GPS Module Series   Model: GT-310FA
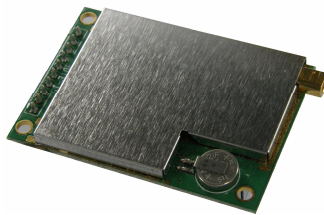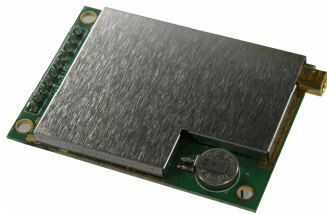## FLASH version

Technical Manual

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Contents

GT-310FA (Flash version)

Fast Acquisition Enhanced Sensitivity 16 Channels GPS Sensor Module

FEATURES

- 16 parallel channels GPS receiver
- 4100 simultaneous time-frequency search bins
- SBAS (WAAS, EGNOS) support
- Selectable User Profiles with ability to change and save configuration to Flash
- -140dBm acquisition sensitivity
- -155dBm tracking sensitivity
- Hot start < 5 second
- Cold start < 60 second
- Power Consumption < 45mA
- Provides a 10pin header to easily connect to PCB
- 5m CEP accuracy
- RoHS compliance

The GT-310FA module is a small, single-board, 16 parallel-channels receiver intended for Original Equipment Manufacturer (OEM) products.

The receiver continuously tracks all satellites in view and provides accurate satellite positioning data. The GT-310FA is optimized for applications requiring good performance, low cost, and maximum flexibility; suitable for a wide range of OEM configurations including handhelds, asset tracking, marine and vehicle navigation products.

Its 16 parallel channels and 4100 search bins provide fast satellite signal acquisition and short startup time. Acquisition sensitivity of −140dBm and tracking sensitivity of −155dBm offers good navigation performance even in urban canyons having limited sky view.

Satellite-based augmentation systems, such as WAAS and EGNOS, are supported to yield improved accuracy.

Users can modify the NMEA sentences and Binary code

TECHNICAL SPEICIFICAIONS

Receiver Type	16 parallel channels [1] L1 C/A code
Accuracy	Position 5m CEP Velocity 0.1m/sec Timing +/-1us
Startup Time	< 5sec Hot Start < 35sec Warm Start < 60sec Cold Start
Signal Reacquisition	1s
Sensitivity	-140dBm acquisition -155dBm tracking
Dynamics	4G ($39.2m/sec^2$)
Operational Limits	Altitude < 18,000m or Velocity < 515m/sec (COCOM limit, either may be exceeded but not both)
Protocol	NMEA-0183, ver. 3.01 9600 baud, 8 N 1
Datum	Default WGS-84 User definable
Serial Interface	LVTTL Level
RF Connector	MMCX
Interface Connector	10pin 2mm male header
Power Supply	3.3V +/- 100mV or 3.8V ~ 8.0V (5V version)
Power Consumption	<45 mA
Operating Temperature	-40°C ~ 85°C
Dimension	43L x 31W x 6H (mm)
Weight	10g

10 Pins Connector
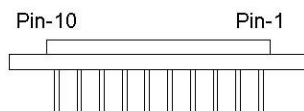
GT-310FA Lateral View

PINOUT DESCRIPTION

Pin Number	Signal Name	Description
1	Serial Data Out 1	Asynchronous serial output at LVTTL level, to output NMEA message
2	Serial Data In 1	Asynchronous serial input at LVTTL level, to input commands Pull high if not used
3	VCC	Regulated 3.3V power input (3.3V version) 3.8V ~ 8.0V (5V version)
4	GND	Ground
5	PIO Output	PIO output, default used for GPS status indication
6	1PPS	1 pulse per second time mark
7	RESET IN	Reset input, active LOW
8	Serial Data In 2	Asynchronous serial input at LVTTL level, to input DGPS RTCM data Pull high if not used
9	VBAT	Optional 3.3V backup power input to sustain RTC and SRAM data
10	Antenna Power	Power input for active antenna

1PPS Output

The GPS receiver is in navigation mode upon power-up, with 1PPS output free running. After 3 minutes of valid position fix and remaining under static-mode, the receiver changes to timing-mode, with 1PPS output signal synchronized to the UTC second. The receiver will change to navigation-mode, with 1PPS output free running, if the receiver is in motion. The 1PPS output will become synchronized to the UTC second again after the receiver had remained in static mode for 3 minutes.

NMEA Messages

The serial interface protocol is based on the National Marine Electronics Association's NMEA 0183 ASCII interface specification. This standard is fully define in "NMEA 0183, Version 3.01" The standard may be obtained from NMEA, www.nmea.org

GGA - GPS FIX DATA

Time, position and position-fix related data (number of satellites in use, HDOP, etc.).

Format:
$GPGGA,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,M,<10>,M,<11>,<12>,*<13><CR><LF>

Example:
$GPGGA,104549.04,2447.2038,N,12100.4990,E,1,06,01.7,00078.8,M,0016.3,M,,*5C<CR><LF>

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	2447.2038	Latitude in ddmm.mmmm format Leading zeros transmitted
3	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
4	12100.4990	Longitude in dddmm.mmmm format Leading zeros transmitted
5	E	Longitude hemisphere indicator, 'E' = East, 'W' = West

6	1	Position fix quality indicator
		    0: position fix unavailable
		    1: valid position fix, SPS mode
		    2: valid position fix, differential GPS mode

7	06	Number of satellites in use, 00 ~ 12
8	01.7	Horizontal dilution of precision, 00.0 ~ 99.9
9	00078.8	Antenna height above/below mean sea level, -9999.9 ~ 17999.9
10	0016.3	Geoidal height, -999.9 ~ 9999.9
11		Age of DGPS data since last valid RTCM transmission in xxx format (seconds) NULL when DGPS not used
12		Differential reference station ID, 0000 ~ 1023 NULL when DGPS not used
13	5C	Checksum

Note: The checksum field starts with a '*' and consists of 2 characters representing a hex number. The checksum is the exclusive OR of all characters between '$' and '*'.

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GLL - LATITUDE AND LONGITUDE, WITH TIME OF POSITION FIX AND STATUS
Latitude and longitude of current position, time, and status.

Format:
$GPGLL,<1>,<2>,<3>,<4>,<5>,<6>,<7>*<8><CR><LF>

Example:
$GPGLL,2447.2073,N,12100.5022,E,104548.04,A,A*65<CR><LF>

Field	Example	Description
1	2447.2073	Latitude in ddmm.mmmm format Leading zeros transmitted
2	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
3	12100.5022	Longitude in dddmm.mmmm format Leading zeros transmitted
4	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
5	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
6	A	Status, 'A' = valid position, 'V' = navigation receiver warning
7	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
8	65	Checksum

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GSA-GPS DOP AND ACTIVE SATELLITES

GPS receiver operating mode, satellites used for navigation, and DOP values.

Format:
$GPGSA,<1>,<2>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<4>,<5>,<6>*<7><CR><LF>
Example:
$GPGSA,A,3,26,21,,,09,17,,,,,,,10.8,02.1,10.6*07<CR><LF>

Field	Example	Description
1	A	Mode, 'M' = Manual, 'A' = Automatic
2	3	Fix type, 1 = not available, 2 = 2D fix, 3 = 3D fix
3	26,21,,,09,17,,,,,,	PRN number, 01 to 32, of satellite used in solution, up to 12 transmitted
4	10.8	Position dilution of precision, 00.0 to 99.9
5	02.1	Horizontal dilution of precision, 00.0 to 99.9
6	10.6	Vertical dilution of precision, 00.0 to 99.9
7	07	Checksum

GSV - GPS SATELLITE IN VIEW

Number of satellites in view, PRN number, elevation angle, azimuth angle, and C/No. Only up to four satellite details are transmitted per message. Additional satellite in view information is sent in subsequent GSV messages.

Format:
$GPGSV,<1>,<2>,<3>,<4>,<5>,<6>,<7>,…,<4>,<5>,<6>,<7> *<8><CR><LF>

Example:
$GPGSV,2,1,08,26,50,016,40,09,50,173,39,21,43,316,38,17,41,144,42*7C<CR><LF>
$GPGSV,2,2,08,29,38,029,37,10,27,082,32,18,22,309,24,24,09,145,*7B<CR><LF>

Field	Example	Description
1	2	Total number of GSV messages to be transmitted
2	1	Number of current GSV message
3	08	Total number of satellites in view, 00 ~ 12
4	26	Satellite PRN number, GPS: 01 ~ 32, SBAS: 33 ~ 64 (33 = PRN120)
5	50	Satellite elevation number, 00 ~ 90 degrees
6	016	Satellite azimuth angle, 000 ~ 359 degrees
7	40	C/No, 00 ~ 99 dB Null when not tracking
8	7C	Checksum

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RMC - RECOMMANDED MINIMUM SPECIFIC GPS/TRANSIT DATA

Time, date, position, course and speed data.

Format:
$GPRMC,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>,<11>,<12>*<13><CR><LF>

Example:
$GPRMC,104549.04,A,2447.2038,N,12100.4990,E,016.0,221.0,250304,003.3,W,A*22<CR><LF>

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	A	Status, 'V' = navigation receiver warning, 'A' = valid position
3	2447.2038	Latitude in dddmm.mmmm format Leading zeros transmitted
4	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
5	12100.4990	Longitude in dddmm.mmmm format Leading zeros transmitted
6	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
7	016.0	Speed over ground, 000.0 ~ 999.9 knots
8	221.0	Course over ground, 000.0 ~ 359.9 degrees
9	250304	UTC date of position fix, ddmmyy format
10	003.3	Magnetic variation, 000.0 ~ 180.0 degrees
11	W	Magnetic variation direction, 'E' = East, 'W' = West
12	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
13	22	Checksum

VTG - COURSE OVER GROUND AND GROUND SPEED
Velocity is given as course over ground (COG) and speed over ground (SOG).

Format:
GPVTG,<1>,T,<2>,M,<3>,N,<4>,K,<5>*<6><CR><LF>

Example:
$GPVTG,221.0,T,224.3,M,016.0,N,0029.6,K,A*1F<CR><LF>

Field	Example	Description
1	221.0	True course over ground, 000.0 ~ 359.9 degrees
2	224.3	Magnetic course over ground, 000.0 ~ 359.9 degrees
3	016.0	Speed over ground, 000.0 ~ 999.9 knots
4	0029.6	Speed over ground, 0000.0 ~ 1800.0 kilometers per hour
5	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
6	1F	Checksum

ZDA TIME AND DATE

Format:
$GPZDA,<1>,<2>,<3>,<4>,<5>,<6>*<7><CR><LF>

Example:
$GPZDA,104548.04,25,03,2004,,*6C<CR><LF>

Field	Example	Description
1	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	25	UTC time: day (01 ... 31)
3	03	UTC time: month (01 ... 12)
4	2004	UTC time: year (4 digit year)
5		Local zone hour Not being output by the receiver (NULL)
6		Local zone minutes Not being output by the receiver (NULL)
7	6C	Checksum

Binary Messages

See *Binary Message Protocol User's Guide* for detailed descriptions.

BATTERY

Ø6.80

MMCX ST. JACK EDGE MOUNT

PIN 1

PIN 10

A

Detail A

ANTENNA POWER

SERIAL DATA OUT1
SERIAL DATA IN1
VCC
GND
PID OUTPUT
1 PPS
RESET IN
SERIAL DATA IN2
VBAT

UniTraQ International Corp

GT-310F

DR. BY	Joseph		TITLE				
	11/5/2007						
CHK'D			DWG NO.		UNIT		
APP'D		SCALE	85024-X310F-5V		mm	SHEET	SIZE	REV
		2:1				1 OF 1	A4	A
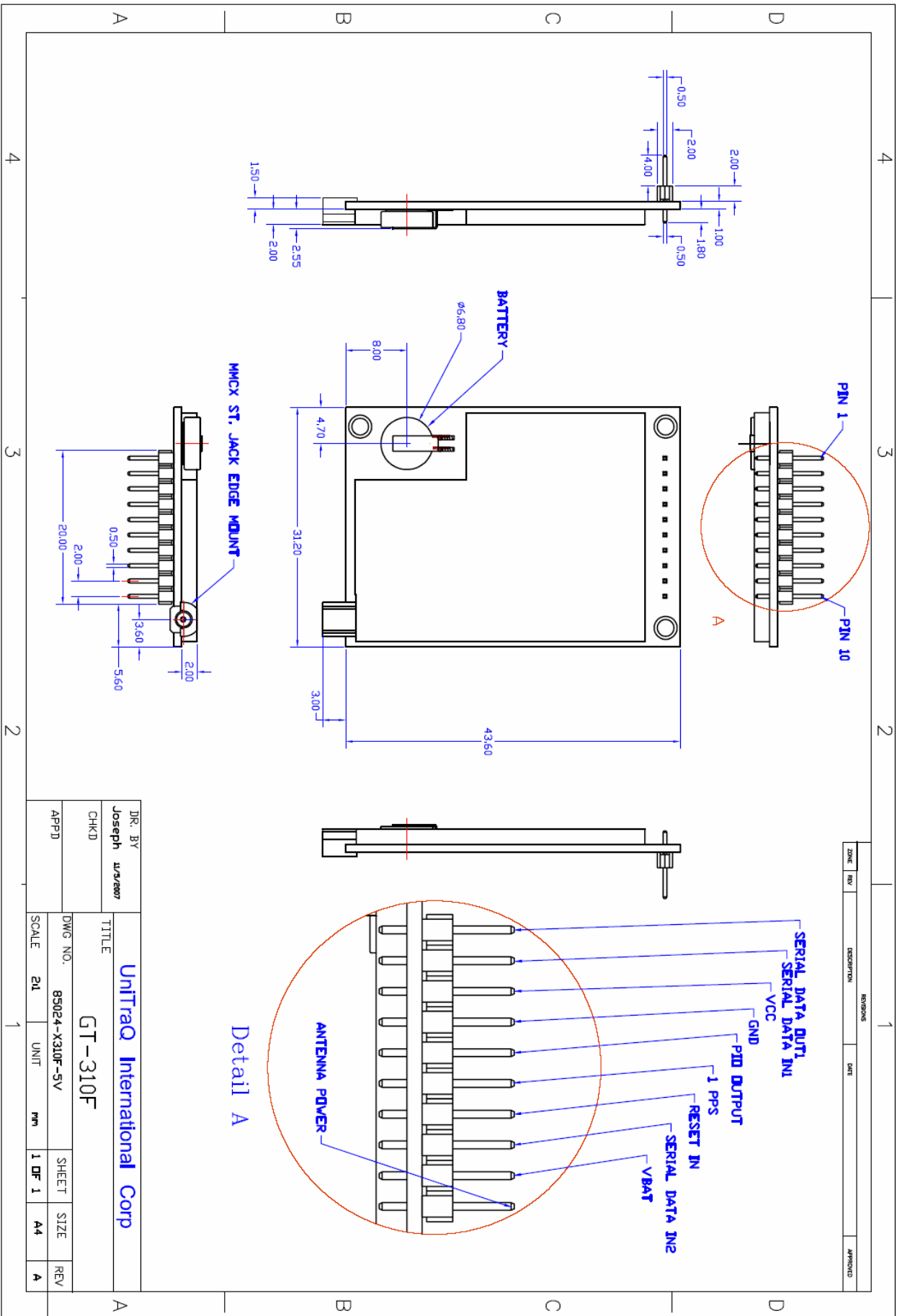
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All of products designed and produced in Taiwan, and RoHS compliance