

ELECTRONIC TUBE REFERENCE

19CL8A

Voltage Radio Detector Converter electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

TETRODE-TRIODE

Triode-tetrode used as an FM converter and RF amplifier in radio receivers.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9FX	BASE PINS	9
NOMINAL HEATER	18.9 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

9FX - TERMINAL PINOUT

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

SECTION RATINGS

SECTION1 Triode	
PLATE RESISTANCE	5000 Ω
TRANSCONDUCTANCE	0.008 S
AMPLIFICATION FACTOR	40
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM PLATE DISSIPATION	2.7 W
MAXIMUM CATHODE CURRENT	25 mA
<i>6CL8A triode section.</i>	

SECTION2 Tetrode	
PLATE RESISTANCE	100000 Ω
TRANSCONDUCTANCE	0.0064 S
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	150 V
MAXIMUM PLATE DISSIPATION	2.8 W
MAXIMUM SCREEN DISSIPATION	0.55 W
MAXIMUM CATHODE CURRENT	25 mA
<i>6CL8A tetrode section.</i>	

19CL8A — Medium-Mu Triode and Sharp-Cutoff Tetrode/Pentode

The **19CL8A** is a miniature multi-section vacuum tube designed for high-frequency applications in television and radio receivers. It combines a medium-mu triode and a sharp-cutoff (or semi-remote cutoff) tetrode or pentode within a single envelope. The tube is primarily intended for combined oscillator-mixer service in VHF television tuners (including color and black-and-white receivers) and FM receivers, performing well at high frequencies.

The 19CL8A is identical to the **6CL8A** (and in some respects **5CL8A**) except for its heater ratings. It features controlled thermal characteristics to minimize heater voltage surges during warm-up, making it suitable for series-string entertainment equipment.

Construction and Mechanical Characteristics

The 19CL8A is constructed in a miniature glass envelope (T-6 1/2 bulb) with a miniature button 9-pin base. The cathodes are coated unipotential types, with separate and electrically independent cathode connections for each section.

The physical dimensions of the tube are:

- **Maximum overall height:** 2.187 inches (approx. 2-3/16")
- **Maximum seated height:** 1.937 inches
- **Maximum diameter:** 0.875 inches (7/8")
- **Mounting position:** Any

Heater Ratings

The heater is designed for series-string operation with controlled warm-up characteristics.

- **Heater Voltage (AC or DC):** 18.9 V
- **Heater Current:** 0.15 A (150 mA) □ 0.010 A
- **Heater Warm-up Time:** 11.0 seconds (defined as the time to reach 80% of rated voltage when four times the rated voltage is applied in series with a resistance three times the nominal heater operating resistance).
- **Heater-Cathode Voltage Limits:**
 - **Heater negative with respect to cathode:** 200 V max (Total DC and Peak)
 - **Heater positive with respect to cathode:** 100 V max (DC component), 200 V max (Total DC and Peak)
 - *Alternative rating:* Peak heater-cathode voltage of 200 V max, average heater-cathode voltage of 100 V max.

Pinout and Electrode Connections

The tube uses a 9-pin miniature base. Depending on the specific design variant and standard (such as 9FX or 9FA), the pin connections are documented in several configurations:

Configuration A (Standard 9FX Tetrode Pinout)

This is the most common configuration for the triode-tetrode variant:

- **Pin 1:** Triode Plate
- **Pin 2:** Tetrode Grid No. 1 (Control Grid)
- **Pin 3:** Tetrode Grid No. 2 (Screen Grid)
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Tetrode Plate
- **Pin 7:** Tetrode Cathode, Grid No. 3, and Internal Shield
- **Pin 8:** Triode Cathode
- **Pin 9:** Triode Grid

Configuration B (Alternative 9FX Pinout)

An alternative 9FX layout is documented as:

- **Pin 1:** Triode Plate
- **Pin 2:** Tetrode Grid #1
- **Pin 3:** Tetrode Grid #2
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Tetrode Plate
- **Pin 7:** Tetrode Cathode
- **Pin 8:** Triode Grid
- **Pin 9:** Triode Cathode

Configuration C (Alternative 9FX Pinout with swapped triode/tetrode pins)

Another variation of the 9FX layout lists:

- **Pin 1:** Plate (Triode)
- **Pin 2:** Grid (Triode)
- **Pin 3:** Cathode (Triode)
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Plate (Tetrode)
- **Pin 7:** Grid 2 (Tetrode)
- **Pin 8:** Cathode (Tetrode)
- **Pin 9:** Grid 1 (Tetrode)

Configuration D (Alternative 9FX Pinout with swapped triode/tetrode pins - Variant 2)

Another variation of the 9FX layout lists:

- **Pin 1:** Triode Grid
- **Pin 2:** Triode Plate
- **Pin 3:** Tetrode Cathode, Grid No. 3, Internal Shield
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Triode Cathode
- **Pin 7:** Tetrode Grid No. 2
- **Pin 8:** Tetrode Grid No. 1
- **Pin 9:** Tetrode Plate

Configuration E (9FA Pentode Pinout)

For the triode-pentode variant:

- **Pin 1:** Triode Grid
- **Pin 2:** Triode Plate
- **Pin 3:** Triode Cathode, Grid No. 3, Internal Shield
- **Pin 4:** Heater
- **Pin 5:** Heater
- **Pin 6:** Pentode Plate
- **Pin 7:** Pentode Grid No. 2
- **Pin 8:** Pentode Cathode, Grid No. 3 Pentode, Internal Shield
- **Pin 9:** Pentode Grid No. 1

Interelectrode Capacitances

The direct interelectrode capacitances vary depending on whether an external shield (such as Shield No. 315) is connected.

Triode Section Capacitances

- **Grid to Plate:** 1.8 pF (with or without shield); also listed as 1.7 pF in some configurations.
- **Input (Grid to Heater + Cathode):** 2.7 pF to 2.8 pF (with or without shield); also listed as 3.2 pF (including pentode cathode and shield).
- **Output (Plate to Heater + Cathode):** 1.2 pF (shielded), 0.4 pF (unshielded); also listed as 2.0 pF (shielded), 1.5 pF (unshielded), or 2.2 pF in alternative configurations.

Tetrode/Pentode Section Capacitances

- **Grid No. 1 to Plate:** 0.010 pF max (shielded), 0.020 pF to 0.028 pF max (unshielded); also listed as 0.01 pF in pentode configuration.
- **Input (Grid No. 1 to Heater + Cathode + Grid No. 2):** 5.0 pF (with or without shield); also listed as 5.5 pF in pentode configuration.
- **Output (Plate to Heater + Cathode + Grid No. 2):** 3.4 pF (shielded), 2.0 pF to 2.4 pF (unshielded).

Inter-Section Coupling and Heater-Cathode Capacitances

- **Tetrode Grid No. 1 to Triode Plate:** 0.01 pF max (shielded), 0.015 pF max (unshielded)
- **Tetrode Plate to Triode Plate:** 0.03 pF max (shielded), 0.15 pF max (unshielded)
- **Cathode to Heater (either section):** ~2.5 pF to 3.0 pF

Maximum Ratings (Design-Maximum or Design-Center Values)

The maximum ratings for the 19CL8A are defined under the Design-Maximum or Design-Center systems. (Note: Some documentation references the [6U8A](#) for Class A1 maximum ratings, but specific limits are detailed below).

Parameter	Triode Section	Tetrode / Pentode Section
Plate Voltage	300 V / 330 V max	300 V / 330 V max
Grid No. 2 Supply Voltage	—	300 V / 330 V max
Grid No. 2 Voltage	—	See Rating Chart
Grid No. 1 Positive Bias	0 V max	0 V max
Plate Dissipation	2.5 W / 2.7 W max	2.8 W / 3.0 W max (2.5 W max in pentode)
Grid No. 2 Dissipation	—	0.5 W / 0.55 W max

Grid No. 2 Input Limits

For Grid No. 2 (screen grid) voltages up to 150 V (or 170 V in some charts), the maximum dissipation is limited to 0.5 W or 0.55 W. For voltages between 150 V (or 165 V) and 300 V, the permissible dissipation decreases non-linearly to 0 W at 300 V, as defined by the screen rating chart.

Maximum Circuit Resistance (Grid No. 1)

- **Fixed Bias:** 0.5 M Ω (Triode), 0.25 M Ω (Tetrode/Pentode)
- **Cathode Bias (Self Bias):** 1.0 M Ω (Triode), 1.0 M Ω (Tetrode/Pentode); also listed as 2.2 M Ω for both sections in some configurations.

Typical Operating Characteristics

The 19CL8A operates as a Class A1 amplifier under the following typical conditions:

Triode Section

- **Plate Voltage:** 125 V
- **Grid No. 1 Voltage:** 0 V (with cathode bias) or -1.0 V
- **Cathode Bias Resistor:** 56 Ω , (when Grid No. 1 is at 0 V)
- **Plate Current:** 13.5 mA to 15 mA
- **Amplification Factor (μ):** 40 to 46
- **Plate Resistance (r_p):** 5,000 Ω to 5,400 Ω
- **Transconductance (g_m):** 8,000 μ mhos (8,500 μ mhos in some configurations)
- **Grid No. 1 Cutoff Voltage** (for $I_b = 10 \mu$ A or 20 μ A): -8 V to -9 V (approx.)

Tetrode / Pentode Section

The tetrode section can be operated under different typical conditions:

Parameter	Tetrode Condition 1	Tetrode Condition 2	Pentode Condition
Plate Voltage	100 V	125 V	125 V
Grid No. 2 (Screen) Voltage	100 V	125 V	125 V
Grid No. 1 Voltage	0 V	-1.0 V	-1.0 V
Plate Current	—	12 mA	12 mA
Grid No. 2 Current	—	4.0 mA	4.0 mA
Plate Resistance (approx.)	—	100,000 _Ω	200,000 _Ω
Transconductance	8,200 _μ mhos	6,400 _μ mhos (or 6,500 _μ mhos)	7,500 _μ mhos
Grid No. 1 Cutoff Voltage	—	-10 V (approx. for I _b = 10 _μ A)	-8 V (approx. for I _b = 10 _μ A)

Technical Summary

The **19CL8A** is a versatile **9-pin miniature triode-tetrode (or triode-pentode)** designed for high-frequency applications, particularly as a combined VHF oscillator and mixer in television and FM receivers. It features a **18.9 V, 0.15 A heater** with controlled warm-up characteristics for series-string operation. The triode section provides a medium amplification factor of **40 to 46** with a transconductance of **8,000 to 8,500 _μmhos**, while the sharp-cutoff tetrode/pentode section offers high plate resistance and transconductance up to **8,200 _μmhos**. With separate cathodes and low interelectrode capacitances, the 19CL8A delivers reliable, low-noise performance in demanding RF and converter stages.

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
Service	VHF oscillator	—
Heater Warmup Time	11 s	—

1961 TUNG SOL

Section 2 · Tetrode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Service	VHF mixer	—

SOURCE OPERATING CONDITIONS

1965 Sylvania Electronic Tubes Vol3

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

1965 SYLVANIA ELECTRONIC TUBES VOL3

Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	18.9 V	—
Heater current	150 mA	—
Typical plate voltage	125 V	OscillatorMixer
Typical plate current	14 mA	OscillatorMixer

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	6000 ohm	—
Transconductance	8000 uS	—
Amplification factor	40	—

1965 SYLVANIA ELECTRONIC TUBES VOL3

Section 2 · Tetrode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	18.9 V	—
Heater current	150 mA	—
Typical plate voltage	125 V	OscillatorMixer
Typical screen-grid voltage	125 V	OscillatorMixer
Typical plate current	12 mA	OscillatorMixer

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	200000 ohm	—
Transconductance	6500 uS	—



TUBE TINKER
ELECTRON TUBE DATABASE

SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 3 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 1 · Triode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Triode grid-to-plate capacitance	1.8 pF	WholeTube
Triode input capacitance	2.7 pF	WholeTube
Triode output capacitance	1.2 pF	WholeTube

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum plate voltage	300 V	WholeTube
Maximum plate dissipation	2.7 W	WholeTube
Plate voltage	125 V	TypicalOperation
Plate resistance	5000 ohm	TypicalOperation
Transconductance	8000 μ S	TypicalOperation
Amplification factor	40	TypicalOperation

1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 2 · Tetrode

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tetrode grid-to-plate capacitance maximum	0.01 pF	WholeTube
Tetrode input capacitance	5 pF	WholeTube
Tetrode output capacitance	3.4 pF	WholeTube

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum plate voltage	300 V	WholeTube
Maximum screen supply voltage	300 V	WholeTube
Maximum plate dissipation	2.8 W	WholeTube
Maximum screen dissipation	0.5 W	WholeTube
Plate voltage	125 V	TypicalOperation
Screen voltage	125 V	TypicalOperation
Plate resistance	100000 ohm	TypicalOperation
Transconductance	9400 μ S	TypicalOperation



SOURCE DATA APPENDIX

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO
Section 1 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
AllowableHeaterCurrent	140 mA–160 mA	Shared heater



SOURCE DATA APPENDIX

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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	18.9 V	—
Heater current	450 mA	—
Heater warm-up time	11 s	ControlledWarmup
Plate voltage	150 V	Triode;ClassA
Plate current	18 mA	Triode;ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	5000 ohm	Triode
Transconductance	8000 uS	Triode
Amplification factor	40	Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	125 V	Tetrode;ClassA
Screen voltage	125 V	Tetrode;ClassA
Plate current	12 mA	Tetrode;ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	180000 ohm	Tetrode
Transconductance	8000 uS	Tetrode



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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak value	200 V	Other;PublishedValue1
Peak value	0 V	Other;PublishedValue2
Average value	100 V	Other;PublishedValue1
Average value	100 V	Other;PublishedValue2
Plate Voltage	300 V	MaximumRating;PublishedValue1
Plate Voltage	300 V	MaximumRating;PublishedValue2
–	300 V	MaximumRating
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0 V	MaximumRating;PublishedValue1
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0 V	MaximumRating;PublishedValue2
Plate Dissipation	2.5 W	MaximumRating;PublishedValue1
Plate Dissipation	2.5 W	MaximumRating;PublishedValue2

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
For grid-No.2 voltages up to 150 volts	0.55 V	MaximumRating
For fixed-bias operation	2.2 megohm	MaximumCircuitValue;PublishedValue1
For fixed-bias operation	2.2 megohm	MaximumCircuitValue;PublishedValue2
For cathode-bias operation	2.2 megohm	MaximumCircuitValue;PublishedValue1
For cathode-bias operation	2.2 megohm	MaximumCircuitValue;PublishedValue2
Maximum Plate Voltage	300 V	Section1
Maximum Plate Dissipation	2.5 W	Section1

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Grid No.1 to Plate	0.01 pF	Capacitance
Shield	5.5 pF	Capacitance
Shield	3.4 pF	Capacitance
Grid to Plate	1.7 pF	Capacitance
and Internal Shield	3.2 pF	Capacitance
and Internal Shield	2.2 pF	Capacitance

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Voltage	125 V	Characteristic;PublishedValue1
Plate Voltage	125 V	Characteristic;PublishedValue2
Grid-No.2 Voltage	125 V	Characteristic
Grid-No.1 Voltage	-1 V	Characteristic;PublishedValue1
Grid-No.1 Voltage	-1 V	Characteristic;PublishedValue2
Plate Resistance (Approx.)	5400 ohm	Characteristic;PublishedValue1
Plate Resistance (Approx.)	200000 ohm	Characteristic;PublishedValue2
Plate Current	13.5 mA	Characteristic;PublishedValue1
Plate Current	12 mA	Characteristic;PublishedValue2
Grid-No.2 Current	4 mA	Characteristic
10 /iA	-8 V	Characteristic
Plate Resistance	5400 ohm	Section1
Transconductance	8500 uS	Section1
Amplification Factor	46	Section1

Section 2 · Tetrode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate Voltage	300 V	Section2
Maximum Screen Voltage	300 V	Section2
Maximum Plate Dissipation	2.5 W	Section2
Maximum Screen Dissipation	0.55 W	Section2

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate Resistance	200000 ohm	Section2
Transconductance	7500 uS	Section2