SigNav

TM3-02
Weak Signal Timing Module

Product Overview

The TM3-02, part of SigNav's new *sub*ATTO^{TM} generation of GPS modules, delivers enhanced solutions for conventional and high sensitivity, Assisted GPS (A-GPS) synchronization, timing and positioning applications.

Advanced timing features such as Sawtooth Error Elimination, ultra stable Reference Frequency, programmable PPS and Even Second (PP2S) output coupled with superior weak signal performance provides the TM3-02 with a significant edge over its competitors.

Market leading performance in Weak Signal Environments

*sub*ATTO is a unique, multimode, high sensitivity A-GPS solution extending GPS use into environments previously considered hostile. Precision, satellite synchronized, timing and frequency references and positioning can now be provided in harsh conditions, such as indoors, in urban canyons and under dense foliage.

Unlike its competitors, *sub*ATTO's advanced ambiguity resolution enables the TM3-02 to start and synchronize in exclusively weak signal environments even if its position is unknown.

Not only can the TM3-02 operate in a wider range of environments, it is also far easier to install and requires less support than other solutions making it ideal for consumer applications such as the emerging femtocell market.
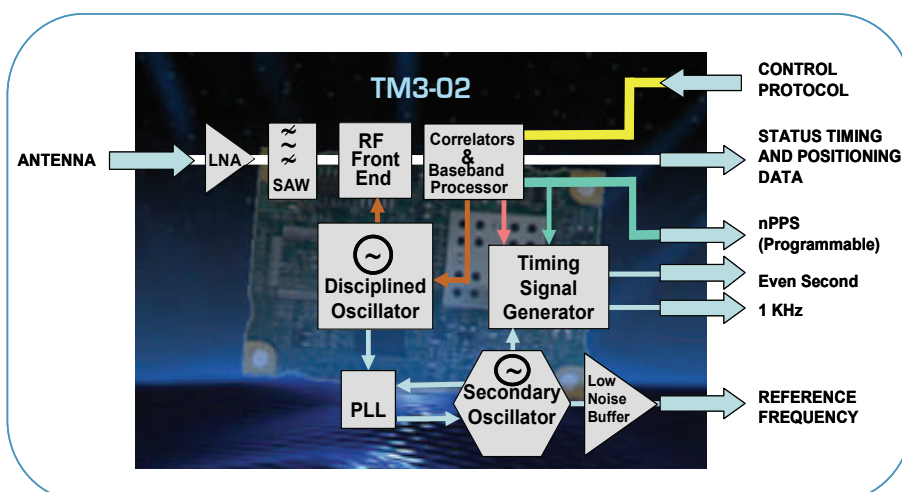
Quantization or Sawtooth Error Elimination

In conventional receivers, sawtooth errors occur because their PPS is asynchronous with GPS time. The alignment error between the PPS and GPS time is estimated and reported via a serial port so users can apply a "correction" with expensive external components to account for this constantly variable error.

In contrast, the TM3's PPS and frequency output are precisely aligned to GPS time, eliminating the need for expensive "correction mechanisms", dramatically simplifying implementations. Coupled with ultra low phase noise and the frequency output can double as the host's system clock, relieving the need for yet another clock to be implemented and providing even further cost savings.

Key Features

- High sensitivity (-153 dBm) extends operation into a wider range of environments – especially indoors

- Advanced ambiguity resolution enables start up and operation in weak signal environments with minimal assistance greatly simplifying installation and support requirements - ideal for consumer products

- Rapid acquisition minimizing Time To First Fix (TTFF) and Time To Time Lock (TTTL)

- Conventional or Assisted GPS modes of operation providing flexible deployments

- Low phase noise 10 MHz for precision clocking *(Other frequencies are available on request)*

- Position-hold and Sawtooth Error Elimination for superior accuracy

- Sawtooth Error Elimination and Low Phase noise yield an ultra stable frequency output that double as the host's system clock reducing costs

- Programmable PPS, Even Second (PP2S) and 1 kHz timing outputs providing the ultimate application flexibility

- Time-Receiver Autonomous Integrity Monitoring (T-RAIM) eliminating errors from inaccurate satellite signals

- Self-survey precisely determining exact position at start up

- Compensation for antenna and cable delays

Satellites & Signal Strengths required for Start & Sync.		
Position Accuracy	TM3-02	Other Receivers
PA <3 km	1 x Weak	1 x Strong
3 km < PA < 75 km	4 x Weak	1 x Strong + 3 x Weak
PA >75 km	4 x Weak	4 x Strong
Weak Satellite Signal < -142 dBm *Strong Satellite Signal > -142 dBm*		

Specifications

Features	Receiver	Type L1 GPS (1575.42 MHz) 12 Channels	Protocols NMEA 0183 with SigNav extensions and the essential Motorola message set
	Sensitivity	Acquisition -153 dBm	Tracking -153 dBm

Time To First Fix (TTFF) -Typical	Condition	Satellite Signal Strength	TTFF (Seconds)
	Cold start	> -142 dBm	60
	Warm Start	> -142 dBm	48
	Hot Start	> -142 dBm	10
	Hot Start	-142 dBm to -153 dBm	60

Electrical	Supply	3 volt ± 5%
	Consumption	150 mW
	I/O Level	3 volt

Physical	I/O	Antenna	MMCX
		Serial, Antenna Bias, Power, PPS etc	20 Pin header/socket
	Weight	10 grams	
	Dimensions	60 x 40 x 6 mm (not including connector)	

Environmental	Temperature	- 40 to 85 deg Celsius
	Humidity	5% to 95%, non condensing

Programmable PPS Output	(nPPS)	Wave Shape	Pulse
		Period Options	2 ms, 4 ms, 5 ms, 10 ms, 20 ms, 25 ms, 50 ms, 100 ms, 200 ms, 250 ms, 500 ms, 1 s, 2 s, 3 s, 4 s, 5 s, 6 s , 7 s, 8 s, 9 s, 10 s
		Pulse Width Range	1 ms to Period less 1 ms
		Alignment	GPS or UTC second
		Timing Accuracy/Jitter	< 10 ns jitter @ > - 142 dBm signal strength < 15 ns jitter @ - 142 dBm to -153 dBm signal strength < 1 µs error indoors in Position Hold

Even Second –PPS2	Wave Shape	Pulse
	Alignment	GPS or UTC second
	Timing Accuracy/Jitter	See Programmable PPS Output

1 kHz Output	Waveshape	Square
	Alignment	GPS or UTC second
	Timing Accuracy/Jitter	See Programmable PPS output

Frequency Reference Output (10 MHz)	Waveshape	Nominally Square
	Alignment	GPS or UTC second

Deviation Accuracy/Jitter	Satellite Signal Strength (dBm)	Frequency Accuracy	Alignment	Allan Variance	MTIE
	> -142 dBm	10 ppb	< 10 ns jitter		
	-142 to -153 dBm	30 ppb	< 15 ns jitter		
	Indoors in Position Hold, GPS Lock		< 1 µs error	< 30 ppb (τ = 100 s)	
	Indoors, GPS Holdover				< 80 ns (τ = 1 s)

Phase Noise	Frequency	100 Hz	1 KHz	10 KHz	100 KHz
	Phase Noise	-100 dBc/Hz	-120 dBc/Hz	-135 dBc/Hz	-135 dBc/Hz

Ordering Information	Part Number	TM3-02

RoHS Compliant 2002/95/EC

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