GPS Receiver Module

FST-UE1528M

UBX-G8020-KT Single Chip

Version 1.1
2019/04/10

www. Fourstech.com

▶ Revision History

Revision	Description of change	Revision date	APPR.
VER1.0	Initial Release	Apr-21-2015	ywkim
VER1.1	- GPS Chipset변경 - UBX-G7020-KT ->UBX-G8020-KT	Apr-10-2019	ywkim

CONTENTS

1 Introduction

1.1 General Description

The FST-UE1528M is the latest generation of low power GPS receiver Module from FourStech. It's a highly integrated GPS receiver offering high performance and wide range applications. FST-UE528M receiver module designed to receive the L1 band signal 1575.42 MHz.

1.2 Feature Highlights

- Low power, Fast standby mode
- Single Supply Voltage(3.3V)
- Integrated 0.5ppm TCXO
- UART Support 9,600bps baud rate
- 72 channels Ublox 7 Engine
- Hybrid GPS/SBAS engine (WAAS, EGNOS, QSZZ)
- Anti-jamming technology
- Removes in-band jammers up to 80dB-Hz
- Navigate down to –163 dBm
- Faster acquisition with AssistNow Autonomous
- Support standard NMEA-0183 and binary protocol
- RoHS Compliant
- ARM7TDMI-S Technologies
- GPS Week rollover : 2015-10-18 ~ 2035-06-02
- Small size 22 x 46 x 10mm

1.3 Applications

- Telematics equipment
- Marine navigation application
- Mobile Phone and Handheld GPS receiver application
- Ideal for PDA, Pocket PC and other computing devices at GPS application

2 Specification

2.1 Absolute Maximum Ratings

Symbol	Parameter	Min	Max	Unit
VCC	Supply Voltage	0	6.0	V
VBAT	Input back_Up Battery	0	5	V
ESD	ESD Rating	-	2	KV
TSTG	Storage Temperrature Range	-40	+85	˚C
Humidity		-	95	%

Note : Absolute maximum ratings are stress ratings only, and functional operation at the maximums is not guaranteed. Stress beyond the limits specified in this table may affect device
reliability or cause permanent damage to the device.
For functional operating conditions, please refer to the operating conditions tables as follow.

2.2 Operating Conditions

Symbol	Parameter	Min	Typ	Max	Unit
VCC	Supply Voltage	3.0	3.3	5.5	V
VBAT	Voltage Back_up battery	1.4	3.1	3.3	V
ViH	I/O input high level	0.7x3.0	-	3.3	V
ViL	I/O input low level	-0.4	-	0.45	V
VoH	I/O output high level	0.7x3.0	-	3.0	V
VoL	I/O output low level			0.4	V
Temperature	With battery	-20	-	+60	˚C
*Temperature	Without battery	-30	-	+85	˚C

2.3 DC Electrical Characteristics

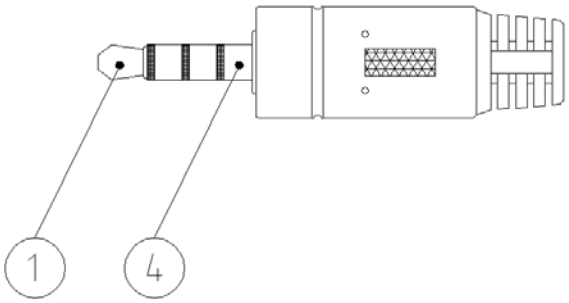
	Parameter	Min	Typ	Max	Unit
Power Consumption (With LNA)	Average Acquisition	-	42	-	mA
	Average Tracking (Max performance Mode)	-	40	-	mA
	V_BackUp	-	15	-	uA

3 General & Performance Specification

Parameter	Description	Specification
Receiver Type	L1 Band	1575.42MHz
Sensitivity	Tracking	-166dBm
	Cold starts	-148dBm
	Hot starts	-157dBm
Time To First Fix	Cold start (autonomous)	29sec
	Warm start (autonomous)	26sec
	Hot start (autonomous)	<1S
Accuracy	Position	2.5m CEP
	SBAS	2.0m CEP
Operation Limits	Velocity	500m/s
	Altitude	50,000m
Serial Interface	1 UART	9,600bps Full Duplex
Protocol Message	NMEA-0183	Version 4.0 With WGS-84
LNA	Gain	20dB±1dB
	Noise Figure	Less than 0.65dB
Antenna Type	Active antenna	Patch or Linear
	Centerfrequency	1575.42MHz
	Polarrization	RHCP
	Impedance	50Ω

5 Pin Assignment

Pin Number	Name	I/O	Description
1	VCC	I	Supply Voltage dc 3.3V
2	TXD	O	Serial data output (GPS to Host)
3	RXD	I	Serial data input (Host to GPS)
4	GND	-	GND



VCC(+3.3V DC power Input)
This is the main DC power supply input pin. IT provides voltage to module.

TXD (GPS to Host)
This is the main transmitting NMEA data and is used to programming download or debug port. NMEA Format 9,600 Baud rate.

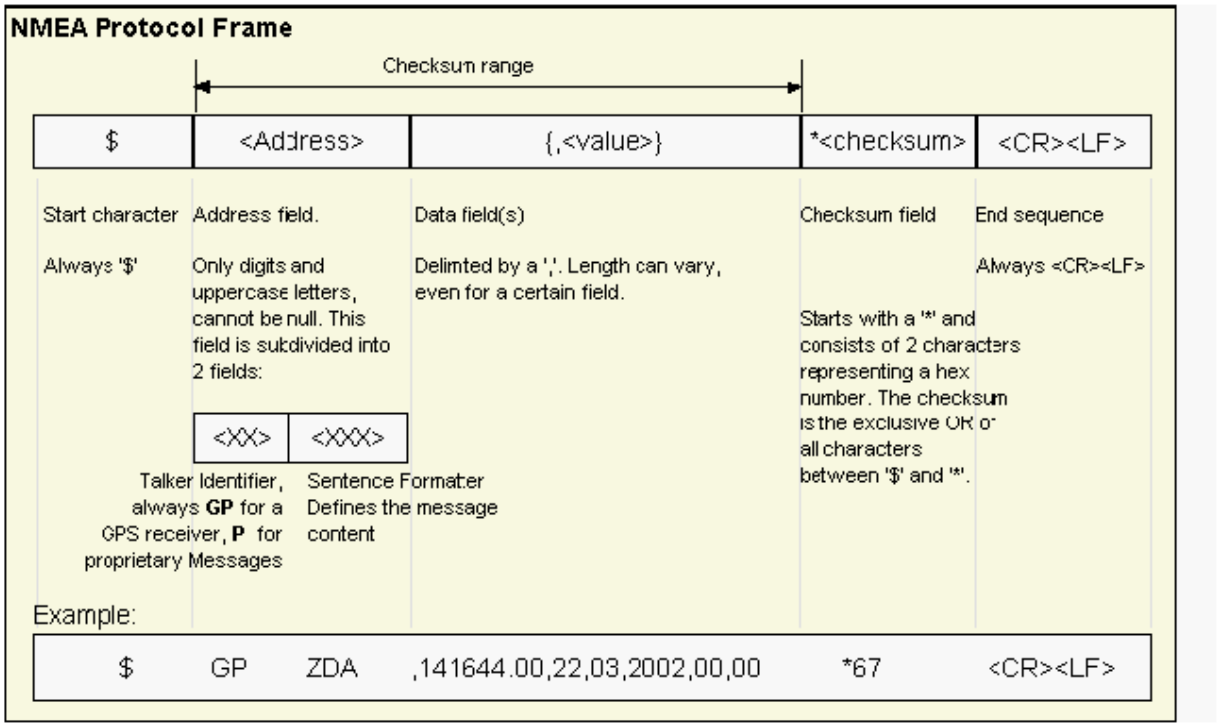
RXD (Host to GPS)
This is the UART receiver port of the module. It is used to receive software commands and If you want you can change Baud rate, Static Hold, assistnow autonomous...

GND
GND provides the ground.

6 S/W – NMEA Protocol

6 .1 NMEA Protocol Overview

NMEA messages sent by the GPS receiver are based on NMEA 0183 Version 2.3. 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. The mnemonic assigned to u-blox is UBX and is used for all non-standard messages. These proprietary NMEA messages therefore have the address field set to PUBX. The first data field in a PUBX message identifies the message number with two digits.

6.2 NMEA Message Overview

When configuring NMEA messages using the UBX protocol message CFG-MSG, the Class/Ids shown in the table shall be used.

Page	*Mnemonic*	*Cls/ID*	*Description*
	NMEA Proprietary Messages		**Proprietary Messages**
21	**UBX,00**	0xF1 0x00	Lat/Long Position Data
23	**UBX,03**	0xF1 0x03	Satellite Status
25	**UBX,04**	0xF1 0x04	Time of Day and Clock Information
27	**UBX,40**	0xF1 0x40	Set NMEA message output rate
28	**UBX,41**	0xF1 0x41	Set Protocols and Baudrate
26	**UBX**	0xF1 0x40	Poll a PUBX message
	NMEA Standard Messages		**Standard Messages**
18	**DTM**	0xF0 0x0A	Datum Reference
17	**GBS**	0xF0 0x09	GNSS Satellite Fault Detection
7	**GGA**	0xF0 0x00	Global positioning system fix data
9	**GLL**	0xF0 0x01	Latitude and longitude, with time of position fix and status
19	**GPQ**	0xF0 0x40	Poll message
14	**GRS**	0xF0 0x06	GNSS Range Residuals
10	**GSA**	0xF0 0x02	GPS DOP and Active Satellites
15	**GST**	0xF0 0x07	GNSS Pseudo Range Error Statistics
11	**GSV**	0xF0 0x03	GPS Satellites in View
12	**RMC**	0xF0 0x04	Recommended Minimum data
20	**TXT**	0xF0 0x41	Text Transmission
13	**VTG**	0xF0 0x05	Course over ground and Ground speed
16	**ZDA**	0xF0 0x08	Time and Date

GGA

Message	**GGA**		
Description	**Global positioning system fix data**		
Type	Output Message		
Comment	**The output of this message is dependent on the currently selected datum (Default: WGS84)** Time and position, together with GPS fixing related data (number of satellites in use, and the resulting HDOP, age of differential data if in use, etc.).		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x00	17	

Message Structure:

```
$GPGGA,hhmmss.ss,Latitude,N,Longitude,E,FS,NoSV,HDOP,msl,m,Altref,m,DiffAge,DiffStation*cs<CR><LF>
```

Example:

```
$GPGGA,092725.00,4717.11399,N,00833.91590,E,1,8,1.01,499.6,M,48.0,M,,0*5B
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPGGA	string	`$GPGGA`	-	Message ID, GGA protocol header
1	092725.00	hhmmss.sss	`hhmmss.ss`	-	UTC Time, Current time
2	4717.11399	ddmm.mmmm	`Latitude`	-	Latitude, Degrees + minutes, see Format description
3	N	character	`N`	-	N/S Indicator, N=north or S=south
4	00833.91590	dddmm.mmmm	`Longitude`	-	Longitude, Degrees + minutes, see Format description
5	E	character	`E`	-	E/W indicator, E=east or W=west
6	1	digit	`FS`	-	Position Fix Status Indicator, See Table below and Position Fix Flags description
7	8	numeric	`NoSV`	-	Satellites Used, Range 0 to 12
8	1.01	numeric	`HDOP`	-	HDOP, Horizontal Dilution of Precision
9	499.6	numeric	`msl`	m	MSL Altitude
10	M	character	`uMsl`	-	Units, Meters (fixed field)
11	48.0	numeric	`Altref`	m	Geoid Separation
12	M	character	`uSep`	-	Units, Meters (fixed field)
13	-	numeric	`DiffAge`	s	Age of Differential Corrections, Blank (Null) fields when DGPS is not used
14	0	numeric	`DiffStation`	-	Diff. Reference Station ID
15	*5B	hexadecimal	`cs`	-	Checksum
16	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

GLL

Message	**GLL**		
Description	**Latitude and longitude, with time of position fix and status**		
Type	Output Message		
Comment	**The output of this message is dependent on the currently selected datum (Default: WGS84)** -		
Message Info	*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.mmmm	`Latitude`	-	Latitude, Degrees + minutes, see Format description
2	N	character	`N`	-	N/S Indicator, hemisphere N=north or S=south
3	00833.91565	dddmm.mmmm	`Longitude`	-	Longitude, Degrees + minutes, see Format description
4	E	character	`E`	-	E/W indicator, E=east or W=west
5	092321.00	hhmmss.sss	`hhmmss.ss`	-	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
8	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

GSA

Message	**GSA**		
Description	**GPS DOP and Active Satellites**		
Type	Output Message		
Comment	• 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 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
19	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

Table Smode

Smode	*Description*
M	Manual - forced to operate in 2D or 3D mode
A	Allowed to automatically switch 2D/3D mode

Table Fix Status

Fix Status	*Description, see also Position Fix Flags description*
1	Fix not available
2	2D Fix
3	3D Fix

GSV

Message	**GSV**		
Description	**GPS Satellites in View**		
Type	Output Message		
Comment	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
$GPGSV,3,2,10,10,07,189,,05,05,220,,09,34,274,42,18,25,309,44*72
$GPGSV,3,3,10,26,82,187,47,28,43,056,46*77
```

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
5 + 4*N	38	numeric	`elv`	degrees	Elevation, range 0..90
6 + 4*N	230	numeric	`az`	degrees	Azimuth, range 0..359
7 + 4*N	44	numeric	`cno`	dBHz	C/N0, range 0..99, null when not tracking
End of repeated block					
5..16	*7F	hexadecimal	`cs`	-	Checksum
6..16	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

RMC

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,ddmmyy,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
1	083559.00	hhmmss.sss	`hhmmss.ss`	-	UTC Time, Time of position fix
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`	knots	Speed over ground
8	77.52	numeric	`Cog`	degrees	Course over ground
9	091202	ddmmyy	`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
12	-	character	`mode`	-	Mode Indicator, see Position Fix Flags description
13	*57	hexadecimal	`cs`	-	Checksum
14	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

VTG

Message	**VTG**		
Description	**Course over ground and Ground speed**		
Type	Output Message		
Comment	Velocity is given as Course over Ground (COG) and Speed over Ground (SOG).		
Message Info	*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

GRS

Message	**GRS**		
Description	**GNSS Range Residuals**		
Type	Output Message		
Comment	**This messages relates to associated GGA and GSA messages.** If less than 12 SVs are available, the remaining fields are output empty. If more than 12 SVs are used, only the residuals of the first 12 SVs are output, in order to remain consistent with the NMEA standard.		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x06	17	

Message Structure:

```
$GPGRS,hhmmss.ss, mode {,residual}*cs<CR><LF>
```

Example:

```
$GPGRS,082632.00,1,0.54,0.83,1.00,1.02,-2.12,2.64,-0.71,-1.18,0.25,,,*70
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPGRS	string	`$GPGRS`	-	Message ID, GRS protocol header
1	082632.00	hhmmss.sss	`hhmmss.ss`	-	UTC Time, Time of associated position fix
2	1	digit	`mode`	-	Mode (see table below), u-blox receivers will always output Mode 1 residuals
Start of repeated block (12 times)					
3 + 1*N	0.54	numeric	`residual`	m	Range residuals for SVs used in navigation. The SV order matches the order from the GSA sentence.
End of repeated block					
15	*70	hexadecimal	`cs`	-	Checksum
16	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

Table Mode

Mode	*Description*
0	Residuals were used to calculate the position given in the matching GGA sentence.
1	Residuals were recomputed after the GGA position was computed.

GST

Message	**GST**		
Description	**GNSS Pseudo Range Error Statistics**		
Type	Output Message		
Comment	-		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x07	11	

Message Structure:

```
$GPGST,hhmmss.ss,range_rms,std_major,std_minor,hdg,std_lat,std_long,std_alt*cs<CR><LF>
```

Example:

```
$GPGST,082356.00,1.8,,,,1.7,1.3,2.2*7E
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPGST	string	`$GPGST`	-	Message ID, GST protocol header
1	082356.00	hhmmss.sss	`hhmmss.ss`	-	UTC Time, Time of associated position fix
2	1.8	numeric	`range_rms`	m	RMS value of the standard deviation of the ranges
3	-	numeric	`std_major`	m	Standard deviation of semi-major axis, not supported (empty)
4	-	numeric	`std_minor`	m	Standard deviation of semi-minor axis, not supported (empty)
5	-	numeric	`hdg`	degrees	Orientation of semi-major axis, not supported (empty)
6	1.7	numeric	`std_lat`	m	Standard deviation of latitude, error in meters
7	1.3	numeric	`std_long`	m	Standard deviation of longitude, error in meters
8	2.2	numeric	`std_alt`	m	Standard deviation of altitude, error in meters
9	*7E	hexadecimal	`cs`	-	Checksum
10	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

ZDA

Message	**ZDA**		
Description	**Time and Date**		
Type	Output Message		
Comment	-		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x08	9	

Message Structure:

```
$GPZDA,hhmmss.ss,day,month,year,ltzh,ltzn*cs<CR><LF>
```

Example:

```
$GPZDA,082710.00,16,09,2002,00,00*64
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPZDA	string	`$GPZDA`	-	Message ID, ZDA protocol header
1	082710.00	hhmmss.sss	`hhmmss.ss`	-	UTC Time
2	16	dd	`day`	day	UTC time: day, 01..31
3	09	mm	`month`	month	UTC time: month, 01..12
4	2002	yyyy	`year`	year	UTC time: 4 digit year
5	00	-xx	`ltzh`	-	Local zone hours, not supported (fixed to 00)
6	00	zz	`ltzn`	-	Local zone minutes, not supported (fixed to 00)
7	*64	hexadecimal	`cs`	-	Checksum
8	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

GBS

Message	**GBS**		
Description	**GNSS Satellite Fault Detection**		
Type	Output Message		
Comment	This message outputs the results of the Receiver Autonomous Integrity Monitoring Algorithm (RAIM). • The fields **errlat**, **errlon** and **erralt** output the standard deviation of the position calculation, using all satellites which pass the RAIM test successfully. • The fields **errlat**, **errlon** and **erralt** are only output if the RAIM process passed successfully (i.e. no or successful Edits happened). These fields are never output if 4 or fewer satellites are used for the navigation calculation (because - in this case - integrity can not be determined by the receiver autonomously) • The fields **prob**, **bias** and **stdev** are only output if at least one satellite failed in the RAIM test. If more than one satellites fail the RAIM test, only the information for the worst satellite is output in this message.		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x09	11	

Message Structure:

```
$GPGBS,hhmmss.ss,errlat,errlon,erralt,svid,prob,bias,stddev*cs<CR><LF>
```

Example:

```
$GPGBS,235503.00,1.6,1.4,3.2,,,,*40

$GPGBS,235458.00,1.4,1.3,3.1,03,,-21.4,3.8*5B
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPGBS	string	`$GPGBS`	-	Message ID, GBS protocol header
1	235503.00	hhmmss.sss	`hhmmss.ss`	-	UTC Time, Time to which this RAIM sentence belongs
2	1.6	numeric	`errlat`	m	Expected error in latitude
3	1.4	numeric	`errlon`	m	Expected error in longitude
4	3.2	numeric	`erralt`	m	Expected error in altitude
5	03	numeric	`svid`	-	Satellite ID of most likely failed satellite
6	-	numeric	`prob`	-	Probability of missed detection, no supported (empty)
7	-21.4	numeric	`bias`	m	Estimate on most likely failed satellite (a priori residual)
8	3.8	numeric	`stddev`	m	Standard deviation of estimated bias
9	*40	hexadecimal	`cs`	-	Checksum
10	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

DTM

Message	**DTM**		
Description	**Datum Reference**		
Type	Output Message		
Comment	This message gives the difference between the currently selected Datum, and the reference Datum. If the currently configured Datum is not WGS84 or WGS72, then the field **LLL** will be set to 999, and the field **LSD** is set to a variable-lenght string, representing the Name of the Datum. The list of supported datums can be found in CFG-DAT. The reference Datum can not be changed and is always set to WGS84.		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x0A	11	

Message Structure:

```
$GPDTM,LLL,LSD,lat,N/S,lon,E/W,alt,RRR*cs<CR><LF>
```

Example:

```
$GPDTM,W84,,0.0,N,0.0,E,0.0,W84*6F

$GPDTM,W72,,0.00,S,0.01,W,-2.8,W84*4F

$GPDTM,999,CH95,0.08,N,0.07,E,-47.7,W84*1C
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPDTM	string	`$GPDTM`	-	Message ID, DTM protocol header
1	W72	string	`LLL`	-	Local Datum Code, W84 = WGS84, W72 = WGS72, 999 = user defined
2	-	string	`LSD`	-	Local Datum Subdivision Code, This field outputs the currently selected Datum as a string (see also note above).
3	0.08	numeric	`lat`	minutes	Offset in Latitude
4	S	character	`NS`	-	North/South indicator
5	0.07	numeric	`lon`	minutes	Offset in Longitude
6	E	character	`EW`	-	East/West indicator
7	-2.8	numeric	`alt`	m	Offset in altitude
8	W84	string	`RRR`	-	Reference Datum Code, W84 = WGS 84. This is the only supported Reference datum.
9	*67	hexadecimal	`cs`	-	Checksum
10	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

GPQ

Message	**GPQ**		
Description	**Poll message**		
Type	Input Message		
Comment	Polls a standard NMEA message.		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x40	4	

Message Structure:

```
$xxGPQ,sid*cs<CR><LF>
```

Example:

```
$EIGPQ,RMC*3A
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$EIGPQ	string	`$xxGPQ`	-	Message ID, GPQ protocol header, xx = talker identifier
1	RMC	string	`sid`	-	Sentence identifier
2	*3A	hexadecimal	`cs`	-	Checksum
3	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

TXT

Message	**TXT**		
Description	**Text Transmission**		
Type	Output Message		
Comment	**This message is not configured through CFG-MSG, but instead through CFG-INF.** This message outputs various information on the receiver, such as power-up screen, software version etc. This message can be configured using UBX Protocol message CFG-INF		
Message Info	*ID for CFG-MSG*	*Number of fields*	
	0xF0 0x41	7	

Message Structure:

```
$GPTXT,xx,yy,zz,ascii data*cs<CR><LF>
```

Example:

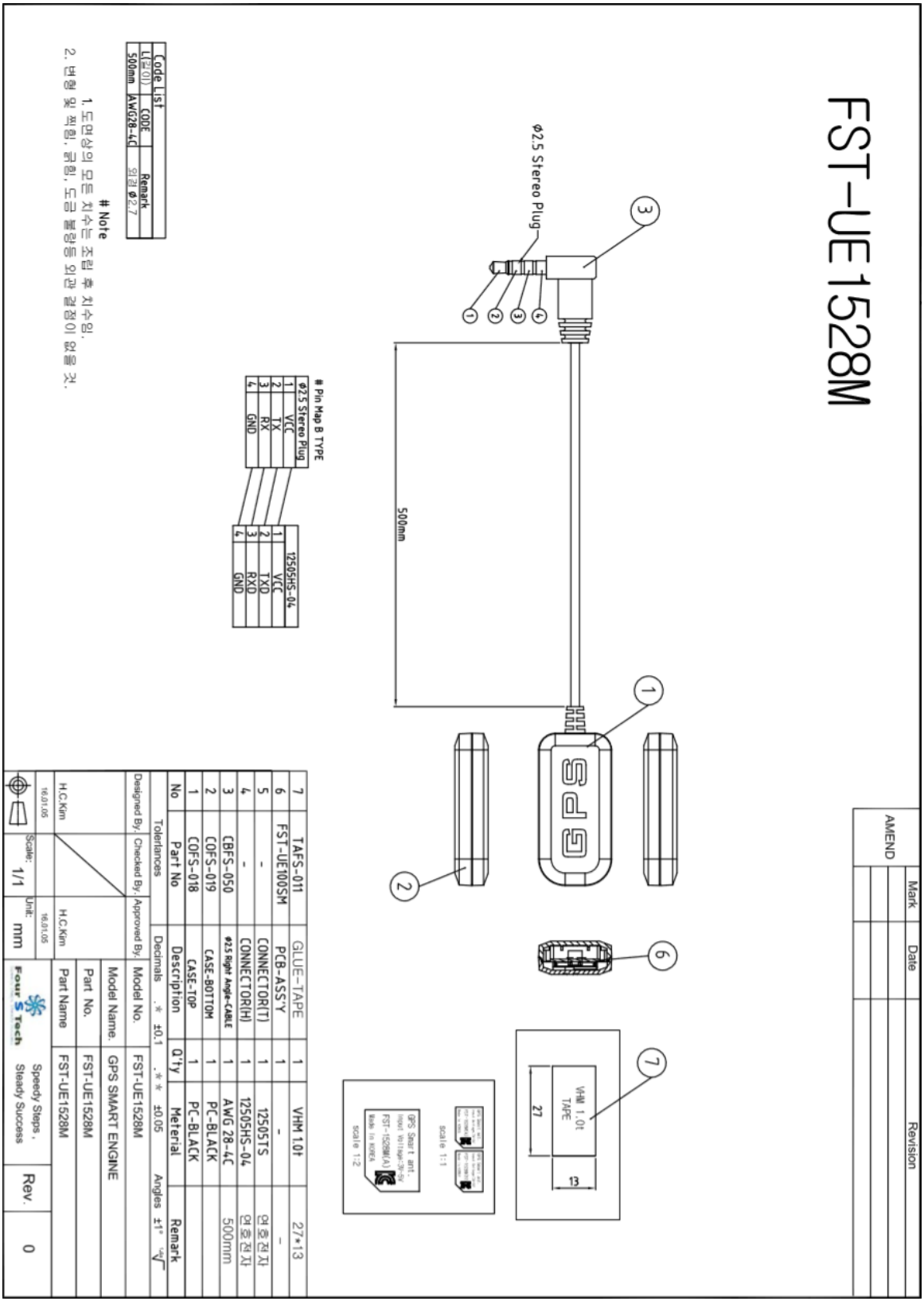
```
$GPTXT,01,01,02,u-blox ag - www.u-blox.com*50
$GPTXT,01,01,02,ANTARIS ATR0620 HW 00000040*67
```

Field No.	*Example*	*Format*	*Name*	*Unit*	*Description*
0	$GPTXT	string	`$GPTXT`	-	Message ID, TXT protocol header
1	01	numeric	`xx`	-	Total number of messages in this transmission, 01..99
2	01	numeric	`yy`	-	Message number in this transmission, range 01..xx
3	02	numeric	`zz`	-	Text identifier, u-blox GPS receivers specify the severity of the message with this number. - 00 = ERROR - 01 = WARNING - 02 = NOTICE - 07 = USER
4	www.u-blox.com	string	`string`	-	Any ASCII text
5	*67	hexadecimal	`cs`	-	Checksum
6	-	character	`<CR><LF>`	-	Carriage Return and Line Feed

7. GPS NMEA DATA (Exam.)

```
02:26:03  $GPRMC,022603.00,A,3731.33764,N,12646.00657,E,0.110,,190418,,,D*75
02:26:03  $GPVTG,,T,,M,0.110,N,0.204,K,D*20
02:26:03  $GPGGA,022603.00,3731.33764,N,12646.00657,E,2,05,2.10,205.3,M,18.0,M,,0000*51
02:26:03  $GPGSA,A,3,32,26,14,31,16,,,,,,,,3.82,2.10,3.19*06
02:26:03  $GPGSV,3,1,10,04,77,260,,14,74,168,39,16,30,232,30,23,,,20*4E
02:26:03  $GPGSV,3,2,10,26,61,246,37,29,,,24,31,68,014,28,32,44,155,39*4A
02:26:03  $GPGSV,3,3,10,42,43,152,35,50,43,152,35*7B
02:26:03  $GPGLL,3731.33764,N,12646.00657,E,022603.00,A,D*69
02:26:04  $GPRMC,022604.00,A,3731.34877,N,12646.01132,E,0.033,,190418,,,D*7D
02:26:04  $GPVTG,,T,,M,0.033,N,0.062,K,D*22
02:26:04  $GPGGA,022604.00,3731.34877,N,12646.01132,E,2,05,2.10,182.1,M,18.0,M,,0000*57
02:26:04  $GPGSA,A,3,32,26,14,31,16,,,,,,,,3.82,2.10,3.19*06
02:26:04  $GPGSV,3,1,10,04,77,260,,14,74,168,39,16,30,232,29,23,,,18*4D
02:26:04  $GPGSV,3,2,10,26,61,246,37,29,,,23,31,68,014,28,32,44,155,39*4D
02:26:04  $GPGSV,3,3,10,42,43,152,34,50,43,152,35*7A
02:26:04  $GPGLL,3731.34877,N,12646.01132,E,022604.00,A,D*61
02:26:05  $GPRMC,022605.00,A,3731.35465,N,12646.01383,E,0.557,,190418,,,D*7D
02:26:05  $GPVTG,,T,,M,0.557,N,1.031,K,D*22
02:26:05  $GPGGA,022605.00,3731.35465,N,12646.01383,E,2,05,2.10,169.5,M,18.0,M,,0000*51
02:26:05  $GPGSA,A,3,32,26,14,31,16,,,,,,,,3.82,2.10,3.19*06
02:26:05  $GPGSV,3,1,10,04,77,260,,14,74,168,39,16,30,232,29,23,,,14*41
02:26:05  $GPGSV,3,2,10,26,61,246,37,29,,,23,31,68,014,28,32,44,155,39*4D
02:26:05  $GPGSV,3,3,10,42,43,152,34,50,43,152,35*7A
02:26:05  $GPGLL,3731.35465,N,12646.01383,E,022605.00,A,D*66
02:26:06  $GPRMC,022606.00,A,3731.35815,N,12646.01535,E,0.221,,190418,,,D*78
02:26:06  $GPVTG,,T,,M,0.221,N,0.409,K,D*2A
02:26:06  $GPGGA,022606.00,3731.35815,N,12646.01535,E,2,05,2.10,161.9,M,18.0,M,,0000*56
02:26:06  $GPGSA,A,3,32,26,14,31,16,,,,,,,,3.82,2.10,3.19*06
02:26:06  $GPGSV,3,1,10,04,77,260,,14,74,168,39,16,30,232,29,23,,,12*47
02:26:06  $GPGSV,3,2,10,26,61,246,37,29,,,23,31,68,014,28,32,44,155,39*4D
02:26:06  $GPGSV,3,3,10,42,43,152,34,50,43,152,35*7A
02:26:06  $GPGLL,3731.35815,N,12646.01535,E,022606.00,A,D*65
02:26:07  $GPRMC,022607.00,A,3731.36037,N,12646.01633,E,0.423,,190418,,,D*73
02:26:07  $GPVTG,,T,,M,0.423,N,0.784,K,D*28
02:26:07  $GPGGA,022607.00,3731.36037,N,12646.01633,E,2,05,2.10,156.9,M,18.0,M,,0000*5D
02:26:07  $GPGSA,A,3,32,26,14,31,16,,,,,,,,3.82,2.10,3.19*06
02:26:07  $GPGSV,3,1,11,04,77,260,,14,74,168,39,16,30,232,29,19,,,20*4E
02:26:07  $GPGSV,3,2,11,23,,,10,26,61,246,37,29,,,22,31,68,014,28*77
02:26:07  $GPGSV,3,3,11,32,44,155,39,42,43,152,34,50,43,152,34*40
02:26:07  $GPGLL,3731.36037,N,12646.01633,E,022607.00,A,D*6A
```

8. Dimension


FST-UE1528M
AMEND
Mark
Date
Revision
ø2.5 Stereo Plug
500mm
Pin Map B TYPE
ø2.5 Stereo Plug
1 VCC
2 TX
3 RX
4 GND
12505HS-04
1 VCC
2 TXD
3 RXD
4 GND
Code List
LI길이) CODE Remark
500mm AWG28-4C 외경 ø2.7
Note
1. 도면상의 모든 치수는 조립 후 치수임.
2. 변형 및 찍힘, 긁힘, 도금 불량등 외관 결점이 없을 것.
7 TAFS-011 GLUE-TAPE 1 VHM 1.0t 27*13
6 FST-UE100SM PCB-ASS'Y 1 - -
5 - CONNECTOR(T) 1 12505TS 연호전자
4 - CONNECTOR(H) 1 12505HS-04 연호전자
3 CBFS-050 ø2.5 Right Angle-CABLE 1 AWG 28-4C 500mm
2 COFS-019 CASE-BOTTOM 1 PC-BLACK
1 COFS-018 CASE-TOP 1 PC-BLACK
No Part No Description Q'ty Meterial Remark
Tolerances Decimals .* ±0.1 .** ±0.05 Angles ±1°
Designed By: Checked By: Approved By: Model No. FST-UE1528M
H.C.Kim 16.01.05 H.C.Kim 16.01.05
Scale: 1/1 Unit: mm
Model Name. GPS SMART ENGINE
Part No. FST-UE1528M
Part Name FST-UE1528M
Four S Tech
Speedy Steps, Steady Success
Rev. 0
VHM 1.0t TAPE
27
13
scale 1:1
scale 1:2

FCC Information to User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

• Reorient or relocate the receiving antenna.

• Increase the separation between the equipment and receiver.

• Connect the equipment into an outlet on a circuit different from that to which the receiver is con-nected.

• Consult the dealer or an experienced radio/TV technician for help.

Caution

Modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Compliance Information : This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

"CAUTION : Exposure to Radio Frequency Radiation.

Antenna shall be mounted in such a manner to minimize the potential for human contact during normal operation. The antenna should not be contacted during operation to avoid the possibility of exceeding the FCC radio frequency exposure limit.