C-Band Magnetron Transmitter VPC3475B

Communications & Power Industries Magnetron Transmitter

The VPC3475B magnetron transmitter is developed as a fully integrated magnetron system operating at 350 kW peak power. This microwave transmitter uses a CPI coaxial magnetron as its RF output device. The frequency of operation is magnetron dependent. CPI provides any modifications required for the particular magnetron chosen. CPI is able to furnish a compact, user-friendly, microwave power source which is also cost effective.

The transmitter cabinet contains the high voltage power supply, magnetron, solid state switch, and the high voltage tank assembly which includes the pulse transformer, energy storage high voltage capacitor, and filament power supply and control system for local or remote operation. CPI provides a complete cabinet with a touch screen controller and dual-directional coupler which is part of the CPI control system for monitoring forward and reflected power.

FEATURES:

- 350 kW peak power
- Utilizing a VMC2033B magnetron
- VSWR protection
- Modular design for ease of customization
- Touch screen local control with Ethernet connectivity for remote control and monitoring
- Air cooled

BENEFITS:

- CPI BMD Magnetrons and modulators ensure compatible performance
- Transmitter is compatible with magnetrons at various power levels and frequencies
- Easy to use and user friendly
- Built in diagnostics and BIT for local or remote troubleshooting.

APPLICATIONS:

- Instrumentation radar
- Weather radar
- EMI/EMC field testing

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The high voltage power supply is a 19 inch tray inside the cabinet. It is completely self-protected with over current and input under/over voltage circuits. The filament power supply needed to operate the magnetron is contained in this unit. All external interface and control is done in this supply. Cooling is accomplished by internal fans.

Cathode pulsing is done by a completely solid-state array of IGBT switch boards that is driven by the control interface board in the high voltage power supply. This switch inherently limits current and pulse energy by design, no external circuitry is required for these functions. The IGBT switch is also a current controlled switch, set by a bias voltage from the high voltage power supply control interface board. The voltage across the switch will automatically change as the voltage across the magnetron changes due to frequency and temperature changes. Shifting from magnetron to magnetron only requires an adjustment of the drive voltage. This switch will inherently limit arc current in the event of a magnetron HV arc. The limit is less than twice the normal operating current in the event of a complete short circuit. The switch assembly has internal fans to cool the switches.

All high voltage is contained in a sealed tank. The pulse transformer that steps up the high voltage power supply output to the required magnetron voltage, the storage capacitor bank to supply the energy during the pulse, and the magnetron filament connections are all contained in this tank. The magnetrons are mounted at the top of the enclosure for easy access. A fan is provided to cool the magnetron.

- An RF isolator is provided for VSWR protection

Instrumentation and Control

Front Panel Control and Display

The magnetron transmitter has a touch screen computer control system that accepts control inputs and provides status, fault/alarm conditions, and metered parameter information. This information is available on the front panel screen of the transmitter and also via an Ethernet connector. The table on page 3 defines the specific control functions, monitored test points on the front panel, transmitter operating status, fault/alarm conditions, and metered voltages, currents, and operating times.

The front panel consists of the touch screen that allows for individual controls and as well for operation remotely through the Ethernet connection. Analog test points are available for diagnostic and performance assessment on the rear panel. These test points are buffered to allow the use of standard test equipment such as oscilloscopes, RF spectrum analyzers, and RF power meters.

The remote interface utilizes an Ethernet IP address with CPI standard protocol and command set. All the front panel information and functions that are available on the control panel are also available via the remote interface. In order for the transmitter to be remotely operated, the Front Panel local/remote switch must be commanded to remote. The analog test points are not remotely available.

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Pulsed operation and timing are derived from an externally supplied modulator gate signal. This gate will determine the duration of the output RF and pulse repetition frequency (PRF). Internal monitoring circuits will ensure that the acceptable pulse width, PRF, and duty cycle limits of the transmitter are not exceeded. This modulator gate signal is not part of the serial interface and must be supplied separately via a dedicated low impedance driver.

Fault Protection

Remove pulses for:
- Beam over current
- Filament fault
- Over duty
- High voltage power supply faults
- Low voltage power supply under voltage fault
- Over temperature
- External Interlock

Control Functions
- Main power On/Off (front panel circuit breaker)
- Transmit/standby (RF On/Off)
- Fault reset
- Local / remote select

Fault Display
- Fault sum
- Interlocks open (external or cover)
- Magnetron average over current
- Magnetron peak over current
- High voltage low
- High voltage current high
- Filament voltage
- Filament current
- Over temperature
- Low voltage power supply
- Drive power supply
- Duty cycle high
- Fault log
- Tuner fault

Front Panel Monitoring
- Magnetron pulse current (0.1 V/A)
- Trigger sample

Display Monitoring
- Power on
- Heater time delay
- Standby
- Transmit (RF On)
- Local/remote
- Beam elapsed hour meter
- Heater elapsed hour meter
- Magnetron average current
- High voltage
- High voltage power supply current
- Filament voltage
- Filament current

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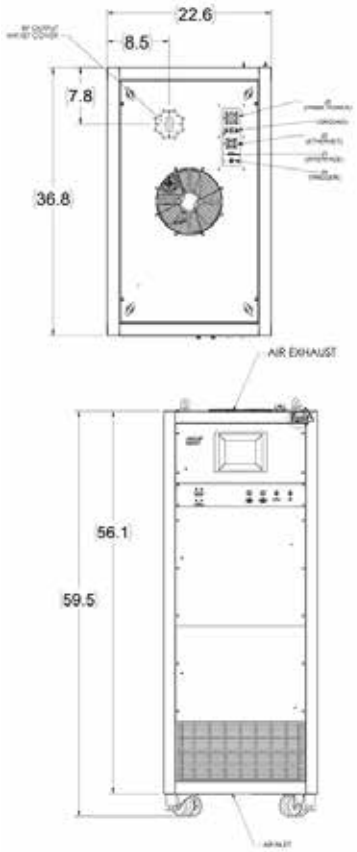
ETHERNET

Control Signals	Description	Comments
Control Inputs	Filament power on	Available at touch screen and remotely
	Radiate	Available at touch screen and remotely
	Input Gate	+5 V into 50 ohms, variable width
	Reset	Available at touch screen and remotely
Control Adjustments	Peak current adjust	Available at touch screen and remotely
Status Outputs		Available at touch screen and remotely
	LVPS fault	LVPS < 80% nominal
	HVPS fault	HVPS < 80% nominal
	Filament PS fault	Out of regulation
	Magnetron over current	Avg. current > 50 mA, peak current > 50 A
	Over duty	Duty over 0.001
	Over-temp.	Excess temperature
	Interlock	Open interlock
Meter Outputs	Pulse avg. current	Available at touch screen and remotely
	HVPS voltage	
	Mod. avg. current	
	Filament voltage	
	Filament current	
	Filament hours	
	Radiate hours	
	Internal temperature	



Electrical Parameters

Frequency Range	C-Band
RF Output	350 kW
Duty Cycle	0.001 Typical
Pulse Width	0.4 µS to 3.0 µS (continuously variable)
Maximum PRF	2 KHz
Prime Power	208 VAC (3 phase with neutral) 50/60 Hz

Mechanical and Environmental Parameters

Ambient Temperature	-10°C to +50°C operating
Shock and Vibration	Ground benign (typical transportation)
Cooling	Air cooled
RF Output Connection	Waveguide
Control I/O	Ethernet
Dimensions (width)	22 inch (57.4 cm) rack
Dimensions (height)	59.5 inch (151.1 cm) max.
Dimensions (depth)	37 inches (94 cm)max.
Weight	350 lbs. (159 kg) without magnetron

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