

## 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.

**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

**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 KDB 447498 D01 General RF Exposure Guidance v06 Guidance:

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 : Joyce Kuo , Date: Sep. 24, 2020  
Joyce Kuo / Specialist

Joyce Kuo / Specialist

Approved by :  , 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 <sup>2</sup> ) | 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 <sup>2</sup> )*              | 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/cm<sup>2</sup>

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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|-----------------|----------------------------|-------------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 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 <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|-----------------|----------------------------|-------------------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 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

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

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

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

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

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

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

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

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