



# IRF530 IRF530FI

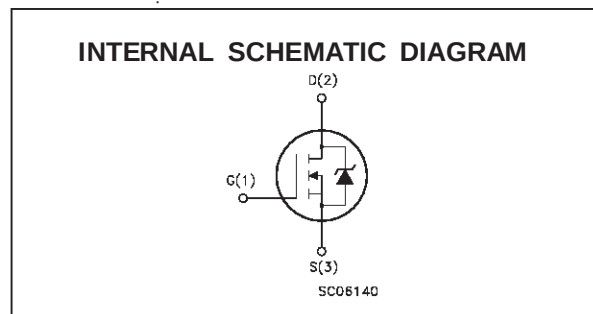
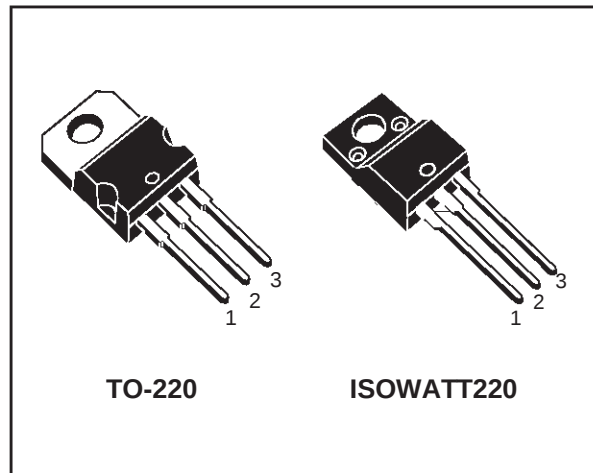
## N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

| TYPE     | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|----------|------------------|---------------------|----------------|
| IRF530   | 100 V            | < 0.16 Ω            | 16 A           |
| IRF530FI | 100 V            | < 0.16 Ω            | 11 A           |

- TYPICAL R<sub>DS(on)</sub> = 0.12 Ω
- AVALANCHE RUGGED TECHNOLOGY
- 100% AVALANCHE TESTED
- REPETITIVE AVALANCHE DATA AT 100°C
- LOW GATE CHARGE
- HIGH CURRENT CAPABILITY
- 175°C OPERATING TEMPERATURE
- APPLICATION ORIENTED CHARACTERIZATION

### APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- DC-DC & DC-AC CONVERTER
- AUTOMOTIVE ENVIRONMENT (INJECTION, ABS, AIR-BAG, LAMP DRIVERS Etc.)



### ABSOLUTE MAXIMUM RATINGS

| Symbol              | Parameter                                             | Value      |          | Unit |
|---------------------|-------------------------------------------------------|------------|----------|------|
|                     |                                                       | IRF530     | IRF530FI |      |
| V <sub>DS</sub>     | Drain-source Voltage (V <sub>GS</sub> = 0)            | 100        |          | V    |
| V <sub>DGR</sub>    | Drain- gate Voltage (R <sub>GS</sub> = 20 kΩ)         | 100        |          | V    |
| V <sub>GS</sub>     | Gate-source Voltage                                   | ± 20       |          | V    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>c</sub> = 25 °C  | 16         | 11       | A    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>c</sub> = 100 °C | 11         | 7.8      | A    |
| I <sub>DM</sub> (•) | Drain Current (pulsed)                                | 64         | 64       | A    |
| P <sub>tot</sub>    | Total Dissipation at T <sub>c</sub> = 25 °C           | 90         | 40       | W    |
|                     | Derating Factor                                       | 0.6        | 0.27     | W/°C |
| Viso                | Insulation Withstand Voltage (DC)                     | -          | 2000     | V    |
| T <sub>stg</sub>    | Storage Temperature                                   | -65 to 175 |          | °C   |
| T <sub>j</sub>      | Max. Operating Junction Temperature                   | 175        |          | °C   |

(•) Pulse width limited by safe operating area

(1) I<sub>SD</sub> ≤ 16 A, di/dt ≤ 200 A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>j</sub> ≤ T<sub>JMAX</sub>

## THERMAL DATA

|                |                                                | TO-220 | TO-220FI |               |
|----------------|------------------------------------------------|--------|----------|---------------|
| $R_{thj-case}$ | Thermal Resistance Junction-case               | Max    | 1        | 3.75          |
| $R_{thj-amb}$  | Thermal Resistance Junction-ambient            | Max    | 62.5     | $^{\circ}C/W$ |
| $R_{thc-sink}$ | Thermal Resistance Case-sink                   | Typ    | 0.5      | $^{\circ}C/W$ |
| $T_l$          | Maximum Lead Temperature For Soldering Purpose |        | 300      | $^{\circ}C$   |

## AVALANCHE CHARACTERISTICS

| Symbol   | Parameter                                                                                           | Max Value | Unit |
|----------|-----------------------------------------------------------------------------------------------------|-----------|------|
| $I_{AR}$ | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by $T_j$ max, $\delta < 1\%$ ) | 16        | A    |
| $E_{AS}$ | Single Pulse Avalanche Energy (starting $T_j = 25^{\circ}C$ , $I_D = I_{AR}$ , $V_{DD} = 50$ V)     | 100       | mJ   |

ELECTRICAL CHARACTERISTICS ( $T_{case} = 25^{\circ}C$  unless otherwise specified)

## OFF

| Symbol        | Parameter                                        | Test Conditions                                                                   | Min. | Typ. | Max.      | Unit               |
|---------------|--------------------------------------------------|-----------------------------------------------------------------------------------|------|------|-----------|--------------------|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage                   | $I_D = 250 \mu A$ $V_{GS} = 0$                                                    | 100  |      |           | V                  |
| $I_{DSS}$     | Zero Gate Voltage Drain Current ( $V_{GS} = 0$ ) | $V_{DS} = \text{Max Rating}$<br>$V_{DS} = \text{Max Rating}$ $T_c = 125^{\circ}C$ |      |      | 1<br>10   | $\mu A$<br>$\mu A$ |
| $I_{GSS}$     | Gate-body Leakage Current ( $V_{DS} = 0$ )       | $V_{GS} = \pm 20$ V                                                               |      |      | $\pm 100$ | nA                 |

## ON (\*)

| Symbol       | Parameter                         | Test Conditions                                              | Min. | Typ. | Max. | Unit     |
|--------------|-----------------------------------|--------------------------------------------------------------|------|------|------|----------|
| $V_{GS(th)}$ | Gate Threshold Voltage            | $V_{DS} = V_{GS}$ $I_D = 250 \mu A$                          | 2    | 3    | 4    | V        |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS} = 10$ V $I_D = 8$ A                                  |      | 0.12 | 0.16 | $\Omega$ |
| $I_{D(on)}$  | On State Drain Current            | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$<br>$V_{GS} = 10$ V | 16   |      |      | A        |

## DYNAMIC

| Symbol       | Parameter                    | Test Conditions                                       | Min. | Typ. | Max. | Unit |
|--------------|------------------------------|-------------------------------------------------------|------|------|------|------|
| $g_{fs} (*)$ | Forward Transconductance     | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 8$ A | 5    | 8    |      | S    |
| $C_{iss}$    | Input Capacitance            | $V_{DS} = 25$ V $f = 1$ MHz $V_{GS} = 0$              |      | 950  | 1300 | pF   |
| $C_{oss}$    | Output Capacitance           |                                                       |      | 150  | 270  | pF   |
| $C_{rss}$    | Reverse Transfer Capacitance |                                                       |      | 50   | 70   | pF   |

**ELECTRICAL CHARACTERISTICS** (continued)**SWITCHING ON**

| Symbol      | Parameter          | Test Conditions                                                   | Min. | Typ. | Max. | Unit |
|-------------|--------------------|-------------------------------------------------------------------|------|------|------|------|
| $t_{d(on)}$ | Turn-on Time       | $V_{DD} = 50\text{ V}$ $I_D = 8\text{ A}$                         |      | 12   | 16   | ns   |
| $t_r$       | Rise Time          | $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$                        |      | 20   | 28   | ns   |
| $Q_g$       | Total Gate Charge  | $V_{DD} = 80\text{ V}$ $I_D = 16\text{ A}$ $V_{GS} = 10\text{ V}$ |      | 32   | 44   | nC   |
| $Q_{gs}$    | Gate-Source Charge |                                                                   |      | 9    |      | nC   |
| $Q_{gd}$    | Gate-Drain Charge  |                                                                   |      | 13   |      | nC   |

**SWITCHING OFF**

| Symbol         | Parameter             | Test Conditions                            | Min. | Typ. | Max. | Unit |
|----------------|-----------------------|--------------------------------------------|------|------|------|------|
| $t_r(V_{off})$ | Off-voltage Rise Time | $V_{DD} = 80\text{ V}$ $I_D = 16\text{ A}$ |      | 11   | 15   | ns   |
| $t_f$          | Fall Time             | $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ |      | 12   | 17   | ns   |
| $t_c$          | Cross-over Time       |                                            |      | 25   | 35   | ns   |

**SOURCE DRAIN DIODE**

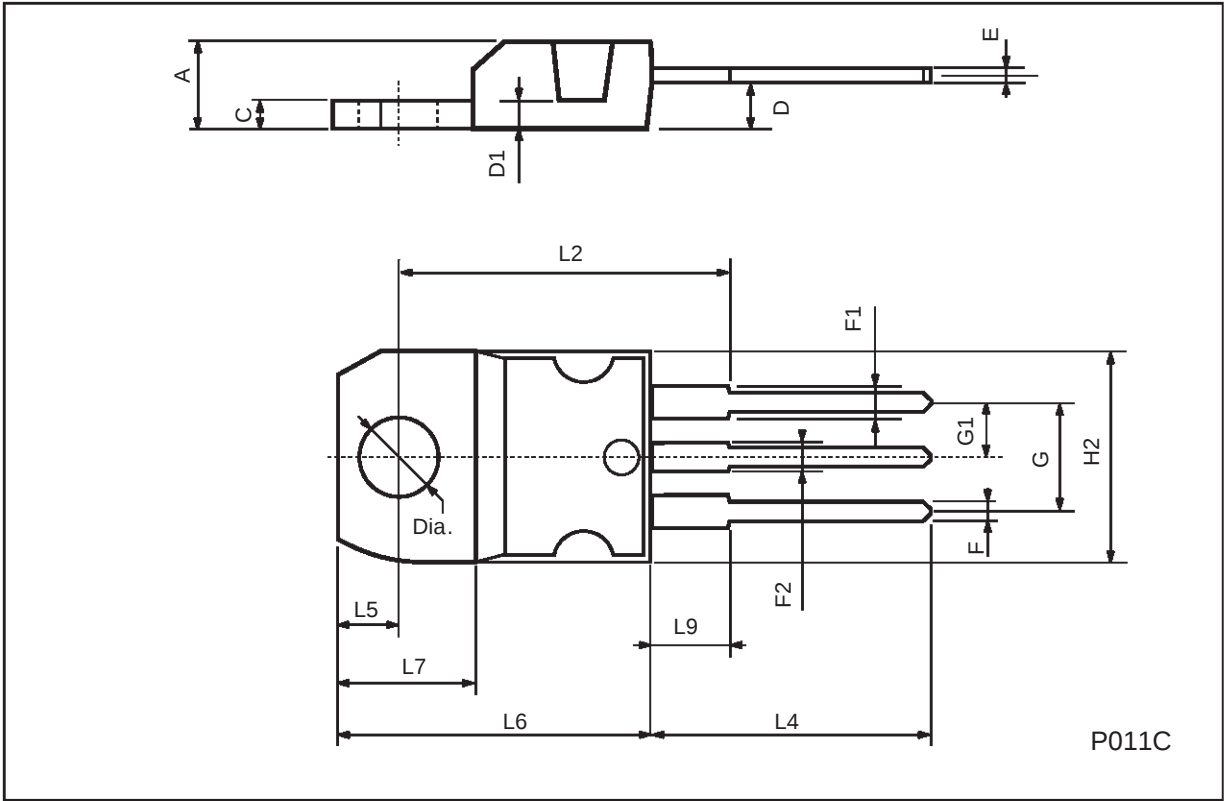
| Symbol             | Parameter                     | Test Conditions                                                                                                       | Min. | Typ. | Max. | Unit          |
|--------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $I_{SD}$           | Source-drain Current          |                                                                                                                       |      |      | 16   | A             |
| $I_{SDM}(\bullet)$ | Source-drain Current (pulsed) |                                                                                                                       |      |      | 64   | A             |
| $V_{SD} (*)$       | Forward On Voltage            | $I_{SD} = 16\text{ A}$ $V_{GS} = 0$                                                                                   |      |      | 1.6  | V             |
| $t_{rr}$           | Reverse Recovery Time         | $I_{SD} = 16\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$<br>$V_{DD} = 30\text{ V}$ $T_j = 150\text{ }^\circ\text{C}$ |      | 150  |      | ns            |
| $Q_{rr}$           | Reverse Recovery Charge       |                                                                                                                       |      | 0.8  |      | $\mu\text{C}$ |
| $I_{RRM}$          | Reverse Recovery Current      |                                                                                                                       |      | 10   |      | A             |

(\*) Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

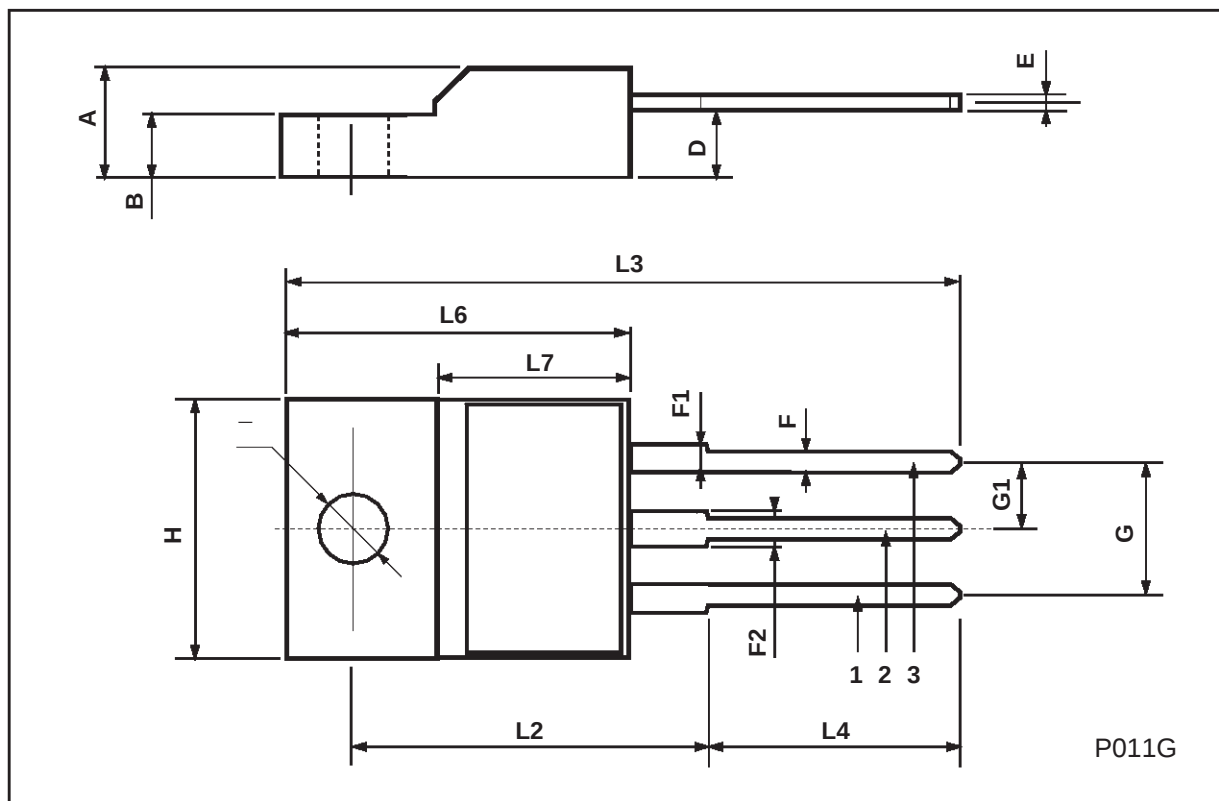
TO-220 MECHANICAL DATA

| DIM. | mm    |      |       | inch  |       |       |
|------|-------|------|-------|-------|-------|-------|
|      | MIN.  | TYP. | MAX.  | MIN.  | TYP.  | MAX.  |
| A    | 4.40  |      | 4.60  | 0.173 |       | 0.181 |
| C    | 1.23  |      | 1.32  | 0.048 |       | 0.051 |
| D    | 2.40  |      | 2.72  | 0.094 |       | 0.107 |
| D1   |       | 1.27 |       |       | 0.050 |       |
| E    | 0.49  |      | 0.70  | 0.019 |       | 0.027 |
| F    | 0.61  |      | 0.88  | 0.024 |       | 0.034 |
| F1   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| F2   | 1.14  |      | 1.70  | 0.044 |       | 0.067 |
| G    | 4.95  |      | 5.15  | 0.194 |       | 0.203 |
| G1   | 2.4   |      | 2.7   | 0.094 |       | 0.106 |
| H2   | 10.0  |      | 10.40 | 0.393 |       | 0.409 |
| L2   |       | 16.4 |       |       | 0.645 |       |
| L4   | 13.0  |      | 14.0  | 0.511 |       | 0.551 |
| L5   | 2.65  |      | 2.95  | 0.104 |       | 0.116 |
| L6   | 15.25 |      | 15.75 | 0.600 |       | 0.620 |
| L7   | 6.2   |      | 6.6   | 0.244 |       | 0.260 |
| L9   | 3.5   |      | 3.93  | 0.137 |       | 0.154 |
| DIA. | 3.75  |      | 3.85  | 0.147 |       | 0.151 |



## ISOWATT220 MECHANICAL DATA

| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    | 4.4  |      | 4.6  | 0.173 |       | 0.181 |
| B    | 2.5  |      | 2.7  | 0.098 |       | 0.106 |
| D    | 2.5  |      | 2.75 | 0.098 |       | 0.108 |
| E    | 0.4  |      | 0.7  | 0.015 |       | 0.027 |
| F    | 0.75 |      | 1    | 0.030 |       | 0.039 |
| F1   | 1.15 |      | 1.7  | 0.045 |       | 0.067 |
| F2   | 1.15 |      | 1.7  | 0.045 |       | 0.067 |
| G    | 4.95 |      | 5.2  | 0.195 |       | 0.204 |
| G1   | 2.4  |      | 2.7  | 0.094 |       | 0.106 |
| H    | 10   |      | 10.4 | 0.393 |       | 0.409 |
| L2   |      | 16   |      |       | 0.630 |       |
| L3   | 28.6 |      | 30.6 | 1.126 |       | 1.204 |
| L4   | 9.8  |      | 10.6 | 0.385 |       | 0.417 |
| L6   | 15.9 |      | 16.4 | 0.626 |       | 0.645 |
| L7   | 9    |      | 9.3  | 0.354 |       | 0.366 |
| Ø    | 3    |      | 3.2  | 0.118 |       | 0.126 |



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