



u-blox extension to SiRF[®] binary protocol

GPS-XS1E RECEIVER APPLICATION NOTE



Abstract

u-blox receivers support two protocols: SiRF binary and NMEA-0183. For some applications the SiRF binary protocol contains too little information. u-blox has implemented proprietary messages based on the SiRF binary protocol to address these shortcomings and support common requirements.



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SiRF® Binary Output message I.D. 98, Extended Measured Navigation

In contrast to the NMEA protocol, the original SiRF® Binary protocol outputs position in a Cartesian coordinate frame called Earth-Centered, Earth-Fixed (ECEF). For many applications, geodetic mapping coordinates of Latitude, Longitude and Altitude similar to NMEA are desired. In the SiRF® binary protocol, time is sent as GPS week number and Time of Week (TOW). But in many applications, the Universal Time Coordinated (UTC) is the best time format.

Output Rate: 1 Hz

Example:

AOA20027—Start Sequence and Payload Length
 6204EDBB4F00E3C83E0007C29800000FA0000006607FB9FB9
 6407CF091E0712B0C20B06090507 —Payload
 0C73B0B3—Message Checksum and End Sequence

Name	Bytes	Binary (Hex)		Units	ASCII (Decimal)	
		Scale	Example		Scale	Example
Message ID	1		62			98
Latitude (based on WGS-84)	4	*10 ³	04EDBB4F	rad	/10 ³	0x82688847
Longitude (based on WGS-84)	4	*10 ³	00E3C83E	rad	/10 ³	0x14927934
Altitude (based on WGS-84)	4	*1000	0007C298	m	/1000	508.568
Speed over Ground	4	*1000	000000FA	m/s	/1000	0.250
Climb Rate	4	*1000	00000066	m/s	/1000	0.102
Course over Ground	4	*10 ³	07FB9FB9	rad	/10 ³	1.33930937
Mode ¹	1		64	bit map ¹		100 ²
UTC Year	2		07CF	years		1999
UTC Month	1		09	months		9
UTC Day	1		1E	days		30
UTC Hour	1		07	hours		7
UTC Minute	1		12	minutes		12
UTC Second	2	*1000	B0C2	seconds	/1000	45.250
GDOP (geometric DOP)	1	*5	0B		/5	2.2
HDOP (horizontal DOP)	1	*5	06		/5	1.2
PDOP (position DOP)	1	*5	09		/5	1.8
TDOP (time DOP)	1	*5	05		/5	1.0
VDOP (vertical DOP)	1	*5	07		/5	1.4

Table 1: Extended Measured Navigation

¹ See Table 2 and Table 3

² Example indicates L ≥ 4 satellite solution (3D), validated, UTC leap seconds corrected

Payload length: 39 bytes

Bit	7	6	5	4	3	2	1	0
Bit(s) Name	DGPS	LEAP- SEC	VALI- DATION	DOP- MASK	DRTMO	PMODE		

Table 2: Mode Byte

Bit(s) Name	Name	Value	Description
PMODE	Position mode	0	No navigation solution
		1	1 satellite solution (altitude hold, direction hold, time hold)
		2	2 satellite solution (altitude hold and direction or time hold)
		3	3 satellite solution (altitude hold)
		4	≥4 satellite solution
		5	2D point solution (least square)
		6	3D point solution (least square)
		7	Dead reckoning
DRTMO	Dead Reckoning timed out	0	No
		1	Yes
DOPMASK	DOP mask status	0	DOP mask not exceeded
		1	DOP mask exceeded
VALIDATION	Fix Quality	0	Unvalidated
		1	Validated
LEAPSEC	UTC Leap Seconds	0	Leap seconds not corrected
		1	Leap seconds corrected
DGPS	DGPS status	0	No DGPS position
		1	DGPS position

Table 3: Interpretation of Mode Byte

By default, 'Extended Measured Navigation' message (I.D. 98) is disabled. There is no input message to enable this output messages. Enabling the feature must be done by performing a Firmware Update and using the 'Adjust Settings' Feature of the Firmware Downloader `gpsxs-dl.exe`, Version 1.4.2 or newer. Firmware downloader and firmware images can be downloaded from our website.

Please refer to the 'Firmware Update Utility' manual [5] for further information.

A GLOSSARY

Please refer to the GPS dictionary from u-blox [1].

B RELATED DOCUMENTS

- [1] The GPS Dictionary
(<http://www.u-blox.ch/customersupport/docs/GPS-X-00001.pdf>)
- [2] GPS-xS1x Protocol Specification Manual, GPS.G1-X-00002-A
(<http://www.u-blox.ch/customersupport/gps.g1/GPS.G1-X-00005.pdf>)
- [3] GPS-MS1E Data Sheet, GPS.G1-MS1-00002A
(<http://www.u-blox.ch/customersupport/gps.g1/GPS.G1-MS1-00002-A.pdf>)
- [4] GPS-PS1E Data Sheet, GPS.G1-PS1-00002-A
(<http://www.u-blox.ch/customersupport/gps.g1/GPS.G1-PS1-00002-A.pdf>)
- [5] Firmware Update Utility Manual for GPS-MS1E and GPS-PS1E
(<http://www.u-blox.ch/customersupport/gps.g1/GPS.G1-X-00002-H.pdf>)

All u-blox documents are available on our website (<http://www.u-blox.com>).

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