

# Amperex

## YD1195/8913 YD1197/8937 RF Power Triodes

The YD1195/8913 and YD1197/8937 are RF power triodes in metal-ceramic construction intended for use as industrial oscillators. The YD1195 is forced-air cooled. The YD1197 has an integral water cooler.

### GENERAL DATA

#### Electrical:

Direct, Filament-Thoriated Tungsten	Mesh Construction
Voltage <sup>Note 1</sup>	8.4 V
Current	235 A

**Characteristics:** measured at:  $V_a = 12$  kV,  $I_a = 3$  A

Amplification Factor	$\mu$	50	
Transconductance	S	80	mA/V
Direct Interelectrode Capacities:			
Grid-Anode	$C_{ag}$	33	pF
Grid-Filament	$C_{gf}$	100	pF
Anode-Filament	$C_{af}$	1.2	pF
Peak filament starting current	$I_{fp}$	max. 1500	A
Cold filament resistance	$R_{fo}$	max. 3.9	m $\Omega$

#### Mechanical:

	<u>YD1195/8913</u>	<u>YD1197/8937</u>
Overall Dimensions:		
Length	294	351 mm (max)
Diameter	214-216	160.5 mm (max)
Mounting Position	See outline drawings	
Cooling Type:	air	water

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**YD1195/8913, YD1197/8937**

**Cooling:**

To obtain optimum life, the temperature of the seals/envelope should, under normal operating conditions, be kept below 200°C. To maintain these temperatures additional cooling may be necessary.

At low frequencies the seals are sufficiently cooled when the filament connectors are water cooled with a flow of about 0, 5 l/min. At higher frequencies, however, an additional air flow of about 1 m<sup>3</sup>/min must be led along the seals from a 30 mm diameter nozzle positioned at a distance of 200 mm from the tube header.

**YD1195/8913 Table 1: Air cooling characteristics**

anode + grid dissipation $W_a + W_g$ (kW)	Altitude  h (m)	inlet temperature $T_i$ (°C)	rate of flow $q_{min}$ (m <sup>3</sup> /min)	pressure drop $\Delta P$ (Pa*)	outlet temperature $T_o$ (°C)
30	0	35	34	1200	84
25	0	35	27.2	780	87
20	0	35	21.4	480	89
30	0	45	38	1500	91
25	0	45	30.4	980	93
20	0	45	23.9	600	95
30	1500	35	41	1380	84
25	1500	35	32.7	900	87
20	1500	35	25.7	550	89
30	3000	25	43	1350	79
25	3000	25	34.4	880	83
20	3000	25	27	540	85

\* 1 Pa=0.1 mm H<sub>2</sub>O

**YD1197/8937 Table 2: Water cooling characteristics**

anode + grid dissipation $W_a + W_g$ (kW)	inlet temperature $T_i$ (°C)	rate of flow $q_{min}$ (l/min)	pressure drop $\Delta P$ (kPa**)	outlet temperature $T_o$ (°C)
50	20	26	60	49
	50	39	123	69
40	20	20	40	51
	50	30	80	71
30	20	14	24	53
	50	21	43	72
20	20	9	10	56
	50	13, 5	20	74

Absolute max. water inlet temperature

$T_i$  max 50 °C

Absolute max water pressure

P max 600 kPa\*\* (abs)

\*\*100 kPa=1 at

**LIMITING VALUES** (Absolute maximum rating system)

Frequency	f	up to		100 MHz
Anode Voltage	$V_a$	max.		14.4 kV
Anode Current	$I_a$	max.		15 A
Anode input power	$W_{ia}$	max.	YD1195	144 kW
	$W_{ia}$	max.	YD1197	150 kW
Anode dissipation (Continuous service)	$W_a$	max.	YD1195	30 kW
Anode dissipation (Intermittent service)	$W_a$	max.	YD1195*	
Anode dissipation	$W_a$	max.	YD1197	50 kW
Grid voltage	$-V_g$	max.		1.5 kV
Grid current, on load	$I_g$	max.		2.8 A
Grid current, off load	$I_g$	max.		3.8 A
Grid dissipation	$W_g$	max.		1 kW
Grid circuit resistance	$R_g$	max.		10 k $\Omega$
Cathode current				
mean	$I_k$	max.		17.5 A
peak	$I_{kp}$	max.		70 A
Envelope Temperature	$T_{env}$	max.		240 °C

**RF CLASS C OSCILLATOR FOR INDUSTRIAL USE  
OPERATING CONDITIONS**

		<u>YD1195/YD1197</u>			<u>YD1197</u>
Frequency	f	30	30	30 MHz	30 MHz
Oscillator output power (Wo-Wfeedb)	$W_{osc}$	60.6	74	90 kW	107.6 kW
Anode Voltage	$V_a$	8.5	10	12 kV	12 kV
Anode Current	$I_a$	10	10	9.75 A	12 A
Anode input power	$W_{ia}$	85	100	117 kW	144 kW
Anode dissipation	$W_a$	22.4	24	24.9 kW	34 kW
Anode output power	$W_o$	62.6	76	92.1 kW	110 kW
Anode efficiency	$n_a$	73.6	76	78.8 %	76.4 %
Oscillator efficiency	$n_{osc}$	71.2	74	77 %	74.7 %
Feedback ratio	$V_{gp}/V_{ap}$	12.5	10.9	9.4 %	11 %
Grid resistor	$R_g$	210	240	260 $\Omega$	230 $\Omega$
Grid current, on load	$I_g$	2.4	2.3	2.3 A	2.6 A
Grid voltage, negative	$-V_g$	500	550	600 V	600 V
Grid dissipation	$W_g$	760	730	720 W	840 W
Grid resistor dissipation	$W_{rg}$	1.2	1.27	1.38 W	1.56 W

Notes section:

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

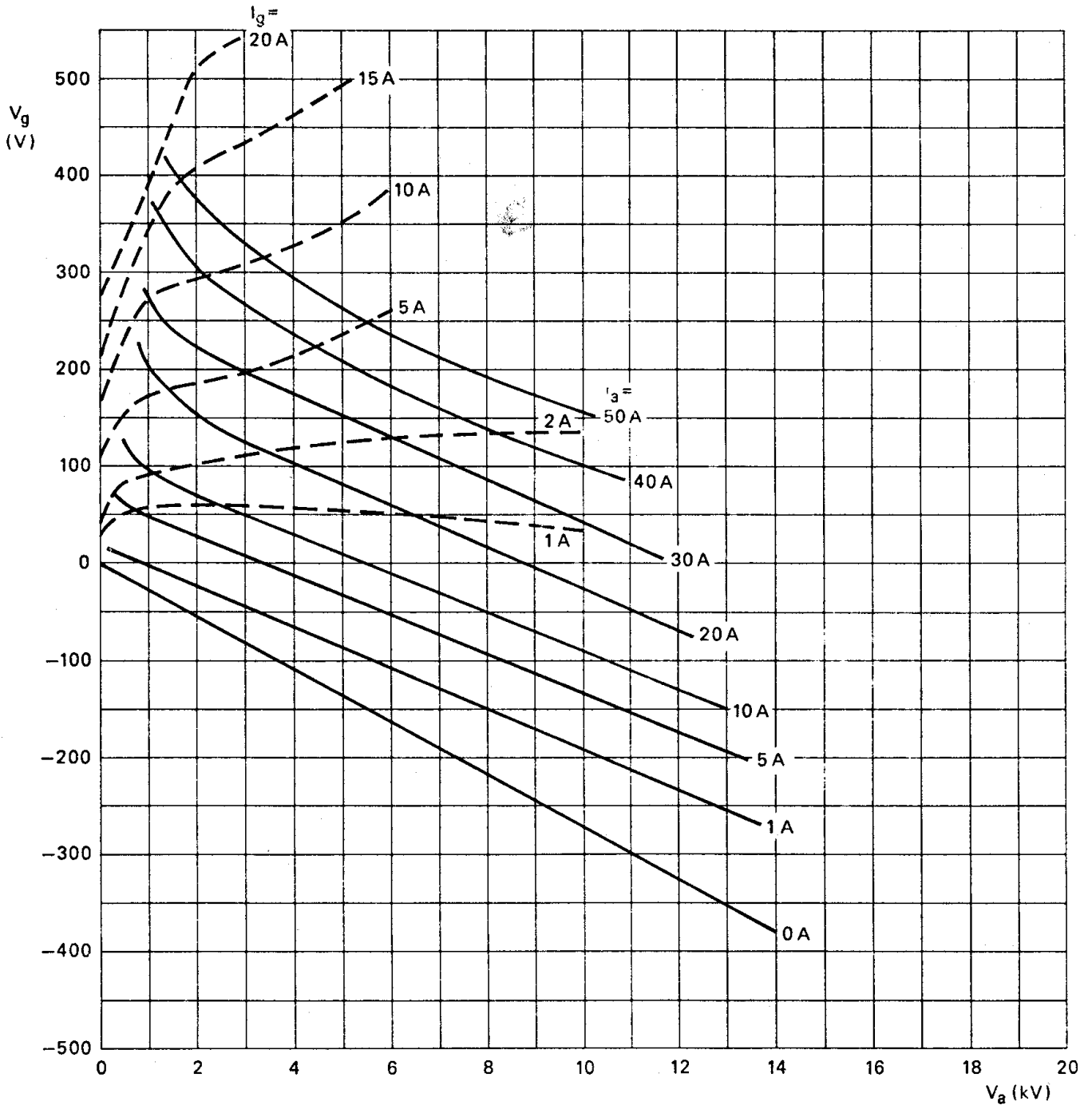
To ensure that the cathode temperature remains constant irrespective of the operating frequency it may be necessary to reduce the filament voltage at higher frequencies. When doing so, you must remember that the filament voltage-to-current ratio, as measured with only the filament voltage applied, should 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.

2. When the tubes are to be used at frequencies above 30 MHz the manufacturer should be consulted for more detailed information.

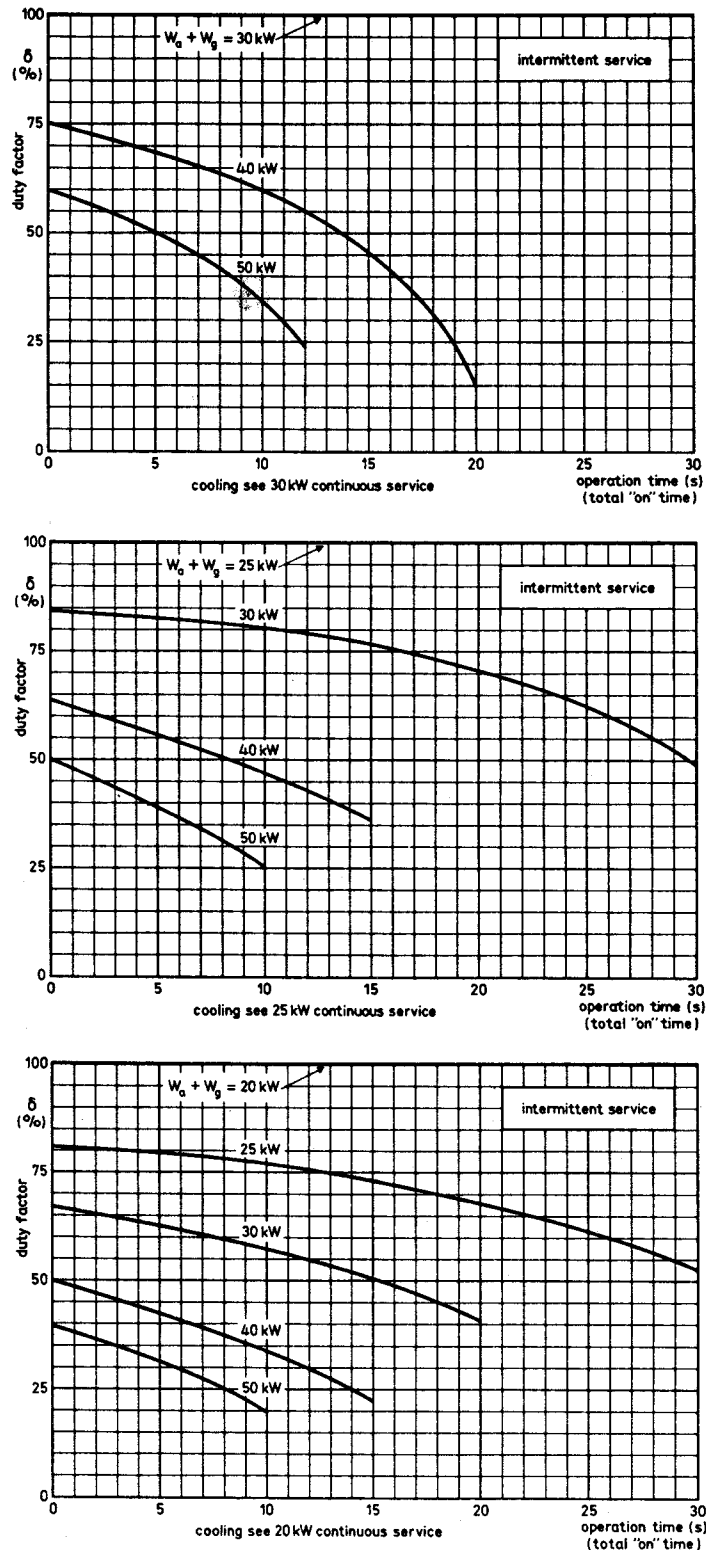
\*See Figure 2

Figure 1 - Constant Current Characteristics



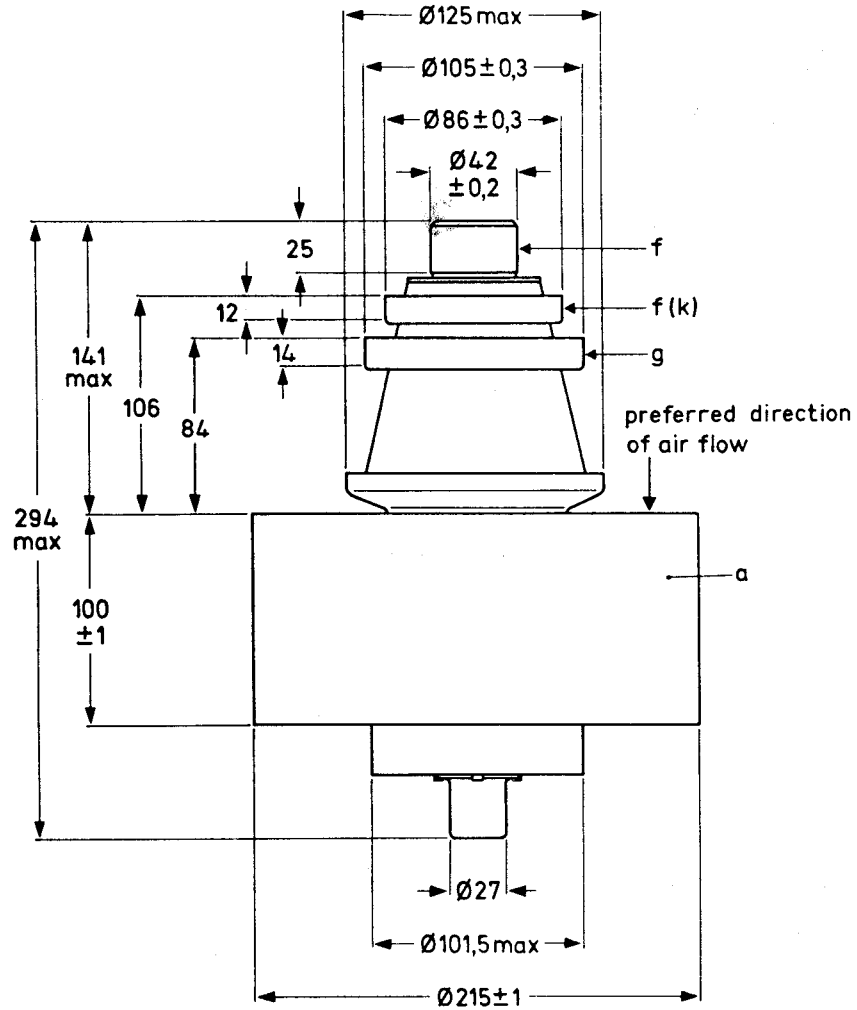
Characteristics and operating values are based upon performance tests. These figures may change without notice as the result of additional data or product refinement. Richardson Electronics, Ltd. should be consulted before using this information for final equipment design.

Figure 2 - Intermittent Service. Limits of anode dissipation and cooling.



**Figure 3 - Mechanical Outline**

\*Dimensions in mm



**MECHANICAL DATA:**

Net Mass: 20 kg

Mounting Position: Vertical with anode up or down.

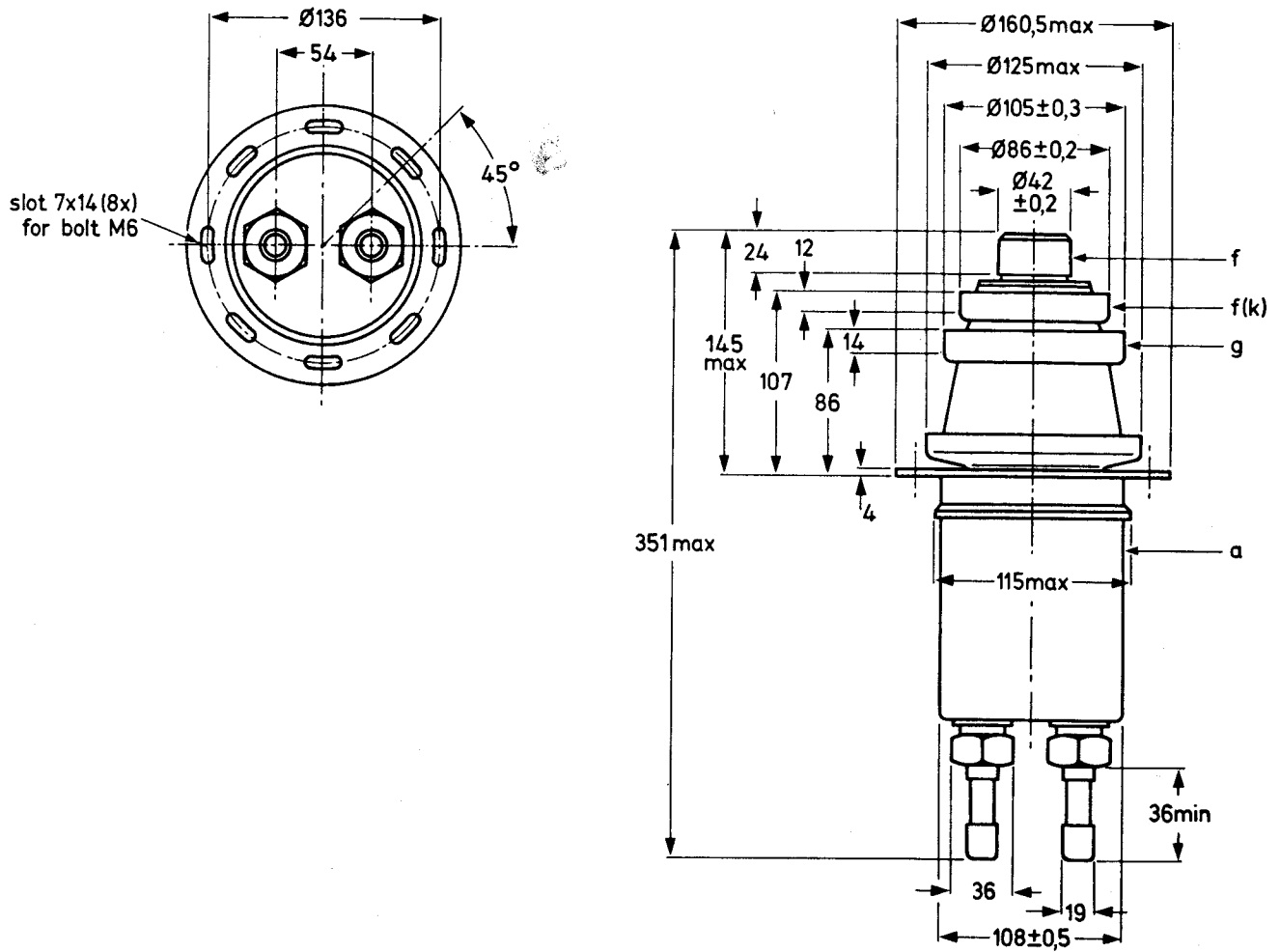
**ACCESSORIES:**

Filament connector with cable	type	40705A
Filament/cathode connector with cable	type	40706A
Grid connector	f ≤ 4 MHz	type 40707
	f > 4 MHz	type 40736
Insulating Pedestal (YD1195 only)	type	40729

\* Note: All dimensions for reference only.

**Figure 4 - Mechanical Outline**

\*Dimensions in mm



**MECHANICAL DATA:**

Net Mass: 6.5 kg

Mounting Position: Vertical , with the anode up or down.

Thread of water connections BSP 1 inch.

With the anode up, the inlet and outlet connections should be interchanged.

**ACCESSORIES:**

Filament connector with cable	type	40705A
Filament/cathode connector with cable	type	40706A
Grid connector	f ≤ 4 MHz	type 40707
	f > 4 MHz	type 40736

\* Note: All dimensions for reference only.