GPS Module

Ct-G302

Specifications Sheet V0.1

Features:

- **SiRF StarIII low power single chipset**
- **Compact module size for easy**
- **integration : 15 x 14 x 2.8 mm**
- **RoHS compliance**

1. Introduction

The Ct-G302 module is a high sensitivity, low power and very compact Surface Mount Device (SMD). This 20-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 SiRFStarIII™ low power single chipset architecture.
Ct-G302 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 and Software

- Based on the high performance features of the SiRF Star III low power single chipset.
- Compact module size for easy integration: 15x14x2.8 mm (590.6x551.2x110.2 mil).
- SMT pads allow for fully automatic assembly processes equipment and reflow soldering
- RoHS compliant (lead-free)

Performance

- Cold/Warm/Hot Start Time: 42 / 38 / 1 sec.
- Reacquisition Time: 0.1 second
- RF Metal Shield for best performance in noisy environments
- Multi-path Mitigation Hardware

Interface

- TTL level serial port for GPS communications interface
- Protocol: NMEA-0183/SiRF Binary (default NMEA)
- Baud Rate: 4800 ~19200 bps (default 9600)

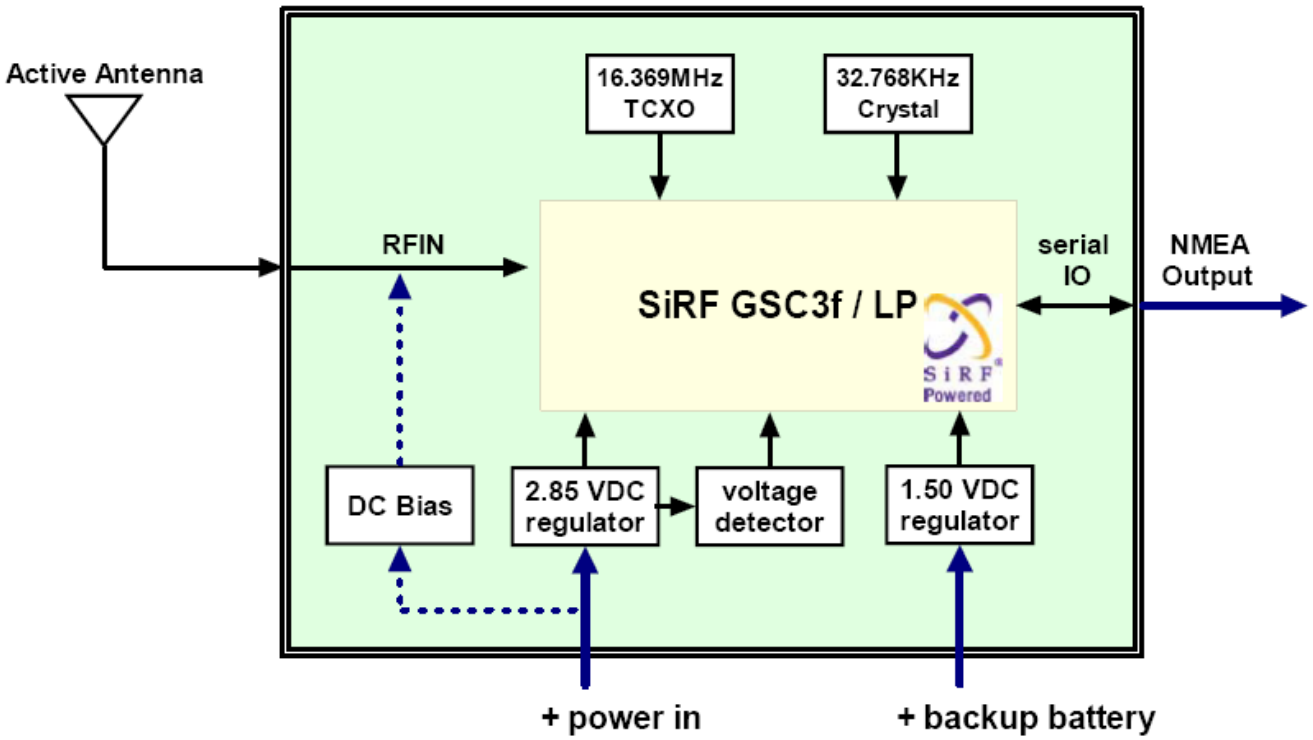
1.2. Advantages

- 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

Ct-G302 Block Diagram



Hardware Features

- Based on the high performance features of the SiRF Star III low power single chipset
- Compact module size for easy integration: 15x14x2.8 mm (590.6x551.2x110.2 mil)
- SMT pads allow for fully automatic assembly processes equipment and reflow soldering
- RoHS compliant (lead-free)

2.2. Software Features

The firmware used on Ct-G302 module is GSW3.2.x, the software for SiRF StarIII low power single chipset receivers, and the default configuration is as following description:

Item	Description
Core of firmware	SiRF GSW3.2.2
Baud rate	4800 ~19200 bps (default 9600)
Code type	NMEA-0183 ASCII
Datum	WGS-84
Protocol message	GGA, GSA, GSV, RMC,VTG
Output frequency	1 Hz

2.3. Mechanical specification

The Physical dimensions of the Ct-G302 GPS Module are as follow:

Items	Description
Length	15.0 ± 0.1 mm (590.6 ± 4 mil)
Width	14.0 ± 0.1 mm (551.2 ± 4 mil)
Height	2.80 ± 0.3 mm (110.2 ± 12 mil)
Weight	1g

2.4. Recommended GPS Antenna Specification

This Ct-G302 receiver is designed for use with passive antenna.

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

2.5. Environmental Specification

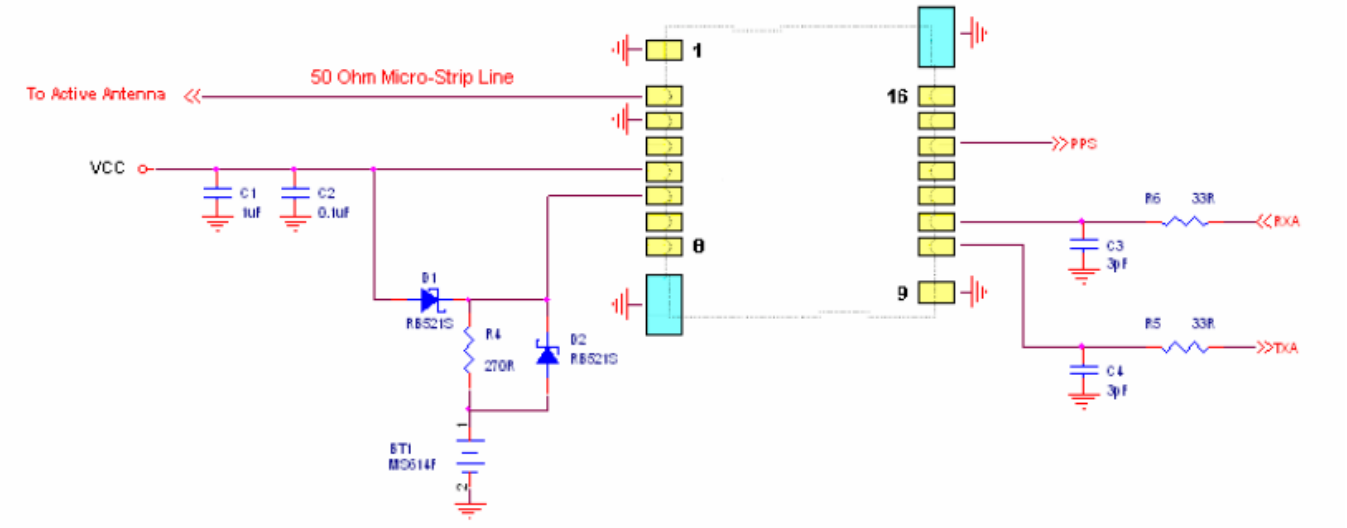
Item	Description
Operating temperature rang	-40 deg. C to +85 deg. C
Storage temperature range	-55 deg. C to +100 deg. C
Humidity	up to 95% non-condensing or a wet bulb temperature of +35 deg. C
Altitude	18,000 meters (60,000 feet) max.
Velocity	515 meters/second (1000 knots) max.
Jerk	20 meters/second^3, max.
Acceleration	4g, max.

2.6. ESD Specification

Air Discharge: 2 ; 4 ; 8KV (direct)

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

2.7. Reference design



- All ground pads attach directly to ground plane by way of via.
- All components are reference only.
- The antenna input should have the proper impedance matching.

Performance Characteristics

2.8. 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

2.9. Dynamic constrains

Dynamic Conditions	Altitude	18,000 meters (60,000 feet) max.
	Velocity	515 meters/second (1000 knots) max.
	Acceleration	4g, max.
	Jerk	20 meters/second3, max.

2.10. Acquisition time[1]

Mode	Ct-G302 GPS Module
TTFF Hot (valid almanac, position, time & ephemeris)	1 s
TTFF Warm (valid almanac, position, & time)	38 s
TTFF Cold (valid almanac)	42 s
re-acquisition (<10 s obstruction with valid almanac, position, time & ephemeris)	100 ms

Note 1: Open Sky and Stationary Environments.

2.11. Timing 1PPS output

The 1PPS pulse width is 1 μs, this 1PPS is NOT suited to steer various oscillators (timing receivers, telecommunications system, etc).

2.12. Sensitivity (According to SiRF GSC3f spec.)

Parameter	Description
Tracking Sensitivity	-148 dBm
Acquisition Sensitivity	-143 dBm

2.13. Battery backup (SRAM/RTC backup)

This is the battery backup supply that powers the SRAM and RTC when power is removed. To achieve the faster hot startup, a backup battery has to be connected.

2.14. Differential aiding

2.14.1. Differential GPS (DGPS) Optional

DGPS specification improves the Ct-G302 GPS Module horizontal position accuracy to <4M 2dRMS.

2.14.2. Satellite Based augmentation System (WASS/EGONS) Optional

The Ct-G302 GPS Module is capable of receive SBAS (WASS and EGONS) 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, multi-path, distance from DGPS reference station and latency of corrections.

3. Hardware Interface Power supply

Parameter	Ct-G302 GPS Module
Input voltage	3.2~ 5.0 VDC
Battery backup voltage	1.65~3.3.0 VDC
Power consumption in acquisition	50 mA
Power consumption in tracking	40 mA

4. Software interface

The host serial I/O port of the module's serial data interface supports full duplex communication between the module and the user.
The default serials are shown in Table 5-1.

Port	Protocol	Description
Port A	NMEA 0183, 9600 bps	GGA, GSA, GSV, RMC, VTG
Port B	N/A	N/A

Table 5-1 Ct-G302 GPS module default baud rates

4.1. NMEA output messages

The output NMEA (0183 v3.0) messages for the receiver are listed in Table 5-2. A complete description of each message is contained in the SiRF NMEA reference manual.

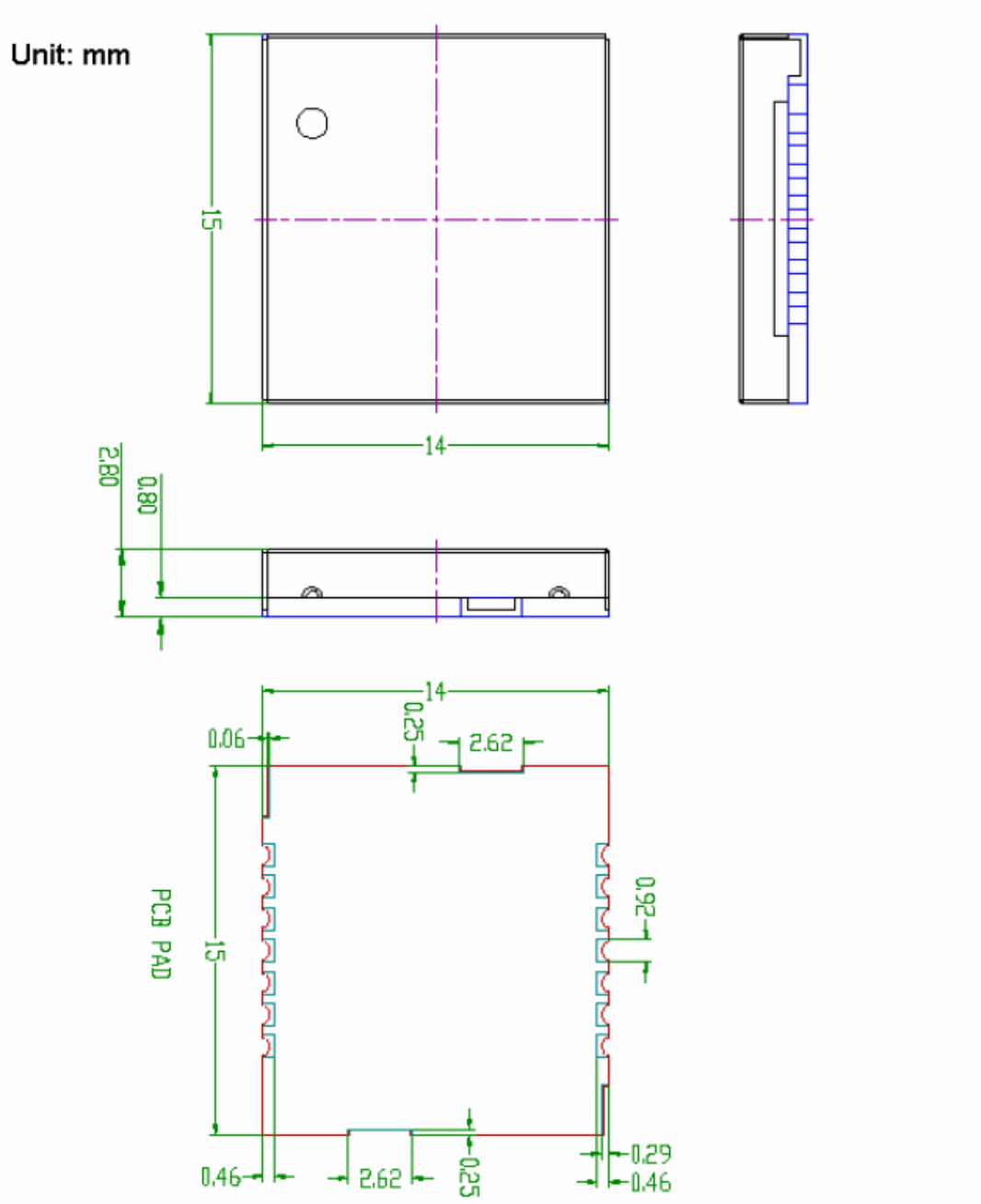
4.2. SiRF binary

A complete description of each binary message is contained in the Connectec SiRF Binary Protocol reference manual.

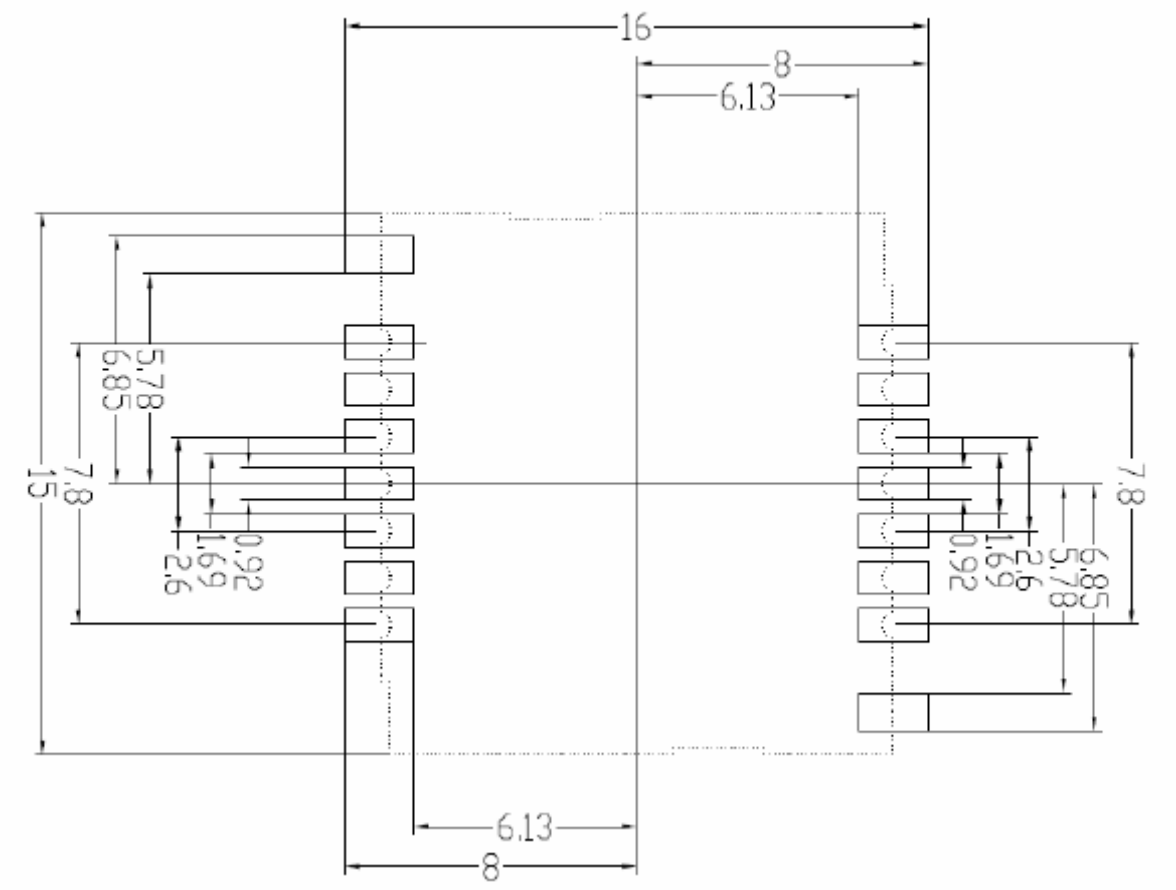
5. Mechanical drawing and footprint

Items	Description
Length	15.0 ± 0.1 mm (590.6 ± 4 mil)
Width	14.0 ± 0.1 mm (551.2 ± 4 mil)
Height	2.80 ± 0.3 mm (110.2 ± 12 mil)

5.1. Outline Drawing

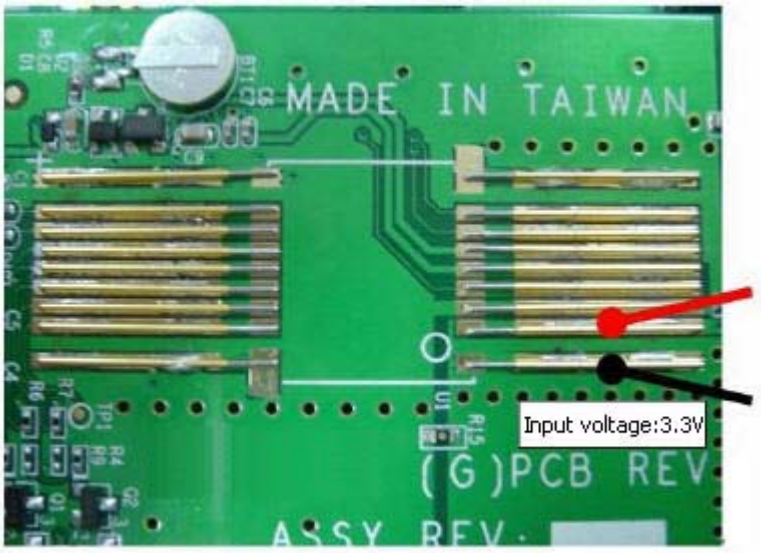


5.2. Recommended footprint (Top view)



6. Application Note

- When using Connectec F1 board in your Ct-G302 test, please connect two pins as shown in following picture to the power supply (3.3V).



- Ct-G302 is a compact-sized GPS module, specific for active antenna design. It has the pin- to- pin compatibility with Ct-G301, which is specific for patch antenna design.