

## BCR12PM-12LG

Triac

Medium Power Use

REJ03G1510-0100

Rev.1.00

Feb 14, 2007

### Features

- $I_{T(RMS)}$  : 12 A
- $V_{DRM}$  : 600 V
- $I_{FGT}$ ,  $I_{RGT}$ ,  $I_{RGT III}$  : 30 mA
- $V_{iso}$  : 2000V
- The Product guaranteed maximum junction temperature 150°C
- Insulated Type
- Planar Type
- UL Recognized : Yellow Card No. E223904  
File No.E80271

### Outline

RENESAS Package code: PRSS0003AA-A  
(Package name: TO-220F )



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

### Applications

Switching mode power supply, light dimmer, electronic switch, hair dryer, Television, Stereo system, refrigerator, Washing machine, infrared kotatsu, and carper, small motor controller, SS relay, solenoid driver, copying machine, electric tool, electric heater control, and other general purpose control applications

| 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, $T_c = 92^\circ\text{C}$        |
| Surge on-state current         | $I_{TSM}$   | 120         | A                    | 60Hz sinewave 1 full cycle, peak value, non-repetitive                               |
| $I^2t$ for fusion              | $I^2t$      | 60          | $\text{A}^2\text{s}$ | 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 | $^\circ\text{C}$     |                                                                                      |
| Storage temperature            | $T_{stg}$   | -40 to +150 | $^\circ\text{C}$     |                                                                                      |
| Mass                           | —           | 2.0         | g                    | Typical value                                                                        |
| Isolation voltage              | $V_{iso}$   | 2000        | V                    | $T_a = 25^\circ\text{C}$ , AC 1 minute, $T_1 \bullet T_2 \bullet G$ terminal to case |

Notes: 1. Gate open.

## 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                                                        | $V_{TM}$         | —       | —    | 1.6  | V                      | $T_c = 25^\circ\text{C}$ , $I_{TM} = 20\text{ A}$ , instantaneous measurement           |
| Gate trigger voltage <sup>Note2</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>Note2</sup>                                   | I $I_{FGTI}$     | —       | —    | 30   | mA                     | $T_j = 25^\circ\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$ |
|                                                                         | II $I_{RGTI}$    | —       | —    | 30   | mA                     |                                                                                         |
|                                                                         | III $I_{RGTIII}$ | —       | —    | 30   | mA                     |                                                                                         |
| Gate non-trigger voltage                                                | $V_{GD}$         | 0.2/0.1 | —    | —    | V                      | $T_j = 125^\circ\text{C}/150^\circ\text{C}$ , $V_D = 1/2 V_{DRM}$                       |
| Thermal resistance                                                      | $R_{th(j-c)}$    | —       | —    | 4.0  | $^\circ\text{C/W}$     | Junction to case <sup>Note3</sup>                                                       |
| Critical-rate of rise of off-state commutation voltage <sup>Note4</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.

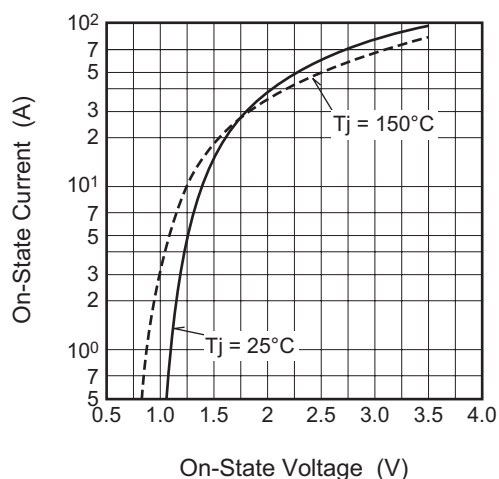
3. The contact thermal resistance  $R_{th(j-c)}$  in case of greasing is  $0.5^\circ\text{C/W}$ .

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

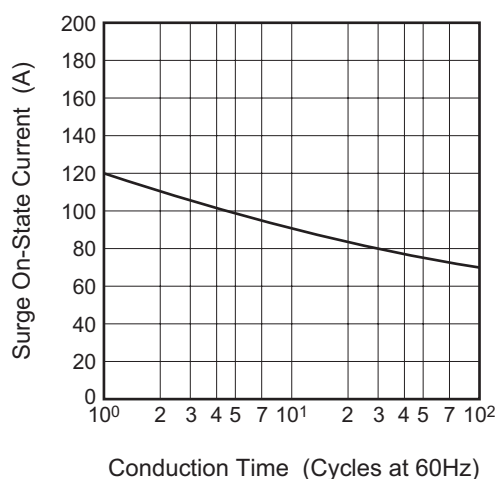
| Test conditions                                                                                                                                                                                                   | Commutating voltage and current waveforms (inductive load) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| 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

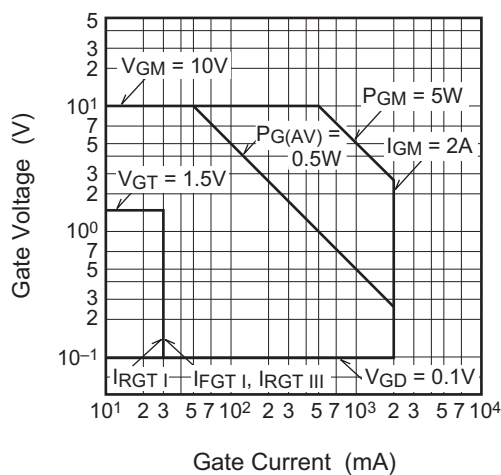
Maximum On-State Characteristics



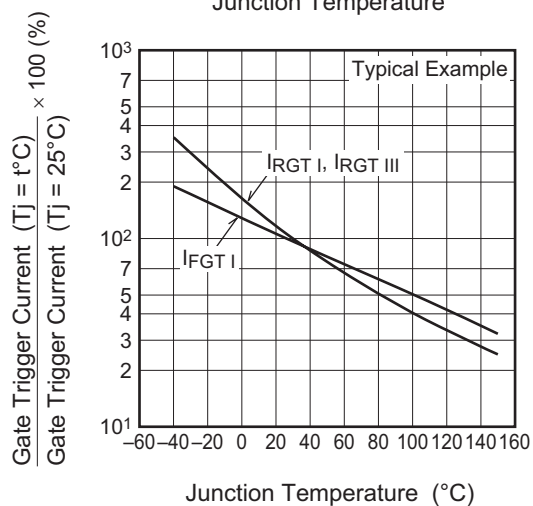
Rated Surge On-State Current



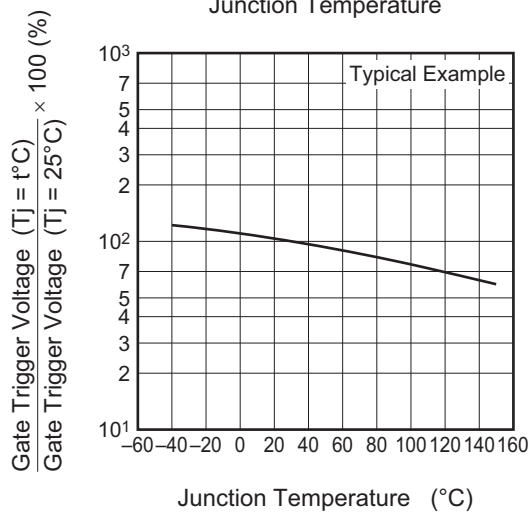
Gate Characteristics (I, II and III)



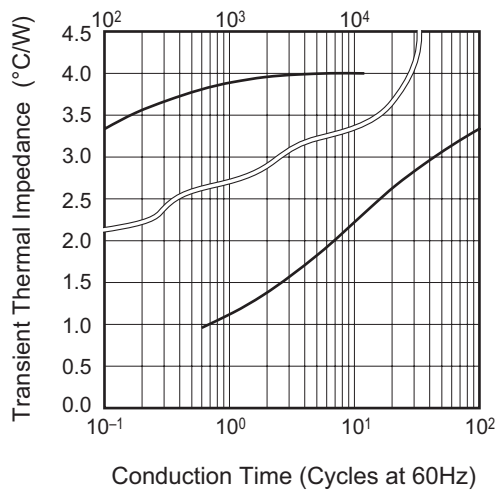
Gate Trigger Current vs. Junction Temperature



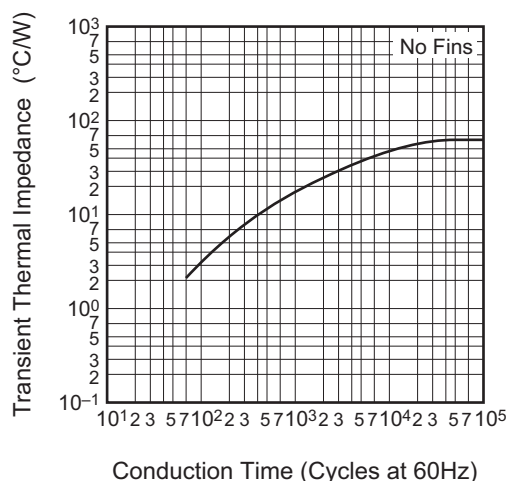
Gate Trigger Voltage vs. Junction Temperature



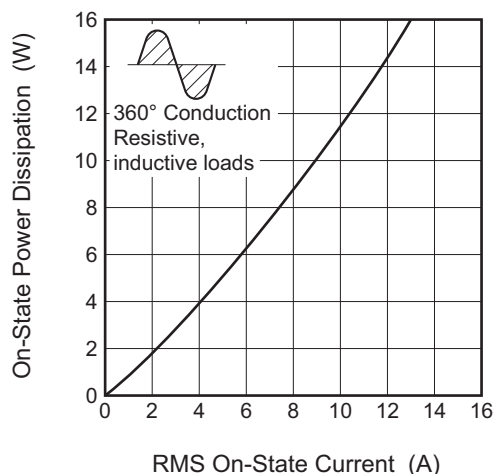
Maximum Transient Thermal Impedance Characteristics (Junction to case)



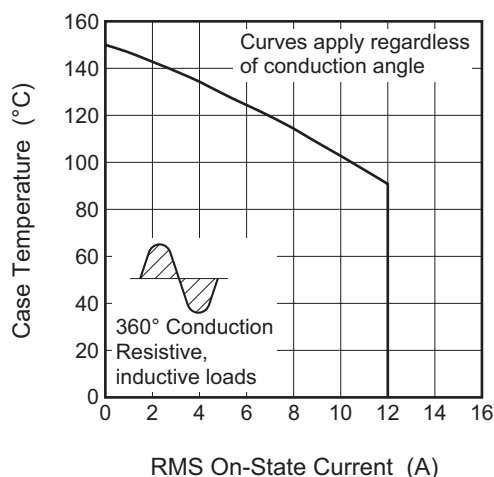
Maximum Transient Thermal Impedance Characteristics (Junction to ambient)



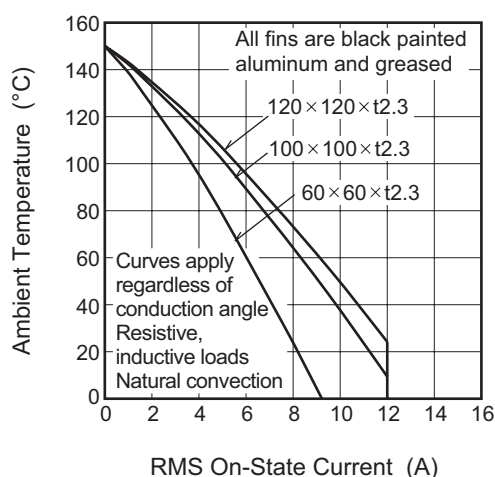
Maximum On-State Power Dissipation



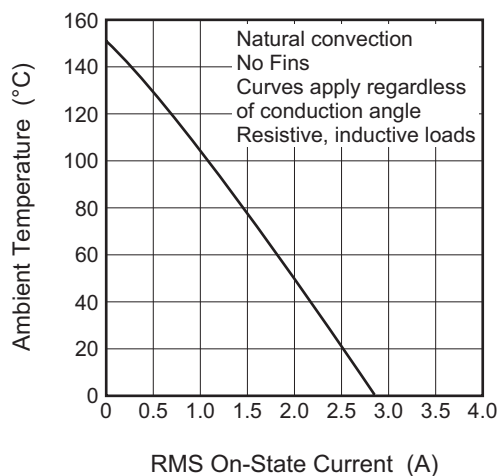
Allowable Case Temperature vs. RMS On-State Current



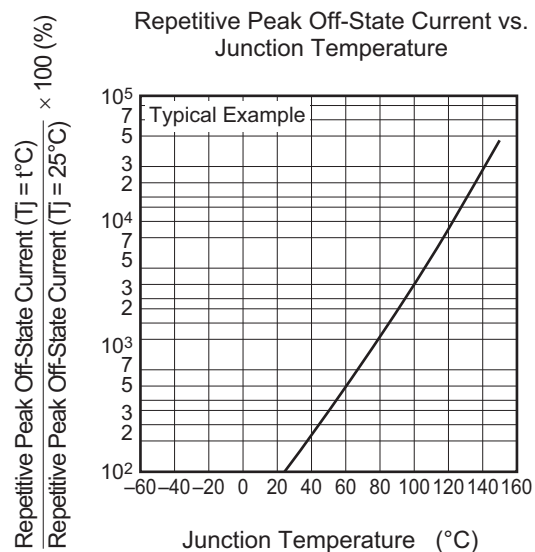
Allowable Ambient Temperature vs. RMS On-State Current

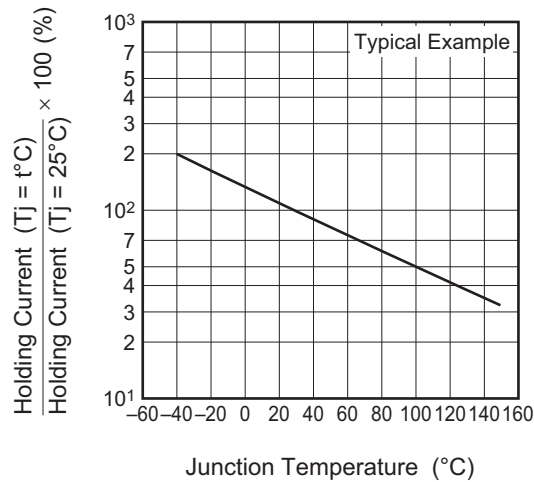
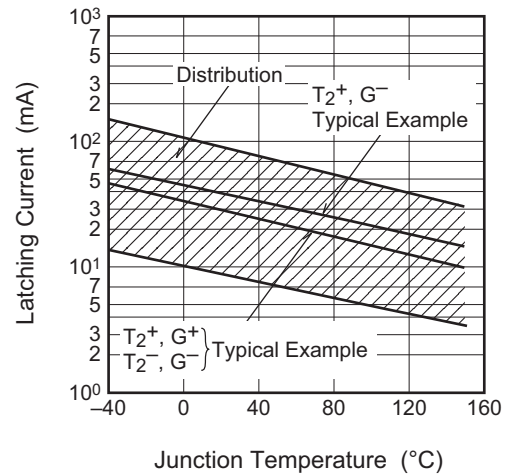
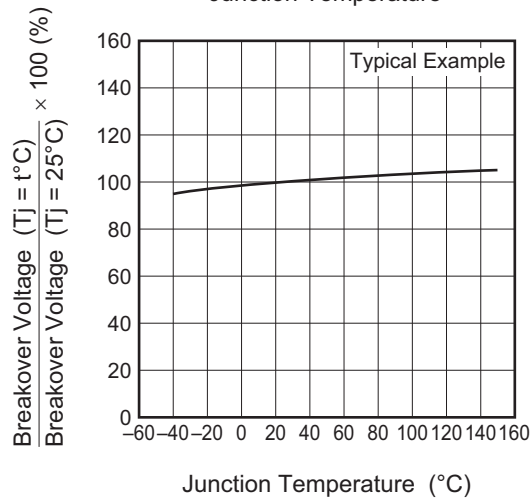
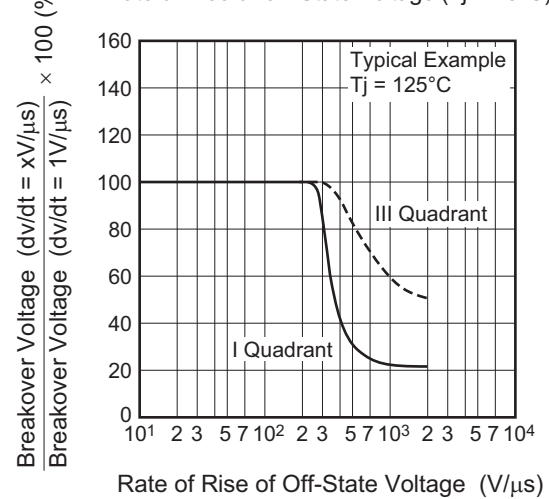
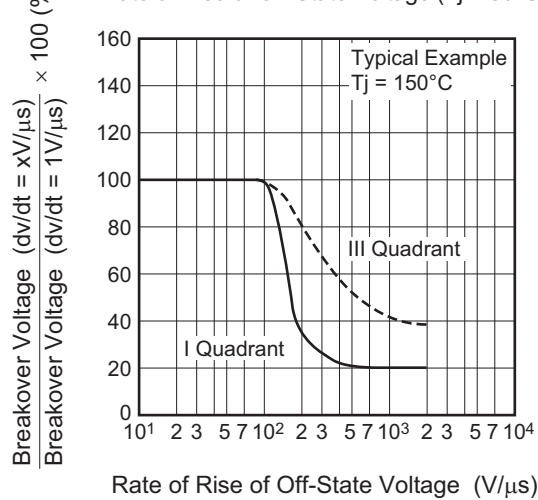
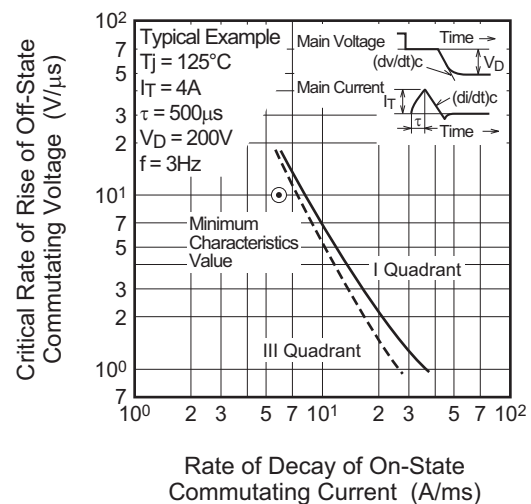


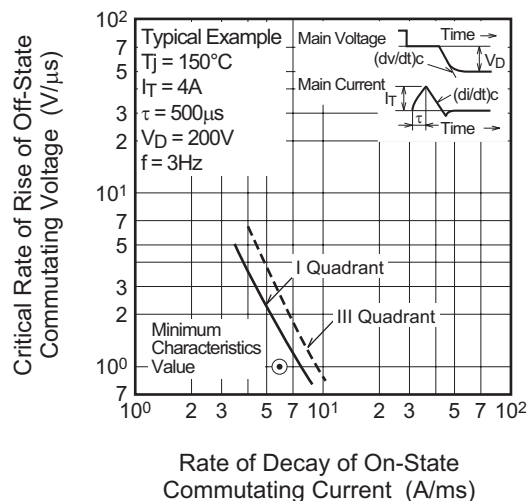
Allowable Ambient Temperature vs. RMS On-State Current



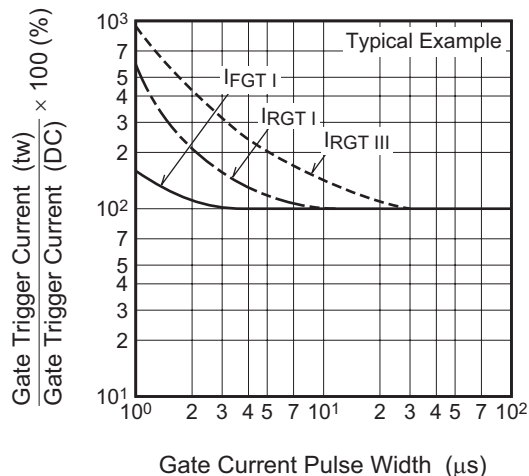
Repetitive Peak Off-State Current vs. Junction Temperature



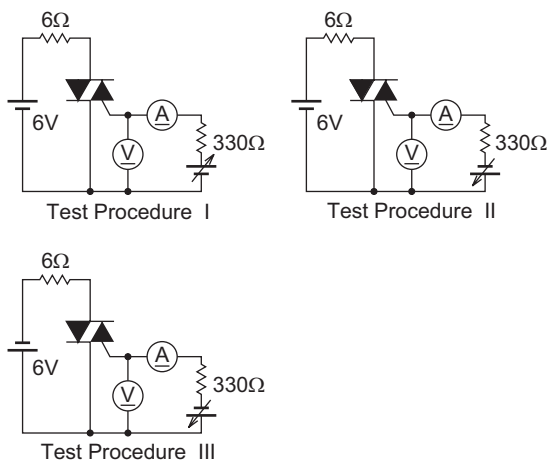
Holding Current vs.  
Junction TemperatureLatching Current vs.  
Junction TemperatureBreakover Voltage vs.  
Junction TemperatureBreakover Voltage vs.  
Rate of Rise of Off-State Voltage ( $T_j = 125^\circ\text{C}$ )Breakover Voltage vs.  
Rate of Rise of Off-State Voltage ( $T_j = 150^\circ\text{C}$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

Commutation Characteristics ( $T_j=150^\circ\text{C}$ )

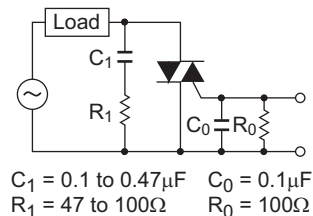
Gate Trigger Current vs. Gate Current Pulse Width



Gate Trigger Characteristics Test Circuits



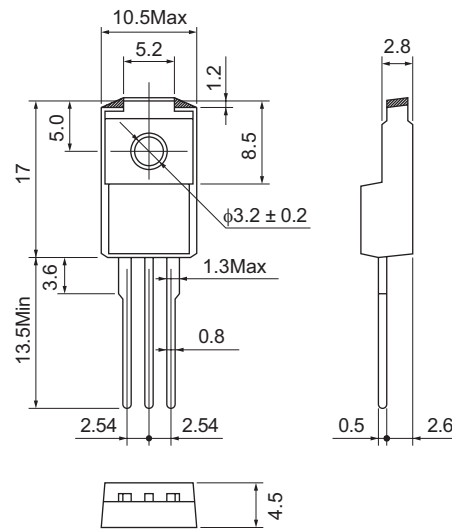
Recommended Circuit Values Around The Triac



## Package Dimensions

| Package Name | JEITA Package Code | RENESAS Code | Previous Code | MASS[Typ.] |
|--------------|--------------------|--------------|---------------|------------|
| TO-220F      | SC-67              | PRSS0003AA-A | —             | 2.0g       |

Unit: mm



## Order Code

| Lead form     | Standard packing        | Quantity | Standard order code           | Standard order code example |
|---------------|-------------------------|----------|-------------------------------|-----------------------------|
| Straight type | Vinyl sack              | 100      | Type name                     | BCR12PM-12LG                |
| Lead form     | Plastic Magazine (Tube) | 50       | Type name – Lead forming code | BCR12PM-12LG-A8             |

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

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