

User Manual

ML-NWA65L(ML-NWA65L/XRX)

802.11b/g/n WLAN Module

July, 2010



Revision History

Revision	Date	Descriptions
0.1	2010-07-30	Created

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1 General Description

1.1 Functional Description

ML-NWA65L(ML-NWA65L/XRX) is the low power USB 2.0 module for 802.11b/g/n wireless LAN (WLAN) aimed at embedded applications. ML-NWA65L(ML-NWA65L/XRX) is the USB 2.0 module that adopts a single-chip wireless local area network (WLAN) medium-access controller (MAC) spread-spectrum baseband processor and 2.4 GHz RF radio.

ML-NWA65L(ML-NWA65L/XRX) supports IEEE 802.11b, 802.11g and 802.11n standards.

ML-NWA65L(ML-NWA65L/XRX) provides crucial power management functionality and requires only a single 3.3V or 5.0 V supply voltage.

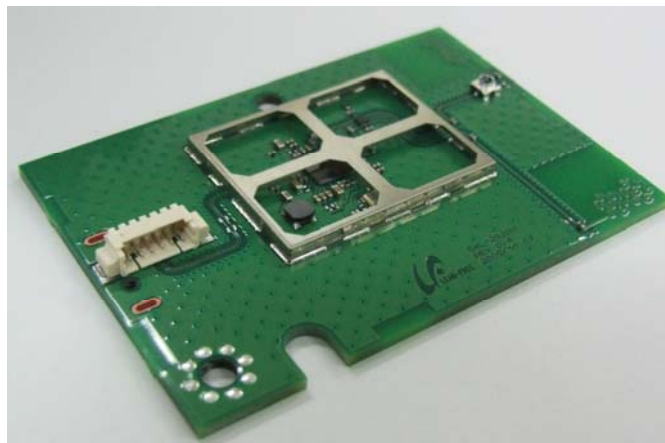


Figure 1-1 ML-NWA65L(ML-NWA65L/XRX) Picture

1.2 Features

- Wi-Fi compliant
- Security: WEP, WPA-PSK, WPA2-PSK, WMM, WMM-PS, TKIP, and AES hardware acceleration
- Host interface: USB 2.0
- Low power consumption
- Single 3.3V or 5.0 V external supply voltage required

1.3 Applications

- Network printer servers with WLAN connectivity
- Set-top boxes that need WLAN connectivity

1.4 Dimension and Pin Assignments

1.4.1 Mechanical Dimension

W X L X H = 45mm X 65mm X 5.1mm

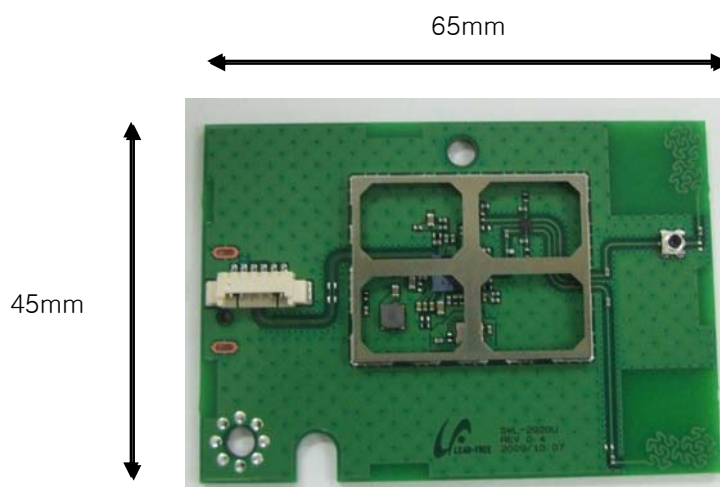


Figure 1-2 ML-NWA65L(ML-NWA65L/XRX) Top

1.4.2 HOST Interface

USB Interface : **Molex 53261-0671**, 6pin, Right Angle, SMT

* SIZE : 5.2 x 12.65 x 3.4 mm

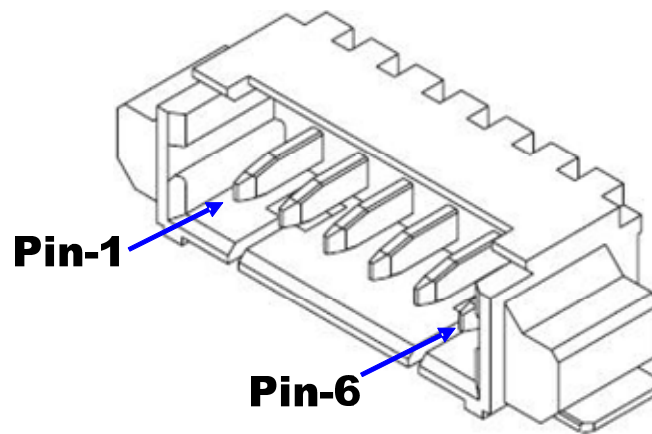


Figure 1-3 ML-NWA65L(ML-NWA65L/XRX) CON1 Connector PIN Assignment

Table 1-1 CON1 PIN Description

No.	Pin Name	Description
1	Shell	Drain wire, to GND
2	VBUS	RED, 5V from HOST
3	D-	White, USB data Negative
4	D+	Green, USB data Positive
5	GND	Black, signal ground
6	Shell	Drain wire, to GND

2 Operating Conditions

2.1 Maximum Power Supply Rating

The supply Voltage of ML-NWA65L(ML-NWA65L/XRX) is 5V , do follow the Maximum Rating in 3.1.

2.2 Connection to HOST

ML-NWA65L(ML-NWA65L/XRX) will work properly only if connecting to USB2.0 Interface as defined at 1.5.2 .

2.3 Ground Connection

ML-NWA65L(ML-NWA65L/XRX) does not need special ground, but uses the ground wire in HOST Interface.

2.4 Storage Condition

It needs proper condition for protecting the rust.

- Temperature : 0 ~ +50 °C
- Humidity : lower level recommended , 25% ~ 65%RH
- Max Storage Limit : Within 6 Month from Production

2.5 Absolute Maximum Ratings

Symbol	Parameter	Conditions	Min.	Nom.	Max.	Unit
DC supply	DC supply voltage from HOST	3.3V applied	+3.1	+3.3	+3.5	V
		5V applied	+4.85	+5.0	+5.25	V
DC for I/O	USB2.0 Compliant		-	-	-	-
ESD*	Electro-static discharge voltage IEC1000-4~2 POINT: CON1, CON12	AIR			5K	V
		Contact			1K	V
T _s	Storage temperature		-20	-	+85	°C
T _o	Operating temperature		0	-	+60	°C

* Final specification will be fixed later.

2.6 Current Consumption

Symbol	Parameter	Min.	Nom.	Max.	Unit	
Current consumption *	Transmit current value	11b		290	<500	mA
		11g/n		230	<500	mA

* It can be different to test condition.

3 RF Specification

All measurements are made under nominal power supply and room temperature 25 °C unless specified.

RF specification of ML-NWA65L(ML-NWA65L/XRX) was defined according to 802.11b/g mandatory

3.1 Supportable Modulation Scheme & Data Rates

	Spacing	Rate	Data rates (Mbps)	Remark
802.11n OFDM	20MHz	MCS0	6.5	Mandatory
		MCS1	13	
		MCS2	19.5	
		MCS3	26	
		MCS4	39	
		MCS5	52	
		MCS6	58.5	
		MCS7	65	

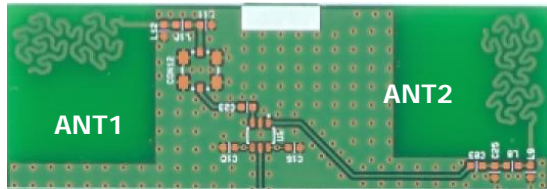
	Modulation	Coding rate	Data rates (Mbps)	Remark
802.11g OFDM	BPSK	1/2	6	
	BPSK	3/4	9	
	QPSK	1/2	12	
	QPSK	3/4	18	
	16-QAM	1/2	24	
	16-QAM	3/4	36	
	64-QAM	1/2	48	
	64-QAM	3/4	54	
802.11b	DBPSK	NA	1	
	DQPSK	NA	2	
	CCK	NA	5.5	
		NA	11	

3.2 Channel & Center Frequency

Channel No	Center Frequency [Mbps]	FCC, IC	ETSI Korea	
1	2412	0	0	
2	2417	0	0	
3	2422	0	0	
4	2427	0	0	
5	2432	0	0	
6	2437	0	0	
7	2442	0	0	
8	2447	0	0	
9	2452	0	0	
10	2457	0	0	
11	2462	0	0	
12	2467	-	0	
13	2472	-	0	

3.3 ANTENNA Specifications

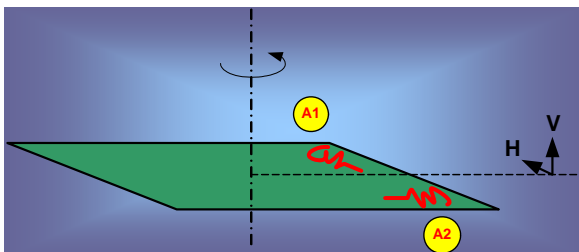
2 Fractal Antennas on PCB that support Diversity



ANTENNA	Polarization	AVG	Max.	Unit
ANT1	Horizontal	-1.57	2.46	dBi
	Vertical	-	-	dBi
ANT2	Horizontal	-1.66	2.66	dBi
	Vertical	-	-	dBi

All measurement is done with bare PCB.

It can be different to ANTENNA direction & measurement set-up.



For better performance, the Antennas should be apart more than **5mm** from other material.

FCC Compliance

□ FCC Statement

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

Test Mode	Frequency	Test Results	
		dBm	W
802.11b	Lowest	13.50	0.0224
	Middle	13.83	0.0242
	Highest	13.06	0.0202
802.11g	Lowest	13.16	0.0207
	Middle	13.74	0.0237
	Highest	12.84	0.0192
802.11n HT20	Lowest	10.11	0.0103
	Middle	10.26	0.0106
	Highest	10.66	0.0116

Information to User

This equipment has been tested and found to comply with the limits for a Class B digital device, Pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio Frequency energy and, if not installed and used in accordance with the instructions,

may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and

on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

□ Caution

Any changes or modifications NOT explicitly APPROVED by Samsung Electronics Co., Ltd. could cause the ML-NWA65L(ML-NWA65L/XRX) module to cease to comply with FCC rules part 15, and thus void the user's authority to operate the equipment.

□ RF-exposure statement

These modular transmitters, ML-NWA65L(ML-NWA65L/XRX), comply with FCC radiation exposure limits set forth for an uncontrolled environment. The ML-NWA65L(ML-NWA65L/XRX) should be installed and operated with minimum distance 20cm between the antenna and the body of the user or nearby persons. The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the users manual of the end product which integrate this module.

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

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as the 2 conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.).

IMPORTANT NOTE: In the event that these conditions cannot 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 cannot 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.

□ Antenna

These modular transmitters are for OEM integrations only. The end-user product will be installed in such a manner that only the authorized antennas are used.

□ Label and manual requirements for the End Product

For an end product using the ML-NWA65L(ML-NWA65L/XRX) there must be a label containing, at least, the following information:

FCC ID for model ML-NWA65L(ML-NWA65L/XRX)

This device contains FCC ID : A3LML-NWA65L

The label must be affixed on an exterior surface of the end product such that it will be visible upon inspection in compliance with the modular approval guidelines developed by the FCC.

Where the ML-NWA65L(ML-NWA65L/XRX) will be installed in final products larger than 8cm x 10cm following statements has to be placed ONTO the device.

"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, and
- (2) this device must accept any interference received, including interference that may cause undesired operation."

In case where the final product will be installed in locations where the end consumer is not able to see the FCC ID and/or this statement, the FCC ID and the statement shall also be included in the end-product manual.

The users 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 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter."

EU Compliance

□ Regulatory compliance of the ML-NWA65L(ML-NWA65L/XRX)

The ML-NWA65L(ML-NWA65L/XRX) are made for OEM integrations only. The European regulations applying to the ML-NWA65L(ML-NWA65L/XRX) is the R&TTE Directive 1999/5/EC.

ML-NWA65L(ML-NWA65L/XRX) meets the following requirements of the R&TTE Directive.

R&TTE Directive article	Test category	Harmonized standard
Article 3.1(a)	Protection of health and safety	EN 60950-1, EN 50385
Article 3.1(b)	EMC	EN 301 489-1/-17
Article 3.2	Effective use of the spectrum	EN 300 328

The conformity assessment for the ML-NWA65L(ML-NWA65L/XRX) were completed in accordance with the R&TTE Directive Annex IV procedures, and the EC Declaration of Conformity is attached to this manual.

□ Cautions regarding regulatory compliance when integrating the ML-NWA65L(ML-NWA65L/XRX)

The person integrating the ML-NWA65L(ML-NWA65L/XRX) becomes the manufacturer of the final product and is therefore responsible for demonstrating compliance of the product with the essential requirements of the R&TTE Directive.

In all cases assessment of the final product must be made against the Essential requirements of the R&TTE Directive Article 3.1(a) and (b), safety and EMC respectively, and any relevant Article

3.3 requirements

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

1. This appliance and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

2. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements of the Council recommendation 1999/519/EC of 12 July 1999.

As long as the 2 conditions above are met, no further evaluation under Article 3.2 of the R&TTE Directive and do not require further involvement of an R&TTE Directive Notified Body for the final product. In all other cases, or if the manufacturer of the final product is in doubt then the equipment integrating the radio module must be assessed against Article 3.2 of the R&TTE Directive.

Please note that this product, ML-NWA65L(ML-NWA65L/XRX), uses radio frequency bands not harmonized throughout the Community. This product is classified as Class 2 radio equipment for which some Member States apply restrictions on placing on the market and in use. Any parties putting Class 2 radio equipment on the market must notify the relevant national spectrum management authority of their intention, and the radio equipment must be given a Class Identifier (alert symbol).

Antenna

This product, ML-NWA65L(ML-NWA65L/XRX), is for OEM integrations only. The end-user product will be installed in such a manner that only the authorized antennas are used.

Enclosure

This product, ML-NWA65L(ML-NWA65L/XRX), is made for integrating in another final product. For this reason, there are some parts of the final product on which the ML-NWA65L(ML-NWA65L/XRX) depends for regulatory compliance regarding EMC and safety. The ML-NWA65L(ML-NWA65L/XRX) is mounted on the circuit board of the final product, and must be contained inside the case of the final product. Integrated the ML-NWA65L(ML-NWA65L/XRX) in the final product so that its surfaces are not in contact with the outside.

Documentation

In the documentation for the conformity assessment of the final product, state clearly that the ML-NWA65L(ML-NWA65L/XRX) is integrated in the system.

Conformity Assessment of the Products integrating the ML-NWA65L(ML-NWA65L/XRX)

The following is a supplementary explanation of conformity assessments for final products integrating the radio modules such as the ML-NWA65L(ML-NWA65L/XRX), that have passed conformity assessments in accordance with the R&TTE Directive. The

procedures for conformity assessment in accordance with the R&TTE Directive are the responsibility of the manufacturer of the final product. With final products integrating radio modules, the person who integrates the module in the system becomes the manufacturer of the final product, and it is their responsibility to certify that the requirements of the R&TTE Directive are met.

□ Exemption from conformity assessment

However, if radio modules that meet the requirements of the R&TTE Directive and that have passed the conformity assessment are integrated in a final product that follows the cautions concerning integrating radio modules, they are exempted from the conformity assessment for R&TTE Directive Article 3.2 (efficient use of the radio spectrum). For details, refer to the following Guidance and ETSI Technical Report from the R&TTE Compliance Association, and check whether your case applies.

Organization	R&TTE Compliance Association	Document No. TGN 01 Rev 3
Document title	Technical Guidance Note on Requirement for a Final Product that Integrates an R&TTE Directive Assessed Module	
URL	You can download the guidance from the download area of R&TTE Compliance association. http://www.rtteca.com	

Organization	ETSI (Technical report)	Document No. ETSI TR 102 070-2
Document title	Electromagnetic compatibility and Radio spectrum Matters (ERM); Guide to the application of harmonized standards to multi-radio and combined radio and non-radio equipment; Part 2: Effective use of radio frequency spectrum	
URL	You can download the guidance from the ETSI web site by entering TR102 070-2 in the search engine. Before downloading, you will be requested to register. http://www.rtteca.com	

□ **Conformity assessment procedures for final products exempted from R&TTE Directive Article 3.2**

In every case, the manufacturer of a final product must follow the procedures for conformity assessment of the final product with the requirements of R&TTE Directive Article 3.1(a) and (b), for safety and EMC. The conformity assessment for Article 3.2 is carried out in accordance with the following:

- 1) Attach the EN 300 328 test report of the assessed radio module and the EC Declaration of Conformity to the conformity assessment of the final product (The Declaration of Conformity is attached to the manual).
- 2) Specify on the conformity assessment of the end product that the assessed radio module was integrated in the system without any changes, in accordance with the installation directions of the manufacturer.

□ **Notification of the final product**

Please note that this product, ML-NWA65L(ML-NWA65L/XRX), uses radio frequency bands not harmonized throughout the Community. The notification required by R&TTE Directive Article 6(4) is necessary. It is the responsibility of the manufacturer of the final product to notify the relevant national spectrum management authority of the intention to place the final product on the market.

□ **CE marking**

It is necessary to attach the CE mark to the final product to indicate that it conforms with all the directives that apply to the final product. It must be given a Class Identifier (alert symbol) in addition to the CE mark.

□ **Exemption clause**

Samsung Electronics Co., Ltd. does not guarantee the accuracy of the information above. In case of doubt or uncertainty, we recommend that you check with the authorities or official certification organizations of the relevant countries.

EC Declaration of Conformity

We, Samsung Electronics Co., Ltd.

of Samsung Electronics Co., Ltd.

#259, Gongdan-Dong, Gumi-City, Gyeongsangbuk-Do, 730-030 Korea

of Samsung Electronics(Shandong) Digital Printing Co., Ltd.

264209, Samsung Road, Weihai Hi-Tech IDZ, Shandong Province, China

declare under our sole responsibility that the product

WLAN Module

model " ML-NWA65L(ML-NWA65L/XRX) "

to which this declaration relates is in conformity

with

R&TTE Directive 1999/5/EC

By application of the following standards

▪ Article.3.1.(a)	Safety	EN 60950-1:2006+A11:2009 EN 50385
▪ Article.3.1.(b)	EMC	ETSI EN 301 489-01 V1.8.1 (2008-04) ETSI EN 301 489-17 V2.1.1 (2009-05)
▪ Article.3.2	RF	ETSI EN 300 328 V1.7.1(2006-10)

Notified UL CCS

Body 47173 Benicia Street, Fremont, CA 94538, USA.

EU Identification Number: 0984

Documentary evidence to demonstrate conformity

Description	Report or Certificate No.	Issue Data	Issued By

Manufacturer

Samsung Electronics Co., Ltd.

#259, Gongdan-Dong, Gumi-City Gyungbuk, Korea 730-030

(Sang youp Hyoun) / 30th ,July ,2010