IXYS

PolarHT™ HiPerFET Power MOSFET
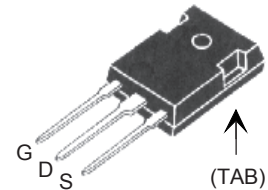
IXFH 96N15P
IXFV 96N15P
IXFV 96N15PS

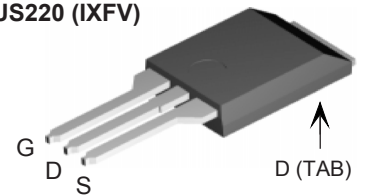|			
V_{DSS}	=	150	V
I_{D25}	=	96	A
$R_{DS(on)}$	≤	24	mΩ
t_{rr}	≤	200	ns

N-Channel Enhancement Mode
Avalanche Energy Rated
Fast Intrinsic Diode
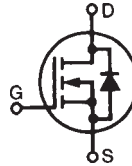
TO-247 (IXFH)

PLUS220 (IXFV)

PLUS220SMD (IXFV__S)
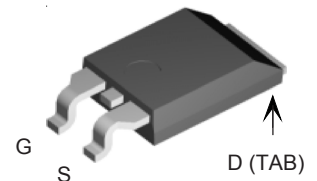
G = Gate   D = Drain
S = Source   TAB = Drain

Features

| International standard packages
| Unclamped Inductive Switching (UIS) rated
| Low package inductance
 - easy to drive and to protect

Advantages

| Easy to mount
| Space savings
| High power density

Symbol	Test Conditions		Maximum Ratings	
V_{DSS}	$T_J = 25°$ C to $175°$ C		150	V
V_{DGR}	$T_J = 25°$ C to $175°$ C; $R_{GS} = 1$ MΩ		150	V
V_{GS}	Continuous		±20	V
V_{GSM}	Transient		±30	V
I_{D25}	$T_C = 25°$ C		96	A
$I_{D(RMS)}$	External lead current limit		75	A
I_{DM}	$T_C = 25°$ C, pulse width limited by T_{JM}		250	A
I_{AR}	$T_C = 25°$ C		60	A
E_{AR}	$T_C = 25°$ C		40	mJ
E_{AS}	$T_C = 25°$ C		1.0	J
dv/dt	$I_S ≤ I_{DM}$, di/dt $≤100$ A/µs, $V_{DD} ≤ V_{DSS}$, $T_J ≤175°$ C, $R_G = 4$ Ω		10	V/ns
P_D	$T_C = 25°$ C		480	W
T_J			-55 ... +175	°C
T_{JM}			175	°C
T_{stg}			-55 ... +150	°C
T_L	1.6 mm (0.062 in.) from case for 10 s		300	°C
T_{SOLD}	Plastic body for 10s		260	°C
F_C	Mounting force	(PLUS220)	11...65/2.4...11	N/lb
M_d	Mounting torque	(TO-247)	1.13/10	Nm/lb.in.
Weight	TO-247		6	g
	PLUS220		4	g

Symbol	Test Conditions ($T_J = 25°$ C, unless otherwise specified)	Min.	Typ.	Max.	
BV_{DSS}	$V_{GS} = 0$ V, $I_D = 250$ µA	150			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 4$ mA	3.0		5.0	V
I_{GSS}	$V_{GS} = ±20$ V_{DC}, $V_{DS} = 0$			±100	nA
I_{DSS}	$V_{DS} = V_{DSS}$			25	µA
	$V_{GS} = 0$ V $T_J = 175°$ C			1000	µA
$R_{DS(on)}$	$V_{GS} = 10$ V, $I_D = 0.5$ I_{D25} Pulse test, t $≤300$ µs, duty cycle d $≤ 2$ %			24	mΩ

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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}, pulse test	35	45		S
C_{iss}			3500		pF
C_{oss}	$V_{GS} = 0$ V, $V_{DS} = 25$ V, f = 1 MHz		1000		pF
C_{rss}			280		pF
$t_{d(on)}$			30		ns
t_r	$V_{GS} = 10$ V, $V_{DS} = 0.5$ V_{DSS}, $I_D = 60$ A		33		ns
$t_{d(off)}$	$R_G = 4$ Ω (External)		66		ns
t_f			18		ns
$Q_{g(on)}$			110		nC
Q_{gs}	$V_{GS} = 10$ V, $V_{DS} = 0.5$ V_{DSS}, $I_D = 0.5$ I_{D25}		26		nC
Q_{gd}			59		nC
R_{thJC}				0.31° C/W	
R_{thCS}	(TO-247, PLUS220)		0.21		° C/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			96	A
I_{SM}	Repetitive			250	A
V_{SD}	$I_F = I_S$, $V_{GS} = 0$ V, Pulse test, t ≤300 µs, duty cycle d≤ 2 %			1.5	V
t_{rr}	$I_F = 25$ A, -di/dt = 100 A/µs			200	ns
Q_{RM}	$V_R = 100$ V, $V_{GS} = 0$ V		600		nC
I_{RM}			6		A

TO-247 (IXFH) Outline

Terminals: 1 - Gate 2 - Drain
3 - Source TAB - Drain

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.7	5.3	.185	.209
A_1	2.2	2.54	.087	.102
A_2	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b_1	1.65	2.13	.065	.084
b_2	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
ØP	3.55	3.65	.140	.144
Q	5.89	6.40	0.232	0.252
R	4.32	5.49	.170	.216
S	6.15 BSC		242 BSC	

PLUS220 (IXFV) Outline

1. GATE
2. DRAIN (COLLECTOR)
3. SOURCE (EMITTER)
4. DRAIN (COLLECTOR)

SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.169	.185	4.30	4.70
A1	.028	.035	0.70	0.90
A2	.098	.118	2.50	3.00
b	.035	.047	0.90	1.20
b1	.080	.095	2.03	2.41
b2	.054	.064	1.37	1.63
c	.028	.035	0.70	0.90
D	.551	.591	14.00	15.00
D1	.512	.539	13.00	13.70
E	.394	.433	10.00	11.00
E1	.331	.346	8.40	8.80
e	.100 BSC		2.54 BSC	
L	.512	.551	13.00	14.00
L1	.118	.138	3.00	3.50
L2	.035	.051	0.90	1.30
L3	.047	.059	1.20	1.50

PLUS220SMD (IXFV__S) Outline

SYM	INCHES		MILLIMETER	
	MIN	MAX	MIN	MAX
A	.169	.185	4.30	4.70
A1	.028	.035	0.70	0.90
A2	.098	.118	2.50	3.00
A3	.000	.010	0.00	0.25
b	.035	.047	0.90	1.20
b1	.080	.095	2.03	2.41
b2	.054	.064	1.37	1.63
c	.028	.035	0.70	0.90
D	.551	.591	14.00	15.00
D1	.512	.539	13.00	13.70
E	.394	.433	10.00	11.00
E1	.331	.346	8.40	8.80
e	.200 BSC		5.08 BSC	
L	.209	.228	5.30	5.80
L1	.118	.138	3.00	3.50
L2	.035	.051	0.90	1.30
L3	.047	.059	1.20	1.50
L4	.039	.059	1.00	1.50

1. GATE
2. DRAIN (COLLECTOR)
3. SOURCE (EMITTER)
4. DRAIN (COLLECTOR)

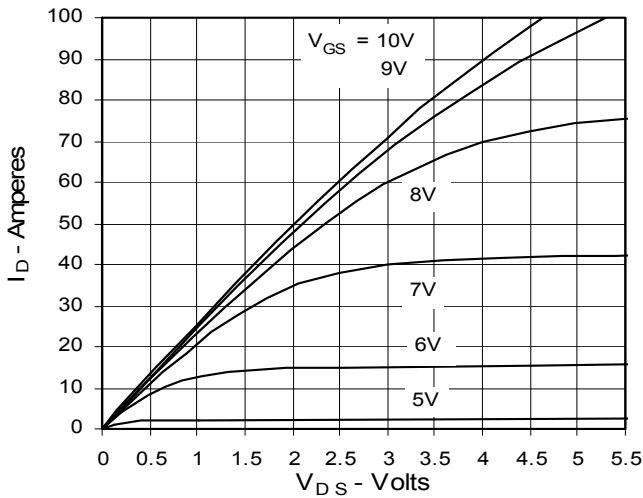IXYS reserves the right to change limits, test conditions, and dimensions.

Fig. 1. Output Characteristics @ 25°C
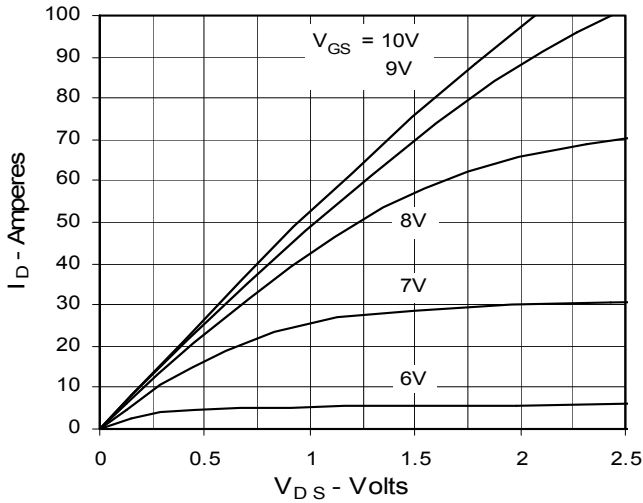
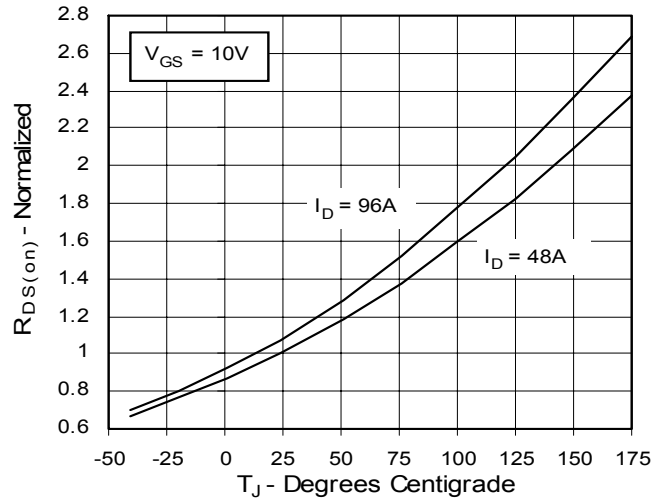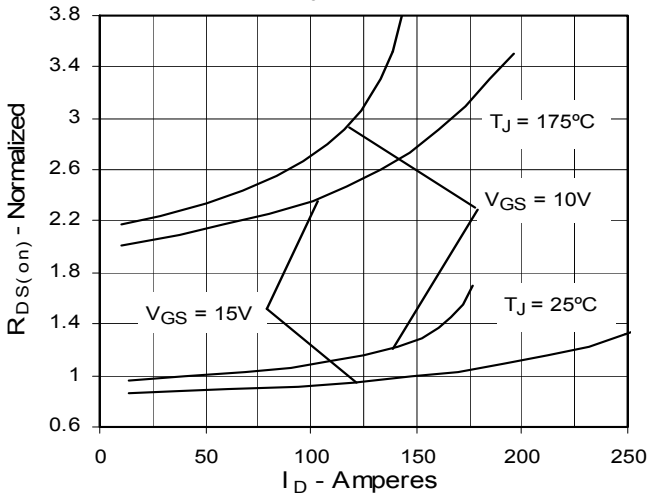### Fig. 2. Extended Output Characteristics @ 25°C
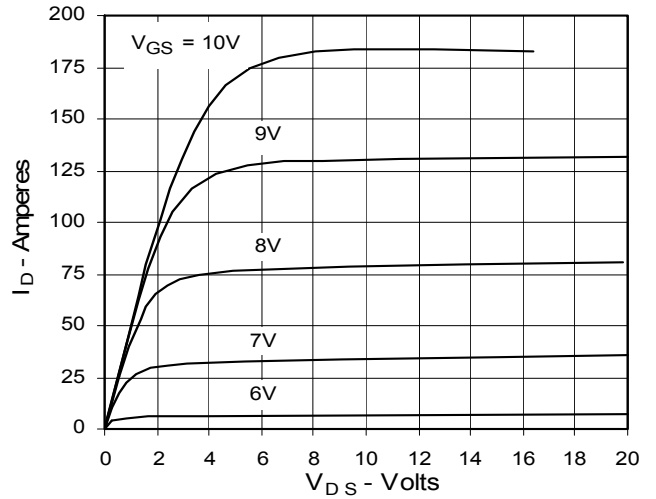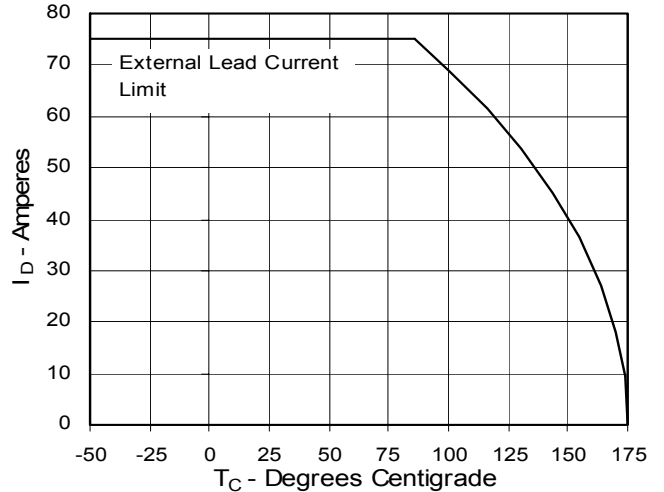

Fig. 3. Output Characteristics @ 150°C

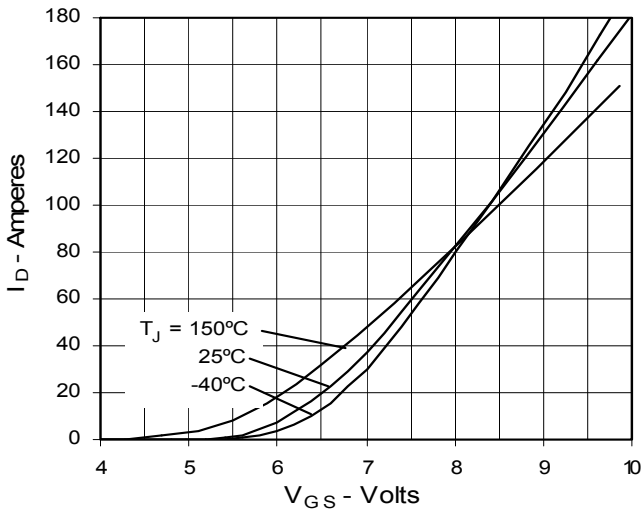### Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

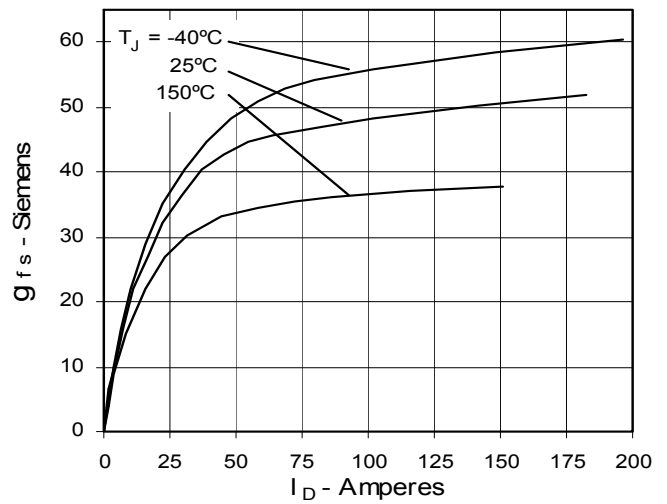### Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D
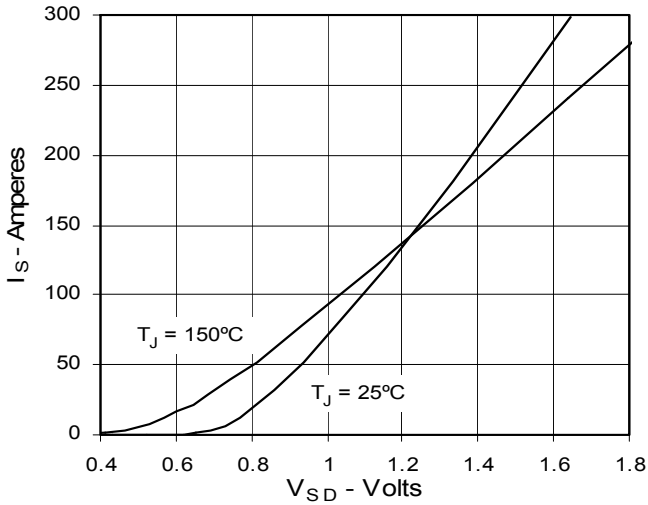

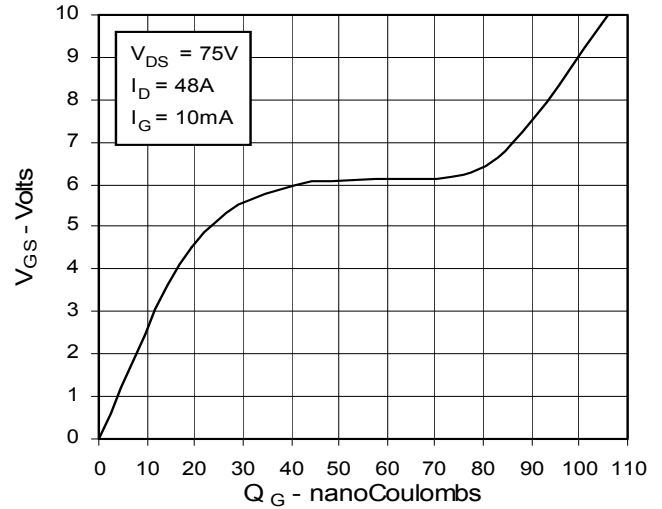### Fig. 6. Drain Current vs. Case Temperature

Fig. 7. Input Admittance

Axes: I_D - Amperes (0–180) vs V_{GS} - Volts (4–10)

Curves: $T_J = 150°C$, $25°C$, $-40°C$

Fig. 8. Transconductance

Axes: g_{fs} - Siemens (0–60) vs I_D - Amperes (0–200)

Curves: $T_J = -40°C$, $25°C$, $150°C$

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

Axes: I_S - Amperes (0–300) vs V_{SD} - Volts (0.4–1.8)

Curves: $T_J = 150°C$, $T_J = 25°C$

Fig. 10. Gate Charge

Axes: V_{GS} - Volts (0–10) vs Q_G - nanoCoulombs (0–110)

$V_{DS} = 75V$
$I_D = 48A$
$I_G = 10mA$

Fig. 11. Capacitance

Axes: Capacitance - picoFarads (100–10000) vs V_{DS} - Volts (0–40)

$f = 1MHz$

C_{iss}, C_{oss}, C_{rss}
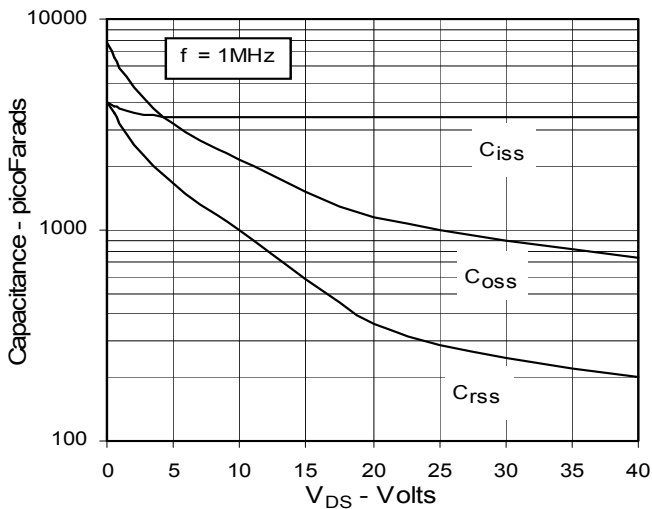
Fig. 12. Forward-Bias Safe Operating Area

Axes: I_D - Amperes (1–1000) vs V_{DS} - Volts (1–1000)

$R_{DS(on)}$ Limit

25µs, 100µs, 1ms, 10ms, DC

$T_J = 175°C$
$T_C = 25°C$

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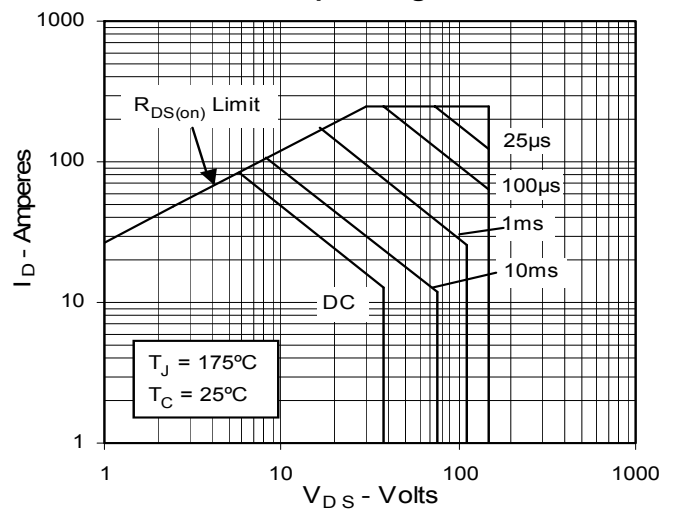
Fig. 13. Maximum Transient Thermal Resistance
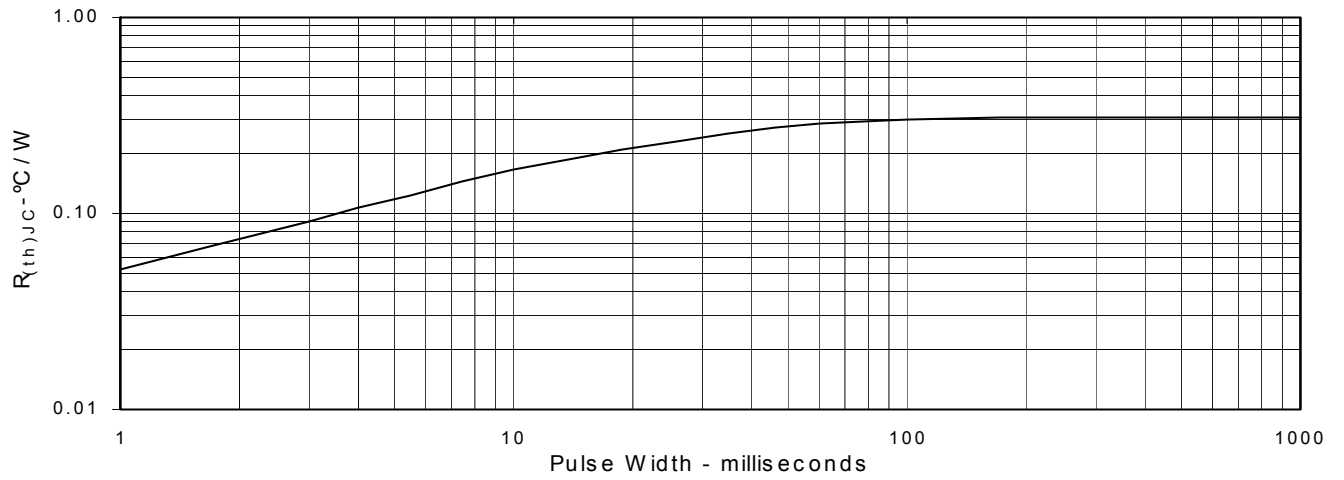
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