

To all our customers

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## **Regarding the change of names mentioned in the document, such as Mitsubishi Electric and Mitsubishi XX, to Renesas Technology Corp.**

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The semiconductor operations of Hitachi and Mitsubishi Electric were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Mitsubishi Electric, Mitsubishi Electric Corporation, Mitsubishi Semiconductors, and other Mitsubishi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Note : Mitsubishi Electric will continue the business operations of high frequency & optical devices and power devices.

Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

# BCR3AS

LOW POWER USE

NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

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

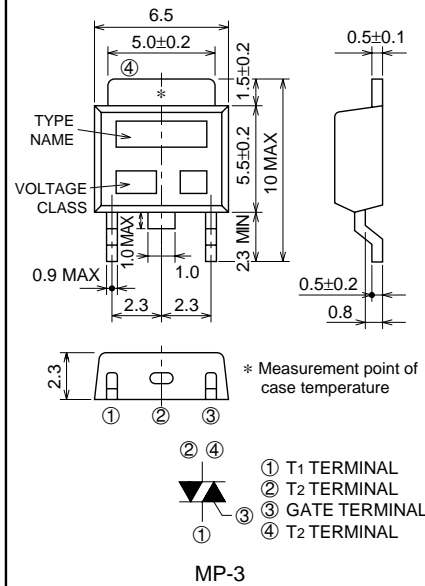
## BCR3AS



- **IT (RMS)** ..... **3A**
- **VDRM** ..... **600V**
- **IFGT I, IRGT I, IRGT III** ..... **15mA (10mA)\*5**

## OUTLINE DRAWING

Dimensions in mm



## APPLICATION

Hybrid IC, solid state relay, switching mode power supply, light dimmer, electric fan, electric blankets, control of household equipment such as washing machine, other general purpose control applications

## MAXIMUM RATINGS

Symbol	Parameter	Voltage class		Unit
		12	600	
VDRM	Repetitive peak off-state voltage*1	600		V
VDSM	Non-repetitive peak off-state voltage*1	720		V

Symbol	Parameter	Conditions	Ratings	Unit
IT (RMS)	RMS on-state current	Commercial frequency, sine full wave 360° conduction, Tc=108°C*3	3	A
ITSM	Surge on-state current	60Hz sinewave 1 full cycle, peak value, non-repetitive	30	A
I <sup>2</sup> <sub>t</sub>	I <sup>2</sup> <sub>t</sub> for fusing	Value corresponding to 1 cycle of half wave 60Hz, surge on-state current	3.7	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		6	V
IGM	Peak gate current		0.3	A
T <sub>j</sub>	Junction temperature		-40 ~ +125	°C
T <sub>stg</sub>	Storage temperature		-40 ~ +125	°C
—	Weight	Typical value	0.26	g

\*1. Gate open.

**BCR3AS**

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

**LOW 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> =125°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> =4.5A, Instantaneous measurement	—	—	1.7	V	
V <sub>FGT I</sub>	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	I	—	—	1.5	V
V <sub>RGT I</sub>			II	—	—	1.5	V
V <sub>RGT III</sub>			III	—	—	1.5	V
I <sub>FGT I</sub>	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	I	—	—	15*5	mA
I <sub>RGT I</sub>			II	—	—	15*5	mA
I <sub>RGT III</sub>			III	—	—	15*5	mA
V <sub>GD</sub>	Gate non-trigger voltage	T <sub>j</sub> =125°C, V <sub>D</sub> =1/2V <sub>DRM</sub>	0.2	—	—	V	
R <sub>th(j-c)</sub>	Thermal resistance	Junction to case *3	—	—	3.8	°C/W	
(dv/dt) <sub>c</sub>	Critical-rate of rise of off-state commutating voltage *4	T <sub>j</sub> =125°C	5	—	—	V/μs	

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

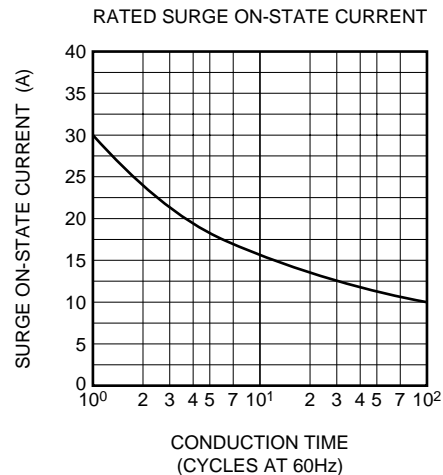
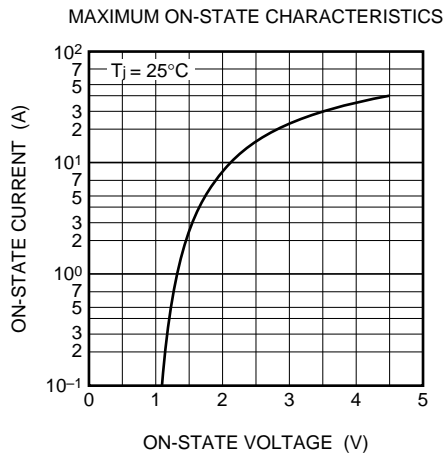
\*3. Case temperature is measured on the T<sub>2</sub> terminal.

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

\*5. High sensitivity (I<sub>GT</sub>≤10mA) is also available. (IGT item①)

Test conditions	Commutating voltage and current waveforms (inductive load)
1. Junction temperature T <sub>j</sub> =125°C  2. Rate of decay of on-state commutating current (di/dt) <sub>c</sub> =-1.5A/ms  3. Peak off-state voltage V <sub>D</sub> =400V	

**PERFORMANCE CURVES**

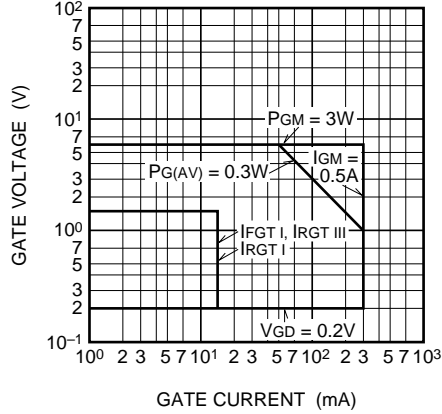


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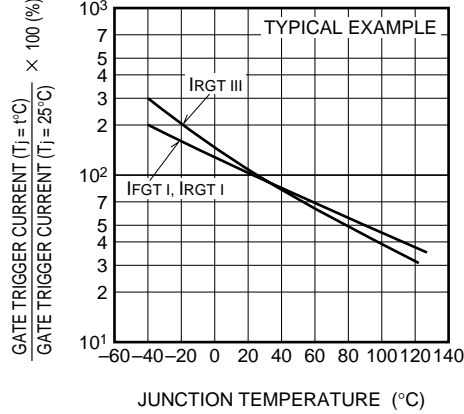
Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

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

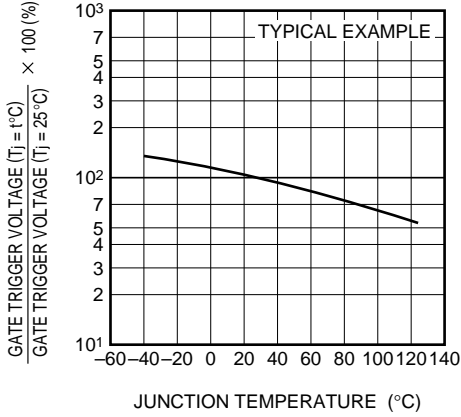
**GATE CHARACTERISTICS**  
(I, II AND III)



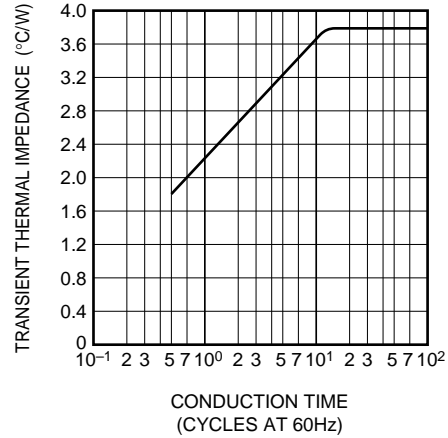
**GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE**



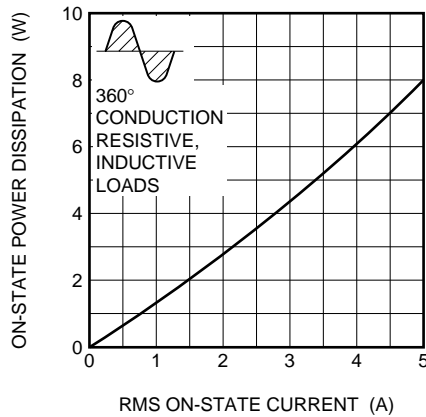
**GATE TRIGGER VOLTAGE VS. JUNCTION TEMPERATURE**



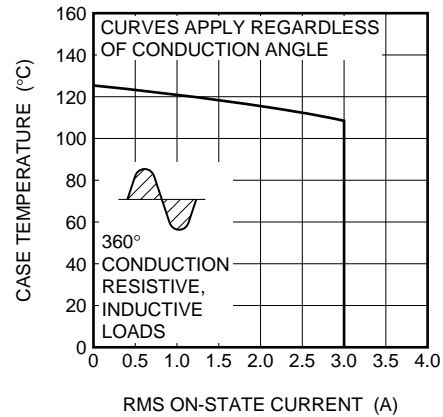
**MAXIMUM TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)**



**MAXIMUM ON-STATE POWER DISSIPATION**



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

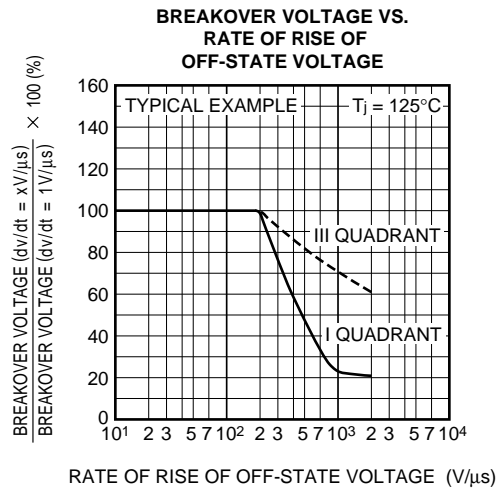
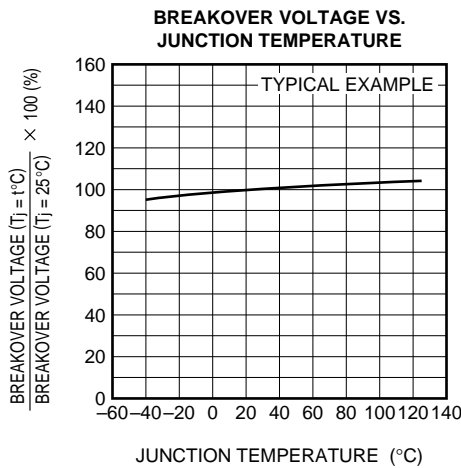
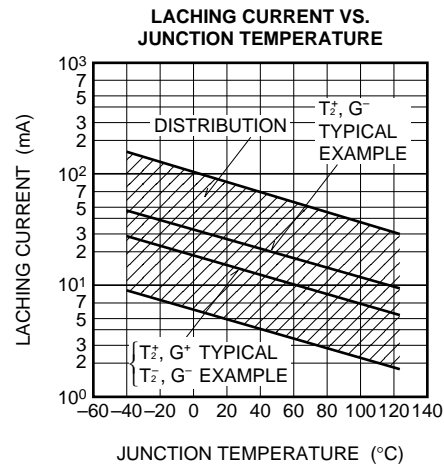
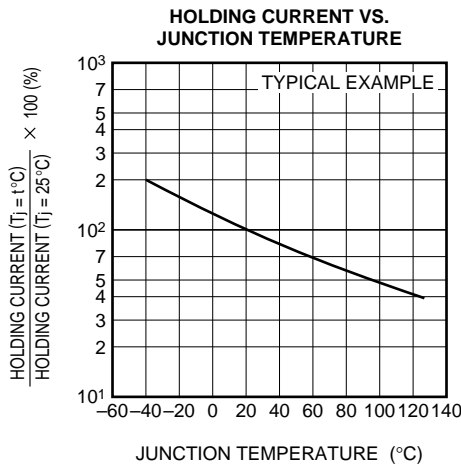
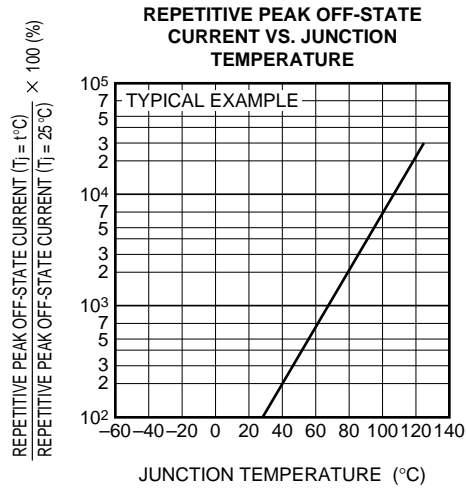
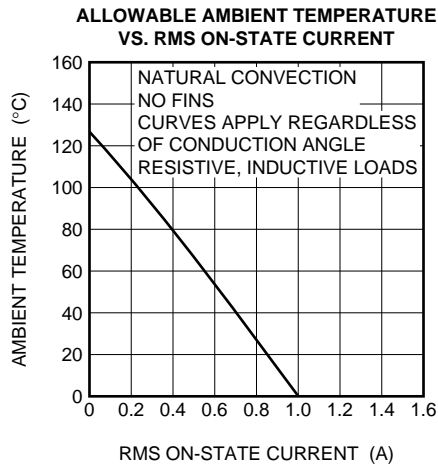


**BCR3AS**

LOW POWER USE

NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

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

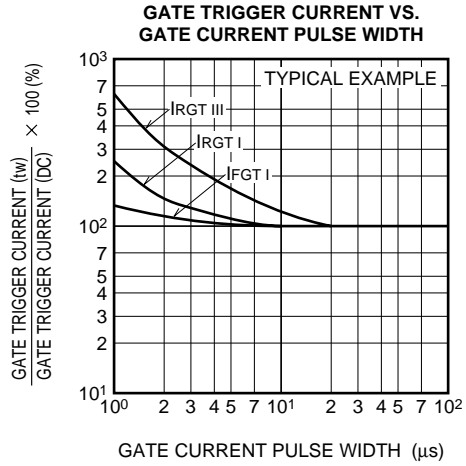
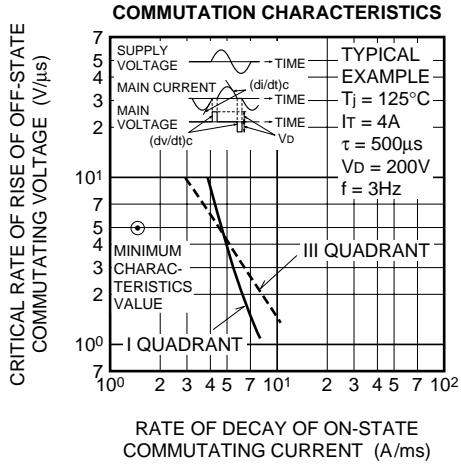


**BCR3AS**

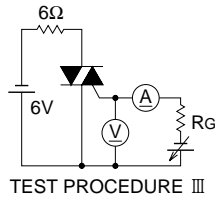
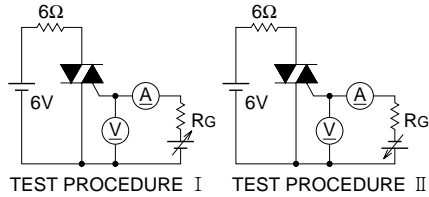
LOW POWER USE

NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

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



**GATE TRIGGER CHARACTERISTICS TEST CIRCUITS**




# BCR3AS

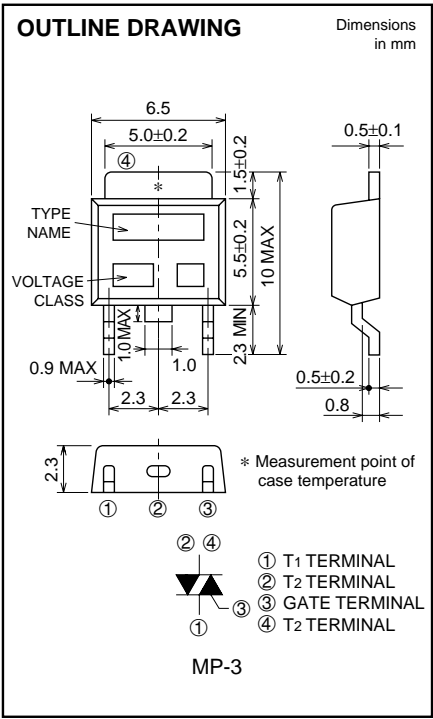
The product guaranteed maximum junction temperature 150°C (See warning.)

LOW POWER USE  
NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

**BCR3AS**



- **IT (RMS)** ..... **3A**
- **VDRM** ..... **600V**
- **IFGT I, IRGT I, IRGT III** ..... **15mA (10mA)\*5**



**APPLICATION**

Hybrid IC, solid state relay, switching mode power supply, light dimmer, electric fan, electric blankets, control of household equipment such as washing machine, 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	600	
VDRM	Repetitive peak off-state voltage*1	600		V
VDSM	Non-repetitive peak off-state voltage*1	720		V

Symbol	Parameter	Conditions	Ratings	Unit
IT (RMS)	RMS on-state current	Commercial frequency, sine full wave 360° conduction, Tc=133°C*3	3	A
ITSM	Surge on-state current	60Hz sinewave 1 full cycle, peak value, non-repetitive	30	A
I <sup>2</sup> <sub>t</sub>	I <sup>2</sup> <sub>t</sub> for fusing	Value corresponding to 1 cycle of half wave 60Hz, surge on-state current	3.7	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		6	V
IGM	Peak gate current		0.3	A
T <sub>j</sub>	Junction temperature		-40 ~ +150	°C
T <sub>stg</sub>	Storage temperature		-40 ~ +150	°C
—	Weight	Typical value	0.26	g

\*1. Gate open.

**BCR3AS**

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

**LOW 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> =4.5A, Instantaneous measurement	—	—	1.7	V	
V <sub>FGT I</sub>	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	I	—	—	1.5	V
V <sub>RGT I</sub>			II	—	—	1.5	V
V <sub>RGT III</sub>			III	—	—	1.5	V
I <sub>FGT I</sub>	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	I	—	—	15*5	mA
I <sub>RGT I</sub>			II	—	—	15*5	mA
I <sub>RGT III</sub>			III	—	—	15*5	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(j-c)</sub>	Thermal resistance	Junction to case *3	—	—	3.8	°C/W	
(dv/dt) <sub>c</sub>	Critical-rate of rise of off-state commutating voltage *4	T <sub>J</sub> =125°C/150°C	5/1	—	—	V/μs	

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

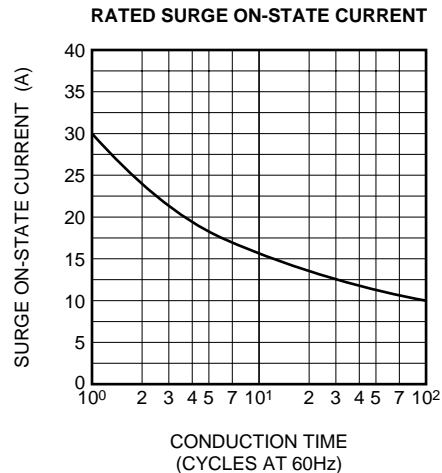
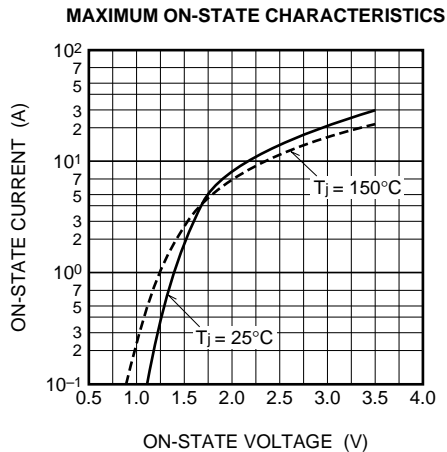
\*3. Case temperature is measured on the T<sub>2</sub> terminal.

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

\*5. High sensitivity (I<sub>GT</sub>≤10mA) is also available. (IGT item①)

Test conditions	Commutating voltage and current waveforms (inductive load)
1. Junction temperature T <sub>J</sub> =125°C/150°C  2. Rate of decay of on-state commutating current (di/dt) <sub>c</sub> =-1.5A/ms  3. Peak off-state voltage V <sub>D</sub> =400V	

**PERFORMANCE CURVES**



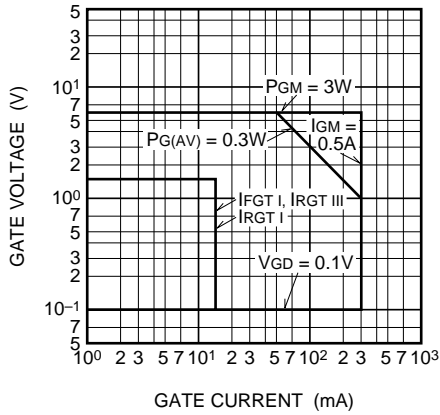


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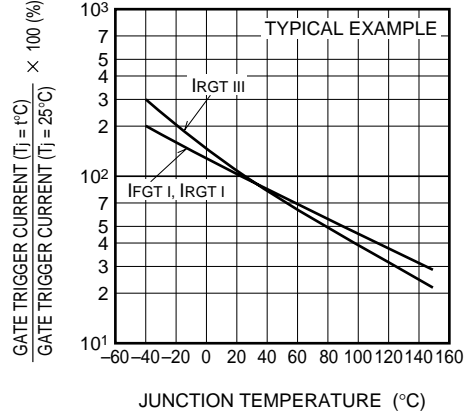
The product guaranteed maximum junction temperature 150°C (See warning.)

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

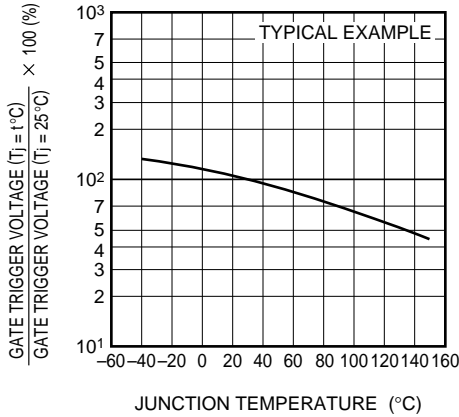
**GATE CHARACTERISTICS (I, II AND III)**



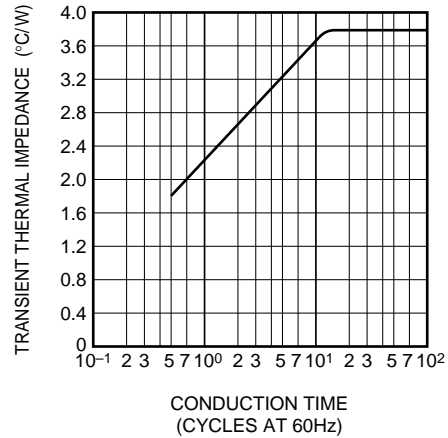
**GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE**



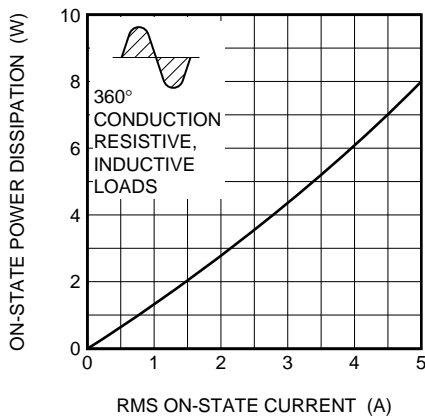
**GATE TRIGGER VOLTAGE VS. JUNCTION TEMPERATURE**



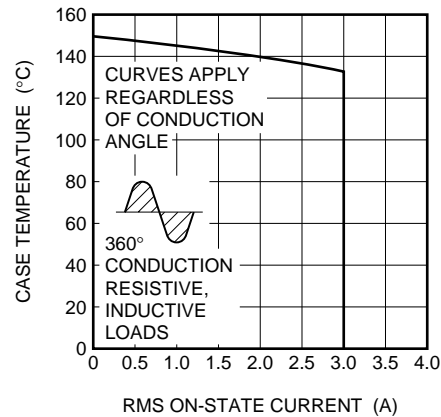
**MAXIMUM TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)**



**MAXIMUM ON-STATE POWER DISSIPATION**



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



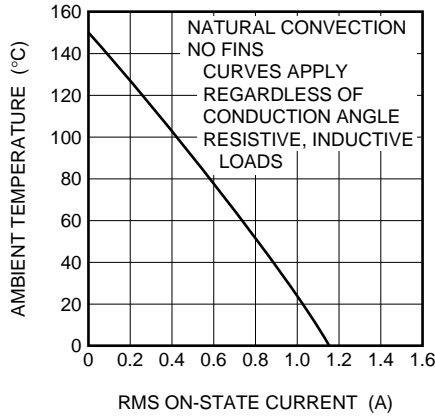
**BCR3AS**

LOW POWER USE

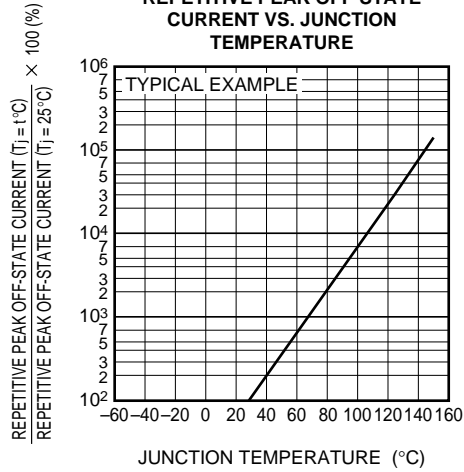
NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

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

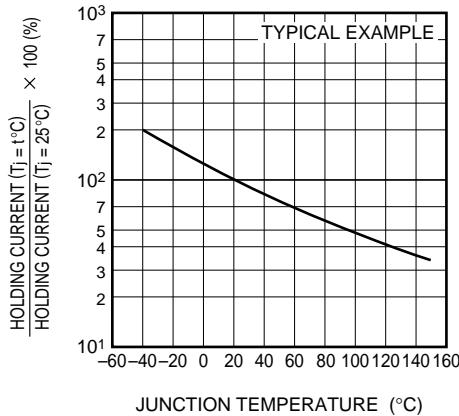
**ALLOWABLE AMBIENT TEMPERATURE VS. RMS ON-STATE CURRENT**



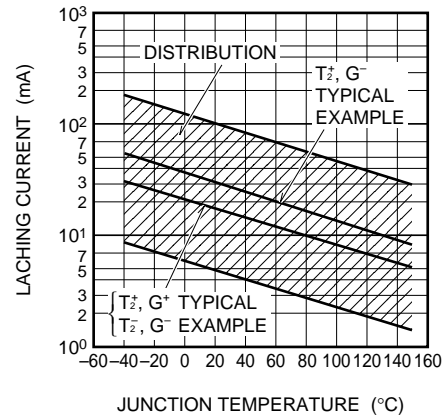
**REPETITIVE PEAK OFF-STATE CURRENT VS. JUNCTION TEMPERATURE**



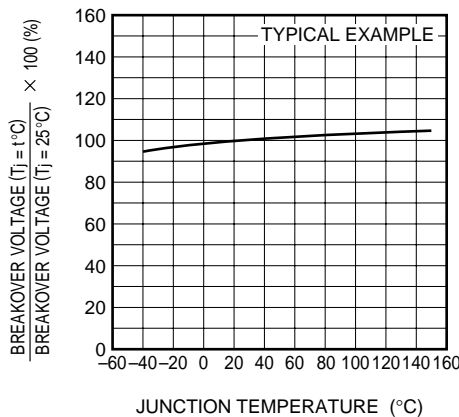
**HOLDING CURRENT VS. JUNCTION TEMPERATURE**



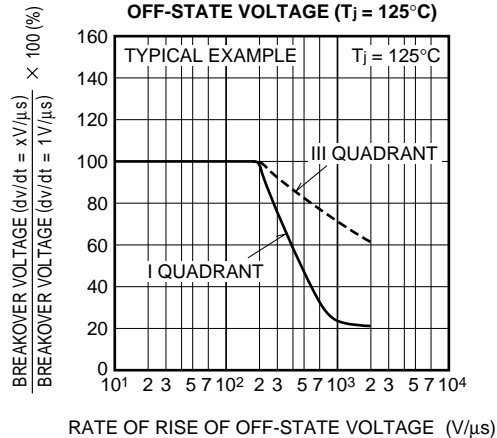
**LATCHING CURRENT VS. JUNCTION TEMPERATURE**



**BREAKOVER VOLTAGE VS. JUNCTION TEMPERATURE**



**BREAKOVER VOLTAGE VS. RATE OF RISE OF OFF-STATE VOLTAGE (Tj = 125°C)**

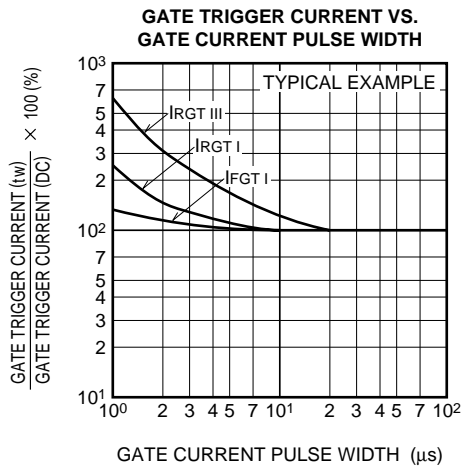
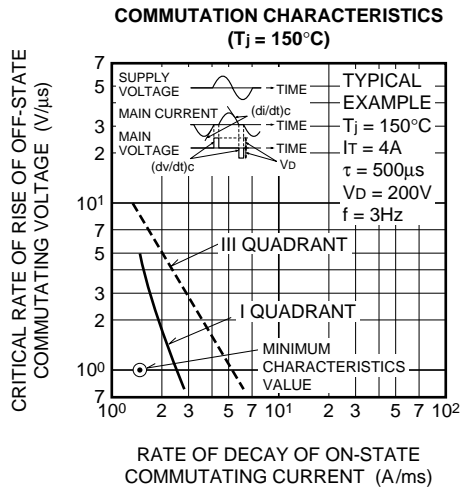
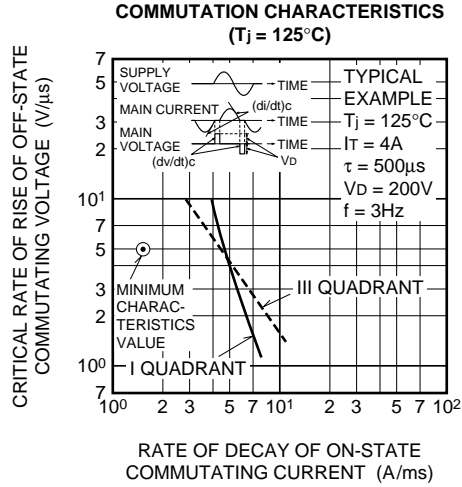
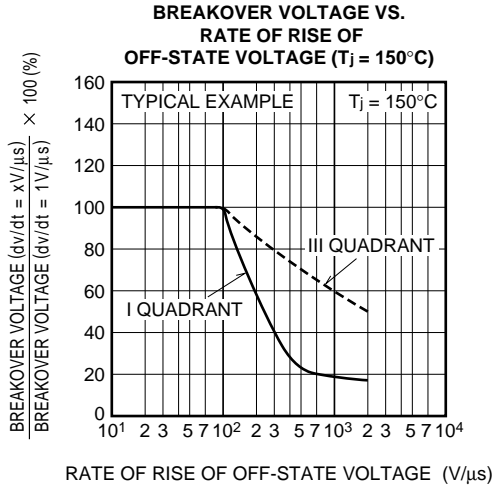


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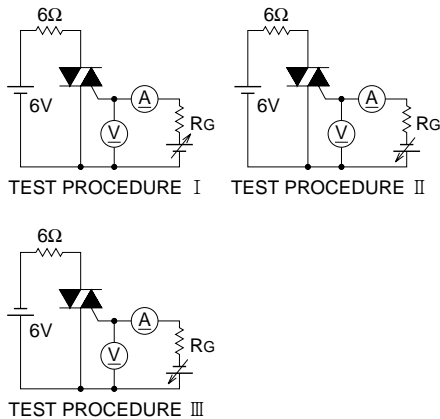
LOW POWER USE

NON-INSULATED TYPE, PLANAR PASSIVATION TYPE

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



**GATE TRIGGER CHARACTERISTICS TEST CIRCUITS**



**RECOMMENDED CIRCUIT VALUES AROUND THE TRIAC**

