Beam Power Tube

Full Ratings to 500 MHz
80 Watts PEP Output at 30 MHz

ELECTRICAL

Heater, for Unipotential Cathode:		
Voltage (AC or DC)[a]	26.5	V
Current at 26.5 volts	0.68	A
Minimum heating time	120	s
Mu-Factor, (Grid No.2 to Grid No.1)[b]	12	
Direct Interelectrode Capacitances:[c]		
Grid No.1 to plate	0.15 max.	pF
Grid No.1 to cathode	16	pF
Plate to cathode	0.010	pF
Grid No.1 to grid No.2	23	pF
Grid No.2 to plate	7.2	pF
Grid No.2 to cathode	2.7	pF
Cathode to heater	3.3	pF
Mounting flange to plate	3.0	pF

MECHANICAL

Operating Position ..... Any

Maximum Overall Length ..... (56.9 mm) 2.24 in

Seated Length ..... (49.8 mm) 1.96 in

Greatest Radius ..... (35.1 mm) 1.38 in

Base-Large Wafer Elevenar 11-Pin with Ring ..... (JEDEC No.E11-81)

Socket[d] ..... Erie 9802-000, Erie 9804-000; Johnson 124-311-100 or equivalent

Grid No.2 By-pass Capacitor ... Erie 2943-002, Johnson 124-121 or equivalent

Weight (Approx.) ..... (170.1 gr) 6 oz

THERMAL

Terminal Temperature[e]	250 max.	°C
Radiator Core Temperature[e]	250 max.	°C
Mounting Flange Temperature[e]	125 max.	°C

LINEAR RF POWER AMPLIFIER[f]
SINGLE-SIDEBAND SUPPRESSED-CARRIER SERVICE

Peak envelope conditions for a signal having a minimum peak-to-average power ratio of 2

MAXIMUM CCS RATINGS, *Absolute-Maximum Values:*

	Up to 500 MHz	
DC Plate Voltage	2200 max.	V
DC Grid-No.2 Voltage	400 max.	V
DC Grid-No.1 Voltage	-100 max.	V
DC Plate Current at Peak of Envelope[g]	450 max.	mA
DC Grid-No.1 Current	100 max.	mA
Plate Dissipation[h]	200 max.	W
Grid No.2 Dissipation	8 max.	W
Peak Heater-Cathode Voltage:		
Heater negative with respect to cathode	150 max.	V
Heater positive with respect to cathode	150 max.	V

TYPICAL CCS OPERATION WITH "TWO-TONE MODULATION":

	At 30 MHz	
DC Plate Voltage[j]	700	V
DC Grid-No.2 Voltage[k]	250	V
DC Grid-No.1 Voltage[m]	-20	V
Zero-Signal DC Plate Current	100	mA
Effective RF Load Resistance	1420	Ω
DC Plate Current at Peak of Envelope	205	mA
Average DC Plate Current	150	mA
DC Grid-No.2 Current at Peak of Envelope	16	mA
Average DC Grid-No.2 Current	10	mA
Average DC Grid-No.1 Current[n]	1.0	mA
Peak-Envelope Driver Power Output (Approx.)[p]	0.3	W
Output-Circuit Efficiency (Approx.)	95	%
Distortion Products Level:[r]		
Third order	30	dB
Fifth order	35	dB
Useful Power Output (Approx.):		
Average[s]	40	W
Peak envelope	80	W

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance

Under Any Condition:

With fixed bias . . . . . 25000 max.Ω

With fixed bias (in Class AB_1 operation) . . . . . 100000 max.Ω

With cathode bias . . . . . Not recommended

Grid-No.2 Circuit Impedance . . . . . 10000 Ω

Plate Circuit Impedance . . . . . See Note j

PLATE-MODULATED RF POWER AMPLIFIER[f] CLASS C TELEPHONY

Carrier conditions per tube for use with a max. modulation factor of 1.0.

MAXIMUM CCS RATINGS, *Absolute-Maximum Values:*

	Up to 500 MHz	
DC Plate Voltage	1800 max.	V
DC Grid-No.2 Voltage	400 max.	V
DC Grid-No.1 Voltage	-100 max.	V
DC Plate Current	250 max.	mA
DC Grid-No.1 Current	100 max.	mA
Grid-No.2 Input	5 max.	W
Plate Dissipation	150 max.	W

TYPICAL CCS OPERATION

In grid-drive circuit at 50 MHz

DC Plate Voltage	500	700	V
DC Grid-No.2 Voltage[t]	150	150	V
DC Grid-No.1 Voltage[u]	-20	-25	V
DC Plate Current	200	250	mA
DC Grid-No.2 Current	35	40	mA
DC Grid-No.1 Current	20	35	mA
Driver Power Output (Approx.)[v]	1.2	2	W
Output Circuit Efficiency (Approx.)	90	90	%
Useful Power Output (Approx.)	50	100	W

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance

Under Any Condition:

With fixed bias . . . . . 25000 max.Ω

Grid-No.2 Circuit Impedance . . . . . 10000 max.Ω

Plate Circuit Impedance . . . . . See Note j

RF POWER AMP. AND OSCILLATOR[f], CLASS C TELEGRAPHY
RF POWER AMPLIFIER[f] AND CLASS C FM TELEPHONY

MAXIMUM CCS RATINGS, *Absolute-Maximum Values:*

	Up to 500 MHz	
DC Plate Voltage[j]	2200 max.	V
DC Grid-No.2 Voltage[k]	400 max.	V
DC Grid-No.1 Voltage[m]	-100 max.	V
DC Plate Current	300 max.	mA
DC Grid-No.1 Current	100 max.	mA
Grid-No.2 Dissipation	8 max.	W
Plate Dissipation[h]	200 max.	W
Peak Heater-Cathode Voltage:		
Heater negative with respect to cathode	150 max.	V
Heater positive with respect to cathode	150 max.	V

TYPICAL CCS OPERATION

In Grid-Drive Circuit at 50 MHz

DC Plate Voltage	500	700	V
DC Grid-No.2 Voltage	160	175	V
DC Grid-No.1 Voltage	-10	-10	V
DC Plate Current	300	300	mA
DC Grid-No.2 Current	25	25	mA
DC Grid-No.1 Current	50	50	mA
Driver Power Output (Approx.)[v]	1.2	1.2	W
Useful Power Output[s]	75	100	W

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance	
Under Any Condition:	
With Fixed bias	25,000 max.Ω
Grid-No.2 Circuit Impedance	10,000 max.Ω
Plate Circuit Impedance	See Note j

CHARACTERISTICS RANGE VALUES

	Note	Min.	Max.	
Heater Current	1	0.62	0.74	A
Direct Interelectrode Capacitances:				
Grid-No.1 to plate	2		0.15	pF
Grid-No.1 to cathode	2	14.6	18.0	pF
Plate to cathode	2	0.004	0.016	pF
Grid-No.1 to grid No.2	2	20.0	26.5	pF
Grid-No.2 to plate	2	6.5	7.9	pF
Grid-No.2 to cathode	2	2.1	3.3	pF
Cathode to heater	2	2.5	4.1	pF
Grid-No.1 Voltage	1,3	-8	-19	V
Grid-No.2 Current	1,3	-5	+6	mA
Interelectrode Leakage Resistance	4	50		MΩ
Cutoff Grid-No.1 Voltage	1,5		-47	V

Note 1: With 26.5 volts ac or dc on heater.

Note 2: Measured with special shield adapter.

Note 3: With dc plate voltage of 700 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage adjusted to give a dc plate current of 185 ma.

Note 4: Under conditions with tube at 20° to 30° C for at least 30 minutes without any voltages applied to the tube. The resistance between any two electrodes is measured with a 200-volt Megger-type ohmmeter, or equivalent, having an internal impedance of 1.0 megohm.

Note 5: With dc plate voltage of 2000 volts, dc grid-No.2 voltage of 250 volts, and dc grid-No.1 voltage varied to obtain a plate current of 5 ma.

b For plate volts = 450 V_{dc} Grid No.2 volts = 325 V_{dc}
Plate Current = 1.2 A

c Measured with special shield adapter.

d These items may be obtained from:

Erie Technological Products Inc.,
644 West Twelfth Street
Erie, PA 16512

E. F. Johnson Company
299 Tenth Avenue S. W.
Waseca, MN 56093

e See Dimensional Outline for Temperature Measurement Points.

g The maximum rating for a signal having a minimum peak-to-average power ratio less than 2, such as is obtained in "Single-Tone" operation, is 300 mA. During short periods of circuit adjustment under "Single-Tone" conditions, the average plate current may be as high as 450 mA.

h Maximum plate dissipation is limited by the maximum mounting flange temperature and the cooling system to maintain tube operation below the specified maximum mounting flange temperature.

n This value represents the approximate grid-No.1 current obtained due to initial electron velocities and contact-potential effects when grid No.1 is driven to zero volts at maximum signal.

p Driver power output represents circuit losses and is the actual power measured at input to grid-No.1 circuit. The actual power required depends on the operating frequency and the circuit used. The tube driving power is approximately zero watts.

r Referenced to either of the two tones and without the use of feedback to enhance linearity.

s This value of useful power is measured at the load of the output circuit.

t Obtained preferably from a separate source modulated along with the plate supply.

u Obtained from the Grid-No.1 resistor or from a combination of Grid-No.1 resistor with either a fixed supply or cathode resistor.

v Driver power output included circuit losses and is the actual power measured at the input to the grid circuit. It will vary depending upon the frequency of operation and the circuit used.

The following footnotes apply to the *RCA Transmitting Tube Operating Considerations* given at the front of this section.

a–See *ELECTRICAL CONSIDERATIONS* - Filament or Heater.

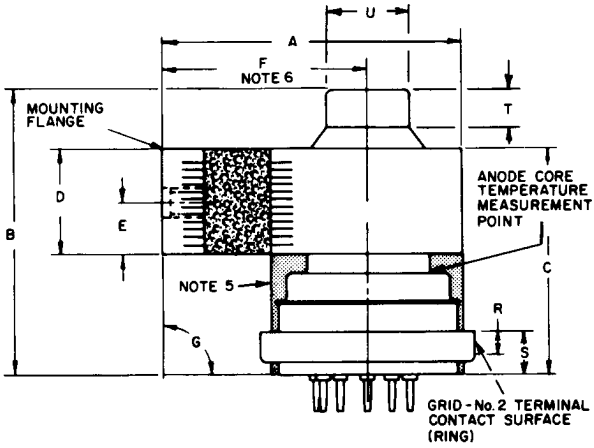
f–See *CLASSES OF SERVICE* - RF Power Amplifiers or Oscillators.

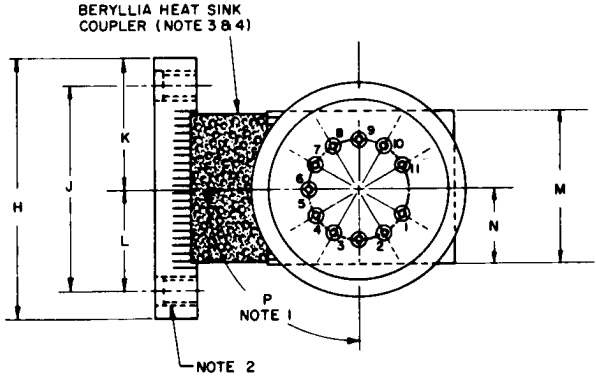
j–See *ELECTRICAL CONSIDERATIONS* - Plate Voltage Supply.

k–See *ELECTRICAL CONSIDERATIONS* - Grid-No. 2 Voltage Supply.

m–See *ELECTRICAL CONSIDERATIONS* - Grid-No. 1 Voltage Supply.

DIMENSIONAL OUTLINE





CERAMIC

KEEP CLEAR

OUTLINE DIMENSIONS

Dimension	Value Inches	Millimeters	Degrees
A	2.000 max.	50.80 max.	
B	1.960 max.	49.78 max.	
C	1.515 ± .030	38.48 ± .76	
D	0.700 ± .020	17.78 ± .51	
E	0.350 ± .010	8.89 ± .25	
F	1.375 ref.	34.93 ref.	
G			90° ± 1°
H	1.750 ± .020	44.45 ± .51	
J	1.375	34.93	
K	0.875	22.23	
L	0.688	17.48	
M	1.187 ± .015	30.15 ± .38	
N	0.593 ± .005	15.06 ± .13	
P			90°
R	0.150 min.	3.81 min.	
S	0.300 ± .020	7.62 ± .51	
T	0.255 $^{+.025}_{-.015}$	6.48 $^{+.64}_{-.38}$	
U	0.568 $^{+.005}_{-.009}$	14.43 $^{+.13}_{-.23}$	

DIMENSIONAL OUTLINE NOTES

Note 1: Flat location in relation to pin 6 of JEDEC Base E11-81.

Note 2: Tapped holes (2) 6-32 for conduction cooling system.

Note 3: CAUTION! Heat sink ceramic consists of beryllium oxide. Inhalation of beryllium oxide dust can be hazardous. Disposal precaution required.

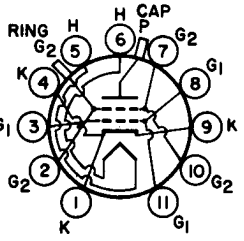
Note 4: Reference. J.F. Gaylord. "The Conduction Cooling of Power Tubes in Vehicular Communication Equipment", RCA Publication ST 2250 9/63.

Note 5: Keep all stippled regions clear. Do not allow contact or circuit components to intrude into this annular volume.

Note 6: In order to accomodate the eccentricities of the tube base with respect to the anode, and the variations in manufacturing tolerances of the conduction cooling assembly it is recommended that the holes for socket mounting be made larger than that required for screw clearance. Thus the tube may be mounted to the heat sink without placing undue strain on the tube base pins. An increase in socket mounting hole size of .030 inch should be adequate in most instances.

TERMINAL DIAGRAM

(Bottom View)

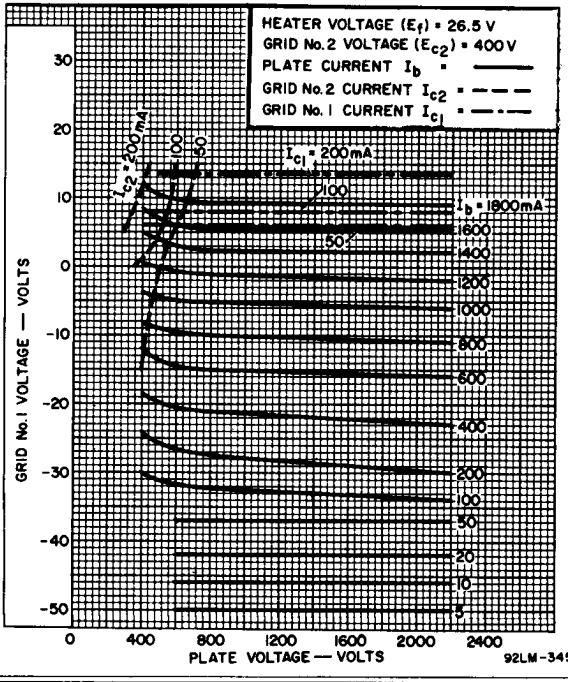


Pin 1: Cathode
Pin 2: Grid No.2
Pin 3: Grid No.1
Pin 4: Cathode
Pin 5: Heater
Pin 6: Heater
Pin 7: Grid No.2
Pin 8: Grid No.1
Pin 9: Cathode
Pin 10: Grid No.2
Pin 11: Grid No.1

Cap: Plate Terminal
Ring: Grid-No.2 Terminal Contact Surface (For use at higher frequencies)

Base conforms to specification of JEDEC No.E11-81
Large Wafer Elevenar Base Eleven Pin with Ring and can be checked with gauge JEDEC No.GE11-1

CONSTANT-CURRENT CHARACTERISTICS



CONSTANT-CURRENT CHARACTERISTICS