MT4000

TRAVELING WAVE TUBE MEDIUM POWER AMPLIFIER

FOR SATELLITE UPLINK APPLICATIONS

C-BAND: 750W
Ku-BAND: 750W
DBS-BAND: 500W

AVAILABLE SYSTEM OPTIONS:

MT4011	1 + 1 Redundant System
MT4012	1 + 2 Redundant System
MT40PC	Phase Combined, Single Path Redundant System

Other Configurations Available Upon Request

AVAILABLE AMPLIFIER OPTIONS:

- Controller Bypass
- Parallel Remote Interface
- Manual Attenuator
- Internal Linearizer
- Extended Band Operations
- Remote Panel

FEATURES:

Field Replaceable Modules For Unsurpassed Serviceability

Ducted Forced Air Cooling

Phase Noise 10 dB Below IESS-308

Control Dial For Easy Set-up And Adjustment

Output RF Power Hold

Easily Accessible Diagnostic Port

Programmable Alarms

THE MT4000 medium power TWT amplifier is available for C-Band and Ku-Band applications up to 750W, or the DBS-Band up to 500W. The unique new design of the MT4000 incorporates five standard field replaceable modules including the Simplified Logic Interface Module II, the RF assembly, the Prime Power Converter, the HV Power Supply and the HV Filter assembly. All modules are housed in a compact 4RU (7.0") cabinet mount drawer.

The RF assembly operates using dual depressed collector TWT tubes. This and other modules of the MT4000 are cooled using a ducted cooling system incorporating proven forced air and soldered fin copper heatsink technology. All high voltage circuits are fully encapsulated to eliminate corona and various environmental influences.

Prime power interfaces to a wide variety of voltages and frequencies without the need for modifications. Power factor correction provides near unity (greater than 0.95 PF) power transfer for the most efficient use of prime power.

The front panel of the MT4000 provides the user with alpha-numeric feedback on system status and diagnostics through a four-line, eighty character, vacuum fluorescent display (VFD).

The serial bus interface allows communication with a remote panel and a remote computer. The MT4000 features an event log, which records all operating events by date, time and summary description. The event log and maintenance log summaries can be downloaded from a front panel diagnostic port.

ISO 9001

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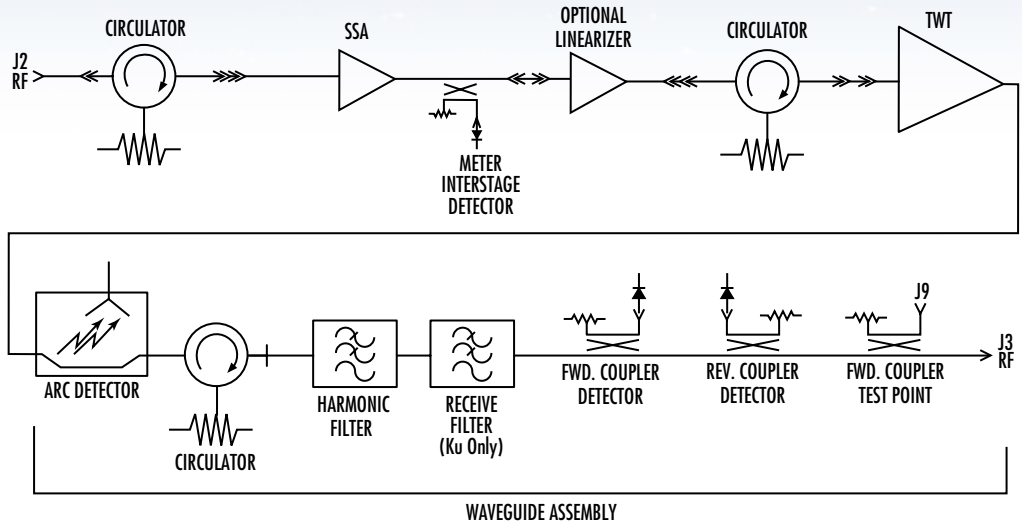
ELECTRICAL SPECIFICATIONS	C-BAND 750 W	Ku-BAND 750 W	DBS-BAND 500 W
Frequency Range (F_0) (Standard):	5.850 - 6.425 GHz	13.75 - 14.5 GHz	17.3 - 18.4 GHz
(Extended):	Option: 5.850 - 7.10 GHz	Option: 12.75 - 14.5 GHz	
(Extended):	Option: 5.850 - 6.75 GHz		
Output Power (min.):			
Tube Output Flange:	750 W (58.75 dBm)	750 W (58.75 dBm)	500 W (57 dBm)
HPA Rated Output:	665 W (58.25 dBm)	665 W (58.25 dBm)	420 W (56.23 dBm)
Gain:			
At Rated Power (min.):	72 dB	72 dB	65 dB
Small Signal Gain (SSG) (min.):	77 dB	77 dB	71 dB
Attenuation Range:	30 dB (0.10 Inc.)	30 dB (0.10 Inc.)	30 dB (0.10 Inc.)
Maximum SSG Variation Over:			
Narrow Band:	.5 dB/40 MHz	1.0 dB/80 MHz	1.0 dB/80 MHz
Per 500 MHz:	2.5 dB	2.5 dB	4.0 dB
Slope, Max.:	±0.04 dB/MHz	±.04 dB/MHz	±.04 dB/MHz
Gain Stability:	±0.25 dB/24 hr. max. (constant drive, line voltage and temp.)		
Stability, Any Freq. Over Entire Temp.:	±1.0 dB typ.	±1.0 dB typ.	±1.0 dB typ.
Stability, Any Freq. ±10°C:	±0.75 dB max.	±0.75 dB max.	±0.75 dB max.
Input VSWR:	1.20:1 max. with respect to 50 Ohms		
Output VSWR:	1.25:1 max.		
Load VSWR:	2.0:1 max. without damage, continuous		
AM/PM Conversion:			
At Rated Power:	6.0°/dB max.	6.0°/dB max.	8.0°/dB max.
6 dB Below Rated Power:	2.5°/dB max.	2.5°/dB max.	3.0°/dB max.
Residual AM Noise, Max.:			
To 10 kHz:	-50 dBc		
10 - 500 kHz:	-20 (1.5 + Log$f$ kHz) dBc		
Above 500 kHz:	-85 dBc		
Harmonic Output, Max.:	-60 dBc		
Noise & Spurious, Max.:			
Receive Band (Standard):	-150 dBW/4 kHz, 3.4 - 4.2 GHz	-150 dBW/4 kHz, 10.7 - 12.75 GHz	-150 dBW/4 kHz, 10.70 - 12.75 GHz
(Extended):	-150 dBW/4 kHz, 3.4 - 4.2 GHz	-150 dBW/4 kHz, 10.7 - 11.70 GHz	N/A
Transmit Band (F_0):	-70 dBW/4 kHz	-70 dBW/4 kHz	-65 dBW/4 kHz
Phase Noise, Max.:	10 dB below IESS Phase Noise Profile		
AC Fundamental:	-50 dBc		
Sum Of All Except AC Fundamental:	-47 dBc		
Intermodulation	Total P_0 / IM Product		Total P_0 / IM Product
(for 2 equal carriers relative	-4 dB / -18 dBc		-4 dB / -17 dBc
to single carrier rated output):	-7 dB / -24 dBc		-7 dB / -23 dBc
Linearizer Option:	-4 dB / -27 dBc		-4 dB / -26 dBc
Group Delay, Max.:	Any 40 MHz Bandwidth	Any 80 MHz Bandwith	Any 80 MHz Bandwidth
Linear:	0.01 ns/MHz	0.01 ns/MHz	0.01 ns/MHz
Parabolic:	0.005 ns/MHz^2	0.005 ns/MHz^2	0.005 ns/MHz^2
Ripple:	0.5 ns p-p	0.5 ns p-p	0.5 ns p-p
Prime Power:			
Voltage:	180 - 264 VAC, 1-phase, 47 - 63 Hz		
Power Consumption:	2.4 KVA typ. at Rated Power Out (See Note)		
Power Factor:	0.95 min.		
In-Rush:	28A max.		
Input Transients:	EN61000-4-4,4-5,4-11 (Surge, Fast Transients, Line Dropout)		

Note* Input power will be greater if the HPA is driven to saturation.

700W output power	2400 VA input power
70W output power	1650 VA input power
No output power	1600 VA input power

Note: Performance information is subject to change without notification. Contact MCL for the latest specifications.

RF BLOCK DIAGRAM



CONTROL AND STATUS CAPABILITIES

TYPE	FUNCTION		
Controls	Filament ON/OFF Transmit/Standby RF ON/OFF Reset Attenuation	Units Select Hold Power ON/OFF Auto Switching (1:1) Manual Switching (1:1)	Fault Counter ON/OFF Antenna Position (1:1) Load Position (1:1) Local/Remote/Computer
Adjustable Parameters	Auto Power Tube Temperature Alarm RF Low Alarm Comm Address Date	Tube Overdrive Alarm RF Reflected Power Alarm RF High Alarm Comm Band Rate Time	Tube Overdrive Fault RF Reflected Power Fault Filament Under Current Fault Comm Protocol
Displays	RF Forward Power Helix Voltage Filament Delay	Tube Drive Helix Current Tube Temperature	RF Reflected Power Filament Current PS Temperature
Faults (Notification, RF & HV Shutdown)	Tube Temperature Switch Tube Temperature Analog Helix Run Current HV Under Voltage User Interlock	WG Pressure WG Arc Helix Surge Current HV Over Voltage	Arc Test Failed PS Temperature Chassis Interlock Filament Under Current
Alarms (Notification Only)	RF High RF Reflected Blower Failed Exciter	RF Low Tube Temperature AC Low Line	Tube Overdrive PS Temperature RF Switch Failed
Additional Status	Delay Summary Alarm Computer Tx Remote Rx Maintenance Log	Transmit Selected Summary Fault Computer Rx Event Log	Sampler Port Cal Table RF Low Switching ON/OFF Remote Tx Fault Log

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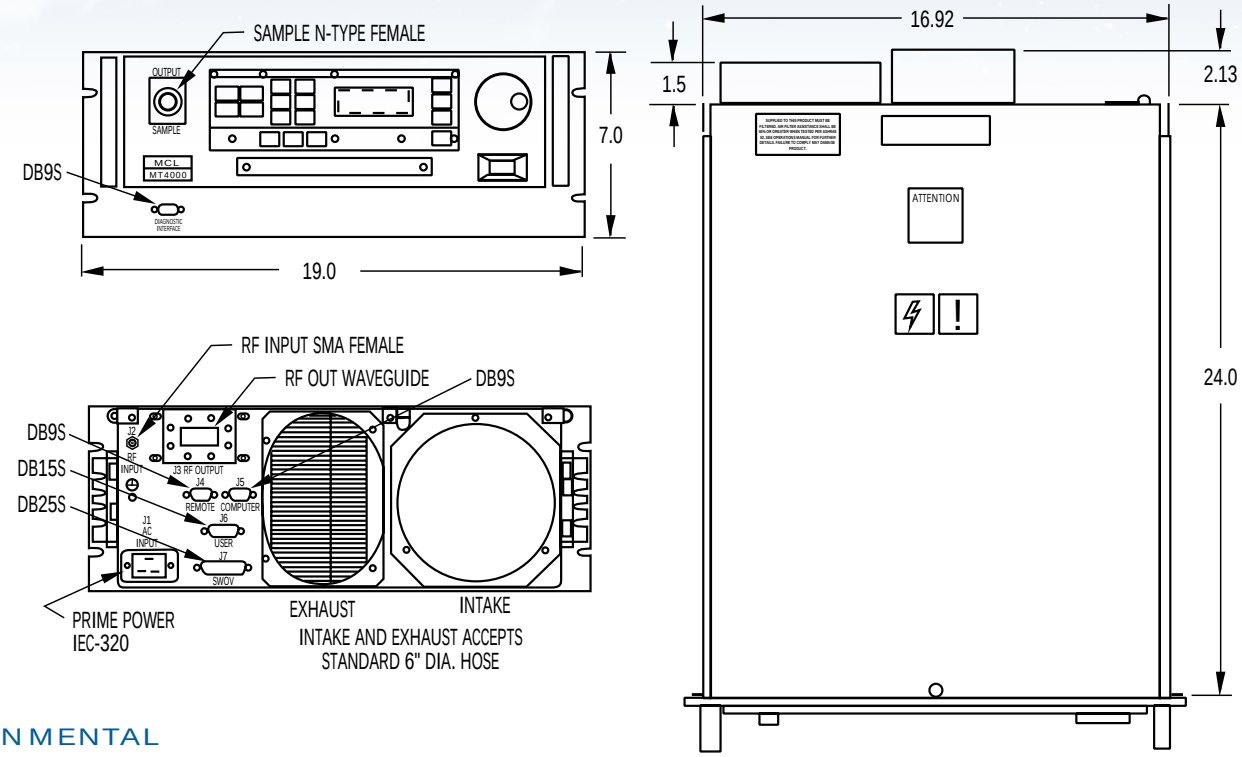
OUTLINE DRAWING



ENVIRONMENTAL SPECIFICATIONS

Operating Temperature:
-10°C to +50°C (derated 1.9°C per 1,000 ft. above sea level)

Non-Operating Temperature:
-40°C to +70°C

Relative Humidity:
95%, non-condensing

Operating Altitude:
10,000 ft. above sea level (3,048 m)

Non-Operating Altitude:
50,000 ft. above sea level (15,240 m)

Vibration:
Basic Transport Method 514-4 of MIL-STD-810E Category I, Figures 514.4-1, 514.4-2, 514.4-3

Shock:
10 g, 11ms Half Sine Pulse along each of 3 Orthogonal Axes

Maximum Backpressure:
.5 Inches of Water (exhaust air)

MECHANICAL SPECIFICATIONS

RF Connectors:
Input: Type SMA female (C, Ku, DBS)
Output: (Waveguide Flange)
C-Band: CPR137F
Ku-Band: WR75F
DBS-Band: WR62F

Installed Weight:
75 lbs. nominal

Cooling:
Forced air with integral blower

Acoustic Noise:
68 dBA at 1 Meter (from front panel)

PHYSICAL SPECIFICATIONS

Dimensions:
7.00" H (4RU)
19.00" W
24.00" L (incl. WG Flange)

Air Flow:
210 CFM

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