S3700 Series

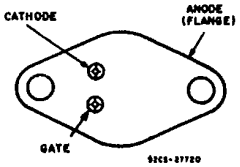
File Number **306**

5-A Silicon Controlled Rectifiers

For Inverter Applications

Features:
- *600V, 125°C T_J operating*
- *High dv/dt and di/dt capability*
- *Low switching losses*
- *High pulse-current capability*
- *Low forward and reverse leakage*
- *SIPOS oxide glass multilayer passivation system*
- *Advanced unisurface construction*
- *Precise ion-implanted diffusion source*

TERMINAL DESIGNATIONS



JEDEC TO-213AA

The RCA-S3700-series types are all-diffused, silicon controlled rectifiers (reverse-blocking triode thyristors) designed for inverter applications such as ultrasonics, choppers, regulated power supplies; induction heaters, and fluorescent lighting. These types may be used at frequencies up to 25 kHz.

The S3700 series employ a hermetic JEDEC TO-213AA package.

MAXIMUM RATINGS, *Absolute-Maximum Values:*		**S3700B**	**S3700D**	**S3700M**	
Non-repetitive peak reverse voltage:■ Gate Open	V_{RSOM}	300	500	700	V
Non-repetitive peak off-state voltage:■ Gate Open	V_{DSOM}	300	500	700	V
Repetitive peak reverse voltage:■ Gate Open	V_{RROM}	200	400	600	V
Repetitive peak off-state voltage:■ Gate Open	V_{DROM}	200	400	600	V
On-state current: T_C = 85°C; conduction angle = 180°:					
RMS	$I_{T(RMS)}$	5			A
Average	$I_{T(AV)}$	3.2			A
For other conditions		See Figs. 3 & 4			
Peak surge (non-repetitive) on-state current:	I_{TSM}				
For one full cycle of applied principal voltage, T_C = 85°C					
60 Hz (sinusoidal)		80			A
50 Hz (sinusoidal)		65			A
For more than one full cycle of applied principal voltage		See Fig. 5			
Rate of change of on-state current $V_D = V_{DROM}$, I_{GT} = 50 mA, t_r = 0.1 μs	di/dt	200			A/μs
Fusing current (for SCR protection): T_J = -40 to 100°C, t = 1 to 8.3 ms	I^2t	25			A
Gate power dissipation:•					
Peak Forward (for 10 μs max., See Fig. 7)	P_{GM}	13			W
Peak Reverse (for 10 μs max., See Fig. 8)	P_{RGM}	13			W
Average (averaging time = 10 ms max.)	$P_{G(AV)}$	0.5			W
Temperature Range:†					
Storage	T_{stg}	-40 to 150			°C
Operating (Case)	T_C	-40 to 125			°C
Pin Temperature (During soldering): At distances ≥ 1/32 in. (0.8 mm) from seating plane for 10 s max.	T_P	225			°C

■ These values do not apply if there is a positive gate signal. Gate must be open or negatively biased.

• Any product of gate current and gate voltage which results in a gate power less then the maximum is permitted.

† For temperature measurement reference point, *see Dimensional Outline.*

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ELECTRICAL CHARACTERISTICS
At Maximum Ratings Unless Otherwise Specified and at Indicated Case Temperature (T_C)

CHARACTERISTIC	SYMBOL	LIMITS FOR ALL TYPES Except as Specified			UNITS
		MIN.	TYP.	MAX.	
Peak Off-State Current: (Gate open, T_C = 125°C)					
Forward Current (I_{DOM}) at $V_D = V_{DROM}$	I_{DOM}	–	0.5	3	mA
Reverse Current (I_{ROM}) at $V_R = V_{RROM}$	I_{ROM}	–	0.3	1.5	
Instantaneous On-State Voltage: i_T = 30 A (peak), T_C = 25°C	v_T	–	2.2	3	V
For other conditions				See Fig. 6	
Instantaneous Holding Current: Gate open, T_C = 25°C	i_{HO}	–	20	50	mA
Critical Rate of Rise of Off-State Voltage: $V_D = V_{DROM}$, exponential voltage rise, Gate open, T_C = 125°C	dv/dt	100	250	–	V/μs
DC Gate Trigger Current: V_D = 12 V (dc), R_L = 30 Ω, T_C = 25°C	I_{GT}	–	15	40	mA
For other conditions				See Fig. 7	
DC Gate Trigger Voltage: V_D = 12 V (dc), R_L = 30 Ω, T_C = 25°C	V_{GT}	–	1.8	3.5	V
For other conditions				See Fig. 7	
Gate Controlled Turn-On Time: (Delay Time + Rise Time) For $V_{DX} = V_{DROM}$, I_{GT} = 300 mA, t_r = 0.1 μs, I_T = 2 A (peak), T_C = 25°C (See Fig. 10)	t_{gt}	–	0.7	–	μs
Circuit Commutated Turn-Off Time: $V_{DX} = V_{DROM}$, i_T = 2 A, pulse duration = 50 μs, dv/dt = 100 V/μs, –di/dt = –10 A/μs, I_{GT} = 100 mA, V_{GT} = 0 V (at turn-off), T_C = 80°C (See Fig. 13)	t_q		4	6	μs
Thermal Resistance:					
Junction-to-Case	$R_{\theta JC}$	–	4	8	°C/W
Junction-to-Ambient	$R_{\theta JA}$	–	–	40	°C/W

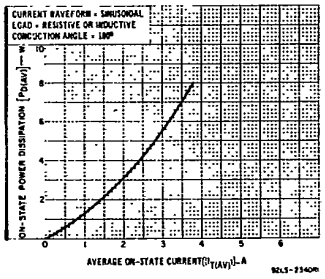

Fig. 1—Power dissipation vs. average on-state current.

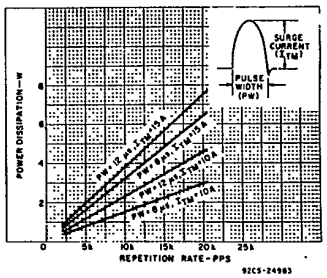

Fig. 2—Dissipation vs. repetition rate.

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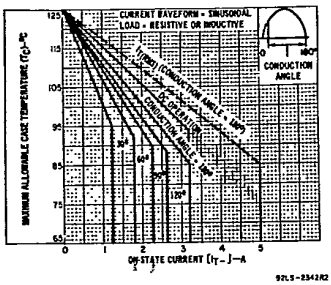

Fig. 3—Maximum allowable case temperature vs. on-state current.

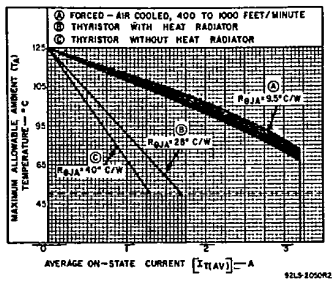

Fig. 4—Maximum allowable ambient temperature vs. average on-state current.

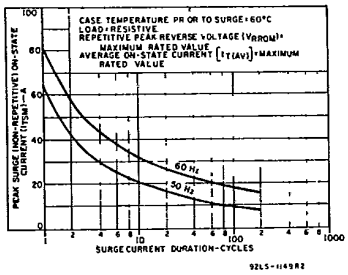

Fig. 5—Peak surge on-state current vs. surge-current duration.

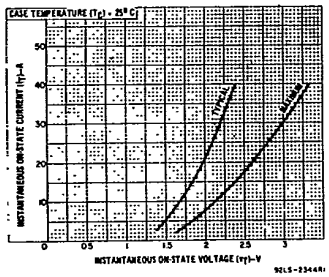

Fig. 6—Instantaneous on-state current vs. on-state voltage.

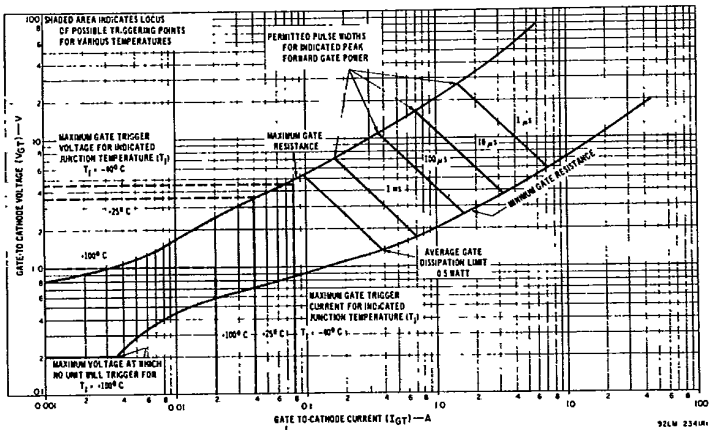

Fig. 7—Gate-trigger characteristics and limiting conditions for determination of permissible gate-trigger pulses.

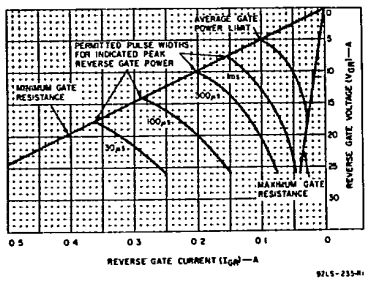

Fig. 8—Reverse-gate voltage vs. reverse-gate current.

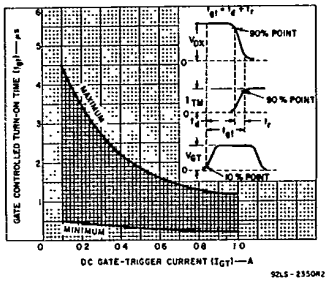

Fig. 9—Turn-on time vs. gate-trigger current.