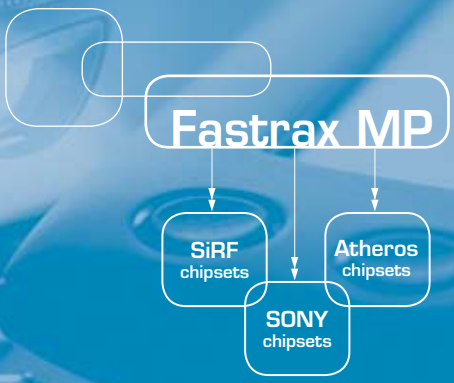
smart positioning

3/2008

GPS

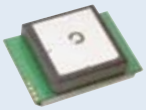
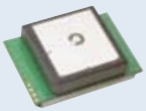
RECEIVER HARDWARE & APPLICATION DEVELOPMENT PRODUCTS



Fastrax

FASTRAX PRODUCT MATRIX

Product	Description	TTFF	Sensivity	Power consumption	Dimensions (mm)	Protocols
FASTRAX 300-Series FOR HIGH PERFORMANCE						
IT321	Ultra small, low-power and highly sensitive GPS receiver	<40s	-159 dBm	90mW@3.3V	10.4 x 14.0 x 2.3	NMEA & SiRF
IT310	Small and highly sensitive GPS receiver module	<40s	-159 dBm	110mW@3.0V	13.1 x 15.9 x 2.3	NMEA & SiRF
IT300	Highly sensitive, pin-compatible with MP family GPS receivers	<40s	-159 dBm	110mW@ 3.0V	16.2 x 18.8 x 2.3	NMEA & SiRF
FASTRAX 03-Series FOR PROGRAMMABILITY AND LOW POWER						
IT03-S	Sensitive, low-power, pin-compatible with MP family GPS receivers, DataLogger 14.000 pts	<36s	-156 dBm	100mW@2.7V	16.2 x 18.8 x 2.3	NMEA & iTalk
IT03	Sensitive, low-power, programmable DataLogger 140.000 pts	<36s	-156 dBm	100mW@2.7V	22 x 23 x 2.9	NMEA & iTalk
IT03-02	Sensitive, low-power, programmable, compatible with IT02	<36s	-156 dBm	100mW@2.7V	25.9 x 25.9 x 4.6	NMEA & iTalk
FASTRAX 100-Series FOR PROGRAMMABILITY AND COST-EFFICIENCY						
IT130	Sensitive, pin-compatible with MP family GPS receivers. Datalogger.	<39s	-154 dBm	150mW@3.0V	16.2 x 18.8 x 2.3	NMEA & iTalk
FASTRAX 300-Series WITH INTEGRATED ANTENNA						
UP300	Highly sensitive, low-power GPS receiver module with integrated patch antenna & ext. antenna connector	<40s	-159 dBm	120mW@3.0V	19 x 27 x 7.2	NMEA & SiRF
UC322	Very small GPS receiver module with embedded chip antenna	<40s	-159 dBm	90mW@3.3V	10.4 x 30 x 2.9	NMEA & SiRF
FASTRAX 100-Series WITH INTEGRATED ANTENNA						
UP130	Sensitive GPS receiver module with integrated patch antenna & ext. antenna connector	<45s	-154 dBm	150mW@3.0V	19 x 27 x 7.2	NMEA & iTalk

	Program-mable	Chipset	Chn.	Main I/O ports	Photo	Note
	No	SiRFstarIII GSC3LT	20	1 PPS ON/OFF control		Adaptive Trickle-Power. Push-to-Fix. Extended ephemeris. Static filter. Track smoothing
	No	SiRFstarIII GSC3f/LP	20	1 PPS Wakeup interrupt Battery backup		Adaptive Trickle-Power. Push-to-Fix. Extended ephemeris. Static filter. Track smoothing.
	No	SiRFstarIII GSC3e/LP	20	1 PPS Wakeup Battery backup		Fastrax IT MP compatible. Adaptive Trickle-Power. Push-to-Fix. Extended ephemeris. Static filter. Track smoothing.
	Yes	Atheros (uN8021 RF, uN2110 BB)	12	1 PPS		Fastrax IT MP compatible. Programmable with iSuite MP SDK
	Yes	Atheros (uN8021 RF, uN8130 BB)	12	1 PPS		Programmable with iSuite MP SDK
	Yes	Atheros (uN8021 RF, uN8130 BB)	12	1 PPS		Programmable with iSuite MP SDK
	Yes	SONY CXD2985	12	Battery backup		Fastrax IT MP compatible. Programmable with iSuite MP SDK
	No	SiRFstar III GSC3e/LP	20	1 PPS Main power supply Back-up power supply		Fastrax UP MP compatible. Adaptive Trickle-Power. Push-to-Fix. Extended ephemeris. Static filter. Track smoothing.
	No	SiRF GSC3LT	20	1 PPS ON/OFF control		Special design for PNDs. Utilizes PCB as antenna ground plane (min 50x50). Extended ephemeris. Static filter. Track smoothing.
	Yes	SONY CXD2985	12	1 PPS Main power supply Back-up power supply		Fastrax UP MP compatible. Programmable with iSuite MP SDK

Fastrax in a Nutshell

Fastrax manufactures GNSS (Global Navigation Satellite Systems) receivers and develops software for enhanced satellite navigation and for cost efficient end application development.

GNSS / GPS Receivers

Fastrax, a company based in Finland and established in 1999, has created a strong brand as a world leader in developing and manufacturing OEM GPS receiver modules. Fastrax receivers meet the most demanding market requirements concerning receiver size, power consumption, performance and programmability.

The receivers are ideally suited for both industrial location applications like various asset tracking platforms and high-volume, consumer products such as PND's (Personal Navigation Devices), battery operated mobile phones, PDA's, and recreational devices.

GNSS / GPS Software

Fastrax iSuite MP SDK (Software Development Kit) is the only available embedded SDK for multiple chipset platforms. It offers the programmer a lot of free resources in processing power, I/O's and memory size and full control of the GPS core. Thus cost and space can be reduced in many devices as no external microcontroller or memory is needed.

Fastrax software knowledge combined with the iSuite Software Development environment and Fastrax's IPR is also an optimal base for continued product development and continued growth of the company.

Fastrax is privately owned and backed by leading venture capital investors CapMan, Eqvitec, Startupfactory and Innocap with a strategic investment by Suunto Corporation, a subsidiary of Amer Group and leading global supplier of sporting equipment.

Fastrax partner network

Fastrax has partners serving the customers in more than 30 countries. All Fastrax partners are constantly trained to be able to support the customers and for aiding the customers to select the most suitable products. Being able to make successful and well functioning designs is a benefit for all parties.

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Fastrax products and services – overview

Best available GPS chipsets combined with Fastrax extensive hardware, RF design and software knowledge enable Fastrax to manufacture state of the art OEM GNSS receivers for varying needs and requirements. The receivers combined with Fastrax strong support and application design knowledge allow customer to integrate GPS functionality in devices with less effort and cost than ever before.

GPS Receiver Module Series

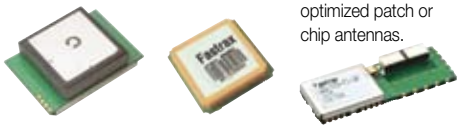
- Fastrax IT300
- Fastrax IT100
- Fastrax IT03

Highly sensitive, very small and cost-efficient GPS modules.

GPS Receiver Modules with Antenna

- Fastrax UC322
- Fastrax UP300
- Fastrax UP130
- Fastrax UP100-S
- Fastrax UP102

GPS receiver modules with already integrated and optimized patch or chip antennas.



Software Development tools

Complete software development environment iSuite MP SDK

Development Tools

For developing IT130 / IT03 embedded client application software

Evaluation Kits

Evaluation Kit for all GPS receivers in the lab or in the field

Fastrax solutions

Fastrax solutions include, in addition to world-class OEM GPS receiver modules, also the best-of-breed tools for product development and application integration, as well as for testing purposes.

Fastrax Engineering Services Team

Fastrax Engineering Services Team has outstanding expertise to integrate the GPS function to your end product. In order to make it easier for your system developers to concentrate in their core competence, Fastrax Engineering team is offering its services to integrate Fastrax modules into specified designs or to optimize the GPS functionality in your application, to ensure the highest possible application quality.

These services include, but are not limited to:

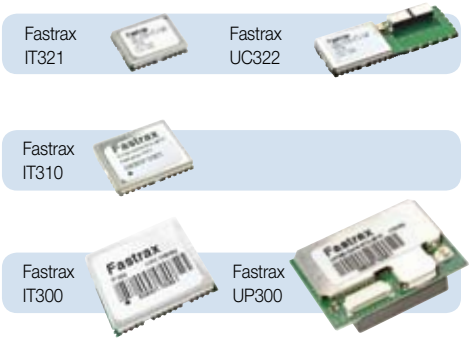
- ***Antenna design service*** - to find the best feasible signal reception in your application, even for very limited space.
- ***Solving EMI issues*** - to avoid or minimize the harmful impact of Electro Magnetic Interference.
- ***System integration issues*** – to solve any difficulties in integrating a GPS functionality in customer's application.
- ***GPS Design Verification*** – for verifying design files already prior to ordering proto types in order to save time and development cost.
- ***GPS testing*** – for testing the application in early stages of development, in order to ensure best available functionality and quality.

Fastrax Technology Platforms

Fastrax GNSS (Global Navigation Satellite Systems) receivers are based on chipsets from a few selected suppliers in order to guarantee best possible features and functionalities at a competitive price for its customers.

SiRF Technology Inc

All receivers in the Fastrax 300-Series are based on the SiRFstarIII™ single chips, either GSC3e/LP, GSC3f/LP or GSC3LT. The protocols and commands are NMEA and/or Sirf binary. The complete Fastrax 300-Series is very high performing including ultra high sensitivity (-159dBm), very fast re-acquisition and marketing leading navigation performance even in urban canyons and dense foliage. Additional features like Adaptive Trickle Power ™, Instant Fix ™, and Extended Ephemeris ™ increase furthermore the performance of the receivers based on SiRFStarIII single chips.



Atheros Communications

(Previously uNav Microelectronics)

All GPS receivers in the Fastrax 03-Series of receivers are based on the RF chip uN8021 and the base band chips uN8130 or uN2110 from Atheros Communications (Atheros). The receivers offer minimal power consumption with excellent navigation performance and on-board data logger, interval mode and versatile programmability with a lot of free processing resources, memory size and I/O's at a very low cos

Sony

The Fastrax 100-Series of receivers are based on the CXD2951 and CXD2985 single chips from Sony. The GPS receiver firmwares are NMEA and either Sony ROM code or Fastrax binary protocols depending on the receiver. The receivers offer very robust functionality with excellent accuracy, on-board data logger and iSuite SDK programmability at very competitive prices.

Fastrax IT321

Ultra small, high sensitive GPS receiver module

High Performance GPS with ROM firmware in miniature package

The Fastrax IT321 is a state of the art GPS receiver module, based on the SiRFstarIII, GSC3LT single chip combined with SiRF ROM code. This tiny GPS receiver provides low power consumption and very fast time-to-first-fix together with weak signal acquisition and extremely demanding tracking capability to meet even the most stringent performance requirements on the market.

Ideal for demanding applications

Fastrax IT321 is an ideal solution for applications with high performance requirements as well as small space and low power consumption requirements. Ideal applications are cost sensitive navigation systems and battery operated consumer devices like mobile phones, PND's, handheld computers and sport accessories. The Fastrax IT321 GPS receiver has one power supply, ON/OFF-control, 1 UART, 1PPS and 2 configuration I/O's that allow the user to configure which firmware version to use. For detailed firmware configuration alternatives, see page 30.

Key Features:

- SiRFstarIII single chip
- 20 channels
- Very low power consumption: 90mW @ 3,3V
- One power supply, no battery back-up
- ON/OFF control
- Ultra high sensitivity: -159dBm
- ROM based firmware
- Very small form factor: 10.4 x 14.0 x 2.3 mm

Actual size

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Other Fastrax 300-Series GPS Receiver Modules

Fastrax IT310

Key Features:

- High Sensitivity with SiRFstarIII
- Ultra High Sensitivity: –159 dBm (navigating and tracking)
- Low power consumption: 110mW @ 3.0V
- Small form factor: 13.1 x 15.9 x 2.3 mm
- Extremely Fast TTFF

Actual size

Fastrax IT300

Key Features:

- High Sensitivity with SiRFstarIII
- Compatible with IT Multi Platform footprint
- Ultra High Sensitivity –159 dBm (navigating and tracking)
- Low power consumption: 110mW @ 3.0V
- Size 16.2 x 18.8 x 2.3 mm
- Extremely Fast TTFF

Actual size

Why IT310?

The advantage of the IT310 is the internal flash memory that allows Fastrax to update the internal firmware depending on customer requirements. Additionally the receiver has 2 UARTs for binary and NMEA protocols, 1PPS and inputs for external clock, timesync and wakeup interrupt.

Why IT300?

The main benefit of Fastrax IT300 is the IT Multi Platform compatible footprint. This allow customer to benefit of the freedom to select three different modules, with three different functionalities but with the same form factor. This translates to flexibility and cost savings in any design.

Fastrax 300-Series receivers with integrated antenna

Fastrax UC322

(More on page 14)

Fastrax UP300

(More on page 15)

Fastrax IT03-S

Programmable, High Sensitive and Low Power GPS Receiver Module

Performance & Power

Ultra-low, user configurable power management makes Fastrax IT03-S one of the lowest power consuming, complete 12-channel GPS receiver modules on the market. Nevertheless, there are no compromises in performance. The Fastrax IT03-S receiver module has a tracking sensitivity as low as -156 dBm making it applicable even for extremely demanding applications and environments.

Programmability for savings

The Fastrax IT03-S features a 8Mbit Flash memory, which allows remote firmware updates, permanent operation parameter changes via NMEA or iTalk 3 and data logging as a standard feature. Fastrax IT03-S supports versatile programmability with iSuite MP SDK, which results to reduced application costs when no external processor is required as the Fastrax IT03-S is used as a host controller. With less components, cost and application size are reduced.

World of applications

Offering industry-leading benefits in performance, size, power consumption, programmability and total cost of product, the Fastrax IT03-S receivers are ideally suited for both industrial tracking and navigation systems and battery operated consumer products like sports accessories, handheld computers, asset tracking devices, vehicle navigation devices and mobile phones.

Actual size

Key Features:

- Atheros chip set (Previously uNav Microelectronics)
- Very small form factor: 16.2 x 18.8 x 2.3 mm
- Ultra-high sensitivity: -156 dBm
- Low power consumption: – only 100 mW @ 2.7V
- Compatible with other MP-family modules
- Programmable with iSuite™
- On-board datalogger

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Other Fastrax 03-Series GPS Receiver Modules

Fastrax IT03

Key Features:

- High Sensitivity with Atheros chip set: -156 dBm (tracking)
- Low power: 100 mW @ 2.7V
- Size: 22 x 23 x 2.9mm
- Extremely Fast TTFF: <36s
- 16 MBit Flash Memory
- DataLogger
- Programmable with iSuite MP SDK
- Extensive interface ports

Actual size

Why IT03?

When you need programmability for more demanding applications, IT03 offers more general purpose I/O's and bigger size flash memory for code or alternatively for storing up to 140.000 data points.

A list for user available resources for all Fastrax IT03-Series of receivers is found in the chapter about iSuite MP SDK.

Fastrax IT03-02

Key Features:

- Compatible mechanics and connectivity with IT02 (IT02)
- Ultra High Sensitivity with Atheros chip set –156 dBm (tracking)
- Size: 25.9 x 25.9 x 4.6mm
- Low power: 100 mW @ 2.7V
- Remote firmware updates
- 16 MBit Flash Memory
- DataLogger
- AMP connector enables retro-fitting

Actual size

Why IT03-02?

For customers who want to upgrade their existing design with IT02 to latest technology without having to re-design the PCB. Additionally it is also the only GPS that has a physical connector and thus the GPS can be installed after SMD process, which makes stock handling more effective.

Fastrax IT130

Fastrax IT MP Compatible, Very Sensitive, Small And Programmable GPS Receiver Module

High performance, Fastrax IT MP compatible GPS receiver with programmable firmware

The Fastrax IT130 is a small SMD GPS receiver module for applications that require permanent configuration changes, on-board data logger, interval functionality for effective power saving modes or position pinning for user configurable position filtering. The flash firmware is upgradeable and the internal ARM7 processor can be programmed with the users own applications firmware.

Programmability

Fastrax IT130 features an 8MBit Flash memory, which allows remote firmware updates, permanent operation parameter changes via NMEA or iTalk 3 and data logging as standard features. Fastrax IT130 supports versatile programmability with iSuite MP SDK, which results to reduced application costs when no external processor is required and when the Fastrax IT130 is used as a host controller. With fewer components, cost and application size are reduced.

Supports iSuite MP SDK

Fastrax IT130 offers full support for iSuite MP SDK environment, which enables exploiting the spare processing capacity and extensive I/O capabilities of this GPS module for many location aware applications. A list for user available resources is found in the chapter about iSuite MP SDK.

Versatile interface

The Fastrax IT130 is very easy to use. User needs only to connect the power supply and design an antenna to make it functional.

Actual size

Key Features:

- Sony CXD2985 single chip
- Compatible with Fastrax IT Multi Platform footprint
- Power Consumption: 150mW@3.0V
- Very High sensitivity: -154dBm (tracking)
- On-board data logger to store up to 30.000 interest points
- Optional programmability with iSuite MP SDK on the ARM7 core

Other Fastrax 100-Series GPS Receiver Modules

Fastrax IT100 can be found under Legacy Products on page 25.

Fastrax 100-Series modules with integrated antenna

Fastrax UP130

More on page 15.

(Fastrax UP100-S and Fastrax UP102 can be found under Legacy Products on page 25)

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Fastrax Multiplatform Receivers

GPS receivers for several applications

Fastrax MP (Multiplatform) receivers are pin compatible with each other offering common form factor and main functionality. The receivers offer very high sensitivity, low power consumption and excellent navigation performance even in most demanding environments.

Fastrax IT MP modules

- Fastrax IT300
- Fastrax IT03-S
- Fastrax IT130

The Fastrax IT03-S and Fastrax IT130 are software compatible concerning NMEA and Fastrax binary protocols while Fastrax IT300 works with Sirf NMEA and Sirf binary protocols.

In order to verify seamless change between modules it is important that any Fastrax IT MP design is made according to the Fastrax IT MP Application Note. The Fastrax IT MP Application Note can be downloaded from www.fastrax.fi

Fastrax UP MP modules

- Fastrax UP300
- Fastrax UP130

Fastrax UP300 and Fastrax UP130 receivers have same footprint, same form factor and same external connectors. Both receivers are also equipped with an already integrated and optimized patch antenna in order to make GPS integration easier than ever before. The Fastrax UP300 work with NMEA and Sirf binary protocol while Fastrax UP130 work with NMEA and Fastrax binary protocol, iTalk.

Benefits:

- Common footprint
- Only one hardware design
- Optimal receiver for each application
- Fast Time To Market with Low Development Cost (development, testing and documentation costs can be shared among several designs)
- 2 UARTS, 1PPS, AD converter, free I/O's
- High sensitivity
- Low power consumption
- Internal data logger and optional programmability with Fastrax 03 and Fastrax 130 Series of receivers

Fastrax IT MP

Key Features:

- Three Pin Compatible receivers
- Footprint: 16.2 x 18.8 x 2.3mm

Fastrax UP MP

Key Features:

- Two Pin Compatible receivers
- Footprint: 19.0 x 27.0mm
- Common system and optional external antenna connectors

Fastrax UC322

Revolutionary antenna solution for PND applications!

NEW!

Actual size

Miniature GPS receiver with chip antenna for PND´s.

The Fastrax UC322 is an OEM GPS receiver module, which uses the state of the art SiRF single chip receiver GSC3LT with high navigation sensitivity (-159dBm). The UC322 receiver is equipped with an on-board chip antenna that enables thinner PND design than ever before. The receiver provides low power consumption (90mW) and very fast TTFF together with weak signal acquisition and tracking capability to meet even the most demanding performance expectations.

Impossible to fit in a good antenna?

The module provides complete signal processing from embedded GPS antenna to serial data output in NMEA (or SiRF binary) messages. The embedded chip antenna has good radiation gain, which leads to solid GPS signal levels. The antenna operation is optimized for 50-110mm ground plane width.

Mother Board PCB = GPS Antenna Ground Plane

Fastrax UC322 enables extremely high navigation performance even for applications with very tight requirements for size. The antenna does not need a separate ground plane. Instead it utilizes the application's own PCB for gaining the best antenna signal.

Ultimate GPS receiver module

SiRF GSC3LT chipset with the sensitivity of -159 dBm joined by this revolutionary antenna solution, enables navigation in urban canyons, where many others would fail in acquiring and reading the signal from satellites.

Key Features:

- SiRF GSC3LT single chip
- 20 channels
- Revolutionary antenna solution
- Size: 10.4 x 30.0 x 2.9mm
- Sensitivity: -159 dBm (tracking)
- Power consumption: 90 mW @ 3.3V
- Full SMT mounting
- Operating temp: -30ºC…+85ºC
- One power supply, no battery back-up

NOTE: For detailed firmware configuration alternatives, see page 30.

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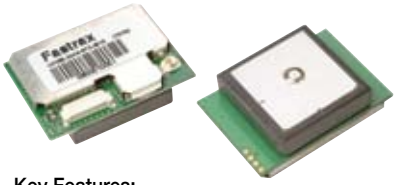
Fastrax GPS Modules with Integrated Patch Antennas

Fastrax UP300



Key Features:

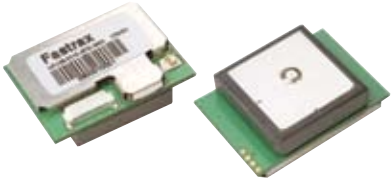
- SiRF GSC3e/LP single chip
- Size 19 x 27 x 7.2mm
- Sensitivity: -159 dBm (tracking)
- Power consumption: 120 mW @ 3.3V

Actual size

Other Features:

- Embedded GPS patch antenna
- Ultra High Sensitivity with SiRFstarIII single chip receiver
- Low power consumption
- External system connector
- Connector for optional external antenna

Fastrax UP130



Key Features:

- SONY CXD2985 single chip
- Size 19 x 27 x 7.2mm
- Sensitivity -154 dBm (tracking)
- Power consumption 150 mW @ 3.0V

Actual size

Other Features:

- Integrated GPS antenna
- High Sensitivity with Sony single chip receiver
- Flash Memory 8 MBit
- DataLogger
- Programmable with iSuite™3 SDK
- Flexible configurations with default firmware
- External system connector
- Connector for optional external antenna

NOTE: Cable + connector available for Fastrax UP300 / Fastrax UP130 – see accessories on page 24

iSuite MP SDK

Software Development Kit for Embedded GPS Applications

iSuite MP SDK is a complete software development environment for application specific customization and programming of Fastrax GPS Receivers.

The main advantages are fast time to market, miniature size and lowest possible cost of ownership as no additional microcontroller is needed in the end applications. Suitable target segments are asset tracking, person tracking and recreation applications where miniature size, lowest possible power consumption and excellent sensitivity are key requirements.

Typical iSuite MP SDK Applications

iSuite MP SDK is used in a variety of different applications. The applications are often high volumes consumer application like speed camera devices, Bluetooth positioning devices, sports devices or anti-theft asset tracking devices. In such applications the internal microcontroller has been used to manage GSM/GPRS modems, Bluetooth modules, LED's, displays, buttons, microphones, POI storage etc. The iSuite MP SDK has also been used for more technical requirements such as geo-fencing, integrating proprietary communication protocols, accessing carrier phase data or 100Hz post processed position updates.

Develop your own application

iSuite MP SDK is used to develop customer specific applications that are executed on the Fastrax IT OEM GPS receivers. The customer application software can process both raw and calculated position data generated by the iSuite MP SDK GPS Navigation software. The application software can also communicate with other devices with standard and customer specific communication protocols. The Fastrax IT receivers can also be used to do other programmed tasks triggered either internally or externally. These applications can utilize the on chip memory, flash memory file system for data and software code storage in addition to access the various I/O lines on the Fastrax IT OEM GPS receiver. The receivers provide enough memory and bandwidth for even complex user tasks.

iSuite MP SDK is now more powerful than ever

iSuite MP SDK is the only true embedded, real time GPS Software Development Environment and it is furthermore available for multiple GPS chipset platforms! Spare CPU processing capacity and extensive I/O's of Fastrax IT03, Fastrax IT03-S, Fastrax IT03-02, Fastrax IT130 and Fastrax UP130 OEM GPS receivers can be used for custom purposes.

	IT03/16	IT03-S	IT03-02	IT130	UP130
Free Program code and constant data memory Flash [1]	1082 kBytes	57.8 kBytes	1082 kBytes	553.5 kBytes	
CPU Available for user applications • Code executed from RAM [2] • Code executed from Flash [2]	41% of total CPU cycles free 4.8 Dhrystone MIPS 0.8 Dhrystone MIPS			68% of total CPU cyckles free 17 Dhrystone MIPS 4.0 Dhrystone MIPS	
Free RAM memory	48 kBytes			20.7 kBytes	

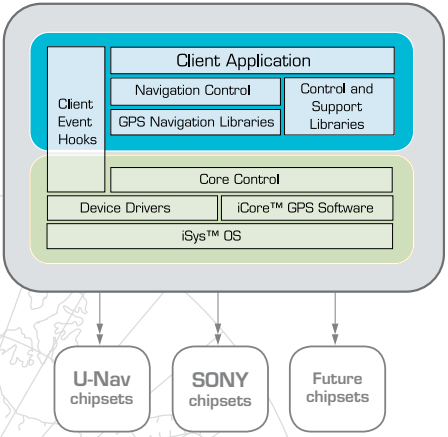
Note 1): These are minimum values. Available program code space can be increased by leaving out unused system features while compiling user application. Note 2): 100% of the CPU can be allocated to user application by temporarily suspending the GPS functionality.
NOTE: System resources are based on currently available iSuite firmware version. Available resources are subject to change without prior notice.

iSys Real Time Operating System

iSys offers true multitasking and a 100% control of the application while iTalk protocol offers effective synchronized message queues. Programming challenges of multitasking and data sharing environment are already solved by the operating system and by using the extensive system programming facilities you can concentrate to what is important for you without the need to reinvent the wheel.

Toolkits for controlling your device

Optional iSuite MP SDK Toolkits can be used to enhance the capabilities further. Control of wireless modems, simple keyboards, LCD displays and other similar devices is easy to implement with specialized Toolkits which provide functional reference implementations with complete source code. iSuite MP SDK Toolkits are well suited for demanding application development such as interfacing with external sensors and peripheral devices. This allows Fastrax IT OEM GPS receivers to be used in independent solutions like wireless asset tracking devices and applications based on geo-fencing databases.

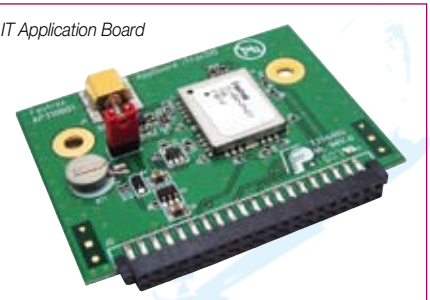


Hardware Platforms for application development with iSuite MP SDK

The Fastrax Evaluation Kit or the Fastrax Mini Evaluation kit together with either appropriate IT Application Board, or with the IT130 Development Board are used as hardware development platforms for iSuite MP SDK software development. The hardware enables easier debugging and testing of receiver software and access to all interface signals of programmable modules.
Fastrax hardware development platforms together with iSuite MP SDK enable seamless platform to platform transition of the application code and thus your valuable investment in software development is protected.

IT130 Development Board

IT Application Board



iSuite MP SDK Includes:

- iSuite MP SDK Software development environment
- New iSuite Builder IDE
- iSys™ Portable Real Time Operating System
- GPS core software, navigation libraries with control and support API's
- System libraries and device drivers with source code
- Protocol libraries with source code including iTalk 3 and NMEA.
- Full on-line documentation
- Support for Windows based development, debugging and testing using Microsoft® Visual Studio® .NET 2003
- 2 days of intensive training is optionally available.

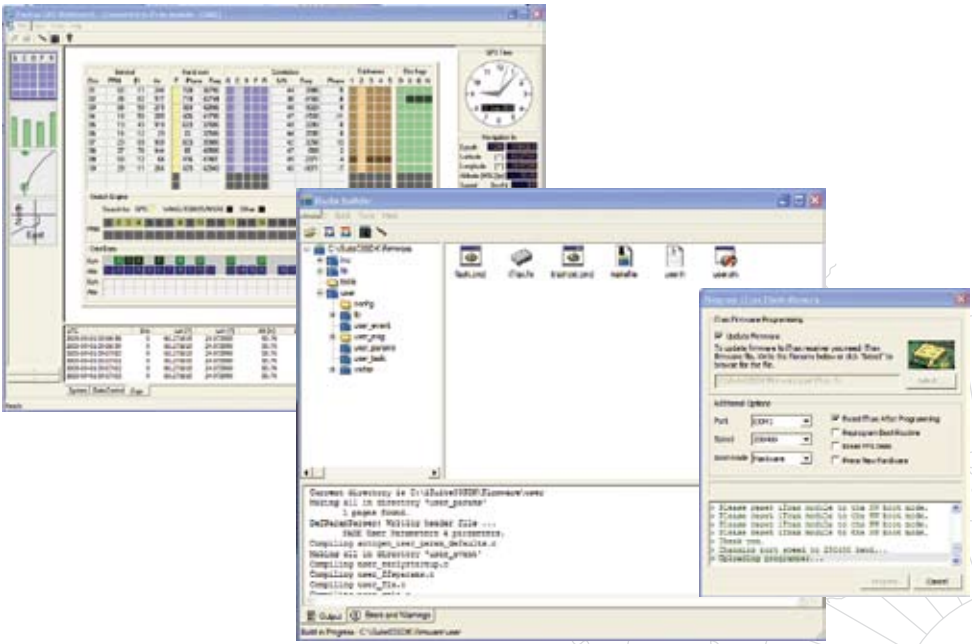
For more information, please visit iSuite SDK Developers site http://isuite.fastrax.fi

iSys Operating System

- iSys Operating system offers true multitasking with real time response to user tasks
- iSys supports task prioritization, inter-task messaging and synchorization
- iSys libraries for Windows XP operating System provides development and testing using Microsoft Visual Studio .Net 2003

iSuite MP SDK Software

- iSuite MP SDK customizable communications libraries for iTalk 3 and NMEA protocols
- A-GPS support
- DGPS support
- Advanced search and tracking software
- Advanced multipath mitigation
- Advanced cross correlation mitigation
- Configurable power management
- Flash File System
- Autonomous Logging system
- WAAS/EGNOS/MSAS support



iSuite Builder IDE

- Automatic creation and management of user projects
- Automated firmware build process
- Flash memory programming
- Configurable and extensible parameter system

GPS Navigation Library

- Extensively configurable
- Kalman navigation engine
- Standard interfaces for external A-GPS, DGPS and INS data

Control and Support Libraries

- Navigation and GPS core control for specialized customer applications
- Provides complete control over GPS functionality

GPS Workbench PC Software

- Easy and quick evaluation of programmable Fastrax IT OEM GPS receivers
- Complete data archiving and playback capability including raw GPS measurements
- Flash programming and debugging tools
- Data handling and navigation hosting for PC based development, debugging and testing

Documentation and Training

- 2 days optional training and hands-on programming sessions are available
- Full On-line documentation with search facilities make using the SDK easy

For more information, please visit iSuite SDK Developers site http://isuite.fastrax.fi

Tester with optional flasher tool

Fastrax Mini Evaluation Kit

Easy evaluation of Fastrax receivers

The Fastrax Mini Evaluation Kit is equipped with a 40 pin socket for Fastrax Application Boards and a JST system connector for Fastrax UP300 and Fastrax UP130 antenna modules. Easy module evaluation of the different GPS receivers can be done by simply changing the application boards or by connecting the Fastrax UP300 or Fastrax UP130 with a cable to the system connector.

The Fastrax Mini Evaluation kit is furthermore equipped with two (mini-B) USB connectors, a reset switch and a programming switch for firmware upgrades. PPS signal is available from a pin header and the general I/O lines can be probed from a 40-pin socket connector if needed. The GPS antenna signal is obtained by connecting an active antenna to the MCX rf connector of the Application Board. The Fastrax UP receivers do not need an external antenna as they are already equipped with an internal patch antenna.

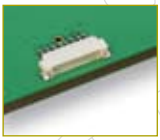
Fastrax provides one USB cable in the sales package. The USB needs drivers to be installed on the PC. This driver is included in the sales package on a CD, but it can also be downloaded from the iSuite SDK Developers page at: http://isuite.fastrax.fi/downloads.html

Suitable PC softwares are either terminal programs for NMEA, Fastrax GPS WorkBench for iTalk or Sirf Demo for Sirf binary. The Sirf Demo can be requested from support@fastrax.fi while the Fastrax GPS WorkBench can be downloaded from:

http://isuite.fastrax.fi/downloads.htm

- For all Fastrax IT GPS receiver modules
- For Fastrax UP300 and Fastrax UP130 GPS antenna modules

Mini-B USB connector



JST system connector for Fastrax UP300 and Fastrax UP130

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Fastrax Evaluation Kit

For thorough evaluation of Fastrax IT receivers and for iSuite MP SDK development projects

The Fastrax Evaluation Kit is equipped with a 40 pin socket for Fastrax Application Boards. The different Fastrax IT receivers can be evaluated by simply changing the Application Boards internally.

In addition to the internal 40 pin Application Board system connector and 2x20 pin IDC connector for all CMOS level I/O signals, the Fastrax Evaluation kit has external interfaces for antenna (MCX, 2.8V bias voltage), power supply (+6VDC...16VDC), two 9-pin serial ports, 1PPS output, on/off switch, program/reset switch and one LED for low battery indication and two LED's for user interfaces. The Fastrax Evaluation Kit is also equipped with two AA battery holders that enable field test without the need for nerve wrecking power supply arrangements.

In the sales package Fastrax include two Null modem cables for serial communication, a universal power supply, a user manual including schematics, an active GPS antenna and two AA batteries for independent operation.

Suitable PC softwares are either terminal programs for NMEA, Fastrax GPS WorkBench for iTalk or Sirf Demo for Sirf binary. The Sirf Demo can be requested from support@fastrax.fi while the Fastrax GPS WorkBench can be downloaded from:

http://isuite.fastrax.fi/downloads.html

- For all Fastrax IT GPS receiver modules
- For iSuite MP SDK Application Development

smart positioning

Fastrax Application Boards

Fastrax has developed Application Boards for all Fastrax IT modules in order to make evaluation easier. The Application Boards are connected to the Fastrax Evaluation kit or the Fastrax Mini Evaluation kit with the on-board 40 pin system connector. The application boards are also equipped with a MCX antenna connector for the external active antenna.

Each Application Board is also a reference design for its appropriate Fastrax IT module and therefore each BoM and design layouts are described in detail in the Technical Interface Description of each module.

- For Fastrax Evaluation kit
- For Fastrax Mini Evaluation kit

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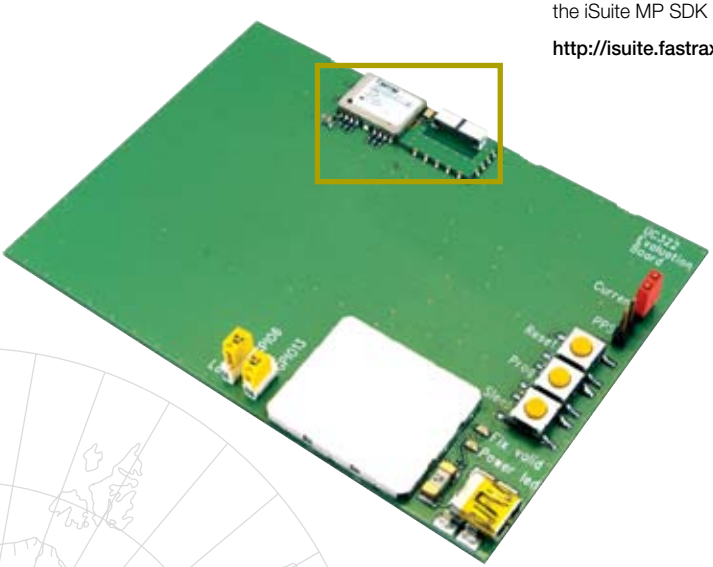
Fastrax EV322 Evaluation Board

For Fastrax UC322 module evaluation

The Fastrax EV322 Evaluation Board is used for evaluating the Fastrax UC322 module including the antenna performance of the integrated, miniature GPS antenna. The Fastrax EV322 Evaluation board provides a single chip USB to UART Bridge, a regulated +3.3V power supply for Fastrax UC322 module and three push buttons for re-set, on/off (normal mode / hibernate mode) and re-programming mode.

The ground plane size of the Fastrax EV322 Evaluation board is 100x70mm, which reflects the size of a typical PCB in Personal Navigation Devices. The PCB of the end application acts as a vital part of the embedded GPS antenna operation.



▶ For Fastrax UC322 OEM GPS receivers

The Fastrax UC322 modules are configured to 4800 baud by default and any software suitable for NMEA evaluation can be used.

Sirf Demo software can also be used and it can be requested from support@fastrax.fi.

Fastrax provides one USB cable in the sales package. The USB needs drivers to be installed on the PC prior to connecting the Fastrax EV322 Evaluation Board to the computer. This driver is included in the sales package on a CD, but it can also be downloaded from the iSuite MP SDK Developers page at:

http://isuite.fastrax.fi/downloads.html

Legacy GPS receiver modules

Fastrax designs new modules continuously and thus some modules that have been in the standard offering for a long time are considered as legacy products. The modules are still available, but improvements or modifications for these modules are made very selectively.

Fastrax IT100

- Sony CXD2951 single chip
- Sony ROM code
- Easy to use
- For plain NMEA need

Fastrax UP100-S

- Integrated GPS antenna
- Size 22 x 22 x 8mm
- Patch antenna 18 x 18 x 4mm
- SONY CDX 2951GL-4 single chip
- Sensitivity -152 dBm (tracking)

Fastrax UP102

- Integrated GPS antenna
- Size 28 x 28 x 7.4mm
- Patch antenna 25 x 25 x 4mm
- Low power consumption: 145mW @ 3.3V
- SONY CDX 2951GL-4 single chip
- Suitable for GPS mouse type of applications

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Accessories

In order to make design, sourcing and manufacturing easier Fastrax offers some accessories that can be used together with the GPS receiver modules. The accessories are sold only in conjunction with modules. Order codes can be found on page 31.

Fastrax UP300 and Fastrax UP130: System cable and mother board connector

The 10 cm system cable including system connectors on both ends is designed to be used with the Fastrax UP300 and Fastrax UP130 GPS antenna receivers. Fastrax offers also the mother board system connector separately in order to make sourcing even easier. Detailed information about the system cable and the mother board connector can be downloaded from www.fastrax.fi or by contacting any Fastrax distributors, sales contacts or by e-mailing support@fastrax.fi.

Fastrax IT03-02: AMP 4-5353512-0 mating connector

The AMP mating connector is used for the system connector on the Fastrax IT03-02 GPS receiver.

Fastrax UP102: Mounting clip

The mounting clip is designed to make Fastrax UP102 mounting easier. Detailed information about the mounting clip can be downloaded from www.fastrax.fi or by contacting any Fastrax distributors, sales contacts or by e-mailing support@fastrax.fi.

	General	GPS receiver I/C	Channels	Sensitvity	Height (mm)	Weight (g)	Serial Ports	Protocols	Baudrate	Update rate	1PPS
OEM GPS Receivers											
Fastrax IT321 NEW!	L1 frequency, C/A code	GSC3LT	20	-159dBm	2.3	0.7	1	NMEA, Sirf binary	4800, 57600	1Hz	Yes
Fastrax IT310	L1 frequency, C/A code	GSC3fLP	20	-159dBm	2.3	0.9	2	NMEA, Sirf binary	4800, 9600, 57600	1Hz	Yes
Fastrax IT300	L1 frequency, C/A code	GSC3eLP	20	-159dBm	2.3	1.4	2	NMEA, Sirf binary	4800, 9600, 57600	1Hz	yes
Fastrax IT03-S	L1 frequency, C/A code	uN2110 + uN8021	12	-156dBm	2.3	1.6	2	NMEA, iTalk	fully configurable	1Hz(..3Hz)	yes
Fastrax IT03/16	L1 frequency, C/A code	uN8130 + uN8021	12	-156dBm	2.9	2.7	2	NMEA, iTalk	fully configurable	1Hz(..3Hz)	yes
Fastrax IT0302	L1 frequency, C/A code	uN8130 + uN8021	12	-156dBm	4.6	4.3	2	NMEA, iTalk	fully configurable	1Hz(..3Hz)	yes
Fastrax IT130	L1 frequency, C/A code	CXD2985	12	-154dBm	2.3	1.4	2	NMEA, iTalk	fully configurable	1Hz	No
Fastrax IT100	L1 frequency, C/A code	CXD2951	12	-152dBm	2.8	1.6	1	NMEA, SONY ASCII	4800, 9600, 19200, 38400	1Hz	yes

* Increased TTFF times may occur when operating temperature is between -40C and -30C

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I/O ports	Antenna	Antenna input	Antenna bias	Flash memory	Data-logger	Operating temperature	Storage temperature	Other
24 contact LGA One asynchronous serial port 1PPS output 2 x GPIO External clock input Timesync input Input for ON/OFF control	No	ext. active or passive	Yes	No	No	-30C...+85C	-40C...+85C	Adaptive TricklePower Push-to-Fix Extremely fast TTFF EE (Extended ephemeris)
36 contact LGA Two asynchronous serial ports 1PPS output 2 x GPIO External clock input Timesync input Wakeup interrupt input	No	ext. active or passive	Yes	Yes	No	-30C...+85C	-40C...+85C	Adaptive TricklePower Push-to-Fix Extremely fast TTFF EE (Extended ephemeris)
30 contact LGA Two asynchronous serial ports 1PPS output 7xGPIO (one interrupt capable)	No	ext. active or passive	Yes	Yes	No	-30...+85 C*	-40 - +85 C*	Fastrax iT MP (Multi Platform) footprint. Adaptive Trickle Power, Push-To-Fix, EE
30 contact LGA Two asynchronous serial ports 1PPS output SPI-bus Capture timer input Pulse measurement input MMC (Master) connection	No	ext. active or passive	Yes	Yes	Yes	-40...+85 C*	-40 - +85 C*	Programmable with iSuite MP SDK DataLogger up to 10.000 datapoints
Two asynchronous serial ports 22-pin GPIO (Shared functionality) 2 x SPI-interface Dual pulse measurement inputs 1PPS output 2 x Pulse measurement timers 2 x Capture timers 2 x Clock inputs MMC (Master) connection	No	ext. active or passive	Yes	Yes	Yes	-40...+85 C*	-40 - +85 C*	Programmable with iSuite MP SDK DataLogger up to 140.000 datapoints
Two asynchronous serial ports 1PPS output SPI-bus 27 GPIOs with shared functionality 2 x Pulse measurement timers 2 x Capture timers MMC (Master) connection	No	ext. active or passive	Yes	Yes	Yes	-40...+85 C*	-40 - +85 C*	Programmable with iSuite MP SDK DataLogger up to 140.000 datapoints Compatible with IT02
Two asynchronous UART data ports 12-bit GPIO 10-bit A/D, 2 channel + reference voltage		ext. active or passive	Yes	Yes	No	-40...+85 C*	-40 - +85 C*	Programmable with iSuite MP SDK DataLogger
One asynchronous data port 18-pin interface pads Two baud rate select pins 1PPS output Valid fix indicator output Main power supply External reset input Battery backup supply	No	ext. active or passive	Yes	No	No	-40...+85 C*	-40 - +85 C*	

OEM GPS Receivers with antenna >>

	General	GPS receiver I/C	Channels	Sensitvity	Height (mm)	Weight (g)	Serial Ports	Protocols	Baudrate	Update rate	1PPS
OEM GPS Receivers with antenna											
Fastrax UC322 NEW!	L1 frequency, C/A code	GSC3LT	20	-159dBm	2.9	2.0	1	NMEA, Sirf binary	4800, 57600	1Hz	Yes
Fastrax UP300	L1 frequency, C/A code	GSC3e/LP	20	-159dBm	7.2	9.1	2	NMEA, Sirf binary	9600	1Hz	Yes
Fastrax UP130	L1 frequency, C/A code	CXD2985	12	-154dBm	7.2	9.1	1	NMEA, iTalk	9600	1HZ	Yes
Fastrax UP102-R	L1 frequency, C/A code	CXD2951	12	-152dBm	7.4	13.4	1	NMEA, SONY ASCII	4800, 9600	1Hz	Yes
Fastrax UP102-C	L1 frequency, C/A code	CXD2951	12	-152dBm	7.4	13.4	1	NMEA, SONY ASCII	4800, 9600	1Hz	Yes
Fastrax UP100-S	L1 frequency, C/A code	CXD2951	12	-152dBm	8	9.4	1	NMEA, SONY ASCII	4800, 9600, 19200, 38400	1Hz	Yes

* Increased TTFF times may occur when operating temperature is between -40C and -30C

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I/O ports	Antenna	Antenna input	Antenna bias	Flash memory	Data-logger	Operating temperature	Storage temperature	Other
27 contact LGA One asynchronous serial port 1PPS output 2 x GPIO Input for ON/OFF control	10 x 3 x 2 chip	Int. Chip antenna	NA	No	No	-30C...+85C	-40C...+85C	Adaptive TricklePower(TM) Push-to-Fix(TM) Extremely fast TTFF EE (Extended ephemeris)
Asynchronous serial port A Main & Back-up supply 1PPS output RESET input UPDATE input (re-programming)	18,4 x 18,4 x 4,2 patch	Int.patch and optional ext. antenna	same as main supply	No	No	-30C...+85C	-40C...+85C	Adaptive TricklePower(TM) Push-to-Fix(TM) Extremely fast TTFF EE (Extended ephemeris)
Asynchronous serial port A Main & Back-up supply 1PPS output RESET input UPDATE input (re-programming)	18,4 x 18,4 x 4,2 patch	Int.patch and optional ext. antenna	same as main supply	Yes	Yes	-40C...+85C	-40C...+85C	Programmable with iSuite MP SDK DataLogger
One serial/USB data port 10-pin interface pads Two baudrate select pins 1PPS output Valid fix indicator output Main power supply External reset input Battery backup supply	25 x 25 x 4 patch	Int.patch	NA	No	No	-40C...+85C	-40C...+85C	Plastic holder available
One serial/USB data port 10-pin interface pads Two baudrate select pins 1PPS output Valid fix indicator output Main power supply External reset input Battery backup supply	25 x 25 x 4 patch	Int.patch	NA	No	No	-40C...+85C	-40C...+85C	Plastic holder available
One asynchronous data port 10-pin pad-row w/1.27mm pitch Two baud rate select pins 1PPS output Valid fix indicator output Main power supply Battery backup supply	18 x 18 x 4 patch	Int.patch	NA	No	No	-40C...+85C	-40C...+85C	

Configurations for 300-Series, ROM based receivers

- Fastrax IT321 and Fastrax UC322 GPS receiver modules

High Performance GPS with ROM firmware

The user needs access to GPIO2 and GPIO6 in the respective receivers and by pulling these pins high or low the user can choose which firmware is selected from the on-board ROM code. The table below indicates what configurations are chosen with the different pin states:

Configuration	1	2	3
GPIO6 input	low	high	low
GPIO2 input	low	low	high
Protocol	NMEA 3.01	SiRF binary	NMEA 3.01
Baud rate	4800,n,8,1	57600,n,8,1	57600,n,8,1
NMEA messages @1s	GGA, GSA, GSV@5s, RMC, VTG	-	GGA, GSA, GSV, RMC, VTG, (EE)
Binary messages @1s		2, 4, 9, 13, 18, 41, (EE)	
GPIO1 output, no navigation	high	high	high
GPIO1 output, navigation	100ms high @ 1Hz	100ms high @ 1Hz	100ms high @ 1Hz
DGPS/SBAS	Disabled	Enabled	Enabled
Static navigation filter	Disabled	Disabled	Enabled
Track smoothing filter	Enabled	Enabled	Enabled
Internal DR	Disabled	Disabled	Enabled
Extended Ephemeris	Disabled	Enabled	Enabled

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Fastrax Order Codes

Fastrax order codes define GPS receivers, Evaluation tools and accessories as well as hardware and software versions.

General naming convention

The GPS receivers are named: xxxxxx-sssr-yyy-bbbb:

Where xxxxxx	=	Module name (e.g. IT321, UC322, IT03S, UP130)
sss	=	Firmware version (e.g. 324, 325 (Sirf), 331, 341 (iTalk)
r	=	Incremental starting from A, Sirf is always S
yyy	=	Firmware specific custom code (e.g. STD=standard)
bbbb	=	Material code

Example codes:

IT03S-331E-STD-1677 = Fastrax IT03-S, firmware 3.31.E (6151)-standard conf., BoM 1677

IT300-324S-STD-1892 = Fastrax IT300, firmware 3.2.4 (Sirf), standard conf., BoM 1892

GPS Modules

Fastrax 300-Series:

IT321-325S-ROM-XXXX	(available in Q1/2008)
IT310-325S-STD-XXXX	(available in Q1/2008)
IT310-324S-STD-XXXX	
IT300-325S-STD-XXXX	(available in Q1/2008)
IT300-324S-STD-XXXX	

Fastrax 03-Series:

IT03S-341E-STD-XXXX
IT03S-331E-STD-XXXX
IT316-341E-STD-XXXX
IT316-331E-STD-XXXX
IT032-341E-STD-XXXX
IT032-331E-STD-XXXX

Fastrax 100-Series

IT130-341E-STD-XXXX
IT130-331E-STD-XXXX
IT100-180A-ROM-XXXX

GPS Modules with integrated Antennas

Fastrax 300-Series:

UC322-325S-ROM-XXXX	(available in Q1/2008)
UP300-325S-STD-XXXX	(available in Q1/2008)
UP300-324S-STD-XXXX	

Fastrax 100-Series

UP130-341E-STD-XXXX
UP130-331E-STD-XXXX
UP102R-180A-ROM-XXXX
UP102C-180A-ROM-XXXX
UP100-180A-ROM-XXXX

Evaluation Tools

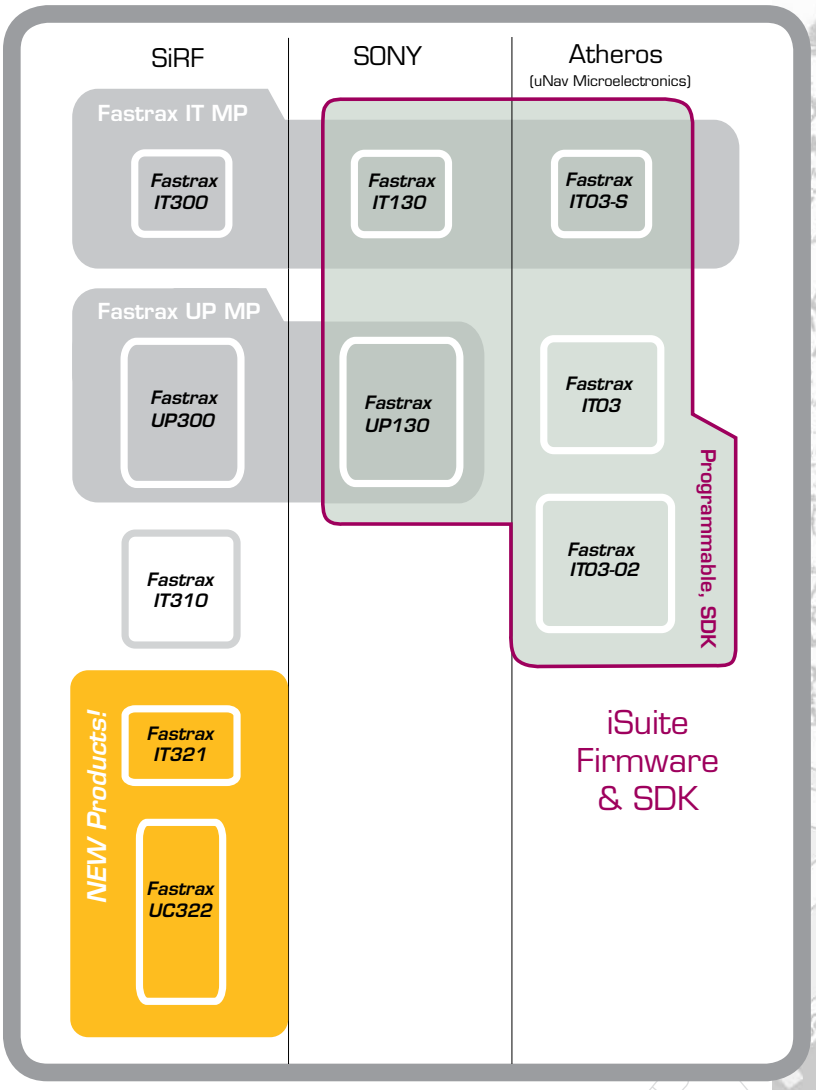
Fastrax Mini Evaluation kit:	MVK
Fastrax Evaluation kit:	EVK
Fastrax EV322 Evaluation Board:	EV322
Application Boards=AP+module code:	
AP321, AP310, AP300	(300-Series)
AP03S, AP03/16, AP0302	(03-Series)
AP130, AP100	(100-Series)

All Evaluation kits, Application Boards and the EV322 Evaluation Board are supplied with the latest available firmware versions by default unless otherwise requested.

Accessories

Cable for UP300 and UP130:	CBL-JST-2351
Connector for UP300 and UP130 cable:	CON-JST-1852
Mounting Clip for UP102:	CLIP-UP102
AMP system connector for IT032:	AMP 4-5353512-0

Fastrax GPS Receiver Modules
arranged according to chip set and general characteristics.



Fastrax

Valimotie 7, FI-01510 Vantaa, FINLAND
www.fastrax.fi