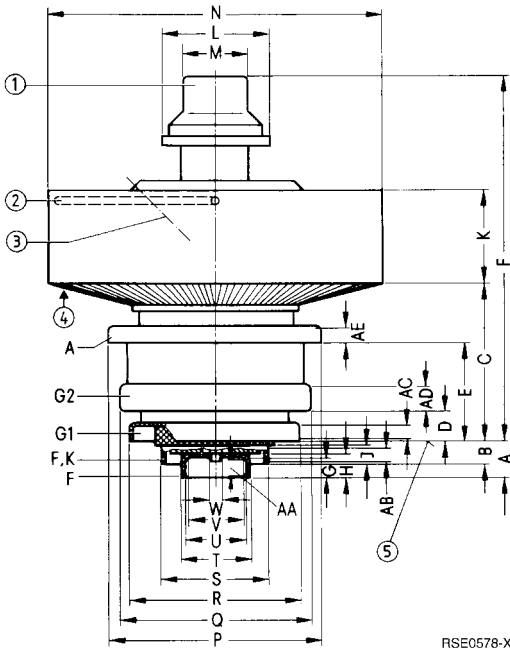**For frequencies up to 1215 MHz**

Ordering code Q51-X1057

Coaxial metal-ceramic tetrode, forced-air-cooled.

The tube is suitable for power amplifiers up to 2,3 kW, in particular for the final stages of TV vision and sound transmitters as well as TV translators. It features especially close tolerance characteristics and high amplification.

RSE0578-X

Dimensional data

	min	max	
A	10,3	12,1	
B	6,4	7,8	
C	44	45,4	
D	8,1	9,7	
E	27,9	29,5	
F	99,8	103	
G	6,2		
H	6,8		
J	6,8		
K	30,8	33,2	
L		dia. 27	
M		dia. 22	
N	dia. 94,7	dia. 95,3	
P	dia. 59,8	dia. 60,2	
Q	dia. 53,6	dia. 54	
R	dia. 45,6	dia. 46,2	
S	dia. 29,9	dia. 30,1	
T	dia. 17,9	dia. 18,1	
U	dia. 16,5	dia. 16,9	
V	dia. 15,5		
W		dia. 5	
AA	5,2		⑥
AB	4,7		⑥
AC	2,7		⑥
AD	5,6		⑥
AE	3,7		⑥

Dimensions in mm

① Pump stem protecting cap, not be used as terminal
② Handle, swingable
③ Taphole for tube fuse RöSich2
④ Recommended direction of cooling air
⑤ Reference edge
⑥ For connection of the contact springs

Approx. weight 1,1 kg

Packing dimensions: approx. 310 mm × 310 mm × 320 mm.

Heating

Heater voltage	U_F	3,8 ($\pm$ 5 %)	V [1]
Heater current	I_F	19,5 $\pm$ 2	A
Preheating time	t_h	$\geq$ 3	min
Heating: indirect by ac or dc			
Cathode: matrix oxide			

Characteristics

Amplification factor of screen grid at U_A = 3 kV, U_{G2} = 500 V, I_A = 0,5 A	μ_{g2g1}	11	
Transconductance at U_A = 3 kV, U_{G2} = 500 V, I_A = 0,5 A	s	55	mA/V

Capacitances

		min	nom	max	
Cathode/control grid	c_{kg1}	38	42	46	pF
Cathode/screen grid	c_{kg2}	1,9	2,2	2,5	pF
Cathode/anode	c_{ka}		0,005	0,011	pF
Control grid/screen grid	c_{g1g2}	56	60	64	pF
Control grid/anode	c_{g1a}		0,05	0,06	pF
Screen grid/anode	c_{g2a}	7,5	8,2	8,8	pF

Accessories

		Ordering code
Tube fuse	RöSich2	Q81-X1402 [2]
Tube fuse	RöSich9	Q81-X1409 [2]
Socket wrench for tube fuse	RöZub10	Q81-X2110
Tube protective device	RöKt2	Q81-X1302
Pull switch for tube fuse	RöKt11	Q81-X1311
Cavity band IV/V, 1,1 kW vision/sound	TK4435	Q94-X4435
Cavity band IV/V, 1,3 kW sound, 400 W vision	TK4436	Q94-X4436
Cavity band III, 2,2 kW sound	TK4451	Q94-X4451
Spring-finger contact for anode terminal	YLZ9521a	Q81-X9204
Spring-finger contact for screen grid terminal	YLZ9521g2	Q81-X9205
Spring-finger contact for control grid terminal	YLZ9521g1	Q81-X9206
Spring-finger contact for heater cathode terminal	YLZ9523	Q81-X9523

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[1] For immediate operation, the tube can be continuously heated without damaging the cathode. The optimum heater voltage for standby operation is 3,5 to 3,8 V. The standby and operating times should be equal (e.g. 1 week operation, 1 week standby). Care should be taken not to exceed the maximum permissible surface temperature of 250 °C even during standby operation, especially without cooling.

[2] RöSich2 (120 mm) and RöSich9 (25 mm) only differ in the length of the phosphor-bronze litz wire.

Maximum ratings

Cold anode voltage (dc)	(band III)	$U_{A\,0}$	4200	V
Cold anode voltage (dc)	(band IV/V)	$U_{A\,0}$	3800	V
Anode voltage (dc)	(band III)	U_A	4000	V
Anode voltage (dc)	(band IV/V)	U_A	3600	V
Screen grid voltage (dc)		U_{G2}	650	V
Control grid voltage (dc)		U_{G1}	− 100	V
Cathode current (dc)		I_K	1,2	A
Anode input power		$P_{B\,A}$	4,0	kW
Anode dissipation		P_A	2,0	kW
Screen grid dissipation		P_{G2}	30	W
Control grid dissipation		P_{G1}	5,0	W
Surface temperature		t_{surf}	250	°C [1])

Operating characteristics for TV sound transmitters

|					
Frequency	f	170…230	470…600	600…860	MHz
Bandwidth (3 dB)	B	2,0	4,0	6,0	MHz
Output power	P_2	2,2	1,3	1,3	kW [2])
Power gain	V_p	≥ 19	≥ 19	≥ 17,5	dB
Anode voltage (dc)	U_A	3900	3200	3400	V
Screen grid voltage (dc)	U_{G2}	600	600	600	V
Zero signal anode current (dc)	$I_{A\,0}$	250	450	450	mA
Anode current (dc)	I_A	1000	800	900	mA
Screen grid current (dc)	I_{G2}	28	18	22	mA [3])

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1) See cooling.
2) Power at cavity output with ≥ 90 % circuit efficiency.
3) The power supply must be designed for a screen grid current of − 1 to + 50 mA.

Operating characteristics for TV translators with combined vision/sound transmission

Frequency	f	470…600	600…860	MHz
Bandwidth (1 dB)	B	8,5	8,5	MHz
Output power, sync. level	$P_{2\,SY}$	1,1	1,1	kW [1])
Power gain	V_p	≥ 17	≥ 16,5	dB
3-tone intermodulation ratio	a_{IM3}	≥ 50	≥ 47	dB [2])
Anode voltage	U_A	3400	3400	V
Screen grid voltage	U_{G2}	600	600	V
Zero signal anode current	$I_{A\,0}$	550	500	mA
Anode current, black level	$I_{A\,SW}$	800	750	mA
Screen grid current	I_{G2}	15	15	mA [3])

Level diagram
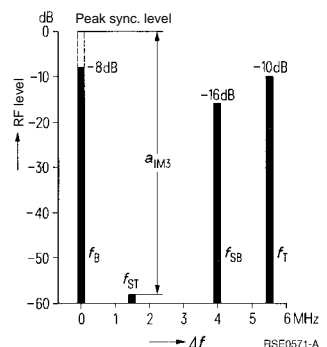
1) Power at cavity output with ≥ 85 % circuit efficiency.
2) Measured in accordance with specification FTZ 176 Pfl 2 of the German Telekom with distortion-free input signal; f_B: − 8 dB, f_{SB}: − 16 dB, f_T: − 10 dB.
3) The power supply must be designed for a screen grid current of − 5 to + 40 mA.

Tube mounting

Sufficiently flexible spring-finger contacts must be used to connect the tube. Suitable contact rings are available as accessories. The reference edge (control grid terminal, see dimensional drawing) also serves as stop edge.

If the tube is to be clamped to the socket in order to prevent it from jumping out of the latter, the clamping pressure may only have an effect on the stop edge.

The tube can be mounted as required.

Recommendations on power supply dimensioning for linear amplifiers

For the generation of the control grid voltage we recommend a constant voltage source since the linearity of performance deteriorates if a cathode resistor is used.

At drive with modulated signal, a rectifying effect is produced by the quadratic component of the tube transfer characteristic and the anode or cathode current contains video frequency components with frequencies up to 5,5 MHz. Therefore, the cathode/grid path as well as the anode power supply must be sufficiently blocked and free of resonances for the entire video frequency range to prevent reactive effects on the intermodulation of the amplifier. Experience has shown that an electrolytic capacitor of 10 µF to 50 µF is necessary between control grid and cathode. For screen grid and anode power supply a capacitor of 0,1 µF up to some µF is recommended.

Forced-air cooling

The minimum air flow rate required for max. anode dissipation is given in the cooling air diagram, valid for 45 °C inlet temperature at a normal air pressure of 1 bar (sea level). The cooling air is supplied from the electrode terminal side. For further details on forced-alr cooling refer to "Explanations on Technical Data".

Safety precautions

The section "Safety precautions" under "Explanations on Technical Data" describes how the tube is to be protected against damage due to electric overload or insufficient cooling. A copper wire with 0,12 mm diameter should be used to test the anode overcurrent trip circuit.

The use of a tube fuse RöSich2/RöSich9 is recommended to protect the anode against thermal overload. In conjunction with a pull switch RöKt11 it disconnects the voltages at the tube in case of overload (see accessories).

A protective gap shall be provided between screen grid and cathode to protect the control grid and the cathode against damage in case of spark-over from the side of the anode.

In addition, a limiting circuitry is recommended for screen grid protection.
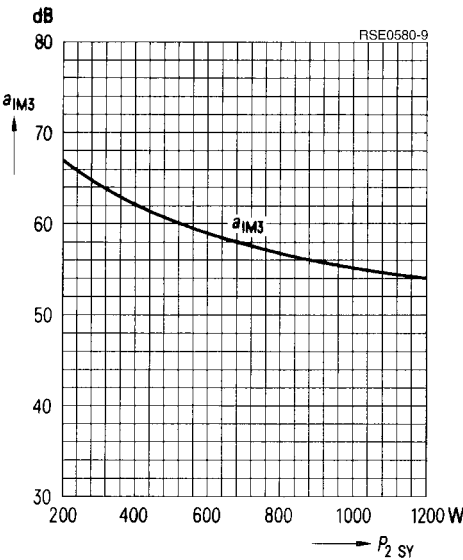
Cooling air diagram

t_2 Δp Q
°C mbar m³/min

RSE0604-Q
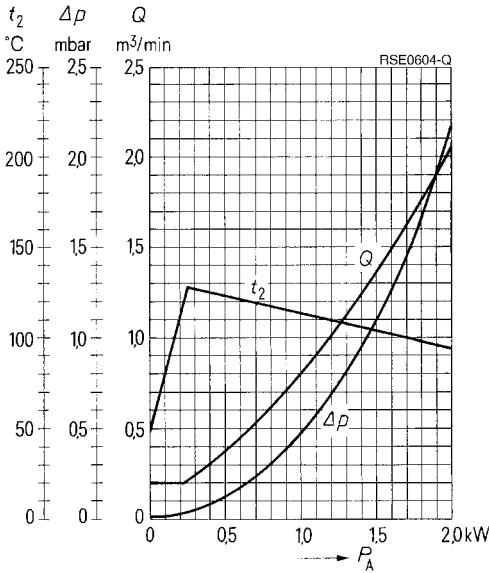
The cooling air is supplied from the electrode terminal side.

Air pressure = 1 bar
t_1 = 45 °C

3-ton intermodulation ratio $a_{IM3} = f(P_{2\,SY})$

RSE0580-9

U_A = 3,4 kV
U_{G2} = 600 V
U_F = 3,8 V
B (1 dB) = 8,5 MHz
f = 780 MHz

$U_{G1} = f(U_A)$ Parameter = I_A ————————

$U_{G2} = 500$ V   Parameter = I_{G2} —·—·—·—·—·—·—

Parameter = I_{G1} — — — — — — —

V

50

U_{G1}

40

$I_{G2} = 0{,}5$ A

0,4 A

0,35 A

30

$I_{G1} = 3$ A

0,3 A

0,25 A

2 A

0,2 A

20

1,5 A

0,15 A

1 A

$I_A = 10$ A

10

0,6 A

0,2 A

0

6 A

4 A

−10

2 A

−20

1,5 A

1 A

−30

0,6 A

−40

0,2 A

−50

0   0,5   1   1,5   2   2,5   3 kV

U_A

RSE0581-H