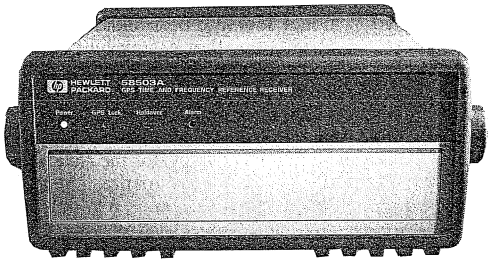
FREQUENCY & TIME STANDARDS

GPS Time and Frequency References

HP 58000 Series, 58503A, 10811D/E, 105B

- Reduce costs of synchronization network
- Improve reliability and performance
- Satisfy exacting needs through custom design



HP 58503A

Meeting Your Time and Frequency Reference Needs

The HP 58000 series of time and frequency references provides a highly reliable, low-cost source of precision time and frequency. These sources provide cesium-like frequency accuracy, without the need for periodic calibration—saving you time. Both an off-the-shelf product, the HP 58503A or fully custom solutions are available to meet your most exacting needs.

The HP 58503A is well suited for a broad range of applications. Regardless of industry, the HP 58503A meets the needs of manufacturing, calibration, and development. All areas of manufacturing and development can benefit from the availability of precise timing. The HP 58503A can be an ideal alternative to installing a primary frequency standard and its distribution system.

When more exacting requirements need to be satisfied, the HP 58000 series offers custom designs to meet your needs. These custom solutions solve your timing and synchronization problems, while freeing you to concentrate on critical development areas of success. This proves an attractive alternative for customers in the communications industry where synchronization of networks and base stations are crucial for success.

Whether the HP 58503A off-the-shelf product or an HP 58000 series custom solution satisfies your exacting timing needs, Hewlett-Packard's frequency and time references offer a surprisingly low price.

HP 58503A GPS Time and Frequency Reference Receiver

The HP 58503A GPS reference receiver delivers precise time and frequency anywhere in the world. Through a unique combination of technology the HP 58503A provides a highly reliable, low-cost source of precision time and frequency. This satisfies the requirements of a broad range of applications.

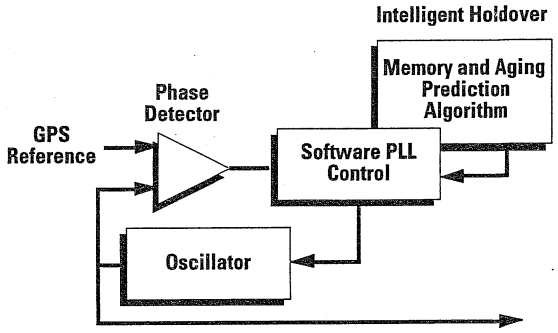
The HP 58503A sets a new price-performance point in the marketplace. With accuracy of better than 1×10^{-12}, the HP 58503A provides performance previously unavailable at this price. This, combined with increased reliability and supportability, reduces your costs while improving your quality.

Using Technology to Solve Problems

The HP 58503A is based on Hewlett-Packard's proven quartz technology. This provides unsurpassed reliability and confidence, as well as excellent short-term stability. The core of the design is an oscillator with > 500,000 hours of field-proven mean-time-between-failure (MTBF).

When locked to the GPS signal, the HP 58503A provides accuracy of better than 1×10^{-12}. This gives the HP 58503A the long-term performance of GPS with the superior short-term stability of a state-of-the-art quartz oscillator.

Should the GPS signal be interrupted, the HP 58503A automatically enters an intelligent holdover mode using HP SmartClock. This unique technology learns and corrects for the effects of crystal aging and temperature changes. This minimizes frequency drift and maintains accuracy to better than 1×10^{-10} per day.



HP SmartClock and Enhanced GPS delivers a highly reliable, low-cost reference.

Finally, HP Enhanced GPS improves the typical performance of GPS as a timing reference. More than just a simple averaging technique, the HP Enhanced GPS digital filtering is designed to remove most of the effects of Selective Availability (SA) on the HP 58503A.

The combination of these four technologies provide you superior value—higher performance, smaller size, and improved reliability.

HP 58503A GPS Time and Frequency Reference Receiver Abbreviated Characteristics and Specifications

GPS Receiver

- 6-channel, parallel-tracking
- C/A code, L1 code
- HP SmartClock/HP Enhanced GPS
- DC power supplies available

10 MHz Output Characteristics

Frequency accuracy (locked): $<1\times10^{-12}$ for a one day average
Holdover aging (unlocked): $<1\times10^{-10}$ per day average frequency change in 24 hours of unlocked operation
Output level: $>1V_{p-p}$ sinewave into 50 Ω load
Phase noise (locked):

Offset from signal (Hz)	SSB phase noise (dBc)
1	−85
10	−125
100	−135
1,000	−140
10,000	−145

Time domain stability (locked):

Averaging time (seconds)	Root Allan variance
0.01	1.5×10^{-10}
0.1	1.5×10^{-11}
1	5×10^{-12}
10	5×10^{-12}
100	5×10^{-11}
1,000	5×10^{-11}

1 pps Output Characteristics

Jitter on leading edge (locked): <50 ps rms
Time accuracy (locked): <110 ns with respect to UTC (USNO MC)—95% probability when unit is properly installed and calibrated
Accumulated time error (unlocked): <8.6 μs/accumulated in 24 hours after three days of locked operation with a fixed antenna location
Output level: >2.4 V pulse into 50 Ω load
Pulse width: 26 μs
Remote Interface: RS-232-C DTE configuration
Front Panel Indicators (LED): Power, GPS lock, holdover, alarm

Custom-designed HP 58000 Series Solutions for Wireless Communications

In today's wireless industry, the demands for better timing and synchronization are ever increasing. Solutions need to be less expensive and more reliable while providing more performance than ever before. The HP 58000 series of time and frequency references is a highly reliable source of precision time and frequency—meeting today's challenges.

The HP 58000 series addresses the needs of both analog and digital (TDMA or CDMA) communications systems in the wireless industry. These products meet the needs of the following communications systems:

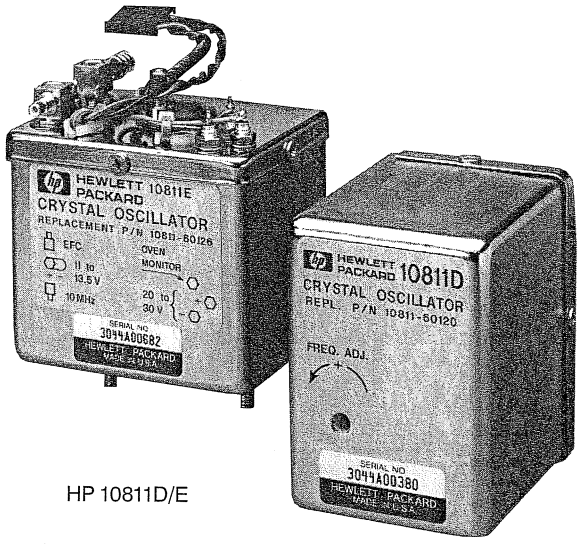
- Cellular
- PCS
- Satellite
- Paging
- Mobile radio
- Military

The HP 58000 series of custom solutions to meets your demanding system needs. A fully-custom solution gives you the exact product you need with Hewlett-Packard's reliability and timing technology built in. HP meets your precise needs of form, fit, function, and performance at a surprisingly low price. This is an ideal solution for large volume requirements.

The HP 58000 series custom products are based on proven designs of:

- GPS timing receivers
- High-stability oscillators
- Intelligent holdover (HP SmartClock)
- HP Enhanced GPS
- Frequency references/translators
- Distribution amplifiers
- AC or dc power modules

Take advantage of over 30 years of HP experience in the business of building precise time and frequency products. You will get the product you want while lowering your investment and operating costs.



HP 10811D/E

HP 10811D/E Oscillators

The HP 10811D/E crystal oscillators are oven-controlled, high-performance component oscillators. Both offer unmatched quality, high performance, and low cost. The low aging rate and fast warmup time reduce maintenance costs and downtime. Low power consumption gives the HP 10811D/E oscillators longer battery-backup time. Low phase noise translates to lower system phase noise when using HP oscillators.

The HP 10811D has a PCB connector for all external connections; the HP 10811E uses filter feedthrough terminals for power connections and oven monitor. The HP 10811E also has SMB snap-on RF connectors for the 10 MHz output and EFC input, and provisions for shock mounting.

The HP 105B quartz frequency standard uses the HP 10811D and is available as a complete standalone instrument.

Ordering Information	Price
HP 105B Quartz Frequency Standard	$10,400
Opt 908 Rack Flange Kit	+$184
Opt 910 Extra Manual	+$128
HP 10811D 10 MHz Oscillator, PCB/Edge Connector	$1,070
HP 10811E 10 MHz Oscillator, SMB Connectors	$1,225
Options for HP 10811D or HP 10811E	
Opt 001 Low Aging Rate	+$510
Opt 002 Low Phase Noise	+$765
Opt 003 Integrated Opt 001 and Opt 002	+$2,550
Opt 100 Reduced Specifications	−$200
Note: Options are mutually exclusive; no mixing.	
HP 5089A Standby Power Supply (includes ac and dc input power cables, dc output cable, and extender board)	$9,380
Opt 001 Spare Board (HP 05089-60001)	+$1,530
Opt 908 Rack Mounting Adapter Kit	+$77
Opt 910 Extra Operating and Service Manual	+$53
HP 58503A GPS Time and Frequency Reference Receiver	$5,400
Opt 001 Front Panel Display	Contact HP
Opt AWM ±48 Vdc Power	$300
Opt AWR ±24 Vdc Power	$300
Opt 104 or **105** 1.544 Mb/s, 100 Ω Balanced	Contact HP
Opt 220, 221 or **222** 2.048 Mb/s, 120 Ω Balanced	Contact HP
Opt 270, 271 or **272** 2.048 Mb/s, 75 Ω	Contact HP
HP 58504A GPS Antenna (required)	$130
HP 58505A Lightning Arrester	$275
HP 58509A Line Amplifier	$550
HP 58000 Series Time and Frequency Reference System	From <$1,000*

*Contact Hewlett-Packard for more information and design consultation on your custom solution.

For the most current prices and product information, contact your local Hewlett-Packard sales office—see page 632.