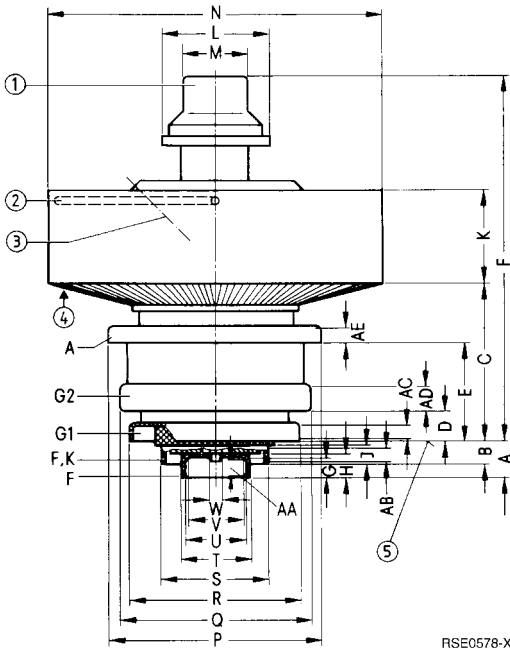


For frequencies up to 1215 MHz

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.



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 R6Sich2
- 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 (± 5 %) | V <sup>1)</sup> |
| Heater current                | $I_F$ | 19,5 ± 2    | A               |
| Preheating time               | $t_h$ | ≥ 3         | min             |
| Heating: indirect by ac or dc |       |             |                 |
| Cathode: matrix oxide         |       |             |                 |

**Characteristics**

|   |              |    |      |
|---|--------------|----|------|
| Amplification factor of screen grid<br>at $U_A = 3$ kV, $U_{G2} = 500$ V, $I_A = 0,5$ A | $\mu_{g2g1}$ | 11 | mA/V |
| Transconductance<br>at $U_A = 3$ kV, $U_{G2} = 500$ V, $I_A = 0,5$ A                    | s            | 55 |      |

**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 <sup>2)</sup> |
| Tube fuse   | RöSich9   | Q81-X1409 <sup>2)</sup> |
| 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               |

- 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)  | $U_{A0}$   | 4200  | V     |
| Cold anode voltage (dc)   | (band IV/V) | $U_{A0}$   | 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) | $I_{A0}$ | 250        | 450        | 450        | mA    |
| Anode current (dc)             | $I_A$    | 1000       | 800        | 900        | mA    |
| Screen grid current (dc)       | $I_{G2}$ | 28         | 18         | 22         | mA 3) |

1) See cooling.

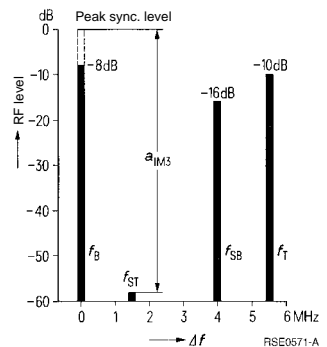
2) Power at cavity output with ≥ 90 % circuit efficiency.

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    | $P_{2SY}$ | 1,1        | 1,1         | kW <sup>1)</sup> |
| Power gain                   | $V_p$     | $\geq 17$  | $\geq 16,5$ | dB               |
| 3-tone intermodulation ratio | $a_{IM3}$ | $\geq 50$  | $\geq 47$   | dB <sup>2)</sup> |
| Anode voltage                | $U_A$     | 3400       | 3400        | V                |
| Screen grid voltage          | $U_{G2}$  | 600        | 600         | V                |
| Zero signal anode current    | $I_{A0}$  | 550        | 500         | mA               |
| Anode current, black level   | $I_{ASW}$ | 800        | 750         | mA               |
| Screen grid current          | $I_{G2}$  | 15         | 15          | mA <sup>3)</sup> |

Level diagram



- 1) Power at cavity output with  $\geq 85\%$  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  $\mu\text{F}$  to 50  $\mu\text{F}$  is necessary between control grid and cathode. For screen grid and anode power supply a capacitor of 0,1  $\mu\text{F}$  up to some  $\mu\text{F}$  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-air cooling refer to "Explanations on Technical Data".

**Safety precautions**

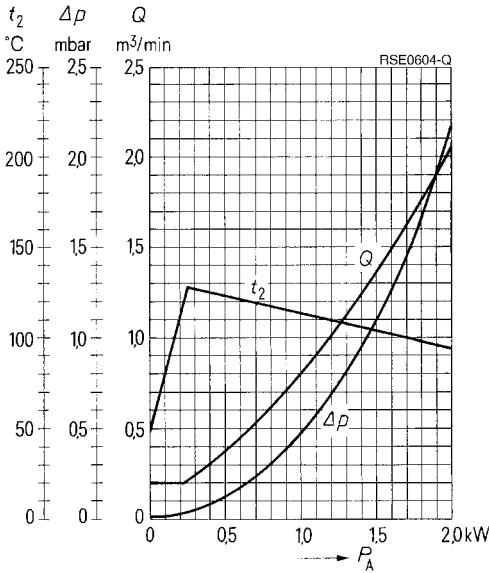
The section "Safety precautions" under "Explanations on Technical Data" describes how the tube is to be protected against damage due to electric overload or insufficient cooling. A copper wire with 0,12 mm diameter should be used to test the anode overcurrent trip circuit.

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.

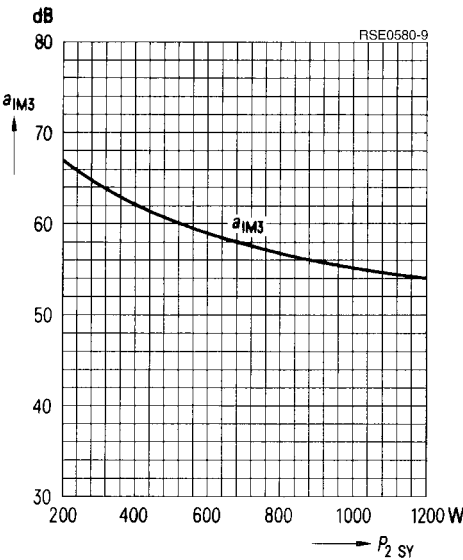
Cooling air diagram



The cooling air is supplied from the electrode terminal side.

Air pressure = 1 bar  
 $t_1 = 45\text{ °C}$

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



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

$U_{G1} = f(U_A)$   
 $U_{G2} = 500 \text{ V}$   
 Parameter =  $I_A$  —————  
 Parameter =  $I_{G2}$  - - - - -  
 Parameter =  $I_{G1}$  - - - - -

