



20 channels SiRF Star III

# WAY D3x GPS Receiver



Motorbike, Car, Bus, Truck, Aircraft, Engineering

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WHERE ARE YOU?

**WAY** 2007  
NAVIGATION SYSTEMS

Technology by **FIKO**

## 20 Channel GPS Receiver based upon SiRF Star III Generation 2 Chipset

### Features

- 20 channel all-in-view GPS/EGNOS/WAAS receiver
- Indoor/parking house reception
- Integrated SiRF Star III Generation 2 chipset
- Extremely good sensitivity of  $-159$  dBm
- Extremely fast Time-To-First-Fix ("TTFF")
- Very precise one pulse per second ("1PPS") output
- External antenna voltage as option (3.3V standard)
- External Reset of device
- Supports NMEA 0183 and SiRF binary protocols
- RS-232 data communication (USB as option)
- $-40^{\circ}$  to  $+85^{\circ}$ C Operating Temperature Range
- Wide voltage input range 5-36 VDC unregulated
- Compact Size 37x52x21 mm (1.46x2.05x0.83 Inch)
- FIKO's aluTECH<sup>®</sup> red anodised aluminium casing
- Fix mounting, light weight and affordable pricing

### General Description

FIKO's WAY D3x GPS Receiver is an integrated 20-channels all-in-view GPS receiver with built-in protected switching power supply that has input range from 5 to maximum 36 VDC. With the rapid time-to-fix and high sensitivity, WAY D3x GPS design and architecture is designed to meet rigorous demands for precise localisation including many indoor environment, through urban valleys, under dense foliage or in cities with many high-rise buildings. All this makes real-time navigation of vehicles, aircraft and marine boats practical without investing in expensive GPS receivers.

In traditional GPS receivers there is lengthy sequences to process time-to-fix, the WAY D3x GPS architecture however operates to the equivalent of more than 200,000 correlate's, enables fast and deep GPS signal search capabilities, resulting in significant improvement over today's architectures that contain only a few hundred to a few thousand correlate's.



WAY D3x GPS is designed for FIKO's Patent Pending aluTECH<sup>®</sup> casing made in red anodised aluminium and comes with fastening bracket for secure installations.



WAY D3x GPS PCB design with MCX GPS active antenna connection.

Data communication are made via RS-232 Rx/D and Tx/D. Supply power are connected via the same 9-pin D-SUB data connector.

**For Ordering Information see last page of this User's Manual:**

**Document:**  
**P020-S01-D11-T02v1.0r07 01/07**

**Information herein is subject to change without prior notice.**

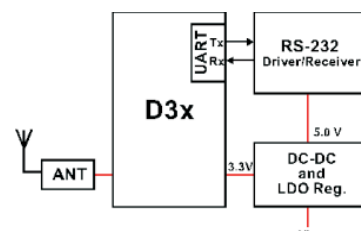
## WAY D3x GPS APPLICATIONS

manufactured by FIKO

### APPLICATIONS

- In-vehicle navigation systems
- Field Engineering
- Geo-referencing
- Agricultural management
- Vehicle, Marine and Experimental Aircraft Navigation
- Dead tracking
- Galileo/Glonass Integration (Data synchronisation)

### FIKO WAY D3x GPS Block Diagram



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## Revisions:

VERSIONS:	DATE:	APPROVED BY:	DESCRIPTION:
1.0r0.1	2nd JAN 2006	Mr. Surachai W. - Design Engineer Mr. Apisak W - Project Manager Mr. Attila F. Chief Design Architect	First release in new format
1.0r0.2	24th MAR 2006	Mr. Attila F. Chief Design Architect	Added data and information
1.0r0.3	24th APR 2006	Mr. Attila F. Chief Design Architect	Modification of content
1.0r0.4	10th MAY 2006	Mr. Attila F. Chief Design Architect	Added data and information
1.0r0.5	16th JUN 2006	Mr. Attila F. Chief Design Architect	Added data and information
1.0r0.6	27th JUN 2006	Mr. Attila F. Chief Design Architect	Modification of content
1.0r0.7	03rd JAN 2007	Mr. Attila F. Chief Design Architect	Modification of content

## WAY D3x GPS SPECIFICATIONS

Characteristics	Conditions	Min	Typ	Max	Units
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### General

Chipset	SiRF Star III G2	-	-	-	-
Frequency	L1, 1575.42 Mhz	-	-	-	-
C/A Code	1,023 Mhz chip rate	-	-	-	-
Sensitivity			-159		dBm
Channels	All-in-view	12	20	20	channels

### Accuracy

Positioning	2D RMS with EGNOS/WAAS enabled	15 -	10 5	8 1	m m
Velocity		-	0.1	-	m/sec
Time	Synchronised to GPS	-	1	-	µs

### Datum

Default	WGS-84	-	-	-	-
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### Average Acquisition time

Re-acquisition		-	0.1	-	sec
Hot start		-	1	-	sec
Warm start		-	38	-	sec
Cold start		-	42	-	sec

### Dynamic conditions

Altitude		- -	18,000 60,000	- -	m feet
Velocity		-	515 1,000	- -	m/sec knots
Acceleration		-	<4	-	G
Jerk		-	20	-	m/sec

### Power

Vin	Regulated i.e. from USB port	-	5	-	Vdc
	Unregulated	5	12	36	Vdc
Efficiency	Switching power supply	-	90	-	%
Frequency		-	260	-	Khz
Capacity	Thermal shutdown and current limit protection	-	330	-	mA
Consumption	Continuous mode	116	120	125	mA
	Satellite search w/active antenna	110	120	125	mA

### Digital Interface

UART RS-232	1 Start, 8 Data, 1 Stop, 0 Parity	4,800	9,600	57,600	bps
Update rate	Continuous	-	1	-	Hz
Antenna	Active	2.3	3.3*	5.5	Vdc
Connector	RS-232 and power: 9-pin D-SUB Antenna: RCX		-		

\* D3x GPS - (AA2) has the option of external antenna power where active antennas of 4, 5 and 12 Vdc can be used.

## WAY D3x GPS SPECIFICATIONS cont.

Characteristics	Conditions	Min	Typ	Max	Units
<b>Physicals</b>					
Dimensions	Circuit board assembly aluTECH top case	-	35x56x10	-	mm
		-	37x52x21	-	mm
Weight	WAY D3x GPS incl. aluTECH housing and fastening bracket	-	75	-	grams

### Environment

Temperature	Operational Storage	-40	-	+85	°C
		-65	-	+160	°C
Humidity	Relative Humidity	5	95	98	%
EMI	FCC and EC EMI compliant Class B	-	-	-	
Shock	> 11 ms	-	35	-	G
Vibration	5 Hz ~ 14 Hz	-	0.6	-	G
	27 Hz ~ 50 Hz	-	1.0	-	G
	50 Hz ~ 500 Hz	-	20	-	G
Rain	IEC 529 IPX5	-	-	-	

### CIRCUIT DESCRIPTION

The FIKO WAY D3x GPS receiver module circuit boards include all the basic sensors and electronics to provide a digital indication of GPS/EGNOS/WAAS navigational data. The WAY D3x GPS are based on the popular SiRF Star III Generation 2 chipset as GPS sensors plus necessarily RF and power supply components to provide RS-232 interfacing and power to the device. The WAY D3x GPS system has battery power to store fix position and port settings.

The direction of WAY D3x GPS is not critical to archive the right data from the GPS system. WAY D3x GPS might need to be re-programmed with regards to baud rates and EGNOS/WAAS capabilities – see further down in this document for more info. EGNOS is available in Europe and North Africa only while WAAS is available for USA. The rest of the world has no EGNOS/WAAS coverage but might have other systems in the future.

The WAY D3x GPS circuit uses SiRF Star III single-chip solution for compact and reduced size. The system is supplied power by a constant current source to maintain best accuracy over wide temperature range. The sensor output voltage and constant current sensor supply voltage are provided by high frequency switching power supply integrated circuitry. The WAY D3x GPS uses ARM7DMI CPU for best performance and reliability, where an onboard 1Mb SRAM integrated circuit is employed to retain necessary data variables. WAY D3x GPS supports FCC E911 mandate.

The power supply for the WAY D3x GPS circuit is regulated DC-DC switching design allowing the user to directly provide a regulated supply voltage of +5V DC (from i.e. USB port) or a +5 to +36 volt unregulated supply voltage. The power supply is a dual ground (analogue and digital) system to control internal noise and maximise measurement accuracy.

## PHYSICAL CHARACTERISTICS

The circuit board for the FIKO WAY D3x GPS Solutions is approximately 35x46x10 mm or 1.37x1.81x0.39 inches while in the ready mounted rugged aluTECH case is approximately 53x38x25 mm or 2.16x1.5x0.98 inches. The WAY D3x GPS contains one PCB (Printed Circuit Boards) where components are mounted on both sides of the PCB based upon miniature SMD (Surface Mount Devices). The topside contains the GPS and interface modules while the bottom side does carry the switching power supply and other circuitry. Figure 1 shows the bottom PCB with its dimensions.

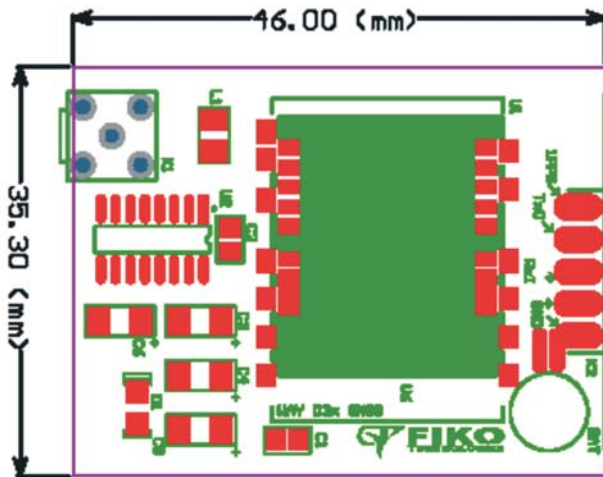


Figure 1. Top PCB side with GPS and interfaces.

The FIKO's WAY D3x GPS module are available with integrated switching power supply, RS-232 level shifter, battery backup (option), and has Reset, GPS time synchronisation with 1 Pulse Per Second (1PPS) output as well as voltage input for active antennas that uses other voltages beside the included 3.3V. The MCX antenna connector are delivered as standard, but other connectors like i.e. BNC can be delivered upon request.

The default baud rate is 4,800 bps and other baud rates can be set via SiRF commands.

Figure 2 and 3 shows the dimensions of FIKO's aluTECH top case and the fastening bracket with screw-hole positioning. The width of the top case is the same as for the fastening bracket 53-mm or 2.08 inches. Fastening screws for the WAY D3x GPS is provided with the purchase of this device.

Fix installation of WAY D3x GPS requires that the aluminium bracket is to be removed from the top case. The fastening bracket can be removed by sliding it off the top case simply by pressing down the locking device and then slide the top case backwards. Information about installation is found in the following pages of this document.

The most important aspects of finding a location and installing WAY D3x GPS is to make sure that the unit is mounted is such way that the 9-pin D-SUB connector has enough free space for mounting and cables.



Figure 2. Fastening bracket for the aluTECH case

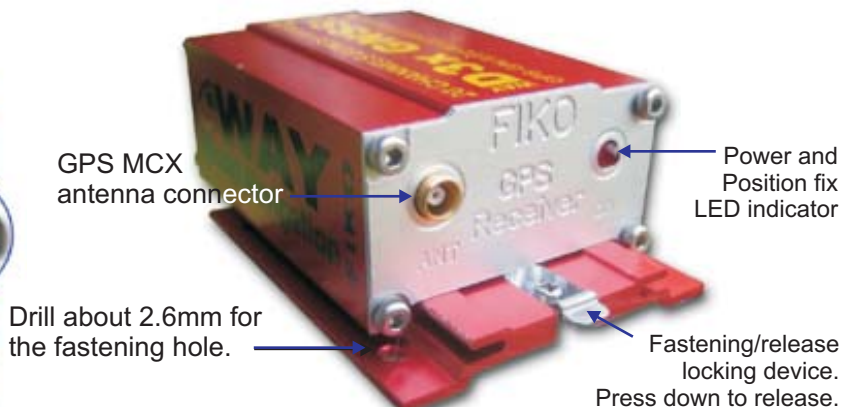


Figure 3. Back plate side of the aluTECH case

Positioning of drill holes from each corner are 3.5mmx8mm and you may fix the bracket with the included screws. If you don't use these screws, please make sure that the head of the screw fits the gap between the bracket and the top case. The drill hole should be 2.6mm for a 3.0mm screw.

## OVERVIEW

Most of "WAY" product for GPS, AVL, GYRO, AUDIO etc. is delivered with FIKO's standard casing – the Patent Pending "aluTECH" as shown in image 4. The advantage of these products is that it's well designed for harsh environments and does comply with MIL-STD-818F operational environment criteria's.



**Figure 4.** FIKO's patent pending aluTECH® case.



**Figure 5.** USB to RS-232 converter

*This is a sample connection where the RS-232 COM-port from D3x GPS is connected to a USB to RS-232 interface (can be both 1.1 and 2.0). In this case the black part (the converter) goes into the PC or Mac's USB port and the other goes to the D3x GPS communication connector (9-pin male D-SUB). Max length of such data-cable is 15 metres.*

The WAY D3x GPS module is based on the highly reliable SiRF Star III engine board with additional components to provide RS-232 communication or USB connection via RS-232 to USB interface module. The WAY D3x GPS uses the world standard NMEA 0183 used in GPS-based navigation for marine, in-vehicle, aviation, agriculture management, mapping, survey and engineering, just to mention few. The WAY D3x GPS saves and stores retrieved satellite data into memory backups for fast and reliable data transmission via traditional RS-232 serial interface. NMEA data over USB can be obtained by using i.e. WAY iUSB an RS-232 to USB converter where our WAYGPS32.DLL software module can be used by software developers to obtain GPS integration for navigation software developments etc.

For precise localisation, the WAY D3x GPS are able to track up to 20 channels at same time. The built-in processor re-acquires GPS satellite information every 100ms and updates positioning data every 1 second, while the standard settings updates satellite positioning information (\$GPGSV) every 4 seconds.

The smart internal memory saving of GPS satellite history data allows the WAY D3x GPS to give its users a really fast positioning fix even if the receiver has been off for a while.



**Figure 5.** The topside circuitry of WAY D3x GPS.

WAY D3x GPS is provided as both ready to use system mounted in FIKO's aluTECH® casing as well as provided in PCB format for those whom would like to use this system as integration into i.e. embedded navigational systems.

For those whom only need the GPS engine board (without power supply and connectors), they can also purchase this from us or from our dealers.

Please see the last page for ordering information.

## FEATURES

Unlike other GPS receiver modules, WAY D3x GPS provides several unique benefits to its users where such benefits includes;

- Wide input voltage that fits most battery voltages found in motorbikes, cars, aviation, marine, train, truck, camping cars, busses etc.
- Rugged module capable of withstanding vibration, humidity and temperature above and under normal use and circumstances.
- Supplied in extra strong aluminium case for fixed mounting, made and designed with aluminium extrusion technologies.
- Red anodised surface that guarantees protection of the aluminium close to the strength and hardness found in only diamonds.
- Brackets mounting to any surface (metal, fibre, wood etc.) with four screws that are safety-protected against easy removals of the top case.
- Two-part solution where the top case is fastened to the bottom bracket by simply sliding the top case into the bottom bracket rails.

The GPS technology used are compromised by these data:

- Integrated SiRF Star III Generation 2 high performance GPS chipset.
- Extremely good sensitivity - tracking sensitivity of -159 dBm makes it also work indoors.
- Extremely fast Time To First Fix ("TTFF") at low signal level.
- Supports both NMEA0183 and SiRF binary protocols.

WAYGPS32.DLL for fast tracking via COM-ports are available for developers of Windows navigational software.

## INSTALLATION

The fix installation of FIKO's WAY D3x GPS is really simple and requires that the bottom bracket are removed from the top case by pressing down the lock and sliding the top case forward. Once released, it can be fixed to suitable surface and fastened with the provided four screws. If fastened to plastic, glass fibre, or metal sheet you will need to drill the four holes with a suitable drill - for other surfaces you might use double-sided tape. Once fastened, you will need to re-insert the top case for securely fastening of the unit. See next section for further installation details.

## REMOVING THE TOP CASE



**Figure 6.** How to release the top case

After unpacking the WAY D3x GPS you will need to release the fastening bracket by pressing down the locking device tap (as shown in Figure 6) and sliding the top case backwards.

When the top case is removed, the fastening bracket can be released that now needs to be fastened or mounted to its place where you like to install the WAY D3x GPS module.

**Make sure that power is not connected to the unit during this operation.**

## IMPORTANT NOTICE!



If you open the case of the WAY D3x GPS be aware to never touch the electronic parts inside the case as this could cause electronic discharge from your body and therefore damage the components causing the WAY D3x GPS to become unusable and void any guarantee.

For fix mounting of WAY D3x GPS you will first of all need to drill the four holes for the fastening bracket. You will find the four fastening screws provided with the package. Figure 7 shows the placement where you need to drill the holes. If you don't have a measuring tool, then just place the bracket on the place where you like to have it mounted and use a pencil or a pen to mark the four holes or alternatively print out this page and use Figure 7 as a footprint.

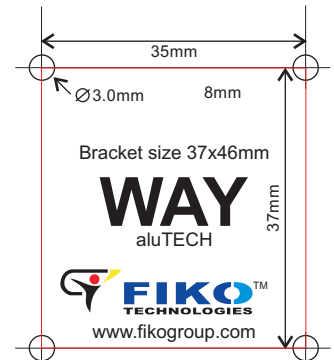


Figure 7. Drill positions for the fastening bracket



**Before making the choice for placement of WAY D3x GPS module, ensure enough free space on the connector side of the bracket to enable the top case to slide onto the bracket. As you need to use a small screwdriver to fasten the cover plate, you need enough space for tools and the power and data connector cable to be mounted.**

## CONNECTING POWER

Extra care shall be taken when connecting power to the WAY D3x GPS. Make sure that your power source is right for this unit. When mounted in vehicle, you need to use a cable with fuse holder connected to the + (plus). It is sufficient to use a fuse of 300mA. The black cable must be connected to – (ground).

## IMPORTANT NOTICE!



Before connecting power to the WAY D3x GPS, make sure you understand what you're doing. If you're not sure, ask an authorised person to conduct the installation for you. As a golden rule, touch a grounded point before handling the WAY D3x GPS. Make sure that your WAY D3x GPS module is suited for your intended power source. If you purchased the standard version, then max voltage is +36VDC which is OK to be used on motorbikes, boats, aircraft, cars, busses, trucks and trains as they normally has battery voltage of between 6-24VDC.

If you're not sure about what max voltage your WAY D3x GPS is designed for, you can check this out by reading the label found on the top of the fastening bracket. If you need to use the WAY D3x GPS for i.e. 48V, you will need to use i.e. 48V to 12V (or 48V to 24V) DC-DC power adapter.

**WARNING!** Please note that providing more than +36V DC to the voltage input **MAY DESTROY** the unit. Make sure that you are providing regulated/unregulated power of +5 to +36VDC between pin 9 (+Vin) and pin 4 and/or 5 (GND) on the D-SUB connector. The red LED at the front of the case indicates the status of GPS and not power (depending on model).

**WAY = Where Are You?**

## POWER CABLE EXTENSION

If the supplied power cable is too short to reach your battery, you will need to extend the power cable and secure the connection points against short circuit. **Make sure that you use the same thickness of cables and colours (red and black) for your cable extension where you extend the red with red and black with black.**



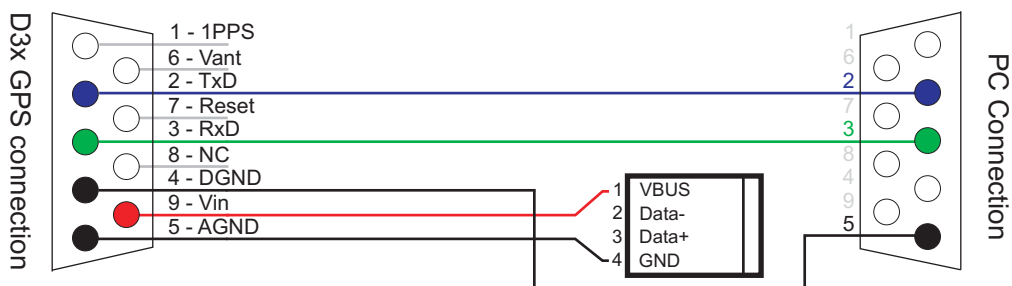
**Figure 8.** The pin connection for the standard version of WAY D3x GPS (outside view)

### Pin connections

Pin Number	Name	Description
1	1PPS (one pulse per second)	This line does send a 1 second pulse
2	TxD	UART Transmit data
3	RxD	UART Receive Data
4	DGND	Ground for Data connector (Signal Ground)
5	AGND	Ground in from power source (Power Ground)
6	Vant	External antenna power (option)
7	Reset	Pull low to reset WAY D3x GPS
8	NC	Not connected (Reserved)
9	Vin* (max 36Vdc)	Positive voltage DC input 5-36Vdc

\*Note: Use pin 9 (+Vin) to power WAY D3x GPS. Connector cables for power from Car battery, USB or car cigarette lighter outlet available where connector cable for battery are delivered as standard.

The standard version of WAY D3x GPS comes with a female 9-pin D-SUB connector that contains RS-232 communication ports (RxD and TxD), functions and power input. Figure 8 shows the pin connections viewed from outside the aluTECH case of WAY D3x GPS.



**Figure 9.** Pin assignment for data with USB power (use USB Type A Male connector)

The 9-pin D-SUB female connector found on WAY D3x GPS acts as both power and data connector and there is therefore need to add a second connector where on the WAY D3x GPS side, the unregulated power is supplied between pin 9 (+ 5 to 36V DC) and pin 5 (AGND). On the other end, pin 9 is left open to avoid sending the supplied voltage to the same pin on the computer side (RS-232). See Figure 9 for more connection details. USB and Car cigarette lighter-typer connector cables are available from FIKO - see ordering information on last page.

## DATA CABLE EXTENSION

Max length of connector cable for RS-232 shall not be more than 9 meters and you should use two-wired shield twisted pair cable for the RxD and TxD data where the shield is connected to DGND. Once connected the GPS antenna and wire to the RS-232 on your PC, you should be able to receive satellite data. If you don't have any RS-232 (COM-port) on your PC, you can also use i.e. our WAY iUSB, an USB to RS-232 converter that will create a virtual COM-port under Windows. Please note that such converters will not work under DOS unless you have a DOS driver for the device. The serial RS-232 I/O port driver used in WAY D3x GPS provides -10V to +10V even at supply voltage of 5V DC.

## Application Notes

The WAY D3x GPS modules communicate through ASCII code at baud rate of 4,800 bps (default). The data format is 1 Start, 8 Data, 1 Stop, and No parity bits. Some of the operating commands are:

## UART COMMUNICATION PROTOCOL GPS DATA

WAY D3x GPS modules communicate through ASCII code at baud rate of 4,800 bps. The system has one integrated Universal Asynchronous Receiver Transmitter's ("UART") The data bit format is 1 Start, 8 Data, 1 Stop, and No parity bits. Asynchronous communication has the complete menu of commands. The receiving data (RxD) towards PC or embedded computer system are indicated with National Marine Electronics Association ("NMEA") sentences that are transmitted as serial data and would look like i.e. **\$GPRMC, 171956.000,A,4729.7386,N,00654.6399,E,0.19,313.58,020406,,\*0A** where;

**\$GPRMC** is the message header indicating that the data is being received from the NMEA protocol

**171956.000** is the UTC time (17:19:56:000)

**A** is a valid data status

**4729.7386,N** is the Latitude data 47 29' 7386 North

**00654.6399,E** is the Longitude data 006 54' 6399 East

**0.19** is the Speed in Knots over ground

**313.58** is the True course over ground 313.58 degrees

**020406** is the date 02nd April 2006

**,,** is magnetic variation in degrees (none)

**\*0A** is the checksum of the whole sentence where the sentence is terminated with <CR><LF>.

For more information about NMEA sentences see hereunder.

The GPS NMEA data **\$GPGGA**, **\$GPGLL**, **\$GPGSA**, **\$GPRMC** and **\$GPVTG** are transmitted in 1Hz for all data with exemption of **\$GPVTG** which is transmitted every 4 sec.

The WAY D3x GPS are capable of sending GPS data according to *National Marine Electronics Association's* NMEA-0183 interface specification defined as NMEA 0183 or just NMEA protocol where this section of this datasheet will focus on the NMEA sentences.

## NMEA sentences used by the internal WAY D3x GNSS receiver are shown as below:

NMEA Sentence	Description
\$GPGGA	Global Positioning system fixed data
\$GPGLL	Geographic Position Latitude/Longitude
\$GPGSA	GPS DOP and Active Satellites
\$GPGSV	GPS Satellites in view
\$GPRMC	Recommended minimum specific GPS data
\$GPVTG	Course over ground and ground speed

Table I NMEA-0183 output sentence format

## GLOBAL POSITIONING SYSTEM FIX DATA (GGA)

The most common used NMEA sentence is the GGA or \$GPGGA. A sample of the \$GPGGA sentence for a location in France would be:

`$GPGGA,171959.000,4729.7386,N,00654.6398,E,1,06,3.1,406.7,M,48.0,M,,0000*52`

Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Time	171959.000		hhmmss.sss
Latitude	4729.7386		ddmm.mmmm
N/S Indicator	N		N=North, S=South
Longitude	00654.6398		dddmm.mmmm
E/W Indicator	E		E=East, W=West
Position Fix Indicator	1		See Table III
Satellites used	06		Range from 0 to 12 (excluding EGNOS and WAAS)
HDOP	3.1		Horizontal Dilution of Precision
MSL Altitude <sup>1</sup>	406.7	meters	
Units	M	meters	
Geoid Separation <sup>1</sup>	48.0	meters	
Units	M	meters	
Age of diff. correction		seconds	Null fields when DGPS is not in use
Diff. Ref. Station ID	0000		
Checksum	*18		
<CR><LF>			End of message termination (Carriage Return and Line Feed)

**Table II** NMEA-0183 GGA sentence \*1 SiRF Technology Inc. does not support geoid corrections. Values given are WGS84 ellipsoid heights.

Name	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

**Table III** NMEA-0183 position Fix Indicator

## GEOGRAPHIC POSITION WITH LATITUDE/LONGITUDE (GLL)

`$GPGLL,3723.2475,N,12158.3416,W,161229.487,A*2C`

Name	Example	Units	Description
Message ID	\$GPGLL		GLL protocol header
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=North, S=South
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=East, W=West
UTC Time	161229.487		hhmmss.sss
Status	A		A=Data Valid, V=Data NOT valid
Checksum	*2C		
<CR><LF>			End of message termination (Carriage Return and Line Feed)

**Table IV** NMEA-0183 GGL sentence

## GPS DOP AND ACTIVE SATELLITES (GSA)

\$GPGSA,A,3,08,04,27,13,23,24,,,,,,,,,4.0,3.1,2.5\*3F

Name	Example	Units	Description
Message ID	\$GPGSA		GSA protocol header
Mode1	A		See table VI
Mode2	3		See table VII
Satellite Used <sup>1</sup>	08		SV on Channel 1
Satellite Used <sup>1</sup>	04		SV on Channel 2
...			
Satellite Used <sup>1</sup>			SV on Channel 12
PDOP	4.0		Position Dilution of Precision
HDOP	3.1		Horizontal Dilution of Precision
VDOP	2.5		
Checksum	*3F		
<CR><LF>			End of message termination (Carriage Return and Line Feed)

**Table V** NMEA-0183 GSA sentence

Value	Description
M	Manually-forced to operate in 2D or 3D mode
A	2D automatic-allowed to automatically switch between 2D and 3D

**Table VI** Mode1

Value	Description
1	Fix Not Available
2	2D
3	3D

**Table VII** Mode2

## GPS SATELLITES IN VIEW (GSV)

\$GPGSV,3,1,10,27,64,164,49,13,54,059,42,02,46,261,39,04,41,215,48\*7E

\$GPGSV,3,2,10,08,35,190,41,10,24,303,14,23,20,071,47,24,16,180,43\*71

\$GPGSV,3,3,10,16,09,032,18,06,00,331,07\*7E

Name	Example	Units	Description
Message ID	\$GPGSV		GSV protocol header
Number of messages <sup>1</sup>	3		Range 1 to 3
Message Number <sup>1</sup>	1		Range 1 to 3
Satellites in View	10		
Satellite ID	27		Channel 1 (Range from 1 to 32)
Elevation	64	Degrees	Channel 1 (maximum 90)
Azimuth	164	Degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	49	dBHz	Range 0 to 99, null when not tracking
...			
Satellite ID	04		Channel 1 (Range from 1 to 32)
Elevation	41	Degrees	Channel 1 (maximum 90)
Azimuth	215	Degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	48	dBHz	Range 0 to 99, null when not tracking
Checksum	*7E		
Checksum	M		

**Table VIII** NMEA-0183 GSV sentence

<sup>1</sup> Depending on the number of satellites tracked multiple messages of GSV data may be required.

## RECOMMENDED MINIMUM SPECIFIC GPS DATA (RMC)

\$GPRMC,171956.000,A,4729.7386,N,00654.6399,E,0.19,313.58,020406,,\*0A

Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTC Time	171956.000		hhmmss.sss
Status	A		A=Data Valid, V=Data NOT Valid
Latitude	4729.7386		ddmm.mmmm
N/S Indicator	N		N=North, S=South
Longitude	00654.6399		dddmm.mmmm
E/W Indicator	E		E=East, W=West
Speed Over Ground	0.19	Knots	
Course Over Ground	313.58	Degrees	True
Data	020406		ddmmyy
Magnetic Variation 1		Degrees	E=East, W=West
Checksum	*0F		
<CR><LF>			End of message termination (Carriage Return and Line Feed)

**Table IX** NMEA-0183 RMC sentence

\*1 SiRF does not support magnetic declination. All "course over ground" data are geodetic WGS48 directions.

## COURSE OVER GROUND AND GROUND SPEED (VTG)

\$GPVTG,309.62,T,,M,0.13,N,0.2,K\*6E

Name	Example	Units	Description
Message ID	\$GPVTG		VTG protocol header
Course	309.62	Degrees	Measured Heading
Reference	T		True
Course		Degrees	Measured Heading
Reference	M		Magnetic
Speed	0.13	Knots	Measured Horizontal Speed
Units	N		Knots
Speed	0.2	Km/hr	Measured Horizontal Speed
Units	K		Kilometres per hour
Checksum	*6E		
<CR><LF>			End of message termination (Carriage Return and Line Feed)

**Table X** NMEA-0183 VTG sentence

To test WAY D3x GPS data, you can do so by starting FIKO's COMM Terminal Pro which is also used to change baud rate if other than 4.800 bps is required. The COMM Terminal Pro software is available for download from our website and there is a minimal fee for this software and purchase can be made online. COMM Terminal Pro are also a handy tool for those that need to simulate or monitor data which is done by starting two COMM Terminal Pro connecting two COM-ports together with a NULL Modem Cable, also available from FIKO.

## Demo Module Kit Set

The WAY D3x GPS Demo Module Kit Set includes WAY D3x GPS module, USB cable for 5Vdc power, RS-232 data cable, active 3.3V GPS antenna and FIKO's COMM Terminal Pro Windows software where this forms a development kit for study of GPS reception. The Demo Module Kit Set includes DLL's and other development tools for rapid software developments using the WAY D3x GPS.

## Product Ordering Information

Ordering No.	Product	Product Information
D3xGPSV07-01	WAY D3x GPS	Complete mounted in aluTECH casing
D3xGPSV07-02	WAY D3x GPS ANT	Complete mounted in aluTECH casing w/active 3.3v GPS antenna
D3xGPSV07-03	WAY D3x GPS PCB	PCB mounted only
D3xGPSV07-04	WAY D3x GPS SW	DLL and Software for developments
D3xGPSV07-05	WAY D3x GPS Demo	Complete WAY D3x GPS module with all cables, interfaces active antenna and developer kit.
D3xGPSV07-06	WAY Li-polymer battery	Internal 600mA Li-polymer changeable battery (BAT1200-01)
D3xGPSV07-07	WAY D3x USB	Connector cable for USB
D3xGPSV07-08	WAY D3x OUTLET	Connector cable for Cigarette outlet
D3xGPSV07-09	WAY D3x BRACKET	Spare part aluTECH fastening bracket
SOFTCMT01-01	COMM TERMINAL PRO	Terminal software for RS-232 communication
SOFTWCD01-01	WAY COMM DLL	DLL for NMEA data and SiRF Star III command set

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## SiRF Binary Protocol

WAY D3x GPS uses the SiRF Star III GSC3 chipset, equipped with GSW3 firmware and to change baudrate you can use sentences 100 and 102 set the serial ports.

Sentence 100 sets the main port A and 102 sets the DGPS input port B while 100 has an extra field that can be used to switch to the SiRF binary mode. The Binary mode requires to set the COM-port to 8 bits, 1 stop bit, no parity. If the D3x GPS are set to SiRF Binary mode there is another command to set it back to NMEA, but this command must be set in Binary format.

**If you don't know the means how to switch it back to NMEA from Binary mode, don't try to switch it from NMEA to Binary mode because this will make your WAY D3x GPS inoperative in NMEA mode.** For more information about SiRF NMEA and SiRF Binary mode, please refer to our WAYGPS32.DLL and demo software that are designed for both SiRF NMEA and SiRF Binary. Setting EGNOS/WAAS is done in SiRF Binary mode.

**\$PSRF100,0,9600,8,1,0\*0C where; \$PSRF100 is;**

0            0=SiRF, 1=NMEA - Change from NMEA to SiRF Binary mode  
 9600        Bps rate 4800, 9600, 19200, 38400  
 8            7 or 8 Data bits  
 1            0 or 1 Stopbit  
 0            0=none, 1=odd, 2=even Parity  
 \*0C        checksum

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