

Netzröhre für GW-Heizung  
 Indirekt geheizt  
 Parallelspeisung  
 DC-AC-Heating  
 Indirectly heated  
 connected in parallel

# TELEFUNKEN

**5894**  
 QQE 06/40

**Doppel-Tetrode**  
**Twin-tetrode**

**Doppel-Tetrode mit innerer Neutralisation für HF-Verstärker, Oszillatoren, Frequenzvervielfacher und Modulatoren.**

Twin-tetrode with internal neutralization for RF-amplifier, oscillators, frequency multipliers and modulators.

$U_f$                       **6,3**                      **12,6**                      V  
 $I_f$                               1,8                              0,9                              A

Oxyd-Kathode · Oxide-coated cathode

**Meßwerte · Measuring values**

je System bei  $I_a = 30$  mA

S                              4,5                              mA/V  
 $\mu_{g2/g1}$                       8,2

**Leistungs-Tabelle · Table of power output**

f	Telegraphie, C-Betrieb Telegraphy, class C		Anoden-Schirmgitter-Modulation, C-Betrieb Anode-grid 2-modulation, class C		SSB-Verstärker, B-Betrieb SSB, class B	
	$U_a$	N	$U_a$	N	$U_a$	$N_{sp}$
30 MHz					750 V	74 W
60 MHz			600 V	71 W		
200 MHz	600 V	90 W				
250 MHz	750 V	85 W	600 V	64 W		
430 MHz	520 V	66 W				
500 MHz	500 V	60 W				

f	Frequenz-Vervielfacher, C-Betrieb Frequency multiplier, class C		Modulator, B-Betrieb Modulator, class B	
	$U_a$	N	$U_a$	N
50/150 MHz	500 V	20 W	600 V	86 W
	400 V	18 W	450 V	60 W
75/225 MHz	400 V	12 W	300 V	37 W



## HF-Verstärker, Telegraphie C-Betrieb

RF-amplifier, telegraphy class C

System I und II in Gegentakt

System I and II in push-pull

### Betriebswerte · Typical operation

	CCS				ICAS		
f	<b>200</b>	<b>250</b>	<b>430</b>	<b>500</b>	<b>250</b>		MHz
U <sub>a</sub>	<b>600</b>	<b>750</b>	<b>520</b>	<b>500</b>	<b>750</b>		V
U <sub>g2</sub>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>		V
U <sub>g1</sub>	<b>-80</b>	<b>-80</b>	<b>-80</b>	—	<b>-80</b>		V
R <sub>g1</sub>	—	—	—	<b>20</b>	—		kΩ
U <sub>g1lsp/g1lsp</sub>	200	250	—	—	260		V
I <sub>a</sub>	2×100	2×80	2×100	2×100	2×90		mA
I <sub>g2</sub>	16	17	18	20	14		mA
I <sub>g1</sub>	2×2,5	2×1,5	2×2,8	2×3	2×1,7		mA
N <sub>a</sub>	2×60	2×60	2×52	2×50	2×67,5		W
Q <sub>a</sub>	2×15	2×17,5	2×19	2×20	2×19,5		W
Q <sub>g2</sub>	4	4,25	4,5	5	3,5		W
N	90	85	66	60	96		W
η	75	71	64	60	71		%

### Grenzwerte · Maximum ratings

f ≤ 250 MHz

	CCS	ICAS		CCS	ICAS	
U <sub>a</sub>	<b>750</b>	<b>750</b>	V	I <sub>g1</sub>	<b>2×5</b>	<b>2×5</b> mA
N <sub>a</sub>	<b>2×60</b>	<b>2×75</b>	W	R <sub>g1</sub>	<b>50</b>	<b>50</b> kΩ
Q <sub>a</sub>	<b>2×20</b>	<b>2×22,5</b>	W	U <sub>f/k</sub>	<b>100</b>	<b>100</b> V
I <sub>a</sub>	<b>2×110</b>	<b>2×120</b>	mA	f = 500 MHz		
U <sub>g2</sub>	<b>300</b>	<b>300</b>	V	U <sub>a</sub>	<b>600</b>	<b>600</b> V
Q <sub>g2</sub>	<b>7</b>	<b>8</b>	W	N <sub>a</sub>	<b>2×50</b>	<b>2×60</b> W
U <sub>g1</sub>	<b>-175</b>	<b>-175</b>	V			



## Frequenzverdreifacher, C-Betrieb · Frequency tripler, class C

System I und II in Gegentakt

System I and II in push-pull

### Betriebswerte · Typical operation

f	<b>50/150</b>	<b>50/150</b>	<b>75/225</b>	MHz
$U_a$	<b>500</b>	<b>400</b>	<b>400</b>	V
$U_{g2}$	<b>250</b>	<b>250</b>	<b>250</b>	V
$U_{g1}$	<b>-150</b>	<b>-150</b>	<b>-150</b>	V
$U_{g1\text{isp}/g1\text{llsp}}$	360	360	360	V
$N_e$	1,2	1	0,6	W
$I_a$	2×60	2×73	2×65	mA
$I_{g2}$	10	16	20	mA
$I_{g1}$	2×3	2×2,5	2×1,5	mA
$N_a$	2×30	2×29	2×26	W
$Q_a$	2×20	2×20	2×20	W
$Q_{g2}$	2,5	4	5	W
N	20	18	12	W
$\eta$	33	31	23	%

### Grenzwerte · Maximum ratings

$f \leq 250$  MHz

	<b>CCS</b>			<b>CCS</b>	
$U_a$	<b>750</b>	V	$I_{g1}$	<b>2×5</b>	mA
$N_a$	<b>2×60</b>	W	$R_{g1}$	<b>50</b>	k $\Omega$
$Q_a$	<b>2×20</b>	W	$U_{f/k}$	<b>100</b>	V
$I_a$	<b>2×110</b>	mA	$f = 500$ MHz		
$U_{g2}$	<b>300</b>	V	$U_a$	<b>600</b>	V
$Q_{g2}$	<b>7</b>	W	$N_a$	<b>2×50</b>	W
$U_{g1}$	<b>-175</b>	V			



## HF-Einseitenbandverstärker, B-Betrieb

Single sideband amplifier, class B

$$I_{g1} = 0$$

System I und II parallel geschaltet

System I and II connected in parallel

### Betriebswerte · Typical operation

Einzelton · Single sound  $f = 30 \text{ MHz}$

$U_a$	<b>750</b>		V
$U_{g2}$	<b>280</b>		V
$U_{g1}^{1)}$	<b>-30</b>		V
$R_L$	<b>2,86</b>		k $\Omega$
$U_{g1sp}$	0	30	V
$I_a$	40	150	mA
$I_{g2}$	0	25	mA
$N_a$	30	112,5	W
$Q_a$	30	38,5	W
$Q_{g2}$	0	7	W
$N_{sp}^{2)}$	0	74	W

### Grenzwerte · Maximum ratings

$f \leq 250 \text{ MHz}$

$U_a$	<b>750</b>	V
$Q_a$	<b>2 × 20</b>	W
$I_a$	<b>2 × 110</b>	mA
$U_{g2}$	<b>300</b>	V
$Q_{g2}$	<b>7</b>	W
$U_{g1}$	<b>-175</b>	V

1) Für  $I_a = 40 \text{ mA}$  einstellen · adjust for  $I_a = 40 \text{ mA}$

2) Leistung beim Scheitelwert der Hüllkurve · power at peak value of envelope power

## Anoden- und Schirmgittermodulation, C-Betrieb

Anode and grid 2 modulation, class C

System I und II in Gegentakt

System I and II in push-pull

### Betriebswerte · Typical operation

	CCS		ICAS		
f	<b>60</b>	<b>250</b>	<b>60</b>	<b>250</b>	MHz
U <sub>a</sub>	<b>600</b>	<b>600</b>	<b>600</b>	<b>600</b>	V
U <sub>g2</sub>	<b>250</b>	<b>250</b>	<b>250</b>	<b>250</b>	V
U <sub>g1</sub>	<b>-80</b>	<b>-80</b>	<b>-80</b>	<b>-80</b>	V
U <sub>g1 sp</sub>	105	130	105	130	V
N <sub>a</sub>	2×45	2×45	2×50	2×50	W
I <sub>a</sub>	2×75	2×75	2×83	2×83	mA
I <sub>g2</sub>	20	18	16	16	mA
I <sub>g1</sub>	2×3,8	2×1,6	2×4	2×1,7	mA
Q <sub>a</sub>	2×9,5	2×13	2×10,5	2×14,5	W
Q <sub>g2</sub>	5	4,5	4	4	W
Z	71	64	79	71	W
η	79	71	79	71	%
m	100	100	100	100	%
U <sub>g2sp</sub>	90	90	90	90	V
N <sub>mod</sub>	45	45	50	50	W

### Grenzwerte · Maximum ratings

	CCS	ICAS	
f ≤ 250 MHz			
U <sub>a</sub>	<b>600</b>	<b>600</b>	V
N <sub>a</sub>	<b>2×45</b>	<b>2×50</b>	W
Q <sub>a</sub>	<b>2×14</b>	<b>2×15</b>	W
I <sub>a</sub>	<b>2×92</b>	<b>2×100</b>	mA
U <sub>g2</sub>	<b>300</b>	<b>300</b>	V
Q <sub>g2</sub> <sup>1)</sup>	<b>7</b>	<b>8</b>	W
Q <sub>g2</sub> <sup>2)</sup>	<b>4,6</b>	<b>5,2</b>	W
U <sub>g1</sub>	<b>-175</b>	<b>-175</b>	V
I <sub>g1</sub>	<b>2×5</b>	<b>2×5</b>	mA
R <sub>g1</sub> <sup>3)</sup>	<b>25</b>	<b>25</b>	kΩ
U <sub>f/k</sub>	<b>100</b>	<b>100</b>	V
f = 500 MHz			
U <sub>a</sub>	<b>480</b>	<b>480</b>	V
N <sub>a</sub>	<b>2×33,5</b>	<b>2×40</b>	W

<sup>1)</sup> Schirmgitter über Drosselspule moduliert · Screen grid modulated via choke coil

<sup>2)</sup> Für alle anderen Modulationsarten · For all other types of modulation

<sup>3)</sup> je Röhre; je System max. 50 kΩ · per tube; per section max. 50 kΩ

## NF-Verstärker in B-Betrieb, Modulator

### AF-amplifier class B, modulator

System I und II in Gegentakt · System I and II push-pull

#### Betriebswerte · Typical operation

$$I_{g1} > 0$$

$U_a$	<b>600</b>		<b>450<sup>2)</sup></b>		<b>300</b>	V
$U_{g2}$	<b>250</b>		<b>250</b>		<b>250</b>	V
$U_{g1}^{1)}$	<b>-25</b>		<b>-25</b>		<b>-25</b>	V
$R_{aa}$	<b>8</b>		<b>6</b>		<b>4</b>	k $\Omega$
$U_{g1sp/g1lsp}$	0	78	0	76	0	75 V
$N_e$	0	2×0,1	0	2×0,1	0	2×0,1 W
$I_a$	2×25	2×100	2×25	2×97	2×25	2×94 mA
$I_{g2}$	1,2	26	1,9	28	2,8	28 mA
$I_{g1}$	0	2×2,6	0	2×2,6	0	2×2,6 mA
$N_a$	2×15	2×60	2×11,2	2×43,5	2×7,5	2×28,2 W
$Q_a$	2×15	2×17	2×11,2	2×13,5	2×7,5	2×9,7 W
$Q_{g2}$	0,3	6,5	0,5	7	0,7	7 W
$N$	0	86	0	60	0	37 W
$\eta$	—	71,5	—	69	—	65,5 %
$k_{ges}$	—	5	—	5	—	5 %

#### Grenzwerte · Maximum ratings

$U_a$	<b>600</b>	V
$N_a$	<b>2×60</b>	W
$Q_a$	<b>2×20</b>	W
$I_a$	<b>2×110</b>	mA
$I_{g1}$	<b>2×5</b>	mA
$U_{g2}$	<b>300</b>	V
$Q_{g2}$	<b>7</b>	W
$R_{g1}$	<b>50</b>	k $\Omega$
$U_{f/k}$	<b>100</b>	V

1) Es wird empfohlen, die Gittervorspannung jedes Systems einzeln einzustellen.  
It is recommended to adjust the grid bias of each section separately.

2) Betriebskennlinien für diese Einstellungen stehen auf Anforderung zur Verfügung.  
On request characteristic curves for tube operation will be supplied to facilitate adjustments.



## NF-Verstärker in B-Betrieb, Modulator

### AF-amplifier class B, modulator

System I und II in Gegentakt · System I and II push-pull

#### Betriebswerte · Typical operation

$$I_{g1} = 0$$

$U_a$	<b>600</b>		<b>450<sup>2)</sup></b>		<b>300</b>	V
$U_{g2}$	<b>250</b>		<b>250</b>		<b>250</b>	V
$U_{g1}^{1)}$	<b>-27,5</b>		<b>-27,5</b>		<b>-26</b>	V
$R_{aa}$	<b>12,5</b>		<b>10</b>		<b>6,5</b>	k $\Omega$
$U_{g1sp/g1lsp}$	0	55	0	55	0	52 V
$I_a$	2 $\times$ 20	2 $\times$ 62	2 $\times$ 20	2 $\times$ 58	2 $\times$ 20	2 $\times$ 56 mA
$I_{g2}$	0,9	23	1,4	27	2,2	28 mA
$N_a$	2 $\times$ 12	2 $\times$ 37	2 $\times$ 9	2 $\times$ 26	2 $\times$ 6	2 $\times$ 16,8 W
$Q_a$	2 $\times$ 12	2 $\times$ 12	2 $\times$ 9	2 $\times$ 8,5	2 $\times$ 6	2 $\times$ 5,6 W
$Q_{g2}$	0,2	5,8	0,4	6,7	0,6	7 W
$N$	0	50	0	35	0	22,5 W
$\eta$	—	67,5	—	67,5	—	67 %
$k_{ges}$	—	2,4	—	3,1	—	2,9 %

#### Grenzwerte · Maximum ratings

$U_a$	<b>600</b>	V
$N_a$	<b>2<math>\times</math>60</b>	W
$Q_a$	<b>2<math>\times</math>20</b>	W
$I_a$	<b>2<math>\times</math>110</b>	mA
$U_{g2}$	<b>300</b>	V
$Q_{g2}$	<b>7</b>	W
$R_{g1}$	<b>50</b>	k $\Omega$
$U_{f/k}$	<b>100</b>	V

1) Es wird empfohlen, die Gittervorspannung jedes Systems einzeln einzustellen.  
It is recommended to adjust the grid bias of each section separately.

2) Betriebskennlinien für diese Einstellungen stehen auf Anforderung zur Verfügung.  
On request characteristic curves for tube operation will be supplied to facilitate adjustments.

## Impulsmodulator · Pulse modulator

System I und II parallel geschaltet · System I and II connected in parallel

### Betriebswerte · Typical operation

$t_{\text{pulse}}$	0,1	1	10	1000	$\mu\text{s}$
$f_{\text{pulse}}$	<b>1000</b>	<b>1250</b>	<b>500</b>	<b>1</b>	Hz
$U_a$	<b>6</b>	<b>6</b>	<b>5</b>	<b>2,5</b>	kV
$U_{g2}$	<b>850</b>	<b>800</b>	<b>800</b>	<b>800</b>	V
$U_{g1}$	<b>-250</b>	<b>-200</b>	<b>-200</b>	<b>-150</b>	V
$U_{g1\text{pulse}}$	400	360	200	160	V
$R_a$	<b>0,83</b>	<b>0,7</b>	<b>4,9</b>	<b>3,85</b>	k $\Omega$
$I_a\text{pulse}$	6	5	1	0,6	A
$I_a$	0,6	6,25	5	0,6	mA

### Grenzwerte · Maximum ratings

$U_a$	<b>7</b>	<b>7</b>	<b>7</b>	kV
$U_{g2}$	<b>850</b>	<b>850</b>	<b>850</b>	V
$U_{g1}$	<b>-200</b>	<b>-200</b>	<b>-200</b>	V
$Q_a$	<b>20</b>	<b>20</b>	<b>20</b>	W
$Q_{g2}$	<b>3</b>	<b>3</b>	<b>3</b>	W
$I_a\text{pulse}^1)$	<b>6</b>	<b>5</b>	<b>2,2</b>	A
$I_{g2\text{pulse}}^1)$	<b>2</b>	<b>2</b>	<b>0,7</b>	A
$I_{g1\text{pulse}}^1)$	<b>2</b>	<b>2</b>	<b>0,7</b>	A
$t_{\text{pulse}}^1)$	<b>0,1</b>	<b>1</b>	<b>10</b>	$\mu\text{s}$
$V_T^1)$	<b>0,001</b>	<b>0,001</b>	<b>0,001</b>	

<sup>1)</sup> Die Spitzenströme sind absolute Maximalwerte, Impulsdauer  $t_{\text{pulse}}$  und Tastverhältnis  $V_T$  sind Maximalwerte für den betreffenden Spitzenstrom.

The peak currents are absolute maximum ratings, pulse duration  $t_{\text{pulse}}$  and keying ratio  $V_T$  are maximum ratings for the peak current concerned.



## Impulsmodulierter HF-Verstärker · Pulse-modulated RF amplifier

System I und II parallel geschaltet · System I and II connected in parallel

### Betriebswerte · Typical operation

Oszillator mit impulsförmiger Speisespannung Oscillator with interrupted (pulsed) supply voltage			Impulsmodulierter HF-Verstärker Pulse-modulated RF amplifier			
f	<b>420</b>	MHz	f	<b>200</b>	<b>0,2</b>	MHz
t <sub>pulse</sub>	3000	µs	t <sub>pulse</sub>	3	1000	µs
f <sub>pulse</sub>	<b>50</b>	Hz	f <sub>pulse</sub>	<b>1200</b>	<b>1</b>	Hz
U <sub>a pulse</sub>	<b>1000</b>	V	U <sub>a</sub>	<b>3</b>	<b>3</b>	kV
U <sub>g2 pulse</sub>	<b>250</b>	V	U <sub>g2</sub>	<b>500</b>	<b>500</b>	V
R <sub>g1</sub>	<b>3,3</b>	kΩ	U <sub>g1</sub>	<b>-330</b>	<b>-330</b>	V
U <sub>g1 sp</sub>	150	V	U <sub>g1 sp</sub>	280	150	V
I <sub>a pulse</sub>	300	mA	U <sub>g1 pulse</sub>	230	230	V
I <sub>a</sub>	60	mA	I <sub>a pulse</sub>	800	300	mA
I <sub>g2 pulse</sub>	36	mA	I <sub>a</sub>	2,9	0,3	mA
I <sub>g2</sub>	5	mA	I <sub>g2 pulse</sub>	350	80	mA
N <sub>pulse</sub>	165	W	I <sub>g2</sub>	1,4	0,08	mA
			N <sub>pulse</sub>	1600	600	W

### Grenzwerte · Maximum ratings

U <sub>a</sub>	<b>3,5</b>	<b>3,5</b>	<b>3,5</b>	<b>3,5</b>	<b>1,2</b>	kV
U <sub>g2</sub>	<b>650</b>	<b>650</b>	<b>650</b>	<b>650</b>	<b>300</b>	V
U <sub>g1</sub>	<b>-400</b>	<b>-400</b>	<b>-400</b>	<b>-400</b>	<b>-200</b>	V
Q <sub>a</sub>	<b>20</b>	<b>20</b>	<b>20</b>	<b>30</b>	<b>30</b>	W
Q <sub>g2</sub>	<b>3</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>6</b>	W
Q <sub>g1</sub>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	W
I <sub>a pulse</sub> <sup>1)</sup>	<b>8</b>	<b>3,5</b>	<b>2,5</b>	<b>1,3</b>	<b>1</b>	A
t <sub>pulse</sub> <sup>1)</sup>	<b>1</b>	<b>5</b>	<b>10</b>	<b>100</b>	<b>1000</b>	µs
V <sub>T</sub> <sup>1)</sup>	<b>0,001</b>	<b>0,001</b>	<b>0,001</b>	<b>0,001</b>	<b>0,001</b>	

<sup>1)</sup> Die Spitzenströme sind absolute Maximalwerte, Impulsdauer t<sub>pulse</sub> und Tastverhältnis V<sub>T</sub> sind Maximalwerte für den betreffenden Spitzenstrom.

The peak currents are absolute maximum ratings, pulse duration t<sub>pulse</sub> and keying ratio V<sub>T</sub> are maximum ratings for the peak current concerned.

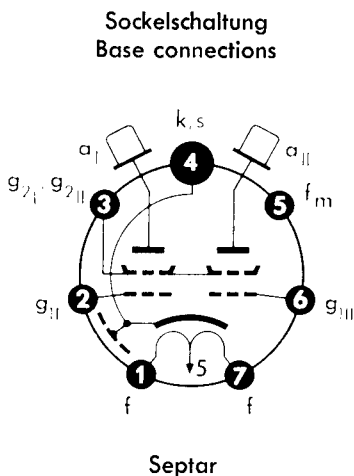
### Kapazitäten · Capacitances

ein System · one system

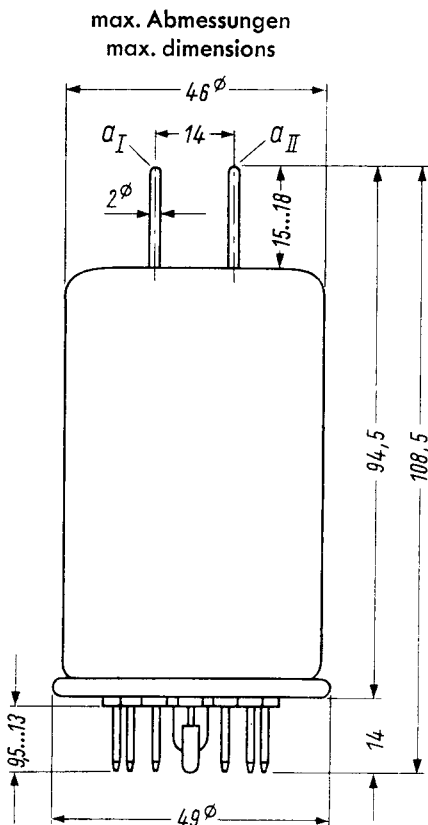
c <sub>e</sub>	10,5	pF
c <sub>a</sub>	3,2	pF
c <sub>a/g1</sub>	< 0,08	pF

in Gegentaktschaltung · push-pull circuit

c <sub>e</sub>	6,7	pF
c <sub>a</sub>	2,1	pF



Socket · Base	(E 7-21)
Fassung	Lager-Nr. 30 239
Socket	stock-no. 30 239
Kühlklemmen	Lager-Nr. 30 566
Cooling clips	stock-no. 30 566



Gewicht · Weight  
max. 155 g

Kühlung durch Strahlung · Cooling by radiation

Temperatur des Kolbens und der Anodenanschlüsse max. 200 °C

Temperature of envelope and anode terminals max. 200 °C

Temperatur der Sockelstifte max. 180 °C · Max. pin temperature 180 °C

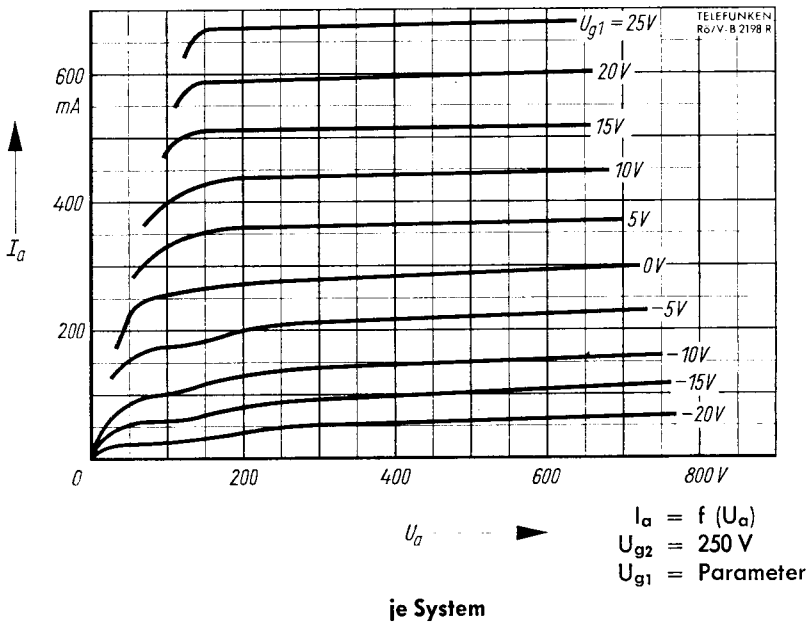
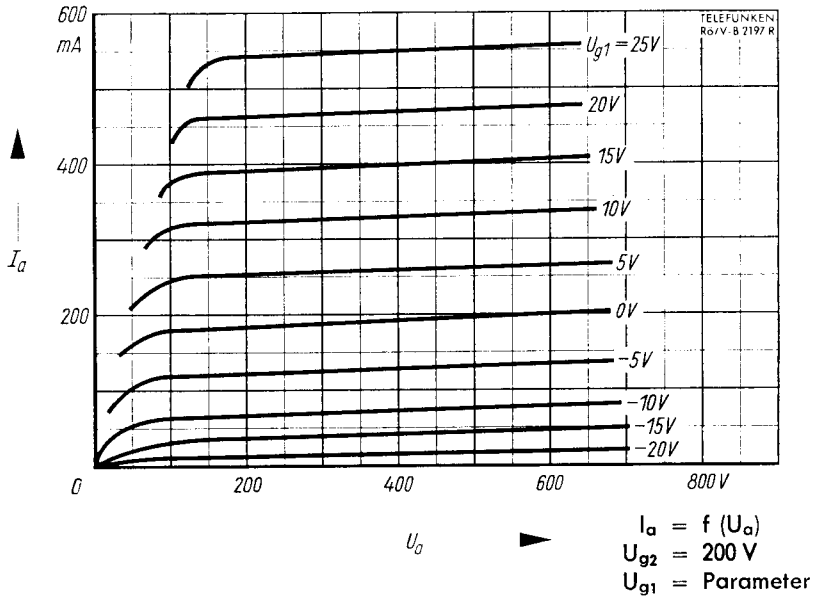
Wenn die Röhre bei einer Frequenz > 150 MHz benutzt wird, kann ein schwacher Luftstrom auf den Kolben und die Anodenanschlüsse erforderlich werden.

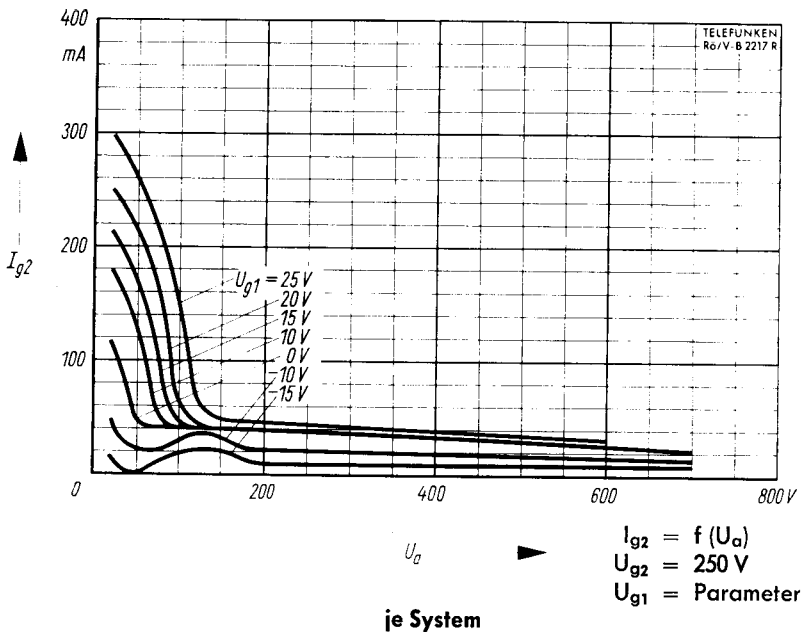
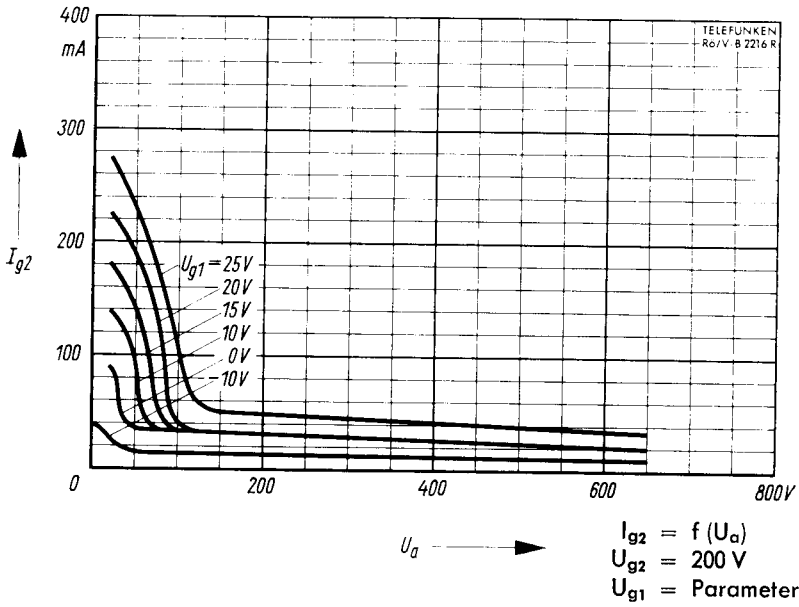
If the tube is operated at a frequency in excess of 150 Mc/s, a weak current of air directed at the envelope and anode terminals may be necessary.

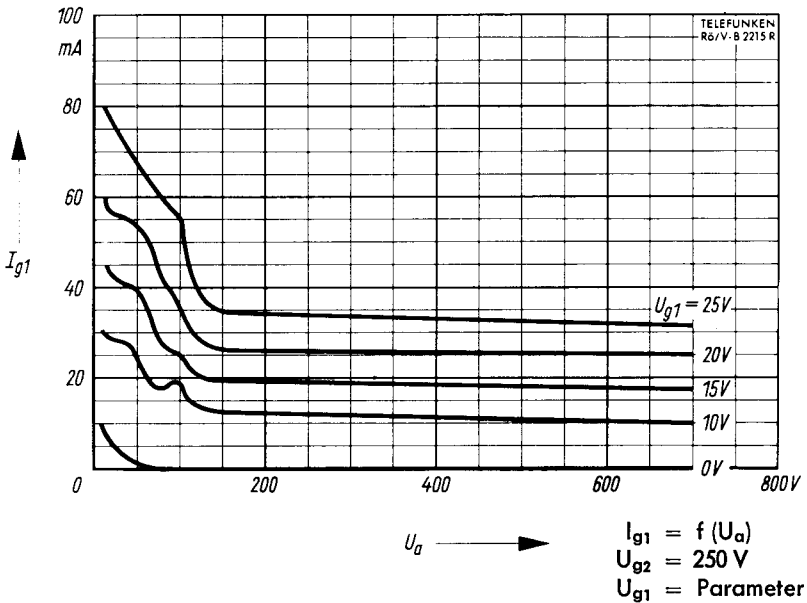
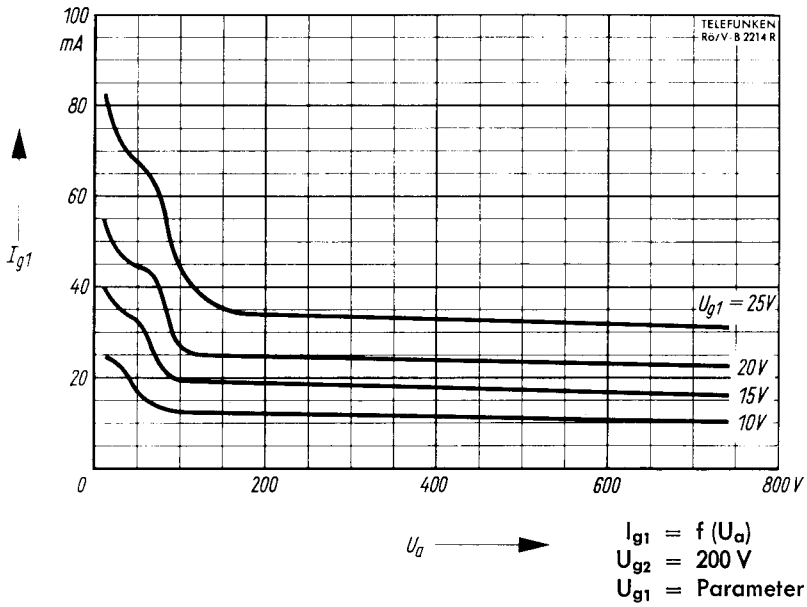
**Einbau:** Senkrecht, Sockel oben oder unten.  
Waagrecht, Anodenanschlüsse in einer waagerechten Ebene.

**Mounting position:** Vertical, base to top or bottom.  
Horizontal, anode terminals in a horizontal plane.



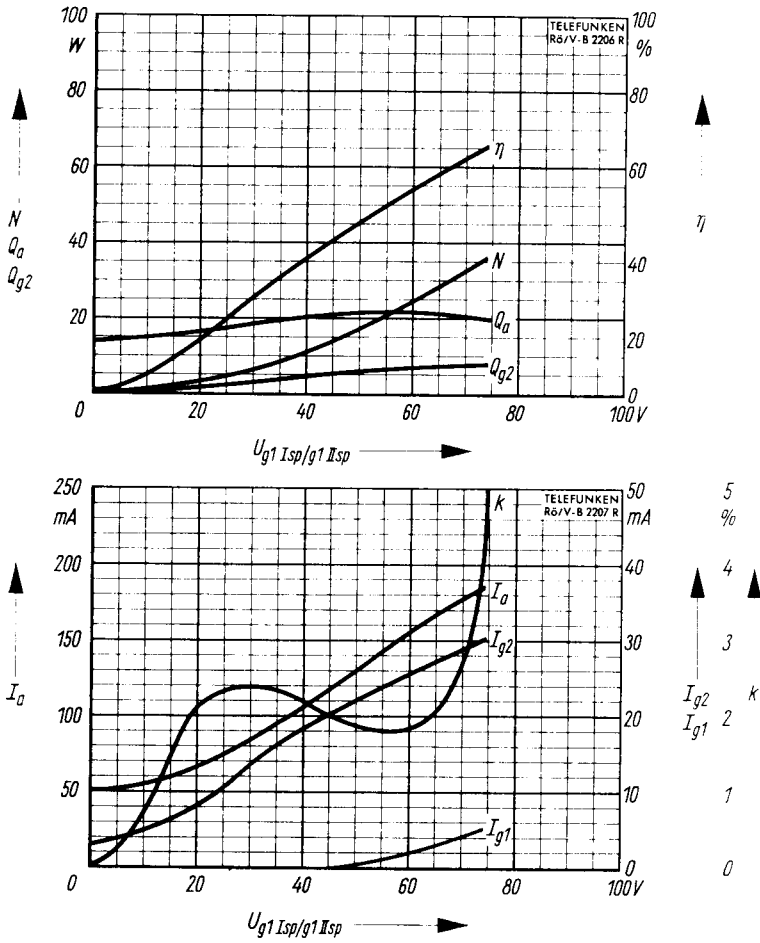






je System





NF-Verstärker in B-Betrieb, Modulator · ÄF amplifier class B, modulator  
System I und II in Gegentakt · System I and II in push-pull

$$N, Q_a, Q_{g2}, I_a, I_{g2}, I_{g1}, k, \eta = f(U_{g1})$$

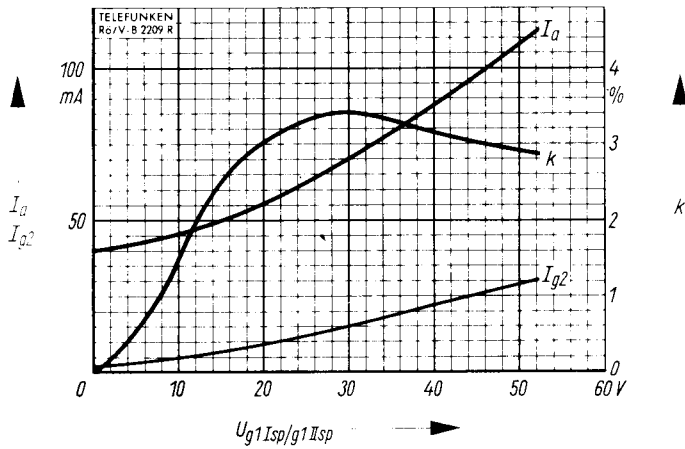
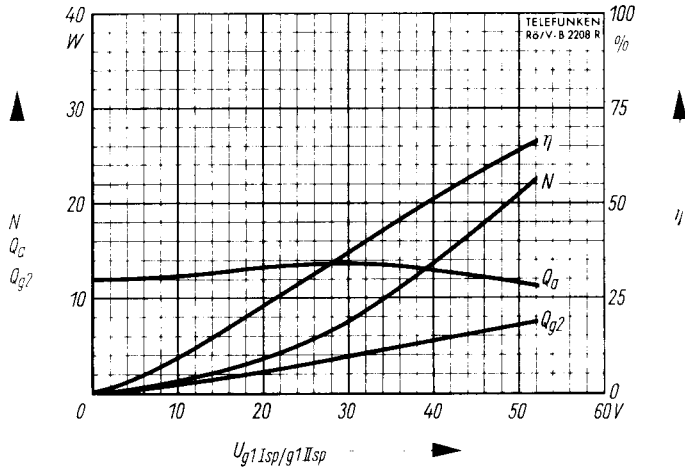
$$U_a = 300 \text{ V}$$

$$U_{g2} = 250 \text{ V}$$

$$U_{g1} = -25 \text{ V}$$

$$R_{aa} = 4 \text{ k}\Omega$$





**NF-Verstärker in B-Betrieb, Modulator** · AF amplifier class B, modulator  
System I und II in Gegentakt · System I and II in push-pull

$$N, Q_a, Q_{g2}, I_a, I_{g2}, k, \eta = f(U_{g1Isp/g1IIsp})$$

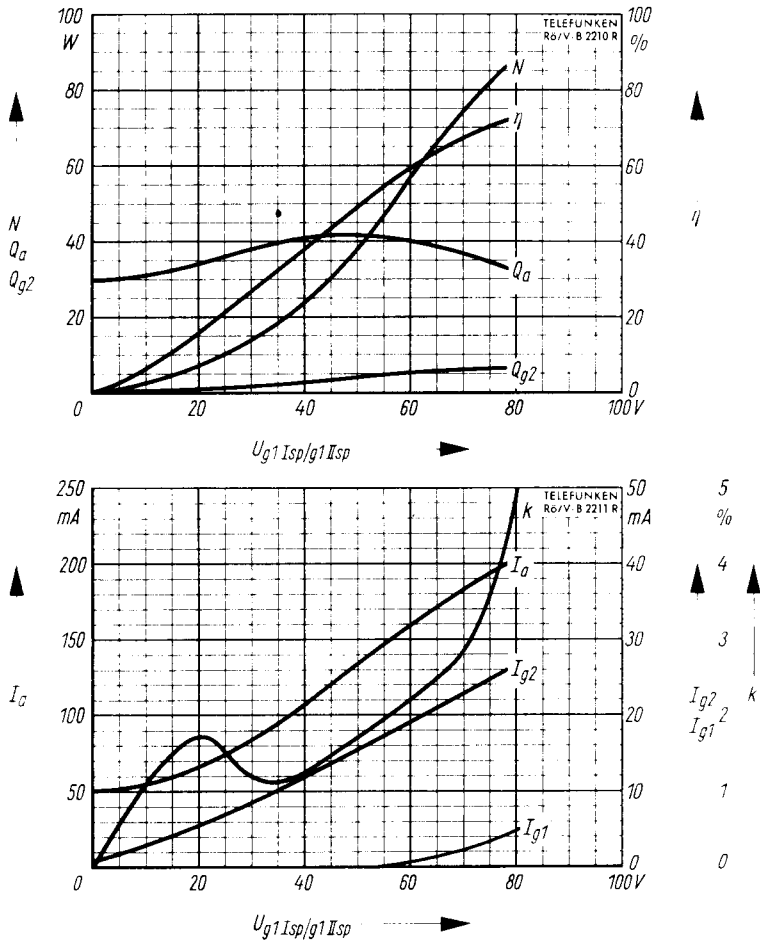
$$U_a = 300 \text{ V}$$

$$U_{g2} = 250 \text{ V}$$

$$U_{g1} = -26 \text{ V}$$

$$R_{aa} = 6,5 \text{ k}\Omega$$





**NF-Verstärker in B-Betrieb, Modulator** · AF amplifier class B, modulator  
System I und II in Gegentakt · System I and II in push-pull

$$N, Q_a, Q_{g2}, I_a, I_{g2}, I_{g1}, k, \eta = f(U_{g1} I_{sp} / g_1 I_{sp})$$

$$U_a = 600 \text{ V}$$

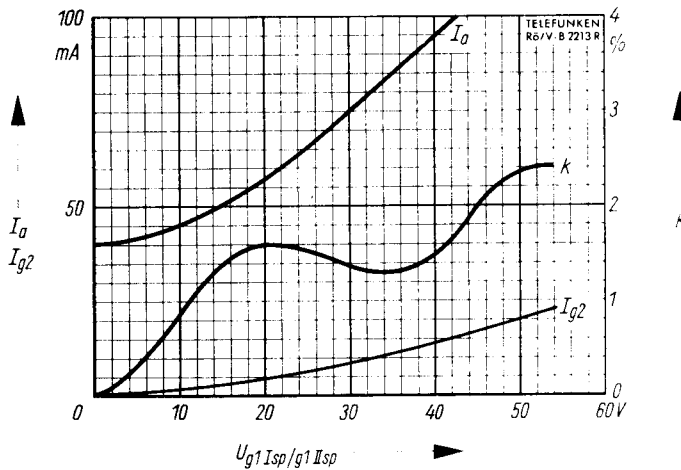
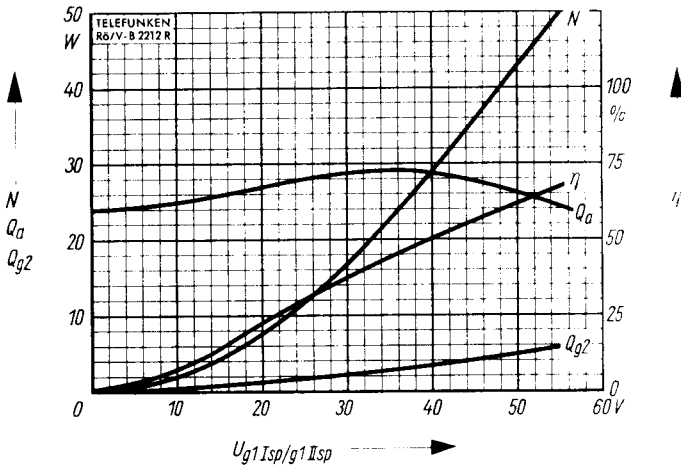
$$U_{g2} = 250 \text{ V}$$

$$U_{g1} = -25 \text{ V}$$

$$R_{ca} = 8 \text{ k}\Omega$$







**NF-Verstärker in B-Betrieb, Modulator** · AF amplifier class B, modulator  
System I und II in Gegentakt · System I and II in push-pull

$$N, Q_a, Q_{g2}, I_a, I_{g2}, k, \eta = f(U_{g1} I_{sp} / g_1 II_{sp})$$

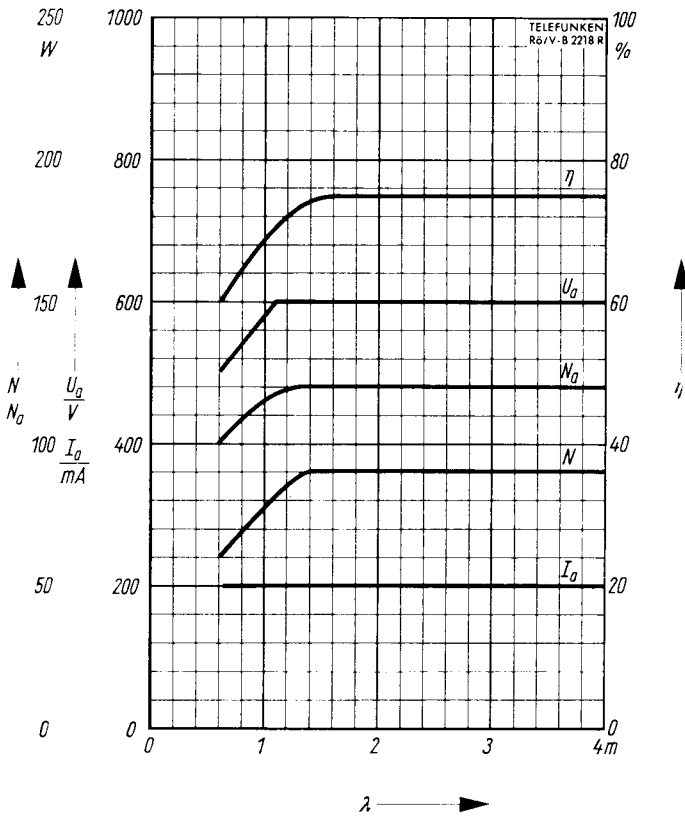
$$U_a = 600 \text{ V}$$

$$U_{g2} = 250 \text{ V}$$

$$U_{g1} = -27,5 \text{ V}$$

$$R_{aa} = 12,5 \text{ k}\Omega$$



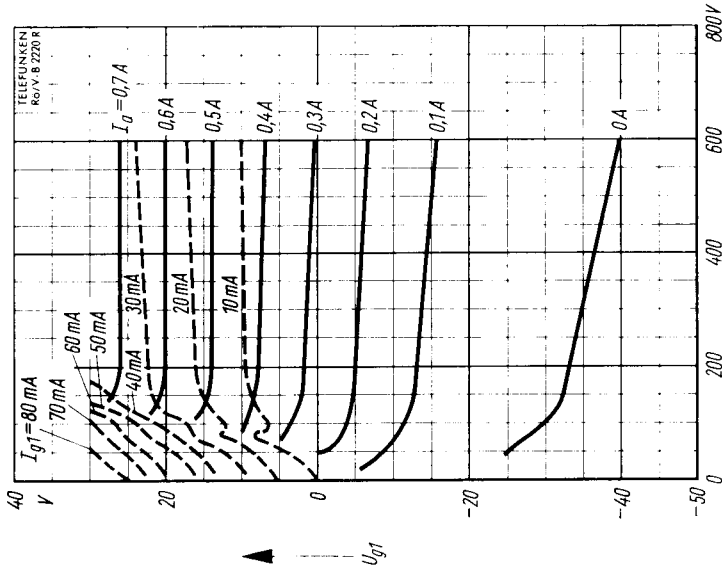


**HF-Verstärker, Telegraphie C-Betrieb** · RF amplifier, telegraphy class C  
System I und II in Gegentakt · System I and II in push-pull

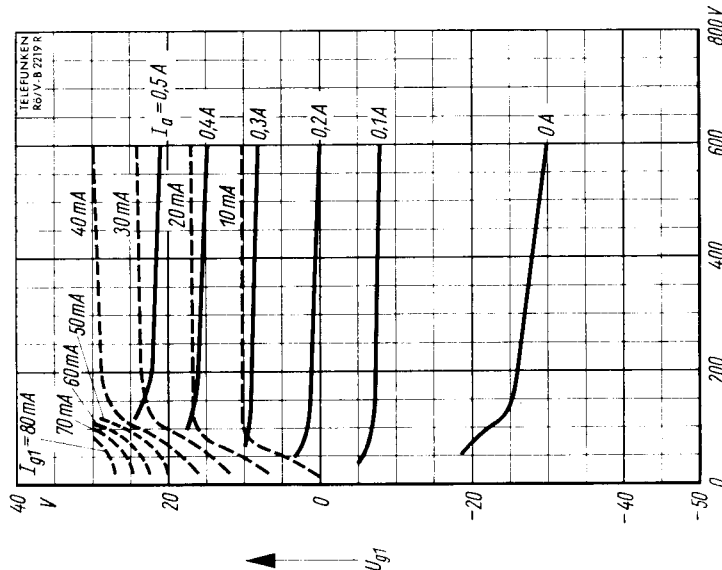
$$N, N_a, U_a, I_a, \eta = f(\lambda)$$

$$U_{g2} = 250 \text{ V}$$





$U_{g1} = f(U_{g2})$   
 $U_{g2} = 250 \text{ V}$



$U_{g1} = f(U_{g2})$   
 $U_{g2} = 200 \text{ V}$



