



User Manual

CLX-NWA20L

802.11b/g/n WLAN Module

December, 2009



Revision History

| Revision | Date | Descriptions |
|----------|------------|--------------|
| 0.1 | 2009-11-25 | Created |
| | | |
| | | |
| | | |
| | | |

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1 General Description

1.1 Functional Description

CLX-NWA20L is the low power USB 2.0 module for 802.11b/g/n wireless LAN (WLAN) aimed at embedded applications. CLX-NWA20L 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.

CLX-NWA20L supports IEEE 802.11b, 802.11g and 802.11n standards.

CLX-NWA20L provides crucial power management functionality and requires only a single 3.3V or 5.0 V supply voltage.



Figure 1-1 CLX-NWA20L 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

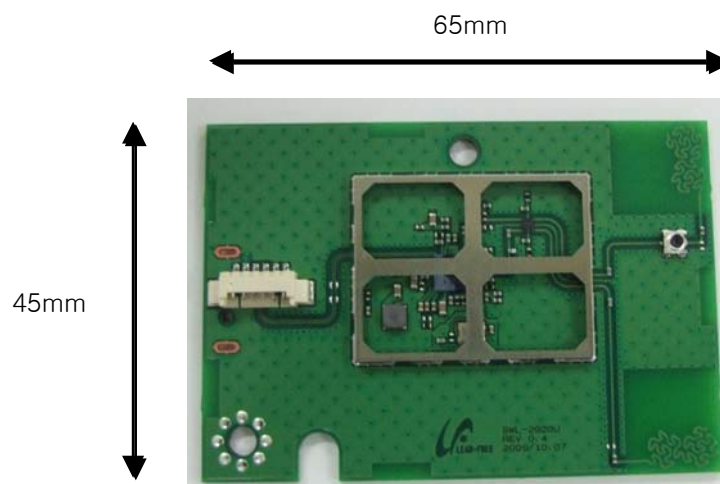


Figure 1-2 CLX-NWA20L Top

1.4.2 HOST Interface

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

* SIZE : 5.2 x 12.65 x 3.4 mm

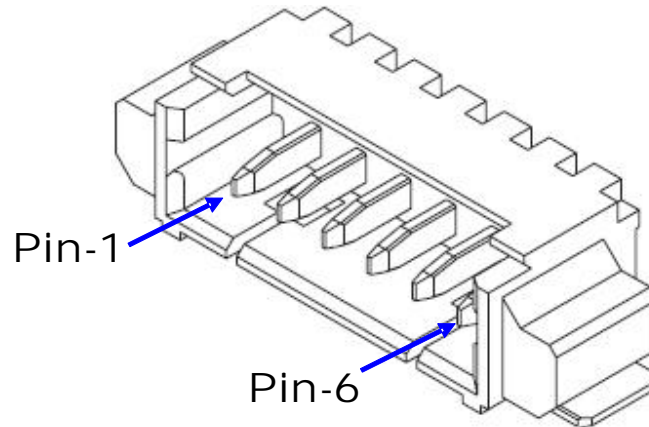


Figure 1-3 CLX-NWA20L CON1 Connector PIN Assignment

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 CLX-NWA20L is 5V , do follow the Maximum Rating in 3.1.

2.2 Connection to HOST

CLX-NWA20L will work properly only if connecting to USB2.0 Interface as defined at 1.5.2 .

2.3 Ground Connection

CLX-NWA20L 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 (Tx pwr: 17 dBm) | | 290 | <500 | mA |
| | | 11g/n (Tx pwr: 13 dBm) | | 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 CLX-NWA20L 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 | | |
| | 40MHz | MCS0 | 15 | Optional |
| | | MCS1 | 30 | |
| | | MCS2 | 45 | |
| | | MCS3 | 60 | |
| | | MCS4 | 90 | |
| | | MCS5 | 120 | |
| MCS6 | | 135 | | |
| MCS7 | 150 | | | |

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

3.2 11b RF Specification

| Data Rate / TRx | Item | IEEE 802.11b/g | Min | Nom | Max | Unit |
|-----------------|-----------------------------|----------------|-----|------------|-----|------|
| 11Mbps/Tx | Power | 18.4.7.1 | 15 | 17 | 20 | dBm |
| 11Mbps/Tx | Frequency Tolerance | 18.4.7.4 | -25 | -6 | +25 | ppm |
| 11Mbps/Tx | EVM | 18.4.7.8 | | 13 | 35 | % |
| 11Mbps/Tx | Spectrum Mask 1st Side Lobe | 18.4.7.3 | | 40 | 30 | dBc |
| 11Mbps/Tx | Spectrum Mask 2nd Side Lobe | 18.4.7.3 | | 60 | 50 | dBc |
| 11Mbps/Rx | Rx Sensitivity Level | 18.4.8.1 | -85 | -83 | -76 | dBm |

3.3 11g RF Specification

| Data Rate / TRx | Item | IEEE 802.11b/g | Min | Nom | Max | Unit |
|-----------------|-----------------------------|---------------------------|-----|------------|-----|------|
| 48Mbps/Tx | Power | 19.4.7.1 | 10 | 13 | 15 | dBm |
| 48Mbps/Tx | Frequency Tolerance | 19.4.7.2 | -25 | -6 | +25 | ppm |
| 48Mbps/Tx | EVM | 17.3.2.2 17.3.8~17.3.9 | | -27 | -22 | dB |
| 48Mbps/Tx | Spectrum Mask 1st Side Lobe | 19.5.4 | | 40 | 20 | dBc |
| 48Mbps/Tx | Spectrum Mask 2nd Side Lobe | 19.5.4 | | 50 | 28 | dBc |
| 48Mbps/Tx | Spectrum Mask 3rd Side Lobe | 19.5.4 | | 50 | 40 | dBc |
| 54Mbps/Rx | Rx Sensitivity Level | 19.5.1 | -76 | -73 | -65 | dBm |

3.4 11n RF Specification

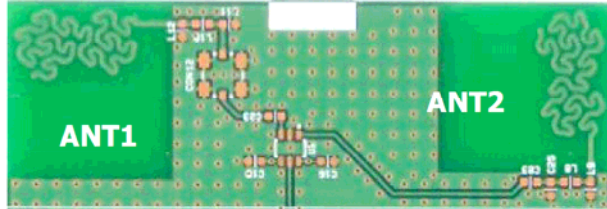
| Data Rate / TRx | Item | IEEE 802.11n | Min | Nom | Max | Unit |
|-----------------|-----------------------------|--------------|-----|------------|-----|------|
| 65Mbps/Tx | Power | | 10 | 13 | 15 | dBm |
| 65Mbps/Tx | Frequency Tolerance | | -25 | -6 | +25 | ppm |
| 65Mbps/Tx | EVM | | | -30 | -28 | dB |
| 65Mbps/Tx | Spectrum Mask 1st Side Lobe | | | 40 | 20 | dBc |
| 65Mbps/Tx | Spectrum Mask 2nd Side Lobe | | | 50 | 28 | dBc |
| 65Mbps/Tx | Spectrum Mask 3rd Side Lobe | | | 50 | 40 | dBc |
| 65Mbps/Rx | Rx Sensitivity Level | | -75 | -72 | -64 | dBm |

3.5 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 | |

3.6 ANTENNA Specifications

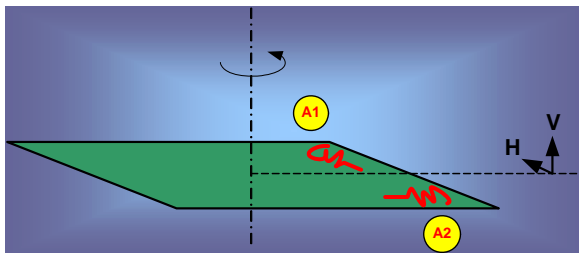
2 Fractal Antennas on PCB that support Diversity



| ANTENNA | Polarization | AVG | Max. | Unit |
|---------|--------------|-------|------|------|
| ANT1 | Horizontal | -1.57 | 2.57 | 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.

4 REGULATORY INFORMATION

4.1 FCC AND IC COMPLIANCE

• Compliance Statement

This device complies with Part 15 of the FCC Rules, and Industry Canada RSS-210.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

• Caution

Any changes or modifications NOT explicitly APPROVED by SAMSUNG ELECTRONICS CO., LTD. could cause the CLX-NWA20L module to cease to comply with FCC rules part 15 and Industry Canada RSS-210, and thus void the user's authority to operate the equipment.

• RF-exposure statement

These modular transmitters, CLX-NWA20L, comply with FCC and IC radiation exposure limits set forth for an uncontrolled environment. The CLX-NWA20L 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 and/or IC authorization is no longer considered valid and the FCC ID and/or IC certification number 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 and/or IC equipment 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 CLX-NWA20L there must be a label containing, at least, the following information:
FCC ID and IC certification number for model CLX-NWA20L*

This device contains
FCC ID : A3LSWL-2920U

This device contains
IC : 649E-SWL2920U

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 and/or Industry Canada.

Where the CLX-NWA20L will be installed in final products larger than 8cm x 10cm following statements has to be placed ONTO the device.

"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, IC certification number, and/or this statement, the FCC ID, IC certification number, 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."