

# BCR10FM-12LB

600V - 10A - Triac

Medium Power Use

R07DS1107EJ0100

Rev.1.00

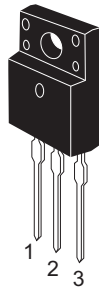
Aug 30, 2013

## Features

- $I_{T(RMS)}$  : 10 A
- $V_{DRM}$  : 600 V
- $T_j$ : 150 °C
- $I_{FGT}$ ,  $I_{RGT}$ ,  $I_{RGT III}$  :30 mA(20mA) <sup>Note6</sup>
- Insulated Type
- Planar Passivation Type
- $V_{iso}$  : 2000V

## Outline

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



1. T<sub>1</sub> Terminal
2. T<sub>2</sub> Terminal
3. Gate Terminal

## Applications

Switching mode power supply, washing machine, motor control, 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               | $I_{T(RMS)}$ | 10          | A                | Commercial frequency, sine full wave 360° conduction, $T_c = 111^\circ\text{C}$              |
| Surge on-state current             | $I_{TSM}$    | 100         | A                | 60Hz sinewave 1 full cycle, peak value, non-repetitive                                       |
| $I^2t$ for fusion                  | $I^2t$       | 41.6        | 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               | $T_j$        | -40 to +150 | °C               |  |
| Storage temperature                | $T_{stg}$    | -40 to +150 | °C               |  |
| Mass                               | —            | 1.9         | g                | Typical value  |
| Isolation voltage <sup>Note5</sup> | $V_{iso}$    | 2000        | V                | $T_a = 25^\circ\text{C}$ , AC 1 minute, T <sub>1</sub> • T <sub>2</sub> • G terminal to case |

## 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                   | $T_c = 25^\circ\text{C}$ , $I_{TM} = 15\text{ A}$ , instantaneous measurement           |    |
| Gate trigger voltage <sup>Note2</sup>                                   | I             | $V_{FGTI}$   | —    | —    | 1.5                 | $T_j = 25^\circ\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$ |    |
|   | II            | $V_{RGTI}$   | —    | —    | 1.5                 |   | V  |
|   | III           | $V_{RGTIII}$ | —    | —    | 1.5                 |   | V  |
| Gate trigger current <sup>Note2</sup>                                   | I             | $I_{FGTI}$   | —    | —    | 30 <sup>Note6</sup> | $T_j = 25^\circ\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$ |    |
|   | II            | $I_{RGTI}$   | —    | —    | 30 <sup>Note6</sup> |   | mA |
|   | III           | $I_{RGTIII}$ | —    | —    | 30 <sup>Note6</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          | —    | —    | V                   | $T_j = 150^\circ\text{C}$ , $V_D = 1/2 V_{DRM}$   |    |
| Thermal resistance  | $R_{th(j-c)}$ | —            | —    | 3.4  | $^\circ\text{C/W}$  | Junction to case <sup>Note3</sup>   |    |
| Critical-rate of rise of off-state commutation voltage <sup>Note4</sup> | $(dv/dt)_c$   | 10           | —    | —    | V/ $\mu\text{s}$    | $T_j = 125^\circ\text{C}$   |    |
|   |               | 1            | —    | —    | V/ $\mu\text{s}$    | $T_j = 150^\circ\text{C}$   |    |

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  $0.5^\circ\text{C/W}$ .

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

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

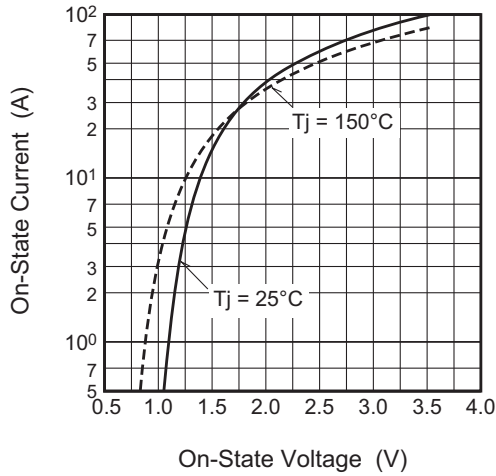
For safety, it's advisable that heatsink is electrically floating.

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

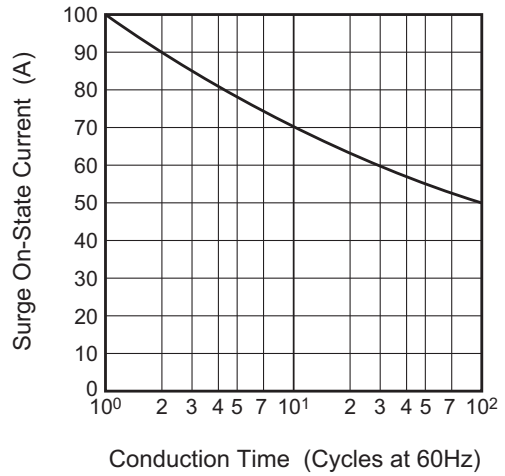
| Test conditions   | Commutating voltage and current waveforms (inductive load) |
|---|--|
| 1. Junction temperature<br>$T_j = 125^\circ\text{C}/150^\circ\text{C}$<br>2. Rate of decay of on-state commutating current<br>$(di/dt)_c = -5.0\text{ A/ms}$<br>3. Peak off-state voltage<br>$V_D = 400\text{ V}$ |  |

Performance Curves

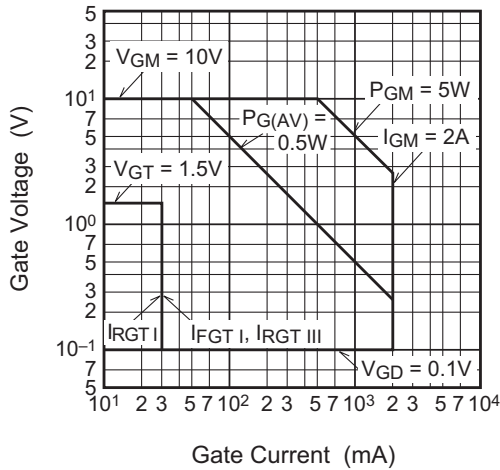
Maximum On-State Characteristics



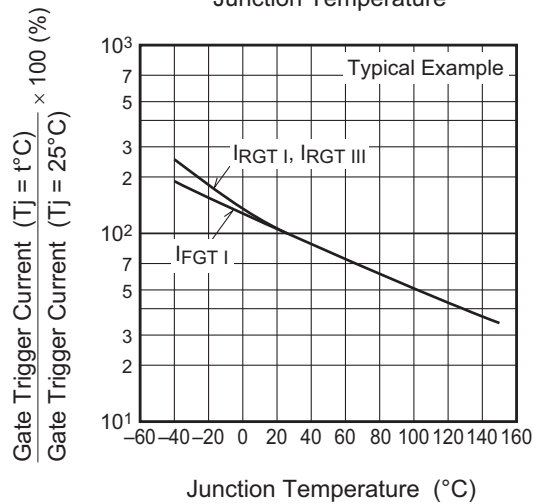
Rated Surge On-State Current



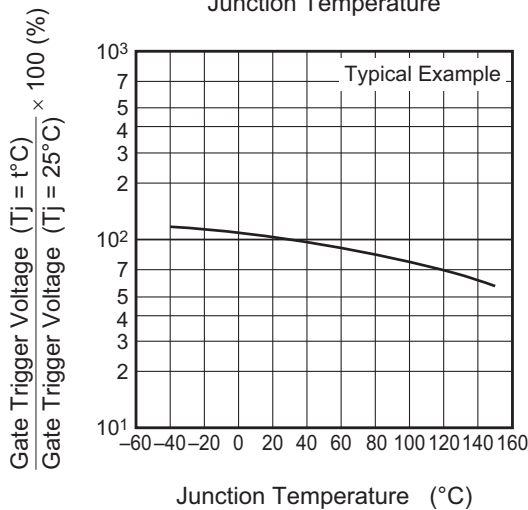
Gate Characteristics (I, II and III)



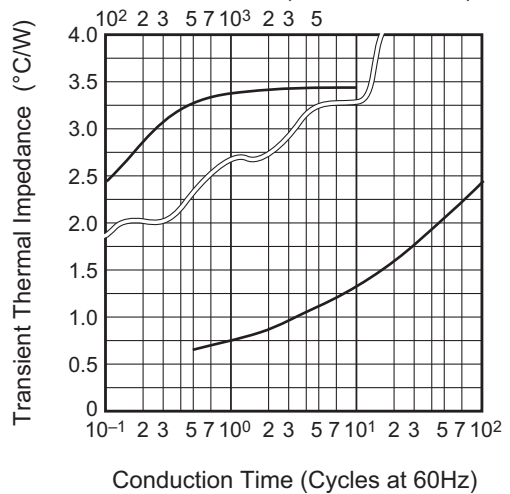
Gate Trigger Current vs. Junction Temperature



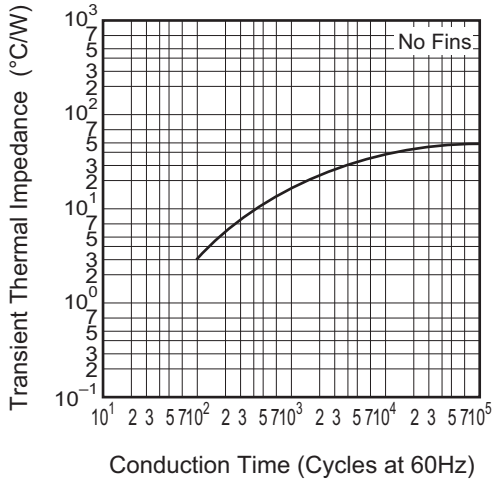
Gate Trigger Voltage vs. Junction Temperature



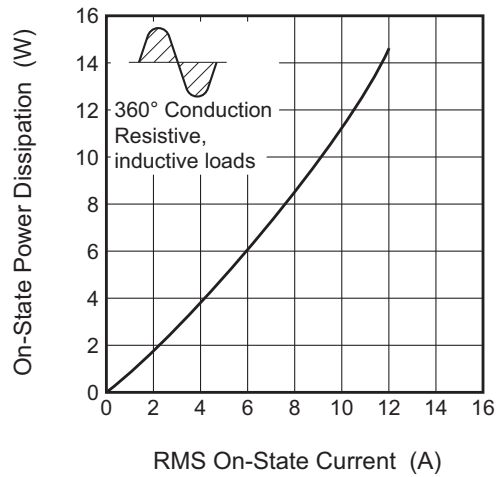
Maximum Transient Thermal Impedance Characteristics (Junction to case)



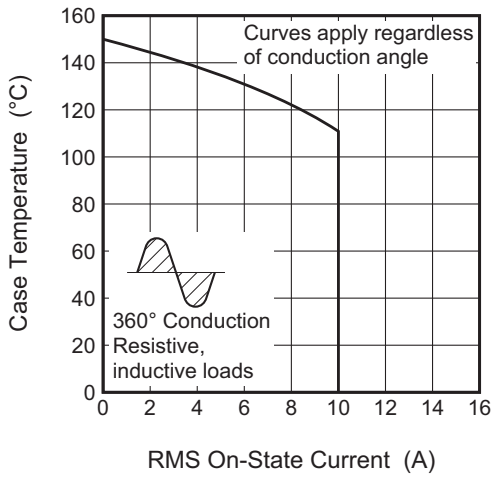
Maximum Transient Thermal Impedance Characteristics (Junction to ambient)



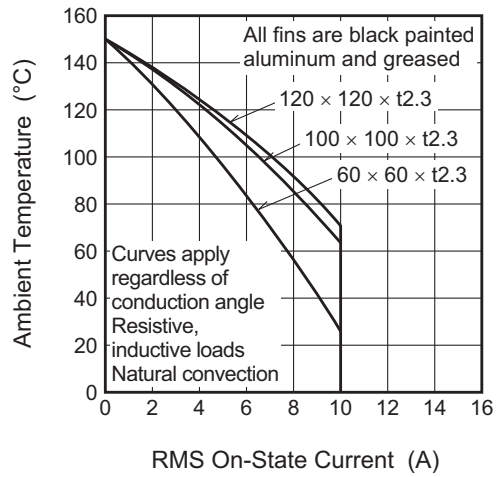
Maximum On-State Power Dissipation



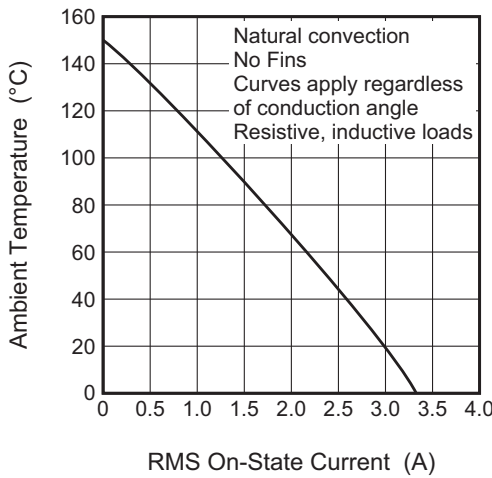
Allowable Case Temperature vs. RMS On-State Current



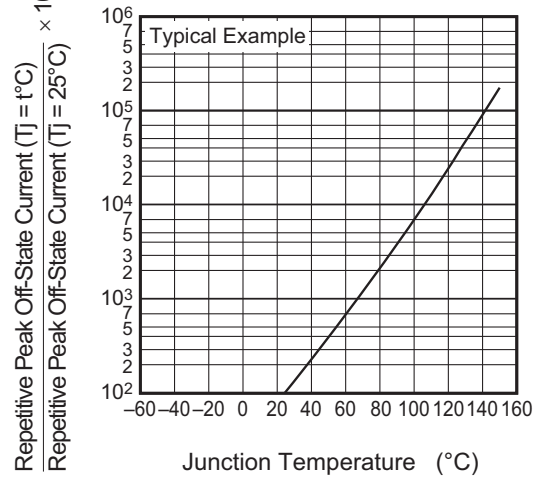
Allowable Ambient Temperature vs. RMS On-State Current



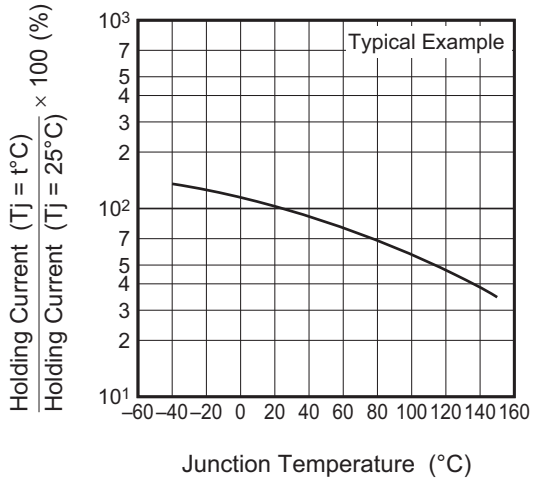
Allowable Ambient Temperature vs. RMS On-State Current



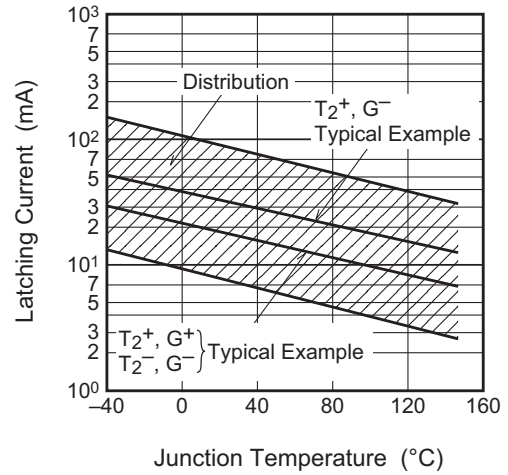
Repetitive Peak Off-State Current vs. Junction Temperature



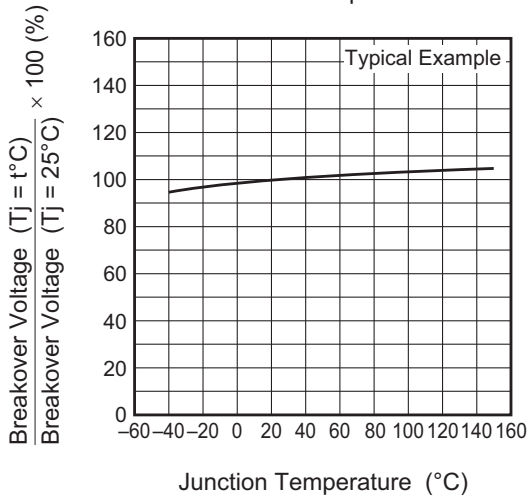
Holding Current vs. Junction Temperature



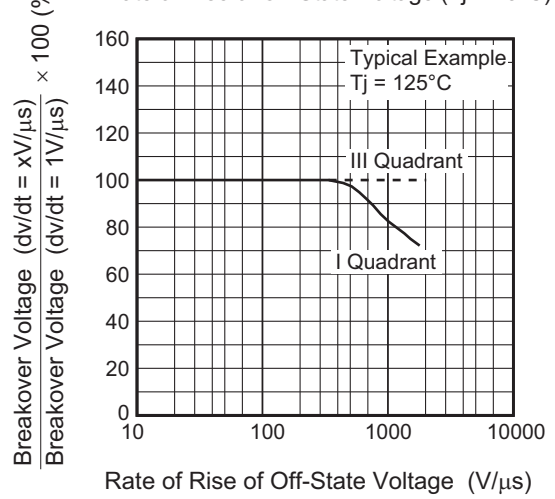
Latching Current vs. Junction Temperature



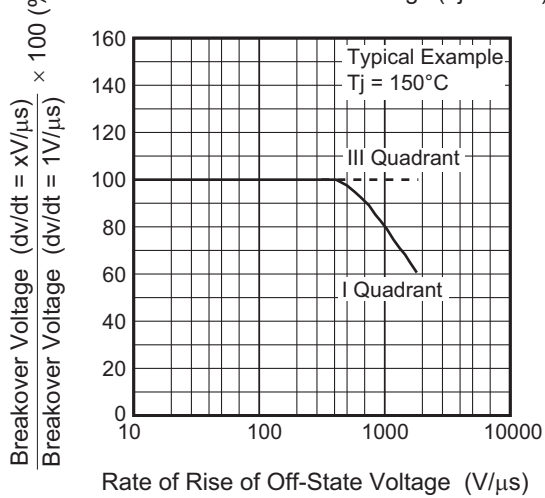
Breakover Voltage vs. Junction Temperature



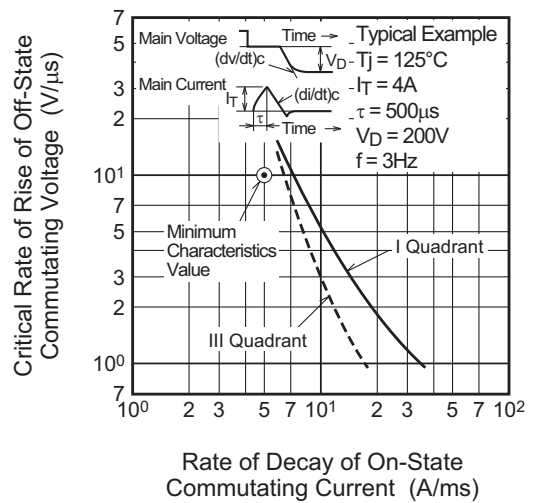
Breakover Voltage vs. Rate of Rise of Off-State Voltage (Tj=125°C)



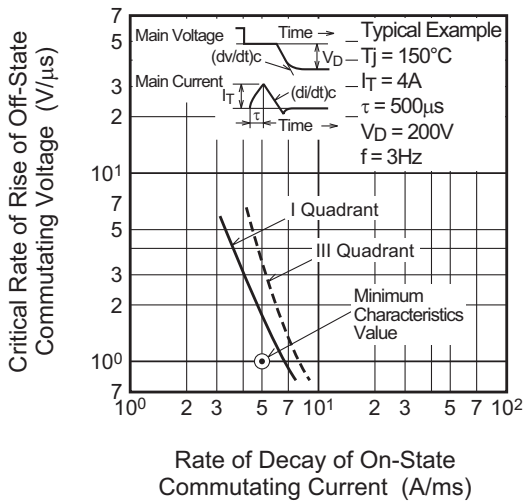
Breakover Voltage vs. Rate of Rise of Off-State Voltage (Tj=150°C)



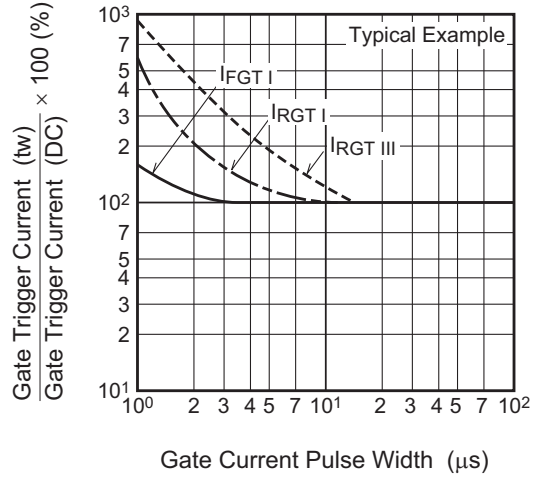
Commutation Characteristics (Tj=125°C)



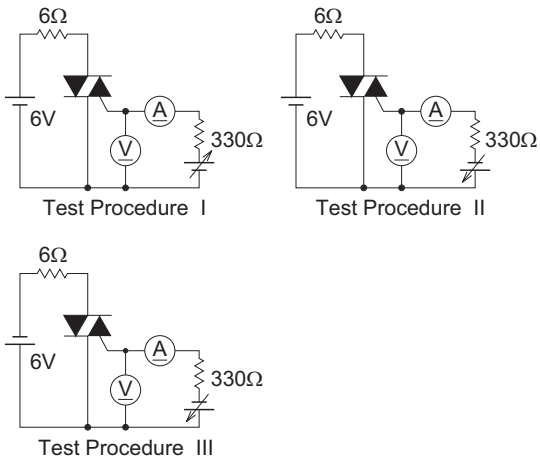
Commutation Characteristics (Tj=150°C)



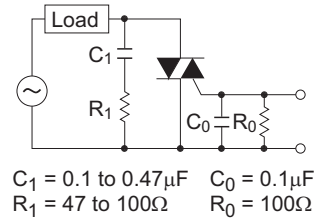
Gate Trigger Current vs. Gate Current Pulse Width



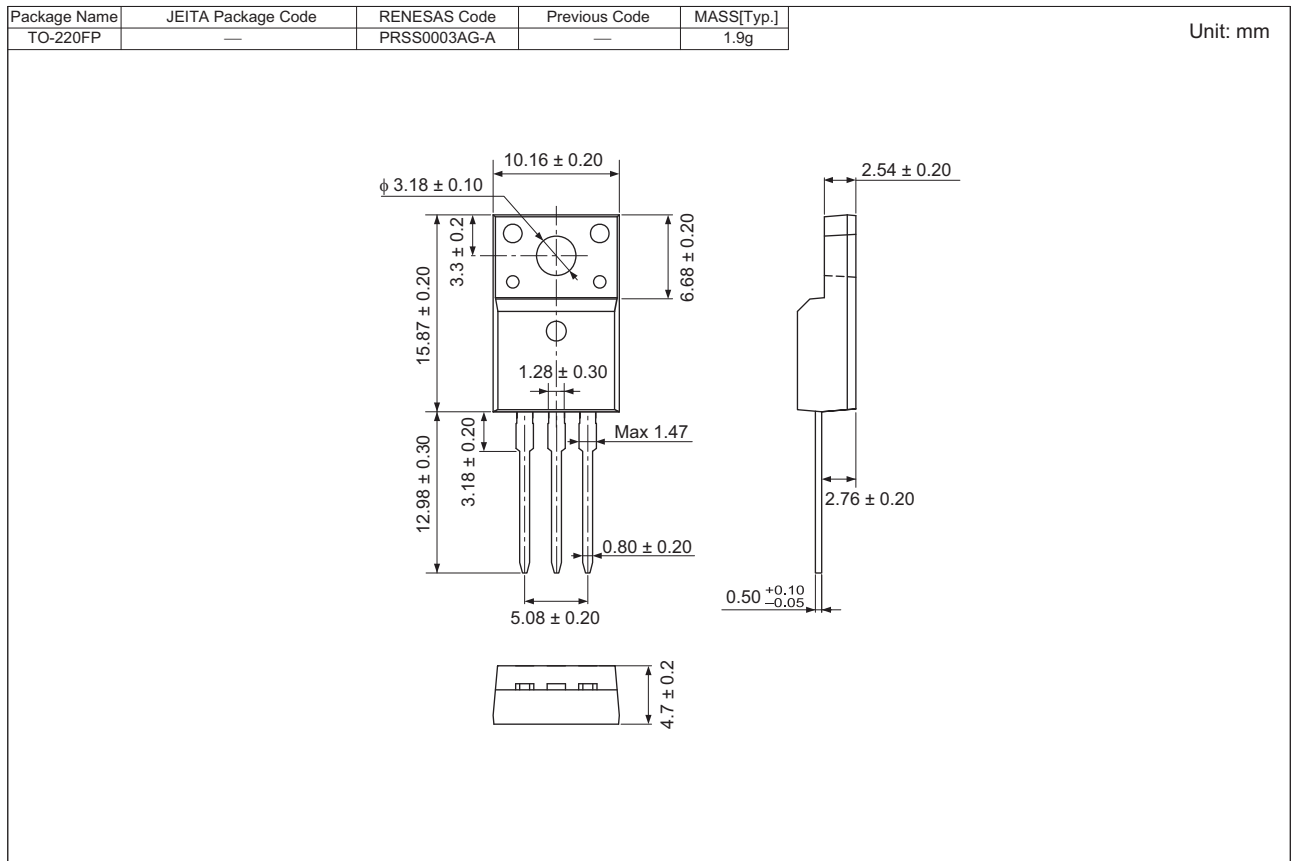
Gate Trigger Characteristics Test Circuits



Recommended Circuit Values Around The Triac



## Package Dimensions



## Ordering Information

| Orderable Part Number | Packing | Quantity | Remark        |
|-----------------------|---------|----------|---------------|
| BCR10FM-12LB#BB0      | Tube    | 50 pcs.  | Straight type |
| BCR10FM-12LBA8#BB0    | Tube    | 50 pcs.  | A8 Lead form  |

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

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2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.  
Tel: +1-408-588-6000, Fax: +1-408-588-6130

**Renesas Electronics Canada Limited**  
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada  
Tel: +1-905-898-5441, Fax: +1-905-898-3220

**Renesas Electronics Europe Limited**  
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.  
Tel: +44-1628-651-700, Fax: +44-1628-651-804

**Renesas Electronics Europe GmbH**  
Arcadiastrasse 10, 40472 Düsseldorf, Germany  
Tel: +49-211-65030, Fax: +49-211-6503-1327

**Renesas Electronics (China) Co., Ltd.**  
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China  
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

**Renesas Electronics (Shanghai) Co., Ltd.**  
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China  
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

**Renesas Electronics Hong Kong Limited**  
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong  
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

**Renesas Electronics Taiwan Co., Ltd.**  
13F, No. 363, Fu Shing North Road, Taipei, Taiwan  
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

**Renesas Electronics Singapore Pte. Ltd.**  
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre Singapore 339949  
Tel: +65-6213-0200, Fax: +65-6213-0300

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Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia  
Tel: +60-3-7955-3390, Fax: +60-3-7955-9510

**Renesas Electronics Korea Co., Ltd.**  
11F., Samik Laved' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea  
Tel: +82-2-558-3737, Fax: +82-2-558-5141