

## 2. Features

### 2.1 General

- IEEE® 802.11 b/g/n (20MHz/40MHz) (1x1) solution
- Integrated PCB antenna (Peak Gain: 3.56 dBi)
- SIZE : 48mm x 20mm x 10mm
- CMOS MAC, Baseband PHY, and RF in a single chip for 802.b/g/n compatible WLAN
- Complete 802.11n solution for 2.4GHz band
- 72.2Mbps receive PHY rate and 72.2Mbps transmit PHY rate using 20MHz bandwidth
- 150Mbps receive PHY rate and 150Mbps transmit PHY rate using 40MHz bandwidth
- Compatible with 802.11n specification
- Backward compatible with 802.11b/g devices while operating in 802.11n mode

### 2.2 Ordering Information

Model	Description
LCW-010	802.11 b/g/n (HT20/HT40) Module

## 3. Product Specifications

### 3.1 Electrical Specifications

#### 3.1.1 Absolute Maximum Ratings

Description	Min.	Typ	Max.	Unit
Storage Temperature	-30		+80	°C
Storage Humidity (40°C)			85	%

#### 3.1.2 Operating conditions

Description	Min.	Typ	Max.	Unit
Supply Voltage	4.5		13.2	Vdc
Ambient Temperature	-20		+70	°C
Ambient Humidity (40°C)			85	%

### 3.2 Standard Test Conditions

The Test for electrical specification shall be performed under the following condition

Otherwise this following conditions, not guaranteed this performance

#### 3.2.1 Ambient Condition

Description	Min.	Typ	Max.	Unit
Ambient Temperature	20		30	°C
Ambient Humidity (40°C)	60		70	%

#### 3.2.2 Power Supply Voltages

Input power	Unit
VDD_5V	5V ± 0.5V
VDD_12V	12V ± 1.2V

### 3.3 Standard Rated Specification

Radio Performance under Typical Conditions: VDD @ 5.0V, VD33@ 3.3V, temp. 25°C

Division	Characteristic
WLAN Standard	IEEE 802.11 b/g/n HT20/40, Wi-Fi compliant
Host Interface	UART
Frequency Range / Output Power	2400 MHz-2483.5MHz (2.4GHz ISM Band) / 17.42 dBm
Dimension	L x W x H : 48 x 20 x 10 (typical) mm
Modulation	802.11b : DQPSK, DBPSK, CCK 802.11g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK
Data Rate	802.11b: 1, 2, 5.5, 11Mbps 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps
Data Rate (20MHz, 40MHz)	802.11n: MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7

Hereby, LG Electronics declares that the radio equipment type WLAN module is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: <http://www.lg.com/global/support/cedoc/cedoc#>

LG Electronics European Shared Service Center B.V.  
Krijgsman 1  
1186 DM Amstelveen  
The Netherlands

Wireless function S/W version : 1.0

### 3.4 Electrical Specifications for Wi-Fi (Radiation TEST)

#### 3.4.1 RF Characteristics for IEEE802.11b

ITEM	CONTENTS			
SPECIFICATION	IEEE802.11b			
MODE	CCK			
CHANNEL FREQUENCY	2400 ~ 2483.5 MHz			
DATA RATE	1, 2, 5.5, 11 Mbps			
TX CHARACTERISTICS	MIN	TYP	MAX	UNIT
POWER LEVEL	15	17	17.42	dBm
SPECTRUM MASK				
1 <sup>ST</sup> SIDE LOBES (at FC±11MHz)		-45	-30	dBr
2 <sup>nd</sup> SIDE LOBES (at FC±22MHz)		-60	-50	dBr
MODULATION ACCURACY (EVM)		30	35	%
FREQ. TOLERANCE	-20		20	ppm
CHIP CLOCK FREQ. TOLERANCE	-20		20	ppm
RX CHARACTERISTICS	MIN	TYP	MAX	UNIT
MINIMUM LEVEL SENS. (PER≤8%)_11Mbps		-84	-93	dBm

\*Nomal Condition : 25°C, VDD=5.0V

Note 1 : this varies by regulatory domain.

refer to the product documentation for specific details for  
each regulatory domain.

Note 2 : the maximum power setting will vary by channel and according

to individual country regulations.

refer to the product documentation for specific details.

### 3.4.2 RF Characteristics for IEEE802.11g

ITEM	CONTENTS			
SPECIFICATION	IEEE802.11g			
MODE	OFDM			
CHANNEL FREQUENCY	2400 ~ 2483.5 MHz			
DATA RATE	6, 9, 12, 18, 24, 36, 48, 54 Mbps			
TX CHARACTERISTICS	MIN	TYP	MAX	UNIT
POWER LEVEL	13	15	15.53	dBm
SPECTRUM MASK				
1 <sup>ST</sup> SIDE LOBES (at FC±11MHz)		-35	-20	dBr
2 <sup>nd</sup> SIDE LOBES (at FC±20MHz)		-45	-28	dBr
3 <sup>rd</sup> SIDE LOBES (at FC≥ ±30MHz)		-50	-40	dBr
MODULATION ACCURACY (EVM)		-32	-25	dB
FREQ. TOLERANCE	-20		20	ppm
CHIP CLOCK FREQ. TOLERANCE	-20		20	Ppm
RX CHARACTERISTICS	MIN	TYP	MAX	UNIT
MINIMUM LEVEL SENS. (PER≤10%)_54Mbps		-72	-89	dBm

\*Nomal Condition : 25°C, VDD=5.0V

Note 1 : this varies by regulatory domain.

refer to the product documentation for specific details for  
each regulatory domain.

Note 2 : the maximum power setting will vary by channel and according  
to individual country regulations.

refer to the product documentation for specific details.

### 3.4.3 RF Characteristics for IEEE802.11n (HT20)

ITEM	CONTENTS			
SPECIFICATION	IEEE802.11n (HT20)			
MODE	OFDM			
CHANNEL FREQUENCY	2400 ~ 2483.5 MHz			
DATA RATE	MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7			
TX CHARACTERISTICS	MIN	TYP	MAX	UNIT
POWER LEVEL	12	14	14.02	dBm
SPECTRUM MASK				
1 <sup>ST</sup> SIDE LOBES (at FC±11MHz)		-35	-20	dBr
2 <sup>nd</sup> SIDE LOBES (at FC±20MHz)		-45	-28	dBr
3 <sup>rd</sup> SIDE LOBES (at FC±30MHz)		-50	-40	dBr
MODULATION ACCURACY (EVM)		-33	-28	dB
FREQ. TOLERANCE	-20		20	ppm
CHIP CLOCK FREQ. TOLERANCE	-20		20	Ppm
RX CHARACTERISTICS	MIN	TYP	MAX	UNIT
MINIMUM INPUT LEVEL SENS. (FER≤10%)		-70	-89	dBm

\*Nomal Condition : 25°C, VDD=5.0V

Note 1 : this varies by regulatory domain.

refer to the product documentation for specific details for  
each regulatory domain.

Note 2 : the maximum power setting will vary by channel and according

to individual country regulations.

refer to the product documentation for specific details.

### 3.4.4 RF Characteristics for IEEE802.11n (HT40)

ITEM	CONTENTS			
SPECIFICATION	IEEE802.11n (HT40)			
MODE	OFDM			
CHANNEL FREQUENCY	2400 ~ 2483.5 MHz			
DATA RATE	MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6, MCS7			
TX CHARACTERISTICS	MIN	TYP	MAX	UNIT
POWER LEVEL	12	14	14.06	dBm
SPECTRUM MASK				
1 <sup>ST</sup> SIDE LOBES (at FC±11MHz)		-35	-20	dBr
2 <sup>nd</sup> SIDE LOBES (at FC±20MHz)		-45	-28	dBr
3 <sup>rd</sup> SIDE LOBES (at FC±30MHz)		-50	-40	dBr
MODULATION ACCURACY (EVM)		-33	-28	dB
FREQ. TOLERANCE	-20		20	ppm
CHIP CLOCK FREQ. TOLERANCE	-20		20	Ppm
RX CHARACTERISTICS	MIN	TYP	MAX	UNIT
MINIMUM INPUT LEVEL SENS. (FER≤10%)		-67	-86	dBm

\*Nomal Condition : 25°C, VDD=5.0V

Note 1 : this varies by regulatory domain.

refer to the product documentation for specific details for  
each regulatory domain.

Note 2 : the maximum power setting will vary by channel and according

to individual country regulations.

refer to the product documentation for specific details.

### 3.4.5 송신(TX) 특성

Radio performance under typical conditions: VDD @ 5.0V, VD33@ 3.3V, temp. 25°C

Parameter	Description	Min	Typ	Max	Unit
Frequency		2,400		2,483.5	MHz
Output Power ON_Transmit	802.11b 1Mbps		16.0		dBm
	802.11b 11Mbps		16.0		
	802.11g 6Mbps		14.0		
	802.11g 54Mbps		14.0		
	802.11n MCS0 (HT20)		13.0		
	802.11n MCS7 (HT20)		13.0		
	802.11n MCS0 (HT40)		13.0		
	802.11n MCS7 (HT40)		13.0		
BAND EDGE			-50	-54	dBc
Harmonic Output Power	2nd		-50	-54	dBm/MHz
Harmonic Output Power	3rd		-50	-54	dBm/MHz

### 3.4.6 수신(RX) 특성

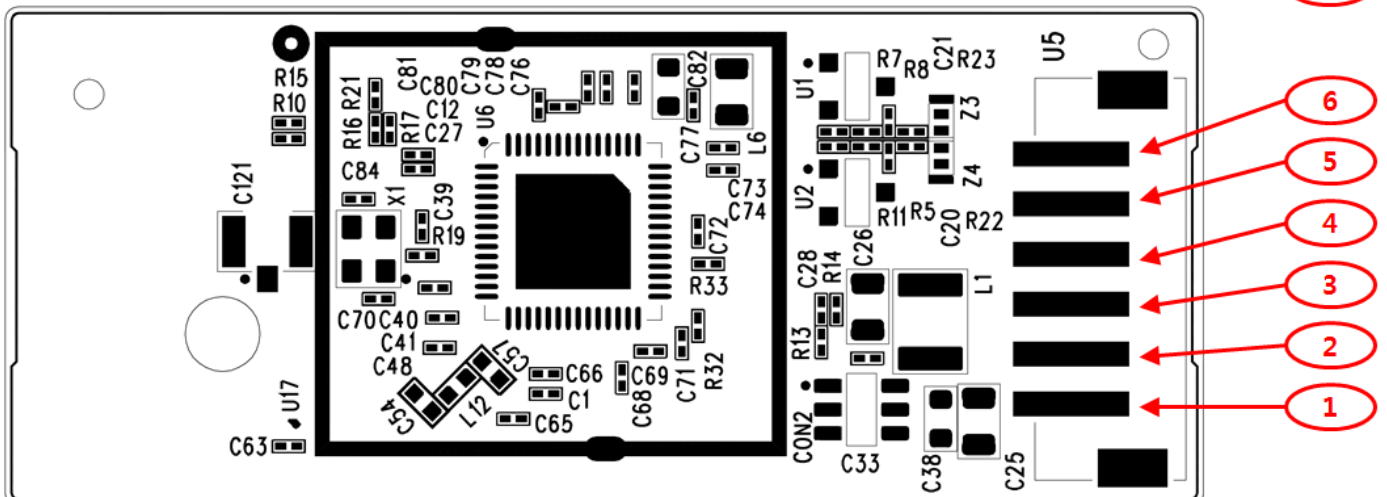
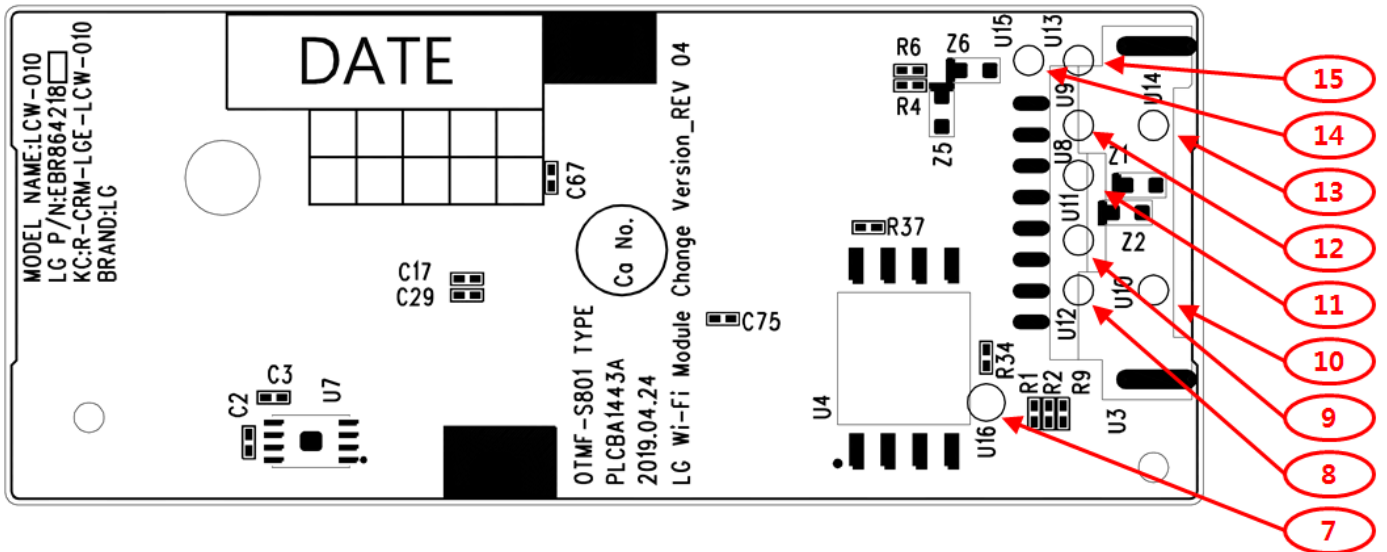
Radio performance under typical conditions: VDD @ 5.0V, VD33@ 3.3V, temp. 25°C

Parameter	Description	Min	Typ	Max	Unit
Frequency		2,400		2,483.5	MHz
Sensitivity 802.11b	1Mbps DSS		-93		dBm
	11Mbps DSS		-84		
Sensitivity 802.11g	6Mbps OFDM		-89		
	54Mbps OFDM		-72		
Sensitivity 802.11n (BW=20MHz)	MCS 0		-89		
	MCS 7		-70		
Sensitivity 802.11n (BW=40MHz)	MCS 0		-86		
	MCS 7		-67		



## 5. Pin Description

Pin No.	Pin Name	I/O	Pin Description
1	VDD	-	Power Supply 5V or 12V
2	UART0_RX	I/O	MAIN UART_RX
3	NC	-	NC
4	NC	-	NC
5	UART0_TX	I/O	MAIN UART_TX
6	GND	-	Ground
7	GND	-	Ground
8	JTAG_CLK/SWD_CLK	I/O	Firmware Download_CLK
9	JTAG_TMS/SWD_DIO	I/O	Firmware Download_DIO
10	UART0_TX	I/O	MAIN UART_TX
11	DBG_UART_RX	I/O	DEBUG UART_RX
12	DBG_UART_TX	I/O	DEBUG UART_TX
13	UART0_RX	I/O	MAIN UART_RX
14	VDD	-	Power Supply 5V or 12V
15	GND	-	Ground



## 14. FCC, ISED Statement

### FCC Part 15.19

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

Any changes or modifications (including the antennas) to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

### FCC Part 15.247

This device complies with part 15.247 of the FCC Rules.

Modifications not expressly approved by the manufacturer could void your authority to operate the equipment under FCC rules.

FCC RF Radiation Exposure Statement: This equipment complies with FCC RF Radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

Please notice that if the FCC identification 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.

This exterior label can use wording such as the following: "Contains FCC ID:BEJ-LCW010" any similar wording that expresses the same meaning may be used.

### Manual Information to the End User

The module is limited to OEM installation ONLY.

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

The module is limited to installation in fixed application;

A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.

There is requirement that the grantee provide guidance to the host manufacturer for compliance with Part 15B requirements.

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.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique

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;

(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

IC RF Radiation Exposure Statement : This equipment complies with IC RF Radiation exposure limits set forth for an uncontrolled environment. This device and

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

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

RF du IC d'exposition aux radiations: Cet équipement est conforme à l'exposition de la IC rayonnements RF limites établies pour un environnement non contrôlé.

L'antenne pour ce transmetteur ne doit pas être même endroit avec d'autres émetteur sauf conformément à la IC procédures de produits Multi-émetteur.

Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.

Please notice that if the IC identification 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.

This exterior label can use wording such as the following: "Contains IC:2703N-LCW010" any similar wording that expresses the same meaning may be used.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps.

En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada,

précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit :

Contient IC : 2703N-LCW010 est le numéro d'homologation du module

### Integration instruction

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 user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as shown in this manual.

For mobile and fixed operation configurations the antenna gain, including cable loss will be registered under the following identifiers:

FCC Identifier: BEJ-LCW010

Industry Canada Certification Number: 2703N-LCW010

Granted to LG Electronics USA / LG Electronics Inc.

The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed

Le produit hôte final nécessite toujours des tests de conformité de la partie 15, sous-partie B avec le transmetteur modulaire installé.