

# SCRs

## Commercial Nanosecond Switching Planar

GA300      GB300  
 GA300A    GB300A  
 GA301      GB301  
 GA301A    GB301A

### FEATURES

- Rise Time: 10ns
- Delay Time: 10ns
- Recovery Time: 0.5 $\mu$ s
- Pulse Current: to 100A
- Turn-on with 20ns, 10mA 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 GA300, GB300 Series is specifically designed for use as switching element in high speed laser diode pulse drivers. Other applications include electronic crowbars, harmonic wave-form generators, line drivers and general purpose replacements for avalanche transistors. For applications requiring higher voltage levels, Microsemi has developed several "series string" circuits which allow the series connection of 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.

8

### ABSOLUTE MAXIMUM RATINGS

	GA300 GA300A	GA301 GA301A	GB300 GB300A	GB301 GB301A
Repetitive Peak Off-State Voltage, $V_{DRM}$	60V	100V	60V	100V
Repetitive Peak On-State Current, $I_{TRM}$	up to 100A		up to 100A	
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	
Storage Temperature Range	-65°C to +150°C		-65°C to +150°C	
Operating Temperature Range	0°C to +125°C		0°C to +125°C	

### MECHANICAL SPECIFICATIONS

**GA300 GA300A GA301 GA301A**

	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.	432 ± .051
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

**TO-18**

**GB300 GB300A GB301 GB301A**

	INCHES	MILLIMETERS
A	.400-.455	10.16-11.56
B	.090-.150	2.28-3.81
C	.320-.468	8.13-11.88
D	.570-.763	14.48-19.38
E	.318-.390	8.07-9.91
F	.055 ± .010	1.40 ± .254
G	.424-.437	10.77-11.10
H	.185-.215	4.70-5.46

**NOTE:** Anode connected to case.

**TO-59**

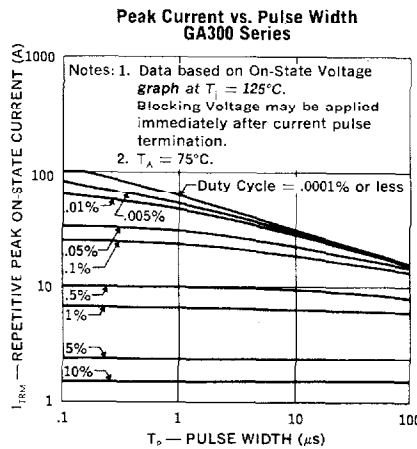
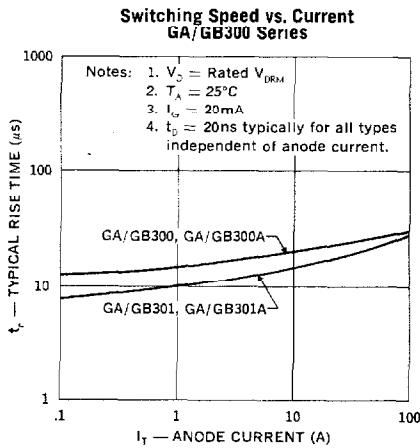
**Microsemi Corp.**  
**Watertown**  
 The diode experts

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

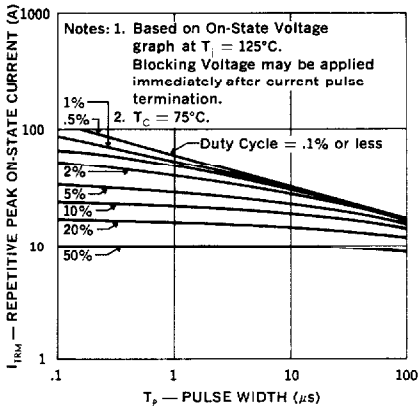
Test	Symbol	Min.	Typical	Max.	Units	Test Conditions
Delay Time	$t_d$	—	20 10	30 —	ns	$I_G = 20mA, I_T = 1A$ $I_G = 30mA, I_T = 1A$
Rise Time (Note 1) GA300, 300A, GB300, 300A	$t_r$	—	15 25	25 —	ns	$V_D = 60V, I_T = 1A$ $V_D = 60V, I_T = 30A$ (Note 1)
Rise Time (Note 1) GA301, 301A, GB301, 301A	$t_r$	—	10 20	20 —	ns	$V_D = 100V, I_T = 1A$ $V_D = 100V, I_T = 30A$ (Note 1)
Circuit Commutated Turn-off Time GA300, 301, GB300, 301	$t_q$	—	0.8	2.0	$\mu s$	$I_T = 1A, I_R = 1A, R_{GK} = 1K$
GA300A, 301A, GB300A, 301A			0.3	0.5	$\mu s$	$I_T = 1A, I_R = 1A, R_{GK} = 1K$
Gate Trigger-on Pulse Width	$t_{og(on)}$	—	0.02	0.05	$\mu s$	$I_G = 10mA, I_T = 1A$
Off-state Current	$I_{DRM}$	—	0.01 20	0.1 100	$\mu A$	$V_{DRM} = \text{Rating}, R_{GK} = 1K, T = 25^\circ C$ $V_{URM} = \text{Rating}, R_{GK} = 1K, T = 125^\circ C$
Reverse Current (Note 2)	$I_{RRM}$	—	1.0	10	mA	$V_{RRM} = 30V, R_{GK} = 1K$ (Note 2)
Gate Trigger Voltage	$V_{GT}$	0.4 0.10	0.6 0.2	0.75 —	V	$V_D = 5V, R_{GS} = 100\Omega, T = 25^\circ C$ $V_D = 5V, R_{GS} = 100\Omega, T = 125^\circ C$
Gate Trigger Current	$I_{GT}$	—	10	200	$\mu A$	$V_D = 5V, R_{GS} = 10K$
On-state Voltage	$V_T$	—	1.1	1.5	V	$I_T = 2A$
Off-state Voltage — Critical Rate of Rise	$dv/dt$	15	30	—	V/ $\mu s$	$V_D = 30V, R_{GK} = 1K$
Reverse Gate Current	$I_{GR}$	—	0.01	0.1	mA	$V_{GR} = 5V$
Holding Current	$I_H$	0.3 0.05	2.0	5.0	mA	$V_D = 5V, R_{GK} = 1K, T = 25^\circ C$
			0.4	—	mA	$V_D = 5V, R_{GK} = 1K, T = 125^\circ C$

Notes: 1.  $I_G = 10mA$ , Pulse Test, Duty Cycle < 1%.

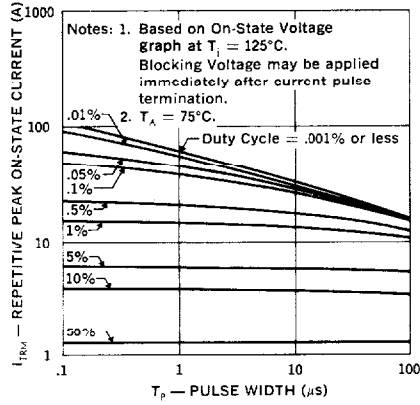
2. Pulse test intended to guarantee reverse anode voltage capability for pulse commutation. Device should not be operated in the reverse blocking mode on a continuous basis.



**Peak Current vs. Pulse Width  
 GB300 Series**

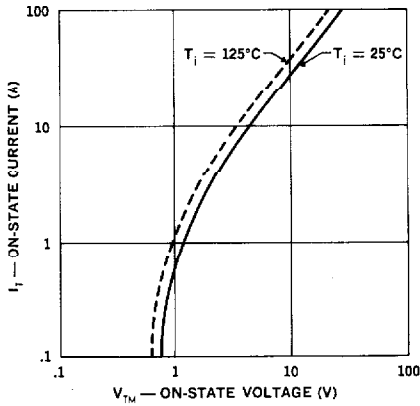


**Peak Current vs. Pulse Width  
 GB300 Series**



8

**On-State Voltage vs. Current  
 GA/GB300 Series**



**Surge Rating  
 GA/GB300 Series**

