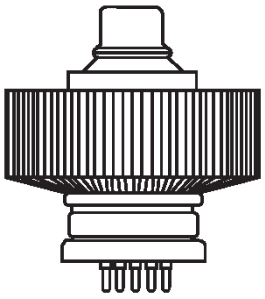


4CX800A
High Performance Tetrode

The Penta Laboratories 4CX800A is a high- performance ceramic metal tetrode with a plate dissipation rating of 800 watts with forced air cooling. The performance characteristics of the 4CX800A allow its use as a high gain grid-driven RF amplifier or in grounded grid service. A recommended mode of operation is in grid-driven service with a passive (resistive) 50 ohm untuned input circuit. This eliminates the need for multiple input tuned circuits and neutralization. In this mode, an exceptionally simple, stable, lowcost amplifier with good intermodulation performance can be designed.

As a linear power amplifier, the 4CX800A will conservatively produce 750 watts PEP SSB, and 750 watts Key Down CW in any of the three modes: grid-driven, grid-driven passive input, and cathode-driven. Because of the high performance characteristics of the 4CX800A , the tube will operate efficiently at low plate voltage.

ELECTRICAL CHARACTERISTICS

Filament:	Oxide-coated	
Voltage	12.6	Volts
Current (at 12.6 volts)	3.6	Amps
Voltage cathode-heater, max.	100	Volts
Warm-up time	2.5	Min
Amplification Factor, grid-to-screen	6.5	
Direct Interelectrode Capacitances - Grounded catjhode		
Input	51	pF
Ouput	11	pF
Feedback	0.09	pF
Frequency of Maximum Rating (CW)	150	MHz

MECHANICAL CHARACTERISTICS

Base	7 Pin Special	
Net Weight	19.4	Ounces
Maximum Overall Dimensions		
Length	3.51	inches
Diameter	2.81	inches
Mounting Position		Any
Cooling		Forced-air

Revised 28 April 2023

P E N T A L A B O R A T O R I E S

14399 PRINCETON AVENUE * MOORPARK * CALIFORNIA 93021
(800) 421-4219 * (818) 882-3872 * FAX: (818) 882-3968

ELECTRON TUBES FOR INDUSTRY

Maximum operating envelope temperature	200	°C
Recommended Socket	PSK-1A	

Radio Frequncy Linear Amplifier Class AB_1

Maximum Ratings

DC Plate Voltage	2500	Volts
DC Screen Voltage	350	Volts
DC Grid Voltage	-150	Volts
DC Plate Current	0.8	Amps
Plate Dissipation	800	Watts
Screen Dissipation	15	Watts
Grid Dissipation	2	Watts

Typical Operation - Grid Driven, Single Tone

Frequency	60	60	MHz
Power Output	550	780	Watts
DC Plate Voltage	2	2.2	Volts
DC Screen Voltage	300	350	Volts
Bias Voltage	-37	-47	Volts
Zero Signal Plate Current	300	360	mA
DC Plate Current	465	630	mA
DC Screen Current	30	30	mA
Peak RF Grid Voltage	30	35	Volts
Plate Dissipation	380	600	Watts
Intermodulation Distortion Measured by Two Tone Method at 1 MHz:			
Third Order	---	-30	dB
Fifth Order	---	-40	dB

Typical Operation - Linear with Cathode Resistance, Grid Driven

DC Plate Voltage	2200	2200	Volts
Bias Voltage	-56	-57	Volts
Zero Signal Plate Current	160	150	mA
DC Plate Current	550	520	mA
Plate Input Power	1200	1150	Watts
Driving Voltage	75	77	Volts
DC Grid Current	0	0	mA
Driving Power	56	59	Watts
Power Output	750	750	Watts
Intermodulation Distortion:			
Third Order	-30	-30	dB
Fifth Order	-43	-42	dB
Efficiency	63	65	%
Zero-Signal Plate Dissipation	352	330	Watts
DC Screen Voltage	350	350	Volts
DC Screen Current	24	24	mA
Cathode Resistance	24	33	Ohms

Typical Operation - Linear with Cathode Resistance, Cathode Driven

DC Plate Voltage	2200	2200	Volts
Bias Voltage	-57	-63	Volts
Zero Signal Plate Current	100	70	mA
DC Plate Current	590	490	mA
Plate Input Power	1300	1100	Watts
Driving Voltage	52	64	Volts
DC Grid Current	0	0	mA

Driving Power	27	41	Watts
Power Output	750	750	Watts
Intermodulation Distortion:			
Third Order	-32	-32	dB
Fifth Order	-40	-35	dB
Efficiency	58	68	%
Zero-Signal Plate Dissipation	200	154	Watts
DC Screen Voltage	300	300	Volts
DC Screen Current	20	17	mA
Cathode Resistance	0	24	Ohms

Typical Operation - FM Broadcast Power Amplifier

DC Plate Voltage	2200	Volts
Bias Voltage	-70	Volts
Driving Voltage	80	Volts
DC Plate Current	500	mA
DC Screen Current	30	mA
DC Grid Current	12	mA
Power Output	800	Watts
Screen Dissipation	8	Watts
Grid Dissipation	1	Watts
Efficiency	73	%

Linear Operation

Operating conditions with feedback are shown in the table on the previous page under Typical Operation, Linear with Cathode Resistance. This mode of operation is recommended for linear amplifier service where low zero signal plate current together with good intermodulation performance is required. These conditions were optimized for 750 watts power output, low zero signal plate current and intermodulation performance. A resistor is introduced in the cathode circuit to provide degeneration for improved linearity and reduced zero signal plate current. Increasing the resistance in the cathode circuit decreases the zero signal plate current and increases the required drive power. The drive power shown in the table was determined using a 50 ohm resistor for the input circuit. Note that no input tuned circuit or neutralization is required.

Plate Operation

The rated maximum plate dissipation power of the 4CX800A is 800 watts. The tube and associated circuits should be protected in the event of an internal arc by including a series current limiting resistance in the DC lead from the power supply to the plate. Its value must be 25 ohms or more. The resistor should be capable of withstanding the high surge current caused by the arc, and should not be used as a fuse.

Control Grid Operation

The maximum grid dissipation rating of the 4CX800A is 2 watts. The grid should not be driven unless screen and plate voltage is applied. The grid and associated circuitry should be protected against current surges in the event of internal arcs by a source impedance of greater than 50 ohms. For stability, the source impedance should not exceed 1K ohms.

Screen Grid Operation

The maximum rated power dissipation for the screen grid is 15 watts. The screen current may reverse under certain conditions and produce negative current. This is a normal characteristic of most tetrodes. The screen power supply should be designed with this characteristic in mind. A current path from screen to cathode must be provided and the source impedance should not exceed 3K ohms. When plate voltage, plate load or bias voltage is removed, screen grid voltage should be turned off automatically. Otherwise, screen grid power dissipation will be exceeded.

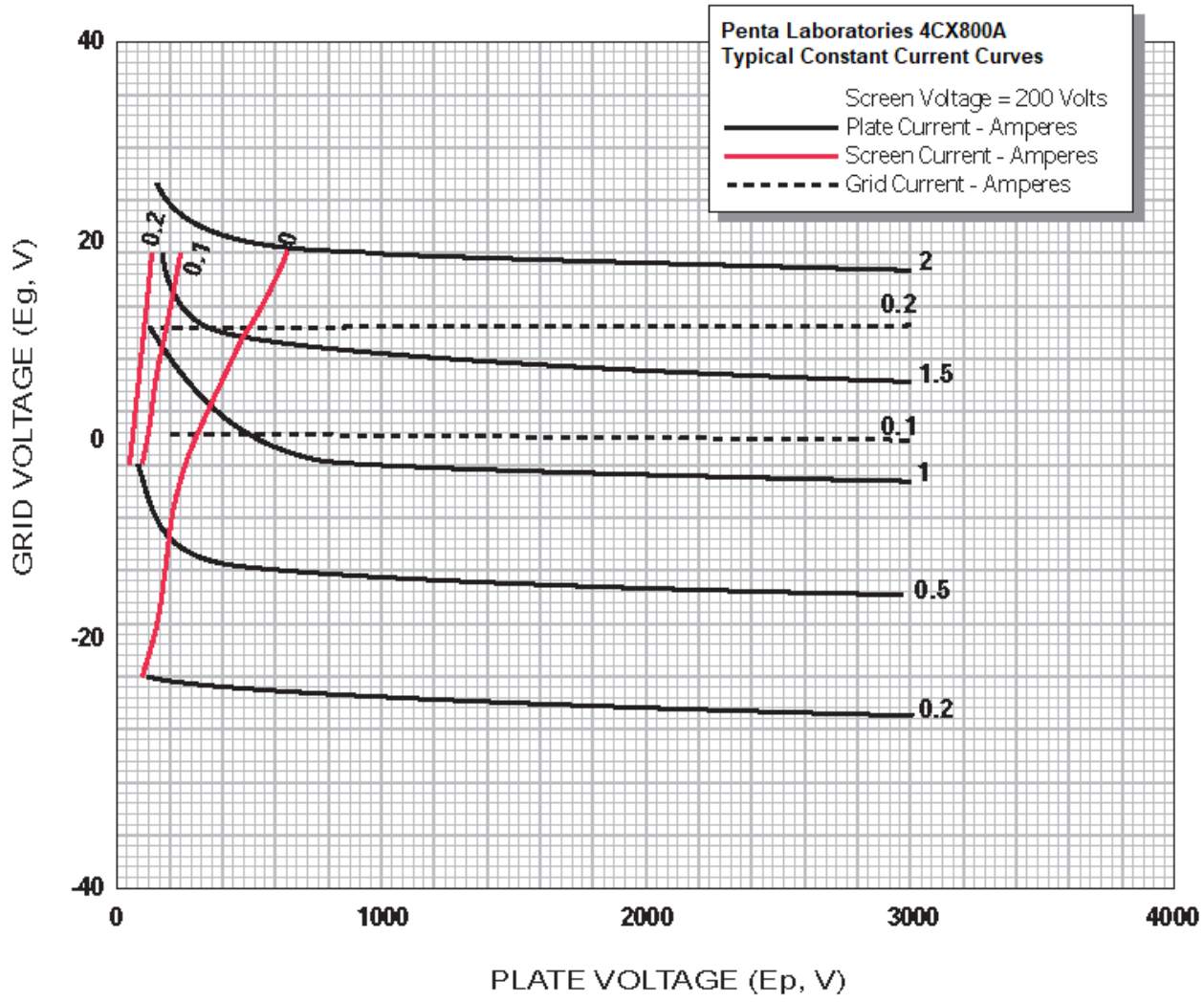
Cathode Operation

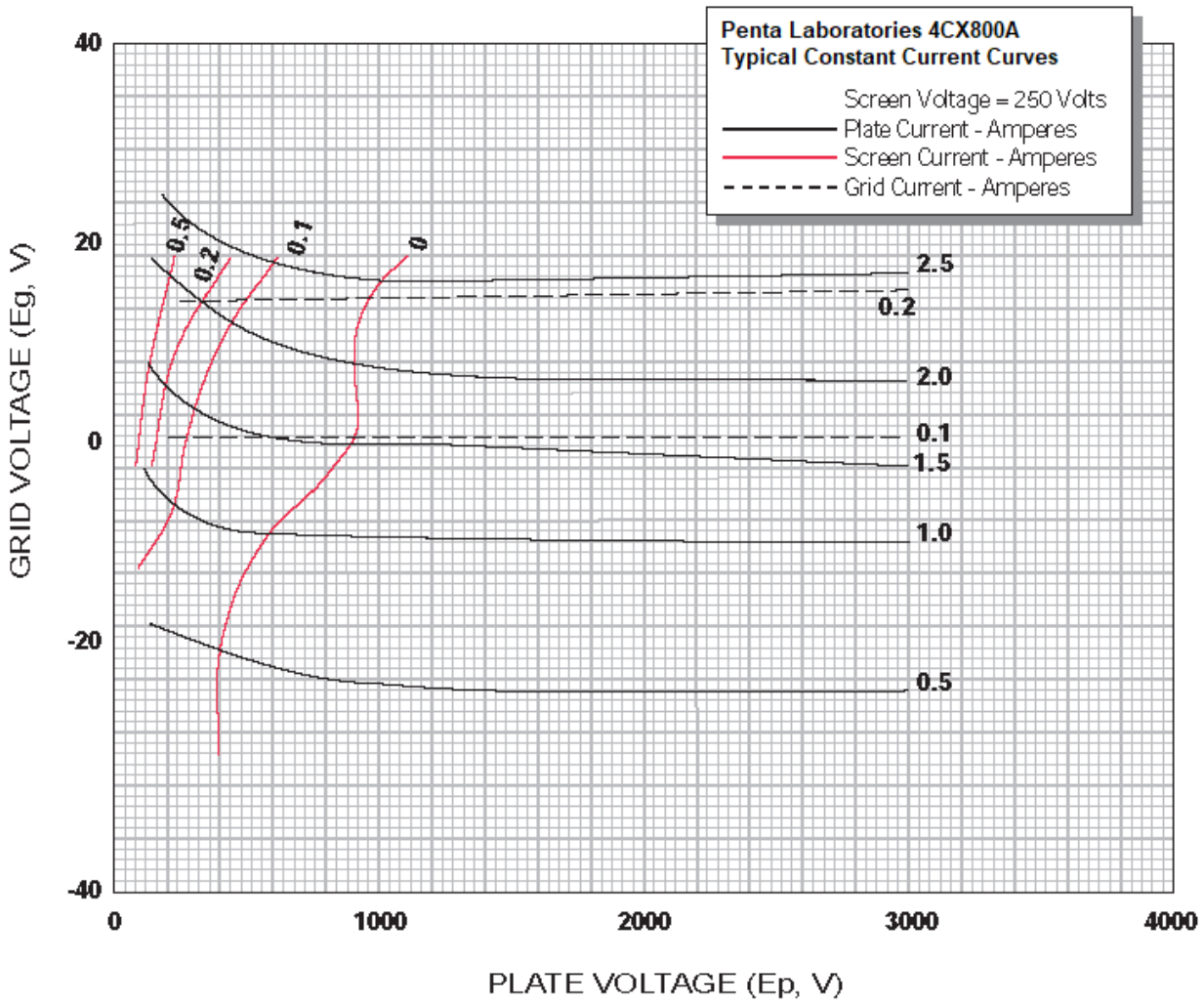
The cathode is internally connected to pins 2, 4 and 6. Three of the corresponding socket terminals should be used to make connection to the external circuits. At radio frequencies, it is important to keep the cathode leads short and direct and to use conductors with large areas to minimize the inductive reactances in series with the cathode leads.

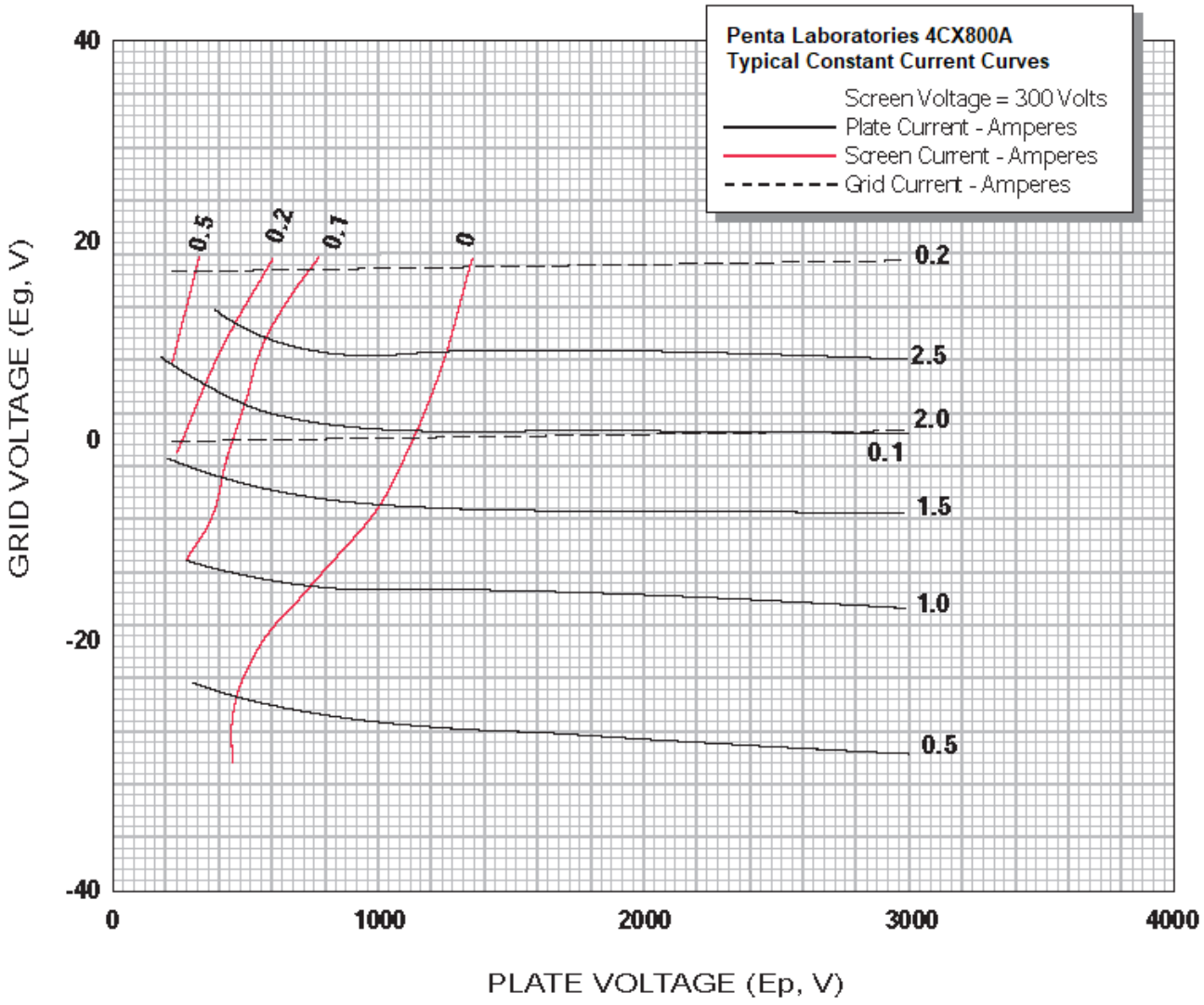
Mounting

The Penta PSK-1A socket is available for use with the 4CX800A. The PSK-1A has a built-in annular screen bypass capacitor of 0.01 mF suitable for use at HF and VHF. The tube may be mounted in any orientation.

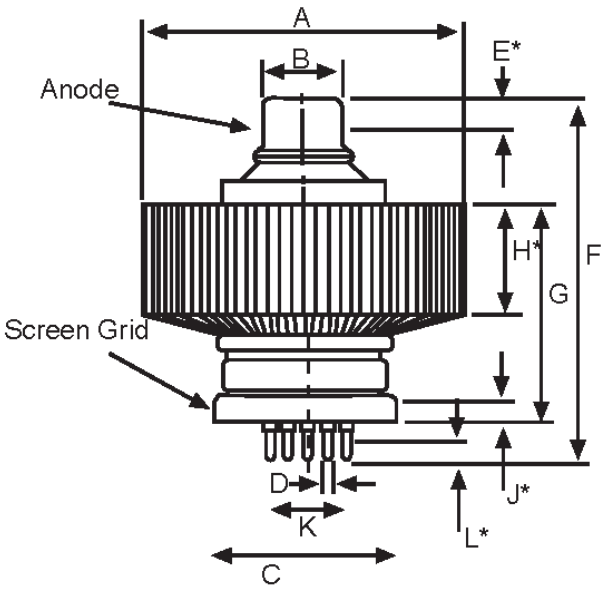
Penta 4CX800A Air-Flow Requirements				
Plate Power Dissipation (Watts)	Sea Level		5,000 Feet	
	Air Flow CFM	Pressure Drop in./water	Air Flow CFM	Pressure Drop in./water
Cooling air at 25°C				
400	6	0.1	7	0.2
600	12	0.2	14	0.3
800	20	0.5	25	0.6
Cooling air at 50°C				
400	8	0.2	10	0.2
600	17	0.4	21	0.4
800	29	0.835	35	0.6


Penta Laboratories 4CX800A
Typical Constant Current Curves
Screen Voltage = 200 Volts
Plate Current - Amperes
Screen Current - Amperes
Grid Current - Amperes
GRID VOLTAGE (Eg, V)
PLATE VOLTAGE (Ep, V)
40
20
0
-20
-40
0
1000
2000
3000
4000
0.2
0.1
0
2
0.2
1.5
0.1
1
0.5
0.2


Penta Laboratories 4CX800A
Typical Constant Current Curves
Screen Voltage = 250 Volts
Plate Current - Amperes
Screen Current - Amperes
Grid Current - Amperes
GRID VOLTAGE (Eg, V)
PLATE VOLTAGE (Ep, V)
40
20
0
-20
-40
0
1000
2000
3000
4000
0.5
0.2
0.1
0
2.5
0.2
2.0
0.1
1.5
1.0
0.5

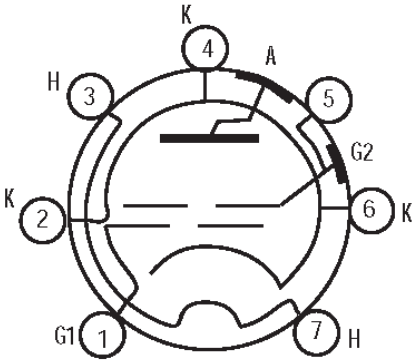

Penta Laboratories 4CX800A
Typical Constant Current Curves
Screen Voltage = 300 Volts
Plate Current - Amperes
Screen Current - Amperes
Grid Current - Amperes
GRID VOLTAGE (Eg, V)
PLATE VOLTAGE (Ep, V)
40
20
0
-20
-40
0
1000
2000
3000
4000
0.5
0.2
0.1
0
0.2
2.5
2.0
0.1
1.5
1.0
0.5

Penta Outline Drawing



*Contact Surface

Index
Vertical line marked on Anode Cooler



Bottom View

Dimensional Data						
Dim.	Inches			Millimeters		
	Min.	Max.	Ref.	Min.	Max.	Ref.
A	2.756	2.835		70	72	
B	0.669	0.748		17	19	
C	1.988	2.028		50.5	51.5	
D	0.053	0.060		1.34	1.53	
E	0.394	–		10	–	
F	–	3.543		–	90	
G	2.008	2.126		51	54	
H	0.747	0.860		20	22	
J	0.197	–		5	–	
K	–	–	0.7	–	–	175
L	0.3	0.37		7.6	9.4	

Note: Ref. dimensions are for reference