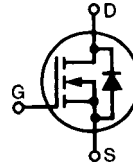


HiPerFET™ Power MOSFETs

IXFH/IXFM10N90
IXFH/IXFM12N90
IXFH13N90

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

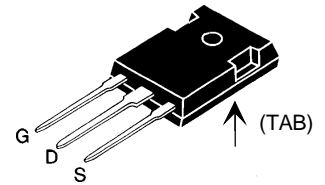


| V_{DSS} | I_{D25} | $R_{DS(on)}$ |
|--------------|-------------|--------------------------------|
| 900 V | 10 A | 1.1 Ω |
| 900 V | 12 A | 0.9 Ω |
| 900 V | 13 A | 0.8 Ω |

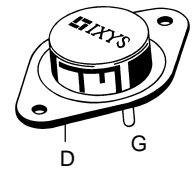
$t_{rr} \leq 250 \text{ ns}$

| 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 ; $R_{GS} = 1 \text{ M}\Omega$ | 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 | $I_S \leq I_{DM}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq V_{DSS}$, $T_J \leq 150^\circ\text{C}$, $R_G = 2 \Omega$ | 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 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

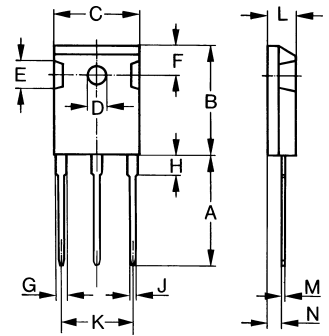
| Symbol | Test Conditions | Characteristic Values ($T_J = 25^\circ\text{C}$, unless otherwise specified) | | |
|--------------|--|---|------|----------------------|
| | | min. | typ. | max. |
| V_{DSS} | $V_{GS} = 0 \text{ V}$, $I_D = 3 \text{ mA}$ | 900 | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D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

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

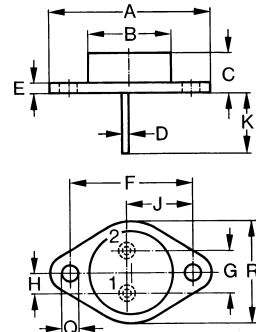
91530G (3/98)

| 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} | | | 0.42 | 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 | $V_{GS} = 0\text{ V}$ | 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} | | $T_J = 25^\circ\text{C}$ | 1 | μC |
| | | $T_J = 125^\circ\text{C}$ | 2 | 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

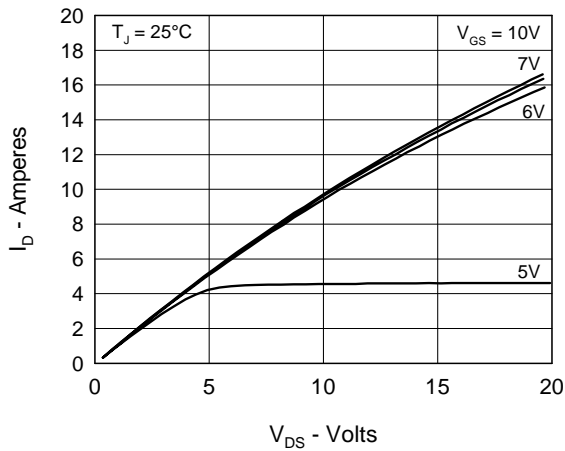


Fig. 2 Input Admittance

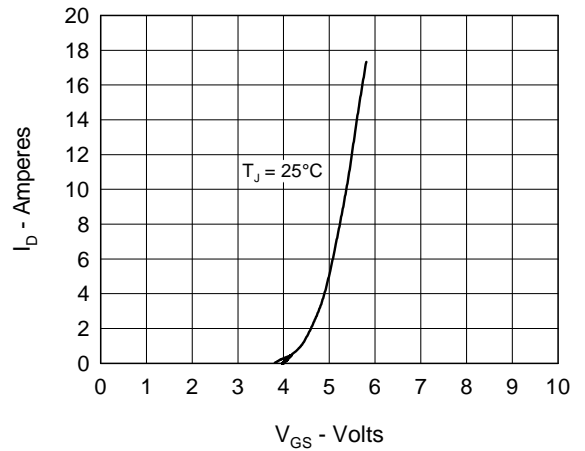


Fig. 3 $R_{DS(on)}$ vs. Drain Current

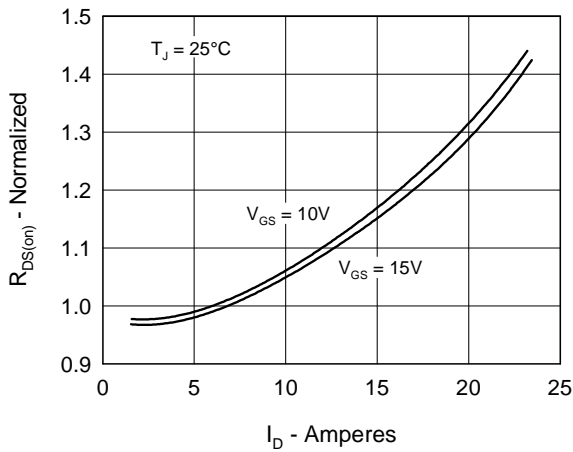


Fig. 4 Temperature Dependence of Drain to Source Resistance

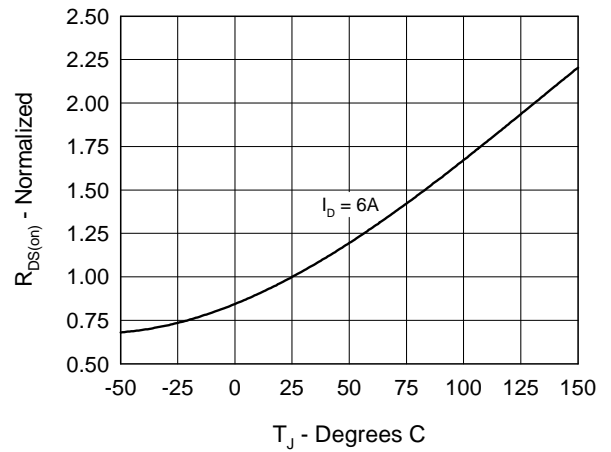


Fig. 5 Drain Current vs. Case Temperature

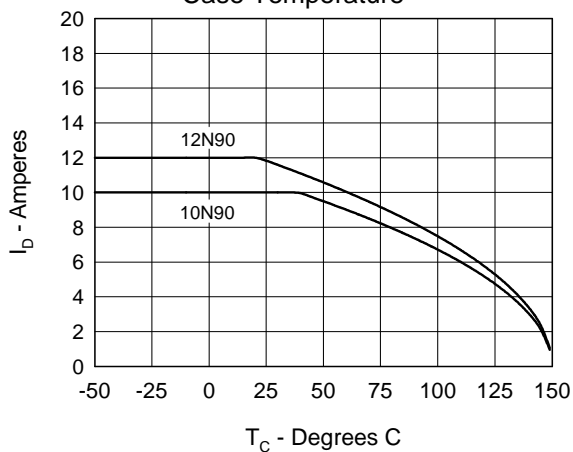


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

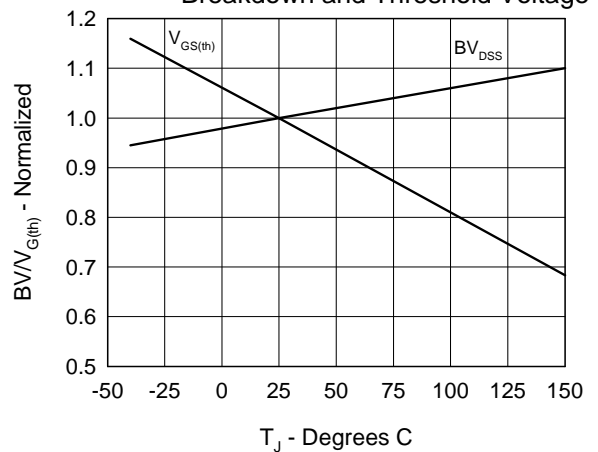


Fig.7 Gate Charge Characteristic Curve

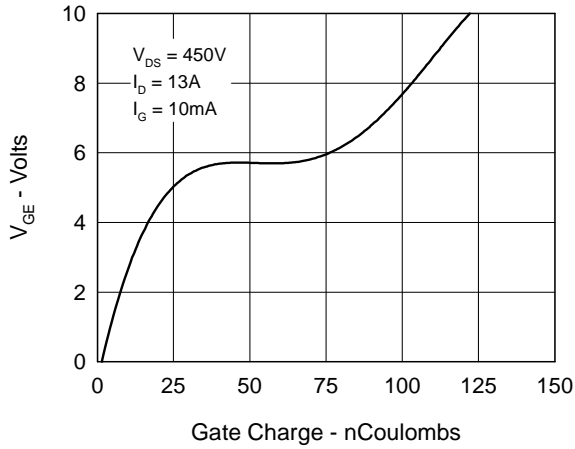


Fig.8 Forward Bias Safe Operating Area

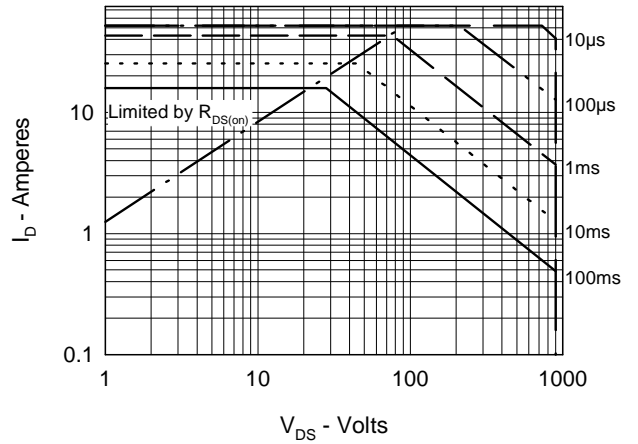


Fig.9 Capacitance Curves

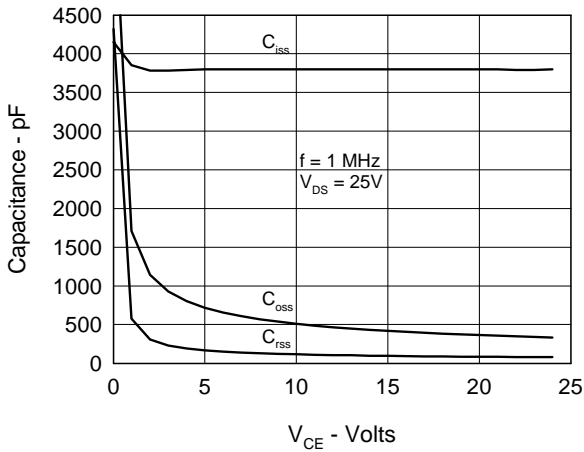


Fig.10 Source Current vs. Source to Drain Voltage

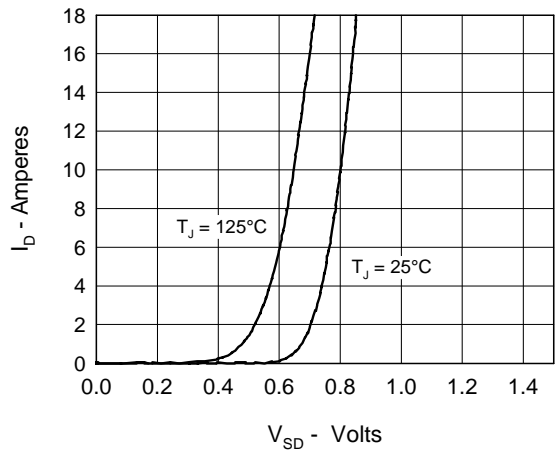


Fig.11 Transient Thermal Impedance

