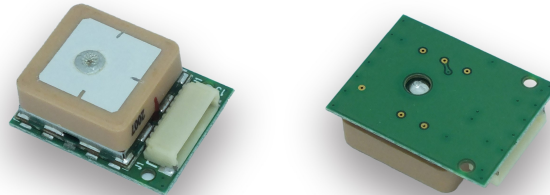


Product name	Description	Version
LS2003D	Standalone GPS smart antenna module	1.3



21 x 17 x 7.2 mm

## 1 Introduction

LS2003D is a complete standalone GPS smart antenna module, including embedded patch antenna and GPS receiver circuits. The module is powered by MediaTek GPS chip and can acquire a lot of satellites at a time while providing fast time-to-first-fix and low power consumption. Besides, it can provide you with superior sensitivity and performance even in urban canyon and dense foliage environment.

This module supports hybrid ephemeris prediction to achieve faster cold start. One is self-generated ephemeris prediction (called EASY) that is no need of both network assistance and host CPU's intervention. This is valid for up to 3 days and updates automatically from time to time when GPS module is powered on and satellites are available. The other is server-generated ephemeris prediction (called EPO) that gets from an internet server. This is valid for up to 14 days. Both ephemeris predictions are stored in the on-board flash memory and perform a cold start time less than 15 seconds.

It is easy to install without both RF connector and coaxial cable that are needed in a separated GPS active antenna. In other words, reduce the cost and size. Also, speed up the time to market by eliminating R&D efforts on RF matching and stability between separated GPS antenna and module. Furthermore, it can be directly powered by a lithium battery without any external voltage regulars. Therefore, LS2003D of miniature size and brilliant performance is the best choice to be integrated into your slim devices.

## 2 Features

- MediaTek high sensitivity solution
- Support 66-channel GPS
- Ultra low power consumption
- Fast TTFF at low signal level
- Built-in 12 multi-tone active interference canceller
- Free hybrid ephemeris prediction to achieve faster cold start
- Built-in data logger
- Built-in DC/DC converter to save power
- Allow direct connection with the lithium battery
- Up to 10 Hz update rate
- ±11ns high accuracy time pulse (1PPS)
- Capable of SBAS (WAAS, EGNOS, MSAS, GAGAN)
- Support Japan QZSS

- Indoor and outdoor multi-path detection and compensation
- RoHS compliant

### 3 Application

- Personal positioning and navigation
- Automotive navigation
- Marine navigation
- Weather balloon

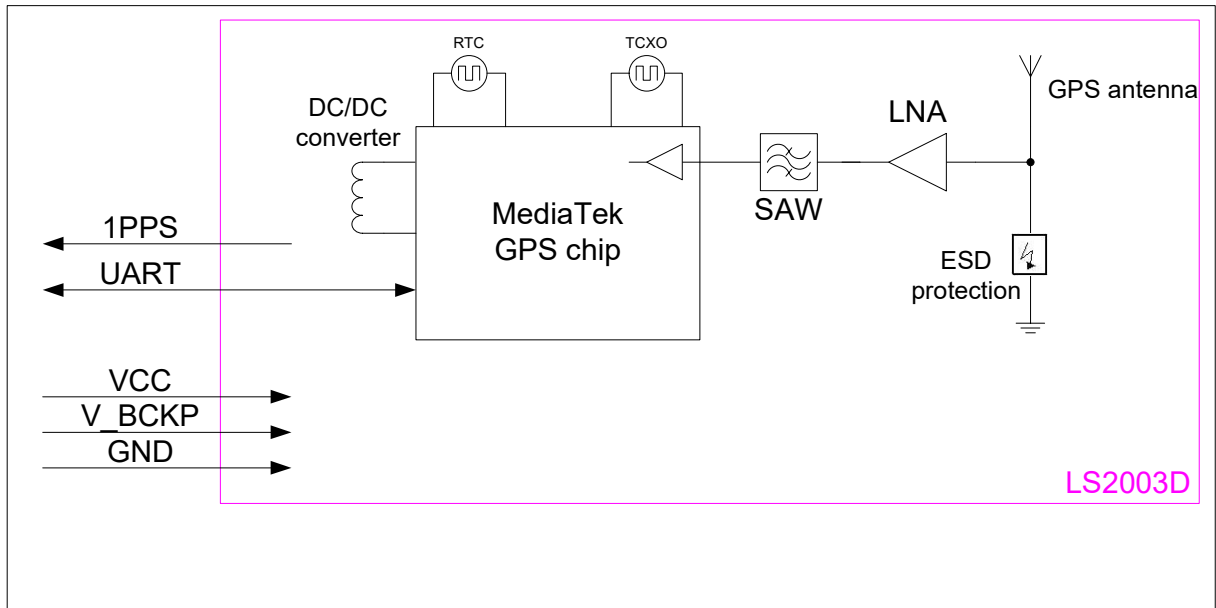


Fig 3-1 System block diagram of LS2003D

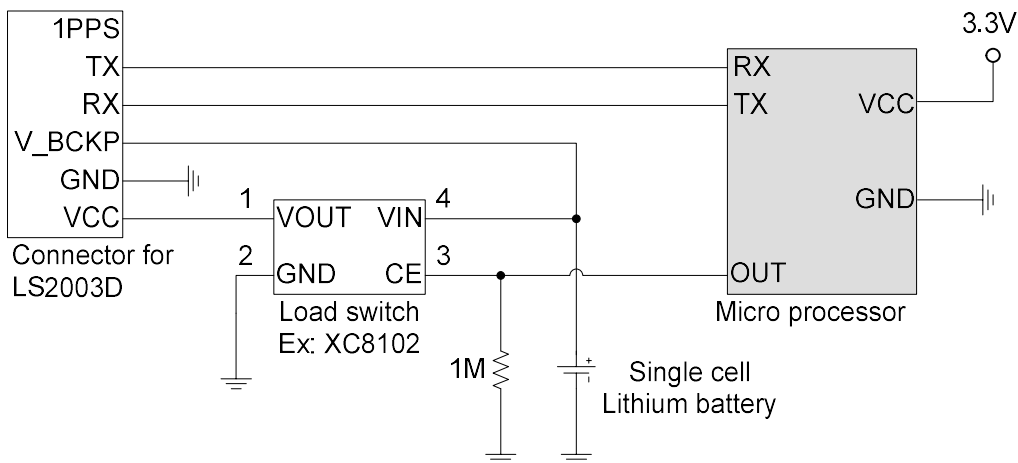


Fig 3-2 Typical application circuit that directly uses lithium battery to save power.

## 4 GPS receiver and antenna

### 4.1 GPS receiver

Chip	MediaTek MT3339	
Frequency	L1 1575.42MHz, C/A code	
Channels	Support 66 channels (22 Tracking, 66 Acquisition)	
Update rate	1Hz default, up to 10Hz	
Acquisition Time	Hot start (Open Sky)	< 1s (typical)
	Cold Start (Open Sky)	33s (typical) without AGPS
		< 15s (typical) with AGPS (hybrid ephemeris prediction)
Position Accuracy	Autonomous	2.5m CEP
	SBAS	2.5m (depends on accuracy of correction data)
Datum	WGS-84 (default)	
Max. Altitude	< 50,000 m	
Max. Velocity	< 515 m/s	
Protocol	NMEA 0183 ver 3.01	9600 bps <sup>(1)</sup> , 8 data bits, no parity, 1 stop bits 1Hz: GGA, GLL, GSA, GSV, RMC, VTG

Note 1: Both baud rate and output message rate are configurable.

### 4.2 GPS antenna

Antenna type	Patch antenna (4mm thickness)
Polarization	RHCP
Frequency Range	1575.42MHz ± 1.023MHz <sup>(1)</sup>
Gain	2 dBic Typ. @zenith <sup>(1)</sup>
Axial ratio	Max 4.0dB @zenith <sup>(1)</sup>

Note 1: This value is measured with the evaluation board and must be fine tuned when installed into your device. Please contact LOCOSYS for your antenna tuning.