

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# BCR16KM-12LB

Triac

Medium Power Use

REJ03G0327-0100

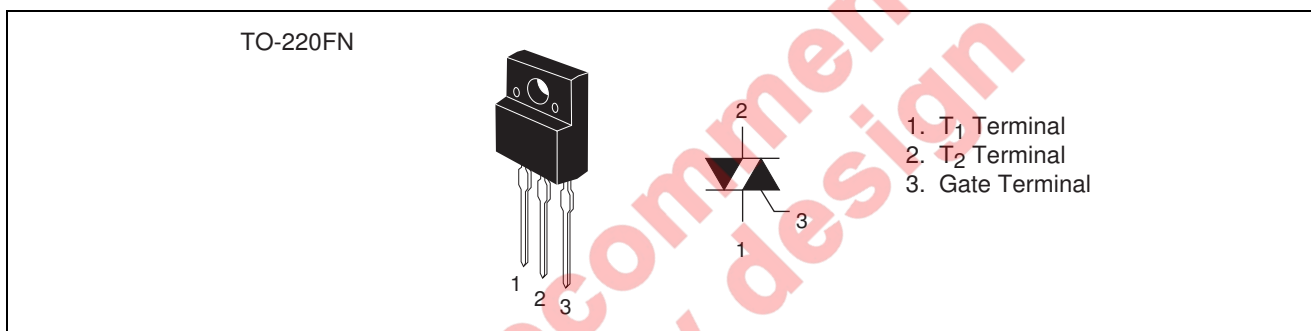
Rev.1.00

Aug.20.2004

## Features

- $I_T(RMS)$  : 16 A
- $V_{DRM}$  : 600 V
- $I_{FGTI}$ ,  $I_{RGTI}$ ,  $I_{RGTIII}$  : 30 mA (20 mA)<sup>Note5</sup>
- $V_{ISO}$  : 2000 V
- The product guaranteed maximum junction temperature 150°C.
- Insulated Type
- Planar Passivation Type
- Refer to the recommended circuit values around the triac before using.

## Outline



## Applications

Switching mode power supply, copying machine, motor control, heater control, and other general purpose control applications

## Maximum Ratings

Parameter	Symbol	Voltage class	Unit
		12	
Repetitive peak off-state voltage <sup>Note1</sup>	$V_{DRM}$	600	V
Non-repetitive peak off-state voltage <sup>Note1</sup>	$V_{DSM}$	720	V

Parameter	Symbol	Ratings	Unit	Conditions
RMS on-state current	$I_T$ (RMS)	16	A	Commercial frequency, sine full wave 360° conduction, $T_c = 98^\circ\text{C}$
Surge on-state current	$I_{TSM}$	160	A	60Hz sinewave 1 full cycle, peak value, non-repetitive
$I^2t$ for fusing	$I^2t$	106.5	$\text{A}^2\text{s}$	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	$^\circ\text{C}$	
Mass	—	2.0	g	Typical value
Isolation voltage	Viso	2000	V	$T_a = 25^\circ\text{C}$ , AC 1 minute, $T_1 \cdot T_2 \cdot G$ terminal to case

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	$V_{TM}$	—	—	1.5	V	$T_c = 25^\circ\text{C}$ , $I_{TM} = 25\text{ A}$ , Instantaneous measurement	
Gate trigger voltage <sup>Note2</sup>	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 <sup>Note2</sup>	I	$I_{FGTI}$	—	—	30 <sup>Note5</sup>	mA	$T_j = 25^\circ\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$
	II	$I_{RGTI}$	—	—	30 <sup>Note5</sup>	mA	
	III	$I_{RGTIII}$	—	—	30 <sup>Note5</sup>	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	$R_{th(j-c)}$	—	—	2.9	$^\circ\text{C}/\text{W}$	Junction to case <sup>Note3</sup>	
Critical-rate of rise of off-state commutating voltage <sup>Note4</sup>	$(dv/dt)_c$	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.

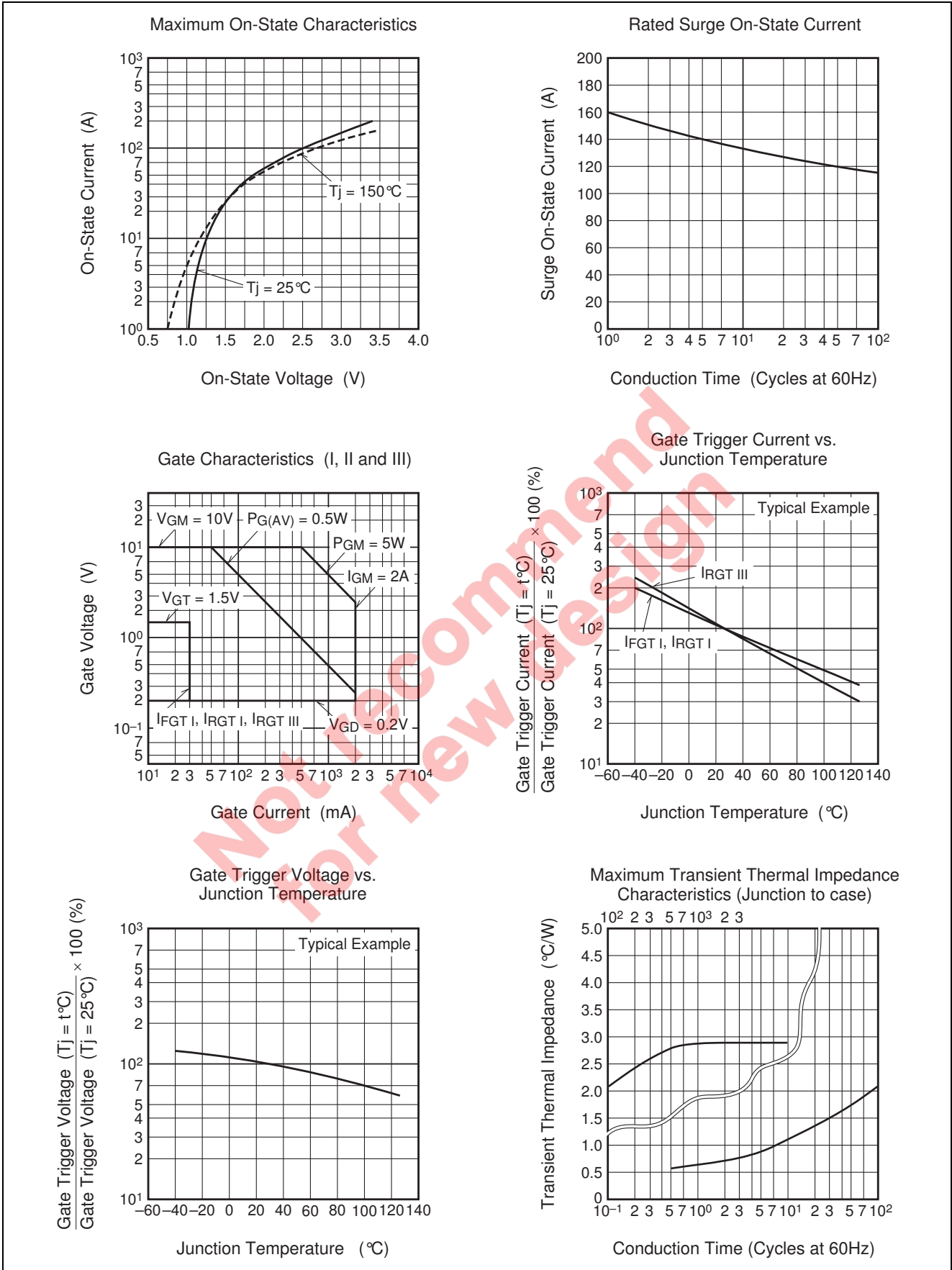
3. The contact thermal resistance  $R_{th(c-f)}$  in case of greasing is  $0.5^\circ\text{C}/\text{W}$ .

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

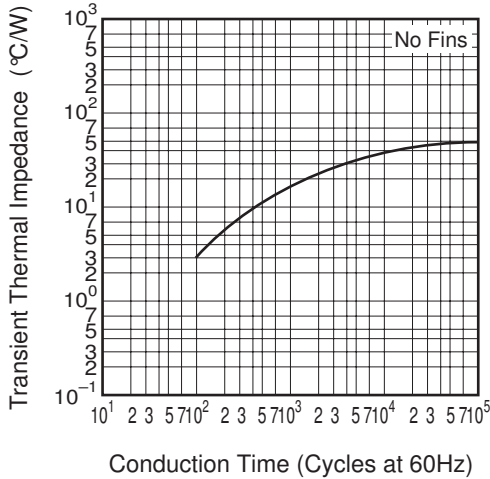
5. High sensitivity ( $I_{GT} \leq 20\text{ mA}$ ) is also available. ( $I_{GT}$  item: 1)

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 $(di/dt)_c = -8\text{ A/ms}$ 3. Peak off-state voltage $V_D = 400\text{ V}$	<p>The diagram shows three waveforms over time. The top waveform is 'Supply Voltage', a sine wave. The middle waveform is 'Main Current', which shows a decaying current during the commutation period, with a slope labeled <math>(di/dt)_c</math>. The bottom waveform is 'Main Voltage', which shows a peak voltage <math>V_D</math> and a rate of rise <math>(dv/dt)_c</math> during the commutation period.</p>

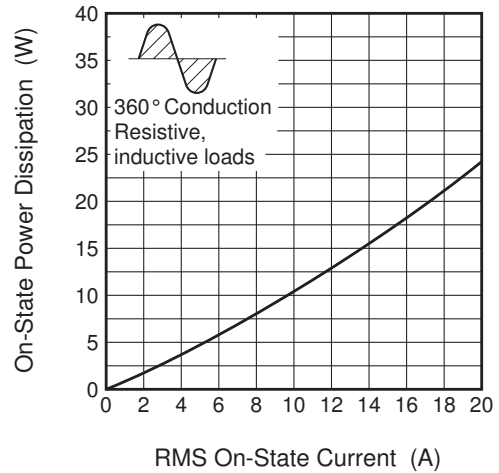
Performance Curves



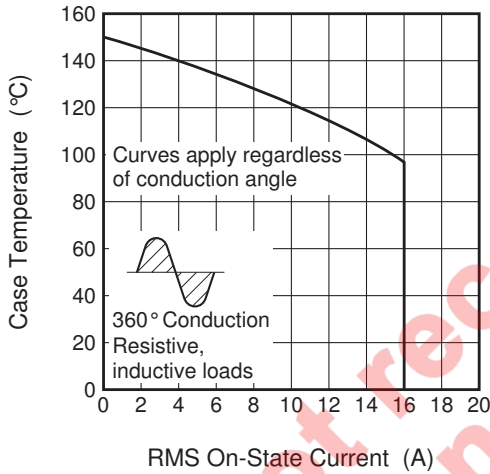
Maximum Transient Thermal Impedance Characteristics (Junction to ambient)



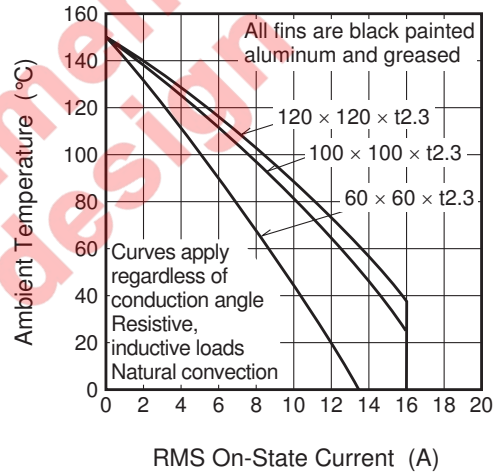
Maximum On-State Power Dissipation



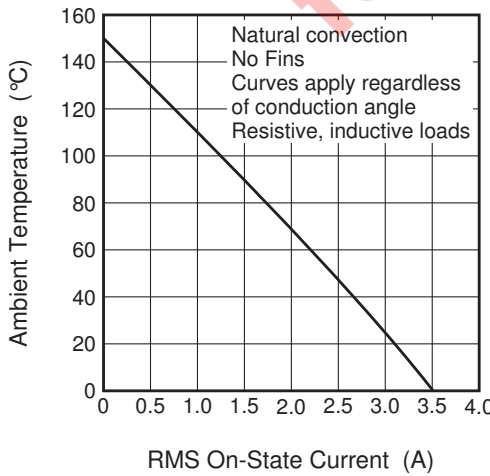
Allowable Case Temperature vs. RMS On-State Current



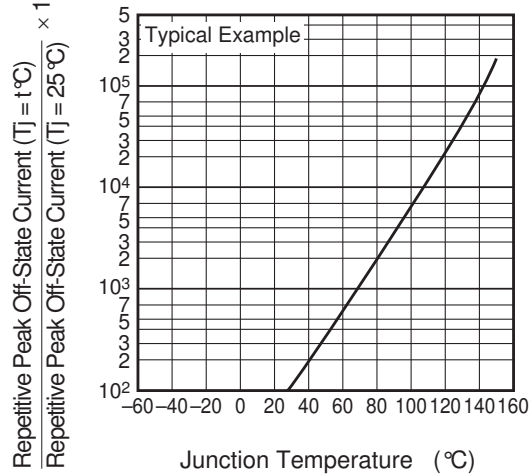
Allowable Ambient Temperature vs. RMS On-State Current



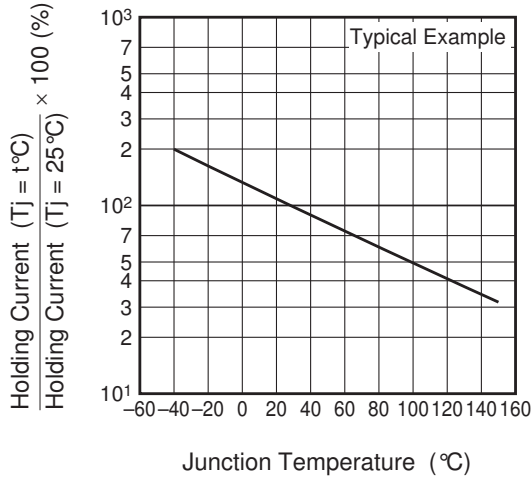
Allowable Ambient Temperature vs. RMS On-State Current



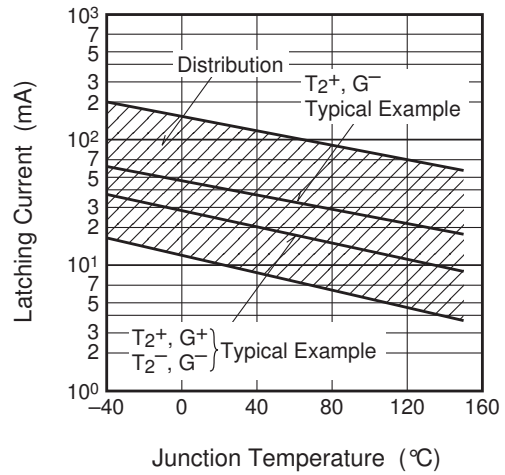
Repetitive Peak Off-State Current vs. Junction Temperature



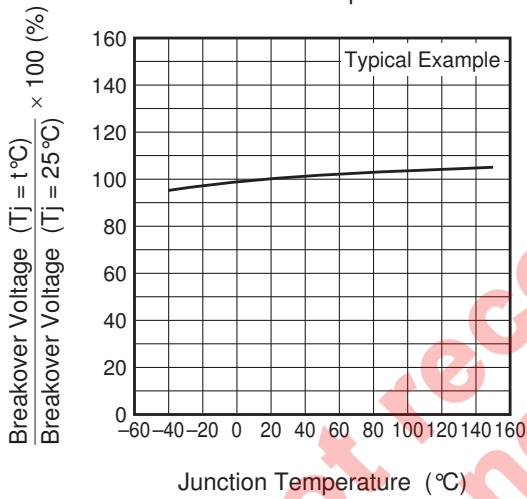
Holding Current vs. Junction Temperature



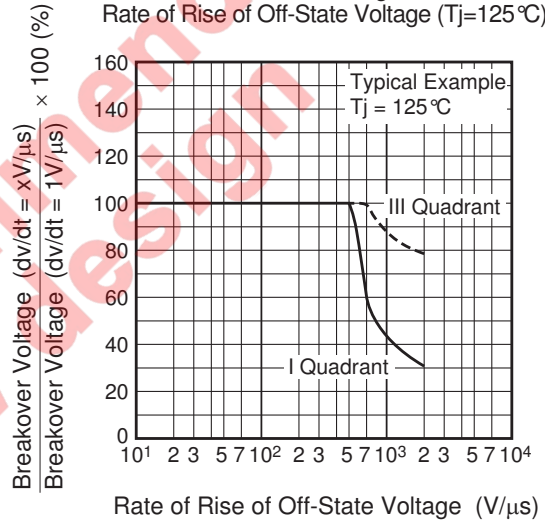
Latching Current vs. Junction Temperature



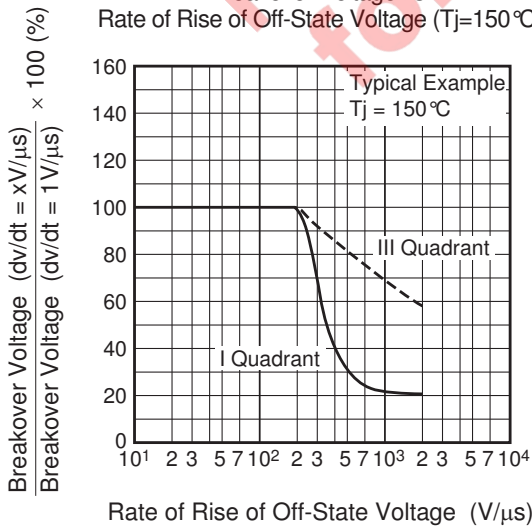
Breakover Voltage vs. Junction Temperature



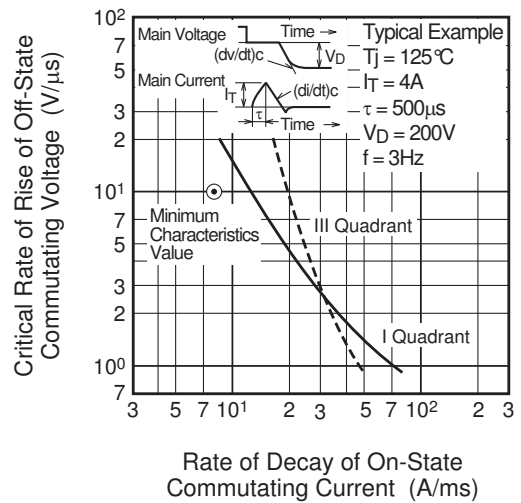
Breakover Voltage vs. Rate of Rise of Off-State Voltage (Tj=125°C)



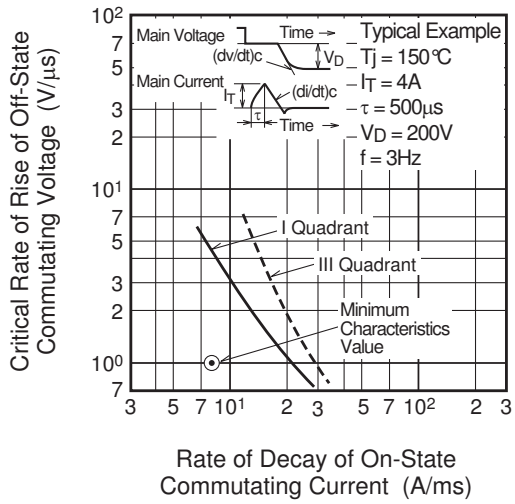
Breakover Voltage vs. Rate of Rise of Off-State Voltage (Tj=150°C)



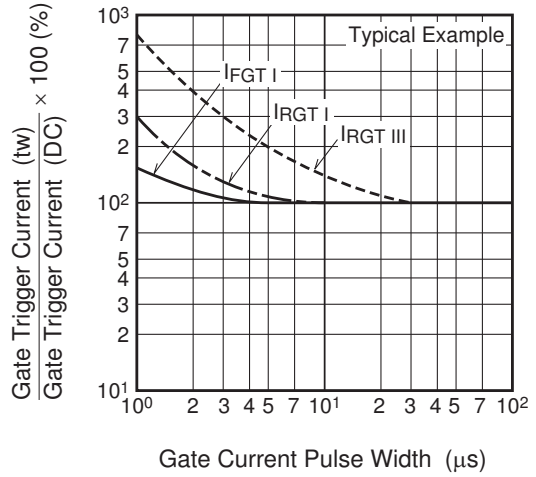
Commutation Characteristics (Tj=125°C)



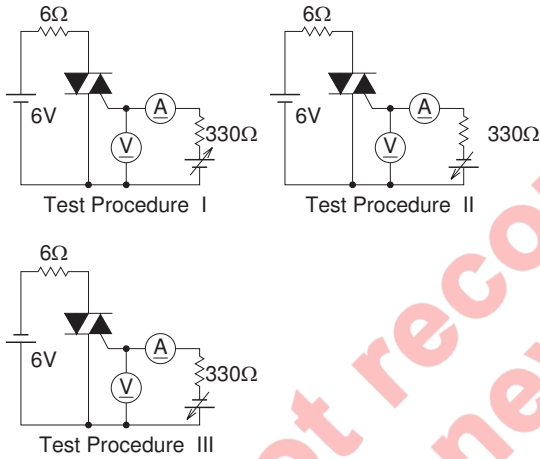
Commutation Characteristics ( $T_j=150^\circ\text{C}$ )



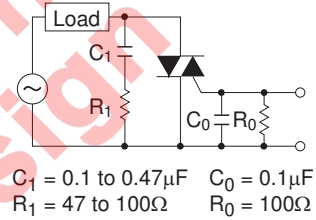
Gate Trigger Current vs. Gate Current Pulse Width



Gate Trigger Characteristics Test Circuits



Recommended Circuit Values Around The Triac





Package Dimensions

**TO-220FN**

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

Technical drawings showing dimensions for the TO-220FN package. Dimensions include: 10 ± 0.3, 15 ± 0.3, 3 ± 0.3, 6.5 ± 0.3, φ 3.2 ± 0.2, 14 ± 0.5, 3.6 ± 0.3, 1.1 ± 0.2, 0.75 ± 0.15, 2.54 ± 0.25, 2.8 ± 0.2, 0.75 ± 0.15, 4.5 ± 0.2, and 2.6 ± 0.2.

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

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

Order Code

Lead form	Standard packing	Quantity	Standard order code	Standard order code example
Straight type	Plastic Magazine (Tube)	50	Type name	BCR16KM-12LB
Lead form	Plastic Magazine (Tube)	50	Type name – Lead forming code	BCR16KM-12LB-A8

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