IXYS

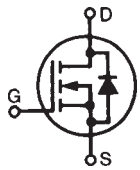
Advance Technical Information

# Standard Power MOSFET

**IXTH 60N25**

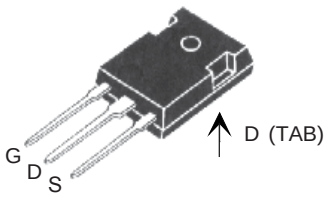
$V_{DSS}$ = 250 V
$I_{D(cont)}$ = 60 A
$R_{DS(on)}$ = 46 mΩ

N-Channel Enhancement Mode




| Symbol | Test conditions | Maximum ratings | |
|---|---|---|---|
| $V_{DSS}$ | $T_J$ = 25°C to 150°C | 250 | V |
| $V_{DGR}$ | $T_J$ = 25°C to 150°C; $R_{GS}$ = 1.0 MΩ | 250 | V |
| $V_{GS}$ | Continuous | ±20 | V |
| $V_{GSM}$ | Transient | ±30 | V |
| $I_{D25}$ | $T_C$ = 25°C MOSFET chip capability | 60 | A |
| $I_{DM}$ | $T_C$ = 25°C, pulse width limited by $T_{JM}$ | 240 | A |
| $I_{AR}$ | | 60 | A |
| $E_{AR}$ | $T_C$ = 25°C | 50 | mJ |
| $E_{AS}$ | $T_C$ = 25°C | 1.5 | J |
| 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 | 400 | 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-264 | 6 | g |
| Maximum lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s | | 300 | °C |

**TO-247 AD**




G = Gate D = Drain
S = Source Tab = Drain

| Symbol | Test Conditions ($T_J$ = 25°C unless otherwise specified) | Characteristic Values Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $V_{DSS}$ | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 250 | | | V |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$, $I_D$ = 250 µA | 2.0 | | 4.0 | V |
| $I_{GSS}$ | $V_{GS}$ = ±20 V DC, $V_{DS}$ = 0 | | | ±100 | nA |
| $I_{DSS}$ | $V_{DS} = V_{DSS}$ $V_{GS}$ = 0 V $T_J$ = 125°C | | | 25<br>250 | µA<br>µA |
| $R_{DS(on)}$ | $V_{GS}$ = 10 V, $I_D$ = 15A Pulse test, t ≤ 300 ms, duty cycle d ≤ 2% | | | 46 | mΩ |

### Features

- Low $R_{DS\ (on)}$ HDMOS™ process
- Rugged polysilicon gate cell structure
- International standard package JEDEC TO-247 AD
- Fast switching times
- High commutating dv/dt rating

### Applications

- Motor controls
- DC choppers
- Switched-mode and resonant-mode power supplies
- Uninterruptible Power Supplies (UPS)

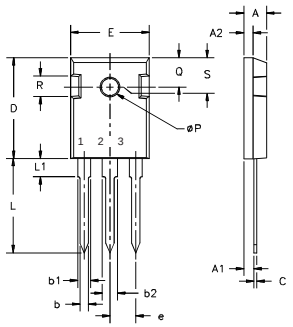
### Advantages

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

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| 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 | 28 | 36 | | S |
| $C_{iss}$ | $V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz | | 4400 | | pF |
| $C_{oss}$ | | | 800 | | pF |
| $C_{rss}$ | | | 290 | | pF |
| $t_{d(on)}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 $V_{DSS}$, $I_D$ = 0.5 $I_{D25}$ $R_G$ = 2.0 Ω (External) | | 23 | | ns |
| $t_r$ | | | 23 | | ns |
| $t_{d(off)}$ | | | 60 | | ns |
| $t_f$ | | | 17 | | ns |
| $Q_{g(on)}$ | $V_{GS}$ = 10 V, $V_{DS}$ = 0.5 $V_{DSS}$, $I_D$ = 0.5 $I_{D25}$ | | 164 | | nC |
| $Q_{gs}$ | | | 30 | | nC |
| $Q_{gd}$ | | | 85 | | nC |
| $R_{thJC}$ | | | | 0.31 | K/W |
| $R_{thCK}$ | | | 0.25 | | K/W |

**TO-247 AD 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 |

**Source-Drain Diode** **Ratings and Characteristics** ($T_J$ = 25°C unless otherwise specified)

| Symbol | Test Conditions | Min. | Typ. | Max. | |
|---|---|---|---|---|---|
| $I_S$ | $V_{GS}$ = 0V | | | 60 | A |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$ | | | 240 | A |
| $V_{SD}$ | $I_F$ = $I_S$, $V_{GS}$ = 0 V, Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 % | | | 1.5 | V |
| $t_{rr}$ | $I_F$ = 25A, -di/dt = 100 A/µs, $V_R$ = 100V | | 300 | | ns |
| $Q_{rr}$ | | | 3.0 | | µC |

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**Fig. 1. Output Characteristics @ 25 Deg. C**

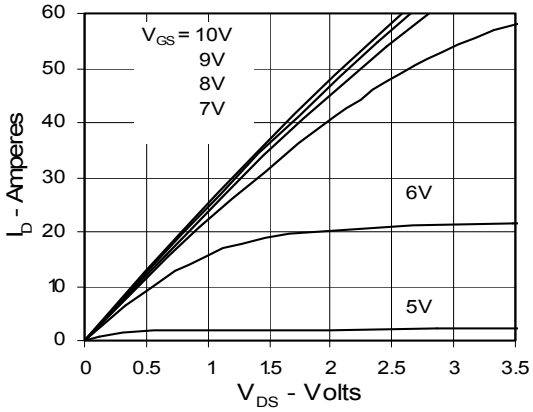



**Fig. 2. Extended Output Characteristics @ 25 deg. C**

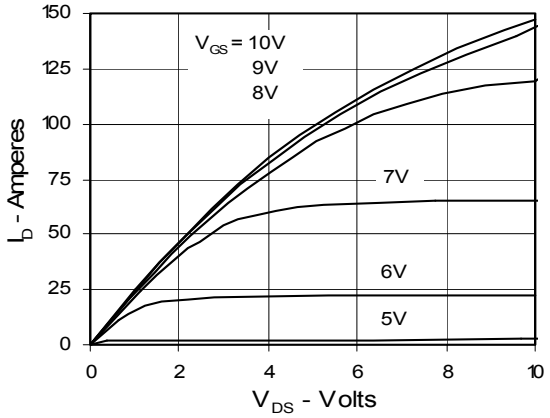



**Fig. 3. Output Characteristics @ 125 Deg. C**

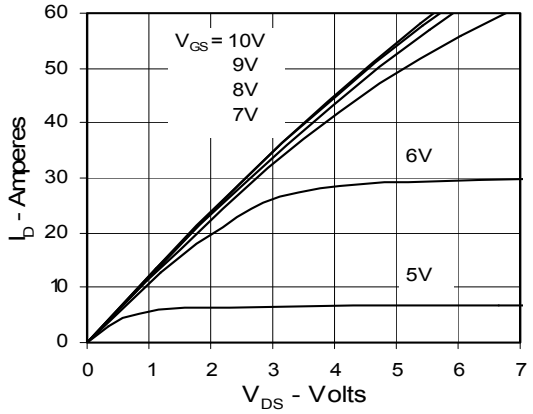



**Fig. 4. $R_{DS(on)}$ Normalized to $I_{D25}$ Value vs. Junction Temperature**

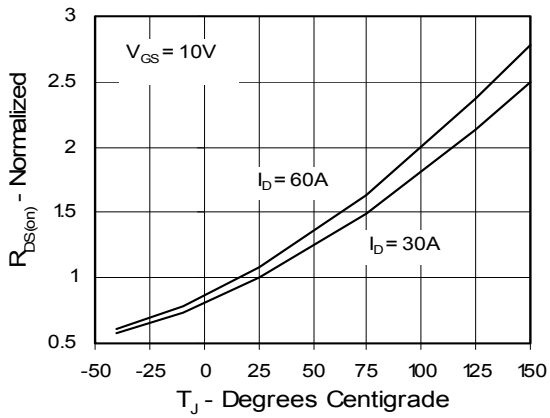



**Fig. 5. $R_{DS(on)}$ Normalized to $I_{D25}$ Value vs. $I_D$**

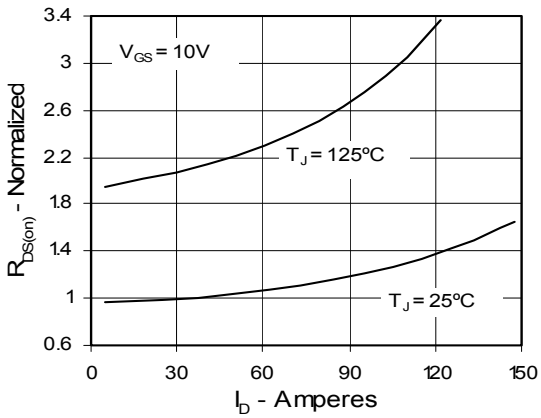
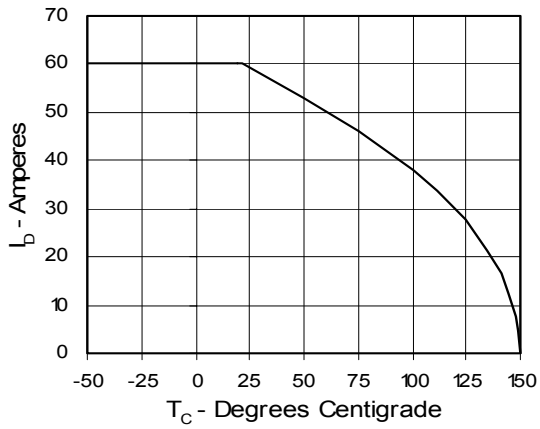



**Fig. 6. Drain Current vs. Case Temperature**




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**Fig. 7. Input Admittance**

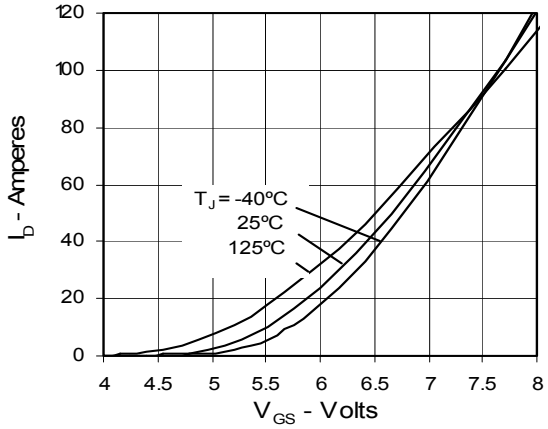



**Fig. 8. Transconductance**

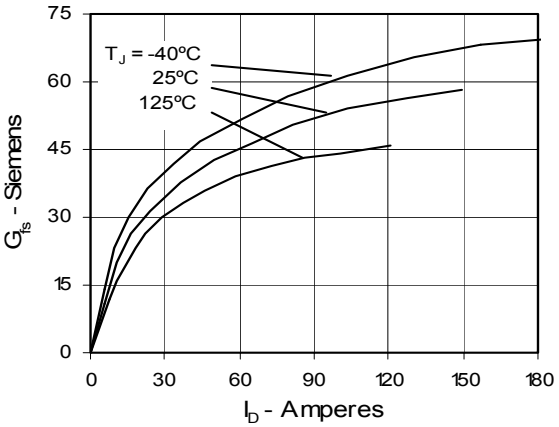



**Fig. 9. Source Current vs. Source-To-Drain Voltage**

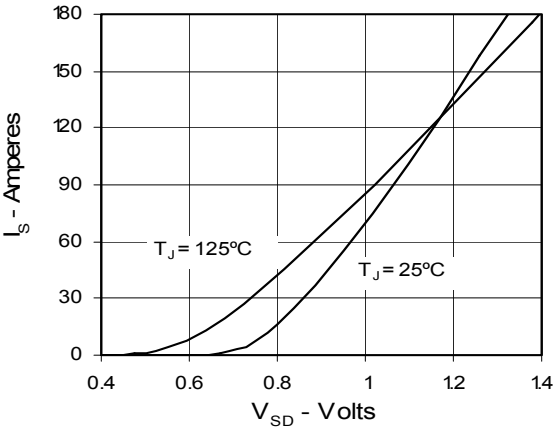



**Fig. 10. Gate Charge**

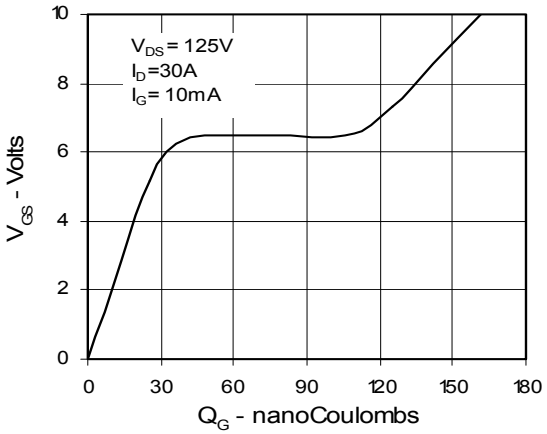



**Fig. 11. Capacitance**

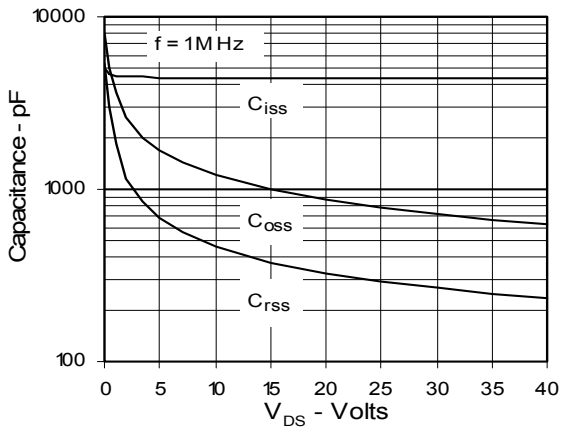
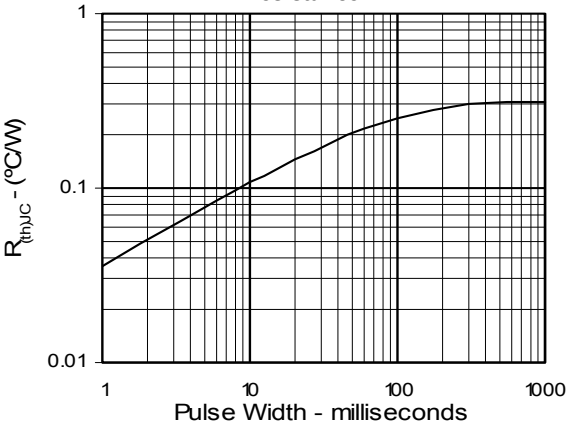



**Fig. 12. Maximum Transient Thermal Resistance**




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