

3875081 G E SOLID STATE
Silicon Controlled Rectifiers

01E 17694 D T-25-15

2N6394—2N6398

File Number 891

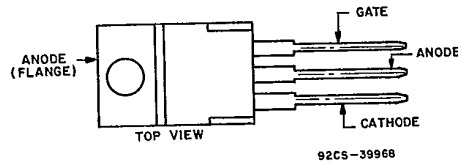
12-A Silicon Controlled Rectifiers

For Power Switching, Power Control, and Ignition Applications

Features:

- High dv/dt capability
- Low thermal resistance
- Low on-state voltage at high current levels

TERMINAL DESIGNATIONS



JEDEC TO-220AB

The RCA-2N6394 to 2N6398, inclusive, are all-diffused silicon controlled rectifiers (reverse-blocking triode thyristors) designed for switching ac and dc currents.

The TO-220AB package provides easy package mounting and low thermal resistance allowing operation at high case temperatures and permitting reduced heat-sink size.

MAXIMUM RATINGS, Absolute-Maximum Values:	2N6394	2N6395	2N6396	2N6397	2N6398	
* V_{RSOM} †	75	125	250	450	650	V
V_{BSOM} †	75	125	250	450	650	V
* V_{RROM} †	50	100	200	400	600	V
* V_{DROM} †	50	100	200	400	600	V
$I_{T(RMS)}$ ($T_C = 90^\circ\text{C}$, $\theta = 180^\circ$)			12			A
I_{TSM} : For one full cycle of applied principal voltage 60-Hz‡			125*			A
50-Hz‡			105			A
For more than one full cycle of applied principal voltage			See Fig. 4			
di/dt :				100		A/ μs
$V_D = V_{DROM}$, $I_{GT} = 80\text{ mA}$, $t_r = 0.1\ \mu\text{s}$ (See Fig. 13)				65		A2s
I_{GT} :				16#		W
$T_J = -40$ to 125°C , $t = 1$ to 8.3 ms				See Fig. 7		
Peak forward for $10\ \mu\text{s}$ max.				0.5		W
Peak reverse				2		A
* $P_{G(AV)}$:				-40 to 150		$^\circ\text{C}$
Averaging time = 8 ms maximum				-40 to 125		$^\circ\text{C}$
I_{GM} : (forward)						
* T_{stg}						
* T_C						
T_r :						
During soldering for 10 s maximum (terminal and case)				250		$^\circ\text{C}$

* In accordance with JEDEC registration data format (JS-22, RDF-1) filed for the JEDEC (2N series) types.
 † These values do not apply if there is a positive gate signal. Gate must be open or negatively biased.
 ‡ At $I_{T(RMS)} = 12\text{ A}$ and $T_C = 90^\circ\text{C}$.
 • JEDEC registration value is 100 A at $T_C = 90^\circ\text{C}$.
 ■ Any product of gate current and gate voltage which results in a gate power less than the maximum is permitted.
 # JEDEC registered value is 10 W.

ELECTRICAL CHARACTERISTICS

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

CHARACTERISTIC	LIMITS			UNITS
	FOR ALL TYPES			
	MIN.	TYP.	MAX.	
I_{DOM} or I_{ROM} : $V_D = V_{DROM}$ or $V_R = V_{RROM}$, $T_C = 125^\circ\text{C}$	—	0.1	2*	mA
V_T : $i_T = 24$ A (peak), $T_C = 25^\circ\text{C}$ (See Fig. 5)	—	1.7	2.2*	V
i_{HO} : $T_C = 25^\circ\text{C}$	—	10	35	mA
$T_C = -40^\circ\text{C}$	—	—	60*	
dv/dt : $V_D = V_{DROM}$, exponential voltage rise, $T_C = 125^\circ\text{C}$ (See Fig. 15)	50	—	—	V/ μs
I_{GT} : $V_D = 12$ V (dc), $R_L = 50 \Omega$, $T_C = 25^\circ\text{C}$	—	8	30	mA
$V_D = 12$ V (dc), $R_L = 50 \Omega$, $T_C = -40^\circ\text{C}$	—	—	60*	
V_{GT} : $V_D = 12$ V (dc), $R_L = 50 \Omega$, $T_C = 25^\circ\text{C}$	—	0.7	1.5	V
$V_D = 12$ V (dc), $R_L = 50 \Omega$, $T_C = -40^\circ\text{C}$	—	—	2.5*	
V_{GRD} : $V_D = V_{DROM}$, $T_C = 125^\circ\text{C}$	0.2	—	—	V
t_{gt} : $V_D = V_{DROM}$, $i_T = 24$ A (peak), $I_{GT} = 200$ mA, $t_r = 0.02 \mu\text{s}$, $T_C = 25^\circ\text{C}$ (See Figs. 12 & 14)	—	—	2*	μs
t_q : Rectangular Pulse $V_D = V_{DROM}$, $i_T = 12$ A, pulse duration = $50 \mu\text{s}$, $dv/dt = 50$ V/ μs , $-di/dt = -10$ A/ μs , $I_{GT} = 80$ mA at turn-on, $V_R = 20$ V minimum, $V_{GK} = 0$ V at turn-off, $T_C = 75^\circ\text{C}$ (See Fig. 16)	—	35	75	μs
$R_{\theta JC}$	—	—	2*	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	—	—	50*	

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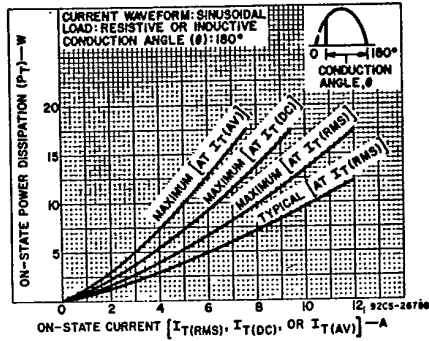


Fig. 1 — On-state power dissipation vs. on-state current.

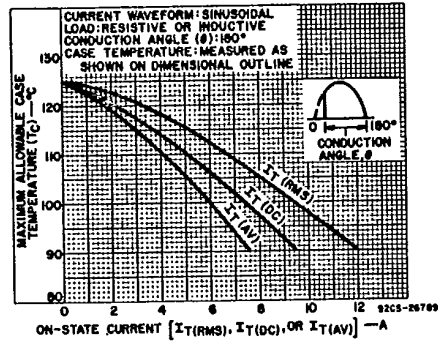


Fig. 2 — Maximum allowable case temperature vs. on-state current.

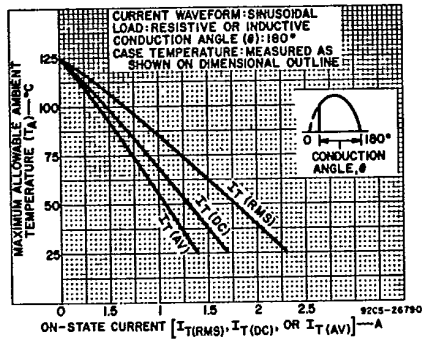


Fig. 3 — Maximum allowable ambient temperature vs. on-state current — no heat sinking.

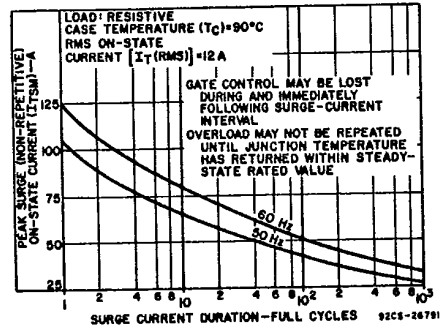


Fig. 4 — Allowable peak surge on-state current vs. surge duration.

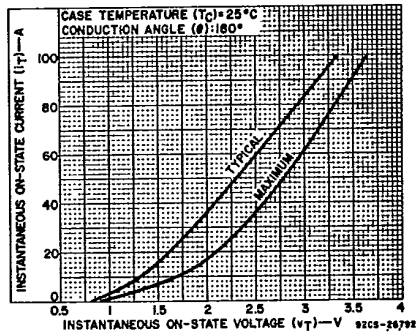


Fig. 5 — Instantaneous on-state current vs. instantaneous on-state voltage.

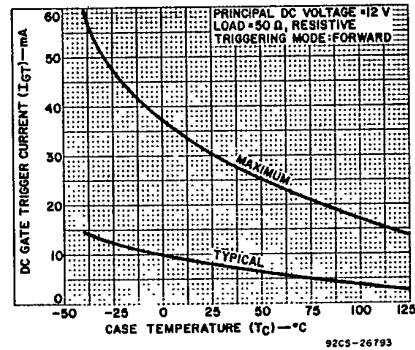


Fig. 6 — DC Gate trigger current vs. case temperature.

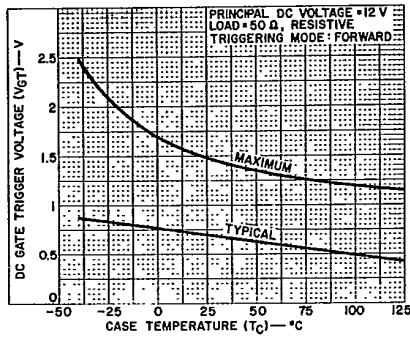


Fig. 7 — DC Gate trigger voltage vs. case temperature.

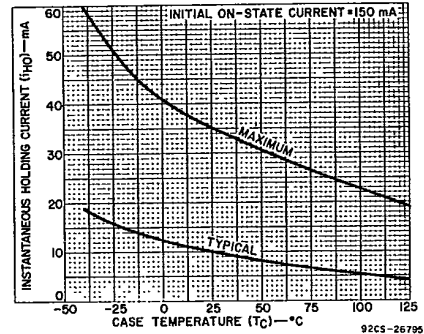


Fig. 8 — Instantaneous holding current vs. case temperature.

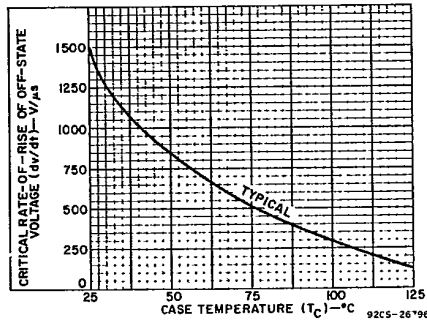


Fig. 9 — Critical of rise of off-state voltage vs. case temperature.

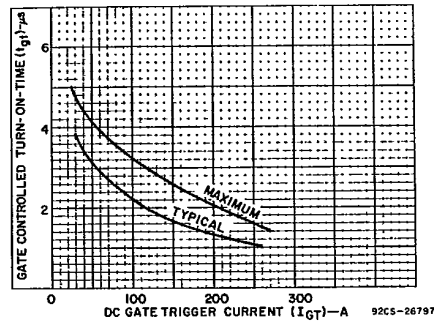


Fig. 10 — Typical gate-controlled turn-on time vs. gate trigger current.

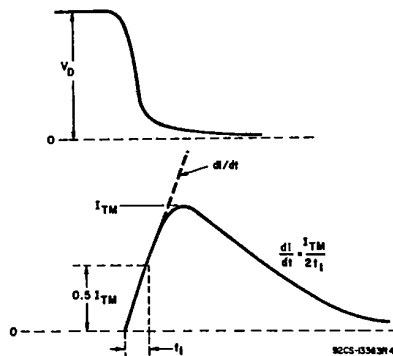


Fig. 11 — Rate of change on-state current with time (defining dI/dt).

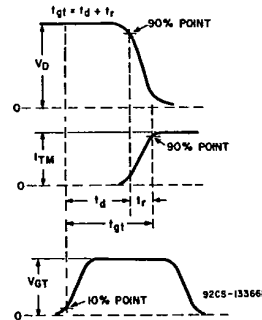


Fig. 12 — Relationship between off-state voltage, on-state current, and gate-trigger voltage showing reference points for definition of turn-on time (t_{gn}).

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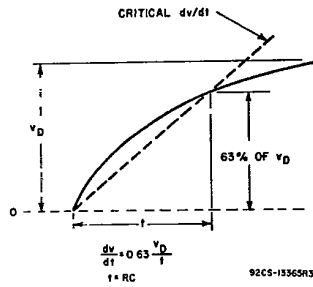


Fig. 13 — Rate of rise of off-state voltage with time (defining critical dv/dt).

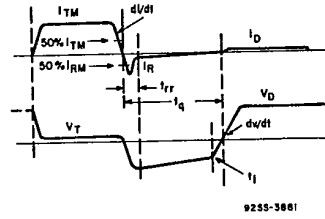


Fig. 14 — Relationship between instantaneous on-state current and voltage, showing reference points for definition of circuit-commutated turn-off time (t_a).