Features

- \( I_{T\text{(RMS)}} \): 8 A
- \( V_{DRM} \): 600 V
- \( I_{FGT}, I_{RGT}, I_{RGTI} \): 10 mA
- \( V_{iso} \): 1800 V
- Insulated Type
- Planar Type
- UL Recognized : File No. E223904

Outline

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

Applications

Switching mode power supply, washing machine, motor control, heater control, and other general purpose AC power control applications

Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Voltage class</th>
<th>Unit</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repetitive peak off-state voltage\textsuperscript{Note1}</td>
<td>( V_{DRM} )</td>
<td>12</td>
<td>V</td>
<td>Commercial frequency, sine full wave 360° conduction, ( T_c = 82°C )</td>
</tr>
<tr>
<td>Non-repetitive peak off-state voltage\textsuperscript{Note1}</td>
<td>( V_{DSM} )</td>
<td>720</td>
<td>V</td>
<td>60 Hz sine wave 1 full cycle, peak value, non-repetitive</td>
</tr>
<tr>
<td>RMS on-state current</td>
<td>( I_{T\text{(RMS)}} )</td>
<td>8</td>
<td>A</td>
<td>Commercial frequency, sine full wave 360° conduction, ( T_c = 82°C )</td>
</tr>
<tr>
<td>Surge on-state current</td>
<td>( I_{TSM} )</td>
<td>80</td>
<td>A</td>
<td>60 Hz sine wave 1 full cycle, peak value, non-repetitive</td>
</tr>
<tr>
<td>( I^2t ) for fusion</td>
<td>( I^2t )</td>
<td>26</td>
<td>A^2s</td>
<td>Value corresponding to 1 cycle of half wave 60 Hz, surge on-state current</td>
</tr>
<tr>
<td>Peak gate power dissipation</td>
<td>( P_{GM} )</td>
<td>5</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>Average gate power dissipation</td>
<td>( P_{G\text{(AV)}} )</td>
<td>0.5</td>
<td>W</td>
<td></td>
</tr>
<tr>
<td>Peak gate voltage</td>
<td>( V_{GM} )</td>
<td>10</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Peak gate current</td>
<td>( I_{GM} )</td>
<td>2</td>
<td>A</td>
<td></td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>( T_j )</td>
<td>-40 to +125</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Storage temperature</td>
<td>( T_{stg} )</td>
<td>-40 to +125</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>—</td>
<td>1.5</td>
<td>g</td>
<td>Typical value</td>
</tr>
<tr>
<td>Isolation voltage\textsuperscript{Note4}</td>
<td>( V_{iso} )</td>
<td>1800</td>
<td>V</td>
<td>( Ta = 25°C, AC ) 1 minute, ( T1 \bullet T2 \bullet G ) terminal to case</td>
</tr>
</tbody>
</table>
## Electrical Characteristics

<table>
<thead>
<tr>
<th>Parameter</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>Repetitive peak off-state current</td>
<td>$I_{DRM}$</td>
<td>—</td>
<td>—</td>
<td>2.0</td>
<td>mA</td>
<td>$T_j = 125^\circ C$, $V_{DRM}$ applied</td>
</tr>
<tr>
<td>On-state voltage</td>
<td>$V_{TM}$</td>
<td>—</td>
<td>—</td>
<td>1.6</td>
<td>V</td>
<td>$T_c = 25^\circ C$, $I_{TM} = 12$ A, instantaneous measurement</td>
</tr>
<tr>
<td>Holding current</td>
<td>$I_H$</td>
<td>—</td>
<td>10</td>
<td>—</td>
<td>mA</td>
<td>$T_j = 25^\circ C$, $V_D = 12$ V, $R_{GT1} = \infty \Omega$</td>
</tr>
<tr>
<td>Gate trigger voltage $^{Note2}$</td>
<td>$V_{FGT1}$</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
<td>V</td>
<td>$T_j = 25^\circ C$, $V_D = 6$ V, $R_L = 6 \Omega$, $R_G = 330 \Omega$</td>
</tr>
<tr>
<td></td>
<td>$V_{RG1}$</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$V_{RG2}$</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Gate trigger current $^{Note2}$</td>
<td>$I_{FGT1}$</td>
<td>—</td>
<td>—</td>
<td>10</td>
<td>mA</td>
<td>$T_j = 25^\circ C$, $V_D = 6$ V, $R_L = 6 \Omega$, $R_G = 330 \Omega$</td>
</tr>
<tr>
<td></td>
<td>$I_{RG1}$</td>
<td>—</td>
<td>—</td>
<td>10</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$I_{RG2}$</td>
<td>—</td>
<td>—</td>
<td>10</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Gate non-trigger voltage</td>
<td>$V_{GD}$</td>
<td>0.2</td>
<td>—</td>
<td>—</td>
<td>V</td>
<td>$T_j = 125^\circ C$, $V_D = 1/2 V_{DRM}$</td>
</tr>
<tr>
<td>Thermal resistance $^{Note3}$</td>
<td>$R_{th(j-c)}$</td>
<td>—</td>
<td>—</td>
<td>4.3</td>
<td>°C/W</td>
<td>Junction to case</td>
</tr>
</tbody>
</table>

Notes:
1. Gate open.
2. Measurement using the gate trigger characteristics measurement circuit.
3. The contact thermal resistance $R_{th(c-f)}$ in case of greasing is $0.5^\circ C/W$.
4. Make sure that your finished product containing this device meets your safe isolation requirements.

For safety, it is advisable that heatsink is electrically floating.
Performance Curves

Maximum On-State Characteristics

On-State Current (A) vs. On-State Voltage (V)

- Tj = 150°C
- Tj = 25°C

Rated Surge On-State Current

Surge On-State Current (A) vs. Conduction Time (Cycles at 60Hz)

Gate Characteristics (I, II and III)

Gate Voltage (V) vs. Gate Current (mA)

- V_GM = 10V
- P_GM = 0.5W
- P_GM = 5W
- I GM = 2A
- V_GT = 1.5V
- V_GD = 0.2V

Gate Trigger Current vs. Junction Temperature

Gate Trigger Current (Tj = t°C) vs. Junction Temperature (°C)

- IRGT I
- IRGT II
- IRGT III

Gate Trigger Voltage vs. Junction Temperature

Gate Trigger Voltage (Tj = t°C) vs. Junction Temperature (°C)

- Typical Example

Maximum Transient Thermal Impedance Characteristics (Junction to case)

Transient Thermal Impedance (°C/W) vs. Conduction Time (Cycles at 60Hz)

- Typical Example

On-State Voltage (V)

0 1 2 3 4

On-State Current (A)

10^2 10^1 10^0

Gate Voltage (V)

10^1 10^2 10^3 10^4

Gate Current (mA)

10^{-1}

Gate Trigger Voltage (Tj = t°C) vs. Junction Temperature (°C)

10^1 10^2 10^3 10^4

Junction Temperature (°C)

-40 0 40 80 120 160

Conduction Time (Cycles at 60Hz)

10^{-1} 10^0 10^1 10^2
Maximum Transient Thermal Impedance Characteristics (Junction to ambient)

Conduction Time (Cycles at 60Hz)

Allowable Case Temperature vs. RMS On-State Current

Case Temperature (°C)

RMS On-State Current (A)

Curves apply regardless of conduction angle

360° Conduction Resistive, inductive loads

Allowable Ambient Temperature vs. RMS On-State Current

Ambient Temperature (°C)

RMS On-State Current (A)

Curves apply regardless of conduction angle

Resistive, inductive loads

Natural convection

No Fins

Repetitive Peak Off-State Current vs. Junction Temperature

Repetitive Peak Off-State Current (J = 1°C)

Junction Temperature (°C)

Typical Example

Maximum On-State Power Dissipation

On-State Power Dissipation (W)

RMS On-State Current (A)

360° Conduction Resistive, inductive loads

All fins are black painted aluminum and greased

120 × 120 × 12.3

100 × 100 × 12.3

60 × 60 × 12.3

Curves apply regardless of conduction angle

Resistive, inductive loads

Natural convection
Holding Current vs. Junction Temperature

Breakover Voltage vs. Junction Temperature

Breakover Voltage vs. Rate of Rise of Off-State Voltage (Tj = 125°C)

Gate Trigger Current vs. Gate Current Pulse Width

Gate Trigger Characteristics Test Circuits

Test Procedure I

Test Procedure II

Test Procedure III
**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>
<th>Unit: mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO-220FL</td>
<td>—</td>
<td>PRSS0003AF-A</td>
<td>TO-220FL</td>
<td>1.5g</td>
<td></td>
</tr>
</tbody>
</table>

|                | 10.0 ± 0.3          | 3.0 ± 0.3    | 1.15 ± 0.2    | 0.75 ± 0.15 | 2.8 ± 0.2 |
|                | 3.8 ± 0.3           | 1.15 ± 0.2   | 0.85 ± 0.3    | 0.40 ± 0.15 |          |
|                | 12.5 ± 0.5          | 0.75 ± 0.15  | 0.40 ± 0.2    | 0.5 ± 0.2   |          |
|                | 3.2 ± 0.2           | 0.40 ± 0.2   | 0.7 ± 0.2     | 1.1 ± 0.2   |          |
|                | 2.54 ± 0.25         | 0.7 ± 0.2    | 2.54 ± 0.25   | 1.1 ± 0.2   |          |
|                | 2.54 ± 0.25         |              | 2.54 ± 0.25   |              |          |

**Ordering Information**

<table>
<thead>
<tr>
<th>Orderable Part Number</th>
<th>Packing</th>
<th>Quantity</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCR8LM-12LA#B00</td>
<td>Tube</td>
<td>50 pcs.</td>
<td>Straight type</td>
</tr>
<tr>
<td>BCR8LM-12LA-A8#B00</td>
<td>Tube</td>
<td>50 pcs.</td>
<td>A8 Lead form</td>
</tr>
</tbody>
</table>

Note: Please confirm the specification about the shipping in detail.
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