

DOUBLE TETRODE for use as H.F. amplifier or oscillator, frequency multiplier or modulator

DOUBLE TETRODE pour utilisation en amplificatrice ou oscillatrice H.F., multiplicatrice de fréquence ou modulatrice

DOPPELTETRODE zur Verwendung als HF-Verstärker. oder Oszillator, Frequenzvervielfacher oder Modulator

Filament : oxide-coated

Filament : oxyde

Heizfaden: Oxyd

$V_f = 3-3,15^1) \quad 6-6,3 \text{ V}^1)$

$I_f = 1,36 \quad 0,68 \text{ A}$

Heating : direct

Chauffage: direct

Heizung : direkt

Pins

Broches 3-(1+5) 1-5

Stifte

Capacitances

Capacités

Kapazitäten

per system

par système

pro System

in push-pull

en push-pull

in Gegentakt

$C_a = 3,3 \text{ pF} \quad C_o = 1,7 \text{ pF}$

$C_{g1} = 8,5 \text{ pF} \quad C_i = 5,7 \text{ pF}$

$C_{ag1} = 0,05 \text{ pF}$

Typical characteristics

Caractéristiques types

Kenndaten

$\mu_{2g1} = 7,5$

$S^3) (I_a = 20 \text{ mA}) = 2 \text{ mA/V}$

λ	Freq.	C teleg.				Cag2 mod.				B mod	
m	Mc/s	V_a (V)	W_o (W) 2)		V_a (V)	W_o (W) 2)		V_a (V)	W_o (W)		
			CCS	ICAS		CCS	ICAS				
5 											

1) Nominal values; valeurs nominales; Nennwerte

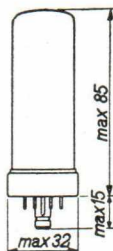
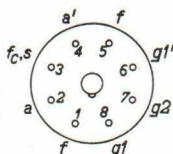
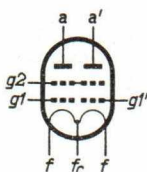
2) CCS = continous service; service continu; Dauerbetrieb

ICAS = intermittent service; service intermittent; aussetzender Betrieb

3) One system; un système; ein System

Pin temperature = max. 100 °C
 Temp. des broches = max. 100 °C
 Stiftentemperatur = max. 100 °C
 Bulb temperature = max. 200 °C
 Temp. de l'ampoule = max. 200 °C
 Kolbentemperatur = max. 200 °C

Dimensions in mm
 Dimensions en mm
 Abmessungen in mm



Base, culot, Sockel: Octal

Socket 40213
 Support
 Fassung

Mounting position: vertical with base up or down
 Horizontal with pins 1 and 5 in one horizontal plane

Montage : vertical avec le culot en haut ou en bas
 Horizontal avec les broches 1 et 5 situées dans le même plan horizontal

Einbau : senkrecht mit Sockel oben oder unten
 Waagrecht mit den Stiften 1 und 5 in einer waagerechten Ebene

Net weight 40 g
 Poids net
 Nettogewicht

Shipping weight 55 g
 Poids brut
 Bruttogewicht

H.F. class C telegraphy, two systems in push-pull
H.F. classe C télégraphie, deux systèmes en push-pull
HF Klasse C Telegraphie, zwei Systeme in Gegentakt

Limiting values, continuous service
C.C.S. Caractéristiques limites, service continu
Grenzdaten, Dauerbetrieb

f	= max. 186 Mc/s	f	= max. 300 Mc/s
V_a	= max. 600 V	V_a	= max. 450 V
W_{ia}	= max. 2x18 W	W_{ia}	= max. 2x9 W
W_a	= max. 2x6 W		
I_a	= max. 2x30 mA		
V_{g2}	= max. 250 V		
W_{g2}	= max. 7 W		
$-V_{g1}$	= max. 200 V		
I_{g1}	= max. 2x5 mA		

Operating conditions; continuous service
C.C.S. Caractéristiques d'utilisation; service continu
Betriebsdaten; Dauerbetrieb

f	=	60	60	60 Mc/s
V_a	=	600	400	250 V
V_{g2}	=	200	200	175 V
V_{g1}	=	-80	-80	-70 V
I_a	=	2x30	2x30	2x30 mA
I_{g2}	=	6	6	6,5 mA
I_{g1}	=	2x1,0	2x1,2	2x1,8 mA
$V_{g1g1'p}$	=	210	210	210 V
W_{ig1}	=	2x0,1	2x0,11	2x0,17 W
W_{g2}	=	1,2	1,2	1,1 W
W_{ia}	=	2x18	2x12	2x7,5 W
W_a	=	2x4,7	2x3,2	2x2,2 W
W_o	=	26,6	17,6	10,6 W
η	=	74	73	71 %

H.F. class C telegraphy, two systems in push-pull; con-
 H.F. classe C télégraphie, deux systèmes en push-pull; continuation
 HF Klasse C Telegraphie, zwei Systeme in Gegentakt; Fortsetzung

Operating conditions; continuous service
 C.C.S. Caractéristiques d'utilisation; service continu
 Betriebsdaten; Dauerbetrieb

f	=	186	186	186 Mc/s
V _a	=	600	400	250 V
V _{g1}	=	-80	-80	-70 V
V _{g2}	=	200	200	175 V
I _a	=	2x30	2x30	2x30 mA
I _{g1}	=	2x1,0	2x1,0	2x1,5 mA
I _{g2}	=	3,0	3,5	4,5 mA
V _{g1g1'} p	=	210	210	220 V
W _{g1}	=	2x0,1	2x0,1	2x0,15 W
W _{g2}	=	0,6	0,7	0,8 W
W _{ia}	=	2x18	2x12	2x7,5 W
W _a	=	2x5,2	2x3,6	2x2,4 W
W _o	=	25,6	16,8	10,2 W
η	=	71 ¹⁾	70	68 %

Limiting values, intermittent service
 I.C.A.S. Caractéristiques limites, service intermittent
 Grenzdaten, aussetzender Betrieb

f	= max.	186 Mc/s	f	= max.	300 Mc/s
V _a	= max.	600 V	V _a	= max.	450 V
W _{ia}	= max.	2x24 W	W _{ia}	= max.	2x12 W
W _a	= max.	2x8 W			
I _a	= max.	2x40 mA			
V _{g2}	= max.	250 V			
W _{g2}	= max.	7 W			
-V _{g1}	= max.	200 V			
I _{g1}	= max.	2x5 mA			

¹⁾ In order to prevent overheating a low velocity air flow should be directed on the bulb and the base
 Afin de prévenir le surchauffage il faut diriger un léger courant d'air sur l'ampoule et le culot
 Zur Vermeidung einer Überhitzung ist ein schwacher Luftstrom auf den Kolben und den Sockel notwendig

H.F. class C telegraphy, two systems in push-pull; continued
H.F. classe C télégraphie, deux systèmes en push-pull; continuation
HF Klasse C Telegraphie, zwei Systeme in Gegentakt; Fortsetzung

Operating conditions; intermittent service
I.C.A.S. Caractéristiques d'utilisation; service intermittent

Betriebsdaten; aussetzender Betrieb

f	=	60	60	60 Mc/s
V _a	=	600	400	250 V
V _{g2}	=	200	200	175 V
V _{g1}	=	-80	-80	-70 V
I _a	=	2x40	2x40	2x40 mA
I _{g2}	=	5,5	6,0	7,5 mA
I _{g1}	=	2x1,2	2x2,0	2x2,5 mA
V _{g1g1'} p	=	220	220	230 V
W _{ig1}	=	2x0,12	2x0,22	2x0,26 W
W _{g2}	=	1,1	1,2	1,3 W
W _{ia}	=	2x24	2x16	2x10 W
W _a	=	2x6,5	2x4,4	2x3,0 W
W _o	=	35	23,2	14,0 W
η	=	73	72,5	70 %

f	=	186	186	186 Mc/s
V _a	=	600	400	250 V
V _{g2}	=	200	200	175 V
V _{g1}	=	-80	-80	-70 V
I _a	=	2x40	2x40	2x40 mA
I _{g2}	=	4,5	5,0	7,5 mA
I _{g1}	=	2x1,3	2x1,5	2x2,0 mA
V _{g1g1'} p	=	220	220	230 V
W _{ig1}	=	2x0,13	2x0,15	2x0,26 W
W _{g2}	=	0,9	1,0	1,3 W
W _{ia}	=	2x24	2x16	2x10 W
W _a	=	2x7,2	2x5	2x3,4 W
W _o	=	33,6	22	13,2 W
η	=	70 ¹⁾	69	66 %

¹⁾See page 4; voir page 4; siehe Seite 4

H.F. class C anode and screen grid modulation, two systems in push-pull

H.F. classe C modulation d'anode et de grille-écran, deux systèmes en push-pull

HF Klasse C Anoden- und Schirmgittermodulation, zwei Systeme in Gegentakt

Limiting values, continuous service

C.C.S. Caractéristiques limites, service continu

Grenzdaten, Dauerbetrieb

f	= max.	186 Mc/s	f	= max.	300 Mc/s
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V_a	= max.	480 V	V_a	= max.	360 V
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W_{ia}	= max.	2x11,5 W	W_{ia}	= max.	2x5,25 W
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W_a	= max.	2x4 W
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I_a	= max.	2x25 mA
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V_{g2}	= max.	250 V
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W_{g2}	= max.	4,5 W
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$-V_{g1}$	= max.	200 V
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I_{g1}	= max.	2x5 mA
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Operating conditions, continuous service

C.C.S. Caractéristiques d'utilisation, service continu

Betriebsdaten, Dauerbetrieb

f	=	60	60	60	186 Mc/s
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V_a	=	450	400	250	250 V
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R_{g2}	=	18	18	10	10 k Ω
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V_{g1}	=	-80	-80	-70	-70 V
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I_a	=	2x25	2x25	2x19,5	2x19,5 mA
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I_{g2}	=	14	11	11	11 mA
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I_{g1}	=	2x1,0	2x0,8	2x1,5	2x1,5 mA
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V_{g1p}	=	83	83	110	110 V
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W_{ig1}	=	2x0,08	2x0,06	2x0,15	2x0,15 W
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W_{g2}	=	2,8	2,2	1,6	1,6 W
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W_{ia}	=	2x11,25	2x10	2x4,9	2x4,9 W
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W_a	=	2x2,5	2x2,3	2x1,8	2x1,9 W
-------	---	-------	-------	-------	---------

W_o	=	17,5	15,4	6,2	6,0 W
-------	---	------	------	-----	-------

η	=	77,5	77	63	61 %
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m	=	100	100	100	100 %
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W_{mod}	=	11,5	10	5	5 W
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H.F. class C anode and screen grid modulation, two systems in push-pull; continued

H.F. classe C modulation d'anode et de grille-écran, deux systèmes en push-pull; continuation

HF Klasse C Anoden- und Schirmgittermodulation, zwei Systeme in Gegentakt; Fortsetzung

I.C.A.S. Limiting values, intermittent service
Caractéristiques limites, service intermittent
Grenzdaten, aussetzender Betrieb

f = max.	186 Mc/s	f = max.	300 Mc/s
V_a = max.	480 V	V_a = max.	360 V
W_{ia} = max.	2x15,5 W	W_{ia} = max.	2x7 W
W_a = max.	2x5 W		
I_a = max.	2x32 mA		
V_{g2} = max.	250 V		
W_{g2} = max.	4,5 W		
$-V_{g1}$ = max.	200 V		
I_{g1} = max.	2x5 mA		

I.C.A.S. Operating conditions, intermittent service
Caractéristiques d'utilisation, service intermittent
Betriebsdaten, aussetzender Betrieb

f	=	60	186 Mc/s
V_a	=	250	250 V
R_{g2}	=	10	10 k Ω
V_{g1}	=	-70	-70 V
I_a	=	2x26,5	2x26,5 mA
I_{g2}	=	9	9 mA
I_{g1}	=	2x1,8	2x1,5 mA
V_{g1p}	=	110	110 V
W_{ig1}	=	2x0,18	2x0,15 W
W_{g2}	=	1,5	1,5 W
W_{ia}	=	2x6,6	2x6,6 W
W_a	=	2x2,5	2x2,7 W
W_o	=	8,2	7,8 W
η	=	62	59 %
m	=	100	100 %
W_{mod}	=	7	7 W

Class C frequency tripler, two systems in push-pull
 Classe C tripleur de fréquence, deux systèmes en push-pull
 Klasse C Frequenzverdreifacher, zwei Systeme in Gegentakt

C.C.S. Limiting values, continuous service
 Caractéristiques limites, service continu
 Grenzdaten, Dauerbetrieb

f	= max. 186 Mc/s	f	= max. 300 Mc/s
V_a	= max. 600 V	V_a	= max. 450 V
W_{ia}	= max. 2x12 W	W_{ia}	= max. 2x9 W
W_a	= max. 2x6 W		
I_a	= max. 2x30 mA		
V_{g2}	= max. 250 V		
W_{g2}	= max. 7 W		
$-V_{g1}$	= max. 200 V		
I_{g1}	= max. 2x5 mA		

C.C.S. Operating conditions, continuous service
 Caractéristiques d'utilisation, service continu
 Betriebsdaten, Dauerbetrieb

f	= 62/186	62/186 Mc/s
V_a	= 400	250 V
V_{g2}	= 200	200 V
V_{g1}	= -175	-175 V
I_a	= 2x24	2x30 mA
I_{g2}	= 3	6 mA
I_{g1}	= 2x0,6	2x1,1 mA
$V_{g1g1'p}$	= 430	430 V
W_{ig1}	= 2x0,12	2x0,22 W
W_{g2}	= 0,6	1,2 W
W_{ia}	= 2x9,6	2x7,5 W
W_a	= 2x6	2x5,2 W
W_o	= 7,2	4,6 W
η	= 37,5	31 %

Class C frequency tripler, two systems in push-pull; continued
 Classe C tripleur de fréquence, deux systèmes en push-pull; continuation
 Klasse C Frequenzverdreifacher, zwei Systeme in Gegentakt; Fortsetzung

Limiting values, intermittent service
 I.C.A.S. Caractéristiques limites, service intermittent
 Grenzwerten, aussetzender Betrieb

f	= max.	186 Mc/s	f	= max.	300 Mc/s
V_a	= max.	600 V	V_a	= max.	450 V
W_{ia}	= max.	2x16 W	W_{ia}	= max.	2x12 W
W_a	= max.	2x8 W			
I_a	= max.	2x40 mA			
V_{g2}	= max.	250 V			
W_{g2}	= max.	7 W			
$-V_{g1}$	= max.	200 V			
I_{g1}	= max.	2x5 mA			

Operating conditions, intermittent service
 I.C.A.S. Caractéristiques d'utilisation, service intermittent
 Betriebsdaten, aussetzender Betrieb

f	=	62/186	62/186 Mc/s
V_a	=	400	250 V
V_{g2}	=	200	200 V
V_{g1}	=	-175	-175 V
I_a	=	2x32,5	2x40 mA
I_{g2}	=	4	6,5 mA
I_{g1}	=	2x1,1	2x1,5 mA
$V_{g1g1}'p$	=	430	430 V
W_{ig1}	=	2x0,22	2x0,3 W
W_{g2}	=	0,8	1,3 W
W_{ia}	=	2x13	2x10 W
W_a	=	2x8	2x6,9 W
W_o	=	10	6,2 W
η	=	38,5	31 %

Class C frequency doubler
 Classe C doubleur de fréquence
 Klasse C Frequenzverdoppler

Limiting values, per tube
 C.C.S. Caractéristiques limites, par tube
 Grenzdaten, pro Röhre

f = max. 186 Mc/s	f = max. 300 Mc/s
V_a = max. 600 V	V_a = max. 450 V
W_{ia} = max. 2x12 W	W_{ia} = max. 2x9 W
W_a = max. 2x6 W	
I_a = max. 2x30 mA	
V_{g2} = max. 250 V	
W_{g2} = max. 7 W	
$-V_{g1}$ = max. 200 V	
I_{g1} = max. 2x5 mA	

Operating conditions, one system, continuous service

C.C.S. Caractéristiques d'utilisation, un système, service continu
 Betriebsdaten, ein System, Dauerbetrieb

f	= 93/186	93/186 Mc/s
V_a	= 400	250 V
V_{g1}	= -175	-175 V
V_{g2}	= 200	200 V
I_a	= 30	30 mA
I_{g1}	= 1,2	1,5 mA
I_{g2}	= 1,5	2 mA
V_{g1p}	= 210	220 V
W_{ig1}	= 0,23	0,3 W
W_{g2}	= 0,3	0,4 W
W_{ia}	= 12	7,5 W
W_a	= 5,5	3,5 W
W_o	= 6,5	4 W
η	= 54	53 %

Class C frequency doubler
 Classe C doubleur de fréquence
 Klasse C Frequenzverdoppler

Limiting values, per tube
 I.C.A.S. Caractéristiques limites, par tube
 Grenzdaten, pro Röhre

f = max. 186 Mc/s	f = max. 300 Mc/s
V_a = max. 600 V	V_a = max. 450 V
W_{ia} = max. 2x16 W	W_{ia} = max. 2x12 W
W_a = max. 2x8 W	
I_a = max. 2x40 mA	
V_{g2} = max. 250 V	
W_{g2} = max. 7 W	
$-V_{g1}$ = max. 200 V	
I_{g1} = max. 2x5 mA	

Operating conditions, one system, intermittent service
 I.C.A.S. Caractéristiques d'utilisation, un système, service intermittent
 Betriebsdaten, ein System, aussetzender Betrieb

f	= 93/186	93/186 Mc/s
V_a	= 400	250 V
V_{g2}	= 200	200 V
V_{g1}	= -175	-175 V
I_a	= 40	40 mA
I_{g2}	= 2,5	3 mA
I_{g1}	= 1,5	2 mA
V_{g1p}	= 220	230 V
W_{ig1}	= 0,3	0,42 W
W_{g2}	= 0,5	0,6 W
W_{ia}	= 16	10 W
W_a	= 8	5,1 W
W_o	= 8	4,9 W
η	= 50	49 %

L.F. class B amplifier and modulator, two systems in push-pull

Amplificatrice et modulatrice B.F. classe B, deux systèmes en push-pull

NF-Verstärker und Modulator Klasse B, zwei Systeme in Gegentakt

C.C.S. Limiting values, continuous service
Caractéristiques limites, service continu
Grenzdaten, Dauerbetrieb

V_a	= max.	600 V
W_{ia}	= max.	2x18 W
W_a	= max.	2x6 W
I_a	= max.	2x30 mA
V_{g2}	= max.	250 V
W_{g2}	= max.	7 W
$-V_{g1}$	= max.	200 V

C.C.S. Operating conditions, continuous service
Caractéristiques d'utilisation, service continu
Betriebsdaten, Dauerbetrieb

V_f	=	6,3 ¹⁾	6,3 ¹⁾	V
V_a	=	450	400	V
V_{g2}	=	200	200	V
V_{g1}	=	-24	-24	V
$R_{aa'}$	=	20	16	kΩ
$V_{g1g1'p}$	=	0 94	0 94	V
I_a	=	2x2,8 2x32,5	2x2,7 2x35	mA
I_{g2}	=	2x0,16 2x5	2x0,15 2x5,3	mA
I_{g1}	=	0 2x1,1	0 2x1,3	mA
W_{ia}	=	2x1,3 2x14,6	2x1,1 2x14	W
W_a	=	2x1,3 2x5,6	2x1,1 2x5,5	W
W_o	=	- 18	- 17	W
d_{tot}	=	- 5	- 5	%
η	=	- 61,5	- 60,5	%

¹⁾ D.C. voltage
Tension directe
Gleichspannung

L.F. class B amplifier and modulator, two systems in push-pull; continued
 Amplificatrice et modulatrice B.F. classe B, deux systèmes en push-pull; continuation
 NF-Verstärker und Modulator Klasse B, zwei Systeme in Gegentakt; Fortsetzung

C.C.S.

Operating conditions, continuous service
 Caractéristiques d'utilisation, service continu
 Betriebsdaten, Dauerbetrieb

V_f	=	6,3 ¹⁾	6,3 ¹⁾	V
V_a	=	350	250	V
V_{g2}	=	200	175	V
V_{g1}	=	-24	-20	V
R_{aa}	=	12	8	k Ω
$V_{g1g1'p}$	=	0 104	0 100	V
I_a	=	2x2,5 2x37,5	2x2,9 2x36	mA
I_{g2}	=	2x0,14 2x5,5	2x0,2 2x5	mA
I_{g1}	=	0 2x1,4	0 2x1,5	mA
W_{ia}	=	2x0,88 2x13,1	2x0,71 2x9	W
W_a	=	2x0,88 2x5,1	2x0,71 2x4,5	W
W_o	=	- 16	- 9	W
dt_{tot}	=	- 5	- 5	%
η	=	- 61	- 50	%

¹⁾ Direct voltage
 Tension directe
 Gleichspannung

L.F. class B amplifier and modulator, two systems in push-pull; continued
 Amplificatrice et modulatrice B.F. classe B, deux systèmes en push-pull; continuation
 NF-Verstärker und Modulator Klasse B, zwei Systeme in Gegentakt; Fortsetzung

Limiting values, intermittent service

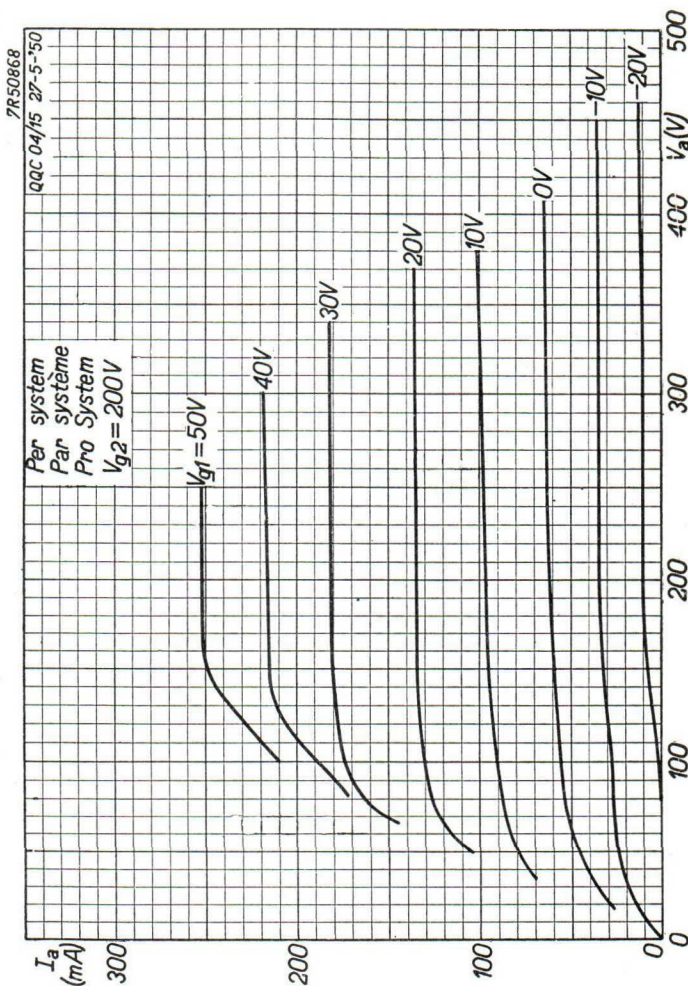
I.C.A.S. Caractéristiques limites, service intermittent
 Grenzdaten, aussetzender Betrieb

V_a	= max.	600 V
W_{ia}	= max.	2x24 W
W_a	= max.	2x8 W
I_a	= max.	2x40 mA
V_{g2}	= max.	250 V
W_{g2}	= max.	7 W
$-V_{g1}$	= max.	200 V

Operating conditions, intermittent service

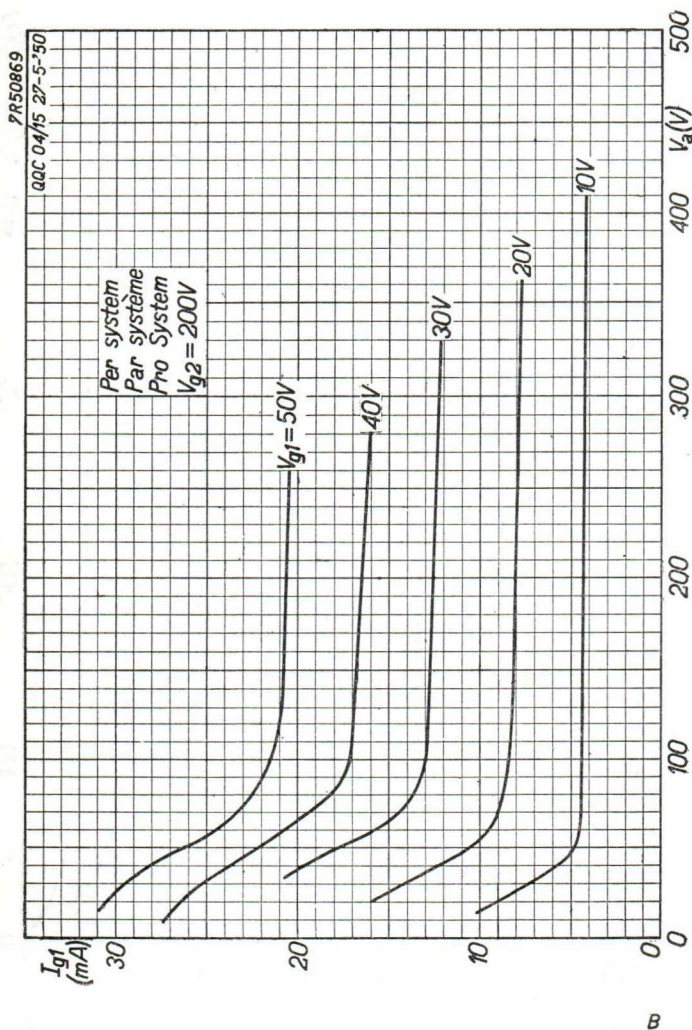
I.C.A.S. Caractéristiques d'utilisation, service intermittent
 Betriebsdaten, aussetzender Betrieb

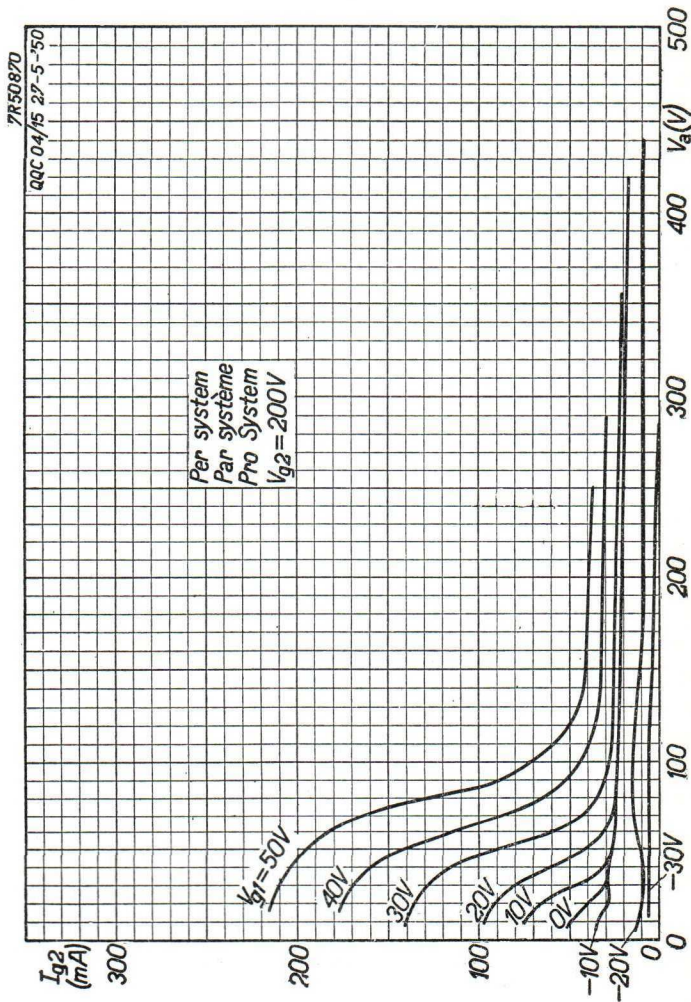
V_f	=	6,3 ¹⁾	V
V_a	=	600	V
V_{g2}	=	200	V
V_{g1}	=	-24	V
$R_{aa'}$	=	25	k Ω
$V_{g1g1'p}$	=	0	85 V
I_a	=	2x3,0	2x33,5 mA
I_{g2}	=	2x0,18	2x4,5 mA
I_{g1}	=	0	2x1,2 mA
W_{ia}	=	2x1,8	2x20,1 W
W_a	=	2x1,8	2x6 W
W_o	=	0	28,2 W
d_{tot}	=	-	5 %
η	=	0	70 %



QQC 04/15

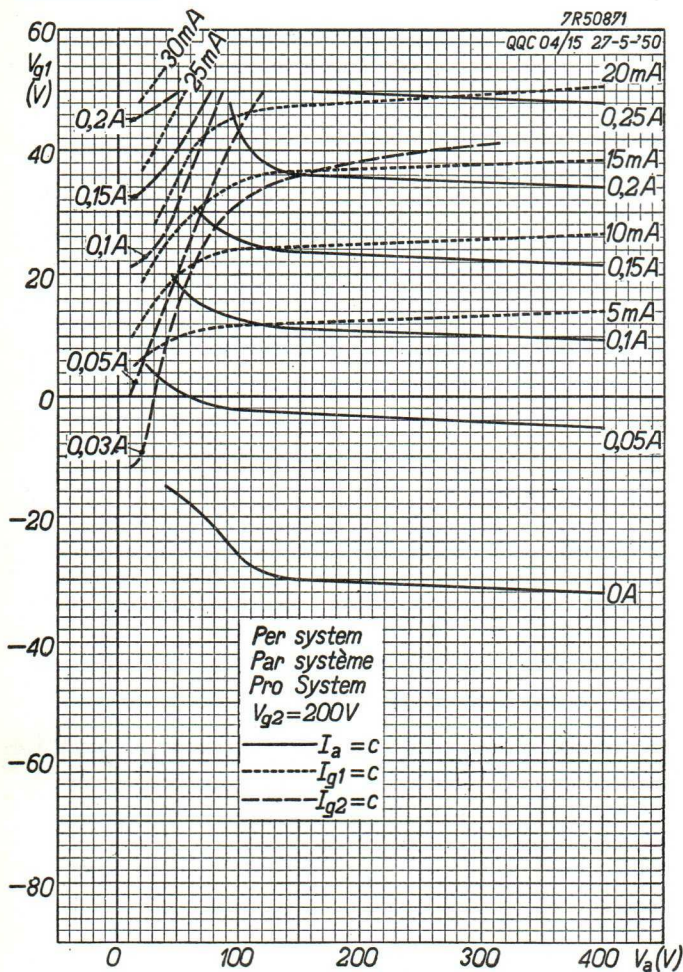
PHILIPS

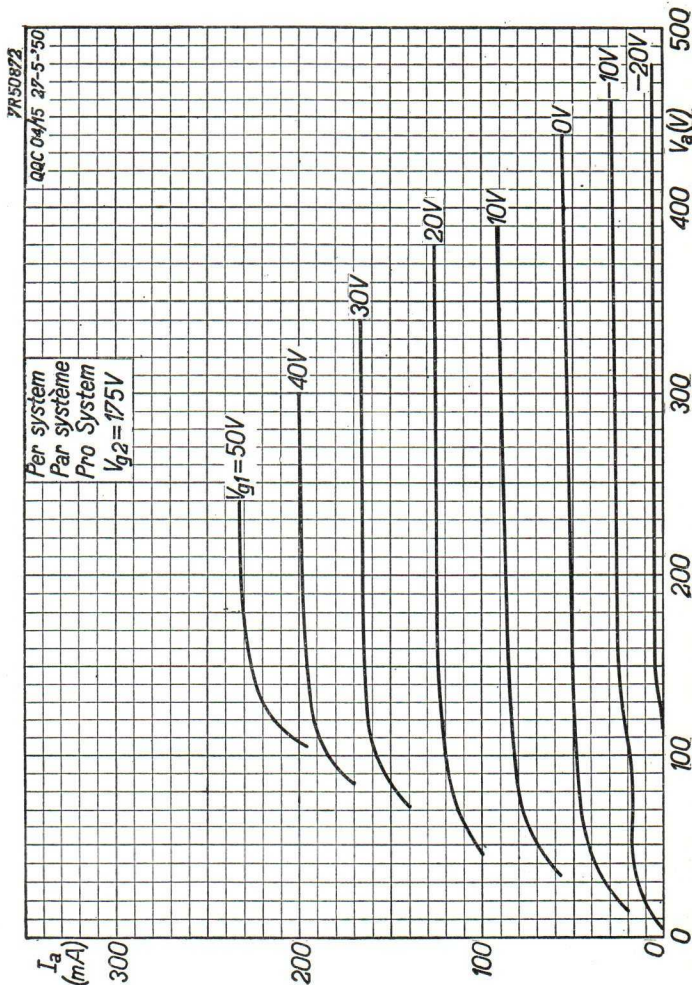




QQC 04/15

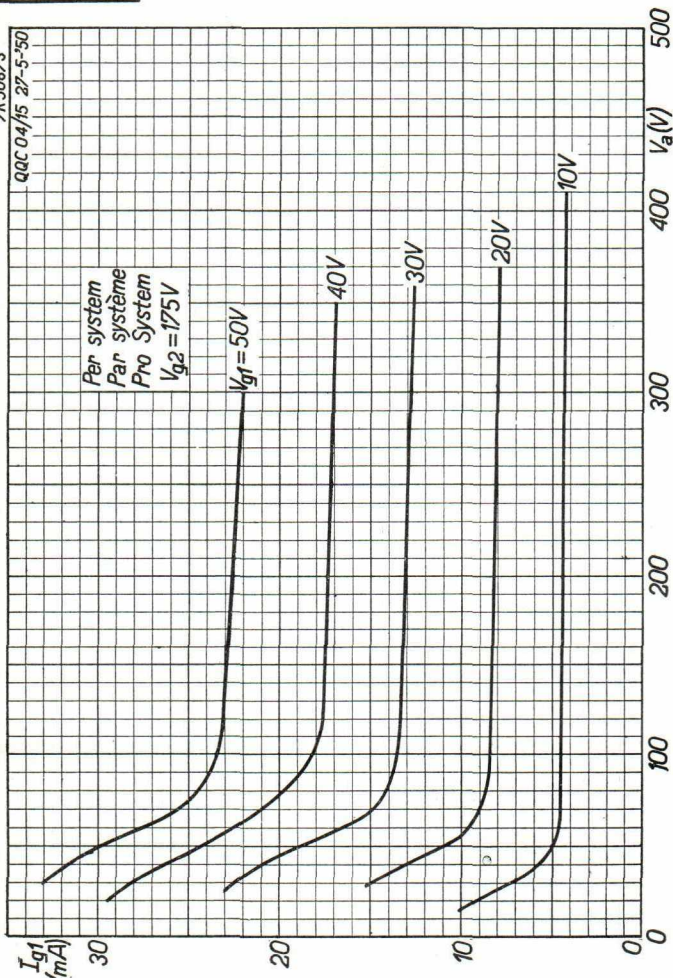
PHILIPS





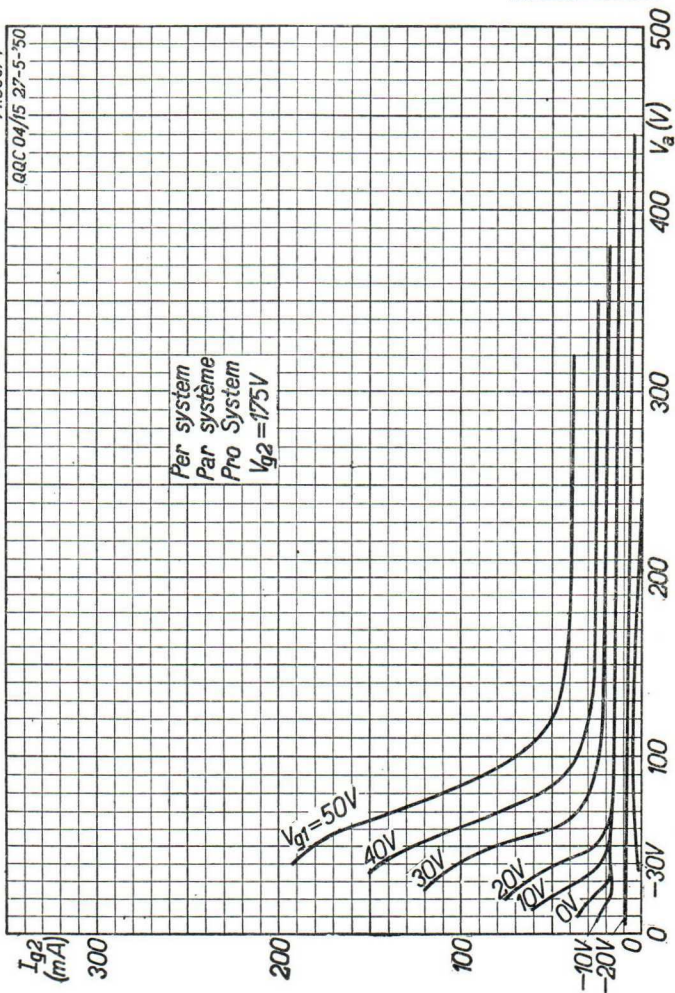
7R50873

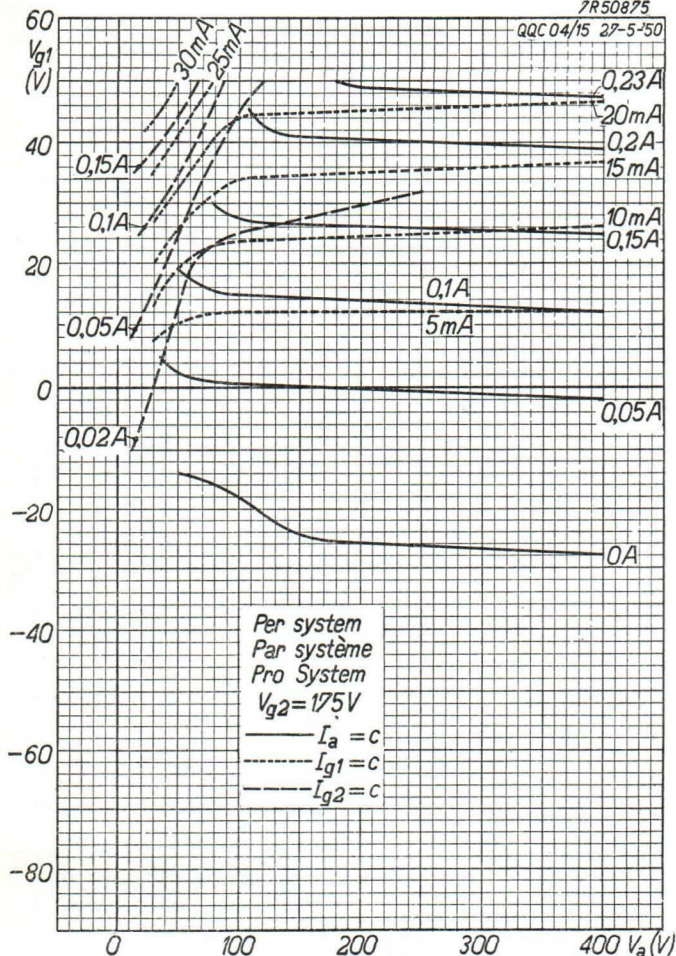
QQC 04/15 27-5-50



7R50874

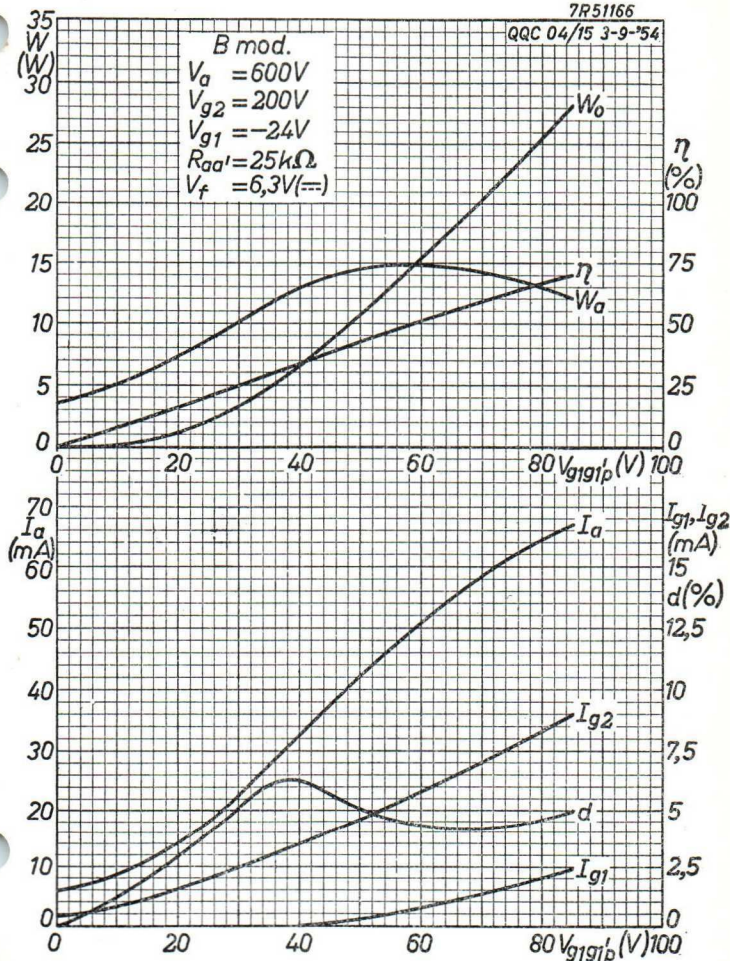
QQC 04/15 27-5-50





7R51166

QQC 04/15 3-9-54



7.7.1954

I

QQC 04/15

PHILIPS

7R51047A

QQC 04/15 29-3-'52

B mod.

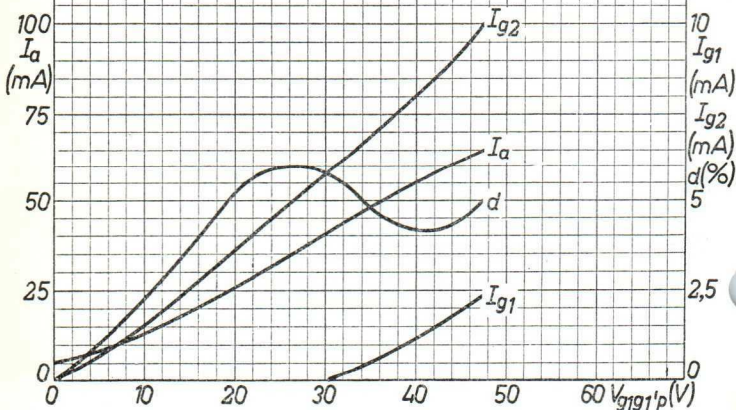
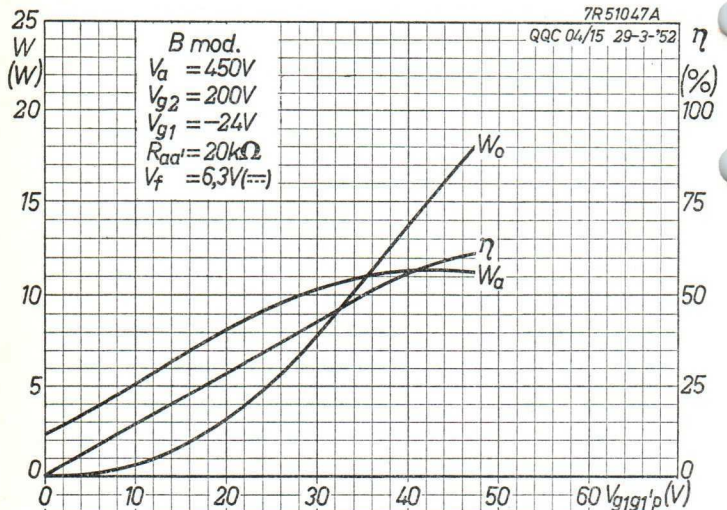
$V_a = 450V$

$V_{g2} = 200V$

$V_{g1} = -24V$

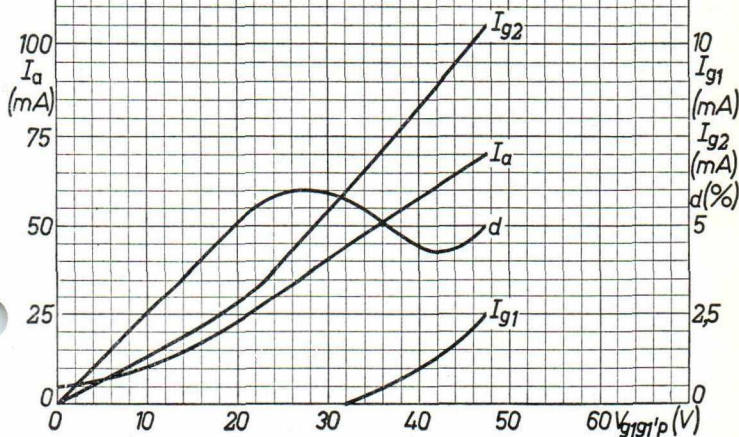
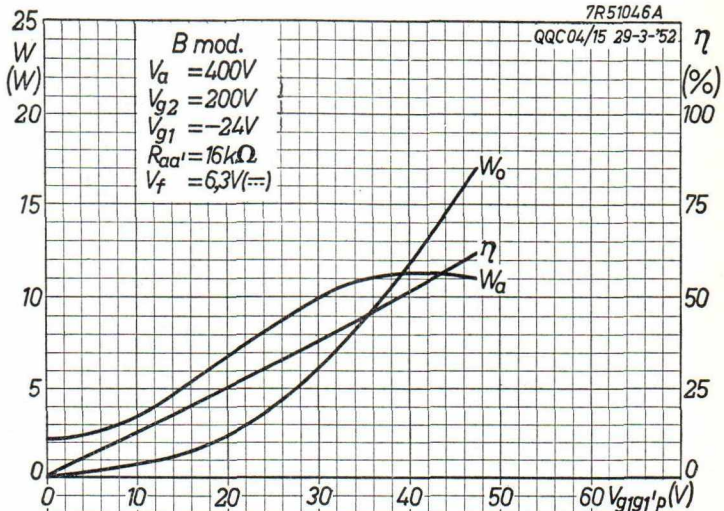
$R_{aa'} = 20k\Omega$

$V_f = 6,3V(=)$



7R51046A

QQC 04/15 29-3-52



7R51045A

QQC 04/15 29-3-52

B mod.

$V_a = 350V$

$V_{g2} = 200V$

$V_{g1} = -24V$

$R_{aa'} = 12k\Omega$

$V_f = 6,3V(\dots)$

