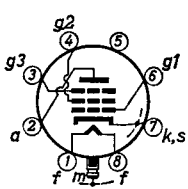
SPECIAL QUALITY, LONG LIFE PENTODE for use as A.F., I.F. or R.F. amplifier, output tube, oscillator, etc.

HEATING

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

Heater voltage V_f = 20 V

Heater current I_f = 125 mA



Base: LOCTAL (Dimensions in mm)

CHARACTERISTICS

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

Capacitances			I	II
Grid No.1 to all other elements except anode	C_{g_1}	=	8.5	7.5-9.5 pF
The same with I_k = 19 mA	C_{g_1}	=	10.5	pF
Anode to all other elements except grid No.1	C_a	=	6.0	4.5-7.7 pF
Input + output capacitance	$C_{g_1}+C_a$	=		< 16 pF
Anode to grid No.1	C_{ag_1}	=	0.014	< 0.018 pF
Anode to grid No.3	C_{ag_3}	=	1.2	pF
Anode to heater	C_{af}	=	0.12	pF
Grid No.1 to grid No.2	$C_{g_1g_2}$	=	3	pF
Grid No.1 to cathode	C_{g_1k}	=	4.5	pF
Grid No.1 to heater	C_{g_1f}	=	0.02	< 0.04 pF
Grid No.2 to grid No.3	$C_{g_2g_3}$	=	2.2	pF
Cathode to heater	C_{kf}	=	7	pF

CHARACTERISTICS (continued)

Capacitances in triode connection
(Grids No.2 and 3 connected to anode)

		I	II	
Grid No.1 to all other elements except anode ($+g_2+g_3$)	C_{g_1} =	5	< 6	pF
Anode ($+g_2+g_3$) to all other elements except grid No.1	C_a =	7.5	< 9	pF
Anode ($+g_2+g_3$) to grid No.1	C_{ag_1} =	3.2	< 4	pF

Heater current

		I	II	
Heater voltage	V_f =	20		V
Heater current	I_f =	125	120-130	mA

Typical characteristics

		I	II	III	
Anode supply voltage	V_{b_a} =	225			V
Grid No.3 voltage	V_{g_3} =	0			V
Grid No.2 supply voltage	V_{bg_2} =	155			V
Cathode resistor	R_k =	250			Ω
Anode current	I_a =	16	13.5-19	11.5	mA
Grid No.2 current	I_{g_2} =	3	2-4		mA
Mutual conductance	S =	6.5	5.5-7.8	4.5	mA/V
Internal resistance	R_i =	0.25	> 0.2		MΩ
Amplification factor of grid No.2 with respect to grid No.1	$\mu_{g_2g_1}$ =	19			
Aequivalent noise resistance					
R.F.	R_{eq} =	1.2	< 2.0		kΩ
A.F. (f = 500-3000 c/s)	R_{eq} =	5			kΩ
Triode connection, R.F.	R_{eq} =	650			Ω

Negative grid current

		I	II	III	
Anode supply voltage	V_{b_a} =	225			V
Grid No.3 voltage	V_{g_3} =	0			V
Grid No.2 supply voltage	V_{bg_2} =	155			V
Cathode resistor	R_k =	250			Ω
Grid No.1 resistor	R_{g_1} =	0.1			MΩ
Negative grid current	$-I_{g_1}$ =		< 0.5	1.0	μA

CHARACTERISTICS (continued)

Grid current starting point			I	II	III	
Anode supply voltage	V_{ba}	=	225			V
Grid No.3 voltage	V_{g3}	=	0			V
Grid No.2 supply voltage	V_{bg2}	=	155			V
Positive grid No.1 current	$+I_{g1}$	=	0.3			µA
Negative grid No.1 voltage	$-V_{g1}$	=		< 1.3		V

Output power			I	II	III	
Anode supply voltage	V_{ba}	=	225			V
Grid No.3 voltage	V_{g3}	=	0			V
Grid No.2 supply voltage	V_{bg2}	=	155			V
Cathode resistor	R_k	=	250			Ω
Load resistance	$Ra_{\sim}$	=	10			kΩ
Total distortion	d_{tot}	=	10			%
Output power	W_o	=	1.5			W

Hum voltage (referred to grid No.1)

Measured with straight response filter. Heater supply frequency 50 c/s. Centre of heater connected to earth.

			I	II	III	
Heater voltage	V_f	=	20			V
Grid No.1 resistor	Rg_1	=	0.5			MΩ
Cathode capacitor	C_k	>	100			µF
Hum voltage	V_{g1hum}	=		< 10		µV

Heating time			I	II	III	
Anode supply voltage	V_{ba}	=	225			V
Grid No.3 voltage	V_{g3}	=	0			V
Grid No.2 supply voltage	V_{bg2}	=	155			V
Cathode resistor	R_k	=	250			Ω
Heating time for anode current rise from 0 to 4 mA	T_h	=	26	19-33		sec

CHARACTERISTICS (continued)

Insulation between heater and cathode

		I	II	III
Heater voltage	V_f	= 20		V
Heater to cathode voltage cathode positive	V_{kf}	= 50		V
Heater to cathode insulation resistance	R_{isol}	=	> 100	50 MΩ

Insulation between two arbitrary electrodes

		I	II	III
Heater voltage	V_f	= 20		V
Voltage between two electrodes	V	= 50		V
Insulation resistance	R_{isol}	=	>1000	300 MΩ

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

Heater voltage	V_f	=	20 V
Anode supply voltage	V_{b_a}	=	225 V
Grid No.3 voltage	V_{g_3}	=	0 V
Grid No.2 supply voltage	$V_{b_{g2}}$	=	155 V
Cathode resistor	R_k	=	250 Ω

In case of heater parallel supply the heater voltage should be within ± 5 % of its nominal value (absolute limits). In case of heater series supply the heater current should be within ± 1.5 % of its nominal value (absolute limits).

The data indicating the endpoint of life are given in column III under the heading "Characteristics".

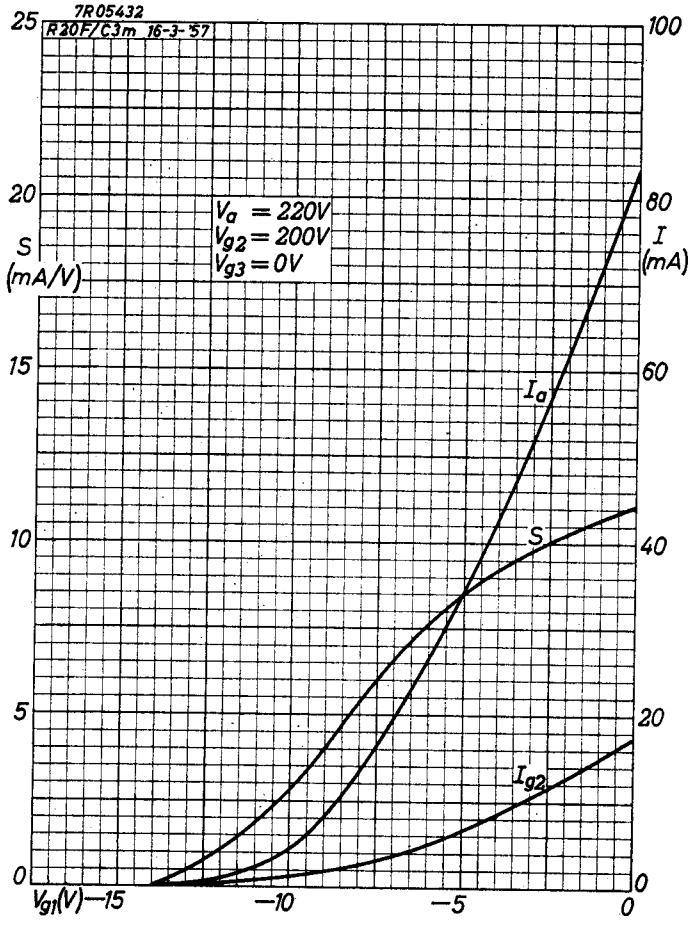
LIMITING VALUES (Design centre limits)

Anode voltage in cold condition	V_{a_o}	= max.	550	V
Anode voltage	V_a	= max.	300	V
Anode dissipation	W_a	= max.	4	W [1]
Grid No.3 voltage in cold condition	$V_{g_{3o}}$	= max.	550	V
Grid No.3 voltage	V_{g_3}	= max.	300	V
Grid No.3 dissipation	W_{g_3}	= max.	1	W
Grid No.2 voltage in cold condition	$V_{g_{2o}}$	= max.	550	V
Grid No.2 voltage	V_{g_2}	= max.	300	V
Grid No.2 dissipation	W_{g_2}	= max.	1	W
Negative grid No.1 voltage	$-V_{g_1}$	= max.	100	V
Grid No.1 dissipation	W_{g_1}	= max.	50	mW
Grid No.1 circuit resistance				
when $W_a > 1.5$ W	R_{g_1}	= max.	0.5	MΩ
when $W_a < 1.5$ W	R_{g_1}	= max.	3	MΩ
Cathode current	I_k	= max.	30	mA
Voltage between heater and cathode	V_{kf}	= max.	120	V
Circuit resistance between heater and cathode	R_{kf}	= max.	20	kΩ
Heater voltage in case of heater parallel supply	V_f	= 20 V ±	5	% [2]
Heater current in case of heater series supply	I_f	= 125 mA ±	1.5	% [2]
Temperature of metal envelope	t_{bulb}	= max.	120	°C

[1] In case of triode connection $W_a+W_{g_2}+W_{g_3}$ = max. 5 W

[2] Absolute limits

SQ **PHILIPS** **18048/C3m**



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A

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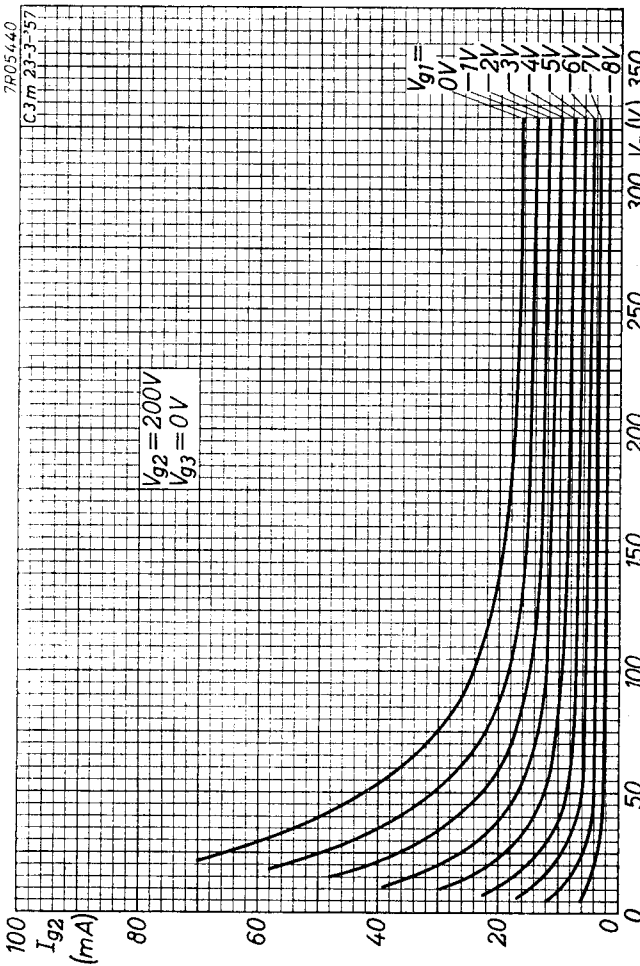
B

SQ **PHILIPS** **18048/C3m**



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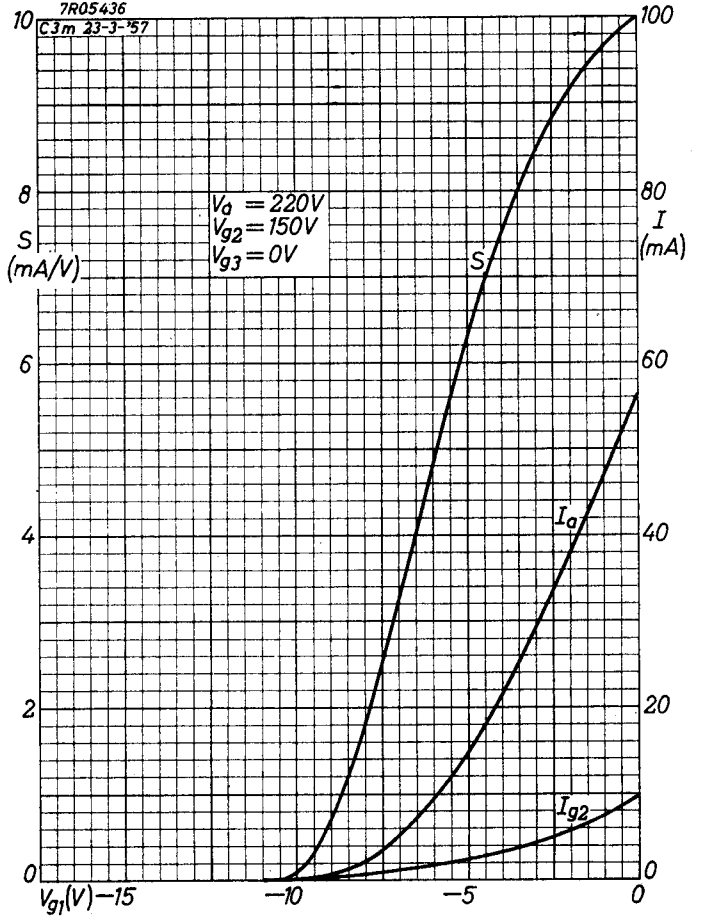
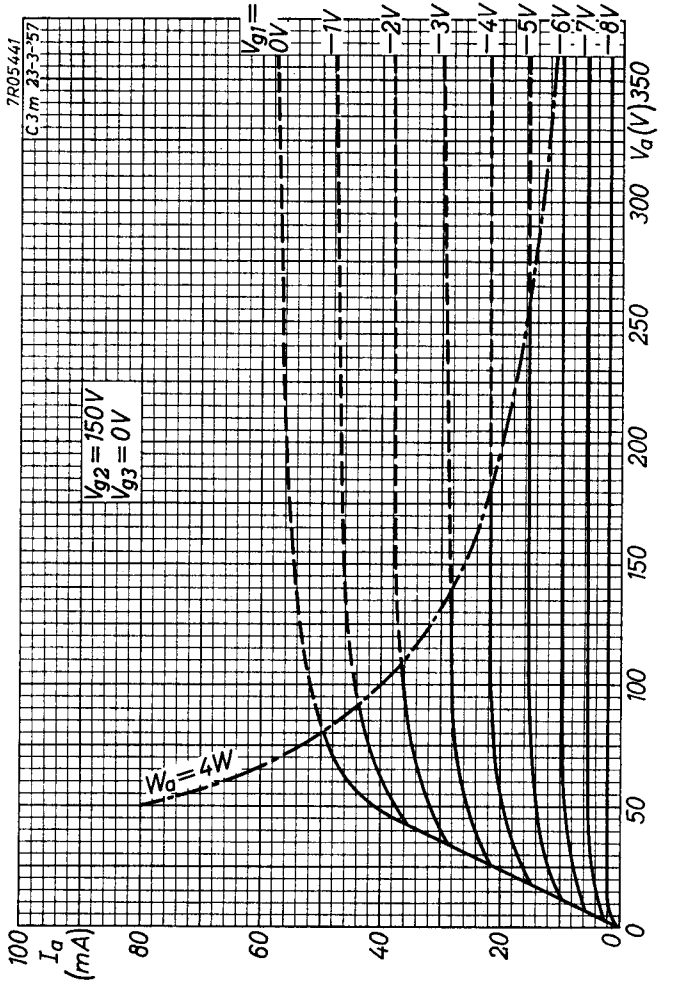
C

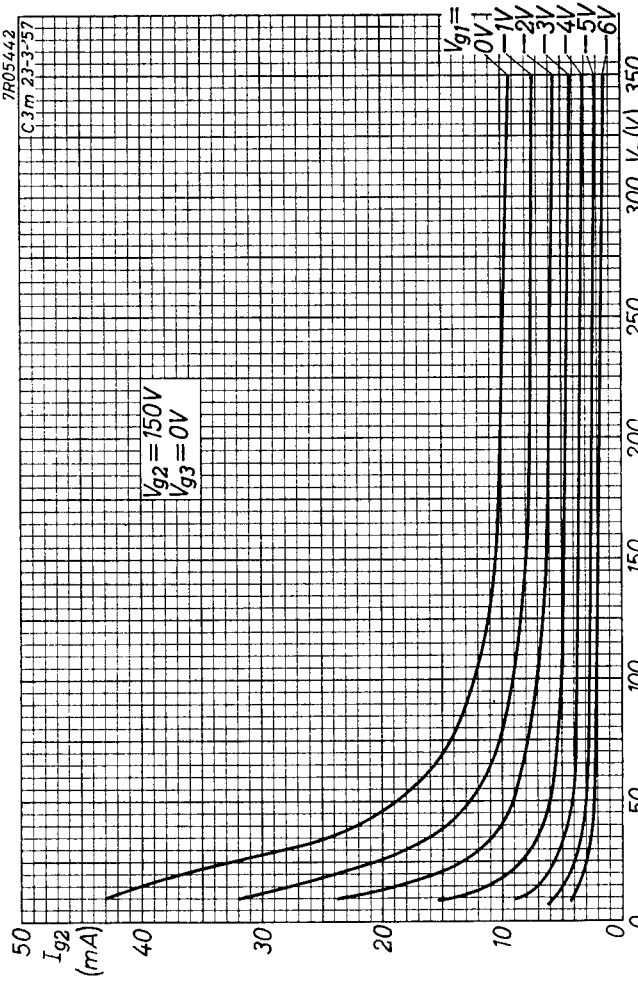
18048/C3m **PHILIPS** **SQ**



D

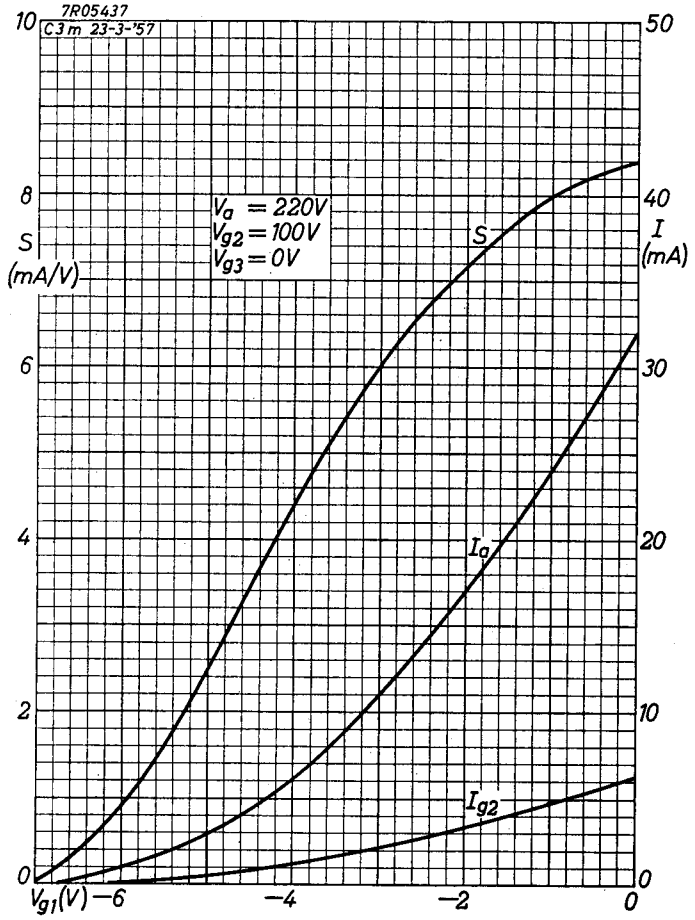

7R05441
C3m 23-3-'57
V_{g1} = 0V -1V -2V -3V -4V -5V -6V -7V -8V
V_{g2} = 150V
V_{g3} = 0V
W_a = 4W
I_a (mA)
100
80
60
40
20
0
V_a (V)
350
300
250
200
150
100
50
0

18048/C3m **PHILIPS** **SQ**



F

SQ **PHILIPS** **18048/C3m**



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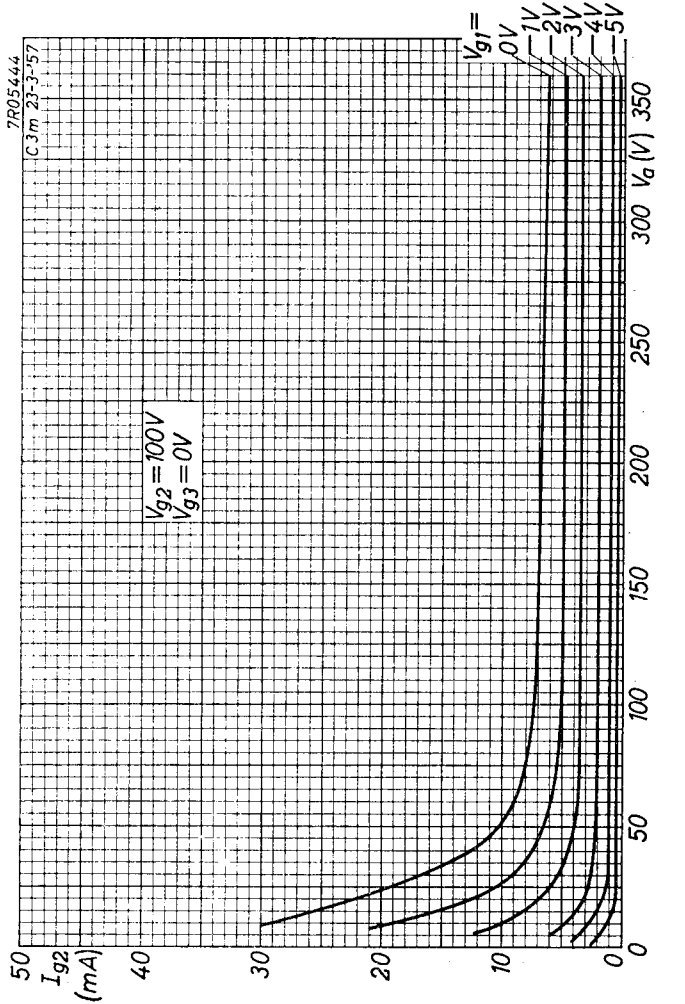
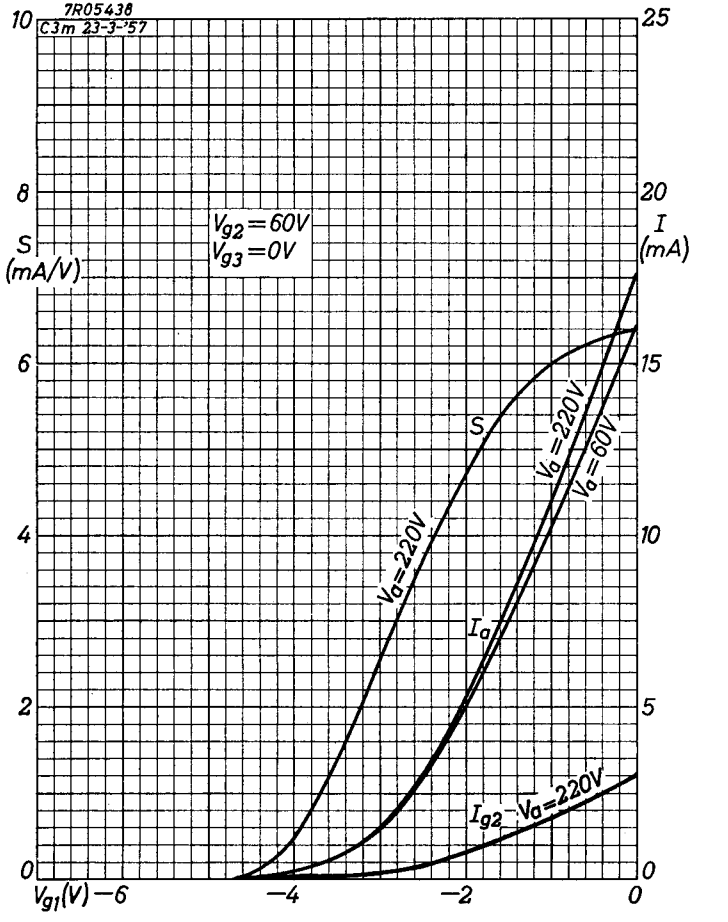
G

18048/C3m **PHILIPS** **SQ**


7R054444
C3m 23-3-'57
V_{g1} =
0V
1V
2V
3V
4V
5V
V_{g2}=100V
V_{g3}=0V
I_{g2} (mA)
50
40
30
20
10
0
0
50
100
150
200
250
300
350
V_a (V)

18048/C3m **PHILIPS** **SQ**



J

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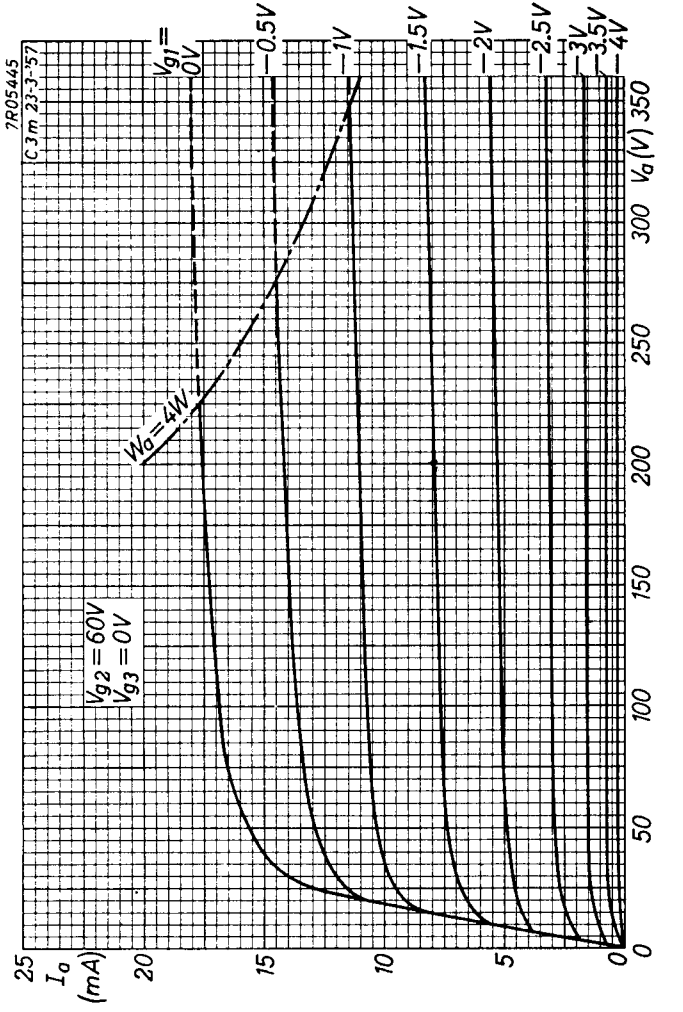

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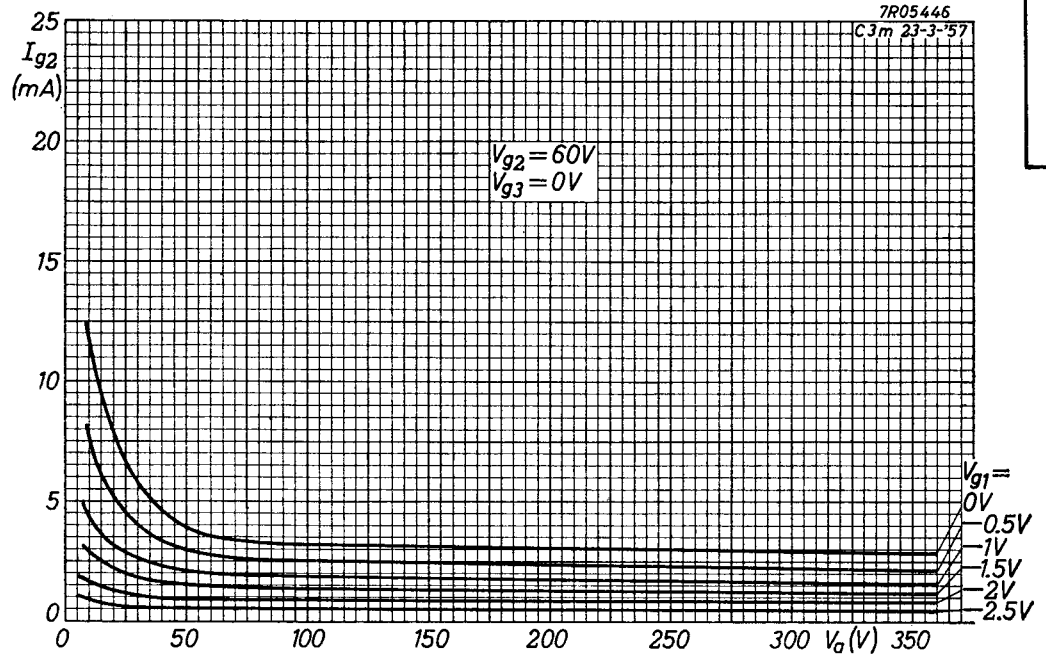
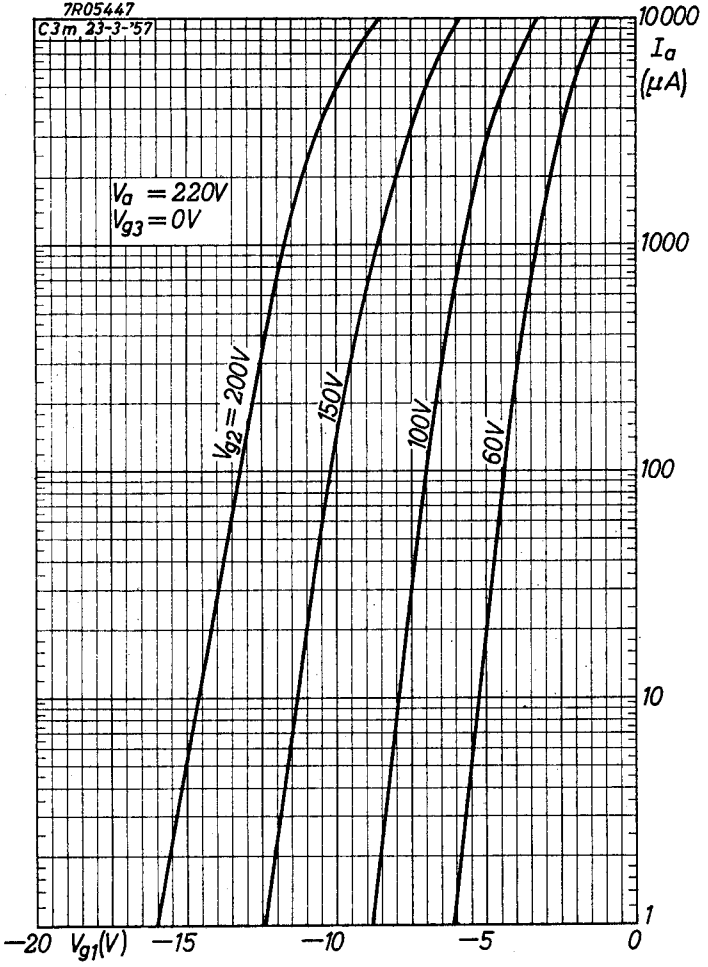
K


7R05446
C3m 23-3-'57
I_{g2} (mA)
25
20
15
10
5
0
$V_{g2} = 60V$
$V_{g3} = 0V$
V_{g1} =
0V
0.5V
1V
1.5V
2V
2.5V
0
50
100
150
200
250
300
V_a (V)
350

SQ **PHILIPS** **18048/C3m**



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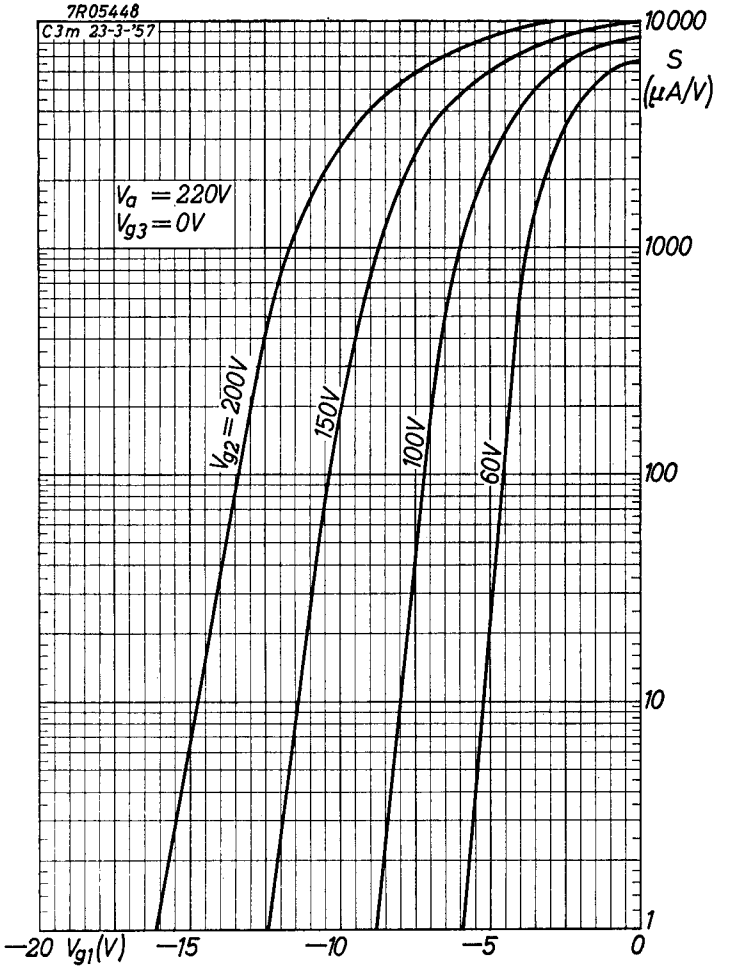
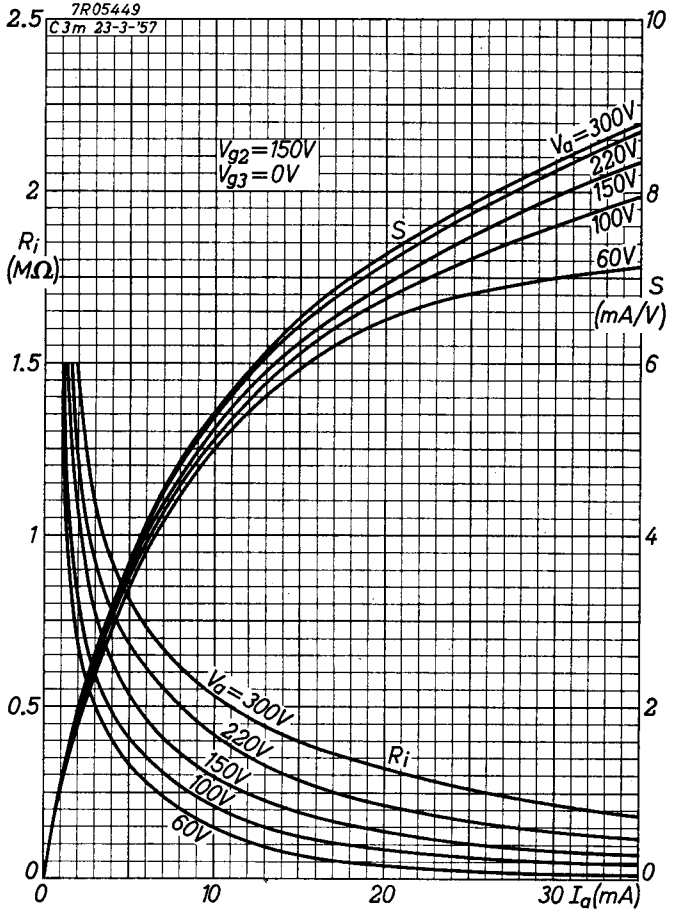
M

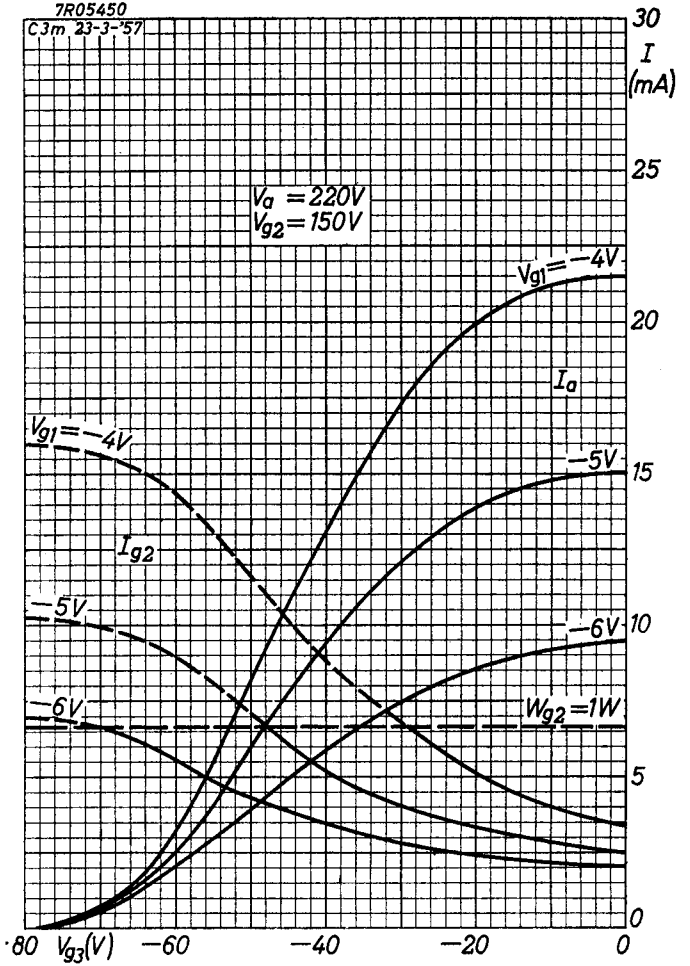
18048/C3m **PHILIPS** **SQ**



N

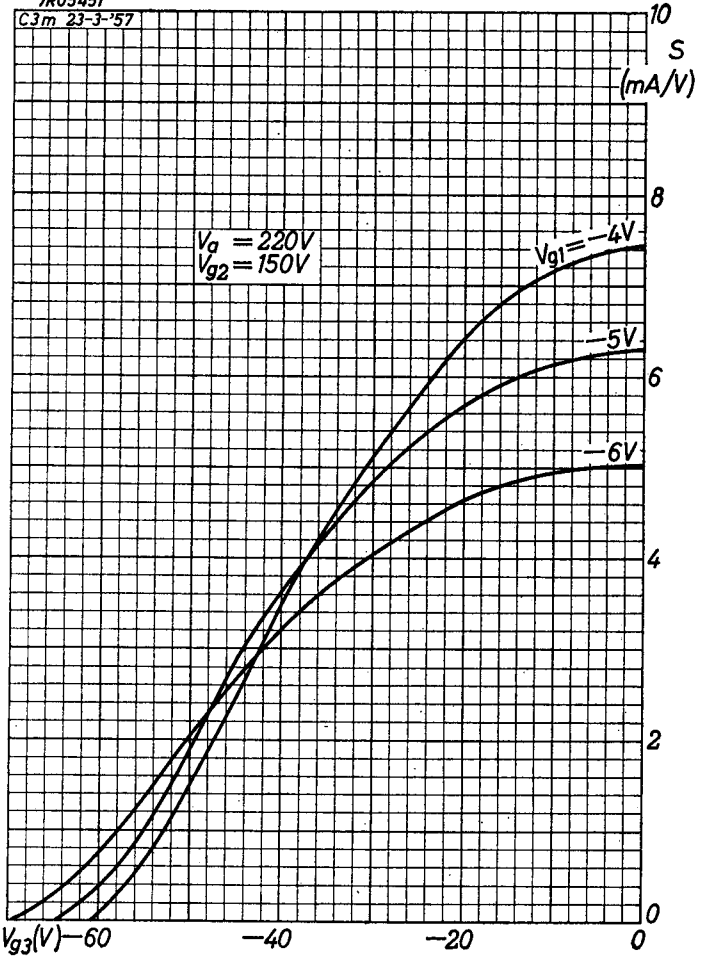

7R05449
C3m 23-3-'57
V_{g2}=150V
V_{g3}=0V
V_a=300V
220V
150V
100V
60V
S
S (mA/V)
R_i
R_i (MΩ)
0
0.5
1
1.5
2
2.5
0
2
4
6
8
10
0
10
20
30 I_a(mA)

18048/C3m **PHILIPS** **SQ**

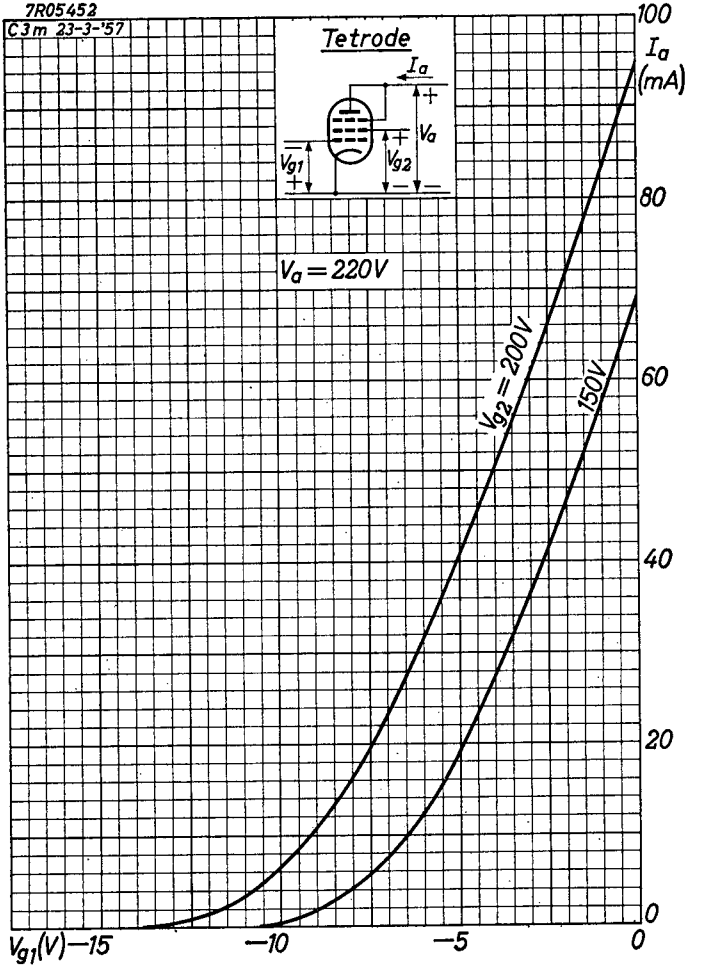


P

SQ **PHILIPS** **18048/C3m**



18048/C3m **PHILIPS** **SQ**



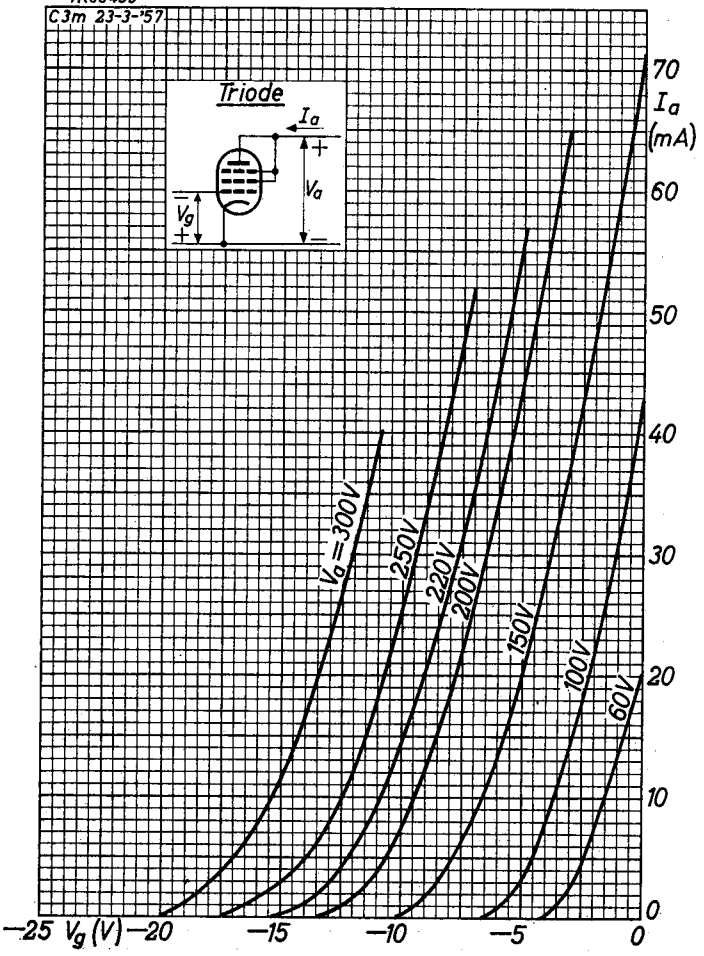
R

7R05453
C3m 23-3-'57
Pentode
Tetrode
Ia
Va
Vg2
Vg1
Vg2 = 200V
Vg1 = 0V
-2V
-4V
-6V
-8V
Ia (mA)
100
80
60
40
20
0
0
50
100
150
200
250
300
350
Va (V)

7R05454
C3m 23-3-'57
Pentode
Tetrode
Ia
Va
Vg2
Vg1
Vg2 = 150V
Vg1 = 0V
−2V
−4V
−6V
−8V
Ia (mA)
Va (V)
0
20
40
60
80
100
50
100
150
200
250
300
350

SQ **PHILIPS** **18048/C3m**

7R05455
C3m 23-3-'57



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U

18048/C3m **PHILIPS** **SQ**

SQ **PHILIPS** **18048/C3m**

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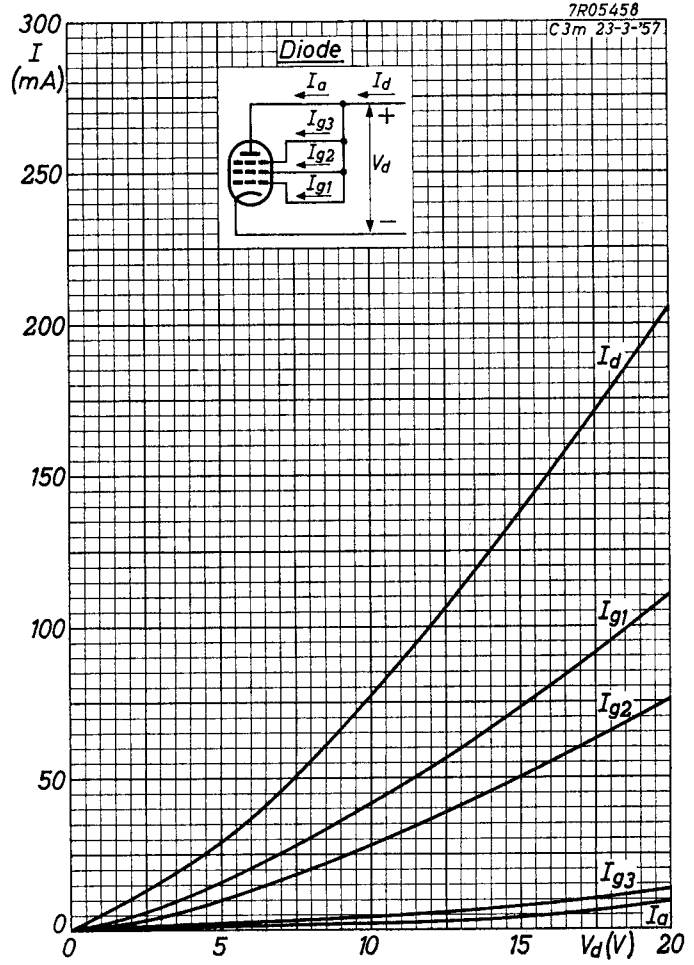
W

18048/C3m **PHILIPS** **SQ**



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PHILIPS

Electronic Tube HANDBOOK

18048

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