



ELECTRONIC TUBE REFERENCE

1619

Power - Beam (NOT sweep) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

BEAMPOWER

Quick-heating beam-power transmitting tube for RF amplification, modulation, and audio power service, with published Class-A, Class-AB2, and Class-C operating conditions.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	7
NOMINAL HEATER	2.5 V / 2 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Beam Power	
TRANSCONDUCTANCE	0.0045 S
MAXIMUM PLATE VOLTAGE	400 V
MAXIMUM SCREEN VOLTAGE	300 V
MAXIMUM PLATE DISSIPATION	15 W
MAXIMUM SCREEN DISSIPATION	3.5 W
<i>Representative electrical section; promoted values mapped from published ratings and characteristics where applicable.</i>	

1619 — Beam Power Transmitting Tube

A metal-shell, filamentary beam power tube designed for audio-frequency and radio-frequency power amplification, modulation, frequency multiplication, and oscillation in transmitting and industrial applications.

Overview

The **1619** (also designated as the **GL-1619**) is a five-electrode beam power transmitting tube featuring a metal envelope and a fast-heating, coated filamentary cathode. Engineered for high power sensitivity and rapid thermal response, the 1619 is particularly suited for applications where quick off-on operation is essential.

The tube is rated for operation at full input up to **45 MHz**, and can be operated at reduced ratings up to **90 MHz**. Its documented applications include Class A1 audio-frequency (AF) power amplification, Class [AB1](#) and Class [AB2](#) push-pull AF power amplification and modulator service, Class C grid-modulated and plate-modulated radio-frequency (RF) power amplification, and Class C RF telegraphy and FM telephony. In later commercial life, the 1619 was primarily utilized for renewal purposes in existing equipment.

Construction, Filament, and Basing

The 1619 is constructed with a robust metal shell enclosing a five-electrode system. The filamentary cathode is coated to provide rapid heating, enabling the tube to reach operating temperature almost immediately upon application of power.

Filament Characteristic	Value
Filament Voltage (AC or DC)	2.5 V
Filament Current	2.0 A
Calculated Filament Power	5.0 W
Cathode Type	Coated, filamentary

The calculated filament power of **5.0 W** is derived directly from the nominal filament voltage of 2.5 V and the nominal filament current of 2.0 A.

Basing and Physical Dimensions

The tube utilizes a **small wafer octal 7-pin base (B7-22)**. The bottom-view basing diagram provides the following pin connections:

- **Pin 1:** Metal Shell (S)
- **Pin 2:** Filament (F)
- **Pin 3:** Plate (P)
- **Pin 4:** Grid No. 2 (Screen Grid, [G2](#))
- **Pin 5:** Grid No. 1 (Control Grid, G1)
- **Pin 7:** Filament (F)
- **Pin 8:** Grid No. 3 (Beam-Forming Plates, G3)

The physical dimensions of the metal envelope are as follows:

- **Maximum Overall Length:** 4-5/16 inches

- **Maximum Diameter (at base wafer):** 1-5/8 inches
- **Maximum Bulb Diameter:** 1-5/16 inches
- **Maximum Seated Height:** 3-3/4 inches
- **Net Weight (Approximate):** 3 ounces
- **Shipping Weight (Approximate):** 1 pound

Regarding mounting orientation, there is a minor variation in manufacturer recommendations: some specifications restrict the 1619 to a **vertical position only** (either base down or base up), while other technical guidelines permit mounting in **either vertical or horizontal positions**.

Electrical Characteristics and Capacitances

At its standard operating point, the 1619 exhibits high transconductance and low interelectrode capacitances, which minimizes the need for neutralization in adequately shielded circuits.

- **Transconductance:** Approximately **4500 μ mhos** (for a plate current of 50 mA).
- **Direct Interelectrode Capacitances (with shell connected to cathode):**
 - **Grid No. 1 to Plate:** 0.29 pF (approximate) to 0.45 pF (maximum).
 - **Input (Grid No. 1 to filament, Grid No. 3, Grid No. 2, and shell):** 9.6 pF.
 - **Output (Plate to filament, Grid No. 3, Grid No. 2, and shell):** 12.5 pF.

Audio-Frequency Power Amplification and Modulator Service

The 1619 is highly versatile in audio-frequency applications, operating under Class A1, Class [AB1](#), or Class [AB2](#) conditions. Grid voltages are typically specified with respect to the mid-point of an AC-operated filament. When DC is used on the filament, each stated grid voltage value must be decreased by **1.75 V**.

Single-Tube Class A1 Amplifier

Under Class A1 service, the maximum continuous commercial service (CCS) ratings are:

- **DC Plate Voltage:** 400 V max
- **DC Screen Voltage (Grid No. 2):** 300 V max
- **Screen Input:** 3.5 W max
- **Plate Dissipation:** 15 W max

Typical single-tube Class A1 operating conditions with fixed bias are:

Parameter	Value
DC Plate Voltage	300 V
DC Screen Voltage	250 V
DC Grid No. 1 Voltage	-10 V

Parameter	Value
Peak AF Grid Voltage	10 V
Zero-Signal DC Plate Current	44 mA
Max-Signal DC Plate Current	46 mA
Zero-Signal DC Screen Current	4.0 mA
Max-Signal DC Screen Current	6.0 mA
Load Resistance	8800 Ω
Total Harmonic Distortion (THD)	7%
Max-Signal Power Output (Approx.)	3.0 W

Push-Pull Class AB1 Amplifier

For Class [AB1](#) push-pull service, the maximum CCS ratings remain identical to Class A1. Typical operating conditions for two tubes with fixed bias are:

Parameter	Value (for 2 tubes)
DC Plate Voltage	400 V
DC Screen Voltage	300 V
DC Grid No. 1 Voltage	-20 V
Peak AF Grid-to-Grid Voltage	40 V
Zero-Signal DC Plate Current	52 mA
Max-Signal DC Plate Current	80 mA
Zero-Signal DC Screen Current	3.5 mA
Max-Signal DC Screen Current	10 mA
Load Resistance (per tube)	3500 Ω
Effective Plate-to-Plate Load Resistance	14000 Ω
Total Harmonic Distortion (THD)	3%
Max-Signal Power Output (Approx.)	17.5 W

Push-Pull Class AB2 Amplifier

In Class AB2 push-pull service, the grids are driven positive, requiring a low-impedance driver stage. The maximum CCS ratings per tube are:

- **DC Plate Voltage:** 400 V max
- **DC Screen Voltage:** 300 V max
- **Max-Signal DC Plate Current:** 75 mA max
- **Max-Signal Plate Input:** 30 W max
- **Screen Input:** 3.5 W max
- **Plate Dissipation:** 15 W max

Typical operating conditions for two tubes in Class AB2 with fixed bias are:

Parameter	Value (for 2 tubes)
DC Plate Voltage	400 V
DC Screen Voltage	300 V
DC Grid No. 1 Voltage	-16.5 V
Peak AF Grid-to-Grid Voltage	77 V
Zero-Signal DC Plate Current	75 mA
Max-Signal DC Plate Current	150 mA
Zero-Signal DC Screen Current	6.5 mA
Max-Signal DC Screen Current	11.5 mA
Load Resistance (per tube)	1500 Ω
Effective Plate-to-Plate Load Resistance	6000 Ω
Peak Grid Input Power	0.4 W
Total Harmonic Distortion (THD)	2.5%
Max-Signal Power Output (Approx.)	36 W

To maintain low distortion in Class AB2, the driver stage must be capable of supplying the grids with the specified peak grid voltage. The effective resistance per grid circuit must not exceed **500 Ω** , and the effective impedance at the highest desired response frequency must not exceed **700 Ω** .

Radio-Frequency Power Amplification and Oscillator Service

The 1619 is highly effective as an RF power amplifier, frequency multiplier, or oscillator. It can be operated under Class C telegraphy, FM telephony, grid-modulated telephony, or plate-modulated telephony.

Class C Telegraphy and FM Telephony

For unmodulated, key-down conditions, the maximum CCS ratings are:

- **DC Plate Voltage:** 400 V max
- **DC Screen Voltage:** 300 V max
- **DC Grid No. 1 Voltage:** -125 V max
- **DC Plate Current:** 75 mA max
- **DC Grid No. 1 Current:** 5 mA max
- **Plate Input:** 30 W max
- **Screen Input:** 3.5 W max
- **Plate Dissipation:** 15 W max

Typical operating conditions for Class C Telegraphy are:

Parameter	Value
DC Plate Voltage	400 V
DC Screen Voltage	300 V
DC Grid No. 1 Voltage	-55 V
Peak RF Grid Voltage	80 V
DC Plate Current	75 mA
DC Screen Current	10.5 mA
DC Grid No. 1 Current (Approx.)	5.0 mA
Screen Series Resistor	9500 Ω
Grid Series Resistor	11000 Ω
Driving Power (Approx.)	0.36 W
Power Output (Approx.)	19.5 W

Class C Grid-Modulated Telephony

Under grid-modulated carrier conditions (with a maximum modulation factor of 1.0), the maximum CCS ratings are:

- **DC Plate Voltage:** 400 V max
- **DC Screen Voltage:** 300 V max
- **DC Grid No. 1 Voltage:** -125 V max
- **DC Plate Current:** 37.5 mA max
- **Plate Input:** 15 W max
- **Screen Input:** 2.5 W max
- **Plate Dissipation:** 15 W max

Typical operating conditions are:

Parameter	Value
DC Plate Voltage	400 V
DC Screen Voltage	250 V
DC Grid No. 1 Voltage	-50 V
Peak RF Grid Voltage	58 V
Peak AF Grid Voltage	30 V
DC Plate Current	31 mA
DC Screen Current	1.5 mA
DC Grid No. 1 Current (Approx.)	1.2 mA
Cathode Resistor	1500 Ω
Driving Power (Approx.)	0.25 W
Power Output (Approx.)	3.8 W

Class C Plate-Modulated Telephony

Under plate-modulated carrier conditions (with a maximum modulation factor of 1.0), the maximum CCS ratings are:

- **DC Plate Voltage:** 325 V max
- **DC Screen Voltage:** 300 V max
- **DC Grid No. 1 Voltage:** -125 V max
- **DC Plate Current:** 62 mA max
- **DC Grid No. 1 Current:** 5 mA max
- **Plate Input:** 20 W max

- **Screen Input:** 2.5 W max
- **Plate Dissipation:** 10 W max

Typical operating conditions are:

Parameter	Value
DC Plate Voltage	325 V
DC Screen Voltage	285 V
DC Grid No. 1 Voltage	-50 V
Peak RF Grid Voltage	70 V
DC Plate Current	62 mA
DC Screen Current	7.5 mA
DC Grid No. 1 Current (Approx.)	2.8 mA
Screen Series Resistor	5000 Ω
Grid Series Resistor	18000 Ω
Driving Power (Approx.)	0.18 W
Power Output (Approx.)	13 W

High-Frequency Derating and Circuit Limits

The maximum ratings for the 1619 apply fully at frequencies up to **45 MHz**. For operation at higher frequencies, adequate ventilation and normal ambient temperatures must be maintained, and the plate voltage and plate input must be derated according to the following percentages:

Frequency	Class C Grid-Modulated	Class C Plate-Modulated	Class C Unmodulated (Telegraphy)
45 MHz	100%	100%	100%
60 MHz	93%	90%	90%
90 MHz	85%	77%	77%

Grid-Circuit Resistance Limits

To prevent thermal runaway and maintain stable bias, the total effective grid-circuit resistance must be kept within strict limits:

- **Class A1 and Class [AB1](#) Service:** The total effective grid-circuit resistance must not exceed **50,000 Ω** .
- **Class C Service:** The effective grid-circuit resistance must not exceed **25,000 Ω** .

Characteristic Curves and Design Interpretation

The published characteristic curves for the 1619 provide essential design data for selecting operating points and load lines:

- **Average Plate Characteristics:** Curves plotted at screen voltages of **250 V** and **300 V** show the relationship between plate voltage and plate current (I_b) across a range of control-grid voltages (E_{c1}) from +35 V down to -20 V. These curves demonstrate the typical "knee" of a beam power tube, where plate current remains relatively constant over a wide range of plate voltages, ensuring high efficiency and low distortion.
- **Typical Characteristics (Control-Grid Current):** Curves showing control-grid current (I_{c1}) in milliamperes versus plate voltage in volts are provided for screen voltages of **250 V** and **300 V**. These curves are critical for Class [AB2](#) and Class C designs, where grid current flows during positive grid excursions, allowing designers to calculate the exact driving power requirements and grid-bias resistor values.

Technical Summary

The **1619** is a **metal-shell, filamentary beam power transmitting tube** featuring a **2.5 V, 2.0 A** fast-heating coated filamentary cathode. It is designed for high power sensitivity and rapid thermal response in transmitting and industrial equipment.

With a maximum plate voltage rating of **400 V** and a maximum plate dissipation of **15 W**, the 1619 is capable of delivering **36 W** of audio power in push-pull Class [AB2](#) modulator service, or **19.5 W** of RF output in Class C telegraphy at frequencies up to **45 MHz**. The tube features a **small wafer octal 7-pin base** and exhibits a transconductance of **4500 μmhos** at a plate current of 50 mA. When operating at elevated frequencies up to **90 MHz**, the plate voltage and input power must be derated to protect the tube from thermal overload.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1950 General Electric Transmitting Types

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

1950 GENERAL ELECTRIC TRANSMITTING TYPES

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Single-tube Class A power output	3 W	ClassA
Maximum operating frequency	45 MHz	Published datasheet value



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1956 RCA Transmitting Tubes

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

1956 RCA TRANSMITTING TUBES

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Plate/Inverse Voltage	400 V	Source rating
Maximum Plate Dissipation	15 W	—



1960 RCA Industrial and Communications Types

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

1960 RCA INDUSTRIAL AND COMMUNICATIONS TYPES

Section 1 · Beam Power

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	400 V	PushPull;ClassAB2;TwoTubes
Screen supply	300 V	PushPull;ClassAB2;TwoTubes
Grid bias	-16.5 V	PushPull;ClassAB2;TwoTubes
Plate current	75 mA	PushPull;ClassAB2;TwoTubes
Load resistance	6000 Ohm	PushPull;ClassAB2;PlateToPlate
Power output	36 W	PushPull;ClassAB2;TwoTubes
Power output	13 W	ClassC;Telephony
Power output	19.5 W	ClassC;Telegraphy