S6493M

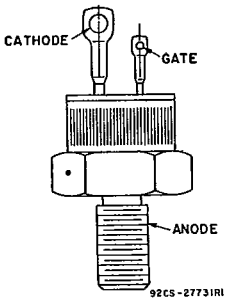
File Number **247**

Silicon Controlled Rectifier For High-Current Pulse Applications

Features:

- *Up to 900 A peak pulse on-state current*
- *300 W maximum average dissipation*
- *On-state current of 35 A (rms value)*

TERMINAL DESIGNATIONS



JEDEC TO-208AA

The RCA-S6493M* is an all-diffused silicon controlled rectifier (reverse-blocking triode thyristor) designed especially for use in radar pulse modulators, inverters, switching regulators, and other applications requiring a large ratio of peak to average current.

It is especially constructed for rapid spread of forward current over the full junction area to achieve a high rate of change of forward current (di/dt) capability and low switching dissipation.

* Formerly RCA Type No. S6431M.

MAXIMUM RATINGS, *Absolute-Maximum Values:*

V_{RSOM} Δ	700	V
V_{DSOM} Δ	700	V
V_{RROM} Δ	600	V
V_{DROM} Δ	600	V
$I_{T(RMS)}$ (T_C = 65°C, θ = 180°C)	35	A
I_{TM} (pulse)		
T_C = 65°C, See Figs. 1 and 2	900	A
I^2t		
T_J = -65 to 125°C, t = 1 to 8.3 ms	2000	A^2s
$P_{D(AV)}$ (T_C = 65°C, See Fig. 3)	30	W
P_{GM} •		
Peak (forward or reverse) for 10 μs maximum	40	W
$P_{G(AV)}$ •		
Averaging time = 10 ms maximum	1	W
T_{stg}	-65 to 150	°C
T_C	-65 to 125	°C
T_T		
During soldering for 10 s maximum (terminals and case)	225	°C
T_s		
Recommended	35 / 0.4	in-lbf / kgf-m
Maximum (DO NOT EXCEED)	50 / 0.57	in-lbf / kgf-m

Δ 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 than the maximum is permitted.

S6493M

ELECTRICAL CHARACTERISTICS

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

CHARACTERISTIC	LIMITS			UNITS
	MIN.	TYP.	MAX.	
I_{DOM} or I_{ROM}: $V_D = V_{DROM}$ or $V_R = V_{RROM}$, $T_C = 125°C$	–	2	10	mA
$v_{T(I)}$ $I_{TM(pulse)}$ = 600 A, t = 2 μs, T_C = 65°C (See Fig. 4)	–	–	19	V
i_{HO}: T_C = 25°C	0.5	20	70	mA
dv/dt: $V_D = V_{DROM}$, exponential voltage rise, T_C = 125°C (See Fig. 8)	20	50	–	V/μs
I_{GT} (T_C = 25°C)	1	25	80	mA
V_{GT} (T_C = 25°C)	–	1.1	2	V
t_{gt}: $V_D = V_{DROM}$, i_T = 30 A (peak), I_{GT} = 200 mA, t_r = 0.1 μs, T_C = 25°C (See Figs. 5 and 9)	–	1.25	–	μs
t_q: Rectangular Pulse $V_{DX} = V_{DROM}$, i_T 18 A, pulse duration = 50 μs, dv/dt = 20 V/μs, – di/dt = –30 A/μs, I_{GT} = 200 mA at turn-on, T_C = 80°C (See Figs. 10 and 11)	–	20	40	μs
$R_{\theta JC}$	–	–	2	°C/W

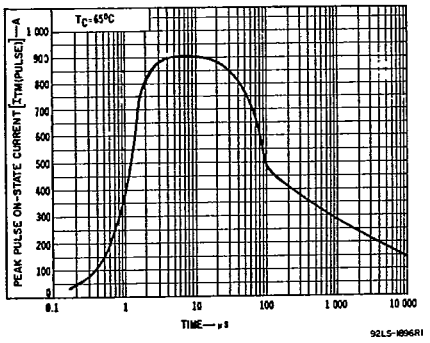


Fig. 1 - Peak pulse on-state current vs. time.

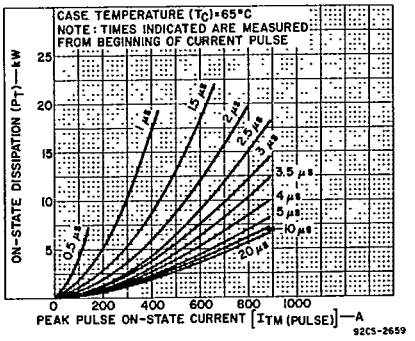


Fig. 2 - On-state dissipation vs. peak pulse on-state current and time.

S6493M

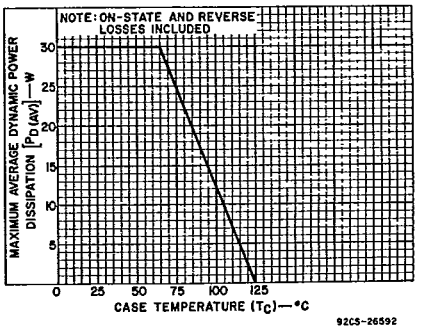


Fig. 3 - Dissipation derating curve.

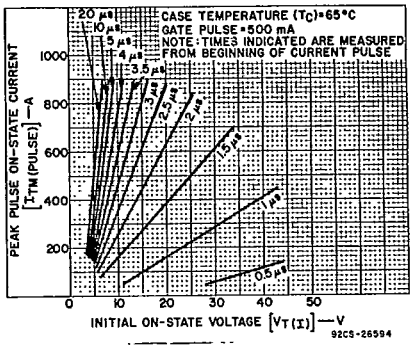


Fig. 4 - Initial on-state voltage characteristics.

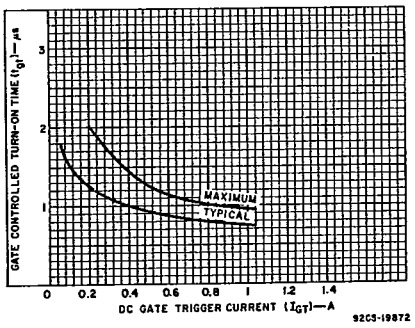


Fig. 5 - Gate-controlled turn-on time vs. gate trigger current.

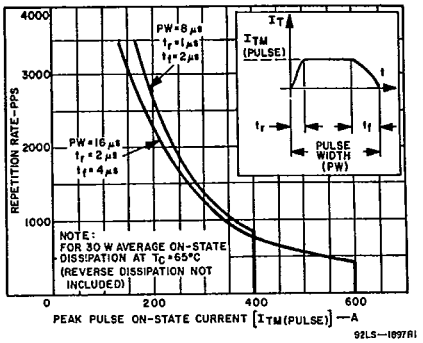


Fig. 6 - Peak pulse on-state current as a function of repetition rate, rectangular pulse.

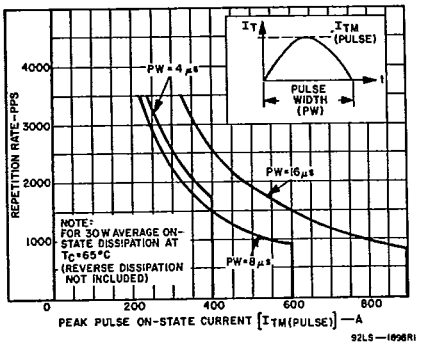


Fig. 7 - Peak pulse on-state current as a function of repetition rate, half sine wave pulse.

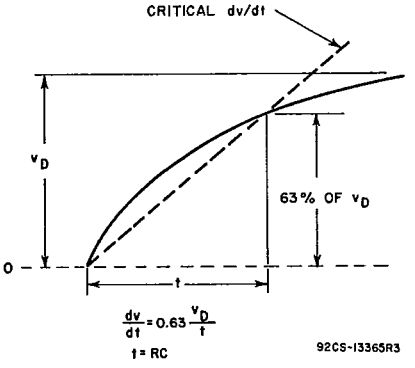


Fig. 8 - Rate-of-rise off-state voltage with time (defining dv/dt).

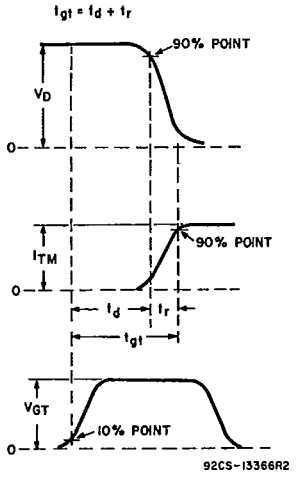


Fig. 9 - Relationship between off-state voltage, on-state current, and gate trigger voltage showing reference points for definition of turn-on time (t_{gt}).

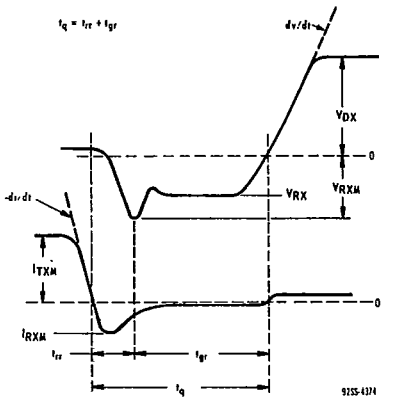


Fig. 10 - Relationship between off-state voltage, reverse voltage, on-state current, and reverse current showing reference points defining turn-off time (t_q), rectangular pulse.

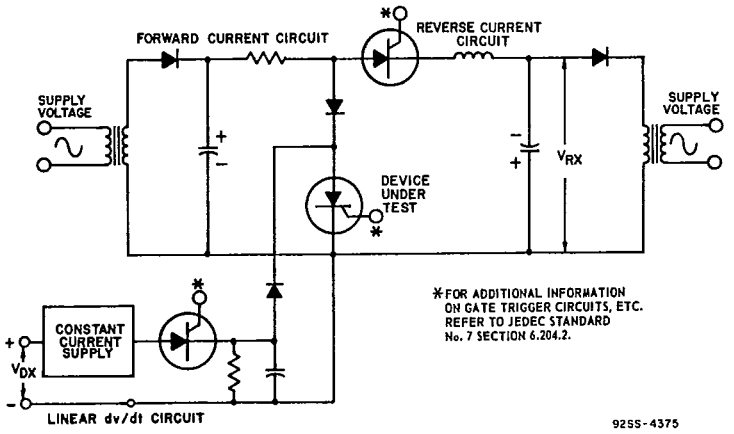


Fig. 11 - Circuit used to measure turn off-time (t_q), rectangular pulse.