



ptf

## CH1-75 ACTIVE HYDROGEN MASER

The CH1-75 Active Hydrogen MASER is one of the most stable frequency sources over time intervals from 1s to several months. Its frequency stability over these time intervals exceeds the stability of the best caesium frequency standards. The CH1-75 principle of operation is based on a forced hydrogen atom emission in the storage quartz bulb located in the microwave cavity. At large enough atom density in the bulb and high Q of the microwave cavity, the CH1-75 self-excitation takes place and it begins generation at 1420.4 MHz frequency.

The CH1-75 emission signal is amplified by the sensitive crystal oscillator. In such a way a high frequency stability of the MASER is transferred to the crystal oscillator.

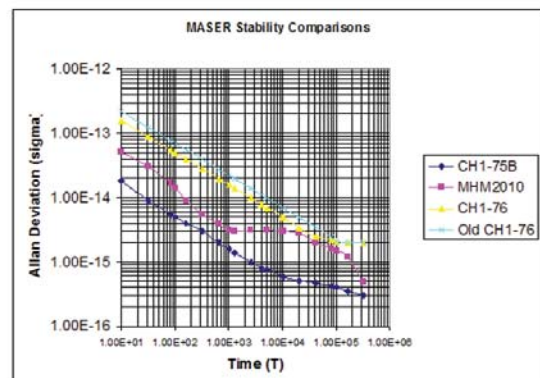
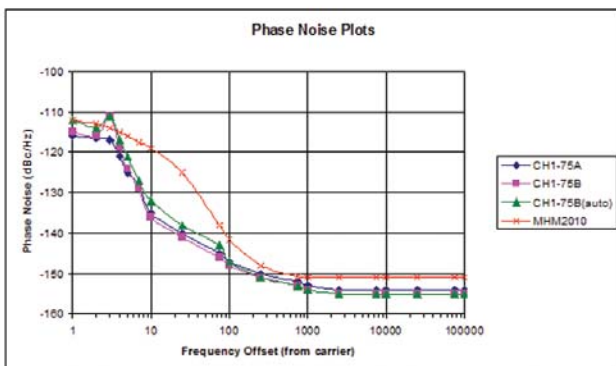


### APPLICATIONS

National Timekeeping  
National Frequency Standards  
VLBI  
Deep Space Navigation  
Fountain Caesium Reference  
Navigation  
Telecommunications  
GNS Ground Control  
GPS Satellite Monitoring  
Astro Laser Range Finding

Astronomy  
Baseline Definition  
Calibration  
Calibration of Caesium or Rubidium  
Climatology  
Defense  
Determination of Earth Rotation  
Earthquake Research  
Fast Missile Tracking  
Geodesy

Geodynamics  
Glacial Movement  
Gravity Prospecting  
Intelligence  
Plate Tectonics  
Position fixing  
Secure Communications  
Space Navigation  
Support of Radar



Specifications subject to change without notice



# CHI-75 ACTIVE HYDROGEN MASER

## SPECIFICATIONS

### Frequency Outputs

(2) 5MHz, sine	50Ω, 1±0.2 Vrms
(2) 100MHz,	50Ω, 1±0.2 Vrms
(2) 1Hz (1 pps)	50Ω, >2.5V peak
Pulse Width	10 to 20 μs
Rise Time	15 ns
Jitter	100 ps

### Clock Synchronization

Automatic within 50 ns of reference pulse	
Width	1 - 100 ms
Rise Time	20 ns
Input Z	50Ω

### Stability (5MHz & 100MHz Allan Variance)

Avg Time $\sigma_y(2,\tau)$ Autonomous Auto tune	
1s	2E-13
10s	3E-14
100s	7E-15
1000s	3E-15
1 hour	2E-15
1 day	3E-16

### Aging Autonomous Auto Tune

<b>At Delivery</b>	<b>After 1 year operation</b>
≤5E-16/Day	≤3E-16/Day

### Accuracy Autonomous Auto Tune

≤5E-16 over 5 year period

**Frequency Trim Range** At least 1E-10

**Setting Resolution** 1E-14 Steps

### Phase Noise (dBc)

Hz from carrier	5MHz outputs	100MHz outputs
1	-110	-85
10	-130	-105
100	-140	-115
1000	-150	-125
10000	-150	-125

**Harmonic Distortion** <-30dBc (5MHz output)

### Frequency Measurement Error (RMS) of built-in comparator

1E-13 per 1 sec
1.5E-14 per 10 sec
3E-15 per 100 sec
5E-16 per 1 hour or more

**Power Input - AC** 115/220 Vac, ±10%, 45 to 430Hz  
<150 VA power consumption

### Power Input - DC (automatic battery back-up)

As an alternative to AC, the CH175 can be powered by an external 22-30 VDC supply. <100 watts power consumption.

**Warm-up Time** 240 hours to meet specification

**Operating Temp** +5 to +35°C

**Temp Coefficient** 5E-16/°C

**Storage Temp** -50°C to +50°C

**Magnetic Sensitivity** ≤1E-14/Gauss

**Pressure** 630 to 795 mm Hg

**Humidity** Up to 80% at 25°C

**Size (HxWxD)** 27" x 19" x 22" (68x48x56 cm)

**Weight** 210 lbs (90kg)

**Warranty** 1 year (2 - 5 year options)

**Service Life** 15 years

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