BCR12CS-12LB
600V-12A-Triac
Medium Power Use

Features
- $I_{(RMS)}$: 12 A
- $V_{DRM}$: 600 V
- $I_{FGT I}, I_{RGTI}, I_{RGT III}$: 30 mA (20 mA)$^\text{Note6}$
- The product guaranteed maximum junction temperature of 150°C
- Non-Insulated Type
- Planar Passivation Type

Outline
- RENESAS Package code: PRSS0004AE-B (Package name: LDPAK(S)-(1) )
- RENESAS Package code: PRSS0004AB-A (Package name: TO-220S)
- RENESAS Package code: PRSS0004AS-A (Package name: TO-263)
- RENESAS Package code: PRSS0004AR-A (Package name: TO-262)

Applications
Contactless AC switch, light dimmer, electronic flasher unit, control of household equipment such as TV sets, stereo systems, refrigerator, washing machine, infrared kotatsu, carpet, electric fan, solenoid driver, small motor control, solid state relay, copying machine, electric tool, electric heater control, and other general purpose control applications

Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Voltage class</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repetitive peak off-state voltage$^{\text{Note1}}$</td>
<td>$V_{DRM}$</td>
<td>600</td>
<td>V</td>
</tr>
<tr>
<td>Non-repetitive peak off-state voltage$^{\text{Note1}}$</td>
<td>$V_{DSM}$</td>
<td>720</td>
<td>V</td>
</tr>
<tr>
<td>Parameter</td>
<td>Symbol</td>
<td>Ratings</td>
<td>Unit</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>RMS on-state current</td>
<td>$I_T,(\text{RMS})$</td>
<td>12</td>
<td>A</td>
</tr>
<tr>
<td>Surge on-state current</td>
<td>$I_{TM}$</td>
<td>120</td>
<td>A</td>
</tr>
<tr>
<td>$I_f$ for fusing</td>
<td>$P_f$</td>
<td>60</td>
<td>A$^2$s</td>
</tr>
<tr>
<td>Peak gate power dissipation</td>
<td>$P_{GM}$</td>
<td>5</td>
<td>W</td>
</tr>
<tr>
<td>Average gate power dissipation</td>
<td>$P_{G,(AV)}$</td>
<td>0.5</td>
<td>W</td>
</tr>
<tr>
<td>Peak gate voltage</td>
<td>$V_{GM}$</td>
<td>10</td>
<td>V</td>
</tr>
<tr>
<td>Peak gate current</td>
<td>$I_{GM}$</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>Junction temperature</td>
<td>$T_j$</td>
<td>−40 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>$T_{stg}$</td>
<td>−40 to +150</td>
<td>°C</td>
</tr>
<tr>
<td>Mass</td>
<td>—</td>
<td>1.3</td>
<td>g</td>
</tr>
</tbody>
</table>

Notes: 1. Gate open.

## 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>$T_j = 150°C$, $V_{DRM}$ 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>$T_c = 25°C$, $I_{TM} = 20$ A, Instantaneous measurement</td>
</tr>
<tr>
<td>Gate trigger voltage\textsuperscript{Note2}</td>
<td>$V_{FGT_{I}}$</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
<td>V</td>
<td>$T_j = 25°C$, $V_D = 6$ V, $R_L = 6$ Ω, $R_0 = 330$ Ω</td>
</tr>
<tr>
<td></td>
<td>$V_{RG_{I}}$</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$V_{RG_{II}}$</td>
<td>—</td>
<td>—</td>
<td>1.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Gate trigger current\textsuperscript{Note2}</td>
<td>$I_{FGT_{I}}$</td>
<td>—</td>
<td>—</td>
<td>30$^\text{Note6}$</td>
<td>mA</td>
<td>$T_j = 25°C$, $V_D = 6$ V, $R_L = 6$ Ω, $R_0 = 330$ Ω</td>
</tr>
<tr>
<td></td>
<td>$I_{RG_{I}}$</td>
<td>—</td>
<td>—</td>
<td>30$^\text{Note6}$</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$I_{RG_{II}}$</td>
<td>—</td>
<td>—</td>
<td>30$^\text{Note6}$</td>
<td>mA</td>
<td></td>
</tr>
<tr>
<td>Gate non-trigger voltage</td>
<td>$V_{GD}$</td>
<td>0.2/0.1</td>
<td>—</td>
<td>—</td>
<td>V</td>
<td>$T_j = 125°C/150°C$, $V_D = 1/2$ $V_{DRM}$</td>
</tr>
<tr>
<td>Thermal resistance</td>
<td>$R_{th,(j-c)}$</td>
<td>—</td>
<td>—</td>
<td>1.8</td>
<td>°C/W</td>
<td>Junction to case\textsuperscript{Note3}\textsuperscript{Note4}</td>
</tr>
<tr>
<td>Critical-rate of rise of off-state commutating voltage\textsuperscript{Note5}</td>
<td>$(dvd/dt)c$</td>
<td>10/1</td>
<td>—</td>
<td>—</td>
<td>V/μs</td>
<td>$T_j = 125°C/150°C$</td>
</tr>
</tbody>
</table>

Notes: 2. Measurement using the gate trigger characteristics measurement circuit.

3. Case temperature is measured on the $T_2$ tab.

4. The contact thermal resistance $R_{th\,(c-f)}$ in case of greasing is 1.0°C/W.

5. Test conditions of the critical-rate of rise of off-state commutating voltage is shown in the table below.

6. High sensitivity ($I_{GT} \leq 20$ mA) is also available. ($I_{GT}$ item: 1)

### Test conditions

<table>
<thead>
<tr>
<th>Test conditions</th>
<th>Commutating voltage and current waveforms (inductive load)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Junction temperature $T_j = 125°C/150°C$</td>
<td>Supply Voltage</td>
</tr>
<tr>
<td>2. Rate of decay of on-state commutating current $$(di/dt)c = −6.0$ A/ms</td>
<td>Main Current</td>
</tr>
<tr>
<td>3. Peak off-state voltage $V_D = 400$ V</td>
<td>(dvd/dt)c</td>
</tr>
</tbody>
</table>
Performance Curves

**Maximum On-State Characteristics**

- On-State Voltage (V) vs. On-State Current (A) for different temperatures (Tj = 25°C, Tj = 150°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)

**Gate Trigger Current vs. Junction Temperature**

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

**Gate Trigger Voltage vs. Junction Temperature**

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

**Maximum Transient Thermal Impedance Characteristics (Junction to case)**

- Transient Thermal Impedance (°C/W) vs. Conduction Time (Cycles at 60Hz)
**Latching Current vs. Junction Temperature**

![Graph of Latching Current vs. Junction Temperature]

- **Breakover Voltage vs. Junction Temperature**
  - Typical Example
  - Breakover Voltage (TJ = 25°C) × 100 (%)

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

- **Breakover Voltage vs. Rate of Rise of Off-State Voltage (TJ=150°C)**
  - Typical Example

**Commutation Characteristics (TJ=125°C)**

- **Commutation Characteristics (TJ=150°C)**
  - Typical Example

**Typical E**
**Gate Trigger Characteristics Test Circuits**

- **Test Procedure I**
  - $6\Omega$
  - $6V$
  - $330\Omega$

- **Test Procedure II**
  - $6\Omega$
  - $6V$
  - $330\Omega$

- **Test Procedure III**
  - $6\Omega$
  - $6V$
  - $330\Omega$

**Recommended Circuit Values Around The Triac**

- $C_1 = 0.1$ to $0.47\mu F$
- $R_1 = 47$ to $100\Omega$
- $C_0 = 0.1\mu F$
- $R_0 = 100\Omega$
### Package Dimensions

#### Package Name

<table>
<thead>
<tr>
<th>Package Name</th>
<th>JETTA Package Code</th>
<th>RENESAS Code</th>
<th>Previous Code</th>
<th>Mass [Typ.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO-220S</td>
<td>SC-83</td>
<td>PRS0004AB-A</td>
<td>TO-220S</td>
<td>1.2g</td>
</tr>
</tbody>
</table>

#### Unit: mm

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>10.2 ± 0.3</td>
</tr>
<tr>
<td>Height</td>
<td>4.44 ± 0.2</td>
</tr>
<tr>
<td>Thickness</td>
<td>4.5 ± 0.2</td>
</tr>
</tbody>
</table>

#### Package Name

<table>
<thead>
<tr>
<th>Package Name</th>
<th>JETTA Package Code</th>
<th>RENESAS Code</th>
<th>Previous Code</th>
<th>Mass [Typ.]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC-83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Unit: mm

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>7.8 ± 0.3</td>
</tr>
<tr>
<td>Height</td>
<td>7.0 ± 0.3</td>
</tr>
<tr>
<td>Thickness</td>
<td>4.5 ± 0.5</td>
</tr>
</tbody>
</table>

---

SC-83 1.30g

M ASS [Typ.]
LD PAK(S)- (1) / LD PAK(S)- (1) V PR SS 000 4 AL PR ENG

AS Code
JEITA P ackage Code
Previous Code
Unit: mm

---

R07DS0225EJ0500 Rev.5.00
Oct 19, 2015
## Ordering Information

<table>
<thead>
<tr>
<th>Orderable Part Number</th>
<th>Package</th>
<th>Packing</th>
<th>Quantity</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCR12CS-12LB#BH0</td>
<td>TO-263</td>
<td>Tube</td>
<td>50 pcs.</td>
<td></td>
</tr>
<tr>
<td>BCR12CS-12LB#B00</td>
<td>TO-220S</td>
<td>Tube</td>
<td>50 pcs.</td>
<td>EOL</td>
</tr>
<tr>
<td>BCR12CS-12LBT1#BH0</td>
<td>TO-263</td>
<td>Embossed Tape</td>
<td>800 pcs.</td>
<td>Taping direction &quot;T1&quot;</td>
</tr>
<tr>
<td>BCR12CS-12LBT2#BH0</td>
<td>TO-263</td>
<td>Embossed Tape</td>
<td>800 pcs.</td>
<td>Taping direction &quot;T2&quot;</td>
</tr>
<tr>
<td>BCR12CS-12LBA1#BH0</td>
<td>TO-262</td>
<td>Tube</td>
<td>50 pcs.</td>
<td></td>
</tr>
<tr>
<td>BCR12CS-12LBT1#B00</td>
<td>LDPAK(S)-(1)</td>
<td>Tube</td>
<td>50 pcs.</td>
<td>Not Recommend for New Design</td>
</tr>
<tr>
<td>BCR12CS-12LBT2#B00</td>
<td>LDPAK(S)-(1)</td>
<td>Embossed Tape</td>
<td>1000 pcs.</td>
<td>Not Recommend for New Design</td>
</tr>
<tr>
<td>BCR12CS-12LBT21#B00</td>
<td>LDPAK(S)-(1)</td>
<td>Embossed Tape</td>
<td>1000 pcs.</td>
<td>Not Recommend for New Design</td>
</tr>
</tbody>
</table>

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