

Amperex

YD1174FL YD1178FL RF Power Triodes

The YD1174FL and YD1178FL are RF power triodes in metal-ceramic construction with flying leads intended for use as industrial oscillators. The YD1174FL is forced-air cooled. The YD1178FL has an integral water cooler.

GENERAL DATA

Electrical:

Direct, Filament-Thoriated Tungsten

Voltage ^{Note 1}	5.8	V
Current	130	A

Characteristics: measured at: $V_a = 6$ kV, $I_a = 2$ A

Amplification Factor	μ	24	
Transconductance	S	55	mA/V
Direct Interelectrode Capacities:			
Grid-Anode	C_{ag}	25	pF
Grid-Filament	C_{gf}	47	pF
Anode-Filament	C_{af}	1	pF

Mechanical:

	<u>YD1174FL</u>	<u>YD1178FL</u>	
Overall Dimensions:			
Length	520	539	mm (max)
Diameter	159	115	mm (max)
Mounting Position	See outline drawings		
Cooling Type:	air	water	

2/94



40W267 Keslinger Road
LaFox, IL 60147 USA
(630) 208-2200

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 frequencies higher than about 4 MHz, cooling of the seals becomes mandatory.

YD1174FL 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} l/min	pressure drop ΔP kPa*	outlet temperature T_o °C
10	0	35	9.5	550	94
8	0	35	6.5	280	105
6	0	35	4.5	150	113
4	0	35	3.0	80	117
10	0	45	11.0	690	98
8	0	45	7.6	350	108
6	0	45	5.2	190	115
4	0	45	3.5	100	119
10	1500	35	11.4	630	94
8	1500	35	7.8	320	105
6	1500	35	5.5	170	113
4	1500	35	3.6	90	117
10	3000	25	12.0	620	90
8	3000	25	8.2	320	102
6	3000	25	5.7	170	111
4	3000	25	3.8	90	116

Absolute maximum air inlet temperature: T_i max. 45°C

Direction of airflow: arbitrary

* 1 Pa=0.1 mm H₂O

YD1178FL 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
10	20	6.0	25	46
	50	9.0	52	67
8	20	4.5	15	49
	50	6.7	31	69
6	20	3.0	7	53
	50	4.5	15	72

Absolute max. water inlet temperature T_i max 50 °C

Absolute max water pressure P max 600 kPa

**100 kPa=1 at

A low velocity airflow may be required for cooling of the seals.

LIMITING VALUES (Absolute maximum rating system)

Frequency	f	up to	120 MHz ^{Note 2}
Anode voltage	V_a	max.	12 kV
Anode current	I_a	max.	5 A
Anode input power	W_{Ia}	max.	50 kW
Anode dissipation	W_a	max.	10 kW
Grid voltage	$-V_g$	max.	1.8 kV
Grid current, on load	I_g	max.	1 A
Grid current, off load	I_g	max.	1.5 A
Grid dissipation	W_g	max.	300 W
Grid circuit resistance	R_g	max.	10 k Ω
Cathode current			
mean	I_k	max.	6 A
peak	I_{kp}	max.	25 A
Envelope Temperature	T_{env}	max.	240 °C

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

Frequency	f	30	30 MHz
Oscillator output power (Wo-Wfeedb)	W_{osc}	25.7	30.3 kW
Anode voltage	V_a	10	10 kV
Anode current	I_a	3.4	4.0 A
Anode input power	W_{Ia}	34	40 kW
Anode dissipation	W_a	7.6	9.2 kW
Anode output power	W_o	26.4	30.8 kW
Anode efficiency	n_a	77.6	77.7 %
Oscillator efficiency	n_{osc}	75.6	75.8 %
Feedback ratio	V_{gp}/V_{ap}	12	10 %
Grid resistor	R_g	1440	900 Ω
Grid current, on load	I_g	600	690 A
Grid voltage, negative	$-V_g$	864	621 V
Grid dissipation	W_g	150	180 W
Grid resistor dissipation	W_{rg}	518	428 W
Peak filament starting current	I_{fp}	max.	800 A
Cold filament resistance	R_{fo}	max.	5.6 Ω

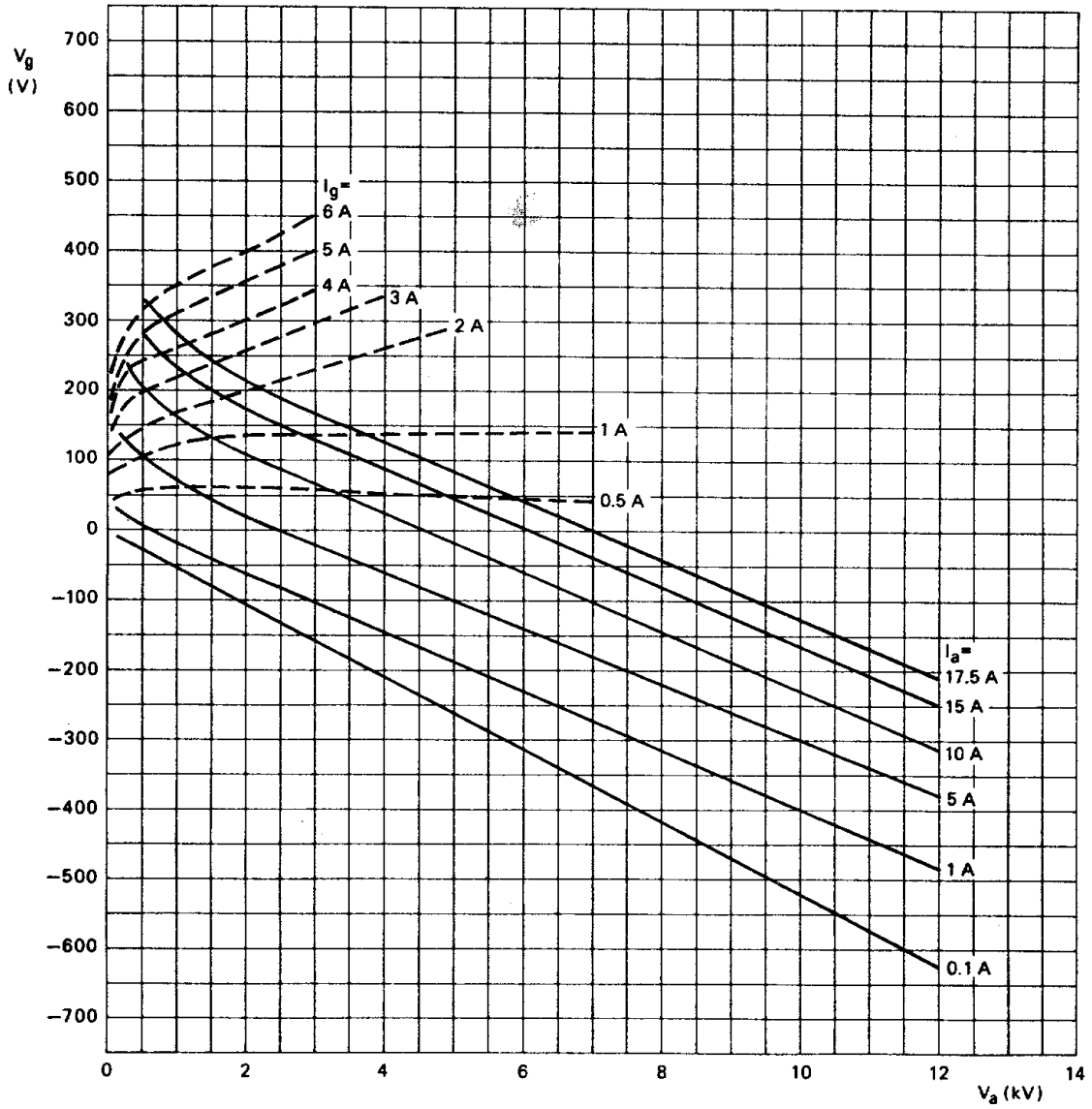
Notes section:

- 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.

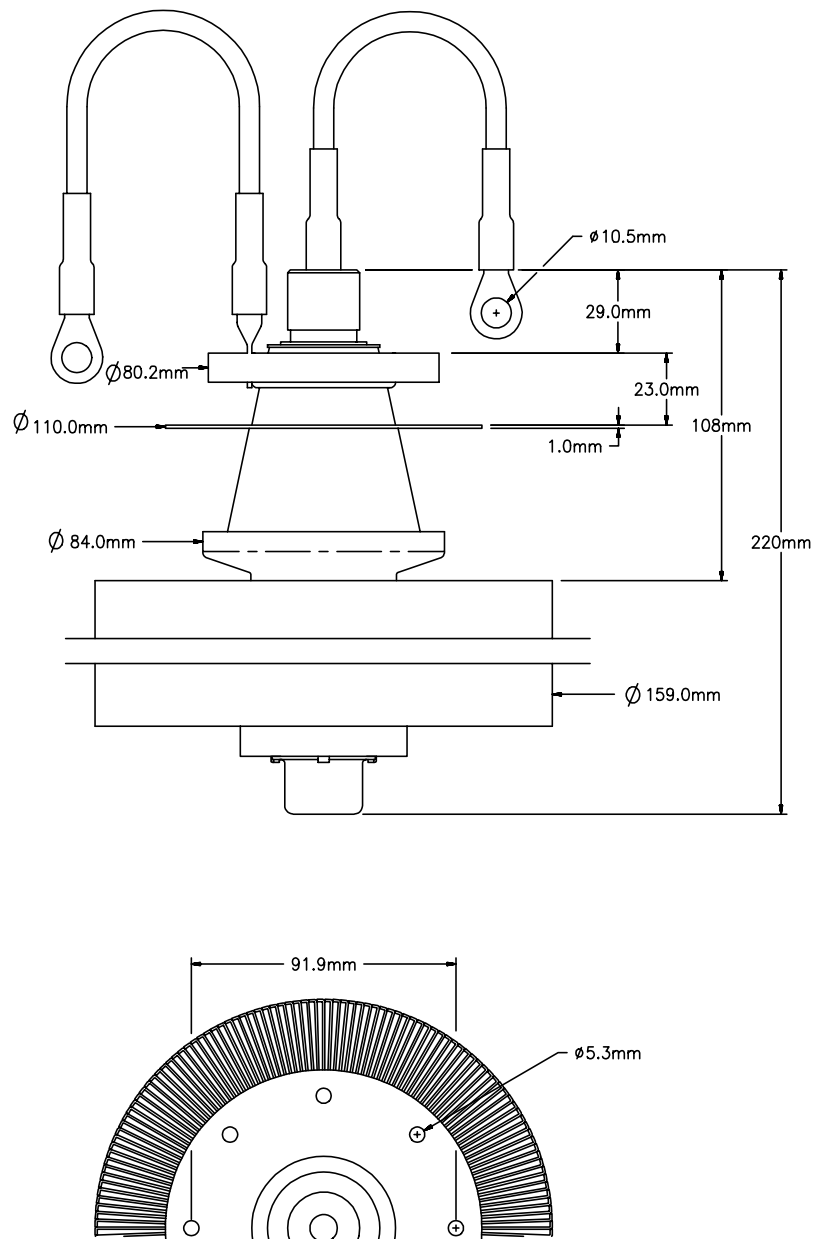
- When the tubes are to be used at frequencies above 50 MHz, the manufacturer should be consulted for more detailed information.

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 - Mechanical Outline
 *Dimensions in mm



MECHANICAL DATA:

Net Mass: 7.3 kg

Mounting Position: Vertical with anode up or down

ACCESSORIES:

Insulating Pedestal

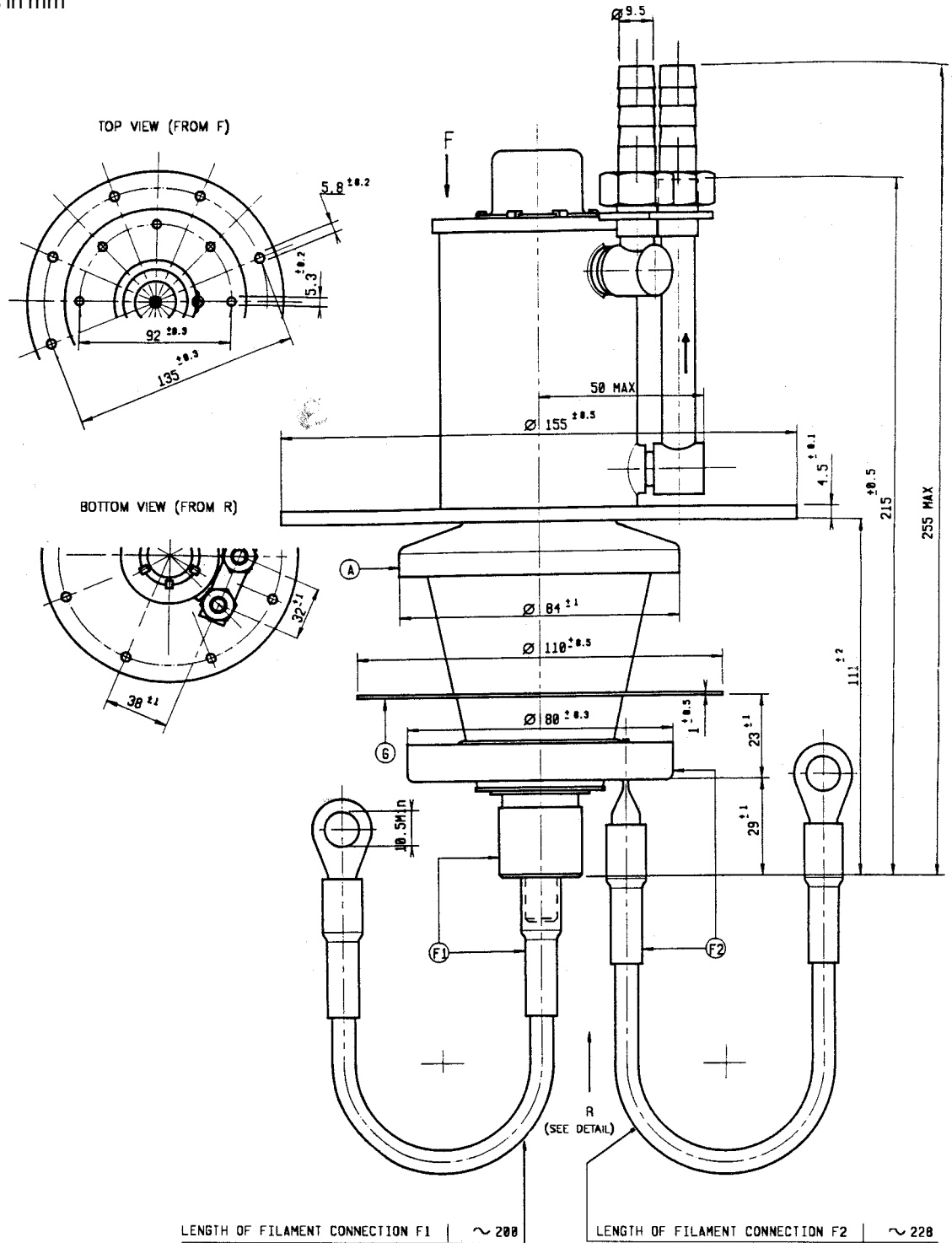
Type 40654

*Note: All dimensions for reference only.

YD1178FL

Figure 3 - Mechanical Outline

*Dimensions in mm



MECHANICAL DATA:

Net Mass: 2.2 kg

Mounting Position: Vertical with anode up or down

*Note: All dimensions for reference only.

Printed in U.S.A. 2/94