

1.Module: LGSBWAC24

This Module is based on REALTEK RTL8822CU-CG chipset .It is a complete dual-band(2.4GHz and 5GHz)WIFI 2×2 MIMO MAC/PHY/Radio System-on-a-Chip. This module provides a high level of integration with a dual-stream IEEE 802.11ac MAC/ base band/radio. The WLAN operation supports 20MHz,40MHz and 80MHz channels for data rates up to 866.7Mbps. It is also backward complied with IEEE 802.11a standard from 5.15~5.825GHz wideband and IEEE 802.11b/g standard from 2.4~2.5GHz. It can be used to provide up to 54Mbps for IEEE 802.11a and IEEE 802.11g, 11Mbps for IEEE 802.11b and 300Mbps for IEEE 802.11n. The Bluetooth part supports latest 5.1.

2.Features

Chips	RTL8822CU
Spec	IEEE 802.11 ac/a/b/g/n 2T2R WLAN BLUETOOTH 5.1
Frequency Band	2400 ~ 2483.5 MHz、 5150~5850 MHz
Power Voltage	3.3V
Dimension	35x50x8.7mm
Environmental Range	Operation temperature:0~60℃
Modulation	BPSK/QPSK/16QAM/64QAM/256QAM/DBPSK/DQPSK/ CCK、 GFSK $\pi/4$ -DQPSK 8DPSK

3. Electrical Characteristics

Parameter	Min	Max	Unit
Power Supply Voltage	3.0V	3.6V	V
Storage Temperature	-20	+80	°C

Digital I/O

Parameter	Minimum	Normal	Maximum	Units
Input high voltage	-	0	0.9	V
Input low voltage	2	3.3	3.6	V
Output high voltage	0	--	0.33	V
Output low voltage	2	--	3.3	V

4. Electrical Specifications for Wi-Fi (Radiation Test)

RF Characteristics for IEEE802.11b (11Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11b			
Mode	DSSS/CCK			
Channel frequency	2400 ~ 2483.5 MHz			
Data rate	1, 2, 5.5, 11Mbps			
Media Access Protocol	CSMA/CA with ACK			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	15	17	19	dBm
Constellation Error (EVM)			-10	dB
Freq. Tolerance	-20		20	ppm
Chip Clock Freq. Tolerance	-20		20	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (FER ≤ 8%)			-83	dBm

Note 1. Normal Condition : 25°C, VDD=3.3V.

Note 2. This varies by regulatory domain.

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

Note 3. The maximum power setting will vary by channel and according to individual country regulations.

Refer to the product documentation for specific details.

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

Items	Contents			
Specification	IEEE802.11g			
Mode	OFDM			
Channel frequency	2400 ~ 2483.5 MHz			
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps			
Specification	CSMA/CA with ACK			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	13	15	17	dBm
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. (FER ≤ 8%)			-71	dBm

Note 1. Normal Condition : 25°C, VDD=3.3V.

Note 2. This varies by regulatory domain.

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

Note 3. The maximum power setting will vary by channel and according to individual country regulations.

Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11a (54Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11a			
Mode	OFDM			
Channel frequency	5150~5850 MHz			
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps			
Specification	CSMA/CA with ACK			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	11	13	15	dBm
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. (FER ≤ 8%)			-71	dBm

Note 1. Normal Condition : 25°C, VDD=3.3V.

Note 2. This varies by regulatory domain.

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

Note 3. The maximum power setting will vary by channel and according to individual country regulations.

Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11n (MCS7 mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11n – 2.4GHz			
Mode	HT20			
Channel frequency	2400 ~ 2483.5 MHz			
Data rate	6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps			
Specification	CSMA/CA with ACK			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	13	15	17	dBm
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,FER ≤ 8%)			-68	dBm
Minimum Input Level Sens. (HT40,PER≤ 10%)			-66	dBm

Note 1. Normal Condition : 25°C, VDD=3.3V.

Note 2. This varies by regulatory domain.

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

Note 3. The maximum power setting will vary by channel and according to individual country regulations.

Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11an (MCS7 mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11n – 5GHz			
Mode	HT20			
Channel frequency	5150~5850 MHz			
Data rate	6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps			
Specification	CSMA/CA with ACK			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	11	13	15	dBm
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,FER ≤ 8%)			-68	dBm
Minimum Input Level Sens. (HT40,PER≤ 10%)			-66	dBm

Note 1. Normal Condition : 25°C, VDD=3.3V.

Note 2. This varies by regulatory domain.
Refer to the product documentation for specific details for each regulatory domain.

Note 3. The maximum power setting will vary by channel and according to individual country regulations.
Refer to the product documentation for specific details.

RF Characteristics for IEEE802.11ac (MCS8/9 mode unless otherwise specified)

Items		Contents			
Specification		IEEE802.11ac – 5GHz			
Mode		VHT			
Channel frequency		5150 ~ 5850 MHz			
Data rate		6.5,13,19.5,26,39,52,58.5,65,78Mbps			
TX Characteristics		Min.	Typ.	Max.	Unit
Power Level	VHT20(MCS8)	10	12	14	dBm
	VHT40(MCS9)	10	12	14	dBm
	VHT80(MCS9)	10	12	14	dBm
Constellation Error (EVM)	VHT20(MCS8)			-30	dB
	VHT40(MCS9)			-32	dB
	VHT80(MCS9)			-32	dB
Freq. Tolerance		-20		20	ppm
Chip Clock Freq. Tolerance		-20		20	ppm
RX Characteristics		Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (VHT20,PER≤ 10%)				-64	dBm
Minimum Input Level Sens. (VHT40,PER≤ 10%)				-58	dBm
Minimum Input Level Sens. (VHT80,PER≤ 10%)				-55	dBm

Note 1. Normal Condition : 25°C, VDD=3.3V.

Note 2. This varies by regulatory domain.

Refer to the product documentation for specific details for each regulatory domain.S

Note 3. The maximum power setting will vary by channel and according to individual country regulations.

Refer to the product documentation for specific details.

BT Transmitter Performance

Parameter (Condition)	Min.	Typ.	Max.	Unit																			
Transmit Power (PGPSK)	6	8	10	dBm																			
<table> <tr> <td>Power Density</td><td></td><td></td><td>20</td><td>dBm</td><td></td></tr> <tr> <td>Frequency Range</td><td>2402</td><td></td><td>2480</td><td>MHz</td><td></td></tr> <tr> <td>20dB Bandwidth</td><td></td><td></td><td>1000</td><td>kHz</td><td></td></tr> </table>						Power Density			20	dBm		Frequency Range	2402		2480	MHz		20dB Bandwidth			1000	kHz	
Power Density			20	dBm																			
Frequency Range	2402		2480	MHz																			
20dB Bandwidth			1000	kHz																			
In-band Spurious Emissions																							
$\pm 500\text{kHz}$			-20	dBc																			
$ M-N = 2\text{MHz}$			-20	dBm																			
$ M-N \geq 3\text{MHz}$			-40	dBm																			
Modulation Characteristics, frequency Deviation																							
$\Delta F_{1\text{avg}}$ (00001111 sequence in payload)	140		175	kHz																			
$\Delta F_{2\text{max}}$ (10101010 sequence in payload)	115			kHz																			
$\Delta F_{1\text{avg}} / \Delta F_{2\text{max}}$	0.8			KHz																			
Initial Carrier Frequency Tolerance	-75		75	kHz																			
Carrier Frequency Drift																							
DH1 Packet	-25		25	kHz																			
DH3 Packet	-40		40	kHz																			
DH5 Packet	-40		40	kHz																			
Drift rate	10		20	kHz / μs																			
Note 1. Normal Condition : 25°C, VDD=3.3V. Note 2. Supported Bluetooth TX power class 1.																							

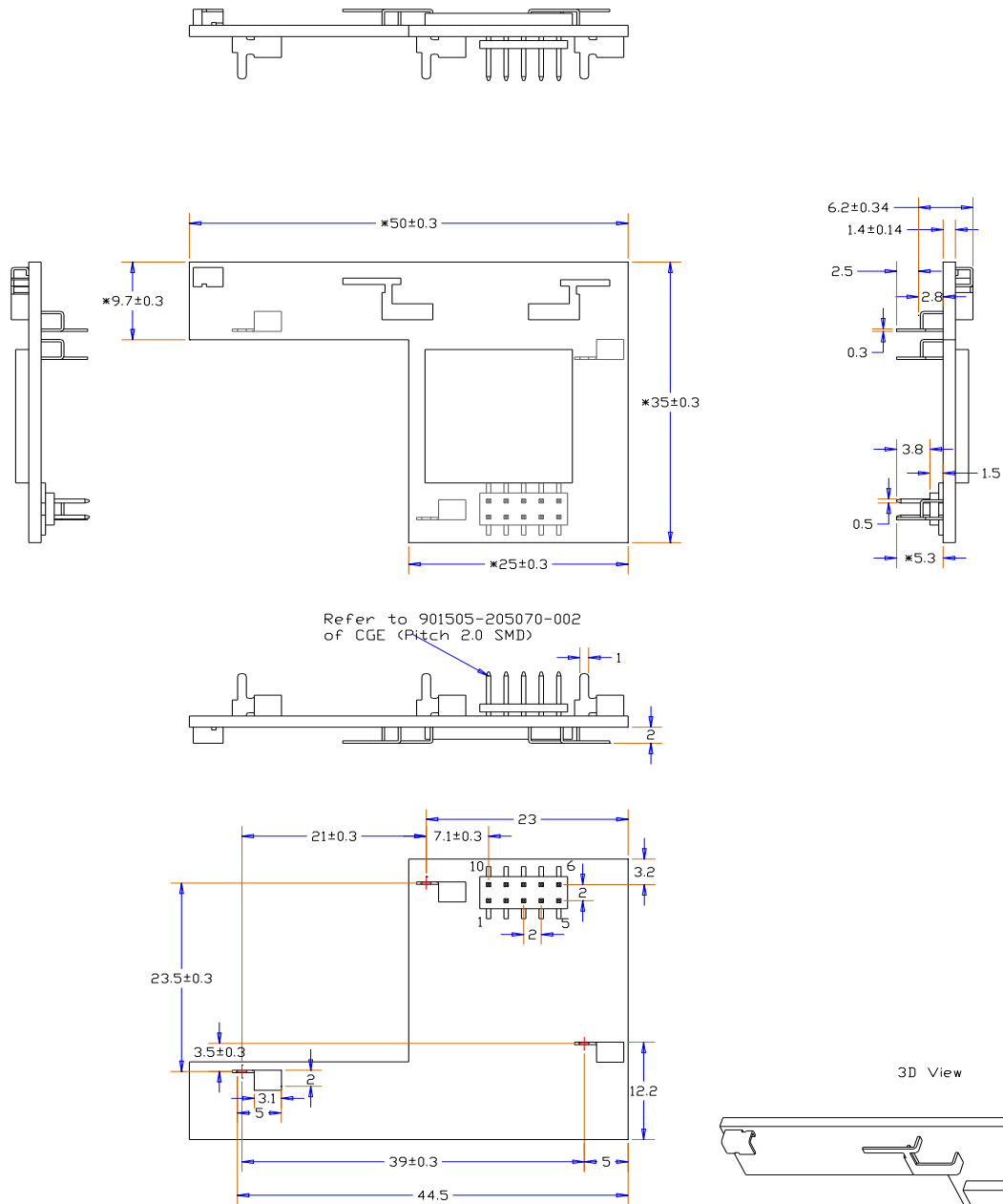
BT Transmitter Performance

Parameter (Condition)		Min.	Typ.	Max.	Unit
EDR Relative Transmit Power		6	8	10	dBm
EDR Carrier Frequency Stability					
ω_i (2-DH5 and 3-DH5)		-75		75	kHz
ω_0 (2-DH5 and 3-DH5)		-10		10	kHz
$\omega_i + \omega_0$ (2-DH5 and 3-DH5)		-75		75	kHz
EDR Modulation Accuracy					
RMS DEVM	2-DH5			20	%
	3-DH5			13	%
99% DEVM DEVM < 0.30, $\pi/4$ -DQPSK DEVM < 0.20, 8DPSK symbols	2-DH5	99			%
	3-DH5	99			%
Peak DEVM	2-DH5			35	%
	3-DH5			25	%
EDR Differential Phase Encoding (packet with 0 error > 99%)		99			%
EDR In-band Spurious Emissions					
$ M-N = 1\text{MHz}$				Ptx_ref-26	dBm
$ M-N = 2\text{MHz}$				-20	dBm
$ M-N = 3\text{MHz}$				-40	dBm
Note 1. EDR power and BDR power is same					

BLE RF Performance

Parameter (Condition)	Min.	Typ.	Max.	Unit
Tx Power	6	8	10	dBm
Rx sensitivity (GFSK, BER, 1 Mbps)			-80	dBm
Mod Char : delta F1 average	225		275	kHz
Mod Char : delta F2 max	99.9		-	%
Mod Char : ratio	80		-	%

5. Pin Description and Outline



Notes:

1. Tolerances are ± 0.3 , unless otherwise specified.
2. As long as the outer appearance doesn't affect the performance of the product,
3. Label information is based on specification
4. *For a critical size

Pin No	Pin name	I/O	Pin Description
1	GND	-	GND
2	WOBLE	O	BT Wake up host
3	GND	-	GND
4	USBDM	I/O	USB Communication signal (USB_DM)
5	3.3V_ST	I	VDD 3.3V
6	3.3V_ST	I	VDD 3.3V
7	USBDP	I/O	USB Communication signal (USB_DP)
8	GND	-	GND
9	WOWL	O	WIFI Wake up host
10	RST_N	I	RESERT

<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.

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 15.247, 15.407

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 below in this instruction manual.

Limited module procedures (Only limited modular approval)

single module

Trace antenna designs (Only trace antenna module) 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, partslist (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 multiple(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 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.

TV 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

This module is certified with the following integrated antenna.

-Type: PIFA antenna

1) WiFi1 Peak gain: 1.87 dBi for 2.4 GHz and 1.74 dBi for 5 GHz (Minimum gain: -0.43 dBi in DFS bands)

2) WiFi0 Peak gain: 1.97 dBi for 2.4 GHz and 1.86 dBi for 5 GHz (Minimum gain: 1.32 dBi in DFS bands)

Any new antenna type, higher gain than listed antennas should be met the requirements of FCC rule 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 final end product must be labeled in a visible area with the following:

"Contains FCC ID: BEJLGSBWAC24

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.

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 will be used differently than granted, please contact the module manufacture on below contact information.

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

<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.

End Product Labeling (ISED)

The module is labeled with its own IC Certification Number. If the 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 IC: **2703H-LGSBWAC24**

Étiquetage du produit final

Le module est étiqueté avec son propre numéro de certification IC. Si le numéro de certification IC n'est pas visible lorsque le module est installé à l'intérieur d'un autre appareil, alors l'extérieur de l'appareil dans lequel le module est installé doit également afficher une étiquette faisant référence au module inclus. Dans ce cas, le produit final doit être étiqueté dans une zone visible avec les éléments suivants :

"Contient IC : **2703H-LGSBWAC24**"

5150-5250 MHz is indoor use only.

5150-5250 MHz est réservé à une utilisation en intérieur uniquement.