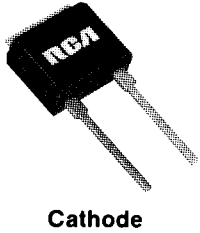


**SURGECTOR™ Power Devices**



Anode  
Cathode  
H-1940

**Unidirectional Transient Surge Suppressors**

**Features:**

- Clamping voltages - 33V, 60V, or 230V
- 300A peak transient surge current
- 130 mA minimum holding current
- Subnanosecond clamping action
- Low on-state voltage

**Applications:**

- Telecommunications equipment
- Data and voice lines
- Computer modems
- Alarm systems

**Modified TO-202**

RCA SURGECTORS are designed to protect telecommunication equipment, data links, alarm systems, power supplies and other sensitive electrical circuits from damage that could be caused by switching transients, lightning strikes, load changes, commutation spikes, and line crosses.

These RCA SURGECTORS are monolithic compound structures consisting of a thyristor whose gate region contains a special diffused section which acts as a zener diode. This zener diode section permits anode voltage turn-

on of the structure. Initial clamping by the zener diode section and fast turn-on by the thyristor provide excellent voltage limiting even on very fast rise-time transients. The thyristor also features very high holding current allowing the SURGECTOR to recover to its high impedance off-state after the transient. The SURGECTOR's normal off-state condition in the forward blocking mode is a high-impedance, low-leakage state that prevents loading of the telecommunication line.

**MAXIMUM RATINGS, Absolute-Maximum Values:**

	SGT03U13	SGT06U13	SGT23U13	
Continuous Off-State Voltage .....	30	58	225	V
	1	1	1	V
Transient Peak Surge Current .....				
1μs x 2μs* .....		300		A
6μs x 400μs .....		125		A
10μs x 560μs .....		90		A
10μs x 1000μs .....		75		A
One Half Cycle, 50-60 Hz**		60		A
One Second, 50-60 Hz, Halfwave		30		A
Operating Temperature .....		-40 to +85		°C
Storage Temperature .....		-40 to +150		°C

\*Unit designed not to fail open below 450A.

\*\*One every 30 seconds maximum.

ELECTRICAL CHARACTERISTICS, At Case Temperature ( $T_C = 25^\circ\text{C}$ ) unless otherwise specified

CHARACTERISTIC		LIMITS			UNITS
		MIN.	TYP.	MAX.	
Off-State Current At Maximum Rated $V_{DM}$	$I_{DM}$	—	—	50	nA
$T_A = 25^\circ\text{C}$		—	—	10	$\mu\text{A}$
$T_A = 85^\circ\text{C}$		—	—	10	$\mu\text{A}$
Reverse Current $V_{RM} = 1\text{ V}$	$I_{RM}$	—	—	1	mA
$T_A = 25^\circ\text{C}$		—	—	10	mA
$T_A = 85^\circ\text{C}$		—	—	10	mA
Clamping Voltage, $I_z = 100\ \mu\text{A}$	$V_z$				
SGT03U13		33	—	—	V
SGT06U13		60	—	—	V
SGT23U13		230	—	—	V
Breakover Voltage, $D_V/D_T = 100\text{V}/\mu\text{s}$	$V_{BO}$				
SGT03U13		—	—	50	V
SGT06U13		—	—	85	V
SGT23U13		—	—	275	V
Holding Current	$I_H$	130	—	—	mA
On-State Voltage, $I_T = 10\text{A}$	$V_T$	—	—	2	V
Main Terminal Capacitance	$C_O$	—	90	—	pF

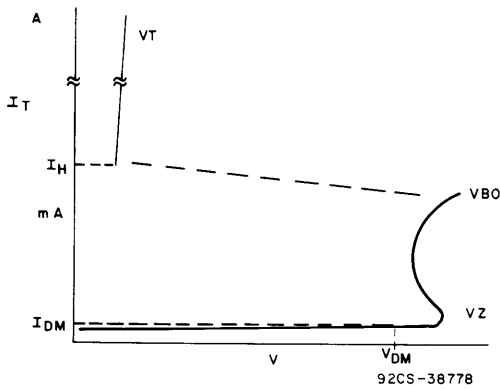


Fig. 1 - Typical volt-ampere characteristics.

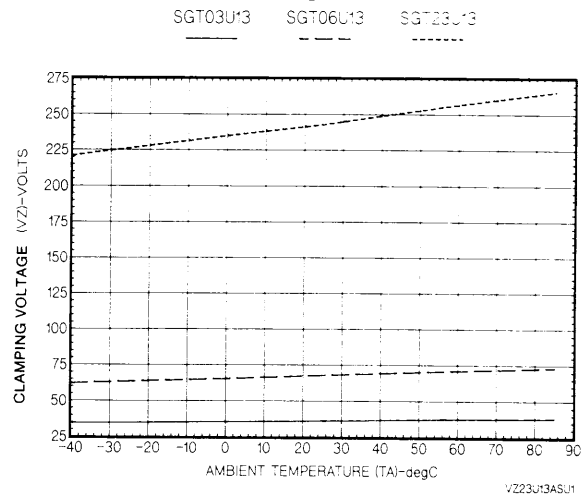


Fig. 2 - Typical clamping voltage vs. temperature.

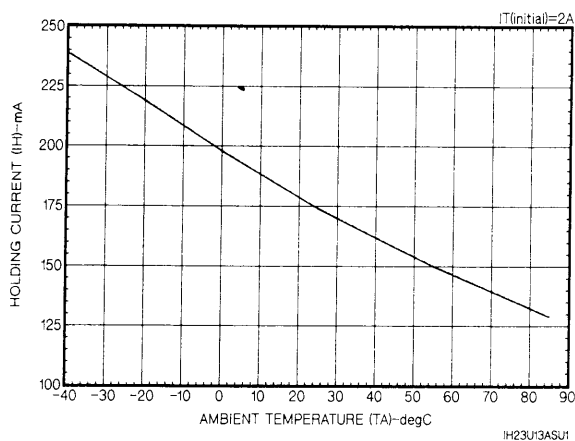
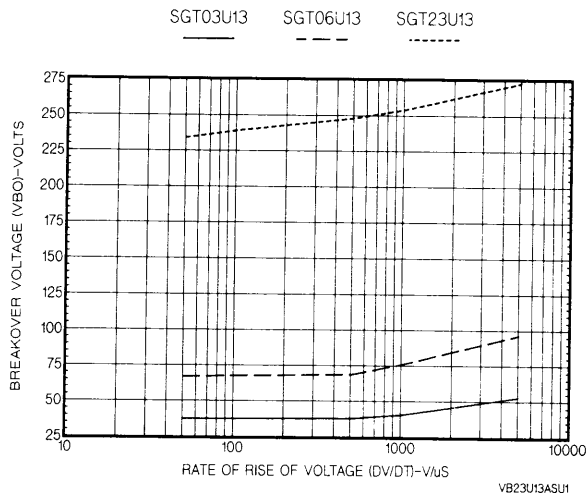


Fig. 3 - Typical holding current vs. temperature.

Fig. 4 - Typical  $V_{BO}$  vs.  $dV/dt$ .

### Terms and Symbols

$V_{DM}$  - Maximum Off-State Voltage - maximum off-state voltage (DC or peak) which may be applied continuously.

$V_{RM}$  - Maximum Reverse Voltage - maximum reverse blocking voltage (DC or peak) which may be applied.

$I_{TSM}$  - Maximum Peak Surge Current - maximum non-repetitive current which may be allowed to flow for the time state.

$T_A$  - Ambient Operating Temperature - ambient temperature range permitted during operation in a circuit.

$T_{stg}$  - Storage Temperature - temperature range permitted during storage.

$I_{DM}$  - Off-State Current - maximum value of off-state current that results from the application of the maximum off-state voltage ( $V_{DM}$ ).

$I_{RM}$  - Reverse Current - maximum value of reverse current that results from the application of the maximum reverse voltage ( $V_{RM}$ ).

$V_z$  - Clamping Voltage - off-state voltage at a specified current.

$V_{BO}$  - Breakdown Voltage - voltage at which the device switches from the off-state to the on-state.

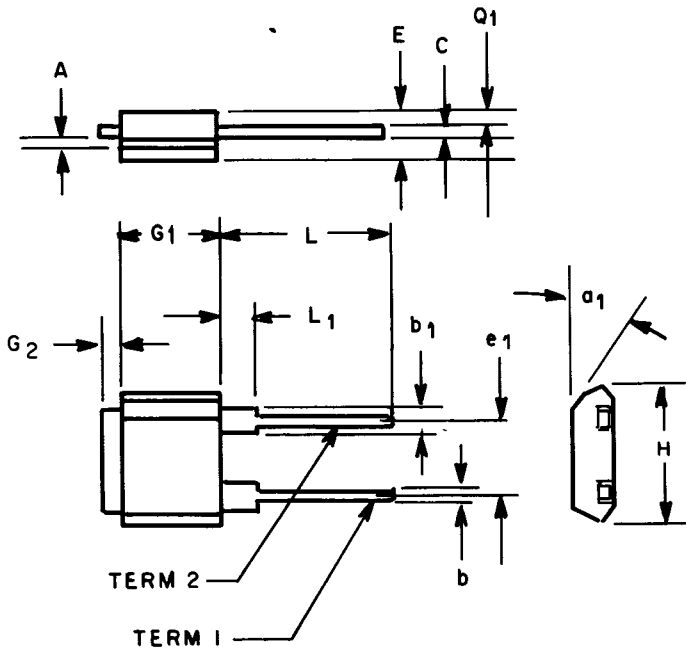
$I_H$  - Holding Current - minimum on-state current that will hold the device in the on-state after it has been latched on.

$V_T$  - On-State Voltage - voltage across the main terminals for a specified on-state current.

$C_O$  - Main Terminal Capacitance - capacitance between the main terminal at a specified off-state voltage.

## DIMENSIONAL OUTLINE

## TO-202 MODIFIED



Terminal 1 - Cathode  
Terminal 2 - Anode

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	—	0.05	—	1.270	1
b	0.023	0.029	0.584	0.736	
b <sub>1</sub>	0.045	0.055	1.143	1.397	1
c	0.018	0.026	0.457	0.660	
E	0.130	0.150	3.302	3.810	
e <sub>1</sub>	0.190	0.210	4.826	5.334	
G <sub>1</sub>	0.220	0.260	5.588	6.624	
G <sub>2</sub>	—	0.06	—	1.524	
H	0.330	0.380	8.382	9.652	
L	0.390	0.450	9.906	11.43	
L <sub>1</sub>	—	0.110	—	2.794	1, 2
Q <sub>1</sub>	0.039	0.050	0.990	1.270	
a <sub>1</sub>	—	50°	—	50°	1

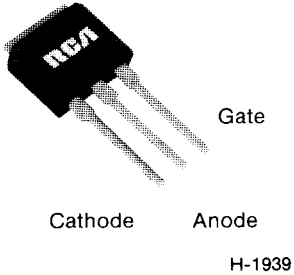
92CS-39011

## Notes:

1. Package contour optional within dimensions specified.
2. Lead dimensions uncontrolled in this zone.

When incorporating RCA Solid State Devices in equipment, it is recommended that the designer refer to "Operating Considerations for RCA Solid State Devices," Form No. 1CE-402, available on request from RCA Solid State Division, Box 3200, Somerville, N.J. 08876.

**SURGECTOR™ Power Devices**



**Gate-Controlled Unidirectional Transient Surge Suppressor**

**Features:**

- 100V Forward Blocking Voltage
- 300A Peak Transient Surge Current
- 100 mA Minimum Holding Current
- Subnanosecond Clamping Action
- Low On-State Voltage

**Applications:**

- Telecommunications Equipment
- Data and Voice Lines
- Computer Modems
- Alarm Systems

**Modified TO-202**

RCA SURGECTORS are designed to protect telecommunication equipment, data links, alarm systems, power supplies and other sensitive electrical circuits from damage that could be caused by switching transients, lightning strikes, load changes, commutation spikes, and line crosses.

This RCA SURGECTOR is a fast turn-on, high-holding-

current thyristor. When coupled with a user-supplied voltage level detector it provides excellent voltage limiting even on very fast rise time transients. The high holding current allows the SURGECTOR to return to its high impedance state following a transient. The SURGECTOR'S normal "off" condition high-forward impedance prevents loading of the line.

**MAXIMUM RATINGS, Absolute-Maximum Values ( $T_c = 25^\circ\text{C}$ ):**

Continuous Off-State Voltage .....	VDM .....	100V
	VRM .....	1V
Transient Peak Surge Current .....	ITSM .....	
$1\mu\text{s} \times 2\mu\text{s}^*$ .....		300A
$6\mu\text{s} \times 400\mu\text{s}$ .....		125A
$10\mu\text{s} \times 560\mu\text{s}$ .....		90A
$10\mu\text{s} \times 1000\mu\text{s}$ .....		75A
One half Cycle, 50-60 Hz, 1 Every 30 Sec. Max. ....		50A
One Second, 50-60Hz, Halfwave .....		30A
Operating Temperature .....	TA .....	-40 to +85°C
Storage Temperature .....	Tstg .....	-40 to +150°C

\*Unit designed not to fail open below 450A.

**ELECTRICAL CHARACTERISTICS, At Case Temperature ( $T_c = 25^\circ\text{C}$ ) unless otherwise specified**

CHARACTERISTIC	SYMBOL	LIMITS			Units
		Min.	Typ.	Max.	
Off-State Current VDM = 100V, TA = 25°C TA = 85°C VRM = 1V, TA = 25°C TA = 85°C	IDM	—	—	50	nA
		—	—	10	μA
	IRM	—	—	1	mA
		—	—	10	mA
*Breakover Voltage, DV/DT = 100V/μs	VBO			100	V
Holding Current	IH	100	—	—	mA
On-State Voltage, IT = 10A	VT	—	—	2	V
Gate Trigger Current	IGT	—	—	150	mA
Main Terminal Capacitance, VD = 0	CO	—	90	—	pF

\*External 60V Zener Diode from Anode to Gate.

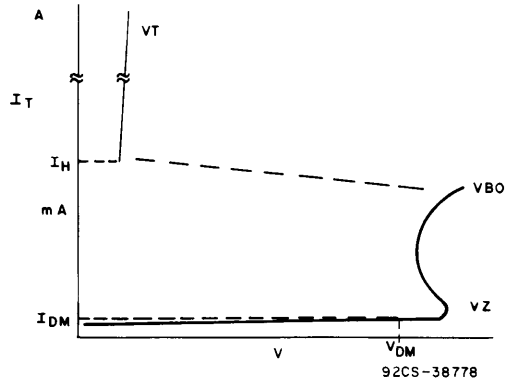


Fig. 1 — Typical Volt-Ampere Characteristics

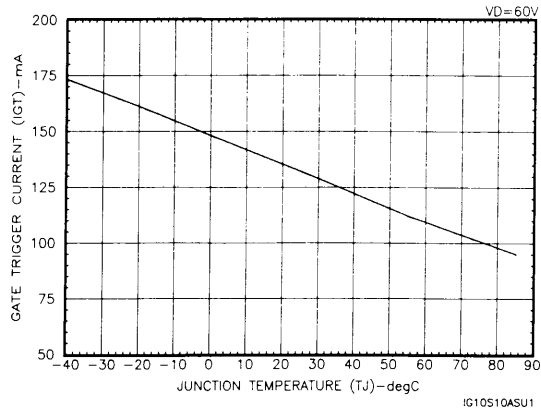


Fig. 2 — Typical Gate Trigger Current vs. Temperature

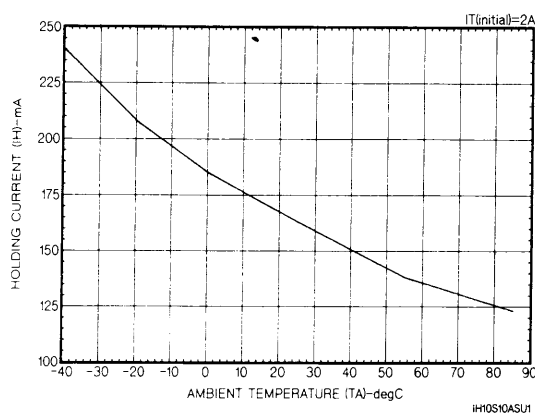


Fig. 3 — Typical Holding Current vs. Temperature

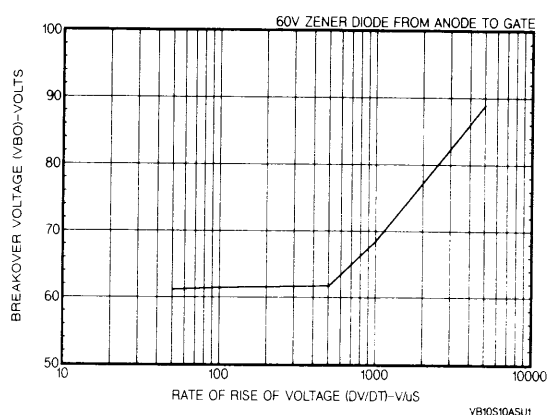


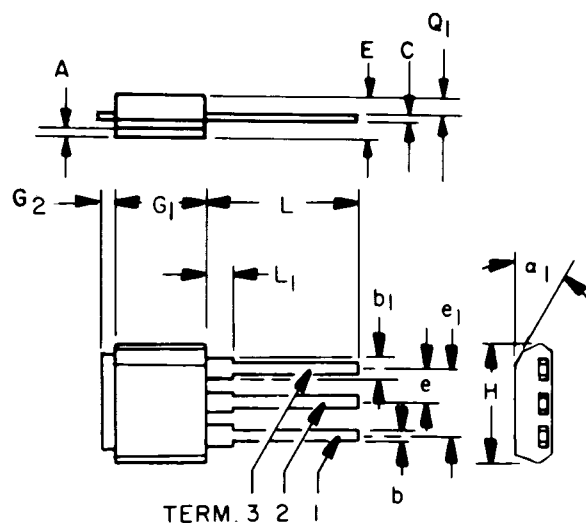
Fig. 4 — Typical VBO vs. DV/DT

### TERMS AND SYMBOLS

- VDM** — Maximum Off-State Voltage — maximum off-state voltage (DC or peak) which may be applied continuously.
- VRM** — Maximum Reverse Voltage — maximum reverse blocking voltage (DC or peak) which may be applied.
- ITSM** — Maximum Peak Surge Current — maximum non-repetitive current which may be allowed to flow for the time state.
- TA** — Ambient Operating Temperature — ambient temperature range permitted during operation in a circuit.
- Tstg** — Storage Temperature — temperature range permitted during storage.
- IDM** — Off-State Current — maximum value of off-state current that results from the application of the maximum off-state voltage (VDM).
- IRM** — Reverse Current — maximum value of reverse current that results from the application of the maximum reverse voltage (VRM).
- VBO** — Breakdown Voltage — voltage at which the device switches from the off-state to the on-state.
- IH** — Holding Current — minimum on-state current that will hold the device in the on-state after it has been latched on.
- VT** — On-State Voltage — voltage across the main terminals for a specified on-state current.
- IGT** — Gate Trigger Current — minimum gate current which will cause the device to switch from the off-state to the on-state.
- CO** — Main Terminal Capacitance — capacitance between the main terminal at a specified off-state voltage.

## DIMENSIONAL OUTLINES

## TO-202 Modified



Terminal 1 — Cathode  
Terminal 2 — Anode  
Terminal 3 — Gate

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	—	0.05	—	1.270	1
b	0.023	0.029	0.584	0.736	
b <sub>1</sub>	0.045	0.055	1.143	1.397	1
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e	0.095	0.105	2.413	2.667	
e <sub>1</sub>	0.190	0.210	4.826	5.334	
G <sub>1</sub>	0.220	0.260	5.588	6.624	
G <sub>2</sub>	—	0.06	—	1.524	
H	0.330	0.380	8.382	9.652	
L	0.390	0.450	9.906	11.43	
L <sub>1</sub>	—	0.110	—	2.794	1, 2
Q <sub>1</sub>	0.039	0.050	0.990	1.270	
α <sub>1</sub>	—	50°	—	50°	1

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**Note:**

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2: Lead dimensions uncontrolled in this zone.

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