CMLD 1.2/CML 1.2: Coaxial Magnetron Launchers

Basic Description

The CMLD 1.2 (Fig. 1) and CML 1.2 coaxial magnetron launchers are compact, robust components connecting a class of standard 2.45-GHz Panasonic (and equivalent) magnetron types directly to 7/8'' EIA coaxial line, thus avoiding the need for a cumbersome combination of a bulky waveguide launcher with an additional waveguide-to-coax adapter.

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 equivalent to the BD142 that enables simultaneous measurement of the incident and reflected powers, and thus the net power delivered to load. The detector signals can also be used for activating magnetron protection circuits.

The CML is an option without a bidirectional detector. All relevant parameters are the same as those of the CMLD, including all physical dimensions except the total length (120 mm in CMLD, 69 mm in CML). The CML can be used when there is no need to monitor reflected power for magnetron protection. We do not recommended its use in initial design phases.

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

Fig. 1. Coaxial magnetron launcher CMLD 1.2.

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Specifications

Electrical	
Panasonic magnetron types	2M213 (0.7 kW) 2M107A (0.87 kW) 2M167 (0.94 kW) 2M244 (1 kW) 2M261 (1.1 kW)
Output coaxial line	7/8'' EIA
Frequency range	2425 – 2475 MHz
Maximum working power	2 kW
Directivity of the bidirectional detectors (CMLD)	25 dB min
Detector output voltage at magnetron power 1 kW	315 mV typ
Detector output connectors	SMB-male
Video resistance (typical)	10.2 kΩ
Internal output capacitance	180 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 is the inverse of the 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 serve, in particular in its mathematical form, for determining the magnetron-generated and returned powers. Fig. 2 shows a typical correction curve for an ambient temperature of T_a = 25 °C, frequency 2450 MHz, and detector load resistance R_L = 33 kΩ.

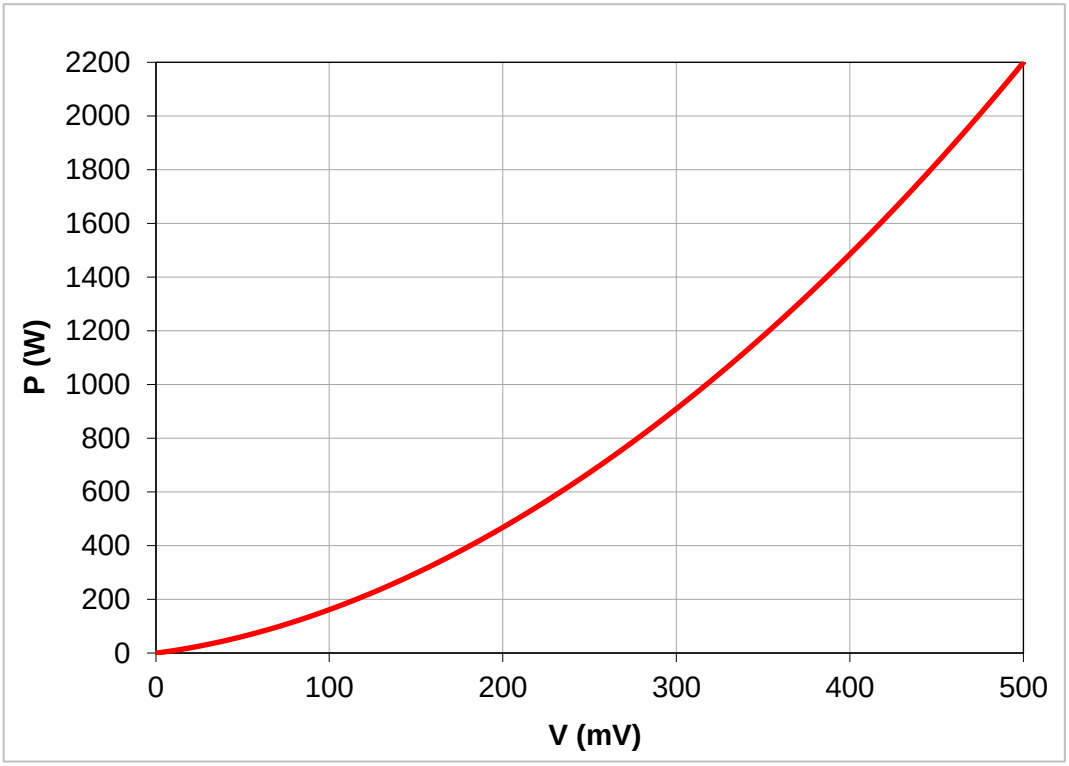

Fig. 2. Typical CMLD correction curve for both directions.

The curve can be approximated by the polynomial

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

where P is the input microwave power, V is the output voltage in millivolts, and d_i are the 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 be aware that the function is a statistical average based on the evaluation of a number of launcher detectors. The behavior of individual launchers may vary.

Basic Dimensions

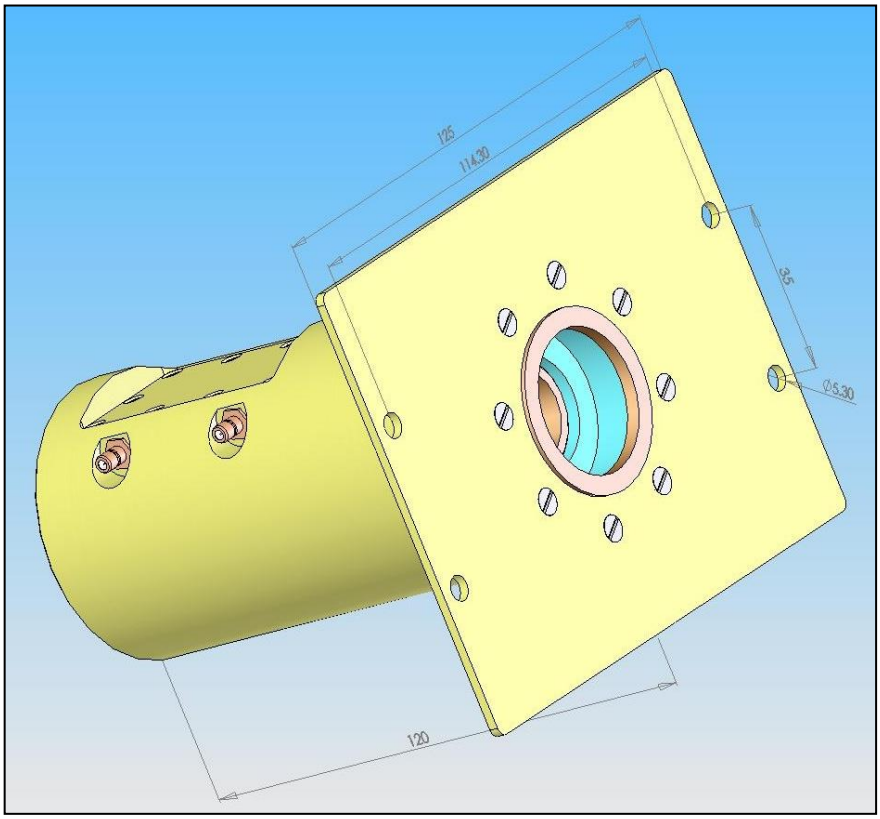

Fig. 3. Basic CMLD dimensions. All dimensions are in millimeters. In the CML, the total length is 69 mm instead of 120 mm.

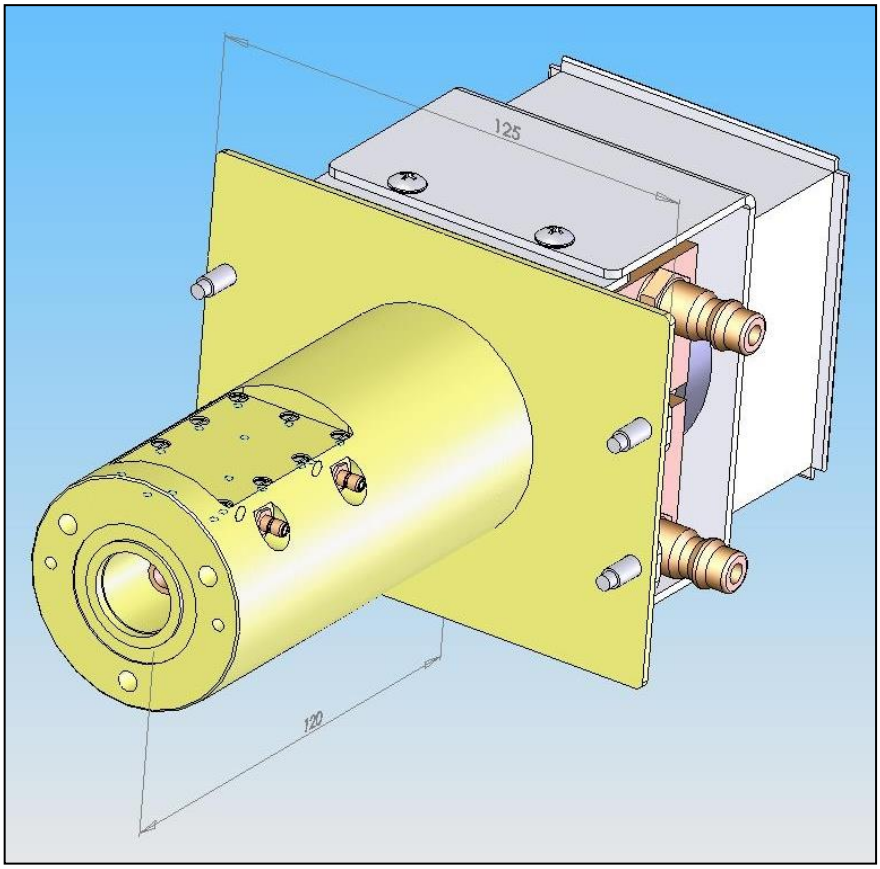

Fig. 4. Example of a magnetron-launcher assembly.

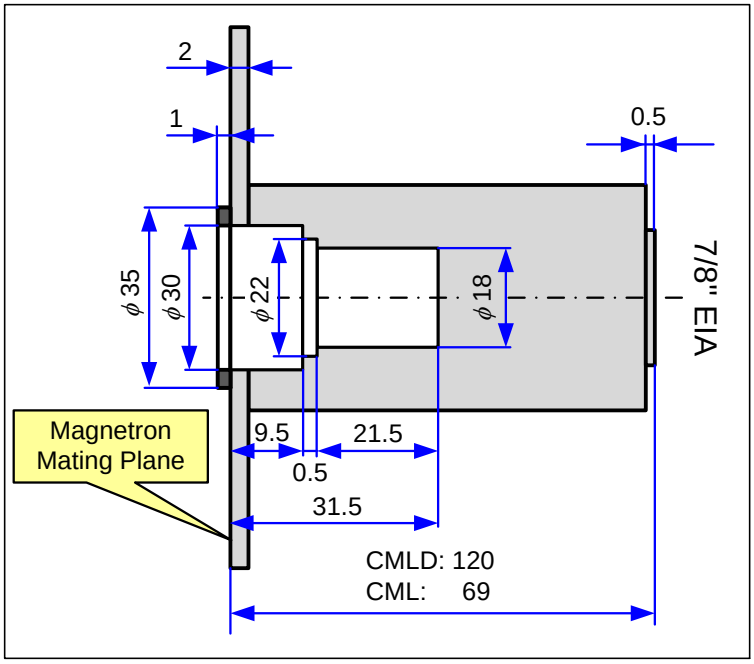

Fig. 5. Dimensions of the cavity for the magnetron antennas.