

## FCC Test Report (BT-EDR)

**Report No.:** RF180816E04I-2

**FCC ID:** TX2-RTL8822CE

**Test Model:** RTL8822CE

**Received Date:** Sep. 16, 2019

**Test Date:** Sep. 19 to Oct. 04, 2019

**Issued Date:** Oct. 17, 2019

**Applicant:** Realtek Semiconductor Corp.

**Address:** No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

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Taiwan.

**Test Location :** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan.

**FCC Registration /  
Designation Number:** 723255 / TW2022



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### Release Control Record

Issue No.	Description	Date Issued
RF180816E04I-2	Original release.	Oct. 17, 2019

## 1 Certificate of Conformity

**Product:** 802.11a/b/g/n/ac RTL8822CE Combo module

**Brand:** Realtek

**Test Model:** RTL8822CE

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Realtek Semiconductor Corp.

**Test Date:** Sep. 19 to Oct. 04, 2019

**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**Prepared by :** Wendy Wu, **Date:** Oct. 17, 2019  
Wendy Wu / Specialist

**Approved by :** May Chen, **Date:** Oct. 17, 2019  
May Chen / Manager

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.247(b)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
-	20dB Bandwidth Measurement	-	Reference only.

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. This report is supplementary report.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Conducted Emissions	-	3.1 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT (BT-EDR)

Product	802.11a/b/g/n/ac RTL8822CE Combo module
Brand	Realtek
Test Model	RTL8822CE
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V from host equipment
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	Up to 3Mbps
Operating Frequency	2402MHz ~ 2480MHz
Number of Channel	79
Output Power	9.419mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

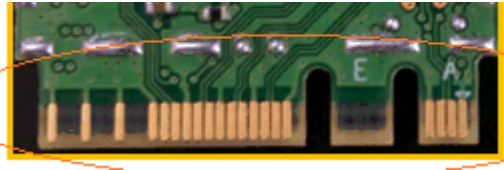
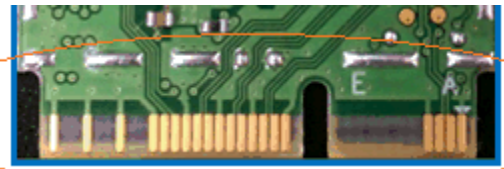
Note:

- This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RF180816E04-2 as the following:
  - ◆ Reduce power from 13dBm to 6.5~7dBm.
- According to above conditions, only Conducted power and Bandwidth need to be performed. And all data were verified to meet the requirements.
- There are WLAN and Bluetooth technology used for the EUT.
- The EUT has four SKUs, please refer to the following table:

SKU	Ant Port	Interface
A	Tri	PCI-E with A+E key
B	Tri	PCI-E with E key
C	Dual	PCI-E with A+E key
D	Dual	PCI-E with E key

Note: From the above SKUs, SKU: A was selected as representative model for the test and its data was recorded in this report.

- The EUT has two interfaces. The main difference is interface, but RF is the same. Please refer to the following table:

Interface	Photo	Difference
PCI-E with A+E key		Interface (RF is the same.)
PCI-E with E key		

6. Simultaneously transmission condition (only for SKU A, B).

Condition	Technology	
1	WLAN (2.4GHz)	Bluetooth
2	WLAN (5GHz)	Bluetooth

**Note:** The emission of the simultaneous operation has been evaluated and no non-compliance was found.

7. The EUT has dual antenna and tri antenna, please refer to the following table:

**Dual antenna**

CON1+CON2

- 2X2 WIFI Antenna port: CON1 & CON2
- 1X1 BT Antenna port: CON1
- WiFi/BT used Time-division duplex function at CON1, so WiFi/BT not transmitter simultaneous at CON1.

**Tri antenna**

CON1+CON2+CON3

- 2X2 WIFI Antenna port: CON1 & CON2
- 1X1 BT Antenna port: CON3 or CON1
- If BT function at CON1, WiFi/BT used Time-division duplex function, so WiFi/BT not transmitter simultaneous at CON1.
- If BT function at CON3, WiFi/BT can transmitter simultaneous for BT at CON 3 and WiFi at CON1 & CON2.

8. The antennas provided to the EUT, please refer to the following table:

Antenna No.	CON No.	Brand	Model	Ant. Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Connector Type
1	CON1 CON2 CON3 (only for SKU A,B)	LYNwave	ALA110-222050-300011	3.5	2.4~2.4835	PIFA	i-pex(MHF)
				5	5.15~5.85	PIFA	i-pex(MHF)
2	CON1 CON2 CON3 (only for SKU A,B)	PSA	RFDPA171320E MLB301	3.14	2.4~2.4835	Dipole	i-pex(MHF)
				5	5.15~5.85	Dipole	i-pex(MHF)

9. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

### 3.2 Description of Test Modes

79 channels are provided for BT-EDR mode:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		



### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO	DESCRIPTION
	APCM	
	√	

Where **APCM**: Antenna Port Conducted Measurement

#### Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

CON 1 Mode				
AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

#### Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

### 3.3 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C (15.247)**

**KDB 558074 D01 15.247 Meas Guidance v05r02**

**ANSI C63.10-2013**

All test items have been performed and recorded as per the above standards.

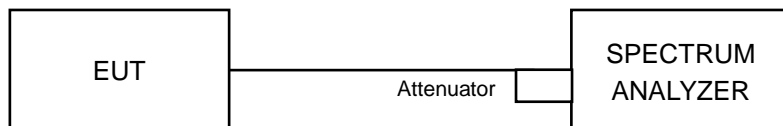
## 4 Test Types and Results

### 4.1 Channel Bandwidth

#### 4.1.1 Limits of Channel Bandwidth Measurement

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

#### 4.1.2 Test Setup



#### 4.1.3 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	June 04, 2019	June 03, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020

- NOTE:**
1. The test was performed in Oven room 2.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: Sep. 19 to Oct. 04, 2019

#### 4.1.4 Test Procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Detector = peak.
- e. Repeat above procedures until all frequencies measured were complete.

#### 4.1.5 Deviation from Test Standard

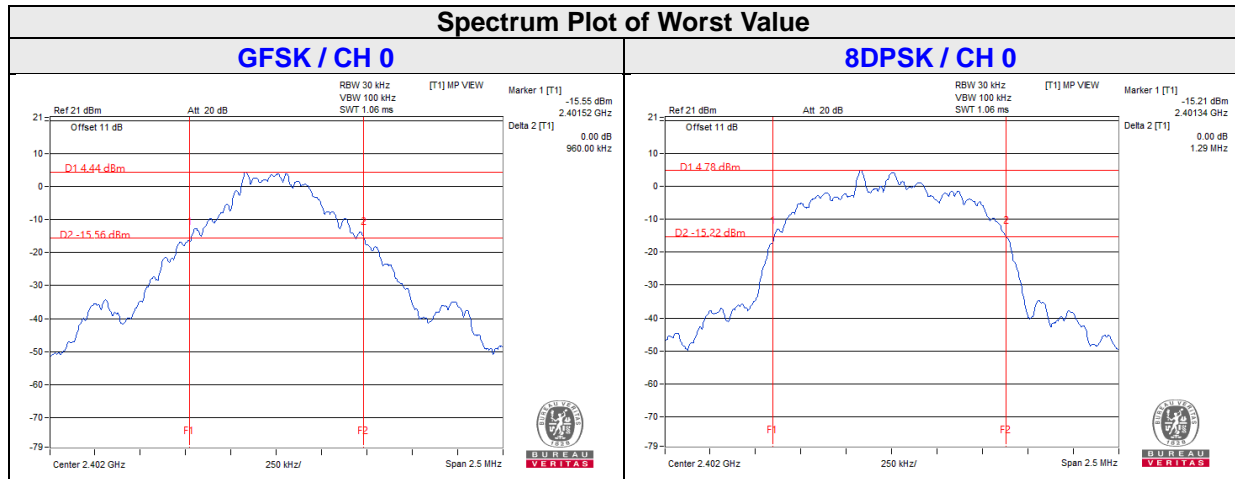
No deviation.

#### 4.1.6 EUT Operating Condition

The software (Bluetooth RF test tool (5.2.1.21)) provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.1.7 Test Results

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	
		GFSK	8DPSK
0	2402	0.96	1.29
39	2441	0.95	1.29
78	2480	0.96	1.29

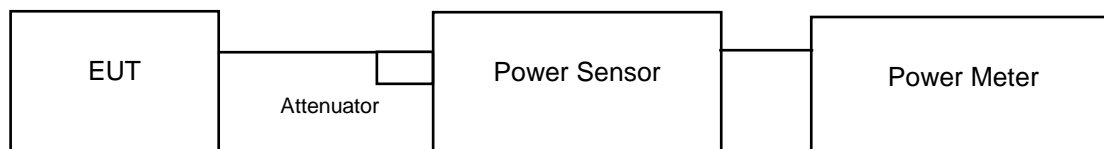


## 4.2 Maximum Output Power

### 4.2.1 Limits of Maximum Output Power Measurement

The Maximum Output Power Measurement is 125mW.

### 4.2.2 Test Setup



### 4.2.3 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	1014008	May 13, 2019	May 12, 2020
Power sensor Anritsu	MA2411B	0917122	May 13, 2019	May 12, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020

- NOTE:**
1. The test was performed in Oven room 2.
  2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
  3. Tested Date: Sep. 19 to Oct. 04, 2019

### 4.2.4 Test Procedure

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

### 4.2.5 Deviation from Test Standard

No deviation.

### 4.2.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.2.7 Test Results

##### FOR PEAK POWER

Channel	Frequency (MHz)	GFSK		8DPSK		Power Limit (mW)	Pass / Fail
		Output Power (mW)	Output Power (dBm)	Output Power (mW)	Output Power (dBm)		
0	2402	4.989	6.98	9.419	9.74	125	Pass
39	2441	4.966	6.96	9.204	9.64	125	Pass
78	2480	4.92	6.92	9.12	9.60	125	Pass

##### FOR AVERAGE POWER

Channel	Frequency (MHz)	GFSK		8DPSK	
		Average Power (mW)	Average Power (dBm)	Average Power (mW)	Average Power (dBm)
0	2402	4.875	6.88	4.842	6.85
39	2441	4.831	6.84	4.721	6.74
78	2480	4.775	6.79	4.656	6.68

## Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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