

Communications & Power Industries - Microwave Power Module

The PTXM1000 Microwave Power Module integrates a “Super Mini” Travelling Wave Tube (TWT), lineariser and an optimised high density switch mode power supply to produce a single “drop-in” microwave amplifier block for any CW application requiring the highest power, linear performance.

Integration of the TWT and its high voltage power supply simplifies the system designer’s task by eliminating the TWT interconnect (and their associated safety and reliability hazards). Integration further reduces the overall system size, simplifying the installation task.

The MPM is factory adjusted to optimise the TWT performance. No user adjustments are required, simplifying replacement and reducing replacement times in the field.

The MPM can be configured to incorporate a variety of TWT models, allowing the user to specify frequency and peak power parameters.

The PTXM1000 features a Ku band (13.75 GHz to 14.5 GHz) TWT capable of providing 110 W across the band. A low gain dual collector TWT is incorporated together with a low noise lineariser to provide optimum noise performance and maximum undistorted power capability.

A control interface is incorporated which allows remote operation and status monitoring, providing diagnostic outputs for BIT purposes.



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FEATURES:

- In addition to very small size and light weight, the unit features excellent thermal management. The high electrical efficiency of the unit ensures a highly reliable capability with minimum cooling over a wide operating temperature range.

BENEFITS:

- By virtue of the fully encapsulated high voltage section, the unit can operate at high altitudes and high humidity and will survive high levels of vibration and shock for operation in the harshest military environments

APPLICATIONS:

- These Microwave Power Modules are fully tested including temperature cycling to agreed acceptance test procedures before shipment, meeting the demands of high performance Ku band communications systems, high performance Radar and ECM systems.

RF Characteristics

Typical Operating Characteristics for the MPM incorporating a 13.75 to 14.5 GHz, 100 W TWT ^{Note 1}.

Frequency Range	13.75 to 14.5 GHz
RF Output Power (Saturated)	110 W (+50.4 dBm) min (14.0 to 14.5 GHz)
Duty Cycle	100% (CW operation only)
Small Signal Gain	53 dB Nom +/- 3 dB
Small Signal Gain Stability	+/-2.0 dB max over 24 hours and over temperature range
Small Signal Gain Variation	+/-1.5 dB over 500 MHz bandwidth
RF Input Power (for saturation)	0 dBm typical
Second Harmonic at saturation	-15 dBc Max with matched load
Noise Power Density (Beam On)	-32 dBm/MHz max
Maximum spurious PM	-60 dBc max (Excluding +/-1MHz of carrier frequency)
Single sideband CW equivalent Phase Noise Power Density	-40 dBc/Hz @ 10 Hz from carrier -60 dBc/Hz @100 Hz from carrier -80 dBc/Hz Max at 1 kHz from carrier -90 dBc/Hz Max at 10 kHz from carrier -100 dBc/Hz Max at >100 kHz from carrier
Noise Figure	10 dB (typical)
Input VSWR	1.5:1 max

Output VSWR	2.0:1 max
3rd Order 2 Tone Intermodulation	-25 dBc max @ 2.5 dB back-off ^{Note 2}
AM/PM Conversion	5 °/ dB typical

Prime Power Requirements

Prime Power	270 V DC per MIL-STD-704F ($\pm 10\%$ normal operating range & abnormal voltage transient)
Power Consumption	455 W @ 100 W RF

Connectors

Primary Power Input Connector	Nicomatic: 322YL015D51
Control and Monitoring Connector	Nicomatic: D221EP00D51-0003-3305+RF
RF Input Connector	SMA Female
RF Output Connector	TNC Female

Control and Monitoring

Control Inputs	HV On TWT Beam On
Status Outputs	Standby HV On Fault

Notes:

- 1 Other Characteristics are available to special order
- 2 Two equal tones spaced 10 MHz apart. MPM is fitted with a lineariser

Fault Protection

Extensive internal BIT incorporated to monitor most TWT parameters. MPM shuts down under fault conditions. TWT operating parameters can be monitored externally to aid fault location.

An overtemperature trip is incorporated.

Fault Outputs	Overtemperature
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	Summary Fault
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TWT Monitor Outputs	Cathode Voltage
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	Beam Current
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	Helix Current
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Heater Warm-Up	90 Seconds from power on
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Automatic Restart	Auto-reset after fault is included (3 restarts) typical
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Mechanical

Mechanical Outline

190 x 120 x 30 mm excluding
fixings and connectors

Weight	1.7 kg max
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Orientation	Any
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Finish	Nickel plated
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Markings/Labels	Type Number
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	Model Number
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	Serial Number
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	Connector Ident
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	Hazard Warning
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Cooling	Conduction via baseplate, +85 °C maximum temperature
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Options (available on request)

Alternative prime power 28V, 115VAC 3-phase
(plug-in or stand-alone converters)

Block up converter (BUC)

RF output assemblies

Environmental

Ambient Temperature (operating)	-50°C to +85°C
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Ambient Temperature (Non-operating)	-55°C to +100°C
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Baseplate Temperature (MPM)	85°C maximum (operating)
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Altitude (Operating)	0 - 70,000 ft
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Vibration (Operational)	MIL-STD-810G 514.6 Category 13
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Vibration (Storage and transit)	MIL-STD-810G 514.6 Category 8 & 6
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Shock	MIL-STD-810G 516.6 Procedure I Functional shock
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Acceleration	MIL-STD-810G Table 513.6-II (Aircraft operational)
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	MIL-STD-810G Table 513.6-I (Aircraft structural)
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Humidity (Operation & Storage)	MIL-STD-810G Part one C-I, Constant high humidity (B1)
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EMC Performance	MIL-STD-461E – Requires external EMC filter
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For more detailed information, please refer to the corresponding technical description if one has been published, or contact CPI TMD Technologies. Specifications may change without notice as a result of additional data or product refinement. Please contact CPI TMD Technologies before using this information for system design.

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