RJK03M5DPA
30V, 30A, 6.5mΩmax.
N Channel Power MOS FET
High Speed Power Switching

Features
- High speed switching
- Capable of 4.5 V gate drive
- Low drive current
- High density mounting
- Low on-resistance
- Pb-free
- Halogen-free

Outline

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>30</td>
<td>V</td>
</tr>
<tr>
<td>Gate to source voltage</td>
<td>V_GSS</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>Drain current</td>
<td>I_D</td>
<td>30</td>
<td>A</td>
</tr>
<tr>
<td>Drain peak current</td>
<td>I_D(µs)</td>
<td>120</td>
<td>A</td>
</tr>
<tr>
<td>Body-drain diode reverse drain current</td>
<td>I_DR</td>
<td>30</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche current</td>
<td>I_A</td>
<td>10.5</td>
<td>A</td>
</tr>
<tr>
<td>Avalanche energy</td>
<td>E_AS</td>
<td>11</td>
<td>mJ</td>
</tr>
<tr>
<td>Channel dissipation</td>
<td>Pch</td>
<td>30</td>
<td>W</td>
</tr>
<tr>
<td>Channel to case thermal impedance</td>
<td>θ_ch-c</td>
<td>4.2</td>
<td>°C/W</td>
</tr>
<tr>
<td>Channel temperature</td>
<td>Tch</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>Tstg</td>
<td>-55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Notes:
1. PW ≤ 10 µs, duty cycle ≤ 1%
2. Value at Tch = 25°C, Rg ≥ 50 Ω
3. Tc = 25°C
## Electrical Characteristics

(Ta = 25°C)

<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>30</td>
<td>—</td>
<td>—</td>
<td>V</td>
<td>I_D = 10 mA, V_{GS} = 0</td>
</tr>
<tr>
<td>Gate to source leak current</td>
<td>I_{GSS}</td>
<td>—</td>
<td>—</td>
<td>± 0.5</td>
<td>μA</td>
<td>V_{GS} = ±20 V, V_{DS} = 0</td>
</tr>
<tr>
<td>Zero gate voltage drain current</td>
<td>I_{DSS}</td>
<td>—</td>
<td>—</td>
<td>1</td>
<td>μA</td>
<td>V_{DS} = 24 V, V_{GS} = 0</td>
</tr>
<tr>
<td>Gate to source cutoff voltage</td>
<td>V_{GSS(Off)}</td>
<td>1.2</td>
<td>—</td>
<td>2.5</td>
<td>V</td>
<td>V_{DS} = 10 V, I_D = 1 mA</td>
</tr>
<tr>
<td>Static drain to source on state resistance</td>
<td>R_{DSS(on)}</td>
<td>—</td>
<td>5.4</td>
<td>6.5</td>
<td>mΩ</td>
<td>I_D = 15 A, V_{GS} = 10 V</td>
</tr>
<tr>
<td></td>
<td>R_{DSS(on)}</td>
<td>—</td>
<td>6.6</td>
<td>8.6</td>
<td>mΩ</td>
<td>I_D = 15 A, V_{GS} = 4.5 V</td>
</tr>
<tr>
<td>Forward transfer admittance</td>
<td></td>
<td></td>
<td>—</td>
<td>70</td>
<td>—</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>[y_{fs}]</td>
<td></td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>I_D = 15 A, V_{DS} = 5 V</td>
</tr>
<tr>
<td>Input capacitance</td>
<td>Ciss</td>
<td>—</td>
<td>1350</td>
<td>1890</td>
<td>pF</td>
<td>V_{DS} = 10 V</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>Coss</td>
<td>—</td>
<td>220</td>
<td>—</td>
<td>pF</td>
<td>V_{GS} = 0</td>
</tr>
<tr>
<td>Reverse transfer capacitance</td>
<td>Crss</td>
<td>—</td>
<td>120</td>
<td>—</td>
<td>pF</td>
<td>f = 1 MHz</td>
</tr>
<tr>
<td>Gate Resistance</td>
<td>Rg</td>
<td>—</td>
<td>1.4</td>
<td>2.8</td>
<td>Ω</td>
<td></td>
</tr>
<tr>
<td>Total gate charge</td>
<td>Qg</td>
<td>—</td>
<td>10.4</td>
<td>—</td>
<td>nC</td>
<td>V_{DD} = 10 V</td>
</tr>
<tr>
<td>Gate to source charge</td>
<td>Qgs</td>
<td>—</td>
<td>4.0</td>
<td>—</td>
<td>nC</td>
<td>V_{GS} = 4.5 V</td>
</tr>
<tr>
<td>Gate to drain charge</td>
<td>Qgd</td>
<td>—</td>
<td>3.1</td>
<td>—</td>
<td>nC</td>
<td>I_D = 30 A</td>
</tr>
<tr>
<td>Turn-on delay time</td>
<td>t_{d(on)}</td>
<td>—</td>
<td>3.7</td>
<td>—</td>
<td>ns</td>
<td>V_{GS} = 10 V, I_D = 15 A</td>
</tr>
<tr>
<td>Rise time</td>
<td>t_{r}</td>
<td>—</td>
<td>3.0</td>
<td>—</td>
<td>ns</td>
<td>V_{DD} = 10 V</td>
</tr>
<tr>
<td>Turn-off delay time</td>
<td>t_{d(off)}</td>
<td>—</td>
<td>21.7</td>
<td>—</td>
<td>ns</td>
<td>R_L = 0.67 Ω</td>
</tr>
<tr>
<td>Fall time</td>
<td>t_{f}</td>
<td>—</td>
<td>7.0</td>
<td>—</td>
<td>ns</td>
<td>R_G = 4.7 Ω</td>
</tr>
<tr>
<td>Body–drain diode forward voltage</td>
<td>V_{DF}</td>
<td>—</td>
<td>0.87</td>
<td>1.13</td>
<td>V</td>
<td>I_F = 30 A, V_{GS} = 0</td>
</tr>
<tr>
<td>Body–drain diode reverse recovery time</td>
<td>t_{tr}</td>
<td>—</td>
<td>8.8</td>
<td>—</td>
<td>ns</td>
<td>I_F = 30 A, V_{GS} = 0</td>
</tr>
</tbody>
</table>

Notes: 4. Pulse test
Main Characteristics

Power vs. Temperature Derating

Channel Dissipation, \( P_{ch} \) (W)

Case Temperature, \( T_c \) (°C)

Maximum Safe Operation Area

Drain Current, \( I_D \) (A)

Drain to Source Voltage, \( V_{DS} \) (V)

Operation in this area is limited by \( R_{DS(on)} \)

\( T_c = 25 \) °C

1 shot Pulse

Typical Output Characteristics

Drain Current, \( I_D \) (A)

Drain to Source Voltage, \( V_{DS} \) (V)

\( V_{GS} = 2.4 \) V

Drain to Source Saturation Voltage vs. Gate to Source Voltage

Drain to Source Saturation Voltage, \( V_{DS(on)} \) (mV)

Gate to Source Voltage, \( V_{GS} \) (V)

\( I_D = 20 \) A

Static Drain to Source On State Resistance

Static Drain to Source On State Resistance, \( R_{DS(on)} \) (mΩ)

Drain Current, \( I_D \) (A)

Gate to Source Voltage, \( V_{GS} \) (V)

\( V_{GS} = 4.5 \) V
Normalized Transient Thermal Impedance vs. Pulse Width

Avalanche Test Circuit

V_in = 15 V

Avalanche Waveform

\[ E_{AS} = \frac{1}{2} L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_D} \]

Switching Time Test Circuit

Switching Time Waveform

\[ V_{IN} = 10 V \]

\[ t_d(on), t_r, t_d(off), t_f \]
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.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPAK(3F)</td>
<td>—</td>
<td>PWSN0038DE-A</td>
<td>WPAK(3F)V</td>
<td>0.075g</td>
</tr>
</tbody>
</table>

Notice: The reverse pattern of die-pad support lead described above exists.

Ordering Information

<table>
<thead>
<tr>
<th>Orderable Part Number</th>
<th>Quantity</th>
<th>Shipping Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>RJK03M5DPA-00-J5A</td>
<td>3000 pcs</td>
<td>Taping</td>
</tr>
</tbody>
</table>

Note: The symbol of 2nd "-" is occasionally presented as ":#".
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