



# Connect Tech Inc.

Embedded Computing Experts

[www.connecttech.com](http://www.connecttech.com)

## M.2 GPS Users Guide



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## Preface

### Disclaimer

The information contained within this user's guide, including but not limited to any product specification, is subject to change without notice.

Connect Tech assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user's guide.

### Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech reseller from which you purchased the product. In most cases the reseller can help you with product installation and difficulties.

In the event that the reseller is unable to resolve your problem, our highly qualified support staff can assist you. Our support section is available 24 hours a day, 7 days a week on our website at: [www.connecttech.com/sub/support/support.asp](http://www.connecttech.com/sub/support/support.asp). See the contact information section below for more information on how to contact us directly. Our technical support is always free.

### Contact Information

#### Mail/Courier

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42 Arrow Road  
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Canada N1K 1S6

#### Email/Internet

[sales@connecttech.com](mailto:sales@connecttech.com)  
[support@connecttech.com](mailto:support@connecttech.com)  
[www.connecttech.com](http://www.connecttech.com)

#### Note:

Please go to the [Download Zone](#) or the [Knowledge Database](#) in the [Support Center](#) on the Connect Tech website for product manuals, installation guides, device driver software and technical tips. Submit your technical support questions to our customer support engineers via the [Support Center](#) on the Connect Tech website.

#### Telephone/Facsimile

Technical Support representatives are ready to answer your call Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time. Our numbers for calls are:

**Toll Free:** 800-426-8979 (North America only)

**Telephone:** 519-836-1291 (Live assistance available 8:30 a.m. to 5:00 p.m. EST, Monday to Friday)

**Facsimile:** 519-836-4878 (on-line 24 hours)



## Limited M.2 GPS Warranty

Connect Tech Inc. provides a 2-Year Warranty for the M.2 GPS. Should this product, in Connect Tech Inc.'s opinion, fail to be in good working order during the warranty period, Connect Tech Inc. will, at its option, repair or replace this product at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster or non-Connect Tech Inc. authorized modification or repair.

You may obtain warranty service by delivering this product to an authorized Connect Tech Inc. business partner or to Connect Tech Inc. along with proof of purchase. Product returned to Connect Tech Inc. must be pre-authorized by Connect Tech Inc. with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured and packaged for safe shipment. Connect Tech Inc. will return this product by prepaid ground shipment service.

The Connect Tech Inc. 2-Year Warranty is only valid over the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, Connect Tech Inc. reserves the right to substitute an equivalent product if available or to retract the 2-Year Warranty if no replacement is available.

The above warranty is the only warranty authorized by Connect Tech Inc. Under no circumstances will Connect Tech Inc. be liable in any way for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, such product.

## Copyright Notice

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## ESD Warning



Electronic components and circuits are sensitive to ElectroStatic Discharge (ESD). When handling any circuit board assemblies including Connect Tech COM Express carrier assemblies, it is recommended that ESD safety precautions be observed. ESD safe best practices include, but are not limited to:

- Leaving circuit boards in their antistatic packaging until they are ready to be installed.
- Using a grounded wrist strap when handling circuit boards, at a minimum you should touch a grounded metal object to dissipate any static charge that may be present on you.
- Only handling circuit boards in ESD safe areas, which may include ESD floor and table mats, wrist strap stations and ESD safe lab coats.
- Avoiding handling circuit boards in carpeted areas.
- Try to handle the board by the edges, avoiding contact with components.

## Revision History

Revision	Date	Changes
0.00	2016-03-18	Initial Release

## Introduction

Connect Tech's M.2 GPS is a GNSS receiver based on the very small industry standard M.2 Type-2242-S3-B form factor. Using the USB bus, the M.2 GPS provides global positioning and time-stamp information, while taking up little space and power within a system. Also considering the existing support for Windows and Linux, the M.2 GPS can be easily integrated into any existing system, as well as easily implemented into new systems.

## Product Features and Specifications

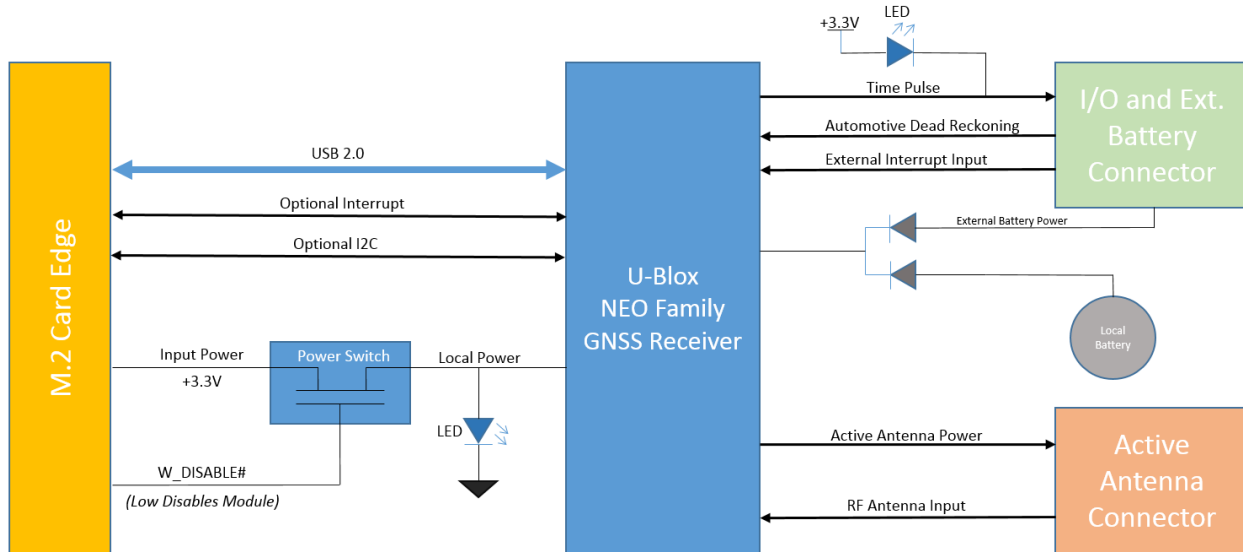
Specifications	
Dimensions	42 mm x 22 mm (M.2 Type-2242-S3-B)
Antenna Connector	HSC (MHF4), support for active antennas only
GPS	GPS, GLONASS, QZSS, Galileo UBX, RTCM, NMEA protocols
I/O	TIMPULSE output synchronized with GPS time grid WHEELTICK input (used for Automotive Dead Reckoning) FWD input (used for Automotive Dead Reckoning) External Interrupt Input External Battery Input
Cables	CBG162: External I/O Cable CBG214: HSC (MHF4) to SMA Female Cable
Antenna	GPS-06T, VTGPSA-9, Active GPS/GLONASS antennas only
Environmental	-40° C to +85° C
Warranty and Support	2 Years

## Part Numbers / Ordering Information

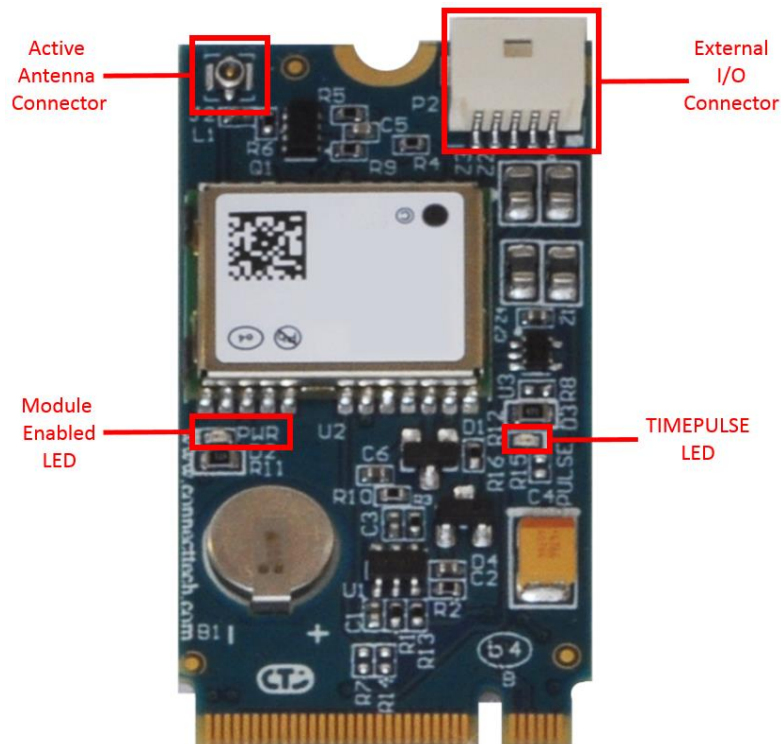
Ordering Information	
M2G201	M.2 GPS Receiver (Battery not included) populated with NEO-7N module
M2G202	M.2 GPS Receiver (Battery included) populated with NEO-7N module
M2G203	M.2 GPS Receiver (Battery not included) populated with NEO-M8N module
M2G204	M.2 GPS Receiver (Battery included) populated with NEO-M8N module
M2G205	M.2 GPS Receiver (Battery not included) populated with NEO-M8L module, supports Automotive Dead Reckoning
M2G206	M.2 GPS Receiver (Battery included) populated with NEO-M8L module, supports Automotive Dead Reckoning

## Product Overview

### Block Diagram



### Connector Summary & Locations



## Interface Pin-outs

### M.2 Edge Connector

The M.2 GPS pin-out is compliant to the M.2 Socket 2 with B Key. This module uses only +3.3V for input power and all I/O is +3.3V signaling.

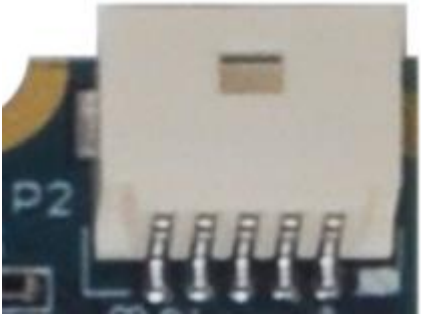
Function	M.2 Card Edge Connector			
Location	P3			
Pinout	Signal	Pin	Pin	Signal
	NC	1	2	+3.3V
GND	3	4	+3.3V	
GND	5	6	NC	
USB_D+	7	8	W_DISABLE1#	
USB_D-	9	10	NC	
GND	11	12	Connector Key	
Connector Key	13	14	Connector Key	
Connector Key	15	16	Connector Key	
Connector Key	17	18	Connector Key	
Connector Key	19	20	NC	
CONFIG_0 (GND)	21	22	NC	
NC	23	24	NC	
NC	25	26	NC	
GND	27	28	NC	
NC	29	30	NC	
NC	31	32	NC	
GND	33	34	NC	
NC	35	36	NC	
NC	37	38	NC	
GND	39	40	M.2 GNSS SCL	
NC	41	42	M.2 GNSS SDA	
NC	43	44	M.2 GNSS IRQ	
GND	45	46	NC	
NC	47	48	NC	
NC	49	50	RESET#	
GND	51	52	NC	
NC	53	54	NC	
NC	55	56	NC	
GND	57	58	NC	
NC	59	60	NC	
NC	61	62	NC	
NC	63	64	NC	
NC	65	66	NC	
NC	67	68	NC	
CONFIG_1 (GND)	69	70	+3.3V	
GND	71	72	+3.3V	
GND	73	74	+3.3V	
CONFIG_2 (GND)	75	N/A	-	





## External I/O Connector


The pinout for the I/O connector is outlined in the table below.

<b>Function</b>	External I/O Connector		 <p>501568-0507</p>																	
<b>Location</b>	P2																			
<b>Connector PN</b>	501568-0507 - Manufacturer: Molex																			
<b>Mating Connector PN</b>	501330-0500 - Manufacturer: Molex CTI Cable #: CBG162																			
<b>Pinout</b>	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>EXT_INT / WHEELTICK</td> <td>External Interrupt Input or Speed pulse input</td> </tr> <tr> <td>2</td> <td>TIMEPULSE</td> <td>Time pulse Output</td> </tr> <tr> <td>3</td> <td>FWD</td> <td>Forward/Reverse indicator</td> </tr> <tr> <td>4</td> <td>GND</td> <td>Digital Ground</td> </tr> <tr> <td>5</td> <td>EXT_BAT</td> <td>External Battery Input</td> </tr> </tbody> </table>	Pin		Signal	Description	1	EXT_INT / WHEELTICK	External Interrupt Input or Speed pulse input	2	TIMEPULSE	Time pulse Output	3	FWD	Forward/Reverse indicator	4	GND	Digital Ground	5	EXT_BAT	External Battery Input
Pin	Signal	Description																		
1	EXT_INT / WHEELTICK	External Interrupt Input or Speed pulse input																		
2	TIMEPULSE	Time pulse Output																		
3	FWD	Forward/Reverse indicator																		
4	GND	Digital Ground																		
5	EXT_BAT	External Battery Input																		

NOTE: WHEELTICK is only available on M2G205 and M2G206, otherwise this signal is EXT\_INT

NOTE: FWD is only available on M2G205 and M2G206, otherwise it is not connected and should be left floating

## Active Antenna Connector

<b>Function</b>	Active Antenna Connector		 <p>HSC - MHF4 Jack</p>
<b>Location</b>	J2		
<b>Connector PN</b>	MM4829-2702RA4 - Manufacturer: Murata		
<b>Mating Connector PN</b>	HSC – MHF4 Socket Standard CTI Cable #: CBG214		

## Detailed Feature Description

### USB

The M.2 GPS uses a USB 2.0 Full Speed (12Mb/s) interface as the primary communication bus. The USB interfaces is connect between the GPS receiver and the M.2 card edge connector (pins 7/9).

### TIMEPULSE

The TIMEPULSE output is a buffered and ESD protected signal from the GPS receiver. This signal connects to pin 2 of the External I/O Connector. It also drives the TIMEPULSE LED. By default, when satellites are not fixed this signal is High (3.3V). When satellites are fixed, this signal pulses at 1 pulse-per-second (1Hz) with a 20% duty cycle (200ms High, 800ms Low). For more information see the Receiver Description Including Protocol Specification document for your GPS receiver found in the Software Support section of this document.

### W\_DISABLE1#

The W\_DISABLE# input from the M.2 card edge connector (pin 8) can be used to enable and disable power to the M.2 GPS module. When W\_DISABLE1# is low, the module is disabled and no power is applied to the M.2 GPS. When W\_DISABLE1# is High, the module is enabled and powered on. This signal is locally pulled up to 3.3V through a 100K ohm resistor.

### External Interrupt Input/WHEELTICK Input

The external interrupt/WHEELTICK input is an ESD protected input signal from the external I/O connector to the GPS receiver. On modules that do not support Automotive Dead Reckoning, this signal will always be an External Interrupt input, and this input can be used for control of the GPS receiver or for aiding. On modules that support Automotive Dead Reckoning (M2G205/M2G206), this signal is by default used as the WHEELTICK input and is used to provide speed pulse information to the module. If the speed pulse information is available from the host processor, then the information can be provided using software messages in the UBX protocol. If using software messages to provide speed pulse information, this signal can be configured as an external interrupt input. See the Receiver Description Including Protocol Specification document for your GPS receiver found in the Software Support section of this document. If this signal is not used, it should be left floating. Do not exceed 3.6V on this signal.

### FWD

The forward/reverse signal is an ESD protected input used on modules that support Automotive Dead Reckoning. This signal is used to indicate the moving direction of the module. An active high indicates moving forward and a low for moving backwards. If the forward/reverse information is available from a host processor, then this information can be provided to the module using software messages in the UBX protocol. For more information see the Receiver Description Including Protocol Specification document for your GPS receiver found in the Software Support section of this document. On modules that do not support Automotive Dead Reckoning, this signal should be left floating. Do not exceed 3.6V on this signal.

## External Battery

The external battery input is an ESD protected input from the External I/O Connector to the backup voltage supply of the GPS receiver. The purpose of a battery signal is to power internal memory for GPS almanac, ephemeris, and last position retention through power cycles. The voltage on this input signal should be greater than 2.0V and less than 3.6V. The supply of this signal should be able to provide at least 20uA continuous at room temperature, and 50uA at +85 degrees Celsius.

## Local Battery and BAT\_EN Header

There is a local battery supply on the M.2 GPS. The purpose of a battery signal is to power internal memory for GPS almanac, ephemeris, and last position retention through power cycles. The design includes a MS621 rechargeable battery which recharges itself when the unit is powered on. When power is removed from the unit the GPS receiver will typically consume 15uA on its battery supply input at room temperature and 24uA at 85 degrees Celsius.

## On-board Indicator LEDs

LED	Description
TIMEPULSE	TIMEPULSE visual indicator. This LED will blink at the rate and duty cycle of the TIMEPULSE output.
PWR	ON: indicates the module is powered on and enabled OFF: indicates the module is not powered and is disabled *the module is enabled/disabled using the W_DISABLE1# input from the M.2 card edge connector



## Software Support for the NEO-7 and NEO-M8 GPS Receivers

The USB drivers for the NEO-7 and NEO-M8 GPS Receivers can be found on the u-Blox website:

[https://www.u-blox.com/en/product-resources?f\[0\]=property\\_file\\_product\\_filter%3A2668&f\[1\]=field\\_file\\_category%3A221](https://www.u-blox.com/en/product-resources?f[0]=property_file_product_filter%3A2668&f[1]=field_file_category%3A221)

For configuration and setting options for the NEO-7 GPS receiver, please refer to the u-Blox 7 Receiver Description Including Protocol Specification V14 found on the u-Blox website:

[https://www.u-blox.com/en/product-resources?f\[0\]=field\\_file\\_category%3A209](https://www.u-blox.com/en/product-resources?f[0]=field_file_category%3A209)

For configuration and setting options for the NEO-M8N GPS receiver, please refer to the u-Blox M8 Receiver Description Including Protocol Specification found on the u-Blox website:

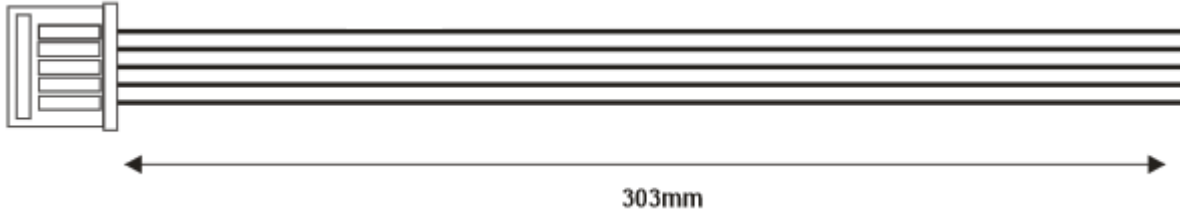
[https://www.u-blox.com/en/product-resources?f\[0\]=field\\_file\\_category%3A209](https://www.u-blox.com/en/product-resources?f[0]=field_file_category%3A209)

Changing the configuring of the NEO modules is best accomplished using the u-center application provided by u-Blox. To get the u-center application for windows, please see the link below:

<https://www.u-blox.com/en/product/u-center-windows>

## Cables

### CBG162 – External I/O Cable



501330-0500	Signal	Open End (Unterminated)
1	See I/O Connector Section for pin-out	Un-terminated
2		Un-terminated
3		Un-terminated
4		Un-terminated
5		Un-terminated

### CBG214 – Murata HSC to SMA Female Cable



HSC	TO	SMA Female (Socket)
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