

RF POWER TRIODE

QUICK REFERENCE DATA									
λ (m)	Freq. (MHz)	C telegr.		C osc.		B teleph.		C _a mod.	
		V _a (V)	W _o (W)	V _a (V)	W _o (W)	V _a (V)	W _o (W)	V _a (V)	W _o (W)
4	75	2500	390			2500	65	2000	204
		2000	295			2000	64	1500	153
		1500	210			1500	59	1000	95
		1000	126						
2	150			2500	376				
				2000	282				
1.5	200			2000	198				

HEATING: direct; filament thoriated tungsten

Filament voltage $V_f = 6.3 \text{ V}$

Filament current $I_f = 5.4 \text{ A}$

CAPACITANCES

Anode to all other elements except grid $C_a = 0.1 \text{ pF}$

Grid to all other elements except anode $C_g = 4.3 \text{ pF}$

Anode to grid $C_{ag} = 5.2 \text{ pF}$

TYPICAL CHARACTERISTICS

Amplification factor $\mu = 25$

Mutual conductance $S (I_a = 44 \text{ mA}) = 2.8 \text{ mA/V}$

COOLING: radiation/low-velocity air flow

It is necessary to direct a low-velocity air flow to the bottom and the top seal if the tube is used at or near the limiting values at frequencies above 50 MHz.

LIMITING VALUES

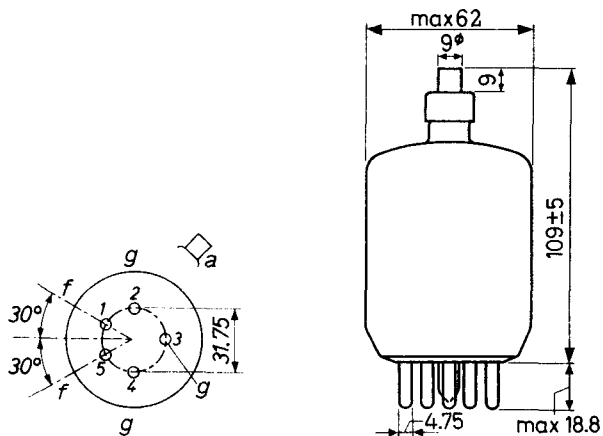
Absolute maximum rating system

Anode voltage	V_a	max.	2500 V
Anode dissipation*	W_a	max.	135 W
Grid dissipation	W_g	max.	16 W
Grid circuit resistance with fixed grid bias	R_g	max.	0,1 M Ω
Grid circuit resistance with automatic grid bias	R_g	max.	0,2 M Ω
Cathode current	I_k	max.	250 mA
Peak cathode current	I_{kp}	max.	1,6 A
Temperature of anode seal		max.	220 °C
Bottom temperature		max.	180 °C

MECHANICAL DATA

Base	giant 5 p
Anode connector	40624
Socket	2422 512 01001
Socket with grounded grid connections	40215/01
Net mass	110 g

Dimensions in mm



Mounting position

vertical with base up or down

Fig. 1 Mechanical outline.

* Anode red hot, temperature = 850 °C.

OPERATING CONDITIONS RF CLASS C TELEGRAPHY

Wavelength	λ	=	4	4	4	4	m
Anode voltage	V_a	=	2500	2000	1500	1000	V
Grid voltage	V_g	=	-200	-150	-110	-80	V
Anode current	I_a	=	205	205	205	205	mA
Grid current	I_g	=	40	40	40	40	mA
Peak grid AC voltage	V_{gp}	=	390	340	300	260	V
Grid input power	W_{ig}	=	14	13	11	10	W
Anode input power	W_{ia}	=	512	410	308	205	W
Anode dissipation	W_a	=	122	115	98	79	W
Output power	W_o	=	390	295	210	126	W
Efficiency	η	=	76	72	68	61.5	%

OPERATING CONDITIONS RF CLASS B TELEPHONY

Wavelength	λ	=	4	4	4	m
Anode voltage	V_a	=	2500	2000	1500	V
Grid voltage	V_g	=	-87	-67	-45	V
Anode current	I_a	=	77	97	120	mA
Peak grid AC voltage	V_{gp}	=	100	100	100	V
Anode input power	W_{ia}	=	193	194	180	W
Anode dissipation	W_a	=	128	130	121	W
Output power	W_o	=	65	64	59	W
Efficiency	η	=	34	33	33	%
Modulation depth	m	=	100	100	100	%
Grid current	I_g	=	20	28	52	mA
Grid input power	W_{ig}	=	3.6	5.1	9.4	W

OPERATING CONDITIONS RF CLASS C ANODE MODULATION; two tubes

Wavelength	λ	=	4	4	4	m
Anode voltage	V_a	=	2000	1500	1000	V
Grid voltage	V_g	=	-225	-180	-130	V
Anode current	I_a	=	255	255	255	mA
Grid current	I_g	=	80	80	80	mA
Peak grid AC voltage	V_{gp}	=	415	370	320	V
Grid input power	W_{ig}	=	30	27	23	W
Anode input power	W_{ia}	=	510	382	255	W
Anode dissipation	W_a	=	102	76	65	W
Output power	W_o	=	408	306	190	W
Efficiency	η	=	80	80	74.5	%
Modulation depth	m	=	100	100	100	%
Modulation power	W_{mod}	=	255	191	126	W

OPERATING CONDITIONS AS RF CLASS C OSCILLATOR; two tubes

Wavelength	λ	=	2	2	1.5	m
Anode voltage	V_a	=	2500	2000	2000	V
Anode current	I_a	=	410	410	346	mA
Grid current	I_g	=	80	80	80	mA
Grid resistor	R_g	=	2500	1875	1875	Ω
Anode input power	W_{ia}	=	1025	820	692	W
Anode dissipation	W_a	=	245	230	270	W
Grid input power	W_{ig}	=	28	26	26	W
Output power	W_o	=	752	564	396	W
Efficiency	η	=	73	69	57	%

OPERATING CONDITIONS AS RF CLASS C OSCILLATOR for high frequency heating and diathermy generators

A. With anode voltage from single-phase full-wave rectifier without filter

Wavelength	λ	=	7.3	m
Anode voltage	V_a	=	2000	V ¹⁾
Anode current	I_a	=	170	mA
Grid current	I_g	=	34	mA
Grid resistor	R_g	=	3750	Ω
Anode input power	W_{ia}	=	420	W
Anode dissipation	W_a	=	120	W
Grid input power	W_{ig}	=	10	W
Output power	W_o	=	290	W
Efficiency	η	=	69	%

B. With anode and grid alternating voltage. Phase-shift of 180° between V_a and V_g

Wavelength	λ	=	7.3	m
Anode voltage	V_a	=	2500	V_{RMS}
Anode current	I_a	=	90	mA
Grid current	I_g	=	20	mA
Grid resistor	R_g	=	1700	Ω
Grid voltage	V_g	=	85	V_{RMS}
Anode input power	W_{ia}	=	255	W
Anode dissipation	W_a	=	85	W
Output power	W_o	=	170	W
Efficiency	η	=	67	%

¹⁾ Mean value

OPERATING CONDITIONS RF CLASS C TELEGRAPHY

grounded grid, two tubes

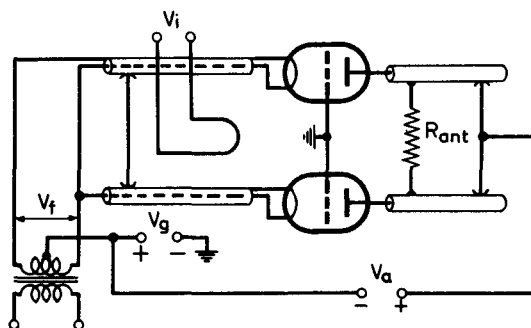


Fig. 2 Grounded-grid configuration.

Wavelength	λ	=	3	3	3	3 m
Anode voltage	V_a	=	2500	2000	1500	1000 V
Grid voltage	V_g	=	-200	-150	-110	-80 V
Anode current	I_a	=	410	410	410	410 mA
Grid current	I_g	=	80	80	80	80 mA
Peak grid AC voltage	V_{gp}	=	390	340	300	260 V
Grid input power	W_{ig}	=	158	136	118	100 W
Anode input power	W_{ia}	=	1025	820	615	410 W
Anode dissipation	W_a	=	245	230	195	158 W
Output power	W_o	=	780+130	590+110	420+96	252+80 W ¹⁾
Efficiency	η	=	76	72	68	61.5 % ²⁾

1) Power transferred from driving stage included

2) Pure tube efficiency

AF CLASS B AMPLIFIER AND MODULATOR

LIMITING VALUES (Absolute limits)

Anode voltage	V_a	=	max.	2500	V
Anode dissipation	W_a	=	max.	135	W
Grid dissipation	W_g	=	max.	16	W
Cathode current	I_k	=	max.	250	mA
Peak cathode current	I_{kp}	=	max.	1.6	A

OPERATING CONDITIONS, two tubes

Anode voltage	V_a	=	2500	2000	V
Grid voltage	V_g	=	-86	-65	V
Load resistance	$R_{aa\sim}$	=	18.2	12.0	k Ω
Peak grid to grid voltage	V_{ggp}	=	0 412	0 394	V
Anode current	I_a	=	2x30 2x178	2x30 2x208	mA
Grid current	I_g	=	0 2x42	0 2x42	mA
Grid input power	W_{ig}	=	0 2x7.8	0 2x7.3	W
Anode input power	W_{ia}	=	2x75 2x445	2x60 2x416	W
Anode dissipation	W_a	=	2x75 2x95	2x60 2x101	W
Output power	W_o	=	0 700	0 630	W
Total harmonic distortion	d_{tot}	=	- 5.0	- 3.7	%
Efficiency	η	=	- 78.5	- 76	%

Anode voltage	V_a	=	1500	1000	V
Grid voltage	V_g	=	-46	-23	V
Load resistance	$R_{aa\sim}$	=	8.5	5.0	k Ω
Peak grid to grid voltage	V_{ggp}	=	0 340	0 295	V
Anode current	I_a	=	2x30 2x210	2x30 2x210	mA
Grid current	I_g	=	0 2x40	0 2x40	mA
Grid input power	W_{ig}	=	0 2x6.1	0 2x5.4	W
Anode input power	W_{ia}	=	2x45 2x315	2x30 2x210	W
Anode dissipation	W_a	=	2x45 2x90	2x30 2x73	W
Output power	W_o	=	0 450	0 274	W
Total harmonic distortion	d_{tot}	=	- 2.9	- 2.2	%
Efficiency	η	=	- 71.5	- 65	%

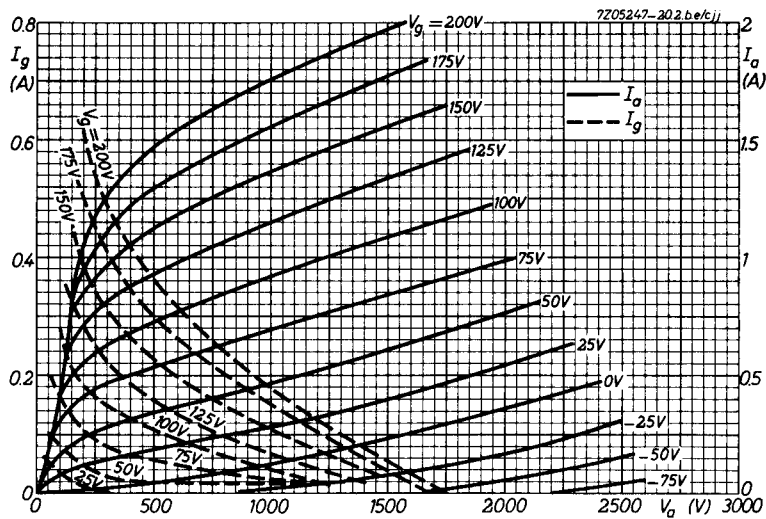


Fig. 3
 I_a/I_g characteristics.

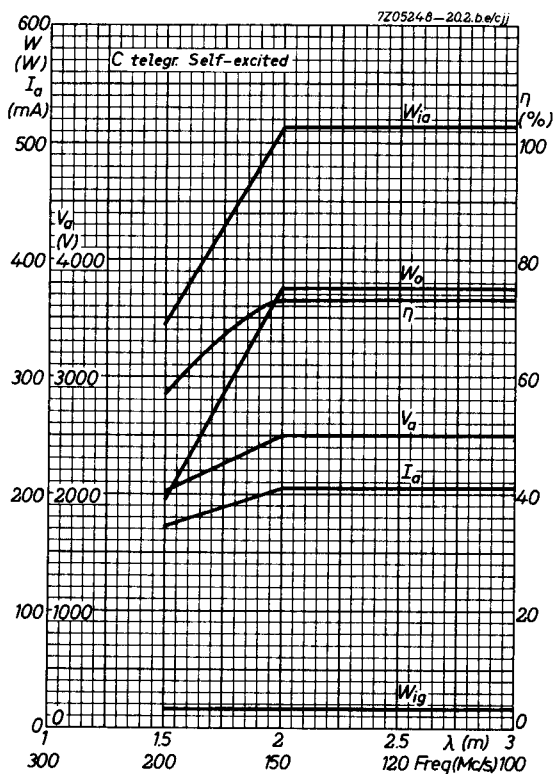


Fig. 4
Characteristics at
frequencies above 150 MHz.

PHILIPS

Data handbook



**Electronic
components
and materials**

TB2.5/300

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8	36	1988.02
9	FP	2000.09.14