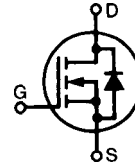


HiPerFET™ Power MOSFETs

IXFH/IXFM10N90
IXFH/IXFM12N90
IXFH13N90

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

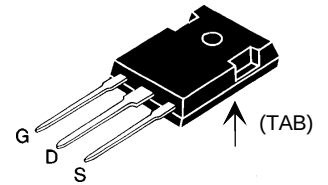


V_{DSS}	I_{D25}	$R_{DS(on)}$
900 V	10 A	1.1 Ω
900 V	12 A	0.9 Ω
900 V	13 A	0.8 Ω

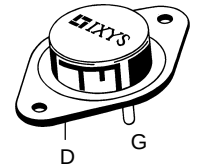
$t_{rr} \leq 250$ ns

Symbol	Test Conditions	Maximum Ratings	
V_{DSS}	$T_J = 25^\circ\text{C}$ to 150°C	900	V
V_{DGR}	$T_J = 25^\circ\text{C}$ to 150°C ; $R_{GS} = 1$ M Ω	900	V
V_{GS}	Continuous	± 20	V
V_{GSM}	Transient	± 30	V
I_{D25}	$T_C = 25^\circ\text{C}$	10N90	10 A
		12N90	12 A
		13N90	13 A
I_{DM}	$T_C = 25^\circ\text{C}$, pulse width limited by T_{JM}	10N90	40 A
		12N90	48 A
		13N90	13 A
I_{AR}	$T_C = 25^\circ\text{C}$	10N90	10 A
		12N90	12 A
		13N90	13 A
E_{AR}	$T_C = 25^\circ\text{C}$	30	mJ
dv/dt	$I_S \leq I_{DM}$, di/dt ≤ 100 A/ μs , $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 2$ Ω	5	V/ns
P_D	$T_C = 25^\circ\text{C}$	300	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	$^\circ\text{C}$
M_d	Mounting torque	1.13/10	Nm/lb.in.
Weight		TO-204 = 18 g, TO-247 = 6 g	

TO-247 AD (IXFH)



TO-204 AA (IXFM)



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

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)
- Space savings
- High power density

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
V_{DSS}	$V_{GS} = 0$ V, $I_D = 3$ mA	900		V
$V_{GS(th)}$	$V_{DS} = V_{DSS}$, $I_D = 4$ mA	2.0		4.5 V
I_{GSS}	$V_{GS} = \pm 20$ V $_{DC}$, $V_{DS} = 0$			± 100 nA
I_{DSS}	$V_{DS} = V_{DSS}$ $V_{GS} = 0$ V	$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$		25 μA
				1 mA
$R_{DS(on)}$	$V_{GS} = 10$ V, $I_D = 0.5 \cdot I_{D25}$	10N90		1.1 Ω
		12N90		0.9 Ω
		13N90		0.8 Ω
		Pulse test, $t \leq 300$ μs , duty cycle $d \leq 2$ %		

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

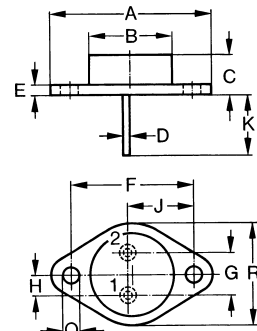
91530G (3/98)

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
g_{fs}	$V_{DS} = 10\text{ V}$; $I_D = 0.5 \cdot I_{D25}$, pulse test	6	12	S
C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$		4200	pF
C_{oss}			315	pF
C_{rss}			90	pF
$t_{d(on)}$	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$ $R_G = 2\ \Omega$ (External)		18	50 ns
t_r			12	50 ns
$t_{d(off)}$			51	100 ns
t_f			18	50 ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}$, $V_{DS} = 0.5 \cdot V_{DSS}$, $I_D = 0.5 \cdot I_{D25}$		123	155 nC
Q_{gs}			27	45 nC
Q_{gd}			49	80 nC
R_{thJC}		0.25		0.42 K/W
R_{thCK}				K/W

Source-Drain Diode		Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
Symbol	Test Conditions	min.	typ.	max.
I_S	$V_{GS} = 0\text{ V}$	10N90 12N90 13N90		10 A 12 A 13 A
I_{SM}	Repetitive; pulse width limited by T_{JM}	10N90 12N90 13N90		40 A 48 A 52 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}	$I_F = I_S$ $-di/dt = 100\text{ A}/\mu\text{s}$, $V_R = 100\text{ V}$	$T_J = 25^\circ\text{C}$		250 ns
		$T_J = 125^\circ\text{C}$		400 ns
Q_{RM}		$T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$	1 2	μC μC
I_{RM}		$T_J = 25^\circ\text{C}$	10	A
		$T_J = 125^\circ\text{C}$	15	A

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 AA (IXFM) Outline


Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	38.61	39.12	1.520	1.540
B	19.43	19.94	-	0.785
C	6.40	9.14	0.252	0.360
D	0.97	1.09	0.038	0.043
E	1.53	2.92	0.060	0.115
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	25.90	0.991	1.020

Fig. 1 Output Characteristics

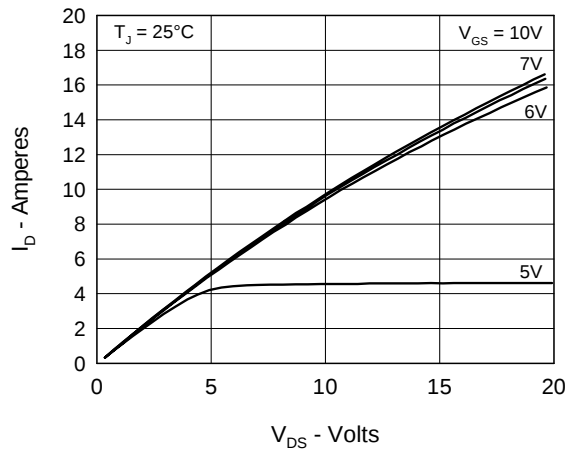


Fig. 2 Input Admittance

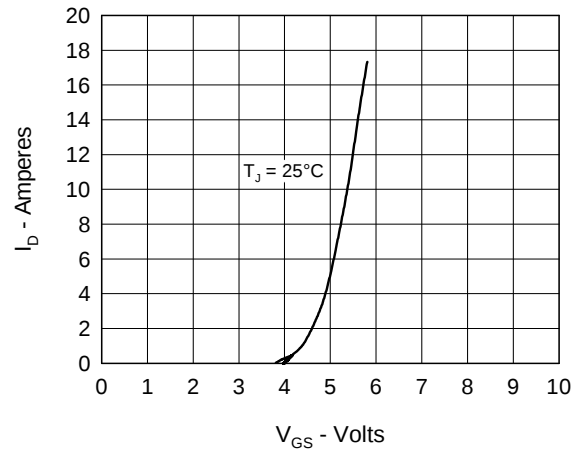


Fig. 3 $R_{DS(on)}$ vs. Drain Current

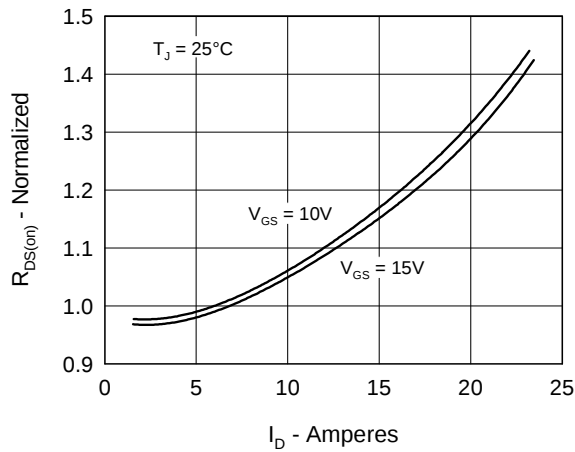


Fig. 4 Temperature Dependence of Drain to Source Resistance

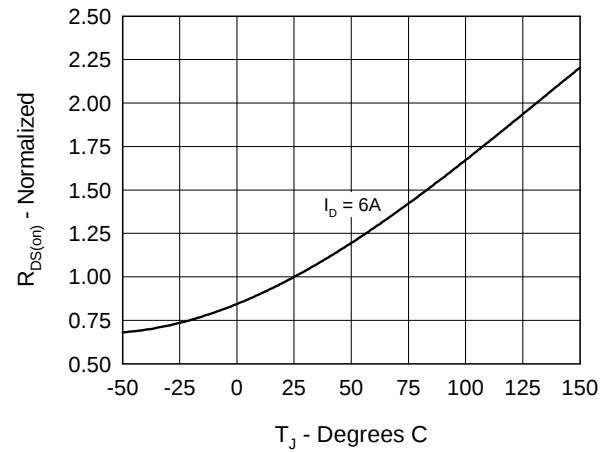


Fig. 5 Drain Current vs. Case Temperature

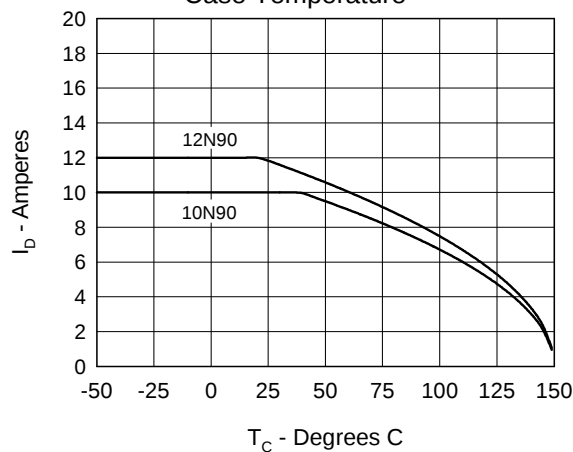


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

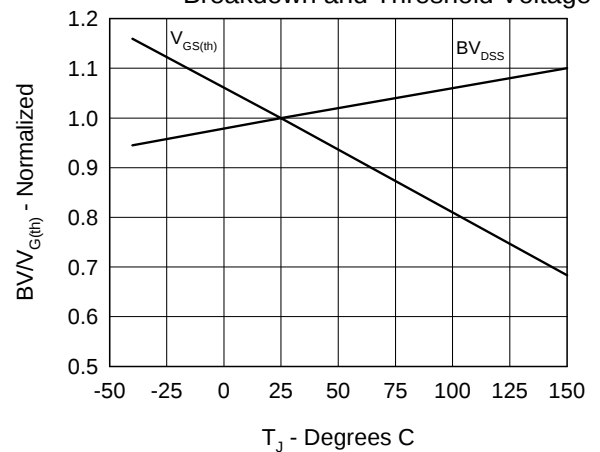


Fig.7 Gate Charge Characteristic Curve

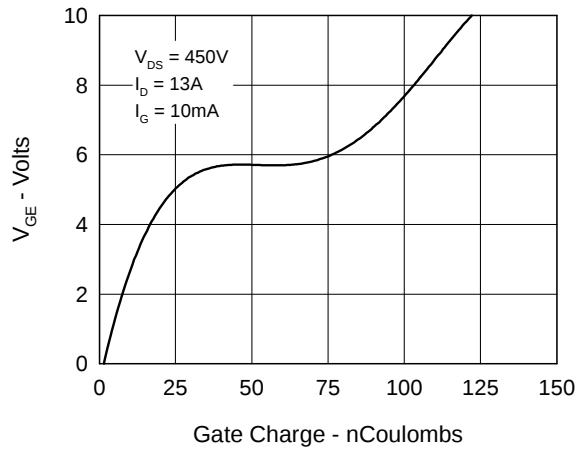


Fig.8 Forward Bias Safe Operating Area

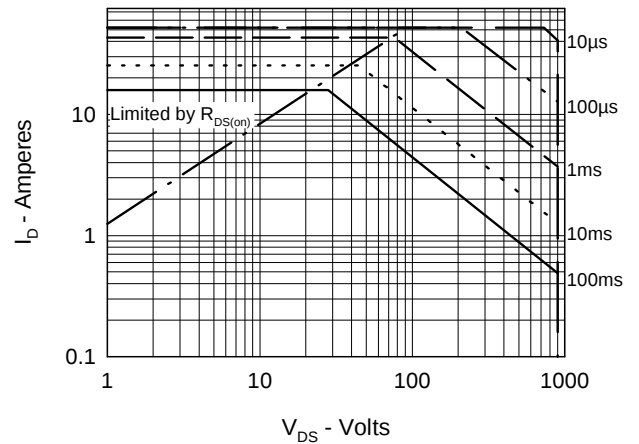


Fig.9 Capacitance Curves

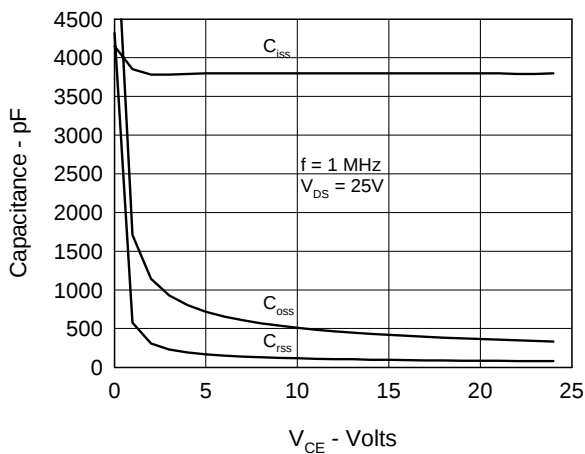


Fig.10 Source Current vs. Source to Drain Voltage

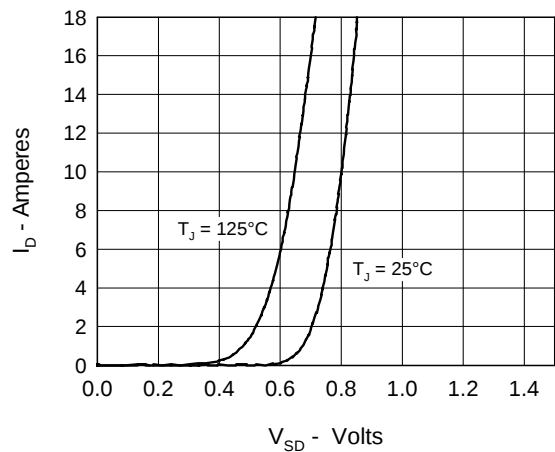


Fig.11 Transient Thermal Impedance

