AIR COOLED R.F. POWER TRIODE

QUICK REFERENCE DATA								
Freq. (MHz)	C telegr.		C an. mod.		C industr. osc.		B mod [1])	
	V_a (kV)	W_o (kW)	V_a (kV)	W_o (kW)	V_a (kV)	W_o (kW)	V_a (kV)	W_o (kW)
30	12	108	10	83	12	124	10	106
	10	75	10	58	12	108	10	64
					10	75		

HEATING: direct; filament thoriated tungsten

Filament voltage	V_f	=	17.5	V
Filament current	I_f	=	196	A
Filament peak current	I_{fp}	max.	420	A
Cold filament resistance	Rf_o	=	0.012	Ω

CAPACITANCES

Anode to all other elements except grid	C_a	=	2.2	pF
Grid to all other elements except anode	C_g	=	122	pF
Anode to grid	C_{ag}	=	75	pF

TYPICAL CHARACTERISTICS

Anode voltage	V_a	=	3	10	kV
Anode current	I_a	=	50	5	A
Amplification factor	μ	=	25	25	
Mutual conductance	S	=	140	60	mA/V

[1]) Two tubes

TEMPERATURE LIMITS (Absolute limits)

Temperature of all seals = max. 180 °C

AIR COOLING CHARACTERISTICS ; see also cooling curves

W_a (kW)	h (m)	t_i (°C)	q_{min} (m^3/min)	p_i (mm H_2O)
30	0	35	35	114
	0	45	40	143
	1500	35	42	136
	3000	25	44	132
45	0	35	54	275
	0	45	62.5	335
	1500	35	64.5	322
	3000	25	68	319

When the tube is used at frequencies above 6 MHz special attention must be paid to the anode and grid seal temperatures. For frequencies below 20 MHz cooling of these seals can be effected by air flowing through the slots at the top of the cooler. In certain cases, e.g. at low dissipation and cooling with the minimum quantity of air (according to the cooling curves), the air flow to the seals will not be sufficient to maintain the seal temperatures below 180 °C. In these cases and also if it is preferred to close the slots, cooling of the seals should be effected by a separate air flow to the seals.

When using the filament connectors type 40628, together with connecting leads of adequate cross-section, additional air cooling of the filament terminals is, as a rule, not necessary.

Care should be taken to ensure firm contact of the filament terminals in order to obtain equal distribution of current over these terminals.

MECHANICAL DATA

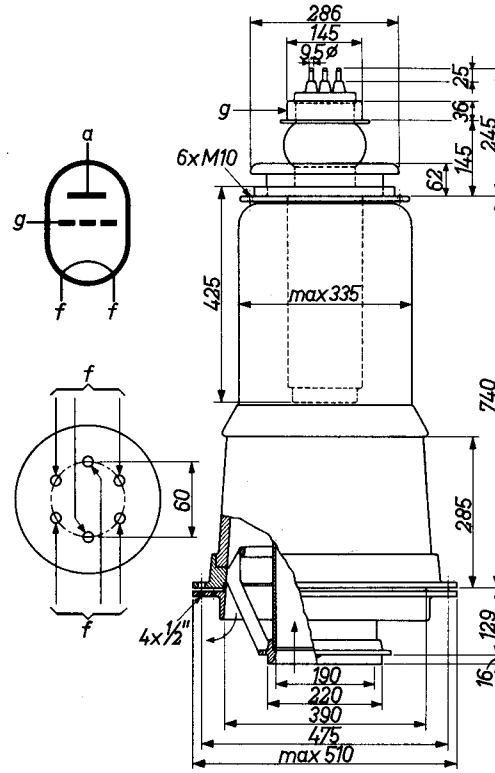
Dimensions in mm

Filament connectors: 40628

Cooler housing : K506

Net weight of tube : 28.5 kg

Net weight of K506 : 72 kg



Tube mounted in cooler housing type K 506

Mounting position: vertical with anode down

When connecting the filament the three pins of each group must be joined.

R.F. CLASS C TELEGRAPHY

LIMITING VALUES (Absolute limits)

Frequency				f	up to	4	15	30	MHz
Anode voltage	V_a	=	max.			15	13.5	12.5	kV
Anode current	I_a	=	max.			12.5	12.5	12.5	A
Anode input power	W_{i_a}	=	max.			165	165	150	kW
Anode dissipation	W_a	=	max.			45	45	45	kW
Negative grid voltage	$-V_g$	=	max.			1200	1200	1200	V
Grid current	I_g	=	max.			1.2	1.2	1.2	A

OPERATING CONDITIONS

Frequency	f	=	30	30	MHz
Anode voltage	V_a	=	12	10	kV
Grid voltage	V_g	=	-1000	-800	V
Grid driving voltage	V_{g_p}	=	1500	1200	V
Anode current	I_a	=	12	10	A
Grid current	I_g	=	0.75	0.75	A
Anode input power	W_{i_a}	=	144	100	kW
Anode dissipation	W_a	=	36	25	kW
Driving power	W_{dr}	=	1100	850	W
Output power	W_o	=	108	75	kW
Efficiency	η	=	75	75	%

R.F. CLASS C ANODE MODULATION

LIMITING VALUES (Absolute limits)

Frequency		f	up to	30	MHz
Anode voltage	V_a	= max.	10.5		kV
Anode current	I_a	= max.	10.5		A
Anode input power	W_{i_a}	= max.	110		kW
Anode dissipation	W_a	= max.	30		kW
Negative grid voltage	$-V_g$	= max.	1200		V
Grid current	I_g	= max.	1.3		A

OPERATING CONDITIONS

Frequency	f	=	30	30	MHz
Anode voltage	V_a	=	10	10	kV
Grid voltage	V_g	=	-1050	-1050	V [1])
Grid driving voltage	V_{g_p}	=	1550	1450	V
Anode current	I_a	=	10.5	7.4	A
Grid current	I_g	=	1.1	0.8	A
Anode input power	W_{i_a}	=	105	74	kW
Anode dissipation	W_a	=	22	16	kW
Driving power	W_{dr}	=	1650	1100	W
Output power	W_o	=	83	58	kW
Efficiency	η	=	79	79	%
Modulation depth	m	=	100	100	%
Modulation power	W_{mod}	=	53	37	kW

[1]) Grid bias partly obtained by a grid resistor

R.F. CLASS C OSCILLATOR for industrial use with anode voltage from three-phase rectifier without filter

LIMITING VALUES (Absolute limits)

Frequency					MHz
	f	up to	30		
Anode voltage	V_a	= max.	13		kV
Anode current	I_a	= max.	15		A
Anode input power	W_{i_a}	= max.	180		kW
Anode dissipation	W_a	= max.	45		kW
Negative grid voltage	$-V_g$	= max.	1600		V
Grid current, loaded	I_g	= max.	1.0		A
Grid current, unloaded	I_g	= max.	1.4		A
Grid circuit resistance	R_g	= max.	10		kΩ

OPERATING CONDITIONS

Frequency	f	=	30	30	30	MHz
Anode voltage	V_a	=	12	12	10	kV
Anode current	I_a	=	14	12	10	A
Grid current	I_g	=	0.9	0.75	0.75	A
Grid circuit resistance	R_g	=	1100	1350	1100	Ω
Feedback ratio	$V_{g\sim}/V_{a\sim}$	=	15	14	14	%
Anode input power	W_{i_a}	=	168	144	100	kW
Anode dissipation	W_a	=	44	36	25	kW
Output power	W_o	=	124	108	75	kW
Efficiency	η	=	74	75	75	%
Output power in the load	W_ℓ	=	104	91	63	kW[1])

[1]) Useful power in the load measured in a circuit having an efficiency of 85%

A.F. CLASS B AMPLIFIER AND MODULATOR

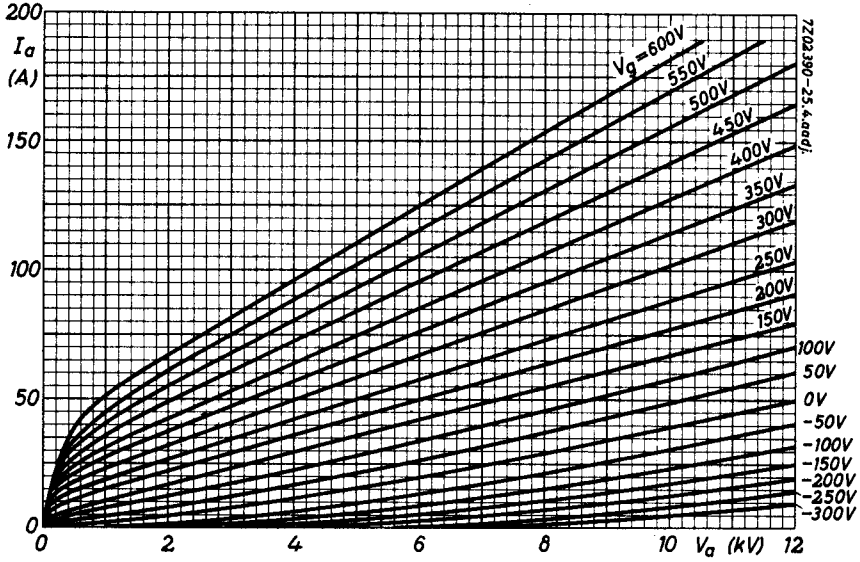
LIMITING VALUES (Absolute limits)

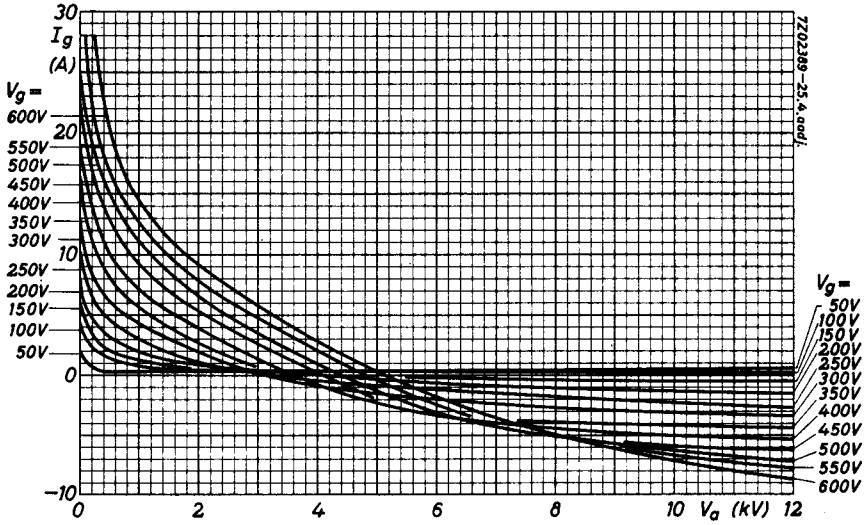
Anode voltage	V_a	= max.	15	kV
Anode current	I_a	= max.	12	A
Anode input power	W_{i_a}	= max.	162	kW
Anode dissipation	W_a	= max.	45	kW
Negative grid voltage	$-V_g$	= max.	1200	V
Grid current	I_g	= max.	1.2	A

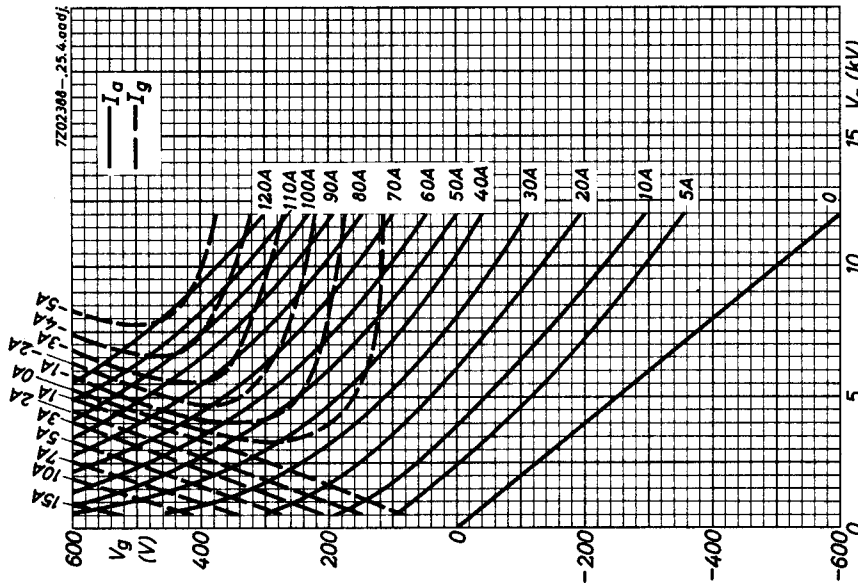
OPERATING CONDITIONS, two tubes in push-pull

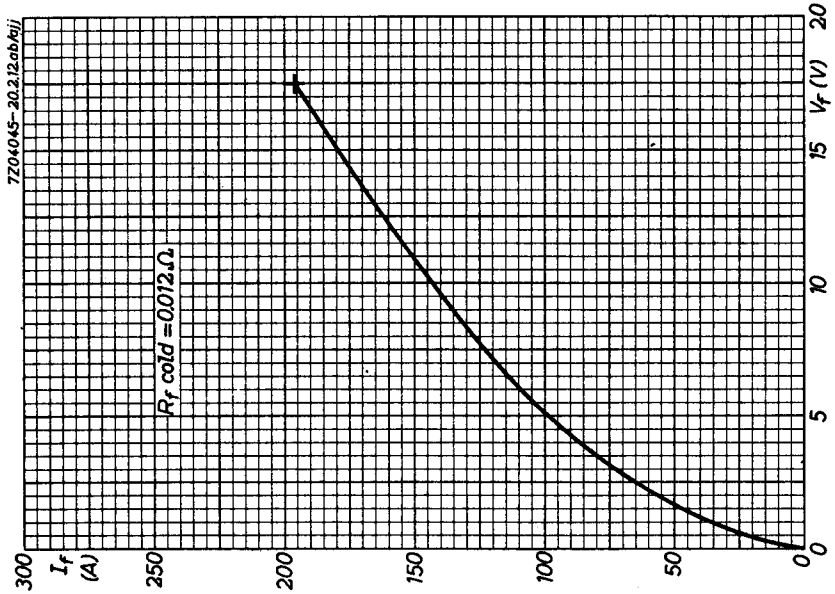
Anode voltage	V_a	=	10		10		kV
Grid voltage	V_g	=	-540		-540		V [1]
Load resistance	$R_{aa\sim}$	=	1360		1440		Ω
Driving voltage	V_{ggp}	=	0	1550	0	1300	V
Anode current	I_a	=	2x0.3	2x8	2x0.3	2x5.8	A
Grid current	I_g	=	0	2x0.2	0	2x0.15	A
Anode input power	W_{i_a}	=	2x3	2x80	2x3	2x58	kW
Anode dissipation	W_a	=	2x3	2x27	2x3	2x26	kW
Driving power	W_{dr}	=	0	2x150	0	2x100	W
Output power	W_o	=	0	106	0	64	kW
Efficiency	η	=	-	67	-	56	%

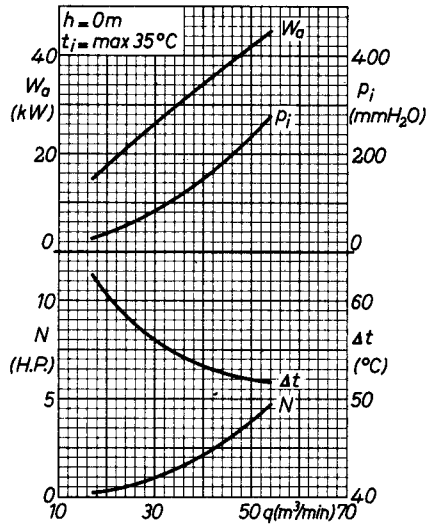
[1]) To be adjusted for a zero signal anode current of 0.3 A

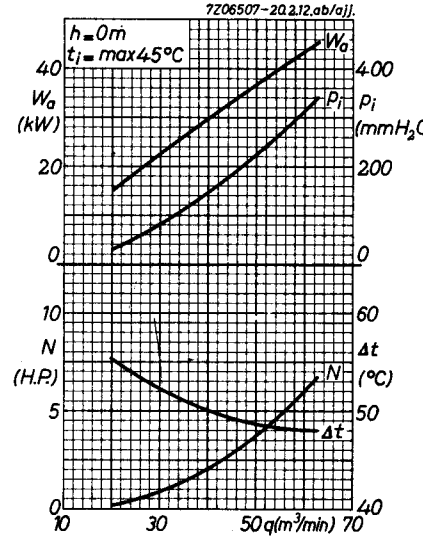

200
Ia
(A)
150
100
50
0
0
2
4
6
8
10 Va (kV) 12
Vg=600V
550V
500V
450V
400V
350V
300V
250V
200V
150V
100V
50V
0V
-50V
-100V
-150V
-200V
-250V
-300V
7Z02390-25.4.aadj.

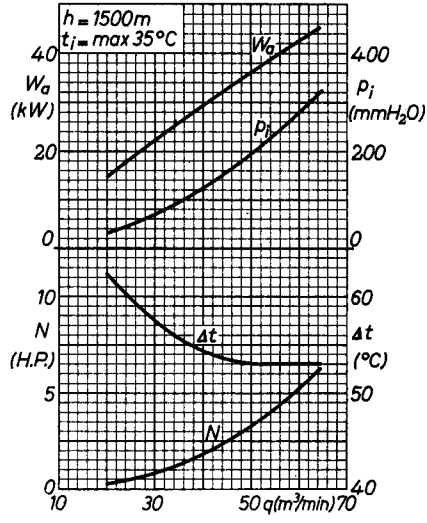

30
Ig
(A)
Vg=
600V
20
550V
500V
450V
400V
350V
300V
10
250V
200V
150V
100V
50V
0
-10
0
2
4
6
8
10 Va (kV) 12
Vg=
50V
100V
150V
200V
250V
300V
350V
400V
450V
500V
550V
600V
7Z02389-25.4.aadj.

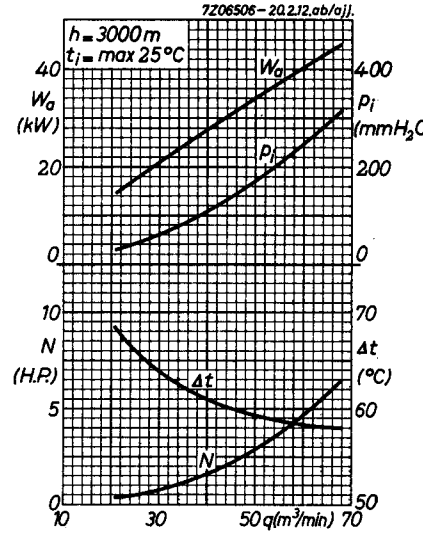

7202388-25.4.aadj
Ia
Ig
120A
110A
100A
90A
80A
70A
60A
50A
40A
30A
20A
10A
5A
0
15A
10A
7A
5A
3A
2A
1A
0A
-1A
-2A
-3A
-4A
-5A
600
400
200
0
-200
-400
-600
Vg (V)
15
10
5
0
Va (kV)


7204045-20.2.12.aabtjj
Rf cold = 0.012 Ω
300
250
200
150
100
50
0
If (A)
20
15
10
5
0
Vf (V)


h = 0m
t_i = max 35°C
W_a
p_i
Δt
N
W_a (kW)
p_i (mmH_2O)
N (H.P.)
Δt (°C)
40
20
0
10
5
0
400
200
0
60
50
40
10
30
50
70
q(m³/min)


7Z06507-20.2.12.ab/ajj.
h = 0m
t_i = max 45°C
W_a
p_i
N
Δt
W_a (kW)
p_i (mmH_2O)
N (H.P.)
Δt (°C)
40
20
0
10
5
0
400
200
0
60
50
40
10
30
50
70
q(m³/min)


h = 1500m
t_i = max 35°C
W_a
p_i
Δt
N
W_a (kW)
p_i (mmH_2O)
N (H.P.)
Δt (°C)
40
20
0
10
5
0
400
200
0
60
50
40
10
30
50
70
q(m³/min)


7Z06506-20.2.12.ab/ajj.
h = 3000m
t_i = max 25°C
W_a
p_i
Δt
N
W_a (kW)
p_i (mmH_2O)
N (H.P.)
Δt (°C)
40
20
0
10
5
0
400
200
0
70
60
50
10
30
50
70
q(m³/min)