

FORCED AIR COOLED V.H.F. POWER TRIODE

Code: 6961 (CV5239)

The 6961 is designed for use as a v.h.f. amplifier, industrial heating oscillator or a.f. amplifier. It is capable of operation up to 85MHz.

CATHODE

Thoriated tungsten filament

Filament voltage (Note 1)	12,6	V
Filament current, nominal	33	A

The connection to the mid-point of the filament is intended for cathode connection but should not be used to carry filament current. At frequencies above 30MHz the filament pins should be decoupled to the centre tap by suitable capacitors.

Note 1. The filament has been designed to tolerate temporary fluctuations of supply voltage of +5% and -10%.

CHARACTERISTICS

Mutual conductance	{ Measured at $V_g = 6kV$ $I_g = 1A$ }	15	mA/V
Amplification factor		32	

DIRECT INTERELECTRODE CAPACITANCES

Grid to anode	11	pF
Grid to filament	16	pF
Anode to filament	0,3	pF

MECHANICAL DATA

Dimensions	As shown in outline drawing, Figure 3.
Mounting position	Vertical, anode upwards or downwards.

November 1969

3J/199E-1

ITT Components Group Europe
Standard Telephones and Cables Limited

Valve Product Division, Brixham Road, Paignton, Devon
Telephone: Paignton 50762 (STD Code 0803) Telex: 42830

ITT
COMPONENTS

© International
Telephone and Telegraph
Corporation.
All rights reserved.

MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS

CLASS C. TELEGRAPHY OR F.M. TELEPHONY

Maximum Ratings

Direct anode voltage		7,2	kV
Direct anode current		2,2	A
Direct anode dissipation		6	kW
Direct grid dissipation		250	W
Direct grid current		600	mA
Negative grid bias		1,25	kV
Peak cathode current		14	A
Frequency for above ratings		30	MHz

Typical Operating Conditions (Frequency 30MHz)

Direct anode voltage	5	5	6	6	6,5	6,5	kV
Direct grid voltage	-300	-300	-400	-400	-450	-450	V
Direct anode current	2	2	2	2	2	2	A
Peak r.f. grid voltage	660	700	780	820	820	850	V
Direct grid current	500	600	500	600	500	600	mA
Anode dissipation	2,9	2,7	3,5	2,8	3,5	3,0	kW
Power output	7,1	7,3	8,5	9,2	9,5	10	kW
Power into load	5,7	5,8	7,0	7,4	7,6	8	kW
Drive power	297	378	350	443	370	460	W

CLASS C. TELEPHONY (Carrier conditions for use with 100% modulation)

Maximum Ratings

Direct anode voltage		5,5	kV
Direct anode current		1,8	A
Direct anode dissipation		4	kW
Direct grid dissipation		250	W
Direct grid current		600	mA
Negative grid bias		1,25	kV
Peak cathode current		12	A
Frequency for above ratings		30	MHz

CLASS C. TELEPHONY (continued)

Typical Operating Conditions (Frequency 30MHz)

Direct anode voltage	4	5	5	kV
Direct grid voltage	-300	-400	-400	V
Direct anode current	1,6	1,4	1,6	A
Peak r.f. grid voltage	680	730	800	V
Direct grid current	600	500	500	mA
Anode dissipation	1,4	1,4	1,6	kW
Power output	5	5,6	6,4	kW
Power into load at 80% transfer efficiency	4	4,5	5,1	kW
Drive power	367	328	432	W
Modulator power for 100% modulation depth	3,2	3,5	4,0	kW

CLASS C. INDUSTRIAL OSCILLATOR

(Anode supply from 3-phase half-wave rectifier without filter)

Maximum Ratings

	Up to 55MHz	Up to 85MHz	
Direct anode voltage	7	6,5	kV
Direct anode current	2	2	A
Direct anode dissipation	6	6	kW
Direct grid dissipation	250	250	W
Direct grid current			
loaded	500	500	mA
unloaded	700	700	mA
Negative grid bias	1,25	1,25	kV
Peak cathode current	11	11	A
Grid-filament resistance	10	10	k Ω

Typical Operating Conditions

Maximum frequency	55	85	85	MHz
Direct anode voltage	6,5	6	5	kV
Direct anode current	1,7	1,5	1,7	A
Direct grid current				
loaded	500	400	450	mA
unloaded	700	700	700	mA
Grid resistor	900	1 000	850	Ω
Drive power, approx.	350	300	350	W
Anode dissipation	2,4	2,7	2,4	kW
Power output	8,6	6,5	6,1	kW
Power into load (Note 2)	7	5,5	5	kW

Note 2. Load power = $(P_{out} - P_{drive}) \times$ transfer efficiency (approx. 85%).

CLASS B. A.F. AMPLIFIER (for balanced 2-tube operation)

Maximum Ratings (per tube)

Direct anode voltage		7,2	kV
Direct anode current		2,8	A
Direct anode dissipation		6	kW
Direct grid dissipation		250	W
Direct grid current		600	mA
Peak cathode current		10	A
Grid-filament resistance		15	kΩ

Typical Operating Conditions (2 tubes in push-pull)

Direct anode voltage	4	5	5	7	kV
Direct grid voltage	-135	-165	-165	-250	V
Direct anode current					
zero signal	2 x 100	2 x 150	2 x 150	2 x 200	mA
max. signal	2 x 1,25	2 x 1,1	2 x 1,25	2 x 2	A
Peak grid-to-grid voltage	630	483	588	854	V
Direct grid current	2 x 360	2 x 220	2 x 330	2 x 530	mA
Anode dissipation	2 x 1,45	2 x 1,5	2 x 1,7	2 x 4	kW
Efficiency	71	72,5	72,5	71,5	%
Power output	7,1	8	9	20	kW
Drive power	2 x 140	2 x 65	2 x 130	2 x 310	W
Anode-to-anode resistance	3,8	5,5	4,8	4,15	kΩ

COOLING REQUIREMENTS

The tube must not be operated without a heat dissipating connector on the filament mid-point pin.

Maximum filament seal temperature is 210°C

Maximum anode and grid seal temperature 180°C

In order to keep within the temperature limits it may be necessary to direct a flow of air on to the filament and grid seals.

The amount of forced-air-cooling required by the 6961 tube depends upon its height above sea level, the ambient air temperature and the anode dissipation. Typical data are given in the following table.

Anode dissipation (kW)	Height above sea level		Max. inlet temperature (°C)	Min. rate of air flow		Pressure drop between inlet and outlet	
	(m)	(ft)		m ³ /min	ft ³ /min	mm. water	in. water
2	0	0	35	4,8	169	20	0,79
2	0	0	45	5,7	201	25	0,98
2	1 500	4 920	35	5,7	201	23	0,9
2	3 000	9 840	25	6,1	215	23	0,9
3,5	0	0	35	6,2	219	32	1,26
3,5	0	0	45	7,3	258	42	1,65
3,5	1 500	4 920	35	7,3	258	36	1,42
3,5	3 000	9 840	25	7,8	275	36	1,42
6	0	0	35	9,2	325	68	2,68
6	0	0	45	10,7	378	91	3,58
6	1 500	4 920	35	11,2	396	81	3,19
6	3 000	9 840	25	11,7	413	80	3,15

Fig. 1. Typical Anode and Grid Characteristics

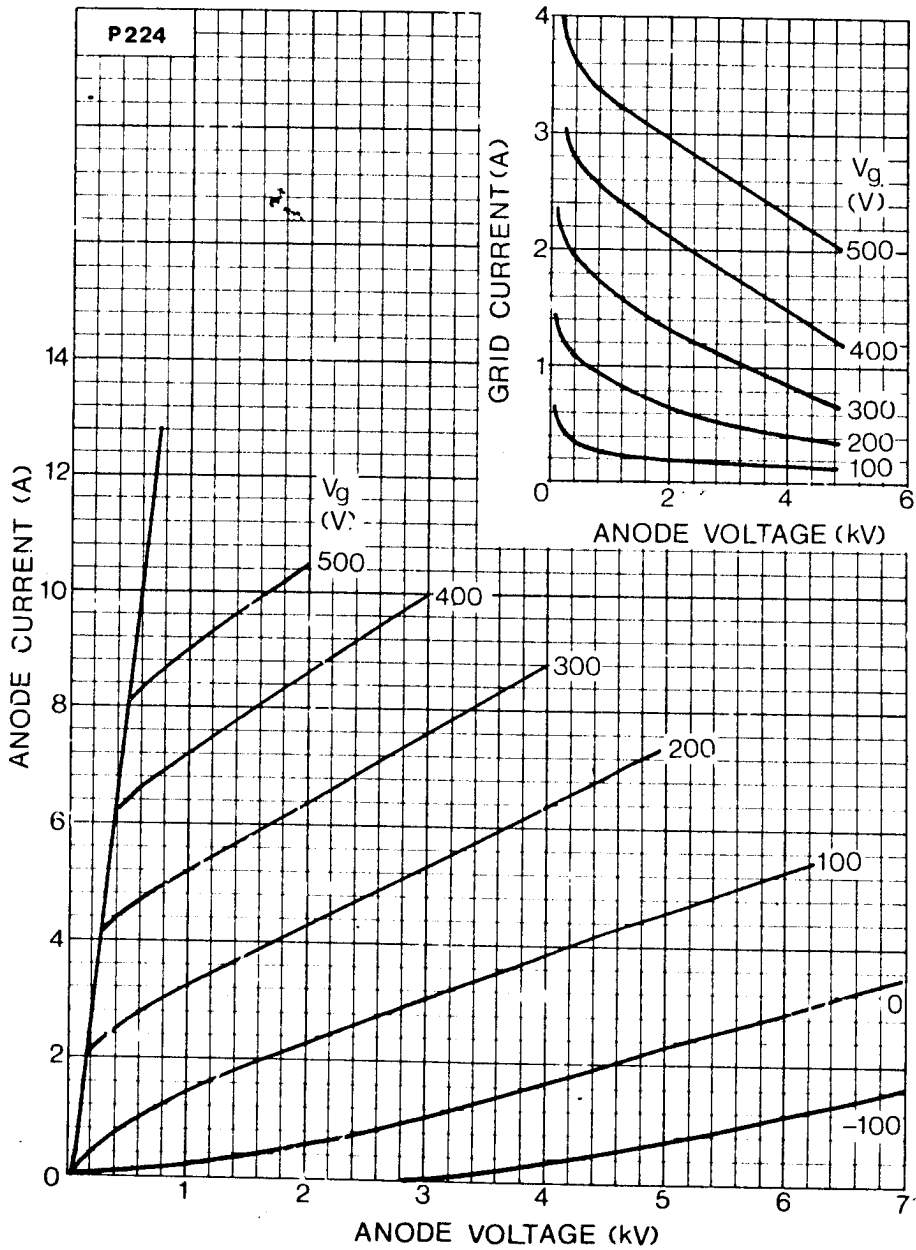


Fig. 2. Typical Constant Current Characteristics

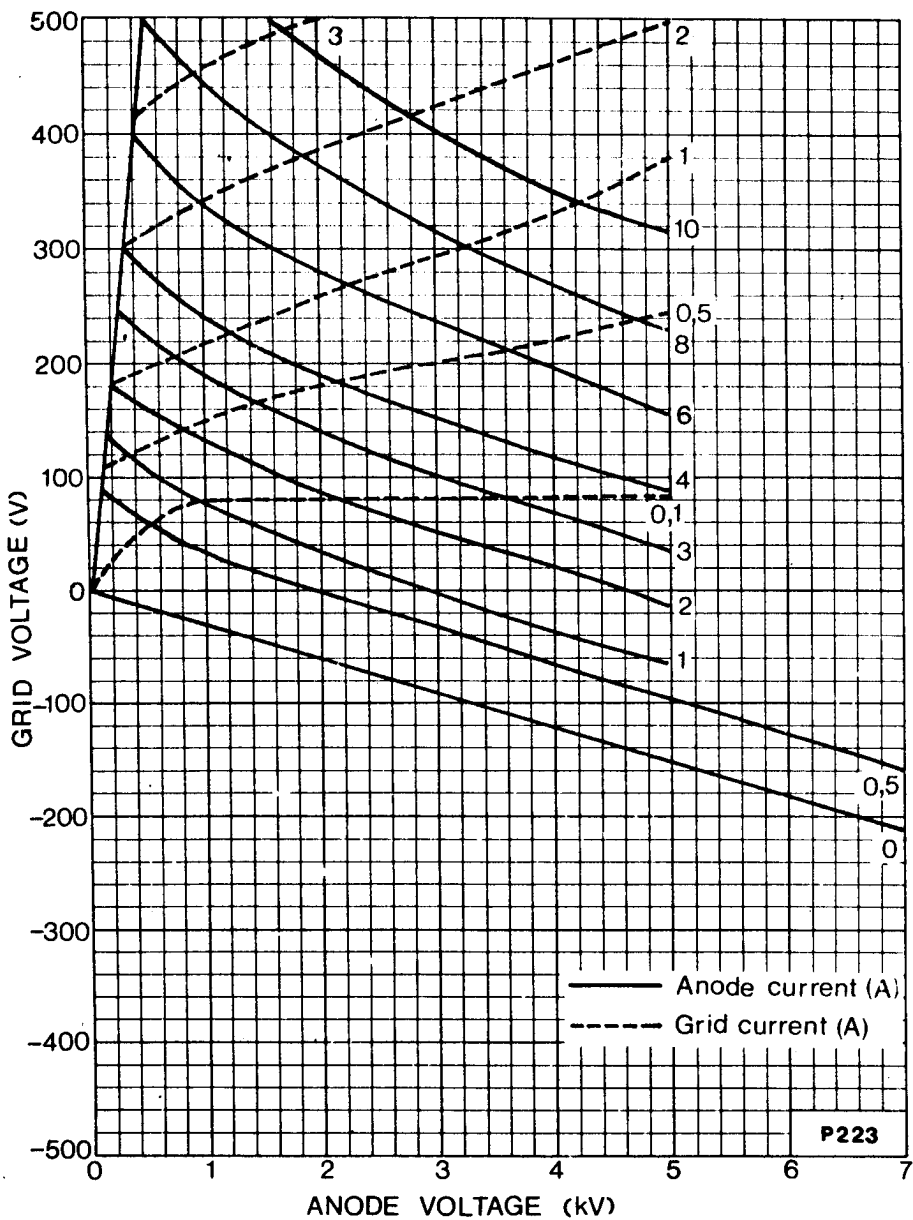
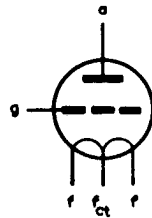
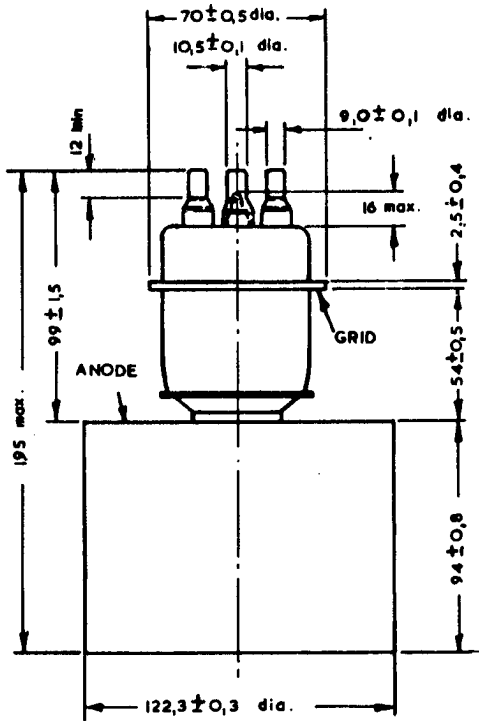
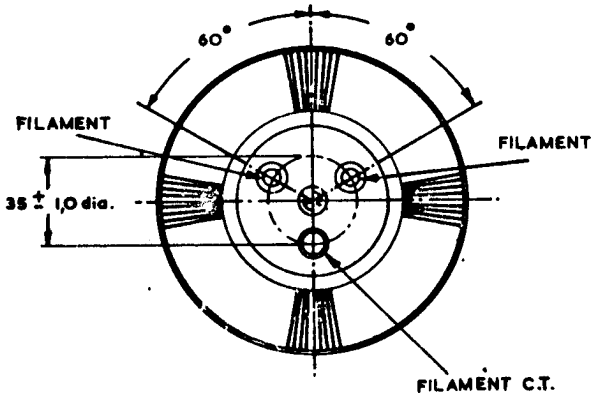


Fig. 3. Outline of 6961 Tube



DIMENSIONS ARE MILLIMETRES