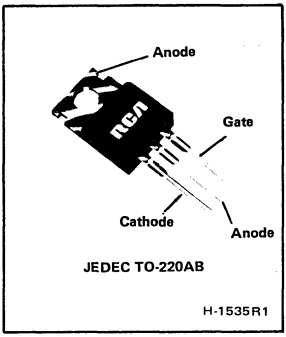
RCA
Solid State
Division

Thyristors
S2060 Series
S2061 Series
S2062 Series



4-Ampere Sensitive-Gate Silicon Controlled Rectifiers

For Power Switching and Control Applications

Features:

- Microampere gate sensitivity
- Minimum gate current specified for the S2062 series
- 600-V capability
- 4-A (rms) on-state current ratings
- 35-A peak surge capability
- Glass-passivated chip for stability
- Low thermal resistances
- Surge capability curve

The S2060, S2061, and S2062 series● are sensitive-gate silicon controlled rectifiers designed for switching ac and dc currents. These SCR's are divided into the three different series according to gate sensitivity. The types within each series differ in their voltage ratings; the voltage ratings are identified by suffix letters in the type designations.

All types in each series utilize the JEDEC TO-220AB package. Upon request, each type is available in either of two variants of the TO-220AB package. For information on these package variations, contact the RCA Sales Office in your locale.

These thyristors have microampere gate-current requirements which permit operation with low-level logic circuits. They can be used for lighting, power-switching, and motor-speed controls, and for gate-current amplification for driving larger SCR's.

● Formerly the RCA106, RCA107, and RCA108 series.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

		Suffix Letter									
		Q	Y	F	A	B	C	D	E	M	
NON-REPETITIVE PEAK REVERSE VOLTAGE											
R_{GK} = 1000 Ω, T_C = -40 to 110°C	V_{RSXM}	25	50	75	125	250	400	500	600	700	V
NON-REPETITIVE PEAK OFF-STATE VOLTAGE											
R_{GK} = 1000 Ω, T_C = -40 to 110°C	V_{DSXM}										
REPETITIVE PEAK REVERSE VOLTAGE											
R_{GK} = 1000 Ω, T_C = -40 to 110°C	V_{RRXM}	15	30	50	100	200	300	400	500	600	V
REPETITIVE PEAK OFF-STATE VOLTAGE											
R_{GK} = 1000 Ω, T_C = -40 to 110°C	V_{DRXM}										
ON-STATE CURRENT:											
Conduction angle = 180°, T_C = 85°C											
Average ac value	$I_{T(AV)}$	2.5									A
RMS value	$I_{T(RMS)}$	4									A
DC operation	$I_{T(DC)}$	2.75									A
PEAK SURGE (NON-REPETITIVE) ON-STATE CURRENT:	I_{TSM}										
For one cycle of applied principal voltage, T_C = 85°C											
60 Hz (sinusoidal)		35									A
50 Hz (sinusoidal)		28									A
60 Hz (sinusoidal)	I_{TSM}	35									A
For more than one cycle of applied principal voltage		See Fig. 6									
PEAK GATE CURRENT (t = 10 μsec)	I_{GFM}	0.2									A
PEAK GATE REVERSE VOLTAGE	V_{GRM}	6									V
RATE OF CHANGE OF ON-STATE CURRENT:											
$V_{DM} = V_{DROM}$, I_{GT} = 1 mA, t_r = 0.5 μs, T_C = 110°C	di/dt	100									A/μs
FUSING CURRENT (for SCR protection):											
T_J = −40 to 110°C, t = 1 to 8.3 ms	I^2t	2.6									A^2s

MAXIMUM RATINGS, *Absolute-Maximum Values (Cont'd.)*:

		Suffix Letter Q Y F A B C D E M	
GATE POWER DISSIPATION:			
PEAK FORWARD (for 10 μs max.)	P_{GM}	0.5	W
AVERAGE (averaging time = 10 ms max.)	$P_{G(AV)}$	0.1	W
TEMPERATURE RANGE:			
Storage	T_{stg}	-40 to +150	°C
Operating (case)*	T_C	-40 to +110	°C
TERMINAL TEMPERATURE (During soldering):			
For 10 s max.	T_T	250	°C

*Temperature measuring point is shown in the dimensional outline.

ELECTRICAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	LIMITS FOR ALL TYPES UNLESS OTHERWISE SPECIFIED MIN.	TYP.	MAX.	UNITS
PEAK OFF-STATE CURRENT:					
Forward, $V_D = V_{DRXM}$, R_{GK} = 1000 Ω					
T_C = 25°C	I_{DRXM}	–	0.1	10	μA
T_C = 110°C		–	10	100	
Reverse, $V_R = V_{RRXM}$, R_{GK} = 1000 Ω					
T_C = 25°C	I_{RRXM}	–	0.1	10	
T_C = 100°C		–	10	100	
INSTANTANEOUS ON-STATE VOLTAGE:					
For i_T = 4 A and T_C = 25°C (See Fig. 16)	v_T	–	1.25	2.2	V
DC GATE TRIGGER CURRENT:					
V_D = 12 V (dc), R_L = 30 Ω, T_C = 25°C:					
S2060 Series	I_{GT}	–	–	200	μA
S2061 Series		–	–	500	
S2062 Series		100	–	2000	
For other case temperatures		See Figs. 10,11,12			
DC GATE TRIGGER VOLTAGE:					
V_D = 12 V (dc), R_L = 30 Ω, T_C = 25°C	V_{GT}	–	0.5	0.8	V
For other case temperatures		See Fig. 14			
INSTANTANEOUS HOLDING CURRENT:					
R_{GK} = 1000 Ω, V_D = 12 V, I_T (INITIAL) = 50 mA, T_C = 25°C:					
S2060 Series	i_H	–	1.7	3	mA
S2061 Series		–	3.9	6	
S2062 Series		–	6	10	
LATCHING CURRENT:					
R_{GK} = 1000 Ω, V_D = 12 V, T_C = 25°C:					
S2060 Series (I_{GT} = 200 μA)	i_L	–	1.8	4	mA
S2061 Series (I_{GT} = 500 μA)		–	2.5	8	
S2062 Series (I_{GT} = 2000 μA)		–	8	12	
CRITICAL RATE OF RISE OF OFF-STATE VOLTAGE:					
$V_D = V_{DRXM}$, R_{GK} = 1000 Ω,	dv/dt				V/μs
Exponential rise, T_C = 110°C		5	8	–	
GATE-CONTROLLED TURN-ON TIME:					
$V_D = V_{DRXM}$, i_T = 1 A, R_{GK} = 1000 Ω,	t_{gt}				μs
I_{GT} = 1 mA, rise time = 0.1 μs, T_C = 25°C		–	1.7	2.5	
CIRCUIT COMMUTATED TURN-OFF TIME:					
$V_D = V_{DRXM}$, i_T = 1 A, R_{GK} = 1000 Ω,					
Pulse Duration = 50 μs, dv/dt = 5 V/μs,	t_q				μs
di/dt = –10 A/μs, I_{GT} = 1 mA at turn on, T_C = 110°C		–	30	100	
THERMAL RESISTANCE:					
Junction-to-Case*	$R_{\theta JC}$	–	–	3.5	°C/W
Junction-to-Ambient	$R_{\theta JA}$	–	–	60	

* Temperature measuring point is shown in the dimensional outline.

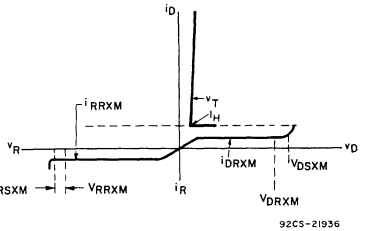


Fig. 1—Typical volt-ampere characteristics for all series.

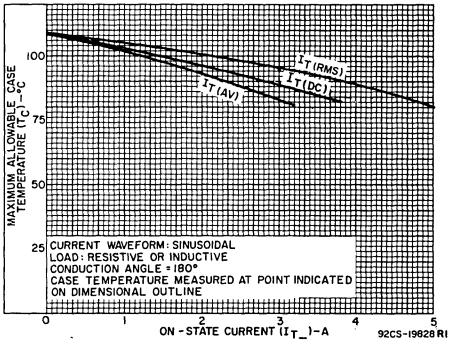


Fig. 2—Maximum allowable case temperature vs. on-state-current for all series.

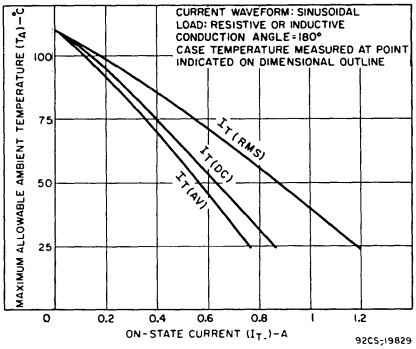


Fig. 3—Maximum allowable ambient temperature vs. on-state current for all series.

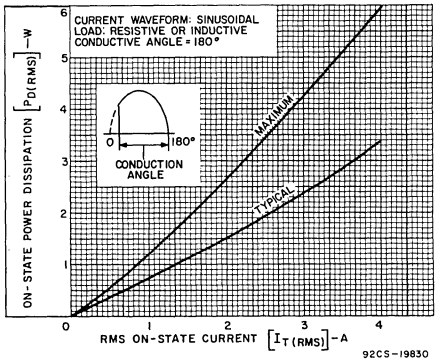


Fig. 4—Power dissipation vs. rms-on-state current for all series.

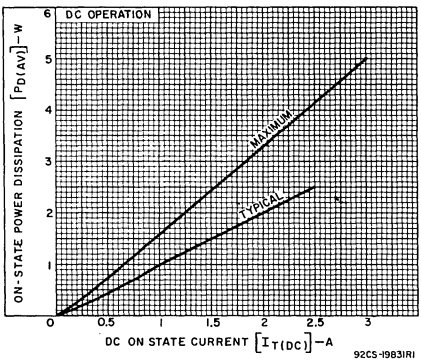


Fig. 5—Power dissipation vs. dc on-state current for all series.

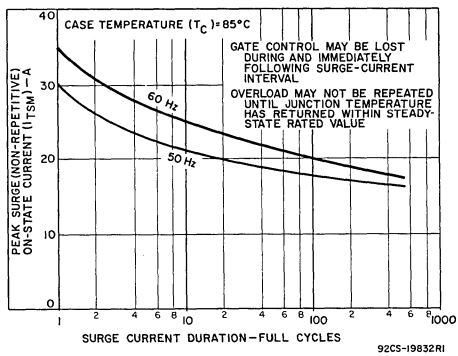


Fig. 6—Peak surge on-state current vs. surge-current duration for all series.

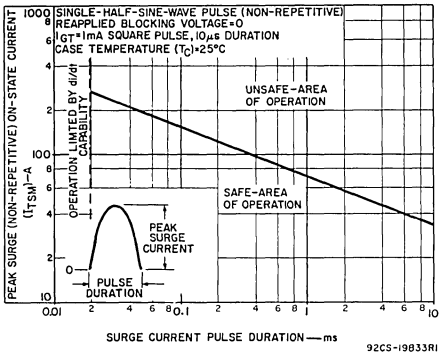


Fig. 7—Surge capability without reapplied blocking voltage for all series.

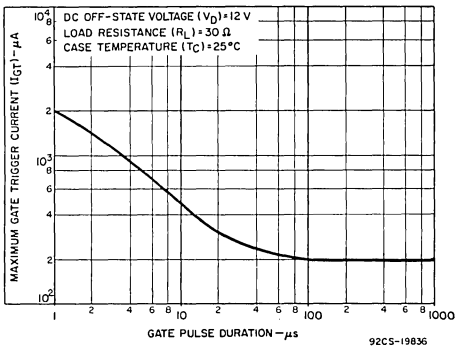


Fig. 8—Maximum gate trigger current vs. gate pulse duration for types in the S2060 series.

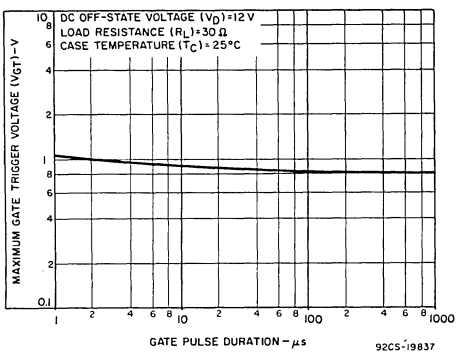


Fig. 9—Maximum gate trigger voltage vs. gate pulse duration for types in the S2060 series.

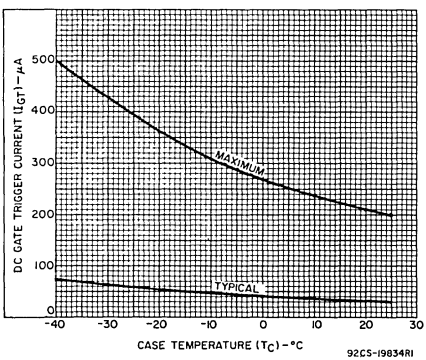


Fig. 10—DC gate trigger current vs. case temperature for S2060 series.

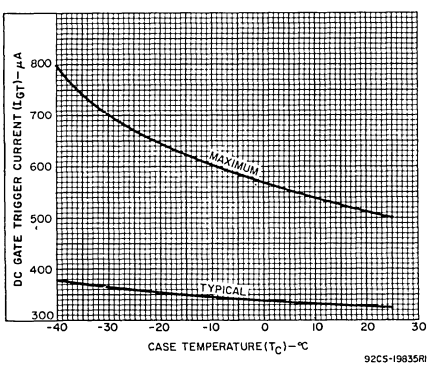


Fig. 11—DC gate trigger current vs. case temperature for S2061 series.

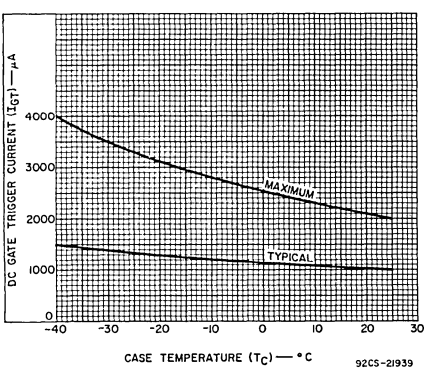


Fig. 12—DC gate trigger current vs. case temperature for S2062 series.

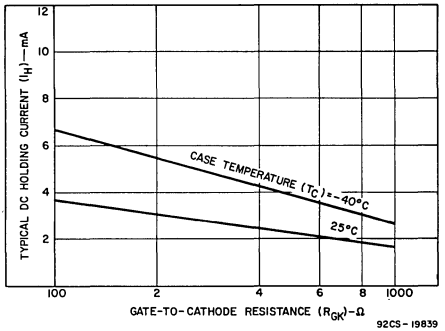


Fig. 13—DC holding current vs. gate-cathode resistance for the S2060 series.

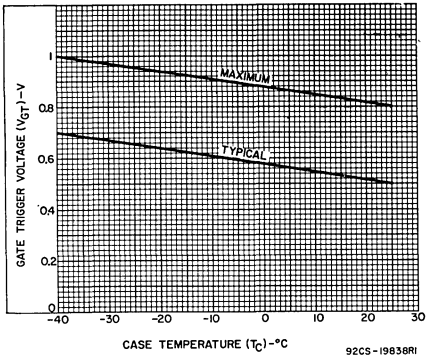


Fig. 14—Gate trigger voltage vs. case temperature for all series.

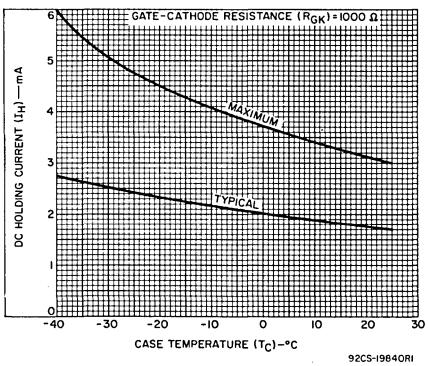


Fig. 15—DC holding current vs. case temperature for the S2060 series.

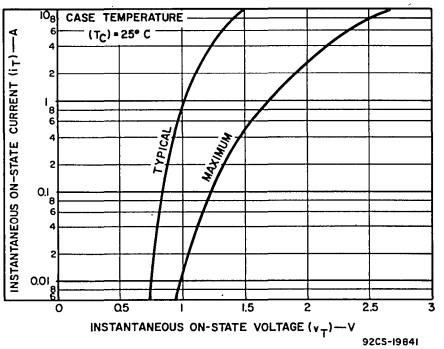


Fig. 16—Instantaneous on-state current vs. on-state voltage for all series.

TERMINAL CONNECTIONS

Mounting Flange, No. 1 – Cathode
No. 2 – Anode
No. 3 – Gate