JN3 Product Description

80403ST10104A r5 – 2015-07-09

Making machines talk.

APPLICABILITY TABLE

PRODUCT
JN3

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Notice

While reasonable efforts have been made to assure the accuracy of this document, Telit assumes no liability resulting from any inaccuracies or omissions in this document, or from use of the information obtained herein. The information in this document has been carefully checked and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies or omissions. Telit reserves the right to make changes to any products described herein and reserves the right to revise this document and to make changes from time to time in content hereof with no obligation to notify any person of revisions or changes. Telit does not assume any liability arising out of the application or use of any product, software, or circuit described herein; neither does it convey license under its patent rights or the rights of others.

It is possible that this publication may contain references to, or information about Telit products (machines and programs), programming, or services that are not announced in your country. Such references or information must not be construed to mean that Telit intends to announce such Telit products, programming, or services in your country.

Copyrights

This instruction manual and the Telit products described in this instruction manual may be, include or describe copyrighted Telit material, such as computer programs stored in semiconductor memories or other media. Laws in the Italy and other countries preserve for Telit and its licensors certain exclusive rights for copyrighted material, including the exclusive right to copy, reproduce in any form, distribute and make derivative works of the copyrighted material. Accordingly, any copyrighted material of Telit and its licensors contained herein or in the Telit products described in this instruction manual may not be copied, reproduced, distributed, merged or modified in any manner without the express written permission of Telit. Furthermore, the purchase of Telit products shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents or patent applications of Telit, as arises by operation of law in the sale of a product.

Computer Software Copyrights

The Telit and 3rd Party supplied Software (SW) products described in this instruction manual may include copyrighted Telit and other 3rd Party supplied computer programs stored in semiconductor memories or other media. Laws in the Italy and other countries preserve for Telit and other 3rd Party supplied SW certain exclusive rights for copyrighted computer programs, including the exclusive right to copy or reproduce in any form the copyrighted computer program. Accordingly, any copyrighted Telit or other 3rd Party supplied SW computer programs contained in the Telit products described in this instruction manual may not be copied (reverse engineered) or reproduced in any manner without the express written permission of Telit or the 3rd Party SW supplier. Furthermore, the purchase of Telit products shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents or patent applications of Telit or other 3rd Party supplied SW, except for the normal non-exclusive, royalty free license to use that arises by operation of law in the sale of a product.

Usage and Disclosure Restrictions

License Agreements

The software described in this document is the property of Telit and its licensors. It is furnished by express license agreement only and may be used only in accordance with the terms of such an agreement.

Copyrighted Materials

Software and documentation are copyrighted materials. Making unauthorized copies is prohibited by law. No part of the software or documentation may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, without prior written permission of Telit

High Risk Materials

Components, units, or third-party products used in the product described herein are NOT fault-tolerant and are NOT designed, manufactured, or intended for use as on-line control equipment in the following hazardous environments requiring fail-safe controls: the operation of Nuclear Facilities, Aircraft Navigation or Aircraft Communication Systems, Air Traffic Control, Life Support, or Weapons Systems (High Risk Activities"). Telit and its supplier(s) specifically disclaim any expressed or implied warranty of fitness for such High Risk Activities.

Trademarks

TELIT and the Stylized T Logo are registered in Trademark Office. All other product or service names are the property of their respective owners.

Contents

1. Introduction

1.1. Scope

Scope of this document is to give an overview of new standalone GPS module JN3.

1.2. Audience

This document is intended for customers developing applications using JN3.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit Technical Support Center (TTSC) at:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:

http://www.telit.com/en/products/technical-support-center/contact.php

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

http://www.telit.com

To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Document Organization

This document contains the following chapters:

"Chapter 1: "Introduction" provides a scope for this document, target audience, contact and support information, and text conventions.

"Chapter 2: "General Description" gives an overview of the features of the product.

"Chapter 3: "Technical Description" describes the features of the product.

"Chapter 4: "Software" describes in details the characteristics of the product.

"Chapter 5: "Performance Data" shows the performance information of the product.

"Chapter 6: "Electrical Requirements" describes in details the electrical characteristics of the product.

"Chapter 7: "Software Interface" provides some fundamental hints about the conformity assessment that the final application might need.

"Chapter 8: "Mechanical Drawings" provides info about Hardware interfaces.

"Chapter 9: "Conformity Assessment" provides Declaration of Conformity and Notified Body Opinions.

"Chapter 10: "Evaluation Kit" provides some fundamental hints about evaluation Kit.

"Chapter 11: "Product Handling" describes the packaging and mounting of the module.

"Chapter 12: "Ordering Information" contains the ordering SKUs for the product

"Chapter 12: "Glossary and acronyms" contain the explanation of acronyms used in the present document

"Chapter 13: "Safety Recommendation" provides some safety recommendations that must be follow by the customer in the design of the application that makes use of the JN3.

"Chapter 14: "Document History" provides the history of the present document.

1.5. Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.6. Related Documents

- JN3 Hardware User Guide,
- JN3 EVK User Guide,
- JF2_JN3 Low Power Modes Application Note
- JF2_JN3 MEMS Application Note

2. General Product Description

Building upon the SiRFstarIV™ architecture's high-performance, the JN3 device incorporates innovations such as SiRFInstantFix™ and Active Jammer Removal. The JN3 can navigate to -160dBm and track to -163dBm, providing higher coverage, accuracy and availability. This next generation Jupiter Module consumes only 13mA (3.3V) in 1-Hz TricklePower™ mode. The JN3 offers A-GPS support and operate with a 3.3V power supply. JN3 supports a full range of satellite-based augmentation systems, including WAAS, EGNOS, MSAS and GAGAN.
The GPS module combines the SiRFstarIV™ GSD4e™ GPS engine, TCXO, SAW filter, RTC, LDO, level conversion and memory (Flash and EEPROM devices only).

3. Technical Description

High-speed Location Engine – Twice the available DSP memory and search speed of SiRFstarIII architecture for enhanced sensitivity and navigation performance, greater coverage, reduced time to fix and improved positional accuracy.

Battery Backup is supported via a separate pin for applications that use a battery backup source.

MEMS Sensor Interface (I^2C DR Port) – Static detection is implemented and utilizes an accelerometer to determine if the module is moving in order to pin position.

Active Jammer Remover – Advanced DSP technology actively identifies and removes jammers prior to correlation. This feature maximizes GPS performance and helps identify issues during the design phase. Up to 8 jammers can be identified and removed.

5Hz Navigation – The JN3 can run with a navigation update rate of 1Hz or 5Hz. This is controllable in NMEA and OSP mode. Note that the UART baud rate will need to be increased to support the higher message output (about 38400 baud minimum in NMEA).

High Performance Solution:
- High sensitivity navigation engine (PVT) tracks as low as -163dBm
- 48 track verification channels
- SBAS (WAAS), EGNOS, MSAS, GAGAN

Active Jammer Remover:
- Removes in-band jammers up to 80 dB-Hz
- Tracks up to 8 CW jammers

Advanced Navigation Features:
- Smart sensor I2C interface
- Interrupt input for context change detection

3.1. Product Compatibility

The JN3 incorporates a new technology far advanced compared to the previous SiRFstarIII designs. It offers an upgrade path from existing Telit and competitive designs.

NMEA version 3.0 protocol is supported as well as the new SiRF ONE SOCKET binary PROTOCOL (OSP).

3.2. Receiver Architecture

The functional architecture of the JN3 receiver is shown in Figure 1.

Note: The LNA is included in the GPS chip for passive antenna operation.

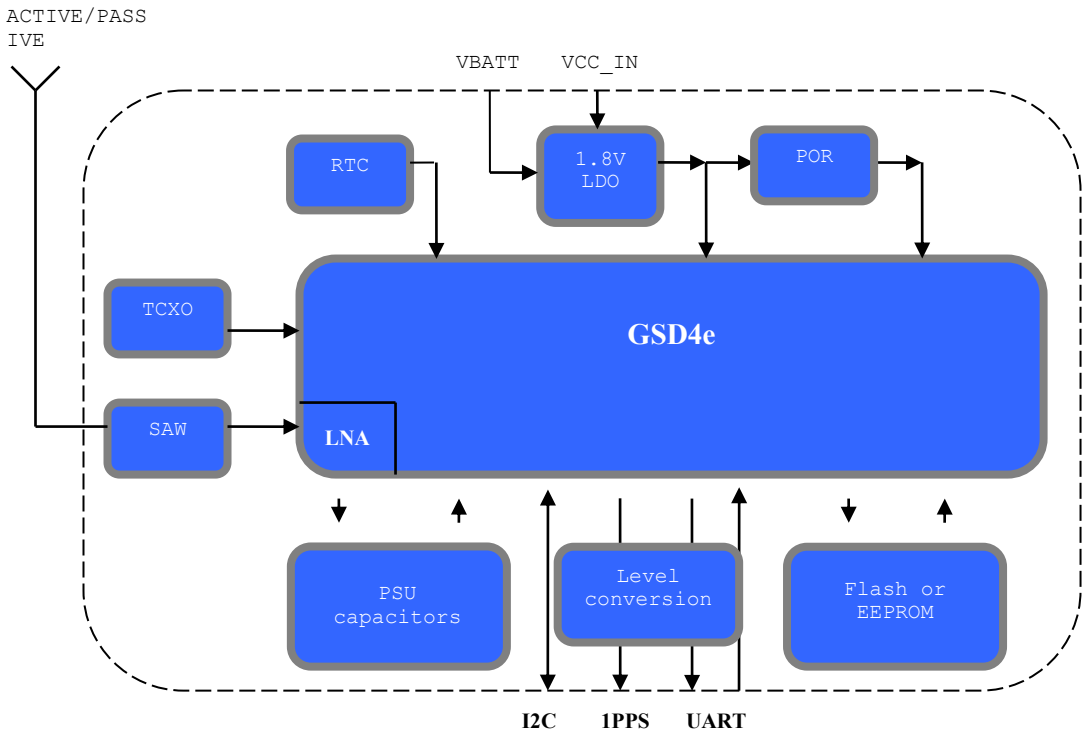


Figure 1 – JN3 Architecture

Note: LNA is included in the GPS chip for passive antenna operation.

3.3. Major Components

All power supply components are on board including capacitors.

3.3.1. GSD4e Chip

This single chip GPS device includes an integrated Baseband and RF sections. The LNA amplifies the GPS signal and provides enough gain for the receiver to use a passive antenna. A very low noise design is utilized to provide maximum sensitivity. This LNA is internal to the GPS baseband and can be switched between low and high gain mode.

3.3.2. RF_IN

GPS RF signal input. This requires an external BIAS-T and antenna voltage supply for active antenna.

3.3.3. VCC_IN

This is the primary 2.85V to 3.6V supply voltage for the module. A voltage of 2.85V to 3.3V is recommended.

3.3.4. VBATT

The Battery Backup supply voltage is 2.2V to 3.3V. A typical low current supply for ensuring the RTC/BBRAM is kept running to ensure HOT/WARM starts. Higher battery backup supply voltages are catered for up to 3.6V.

3.3.5. Host Port

The JN3 has a single serial communications port -- UART. See the Designer's Notes for more details.

3.3.6. MEMS Sensor Interface

The DR I2C port is used for MEMS sensor interface. The JN3 ROM2.2 9600 baud rate variant will not support external MEMS. Reference the Designer's Notes for more details on how to connect to an accelerometer and/or magnetic sensor to this port.

3.3.7. SAW Filter (1.575 GHz)

This filters the GPS signal and removes unwanted signals caused by external influences that would corrupt the operation of the receiver. The filtered signal is fed to the RF input of GSD4e chipset for further processing.

3.3.8. TCXO

This highly stable 16.369 MHz oscillator controls the down conversion process for the RF block.

3.3.9. RTC

The Real Time Clock allows Hot/Warm starts and low power modes.

3.3.10. Memory

The JN3 Flash design includes a 16MB Flash storage device for operational software and satellite data.

The JN3 EEPROM design includes a 512KB EEPROM storage device for patch code and satellite data.

The JN3 ROM-only design does not include on-module memory. External Host memory may be used to store patch code and satellite data.

3.4. Physical Characteristics

The JN3 receiver has advanced miniature packaging with a base metal of copper and an Electroless Nickel Immersion Gold (ENIG) finish.

It has 24 interface pads. These are castellated edge contacts.

3.5. Mechanical Specification

The physical dimensions of the JN3 are as follows:

- length: 16.0 mm ± 0.1 mm
- width: 12.2 mm ± 0.1 mm
- thickness: 2.4 mm ± 0.2 mm
- weight: 1 g max

Refer to Figure 2 for the JN3 mechanical layout drawing.

3.6. External Antenna Connection

The RF connection for the external antenna has a characteristic impedance of 50 ohms.

3.7. Input/Output and Power Connections

The I/O (Input / Output) and power connections use surface mount pads.

3.8. Environmental

The environmental operating conditions of the JN3 are as follows:

- temperature: –40°C to +85°C (measured on the shield)
- humidity: up to 95% non-condensing or a wet bulb temperature of +35°C
- shock (non-operating): 18 G peak, 5 ms

3.9. Compliances

The JN3 complies with the following:

- Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
- Manufactured in an ISO 9000: 2000 accredited facility
- Manufactured to TS 16949 requirement (upon request)

3.10. Marking/Serialization

The JN3 supports a 2D barcode indicating the unit serial number below. The Telit 13-character serial number convention is:

- characters 1 and 2: year of manufacture (e.g. 12 = 2012, 13 = 2013)
- characters 3 and 4: week of manufacture (01 to 52, starting first week in January)
- character 5: manufacturer code
- characters 6 and 7: product and type
- character 8: product revision
- characters 9-13: sequential serial number

3.11. Active Antenna Gain Requirements

LNA Gain Setting	LNA Gain (dB)	GPS Noise Figure (dB)	Recommended External Gain Range (dB)
Low	6.0 – 10.0	8.5 – 9.5	16-30
High (default)	16.0 – 20.0	4.0	8-18

Table 1 – Active Antenna Gain Requirements

Notes:

1. Recommended external gain range is total any external gain, such as antenna or external LNA and any passive loss due to cables, connectors, filters, matching network, etc.
2. In the High Gain setting an external LNA is not recommended.
3. In the Low Gain setting, the noise figure of the external LNA or active antenna must be chosen to ensure that the total cascaded noise figure is sufficiently low to meet overall system design requirements.

4. Software

4.1. TTFF (Time to First Fix)

TTFF is the actual time required by a GPS receiver to achieve a valid position solution. This specification will vary with the operating state of the receiver, the length of time since the last position fix, the location of the last fix, and the specific receiver design.

4.1.1. Hot Start

A hot start results from a software reset after a period of continuous navigation, or a return from a short idle period (i.e. a few minutes) that was preceded by a period of continuous navigation. In this state, all of the critical data (position, velocity, time, and satellite ephemeris) is valid to the specified accuracy and available in memory.

4.1.2. Warm Start

A warm start typically results from user-supplied position and time initialization data or continuous RTC operation with an accurate last known position available in memory. In this state, position and time data are present and valid but ephemeris data validity has expired.

4.1.3. Cold Start

A cold start acquisition results when either position or time data is unknown. Almanac information is used to identify previously healthy satellites.

Please refer to section 5 for performance data.

4.2. AGPS

GPS aiding comes in several forms. For the purposes of this document, we will focus on extended ephemeris data as a form of assisted GPS data.

InstantFix (SGEE and CGEE) is a method of GPS aiding that effectively reduces the TTFF by making every start a Hot or Warm start, through the use of ephemeris predictions.

CGEE captures ephemeris data from satellites locally and predicts ephemeris up to 3 days.

SGEE does not require local ephemeris collection from satellites; it receives the extended ephemeris data from a server.

The module supports AGPS as standard. TELIT provides a server for customers to download the SGEE file. Contact TELIT for support regarding this service.

Note: Due to memory size constraints, the EEPROM devices do not support SGEE.

Note: The ROM-only devices do not support CGEE or SGEE. External Host memory can be used to enable both these features. See Designer's Notes for more details on how to interface with external Host memory.

4.3. Time Mark Pulse (1PPS)

A 1PPS time mark pulse is provided as an output with a width of 200ms. This signal has not been verified or characterized for all operational conditions.

Note: The GPS receiver will only provide 1PPS when a 3D fix has been obtained using 5 SVs. When the fix degrades below a 3D solution, the 1PPS will be blanked. Once the fix quality improves back to a 3D fix the 1PPS will again be output.

4.4. Power Management

The following paragraph describes the power management mode supported by the JN3.

4.4.1. Adaptive Trickle Power (ATP)

Trickle Power mode is a duty-cycled power management mode that reduces average current consumption by the JN3 while retaining a high quality of GPS accuracy and dynamic motion response. The duty cycle and navigation update rate are specified by the user to best fit in the operating environment. This mode adapts to weak or blocked satellite signals by transitioning the JN3 in and out of full power mode as needed in order to maintain GPS performance.

4.5. Differential Aiding

4.5.1. Satellite Based Augmentation Systems (SBAS)

The JN3 is capable of receiving WAAS, EGNOS, MSAS, and GAGAN differential corrections which are regional implementations of SBAS. SBAS improves horizontal position accuracy by correcting GPS signal errors caused by ionospheric disturbances, timing and satellite orbit errors.

4.6. 5Hz Update Rate

The JN3 defaults to an update rate of 1Hz. The JN3 can be configured to operate in 5Hz through NMEA or SiRF Binary OSP command (v4.1.0 firmware or later). In UART mode, it is necessary to increase the baud rate to meet the higher rate of message output from the receiver.

For example, in NMEA, an output of RMC, GGA, and GSA at five times per second, and GSV at once per second (GSV can be output in groups of three lines) will require at least a baud rate of 19200. This will ensure that the messages are outputted within about 0.75 seconds.

Note that the JN3 will continue to run in 1Hz navigation until it gets a navigation fix. Once a navigation fix is attained, it will transition into 5Hz navigation.

Utilize $PSRF103 for control in NMEA and MID136 in SiRF Binary OSP.

4.7. Dynamic Constraints

The JN3 receiver will lose track if any of the following limits are exceeded:

- ITAR limits: velocity greater than 514 m/s AND altitude above 18,288 m
- altitude: 24,000 m (max) or -500 m (min)
- velocity: 600 m/s (max)
- acceleration: 4 G (max)
- vehicle jerk: 5 m/s^3 (max)

5. Performance Data

Parameter	Description	Performance			
		Min	Typical	Max	Units
Horizontal Position Accuracy[1]	Autonomous	-	<2.5	-	m
Velocity Accuracy[2]	Speed	-	-	<0.01	m/s
	Heading	-	-	<0.01	0
Time to First Fix[3]	Hot Start: Autonomous	-	<1	-	s
	Warm Start: Autonomous	-	<35	-	s
	Cold Start: Autonomous	-	<35	-	s
Sensitivity	Autonomous acquisition	-147		-	dBm
	Tracking	-163	-	-	dBm
	Navigation	-160	-	-	dBm

[1]50%, 24 hr static, -130 dBm
[2]50% @ 30 m/s
[3]50% , -130 dBm (Fu 0.5 ppm, Tu ±2 s, Pu 30 Km)

Table 2 – JN3 Performance Data

6. Electrical Requirements

6.1. Power Supply

6.1.1. VCC_IN

Main 2.85V-3.6V power input. Reference the Designer's Notes for additional details.

Supply voltage: 2.85V to 3.6V +/- 30mV noise/ripple.

6.1.2. VBATT

Battery backup power input. 2.2V to 3.3V recommend. Maximum 3.6V supported, minimum of 2.2V. Required for HOT/WARM starts and retention of GPS data.

6.2. External Antenna Voltage

The JN3 requires an external antenna Bias-T to provide the voltage to the antenna. This is detailed in the Designer's Notes.

6.3. RF (Radio Frequency) Input

RF input is 1575.42 MHz (L1 Band) at a level between –135 dBm and –165 dBm into 50 Ohm impedance.

6.4. Antenna Gain

The receiver will operate with a passive antenna with Isotropic gain down to a minimum of -6dBi. Active antennas are supported. The internal LNA must be switched to low gain mode if an active antenna is used.

An active antenna of 20dB minimum (exiting the cable) will offer the best performance. 30dB exiting the antenna cable is maximum useable active antenna gain. Refer to section 2.11 for more details.
Contact TELIT for in depth passive antenna design support.

6.5. Burnout Protection

The receiver accepts without risk of damage a signal of +10 dBm from 0 to 2 GHz carrier frequency, except in band 1560 to 1590 MHz where the maximum level is –10 dBm.

6.6. Jamming Performance

Eight separate in band jammers can be detected and digitally removed in the GPS DSP. This is over and above the excellent SAW filter response that exists before the GPS LNA input.

Note: The spectral purity of oscillators and RF transmitters in the host system will determine if harmonics are formed that are equal to the frequencies above.

Compact wireless product design requires close monitoring of jamming issues.

6.7. Flash Upgradability (Flash only)

The firmware programmed in the Flash memory may be upgraded via the serial port TX/RX pads. The user can control this by driving the Serial BOOT select line high at startup, then downloading the code from a PC with suitable software (SiRFFlash). In normal operation this pad should be left floating for minimal current drain. It is recommended that in the user's application, the BOOT select pad is connected to a test pad for use in future software upgrades. The JN3 Flash has a maximum flash update baud rate of 115200. Refer to the Designer's Notes for additional information.

6.8. Patch Updates (EEPROM only)

Modules with EEPROM can be patched from the Host using simple One Socket Protocol (OSP) Patch Protocol serial messages. Patches are stored inside the I2C Serial EEPROM and are automatically applied by internal firmware whenever the baseband CPU is started.

Note: ROM-only devices can support patch updates, if Host memory is available.

6.9. Data Input/Output Specifications

All communications between the JN3 receiver and external devices are through the I/O surface mount pads. These provide the contacts for power, ground, serial I/O and control. Power requirements are discussed in the following sections.

6.9.1. Voltages and Currents

Parameter	Symbol	Min	Typ	Max	Unit
Power Supply Voltage [1]	VCC_IN	2.85	2.9 to 3.3	3.6	V
Operating Temperature [2]	T_{OPR}	-40		85	^{0}C
Current Consumption[3]: Acquisition Tracking			 41 32		 mA mA
Battery Backup Supply	VBATT	2.2	3	3.6	V
Battery Backup Current: Flash/ ROM/EEPROM modules			 40		 uA
Trickle Power Current			10		mA

[1]Ripple characteristics must be ensured for best GPS performance and reliable operation.
[2]Operating temperature is ambient.
[3]LNA set to High Gain Mode.

Table 3 – Power Requirements

Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Power Supply Voltage	VCC_IN	3.6	V
Input Pin Voltage	VIO_IN	3.6	V
Output Pin Voltage	VIO_OUT	3.6	V
Storage Temperature	T_{stg}	-40°C to +85°C	^{0}C
Warning – Stressing the device beyond the "Absolute Maximum Ratings" may cause permanent damage. These are stress ratings only. Operation beyond the "Operating Conditions" is not recommended and extended exposure beyond the "Operating Conditions" may affect device reliability.			

Table 4 – Digital Core and I/O Voltage (Volatile)

6.9.2. DC Electrical Characteristics

6.9.2.1. TX and 1PPS

TXA and 1PPS outputs at TRISTATE until Active VCC is reached. Active VCC min is 1V.

These outputs TRISTATE if VCC reaches Ground. Maximum stress voltage on these pins is 4.5V and there is OVT protection.

V_{OL} = 0.3V-0.4V MAX.

V_{OH} = 0.75 x VCC typical MIN, 3.6V MAX pull up.

Typical MAX current = + 12mA, -12mA.

Normal current = +100uA to +6mA (V_{OL}), -100uA to -6mA (V_{OH})

VCC = 2.85V to 3.3V typical, 3.6V MAX.

6.9.2.2. RX

V_{IL} = 0.45V MAX.

V_{IH} = 1.26V MIN. MAX 3.6V pull up.

Internal pull up resistance 90k ohm nominal to internal 1.8V. MAX 3.6V pull up.

INPUT/TRISTATE leakage = -10uA, +10uA.

6.9.2.3. SDA2 and SCL2

SDA2 and SCL2 outputs are in a high-impedance state until Active VCC is reached.

V_{OL} = 0.40V MAX.

V_{OH} = 1.35V MIN.

6.9.2.4. BOOT (Flash only)

For normal operation, leave this pin floating. To place the JN3 into BOOT mode, tie this pin to 1.8 volts DC.

Note: This pin is not 3.3 volt tolerant. See the Designer's Notes for more information.

6.9.3. Pinout Description

Details of the LCC pad functions are shown in Table 5.

Pad Number	Pad Function	Type	Description
1	NC	-	No connection
2	NC	-	No connection
3	1PPS	O	Timemark Pulse, 200ms Active High
4	EXT_INT	I	Reserved
5	NC	-	No connection
6	NC	-	No connection
7	BOOT / NC	I/-	Low for run, high for reprogram (Flash only). No connection for ROM devices.
8	NC	-	No connection
9	VCC_IN	PWR	VCC
10	GND	PWR	Ground
11	RF_IN	I	GPS RF Input, 50 Ohm
12	GND	PWR	Ground
13	GND	PWR	Ground
14	NC	-	No connection
15	NC	-	No connection
16	NC	-	No connection
17	NC	-	No connection
18	SDA2	I/O	Sensor I2C Data Port
19	SCL2	I/O	Sensor I2C Clock Port
20	TX	O	UART TX Output
21	RX	I	UART RX Input
22	VBATT	PWR	Battery Backup Voltage
23	VCC_IN	PWR	Main Supply Voltage
24	GND	PWR	Ground

Table 5 – LCC Pad Functions

7. Software Interface

The host serial I/O port of the receiver's serial data interface supports full duplex communication between the receiver and the user.

The default serial configuration is as follows: NMEA, 4800 bps, 8 data bits, no parity, 1 stop bit

Note: Contact your local sales representative for details on module configurations with default NMEA 9600 bps.

7.1. NMEA Output Messages

NMEA v3.0 is the default protocol. The following messages are output by default:

- RMC = 1 second update
- GGA = 1 second update
- GSA = 1 second update
- GSV = 5 second update (outputs at 1 second update for 9600 default variant)

Reference the NMEA protocol manual for additional message details.

7.2. SiRF OSP Output Messages

SiRF One Socket Protocol (OSP) is supported. This is an extension of the existing SiRF Binary protocol.

The following messages are output once per second:

- MID2
- MID4
- MID9
- MID41
- MID56, 5
- MID56, 35

Reference the SiRF One Socket Protocol manual for additional message details.

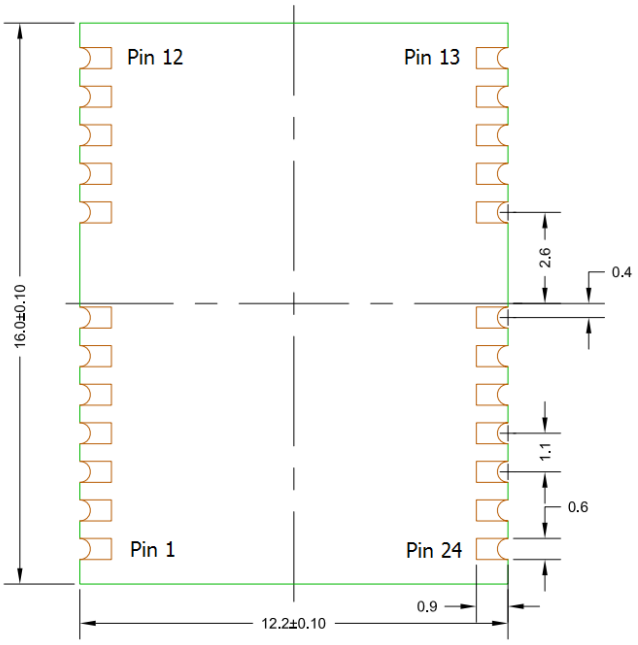
7.3. Software Functions and Capabilities

Table 6 shows the software features available to the JN3.

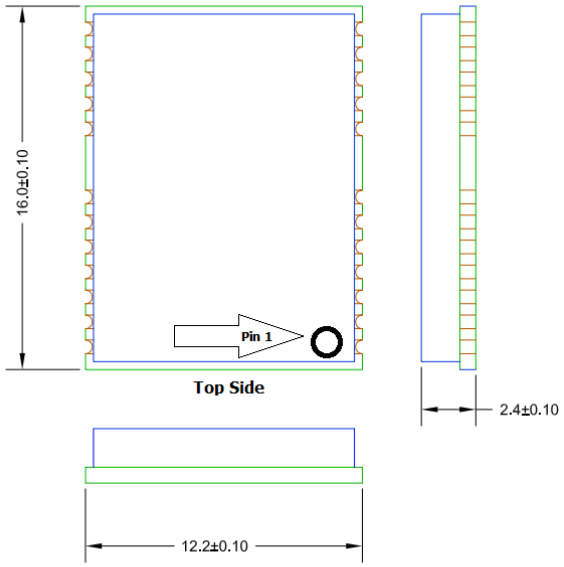
Feature	Description	Availability
SBAS	Improve position accuracy by using freely available satellite based correction services called SBAS (Satellite Based Augmentation System)	A
Adaptive Trickle Power	Improves battery life by using enhanced power management and intelligently switching between low and full power depending on the current GPS signal level. Refer to the Low Power Operating Modes application note.	A
Almanac to Flash	Improves cold start times by storing the most recent almanac to flash memory.	Yes (Flash only)
Low Signal Acquisition	Acquires satellites and continues tracking in extremely low signal environments.	Yes
Low Signal Navigation	Continues navigating in extremely low signal environments.	Yes
Time Mark Pulse (1PPS)	A timing pulse generated every second the receiver is in a valid navigation state (5 SVs required for initial pulse start-up).	Yes
MEMS	3-axis accelerometer support for static detection. 3-axis magnetometer support for compass heading pass-thru data.	A
Antenna Supervisor	Active antenna short circuit and open circuit detection/control, software supported.	V4.1.2
SGEE	AGPS using predicted ephemeris data from a server. Supporting Host required.	Yes (Flash only)
CGEE	AGPS using prediction of ephemeris from live (downloaded from satellites), ephemeris stored in memory.	Yes (Flash/EEPROM only)
Adaptive Jammer Detection	System scan for up to 8 CW jammers for removal by the GPS	Yes
Yes = always enabled A = available, but not enabled by default		

Table 6 – Software Features

8. Mechanical Drawing



Bottom Side



Package Outline Drawing

Figure 2 – Mechanical Layout

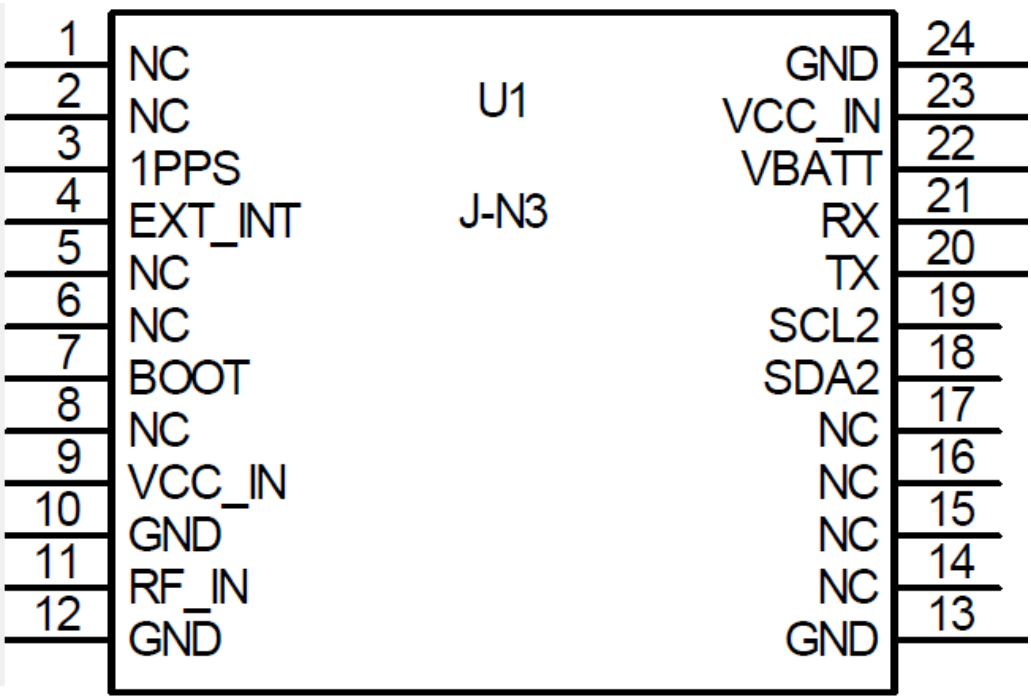


Figure 3 – Pinout (Top View)

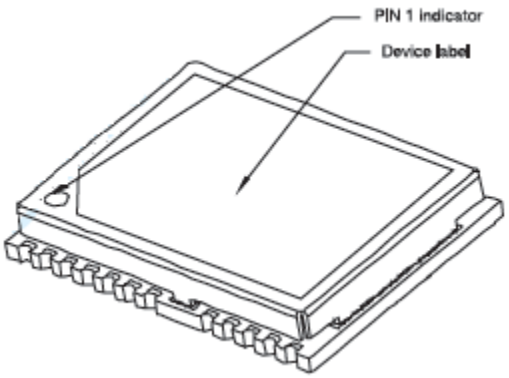


Figure 4 – 3D Model

9. Conformity Assessment

9.1. Declaration of Conformity

Telit Communications S.p.A.

EC DECLARATION OF CONFORMITY

1. **JN3** (product name)
2. Telit Communications S.p.A Via Stazione di Prosecco, 5/b 34010 Sgonico –TRIESTE- ITALY (manufacturer)
3. This declaration of conformity is issued under the sole responsibility of the manufacturer.
4. Stand-alone GPS receiver module.
5. The object of the declaration described above is in conformity with the relevant Community harmonisation: European Directive 1999/05/EC (R&TTE)
6. The conformity with the essential requirements of the 1999/05/EC has been demonstrated against the following harmonized standard:

EN 60950-1:2006 + A11:2009+A1:2010+A12:2011	For article 3.1 (a): Health and Safety of the User
EN 301 489-1 V1.8.1 EN 301 489-3 V1.4.1	For article 3.1 (b): Electromagnetic Compatibility
EN 300 440-2 V1.4.1 EN 300 440-1 V1.6.1	For article 3.2 : Effective use of spectrum allocated

7. The conformity assessment procedure referred to in Article 10 and detailed in Annex IV of Directive 1999/05/EC has been followed with the involvement of the following Notified Body for article 3.2:
   CETECOM ICT Services GmbH, Untertürkheimer Straße 6-10, 66117 Saarbruecken, Germany
   Thus, CE 0682 is placed on the product.
8. The Technical Construction File (TCF) relevant to the product described above and which support this Declaration of Conformity, is held at: Telit Communications S.p.A Via Stazione di Prosecco, 5/b 34010 Sgonico (TRIESTE) ITALY.

Signed for and on behalf of Telit Communications S.p.A.
Trieste, **2012-05-21**

Quality & IPR Director
Guido Walcher

Vice President, Telit Location Solution LP
George Arnott

Mod 0211 2010-11 Rev.1 - This declaration of conformity is issued in compliance with 768/2008/EC

9.2. R&TTE Notified Body Opinion

CETECOM ICT Services GmbH

EC Identification Number 0682

authorized by the German Government

Bundesnetzagentur

BNetzA-bS-02/51-52

to act as Notified Body in accordance with the R&TTE Directive 1999/5/EC of March 9, 1999.

EXPERT OPINION

Registration-No.:	**U816608Z-EOrev**
Applicant & Product Manufacturer:	**Telit Location Solutions** **27422 Portola Parkway, Suite 320** **Foothill Ranch, CA 92610 U.S.A.**
Product Designation:	**JN3 / JF2**
Product Description:	**Stand-alone GPS receiver module (L1 band, 1575.42 MHz);**

essential requirement (R&TTE-D article)	Specifications / Standards	Submitted documents	Result
Safety and Heatlth (art. 3.1a)	IEC 60950-1: 2005 (2nd Edition)/A1:2009 and EN 60950-1:2006/A11:2009/A1:2010/A12: 2011	Test Report	conform
EMC (art. 3.1b)	EN 301 489-1:V1.8.1, EN 301 489-3:V1.4.1;	Test Report	conform
Radio spectrum (art. 3.2)	EN 300 440-1:V1.6.1, EN 300 440-2:V1.4.1;	Test Report	conform

Marking: **The EC conformity marking (CE mark) of the products shall be accompanied by our EC identification number 0682 as shown right hand.** CE 0682

The scope of this evaluation relates to the submitted documents only.
The certificate is only valid in conjunction with the following annex.

Milpitas, 2012-05-15
Place, Date of Issue

Signed by Nikolaus Wahl
Notified Body

GERMAN NOTIFIED BODY • DEUTSCHE BENANNTE STELLE •

CETECOM ICT Services GmbH, Untertürkheimer Straße 6-10, 66117 Saarbruecken, Germany
http://www.cetecom-ict.de

10. Evaluation Kit

The JN3 Development Kit is available to assist in the evaluation and integration of the JN3 module in custom applications. The Development Kit contains all of the necessary hardware and software to carry out a thorough evaluation of the JN3 module.

Figure 5 Evaluation Kit

11. Product Handling

11.1. Product Packaging and Delivery

JN3 modules are shipped in Tape and Reel form. The reeled modules are shipped in 24mm reels with 1000 units per reel. Each reel is 'dry' packaged and vacuum sealed in an Moisture Barrier Bag (MBB) with two silica gel packs and placed in a carton.

The minimum order quantity for shipping is 1000 units. Refer to the Designer's Notes for additional details.

All packaging is ESD protective lined. The JN3 GPS receiver is a Moisture Sensitive Device (MSD) level 3. Please follow the MSD and ESD handling instructions on the labels of the MBB and exterior carton (refer to sections 8.2 and 8.3).

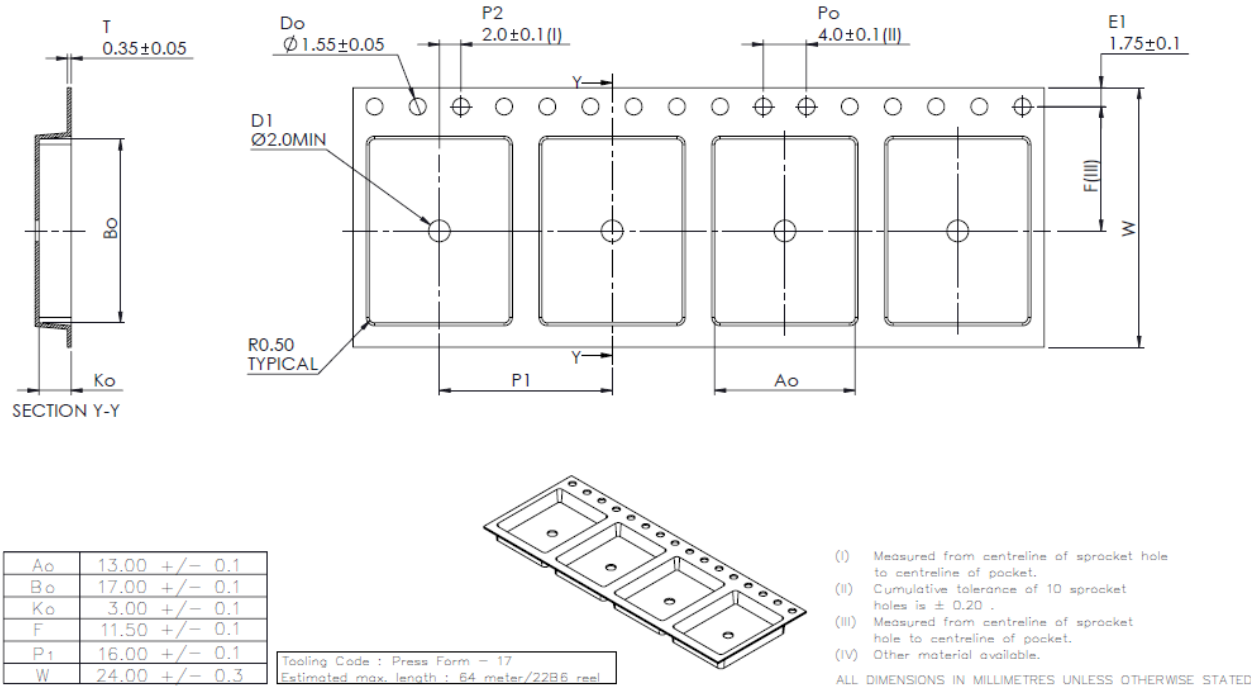


Figure 6 – Tape and Reel Packaging

11.2. Moisture Sensitivity

Precautionary measures are required in handling, storing and using such devices to avoid damage from moisture absorption. If localized heating is required to rework or repair the device, precautionary methods are required to avoid exposure to solder reflow temperatures that can result in performance degradation.

Further information can be obtained from the IPC/JEDEC standard J-STD-033: Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices.

11.3. ESD Sensitivity

The JN3 GPS receiver contains class 1 devices and is Electro-Static Discharge Sensitive (ESDS). Telit recommends the two basic principles of protecting ESD devices from damage:

Only handle sensitive components in an ESD Protected Area (EPA) under protected and controlled conditions

Protect sensitive devices outside the EPA using ESD protective packaging. All personnel handling ESDS devices have the responsibility to be aware of the ESD threat to the reliability of electronic products.

Further information can be obtained from the JESD625-A requirements for Handling Electrostatic Discharge Sensitive (ESDS) Devices.

11.4. Safety

Improper handling and use of the Jupiter GPS receiver can cause permanent damage to the receiver. There is also the possible risk of personal injury from mechanical trauma or choking hazard.

11.5. Disposal

We recommend that this product should not be treated as household waste. For more detailed information about recycling this product, please contact your local waste management authority
or the reseller from whom you purchased the product.

12. Ordering Information

- J-N3-B3E5-Lx JN3 Flash Module (4800 bps v4.1.2-P9)
- J-N3-B3E6-Lx JN3 Flash Module (9600 bps v4.1.2-P9)
- J-N3-B3EV-L JN3 Flash Module Evaluation Kit
- J-N3-C1E8-Fx JN3 512K EEPROM Module (4800 ROM2.2 Patch 5)
- J-N3-C1E9-Fx JN3 512K EEPROM Module (9600 ROM2.2 Patch 5)
- J-N3-C0D1-Fx JN3 ROM Module (4800 bps ROM2.2)
- J-N3-C0D2-Fx JN3 ROM Module (9600 bps ROM2.2)

NOTE: x denotes packaging type (R=Tape & Reel, Y=Tray).

Contact your local sales representative for more details.

13. Glossary and Acronyms

AGPS: Assisted GPS. AGPS uses additional resources to locate the satellites faster and better in poor signal conditions.

Almanac: A set of orbital parameters that allows calculation of approximate GPS satellite positions and velocities. The almanac is used by a GPS receiver to determine satellite visibility and as an aid during acquisition of GPS satellite signals. The almanac is a subset of satellite ephemeris data and is updated weekly by GPS Control.

CGEE: Client Generated Extended Ephemeris data. AGPS using prediction of ephemeris from live (downloaded from satellites), ephemeris stored in memory.

EGNOS: European Geostationary Navigation Overlay Service
The system of geostationary satellites and ground stations developed in Europe to improve the position and time calculation performed by the GPS receiver.

Ephemeris plural ephemerides: A set of satellite orbital parameters that is used by a GPS receiver to calculate precise GPS satellite positions and velocities. The ephemeris is used to determine the navigation solution and is updated frequently to maintain the accuracy of GPS receivers.

ESD: Electro-Static Discharge
large momentary unwanted currents that cause damage to electronic equipment.

GDOP: Geometric Dilution of Precision.
A factor used to describe the effect of the satellite geometry on the position and time accuracy of the GPS receiver solution. The lower the value of the GDOP parameter, the less the error in the position solution. Related indicators include PDOP, HDOP, TDOP and VDOP.

GPS: Global Positioning System.
A space-based radio positioning system that provides accurate position, velocity, and time data.

InstantFix: Eliminates the initial delay of obtaining GPS satellite location data from the satellites themselves by using algorithms to predict seven days of satellite location data.

LCC: Leadless Chip Carrier

A surface mount device that uses surfaces on the side of its body for board attachment and has no leads or legs but has rounded pins through the edges of the ceramic or molded plastic package.

MSD: Moisture sensitive device.

NMEA: National Marine Electronics Association

POR: Power on Reset.

SBAS: Satellite Based Augmentation System
Any system that uses a network of geostationary satellites and ground stations to improve the

performance of a Global Navigation Satellite System (GNSS). Current examples are EGNOS and WAAS.

SGEE: Server Generated Extended Ephemeris data. AGPS using predicted ephemeris data from a server. Supporting Host required.

WAAS: Wide Area Augmentation System
The system of satellites and ground stations developed by the FAA (Federal Aviation Administration) that provides GPS signal corrections. WAAS satellite coverage is currently only available in North America.

14. Safety Recommendations

READ CAREFULLY

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas:

- Where it can interfere with other electronic devices in environments such as hospitals, airports, aircrafts, etc.
- Where there is risk of explosion such as gasoline stations, oil refineries, etc. It is responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will compromise the warranty validity. We recommend following the instructions of the hardware user guides for a correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to be conforming to the security and fire prevention regulations. The product has to be handled with care, avoiding any contact with the pins because electrostatic discharges may damage the product itself.
The system integrator is responsible of the functioning of the final product; therefore, care has to be taken to the external components of the module, as well as of any project or installation issue. Should there be any doubt, please refer to the technical documentation and the regulations in force. Every module has to be equipped with a proper antenna with specific characteristics. The antenna has to be installed with care in order to avoid any interference with other electronic devices.

The European Community provides some Directives for the electronic equipments introduced on the market. All the relevant information's are available on the European Community website:

http://ec.europa.eu/enterprise/sectors/rtte/documents/

The text of the Directive 99/05 regarding telecommunication equipments is available, while the applicable Directives (Low Voltage and EMC) are available at:

http://ec.europa.eu/enterprise/sectors/electrical/

15. Document History

Revision	Date	Changes
0	2012-01-19	First issue
1	2012-04-23	§5.9.2.3 updated I2C voltage range Updated figure 3
2	2012-12-17	Updated ordering information, Updated table 3 of §5.9.1 about ROM/EEPROM hibernate current consumption Inserted § 8 Conformity Assessment
3	2013-04-19	Update section 3 Add section 4.6 for 5Hz Update formatting Update Ordering information
4	2013-05-15	Update section 8 – added pin 1 designations and clarified bottom side and top references.
5	2015-07-09	Updated §12 “ordering information” Update §14 “safety recommendations”