

BCR12CM-12L

Triac

Medium Power Use

REJ03G0297-0100

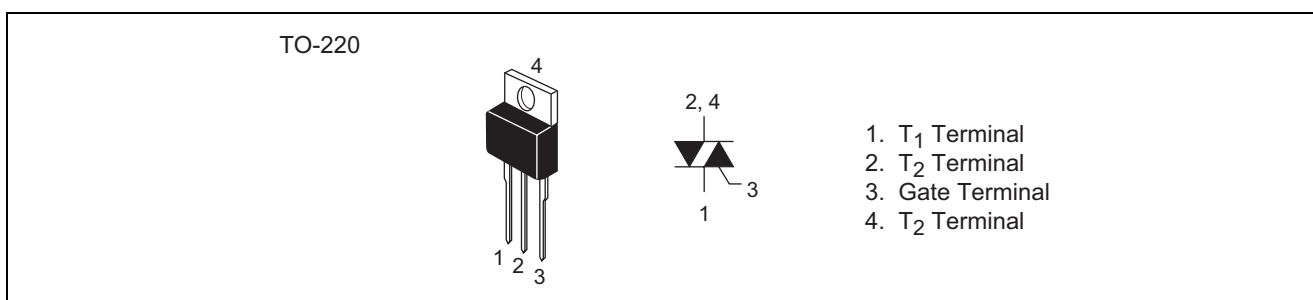
Rev.1.00

Aug.20.2004

Features

- $I_{T(RMS)}$: 12 A
- V_{DRM} : 600 V
- I_{FGTI} , I_{RGTI} , I_{RGTIII} : 30 mA (20 mA)^{Note6}
- Non-Insulated Type
- Planar Passivation Type

Outline



Applications

Contactless AC switch, light dimmer, electronic flasher unit, control of household equipment such as TV sets, stereo systems, refrigerator, washing machine, infrared kotatsu, carpet, electric fan, and solenoid driver, small motor control, copying machine, electric tool, electric heater control, and other general purpose control applications

Maximum Ratings

Parameter	Symbol	Voltage class	Unit
		12	
Repetitive peak off-state voltage ^{Note1}	V_{DRM}	600	V
Non-repetitive peak off-state voltage ^{Note1}	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, $T_c = 98^\circ\text{C}$ ^{Note3}
Surge on-state current	I_{TSM}	120	A	60Hz sinewave 1 full cycle, peak value, non-repetitive
I^2t for fusing	I^2t	60	A^2s	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 +125	$^\circ\text{C}$	
Storage temperature	T_{stg}	- 40 to +125	$^\circ\text{C}$	
Mass	—	2.0	g	Typical value

Notes: 1. Gate open.

Electrical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test conditions
Repetitive peak off-state current	I_{DRM}	—	—	2.0	mA	$T_j = 125^\circ\text{C}$, 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 ^{Note2}	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	
	III	V_{RGTIII}	—	—	1.5	
Gate trigger current ^{Note2}	I	I_{FGTI}	—	—	30 ^{Note6}	$T_j = 25^\circ\text{C}$, $V_D = 6\text{ V}$, $R_L = 6\ \Omega$, $R_G = 330\ \Omega$
	II	I_{RGTI}	—	—	30 ^{Note6}	
	III	I_{RGTIII}	—	—	30 ^{Note6}	
Gate non-trigger voltage	V_{GD}	0.2	—	—	V	$T_j = 125^\circ\text{C}$, $V_D = 1/2 V_{DRM}$
Thermal resistance	$R_{th(j-c)}$	—	—	1.8	$^\circ\text{C/W}$	Junction to case ^{Note3 Note4}
Critical-rate of rise of off-state commutating voltage ^{Note5}	$(dv/dt)_c$	10	—	—	$\text{V}/\mu\text{s}$	$T_j = 125^\circ\text{C}$

Notes: 2. Measurement using the gate trigger characteristics measurement circuit.

3. Case temperature is measured at the T_2 tab 1.5 mm away from the molded case.

4. The contact thermal resistance $R_{th(c-f)}$ in case of greasing is 1.0°C/W .

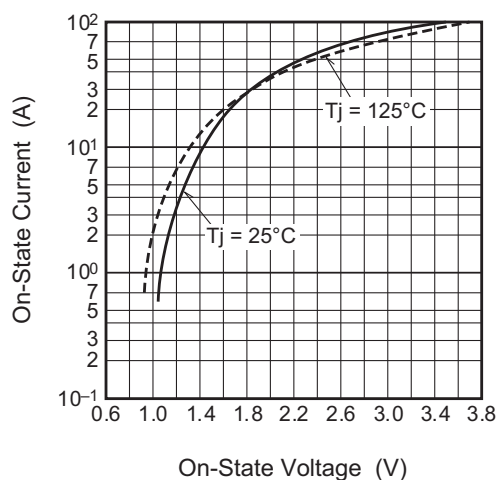
5. Test conditions of the critical-rate of rise of off-state commutating voltage is shown in the table below.

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

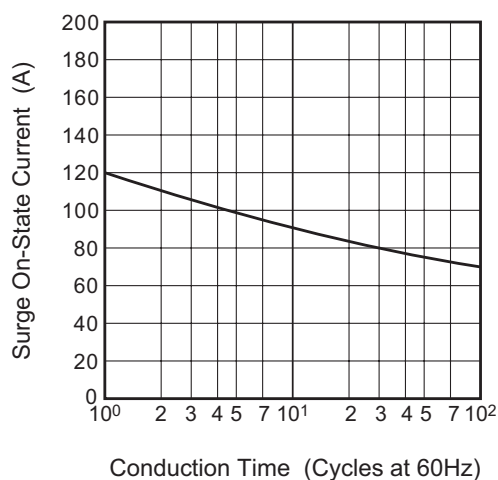
Test conditions	Commutating voltage and current waveforms (inductive load)
1. Junction temperature $T_j = 125^\circ\text{C}$ 2. Rate of decay of on-state commutating current $(di/dt)_c = -6.0\text{ A/ms}$ 3. Peak off-state voltage $V_D = 400\text{ V}$	

Performance Curves

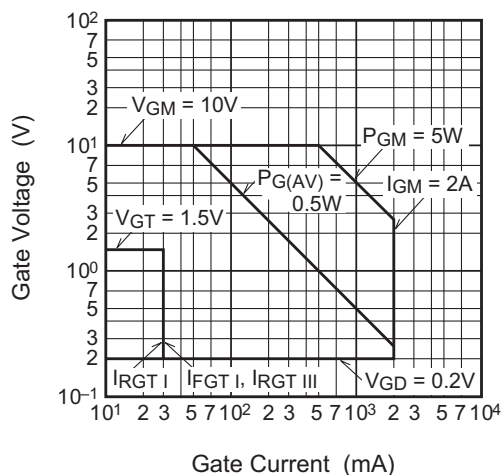
Maximum On-State Characteristics



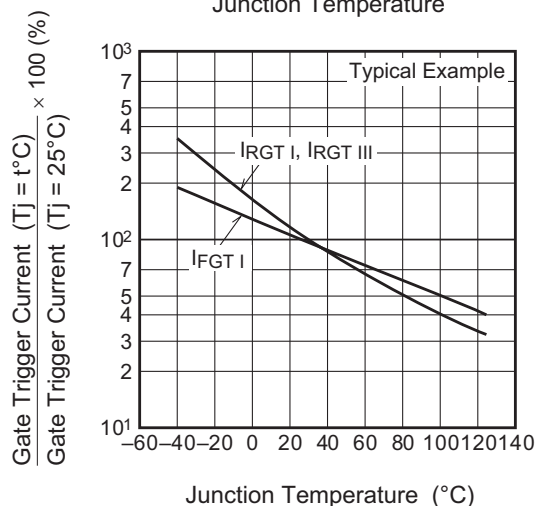
Rated Surge On-State Current



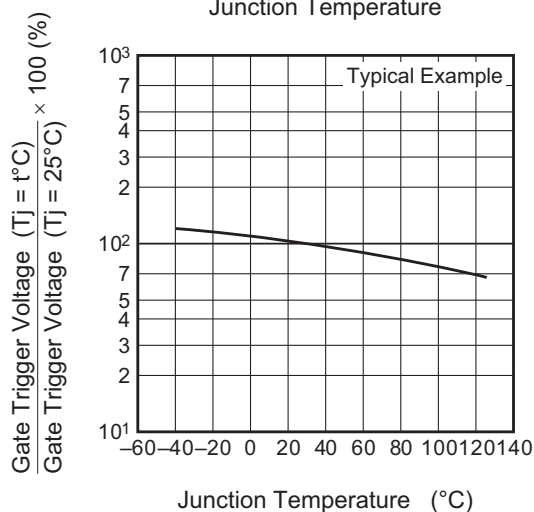
Gate Characteristics (I, II and III)



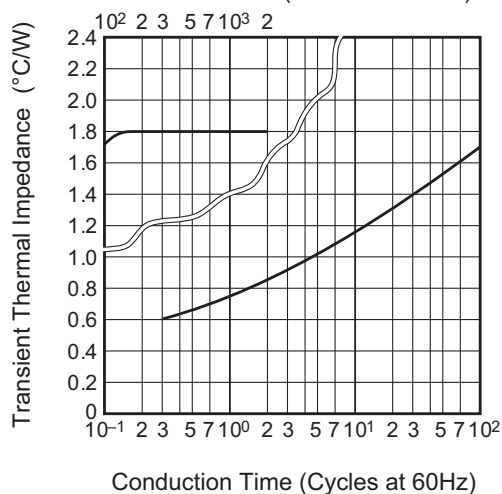
Gate Trigger Current vs. Junction Temperature

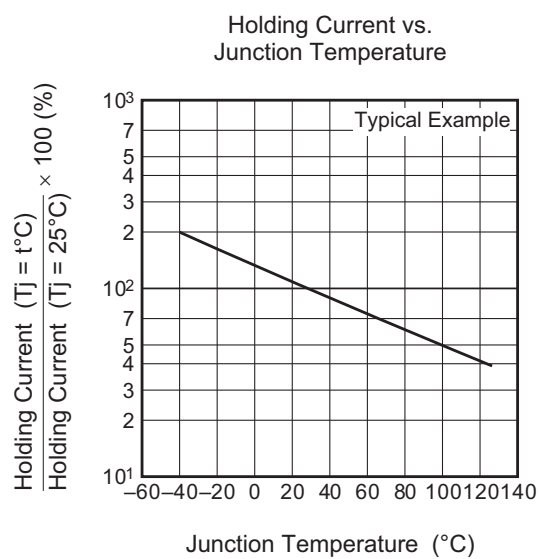
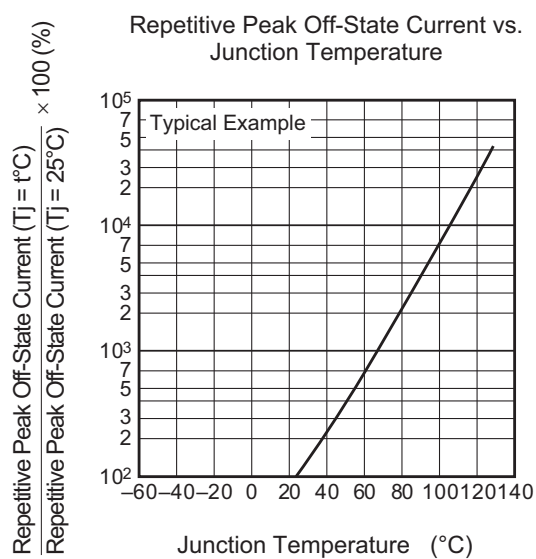
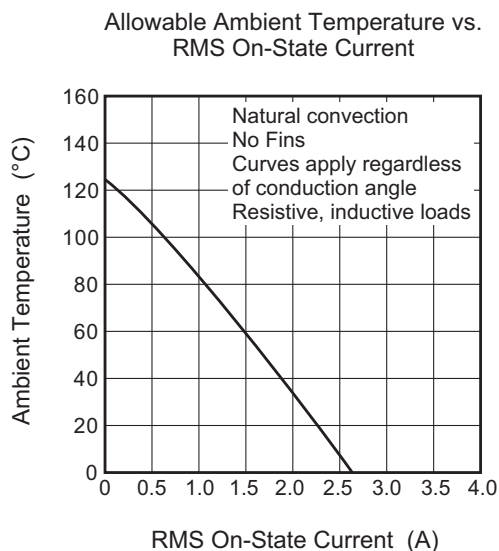
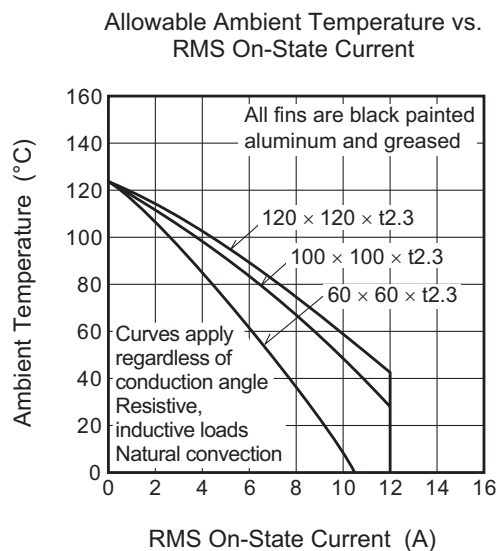
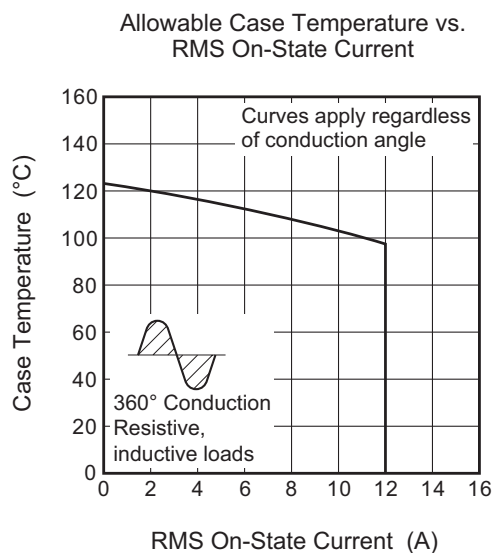
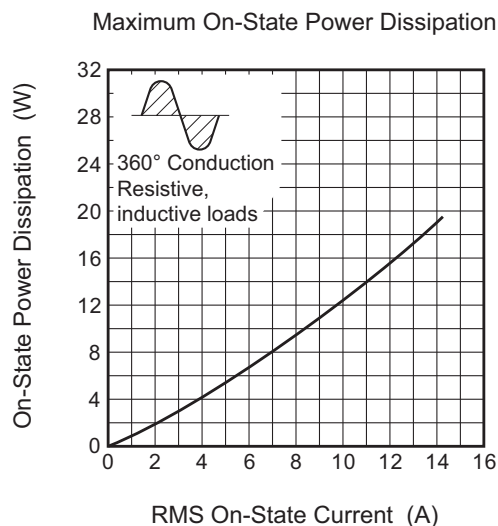


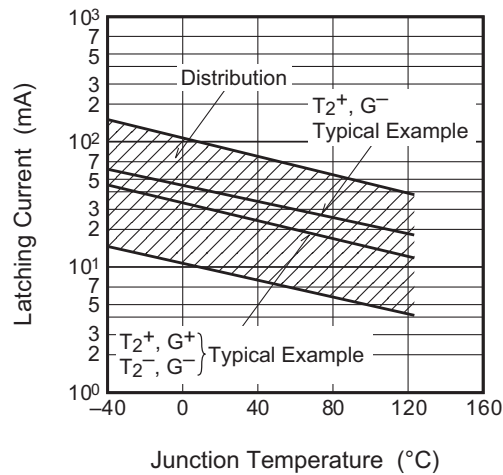
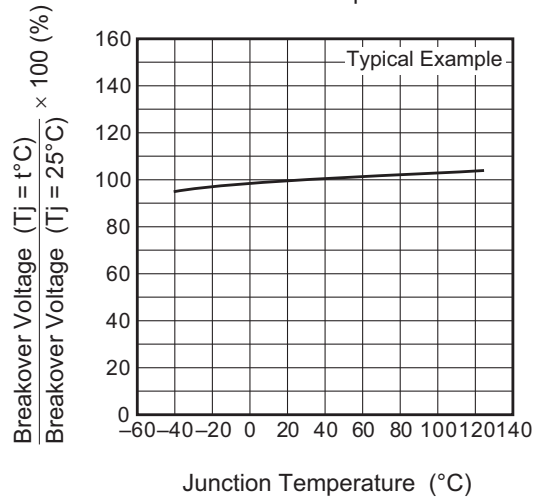
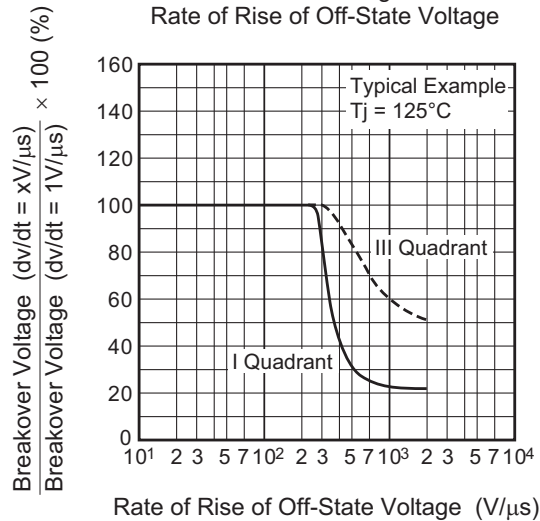
Gate Trigger Voltage vs. Junction Temperature



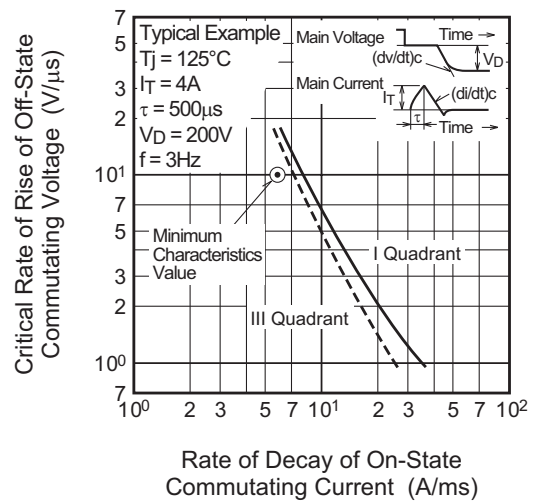
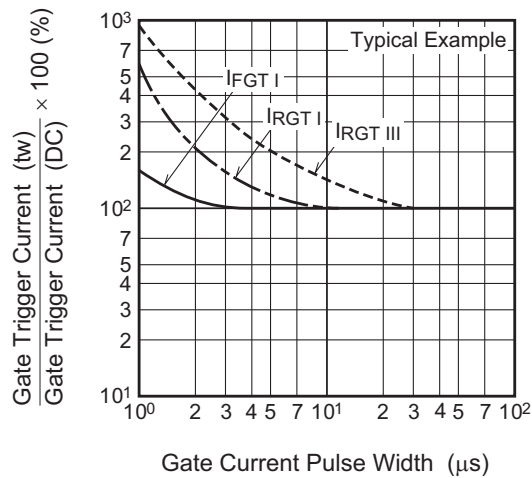
Maximum Transient Thermal Impedance Characteristics (Junction to case)



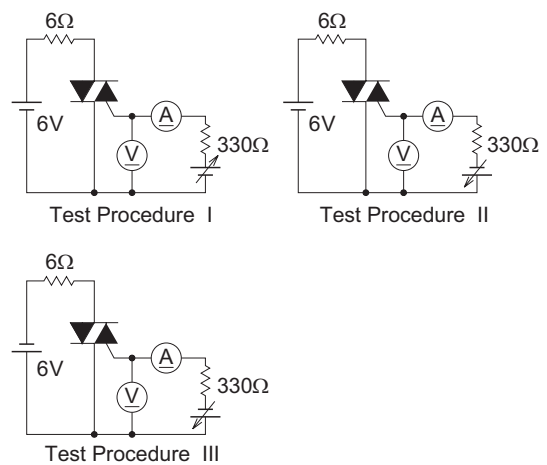


Latching Current vs.
Junction TemperatureBreakover Voltage vs.
Junction TemperatureBreakover Voltage vs.
Rate of Rise of Off-State Voltage

Commutation Characteristics

Gate Trigger Current vs.
Gate Current Pulse Width

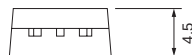
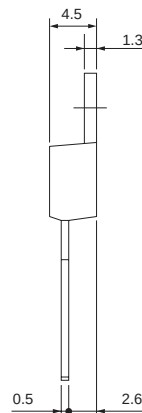
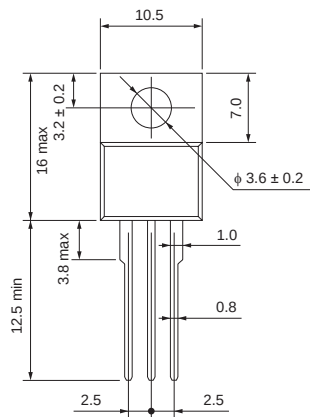
Gate Trigger Characteristics Test Circuits



Package Dimensions

TO-220

EIAJ Package Code	JEDEC Code	Mass (g) (reference value)	Lead Material
Conforms	Conforms	2.0	Cu alloy



Note 1) The dimensional figures indicate representative values unless otherwise the tolerance is specified.

Symbol	Dimension in Millimeters		
	Min	Typ	Max
A	—	—	—
A ₁	—	—	—
A ₂	—	—	—
b	—	—	—
D	—	—	—
E	—	—	—
e	—	—	—
x	—	—	—
y	—	—	—
y ₁	—	—	—
ZD	—	—	—
ZE	—	—	—

Order Code

Lead form	Standard packing	Quantity	Standard order code	Standard order code example
Straight type	Vinyl sack	100	Type name +A	BCR12CM-12LA
Lead form	Plastic Magazine (Tube)	50	Type name +A – Lead forming code	BCR12CM-12LA-A8

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



BCR12CM-12L

Triac

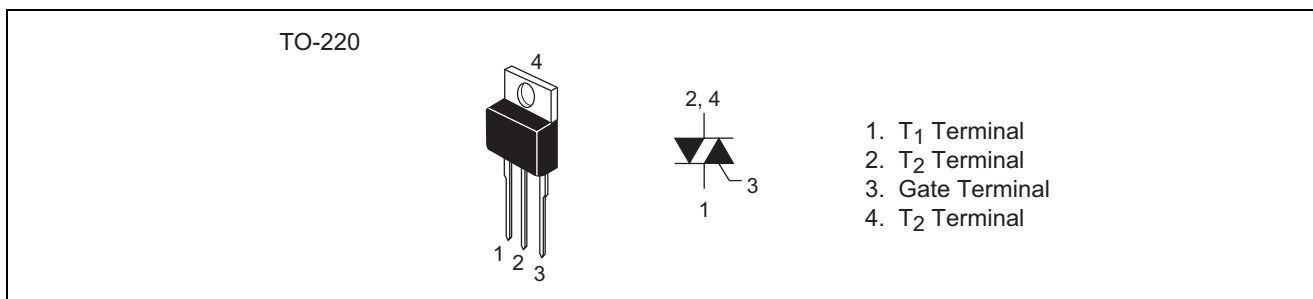
Medium Power Use

(The product guaranteed maximum junction temperature of 150°C)

Features

- $I_T(RMS)$: 12 A
- V_{DRM} : 600 V
- I_{FGTI} , I_{RGTI} , I_{RGTIII} : 30 mA (20 mA)^{Note6}
- Non-Insulated Type
- Planar Passivation Type

Outline



Applications

Contactless AC switch, light dimmer, electronic flasher unit, control of household equipment such as TV sets, stereo systems, refrigerator, washing machine, infrared kotatsu, carpet, electric fan, and solenoid driver, small motor control, copying machine, electric tool, electric heater control, and 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. Otherwise, general triacs with the maximum junction temperature of 125°C will be supplied.

Maximum Ratings

Parameter	Symbol	Voltage class	Unit
		12	
Repetitive peak off-state voltage ^{Note1}	V_{DRM}	600	V
Non-repetitive peak off-state voltage ^{Note1}	V_{DSM}	720	V

BCR12CM-12L (The product guaranteed maximum junction temperature of 150°C)

Parameter	Symbol	Ratings	Unit	Conditions
RMS on-state current	$I_{T(RMS)}$	12	A	Commercial frequency, sine full wave 360° conduction, $T_c = 123^{\circ}\text{C}$ ^{Note3}
Surge on-state current	I_{TSM}	120	A	60Hz sinewave 1 full cycle, peak value, non-repetitive
I^2t for fusing	I^2t	60	A^2s	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	$^{\circ}\text{C}$	
Weight	—	2.0	g	Typical value

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 ^{Note2}	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 ^{Note2}	I I_{FGTI}	—	—	30 ^{Note6}	mA	$T_j = 25^{\circ}\text{C}$, $V_D = 6\text{ V}$, $R_L = 6\ \Omega$, $R_G = 330\ \Omega$
	II I_{RGTI}	—	—	30 ^{Note6}	mA	
	III I_{RGTIII}	—	—	30 ^{Note6}	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	$R_{th(j-c)}$	—	—	1.8	$^{\circ}\text{C/W}$	Junction to case ^{Note3 Note4}
Critical-rate of rise of off-state commutating voltage ^{Note5}	$(dv/dt)_c$	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.

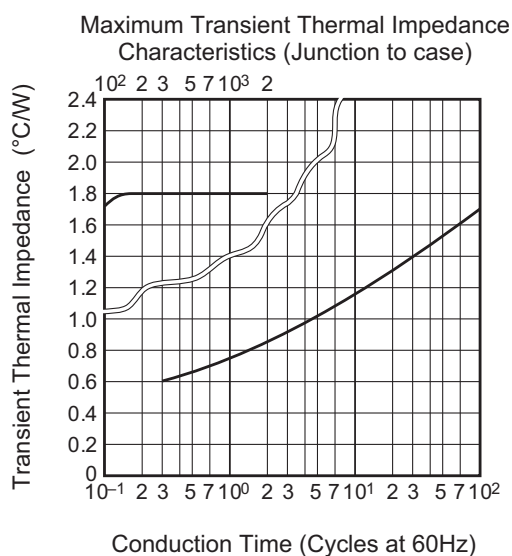
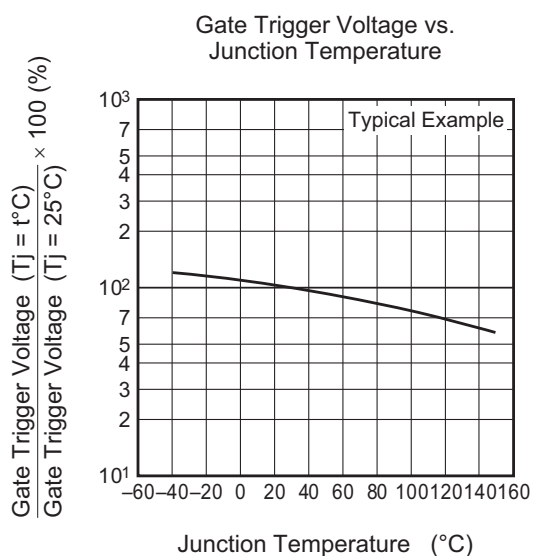
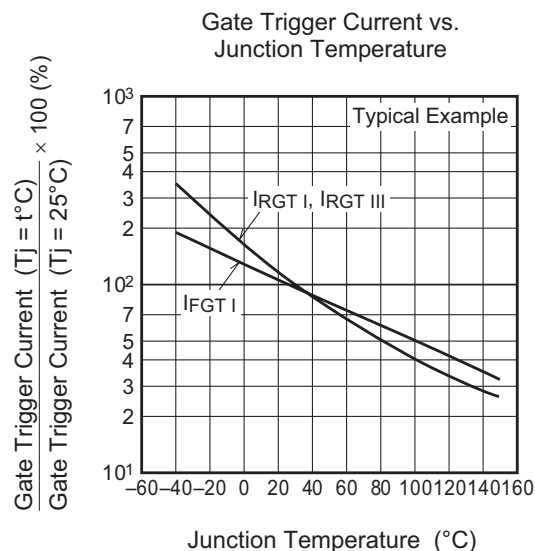
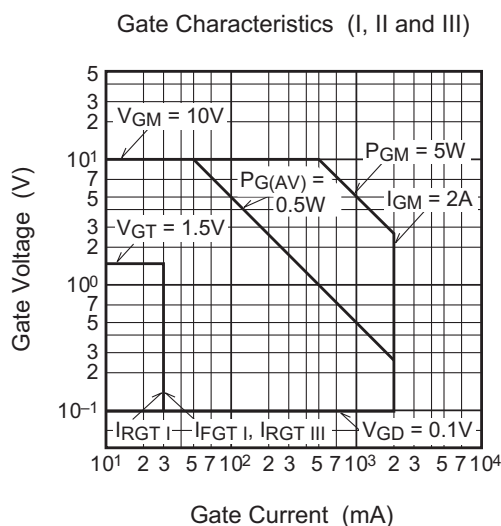
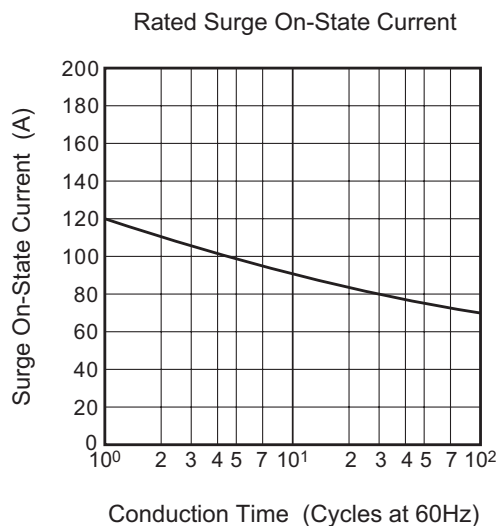
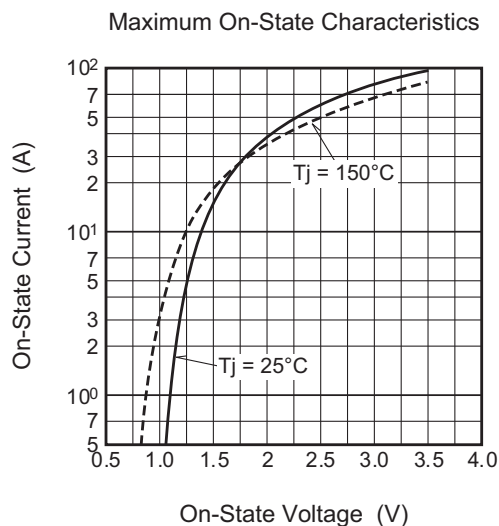
3. Case temperature is measured at the T_2 tab 1.5 mm away from the molded case.4. The contact thermal resistance $R_{th(c-f)}$ in case of greasing is 1.0°C/W .

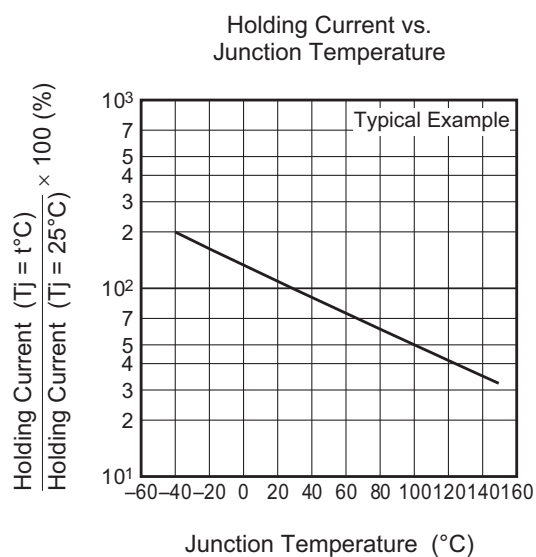
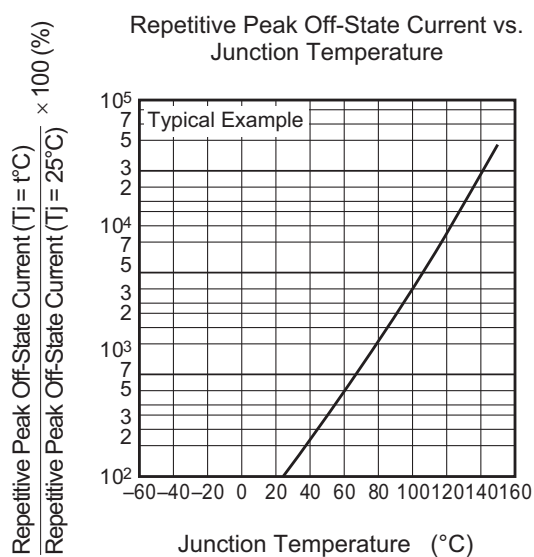
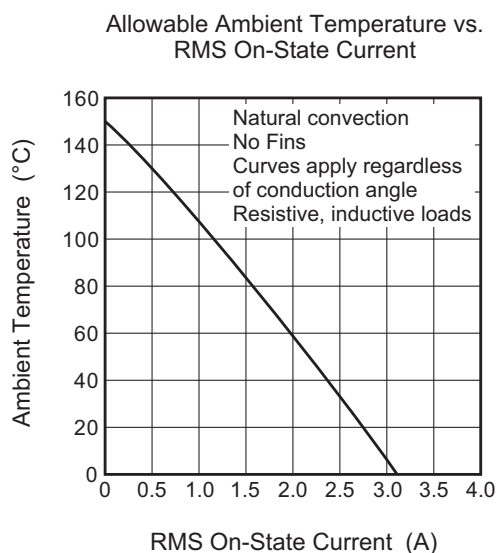
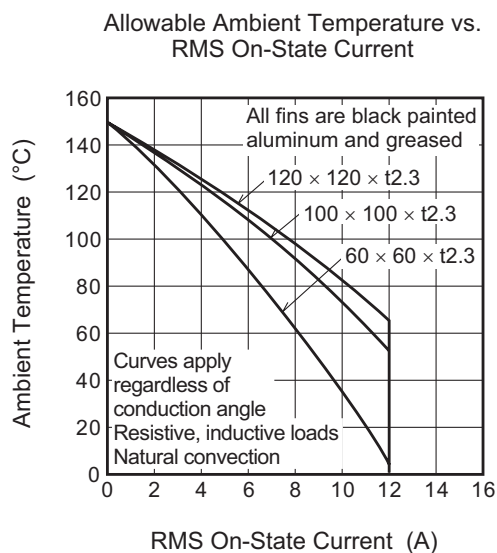
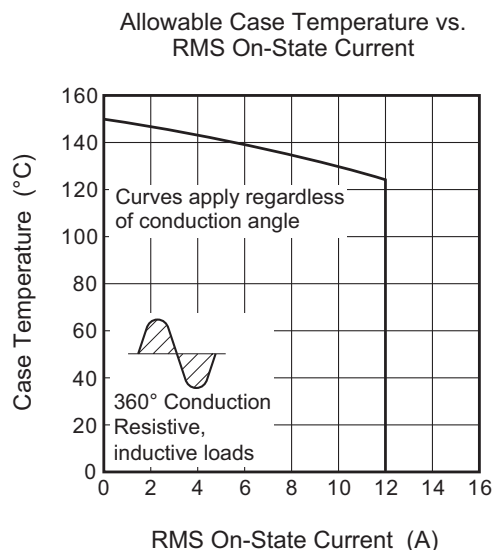
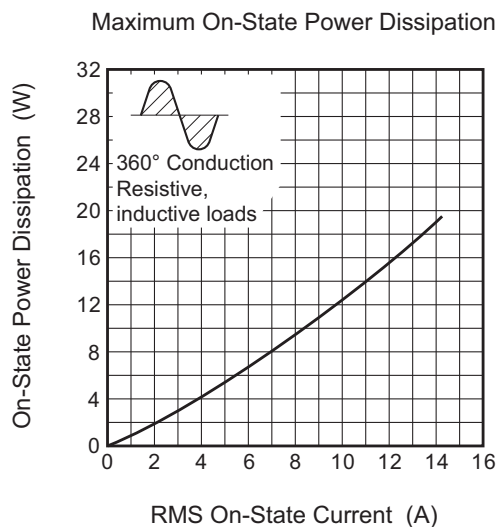
5. Test conditions of the critical-rate of rise of off-state commutating voltage is shown in the table below.

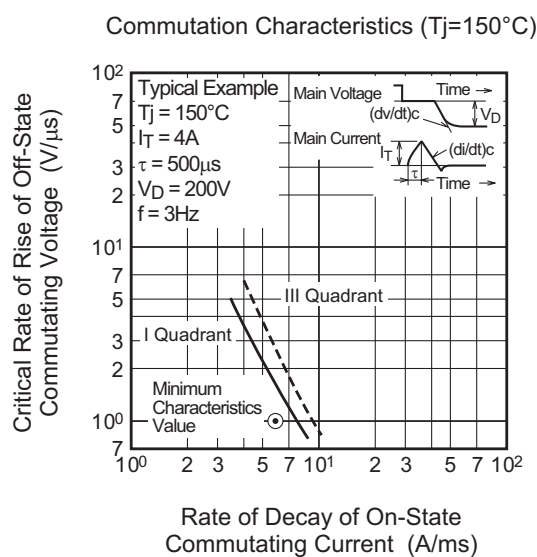
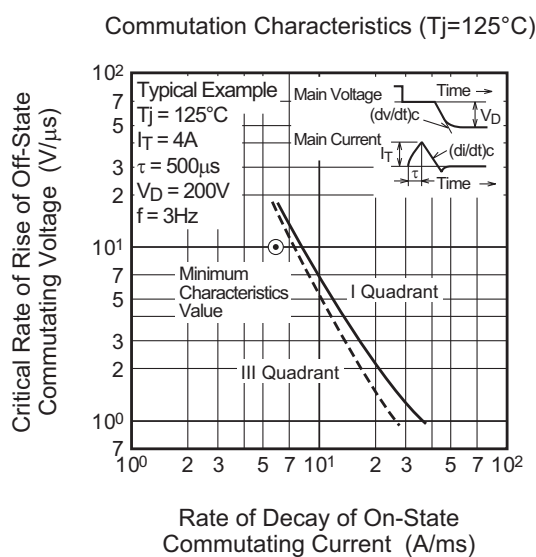
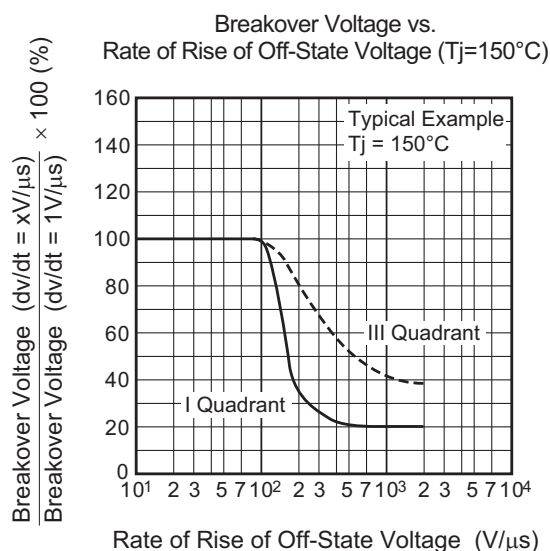
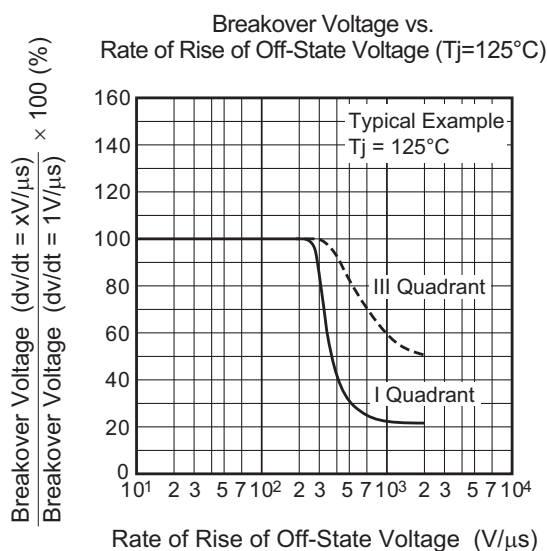
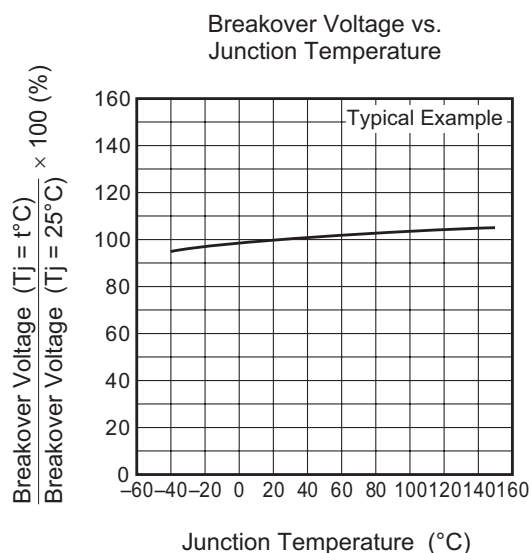
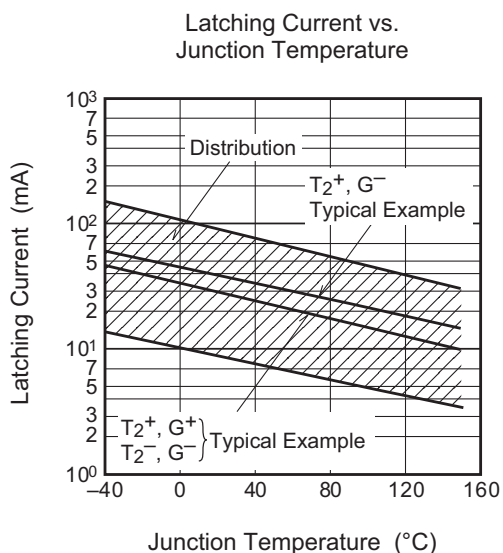
6. High sensitivity ($I_{GT} \leq 20\text{ mA}$) is also available. (I_{GT} item: 1)

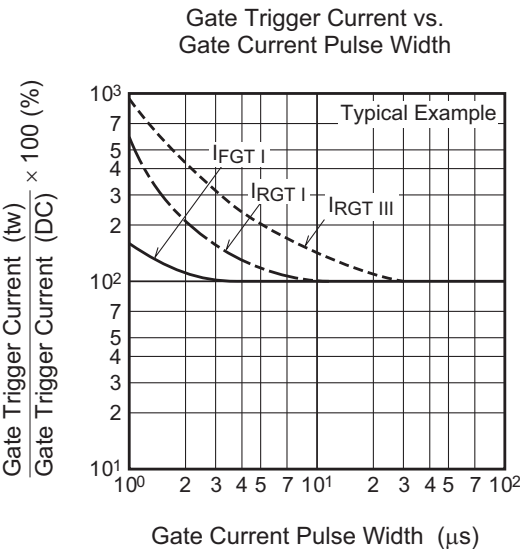
Test conditions	Commutating voltage and current waveforms (inductive load)
1. Junction temperature $T_j = 125^{\circ}\text{C}/150^{\circ}\text{C}$ 2. Rate of decay of on-state commutating current $(di/dt)_c = -6.0\text{ A/ms}$ 3. Peak off-state voltage $V_D = 400\text{ V}$	

Performance Curves

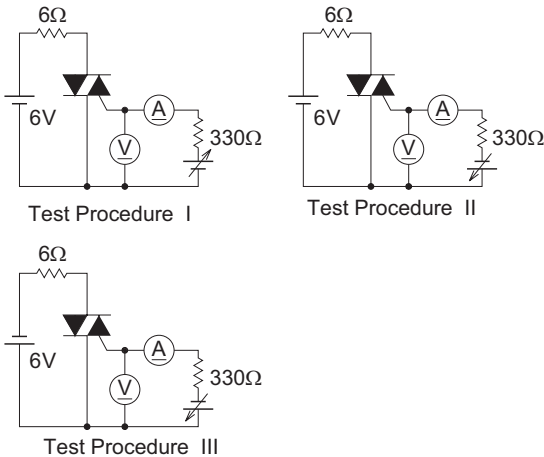




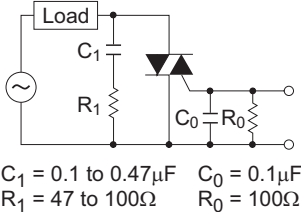




Gate Trigger Characteristics Test Circuits



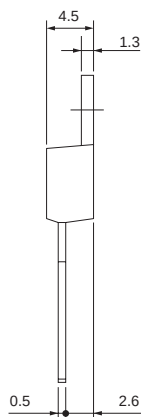
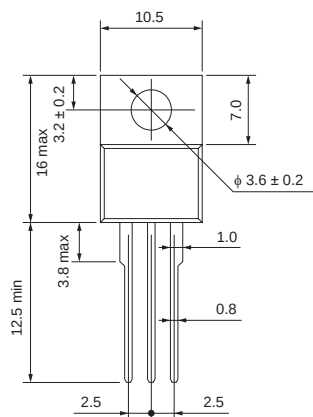
Recommended Circuit Values Around The Triac



Package Dimensions

TO-220

EIAJ Package Code	JEDEC Code	Mass (g) (reference value)	Lead Material
Conforms	Conforms	2.0	Cu alloy



Note 1) The dimensional figures indicate representative values unless otherwise the tolerance is specified.

Symbol	Dimension in Millimeters		
	Min	Typ	Max
A			
A ₁			
A ₂			
b			
D			
E			
e			
x			
y			
y ₁			
ZD			
ZE			

Order Code

Lead form	Standard packing	Quantity	Standard order code	Standard order code example
Straight type	Vinyl sack	100	Type name +B	BCR12CM-12LB
Lead form	Plastic Magazine (Tube)	50	Type name +B – Lead forming code	BCR12CM-12LB-A8

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

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