**Features**

- **Low on-resistance**
  \[ R_{\text{DS(on)}} = 1.1 \, \Omega \text{ typ. (at } I_D = 3 \, \text{A, } V_{GS} = 10 \, \text{V, } T_a = 25 \, ^\circ\text{C}) \]
- **Low leakage current**
- **High speed switching**
- **Quality grade: Standard**

**Outline**

RENAS Package code: PRSS0003AP-A  
(Package name: TO-220FPA)

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain to source voltage</td>
<td>( V_{DSS} )</td>
<td>600</td>
<td>V</td>
</tr>
<tr>
<td>Gate to source voltage</td>
<td>( V_{GSS} )</td>
<td>±30</td>
<td>V</td>
</tr>
<tr>
<td>Drain current</td>
<td>( I_D^{\text{Notes4}} )</td>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>Drain peak current</td>
<td>( I_D^{\text{(pulse)\text{Notes1}}} )</td>
<td>24</td>
<td>A</td>
</tr>
<tr>
<td>Body-drain diode reverse drain current</td>
<td>( I_{DR}^{\text{Notes2}} )</td>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>Body-drain diode reverse drain peak current</td>
<td>( I_{DR}^{\text{(pulse)\text{Notes1}}} )</td>
<td>24</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche current</td>
<td>( I_{AB}^{\text{Notes3}} )</td>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche energy</td>
<td>( E_{AR}^{\text{Notes3}} )</td>
<td>1.65</td>
<td>mJ</td>
</tr>
<tr>
<td>Channel dissipation</td>
<td>( P_{\text{ch}}^{\text{Notes2}} )</td>
<td>29.5</td>
<td>W</td>
</tr>
<tr>
<td>Channel temperature</td>
<td>( T_{ch} )</td>
<td>150</td>
<td>(^\circ\text{C})</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>( T_{stg} )</td>
<td>–55 to +150</td>
<td>(^\circ\text{C})</td>
</tr>
</tbody>
</table>

Note: Continuous heavy condition (e.g. high temperature/voltage/current or high variation of temperature) may affect a reliability even if it is within the absolute maximum ratings. Please consider derating condition for appropriate reliability in reference Renesas Semiconductor Reliability Handbook (Recommendation for Handling and Usage of Semiconductor Devices) and individual reliability data.

Notes:
1. \( PW \leq 10 \, \mu\text{s} \), 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. Limited by maximum safe operation area
### Thermal Resistance Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Max. Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel to case thermal impedance</td>
<td>( \theta_{ch-c} )</td>
<td>4.23</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

Notes: 5. Designed target value on Renesas measurement condition. (Not tested)

### Electrical Characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Test conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain to source breakdown voltage</td>
<td>( V_{BRDSS} )</td>
<td>600</td>
<td>—</td>
<td>—</td>
<td>V</td>
<td>( I_D = 10 \text{ mA}, \quad V_{GS} = 0 )</td>
</tr>
<tr>
<td>Zero gate voltage drain current</td>
<td>( I_{oss} )</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>( \mu \text{A} )</td>
<td>( V_{DS} = 600 \text{ V}, \quad V_{GS} = 0 )</td>
</tr>
<tr>
<td>Gate to source leak current</td>
<td>( I_{GSS} )</td>
<td>—</td>
<td>—</td>
<td>±0.1</td>
<td>( \mu \text{A} )</td>
<td>( V_{GS} = \pm30 \text{ V}, \quad V_{DS} = 0 )</td>
</tr>
<tr>
<td>Gate to source cutoff voltage</td>
<td>( V_{GS(off)} )</td>
<td>3.0</td>
<td>—</td>
<td>4.5</td>
<td>V</td>
<td>( I_D = 1 \text{ mA}, \quad V_{GS} = 10 \text{ V} )</td>
</tr>
<tr>
<td>Static drain to source on state resistance</td>
<td>( R_{DS(on)} )</td>
<td>—</td>
<td>1.10</td>
<td>1.37</td>
<td>( \Omega )</td>
<td>( I_D = 3 \text{ A}, \quad V_{GS} = 10 \text{ V} )</td>
</tr>
<tr>
<td>Input capacitance</td>
<td>( C_{iss} )</td>
<td>—</td>
<td>765</td>
<td>—</td>
<td>pF</td>
<td>( V_{DS} = 25 \text{ V} )</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>( C_{oss} )</td>
<td>—</td>
<td>78</td>
<td>—</td>
<td>pF</td>
<td>( V_{GS} = 0 )</td>
</tr>
<tr>
<td>Reverse transfer capacitance</td>
<td>( C_{rss} )</td>
<td>—</td>
<td>9</td>
<td>—</td>
<td>pF</td>
<td>( f = 1 \text{ MHz} )</td>
</tr>
<tr>
<td>Turn-on delay time</td>
<td>( t_{on} )</td>
<td>—</td>
<td>12</td>
<td>—</td>
<td>ns</td>
<td>( I_D = 3 \text{ A} )</td>
</tr>
<tr>
<td>Rise time</td>
<td>( t_{r} )</td>
<td>—</td>
<td>4.6</td>
<td>—</td>
<td>ns</td>
<td>( V_{GS} = 10 \text{ V} )</td>
</tr>
<tr>
<td>Turn-off delay time</td>
<td>( t_{off} )</td>
<td>—</td>
<td>65</td>
<td>—</td>
<td>ns</td>
<td>( I_{D} = 3 \text{ A} )</td>
</tr>
<tr>
<td>Fall time</td>
<td>( t_{f} )</td>
<td>—</td>
<td>5.3</td>
<td>—</td>
<td>ns</td>
<td>( V_{DD} = 480 \text{ V} )</td>
</tr>
<tr>
<td>Total gate charge</td>
<td>( Q_{g} )</td>
<td>—</td>
<td>20</td>
<td>—</td>
<td>nC</td>
<td>( V_{DD} = 480 \text{ V} )</td>
</tr>
<tr>
<td>Gate to source charge</td>
<td>( Q_{gs} )</td>
<td>—</td>
<td>4</td>
<td>—</td>
<td>nC</td>
<td>( V_{GS} = 10 \text{ V} )</td>
</tr>
<tr>
<td>Gate to drain charge</td>
<td>( Q_{gd} )</td>
<td>—</td>
<td>10</td>
<td>—</td>
<td>nC</td>
<td>( I_{D} = 3 \text{ A} )</td>
</tr>
<tr>
<td>Body-drain diode forward voltage</td>
<td>( V_{DF} )</td>
<td>—</td>
<td>0.9</td>
<td>1.5</td>
<td>V</td>
<td>( I_{F} = 6 \text{ A}, \quad V_{GS} = 0 )</td>
</tr>
<tr>
<td>Body-drain diode reverse recovery time</td>
<td>( t_{rr} )</td>
<td>—</td>
<td>360</td>
<td>—</td>
<td>ns</td>
<td>( I_{F} = 6 \text{ A}, \quad V_{GS} = 0 )</td>
</tr>
</tbody>
</table>

Notes: 6. Pulse test
Main Characteristics

- **Maximum Safe Operation Area**
  - Drain to Source Voltage $V_{DS}$ (V)
  - Drain Current $I_D$ (A)

- **Typical Output Characteristics**
  - Drain Current $I_D$ (A)

- **Typical Transfer Characteristics**
  - Gate to Source Voltage $V_{GS}$ (V)
  - Drain Current $I_D$ (A)

- **Typical Body-Drain Diode Reverse Recovery Time**
  - Reverse Recovery Time $t_{rr}$ (ns)

- **Static Drain to Source on State Resistance**
  - Static Drain to Source on State Resistance $R_{DS(on)}$ (Ω)
  - Case Temperature $T_c$ (°C)

Notes: 7. Designed target value on Renesas measurement condition. (Not tested)
Renesas recommends that operating conditions are designed according to a document "Power MOS FET ・ IGBT Attention of Handling Semiconductor Devices".

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Mar.10.2021
Vin Monitor

D.U.T.

Vin
10 V

RL

VDD
= 300 V

Vout

Monitor

D = 1

0.5

0.2

0.1

0.05

0.02

0.01

90%

10%

Tc = 25°C

Notes 8

Normalized Transient Thermal Impedance vs. Pulse Width

PDM

PW

T

\[ \theta_ch - c(t) = 7 s(t) + 9 \theta_ch - c \]

\[ \theta_ch - c = 4.23 \degree C/W, Tc = 25\degree C \]

Notes: 8. Designed target value on Renesas measurement condition. (Not tested)
Package Dimensions

<table>
<thead>
<tr>
<th>Package Name</th>
<th>JEITA Package Code</th>
<th>RENESAS Code</th>
<th>Previous Code</th>
<th>MASS (Typ) [g]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO-220FPA</td>
<td>—</td>
<td>PRSS0003AP-A</td>
<td>TO-220FPA</td>
<td>1.65</td>
</tr>
</tbody>
</table>

Unit: mm

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Ordering Information

<table>
<thead>
<tr>
<th>Orderable Part No.</th>
<th>Quantity</th>
<th>Shipping Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>RJK6035DPP-A0#T2</td>
<td>2500 pcs</td>
<td>Box (Tube)</td>
</tr>
</tbody>
</table>
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