Coaxial Magnetron Launchers CMLD 1.3 and CML 1.3

Basic Description

The coaxial magnetron launchers CMLD 1.3 (Fig. 1) and CML 1.3 are compact, robust components that couple a class of standard 2.45-GHz Panasonic (and equivalent) magnetron types directly to a 7/8'' EIA coaxial line. This direct coupling removes the need for a cumbersome combination of a bulky waveguide launcher with a waveguide-to-coax adapter.

These launchers are compatible with a wider variety of magnetrons, and thus supersede the corresponding older models CMLD 1.2 and CML 1.2.

The employed noncontacting coupling of the magnetron antenna eliminates the problem of sparking and overheating that can arise in contacting junctions due to imperfect galvanic contact.

The CMLD launcher integrates a bidirectional detector. This allows simultaneous measurement of the incident and reflected powers (and thus the net power delivered to load), and provides signals for magnetron protection circuits.

The CML is an option without a bidirectional detector. All relevant parameters are the same, notably all dimensions except the total length (120 mm in CMLD, 69 mm in CML). A CML can be used when there is no need to monitor reflected power for magnetron protection: it is not recommended in initial design phases.

The maximum mean power of 2 kW is limited mainly by the 7/8'' EIA line specifications.

Fig. 1. Coaxial magnetron launcher CMLD 1.3.

Specifications

Electrical		
Examples of applicable magnetron types	2M213 (700 W) 2M107A (870 W) 2M214 (900 W) 2M167 (940 W)	2M244 (1 kW) 2M261 (1.1 kW) 2M137 (1.4 kW) 2M262 (1.5 kW)
Output coaxial line	7/8'' EIA (diameters 8.7 mm/20 mm)	
Frequency range	2425 – 2475 MHz	
Maximum working power	2 kW	
Directivity of the bidirectional detector couplers (min)	25 dB	
Detector output voltage; P_{IN} = 1 kW (typ)	315 mV	
Detector output connector	SMB-male	
Video resistance (typical)	10.2 kΩ	
Internal output capacitance	24 pF	
Mechanical		
Mass	0.75 kg (CMLD), 0.45 kg (CML)	
Length (axial dimension)	120 mm (CMLD), 69 mm (CML)	
Width	125 mm	
Height	95 mm	
Other		
Operating temperature range	-10 to +65 °C	
Storage temperature range	-20 °C to +80 °C	

CMLD Detector Correction Curve

A detector correction curve $P = f(V)$ is the inverse of its transfer curve $V = f(P)$ where P is the power of a wave propagating in the transmission line in a given direction, and V is the output voltage of the corresponding detector channel. The correction curve can be used, in particular in its mathematical form, to determinine the magnetron-generated and returned (reflected) powers. Fig. 2 shows a typical correction curve for the ambient temperature T_a = 25 °C, frequency 2450 MHz, and the recommended detector load resistance R_L = 33 kΩ.

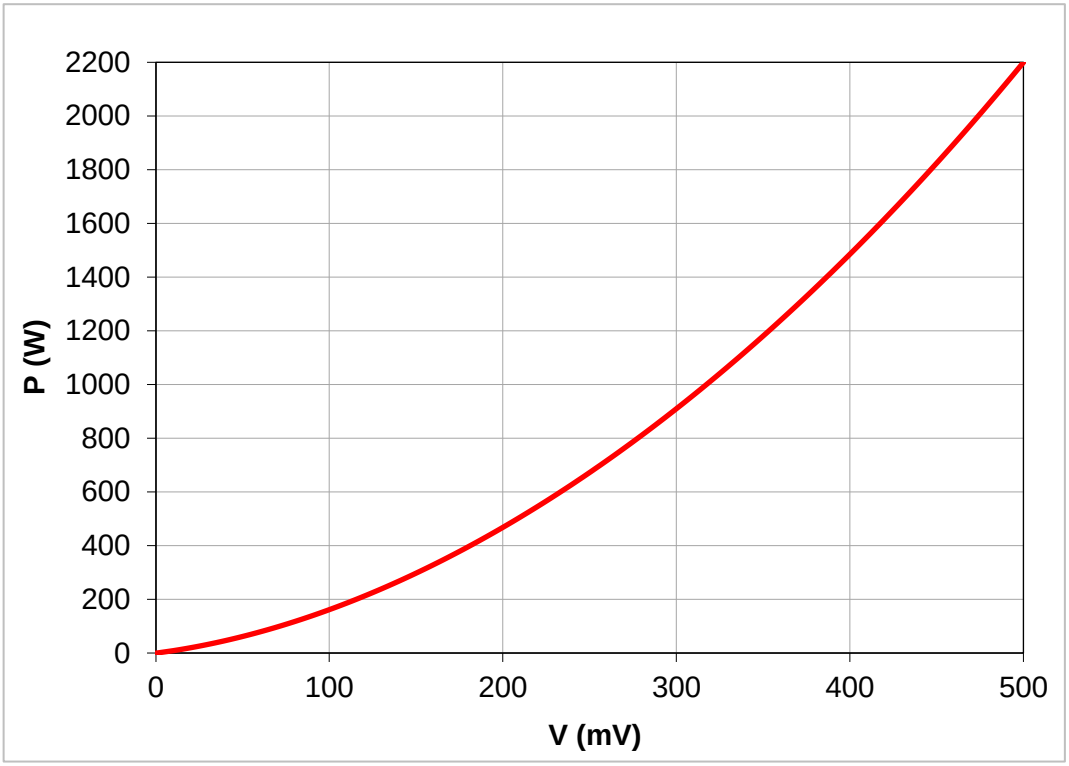

Fig. 2. Typical CMLD correction curve for both directions.

The correction curve can be approximated by the polynomial

$$P = d_1 V + d_2 V^2 + d_3 V^3 + d_4 V^4$$

where V is the detector output voltage in millivolts, P is the input microwave power in watts, and d_i are coefficients, listed in Tab. 1.

Tab. 1. Polynomial coefficients for CMLD correction curve.

Coefficient	Value
d_1	8.5407210E-01
d_2	7.9646036E-03
d_3	-3.1950403E-06
d_4	2.8934286E-09

Please note that this function is a statistical average based on evaluation of a number of detectors. The behavior of individual launchers may vary.

Basic Dimensions

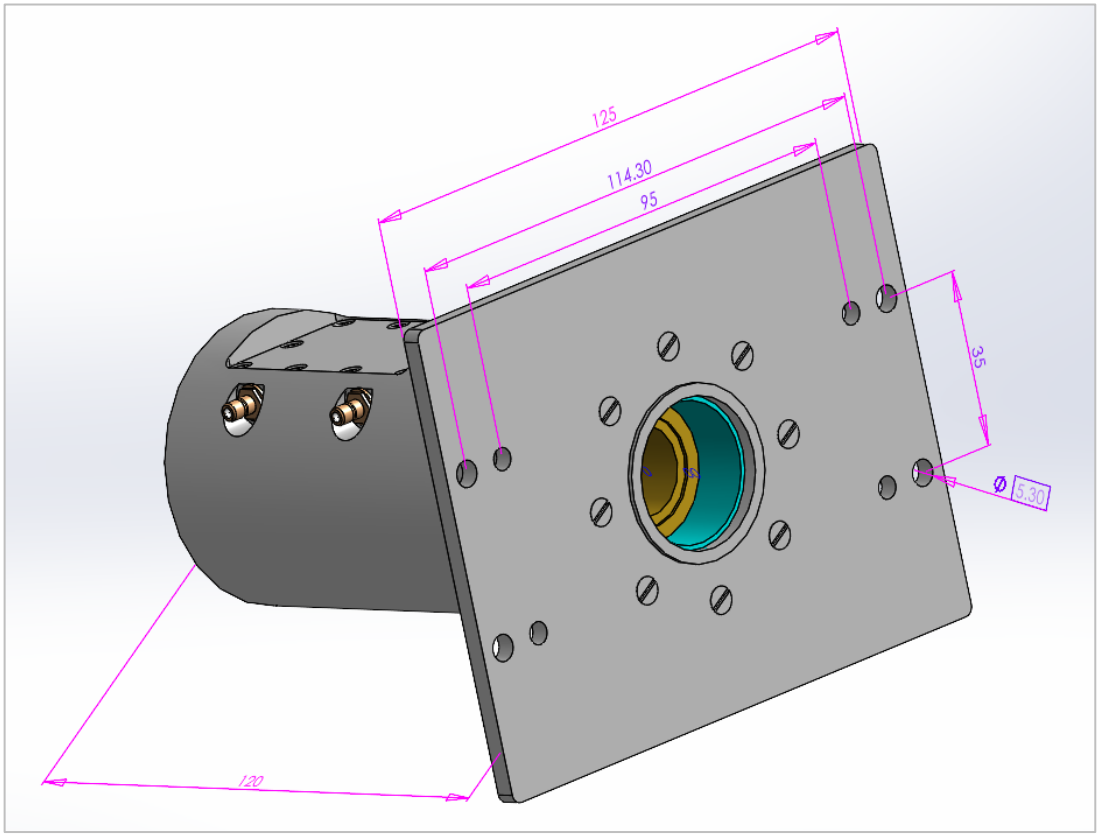

Fig. 3. Basic CMLD mounting dimensions. All dimensions are in millimeters. In CML, the total length is 69 mm.

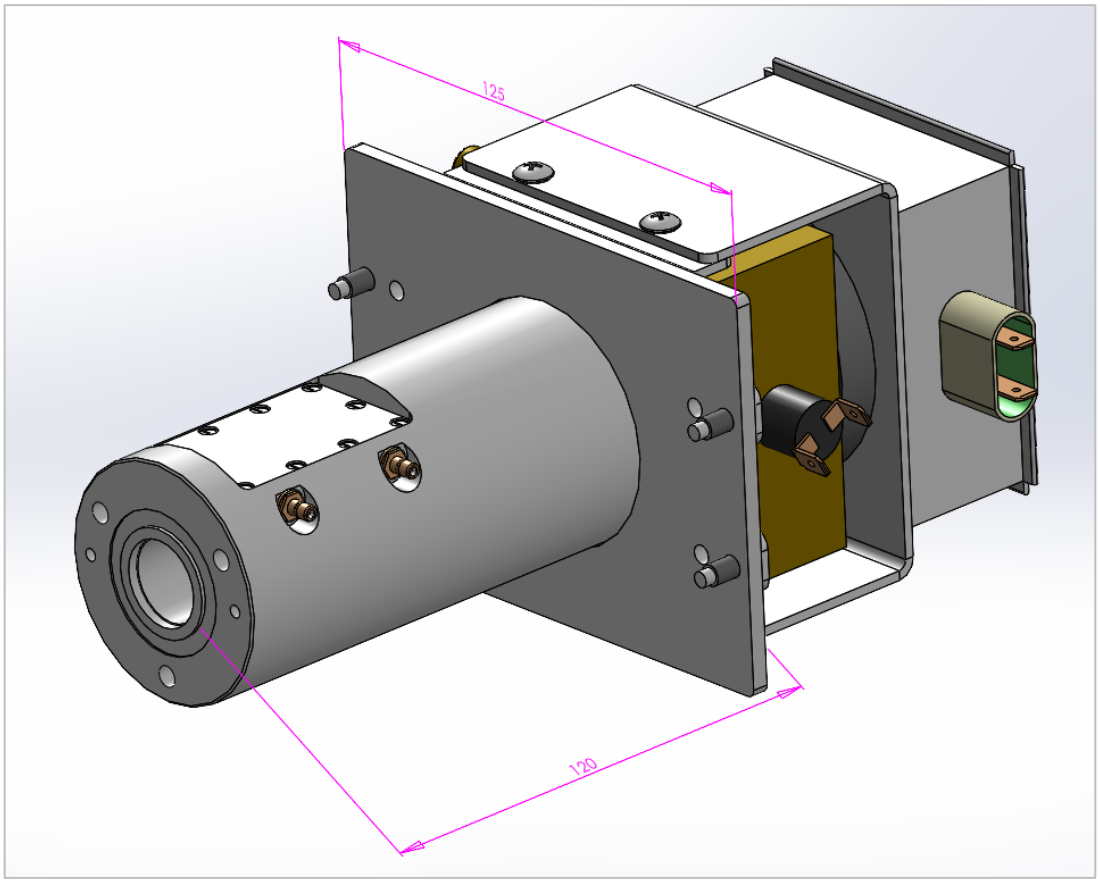

Fig. 4. Magnetron + Launcher assembly.

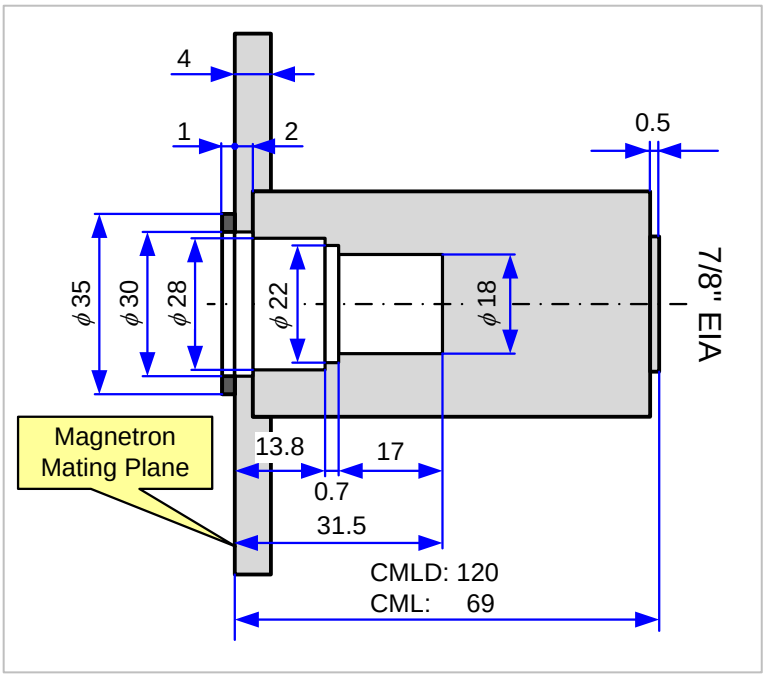

Fig. 5. Dimensions in millimeters of the cavity for magnetron antennas.