



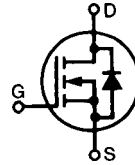
THE DATASHEET OF IXFH15N60



HiPerFET™ Power MOSFETs

IXFH/IXFM15N60
IXFH/IXFM20N60

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

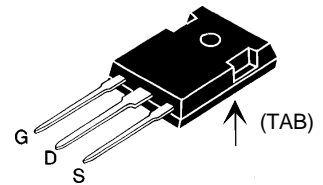


V_{DSS}	I_{D25}	$R_{DS(on)}$
600 V	15 A	0.50 Ω
600 V	20 A	0.35 Ω

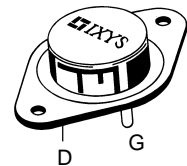
$t_{rr} \leq 250$ ns

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	± 20	V
V_{GSM}	Transient	± 30	V
I_{D25}	$T_C = 25^\circ\text{C}$	15N60	15 A
		20N60	20 A
I_{DM}	$T_C = 25^\circ\text{C}$, pulse width limited by T_{JM}	15N60	60 A
		20N60	80 A
I_{AR}	$T_C = 25^\circ\text{C}$	15N60	15 A
		20N60	20 A
E_{AR}	$T_C = 25^\circ\text{C}$	30	mJ
dv/dt	$I_S \leq I_{DM}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 2\ \Omega$	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 AE (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

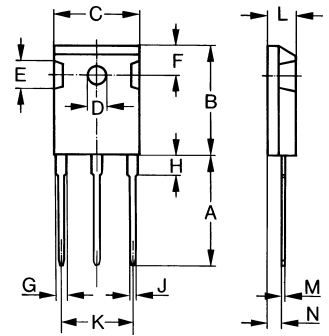
Advantages

- Easy to mount with 1 screw (TO-247) (isolated mounting screw hole)
- Space savings
- High power density

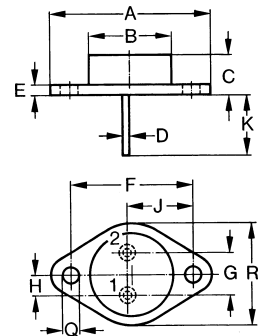
Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
V_{DSS}	$V_{GS} = 0\text{ V}$, $I_D = 250\ \mu\text{A}$	600		V
$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 4\text{ mA}$	2.0		4.5 V
I_{GSS}	$V_{GS} = \pm 20\text{ V}_{DC}$, $V_{DS} = 0$			$\pm 100\text{ nA}$
I_{DSS}	$V_{DS} = 0.8 \cdot V_{DSS}$ $V_{GS} = 0\text{ V}$	$T_J = 25^\circ\text{C}$		250 μA
		$T_J = 125^\circ\text{C}$		1 mA
$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 0.5 \cdot I_{D25}$ Pulse test, $t \leq 300\ \mu\text{s}$, duty cycle $d \leq 2\%$	15N60		0.50 Ω
		20N60		0.35 Ω

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	11	18	S	
C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		4500	pF	
C_{oss}			420	pF	
C_{rss}			140	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)		20	40	ns
t_r			43	60	ns
$t_{d(off)}$			70	90	ns
t_f			40	60	ns
$Q_{g(on)}$	$V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}; I_D = 0.5 \cdot I_{D25}$		151	170	nC
Q_{gs}			29	40	nC
Q_{gd}			60	85	nC
R_{thJC}			0.42	K/W	
R_{thCK}		0.25		K/W	

Symbol	Test Conditions	Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified)		
		min.	typ.	max.
I_S	$V_{GS} = 0\text{ V}$	15N60 20N60		15 A 20 A
I_{SM}	Repetitive; pulse width limited by T_{JM}	15N60 20N60		60 A 80 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}	$I_F = I_S$ $-di/dt = 100\text{ A}/\mu\text{s}$, $V_R = 100\text{ V}$	$T_J = 25^\circ\text{C}$	1	μC
		$T_J = 125^\circ\text{C}$	2	μC
I_{RM}	$I_F = I_S$ $-di/dt = 100\text{ A}/\mu\text{s}$, $V_R = 100\text{ V}$	$T_J = 25^\circ\text{C}$	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	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

Fig. 1 Output Characteristics

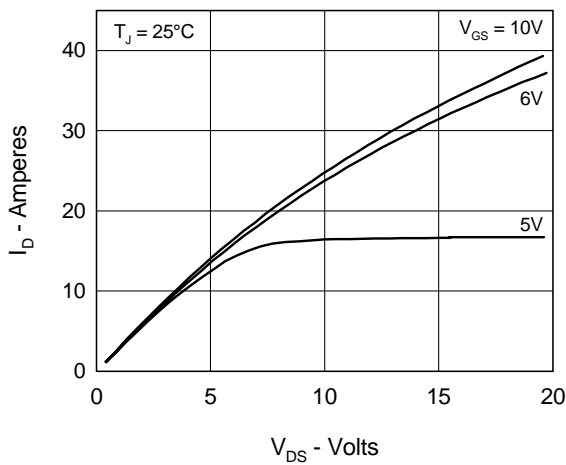


Fig. 2 Input Admittance

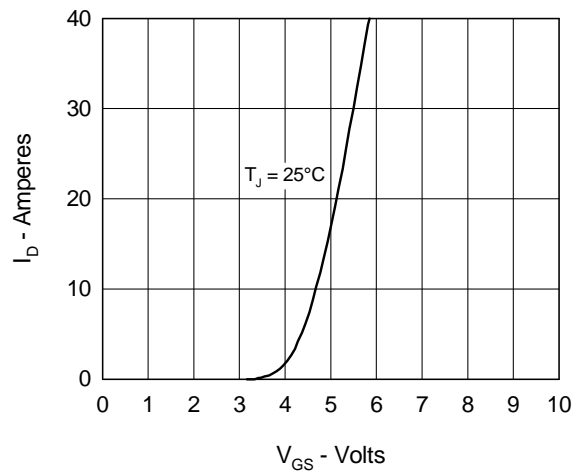


Fig. 3 $R_{DS(on)}$ vs. Drain Current

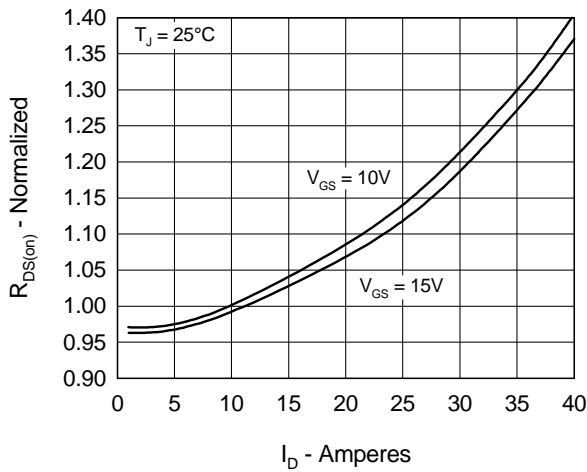


Fig. 4 Temperature Dependence of Drain to Source Resistance

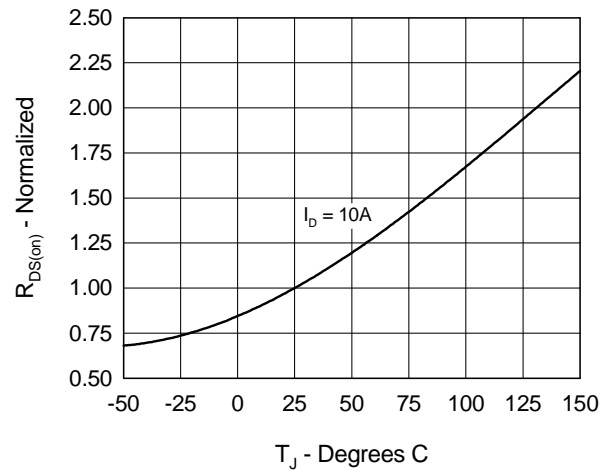


Fig. 5 Drain Current vs. Case Temperature

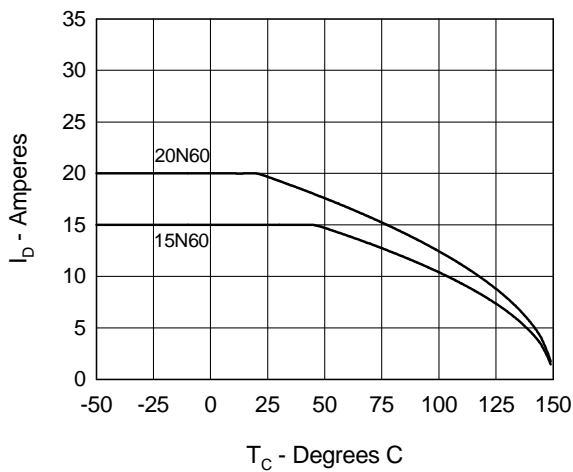


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

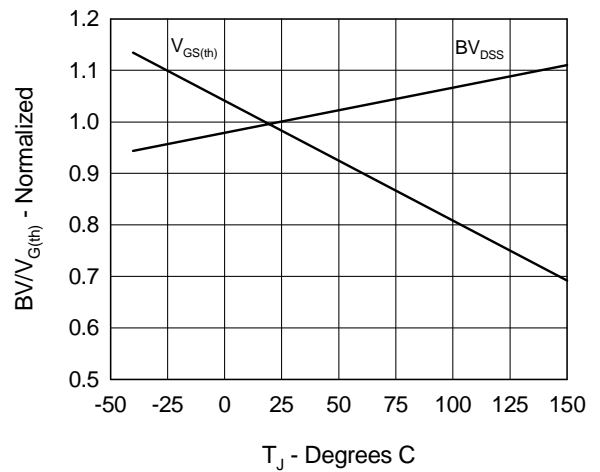


Fig.7 Gate Charge Characteristic Curve

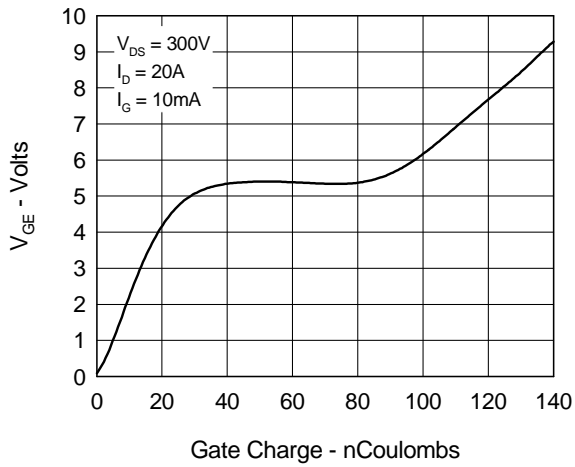


Fig.8 Forward Bias Safe Operating Area

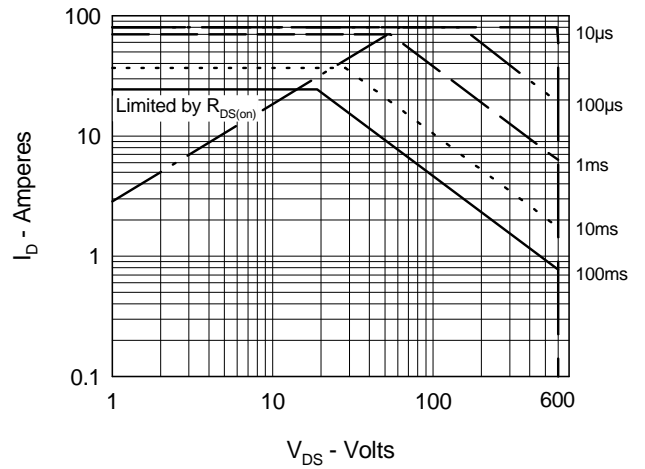


Fig.9 Capacitance Curves

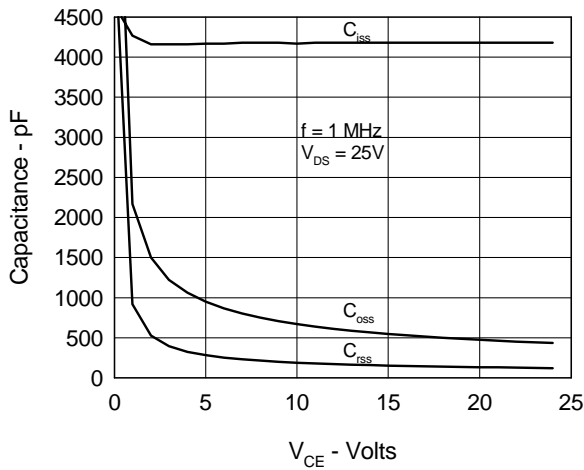
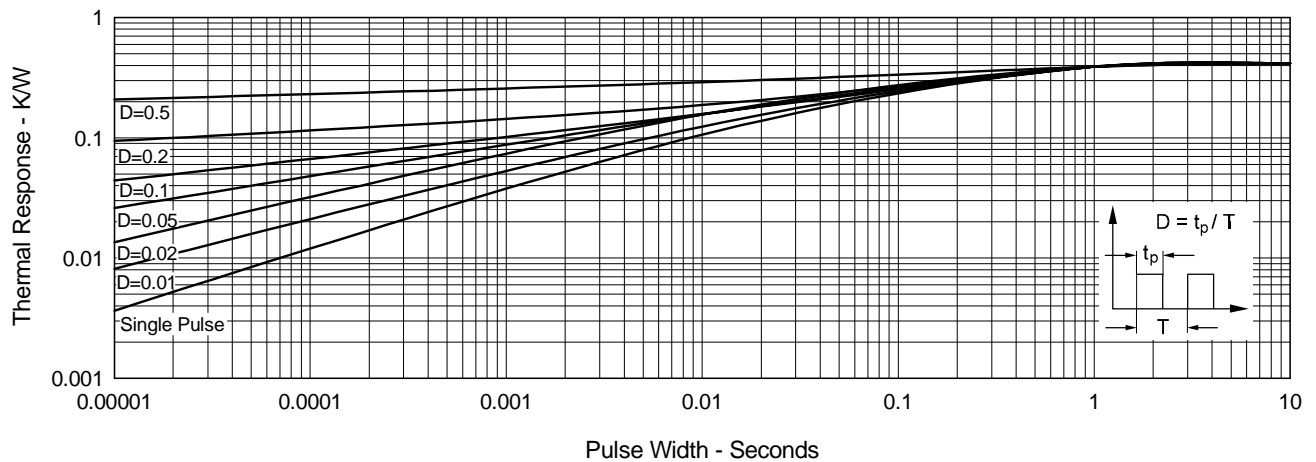


Fig.10 Transient Thermal Impedance



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