

HiPerFET™ Power MOSFETs

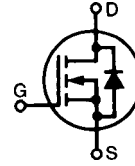
~~IXFH/IXFM42N20~~
~~IXFH/IXFM/IXFT50N20~~
IXFH/IXFT58N20

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

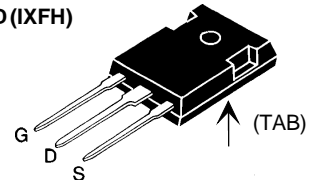
Obsolete:
IXFM42N20
IXFM50N20

| V _{DSS} | I _{D25} | R _{DS(on)} |
|------------------|------------------|---------------------|
| 200 V | 42 A | 60mΩ |
| 200 V | 50 A | 45mΩ |
| 200 V | 58 A | 40mΩ |

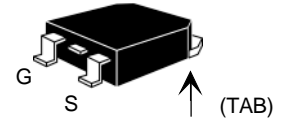
t_{rr} ≤ 200 ns



TO-247 AD (IXFH)

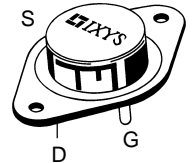


TO-268 (D3) Case Style



~~TO-204 AE (IXFM)~~

**Package
unavailable**



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

| Symbol | Test Conditions | Maximum Ratings | |
|------------------|---|-----------------------------|-----------|
| V _{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 ≤ I _{DM} , di/dt ≤ 100 A/μs, V _{DD} ≤ V _{DSS} , T _J ≤ 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 |
| T _L | 1.6 mm (0.062 in.) from case for 10 s | 300 | °C |
| M _d | Mounting torque | 1.13/10 | Nm/lb.in. |
| Weight | | TO-204 = 18 g, TO-247 = 6 g | |

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)
- High power surface mountable package
- High power density

| 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 | | V |
| I _{GSS} | V _{GS} = ±20 V _{DC} , V _{DS} = 0 | | | ±100 nA |
| I _{DSS} | V _{DS} = 0.8 • V _{DSS} V _{GS} = 0 V | T _J = 25°C | 200 | μA |
| | | T _J = 125°C | 1 | mA |

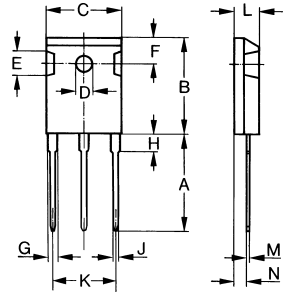
| Symbol | Test Conditions ($T_J = 25^\circ\text{C}$, unless otherwise specified) | Characteristic Values | | |
|---|---|-----------------------|------|----------------|
| | | Min. | Typ. | Max. |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}, I_D = 0.5 I_{D25}$ | 42N20 | | 0.060 Ω |
| | | 50N20 | | 0.045 Ω |
| | | 58N20 | | 0.040 Ω |
| 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 |
| | | $T_J = 125^\circ\text{C}$ | | 300 ns |
| Q_{RM} | | $T_J = 25^\circ\text{C}$ | 1.5 | μC |
| | | $T_J = 125^\circ\text{C}$ | 2.6 | μC |
| I_{RM} | | $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ | 19 23 | A |

TO-268AA (D³ PAK)

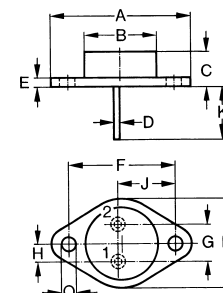
| Dim. | Millimeter | | Inches | |
|----------------|------------|-------|----------|------|
| | Min. | Max. | Min. | Max. |
| A | 4.9 | 5.1 | .193 | .201 |
| A ₁ | 2.7 | 2.9 | .106 | .114 |
| A ₂ | .02 | .25 | .001 | .010 |
| b | 1.15 | 1.45 | .045 | .057 |
| b ₂ | 1.9 | 2.1 | .75 | .83 |
| C | .4 | .65 | .016 | .026 |
| D | 13.80 | 14.00 | .543 | .551 |
| E | 15.85 | 16.05 | .624 | .632 |
| E ₁ | 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

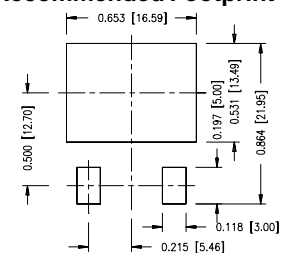


Fig. 1 Output Characteristics

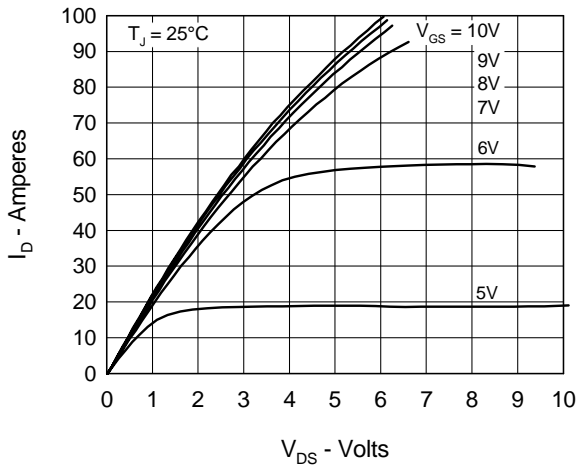


Fig. 2 Input Admittance

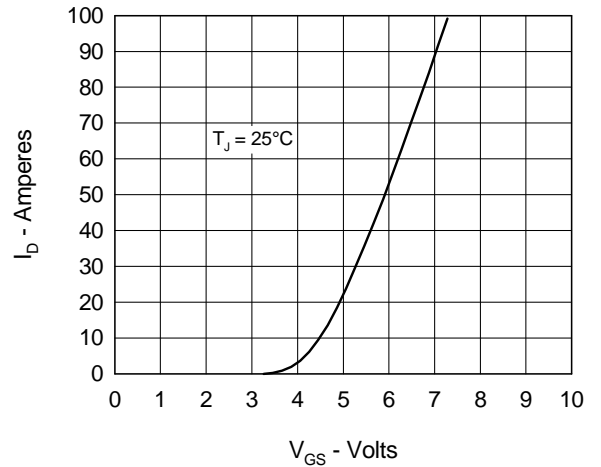


Fig. 3 $R_{DS(on)}$ vs. Drain Current

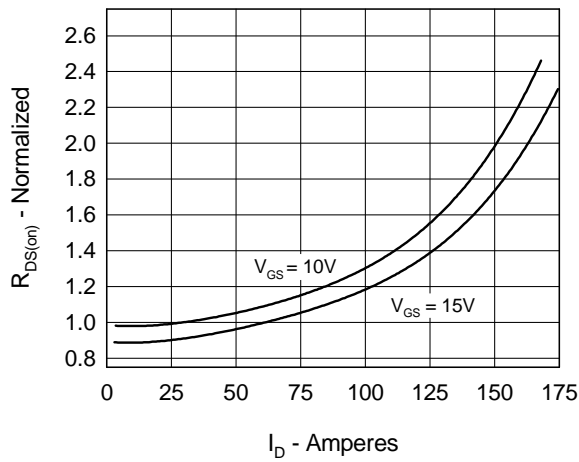


Fig. 4 Temperature Dependence of Drain to Source Resistance

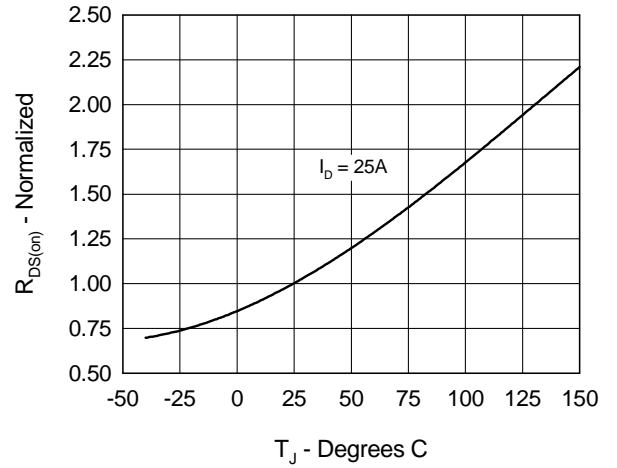


Fig. 5 Drain Current vs. Case Temperature

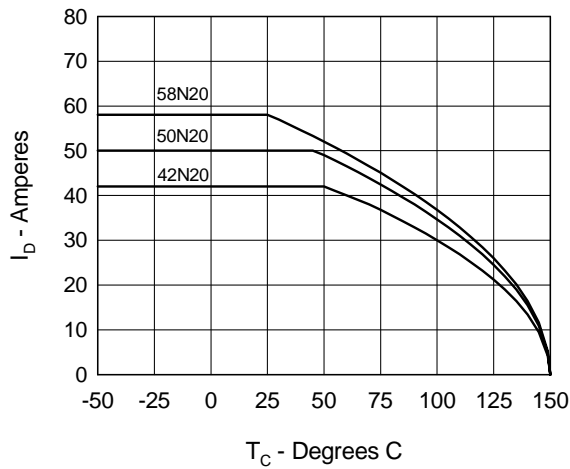


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

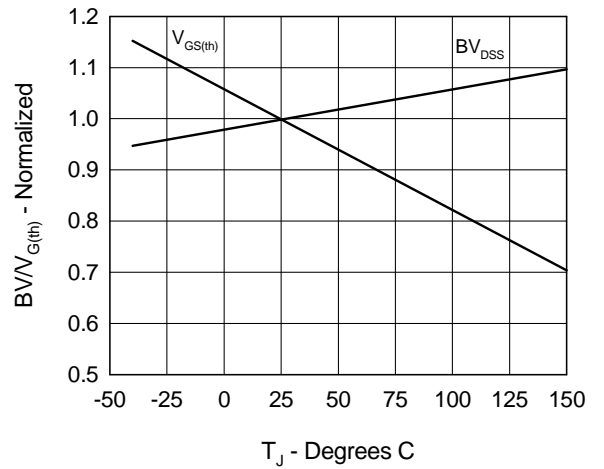


Fig.7 Gate Charge Characteristic Curve

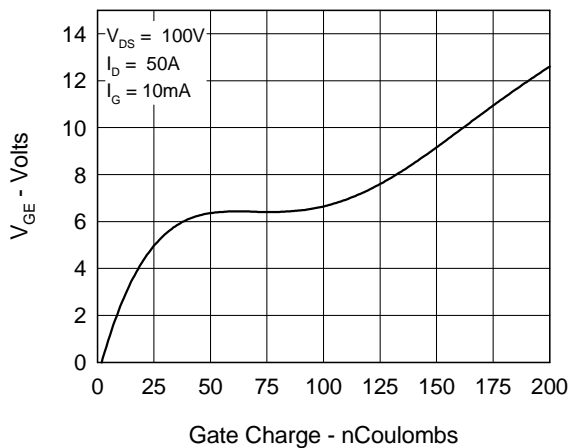


Fig.8 Forward Bias Safe Operating Area

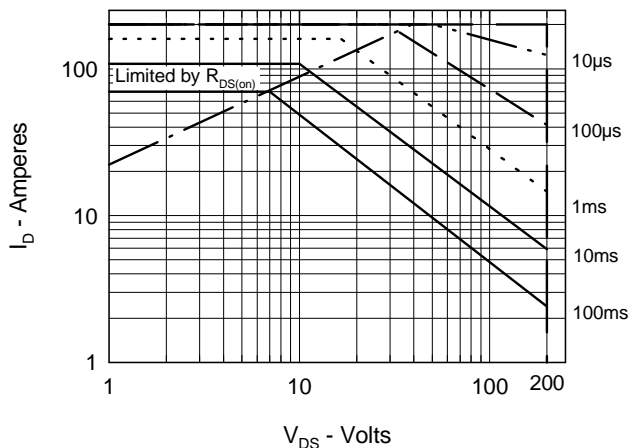


Fig.9 Capacitance Curves

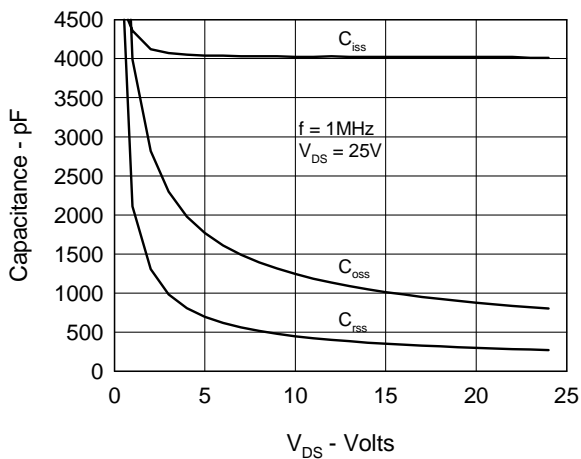


Fig.10 Source Current vs. Source to Drain Voltage

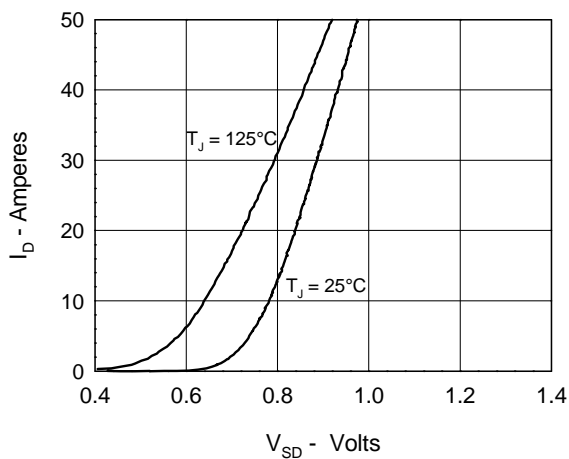
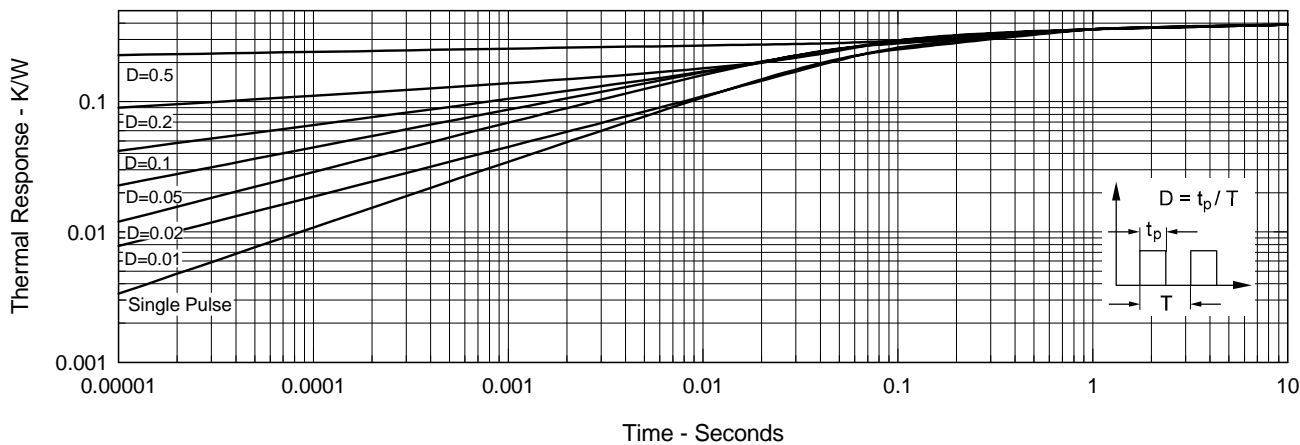


Fig.11 Transient Thermal Impedance





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