IXYS

HiPerFET™ Power MOSFETs

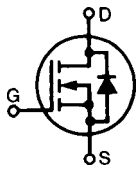
IXFH/~~IXFM~~42N20
IXFH/~~IXFM~~/IXFT50N20
IXFH/IXFT58N20

V_{DSS}	I_{D25}	$R_{DS(on)}$
200 V	42 A	60mΩ
200 V	50 A	45mΩ
200 V	58 A	40mΩ

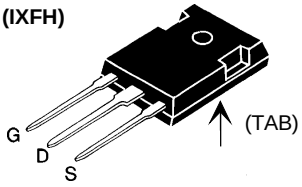
$t_{rr} \leq$ 200 ns

N-Channel Enhancement Mode
High dv/dt, Low t_{rr}, HDMOS™ Family

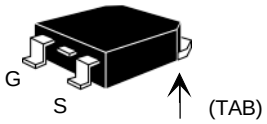
Obsolete:
IXFM42N20
IXFM50N20



TO-247 AD (IXFH)

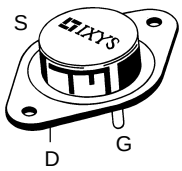


TO-268 (D3) Case Style



~~**TO-204 AE (IXFM)**~~

Package unavailable



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

Symbol	Test Conditions		Maximum Ratings	
V_{DSS}	T_J = 25°C to 150°C		200	V
V_{DGR}	T_J = 25°C to 150°C; R_{GS} = 1 MΩ		200	V
V_{GS}	Continuous		±20	V
V_{GSM}	Transient		±30	V
I_{D25}	T_C = 25°C	42N20	42	A
		50N20	50	A
		58N20	58	A
I_{DM}	T_C = 25°C, pulse width limited by T_{JM}	42N20	168	A
		50N20	200	A
		58N20	232	A
I_{AR}	T_C = 25°C	42N20	42	A
		50N20	50	A
		58N20	58	A
E_{AR}	T_C = 25°C		30	mJ
dv/dt	$I_S \leq I_{DM}$, di/dt ≤ 100 A/µs, $V_{DD} \leq V_{DSS}$, $T_J \leq$ 150°C, R_G = 2 Ω		5	V/ns
P_D	T_C = 25°C		300	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
M_d	Mounting torque		1.13/10	Nm/lb.in.
Weight			TO-204 = 18 g, TO-247 = 6 g	

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_{DSS}	V_{GS} = 0 V, I_D = 250 µA		200			V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 4 mA		2		4	V
I_{GSS}	V_{GS} = ±20 V_{DC}, V_{DS} = 0				±100	nA
I_{DSS}	V_{DS} = 0.8 • V_{DSS}	T_J = 25°C			200	µA
	V_{GS} = 0 V	T_J = 125°C			1	mA

Features
- International standard packages
- Low $R_{DS(on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- Unclamped Inductive Switching (UIS) rated
- Low package inductance
  - easy to drive and to protect
- Fast intrinsic Rectifier

Applications
- DC-DC converters
- Synchronous rectification
- Battery chargers
- Switched-mode and resonant-mode power supplies
- DC choppers
- AC motor control
- Temperature and lighting controls
- Low voltage relays

Advantages
- Easy to mount with 1 screw (TO-247) (isolated mounting screw hole)
- High power surface mountable package
- High power density

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

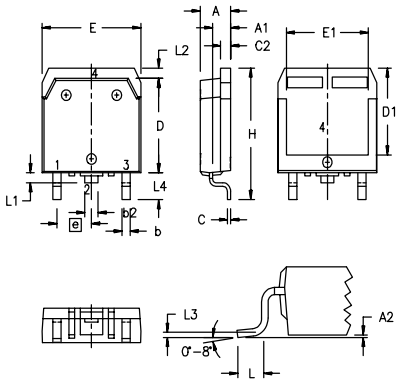
91522H (2/98)

Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
$R_{DS(on)}$	V_{GS} = 10 V, I_D = 0.5 I_{D25}	42N20			0.060	Ω
		50N20			0.045	Ω
		58N20			0.040	Ω
	Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %					
g_{fs}	V_{DS} = 10 V; I_D = 0.5 I_{D25}, pulse test		20	32		S
C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz			4400		pF
C_{oss}				800		pF
C_{rss}				285		pF
$t_{d(on)}$	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}			18	25	ns
t_r				15	20	ns
$t_{d(off)}$	R_G = 1 Ω (External)			72	90	ns
t_f				16	25	ns
$Q_{g(on)}$	V_{GS} = 10 V, V_{DS} = 0.5 V_{DSS}, I_D = 0.5 I_{D25}			190	220	nC
Q_{gs}				35	50	nC
Q_{gd}				95	110	nC
R_{thJC}					0.42	K/W
R_{thCK}	(TO-247 and TO-204 Case styles)			0.25		K/W

Source-Drain Diode

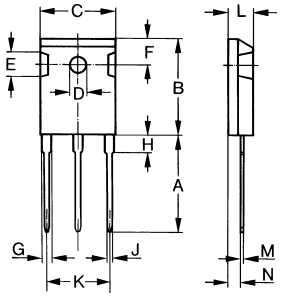
Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) Min.	Typ.	Max.	
I_S	V_{GS} = 0 V	42N20			42	A
		50N20			50	A
		58N20			58	A
I_{SM}	Repetitive;	42N20			168	A
	pulse width limited by T_{JM}	50N20			200	A
		58N20			232	A
V_{SD}	I_F = I_S, V_{GS} = 0 V, Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 %				1.5	V
t_{rr}	I_F = 25A, -di/dt = 100 A/μs, V_R = 100 V	T_J = 25°C			200	ns
		T_J = 125°C			300	ns
Q_{RM}		T_J = 25°C		1.5		μC
		T_J = 125°C		2.6		μC
I_{RM}		T_J = 25°C		19		A
		T_J = 125°C		23		A

TO-268AA (D³ PAK)



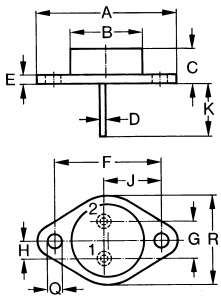
Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.9	5.1	.193	.201
A_1	2.7	2.9	.106	.114
A_2	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b_2	1.9	2.1	.75	.83
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E_1	13.3	13.6	.524	.535
e	5.45 BSC		.215 BSC	
H	18.70	19.10	.736	.752
L	2.40	2.70	.094	.106
L1	1.20	1.40	.047	.055
L2	1.00	1.15	.039	.045
L3	0.25 BSC		.010 BSC	
L4	3.80	4.10	.150	.161

TO-247 AD (IXFH) Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

TO-204 AE (IXFM) Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	38.61	39.12	1.520	1.540
B	-	22.22	-	0.875
C	6.40	11.40	0.252	0.449
D	1.45	1.60	0.057	0.063
E	1.52	3.43	0.060	0.135
F	30.15	BSC	1.187	BSC
G	10.67	11.17	0.420	0.440
H	5.21	5.71	0.205	0.225
J	16.64	17.14	0.655	0.675
K	11.18	12.19	0.440	0.480
Q	3.84	4.19	0.151	0.165
R	25.16	26.66	0.991	1.050

Min. Recommended Footprint

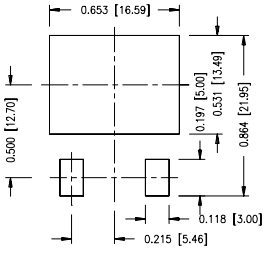


Fig. 1 Output Characteristics

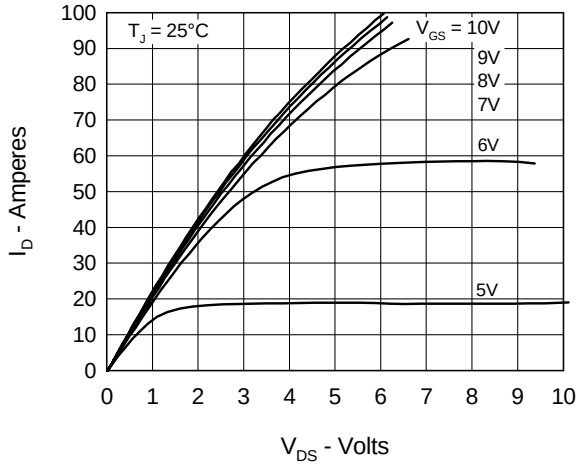


Fig. 2 Input Admittance

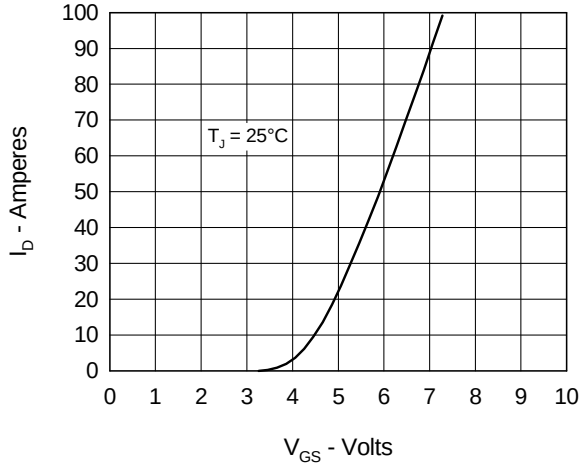


Fig. 3 $R_{DS(on)}$ vs. Drain Current

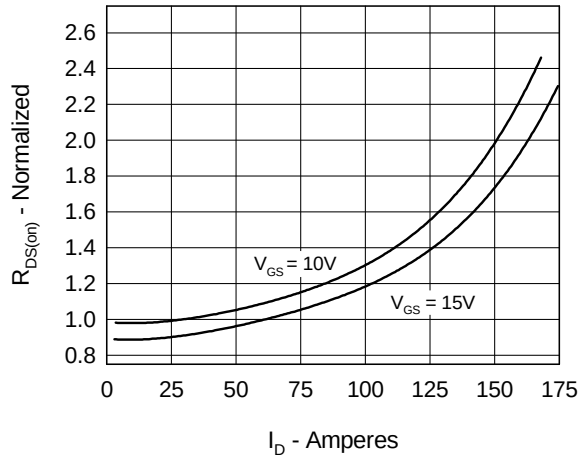


Fig. 4 Temperature Dependence of Drain to Source Resistance

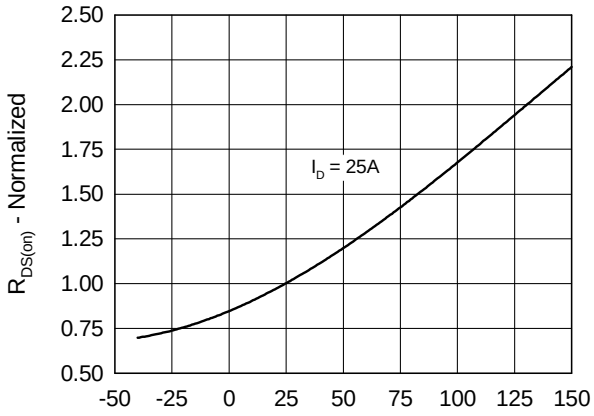


Fig. 5 Drain Current vs. Case Temperature

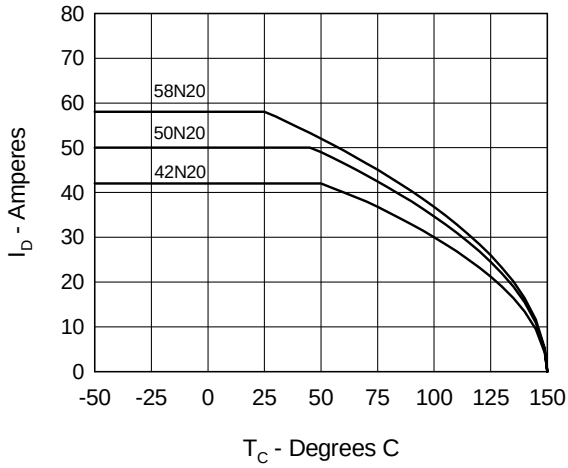


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

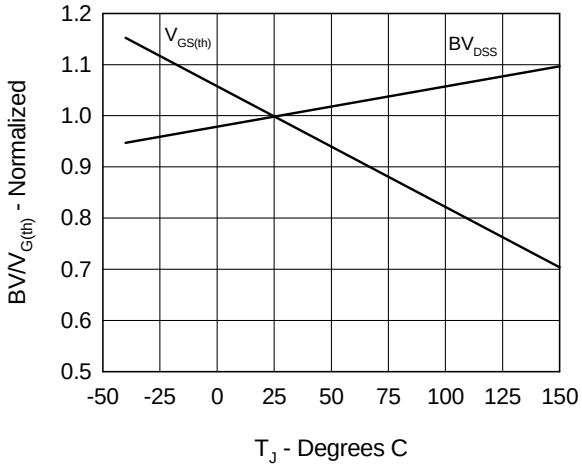


Fig.7 Gate Charge Characteristic Curve

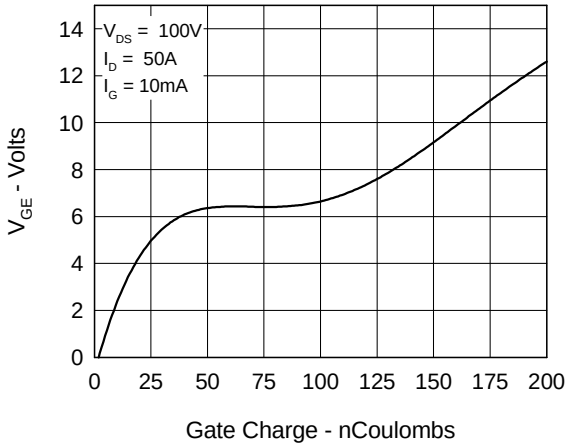


Fig.8 Forward Bias Safe Operating Area

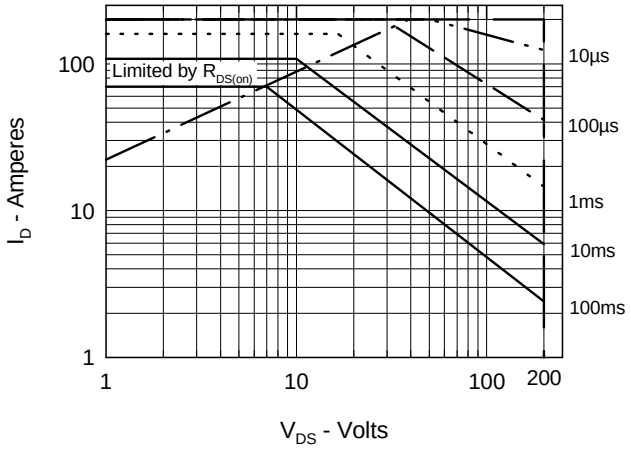


Fig.9 Capacitance Curves

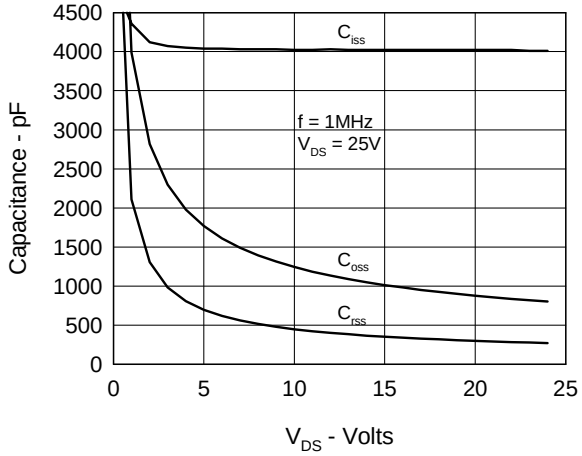


Fig.10 Source Current vs. Source to Drain Voltage

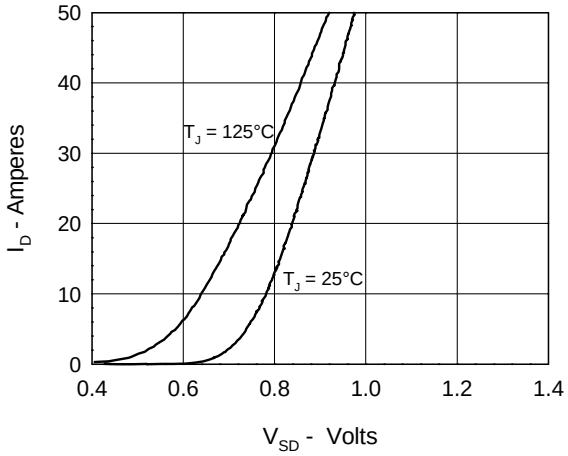


Fig.11 Transient Thermal Impedance