Resolution T

Full-featured, low-cost, embedded GPS Timing Receiver

Key Features and Benefits

- **Automatic self-survey for improved timing accuracy.**

- **Extremely accurate 1-PPS output, synchronized to GPS or UTC within 15 ns (one sigma)**

- **Cable delay compensation removes time delay due to cable distance between antenna and receiver**

- **TRAIM - Timing Receiver Autonomous Integrity Monitoring assures high PPS integrity**

- **Quantization Error Reporting can further improve native accuracy**

- **Supports 3 V or 5 V Antennas**

Trimble's Resolution™ T GPS Timing Receiver is a significant new development in GPS architecture: the general purpose, DSP-based software GPS timing receiver. The development of Trimble DSP/GPS software was key to this accomplishment.

Precise Timing Where You Need It

The receiver is an all-in-view, 12-channel, parallel-tracking, embeddable GPS receiver designed to provide precise GPS or UTC time and synchronization for many static timing applications. The timing accuracy will provide for your current needs with plenty of headroom for future requirements.

This low-cost, yet highly accurate and reliable receiver allows the system integrator to put precise timing and synchronization into locations where cost or size is a limitation. Rather than sharing time from a single timing source, with the resultant delays and loss of accuracy, you now can have precise time (synchronization) at every location regardless of how isolated or remote.

Features Flexibility with Software

To provide a true software-driven GPS timing receiver, the Resolution T receiver uses an off-the-shelf, software programmable, general-purpose, digital signal processor (DSP) in place of the usual custom GPS ASIC. Using a general-purpose DSP allows incremental software
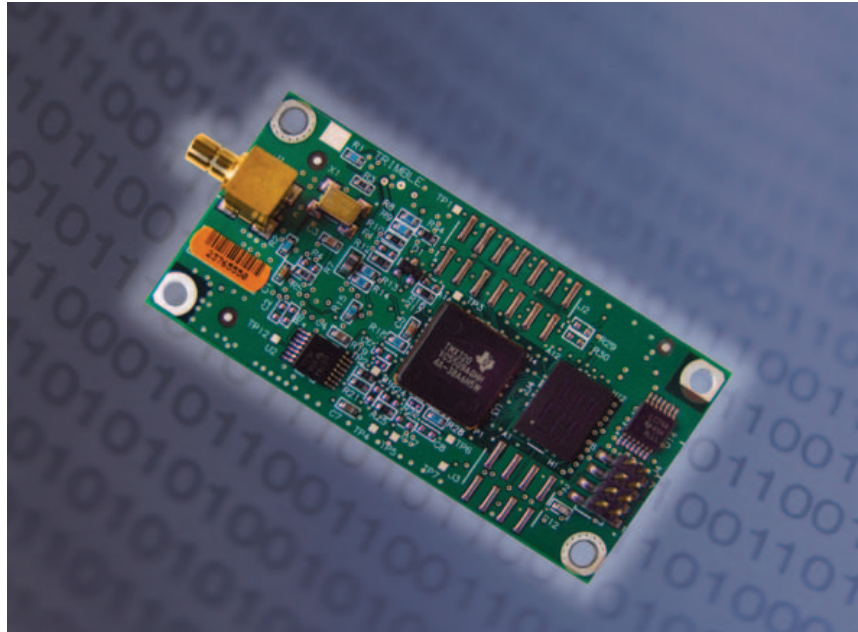
The Resolution T GPS Timing Receiver

improvements to be implemented throughout the product life cycle. This is not possible in custom GPS hardware ASICs, because most features are permanently locked in the hardware design. The Resolution T receiver can be updated easily in the field with new features as they become available. The modular design also allows for both reduced integration time and low implementation risk.

1-PPS within 15 ns

The Resolution T receiver outputs a 1 Pulse-per-second (1 PPS) timing signal accurate to within 15 nanoseconds of GPS or UTC (1 sigma) when using an overdetermined solution in a stationary mode.

3 or 5 Volt Antenna Compatible

The receiver is designed for 3.3-VDC prime power, but provides a separate pin on the I/O connector for powering the antenna with a user-supplied voltage from 3.0 to 5.5 VDC.

Starter Kit

The Resolution T Starter Kit provides everything you need to start integrating the module into your application. The kit includes an active, external 5-VDC Bullet-style antenna, 50 feet of RG-59 cable, and an AC/DC power adapter. The starter kit enclosure includes a mother board that provides serial output, and a serial interface cable. A reference manual and monitor programs are provided on CD-ROM.

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PERFORMANCE SPECIFICATIONS

General	L1 (1575.42 MHz) Frequency, C/A Code, 12-channel, parallel-tracking receiver, DSP-based
Update Rate	TSIP @ 1 Hz; NMEA @ 1 HZ

Accuracy		
	Horizontal Position:	<6 meters (50%), <9 meters (90%)
	Altitude Position:	<11 meters (50%), <18 meters (90%)
	Velocity:	0.06 m/sec
	PPS:	within 15 ns to GPS/UTC (1 Sigma)
		<5 ns with quantization error removed

Acquisition		
	Reacquisition:	<2 sec. (90%)
	Hot Start:	<14 sec (50%), <18 sec (90%)
	Warm Start:	<41 sec (50%), <45 sec (90%)
	Cold Start:	<46 sec (50%), <50 sec (90%)

Cold start requires no initialization. Warm start implies last position, time and almanac are saved by backup power. Hot start implies ephemeris also saved. Hot and Warm are shown for comparison purposes and are not used in timing applications.

Sensitivity		
	Acquisition	–136 dBm
	Tracking	–141 dBm
Operational (COCOM)		
Limits	Altitude	18,000 m
	Velocity	515 m/s

Either limit may be exceeded, but not both

PHYSICAL CHARACTERISTICS

Dimensions	66.3mm L x 32.1mm W x 8.5mm H (2.6"L x 1.3"W x 0.33"H)
Weight	approximately 12.5 grams (0.4 ounce)

ENVIRONMENTAL SPECIFICATIONS

Operating Temperature	–40° C to +85° C	
Storage Temperature	–55° C to +105° C	
Vibration	0.008 g^2/Hz	5 Hz to 20 Hz
	0.05 g^2/Hz	20 Hz to 100 Hz
	–3 dB/octave	100 Hz to 900 Hz
Operating Humidity	5% to 95% R.H. non-condensing, at +60° C	
Altitude	–400 to 18,000 m max	

ELECTRICAL SPECIFICATIONS

Prime Power	+3.3 VDC ±0.3 VDC
Power Consumption	GPS board only: 350 mW @ 3.3 V
Ripple Noise	Max 50 mV, peak to peak from 1 Hz to 1 MHz
Antenna Fault Protection	Short-circuit/open detection and protection

INTERFACE CHARACTERISTICS

Connectors	I/O:	8-pin (2x4) 2 mm Male Header
	RF:	Right-angle SMB (SMA optional)
Serial Port		1 serial port (transmit/receive)
PPS		3.3 V CMOS-compatible TTL-level pulse, once per second
		Rising edge of the pulse synchronized with GPS/UTC
Protocols		TSIP @ 9600 baud, 8 bits
		NMEA 0183 v3.0 @ 4800 baud, 8 bits
NMEA Messages		GGA, VTG, GLL, ZDA, GSA, GSV and RMC
		Messages selectable by TSIP command
		Selection stored in flash memory

ACCESSORIES

Rooftop Antenna	Bullet III, TNC (F) 3.3 VDC with 30 dBi gain. Bullet III, F 5 VDC with 35 dBi gain
Transition cable	SMB to F
Rooftop Antenna Kits	3 or 5 VDC

FOR MORE INFORMATION

E-mail us at: timing@trimble.com

Visit our website at http://www.trimble.com/restime

Specifications subject to change without notice.