To all our customers

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

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

BCR3PM

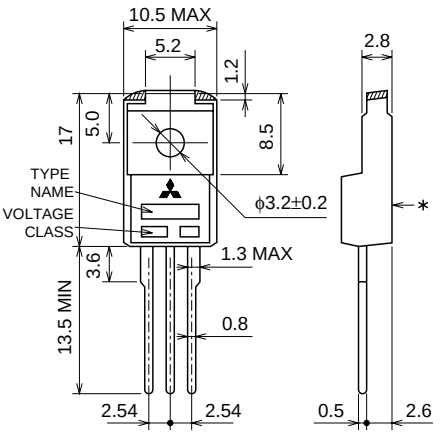
Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

LOW POWER USE
INSULATED TYPE, PLANAR PASSIVATION TYPE

BCR3PM

- **$I_{T\ (RMS)}$ 3A**
- **V_{DRM} 600V**
- **$I_{FGT\ I}$, $I_{RGT\ I}$, $I_{RGT\ III}$ 20mA (10mA) *5**
- **V_{iso} 2000V**
- **UL Recognized: Yellow Card No.E80276(N)**
  File No. E80271

OUTLINE DRAWING Dimensions in mm



TO-220F

APPLICATION

Contactless AC switches, light dimmer, electric blankets, control of household equipment such as electric fan, solenoid drivers, small motor control, 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=107°C	3.0	A
I_{TSM}	Surge on-state current	60Hz sinewave 1 full cycle, peak value, non-repetitive	30	A
I^2t	I^2t for fusing	Value corresponding to 1 cycle of half wave 60Hz, surge on-state current	3.7	A^2s
P_{GM}	Peak gate power dissipation		3	W
$P_{G\ (AV)}$	Average gate power dissipation		0.3	W
V_{GM}	Peak gate voltage		6	V
I_{GM}	Peak gate current		0.5	A
T_j	Junction temperature		–40 ~ +125	°C
T_{stg}	Storage temperature		–40 ~ +125	°C
—	Weight	Typical value	2.0	g
V_{iso}	Isolation voltage	T_a=25°C, AC 1 minute, T_1 · T_2 · G terminal to case	2000	V

*1. Gate open.

BCR3PM

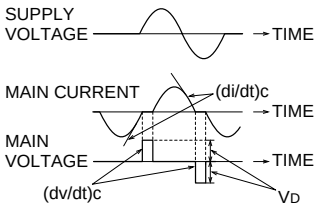
Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

LOW POWER USE
INSULATED TYPE, PLANAR PASSIVATION TYPE

ELECTRICAL CHARACTERISTICS

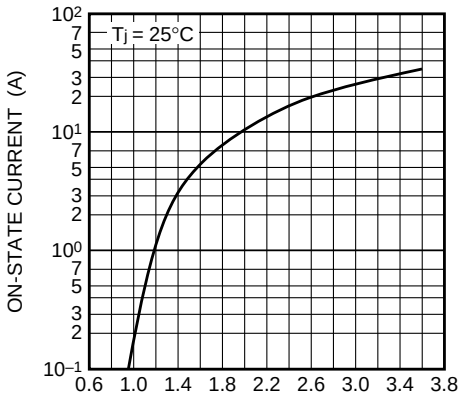
Symbol	Parameter		Test conditions	Limits			Unit
				Min.	Typ.	Max.	
I_{DRM}	Repetitive peak off-state current		T_j=125°C, V_{DRM} applied	—	—	2.0	mA
V_{TM}	On-state voltage		T_C=25°C, I_{TM}=4.5A, Instantaneous measurement	—	—	1.5	V
$V_{FGT\ I}$	Gate trigger voltage *2	Ⅰ	T_j=25°C, V_D=6V, R_L=6Ω, R_G=330Ω	—	—	1.5	V
$V_{RGT\ I}$		Ⅱ		—	—	1.5	V
$V_{RGT\ III}$		Ⅲ		—	—	1.5	V
$I_{FGT\ I}$	Gate trigger current *2	Ⅰ	T_j=25°C, V_D=6V, R_L=6Ω, R_G=330Ω	—	—	20*5	mA
$I_{RGT\ I}$		Ⅱ		—	—	20*5	mA
$I_{RGT\ III}$		Ⅲ		—	—	20*5	mA
V_{GD}	Gate non-trigger voltage		T_j=125°C, V_D=1/2V_{DRM}	0.2	—	—	V
$R_{th\ (j-c)}$	Thermal resistance		Junction to case *3	—	—	4.5	°C/W
$(dv/dt)_c$	Critical-rate of rise of off-state commutating voltage	*4	T_j=125°C	5	—	—	V/μs

*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°C/W.
*4. Test conditions of the critical-rate of rise of off-state commutating voltage is shown in the table below.
*5. High sensitivity (I_{GT}≤10mA) is also available. (I_{GT} item①)

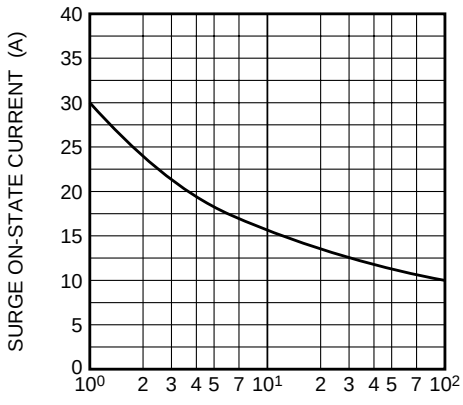
Test conditions	Commutating voltage and current waveforms (inductive load)
1. Junction temperature T_j=125°C 2. Rate of decay of on-state commutating current $(di/dt)_c$=–1.5A/ms 3. Peak off-state voltage V_D=400V	

PERFORMANCE CURVES

MAXIMUM ON-STATE CHARACTERISTICS



RATED SURGE ON-STATE CURRENT

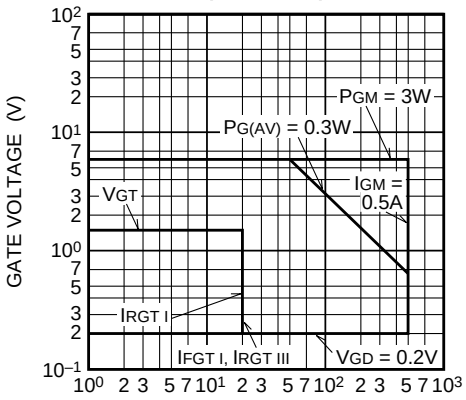


BCR3PM

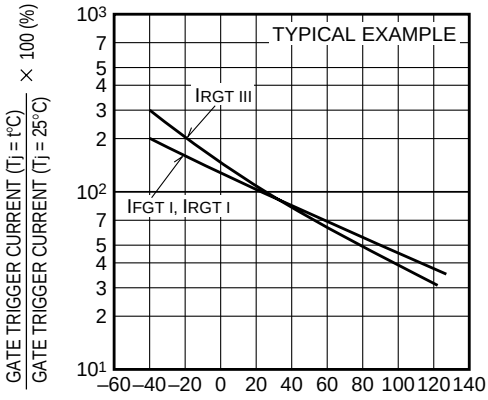
Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

LOW POWER USE
INSULATED TYPE, PLANAR PASSIVATION TYPE

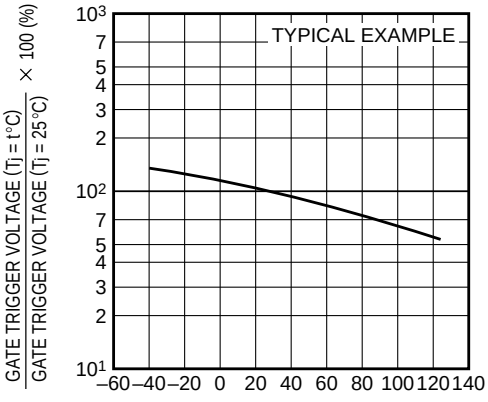
GATE CHARACTERISTICS (I, II AND III)



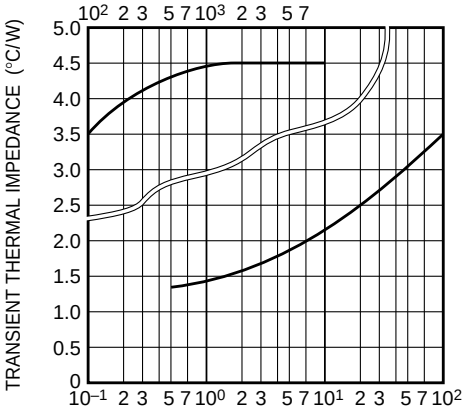
GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE



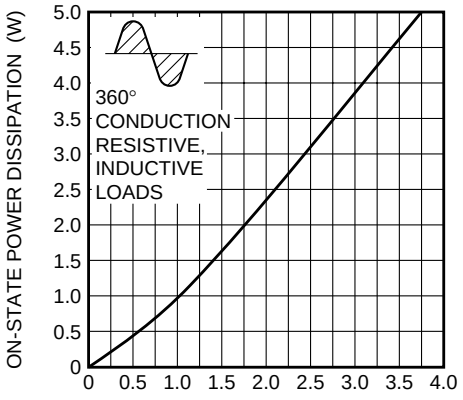
GATE TRIGGER VOLTAGE VS. JUNCTION TEMPERATURE



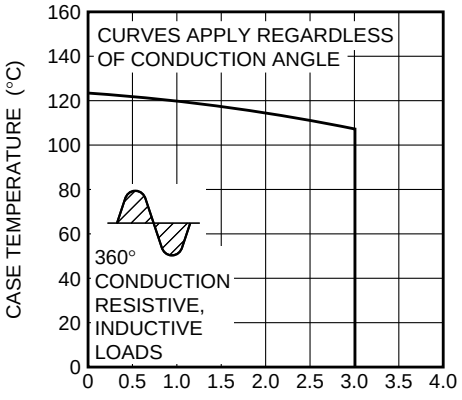
MAXIMUM TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



MAXIMUM ON-STATE POWER DISSIPATION

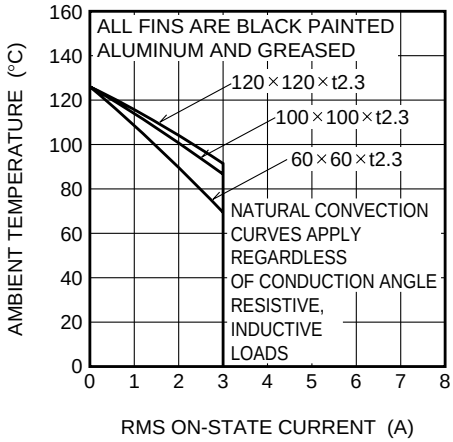


ALLOWABLE CASE TEMPERATURE VS. RMS ON-STATE CURRENT

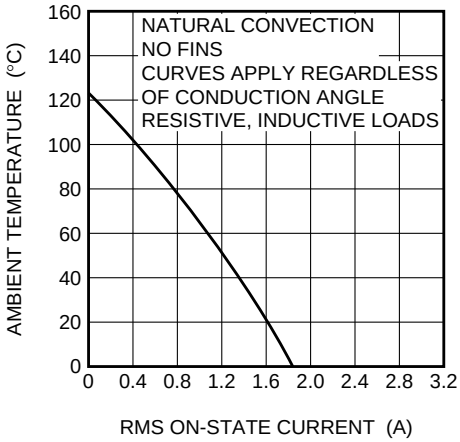


Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

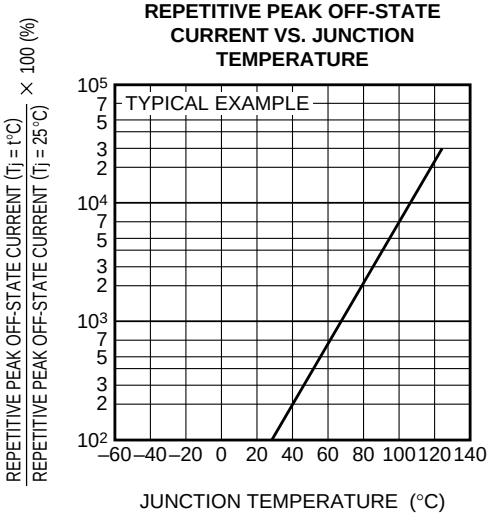
ALLOWABLE AMBIENT TEMPERATURE VS. RMS ON-STATE CURRENT



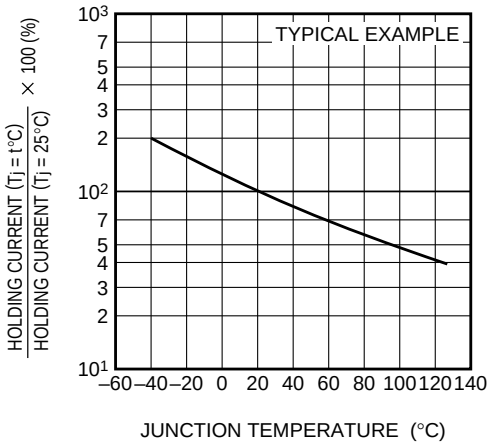
ALLOWABLE AMBIENT TEMPERATURE VS. RMS ON-STATE CURRENT



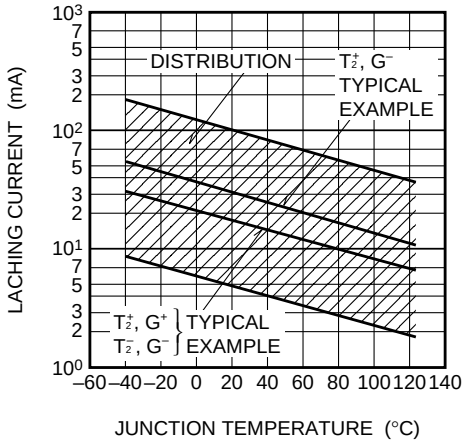
REPETITIVE PEAK OFF-STATE CURRENT VS. JUNCTION TEMPERATURE



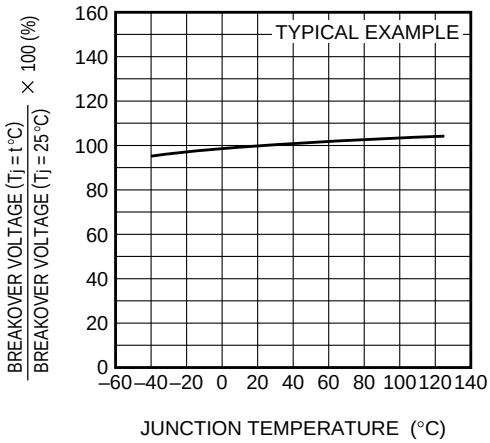
HOLDING CURRENT VS. JUNCTION TEMPERATURE



LACHING CURRENT VS. JUNCTION TEMPERATURE

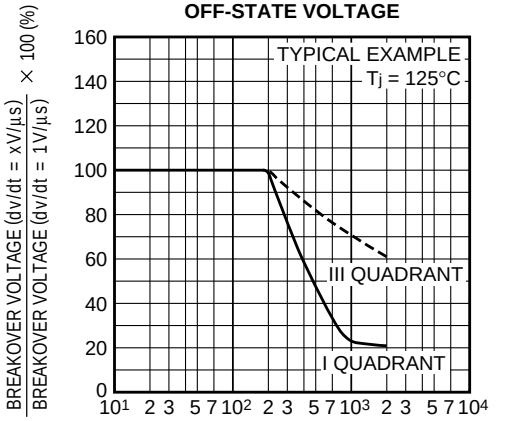


BREAKOVER VOLTAGE VS. JUNCTION TEMPERATURE

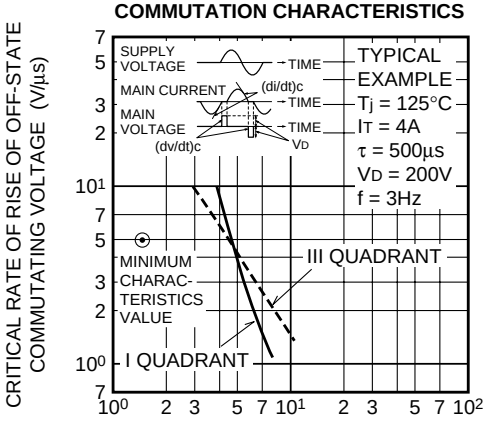


Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

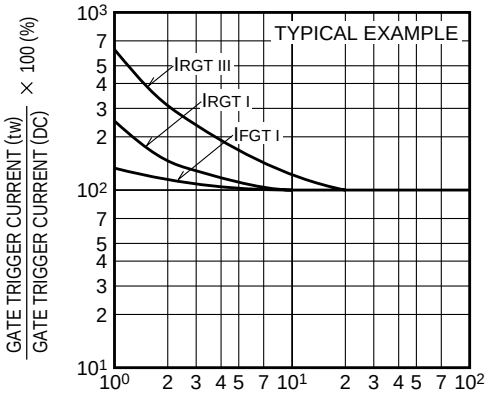
BREAKOVER VOLTAGE VS. RATE OF RISE OF OFF-STATE VOLTAGE



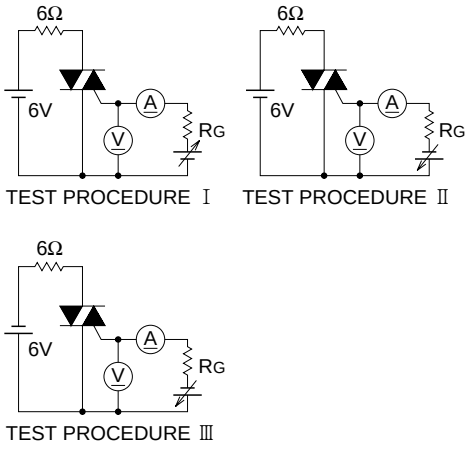
COMMUTATION CHARACTERISTICS



GATE TRIGGER CURRENT VS. GATE CURRENT PULSE WIDTH



GATE TRIGGER CHARACTERISTICS TEST CIRCUITS



BCR3PM

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

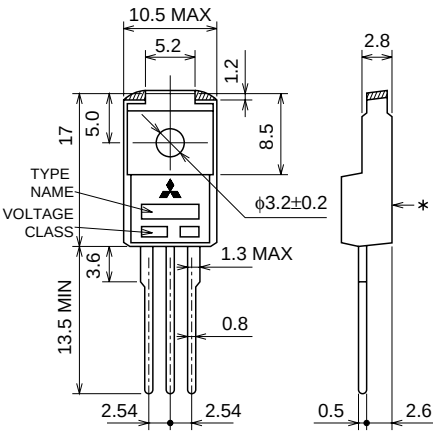
LOW POWER USE
INSULATED TYPE, PLANAR PASSIVATION TYPE

BCR3PM

- **$I_{T\ (RMS)}$ 3A**
- **V_{DRM} 600V**
- **$I_{FGT\ I}$, $I_{RGT\ I}$, $I_{RGT\ III}$ 20mA (10mA) *5**
- **V_{iso} 2000V**
- **UL Recognized: Yellow Card No.E80276(N)**
  File No. E80271

OUTLINE DRAWING

Dimensions in mm



TO-220F

APPLICATION

Contactless AC switches, light dimmer, electric blankets,
control of household equipment such as electric fan,
solenoid drivers, small motor control, 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=132°C	3.0	A
I_{TSM}	Surge on-state current	60Hz sinewave 1 full cycle, peak value, non-repetitive	30	A
I^2t	I^2t for fusing	Value corresponding to 1 cycle of half wave 60Hz, surge on-state current	3.7	A^2s
P_{GM}	Peak gate power dissipation		3	W
$P_{G\ (AV)}$	Average gate power dissipation		0.3	W
V_{GM}	Peak gate voltage		6	V
I_{GM}	Peak gate current		0.5	A
T_j	Junction temperature		–40 ~ +150	°C
T_{stg}	Storage temperature		–40 ~ +150	°C
—	Weight	Typical value	2.0	g
V_{iso}	Isolation voltage	T_a=25°C, AC 1 minute, T_1 · T_2 · G terminal to case	2000	V

*1. Gate open.

BCR3PM

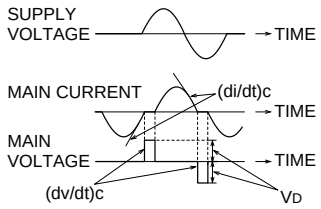
The product guaranteed maximum junction temperature 150°C (See warning.)

LOW POWER USE
INSULATED TYPE, PLANAR PASSIVATION TYPE

ELECTRICAL CHARACTERISTICS

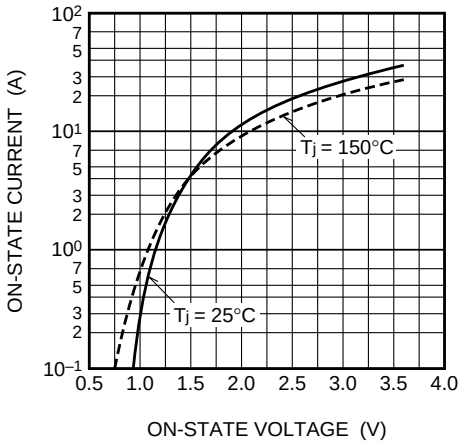
Symbol	Parameter		Test conditions	Limits			Unit
				Min.	Typ.	Max.	
I_{DRM}	Repetitive peak off-state current		T_j=150°C, V_{DRM} applied	—	—	2.0	mA
V_{TM}	On-state voltage		T_C=25°C, I_{TM}=4.5A, Instantaneous measurement	—	—	1.5	V
$V_{FGT\ I}$	Gate trigger voltage *2	Ⅰ	T_j=25°C, V_D=6V, R_L=6Ω, R_G=330Ω	—	—	1.5	V
$V_{RGT\ I}$		Ⅱ		—	—	1.5	V
$V_{RGT\ III}$		Ⅲ		—	—	1.5	V
$I_{FGT\ I}$	Gate trigger current *2	Ⅰ	T_j=25°C, V_D=6V, R_L=6Ω, R_G=330Ω	—	—	20*5	mA
$I_{RGT\ I}$		Ⅱ		—	—	20*5	mA
$I_{RGT\ III}$		Ⅲ		—	—	20*5	mA
V_{GD}	Gate non-trigger voltage		T_j=125°C/150°C, V_D=1/2V_{DRM}	0.2/0.1	—	—	V
$R_{th\ (j-c)}$	Thermal resistance		Junction to case *3	—	—	4.5	°C/W
$(dv/dt)_c$	Critical-rate of rise of off-state commutating voltage	*4	T_j=125°C/150°C	5/1	—	—	V/μs

*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°C/W.
*4. Test conditions of the critical-rate of rise of off-state commutating voltage is shown in the table below.
*5. High sensitivity (I_{GT}≤10mA) is also available. (I_{GT} item①)

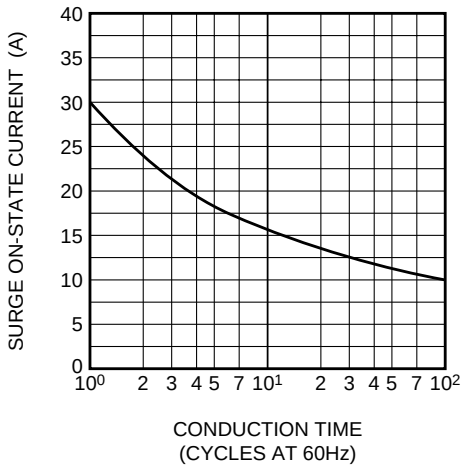
Test conditions	Commutating voltage and current waveforms (inductive load)
1. Junction temperature T_j=125°C/150°C 2. Rate of decay of on-state commutating current $(di/dt)_c$=–1.5A/ms 3. Peak off-state voltage V_D=400V	

PERFORMANCE CURVES

MAXIMUM ON-STATE CHARACTERISTICS



RATED SURGE ON-STATE CURRENT

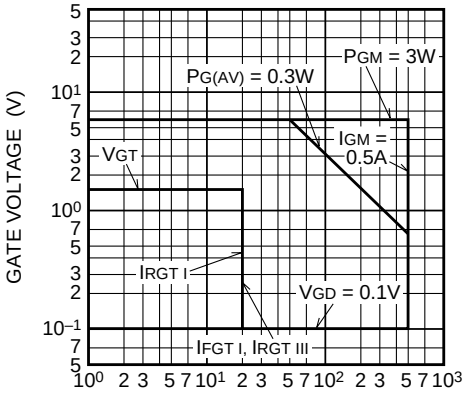


BCR3PM

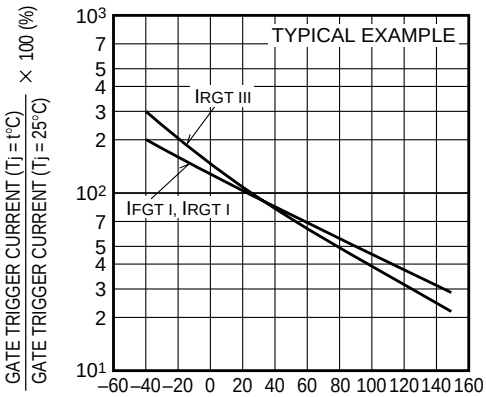
The product guaranteed maximum junction temperature 150°C (See warning.)

LOW POWER USE
INSULATED TYPE, PLANAR PASSIVATION TYPE

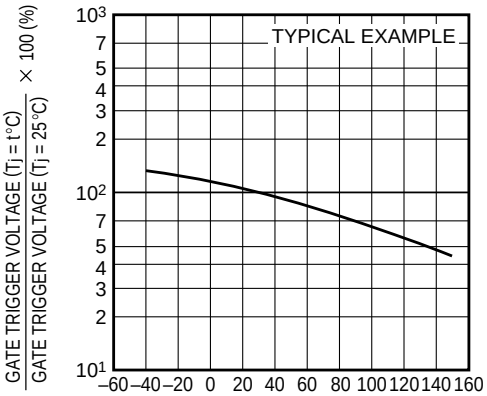
GATE CHARACTERISTICS (I, II AND III)



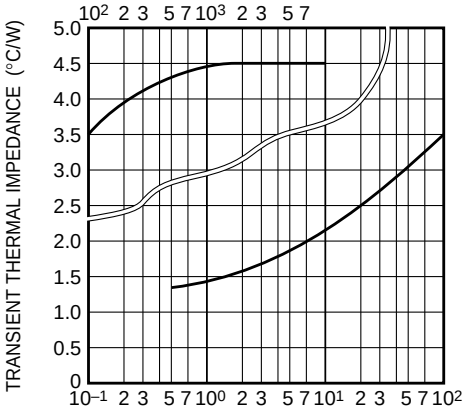
GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE



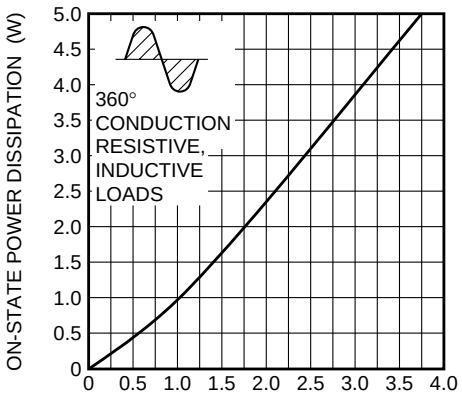
GATE TRIGGER VOLTAGE VS. JUNCTION TEMPERATURE



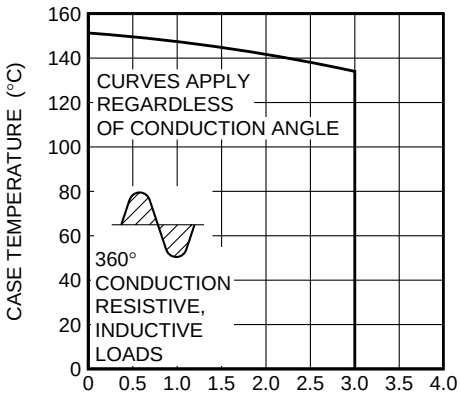
MAXIMUM TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)



MAXIMUM ON-STATE POWER DISSIPATION



ALLOWABLE CASE TEMPERATURE VS. RMS ON-STATE CURRENT

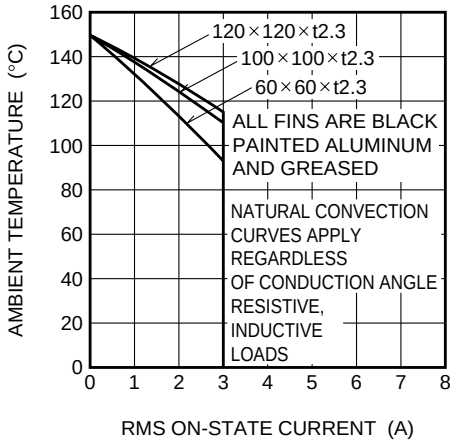


BCR3PM

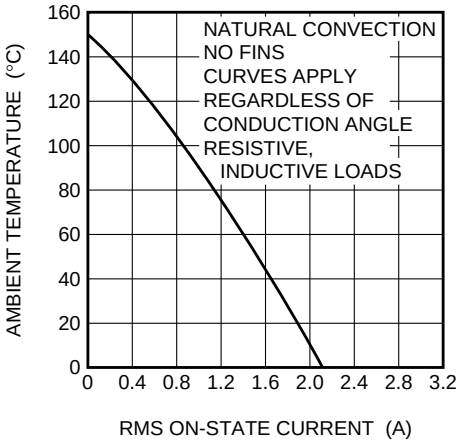
The product guaranteed maximum junction temperature 150°C (See warning.)

LOW POWER USE
INSULATED TYPE, PLANAR PASSIVATION TYPE

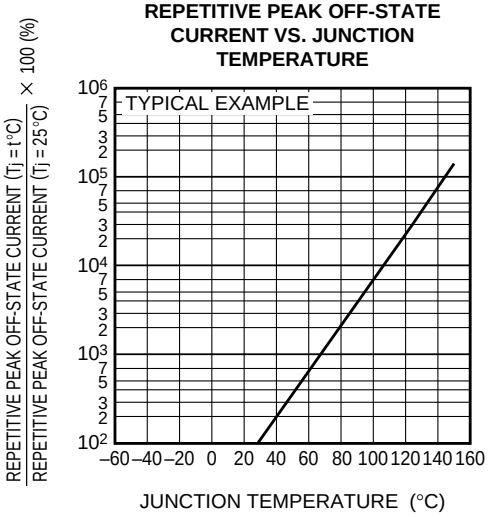
ALLOWABLE AMBIENT TEMPERATURE VS. RMS ON-STATE CURRENT



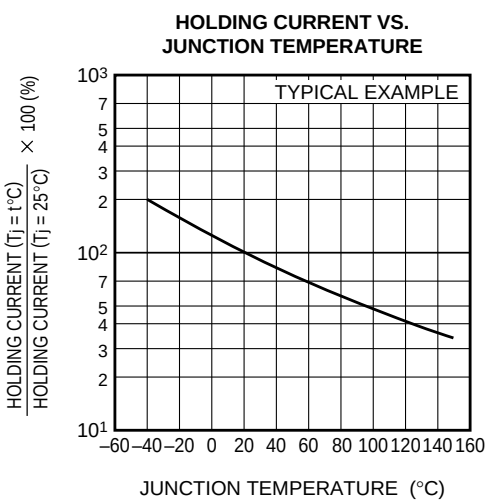
ALLOWABLE AMBIENT TEMPERATURE VS. RMS ON-STATE CURRENT



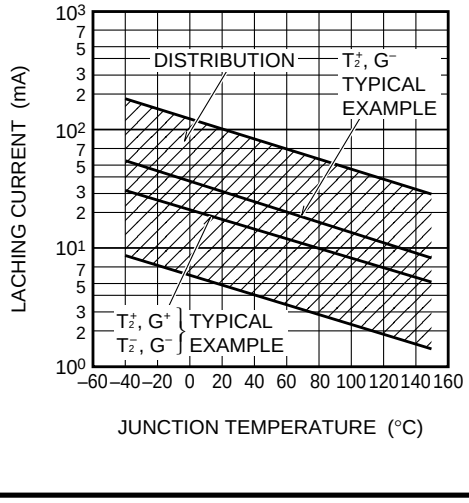
REPETITIVE PEAK OFF-STATE CURRENT VS. JUNCTION TEMPERATURE



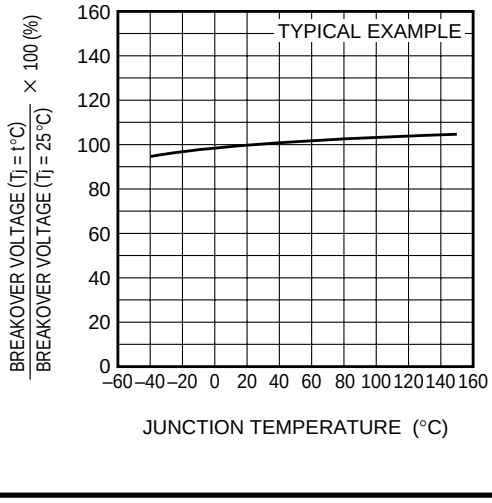
HOLDING CURRENT VS. JUNCTION TEMPERATURE



LACHING CURRENT VS. JUNCTION TEMPERATURE



BREAKOVER VOLTAGE VS. JUNCTION TEMPERATURE

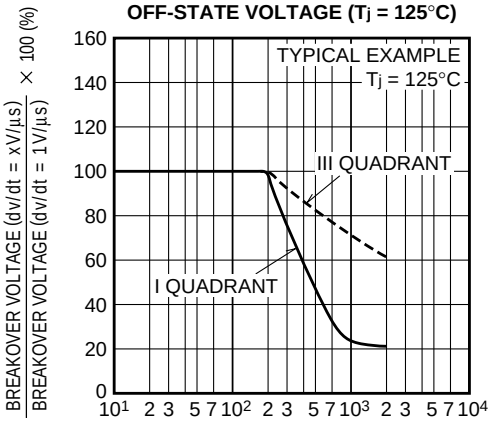


BCR3PM

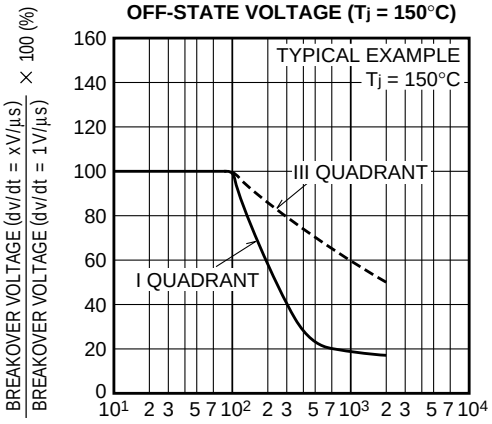
The product guaranteed maximum junction temperature 150°C (See warning.)

LOW POWER USE
INSULATED TYPE, PLANAR PASSIVATION TYPE

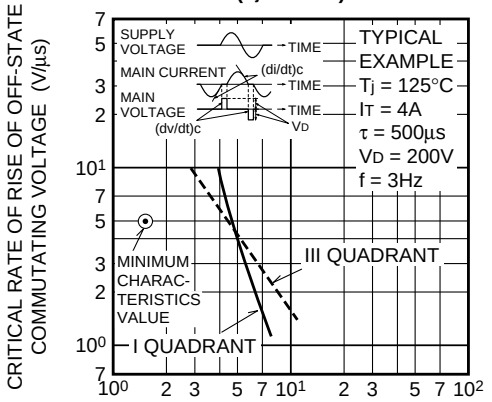
BREAKOVER VOLTAGE VS. RATE OF RISE OF OFF-STATE VOLTAGE (T_j = 125°C)



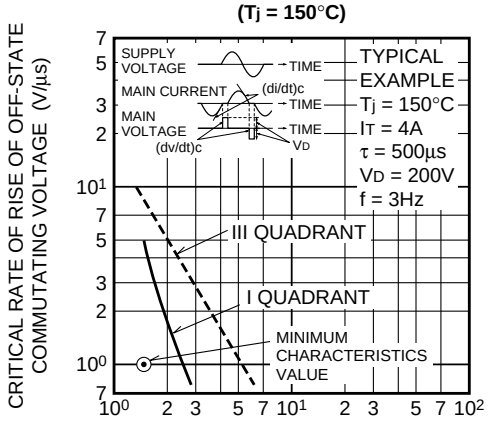
BREAKOVER VOLTAGE VS. RATE OF RISE OF OFF-STATE VOLTAGE (T_j = 150°C)



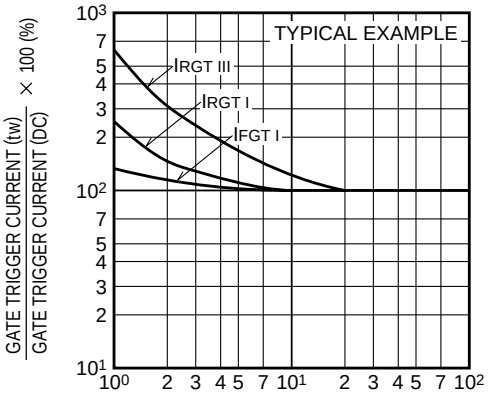
COMMUTATION CHARACTERISTICS (T_j = 125°C)



COMMUTATION CHARACTERISTICS (T_j = 150°C)



GATE TRIGGER CURRENT VS. GATE CURRENT PULSE WIDTH

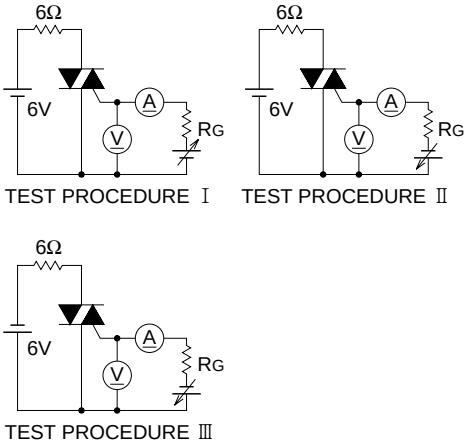


BCR3PM

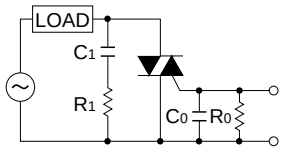
The product guaranteed maximum junction temperature 150°C (See warning.)

LOW POWER USE
INSULATED TYPE, PLANAR PASSIVATION TYPE

GATE TRIGGER CHARACTERISTICS TEST CIRCUITS



RECOMMENDED CIRCUIT VALUES AROUND THE TRIAC



C_1 = 0.1~0.47μF C_0 = 0.1μF
R_1 = 47~100Ω R_0 = 100Ω