CW12-TIM GPS Receiver

Timing and Navigation Applications

Description

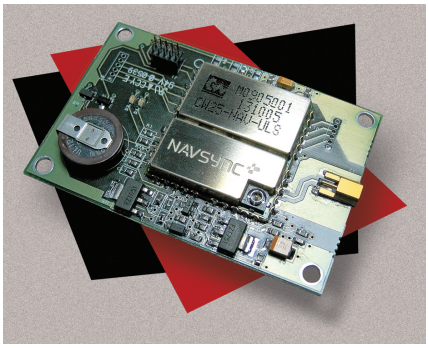
The CW12-TIM GPS receiver module is an integrated timing module powered by NavSync's CW25 GPS receiver. It has been specifically designed for use in synchronization and timing applications,

The CW12-TIM has an on-board programmable NCO oscillator that outputs a synthesized frequency up to 10 MHz that is steered by the GPS receiver.

The CW12-TIM has a self survey mode of operation that allows the receiver to enter a position hold mode to allow accurate timing to be continue with only one satellite being tracked.

The output frequency is highly accurate and can achieve full PRC MTIE performance. It can also track satellites and provide GPS synchronization in weak signal areas such as indoor applications. This reduces the need for high antenna placement in many environments.

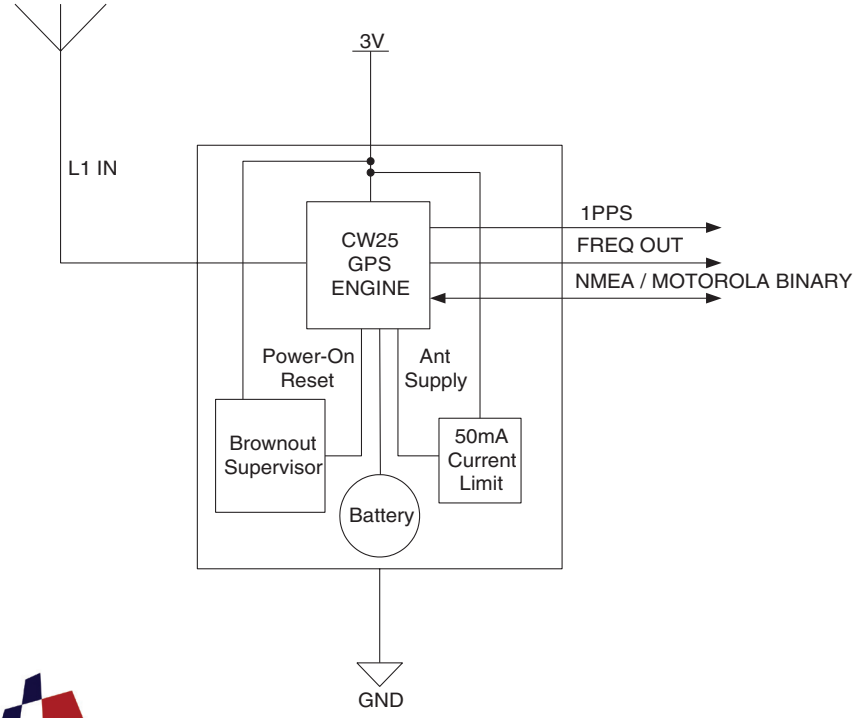
The CW12-TIM receiver module is a 40 x 60 x 10mm package with 10 pin (2 x 5) interface for ease of placement.



Features

- 3.0 - 3.6V volt operation
- 12 channel simultaneous operation
- Fully calibrated to UTC at USNO
- 40 x 60 x 10mm form factor
- 45 s typical cold start TTFF
- 38 s typical warm start TTFF
- 5 s typical hot start TTFF
- <0.5 s reacquisition
- Position hold for improved accuracy
- Antenna current limit
- Motorola M12 form factor

Block Diagram



Bulletin	NS04-DS
Revision	05
Date	13 April 2010

NAVSYNC

CW12-TIM GPS RECEIVER SPECIFICATIONS

SPECIFICATIONS			NOTE
Physical	Module dimensions	60mm (D) x 40mm (W) x 10mm (H)	
	Supply voltages	3.0 - 3.6V	
	Operating / Storage Temp	-40°C to +75°C / -55°C to +125°C	
	Humidity	5% to 95% non-condensing	
	Max Acceleration / Jerk	4g / 1gs^{-1} (sustained for less than 5 seconds)	1
	Datum	WGS-84 Default	
	Connector	Data/Power: 10 pin (2 x 5) unshrouded header on 0.050 inches centers. RF: MMCX (subminiature snap-on)	
Sensitivity	Acquisition/Tracking	-173dBW / -186dBW (-143dBm / -156dBm)	
Acquisition Time	Stand Alone (Outdoor)	Cold: <45s Warm: <38s Hot: <5s Re-acquisition: <0.5s (90% confidence)	
Accuracy	Position: Outdoor / Indoor	<5m rms / <50m rms	
	Velocity	<0.05ms	
	Latency	<200ms	
	Raw Measurement Accuracy	Pseudorange <0.3m rms, Carrier phase <5mm rms	
	Tracking	Code and carrier coherent	
Power	1 fix per second	0.6W typically	
Interfaces	Serial	1 port, CMOS levels	
	Multi-function I/O	1PPS and Frequency Output 2 Status LEDs	
	Protocols	NMEA 0183 or Motorola Binary	
	1pps Timing Output	10nS rms accuracy, <5nS resolution Pulse Width NMEA: 100 µS; Motorola Binary: 200ms	2
	Frequency Output	NMEA: 10 Hz to 10 MHz; Motorola Binary: 10 MHz	2
	Receiver Type	12 parallel channel x 32 taps up to 32 point FFT. Channels, taps and FFT can be switched off to minimize power or simulate simpler designs.	
General	Processor	ARM 966E-S on a 0.18 micron process at up to 120 MHz.	

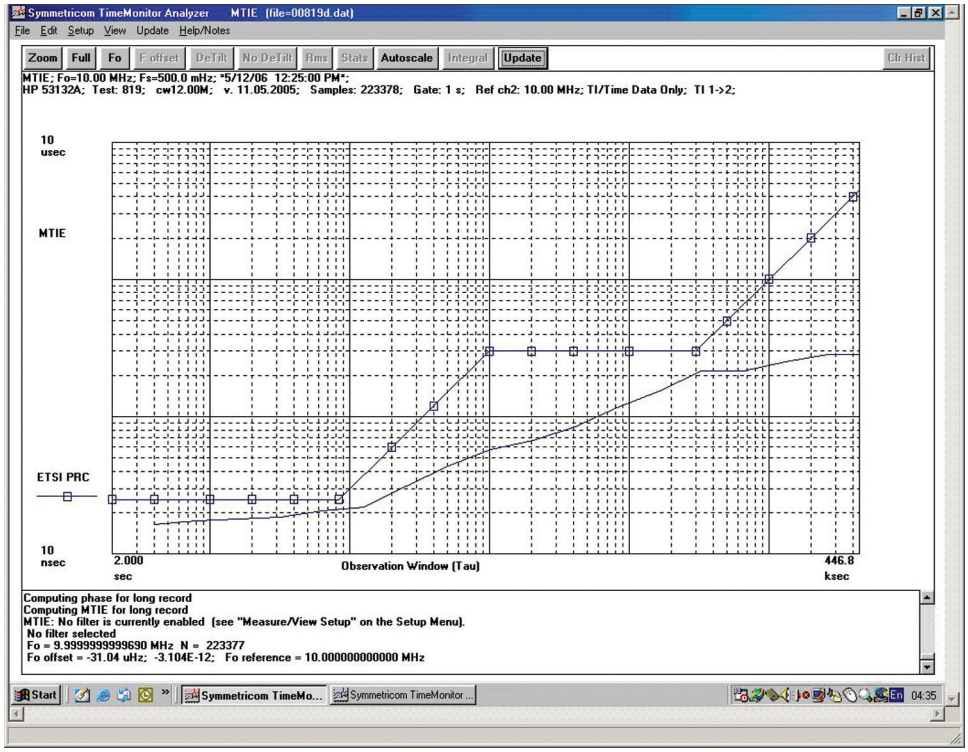
Note:

1. Timing Applications typically assume static operation.

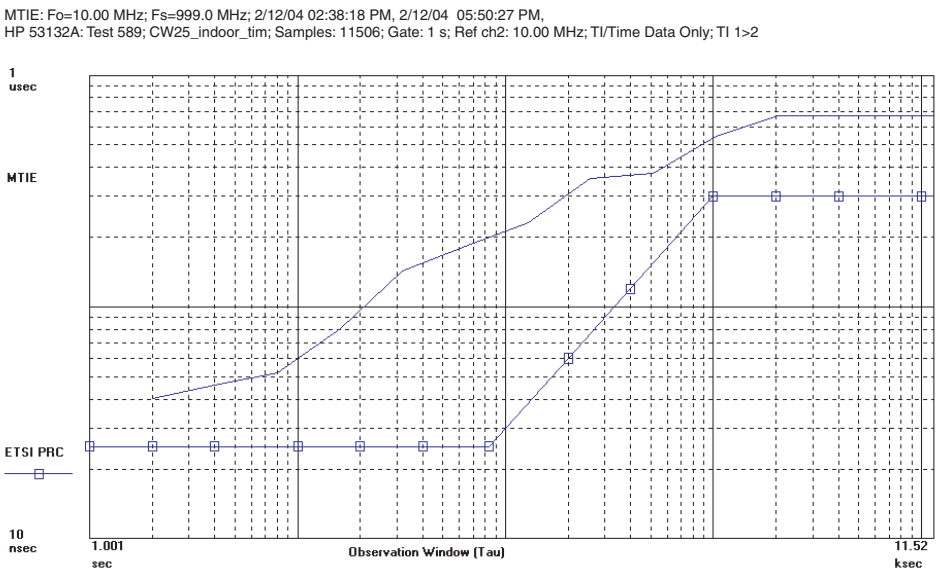
2. Could be customized

CW12-TIM GPS MTIE PERFORMANCE

The graph below demonstrates the MTIE performance of the CW25-TIM output frequency relative to a Caesium atomic clock, with the CW12-TIM GPS operating with a clear view of the sky.



The graph below demonstrates the ability of the CW12-TIM GPS to continue to provide a GPS disciplined output frequency with the GPS aerial located completely inside a building (the degradation of MTIE performance is due to the effects of signal multi-path)



CW12-TIM-Application Notes

Migrating from Motorola M12+ to NavSync CW12-TIM

The CW12-TIM was designed to meet the form and functionality of the M12 as closely as possible using NavSync's CW25 receiver module. The information contained in the following application notes identifies key similarities between the two products as well as advantages offered by the CW12-TIM. This document will also offer guidelines on how to replace the M12 with the CW12-TIM, as well as how to design in the CW12-TIM to a new application.

Key features of the products are highlighted in the following table.

Feature	M12+	CW12-TIM
12-Channel	✓	✓
High Sensitivity	✘	✓
1PPS	✓ (500nS)	✓(30nS)
Variable Freq Output	✘	✓ (NMEA 0183)
Antenna Current Limiting	✓	✓
Voltage	3V	3V - 3.6V
Positional Accuracy (3D)	25m	10m
On-Board Battery	✓ (option)	✓
T-RAIM	✓	✓
RTCM Input	✓	✘
Data Output Format	NMEA 0183 (4800) or Motorola Binary (9600)	NMEA 0183 Variable Baud Rate or Motorola Binary (9600)

Table: Differences between NavSync CW12-TIM and Motorola M12+.

Check table for list of supported Binary commands.

Motorola Binary Commands supported by NavSync's CW12-TIM

Motorola Binary Command	Description	Notes
@@Be	Almanac Data Output	
@@Bd	Almanac Status	
@@Cb	Almanac Data Input	
@@Cf	Set to defaults	
@@Cj	Receiver ID	No unique serial or manufacture data
@@Eq	ASCII Position	
@@Ga	Combined Position	GPS only
@@Gb	Combined Time	
@@Gc	1PPS Control	
@@Gd	Position Control	
@@Ge	T-RAIM Select Message	
@@Ha	Position/Status/Data	
@@Hn	12 Channel T-RAIM Status	
@@Ia	Self Test	Only FLASH and ROM tested. No support for antenna status.

CW12-TIM Application Notes continued

The CW12-TIM offers access to a subset of the CW25 interface pins. The following Diagram shows the layout of interface connector, and Table 2 gives a signal description for each pin.

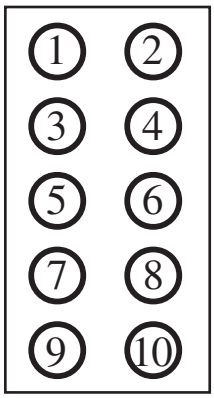


Figure 1: Layout of I/O connector on the CW12-TIM

Pin	Name	I/O	Description
1	TXD	O	NMEA 0183 output from GPS Core. Refer to CW25 User Manual for description of proprietary messages or Motorola Binary interface.
2	RXD	I	NMEA 0183 input to GPS Core. Refer to CW25 User Manual for description of proprietary commands or Motorola Binary interface.
3	VCC	PWR	Voltage Supply input. 3.0 - 3.6VDC to be supplied here.
4	1PPS	O	1 Pulse Per Second output. Pulse is 100uS (NMEA 0183) or 200 mS (Motorola Binary) in duration and rising edge signifies top of second.
5	GND	PWR	Power supply return to ground.
6	VBATT	PWR	~3V needs to be supplied here to keep the real time clock alive while the receiver is powered off.
7	BOOTSEL	I	Boot select pin allows Firmware to be upgraded when grounded.
8	RTCM	I	Not supported in this version.
9	ANT_SUPPLY	PWR	Power supply for active antenna used. The voltage applied here needs to reflect the voltage needed by the antenna. This supply is limited to ~50mA on the CW12-TIM.
10	FREQ_OUT	O	Programmable synchronized frequency output from GPS core, this frequency is 10MHz by default but may be changed by sending a NMEA command. See CW25 User Manual for details.

Table 2: Signal Description of IO Connector on the CW12-TIM

The CW12-TIM is closely based on the NavSync CW25 GPS Receiver, many of the design considerations apply equally to both parts. Please refer to the CW25 User Manual for details.

CW12-TIM GPS Receiver

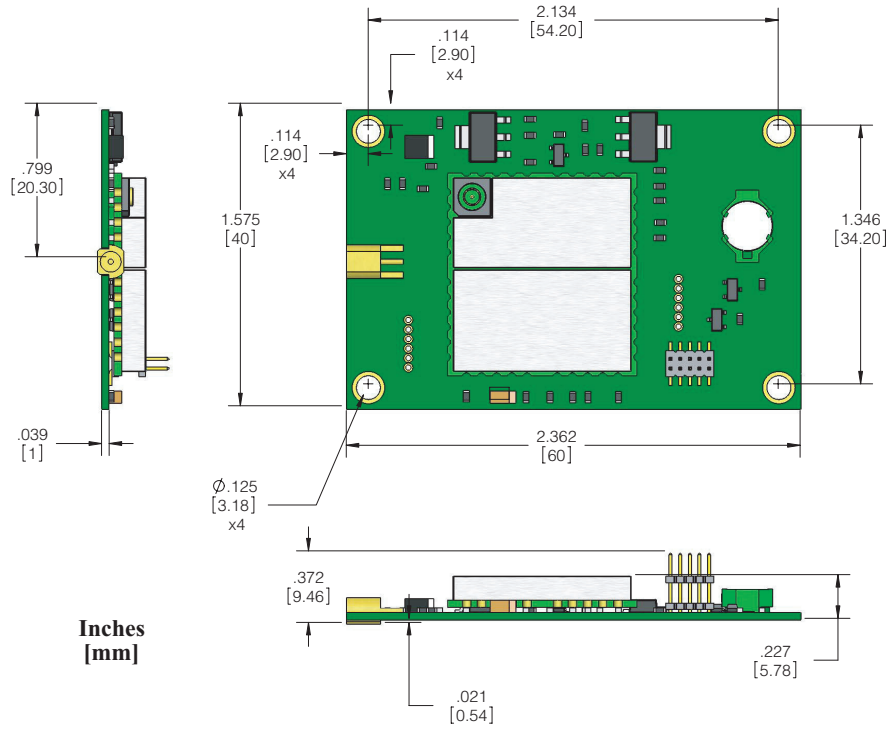


Figure 2: Mechanical Drawings

Contact us at either of the locations below for questions or ordering information.

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