

# BCR3FM-12RB

600V - 3A - Triac

Medium Power Use

R07DS0962EJ0201

Rev.2.01

Feb. 19, 2019

## Features

- $I_T$  (RMS): 3 A
- $V_{DRM}$ : 600 V
- $T_j$ : 150 °C
- $I_{FGT1}$ ,  $I_{RGT1}$ ,  $I_{RGT3}$ : 15 mA (10 mA) <sup>Note5</sup>
- Insulated Type
- Planar Passivation Type
- Viso: 2000 V

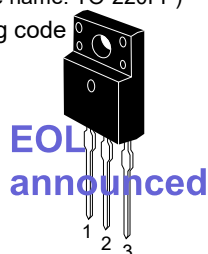
## Outline

RENESAS Package code: PRSS0003AG-A  
(Package name: TO-220FP)

Ordering code

#BB0

#FA0

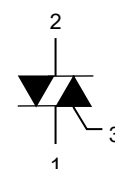


RENESAS Package code: PRSS0003AP-A  
(Package name: TO-220FPA)

Ordering code

#BG0

#FG0



1.  $T_1$  Terminal
2.  $T_2$  Terminal
3. Gate Terminal

## Application

Electric rice cooker, electric pot, and other general purpose resistive loads.

## Maximum Ratings

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

| Parameter                          | Symbol      | Ratings     | Unit             | Conditions                                                                                                                                                                  |
|------------------------------------|-------------|-------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RMS on-state current               | $I_T$ (RMS) | 3           | A                | Commercial frequency, sine full wave 360° conduction,<br>$T_c = 136^\circ\text{C}$ (#BB0) <sup>Note2</sup><br>$T_c = 130^\circ\text{C}$ (#BG0, #FG0, #FA0) <sup>Note2</sup> |
| Surge on-state current             | $I_{TSM}$   | 30          | A                | 60 Hz sinewave 1 full cycle, peak value, non-repetitive                                                                                                                     |
| $I^2t$ for fusion                  | $I^2t$      | 3.7         | A <sup>2</sup> s | Value corresponding to 1 cycle of half wave 60 Hz, surge on-state current                                                                                                   |
| Peak gate power dissipation        | $P_{GM}$    | 3           | W                |                                                                                                                                                                             |
| Average gate power dissipation     | $P_G$ (AV)  | 0.3         | W                |                                                                                                                                                                             |
| Peak gate voltage                  | $V_{GM}$    | 6           | V                |                                                                                                                                                                             |
| Peak gate current                  | $I_{GM}$    | 0.5         | A                |                                                                                                                                                                             |
| Junction Temperature               | $T_j$       | -40 to +150 | °C               |                                                                                                                                                                             |
| Storage temperature                | $T_{stg}$   | -40 to +150 | °C               |                                                                                                                                                                             |
| Isolation voltage <sup>Note6</sup> | $V_{iso}$   | 2000        | V                | $T_a = 25^\circ\text{C}$ , AC 1 minute,<br>$T_1 \cdot T_2 \cdot G$ terminal to case                                                                                         |

Notes: 1. Gate open.

2. Please refer to the Ordering Information.

## Electrical Characteristics

| Parameter                             |     | Symbol        | Min. | Typ. | Max.                | Unit                 | Test conditions                                                                          |
|---------------------------------------|-----|---------------|------|------|---------------------|----------------------|------------------------------------------------------------------------------------------|
| Repetitive peak off-state current     |     | $I_{DRM}$     | —    | —    | 2.0                 | mA                   | $T_J = 150^{\circ}\text{C}$ , $V_{DRM}$ applied                                          |
| On-state voltage                      |     | $V_{TM}$      | —    | —    | 1.5                 | V                    | $T_c = 25^{\circ}\text{C}$ , $I_{TM} = 4.5\text{A}$ , instantaneous measurement          |
| Gate trigger voltage <sup>Note3</sup> | I   | $V_{FGTI}$    | —    | —    | 1.5                 | V                    | $T_J = 25^{\circ}\text{C}$ , $V_D = 6\text{V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$ |
|                                       | II  | $V_{RGTI}$    | —    | —    | 1.5                 | V                    |                                                                                          |
|                                       | III | $V_{RGTIII}$  | —    | —    | 1.5                 | V                    |                                                                                          |
| Gate trigger current <sup>Note3</sup> | I   | $I_{FGTI}$    | —    | —    | 15 <sup>Note5</sup> | mA                   | $T_J = 25^{\circ}\text{C}$ , $V_D = 6\text{V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$ |
|                                       | II  | $I_{RGTI}$    | —    | —    | 15 <sup>Note5</sup> | mA                   |                                                                                          |
|                                       | III | $I_{RGTIII}$  | —    | —    | 15 <sup>Note5</sup> | mA                   |                                                                                          |
| Gate non-trigger voltage              |     | $V_{GD}$      | 0.2  | —    | —                   | V                    | $T_J = 125^{\circ}\text{C}$ , $V_D = 1/2 V_{DRM}$                                        |
|                                       |     |               | 0.1  | —    | —                   |                      | $T_J = 150^{\circ}\text{C}$ , $V_D = 1/2 V_{DRM}$                                        |
| Thermal resistance                    |     | $R_{th(j-c)}$ | —    | —    | 4.0                 | $^{\circ}\text{C/W}$ | Junction to case <sup>Note4</sup><br>(#BB0) <sup>Note2</sup>                             |
|                                       |     |               | —    | —    | 5.2                 | $^{\circ}\text{C/W}$ | Junction to case <sup>Note4</sup><br>(#BG0, #FG0, #FA0) <sup>Note2</sup>                 |

Notes: 3. Measurement using the gate trigger characteristics measurement circuit.

4. The contact thermal resistance  $R_{th(c-f)}$  in case of greasing is  $0.5^{\circ}\text{C/W}$ .

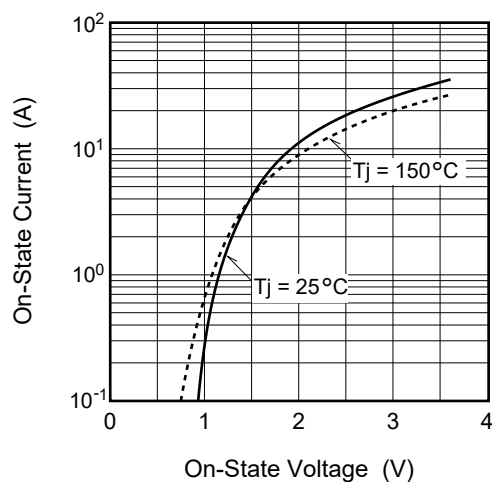
5. High sensitivity ( $I_{GT} \leq 10\text{mA}$ ) is also available. ( $I_{GT}$  item:1)

6. Make sure that your finished product containing this device meets your safe isolation requirements.

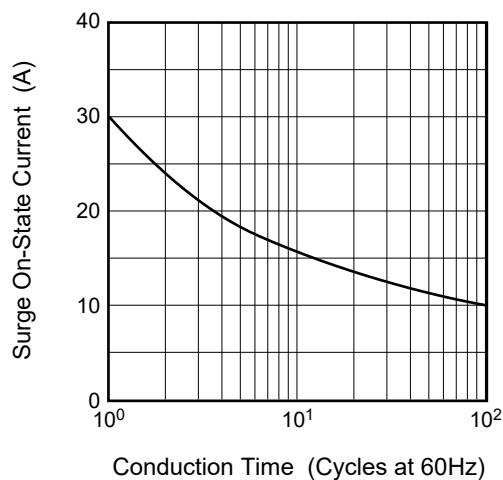
For safety, it's advisable that heatsink is electrically floating.

## Performance Curves

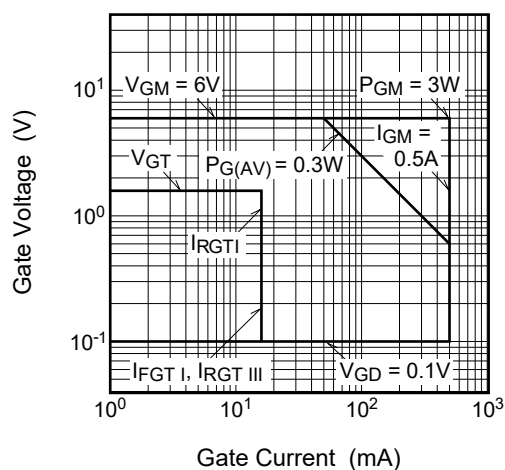
Maximum On-State Characteristics



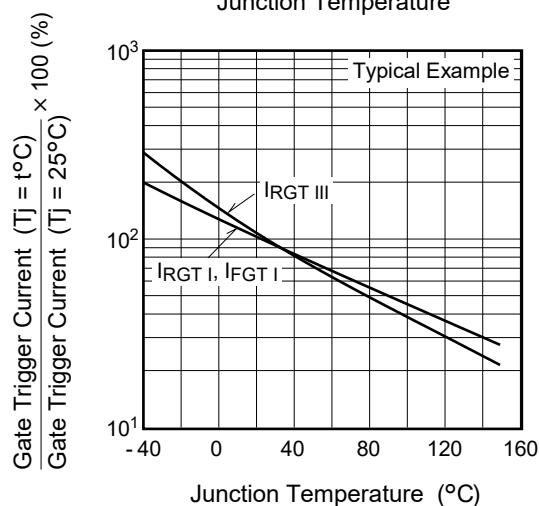
Rated Surge On-State Current



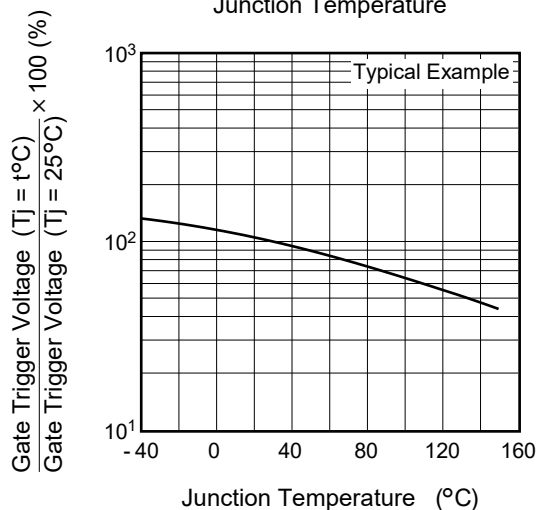
Gate Characteristics (I, II and III)



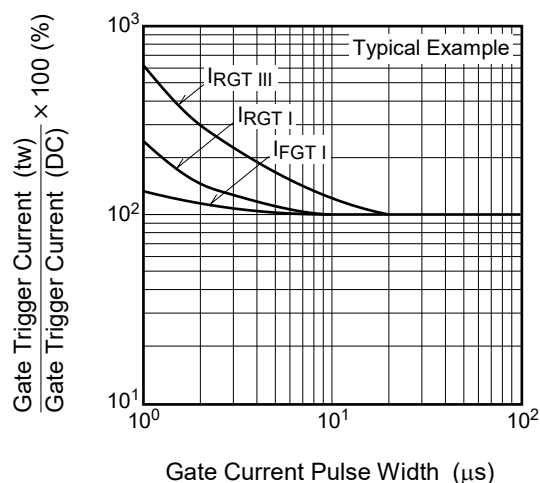
Gate Trigger Current vs. Junction Temperature

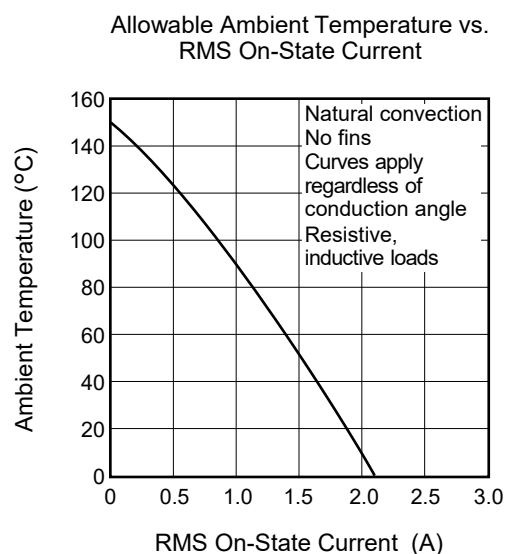
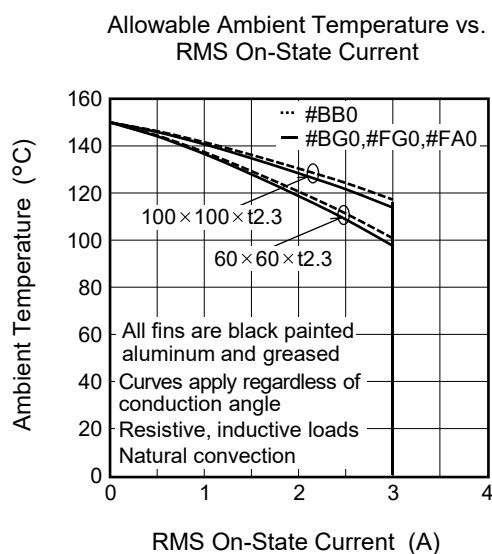
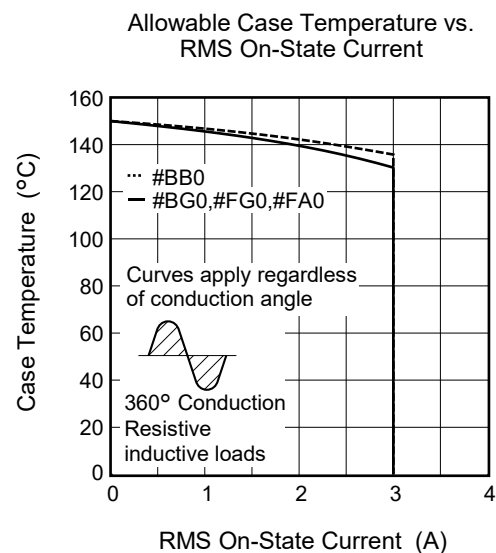
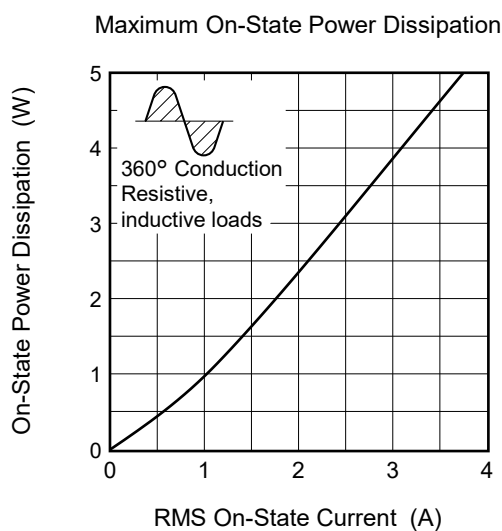
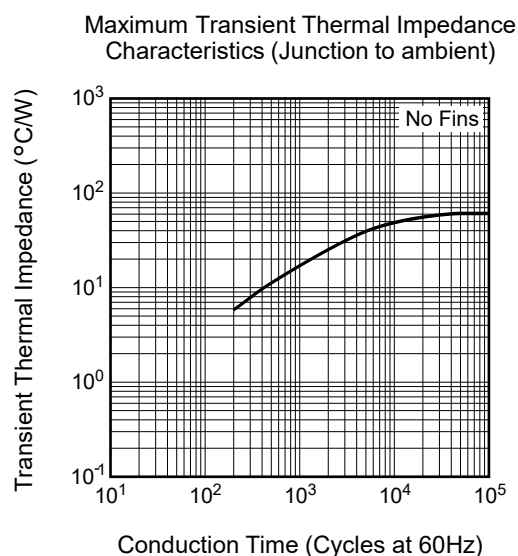
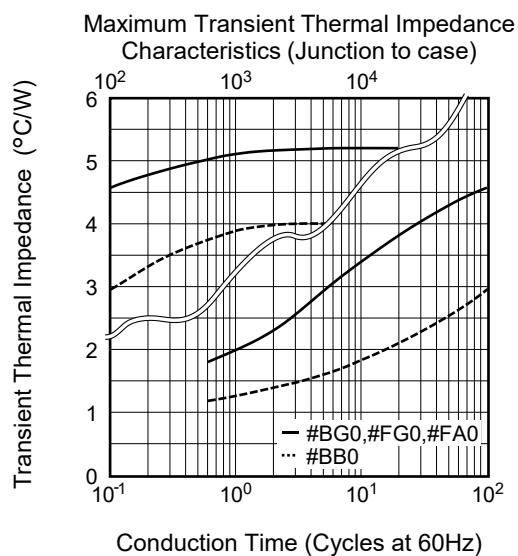


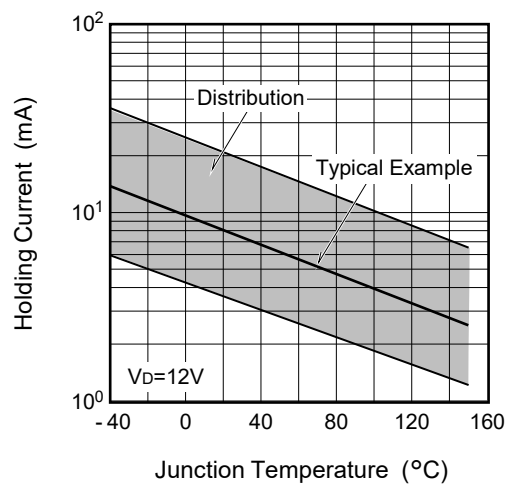
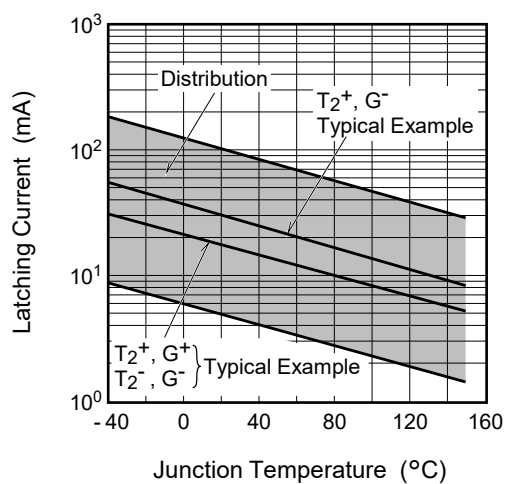
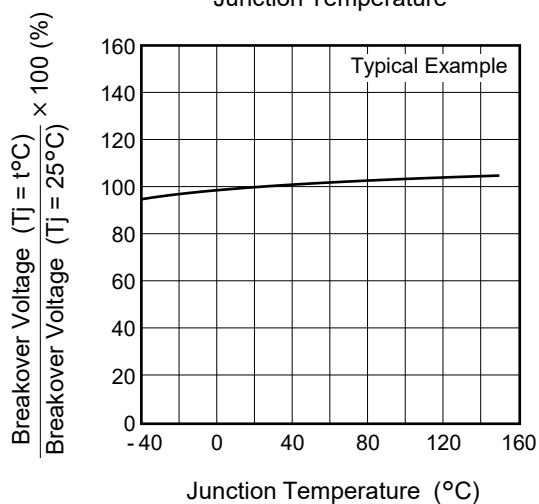
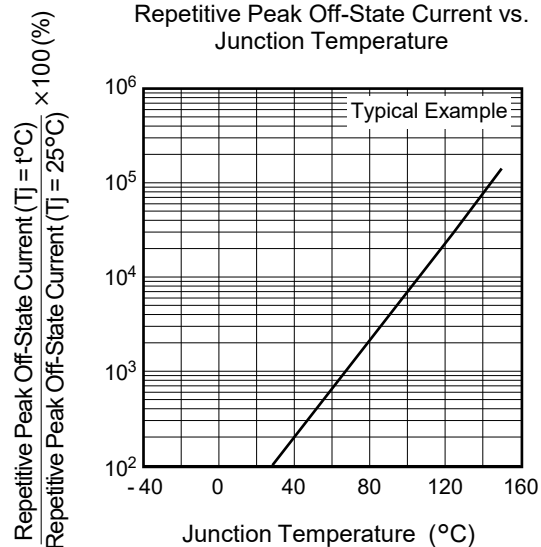
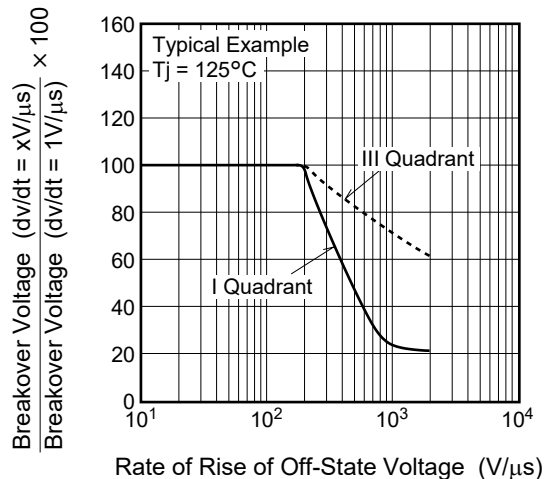
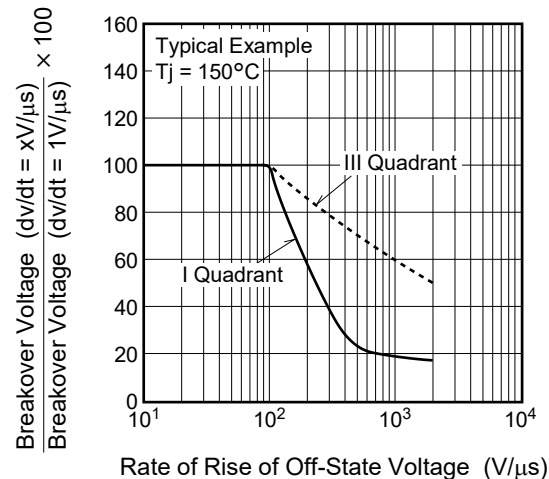
Gate Trigger Voltage vs. Junction Temperature



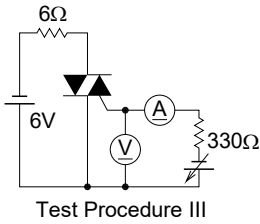
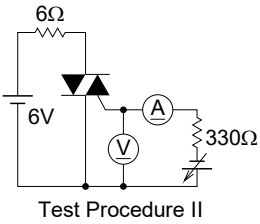
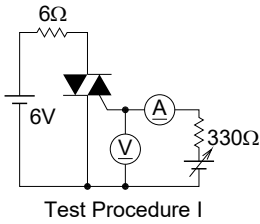
Gate Trigger Current vs. Gate Current Pulse Width



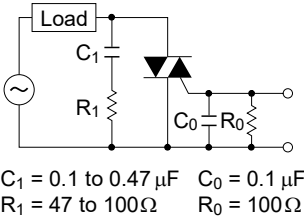


Holding Current vs.  
Junction TemperatureLatching Current vs.  
Junction TemperatureBreakover Voltage vs.  
Junction TemperatureRepetitive Peak Off-State Current vs.  
Junction TemperatureBreakover Voltage vs.  
Rate of Rise of Off-State Voltage ( $T_J = 125^{\circ}\text{C}$ )Breakover Voltage vs.  
Rate of Rise of Off-State Voltage ( $T_J = 150^{\circ}\text{C}$ )

Gate Trigger Characteristics Test Circuits



Recommended peripheral components for Triac



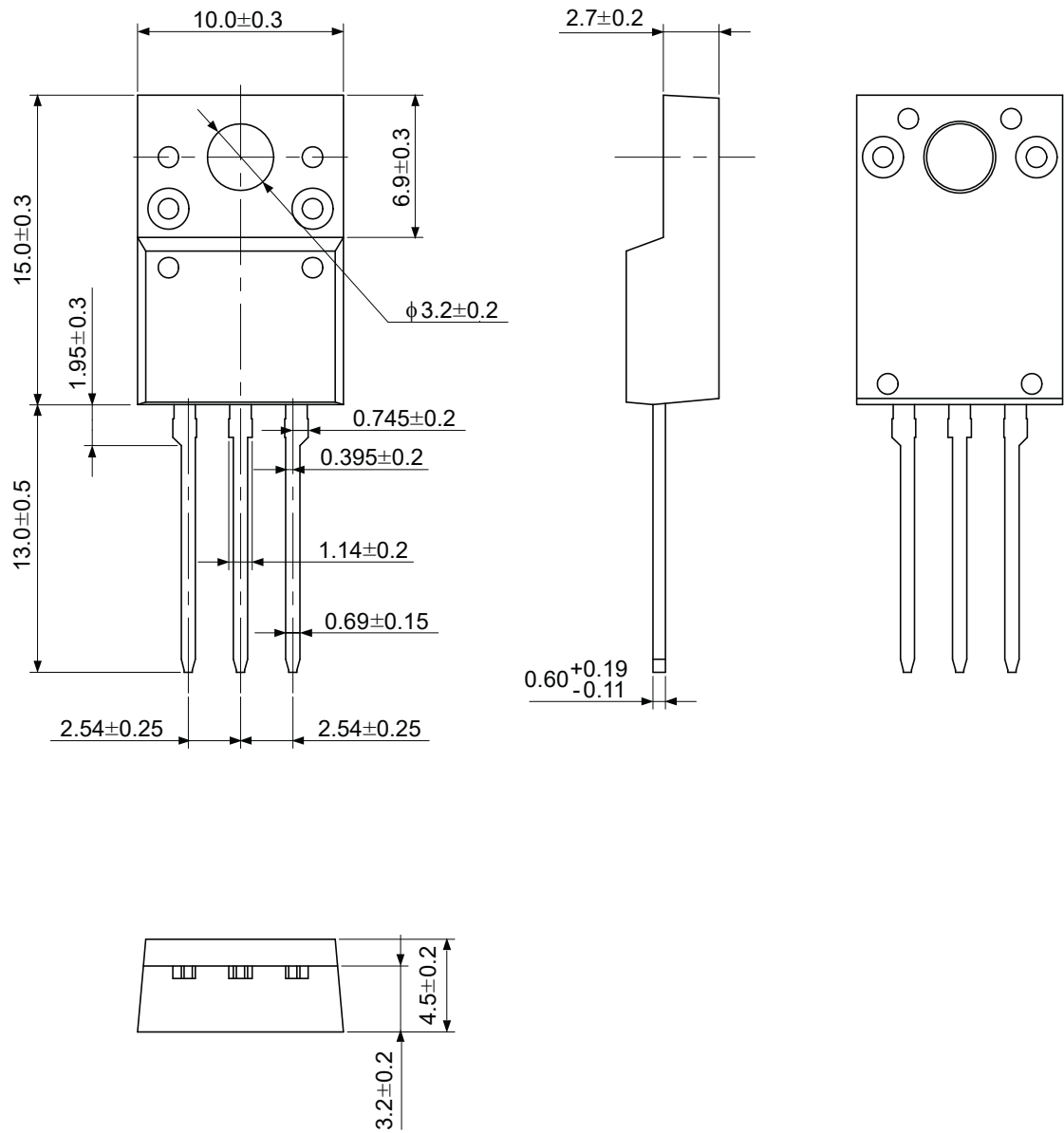
$C_1 = 0.1 \text{ to } 0.47 \mu\text{F}$      $C_0 = 0.1 \mu\text{F}$   
 $R_1 = 47 \text{ to } 100 \Omega$      $R_0 = 100 \Omega$

Package Dimensions

Ordering code: #BG0, #FG0

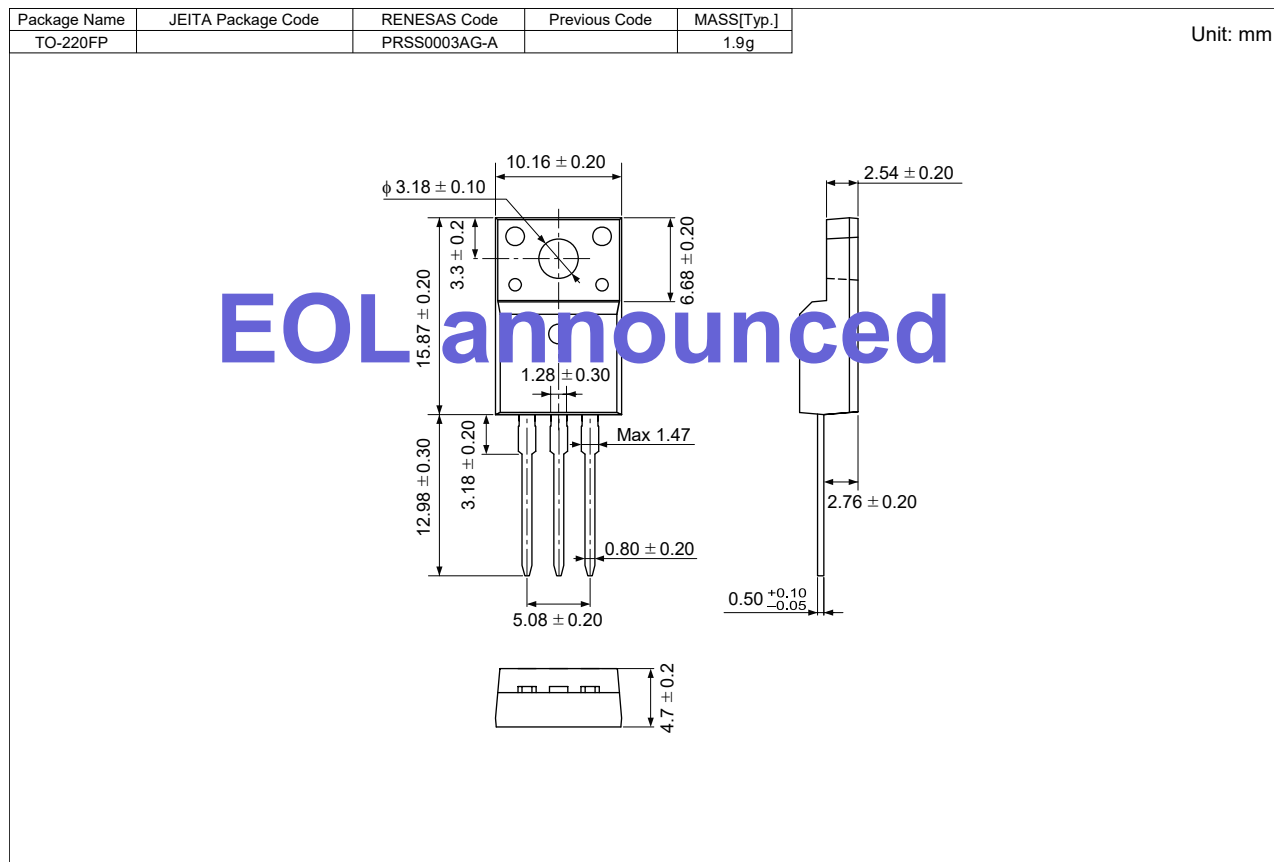
| JEITA Package Code | RENESAS Code | Previous Code | MASS (Typ) [g] |
|--------------------|--------------|---------------|----------------|
| -                  | PRSS0003AP-A | TO-220FPA     | 1.65           |

Unit: mm



## Package Dimensions

Ordering code: #BB0, #FA0 <EOL announced>



## Ordering Information

| Orderable Part Number | Package   | Quantity <sup>Note7</sup> | Remark                        | Quality Grade <sup>Note9</sup>               |
|-----------------------|-----------|---------------------------|-------------------------------|----------------------------------------------|
| BCR3FM-12RB#BG0       | TO-220FPA | 50 pcs./ tube             | Straight type                 | General Industrial &<br>General Consumer Use |
| BCR3FM-12RB-1#BG0     | TO-220FPA | 50 pcs./ tube             | Straight type, IGT item:1     |                                              |
| BCR3FM-12RB-□□#BG0    | TO-220FPA | 50 pcs./ tube             | □□:Lead form type             |                                              |
| BCR3FM-12RB1□□#BG0    | TO-220FPA | 50 pcs./ tube             | □□:Lead form type, IGT item:1 |                                              |
| BCR3FM-12RB#BB0       | TO-220FP  | 50 pcs./ tube             | Straight type                 | EOL announced                                |
| BCR3FM-12RB#FG0       | TO-220FPA | 50 pcs./ tube             | Straight type                 | Special Consumer Use <sup>Note8</sup>        |
| BCR3FM-12RB-□□#FG0    | TO-220FPA | 50 pcs./ tube             | □□:Lead form type             |                                              |
| BCR3FM-12RB#FA0       | TO-220FP  | 50 pcs./ tube             | Straight type                 | EOL announced                                |

Notes: 7. Please confirm the specification about the shipping in detail.

8. "Special Consumer Use" grade product is not tested for the "Temperature Humidity Bias" reliability in the condition of rated  $V_{\text{DRM}}$ . Please be sure to implement qualification tests and judge whether the product meets your criteria. If necessary, please apply moisture-proof measures according to user's conditions.

9. For further details about the classification in the Standard quality grade, please refer to the application note.



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