

Test Equipment Solutions Datasheet

Test Equipment Solutions Ltd specialise in the second user sale, rental and distribution of quality test & measurement (T&M) equipment. We stock all major equipment types such as spectrum analyzers, signal generators, oscilloscopes, power meters, logic analysers etc from all the major suppliers such as Agilent, Tektronix, Anritsu and Rohde & Schwarz.

We are focused at the professional end of the marketplace, primarily working with customers for whom high performance, quality and service are key, whilst realising the cost savings that second user equipment offers. As such, we fully test & refurbish equipment in our in-house, traceable Lab. Items are supplied with manuals, accessories and typically a full no-quibble 2 year warranty. Our staff have extensive backgrounds in T&M, totalling over 150 years of combined experience, which enables us to deliver industry-leading service and support. We endeavour to be customer focused in every way right down to the detail, such as offering free delivery on sales, covering the cost of warranty returns BOTH ways (plus supplying a loan unit, if available) and supplying a free business tool with every order.

As well as the headline benefit of cost saving, second user offers shorter lead times, higher reliability and multivendor solutions. Rental, of course, is ideal for shorter term needs and offers fast delivery, flexibility, try-before-you-buy, zero capital expenditure, lower risk and off balance sheet accounting. Both second user and rental improve the key business measure of Return On Capital Employed.

We are based near Heathrow Airport in the UK from where we supply test equipment worldwide. Our facility incorporates Sales, Support, Admin, Logistics and our own in-house Lab.

All products supplied by Test Equipment Solutions include:

- No-quibble parts & labour warranty (we provide transport for UK mainland addresses).
- Free loan equipment during warranty repair, if available.
- Full electrical, mechanical and safety refurbishment in our in-house Lab.
- Certificate of Conformance (calibration available on request).
- Manuals and accessories required for normal operation.
- Free insured delivery to your UK mainland address (sales).
- Support from our team of seasoned Test & Measurement engineers.
- ISO9001 quality assurance.

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FREQUENCY/TIME STANDARDS & SYNCHRONIZATION

GPS Time and Frequency Reference Receiver

HP 58503A

- Reduce the cost for precise time and frequency
- Eliminate calibration through GPS technology
- Improve reliability through HP quartz oscillators



HP 58503A Option 001

GPS Makes Precise Time and Frequency Affordable

The HP 58503A is well-suited for a broad range of applications. Regardless of industry, it meets the needs of manufacturing, development, calibration labs and services. Through a unique combination of technology, the HP 58503A Time and Frequency Reference Receiver provides a highly-reliable, low-cost source of precision time and frequency.

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). This delivers superior performance and reliability while eliminating the need for periodic oscillator replacement as required in rubidium sources.

By locking the oscillator to the GPS signal, the HP 58503A provides frequency accuracy of better than 1×10^{-12} . This gives you the long-term performance of GPS with the superior short-term stability of a state-of-the-art quartz oscillator. Time accuracy compared to UTC (USNO MC) is better than 110 ns—even in the presence of Selective Availability (SA).

When the GPS signal is interrupted, the HP 58503A automatically enters an intelligent holdover mode using HP SmartClock. This minimizes frequency drift and compensates for environmental changes, maintaining accuracy to better than 1×10^{-10} per day.

This unique combination of technology provides you superior value—lower cost, smaller size, higher performance and superior reliability. For a more detailed description of the technologies, see "Key Technologies", page 489.

Using Technology to Solve Problems

By providing an affordable high-performance reference for frequency and time, many problems have been solved. This convenient reference is easy to integrate into any environment requiring precise time or frequency.

Development labs and manufacturing now have a convenient source for frequency and time—both 10 MHz and 1 pps outputs are standard. Often the HP 58503A proves to be a cost-effective alternative to distributing an in-house standard. By using the HP 58503A as an external frequency reference for test equipment, time-base aging is eliminated—improving the quality of test results while eliminating the need for periodic time-base calibration.

Metrology and calibration labs find the HP 58503A essential. For smaller labs where cost is a key concern, the HP 58503A provides a low-cost alternative for precise time and frequency. For more advanced labs, the HP 58503A offers an excellent time reference. Additionally, it gives you a view into the international time scale through UTC—allowing you to steer or monitor the performance of other oscillators in the lab.

The communications industry also benefits from the convenience of the HP 58503A. When telecom reference signals are unavailable or unreliable, a high-quality reference signal is required. Output options for the HP 58503A provide highly-accurate reference signals with signal formats consistent with all ITU-T specifications. This simplifies the evaluation of communications equipment during development and deployment.

Regardless of industry, the HP 58503A provides a cost-effective, highly-reliable source of precise time and frequency anywhere in the world.

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): $< 1 \times 10^{-12}$ for a one-day average

Holdover Aging (unlocked): $< 1 \times 10^{-10}$ per-day average frequency change in 24 hours of unlocked operation

Output Level: $> 1V_{pp}$ sine wave into 50Ω 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): < 750 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): $< 8.6 \mu s$ /accumulated in 24 hours after three days of locked operation with a fixed antenna location

Output Level: > 2.4 V pulse into 50Ω load

Pulse Width: 26 μs

Front Panel Indicators (LED): Power, GPS lock, holdover, alarm

Remote Interface: RS-232-C DTE configuration

RS-232 Connector: 25-pin female rectangular D subminiature on rear panel

Power Requirements

Standard (ac power): 90 to 132 Vac or 198 to 264 Vac, automatically selected; 50 to 60 Hz

Option AWM (48 Vdc Power): -37 to -60 Vdc operating range. Less than -46 Vdc required at start.

Option AWR (24 Vdc Power): +19 to +30 Vdc operating range. Greater than +23 Vdc required at start.

Input Power (all power options): < 35 watts nominal

Ordering Information

HP 58503A GPS Time and Frequency Reference Receiver

Opt 001 Front Panel Display

Opt AWM 48 Vdc Power

Opt AWR 24 Vdc Power

Telecom Output Options

Opt 104 1.544 Mb/s, 100 Ω Balanced Superframe

Opt 105 1.544 Mb/s, 100 Ω Balanced ESF

Opt 220 2.048 Mb/s, 120 Ω Balanced CCS

Opt 221 2.048 Mb/s, 120 Ω Balanced CAS

Opt 222 2.048 Mb/s, 120 Ω Balanced CAS/CRC4

Opt 270 2.048 Mb/s, 75 Ω Unbalanced CCS

Opt 271 2.048 Mb/s, 75 Ω Unbalanced CAS

Opt 272 2.048 Mb/s, 75 Ω Unbalanced CAS/CRC4

GPS Antenna System and Accessories

See page 495 for the complete line of GPS Accessories.