IXYS

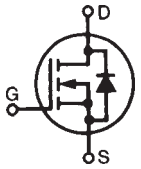
Advance Technical Information

PolarHV™ Power MOSFET

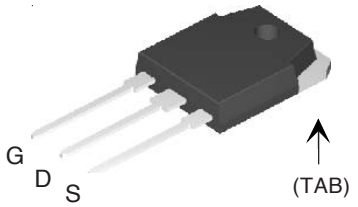
IXTQ 22N50P
IXTV 22N50P
IXTV 22N50PS

V_{DSS} = 500 V
I_{D25} = 22 A
$R_{DS(on)}$ = 270 mΩ

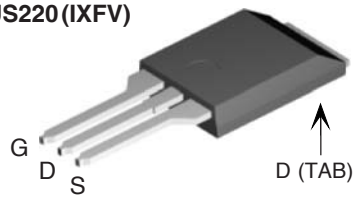
N-Channel Enhancement Mode



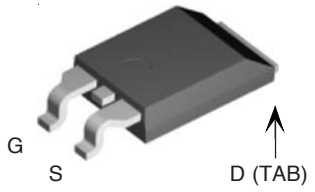
TO-3P (IXTQ)



PLUS220 (IXFV)



PLUS220SMD (IXFV-PS)



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_{GSM}		±30	V
I_{D25}	T_C = 25°C	22	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	66	A
I_{AR}	T_C = 25°C	22	A
E_{AR}	T_C = 25°C	30	mJ
E_{AS}	T_C = 25°C	750	mJ
dv/dt	$I_S \le I_{DM}$, di/dt ≤ 100 A/µs, $V_{DD} \le V_{DSS}$, $T_J \le$ 150°C, R_G = 10 Ω	10	V/ns
P_D	T_C = 25°C	350	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	1.6 mm (0.062 in.) from case for 10 s	300	°C
	Maximum tab temperature for soldering for 10s	260	°C
M_d	Mounting torque	1.13/10	Nm/lb.in.
Weight	TO-3P	5.5	g
	PLUS220 & PLUS220SMD	4	g

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
V_{DSS}	V_{GS} = 0 V, I_D = 250 µA	500			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250µA	3.0		5.0	V
I_{GSS}	V_{GS} = ±20 V_{DC}, V_{DS} = 0			±10	nA
I_{DSS}	V_{DS} = V_{DSS}			5	µA
	V_{GS} = 0 V, T_J = 125°C			50	µA
$R_{DS(on)}$	V_{GS} = 10 V, I_D = 0.5 I_{D25} Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %			270	mΩ

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

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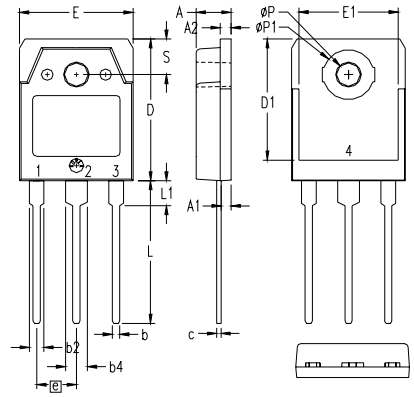
Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
g_{fs}	V_{DS}= 20 V; I_D = 0.5 I_{D25}, pulse test		20		S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		3050		pF
C_{oss}			340		pF
C_{rss}			40		pF
$t_{d(on)}$	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS}, I_D = I_{D25}		25		ns
t_r	R_G = 18 Ω (External)		27		ns
$t_{d(off)}$			75		ns
t_f			21		ns
$Q_{g(on)}$	V_{GS}= 10 V, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}		70		nC
Q_{gs}			17		nC
Q_{gd}			40		nC
R_{thJC}				0.35	K/W
R_{thCK}	(TO-247)		0.21		K/W
R_{thCK}	(TO-3 P)		0.21		K/W

Source-Drain Diode — Characteristic Values (T_J = 25°C, unless otherwise specified)

Symbol	Test Conditions	Min.	typ.	Max.	
I_S	V_{GS} = 0 V			16	A
I_{SM}	Repetitive			64	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 = 22 A -di/dt = 100 A/µs		400		ns

TO-3P (IXTQ) Outline

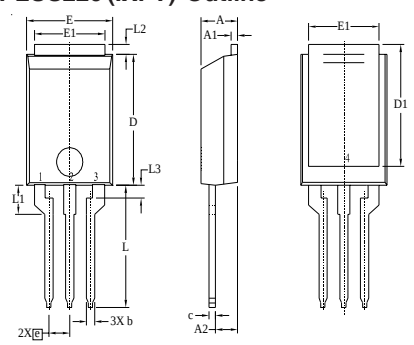


1 – GATE
2 – DRAIN (COLLECTOR)
3 – SOURCE (EMITTER)
4 – DRAIN (COLLECTOR)

SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.185	.193	4.70	4.90
A1	.051	.059	1.30	1.50
A2	.057	.065	1.45	1.65
b	.035	.045	0.90	1.15
b2	.075	.087	1.90	2.20
b4	.114	.126	2.90	3.20
c	.022	.031	0.55	0.80
D	.780	.791	19.80	20.10
D1	.665	.677	16.90	17.20
E	.610	.622	15.50	15.80
E1	.531	.539	13.50	13.70
e	.215 BSC		5.45 BSC	
L	.779	.795	19.80	20.20
L1	.134	.142	3.40	3.60
øP	.126	.134	3.20	3.40
øP1	.272	.280	6.90	7.10
S	.193	.201	4.90	5.10

All metal area are tin plated.

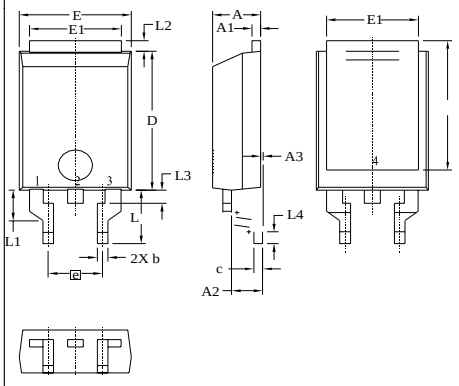
PLUS220 (IXFV) Outline



Terminals: 1-Gate 2-Drain

SYM	INCHES MIN	INCHES MAX	MILLIMETER MIN	MILLIMETER 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
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-PS) Outline



Terminals: 1-Gate 2-Drain

SYM	INCHES MIN	INCHES MAX	MILLIMETER MIN	MILLIMETER 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
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	.200BSC		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

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 4,850,072 5,017,508 5,063,307 5,381,025 6,259,123 B1 6,534,343 6,710,405B2 6,759,692 4,881,106 5,034,796 5,187,117 5,486,715 6,306,728 B1 6,583,505 6,710,463

Fig. 1. Output Characteristics @ 25ºC

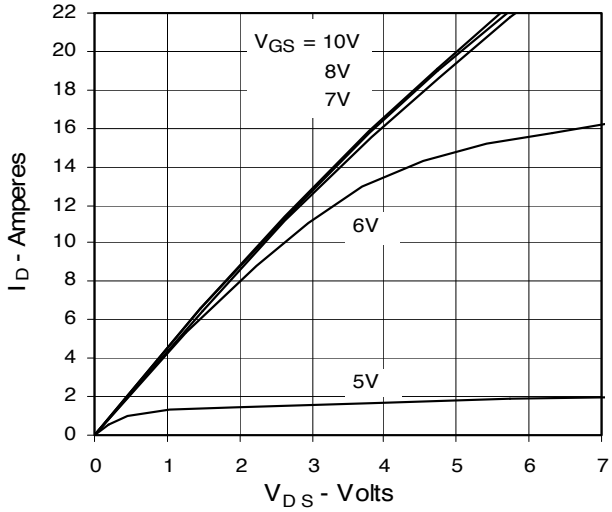


Fig. 2. Extended Output Characteristics @ 25ºC

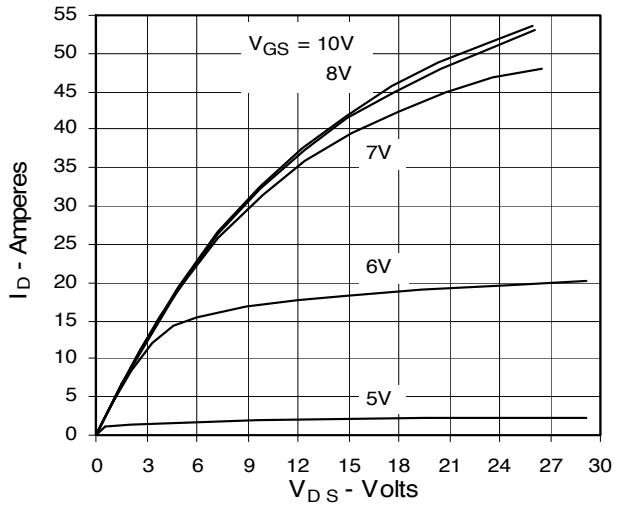


Fig. 3. Output Characteristics @ 125ºC

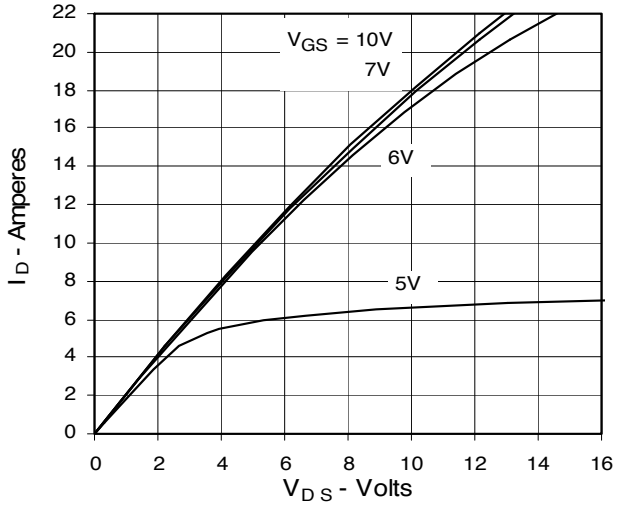


Fig. 4. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. Junction Temperature

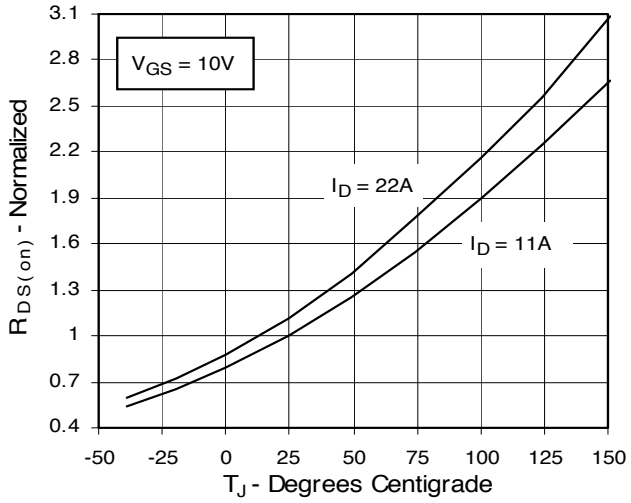


Fig. 5. $R_{DS(on)}$ Normalized to 0.5 I_{D25} Value vs. I_D

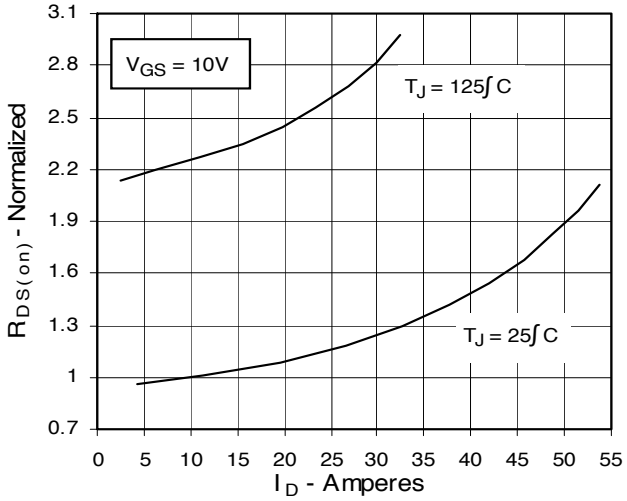


Fig. 6. Drain Current vs. Case Temperature

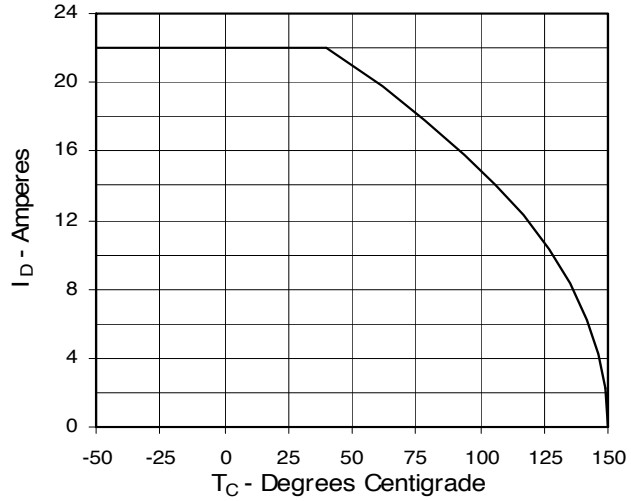


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Fig. 7. Input Admittance

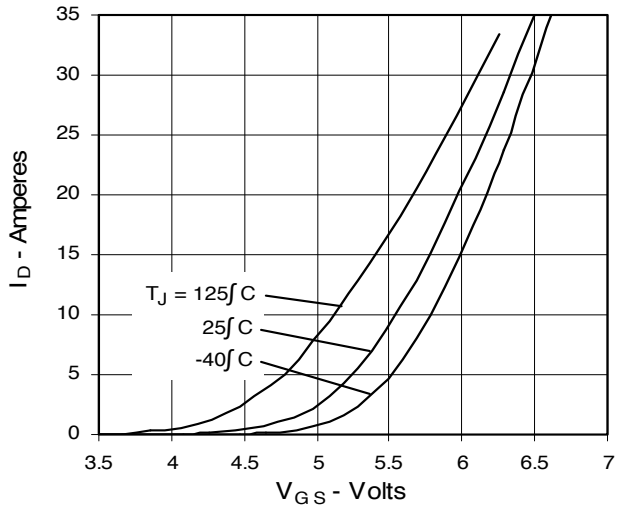

Fig. 8. Transconductance

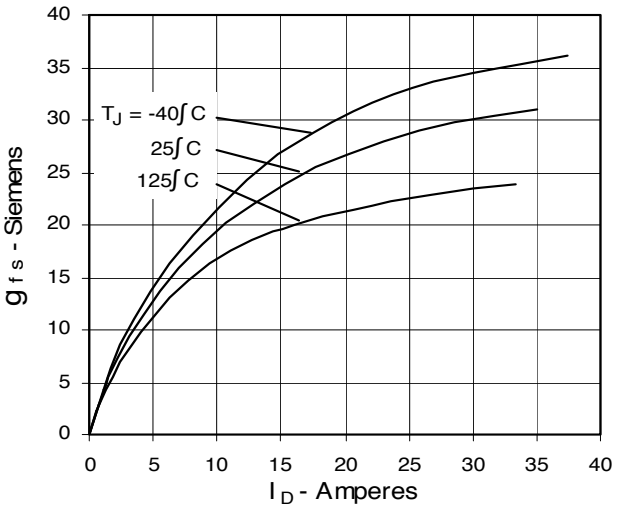

Fig. 9. Source Current vs. Source-To-Drain Voltage

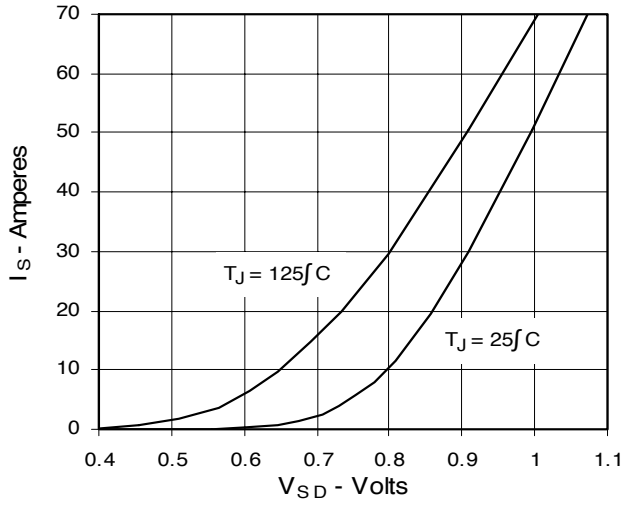

Fig. 10. Gate Charge

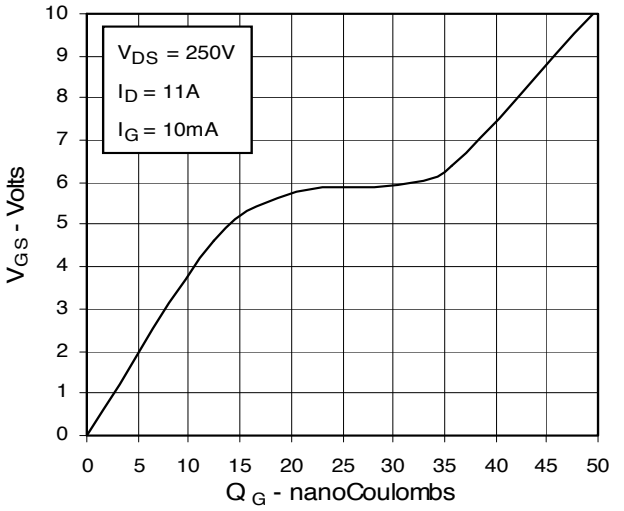

Fig. 11. Capacitance

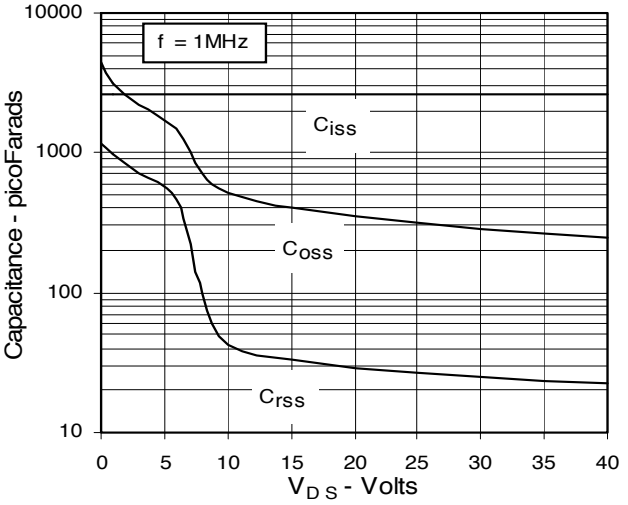

Fig. 12. Forward-Bias Safe Operating Area

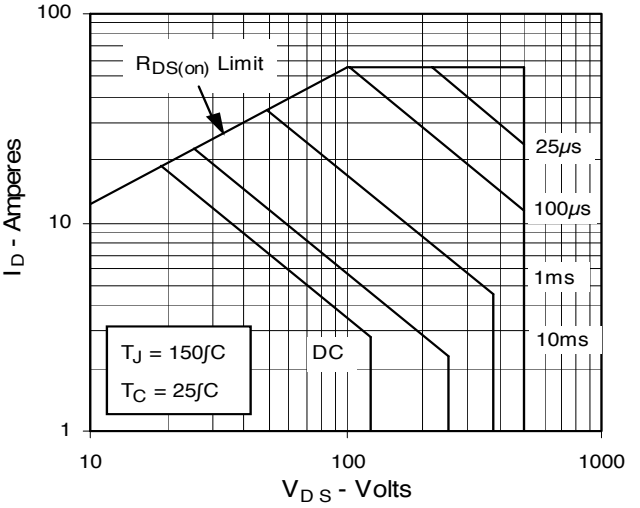

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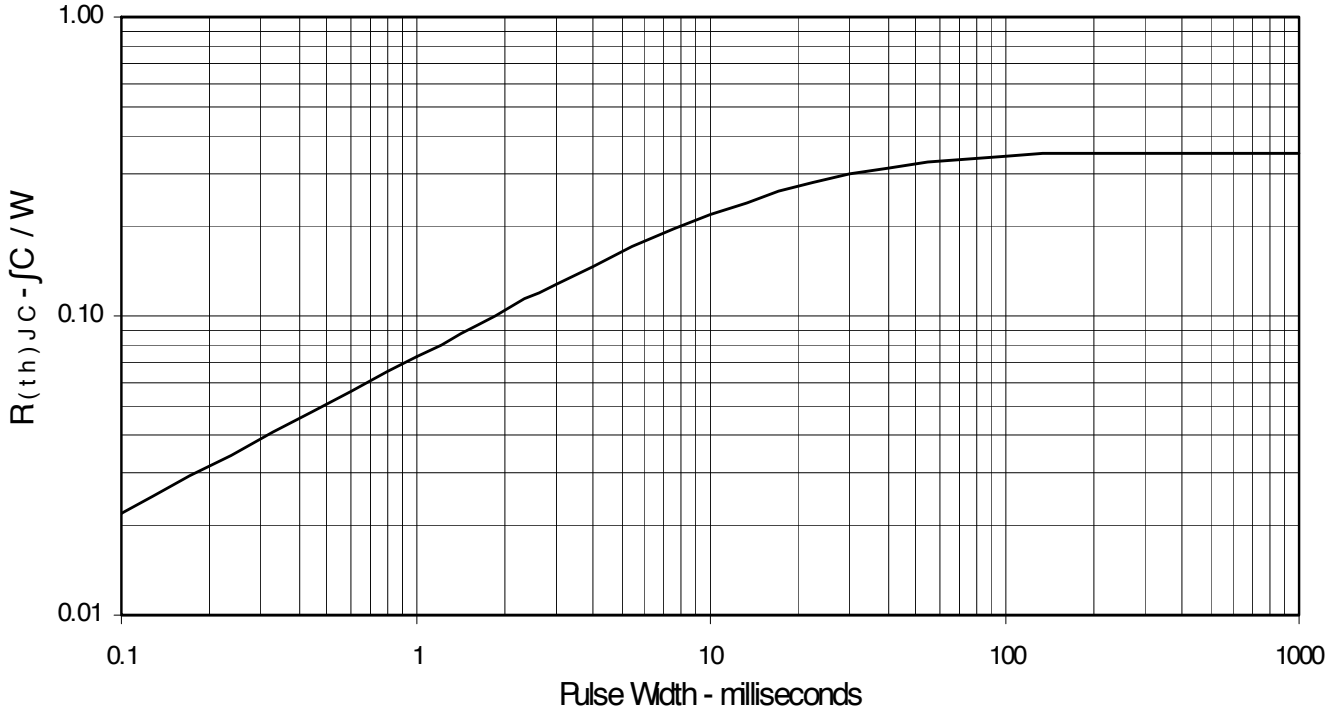
Fig. 13. Maximum Transient Thermal Resistance



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