

ELECTRONIC TUBE REFERENCE

10BQ5

Power - Pentode (NOT beam) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
PENTODE

Miniature audio-output power pentode electrically equivalent to 6BQ5/EL84 except for heater rating. Designed for the output stage of audio-frequency amplifiers, it provides substantial power from compact nine-pin construction.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9CV	BASE PINS	9
NOMINAL HEATER	10.5 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

9CV - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1 – IC	–	–	IC
PIN2 – G1	A	G1 – Control Grid	CONNECTED
PIN3 – G3	A	G3 – Suppressor Grid	CONNECTED
PIN3 – K	A	K – Cathode	CONNECTED
PIN4 – H	–	H – Heater	CONNECTED
PIN5 – H	–	H – Heater	CONNECTED
PIN6 – IC	–	–	IC
PIN7 – P	A	P – Plate (Anode)	CONNECTED
PIN8 – IC	–	–	IC
PIN9 – G2	A	G2 – Screen Grid	CONNECTED

SECTION RATINGS

SECTION1 Pentode	
PLATE RESISTANCE	38000 Ω
TRANSCONDUCTANCE	0.0113 S
MAXIMUM PLATE VOLTAGE	300 V
MAXIMUM SCREEN VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	12 W
MAXIMUM SCREEN DISSIPATION	2 W
MAXIMUM CATHODE CURRENT	65 mA
<i>Promoted ratings and representative Class A characteristics; additional operating modes retained as parameters.</i>	

10BQ5 — Miniature Audio Output Pentode

An indirectly heated, nine-pin power pentode for medium-power high-fidelity audio amplification, including single-ended Class A, push-pull Class AB and Class B, and triode-connected output stages.

Overview

The **10BQ5** is a miniature **audio-frequency power output pentode** intended for the output stage of audio amplifiers. Tung-Sol describes its role in medium-power high-fidelity amplifiers and documents **5.7 W single-ended** output and **17 W push-pull Class AB** output at the stated operating conditions. RCA and Sylvania publish corresponding amplifier examples and identify the **6BQ5/EL84**, **8BQ5**, and **10BQ5** as electrically related versions with different heater requirements.

Unlike a small-signal voltage-amplifier pentode, the 10BQ5 is designed to deliver appreciable audio power into an output-transformer load. Its operating data include plate and screen-grid dissipation limits, high transconductance, plate-load resistance, screen current, harmonic distortion, and output power. The manufacturer's examples cover conventional pentode operation and operation with the screen grid connected to the plate to obtain triode characteristics.

Construction, Heater, and Base

The tube has a **coated, indirectly heated unipotential cathode**, a control grid (grid No. 1), a screen grid (grid No. 2), a suppressor grid (grid No. 3), and a plate. It is housed in a miniature glass envelope with a **nine-pin button base**. Tung-Sol identifies **E9-1** base construction, **9CV** basing, and a JEDEC miniature outline; Sylvania gives a T-6½ miniature envelope and permits **any mounting position**.

Heater property	Published value
Nominal heater voltage	10.6 V
Nominal heater current	0.45 A (450 mA)

Heater property	Published value
Heater warm-up time	11 seconds
Calculated heater power	4.77 W
Heater supply	AC or DC
Maximum heater-to-cathode voltage	100 V under the stated ratings

The heater specification distinguishes the 10BQ5 from its 6.3 V and 8 V relatives. The 11-second warm-up figure is particularly relevant to equipment using coordinated heater warm-up behavior. Tung-Sol expressly notes that the 10BQ5 is otherwise identical to the [6BQ5](#) apart from heater characteristics and heater warm-up time; RCA likewise groups these output pentodes as corresponding electrical types differing in heater ratings.

Sylvania lists maximum dimensions of approximately **0.875 inch diameter**, **2.812 inches seated height**, and **3.062 inches overall height** for the family.

Electrical Ratings

The published conventional pentode ratings use a **design-center rating system**. The limits must not be treated as a license to operate all electrodes at their individual maxima simultaneously.

Characteristic	Rating
Maximum plate voltage	300 V
Maximum screen-grid voltage	300 V
Maximum plate dissipation	12 W
Maximum screen-grid dissipation	2 W
Maximum cathode current	65 mA
Maximum negative control-grid voltage	100 V
Maximum control-grid circuit resistance, cathode bias	1 MΩ
Maximum control-grid circuit resistance, fixed bias	0.3 MΩ

Tung-Sol also lists **550 V** maximum plate and screen voltages **without current**, which are not ordinary loaded operating-voltage ratings, and a **4 W peak screen-dissipation** limit. It gives a maximum grid-current starting-point condition of approximately **−1.3 V** at **0.3 μA** control-grid current.

The Tung-Sol sheet adds a specific restriction when heater and positive voltages are obtained from a storage battery using a vibrator supply: maximum plate and screen voltages become **250 V** and maximum

plate dissipation **9 W**. This is a special supply-condition rating, not a replacement for the general ratings in other circuits.

Typical Single-Ended Class A Pentode Operation

In a single-ended output stage, one 10BQ5 drives the primary of an output transformer. The control grid receives the audio signal, the cathode resistor establishes operating bias, and the screen grid receives its specified DC supply.

RCA documents the following representative **Class A1** operating condition:

Characteristic	Value
Plate voltage	250 V
Screen-grid voltage	250 V
Control-grid bias	−7.3 V
Zero-signal plate current	48 mA
Maximum-signal plate current	50.6 mA
Zero-signal screen current	5.5 mA
Maximum-signal screen current	10 mA
Plate resistance	Approximately 38 kΩ
Transconductance	11,300 μmhos (11.3 mA/V)
Effective plate load	4,500 Ω
Maximum-signal audio power	5.7 W
Total harmonic distortion	10%

Tung-Sol also publishes a **250 V plate / 250 V screen** Class A condition using a **135 Ω cathode resistor** and a **5,200 Ω** load, with 48 mA zero-signal plate current. Its tables show that changes in output-transformer load, cathode bias, and screen voltage alter the available output and harmonic distribution.

For example, its single-ended tables include a **7,000 Ω** load with lower screen voltage or changed bias, producing approximately **4–5.6 W** depending on the specified signal condition. This illustrates why the 5.7 W figure is a particular rated operating example, not a guaranteed output at every supply voltage and load.

The reported transconductance is comparatively high for an audio output stage, allowing significant plate-current modulation from a relatively modest grid-voltage swing. The plate resistance is considerably greater than the recommended output load because the output transformer establishes the effective AC load under the specified conditions.

Push-Pull Class AB Audio Amplification

A major application of the 10BQ5 is a **two-tube push-pull Class AB1 amplifier**. The two output tubes operate into opposite halves of an output-transformer primary, with the effective load specified from **plate to plate**.

RCA and Tung-Sol provide two representative operating conditions:

Characteristic	250 V supply	300 V supply
Plate supply voltage	250 V	300 V
Screen-grid supply voltage	250 V	300 V
Common cathode-bias resistor	130 Ω	130 Ω
Plate-to-plate load	8,000 Ω	8,000 Ω
Zero-signal plate current, both tubes	62 mA	72 mA
Maximum-signal plate current, both tubes	75 mA	92 mA
Zero-signal screen current, both tubes	7 mA	8 mA
Maximum-signal screen current, both tubes	15 mA	22 mA
Maximum-signal output	11 W	17 W
Total harmonic distortion	3%	4%

These figures are published operating examples **without a feedback-dependent reduction of distortion**. Tung-Sol specifically characterizes the 17 W Class AB push-pull result as approximately 4% distortion without feedback.

The data also illustrate the importance of screen-grid current under signal drive. Screen current rises substantially at maximum output, so screen supply arrangements and dissipation must be evaluated alongside plate current and plate dissipation.

The **8,000 Ω** specification refers to the full plate-to-plate output-transformer load, not an 8,000 Ω resistor connected independently to each plate.

Class B Push-Pull Operation

Tung-Sol also includes **Class B, two-tube** operating data, with fixed control-grid bias. Representative cases use **250 V** or **300 V** plate and screen supplies and an **8,000 Ω plate-to-plate load**.

The corresponding published grid-bias values are approximately **−11.6 V** and **−14.7 V**, with audio power outputs of **11 W** and **17 W** at approximately **3%** and **4%** total harmonic distortion, respectively.

Although the maximum output figures resemble the Class AB examples, the bias method and idle currents differ. The operating class, bias, and load conditions must therefore be preserved when using the published values in amplifier design.

Triode-Connected Operation

The 10BQ5 may be operated with **grid No. 2 connected to the plate**, converting the pentode electrode arrangement into a triode-connected output stage. This is an explicitly documented application, not a claim that the tube is internally constructed as a triode.

Sylvania and Tung-Sol give a single-tube Class A triode-connected example:

Characteristic	Value
Plate voltage	250 V
Cathode resistor	270 Ω
Effective plate load	Approximately 3.5 k Ω
Zero-signal plate current	34 mA
Audio input voltage	6.7 V RMS
Maximum-signal plate current	36 mA
Maximum-signal power output	1.95 W
Total harmonic distortion	9%

In triode connection the effective electrical characteristics differ substantially from conventional pentode operation, including the relationship between plate current, plate voltage, and control-grid voltage. The manufacturer curves separately document this connection.

For **two triode-connected tubes in Class AB push-pull**, Tung-Sol and Sylvania specify a **10,000 Ω plate-to-plate load** and a **270 Ω common cathode resistor**. Their examples produce approximately **3.4 W at 250 V** and **5.2 W at 300 V**, with approximately **2.5% total harmonic distortion** under the published conditions.

The choice between conventional pentode and triode-connected operation is therefore a substantial circuit-design decision affecting output power, drive, loading, and distortion.

Ultra-Linear Output Operation

Sylvania additionally documents a **Class AB1 ultra-linear connection** for the family. Its example uses **300 V plate voltage**, a **270 Ω cathode resistor per tube**, an **8,000 Ω plate-to-plate load**, and reports approximately **11 W output**.

Ultra-linear operation is distinct from both ordinary pentode connection and direct triode connection. The manufacturer presents it as another output-stage operating arrangement, rather than as a different physical tube type.

Interelectrode Capacitance

The manufacturers give approximate direct interelectrode capacitances:

Measurement	Value
Control grid to plate	0.5 pF maximum
Input capacitance	10.8 pF
Output capacitance	6.5 pF
Control grid to heater	0.25 pF maximum

These values are relevant to amplifier input loading, high-frequency stability, feedback paths, and the relationship between the output-stage wiring and its driving stage. The published input and output capacitances include the electrode groupings specified in the manufacturer sheets and should not be confused with isolated two-electrode measurements.

Plate Curves, Distortion, and Output-Stage Design

The extended Tung-Sol sheets include characteristic curves for plate current versus plate voltage, control-grid bias, screen-voltage conditions, triode-connected operation, and the relationships among input drive, plate current, screen current, output power, and harmonic distortion.

These curves complement the fixed operating tables. They show why output power cannot be separated from supply voltage, grid drive, effective transformer load, and the rise in screen current at large signal amplitudes.

Tung-Sol provides separate plots for conventional single-ended Class A, Class B push-pull, Class AB push-pull, and triode-connected circuits. They are useful for interpreting how different operating choices change current demand and harmonic behavior. The numerical values quoted here are taken from the manufacturers' printed tables rather than estimated from imperfect OCR of the curves.

Relationship to 6BQ5 / EL84 and 8BQ5

RCA explicitly identifies the **10BQ5**, **8BQ5**, and **6BQ5/EL84** as corresponding power pentodes with different heater ratings:

Type	Heater voltage	Heater current
<u>6BQ5</u> / <u>EL84</u>	6.3 V	0.76 A
<u>8BQ5</u>	8.0 V	0.60 A

Type	Heater voltage	Heater current
10BQ5	10.6 V	0.45 A

The different heater ratings are essential when selecting a tube for a particular amplifier power supply or series-heater arrangement. Similarity in audio operating characteristics does **not** permit substitution without ensuring that the heater supply is appropriate.

The 10BQ5's **11-second heater warm-up** characteristic is specifically noted in the Tung-Sol and RCA data. This reinforces the importance of heater behavior when comparing the family members.

Technical Summary

The **10BQ5** is a **miniature nine-pin, indirectly heated audio power pentode** with a **10.6 V / 0.45 A heater, 9CV basing, 12 W maximum plate dissipation, and 2 W maximum screen dissipation** under its published design-center rating system. It is documented for **single-ended Class A audio output, two-tube Class AB and Class B push-pull output, triode-connected amplification, and ultra-linear operation.**

Its representative audio performance ranges from **5.7 W single-ended pentode output** to **17 W Class AB push-pull output**, while triode-connected examples produce lower output power at their respective stated conditions. The tube is closely related electrically to the [6BQ5/EL84](#) and [8BQ5](#), but differs in heater voltage, current, and warm-up requirements.

The manufacturer's published ratings, characteristic curves, output-transformer load requirements, control-grid bias arrangements, screen-current behavior, and harmonic-distortion data collectively define the 10BQ5 as a versatile medium-power high-fidelity audio output valve.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

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

1961 TUNG SOL

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	250 V	ClassA
Screen Voltage	250 V	ClassA



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 2 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 2 OF 4

Section 1 · Pentode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA;OneTube
Grid 2 voltage	250 V	ClassA;OneTube
Plate current	48 mA	ClassA;OneTube
Grid 2 current	5.5 mA	ClassA;OneTube
Load resistance	5000 ohm	ClassA;OneTube
Maximum signal power output	5.7 W	ClassA;OneTube
Class B power output	11 W	ClassB;TwoTubes
Class AB power output	17 W	ClassAB;PushPull;TwoTubes
Triode connection power output	1.95 W	ClassA;TriodeConnection;OneTube

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Triode connection push-pull power output	5.2 W	ClassAB;PushPull;TriodeConnection;TwoTubes
Maximum no-current plate voltage	550 V	WholeTube
Maximum no-current grid 2 voltage	550 V	WholeTube

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Transconductance alternate operating point	10400 μ S	ClassA;OneTube
Heater warm-up time	11 s	WholeTube



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 · Pentode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	125 volts	Published value from supplied target entry
Grid-No	125 volts	Published value from supplied target entry
Plate Resistance (Approx.)	0.2 megohm	Published value from supplied target entry
Transconductance	13000	Published value from supplied target entry
Plate Current	11 mA	Published value from supplied target entry
Grid-No	3.8 mA	Published value from supplied target entry
Grid-No.1 Voltage (Approx.) for plate current of	3 volts	Published value from supplied target entry
Grid-No.1-Circuit Resistance, for cathode-bias operation	0.25 megohm	Published value from supplied target entry
Heater Voltage (ac/dc)	10.6 volts	Published value from supplied target entry
Heater Current	0.45 ampere	Published value from supplied target entry

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater Warm-up Time (Average)	11 seconds	Published value from supplied target entry
Plate Voltage	300 volts	Published value from supplied target entry
Grid-No	300 volts	Published value from supplied target entry
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0 volts	Published value from supplied target entry
Cathode Current	65 mA	Published value from supplied target entry
Plate Dissipation	12 watts	Published value from supplied target entry
Grid No	2 watts	Published value from supplied target entry
Plate Voltage	250 volts	Published value from supplied target entry
Grid-No	250 volts	Published value from supplied target entry
Grid-No	-7.3 volts	Published value from supplied target entry
Peak AF Grid No.1 Voltage	6.2 volts	Published value from supplied target entry
Zero-Signal Plate Current	48 mA	Published value from supplied target entry
Zero-Signal Grid-No	5.5 mA	Published value from supplied target entry
Plate Resistance (Approx.)	38000 ohms	Published value from supplied target entry
Transconductance	11300	Published value from supplied target entry
Load Resistance	4500 ohms	Published value from supplied target entry
Plate Supply Voltage	300 volts	Published value from supplied target entry
Peak AF Grid-No.1-to-Grid-No.1 Voltage	28.3 volts	Published value from supplied target entry
Zero-Signal Plate Current	72 mA	Published value from supplied target entry
Zero-Signal Grid-No	8 mA	Published value from supplied target entry
Effective Load Resistance (Plate-to-plate)	8000 ohms	Published value from supplied target entry
Grid-No	1	Published value from supplied target entry
Heater Voltage (ac/dc)	25 volts	Published value from supplied target entry
Heater Current	0.3 ampere	Published value from supplied target entry

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to Cathode, Heater, Grid No	6.5 pF	Published value from supplied target entry
Plate to Cathode, Heater, Grid No	7 PF	Published value from supplied target entry

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum- Sign a I Plate Current	50.6 mA	Published value from supplied target entry
Maximum -Signal Grid-No	10 mA	Published value from supplied target entry
Maximum-Signal Plate Current	92 mA	Published value from supplied target entry
Maximum-Signal Grid-No	22 mA	Published value from supplied target entry
Maximum-Signal Power Output	17 watts	Published value from supplied target entry

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