LG LCWB-001 Wi-Fi BLE + MCU Modul User Manual

User manual
PRODUCT NAME : Wi-Fi / BLE + MCU Module
MODEL NAME: LCWB-001
H/W version: V1.0
S/W version: V1.0

Contents

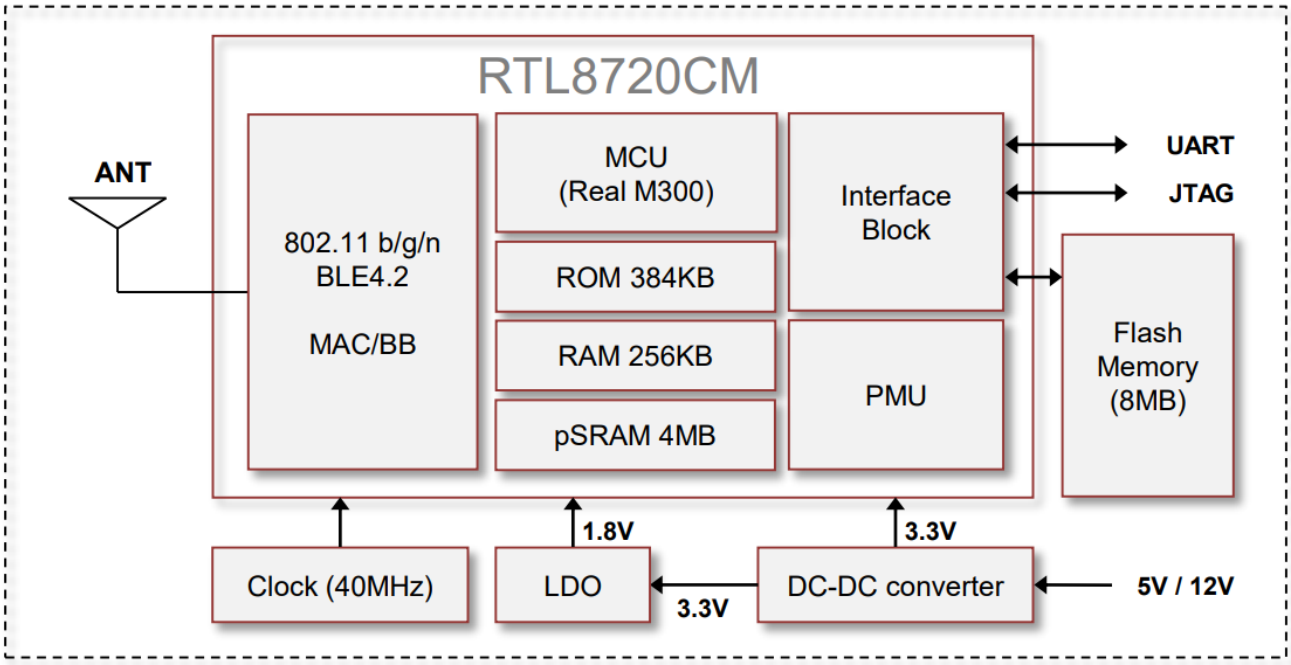
Features

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

Block Diagram



Absolute Maximum Ratings

Parameter	Min	Max	Unit
Storage Temperature	-40	+100	℃
Storage Humidity (@ 40℃)	–	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 extended 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℃ and 20 to 60%

3) Assemble the modules within 6 months Check the soldering ability in case of 6 months over

Operating Test Conditions

Parameter	Min	Typ	Max	Unit
Operating Temperature	0	–	+85	℃
Operating Humidity (40℃)	–	–	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)

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				
1st side lobes (to FC ±11MHz)	–	–	-30	Br
2nd side lobes (to FC ±22MHz)	–	–	-50	Br
Modulation Accuracy (EVM)	–	–	35	%
Power On/Off ramp	–	–	2.0	uses
Freq. Tolerance	-25	–	25	ppm
Chip Clock Freq. Tolerance	-25	–	25	ppm
RX Characteristics	**Min.**	**Typ.**	**Max.**	**Unit**
Minimum Input Level Sens. (FER ≤ 8%)	–	–	-76	dBm
Maximum Input Level (FER ≤ 8%)	-10	–	–	dBm

* Normal Condition: 25℃, VDD=5V.
* RF characteristics are board limit. It can differ according to standards

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 FC ±11MHz	–	–	-20	dBr
at FC ±20MHz	–	–	-28	dBr
at FC ≥ ± 30MHz	–	–	-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 ≤ 10%)	–	–	-65	dBm
Maximum Input Level (PER ≤ 10%)	-20	–	–	dBm

* Normal Condition: 25℃, VDD=5V.
* RF characteristics are board limit. It can differ according to standards

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 FC ±11MHz	–	–	-20	dBr
at FC ±20MHz	–	–	-28	dBr
at FC ±30MHz	–	–	-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.
* RF characteristics are board limit. It can differ according to standards

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 are board limit. It can differ according to standards

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

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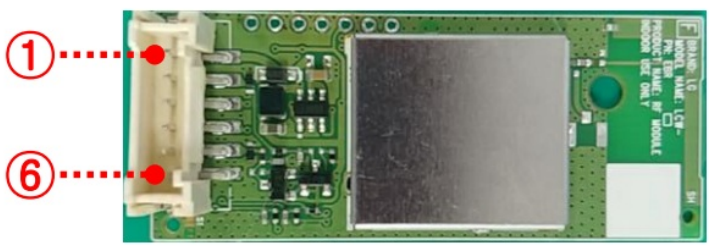

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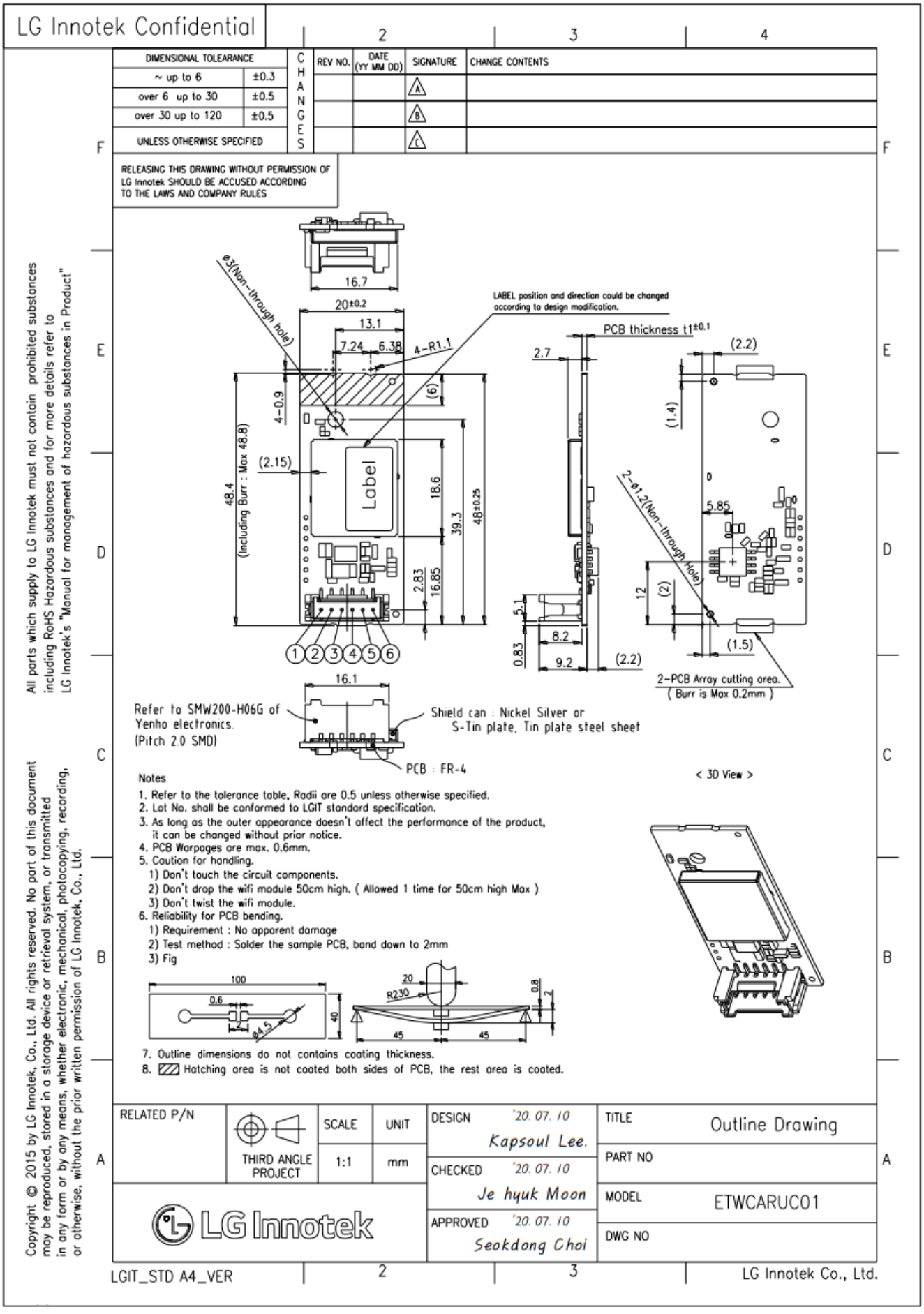
Note.

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

Outline Drawing



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

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 are 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 the 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.

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, a higher gain than the listed antenna should be met the requirements of FCC rules 15.203 and 2.1043 as a 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:

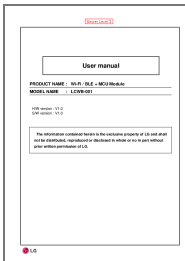
- Contains FCC ID: BEJ-LCWB001

- 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, the 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.

3. ISED Statement
RSS-GEN, Sec. 7.1.3–(license-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.
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.
Caution: Any changes or modifications to this device not explicitly approved by the manufacturer could void your authority to operate this equipment. Attention:

Documents / Resources

	LG LCWB-001 Wi-Fi BLE + MCU Modul [pdf] User Manual LCWB-001 Wi-Fi BLE MCU Module, Wi-Fi BLE MCU Module, MCU Module