TECHNICAL DATA

3CX1200A7

HIGH-MU POWER TRIODE

The EIMAC 3CX1200A7 is a high mu, compact, forced-air cooled, rugged, ceramic/metal power triode, intended to be used as a zero-bias Class AB_2 amplifier. Grounded grid operation is also attractive since a power gain as high as twenty times can be obtained in a cathode-driven circuit.

GENERAL CHARACTERISTICS[1]

ELECTRICAL

Filament: Thoriated Tungsten

Voltage	7.5 Volts ±0.37 V
Current	21.3
Frequency for Maximum Ratings	110 MHz
Amplification Factor	200

Interelectrode Capacitances (grounded filament connection)[2]

Input	20 pF
Output (max)	0.6 pF
Feedback	10.3 pF

Interelectrode Capacitances (grounded grid connection)[2]

Input	20 pF
Output	10.3 pF
Feedback (max)	0.6 pF

MECHANICAL

Cooling	Forced Air
Maximum Operating Temperatures	
Plate Seal	250°C
Base Seal	250°C
Mounting Position	Vertical, Base Up or Down
Socket	SK410
Chimney	SK436
Maximum Length	6.0 in; 147 mm
Maximum Diameter	2.91 in; 73.1 mm
Weight (Approximate)	2.5 lb; 1.1 kg

[1] Characteristics and operating values are based upon performance tests. These figures may change without notice as the result of additional data or product refinement. Varian EIMAC should be consulted before using this information for final equipment design.

[2] Capacitance values are for a cold tube as measured in a special shielded fixture in accordance with Electronic Industries Association Standard RS-191.

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Printed in U.S.A.

RADIO FREQUENCY LINEAR AMPLIFIER
CATHODE DRIVEN Class AB_2

TYPICAL OPERATION

(Frequencies to 30 MHz) Class AB_2, Cathode Driven, Peak Envelope or Modulation Crest Conditions

Plate Voltage	2500	3000	3500	4000	Vdc
Cathode Voltage[1]	0	0	0	0	Vdc
Zero-Signal Plate Current[3]	130	165	205	240	mA dc
Single-Tone Plate Current	800	800	800	800	mA dc
Two-Tone Plate Current	540	560	570	565	mA dc
Single-Tone Grid Current[3]	255	250	275	250	mA dc
Two-Tone Grid Current[3]	140	130	140	112	mA dc
Peak rf Cathode Voltage[3]	115	105	120	115	vAc
Peak Driving Power[3]	102	105	110	100	W
Single-Tone Useful Output Power[3]	1250	1600	1870	2055	W
Resonant Load Impedance	1750	2080	2430	2780	ohms
Intermodulation Distortion Products[2]					
3rd Order	-37	-35	-30	-33	dB
5th Order	-42	-47	-43	-48	dB

1 Positive cathode bias may be provided by a zener diode.
2 The intermodulation distortion products are referenced against one tone of a two-equal-tone signal.
3 Approximate values.

MAXIMUM RATINGS:

DC Plate Voltage	5500 V
DC Plate Current	0.9 Adc
Grid Dissipation	50 W
Plate Dissipation	1200 W

RADIO FREQUENCY POWER AMPLIFIER
CATHODE DRIVEN Class C

TYPICAL OPERATION

Carrier Conditions, Frequencies to 30 MHz

Plate Voltage	5000	Vdc
Cathode Voltage	+65	Vdc
Plate Current	800	mA dc
Grid Current	240	mA dc
Plate Load Resistance	3200	ohms
Driving Power	43	W
Plate Output Power	2700	W
Power Gain	18	dB

MAXIMUM RATINGS:

DC Plate Voltage	5500 V
DC Plate Current	0.9 Adc
Grid Dissipation	50 W
Plate Dissipation	1200 W

RANGE VALUES FOR EQUIPMENT DESIGN	Min	Max	
Filament Current at 7.5V	20.0	22.7	Aac
Direct Interelectrode Capacitance (grounded grid connection)			
Input	18.5	22.5	pF
Output	8.8	11.8	pF
Feedback	—	0.9	pF
Direct Interelectrode Capacitance (grounded cathode connection)			
Input	18.5	22.5	pF
Output	—	0.9	pF
Feedback	8.8	11.8	pF

APPLICATION

MECHANICAL

MOUNTING: The 3CX1200A7 must be operated vertically, base up or down. A flexible connecting strap should be provided between plate connector and external plate circuit. The tube must be protected from severe vibration and shock.

SOCKET: The EIMAC SK-410 air system socket and SK-436 chimney are recommended for use with the 3CX1200A7. When a socket other than the SK-410 is used, provisions must be made for equivalent cooling of the base, the envelope, and the plate lead.

If a socket other than the EIMAC SK-410 is used, the user should assure himself that strong lateral pressure is not applied to the tube base pins. Otherwise, even though the base of the tube is reinforced, damage to the base seals may result.

COOLING: Forced-air cooling is required to maintain the base seals at a temperature below 250° C, and the plate seal at a temperature below 250° C. Air flow requirements to maintain the above maximum temperatures are shown on cooling data curve.

At 1200 W of plate dissipation an airflow of 30 cfm with a back pressure of 0.5 inches of water should be applied and directed through the fins of the tube. A minimum of 5 cfm must be supplied to the base of tube whenever the filament voltage is on.

In all cases, the only criterion of proper cooling is the temperature of the tube seals. Tube temperatures may be measured with temperature sensitive paint, spray, or crayon.

HOT SURFACES: When the tube is used in air and air cooled, external surfaces may reach temperatures up to 200 degrees C and higher. In addition to the anode, the cathode insulator and cathode-heater surfaces especially may reach the high temperatures. All hot surfaces may remain hot for an extended time after the tube is shut off. To prevent serious burns, take care to avoid any bodily contact with these surfaces, both during, and for a reasonable cool-down period after, tube operation.

ELECTRICAL

ABSOLUTE MAXIMUM RATINGS: Values shown for each type of service are based on the "absolute system" and are not to be exceeded under any service conditions. These ratings are limiting values outside which the serviceability of the tube may be impaired. In order not to exceed absolute ratings, the equipment designer has the responsibility of determining an average design value for each rating below the absolute value of that rating by a safety factor so that the absolute values will never be exceeded under any usual conditions of supply voltage variation in the equipment itself. It does not necessarily follow that combinations of absolute maximum ratings can be attained simultaneously.

ZERO-BIAS OPERATION: Operation at zero-bias is not recommended with plate voltages over 4000 since plate dissipation may be exceeded. A zener diode placing positive bias on the cathode or other constant voltage source may be used to reduce zero signal plate current at plate potentials over 4000 volts.

CLASS-C OPERATION: Although specifically designed for linear amplifier service, the 3CX1200A7 may be operated as a class-C power amplifier or oscillator or as a plate-modulated radio-frequency power amplifer. The zero-bias characteristic of the 3CX1200A7 can be used to advantage in class-C amplifiers operating at plate voltages of 4000 volts or below by employing only grid-resistor bias. If driving power fails, plate dissipation is then kept to a low value because the tube will be operating at the normal static zero-bias conditions.

FILAMENT OPERATION: The rated filament voltage for the 3CX1200A7 is 7.5 volts. Filament voltage, as measured at the socket, must be maintained within the range of 7.87 to 7.13 volts to obtain maximum tube life.

For best tube life the inrush current to the filament should be limited to two times normal current during turn-on. This will minimize thermal stress on the thoriated-tungsten filament wire, which can cause internal tube geometry changes with repeated cycling.

HIGH VOLTAGE: Operating voltage for the 3XC1200A7 can be deadly, so the equipment must be designed properly and operating precautions must be followed. Design equipment so that no one can come in contact with high voltages. All equipment must include safety enclosures for high voltage circuits and terminals, with interlock switches to open the primary circuits of the power supply and to discharge high voltage capacitors whenever access doors are opened. Interlock switches must not be bypassed or "cheated" to allow operation with access doors open. Remember that HIGH VOLTAGE CAN KILL.

INTERMODULATION DISTORTION: Typical operating conditions with distortion values included are the result of data taken during actual operation at 2 megahertz. Intermodulation values listed are those measured at the full peak envelope power noted.

INTERELECTRODE CAPACITANCE: The actual internal interelectrode capacitance of a tube is influenced by many variables in most applications such as stray capacitance to the chassis, capacitance added by the socket used, stray capacitance between the tube terminals, and wiring effects. To control the actual capacitance values within the tube as the key component involved, the industry and military services use a standard test procedure as described in Electronic Industries Association Standard RS-191. This requires the use of specially constructed test fixtures which effectively shield all external tube leads from each other and eliminate any capacitance reading to "ground." The test is performed on a cold tube. Other factors being equal, controlling internal tube capacitance in this way normally assures good interchangeability of tubes over a period of time, even if the tube is made by different manufacturers. The capacitance values shown in the manufacturer's technical data, or test specifications, normally are taken in accordance with Standard RS-191.

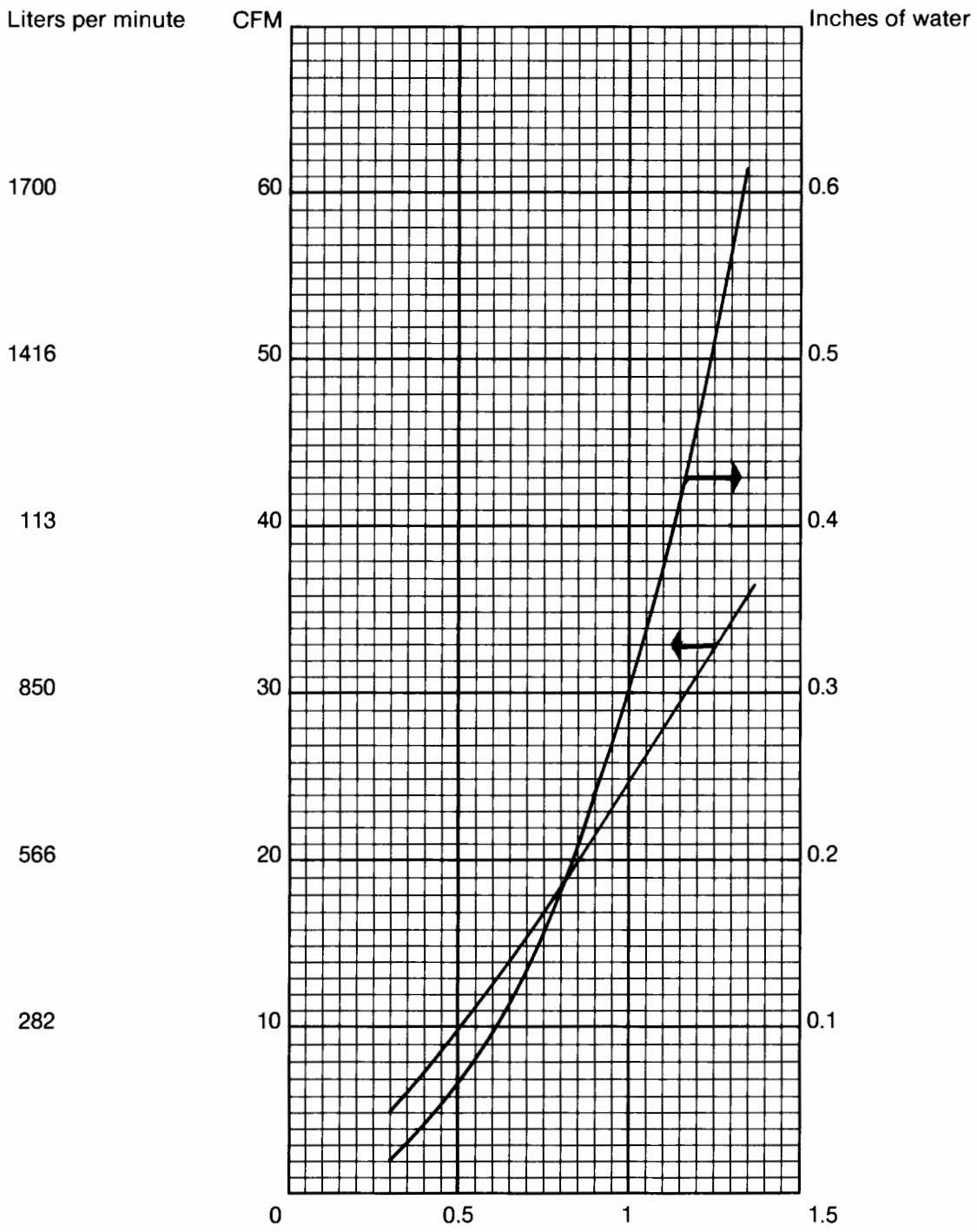
The equipment designer is, therefore, cautioned to make allowance for the actual capacitance values which will exist in any normal application. Measurements should be taken with the socket and mounting which represent approximate final layout if capacitance values are highly significant in the design.

INPUT CIRCUIT: When the 3CX1200A7 is operated as a grounded-grid rf amplifier, the use of a resonant tank in the cathode circuit is recommended in order to obtain greatest linearity and power output. For best results with a single-ended amplifier it is suggested that the cathode tank circuit operate at a Q of two or more.

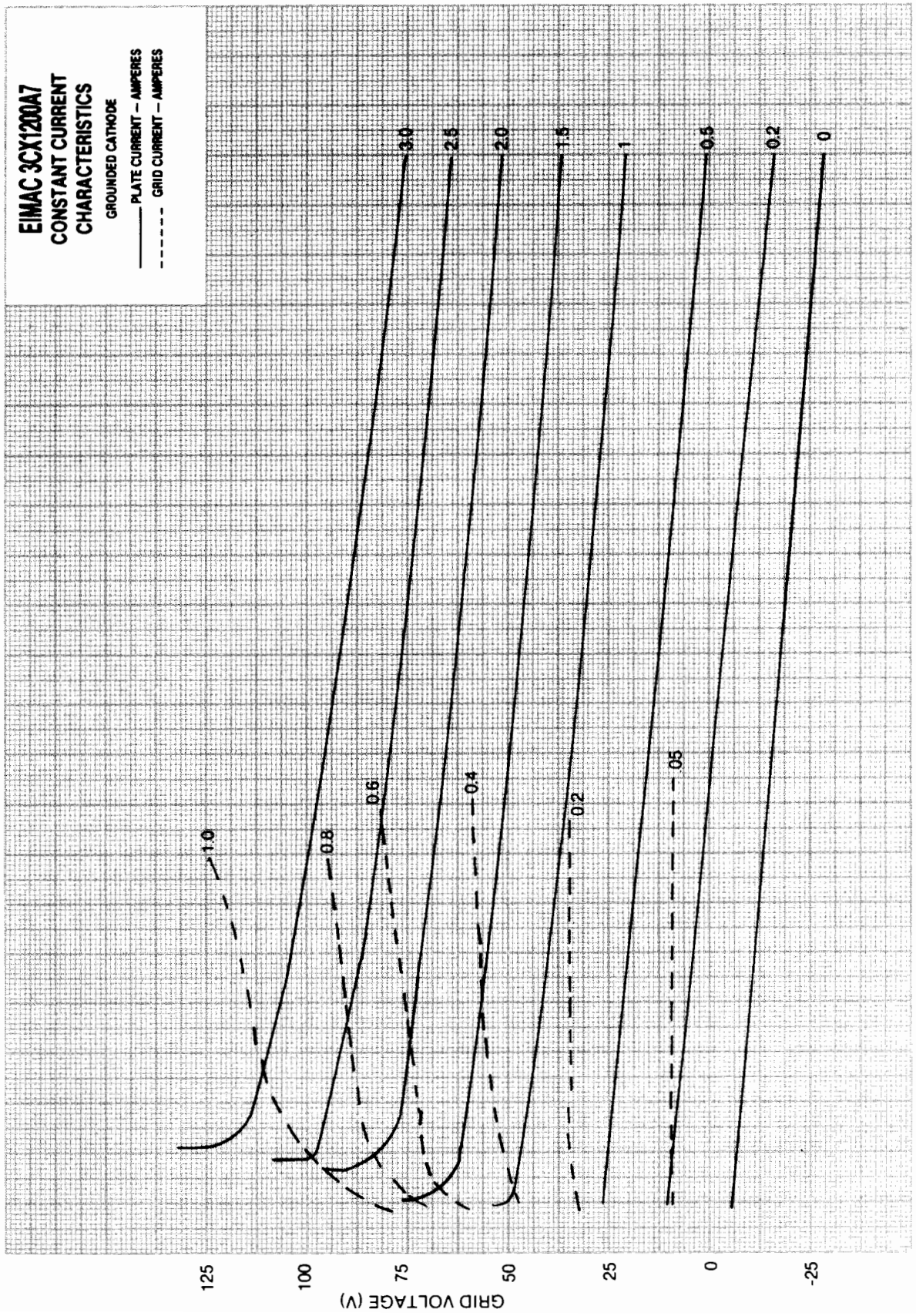
SPECIAL APPLICATIONS: If it is desired to operate this tube under conditions widely different from those given here, write to the Varian Electron Device Group Sales Office or the Product Manager, Varian EIMAC, 1678 Pioneer Rd., Salt Lake City, UT 84104, for information and recommendation.

COOLING DATA

3CX1200A7



CFM and pressure required to keep anode temperature at 225°C.
Standard conditions 25°C at 29.92 In. Hg
1 PAS = .00407 X In. of water
1 cubic meter/min. = 2.832 X 10^{-2} X CFM


EIMAC 3CX1200A7
CONSTANT CURRENT CHARACTERISTICS
GROUNDED CATHODE
PLATE CURRENT – AMPERES
GRID CURRENT – AMPERES
3.0
2.5
2.0
1.5
1
0.5
0.2
0
1.0
0.8
0.6
0.4
0.2
.05
GRID VOLTAGE (V)
125
100
75
50
25
0
-25
1
2
3
4
5
PLATE VOLTAGE (kV)

DIMENSIONAL DATA						
	INCHES			MILLIMETERS		
DIM	MIN	MAX	REF	MIN	MAX	REF
A		5.400			137.16	
B			2.750			67.4
C			2.500			63.5
D			.312			7.65
E			1.500			36.75
F			3.375			82.7
G	.700	.800		17.15	19.6	
H			.937			22.95
K			30°			30°
L	.185	.191		4.53	4.68	
M			1.250			30.63
N			2.875			70.44

NOTES:

1. REF DIMENSIONS ARE FOR INFO ONLY & ARE NOT REQUIRED FOR INSPECTION PURPOSES.