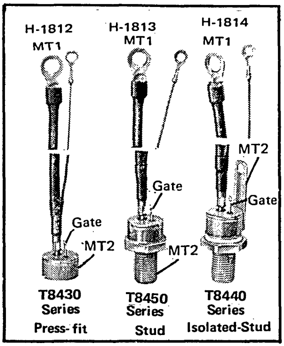
RCA
Solid State
Division

Thyristors

T8430 T8440 T8450 Series



80-A Silicon Triacs

Press-Fit, Stud, and Isolated-Stud Packages

Features:

- di/dt Capability = 300 A/μs
- Shorted-Emitter Center-Gate Design
- Low Switching Losses
- Low On-State Voltage at High Current Levels
- Low Thermal Resistance

Package \ Voltage	200 V Types	400 V Types	600 V Types
Press-fit	T8430B (40916)	T8430D (40917)	T8430M (40918)
Stud	T8440B (40919)	T8440D (40920)	T8440M (40921)
Isolated-stud	T8450B (40922)	T8450D (40923)	T8450M (40924)

Numbers in parentheses are former RCA type numbers.

These RCA triacs are gate-controlled full-wave silicon ac switches. They 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.

These triacs are intended for control of ac loads in applications such as heating controls, motor controls, arc-welding equipment, light dimmers, and power switching systems. They can also be used in air-conditioning and photocopying equipment.

MAXIMUM RATINGS, *Absolute-Maximum Values:*
For Operation with Sinusoidal Supply Voltage at Frequencies up to 50/60 Hz and with Resistive or Inductive Load.

		T8430B T8440B T8450B	T8430D T8440D T8450D	T8430M T8440M T8450M	
REPETITIVE PEAK OFF-STATE VOLTAGE:* Gate open, T_J = -40 to 110°C	V_{DROM}	200	400	600	V
RMS ON-STATE CURRENT (Conduction Angle = 360°):	$I_{T(RMS)}$				
Case temperature T_C = 75°C (Press-Fit types)			80		A
65°C (Stud types)			80		A
55°C (Isolated-Stud types)			80		A
For other conditions			See Fig. 3		
PEAK SURGE (NON-REPETITIVE) ON-STATE CURRENT:	I_{TSM}				
For one cycle of applied principal voltage, T_C as above 60 Hz (sinusoidal)			850		A
50 Hz (sinusoidal)			720		A
For more than one cycle of applied principal voltage			See Fig. 4		
RATE-OF-CHANGE OF ON-STATE CURRENT: V_{DM} = V_{DROM}, I_{GT} = 300 mA, t_r = 0.1μs *(See Fig. 13)*	di/dt		300		A/μs
FUSING CURRENT (for Triac Protection): T_J = -40 to 110°C, t = 1.25 to 10 ms	I^2t		3600		A^2s
PEAK GATE-TRIGGER CURRENT: ■ For 10μs max. *(See Fig. 7)*	I_{GTM}		7		A
GATE POWER DISSIPATION: Peak (For 10μs max., $I_{GTM} \leq$ 7A (peak), *(See Fig. 7)*	P_{GM}		40		W
Average	$P_{G(AV)}$		0.75		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. (terminals and case)	T_T		225		°C

Formerly RCA Dev. Nos. TA7752—TA7757, and TA7937—TA7939, respectively.
*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.

MAXIMUM RATINGS, *Absolute-Maximum Values:*
For Operation with Sinusoidal Supply Voltage at Frequencies up to 50/60 Hz and with Resistive or Inductive Load. (Cont'd.).

		T8430B T8440B T8450B	T8430D T8440D T8450D	T8430M T8440M T8450M	
STUD TORQUE:	τ_s				
Recommended			125		in.-1b
Maximum (DO NOT EXCEED)			150		in.-1b

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

CHARACTERISTIC	SYMBOL	LIMITS MIN.	TYP.	MAX.	UNITS
Peak Off-State Current:♠					
Gate open, T_J = 110°C, V_{DROM} = Max. rated value	I_{DROM}	–	0.4	4	mA
Maximum On-State Voltage:♠					
For i_T = 200 A (peak), T_C = 25°C	V_{TM}	–	1.7	2	V
DC Holding Current:♠					
Gate open, Initial principal current = 500 mA (dc), v_D = 12V:					
T_C = 25°C	I_{HO}	–	20	60	mA
= -40°C		–	–	85	
For other case temperatures			See *Fig. 6*		
Critical Rate-of-Rise of Commutation Voltage:♠					
For v_D = V_{DROM}, $I_{T(RMS)}$ = 80 A, commutating di/dt = 42 A/ms, gate unenergized, (See *Fig. 14*):					
T_C = 75°C (Press-fit types)		3	10	–	
= 65°C (Stud types)	dv/dt	3	10	–	V/μs
= 55°C (Isolated-stud types)		3	10	–	
Critical Rate-of-Rise of Off-State Voltage:♠					
For v_D = V_{DROM}, exponential voltage rise, gate open, T_C = 110°C:					
T8430B, T8440B, T8450B		50	200	–	
T8430D, T8440D, T8450D	dv/dt	30	150	–	V/μs
T8430M, T8440M, T8450M		20	100	–	
DC Gate-Trigger Current:♠♦ Mode / V_{MT2} / V_G					
For v_D = 12 V (dc), R_L = 30 Ω, T_C = 25°C — I+ positive positive		–	20	75	
III− negative negative		–	40	75	
I− positive negative		–	40	150	
III+ negative positive	I_{GT}	–	100	150	mA
For v_D = 12 V (dc), R_L = 30Ω, T_C = -40°C — I+ positive positive		–	35	150	
III− negative negative		–	80	150	
I− positive negative		–	100	400	
III+ negative positive		–	280	400	
For other case temperatures			See *Figs. 8 & 9*		
DC Gate-Trigger Voltage:♠♦					
For v_D = 12 V (dc), R_L = 30 Ω, T_C = 25°C	V_{GT}	–	1.35	2.5	V
For other case temperatures			See *Fig. 10*		
Gate-Controlled Turn-On Time: (Delay Time + Rise Time)					
For v_D = V_{DROM}, I_{GT} = 300 mA, t_r = 0.1 μs, i_T = 112 A (peak), T_C = 25°C (See *Figs. 11 & 15*)	t_{gt}	–	1.2	2.5	μs
Thermal Resistance, Junction-to-Case:					
Steady-State					
Press-fit types		–	–	0.3	
Stud types	$R_{\theta JC}$	–	–	0.35	°C/W
Isolated-stud types		–	–	0.4	
Transient (Press-fit & Stud types)			See *Fig. 12*		

♠ 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.

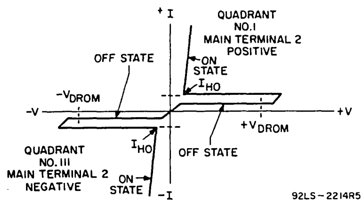


Fig. 1 — Principal voltage-current characteristic.

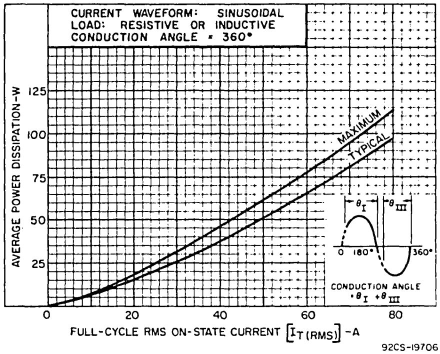


Fig. 2 — Power dissipation vs. on-state current.

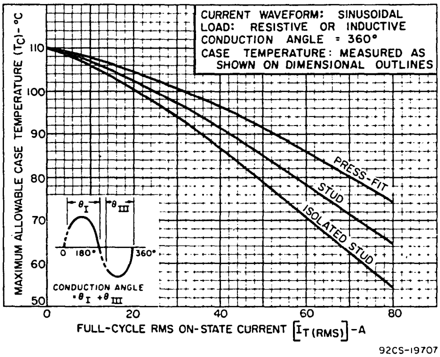


Fig. 3 — Maximum allowable case temperature vs. on-state current.

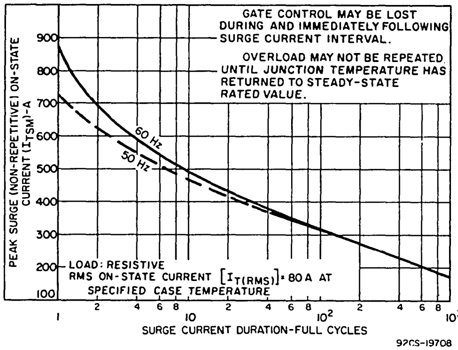


Fig. 4 — Peak surge on-state current vs. surge current duration.

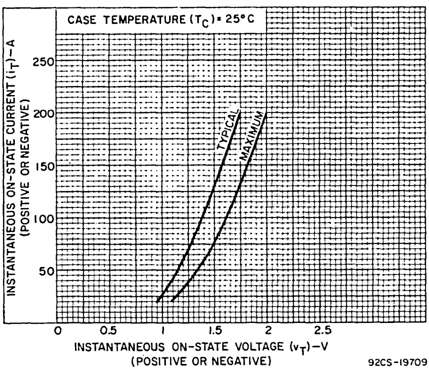


Fig. 5 — On-state current vs. on-state voltage.

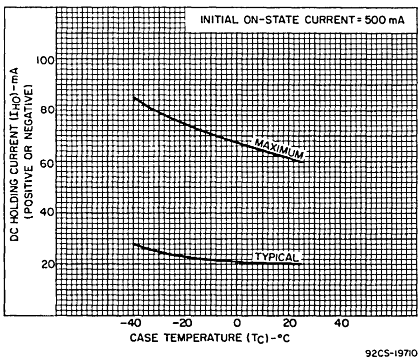


Fig. 6 — DC holding current vs. case temperature.

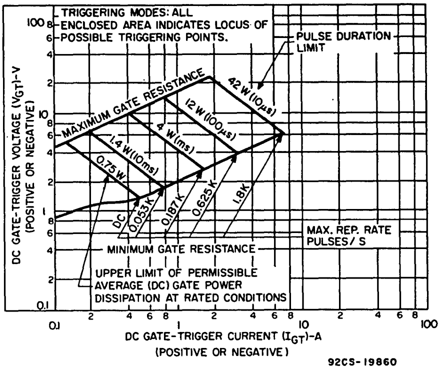


Fig. 7 — Gate-trigger characteristics and limiting conditions for determination of permissible gate-trigger pulses.

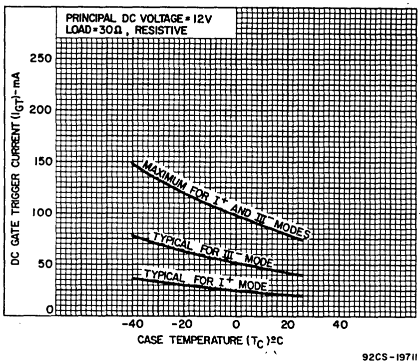


Fig. 8 — DC gate-trigger current vs. case temperature (I^+ & III^- modes).

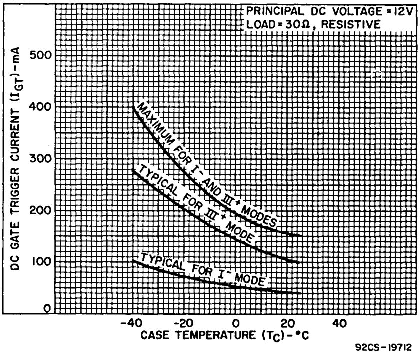


Fig. 9 — DC gate-trigger current vs. case temperature (I^- & III^+ modes).

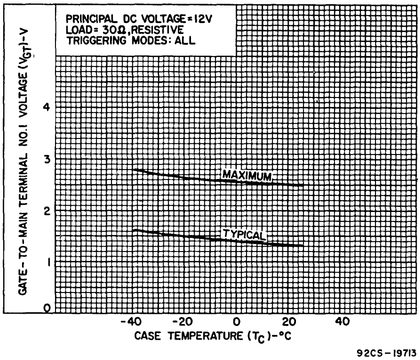


Fig. 10 — DC gate-trigger voltage vs. case temperature.

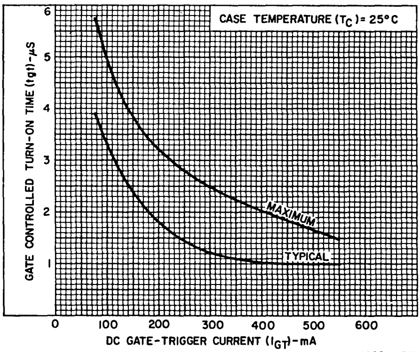


Fig. 11 — Turn-on time vs. gate-trigger current.

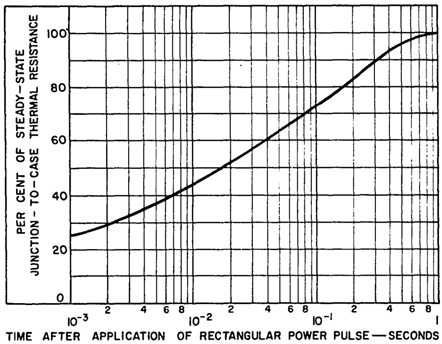


Fig. 12 — Transient junction-to-case thermal resistance vs. time.

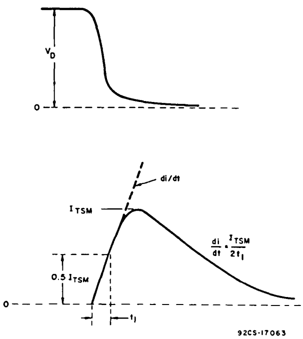


Fig. 13 — Rate-of-change of on-state current with time (defining di/dt).

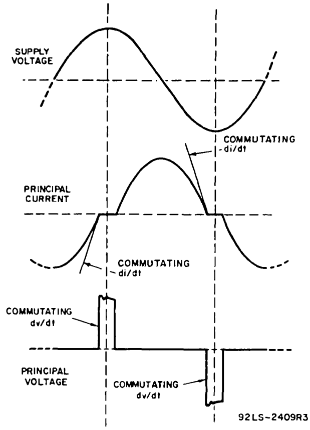


Fig. 14—Relationship between supply voltage and prinicpal current (inductive load) showing reference points for definition of commutating voltage (dv/dt).

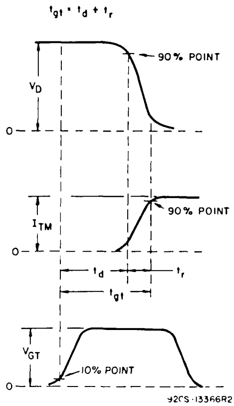
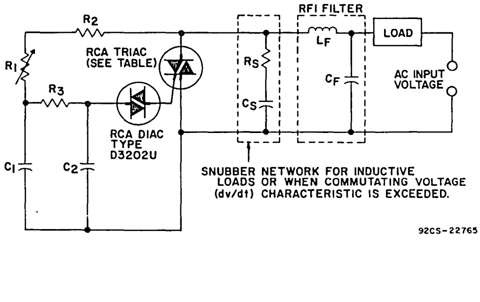


Fig. 15—Relationship between off-state voltage, on-state current, and gate-trigger voltage showing reference points for definition of turn-on time (t_{gt}).



AC INPUT VOLTAGE		120 V 60 Hz	240 V 60 Hz	240 V 50 Hz
C_1		0.1 μF 200 V	0.1 μF 400 V	0.1 μF 400 V
C_2		0.1 μF 100 V	0.1 μF 100 V	0.1 μF 100 V
R_1		100 kΩ ½ W	200 kΩ ½ W	250 kΩ ½ W
R_2		2.2 kΩ ½ W	3.3 kΩ ½ W	3.3 kΩ ½ W
R_3		15 kΩ ½ W	15 kΩ ½ W	15 kΩ ½ W
SNUBBER NETWORK FOR 80 A (RMS)° IN DUCTIVE LOAD	C_S	0.18 0.22 μF 200 V	0.18 0.22 μF 400 V	0.18 0.22 μF 400 V
	R_S	330 390 Ω ½ W	330 390 Ω ½ W	330 390 Ω ½ W
RFI FILTER	C_F•	0.1 μF 200 V	0.1 μF 400 V	0.1 μF 400 V
	L_F•	100 μH	200 μH	200 μH
RCA TRIACS		T8430B T8440B T8450B	T8430D T8440D T8450D	T8430D T8440D T8450D

° For other RMS Current values refer to RCA Application Note AN-4745.

• Typical values for Lamp dimming circuits.

Fig. 16 — Typical phase-control circuit for lamp dimming, heat control, and universal-motor speed control.

TERMINAL CONNECTIONS FOR ALL TYPES

No. 1 — Gate
No. 2 — Main Terminal 1
Case, No. 3 — Main Terminal 2

WARNING: The ceramic of the isolated stud package contains beryllium oxide. Do not crush, grind, or abrade this part because the dust resulting from such action may be hazardous if inhaled. Disposal should be by burial.