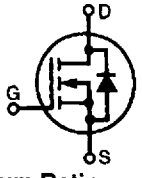
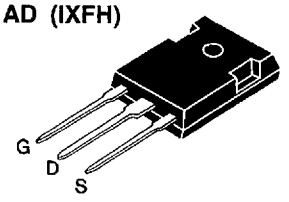
HiPerFET™ Power MOSFETs

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

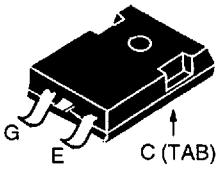
	V_{DSS}	I_{D25}	$R_{DS(on)}$	t_{rr}
IXFH/FM 42N20	200 V	42 A	60 mΩ	200 ns
IXFH/FM 50N20	200 V	50 A	45 mΩ	200 ns
IXFH 58N20	200 V	58 A	40 mΩ	200 ns



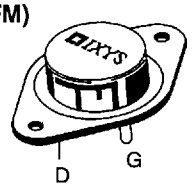
TO-247 AD (IXFH)



TO-247 SMD
("S" Suffix)
(Note 1)



TO-204 AE (IXFM)



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	$I_S \le I_{DM}$, di/dt ≤ 100 A/µs, $V_{DD} \le V_{DSS}$, $T_J \le 150°C$, 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
M_d	Mounting torque		1.13/10	Nm/lb.in.
Weight			TO-204 = 18 g, TO-247 = 6 g	
Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s			300	°C

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)
- Space savings
- High power density

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91522F (10/95)

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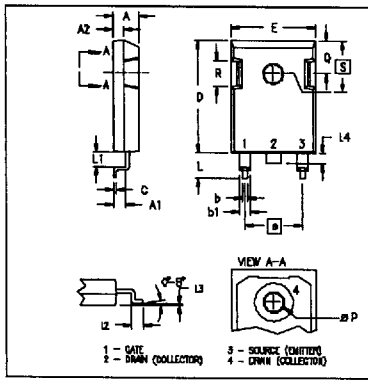
Symbol	Test Conditions (T_J = 25°C, unless otherwise specified)		Characteristic Values Min.	Typ.	Max.	
$R_{DS(on)}$	V_{GS} = 10 V, I_D = 0.5 I_{D25}	42N20			0.060	Ω
		50N20			0.045	Ω
		58N20			0.040	Ω
	Pulse test, t ≤ 300 µs, duty cycle δ ≤ 2 %					
g_{fs}	V_{DS} = 10 V; I_D = 0.5 I_{D25}, pulse test		26	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	R_G = 1 Ω (External)			15	20	ns
$t_{d(off)}$				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}				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	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 δ ≤ 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

Note 1: Add "S" suffix for TO-247 SMD package option (EX: IXFH50N20S)

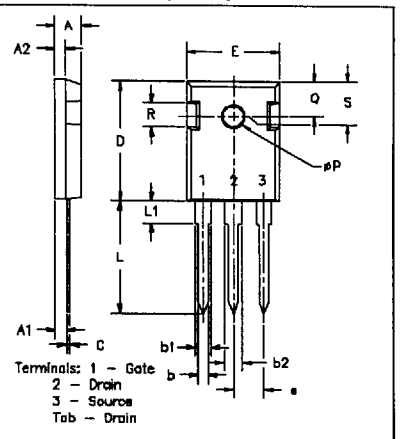
TO-247 SMD Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.045	.055	1.14	1.40
b1	.075	.084	1.91	2.13
C	.024	.031	0.61	0.80
D	.819	.840	20.80	21.34
E	.620	.635	15.75	16.13
e	.215 BSC		5.45 BSC	
L	.193	.201	4.90	5.10
L1	.106	.114	2.70	2.90
L2	.083	.091	2.10	2.30
L3	.00	.004	0.00	0.10
L4	.075	.083	1.90	2.10
øP	.140	.144	3.55	3.65
Q	.220	.244	5.59	6.20
R	.170	.190	4.32	4.83
S	.242 BSC		6.15 BSC	

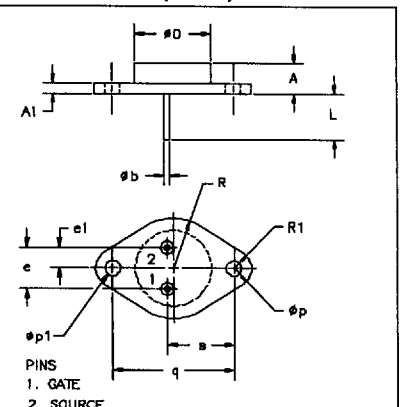
NOTE: All metal surfaces solder plated.

TO-247 AD (IXFH) Outline



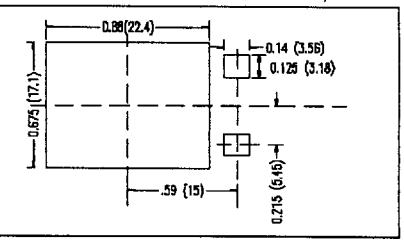
SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.185	.209	4.7	5.3
A1	.087	.102	2.2	2.54
A2	.059	.098	2.2	2.6
b	.040	.055	1.0	1.4
b1	.065	.084	1.65	2.13
b2	.113	.123	2.87	3.12
C	.016	.031	.4	.8
D	.819	.845	20.80	21.46
E	.610	.640	15.75	16.26
e	.215 BSC		5.45 BSC	
L	.780	.800	19.81	20.32
L1		.177		4.50
øP	.140	.144	3.55	3.65
Q	.212	.244	5.4	6.2
R	.170	.216	4.32	5.49
S	.242 BSC		6.15 BSC	

TO-204AE (IXFM) Outline



SYM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	.250	.450	6.4	11.4
A1	.060	.135	1.53	3.42
øb	.057	.063	1.45	1.60
øD		.875		22.22
e	.420	.440	10.67	11.17
e1	.205	.225	5.21	5.71
L	.440	.480	11.18	12.19
øp	.151	.165	3.84	4.19
øp1	.151	.165	3.84	4.19
q	1.187 BSC		30.15 BSC	
R	.495	.525	12.58	13.33
R1	.131	.188	3.33	4.77
s	.655	.675	16.64	17.14

Min. Recommended Footprint
Dimensions in inches and mm)



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

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Fig.1. Output Characteristics

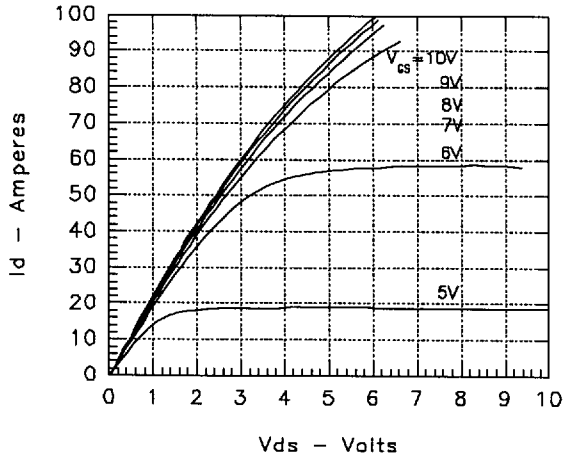

Fig. 2. Input Admittance

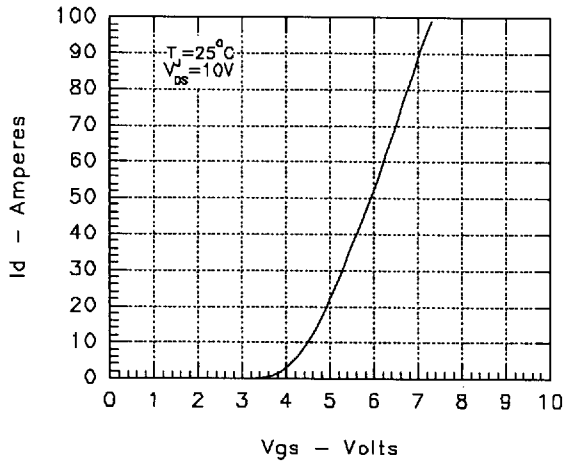

Fig. 3. Rds(on) vs. Drain Current

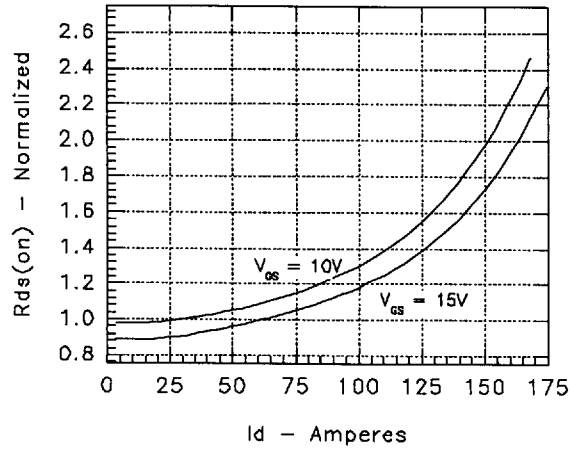

Fig. 4. Temperature Dependence of Drain to Source Resistance

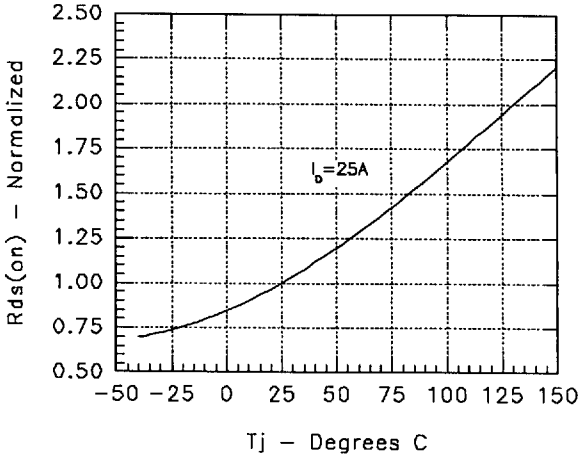

Fig. 5. Drain Current vs. Case Temperature

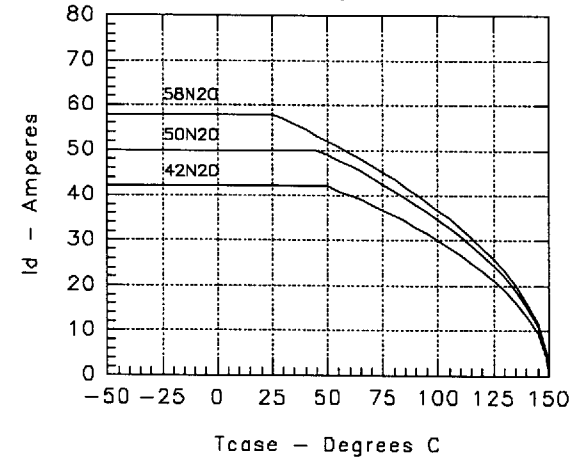

Fig. 6. Temperature Dependence of Breakdown Voltage and Threshold Voltage

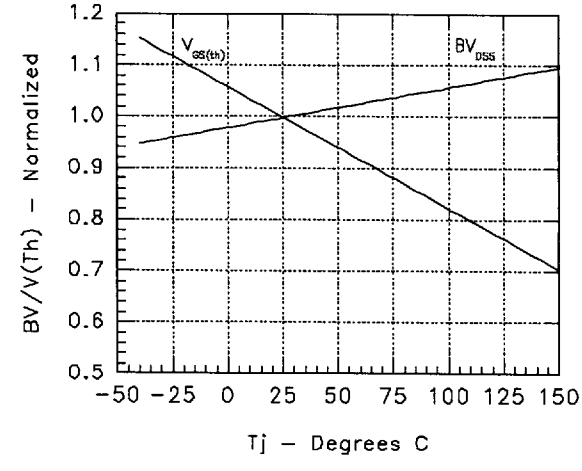

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Fig. 7. Gate Charge

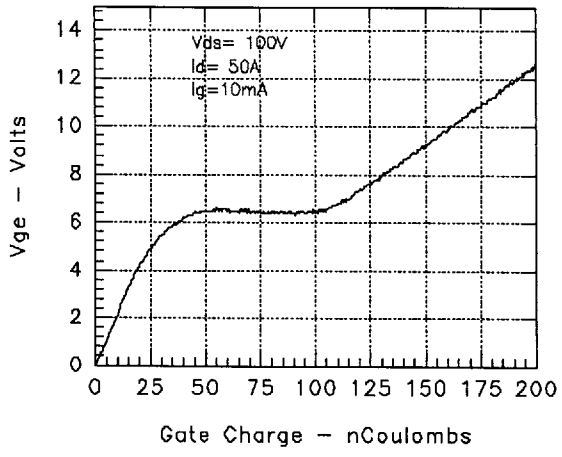


Fig. 8. Forward Bias Safe Operating Area

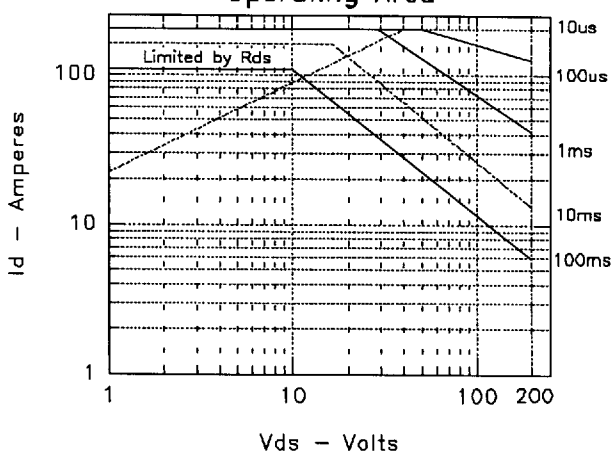


Fig. 9. Capacitance Curves

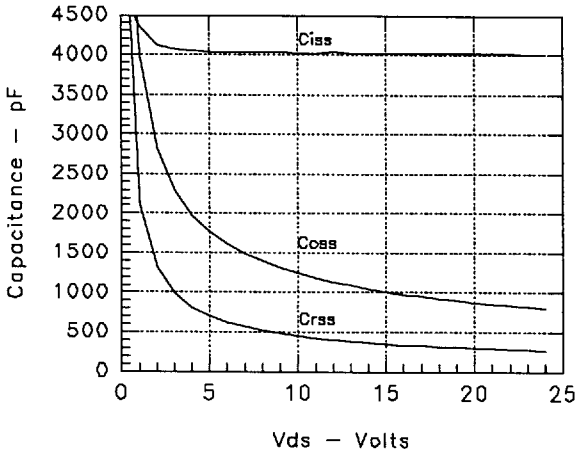


Fig. 10. Source Current vs. Source to Drain Voltage

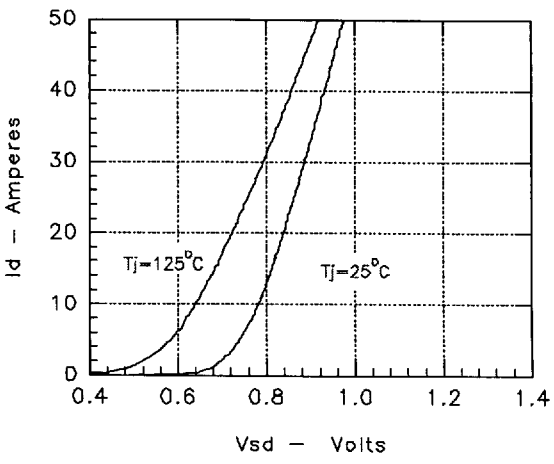
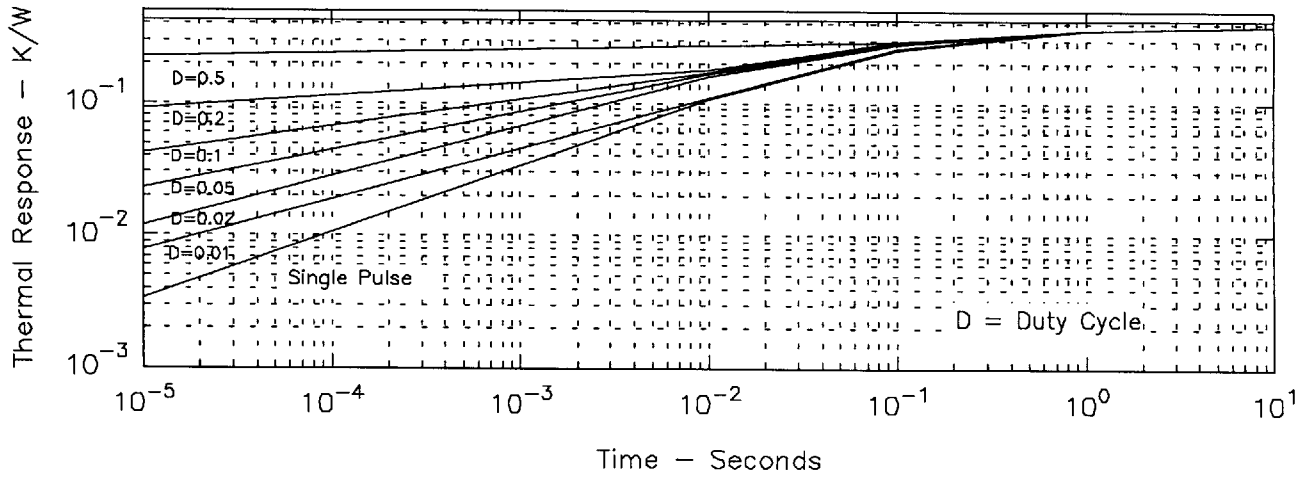


Fig. 11. Transient Thermal Impedance



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