


# BCR20KM

MEDIUM POWER USE

INSULATED TYPE, PLANAR PASSIVATION TYPE

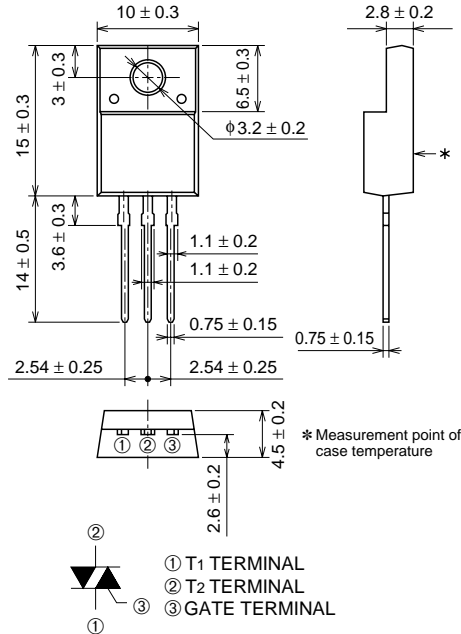
Refer to the page 6 as to the product guaranteed maximum junction temperature 150°C

**BCR20KM**



- IT (RMS) ..... 20A
- VDRM ..... 600V
- IFGT I, IRGT I, IRGT III ..... 20mA
- V<sub>iso</sub> ..... 2000V
- UL Recognized: Yellow Card No.E80276(N)  
File No. E80271

**OUTLINE DRAWING** Dimensions in mm



\* Measurement point of case temperature

**TO-220FN**

① T1 TERMINAL  
② T2 TERMINAL  
③ GATE TERMINAL

## APPLICATION

Vacuum cleaner, light dimmer, copying machine, other control of motor and heater

## MAXIMUM RATINGS

Symbol	Parameter	Voltage class	
		12	Unit
V <sub>DRM</sub>	Repetitive peak off-state voltage*1	600	V
V <sub>DSM</sub>	Non-repetitive peak off-state voltage*1	720	V

Symbol	Parameter	Conditions	Ratings	Unit
I <sub>T</sub> (RMS)	RMS on-state current	Commercial frequency, sine full wave 360° conduction, T <sub>c</sub> =85°C	20	A
I <sub>TSM</sub>	Surge on-state current	60Hz sinewave 1 full cycle, peak value, non-repetitive	200	A
I <sub>t</sub> <sup>2</sup>	I <sub>t</sub> <sup>2</sup> for fusing	Value corresponding to 1 cycle of half wave 60Hz, surge on-state current	167	A <sup>2</sup> s
P <sub>GM</sub>	Peak gate power dissipation		5	W
P <sub>G (AV)</sub>	Average gate power dissipation		0.5	W
V <sub>GM</sub>	Peak gate voltage		10	V
I <sub>GM</sub>	Peak gate current		2	A
T <sub>j</sub>	Junction temperature		-40 ~ +125	°C
T <sub>stg</sub>	Storage temperature		-40 ~ +125	°C
—	Weight	Typical value	2.0	g
V <sub>iso</sub>	Isolation voltage	T <sub>a</sub> =25°C, AC 1 minute, T <sub>1</sub> · T <sub>2</sub> · G terminal to case	2000	V

\*1. Gate open.

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

MEDIUM POWER USE  
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	
VTM	On-state voltage	T <sub>c</sub> =25°C, I <sub>TM</sub> =30A, Instantaneous measurement	—	—	1.5	V	
VFGT 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	I	—	—	1.5	V
VRGT I			II	—	—	1.5	V
VRGT III			III	—	—	1.5	V
IFGT 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	I	—	—	20	mA
IRGT I			II	—	—	20	mA
IRGT III			III	—	—	20	mA
VGD	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	—	—	2.0	°C/W	
(dv/dt) <sub>c</sub>	Critical-rate of rise off-state commutating voltage*4	T <sub>j</sub> =125°C	10	—	—	V/μs	

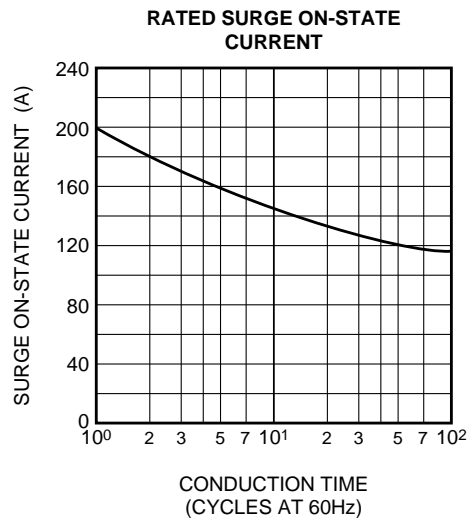
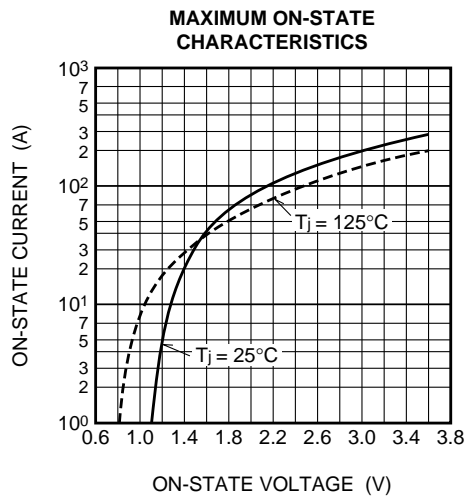
\*2. Measurement using the gate trigger characteristics measurement circuit.

\*3. The contact thermal resistance R<sub>th(c-f)</sub> 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.

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> =-10A/ms  3. Peak off-state voltage V <sub>D</sub> =400V	

## PERFORMANCE CURVES



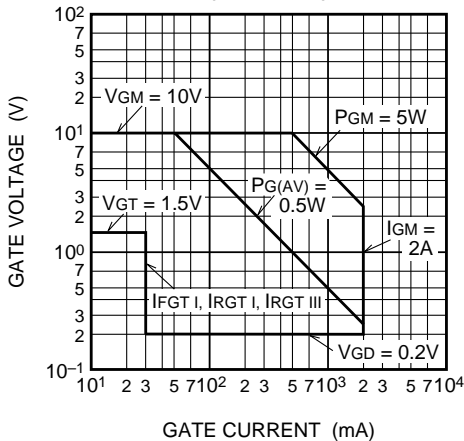
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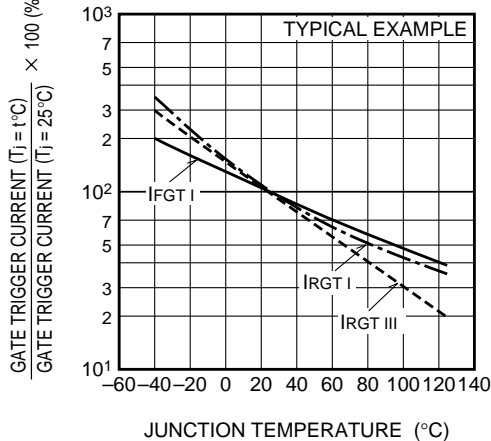
INSULATED TYPE, PLANAR PASSIVATION TYPE

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

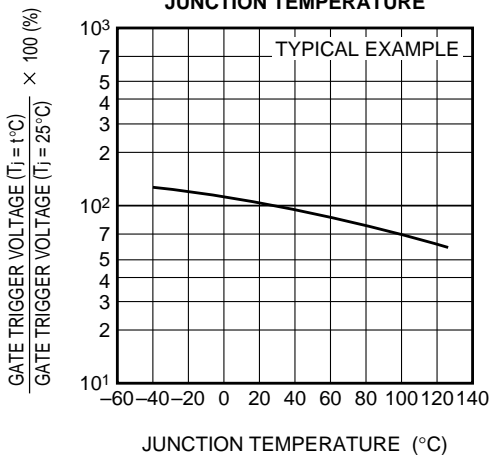
**GATE CHARACTERISTICS (I, II AND III)**



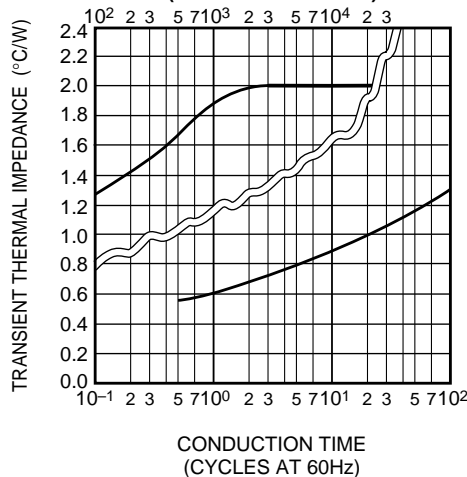
**GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE**



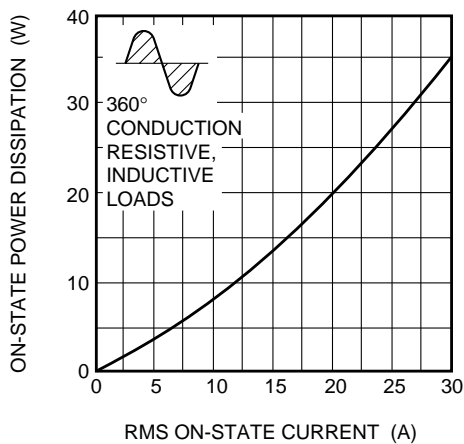
**GATE TRIGGER VOLTAGE VS. JUNCTION TEMPERATURE**



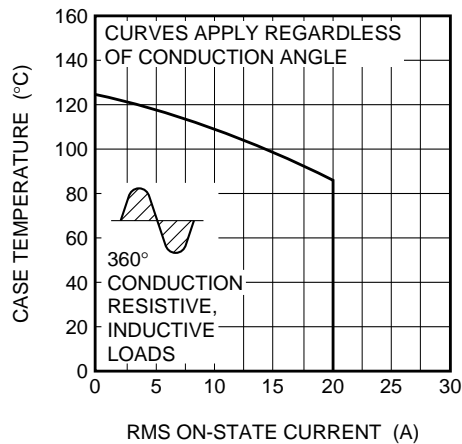
**MAXIMUM TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)**



**MAXIMUM ON-STATE POWER DISSIPATION**



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

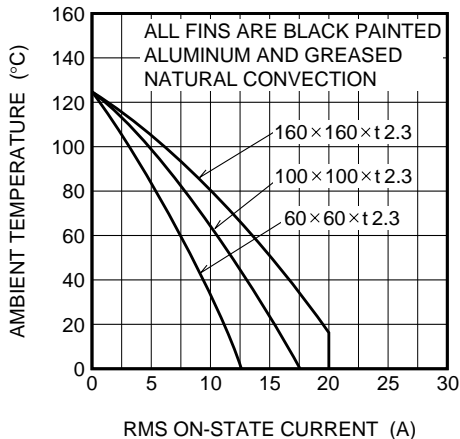


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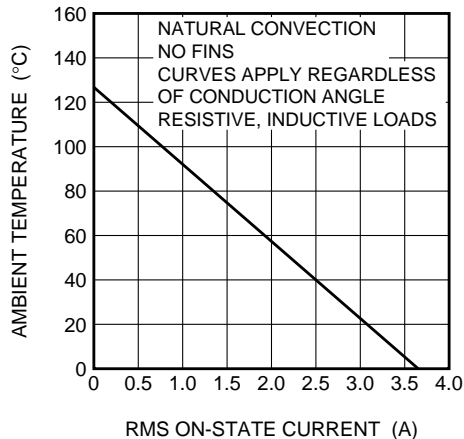
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MEDIUM POWER USE  
INSULATED TYPE, PLANAR PASSIVATION TYPE

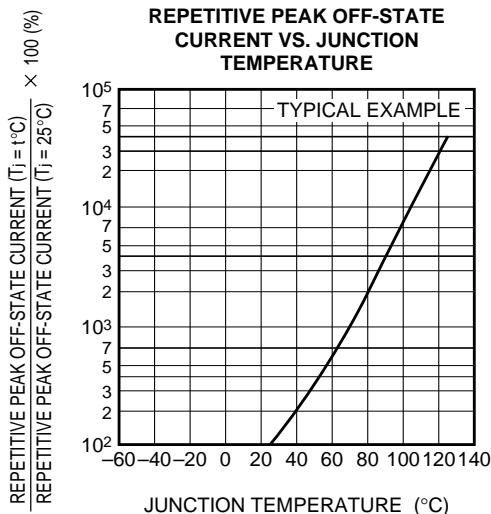
**ALLOWABLE AMBIENT TEMPERATURE VS. RMS ON-STATE CURRENT**



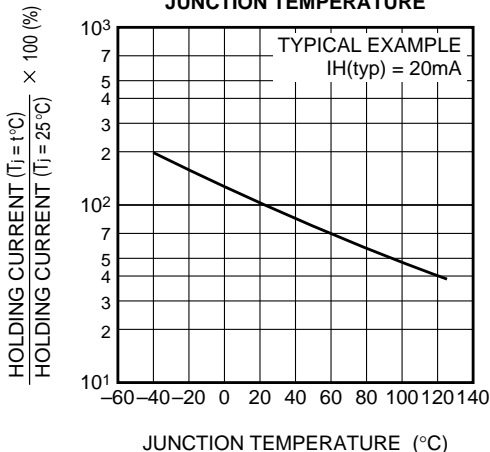
**ALLOWABLE AMBIENT TEMPERATURE VS. RMS ON-STATE CURRENT**



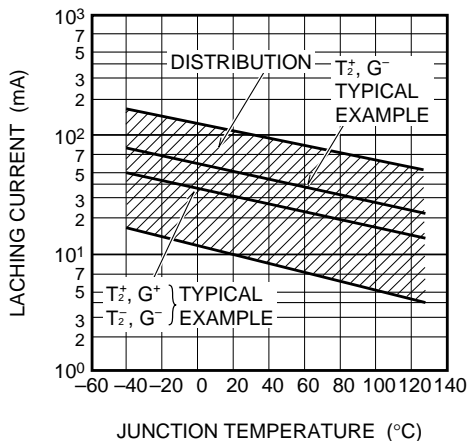
**REPETITIVE PEAK OFF-STATE CURRENT VS. JUNCTION TEMPERATURE**



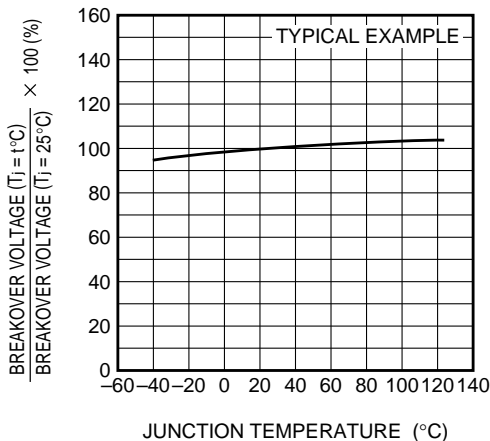
**HOLDING CURRENT VS. JUNCTION TEMPERATURE**



**LATCHING CURRENT VS. JUNCTION TEMPERATURE**



**BREAKOVER VOLTAGE VS. JUNCTION TEMPERATURE**



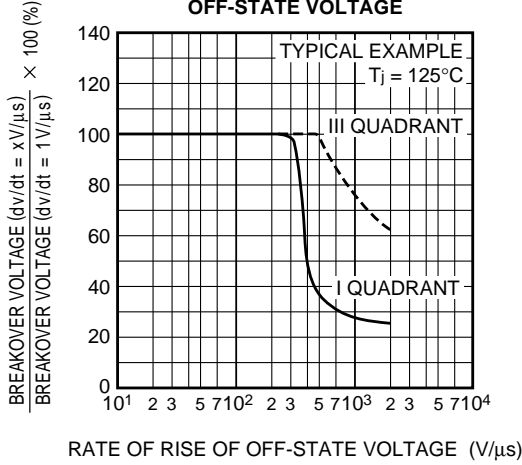
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MEDIUM POWER USE

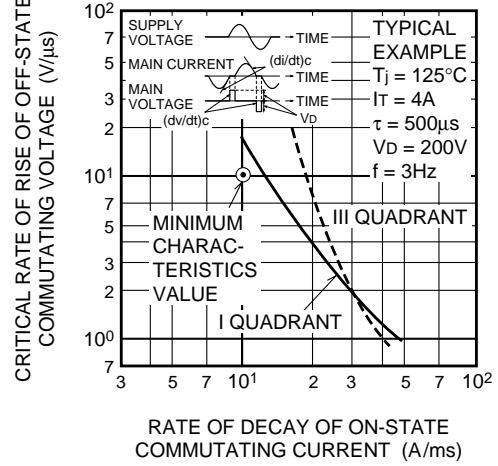
INSULATED TYPE, PLANAR PASSIVATION TYPE

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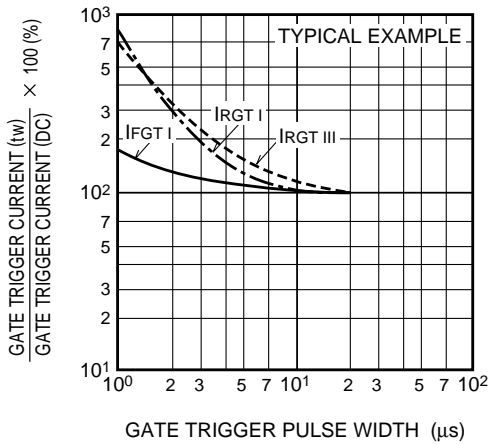
**BREAKOVER VOLTAGE VS. RATE OF RISE OF OFF-STATE VOLTAGE**



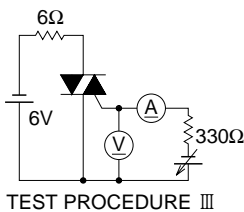
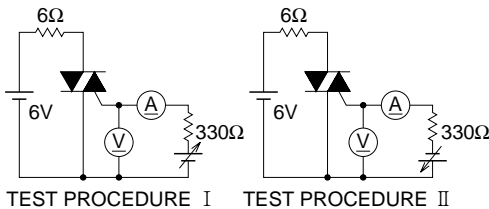
**COMMUTATION CHARACTERISTICS**



**GATE TRIGGER CURRENT VS. GATE CURRENT PULSE WIDTH**



**GATE TRIGGER CHARACTERISTICS TEST CIRCUITS**




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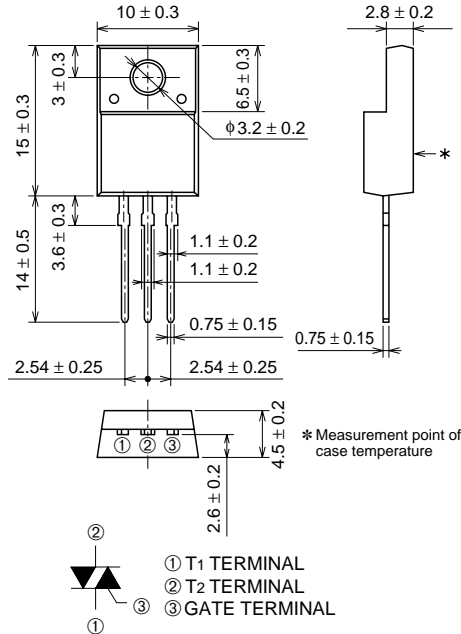
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- V<sub>iso</sub> ..... 2000V
- UL Recognized: Yellow Card No.E80276(N)  
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**OUTLINE DRAWING** Dimensions in mm



\* Measurement point of case temperature

**TO-220FN**

① T1 TERMINAL  
② T2 TERMINAL  
③ GATE TERMINAL

## APPLICATION

Vacuum cleaner, light dimmer, copying machine, other control of motor and heater

(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	
		12	Unit
V <sub>DRM</sub>	Repetitive peak off-state voltage*1	600	V
V <sub>DSM</sub>	Non-repetitive peak off-state voltage*1	720	V

Symbol	Parameter	Conditions	Ratings	Unit
I <sub>T (RMS)</sub>	RMS on-state current	Commercial frequency, sine full wave 360° conduction, T <sub>c</sub> =110°C	20	A
I <sub>TSM</sub>	Surge on-state current	60Hz sinewave 1 full cycle, peak value, non-repetitive	200	A
I <sub>t</sub> <sup>2</sup>	I <sub>t</sub> <sup>2</sup> for fusing	Value corresponding to 1 cycle of half wave 60Hz, surge on-state current	167	A <sup>2</sup> s
P <sub>GM</sub>	Peak gate power dissipation		5	W
P <sub>G (AV)</sub>	Average gate power dissipation		0.5	W
V <sub>GM</sub>	Peak gate voltage		10	V
I <sub>GM</sub>	Peak gate current		2	A
T <sub>j</sub>	Junction temperature		-40 ~ +150	°C
T <sub>stg</sub>	Storage temperature		-40 ~ +150	°C
—	Weight	Typical value	2.0	g
V <sub>iso</sub>	Isolation voltage	T <sub>a</sub> =25°C, AC 1 minute, T <sub>1</sub> · T <sub>2</sub> · G terminal to case	2000	V

\*1. Gate open.

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

**MEDIUM POWER USE**  
**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/150°C, V <sub>DRM</sub> applied	—	—	2.0/3.0	mA	
VTM	On-state voltage	T <sub>c</sub> =25°C, I <sub>TM</sub> =30A, Instantaneous measurement	—	—	1.5	V	
VFGT 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	I	—	—	1.5	V
VRGT I			II	—	—	1.5	V
VRGT III			III	—	—	1.5	V
IFGT 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	I	—	—	20	mA
IRGT I			II	—	—	20	mA
IRGT III			III	—	—	20	mA
VGD	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	—	—	2.0	°C/W	
(dv/dt) <sub>c</sub>	Critical-rate of rise off-state commutating voltage*4	T <sub>j</sub> =125°C/150°C	10/1	—	—	V/μs	

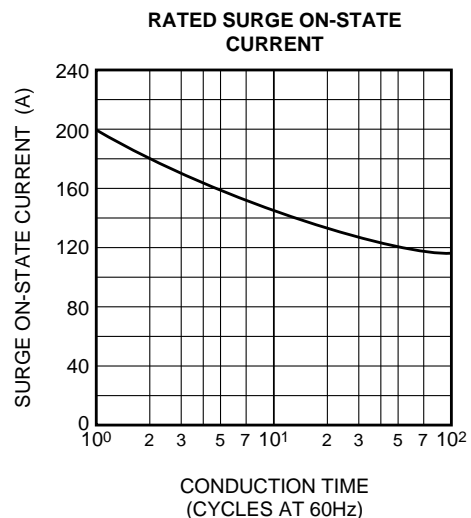
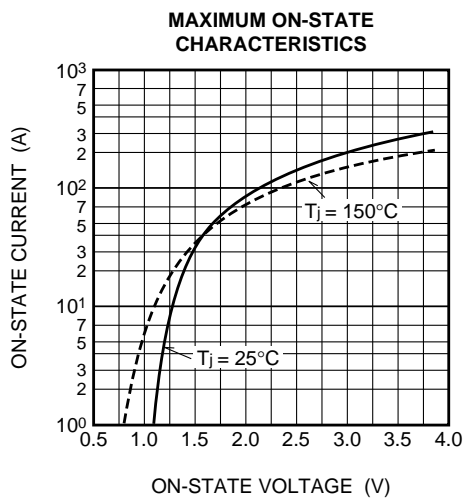
\*2. Measurement using the gate trigger characteristics measurement circuit.

\*3. The contact thermal resistance R<sub>th(c-f)</sub> 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.

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> =-10A/ms  3. Peak off-state voltage V <sub>D</sub> =400V	

## PERFORMANCE CURVES



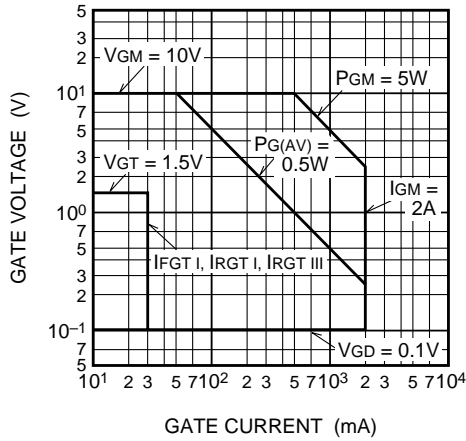
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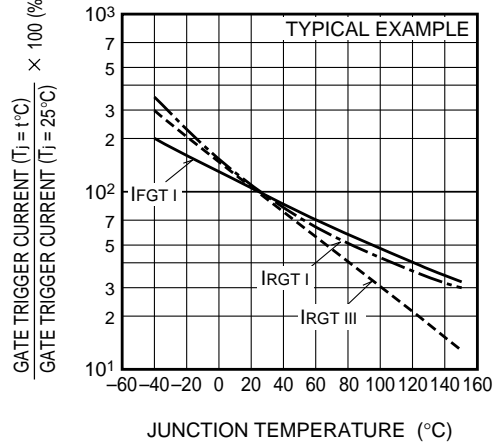
INSULATED TYPE, PLANAR PASSIVATION TYPE

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

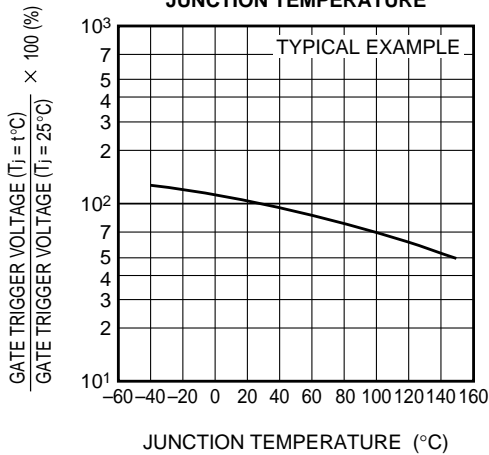
**GATE CHARACTERISTICS (I, II AND III)**



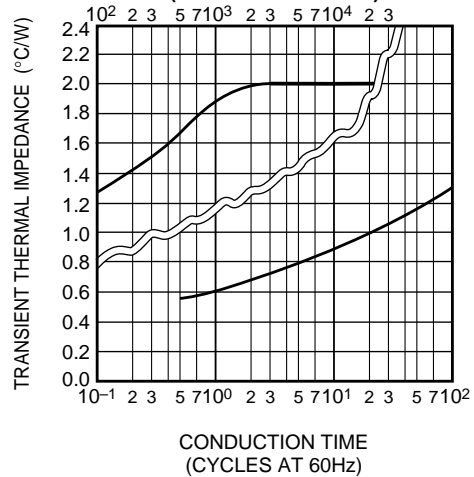
**GATE TRIGGER CURRENT VS. JUNCTION TEMPERATURE**



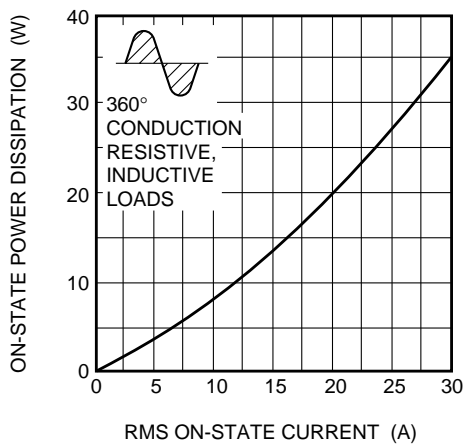
**GATE TRIGGER VOLTAGE VS. JUNCTION TEMPERATURE**



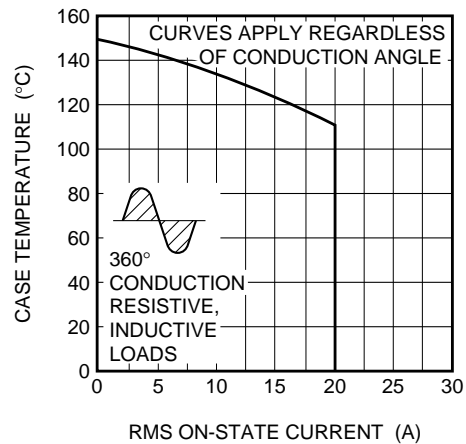
**MAXIMUM TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (JUNCTION TO CASE)**



**MAXIMUM ON-STATE POWER DISSIPATION**



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

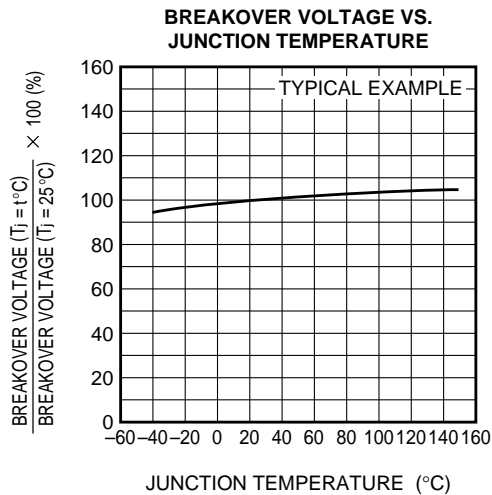
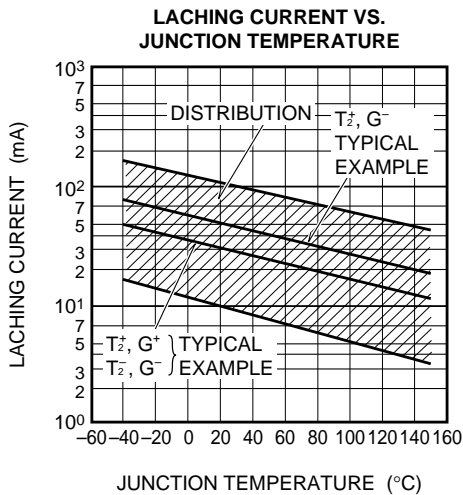
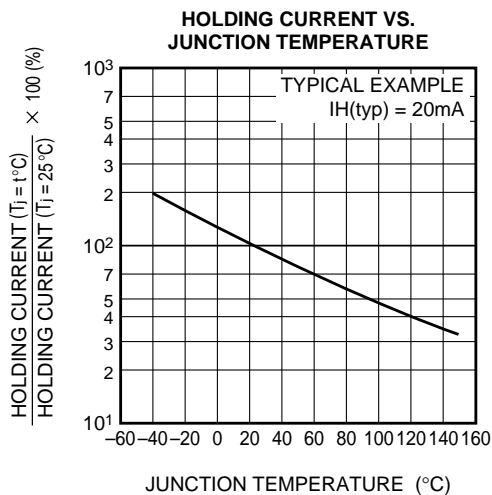
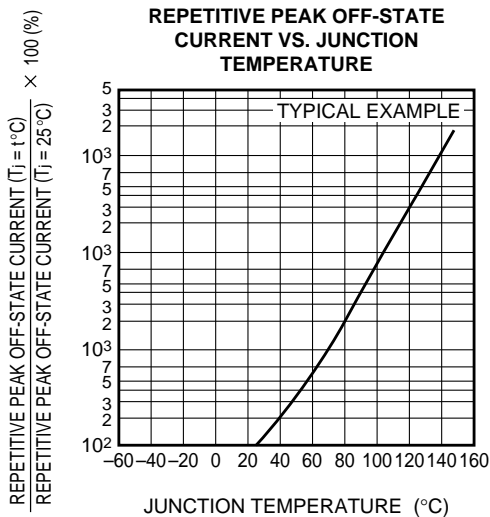
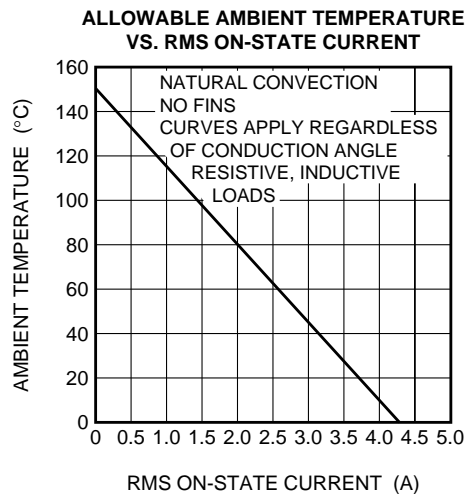
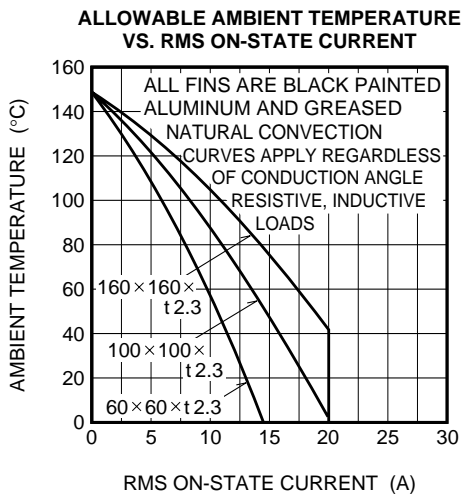




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The product guaranteed maximum junction temperature 150°C (See warning.)

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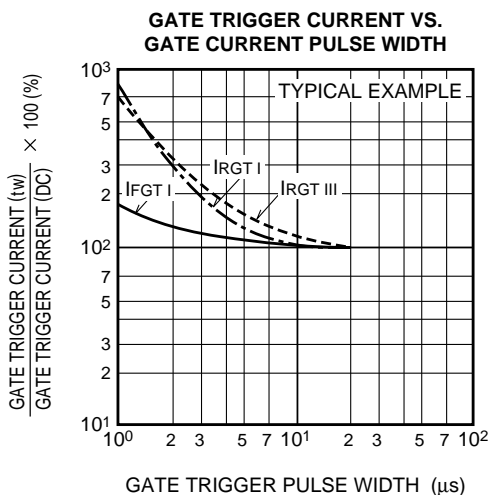
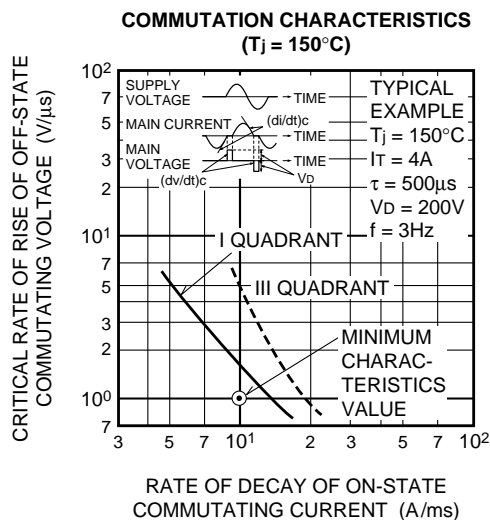
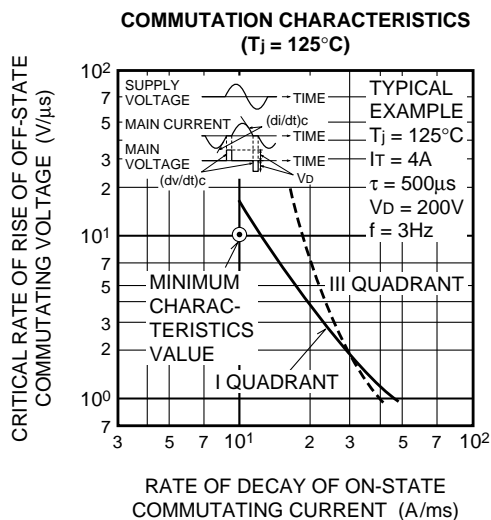
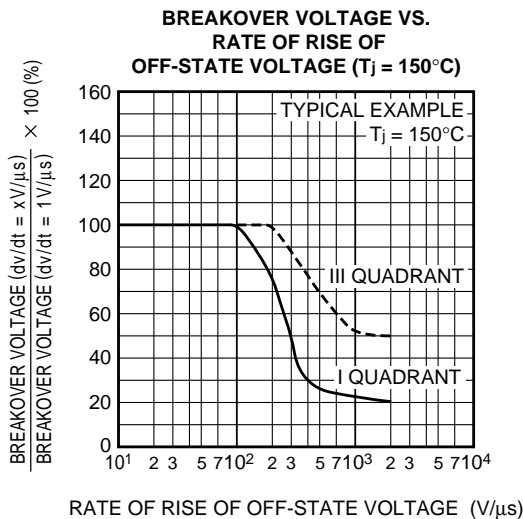
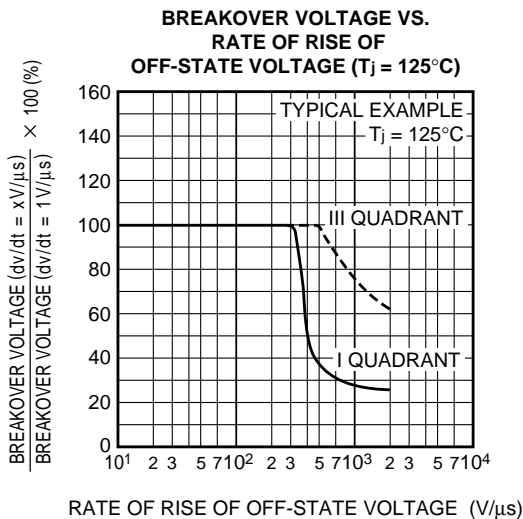


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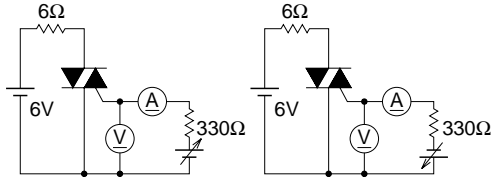


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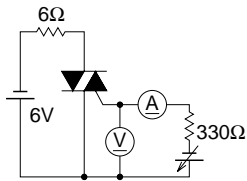
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MEDIUM POWER USE  
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### GATE TRIGGER CHARACTERISTICS TEST CIRCUITS

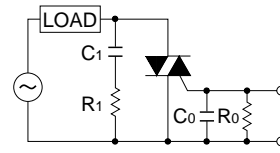


TEST PROCEDURE I      TEST PROCEDURE II



TEST PROCEDURE III

### RECOMMENDED CIRCUIT VALUES AROUND THE TRIAC



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