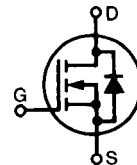


# Standard Power MOSFET

IXTH / IXTM 5N100  
IXTH / IXTM 5N100A

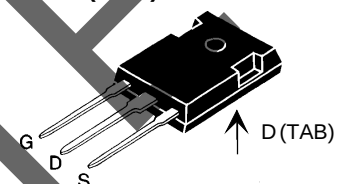
| $V_{DSS}$ | $I_{D25}$ | $R_{DS(on)}$ |
|-----------|-----------|--------------|
| 1000 V    | 5 A       | 2.4 $\Omega$ |
| 1000 V    | 5 A       | 2.0 $\Omega$ |

## N-Channel Enhancement Mode

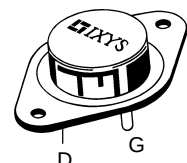


| Symbol                                                                          | Test Conditions                                                               | Maximum Ratings             |                  |
|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------|------------------|
| $V_{DSS}$                                                                       | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                               | 1000                        | V                |
| $V_{DGR}$                                                                       | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1\text{ M}\Omega$ | 1000                        | V                |
| $V_{GS}$                                                                        | Continuous                                                                    | $\pm 20$                    | V                |
| $V_{GSM}$                                                                       | Transient                                                                     | $\pm 30$                    | V                |
| $I_{D25}$                                                                       | $T_C = 25^\circ\text{C}$                                                      | 5                           | A                |
| $I_{DM}$                                                                        | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                    | 20                          | A                |
| $P_D$                                                                           | $T_C = 25^\circ\text{C}$                                                      | 180                         | W                |
| $T_J$                                                                           |                                                                               | -55 ... +150                | $^\circ\text{C}$ |
| $T_{JM}$                                                                        |                                                                               | 150                         | $^\circ\text{C}$ |
| $T_{stg}$                                                                       |                                                                               | -55 ... +150                | $^\circ\text{C}$ |
| $M_d$                                                                           | Mounting torque                                                               | 1.13/10                     | Nm/lb.in.        |
| <b>Weight</b>                                                                   |                                                                               | TO-204 = 13 g, TO-247 = 6 g |                  |
| Maximum lead temperature for soldering<br>1.6 mm (0.062 in.) from case for 10 s |                                                                               | 300                         | $^\circ\text{C}$ |

TO-247 AD (IXTH)



TO-204 AA (IXTM)



G = Gate,  
S = Source,

D = Drain,  
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 controls
- Uninterruptible Power Supplies (UPS)
- DC choppers

## Advantages

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

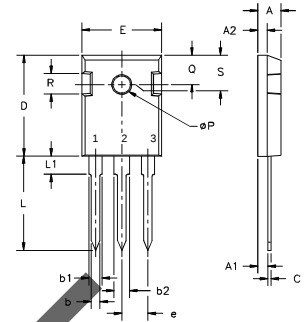
| Symbol       | Test Conditions                                                                                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                              |
|--------------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|------------------------------|
|              |                                                                                                                       | min.                                                                              | typ. | max.                         |
| $V_{DSS}$    | $V_{GS} = 0\text{ V}$ , $I_D = 3\text{ mA}$                                                                           | 1000                                                                              |      | V                            |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$                                                                    | 2                                                                                 |      | 4.5 V                        |
| $I_{GSS}$    | $V_{GS} = \pm 20\text{ V}_{DC}$ , $V_{DS} = 0$                                                                        |                                                                                   |      | $\pm 100\text{ nA}$          |
| $I_{DSS}$    | $V_{DS} = 0.8 \cdot V_{DSS}$<br>$V_{GS} = 0\text{ V}$                                                                 |                                                                                   |      | 250 $\mu\text{A}$<br>1 mA    |
| $R_{DS(on)}$ | $V_{GS} = 10\text{ V}$ , $I_D = 0.5 I_{D25}$<br>Pulse test, $t \leq 300\text{ }\mu\text{s}$ , duty cycle $d \leq 2\%$ |                                                                                   |      | 2.4 $\Omega$<br>2.0 $\Omega$ |

| Symbol       | Test Conditions                                                                                                 | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |        |
|--------------|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|--------|
|              |                                                                                                                 | min.                                                                              | typ. | max.   |
| $g_{fs}$     | $V_{DS} = 10\text{ V}$ ; $I_D = 0.5 \cdot I_{D25}$ , pulse test                                                 | 4                                                                                 | 6    | S      |
| $C_{iss}$    | $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$                                             |                                                                                   | 2600 | pF     |
| $C_{oss}$    |                                                                                                                 |                                                                                   | 180  | pF     |
| $C_{rss}$    |                                                                                                                 |                                                                                   | 45   | pF     |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 I_{D25}$<br>$R_G = 4.7\ \Omega$ , (External) |                                                                                   | 35   | 100 ns |
| $t_r$        |                                                                                                                 |                                                                                   | 20   | 50 ns  |
| $t_{d(off)}$ |                                                                                                                 |                                                                                   | 100  | 200 ns |
| $t_f$        |                                                                                                                 |                                                                                   | 30   | 80 ns  |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}$ , $V_{DS} = 0.5 \cdot V_{DSS}$ , $I_D = 0.5 I_{D25}$                                     |                                                                                   | 88   | 130 nC |
| $Q_{gs}$     |                                                                                                                 |                                                                                   | 21   | 30 nC  |
| $Q_{gd}$     |                                                                                                                 |                                                                                   | 38   | 70 nC  |
| $R_{thJC}$   |                                                                                                                 |                                                                                   | 0.7  | K/W    |
| $R_{thCK}$   |                                                                                                                 |                                                                                   | 0.25 | K/W    |

#### Source-Drain Diode

| Symbol   | Test Conditions                                                                                          | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |       |
|----------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|-------|
|          |                                                                                                          | min.                                                                              | typ. | max.  |
| $I_S$    | $V_{GS} = 0\text{ V}$                                                                                    |                                                                                   |      | 5 A   |
| $I_{SM}$ | Repetitive; pulse width limited by $T_{JM}$                                                              |                                                                                   |      | 20 A  |
| $V_{SD}$ | $I_F = I_S$ , $V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |                                                                                   |      | 1.5 V |
| $t_{rr}$ | $I_F = I_S$ , $-di/dt = 100\text{ A}/\mu\text{s}$ , $V_R = 100\text{ V}$                                 |                                                                                   | 900  | ns    |

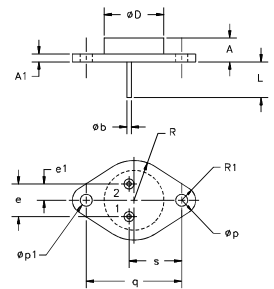
#### TO-247 AD (IXTH) Outline



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

| Dim.           | Millimeter |       | Inches   |       |
|----------------|------------|-------|----------|-------|
|                | Min.       | Max.  | Min.     | 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-204AA (IXTM) Outline



Pins 1 - Gate Case - Drain 2 - Source

| Dim.            | Millimeter |       | Inches    |      |
|-----------------|------------|-------|-----------|------|
|                 | Min.       | Max.  | Min.      | Max. |
| A               | 6.4        | 11.4  | .250      | .450 |
| A <sub>1</sub>  |            | 3.42  |           | .135 |
| Øb              | .97        | 1.09  | .038      | .043 |
| ØD              |            | 22.22 |           | .875 |
| e               | 10.67      | 11.17 | .420      | .440 |
| e <sub>1</sub>  | 5.21       | 5.71  | .205      | .225 |
| L               | 7.93       |       | .312      |      |
| Øp              | 3.84       | 4.19  | .151      | .165 |
| Øp <sub>1</sub> | 3.84       | 4.19  | .151      | .165 |
| q               | 30.15 BSC  |       | 1.187 BSC |      |
| R               |            | 13.33 |           | .525 |
| R <sub>1</sub>  |            | 4.77  |           | .188 |
| s               | 16.64      | 17.14 | .655      | .675 |

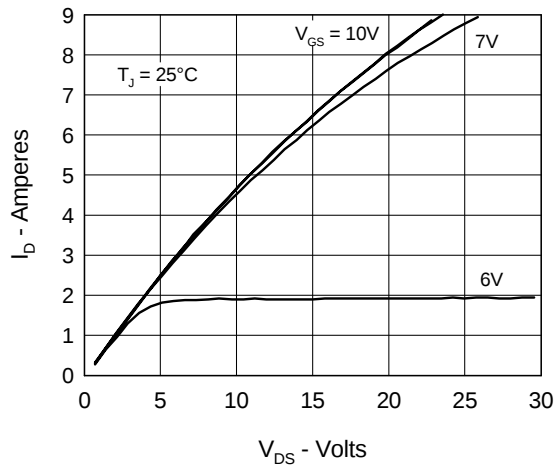
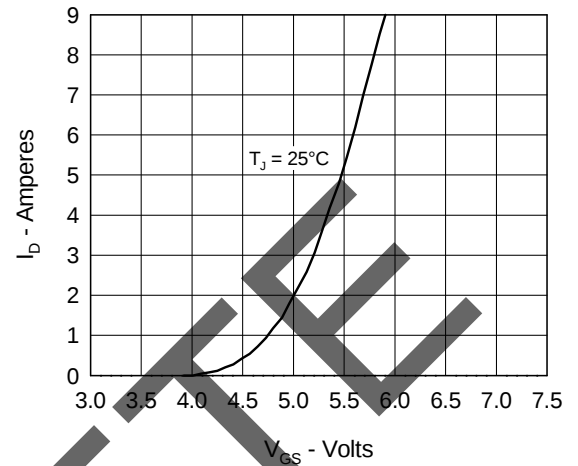
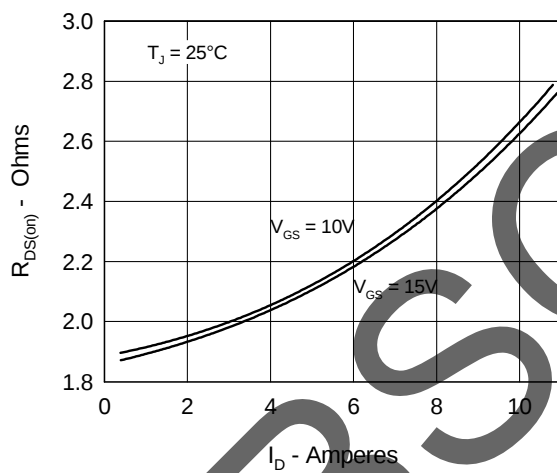
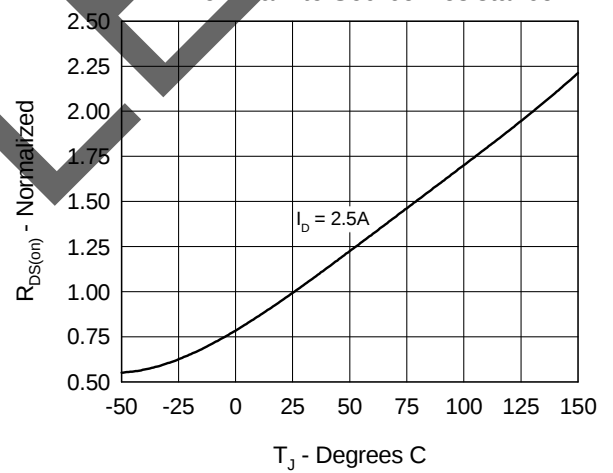
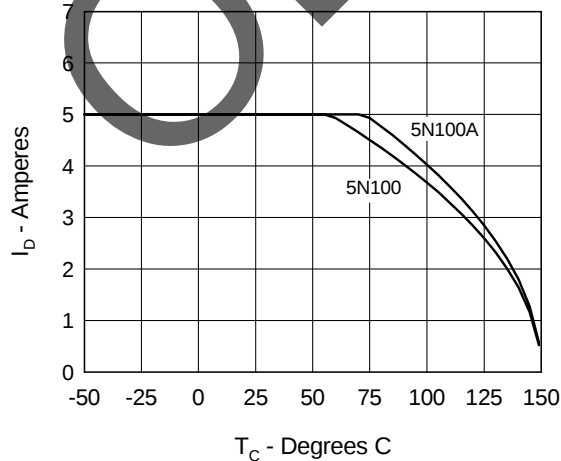
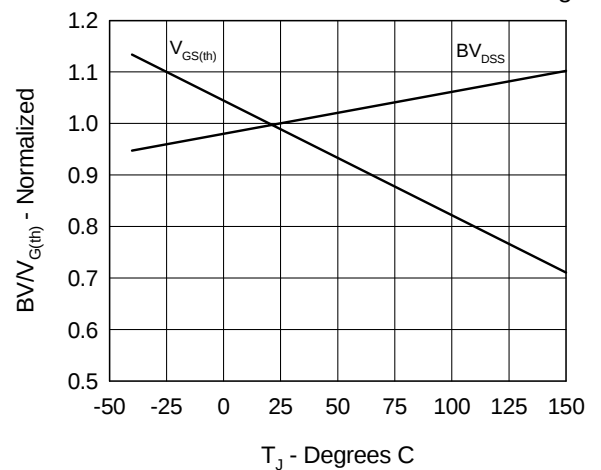
**Fig. 1 Output Characteristics**

**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

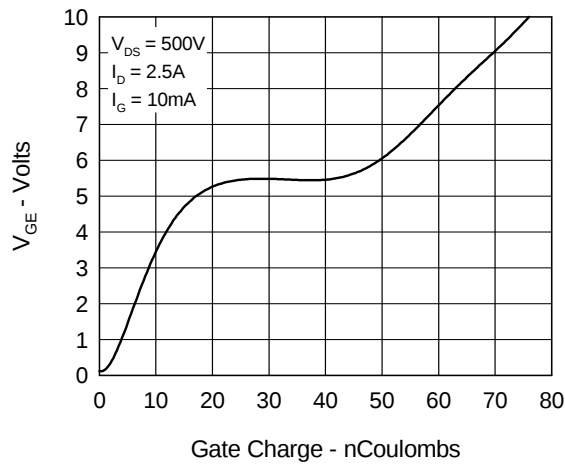


Fig.8 Forward Bias Safe Operating Area

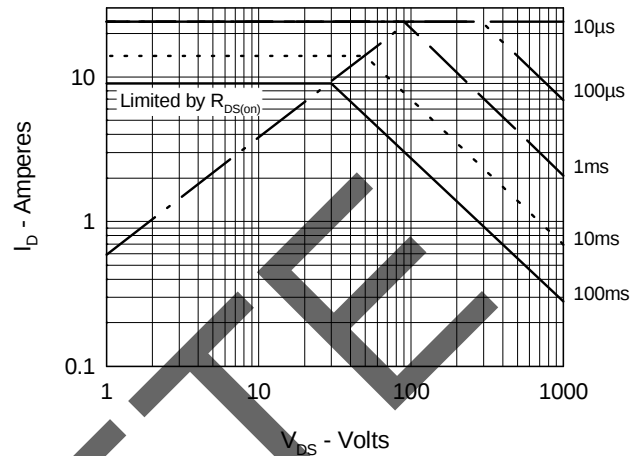


Fig.9 Capacitance Curves

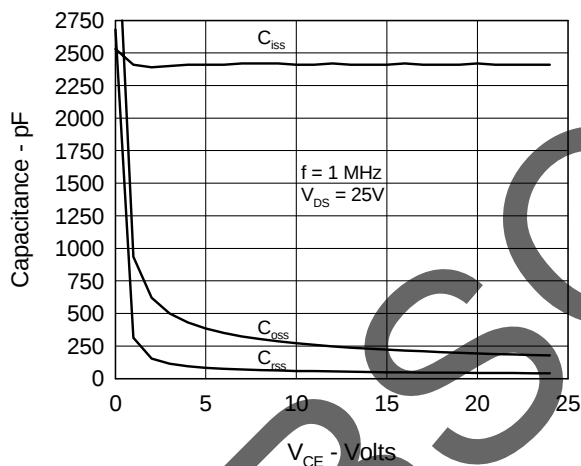


Fig.10 Source Current vs. Source to Drain Voltage

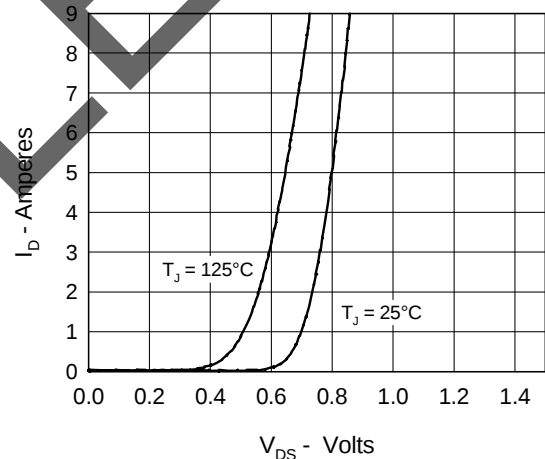
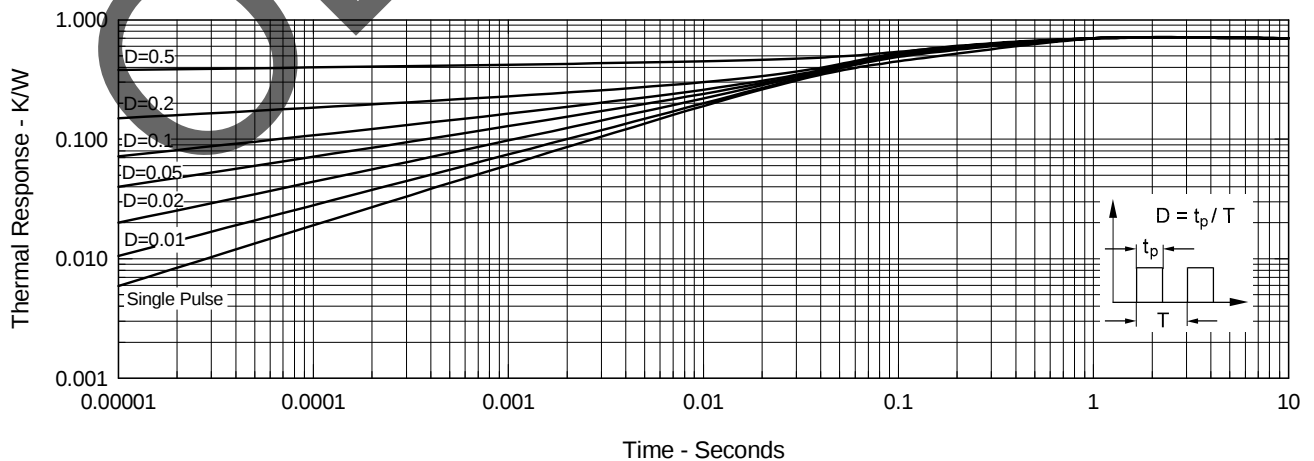


Fig.11 Transient Thermal Impedance





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