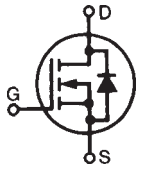
IXYS

Polar™ Power MOSFET
HiPerFET™

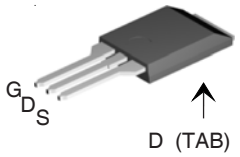
IXFH12N120P
IXFV12N120P
IXFV12N120PS

V_{DSS} = 1200V
I_{D25} = 12A
$R_{DS(on)}$ ≤ 1.35Ω
t_{rr} ≤ 300ns

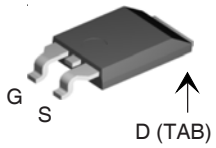
N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode



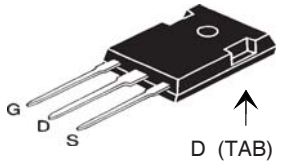
PLUS220 (IXFV)



PLUS220SMD (IXFV_S)



TO-247 (IXFH)



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

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C	1200	V
V_{DGR}	T_J = 25°C to 150°C, R_{GS} = 1MΩ	1200	V
V_{GSS}	Continuous	± 30	V
V_{GSM}	Transient	± 40	V
I_{D25}	T_C = 25°C	12	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	30	A
I_A	T_C = 25°C	6	A
E_{AS}	T_C = 25°C	500	mJ
dV/dt	$I_S \le I_{DM}$, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$	15	V/ns
P_D	T_C = 25°C	543	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
T_L	Maximum lead temperature for soldering	300	°C
T_{SOLD}	Plastic body for 10s	260	°C
M_d	Mounting torque (TO-247)	1.13/10	Nm/lb.in.
F_C	Mounting force (PLUS 220)	11..65 / 2.5..14.6	N/lb.
Weight	TO-247	6	g
	PLUS 220 types	4	g

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)	Characteristic Values Min.	Typ.	Max.	
BV_{DSS}	V_{GS} = 0V, I_D = 1mA	1200			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 1mA	3.5		6.5	V
I_{GSS}	V_{GS} = ± 30V, V_{DS} = 0V			± 100	nA
I_{DSS}	$V_{DS} = V_{DSS}$			25	μA
	V_{GS} = 0V, T_J = 125°C			2	mA
$R_{DS(on)}$	V_{GS} = 10V, $I_D = 0.5 \bullet I_{D25}$, Note 1		1.15	1.35	Ω

Features

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

Advantages

- Easy to mount
- Space savings
- High power density

Applications:

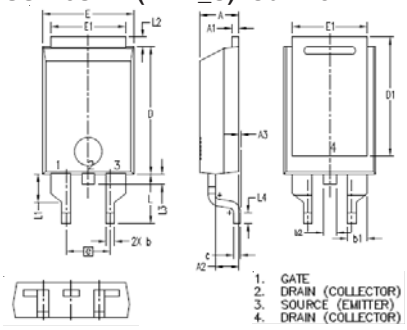
- High Voltage Switched-mode and resonant-mode power supplies
- High Voltage Pulse Power Applications
- High Voltage Discharge circuits in Lasers Pulsers, Spark Igniters, RF Generators
- High Voltage DC-DC converters
- High Voltage DC-AC inverters

Symbol	Test Conditions (T_J = 25°C unless otherwise specified)	Characteristic Values Min.	Typ.	Max.
g_{fs}	V_{DS} = 20V, I_D = 0.5 • I_{D25}, Note 1	5	9	S
C_{iss}	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz		5400	pF
C_{oss}			290	pF
C_{rss}			40	pF
R_{Gi}	Gate input resistance		1.5	Ω
$t_{d(on)}$	**Resistive Switching Times**		34	ns
t_r	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		25	ns
$t_{d(off)}$	R_G = 2Ω (External)		62	ns
t_f			34	ns
$Q_{g(on)}$	V_{GS} = 10V, V_{DS} = 0.5 • V_{DSS}, I_D = 0.5 • I_{D25}		103	nC
Q_{gs}			29	nC
Q_{gd}			41	nC
R_{thJC}				0.23 °C/W
R_{thCS}	(TO-247, PLUS 220)		0.21	°C/W

Source-Drain Diode (T_J = 25°C unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
I_S	V_{GS} = 0V			12	A
I_{SM}	Repetitive, pulse width limited by T_{JM}			48	A
V_{SD}	I_F = I_S, V_{GS} = 0V, Note 1			1.5	V
t_{rr}	I_F = 6A, -di/dt = 100A/μs			300	ns
Q_{RM}	V_R = 100V, V_{GS} = 0V		0.5		μC
I_{RM}			6		A

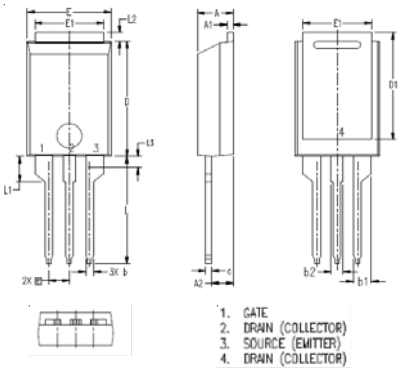
Note 1: Pulse test, t ≤ 300μs; duty cycle, d ≤ 2%.

PLUS220SMD (IXFV_S) Outline



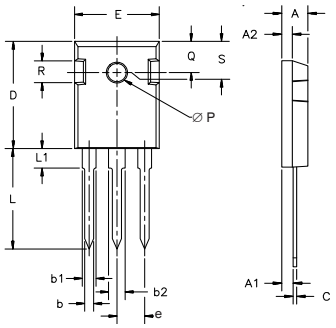
SYM	INCHES MIN	INCHES MAX	MILLIMETER MIN	MILLIMETER MAX
A	.169	.185	4.30	4.70
A1	.028	.035	0.70	0.90
A2	.098	.118	2.50	3.00
A3	.000	.010	0.00	0.25
b	.035	.047	0.90	1.20
b1	.080	.095	2.03	2.41
b2	.054	.064	1.37	1.63
c	.028	.035	0.70	0.90
D	.551	.591	14.00	15.00
D1	.512	.539	13.00	13.70
E	.394	.433	10.00	11.00
E1	.331	.346	8.40	8.80
e	.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

PLUS220 (IXFV) Outline



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
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

TO-247 (IXFH) Outline



Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches 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
∅P	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

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

Fig. 1. Output Characteristics @ 25ºC

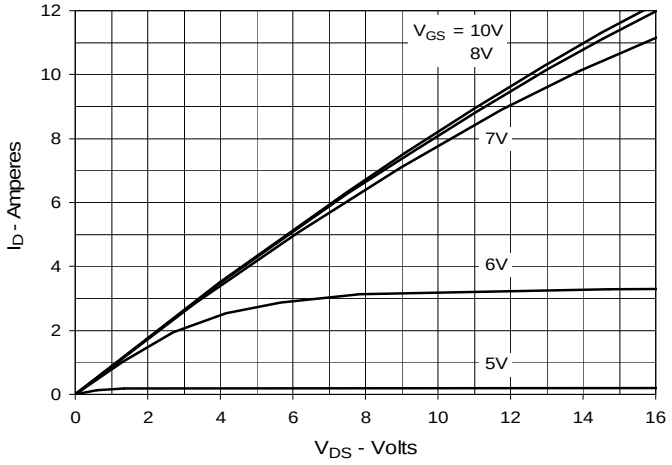


Fig. 2. Extended Output Characteristics @ 25ºC

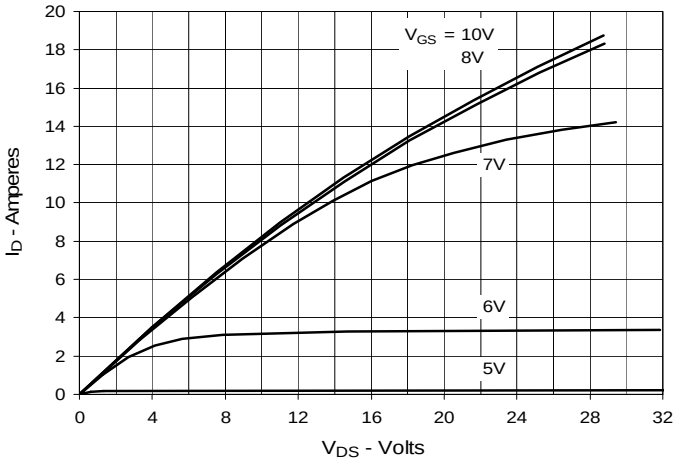


Fig. 3. Output Characteristics @ 125ºC

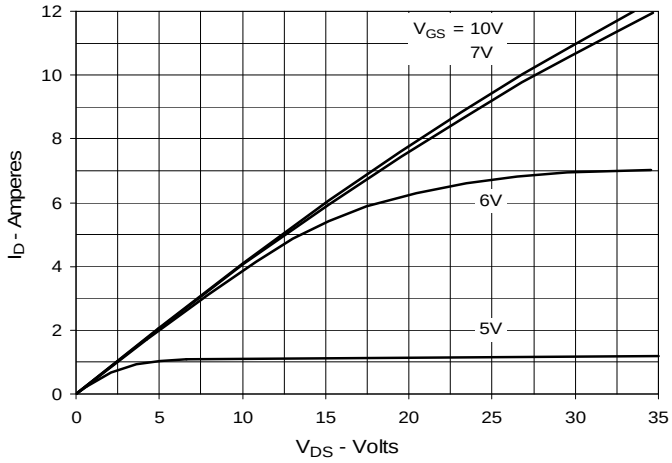


Fig. 4. $R_{DS(on)}$ Normalized to I_D = 6A Value vs. Junction Temperature

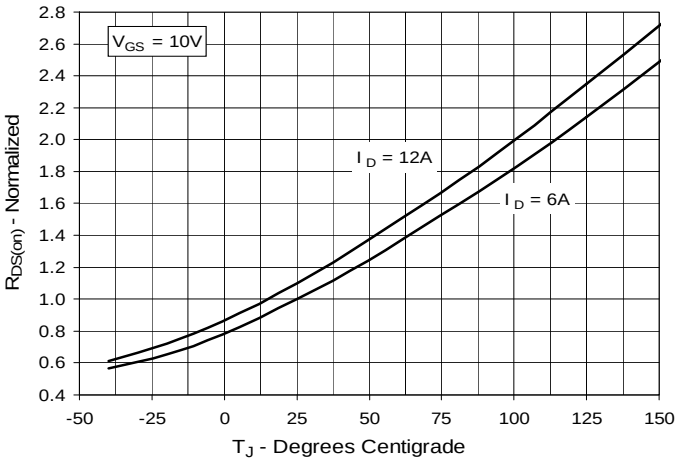


Fig. 5. $R_{DS(on)}$ Normalized to I_D = 6A Value vs. Drain Current

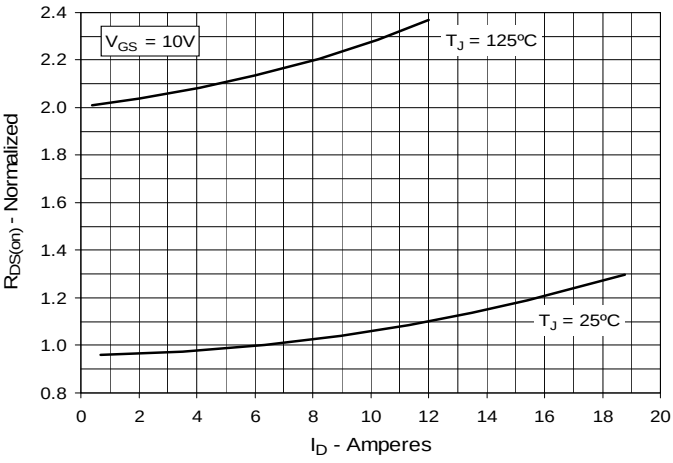


Fig. 6. Maximum Drain Current vs. Case Temperature

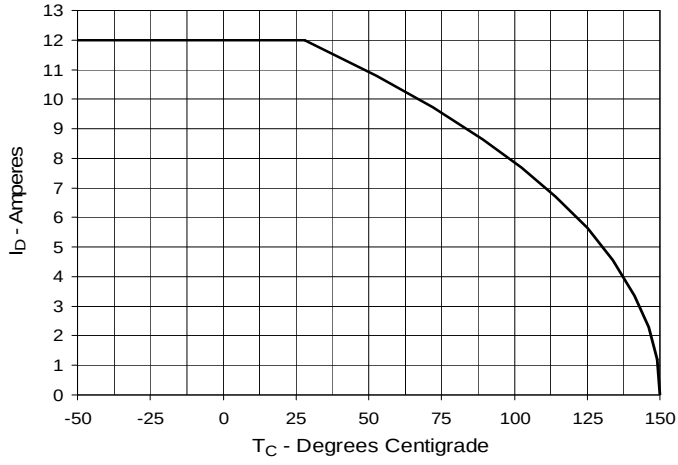


Fig. 7. Input Admittance

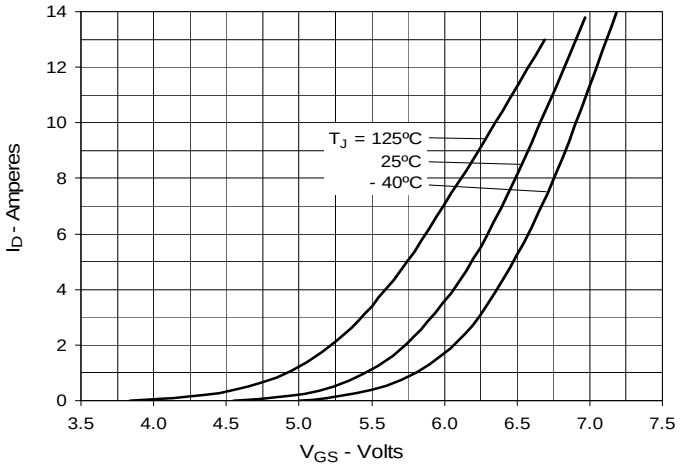


Fig. 8. Transconductance

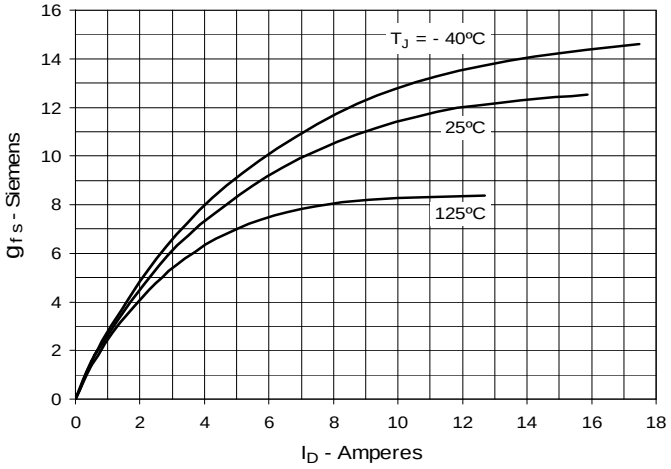


Fig. 9. Forward Voltage Drop of Intrinsic Diode

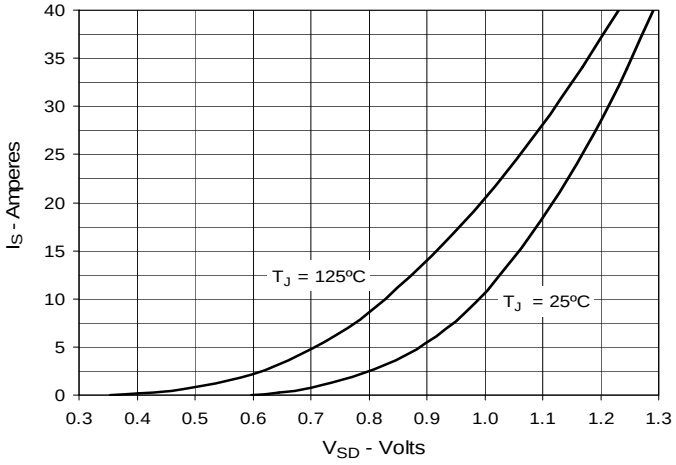


Fig. 10. Gate Charge

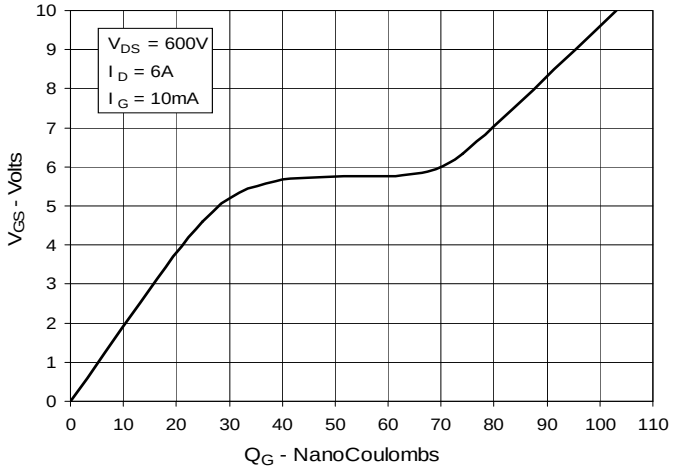


Fig. 11. Capacitance

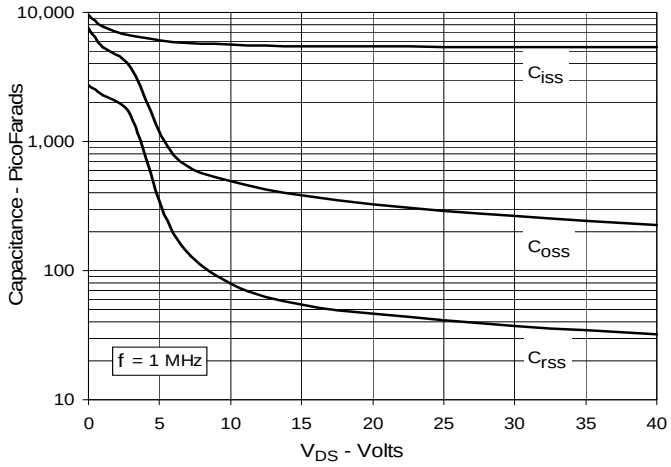
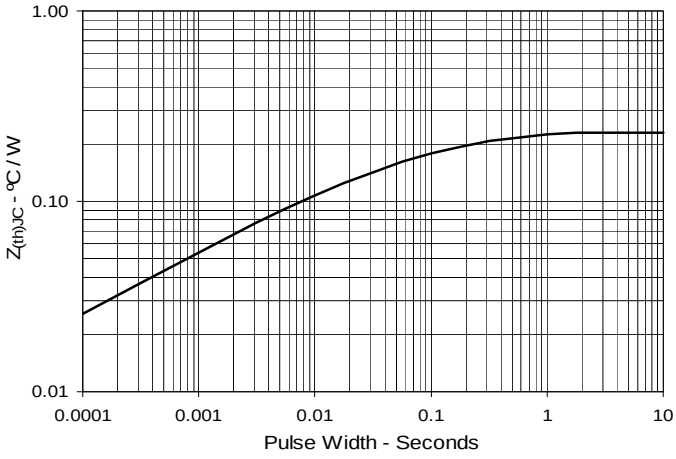


Fig. 12. Maximum Transient Thermal Impedance



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