GPS-1 Peripheral board

Quick Start Guide

(For use with MINI-MAX/ARM)

Document Revision: 1.01

Date: 8 September, 2009



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1. Overview

Thank you for your purchase of the GPS-1 peripheral board. GPS-1 is based MN5010HS GPS Receiver Module. GPS-1 output messages are NMEA-0183 compatible. This document describes how to use GPS-1 with MINI-MAX/ARM (-C or -E) Single Board Computer.

2. Tools

2.1 GCC (GNUARM) is an open-source software development tool. The package includes the GNU GCC compiler for C and C++.

2.2 Micro-IDE from BiPOM (<u>www.bipom.com</u>) is a Windows-based Integrated Development Environment for micro-controller application development. Micro-IDE provides a built-in terminal window to interact with MINI-MAX boards through a host PC's COM port.

2.3 CoordTrans and GpsGate from Franson Technology (http://franson.com) are multifunctional GPS utility programs for professional and personal use.

2.4 Project examples for MINI-MAX/ARM.

3. Software setup

3.1 Installing GNU ARM C Compiler

Download GNU ARM C Compiler from: http://www.bipom.com/armdev_down.php

Download and run this file and a Welcome screen will appear.

Setup - GNUAR	
	Welcome to the GNUARM Setup Wizard
	This will install GNUARM 4.1.1 on your computer.
	It is recommended that you close all other applications before continuing.
	Click Next to continue, or Cancel to exit Setup.
	Next > Cancel

License Agreement will appear.

Setup - GHUAR	- 🗆 🗙
License Agreement Please read the following important information before continuing.	
Please read the following License Agreement. You must accept the terms of this agreement before continuing with the installation.	
GNU GENERAL PUBLIC LICENSE Version 2, June 1991	1
Copyright (C) 1989, 1991 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.	
Preamble	
The licenses for most software are designed to take away your	•
 I accept the agreement I do not accept the agreement 	
< <u>B</u> ack <u>N</u> ext>	Cancel

Please read the agreement. If you wish to continue with installation, select "I accept the agreement" and click Next.

Select destination location:

🚟 Setup - GRUARE
Select Destination Location Where should GNUARM be installed?
Setup will install GNUARM into the following folder.
To continue, click Next. If you would like to select a different folder, click Browse.
C:\Program Files\GNUARM Browse
At least 105.2 MB of free disk space is required.
< <u>B</u> ack (Next> Cancel

Using default location C:\Program Files\GNUARM is recommended. Click Next to continue.

On the next page, select components to install. Just keep the default settings if you do not know what to select:

Select the components you want to install. Click Next when you are rea	o install; clear the components y ady to continue.	ou do not want to
Full installation		_
ARM-THUMB Interworking	3	11.7 MB 🔺
— 🗹 ТНИМВ		23.3 MB
THUMB Libraries		11.6 MB
ARM-THUMB Interwork	king	11.7 MB
🛛 🗹 Floating Point Unit		34.7 MB
FPU Libraries		11.6 MB
🔤 🗹 No Fast Multiplier		11.6 MB
ARM-THUMB Interwork	king	11.6 MB 💻
J		-

Click Next to select the Start Menu Folder where the shortcuts for GNUARM will be installed. Default selection is **GNUARM**:

Gang Setup - GHUAR	<u>- 🗆 ×</u>
Select Start Menu Folder Where should Setup place the program's shortcuts?	R
Setup will create the program's shortcuts in the following Start Me	enu folder.
To continue, click Next. If you would like to select a different folder, click B	Browse.
GNUARM	Browse
Don't create a Start Menu folder	
< Back Next >	Cancel

Click Next.

Select Additional Tasks:

Setup - GHUAR	- 🗆 🗵
Select Additional Tasks Which additional tasks should be performed?	
Select the additional tasks you would like Setup to perform while installing GNUARM, then click Next.	
Additional icons:	
🔽 Create a <u>d</u> esktop icon	
Cygwin options:	
🔽 Install Cygwin DLLs (ONLY in case you don't have or don't use Cygwin)	
< <u>Back</u>	ncel

The option "Install Cygwin DLLs" should be checked. Uncheck this only if you are sure that you had installed Cygwin previously on your computer.

Click on Next button. The Ready to install page now appears:

Setup is now ready to begin installing GI	NUARM on your computer.	Į
Click Install to continue with the installat change any settings.	ion, or click Back if you want to review c	ır
Destination location: E:\Program Files\GNUARM		-
Setup type: Full installation		
Selected components: Little Endian LE Libraries No Fast Multiplier ARM-THUMB Interworking THUMB THUMB		_
		▶

Click Install.

GNUARM will be installed and you will see the progress:

Setup - GHUAR	- 🗆 🗙
Installing Please wait while Setup installs GNUARM on your computer.	
Extracting files C:\Program Files\GNUARM\include\c++\4.1.1\arm-elf\bits\stdc++.h.gch\00g.go	:h
	Cancel

When the installation is complete, following page will appear:



Click Finish to finish the installation.

3.2 Installing ARM Development System

Download ARM Development System from: http://www.bipom.com/armdev.php

Open the zip file arm7dev.zip and install by running setup.exe. A Welcome screen will appear:



Click Next. An End User Agreement will appear:

Software License Agreement	×
Please read the following License Agreement. Press the PAGE DOWN key to see the rest of the agreement.	
Please read the following End User License Agreement ("EULA") carefully. The EULA is a legal agreement between you the user and BiPOM Electronics for the use of Micro-IDE (the "Software"). This EULA contains the conditions under which you may use the software as well as warranty and liability disclaimers. By installing, copying or using the Software, you agree to be bound by the terms of this EULA. If you do not agree to the terms of this EULA, do not install, copy, or use the Software. This Software is protected by copyright laws and international copyright treaties, as well as other intellectual property laws and treaties. This Software is licensed, not sold.	
For more information about Micro-IDE, see the About box under Help menu in this program. To learn more about BiPOM Electronics and its products, visit	
Do you accept all the terms of the preceding License Agreement? If you choose No, Setup will close. To install Micro-IDE, you must accept this agreement.	
< <u>B</u> ack <u>Y</u> es <u>N</u> o	

Please read the agreement and click Yes if you wish to continue with installation.

User Information			×
	Please ente number as i	er your name and company name below. Leave serial s for free using Micro-IDE.	
	N <u>a</u> me:	Jack	
	<u>C</u> ompany:	ВіРОМ	
	<u>S</u> erial:	FREE	
250			
			_
		< <u>B</u> ack <u>N</u> ext > Cancel	

Enter your name, company and 'FREE' as a serial number. Then click Next:

You can enter any Serial Number in the Serial field. Click Next to continue. Select the disk location where the software will be installed. Using the default location of c:\bipom\devtools is recommended:

Choose Destination Loca	ation
	Setup will install Micro-IDE in the following folder. To install to this folder, click Next. To install to a different folder, click Browse and select another folder. You can choose not to install Micro-IDE by clicking Cancel to exit Setup.
er (y	Destination Folder
	C:\bipom\devtools\ Browse
	< <u>B</u> ack <u>Next</u> > Cancel

Click Next. Select the Program Folder where the icons for Micro-IDE will be installed.

Default selection is Micro-IDE folder.

	Program Folders: Micro-IDE Existing Folders:
	Giames in the second seco
	GNUARM Google Desktop Google Earth Google Updater Intel(R) Matrix Storage Manager Maintenance Matrix Multimedia
M	

Click Next. Micro-IDE will be installed and you will see the progress:

59 searb		
Micro-IDE		
	66 % Cancel	

When the installation is complete, you will be given an option to start Micro-IDE now.

Setup has finished installing Micro-IDE on your computer. Setup can launch the Read Me file and Micro-IDE. Choose the options you want below.
U would like to launch Micro-IDE.
Click Finish to complete Setup.
< Back Finish

Uncheck the option and click Finish to finish the installation.

3.3 Installing GpsGate program

Download GpsGate from: http://franson.com/gpsgate/

Download and run this installation file and a Welcome screen will appear:

🚏 Franson GpsGate 2.6 - InstallShield Wizard								
	Welcome to the InstallShield Wizard for Franson GpsGate 2.6							
	The InstallShield(R) Wizard will install Franson GpsGate 2.6 on your computer. To continue, click Next.							
	WARNING: This program is protected by copyright law and international treaties.							
	< Back Next > Cancel							

🙀 Franson GpsGate 2.6 - InstallShield Wizard	×								
License Agreement Please read the following license agreement carefully.									
EULA Franson GpsGate									
Franson Technology AB licenses the accompanying software to you only upon the condition that you accept all of									
the terms contained in this license agreement. Please read the terms carefully. If you do not agree to these terms, Franson Technology AB is unwilling to license the software to you, in which event you should delete the									
• I accept the terms in the license agreement									
\bigcirc I do not accept the terms in the license agreement									
Install5hield									
< <u>B</u> ack <u>N</u> ext > Cancel									

🔂 Franson GpsGate 2.6 - InstallShie	d Wizard	×
Inst	allShield Wizard Completed	
The Ir GpsGa	istallShield Wizard has successfully installed Franson ate 2.6. Click Finish to exit the wizard.	
	< Back Finish Cancel	

3.4 Installing CoordTrans program

Download CoordTrans from: http://franson.com/coordtrans/

Download and run the installation file and a Welcome screen will appear:

🙀 Franson CoordTrans v2.30	- InstallShield Wizard	×					
	Welcome to the InstallShield Wizard for Franson CoordTrans v2.30						
	The InstallShield(R) Wizard will install Franson CoordTrans v2.30 on your computer. To continue, click Next.						
	WARNING: This program is protected by copyright law and international treaties.						
	< <u>Back</u> Cancel						
📲 Franson CoordTrans v2 30	- InstallShield Wizard	X					
Franson Loord Trans v2.30 - InstallShield Wizard License Agreement Please read the following license agreement carefully.							

EULA Franson CoordTrans			<u> </u>
Franson Technology AB licer to you only upon the condit the terms contained in this read the terms carefully. I terms, Franson Technology B software to you, in which e software from your system.	nses the a cion that s license If you do AB is unw: event you	accompanying you accept a agreement. P not agree to illing to lic should delet	software all of lease these ense the e the
			-
1 ITOPMOP			<u> </u>
• I accept the terms in the license agreeme	nt		
C I do not accept the taying in the linearce as	: 		
 T go not accept the terms in the license ag 	greemend		
ostal/Shield			
	< <u>B</u> ack	<u>N</u> ext >	Cancel

🖟 Franson CoordTrans v2.30 - InstallShield Wizard 🛛 🔀								
	InstallShield Wizard Completed							
	The InstallShield Wizard has successfully installed Franson CoordTrans v2.30. Click Finish to exit the wizard.							
	Launch the program							
	< <u>B</u> ack Einish Cancel							

Uncheck the option and click Finish to finish the installation.

4. Hardware Setup

4.1 Place the MINI-MAX/ARM Microcontroller board on a clean, non-conductive surface.

4.2 Connect the provided 6VDC power supply plug to the power jack on the MINI-MAX/ARM. Do not connect the power supply to the outlet yet.

CAUTION: Do not use a power supply other than one that is supplied or approved by BiPOM Electronics. Use of another power supply voids the warranty and may permanently DAMAGE the board or the computer to which the board is connected!!!

4.3 Connect the MINI-MAX/ARM to an available serial port on the PC using the supplied serial cable as shown:





4.4 Install X1,X4,X13 and X15 jumpers to the GPS-1 board:

4.6 Set a GPS-1 peripheral board on a socket of expansion MINI-MAX/ARM. Peripheral boards can either be stacked on top of MINI-MAX/ARM using stand-offs or connected in a chain configuration using flat ribbon cable. The following Figure shows how MINI-MAX/ARM can be connected to a GPS-1 board in a stacked fashion.



^{4.5} Connect GPS antenna (1575MHz).

5. Downloading Programs

After the software is installed, you can build and download programs to the MINI-MAX/ARM board. Follow the steps below:

5.1 Make sure that the board is powered and connected to the PC as described in the section Hardware Setup.

5.2 Run Micro-IDE from Windows Start menu. When Micro-IDE starts, the Project Selection window appears:



Click OK to select an existing example project.

5.3 Open the example project gps1.prj from C:\bipom\devtools\GCC\LPC2000\examples\GPS-1



5.4 Select type of output messages in the gps1.h files.

#define MODE_PARSING_DATA	-	Switch to a parsing mode.
// #define MODE_PARSING_DATA	-	Switch to a bridge mode.

5.5 Click the Build button on the main toolbar. This will build the GPS1 project:



If the project builds successfully, you should see a message indicating no errors on the Output Window:



5.6 To specify the correct loader settings please select Tools->Options menu:

Editor Terminal Loader Communication Baud Rate Parity Com Port 115200 None Odd COM3 COM7 COM4 COM8 Echo Stop Bits 1 2 Echo Off On T 2 Echo Off On T 2 Echo Stop Bits 1 2

Select the correct PC COM port you have connected to the MINI-MAX/ARM. The following settings match the example that we run on MINI-MAX/ARM board:

Baudrate: 115200 Parity: None Data Bits: 8 Stop bits: 1 Echo: Off

Press OK button.

5.7 Press download button:



Downloading program	×
47%	
	1
Cancel	

When the download is finished, the progress indicator disappears:



Please check if "Download is completed" appears. This means that the board has been programmed successfully.

6. Testing the program in the "Parsing" mode

This mode is defined in section **Downloading Programs** (see 5.4).

6.1 After the program has been successful build and downloaded, it can be started using the Mode button on the main Toolbar:



Mode button puts the board into **Run** or **Program** mode. In Run mode, the microcontroller is executing the program in its memory. In Program mode, the microcontroller is in Reset state so no programs are running. In Program mode, microcontroller's flash memory can be changed and a new program can be downloaded.

6.2 Open the terminal window using Toggle Terminal icon button:



Connect Terminal

Connect Terminal connects the terminal window to a PC COM port. If a board sends data to the serial port, the messages will appear in Terminal window.

Disconnect Terminal disconnects the terminal window from a PC COM port.

Toggle Terminal shows/hides the terminal window.

Clear Terminal clears all messages in the terminal window.

Press Connect icon button to connect the terminal window to the board:

=ile	Edit	View	Build	Project	Debug	Tools	Window	Help						
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	≽	III 55	E E	荫		l I	B 4	(})	()) {))	(🗣	×.	ъ	í 🖻	۲ 📃 🔜 ۱
Work	space		- 🔺 🗶										Ter	minal ———

6.3 GPS messages should appear in the terminal window:

📕 Micro-IDI - (gosi h)				
Ble Edit Yew Build Broject Debug Iools Windo	w Reb	Te X		
] 🗅 🚅 🖬 🕼 🐰 🐜 🛍 🗳 🗠 🙆 🧶 🖻	5 • O • O A A A A			
	5 🗢 🖻 🗗 🖓 🞭 🕷 🔂 💻 🗖			
Workspace	#define END CMD			
Gps1' Project Files Gps1.c	#define WAIT_FOR_BYTE UTC DATE: 09/06/2009 #define UART_EMPTY UTC TIME: 08:56:38.000	1		
- ges1.h - mea.c	#define RX BUFFER SIZE LONGITUDE: 03422,6228			
- mea.h	#define SEND_PARSING_DATA ALTITUDE: 103.0			
	#define EMPTY SATELLITE: 07			
	#define INUSE MODE: Autonomous			
	MODE3D: 3D			
	#define START_CMD PDOP: 2.5			
	#define END_CMD SPEED: 0.3			
	N/S Indicator: NORTH			
	For the WNSOLD DELAT 1000 E/W Indicator: EAST			
	for the part stabilities COORSE: 293./1			
	Werthe Chanter A To Contrart. WALLD			
	#define MODE PARSING DATA ID 00 : 13 Elevation: 70 Azimuth: 305 SNR: 33			
	ID 01 : 25 Elevation: 66 Azimuth: 206 SNR: 22			
	ID 02 : 23 Elevation: 63 Azimuth: 065 SNR: 18			
	// ID 03 : 07 Elevation: 42 Azimuth: 210 SNR: 27			
	ERRCODE gps_Bridge(UBYTE if ID 04 : 04 Elevation: 35 Azimuth: 265 SNR: 31			
	ERRCODE GetByteUARTO(UBYTE* ID 05 : 20 Elevation: 34 Azimuth: 144 SNR: 25			
	void gps_PrintData(); ID 06 : 16 Elevation: 29 Azimuth: 070 SNR:			
	ID 07 : 02 Elevation: 22 Azimuth: 306 SNR: 28			
	ID 08 : Elevation: Azimuth: SNR:			
	TD 09 : Elevation: Azimuth: SNR:			
	1D 10 : Elevation: Azimuth: SNR:			
Pt Files	A DIT : DIVACION: AZIMUN: SNK:	I		
N				
Success writing 40% bytes, 00005000-00005FFF		.2		
Red Dates Ends Elect L Ends Elec 2				
Bandy Cecup Price Price 1 Price Press 2 Loader	is 23 full Presented			

NOTE. The GPS-1 board starts to work from cold start. Valid GPS position information will start appearing on the terminal window in about 100 seconds.

7. Testing the program in the "Bridge" mode

This mode is defined in section **Downloading Programs** (see 5.4).

7.1 After the program has been successful built and downloaded, please run CoordTrans program and click **"To advanced mode"** button:



7.2 Click Start:



7.3 In system tray, there will be the GpsGate icon:

CoordTrans v2.3 - Fran	Franson GpsGate	:06

7.4 Open the Settings dialog from the Tray menu:



7.5 Select "COM Port" from the pull down menu. Click "Setting" :

Franson GpsGate Settings			
Franson GpsGate Settings			
Virtual COM Port GpsGate Direct A NMEA Logger GPS Simulator Freasy connection to input Close input when no outputs are opened Use multiple inputs (MUX)			
Setup Wizard			
Default Help			

A dialog now opens. You can use this to select the port your GPS is connected to.

Se	erial port set	tings				×
	- Port settings					
	Serial po	rt	COM7	•		
	Baud rati	Э	11520	0 💌		
	-Advanced se	ettings (do	n't care if y	you are unsure)		
	Parity	No	-	Handshake	None	•
	Stop bits	One	•		🗖 DTR	
	Byte size	8	•		🗆 RTS	
				Cance		OK

Select the correct PC COM port that is connected to the MINI-MAX/ARM. The following settings match the example that we run on the MINI-MAX/ARM board:

Baud rate: 115200 Parity: None Data Bits: 8 Stop bits: 1 DTR: OFF Press OK button.

7.6 Set connection with MINI-MAX/ARM. Click Open:

Franson GpsGate v2.6.0.340	<u> </u>
Input Output Advanced Set input - from where GPS data is received COM7,115200 Closed! No data is coming in Advanced Enable under Advanced tab	
Setup Wizard	

Franson GpsGate v2.6.0.340	X
Input Output Advanced	
Set input - from where GPS data is received	
COM7,115200	
Settings	
GPS data with valid position.	
Advanced	
Enable under Advanced tab	
Setup Wizard]
Default Help	

The tray icon always indicates the status of GpsGate. The status icon is also displayed in the Input tab of the Settings dialog. These are the possible tray icons:

No GPS or NMEA data is detected by GpsGate.

Valid GPS data has been detected at the selected input, but the GPS data has no fix; that is, it cannot determine its position (yet).



A valid GPS position (fix) has been detected at the selected input.

NOTE. The GPS-1 board starts to work from cold start. Valid GPS position information will start appearing on the terminal window in about 100 seconds.

CoordTrans v2.3 - Franson					
File Tools Help					
Longitude / Latitude Region The Earth	C Longitude / Latitude Easting / Northing				
Datum WGS84 Deg. Minutes Seconds Longitude 95 47 12,563 West Bearing	Grid UTM Zone 32N [WGS84] Easting -12174184,12 Meter ▼ Northing 15932567,76				
Image: Solution of the solut					
world_topo 💌 Center world_topo 💌 Cent	er world_topo 💌 Center				
Read position from GPS Click on map to get a position. Use right and	left mouse button. Read position from GPS				
UTM Zone 15R (North) Google Maps FRANSON COORD	Google Maps Once Stop View UTM Zone 15R (North) To ease mode				
	roleasymode				

7.7 If your PC has connection to the Internet, then click View:

You can see your location from the satellite:



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