

# HiPerFET™ Power MOSFETs

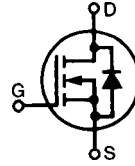
~~IXFH/IXFM42N20~~  
~~IXFH/IXFM/IXFT50N20~~  
IXFH/IXFT58N20

N-Channel Enhancement Mode  
High dv/dt, Low t<sub>rr</sub>, HDMOS™ Family

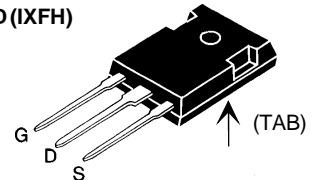
**Obsolete:**  
IXFM42N20  
IXFM50N20

V <sub>DSS</sub>	I <sub>D25</sub>	R <sub>DS(on)</sub>
200 V	42 A	60mΩ
200 V	50 A	45mΩ
200 V	58 A	40mΩ

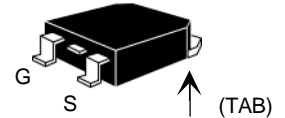
t<sub>rr</sub> ≤ 200 ns



TO-247 AD (IXFH)

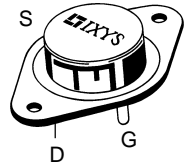


TO-268 (D3) Case Style



~~TO-204 AE (IXFM)~~

**Package  
unavailable**



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

Symbol	Test Conditions	Maximum Ratings	
V <sub>DSS</sub>	T <sub>J</sub> = 25°C to 150°C	200	V
V <sub>DGR</sub>	T <sub>J</sub> = 25°C to 150°C; R <sub>GS</sub> = 1 MΩ	200	V
V <sub>GS</sub>	Continuous	±20	V
V <sub>GSM</sub>	Transient	±30	V
I <sub>D25</sub>	T <sub>C</sub> = 25°C	42N20	42 A
		50N20	50 A
		58N20	58 A
I <sub>DM</sub>	T <sub>C</sub> = 25°C, pulse width limited by T <sub>JM</sub>	42N20	168 A
		50N20	200 A
		58N20	232 A
I <sub>AR</sub>	T <sub>C</sub> = 25°C	42N20	42 A
		50N20	50 A
		58N20	58 A
E <sub>AR</sub>	T <sub>C</sub> = 25°C	30	mJ
dv/dt	I <sub>S</sub> ≤ I <sub>DM</sub> , di/dt ≤ 100 A/μs, V <sub>DD</sub> ≤ V <sub>DSS</sub> , T <sub>J</sub> ≤ 150°C, R <sub>G</sub> = 2 Ω	5	V/ns
P <sub>D</sub>	T <sub>C</sub> = 25°C	300	W
T <sub>J</sub>		-55 ... +150	°C
T <sub>JM</sub>		150	°C
T <sub>stg</sub>		-55 ... +150	°C
T <sub>L</sub>	1.6 mm (0.062 in.) from case for 10 s	300	°C
M <sub>d</sub>	Mounting torque	1.13/10	Nm/lb.in.
Weight		TO-204 = 18 g, TO-247 = 6 g	

### Features

- International standard packages
- Low R<sub>DS(on)</sub> 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

Symbol	Test Conditions	Characteristic Values (T <sub>J</sub> = 25°C, unless otherwise specified)		
		min.	typ.	max.
V <sub>DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	200		V
V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 4 mA	2		V
I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V <sub>DC</sub> , V <sub>DS</sub> = 0			±100 nA
I <sub>DSS</sub>	V <sub>DS</sub> = 0.8 • V <sub>DSS</sub> V <sub>GS</sub> = 0 V	T <sub>J</sub> = 25°C	200	μA
		T <sub>J</sub> = 125°C	1	mA

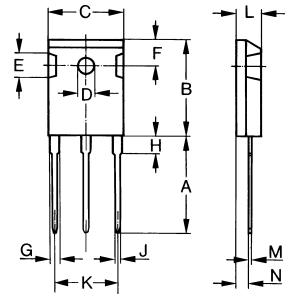
Symbol	Test Conditions ( $T_J = 25^\circ\text{C}$ , unless otherwise specified)	Characteristic Values		
		Min.	Typ.	Max.
$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ , $I_D = 0.5 I_{D25}$	42N20		0.060 $\Omega$
		50N20		0.045 $\Omega$
		58N20		0.040 $\Omega$
Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d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

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

**TO-268AA (D<sup>3</sup> PAK)**

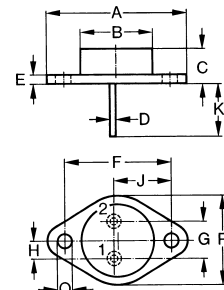
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	4.9	5.1	.193	.201
A <sub>1</sub>	2.7	2.9	.106	.114
A <sub>2</sub>	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b <sub>2</sub>	1.9	2.1	.75	.83
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E <sub>1</sub>	13.3	13.6	.524	.535
e	5.45 BSC		.215 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		Inches	
	Min.	Max.	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		Inches	
	Min.	Max.	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

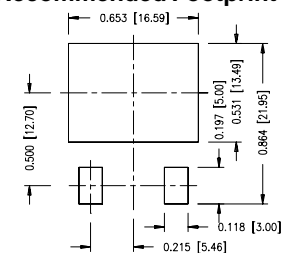


Fig. 1 Output Characteristics

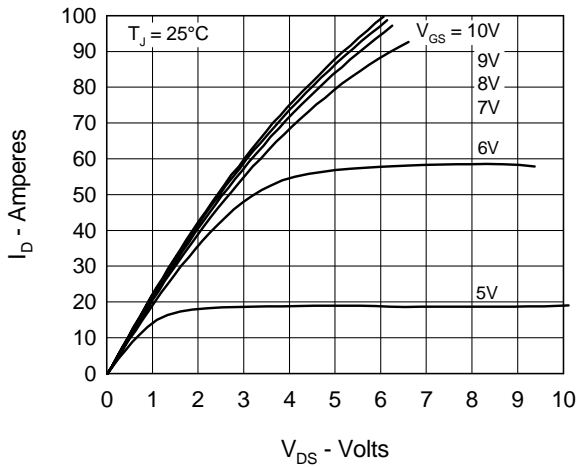


Fig. 2 Input Admittance

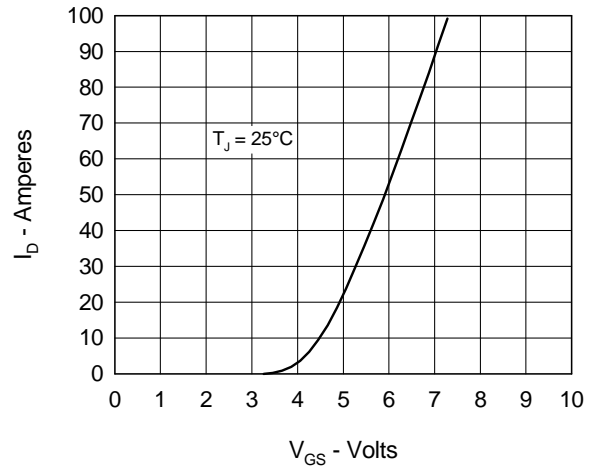


Fig. 3  $R_{DS(on)}$  vs. Drain Current

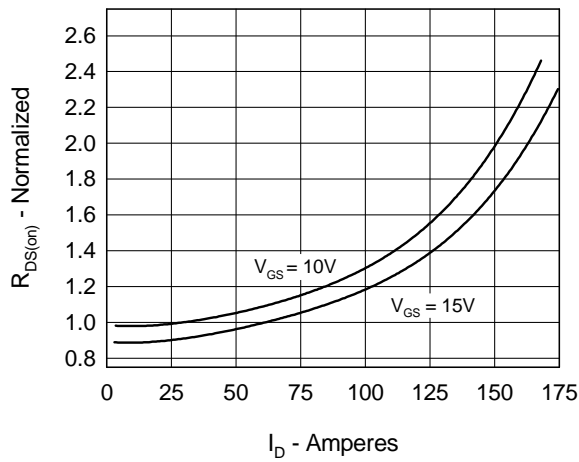


Fig. 4 Temperature Dependence of Drain to Source Resistance

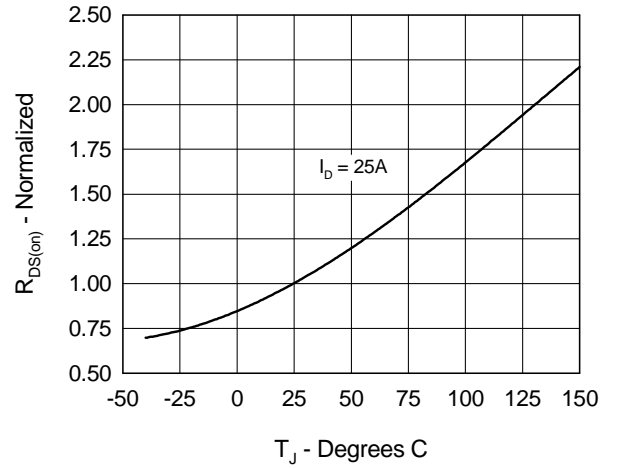


Fig. 5 Drain Current vs. Case Temperature

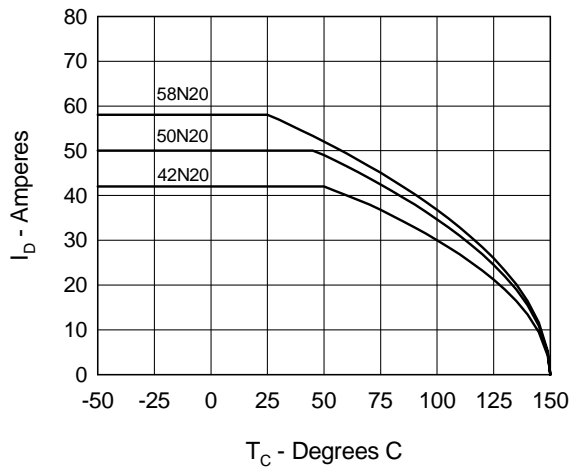


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

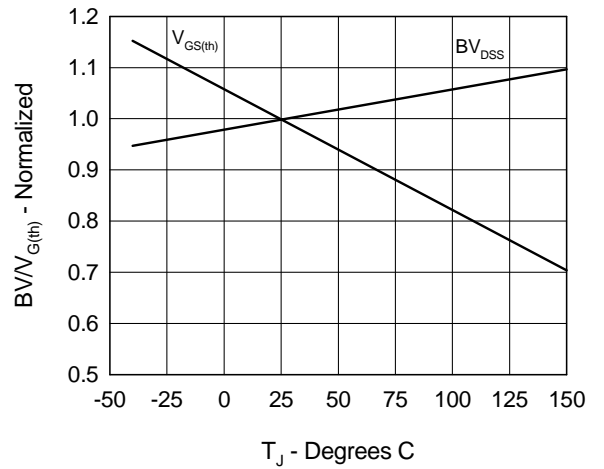


Fig.7 Gate Charge Characteristic Curve

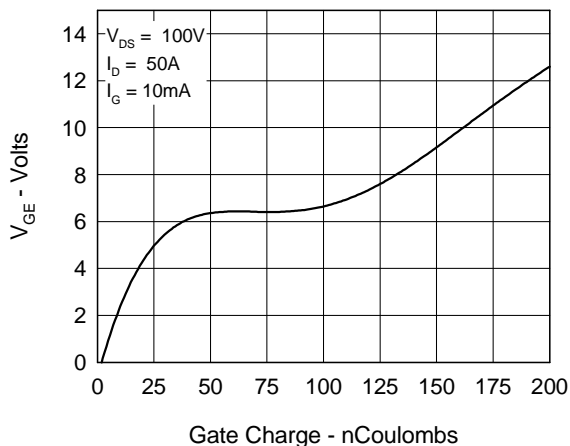


Fig.8 Forward Bias Safe Operating Area

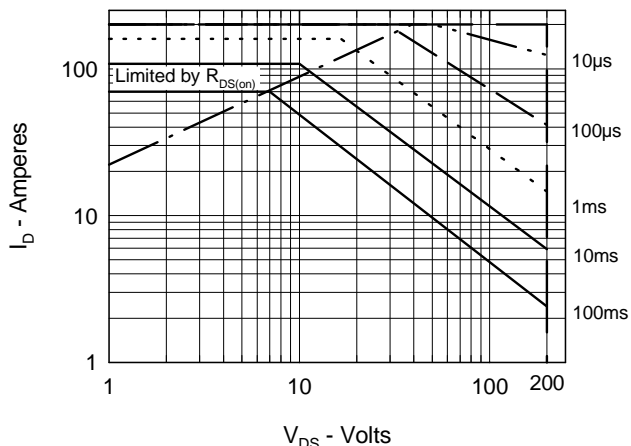


Fig.9 Capacitance Curves

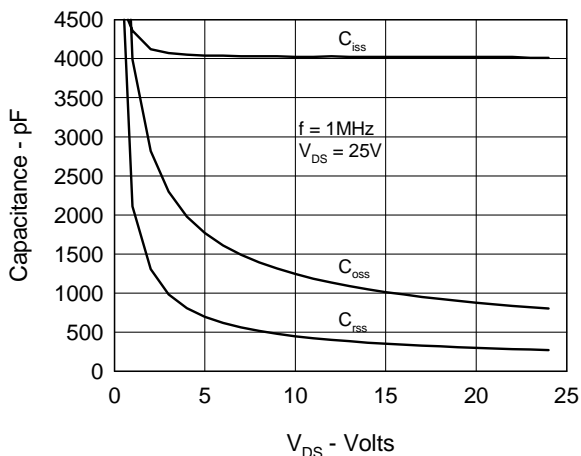


Fig.10 Source Current vs. Source to Drain Voltage

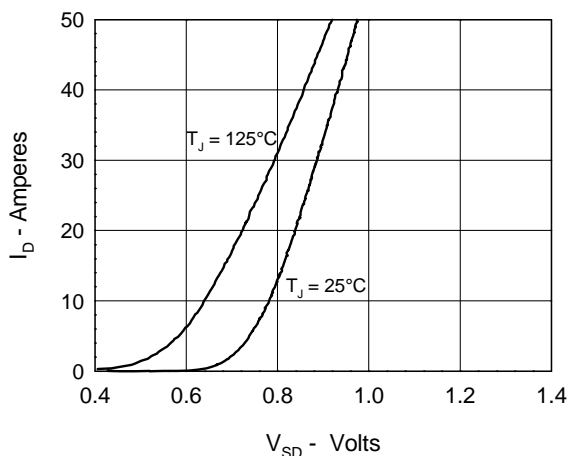
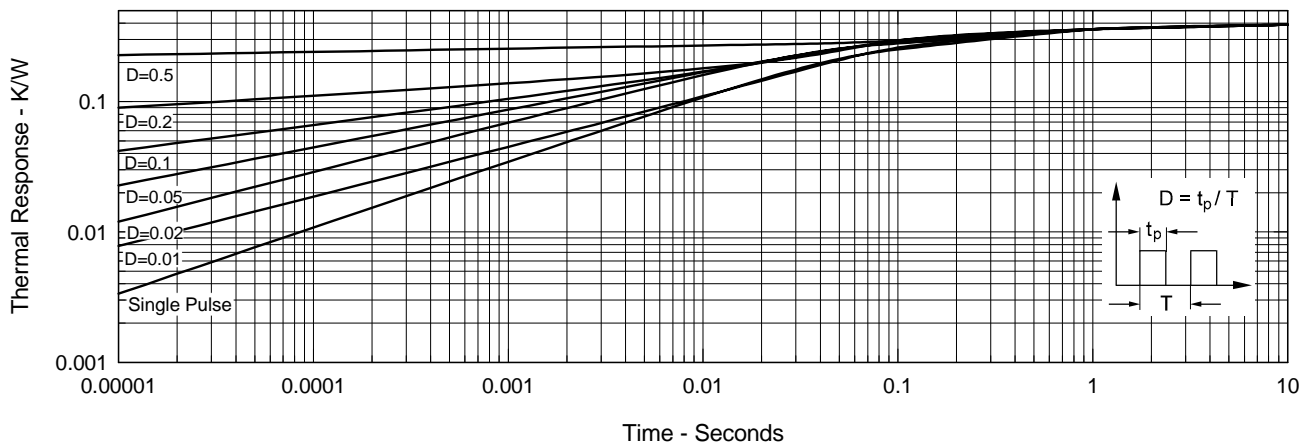


Fig.11 Transient Thermal Impedance





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