

RF POWER TRIODE

Forced-air-cooled triode in metal-ceramic construction intended for use as industrial oscillator.

QUICK REFERENCE DATA

Oscillator output power ($W_o - W_{\text{feedb}}$), typical	W_{osc}	50 kW
Frequency for full ratings	f	max. 100 MHz

To be read in conjunction with "General Operational Recommendations".

RF CLASS C OSCILLATOR FOR INDUSTRIAL USE

OPERATING CONDITIONS

Frequency	f	90	90	90 MHz
Oscillator output power ($W_o - W_{\text{feedb}}$)	W_{osc}	33	40	50 kW
Anode voltage	V_a	8,5	10	12 kV
Anode current	I_a	5,4	5,4	5,4 A
Anode input power	W_{ia}	45,9	54,0	64,8 kW
Anode dissipation	W_a	11,6	12,5	13,2 kW
Anode output power	W_o	34,4	41,5	51,6 kW
Anode efficiency	η_a	75	77	80 %
Oscillator efficiency	η_{osc}	72	74	77 %
Feedback ratio	V_{gp}/V_{ap}	17	16	14 %
Grid resistor	R_g	700	900	1100 Ω
Grid current, on load	I_g	1,2	1,1	1,0 A
Grid voltage, negative	$-V_g$	840	1000	1100 V
Grid dissipation	W_g	360	340	320 W
Grid resistor dissipation	W_{Rg}	1000	1100	1200 W

LIMITING VALUES (Absolute maximum rating system)

Frequency for full ratings	f	up to	100 MHz
Anode voltage	V_a	max.	14,5 kV
Anode current	I_a	max.	7 A
Anode input power	W_{ia}	max.	72 kW
Anode dissipation, continuous service *	W_a	max.	15 kW
Grid voltage	$-V_g$	max.	2 kV
Grid current			
on load	I_g	max.	1,2 A
off load	I_g	max.	1,6 A
Grid dissipation	W_g	max.	400 W
Grid circuit resistance	R_g	max.	15 k Ω
Cathode current			
mean	I_k	max.	8 A
peak	I_{kp}	max.	40 A
Envelope temperature	T_{env}	max.	240 °C

HEATING: direct; thoriated tungsten filament, mesh construction

Filament voltage	V_f	7 V
Filament current	I_f	175 A
Peak filament starting current	I_{fp}	max. 1000 A
Cold filament resistance	R_{fo}	4,2 m Ω

The filament is designed to accept temporary fluctuations of +5% and -10%.

To ensure that the cathode temperature remains constant irrespective of the operating frequency, it may be necessary to reduce the filament voltage at higher frequencies. When doing so it must be borne in mind that the filament voltage-to-current ratio measured with only the filament voltage applied should remain constant under all operating conditions.

It is extremely important that the filament be properly decoupled. This should be done so that the resonance of the circuit formed by the filament and the decoupling elements remain below the fundamental oscillator frequency. In grounded-grid circuits this resonance should be below the grid-cathode resonance. For further information please see Application Book "Tubes for RF Heating" or consult the manufacturer.

CAPACITANCES

Anode to filament	C_{af}	0,8 pF
Grid to filament	C_{gf}	60 pF
Anode to grid	C_{ag}	21 pF

* See Fig. 3.

CHARACTERISTICS measured at $V_a = 11$ kV, $I_a = 1,5$ A

Transconductance	S	22 mA/V
Amplification factor	μ	24

COOLING

To obtain optimum life, the temperature of the seals and of the envelope should, under normal operating conditions, be kept below 200 °C.

To maintain these temperatures additional cooling may be necessary. At frequencies higher than about 4 MHz cooling of the seals becomes mandatory.

Table 1 Air cooling characteristics

If used with insulating pedestal type 40648:

Anode + grid dissipation $W_a + W_g$ kW	Altitude h m	Inlet temperature T_i °C	Rate of flow q_{min} m ³ /min	Pressure drop ΔP Pa *	Outlet temperature T_o °C
15	0	35	15	850	92
10	0	35	9,3	350	99
8	0	35	7	220	104
15	0	45	17,3	1060	98
10	0	45	10,7	440	104
8	0	45	8,1	270	108
15	1500	35	18	970	93
10	1500	35	11,2	400	100
8	1500	35	8,4	250	104
15	3000	25	19	950	90
10	3000	25	11,8	390	95
8	3000	25	8,9	250	99

* 1 Pa $\approx$ 0,1 mm H₂O.

MECHANICAL DATA

Dimensions in mm

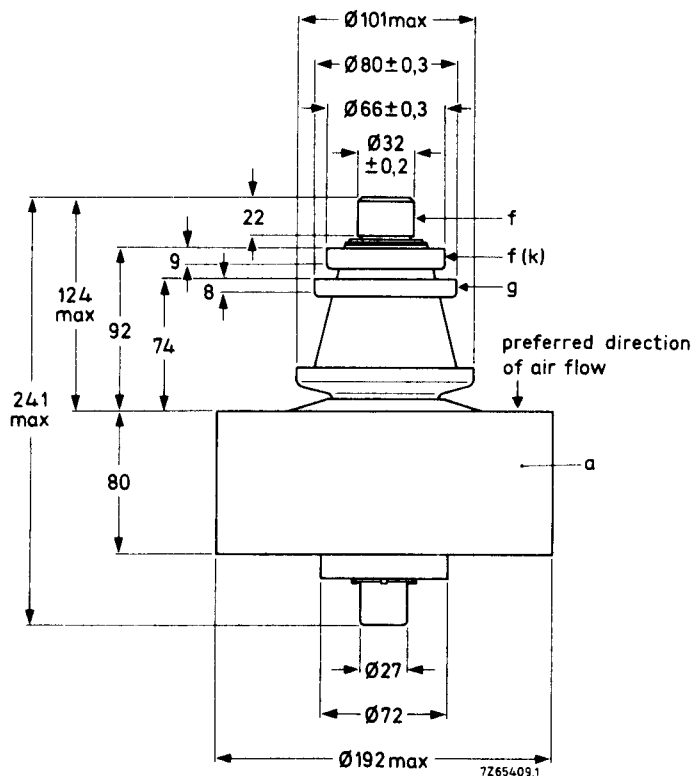
Mounting position: vertical with anode up or down**Net mass:** approx. 12 kg

Fig. 1 Mechanical outline.

ACCESSORIES

Filament connector with cable	type 40708A
Filament/cathode connector with cable	type 40709A
Grid connector ≤ 4 MHz	type 40710
Grid connector > 4 MHz	type 40711
Insulating pedestal	type 40648

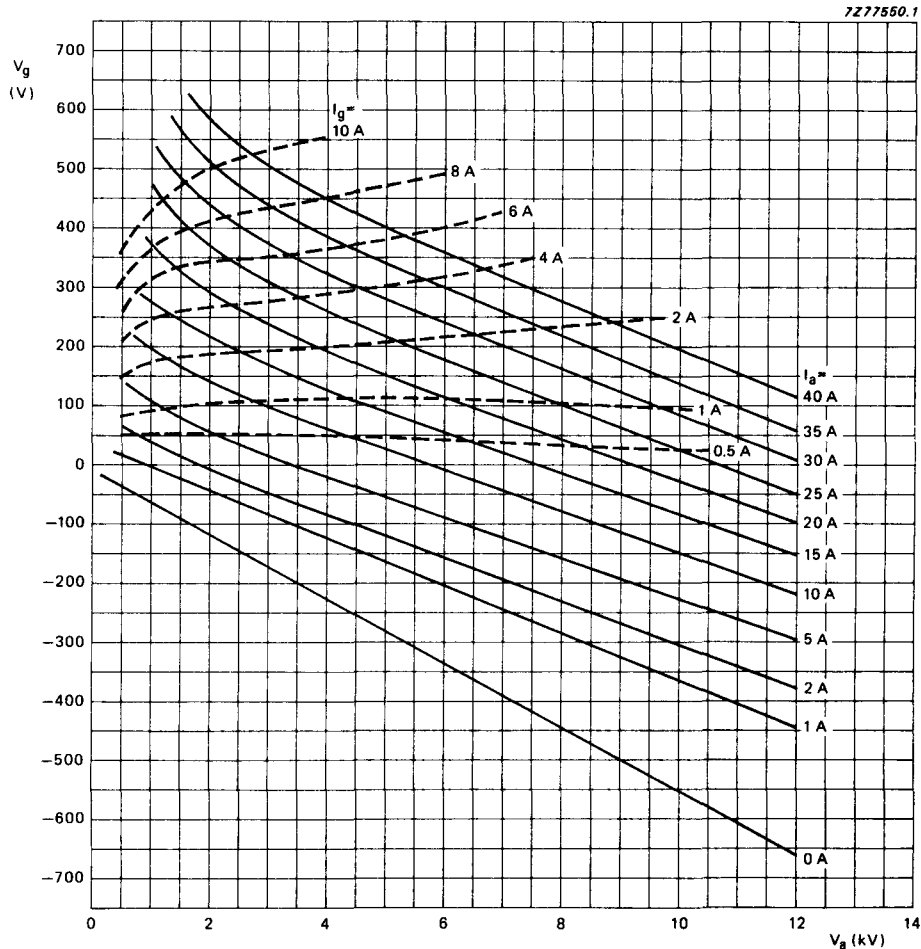


Fig. 2 Constant current characteristics.

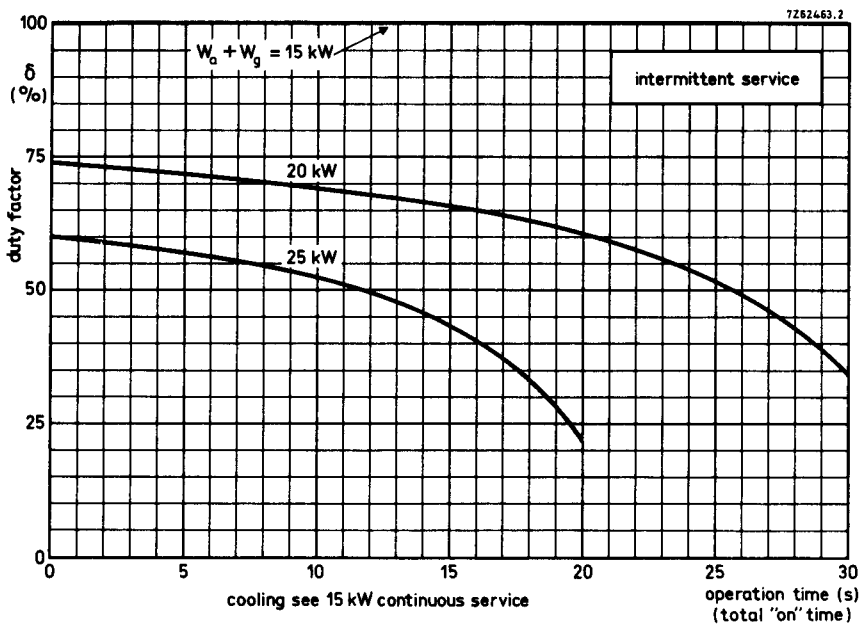
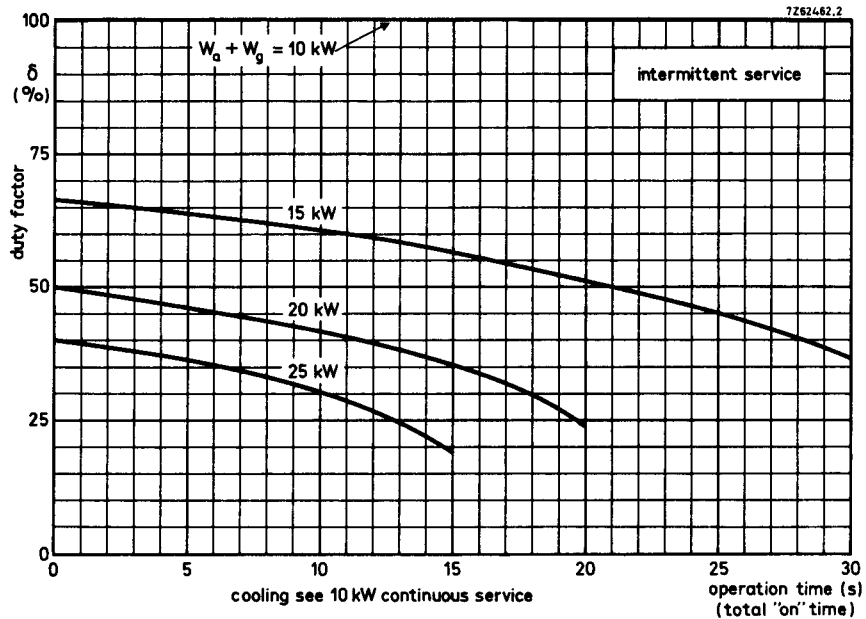


Fig. 3 Intermittent service. Limits of anode dissipation and cooling.

PHILIPS

Data handbook



**Electronic
components
and materials**

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