

# SCRs

## Nanosecond Switching, Planar

GA200      GB200  
GA200A    GB200A  
GA201      GB201  
GA201A    GB201A

### FEATURES

- Rise Time: 10ns
- Delay Time: 10ns
- Recovery Time: 0.5  $\mu$ s
- Pulse Current: to 100A
- Turn-on with 20ns, 10 mA Gate Pulse

### DESCRIPTION

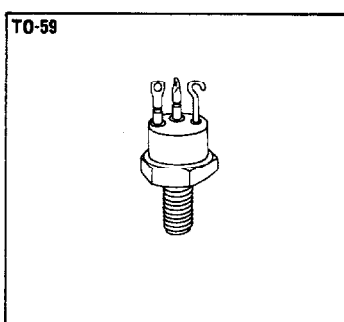
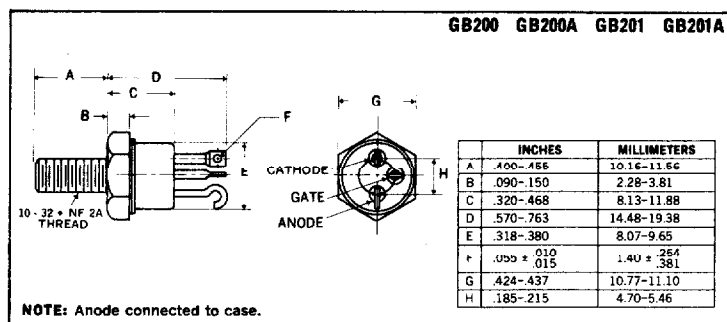
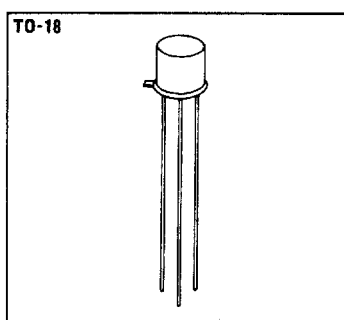
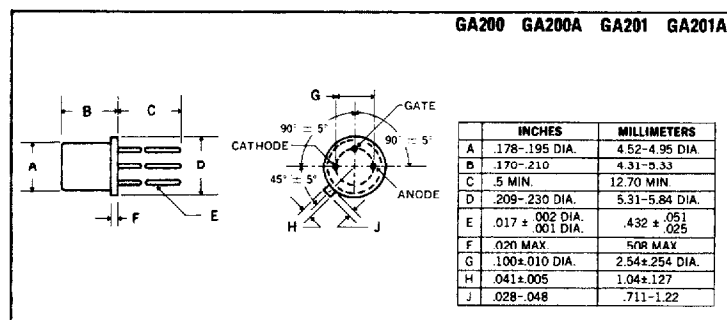
The Microsemi Nanosecond Thyristor Switch combines the turn-on speed of logic level transistors with the high current switching capability inherent in SCRs. With this device engineers can now design circuits capable of switching pulse currents of 1A in less than 10ns or up to 30A in less than 20ns.

The GA/GB200 series is specifically designed for use as switching elements in high speed, low-to-medium power radar pulse modulators. Other applications include switching elements for phased array radars, laser pulse drivers, harmonic wave-form generators, line drivers and high current replacements for avalanche transistors. For applications requiring higher voltage levels, Microsemi has developed several "series string" circuits which allow the series connection of virtually an unlimited number of devices for voltages as high as 2000V with no significant decrease in speed. The circuits are described in Microsemi's Design Note #14.

### ABSOLUTE MAXIMUM RATINGS

|                                              | GA200<br>GA200A | GA201<br>GA201A | GB200<br>GB200A | GB201<br>GB201A |
|----------------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Repetitive Peak Off-State Voltage, $V_{DRM}$ | 60V             | 100V            | 60V             | 100V            |
| Repetitive Peak On-State Current, $I_{TRM}$  | up to 100A      |                 | up to 100A      |                 |
| D.C. On-State Current, $I_T$                 |                 |                 |                 |                 |
| 70°C Ambient                                 | 200mA           |                 | —               |                 |
| 70°C Case                                    | 400mA           |                 | 6A              |                 |
| Peak Gate Current, $I_{GM}$                  | 250mA           |                 | 250mA           |                 |
| Average Gate Current, $I_{G(AV)}$            | 25mA            |                 | 50mA            |                 |
| Reverse Gate Current, $I_{GR}$               | 3mA             |                 | 3mA             |                 |
| Reverse Gate Voltage, $V_{GR}$               | 5V              |                 | 5V              |                 |
| Thermal Resistance, $R_{\theta CA}$          | 300°C/W         |                 |                 |                 |
| Storage Temperature Range                    | -65°C to +200°C |                 |                 |                 |
| Operating Temperature Range                  | -65°C to +150°C |                 |                 |                 |

### MECHANICAL SPECIFICATIONS



**Microsemi Corp.**  
**Watertown**  
The diode experts

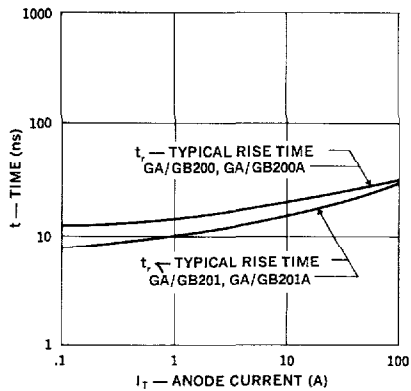
## ELECTRICAL SPECIFICATIONS (at 25°C unless noted)

| Test                                                       | Symbol       | Min. | Typ.     | Max.    | Units                  | Test Conditions                                                                       |
|------------------------------------------------------------|--------------|------|----------|---------|------------------------|---------------------------------------------------------------------------------------|
| Delay Time                                                 | $t_d$        | —    | 20<br>10 | 30<br>— | ns<br>ns               | $I_G = 20\text{mA}, I_T = 1\text{A}$<br>$I_G = 30\text{mA}, I_T = 1\text{A}$          |
| Rise Time GA200, 200A, GB200, 200A                         | $t_r$        | —    | 15<br>25 | 25<br>— | ns<br>ns               | $V_D = 60\text{V}, I_T = 1\text{A}$ (1)<br>$V_D = 60\text{V}, I_T = 30\text{A}$ (1)   |
| Rise Time GA201, 201A, GB201, 201A                         | $t_r$        | —    | 10<br>20 | 20<br>— | ns<br>ns               | $V_D = 100\text{V}, I_T = 1\text{A}$ (1)<br>$V_D = 100\text{V}, I_T = 30\text{A}$ (1) |
| Gate Trigger on Pulse Width                                | $t_{pg(on)}$ | —    | .02      | .05     | $\mu\text{s}$          | $I_G = 10\text{mA}, I_T = 1\text{A}$                                                  |
| Circuit Commutated Turn-off Time<br>GA200, 201, GB200, 201 | $t_q$        | —    | 0.8      | 2.0     | $\mu\text{s}$          | $I_T = 1\text{A}, I_R = 1\text{A}, R_{GK} = 1\text{K}$                                |
| GA200A, 201A, GB200A, 201A                                 | $t_q$        | —    | 0.3      | 0.5     | $\mu\text{s}$          |                                                                                       |
| Off-State Current                                          | $I_{DRM}$    | —    | .01      | 0.1     | $\mu\text{A}$          | $V_{DRM} = \text{Rating}, R_{GK} = 1\text{K}$                                         |
|                                                            |              | —    | 20       | 100     | $\mu\text{A}$          | $V_{DRM} = \text{Rating}, R_{GK} = 1\text{K}, 150^\circ\text{C}$                      |
| Reverse Current                                            | $I_{RRM}$    | —    | 1.0      | 10      | mA                     | $V_{RRM} = 30\text{V}, R_{GK} = 1\text{K}$ (2)                                        |
| Reverse Gate Current                                       | $I_{GR}$     | —    | .01      | 0.1     | mA                     | $V_{GRM} = 5\text{V}$                                                                 |
| Gate Trigger Current                                       | $I_{GT}$     | —    | 10       | 200     | $\mu\text{A}$          | $V_D = 5\text{V}, R_{GS} = 10\text{K}$                                                |
| Gate Trigger Voltage                                       | $V_{GT}$     | 0.4  | .6       | 0.75    | V                      | $V_D = 5\text{V}, R_{GS} = 100\Omega, T = 25^\circ\text{C}$                           |
|                                                            |              | 0.10 | 0.2      | —       | V                      | $T = +150^\circ\text{C}$                                                              |
| On-State Voltage                                           | $V_T$        | —    | 1.1      | 1.5     | V                      | $I_T = 2\text{A}$                                                                     |
| Holding Current                                            | $I_H$        | 0.3  | 2.0      | 5.0     | mA                     | $V_D = 5\text{V}, R_{GK} = 1\text{K}, T = 25^\circ\text{C}$                           |
|                                                            |              | 0.05 | 0.2      | —       | mA                     | $T = +150^\circ\text{C}$                                                              |
| Off-State Voltage-Critical Rate of Rise                    | $dv/dt$      | 20   | 40       | —       | $\text{V}/\mu\text{s}$ | $V_D = 30\text{V}, R_{GK} = 1\text{K}$                                                |

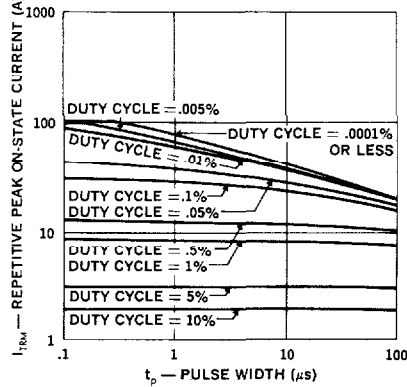
Notes: 1.  $I_G = 10\text{mA}$ ; Pulse Test, Duty Cycle  $<1\%$ .

2. Pulse test intended to guarantee reverse anode voltage capability for pulse commutation. Device should not be operated in the Reverse blocking mode on a continuous basis.

8

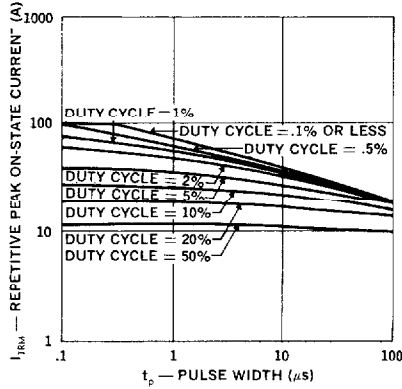
Switching Speed (Typical)  
GA/GB200 Series

NOTES: 1.  $V_D = \text{Rated } V_{DRM}$   
 2.  $T_A = 25^\circ\text{C}$   
 3.  $I_G = 20\text{mA}$   
 4.  $t_d = 20\text{ns}$  TYPICALLY FOR ALL TYPES INDEPENDENT OF ANODE CURRENT

Peak Current vs. Pulse Width  
GA200 Series

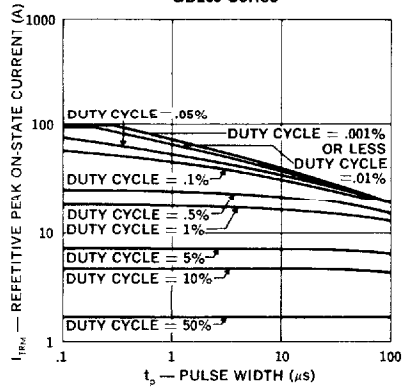
NOTES: 1. DATA BASED ON ON-STATE VOLTAGE GRAPH AT  $T_J = 150^\circ\text{C}$ . BLOCKING VOLTAGE MAY BE APPLIED IMMEDIATELY AFTER TERMINATION OF CURRENT PULSE.  
 2.  $T_A = 75^\circ\text{C}$

Peak Current vs. Pulse Width  
GB200 Series



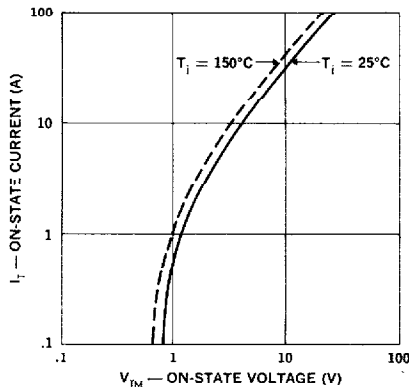
- NOTES: 1. DATA BASED ON ON-STATE VOLTAGE GRAPH AT  $T_J = 150^\circ\text{C}$ . BLOCKING VOLTAGE MAY BE APPLIED IMMEDIATELY AFTER TERMINATION OF CURRENT PULSE.  
2.  $T_C = 75^\circ\text{C}$

Peak Current vs. Pulse Width  
GB200 Series

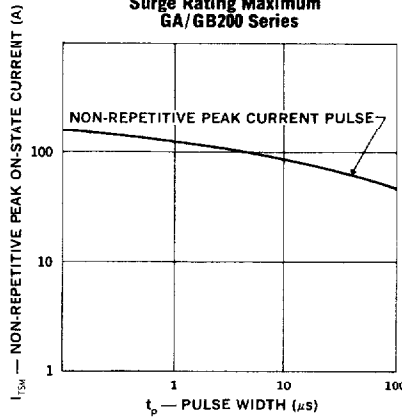


- NOTES: 1. DATA BASED ON ON-STATE VOLTAGE GRAPH AT  $T_J = 150^\circ\text{C}$ . BLOCKING VOLTAGE MAY BE APPLIED IMMEDIATELY AFTER TERMINATION OF CURRENT PULSE.  
2.  $T_A = 75^\circ\text{C}$

On-State Current vs. Voltage  
GA/GB200 Series



Surge Rating Maximum  
GA/GB200 Series



- NOTES: 1. BLOCKING VOLTAGE MAY NOT BE APPLIED FOR .001 SEC. AFTER TERMINATION OF SURGE PULSE AS JUNCTION TEMPERATURE WILL EXCEED  $150^\circ\text{C}$ .  
2.  $T_C = 75^\circ\text{C}$

