

# BCR12CS-12LB

Triac  
Medium Power Use

R07DS0225EJ0400  
(Previous: REJ03G0470-0300)  
Rev.4.00  
Dec 14, 2010

## Features

- $I_{T(RMS)}$  : 12 A
- $V_{DRM}$  : 600 V
- $I_{FGT}$ ,  $I_{RGT}$ ,  $I_{RGT III}$  : 30 mA (20 mA)<sup>Note6</sup>
- The product guaranteed maximum junction temperature of 150°C
- Non-Insulated Type
- Planar Passivation Type

## Outline

|   |   |   |   |   |  |
|---|---|---|---|---|--|
| RENESAS Package code: PRSS0004AE-B<br>(Package name: LDK(S)-(1) ) | RENESAS Package code: PRSS0004AB-A<br>(Package name: TO-220S) |  |  |  | 1. T <sub>1</sub> Terminal<br>2. T <sub>2</sub> Terminal<br>3. Gate Terminal<br>4. T <sub>2</sub> Terminal |
|---|---|---|---|---|--|

## 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

| Parameter  | Symbol    | Voltage class | Unit |
|--|-----------|---------------|------|
|  |           | 12            |      |
| Repetitive peak off-state voltage <sup>Note1</sup>     | $V_{DRM}$ | 600           | V    |
| Non-repetitive peak off-state voltage <sup>Note1</sup> | $V_{DSM}$ | 720           | V    |

| Parameter                      | Symbol           | Ratings      | Unit             | Conditions  |
|--------------------------------|------------------|--------------|------------------|---|
| RMS on-state current           | $I_{T(RMS)}$     | 12           | A                | Commercial frequency, sine full wave 360° conduction, T <sub>c</sub> = 123°C <sup>Note3</sup> |
| Surge on-state current         | $I_{TSM}$        | 120          | A                | 60Hz sinewave 1 full cycle, peak value, non-repetitive  |
| I <sup>2</sup> t for fusing    | I <sup>2</sup> t | 60           | A <sup>2</sup> s | Value corresponding to 1 cycle of half wave 60Hz, surge on-state current                      |
| Peak gate power dissipation    | $P_{GM}$         | 5            | W                |   |
| Average gate power dissipation | $P_{G(AV)}$      | 0.5          | W                |   |
| Peak gate voltage              | $V_{GM}$         | 10           | V                |   |
| Peak gate current              | $I_{GM}$         | 2            | A                |   |
| Junction temperature           | T <sub>j</sub>   | - 40 to +150 | °C               |   |
| Storage temperature            | T <sub>stg</sub> | - 40 to +150 | °C               |   |
| Mass                           | —                | 1.3          | g                | Typical value   |

Notes: 1. Gate open.

## Electrical Characteristics

| Parameter   | Symbol                | Min.                | Typ. | Max. | Unit                      | Test conditions  |
|---|-----------------------|---------------------|------|------|---------------------------|--|
| Repetitive peak off-state current                                       | $I_{\text{DRM}}$      | —                   | —    | 2.0  | mA                        | $T_j = 150^\circ\text{C}$ , $V_{\text{DRM}}$ applied                                       |
| On-state voltage  | $V_{\text{TM}}$       | —                   | —    | 1.6  | V                         | $T_c = 25^\circ\text{C}$ , $I_{\text{TM}} = 20\text{ A}$ ,<br>Instantaneous measurement    |
| Gate trigger voltage <sup>Note2</sup>                                   | I                     | $V_{\text{FGTI}}$   | —    | —    | 1.5                       | $T_j = 25^\circ\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ ,<br>$R_G = 330\ \Omega$ |
|   | II                    | $V_{\text{RGTI}}$   | —    | —    | 1.5                       |  |
|   | III                   | $V_{\text{RGTIII}}$ | —    | —    | 1.5                       |  |
| Gate trigger current <sup>Note2</sup>                                   | I                     | $I_{\text{FGTI}}$   | —    | —    | $30^{\text{Note6}}$       | $T_j = 25^\circ\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ ,<br>$R_G = 330\ \Omega$ |
|   | II                    | $I_{\text{RGTI}}$   | —    | —    | $30^{\text{Note6}}$       |  |
|   | III                   | $I_{\text{RGTIII}}$ | —    | —    | $30^{\text{Note6}}$       |  |
| Gate non-trigger voltage  | $V_{\text{GD}}$       | 0.2/0.1             | —    | —    | V                         | $T_j = 125^\circ\text{C}/150^\circ\text{C}$ , $V_D = 1/2 V_{\text{DRM}}$                   |
| Thermal resistance  | $R_{\text{th (j-c)}}$ | —                   | —    | 1.8  | $^\circ\text{C}/\text{W}$ | Junction to case <sup>Note3 Note4</sup>  |
| Critical-rate of rise of off-state commutating voltage <sup>Note5</sup> | $(dv/dt)_c$           | 10/1                | —    | —    | $\text{V}/\mu\text{s}$    | $T_j = 125^\circ\text{C}/150^\circ\text{C}$  |

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  $R_{\text{th (c-f)}}$  in case of greasing is  $1.0^\circ\text{C}/\text{W}$ .

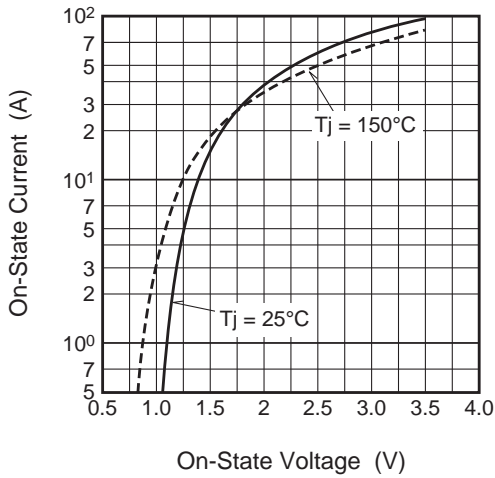
5. Test conditions of the critical-rate of rise of off-state commutating voltage is shown in the table below.

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

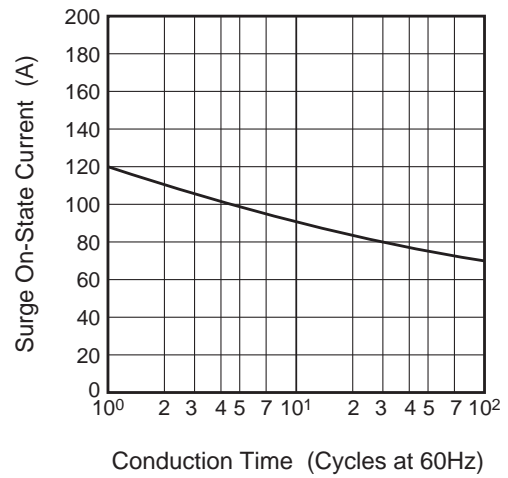
| Test conditions   | Commutating voltage and current waveforms (inductive load) |
|---|--|
| 1. Junction temperature<br>$T_j = 125^\circ\text{C}/150^\circ\text{C}$<br>2. Rate of decay of on-state commutating current<br>$(di/dt)_c = -6.0\text{ A/ms}$<br>3. Peak off-state voltage<br>$V_D = 400\text{ V}$ |  |

Performance Curves

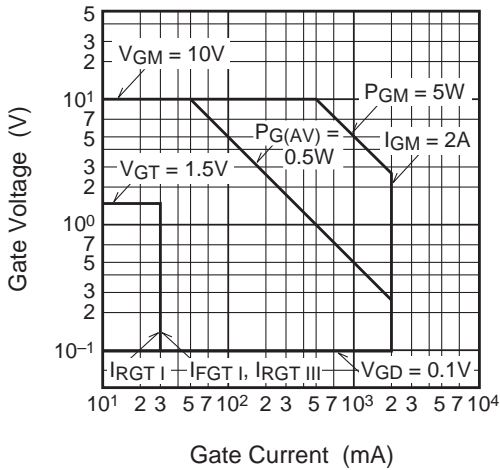
Maximum On-State Characteristics



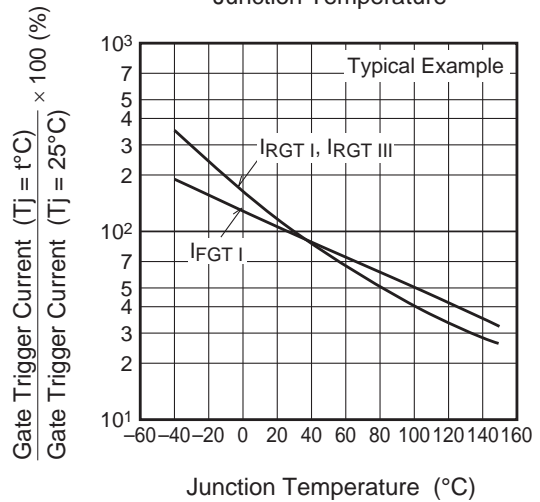
Rated Surge On-State Current



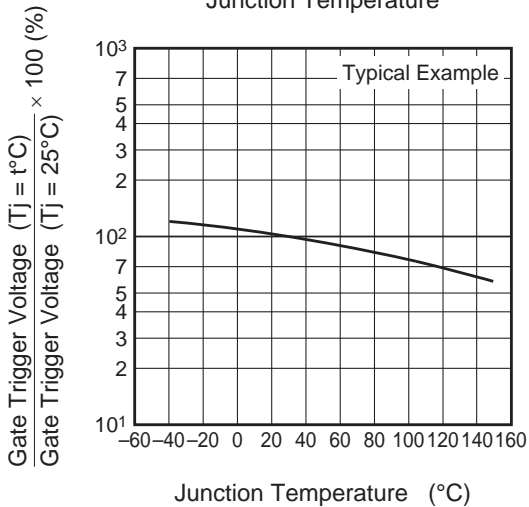
Gate Characteristics (I, II and III)



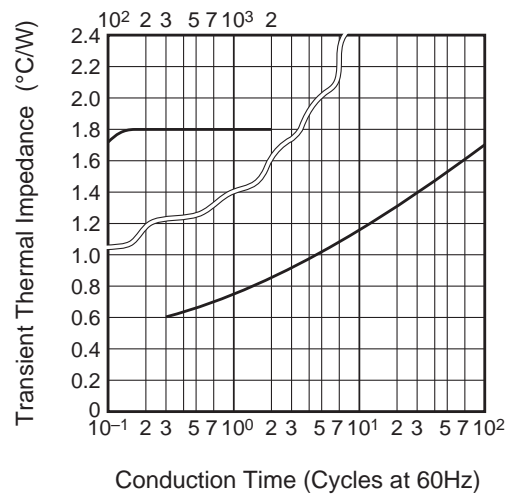
Gate Trigger Current vs. Junction Temperature



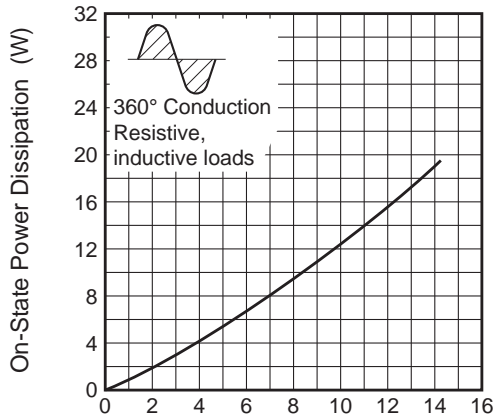
Gate Trigger Voltage vs. Junction Temperature



Maximum Transient Thermal Impedance Characteristics (Junction to case)

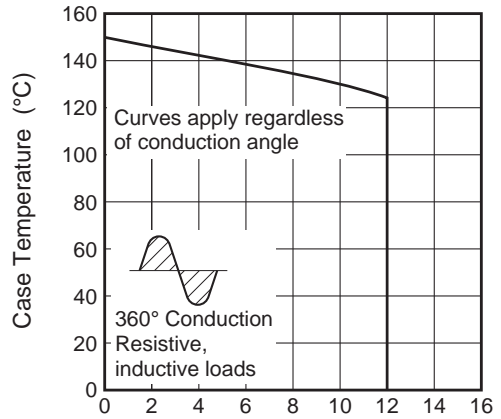


Maximum On-State Power Dissipation



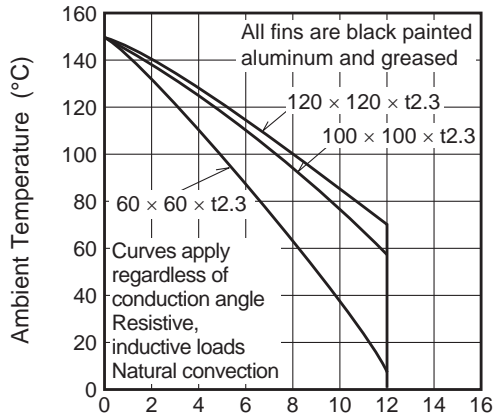
RMS On-State Current (A)

Allowable Case Temperature vs. RMS On-State Current



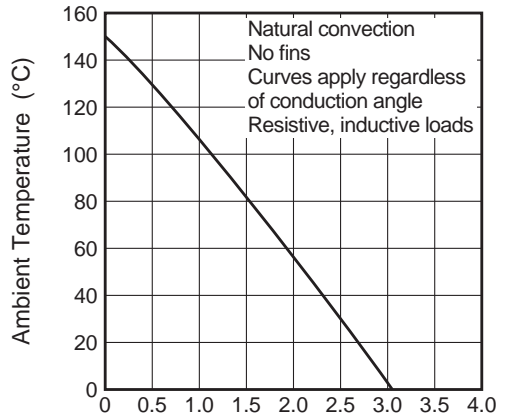
RMS On-State Current (A)

Allowable Ambient Temperature vs. RMS On-State Current



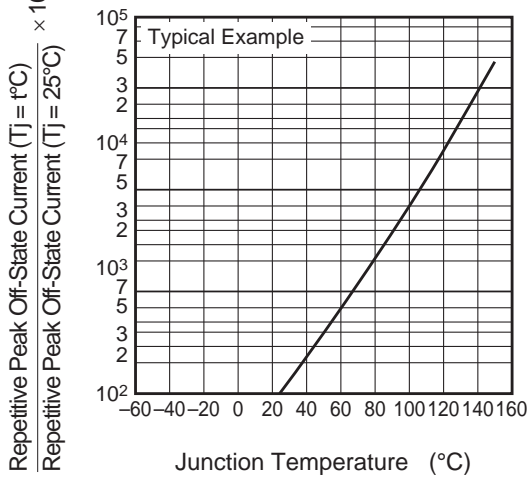
RMS On-State Current (A)

Allowable Ambient Temperature vs. RMS On-State Current



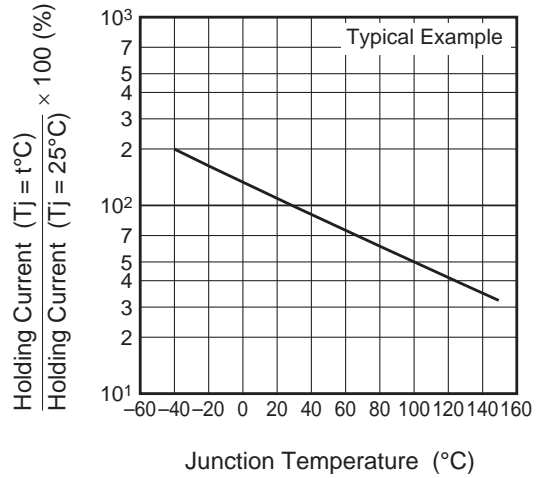
RMS On-State Current (A)

Repetitive Peak Off-State Current vs. Junction Temperature



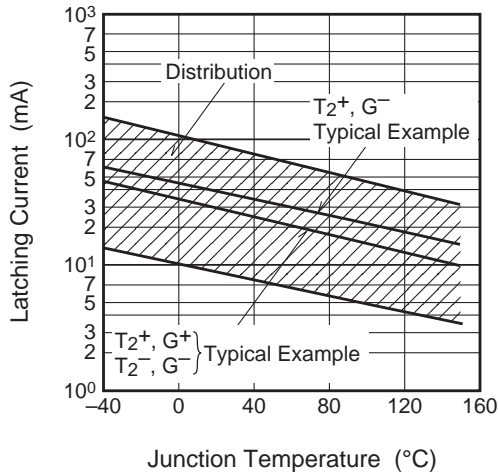
Junction Temperature (°C)

Holding Current vs. Junction Temperature

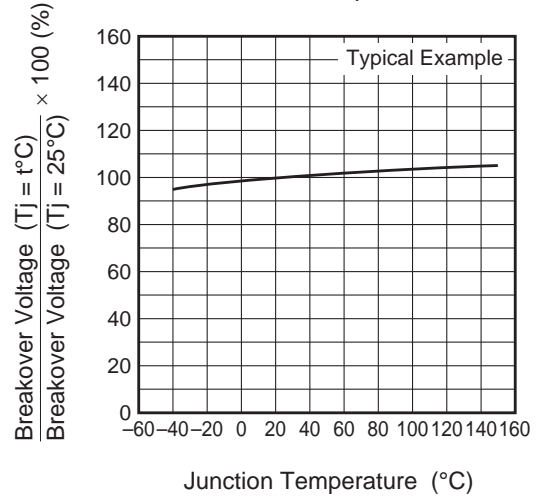


Junction Temperature (°C)

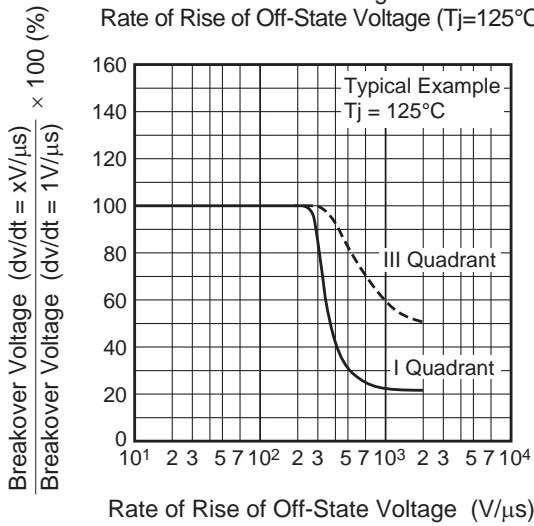
Latching Current vs. Junction Temperature



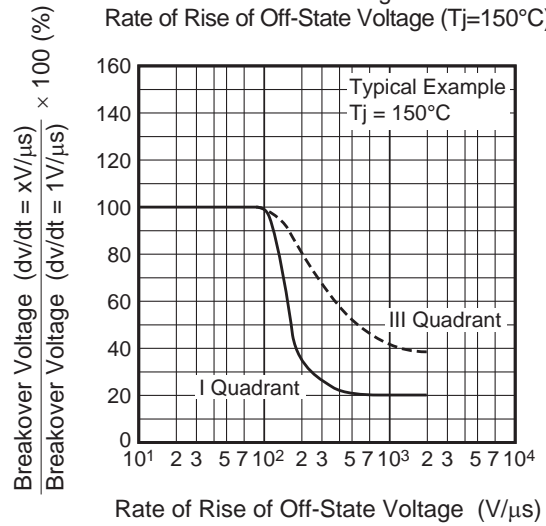
Breakover Voltage vs. Junction Temperature



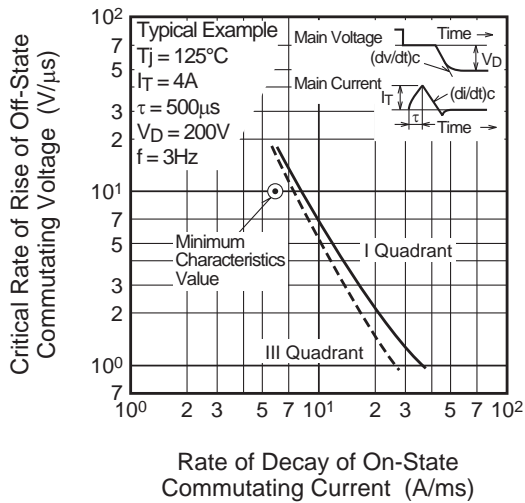
Breakover Voltage vs. Rate of Rise of Off-State Voltage (Tj=125°C)



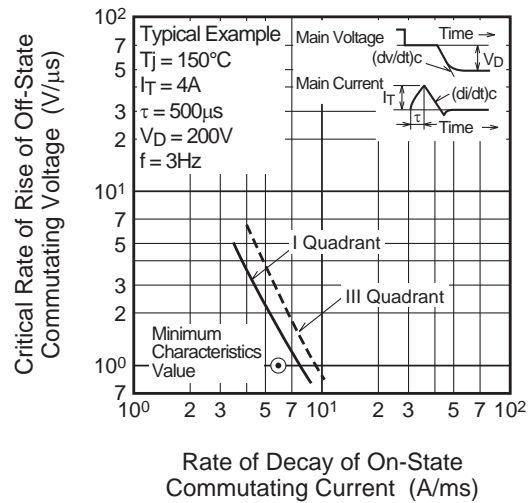
Breakover Voltage vs. Rate of Rise of Off-State Voltage (Tj=150°C)



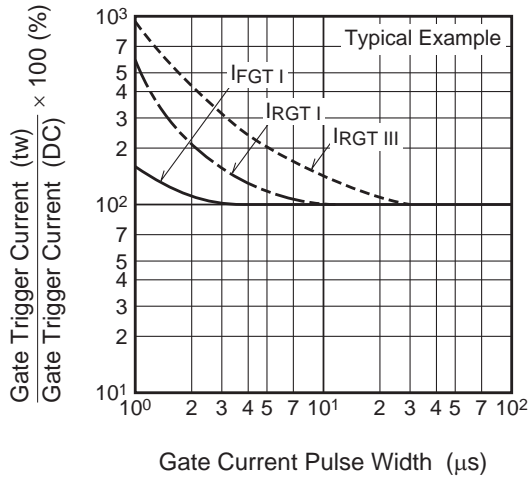
Commutation Characteristics (Tj=125°C)



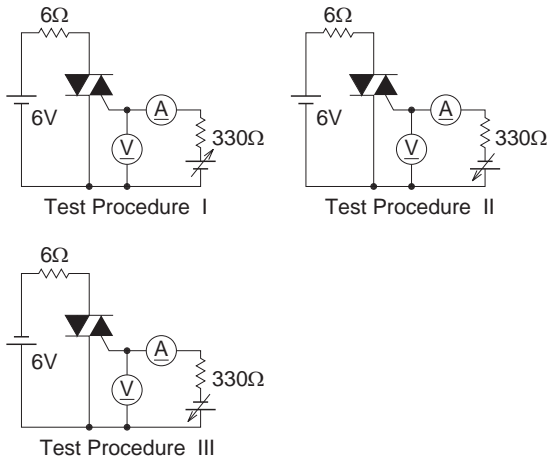
Commutation Characteristics (Tj=150°C)



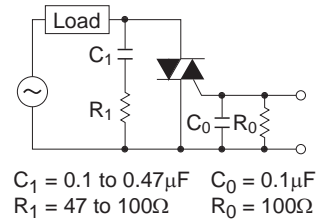
Gate Trigger Current vs. Gate Current Pulse Width



Gate Trigger Characteristics Test Circuits



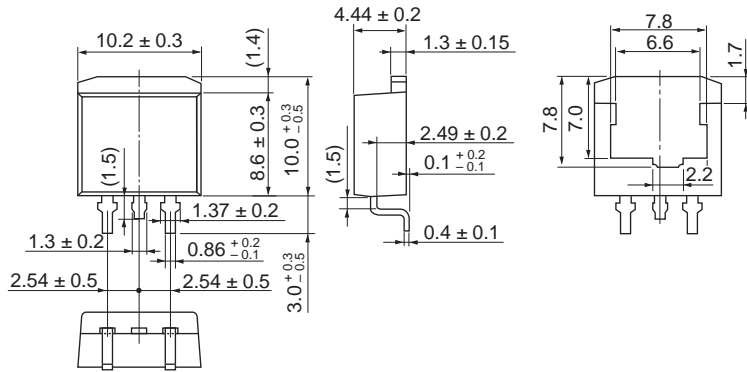
Recommended Circuit Values Around The Triac



Package Dimensions

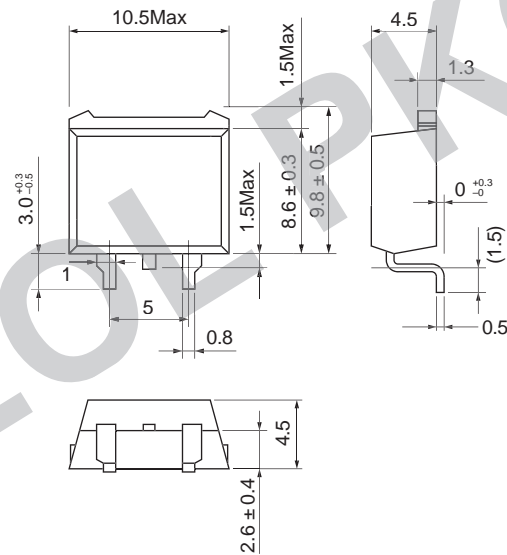
| Package Name  | JEITA Package Code | RENESAS Code | Previous Code                  | MASS[Typ.] |
|---------------|--------------------|--------------|--------------------------------|------------|
| LDBPAK(S)-(1) | SC-83              | PRSS0004AE-B | LDBPAK(S)-(1) / LDBPAK(S)-(1)V | 1.30g      |

Unit: mm



| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|--------------|--------------------|--------------|---------------|------------|
| TO-220S      | SC-83              | PRSS0004AB-A | TO-220S       | 1.2g       |

Unit: mm



**Ordering Information**

| <b>Orderable Part Number</b> | <b>Packing</b> | <b>Quantity</b> | <b>Remark</b>         |
|------------------------------|----------------|-----------------|-----------------------|
| BCR12CS-12LB#B00             | Tube           | 50 pcs.         | —                     |
| BCR12CS-12LB-T11#B00         | Embossed Tape  | 1000 pcs.       | Taping direction "T1" |
| BCR12CS-12LB-T21#B00         | Embossed Tape  | 1000 pcs.       | Taping direction "T2" |



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