

# MCR106-6, MCR106-8

Preferred Device

## Sensitive Gate Silicon Controlled Rectifiers

### Reverse Blocking Thyristors

PNPN devices designed for high volume consumer applications such as temperature, light and speed control; process and remote control, and warning systems where reliability of operation is important.

#### Features

- Glass-Passivated Surface for Reliability and Uniformity
- Power Rated at Economical Prices
- Practical Level Triggering and Holding Characteristics
- Flat, Rugged, Thermopad Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Pb-Free Packages are Available\*

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) ( $T_J = -40$ to $110^\circ\text{C}$ , Sine Wave 50 to 60 Hz, Gate Open) MCR106-6 MCR106-8	$V_{\text{DRM}}$ , $V_{\text{RRM}}$	400 600	V
On-State RMS Current, ( $T_C = 93^\circ\text{C}$ ) ( $180^\circ$ Conduction Angles)	$I_{\text{T(RMS)}}$	4.0	A
Average On-State Current, ( $180^\circ$ Conduction Angles; $T_C = 93^\circ\text{C}$ )	$I_{\text{T(AV)}}$	2.55	A
Peak Non-repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_J = 110^\circ\text{C}$ )	$I_{\text{TSM}}$	25	A
Circuit Fusing Considerations, ( $t = 8.3$ ms)	$I^2t$	2.6	$\text{A}^2\text{s}$
Forward Peak Gate Power, ( $T_C = 93^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )	$P_{\text{GM}}$	0.5	W
Forward Average Gate Power, ( $T_C = 93^\circ\text{C}$ , $t = 8.3$ ms)	$P_{\text{G(AV)}}$	0.1	W
Forward Peak Gate Current, ( $T_C = 93^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )	$I_{\text{GM}}$	0.2	A
Peak Reverse Gate Voltage, ( $T_C = 93^\circ\text{C}$ , Pulse Width $\leq 1.0$ $\mu\text{s}$ )	$V_{\text{RGM}}$	6.0	V
Operating Junction Temperature Range	$T_J$	$-40$ to $+110$	$^\circ\text{C}$
Storage Temperature Range	$T_{\text{stg}}$	$-40$ to $+150$	$^\circ\text{C}$
Mounting Torque (Note 2)	-	6.0	in. lb.

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1.  $V_{\text{DRM}}$  and  $V_{\text{RRM}}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.
2. Torque rating applies with use of compression washer (B52200-F006 or equivalent). Mounting torque in excess of 6 in. lb. does not appreciably lower case-to-sink thermal resistance. Anode lead and heatsink contact pad are common. (See AN209B). For soldering purposes (either terminal connection or device mounting), soldering temperatures shall not exceed  $+200^\circ\text{C}$ . For optimum results, an activated flux (oxide removing) is recommended.

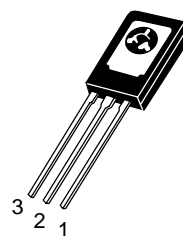
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

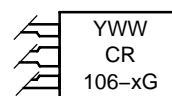
<http://onsemi.com>

SCRs  
4 AMPERES RMS  
400 thru 600 VOLTS



TO-225AA  
CASE 77  
STYLE 2

#### MARKING DIAGRAM



Y = Year  
WW = Work Week  
CR106-x = Device Code  
x = 6 or 8  
G = Pb-Free Package

#### PIN ASSIGNMENT

1	Cathode
2	Anode
3	Gate

#### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

Preferred devices are recommended choices for future use and best overall value.

# MCR106-6, MCR106-8

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.0	$^{\circ}C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	75	$^{\circ}C/W$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	$T_L$	260	$^{\circ}C$

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}C$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

## OFF CHARACTERISTICS

Peak Repetitive Forward or Reverse Blocking Current ( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}; R_{GK} = 1000 \text{ Ohms}$ )	$I_{DRM}, I_{RRM}$	-	-	10	$\mu A$
$T_J = 25^{\circ}C$		-	-	200	$\mu A$
$T_J = 110^{\circ}C$		-	-		

## ON CHARACTERISTICS

Peak Forward On-State Voltage (Note 3) ( $I_{TM} = 4 \text{ A Peak}$ )	$V_{TM}$	-	-	2.0	V
Gate Trigger Current (Continuous dc) (Note 4) ( $V_{AK} = 7 \text{ Vdc}, R_L = 100 \text{ Ohms}$ ) ( $T_C = -40^{\circ}C$ )	$I_{GT}$	-	-	200	$\mu A$
		-	-	500	
Gate Trigger Voltage (Continuous dc) (Note 4) ( $V_{AK} = 7 \text{ Vdc}, R_L = 100 \text{ Ohms}$ )	$V_{GT}$	-	-	1.0	V
Gate Non-Trigger Voltage (Note 4) ( $V_{AK} = 12 \text{ Vdc}, R_L = 100 \text{ Ohms}, T_J = 110^{\circ}C$ )	$V_{GD}$	0.2	-	-	V
Holding Current ( $V_{AK} = 7 \text{ Vdc}, \text{Initiating Current} = 200 \text{ mA}, \text{Gate Open}$ )	$I_H$	-	-	5.0	mA

## DYNAMIC CHARACTERISTICS

Critical Rate-of-Rise of Off-State Voltage ( $T_J = 110^{\circ}C$ )	dv/dt	-	10	-	V/ $\mu s$
--	-------	---	----	---	------------

3. Pulse Test: Pulse Width  $\leq 1.0 \text{ ms}$ , Duty Cycle  $\leq 1\%$ .

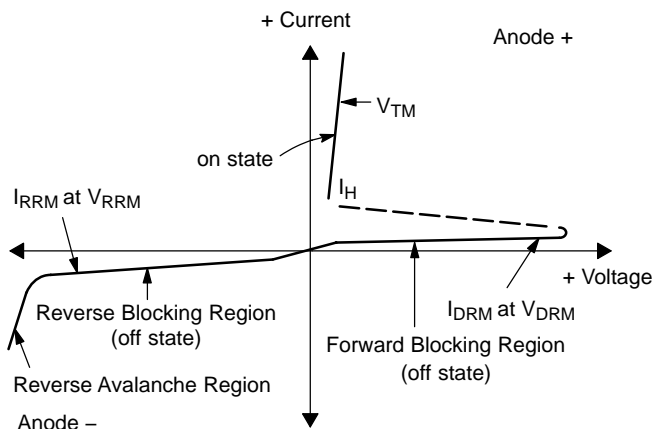
4.  $R_{GK}$  current is not included in measurement.

## ORDERING INFORMATION

Device	Package	Shipping
MCR106-6	TO-225AA	500 Units / Box
MCR106-6G	TO-225AA (Pb-Free)	500 Units / Box
MCR106-8	TO-225AA	500 Units / Box
MCR106-8G	TO-225AA (Pb-Free)	500 Units / Box

Voltage Current Characteristic of SCR

Symbol	Parameter
$V_{DRM}$	Peak Repetitive Off State Forward Voltage
$I_{DRM}$	Peak Forward Blocking Current
$V_{RRM}$	Peak Repetitive Off State Reverse Voltage
$I_{RRM}$	Peak Reverse Blocking Current
$V_{TM}$	Peak On State Voltage
$I_H$	Holding Current



CURRENT DERATING

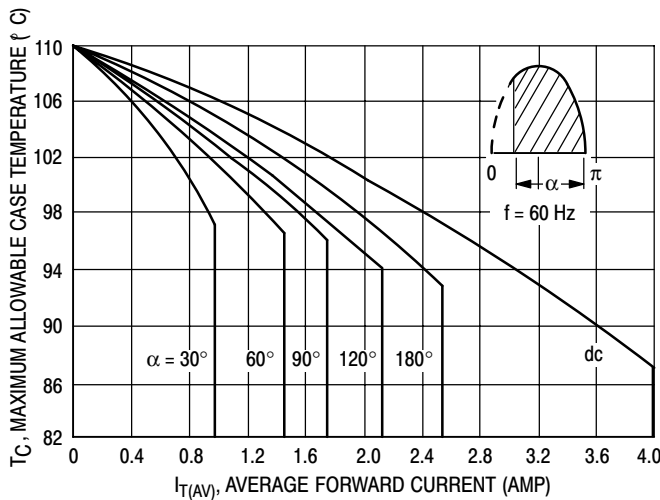


Figure 1. Maximum Case Temperature

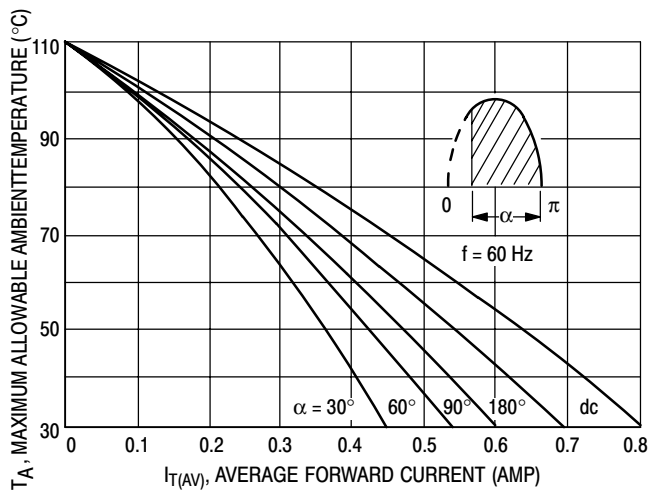
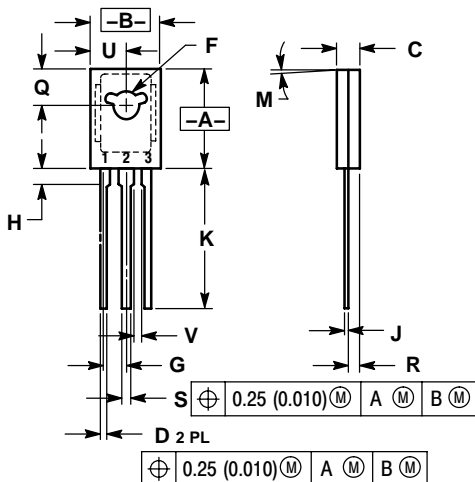


Figure 2. Maximum Ambient Temperature

# MCR106-6, MCR106-8

## PACKAGE DIMENSIONS

### TO-225 CASE 77-09 ISSUE Z



#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 077-01 THRU -08 OBSOLETE, NEW STANDARD 077-09.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.425	0.435	10.80	11.04
B	0.295	0.305	7.50	7.74
C	0.095	0.105	2.42	2.66
D	0.020	0.026	0.51	0.66
F	0.115	0.130	2.93	3.30
G	0.094 BSC		2.39 BSC	
H	0.050	0.095	1.27	2.41
J	0.015	0.025	0.39	0.63
K	0.575	0.655	14.61	16.63
M	5° TYP		5° TYP	
Q	0.148	0.158	3.76	4.01
R	0.045	0.065	1.15	1.65
S	0.025	0.035	0.64	0.88
U	0.145	0.155	3.69	3.93
V	0.040	---	1.02	---

#### STYLE 2:

1. CATHODE
2. ANODE
3. GATE

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

#### PUBLICATION ORDERING INFORMATION

##### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 61312, Phoenix, Arizona 85082-1312 USA  
Phone: 480-829-7710 or 800-344-3860 Toll Free USA/Canada  
Fax: 480-829-7709 or 800-344-3867 Toll Free USA/Canada  
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free  
USA/Canada

Japan: ON Semiconductor, Japan Customer Focus Center  
2-9-1 Kamimeguro, Meguro-ku, Tokyo, Japan 153-0051  
Phone: 81-3-5773-3850

ON Semiconductor Website: <http://onsemi.com>

Order Literature: <http://www.onsemi.com/litorder>

For additional information, please contact your  
local Sales Representative.