



Thyristors

T4700 Series

15-Ampere Silicon Triacs

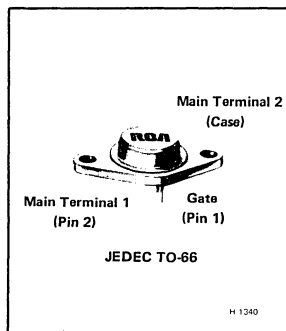
For Low-Power Phase-Control and Load-Switching Applications

Features:

- di/dt Capability = 150 A/ μ s
- Shorted-Emitter, Center-Gate Design
- Low Switching Losses
- Low On-State Voltage at High Current Levels
- Low Thermal Resistance

Voltage	200 V	400 V
Package	Type	Type
TO-66	T4700B (40575)	T4700D (40576)

Numbers in parentheses are former RCA type numbers.



RCA T4700B and T4700D* are gate-controlled full-wave ac silicon switches. They are designed to switch from an off-state to a conducting state for either polarity of applied voltage with positive or negative gate triggering.

These devices are intended for the control of ac loads in applications such as space heater, oven and furnace controls, motor controls, and lamp loads.

*Formerly Dev. Types TA2834 and TA2835, respectively.

MAXIMUM RATINGS, Absolute-Maximum Values:

For Operation with 50/60-Hz, Sinusoidal Supply Voltage and Resistive or Inductive Load

REPETITIVE PEAK OFF-STATE VOLTAGE:[‡]

Gate Open V_{DROM}

RMS ON-STATE CURRENT:

$T_C = 70^\circ\text{C}$, conduction angle = 360° $I_T(\text{RMS})$

PEAK SURGE (NON-REPETITIVE) ON-STATE CURRENT:

For one full cycle of applied principal voltage I_{TSM}

60 Hz (sinusoidal), $T_C = 70^\circ\text{C}$ 100 A

For one full cycle of applied principal voltage 85 A

(50-Hz, sinusoidal), $T_C = 70^\circ\text{C}$ See Fig. 6.

For more than one full cycle of applied voltage I_{GTM}

PEAK GATE-TRIGGER CURRENT:

For 1 μ s max. 4 A

RATE OF CHANGE OF ON-STATE CURRENT:

$V_D = V_{DROM}$, $I_{GT} = 200\text{ mA}$, $tr = 0.1\text{ }\mu\text{s}$ (See Fig. 3) di/dt

FUSING CURRENT (for triac protection):

$T_J = -40$ to 100°C , $t = 1.25$ to 10 ms I^2t

GATE POWER DISSIPATION:

Peak* (for 1 μ s max. and $I_{GTM} \leq 4\text{ A}$) P_{GM}

Average (averaging time = 10 ms max.) $P_{G(AV)}$

TEMPERATURE RANGE:[‡]

Storage T_{stg}

Operating (Case) T_C

PIN TEMPERATURE (During soldering):

At distances $\geq 1/32\text{ in.}$ (0.8 mm) from seating plane for 10 s max. T_p

- * 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*.

	T4700B	T4700D	
V_{DROM}	200	400	V
$I_T(\text{RMS})$	15		A
I_{TSM}	100		A
	85		A
	See Fig. 6.		
I_{GTM}	4		A
di/dt	150		A/ μ s
I^2t	50		A ² s
P_{GM}	16		W
$P_{G(AV)}$	0.45		W
T_{stg}	-40 to 150		$^\circ\text{C}$
T_C	-40 to 100		$^\circ\text{C}$
T_p	225		$^\circ\text{C}$

Characteristics at Maximum Ratings (unless otherwise specified), and at Indicated Case Temperature (T_C).

CHARACTERISTICS	TRIAC TYPES						UNITS
	T4700B			T4700D			
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Peak Off-State Current [♠] , I _{DROM} Gate open At T _J = +100° C and V _{DROM} = Max. rated value	—	0.2	4	—	0.2	4	mA
Instantaneous On-State Voltage [♠] , V _T For i _T = 30 A (peak) and T _C = +25° C.	—	1.6	2.0	—	1.6	2.0	V(peak)
DC Holding Current [♠] , I _{HO} : Gate Open Initial principal current = 150 mA (dc) At T _C = +25° C. For other case temperatures.	—	15	60	—	15	60	mA(dc)
	See Fig. 8			See Fig. 8			
Critical Rate of Applied Commutating Voltage [♠] , Commutating dv/dt: For v _D = V _{DROM} , I _T (RMS) = 15 A, commutating di/dt = 8 A/ms, and gate unenergized At T _C = +70° C.	2	10	—	2	10	—	V/μs
Critical Rate of Rise of Off-State Voltage [♠] , Critical dv/dt: For v _D = V _{DROM} , exponential voltage rise, gate open At T _C = +100° C.	30	150	—	20	100	—	V/μs
DC Gate-Trigger Current [♠] ■, I _{GT} For v _D = 6 volts (dc), R _L = 12 ohms, T _C = +25° C, and Specified Triggering Mode: I ⁺ Mode: V _{T2} is positive, V _G is positive. . . I ⁻ Mode: V _{T2} is positive, V _G is negative. . . III ⁺ Mode: V _{T2} is negative, V _G is positive. . . III ⁻ Mode: V _{T2} is negative, V _G is negative. . . For other case temperatures.	—	15	30	—	15	30	mA(dc)
	—	35	80	—	35	80	mA(dc)
	—	35	80	—	35	80	mA(dc)
	—	15	30	—	15	30	mA(dc)
	See Figs. 12 & 13			See Figs. 12 & 13			
DC Gate-Trigger Voltage [♠] ■, V _{GT} : For v _D = 6 volts (dc) and R _L = 12 ohms At T _C = +25° C. For other case temperatures.	—	1	2.5	—	1	2.5	V(dc)
	See Fig. 14			See Fig. 14			
For v _D = V _{DROM} and R _L = 125 ohms At T _C = +100° C.	0.2	—	—	0.2	—	—	V(dc)
Gate-Controlled Turn-On Time, t _{gt} (Delay Time + Rise Time) For v _D = V _{DROM} , I _{GT} = 160 mA, 0.1 μs rise time, and i _T = 25 A (peak) At T _C = +25° C.	—	1.6	2.5	—	1.6	2.5	μs
Thermal Resistance, Junction to case, R _{θJC}	—	—	1.3	—	—	1.3	°C/W

♠For either polarity of main terminal 2 voltage (V_{T2}) with reference to main terminal 1.

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

TERMINAL CONNECTIONS

Pin 1: Gate
Pin 2: Main Terminal 1
Case: Main Terminal 2

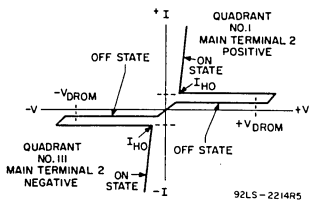


Fig. 1 - Principal voltage-current characteristic.

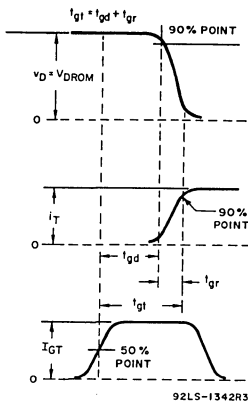
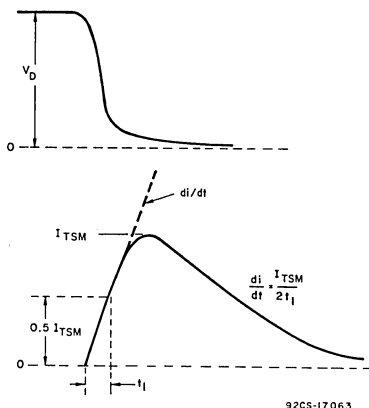
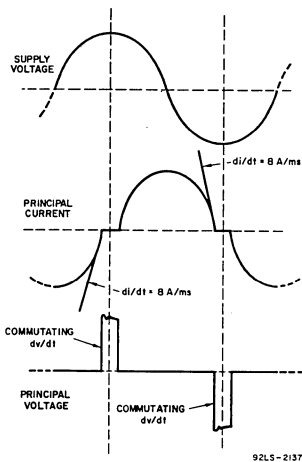
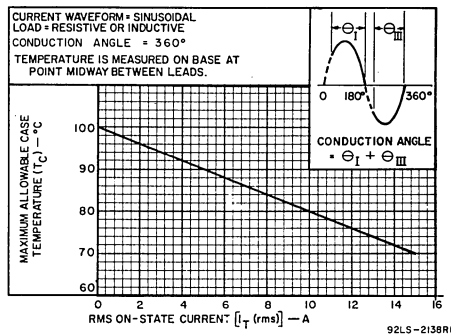
Fig. 2—Waveshapes of t_{gt} characteristics test.Fig. 3—Rate of change of on-state current with time (defining di/dt).Fig. 4—Waveshapes of commutating dv/dt characteristics.

Fig. 5—Conduction rating chart (case temperature).

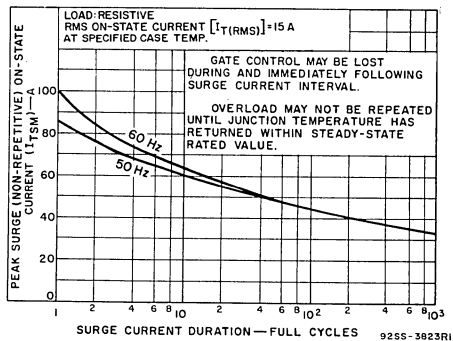


Fig. 6—Surge current rating chart.

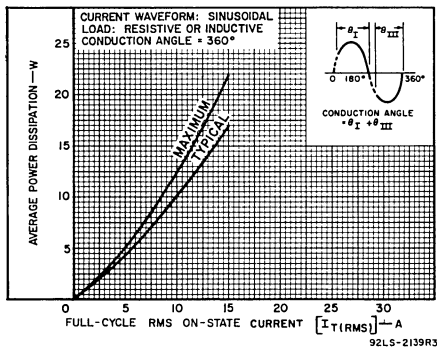


Fig. 7—Power dissipation curve.

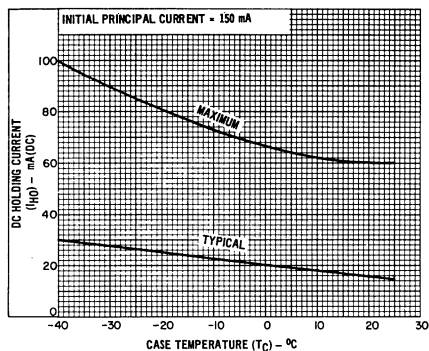


Fig. 8 - DC holding current characteristics for either direction of principal current.

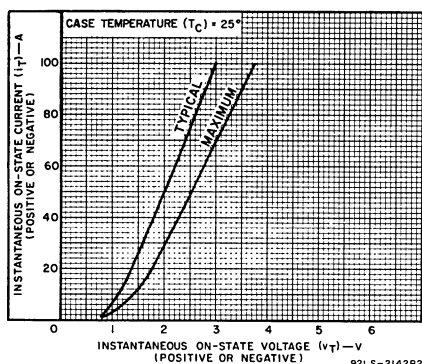


Fig. 9 - On-state characteristics for either direction of principal current.

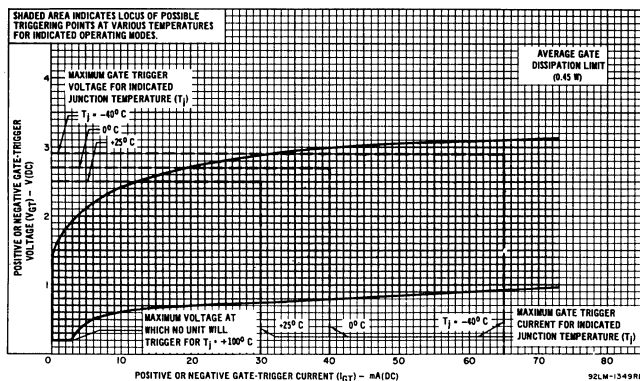


Fig. 10 - Gate characteristics for I^+ and III^+ triggering modes.

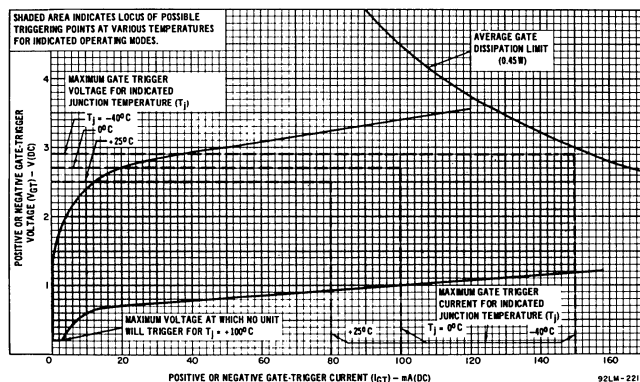
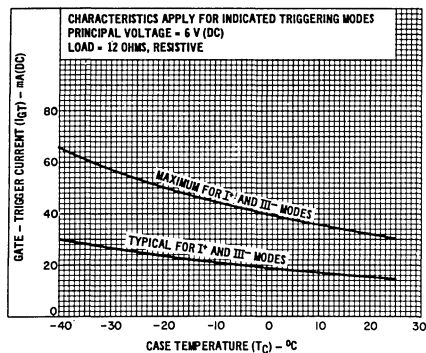
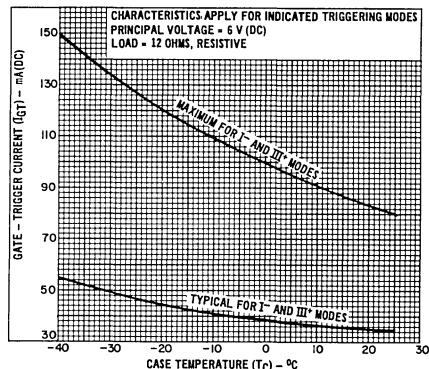


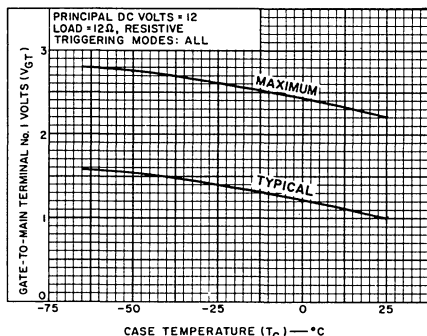
Fig. 11 - Gate characteristics for I^- and III^- triggering modes.



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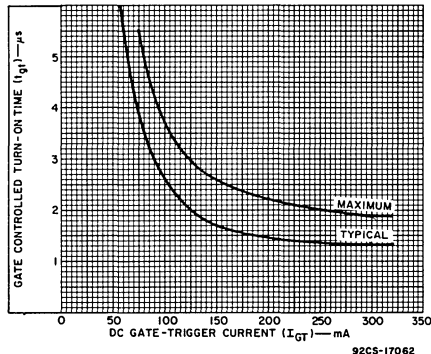


92LS-2212

Fig. 12 - DC gate-trigger current characteristics for I^+ and III^+ modes.Fig. 13 - DC gate-trigger current characteristics for I^- and III^+ modes.

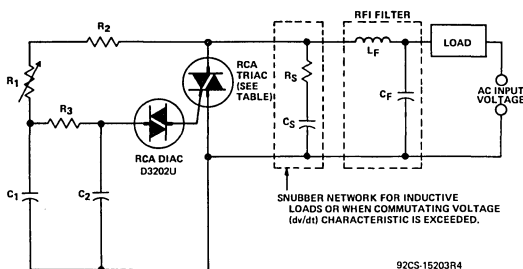
92LS-1413R2

Fig. 14 - DC gate-trigger voltage characteristics.



92CS-17062

Fig. 15 - Turn-on time vs. gate trigger current.



92CS-15203R4

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

AC INPUT VOLTAGE	120 V 60 Hz	240 V 60 Hz	240 V 50 Hz
C ₁	0.1 μF 200 V	0.05 μF 400 V	0.05 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 1 W	200 KΩ 1 W
R ₂	1 KΩ ½ W	7.5 KΩ 2 W	7.5 KΩ 2 W
R ₃	15 KΩ ½ W	7.5 KΩ 2 W	7.5 KΩ 2 W
SNUBBER NETWORK FOR 15-A (RMS) INDUCTIVE	C _S	0.1 μF 200 V	0.1 μF 400 V
	R _S	100 Ω ½ W	100 Ω ½ W
RFI FILTER	C _F *	0.1 μF 200 V	0.1 μF 400 V
	L _F *	100 μH	100 μH
RCA TRIAC	T4700B	T4700D	T4700D

* For other RMS current values refer to RCA Application Note AN-4745.

* Typical values for lamp dimming circuits.