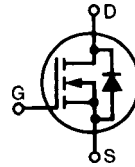


# MegaMOS™FET

IXTH / IXTM 21N50  
IXTH / IXTM 24N50

| $V_{DSS}$ | $I_{D25}$ | $R_{DS(on)}$  |
|-----------|-----------|---------------|
| 500 V     | 21 A      | 0.25 $\Omega$ |
| 500 V     | 24 A      | 0.23 $\Omega$ |

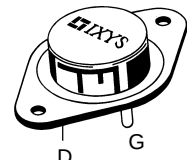
## N-Channel Enhancement Mode



| Symbol                                                                          | Test Conditions                                                               | Maximum Ratings             |                  |
|---------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------|------------------|
| $V_{DSS}$                                                                       | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                               | 500                         | V                |
| $V_{DGR}$                                                                       | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GS} = 1\text{ M}\Omega$ | 500                         | V                |
| $V_{GS}$                                                                        | Continuous                                                                    | $\pm 20$                    | V                |
| $V_{GSM}$                                                                       | Transient                                                                     | $\pm 30$                    | V                |
| $I_{D25}$                                                                       | $T_C = 25^\circ\text{C}$                                                      | 21N50<br>24N50              | 21<br>24 A       |
| $I_{DM}$                                                                        | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                    | 21N50<br>24N50              | 84<br>96 A       |
| $P_D$                                                                           | $T_C = 25^\circ\text{C}$                                                      | 300                         | W                |
| $T_J$                                                                           |                                                                               | -55 ... +150                | $^\circ\text{C}$ |
| $T_{JM}$                                                                        |                                                                               | 150                         | $^\circ\text{C}$ |
| $T_{stg}$                                                                       |                                                                               | -55 ... +150                | $^\circ\text{C}$ |
| $M_d$                                                                           | Mounting torque                                                               | 1.13/10                     | Nm/lb.in.        |
| Weight                                                                          |                                                                               | TO-204 = 18 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 AE (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

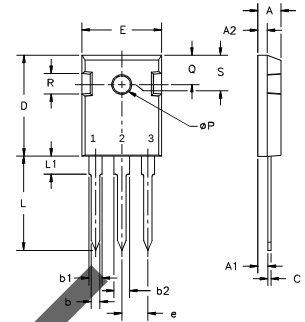
| Symbol       | Test Conditions                                                                                                       | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                                |
|--------------|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|--------------------------------|
|              |                                                                                                                       | min.                                                                              | typ. | max.                           |
| $V_{DSS}$    | $V_{GS} = 0\text{ V}$ , $I_D = 250\text{ }\mu\text{A}$                                                                | 500                                                                               |      | V                              |
| $V_{GS(th)}$ | $V_{DS} = V_{GS}$ , $I_D = 250\text{ }\mu\text{A}$                                                                    | 2                                                                                 |      | 4 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>$V_{GS} = 0\text{ V}$                                                                 |                                                                                   |      | 200 $\mu\text{A}$<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 $d \leq 2\%$ |                                                                                   |      | 0.25 $\Omega$<br>0.23 $\Omega$ |

| 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                                            | 11                                                                                | 21   | S      |
| $C_{iss}$    | $V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$                                           |                                                                                   | 4200 | pF     |
| $C_{oss}$    |                                                                                                         |                                                                                   | 450  | pF     |
| $C_{rss}$    |                                                                                                         |                                                                                   | 135  | pF     |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 I_{D25}$<br>$R_G = 2\ \Omega$ , (External) |                                                                                   | 24   | 30 ns  |
| $t_r$        |                                                                                                         |                                                                                   | 33   | 45 ns  |
| $t_{d(off)}$ |                                                                                                         |                                                                                   | 65   | 80 ns  |
| $t_f$        |                                                                                                         |                                                                                   | 30   | 40 ns  |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 0.5 \cdot V_{DSS}, I_D = 0.5 I_{D25}$                                   |                                                                                   | 160  | 190 nC |
| $Q_{gs}$     |                                                                                                         |                                                                                   | 28   | 40 nC  |
| $Q_{gd}$     |                                                                                                         |                                                                                   | 75   | 85 nC  |
| $R_{thJC}$   |                                                                                                         |                                                                                   | 0.42 | 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.       |
| $I_S$    | $V_{GS} = 0$                                                                                          | 21N50<br>24N50                                                                    |      | 21<br>24 A |
| $I_{SM}$ | Repetitive;<br>pulse width limited by $T_{JM}$                                                        | 21N50<br>24N50                                                                    |      | 84<br>96 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      |
| $t_{rr}$ | $I_F = I_S, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$                                    |                                                                                   | 600  | ns         |

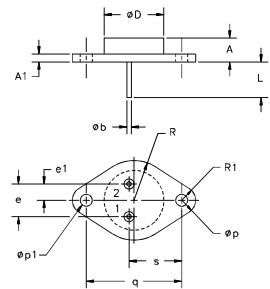
#### TO-247 AD (IXTH) Outline



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

| Dim.           | Millimeter<br>Min. Max. | Inches<br>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           |
| L1             | 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-204 AE(IXTM) Outline



Pins 1 - Gate 2 - Source  
Case - Drain

| Dim.            | Millimeter<br>Min. Max. | Inches<br>Min. Max. |
|-----------------|-------------------------|---------------------|
| A               | 6.4 11.4                | .250 .450           |
| A <sub>1</sub>  | 1.53 3.42               | .060 .135           |
| Øb              | 1.45 1.60               | .057 .063           |
| ØD              | 22.22                   | .875                |
| e               | 10.67 11.17             | .420 .440           |
| e <sub>1</sub>  | 5.21 5.71               | .205 .225           |
| L               | 11.18 12.19             | .440 .480           |
| 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               | 12.58 13.33             | .495 .525           |
| R <sub>1</sub>  | 3.33 4.77               | .131 .188           |
| s               | 16.64 17.14             | .655 .675           |

Fig. 1 Output Characteristics

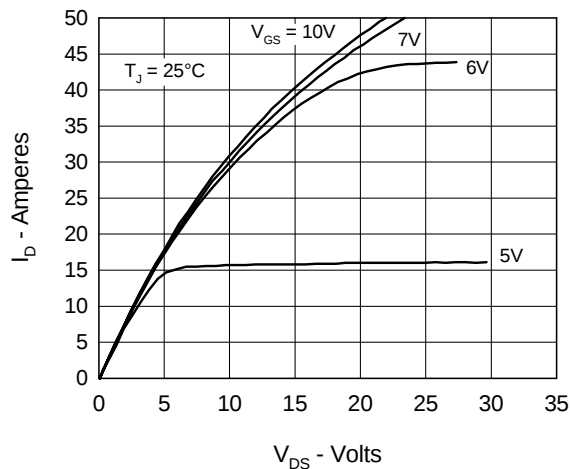


Fig. 2 Input Admittance

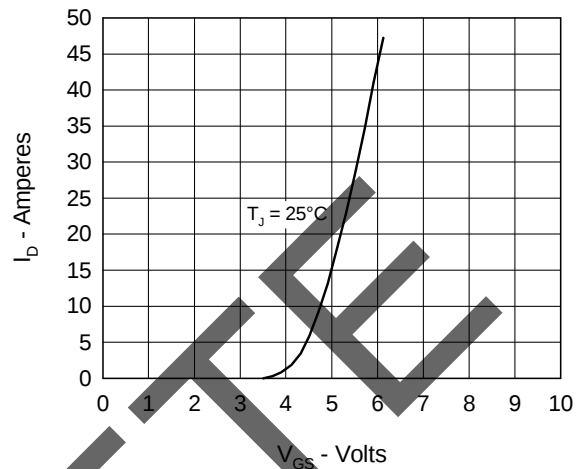
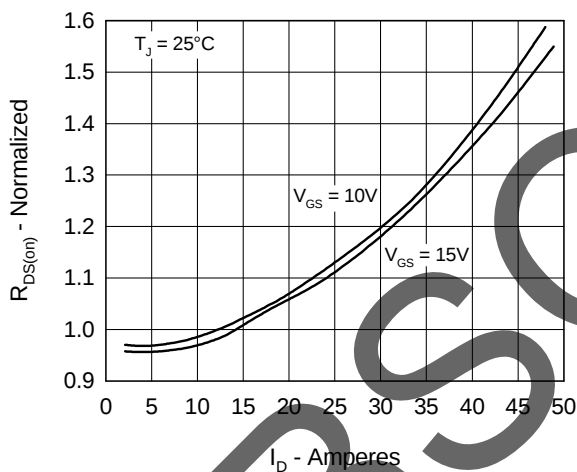

Fig. 3  $R_{DS(on)}$  vs. Drain Current


Fig. 4 Temperature Dependence of Drain to Source Resistance

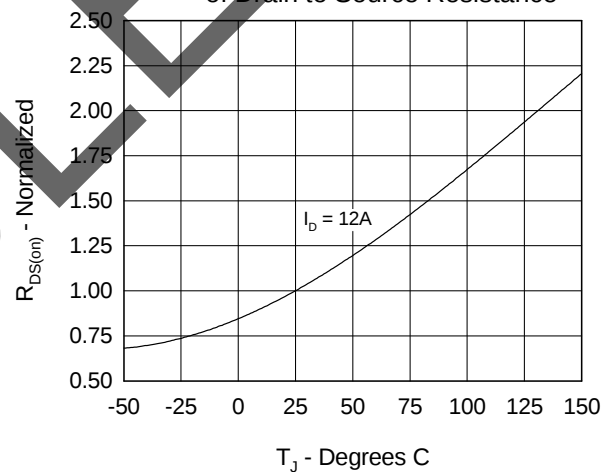


Fig. 5 Drain Current vs. Case Temperature

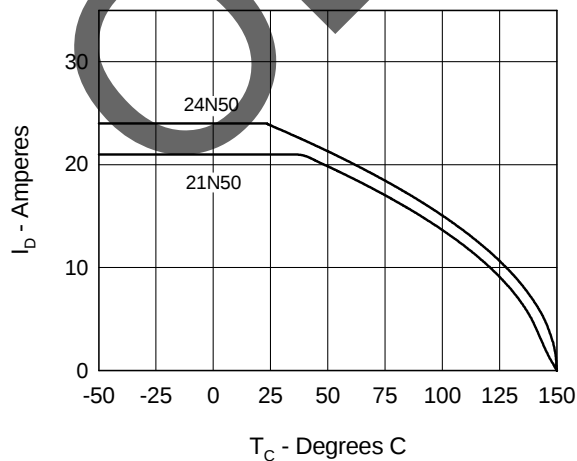


Fig. 6 Temperature Dependence of Breakdown and Threshold Voltage

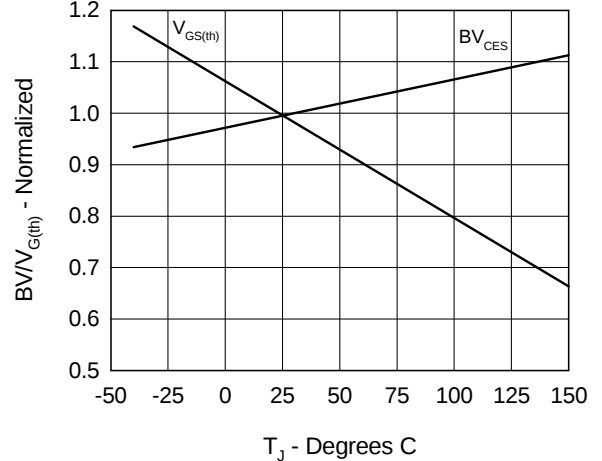


Fig.7 Gate Charge Characteristic Curve

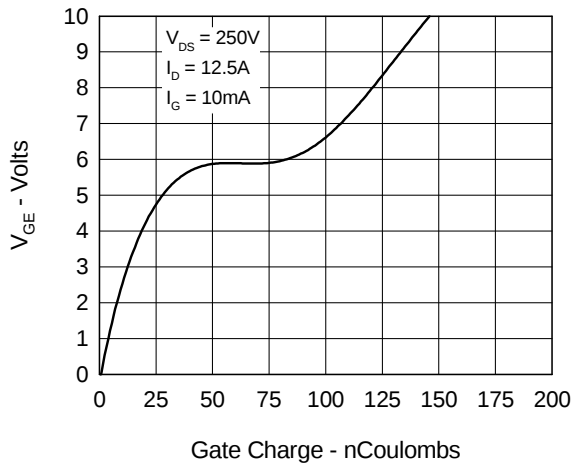


Fig.8 Forward Bias Safe Operating Area

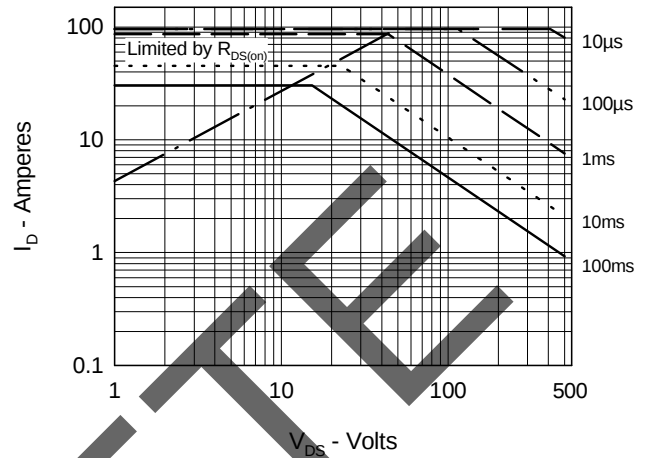


Fig.9 Capacitance Curves

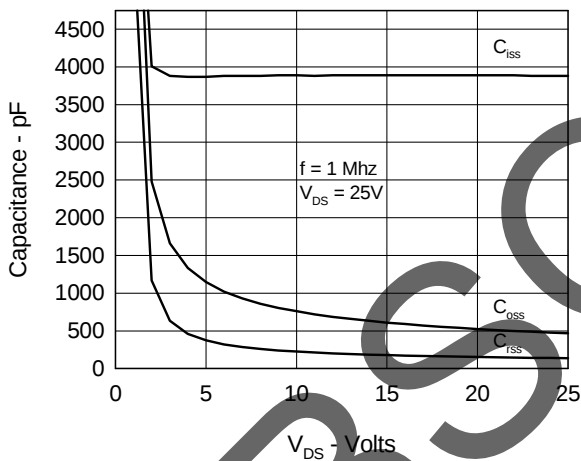


Fig.10 Source Current vs. Source to Drain Voltage

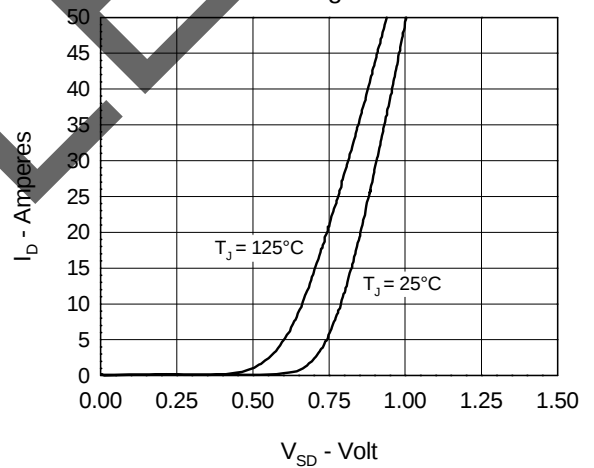
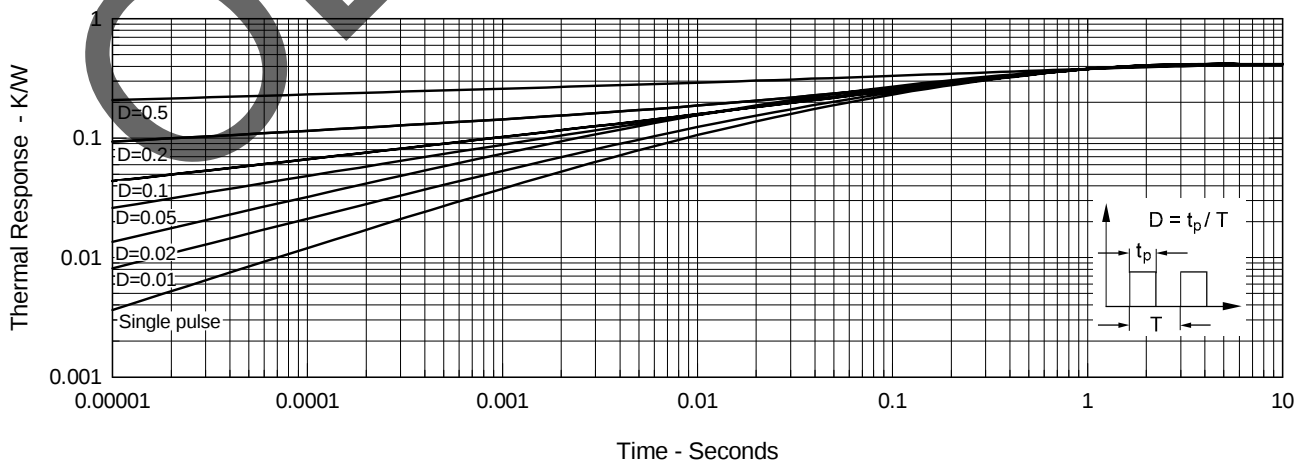


Fig.11 Transient Thermal Impedance





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