

ELECTRONIC TUBE REFERENCE

19CG3

Rectifier - Damper Diode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
RECTIFIER

Compactron half-wave vacuum rectifier designed as a television horizontal-deflection damper diode, differing from the corresponding 6-volt type primarily in heater characteristics.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12FX	BASE PINS	12
NOMINAL HEATER	19 V / 600 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

12FX - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	–	H – Heater	CONNECTED
PIN4	–	P – Plate (Anode)	CONNECTED
PIN5	–	–	IC
PIN6	–	–	IC
PIN7	–	K – Cathode	CONNECTED
PIN8	–	–	IC
PIN9	–	–	IC
PIN10	–	P – Plate (Anode)	CONNECTED
PIN12	–	H – Heater	CONNECTED

SECTION RATINGS

SECTION1 Rectifier	
MAXIMUM PLATE DISSIPATION	6.5 W
PEAK INVERSE VOLTAGE	5500 V
NOMINAL OUTPUT CURRENT	350 mA
PEAK FORWARD CURRENT	2.1 A
FORWARD VOLTAGE DROP	14 V
MAXIMUM HEATER-CATHODE VOLTAGE	5500 V
WARM-UP TIME	11 s
<i>Damping diode; detailed electrical ratings referenced to 6CG3 sheet.</i>	

19CG3 — Half-Wave Vacuum Rectifier

The **19CG3** is a duodecar-type half-wave vacuum rectifier designed primarily for service as a damper diode in the horizontal-deflection circuits of both color and black-and-white television receivers. It features a single heater-cathode structure housed in a Compactron T-9 glass envelope. The 19CG3 is electrically identical to the [6CG3](#) and [25CG3](#), differing only in its heater ratings and characteristics.

Heater Characteristics and Warm-Up

The 19CG3 is designed for series-string heater applications. It incorporates a controlled warm-up time to ensure reliable operation in series-connected heater chains.

Parameter	Value
Nominal Heater Voltage (AC or DC)	19.0 V
Nominal Heater Current	0.6 ± 0.04 A
Calculated Heater Power	11.4 W
Average Heater Warm-up Time	11 seconds

The average heater warm-up time is defined by a standardized test condition. This is the time required for the voltage across the heater to reach 80% of its nominal (bogey) value after applying four times the bogey heater voltage (76.0 V) to a circuit consisting of the tube heater in series with a resistance equal to three times the bogey heater voltage divided by the bogey heater current:

$$\text{Series Resistance} = 3 \times \frac{19.0 \text{ V}}{0.6 \text{ A}} = 95 \, \Omega$$

Physical Construction and Basing Configurations

The 19CG3 is constructed in a Compactron T-9 glass envelope with a button 12-pin base (E12-70), requiring a standard duodecar 12-contact socket. The physical dimensions of the tube are:

- **Maximum Diameter:** 1.188 inches
- **Maximum Seated Height:** 3.000 inches
- **Maximum Overall Height:** 3.375 inches
- **Outline Designations:** Section 8F, Section 8G, or Outline 9-62

Pinout Variations

Depending on the manufacturing standard and historical documentation, three distinct pinout configurations (basing diagrams) are associated with the 19CG3. These are designated as 12FX (with two documented variations) and 12HF.

Pin	12FX (Variant A)	12FX (Variant B)	12HF
1	No Connection (NC)	Heater (H)	Heater (H)
2	Heater (H)	No Connection (NC)	Internal Connection (IC)
3	No Connection (NC)	Plate (P)	Plate (P)
4	Internal Connection (IC)	No Connection (NC)	No Connection (NC)
5	Internal Connection (IC)	Internal Connection (IC)	Internal Connection (IC)
6	Cathode (K)	Cathode (K)	Cathode (K)
7	Internal Connection (IC)	Internal Connection (IC)	Internal Connection (IC)
8	Internal Connection (IC)	Internal Connection (IC)	Internal Connection (IC)
9	Internal Connection (IC)	Internal Connection (IC)	Internal Connection (IC)
10	Plate (P)	Plate (P)	Plate (P)
11	No Connection (NC)	No Connection (NC)	No Connection (NC)
12	Heater (H)	Heater (H)	Heater (H)

Note on Internal Connections (IC): Pins designated as Internal Connection (IC) must not be used for external circuit connections. Leaving these pins entirely free of external wiring is critical to maintaining physical and electrical interchangeability with other tubes.

Electrical Characteristics and Capacitances

The 19CG3 features a coated unipotential cathode. The direct interelectrode capacitances of the tube, measured without an external shield, are:

- **Cathode to Plate and Heater:** 16.0 pF
- **Plate to Cathode and Heater:** 13.0 pF
- **Heater to Cathode:** 4.0 pF

Tube Voltage Drop

The internal resistance of the diode is characterized by its instantaneous tube voltage drop under high-current conditions. Depending on the specific manufacturer's production run, the typical instantaneous voltage drop is documented as:

- **20 V** at an instantaneous plate current (I_b) of 700 mA
- **25 V** at an instantaneous plate current (I_b) of 700 mA

Maximum Ratings (Design-Maximum System)

The ratings of the 19CG3 are established under the Design-Maximum System for operation in a 525-line, 30-frame television system. These ratings represent the limits within which the tube can be operated safely without degrading its reliability or service life.

Damper Service Ratings

- **Peak Inverse Plate Voltage:** 5000 V (absolute maximum)
 - *Pulse Duration Constraint:* The peak inverse voltage pulse must not exceed 15% of one horizontal scanning cycle, or a maximum duration of 10 microseconds.
- **Steady State Peak Plate Current:** 2100 mA
- **DC (Average) Plate Current:** 350 mA
- **Plate Dissipation:** 6.5 W

Heater-Cathode Voltage Limits

Because the cathode of a damper diode experiences high pulse voltages during horizontal retrace, the insulation between the heater and cathode is subjected to severe electrical stress. The 19CG3 is rated to withstand the following heater-cathode potentials:

- **Heater Negative with Respect to Cathode:**
 - **DC Limit:** 900 V
 - **Total DC and Peak (Pulse) Limit:** 5000 V
- **Heater Positive with Respect to Cathode:**
 - **DC Limit:** 100 V
 - **Total DC and Peak (Pulse) Limit:** 300 V

Technical Summary

The **19CG3** is a specialized **duodecar-type half-wave vacuum rectifier** designed for demanding **damper diode service** in television horizontal-deflection circuits. Operating with a **19.0 V, 0.6 A heater** featuring a controlled **11-second warm-up time**, it is optimized for series-string heater configurations. The tube is capable of handling a **peak inverse plate voltage of 5000 V** and a **steady-state peak plate current of 2100 mA**, with a maximum **plate dissipation of 6.5 W**. Its physical construction in a **Compactron T-9 envelope** and its high heater-to-cathode insulation ratings make it a robust component for high-voltage pulse applications.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1968 General Electric Co

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1968 GENERAL ELECTRIC CO

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Warmup Time	11 s	Average



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1971 RCA HB3 Binder 5 of 7

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1971 RCA HB3 BINDER 5 OF 7

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	18.9 V	—
Heater current	600 mA	—
Heater warm-up time	11 s	ControlledWarmup
Peak inverse plate voltage	5500 V	DamperService
Peak plate current	2100 mA	DamperService
Average plate current	350 mA	DamperService
Peak heater-cathode voltage heater negative	-5500 V	—
Peak heater-cathode voltage heater positive	300 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube voltage drop	14 V	PlateCurrent=350mA



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1975 RCA RC30

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1975 RCA RC30

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Warm-up Time –	11 s	Other;PublishedValue1
Heater Warm-up Time –	11 s	Other;PublishedValue2
Peak Inverse Plate Voltage*	5000 V	MaximumRating
Peak Plate Current	2100 mA	MaximumRating
Average Plate Current	300 mA	MaximumRating;PublishedValue1
Average Plate Current	350 mA	MaximumRating;PublishedValue2
Plate Dissipation	6.5 W	MaximumRating
Peak value	-5000 V	MaximumRating
Average value	100 V	MaximumRating;PublishedValue1
Average value	900 V	MaximumRating;PublishedValue2
Tube VoltAge Drop for plate current of	700 mA	MaximumRating;PublishedValue1
Tube VoltAge Drop for plate current of	25 mA	MaximumRating;PublishedValue2
Peak Inverse Plate Voltage	6000 V	Section1;Promoted

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