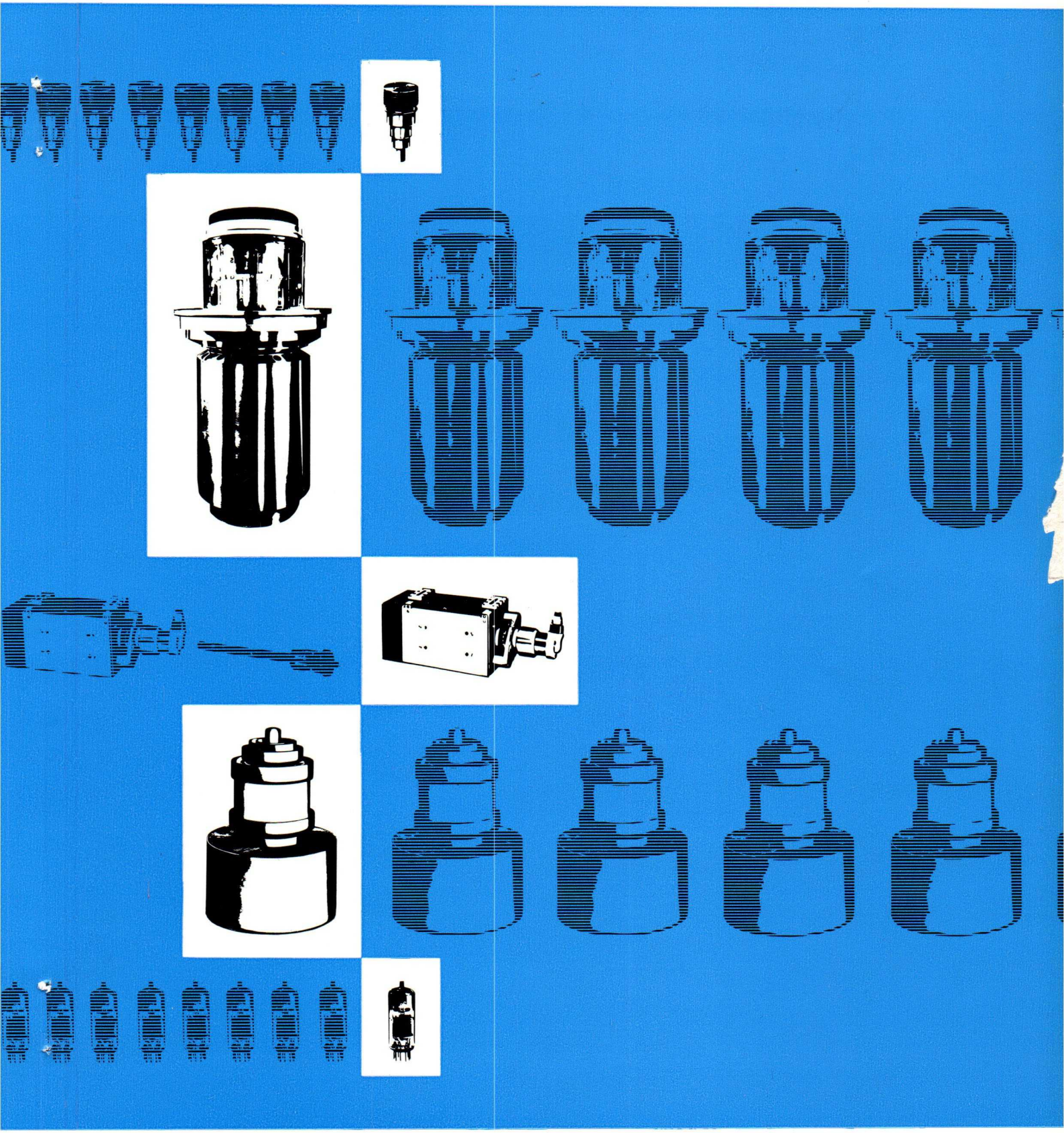
SIEMENS



Power and Special Purpose Tubes

LIST OF ABBREVIATIONS AND SYMBOLS MICROWAVE TUBES

Symbols for Electrodes

c	Collector
dl	Delay line
g	Grid, focusing electrode, accelerating electrode
h	Helix
i.C. (int con)	Internal connection
k	Cathode
p	Plate

Several grids, focusing and accelerating electrodes are numbered 1, 2, 3... according to their relative position from the cathode, the lowest number being closest to the cathode.

Symbols for Voltages

E_b	dc plate or collector voltage
e_b	Plate pulse voltage
E_{bb}	dc plate or collector supply voltage
E_c	dc grid voltage, dc focusing voltage, dc accelerating voltage
e_c	Grid pulse voltage
E_{cc}	dc grid, focusing or accelerating supply voltage
E_{dl}	dc delay line voltage
E_f	Heater voltage
E_g	rms value of ac component of grid voltage
e_g	Peak grid voltage
E_h	dc helix voltage
E_{hk}	Heater - cathode voltage
E_{ip}	dc ion pump voltage
E_p	rms value of ac component of plate voltage with respect to cathode
e_p	Peak plate voltage

LIST OF ABBREVIATIONS AND SYMBOLS MICROWAVE TUBES

SIEMENS

Symbols for Currents

I_b	dc plate or collector current
I_{bo}	Zero signal dc plate current
i_b	Plate pulse current
I_c	dc grid current
	dc focusing current
	dc accelerating current
i_c	Grid pulse current
I_{dl}	Delay line current
I_f	Heater current
I_g	rms value of ac component of grid current
i_g	Peak grid current
I_h	Helix current
i_h	Peak helix current
I_{ip}	dc ion pump current
I_k	dc cathode current
i_k	Peak cathode current
I_p	rms value of ac component of plate current
i_p	Peak plate current

Symbols for Power Values

P_d	Average drive power
p_d	Peak or pulse drive power
P_{dl}	Delay line power dissipation
$P_{d\,syn}$	Synchron drive power
P_g	Power dissipation of grid, focusing or accelerating electrode
P_h	Helix power dissipation
P_i	Power input (plate)
P_o	Average power output
p_o	Peak power output
$P_{o\,syn}$	Synchron power output
P_p	Plate or collector power dissipation
P_{sat}	Saturation power

Symbols for Capacitances

C_{in}	Input capacitance
C_{mn}	Capacitance between the electrodes m and n
$C_{mn/p}$	Capacitance of electrodes m and n with respect to electrode p
C_{out}	Output capacitance

Symbols for Resistances

R_b	dc resistance of external plate or collector circuit (bypassed)
R_g	Resistance in series with grid
R_k	Resistance in series with cathode
R_p	Resistance in series with plate

Other Symbols

Du	The product of time of pulse and pulse repetition rate (Duty cycle)
F	Frequency
G	Gain
IM2	2 tone intermodulation ratio
IM3	3 tone intermodulation ratio
NF	Noise factor
P	Pressure drop
P_{rr}	Pulse recurrence rate
S	Transconductance
T	Temperature
T_A	Ambient temperature
T_E	Envelope temperature
t_k	Cathode - conditioning time, preheating time
T_P	Collector or plate temperature
t_p	Pulse duration
T_M	Magnet system temperature
T_{surf}	Surface temperature
V	Air flow rate
VSWR	Voltage standing wave ratio
α	Cold attenuation
μ	Amplification factor

LIST OF ABBREVIATIONS AND SYMBOLS MICROWAVE TUBES

SIEMENS

Dimensions

A	Amperes (may be either ac rms or dc)
a	Amperes (peak value)
A_{ac}	ac amperes (rms)
ac	Alternating current
Adc	dc amperes
^{o}C	Degrees centigrade
cm	Centimeter
cps (Hz)	Cycles per second
CW	Continuous wave
db	Decibels
dc	Direct current
Gc (GHz)	Gigacycles (kilomegacycles)
kc (kHz)	Kilocycles
kv	Peak kilovolts
kVdc	dc kilovolts
kW	kilowatts
kw	Peak kilowatts
if	Intermediate frequency
m	Meter or one - thousandth
m^3/h	Cubic meter per hour
mA	ac (rms) or dc milliamperes
ma	Peak milliamperes
mAac	ac milliamperes (rms)
mAdc	dc milliamperes
Mc (MHz)	Megacycles
Meg	Megohms
min	Minutes
mm	Millimeter
ms	Milliseconds
rf	Radio frequency
rms	Root mean square
V	Volts (may be either ac rms or dc)
v	Volts, peak value
W	Watts
w	Peak watts
µAac	ac microamperes (rms)
µAdc	dc microamperes
µf	Microfarads
µs	Microseconds
µµf	Micromicrofarads

SIEMENS

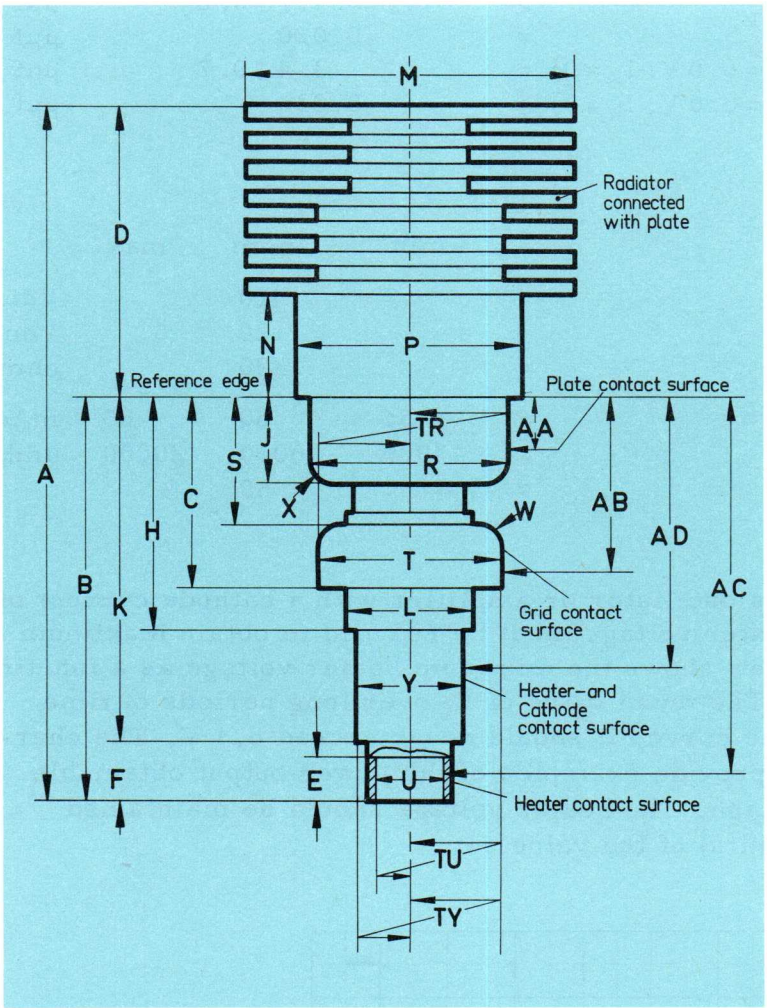
PLANAR TRIODE

RH 6 C
8412

Sachnummer
Q00035-X3251

Design and Application

Air-cooled disk-seal triode of metal-ceramic design, for oscillators, frequency multipliers, and amplifiers up to approximately 7 Gc. With dissipations < 10 W, the tube may be operated without air cooling. The tube is designed for plug-in connection at one end and is therefore easily replaceable. This tube is also available without radiator under the type designation RH 7 C.



Dimensions in mm

	min	max	
A	58.60	61.30	
B	34.80	36.50	
C	15.30	15.90	
D	23.80	24.80	
E	3.90	4.30	
F	4.80	5.80	
H	18.00	19.20	
J	7.44	7.56	
K	29.60	31.10	
L	8.60	8.80	
M	22.60	23.40	
N	8.90	10.10	
P	16.90	19.80	
R	14.95	15.10	
S	10.70	11.00	
T	12.95	13.10	
U	4.00	4.20	
W		0.60	
X		0.60	
Y	7.20	7.35	
AA	3.00	6.50	(1)
AB	11.60	15.00	(1)
AC	32.80	34.60	(1)
AD	19.50	28.50	(1)
TR		0.15	(2)
TU		0.3	(2)
TY		0.15	(2)

(1) For connection of contact springs
(2) Deviation from center

Weight: approx. 65 gm net, approx. 85 gm gross
Dimensions of packing: 55 x 55 x 145 mm

Heating

Heater voltage	E_f	=	6.0	V	1)
Heater current	I_f	≈	0.8	A	

indirect by AC, parallel supply
Metal dispenser cathode

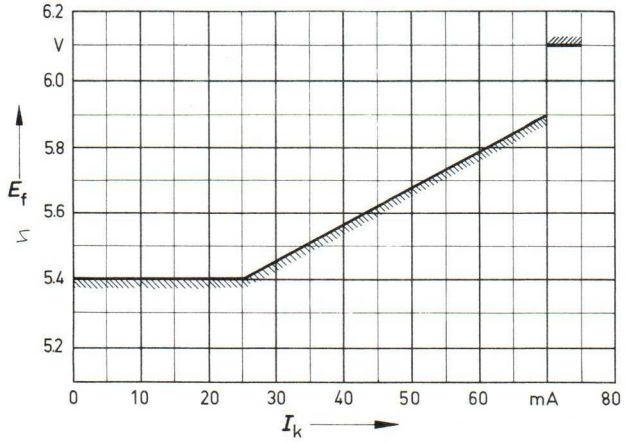
Capacitances

Grid to cathode	C_{gk}	=	2.6 ± 0.6	µµf
Plate to grid	C_{gp}	≦	1.7 ± 0.2	µµf
Plate to cathode	C_{pk}	=	0.020	µµf
Grid to cathode	C_{gk} ($E_f = 6.0$ V, $I_k = 0$)	=	3.4 ± 0.7	µµf
Plate to cathode	C_{pk} ($E_f = 6.0$ V, $I_k = 0$)	≦	0.035	µµf

Characteristics

			min	nom	max	
Plate supply voltage	E_{bb}	=		420		Vdc
Grid supply voltage	E_{cc}	=		+20		Vdc
Cathode resistor	R_k	=		390		ohms
Plate current	I_b	=	55	60	65	mAdc
Transconductance	S_m	=	13000	16000	20000	µmhos
Amplification factor	µ	≈		60		

(1) If the tube is operated as oscillator or amplifier with a cathode current of less than 70 mA, the heater voltage must be reduced to obtain maximum tube life. The curve below shows the minimum heater voltage as a function of the cathode current. The mean value of E_f over long periods of time should be on or above the curve, it should never exceed 6.1 V. The characteristics on Sheet K4 provide examples of the power output obtainable with reduced heater voltage. The heater voltage should be maintained within ± 2% (absolute limits) of the value set.



Maximum Ratings (absolute values)

Plate voltage at zero plate current	E_{bo}	max	800	Vdc
Plate voltage	E_b	max	600	Vdc
Plate dissipation	P_p	max	30	W
Negative grid voltage	$-E_c$	max	50	Vdc
Positive grid voltage	$+E_c$	max	0	Vdc
Grid dissipation	P_g	max	0.2	W
Grid current	I_c	max	12	mAdc (1)
Grid resistor	R_g	max	50000	ohms
Power input	P_i	max	1	W (2)
Cathode current	I_k	max	75	mAdc
Peak cathode current	i_k	max	250	madc
Surface temperature	t_{surf}	max	180	°C

Operating Characteristics

CW Oscillator

Frequency	F	=	4	4	4	6	6	Gc (3)
Heater voltage	E_f	=	5.4	5.7	6.0	5.7	6.0	V
Plate supply voltage	E_{bb}	=	260	320	420	320	420	Vdc
Grid supply voltage	E_{cc}	=	+10	+20	+20	+20	+20	Vdc
Cathode resistor	R_k	=	800	800	800	800	800	ohms (4)
Plate current	I_b	=	20	45	60	45	60	mAdc
Grid current	I_c	≈	5	7	9	6	9	mAdc
Power output	P_o	=	0.4	1.7	4.5	0.65	1.8	W

Frequency Doubler

Frequency	F	=	3/6	Gc
Heater voltage	E_f	=	5.8	Vdc
Plate supply voltage	E_{bb}	=	420	Vdc
Grid supply voltage	E_{cc}	=	+20	Vdc
Cathode resistor	R_k	=	1000	ohms (4)
Power input	P_i	=	500	mW
Plate current	I_b	=	35	mAdc
Grid current	I_c	≈	3	mAdc
Power output	P_o	=	440	mW

(1) The specified value must not be exceeded even briefly (e.g. in tuning an oscillator).
(2) For grounded-grid operation.
(3) At frequencies above 5 Gc, rotation-symmetrical plate circuits must be used to avoid peripheral waves.
(4) A variable cathode resistor of the specified rating must be used for adjusting the plate current to the specified value.

Frequency Tripler

Frequency	F	=	2/6	Gc
Heater voltage	E_f	=	5.7	Vdc
Plate supply voltage	E_{bb}	=	420	Vdc
Grid supply voltage	E_{cc}	=	+20	Vdc
Cathode resistor	R_k	=	2000	ohms (1)
Power input	P_i	=	500	mW
Plate current	I_b	=	20	mAdc
Grid current	I_c	≈	1	mAdc
Power output	P_o	=	130	mW

Amplifier

Frequency	F	=	1	3	Gc
Bandwidth	B	=	20	30	Mc
Heater voltage	E_f	=	6.0	6.0	Vdc
Plate voltage	E_b	=	400	400	Vdc
Plate current	I_b	=	60	60	mAdc
Gain (P_o < 1 W)	G	=	14	14	db
Power output (G = 10 db)	P_o	=	9	6	W

(1) A variable cathode resistor of the specified rating must be used for adjusting the plate current to the specified value.

Operating Instructions

Mounting

The tube should be mounted with the aid of adequately resilient spring contacts. It may be operated in any position. The reference edge (cf. dimensional drawing of the tube, page 1) is to serve at the same time as fitting edge.

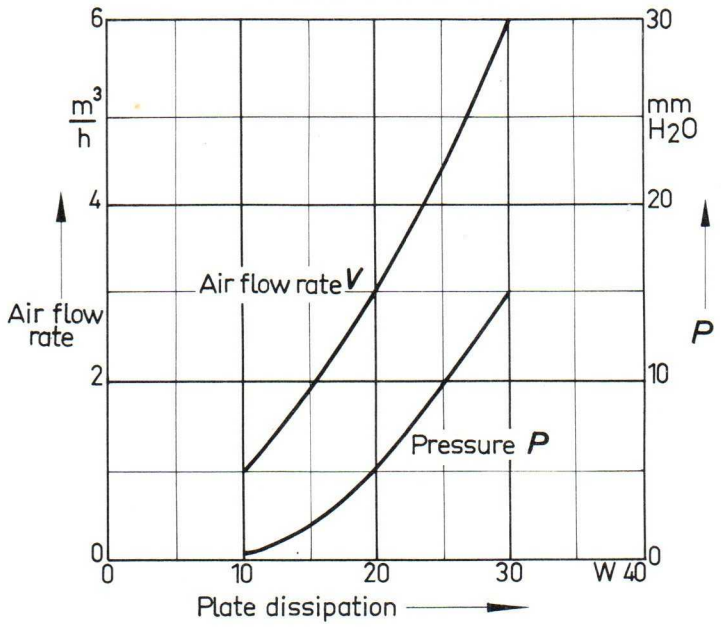
Cooling

The maximum temperature at the surface of the tube is 180° C (absolute limit). To dissipate the heat from the radiator a sufficient air flow through a suitable air duct is necessary. The minimum air flow and associated air pressure required for an air duct having the dimensions indicated in the drawing can be determined from the diagram below.

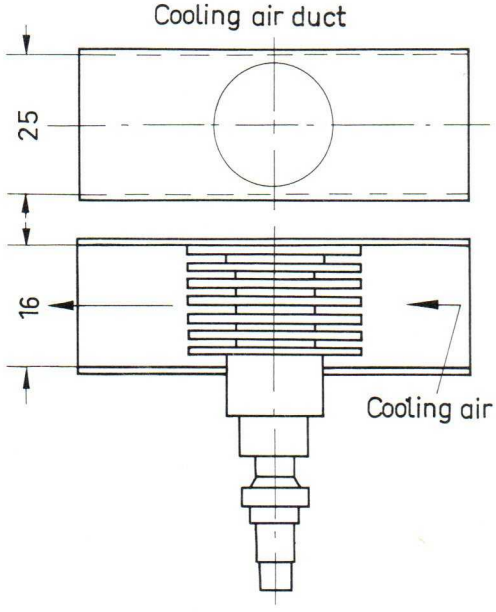
As the constructional design of the ventilation system has to be adapted to the particular type of equipment in which the tube is used, it cannot be furnished as an accessory together with the tube.

If the tube is operated with a dissipation of less than 10 W in concentric coaxial circuits, the heat sink provided by the contact springs and the coaxial circuits is, as a rule, sufficient so that air cooling can be dispensed with.

Air cooling diagram



Cooling air duct

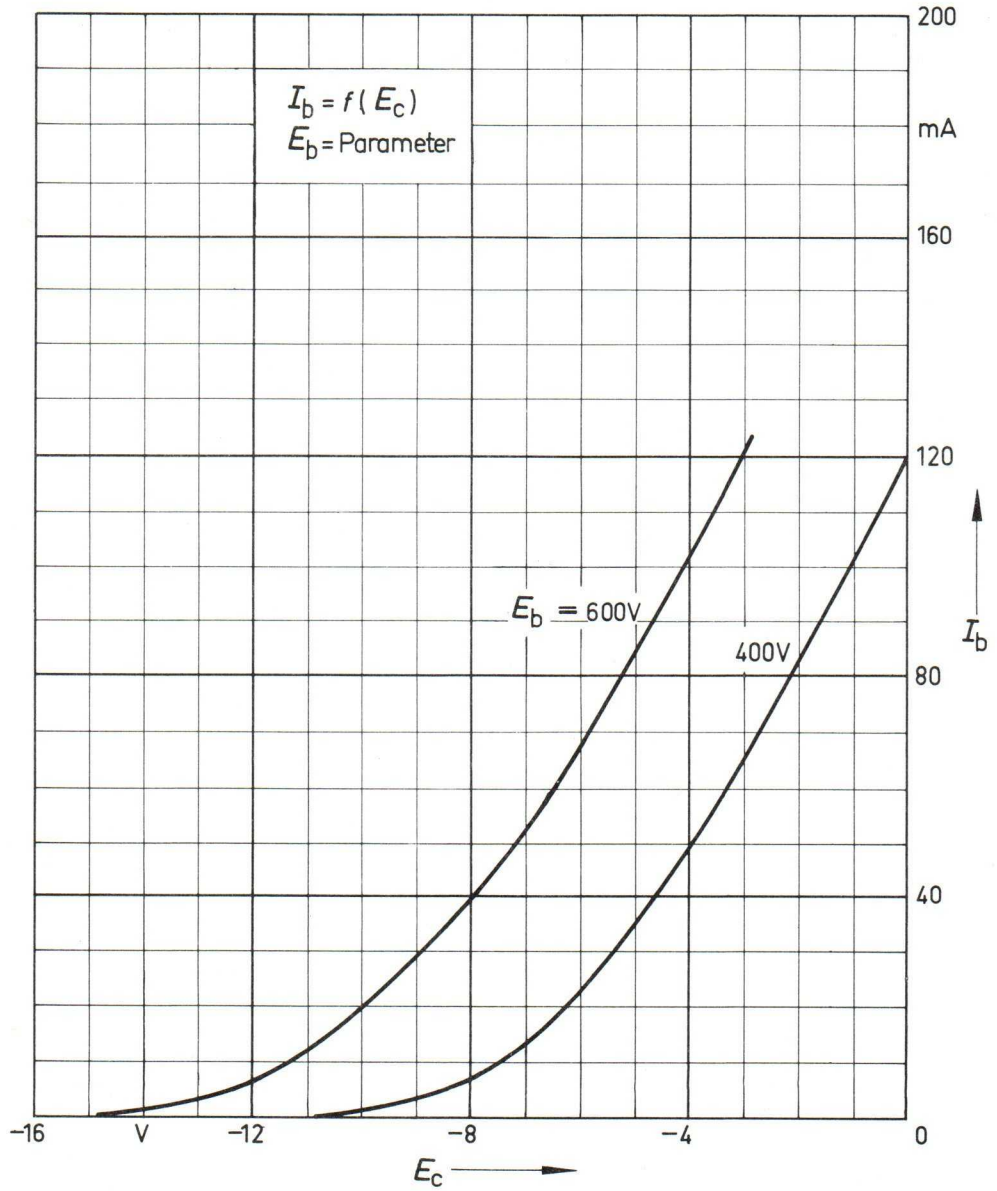


Dimensions in mm

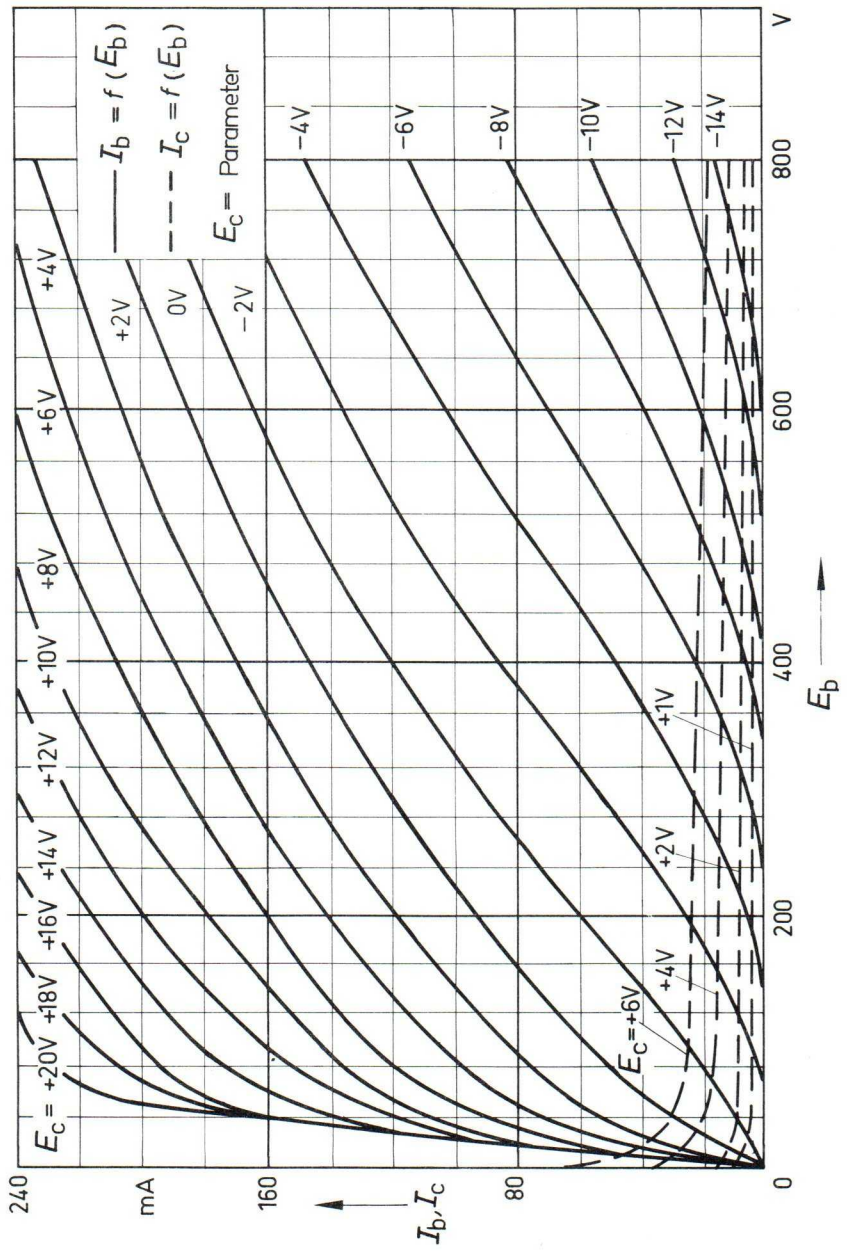
Characteristics

$I_b = f\ (E_c)$

SIEMENS



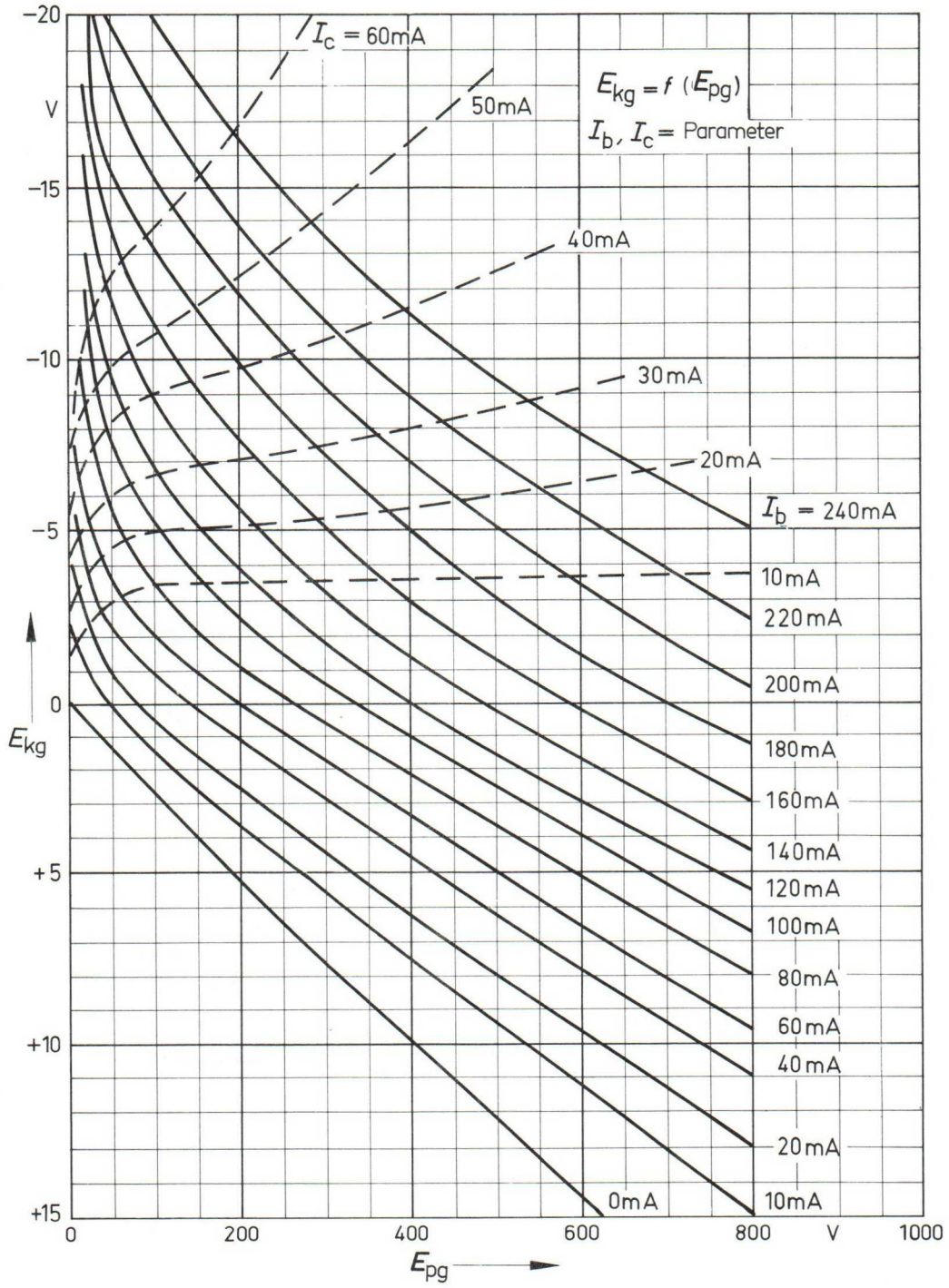
RöK 3522 E/1.8.66

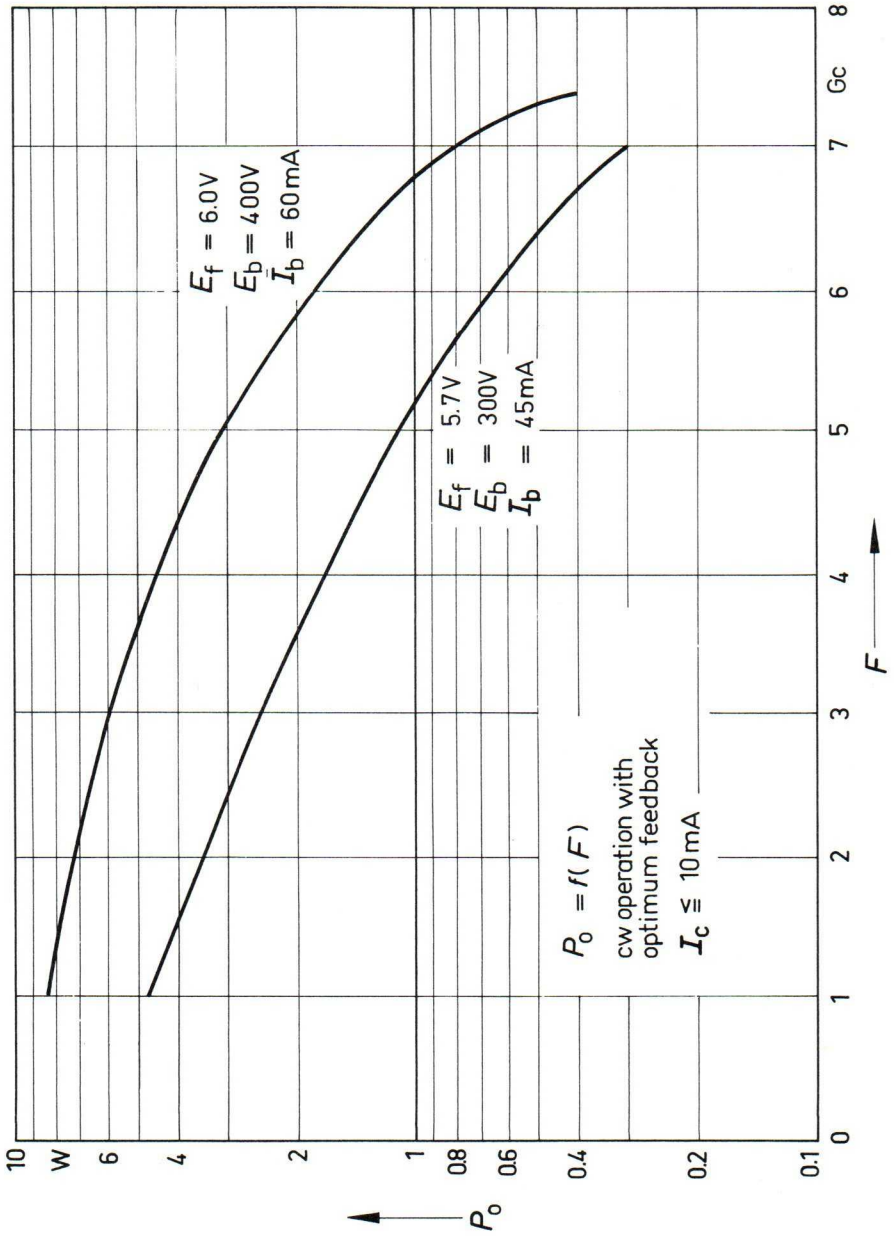

$I_b = f(E_b)$
$I_c = f(E_b)$
E_c = Parameter
+4V
+2V
0V
−2V
+6V
+8V
+10V
+12V
+14V
+16V
+18V
+20V
E_c = +20V
−4V
−6V
−8V
−10V
−12V
−14V
+1V
+2V
+4V
E_c=+6V
240
160
80
0
mA
I_b, I_c
200
400
600
800
V
E_b

Characteristics

$E_{kg} = f\,(E_{pg})$

SIEMENS

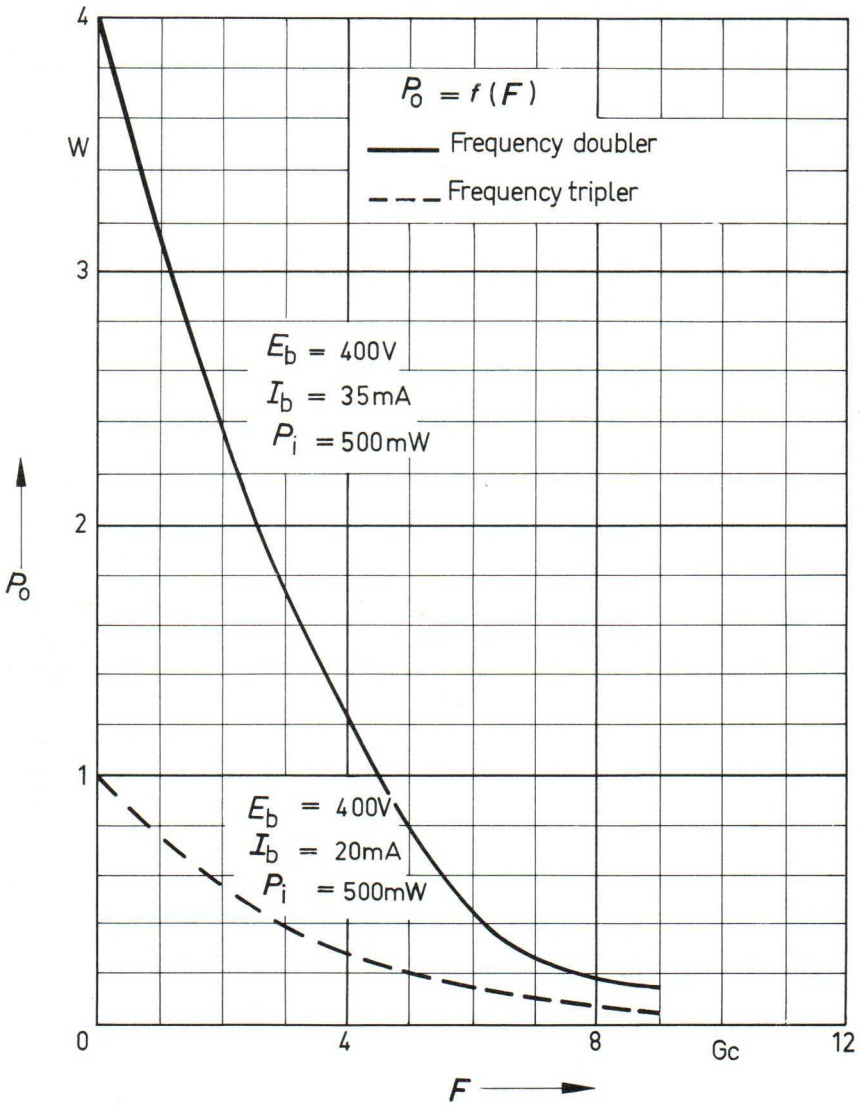


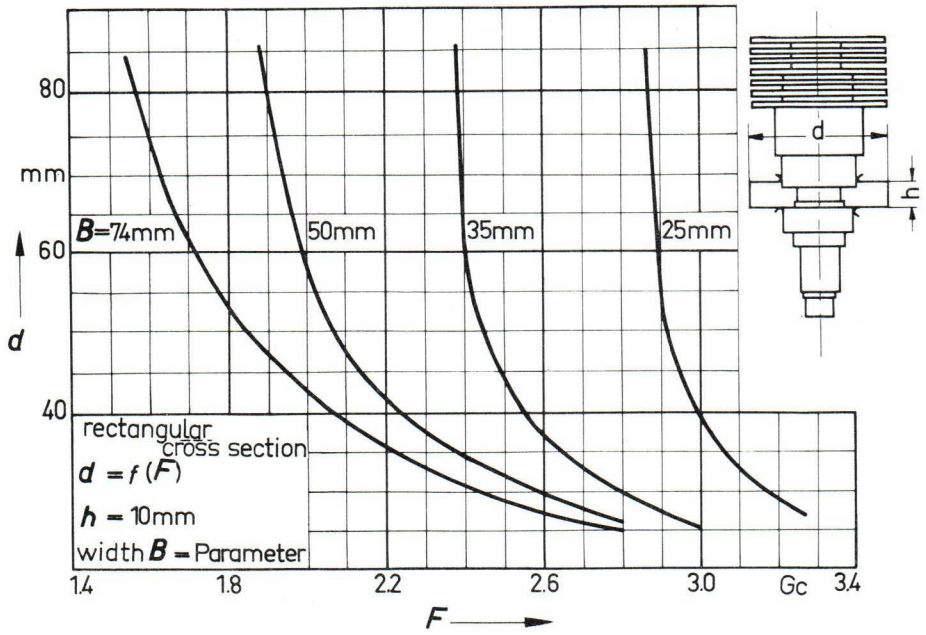

E_f = 6.0V
E_b = 400V
I_b = 60mA
E_f = 5.7V
E_b = 300V
I_b = 45mA
$P_o = f(F)$
cw operation with
optimum feedback
$I_c \leqq$ 10mA
10
W
6
4
2
1
0.8
0.6
0.4
0.2
0.1
P_o
0
1
2
3
4
5
6
7
8
Gc
F

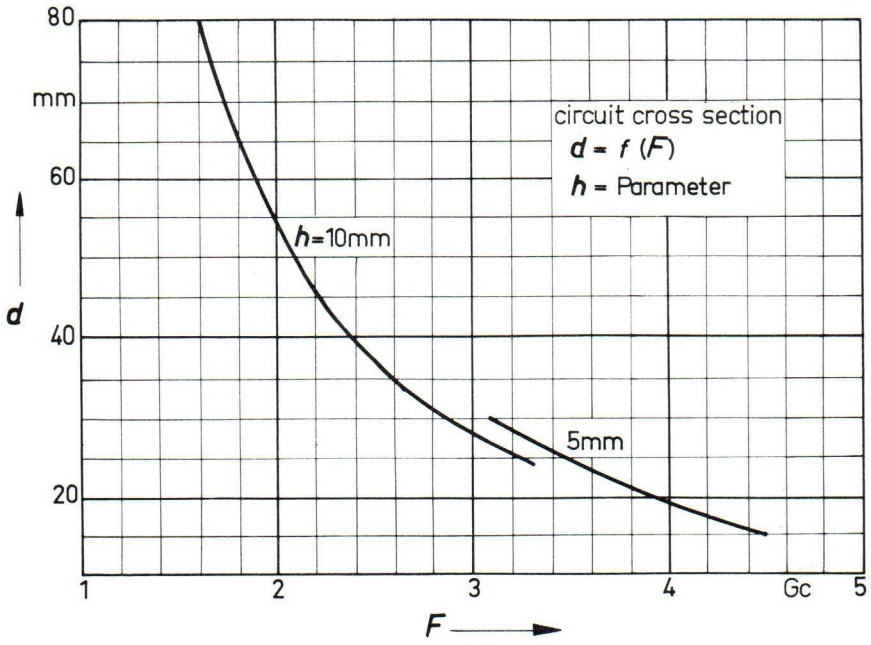
Characteristics

$P_o = f(F)$

SIEMENS

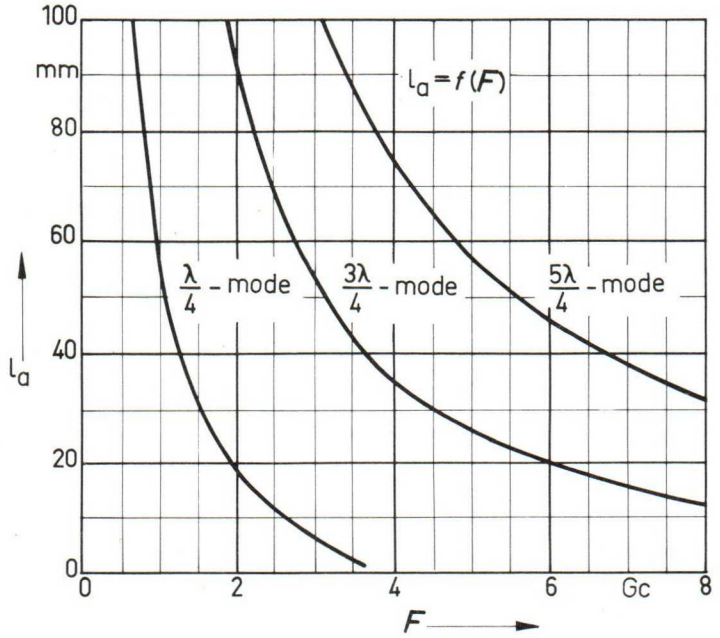


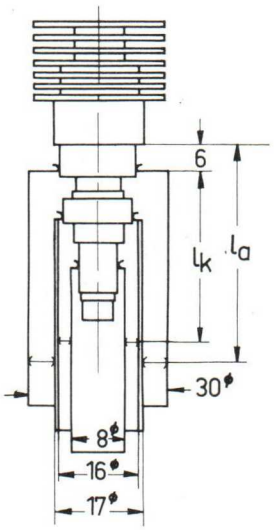

80
mm
60
d
40
B=74mm
50mm
35mm
25mm
rectangular cross section
d = f (F)
h = 10mm
width B = Parameter
1.4
1.8
2.2
2.6
3.0
Gc
3.4
F
d
h

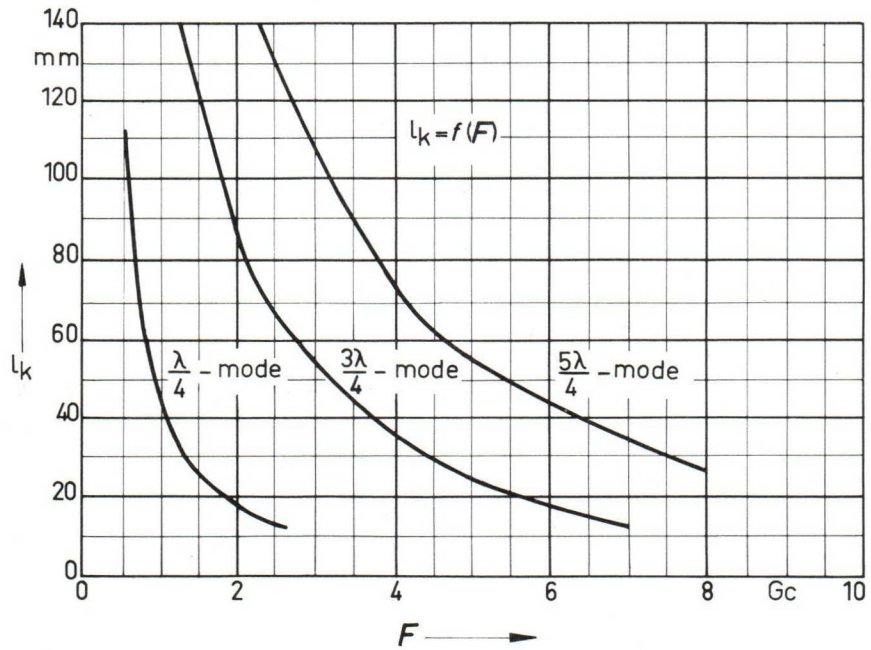

80
mm
60
d
40
20
circuit cross section
d = f (F)
h = Parameter
h=10mm
5mm
1
2
3
4
Gc
5
F

Dimensions of Coaxial circuits (typical values)

SIEMENS







SIEMENS AKTIENGESELLSCHAFT

Printed in Germany

SIEMENS

PLANAR TRIODE

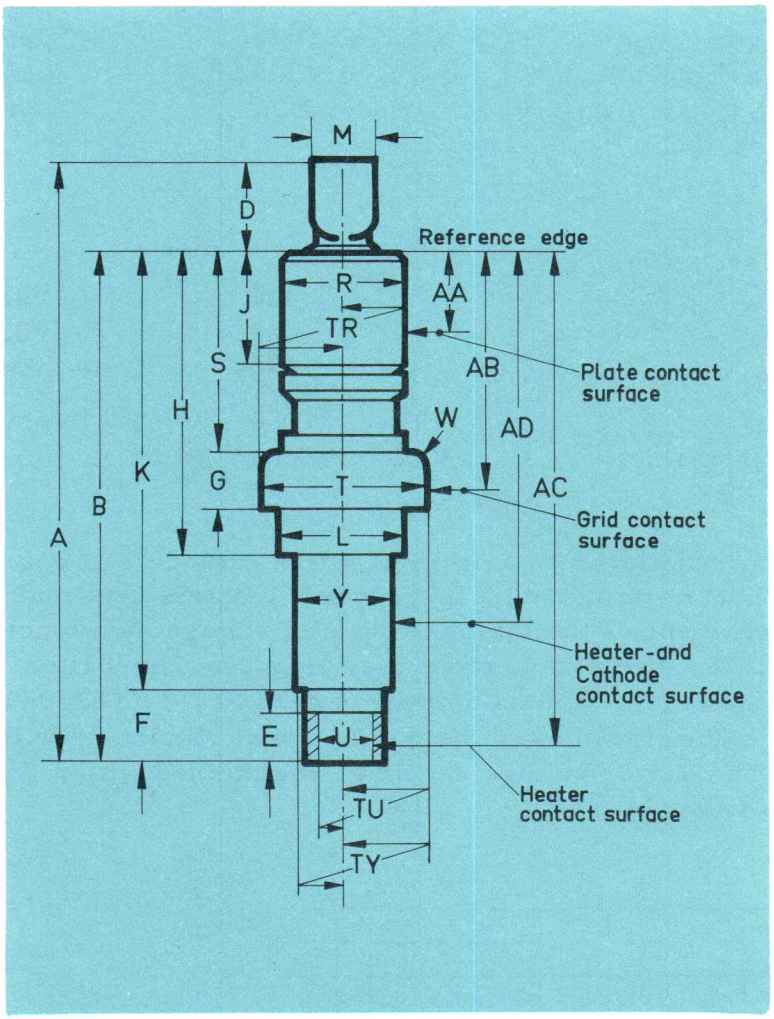
RH 7 C
YD 1070
8413

S&H-Sach-Nr.
Q00035-X3252

Design and Application

Ceramic disc-seal triode with contact cooling or air cooling for use as oscillator or amplifier up to approx. 7 Gc and as frequency multiplier up to approx. 9 Gc.

This tube is also available with radiator under the type designation RH 6 C.



Dimensions in mm

	min.	max.	
A		48.40	
B	37.90	39.40	
D		9.00	
E	3.90	4.30	
F	4.80	5.80	
G	4.60	4.85	
H	21.00	22.20	
J		8.80	(1)
K	32.70	34.00	
L	8.60	8.80	
M		7.00	
R	8.80	8.90	
S	13.65	14.05	
T	12.95	13.10	
U	4.00	4.20	
W		0.60	
Y	7.20	7.35	
AA	3.00	8.00	(2)
AB	14.80	18.20	(2)
AC	35.70	37.70	(2)
AD	23.00	32.00	(2)
TR		0.15	(3)
TU		0.30	(3)
TY		0.15	(3)

(1) Admissible length of clamp contact
(2) For connection of contact springs
(3) Deviation from center

Weight: approx. 11 gm net, approx 30 gm gross
Dimensions of packing: 55 x 55 x 145 mm

Heating, Capacitances Characteristics

SIEMENS

Heating

Heater voltage	E_f	=	6.0	Vac (1)
Heater current	I_f	≈	0.8	A

indirect by ac, parallel supply
Metal dispenser cathode

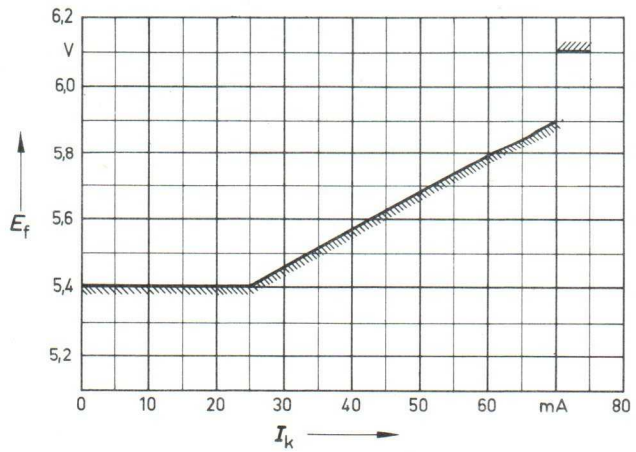
Capacitances

Grid to cathode	C_{gk}	=	2.6 ± 0.6	µµf
Plate to grid	C_{gp}	=	1.7 ± 0.2	µµf
Plate to cathode	C_{pk}	≦	0.020	µµf
Grid to cathode	C_{gk} (E_f=6,0 V, I_k=0)	=	3.4 ± 0.7	µµf
Plate to cathode	C_{pk} (E_f=6,0 V, I_k=0)	≦	0.035	µµf

Characteristics

			min	nom	max	
Plate supply voltage	E_{bb}	=		420		Vdc
Grid supply voltage	E_{cc}	=		+ 20		Vdc
Cathode resistor	R_k	=		390		ohms
Plate current	I_b	=	55	60	65	mAdc
Transconductance	S_m	=	13000	16000	20000	µmhos
Amplification factor	µ	≈		60		

(1) If the tube is operated as oscillator or amplifier with a cathode current of less than 70 mA, the heater voltage must be reduced to obtain maximum tube life. The curve below shows the minimum heater voltage as a function of the cathode current. The mean value of E_f over long periods of time should be on or above the curve, it should never exceed 6.1 V. The characteristics on Sheet K 4 provide examples of the power output obtainable with reduced heater voltage. The heater voltage should be maintained within ± 2 % (absolute limits) of the value set.



Maximum Ratings (absolute values)

Plate voltage at zero plate current	E_{bo}	max	800	Vdc
Plate voltage	E_b	max	600	Vdc
Plate dissipation	P_p	max	25	W (1)
Negative grid voltage	$-E_c$	max	50	Vdc
Positive grid voltage	$+E_c$	max	0	Vdc
Grid dissipation	P_g	max	0.2	W
Grid current	I_c	max	12	mAdc (2)
Grid resistor	R_g	max	50000	ohms
Power intput	P_i	max	1	W (3)
Cathode current	I_k	max	75	mAdc
Peak cathode current	i_k	max	250	mAdc
Surface temperature	t_{surf}	max	180	°C

Operating Characteristics

CW Oscillator

Frequency	F	=	4	4	4	6	6	Gc (4)
Heater voltage	E_f	=	5.4	5.7	6.0	5.7	6.0	Vdc
Plate supply voltage	E_{bb}	=	260	320	420	320	420	Vdc
Grid supply voltage	E_{cc}	=	+10	+20	+20	+20	+20	Vdc
Cathode resistor	R_k	=	800	800	800	800	800	ohms (5)
Plate current	I_b	=	20	45	60	45	60	mAdc
Grid current	I_c	≈	5	7	9	6	8	mAdc
Power output	P_o	=	0.4	1.7	4.5	0.65	1.8	W

Frequency Doubler

Frequency	F	=	3/6	4.5/9	Gc
Heater voltage	E_f	=	5.8	5.8	Vdc
Plate supply voltage	E_{bb}	=	420	420	Vdc
Grid supply voltage	E_{cc}	=	+20	+20	Vdc
Cathode resistor	R_k	=	1000	1000	ohms (5)
Power input	P_i	=	500	500	mW
Plate current	I_b	=	35	35	mAdc
Grid current	I_c	≈	3	3	mAdc
Power output	P_o	=	440	150	mW

(1) For further informations see "Cooling" page 5
(2) The specified value must not be exceeded even briefly (e.g. in tuning an oscillator).
(3) For grounded-grid operation.
(4) At frequencies above 5 Gc, rotation-symmetrical plate circuits must be used to avoid peripheral waves.
(5) A variable cathode resistor of the specified rating must be used for adjusting the plate current to the specified value.

Frequency Tripler

Frequency	F	=	2/6	3/9	Gc
Heater voltage	E_f	=	5.7	5.7	Vdc
Plate supply voltage	E_{bb}	=	420	420	Vdc
Grid supply voltage	E_{cc}	=	+20	+20	Vdc
Cathode resistor	R_k	=	2000	2000	ohms (1)
Power input	P_i	=	500	500	mW
Plate current	I_b	=	20	20	mAdc
Grid current	I_c	=	1	1	mAdc
Power output	P_o	=	130	40	mW

Amplifier

Frequency	F	=	1	3	Gc
Bandwidth	B	=	20	30	Mc
Heater voltage	E_f	=	6.0	6.0	Vdc
Plate voltage	E_b	=	400	400	Vdc
Plate current	I_b	=	60	60	mAdc
Gain (P_o < 1 W)	G	=	14	14	db
Power output (G = 10 db)	P_o	=	9	6	W

(1) A variable cathode resistor of the specified rating must be used for adjusting the plate current to the specified value.

Operating Instructions

Mounting

The tube should be mounted with the aid of adequately resilient spring contacts. It may be operated in any position. The reference edge (see dimensional drawing of the tube, page 1) is to serve at the same time as fitting edge. The evacuation tubulation must not be used as dc voltage lead.

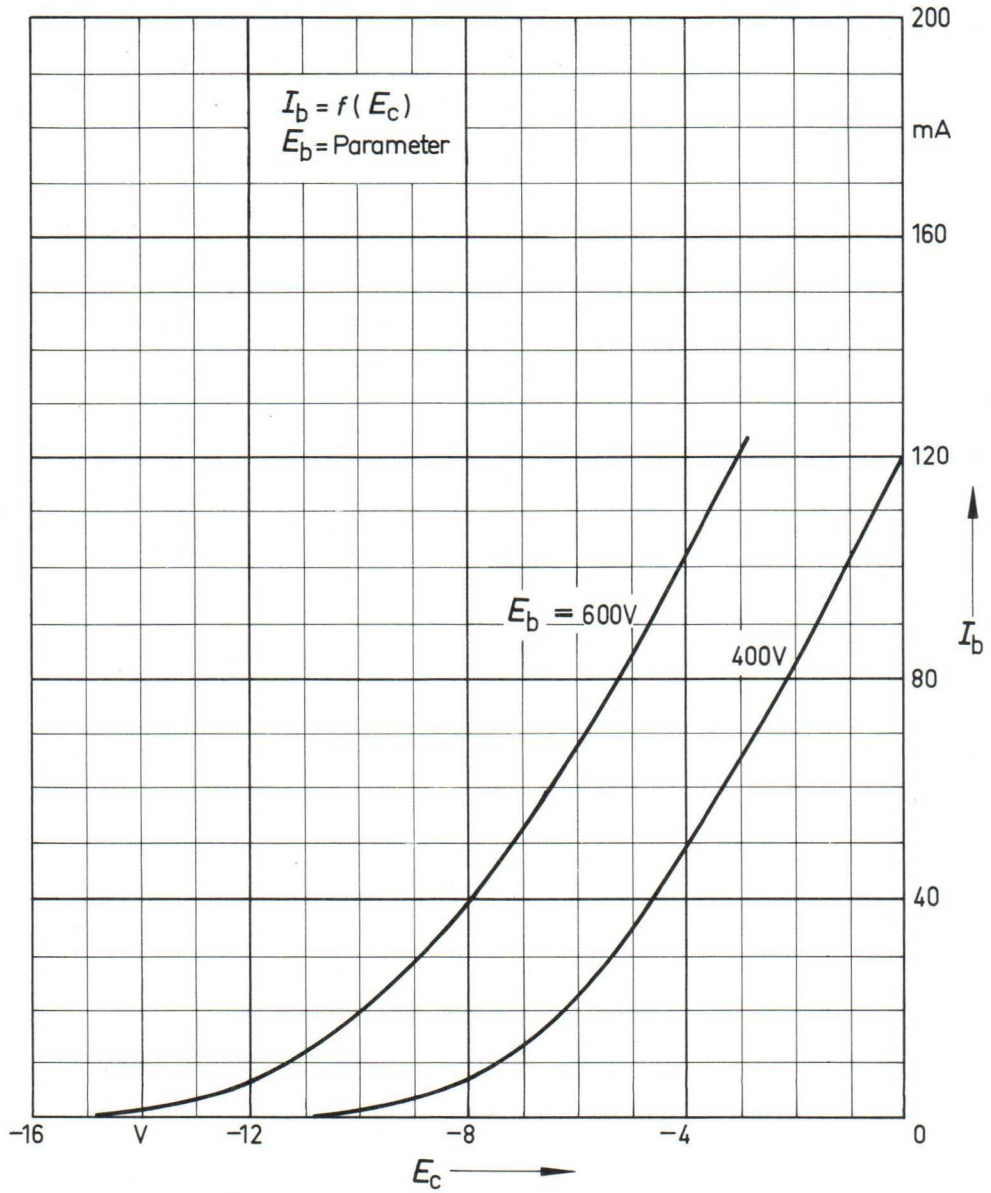
Cooling

The heat must be removed from the plate by means of contact cooling. Particularly good thermal contact must be provided at a dissipation of approximately > 10 W. To convey the heat to the environment or to large metal parts, e.g. the chassis, it is recommended to clamp a suitable adapter to the plate connection. Under certain circumstances it may be practical to design the adapter as a radiator and to provide for additional air cooling. It may also be necessary to provide the cathode connection with a heat sink. In all applications it is essential that the maximum admissible temperature of 180° C (absolute limit) should not be exceeded at any point of the tube surface.

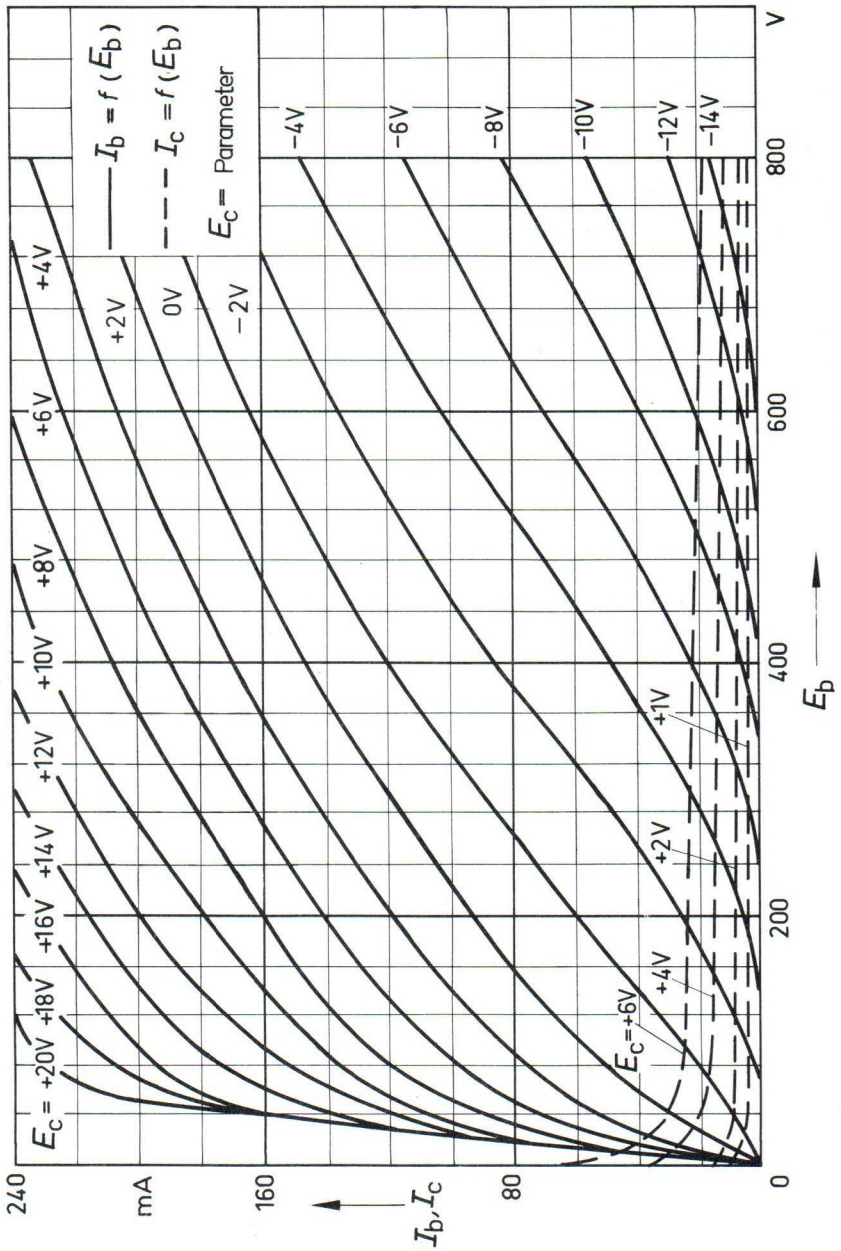
Characteristics

$I_b = f\ (E_c)$

SIEMENS



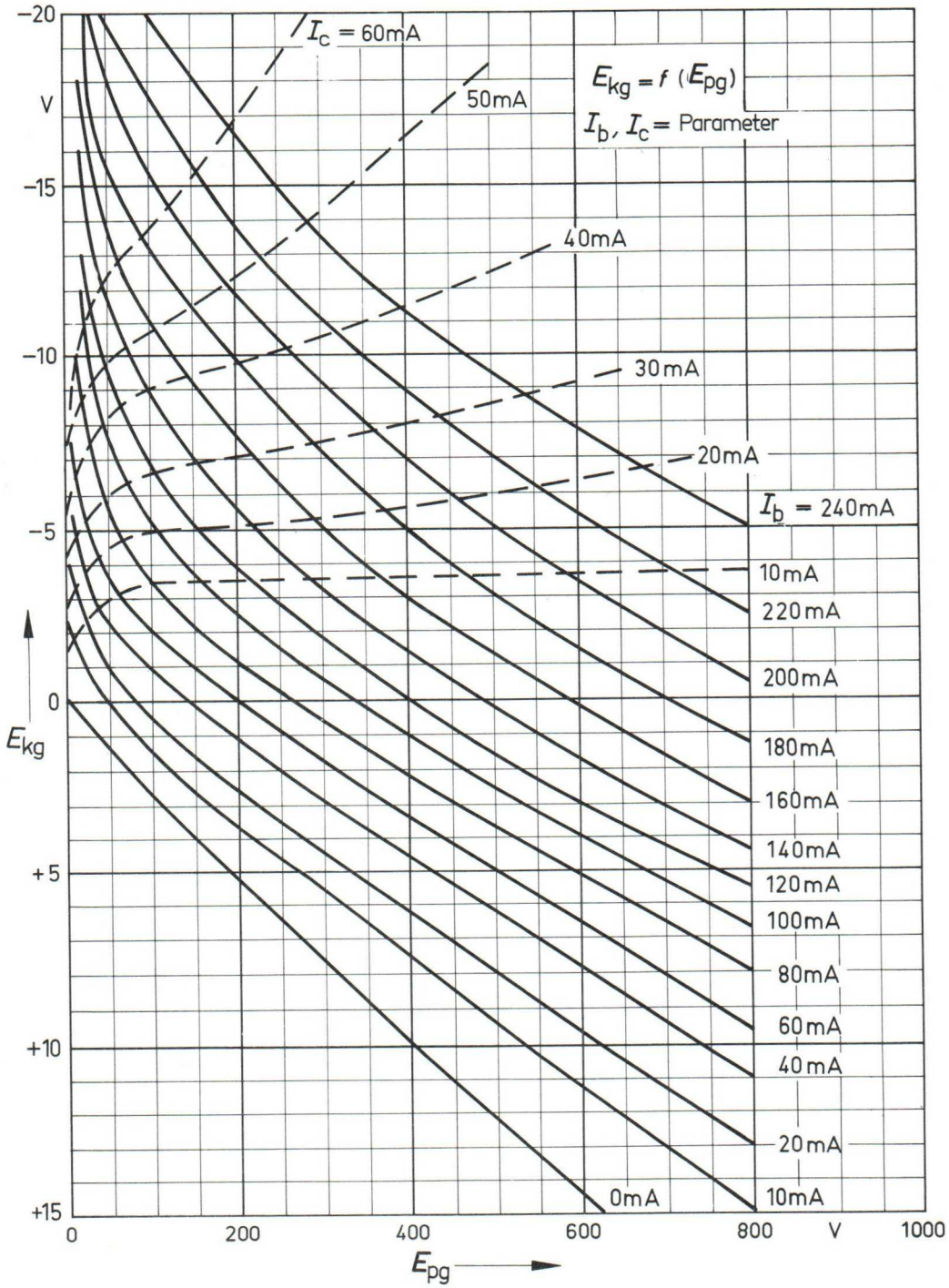
RöK 3523 E / 1.7.66

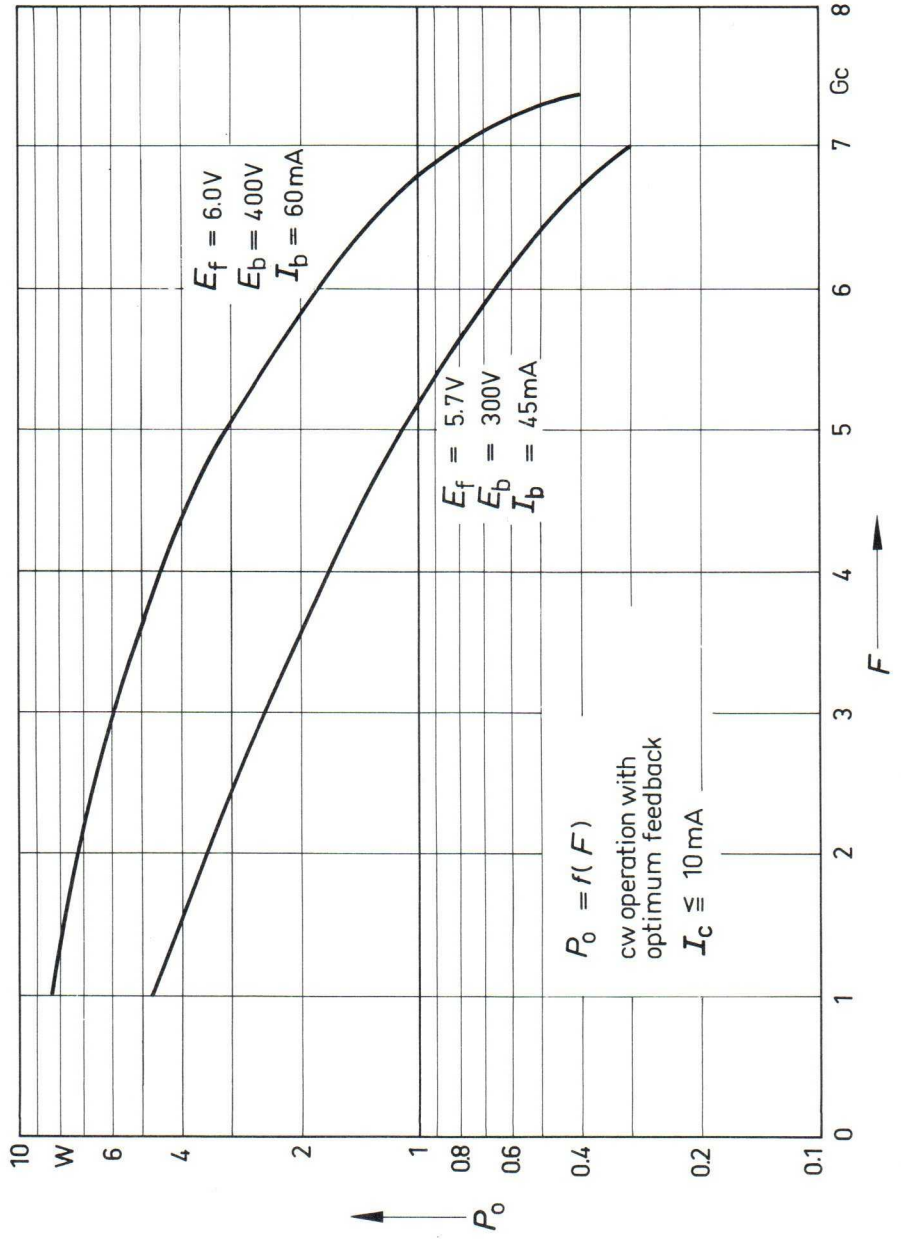

$I_b = f(E_b)$
$I_c = f(E_b)$
E_c = Parameter
E_c = +20V +18V +16V +14V +12V +10V +8V +6V +4V +2V 0V −2V
−4V −6V −8V −10V −12V −14V
+1V +2V +4V E_c=+6V
240 160 80 0
mA
I_b, I_c
0 200 400 600 800 V
E_b

Characteristics

$E_{kg} = f\,(E_{pg})$

SIEMENS

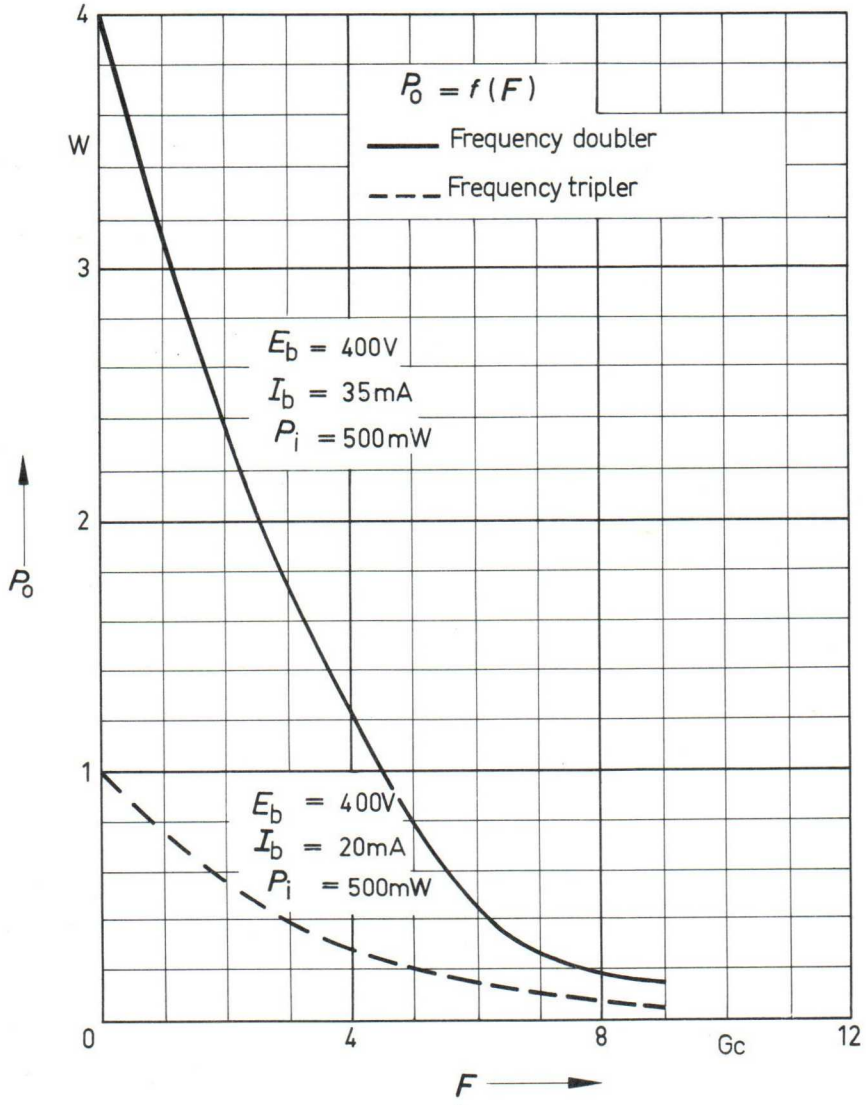



E_f = 6.0V
E_b = 400V
I_b = 60mA
E_f = 5.7V
E_b = 300V
I_b = 45mA
$P_o = f(F)$
cw operation with
optimum feedback
$I_c \leqq$ 10 mA
10 W 6 4 2 1 0.8 0.6 0.4 0.2 0.1
P_o
0 1 2 3 4 5 6 7 8 Gc
F

Characteristics

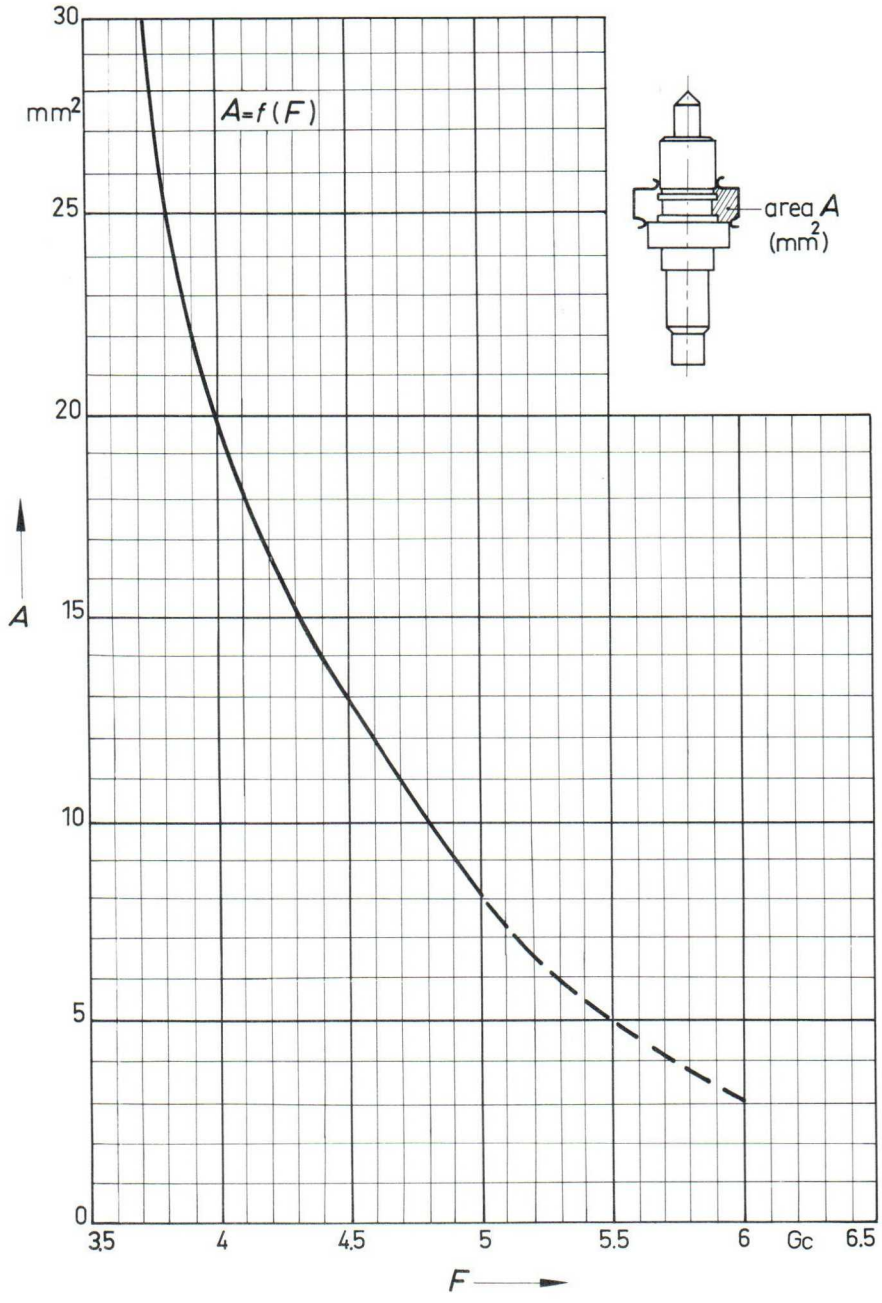
$P_o = f(F)$

SIEMENS



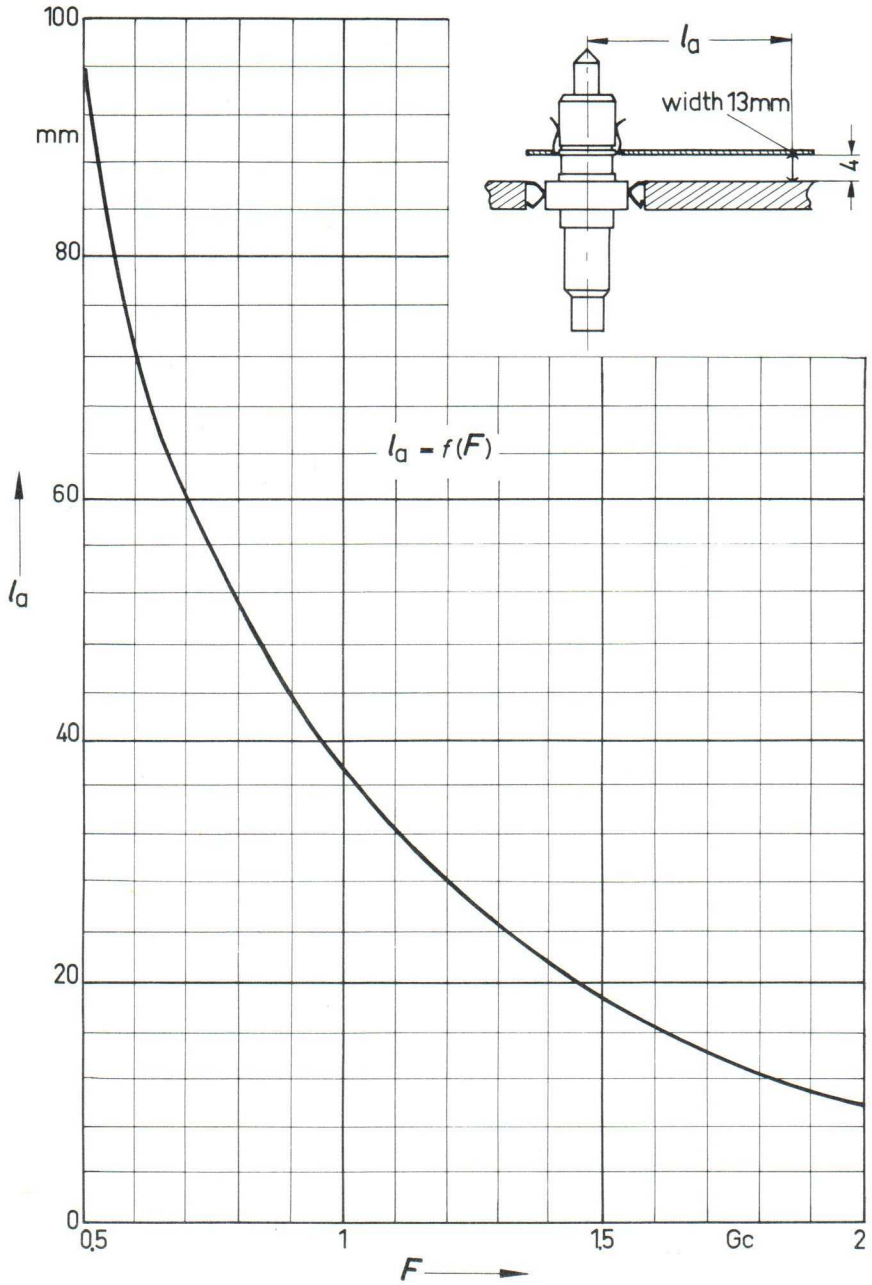
RöK 3523 E / 1.7. 66

Dimensions of plate radial circuits (typical values)



Dimensions of lecher line plate circuits (typical values)

SIEMENS



SIEMENS & HALSKE AKTIENGESELLSCHAFT
WERNERWERK FÜR BAUELEMENTE

Printed in Germany

RöK 3523 E / 1.7.66

SIEMENS

PLANAR TRIODE

2C 39BA

S&H-Sach-Nr.
Q00035-X5002

Design and Application

Air-cooled planar power triode of metal-ceramic design, for oscillators, modulators, mixers, amplifiers and frequency multipliers operating up to approx. 3.5 Gc.

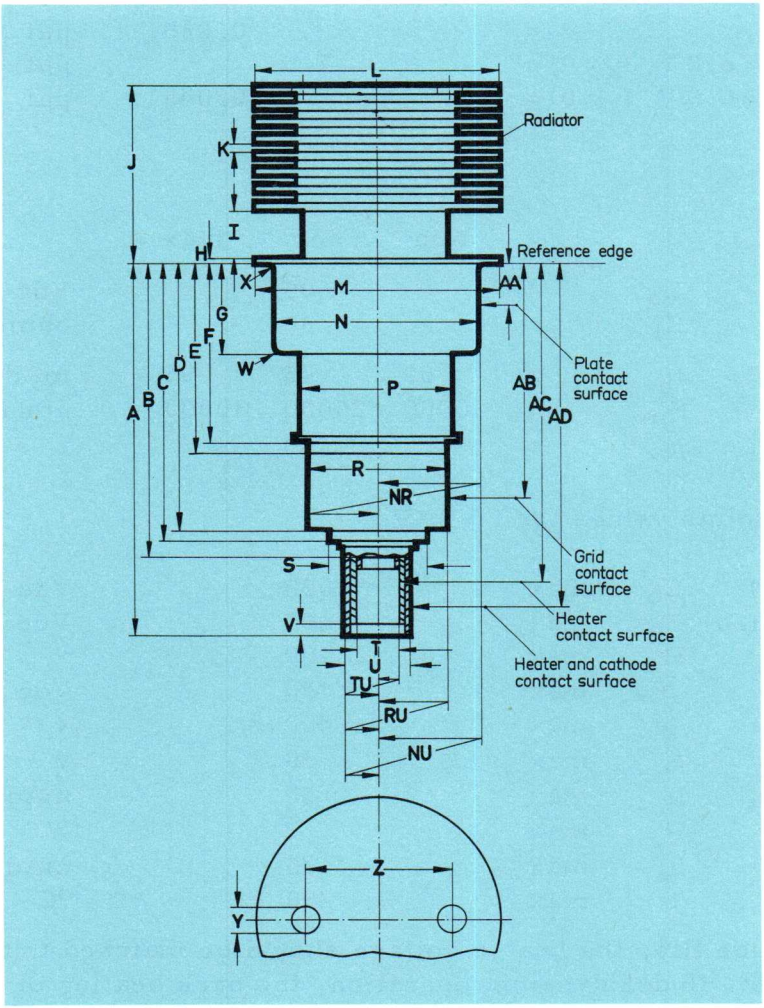


Table of dimensions
(in mm)

	min.	max.	
A	46.10	47.63	
B		38.96	
C		37.46	
D	32.74	33.76	
E		28.83	
F	23.35	23.80	
G	11.73	12.12	
H		1.02	
I	3.17	4.70	
J	19.31	20.98	
K	0.41	1.17	
L	31.34	32.11	
M	29.90	30.35	
N	26.03	26.39	
P		20.12	
R	16.63	16.97	
S		13.84	
T	5.41	5.66	
U	8.00	8.26	
V		2.18	
W		2.54	
X		0.89	
Y	2.67	3.68	(1)
Z	16.51	21.59	
AA	0.89	9.17	(2)
AB	30.10	32.13	(2)
AC	38.96	43.89	(2)
AD	37.46	46.10	(2)
NR		0.50	(3)
NU		0.50	(3)
RU		0.50	(3)
TU		0.30	(3)

(1) Holes for extractor
(2) Connection for contact surface
(3) Center variation

Weight:	approx 70 gm net	approx 105 gm gross
Dimensions of package:		55x55x145 mm

Heating

Heater voltage	E_f	=	6.0	V	(1)
Heater current	I_f	=	$0.95\ ^{+0.10}_{-0.05}$	A	
Preheating time	t_k	≧	1	min	(2)

indirect by ac or dc, parallel supply

Capacitances

			min	nom	max	
Grid to cathode	$C_{g/k}$	=	5.6	6.3	7.0	µµf
Plate to grid	$C_{a/g}$	=	1.95	2.05	2.15	µµf
Plate to cathode	$C_{a/k}$	=			0.035	µµf
Grid to cathode	$C_{g/k}$ (E_f = 6.0 V, I_k = 0)	=		7.5		µµf
Plate to cathode	$C_{a/k}$ (E_f = 6.0 V, I_k = 0)	=			0.045	µµf

Characteristics

			min	nom	max	
Plate voltage	E_b	=		600		Vdc
Cathode resistor	R_k	=		30		ohms
Plate current	I_b	=	60	75	95	mAdc
Transconductance	S_m	=	20000	25000	30000	µmhos
Amplification factor	µ	≈		100		

Maximum Ratings

(absolute values for f ≦ 3 Gc)

Plate voltage (unmodulated)	E_b	max	1000	Vdc
Plate voltage (100% modulated)	E_b	max	600	Vdc
Plate dissipation	P_p	max	100	W
Grid negative bias	$-E_c$	max	150	Vdc
Peak grid negative bias	$-e_c$	max	400	v
Peak grid positive bias	e_c	max	30	v
Grid current	I_c	max	50	mAdc
Grid dissipation	P_g	max	2	W
Cathode current	I_k	max	125	mAdc
Bulb temperature	T	max	250	°C

(1) In the interest of long tube life, the heater voltage should be matched to the required cathode current. Under dynamic operation, the back heating of the cathode which occurs at frequencies in the region of transit time must be compensated for by a reduction of heater voltage. Standard values should be taken from the curves on page 9 and the maximum heater voltage variation should not exceed ± 5 %.

(2) For pulsed operation, 6 V is normally required for preheating. For CW operation preheating should be effected at the voltage indicated in the curve on page 9 (f < 0.5 Gc). In case of power interruption up to 5 sec or CW operation with $E_b \leqq 300$ Vdc and $I_k \leqq 30$ mAdc, preheating is not necessary.

Operating Characteristics

CW Oscillator

Frequency	F	=	2.5	2.5	Gc
Heater voltage	E_f	=	4.5	4.5	V
Plate voltage	E_b	=	600	800	Vdc
Plate current	I_b	=	100	100	mAdc
Grid current	I_c	≈	10	8	mAdc
Power output	P_o	=	16	24	W

Frequency Doubler

Frequency	F	=	1/2	Gc
Heater voltage	E_f	=	5.6	V
Plate voltage	E_b	=	400	Vdc
Negative grid voltage	$-E_c$	=	15	Vdc
Power intput	P_i	=	1.5	W
Plate current	I_b	=	55	mAdc
Power output	P_o	=	5.2	W

Special Tests and Ratings

End of Life (1)

Plate current	I_b	≦	45	mAdc
Transconductance	S_m	≦	15000	µmhos
Power output	P_o	≦	10	W

Test conditions: I_b, S_m see Characteristics
P_o see Operating Characteristics as CW oszillator when E_b = 600 Vdc

(1) The tubes satisfy the life tests according to MIL-E-1/1107. The life of the tube depends on the load and particularly on the tube temperature and the plate voltage. It is therefore recommended that the tube output required in each case be attained with the lowest possible plate voltage, and that the tube temperature be kept as low as possible by adequate cooling.

Operating Instructions

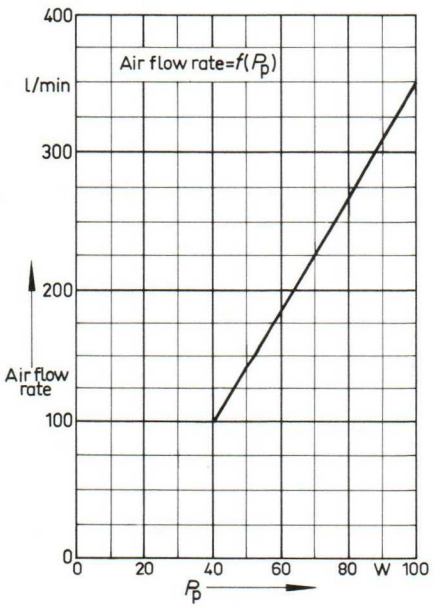
On account of the metal-ceramic design, the 2 C 39 BA, as compared with the 2 C 39 A, displays higher mechanical stability, smaller mechanical tolerances, improved thermal conductivity, smaller frequency spread, and higher power output.
This tube may be used advantageously wherever the power output of the 2C 39A is no longer sufficient and higher temperatures have to be expected.

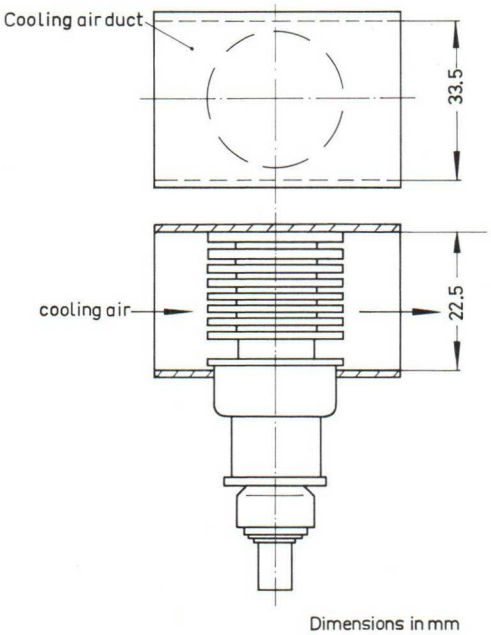
Mounting

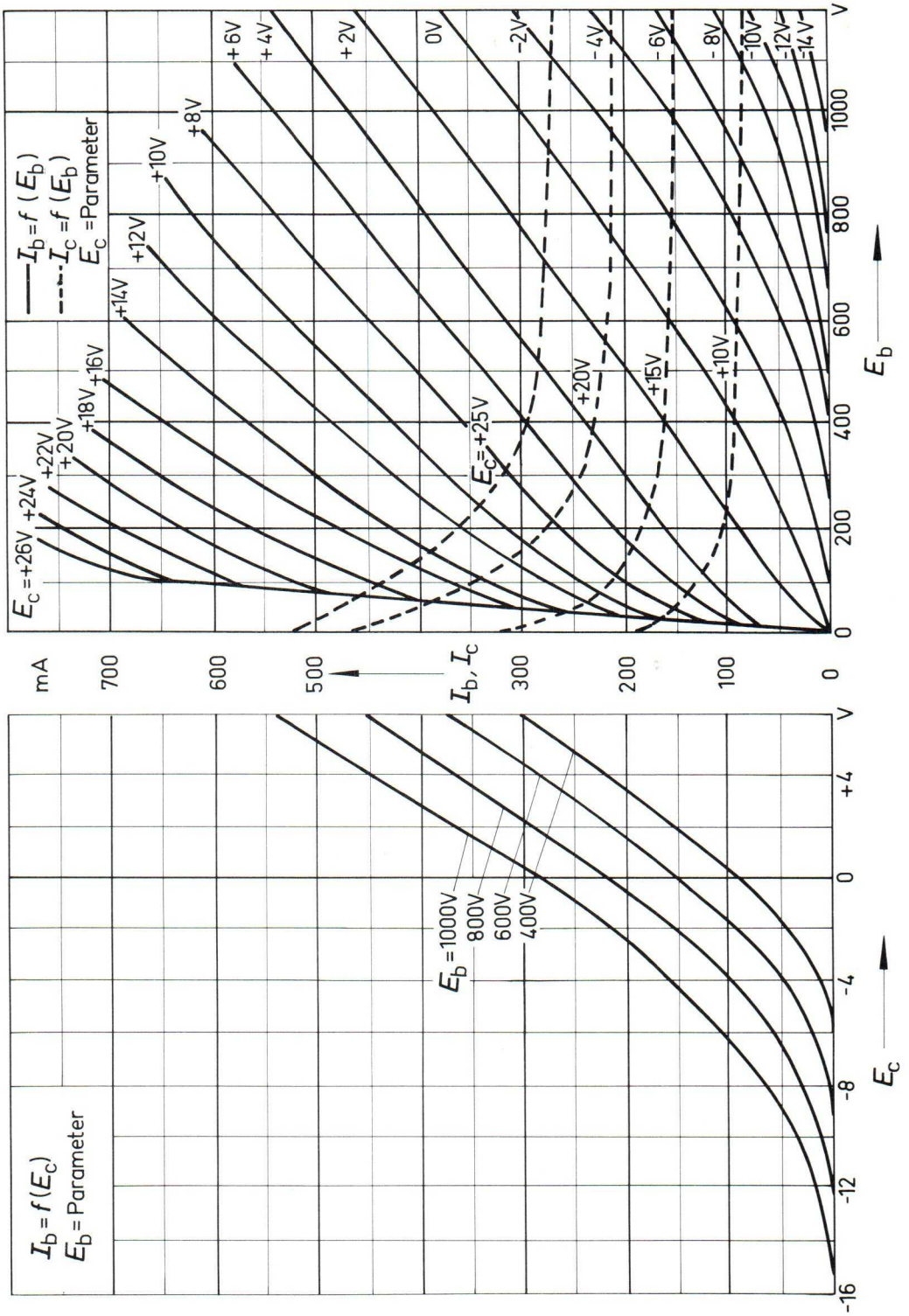
Where possible, the tube should be mounted in the coaxial resonators with the aid of adequately resilient spring contacts. The tube may be mounted in any position.

Cooling

The admissible maximum temperature at the outer surfaces of the tube is 250° C. For the removal of heat, the tube must be cooled with air. For maximum plate dissipation and assuming the use of an air duct of the dimensions indicated, an air current of approx. 350 ltr/min is required for cooling the radiator in the case of an inlet temperature of 25° C. If necessary, the other surfaces should be cooled as well with a gentle air current. As the constructional design of the ventilation system has to be adapted to the particular type of equipment in use, it cannot be furnished as an accessory together with the tube. The dimensions indicated in the diagram are recommended for the guiding piece for cooling the radiator.



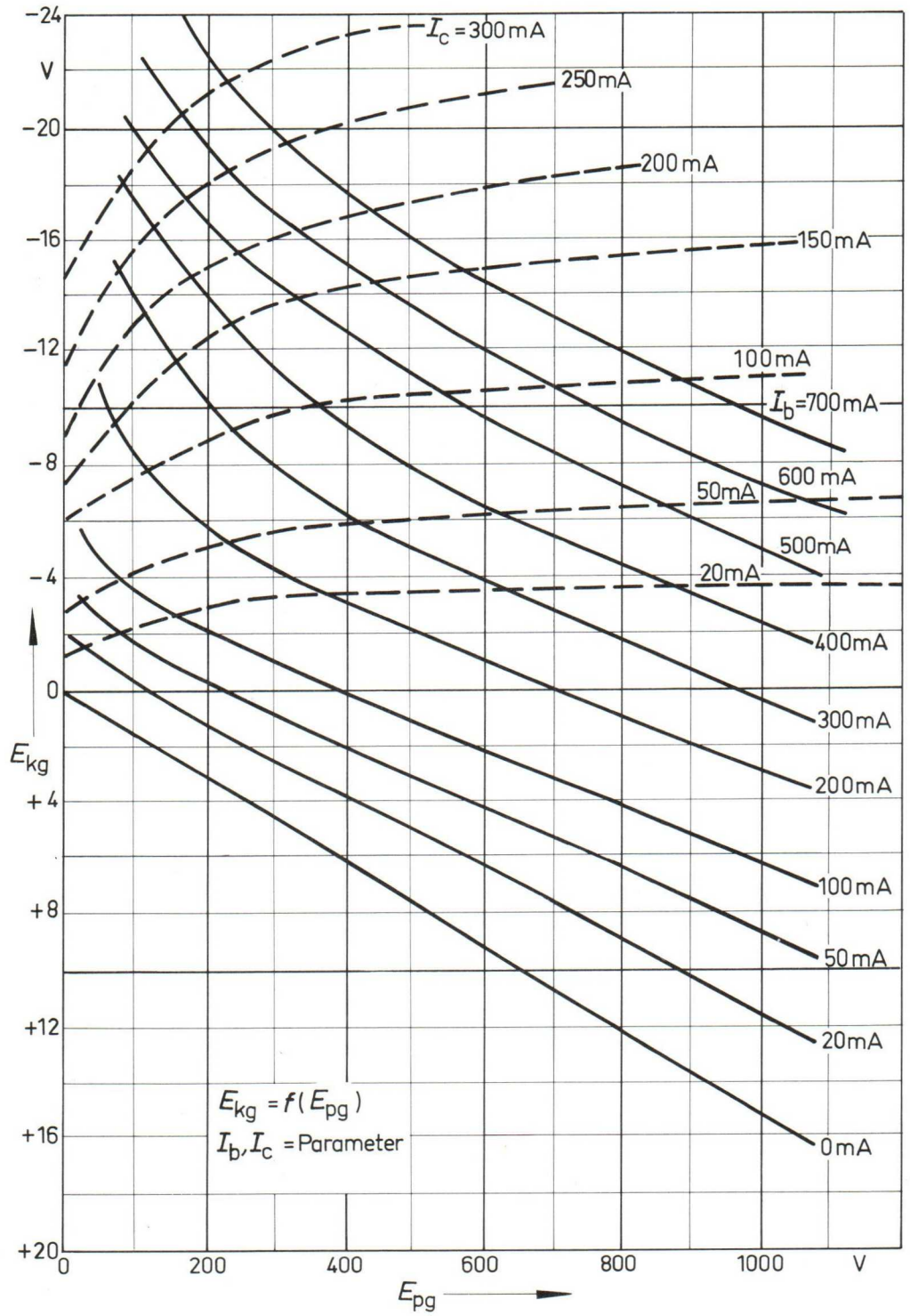


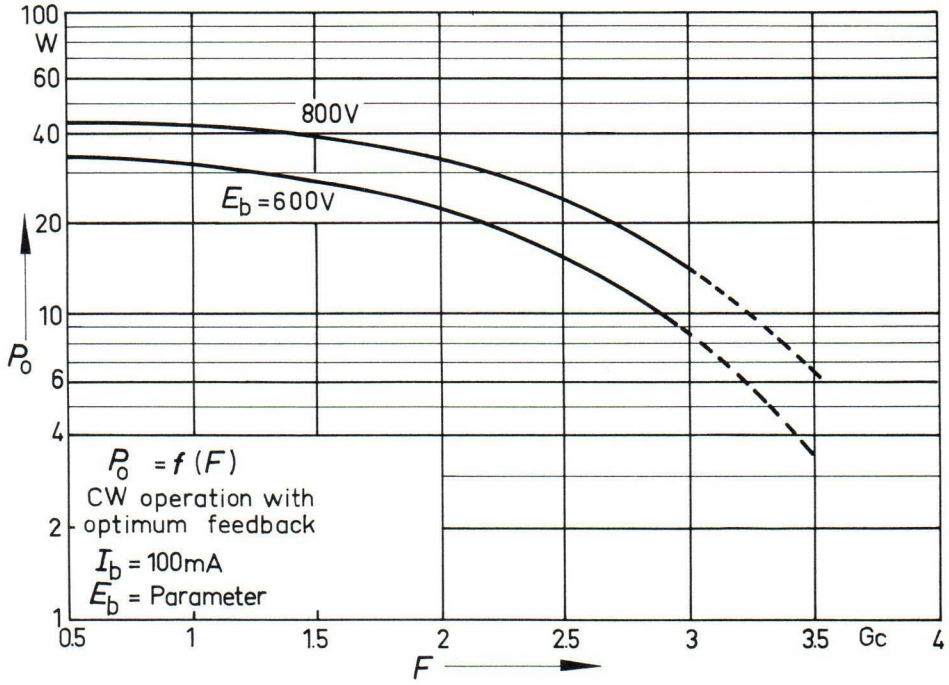

$I_b = f(E_b)$
$I_c = f(E_b)$
E_c = Parameter
E_c = +26V
+24V
+22V
+20V
+18V
+16V
+14V
+12V
+10V
+8V
+6V
+4V
+2V
0V
-2V
-4V
-6V
-8V
-10V
-12V
-14V
E_c = +25V
+20V
+15V
+10V
E_b
V
0
200
400
600
800
1000
mA
700
600
500
300
200
100
0
I_b, I_c
$I_b = f(E_c)$
E_b = Parameter
E_b = 1000V
800V
600V
400V
+4
0
-4
-8
-12
-16
E_c

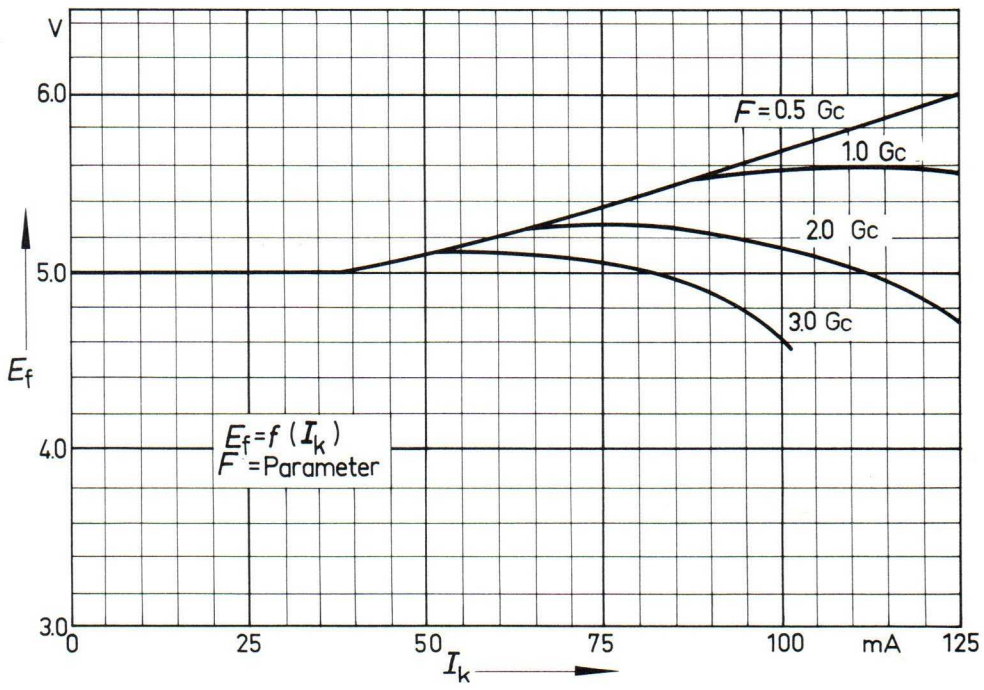
Characteristics

$E_{kg} = f\,(E_{pg})$

SIEMENS



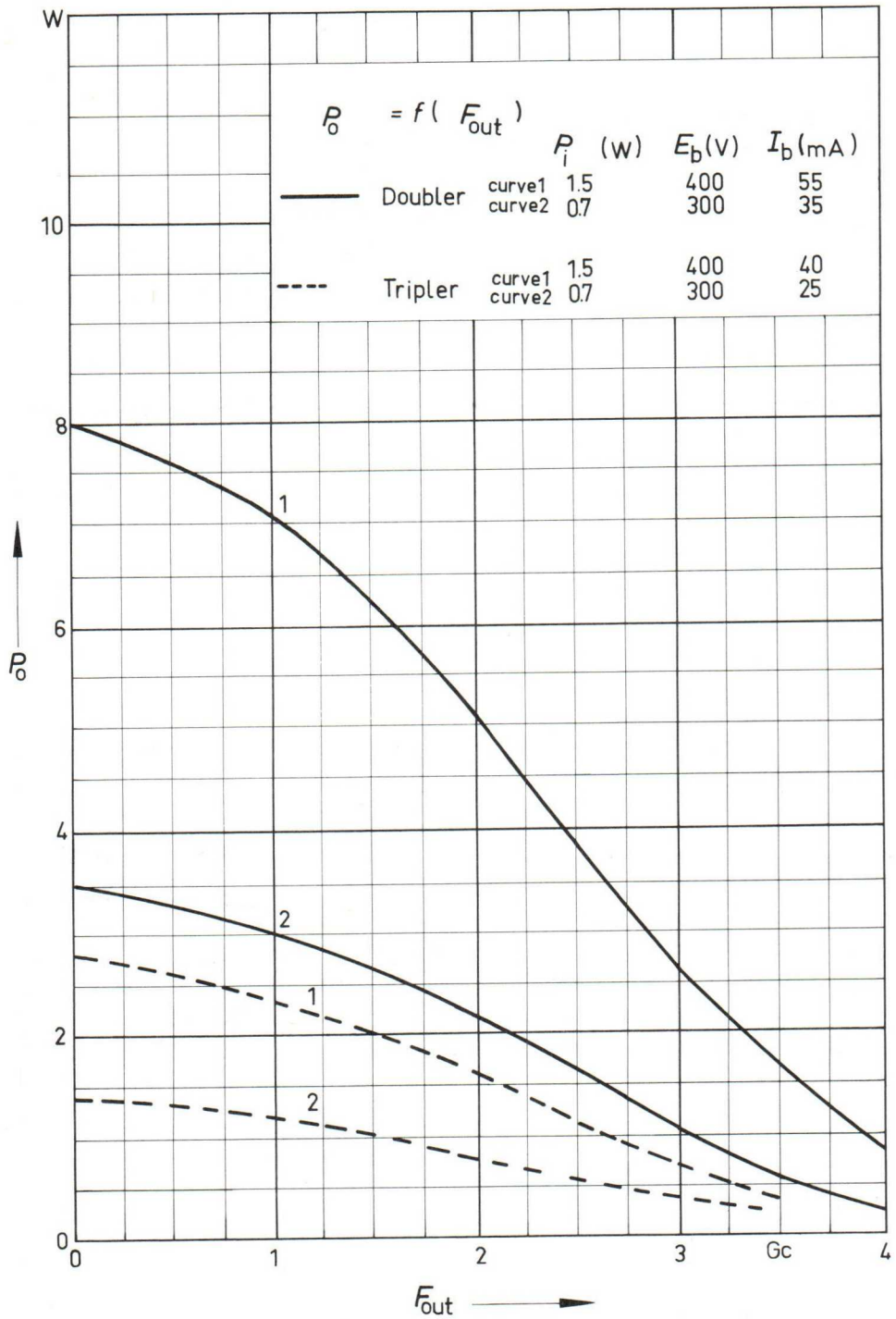

100
W
60
40
20
10
6
4
2
1
P_o
800V
E_b = 600V
P_o = f (F)
CW operation with
optimum feedback
I_b = 100mA
E_b = Parameter
0.5
1
1.5
2
2.5
3
3.5
Gc
4
F


V
6.0
5.0
4.0
3.0
E_f
F = 0.5 Gc
1.0 Gc
2.0 Gc
3.0 Gc
E_f = f (I_k)
F = Parameter
0
25
50
75
100
mA
125
I_k

Characteristics

$P_o = f\ (F_{out})$

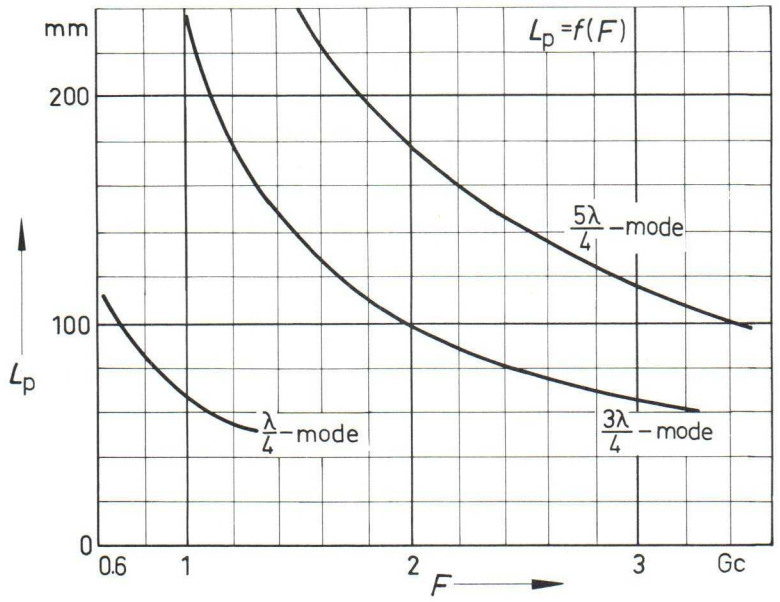
SIEMENS

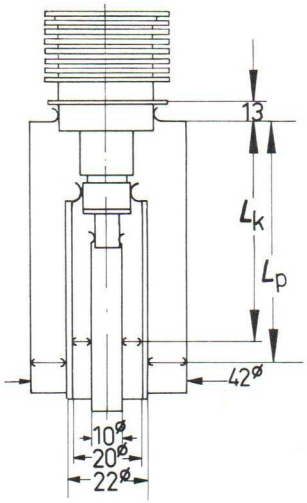


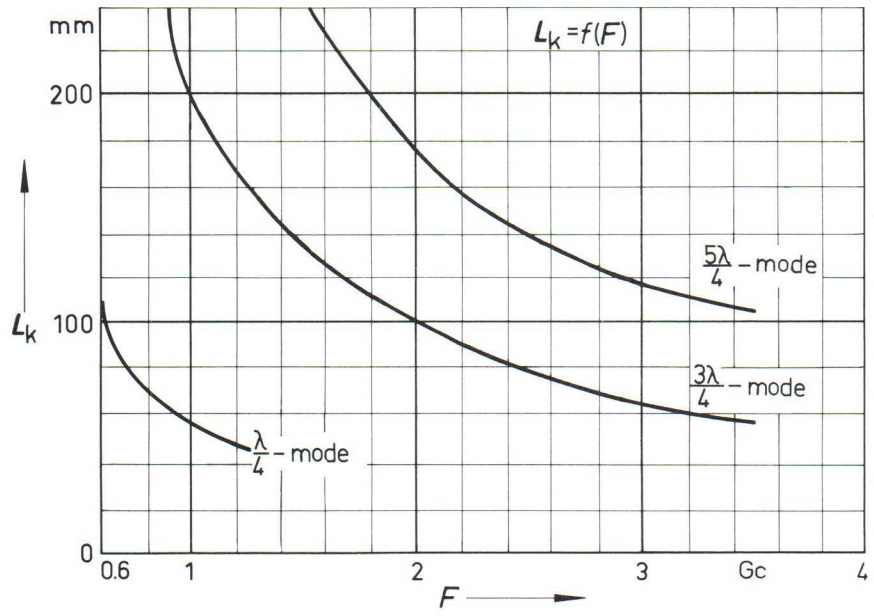
SIEMENS

Dimensions of Coaxial Resonators (Standard Values)

2 C 39 BA







SIEMENS & HALSKE AKTIENGESELLSCHAFT

WERNERWERK FÜR BAUELEMENTE

Printed in Germany

SIEMENS

PLANAR TRIODE 7289

Sachnummer
Q00035-X8001

Design and Application

Air-cooled disk-seal power triode of metal-ceramic design, for oscillators, modulators, mixers, amplifiers and frequency multipliers operating up to approx. 2.5 Gc, as well as for pulsed operation up to approx. 3.0 Gc. The shock and vibration resistance of the tube with its close electrical and mechanical tolerances replaces advantageously the planar triodes 3 CX 100 A 5, 2 C 39 A and 2 C 39 BA.

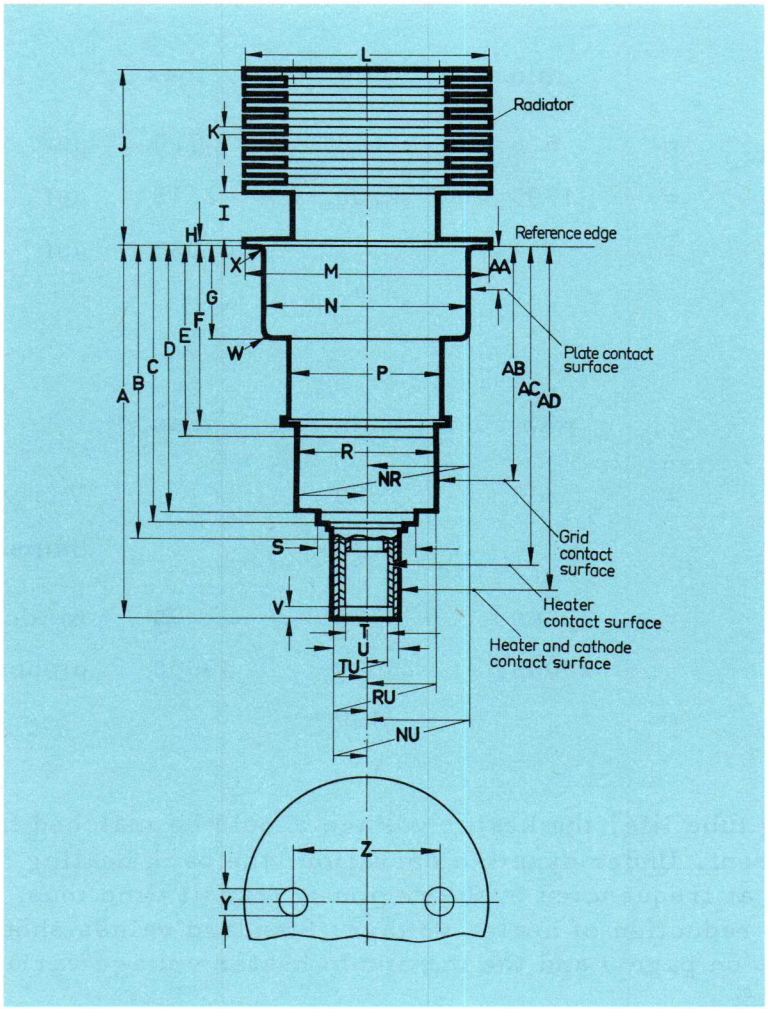


Table of dimensions
(in mm)

	min.	max.	
A	46.10	47.63	
B		38.96	
C		37.46	
D	32.74	33.76	
E		28.83	
F	22.35	23.75	
G	11.73	12.12	
H		1.02	
I	3.17	4.70	
J	19.46	20.98	
K	0.63	1.17	
L	31.34	32.11	
M	29.97	30.35	
N	26.03	26.29	
P		20.12	
R	16.63	16.89	
S		13.84	
I	5.41	5.66	
U	8.00	8.26	
V		2.18	
W		2.54	
X		0.89	
Y	2.67	3.68	(1)
Z	16.51	21.59	
AA	0.89	9.17	(2)
AB	30.10	32.13	(2)
AC	38.96	43.89	(2)
AD	37.46	46.10	(2)
NR		0.50	(3)
NU		0.50	(3)
RU		0.50	(3)
TU		0.30	(3)

(1) Holes for extractor
(2) Connection for contact surface
(3) Center variation

Weight:	approx 70 gm net	approx 105 gm gross
Dimensions of package:		55x55x145 mm

Heating

Heater voltage	E_f	=	6.0	V	(1)
Heater current	I_f	=	$0.95^{+0.10}_{-0.05}$	A	
Preheating time	t_k	≧	1	min	(2)

indirect by ac or dc, parallel supply

Capacitances

			min	nom	max	
Grid to cathode	C_{gk}	=	5.6	6.3	7.0	µµf
Plate to grid	C_{pg}	=	1.95	2.05	2.15	µµf
Plate to cathode	C_{pk}	=			0.035	µµf

Characteristics

			min	nom	max	
Plate voltage	E_b	=		600		Vdc
Cathode resistor	R_k	=		30		ohms
Plate current	I_b	=	60	75	95	mAdc
Transconductance	S_m	=	20000	25000	30000	µmhos
Amplification factor	µ	≈		100		

(1) In the interest of long tube life, the heater voltage should be matched to the required cathode current. Under dynamic operation, the back heating of the cathode which occurs at frequencies in the region of transit time must be compensated for by a reduction of heater voltage. Standard values should be taken from the curves on page 9 and the maximum heater voltage variation should not exceed ± 5 %.

(2) For pulsed operation, 6 V is normally required for preheating. For CW operation preheating should be effected at the voltage indicated in the curve page 9 ($f < 0.5$ Gc). In the case of power outages of up to 5 sec or CW operation with $E_b \leqq 300$ Vdc and $I_k \leqq 30$ mAdc, preheating is not necessary.

Operating Characteristics

CW Oscillator

Frequency	F	=	2.5	2.5	Gc
Heater voltage	E_f	=	4.5	4.5	V
Plate voltage	E_b	=	600	800	Vdc
Plate current	I_b	=	100	100	mAdc
Grid current	I_c	≈	10	8	mAdc
Power output	P_o	=	16	24	W

Frequency Doubler

Frequency	F	=	1/2	Gc
Heater voltage	E_f	=	5.6	V
Plate voltage	E_b	=	400	Vdc
Negative grid voltage	$-E_c$	=	15	Vdc
Power input	P_i	=	1.5	W
Plate current	I_b	=	55	mAdc
Power output	P_o	=	5.2	W

Plate pulsed Oscillator

Frequency	F	=	3.0	Gc
Heater voltage	E_f	=	5.8	V
Plate pulse voltage	e_b	=	3500	v
Pulse length	t_p	=	3.0	µsec
Duty factor	Du	=	0.0025	
Plate current	I_b	=	7.5	mAdc
Grid current	I_c	=	4.5	mAdc
Power output during pulse	p_o	≈	2	kw

Maximum Ratings (absolute values)

CW Operation and grid pulsed operation

Frequency	F	max	2.5	Gc
Plate voltage (unmodulated)	E_b	max	1000	Vdc
Plate voltage (100% modulated)	E_b	max	600	Vdc
Plate dissipation	P_p	max	100	W
Grid negative bias	$-E_c$	max	150	Vdc
Peak grid negative bias	$-e_b$	max	400	v
Peak grid positive bias	e_b	max	30	v
Grid current	I_c	max	50	mAdc
Grid dissipation	P_g	max	2	W
Cathode current	I_k	max	125	mAdc
Envelope temperature	TE	max	300	°C

Plate pulsed operation

Frequency	F	max	3.0	Gc
Plate pulse voltage	e_b	max	3500	v
Grid negative bias	$-E_c$	max	150	V
Peak grid negative bias	$-e_c$	max	750	v
Peak grid positive bias	e_c	max	250	v
Plate pulse current	i_b	max	3	adc
Grid pulse current	i_c	max	1.8	adc
Plate dissipation	P_p	max	27	W
Grid No. 2 dissipation	P_g	max	2	W
Pulse length	t_p	max	3	µsec
Duty factor	Du	max	0.0025	
Envelope temperature	TE	max	300	°C

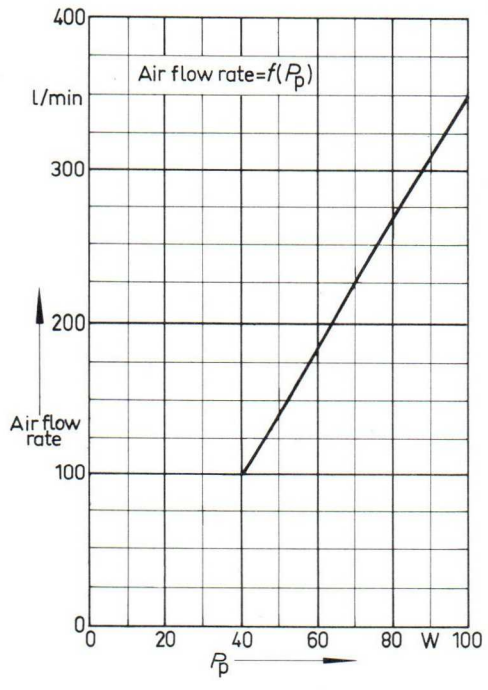
Operating Instructions

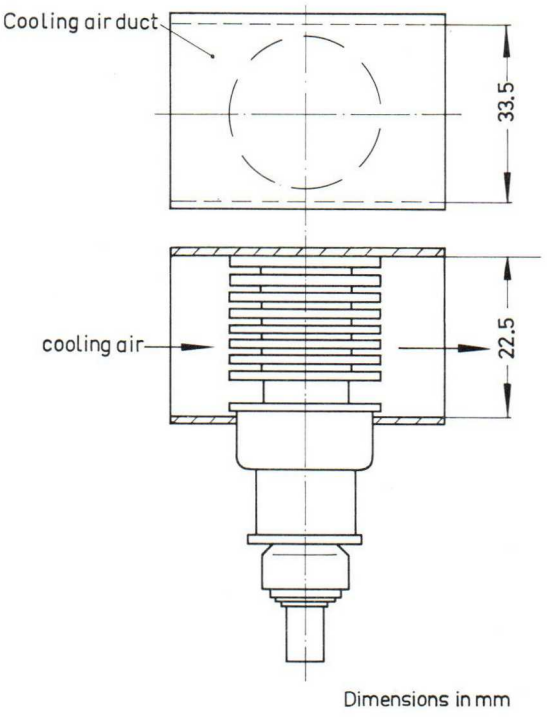
Mounting

Where possible, the tube should be mounted in the coaxial resonators with the aid of adequately resilient spring contacts. The tube may be mounted in any position.

Cooling

The admissible maximum temperature at the outer surfaces of the tube is 300 °C. For the removal of heat, the tube must be cooled with air. For maximum plate dissipation and assuming the use of an air duct of the dimensions indicated, an air current of approx. 350 ltr/min is required for cooling the radiator in the case of an inlet temperature of 25 °C. If necessary, the other surfaces should be cooled as well with a gentle air current. As the constructional design of the ventilation system has to be adapted to the particular type of equipment in use, it cannot be furnished as an accessory together with the tube. The dimensions indicated in the diagram are recommended for the guiding piece for cooling the radiator.

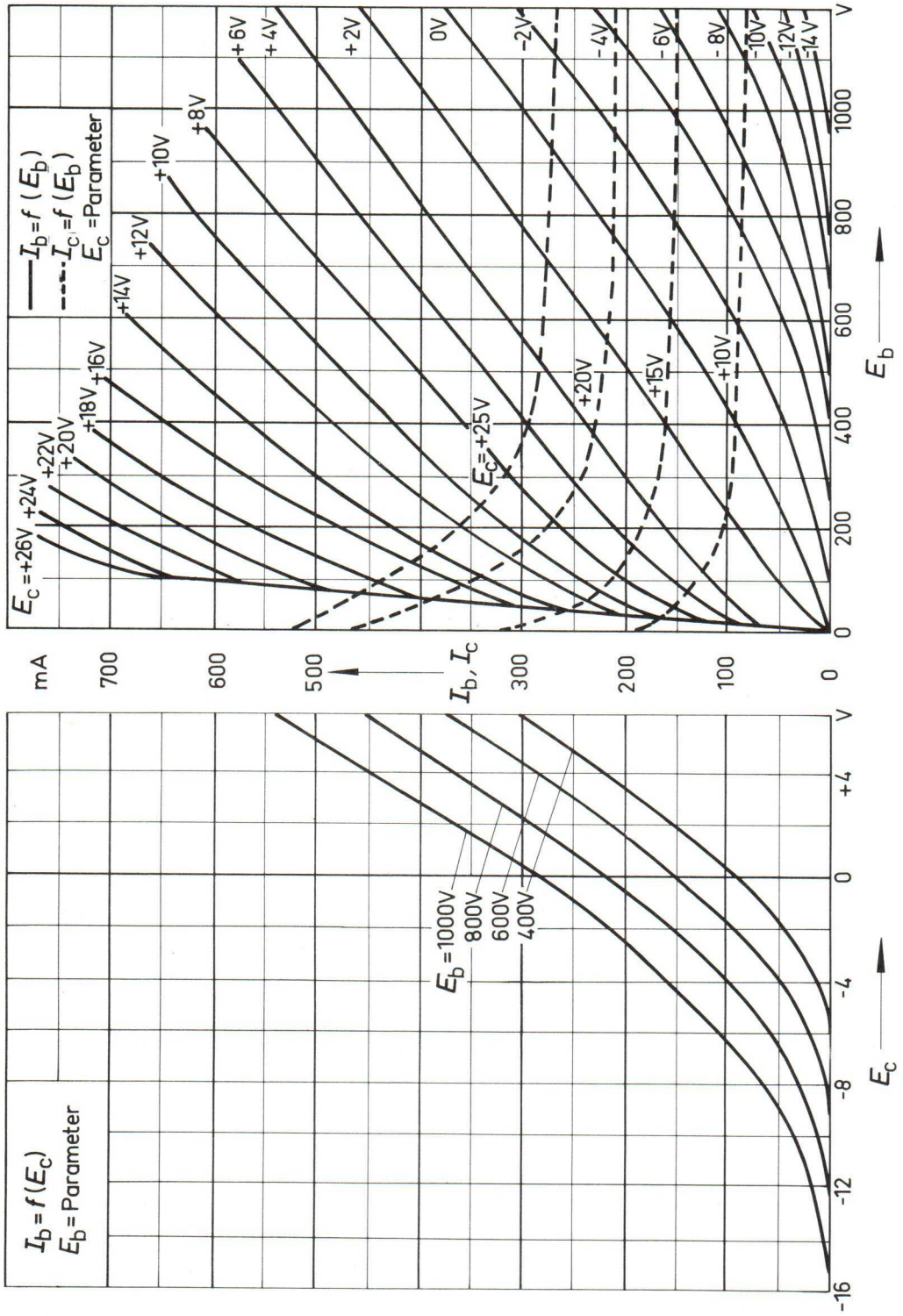


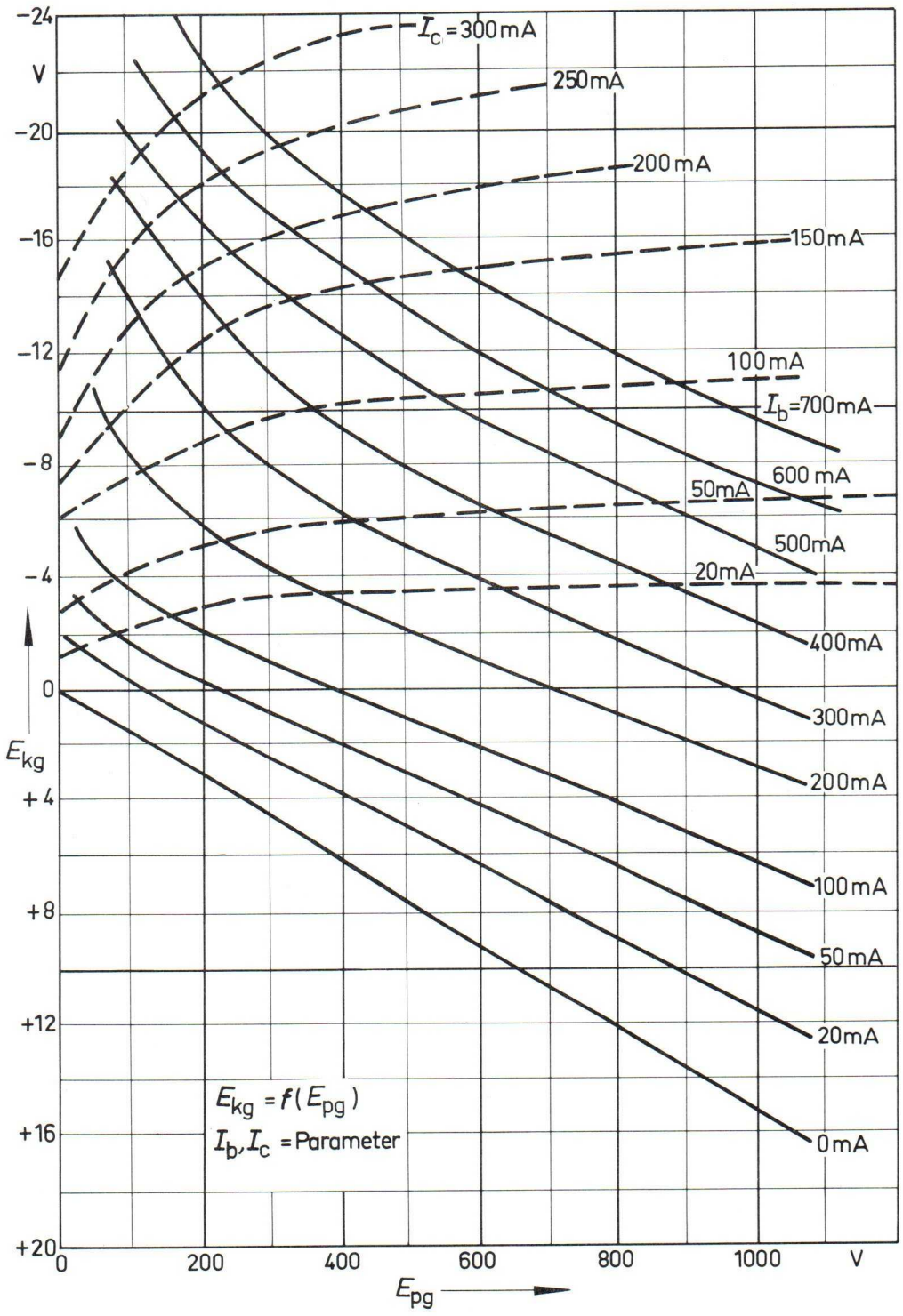


Characteristics

$I_b = f(E_c)$, I_b, $I_c = f(E_b)$

SIEMENS

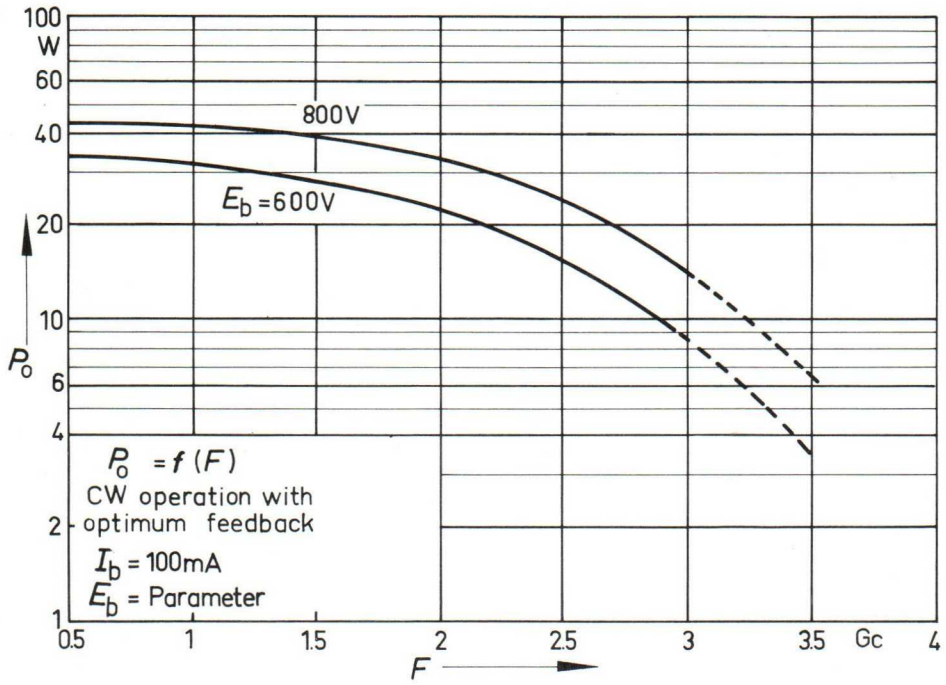


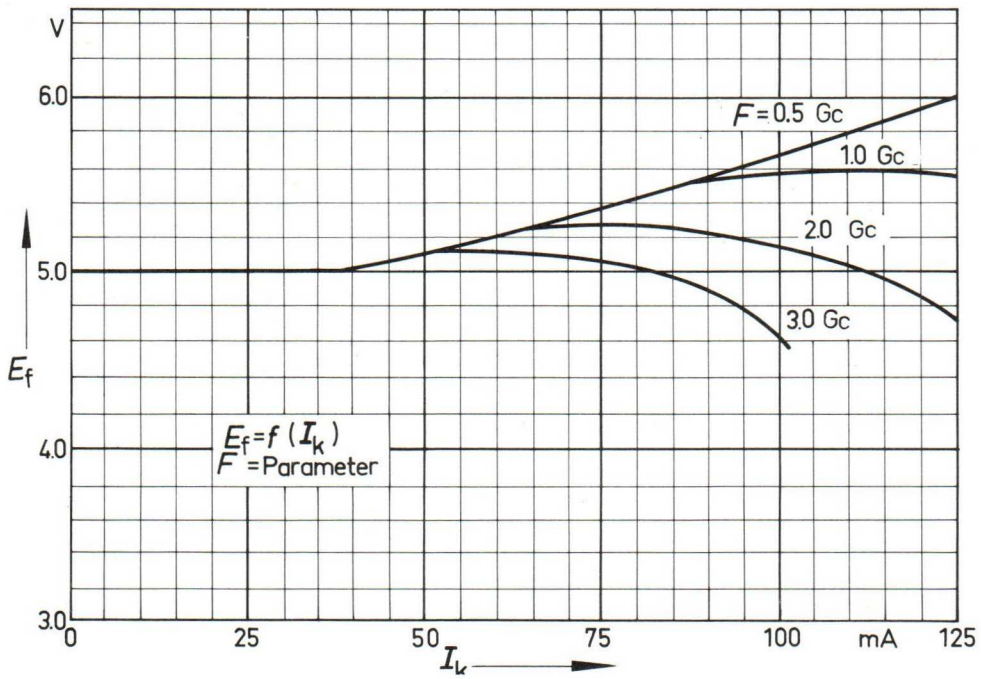

I_c = 300 mA
250 mA
200 mA
150 mA
100 mA
I_b = 700 mA
600 mA
500 mA
400 mA
300 mA
200 mA
100 mA
50 mA
20 mA
0 mA
50 mA
20 mA
$E_{kg} = f(E_{pg})$
I_b, I_c = Parameter
−24
V
−20
−16
−12
−8
−4
0
+4
+8
+12
+16
+20
E_{kg}
0
200
400
600
800
1000
V
E_{pg}

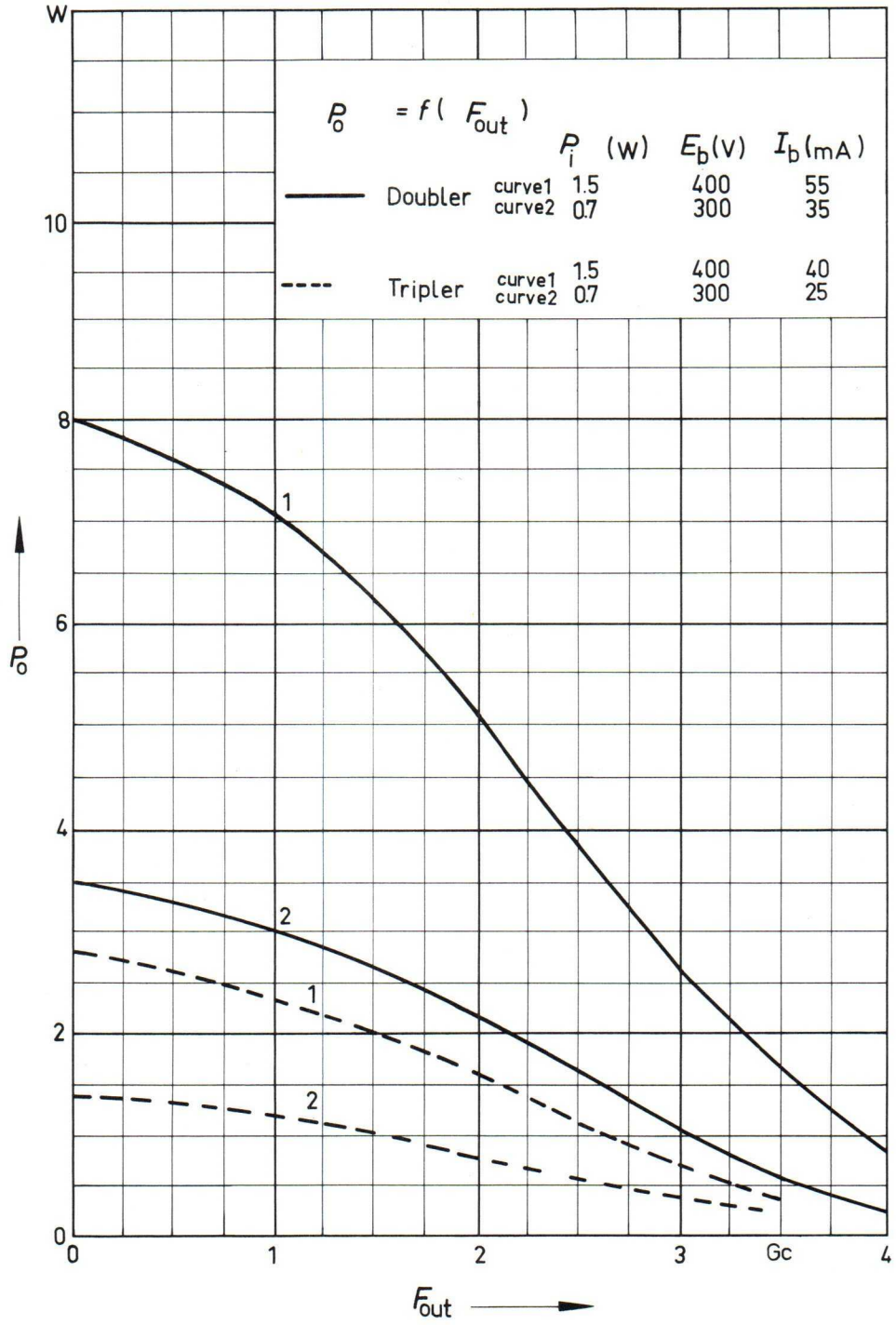
Characteristics

$P_o = f(F)$, $E_f = f(I_k)$

SIEMENS

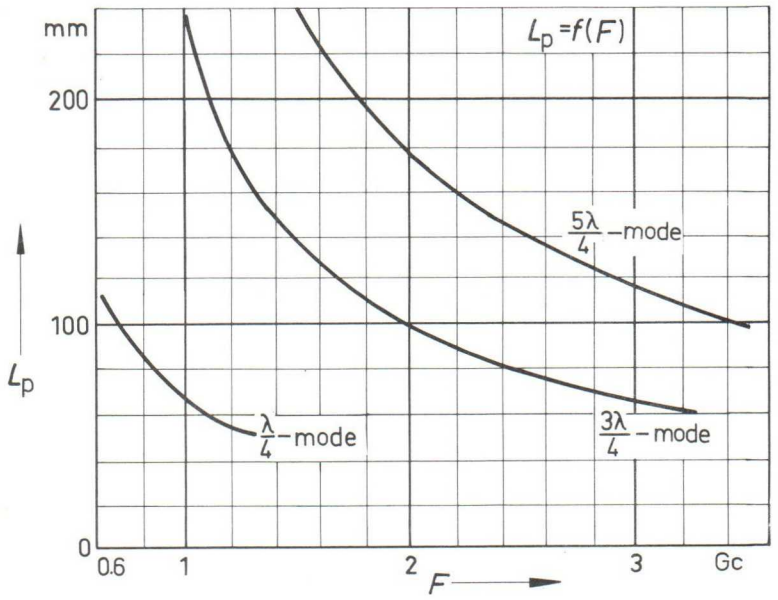


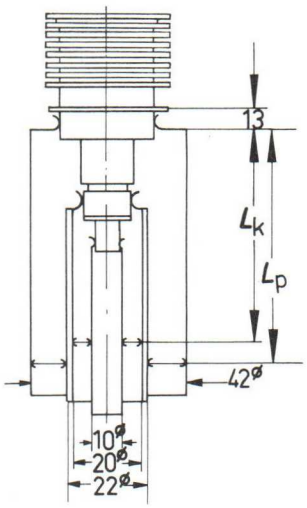


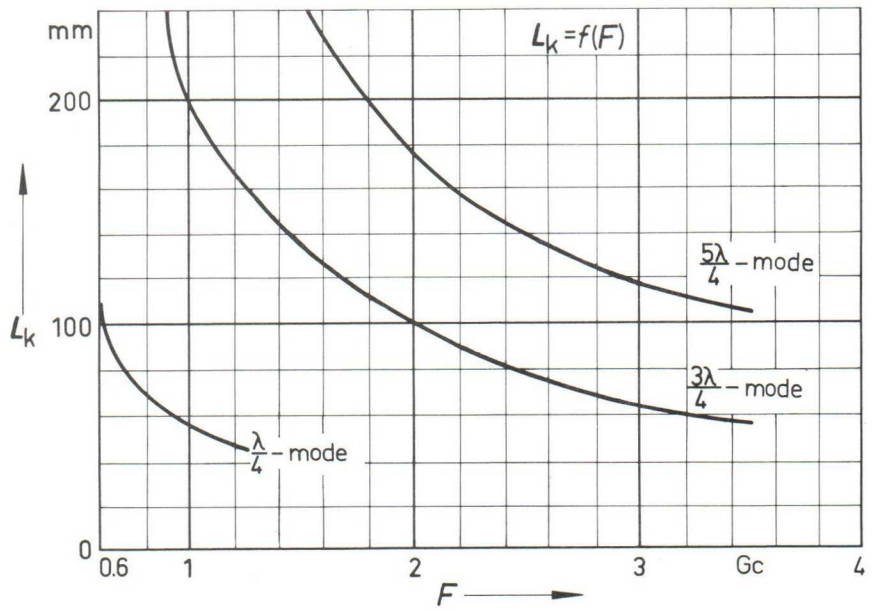

W
$P_o = f(F_{out})$
P_i (W) E_b(V) I_b(mA)
Doubler curve1 1.5 400 55
curve2 0.7 300 35
Tripler curve1 1.5 400 40
curve2 0.7 300 25
10
8
6
4
2
0
P_o
1
2
1
2
0
1
2
3
Gc
4
F_{out}

Dimensions of Coaxial Resonators (Standard Values)

SIEMENS







SIEMENS AKTIENGESELLSCHAFT

Printed in Germany

SIEMENS

PLANAR TRIODE

YD 1040

S&H-Sach-Nr.
Q00035-X4652

Design and Application

Air-cooled planar power triode of metal-ceramic design especially for use as a grid-pulsed or plate-pulsed oscillator, frequency multiplier or amplifier up to 3 Gc.
Special model of the 2 C 39 BA with matrix oxide cathode for increased pulse operation. The tube is a plug-in replacement for the 7815 R.

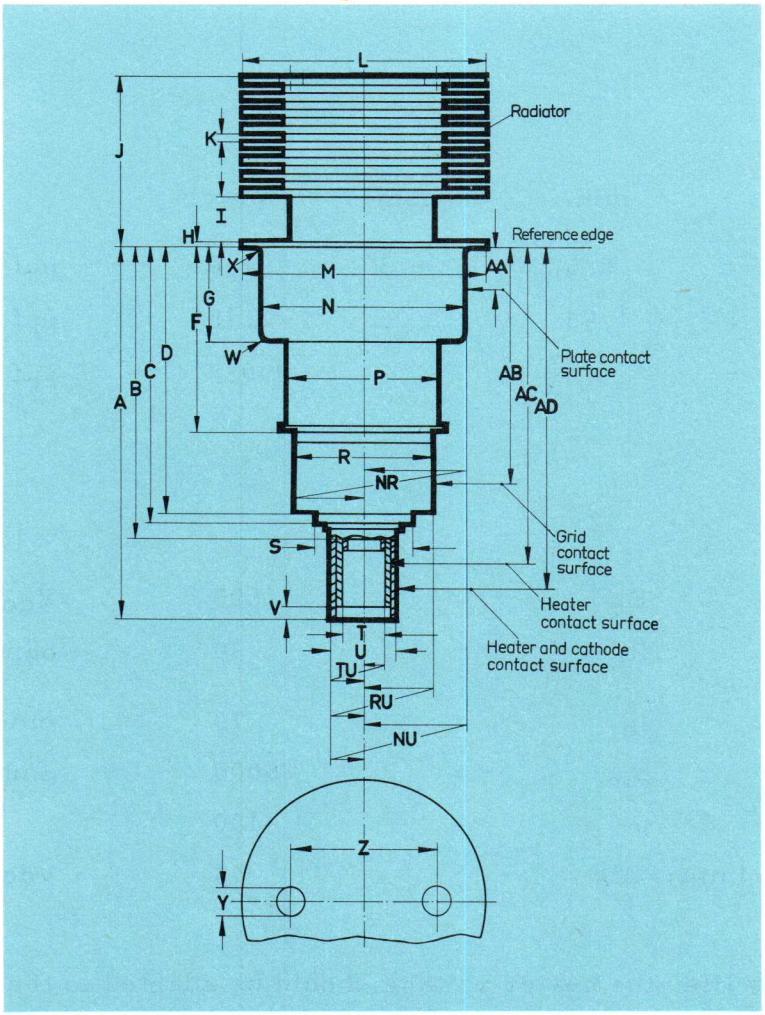


Table of dimensions
(in mm)

	min.	max.	
A	46.10	47.63	
B		38.96	
C		37.46	
D	32.74	33.76	
F	23.35	23.80	
G	11.73	12.12	
H		1.02	
I	3.17	4.70	
J	19.31	20.98	
K	0.41	1.17	
L	31.34	32.11	
M	29.90	30.35	
N	26.03	26.39	
P	19.10	20.12	
R	16.63	16.97	
S		13.84	
T	5.41	5.66	
U	8.00	8.26	
V		2.18	
W		2.54	
X		0.89	
Y	2.67	3.68	(1)
Z	16.51	21.59	
AA	0.89	9.17	(2)
AB	30.10	32.13	(2)
AC	38.96	43.89	(2)
AD	37.46	46.10	(2)
NR		0.50	(3)
NU		0.50	(3)
RU		0.50	(3)
TU		0.30	(3)

(1) Holes for extractor
(2) For connection of contact springs
(3) Center variation

Weight:	approx 70 gm net	approx 105 gm gross
Dimensions of package:		55x55x145 mm

Heating

Heater voltage	E_f	=	6.0	V	(1)
Heater current	I_f	=	1.05 ± 0.1	A	
Preheating time	t_k	≧	1	min	

indirect by ac or dc, parallel supply
Cathode: Matrix oxide cathode

Capacitances

			min	nom	max	
Grid to cathode	C_{gk}	=	5.6	6.3	7.0	µµf
Plate to grid	C_{pg}	=	1.95	2.05	2.15	µµf
Plate to cathode	C_{pk}	=			0.035	µµf

Characteristics

Plate voltage	E_b	=	600	V_{dc}
Cathode resistor	R_k	=	30	ohms
Plate current	I_b	=	70	mAdc
Transconductance	S_m	=	25000	µmhos
Amplification factor	µ	≈	100	
Negative grid voltage (I_b = 1 mA)	$-E_c$	≦	15	Vdc

(1) In the interest of a long life. the heater voltage should be adapted to the required cathode current. The back-heating effect of the cathode occuring in the transit region after the tube has gone into oscillation, must be counterbalanced by reducing the heater voltage. This effect depends especially on the frequency, plate current, and duty factor. For application above 500 Mc the manufacturer must be consulted regarding the optimum heater voltage.

The heater voltage should not vary by more than ± 5 %.

Maximum Ratings (absolute values)

Plate Pulsed Operation

Frequency	F	max	3	Gc	
Plate pulse voltage	e_b	max	3500	vdc	
Plate current	I_b	max	10	mAdc	
Plate pulse current	i_b	max	3	adc	
Plate dissipation	P_p	max	100	W	
Negative grid voltage	$-E_c$	max	150	Vdc	(1)
Grid current	I_c	max	5	mAdc	
Grid dissipation	P_g	max	2	W	
Pulse duration	t_p	max	6	µsec	(2)
Duty cycle	Du	max	0.0033		(2)
Envelope temperature	TE	max	250	°C	

Grid Pulsed Operation

Frequency	F	max	3	Gc	
Plate voltage	E_b	max	2000	Vdc	
Plate current	I_b	max	10	mAdc	
Plate pulse current	i_b	max	3	adc	
Plate dissipation	P_p	max	100	W	
Negative grid voltage	$-E_c$	max	150	Vdc	(1)
Grid current	I_c	max	5	mAdc	
Grid dissipation	P_g	max	2	W	
Pulse duration	t_p	max	6	µsec	(2)
Duty cycle	Du	max	0.0033		(2)
Envelope temperature	TE	max	250	°C	

CW Operation and Pulse Operation with E_b < 1000 Vdc

Frequency	F	max	3	Gc
Plate voltage	E_b	max	1000	Vdc
Plate voltage (100 % modulation)	E_b	max	600	Vdc
Plate dissipation	P_p	max	100	W
Negative grid voltage	E_c	max	150	Vdc
Negative peak grid voltage	$-e_c$	max	400	v
Positive peak grid voltage	e_c	max	30	v
Grid current	I_c	max	50	mAdc
Grid dissipation	P_g	max	2	W
Cathode current	I_k	max	125	mAdc
Cathode current (100% plate modulation)	I_k	max	100	mAdc
Envelope temperature	TE	max	250	°C

(1) The grid to cathode voltage may momentarily rise to a maximum of + 250 to -750 V.

(2) In case of longer pulse length or of higher duty factor please consult the manufacturer.

Operating Characteristics

Grid Pulsed Amplifier

Frequency	F	=	1.1	Gc
Heater voltage	E_f	=	6.0	V
Plate voltage	E_b	=	1700	Vdc
Negative grid voltage	$-E_c$	=	45	Vdc
Pulse drive power	p_d	=	400	w
Pulse length	t_p	=	3.5	µsec
Duty factor	Du	=	0.001	
Plate pulse current	i_b	=	1.9	adc
Grid pulse current	i_c	=	1.1	adc
Power output during pulse	p_o	≈	1500	w

Plate Pulsed Oscillator

Frequency	F	=	2.5	kMc
Heater voltage	E_f	=	5.8	V
Plate pulse voltage	e_b	=	3500	v
Pulse length	t_p	=	5	µsec
Duty factor	Du	=	0.003	
Plate current	I_b	=	9	mAdc
Plate pulse current	i_b	=	3	adc
Grid current	I_c	=	3	mAdc
Pulse power output	p_o	≈	2000	w

Operating Instructions

Mounting

It is advisable to mount the tube so that the contact areas shown as permissible on the dimensional drawing (sheet 1) are supported by sufficiently resilient contact collars in the coaxial circuitry. The reference edge as shown in the dimensional drawing must also be used as stop edge. No other stop edges are permissible. Should it be desirable to clamp the tube to the socket to avoid its jumping out as a result of shock or vibration, the clamping pressure should act only on the stop edge, the position of the tube being inconsequential.

Owing to the small electrode spacings and hence the relatively high field strength between electrodes, momentary flashover may occur especially in grid pulsed operation. To avoid damage to the tube, it is recommended to interpose a protective resistor in the plate lead for limiting the current peaks encountered with such flashover to a value not exceeding ten times value of the permissible maximum.

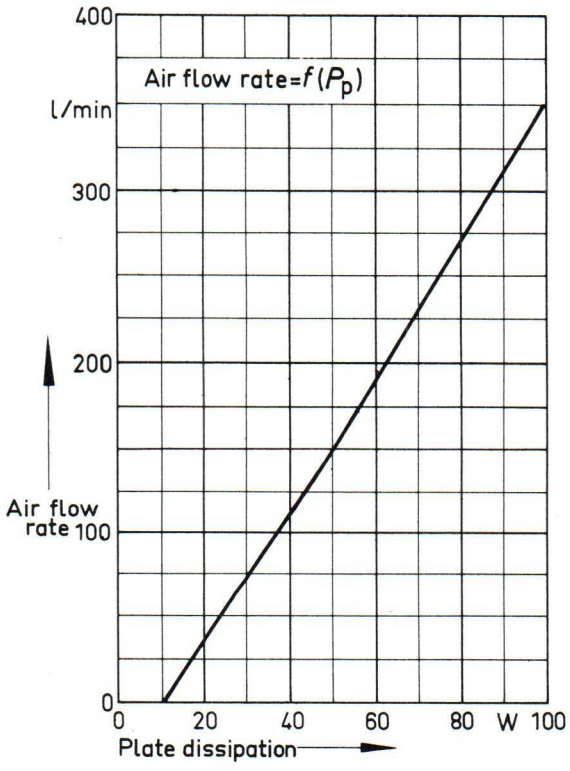
Another reason for recommending this protective measure is that during tuning the load may be higher than under normal operating conditions. This fact also makes it advisable to tune the tube at a lower anode voltage when operating it close to the permissible maximum ratings.

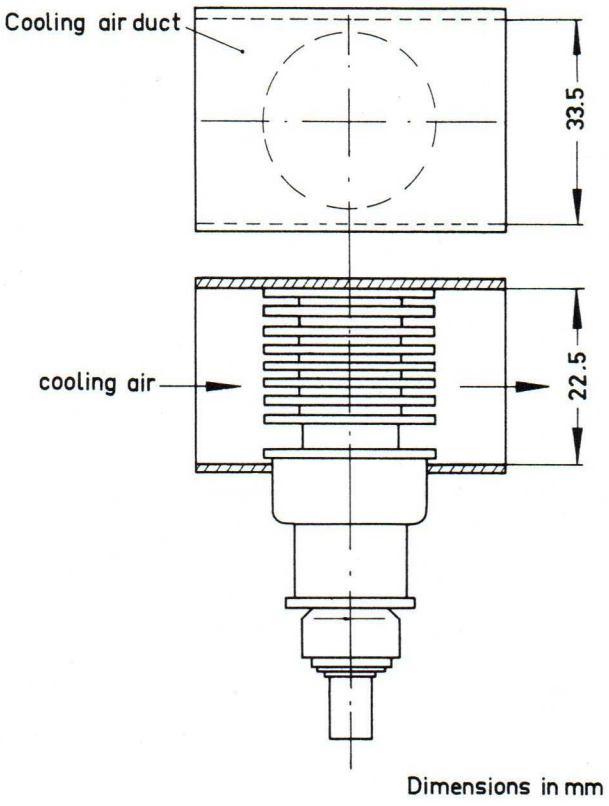
In a grounded-cathode circuit the output power shows a saturation with increasing input power, however, the grounded-grid circuit makes it possible to achieve a higher output power when the input power is further increased.

This will involve higher grid currents, higher cathode back-heating effect and distortion of the RF signal. Under normal operating conditions the mean grid current should not exceed 30 % of the mean cathode current. At higher operating frequencies a still lower percentage is recommended. The load must be correctly matched to the anode circuit.

Cooling

Maximum permissible temperature at the outer surfaces of the tube is 250° C. In the interest of long life it is recommended not to exceed the maximum permissible value of 250° C. For removing the heat, the tube must be air-cooled. With maximum plate dissipation and with use of an air duct of the specified dimensions, the rate of air flow for cooling the radiator at an incoming temperature of 25° C must be about 350 l/min. If necessary, the rest of the surface must also be cooled by a small air flow. As the constructive design of the cooling facilities has to be adapted to the particular equipment layout used, no supply of these as an accessory to the tube is provided for. For the duct for cooling the radiator the dimensions specified in the diagram are recommended.



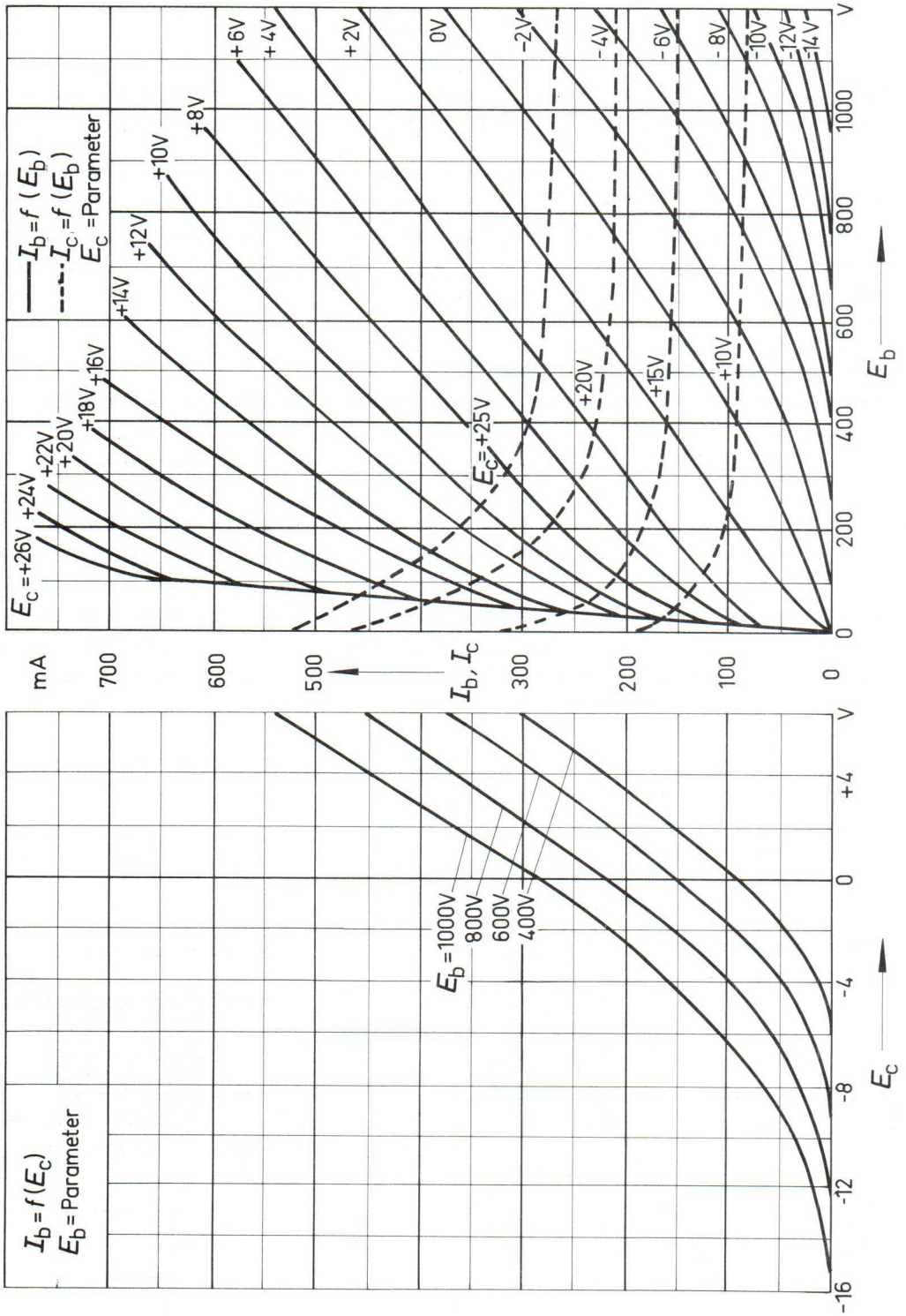


Dimensions in mm

Characteristics

$I_b = f(E_c)$, $I_b\, I_c = f(E_b)$

SIEMENS

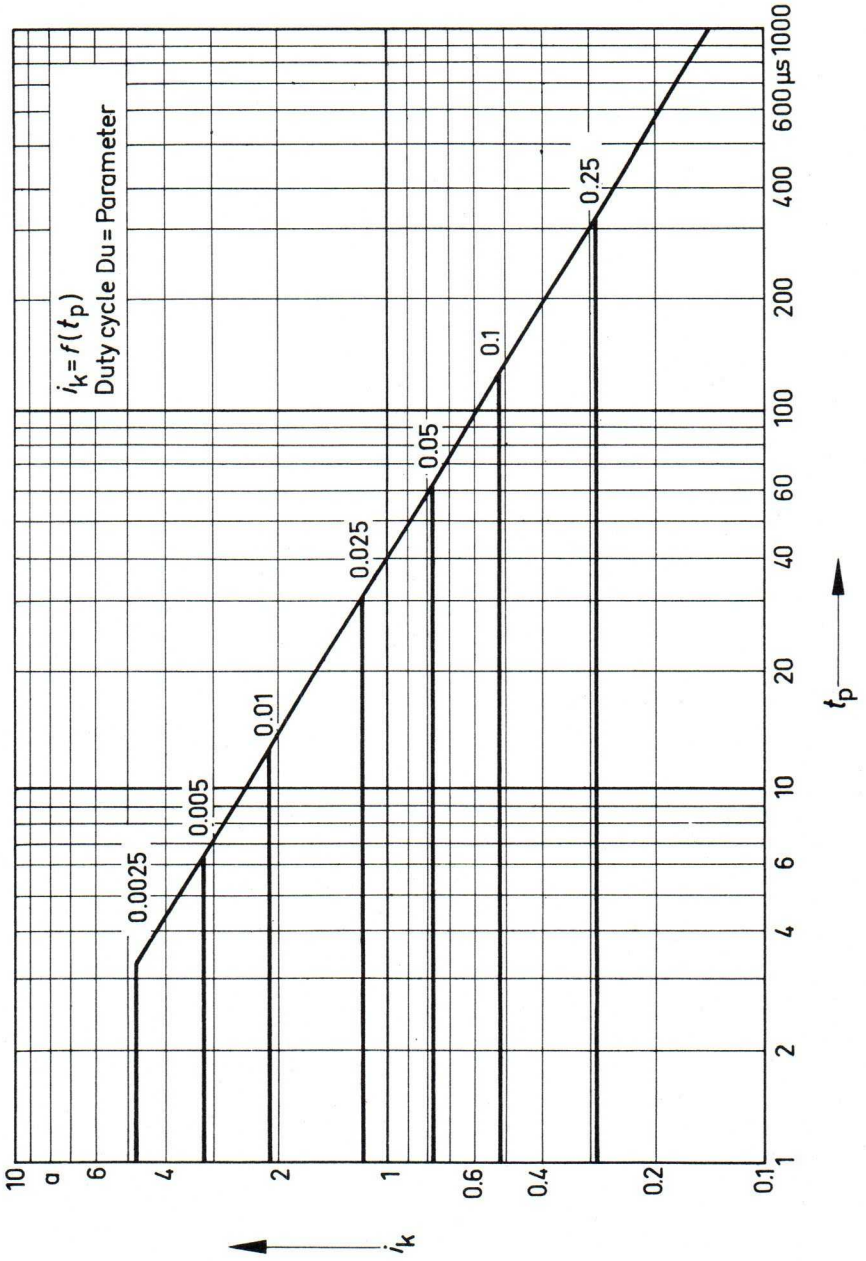


SIEMENS

Characteristics

$i_k = f(t_p)$

YD 1040



SIEMENS AKTIENGESELLSCHAFT

Printed in Germany

RöK 3528E / 1.8.66

SIEMENS

PLANAR TRIODE

YD 1041

Sachnummer
Q00035-X4654

Design and Application

Conduction-cooled planar triode of metal-ceramic design especially for use as a grid-pulsed or plate-pulsed oscillator, frequency multiplier or amplifier up to 3 Gc .
The tube is a plug-in replacement for the 7815.

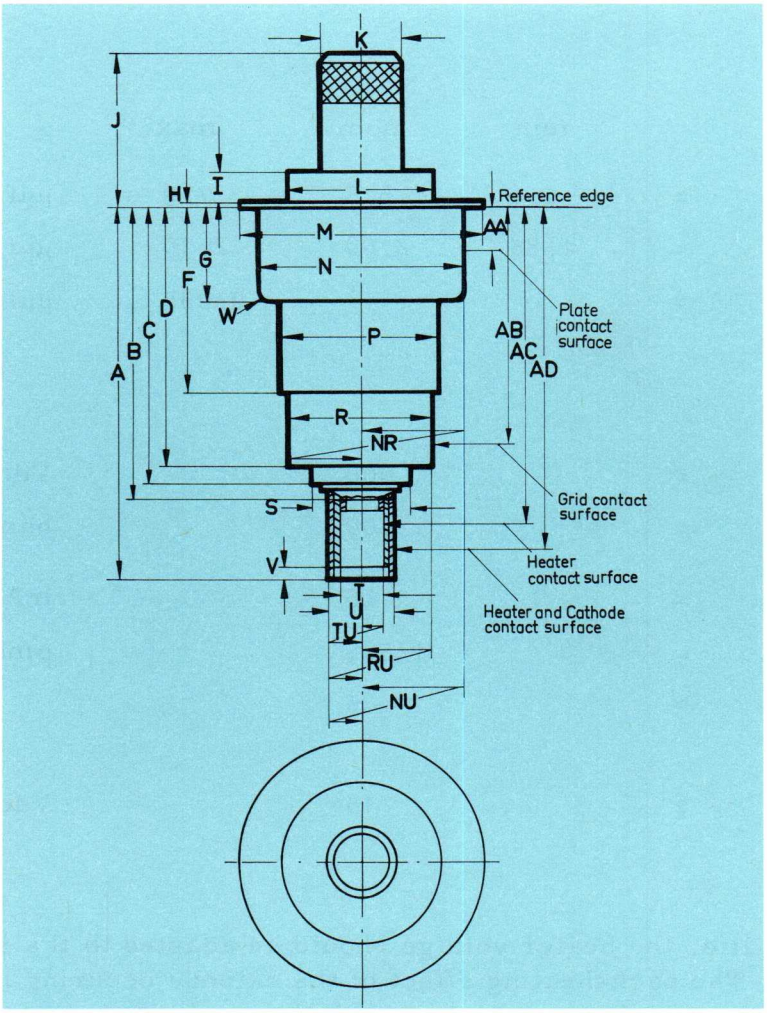


Table of dimensions
(in mm)

	min	max	
A	46.10	47.63	
B		38.96	
C		37.46	
D	32.74	33.76	
F	23.35	25.65	
G	11.73	12.12	
H		1.02	
I		4.70	
J	19.46	20.98	
K	10.85	11.35	
L	21.34	21.84	
M	29.97	30.35	
N	26.03	26.29	
P	19.10	20.12	
R	16.63	16.89	
S		13.84	
T	5.41	5.66	
U	8.00	8.26	
V		2.18	
W		2.54	
AA	0.89	9.17	(1)
AB	30.10	32.13	(1)
AC	38.96	43.89	(1)
AD	37.46	46.10	(1)
NR		0.50	(2)
NU		0.50	(2)
RU		0.50	(2)
TU		0.30	(2)

(1) For connection of contact springs
(2) Center variation

Weight:	approx 60 gm net	approx 95 gm gross
Dimensions of package:		55 x 55 x 145 mm

Heating

Heater voltage	E_f	=	6.0	V	(1)
Heater current	I_f	=	1.05 ± 0.1	A	
Preheating time	t_k	≧	1	min	

indirect by ac or dc, parallel supply

Cathode: Matrix oxide cathode

Capacitances

			min	nom	max	
Grid to cathode	C_{gk}	=	5.6	6.3	7.0	µµf
Plate to grid	C_{gp}	=	1.85	2.00	2.10	µµf
Plate to cathode	C_{pk}	=			0.035	µµf

Characteristics

Plate voltage	E_b	=	600	Vdc
Cathode resistor	R_k	=	200	ohms
Plate current	I_b	=	25	mAdc
Transconductance	S_m	=	12500	µmhos
Amplification factor	µ	≈	85	
Negative grid voltage (I_b = 1 mA)	$-E_c$	≦	15	Vdc

(1) In the interest of a long life, the heater voltage should be adapted to the required cathode current. The back-heating effect of the cathode occuring in the transit region after the tube has gone into oscillation, must be counterbalanced by reducing the heater voltage. This effect depends especially on the frequency, plate current, and duty factor. For application above 500 Mc the manufacturer must be consulted regarding the optimum heater voltage.

The heater voltage should not vary by more than ± 5 %.

Maximum Ratings (absolute values)

Plate Pulsed Operation

Frequency	F	max	3	Gc	
Plate pulse voltage	e_p	max	3500	vdc	
Plate current	I_b	max	10	mAdc	
Plate pulse current	i_p	max	3	adc	
Plate dissipation	P_p	max	10	W	(1)
Negative grid voltage	$-E_c$	max	150	Vdc	(2)
Grid current	I_c	max	5	mAdc	
Grid dissipation	P_g	max	2	W	
Pulse duration	t_p	max	6	µsec	(3)
Duty factor	Du	max	0.0033		(3)
Envelope temperature	TE	max	250	°C	

Grid Pulsed Operation

Frequency	F	max	3	Gc	
Plate voltage	E_b	max	2000	Vdc	
Plate current	I_b	max	10	mAdc	
Plate pulse current	i_p	max	3	adc	
Plate dissipation	P_p	max	10	W	(1)
Negative grid voltage	$-E_c$	max	150	Vdc	(2)
Grid current	I_c	max	1.8	mAdc	
Grid dissipation	P_g	max	2	W	
Pulse duration	t_p	max	6	µsec	(3)
Duty factor	Du	max	0,0033		(3)
Envelope temperature	TE	max	250	°C	

CW Operation and Pulse Operation with E_b < 1000 Vdc

Frequency	F	max	3	Gc	
Plate voltage	E_b	max	1000	Vdc	
Plate voltage (100 % modulation)	E_b	max	600	Vdc	
Plate dissipation	P_p	max	10	W	(1)
Negative grid voltage	E_c	max	150	Vdc	
Negative peak grid voltage	$-e_c$	max	400	v	
Positive peak grid voltage	e_c	max	30	v	
Grid current	I_c	max	50	mAdc	
Grid dissipation	P_g	max	2	W	
Cathode current	I_k	max	125	mAdc	
Cathode current (100 % plate modulation)	I_k	max	100	mAdc	
Envelope temperature	TE	max	250	°C	

(1) The dissipation may amount up to 100 W in case of an adequate cooling of the tube, so that the maximum admissible envelope temperature of 250 °C at the hottest spot of the tube will not be exceeded (see page 5 "Cooling")

(2) The peak to cathode voltage may momentarily rise to a maximum of + 250 to - 750 V.

(3) In case of longer pulse length or of higher duty factor please consult the manufacturer.

Operating Characteristics

Grid Pulsed Amplifier

Frequency	F	=	1.1	Gc
Heater voltage	E_f	=	6.0	V
Plate voltage	E_b	=	1700	Vdc
Negative grid voltage	$-E_c$	=	45	Vdc
Pulse drive power	Pd	=	400	w
Pulse length	t_p	=	3.5	µsec
Duty factor	Du	=	0.001	
Plate pulse current	i_b	=	1.9	adc
Grid pulse current	i_c	=	1.1	adc
Pulse power output	P_o	≈	1500	w

Plate Pulsed Oscillator

Frequency	F	=	2.5	Gc
Heater voltage	E_f	=	5.8	V
Plate pulse voltage	e_b	=	3500	v
Pulse length	t_p	=	5	µsec
Duty factor	Du	=	0.003	
Plate current	I_b	=	9	mAdc
Plate pulse current	i_b	=	3	adc
Grid current	I_c	=	3	mAdc
Pulse power output	P_o	≈	2000	w

Operating Instructions

Mounting

It is advisable to mount the tube so that the contact areas shown as permissible on the dimensional drawing (sheet 1) are supported by sufficiently resilient contact collars in the coaxial circuitry. The reference edge as shown in the dimensional drawing must also be used as stop edge. No other stop edges are permissible. Should it be desirable to clamp the tube to the socket to avoid its jumping out as a result of shock or vibration, the clamping pressure should act only on the stop edge, the position of the tube being inconsequential.

Owing to the small electrode spacings and hence the relatively high field strength between electrodes, momentary flashover may occur especially in grid pulsed operation. To avoid damage to the tube, it is recommended to interpose a protective resistor in the plate lead for limiting the current peaks encountered with such flashover to a value not exceeding ten times value of the permissible maximum.

Cooling

Sufficient conduction or air cooling must be provided to ensure that the maximum body temperature of 250 °C is not exceeded under all operating conditions. In the interest of long tube life it is advisable to increase the air flow rate such that the body temperature remains well below the maximum limit of 250 °C. Tube reliability will be seriously impaired if the maximum temperature is exceeded.

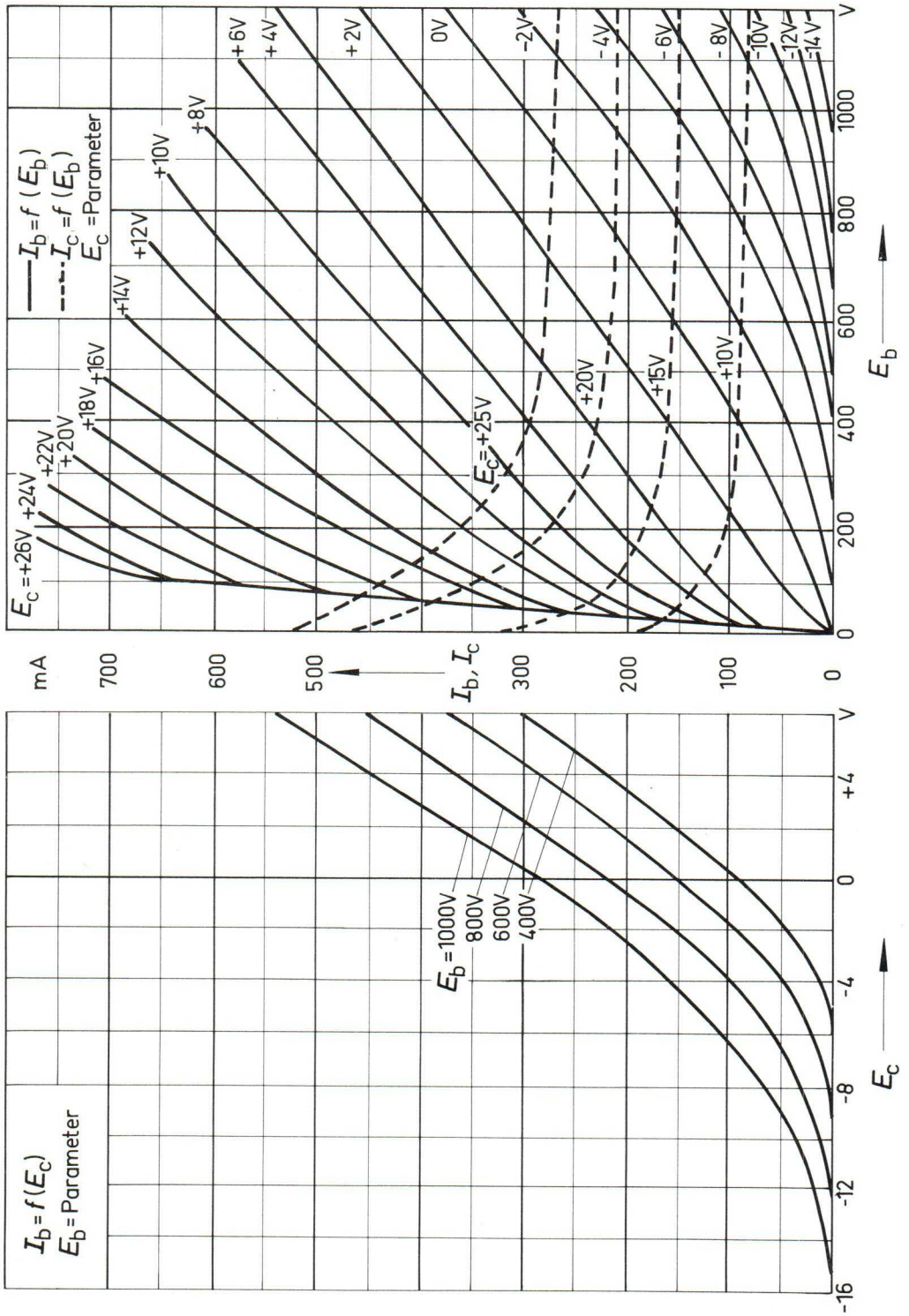
The collector dissipation power can also be conducted away to some form of external cooling circuit, for example copper bands connected to large metallic surfaces such as the equipment chassis. A heat sink with radiator fins may also be used. An insulator must be used to electrically isolate the collector from the cooling arrangement. Because of their high thermal and low electrical conducturity. Beryllium or Aluminium Oxide ceramic are particularly suitable materials. It is in any case necessary to provide adequate thermal contact between the various of the cooling system.

Adequate heat conduction from the grid and cathode connections may also be necessary.

Characteristics

$I_b = f(E_c)$, $I_b I_c = f(E_b)$

SIEMENS

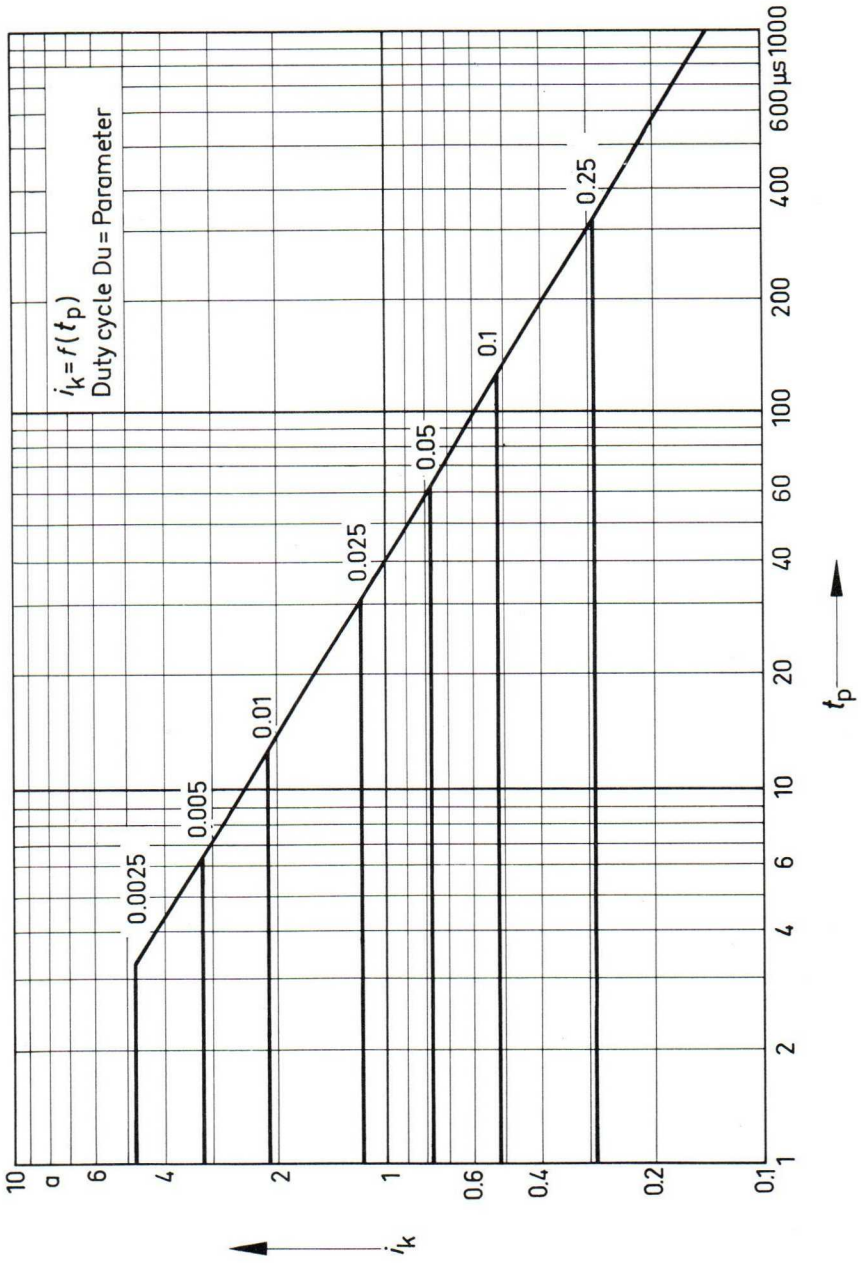


SIEMENS

Characteristics

$i_k = f(t_p)$

YD 1041



SIEMENS AKTIENGESELLSCHAFT

Printed in Germany

RöK3529E/1.10.66

SIEMENS

PLANAR TRIODE

YD 1042

Design and Application

Planar power triode of metal-ceramic construction for oscillators, mixers and amplifiers up to approx. 3 Gc. Special features of this tube provided with a metal capillary dispenser cathode include high current rating and insensitivity against back heating even at high operating frequencies. Therefore the YD 1042 is especially suited for use at CW operation with high amplitudes of the input signal and at pulse operation with high duty factors (e.g. PPM or PCM operation). In its mechanical dimension the YD 1042 is equivalent to the 2 C 39 BA. The tube is designed for air cooling.

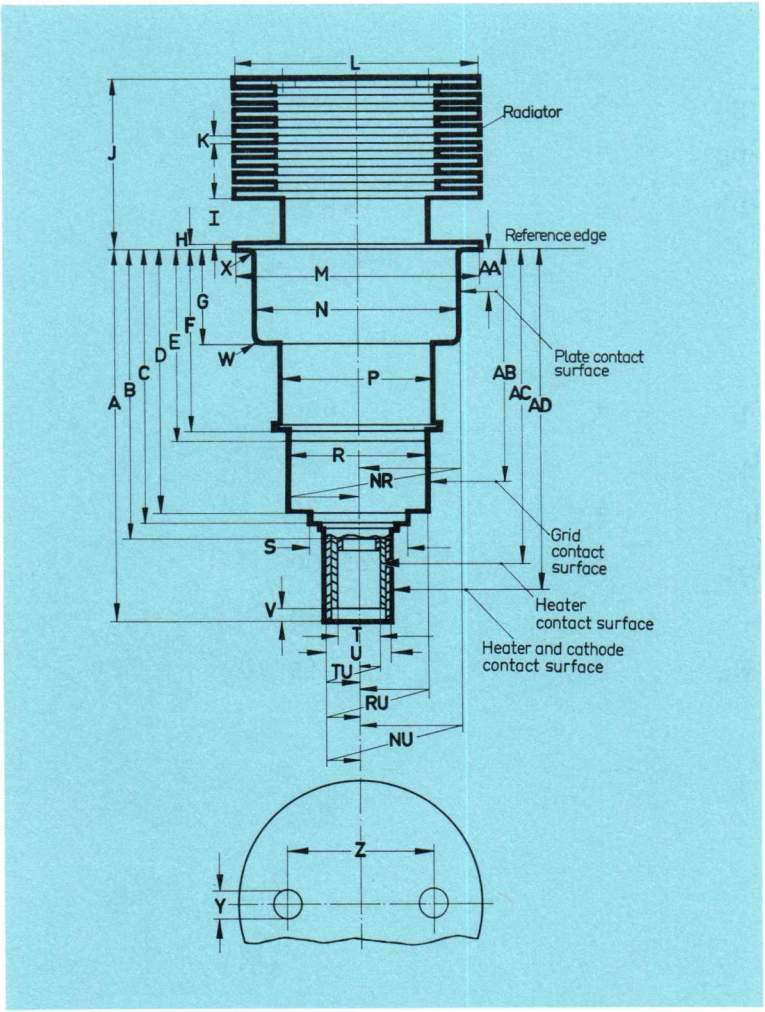


Table of Dimensions (in mm)

	min	max	
A	46.10	47.63	
B		38.96	
C		37.46	
D	32.74	33.76	
E		28.83	
F	22.35	23.80	
G	11.73	12.12	
H		1.02	
I	3.18	4.70	
J	19.46	20.98	
K	0.64	1.17	
L	31.34	32.11	
M	29.90	30.35	
N	26.04	26.29	
P		20.12	
R	16.64	16.97	
S		13.84	
T	5.41	5.66	
U	8.00	8.26	
V		2.18	
W		2.54	
X		0.89	
Y	2.67	3.68	(1)
Z	16.51	21.59	
AA	0.89	9.17	(2)
AB	30.10	32.13	(2)
AC	38.96	43.89	(2)
AD	37.46	46.10	(2)
NR		0.50	(3)
NU		0.50	(3)
RU		0.50	(3)
TU		0.30	(3)

Weight: approx. 70 gm net, approx. 105 gm gross
Dimensions of package: 55 x 55 x 145 mm

(1) Holes for Extractor
(2) For connection of contact springs
(3) Center variation

Heating

Heater voltage	E_f	=	6.0 ± 2 %	Vac
Heater current	I_f	≈	1.3	Aac

indirect by ac, parallel supply

Metal capillary dispenser cathode

Capacitances

Grid to cathode	C_{gk}	=	6.8	µµf
Plate to grid	C_{pg}	=	2	µµf
Plate to cathode	C_{pk}	≤	0.035	µµf

Characteristics

Plate voltage	E_b	=	600	Vdc
Cathode resistor	R_k	=	30	ohms
Plate current	I_b	=	75	mAdc
Transconductance	S_m	=	25000	µmhos
Amplification factor	µ	≈	100	
Negative grid voltage (I_b = 1 mAdc)	$-E_c$	=	15	Vdc

RF-Amplifier, Class B, Grounded Grid

Maximum Ratings (absolute values)

Frequency	F	$\leq$	3	Gc
Plate voltage	E_b	max	1200	Vdc
Plate dissipation	P_p	max	120	W
Grid negative bias	$-E_c$	max	150	Vdc
Peak grid negative bias	$-e_c$	max	400	v
Peak grid positive bias	e_c	max	25	v
Grid current	I_c	max	30	mAdc
Grid dissipation	P_g	max	1.5	W
Cathode current	I_k	max	400	mAdc
Bulb temperature	TE	max	250	°C

Operating Characteristics

Frequency	F	=	2.3	Gc
Heater voltage	E_f	=	6.3	V
Plate voltage	E_b	=	1000	Vdc
Negative grid voltage	$-E_c$	=	15	Vdc
Plate current	I_b	=	135	mAdc
Grid current	I_c	=	18	mAdc
Power output	P_o	=	50	W
Drive power	P_d	=	5	W
Plate dissipation	P_p	=	85	W
Bandwidth	B	=	25	Mc

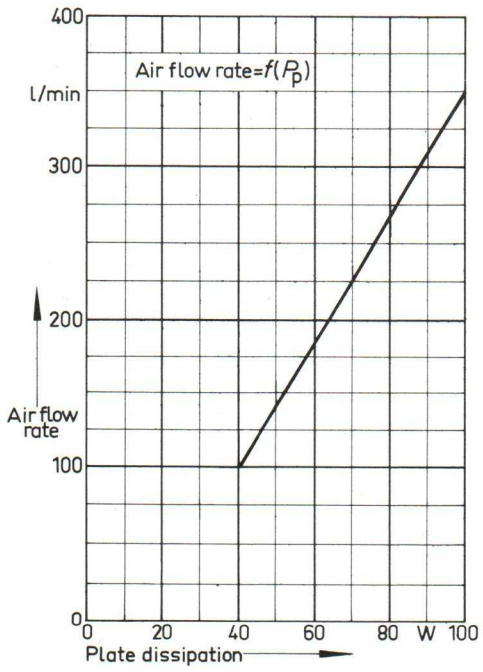
Operating Instructions

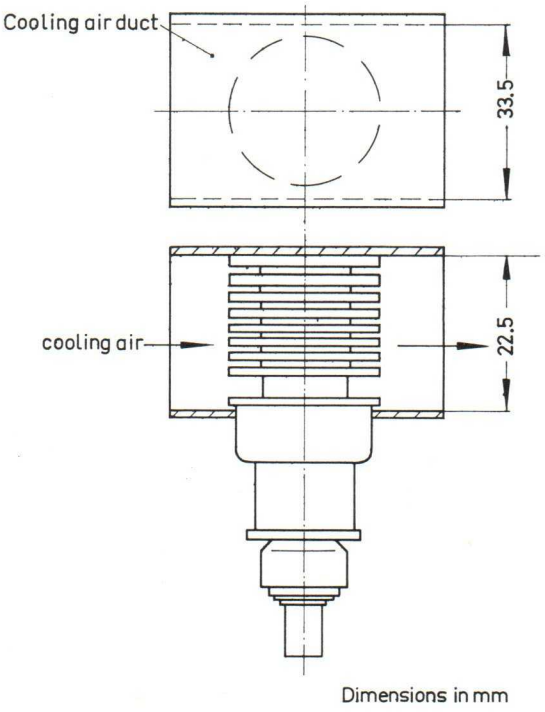
Mounting

Where possible, the tube should be mounted in the coaxial resonators with the aid of adequately resilient spring contacts. The mounting position is optional.

Cooling

The admissible maximum temperature at the outer surfaces of the tube is 250 °C. For the removal of heat, the tube must be cooled with air. For maximum plate dissipation and assuming the use of an air duct of the dimensions indicated, an air current of approx. 425 ltr./min is required for cooling the radiator in the case of an inlet temperature of 25 °C. If necessary, the other surfaces should be cooled as well with a gentle air current. As the constructional design of the ventilation system has to be adapted to the particular type of equipment in use, it cannot be furnished as an accessory together with the tube. The dimensions indicated in the diagram are recommended for the guiding piece for cooling the radiator.



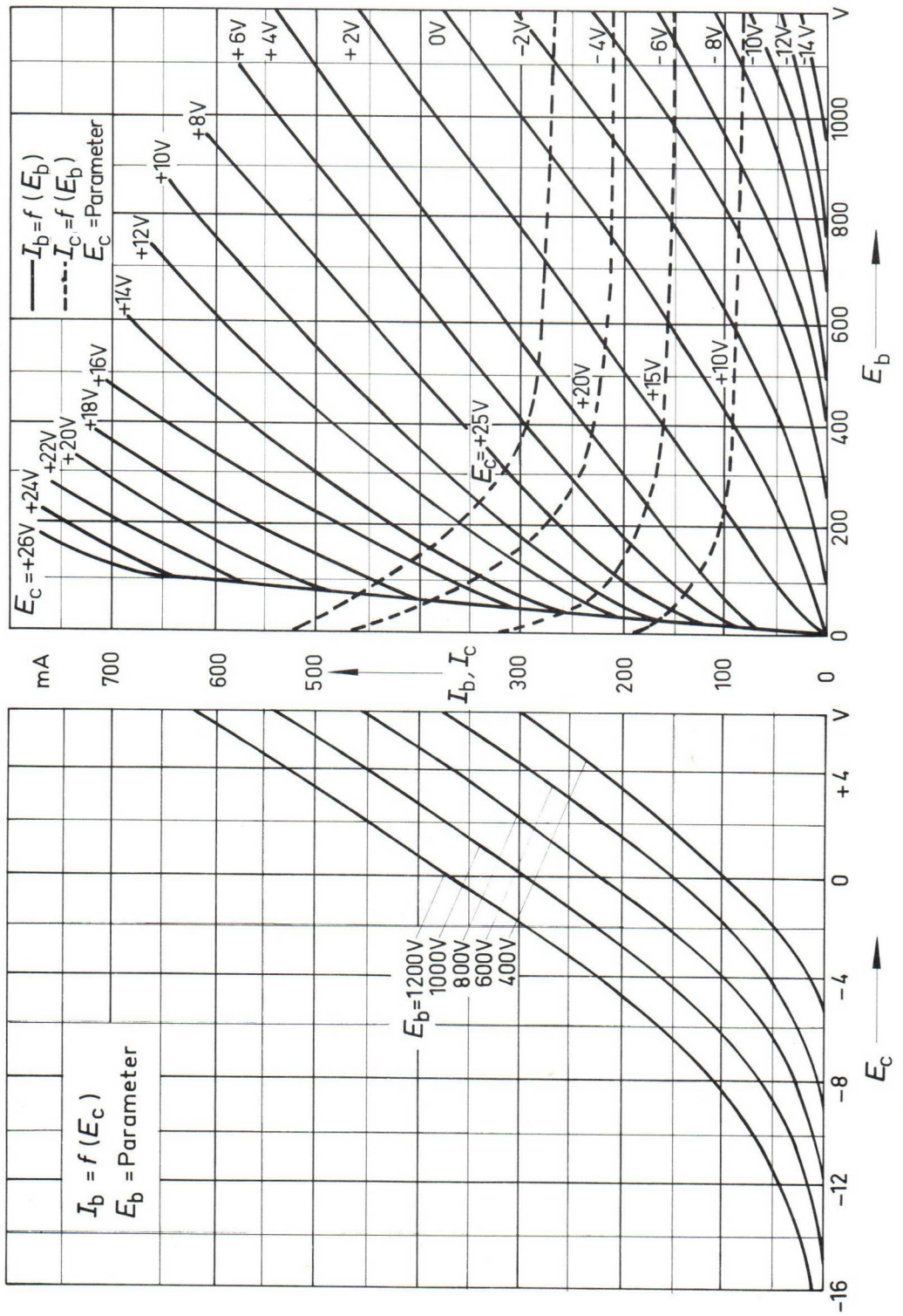


SIEMENS

Characteristics

$I_b = f(E_c)$, $I_b\, I_c = f(E_b)$

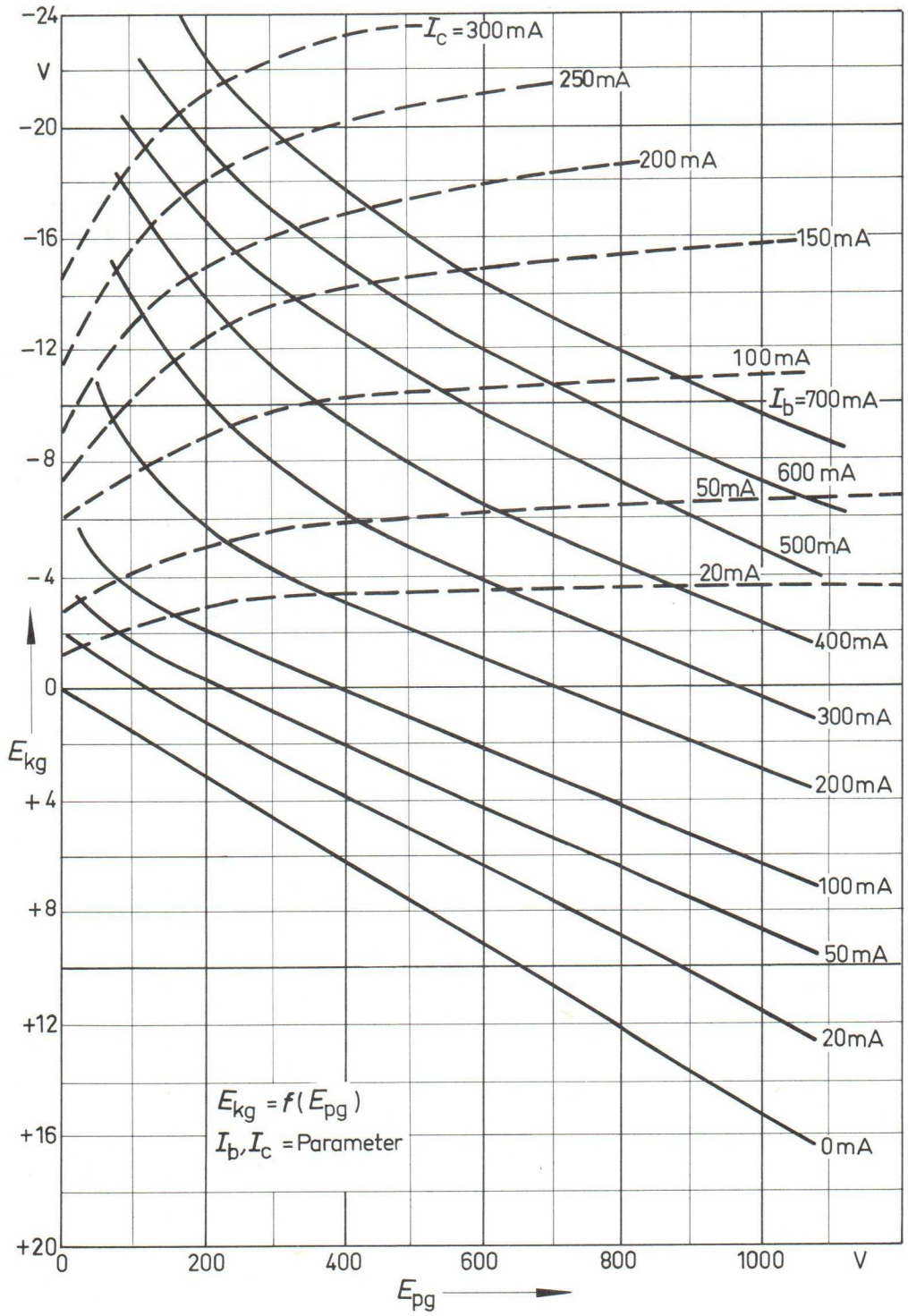
YD 1042



Characteristics

$E_{kg} = f(E_{pg})$

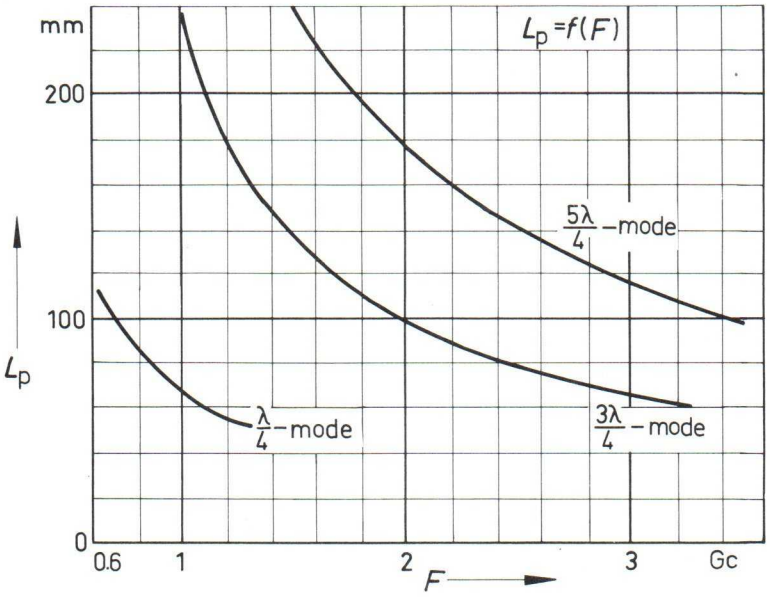
SIEMENS

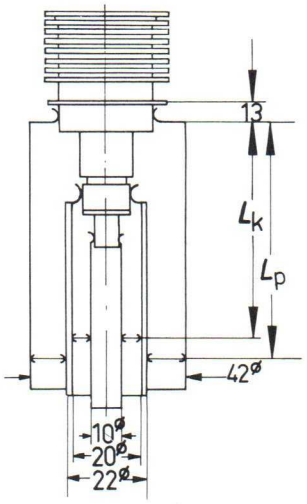


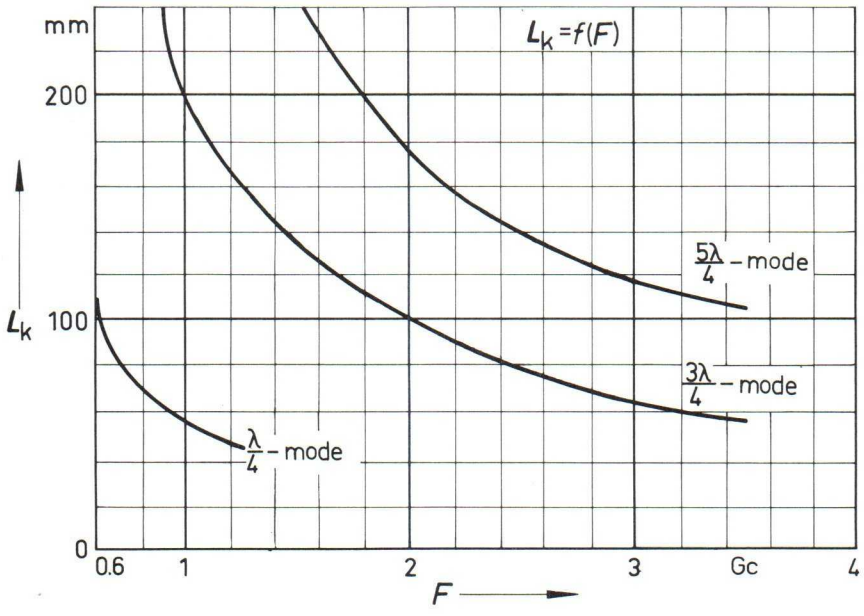
SIEMENS

Plate and cathode tuning curves (approximate values)

YD 1042







SIEMENS AKTIENGESELLSCHAFT

Printed in Germany

RöK 3531 E / 1.11.66

SIEMENS

PLANAR TRIODE YD 1050

Sachnummer
Q00035-X4653

Design and Application

Air cooled planar power triode of metal-ceramic design especially for use as oscillator, frequency multiplier or amplifier up to 2.5 Gc esp. for use as pre-amplifier, driver or output stages in telivision transposers.

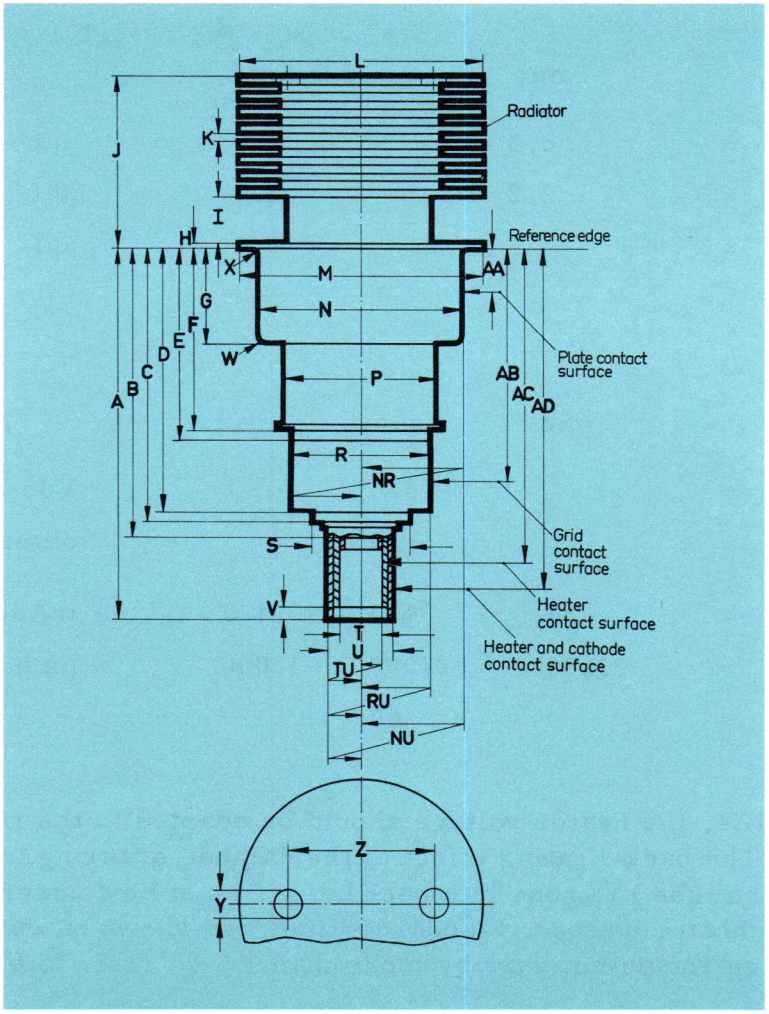


Table of dimensions (in mm)

	min	max	
A	46.10	47.63	
B		38.96	
C		37.47	
D	32.74	33.76	
E		28.83	
F		23.75	
G	11.73	12.12	
H		1.02	
I	3.18	4.70	
J	19.31	20.98	
K	0.64	1.17	
L	31.34	32.11	
M	29.90	30.35	
N	26.04	26.39	
P		20.12	
R	16.64	16.97	
S		13.84	
T	5.41	5.66	
U	8.00	8.26	
V		2.18	
W		2.54	
X		0.89	
Y	2.67	3.68	(1)
Z	16.51	21.59	(1)
AA	0.89	9.17	(2)
AB	30.10	32.13	(2)
AC	38.96	43.89	(2)
AD	37.47	46.10	(2)
NR		0.50	(3)
NU		0.50	(3)
RU		0.50	(3)
TU		0.30	(3)

(1) Holes for extractor
(2) For connection of contact springs
(3) Center variation

Weight:	approx 70 gm net	approx 105 gm gross
Dimensions of package		55x55x145 mm

Heating

Heater voltage	E_f	=	6.0	V	(1)
Heater current	I_f	=	0.9 to 1.05	A	
Preheating time	t_k	$\geqq$	1	min	(2)

indirect by ac or dc, parallel supply

Capacitances

			min	max	
Grid to cathode	C_{gk}	=	6.3	7.0	µµf
Plate to grid	C_{pg}	=	2.2	2.5	µµf
Plate to cathode	C_{pk}	=		0.045	µµf

Characteristics

			min	nom	max	
Plate voltage	E_b	=		500		Vdc
Cathode resistor	R_k	=		30		ohms
Plate current	I_b	=	83	100	125	mAdc
Transconductance	S_m	=	22000	27000	32000	µmhos
Amplification factor	µ	$\approx$		60		

(1) In the interest of a long life, the heater voltage should be adapted to the required cathode current. The back-heating effect of the cathode occuring in the transit region after the tube has gone into oscillation, must be counterbalanced by reducing the heater voltage. Standard values are shown on curve page 7. The heater voltage should not vary by more than $\pm$ 5 %. (ref. to 6.0 V)

(2) For mains supply failures up to 5 sec, or when the tube is CW operated at $E_b \leqq 300$ V and $I_k \leqq 30$ mA, the preheating time can be omitted.

Operation Characteristics

CW Operation

Frequency	F	=	0.5	2.5	Gc
Heater voltage	E_f	=	5.8	4.8	V
Plate voltage	E_b	=	600	600	Vdc
Plate current	I_b	=	80	100	mAdc
Grid current	I_c	≈	25	6	mAdc
Pulse power output	p_o	=	26	16	w

TV Frequency Transposer, Band V, Common Transmission of Audio and Video Signals

Frequency	F	=	700		Gc
Heater voltage	E_f	=	5.6		V
Plate voltage	E_b	=	800		V
Negative grid voltage	$-E_{c1}$	=	8		µsec
Zero plate current	I_{bo}	=	80		mAdc
Plate current	I_b	=	95		mAdc
Synchron power output	P_{osyn}	=	10	(IM3 > 51 db)	W (1,2,3,4)
Synchron power input	P_{dsyn}	max	1	(IM3 > 60 db)	W (2)
Gain	G	=	14		db

Maximum Ratings (absolute values)

CW Operation and Pulse Operation with E_b < 1000 Vdc

Plate voltage	E_b	max	850	Vdc
Plate dissipation	P_p	max	100	W
Negative grid voltage	$-E_{c1}$	max	150	Vdc
Negative peak grid voltage	$-e_{c1}$	max	400	v
Positive peak grid voltage	e_{c1}	max	25	v
Grid current	I_{c1}	max	50	mAdc
Grid dissipation	P_g	max	2	W
Cathode current	I_k	max	125	mAdc
Envelope temperature	TE	max	250	°C

(1) Power output at 85 % circuit efficiency

(2) IM3 third order intermodulation radio measured according to the ARD specification 5/6

(3) With 9 Mc 1 db bandwidth

(4) Visual to aural carrier separation 7 db

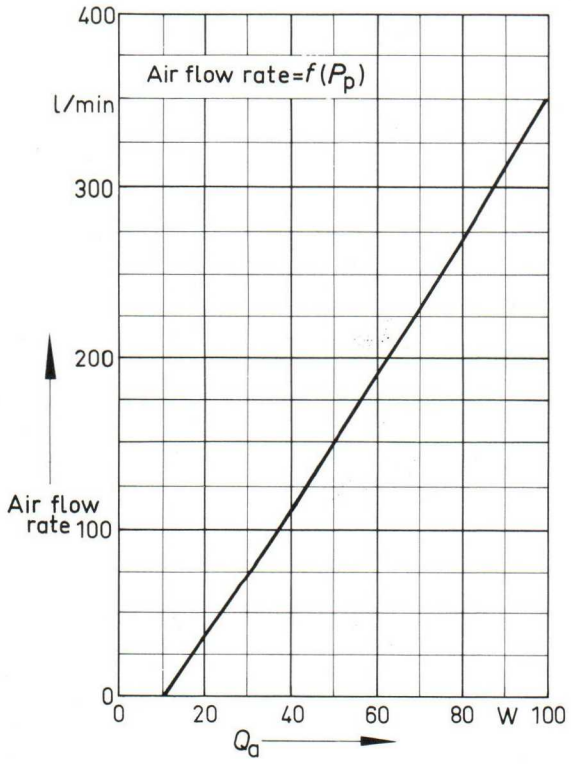
Operating Instructions

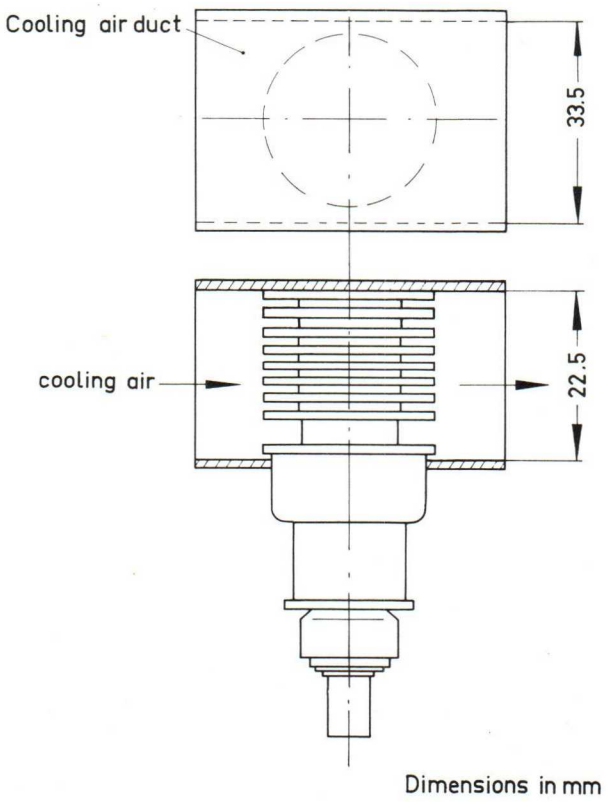
Mounting

It is advisable to mount the tube so that the contact areas are supported by sufficiently resilient contact collars in the coaxial circuitry. The tube may be mounted in any position.

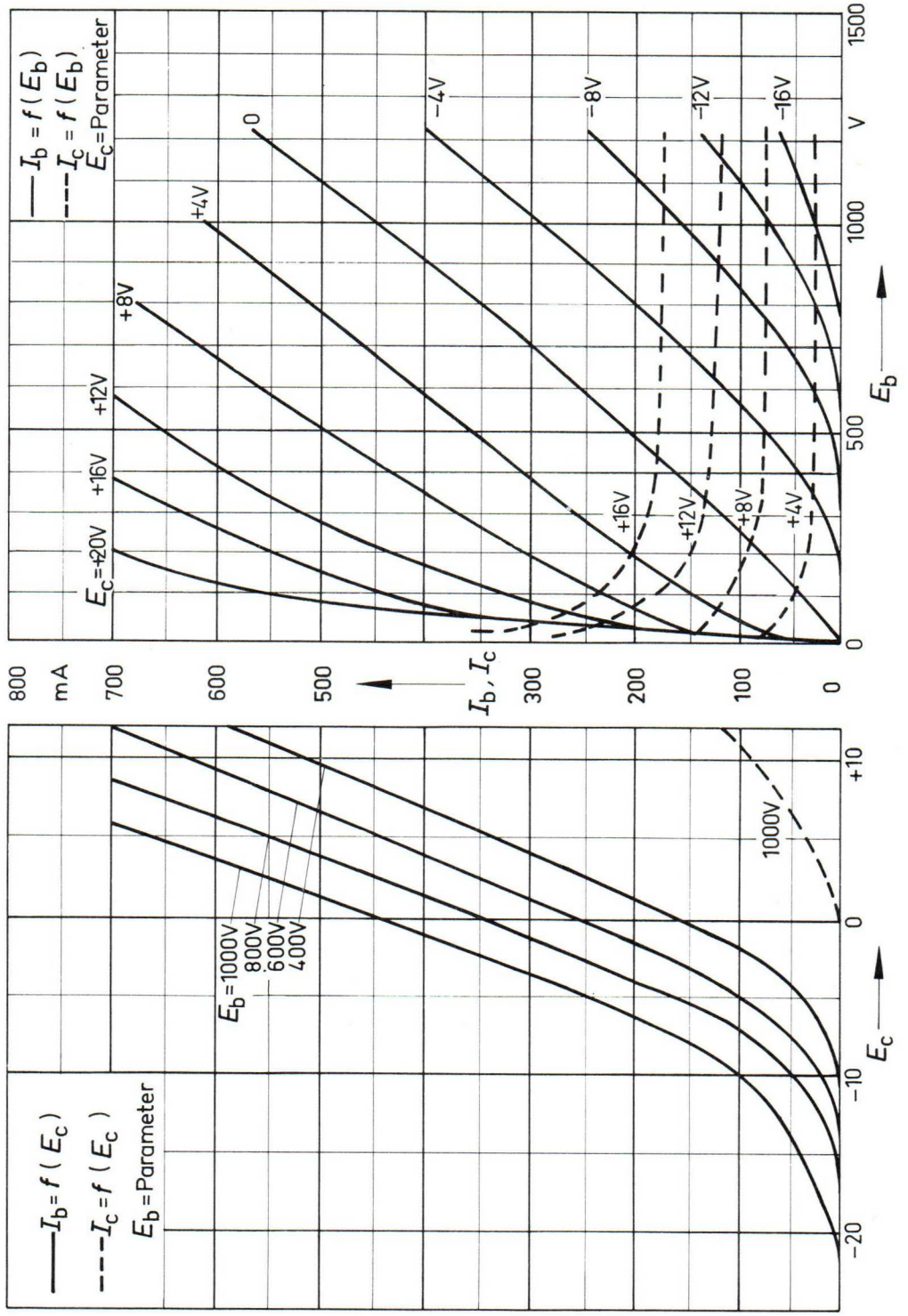
Cooling

Maximum permissible temperature at the outer surfaces of the tube is 250 °C. For removing the heat, the tube must be air-cooled. With maximum plate dissipation and with use of an air duct of the specified dimensions, the rate of air flow for cooling the radiator at an incoming temperature of 25 °C must be about 350 l/min. With respect to the life time of the tube it is recommended however, to increase the rate of airflow so that the plate temperature is kept below the maximum permissible temperature of 250 °C as far as possible. If necessary, the rest of the surface must also be cooled by a small air flow. As the constructive design of the cooling facilities has to be adapted to the particular equipment layout used, no supply of these as an accessory to the tube is provided for. For the duct for cooling the radiator the dimensions specified in the diagram are recommended.





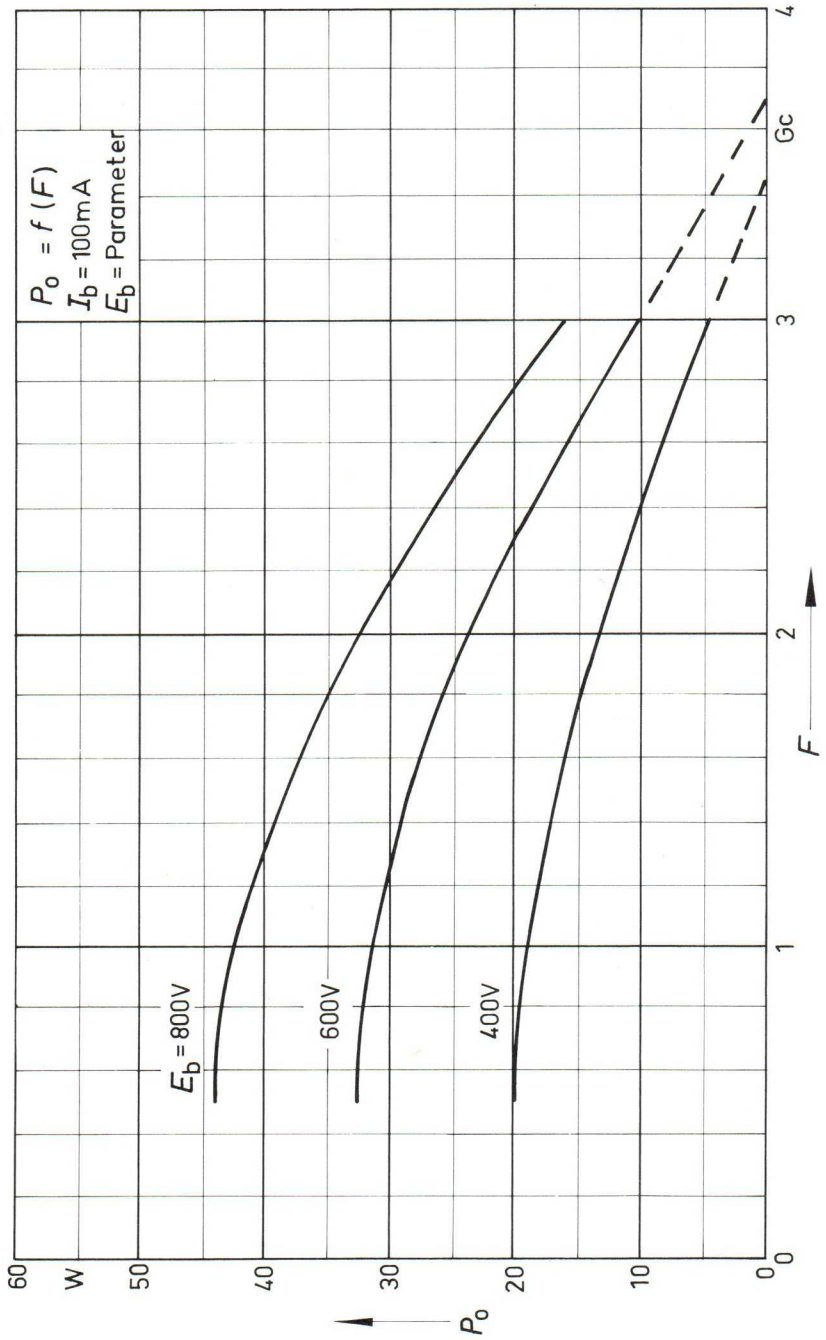
Dimensions in mm

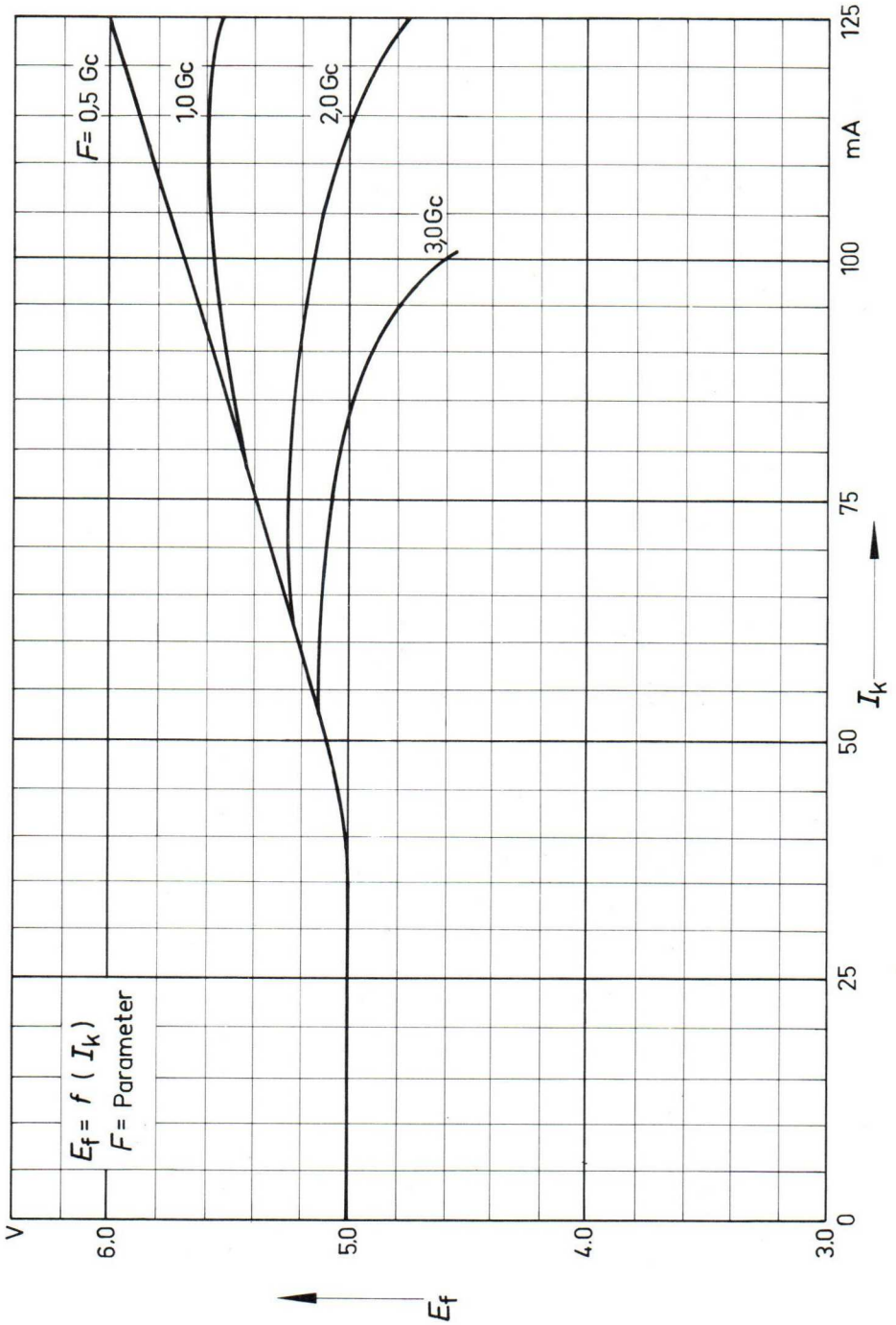

$I_b = f(E_b)$
$I_c = f(E_b)$
E_c=Parameter
E_c=+20V
+16V
+12V
+8V
+4V
0
−4V
−8V
−12V
−16V
E_b
0
500
1000
1500
V
800
mA
700
600
500
I_b, I_c
300
200
100
0
$I_b = f(E_c)$
$I_c = f(E_c)$
E_b=Parameter
E_b=1000V
800V
600V
400V
1000V
+10
0
−10
−20
E_c

Characteristics

$P_o = f(F)$

SIEMENS

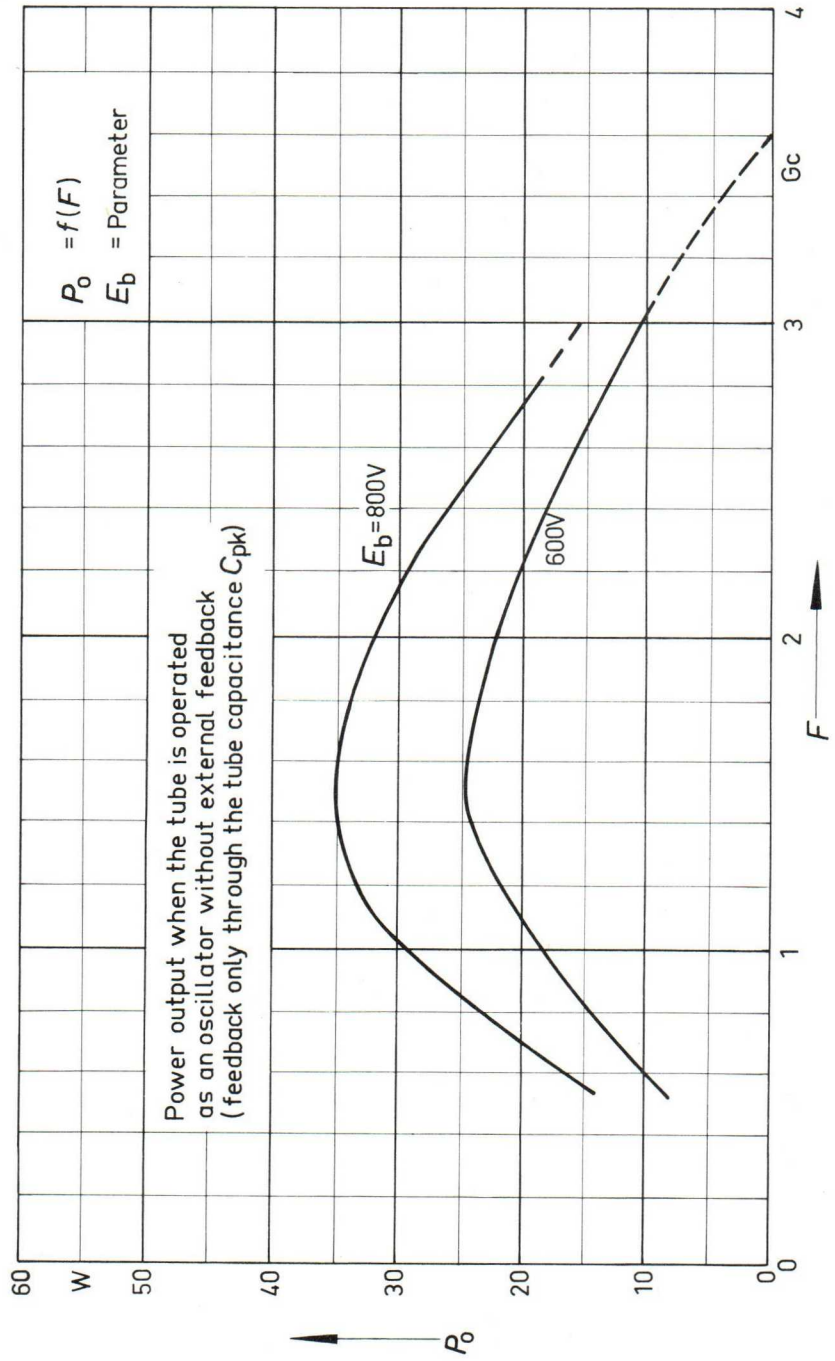



F= 0,5 Gc
1,0 Gc
2,0 Gc
3,0 Gc
$E_f = f(I_k)$
F = Parameter
V
6.0
5.0
4.0
3.0
E_f
0
25
50
75
100
125
mA
I_k

Characteristics

$P_o = f(F)$

SIEMENS



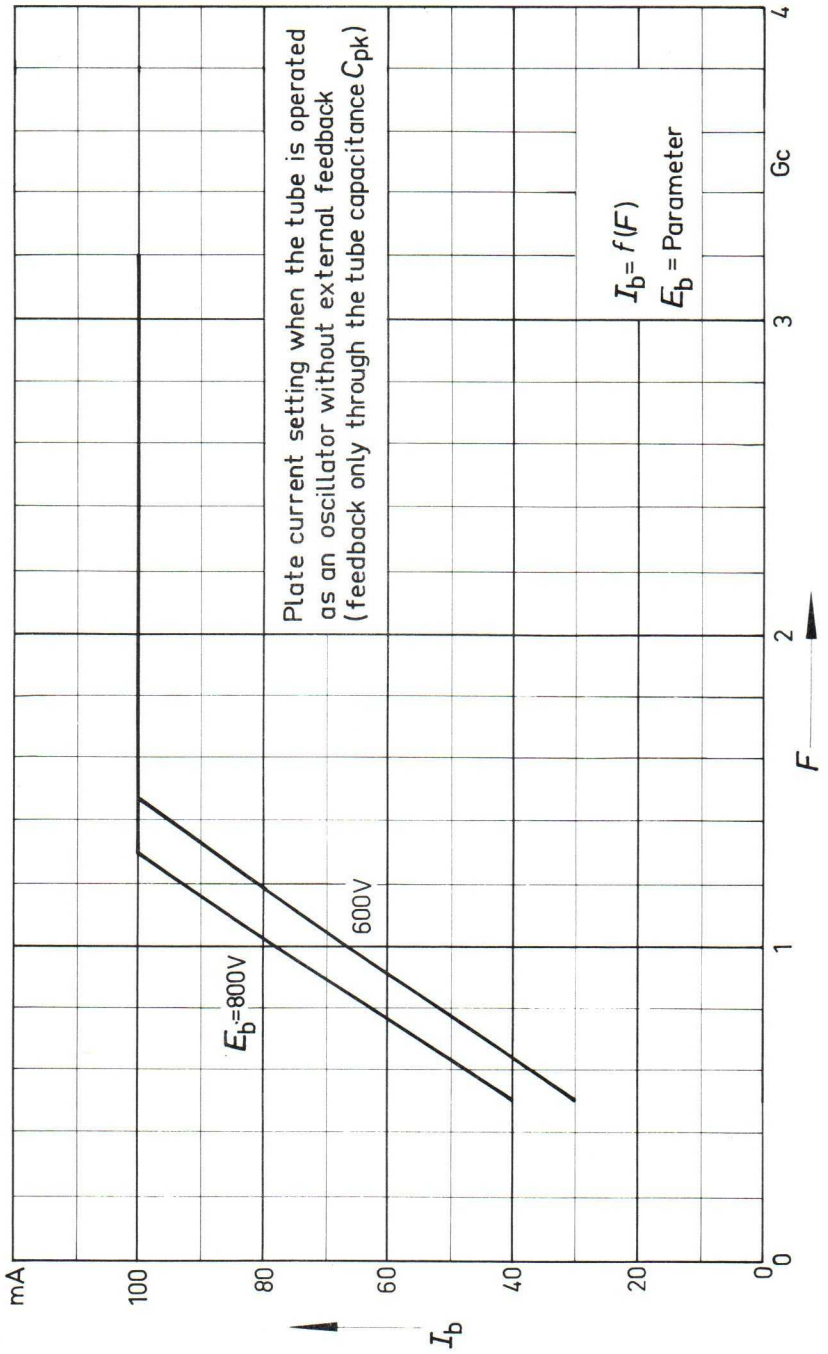
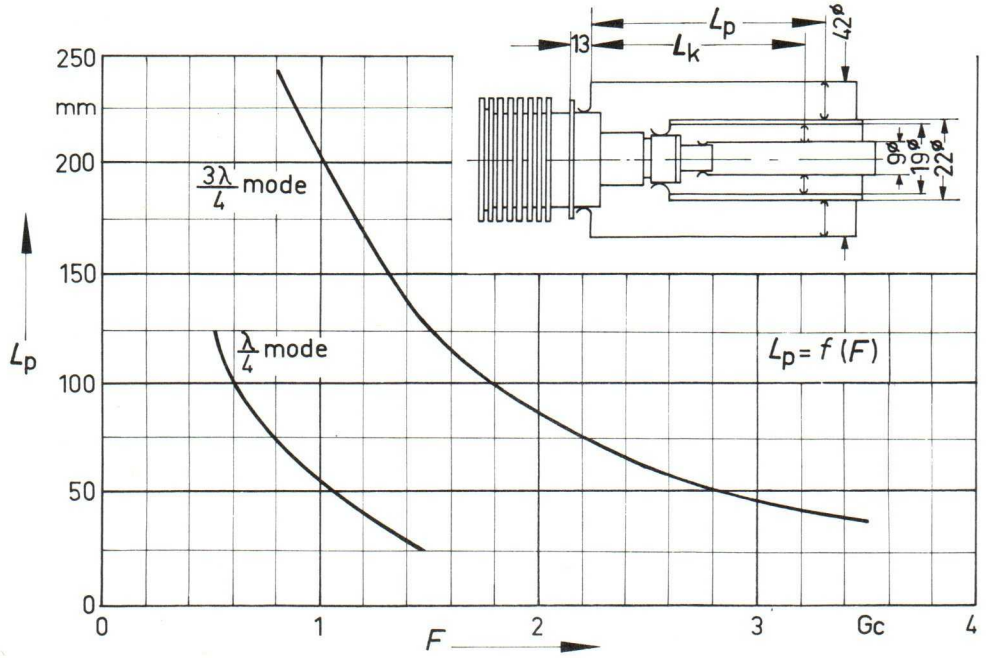
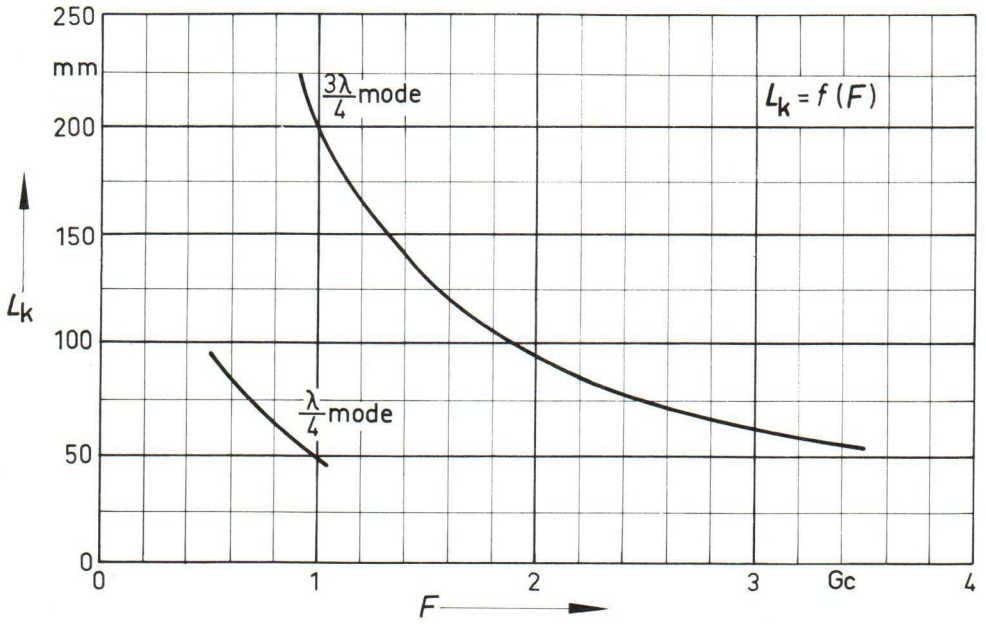


Plate current setting when the tube is operated as an oscillator without external feedback (feedback only through the tube capacitance C_{pk})
$I_b = f(F)$
E_b = Parameter
E_b=800V
600V
mA
100
80
60
40
20
0
I_b
0
1
2
3
4
Gc
F

Dimensions of Coaxial Resonators
(typical values)

SIEMENS





SIEMENS

PLANAR TRIODE

YD 1100
8859

Order No.
Q35-X4651

Design and Application

Planar triode of metal ceramic design with contact cooling for use as oscillator or amplifier up to approx. 5 GHz and as frequency multiplier up to approx. 7 GHz, esp. for use as TV transposer and as driver tube for the YL 1042.

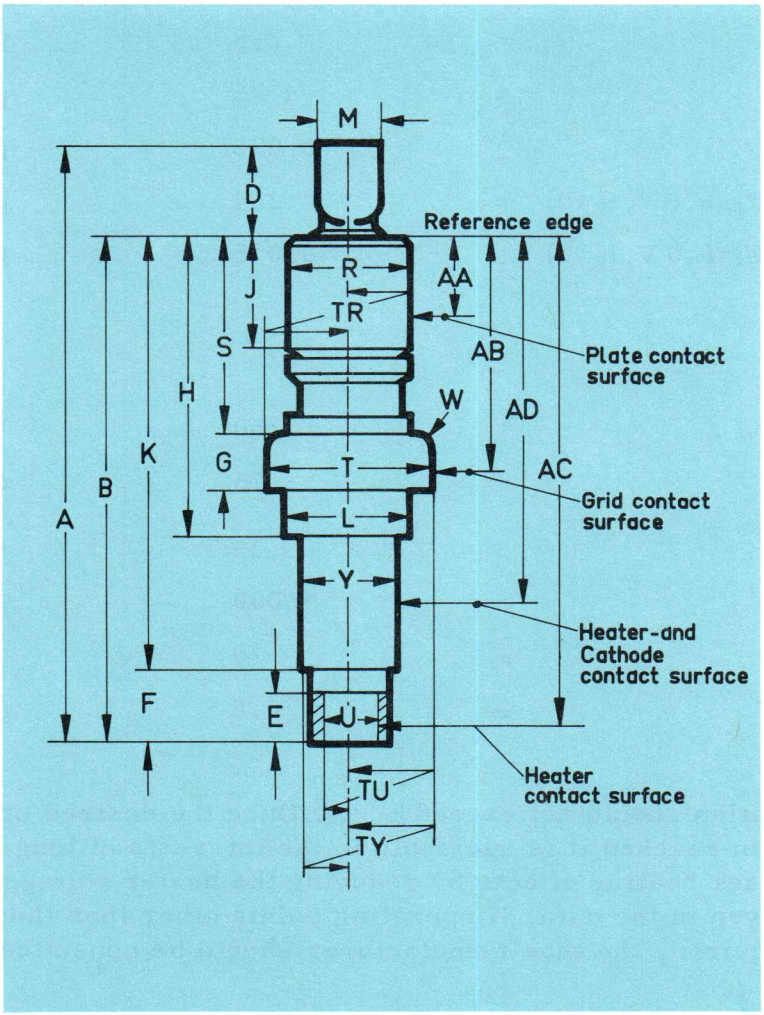


Table of dimensions
(in mm)

	min	max	
A		48.40	
B	37.90	39.40	
D		9.00	
E	3.90	4.30	
F	4.80	5.80	
G	4.60	4.85	
H	21.00	22.20	
J		8.80	(1)
K	32.70	34.00	
L	8.60	8.80	
M		7.00	
R	8.80	8.95	
S	13.65	14.05	
T	12.95	13.15	
U	4.00	4.20	
W		0.60	
Y	7.20	7.40	
AA	3.00	8.00	(2)
AB	14.80	18.20	(2)
AC	35.70	37.70	(2)
AD	23.00	32.00	(2)
TR		0.15	(3)
TU		0.30	(3)
TY		0.15	(3)

(1) Admissible length of clamp contact
(2) For connection of contact springs
(3) Center variation

Weight: approx. 11 gm net, approx. 30 gm gross
Dimensions of packing: 55 x 55 x 145 mm
(2 1/8" x 2 1/8" x 5 3/4")

Heating

Heater voltage	E_f	=	6.0	V (1)
Heater current	I_f	≈	0.33	A

indirect by ac or dc, parallel supply
Oxide cathode

Capacitances

Grid to cathode	C_{gk}	=	2.8	µµf
Plate to grid	C_{pg}	=	1.75	µµf
Plate to cathode	C_{pk}	≤	0.025	µµf (2)
Grid to cathode	C_{gk} (E_f=6.0 V, I_k=0)	=	3.4	µµf
Plate to cathode	C_{pk} (E_f=6.0 V, I_k=0)	≤	0.035	µµf (3)

Characteristics

Plate voltage	E_b	=	250	Vdc
Cathode resistor	R_k	=	75	ohms
Plate current	I_b	=	25	mAdc
Transconductance	S_m	=	16000	µmhos
Amplification factor	µ	≈	70	
Noise factor (F = 800 MHz)	NF	≈	8.5	db

(1) The heater voltage variation should not exceed ± 5 %. Once the desired operating output power has been reached it is advisable in the interests of long tube life to compensate the back heating effects by reducing the heater voltage to the appropriate value given in the data. If operating points other than those given in the data are required, the tube manufacturer should be consulted.

(2) Average value 0.0165 µµf

(3) Average value 0.027 µµf

RF-Amplifier and CW Oscillator with P_o = 2 Watts

Maximum Ratings

Plate voltage	E_b	max	450	Vdc
Plate dissipation	P_p	max	15	W
Negative grid voltage	$-E_{c1}$	max	70	Vdc
Grid current	I_c	max	6	mAdc (1)
Grid resistor	R_g	max	50000	ohms
Cathode current	I_k	max	30	mAdc
Surface temperature	T_{surf}	max	180	°C

Operating Characteristics

Frequency	F	=	2	GHz
Heater voltage	E_f	=	5.6	Vdc
Plate voltage	E_b	=	250	Vdc
Cathode resistor	R_k	=	150	ohms (2)
Plate current	I_b	=	22	mAdc
Grid current	I_c	≈	5	mAdc
Power output	P_o	≈	2	W

Linear Amplifier

Maximum Ratings

Plate voltage	E_b	max	450	Vdc
Plate dissipation	P_p	max	15	W
Negative grid voltage	$-E_{c1}$	max	70	Vdc
Grid current	I_c	max	3	mAdc
Grid resistor	R_g	max	50000	ohms
Cathode current	I_k	max	35	mAdc
Surface temperature	T_{surf}	max	180	°C

Operating Characteristics as TV Transposer, Band V, common visual and aural

Frequency	F	=	750		MHz
Heater voltage	E_f	=	5.8		Vdc
Plate voltage	E_b	=	400		Vdc
Negative grid voltage	$-E_{c1}$	=	3.5		Vdc
Zero signal plate current	I_{bo}	=	30		mAdc
Plate current	I_b	=	32		mAdc
Synchron power output	P_{osyn}	≥ =	1.25	(IM3 > 51 db)	W (3, 4, 5, 6)
Synchron power input	P_{dsyn}	≈	60	(IM3 > 60 db)	mW (4)
Gain	G	≈	13.5		db

(1) The specified value must not be exceeded briefly e.g. in tuning the oscillator
(2) A variable cathode resistor of the specified rating must be used for adjusting the plate current to the specified value
(3) With 85 % circuit efficiency (at the band pass filter output)
(4) IM3 third order intermodulation ratio
(5) Visual to aural carrier separation 7 db
(6) With 9 MHz 1 db bandwidth

Operating Instructions

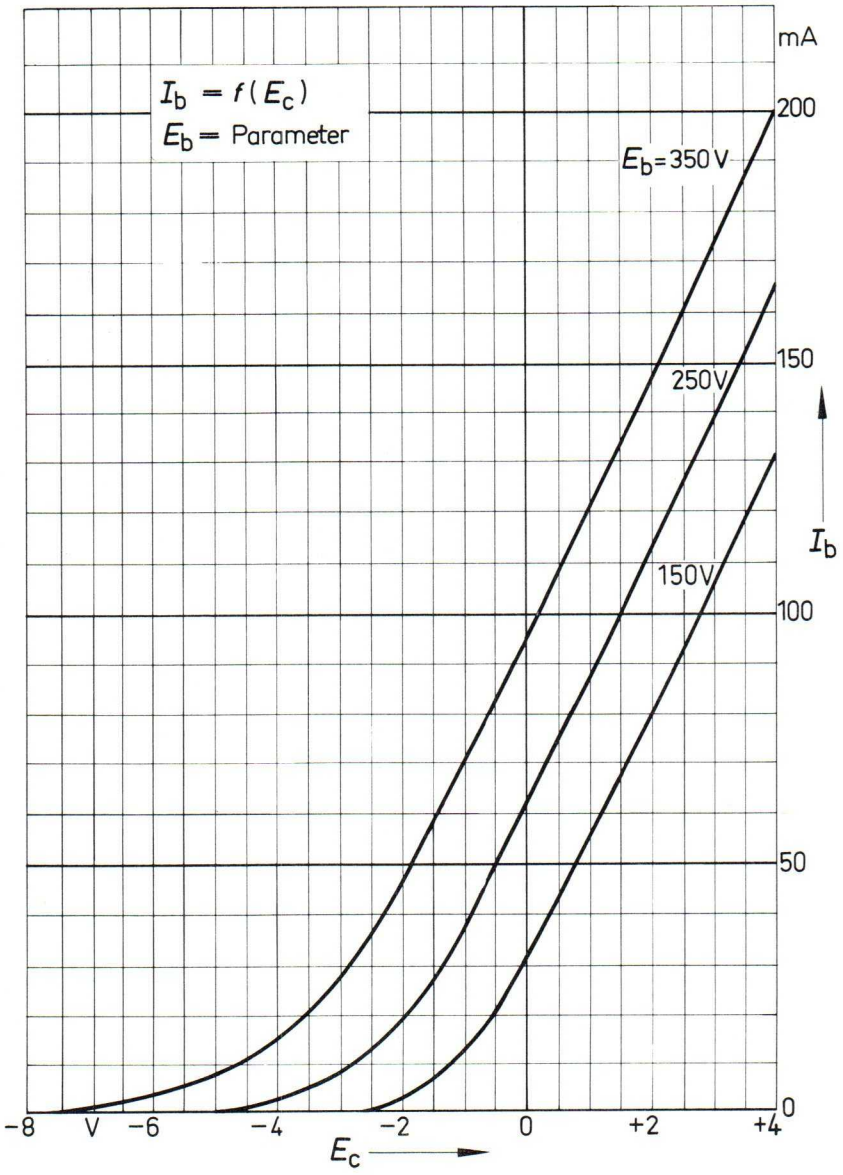
In the transit time region the life of a planar triode depends to a great extent on the degree of back bombardement of the cathode. It is therefore advisable to obtain the required power output from class A or AB operation wherever possible. At higher frequencies and in class C operation increased back-heating and thus reduction in life must be expected. The manufacturer should be consulted for optimum operating condition in Class AB or C service.
Also, attention is drawn to curve k5 . The upper curve only applies to rf powers of less than 100 mW and static operation, the other curves to the maximum possible powers (P_o inversaly proportionally to E_f).
Because of small electrode spacing and thus relatively high field strengths between the electrodes, short-duration flashover can occur particularly if the tube is grid pulsed. To prevent tube damage, a series protection resistor should be included in the plate supply which limits any current peaks thereby occuring to less than ten times (10 x) the maximum admissible value.
This protective measure also serves another purpose, namely to prevent an overload during the tuning process. For this reason it is also advisable to tune the circuit at a lower plate voltage if the tube is normally operated near the maximum ratings. Whereas the input/output characteristic of the grounded cathode stage tends to saturation, in the grounded grid circuit a further increase of input power results in a rise of output power, producing higher grid currents, cathode back-heating and distortion of the rf signal. Normally the average grid current should not exceed 30 % of the average cathode current, whereby with increasing frequency this percentage should be even lower. The load impedance must be correctly matched to the plate circuit.

Mounting

The tube is best held by sufficiently elastic contact springs in the concentric cavity contacting on the surfaces as indicated in the dimensional drawing page 1. If the tube must be fixed rigidly to prevent it jumping out of the resonator under adverse conditions, only the surface indicated in the drawing on page 1 should be used for this purpose. The mounting position is optional.

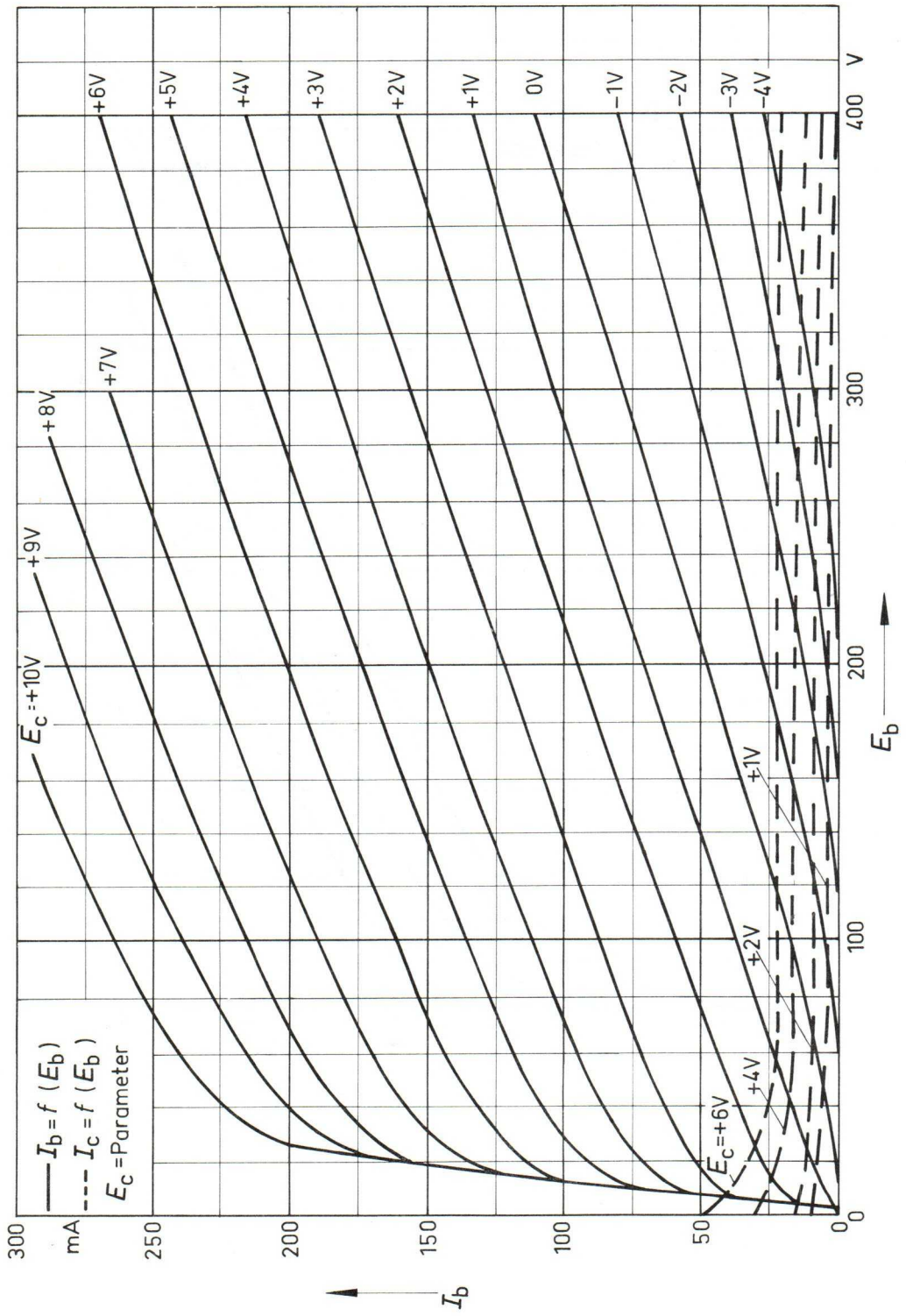
Cooling

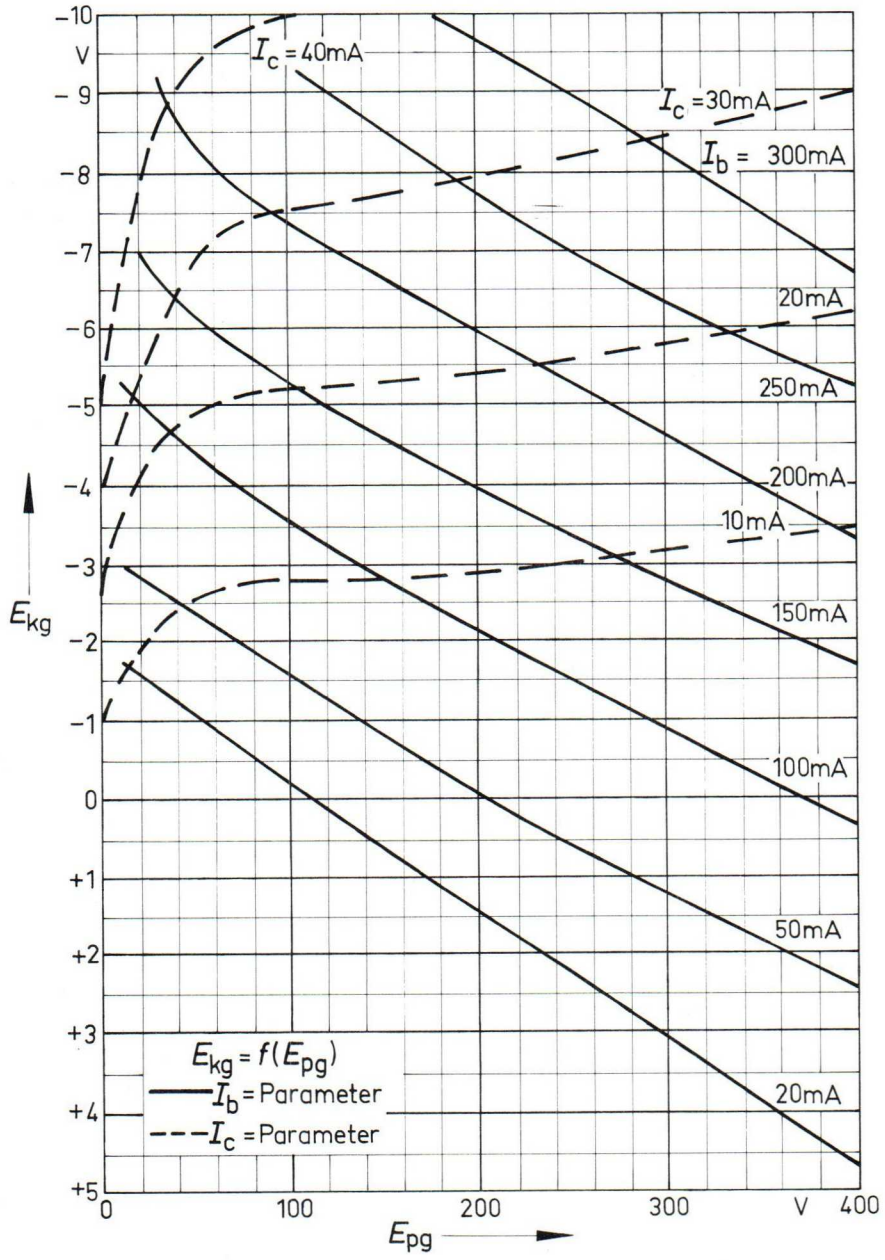
The anode is conduction cooled. Sufficient heat conduction away from the cathode contact, as normally provided by the cavity resonator, should also be ensured. In any case the limiting factor is the requirement that the maximum temperature of 180 °C (absolute value) is not exceeded at any point on the tube surface.
The radiator suitable natched to the cavity can also be fixed to the anode, and here the thermal contact at the junction must be good.


$I_b = f(E_c)$
E_b = Parameter
E_b=350 V
250V
150V
mA
200
150
100
50
0
I_b
−8 V −6 −4 −2 0 +2 +4
E_c

Characteristics
$I_b = f(E_b)$

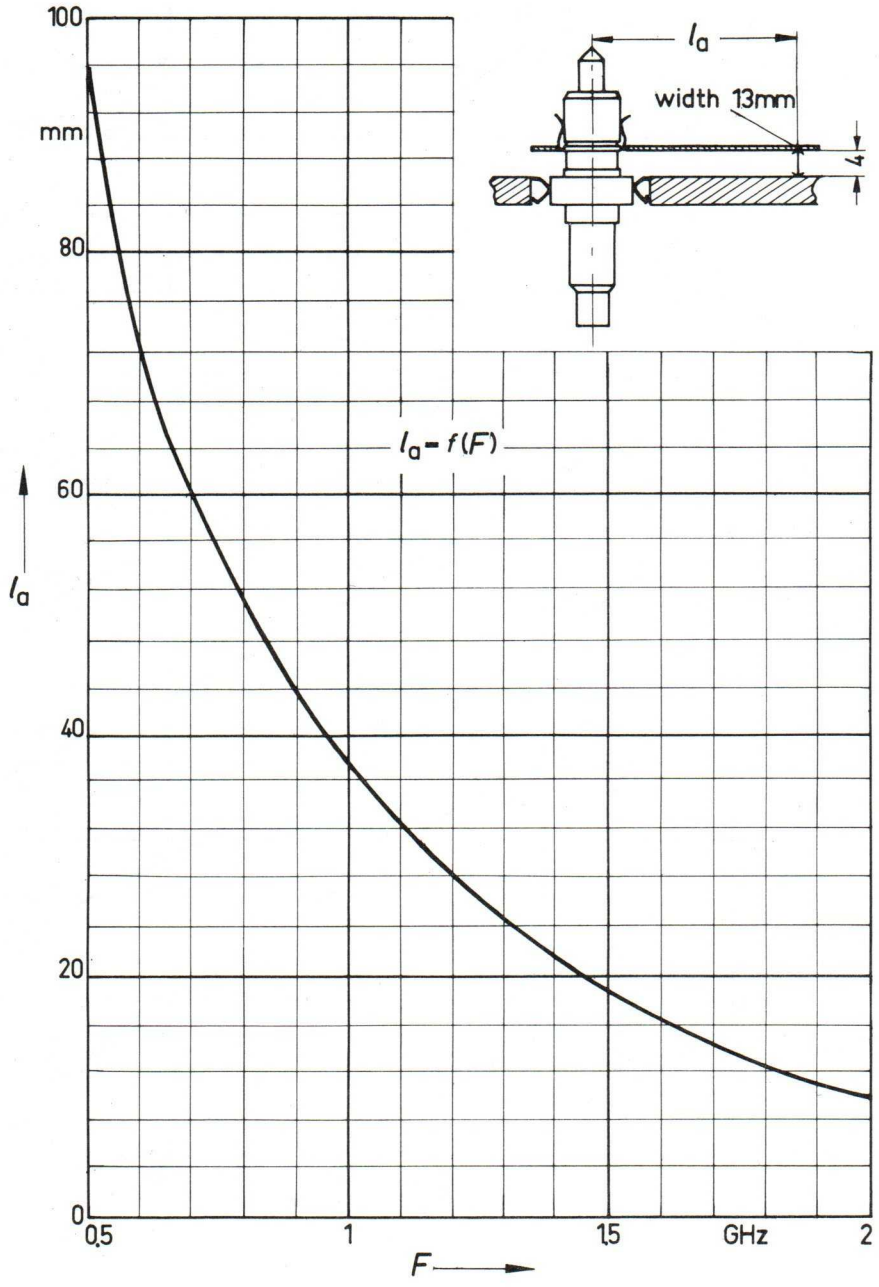
SIEMENS



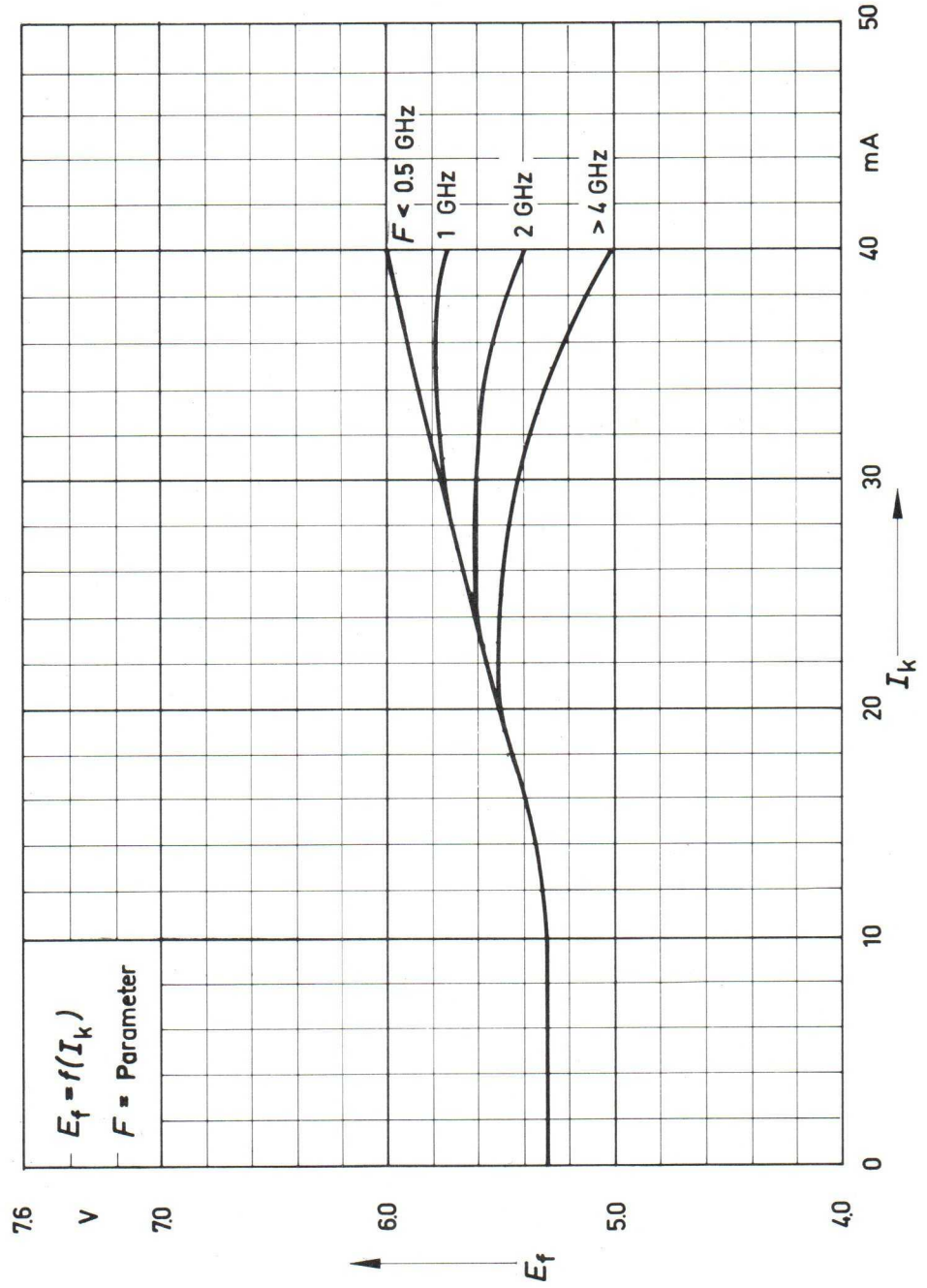

I_c = 40mA
I_c = 30mA
I_b = 300mA
20mA
250mA
200mA
10mA
150mA
100mA
50mA
20mA
E_{kg}
$E_{kg} = f(E_{pg})$
I_b = Parameter
I_c = Parameter
E_{pg}
−10 V −9 −8 −7 −6 −5 −4 −3 −2 −1 0 +1 +2 +3 +4 +5
0 100 200 300 V 400

Dimensions of lecher line plate circuits (typical values)

SIEMENS



RöK 3513E/1.10.69


$E_f = f(I_k)$
F = Parameter
F < 0.5 GHz
1 GHz
2 GHz
> 4 GHz
7.6
V
7.0
6.0
5.0
4.0
E_f
0
10
20
30
40
50
mA
I_k

SIEMENS

POWER TETRODE
for Linear Amplifier

YL 1042

Sachnummer
Q00051-X1042

Design and Application

Metal-ceramic, forced-air cooled, planar tetrode with crossed wire grids, cut off frequency 2 Gc. Particularly suited for use in HF SSB communication transmitters and linear amplifiers in TV transposers with concurrent visual and aural amplification. The YL 1042 can also be used as driver tube for the YL 1050. Due to its stability under severe shock and vibration the tube is ideal for use in mobile equipment.

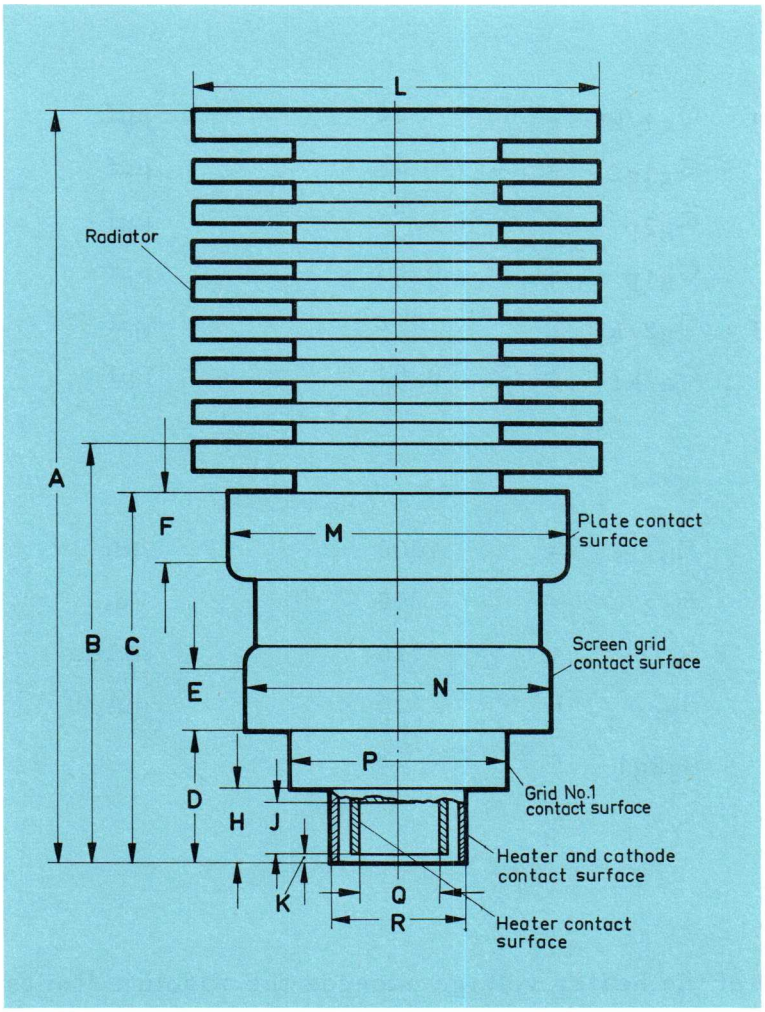


Table of dimensions
(in mm)

	min	nom	max
A	46.4	48.0	49.6
B	27.4	29.0	30.6
C	25.3	26.3	27.3
D	8.9	9.5	10.1
E	3.6		
F	4.2		
H	3.9	4.5	5.1
J	3.0		
K			1.3
L	31.5	31.8	32.0
M	27.6		
N	25.0		
P	18.7		
Q			6.6
R	12.4		

Weight: approx. 60 gm net
Mounting position: any

The radiator and connections lie inside or outside concentric circles with the following diameters:

Radiator:	inside	33.4	mm Ø
Plate connection:	inside	28.4	mm Ø
g_2-connection:	inside	25.9	mm Ø
g_1-connection:	inside	19.4	mm Ø
Cathode connection:	inside	13.2	mm Ø
Heater connection:	outside	6.0	mm Ø

Heating

Heater voltage	E_f	=	6.3	V	(1)
Heater current	I_f	≈	1.05	A	
Preheating time	t_k	≧	1	min	

indirect by ac or dc

Matrix oxide cathode

Capacitances

Grid No. 1 to cathode, heater	$C_{g1/kf}$	=	10	µµf
Grid No. 1 to grid No. 2	C_{g1g2}	=	15	µµf
Grid No. 2 to plate	C_{g2p}	=	3.75	µµf
Grid No. 1 to plate	C_{g1p}	≦	0.03	µµf
Grid No. 2 to cathode, heater	$C_{g2/kf}$	≦	0.2	µµf
Plate to cathode, heater	$C_{a/kf}$	≦	0.01	µµf

Characteristics

Plate voltage	E_b	=	1000	Vdc
Grid No. 2 voltage	E_{c2}	=	200	Vdc
Plate current	I_b	=	125	mAdc
Transconductance	S_m	=	20	mA/V
Amplification factor of grid No. 2 with respect to grid No. 1	μ_{g2g1}	≈	18	

(1) If the maximum variation of the heater voltage exceeds the absolute limits of ± 5 % the operating performance of the tube will be impaired and its life shortened.

Maximum Ratings (absolute values)

Frequency	F	≦	1250	Mc	(1)
Plate voltage	E_b	max	1000	Vdc	
Screen voltage	E_{c2}	max	330	Vdc	
Negative grid No. 1 voltage	$-E_{c1}$	max	75	Vdc	
Cathode current	I_k	max	180	mAdc	
Plate dissipation	P_p	max	115	W	(2)
Screen grid input power	$P_{i\,g2}$	max	2	W	
Grid No. 1 current	I_{g1}	max	16	mAdc	
Grid grid No. 1 resistor	R_{g1}	max	30000	ohms	
Surface temperature	T_{surf}	max	250	°C	

Typical Operation single side band modulation with suppressed carrier single tone (3), grounded cathode, class AB_1

Frequency	F	=	60	Mc	
Heater voltage	E_f	=	6.3	V	
Power output	P_o	=	55	W	(4)
Plate voltage	E_b	=	1000	Vdc	
Screen voltage	E_{c2}	=	300	Vdc	
Negative grid No. 1 voltage	$-E_{c1}$	=	14	Vdc	
Zero signal plate current	I_{bo}	=	40	mAdc	(5)
Plate current	I_b	=	120	mAdc	
Power input	P_i	=	120	W	
Plate dissipation	P_p	≈	60	W	(2)

Typical Operation television transmitter with common transmission of audio and video signals, grounded grid, class AB_1

Frequency	F	=	860	Mc	
Heater voltage	E_f	=	6.3	V	
Synchron power output	$P_{o\,syn}$	≧	15 (IM3 > 51 db)	W	(6, 7, 8, 9)
Synchron power input	$P_{d\,syn}$	=	0.6 (IM3 > 60 db)	W	(7)
Plate voltage	E_b	=	900	Vdc	
Screen voltage	E_{c2}	=	300	Vdc	
Negative grid No. 1 voltage	$-E_{c1}$	=	10	Vdc	
Zero signal plate current	I_{bo}	=	100	mAdc	
Plate current	I_b	=	120	mAdc	
Power input	P_i	=	108	W	
Gain	G	≧	13.5	db	

(1) Maximum ratings for operation with higher frequencies upon request
(2) See "cooling"
(3) Monofrequency rf input signal with constant amplitude
(4) With 90 % circuit efficiency
(5) Setting of plate current with cathode resistor.
(6) With 70 % circuit efficiency (at the band pass filter output)
(7) IM3 third order intermodulationrratio measured according to the ARD specification 5/6
(8) With 8 Mc 1 db bandwidth
(9) Visual to aural carrier separation 7 db

Maximum Ratings (absolute values)

Frequency	F	≦	1250	Mc	(1)
Plate voltage	E_b	max	1000	Vdc	
Screen grid voltage	E_{c2}	max	330	Vdc	
Negative grid No. 1 voltage	$-E_{c1}$	max	75	Vdc	
Cathode current	I_k	max	150	mAdc	
Plate dissipation	P_p	max	115	W	
Screen grid input power	P_{ig2}	max	2	W	
Grid No. 1 current	I_{g1}	max	16	mAdc	
Grid No. 1 resistor	R_{g1}	max	30000	ohms	
Surface temperature	T_{surf}	max	250	°C	

Typical Operation Class C telegraphy operation (2)

Frequency	F	=	1000	Mc	
Heater voltage	E_f	=	6.0	Vdc	
Power output	P_o	=	50	W	(3)
Plate voltage	E_b	=	900	Vdc	
Screen grid voltage	E_{c2}	=	300	Vdc	
Negative grid No. 1 voltage	$-E_{c1}$	=	20	Vdc	
Plate current	I_b	=	140	mAdc	
Grid No. 1 current	I_{g1}	=	5	mAdc	
Plate dissipation	P_p	≈	70	W	(4)
Drive power	P_d	=	4	W	

(1) Maximum ratings for operation at higher frequencies on request

(2) Key-down conditions per tube without amplitude modulation. Amplitude modulation essentially negative may be used if the positive peak of the audio-frequency envelope does not exceed 115 % of the carrier conditions.

(3) Circuit efficiency approximately 90 %

(4) See cooling, page 6

Maximum Ratings (absolute values)

Frequency	F	≦	1250	Mc	(1)
Plate voltage	E_b	max	800	Vdc	
Screen grid voltage	E_{c2}	max	300	Vdc	
Negative grid No. 1 voltage	$-E_{c1}$	max	75	Vdc	
Cathode current	I_k	max	125	Vdc	
Plate dissipation	P_p	max	75	W	
Screen grid input power	$P_{i\,g2}$	max	2	W	
Grid No. 1 current	I_{g1}	max	16	mAdc	
Grid No. 1 resistor	R_{g1}	max	30000	ohms	
Surface temperature	T_{surf}	max	250	°C	

(1) Maximum ratings for operation with higher frequencies upon request

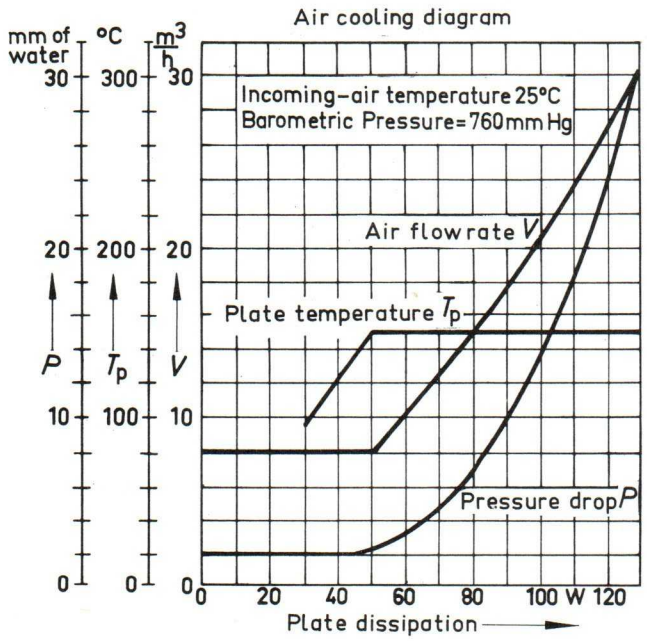
Operating Instructions

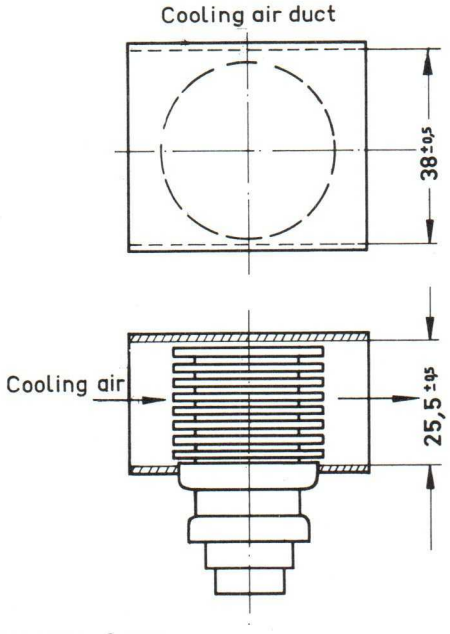
Mounting

It is advisable to mount the tube so that the contact areas are supported by sufficiently resilient contact collars in the coaxial circuitry. The tube may be mounted in any position.

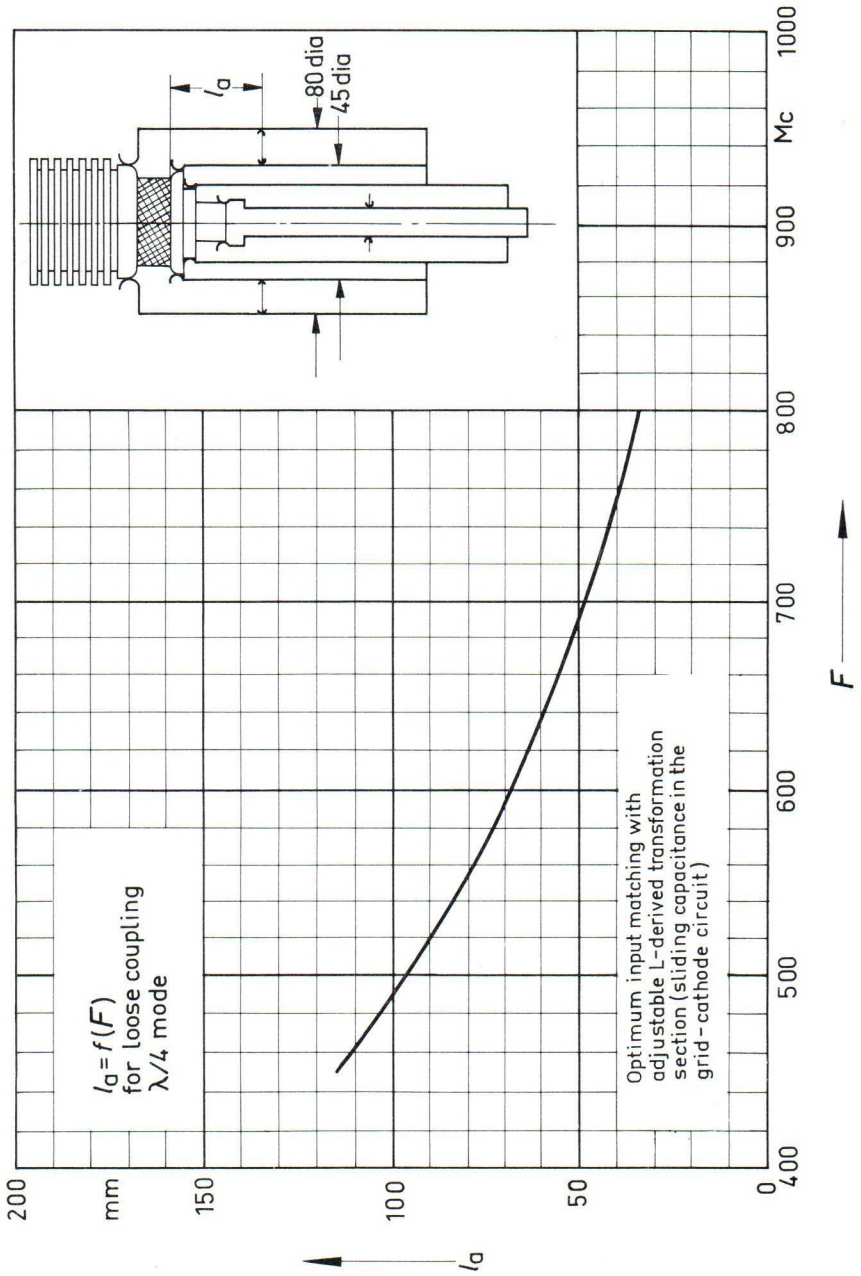
Cooling

Maximum permissible temperature at the outer surfaces of the tube is 250° C. For removing the heat, the tube must be air-cooled. With maximum plate dissipation and with use of an air duct of the specified dimensions, the rate of air flow for cooling the radiator at an incoming temperature of 25° C is shown on the diagram below. With respect to the life time of the tube it is recommended, however, to increase the rate of air flow so that the plate temperature is far below the maximum permissible temperature of 250° C. If necessary, the rest of the surface must also be cooled by a small air flow. The cooling air should be filtered to prevent clogging of the radiator. As the constructive design of the cooling facilities has to be adapted to the particular equipment layout used, no supply of these as an accessory to the tube is provided for.



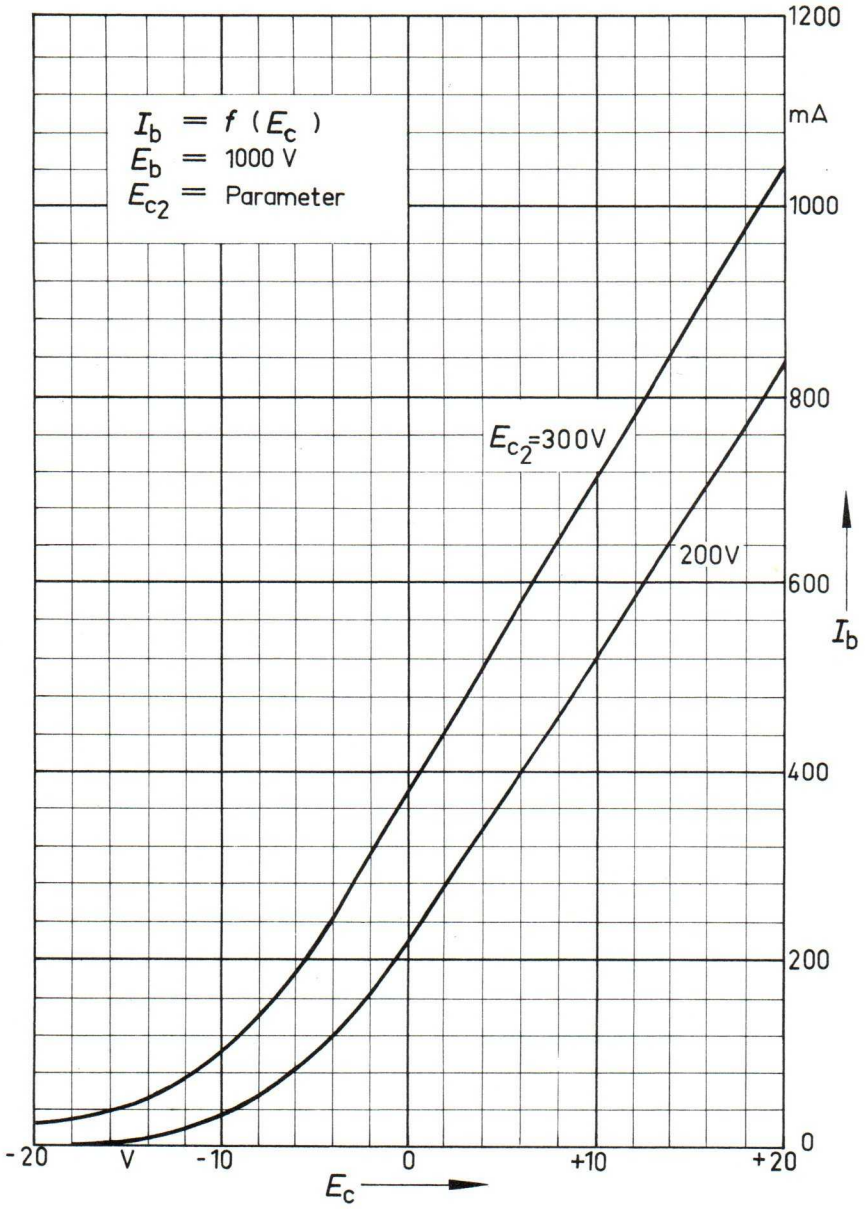


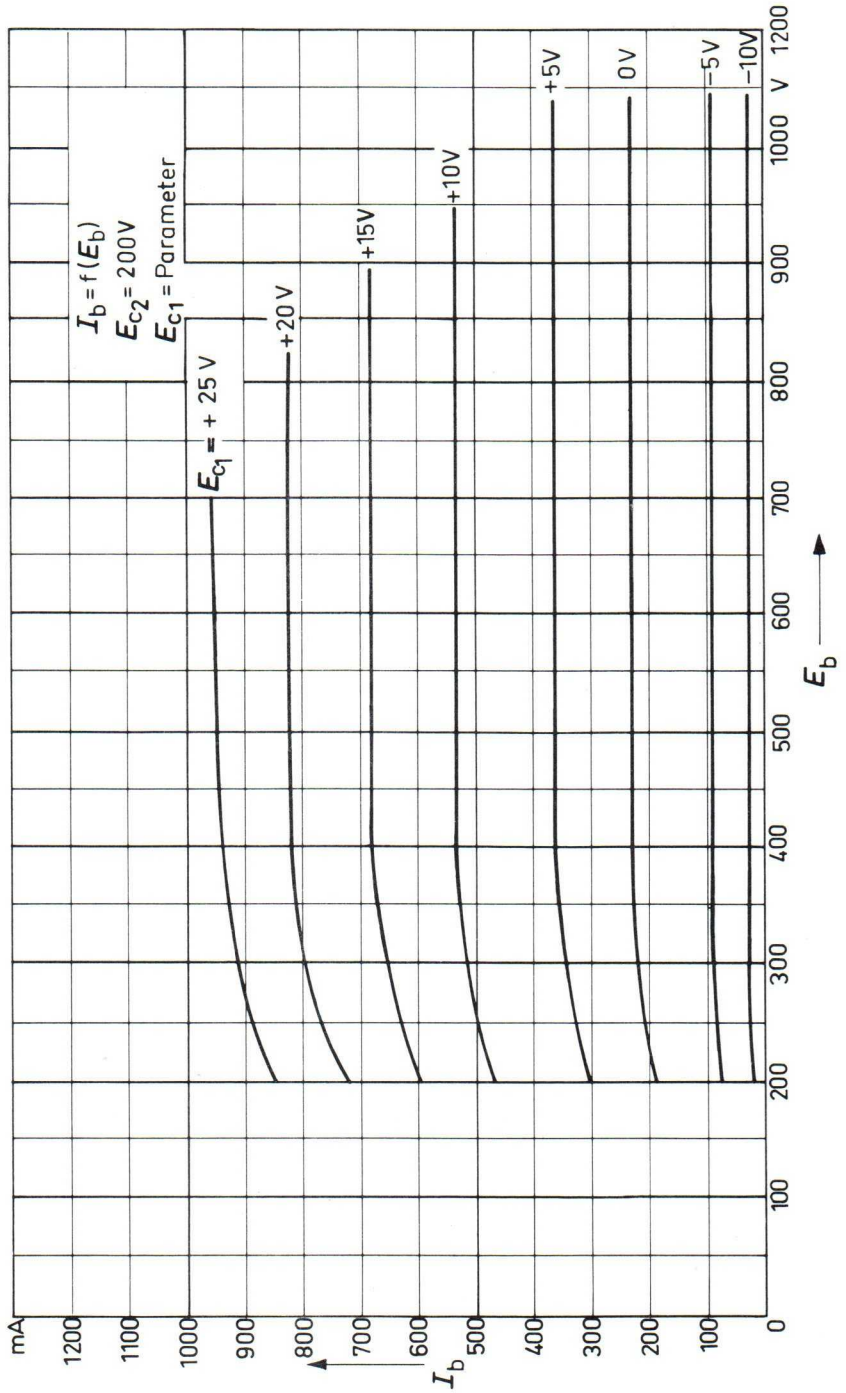
Dimensions in mm


80 dia
45 dia
l_a
$l_a = f(F)$
for loose coupling
λ/4 mode
Optimum input matching with
adjustable L-derived transformation
section (sliding capacitance in the
grid-cathode circuit)
200
mm
150
100
50
0
l_a
400
500
600
700
800
900
1000
Mc
F

Characteristics
$I_b = f(E_c)$

SIEMENS

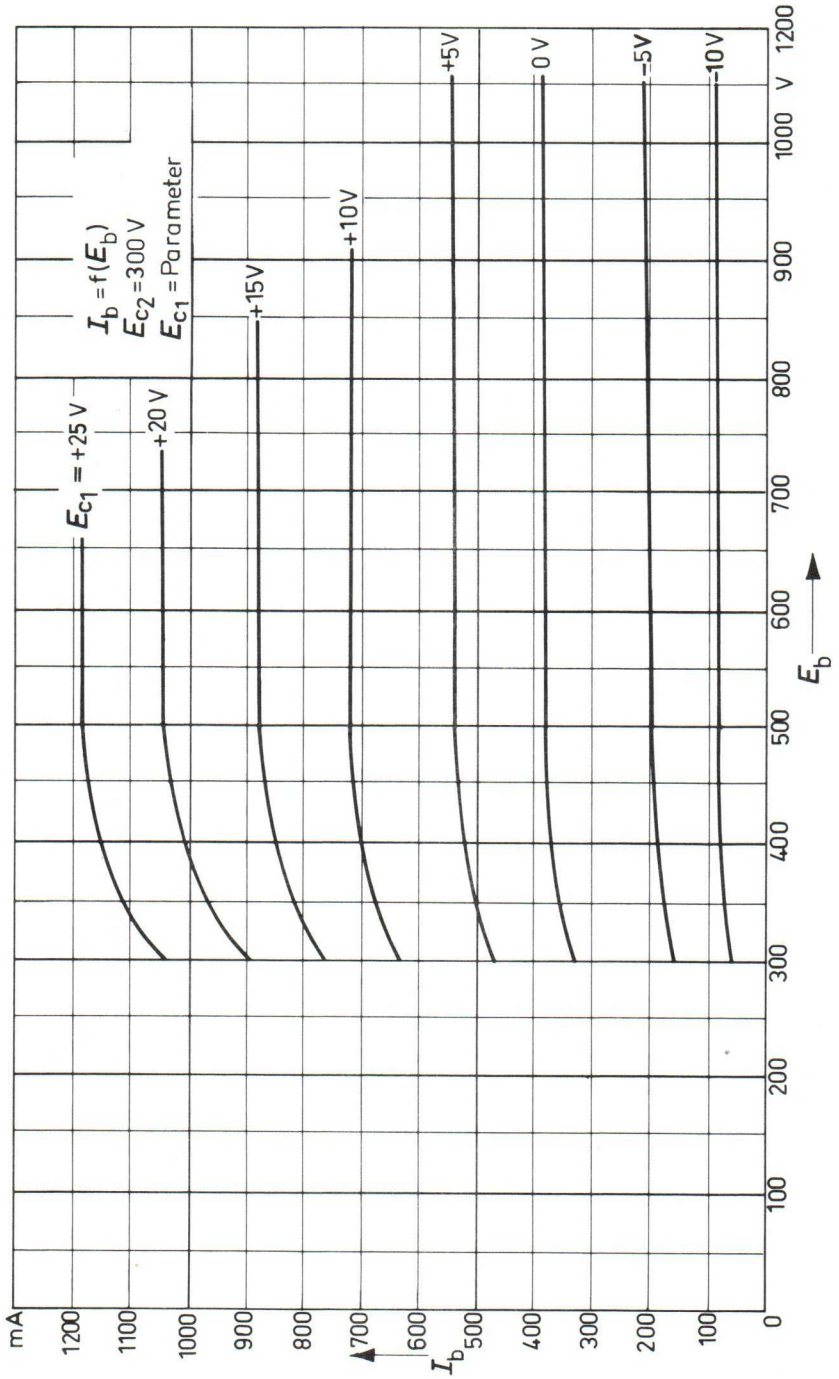



$I_b = f(E_b)$
E_{c2} = 200 V
E_{c1} = Parameter
E_{c1} = + 25 V
+20 V
+15V
+10V
+5V
0V
−5 V
−10V
mA
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
I_b
100
200
300
400
500
600
700
800
900
1000
1200
V
E_b

Characteristics

$I_b = f(E_b)$, E_{c1} = Parameter

SIEMENS



SIEMENS AKTIENGESELLSCHAFT

Printed in Germany

SIEMENS

POWER TETRODE

for Frequencies up to 1250 Mc

RS 1062 C
7650

Sachnummer
Q00051-X1062

Design and Application

Air-cooled tetrode in metal-ceramic technique for frequencies up to 1250 Mc especially suited for use as Class C power amplifier as well as for use in mixer and PA stages in TV transmitters.
Due to its stability under severe shock and vibration the tube is ideal for use in mobile equipment.
The maximum plate dissipation of the tube is 700 W.

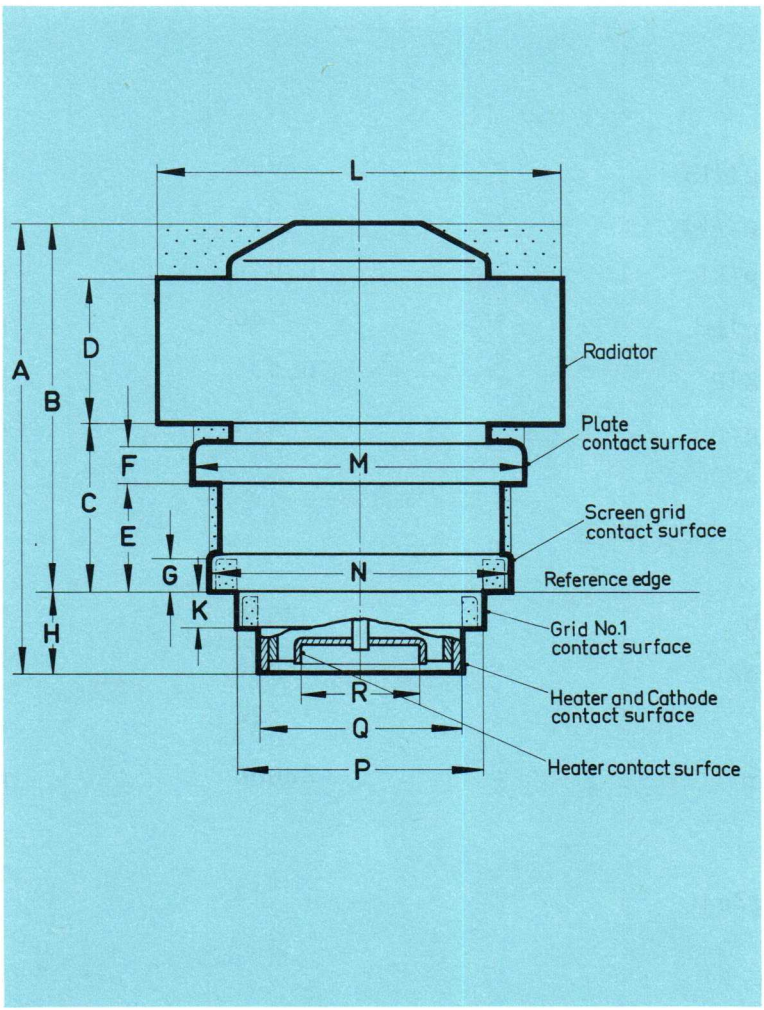


Table of Dimensions
(in mm)

	min	nom	max
A			61.0
B	48.3	49.3	50.3
C	21.8	22.7	23.6
D	18.7	19.2	19.7
E	14.0	14.6	15.2
F	3.7		
G	3.8		
H	9.6	10.1	10.6
K	4.5	5.0	5.5
L	51.6	52.3	53.0
M	44.3		
N	40.4		
P	32.8		
Q	25.1		
R			17.0

Weight: approx 235 gm
Mounting position: any

The dotted area must be kept free. Contacts or other parts of the resonator should not project into this area. The diameters of the dotted zones above the radiator, control grid and screen grid contact surfaces correspond to diameters of these parts.

Heating

Heater voltage	E_f	=	6.3	V (1)
Heater current	I_f	≈	7.5	A
Preheating time	t_k	≥	2	min

indirect by ac or dc, parallel supply

Matrix oxide cathode

Capacitances

Grid No. 1 to cathode, heat.	$C_{g1/kf}$	=	27.5	µµf
Grid No. 2 to cathode, heat.	$C_{g2/kf}$	≤	0.8	µµf
Plate to cathode, heater	$C_{p/kf}$	≤	0.010	µµf
Grid No. 1 to grid No. 2	C_{g1g2}	=	40	µµf
Plate to grid No. 1	C_{g1p}	≤	0.135	µµf
Plate to grid No. 2	C_{g2p}	=	5.4	µµf

Characteristics

Plate voltage	E_b	=	2500	Vdc
Grid No. 2 voltage	E_{c2}	=	400	Vdc
Plate current	I_b	=	240	mAdc
Transconductance	S_m	=	22000	µmhos
Amplification factor of grid No. 2 with respect to grid No. 1	μ_{g2g1}	=	12	

(1) In the interests of long life, the heater voltage should be reduced depending on the operating frequency and drive level. Regarding the optimum heater voltage the manufacturer should be consulted.

Maximum Ratings

(absolute values)

Frequency	F	≤	1250	Mc
Plate voltage	E_b	max	2500	Vdc
Grid No. 2 voltage	E_{c2}	max	1200	Vdc
Grid No. 1 voltage	E_{c1}	max	-250	Vdc
Plate current	I_b	max	500	mAdc
Grid No. 1 current	E_{c1}	max	100	mAdc
Plate dissipation	P_p	max	700	W
Grid No. 2 dissipation	P_{g2}	max	25	W (3)
Surface temperature	T_{surf}	max	250	°C

Operating Characteristics

Frequency	F	=	920	790	470	Mc
Power output	P_o	=	530 (1)	600 (1)	730 (2)	W
Plate voltage	E_b	=	2500	2500	2500	Vdc
Grid No. 2 voltage	E_{c2}	=	400	400	400	Vdc
Grid No. 1 voltage	E_{c1}	≈	-60	-45	-35	Vdc
Plate current	I_b	=	500	500	500	mAdc
Grid No. 2 current	I_{c2}	=	6	7	8	mAdc
Grid No. 1 current	I_{c1}	=	10	11	12	mAdc
Drive power	P_d	=	55	35	30	W

(1) Power output at 75 % circuit efficiency including transferred power

(2) Power output at 80 % circuit efficiency including transferred power

(3) When determining the dissipation power, secondary emission should be taken into consideration.

Maximum Ratings (absolute values)

Frequency	F	$\leq$	1250	Mc
Plate voltage	E_b	max	2500	Vdc
Grid No.2 voltage	E_{c2}	max	1200	Vdc
Grid No.1 voltage	E_{c1}	max	-250	Vdc
Plate current	I_b	max	500	mAdc
Grid No.1 current	E_{c1}	max	100	mAdc
Plate dissipation	P_p	max	700	W
Grid No.2 dissipation	P_{g2}	max	25	W (1)
Surface temperature	T_{surf}	max	250	°C

Operating Characteristics

Frequency	F	=	650	Mc
Synchron power output (IM_3 > 51 db)	$P_{o\,syn}$	=	50	W(2,3,4,5)
Synchron drive power (IM_3> 57 db)	$P_{d\,syn}$	=	2	W(3)
Plate voltage	E_b	=	2500	Vdc
Grid No.2 voltage	E_{c2}	=	400	Vdc
Grid No.1 voltage	E_{c1}	=	-22.5	Vdc
Zero signal plate current	I_{bo}	=	270	mAdc
Plate current	I_b	=	300	mAdc

(1) When determining the dissipation power, secondary emission should be taken into consideration

(2) Power output at 90 % circuit efficiency

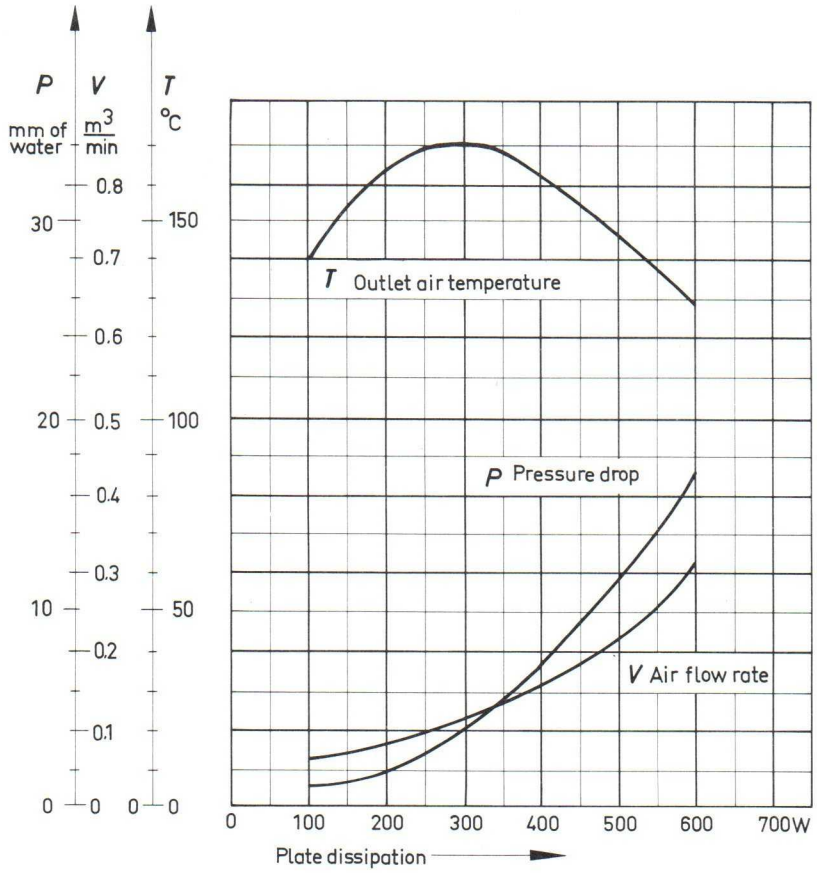
(3) IM_3 third order intermodulation ratio measured according to the ARD specification 5/6

(4) With 1 db bandwidth of 10 Mc and overcoupling

(5) Visual to aural carrier separation 7 db

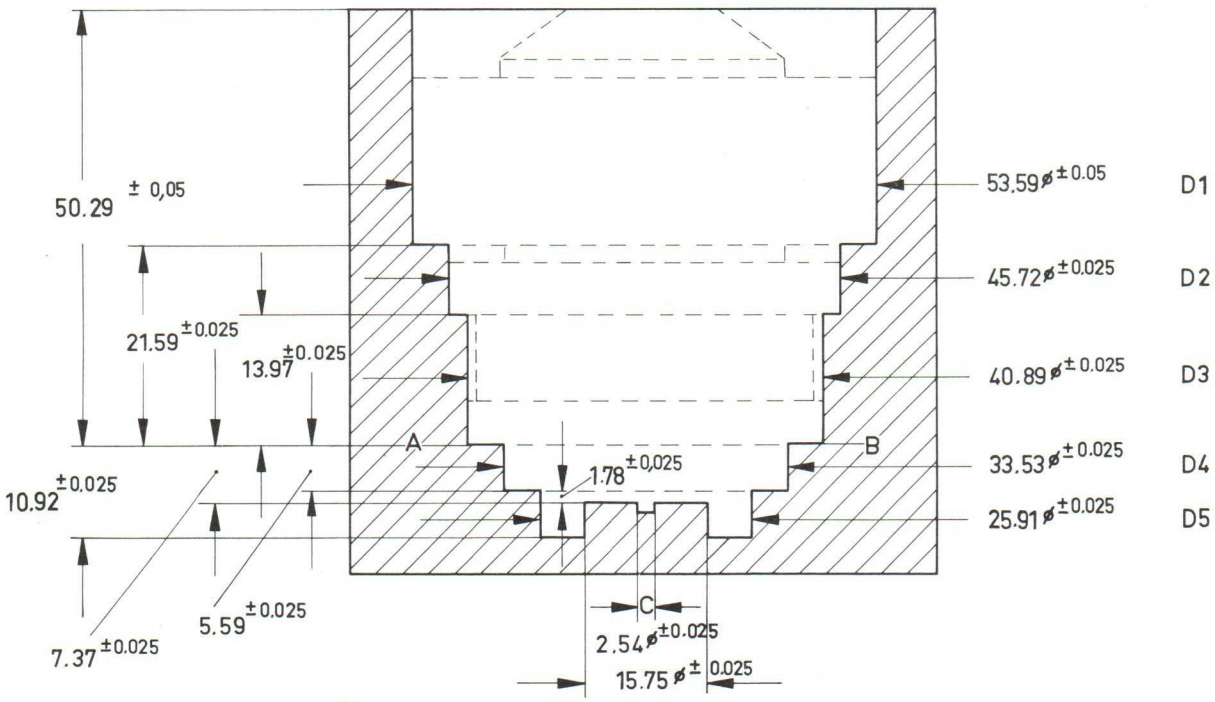
Cooling

For removing the heat, the tube must be air-cooled. The amount of air at an inlet temperature of 25 °C required to cool the radiator as a function of the plate is shown in the graph below.
With regard to the life time of the tube it is recommended to keep the plate temperature below the maximum limit of 250 °C as far as possible by increasing the amount of air.
The diagram applies to the usual method of supplying the cooling air i.e. axially from the electrode contact side. Supply of air from the plate side is also permissible, although a somewhat larger quantity of air is then required. An air cooling characteristic for the latter case can be supplied on demand.
It is also of purpose to use the inlet or exhaust air to cool the grid and cathode contact surfaces. The given air cooling characteristic is only valid for the pressure drop at the anode radiator, and pressure losses in the supply pipes or cavities must be additionally accounted for when selecting the blower.
The cooling air has to be filtered to prevent clogging of the radiator.



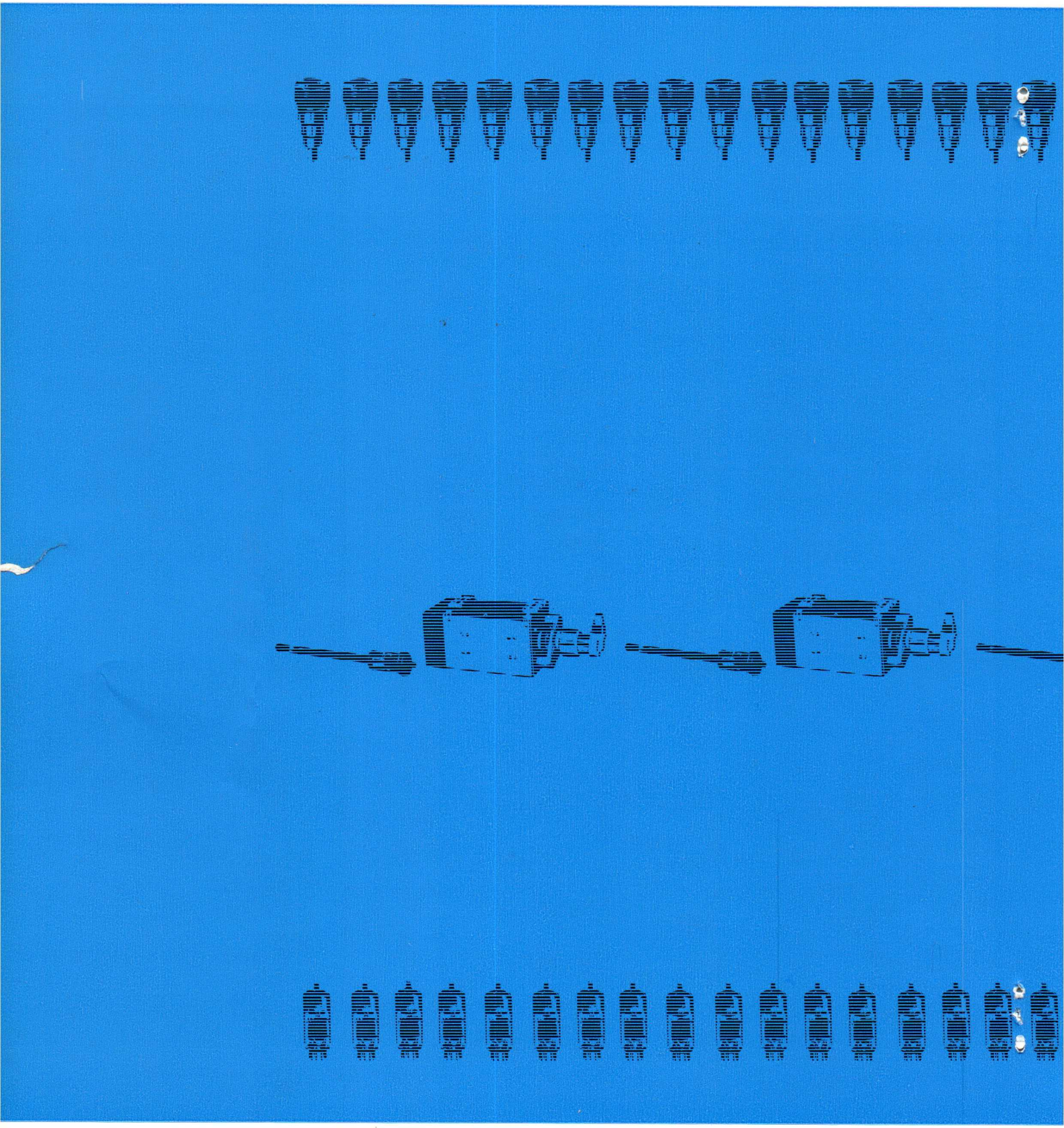
Mounting

The cylindrical surfaces of the electrode connections and radiator permit the tube to be inserted into a gauge with the following dimensions:



Dimensions in mm

The eccentricity of the bore holes D1 to D5 is less than 0.02 mm compared with C.



SIEMENS AKTIENGESELLSCHAFT