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
Written by	Larry Patricio	04-28-12	L P
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Approval by	Matthieu Boulanger	05-04-12	MB

Disclaimer

Table of Contents

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

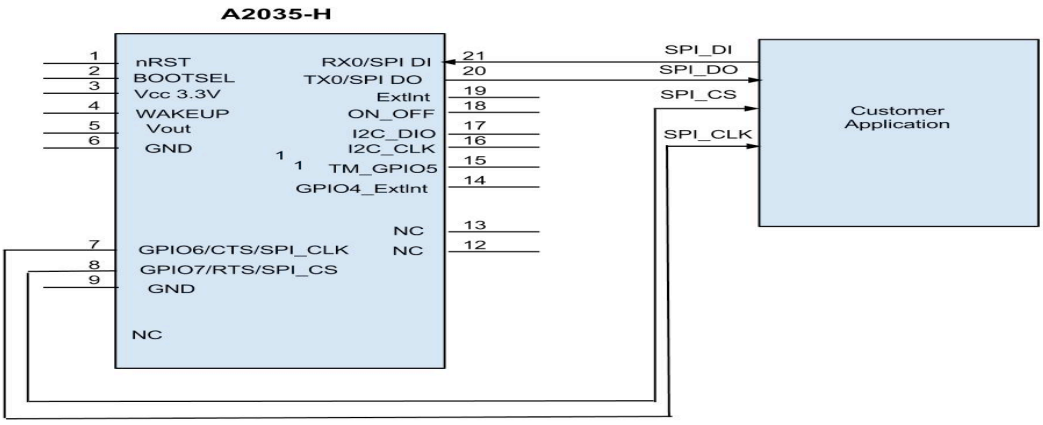

Fig. 1 Example of SPI bus application

2.2 SPI Software control

2.2.1 SPI Timing diagrams

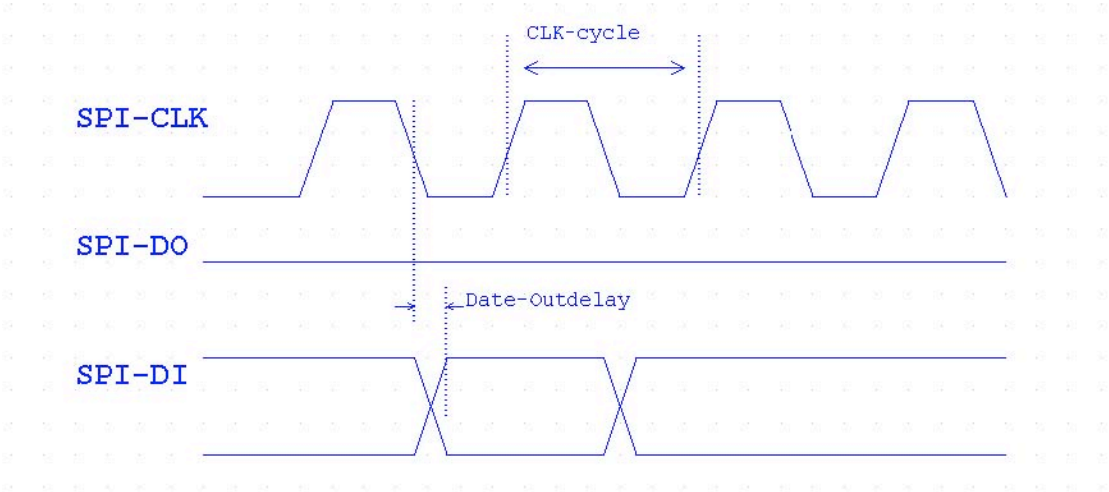

Fig. 2 SPI Timing diagrams,Mode1,Master,4 wires

Signal	Description	Minimum	Typ	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,,,,,0,00,,,M,0.0,M,,0000*51 $GPGSA,A,1,,,,,,,,,,,,,,,*1E
$GPRMC,000051.065,V,,,,,,,191210,,,N*40

Hexadecimal format ouput：
24 47 50 47 47 41 2C 30 30 30 30 35 30 2E 30 35 38 2C 2C 2C 2C 2C 30 2C 30 30 2C 2C 2C 4D 2C 30 2E 30 2C 4D 2C 2C 30 30 30 30 2A 35 45 0D 0A 24 47 50 47 53 41 2C 41 2C 31 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2A 31 45 0D 0A 24 47 50 47 53 56 2C 33 2C 31 2C 31 32 2C 30 31 2C 30 30 2C 30 30 30 2C 2C 30 32 2C 30 30 2C 30 30 30 2C 2C 30 33 2C 30 30 2C 30 30 30 2C 2C 30 34 2C 30 30 2C 30 30 30 2C 2A 37 43 0D 0A 24 47 50 47 53 56 2C 33 2C 32 2C 31 32 2C 30 35 2C 30 30 2C 30 30 30 2C 2C 30 36 2C 30 30 2C 30 30 30 2C 2C 30 37 2C 30 30 2C 30 30 30 2C 2C 30 38 2C 30 30 2C 30 30 30 2C 2A 37 37 0D 0A 24 47 50 47 53 56 2C 33 2C 33 2C 31 32 2C 30 39 2C 30 30 2C 30 30 30 2C 2C 31 30 2C 30 30 2C 30 30 30 2C 2C 31 31 2C 30 30 2C 30 30 30 2C 2C 31 32 2C 30 30 2C 30 30 30 2C 2A 37 31 0D 0A 24 47 50 52 4D 43 2C 30 30 30 30 35 30 2E 30 35 38 2C 56 2C 2C 2C 2C 2C 2C 2C 31 39 31 32 31 30 2C 2C 2C 4E 2A 34 46 0D 0A

B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7

24 47 50 47 47 41 2C 30 30 30 30 35 31 2E 30 36 35 2C 2C 2C 2C 2C 30 2C 30
30 2C 2C 2C 4D 2C 30 2E 30 2C 4D 2C 2C 30 30 30 30 2A 35 31 0D 0A 24 47 50
47 53 41 2C 41 2C 31 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2C 2A 31
45 0D 0A 24 47 50 52 4D 43 2C 30 30 30 30 35 31 2E 30 36 35 2C 56 2C 2C 2C
2C 2C 2C 2C 31 39 31 32 31 30 2C 2C 2C 4E 2A 34 30 0D 0A

B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4
A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7
B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4
A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7
B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4
A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7
B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4
A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7
B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4
A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4 A7
B4 A7 B4 A7 B4 A7 B4 A7 B4 A7 B4

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

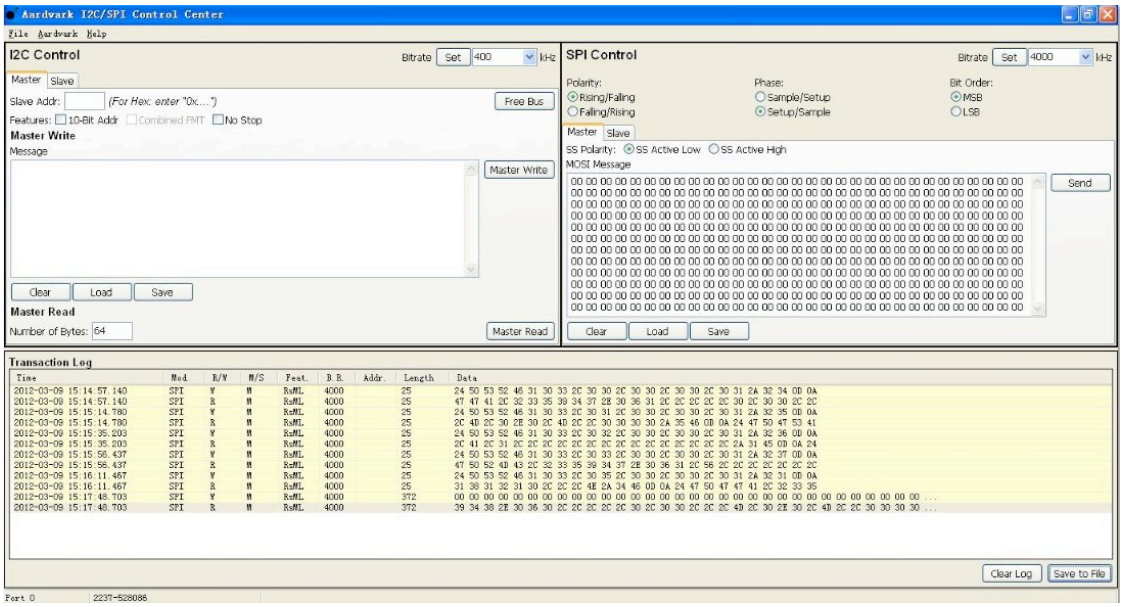

Image 1

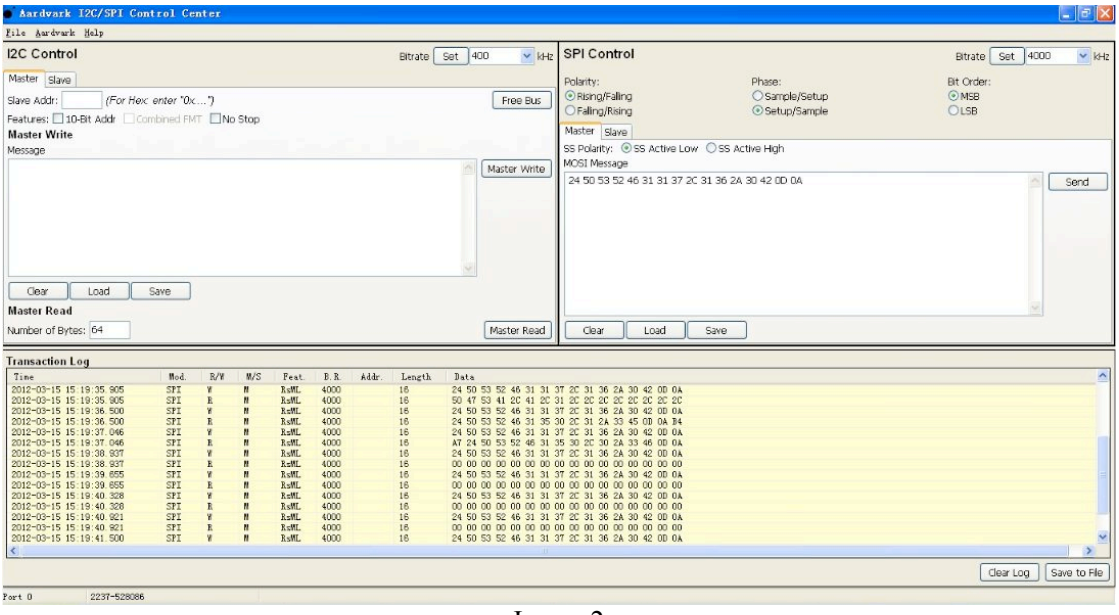

Image 2

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)