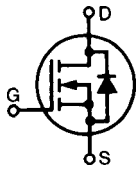
# IXYS

## MegaMOS™FET

**IXTH 20N60**
**IXTM 20N60**

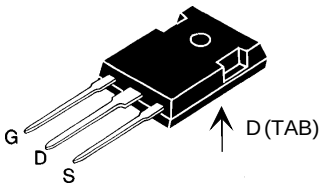
$V_{DSS}$ = 600 V
$I_{D25}$ = 20 A
$R_{DS(on)}$ = 0.35 Ω

N-Channel Enhancement Mode

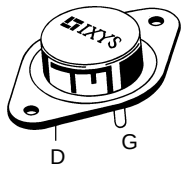



| Symbol | Test Conditions | | Maximum Ratings | |
|---|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | | 600 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C; $R_{GS}$ = 1 MΩ | | 600 | V |
| $V_{GS}$ | Continuous | | ±20 | V |
| $V_{GSM}$ | Transient | | ±30 | V |
| $I_{D25}$ | $T_C$ = 25°C | 15N60 | 15 | A |
| | | 20N60 | 20 | A |
| $I_{DM}$ | $T_C$ = 25°C, pulse width limited by $T_{JM}$ | 15N60 | 60 | A |
| | | 20N60 | 80 | A |
| $P_D$ | $T_C$ = 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 |

**TO-247 AD (IXTH)**




**TO-204 AE (IXTM)**




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

### Features

- International standard packages
- Low $R_{DS\ (on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- Low package inductance (< 5 nH)
  - easy to drive and to protect
- Fast switching times

### Applications

- Switch-mode and resonant-mode power supplies
- Motor control
- Uninterruptible Power Supplies (UPS)
- DC choppers

### Advantages

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

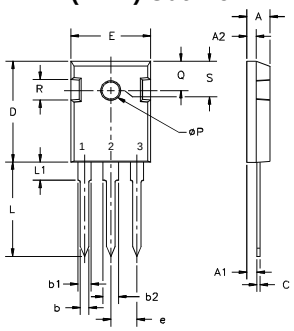
| Symbol | Test Conditions | | Characteristic Values ($T_J$ = 25°C, unless otherwise specified) min. | typ. | max. | |
|---|---|---|---|---|---|---|
| $V_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | | 600 | | | V |
| $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | | 2 | | 4.5 | V |
| $I_{GSS}$ | $V_{GS}$ = ±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 |
| $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 0.5 $I_{D25}$ Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 % | | | | 0.35 | Ω |

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values min. | typ. | max. | |
|---|---|---|---|---|---|
| $g_{fs}$ | $V_{DS}$ = 10 V; $I_D$ = 0.5 • $I_{D25}$, pulse test | 11 | 18 | | S |
| $C_{iss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 4500 | | pF |
| $C_{oss}$ | | | 420 | | pF |
| $C_{rss}$ | | | 140 | | pF |
| $t_{d(on)}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 $I_{D25}$<br>$R_G$ = 2 Ω, (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 V, $V_{DS}$ = 0.5 • $V_{DSS}$, $I_D$ = 0.5 $I_{D25}$ | | 150 | 170 | nC |
| $Q_{gs}$ | | | 29 | 40 | nC |
| $Q_{gd}$ | | | 60 | 85 | nC |
| $R_{thJC}$ | | | | 0.42 | K/W |
| $R_{thCK}$ | | | 0.25 | | K/W |

**Source-Drain Diode**

| Symbol | Test Conditions ($T_J$ = 25°C, unless otherwise specified) | Characteristic Values min. | typ. | max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0 V | | | 20 | A |
| $I_{SM}$ | Repetitive; | | | 80 | A |
| $V_{SD}$ | $I_F = I_S$, $V_{GS}$ = 0 V,<br>Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 % | | | 1.5 | V |
| $t_{rr}$ | $I_F = I_S$, -di/dt = 100 A/µs, $V_R$ = 100 V | | 600 | | ns |

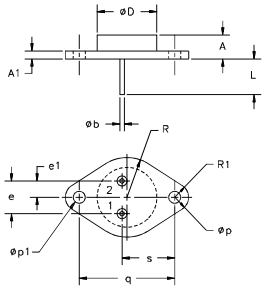
**TO-247 AD (IXTH) Outline**




Terminals: 1 - Gate 2 - Drain
3 - Source Tab - Drain

| Dim. | Millimeter Min. | Max. | Inches Min. | Max. |
|---|---|---|---|---|
| A | 4.7 | 5.3 | .185 | .209 |
| $A_1$ | 2.2 | 2.54 | .087 | .102 |
| $A_2$ | 2.2 | 2.6 | .059 | .098 |
| b | 1.0 | 1.4 | .040 | .055 |
| $b_1$ | 1.65 | 2.13 | .065 | .084 |
| $b_2$ | 2.87 | 3.12 | .113 | .123 |
| C | .4 | .8 | .016 | .031 |
| D | 20.80 | 21.46 | .819 | .845 |
| E | 15.75 | 16.26 | .610 | .640 |
| e | 5.20 | 5.72 | 0.205 | 0.225 |
| L | 19.81 | 20.32 | .780 | .800 |
| L1 | | 4.50 | | .177 |
| ∅P | 3.55 | 3.65 | .140 | .144 |
| Q | 5.89 | 6.40 | 0.232 | 0.252 |
| R | 4.32 | 5.49 | .170 | .216 |
| S | 6.15 BSC | | 242 BSC | |

**TO-204AE (IXTM) Outline**




Pins 1 - Gate 2 - Source
Case - Drain

| Dim. | Millimeter Min. | Max. | Inches Min. | Max. |
|---|---|---|---|---|
| A | 6.4 | 11.4 | .250 | .450 |
| A1 | 1.53 | 3.42 | .060 | .135 |
| ∅b | 1.45 | 1.60 | .057 | .063 |
| ∅D | | 22.22 | | .875 |
| e | 10.67 | 11.17 | .420 | .440 |
| e1 | 5.21 | 5.71 | .205 | .225 |
| L | 11.18 | 12.19 | .440 | .480 |
| ∅p | 3.84 | 4.19 | .151 | .165 |
| ∅p1 | 3.84 | 4.19 | .151 | .165 |
| q | 30.15 BSC | | 1.187 BSC | |
| R | 12.58 | 13.33 | .495 | .525 |
| R1 | 3.33 | 4.77 | .131 | .188 |
| s | 16.64 | 17.14 | .655 | .675 |

Fig. 1 Output Characteristics

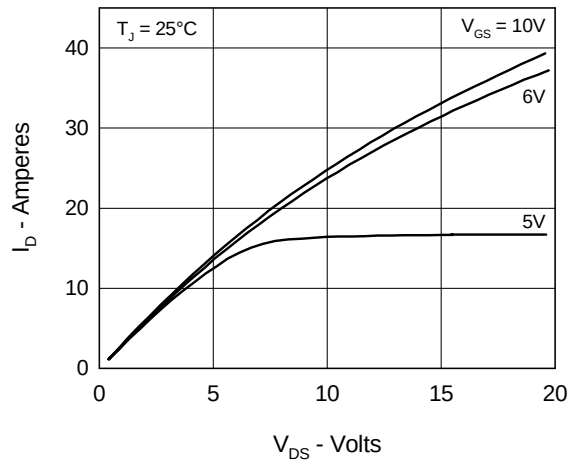



Fig. 2 Input Admittance

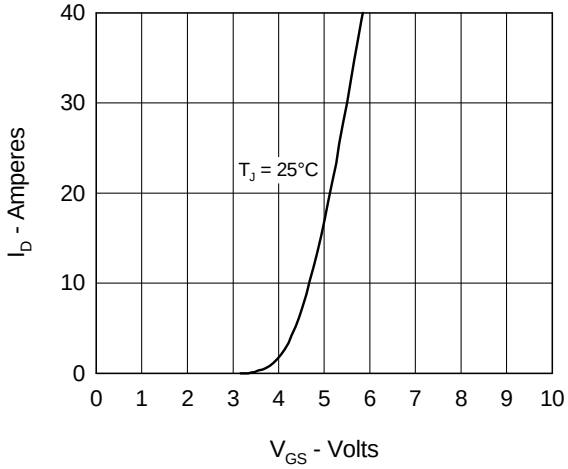



Fig. 3 $R_{DS(on)}$ vs. Drain Current

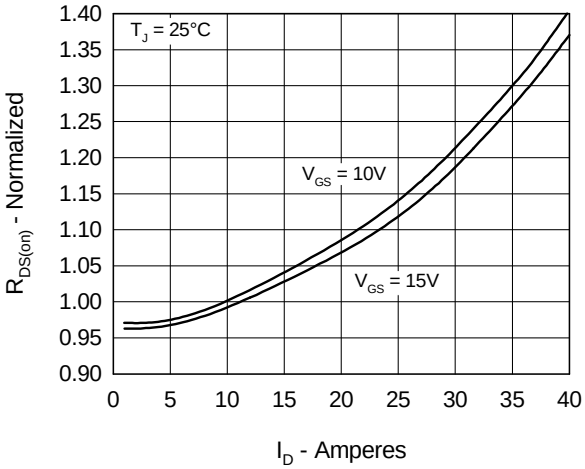



Fig. 4 Temperature Dependence of Drain to Source Resistance

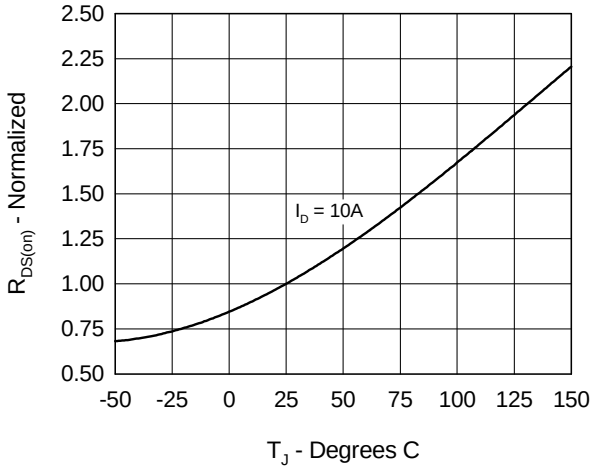



Fig. 5 Drain Current vs. Case Temperature

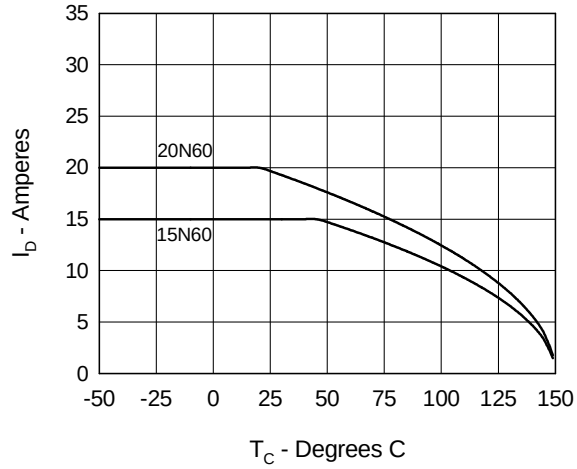



Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

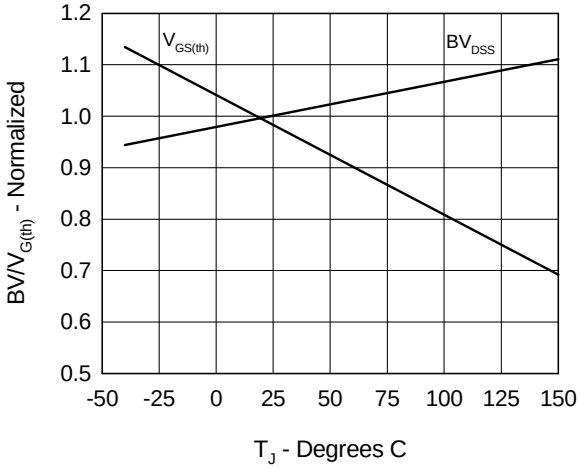


Fig.7 Gate Charge Characteristic Curve

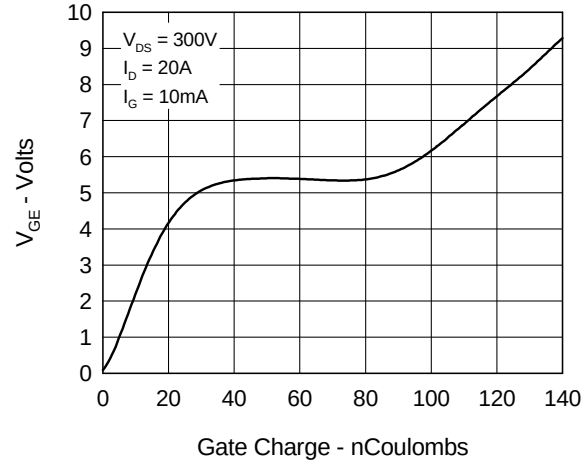



Fig.8 Forward Bias Safe Operating Area

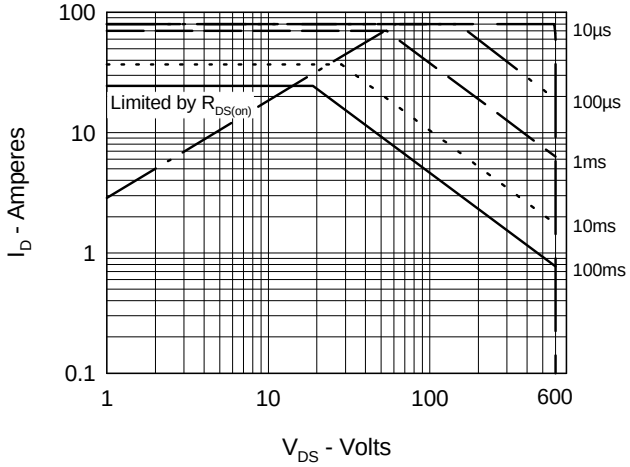



Fig.9 Capacitance Curves

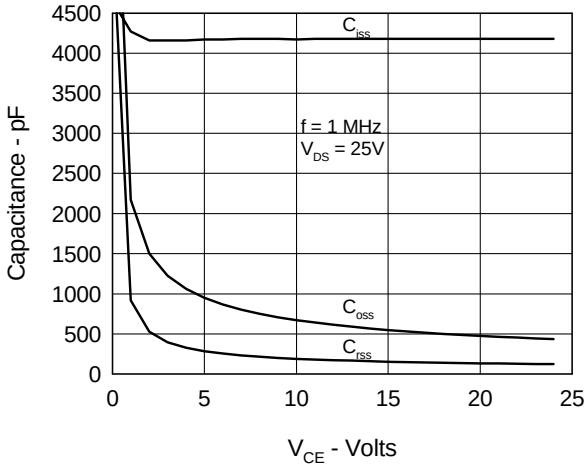



Fig.10 Source Current vs. Source to Drain Voltage

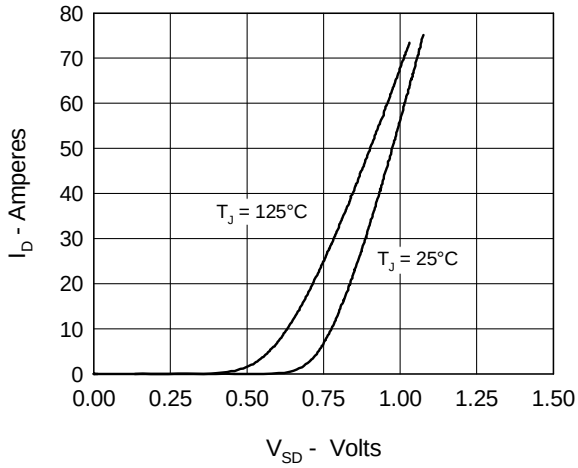



Fig.11 Transient Thermal Impedance