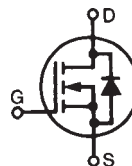


PolarHV™ HiPerFET Power MOSFETs

N-Channel Enhancement Mode
Fast Intrinsic Diode
Avalanche Rated

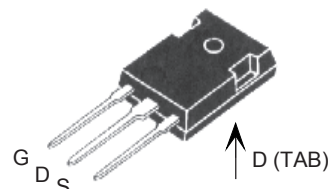
IXFH 22N60P
IXFV 22N60P
IXFV 22N60PS

$V_{DSS} = 600 \text{ V}$
 $I_{D25} = 22 \text{ A}$
 $R_{DS(on)} \leq 350 \text{ m}\Omega$
 $t_{rr} \leq 200 \text{ ns}$

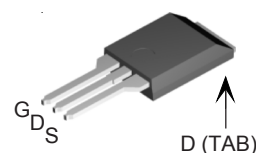


Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ\text{C}$ to 150°C	600	V
V_{DGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1 \text{ M}\Omega$	600	V
V_{GS}	Continuous	± 30	V
V_{GSM}	Transient	± 40	V
I_{D25}	$T_C = 25^\circ\text{C}$	22	A
I_{DM}	$T_C = 25^\circ\text{C}$, pulse width limited by T_{JM}	66	A
I_{AR}	$T_C = 25^\circ\text{C}$	22	A
E_{AR}	$T_C = 25^\circ\text{C}$	40	mJ
E_{AS}	$T_C = 25^\circ\text{C}$	1.0	J
dv/dt	$I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$ $T_J \leq 150^\circ\text{C}$, $R_G = 4 \Omega$	20	V/ns
P_D	$T_C = 25^\circ\text{C}$	400	W
T_J		-55 ... +150	$^\circ\text{C}$
T_{JM}		150	$^\circ\text{C}$
T_{stg}		-55 ... +150	$^\circ\text{C}$
T_L	1.6 mm (0.062 in.) from case for 10 s	300	$^\circ\text{C}$
T_{SOLD}	Plastic body for 10 s	260	$^\circ\text{C}$
M_d	Mounting torque (TO-247)	1.13/10	Nm/lb.in.
F_C	Mounting Force (PLUS220)	11..65/2.5..15	Nm/lb.
Weight	TO-247	6	g
	PLUS220 & PLUS220SMD	4	g

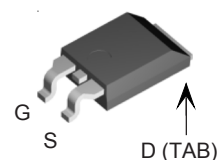
TO-247 (IXFH)



PLUS220 (IXFV)



PLUS220SMD (IXFV...S)



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

Symbol	Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
BV_{DSS}	$V_{GS} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$	600		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 4 \text{ mA}$	3.0		5.5 V
I_{GSS}	$V_{GS} = \pm 30 \text{ V}$, $V_{DS} = 0$			$\pm 100 \text{ nA}$
I_{DSS}	$V_{DS} = V_{DSS}$ $V_{GS} = 0 \text{ V}$ $T_J = 125^\circ\text{C}$			25 μA 250 μA
$R_{DS(on)}$	$V_{GS} = 10 \text{ V}$, $I_D = 0.5 I_{D25}$ Pulse test, $t \leq 300 \mu\text{s}$, duty cycle $d \leq 2 \%$			350 $\text{m}\Omega$

Features

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

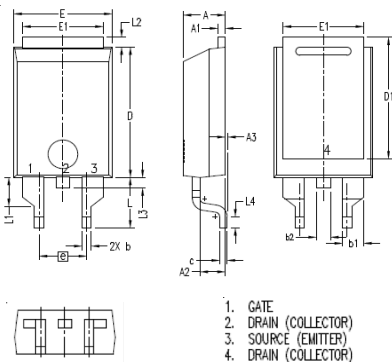
Advantages

- Easy to mount
- Space savings
- High power density

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	15	20	S
C_{iss}	V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz		3600	pF
C_{oss}			305	pF
C_{rss}			38	pF
$t_{d(on)}$	V _{GS} = 10 V, V _{DS} = 0.5 V _{DSS} , I _D = I _{D25} R _G = 4 Ω (External)		20	ns
t_r			20	ns
$t_{d(off)}$			60	ns
t_f			23	ns
$Q_{g(on)}$	V _{GS} = 10 V, V _{DS} = 0.5 V _{DSS} , I _D = 0.5 I _{D25}		58	nC
Q_{gs}			20	nC
Q_{gd}			22	nC
R_{thJC}			0.21	0.31 °C/W
R_{thCS}				°C/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			22 A
I _{SM}	Repetitive			66 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 = 26 A -di/dt = 100 A/μs V _R = 100V, V _{GS} = 0 V		1.0	200 ns
Q_{RM}				μC

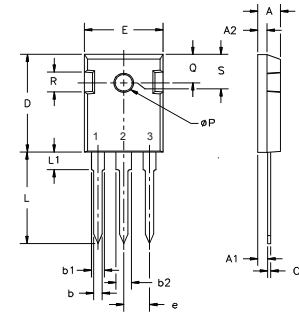
PLUS220SMD (IXFV_S) Outline



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
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

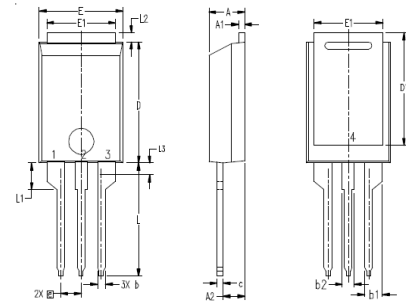
TO-247 AD (IXFH) Outline



- 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



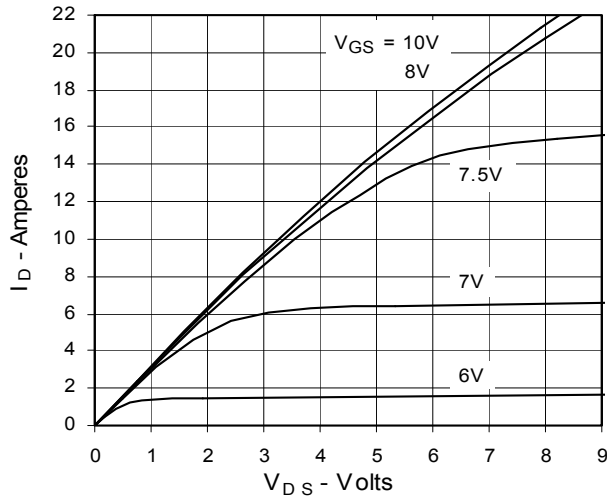
1. GATE
2. DRAIN (COLLECTOR)
3. SOURCE (EMITTER)
4. DRAIN (COLLECTOR)

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

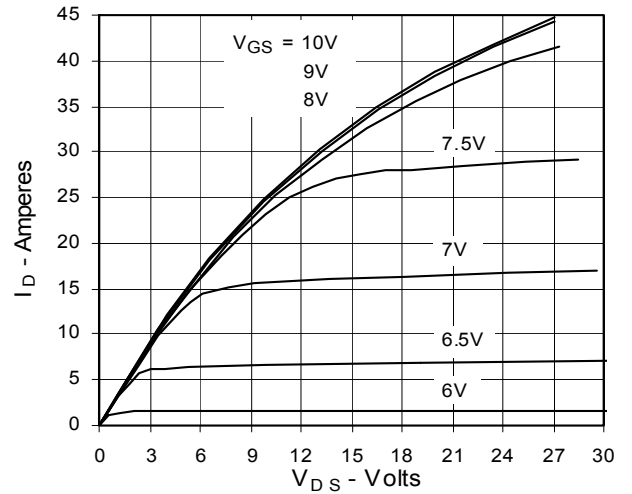
IXYS reserves the right to change limits, test conditions, and dimensions.

IXYS MOSFETs and IGBTs are covered by 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
one or more of the following U.S. patents: 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
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

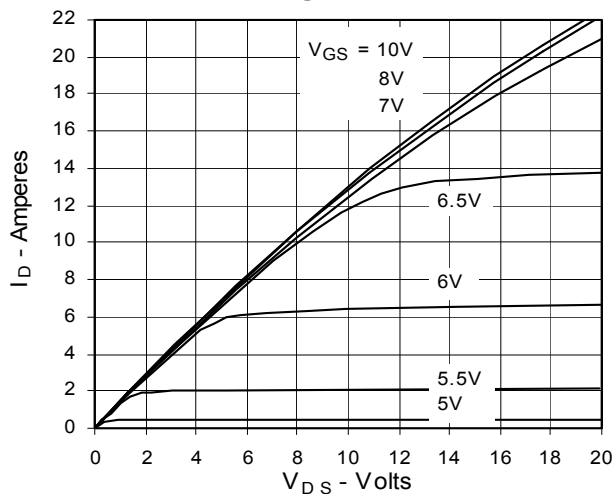
**Fig. 1. Output Characteristics
@ 25°C**



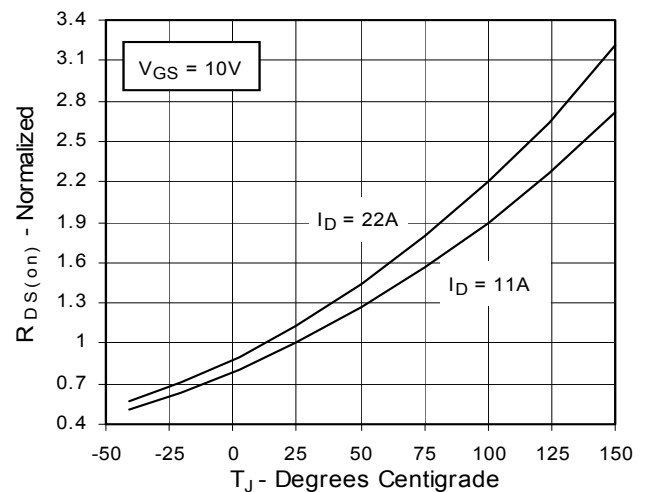
**Fig. 2. Extended Output Characteristics
@ 25°C**



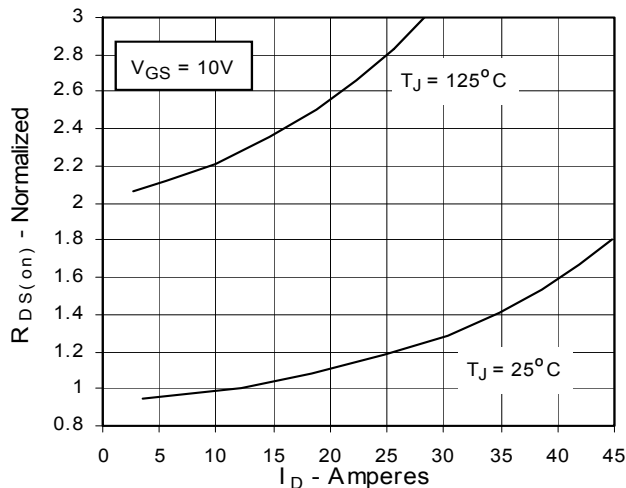
**Fig. 3. Output Characteristics
@ 125°C**



**Fig. 4. $R_{DS(on)}$ Normalized to $I_D = 11A$
Value vs. Junction Temperature**



**Fig. 5. $R_{DS(on)}$ Normalized to
 $I_D = 11A$ Value vs. Drain Current**



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

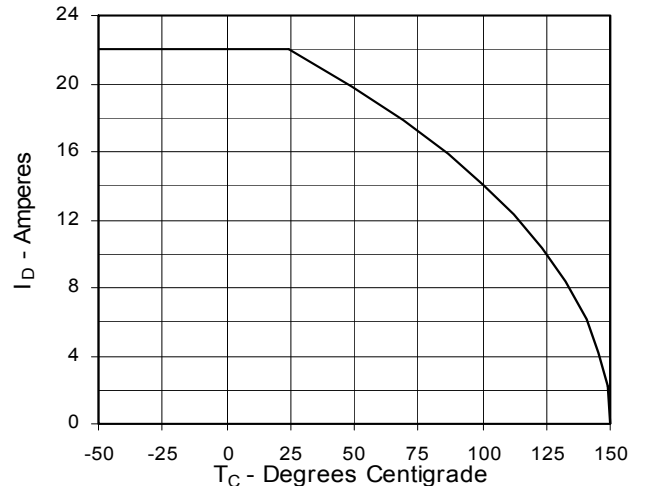


Fig. 7. Input Admittance

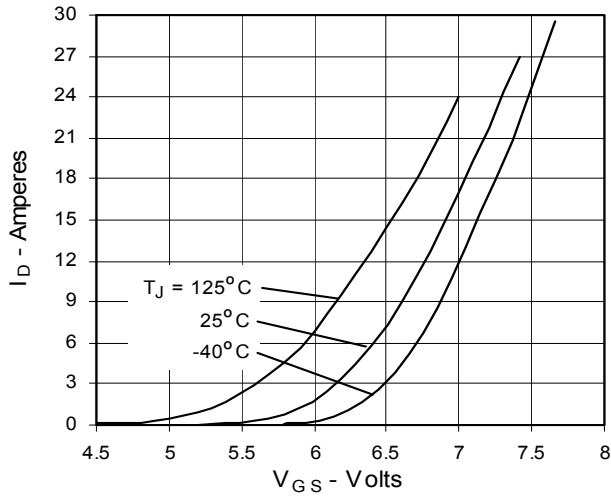
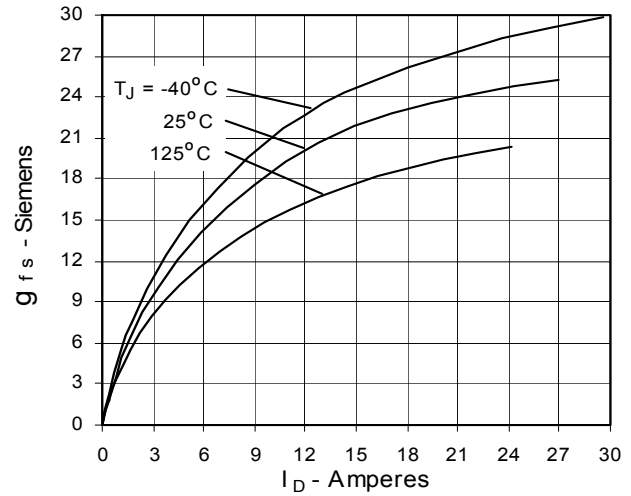


Fig. 8. Transconductance



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

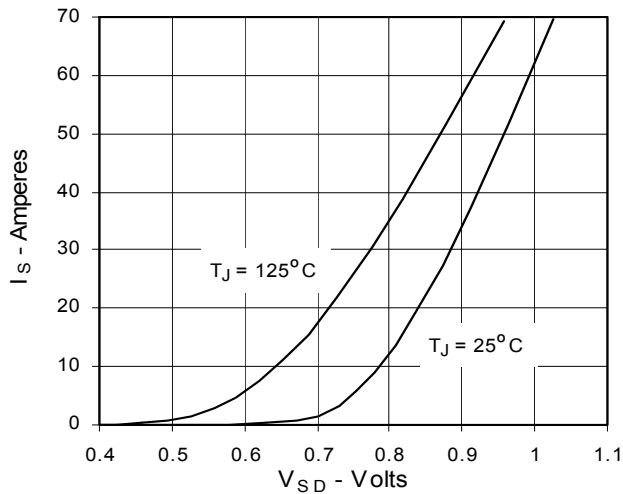


Fig. 10. Gate Charge

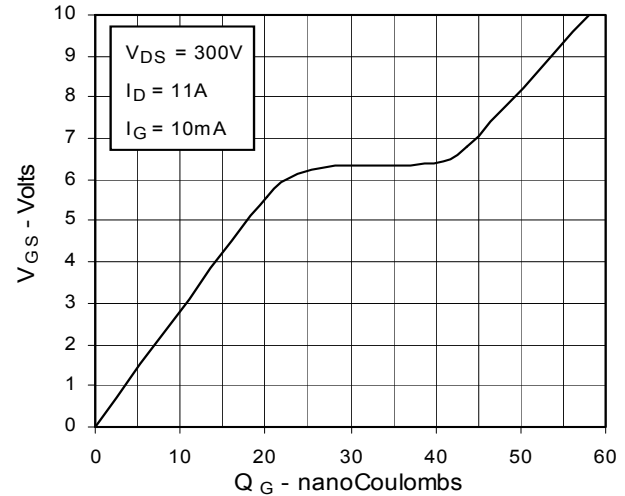
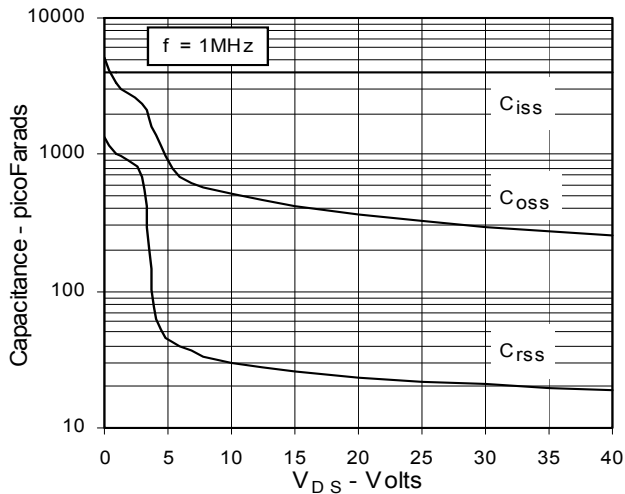


Fig. 11. Capacitance



**Fig. 12. Forward-Bias
Safe Operating Area**

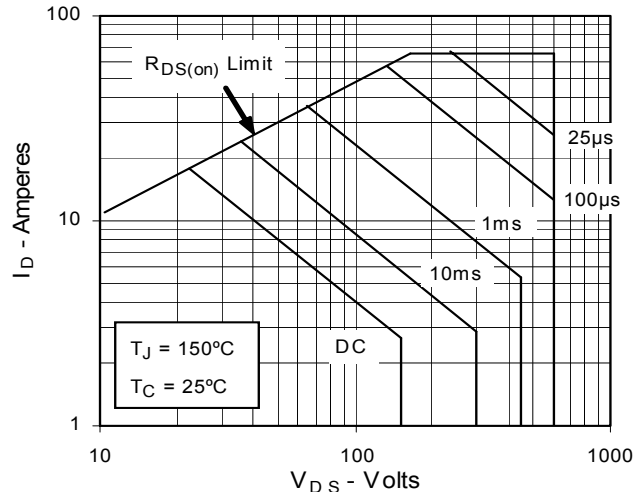
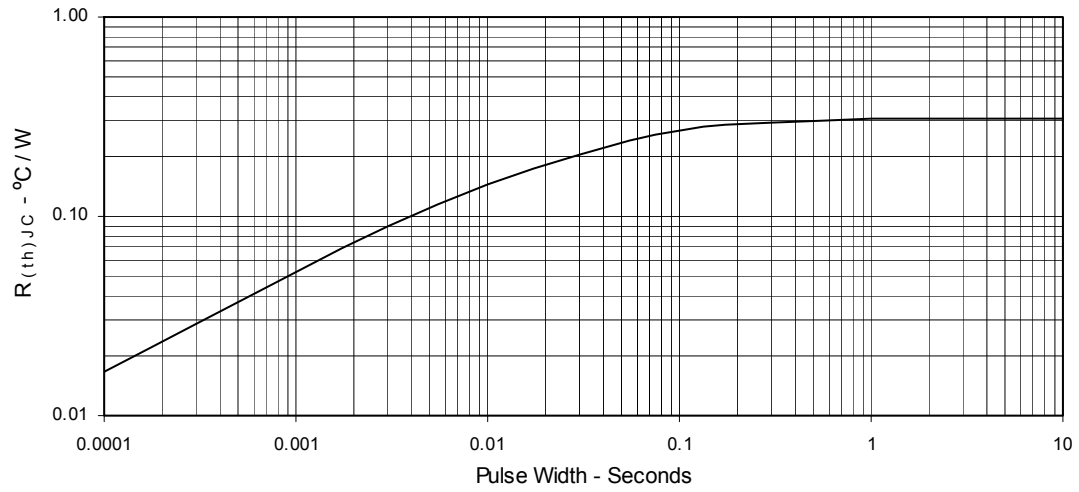


Fig. 13. Maximum Transient Thermal Resistance





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