SiRF V GPS Mouse

Ct-GM551

Specifications Sheet

Features:

- **Powered by SiRFstarV™ ultra low power core logic**
- **GPS, GLONASS, Galileo, BDS and SBAS reception for high GNSS availability and accuracy**
- **Compact module size for easy integration**
- **Dimension : 42.3 x 40 x 14.1 mm**
- **Fully utilized SiRFstarV™ upgrade features**
- **Interface RS232 or USB**

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Connectec

1.Introduction

Connectec's new generation Ct-GM551 of products utilizes SiRFstarV ™ and feature Quad-GNSS for tracking GPS, GLONASS, BDS and Galileo satellites. The product family delivers highly accurate continuous location, advanced power management and high interference immunity. These continue to push the envelope of performance in sensitivity, TTFF and urban canyon availability and accuracy. With a built-in DSP and extremely low power consumption, the family can get fast location fixes for geo-tagging images or videos, asset tracking and wearable applications.

Advanced low power technology means there is no need to maintain full power to achieve maximum performance nor turning the GNSS receiver completely off to save power. It breaks old GNSS performance vs. power trade-off through the fusion of a new high-performance GNSS engine, advanced power management and a smart sensor interface to achieve high sensitivity hot-start conditions for fast location fixes.

Special power modes (Push-to-Fix™) ideally suited for camera and asset tracking use cases. Push-to-Fix™ is an intelligent periodic low power mode that can adaptively change power depending on the environment and motion conditions. Advanced algorithms and a powerful on chip DSP processor maintain high accuracy(QoS) while achieving the lowest power level possible for the given environmental and motion conditions. Data logging can be achieved with a very low energy-per-fix and completely independent of the host processor, which could be power off.

Dynamic contextual awareness, temperature monitoring and MEMS sensors work in concert to conserve power and boost performance. This opens up a wide variety of use cases for sports camera, asset tracking and fitness devices.

Premium on-chip software provides a new level of continuous location awareness by employing the following advanced technology:
• Advanced power management allows GNSS receivers to stay in a hot-start condition nearly
   continuously while consuming very little power.
• Local or server generated ephemeris prediction, from three days to one month in advance to boost
    sensitivity and performance.

1.1 Features

1.1.1 Performance

• GPS, GLONASS, Galileo, BDS and SBAS reception for high GNSS availability and accuracy

• High sensitivity navigation engine (PVT) tracks as low as
  − GPS : -165 dBm
  − GLONASS : -161 dBm

• 52 track verification channels

• SBAS (WAAS, EGNOS, QZSS, MSAS, GAGAN)

• Active Jammer Remover, removes in-band jammers up to 80 dB-Hz

• Tracks up to 8 CW jammers

• Multimode A-GPS (Autonomous, MS-Based, and MS-Assisted), need operator support.

• Embedded CGEE / SGEE (With back-end server support) speed up TTFF a lot and makes cold start time to be around 20+ seconds.

• SiRFGeoRecov™ Reverse EE makes positioning process being done under power saving mode.

• Reacquisition Time : 0.1 second

• RF Metal Shield for best performance in noisy environments

1.1.2 Hardware and Software

• Based on the high performance features of SiRFstarV™ low power single core logic.

• Adaptive micropower controller

• Only 50 to 500µA maintains hot start capability (core logic)

• <10mW required for TricklePower™ mode

• RoHS compliant (lead-free)

• Advanced navigation features

• External interrupt input for context change detection

1.2 Advantages

• Built-in LNA.

• Built-in internal ROM and based on Firmware 5.5.X

• It can remove in-band jammer up to 80db-Hz and track up to 8CW jammers, so the GPS-Mouse can prevent GPS signal interference when design-in the electrical device with noisy electrical signal interferences such as laptop, mobile phone, DSC, etc.

• Maintain tracking sensitivity as low as GPS @ -165dBm, GLONASS @ -161dBm, even without network assistance. (SiRFstar III has only -159dBm sensitivity)

• Support SiRFaware™ technology

• Support adaptive "Micro Power Controller" power management mode.

• <10mW TricklePower™, so user can leave power on all day instead of power off.

• Suitable for battery drive devices that need lower power consumption application

• Cost saving through elimination of RF and board to board digital connectors

• Flexible and cost effective hardware design for different applications

• Embed CGEE (Client Generated Extended Ephemeris) that can capture ephemeris data from satellites locally and predicts ephemeris up to 3 days. So if the GPS-Mouse was off within 3 days, it could complete positioning process with limited time just like hot start.

1.3 Block Diagram
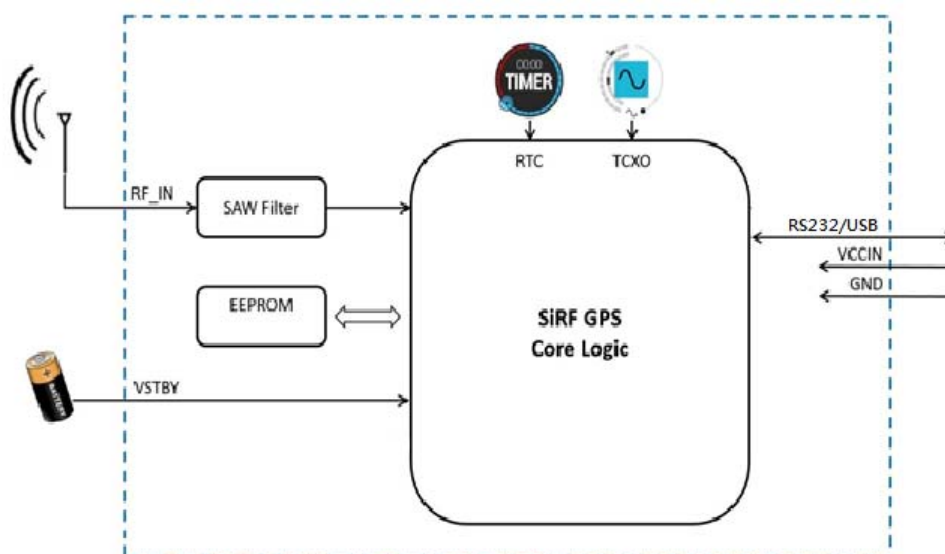
2 Technical Specification

2.1 Hardware Features

• Based on the high performance features of SiRFstarV™ low power single chipset

• RoHS compliant (lead-free)

2.1.1 Hardware Specification

Feature	Content	Description
Chipset	GSD5e/ROM Base	SiRFstarV™ low power single chipset
General	Frequency GPS	L1, 1575.42 MHz
	Frequency GLONASS	L1,1602~1615MHz
	C/A code	1.023 MHz chip rate
	Channels	52
	Sensitivity GPS	-165dB
	Sensitivity GLONASS	-161dB
Accuracy	Position	< 2.5 meters
	Velocity	0.01 meters/second
	Time	1 uS synchronized to GPS time
Datum	Default	WGS-84
	Other	selectable for other Datum
TTFF **(@ -130dBm)**	Reacquisition	0.1 sec., average
	Snap start	1 sec., average
	Hot start	< 2 sec.
	Warm start	< 20 sec.
	Cold start	< 30 sec.
Dynamic Conditions	Altitude	18,000 meters (60,000 feet) max.
	Velocity	515 meters/second (1000 knots) max.
	Acceleration	4g, max.
	Jerk	20 meters/second$_3$, max.
Power	Main power input	5 VDC input
	Power Consumption	Average: 60mA (Tracking Mode)
	Backup Power (VSTBY)	3.3V DC battery input
Serial Port	Electrical interface	Default RS232/UART/USB
	Protocol messages	NMEA-0183@9600bps

2.1.2 Electrical Characteristics

2.1.2.1 RS232 Electrical Characteristics

Parameter	Min.	Typ.	Max.	Units
Input Operation supply voltage	3.2	3.3	5	V
Peak supply current	--	70	--	mA
Sustained supply current	--	60	--	mA
Standby Backup current	--	1	--	mA
I/O Input high level (VIH)	1.8	--	3.6	V
I/O Input low level (VIL)	-0.3	--	0.4	V
I/O Output high level (VoH)	2.4	--	--	V
I/O Output low level (VoL)	0	--	0.4	V

2.1.2.2 USB Electrical Characteristics

| Parameter	Min.	Typ.	Max.	Units
Input Operation supply voltage	4.2	5	5.8	V
Peak supply current	--	70	--	mA
Sustained supply current	--	60	--	mA
Standby Backup current	--	1	--	mA
I/O Input high level (VIH)	2.8	--	--	V
I/O Input low level (VIL)	--	--	0.6	V
I/O Output high level (VoH)	2.8	--	--	V
I/O Output low level (VoL)	--	--	0.6	V

*CP2102 Driver support

http://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers

2.2 Pin Definition & Pin Assignment

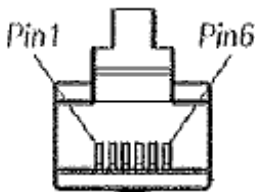### Pin Location

Connects can according customer needs to change

### 2.2.1 Pin Location-1 (MOLEX connector)
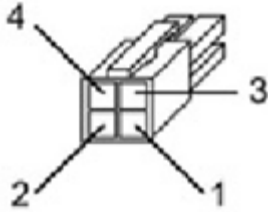
Pin Assignment

PIN	Signal	Type	Description
1	+5VDC	PWR	DC 5V input
2	GND	PWR	Ground
3	Tx(RS232)	O	TX data transmit (TX)
4	Rx(RS232)	I	RX data receive (RX)

2.2.2 Pin Location-2 (RJ-11 Connector)

PIN	Signal	Type	Description
1	NC	NC	Reserve
2	GND	PWR	Ground
3	Rx(RS232)	I	RX data transmit (RX)
4	Tx(RS232)	O	TX data receive (TX)
5	+5VDC	PWR	DC 5V input
6	NC	NC	Reserve

2.2.3 Pin Location-3 (USB Connector)
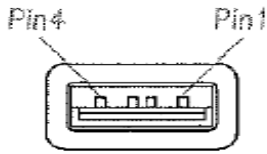
PIN	Signal	Type	Description
1	+5VDC	PWR	DC 5V input
2	D-	I/O	Data -
3	D+	I/O	Data +
4	GND	PWR	Ground

2.3 Time Mark(T.M.)

• When GPS is fixed, the TM cycle will be shown as below :
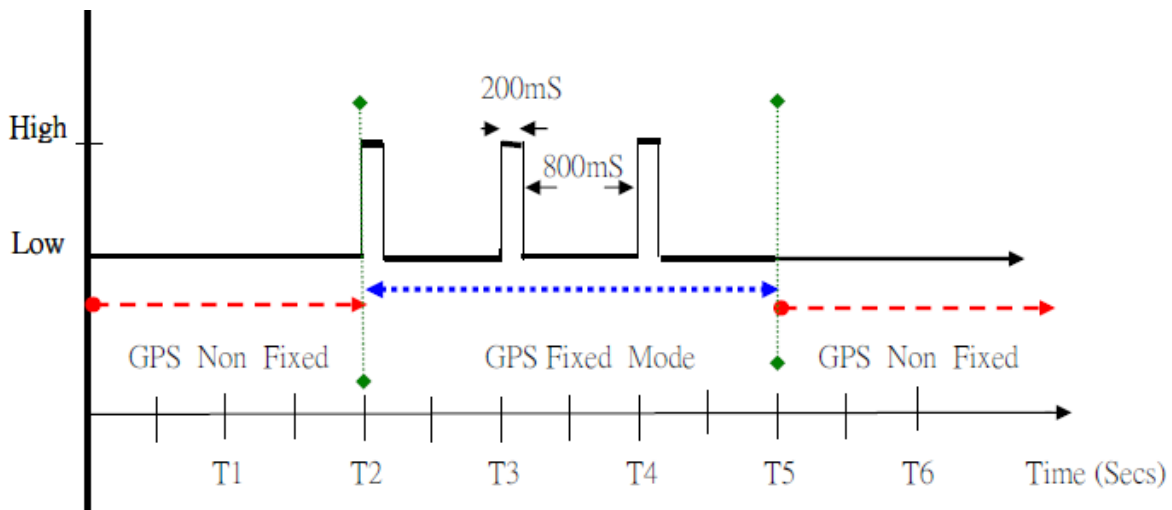
2.4 Recommended GPS Antenna Specification

• Ct-GM551 receiver is designed for using with passive antenna.

Parameter	Specification
Antenna Type	25x25x4 Patch antenna
GPS Frequency Range	1575.42 ± 1.023 MHz
GLONASS Frequency Range	1602 ~ 1615MHz

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2.5 Physical Specification

• Physical dimensions of the Ct-GM551 GPS-Mouse are as follow:

Items	Description
Length	42.34 mm
Width	39.76 mm
Height	14.1 mm
Weight	95 g

2.6 Environmental Specification

Items	Description
Operating temperature range	-20 deg. C to +60 deg. C
Storage temperature range	-40 deg. C to +60 deg. C
Humidity	Up to 95% non-condensing or a wet Bulb temperature of +35 deg. C

2.7 ESD Specification

• Air Discharge : 2 KV / 4KV / 8KV (direct)

• Contact Discharge : 2KV / 4KV (direct/indirect)

3 Software

The firmware used on Ct-GM551 GPS-Mouse is GSD5e, the software for SiRFstarV™ low power single chipset receivers, and its features include:

- Excellent sensitivity

- High configurability

- 1Hz / 5Hz position update rate

- Support SBAS(satellite-based augmentation systems), WAAS, EGNOS, QZSS, MSAS, GAGAN

- Enhanced Navigation Performance

- Improved Jamming Mitigation

- Improved Ephemeris Availability

3.1 Software Interface

The host serial I/O port of the GPS-Mouse's serial data interface supports full duplex communication between the GPS-Mouse and users. The default serials are shown in Table 3-1 with description.

Item	Description
Core of firmware	SiRFstarV™ GSD5e ROM_5.5.X
Baud rate	9600 bps (Default) Configurable up to 19200 ~ 115200 bps according to customer's needs
Code type	NMEA-0183 ASCII
Datum	WGS-84
Protocol message	GGA(1s), GSA(5s), GSV(5s), RMC(1s), VTG(1s)
Output frequency	1Hz
Port	UART

3.2 NEMA Output Message

• The output NMEA-0183 messages for the receiver are listed on Table 3-2.

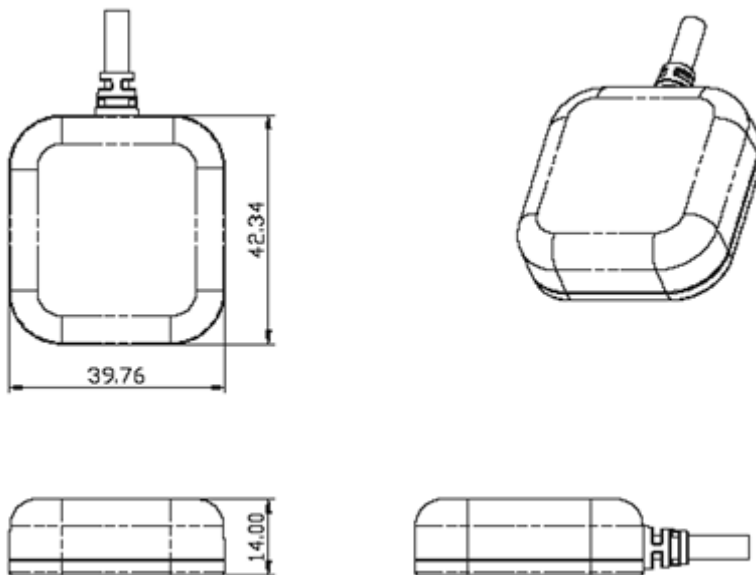| Option	Description
GGA	Fix information, for time, position, and fix related data for a GPS receiver.
GSA	Overall satellite data, GPS receiver operating mode, satellites used in the position solution and DOP values.
GSV	Detailed satellite data, the number of GPS satellites in view satellite ID numbers, elevation, azimuth, and SNR values.
RMC	Recommended minimum data for GPS, time, date, position, course and speed data provided by the GPS receiver.
VTG	Vector track an speed over the ground, speed, degrees, knots, KMPH

4 Mechanical Drawing and Footprint

• Physical dimensions of the Ct-GM551 GPS-Mouse are as follows

Items	Description
Length	42.34mm
Width	39.76mm
Height	14.1mm

4.1 Outline Drawing

Unit : mm