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LG Electronics LCWB-009 WiFi 4 + BLE5.2 Module

Specifications

- **Model:** LCWB-009
- **Module:** WIFI 4 + BLE5.2
- **Software:** Included

Product Usage Instructions

Overview

The LCWB-009 module is a combination of WIFI 4 and Bluetooth 5.2 technologies, providing users with dual connectivity options for their devices.

Software Information

The module comes with pre-installed software for seamless integration into your projects. It is designed to be user-friendly and easily configurable.

Features

- WIFI 4 and Bluetooth 5.2 connectivity
- Compact design
- Low power consumption
- Easy integration

Block Diagram

Overall Block Diagram

The block diagram showcases the internal components and connectivity options of the module.

SoC Internal Power Distribution

This diagram illustrates how power is distributed within the system-on-chip (SoC) of the module.

Physical Photo

A visual representation of the physical appearance of the LCWB-009 module.

PIN Description

Detailed information about each pin on the module for proper connection and usage.

Physical Dimensions

The exact measurements and dimensions module are required for fitting into your project seamlessly.

General Specification

General specifications of the module including compatibility, operating conditions, and more.

Product Specifications

Electrical Specifications

- Absolute Maximum Ratings
- Operating conditions
- ESD spec
- Current Consumption (Wi-Fi)
- Current Consumption (BLE)

Overview

LCWB-009 is a highly integrated 1×1 single-band 2.4 GHz Wi-Fi 4(802.11b/g/n) and Bluetooth Low Energy (LE) 5.2 system designed for applications requiring high security

and rich resources. A 32-bit integrated Armv8-M STAR-MC1 microcontroller and a comprehensive set of peripherals for advanced Internet of Things (IoT) applications. LCWB-009 provides state-of-the-art security based on a powerful security architecture. The module integrates a Platform Security Suite (IPSS) for the Internet of Things for encryption and system security control. IPSS embeds the features of comprehensive and powerful security to set up a top-secret execution environment for IoT devices. Using advanced design technology and ultra-low power process technology, LCWB-009 provides high integration, efficient security, and minimal power consumption for a wide range of advanced IoT applications.

Software informationThe

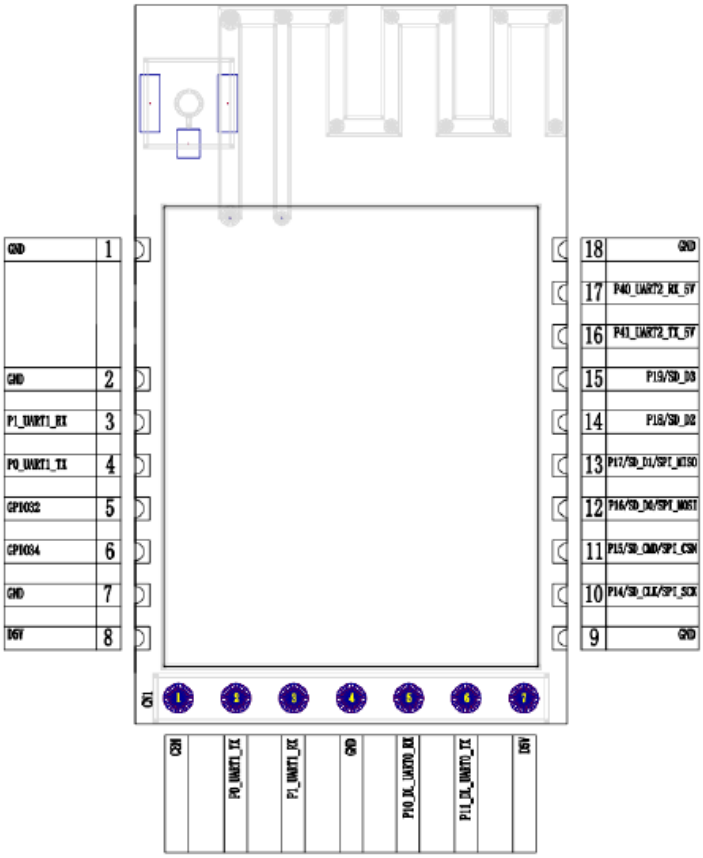
LCWB-009 software information is shown in the table below.

Model	software information	
	Check Sum	Version
LCWB-009	TBD	TBD

Features

- IEEE 802.11b/g/n 1×1 compliant
- 20 MHz channel bandwidth for 2.4 GHz
- Supports Orthogonal Frequency Division Multiple Access (OFDMA)
- Supports Target Wake Time (TWT)
- TX and RX Low-Density Parity Check (LDPC) support for extended range
- WPA/WPA2/WPA3-Personal support for enhanced security
- Operating modes: STA and SoftAP
- Concurrent SoftAP + STA
- Bluetooth Low Energy (LE) 5.2
- Supports Bluetooth Low Energy 1 Mbps and long range (125 kbps and 500 kbps)
- Supported Bluetooth Low Energy features: LE Audio,1 Mbps, advertising extensions, and long range
- Security S/W: Beken

PIN Description



Module disk interface

PIN NO.	NAME	TYPE	FUNCTION
1	GND	Power ground	Ground
2	GND	Power ground	Ground
3	P1_UART1_RX	I/O	GPIO1: general-purpose I/O UART 1_RX: receive data input I2C1_SDA : serial data SWDIO: serial wire data ADC13: an alog input channel LIN_RXD: receive data input

4	P0_UART1_TX	I/O	GPIO0: general-purpose I/O UART 1_TX: transmit data output I2C1_SCL: serial clock SWCLK: serial wire clock ADC12: analog input channel LIN_TXD: transmit data output
5	GPIO32_TX_5V	I/O	GPIO32: general-purpose I/O PWMG1_PWM0: PWMG1 channel PWM 0 TOUCH6: touch sensing I/O
6	GPIO34_RX_5V	I/O	GPIO34: general-purpose I/O PWMG1_PWM2: PWMG1 channel PWM 2 TOUCH8: touch sensing I/O SPI0_CSN: chip select
7	GND	Power ground	Ground
8	D5V	Power VBAT	power supply
9	GND	Power ground	Ground
10	P14/SD_CLK/SPI_SCK	I/O	GPIO14: general-purpose I/O SDIO_CLK: clock SPI0_SCK: serial clock BT_ANT0: Bluetooth antenna select I2C1_SCL: serial clock

11	P15/SD_CMD/SPI_ CSN	I/O	GPIO15: general-purpose I/O SDIO _CMD: command/response SPI0_C SN: chip select BT_ANT1: Bluetooth antenna select I2C1_SDA: serial data
12	P16/SD_D0/SPI_ M OSI	I/O	GPIO16: general-purpose I/O SDIO _DATA0: data SPI0_MOSI: master out, slave in BT_ANT2: Bluetooth antenna select
13	P17/SD_D1/SPI_ M	I/O	GPIO17: general-purpose I/O
	ISO		SDIO_DATA1: data SPI0_MISO: master in slave out BT_ANT3: Bluetooth antenna select
14	P18/SD_D2	I/O	GPIO18: general-purpose I/O SDIO _DATA2: data PWMG0_PWM0: PW MG0 channel PWM0
15	P19/SD_D3	I/O	GPIO19: general-purpose I/O SDIO _DATA3: data PWMG0_PWM1: PW MG0 channel PWM1

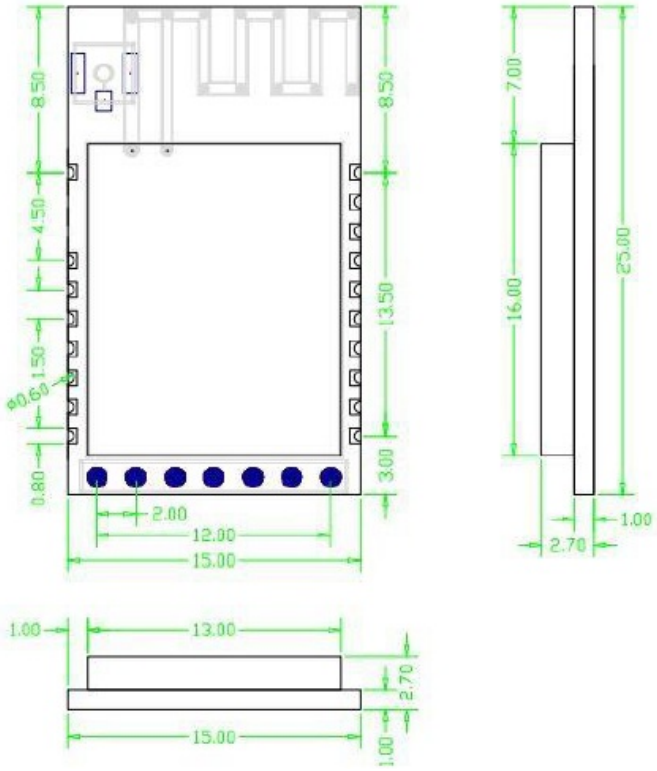
16	P41_UART2_TX_5V	I/O	GPIO41: general-purpose I/O UART 2_TX: transmit data output LIN_TXD: transmit data output
17	P40_UART2_RX_5V	I/O	GPIO40: general-purpose I/O UART 2_RX: receive data input LIN_RXD: receive data input
18	GND	Power ground	Ground

CN1 pinhole interface

PIN NO.	**NAME**	**TYPE**	**FUNCTION**
1	CEN	I/O	Chip enable, active high
2	P0_UART1_TX	I/O	GPIO0: general-purpose I/O UART 1_TX: transmit data output I2C1_SCL: serial clock SWCLK: serial wire clock ADC12: analog input channel LIN_TXD: transmit data output

3	P1_UART1_RX	I/O	GPIO1: general-purpose I/O UART 1_RX: receive data input I2C1_SDA : serial data SWDIO: serial wire data ADC13: an alog input channel LIN_RXD: receive data input
4	GND	Power ground	Ground
5	P10_DL_UART0_ RX	I/O	GPIO10: general-purpose I/O DL_U ART_RX: UART flash download rec eive data input UART0_RX: receive data input SDI O_DATA2: data CLK_AUXS_CIS: C IS master clock (derived from DCO/APLL/CLK_320 M/ CLK_480M)
6	P11_DL_UART0_ TX	I/O	GPIO11: general-purpose I/O DL_U ART_TX: UART flash download tra nsmit data output UART0_TX: transmit data output SDIO_DATA3: data
7	D5V	Power VBAT	power supply

Physical Dimensions



General Specification

Model	LCWB-009
Product Name	WLAN 802.11b/g/n UART 1T1R + BLE 5.2 module
Major Chipset	BK7234
Standard	802.11 b/g/n
WiFi Interface	UART
Supply Voltage	DC5V OR DC3.3V
Operating Temperature	-30° C ~ 85° C
Storage Temperature	-40° C ~ 85°C
Humidity	5% to 90% maximum

ESD Protection	Contact: ± 4KV, Air: ± 8KV; Condition test report, Contact: ± 30KV, Air: ± 30KV.
Dimension	25.0×15.0x2.7mm (LxWxH) ±0.2mm

Product Specifications

Electrical Specifications

Absolute Maximum Ratings

Description	Min.	Ttyp	Max.	Unit
Storage Temperature	-40		+85	℃
Storage Humidity (40℃)	5		90	%

Operating conditions

Description	Min.	Typ	Max.	Unit
Supply Voltage	3		5.5	Vdc
Ambient Temperature	-30		+85	℃
Ambient Humidity (40℃)	5		90	%

ESD spec

ESD	Unit
Air discharge	± 8KV
Contact discharge	± 4KV

Current Consumption (Wi-Fi)

When Supply voltage = 5V

Parameter	Condition	Min	Typ	Max	unit
Active Mode					
RX current	11b: 11 Mbps DSSS	–	21	–	mA
	11g: 54 Mbps OFDM	–	21	–	mA
	11n: MCS7, HT20	–	21	–	mA
TX current	11b: 11 Mbps DSSS @ 19 dBm	–	235	–	mA
	11g: 54 Mbps OFDM @ 17 dBm	–	200	–	mA
	11n: MCS7, HT20 @ 16 dBm	–	189	–	mA
Sleep Mode					
Sleep	Supply Voltage = 5 V	–	236	–	μA
Shutdown	Supply Voltage = 5 V	–	20	–	μA

When Supply voltage = 3.3V

Parameter	Condition	Min	Typ	Max	unit

Active Mode					
RX current	11b: 11 Mbps DSSS	–	27	–	mA
	11g: 54 Mbps OFDM	–	27	–	mA
	11n: MCS7, HT20	–	27	–	mA
TX current	11b: 11 Mbps DSSS @ 19 dBm	–	250	–	mA
	11g: 54 Mbps OFDM @ 17 dBm	–	215	–	mA
	11n: MCS7, HT20 @ 16 dBm	–	205	–	mA
Sleep Mode					
Sleep	Supply Voltage = 3.3 V	–	220	–	μA
Shutdown	Supply Voltage = 3.3 V	–	20	–	μA

Current Consumption (BLE)

When Supply voltage = 5V

Device state	Code rate	Output power	Min	Typ	Max	unit
ON_Transmit	1 Mbps	3.5dBm	–	104	–	mA

When usupplyvoltage = 3.3V

Device state	Code rate	Output power	Min	Typ	Max	unit
ON_Transmit	1 Mbps	3.5dBm	–	110	–	mA

Standard Rated Specification

Radio performance under typical conditions: VDD @5.0V,VD 33@3.3V,t emp.25℃

WIFI

Division	Characteristic
WLAN Standard	IEEE 802.11 b/g/n HT20
Host Interface	UART
Frequency Range	2412MHz 2462MHz
Modulation	802.11b:DSSS,CCK,DPSK,DQPSK
	802.11g/n:OFDM,BPSK,QPSK,16-QAM,64-QAM
Data Rate	802.11b:1,2,5.5,11Mbps
	802.11g:6,9,12,18,24,36,48,54Mbps
Data Rate (20MHz)	802.11n:MCSO,MCS1,MCS2,MCS3,MCS4,MCS5,MCS6, MCS7

BLE

Frequency Range	2402MHz 2480MHz	
Spread Spectrum	FHSS (Frequency Hopping Spread Spectrum)	
Modulation	GFSK (Gaussian Frequency Shift Keying)	

Data Rate	1 Mbps	

RF Specifications

RF Characteristics for Wi-Fi

Feature	Description	
WLAN Standard	IEEE 802.11b/g/n WiFi compliant	
Frequency Range	2412MHz 2462MHz (2.4 GHz ISM Band)	
Number of Channels	2.4GHz Ch1 ~ Ch11	
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK	
Output Power	802.11b / 1Mbps : 17dBm ± 2 dB @ EVM ≤ -10dB 802.11b /11Mbps : 17dBm ± 2 dB @ EVM ≤ -15dB	
	802.11g / 6Mbps : 17dBm ± 2 dB @ EVM ≤ -5dB 802.11g /54Mbps : 15 dBm ± 2 dB @ EVM ≤ -28dB	
	802.11n /MCS 0 802.11n /MCS 7	: 16 dBm ± 2 dB @ EVM ≤ -5dB : 14 dBm ± 2 dB @ EVM ≤ -30dB
Receive	– 1Mbps	PER @ -93 dBm, typical
	– 2Mbps	PER @ -90 dBm, typical

Sensitivity (11b,20MHz) @8% PER	– 5.5Mbps	PER @ -88 dBm, typical
	– 11Mbps	PER @ -85 dBm, typical
Receive Sensitivity (11g,20MHz) @ @10% PER	– 6Mbps	PER @ -91 dBm, typical
	– 9Mbps	PER @ -89 dBm, typical
	– 12Mbps	PER @ -86 dBm, typical
	– 18Mbps	PER @ -83 dBm, typical
	– 24Mbps	PER @ -80 dBm, typical
	– 36Mbps	PER @ -77 dBm, typical
	– 48Mbps	PER @ -74 dBm, typical
	– 54Mbps	PER @ -72 dBm, typical
Receive Sensitivity (11n,20MHz) @10% PER	– MCS=0	PER @ -90 dBm, typical
	– MCS=1	PER @ -87 dBm, typical
	– MCS=2	PER @ -84 dBm, typical

	– 3 MCS=	PER @ -81 dBm, typical
	– 4 MCS=	PER @ -78 dBm, typical

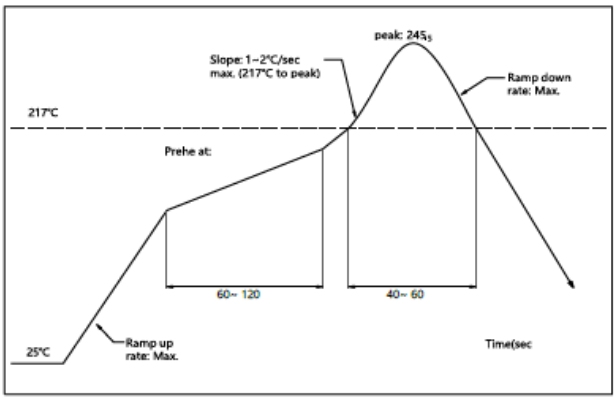
	– 5 MCS=	PER @ -75 dBm, typical
	– 6 MCS=	PER @ -72 dBm, typical
	– 7 MCS=	PER @ -70 dBm, typical

RF Characteristics for BLE

Wireless Standard	Bluetooth® V5.2 specification
Frequency Band	2402~2480 MHz
RF TX Output Power	6dBm ± 1 dB
RX Sensitivity	-95dBm (typical)

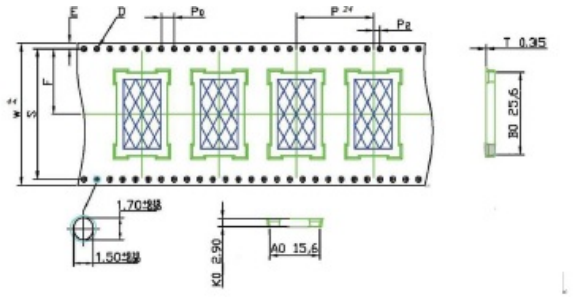
Recommended Reflow Profile

- Referred to the IPC/JEDEC standard.
- Peak Temperature: <250°C
- Number of Times ≤2 times



Packing information

Carrier size Detail:



FCC Statement

FCC Part 15.19 Statements:

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. This service may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

FCC Part 15.105 statement(Class B)

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 usedbyh 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 to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Part 15.21 statement

Any changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate this equipment.

<Regulatory notice to host manufacturer according to KDB 996369 D03 OEM Manual v01 >

List of applicable FCC rules

This module has been granted modular approval as listed below FCC rules.

- FCC Rule parts 15C(15.247)
  Summarize the specific operational use conditions
- The OEM integrator should use equivalent antennas, which are the same type and have equal or less gain than an antenna listed in this instruction manual.

Limited module procedures (N/A)

Single Module

Trace antenna designs (N/A)

If trace antenna designs are applicable, full-detail design specifications are required per D02 Module Q&A Question 11.

For a modular transmitter with trace antenna designs, see the guidance in Question 11

of KDB Publication 996369 D02 FAQ –Modules for Micro-Strip Antennas and traces. The integration information shall include, for the TCB review, the integration instructions for the following aspects: layout of trace design, parts list (BOM), antenna, connectors, and isolation requirements.

- a) Information that includes permitted variances (e.g., trace boundary limits, thickness, length, width, shape(s), dielectric constant, and impedance as applicable for each type of antenna);
- b) Each design shall be considered a different type (e.g., antenna length in multiples (s) of frequency, the wavelength, and antenna shape (traces in phase) can affect antenna gain and must be considered);
- c) The parameters shall be provided in a manner permitting host manufacturers to design the printed circuit (PC) board layout;
- d) Appropriate parts by manufacturer and specifications;
- e) Test procedures for design verification; and
- f) Production test procedures for ensuring compliance.

RF exposure considerations

The module has been certified for integration into products only by OEM integrators under the following conditions:

- The antenna(s) must be installed such that a minimum separation distance of at least 50mm is maintained between the radiator (antenna) and all persons at all times.
- The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except by the FCC multi-transmitter product procedures.
- portable use

  As long as the three conditions above are met, further transmitter testing will not be required.

  OEM integrators should provide the minimum separation distance to end users in their end-product manuals.
- This module is exclusively for LG Electronics' finished products.
- If the host device equipped with this module does not meet the 50mm separation distance requirement, additional certification will be conducted.

* Host device examples: washing machines, air conditioners, refrigerators, ovens,

vacuum cleaners, etc.

Antennas

This module is certified with the following integrated antenna.

- Ant. Type: PCB Pattern Antenna (Max. Antenna gain: -1.05 dBi)
- Any new antenna type, higher gain than listed antennas, meets the requirements of FCC rules 15.203 and 2.1043 as permissive change procedure

Label and compliance information

End Product Labeling (FCC)

The module is labeled with its own FCC ID. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the end product must be labeled in a visible area with the following:

Contains FCC ID: BEJ-LCWB009

Information on test modes and additional testing requirements

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, additional transmitter in the host, etc.).

Additional testing, Part 15 Subpart B disclaimer

The grantee should include a statement that the modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and that the host product manufacturer is responsible for compliance with any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Note EMI Considerations

Note that a host manufacture is recommended to use D04 Module Integration Guide

recommending as “best practice” RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties For standalone mode, reference the guidance in D04 Module Integration Guide and for simultaneous mode; see D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.

How to make changes

Since only Grantees are permitted to make permissive changes, when the module is used differently than granted, please contact the module manufacturer at the below contact information.

Contact information: younguk.nam@lge.com / Tel: 82-31-8066-5539

Responsible Party Information

- Model name: LCWB-009
- Responsible Party U.S. Contact Information LG ELECTRONICS CANADA INC.
- (Name) David Kim
- (Phone number) 201-470-2696
- (Address) 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey 07632, United States

ISED Statement

Licensed-exempt Statement

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada’s licence-exempt RSS(s).

Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

RF Exposure Statement

The antenna(s) must be installed such that a minimum separation distance of at least

50mm is maintained between the radiator (antenna) and all persons at all times.

End Product Labeling

The module is labeled with its own IC Certification Number. If the IC Certification Number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the fid product must be labeled in a visible area with the following:

Contains IC: 2703N-LCWB009

FAQs

- **Q: Can I use both WIFI and BLE simultaneously?**
  A: Yes, the LCWB-009 module supports simultaneous WIFI and BLE connections, allowing for versatile usage scenarios.
- **Q: What is the range of the WIFI connection?**
  A: The WIFI 4 technology in the module provides a standard range of up to 100 meters in open spaces, but this can vary based on environmental factors.

Documents / Resources

	LG Electronics LCWB-009 WiFi 4 + BLE5.2 Module [pdf] User Manual LCWB009, BEJ-LCWB009, BEJLCWB009, LCWB-009 WiFi 4 BLE5.2 Module, LCWB-009, WiFi 4 BLE5.2 Module, BLE5.2 Module, Module

References

- User Manual

LG Electronics

BEJ-LCWB009, BEJLCWB009, BLE5.2 Module, LCWB-009, LCWB-009 WiFi 4 BLE5.2 Module, LCWB009, LG Electronics, Module, WiFi 4 BLE5.2 Module

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