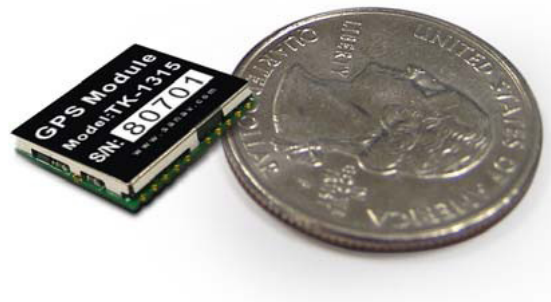


Model: TK-1315 GPS Receiver

USER'S GUIDE

uN3010 Single-Chip GPS Receiver Series



The objective of The TK-1315 User's Guide is to help users to understand the properties of TK-1315 thoroughly and, therefore, obtain the maximum performance from the module easily. This document describes and provides useful information of the TK-1315 GPS module, which includes the functions of pins on the module, configuration setting and utility. It guides users to understand the capability of the module and helps to successfully integrate the TK-1315 into users' GPS systems.

Each chapter is one of the pieces for the module and carries its own purpose.

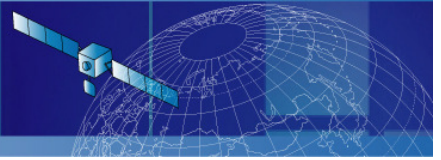
Title: TK-1315

Subtitle: GPS Receiver Module

Doc Type: Data Sheet

Doc ID: GPS.TK-1315-080926

All specifications subject to change without prior notice.



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Chapter 1 Introduction

TK-1315 is a high-sensitivity GPS receiver module of low cost. With built-in and high-gain LNA and filter, the GPS engine board of low power consumption and 20 channels is best suitable for GPS-enabled handheld or AVL applications. Its compact size factor and SMT type pads allow for automatic assembly and soldering.

TK-1315 is designed to be applied as part of integrated system, which includes but not limited to PND (Personal Navigation Device), PVT (Position-Velocity-Time) system, GPS-mouse, GPS Bluetooth Receiver and complex wireless applications such as systems with GSM or GPRS transmission-enabled tracking devices. The TK-1315 GPS module is the best candidate for systems that requires stable performance, excellent start-up time, high sensitivity, low power consumption, positioning accuracy and/or compact size for placement.

Should you have any technical enquiry, please feel free to contact us.

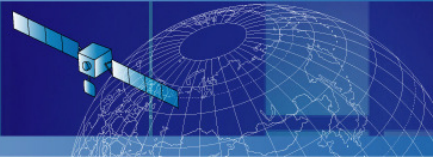
Email: sanav@sanav.com

Tel: +886-2-2269-4456

Fax: +886-2-2269-4451

Please prepare the following information as much as possible that may help us to answer your question as soon as possible:

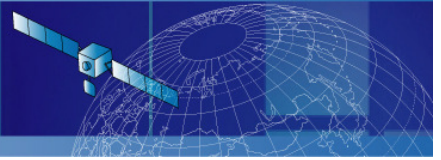
1. Simple description of your application
2. Specifications of the antenna that is connected to the module;
3. Description of failure including the environment where the module was used by text and/or figures;
4. Contact information: name, address, phone number, and e-mail address.



1.1 Specifications

TK-1315

PHYSICAL CONSTRUCTION			PERFORMANCE		
Dimension	L15.0 x W13.0 x H2.2mm		Sensitivity	-159dbm	
Weight	3 gram		Receiver architecture	20 parallel channels	
Receiving frequency	1575.42MHZ; C/A code		Start-up time	Hot start	<2 sec
Mounting	SMT type with 22 stamp holes			Warm start	30 sec
Construction	Full EMI shielding			Cold start	38sec
ENVIRONMENTAL CONDITIONS			Position accuracy	Autonomous	3.0 m
Temperature	Operating: -30 ~ +85 °C			Velocity	<515 m/s
	Storage: -40 ~ +85 °C		Altitude	<18,000 m	
COMMUNICATION			Update Rate	1 Hz	
Protocol	NMEA0184 V3.00, RTCM		Power Supply	3.3V +- 5%	
Signal level	UART @ 3.3V		Current Consumption	Acquisition: 53mA	
INTERFACE CAPABILITY				Tracking	43mA
Output Sentences	Standard	GGA, RMC, GSV, GSA, VTG	Baud Rate	9600 bps (default) & 4800/9600/38400/57600/115200 bps are adjustable	
	Option	GLL, ZDA			



Chapter 2 Pin Assignment

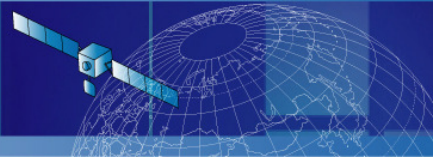
2.1 Pin Assignment

Figure 2.1 shows the pin definitions of TK-1315. Table 2.1 describes the corresponding definitions for pins.

P1	■ RXB	GND	■ P20
P2	■ TXB	RFIN	■ P19
P3	■ 1PPS	GND	■ P18
P4	■ TXA	VOUT	■ P17
P5	■ RXA	BOOT	■ P16
P21	■ GND	GND	■ P22
P6	■ NC	GPIO3	■ P15
P7	■ NC	GPIO7	■ P14
P8	■ RESET	GPIO8	■ P13
P9	■ NC	VCC	■ P12
P10	■ ON_OFF	VBAT	■ P11

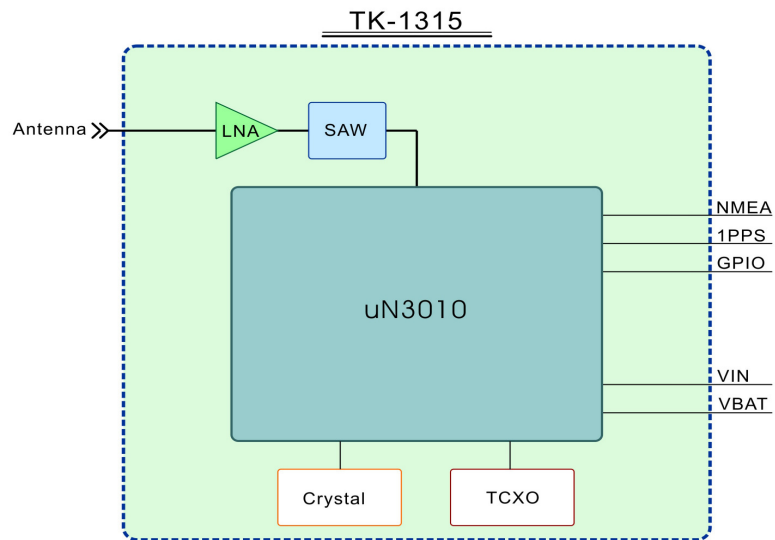
Figure 2.1 TK-1315 Pin definitions

Pin	Name	Type	Description
1	RX_B	I	CMOS level asynchronous input for UART B
2	TX_B	O	CMOS level asynchronous output for UART B
3	1 PPS	O	TIME PULSE output
4	TX_A	O	CMOS level asynchronous output for UART A
5	RX_A	I	CMOS level asynchronous input for UART A PULL HIGH is required (please refer to p.6 for Reference design)
6	NC		None
7	NC		None
8	RESET	I	Keep floating (System Reset, active low)
9	NC		None
7	VCC	P	Main power input (3.0 ~ 3.6VDC)
8	GND	P	Ground
9	NC		None
10	ON_OFF	I	N.C.
11	VBAT	P	Backup Battery Input (1.8 ~ 3.6VDC)
12	VCC	P	3.3V DC Output
13	GPIO8		GPIO
14	GPIO7		GPIO
15	GPIO3		GPIO

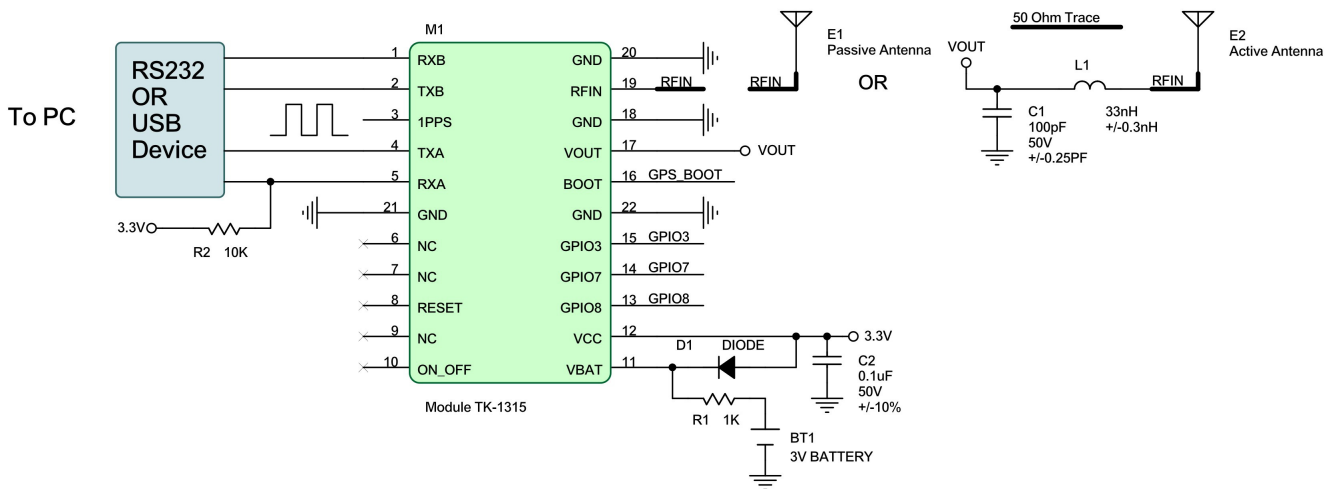


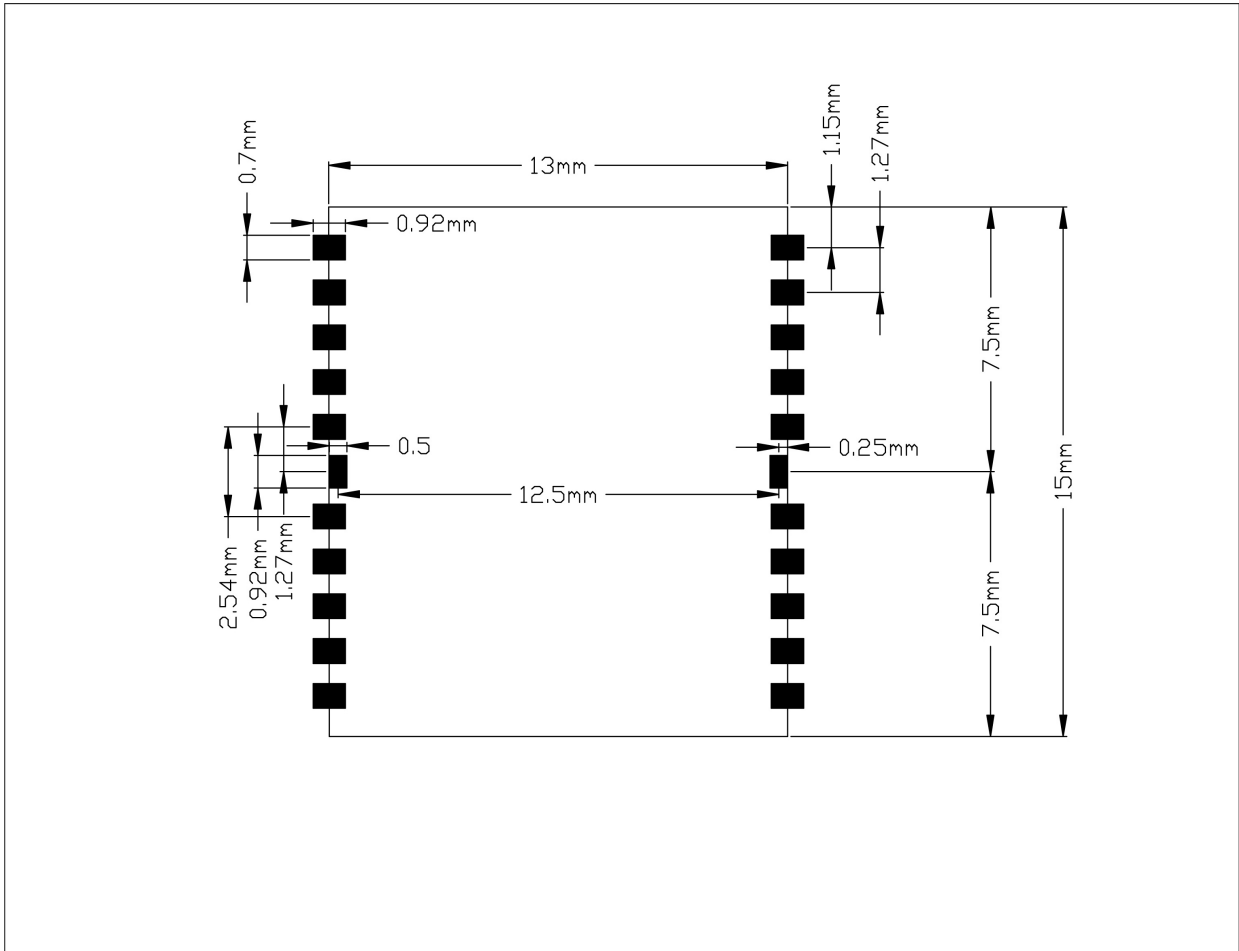
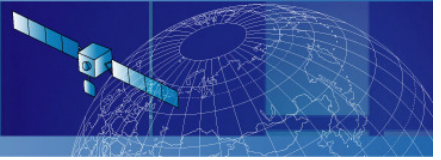
16	BOOT	I	Keep floating (For internal manufacturing use)
17	VOUT		1.8V DC Output
18	GND	P	Ground
19	RFIN	RF	RF input
20	GND	P	Ground
21	GND	P	Ground
22	GND	P	Ground

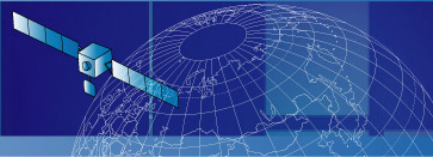
2.2 Block Diagram



2.3 Reference Design





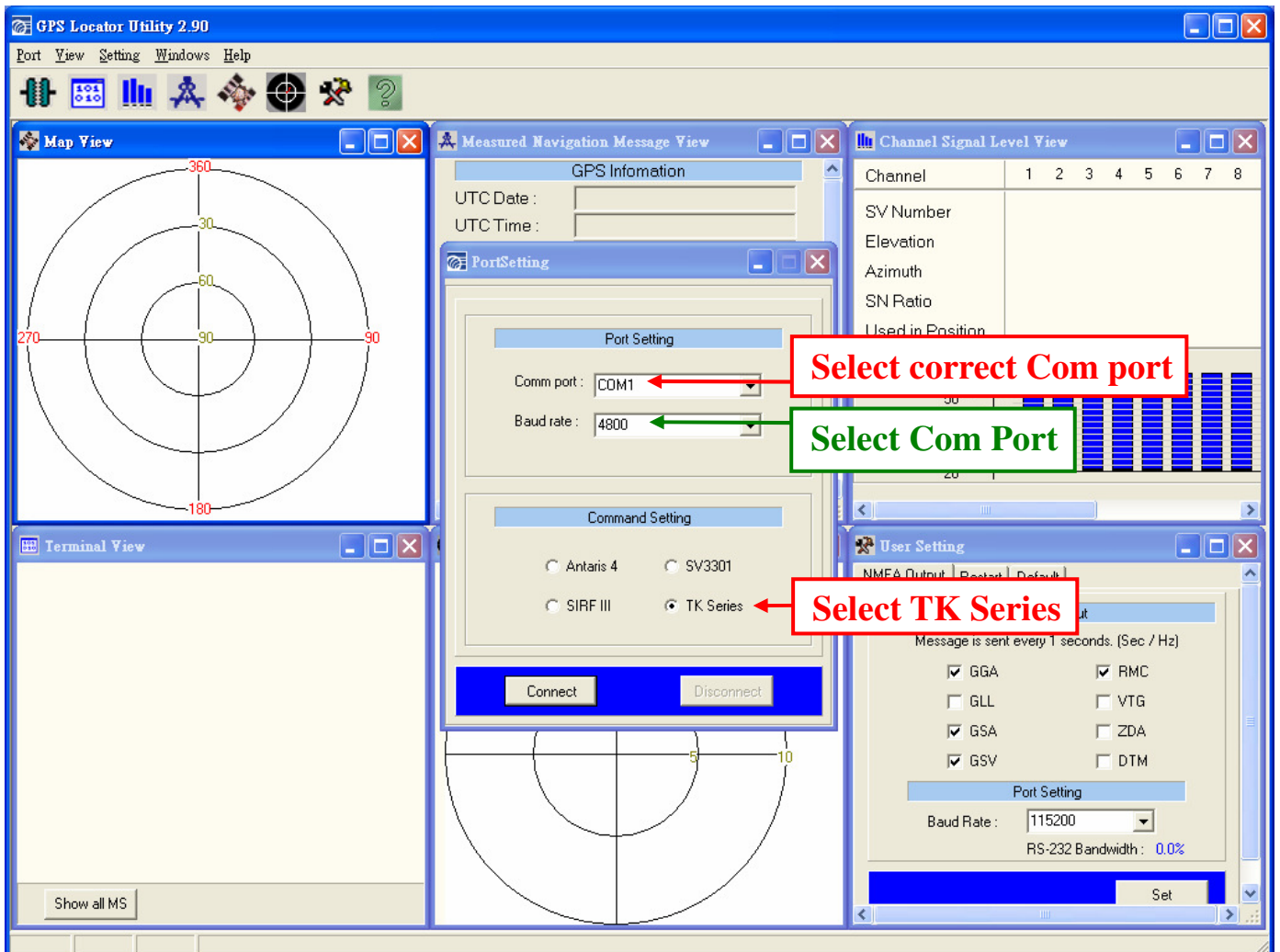


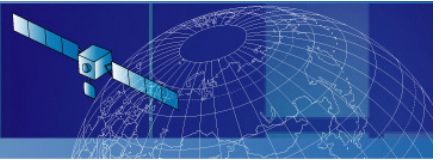
Chapter 3 Operating GPS Utility

GPS Locator Utility V2.90 is the latest utility for configuring the GPS settings of SANAV GPS receivers. The application software can be found in the CD (TK-1315\Utility\Setup) and the password is in License.txt. Double click on the Setup.exe and follow the installation procedures. Below shows the instructions of how to use this software, with the assumption that you have successfully installed GPS Locator Utility.

3.1 Connecting Com Port

Select “Com port” in the Port Setting → Select “Baud rate” → Select “TK Series” in the Command Setting → Click on “Connect”.





3.2 User Setting (NMEA Output)

Select GPS output sentences you need in the “NMEA Output” → Select “Baud rate” → Check the figure of “RS-232 Bandwidth” → Click on “Set”.

The indicator of the “RS-232 Bandwidth” should not exceed 100%.

Select GPS output sentences

Select baud rate

Notice the figure

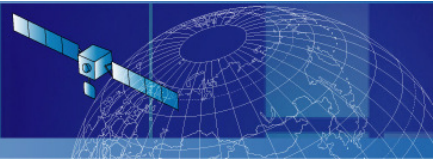
Channel	1	2	3	4	5	6	7	8
SV Number	27	25	07	19	13	16	23	06
Elevation	21	51	30	78	36	27	35	44
Azimuth	321	321	322	297	269	065	228	033
SN Ratio	40	44	41	44	42	42	44	43
Used in Position	0	X	X	X	X	X	X	X

```

$GPRMC,074602.000,A,2457.8108,N,12125.5391,E,0.0,0.0,0.19
$GPGSV,3,1,12,27,21,321,40,25,51,321,44,07,30,322,41,19,78,2
$GPGSV,3,2,12,13,36,269,42,16,27,065,42,23,35,228,44,06,44,0
$GPGSV,3,3,12,03,57,021,45,31,10,137,38,11,18,196,40,42,54,1
$GPGGA,074603.000,2457.8108,N,12125.5391,E,1,12.0,9,96.02
$GPGSA,A,3,03,06,07,11,13,16,19,23,25,27,31,42,1.9,0.9,1.6,30
$GPRMC,074603.000,A,2457.8108,N,12125.5391,E,0.0,0.0,0.19
$GPGSV,3,1,12,27,21,321,40,25,51,321,44,07,30,322,41,19,78,2
$GPGSV,3,2,12,13,36,269,42,16,27,065,42,23,35,228,44,06,44,0
$GPGSV,3,3,12,03,57,021,45,31,10,137,38,11,18,196,40,42,54,1
$GPGGA,074604.000,2457.8108,N,12125.5391,E,1,12.0,9,96.02
$GPGSA,A,3,03,06,07,11,13,16,19,23,25,27,31,42,1.9,0.9,1.6,30
$GPRMC,074604.000,A,2457.8108,N,12125.5391,E,0.0,0.0,0.19
$GPGSV,3,1,12,27,21,321,40,25,51,321,44,07,30,322,41,19,78,2
$GPGSV,3,2,12,13,36,269,42,16,27,065,42,23,35,228,44,06,44,0
$GPGSV,3,3,12,03,57,021,45,31,10,137,38,11,18,196,40,42,54,1
    
```

GPS Information

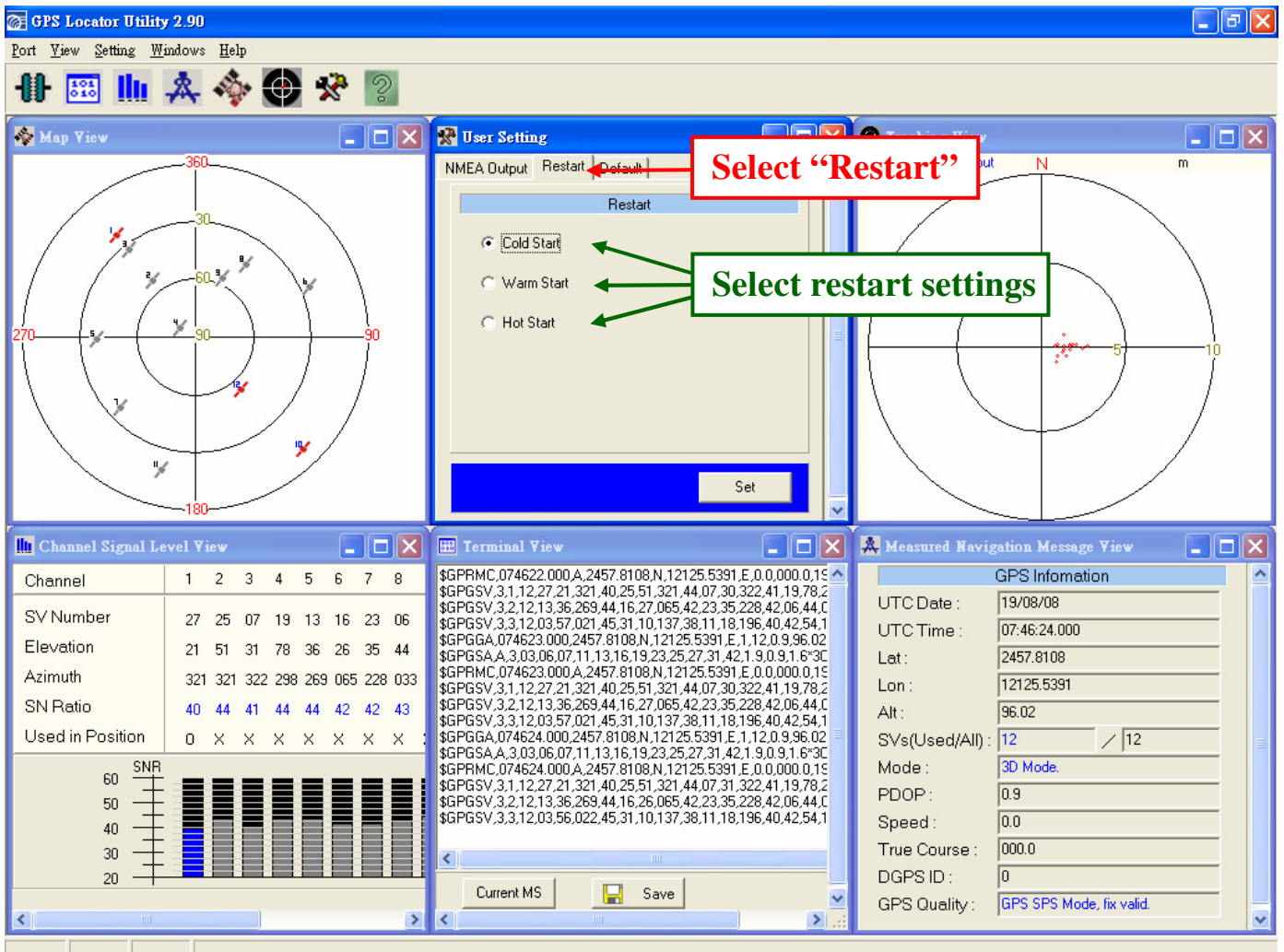
UTC Date : 19/08/08
 UTC Time : 07:46:04.000
 Lat : 2457.8108
 Lon : 12125.5391
 Alt : 96.02
 SVs(Used/All) : 12 / 12
 Mode : 3D Mode
 PDOP : 0.9
 Speed : 0.0
 True Course : 000.0
 DGPS ID : 0
 GPS Quality : GPS SPS Mode, fix valid



3.3 User Setting (Restart)

Restarting the unit by selecting and setting the restart modes.

Select among “Restart” modes → Click on “Set”.



The screenshot shows the GPS Locator Utility 2.90 software interface. The 'User Setting' dialog box is open, showing the 'Restart' section. A red box highlights the 'Restart' dropdown menu with the text 'Select "Restart"'. A green box highlights the radio button options for 'Cold Start', 'Warm Start', and 'Hot Start' with the text 'Select restart settings'. The 'Set' button is visible at the bottom of the dialog box.

Channel Signal Level View

Channel	1	2	3	4	5	6	7	8
SV Number	27	25	07	19	13	16	23	06
Elevation	21	51	31	78	36	26	35	44
Azimuth	321	321	322	298	269	065	228	033
SN Ratio	40	44	41	44	44	42	42	43
Used in Position	0	X	X	X	X	X	X	X

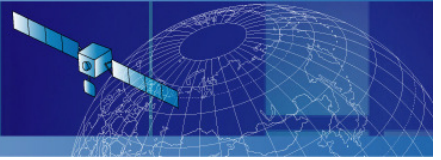
Terminal View

```

$GPRMC,074623.000,A,2457.8108,N,12125.5391,E,0.0,0.0,0.15
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$GPGSV,3,2,12,13,36,269,44,16,27,065,42,23,35,228,42,06,44,0
$GPGSV,3,3,12,03,57,021,45,31,10,137,38,11,18,196,40,42,54,1
$GPGGA,074623.000,2457.8108,N,12125.5391,E,1.12,0.9,96.02
$GPRMC,074623.000,A,2457.8108,N,12125.5391,E,0.0,0.0,0.15
$GPGSV,3,1,12,27,21,321,40,25,51,321,44,07,30,322,41,19,78,2
$GPGSV,3,2,12,13,36,269,44,16,27,065,42,23,35,228,42,06,44,0
$GPGSV,3,3,12,03,57,021,45,31,10,137,38,11,18,196,40,42,54,1
$GPGGA,074624.000,2457.8108,N,12125.5391,E,1.12,0.9,96.02
$GPGSA,A,3,03,06,07,11,13,16,19,23,25,27,31,42,1,9.0,9.1,6.3C
$GPRMC,074624.000,A,2457.8108,N,12125.5391,E,0.0,0.0,0.15
$GPGSV,3,1,12,27,21,321,40,25,51,321,44,07,31,322,41,19,78,2
$GPGSV,3,2,12,13,36,269,44,16,26,065,42,23,35,228,42,06,44,0
$GPGSV,3,3,12,03,56,022,45,31,10,137,38,11,18,196,40,42,54,1
    
```

Measured Navigation Message View

GPS Information	
UTC Date :	19/08/08
UTC Time :	07:46:24.000
Lat :	2457.8108
Lon :	12125.5391
Alt :	96.02
SVs(Used/All) :	12 / 12
Mode :	3D Mode
PDOP :	0.9
Speed :	0.0
True Course :	000.0
DGPS ID :	0
GPS Quality :	GPS SPS Mode, fix valid



3.4 User Setting (Default)

Select GPS output sentences you need in the “Default” → Select “Baud rate” → Check the figure of “RS-232 Bandwidth” → Click on “Set”.

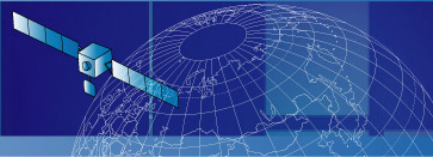
The indicator of the” RS-232 Bandwidth” should not exceed 100%.

The screenshot shows the 'User Setting' window of the GPS Locator Utility 2.90. The window is divided into several panes:

- Map View:** A circular radar-like display showing signal strength or position data.
- User Setting:** The main configuration window. It has tabs for 'NMEA Output', 'Restart', and 'Default'. The 'Default' tab is selected. Under 'Messages - TK Series', several checkboxes are checked: GGA, GSA, GSV, RMC, and VTG. The 'Baud Rate' is set to 115200. The 'RS-232 Bandwidth' is indicated as 106.7%. A 'Set' button is at the bottom.
- Channel Signal Level View:** A table and bar chart showing signal-to-noise ratio (SNR) for various channels.
- Terminal View:** A text area displaying raw NMEA data sentences such as \$GPRMC, \$GPGSV, and \$GPGGA.
- Measured Navigation Message View:** A pane showing GPS information including UTC Date (19/08/08), UTC Time (07:46:48.000), Lat (2457.8108), Lon (12125.5391), Alt (96.02), SVs (Used/All) (12/12), Mode (3D Mode), PDOP (1.2), Speed (0.0), True Course (000.0), DGPS ID (0), and GPS Quality (GPS SPS Mode, fix valid).

Annotations with arrows point to specific elements in the 'User Setting' window:

- A red box labeled 'Select “Default” sheet' points to the 'Default' tab.
- A green box labeled 'Select GPS sentences' points to the checked checkboxes for GGA, GSA, GSV, RMC, and VTG.
- A red box labeled 'Select Baud Rate' points to the 'Baud Rate' dropdown menu.
- A green box labeled 'Bandwidth indicator' points to the 'RS-232 Bandwidth: 106.7%' text.



3.5 Tracking View

This window shows the points that the GPS receiver fixed.

User can change the scale by clicking on “Zoom in” or “Zoom out”.

The screenshot displays the GPS Locator Utility 2.90 interface. The Tracking View window is active, showing a circular map with a red dot indicating the current location. A red box highlights the 'Zoom in' and 'Zoom out' buttons, with the text: **Click on “Zoom in/Zoom out” to change the scale**.

Channel Signal Level View

Channel	1	2	3	4	5	6	7	8
SV Number	27	25	07	19	13	16	23	06
Elevation	21	51	30	78	36	27	35	44
Azimuth	321	321	322	297	269	065	228	033
SN Ratio	40	44	41	44	42	42	44	43
Used in Position	0	X	X	X	X	X	X	X

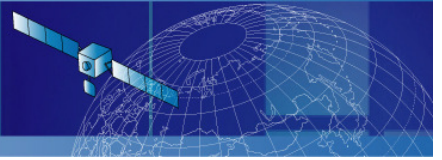
Terminal View

```

$GPRMC,074602.000,A,2457.8108,N,12125.5391,E,0.0,0.0,0.15
$GPGSV,3,1,12,27,21,321,40,25,51,321,44,07,30,322,41,19,78,2
$GPGSV,3,2,12,13,36,269,42,16,27,065,42,23,35,228,44,06,44,0
$GPGSV,3,3,12,03,57,021,45,31,10,137,38,11,18,196,40,42,54,1
$GPGGA,074603.000,2457.8108,N,12125.5391,E,1.12,0.9,96.02
$GPGSA,A,3,03,06,07,11,13,16,19,23,25,27,31,42,1,9,0.9,1.6,3C
$GPRMC,074603.000,A,2457.8108,N,12125.5391,E,0.0,0.0,0.15
$GPGSV,3,1,12,27,21,321,40,25,51,321,44,07,30,322,41,19,78,2
$GPGSV,3,2,12,13,36,269,42,16,27,065,42,23,35,228,44,06,44,0
$GPGSV,3,3,12,03,57,021,45,31,10,137,38,11,18,196,40,42,54,1
$GPGGA,074604.000,2457.8108,N,12125.5391,E,1.12,0.9,96.02
$GPGSA,A,3,03,06,07,11,13,16,19,23,25,27,31,42,1,9,0.9,1.6,3C
$GPRMC,074604.000,A,2457.8108,N,12125.5391,E,0.0,0.0,0.15
$GPGSV,3,1,12,27,21,321,40,25,51,321,44,07,30,322,41,19,78,2
$GPGSV,3,2,12,13,36,269,42,16,27,065,42,23,35,228,44,06,44,0
$GPGSV,3,3,12,03,57,021,45,31,10,137,38,11,18,196,40,42,54,1
    
```

Measured Navigation Message View

GPS Information	
UTC Date :	19/08/08
UTC Time :	07:46:04.000
Lat :	2457.8108
Lon :	12125.5391
Alt :	96.02
SVs(Used/All) :	12 / 12
Mode :	3D Mode
PDOP :	0.9
Speed :	0.0
True Course :	000.0
DGPS ID :	0
GPS Quality :	GPS SPS Mode, fix valid



Ch 4 Available NMEA Messages

4.1 NMEA Output Messages

GGA	Global Positioning System Fixed Data
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
RMC	Recommended Minimum Specific GNSS Data
VTG	Course Over Ground and Ground Speed
GLL	Geographic Position – Latitude / Longitude (Optional)
ZDA	Data and Time (Optional)

(Update rate is 1 Hz)

Chapter 5 Limited Warranty

This unit can be used as part of navigational aids, and is not intended to replace other means of navigation or aids. San Jose Technology, Inc. warrants this GPS receiver and accessories to be free of defect for a period of 12 months from the date of original purchase.

THIS WARRANTY APPLIES ONLY TO ORIGINAL PURCHASE.

In any event of a product defect while in normal usage, San Jose Technology, Inc. will replace or repair the defective product at no charge to the original the original purchaser for parts and labor. However, San Jose Technology, Inc. reserves the right of determination to replace or repair the defective product.

The replacement or repaired product will be warranted for a total of 90 days from the date of return shipment, or for the remaining balance of the original warranty, whichever is longer.

PURCHASER DUTIES

The purchaser must return defective unit postpaid, with the proof of original purchase and a return address to:

San Jose Technology, Inc.

11F., No.2, Sec. 4, Jhongyang Rd., Tucheng City, Taipei County, Taiwan

Tel: +886-2-2269-4456

Fax: +886-2-2269-445

Website: <http://www.sanav.com>