

# 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 GA200A	GA201 GA201A	GB200 GB200A	GB201 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	
DC. 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

**GA200 GA200A GA201 GA201A**

	INCHES	MILLIMETERS
A	.178-.195 DIA.	4.52-4.95 DIA.
B	.170-.210	4.31-5.33
C	5 MIN.	12.70 MIN.
D	.209-.230 DIA.	5.31-5.84 DIA.
E	.017 ± .002 DIA. .031 DIA.	.432 ± .051 .025
F	.020 MAX.	.508 MAX.
G	.100±.010 DIA.	2.54±.254 DIA.
H	.041±.005	1.04±.127
J	.028-.048	.711-1.22

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**GB200 GB200A GB201 GB201A**

	INCHES	MILLIMETERS
A	.400-.455	10.16-11.60
B	.090-.150	2.28-3.81
C	.320-.468	8.13-11.88
D	.570-.763	14.48-19.38
E	.318-.380	8.07-9.65
F	.055 ± .010 .015	1.40 ± .254 .381
G	.424-.437	10.77-11.10
H	.185-.215	4.70-5.46

**NOTE:** Anode connected to case.

**TO-59**

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

ELECTRICAL SPECIFICATIONS (at 25°C unless noted)

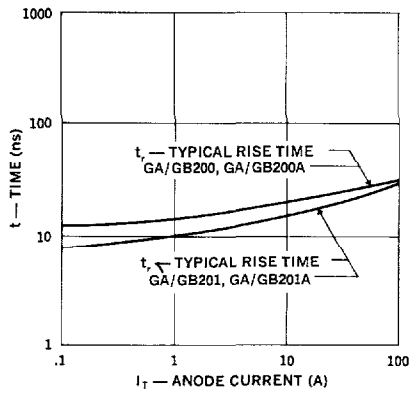
Test	Symbol	Min.	Typ.	Max.	Units	Test Conditions
Delay Time	$t_d$	—	20	30	ns	$I_G = 20\text{mA}, I_T = 1\text{A}$ $I_G = 30\text{mA}, I_T = 1\text{A}$
		—	10	—	ns	
Rise Time GA200, 200A, GB200, 200A	$t_r$	—	15	25	ns	$V_D = 60\text{V}, I_T = 1\text{A}$ (1) $V_D = 60\text{V}, I_T = 30\text{A}$ (1)
		—	25	—	ns	
Rise Time GA201, 201A, GB201, 201A	$t_r$	—	10	20	ns	$V_D = 100\text{V}, I_T = 1\text{A}$ (1) $V_D = 100\text{V}, I_T = 30\text{A}$ (1)
		—	20	—	ns	
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 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	—	0.3	0.5	
Off-State Current	$I_{DRM}$	—	.01	0.1	$\mu\text{A}$	$V_{DRM} = \text{Rating}, R_{GK} = 1\text{K}$ $V_{DRM} = \text{Rating}, R_{GK} = 1\text{K}, 150^\circ\text{C}$
		—	20	100	$\mu\text{A}$	
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	$V_D = 5\text{V}, R_{GS} = 100\Omega, T = 25^\circ\text{C}$ $T = +150^\circ\text{C}$
		0.10	0.2	—	V	
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	$V_D = 5\text{V}, R_{GK} = 1\text{K}, T = 25^\circ\text{C}$ $T = +150^\circ\text{C}$
		0.05	0.2	—	mA	
Off-State Voltage-Critical Rate of Rise	$dv/dt$	20	40	—	$\text{V}/\mu\text{s}$	$V_D = 30\text{V}, R_{GK} = 1\text{K}$

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

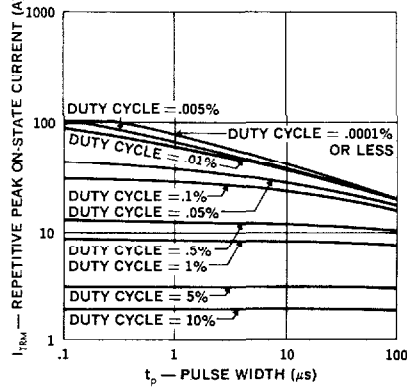
2. Pulse test intended to guarantee reverse anode voltage capability for pulse commutation. Device should not be operated in the Reverse blocking mode on a continuous basis.

Switching Speed (Typical)  
CA/CB200 Series



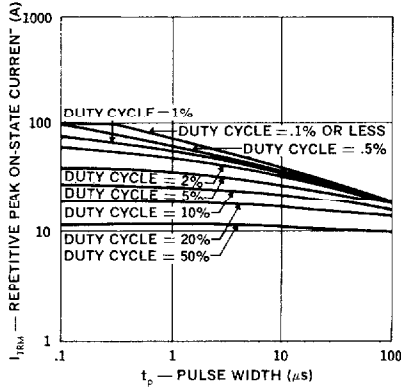
NOTES: 1.  $V_D = \text{Rated } V_{DRM}$   
2.  $T_A = 25^\circ\text{C}$   
3.  $I_G = 20\text{mA}$   
4.  $t_d = 20\text{ns}$  TYPICALLY FOR ALL TYPES INDEPENDENT OF ANODE CURRENT

Peak Current vs. Pulse Width  
CA200 Series



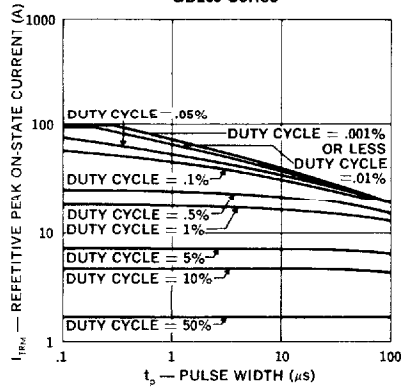
NOTES: 1. DATA BASED ON ON-STATE VOLTAGE GRAPH AT  $T_J = 150^\circ\text{C}$ . BLOCKING VOLTAGE MAY BE APPLIED IMMEDIATELY AFTER TERMINATION OF CURRENT PULSE.  
2.  $T_A = 75^\circ\text{C}$

**Peak Current vs. Pulse Width  
 GB200 Series**



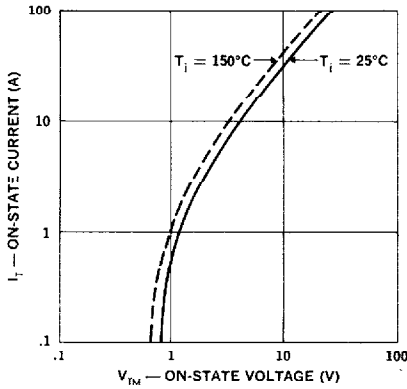
**NOTES:** 1. DATA BASED ON ON-STATE VOLTAGE GRAPH AT  $T_j = 150^\circ\text{C}$ . BLOCKING VOLTAGE MAY BE APPLIED IMMEDIATELY AFTER TERMINATION OF CURRENT PULSE.  
 2.  $T_c = 75^\circ\text{C}$

**Peak Current vs. Pulse Width  
 GB200 Series**

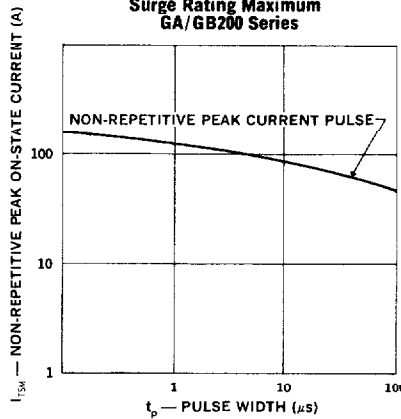


**NOTES:** 1. DATA BASED ON ON-STATE VOLTAGE GRAPH AT  $T_j = 150^\circ\text{C}$ . BLOCKING VOLTAGE MAY BE APPLIED IMMEDIATELY AFTER TERMINATION OF CURRENT PULSE.  
 2.  $T_a = 75^\circ\text{C}$

**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.  $T_c = 75^\circ\text{C}$

