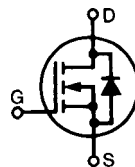


# MegaMOS™ Power MOSFET

## IRFP 460

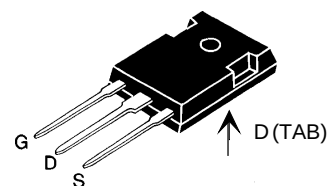
$$\begin{aligned} V_{DSS} &= 500 \text{ V} \\ I_{D(\text{cont})} &= 20 \text{ A} \\ R_{DS(\text{on})} &= 0.27 \Omega \end{aligned}$$

N-Channel Enhancement Mode, HDMOS™ Family



| 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                |
| $I_{D25}$                                                                       | $T_C = 25^\circ\text{C}$                                                                                                                | 20              | A                |
| $I_{DM}$                                                                        | $T_C = 25^\circ\text{C}$ , pulse width limited by $T_{JM}$                                                                              | 80              | A                |
| $I_{AR}$                                                                        |                                                                                                                                         | 20              | A                |
| $E_{AR}$                                                                        | $T_C = 25^\circ\text{C}$                                                                                                                | 28              | mJ               |
| $dv/dt$                                                                         | $I_S \leq I_{DM}$ , $di/dt \leq 100 \text{ A}/\mu\text{s}$ , $V_{DD} \leq V_{DSS}$ ,<br>$T_J \leq 150^\circ\text{C}$ , $R_G = 2 \Omega$ | 3.5             | V/ns             |
| $P_D$                                                                           | $T_C = 25^\circ\text{C}$                                                                                                                | 260             | 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                                                                                                                         | 1.15/10         | Nm/lb.in.        |
| <b>Weight</b>                                                                   |                                                                                                                                         | 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



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

### Features

- Repetitive avalanche energy rated
- Fast switching times
- Low  $R_{DS(\text{on})}$  HDMOS™ process
- Rugged polysilicon gate cell structure
- High Commutating  $dv/dt$  Rating

### Applications

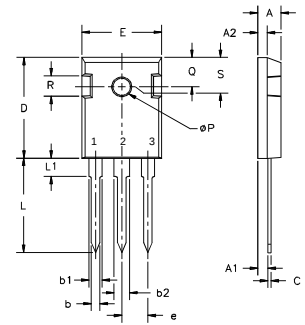
- Switching Power Supplies
- Motor controls

| Symbol              | Test Conditions                                                                                                   | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                                       |
|---------------------|-------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------------------------------|
|                     |                                                                                                                   | min.                                                                              | typ. | max.                                  |
| $V_{DSS}$           | $V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$                                                                  | 500                                                                               |      | V                                     |
| $V_{GS(\text{th})}$ | $V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$                                                                       | 2                                                                                 |      | V                                     |
| $I_{GSS}$           | $V_{GS} = \pm 20 \text{ V}_{DC}$ , $V_{DS} = 0$                                                                   |                                                                                   |      | $\pm 100 \text{ nA}$                  |
| $I_{DSS}$           | $V_{DS} = 0.8 \cdot V_{DSS}$ , $V_{GS} = 0 \text{ V}$                                                             |                                                                                   |      | $25 \mu\text{A}$<br>$250 \mu\text{A}$ |
| $R_{DS(\text{on})}$ | $V_{GS} = 10 \text{ V}$ , $I_D = 12 \text{ A}$<br>Pulse test, $t \leq 300 \mu\text{s}$ , duty cycle $d \leq 2 \%$ | 0.25                                                                              | 0.27 | $\Omega$                              |

| Symbol       | Test Conditions                                                                                      | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |        |
|--------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|--------|
|              |                                                                                                      | min.                                                                              | typ. | max.   |
| $g_{fs}$     | $V_{DS} = 10\text{ V}; I_D = 12\text{ A}$ , pulse test                                               | 13                                                                                | 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     |
| $t_{d(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 250\text{ V}, I_D = 20\text{ A}$<br>$R_G = 4.3\ \Omega$ , (External) |                                                                                   | 23   | 35 ns  |
| $t_r$        |                                                                                                      |                                                                                   | 81   | 120 ns |
| $t_{d(off)}$ |                                                                                                      |                                                                                   | 85   | 130 ns |
| $t_f$        |                                                                                                      |                                                                                   | 65   | 98 ns  |
| $Q_{g(on)}$  | $V_{GS} = 10\text{ V}, V_{DS} = 200\text{ V}, I_D = 20\text{ A}$                                     |                                                                                   | 135  | nC     |
| $Q_{gs}$     |                                                                                                      |                                                                                   | 28   | nC     |
| $Q_{gd}$     |                                                                                                      |                                                                                   | 62   | nC     |
| $R_{thJC}$   |                                                                                                      |                                                                                   | 0.45 | K/W    |
| $R_{thCK}$   |                                                                                                      | 0.25                                                                              |      | K/W    |

| Source-Drain Diode |                                                                                                               | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |               |
|--------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------|
| Symbol             | Test Conditions                                                                                               | min.                                                                              | typ. | max.          |
| $I_S$              | $V_{GS} = 0\text{ V}$                                                                                         |                                                                                   |      | 20 A          |
| $I_{SM}$           | Repetitive; pulse width limited by $T_{JM}$                                                                   |                                                                                   |      | 80 A          |
| $V_{SD}$           | $I_F = 20\text{ A}, V_{GS} = 0\text{ V}$ ,<br>Pulse test, $t \leq 300\ \mu\text{s}$ , duty cycle $d \leq 2\%$ |                                                                                   |      | 1.8 V         |
| $t_{rr}$           | $I_F = 20\text{ A}, -di/dt = 100\text{ A}/\mu\text{s}, V_R = 100\text{ V}$                                    |                                                                                   | 570  | 860 ns        |
| $Q_{rr}$           |                                                                                                               |                                                                                   | 5.7  | $\mu\text{C}$ |

## 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 <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   |      |

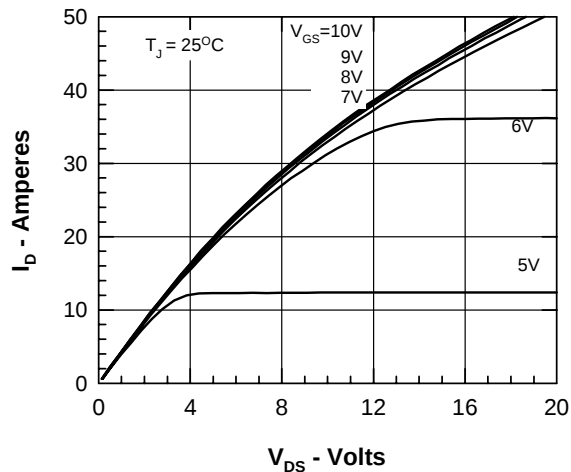


Figure 1. Output Characteristics at 25°C

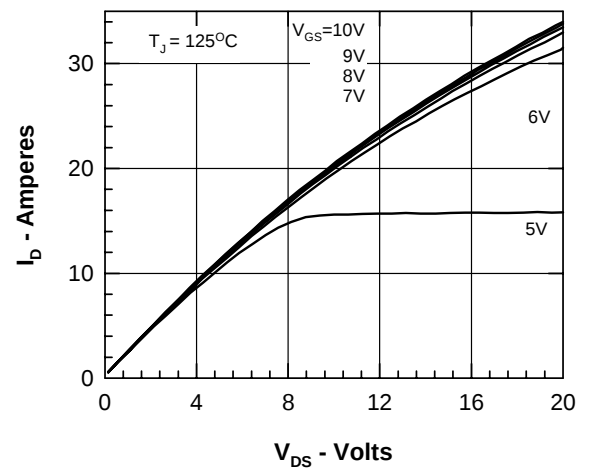


Figure 2. Output Characteristics at 125°C

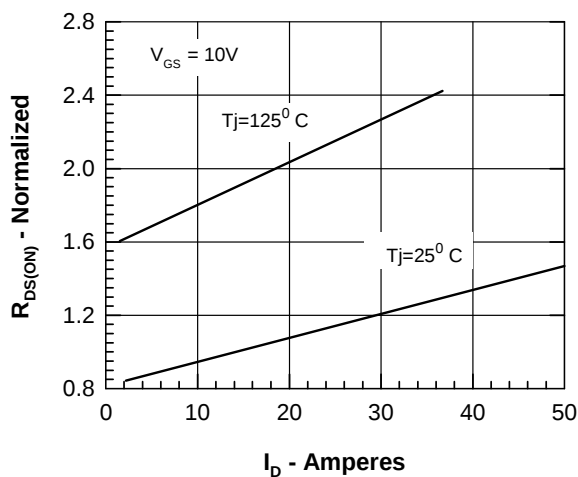


Figure 3.  $R_{DS(on)}$  normalized to value at  $I_D = 12A$

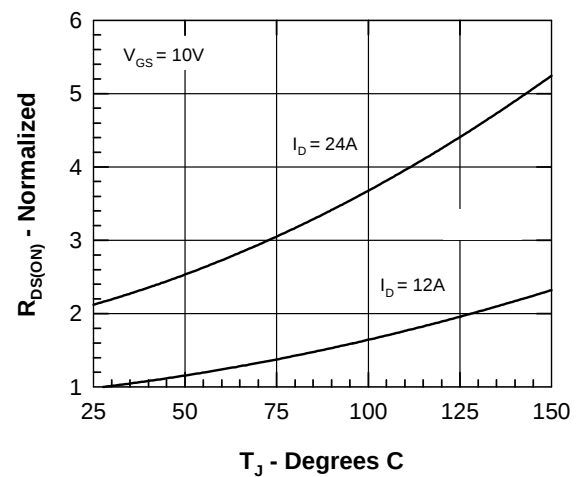


Figure 4.  $R_{DS(on)}$  normalized to value at  $I_D = 12A$

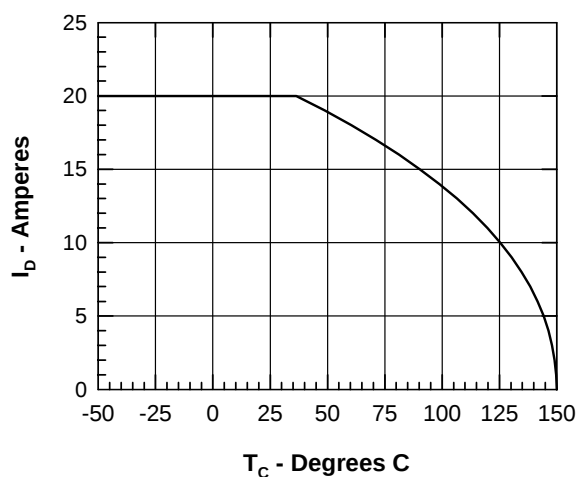


Figure 5. Drain Current vs. Case Temperature

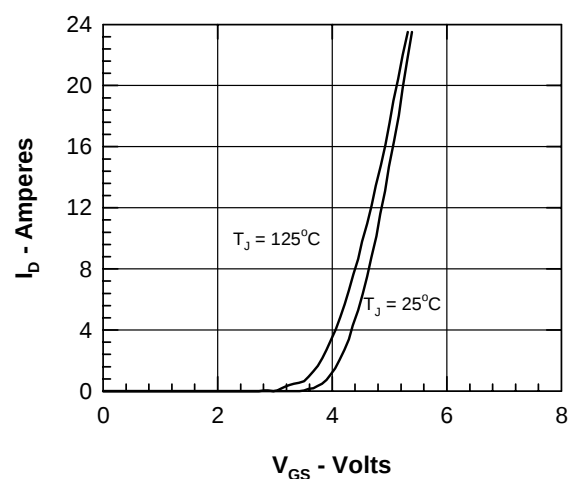


Figure 6. Admittance Curves

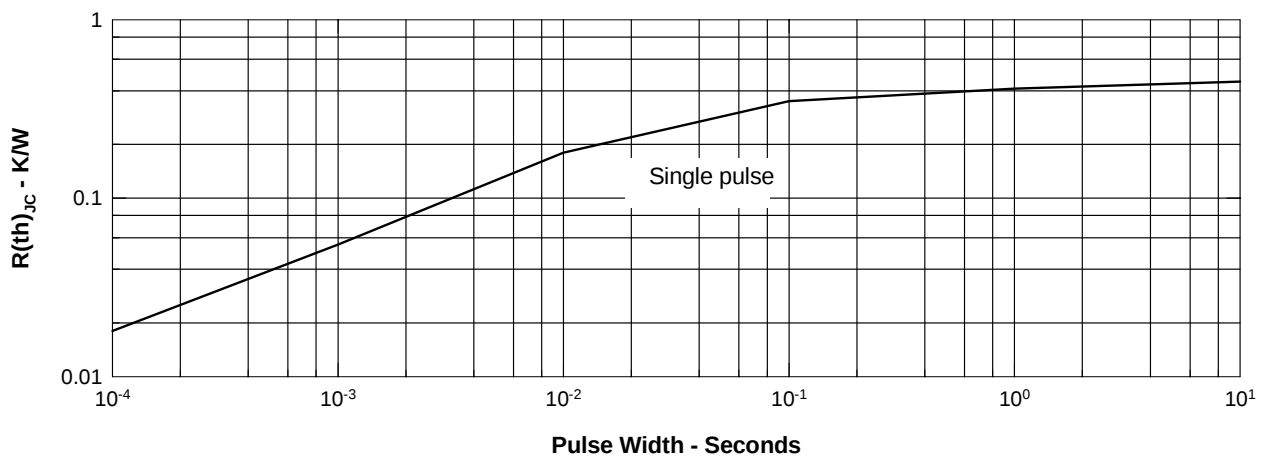
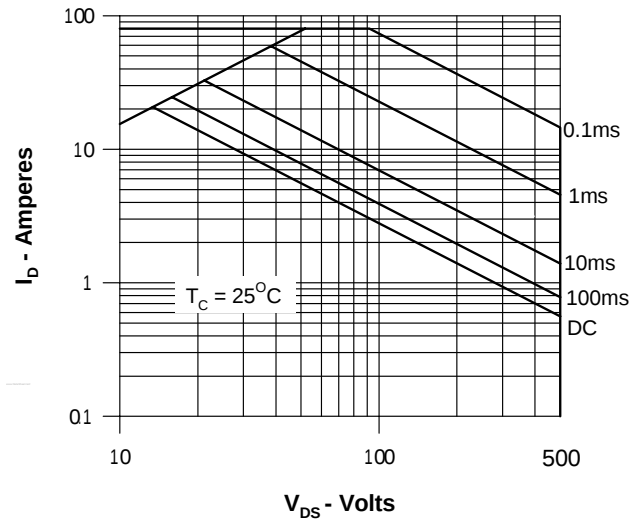
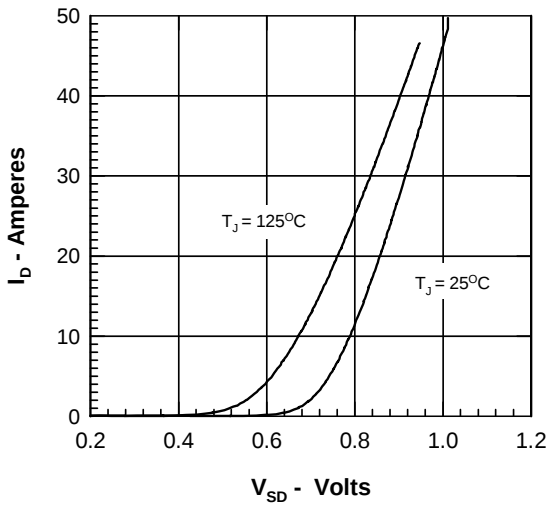
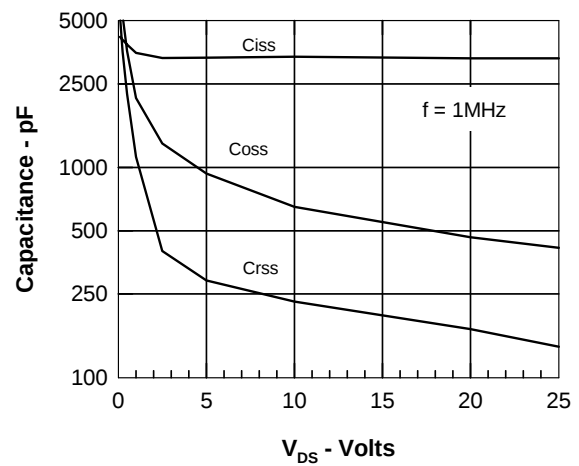
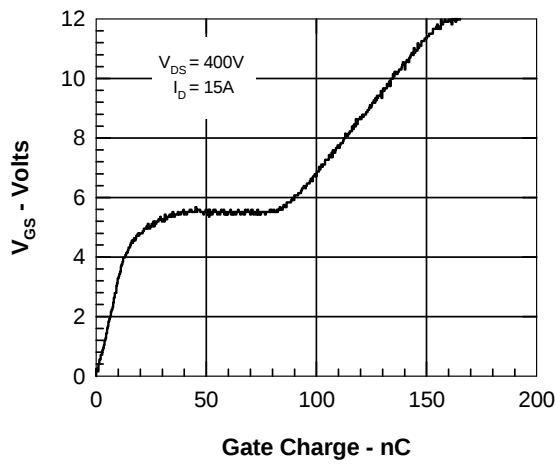


Figure 11. Transient Thermal Resistance