



### AVAILABLE SYSTEM OPTIONS:

MX9011 1 + 1 Redundant System

MX9012 1 + 2 Redundant System

MX90PC Phase Combined, Redundant System

Other Configurations Available Upon Request

### AVAILABLE OPTIONS INCLUDE:

MXR Remote Panel

Low Beam Operation

INMARSAT Filter for Superior Phase Noise Rejection

Automatic Channel Changer

Fast Tune Channel Changer

Extended Band Operations

ISO 9001



# MX9000

KLYSTRON HIGH POWER AMPLIFIER

FOR SATELLITE UPLINK APPLICATIONS

C-BAND: 3000W, 3350W

Ku-BAND: 2000W, 2500W

K-DBS BAND: 1500W, 1700W, 2500W

## FEATURES:

**Superior Earth Station Performance**

**Advanced Beam Supply Design**

**Superior Phase Noise Performance**

**Power Economy by Low Beam Operation**

**Modular Design**

**Rugged Mechanical Design**

**THE MX9000** klystron high power amplifier is available for C-Band, Ku-Band or K-DBS applications to 3,300W. Available with several optional prime power interface configurations, this powerful and reliable amplifier has become a standard for hundreds of earth station applications around the world.

The MX9000 uses standard, modular subassemblies, including the power supplies, Control Logic Module (CLM), and cooling subassemblies. All subassemblies utilize a connector interface design for easy accessibility.

The MX9000 is powered by a highly regulated beam power supply that provides stable and reliable operation. This, combined with a unique beam transformer-filter circuit that suppresses noise generating elements, helps keep phase noise to a minimum. Power factor correction of better than 0.9 assures the most efficient use of the prime power source.

The klystron tube is cooled by a single, high volume, three-phase AC blower. A separate, single-phase blower provides cooling for the beam supply and other cabinet subassemblies. This optimal cooling system is designed to operate at altitudes up to 10,000 ft.

The advanced CLM of the MX9000 uses three 16-bit multi-tasking microcontrollers to process and control all operational functions of the amplifier. RS232 and RS422/485 serial bus interface allows communication with the remote panel (MXR) or a remote computer. The menu-driven CLM features a 500 event log which records all operating events by date, time and summary description, and provides integral 1 + 1 redundant system monitoring/control capability.

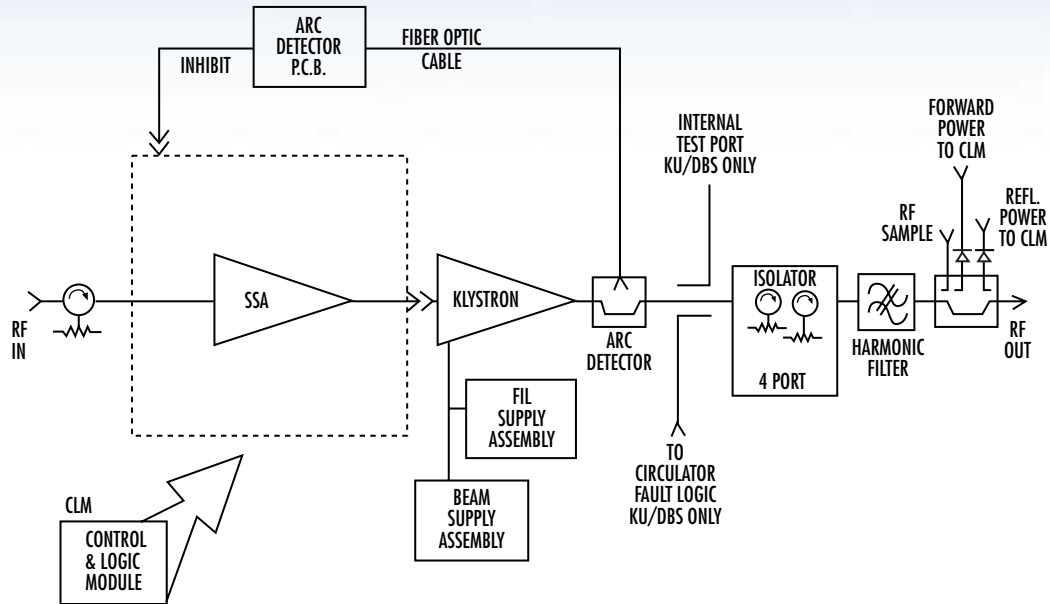
# MX9000

## KLYSTRON HIGH POWER AMPLIFIER

ELECTRICAL SPECIFICATIONS	C- BAND		Ku- BAND		K- DBS		
	3000 W	3350 W	2000 W	2500 W	1700 W	2500 W	1500 W
Frequency Range:	5.850 - 6.450 GHz Option: 5.850 - 6.725 GHz 6.700 - 7.050 GHz		13.75 - 14.50 GHz Option: 12.75 - 13.25 GHz (2.0 kw)		17.3 - 18.1 GHz Option: 17.3 - 18.4 GHz		17.8 - 18.4 GHz
Output Power (min.):							
Tube Output Flange:	3.0 kW (64.8 dBm)	3.35 kW (65.3 dBm)	2.0 kW (63.0 dBm)	2.5 kW (64.0 dBm)	1.7 kW (62.3 dBm)	2.5 kW (64.0 dBm)	1.5 kW (61.8 dBm)
HPA Output Flange:	2.8 kW (64.5 dBm)	3.0 kW (64.8 dBm)	1.65 kW (62.2 dBm)	2.06 kW (63.1 dBm)	1.35 kW (61.3 dBm)	1.99 kW (63.0 dBm)	1.2 kW (60.8 dBm)
Gain:							
At Rated Power (min.):	75 dB	80 dB	75 dB		70 dB		
Attenuation Range:			30.0 dB min.				
Maximum SSG Variation:			1.0 dB p-p center 2/3 of BW				
Slope, Max.:			±0.10 dB/MHz center 2/3 of BW				
Gain Stability:			±0.25 dB/24 hr. max. (constant drive, line voltage and temp.)				
Input VSWR:	1.20:1 max.		1.25:1 max.		1.25:1 max.		
Output VSWR:	1.25:1 max.		1.20:1 max.		1.30:1 max.		
Load VSWR:	2.0:1 max. without damage		1.5:1 max. without damage				
AM/PM Conversion:							
At Rated Power:	4.0°/dB max.		4.5°/dB max.		7.0°/dB max.		
Residual AM Noise, Max.:							
Below 4 kHz			-40 dBc				
4-500 kHz			-20 (1 + Log <sub>f</sub> kHz) dBc [f in kHz]				
Above 500 kHz			-80 dBc				
Harmonic Output, Max.:			-80 dBc max.				
Noise & Spurious, Max.:							
Band 1: -70 dBW/4 kHz, 5.85 - 6.45 GHz			-65 dBW/4 kHz, 12.75 - 14.50 GHz		-100 dBW/4 kHz, 4.0 - 10.0 GHz		
Band 2: -130 dBW/4 kHz, 3.7 - 4.2 GHz			-130 dBW/4 kHz, 10.95 - 12.20 GHz		-130 dBW/4 kHz, 10.0 - 13.0 GHz		
-120 dBW/1 MHz, 4.2 - 40.0 GHz*			-100 dBW/4 kHz, 4.0 - 10.0 GHz		-65 dBW/4 kHz, 17.3 - 18.4 GHz		
*except for bands 1 & 2			-110 dBW/1 MHz, 16.0 - 40.0 GHz		-110 dBW/1 MHz, 19.0 - 40.0 GHz		
Phase Noise, Max.:							
AC Fundamental:			6 dB below IESS Phase Noise Profile				
Sum Of All Except AC Fundamental			-36 dBc				
Intermodulation							
(for 2 equal carriers relative to single carrier rated output):	Total P <sub>0</sub>	IM Product	Total P <sub>0</sub>	IM Product	Total P <sub>0</sub>	IM Product	
	-1.5 dBc	-12 dBc	-1.5 dBc	-12 dBc	-1.5 dBc	-12 dBc	
	-4 dBc	-22 dBc	-4 dBc	-22 dBc	-4 dBc	-22 dBc	
	-7 dBc	-29 dBc	-7 dBc	-27 dBc	-7 dBc	-27 dBc	
	-10 dBc	-35 dBc					
Group Delay, Max.:							
Linear:	0.25 ns/MHz		0.1 ns/MHz		0.1 ns/MHz		
Parabolic:	0.05 ns/MHz <sup>2</sup>		0.02 ns/MHz <sup>2</sup>		0.025 ns/MHz <sup>2</sup>		
Ripple:	2.0 ns p-p		2.0 ns p-p		2.0 ns p-p		
Prime Power:							
Voltage:			208 to 480 VAC, 3-phase WYE or DELTA, 47 - 63 Hz (other options available, contact MCL)				
Power Consumption:	11.0 KVA typ., 12.0 KVA max.				10.0 KVA typ., 11.5 KVA max.		
Power Factor:			0.9 typ.				
In-Rush:			200% max.				

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

## RF BLOCK DIAGRAM

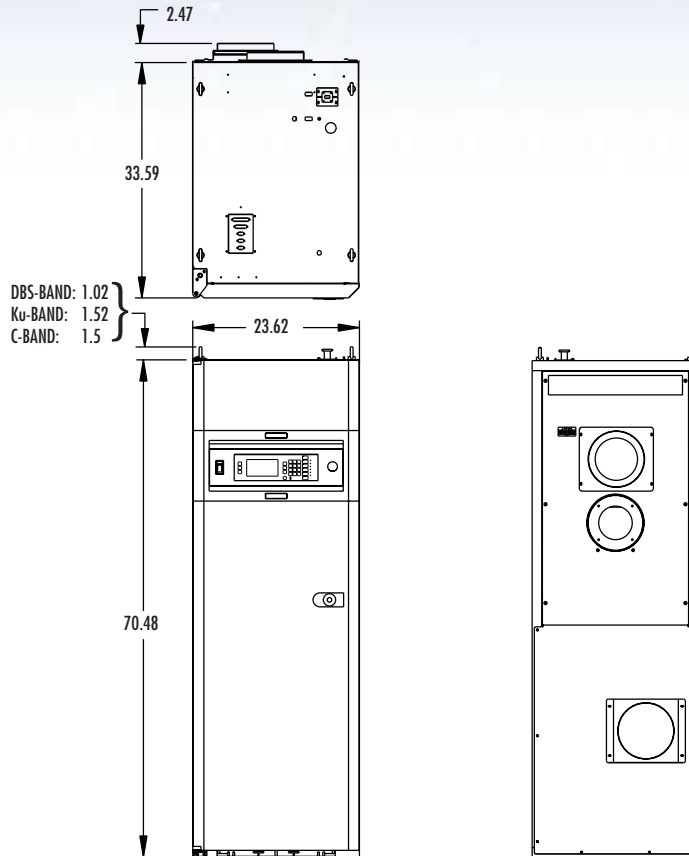


## CONTROL AND STATUS CAPABILITIES

TYPE	FUNCTION		
Local Controls	Transmit Standby Reset Beam Low Beam Normal Gain DEC	Local Remote Computer Set Auto Power Filament Foldback Arc Test	RF Inhibit RF Enable Gain Inc Clear Log Tube Channel
Meters (Analog Displays)	Forward Power Reflected Power Attenuation Body Current	Tube Drive Power Filament Current Filament Foldback Time Time & Date	Delay Time Beam Voltage Beam Current
Limits	Tube Drive Fault RF Low Alarm RF High Alarm Auto Power	Filament Foldback Time Delay Time Reflected Power Fault Blower Delay	Beam OV Fault Beam Current Fault Body Current Fault HV Inrush Delay
Faults	Tube Overdrive Reflected Power Beam Over Volt Interlock Filament	Body Current Beam Current Beam Power Supply WG Circulator Airflow	Tube Temperature WG Arc WG Pressure User Interlock
Alarms	RF Low RF High	Channel Changer Switchover RF Inhibit	User RF Inhibit Exciter
1:1 Switchover (Control and Indicator)	Auto Switching	This HPA ON Antenna	

# MX9000

## OUTLINE DRAWING



### ENVIRONMENTAL SPECIFICATIONS

**Operating Temperature:**

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

**Relative Humidity:**

95%, non-condensing

**Operating Altitude:**

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

**Shock:**

MIL-STD-810E, Method 516.4 Procedure VI; 10g for 11ms

**Vibration:**

MIL-STD-810E, Method 514.4 Procedure 1

**Maximum Backpressure:**

0.25 inches of water

### MECHANICAL SPECIFICATIONS

**RF Connectors:**

Input:

C-Band: Type N Female  
Ku-Band: SMA Female  
K-DBS: WR62 or SMA Female (specify)

Output: (Waveguide Flange)

C-Band: WR137  
Ku-Band: WR75  
K-DBS: WR62

Output Power Monitor: Type N Female

**Installed Weight:**

900 lbs. max.

**Cooling:**

Forced air with integral blowers and fans (klystron collector circuit isolated from cabinet ventilation)

**Acoustic Noise:**

72 dBA max., 60 Hz line power  
69 dBA max., 50 Hz line power

### PHYSICAL SPECIFICATIONS

**Dimensions:**

70.4" H  
23.6" W  
31.5" L (nom.)

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