

GPS Module

Ct-M23



Specification Sheet

Features:

- *Mediatek*
- *Compact module size for easy integration :
11.4 x 10 x 2.0 mm*
- *-165dBm*
- *USBV2.0 Full Speed Compliant interface*
- *RoHS compliance*

1. Introduction

The Ct-M23 module is a high sensitivity, low power and very compact Surface Mount Device (SMD), and it supports signal processing of L1 band signals such as GPS C/A and SBAS (including WAAS, EGNOS, and MSAS). This 22-channel global positioning system (GPS) receiver is designed for a broad spectrum of OEM applications and is based on the fast and deep GPS signal search capabilities of Mediatek architecture, consuming . Ct-M23 is designed to allow quick and easy integration into GPS-related applications, especially for compact size devices, such as:

- PDA, Pocket PC and other computing devices
- Fleet Management / Asset Tracking
- AVL and Location-Based Services
- Hand-held Device for Personal Positioning and Navigation

1.1. Features

Hardware

- Based on the high performance features of the Mediatek chipset.
- USBV2.0 full speed compliant interface
- Advanced DBA technology to achieve -165dBm tracking
- Compact module size for easy integration: 11.4x10.0x2.0 mm.
- SMT pads allow for fully automatic assembly processes equipment and reflow soldering
- Multi-path Mitigation Hardware
- Built-in antenna detection and provided GPS Status information
- Built-in LDO, regulators & USB interface to decrease extra-BOM cost
- Up to 10Hz update rate
- Embedded DC/DC circuitry to prolong battery life

Performance

- Cold/Warm/Hot Start Time: 35 / 34 / 1.5 sec.
- Reacquisition < 1 sec
- RF Metal Shield for best performance in noisy environments
- Enhanced Navigation Performance
- Improved Jamming Mitigation

Interface

- TTL level serial port and USBV2.0
- Protocol: NMEA
- Baud Rate: 9600 bps(Default)

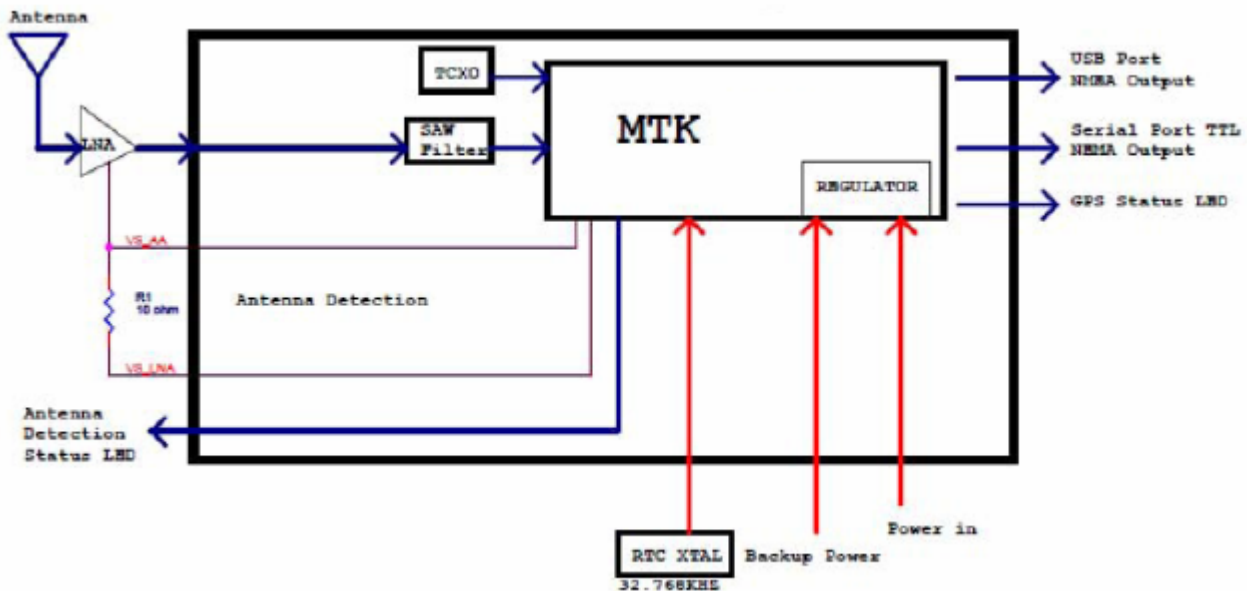
1.2. Advantages

- Ideal for compact size devices
- Data / Power / RF through surface mount pads
- Cost saving through elimination of RF and board to board digital connectors
- Flexible and cost effective hardware design for different application requirements
- Secure SMD PCB mounting method

2. Technical specifications

2.1. Module architecture

Block Diagram



2.2. Hardware Features

- Based on the high performance features of the Mediatek chipset
- USBV2.0 full speed compliant interface
- Compact module size for easy integration: 11.4x10.0x2.0 mm.
- SMT pads allow for fully automatic assembly processes equipment and reflow soldering
- RoHS compliant (lead-free)
- Excellent sensitivity

2.3. Software Features

The firmware used on Ct-M23 for Mediatek receivers and its features include:

- High configurability
- Up to 10 Hz position update rate
- Supports use of satellite-based augmentation systems including WAAS, EGNOS, MSAS
- NMEA 0183 standard V3.01 and backward compliance and support 219 different Datum
- Default configuration is as follows:

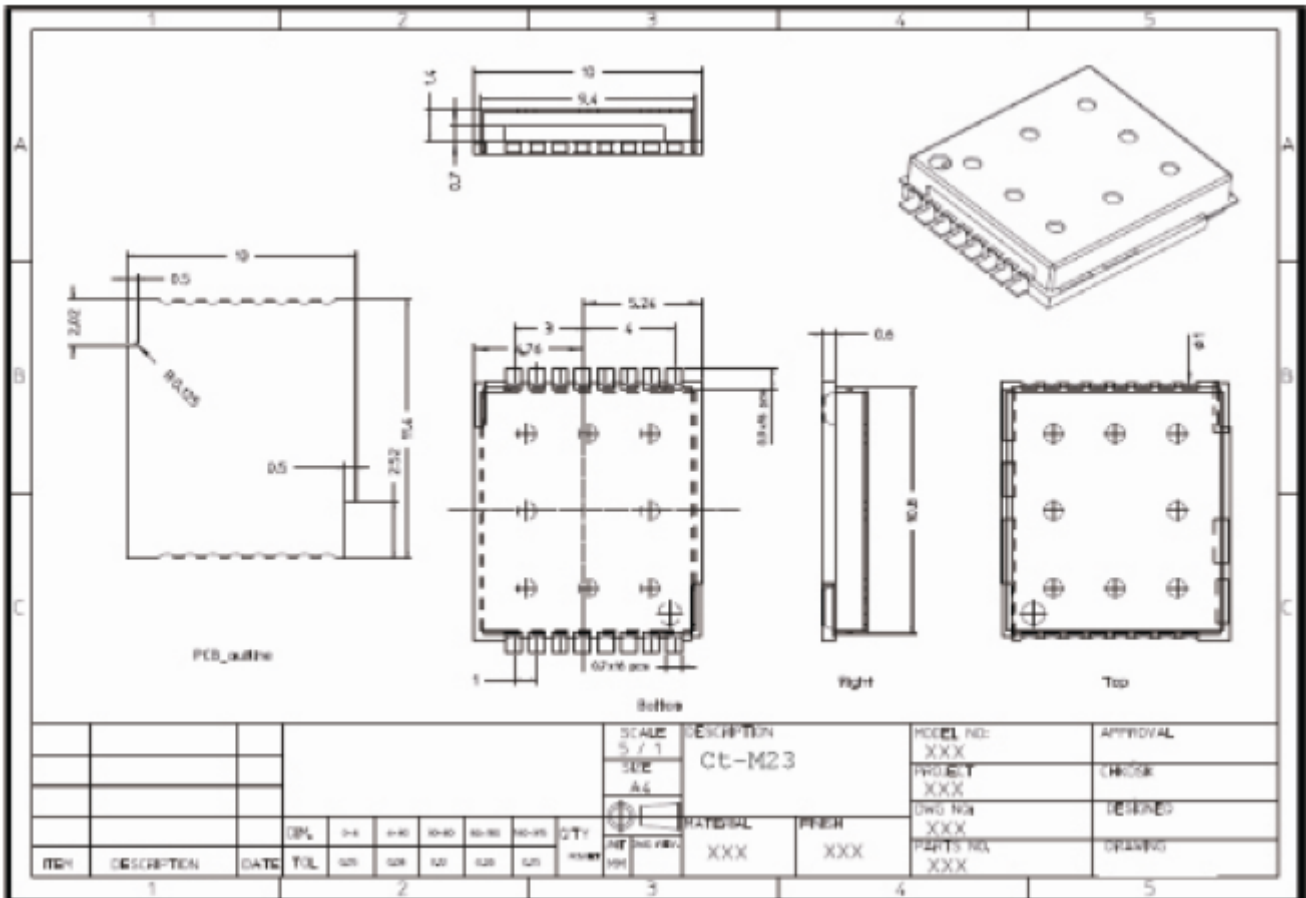
Item	Description
Core of firmware	MTK version AXN_1.0
Baud rate	9600 bps
Code type	NMEA-0183 ASCII
Datum	WGS-84
Protocol message	GGA(1s), GSA(5s), GSV(5s), RMC(1s), VTG(1s)
Output frequency	1 Hz

2.4. Mechanical specification

The Physical dimensions of the Ct-M23 GPS Module are as follow:

Item	Description
Length	11.4 ± 0.3 mm
Width	10.0 ± 0.3 mm
Height	2.0 ± 0.3 mm
Weight	0.4g

2.5. Mechanical drawing



2.6. Recommended GPS Antenna Specification

This Ct-M23 receiver is designed for use with active antenna.

Parameter	Specification
Antenna Type	Right-hand circular polarized active antenna
Frequency Range	1575.42 ± 1.023 MHz

2.7. Environmental Specification

Item	Description
Operating temperature rang	-40 deg. C to +85 deg. C
Storage temperature range	-40 deg. C to +85 deg. C
Altitude	18,000 meters (60,000 feet) max.
Velocity	515 meters/second (1000 knots) max.
Jerk	20 meters/second ³ , max.
Acceleration	4g, max.

3. Performance Characteristics

3.1. Position and velocity accuracy

Accuracy	Position	10 meters, 2D RMS 5 meters 2D RMS, WAAS corrected < 5meters (50%)
	Velocity	0.1 meters/second
	Time	1 microsecond synchronized to GPS time

3.2. Dynamic constrains

Dynamic Conditions	Altitude	18,000 meters (60,000 feet)
	Velocity	515 meters/second (1000 knots) max.
	Acceleration	4g, max.
	Jerk	20 meters/second ³ , max.

3.3. Acquisition time ¹

Mode	Ct-M23 GPS Module
TTFH Hot (valid almanac, position, time & ephemeris)	1.5 s
TTFH Warm (valid almanac, position, & time)	34 s
TTFH Cold (valid almanac)	35 s
Timing Accuracy	100 ns

Note 1: Open Sky and Stationary Environments.

3.4. Sensitivity

Parameter	Description
Tracking Sensitivity	-165 dBm
Acquisition Sensitivity	-148 dBm

3.5. Battery backup (SRAM/RTC backup)

During 'Powered down' condition, the SRAM and RTC (Real Time Clock) may be kept in operation by supplying power from VBATT. The Ct-M23 GPS module can accept slow VBATT supply rise time due to an on-board voltage detector.

3.6. Differential aiding

3.6.1. Differential GPS (DGPS) **Optional**

Position Accuracy: 2.5 sec

Velocity Accuracy: 0.05 m/sec

Acceleration Accuracy: 0.05 m/sec²

3.6.2. Satellite Based augmentation System (WASS/EGONS) **Optional**

The Ct-M23 GPS Module is capable of receiving SBAS (WASS, EGONS and MSAS) differential corrections. SBAS improves horizontal position accuracy by correcting GPS signal errors caused by ionospheric disturbances, timing and satellite orbit errors.

Both SBAS and DGPS should improve position accuracy. However, other factors can affect accuracy, such as GDOP, multipath, distance from DGPS reference station and latency of corrections.

4. Power supply

Parameter	Ct-M23 GPS Module
Input voltage	3.3 VDC
Current (typ.) at full power (3.3V)	40 mA
Battery backup voltage	2.8 VDC

4.1. Power Consumption

Status	Power Consumption
Acquisitioning	40mA
Tracking	33mA
Power save mode	29.47mA
Periodical mode	6~33mA(ON/OFF)

5. Software interface

5.1. NMEA output messages

The output NMEA (0183 v3.01) messages for the receiver are listed in Table 5-1.

Option	Description
GGA	Time, position, and fix related data for a GPS receiver.
GLL	Latitude and longitude of present position, time of position fix and status.
GSA GSV	GPS receiver operating mode, satellites used in the position solution, and DOP values. The number of GPS satellites in view satellite ID numbers, elevation, azimuth, and SNR values.
RMC	Time, date, position, course and speed data provided by the GPS receiver.
VTG	The actual course and speed relative to the ground.

Table 5-1 NMEA-0183 Output messages