

# IRF830



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## Power Field Effect Transistor N-Channel Enhancement Mode Silicon Gate TMOS

This TMOS Power FET is designed for high voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

- Silicon Gate for Fast Switching Speeds
- Low  $R_{DS(on)}$  to Minimize On-Losses, Specified at Elevated Temperature
- Rugged — SOA is Power Dissipation Limited
- Source-to-Drain Diode Characterized for Use with Inductive Loads

**TMOS POWER FET**  
**4.5 AMPERES, 500 VOLTS**

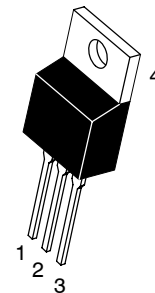
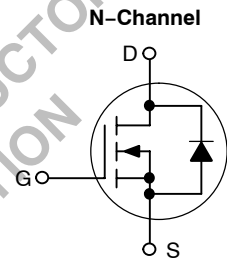
$R_{DS(on)} = 1.5 \Omega$

### MAXIMUM RATINGS

| Rating  | Symbol         | Value      | Unit                   |
|---|----------------|------------|------------------------|
| Drain-Source Voltage  | $V_{DSS}$      | 500        | Vdc                    |
| Drain-Gate Voltage ( $R_{GS} = 1.0 M\Omega$ )                             | $V_{DGR}$      | 500        | Vdc                    |
| Gate-Source Voltage   | $V_{GS}$       | $\pm 20$   | Vdc                    |
| Drain Current   | $I_D$          |            | Adc                    |
| Continuous, $T_C = 25^\circ C$  |                | 4.5        |                        |
| $T_C = 100^\circ C$   |                | 3.0        |                        |
| Peak, $T_C = 25^\circ C$  |                | 18         |                        |
| Total Power Dissipation @ $T_C = 25^\circ C$<br>Derate above $25^\circ C$ | $P_D$          | 75<br>0.6  | Watts<br>W/ $^\circ C$ |
| Operating and Storage<br>Temperature Range                                | $T_J, T_{stg}$ | -55 to 150 | $^\circ C$             |

### THERMAL CHARACTERISTICS

|   |                 |      |              |
|---|-----------------|------|--------------|
| Thermal Resistance  |                 |      | $^\circ C/W$ |
| — Junction-to-Case  | $R_{\theta JC}$ | 1.67 |              |
| — Junction-to-Ambient   | $R_{\theta JA}$ | 62.5 |              |
| Maximum Lead Temperature for<br>Soldering Purposes, 1/8" from Case<br>for 5 Seconds | $T_L$           | 300  | $^\circ C$   |



**TO-220AB**  
**CASE 221A**  
**STYLE 5**

### PIN ASSIGNMENT

|   |        |
|---|--------|
| 1 | Gate   |
| 2 | Drain  |
| 3 | Source |
| 4 | Drain  |

### ORDERING INFORMATION

| Device | Package  | Shipping      |
|--------|----------|---------------|
| IRF830 | TO-220AB | 50 Units/Rail |

See the MTM4N45 Data Sheet for a complete set of design curves for the product on this data sheet. Design curves of the MTP4N45 are applicable for this product.

# IRF830

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

### OFF CHARACTERISTICS

|   |                      |     |            |      |
|---|----------------------|-----|------------|------|
| Drain-to-Source Breakdown Voltage<br>(V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 0.25 mAdc)  | V <sub>(BR)DSS</sub> | 500 | —          | Vdc  |
| Zero Gate Voltage Drain Current<br>(V <sub>DS</sub> = Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0 Vdc)<br>(V <sub>DS</sub> = 0.8 Rated V <sub>DSS</sub> , V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 125°C) | I <sub>DSS</sub>     | —   | 0.2<br>1.0 | mAdc |
| Gate-Body Leakage Current, Forward<br>(V <sub>GSF</sub> = 20 Vdc, V <sub>DS</sub> = 0)  | I <sub>GSS(f)</sub>  | —   | 100        | nAdc |
| Gate-Body Leakage Current, Reverse<br>(V <sub>GSR</sub> = 20 Vdc, V <sub>DS</sub> = 0)  | I <sub>GSS(r)</sub>  | —   | 100        | nAdc |

### ON CHARACTERISTICS (1)

|  |                     |     |     |      |
|--|---------------------|-----|-----|------|
| Gate Threshold Voltage<br>(V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 0.25 mA)     | V <sub>GS(th)</sub> | 2.0 | 4.0 | Vdc  |
| Static Drain-to-Source On-Resistance<br>(V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = 2.5 Adc) | R <sub>DS(on)</sub> | —   | 1.5 | Ohm  |
| On-State Drain Current (V <sub>GS</sub> = 10 V)<br>(V <sub>DS</sub> ≥ 6.75 Vdc)              | I <sub>D(on)</sub>  | 4.5 | —   | Adc  |
| Forward Transconductance<br>(V <sub>DS</sub> ≥ 6.75 Vdc, I <sub>D</sub> = 2.5 Adc)           | g <sub>FS</sub>     | 2.5 | —   | mhos |

### DYNAMIC CHARACTERISTICS

|                              |   |                  |   |     |    |
|------------------------------|---|------------------|---|-----|----|
| Input Capacitance            | (V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0 Vdc,<br>f = 1.0 MHz) | C <sub>iss</sub> | — | 800 | pF |
| Output Capacitance           |   | C <sub>oss</sub> | — | 200 |    |
| Reverse Transfer Capacitance |   | C <sub>rss</sub> | — | 60  |    |

### SWITCHING CHARACTERISTICS (1)

|                     |  |                     |          |    |    |
|---------------------|--|---------------------|----------|----|----|
| Turn-On Delay Time  | (V <sub>DD</sub> = 200 Vdc, I <sub>D</sub> = 2.5 Apk,<br>R <sub>G</sub> = 15 Ω)                                      | t <sub>d(on)</sub>  | —        | 30 | ns |
| Rise Time           |  | t <sub>r</sub>      | —        | 30 |    |
| Turn-Off Delay Time |  | t <sub>d(off)</sub> | —        | 55 |    |
| Fall Time           |  | t <sub>f</sub>      | —        | 30 |    |
| Total Gate Charge   | (V <sub>DS</sub> = 0.8 Rated V <sub>DSS</sub> ,<br>V <sub>GS</sub> = 10 Vdc, I <sub>D</sub> = Rated I <sub>D</sub> ) | Q <sub>g</sub>      | 22 (Typ) | 30 | nC |
| Gate-Source Charge  |  | Q <sub>gs</sub>     | 12 (Typ) | —  |    |
| Gate-Drain Charge   |  | Q <sub>gd</sub>     | 10 (Typ) | —  |    |

### SOURCE-DRAIN DIODE CHARACTERISTICS (1)

|                       |  |                 |                             |     |     |
|-----------------------|--|-----------------|-----------------------------|-----|-----|
| Forward On-Voltage    | (I <sub>S</sub> = Rated I <sub>D</sub> ,<br>V <sub>GS</sub> = 0) | V <sub>SD</sub> | 1.1 (Typ)                   | 1.6 | Vdc |
| Forward Turn-On Time  |  | t <sub>on</sub> | Limited by stray inductance |     |     |
| Reverse Recovery Time |  | t <sub>rr</sub> | 450 (Typ)                   | —   | ns  |

### INTERNAL PACKAGE INDUCTANCE

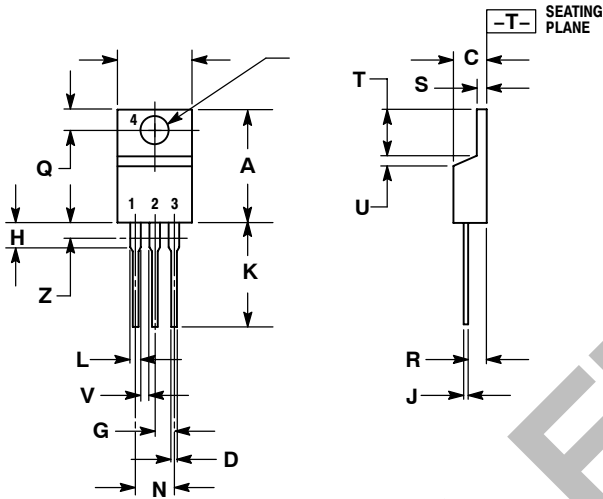
|  |                |                        |   |    |
|--|----------------|------------------------|---|----|
| Internal Drain Inductance<br>(Measured from the contact screw on tab to center of die)<br>(Measured from the drain lead 0.25" from package to center of die) | L <sub>D</sub> | 3.5 (Typ)<br>4.5 (Typ) | — | nH |
| Internal Source Inductance<br>(Measured from the source lead 0.25" from package to source bond pad)  | L <sub>S</sub> | 7.5 (Typ)              | — |    |

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

# IRF830

## PACKAGE DIMENSIONS

TO-220AB  
CASE 221A-09  
ISSUE Z



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.570  | 0.620 | 14.48       | 15.75 |
| B   | 0.380  | 0.405 | 9.66        | 10.28 |
| C   | 0.160  | 0.190 | 4.07        | 4.82  |
| D   | 0.025  | 0.035 | 0.64        | 0.88  |
| F   | 0.142  | 0.147 | 3.61        | 3.73  |
| G   | 0.095  | 0.105 | 2.42        | 2.66  |
| H   | 0.110  | 0.155 | 2.80        | 3.93  |
| J   | 0.018  | 0.025 | 0.46        | 0.64  |
| K   | 0.500  | 0.562 | 12.70       | 14.27 |
| L   | 0.045  | 0.060 | 1.15        | 1.52  |
| N   | 0.190  | 0.210 | 4.83        | 5.33  |
| Q   | 0.100  | 0.120 | 2.54        | 3.04  |
| R   | 0.080  | 0.110 | 2.04        | 2.79  |
| S   | 0.045  | 0.055 | 1.15        | 1.39  |
| T   | 0.235  | 0.255 | 5.97        | 6.47  |
| U   | 0.000  | 0.050 | 0.00        | 1.27  |
| V   | 0.045  | ---   | 1.15        | ---   |
| Z   | ---    | 0.080 | ---         | 2.04  |

STYLE 5:

- PIN 1: GATE  
2: DRAIN  
3: SOURCE  
4: DRAIN

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