

TDS-GU7020N

GPS Smart Module Datasheet

(Chip: u-blox7 UBX-G7020-KT)

Revision 0.2

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1. Instruction

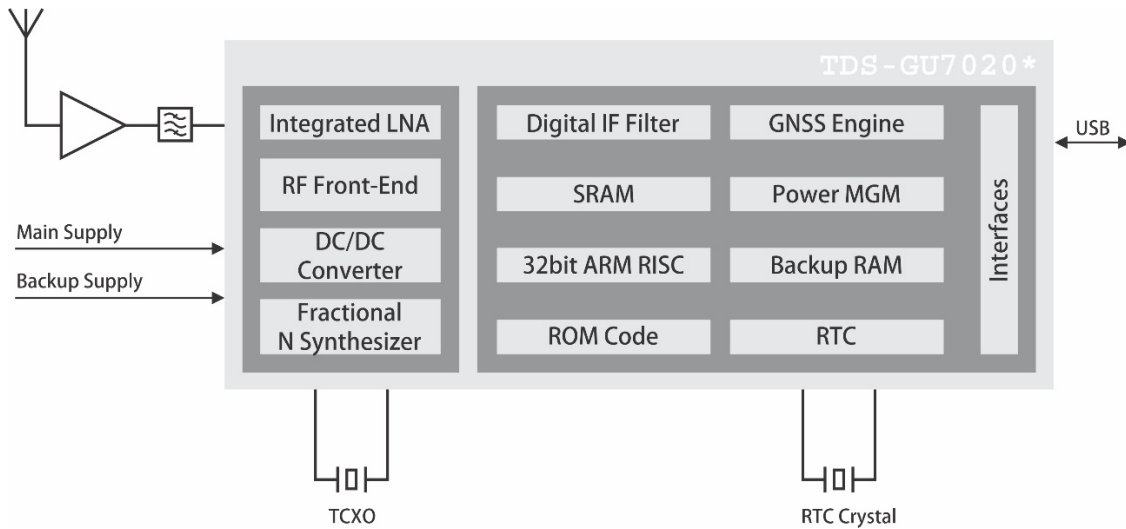
1.1 Overview

The suitable for integration in variety of consumer devices such as PDA, Personal Navigation Device, Digital Camera Vehicle Navigation, Telematics and other applications requiring Position, Velocity and Time. High Sensitivity GPS technology provides unprecedented indoor and outdoor positioning capability including urban canyon and under thick foliage. provides standard NMEA output for compatibility with all user applications, and map engines.

1.2 Features

- * u-blox7 UBX-G7020-KT GPS chip
 - * Active jammer detection and reduction
 - * Multi-path detection and compensation
 - * DGPS(WAAS/EGNOS/MSAS/GAGAN) QZSS support
 - * Update Rate: 1Hz (max up to 10Hz, Configurable by firmware)
 - * RoHS compliant
 - * Support u-blox USB connection
 - * Support to NMEA-0183 compliant protocol
- * If you need a USB driver file, please go to www.u-blox.com to download and install the driver.

1.3 System Block Diagram

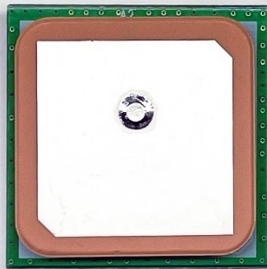


1.4 Product Applications

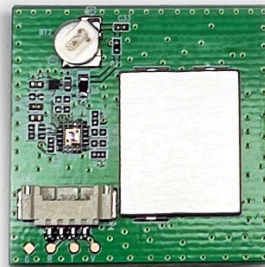
- * Handheld GPS receiver application
- * Automotive application
- * Car navigations and tracking
- * Aviation application
- * Ideal for PDA, Pocket PC and other consumer devices requiring positioning capability

1.5 Product Images

Antenna side



Parts side



2. Technical Specifications

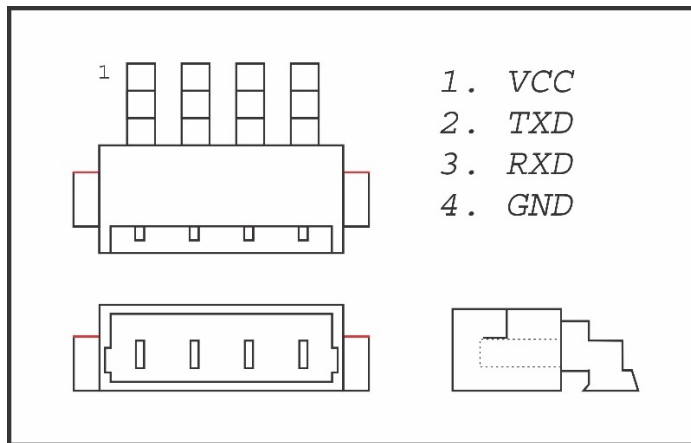
2.1 Specification List

Frequency	L1, 1575.42 MHz
Receiver Type	56 Channel
Position	2.5 m (Autonomous) / 2.0 m SBAS (CEP 50%)
Velocity	0.1 m/s
Time	1 PPS
Hot Start	< 1.5 sec., Autonomous
Cold Start	< 29 sec., Autonomous
Tracking Sensitivity	-162 dBm, Typical
Acquisition Sensitivity	-148 dBm, Autonomous Cold Start
Reacquisition	-160 dBm, Typical
Operation Current	GPS: 30 mA_Acquisition, 25 mA_Tracking
Backup Current	20 uA
Altitude	50,000 m
Velocity	500 m/s
Acceleration	4 g
Jerk	1 g/s
Power Supply Voltage	+5V
Backup Voltage	+1.4 to +3.6V
Dimension	28.0 x 28.0 x 8.6mm (±0.2mm)

3. Hardware Interface

3.1 Pin Configuration

The TDS-GU7020N External pin connection is presented in the figure below.



3.2 Pin Assignment

Pin	Signal Name	I/O	Description
1	VCC	P	DC Power Input
2	TXD	O	UART Serial Data Output
3	RXD	I	UART Serial Data Input
4	GND	G	Ground

VCC

This is the main DC power supply input pin. IT provides voltage to module.

TXD

This is the main transmitting channel and is used to output navigation and measurement data to debug software or user written software.

RXD

This is the main receiver channel and is used to receive software commands to the board from debug software or from user written software.

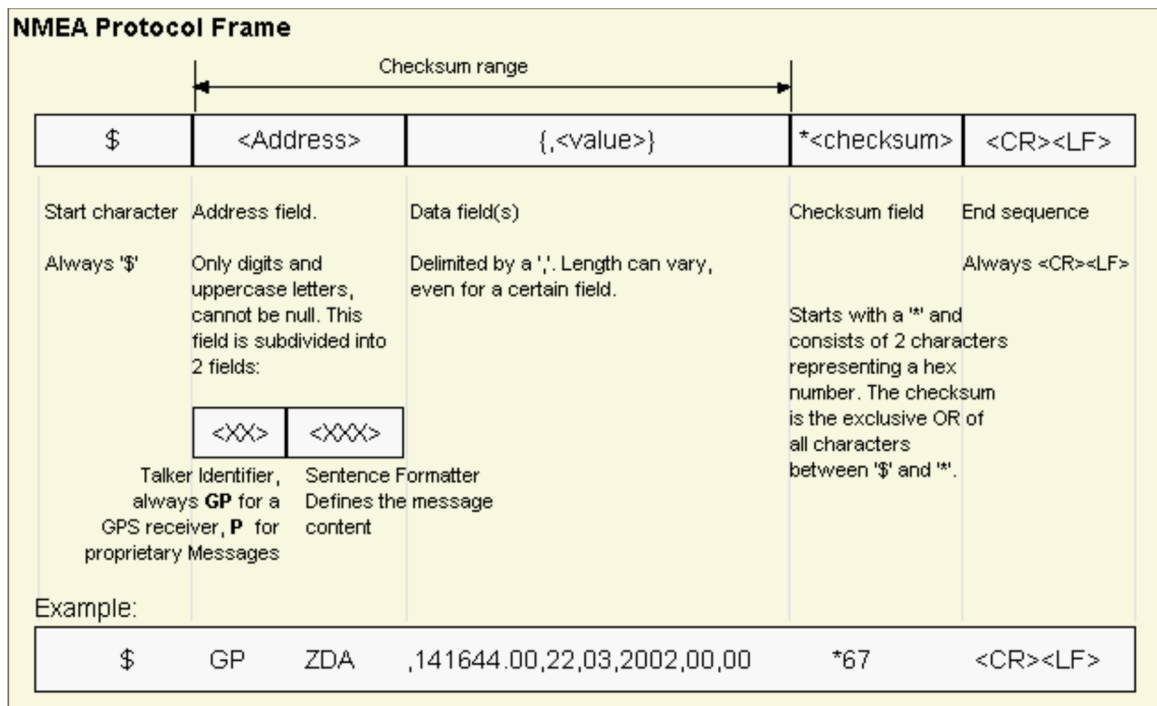
GND

GND provides the ground.

4. NMEA Output Sentences

NMEA messages sent by the GPS receiver are based on the NMEA 0183 Version 2.x.

The following picture shows the structure of a NMEA protocol message.



For further information on the NMEA Standard please refer to NMEA 0183 Standard

For Interfacing Marine Electronic Devices, Version 2.30, March 1, 1998. See <http://www.nmea.org/> for ordering instructions.

The NMEA standard allows for proprietary, manufacturer-specific messages to be added. These shall be marked with a manufacturer mnemonic.

GLL Latitude and Longitude, with Time of Position Fix and Status

<i>Message</i>	GLL		
<i>Description</i>	Latitude and Longitude, with Time of Position Fix and Status		
<i>Type</i>	Output Message		
<i>Comment</i>	The output of this message is dependent on the currently selected datum (Default: WGS84) -		
<i>Message Info</i>	ID for CFG-MSG	Number of Fields	
	0xF0 0x01	(9) or (10)	

Message Structure:

\$GPGLL,Latitude,N,Longitude,E,hhmmss.ss,Valid,Mode*cs<CR><LF>

Example:

\$GPGLL,4717.11364,N,00833.91565,E,092321.00,A,A*60

Field No.	Example	Format	Name	Unit	Description
0	\$GPGLL	string	\$GPGLL	-	Message ID, GLL Protocol Header
1	4717.11364	ddmm.mmmmm	Latitude	-	Latitude, Degrees + minutes, see format description
2	N	character	N	-	N/S Indicator, hemisphere N=north or S=south
3	00833.91565	dddmm.mmmmm	Longitude	-	Longitude, Degrees + minutes, see format description
4	E	character	E	-	E/W indicator, E=east or W=west
5	092321.00	hhmmss.ss	Time	-	UTC Time, Current Time
6	A	character	Valid	-	V = Data invalid or receiver warning, A = Data valid. see position fix flags description
Start of Optional Block					
7	A	character	Mode	-	Positioning Mode, see position fix flags description
End of Optional Block					
7	*60	hexadecimal	cs	-	Checksum

GSA GPS DOP and Active Satellites

Message	GSA		
Description	GPS DOP and Active Satellites		
Type	Output Message		
Comment	<ul style="list-style-type: none"> • If less than 12 SVs are used for navigation, the remaining fields are left empty. If more than 12 SVs are used for navigation, only the IDs of the first 12 are being output. • The SV Numbers (Fields 'Sv') are in the range of 1 to 32 for GPS satellites, and 33 to 64 for SBAS satellites (33 = SBAS PRN 120, 34 = SBAS PRN 121 and so on) 		
Message Info	ID for CFG-MSG	Number of Fields	
	0xF0 0x02	20	

Message Structure:

\$GPGSA,Smode,FS{,sv},PDOP,HDOP,VDOP*cs<CR><LF>

Example:

\$GPGSA,A,3,23,29,07,08,09,18,26,28,,,,,1.94,1.18,1.54*0D

Field No.	Example	Format	Name	Unit	Description
0	\$GPGSA	string	\$GPGSA	-	Message ID, GSA protocol header
1	A	character	Smode	-	Smode, see first table below
2	3	digit	FS	-	Fix status, see second table below and position fix flags description
Start of Repeated Block (12 times)					
3 + 1*N	29	numeric	sv	-	Satellite Number
End of Repeated Block					
15	1.94	numeric	PDOP	-	Position Dilution of Precision
16	1.18	numeric	HDOP	-	Horizontal Dilution of Precision
17	1.54	numeric	VDOP	-	Vertical Dilution of Precision
18	*0D	hexadecimal	cs	-	Checksum

GSV GPS Satellites in View

<i>Message</i>	GSV		
<i>Description</i>	GPS Satellites in View		
<i>Type</i>	Output Message		
<i>Comment</i>	The number of satellites in view, together with each PRN (SV Id), elevation and azimuth, and C/No (Signal/Noise Ratio) value. Only four satellite details are transmitted in one message. There are up to 4 messages used as indicated in the first field NoMsg.		
Message Info	ID for CFG-MSG	Number of Fields	
	0xF0 0x03	7..16	

Message Structure:

\$GPGSV,NoMsg,MsgNo,NoSv,{,sv,elv,az,cno}*cs<CR><LF>

Example:

\$GPGSV,3,1,10,23,38,230,44,29,71,156,47,07,29,116,41,08,09,081,36*7F

Field No.	Example	Format	Name	Unit	Description
0	\$GPGSV	string	\$GPGSV	-	Message ID, GSV protocol header
1	3	digit	NoMsg	-	Number of messages, total number of GPGSV messages being output
2	1	digit	MsgNo	-	Number of this message
3	10	numeric	NoSv	-	Satellites in View
Start of repeated block (1..4 times)					
4+4*N	23	numeric	sv	-	Satellite ID
End of Repeated Block					
5.. 16	*7F	hexadecimal	cs	-	Checksum
6.. 16	-	character	<CR><LF>	-	Carriage Return and Line Feed

RMC Recommended Minimum Data

Message	RMC		
Description	Recommended Minimum Data		
Type	Output Message		
Comment	The output of this message is dependent on the currently selected datum (Default: WGS84) The Recommended Minimum sentence defined by NMEA for GPS/Transit system data.		
Message Info	ID for CFG-MSG	Number of Fields	
	0xF0 0x04	15	

Message Structure:

\$GPRMC,hhmmss,status,latitude,N,longitude,E,spd,cog,ddmmy,mv,mvE,mode*cs<CR><LF>

Example:

\$GPRMC,083559.00,A,4717.11437,N,00833.91522,E,0.004,77.52,091202,,,A*57

Field No.	Example	Format	Name	Unit	Description
0	\$GPRMC	string	\$GPRMC	-	Message ID, RMC protocol header
2	A	character	Status	-	Status, V = Navigation receiver warning, A = Data valid, see position fix flags description
3	4717.11437	ddmm. mmmm	Latitude	-	Latitude, Degrees + minutes, see format description
4	N	character	N	-	N/S Indicator, hemisphere N=north or S=south
5	00833.91522	dddmm. mmmm	Longitude	-	Longitude, Degrees + minutes, see format description
6	E	character	E	-	E/W indicator, E=east or W=west
7	0.004	numeric	Spd	knot s	Speed over ground
9	091202	ddmmy	Date	-	Date in day, month, year format
10	-	numeric	mv	degrees	Magnetic variation value, not being output by receiver
11	-	character	mvE	-	Magnetic variation E/W indicator, not being output by receiver
13	*57	hexadecimal	cs	-	Checksum
14	-	character	<CR><LF>	-	Carriage Return and Line Feed

VTG Course over ground and Ground speed

<i>Message</i>	VTG		
<i>Description</i>	Course over ground and Ground Speed		
<i>Comment</i>	Velocity is given as Course over Ground (COG) and Speed over Ground (SOG).		
<i>Message Info</i>	ID for CFG-MSG	Number of Fields	
	0xF0 0x05	12	

Message Structure:

\$GPVTG,cogt,T,cogm,M,sog,N,kph,K,mode*cs<CR><LF>

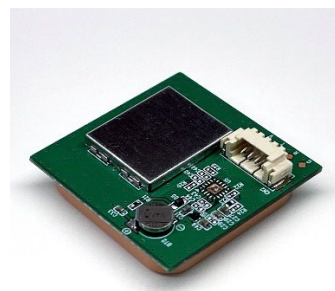
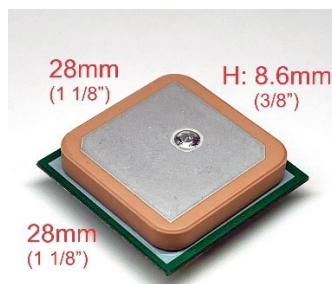
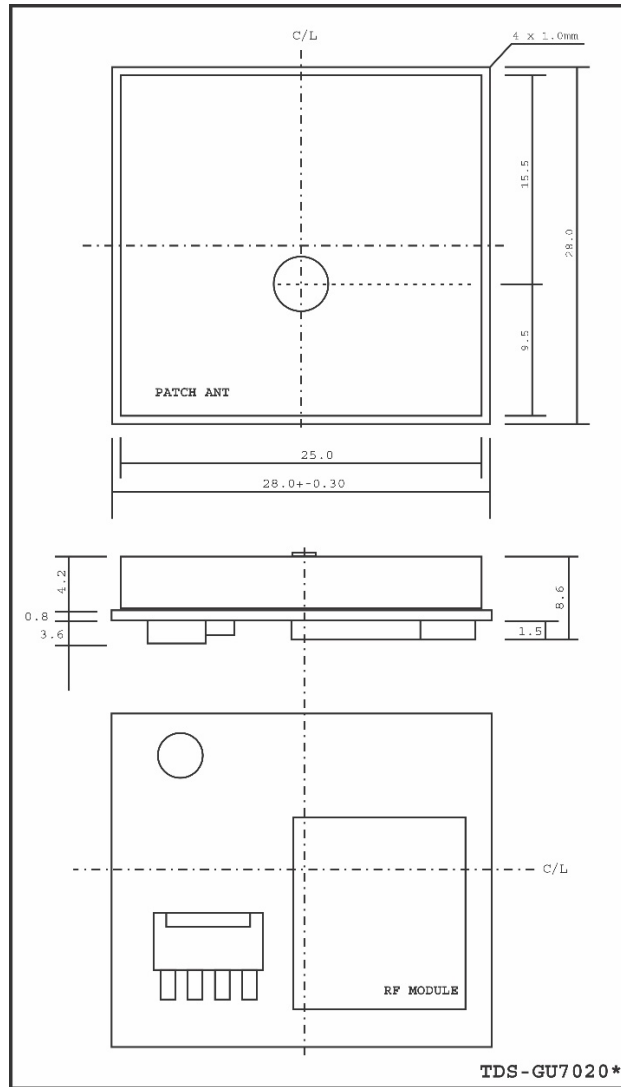
Example:

\$GPVTG,77.52,T,,M,0.004,N,0.008,K,A*06

Field No.	Example	Format	Name	Unit	Description
0	\$GPVTG	string	\$GPVTG	-	Message ID, VTG protocol header
1	77.52	numeric	cogt	degrees	Course over ground (true)
2	T	character	T	-	Fixed field: True
3	-	numeric	cogm	degrees	Course over ground (magnetic), not output
4	M	character	M	-	Fixed field: Magnetic
5	0.004	numeric	Sog	knots	Speed over ground
6	N	character	N	-	Fixed field: Knots
7	0.008	numeric	Kph	km/h	Speed over ground
8	K	character	K	-	Fixed field: kilometers per hour
9	A	character	Mode	-	Mode Indicator, see position fix flags description
10	*06	hexadecimal	cs	-	Checksum
11	-	character	<CR><LF>	-	Carriage Return and Line Feed

5. Outline Drawing

Dimension: (Unit: mm, Tolerance: +/- 0.2mm)



6. Contact Information

Address: 1505 Luna Road, Suite 180, Carrollton, Texas 75006, USA

E-Mail: support@TexasDatalinkSolutions.com