SiRF V GPS Module

Ct-G551

Specifications Sheet V0.1

Features:

- ◆ **SiRF StarV ultra low power chipset**
- ◆ **GPS, GLONASS, Galileo and SBAS reception for high GNSS availability and accuracy**
- ◆ **Compact module size for easy integration : 15 x 14 x 2.8 mm**
- ◆ **Fully utilized SS5 upgrade features**

1. Introduction

The Ct-G551 GPS module is a high sensitivity, low power, Surface Mount Device (SMD) that fully utilized SiRFstarV upgraded features. This 48-channel Global Positioning System (GPS) and Global Navigation Satellite System (GLONASS) receiver is designed for a wide range of OEM applications and is based on the GPS signal search capabilities of the SiRFstarV CSRG05e ROM chipset, Serf′s newest chipset technology. The Ct-G551 provides flexible bus interfaces (UART).

The Ct-G551 is designed to allow quick and easy integration into GPS-related applications such as:

- Mobile gaming
- Cellular handsets
- Cameras
- Asset tracking
- Other location-aware consumer devices Premium on-chip software provides a new level of continuous location awareness by employing.
- Opportunistic ephemeris decode and advanced power management, which enable the GPS receiver to stay in a hot-start condition nearly continuously while consuming very little power
- Full support for client-based and server-based SiRFInstantFix^{TM}
- Dynamic contextual awareness, temperature monitoring, and MEMS sensors that work in concert to conserve power and boost performance
- Use of software control modules to achieve power saving state

1.1. Features

1.1.1 Performance

- ◆ Highest performance Solution :
- ◆ GPS, GLONASS, Galileo and SBAS reception for high GNSS availability and accuracy
- ◆ High sensitivity navigation engine (PVT) tracks as low as GPS:-164dBm、 GLONASS:-161dBm
- ◆ 48 track verification channels
- ◆ SBAS (WAAS or EGNOS,MSAS)
- ◆ 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.

◆ SiRFGeoRecovᴛᴍ 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 the SiRF Star V low power single chipset.

◆ Adaptive Micropower Controller:

◆ Only 50 to 500μA maintains hot start capability

◆ <10mW required for TricklePower™ modeRoHS compliant (lead-free)

◆ SMT pads allow for fully automatic assembly processes equipment and reflow soldering

◆ Advanced Navigation Features:

◆ Smart sensor I²C interface

◆ Interrupt input for context change detection

1.2 Advantages

◆ Built-in LNA.

◆ Built-in internal ROM and based on Firmware 4.1.X

◆ 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 GPS:-164dBm、GLONASS:-161dBm, even without network assistance. (SiRF StarIII has only -159dBm sensitivity)

◆ Support SiRFaware technology :

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

◆ <10mW 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

◆ 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 with limited time just like hot start.

1.3 Block Diagram
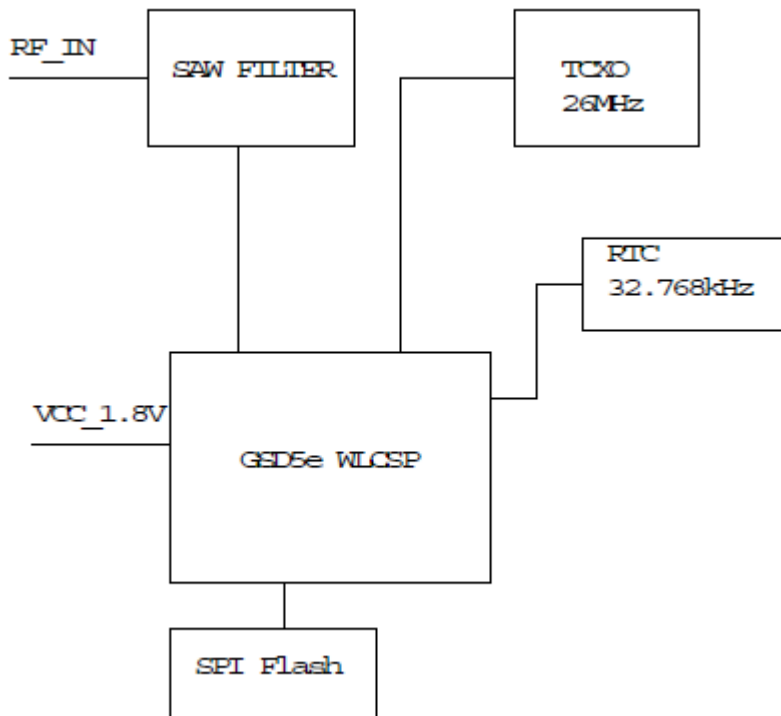
1.4 Electrical Characteristics

Operation Conditions				
Parameter	**Min**	**Typ**	**Max**	**Units**
Input Operation supply voltage	1.71	1.8	1.89	V
Peak supply current	- -	70	- -	mA
Sustained supply current	- -	60	- -	mA
Standby Backup current	- -	1	- -	mA
Input Backup battery voltage (V_RTC)	1.71	1.8	1.89	V
Input Backup battery current (V_RTC)	- -	1.5	- -	mA
I/O Input high level (VIH)	1.26	- -	3.6	V
I/O Input low level (VIL)	-0.3	- -	0.4	V
I/O Output high level (VoH)	1.28	1.35	1.41	V
I/O Output low level (VoL)	0	- -	0.4	V

2. Specifications

2.1. Hardware Features

◆ Based on the high performance features of the SiRF Star V low power single chipset

◆ SMT pads allow for fully automatic assembly processes equipment and reflow soldering

◆ RoHS compliant (lead-free). Halogen free is to be available

2.2 Module Specification

Feature	Content	Description
Chipset	GSD5e/ROM base	SiRF starV low power single chipset
General	Frequency GPS	L1, 1575.42 MHz
	Frequency GLONASS	L1, 1602~1615 MHz
	C/A code	1.023 MHz chip rate
	Channels	48
	Sensitivity GPS	-164 dB
	Sensitivity GLONASS	-161 dB
Accuracy	Position	<2.5 meters
	Velocity	0.01 meters/second
	Time	1 microsecond synchronized to GPS time
Datum	Default	WGS-84
	Other	Selectable for other Datum
Time to First Fix (TTFF/-122dBm) (Open Sky & Stationary Requirements)	Reacquisition	0.1 sec., average
	Snap start	1 sec., average
	Hot start	1 ~ 2 sec.
	Warm start	9 ~ 15 sec.
	Cold start	25 ~ 35 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	1.71 ~ 1.89 VDC input
	Power Consumption	Average: 60mA (Tracking Mode)
	Backup Power(V_RTC)	1.71 ~ 1.89 VDC input
Serial Port	Electrical interface	Default UART
	Protocol messages	NMEA-0183@9600bps

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2.3 Recommended GPS Antenna Specifications

The Ct-G551 receiver is designed for use with passive antenna.

Parameter	Specifications
Antenna Type	Right-hand circular polarized passive antenna
GPS Frequency Range	1575.42 ± 1.023 MHz
GLONASS Frequency Range	1602~1615 MHz

2.4. Physical Characteristics

The Physical dimensions of the Ct-G551 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

2.5 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

2.6 ESD Specification

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

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

3. Software

The firmware used on Ct-G551 module is GSD5e, the software for SiRF StarV low power single chipset receivers, and its features include:

◆ Excellent sensitivity

◆ High configurability

◆ Supports use of SBAS(satellite-based augmentation systems), WAAS, EGNOS, MSAS

◆ Enhanced Navigation Performance

◆ Improved Jamming Mitigation

◆ Improved Ephemeris Availability

3.1 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 3-1. The default configuration is as following description:

Items	Description
Core of firmware	SiRF GSD5e/ROM_4.1.X
Baud rate	9600 bps (Default) According to customer needs Configurable up to 19200 ~115200 bps
Code type	NMEA-0183 ASCII
Datum	WGS-84
Protocol message	GGA(1s), GSA(1s),GSV(5s), RMC(1s)
Output frequency	1Hz
Port	UART

Table 3-1 Ct-G551 GPS module default baud rates

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3.2 NMEA output messages

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

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 3-2 NMEA-0183 Output messages

4. Mechanical drawing and footprint

Items	Description
Length	15.0 ± 0.3 mm
Width	14.0 ± 0.3 mm
Height	2.80 ± 0.3 mm

4.1 Recommended Footprint (Top view)
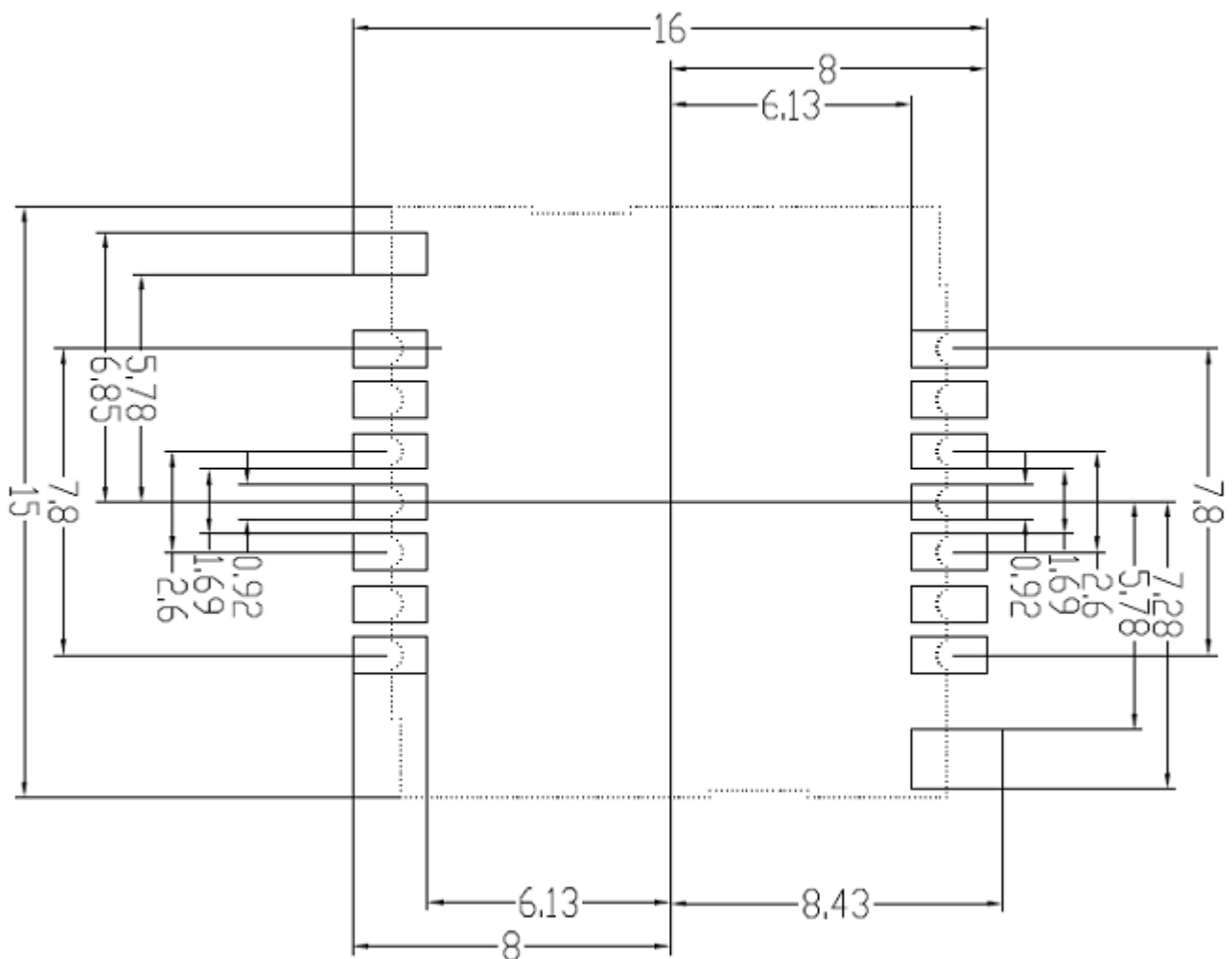
Note: 1. Tolerance of recommended pad: 1.87 * 0.92 (+/- 0.1 mm)

      2. Recommended pad for pin 9 is 2.3 * 1.5 mm (+/- 0.1 mm)

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4.2 Outline Drawing

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