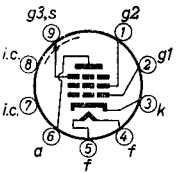
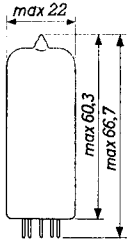
SPECIAL QUALITY PENTODE for use in telephone equipment (life longer than 10 000 hours)
PENTHODE À HAUTE SÉCURITÉ pour utilisation dans l'equipment téléphonique (durée plus longue que 10 000 heures)
ZUVERLÄSSIGE PENTODE zur Verwendung in Telephonanlagen (Lebensdauer länger als 10 000 Stunden)

Heating : indirect by A.C. or D.C.; series or parallel supply
Chauffage: indirect par C.A. ou C.C.; alimentation parallèle ou série
Heizung : indirekt durch Wechsel- oder Gleichstrom; Serien- oder Parallelspeisung

$V_f = 6{,}3$ V [1])
$I_f = 0{,}3$ A [1])

Dimensions in mm
Dimensions en mm
Abmessungen in mm





Base, culot, Sockel: NOVAL

Capacitances Capacités Kapazitäten	C_a	=		3,6 pF
	C_a	=	max.	4,2 pF
	C_{g_1}	=		8,0 pF
	C_{g_1}	=	max.	8,7 pF ←
	C_{ag_1}	<		0,015 pF
	C_{g_1f}	<		0,15 pF
	C_{kf}	=		4 pF
	C_{g_1} (I_k = 12,1 mA)	=		10,8 pF ←
	C_{ra} [2])	<		0,025 pF
	C_{rg_1} [2])	<		0,025 pF

[1])[2]) See page 2
Voir page 2
Siehe Seite 2

SPECIAL QUALITY, LONG LIFE PENTODE for use in telephone equipment

HEATING

Indirect by A.C. or D.C.; series or parallel supply

Heater voltage V_f = 6.3 V

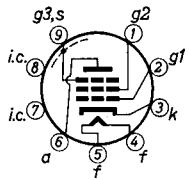
Heater current I_f = 0.3 A

The maximum deviation of the heater current at V_f = 6.3 V is ± 15 mA.

In order to obtain a useful life of 10 000 hours in the case of parallel supply, the maximum variation of the heater voltage should be less than ± 5 % (absolute limits)

In order to obtain a useful life of 10 000 hours in the case of series supply, the maximum variation of the heater current due to voltage fluctuations and tolerances in the parts should be less than 1.5 % (absolute limits)

Dimensions in mm



Base: NOVAL

CHARACTERISTICS

Column I: Setting of the tube and typical (average) measuring results of new tubes
II: Characteristics range values for equipment design
III: Data indicating the end point of life

		I	II	
Heater current				
Heater voltage	V_f	= 6.3		V
Heater current	I_f	= 300	285-315	mA

---

[1]) The maximum deviation of I_f at V_f = 6.3 V is ± 0.015 A. In order to obtain a useful tube life of 10 000 hours in the case of parallel supply, the maximum variation of V_f must be less than ± 5 % (absolute limits)
In order to obtain a useful tube life of 10 000 hours in the case of series supply, the maximum variation of I_f due to voltage fluctuations and tolerances in the parts must be less than ± 1.5 % (absolute limits)

La déviation de I_f à V_f = 6,3 V est de ± 0,015 A aux max. Afin d'obtenir une durée du tube de 10 000 heures en cas d'alimentation parallèle la variation max. de V_f sera moins de ± 5 % (limites absolues)
Afin d'obtenir une durée du tube de 10 000 heures en cas d'alimentation série la variation max.de I_f par suite de fluctuations de la tension et tolérances des accessoires sera moins de ± 1,5 % (limites absolues)

Die Höchstabweichung von I_f bei V_f = 6,3 V ist ± 0,015 A. Zur Erhaltung einer nützlichen Lebensdauer der Röhre von 10 000 Stunden bei Parallelbetrieb muss die max. Schwankung von V_f weniger als ± 5 % betragen (absolute Grenzen)
Zur Erhaltung einer nützlichen Lebensdauer der Röhre von 10 000 Stunden bei Serienbetrieb muss die max. Schwankung von I_f infolge Spannungsschwankungen und Streuungen der Einzelteile weniger als ± 1,5 % betragen (absolute Grenzen)

[2]) Radiation capacitance. Capacitance of the concerning electrode to a surrounding metal box with an inner diameter of 52 mm and a height of 98 mm, the other electrodes being earthed

Capacité de rayonnement. Capacité de l'électrode concernante à l'égard d'une boîte métallique entourante avec un diamètre intérieur de 52 mm et une hauteur de 98 mm. Les autres électrodes sont mises à la terre

Strahlungskapazität. Kapazität zwischen der betreffenden Elektrode und einer Metallbuchse um die Röhre mit einem inneren Durchmesser von 52 mm und einer Höhe von 98 mm. Die übrigen Elektroden der Röhren müssen geerdet sein

CHARACTERISTICS (continued)

Capacitances			I	II	III
Grid No.1 to all other elements except anode	C_{g_1}	=	8.0	< 8.7	pF
The same at Ik = 12.1 mA	C_{g_1}	=	10.8		pF
→ Anode to all other elements except grid No.1	C_a	=	3.5	< 4.1	pF
Anode to grid No.1	C_{ag_1}	=		< 0.015	pF
Grid No.1 to heater	C_{g_1f}	=		< 0.15	pF
Cathode to heater	C_{kf}	=	4		pF
Radiation capacitance grid No.1	Cr_{g_1}	=		< 0.025	pF[1])
Radiation capacitance anode	Cr_a	=		< 0.025	pF[1])

Typical characteristics			I	II	III
Anode voltage	V_a	=	210		V
Grid No.3 voltage	V_{g_3}	=	0		V
Grid No.2 voltage	V_{g_2}	=	120		V
Cathode resistor	R_k	=	165		Ω
Anode current	I_a	=	10	8.7-11.3	7 mA
Grid No.2 current	I_{g_2}	=	2.1	1.7-2.5	1.25 mA
Mutual conductance	S	=	9	7.8-10.2	6.4 mA/V
Internal resistance	R_i	=	0.5	> 0.3	MΩ
→ Amplification factor of grid No.2 with respect to grid No.1	$\mu_{g_2g_1}$	=	38		
Equivalent noise resistance (R.F.)	R_{eq}	=	750	< 1000	Ω
Equivalent noise resistance (f = 0-10 000 c/s)	R_{eq}	=		< 36	kΩ

			I	II	III
Anode voltage	V_a	=	210		V
Grid No.3 voltage	V_{g_3}	=	0		V
Grid No.2 voltage	V_{g_2}	=	120		V
Anode current	I_a	=	0.5		mA
Grid No.1 voltage	$-V_{g_1}$	=	5	< 5.25	V

[1]) Capacitance of the concerning electrode to a surrounding metal box with an inner diameter of 52 mm and a height of 98 mm, the other electrodes being earthed

Typical characteristics
Caractéristiques types
Kenndaten

V_f	=	6,3	V [1]
V_a	=	210	V [1]
V_{g3}	=	0	V [1]
V_{g2}	=	120	V [1]
R_k	=	165	Ω [1]
I_a	=	10 ± 1,3	mA
I_{g2}	=	2,1 ± 0,4	mA
S	=	9 ± 1,2	mA/V
R_i	=	0,5	MΩ
R_i	=	min. 0,3	MΩ
μ_{g2g1}	=	34	
R_{eq} (R.F.)	=	750	Ω
R_{eq} (R.F.)	=	max. 1000	Ω
R_{eq} (f = 0-10 kc/s)	=	max. 36	kΩ
$-I_{g1}$ (R_{g1} = 0,1 MΩ)	=	max. 0,5	μA
$-V_{g1}$ (I_a = 0,5 mA, R_k = 0)	=	5	V ←
$-V_{g1}$ (I_a = 0,5 mA, R_k = 0)	=	max. 5,25	V

---

[1]) With a life test under these conditions the life expectancy is 10 000 hours. ←
The end point of life is reached when one or more of the characteristics have changed to the following values:

En cas d'un essai de durée sous ces conditions la durée prévue est de 10 000 heurs.
Le tube est arrivé à la fin de sa durée si une ou quelques-unes des caractéristiques sont changées jusqu'aux valeurs suivantes:

Bei einer Lebensdauerprobe unter diesen Bedingungen ist die erwartete Lebensdauer 10 000 Stunden.
Das Ende der Lebensdauer ist erreicht, wenn eine oder mehrere der Kennwerte bis folgende Werte geändert sind:

I_a	≦	7	mA
I_{g2}	≦	1,25	mA
S	≦	6,4	mA/V
$-I_{g1}$ (R_{g1} = 0,1 MΩ)	≧	1,0	μA

CHARACTERISTICS (continued)

Negative grid current

			I	II	III	
Anode voltage	V_a	=	210			V
Grid No.3 voltage	V_{g3}	=	0			V
Grid No.2 voltage	V_{g2}	=	120			V
Grid No.1 resistor	R_{g1}	=	0.1			MΩ
Cathode resistor	R_k	=	165			Ω
Negative grid current	$-I_{g1}$	=		< 0.5	1.0	μA

Grid current starting point

			I	II	III	
Anode voltage	V_a	=	210			V
Grid No.3 voltage	V_{g3}	=	0			V
Grid No.2 voltage	V_{g2}	=	120			V
Positive grid current	$+I_{g1}$	=	0.3			μA
Negative grid voltage	$-V_{g1}$	=		< 1.1		V

Hum voltage

			I	II	
Anode voltage	V_a	=	210		V
Grid No.3 voltage	V_{g3}	=	0		V
Grid No.2 voltage	V_{g2}	=	120		V
Grid No.1 resistor	R_{g1}	=	0.5		MΩ
Cathode resistor	R_k	=	165		Ω
Hum voltage	V_{g1hum}	=		< 0.5	mV(RMS)

Insulation between heater and cathode

			I	II	
Voltage between heater and cathode	V_{kf}	=	100		V
Series resistor	R	=	1		MΩ
Current from cathode to heater	I_{kf}	=		< 15	μA

Insulation between the electrodes

			I	II	
Insulation resistance between two arbitrary electrodes	R_{isol}	=		> 100	MΩ

Hum voltage
Tension de ronflement (R_{g1} = 0,5 MΩ) = max. 0,5 mV
Brummspannung

Heater-cathode insulation	V_f	=	6,3 V
→ Isolement filament-cathode	V_{kf}	=	100 V
Katoden-Heizfadenisolation			

Series resistor
Résistance série = 1 MΩ
Serienwiderstand

I_{kf} = max. 15 µA

→ Insulation between two arbitrary electrodes
Isolement entre deux électrodes quelconques
Isolation zwischen zwei beliebigen Elektroden

R = min. 100 MΩ

Operating characteristics
Caractéristiques d'utilisation classe A
Betriebsdaten Klasse A

V_a	=	120	210 V
V_{g3}	=	0	0 V
V_{bg2}	=	120	120 V
R_{g2}	=	5,6	5,6 kΩ
R_k	=	180	180 Ω
I_a	=	8,3	8,3 mA
I_{g2}	=	1,7	1,7 mA
S	=	8,2	8,2 mA/V
R_i	=	0,42	0,44 MΩ
$R_{a\sim}$	=	10	20 kΩ
W_o (d_{tot} = 10 %)	=	340	660 mW
V_i (d_{tot} = 10 %)	=	1,1	1,1 V_{eff}
W_o (I_{g1} = +0,3 µA)	=	400	870 mW [1]
V_i (W_o = 50 mW)	=	0,35	0,25 V_{eff}

[1]) Measured with a control-grid series resistor of 0.33 MΩ
Mesuré avec une résistance série dans la grille de commande de 0,33 MΩ
Gemessen mit einem Steuergitterreihenwiderstand von 0,33 MΩ

LIFE EXPECTANCY: 10 000 hours under the following life-test conditions:

Heater voltage	V_f	= 6.3 V
Anode voltage	V_a	= 210 V
Grid No.3 voltage	V_{g3}	= 0 V
Grid No.2 voltage	V_{g2}	= 120 V
Cathode resistor	R_k	= 165 Ω

The data indicating the end point of life are given in column III under the heading "Characteristics"

OPERATING CHARACTERISTICS, class A

Anode voltage	V_a	=	120	210 V
Grid No.3 voltage	V_{g3}	=	0	0 V
Grid No.2 supply voltage	V_{bg2}	=	120	120 V
Grid No.2 resistor	R_{g2}	=	5.6	5.6 kΩ
Cathode resistor	R_k	=	180	180 Ω
Anode current	I_a	=	8.3	8.3 mA
Grid No.2 current	I_{g2}	=	1.7	1.7 mA
Mutual conductance	S	=	8.2	8.2 mA/V
Internal resistance	R_i	=	0.42	0.44 MΩ
Load resistance	$R_{a\sim}$	=	10	20 kΩ
Input voltage	V_i	=	1.1	1.1 V(RMS)
Output power	W_o	=	340	660 mW
Total distortion	d_{tot}	=	10	10 %
Grid No.1 resistor	R_{g1}	=	0.33	0.33 MΩ
Grid No.1 current	I_{g1}	=	+0.3	+0.3 µA
Output power	W_o	=	400	870 mW
Input power	V_i	=	0.35	0.25 V(RMS)
Output power	W_o	=	50	50 mW

Limiting values (Design centre values)
Caractéristiques limites (Valeurs moyennes)
Grenzdaten (Mittlere Entwicklungsdaten)

V_{a_o}	= max.	550	V
V_a	= max.	210	V
W_a	= max.	2,1	W
V_{g2_o}	= max.	550	V
V_{g2}	= max.	210	V
W_{g2}	= max.	0,35	W
$-V_{g1}$ (I_{g1} = +0,3 µA)	= max.	1,1	V
$-V_{g1}$	= max.	100	V
$-V_{g1p}$ {Timp = 200 µsec; δ = 10 %}	= max.	200	V
W_{g1}	= max.	50	mW
R_{g1}	= max.	1	MΩ [1]
I_k	= max.	16	mA
I_{kp} {Timp = 200 µsec; δ = 10 %}	= max.	80	mA
V_{kf}	= max.	100	V
R_{kf}	= max.	20	kΩ
Bulb temperature Température de l'ampoule Kolbentemperatur	= max.	170	°C [2]

[1]) Automatic grid bias
Polarisation de grille par résistance cathodique
Automatische Gittervorspannung

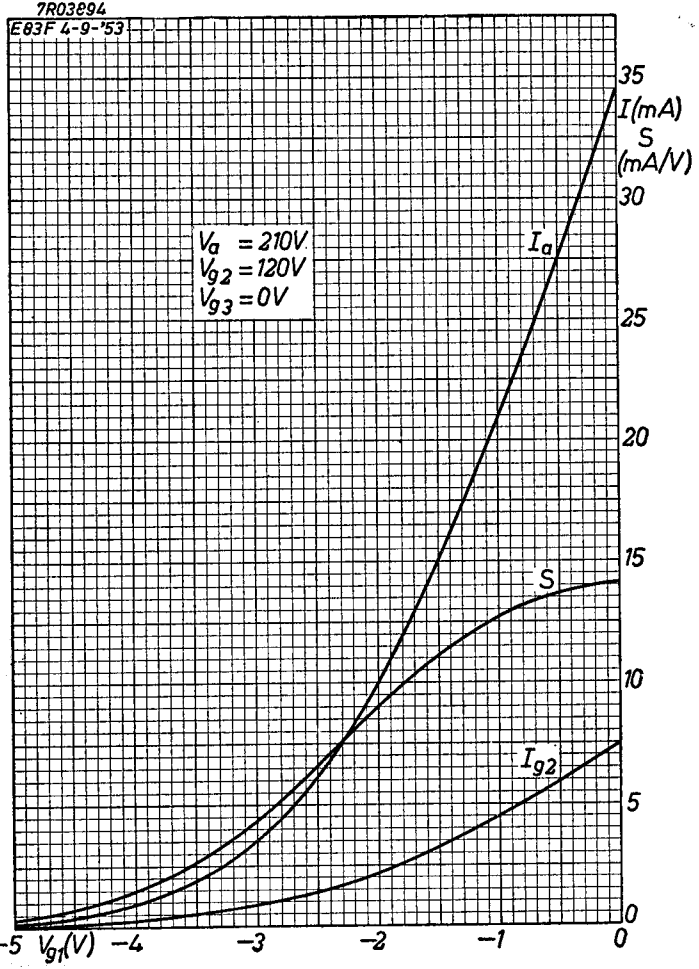
[2]) Absolute maximum
Maximum absolue
Absolutes Maximum

LIMITING VALUES (Design centre limits)

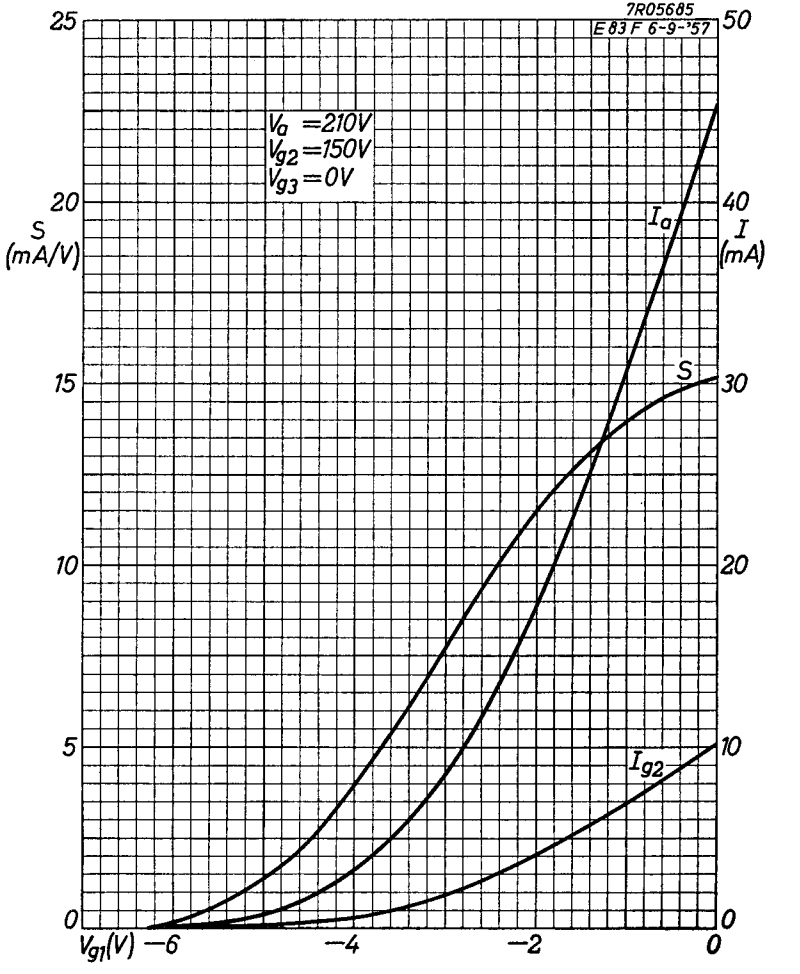
Anode voltage in cold condition	V_{a_o}	= max.	550	V
Anode voltage	V_a	= max.	210	V
Anode dissipation	W_a	= max.	2.1	W
Grid No.2 voltage in cold condition	V_{g2_o}	= max.	550	V
Grid No.2 voltage	V_{g_2}	= max.	210	V
Grid No.2 dissipation	W_{g_2}	= max.	0.35	W
Negative grid No.1 voltage	$-V_{g_1}$	= max.	100	V
Peak negative grid No.1 voltage	$-V_{g_1\,p}$	= max.	200	V [1]
Grid No.1 dissipation	W_{g_1}	= max.	50	mW
Grid No.1 circuit resistance with automatic bias	R_{g_1}	= max.	1	MΩ
Cathode current	I_k	= max.	16	mA
Peak cathode current	I_{kp}	= max.	80	mA [1]
Voltage between heater and cathode	V_{kf}	= max.	100	V
Circuit resistance between heater and cathode	R_{kf}	= max.	20	kΩ
Bulb temperature	t_{bulb}	= max.	170	°C [2]

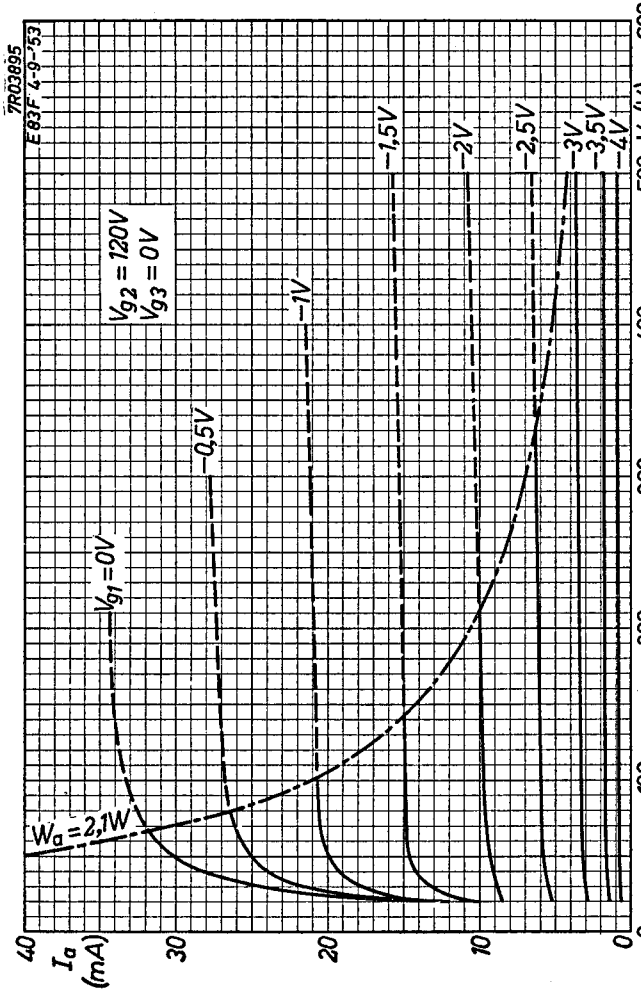
[1]) Pulse duration max. 200 µsec at a duty factor of 10%.

[2]) Absolute limit

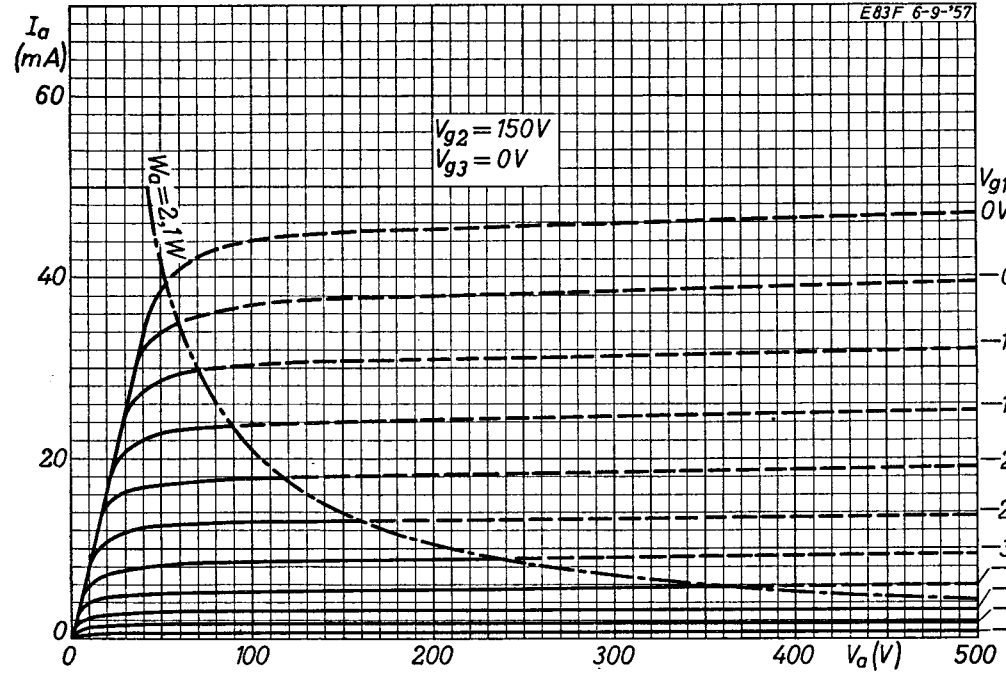

7R03894
E83F 4-9-'53
V_a = 210V
V_{g2} = 120V
V_{g3} = 0V
I_a
S
I_{g2}
I(mA)
S
(mA/V)
35
30
25
20
15
10
5
0
−5
V_{g1}(V)
−4
−3
−2
−1
0

E83F **PHILIPS** **SQ**




7R03095
E83F 4-9-'53
$V_{g2} = 120V$
$V_{g3} = 0V$
$V_{g1} = 0V$
$W_a = 2,1W$
−0,5V
−1V
−1,5V
−2V
−2,5V
−3V
−3,5V
−4V
I_a (mA)
40
30
20
10
0
0
100
200
300
400
500
600
V_a (V)

7R05687
E83F 6-9-'57

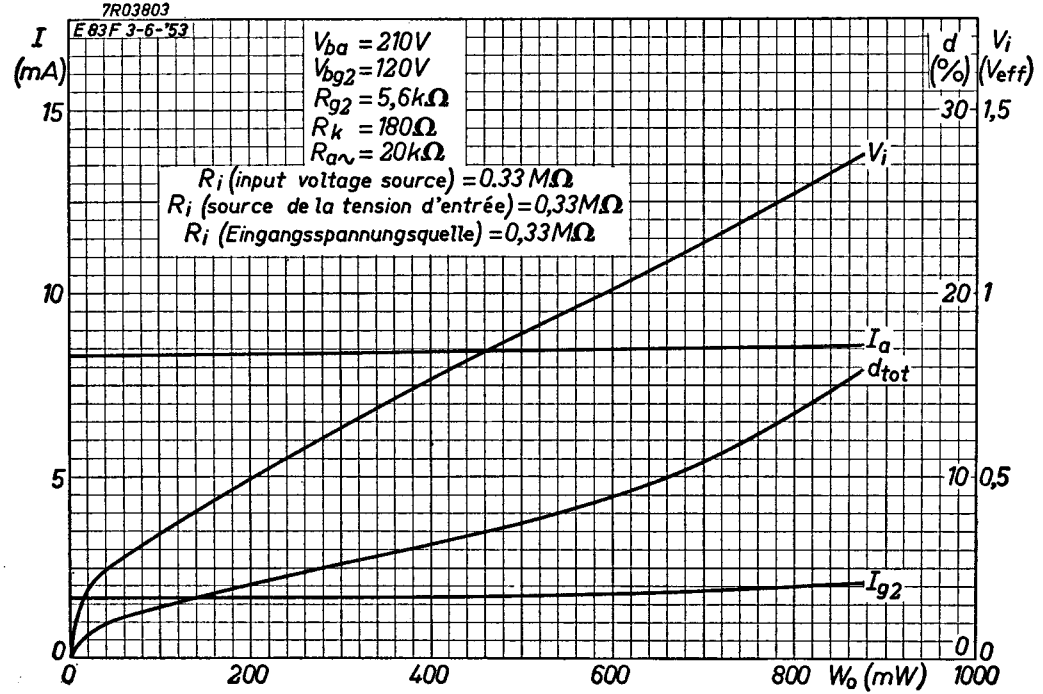


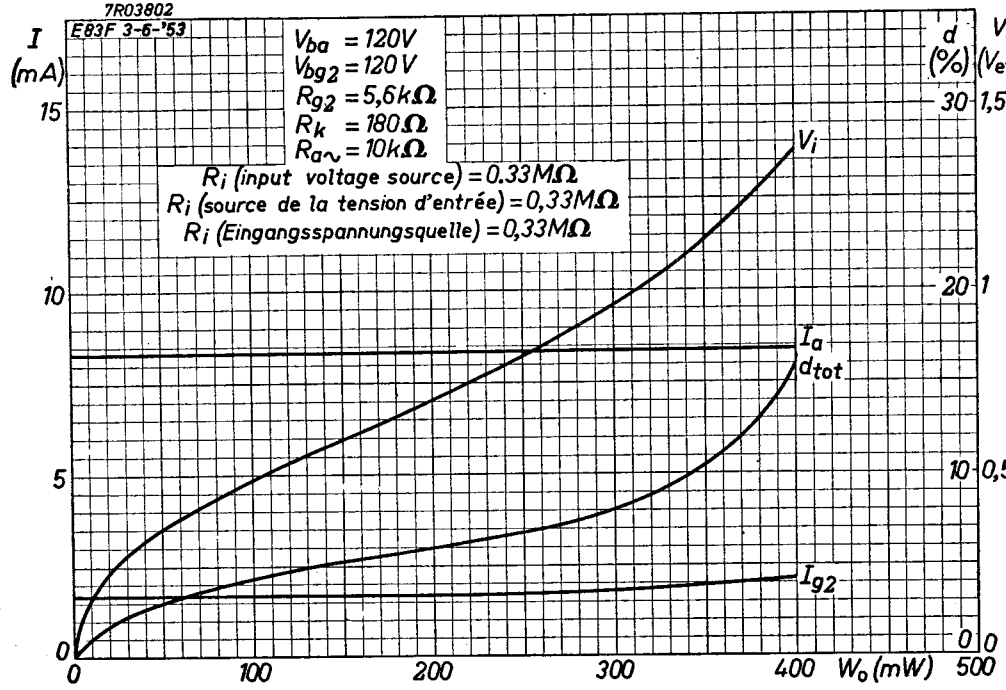
E83F

PHILIPS

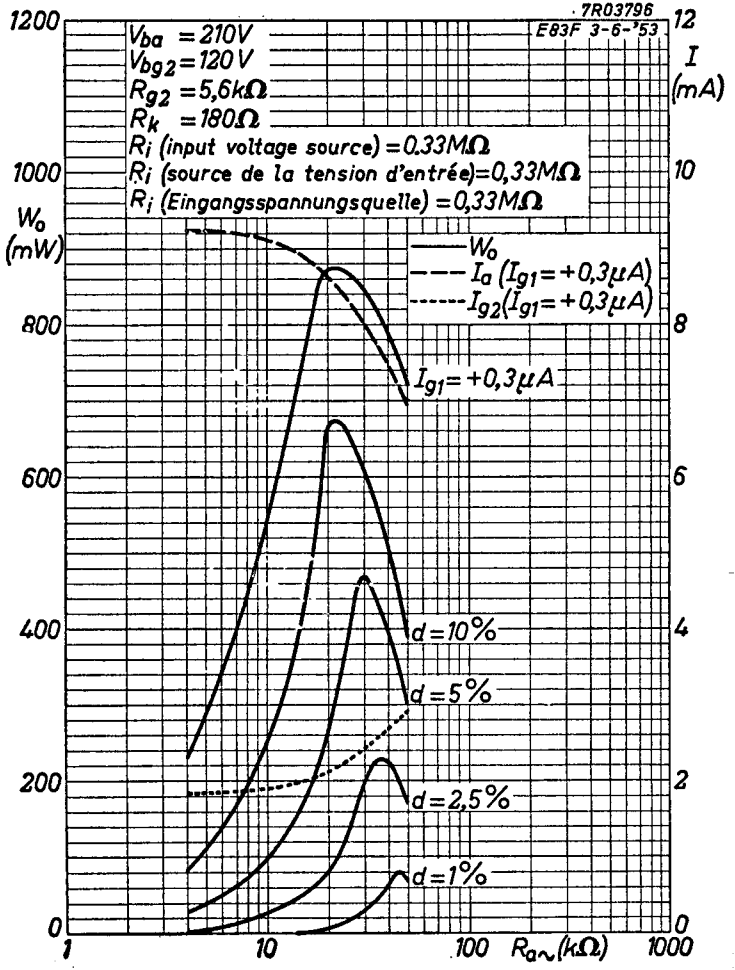
SQ

a


7R03803
E 83 F 3-6-'53
I (mA)
d (%)
Vi (Veff)
Vba = 210V
Vbg2 = 120V
Rg2 = 5,6kΩ
Rk = 180Ω
Ra~ = 20kΩ
Ri (input voltage source) = 0.33 MΩ
Ri (source de la tension d'entrée) = 0,33MΩ
Ri (Eingangsspannungsquelle) = 0,33MΩ
Vi
Ia
dtot
Ig2
15
10
5
0
30
20
10
0
1,5
1
0,5
0
0
200
400
600
800
Wo (mW)
1000

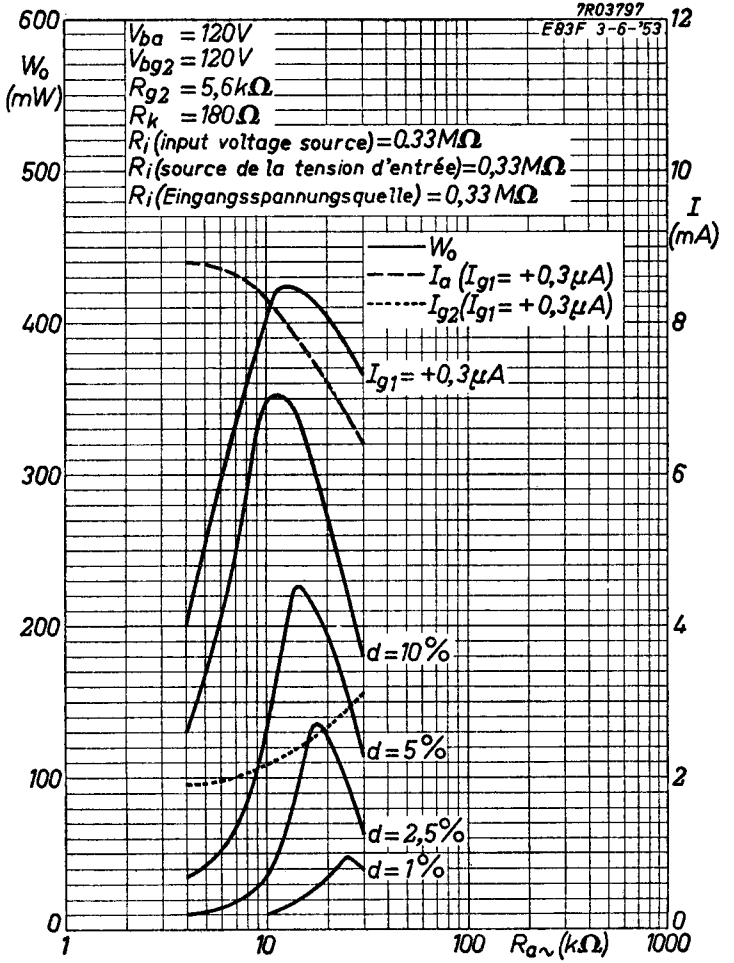


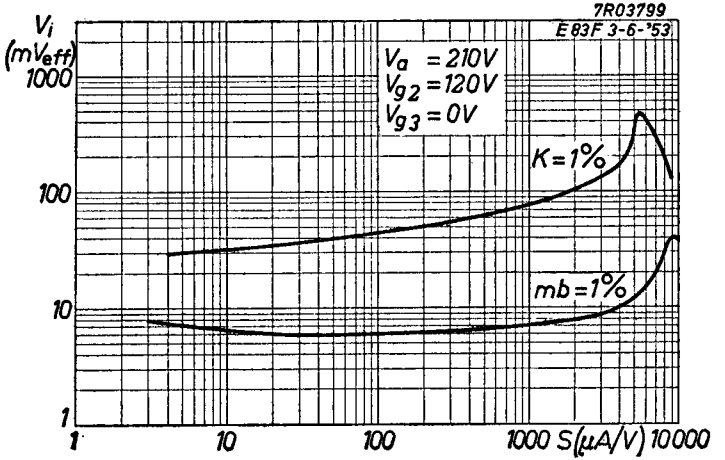
E83F PHILIPS SQ


7R03796
E83F 3-6-'53
V_{ba} = 210V
V_{bg2} = 120V
R_{g2} = 5,6kΩ
R_k = 180Ω
R_i (input voltage source) = 0,33MΩ
R_i (source de la tension d'entrée) = 0,33MΩ
R_i (Eingangsspannungsquelle) = 0,33MΩ
W_o
I_a (I_{g1} = +0,3μA)
I_{g2} (I_{g1} = +0,3μA)
I_{g1} = +0,3μA
d = 10%
d = 5%
d = 2,5%
d = 1%
W_o (mW)
I (mA)
$R_{a\sim}$ (kΩ)
1200
1000
800
600
400
200
0
12
10
8
6
4
2
0
1
10
100
1000

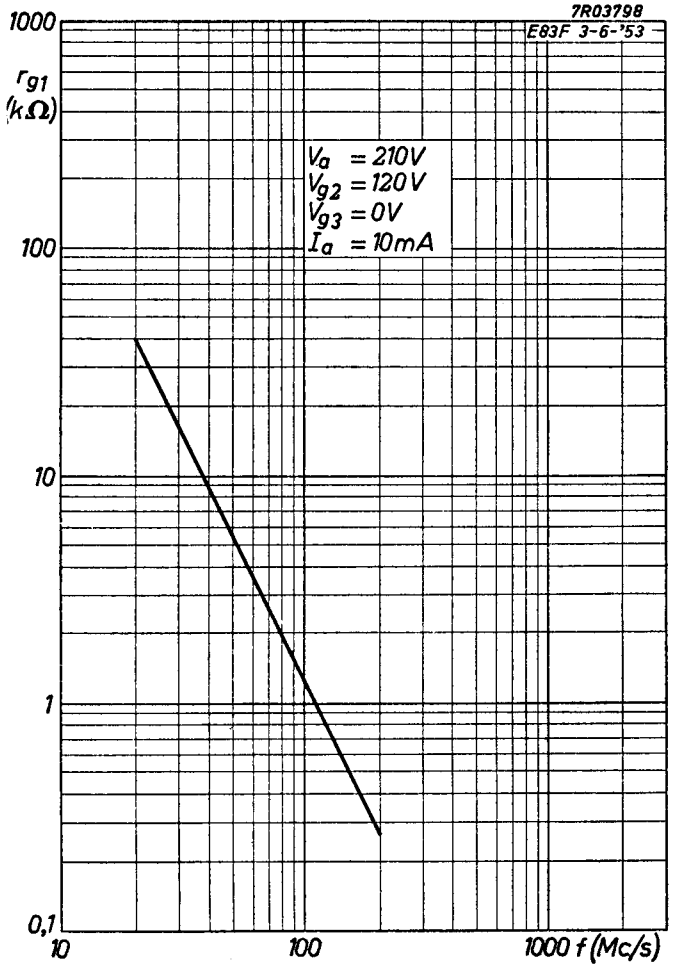
9.9.1957 G

E83F PHILIPS SQ

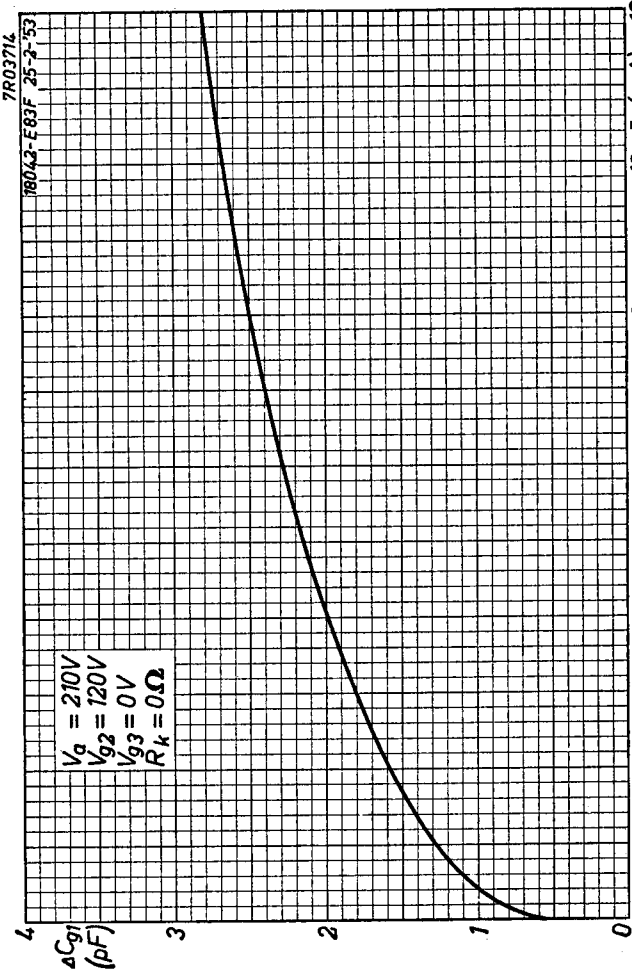



7R03799
E 83F 3-6-'53
V_i (mV_{eff})
1000
100
10
1
V_a = 210V
V_{g2} = 120V
V_{g3} = 0V
K = 1%
mb = 1%
1
10
100
1000 S(μA/V) 10000

E83F PHILIPS SQ



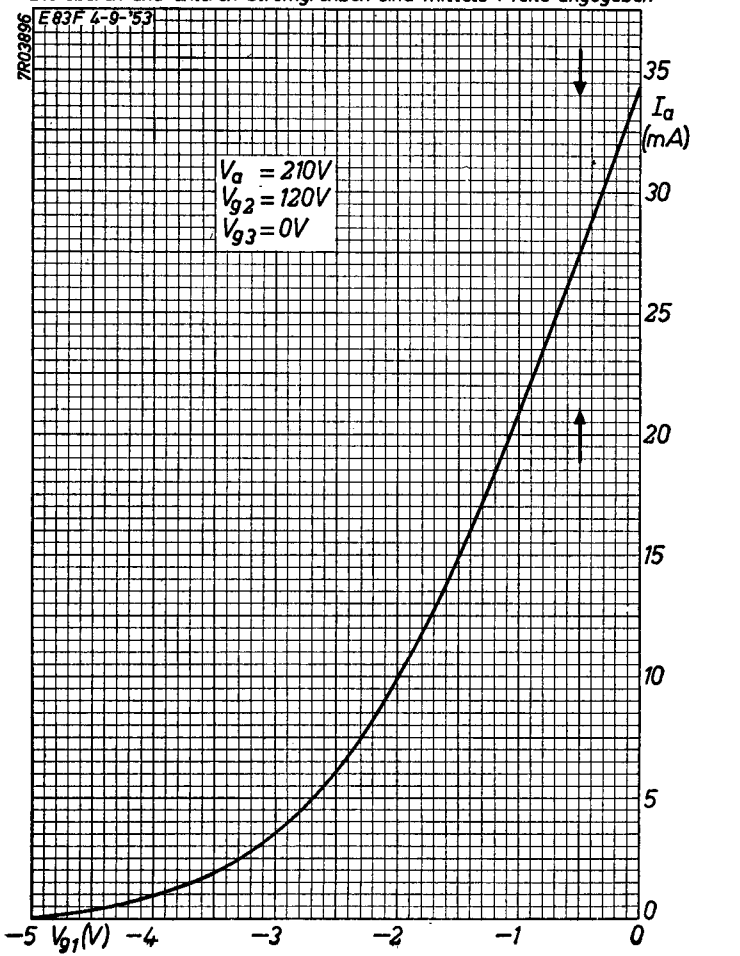
SQ **PHILIPS** **E83F**



9.9.1957

K

Upper and lower current limits are indicated by arrows
Les limites supérieures et inférieures du courant sont indiquées par des fléches
Die oberen und unteren Stromgrenzen sind mittels Pfeile angegeben



E83F

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5	3	1958.06.06
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9	5	1958.06.06
10	5	1962.08.08
11	A	1957.09.09
12	B	1957.09.09
13	C	1957.09.09
14	D	1957.09.09
15	E	1957.09.09
16	F	1957.09.09
17	G	1957.09.09
18	H	1957.09.09
19	I	1957.09.09

20	J	1957.09.09
21	K	1957.09.09
22	L	1957.09.09
23, 24	FP	1999.06.11