

# RJK4002DPP-M0

Silicon N Channel MOS FET  
High Speed Power Switching

R07DS0551EJ0100

Rev.1.00

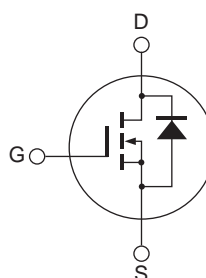
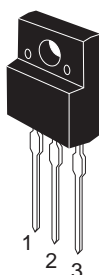
Oct 03, 2011

## Features

- Low on-state resistance  
 $R_{DS(on)} = 2.4 \Omega$  typ. (at  $I_D = 1.5 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$ ,  $T_a = 25^\circ\text{C}$ )
- High speed switching

## Outline

RENESAS Package code: PRSS0003AF-A  
(Package name: TO-220FL)



1. Gate
2. Drain
3. Source

## Absolute Maximum Ratings

( $T_a = 25^\circ\text{C}$ )

| Item  | Symbol                           | Value       | Unit                      |
|---|----------------------------------|-------------|---------------------------|
| Drain to source voltage                     | $V_{DSS}$                        | 400         | V                         |
| Gate to source voltage                      | $V_{GSS}$                        | $\pm 30$    | V                         |
| Drain current                               | $I_D$ <sup>Note4</sup>           | 3           | A                         |
| Drain peak current                          | $I_{D(pulse)}$ <sup>Note1</sup>  | 6           | A                         |
| Body-drain diode reverse drain current      | $I_{DR}$                         | 3           | A                         |
| Body-drain diode reverse drain peak current | $I_{DR(pulse)}$ <sup>Note1</sup> | 6           | A                         |
| Avalanche current                           | $I_{AP}$ <sup>Note3</sup>        | 2.5         | A                         |
| Avalanche energy                            | $E_{AR}$ <sup>Note3</sup>        | 0.357       | mJ                        |
| Channel dissipation                         | $P_{ch}$ <sup>Note 2</sup>       | 20          | W                         |
| Channel to case thermal Impedance           | $\theta_{ch-c}$                  | 6.25        | $^\circ\text{C}/\text{W}$ |
| Channel temperature                         | $T_{ch}$                         | 150         | $^\circ\text{C}$          |
| Storage temperature                         | $T_{stg}$                        | -55 to +150 | $^\circ\text{C}$          |

- Notes: 1.  $PW \leq 10 \text{ ms}$ , duty cycle  $\leq 1 \%$   
 2. Value at  $T_c = 25^\circ\text{C}$   
 3.  $ST_{ch} = 25^\circ\text{C}$ ,  $T_{ch} \leq 150^\circ\text{C}$   
 4. Pulse width limited by safe operating area.

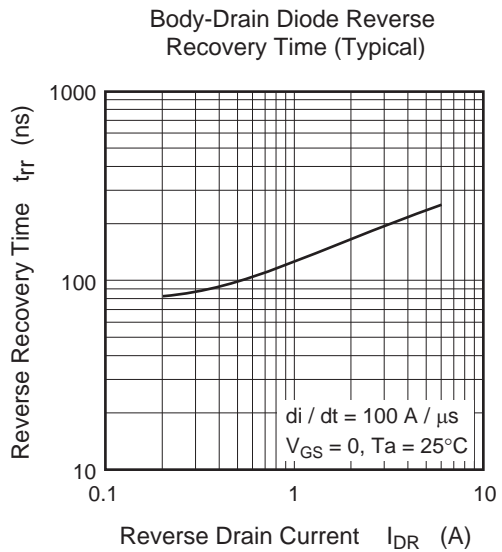
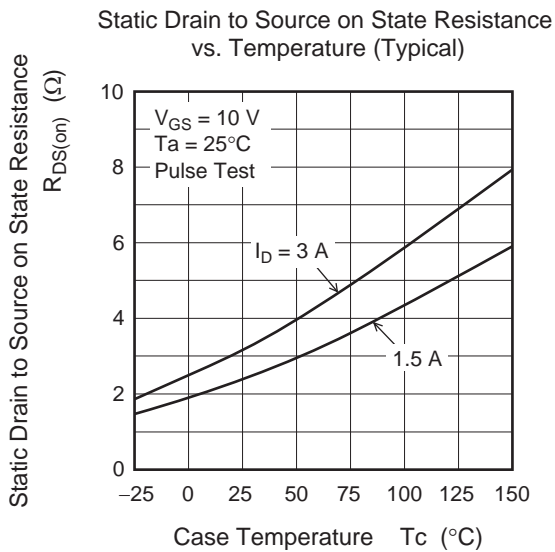
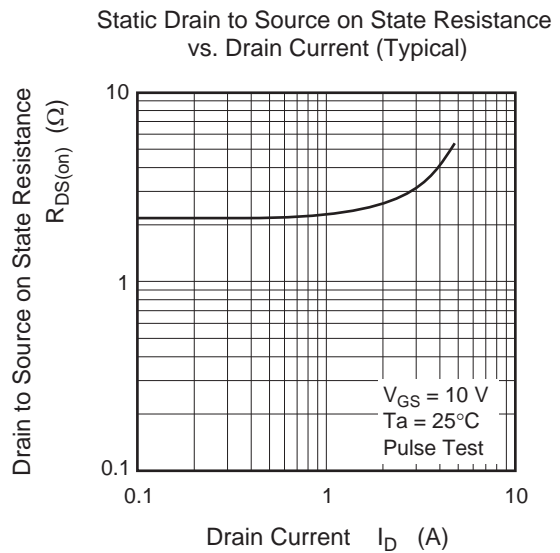
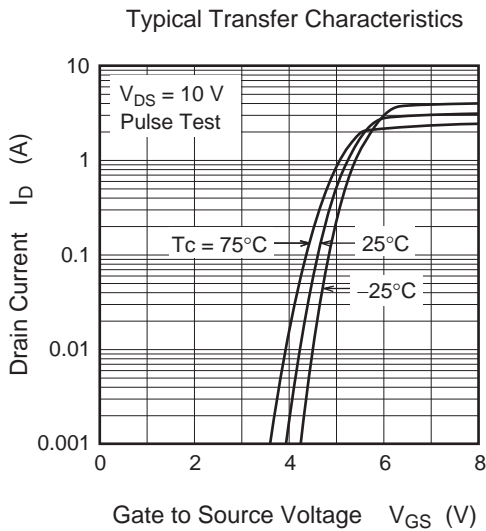
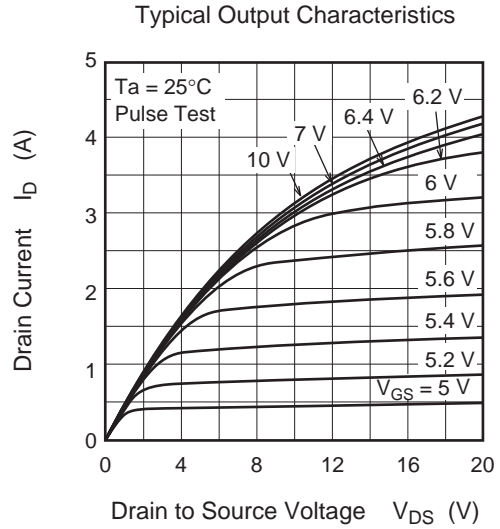
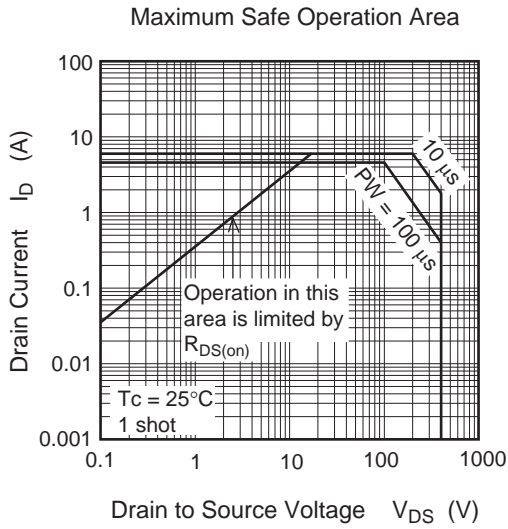
## Electrical Characteristics

(Ta = 25°C)

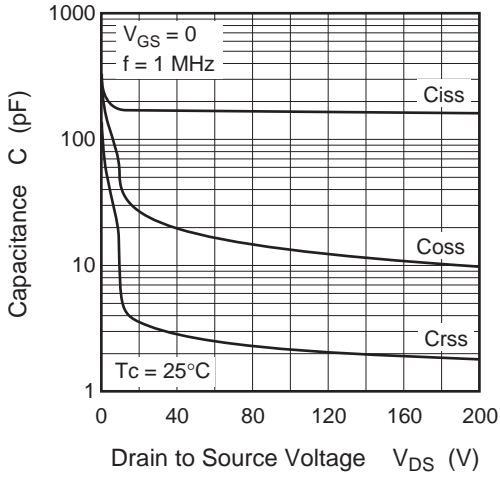
| Item                                       | Symbol        | Min | Typ | Max       | Unit          | Test Conditions   |
|--|---------------|-----|-----|-----------|---------------|---|
| Drain to source breakdown voltage          | $V_{(BR)DSS}$ | 400 | —   | —         | V             | $I_D = 10 \text{ mA}$ , $V_{GS} = 0$  |
| Zero gate voltage drain current            | $I_{DSS}$     | —   | —   | 1         | $\mu\text{A}$ | $V_{DS} = 400 \text{ V}$ , $V_{GS} = 0$   |
| Gate to source leak current                | $I_{GSS}$     | —   | —   | $\pm 0.1$ | $\mu\text{A}$ | $V_{GS} = \pm 30 \text{ V}$ , $V_{DS} = 0$  |
| Gate to source cutoff voltage              | $V_{GS(off)}$ | 3.0 | —   | 4.5       | V             | $V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$  |
| Static drain to source on state resistance | $R_{DS(on)}$  | —   | 2.4 | 2.9       | $\Omega$      | $I_D = 1.5 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note 5</sup>                                       |
| Input capacitance                          | $C_{iss}$     | —   | 165 | —         | pF            | $V_{DS} = 25 \text{ V}$   |
| Output capacitance                         | $C_{oss}$     | —   | 25  | —         | pF            | $V_{GS} = 0$  |
| Reverse transfer capacitance               | $C_{rss}$     | —   | 3.5 | —         | pF            | $f = 1 \text{ MHz}$   |
| Turn-on delay time                         | $t_{d(on)}$   | —   | 27  | —         | ns            | $I_D = 1.5 \text{ A}$   |
| Rise time                                  | $t_r$         | —   | 16  | —         | ns            | $V_{GS} = 10 \text{ V}$   |
| Turn-off delay time                        | $t_{d(off)}$  | —   | 45  | —         | ns            | $R_L = 133 \Omega$  |
| Fall time                                  | $t_f$         | —   | 14  | —         | ns            | $R_g = 10 \Omega$   |
| Total gate charge                          | $Q_g$         | —   | 6.0 | —         | nC            | $V_{DD} = 320 \text{ V}$  |
| Gate to source charge                      | $Q_{gs}$      | —   | 1.2 | —         | nC            | $V_{DS} = 100 \text{ V}$  |
| Gate to drain charge                       | $Q_{gd}$      | —   | 3.4 | —         | nC            | $I_D = 3 \text{ A}$   |
| Body-drain diode forward voltage           | $V_{DF}$      | —   | 0.9 | 1.5       | V             | $I_F = 3 \text{ A}$ , $V_{GS} = 0$ <sup>Note 5</sup>  |
| Body-drain diode reverse recovery time     | $t_{rr}$      | —   | 200 | —         | ns            | $I_F = 3 \text{ A}$ , $V_{GS} = 0$<br>$V_{DD} = 320 \text{ V}$<br>$di_F/dt = 100 \text{ A}/\mu\text{s}$ |

Note: 5. Pulse test

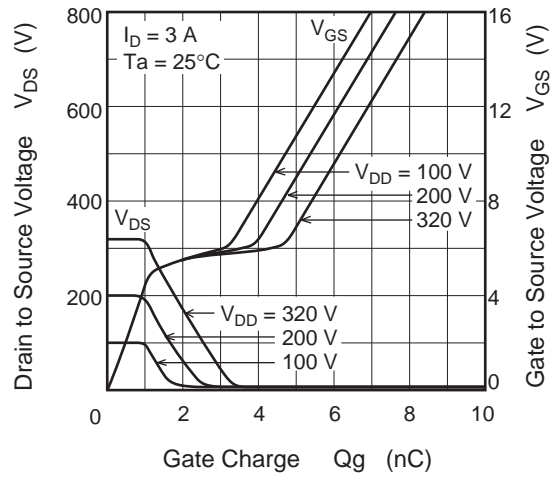
Main Characteristics



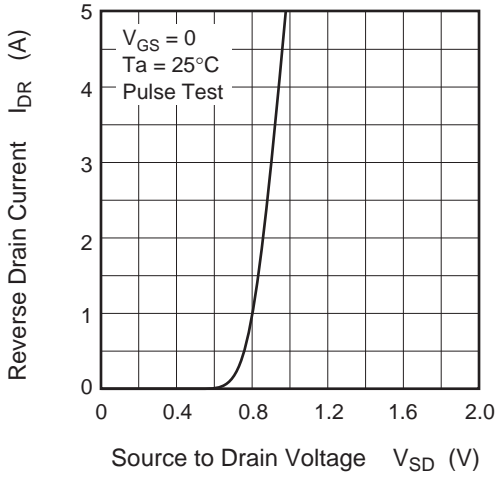
Typical Capacitance vs. Drain to Source Voltage



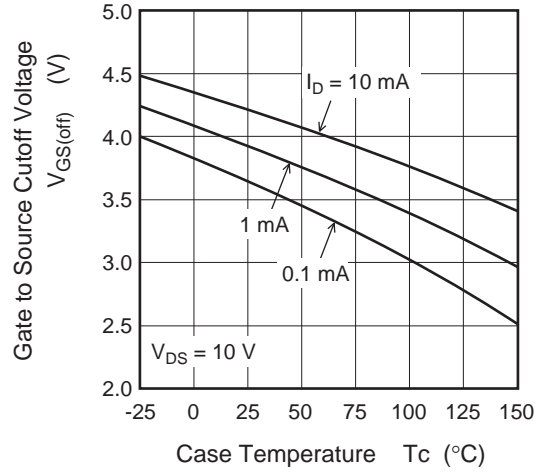
Dynamic Input Characteristics (Typical)



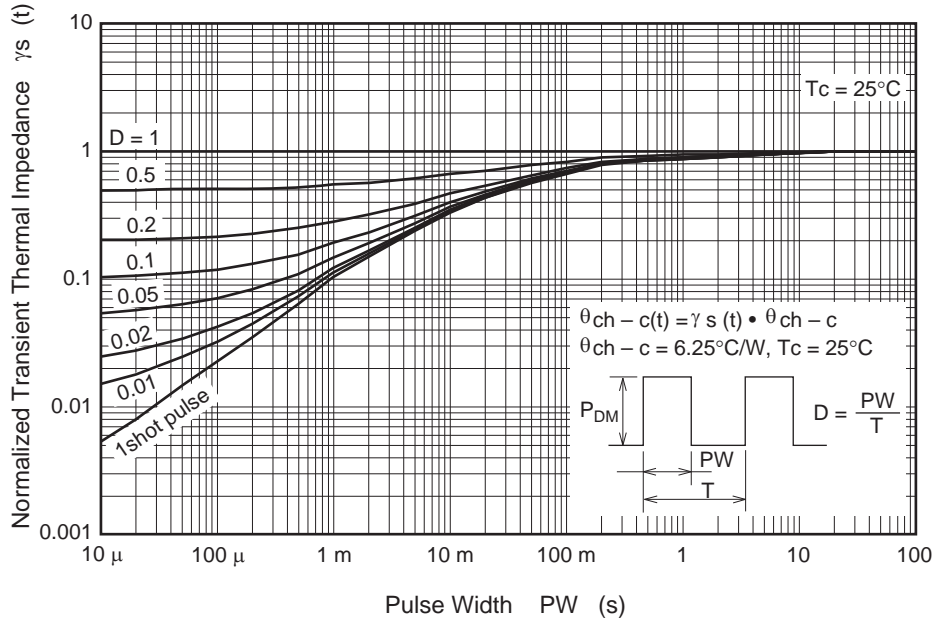
Reverse Drain Current vs. Source to Drain Voltage (Typical)



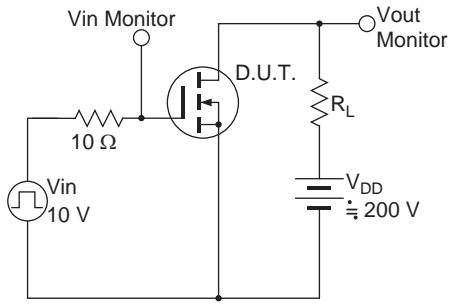
Gate to Source Cutoff Voltage vs. Case Temperature (Typical)



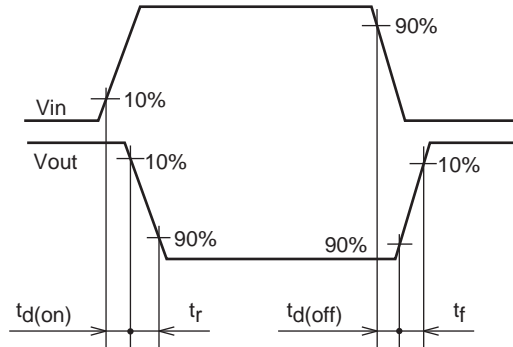
Normalized Transient Thermal Impedance vs. Pulse Width



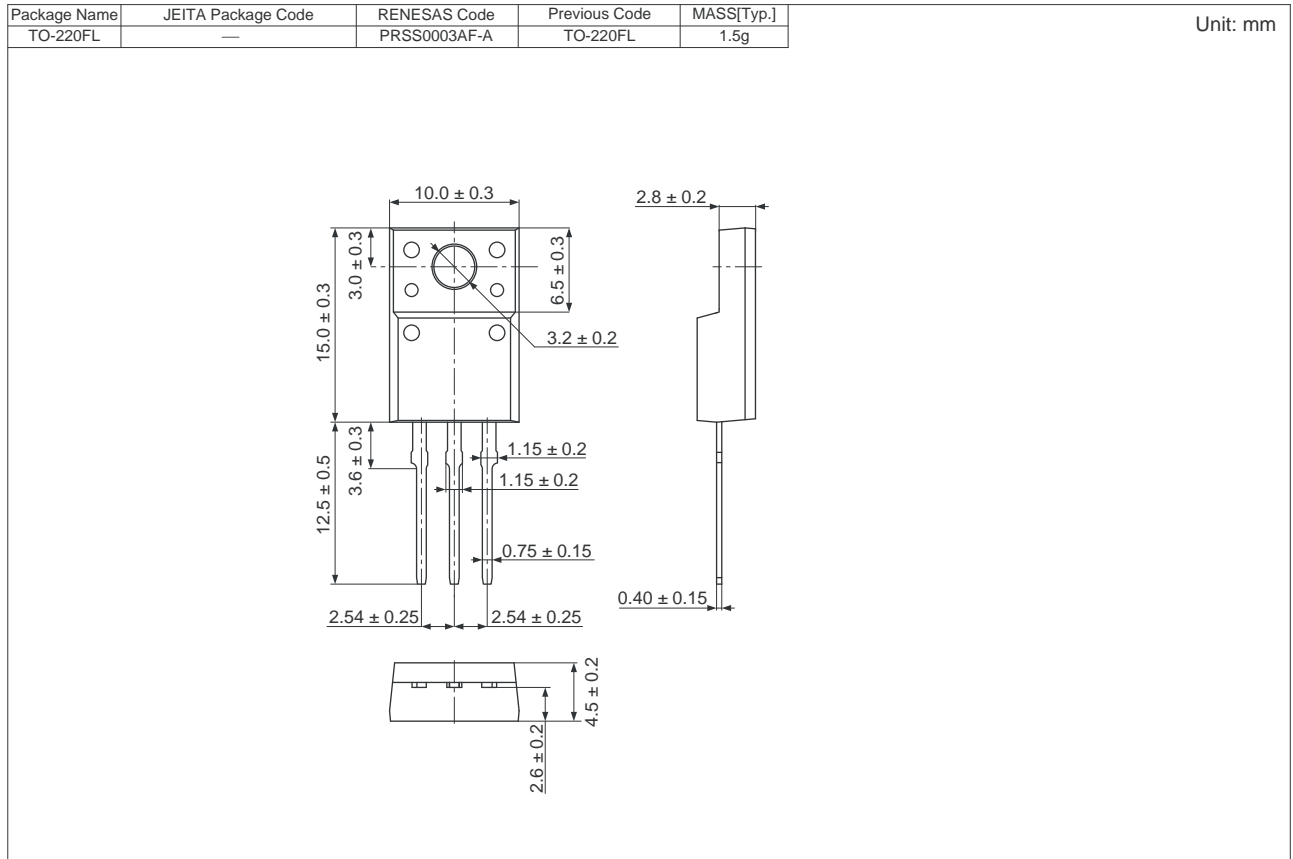
Switching Time Test Circuit



Waveform



### Package Dimensions



### Ordering Information

| Orderable Part No. | Quantity | Shipping Container |
|--------------------|----------|--------------------|
| RJK4002DPP-M0-T2   | 600 pcs  | Box (Tube)         |

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