

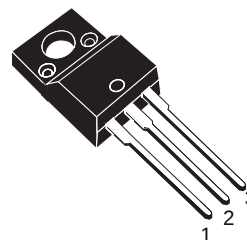
## N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR

| TYPE     | V <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|----------|------------------|---------------------|----------------|
| IRF530FP | 100 V            | < 0.16 $\Omega$     | 10 A           |

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

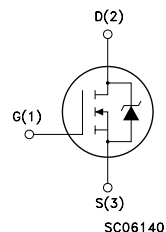
### APPLICATIONS

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



**TO-220FP**

### INTERNAL SCHEMATIC DIAGRAM



### ABSOLUTE MAXIMUM RATINGS

| Symbol              | Parameter                                              | Value      | Unit |
|---------------------|--------------------------------------------------------|------------|------|
| 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 k $\Omega$ ) | 100        | V    |
| V <sub>GS</sub>     | Gate-source Voltage                                    | $\pm 20$   | V    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>c</sub> = 25 °C   | 10         | A    |
| I <sub>D</sub>      | Drain Current (continuous) at T <sub>c</sub> = 100 °C  | 7          | A    |
| I <sub>DM</sub> (●) | Drain Current (pulsed)                                 | 64         | A    |
| P <sub>tot</sub>    | Total Dissipation at T <sub>c</sub> = 25 °C            | 35         | W    |
|                     | Derating Factor                                        | 0.23       | W/°C |
| V <sub>ISO</sub>    | 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

## THERMAL DATA

|                       |                                                |     |      |      |
|-----------------------|------------------------------------------------|-----|------|------|
| R <sub>thj-case</sub> | Thermal Resistance Junction-case               | Max | 4.28 | °C/W |
| R <sub>thj-amb</sub>  | Thermal Resistance Junction-ambient            | Max | 62.5 | °C/W |
| R <sub>thc-sink</sub> | Thermal Resistance Case-sink                   | Typ | 0.5  | °C/W |
| T <sub>l</sub>        | Maximum Lead Temperature For Soldering Purpose |     | 300  | °C   |

## AVALANCHE CHARACTERISTICS

| Symbol          | Parameter                                                                                                                  | Max Value | Unit |
|-----------------|----------------------------------------------------------------------------------------------------------------------------|-----------|------|
| I <sub>AR</sub> | Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T <sub>j</sub> max, δ < 1%)                        | 16        | A    |
| E <sub>AS</sub> | Single Pulse Avalanche Energy (starting T <sub>j</sub> = 25 °C, I <sub>D</sub> = I <sub>AR</sub> , V <sub>DD</sub> = 25 V) | 85        | mJ   |

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

### OFF

| Symbol               | Parameter                                             | Test Conditions                                                                      | Min. | Typ. | Max.    | Unit     |
|----------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------|------|------|---------|----------|
| V <sub>(BR)DSS</sub> | Drain-source Breakdown Voltage                        | I <sub>D</sub> = 250 μA V <sub>GS</sub> = 0                                          | 600  |      |         | V        |
| I <sub>DSS</sub>     | Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0) | V <sub>DS</sub> = Max Rating<br>V <sub>DS</sub> = Max Rating T <sub>c</sub> = 125 °C |      |      | 1<br>10 | μA<br>μA |
| I <sub>GSS</sub>     | Gate-body Leakage Current (V <sub>DS</sub> = 0)       | V <sub>GS</sub> = ± 20 V                                                             |      |      | ± 100   | nA       |

### ON (\*)

| Symbol              | Parameter                         | Test Conditions                                                                         | Min. | Typ. | Max. | Unit |
|---------------------|-----------------------------------|-----------------------------------------------------------------------------------------|------|------|------|------|
| V <sub>GS(th)</sub> | Gate Threshold Voltage            | V <sub>DS</sub> = V <sub>GS</sub> I <sub>D</sub> = 250 μA                               | 2    | 3    | 4    | V    |
| R <sub>DS(on)</sub> | Static Drain-source On Resistance | V <sub>GS</sub> = 10V I <sub>D</sub> = 8 A                                              |      | 0.12 | 0.16 | Ω    |
| I <sub>D(on)</sub>  | On State Drain Current            | V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max</sub><br>V <sub>GS</sub> = 10 V | 10   |      |      | A    |

## DYNAMIC

| Symbol                                                   | Parameter                                                               | Test Conditions                                                                    | Min. | Typ.             | Max.              | Unit           |
|----------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------|------|------------------|-------------------|----------------|
| g <sub>fs</sub> (*)                                      | Forward Transconductance                                                | V <sub>DS</sub> > I <sub>D(on)</sub> × R <sub>DS(on)max</sub> I <sub>D</sub> = 8 A | 5    | 8                |                   | S              |
| C <sub>iss</sub><br>C <sub>oss</sub><br>C <sub>rss</sub> | Input Capacitance<br>Output Capacitance<br>Reverse Transfer Capacitance | V <sub>DS</sub> = 25 V f = 1 MHz V <sub>GS</sub> = 0                               |      | 950<br>150<br>50 | 1300<br>270<br>70 | pF<br>pF<br>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 |
|---------------|-----------------------|----------------------------------------------|------|------|------|------|
| $t_{r(Voff)}$ | 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**

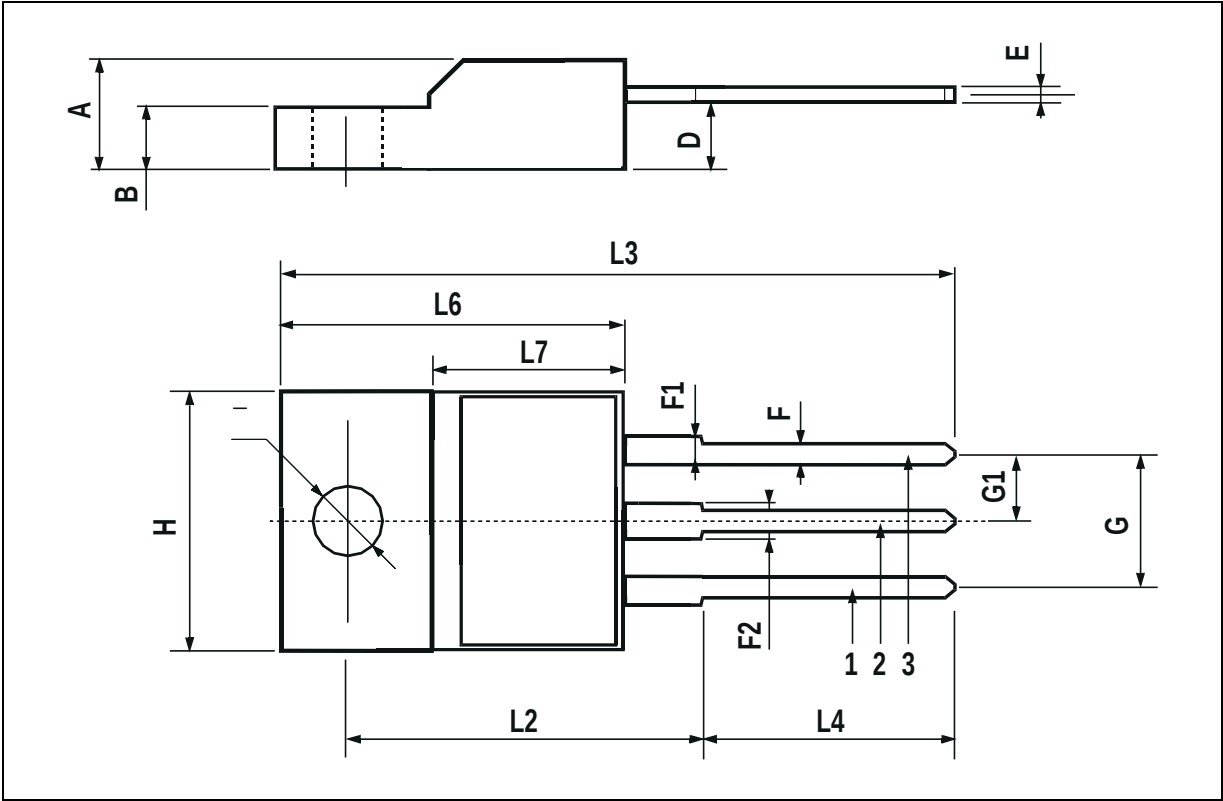
| Symbol             | Parameter                     | Test Conditions                                                                                                  | Min. | Typ. | Max. | Unit          |
|--------------------|-------------------------------|------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $I_{SD}$           | Source-drain Current          |                                                                                                                  |      |      | 16   | A             |
| $I_{SDM}(\bullet)$ | Source-drain Current (pulsed) |                                                                                                                  |      |      | 64   | A             |
| $V_{SD} (*)$       | Forward On Voltage            | $I_{SD} = 16 \text{ A}$ $V_{GS} = 0$                                                                             |      |      | 1.5  | V             |
| $t_{rr}$           | Reverse Recovery Time         | $I_{SD} = 16 \text{ A}$ $di/dt = 100 \text{ A}/\mu\text{s}$<br>$V_{DD} = 30 \text{ V}$ $T_j = 150^\circ\text{C}$ |      | 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-220FP 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    | 0.45 |      | 0.7  | 0.017 |       | 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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