



ELECTRONIC TUBE REFERENCE

12CT3

Rectifier - Damper Diode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
RECTIFIER

Half-wave vacuum rectifier designed as a damper tube in television horizontal-deflection circuits, explicitly documented as a heater variant of its corresponding family.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	9
NOMINAL HEATER	12.6 V / 600 mA	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Rectifier	
MAXIMUM PLATE DISSIPATION	4.75 W
PEAK INVERSE VOLTAGE	5000 V
NOMINAL OUTPUT CURRENT	250 mA
PEAK FORWARD CURRENT	1.2 A
FORWARD VOLTAGE DROP	16 V
WARM-UP TIME	11 s
<i>Supplied sheet explicitly states this is the same as 6CT3 except for heater characteristics. Parent electrical table was not present in the currently available local corpus, so no unsupported promoted values were invented.</i>	

12CT3 — Half-Wave Vacuum Rectifier

The **12CT3** is a miniature half-wave vacuum rectifier designed specifically for use as a damper tube in the horizontal-deflection circuits of television receivers. It is suitable for both black-and-white and small-

screen color television systems. The tube is housed in a 9-pin miniature envelope and requires a standard miniature 9-contact socket.

The 12CT3 belongs to a family of closely related damper diodes, sharing identical electrical characteristics and physical construction with the [17CT3](#) and [25CT3](#) except for their heater ratings. Additionally, the 12CT3 is electrically identical to the [6CT3](#) except for its heater characteristics.

Physical Construction and Pin Connections

The 12CT3 is constructed in a miniature glass envelope conforming to the 6H outline designation. Because it is a power-handling device that dissipates significant heat during normal operation, adequate ventilation must be provided in the equipment layout to prevent overheating. The maximum allowable bulb temperature at its hottest point is **220 °C**.

The tube utilizes the **9RX** basing arrangement, which requires a miniature 9-contact socket. The pin connections, viewed from the bottom of the base, are as follows:

Pin Number	Connection	Description
1	IC	Internal Connection (Do not use as a tie point)
2	P	Plate
3	IC	Internal Connection (Do not use as a tie point)
4	H	Heater
5	H	Heater
6	K	Cathode
7	IC	Internal Connection (Do not use as a tie point)
8	IC	Internal Connection (Do not use as a tie point)
9	K	Cathode

A critical circuit design constraint is that socket terminals **1, 3, 7, and 8** are connected to internal structures of the tube and must **not** be used as tie points for any external circuit components. The cathode is accessible via both pin 6 and pin 9, which helps minimize lead inductance and distribute current.

Heater Characteristics and Family Variants

The heater of the 12CT3 is designed for either series or parallel operation, depending on the specific application and the published rating system used. Two distinct sets of heater specifications exist in manufacturer documentation:

- One specification lists a nominal heater voltage of **12.6 V** (AC or DC) at a current of **0.600 ± 0.040 A**.
- Another specification lists a nominal heater voltage of **6.3 V** (AC or DC) at a current of **0.5 A**.

Regardless of the voltage and current configuration, the average heater warm-up time is rated at **11 seconds**.

The 12CT3 is part of a larger family of damper tubes that differ only in their heater requirements. The table below summarizes the heater characteristics for the 12CT3 and its sister types:

Tube Type	Heater Voltage (AC/DC)	Heater Current	Average Warm-up Time
12CT3 (Option A)	12.6 V	0.600 ± 0.040 A	11 s
12CT3 (Option B)	6.3 V	0.5 A	11 s
<u>17CT3</u>	16.8 V	0.45 A	11 s
<u>25CT3</u>	25.3 V	0.3 A	11 s

Damper Service Ratings

When operated as a damper diode in a standard **525-line, 30-frame** television system, the 12CT3 must be operated within its design-maximum ratings. These limits are established to ensure reliable operation under the high-voltage pulse conditions typical of horizontal-deflection circuits.

Maximum Ratings (Design-Maximum Values)

- **Peak Inverse Plate Voltage: 5000 V.** This rating is subject to a strict pulse duration limit: the pulse duration must not exceed **15% of a horizontal scanning cycle** (equivalent to **10 microseconds** in a standard system).
- **Peak Plate Current: 1200 mA**
- **Average Plate Current: 250 mA**
- **Plate Dissipation: 4.75 W**
- **Maximum Bulb Temperature (Hottest Point): 220 °C**

Heater-Cathode Voltage Limits

Because the cathode of a damper tube experiences extremely high pulse voltages during horizontal retrace, the insulation between the heater and cathode is subjected to severe stress. The 12CT3 is rated to withstand the following heater-cathode potentials:

- **Peak Heater-Cathode Voltage:**
 - Heater positive with respect to cathode: **+300 V**
 - Heater negative with respect to cathode: **-5000 V**
- **Average Heater-Cathode Voltage:**
 - Heater positive with respect to cathode: **+100 V**
 - Heater negative with respect to cathode: **-900 V**

Electrical Characteristics and Capacitances

The internal structure of the 12CT3 is optimized for low forward voltage drop to maximize efficiency in damper service. Under instantaneous operating conditions, the tube exhibits a **voltage drop of 16 V** when conducting a plate current of **350 mA**.

Direct Interelectrode Capacitances

The approximate direct interelectrode capacitances of the tube, measured without an external shield, are:

- **Plate to Cathode and Heater: 12 pF**
- **Cathode to Plate and Heater: 9.5 pF**
- **Heater to Cathode: 2.8 pF**

These capacitances are critical parameters in horizontal-deflection circuit design, as they influence the tuning of the horizontal flyback pulse and the overall efficiency of the deflection system.

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

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Current	0.6	Published value from the filename-designated RCA datasheet block; multiple numbers on one row represent separate limits or heater arrangements.
Voltage (ac or dc) at 0.600 A – published value 1	0.6 V	Published value from the filename-designated RCA datasheet block; multiple numbers on one row represent separate limits or heater arrangements.
Voltage (ac or dc) at 0.600 A – published value 2	12.6 V	Published value from the filename-designated RCA datasheet block; multiple numbers on one row represent separate limits or heater arrangements.
Current – published value 1	0.6	Published value from the filename-designated RCA datasheet block; multiple numbers on one row represent separate limits or heater arrangements.
Current – published value 2	0.04	Published value from the filename-designated RCA datasheet block; multiple numbers on one row represent separate limits or heater arrangements.
Voltage (ac or dc) at 0.600 A – published value 1	0.6 V	Published value from the filename-designated RCA datasheet block; multiple numbers on one row represent separate limits or heater arrangements.
Voltage (ac or dc) at 0.600 A – published value 2	12.6 V	Published value from the filename-designated RCA datasheet block; multiple numbers on one row represent separate limits or heater arrangements.
Warm-up time (Average)	11	Published value from the filename-designated RCA datasheet block; multiple numbers on one row represent separate limits or heater arrangements.

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	Nominal heater rating
Heater current	600 mA	Nominal heater rating



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 {Average}	11 s	Other;PublishedValue1
Heater Warm-up Time {Average}	11 s	Other;PublishedValue2
Heater Warm-up Time {Average}	11 s	Other;PublishedValue3
Peak Inverse Plate Voltage*	5000 V	MaximumRating
Peak Plate Current	1200 mA	MaximumRating
Average Plate Current	250 mA	MaximumRating
Plate Dissipation	4.75 W	MaximumRating
Peak value	800 V	MaximumRating;PublishedValue1
Peak value	-5000 V	MaximumRating;PublishedValue2
Average value -(	-100 V	MaximumRating;PublishedValue1
Average value -(	-900 V	MaximumRating;PublishedValue2
Peak Inverse Plate Voltage	5000 V	Section1;Promoted
Peak Plate Current	1.2 A	Section1;Promoted

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to Cathode and Heater	12 pF	Capacitance
Cathode to Plate and Heater	9.5 pF	Capacitance

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater to Cathode	2.8 pF	Capacitance

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube Voltage Drop for plate current of	350 mA	Characteristic;PublishedValue1
Tube Voltage Drop for plate current of	16 mA	Characteristic;PublishedValue2

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