MOWAY WIFI MODULE MANUAL

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1. Introduction

Moway Wifi Module allows the robot to create a wireless net. So that the robot can communicate with other wifi devices such as phones, tablets or PCs.

The Wifi Module allows to develop applications such as a web server embedded into the Moway robot. This server makes it possible to control the robot through user wifi devices, as well as to receive Moway sensor status in these devices.

Fig. 1. Moway Wifi Module and adapter

This module is based on **MRF24WB0MB** IC of Microchip. This IC is a 2.4 GHz RF transceiver, designed under IEEE 801.11b standard. Moway Wifi Module includes all the necessary elements to use this IC, so that the user does not have to design any additional circuitry.

2. Connection to the robot

In order to attach the Wifi Module to Moway robot is necessary to connect the adapter to the expansion connector of the robot. Then the Wifi Module can be attached to one of the two ports of the adapter.

Fig. 2. Adapter and Wifi Module connected

3. Software

The Wifi Module is managed by means of the TCP/IP stack developed by Microchip. It provides with all the required functions to implement a TCP/IP communication for the Wifi Module, as well as functions to control the module through SPI.

In order to understand how the TCP/IP stack works, an MPLAB project can be downloaded from Moway web page. This example consists of a web server embedded into the robot. The code is written in C. The Moway web server IP can be adapted in "TCPIPConfig MRF24WB0M.h" file.

In addition, a web server will be available for programming directly from the MowayWorld application (included in the final version).

4. SPI communication

Communication between Moway and Wifi Module is done through SPI (4 line SPI with interrupts). The SPI clock frequency is up to 25 MHz.

The slave SPI interface works with the Interrupt line (INT, pin 8). When data is available for Moway during operation, the INT line is asserted (logic low) by the **MRF24WB0MB** module. The INT line is de-asserted (logic high) by the **MRF24WB0MB** after the data is transferred to Moway.

Data is clocked in on the first rising edge of the clock after Chip Select (CS, pin 4) is asserted. Data is placed on the bus with most significant bit (MSb) first. The CS pin must be toggled with transfer blocks and cannot be held low permanently. The falling edge of CS is used to indicate the start of a transfer. The rising edge of CS is used to indicate the completion of a transfer.

Table 1. Wifi Module pinout

Pin	Name	Function
1	+VCC	Voltage
2	GND	Ground
3	RESET	Reset
4	CS	SPI Chip Select
5	SCK	SPI Clock
6	SDI	SPI Data Input
7	SDO	SPI Data Output
8	INT	SPI Interrupt

5. Technical characteristics

MRF24WB0MB IC is compatible with IEEE 802.11b/g/n. It supports the 802.1x, 802.1i security:

- WEP
- WPA-PSK
- WPA-2-PSK.

It has the radio regulation certification United States (FCC), Canada (IC), Europe (ETSI) and Japan (ARIB).

The transmission speed can be chosen between 1 Mbps or 2 Mbps. The RF range is up to 400 meters. The next image shows the radiation pattern of Wifi Module.
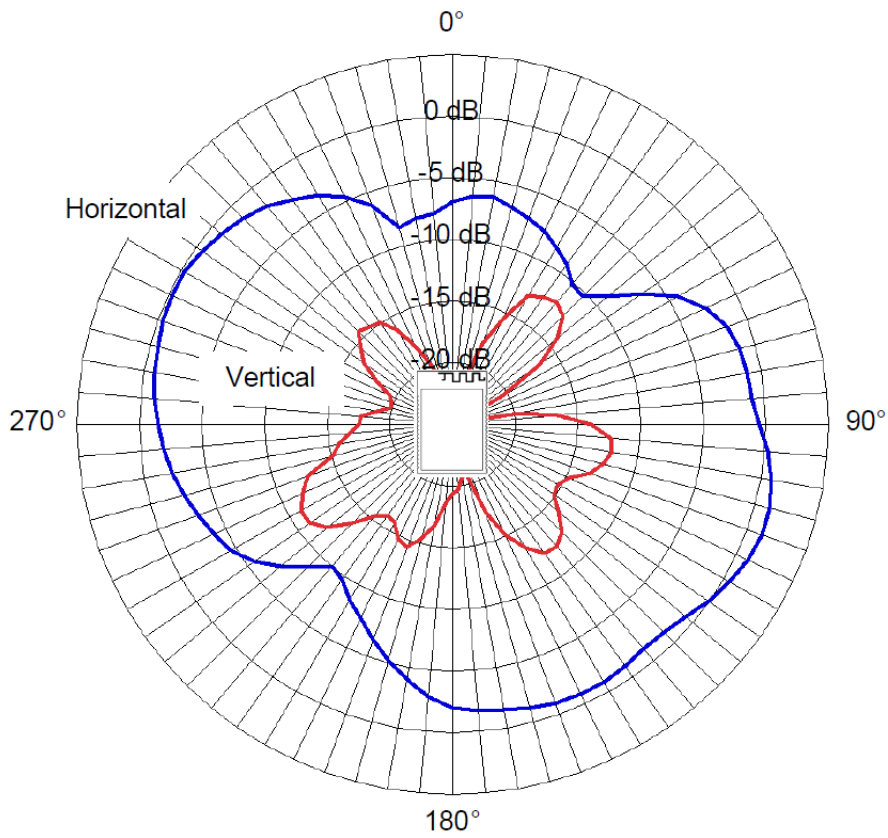
Fig. 3. Wifi Module radiation pattern

Table 2. Recommended operating conditions

Parameter	Min	Typical	Max	Units
Ambient temperature	-20	-	85	ºC
VDD	2.70	3.3	3.63	Volts

Table 3. Current consumption (nominal conditions: 25ºC, VDD=3.3V)

Parameter	Min	Typical	Max	Units
RX Mode	-	85	-	mA
TX Mode	-	154	-	mA
Sleep Mode	-	250	-	µA
Hibernate Mode	-	< 0.1	-	µA

Table 4. Receiver AC characteristics

Parameter	Min	Typical	Max	Units
Frequency	2412	-	2484	mA
Input level sensitivity (1 Mbps)	-91	-	-4	dBm
Input level sensitivity (2 Mbps)	-88	-	-4	dBm

Table 5. Transmitter AC characteristics

Parameter	Min	Typical	Max	Units
Frequency	2412	-	2484	mA
Average output power	-	+10	-	dB
Average power variation	-0.5	-	+0.5	dB