



## Description

The IRFR3411TRPBF uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 100V$   $I_D = 30A$

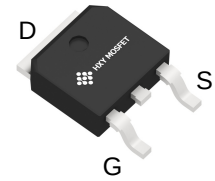
$R_{DS(ON)} < 48m\Omega$  @  $V_{GS}=10V$

## Application

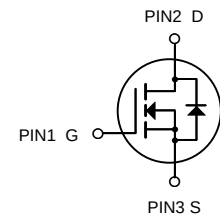
Battery protection

Load switch

Uninterruptible power supply



TO-252-2L  
(DPAK)



N-Channel MOSFET

## Ordering Information

| Product ID    | Pack            | Brand      | Qty(PCS) |
|---------------|-----------------|------------|----------|
| IRFR3411TRPBF | TO-252-2L(DPAK) | HXY MOSFET | 2500     |

## Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

| Symbol                | Parameter                                             | Rating     | Units        |
|-----------------------|-------------------------------------------------------|------------|--------------|
| $V_{DS}$              | Drain-Source Voltage                                  | 100        | V            |
| $V_{GS}$              | Gate-Source Voltage                                   | $\pm 20$   | V            |
| $I_D@T_c=25^\circ C$  | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 30         | A            |
| $I_D@T_c=100^\circ C$ | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 13         | A            |
| $I_{DM}$              | Pulsed Drain Current <sup>2</sup>                     | 80         | A            |
| EAS                   | Single Pulse Avalanche Energy <sup>3</sup>            | 30         | mJ           |
| $P_D@T_c=25^\circ C$  | Total Power Dissipation <sup>4</sup>                  | 42         | W            |
| $T_{STG}$             | Storage Temperature Range                             | -55 to 150 | $^\circ C$   |
| $T_J$                 | Operating Junction Temperature Range                  | -55 to 150 | $^\circ C$   |
| $R_{\theta JC}$       | Thermal Resistance Junction-Case <sup>1</sup>         | 3.6        | $^\circ C/W$ |



## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

| Symbol                                                 | Parameter                                                 | Test Condition                                                                            | Min. | Typ. | Max. | Units |
|--------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------------------------------|------|------|------|-------|
| Off Characteristic                                     |                                                           |                                                                                           |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                | 100  | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =100V, V <sub>GS</sub> =0V,                                               | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V                                                | -    | -    | ±100 | nA    |
| On Characteristics                                     |                                                           |                                                                                           |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                    | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                  | 1.0  | 1.5  | 2.2  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note3</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =10A                                                 | -    | 37   | 48   | mΩ    |
|                                                        |                                                           | V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A                                                 | -    | 39   | 55   | mΩ    |
| Dynamic Characteristics                                |                                                           |                                                                                           |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance                                         | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V,<br>f=1.0MHz                                    | -    | 1964 | -    | pF    |
| C <sub>OSS</sub>                                       | Output Capacitance                                        |                                                                                           | -    | 90   | -    | pF    |
| C <sub>RSS</sub>                                       | Reverse Transfer Capacitance                              |                                                                                           | -    | 74   | -    | pF    |
| Q <sub>g</sub>                                         | Total Gate Charge                                         | V <sub>DS</sub> =80V, I <sub>D</sub> =20A,<br>V <sub>GS</sub> =4.5V                       | -    | 20   | -    | nC    |
| Q <sub>gs</sub>                                        | Gate-Source Charge                                        |                                                                                           | -    | 3.1  | -    | nC    |
| Q <sub>gd</sub>                                        | Gate-Drain(“Miller”) Charge                               |                                                                                           | -    | 14   | -    | nC    |
| Switching Characteristics                              |                                                           |                                                                                           |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time                                        | V <sub>DS</sub> =80V, I <sub>D</sub> =20A,<br>R <sub>G</sub> =3.1Ω, V <sub>GS</sub> =4.5V | -    | 11   | -    | ns    |
| t <sub>r</sub>                                         | Turn-on Rise Time                                         |                                                                                           | -    | 91   | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |                                                                                           | -    | 40   | -    | ns    |
| t <sub>f</sub>                                         | Turn-off Fall Time                                        |                                                                                           | -    | 71   | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |                                                           |                                                                                           |      |      |      |       |
| I <sub>S</sub>                                         | Maximum Continuous Drain to Source Diode Forward Current  |                                                                                           | -    | -    | 27   | A     |
| I <sub>SM</sub>                                        | Maximum Pulsed Drain to Source Diode Forward Current      |                                                                                           | -    | -    | 80   | A     |
| V <sub>SD</sub>                                        | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =20A                                                  | -    | -    | 1.2  | V     |
| t <sub>rr</sub>                                        | Body Diode Reverse Recovery Time                          | I <sub>F</sub> =20A,<br>dI/dt=100A/μs                                                     | -    | 64   | -    | ns    |
| Q <sub>rr</sub>                                        | Body Diode Reverse Recovery Charge                        |                                                                                           | -    | 152  | -    | nC    |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

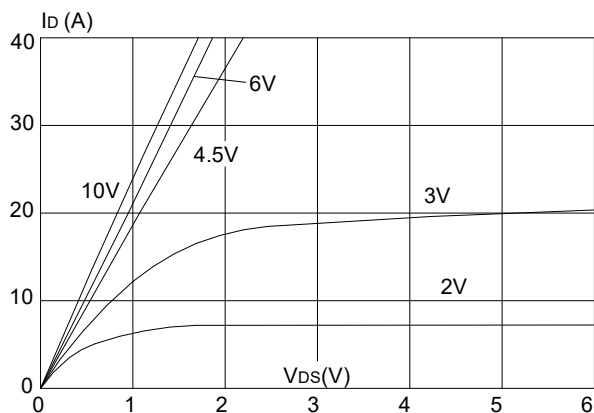
2. EAS condition : T<sub>J</sub>=25°C, V<sub>DD</sub>=50V, V<sub>G</sub>=10V, L=0.5mH, R<sub>G</sub>=25Ω, I<sub>AS</sub>= 11A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

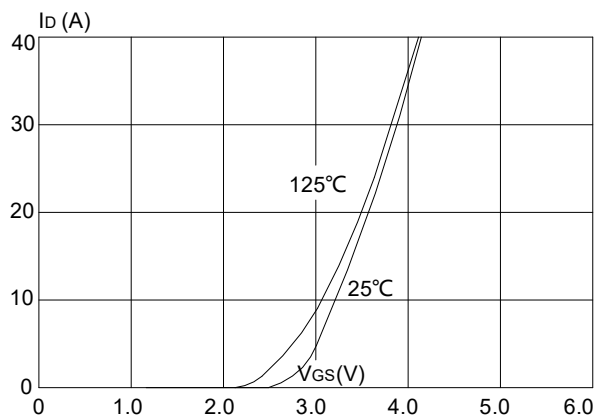


## Typical Performance Characteristics

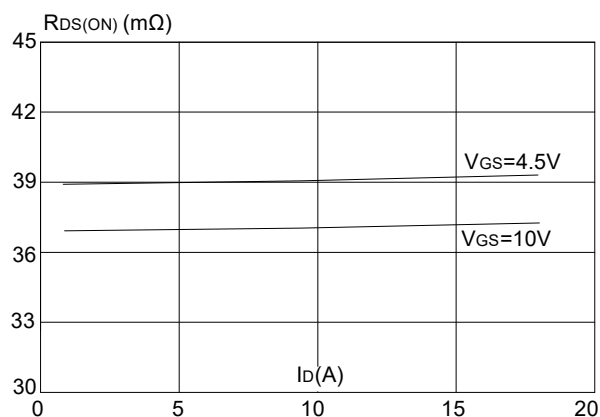
**Figure1:** Output Characteristics



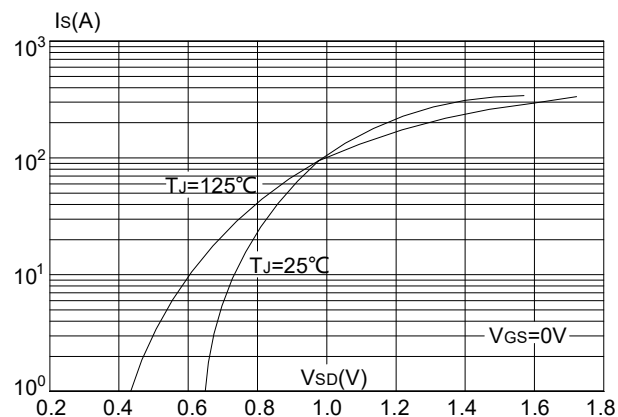
**Figure 2:** Typical Transfer Characteristics



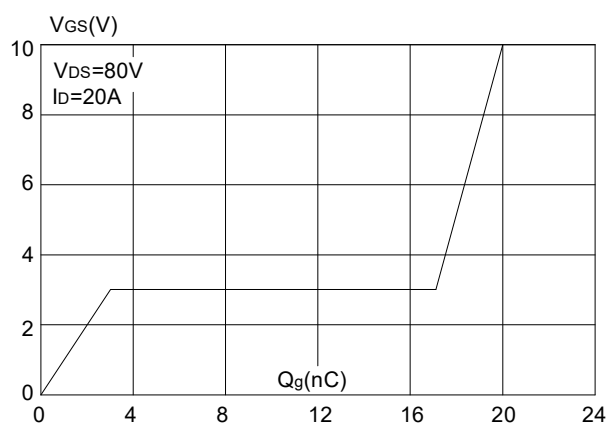
**Figure 3:** On-resistance vs. Drain Current



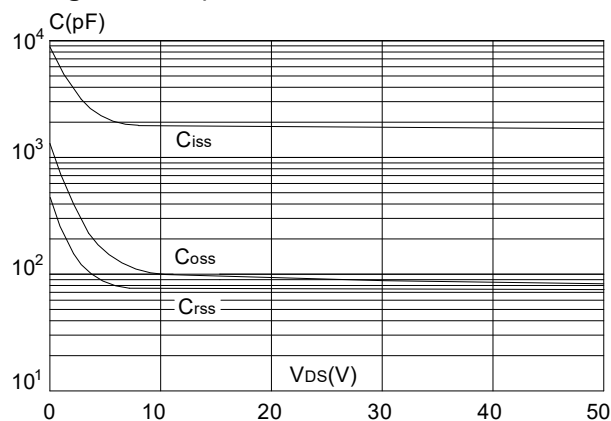
**Figure 4:** Body Diode Characteristics



**Figure 5:** Gate Charge Characteristics

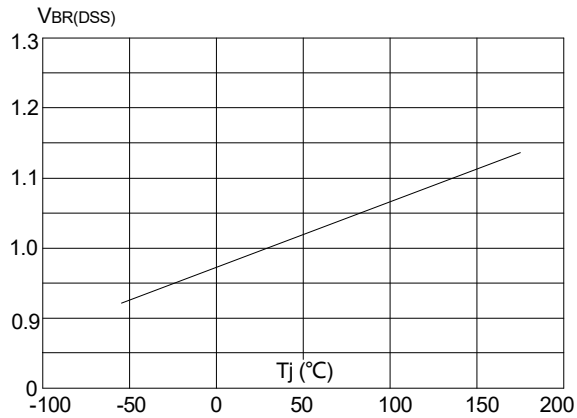


**Figure 6:** Capacitance Characteristics

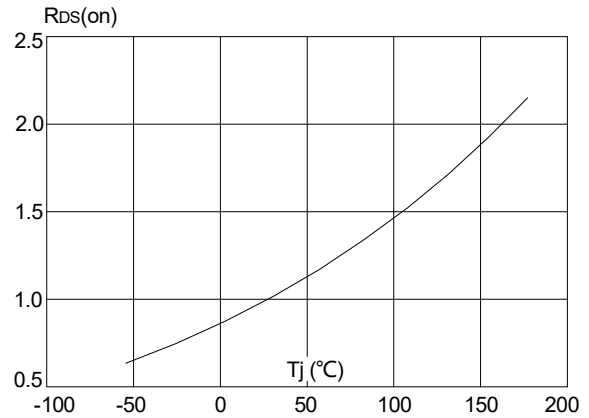




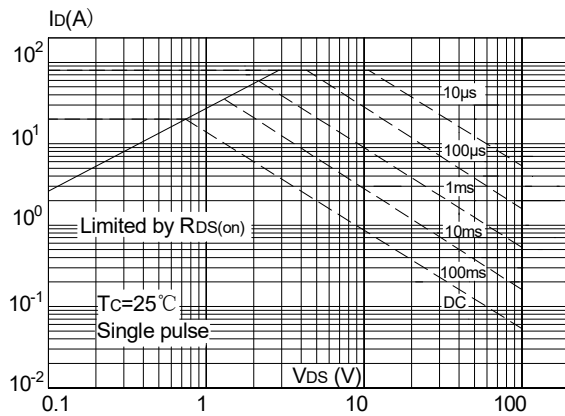
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



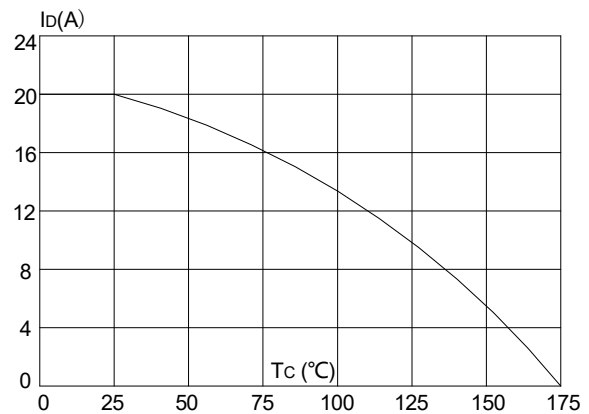
**Figure 8:** Normalized on Resistance vs. Junction Temperature



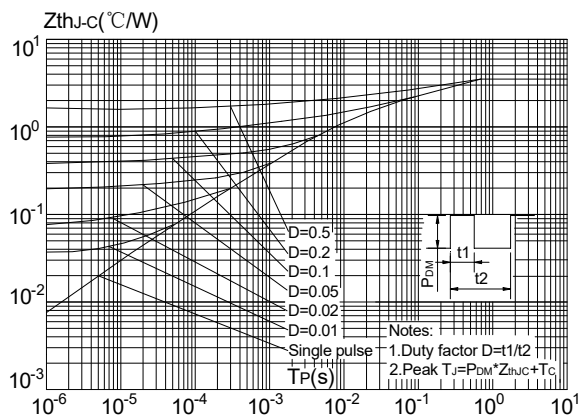
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature

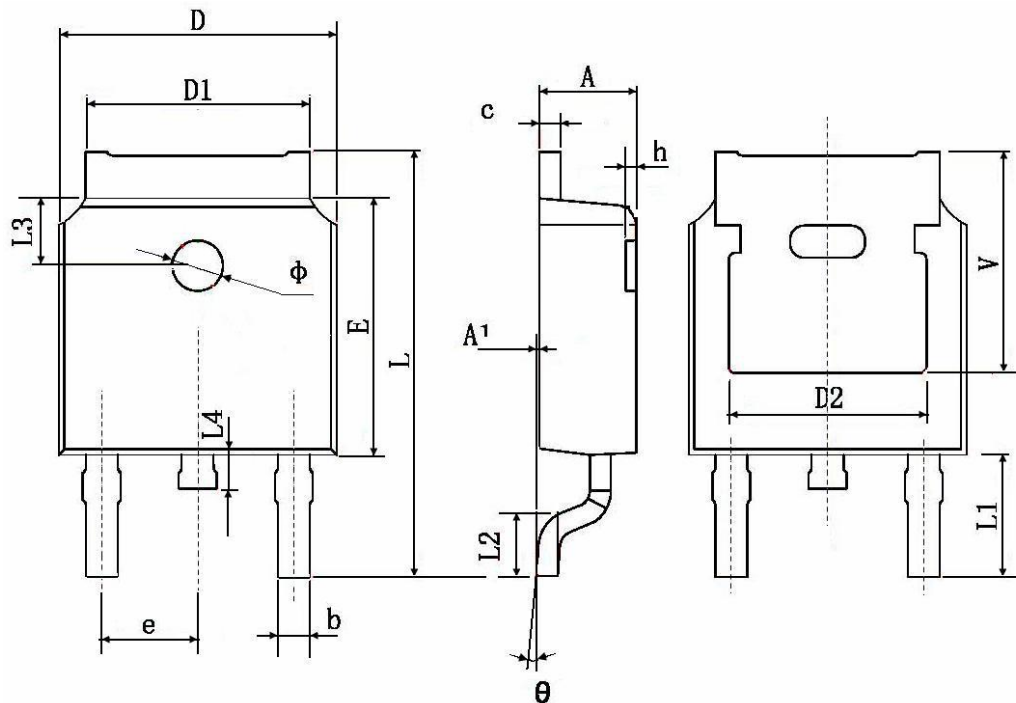


**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case





## TO-252-2L(DPAK) Package Information



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 0.483 TYP.                |        | 0.190 TYP.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 TYP.                |        | 0.211 TYP.           |       |



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