

User manual

PRODUCT NAME : Wi-Fi / BLE + MCU Module

MODEL NAME : LCWB-001

H/W version : V1.0

S/W version : V1.0

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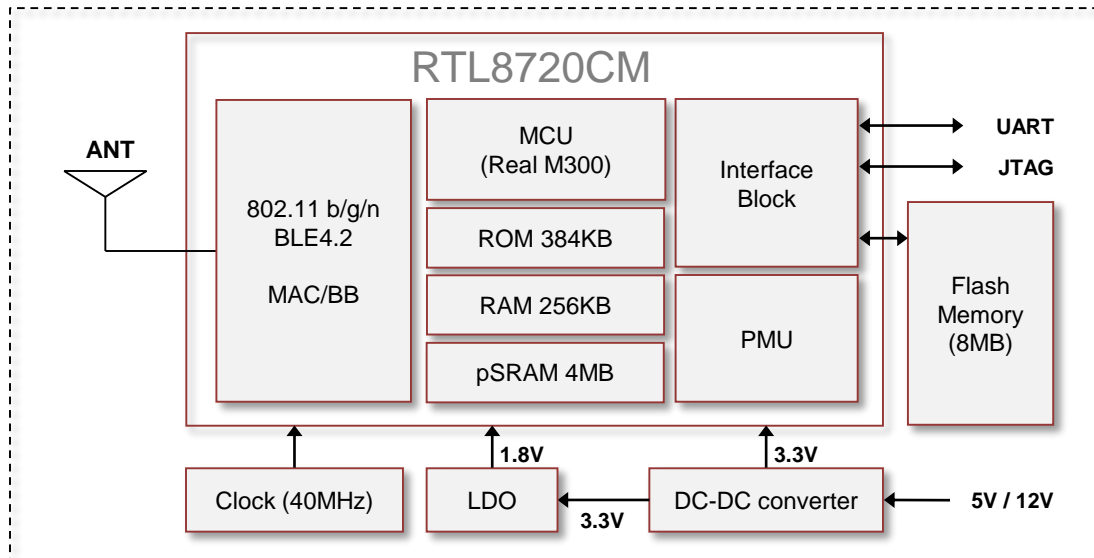
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1. Features

LCWB-001 is the module for IEEE 802.11b/g/n wireless LAN + BLE4.2 + MCU.
 LCWB-001 is based on Realtek RTL8720CM solution.

- IEEE 802.11 b/g/n HT20 single band WLAN infra-structure
- Bluetooth Low Energy 4.2 (BLE4.2)
- Size : 20 mm x 48 mm x 11.4 mm
- Auto-calibration (RF, Crystal)
- Data rates up to 72.2Mbps PHY rate
- UART interface
- Integrated IPv4/IPv6 TCP/IP stack
- Integrated Network services such as HTTP, DNS, FTP
- Security : WFA, WPA, WPA2, WEP, WAPI, TKIP
- Application : Home Appliance

2. Block Diagram



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3. Absolute Maximum Ratings

Parameter	Min	Max	Unit
Storage Temperature	-40	+100	°C
Storage Humidity (@ 40°C)	-	90	%

Caution : The specifications above the Table define levels at which permanent damage to the device can occur. Function operation is not guaranteed under these conditions. Operating at absolute maximum conditions for extend periods can adversely affect the long-term reliability of the device.

- Other conditions

- 1) Do not use or store modules in the corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are contained

Also, avoid exposure to moisture

- 2) Store the modules where the temperature

and relative humidity do not exceed 5 to 40°C and 20 to 60%

- 3) Assemble the modules within 6 months

Check the soldering ability in case of 6 months over

4. Operating Test Conditions

Parameter	Min	Typ	Max	Unit
Operating Temperature	0	-	+85	°C
Operating Humidity (40°C)	-	-	85	%
Supply Voltage	4.5	5.0	5.5	Vdc
	10.8	12	13.2	

1) Test condition : AP connection Ping test mode(not continuous Tx and T-Put mode)

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5. Electrical Characteristics**5-1. RF Characteristics for IEEE802.11b** (11Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11b			
Mode	DSSS / CCK			
Channel frequency	2400 ~ 2483MHz			
Data rate	1, 2, 5.5, 11Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level(Average)	14	17	20	dBm
Spectrum Mask				
1 st side lobes (to fc \pm 11MHz)	-	-	-30	dBr
2 nd side lobes (to fc \pm 22MHz)	-	-	-50	dBr
Modulation Accuracy (EVM)	-	-	35	%
Power On/Off ramp	-	-	2.0	usec
Freq. Tolerance	-25	-	25	ppm
Chip Clock Freq. Tolerance	-25	-	25	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (FER \leq 8%)	-	-	-76	dBm
Maximum Input Level (FER \leq 8%)	-10	-	-	dBm

* Normal Condition : 25°C, VDD=5V.

* RF characteristics is board limit. It can differ according to standards

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5-2. RF Characteristics for IEEE802.11g (54Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11g			
Mode	OFDM			
Channel frequency	2400 ~ 2483MHz			
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level(Average)	12	15	18	dBm
Spectrum Mask				
at $f_c \pm 11\text{MHz}$	-	-	-20	dBr
at $f_c \pm 20\text{MHz}$	-	-	-28	dBr
at $f_c \geq \pm 30\text{MHz}$	-	-	-40	dBr
Constellation Error (EVM)	-	-	-25	dB
Freq. Tolerance	-20	-	20	ppm
Chip Clock Freq. Tolerance	-20	-	20	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (PER $\leq 10\%$)	-	-	-65	dBm
Maximum Input Level (PER $\leq 10\%$)	-20	-	-	dBm

* Normal Condition : 25°C, VDD=5V.

* RF characteristics is board limit. It can differ according to standards

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5-3. RF Characteristics for IEEE802.11gn (MCS7 mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11n – 2.4GHz			
Mode	OFDM			
Channel frequency	2400 ~ 2483MHz			
Data rate	6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level(Average)(HT20 : MCS7)	11	14	17	dBm
Spectrum Mask (HT20)				
at $f_c \pm 11\text{MHz}$	-	-	-20	dBr
at $f_c \pm 20\text{MHz}$	-	-	-28	dBr
at $f_c \pm 30\text{MHz}$	-	-	-40	dBr
Constellation Error (EVM)	-	-	-28	dB
Freq. Tolerance	-20	-	20	ppm
Chip Clock Freq. Tolerance	-20	-	20	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (HT20,PER ≤ 10%)	-	-	-64	dBm
Maximum Input Level (PER ≤ 10%)	-20	-	-	dBm

* Normal Condition : 25°C, VDD=5V.

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5-4. RF Characteristics for BLE

TX characteristics	Min.	Typ.	Max.	Unit
Power Level(Average)	1.5	4.5	7.5	dBm
Adjacent channel transmit power				
@ F = F0 ± 1MHz	-	-	0	dBr
@ F = F0 ± 2MHz	-	-	-30	dBr
@ F = F0 ± 3MHz	-	-	-40	dBr
@ F > F0 ±3MHz	-	-	-40	dBr
Modulation characteristics – Frequency derivation				
$\Delta F1_{AVG}$	140	-	175	KHz
$\Delta F2_{MAX}$	115	-	-	KHz
$\Delta F2_{MAX} / \Delta F1_{AVG}$	80	-	-	%
RX characteristics	Min.	Typ.	Max.	Unit
Min. input level (BER ≤ 0.1%)	-	-	-84	dBm
Max. input level (BER ≤ 0.1%)	-20	-	-	dBm

* Normal Condition : 25°C, VDD=5V.

* RF characteristics is board limit. It can differ according to standards

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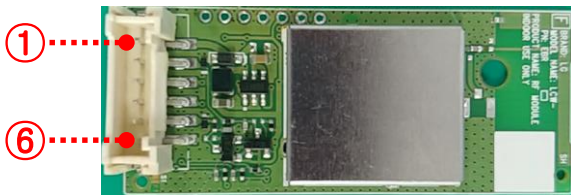
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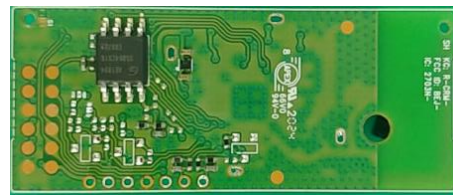
6. Pin Description

Pin No.	Pin Name	I/O	Pin Description
1	VDD	I	VDD (5V, 12V)
2	UART Rx	I	UART Communication signal line
3	NC	-	NC
4	NC	-	NC
5	UART Tx	O	UART Communication signal line
6	GND	-	GND

< Top side >



< Bottom side >

**Note.**

- 1) Recommend a module install sequence for prevent UART device failure
 - Supply 5V, 12V power
 - Connect to data signal (UART Tx, UART Rx)
- 2) Recommend to use the shielding cable

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7. Outline Drawing

LG Innotek Confidential		2	3	4																																
F	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">DIMENSIONAL TOLERANCE</th> <th rowspan="4" style="writing-mode: vertical-rl; text-orientation: mixed;">C H A N G E</th> <th>REV. NO.</th> <th>DATE (YY MM DD)</th> <th>SIGNATURE</th> <th>CHANGE CONTENTS</th> </tr> <tr> <td>~ up to 6</td> <td>±0.3</td> <td></td> <td></td> <td style="text-align: center;">△</td> <td></td> </tr> <tr> <td>over 6 up to 30</td> <td>±0.5</td> <td></td> <td></td> <td style="text-align: center;">△</td> <td></td> </tr> <tr> <td>over 30 up to 120</td> <td>±0.5</td> <td></td> <td></td> <td style="text-align: center;">△</td> <td></td> </tr> <tr> <td colspan="2">UNLESS OTHERWISE SPECIFIED</td> <td></td> <td></td> <td style="text-align: center;">△</td> <td></td> <td></td> </tr> </table>		DIMENSIONAL TOLERANCE		C H A N G E	REV. NO.	DATE (YY MM DD)	SIGNATURE	CHANGE CONTENTS	~ up to 6	±0.3			△		over 6 up to 30	±0.5			△		over 30 up to 120	±0.5			△		UNLESS OTHERWISE SPECIFIED				△				
	DIMENSIONAL TOLERANCE		C H A N G E	REV. NO.		DATE (YY MM DD)	SIGNATURE	CHANGE CONTENTS																												
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RELEASING THIS DRAWING WITHOUT PERMISSION OF LG Innotek SHOULD BE ACCUSED ACCORDING TO THE LAWS AND COMPANY RULES																																				
E																																				
	LABEL position and direction could be changed according to design modification.																																			
D	PCB thickness $t1 \pm 0.1$																																			
	2-PCB Array cutting area. (Burr is Max 0.2mm)																																			
C	Refer to SMW200-H06G of Yenho electronics. (Pitch 2.0 SMD)																																			
	Shield can : Nickel Silver or S-Tin plate, Tin plate steel sheet																																			
B	PCB : FR-4																																			
	<p>Notes</p> <ol style="list-style-type: none"> 1. Refer to the tolerance table, Radii are 0.5 unless otherwise specified. 2. Lot No. shall be conformed to LGIT standard specification. 3. As long as the outer appearance doesn't affect the performance of the product, it can be changed without prior notice. 4. PCB Worpages are max. 0.6mm. 5. Caution for handling. <ol style="list-style-type: none"> 1) Don't touch the circuit components. 2) Don't drop the wifi module 50cm high. (Allowed 1 time for 50cm high Max) 3) Don't twist the wifi module. 6. Reliability for PCB bending. <ol style="list-style-type: none"> 1) Requirement : No apparent damage 2) Test method : Solder the sample PCB, band down to 2mm 3) Fig <div style="display: flex; align-items: center; margin-top: 5px;"> </div> <p>7. Outline dimensions do not contains coating thickness. 8. ▨ Hatching area is not coated both sides of PCB, the rest area is coated.</p>																																			
A	RELATED P/N THIRD ANGLE PROJECT		SCALE 1:1	UNIT mm																																
			DESIGN '20. 07. 10 Kapsoul Lee.	TITLE Outline Drawing																																
CHECKED '20. 07. 10 Je hyuk Moon			PART NO																																	
		APPROVED '20. 07. 10 Seokdong Choi	MODEL ETWCARUC01																																	
			DWG NO																																	
LGIT_STD A4_VER		2	3	4																																
LG Innotek Co., Ltd.																																				

All parts which supply to LG Innotek must not contain prohibited substances including RoHS Hazardous substances and for more details refer to LG Innotek's "Manual for management of hazardous substances in Product"

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Regulation Notice

1. 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 device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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.

Responsible Party Information

Supplier's Declaration of Conformity
47 CFR § 2.1077 Compliance

InformationResponsible Party – U.S. Contact Information

LG Electronics USA1000 Sylvan Avenue Englewood Cliffs
New Jersey, United States, 07632

Telephone number or internet contact information

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Regulation Notice

2. 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 below listed FCC rule parts.

- FCC Rule parts 15C(15.247)

Summarize the specific operational use conditions

The OEM integrator should use equivalent antennas which is the same type and equal or less gain than an antenna listed in this instruction manual.

RF exposure considerations

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

- The antenna(s) must be installed such that a minimum separation distance of at least 20 cm 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 in accordance with FCC multi-transmitter product procedures.
- Mobile 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.

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Regulation Notice

Antennas list

This module is certified with the following integrated antenna.

- Type: PCB Pattern Antenna
- Max. peak Antenna gain

	Frequency	Antenna gain
BT LE	2402 ~ 2480 MHz	1.5 dBi
Wi-Fi	2412 ~ 2462 MHz	1.5 dBi

Any new antenna type, higher gain than listed antenna should be met the requirements of FCC rule 15.203 and 2.1043 as permissive change procedure.

Label and compliance information

End Product Labeling

The module is labeled with its own FCC ID and IC Certification Number. If the FCC ID and IC Certification Number are 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 final end product must be labeled in a visible area with the following:

- Contains FCC ID: BEJ-LCWB001
- Contains IC: 2703N-LCWB001

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 final host product also requires Part 15 subpart B compliance testing with the modular transmitter installed to be properly authorized for operation as a Part 15 digital device.

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Regulation Notice

3. ISED Statement

RSS-GEN, Sec. 7.1.3–(licence-exempt radio apparatus)

This device complies with Industry Canada licence-exempt RSS standard(s). 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.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure

The antenna (or antennas) must be installed so as to maintain at all times a distance minimum of at least 20 cm between the radiation source (antenna) and any individual. This device may not be installed or used in conjunction with any other antenna or transmitter.

l'exposition aux RF

L'antenne (ou les antennes) doit être installée de façon à maintenir à tout instant une distance minimum de au moins 20 cm entre la source de radiation (l'antenne) et toute personne physique.

Caution: Any changes or modifications to this device not explicitly approved by manufacturer could void your authority to operate this equipment. Attention:

Les changements ou modifications de cet appareil non expressément approuvé par le fabricant peuvent annuler votre droit à utiliser cet équipement.

Étiquetage du produit final (IC)

Le module LCWB-001 est étiqueté avec sa propre identification FCC et son propre numéro de certification IC. Si l'identification FCC et le numéro de certification IC ne sont pas visibles lorsque le module est installé à l'intérieur d'un autre dispositif, la partie externe du dispositif dans lequel le module est installé devra également présenter une étiquette faisant référence au module inclus. Dans ce cas, le produit final devra être étiqueté sur une zone visible avec les informations suivantes :

Contient module émetteur identification FCC ID: BEJ-LCWB001

Contient module émetteur IC : 2703N-LCWB001