

ELECTRONIC TUBE REFERENCE

12GJ5A

Power - TV Horizontal Output (sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
BEAMPOWER

Improved beam-power tube for high-efficiency television horizontal-deflection output, combining 17.5 W plate dissipation with low feedback capacitance and high pulse-voltage capability.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9QK	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

9QK - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1	–	G2 – Screen Grid	CONNECTED
PIN2	–	G1 – Control Grid	CONNECTED
PIN3	–	G3 – Suppressor Grid	CONNECTED
PIN3	–	K – Cathode	CONNECTED
PIN4	–	H – Heater	CONNECTED
PIN5	–	H – Heater	CONNECTED
PIN6	–	G1 – Control Grid	CONNECTED
PIN7	–	G2 – Screen Grid	CONNECTED
PIN9	–	–	IC
CAP1	A	P – Plate (Anode)	CONNECTED

SECTION RATINGS

SECTION1 Beam Power	
PLATE RESISTANCE	15000 Ω
TRANSCONDUCTANCE	0.0071 S
AMPLIFICATION FACTOR	4.4
MAXIMUM PLATE VOLTAGE	770 V
MAXIMUM SCREEN VOLTAGE	220 V
MAXIMUM PLATE DISSIPATION	17.5 W
MAXIMUM SCREEN DISSIPATION	3.5 W
MAXIMUM CATHODE CURRENT	550 mA
<i>Published ratings and characteristics extracted from the approved source. Pulse-only ratings are retained as parameter rows rather than substituted for continuous ratings.</i>	

12GJ5A — Beam Power Pentode

The **12GJ5A** is a Novar-type beam power pentode designed primarily for use as a high-efficiency horizontal-deflection-amplifier tube in television receivers. It is characterized by its high peak plate current capabilities, robust pulse voltage ratings, and a specialized Novar 9-pin construction. The 12GJ5A is electrically identical to the [6GJ5A](#) and [17GJ5A](#), differing only in its heater ratings.

Construction, Physical Dimensions, and Basing

The 12GJ5A features a Novar T-12 glass envelope and utilizes a Novar Button 9-pin base (designated as E9-88), which includes an exhaust tip on the base. This construction requires a standard Novar 9-contact socket. The tube also incorporates a top cap connection (compatible with C1-2, C1-3, or C1-33 connectors) for the high-voltage plate terminal, minimizing the risk of arcing.

The physical dimensions of the 12GJ5A are as follows:

- **Maximum Diameter:** 1.562 inches
- **Maximum Seated Height:** 3.125 inches
- **Maximum Overall Height:** 3.505 inches

The 12GJ5A, along with its sister types [6GJ5A](#) and [17GJ5A](#), is identical to the older [12GJ5](#), [6GJ5](#), and [17GJ5](#) families, except for the base configuration (which features the exhaust tip at the bottom) and a shorter bulb design.

The tube uses the **9QK** basing arrangement, which provides the following pin connections (viewed from the bottom of the base):

- **Pin 1:** Grid No. 3 (Beam Plates)
- **Pin 2:** Grid No. 1
- **Pin 3:** Grid No. 2 (Screen Grid)

- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Grid No. 1
- **Pin 7:** Grid No. 2
- **Pin 8:** Internal Connection (Do Not Use)
- **Pin 9:** Internal Connection (Do Not Use)
- **Top Cap:** Plate

Heater and Cathode Characteristics

The 12GJ5A is designed with an indirectly heated, unipotential cathode. The heater is designed for series-string television receiver applications, featuring a controlled warm-up time to ensure reliable operation when connected in series with other tubes.

Parameter	Value
Heater Voltage (AC/DC)	12.6 V
Heater Current	0.6 A
Average Heater Warm-up Time	11 seconds
Maximum Peak Heater-Cathode Voltage	± 200 V
Maximum Average Heater-Cathode Voltage	100 V

For comparison, the [6GJ5A](#) utilizes a 6.3 V, 1.2 A heater, while the [17GJ5A](#) utilizes a 16.8 V, 0.45 A heater. All other electrical and physical characteristics remain identical across these three designations.

Direct Interelectrode Capacitances

The approximate direct interelectrode capacitances of the 12GJ5A, measured without an external shield, are:

- **Grid No. 1 to Plate:** 0.26 pF
- **Grid No. 1 to Cathode, Heater, Grid No. 2, and Grid No. 3:** 15 pF
- **Plate to Cathode, Heater, Grid No. 2, and Grid No. 3:** 6.5 pF

Class A1 Amplifier Characteristics

The 12GJ5A can be operated as a Class A1 amplifier in either a triode-connected or pentode-connected configuration. The typical operating characteristics under these conditions are detailed below:

Triode Connection

In this configuration, Grid No. 2 is connected to the plate:

- **Plate Voltage:** 150 V
- **Grid-No. 2 Voltage:** 150 V
- **Grid-No. 1 Voltage:** -22.5 V
- **Amplification Factor (Mu-Factor, Grid No. 2 to Grid No. 1):** 4.4

Pentode Connection

Under pentode operation, the tube exhibits the following characteristics at two distinct operating points:

Parameter	Operating Point A	Operating Point B
Plate Voltage	60 V	250 V
Grid-No. 2 Voltage	150 V	150 V
Grid-No. 1 Voltage	0 V	-22.5 V
Plate Resistance (Approx.)	—	15,000 Ω
Transconductance	—	7,100 μmhos
Plate Current	390 mA*	70 mA
Grid-No. 2 Current	32 mA*	2.1 mA
Grid-No. 1 Voltage for Plate Current of 1 mA	—	-42 V

Horizontal-Deflection Amplifier Service and Ratings

The primary application of the 12GJ5A is within the horizontal-deflection-amplifier stage of television receivers operating under a standard 525-line, 30-frame scanning system. Due to the demanding nature of this service, which involves high-voltage flyback pulses and significant current swings, the tube is rated under the Design-Maximum System with strict limits.

Maximum Ratings (Design-Maximum Values)

- **DC Plate Supply Voltage:** 770 V
- **Peak Positive-Pulse Plate Voltage:** 6,500 V (The pulse duration must not exceed 15% of a horizontal scanning cycle, equivalent to 10 microseconds)
- **Peak Negative-Pulse Plate Voltage:** 1,500 V
- **DC Grid-No. 2 (Screen Grid) Voltage:** 220 V
- **DC Grid-No. 1 (Control Grid) Voltage:** -55 V
- **Peak Negative-Pulse Grid-No. 1 Voltage:** 330 V
- **Peak Cathode Current:** 550 mA
- **Average Cathode Current:** 175 mA
- **Plate Dissipation:** 17.5 W

- **Grid-No. 2 Input:** 3.5 W
- **Maximum Bulb Temperature (at hottest point):** 248 °C

Maximum Circuit Values

- **Grid-No. 1-Circuit Resistance (for grid-resistor-bias operation):** 1.0 megohm

To protect the tube from excessive dissipation in the event of a loss of excitation, a cathode bias resistor or other protective means must be employed in the circuit.

Average Characteristics and Related Designations

For the average characteristic curves of the 12GJ5A, reference is made to the curves of the **6GW6** beam power tube, which shares similar plate and grid characteristics.

The 12GJ5A is part of a family of identical tubes that includes the **6GJ5A** and **17GJ5A**. These three types differ solely in their heater configurations to accommodate different power supply designs (such as parallel 6.3 V transformer supplies or series-string heater circuits). They represent an updated design over the original **12GJ5**, **6GJ5**, and **17GJ5** types, featuring a more compact bulb and a modified Novar base with the exhaust tip located on the bottom.

Technical Summary

The **12GJ5A** is a high-performance **Novar beam power pentode** designed for **horizontal-deflection-amplifier service** in television receivers. Operating with a **12.6 V, 0.6 A heater** with an average **11-second warm-up time**, it is optimized for series-string heater circuits. The tube features a **Novar T-12 envelope**, a **9-pin E9-88 base with an exhaust tip**, and a **top cap plate connection**.

In horizontal-deflection service, it supports a **peak positive-pulse plate voltage of 6,500 V** and a **peak cathode current of 550 mA**, with a maximum **plate dissipation of 17.5 W**. Under typical Class A1 pentode conditions, it provides a transconductance of **7,100 μ mhos** and a plate resistance of approximately **15,000 Ω** . The 12GJ5A offers a compact, high-efficiency solution for television deflection circuits, combining robust pulse capabilities with reliable series-string heater performance.

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 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
For fixed-bias operation 2.2	2.2 MΩ	Published in approved 17GJ5A target datasheet entry; Section1
For cathode-bias operation 2.2	2.2 MΩ	Published in approved 17GJ5A target datasheet entry; Section1
DC Plate Supply Voltage	770 V	Published in approved 17GJ5A target datasheet entry; Section1
Peak Positive-Pulse Plate Voltage*	6500 V	Published in approved 17GJ5A target datasheet entry; Section1
Peak Negative-Pulse Plate Voltage	1500 V	Published in approved 17GJ5A target datasheet entry; Section1
DC Grid-No.2 Voltage	220 V	Published in approved 17GJ5A target datasheet entry; Section1
DC Grid-No.1 Voltage	-55 V	Published in approved 17GJ5A target datasheet entry; Section1
Peak Negative-Pulse Grid-No.1 Voltage	330 V	Published in approved 17GJ5A target datasheet entry; Section1
Peak Cathode Current	550 mA	Published in approved 17GJ5A target datasheet entry; Section1
Average Cathode Current	175 mA	Published in approved 17GJ5A target datasheet entry; Section1
Plate Dissipation*	17.5 W	Published in approved 17GJ5A target datasheet entry; Section1
Grid-No.2 Input	3.5 W	Published in approved 17GJ5A target datasheet entry; Section1
For grid-resistor-bias operation*	1 MΩ	Published in approved 17GJ5A target datasheet entry; Section1
# Pulse duration must not exceed 15% of a horizontal scanning cycle (	10 microseconds	Published in approved 17GJ5A target datasheet entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Current 4.1 5.6 6.3	8 V	Published in approved 17GJ5A target datasheet entry; Section1
Peak Heater-Cathode 0.6 0.45 0.41	300 mA	Published in approved 17GJ5A target datasheet entry; Section1
Plate-Supply Voltage 600	600 V	Published in approved 17GJ5A target datasheet entry; Section1
DC Plate Voltage 140	275 V	Published in approved 17GJ5A target datasheet entry; Section1
Grid-No.2 (Screen-Grid) Supply Voltage	600 V	Published in approved 17GJ5A target datasheet entry; Section1
DC Grid-No.2 Voltage	275 V	Published in approved 17GJ5A target datasheet entry; Section1
DC Grid-No.1 (Control-Grid) Voltage	-50 V	Published in approved 17GJ5A target datasheet entry; Section1
Cathode Current 22	20 mA	Published in approved 17GJ5A target datasheet entry; Section1
Plate Dissipation 1.8	2.4 W	Published in approved 17GJ5A target datasheet entry; Section1
Grid-No.2 Input*	0.55 W	Published in approved 17GJ5A target datasheet entry; Section1
DC Plate Voltage 100	170 V	Published in approved 17GJ5A target datasheet entry; Section1
DC Grid-No.2 Voltage	120 V	Published in approved 17GJ5A target datasheet entry; Section1
DC Grid-No.1 Voltage -3	-1.2 V	Published in approved 17GJ5A target datasheet entry; Section1
voltage to	100 V	Published in approved 17GJ5A target datasheet entry; Section1
receivers to	50 V	Published in approved 17GJ5A target datasheet entry; Section1

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Voltage (ac/dc) 6.3 12.6	16.8 V	Published in approved 17GJ5A target datasheet entry; Section1
Heater Current 1.2 0.6	450 mA	Published in approved 17GJ5A target datasheet entry; Section1
Heater Warm-up Time (Average) 11	11 seconds	Published in approved 17GJ5A target datasheet entry; Section1

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.26 pF	Published in approved 17GJ5A target datasheet entry; Section1
Plate Voltage 150 60	250 V	Published in approved 17GJ5A target datasheet entry; Section1
Grid-No.2 Voltage 150 150	150 V	Published in approved 17GJ5A target datasheet entry; Section1
Grid-No.1 Voltage -22.5 0	-22.5 V	Published in approved 17GJ5A target datasheet entry; Section1
Plate Resistance (Approx.)	15000 Ω	Published in approved 17GJ5A target datasheet entry; Section1
Transconductance	7100 μS	Published in approved 17GJ5A target datasheet entry; Section1
390"	70 mA	Published in approved 17GJ5A target datasheet entry; Section1
Grid-No.1 Voltage for plate current of	1 mA	Published in approved 17GJ5A target datasheet entry; Section1
Grid-No.1 Voltage for plate current of 1 mA	-42 V	Published in approved 17GJ5A target datasheet entry; Section1
Plate Resistance (Approx.)	0.35 MΩ	Published in approved 17GJ5A target datasheet entry; Section1
Plate Current 15	10 mA	Published in approved 17GJ5A target datasheet entry; Section1
Grid-No.2 Current	3 mA	Published in approved 17GJ5A target datasheet entry; Section1
For fixed-bias operation 0.5	1 MΩ	Published in approved 17GJ5A target datasheet entry; Section1
For cathode-bias operation 0.5	2.2 MΩ	Published in approved 17GJ5A target datasheet entry; Section1

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to Cathode, Heater, Grid No.2, and Grid No.3	6.5 pF	Published in approved 17GJ5A target datasheet entry; Section1

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