

# BCR5AM

MEDIUM POWER USE

NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

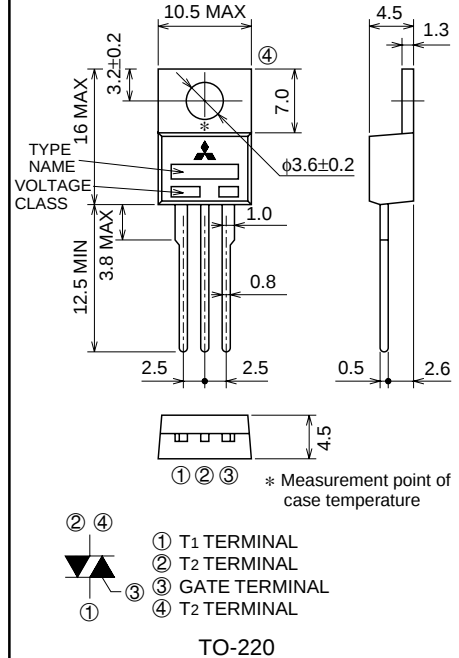
## BCR5AM



- $I_T$  (RMS) ..... 5A
- $V_{DRM}$  ..... 600V
- $I_{FGT}$  I ,  $I_{RGT}$  I ,  $I_{RGT}$  III ..... 20mA (10mA) \*6

## OUTLINE DRAWING

Dimensions  
in mm



## APPLICATION

Switching mode power supply, light dimmer, electric flasher unit, control of household equipment such as TV sets · stereo · refrigerator · washing machine · infrared kotatsu · carpet, solenoid drivers, small motor control, copying machine, electric tool, other general purpose control applications

## MAXIMUM RATINGS

| Symbol    | Parameter                                | Voltage class | Unit |
|-----------|------------------------------------------|---------------|------|
|           |                                          | 12            |      |
| $V_{DRM}$ | Repetitive peak off-state voltage *1     | 600           | V    |
| $V_{DSM}$ | Non-repetitive peak off-state voltage *1 | 720           | V    |

| Symbol      | Parameter                      | Conditions                                                                       | Ratings    | Unit             |
|-------------|--------------------------------|----------------------------------------------------------------------------------|------------|------------------|
| $I_T$ (RMS) | RMS on-state current           | Commercial frequency, sine full wave 360° conduction, $T_c=103^\circ\text{C}$ *3 | 5          | A                |
| $I_{TSM}$   | Surge on-state current         | 60Hz sinewave 1 full cycle, peak value, non-repetitive                           | 50         | A                |
| $I^2_t$     | $I^2_t$ for fusing             | Value corresponding to 1 cycle of half wave 60Hz, surge on-state current         | 10.4       | A <sup>2</sup> s |
| PGM         | Peak gate power dissipation    |                                                                                  | 3          | W                |
| PG (AV)     | Average gate power dissipation |                                                                                  | 0.3        | W                |
| VGM         | Peak gate voltage              |                                                                                  | 10         | V                |
| IGM         | Peak gate current              |                                                                                  | 2          | A                |
| $T_j$       | Junction temperature           |                                                                                  | -40 ~ +125 | °C               |
| $T_{stg}$   | Storage temperature            |                                                                                  | -40 ~ +125 | °C               |
| —           | Weight                         | Typical value                                                                    | 2.0        | g                |

\*1. Gate open.

**BCR5AM**

Refer to the page 6 as to the product guaranteed  
maximum junction temperature 150°C

**MEDIUM POWER USE**  
**NON-INSULATED TYPE, PLANAR PASSIVATION TYPE**

**ELECTRICAL CHARACTERISTICS**

| Symbol               | Parameter                                                 | Test conditions                                                            | Limits |      |       | Unit                   |
|----------------------|-----------------------------------------------------------|----------------------------------------------------------------------------|--------|------|-------|------------------------|
|                      |                                                           |                                                                            | Min.   | Typ. | Max.  |                        |
| $I_{DRM}$            | Repetitive peak off-state current                         | $T_J=125^\circ\text{C}$ , $V_{DRM}$ applied                                | —      | —    | 2.0   | mA                     |
| $V_{TM}$             | On-state voltage                                          | $T_c=25^\circ\text{C}$ , $I_{TM}=7\text{A}$ , Instantaneous measurement    | —      | —    | 1.8   | V                      |
| $V_{FGT\text{ I}}$   | Gate trigger voltage *2                                   | $T_J=25^\circ\text{C}$ , $V_D=6\text{V}$ , $R_L=6\Omega$ , $R_G=330\Omega$ | —      | —    | 1.5   | V                      |
| $V_{RGT\text{ I}}$   |                                                           |                                                                            | —      | —    | 1.5   | V                      |
| $V_{RGT\text{ III}}$ |                                                           |                                                                            | —      | —    | 1.5   | V                      |
| $I_{FGT\text{ I}}$   | Gate trigger current *2                                   | $T_J=25^\circ\text{C}$ , $V_D=6\text{V}$ , $R_L=6\Omega$ , $R_G=330\Omega$ | —      | —    | 20 *6 | mA                     |
| $I_{RGT\text{ I}}$   |                                                           |                                                                            | —      | —    | 20 *6 | mA                     |
| $I_{RGT\text{ III}}$ |                                                           |                                                                            | —      | —    | 20 *6 | mA                     |
| $V_{GD}$             | Gate non-trigger voltage                                  | $T_J=125^\circ\text{C}$ , $V_D=1/2V_{DRM}$                                 | 0.2    | —    | —     | V                      |
| $R_{th(j-c)}$        | Thermal resistance                                        | Junction to case *3 *4                                                     | —      | —    | 3.0   | $^\circ\text{C/W}$     |
| $(dv/dt)_c$          | Critical-rate of rise of off-state commutating voltage *5 | $T_J=125^\circ\text{C}$                                                    | 5      | —    | —     | $\text{V}/\mu\text{s}$ |

\*2. Measurement using the gate trigger characteristics measurement circuit.

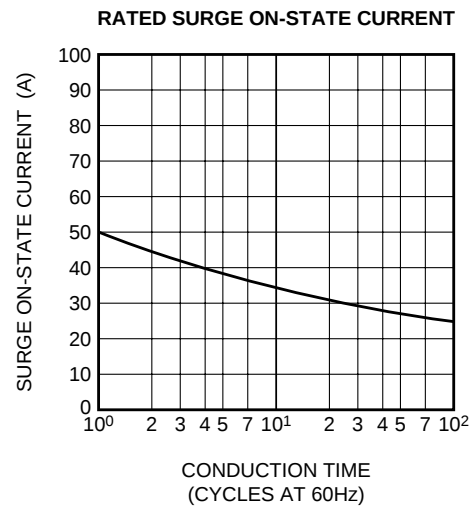
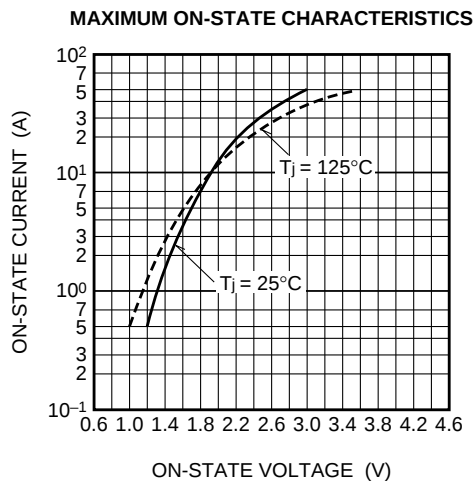
\*3. Case temperature is measured at the T2 terminal 1.5mm away from the molded case.

\*4. The contact thermal resistance  $R_{th(c-j)}$  in case of greasing is  $1.0^\circ\text{C/W}$ .

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

\*6. High sensitivity ( $I_{GT}\leq 10\text{mA}$ ) is also available. ( $I_{GT}$  item ①)

| Test conditions                                                                                                                                                                         | Commutating voltage and current waveforms (inductive load) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| 1. Junction temperature<br>$T_J=125^\circ\text{C}$<br>2. Rate of decay of on-state commutating current<br>$(di/dt)_c=-2.5\text{A/ms}$<br>3. Peak off-state voltage<br>$V_D=400\text{V}$ |                                                            |

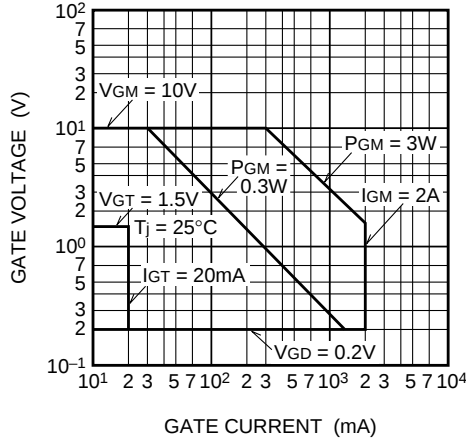
**PERFORMANCE CURVES**

# BCR5AM

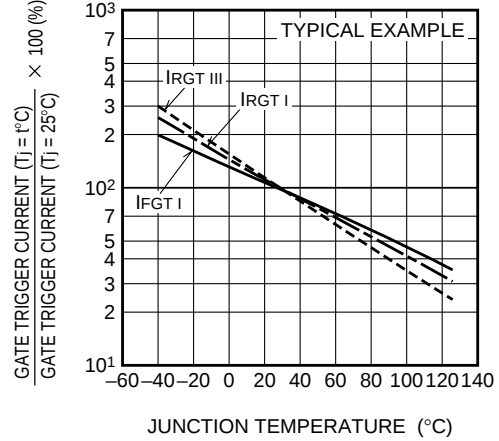
Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

MEDIUM POWER USE  
NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

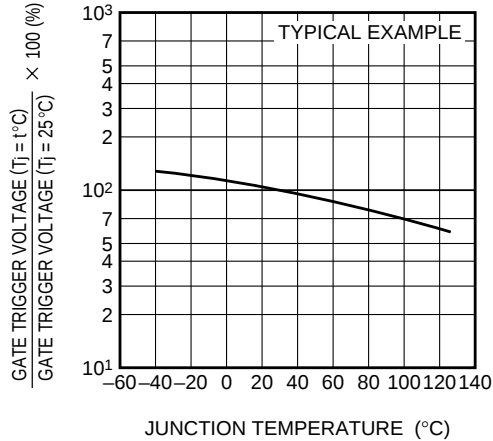
**GATE CHARACTERISTICS  
(I, II AND III)**



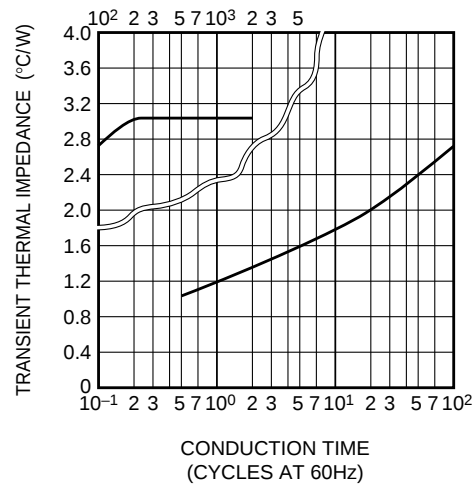
**GATE TRIGGER CURRENT VS.  
JUNCTION TEMPERATURE**



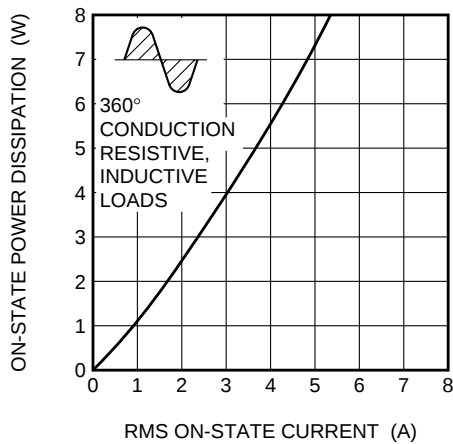
**GATE TRIGGER VOLTAGE VS.  
JUNCTION TEMPERATURE**



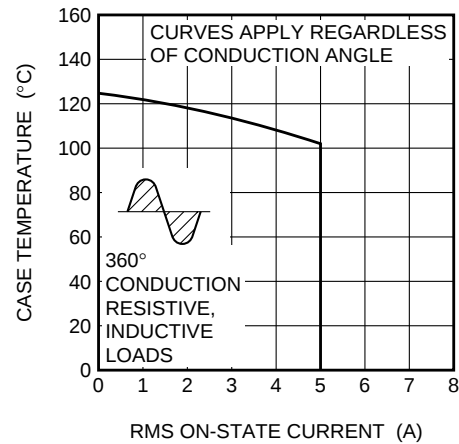
**MAXIMUM TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(JUNCTION TO CASE)**



**MAXIMUM ON-STATE POWER  
DISSIPATION**



**ALLOWABLE CASE TEMPERATURE  
VS. RMS ON-STATE CURRENT**

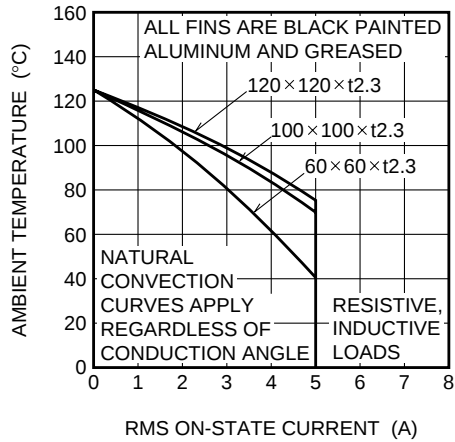


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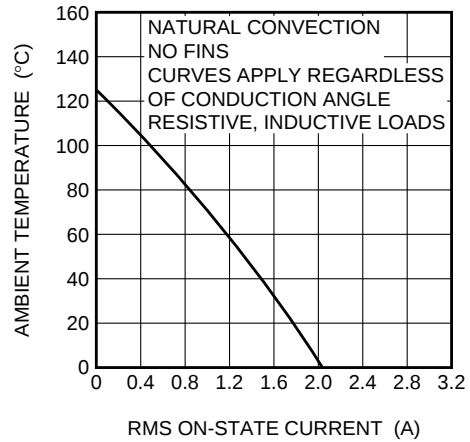
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MEDIUM POWER USE  
NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

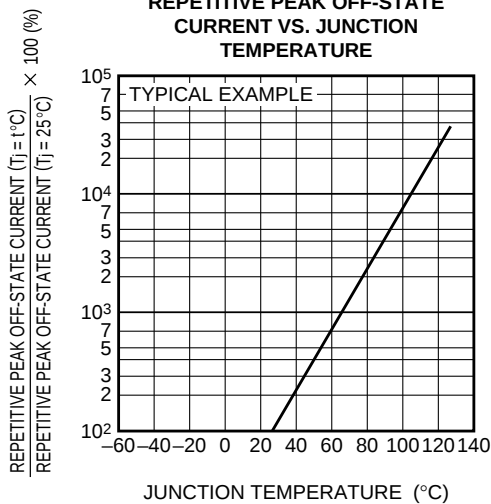
ALLOWABLE AMBIENT TEMPERATURE  
VS. RMS ON-STATE CURRENT



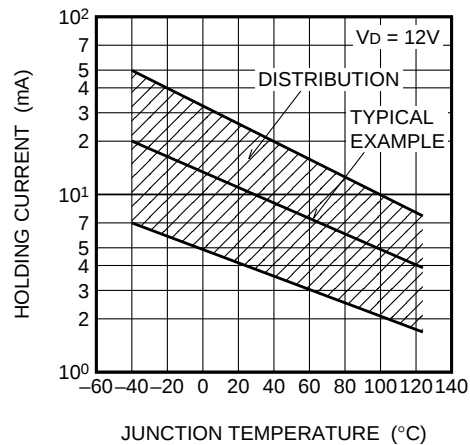
ALLOWABLE AMBIENT TEMPERATURE  
VS. RMS ON-STATE CURRENT



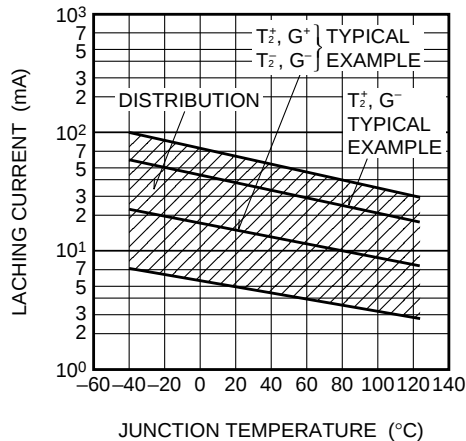
REPETITIVE PEAK OFF-STATE  
CURRENT VS. JUNCTION  
TEMPERATURE



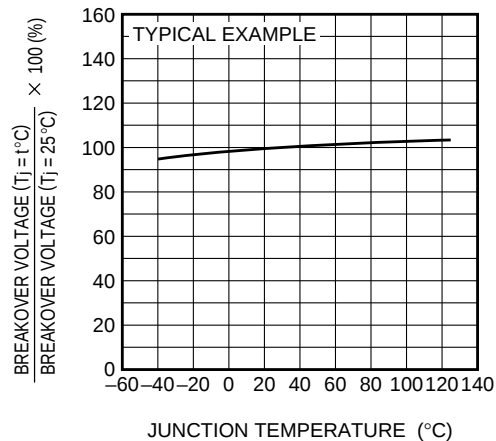
HOLDING CURRENT VS.  
JUNCTION TEMPERATURE



LACHING CURRENT VS.  
JUNCTION TEMPERATURE



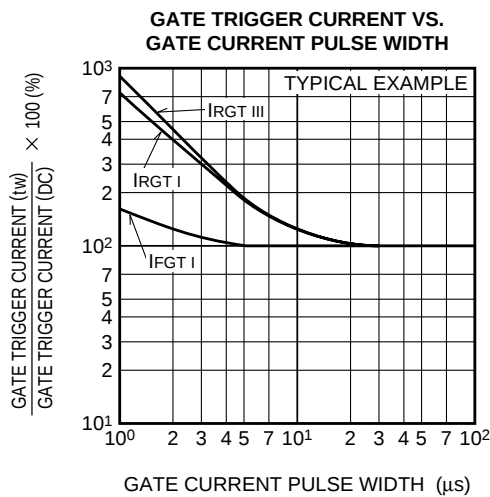
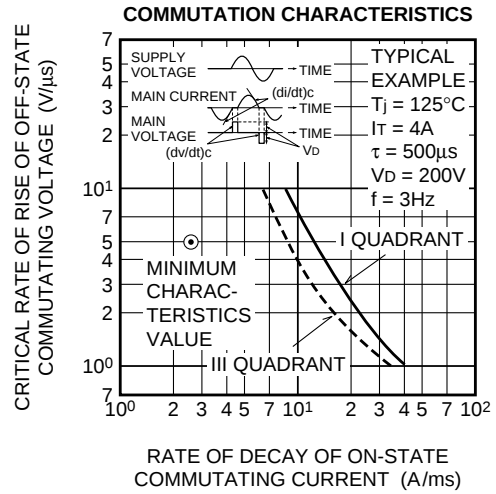
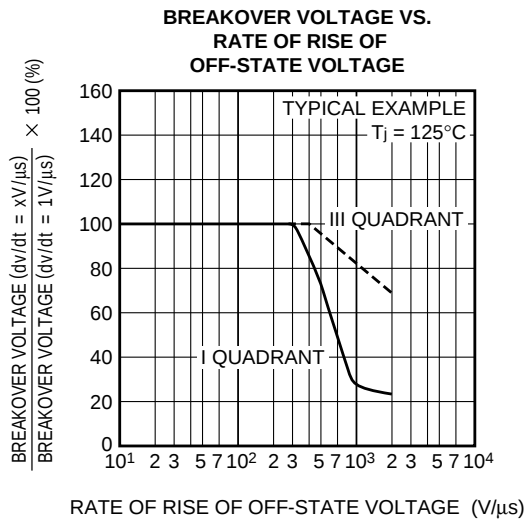
BREAKOVER VOLTAGE VS.  
JUNCTION TEMPERATURE



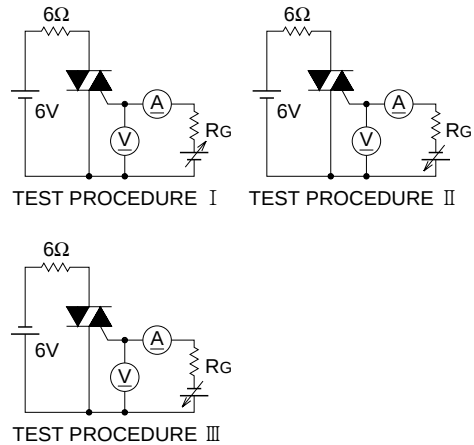
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Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

MEDIUM POWER USE  
NON-INSULATED TYPE, PLANAR PASSIVATION TYPE



## GATE TRIGGER CHARACTERISTICS TEST CIRCUITS



# BCR5AM

MEDIUM POWER USE

NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

The product guaranteed maximum junction temperature 150°C (See warning.)

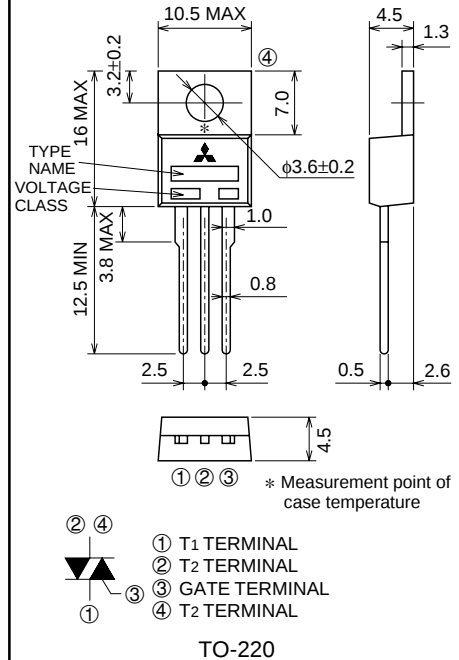
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- $I_T$  (RMS) ..... 5A
- $V_{DRM}$  ..... 600V
- $I_{FGT}$  I ,  $I_{RGT}$  I ,  $I_{RGT}$  III ..... 20mA (10mA) \*6

## OUTLINE DRAWING

Dimensions  
in mm



## APPLICATION

Switching mode power supply, light dimmer, electric flasher unit, control of household equipment such as TV sets · stereo · refrigerator · washing machine · infrared kotatsu · carpet, solenoid drivers, small motor control, copying machine, electric tool, other general purpose control applications

(Warning)

1. Refer to the recommended circuit values around the triac before using.
2. Be sure to exchange the specification before using. If not exchanged, general triacs will be supplied.

## MAXIMUM RATINGS

| Symbol    | Parameter                                | Voltage class | Unit |
|-----------|------------------------------------------|---------------|------|
|           |                                          | 12            |      |
| $V_{DRM}$ | Repetitive peak off-state voltage *1     | 600           | V    |
| $V_{DSM}$ | Non-repetitive peak off-state voltage *1 | 720           | V    |

| Symbol      | Parameter                      | Conditions                                                                       | Ratings    | Unit             |
|-------------|--------------------------------|----------------------------------------------------------------------------------|------------|------------------|
| $I_T$ (RMS) | RMS on-state current           | Commercial frequency, sine full wave 360° conduction, $T_c=128^\circ\text{C}$ *3 | 5          | A                |
| $I_{TSM}$   | Surge on-state current         | 60Hz sinewave 1 full cycle, peak value, non-repetitive                           | 50         | A                |
| $I^2_t$     | $I^2_t$ for fusing             | Value corresponding to 1 cycle of half wave 60Hz, surge on-state current         | 10.4       | A <sup>2</sup> s |
| PGM         | Peak gate power dissipation    |                                                                                  | 3          | W                |
| PG (AV)     | Average gate power dissipation |                                                                                  | 0.3        | W                |
| VGM         | Peak gate voltage              |                                                                                  | 10         | V                |
| IGM         | Peak gate current              |                                                                                  | 2          | A                |
| $T_j$       | Junction temperature           |                                                                                  | -40 ~ +150 | °C               |
| $T_{stg}$   | Storage temperature            |                                                                                  | -40 ~ +150 | °C               |
| —           | Weight                         | Typical value                                                                    | 2.0        | g                |

\*1. Gate open.

# BCR5AM

The product guaranteed maximum junction temperature 150°C (See warning.)

**MEDIUM POWER USE**  
**NON-INSULATED TYPE, PLANAR PASSIVATION TYPE**

## ELECTRICAL CHARACTERISTICS

| Symbol                | Parameter                                                 | Test conditions                                                                    | Limits  |      |       | Unit |
|-----------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------|---------|------|-------|------|
|                       |                                                           |                                                                                    | Min.    | Typ. | Max.  |      |
| IdRM                  | Repetitive peak off-state current                         | T <sub>j</sub> =150°C, V <sub>DRM</sub> applied                                    | —       | —    | 2.0   | mA   |
| V <sub>TM</sub>       | On-state voltage                                          | T <sub>c</sub> =25°C, I <sub>TM</sub> =7A, Instantaneous measurement               | —       | —    | 1.8   | V    |
| V <sub>FGT</sub> I    | Gate trigger voltage *2                                   | T <sub>j</sub> =25°C, V <sub>D</sub> =6V, R <sub>L</sub> =6Ω, R <sub>G</sub> =330Ω | —       | —    | 1.5   | V    |
| V <sub>RGT</sub> I    |                                                           |                                                                                    | —       | —    | 1.5   | V    |
| V <sub>RGT</sub> III  |                                                           |                                                                                    | —       | —    | 1.5   | V    |
| I <sub>FGT</sub> I    | Gate trigger current *2                                   | T <sub>j</sub> =25°C, V <sub>D</sub> =6V, R <sub>L</sub> =6Ω, R <sub>G</sub> =330Ω | —       | —    | 20 *6 | mA   |
| I <sub>RGT</sub> I    |                                                           |                                                                                    | —       | —    | 20 *6 | mA   |
| I <sub>RGT</sub> III  |                                                           |                                                                                    | —       | —    | 20 *6 | mA   |
| V <sub>GD</sub>       | Gate non-trigger voltage                                  | T <sub>j</sub> =125°C/150°C, V <sub>D</sub> =1/2V <sub>DRM</sub>                   | 0.2/0.1 | —    | —     | V    |
| R <sub>th</sub> (j-c) | Thermal resistance                                        | Junction to case *3 *4                                                             | —       | —    | 3.0   | °C/W |
| (dv/dt) <sub>c</sub>  | Critical-rate of rise of off-state commutating voltage *5 | T <sub>j</sub> =125°C/150°C                                                        | 5/1     | —    | —     | V/μs |

\*2. Measurement using the gate trigger characteristics measurement circuit.

\*3. Case temperature is measured at the T2 terminal 1.5mm away from the molded case.

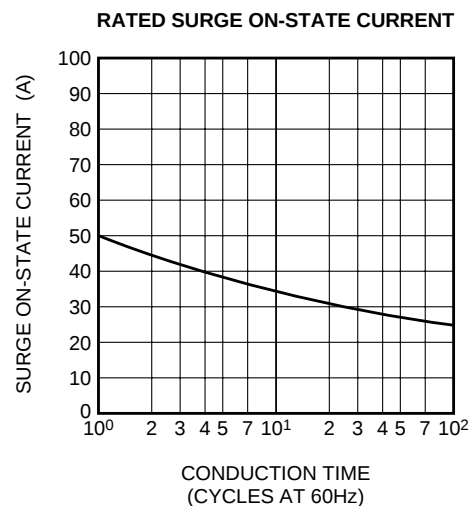
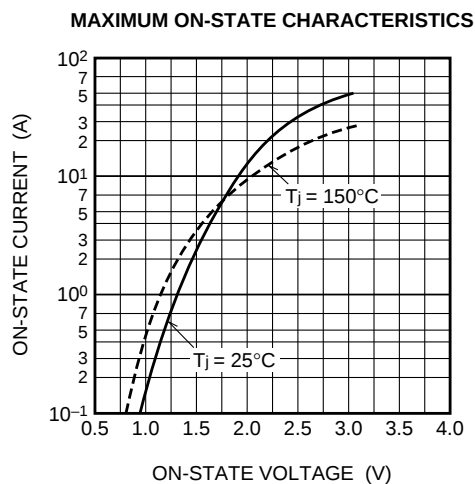
\*4. The contact thermal resistance R<sub>th</sub> (c-j) in case of greasing is 1.0°C/W.

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

\*6. High sensitivity (I<sub>GT</sub>≤10mA) is also available. (I<sub>GT</sub> item ①)

| Test conditions                                                                                                                                                                                           | Commutating voltage and current waveforms (inductive load) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| 1. Junction temperature<br>T <sub>j</sub> =125°C/150°C<br><br>2. Rate of decay of on-state commutating current<br>(di/dt) <sub>c</sub> =-2.5A/ms<br><br>3. Peak off-state voltage<br>V <sub>D</sub> =400V |                                                            |

## PERFORMANCE CURVES

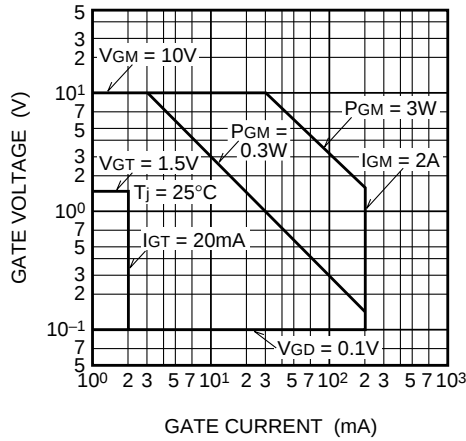


# BCR5AM

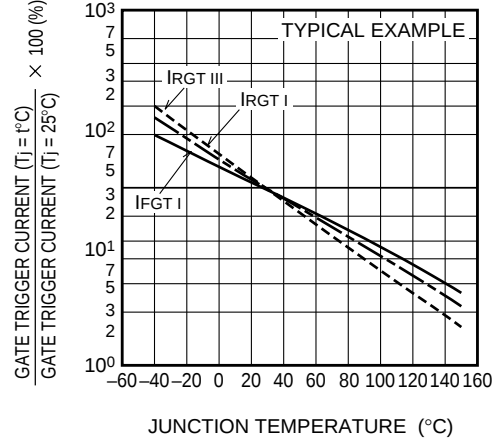
The product guaranteed maximum junction temperature 150°C (See warning.)

MEDIUM POWER USE  
NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

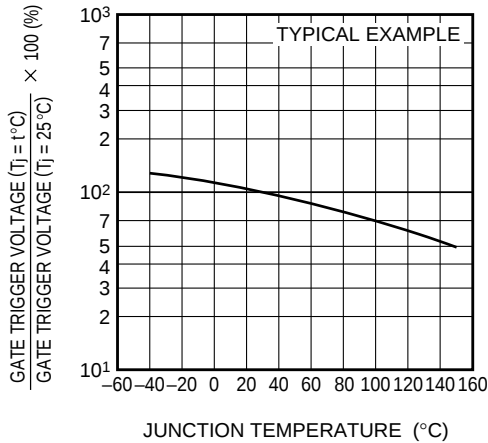
**GATE CHARACTERISTICS  
(I, II AND III)**



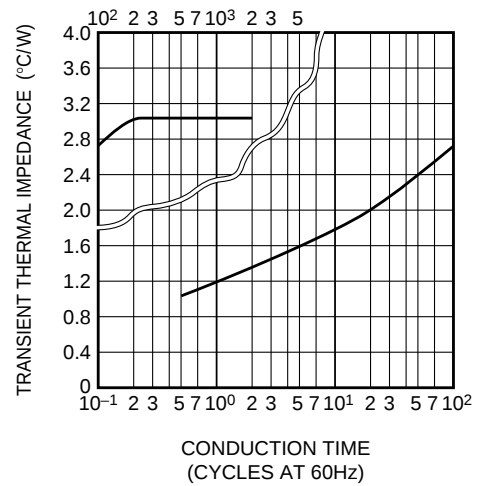
**GATE TRIGGER CURRENT VS.  
JUNCTION TEMPERATURE**



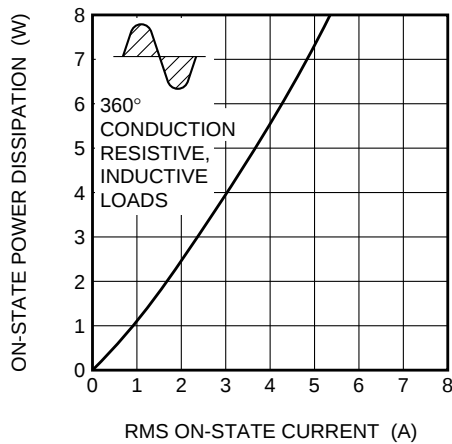
**GATE TRIGGER VOLTAGE VS.  
JUNCTION TEMPERATURE**



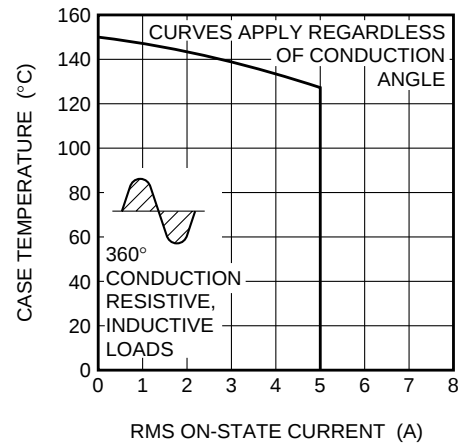
**MAXIMUM TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(JUNCTION TO CASE)**



**MAXIMUM ON-STATE POWER  
DISSIPATION**



**ALLOWABLE CASE TEMPERATURE  
VS. RMS ON-STATE CURRENT**

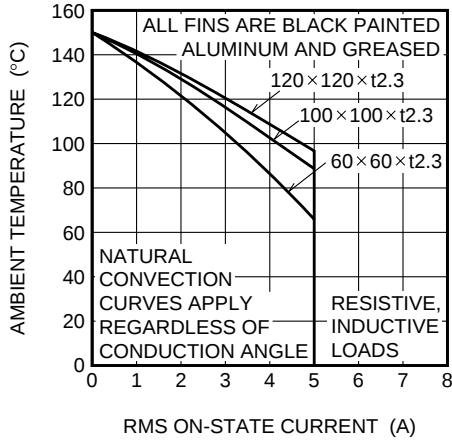


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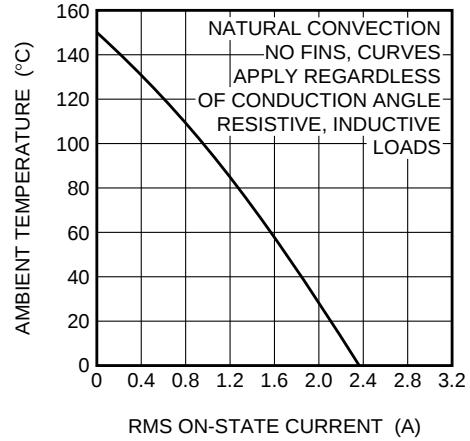
The product guaranteed maximum junction temperature 150°C (See warning.)

MEDIUM POWER USE  
NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

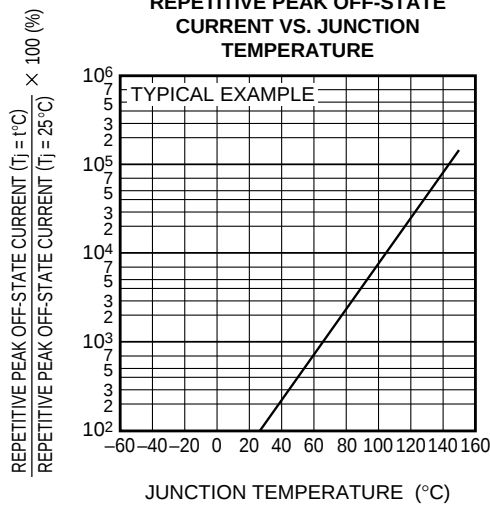
ALLOWABLE AMBIENT TEMPERATURE  
VS. RMS ON-STATE CURRENT



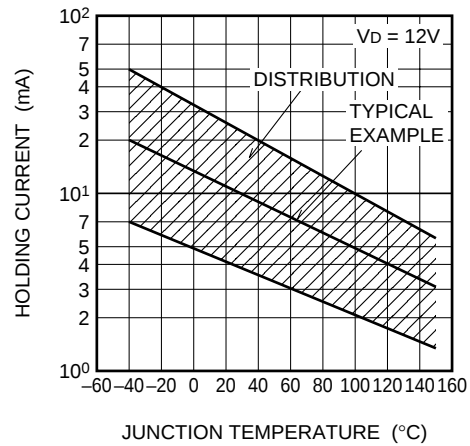
ALLOWABLE AMBIENT TEMPERATURE  
VS. RMS ON-STATE CURRENT



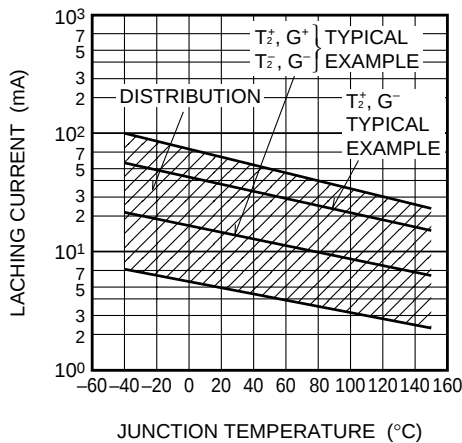
REPETITIVE PEAK OFF-STATE  
CURRENT VS. JUNCTION  
TEMPERATURE



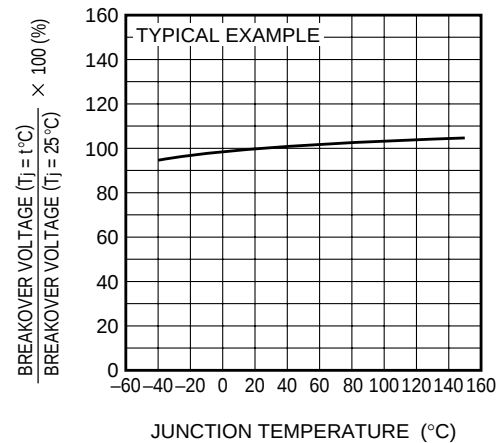
HOLDING CURRENT VS.  
JUNCTION TEMPERATURE



LATCHING CURRENT VS.  
JUNCTION TEMPERATURE



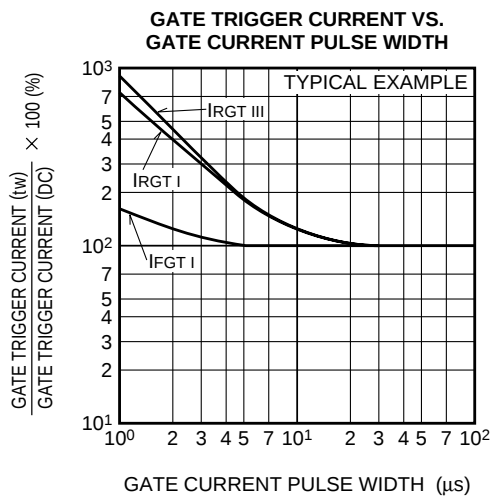
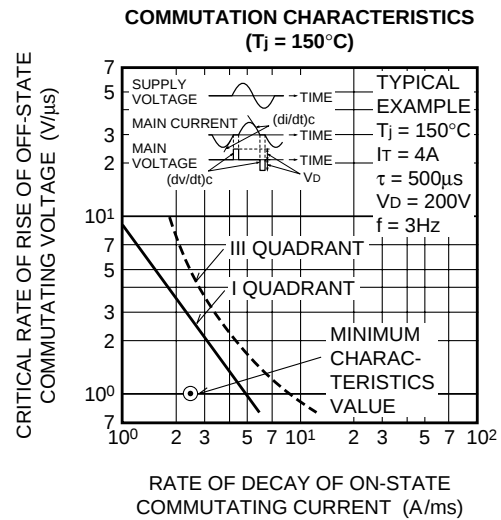
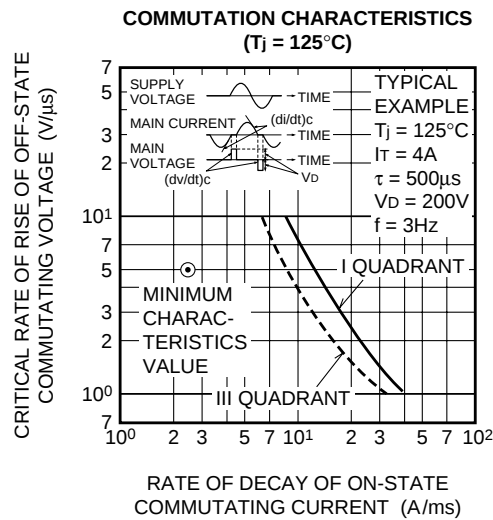
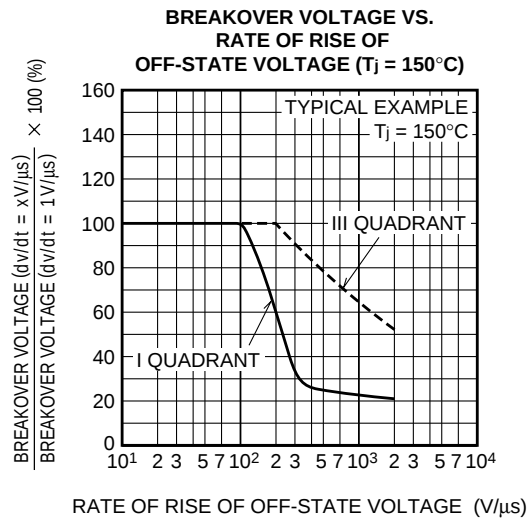
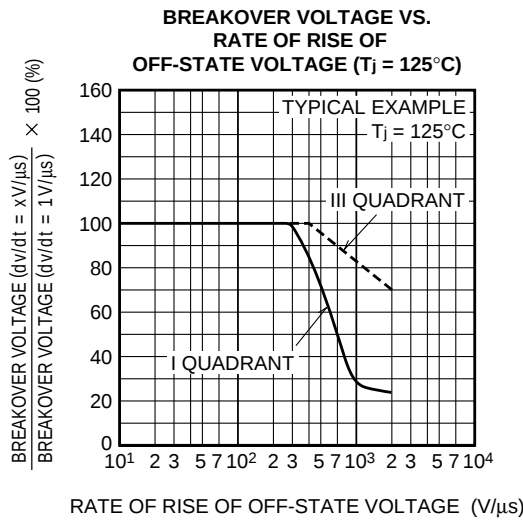
BREAKOVER VOLTAGE VS.  
JUNCTION TEMPERATURE



# BCR5AM

The product guaranteed maximum junction temperature 150°C (See warning.)

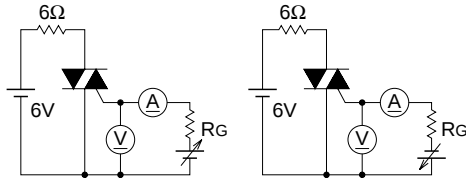
MEDIUM POWER USE  
NON-INSULATED TYPE, PLANAR PASSIVATION TYPE



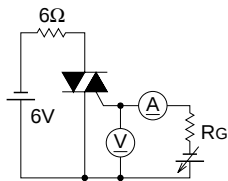
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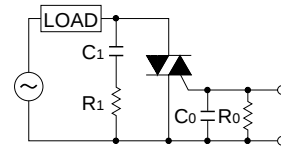
**MEDIUM POWER USE**  
**NON-INSULATED TYPE, PLANAR PASSIVATION TYPE**

**GATE TRIGGER CHARACTERISTICS TEST CIRCUITS**

TEST PROCEDURE I      TEST PROCEDURE II



TEST PROCEDURE III

**RECOMMENDED CIRCUIT VALUES  
AROUND THE TRIAC**

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