



ELECTRONIC TUBE REFERENCE

2CW4

Nuvistor Tubes (all numbers) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

TRIODE

High-mu Nuvistor triode used as a grounded-cathode neutralized VHF RF amplifier in television and FM tuners.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12AQ	BASE PINS	5
NOMINAL HEATER	2.1 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Triode	
PLATE RESISTANCE	5440 Ω
TRANSCONDUCTANCE	0.0125 S
AMPLIFICATION FACTOR	68
MAXIMUM PLATE VOLTAGE	110 V
MAXIMUM PLATE DISSIPATION	1.8 W
MAXIMUM CATHODE CURRENT	15 mA
<i>Electrical characteristics of 6CW4 except heater.</i>	

2CW4 — High-Mu Nuvistor VHF Amplifier Triode

Compact metal-shell triode for grounded-cathode, neutralized RF amplification in VHF television and FM receiver tuners, with a low-voltage 450 mA heater.

Overview

The **2CW4** is a **high-mu Nuvistor triode** designed for **grounded-cathode, neutralized radio-frequency amplification** in VHF tuners of color and black-and-white television receivers and FM receivers. RCA identifies it as electrically corresponding to the **6CW4** and **13CW4**, with different heater requirements. The 2CW4 uses a **2.1 V, 0.45 A heater**, distinguishing it from the 6.3 V and 13.5 V family members.

The RCA and Sylvania documents describe a small metal-shell receiving triode combining high amplification factor, relatively high transconductance, and low interelectrode capacitance. These properties support its explicitly specified use in high-frequency tuner input stages.

Construction and Heater

The 2CW4 uses **Nuvistor metal-shell construction** and a dedicated Nuvistor socket. Sylvania identifies a medium ceramic-wafer, five-contact Nuvistor arrangement with **12AQ basing** and a maximum overall height of approximately **0.800 inch**, seated height of **0.625 inch**, and diameter of **0.440 inch**.

Heater parameter	Value
Nominal voltage	2.1 V in RCA data
Rated current	0.450 A
Average warm-up time	8 seconds in RCA data
Calculated heater power	0.945 W
Heater supply	AC or DC
Maximum peak heater-cathode voltage	±100 V

The Sylvania family table rounds the heater voltage to **2.0 V**, whereas RCA's individual 2CW4 entry and family table specify **2.1 V at 450 mA**. The precise manufacturer's heater condition should be retained when comparing published data.

Intended RF Applications

RCA describes the CW4 family as **neutralized grounded-cathode VHF RF amplifiers** for **FM broadcast receivers, color television tuners, and black-and-white television tuners**.

The control grid receives the RF signal relative to the cathode, and the plate provides the amplified output. At VHF, feedback through grid-to-plate capacitance becomes an important design consideration; the specified neutralized configuration addresses unwanted coupling between input and output circuits.

The manufacturer sheets do not give a single universal tuner gain or frequency-response figure for all installations. Those depend on the tuned input and output networks and the circuit's neutralization.

Electrical Characteristics

RCA publishes two representative sets of Class A1 characteristics:

Parameter	Typical characteristics	Typical operation
Plate supply voltage	110 V	70 V
Cathode resistor	130 Ω	—
Grid resistor	—	47 k Ω
Plate current	7.0 mA	7.2 mA
Transconductance	9,800 μmhos	12,500 μmhos
Plate resistance	6,600 Ω	5,440 Ω
Amplification factor	65	68

The amplification factor and transconductance place the 2CW4 among high-mu, high-slope receiving triodes. The published values satisfy the approximate triode relationship $\mu = g_m \times r_p$: $0.0098 \text{ S} \times 6,600 \Omega \approx 65$, and $0.0125 \text{ S} \times 5,440 \Omega \approx 68$.

The RCA data also list approximately **−4 V** control-grid voltage for a plate current of **10 μ A** at the stated measurement condition. This is a characteristic test point, not a universal grid-cutoff voltage independent of the plate circuit.

Maximum Ratings and Manufacturer Differences

RCA gives the following **Class A1 design-maximum ratings**:

Parameter	RCA rating
Maximum plate voltage	135 V
Conditional maximum plate supply voltage	300 V
Maximum plate dissipation	1.5 W
Maximum cathode current	15 mA
Maximum negative grid voltage	55 V
Maximum peak positive grid voltage	0 V
Maximum fixed-bias grid-circuit resistance	0.5 MΩ
Maximum cathode-bias grid-circuit resistance	2.2 MΩ

The **300 V plate-supply** limit applies only with a sufficiently large plate-circuit resistor to keep dissipation within the specified limit at every operating condition; it is not an unrestricted 300 V plate-electrode rating.

Sylvania lists 1.0 W maximum plate dissipation in its family table, whereas RCA lists **1.5 W**. This is a genuine published rating difference that should be preserved rather than resolved by choosing the higher figure without qualification. RCA specifies operation at metal-shell temperatures up to **135°C** under its stated rating conditions.

Interelectrode Capacitances

RCA and Sylvania give approximate capacitances for the Nuvistor family:

Measurement	Value
Grid to plate	0.92 pF
Grid to cathode, heater, and shell	4.3 pF
Plate to cathode, heater, and shell	1.8 pF
Plate to cathode	0.18 pF

RCA gives **1.6 pF heater-to-cathode** capacitance, while Sylvania's shielded-capacitance table lists **1.3 pF**. Measurement context and manufacturer should be considered when using these values.

The grid-to-plate capacitance is especially relevant to the **neutralized amplifier** application. The published grouped input and output capacitances include the metal shell and other electrodes named in their measurement definitions.

Related Types and Heater Selection

Tube	Heater voltage	Heater current
2CW4	2.1 V	0.450 A
6CW4	6.3 V	0.135 A
13CW4	13.5 V	0.060 A

RCA explicitly identifies these as related high- μ Nuvistor triodes with different heater ratings. Their signal-electrode characteristics may correspond, but the heater supplies are not interchangeable without circuit changes.

Technical Summary

The **2CW4** is a **2.1 V / 450 mA high- μ Nuvistor triode** for **neutralized grounded-cathode VHF RF amplification** in **television and FM tuners**. Its typical amplification factor is **65–68**, transconductance

9.8-12.5 mA/V, plate resistance **5.44-6.6 kΩ**, and plate current approximately **7 mA** at the documented operating points.

The compact metal-shell Nuvistor construction, small interelectrode capacitances, and specialized tuner application distinguish it from ordinary audio-frequency receiving triodes. Its manufacturer-specific maximum plate-dissipation ratings require attention, and its heater specification distinguishes it from the 6CW4 and 13CW4.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1971 RCA HB3 Binder 4 of 7

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

1971 RCA HB3 BINDER 4 OF 7

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	2.1 V	—
Heater current	450 mA	—
Heater warm-up time	8 s	—
Plate voltage	70 V	ClassA
Plate current	8 mA	ClassA
Maximum plate voltage	110 V	—
Maximum plate dissipation	1.8 W	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	5440 ohm	ClassA
Transconductance	12500 uS	ClassA
Amplification factor	68	ClassA

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	VHF Nuvistor amplifier	—

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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Warm-up Time (Average)	8 s	Other
Peak Heater-Cathode Voltage	100 V	Other;PublishedValue1
Peak Heater-Cathode Voltage	100 V	Other;PublishedValue2
Peak Heater-Cathode Voltage	100 V	Other;PublishedValue3
Plate Supply Voltage	300 V	MaximumRating
Plate Voltage	135 V	MaximumRating
Negative-bias value	55 V	MaximumRating
Peak positive value	0 V	MaximumRating
Cathode Current	15 mA	MaximumRating
Plate Dissipation	1.5 W	MaximumRating
Plate Supply Voltage	110 V	TypicalOperation;PublishedValue1
Plate Supply Voltage	70 V	TypicalOperation;PublishedValue2
Cathode-Bias Resistor	130 V	TypicalOperation;PublishedValue1
Cathode-Bias Resistor	0 V	TypicalOperation;PublishedValue2
Grid Resistor –	4 ohm	TypicalOperation;PublishedValue1
Grid Resistor –	0 ohm	TypicalOperation;PublishedValue2
Plate Resistance (Approx.)	6600 ohm	TypicalOperation;PublishedValue1
Plate Resistance (Approx.)	5440 ohm	TypicalOperation;PublishedValue2
Plate Current	7 mA	TypicalOperation;PublishedValue1
Plate Current	7.2 mA	TypicalOperation;PublishedValue2
Grid Voltage (Approx,) for plate current of	10 V	TypicalOperation;PublishedValue1
Grid Voltage (Approx,) for plate current of	-4 V	TypicalOperation;PublishedValue2
For fixed-bias operation	0.5 megohm	MaximumCircuitValue

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
For cathode-bias operation	2.2 megohm	MaximumCircuitValue
* A plate supply voltage of	300 V	MaximumCircuitValue
in the plate circuit to limit the plate dissipation to	1.5 W	MaximumCircuitValue
PLATE	92 V	MaximumCircuitValue;PublishedValue1
PLATE	524 V	MaximumCircuitValue;PublishedValue2
Maximum Plate Voltage	135 V	Section1
Maximum Plate Dissipation	1.5 W	Section1
Maximum Cathode Current	15 mA	Section1

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid to Plate	0.92 pF	Capacitance
Grid to Cathode. Heater, and Shell	4.3 pF	Capacitance
Plate to Cathode, Heater, and Shell	1.8 pF	Capacitance
Plate to Cathode	0.18 pF	Capacitance
Heater to Cathode	1.6 pF	Capacitance

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Resistance	6600 ohm	Section1
Transconductance	9800 uS	Section1
Amplification Factor	65	Section1

TUBE TINKER

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