GPS Module

Ct-G431

Specifications Sheet V0.1

Features:

- ***SiRF StarIV ultra low power chipset***
- ***Compact module size for easy integration : 15 x 14 x 2.8 mm***
- ***I^2C/SPI pins reserved for customizing special user applications (Default: UART)***
- ***Fully utilized SS4 upgrade features***

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1. Introduction

The Ct-G431 GPS module is a high sensitivity, low power, Surface Mount Device (SMD) that fully utilized SiRFstarIV upgrade features. This 48-channel global positioning system (GPS) receiver is designed for a wide range of OEM applications and is based on the GPS signal search capabilities of the SiRFstarIV GSD4e chipset, SiRF's newest chipset technology.
The Ct-G431 provides flexible I/O interfaces (UART is default, I^2C and SPI by customer requirement).

The Ct-G431 is designed to allow quick and easy integration into GPS-related applications such as:

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

1.1. Features

1.1.1 Hardware and Software

- Based on the high performance features of the SiRF Star IV low power single chipset.
- Built-in high gain amplifier and bandpass filter
- RoHS compliant (lead-free)
- 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

1.1.2 Performance

- Highest performance GPS PVT Engine.
- High acquisition sensitivity for fast TTFF
- Extremely low weak signal tracking sensitivity
- High jamming immunity
- Smallest footprint and total solution size
- Highest level of BOM integration
- Value added software enhancements
- Multimode A-GPS (Autonomous, MS-Based, and MS-Assisted) – Need operator support
- Embedded CGEE / SGEE (Need server support)
- SiRFGeoRecov™ Reverse EE
- Cold/Warm/Hot Start Time: 35/35/1 sec. at open sky and stationary environments
- Reacquisition Time: 0.1 second
- RF Metal Shield for best performance in noisy environments

1.1.3 Performance

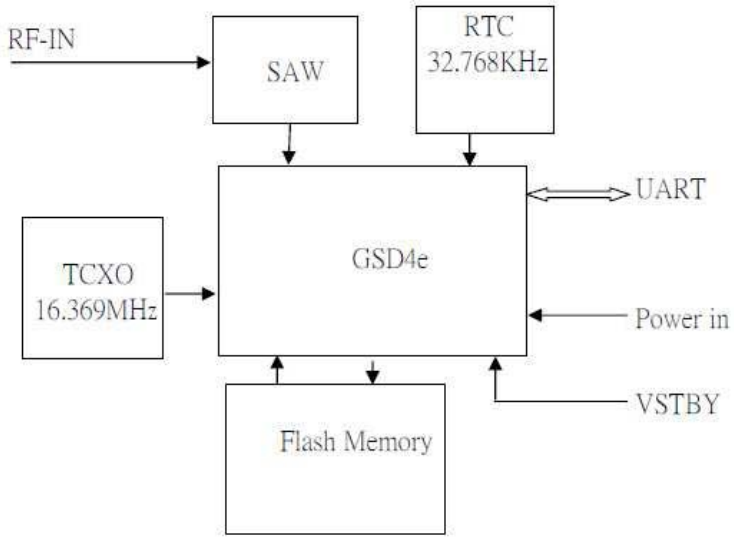
- TTL level serial port for GPS communications interface
- Protocol: NMEA-0183/SiRF Binary (default NMEA)
- Baud Rate: 4800 bps

1.2 Advantages

- Built-in LNA.
- Embed CGEE (Client Generated Extended Ephemeris) that can capture ephemeris data from satellites locally and predicts ephemeris out to 3 days. So if the module was off within 3 days, it could complete positioning process within 2 seconds just like hot start.
- It can remove in-band jammer up to 80db-Hz and track up to 8CW jammers, so the module 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 -163dBm, even without network assistance. (SiRF StarIII has only -159dBm sensitivity)
- Support SiRFaware technology
- Support adaptive “Micro Power Controller” power management mode
- Support MEMS sensor through I^2C interface
- Only 8mW Trickle Power, so user can leave power on all day instead of power off
- Suitable for battery drive devices that need lower power consumption application
- Ideal for high volume mass production(Taping reel package)
- Cost saving through elimination of RF and board to board digital connectors
- Flexible and cost effective hardware design for different application needs

2. Specifications

2.1. Module architecture



2.2. Hardware Features

- Based on the high performance features of the SiRF Star IV 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). Halogen free is to be available

2.3. Software Features

The firmware used on Ct-G431 module is GSW4, the software for SiRF StarIV low power single chipset receivers, and the default configuration is as following description:

Items	Description
Core of firmware	SiRF GSW4
Baud rate	4800 bps
Code type	NMEA-0183 ASCII
Datum	WGS-84
Protocol message	GGA(1s), GSA(1s),GSV(5s), RMC(1s)
Output frequency	1Hz

2.4 Environmental Characteristics

Items	Description
Operating temperature rage	-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

2.5 Physical Characteristics

The Physical dimensions of the Ct-G431 GPS Module are as follow:

Items	Description
Length	15.0 mm ± 0.3mm
Width	14.0 mm ± 0.3mm
Height	2.80 mm ± 0.3mm
Weight	1.8 g

2.6 Recommended GPS Antenna Specifications

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

2.7 ESD Specification

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

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

3. Performance Characteristics

3.1 Position and velocity accuracy

Accuracy	Position	<2.5M
	Velocity	0.01 meters/second
	Time	1 microsecond synchronized to GPS time

3.2 Dynamic constrains

Dynamic constrains	Altitude	18,000 meters (60,000 feet) max.
	Velocity	515 meters/second (1000 knots) max

3.3 Acquisition time [1]

Mode	Ct-G431 GPS module
TTFF Hot (valid almanac, position, time & ephemeris)	1~2 s
TTFF Warm (valid almanac, position, time)	9~15 s
TTFF Cold (valid almanac)	25~35 s
re-acquisition (<10 s obstruction with valid almanac, position, time & ephemeris)	0.1 s

Note 1: Open Sky and Stationary Environments.

3.4 Sensitivity

Parameter	Description
Tracking Sensitivity	-163 dBm
Acquisition Sensitivity	-148 dBm

4.Hardware Interface Power supply

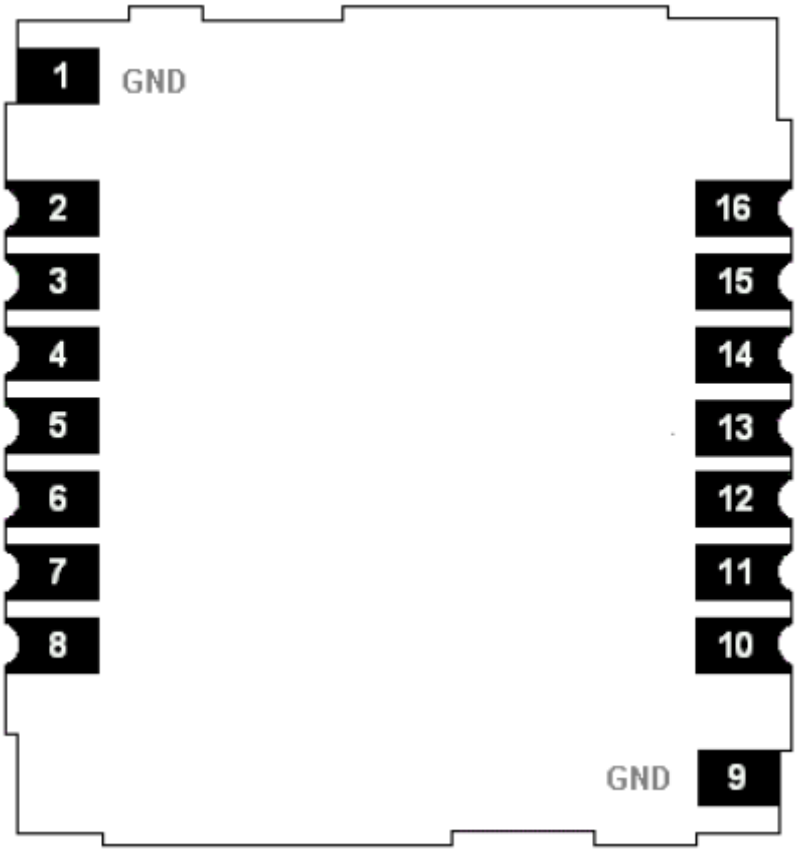
Parameter	GPS module
Input voltage	1.71~1.89 VDC
Battery backup voltage	1.71~1.89 VDC

4.1 Power Consumption

Status	Power Consumption
Acquisitioning	48 mA
Tracking	40 mA

4.2. Specifications

4.2.1 Pin Settings



4.3 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 4-1.

Port	Protocol	Description
Port A	NMEA 0183, 4800 bps	GGA(1s), GSA(1s), GSV(5s), RMC(1s)
Port B	N/A	N/A

Table 4-1 Ct-G431 GPS module default baud rates

4.4 NMEA output messages

The output NMEA (0183 v3.0) messages for the receiver are listed in Table 4-2. A complete description of each message is contained in the SiRF NMEA reference manual.

Option	Description
GGA	Time, position, and fix related data for a GPS receiver.
GSA	GPS receiver operating mode, satellites used in the position solution, and DOP values.
GSV	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.

Table 4-2 NMEA-0183 Output messages

4.5 SiRF Binary

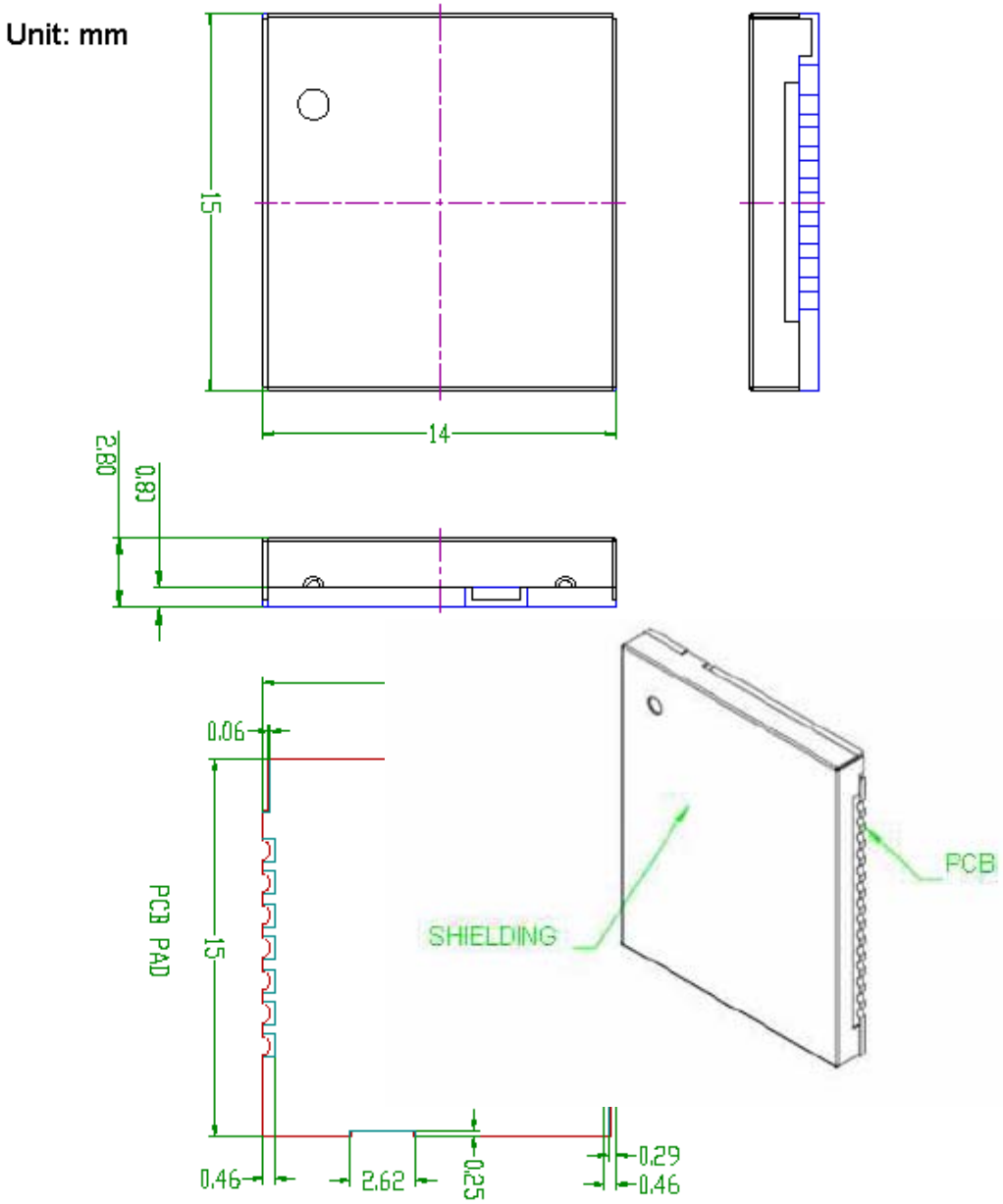
A complete description of each binary message is contained in the SiRF Binary Protocol reference manual.

5. Mechanical drawing and footprint

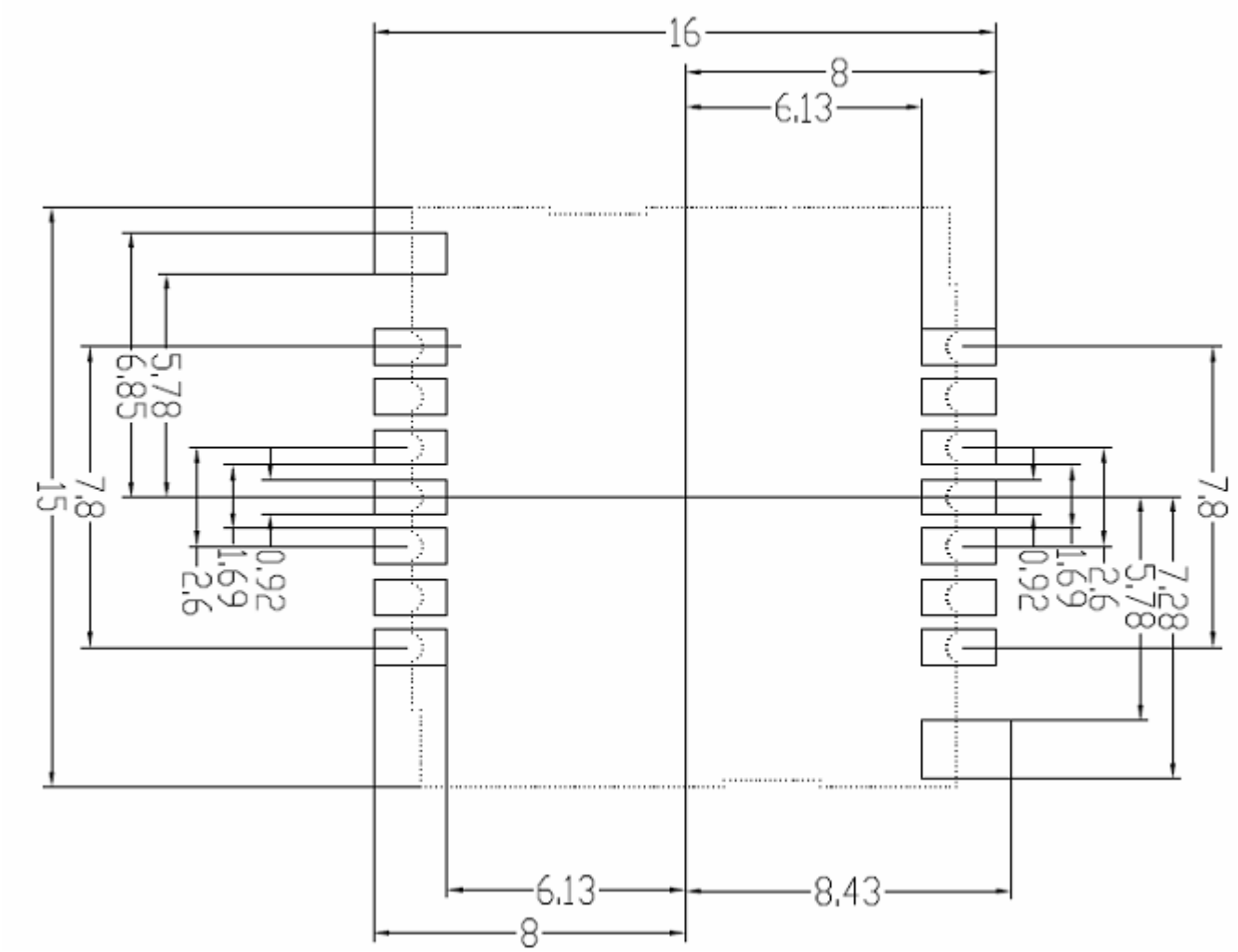
5.1 Outline Drawing

Tolerance:

Length	**24.0 ± 0.3 mm**
Width	**20.0 ± 0.3 mm**
Height	**2.90 ± 0.3 mm**



5.2 Recommended Footprint (Top view)



Note: 1. Tolerance of recommended pad: 1.87 * 0.92 (+/- 0.1 mm)
2. Recommended pad for pin 9 is 2.3 * 1.5 mm (+/- 0.1 mm)