

## S.Q. TUBE

Special quality pentode designed for use as wide band amplifier

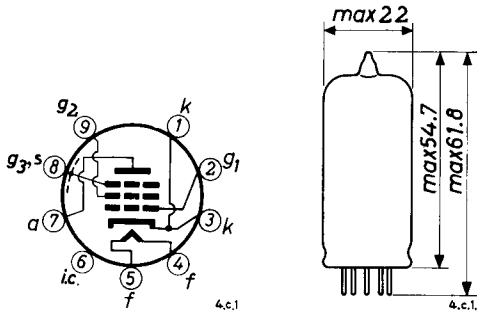
### QUICK REFERENCE DATA

Life test	10 000 hours	
Low interface resistance		
Base	Noval. Gold plated pins	
Heating	Indirect A.C. or D.C.; Parallel supply	
Heater voltage	$V_f$	6.3 V
Heater current	$I_f$	315 mA
Anode current	$I_a$	22 mA
Mutual conductance	$S$	35 mA/V
Equivalent noise resistance	$R_{eq}$	150 $\Omega$

### DIMENSIONS AND CONNECTIONS

Dimensions in mm

Base: Noval



**CHARACTERISTICS**

- Column I Nominal value or setting of the tube
- II Range values for equipment design: Initial spread
- III Range values for equipment design: End of life

		I	II	III	
Heater voltage	$V_f$	6.3			V
Heater current	$I_f$	315	299	331	mA
Anode supply voltage	$V_{ba}$	190			V
Grid No.2 supply voltage	$V_{bg2}$	160			V
Grid No.3 voltage	$V_{g3}$	0			V
Grid No.1 supply voltage	$+V_{bg1}$	10			V
Cathode resistor	$R_k$	400			$\Omega$
Anode current	$I_a$	22	21 - 23	min. 20	mA
Grid No.2 current	$I_{g2}$	6.0	5.4 - 6.6		mA
Internal resistance	$R_i$	120			k $\Omega$
Mutual conductance	S	35	30 - 40	min. 24.5	mA/V
Amplification factor	$\mu_{g2g1}$	80			
<u>Negative grid current</u>	$-I_{g1}$		max. 0.3	max. 1.0	$\mu A$
<u>Equivalent noise resistance</u>	$R_{eq}$	150			$\Omega$
<u>Input resistance</u>	$R_{g1}$	1			k $\Omega$
Frequency = 100 MHz pin No.1 connected to pin No.3					
$\frac{S}{2\pi} \cdot \frac{1}{C_{g1}(\text{hot}) + C_a + 5 \text{ pF}}$		230			MHz
<u>Noise factor</u>	F	7			dB
Frequency = 100 MHz (Adapted to minimum noise)					
<u>Phase angle of slope</u>	$\varphi_s$	22			$^\circ$
Frequency = 100 MHz					

**CHARACTERISTICS** (continued)

As triode (grid No.2 connected to anode)

		I	II	
Anode supply voltage	$V_{ba}$	160		V
Grid No.3 voltage	$V_{g3}$	0		V
Grid No.1 supply voltage	$+V_{bg1}$	10		V
Cathode resistor	$R_k$	470		$\Omega$
Anode current	$I_a$	24		mA
Mutual conductance	S	41		mA/V
Amplification factor	$\mu$	77		
Internal resistance	$R_i$	1.9		k $\Omega$
<u>Equivalent noise resistance</u>	$R_{eq}$	65		$\Omega$
<u>Insulation resistance between anode and other electrodes</u>	$R_{ins}$		min. 500	M $\Omega$
Voltage between electrodes = 300 V				
<u>Insulation resistance between grid No.1 and other electrodes</u>	$R_{ins}$		min. 200	M $\Omega$
Voltage between electrodes = 50 V				
<u>Leakage current between cathode and heater</u>	$I_{kf}$		max. 5	$\mu$ A
Voltage between cathode and heater = 100 V				
<b>CAPACITANCES</b>				
<u>Without external shield.</u>				
Grid No.1 to grid No.2, grid No.3, cathode, heater and screen	$C_{g1/g2g3kfs}$	10	9- 11	pF
Grid No.1 to grid No.2, grid No.3, cathode, heater and screen Cathode current = 28 mA	$C_{g1/g2g3kfs}$	17		pF
Anode to grid No.2, grid No.3, cathode, heater and screen	$C_{a/g2g3kfs}$	2.1	1.8- 2.4	pF

**CAPACITANCES** (continued)

		I	II	
Anode to grid No.1	$C_{ag_1}$		max. 40	mpF
Anode to cathode	$C_{ak}$		max. 50	mpF
Anode to cathode and grid No.2	$C_{a/kg_2}$	0.32	0.28-0.36	pF
Anode to cathode, grid No.2 and grid No.3	$C_{a/kg_2g_3}$	2.0	1.7- 2.3	pF
Anode to heater	$C_{af}$		max. 100	mpF
Grid No.1 to cathode	$C_{g_1k}$	6.8	6.1- 7.5	pF
Grid No.1 to cathode and grid No.2	$C_{g_1/kg_2}$	9.5	8.5-10.5	pF
Grid No.1 to cathode, grid No.2 and grid No.3	$C_{g_1/kg_2g_3}$	10	9- 11	pF
<u>With external shield.</u>				
Grid No.1 to grid No.2, grid No.3, cathode, heater and screen	$C_{g_1/g_2g_3kfs}$	10.1	9.1-11.1	pF
Grid No.1 to grid No.2, grid No.3, cathode, heater and screen Cathode current = 28 mA	$C_{g_1/g_2g_3kfs}$	17.1		pF
Anode to grid No.2, grid No.3, cathode, heater and screen	$C_{a/g_2g_3kfs}$	3.3	2.9- 3.7	pF
Anode to grid No.1	$C_{ag_1}$		max. 35	mpF
<u>As triode. Without external shield.</u>				
Grid No.3 connected to cathode				
Grid No.1 to grid No.3, cathode, heater and screen	$C_{g_1/g_3kfs}$	7.3		pF
Anode and grid No.2 to grid No.3, cathode, heater and screen	$C_{ag_2/g_3kfs}$	3.1		pF
Anode and grid No.2 to grid No.1	$C_{ag_2/g_1}$	2.7		pF
<u>As triode. Without external shield</u>				
Grid No.3 connected to anode				
Grid No.1 to cathode, heater and screen	$C_{g_1/kfs}$	6.7		pF
Anode, grid No.2 and grid No.3 to cathode, heater and screen	$C_{ag_2g_3/kfs}$	1.0		pF
Anode, grid No.2 and grid No.3 to grid No.1	$C_{ag_2g_3/g_1}$	3.3		pF

**LIFE**

Production samples are tested to be within the end of life values (column III) during 10 000 hours.

**LIMITING VALUES** (Design centre rating system, if not otherwise specified)

Anode voltage		$V_{a0}$	max. 400 V
		$V_a$	max. 220 V
Anode dissipation	Des. centre	$W_a$	max. 4.2 W
	Abs. max.	$W_a$	max. 4.5 W
Grid No.2 voltage		$V_{g20}$	max. 400 V
		$V_{g2}$	max. 180 V
Grid No.2 dissipation	Des. centre	$W_{g2}$	max. 1.0 W <sup>1)</sup>
	Abs. max.	$W_{g2}$	max. 1.1 W <sup>1)</sup>
Anode plus grid No.2 dissipation (triode connected)		$W_{a+g2}$	max. 4.5 W
Grid No.1 voltage		$-V_{g1}$	max. 30 V
		$+V_{g1}$	max. 0 V
Cathode current	Des. centre	$I_k$	max. 30 mA
	Abs. max.	$I_k$	max. 33 mA
Grid resistor (Automatic bias)		$R_{g1}$	max. 0.5 M $\Omega$
Voltage between cathode and heater			
cathode positive		$V_{kf}$	max. 120 V
cathode negative		$V_{kf}$	max. 60 V
Bulb temperature	Abs. max.	$t_{bulb}$	max. 190 $^{\circ}\text{C}$

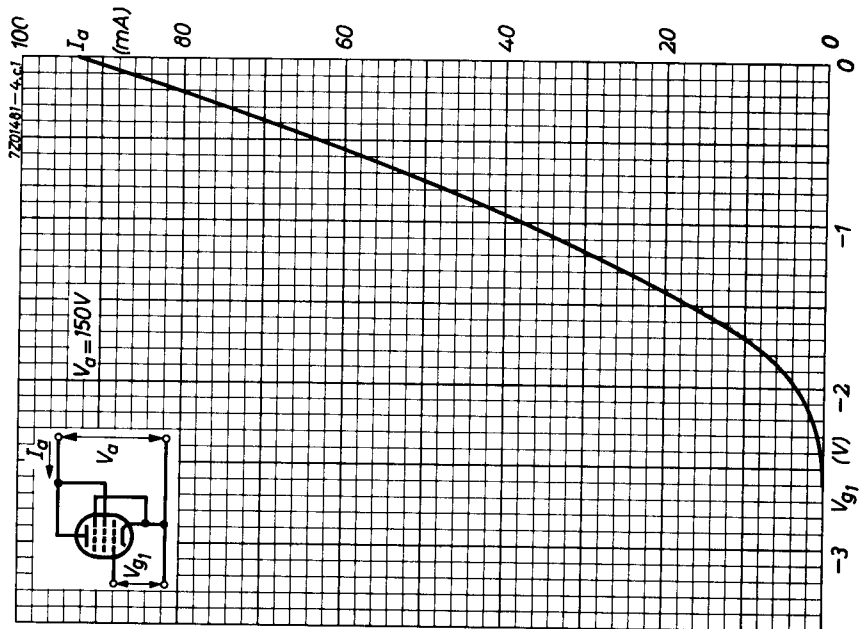
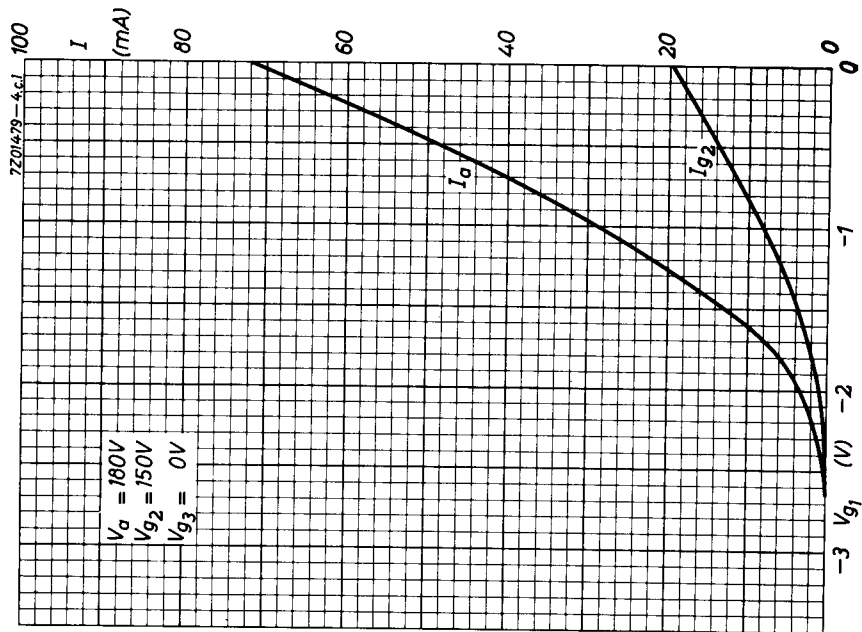
Heater voltage: The average heater voltage should be 6.3 V.

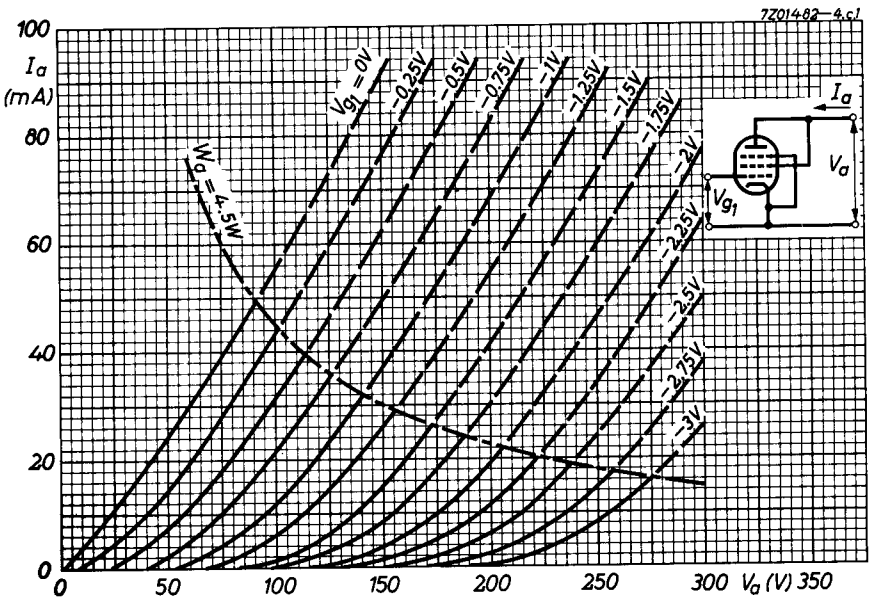
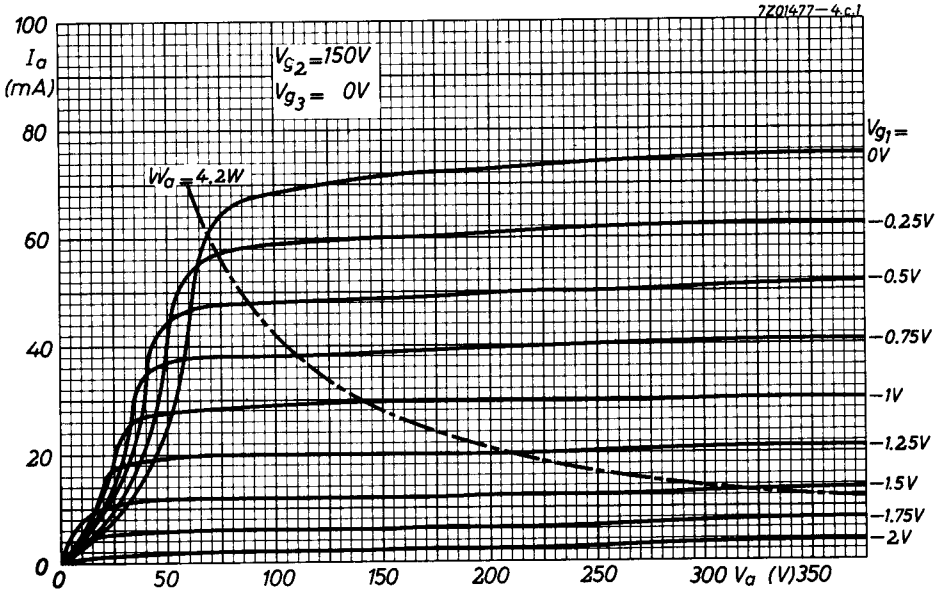
Variations of the heater voltage exceeding the range of 6.0 V to 6.6 V will shorten the tube life.

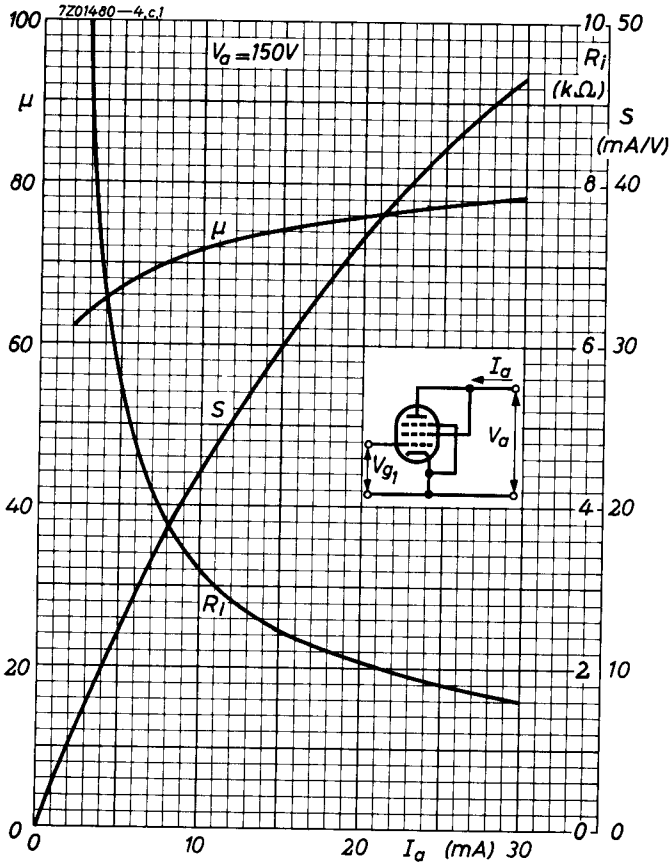
The tolerance of heater current (column II) should be taken into account.

<sup>1)</sup> Care should be taken not to exceed the rated  $W_{g2}$  values due to switching of positive supply voltages.

If the cathode is shunted by a capacitance  $> 10 \mu\text{F}$  a series resistor of minimum 1 k $\Omega$  should be inserted in the grid No.1 lead.









# PHILIPS

Data handbook



Electronic  
components  
and materials

## D3a

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