SCRs
Commercial Nanosecond Switching Planar

GA300 GB300
GA300A GB300A
GA301 GB301
GA301A GB301A

FEATURES

- Rise Time: 10ns
- Delay Time: 10ns
- Recovery Time: 0.5μs
- 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.

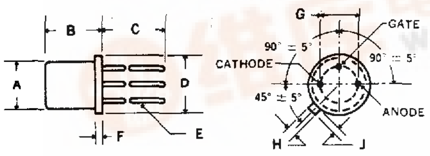
The GA300, GB300 Series is specifically designed for use as switching element in high speed laser diode pulse drivers. Other applications include electronic crowbars, harmonic wave-form generators, line drivers and general purpose replacements for avalanche transistors. For applications requiring higher 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.

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			
Operating Temperature Range	0°C to +125°C			

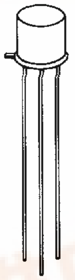
MECHANICAL SPECIFICATIONS

GA300 GA300A GA301 GA301A

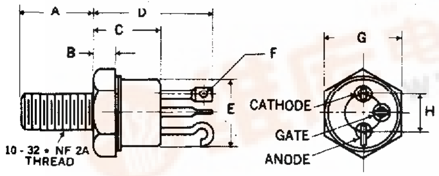


	INCHES	MILLIMETERS
A	.178–.195 DIA.	4.52–4.95 DIA.
B	.170–.210	4.31–5.33
C	.5 MIN.	12.70 MIN.
D	.209–.230 DIA.	5.31–5.84 DIA.
E	.017 ± .002 DIA. .001 DIA.	.432 ± .051 .025
F	.020 MAX.	.508 MAX.
G	.100±.010 DIA.	2.54±.254 DIA.
H	.041±.005	1.04±.127
J	.028–.048	.711–1.22

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–.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.

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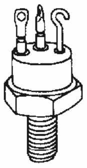


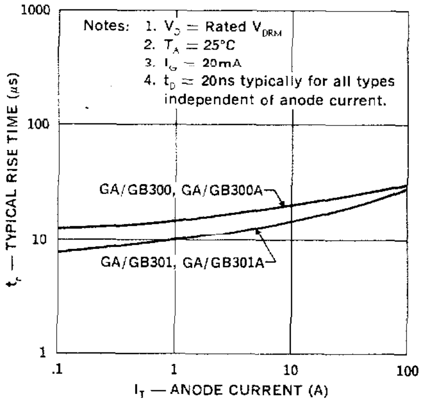
Microsemi Corp.
Watertown
The diode experts

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	μs	$I_T = 1A$, $I_R = 1A$, $R_{GK} = 1K$
GA300A, 301A, GB300A, 301A			0.3	0.5	μs	$I_T = 1A$, $I_R = 1A$, $R_{GK} = 1K$
Gate Trigger-on Pulse Width	$t_{pg\,(on)}$	—	0.02	0.05	μs	$I_G = 10mA$, $I_T = 1A$
Off-state Current	I_{DRM}	— —	0.01 20	0.1 100	μA μA	V_{DRM} = Rating, $R_{GK} = 1K$, $T = 25°C$ V_{DRM} = Rating, $R_{GK} = 1K$, $T = 125°C$
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	$V_D = 5V$, $R_{GS} = 100\Omega$, $T = 25°C$ $V_D = 5V$, $R_{GS} = 100\Omega$, $T = 125°C$
Gate Trigger Current	I_{GT}	—	10	200	μA	$V_D = 5V$, $R_{GS} = 10K$
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 0.4	5.0 —	mA mA	$V_D = 5V$, $R_{GK} = 1K$, $T = 25°C$ $V_D = 5V$, $R_{GK} = 1K$, $T = 125°C$

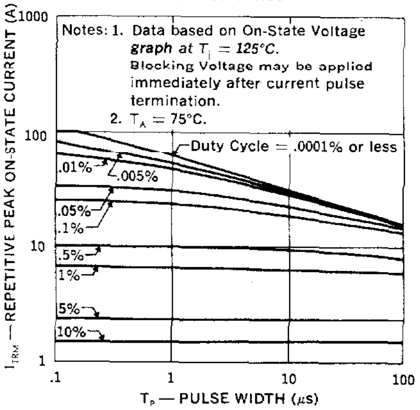
Notes: 1. $I_G = 10mA$, Pulse Test, Duty Cycle $< 1\%$.
2. Pulse test intended to guarantee reverse anode voltage capability for pulse commutation. Device should not be operated in the reverse blocking mode on a continuous basis.

Switching Speed vs. Current
GA/GB300 Series



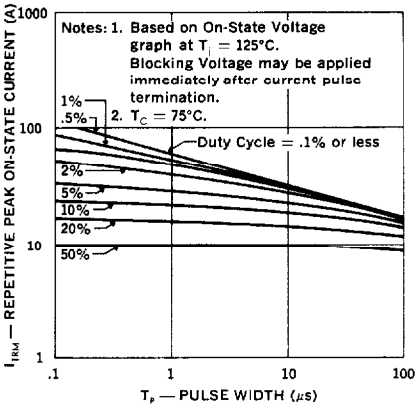
Notes: 1. V_D = Rated V_{DRM}
2. $T_A = 25°C$
3. $I_G = 20mA$
4. $t_D \simeq 20ns$ typically for all types independent of anode current.

Peak Current vs. Pulse Width
GA300 Series

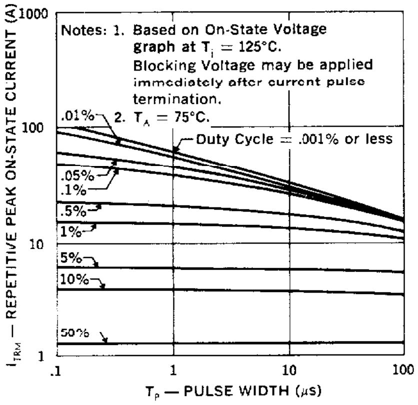


Notes: 1. Data based on On-State Voltage *graph at $T_j = 125°C$.* Blocking Voltage may be applied immediately after current pulse termination.
2. $T_A = 75°C$.

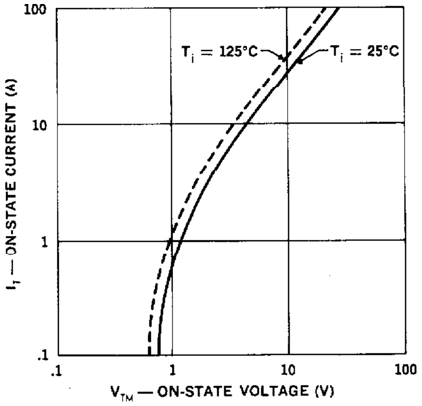
Peak Current vs. Pulse Width GB300 Series


Notes: 1. Based on On-State Voltage graph at T_j = 125°C. Blocking Voltage may be applied immediately after current pulse termination.
2. T_C = 75°C.

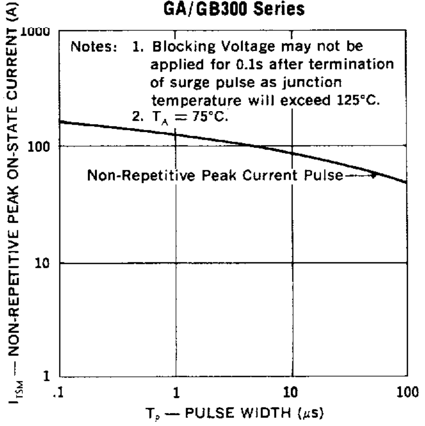
Peak Current vs. Pulse Width GB300 Series


Notes: 1. Based on On-State Voltage graph at T_j = 125°C. Blocking Voltage may be applied immediately after current pulse termination.
2. T_A = 75°C.

On-State Voltage vs. Current GA/GB300 Series



Surge Rating GA/GB300 Series


Notes: 1. Blocking Voltage may not be applied for 0.1s after termination of surge pulse as junction temperature will exceed 125°C.
2. T_A = 75°C.