

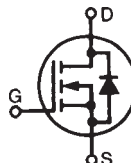
# High Voltage Power MOSFET

**IXTH 6N120**  
**IXTT 6N120**

$V_{DSS} = 1200\text{ V}$   
 $I_{D25} = 6\text{ A}$   
 $R_{DS(on)} = 2.6\ \Omega$

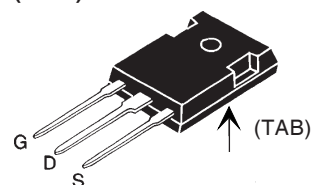
N-Channel Enhancement Mode  
Avalanche Rated

Preliminary Data Sheet

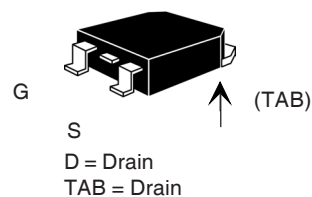


| Symbol    | Test Conditions                                                                                                                         | Maximum Ratings |                  |
|-----------|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------|------------------|
| $V_{DSS}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                         | 1200            | V                |
| $V_{DGR}$ | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1\text{ M}\Omega$                                                           | 1200            | V                |
| $V_{GS}$  | Continuous                                                                                                                              | $\pm 20$        | V                |
| $V_{GSM}$ | Transient                                                                                                                               | $\pm 30$        | V                |
| $I_{D25}$ | $T_C = 25^\circ\text{C}$                                                                                                                | 6               | A                |
| $I_{DM}$  | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 24              | A                |
| $I_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 6               | A                |
| $E_{AR}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 25              | mJ               |
| $E_{AS}$  | $T_C = 25^\circ\text{C}$                                                                                                                | 500             | mJ               |
| $dv/dt$   | $I_S \leq I_{DM}$ , $di/dt \leq 100\text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2\ \Omega$ | 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-247 AD                                                                                                                               | 6               | g                |
|           | TO-268                                                                                                                                  | 4               | g                |

## TO-247 AD (IXTH)



## TO-268 (IXTT) Case Style



## 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

## Advantages

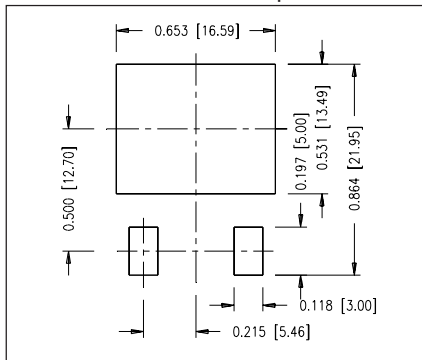
- Easy to mount
- Space savings
- High power density

| Symbol       | Test Conditions<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified)                                     | Characteristic Values |      |                     |
|--------------|-----------------------------------------------------------------------------------------------------------------|-----------------------|------|---------------------|
|              |                                                                                                                 | Min.                  | Typ. | Max.                |
| $V_{DSS}$    | $V_{GS} = 0\text{ V}$ , $I_D = 250\ \mu\text{A}$                                                                | 1200                  |      | V                   |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$                                                                    | 2.5                   |      | V                   |
| $I_{GSS}$    | $V_{GS} = \pm 20\text{ V}_{DC}$ , $V_{DS} = 0$                                                                  |                       |      | $\pm 100\text{ nA}$ |
| $I_{DSS}$    | $V_{DS} = V_{DSS}$ , $T_J = 25^\circ\text{C}$                                                                   |                       |      | 25 $\mu\text{A}$    |
|              | $V_{GS} = 0\text{ V}$ , $T_J = 125^\circ\text{C}$                                                               |                       |      | 500 $\mu\text{A}$   |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |                       |      | 2.6 $\Omega$        |

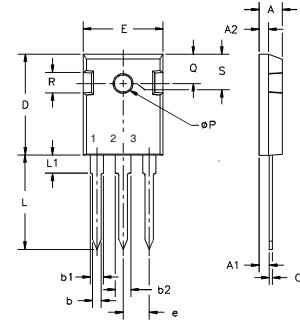
| Symbol                    | Test Conditions                                                                                                                             | Characteristic Values                               |      |      |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------|------|
|                           |                                                                                                                                             | (T <sub>J</sub> = 25°C, unless otherwise specified) |      |      |
|                           |                                                                                                                                             | Min.                                                | Typ. | Max. |
| <b>g<sub>fs</sub></b>     | V <sub>DS</sub> = 20 V; I <sub>D</sub> = 0.5 I <sub>D25</sub> , pulse test                                                                  | 3                                                   | 5    | S    |
| <b>C<sub>iss</sub></b>    | V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz                                                                                    |                                                     | 1950 | pF   |
| <b>C<sub>oss</sub></b>    |                                                                                                                                             |                                                     | 175  | pF   |
| <b>C<sub>rss</sub></b>    |                                                                                                                                             |                                                     | 60   | pF   |
| <b>t<sub>d(on)</sub></b>  | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 0.5 I <sub>D25</sub><br>R <sub>G</sub> = 4.7 Ω (External) |                                                     | 28   | ns   |
| <b>t<sub>r</sub></b>      |                                                                                                                                             |                                                     | 33   | ns   |
| <b>t<sub>d(off)</sub></b> |                                                                                                                                             |                                                     | 42   | ns   |
| <b>t<sub>f</sub></b>      |                                                                                                                                             |                                                     | 18   | ns   |
| <b>Q<sub>g(on)</sub></b>  | V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 0.5 V <sub>DSS</sub> , I <sub>D</sub> = 0.5 I <sub>D25</sub>                                      |                                                     | 56   | nC   |
| <b>Q<sub>gs</sub></b>     |                                                                                                                                             |                                                     | 13   | nC   |
| <b>Q<sub>gd</sub></b>     |                                                                                                                                             |                                                     | 25   | nC   |
| <b>R<sub>thJC</sub></b>   | (TO-247)                                                                                                                                    |                                                     | 0.42 | K/W  |
| <b>R<sub>thCK</sub></b>   |                                                                                                                                             |                                                     |      | K/W  |

| Source-Drain Diode    |                                                                                                        | Characteristic Values                               |      |       |
|-----------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------|-------|
|                       |                                                                                                        | (T <sub>J</sub> = 25°C, unless otherwise specified) |      |       |
| Symbol                | Test Conditions                                                                                        | min.                                                | typ. | max.  |
| <b>I<sub>S</sub></b>  | V <sub>GS</sub> = 0 V                                                                                  |                                                     |      | 6 A   |
| <b>I<sub>SM</sub></b> | Repetitive                                                                                             |                                                     |      | 24 A  |
| <b>V<sub>SD</sub></b> | I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0 V,<br>Pulse test, t ≤ 300 μs, duty cycle d ≤ 2 % |                                                     |      | 1.5 V |
| <b>T<sub>rr</sub></b> | I <sub>F</sub> = 6A<br>-di/dt = 100 A/μs                                                               | 850                                                 |      | ns    |

## Min Recommended Footprint



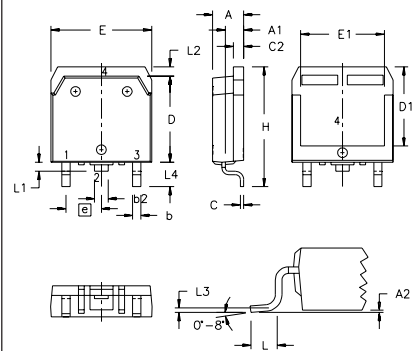
## TO-247 AD Outline



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

| Dim.           | Millimeter Min. | Millimeter Max. | Inches Min. | Inches Max. |
|----------------|-----------------|-----------------|-------------|-------------|
| A              | 4.7             | 5.3             | .185        | .209        |
| A <sub>1</sub> | 2.2             | 2.54            | .087        | .102        |
| A <sub>2</sub> | 2.2             | 2.6             | .059        | .098        |
| b              | 1.0             | 1.4             | .040        | .055        |
| b <sub>1</sub> | 1.65            | 2.13            | .065        | .084        |
| b <sub>2</sub> | 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        |
| L <sub>1</sub> |                 | 4.50            |             | .177        |
| ØP             | 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-268 Outline



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

| SYM            | INCHES   |      | MILLIMETERS |       |
|----------------|----------|------|-------------|-------|
|                | MIN      | MAX  | MIN         | MAX   |
| A              | .193     | .201 | 4.90        | 5.10  |
| A <sub>1</sub> | .106     | .114 | 2.70        | 2.90  |
| A <sub>2</sub> | .001     | .010 | 0.02        | 0.25  |
| b              | .045     | .057 | 1.15        | 1.45  |
| b <sub>2</sub> | .075     | .083 | 1.90        | 2.10  |
| C              | .016     | .026 | 0.40        | 0.65  |
| C <sub>2</sub> | .057     | .063 | 1.45        | 1.60  |
| D              | .543     | .551 | 13.80       | 14.00 |
| D <sub>1</sub> | .488     | .500 | 12.40       | 12.70 |
| E              | .624     | .632 | 15.85       | 16.05 |
| E <sub>1</sub> | .524     | .535 | 13.30       | 13.60 |
| e              | .215 BSC |      | 5.45 BSC    |       |
| H              | .736     | .752 | 18.70       | 19.10 |
| L              | .094     | .106 | 2.40        | 2.70  |
| L <sub>1</sub> | .047     | .055 | 1.20        | 1.40  |
| L <sub>2</sub> | .039     | .045 | 1.00        | 1.15  |
| L <sub>3</sub> | .010 BSC |      | 0.25 BSC    |       |
| L <sub>4</sub> | .150     | .161 | 3.80        | 4.10  |

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

IXYS MOSFETs and IGBTs are covered by one or more of the following U.S. patents:

4,835,592 4,881,106 5,017,508 5,049,961 5,187,117 5,486,715 6,306,728B1 6,259,123B1 6,306,728B1  
4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025 6,404,065B1 6,162,665 6,534,343

Fig. 1. Output Characteristics  
@ 25 Deg. C

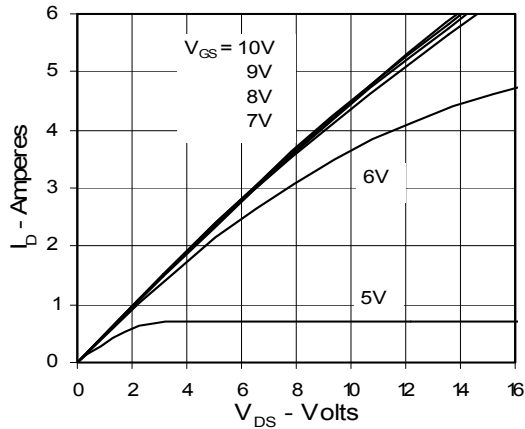


Fig. 2. Extended Output Characteristics  
@ 25 deg. C

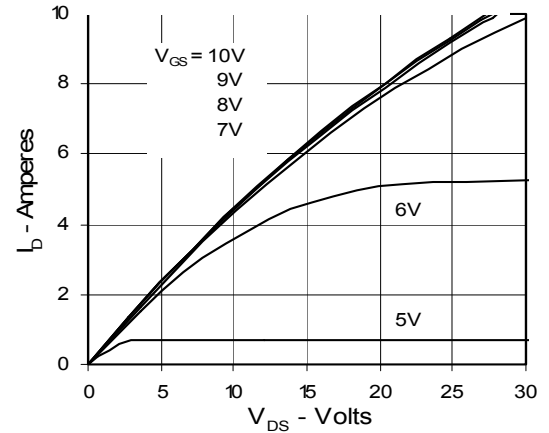


Fig. 3. Output Characteristics  
@ 125 Deg. C

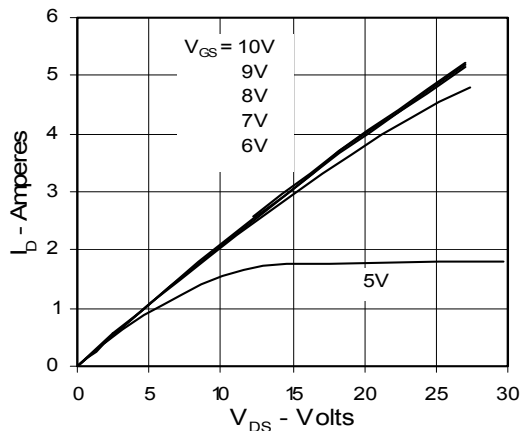


Fig. 4.  $R_{DS(on)}$  Normalized to  $I_{D25}$  Value vs.  
Junction Temperature

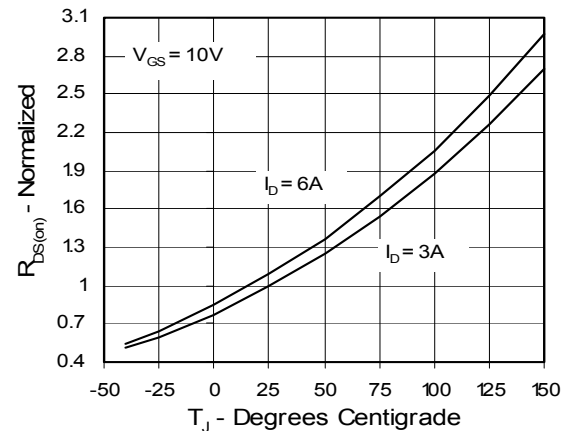


Fig. 5.  $R_{DS(on)}$  Normalized to  $I_{D25}$   
Value vs.  $I_D$

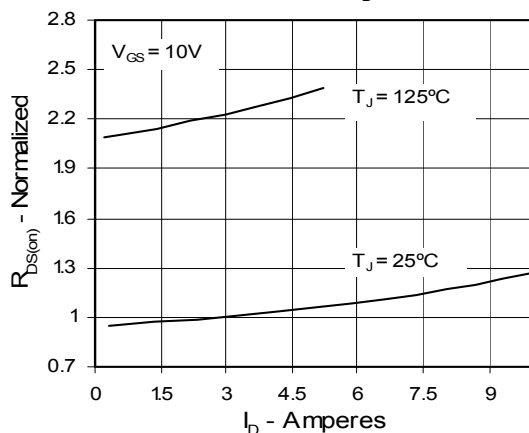


Fig. 6. Drain Current vs. Case  
Temperature

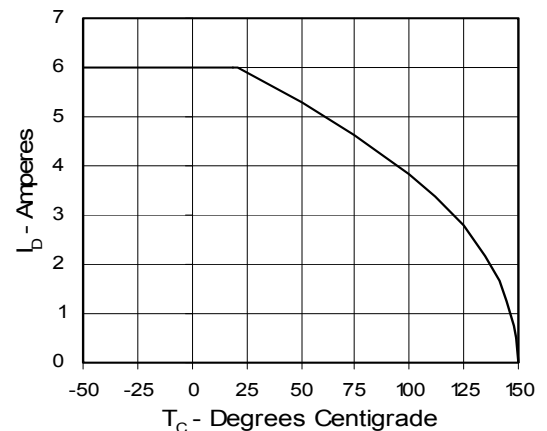


Fig. 7. Input Admittance

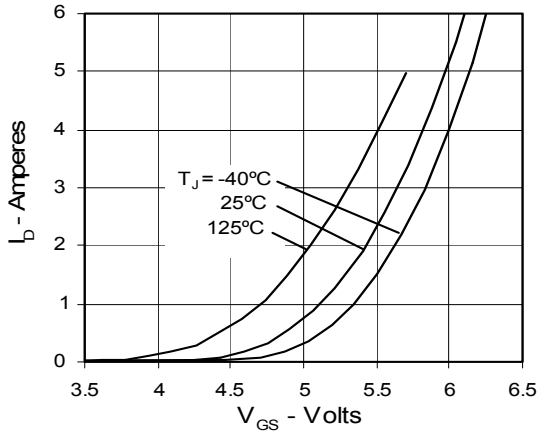


Fig. 8. Transconductance

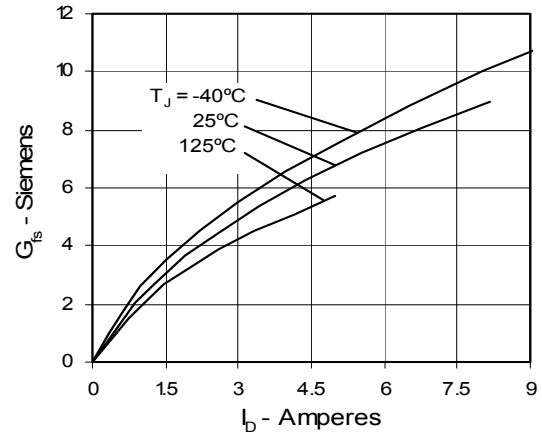


Fig. 9. Source Current vs. Source-To-Drain Voltage

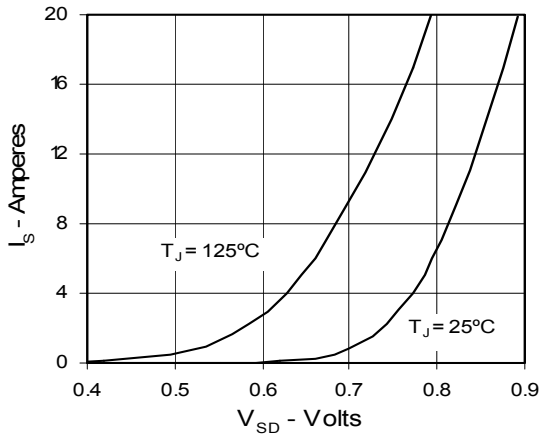


Fig. 10. Gate Charge

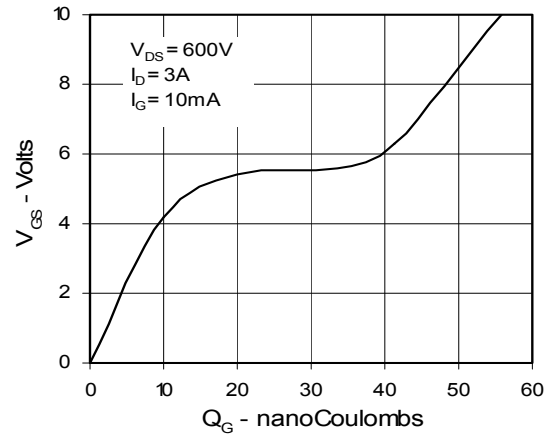


Fig. 11. Capacitance

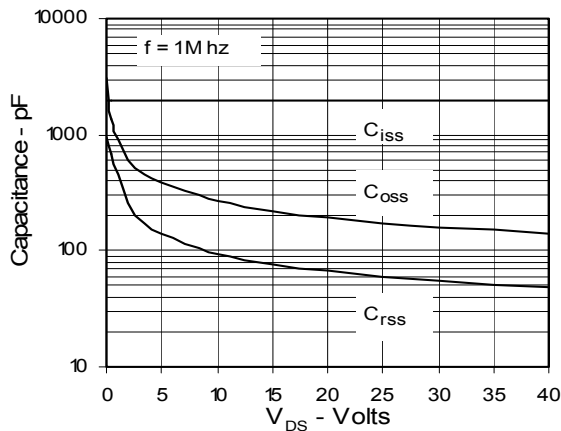
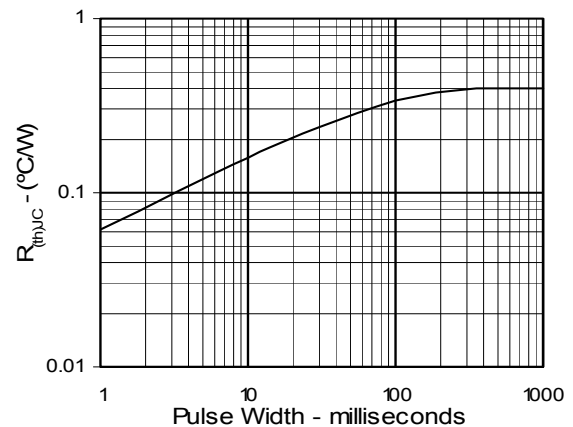


Fig. 12. Maximum Transient Thermal Resistance



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4,850,072 4,931,844 5,034,796 5,063,307 5,237,481 5,381,025 6,404,065B1 6,162,665 6,534,343



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