



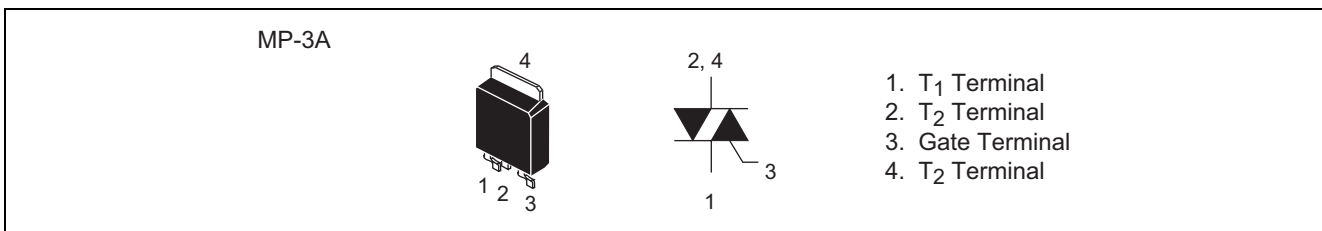
**KERSEMI**

# BCR3AS-12

## Features

- $I_{T(RMS)}$  : 3 A
- $V_{DRM}$  : 600 V
- $I_{FGT I}$ ,  $I_{RGT I}$ ,  $I_{RGT III}$  : 15 mA
- Non-Insulated Type
- Planar Passivation Type

## Outline



## Applications

Hybrid IC, solid state relay, switching mode power supply, light dimmer, electric fan, electric blanket, control of household equipment such as washing machine, 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	$I_{T(RMS)}$	3	A	Commercial frequency, sine full wave 360° conduction, $T_c = 108^{\circ}\text{C}$ <sup>Note3</sup>
Surge on-state current	$I_{TSM}$	30	A	60Hz sinewave 1 full cycle, peak value, non-repetitive
$I^2t$ for fusing	$I^2t$	3.7	$\text{A}^2\text{s}$	Value corresponding to 1 cycle of half wave 60Hz, surge on-state current
Peak gate power dissipation	$P_{GM}$	3	W	
Average gate power dissipation	$P_{G(AV)}$	0.3	W	
Peak gate voltage	$V_{GM}$	6	V	
Peak gate current	$I_{GM}$	0.3	A	
Junction temperature	$T_j$	- 40 to +125	$^{\circ}\text{C}$	
Storage temperature	$T_{stg}$	- 40 to +125	$^{\circ}\text{C}$	
Mass	—	0.26	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	$V_{TM}$	—	—	1.7	V	$T_c = 25^{\circ}\text{C}$ , $I_{TM} = 4.5\text{ A}$ , Instantaneous measurement	
Gate trigger voltage <sup>Note2</sup>	I	$V_{FGT I}$	—	—	1.5	V	$T_j = 25^{\circ}\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$
	II	$V_{RGT I}$	—	—	1.5	V	
	III	$V_{RGT III}$	—	—	1.5	V	
Gate trigger current <sup>Note2</sup>	I	$I_{FGT I}$	—	—	15	mA	$T_j = 25^{\circ}\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$
	II	$I_{RGT I}$	—	—	15	mA	
	III	$I_{RGT III}$	—	—	15	mA	
Gate non-trigger voltage	$V_{GD}$	0.2	—	—	V	$T_j = 125^{\circ}\text{C}$ , $V_D = 1/2 V_{DRM}$	
Thermal resistance	$R_{th(j-c)}$	—	—	3.8	$^{\circ}\text{C}/\text{W}$	Junction to case <sup>Note3</sup>	
Critical-rate of rise of off-state commutating voltage <sup>Note4</sup>	$(dv/dt)_c$	5	—	—	$\text{V}/\mu\text{s}$	$T_j = 125^{\circ}\text{C}$	

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

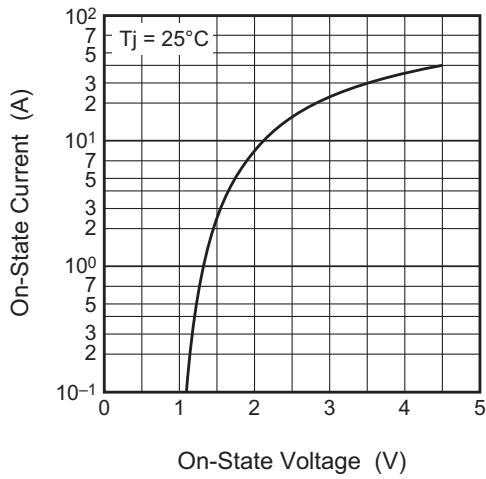
3. Case temperature is measured on the  $T_2$  tab.

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

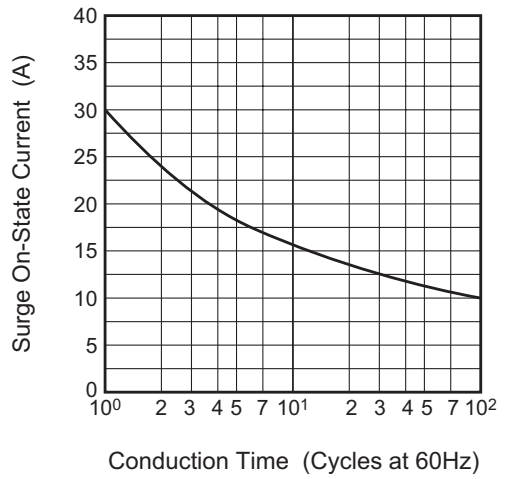
Test conditions	Commutating voltage and current waveforms (inductive load)
1. Junction temperature $T_j = 125^{\circ}\text{C}$ 2. Rate of decay of on-state commutating current $(di/dt)_c = -1.5\text{ A/ms}$ 3. Peak off-state voltage $V_D = 400\text{ V}$	

Performance Curves

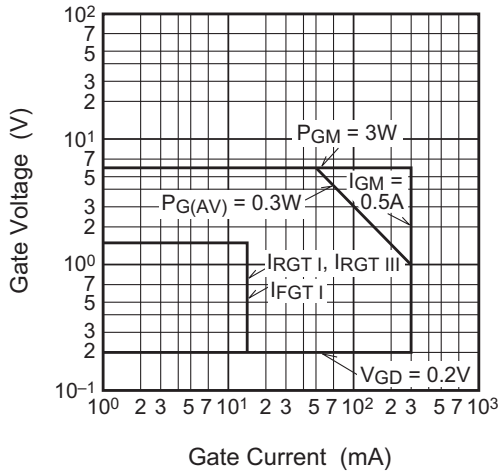
Maximum On-State Characteristics



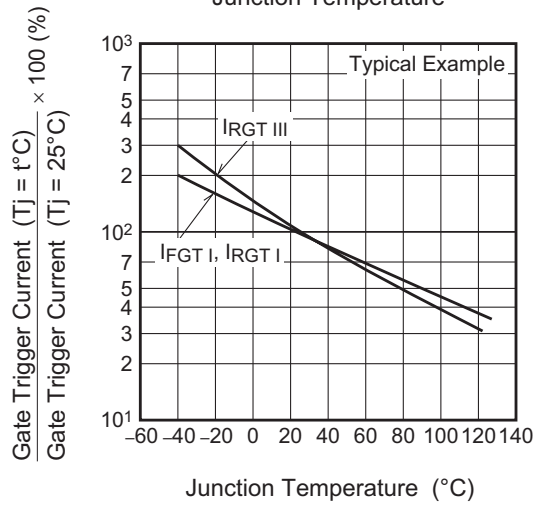
Rated Surge On-State Current



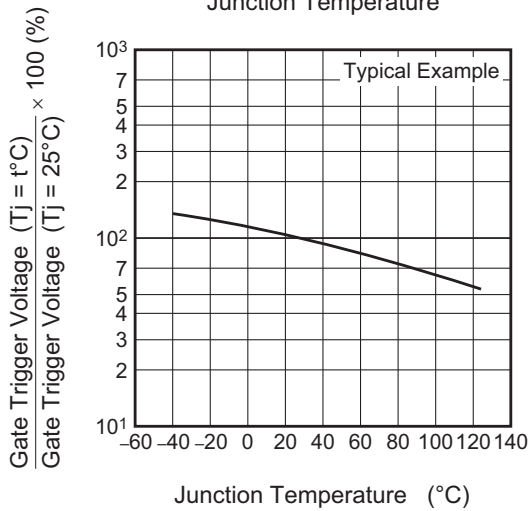
Gate Characteristics (I, II and III)



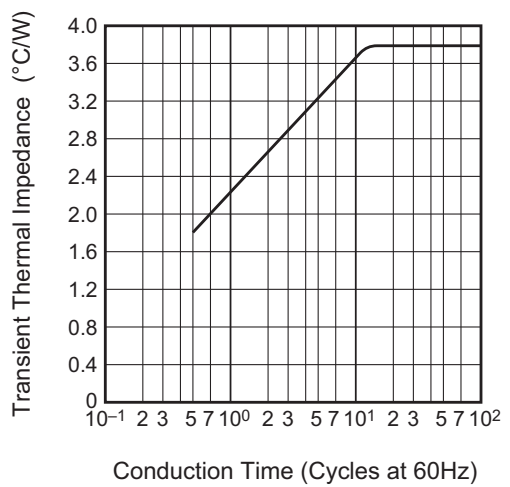
Gate Trigger Current vs. Junction Temperature



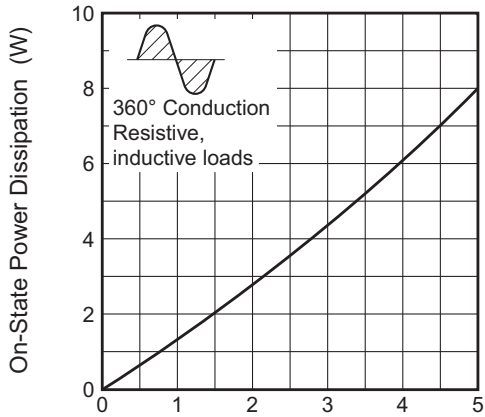
Gate Trigger Voltage vs. Junction Temperature



Maximum Transient Thermal Impedance Characteristics (Junction to case)

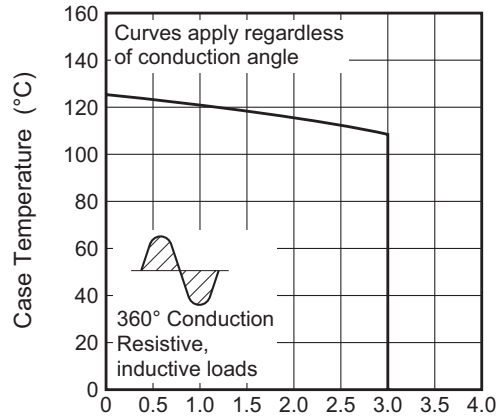


Maximum On-State Power Dissipation



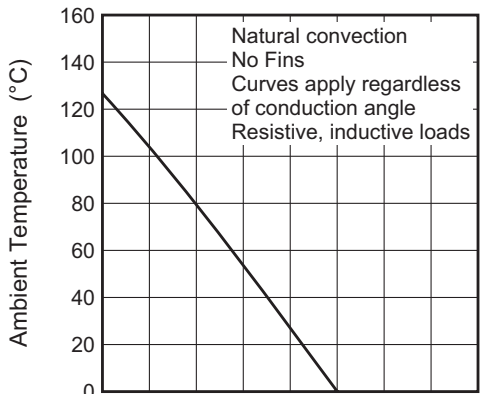
RMS On-State Current (A)

Allowable Case Temperature vs. RMS On-State Current



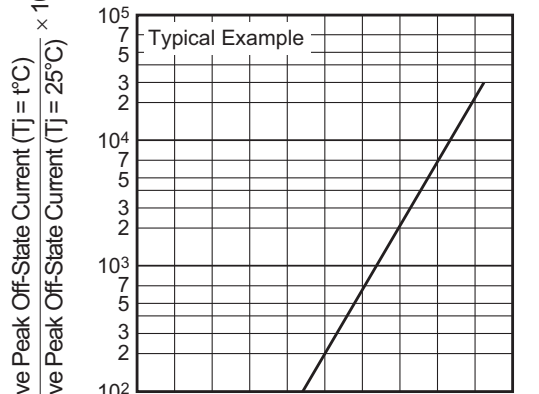
RMS On-State Current (A)

Allowable Ambient Temperature vs. RMS On-State Current



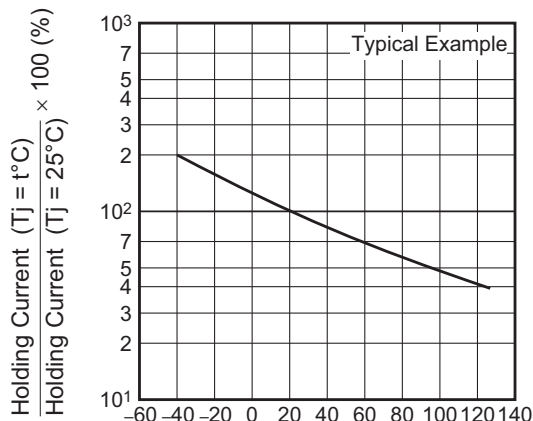
RMS On-State Current (A)

Repetitive Peak Off-State Current vs. Junction Temperature



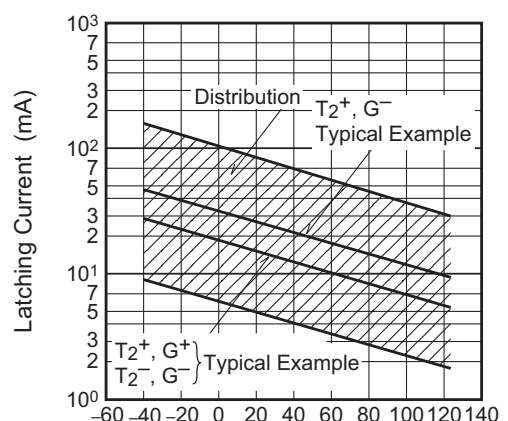
Junction Temperature (°C)

Holding Current vs. Junction Temperature



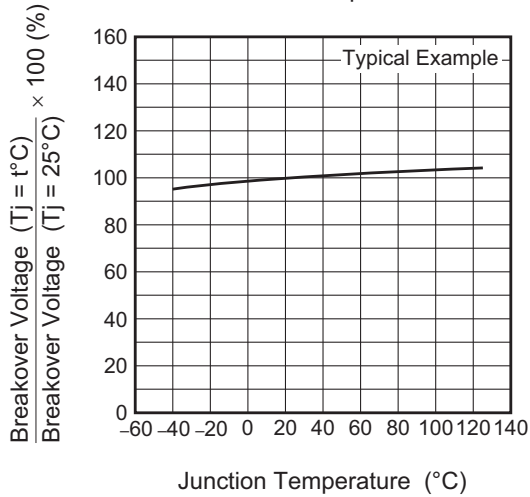
Junction Temperature (°C)

Latching Current vs. Junction Temperature

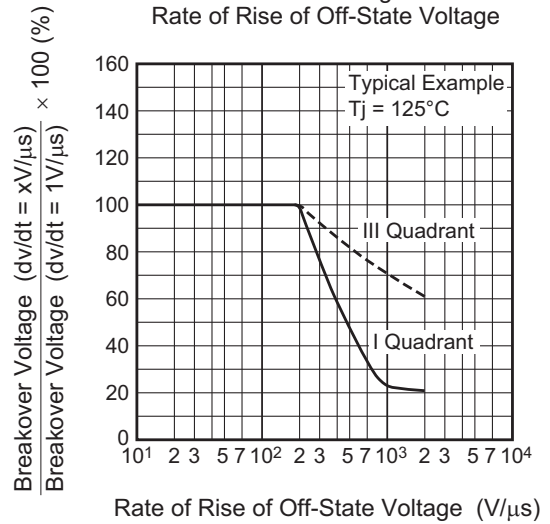


Junction Temperature (°C)

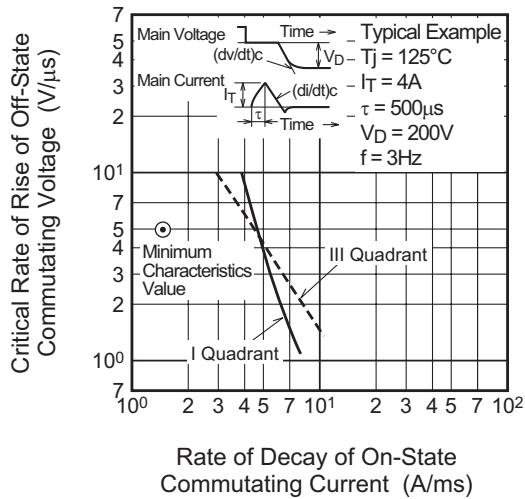
Breakover Voltage vs. Junction Temperature



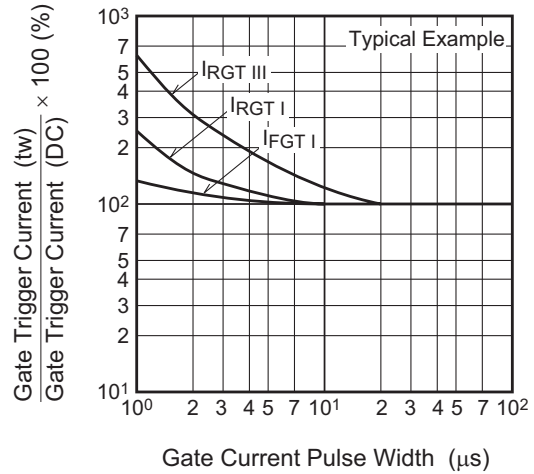
Breakover Voltage vs. Rate of Rise of Off-State Voltage



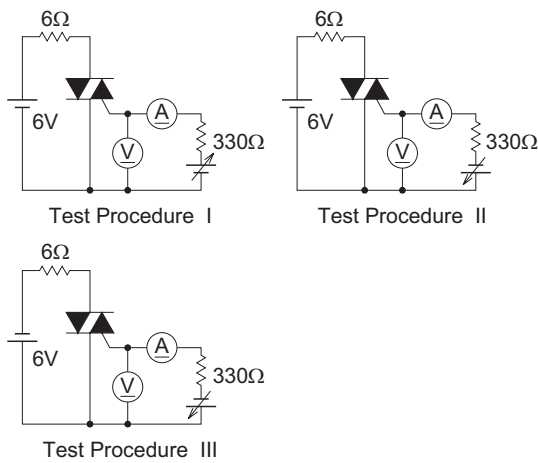
Commutation Characteristics



Gate Trigger Current vs. Gate Current Pulse Width



Gate Trigger Characteristics Test Circuits



### Package Dimensions

**MP-3A**

EIAJ Package Code	JEDEC Code	Mass (g) (reference value)	Lead Material
—	—	0.32	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 <sub>1</sub>	—	—	—
A <sub>2</sub>	—	—	—
b	—	—	—
D	—	—	—
E	—	—	—
e	—	—	—
x	—	—	—
y	—	—	—
y <sub>1</sub>	—	—	—
ZD	—	—	—
ZE	—	—	—

### Order Code

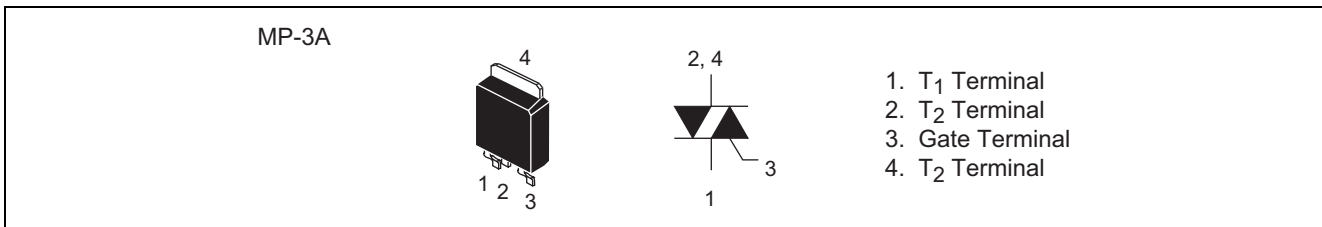
Lead form	Standard packing	Quantity	Standard order code	Standard order code example
Surface-mounted type	Taping	3000	Type name +A – T +Direction (1 or 2) +3	BCR3AS-12A-T13
Surface-mounted type	Plastic Magazine (Tube)	75	Type name +A	BCR3AS-12A

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

## Features

- $I_{T(RMS)}$  : 3 A
- $V_{DRM}$  : 600 V
- $I_{FGT I}$ ,  $I_{RGT I}$ ,  $I_{RGT III}$  : 15 mA
- Non-Insulated Type
- Planar Passivation Type

## Outline



## Applications

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

## Warning

1. Refer to the recommended circuit values around the triac before using.

## 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	$I_{T(RMS)}$	3	A	Commercial frequency, sine full wave 360° conduction, $T_c = 133^{\circ}\text{C}$ <sup>Note3</sup>
Surge on-state current	$I_{TSM}$	30	A	60Hz sinewave 1 full cycle, peak value, non-repetitive
$I^2t$ for fusing	$I^2t$	3.7	$\text{A}^2\text{s}$	Value corresponding to 1 cycle of half wave 60Hz, surge on-state current
Peak gate power dissipation	$P_{GM}$	3	W	
Average gate power dissipation	$P_{G(AV)}$	0.3	W	
Peak gate voltage	$V_{GM}$	6	V	
Peak gate current	$I_{GM}$	0.3	A	
Junction temperature	$T_j$	- 40 to +150	$^{\circ}\text{C}$	
Storage temperature	$T_{stg}$	- 40 to +150	$^{\circ}\text{C}$	
Mass	—	0.26	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	$V_{TM}$	—	—	1.7	V	$T_c = 25^{\circ}\text{C}$ , $I_{TM} = 4.5\text{ A}$ , Instantaneous measurement	
Gate trigger voltage <sup>Note2</sup>	I	$V_{FGT\ I}$	—	—	1.5	V	$T_j = 25^{\circ}\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$
	II	$V_{RGT\ I}$	—	—	1.5	V	
	III	$V_{RGT\ III}$	—	—	1.5	V	
Gate trigger current <sup>Note2</sup>	I	$I_{FGT\ I}$	—	—	15	mA	$T_j = 25^{\circ}\text{C}$ , $V_D = 6\text{ V}$ , $R_L = 6\ \Omega$ , $R_G = 330\ \Omega$
	II	$I_{RGT\ I}$	—	—	15	mA	
	III	$I_{RGT\ III}$	—	—	15	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	$R_{th(j-c)}$	—	—	3.8	$^{\circ}\text{C}/\text{W}$	Junction to case <sup>Note3</sup>	
Critical-rate of rise of off-state commutating voltage <sup>Note4</sup>	$(dv/dt)_c$	5/1	—	—	$\text{V}/\mu\text{s}$	$T_j = 125^{\circ}\text{C}/150^{\circ}\text{C}$	

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

3. Case temperature is measured on the  $T_2$  tab.

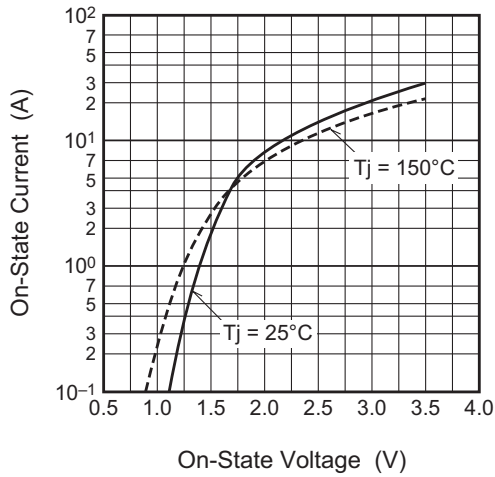
4. Test conditions of the critical-rate of rise of off-state commutating voltage is shown in the table below.

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

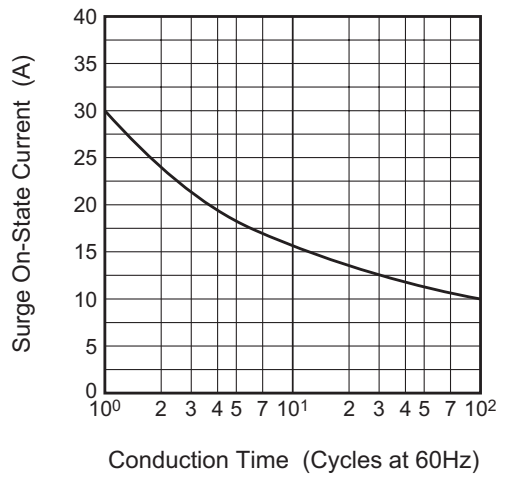


# Performance Curves

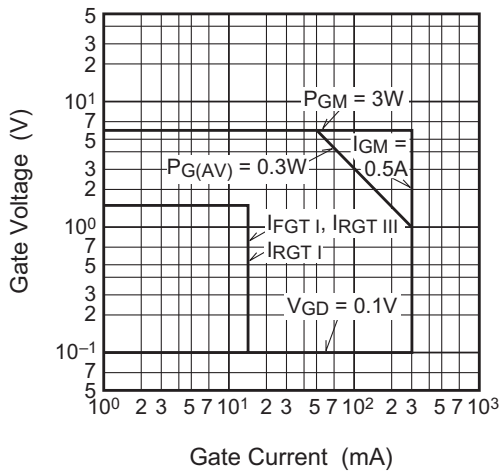
Maximum On-State Characteristics



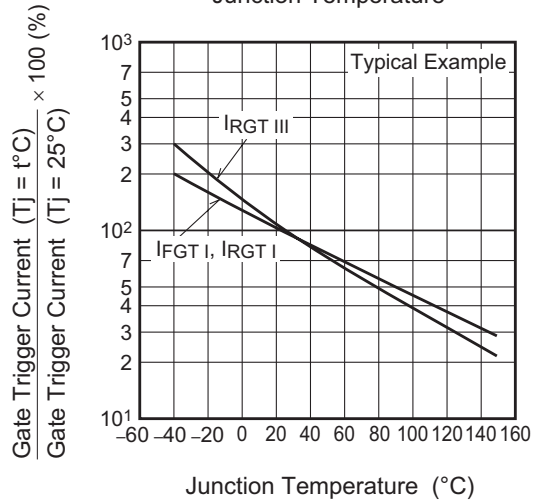
Rated Surge On-State Current



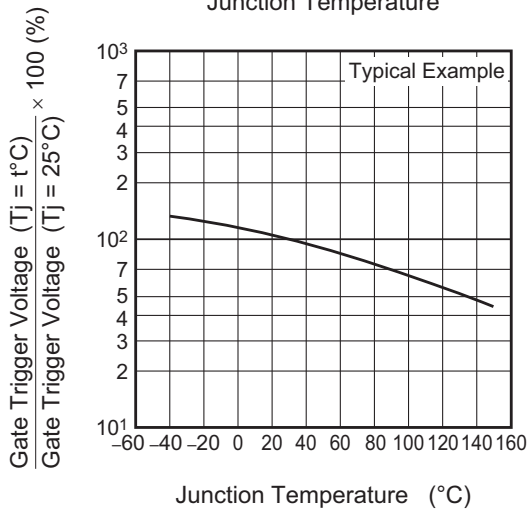
Gate Characteristics (I, II and III)



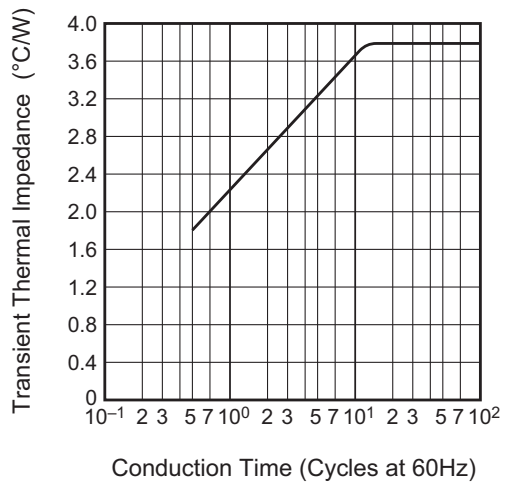
Gate Trigger Current vs. Junction Temperature



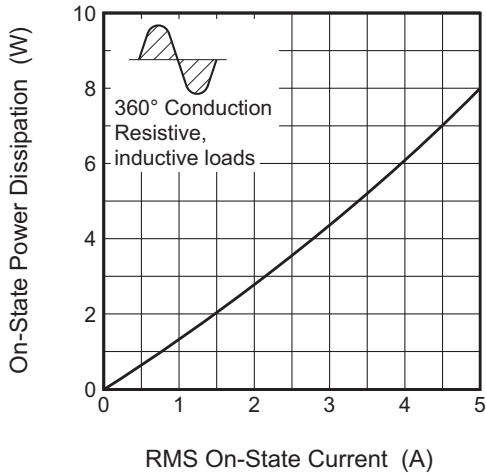
Gate Trigger Voltage vs. Junction Temperature



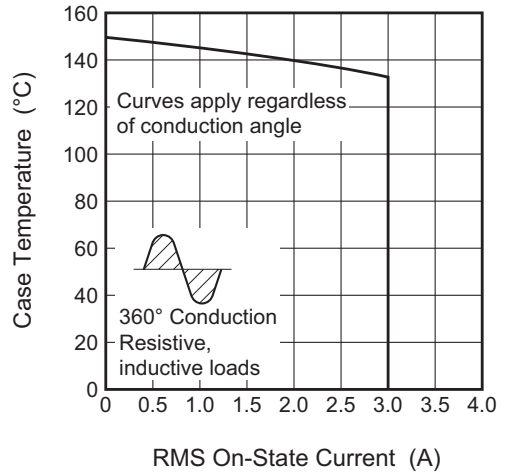
Maximum Transient Thermal Impedance Characteristics (Junction to case)



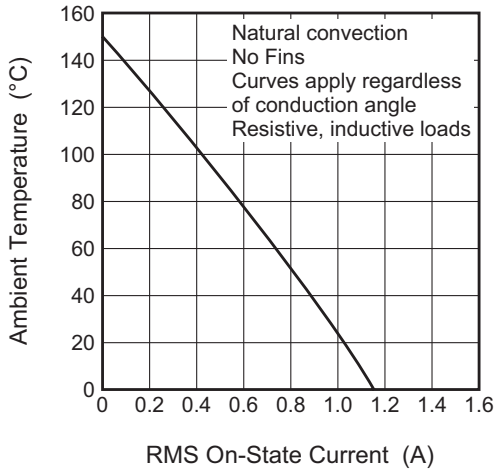
Maximum On-State Power Dissipation



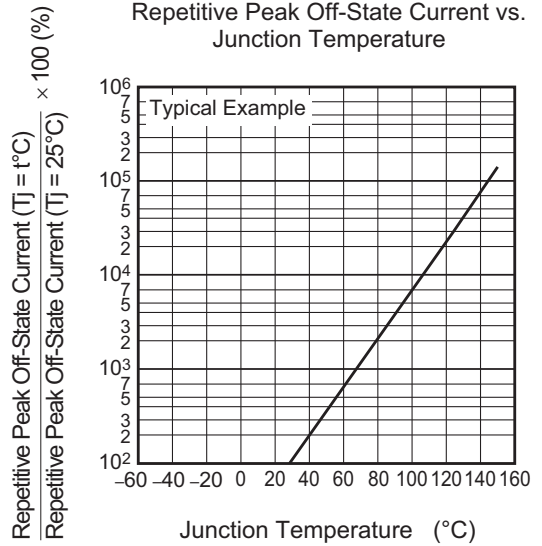
Allowable Case Temperature vs. RMS On-State Current



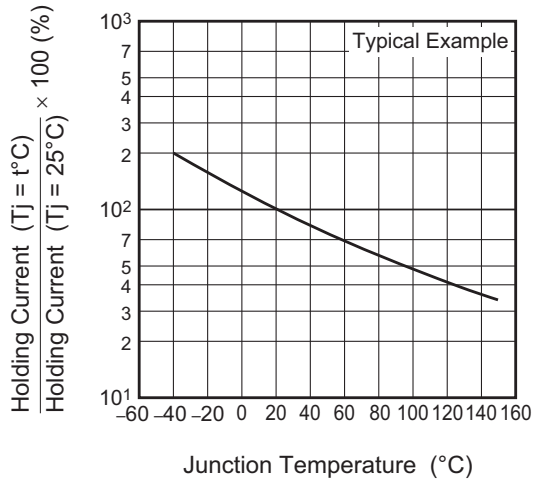
Allowable Ambient Temperature vs. RMS On-State Current



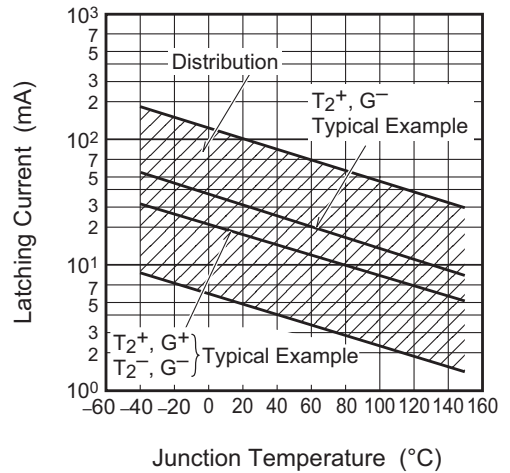
Repetitive Peak Off-State Current vs. Junction Temperature



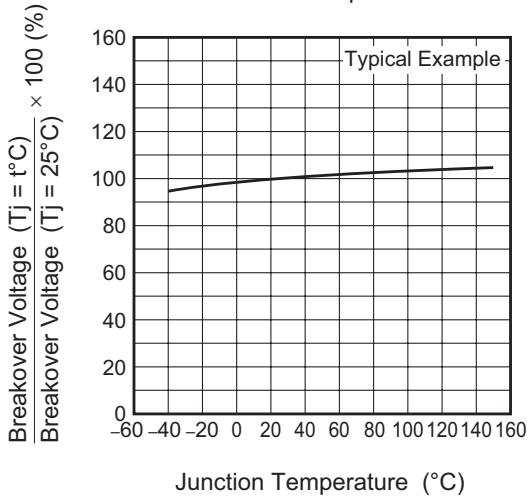
Holding Current vs. Junction Temperature



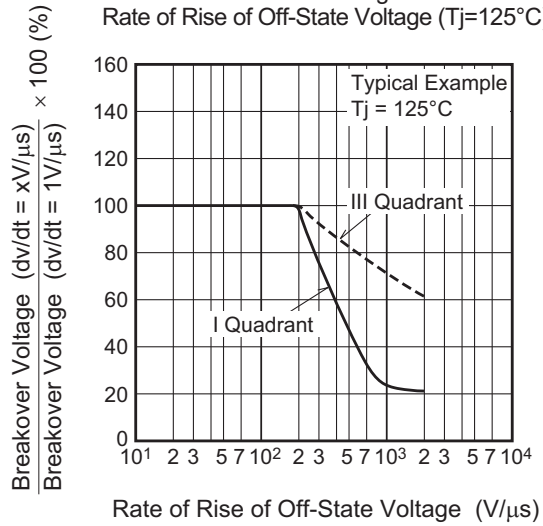
Latching Current vs. Junction Temperature



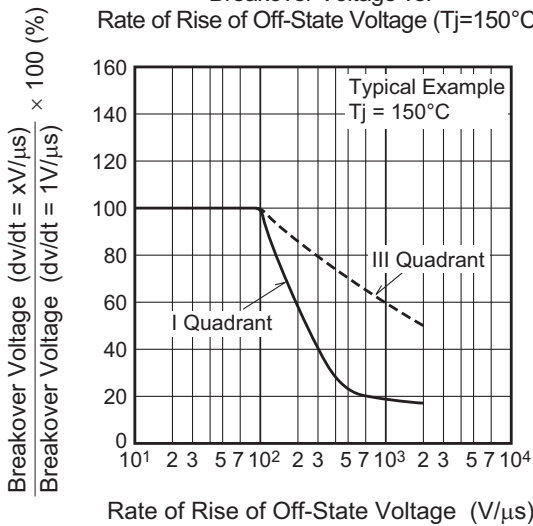
Breakover Voltage vs. Junction Temperature



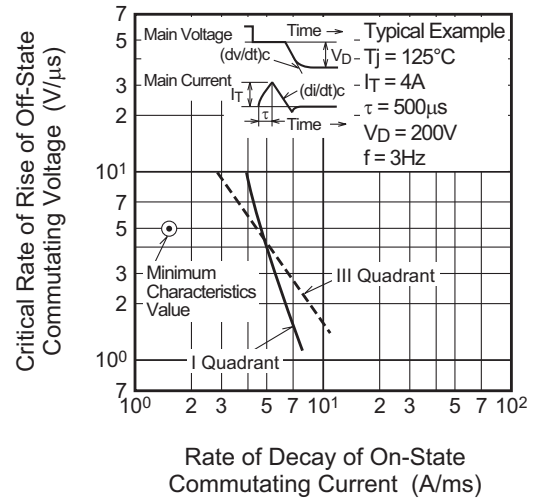
Breakover Voltage vs. Rate of Rise of Off-State Voltage (Tj=125°C)



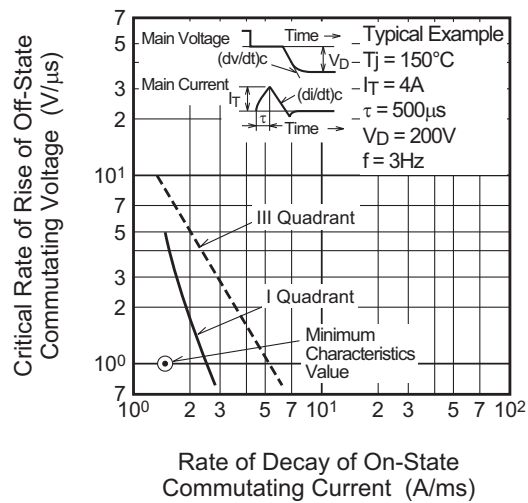
Breakover Voltage vs. Rate of Rise of Off-State Voltage (Tj=150°C)



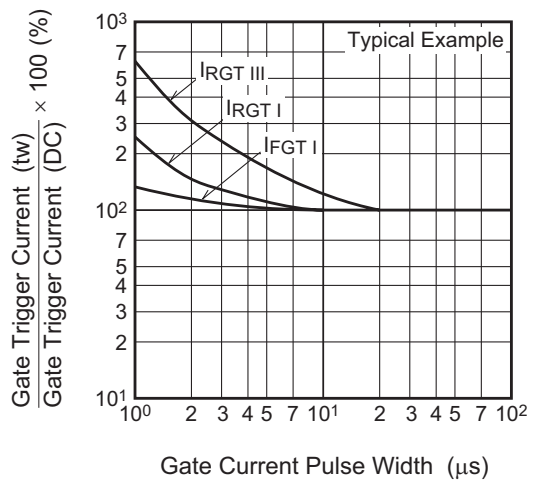
Commutation Characteristics (Tj=125°C)



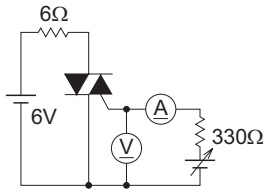
Commutation Characteristics (Tj=150°C)



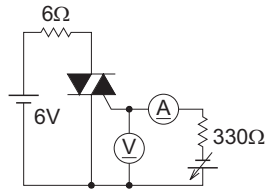
Gate Trigger Current vs. Gate Current Pulse Width



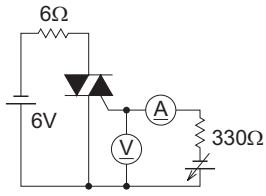
### Gate Trigger Characteristics Test Circuits



Test Procedure I

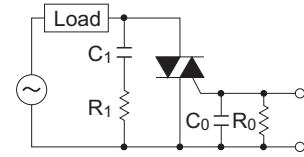


Test Procedure II



Test Procedure III

### Recommended Circuit Values Around The Triac

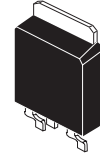
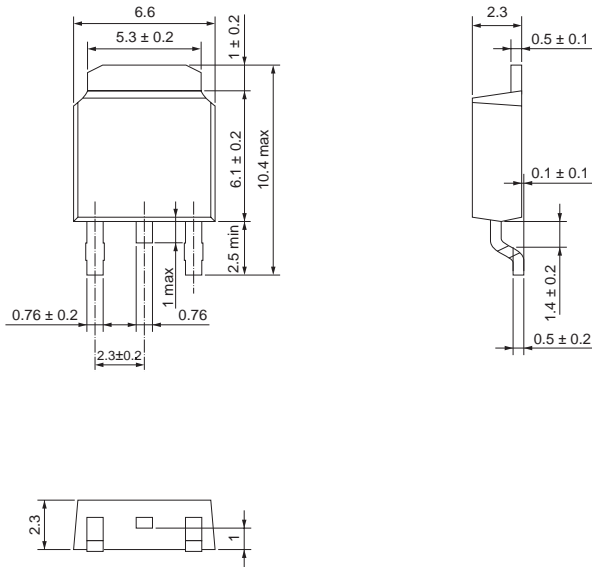


$C_1 = 0.1 \text{ to } 0.47 \mu\text{F}$      $C_0 = 0.1 \mu\text{F}$   
 $R_1 = 47 \text{ to } 100 \Omega$      $R_0 = 100 \Omega$

# Package Dimensions

## MP-3A

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



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	—	—	—

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

## Order Code

Lead form	Standard packing	Quantity	Standard order code	Standard order code example
Surface-mounted type	Taping	3000	Type name +B – T +Direction (1 or 2) +3	BCR3AS-12B-T13
Surface-mounted type	Plastic Magazine (Tube)	75	Type name +B	BCR3AS-12B

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