

Application Note

Version 1.0

SPI Interface On GPS Receiver A2035-H



Revision History

Rev.	Date	Description	Writer
1.0	04-28-12	First release	Larry Patricio
	mm-dd-yy		

	Name	Date	Signature
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1 Introduction

The purpose of this document is to help the customers take advantage of the 2035-H module's SPI interface which including the hardware connection circuit and software development guide.

2 SPI interface

2.1 SPI application

The host interface SPI is a slave mode SPI:

- Supports both SPI and Microwire formats
- An interrupt is provided when the transmit FIFO and output serial register (SR) are both empty
- The transmitter and receiver each have independent 1024B FIFO buffers
- The transmitter and receiver have individual software-defined 2-byte idle patterns of 0xB4, 0xA7
- SPI detects synchronization errors and is reset by software
- Supports a maximum clock of 6.8MHz



Fig. 1 Example of SPI bus application



2.2 SPI Software control

2.2.1 SPI Timing diagrams



Fig. 2 SPI Timing diagrams, Mode1, Master, 4 wires

Signal	Description	Minimum	Тур	Maximum	Unit
CLK-cycle	SPI Clock frequency			6.8	MHz
Data-out delay	Data out read delay time		8		us

2.2.2 software development guide

1. Correctly connect the circuits and configure to SPI mode 1 (CPOL:0,CPHA:1, Default), Shift out MSb first.

2. After power on and getting the clock signal which sending from the master unit , the

GPS module will send out NMEA data.

3. The NMEA data need be read one by one byte, the time interval between every two bytes must be more then 8us, otherwise it might send some error bytes.
4. When GPS module do not send any NMEA data, we will not be able to get NMEA data from the SPI interface, only receive 0xB4,0xA7. For example, the GPS module send 100 bytes per second into SPI FIFO, there will be total 100bytes "0xB4, 0xA7" with the 100bytes NMEA data when your program read 200 bytes per second.

Note:

1. Be careful to control reading speed of the each byte

2. Be careful to control the rate of updated GPS NMEA data .



2.2.3 Example of appearing "0xB4, 0xA7"

If your program read faster than the refresh rate of GPS module's sending out NMEA data, the below error codes or other error codes (i.e. B4 A7 in hex character) will be appearing.

NMEA format :

\$GPGGA,000050.058,,,,,0,00,,,M,0.0,M,,0000*5E \$GPGSA,A,1,,,,,,*1E \$GPGSV,3,1,12,01,00,000,,02,00,000,,03,00,000,,04,00,000,*7C \$GPGSV,3,2,12,05,00,000,,06,00,000,,07,00,000,,08,00,000,*77 \$GPGSV,3,3,12,09,00,000,,10,00,000,,11,00,000,,12,00,000,*71 \$GPRMC,000050.058,V,,,,,191210,,,N*4F \$GPGGA,000051.065,V,,,0,00,,,M,0.0,M,,0000*51 \$GPGSA,A,1,,,,,,*1E \$GPRMC,000051.065,V,,,,191210,,,N*40

Hexadecimal format ouput:

B4 A7 B4 A7



B4 A7 B4 A7



3 Procedure to switch from OSP to NMEA Protocol (vice-versa)

3.1 Switch To OSP Protocol by SPI Test method:

1. Press the ON_OFF button to Power on 2.Send Command MID100 "\$PSRF100,0,115200,8,1,0*04\r\n"(Ascii)="24 50 53 52 46 31 30 30 2C 30 2C 31 31 35 32 30 30 2C 38 2C 31 2C 30 2A 30 34 0D 0A" (Hexadecimal) 3.Press the ON_OFF button to Power off

Wait for one second

4. Press the ON_OFF button to Power on

Then you can recive the OSP format information. (The receiver need wait a moment for all information of the independent 1024B FIFO buffers)

3.2 Switch To NMEA Protocol by SPI Test method:

1. Press the ON_OFF button to Power on 2.Send Command MID129 "A0 A2 00 18 81 02 01 01 00 01 01 01 05 01 01 01 00 01 00 01 00 00 00 01 00 00 12 C0 01 65 B0 B3" (Hexadecimal)

3. Press the ON_OFF button to Power off

Wait for one second

4. Press the ON_OFF button to Power on Then you can receive the NMEA format information. (The receiver need wait a moment for all information of the independent 1024B FIFO buffers



4 SPI of EVA2035-H Test method:

1. Aardvark connection with A2035-H:

SCLK(Pin 7)------ connection to GPIO6 of the A2035-H (SPI CLOCK pin) MOSI(Pin 8)------ connection to RX0 of the A2035-H (SPI data IN pin) MISO(Pin 5)------ connection to TX0 of the A2035-H (SPI data OUT pin) GND (Pin 10)----- connection to GPIO7 of the A2035-H (SPI Chip Select pin) 2. DIP Switch,GPIO6 and GPIO7 setting to OFF;

- 3. Push to ON_OFF button (Power on)
- 4. Aardvark Settings: Please refer to image 1
- 5. Command accepted by SPI refer to image 2

NOTE: As the Aardvark GUI only accepts Hexadecimal: \$PSRF117,16*0B\r\n (Ascii) = 24 50 53 52 46 31 31 37 2C 31 36 2A 30 42 0D 0A (Hexadecimal)



4.1 IMAGES

Aardwark 12C/SP1 Control Center				
Zile Aardvark Help				
I2C Control	Bitrate Set 400 💌 kHz	SPI Control		Bitrate Set 4000 🗸 kH
Master Slave		Polarity:	Phace	Bit Order:
class adds (Carlling system 20) - 70	Data Data	Rising/Ealing	O Samnie/Setun	(€) MSB
Siave Audr: (For Hex. enter Ux)	Hee Bus	O Faling/Rising	Setup/Sample	OLSB
Features: 10-Bit Addr Combined FMT No Stop		Martin (grand)		
Master Write		Master Slave		
Message		SS Polarity: ③ SS Active L	.ow OSS Active High	
	Master Write	MOSI Message		
Clear Load Save Master Read Number of Bytes: 54	Master Read	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		
Transaction Log				
Time Mod. R/W M/S Feat. B.R.	Addr. Length Data			
2012-03-09-15:14:57.140 SPI R M RsML 4000	25 24 50 53 52 46 31 30 25 47 47 41 2C 32 33 35	39 34 37 2E 30 30 2C 30 30 2C 30 39 34 37 2E 30 36 31 2C 2C	20 2C 30 31 2A 32 34 00 0A 2C 2C 2C 30 2C 30 30 2C 2C	
2012-03-09 15:15:14.780 SPI W M R:ML 4000	25 24 50 53 52 48 31 30	33 2C 30 31 2C 30 30 2C 30	30 2C 30 31 2A 32 35 0D 0A	
2012-03-09 15:15:14.780 SPI R N RsML 4000	25 2C 4D 2C 30 2E 30 2C	4D 2C 2C 30 30 30 30 2A 35	46 00 0A 24 47 50 47 53 41	
2012-03-09 15:15:35:203 SPI R M ReAL 4000	25 24 50 53 52 46 31 30 25 20 41 20 31 20 20 20	20 20 20 20 20 20 20 20 20 20 20	2C 2C 2C 2A 31 45 0D 0A 24	
2012-03-09 15:15:56.437 SPI V W RyML 4000	25 24 50 53 52 46 31 30	33 20 30 33 20 30 30 20 30	30 2C 30 31 2A 32 37 0D 0A	
2012-03-09 15:15:56.437 SPI R M RaML 4000	25 47 50 52 4D 43 2C 32	33 35 39 34 37 2E 30 36 31	20 56 20 20 20 20 20 20 20 20	
2012-03-09 15:16:11.467 SPI W M RsML 4000	25 24 50 53 52 46 31 30	33 2C 30 35 2C 30 30 2C 30	30 2C 30 31 2A 32 31 0D 0A	
2012-03-09 15:16:11.467 SPI K W RML 4000	25 31 36 31 32 31 30 20	2C 2C 4E 2A 34 46 0D 0A 24	47 50 47 47 41 20 32 33 35	89.99
2012-03-09 15-17-48-703 SPT R W ReWI 4000	372 39 34 38 27 30 36 30		20 20 20 40 20 30 27 30 20 40 20 20 30 30	30.30
				Clear Log Save to File

Image 1

					Bitra	te Set 400 🗸 kHz	SPI Control		Bitrate Set 4000
laster claus							Delaster	Ohana	Ph Outru
Slave							Polarity:	Phase:	Bit Order:
ave Addr: (For He.	ic enter "0x")					Free Bus	© Rising/Faling	O sample/setup	O M5B
eatures: 10-Bit Addr	ombined FMT	No Stop					O Faling/Rising	 Setup/Sample 	OLSB
laster Write							Master slave		
laster write							SE Bolarity: @SE Active Lo	we MSS Active Lieb	
essage							MOCT Massage	W C 35 Metherright	
						Master Write	MODI Message		
Clear Load	Save								
laster Read umber of Bytes: 64						Master Read	Clear Load	Save	<u>×</u>
laster Read umber of Bytes: 64						Master Read	Clear Load	Save	<u>~</u>
laster Read umber of Bytes: 64 ransaction Log Time	Mod. R/I	w/s	Feat	B. R.	Addr. Leng	Master Read	Clear Load	Save	<u>×</u>
laster Read umber of Bytes: 64 ansaction Log Tine 012-03-15 15 19:35 905 012-03-15 15 19:35 905	Mod. R/1 SFI V	I M/S	Feat. RsML P_MT	B.R. 4000	Addr. Leng	Master Read	Clear Load	Save	<u> </u>
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Image 2



5 Related Information

5.1 Contact

This manual is created with due diligence. We hope that it will be helpful to the user to get the most out of the GPS module.

Inputs about errors or mistakable verbalizations and comments or suggestions to Maestro Wireless for further improvement are highly appreciated.

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5.2 Related Documents

• GPS Receiver A2035-H (Maestro)