

## EN 62311+ EN 50665 Report

**Report No.:** SEBBUI-WTW-P21040655

**Test Model:** RTL8852BE

**Received Date:** Apr. 21, 2021

**Test Date:** July 01, 2021

**Issued Date:** Aug. 05, 2021

**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

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

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



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specifically mentioned, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

## Table of Contents

Release Control Record .....	3
1 Certificate of Conformity .....	4
2 General Information .....	5
2.1 General Description of EUT .....	5
3 RF Exposure Measurement.....	9
3.1 Introduction.....	9
3.2 Limit .....	9
3.3 Normative Reference Classification of the Assessment Methods.....	10
3.4 Test Results .....	11

### Release Control Record

Issue No.	Description	Date Issued
SEBBUI-WTW-P21040655	Original release.	Aug. 05, 2021

## 1 Certificate of Conformity

**Product:** 11ax RTL8852BE Combo module

**Brand:** REALTEK

**Test Model:** RTL8852BE

**Sample Status:** Engineering sample

**Applicant:** Realtek Semiconductor Corp.

**Test Date:** July 01, 2021

**Standards:** EN 62311:2008  
EN 50665:2017

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 :** Vivian Huang , **Date:** Aug. 05, 2021  
Vivian Huang / Specialist

**Approved by :** Clark Lin , **Date:** Aug. 05, 2021  
Clark Lin / Technical Manager

## 2 General Information

### 2.1 General Description of EUT

Product	11ax RTL8852BE Combo module
Brand	REALTEK
Test Model	RTL8852BE
Status of EUT	Engineering sample
Nominal Voltage	3.3Vdc from host equipment
Temperature Operating Range	-20°C ~ 70°C
Modulation Type	<b>WLAN:</b> CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz 1024QAM for OFDMA in 11ax HE mode <b>BT-EDR:</b> GFSK, $\pi/4$ -DQPSK, 8DPSK <b>BT-LE:</b> GFSK
Modulation Technology	<b>WLAN:</b> DSSS, OFDM, OFDMA <b>BT-EDR:</b> FHSS <b>BT-LE:</b> DTS
Transfer Rate	<b>WLAN:</b> 802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 300 Mbps 802.11ac: up to 866.7 Mbps 802.11ax: up to 1201 Mbps <b>BT-EDR:</b> Up to 3Mbps <b>BT-LE:</b> Up to 2Mbps
Operating Frequency	<b>WLAN:</b> <b>2.4GHz:</b> 2.412 ~ 2.472GHz <b>5GHz:</b> 5.18 ~ 5.24 GHz, 5.26 ~ 5.32 GHz, 5.50 ~ 5.70 GHz, 5.745 ~ 5.825 GHz <b>BT-EDR, BT-LE:</b> 2.402 ~ 2.480GHz
Number of Channel	<b>WLAN:</b> <b>2.4GHz:</b> 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 13, 802.11n (HT40), VHT40, 802.11ax (HE40): 9 <b>5GHz:</b> 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 24 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 11 802.11ac (VHT80), 802.11ax (HE80): 5 <b>BT-EDR:</b> 79 <b>BT-LE:</b> 40

EIRP Power	<p><b>WLAN:</b>  <b>For 2TX</b>  <b>CDD Mode:</b>  2.4 GHz : 19.90 dBm  5.18 ~ 5.24 GHz : 22.77 dBm  5.26 ~ 5.32 GHz : 22.77 dBm  5.50 ~ 5.70 GHz : 22.87 dBm  5.745 ~ 5.825 GHz : 13.91 dBm</p> <p><b>Beamforming Mode:</b>  2.4 GHz : 19.86 dBm  5.18 ~ 5.24 GHz : 22.75dBm  5.26 ~ 5.32 GHz : 22.74dBm  5.50 ~ 5.70 GHz : 22.86dBm  5.745 ~ 5.825 GHz : 13.79 dBm</p> <p><b>For 1TX</b>  2.4 GHz : 19.90 dBm  5.18 ~ 5.24 GHz : 22.87 dBm  5.26 ~ 5.32 GHz : 22.88 dBm  5.50 ~ 5.70 GHz : 22.92 dBm  5.745 ~ 5.825 GHz : 13.90 dBm</p> <p>BT-EDR: 15.99 dBm  BT-LE 1M: 9.85 dBm  BT-LE 2M: 11.07 dBm</p>
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT has below HW SKU configuration, as below table:

SKU No.	Interface	Description
1	PCIe + USB	Single antenna port
2	PCIe + USB	Dual antenna port
3	PCIe + UART	Dual antenna port

2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 5GHz	Bluetooth

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

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

Ant. Set	RF Chain No.	Brand	Model	Ant. Net Gain (dBi)	Frequency Range (GHz)	Ant. Type	Connector Type	Cable Length (mm)
1	Chain 0	ARISTOTLE	RFA-27-JP326-MHF4300	3.5	2.4~2.4835	PIFA	i-pex(MHF)	300
				5	5.15~5.85			
				5	5.875~7.125			
	Chain 1	ARISTOTLE	RFA-27-JP326-MHF4300	3.5	2.4~2.4835	PIFA	i-pex(MHF)	300
				5	5.15~5.85			
				5	5.875~7.125			
2	Chain 0	ARISTOTLE	RFA-27-C38H1-MHF4300	3	2.4~2.4835	Dipole	i-pex(MHF)	300
				5	5.15~5.85			
				5	5.875~7.125			
	Chain 1	ARISTOTLE	RFA-27-C38H1-MHF4300	3	2.4~2.4835	Dipole	i-pex(MHF)	300
				5	5.15~5.85			
				5	5.875~7.125			

Note:

1. The Bluetooth technology will fix transmission on Chain 1.

4. The EUT incorporates a MIMO function:

<b>2.4GHZ BAND</b>		
<b>MODULATION MODE</b>	<b>TX &amp; RX CONFIGURATION</b>	
<b>802.11b</b>	2TX/1TX Diversity	2RX
<b>802.11g</b>	2TX/1TX Diversity	2RX
<b>802.11n (HT20)</b>	2TX/1TX Diversity	2RX
<b>802.11n (HT40)</b>	2TX/1TX Diversity	2RX
<b>VHT20</b>	2TX/1TX Diversity	2RX
<b>VHT40</b>	2TX/1TX Diversity	2RX
<b>802.11ax (HE20)</b>	2TX/1TX Diversity	2RX
<b>802.11ax (HE40)</b>	2TX/1TX Diversity	2RX
<b>802.11ax (RU26/52/106/242/484)</b>	2TX/1TX Diversity	2RX
<b>5GHz Band</b>		
<b>MODULATION MODE</b>	<b>TX &amp; RX CONFIGURATION</b>	
<b>802.11a</b>	2TX/1TX Diversity	2RX
<b>802.11n (HT20)</b>	2TX/1TX Diversity	2RX
<b>802.11n (HT40)</b>	2TX/1TX Diversity	2RX
<b>802.11ac (VHT20)</b>	2TX/1TX Diversity	2RX
<b>802.11ac (VHT40)</b>	2TX/1TX Diversity	2RX
<b>802.11ac (VHT80)</b>	2TX/1TX Diversity	2RX
<b>802.11ax (HE20)</b>	2TX/1TX Diversity	2RX
<b>802.11ax (HE40)</b>	2TX/1TX Diversity	2RX
<b>802.11ax (HE80)</b>	2TX/1TX Diversity	2RX
<b>802.11ax (RU26/52/106/242/484/996)</b>	2TX/1TX Diversity	2RX

Note:

1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.

5. 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.
6. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.



### 3 RF Exposure Measurement

#### 3.1 Introduction

This International Standard applies to electronic and electrical equipment for which no dedicated product- or product family standard regarding human exposure to electromagnetic fields applies.

The frequency range covered is 0 Hz to 300 GHz.

The object of this generic standard is to provide assessment methods and criteria to evaluate such equipment against basic restrictions or reference levels on exposure of the general public related to electric, magnetic and electromagnetic fields and induced and contact current.

#### 3.2 Limit

According to EN 62311:2008, the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified 1999/519/EC.

Frequency Range	E-Field Strength (V/m)	H-Field Strength (A/m)	B-Field ( $\mu$ T)	Equivalent Plane Wave Power Density $S_{eq}$ (W/m <sup>2</sup> )
0-1 Hz	—	$3,2 \times 10^4$	$4 \times 10^4$	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	$4\,000/f$	$5\,000/f$	—
0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—
0,8-3 kHz	$250/f$	5	6.25	—
3-150 kHz	87	5	6.25	—
0,15-1 MHz	87	$0.73/f$	$0.92/f$	—
1-10 MHz	$87/f^{1/2}$	$0.73/f$	$0.92/f$	—
10-400 MHz	28	0.073	0.092	2
400-2 000 MHz	$1.375 f^{1/2}$	$0.0037 f^{1/2}$	$0.0046 f^{1/2}$	$f/200$
2 ~ 300 GHz	61	0.16	0.20	10

### 3.3 Normative Reference Classification of the Assessment Methods

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user for keeping at least 20cm separation distance and the prohibition of operating to a person has been printed on the user's manual. So, this product under normal use is located on electromagnetic far field between the human body.

$$E = \eta_0 H = \frac{\sqrt{30PG(\theta, \phi)}}{r}$$

#### Far Field Calculation Formula

G = antenna gain relative to an isotropic antenna  
 $\theta, \phi$  = elevation and azimuth angles to point of investigation  
r = distance from observation point to the antenna  
 $\eta_0$  = Characteristic impedance of free space

### 3.4 Test Results

Calculation for maximum EIRP

Operating Mode	Output Power EIRP (dBm)	Output Power EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
WLAN 2.4 GHz	19.90	97.724	0.194	61	Pass
WLAN 5 GHz	22.87	193.642	12.051	61	Pass
Bluetooth	15.99	39.719	5.458	61	Pass

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

#### Conclusion:

Both of the WLAN and Bluetooth can transmit simultaneously, the formula of calculated the exposure is:

$$(CEF1 / LEF1)^2 + (CEF2 / LEF2)^2 + \dots \text{etc.} < 1$$

CEF = Calculation E-Field Strength

LEF = Limit of E-Field Strength

$$\text{WLAN 5GHz} + \text{Bluetooth} = (12.051 / 61)^2 + (5.458 / 61)^2 = 0.047$$

Therefore, the calculation of this situation which is less than the "1" limit.

--- END ---