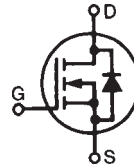# IXYS

PolarHV™ HiPerFET Power MOSFET

N-Channel Enhancement Mode
Avalanche Rated
Fast Intrinsic Diode
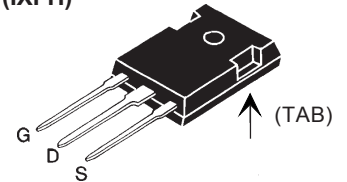
IXFH 20N80P
IXFT 20N80P
IXFV 20N80P
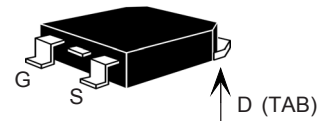**IXFV 20N80PS**

V_{DSS}	=	800 V
I_{D25}	=	20 A
$R_{DS(on)}$	≤	520 mΩ
t_{rr}	≤	250 ns

| Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25° C$ to $150° C$	800	V
V_{DGR}	$T_J = 25° C$ to $150° C$; $R_{GS} = 1 MΩ$	800	V
V_{GSS}	Continuous	± 30	V
V_{GSM}	Transient	± 40	V
I_{D25}	$T_C = 25° C$	20	A
I_{DM}	$T_C = 25° C$, pulse width limited by T_{JM}	50	A
I_{AR}	$T_C = 25° C$	10	A
E_{AR}	$T_C = 25° C$	30	mJ
E_{AS}	$T_C = 25° C$	1.0	J
dv/dt	$I_S ≤ I_{DM}$, di/dt ≤100 A/µs, $V_{DD} ≤ V_{DSS}$, $T_J ≤ 150° C$, $R_G = 4 Ω$	10	V/ns
P_D	$T_C = 25° C$	500	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 case for 10 s	260	°C
M_d	Mounting torque (TO-247)	1.13/10	Nm/lb.in.
F_C	Mounting force (PLUS220)	1..65 / 2.5..15	N/lb
Weight	TO-247	6	g
	TO-268	5.5	g
	PLUS220 types	4	g

TO-247 (IXFH)
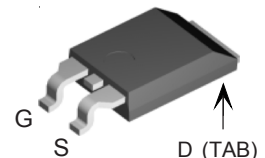
TO-268 (IXFT)

PLUS220 (IXFV)
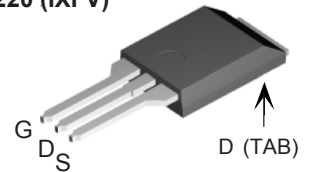
PLUS220 SMD(IXFV..S)

G = Gate   D = Drain
S = Source   Tab = Drain

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

Symbol	Test Conditions ($T_J = 25° C$, unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0 V$, $I_D = 250 µA$	800		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 4 mA$	3.0		5.0 V
I_{GSS}	$V_{GS} = ± 30 V_{DC}$, $V_{DS} = 0$			± 200 nA
I_{DSS}	$V_{DS} = V_{DSS}$			25 µA
	$V_{GS} = 0 V$ $T_J = 125° C$			1000 µA
$R_{DS(on)}$	$V_{GS} = 10 V$, $I_D = 10 A$ Pulse test, $t ≤ 300 µs$, duty cycle $d ≤ 2 \%$			520 mΩ

DS99511E(03/06)

Symbol	Test Conditions	Characteristic Values $(T_J = 25°C$ unless otherwise specified)			
		Min.	Typ.	Max.	
g_{fs}	$V_{DS} = 20$ V; $I_D = 10$ A, pulse test	14	23		S
C_{iss}			4685		pF
C_{oss}	$V_{GS} = 0$ V, $V_{DS} = 25$ V, f = 1 MHz		356		pF
C_{rss}			26		pF
$t_{d(on)}$			30		ns
t_r	$V_{GS} = 10$ V, $V_{DS} = 0.5\ V_{DSS}$, $I_D = 10$ A		24		ns
$t_{d(off)}$	$R_G = 2\ \Omega$ (External)		85		ns
t_f			24		ns
$Q_{g(on)}$			86		nC
Q_{gs}	$V_{GS} = 10$ V, $V_{DS} = 0.5\ V_{DSS}$, $I_D = 10$ A		27		nC
Q_{gd}			24		nC
R_{thJC}				0.25	°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			20	A
I_{SM}	Repetitive			50	A
V_{SD}	$I_F = I_S$, $V_{GS} = 0$ V, Pulse test, t $\leq$ 300 µs, duty cycle d $\leq$ 2 %			1.5	V
t_{rr}	$I_F = 25$A, -di/dt = 100 A/µs			250	ns
Q_{RM}	$V_R = 100$V; $V_{GS} = 0$ V		0.8		µC
I_{RM}			6.0		A

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

Fig. 1. Output Characteristics @ 25°C

Fig. 2. Extended Output Characteristics @ 25°C
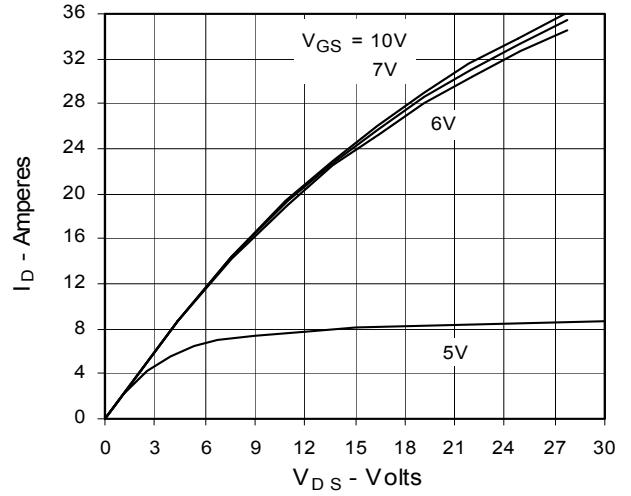
Fig. 3. Output Characteristics @ 125°C
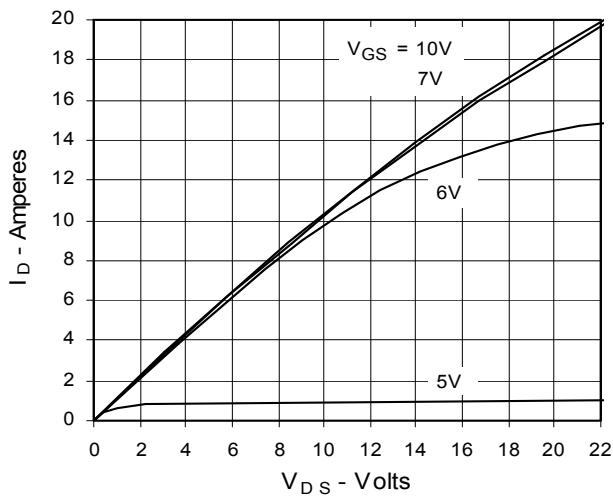
Fig. 4. $R_{DS(on)}$ Normalized to I_D = 10A Value vs. Junction Temperature
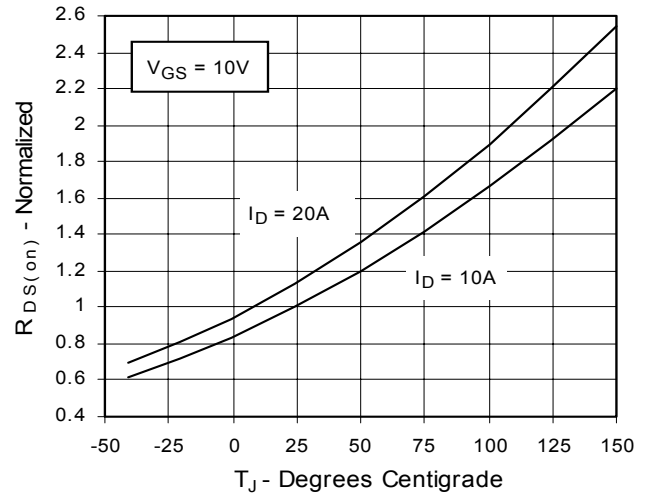
Fig. 5. $R_{DS(on)}$ Normalized to I_D = 10A Value vs. Drain Current
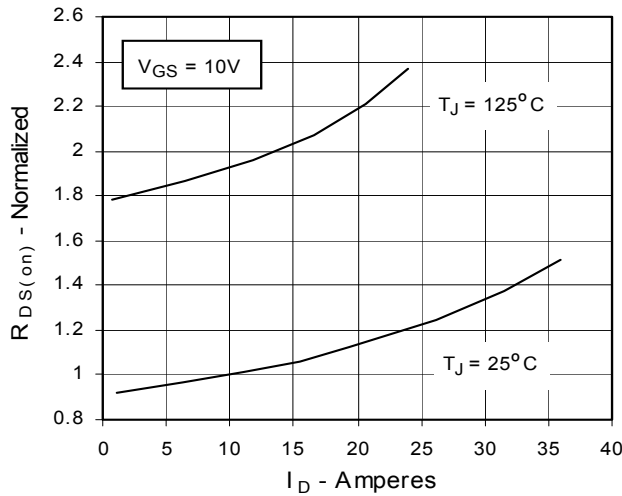
Fig. 6. Drain Current vs. Case Temperature
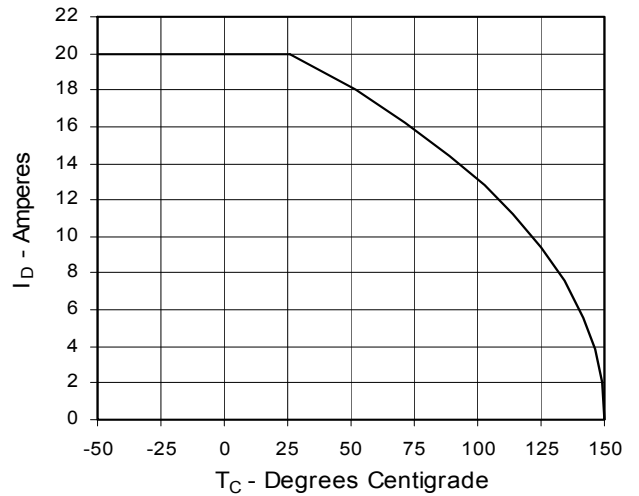
Fig. 7. Input Admittance

Fig. 7 plot: I_D - Amperes (y-axis, 0 to 24) vs V_{GS} - Volts (x-axis, 3.5 to 5.75). Curves for $T_J = 125^{\circ}C$, $25^{\circ}C$, $-40^{\circ}C$.
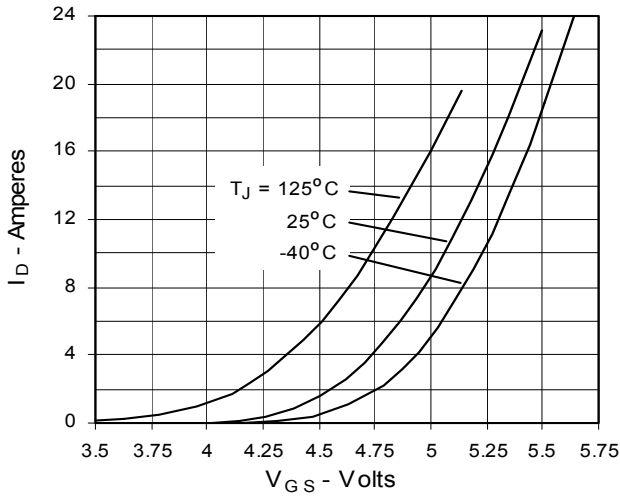
Fig. 8. Transconductance

Fig. 8 plot: g_{fs} - Siemens (y-axis, 0 to 40) vs I_D - Amperes (x-axis, 0 to 25). Curves for $T_J = -40^{\circ}C$, $25^{\circ}C$, $125^{\circ}C$.
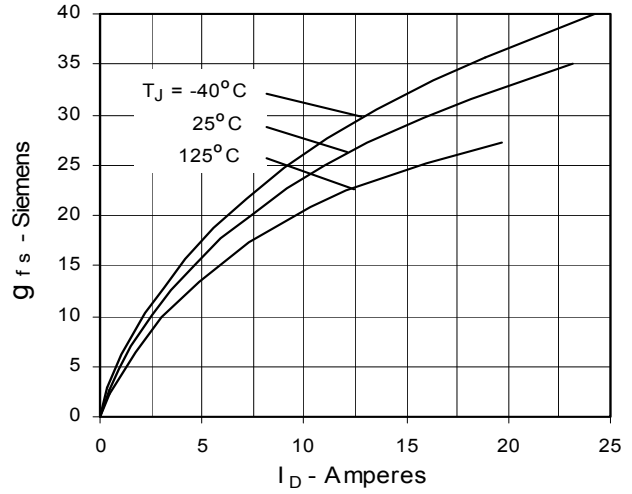
Fig. 9. Source Current vs. Source-To-Drain Voltage

Fig. 9 plot: I_S - Amperes (y-axis, 0 to 60) vs V_{SD} - Volts (x-axis, 0.4 to 1.2). Curves for $T_J = 125^{\circ}C$ and $T_J = 25^{\circ}C$.

Fig. 10. Gate Charge

Fig. 10 plot: V_{GS} - Volts (y-axis, 0 to 10) vs Q_G - nanoCoulombs (x-axis, 0 to 90). $V_{DS} = 400V$, $I_D = 10A$, $I_G = 10mA$.

Fig. 11. Capacitance

Fig. 11 plot: Capacitance - picoFarads (y-axis, 10 to 10000) vs V_{DS} - Volts (x-axis, 0 to 40). Curves for C_{iss}, C_{oss}, C_{rss}. f = 1MHz.
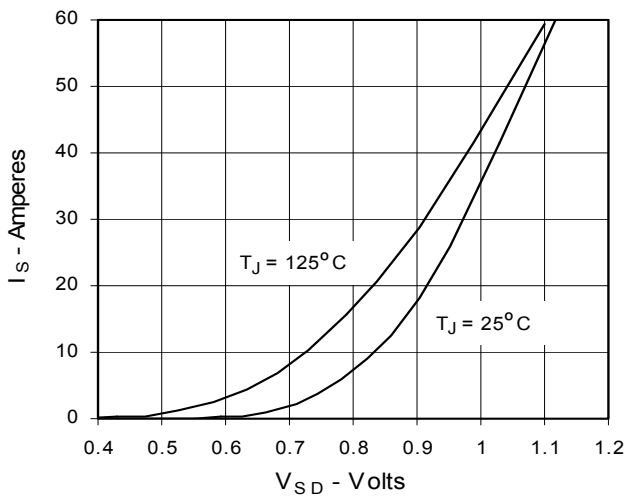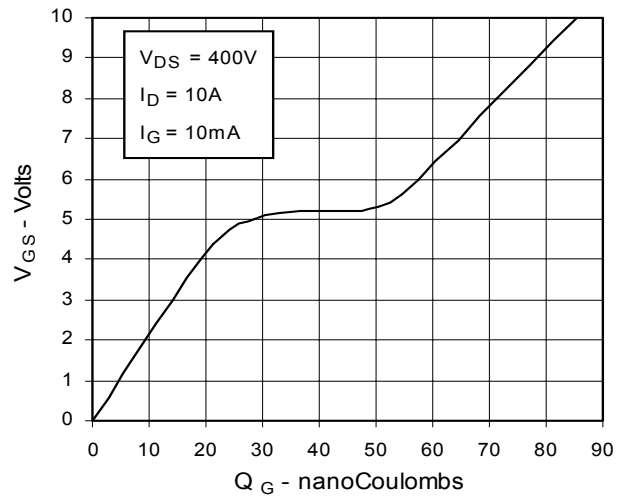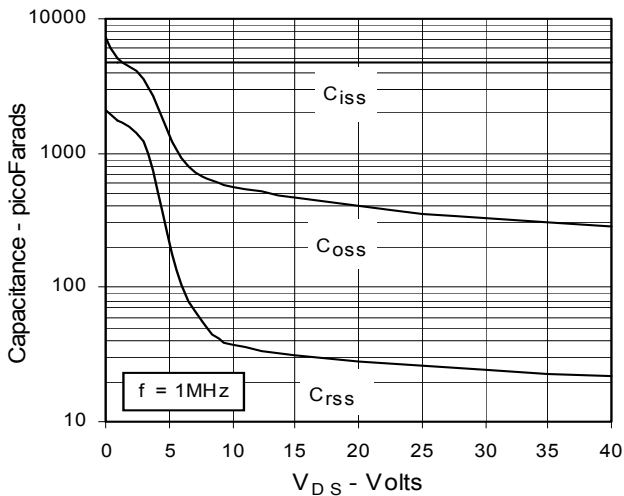
Fig. 12. Maximum Transient Thermal Resistance

Fig. 12 plot: $R_{(th)JC}$ - $^{\circ}C/W$ (y-axis, 0.01 to 1.00) vs Pulse Width - milliseconds (x-axis, 0.1 to 1000).

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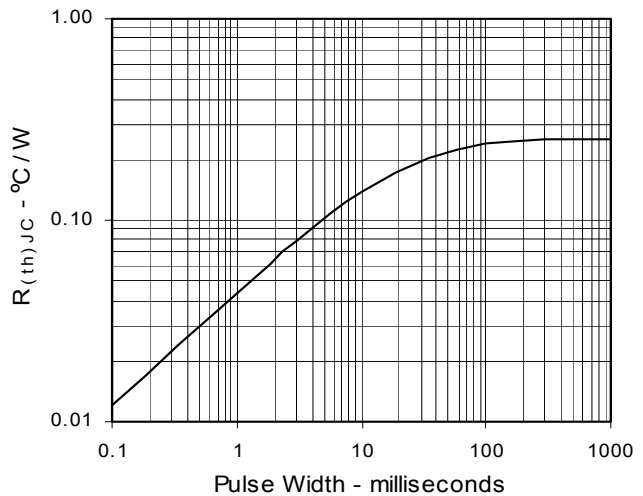
Package Outline Drawings

TO-247AD (IXFH) Outline

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.7	5.3	.185	.209
A₁	2.2	2.54	.087	.102
A₂	2.2	2.6	.059	.098
b	1.0	1.4	.040	.055
b₁	1.65	2.13	.065	.084
b₂	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	

TO-268 (IXFT) Outline

SYM	INCHES MIN	MAX	MILLIMETERS 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

PLUS220 (IXFV) Outline

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

SYM	INCHES MIN	MAX	MILLIMETER 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

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

SYM	INCHES MIN	MAX	MILLIMETER 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

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