

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 $V_f = 6.3$ V

Filament current $I_f = 5.4$ A

CAPACITANCES

Anode to all other elements except grid $C_a = 0.1$ pF

Grid to all other elements except anode $C_g = 4.3$ pF

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

TYPICAL CHARACTERISTICS

Amplification factor $\mu = 25$

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

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	%
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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

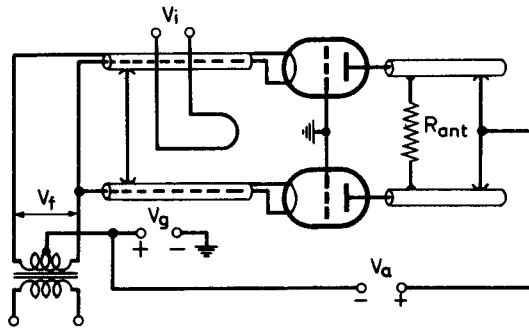


Fig. 2 Grounded-grid configuration.

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	%

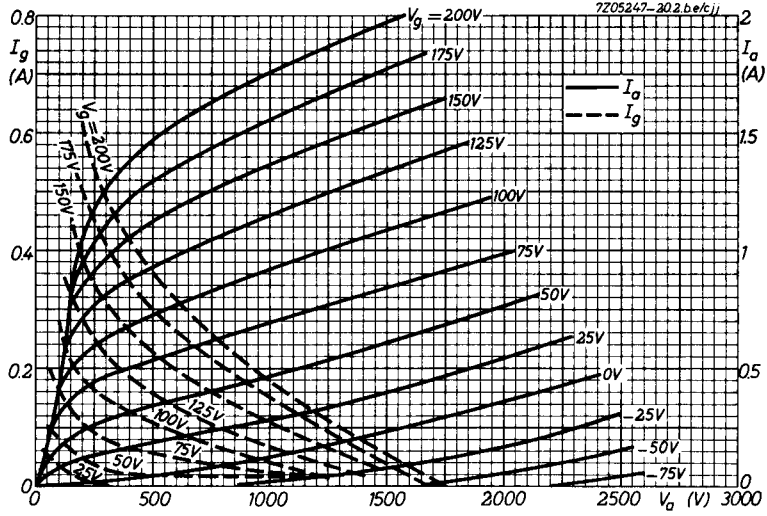


Fig. 3
 I_a/I_g characteristics.

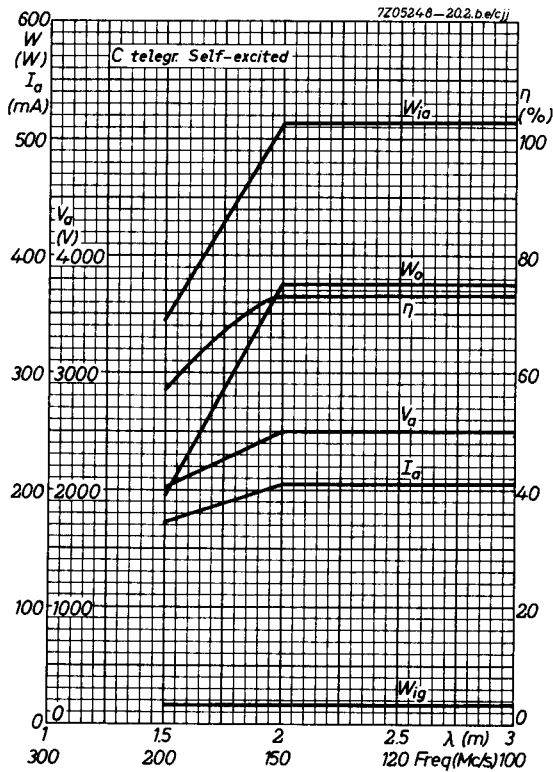


Fig. 4
Characteristics at frequencies above 150 MHz.

PHILIPS

Data handbook



Electronic
components
and materials

TB2.5/300

page	sheet	date
1	29	1988.02
2	30	1988.02
3	31	1988.02
4	32	1988.02
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8	36	1988.02
9	FP	2000.09.14