

RF Exposure Report

Report No.: SA200522E04

FCC ID: TX2-RTL8852AE

Test Model: RTL8852AE

Received Date: May 22, 2020

Test Date: Aug. 31, 2020

Issued Date: Sep. 24, 2020

Applicant: Realtek Semiconductor Corp.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number:** 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SA200522E04	Original release.	Sep. 24, 2020

1 Certificate of Conformity

Product: 11ax RTL8852AE Combo module
Brand: REALTEK
Test Model: RTL8852AE
Sample Status: ENGINEERING SAMPLE
Applicant: Realtek Semiconductor Corp.
Test Date: Aug. 31, 2020
Standards: FCC Part 2 (Section 2.1091)
IEEE C95.3 -2002
References Test Guidance: KDB 447498 D01 General RF Exposure Guidance v06

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.

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Joyce Kuo / Specialist

Approved by : Clark Lin , **Date:** Sep. 24, 2020
Clark Lin / Technical Manager

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	f/1500	30
1500-100,000	1.0	30

f = Frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$Pd = (Pout * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 20 cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Ant. Set	Chain No.	Brand	Model	Ant. Gain (dBi)	Frequency Range (GHz)	Ant. Type	Connector Type	Cable Length (mm)
1	Chain 0	LYNwave	RTK-ANT-0006	3.5	2.4~2.5	PIFA	i-pex(MHF)	300
				5	5.15~5.85			
	Chain 1	LYNwave	RTK-ANT-0006	3.5	2.4~2.5	PIFA	i-pex(MHF)	300
				5	5.15~5.85			
2	Chain 0	PSA	ALA110-222050-300011	3.14	2.4~2.5	Dipole	i-pex(MHF)	200
				5	5.15~5.85			
	Chain 1	PSA	ALA110-222050-300011	3.14	2.4~2.5	Dipole	i-pex(MHF)	200
				5	5.15~5.85			

Note:

1. From the above transmission chains, the transmission on **Chain 0** for 1TX mode was selected as representative model for the test. Therefore only the test data of the mode was recorded in this report.
2. The Bluetooth technology will fix transmission on Chain 1.

* 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.

2.5 Calculation Result

Mode 1 (For 2TX)

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN (2.4GHz)	2412-2472	329.703	6.51	20	0.29367	1
WLAN (U-NII-1)	5180-5240	196.249	8.01	20	0.24691	1
WLAN (U-NII-2A)	5260-5320	189.22	8.01	20	0.23807	1
WLAN (U-NII-2C)	5500-5720	248.921	8.01	20	0.31318	1
WLAN (U-NII-3)	5745-5825	640.55	8.01	20	0.80590	1
BT-EDR	2402-2480	17.378	3.50	20	0.00774	1
BT-LE	2402-2480	17.62	3.50	20	0.00785	1

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. 2.4GHz: The directional gain = 3.5 dBi + 10log(2) = 6.51 dBi
3. 5GHz: The irectional gain = 5 dBi + 10log(2) = 8.01 dBi

Mode 2 (For 1TX)

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN (2.4GHz)	2412-2472	196.789	3.50	20	0.08765	1
WLAN (U-NII-1)	5180-5240	177.419	5.00	20	0.11162	1
WLAN (U-NII-2A)	5260-5320	177.011	5.00	20	0.11136	1
WLAN (U-NII-2C)	5500-5720	193.36	5.00	20	0.12165	1
WLAN (U-NII-3)	5745-5825	382.825	5.00	20	0.24084	1
BT-EDR	2402-2480	17.378	3.50	20	0.00774	1
BT-LE	2402-2480	17.62	3.50	20	0.00785	1

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. 2.4GHz: The directional gain = 3.5 dBi
3. 5GHz: The irectional gain = 5 dBi

Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

$WLAN\ 5GHz\ (S1) + Bluetooth\ (S1) = 0.24084 / 1 + 0.00785 / 1 = 0.24869$

$WLAN\ 5GHz\ (S0) + Bluetooth\ (S1) = 0.24084 / 1 + 0.00785 / 1 = 0.24869$

$WLAN\ 5GHz\ (S0+S1) + Bluetooth\ (S1) = 0.80590 / 1 + 0.00785 / 1 = 0.81375$

$WLAN\ 2.4GHz\ (S1) + WLAN\ 5GHz\ (S0) = 0.08765 / 1 + 0.24084 / 1 = 0.32849$

$WLAN\ 2.4GHz\ (S0) + WLAN\ 5GHz\ (S1) = 0.08765 / 1 + 0.24084 / 1 = 0.32849$

$WLAN\ 2.4GHz\ (S0) + WLAN\ 5GHz\ (S1) + Bluetooth\ (S1) = 0.08765 / 1 + 0.24084 / 1 + 0.00785 / 1 = 0.33634$

Therefore the maximum calculations of above situations are less than the “1” limit.

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