

MHM 2010

Active Hydrogen Maser

Key Features

- Patented magnetic quadrupole for superior atomic beam focusing
- Very low hydrogen usage (< 0.01 mole per year) for extended maintenance-free operation
- Unique, stand-alone, cavity auto tuning feature
- Proprietary teflon coating technique, eliminating any re-coating requirement and extending maintenance free life
- CE compliant

The Symmetricom® MHM 2010™ is the only commercially available active hydrogen maser with stand-alone cavity switching auto tuning manufactured in the USA. This technique enables the MHM 2010 to deliver long-term stability normally only attributed to the most stable of cesium atomic standards.

Each MHM 2010 is manufactured to exacting quality standards and carefully checked at each stage to insure a top quality product. Once built, the units are subjected to extensive performance testing, verifying all aspects of operation.



Before shipment, each unit goes through rigorous testing and performance monitoring to insure that the unit meets or exceeds all specifications.

MHM 2010

Specifications

STABILITY

- Allan deviation (measured in 1Hz bandwidth):

1s	2.0E-13
10s	3.0E-14
100s	7.0E-15
1000s	3.2E-15
Floor*	3.0E-15
 - Long term: <2.0E-16 per day*
 - Auto tuning: no external reference required
- * Typically achieved after extended period of unperturbed, continuous operation.

ENVIRONMENTAL

- Temperature sensitivity: <1.0E-14/°C
- Magnetic sensitivity: <3.0E-14/Gauss
- Power source sensitivity: <1.0E-14

CONTROL

- Synthesized frequency resolution: 7.0E-17
- Frequency control range: 7.0E-10

Note: The synthesizer maintains continuous phase throughout frequency change.

AVAILABLE OUTPUTS

Frequency	Amplitude
5 MHz	13dBm
10 MHz	13dBm
100 MHz	13dBm
Load impedance:	50Ω

TIMING OUTPUT

- Format: 1PPS (positive going pulse)
- Amplitude: >3 V into 50Ω (TTL compatible)
- Pulsewidth: 20 μs
- Rise time: <3 ns
- Jitter: <10 ps RMS

TIMING INPUT

- Auto-sync input: 1PPS
- Amplitude: >3 V into 50Ω (TTL compatible)
- Pulsewidth: ≥20 μs
- Rise time: <5 ns
- Jitter: <1 ns RMS
- Synchronization input to output: <15 ns

PHASE NOISE $\mathcal{L}(f)$

Outputs	5 MHz	10 MHz	100 MHz
1 Hz	≤-116dBc	≤-110dBc	≤-90dBc
10 Hz	≤-135dBc	≤-129dBc	≤-109dBc
100 Hz	≤-148dBc	≤-142dBc	≤-122dBc
1 kHz	≤-155dBc	≤-149dBc	≤-129dBc
10 kHz	≤-155dBc	≤-149dBc	≤-129dBc
100 kHz	≤-155dBc	≤-149dBc	≤-129dBc

LOW PHASE NOISE OPTION

Outputs	5 MHz	10 MHz	100 MHz
1 Hz	≤-125dBc	≤-119dBc	≤-99dBc
10 Hz	≤-142dBc	≤-136dBc	≤-116dBc
100 Hz	≤-153dBc	≤-147dBc	≤-127dBc
1 kHz	≤-156dBc	≤-150dBc	≤-130dBc
10 kHz	≤-156dBc	≤-150dBc	≤-130dBc
100 kHz	≤-156dBc	≤-150dBc	≤-130dBc

POWER

- Operating voltage: 85 to 264 VAC
- Frequency range: 47 to 63 Hz
- Peak power: 150W
- Operating power: 75W
- External DC input: 22 to 28 VDC
3.1A (typical)
- Standby battery pack: 8 hours operation

PHYSICAL SPECIFICATIONS

- Height: 42.0" (106.68 cm)
- Width: 18.0" (45.72 cm)
- Depth: 30.0" (76.0 cm)
- Weight: 475 lbs. (without batteries*)

* Add 66 lbs. for batteries

ORDERING INFORMATION

	Part No.
• (3) 5 MHz, (1) 10 MHz, (1) 100 MHz	75001-101
• (3) 5 MHz, (1) 10 MHz, (2) 100 MHz	75001-102
• (3) 5 MHz, (1) 10 MHz, 1 PPS Sync, 1PPS output	75001-103
• (3) 10 MHz, 1 PPS Sync, (2) 1PPS output	75001-104
• (2) 5 MHz, (1) 100 MHz, 1 PPS Sync, 1PPS output	75001-105
• (2) 5 MHz, (2) 10 MHz, 1 PPS Sync, (2) 1PPS output	75001-106
• (2) 5 MHz, (2) 10 MHz, (1) 100MHz	75001-107
• (2) 5 MHz, (1) 10 MHz, (1) 100MHz, 1 PPS Sync, 1PPS output	75001-108
• (3) 5 MHz, (2) 10 MHz, (2) 100MHz	75001-109
• (3) 5 MHz, (3) 10 MHz	75001-110
• (4) 5 MHz, (2) 10 MHz	75001-111
• (3) 10 MHz, (2) 100MHz, 1 PPS Sync, (2) 1PPS output	75001-112
• (3) 5 MHz, (1) 10 MHz, (2) 100MHz, 1 PPS Sync, 1PPS output	75001-113
• (3) 5 MHz, (1) 10 MHz, (1) 100MHz, 1 PPS Sync, (2) 1PPS output	75001-114



MHM 2010 Back Panel Configuration

* Battery pack not included