
G09B GNSS Module Data Sheet

Revision: 1.1

Date:2022.12

Highlights:

- GPS L1, Beidou B1, Galileo E1, QZSS L1, GLONASS G1
- Full mode solution: GPS/GLONASS /Beidou/Galileo
- Embedded FLASH, archiving flexible customization requirements
- 10.1 x 9.7 x 2.2 mm

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1 Introduction

The *G09B* module is a high sensitivity, low power and very compact Surface Mount Device (SMD), and it supports signal processing of L1 band signals such as GPS C/A and SBAS (including WAAS, EGNOS, and MSAS). 120 tracking channels 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. *G09B* 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

- Assistnow autonomous support
- Compact module size for easy integration: 10.1x9.7x2.2 mm.
- SMT pads allow for fully automatic assembly processes equipment and reflow soldering
- Built-in LDO, regulators to decrease extra-BOM cost
- Up to 25Hz update rate
- Embedded DC/DC circuitry to prolong battery life
- AGPS supported

Performance

- Cold /Hot Start Time: 28 / 1 sec.
- RF Metal Shield for best performance in noisy environments
- Enhanced Navigation Performance

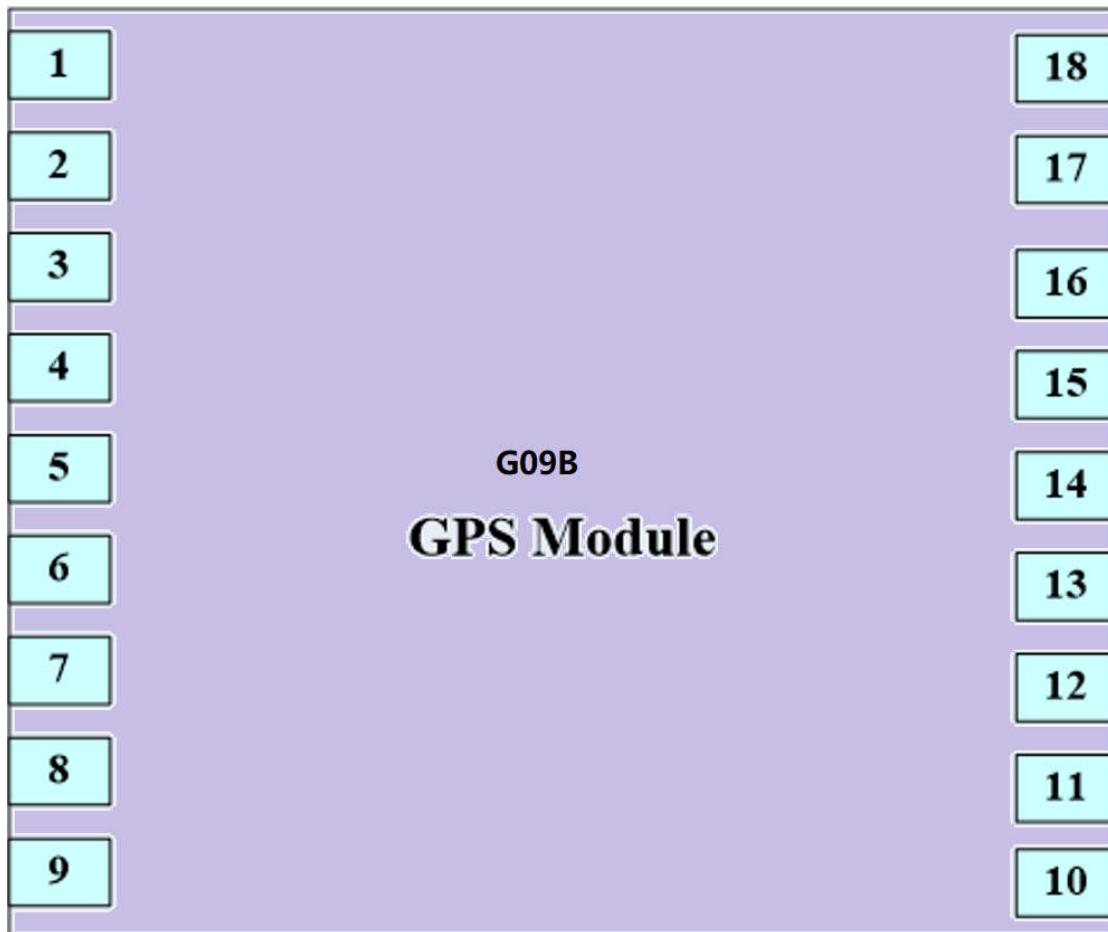
Interface

- TTL level UART interface
- Protocol: NMEA 0183
- Baud Rate: 115200 bps(Default)

Advantages

- Ideal for compact size devices
- Data / Power / RF through surface mount pads
- Flexible and cost effective hardware design for different application requirements
- Secure SMD PCB mounting method

2 Pin Assignment



PIN Table

Pin Numbers	Name	Type	Description	Note
5,7,13,15	NC		NC	
1,10,12	GND	G	Ground	
2	UART_TX	O	TTL UART output,0~3.3V	
3	UART_RX	I	TTL UART input	
4	TIMEPULSE	O	PP1S output	
6	VBAT	P	Backup battery supply voltage	
8	VCC_MAIN	P	Main power supply voltage	
9	RESET_N	I	Reset In	
11	RF_IN	I	GNSS signal input	
14	VCC_RF	P	Supply Antenna Bias voltage(V= Vcc)	
16	DDC_SDA	I/O	DDC Serial Data in/out	
17	DDC_SCL	I	DDC Serial Clock Input	
18	SAFE_BOOT_	I	If low, module enters into safe boot	

	N		mode. No use, pls keep high or not connect.	
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3 Electrical Specification

3.1 Absolute maximum ratings

Parameter	Symbol	Min	Max	Unit
Power Supply Voltage	VCC_MAIN	-0.5	3.6	V
Backup Supply Voltage	VBAT	-0.5	3.6	V
USB Power Supply	USB_PWR	3.0	3.6	V

3.2 Operation Conditions

Parameter	Symbol	Min	Typ	Max	Unit
Main Power Supply					
Power Supply Voltage	VCC_MAIN	2.8	3.3	3.6	V
Operating Current		15	20	25	mA
Backup Power Supply					
Backup Supply Voltage	VBAT	1.6	3.3	3.6	V
Operating Current			14		uA
UART/DDC/IO					
Input Low Voltage	Vil	0		0.72	V
Input High Voltage	Vih	2.0		3.6	V
Output Low Voltage	Vol			0.4	V
Output High Voltage	Voh	2.4			V

3.3 Environmental Specification

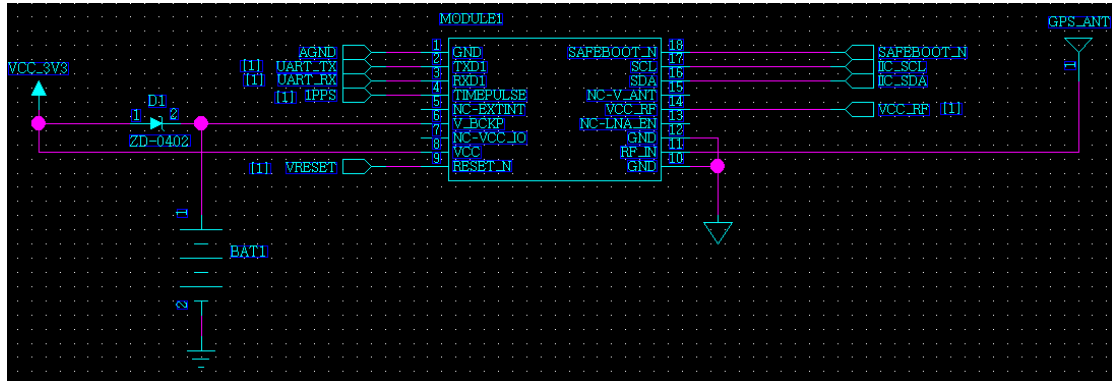
Item	Description
Operating temperature rang	-40 deg. C to +85 deg. C
Storage temperature rang	-50 deg. C to +105 deg. C
Altitude	50,000 m
Velocity	515m/s

3.4 Timepulse

After GPS module is synchronized with GPS satellites, Timepulse is output per second, which is usually used for time synchronization to reference time. The

accuracy is about 30ns. Timepulse's pulse width can be configured according to the protocol document.

4 Reference Design



Note:

Trace impedance between Antenna and Pin11 should be 50 ohm.

5 Performance Characteristics

Position and Velocity Accuracy

Accuracy	Position	CEP <2.5m
	Velocity	0.05m/s

Dynamic constrains

Dynamic Conditions	Altitude	50,000m
	Velocity	515 m/s
	Acceleration	<= 4g

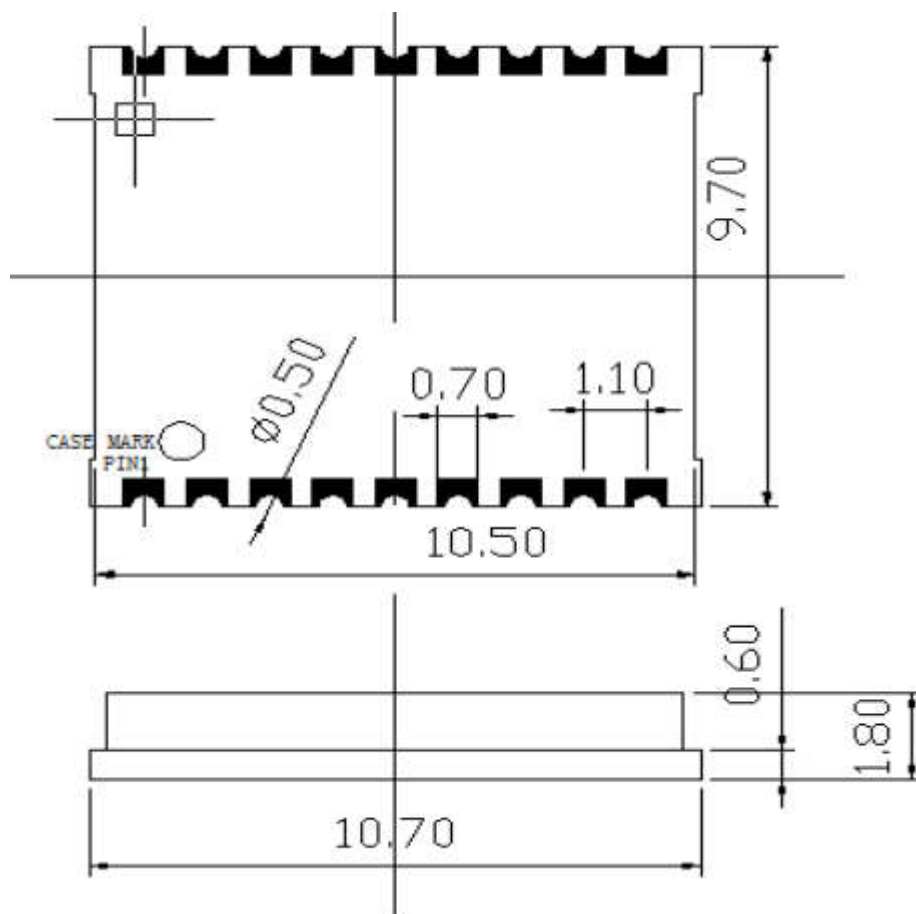
Acquisition time TTFF

Mode	JRG09U
Hot Start	1s
Cold Start	28s

Sensitivity

Parameter	Description
Tracking & Navigation	-163 dBm
Acquisition	-148 dBm

6 PCB Layout Recommend



PCB LAYOUT PAD

PCB Layout Recommendations

- Do not routing the other signal or power trace under the module board.

RF:

- This pin receives signal of GPS analog via external active antenna. **Note: It has to be a controlled impedance trace at 50ohm.**
- Do not place the RF traces close to the othersignal path and not routing it on the top layer.
- Keep the RF traces as short as possible.

Antenna:

- Keep the active antenna on the top of your system and confirm the antenna radiation pattern, axial ratio, power gain, noise figure, VSWR are correct when you Setup the antenna in your case.

7 Configuration Management

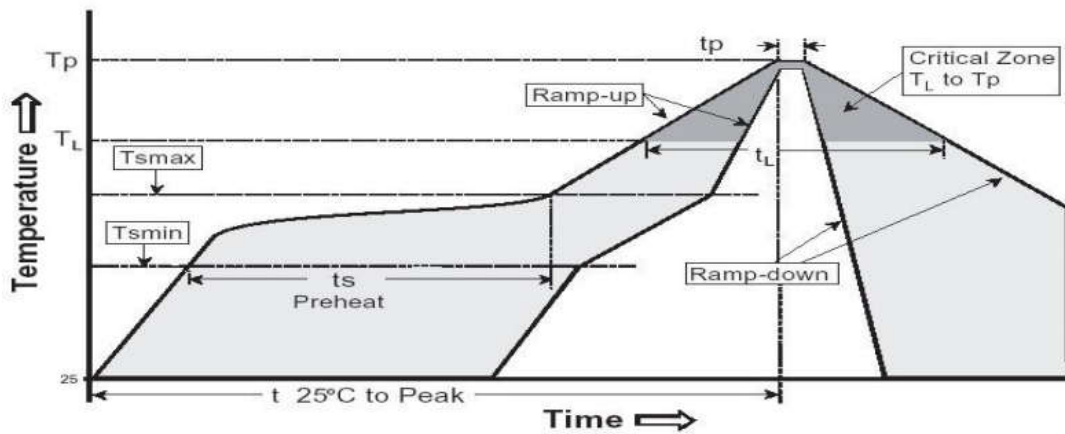
Configuration settings can be modified with configuration messages. The modified settings remain effective until power-down or reset. If these settings have been stored in battery-backup RAM, then the modified configuration will be retained, as long as the backup battery supply is not interrupted.

Note that: If any new configuration needs to be done, pls refer to module Receiver Description Including Protocol Specification.

8 Software Interface

9 Recommended Reflow Profile

High quality, low defect soldering requires identifying the optimum temperature profile for reflowing the solder paste. To have the correct profile assures components, boards, and solder joints are not damaged and reliable solder connection is achievable. Profiles are essential for establishing and maintaining processes. You must be able to repeat the profile to achieve process consistency. The heating and cooling rise rates must be compatible with the solder paste and components. The amount of time that the assembly is exposed to certain temperatures must first be defined and then maintained.

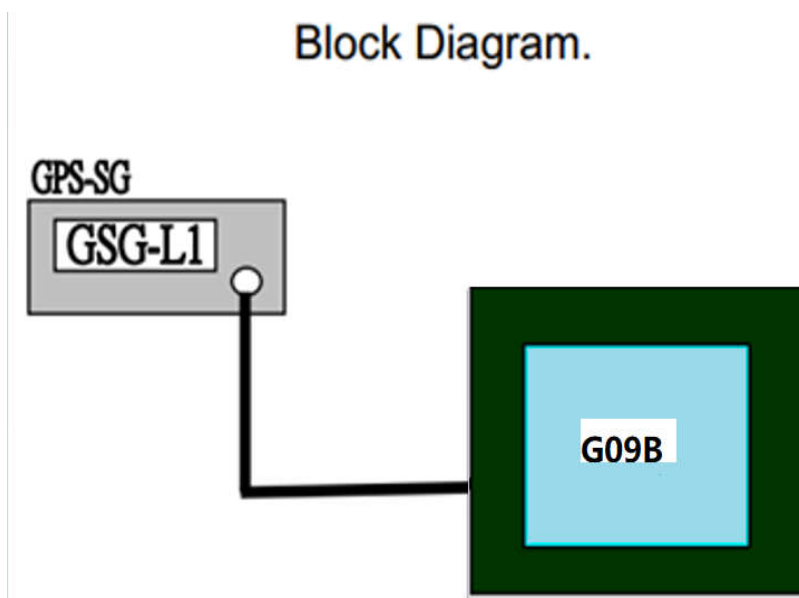


Average ramp-up rate	3°C/second max.
Preheat (T _{smax} – T _{smin} , t _s)	150~200°C ; 60~180seconds
Time maintained above (T _L , t _L)	217°C ; 60~150seconds
Peak Temperature (T _p)	255~260°C ; 10~20seconds
Ramp-down rate	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.
Maximum number of reflow cycles	≤ 3

10 Test Result

10.1 Conduction Test

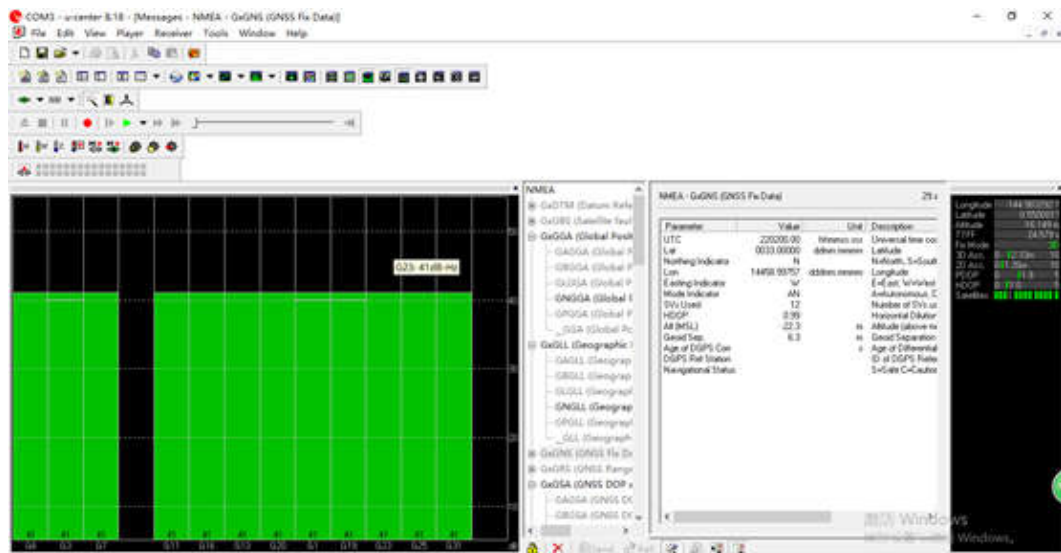
Block Diagram.





10.2 Conduction Test

Input = -130dBm C/N=41



11 Reliability test

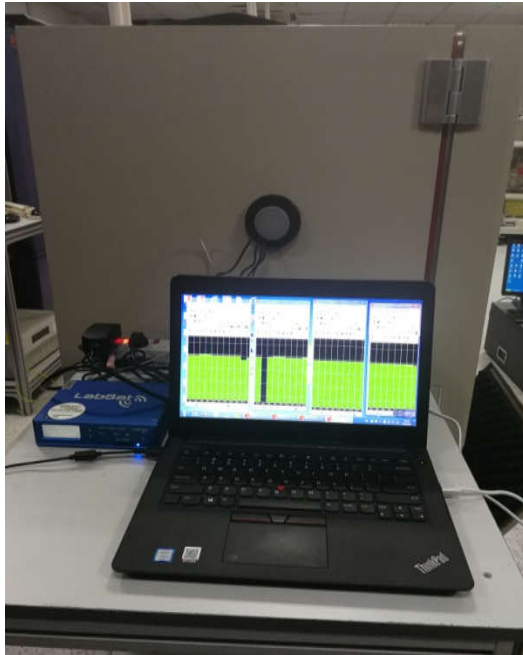


Figure1 test image

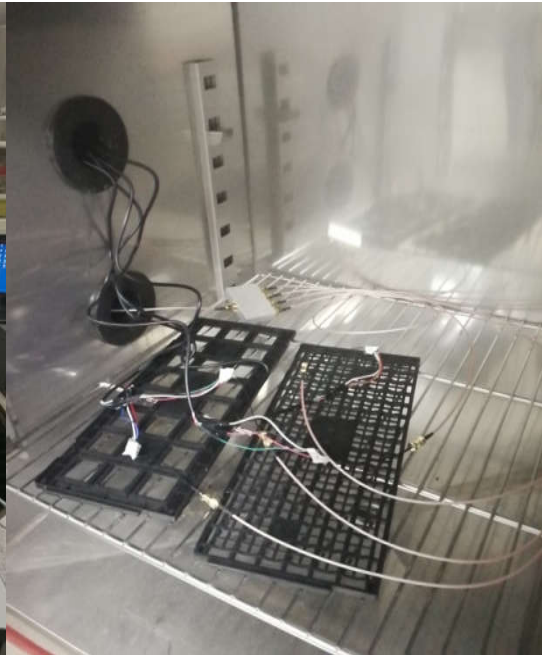


Figure2 DUTs in the chamber

Test Method: DUTs with CN=40dB and SV=16 are placed into chamber in which temperature changes from -45C to +85C and work 48 hours.

Test result: TTF in less than 30 sec and CN fluctuating in 1-2dB.

Revision History

Revision	Date	Name	Status/Comments
R1.0	7-July-2022	EddieX	Initial Release