R.F. POWER TETRODE

Products approved to CECC 45 003-008.

QUICK REFERENCE DATA

λ	freq.	C telegr.		B teleph.		C_{ag2} mod.		B mod. *	
m	MHz	V_a V	W_o W	V_a V	W_o W	V_a V	W_o W	V_a V	W_o W
2,5	120	3000	375	3000	58	2500	300	2500	550
2,5	120	2500	375	2500	55	2000	225	2000	550
2,5	120	2000	275	2000	54	1500	157	1500	455
2,5	120	1500	110						
2	150	2500	360						
1,5	200	2000	225						

HEATING: direct; filament thoriated tungsten

Filament voltage	V_f	=	5 V
Filament current	I_f	=	6,5 A

COOLING: radiation/low-velocity air flow

CAPACITANCES

Anode to all other elements except grid 1	C_a	=	3,5 pF
Grid 1 to all other elements except anode	C_{g1}	=	10,8 pF
Anode to grid 1	C_{ag1}	=	0,05 pF

TYPICAL CHARACTERISTICS

Amplification factor of grid 2 with respect to grid 1	μ_{g2g1}	=	6,2
Mutual conductance	S (I_a = 40 mA)	=	2,2 mA/V

* Two tubes; $I_{g1} > 0$.

TEMPERATURE LIMITS

Absolute maximum rating system		
Temperature of anode seal	max.	220 °C
Temperature of pin seals	max.	180 °C
Bulb temperature	max.	350 °C

COOLING

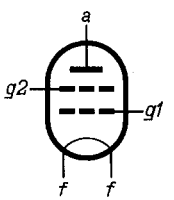
In general cooling of the tube is not necessary at normal ambient temperature at frequencies below 50 MHz.

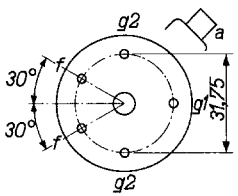
When the tube is used at or near its maximum values at frequencies above 50 MHz, it will be necessary to direct a low-velocity air flow on the anode seal and the bottom of the envelope.

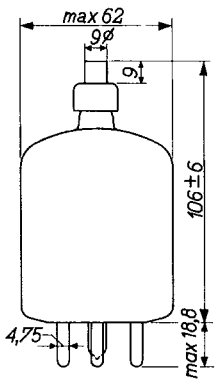
In order to prevent overheating of the screen-grid pins by high-frequency current it is recommended that both screen-grid socket connections be included in the circuit.

MECHANICAL DATA

Mounting position	vertical with base up or down
Net mass	130 g
Base	giant 5-pin
Accessories	socket, code 2422 512 01001; anode connector type 40712







R.F. CLASS C TELEGRAPHY

LIMITING VALUES (Absolute limits)

Frequency	f		up to 120	up to 170	up to 200	MHz
Anode voltage	V_a	=	max. 3000	max. 2500	max. 2200	V
Anode input power	W_{ia}	=	max. 625	max. 560	max. 435	W
Anode current	I_a	=		max. 225		mA
Anode dissipation	W_a	=		max. 125 [1])		W
Grid No.2 voltage	V_{g_2}	=		max. 400		V
Grid No.2 dissipation	W_{g_2}	=		max. 20		W
Negative grid No.1 voltage	$-V_{g_1}$	=		max. 500		V
Grid No.1 current	I_{g_1}	=		max. 15		mA

OPERATING CONDITIONS

Frequency	f		<120	<120	<120	<120	MHz
Anode voltage	V_a	=	3000	2500	2000	1500	V
Grid No.2 voltage	V_{g_2}	=	350	350	350	350	V
Grid No.1 voltage	V_{g_1}	=	-150	-150	-100	-150	V
Anode current	I_a	=	167	200	200	110	mA
Grid No.2 current	I_{g_2}	=	30	40	50	56	mA
Grid No.1 current	I_{g_1}	=	6.5	9	9	8	mA
Peak grid No.1 A.C. voltage	$V_{g_{1p}}$	=	300	330	260	225	V
Grid No.1 input power	W_{ig_1}	=	2	3	2.4	1.7	W
Grid No.2 dissipation	W_{g_2}	=	10.5	14	17.5	19.6	W
Anode input power	W_{ia}	=	500	500	400	165	W
Anode dissipation	W_a	=	125	125	125	55	W
Output power	W_o	=	375	375	275	110	W
Efficiency	η	=	75	75	69	67	%

[1]) Anode red hot, temperature = 850 °C

R.F. CLASS B TELEPHONY

LIMITING VALUES (Absolute limits)

Frequency	f	up to 120	up to 170	up to 200	MHz
Anode voltage	V_a =	max. 3000	max. 2500	max. 2200	V
Anode input power	W_{ia} =	max. 200	max. 190	max. 150	W
Anode current	I_a =		max. 135		mA
Anode dissipation	W_a =		max. 125 [1])		W
Grid No.2 voltage	V_{g_2} =		max. 400		V
Grid No.2 dissipation	W_{g_2} =		max. 14		W

OPERATING CONDITIONS

Frequency	f		<120	<120	<120	MHz
Anode voltage	V_a	=	3000	2500	2000	V
Grid No.2 voltage	V_{g_2}	=	350	350	350	V
Grid No.1 voltage	V_{g_1}	=	−50	−50	−50	V
Anode current	I_a	=	60	70	83	mA
Grid No.2 current	I_{g_2}	=	1	1	1.5	mA
Peak grid No.1 A.C. voltage	$V_{g_{1p}}$	=	50	55	65	V
Grid No.2 dissipation	W_{g_2}	=	0.35	0.35	0.52	W
Anode input power	W_{ia}	=	180	175	166	W
Anode dissipation	W_a	=	122	120	112	W
Output power	W_o	=	58	55	54	W
Efficiency	η	=	32	31.5	32.5	%
Modulation factor	m	=	100	100	100	%
Grid No.1 current	I_{g_1}	=	4.5	4	4	mA
Grid No.1 input power	W_{ig_1}	=	0.45	0.44	0.52	W

[1]) Anode red hot, temperature = 850 °C

R.F. CLASS C ANODE AND SCREEN GRID MODULATION

LIMITING VALUES (Absolute limits)

Frequency	f		up to 120	up to 170	up to 200	MHz
Anode voltage	V_a	=	max. 2500	max. 2100	max. 1800	V
Anode input power	W_{ia}	=	max. 415	max. 375	max. 290	W
Anode current	I_a	=		max. 200		mA
Anode dissipation	W_a	=		max. 83		W
Grid No.2 voltage	V_{g_2}	=		max. 400		V
Grid No.2 dissipation	W_{g_2}	=		max. 20		W
Negative grid No.1 voltage	$-V_{g_1}$	=		max. 500		V
Grid No.1 current	I_{g_1}	=		max. 15		mA

OPERATING CONDITIONS

Frequency	f		<120	<120	<120	MHz
Anode voltage	V_a	=	2500	2000	1500	V
Grid No.2 voltage	V_{g_2}	=	350	350	300	V
Grid No.1 voltage	V_{g_1}	=	−210	−220	−150	V
Anode current	I_a	=	152	150	160	mA
Grid No.2 current	I_{g_2}	=	30	33	33	mA
Grid No.1 current	I_{g_1}	=	4.5	5	10	mA
Peak grid No.1 A.C. voltage	$V_{g_{1p}}$	=	380	390	250	V
Grid No.1 input power	W_{ig_1}	=	1.7	2	2.5	W
Grid No.2 dissipation	W_{g_2}	=	10.5	11.5	10	W
Anode input power	W_{ia}	=	380	300	240	W
Anode dissipation	W_a	=	80	75	83	W
Output power	W_o	=	300	225	157	W
Efficiency	η	=	79	75	65	%
Modulation factor	m	=	100	100	100	%
Peak grid No.2 A.C. voltage	$V_{g_{2p}}$	=	300	300	255	V
Modulation power	W_{mod}	=	190	150	120	W

A.F. CLASS B AMPLIFIER AND MODULATOR. $I_{g_1} = 0$

LIMITING VALUES (Absolute limits)

Anode voltage	V_a	= max.	3000	V
Anode current	I_a	= max.	225	mA
Anode dissipation	W_a	= max.	125	W[1]
Grid No.2 voltage	V_{g_2}	= max.	600	V
Grid No.2 dissipation	W_{g_2}	= max.	20	W
Negative grid No.1 voltage	$-V_{g_1}$	= max.	500	V
Grid No.1 circuit resistance	R_{g_1}	= max.	150	kΩ

OPERATING CONDITIONS, two tubes

V_a	=	2500		2000		1500		V
V_{g_1}	=	−97		−95.5		−94		V
V_{g_2}	=	600		600		600		V
$R_{aa\sim}$	=	25		17.6		12		kΩ
$V_{g_1g_{1p}}$	=	0	190	0	186	0	185	V
I_a	=	2x30	2x108	2x30	2x111	2x30	2x109	mA
I_{g_2}	=	2x0.1	2x13	2x0.1	2x12	2x0.15	2x13.5	mA
W_{g_2}	=	2x0.1	2x7.8	2x0.1	2x7.2	2x0.1	2x8.1	W
W_{ia}	=	2x75	2x270	2x60	2x222	2x45	2x163	W
W_a	=	2x75	2x97.5	2x60	2x92	2x45	2x78	W
W_o	=	0	345	0	260	0	170	W
η	=	–	64	–	58.5	–	52	%
d_{tot}	=	–	4.0	–	3.6	–	3.5	%

[1]) Anode red hot, temperature = 850 °C

A.F. CLASS B AMPLIFIER AND MODULATOR. $I_{g_1} > 0$

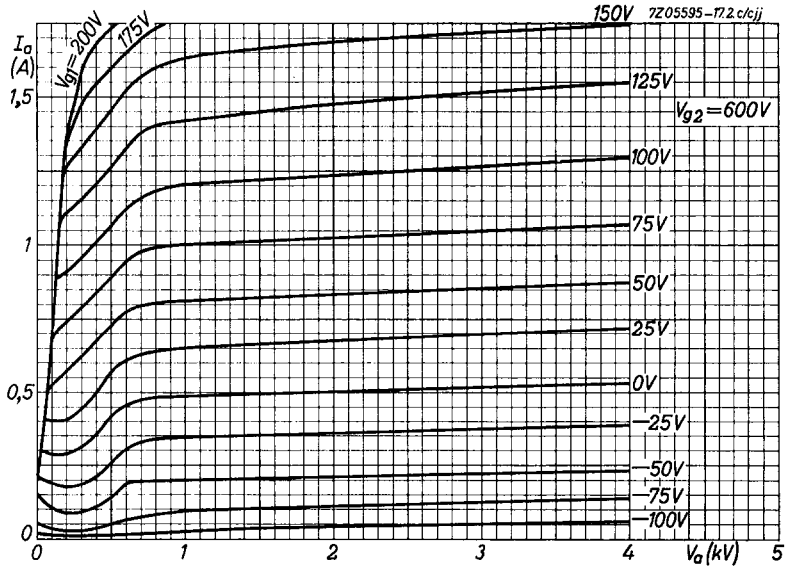
LIMITING VALUES (Absolute limits)

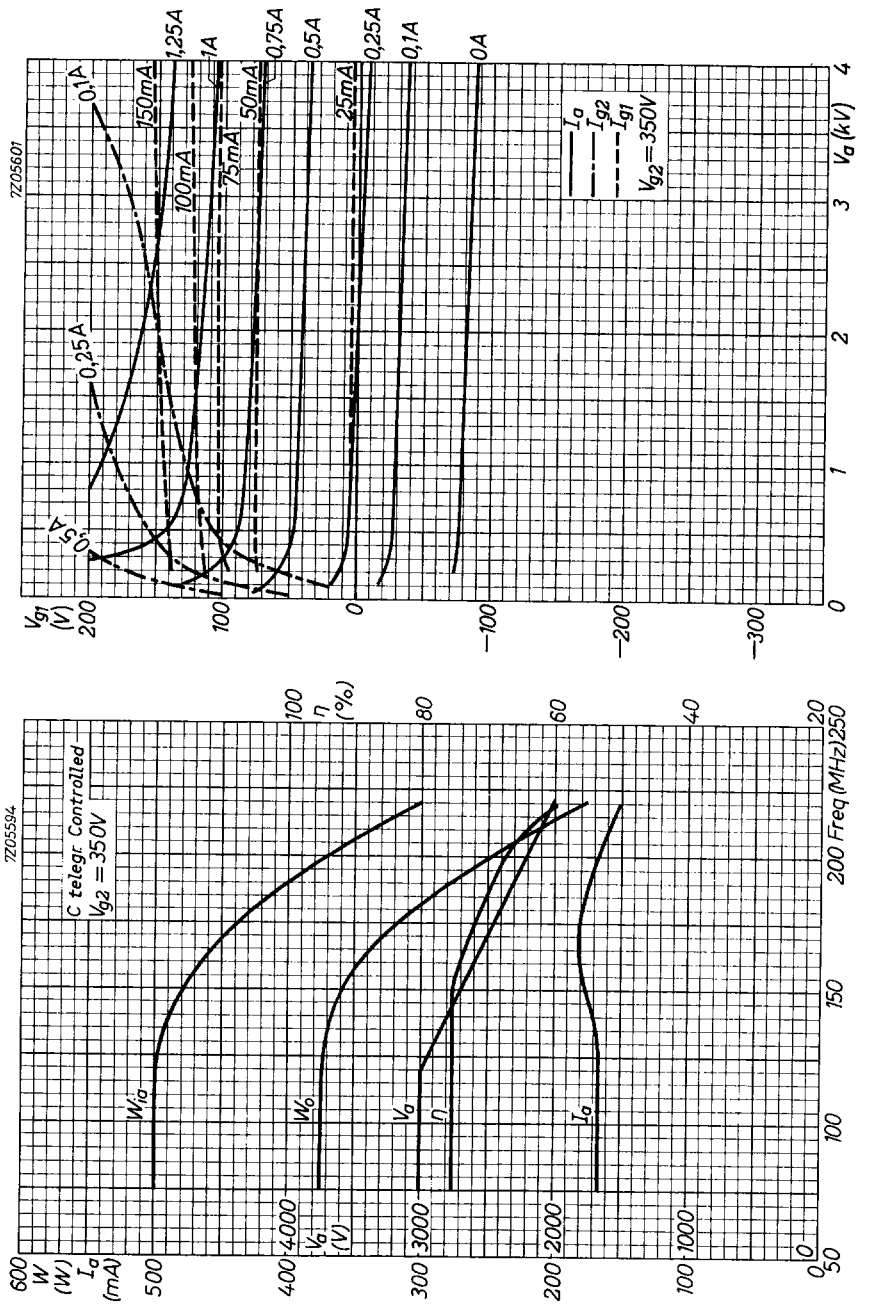
Anode voltage	V_a	=	max.	3000	V
Anode current	I_a	=	max.	225	mA
Anode dissipation	W_a	=	max.	125	W[1])
Grid No.2 voltage	V_{g_2}	=	max.	400	V
Grid No.2 dissipation	W_{g_2}	=	max.	20	W
Negative grid No.1 voltage	$-V_{g_1}$	=	max.	500	V

OPERATING CONDITIONS , two tubes

V_a	=	2500		2000		1500	V
V_{g_1}	=	−51		−50		−48	V
V_{g_2}	=	350		350		350	V
$R_{aa_\sim}$	=	20		12		7.2	kΩ
$V_{g_1 g_{1p}}$	=	0	240	0	296	0	330	V
I_a	=	2x30	2x151	2x30	2x197.5	2x30	2x227.5	mA
I_{g_1}	=	0	2x8.5	0	2x12	0	2x16	mA
I_{g_2}	=	2x0.1	2x18	2x0.15	2x32	2x0.25	2x42	mA
W_{ig_1}	=	0	2x0.9	0	2x1.6	0	2x2.4	W
W_{g_2}	=	0	2x6.3	2x0.1	2x11.2	2x0.1	2x15	W
W_{ia}	=	2x75	2x377.5	2x60	2x395	2x45	2x341.5	W
W_a	=	2x75	2x102.5	2x60	2x120	2x45	2x114	W
W_o	=	0	550	0	550	0	455	W
η	=	–	72.5	–	69.5	–	66.5	%
d_{tot}	=	–	5	–	5	–	5	%

1) Anode red hot, temperature = 850 °C


7Z05595-1712.c/cjj
I_a (A)
V_{g1}=200V
175V
150V
125V
V_{g2}=600V
100V
75V
50V
25V
0V
−25V
−50V
−75V
−100V
1,5
1
0,5
0
0
1
2
3
4
5
V_a(kV)


7Z05601
V_{g1} (V)
200
100
0
−100
−200
−300
0,1A
0,25A
0,5A
150mA
100mA
75mA
50mA
25mA
1,25A
1A
0,75A
0,5A
0,25A
0,1A
0A
I_a
I_{g2}
I_{g1}
V_{g2} = 350V
0
1
2
3
4
V_a (kV)
7Z05594
C telegr. Controlled
V_{g2} = 350V
W (W)
I_a (mA)
600
500
400
300
200
100
0
$W_{i/a}$
W_o
V_a (V)
4000
3000
2000
1000
0
50
V_a
η
I_a
η (%)
100
80
60
40
20
200 Freq (MHz) 250
150
100