Super-Power Triode

8 MEGAWATTS OF PEAK POWER OUTPUT AT 425 MHz

MATRIX-OXIDE-TYPE CATHODE
LIQUID COOLED

DOUBLE-ENDED TERMINAL CONFIGURATION FOR SYMMETRICAL CIRCUITRY

For RF Power Amplifier in Pulse Service at Frequencies up to 450 MHz

ELECTRICAL

Filamentary Cathode, Multistrand, Matrix-Oxide-Type[k]—		
Current (DC):		
Typical operating value	1800	A
Maximum value[a]	2000	A
Maximum value for starting, even momentarily	2000	A
Minimum time to reach operating current	30	s
Minimum time at normal operating current before plate voltage is applied	60	s
Voltage (DC):[b]		
Typical value required to obtain 1800 amperes	1.5	V
Direct Interelectrode Capacitances		
Grid to plate	160	pF
Grid to cathode	1500	pF
Plate to cathode	Less than 1.0	pF

MECHANICAL

Operating Position	Tube axis vertical, either end up
Overall Length	17 max in
Maximum Width	24 max in
Weight	
Uncrated	190 lb
Crated	355 lb
Terminal Connections	(See *Dimensional Outline*)

THERMAL[m,n]

Ceramic-Insulator Temperature	150 max	°C
Metal-Surface Temperature	100 max	°C
Minimum Storage Temperature	-65 min	°C

Water Flow

	Typ. Flow g/m	*Absolute Min. Flow* g/m	*Max. Pressure Differential for Typ. Flow*[c] psi
To plate:			
Total flow for two parallel input and output coolant courses:			
For plate dissipation up to 50 kW (Average)	40	35	4
For plate dissipation of 150 kW (Average)	100	90	25

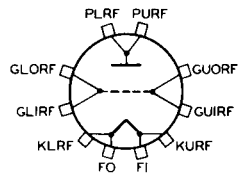
Water Flow (con'd)

	Typ. Flow g/m	Absolute Min. Flow g/m	Max. Pressure Differential for Typ. Flow[c] psi
To upper grid coolant course	3	2	25
To lower grid coolant course	3	2	25
To grid-cathode coolant course	12	10	6

Resistivity of water at 25°C:		
Through plate and grid coolant courses	1 min	MΩ-cm
Through grid-cathode coolant course	5 min	MΩ-cm
Water temperature from any outlet	70 max	°C
External gas pressure[d,e]	65 max	psig
Maximum watter pressure at any inlet	90 max	psig

TERMINAL DIAGRAM (Bottom View)

FI – Filament Terminal (Inner)
FO – Filament Terminal (Outer)
KURF – Upper RF Cathode Terminal
KLRF – Lower RF Cathode Terminal
GUIRF – Upper RF Grid Input Terminal
GUORF – Upper RF Grid Output Terminal
GLIRF – Lower RF Grid Input Terminal
GLORF – Lower RF Grid Output Terminal
PLRF – Lower RF Plate Terminal
PURF – Upper RF Plate Terminal



PULSED RF AMPLIFIER[p]

Absolute-Maximum Ratings

For a maximum "ON" time of 25 microseconds in any 2500-microsecond interval, for frequencies up to 450 MHz

Peak Positive-Pulse Plate Voltage[f]	40	kV
Peak Negative Grid Voltage	200	V
Peak Plate Current	500	A
Peak Cathode Current[g]	750	A
DC Plate Current	5	A
DC Cathode Current[g]	7.5	A
Plate Input (Average)	200	kW
Plate Dissipation (Average)	150	kW

Typical Plate-Pulsed Operation With Rectangular Wave Shape in Cathode-Drive Circuit

With duty factor of 0.01 and pulse duration of 25 microseconds

		At 425 MHz	
Peak Positive-Pulse Plate-to-Grid Voltage[f,h]	30000	35000	V
Peak Cathode-to-Grid Voltage[h]	60	70	V
Peak Plate Current	310	400	A
Peak Cathode Current[g]	525	680	A
DC Plate Current	3.1	4	A
DC Cathode Current[g]	5.2	6.8	A

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Peak Driver Power Output[j]	250	350	kW
Useful Peak Power Output	5	8	MW

[a] The specified maximum filament current is a maximum rating which should not be exceeded, even momentarily, during operation of the tube. The life of the tube can be conserved by operating the filament at the lowest current which will enable the tube to provide the desired power output. Because the filament when operated near the maximum value usually provides emission in excess of any requirements within the tube ratings, the filament current should be reduced to a value that will give adequate but not excessive emission for any particular application. Good regulation of the filament current is, in general, economically advantageous from the viewpoint of tube life.

[b] Measured between KLRF and KURF (See *Terminal Diagram*).

[c] Measured directly across cooled element for the indicated typical flow.

[d] This pressure is related to the output-cavity pressurization when required to prevent corona or external flash-over.

[e] With the gauge located in an area where the maximum pressure external to the gauge is one atmosphere absolute.

[f] The magnitude of any spike on the plate voltage pulse should not exceed its peak value by more than 10%, and the duration of any spike when measured at the peak-value level should not exceed 5% of the pulse duration.

[g] Peak or average cathode current is the total of the peak or average plate current and the peak or average rectified grid current. (Pulses may not be coincident, hence they may not necessarily be added directly).

[h] Preferably obtained from a cathode bias resistor.

[j] The driver stage is required to supply tube losses, rf circuit losses, and rf power added to the plate circuit. The driver stage should be designed to provide an excess of power above the indicated value to take care of variations in line voltage, in components, in initial tube characteristics, and in tube characteristics during life.

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

[k] See *Electrical Considerations* - Filament or Heater.

[m] See *Cooling Considerations* - Forced-Air Cooling.

[n] See *Cooling Considerations* - Liquid Cooling.

[p] See *Classes of Service*.

CHARACTERISTICS RANGE VALUES

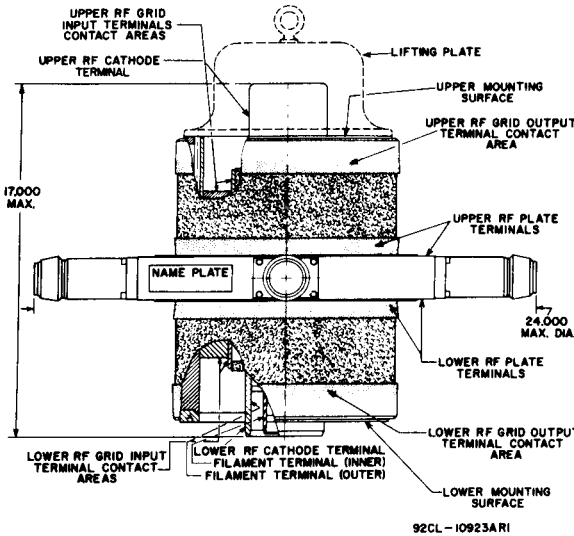
	Note	*Min*	*Max*	
Filament Voltage	1	1	1.8	V
Input Strap-Resonant Frequency	-	90	120	MHz
Output Strap-Resonant Frequency	-	240	280	MHz
Direct Interelectrode Capacitances				
Grid to plate	-	120	180	pF
Grid to cathode	-	1250	1700	pF

Note 1: With 1800 amperes through filament.

FOR ADDITIONAL INFORMATION ON THIS TYPE, WRITE FOR TECHNICAL BULLETIN AND APPLICATION GUIDE FOR RCA SUPER POWER TUBES, ICE-279A AVAILABLE FROM:

Commercial Engineering
Electronic Components and Devices
Radio Corporation of America
Harrison, New Jersey

SIMPLIFIED DIMENSIONAL OUTLINE



DIMENSIONS IN INCHES

A detailed Dimensional Outline and associated Gauge Drawings are given in the Technical Bulletin available upon request.

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