

ELECTRONIC TUBE REFERENCE

12FQ8

Voltage - Dual Triode (similar high frequency) electronic tube

CONSOLIDATED TECHNICAL DATA
2 SECTIONS
CONSTRUCTION
TRIODE-TRIODE

Twin triode intended for high-frequency receiving applications, particularly television tuner oscillator, mixer, and RF functions where compact dual-triode construction is advantageous.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9KT	BASE PINS	9
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Common cathode	SECTION CONSTRUCTION	Similar

9KT - TERMINAL PINOUT

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

SECTION RATINGS

SECTION1 Triode	
PLATE RESISTANCE	76000 Ω
TRANSCONDUCTANCE	0.00125 S
AMPLIFICATION FACTOR	95
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	0.5 W
MAXIMUM CATHODE CURRENT	5 mA
<i>Representative identical-triode row</i>	

SECTION2 Triode	
PLATE RESISTANCE	76000 Ω
TRANSCONDUCTANCE	0.00125 S
AMPLIFICATION FACTOR	95
MAXIMUM PLATE VOLTAGE	330 V
MAXIMUM PLATE DISSIPATION	0.5 W
MAXIMUM CATHODE CURRENT	5 mA
<i>Physical triode row restored under current one-row-per-physical-section policy.</i>	

12FQ8 — High-Mu Twin Double-Plate Triode

The **12FQ8** is a miniature, nine-pin twin double-plate triode designed primarily for use in frequency-divider and complex-wave-generator circuits of electronic musical instruments. It features a unique internal construction where each of its two independent triode sections contains a single control grid and two separate plates, all sharing a common cathode.

Mechanical Design and Pinout

The 12FQ8 is constructed in a T-6 1/2 glass envelope with a small-button Noval 9-pin base (JEDEC No. E9-1). The tube is designed to operate in any mounting position.

Physical Dimensions

- **Maximum Overall Length:** 2-3/16 inches
- **Maximum Seated Length:** 1-15/16 inches
- **Length from Base Seat to Bulb Top (excluding tip):** 1-9/16 inches +/- 3/32 inch
- **Diameter Range:** 0.750 to 0.875 inches

Pin Connections (9KT Basing Diagram)

The pinout configuration, viewed from the bottom of the tube, is as follows:

Pin	Connection
1	Plate B of Unit 2
2	Grid of Unit 2
3	Plate A of Unit 2
4	Heater
5	Heater
6	Plate B of Unit 1
7	Grid of Unit 1
8	Plate A of Unit 1
9	Cathode (Common to both units)

Heater Requirements

The 12FQ8 utilizes a coated unipotential cathode. The heater is designed for operation from either an AC or DC supply.

- **Nominal Heater Voltage:** 12.6 V
- **Allowable Heater Voltage Range:** 11.3 to 13.9 V (representing a +/-10% tolerance)
- **Nominal Heater Current:** 0.15 A (150 mA)
- **Calculated Heater Power:** 1.89 W (calculated as 12.6 V * 0.15 A)

Electrical Characteristics and Class A1 Operation

Each of the two triode units in the 12FQ8 exhibits high-mu characteristics. The typical operating parameters for each section when operated as a Class A1 amplifier are defined under specific grounding conditions:

Parameter	Value
Plate Voltage	250 V
Grid Voltage	-1.5 V
Amplification Factor (mu)	95
Plate Resistance (rp, approximate)	76,000 Ohms

Parameter	Value
Transconductance (gm)	1,250 micromhos
Plate Current (per plate)	1.5 mA

Note: These characteristics apply to each individual plate (Plate A or Plate B) with the plate not currently in use connected directly to ground.

The fundamental triode relationship is demonstrated by the product of the transconductance and plate resistance: $\mu = g_m \times r_p = 0.00125 \text{ S} \times 76,000 \text{ Ohms} = 95$

Interelectrode Capacitances

The direct interelectrode capacitances of the 12FQ8 are measured without an external shield. Because of the double-plate structure, capacitances are specified for each individual plate within the sections:

Capacitance Parameter	Value
Input (each section)	1.7 pF
Grid to either plate (each unit)	0.9 pF
Grid to cathode and heater (each unit)	1.8 pF
Plate A of Unit 1 to cathode and heater	0.34 pF
Plate B of Unit 1 to cathode and heater	0.24 pF
Plate A of Unit 2 to cathode and heater	0.30 pF
Plate B of Unit 2 to cathode and heater	0.18 pF
Plate A of Unit 1 to Plate A of Unit 2	0.4 pF
Plate A to Plate B (within each unit)	0.7 pF to 1.2 pF*

Note: The internal plate-to-plate capacitance within a single unit is specified as 0.7 pF by some manufacturers and up to 1.2 pF by others.

Maximum Ratings

The maximum ratings for the 12FQ8 are established under the Design-Maximum System. These values represent limiting operating and environmental conditions that must not be exceeded under the worst probable circumstances:

Rating Parameter (Each Unit)	Maximum Limit
Plate A Voltage	330 V

Rating Parameter (Each Unit)	Maximum Limit
Plate B Voltage	330 V
Positive-Bias Grid Voltage	0 V
Plate A Dissipation	0.5 W
Plate B Dissipation	0.5 W
Peak Heater-Cathode Voltage (Heater negative to cathode)	200 V
Peak Heater-Cathode Voltage (Heater positive to cathode)	200 V
DC Component of Heater-Cathode Voltage (Heater positive)	100 V

Circuit Applications and Curve Interpretation

The primary application of the 12FQ8 is in frequency-divider and complex-wave-generator circuits for electronic musical instruments, such as organs. The double-plate construction allows a single grid to control the current flowing to two separate plates simultaneously. This enables the generation of multiple output signals from a single control input, which is highly useful for synthesizing complex waveforms or dividing frequencies.

Parallel Plate Operation

While the plates are typically used independently, they can also be connected in parallel. Under parallel operation, the total plate current is the sum of the currents of both plates. For example, at a plate voltage of 250 V and a grid bias of -1.5 V, the total plate current increases from the single-plate value of 1.5 mA to approximately 3.0 mA.

Characteristic Curves

- **Average Plate Characteristics:** The relationship between plate current and plate voltage shows that at 0 V grid bias, plate current rises rapidly with plate voltage. As negative grid bias increases (down to -5 V), the curves shift to the right, requiring higher plate voltages to initiate conduction.
- **Average Transfer Characteristics:** These curves plot plate current against grid voltage for various plate voltages (from 50 V to 300 V). They demonstrate the high-mu nature of the tube, showing a sharp cutoff characteristic as the grid is biased negative.
- **Average Characteristics vs. Plate Current:** Curves of the tube parameters show that plate resistance (r_p) decreases significantly as plate current increases, dropping from over 120,000 Ohms at low currents to approximately 60,000 Ohms at higher currents. Conversely, transconductance (g_m) rises steadily with increasing plate current, while the amplification factor (μ) remains relatively stable between 80 and 110 across the typical operating range.

Technical Summary

The **12FQ8** is a specialized **high-mu twin double-plate triode** housed in a **9-pin miniature (Noval)** glass envelope. It features a shared **12.6 V, 0.15 A heater** and a **common cathode** serving two independent triode units. Each unit is unique in having **two separate plates** controlled by a single grid, providing an amplification factor of **95**, a plate resistance of **76,000 Ohms**, and a transconductance of **1,250 micromhos** per plate under typical Class A1 conditions. Designed for **frequency-divider and complex-wave-generator service** in electronic musical instruments, the 12FQ8 offers a compact and efficient solution for multi-output signal generation and waveform synthesis.



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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	—
Heater current	150 mA	—
Maximum plate dissipation	0.5 W	EachPlate

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Input capacitance	1.7 pF	—
Grid-to-plate capacitance	0.9 pF	—



SOURCE OPERATING CONDITIONS

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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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HEATER VOLTAGE	12.6 V	Maximum ratings
MAXIMUM PLATE VOLTAGE	330 V	Maximum ratings
MAXIMUM POSITIVE DC GRID VOLTAGE	0 V	Maximum ratings

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MAXIMUM PLATE DISSIPATION, EACH PLATE	0.5 W	Maximum ratings
DC COMPONENT	100 V	Maximum ratings
TOTAL DC AND PEAK	200 V	Maximum ratings
HEATER VOLTAGE	12.6 V	Typical operating conditions
HEATER CURRENT	150 mA	Typical operating conditions
PLATE VOLTAGE	250 V	Typical operating conditions
GRID VOLTAGE	-1.5 V	Typical operating conditions
PLATE RESISTANCE, (APPROX.) EACH PLATE '	0 ohm	Typical operating conditions; published column 1
PLATE RESISTANCE, (APPROX.) EACH PLATE '	76000 ohm	Typical operating conditions; published column 2
TRANSCONDUCTANCE, GRID TO EACH PLATE	1250 uS	Typical operating conditions
MA%	1 mA	Maximum ratings; published column 1
Maximum plate voltage	330 V	Published datasheet; promoted section value
Maximum plate dissipation	0.5 W	Published datasheet; promoted section value

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	76000 ohm	Published datasheet; promoted section value
Transconductance	0.00125 A/V	Published datasheet; promoted section value
Amplification factor	95	Published datasheet; promoted section value


SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

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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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater current	150 mA	—
Plate voltage	250 V	ClassA;EachUnit
Grid voltage	-1.5 V	ClassA;EachUnit
Plate current	1.5 mA	ClassA;EachUnit
Maximum plate A voltage	330 V	EachUnit
Maximum plate B voltage	330 V	EachUnit
Maximum plate A dissipation	0.5 W	EachUnit
Maximum plate B dissipation	0.5 W	EachUnit
Peak heater-cathode voltage heater negative	200 V	—
Peak heater-cathode voltage heater positive	200 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Amplification factor	95	EachUnit
Plate resistance	76000 ohm	EachUnit
Transconductance	1250 uS	EachUnit

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid-to-either-plate capacitance	0.9 pF	EachUnit
Grid-to-cathode-and-heater capacitance	1.8 pF	EachUnit
Plate-A-to-plate-B capacitance	0.7 pF	EachUnit

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