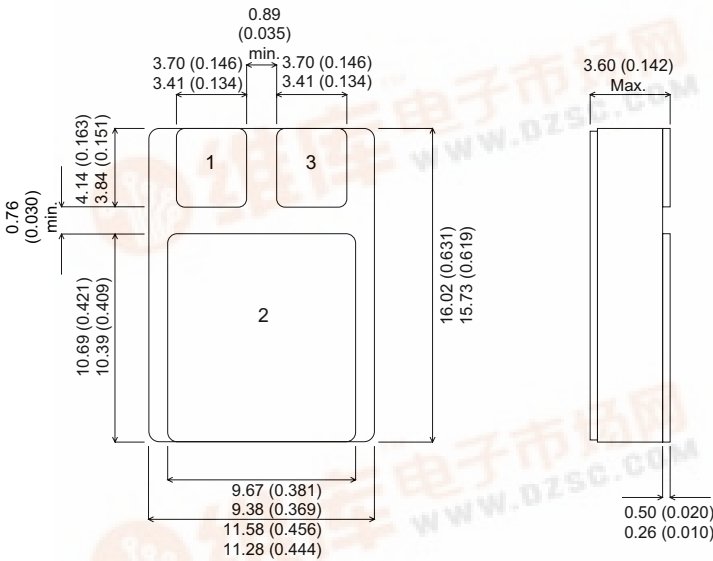




# IRF240SMD

## MECHANICAL DATA

Dimensions in mm (inches)



### SMD1 PACKAGE

Pad 1 – Gate

Pad 2 – Drain

Pad 3 – Source

**Note:** IRFNxxx also available with pins 1 and 3 reversed.

## N-CHANNEL POWER MOSFET

|               |               |
|---------------|---------------|
| $V_{DSS}$     | <b>200V</b>   |
| $I_{D(cont)}$ | <b>13.9A</b>  |
| $R_{DS(on)}$  | <b>0.180Ω</b> |

### FEATURES

- HERMETICALLY SEALED SURFACE MOUNT PACKAGE
- SMALL FOOTPRINT – EFFICIENT USE OF PCB SPACE.
- SIMPLE DRIVE REQUIREMENTS
- LIGHTWEIGHT
- HIGH PACKING DENSITIES

## ABSOLUTE MAXIMUM RATINGS (T<sub>case</sub> = 25°C unless otherwise stated)

|                    |  |              |
|--------------------|--|--------------|
| $V_{GS}$           | Gate – Source Voltage  | ±20V         |
| $I_D$              | Continuous Drain Current ( $V_{GS} = 0$ , $T_{case} = 25^\circ C$ )  | 13.9A        |
| $I_D$              | Continuous Drain Current ( $V_{GS} = 0$ , $T_{case} = 100^\circ C$ ) | 8.8A         |
| $I_{DM}$           | Pulsed Drain Current <sup>1</sup>                                    | 56A          |
| $P_D$              | Power Dissipation @ $T_{case} = 25^\circ C$                          | 75W          |
|                    | Linear Derating Factor   | 0.6W/°C      |
| $E_{AS}$           | Single Pulse Avalanche Energy <sup>2</sup>                           | 450mJ        |
| dv/dt              | Peak Diode Recovery <sup>3</sup>                                     | 5.0V/ns      |
| $T_J, T_{stg}$     | Operating and Storage Temperature Range                              | -55 to 150°C |
| $T_L$              | Package Mounting Surface Temperature (for 5 sec)                     | 300°C        |
| $R_{\theta JC}$    | Thermal Resistance Junction to Case                                  | 1.67°C/W     |
| $R_{\theta J-PCB}$ | Thermal Resistance Junction to PCB (Typical)                         | 4°C/W        |

### Notes

- 1) Pulse Test: Pulse Width ≤ 300ms, δ ≤ 2%
- 2) @  $V_{DD} = 50V$ ,  $L \geq 1.5mH$ ,  $R_G = 25\Omega$ , Peak  $I_L = 22A$ , Starting  $T_J = 25^\circ C$
- 3) @  $I_{SD} \leq 13.9A$ ,  $di/dt \leq 150A/\mu s$ ,  $V_{DD} \leq BV_{DSS}$ ,  $T_J \leq 150^\circ C$ , SUGGESTED  $R_G = 9.1\Omega$

**ELECTRICAL CHARACTERISTICS** ( $T_{amb} = 25^{\circ}\text{C}$  unless otherwise stated)

| Parameter                                   | Test Conditions   | Min.  | Typ.                        | Max.                     | Unit                        |                          |
|---|---|---|-----------------------------|--------------------------|-----------------------------|--------------------------|
| <b>STATIC ELECTRICAL RATINGS</b>            |   |   |                             |                          |                             |                          |
| $BV_{DSS}$                                  | Drain – Source Breakdown Voltage  | $V_{GS} = 0$  | $I_D = 1\text{mA}$          | 200                      | V                           |                          |
| $\frac{\Delta BV_{DSS}}{\Delta T_J}$        | Temperature Coefficient of Breakdown Voltage                                      | Reference to $25^{\circ}\text{C}$<br>$I_D = 1\text{mA}$             |                             | 0.29                     | $\text{V}/^{\circ}\text{C}$ |                          |
| $R_{DS(on)}$                                | Static Drain – Source On–State Resistance <sup>1</sup>                            | $V_{GS} = 10\text{V}$   | $I_D = 8.8\text{A}$         |                          | 0.180                       |                          |
|   |   | $V_{GS} = 10\text{V}$   | $I_D = 13.9\text{A}$        |                          | 0.250                       |                          |
| $V_{GS(th)}$                                | Gate Threshold Voltage  | $V_{DS} = V_{GS}$   | $I_D = 250\mu\text{A}$      | 2                        | 4                           | V                        |
| $g_{fs}$                                    | Forward Transconductance <sup>1</sup>   | $V_{DS} \geq 15\text{V}$  | $I_{DS} = 8.8\text{A}$      | 6.1                      |                             | $\text{S}(\bar{\omega})$ |
| $I_{DSS}$                                   | Zero Gate Voltage Drain Current   | $V_{GS} = 0$  | $V_{DS} = 0.8BV_{DSS}$      |                          | 25                          | $\mu\text{A}$            |
|   |   |   | $T_J = 125^{\circ}\text{C}$ |                          | 250                         |                          |
| $I_{GSS}$                                   | Forward Gate – Source Leakage   | $V_{GS} = 20\text{V}$   |                             |                          | 100                         | nA                       |
| $I_{GSS}$                                   | Reverse Gate – Source Leakage   | $V_{GS} = -20\text{V}$  |                             |                          | -100                        |                          |
| <b>DYNAMIC CHARACTERISTICS</b>              |   |   |                             |                          |                             |                          |
| $C_{iss}$                                   | Input Capacitance   | $V_{GS} = 0$  |                             |                          | 1300                        | pF                       |
| $C_{oss}$                                   | Output Capacitance  | $V_{DS} = 25\text{V}$   |                             |                          | 400                         |                          |
| $C_{riss}$                                  | Reverse Transfer Capacitance  | $f = 1\text{MHz}$   |                             |                          | 130                         |                          |
| $Q_g$                                       | Total Gate Charge <sup>1</sup>  | $V_{GS} = 10\text{V}$   | $I_D = 13.9\text{A}$        | 32                       | 60                          | nC                       |
|   |   | $V_{DS} = 0.5BV_{DSS}$  |                             |                          |                             |                          |
| $Q_{gs}$                                    | Gate – Source Charge <sup>1</sup>   | $I_D = 13.9\text{A}$  |                             | 2.2                      | 10.6                        | nC                       |
| $Q_{gd}$                                    | Gate – Drain (“Miller”) Charge <sup>1</sup>                                       | $V_{DS} = 0.5BV_{DSS}$  |                             | 14.2                     | 37.6                        |                          |
| $t_{d(on)}$                                 | Turn–On Delay Time  | $V_{DD} = 100\text{V}$<br>$I_D = 13.9\text{A}$<br>$R_G = 9.1\Omega$ |                             |                          | 20                          | ns                       |
| $t_r$                                       | Rise Time   |   |                             |                          | 152                         |                          |
| $t_{d(off)}$                                | Turn–Off Delay Time   |   |                             |                          | 58                          |                          |
| $t_f$                                       | Fall Time   |   |                             |                          | 67                          |                          |
| <b>SOURCE – DRAIN DIODE CHARACTERISTICS</b> |   |   |                             |                          |                             |                          |
| $I_S$                                       | Continuous Source Current   |   |                             |                          | 13.9                        | A                        |
| $I_{SM}$                                    | Pulse Source Current <sup>2</sup>   |   |                             |                          | 56                          |                          |
| $V_{SD}$                                    | Diode Forward Voltage   | $I_S = 13.9\text{A}$  | $T_J = 25^{\circ}\text{C}$  |                          | 1.5                         | V                        |
|   |   | $V_{GS} = 0$  |                             |                          |                             |                          |
| $t_{rr}$                                    | Reverse Recovery Time   | $I_F = 13.9\text{A}$  | $T_J = 25^{\circ}\text{C}$  |                          | 500                         | ns                       |
| $Q_{rr}$                                    | Reverse Recovery Charge   | $d_i / d_t \leq 100\text{A}/\mu\text{s}$                            |                             | $V_{DD} \leq 50\text{V}$ | 5.3                         | $\mu\text{C}$            |
| $t_{on}$                                    | Forward Turn–On Time  |   |                             |                          | Negligible                  |                          |
| <b>PACKAGE CHARACTERISTICS</b>              |   |   |                             |                          |                             |                          |
| $L_D$                                       | Internal Drain Inductance (from centre of drain pad to die)                       |   |                             |                          | 0.8                         | nH                       |
| $L_S$                                       | Internal Source Inductance (from centre of source pad to end of source bond wire) |   |                             |                          | 2.8                         |                          |

**Notes**

- 1) Pulse Test: Pulse Width  $\leq 300\text{ms}$ ,  $\delta \leq 2\%$
- 2) Repetitive Rating – Pulse width limited by maximum junction temperature.