

# *CompactGPS™*

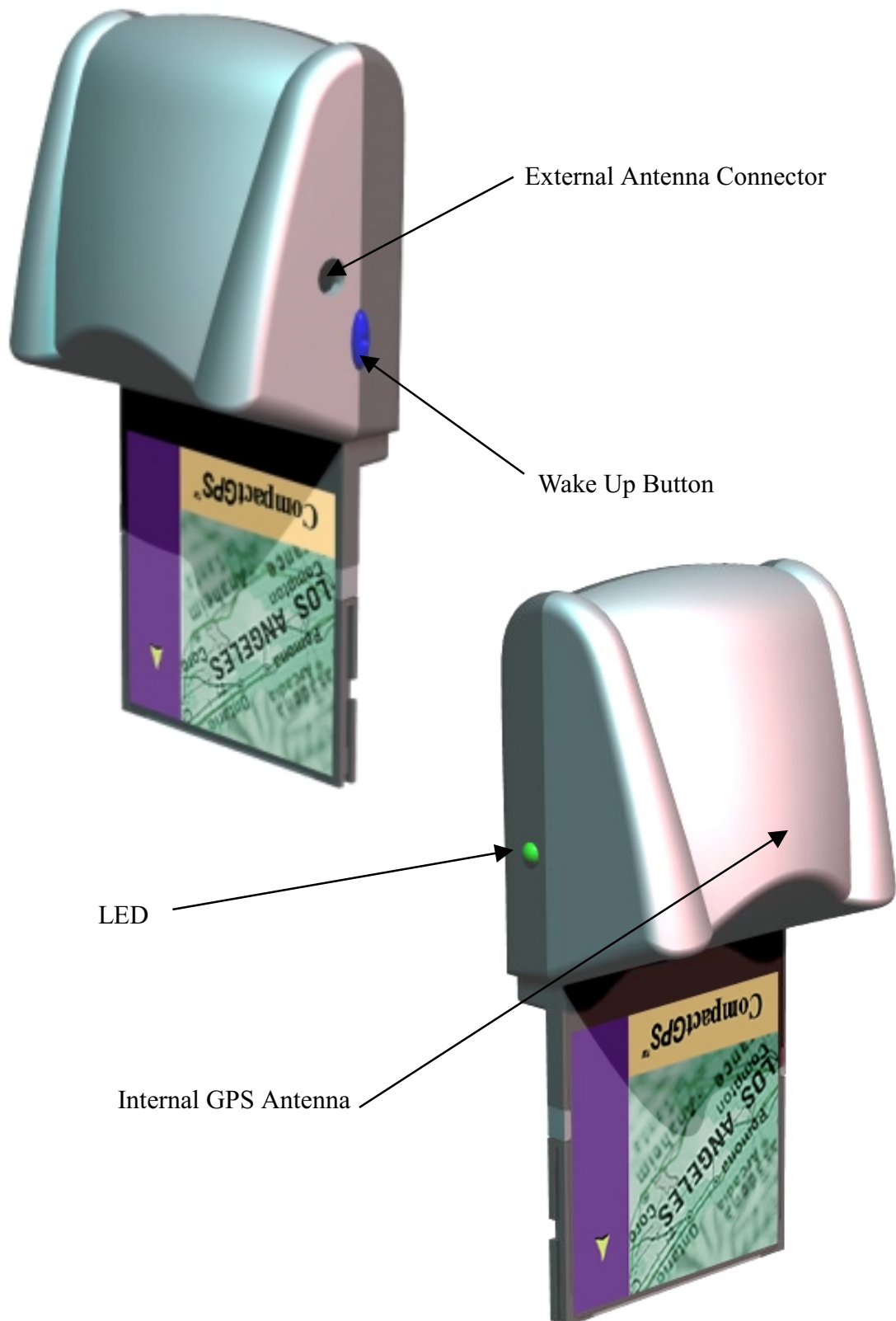
## User Manual



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## CompactGPS™ at A Glance



## **About CompactFlash™**

The CompactFlash™ Association (CFA) was established in October 1995 with the premise that CompactFlash™ (CF) technology would enable the introduction of a new class of advanced, small lightweight, low power mobile products that would significantly increase the productivity and enhance the lifestyles of millions of people.

The concept behind CF technology was simple: to capture, retain and transport data, audio and images on CompactFlash™ Storage Cards. CF Storage Cards provided the capability to easily transfer all types of digital information and software between a large variety of digital systems.

The CFA approved and published the CompactFlash™ standard. This vendor-independent specification enabled users to develop CF products that function correctly and are compatible with future CF designs, eliminating compatibility issues.

Now the CFA has developed the CF+ specification to expand the CF concept beyond flash data storage and include I/O devices and magnetic disk data storage. The CF+ specification also includes the original Type I (3.3mm thick) card and newer Type II (5mm thick) cards. While CompactFlash™ and many I/O devices can fit into the Type I card, the Type II cards enable higher capacity CompactFlash™ cards, magnetic disk cards and many additional I/O cards.

## **What Is CompactGPS™ ?**

CompactGPS™ introduces a GPS module in CompactFlash™ interface. CompactGPS™ represents the latest ingenious GPS technology from the leading GPS receiver manufacturer.

Inserting it and implementing a map or navigation software, CompactGPS™ will convert the compatible devices for GPS functions, such as locate one or multiple objects, conduct personal & vehicle navigation, and / or apply for geographical surveys.

## What Has Inside the Package ?

Before you start up, make sure that your package includes the following items. If any items are missing or damaged, contact your dealer immediately. Please refer to the contact information on the last page of this manual.

- ◆ GPS Receiver
- ◆ User Manual CD
- ◆ External Antenna
- ◆ Warranty Card

## What Is GPS ?

In 1974 the USA Department of Defense set about developing a Global Positioning System (GPS), a constellation of 24 satellites that Orbits 12,000 miles above the Earth. Using triangulation of signals from four of the satellites, a receiving unit on earth can pinpoint its current location to within a few meters. A GPS device receives the GPS data from satellites and then converts the GPS data into longitude, latitude, and altitude (LLA) data, velocity, time and etc. Position and navigation information is vital to a wide range of professional and recreational activities covering surveying, search and rescue, tracking, hiking, navigating, and so forth.

## Description of the interfaces

### LED Function

LED off	GPS receiver switch off
LED on	GPS receiver searching signal
LED flashing	GPS signal is fixed.

### Wake Up Button

When the GPS receiver enters the Power saving mode, the CompactGPS™ stops to output the position data. But it still can be waked up for fast position fix by pressing the wake up button.

The GPS receiver will enter the Power saving mode for saving power when:

1. Cannot lock the GPS signal within a certain period of time.
2. The receiver is stay at same place for a long time.

### External Antenna Connector

When you are in car or any close room the external GPS antenna will help to receive better GPS signal. You can place the external GPS antenna in outdoor open space ensure a better GPS performance. Please refer the Accessory Specifications for detail description and specification of external antenna.

## How to Install & Operate CompactGPS™

The CompactGPS™ supports plug and play.

- 1.If your PDA or laptop have CompactFlash™ slot just plug your CompactGPS™ into the slot.
- 2.If you don't have the CompactFlash™ slot but you got a PCMCIA slot, then you can apply a adapter to connect your CompactGPS™ to PCMCIA slot.

### Note:

- 1.In order to see NMEA0183 navigational data, use the Hyper Terminal program of Windows 95/98®. Please setup the COM port connected with CompactGPS™ to:

Baud rate: 4800  
Data bit: 8  
Parity: None  
Stop bit: 1  
Flow control: None.

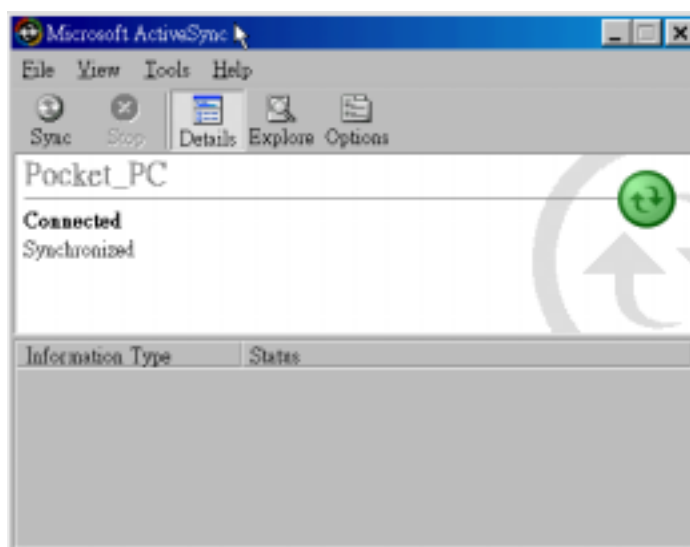
- 2.Refer to NMEA 0183 data format.



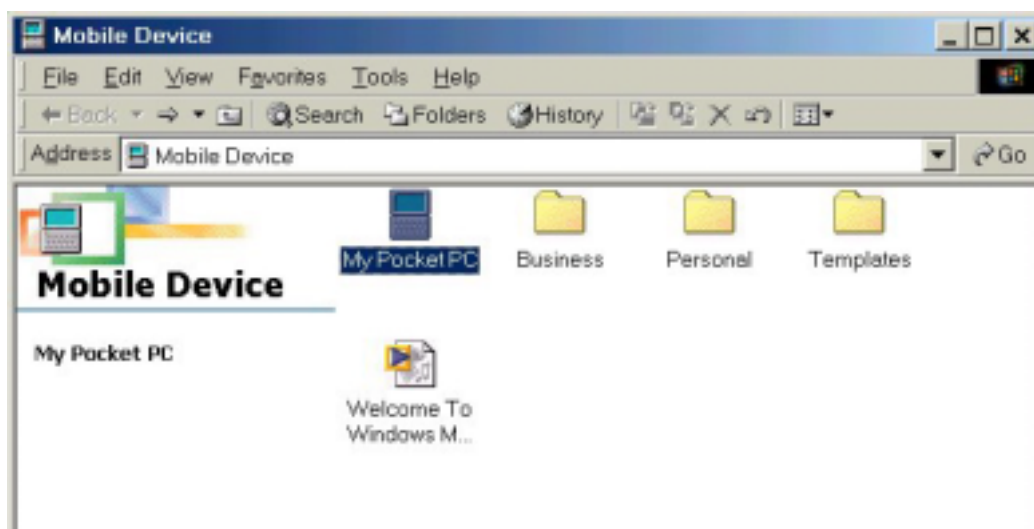
# How to Test Your CompactGPS™

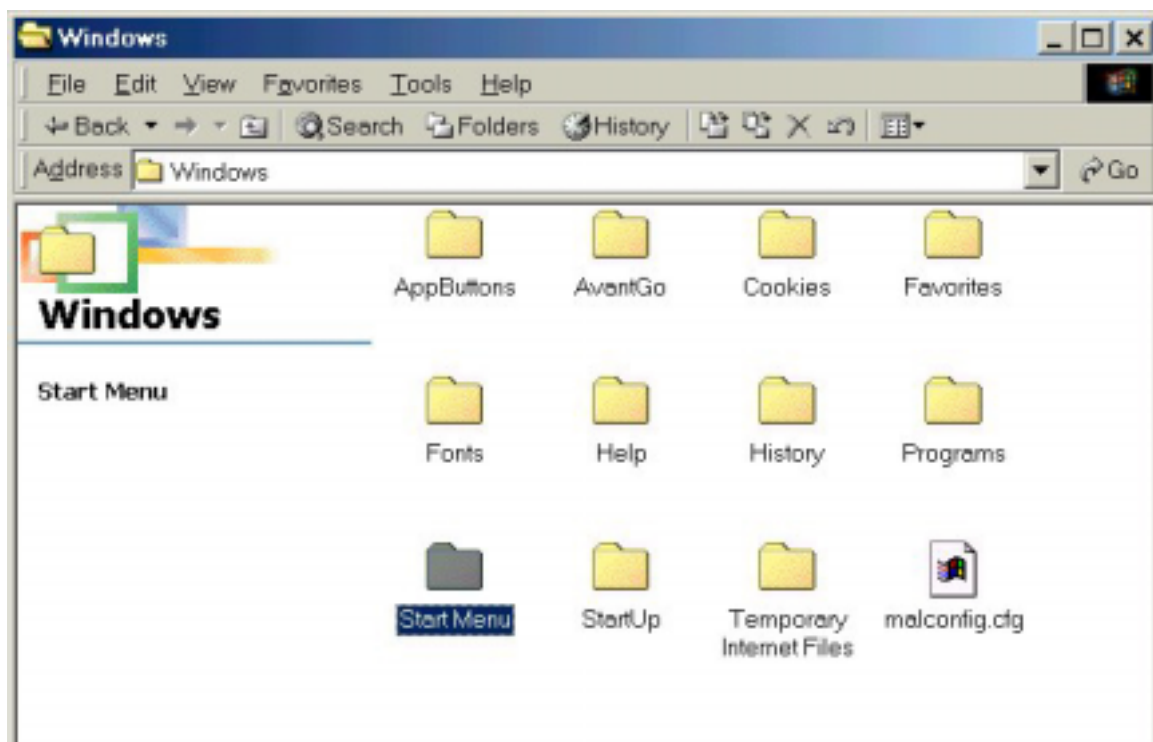
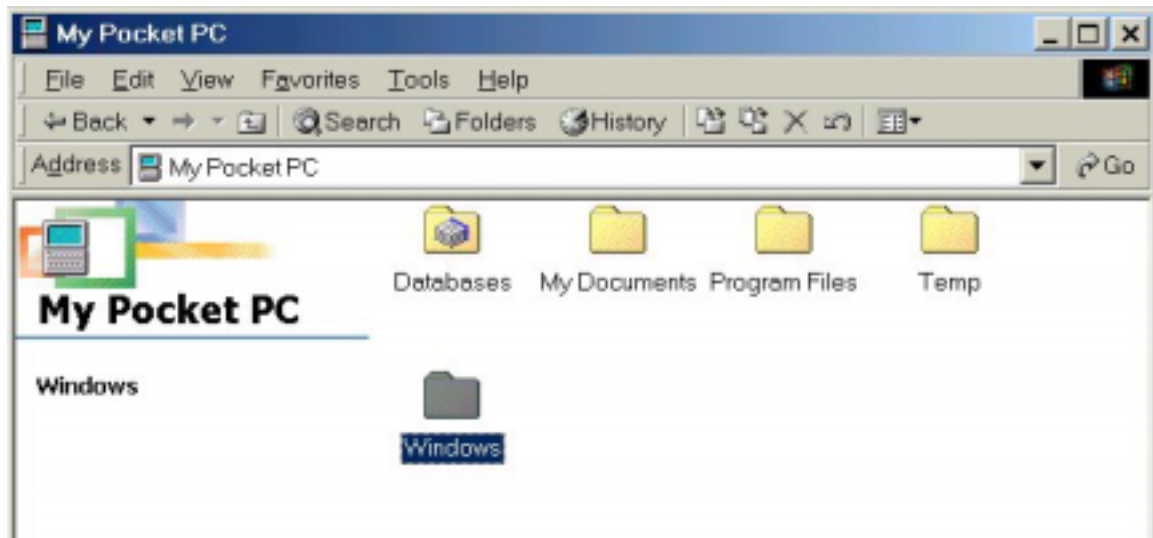
## Install Guide:

1. Copy GPSDemo.exe from PC to your Pocket PC.
  - (1) Install Microsoft ActiveSync to your PC. Refer to your Pocket PC manual for installation procedure.
  - (2) Setup your Pocket PC cradle to Desktop PC UART port .The Microsoft ActiveSync will detect your Pocket PC automatically.

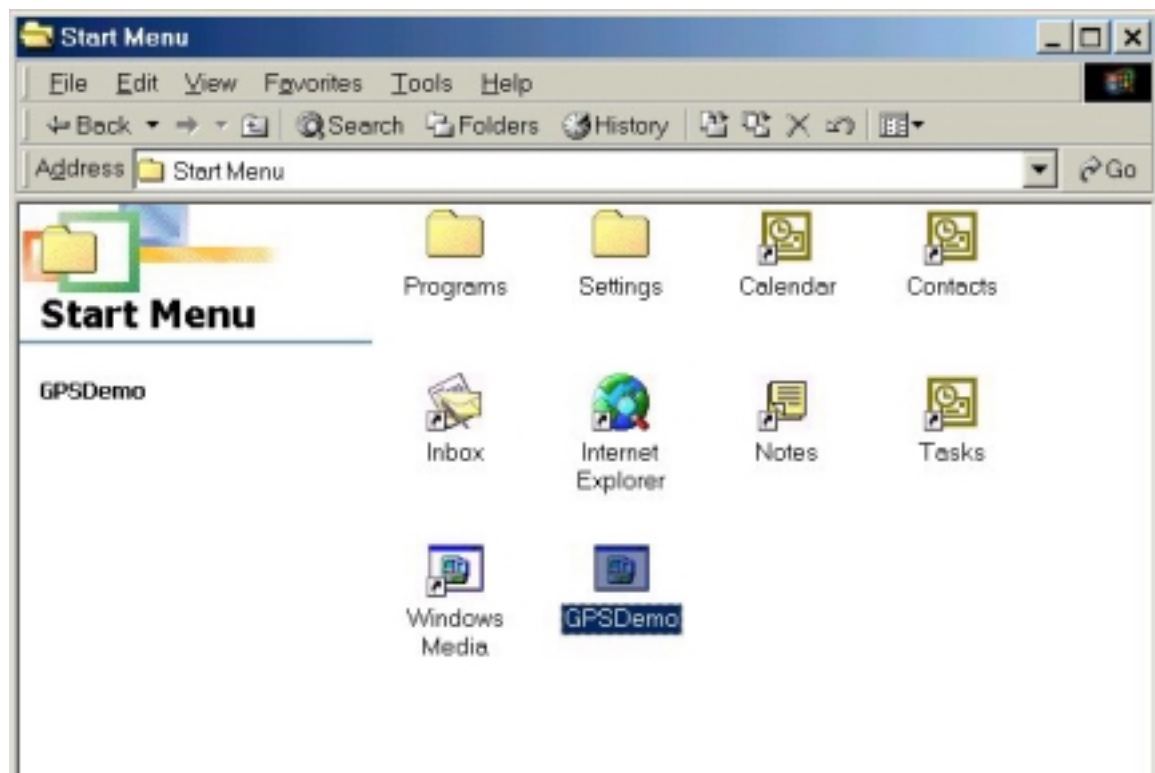


- (3) After finish the connection between PC and the Pocket PC. Copy GPSDemo.exe file to the target path : \Mobile Device\My Pocket PC\windows\Start Menu .ActiveSync will automatically transfer to Pocket PC

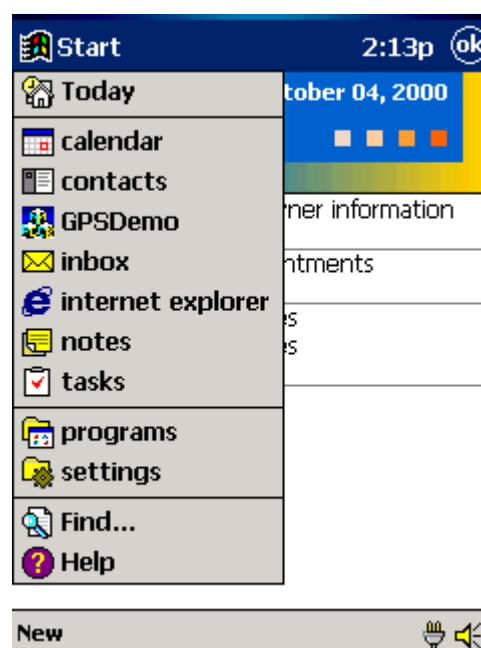








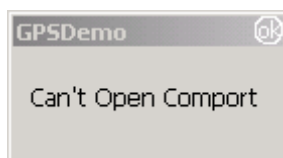
2. Execute GPSDemo by double click the GPSDemo Icon as show below.



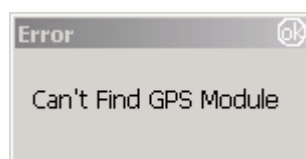
3. Show initial Logo



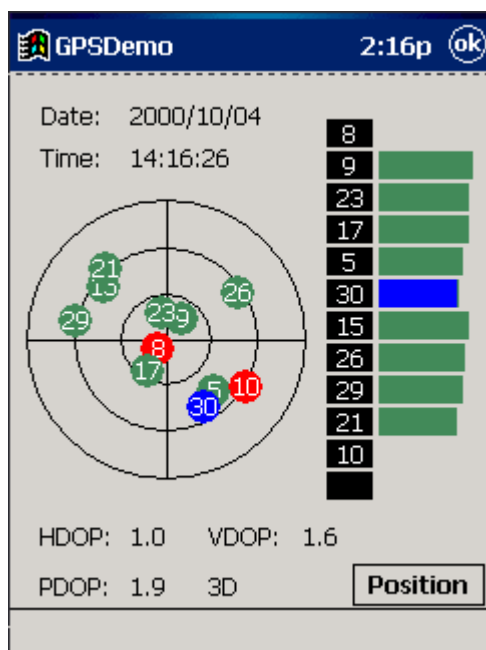
4. If there is no GPS module on the CompactFlash™ slot; it will show Message “Can’t Open Comport”. Then, you must insert the GPS module and push OPEN button to restart.



5. If the GPS module can't receive any signal in about 5 seconds, it will show Message “Can't Find GPS Module”. Then, you must insert the GPS module and push OPEN button to restart.



6. If everything is ok, it will show the satellite diagram like below. Push the “ok” button on titlebar will terminate the program. Push the “Position” Button will change to Position diagram



7. Position Diagram will show the position. Push ok button can return to the satellite diagram.



# Specifications

## Physical characteristics

Length	103.5 mm	Width	48 mm
Height	33 mm	Weight	65 grams

## Temperature characteristics

Storage temperature:	-20°C ~ + 65°C.
Operating temperature:	0°C ~ + 55°C.

## General

Sensitivity	-135 dBm	Channels	12 channels
L1	1575.42 MHz.	C/A code	1.023MHz chip rate.

## Accuracy

Satellites number average	: 7.7
Satellites number $\geq 4$	: 99.87%
Satellites number $\geq 3$	: 100%
Position accuracy	: 10m, 95%
Velocity accuracy	: 0.1 meters / second without SA
Time accuracy	: 1 microsecond synchronized to GPS time.

## Datum

WGS-84.	Position update period : every 1 second
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## Dynamic conditions

Altitude : 18000 meters (60000 feet) max.	Velocity : 515 meters / second max.
Jerk : 20 meters / second <sup>3</sup> , max.	Acceleration : 4 g., max.

## Power

It shall use the following power : DC 3.3V $\pm$ 10 %
Supply current : 190mA, (max)
Power down mode : 800uA

## Accessory Specifications

External GPS Antenna :

### Physical characteristics

Dimensions	45*45*15*500mm
Weight	110 ± 10g(Typ)
Connector	Inverter MMCX SA
Cable	RG-174
Color	Block

### Temperature characteristics

Storage temperature: -40°C ~ +85°C.

Operating temperature: -30°C ~ +80°C.

### General

Center Frequency	1575.42 ± 1.023 MHz
LNA Gain	26dB(min, at 25±15°C,)
Noise Figure	2.0dB(max, at 25±15°C)
Voltage	3.3 ±0.3V
Current	12mA(max)

# Software Data

## NMEA V2.2 Protocol

It is the compact flash interface

## NMEA Output Messages

The CompactGPS™ outputs the following messages as shown in Table 1 :

**Table 1 NMEA Output Messages**

NMEA Record	Description
GGA	Global positioning system fixed data
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data

## GGA – Global Positioning System Fixed Data

Table 2 contains the values of the following example :

\$GPGGA, 161229.487, 3723.2475, N, 12158.3416, W, 1, 07, 1.0, 9.0, M, , , ,0000\*18

**Table 2 GGA Data Format**

Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Position	161229.487		hhmmss.sss
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		See Table 2-1
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude	9.0	meters	
Units	M	meters	
Geoid Separation		meters	
Units	M	meters	
Age of Diff. Corr.		second	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*18		
< CR > < LF >			End of message termination

**Table 2-1 Position Fix Indicator**

Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3	GPS PPS Mode, fix valid

**GSA – GNSS DOP and Active Satellites**

Table 3 contains the values of the following example :

\$GPGSA, A, 3, 07, 02, 26, 27, 09, 04, 15, , , , , 1.8,1.0,1.5\*33

**Table 3 GSA Data Format**

Name	Example	Units	Description
Message ID	\$GPGSA		GSA protocol header
Mode 1	A		See Table 3-2
Mode 2	3		See Table 3-1
Satellite Used <sup>1</sup>	07		Sv on Channel 1
Satellite Used <sup>1</sup>	02		Sv on Channel 2
....			....
Satellite Used <sup>1</sup>			Sv on Channel 12
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		
< CR > < LF >			End of message termination

**Table 3-1 Mode 1**

Value	Description
1	Fix not available
2	2D
3	3D

**Table 3-2 Mode 2**

Value	Description
M	Manual – forced to operate in 2D or 3D mode
A	Automatic – allowed to automatically switch 2D/3D

**GSV – GNSS Satellites in View**

Table 4 contains the values of the following example :

\$GPGSV, 2, 1, 07, 07, 79, 048, 42, 02, 51, 062, 43, 26, 36, 256, 42, 27, 27, 138, 42\*71

**Table 4 GSV Data Format**

Name	Example	Units	Description
Message ID	\$GPGSV		GSV protocol header
Number of Messages <sup>1</sup>	2		Range 1 to 3
Messages Number <sup>1</sup>	1		Range 1 to 3
Satellites in View	07		
Satellite ID	07		Channel 1(Range 1 to 32)
Elevation	79	degrees	Channel 1(Maximum 90)
Azimuth	048	degrees	Channel 1(True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
....			....
Satellite ID	27		Channel 4(Range 1 to 32)
Elevation	27	degrees	Channel 4(Maximum 90)
Azimuth	138	degrees	Channel 4(True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
<CR> <LF>			End of message termination

**RMC – Recommended Minimum Specific GNSS Data**

Table 5 contains the values of the following example : \$GPRMC, 161229.487, A, 3723.2475, N, 12158.3416, W, 0.13, 309.62, 120598, ,\*10

**Table 5 RMC Data Format**

Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTC Position	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Speed Over Ground	0.13	knots	
Course Over Ground	309.62	degrees	True
Date	120598		ddmmyy
Magnetic Variation		degrees	E=east or W=west
Checksum	*10		
<CR> <LF>			End of message termination



## Troubleshooting

Problem	Reason	Solution
No position output but timer is counting	Weak or no GPS signal can be received at the place CompactGPS are.	Connect an external antenna which locate at a outdoor open space to your CompactGPS™ and then press Wake Up Button.
	At outdoor space but GPS signal is block by buildings	Go outdoor and press Wake Up Button to try again.
No position output and No timer counting	The CompactGPS enter power saving mode	Press the Wake Up Button to wake the CompactGPS™ up.
Execute Fail	Wrong CPU Type	Pocket PC support multiple types of CPU. Make sure you download the correct software. ( You can use 'setting' function of start menu to check the correct CPU type )
Can't Open COM port	The CompactFlash™ is not inserted or some other application is using the COM port.	Insert CompactFlash™ or Close all other applications that using the COM port.
Can't Find GPS Module	poor connection	check the CompactFlash™ is inserted correctly.
No signal	No action for few minutes may cause Pocket PC entry powersave mode. It will close the COM port at the same time.	Close the application and execute it again to reopen the COM port.
	The CompactGPS™ enter power saving mode	Press the Wake Up button
	Weak or no GPS signal when using CompactGPS indoor .	Connect a external antenna which locate at a outdoor open space to your CompactGPS™ and then press Wake Up button.