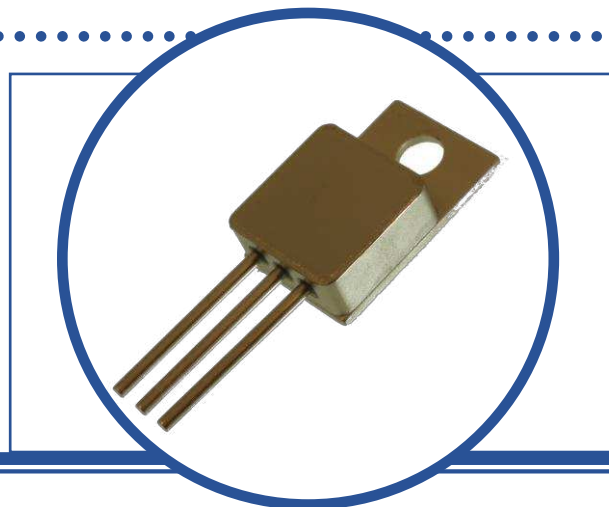


# P-CHANNEL POWER MOSFET

## IRF9530-220M

- Hermetically Sealed TO-220 Metal Package
- Dynamic  $dv/dt$  Rating
- Avalanche Energy Rating
- Simple Drive Requirements
- Screening Options Available



### ABSOLUTE MAXIMUM RATINGS ( $T_{case} = 25^{\circ}C$ unless otherwise stated)

|                |                                                       |                                     |
|----------------|-------------------------------------------------------|-------------------------------------|
| $V_{DS}$       | Drain – Source Voltage                                | -100V                               |
| $V_{GS}$       | Gate – Source Voltage                                 | $\pm 20V$                           |
| $I_D$          | Continuous Drain Current @ $T_{case} = 25^{\circ}C$   | -9.3A                               |
| $I_D$          | Continuous Drain Current @ $T_{case} = 100^{\circ}C$  | -5.8A                               |
| $I_{DM}$       | Pulsed Drain Current <sup>1</sup>                     | -24A                                |
| $P_D$          | Total Power Dissipation @ $T_{case} = 25^{\circ}C$    | 45W                                 |
|                | Linear De-rating Factor @ $T_{case} \geq 25^{\circ}C$ | 0.36W/ $^{\circ}C$                  |
| $E_{AS}$       | Single Pulse Avalanche Energy <sup>2</sup>            | 92mJ                                |
| $dv/dt$        | Peak Diode Recovery $dv/dt$ <sup>3</sup>              | -5.5V/ns                            |
| $T_J, T_{stg}$ | Operating and Storage Temperature Range               | -55 $^{\circ}C$ to +150 $^{\circ}C$ |

### THERMAL CHARACTERISTICS

| Symbol           | Parameters                           | Max | Units         |
|------------------|--------------------------------------|-----|---------------|
| $R_{\theta JC}$  | Thermal Resistance, Junction To Case | 2.8 | $^{\circ}C/W$ |
| $R_{\theta PCB}$ | Thermal Resistance, Junction To PCB  | 80  | $^{\circ}C/W$ |

#### Notes:

- 1) Repetitive Rating; Pulse width limited by maximum junction temperature
- 2)  $V_{DD} = -25V$ , starting  $T_J = 25^{\circ}C$ , Peak  $I_L = -6.1A$
- 3)  $I_{SD} \leq -9.3A$ ,  $di/dt \leq -390A/\mu s$ ,  $V_{DD} \leq -100V$ ,  $T_J \leq 150^{\circ}C$ , Suggested  $R_G = 7.5\Omega$
- 4) Pulse width  $\leq 300 \mu s$ ; Duty Cycle  $\leq 2\%$

Semelab Limited reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing orders.

# P-CHANNEL POWER MOSFET IRF9530-220M

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

| Symbol                               | Parameters                                   | Test Conditions                                                                      | Min  | Typ  | Max  | Units |
|--------------------------------------|----------------------------------------------|--------------------------------------------------------------------------------------|------|------|------|-------|
| BV <sub>DSS</sub>                    | Drain-Source Breakdown Voltage               | V <sub>GS</sub> = 0 I <sub>D</sub> = -1.0mA                                          | -100 |      |      | V     |
| $\frac{\Delta BV_{DSS}}{\Delta T_j}$ | Temperature Coefficient of Breakdown Voltage | Reference to 25°C I <sub>D</sub> = -1.0mA                                            |      | -0.1 |      | V/°C  |
| R <sub>DS(on)</sub> <sup>4</sup>     | Static Drain-Source On-State Resistance      | V <sub>GS</sub> = -10V I <sub>D</sub> = -5.8A                                        |      |      | 0.31 | Ω     |
|                                      |                                              | V <sub>GS</sub> = -10V I <sub>D</sub> = -9.3A                                        |      |      | 0.36 |       |
| V <sub>GS(th)</sub>                  | Gate Threshold Voltage                       | V <sub>DS</sub> = V <sub>GS</sub> I <sub>D</sub> = -250μA                            | -2   |      | -4   | V     |
| g <sub>fs</sub> <sup>4</sup>         | Forward Transconductance                     | V <sub>DS</sub> ≥ -15V I <sub>DS</sub> = -5.8A                                       | 2.5  |      |      | S(Ω)  |
| I <sub>DSS</sub>                     | Zero Gate Voltage Drain Current              | V <sub>GS</sub> = 0 V <sub>DS</sub> = 0.8BV <sub>DSS</sub><br>T <sub>j</sub> = 125°C |      |      | -25  | μA    |
|                                      |                                              |                                                                                      |      |      | -250 |       |
| I <sub>GSS</sub>                     | Forward Gate-Source Leakage                  | V <sub>GS</sub> = -20V                                                               |      |      | -100 | nA    |
| I <sub>GSS</sub>                     | Reverse Gate-Source Leakage                  | V <sub>GS</sub> = 20V                                                                |      |      | 100  |       |

## DYNAMIC CHARACTERISTICS

|                     |                              |                                                                                            |      |     |     |    |
|---------------------|------------------------------|--------------------------------------------------------------------------------------------|------|-----|-----|----|
| C <sub>iss</sub>    | Input Capacitance            | V <sub>GS</sub> = 0<br>V <sub>DS</sub> = -25V<br>f = 1.0MHz                                |      | 800 |     | pF |
| C <sub>oss</sub>    | Output Capacitance           |                                                                                            |      | 350 |     |    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance |                                                                                            |      | 125 |     |    |
| Q <sub>g</sub>      | Total Gate Charge            | V <sub>GS</sub> = -10V<br>I <sub>D</sub> = -9.3A<br>V <sub>DS</sub> = 0.5BV <sub>DSS</sub> | 14.7 |     | 30  | nC |
| Q <sub>gs</sub>     | Gate-Source Charge           |                                                                                            | 1.0  |     | 7.1 |    |
| Q <sub>gd</sub>     | Gate-Drain Charge            |                                                                                            | 2.0  |     | 21  |    |
| t <sub>d(on)</sub>  | Turn-On Delay Time           | V <sub>DD</sub> = -50V<br>I <sub>D</sub> = -9.3A<br>R <sub>G</sub> = 7.5Ω                  |      |     | 60  | ns |
| t <sub>r</sub>      | Rise Time                    |                                                                                            |      |     | 140 |    |
| t <sub>d(off)</sub> | Turn-Off Delay Time          |                                                                                            |      |     | 140 |    |
| t <sub>f</sub>      | Fall Time                    |                                                                                            |      |     | 140 |    |

## SOURCE – DRAIN DIODE CHARACTERISTICS

|                              |                           |                                               |            |  |      |    |
|------------------------------|---------------------------|-----------------------------------------------|------------|--|------|----|
| I <sub>S</sub>               | Continuous Source Current |                                               |            |  | -9.1 | A  |
| I <sub>SM</sub>              | Pulse Source Current      |                                               |            |  | -37  |    |
| V <sub>SD</sub> <sup>4</sup> | Diode Forward Voltage     | I <sub>S</sub> = -9.3A V <sub>GS</sub> = 0    |            |  | -4.7 | V  |
| t <sub>rr</sub> <sup>4</sup> | Reverse Recovery Time     | I <sub>F</sub> = -9.3A V <sub>DD</sub> ≤ -50V |            |  | 250  | ns |
| Q <sub>rr</sub> <sup>4</sup> | Reverse Recovery Charge   | di/dt ≤ -100A/μs                              |            |  | 3.0  | μC |
| t <sub>on</sub>              | Forward Turn - on Time    |                                               | Negligible |  |      |    |

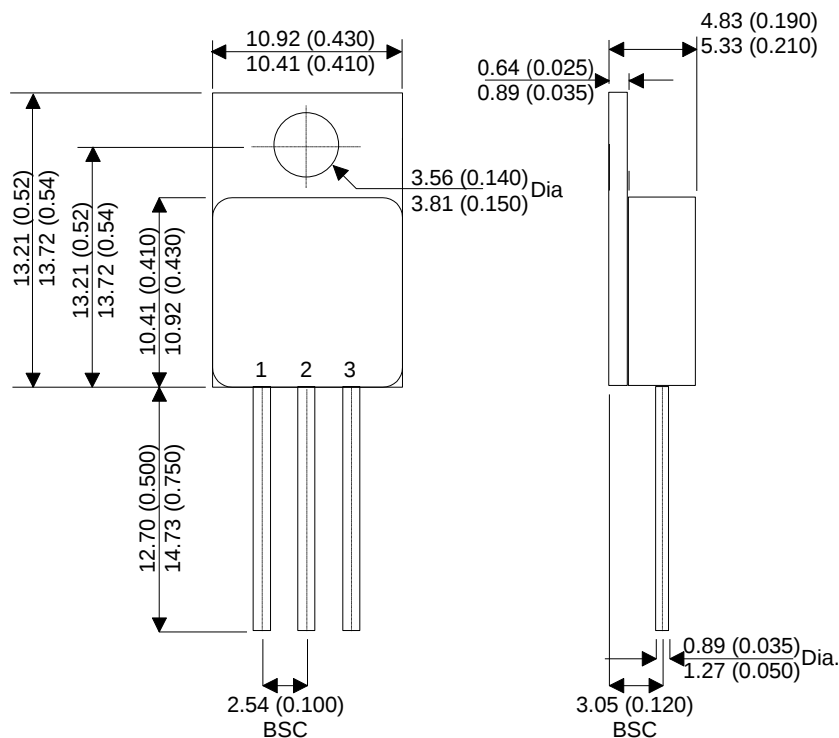
## PACKAGE CHARACTERISTICS

|                |                            |  |     |  |    |
|----------------|----------------------------|--|-----|--|----|
| L <sub>D</sub> | Internal Drain Inductance  |  | 8.7 |  | nH |
| L <sub>S</sub> | Internal Source Inductance |  | 8.7 |  |    |

# P-CHANNEL POWER MOSFET IRF9530-220M

## MECHANICAL DATA

Dimensions in mm (inches)



## TO220M (TO-257AB)

Pin 1 - Gate

Pin 2 - Drain

Pin 3 - Source