

# IRFH5302DTRPBF-TP

## N-Channel Enhancement MOSFET

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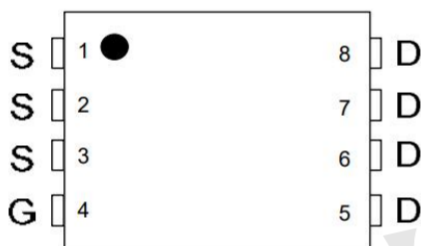
### Product Summary

- $V_{DS}$  30 V
- $I_{DS}$  (at  $V_{GS}=10V$ ) 160A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ )  $\leq 1.4m\Omega$  (TYP)

### Application

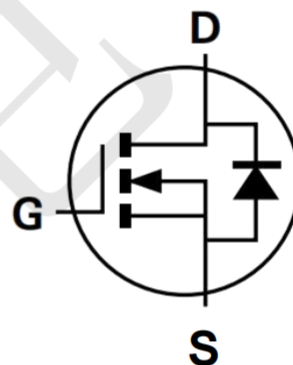
- Load switch
- High Frequency Switching and Synchronous Rectification
- Active Clamp in Intermediate
- DC/DC Power Supplies

### Package and Pin Configuration



PDFN5X6-8

### Circuit diagram



### Absolute Maximum Ratings

( $T_A=25^\circ\text{C}$  unless otherwise noted)

| PARAMETER                            | SYMBOL     | LIMIT                   | UNIT             |
|--------------------------------------|------------|-------------------------|------------------|
| Drain-Source Voltage                 | $V_{DS}$   | 30                      | V                |
| Gate-Source Voltage                  | $V_{GS}$   | $\pm 20$                | V                |
| Continuous Drain Current             | $I_D$      | $T_C=25^\circ\text{C}$  | 160              |
|                                      |            | $T_C=100^\circ\text{C}$ | 100              |
| Pulsed Drain Current                 | $I_{DM}$   | 640                     | A                |
| Single Pulse Avalanche Energy        | EAS        | 870                     | mJ               |
| Total Power Dissipation              | $P_{DTOT}$ | $T_C=25^\circ\text{C}$  | 57               |
| Operating Junction Temperature Range | $T_J$      | -55 to +150             | $^\circ\text{C}$ |
| Storage Temperature Range            | $T_{stg}$  | -55 to +150             | $^\circ\text{C}$ |

### Thermal Characteristic

| PARAMETER                              | Symbol          | Value | Unit               |
|----------------------------------------|-----------------|-------|--------------------|
| Junction-to-Ambient Thermal Resistance | $R_{\theta JA}$ | 62    | $^\circ\text{C/W}$ |
| Thermal Resistance Junction-Case       | $R_{\theta JC}$ | 2.2   | $^\circ\text{C/W}$ |

Note : The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper.

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

| PARAMETER                                               | CONDITIONS                                     | SYMBOL       | MIN | TYP  | MAX       | UNIT       |
|---------------------------------------------------------|------------------------------------------------|--------------|-----|------|-----------|------------|
| Static                                                  |                                                |              |     |      |           |            |
| Drain-Source Breakdown Voltage                          | $V_{GS}=0V, I_D=250\mu A$                      | $BV_{DSS}$   | 30  | --   | --        | V          |
| Gate-Source Threshold Voltage                           | $V_{DS}=V_{GS}, I_D=250\mu A$                  | $V_{GS(th)}$ | 1.0 | 1.5  | 2.2       | V          |
| Gate-Source Leakage                                     | $V_{DS}=0V, V_{GS}=\pm 20V$                    | $I_{GSS}$    | --  | --   | $\pm 100$ | nA         |
| Zero Gate Voltage Drain Current                         | $V_{DS}=30V, V_{GS}=0V$                        | $I_{DSS}$    | --  | 0.1  | 1.0       | $\mu A$    |
|                                                         | $V_{DS}=30V, T_J=55^{\circ}C$                  |              | --  | 1.0  | 5.0       | $\mu A$    |
| Drain-Source On-State Resistance (Note 1)               | $V_{GS}=10V, I_D=20A$                          | $R_{DS(on)}$ | --  | 1.4  | 2.2       | m $\Omega$ |
|                                                         | $V_{GS}=4.5V, I_D=15A$                         |              | --  | 2.1  | 3.2       |            |
| Forward Transconductance (Note 2)                       | $V_{DS}=5V, I_D=20A$                           | $g_{fs}$     | --  | 75   | --        | S          |
| Dynamic (Note 2)                                        |                                                |              |     |      |           |            |
| Total Gate Charge (Note 3)                              | $V_{DS}=30V, I_D=30A, V_{GS}=10V$              | $Q_g$        | --  | 142  | --        | nC         |
| Gate-Source Charge (Note 3)                             |                                                | $Q_{gs}$     | --  | 92   | --        |            |
| Gate-Drain Charge (Note 3)                              |                                                | $Q_{gd}$     | --  | 18   | --        |            |
| Input Capacitance                                       | $V_{DS}=30V, V_{GS}=0V, F=1.0MHz$              | $C_{iss}$    | --  | 7428 | --        | pF         |
| Output Capacitance                                      |                                                | $C_{oss}$    | --  | 664  | --        |            |
| Reverse Transfer Capacitance                            |                                                | $C_{rss}$    | --  | 544  | --        |            |
| Switching                                               |                                                |              |     |      |           |            |
| Turn-On Delay Time (Note 3)                             | $V_{DD}=20V, I_D=1A, V_{GS}=10V, R_G=10\Omega$ | $t_{d(on)}$  | --  | 18   | --        | nS         |
| Rise Time (Note 3)                                      |                                                | $t_r$        | --  | 10   | --        |            |
| Turn-Off Delay Time (Note 3)                            |                                                | $t_{d(off)}$ | --  | 64   | --        |            |
| Fall Time (Note 3)                                      |                                                | $t_f$        | --  | 16   | --        |            |
| Source-Drain Diode Ratings and Characteristics (Note 2) |                                                |              |     |      |           |            |
| Forward Voltage                                         | $V_{GS}=0V, I_F=10A$                           | $V_{SD}$     | --  | 0.7  | 1.2       | V          |
| Continuous Source Current                               | Integral reverse diode in the MOSFET           | $I_S$        | --  | --   | 160       | A          |
| Pulsed Current (Note 1)                                 |                                                | $I_{SM}$     | --  | --   | 640       | A          |

Notes:

1. Pulse test; pulse width ≤ 300 μS, duty cycle ≤ 2%.
2. Guaranteed by design, not subject to production testing.
3. Independent of operating temperature

### Typical Electrical and Thermal Characteristics

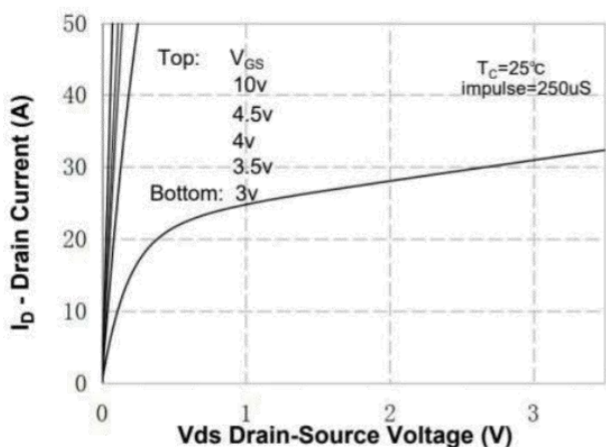


Figure 1. On-Region Characteristics

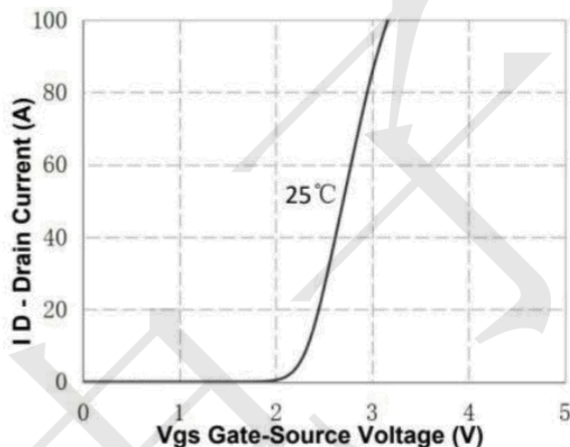


Figure 2. Transfer Characteristics

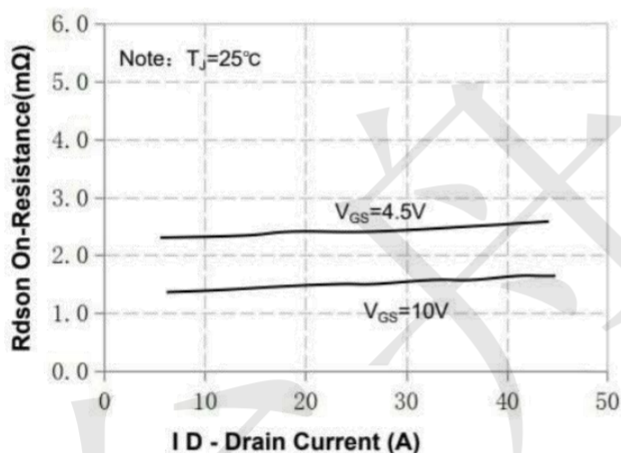


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

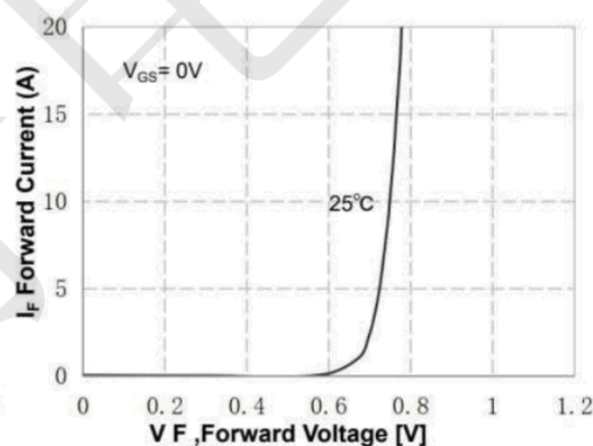


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

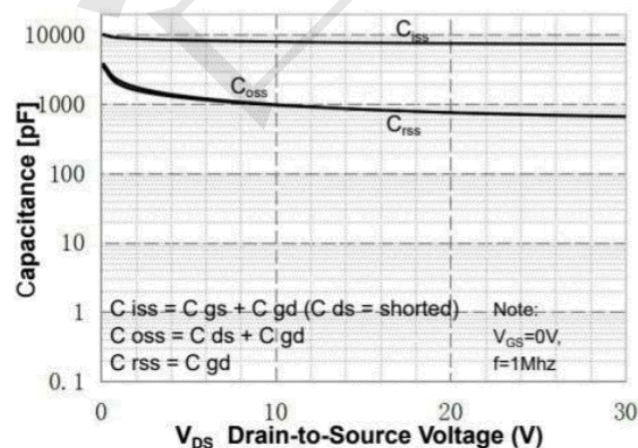


Figure 5. Capacitance Characteristics

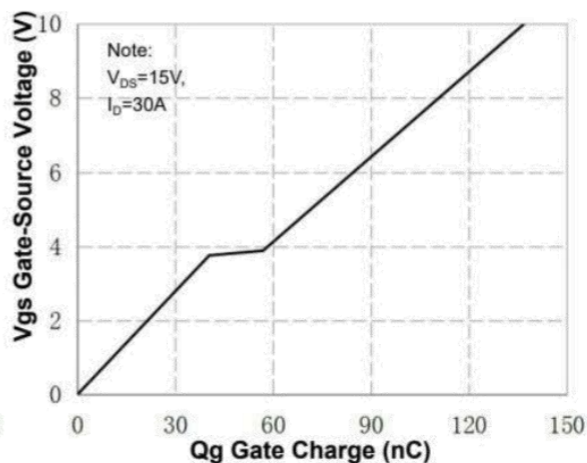
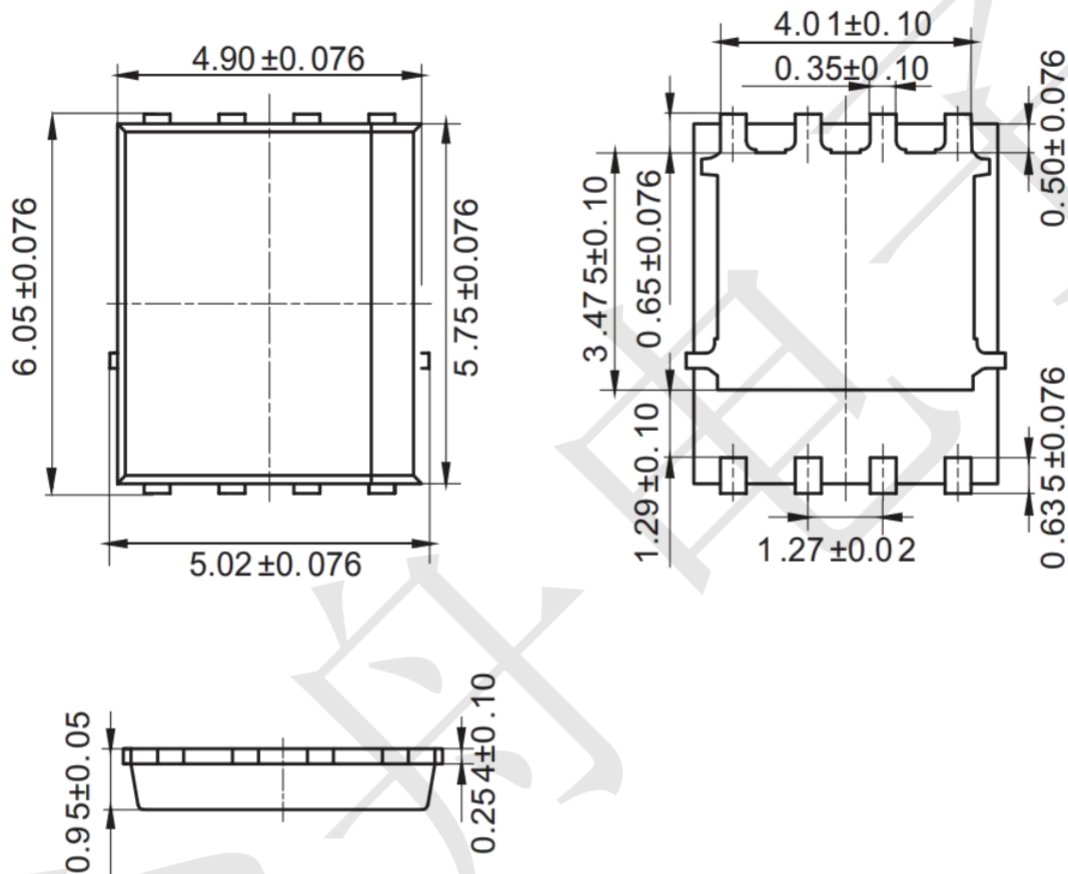


Figure 6. Gate Charge Characteristics

## Package Information

PDFN5X6-8



## Mounting Pad Layout (unit: mm)

