

ELECTRONIC TUBE REFERENCE

11BM8

Power - TV Vertical Output electronic tube

CONSOLIDATED TECHNICAL DATA
2 SECTIONS
CONSTRUCTION
PENTODE-TRIODE

Miniature triode-pentode used for television vertical-deflection oscillator/amplifier service and AF voltage/power amplification. It combines a small-signal triode with a power pentode in one envelope.

GENERAL CHARACTERISTICS

BASE DESIGNATION	9EX	BASE PINS	9
NOMINAL HEATER	10.7 V / 450 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

9EX - TERMINAL PINOUT

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

SECTION RATINGS

SECTION1 Triode	
TRANSCONDUCTANCE	0.0025 S
AMPLIFICATION FACTOR	70
MAXIMUM PLATE VOLTAGE	250 V
<i>Vertical-deflection oscillator or AF voltage-amplifier section; ratings by explicit cross-reference to 16A8/PCL82.</i>	

SECTION2 Pentode	
PLATE RESISTANCE	20000 Ω
TRANSCONDUCTANCE	0.0064 S
MAXIMUM PLATE VOLTAGE	250 V
MAXIMUM SCREEN VOLTAGE	250 V
MAXIMUM PLATE DISSIPATION	7 W
MAXIMUM SCREEN DISSIPATION	1.8 W
MAXIMUM CATHODE CURRENT	50 mA
<i>Vertical-deflection or AF power-amplifier section; ratings by explicit cross-reference to 16A8/PCL82.</i>	

11BM8 — High-Mu Triode and Power Pentode

The **11BM8** is a miniature multi-unit vacuum tube containing a high-mu triode and a power pentode within a single envelope. It is designed for use in television receivers, where it serves as a vertical deflection oscillator or audio-frequency (AF) amplifier in its triode section, and as a vertical deflection amplifier or AF power amplifier in its pentode section. The 11BM8 is electrically identical to the [16A8/PCL82](#) and related to the [8B8](#), differing only in its heater characteristics.

Physical Construction, Heater, and Pinout

The 11BM8 is constructed in a T-6 1/2 miniature glass envelope with a 9-pin button base (E9-1). The physical dimensions of the tube are as follows:

Physical Parameter	Value
Maximum Diameter	0.875 inches
Maximum Seated Height	2.812 inches
Maximum Overall Height	3.062 inches
Outline Designation	6-4 (also designated as 6G)

Heater Operation

The heater is designed for series or parallel AC/DC operation with the following nominal ratings:

Heater Parameter	Value
Heater Voltage	10.7 V
Heater Current	0.45 A (450 mA)
Maximum Heater-Cathode Voltage (Heater Negative with Respect to Cathode)	200 V
Maximum Heater-Cathode Voltage (Heater Positive with Respect to Cathode)	200 V

Pinout and Basing

The tube utilizes the **9EX** basing arrangement, which provides separate connections for the triode and pentode sections, with the exception of the shared heater. The pin connections, viewed from the bottom of the tube, are:

Pin Number	Connection	Symbol
1	Grid No. 1 (Pentode)	G1p
2	Cathode, Grid No. 3, and Internal Shield (Pentode)	Kp, G3p, IS
3	Grid (Triode)	G1t
4	Heater	H
5	Heater	H
6	Plate (Pentode)	Pp
7	Grid No. 2 (Pentode)	G2p
8	Cathode (Triode)	Kt
9	Plate (Triode)	Pt

Direct Interelectrode Capacitances

The direct interelectrode capacitances of the 11BM8 are measured without an external shield. These values define the capacitive coupling within each section and between the independent triode and pentode structures.

Triode Section Capacitances

Parameter	Value
Grid to All Other Elements Except Plate	2.7 pF
Plate to All Other Elements Except Grid	4.3 pF
Plate to Grid	4.2 pF
Grid to Heater (Maximum)	0.02 pF

Pentode Section Capacitances

Parameter	Value
Grid No. 1 to All Other Elements Except Plate	9.3 pF
Plate to All Other Elements Except Grid No. 1	8.0 pF
Plate to Grid No. 1 (Maximum)	0.3 pF
Grid No. 1 to Heater (Maximum)	0.3 pF

Section-to-Section Coupling Capacitances

Parameter	Value
Triode Plate to Pentode Grid No. 1 (Maximum)	0.02 pF
Triode Grid to Pentode Plate (Maximum)	0.02 pF
Triode Grid to Pentode Grid No. 1 (Maximum)	0.025 pF
Triode Plate to Pentode Plate (Maximum)	0.25 pF

Maximum Ratings

The maximum ratings for the 11BM8 are established under the Design Center Rating System. These limits must be observed to ensure reliable operation and prevent premature tube failure.

Pentode Section Ratings

Parameter	Maximum Value
Plate Voltage Without Plate Current	550 V
Plate Voltage	250 V

Parameter	Maximum Value
Peak Plate Voltage (Pulse duration $\leq$ 4% of one cycle, max 0.8 ms)	2500 V
Peak Inverse Plate Voltage	500 V
Plate Dissipation	5 W
Peak Plate Dissipation	7 W
Grid No. 2 Voltage Without Current	550 V
Grid No. 2 Voltage	250 V
Grid No. 2 Dissipation	1.8 W
Peak Grid No. 2 Dissipation	3.2 W
Cathode Current	50 mA
Grid No. 1 Circuit Resistance (with Automatic Bias)	2 M Ω
Grid No. 1 Circuit Resistance (with Fixed Bias)	1 M Ω
Circuit Resistance Between Heater and Cathode	20,000 Ω

Triode Section Ratings

Parameter	Maximum Value
Plate Voltage Without Plate Current	550 V
Plate Voltage	250 V
Peak Plate Voltage (Pulse duration $\leq$ 4% of one cycle, max 0.8 ms)	600 V
Plate Dissipation	1 W
Cathode Current	15 mA
Grid Circuit Resistance (with Automatic Bias)	3 M Ω
Grid Circuit Resistance (with Fixed Bias)	1 M Ω
Voltage Between Heater and Cathode	200 V
Circuit Resistance Between Heater and Cathode	20,000 Ω
Grid Circuit Impedance (at 50 Hz)	0.5 M Ω

Typical Operating Characteristics

The triode and pentode sections of the 11BM8 can be operated under several typical Class A1 amplifier conditions.

Pentode Section Characteristics

The pentode section exhibits high transconductance and moderate plate resistance, making it suitable for power amplification and vertical deflection output stages. The table below outlines four typical operating points:

Parameter	Point A	Point B	Point C	Point D
Plate Voltage	100 V	170 V	200 V	200 V
Grid No. 2 Voltage	100 V	170 V	200 V	200 V
Grid No. 1 Bias	-6.0 V	-11.5 V	-12.5 V	-16 V
Plate Current	26 mA	41 mA	35 mA	35 mA
Grid No. 2 Current	5.0 mA	8.0 mA	6.5 mA	7.0 mA
Transconductance	6800,mhos	7500,mhos	6800,mhos	6400,mhos
Plate Resistance (Approx.)	15,000,	16,000,	20,500,	20,000,
Amplification Factor (Grid No. 2 wrt Grid No. 1)	10	9.5	9.5	9.5

Triode Section Characteristics

The high-mu triode section is optimized for voltage amplification or oscillator service. Under typical Class A1 conditions, its characteristics are:

Parameter	Value
Plate Voltage	100 V
Grid Voltage	0 V
Plate Current	3.5 mA
Transconductance	2500,mhos

Parameter	Value
Amplification Factor	70

Technical Summary

The **11BM8** is a versatile, space-saving **miniature 9-pin high-mu triode and power pentode** designed primarily for television receiver applications. Featuring a **10.7 V, 450 mA heater**, it integrates two distinct, high-performance electron systems in a single T-6 1/2 envelope. The triode section provides an amplification factor of **70** with a transconductance of **2500, mhos** at its typical operating point, while the pentode section delivers up to **5 W** of plate dissipation and a transconductance of up to **7500, mhos**. By offering independent cathode connections and low inter-section coupling capacitances, the 11BM8 allows designers to implement vertical deflection, oscillator, and audio power amplification circuits with minimal component count and high electrical isolation between stages.

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