Datasheet

MLiS WiFi Module
Serial to 802.11b/g

Model: MLW-C-01

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WARNING: The MLiS WiFi module is a RF module intended for embedding in a host device. Local relevant RF regulations such as allowed frequencies and usage in commercial flights must be observed. Safety instructions must be included in the manuals of the host device. Schmidt & Co.,(HK) Ltd assumes NO liability for customer failure to comply with these precautions.

Modular Approval

This device is intended only for OEM integrators under the following conditions:

1) The antenna must be installed such that 20cm is maintained between the antenna and users,

And

2) The transmitter module may not be co-located with any other transmitter or antenna.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Revision History

Revision	Date	Description
1.0	April 2008	1st Release
1.1	September 2008	Added Information and general amendments

CONTENTS

FIGURE

TABLE

1.0 Product Overview

The MLiS WiFi module comprises of an IP controller chip (Connect One CO2128 ichipsec), an 802.11b/g wireless LAN module (Marvell 88W8686) and an 8Mb flash memory. It supports effortless integration of many TCP/IP higher protocols onto the serial host device or application, and also acts as a bridge to the internet via wireless LAN.

The MLiS WiFi module can perform functions like TCP/UDP socket data streaming and sending/retrieving emails. In detail, the module can support up to 10 simultaneous TCP/UDP sockets with 2 listening sockets, SMTP/POP3 clients with MIME attachments and also FTP clients. Additional features include a built-in Web server with two internal web sites for the purpose of remote control and management of both the WiFi module and the application device. Operating the module in SerialNet mode enables the serial-to-IP bridging feature.

In terms of security, the MLiS WiFi module supports SSL3/TLS1 protocols for HTTP/FTP secure sockets and WEP/WPA2 encryption for WiFi.

All the MLiS WiFi module functions and configuration tasks can be carried out using specific AT+I commands issued via the serial (USART) interface. A one-stop window-based GUI utility program (iChipConfig) can also be used to configure the module and perform various functions effortlessly.

In general, the MLiS WiFi module minimizes the need to redesign the host device hardware when implementing wireless IP connectivity. With the use of high-level AT+I APIs where commands are issued via a serial interface, there is no need to add WiFi drivers, security and networking protocols to the host application.

An evaluation board (Order Code: MLW-EV01) is also available for testing the MLiS WiFi module before designing it into the actual product.

2.0 Product Features

2.1 Security

- Acts as a security gap between the host application and the LAN network
- Supports one secure SSL3/TLS1 socket
- Supports WEP, WPA and WPA2 encryption for wireless LAN
- Supports multiple certificate authorities and both client-side and server-side authentication
- Supports Secure FTP and HTTP clients over SSL3
- Supports AES, 3DES and SHA accelerated in hardware

2.2 Protocols

- Up to 10 simultaneous TCP/UDP sockets and 2 listening ports
- HTTP client
- HTTP web server with 2 on-chip websites: configuration site and application site
- FTP and Telnet clients
- DHCP client and server
- Sending and receiving textual email and binary email with MIME attachments

2.3 Additional Features

- Non-volatile, on-chip operational parameter database
- Supports infra-structure wireless LAN networks
- SerialNET mode for serial-to-IP bridging (port server mode)
- Local firmware update
- Remote configuration and firmware update over the internet
- Retrieval of time data from a Network Time Server

3.0 Function Block Diagram

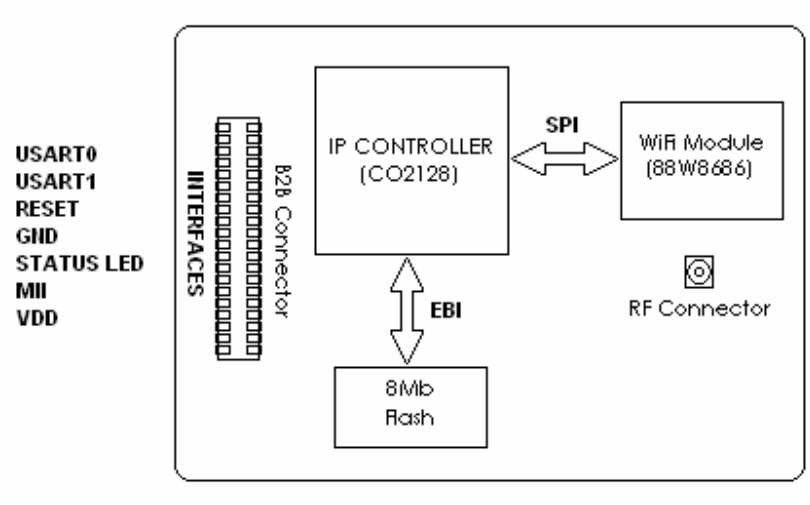


Figure 1. MLIS WiFi Module Functional Block Diagram

4.0 Product Specifications

4.1 Hardware Descriptions

- Core CPU: 32-bit RISC ARM7 TDMI, Low leakage, 0.13 micron, running at 48MHz
- WiFi Module: Marvell 88W8686 802.11b/g Chipset
- Flash Memory: EN29LV800B 8Mbit Boot Sector Flash, CMOS +3.0V

4.2 Performance Specifications

- Host Data Rate: up to 3Mbps in serial mode
- Serial Data Format (AT+i mode): Asynchronous character; binary; 8 data bits; no parity; 1 stop bit
- SerialNET mode: Asynchronous character; binary; 7 or 8 data bits; odd/even/no parity; 1 stop bit
- Flow Control: Hardware (-RTS, -CTS) or Software flow control

4.3 Internet Protocols

- ARP, ICMP, IP, UDP, TCP, DHCP, DNS, NTP, SMTP, POP3, MIME, HTTP, FTP & TELNET

4.4 Security Protocols

- SSL3/TLS1, WEP/WPA/WPA2

4.5 Protocols Accelerated in HW

- AES, 3DES & SHA

4.6 Application Program Interface

- AT+I Commands Protocol
- SerialNet mode for transparent serial data-to-Internet bridging

4.7 Wireless Specifications

- Standard Supported: IEEE 802.11b & IEEE 802.11g
- Data Rates: up to 54Mbps
- Frequency Range: 2.400 GHz ~2.4835GHz
- Center Frequencies: Europe – 2.412GHz ~ 2.472GHz
  USA – 2.412GHz ~ 2.462GHz
- Channels: Europe – 13 channels
  USA – 11 channels

Remark:Channels are used (CH1~CH11)by firmware controlled in U.S.A

5.0 Electrical Specifications

5.1 Absolute Maximum Ratings

SN	Parameter	Rating
1	Voltages at any pin with respect to GND	-0.3V to +3.6V
2	Operating Temperature	-40 °C to +85 °C
3	Storage Temperature	-55 °C to +115 °C
	Operating Humidity	90% max (Non-Condensing)

Table 1. Absolute Maximum Ratings

5.2 DC Operating Characteristics

SN	Parameter	Min	Typical	Max	Unit
1	Supply V_{DD}	+3.0	+3.3	+3.6	Volts
2	High-Level Input	+2.0	-	V_{DD}+0.3	Volts
3	Low-Level Input	-0.3	-	0.8	Volts
4	High-Level Output @ 2mA	V_{DD}-0.4	-	-	Volts
5	High-Level Output @ 0mA	V_{DD}-0.2	-	-	Volts
6	Low-Level Output @ 2mA	-	-	0.4	Volts
7	Low-Level Output @ 0mA	V_{DD}-0.4	-	0.2	Volts
8	Input Leakage Current	-	-	10	uA
9	Power Supply Current from V_{DD} (Transmit)	-	260	280	mA
10	Power Supply Current from V_{DD} (Receive)	-	190	210	mA

Table 2. DC Operating Characteristics

5.3 TX Specifications

SN	Parameter	Condition		Typical	Unit
1	Transmit Power Level	11b 11g		10.89 7.99	dBm
2	Transmit Spectrum Mask	11b	Fc +/- 11MHz Fc +/- 22MHz	40 60	dBc
		11g	Fc +/- 11MHz Fc +/- 22MHz Fc +/- 30MHz	30 40 50	dBc
3	Transmit Center Frequency Tolerance	25°C Room Temp		+/-10	ppm

Table 3. Transmitter Specification

5.4 RX Specifications

SN	Parameter	Condition	Typical	Unit
1	Receiver Minimum Input Level Sensitivity	802.11b Data Rate = 11Mbps PER < 8%	-87	dBm
		802.11g Data Rate = 54Mbps PER < 10%	-72	dBm
2	Adjacent Channel Rejection Desired Channel is tested at 3dB above sensitivity	802.11b Data Rate = 11Mbps PER < 8%	48	dBc
		802.11g Data Rate = 54Mbps PER < 10%	15	dBc

Table 4. Receiver Specification

6.0 Mechanical Specifications

6.1 General Dimensions and Mounting Description

SN	Parameter	Typical
1	Length	35mm
2	Width	29mm
3	Total Thickness	50mm
4	Weight	5 gram
5	Mounting	1 x 3mm Diameter screw hole – for use with 3.5mm spacer if 3mm stacking height header is used B2B 40 pin DF12C Receptacle 0.5mm pitch 3mm stacking height

Table 5. Mechanical Specifications

B2B Connector Remark:

40-pin interface on WiFi Module:
Hirose DF12C (3.0) – 40 DS - 0.5 V (81) 0.5mm pitch 40pins (2 x 20) 3mm stacking Height receptacle

Suggested 40-pin interface on application PCB:
Hirose DF12E (XX) – 40 DP – 0.5 V (81) 0.5mm pitch 40pins (2 x 20) Header stacking height range from 3mm to 5mm

6.2 PCB Dimensions

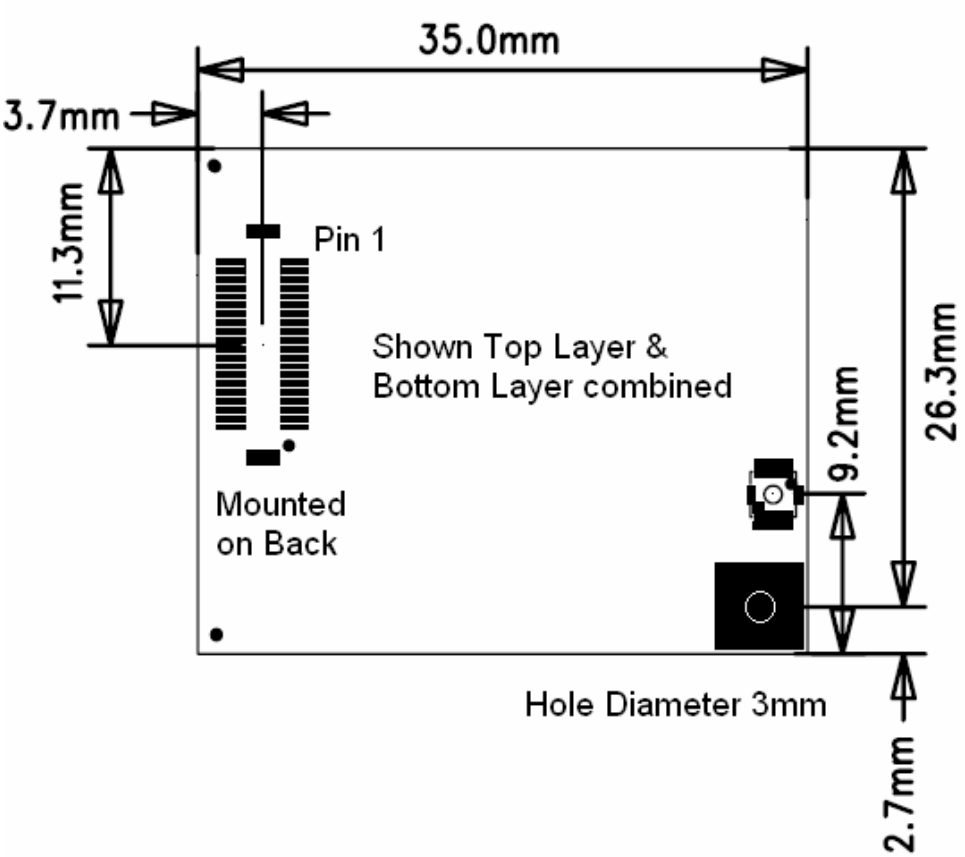


Figure 2. MLiS WiFi Module PCB and Interface Dimension

7.0 Product Interface Description

7.1 40-pin Board-to-Board (B2B) Connector

The MLiS WiFi module comes with a Hirose Receptacle (PN: DF12C(3.0)–40 DS-0.5V(81)) for interfacing to the host application PCB.

Description: Hirose DF12C series 0.5mm pitch 40pins (2 x 20) 3mm stacking Height receptacle

Suggested 40-pin interface on application PCB:
Hirose DF12E (XX) – 40 DP – 0.5 V (81) 0.5mm pitch 40pins (2 x 20) Header stacking height range from 3mm to 5mm

B2B Connector Pin Outs of MLiS WiFi Module

PIN	DESCRIPTION		PIN
21	GND	RI1	20
22	WL_LED	DCD1	19
23	MOD_SEL	DTR1	18
24	GND	DSR1	17
25	/RSET	RTS1	16
26	EIRQ1	CTS1	15
27	EMDIO	RXD1	14
28	EMDC	TXD1	13
29	ERXER	GND	12
30	ERX1	RESET	11
31	ERX0	DTR0	10
32	ECRSDV	DSR0	9
33	ETX1	RTS0	8
34	ETX0	CTS0	7
35	ETXEN	RXD0	6
36	EREFCK	TXD0	5
37	VDD	GND	4
38	VDD	GND	3
39	VDD	GND	2
40	VDD	GND	1

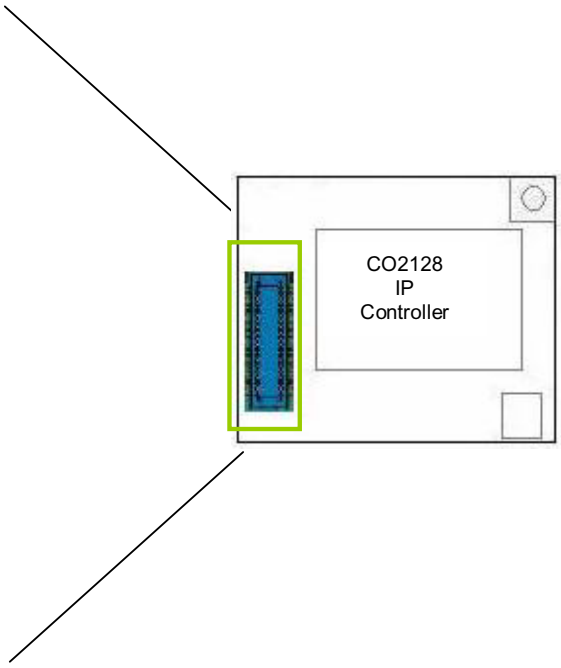


Figure 3. MLiS WiFi Module 40pin Connector Pin Name

Pin No.	Signal Name	I/O	Function
1-4, 12, 21, 24	GND	P	Module Ground
5	TxD0	O	Serial line USART 0 Transmit Data
6	RxD0	I	Serial line USART 0 Receive Data
7	CTS0	I	Serial line USART 0 Clear to send
8	RTS0	O	Serial line USART 0 Request to send
9	DSR0	I	Serial line USART 0 Data Set Ready
10	DTR0	O	Serial line USART 0 Data terminal ready
11	Reset	I	Active Low Module Reset. The Reset must be held Low for at least 1ms after power reaches 90%
13	TxD1	O	Serial line USART 1 Transmit Data
14	RxD1	I	Serial line USART 1 Receive Data
15	CTS1	I	Serial line USART 1 Clear to send
16	RTS1	O	Serial line USART 1 Request to send
17	DSR1	I	Serial line USART 1 Data Set Ready
18	DTR1	O	Serial line USART 1 Data terminal ready
19	DCD1	I	Serial line USART 1 Data Carrier Detected
20	RI1	I	Serial line USART 1 Ring Indicator
22	WL_LED	O	Wireless LAN status Light Blinking – Access Point Scanning Light ON (Low) – Link established
23	MOD_SEL	I	Mode Selection
25	/RSET	O	Reset Output (Active Low)
26	EIRQ1	IO	Status Interrupt IO
27	EMDIO	IO	Management Data IO
28	EMDC	O	Management Data Clock
29	ERXER	I	Receive Data Error
30	ERX1	I	Receive Data Input
31	ERX0	I	Receive Data Input
32	ECRSDV	I	Receive Data Valid
33	ETX1	O	Transmit Data
34	ETX0	O	Transmit Data
35	ETXEN	O	Transmit Enable
36	EREFCK	IO	Reference Clock for RMII mode
37-40	VDD	P	Module Power Supply. +3.3Vdc +/- 0.3Vdc

Table 6. MLiS WiFi Module 40pin Interface Pin Description

7.2 RF Connector

The on-board RF connection is an U.FL-R-SMT male type connector for connecting to an external 2.4GHz antenna via a coaxial cable.

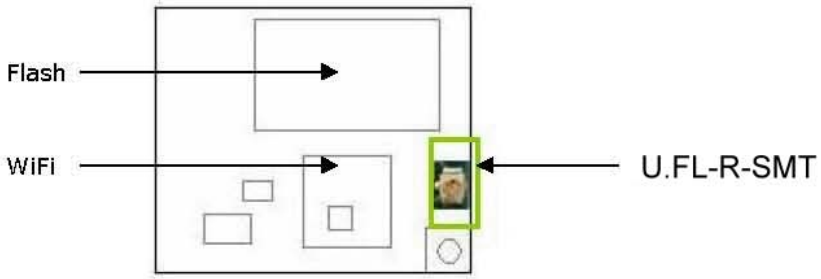


Figure 4. MLiS WiFi Module RF connector

Recommended Antenna:
Frequency: 2.4GHz, 2.5 dBi,50 ohms, omni-directional, 1/4 wavelength dipole configuration, VSWR ≤2.0

8.0 Evaluation Board

An evaluation board (MLW-EV01) is available for testing the MLiS WiFi Module before implementing onto the actual product.

The evaluation board provides the following interfaces:

a. RF Antenna Interface with Rev SMA connector
b. USART 0 Interface with RS232 transceiver and DB9 socket
c. USART 1 Interface with RS232 transceiver and DB9 socket
d. MII Interface with Ethernet PHY chip and RJ45 socket
e. Reset Switch
f. Mode Select Switch
g. LED indication for Power and Wireless LAN status

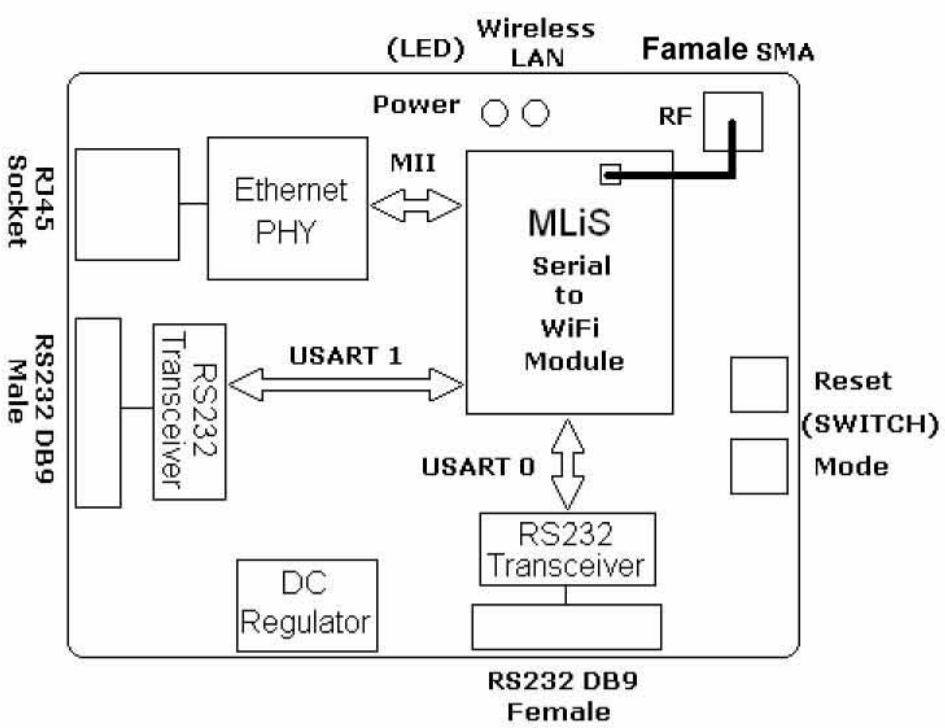


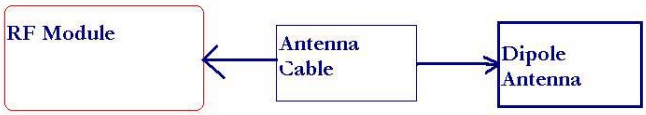
Figure 5. Evaluation Board Function Block Diagram

With the evaluation board and running Windows hyper-terminal on a PC, AT+i commands can be issued to the MLiS WiFi Module for various communication and data requirements.

AT+i commands can also be used to configure parameters into the module's flash memory and activate internet tasks such as emails, sockets, FTPs and more.

For quick start in configuration and communication, a window-based application – iChipConfig can also run on the PC. It contains intuitive dialog boxes to fully configure the MLiS WiFi Module and also performs different internet tasks such as sending/retrieving emails, activating on-chip websites, entering into SerialNet mode and more.

How to connect this dipole antenna to the RF module.



This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

This device is intended only form OEM integrators under the following conditions:

1) The antenna must be installed such that 20cm is maintained between the antenna and users, and

2) The transmitter module may not be co-located with any other transmitter or antenna.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

This transmitter module is authorized only for use in devices where the antenna may be installed such that 20 cm may be maintained between the antenna and users (for example access points, routers, wireless ADSL modems, and similar equipment). The final end product must be labeled in visible area with the following:

“Contains TX FCC ID: VW6MLWC01 ”

The user manual for end users must include the following information in a prominent location “IMPORTANT NOTE: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.”

End Product Labeling

This transmitter module is authorized only for use in devices where the antenna may be installed such that 20 cm may be maintained between the antenna and users (for example access points, routers, wireless ADSL modems, and similar equipment). The final end product must be labeled in visible area with the following:

“Contains TX FCC ID: VW6MLWC01

FCC Caution:Any changes or modification not expressly approved by the part responsible for compliance could void the user’s authority to operate this equipment.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