

# C106 Series

## Sensitive Gate Silicon Controlled Rectifiers Reverse Blocking Thyristors

Glassivated PNP 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

- Glassivated 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
- Sensitive Gate Triggering
- These are Pb-Free Devices

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

| Characteristic                                                                                                                                  | Symbol                   | Max             | Unit                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------------|----------------------|
| Peak Repetitive Off-State Voltage (Note 1)<br>(Sine Wave, 50–60 Hz, $R_{GK} = 1\text{ k}\Omega$ ,<br>$T_C = -40^\circ$ to $110^\circ\text{C}$ ) | $V_{DRM}$ ,<br>$V_{RRM}$ |                 | V                    |
| C106B                                                                                                                                           |                          | 200             |                      |
| C106D, C106D1*                                                                                                                                  |                          | 400             |                      |
| C106M, C106M1*                                                                                                                                  |                          | 600             |                      |
| On-State RMS Current<br>( $180^\circ$ Conduction Angles, $T_C = 80^\circ\text{C}$ )                                                             | $I_{T(RMS)}$             | 4.0             | A                    |
| Average On-State Current<br>( $180^\circ$ Conduction Angles, $T_C = 80^\circ\text{C}$ )                                                         | $I_{T(AV)}$              | 2.55            | A                    |
| Peak Non-Repetitive Surge Current<br>(1/2 Cycle, Sine Wave, 60 Hz, $T_J = +25^\circ\text{C}$ )                                                  | $I_{TSM}$                | 20              | A                    |
| Circuit Fusing Considerations ( $t = 8.3\text{ ms}$ )                                                                                           | $I^2t$                   | 1.65            | $\text{A}^2\text{s}$ |
| Forward Peak Gate Power<br>(Pulse Width $\leq 1.0\text{ }\mu\text{sec}$ , $T_C = 80^\circ\text{C}$ )                                            | $P_{GM}$                 | 0.5             | W                    |
| Forward Average Gate Power<br>(Pulse Width $\leq 1.0\text{ }\mu\text{sec}$ , $T_C = 80^\circ\text{C}$ )                                         | $P_{G(AV)}$              | 0.1             | W                    |
| Forward Peak Gate Current<br>(Pulse Width $\leq 1.0\text{ }\mu\text{sec}$ , $T_C = 80^\circ\text{C}$ )                                          | $I_{GM}$                 | 0.2             | A                    |
| Operating Junction Temperature Range                                                                                                            | $T_J$                    | $-40$ to $+110$ | $^\circ\text{C}$     |
| Storage Temperature Range                                                                                                                       | $T_{stg}$                | $-40$ to $+150$ | $^\circ\text{C}$     |
| Mounting Torque (Note 2)                                                                                                                        | –                        | 6.0             | in. lb.              |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

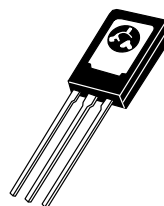
1.  $V_{DRM}$  and  $V_{RRM}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.
2. Torque rating applies with use of compression washer (B52200F006). 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.



ON Semiconductor®

<http://onsemi.com>

SCRs  
4 A RMS, 200 – 600 Volts



TO-225AA  
CASE 077  
STYLE 2

### MARKING DIAGRAM & PIN ASSIGNMENT



Y = Year  
WW = Work Week  
C106xx = Device Code  
xx = B, D, D1, M, M1  
G = Pb-Free Package

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

## C106 Series

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

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

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

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

#### OFF CHARACTERISTICS

|                                                                                                                                             |                    |   |   |     |               |
|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---|---|-----|---------------|
| Peak Repetitive Forward or Reverse Blocking Current<br>( $V_{AK} = \text{Rated } V_{DRM} \text{ or } V_{RRM}, R_{GK} = 1 \text{ k}\Omega$ ) | $I_{DRM}, I_{RRM}$ | – | – | 10  | $\mu\text{A}$ |
| $T_J = 25^\circ\text{C}$<br>$T_J = 110^\circ\text{C}$                                                                                       |                    | – | – | 100 | $\mu\text{A}$ |

#### ON CHARACTERISTICS

|                                                                                                                             |           |            |                      |                   |               |
|-----------------------------------------------------------------------------------------------------------------------------|-----------|------------|----------------------|-------------------|---------------|
| Peak Forward On-State Voltage (Note 3)<br>( $I_{TM} = 4 \text{ A}$ )                                                        | $V_{TM}$  | –          | –                    | 2.2               | V             |
| Gate Trigger Current (Continuous dc) (Note 4)<br>( $V_{AK} = 6 \text{ Vdc}, R_L = 100 \Omega$ )                             | $I_{GT}$  | –          | 15                   | 200               | $\mu\text{A}$ |
| $T_J = 25^\circ\text{C}$<br>$T_J = -40^\circ\text{C}$                                                                       |           | –          | 35                   | 500               |               |
| Peak Reverse Gate Voltage ( $I_{GR} = 10 \mu\text{A}$ )                                                                     | $V_{GRM}$ | –          | –                    | 6.0               | V             |
| Gate Trigger Voltage (Continuous dc) (Note 4)<br>( $V_{AK} = 6 \text{ Vdc}, R_L = 100 \Omega$ )                             | $V_{GT}$  | 0.4<br>0.5 | 0.60<br>0.75         | 0.8<br>1.0        | V             |
| $T_J = 25^\circ\text{C}$<br>$T_J = -40^\circ\text{C}$                                                                       |           |            |                      |                   |               |
| Gate Non-Trigger Voltage (Continuous dc) (Note 4)<br>( $V_{AK} = 12 \text{ V}, R_L = 100 \Omega, T_J = 110^\circ\text{C}$ ) | $V_{GD}$  | 0.2        | –                    | –                 | V             |
| Latching Current<br>( $V_{AK} = 12 \text{ V}, I_G = 20 \text{ mA}, R_{GK} = 1 \text{ k}\Omega$ )                            | $I_L$     | –          | 0.20<br>0.35         | 5.0<br>7.0        | mA            |
| $T_J = 25^\circ\text{C}$<br>$T_J = -40^\circ\text{C}$<br>$T_J = +110^\circ\text{C}$                                         |           | –          |                      |                   |               |
| Holding Current ( $V_D = 12 \text{ Vdc}$ )<br>(Initiating Current = 20 mA, $R_{GK} = 1 \text{ k}\Omega$ )                   | $I_H$     | –          | 0.19<br>0.33<br>0.07 | 3.0<br>6.0<br>2.0 | mA            |
| $T_J = 25^\circ\text{C}$<br>$T_J = -40^\circ\text{C}$<br>$T_J = +110^\circ\text{C}$                                         |           | –          |                      |                   |               |

#### DYNAMIC CHARACTERISTICS

|                                                                                                                                                                        |         |   |     |   |                  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---|-----|---|------------------|
| Critical Rate-of-Rise of Off-State Voltage<br>( $V_{AK} = \text{Rated } V_{DRM}$ , Exponential Waveform, $R_{GK} = 1 \text{ k}\Omega$ ,<br>$T_J = 110^\circ\text{C}$ ) | $dv/dt$ | – | 8.0 | – | V/ $\mu\text{s}$ |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---|-----|---|------------------|

- Pulse Test: Pulse Width  $\leq 2.0 \text{ ms}$ , Duty Cycle  $\leq 2\%$ .
- $R_{GK}$  is not included in measurement.

# C106 Series

## 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                           |

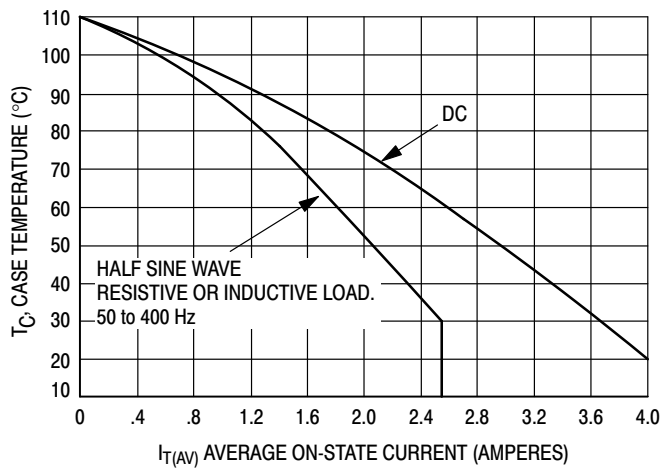
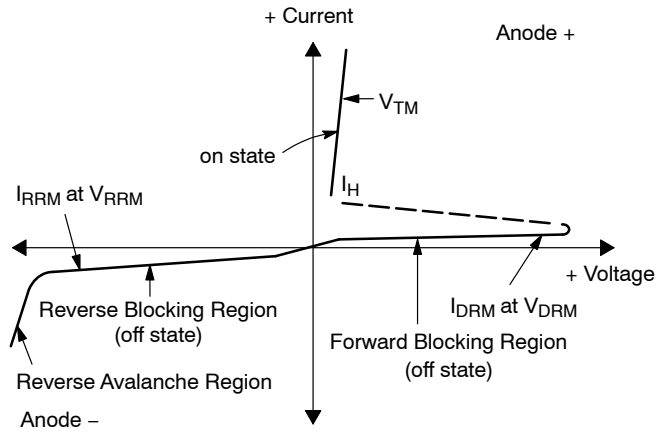


Figure 1. Average Current Derating

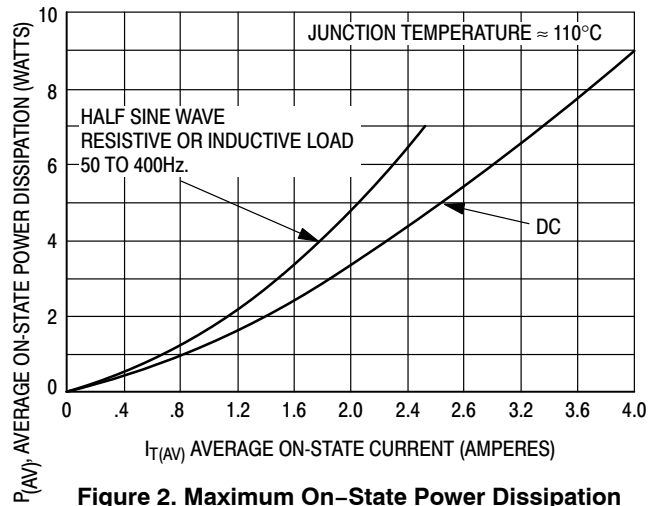
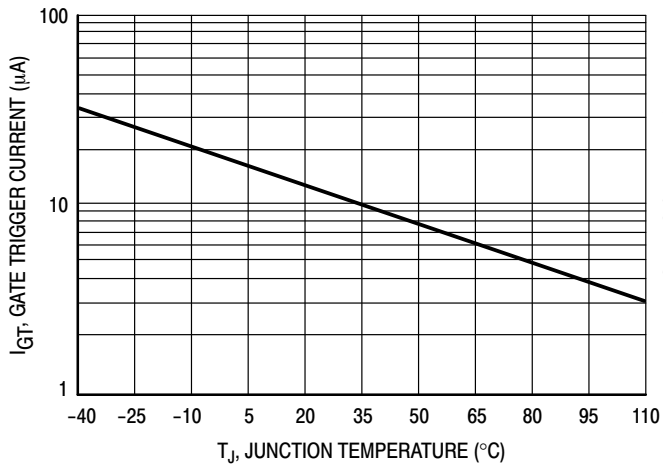
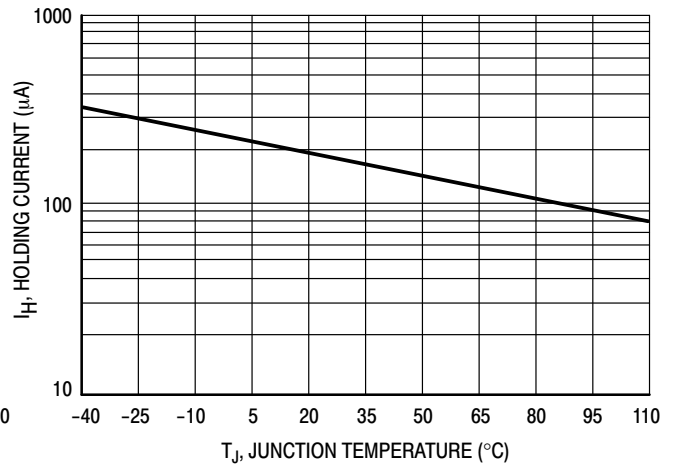


Figure 2. Maximum On-State Power Dissipation

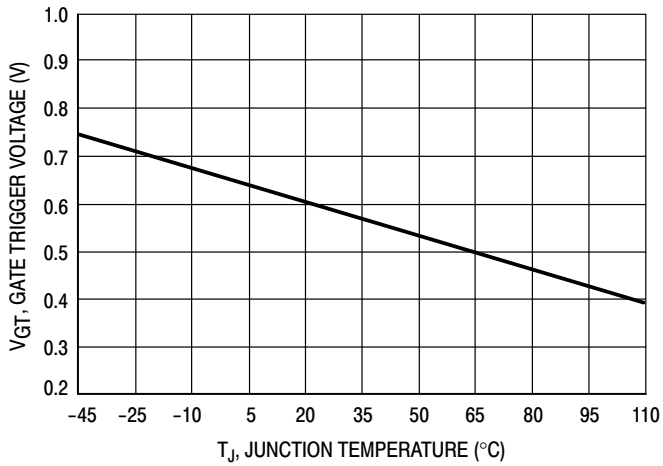
## C106 Series



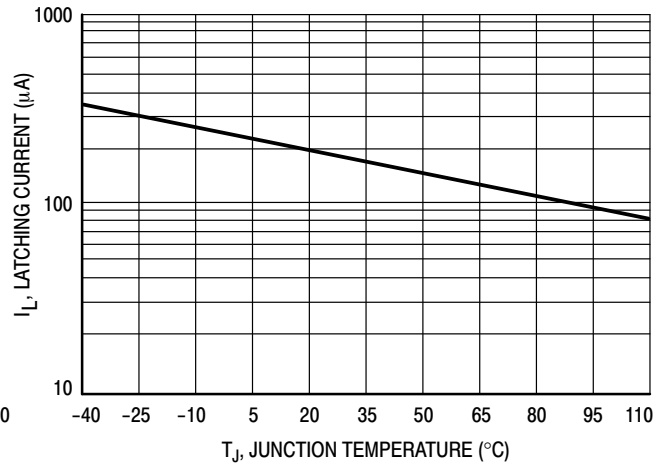
**Figure 3. Typical Gate Trigger Current versus Junction Temperature**



**Figure 4. Typical Holding Current versus Junction Temperature**



**Figure 5. Typical Gate Trigger Voltage versus Junction Temperature**

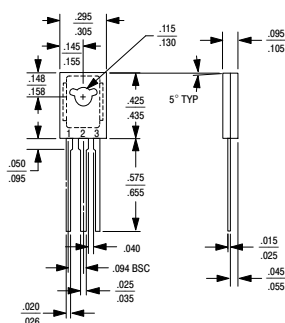


**Figure 6. Typical Latching Current versus Junction Temperature**

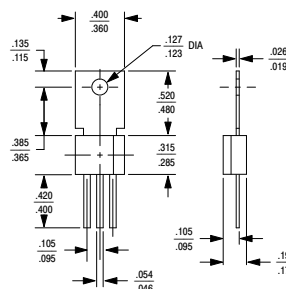
# C106 Series

## PACKAGE INTERCHANGEABILITY

The dimensional diagrams below compare the critical dimensions of the ON Semiconductor C-106 package with competitive devices. It has been demonstrated that the smaller dimensions of the ON Semiconductor package make it compatible in most lead-mount and chassis-mount applications. The user is advised to compare all critical dimensions for mounting compatibility.



ON Semiconductor C-106 Package



Competitive C-106 Package

## ORDERING INFORMATION

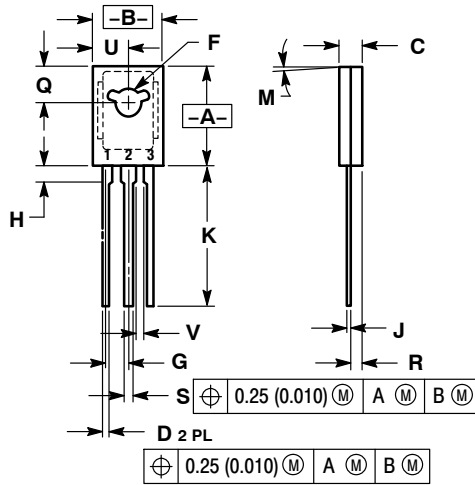
| Device   | Package               | Shipping <sup>†</sup> |
|----------|-----------------------|-----------------------|
| C106BG   | TO-225AA<br>(Pb-Free) | 500 Units / Box       |
| C106DG   | TO-225AA<br>(Pb-Free) | 500 Units / Box       |
| C106D1G* | TO-225AA<br>(Pb-Free) | 500 Units / Box       |
| C106MG   | TO-225AA<br>(Pb-Free) | 500 Units / Box       |
| C106M1G* | TO-225AA<br>(Pb-Free) | 500 Units / Box       |

\*D1 signifies European equivalent for D suffix and M1 signifies European equivalent for M suffix.

# C106 Series

## 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

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