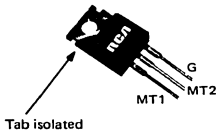
RCA Solid State Division

Thyristors

T2850 Series



JEDEC TO-220AB H-1535

8-A Isolated-Tab Silicon Triacs

Three-Lead Plastic Types for
Power-Control and Power-Switching Applications

Features:

- **Internal Isolation**
- **100-A Peak Surge Full-Cycle Current Ratings**
- **Shorted-Emitter, Center-Gate Design**
- **Low Switching Losses**
- **Low Thermal Resistance**
- **Package Suitable for Direct Mounting on Heat Sink**
- **Glass Passivated Junctions**

Voltage / Package	100 V Type	200 V Type	400 V Type
TO-220AB	T2850A (40900)	T2850B (40901)	T2850D (40902)

Numbers in parentheses are former RCA type numbers.

The T2850A, T2850B[a], and T2850D[b] triacs are gate-controlled full-wave ac switches utilizing a plastic case with three leads to facilitate mounting on printed-circuit boards. They are intended for the control of ac loads in such applications as motor controls, light dimmers, heating controls, and power-switching systems.

These devices are designed to switch from an off-state to an on-state for either polarity of applied voltage with positive or negative gate triggering voltages. They have an on-state current rating of 8 amperes at a T_C of 75°C and repetitive off-state voltage ratings of 100, 200, and 400 volts, respectively.

The ISOWATT package uses a plastic case with three leads that are electrically isolated from the mounting flange. Because of this internal isolation, the triac can be mounted directly on a heat sink, without any insulating hardware; therefore heat transfer is improved and heat-sink size can be reduced.

[a]Formerly RCA Dev. No. TA8357
[b]Formerly RCA Dev. No. TA8358

MAXIMUM RATINGS, *Absolute-Maximum Values:*

For Operation with Sinusoidal Supply Voltage at Frequencies up to 50/60 Hz and with Resistive or Inductive Load.

		T2850A	T2850B	T2850D	
REPETITIVE PEAK OFF-STATE VOLTAGE: •					
Gate open, T_J = −65 to 100°C	V_{DROM}	100	200	400	V
RMS ON-STATE CURRENT (Conduction angle = 360°):					
Case temperature	$I_{T(RMS)}$				
T_C = 75°C			8		A
For other conditions			See *Fig. 3*		
PEAK SURGE (NON-REPETITIVE) ON-STATE CURRENT:					
For one cycle of applied principal voltage, T_C = 75°C	I_{TSM}				
60 Hz (sinusoidal)			100		A
50 Hz (sinusoidal)			85		A
For more than one cycle of applied principal voltage			See *Fig. 4*		
RATE OF CHANGE OF ON-STATE CURRENT:					
$V_D = V_{DROM}$, I_{GT} = 200 mA, t_r = 0.1 μs (See Fig. 16)	di/dt		70		A/μs
FUSING CURRENT (for triac protection):					
T_J = −65 to 100°C, t = 1.25 to 10 ms	I^2t		50		A^2s
PEAK GATE-TRIGGER CURRENT: ■					
For 1 μs max.; see *Fig. 11*	I_{GTM}		4		A
GATE POWER DISSIPATION:					
Peak (For 1 μs max., $I_{GTM} \leq 4$ A; see *Fig. 11*)	P_{GM}		16		W
AVERAGE	$P_{G(AV)}$		0.2		W
TEMPERATURE RANGE: ▲					
Storage	T_{stg}		−65 to 150		°C
Operating (Case)	T_C		−65 to 100		°C
TERMINAL TEMPERATURE (During soldering):					
For 10 s max. (terminals and case)	T_T		225		°C

• For either polarity of main terminal 2 voltage (V_{MT2}) with reference to main terminal 1.

■ For either polarity of gate voltage (V_G) with reference to main terminal 1.

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

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

CHARACTERISTIC	SYMBOL	LIMITS									UNITS
		T2850A			T2850B			T2850D			
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Peak Off-State Current:* Gate Open, V_{DROM} = Max. rated value At T_J = 100°C	I_{DROM}	–	0.1	2	–	0.1	2	–	0.1	2	mA
Maximum On-State Voltage:* For i_T = 30 A (peak) and T_C = 25°C	v_{TM}	–	1.7	2	–	1.7	2	–	1.7	2	V
DC Holding Current:* Gate Open Initial principal current = 150 mA (dc) At T_C = 25°C	I_{HO}	–	15	30	–	15	30	–	15	30	mA
For other case temperatures		← See Fig. 8 →									
Critical Rate of Rise of Commutation Voltage:*♦ For $v_D = V_{DROM}$, $I_{T(RMS)}$ = 8 A, Commutating di/dt = 4.3 A/ms, and gate unenergized At T_C = 75°C	dv/dt	4	10	–	4	10	–	4	10	–	V/μs
Critical Rate of Rise of Off-State Voltage:* For $v_D = V_{DROM}$, exponential voltage rise, and gate open At T_C = 100°C	dv/dt	125	350	–	100	300	–	75	250	–	V/μs
For other case temperatures		← See Fig. 10 →									
DC Gate-Trigger Current:*† For v_D = 12 V (dc), R_L = 12Ω T_C = 25°C, and specified triggering mode:											
I^+ Mode: V_{MT2} is positive, V_G is positive	I_{GT}	–	10	25	–	10	25	–	10	25	mA
III^- Mode: V_{MT2} is negative, V_G is negative		–	15	25	–	15	25	–	15	25	
I^- Mode: V_{MT2} is positive, V_G is negative		–	20	60	–	20	60	–	20	60	
III^+ Mode: V_{MT2} is negative, V_G is positive		–	30	60	–	30	60	–	30	60	
For other case temperatures		← See Figs. 12 & 13 →									
DC Gate-Trigger Voltage:*† For v_D = 12 V (dc) and R_L = 12Ω At T_C = 25°C	V_{GT}	–	1.25	2.5	–	1.25	2.5	–	1.25	2.5	V
For other case temperatures		← See Fig. 14 →									
For $v_D = V_{DROM}$ and R_L = 125Ω At T_C = 100°C		0.2	–	–	0.2	–	–	0.2	–	–	
Gate-Controlled Turn-On Time (Delay Time + Rise Time): For $v_D = V_{DROM}$ and I_{GT} = 160 mA rise time = 0.1 μs, and i_T = 10 A (peak) At T_C = 25°C *(See Fig. 15)*	t_{gt}	–	1.6	2.5	–	1.6	2.5	–	1.6	2.5	μs
Thermal Resistance: Junction-to-Case	$R_{\theta JC}$	–	–	3.1	–	–	3.1	–	–	3.1	°C/W
Junction-to-Ambient	$R_{\theta JA}$	–	–	60	–	–	60	–	–	60	°C/W

*For either polarity of main terminal 2 voltage (V_{MT2}) with reference to main terminal 1.

†For either polarity of gate voltage (V_G) with reference to main terminal 1.

♦Variants of these devices having dv/dt characteristics selected specifically for inductive loads are available on special order; for additional information, contact your RCA Representative or your RCA Distributor.

TERMINAL CONNECTIONS

Lead No. 1 - Main Terminal 1
Lead No. 2 - Main Terminal 2
Lead No. 3 - Gate
Mounting Tab - Isolated

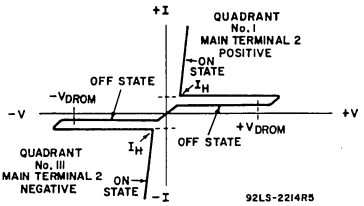


Fig. 1 — Principal voltage-current characteristic.

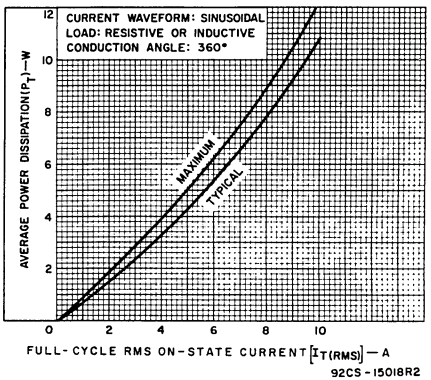


Fig. 2 — Power dissipation vs. on-state current.

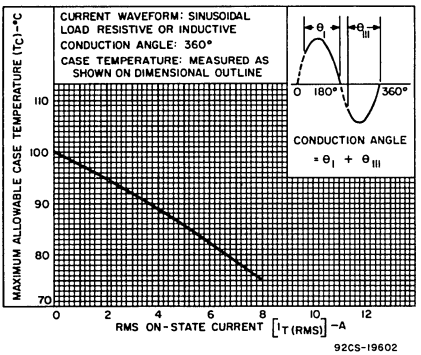


Fig. 3 — Allowable case temperature vs. on-state current.

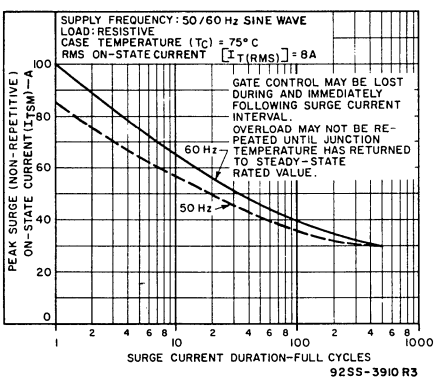


Fig. 4 — Peak surge on-state current vs. surge current duration.

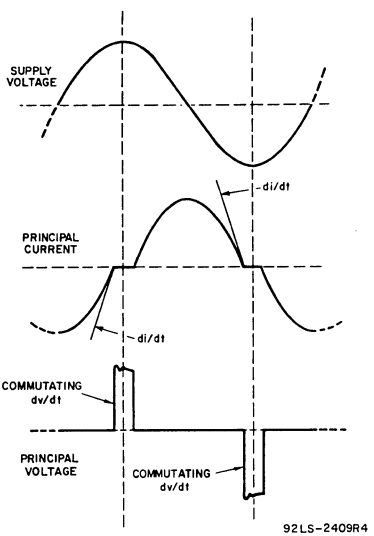


Fig. 5 — Oscilloscope display of commutating dv/dt.

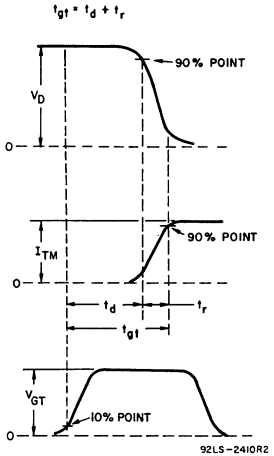
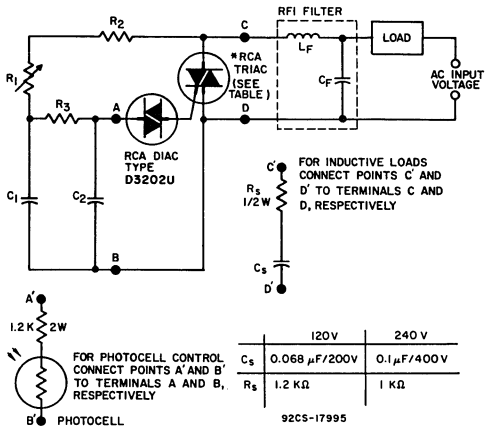


Fig. 6—Oscilloscope display for measurement of gate-controlled turn-on time (t_{gt}).



	120 V	240 V
C_s	0.068 μF/200V	0.1 μF/400 V
R_s	1.2 KΩ	1 KΩ

AC INPUT VOLTAGE	C_1	C_2	R_1	R_2	R_3	RFI FILTER L_F* (typ.)	RFI FILTER C_F* (typ.)	RCA TYPES
120 V 60 Hz	0.1 μF 200 V	0.1 μF 100 V	100 KΩ ½ W	2.2 KΩ ½ W	15 KΩ ½ W	100 μH	0.1 μF 200V	T2850B
240 V 50 Hz	0.1 μF 400 V	0.1 μF 100 V	250 KΩ 1 W	3.3 KΩ ½ W	15 KΩ ½ W	200 μH	0.1 μF 400 V	T2850D
240 V 60 Hz	0.1 μF 400 V	0.1 μF 100 V	200 KΩ 1 W	3.3 KΩ ½ W	15 KΩ ½ W	200 μH	0.1 μF 400 V	T2850D

*Typical values for lamp-dimming circuits.

Fig. 9—Typical phase-control circuit for lamp dimming, heat controls, and universal motor speed controls.

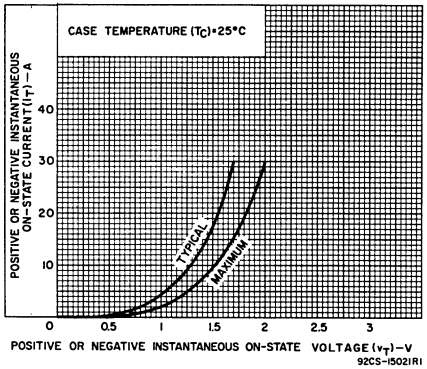


Fig. 7 — On-state current vs. on-state voltage.

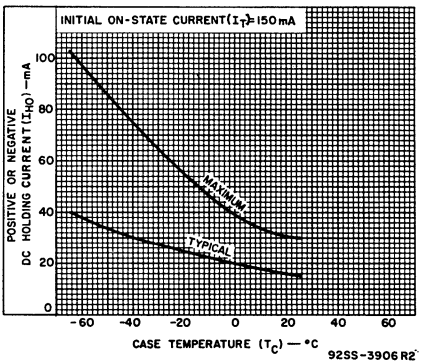


Fig. 8—DC holding current for either direction of on-state current vs. case temperature.

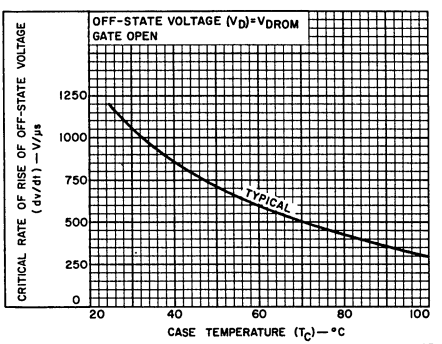


Fig. 10—Critical rate of rise of off-state voltage vs. case temperature.

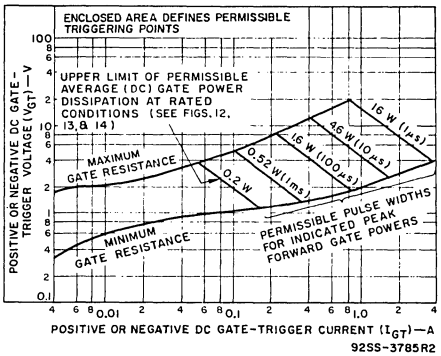


Fig. 11 — Gate-pulse characteristics for all triggering modes.

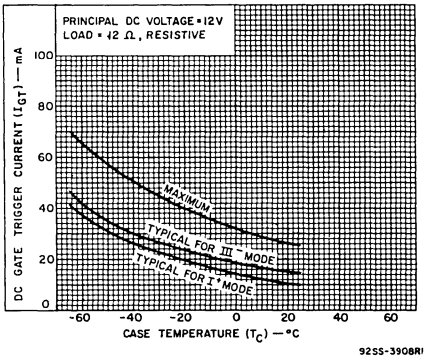


Fig. 12—DC gate-trigger current (for I^+ and III^- triggering modes) vs. case temperature.

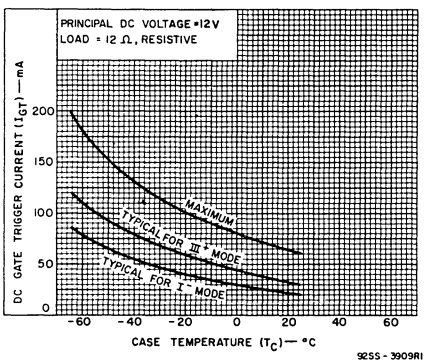


Fig. 13—DC gate-trigger current for I^- and III^+ triggering modes) vs. case temperature.

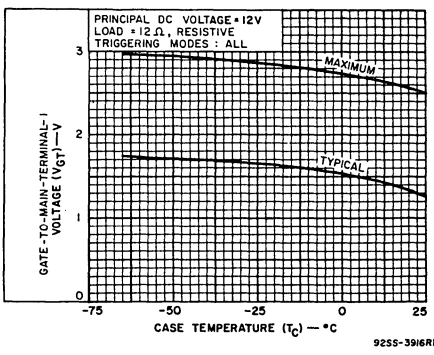


Fig. 14 — DC gate-trigger voltage vs. case temperature.

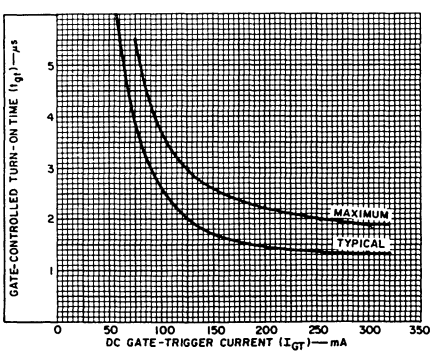


Fig. 15 — Typical turn-on time vs. gate-trigger current.

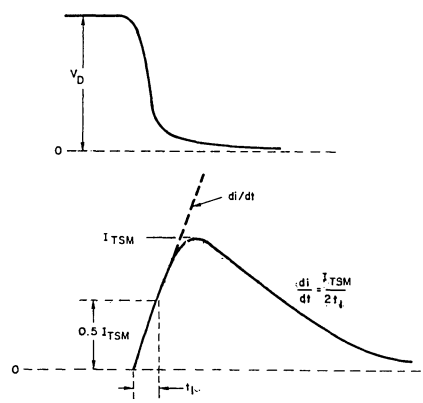


Fig. 16—Rate of change of on-state current with time (defining di/dt).