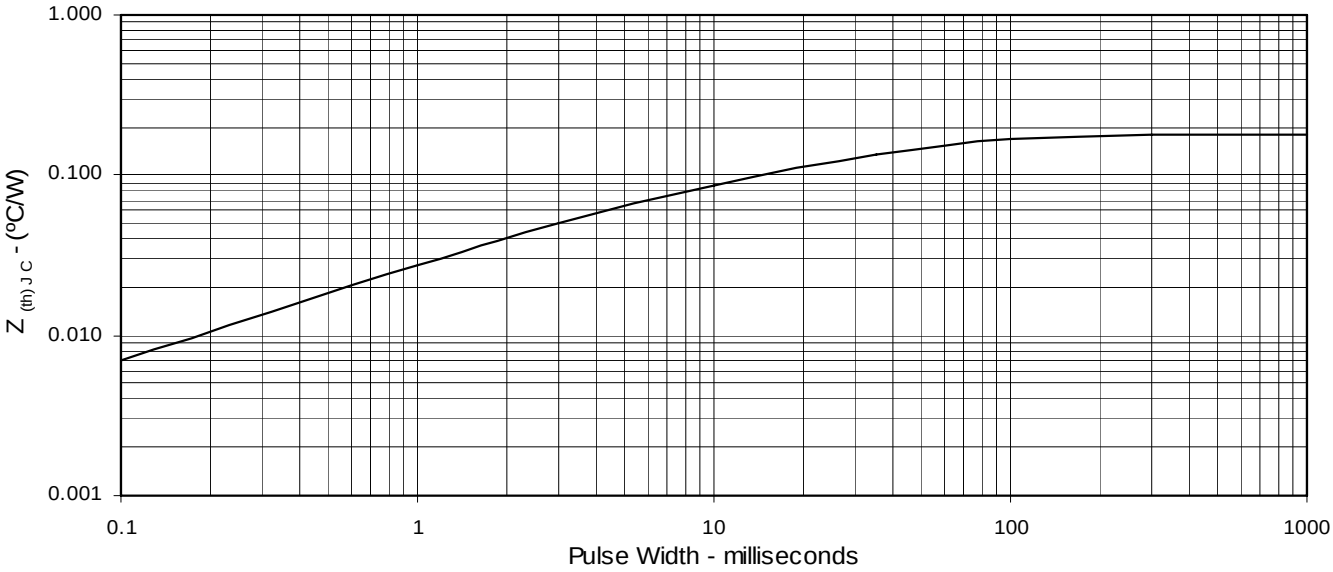


Fig. 14. Maximum Transient Thermal Impedance



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