



RF EXPOSURE REPORT

FCC ID : TX2-RTL8822CE
Equipment : Module
Brand Name : Realtek
Model Name : RTL8822CE
Applicant : Realtek Semiconductor Corp.
No. 2, Innovation Road II, Hsinchu
Science Park, Hsinchu 300, Taiwan
Standard : FCC 47 CFR Part 2 (2.1093)
KDB 447498 D01

The product was installed into Notebook (Brand Name: HP, Model Name: TPN-Q232) during evaluation.

We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 1190) and the FCC designation No. TW1190 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC evaluation.

Approved by: Cona Huang / Deputy Manager



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History of this test report



1. Equipment Under Test (EUT) Information

1.1 General Information

| Product Feature & Specification | |
|---|--|
| Equipment Name | Module |
| Brand Name | Realtek |
| Model Name | RTL8822CE |
| FCC ID | TX2-RTL8822CE |
| Wireless Technology and Frequency Range | WLAN 2.4GHz Band: 2400 MHz ~ 2483.5MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.5GHz Band: 5470 MHz ~ 5745 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz |
| Mode | WLAN: 802.11a/b/g/n/ac HT20 / HT40 / VHT20 / VHT40 / VHT80 Bluetooth BR/EDR/LE |

Reviewed by: Jason Wang

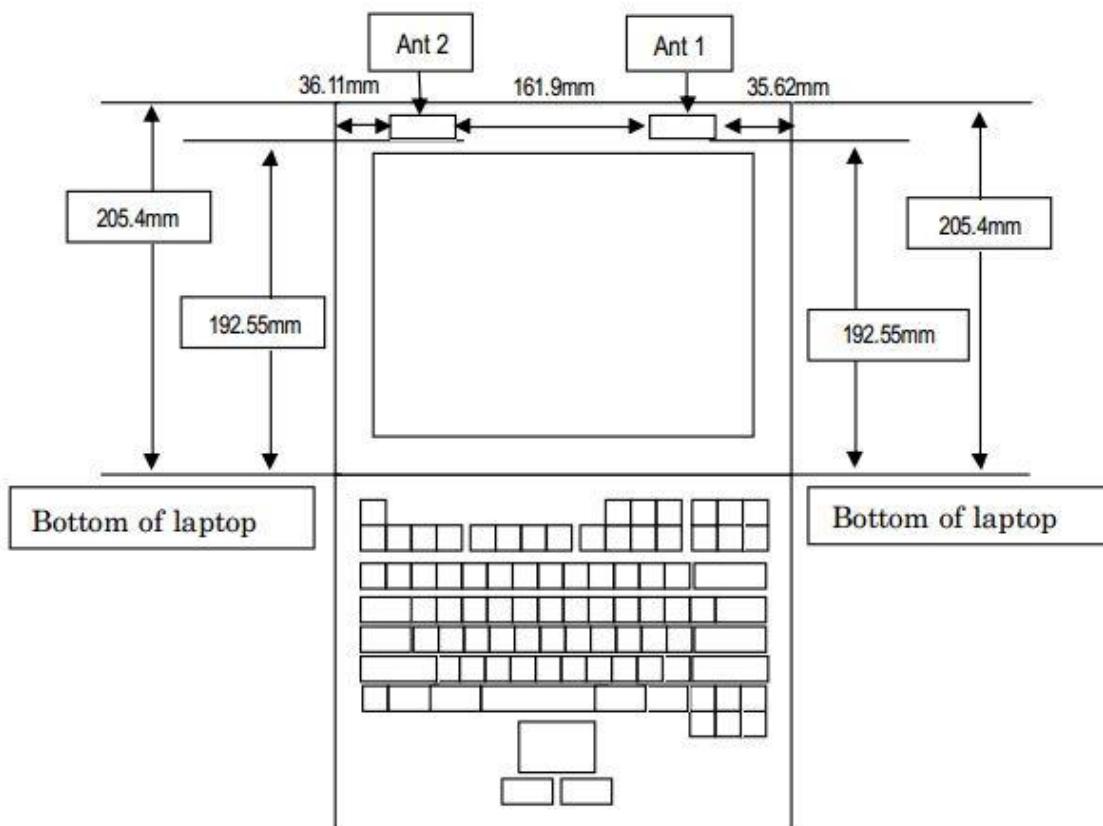
Report Producer: Wan Liu

2. Guidance Applied

The Specific Absorption Rate (SAR) testing specification, method, and procedure for this device is in accordance with the following standards:

- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2013
- FCC KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04
- FCC KDB 865664 D02 SAR Reporting v01r02
- FCC KDB 447498 D01 General RF Exposure Guidance v06
- FCC KDB 616217 D04 SAR for laptop and tablets v01r02

3. Antenna Location



**< SAR test exclusion table >****General Note:**

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. Per KDB 447498 D01v06, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
4. Per KDB 447498 D01v06, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
5. Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$
 - $f(\text{GHz})$ is the RF channel transmit frequency in GHz
 - Power and distance are rounded to the nearest mW and mm before calculation
 - The result is rounded to one decimal place for comparison
6. Per KDB 447498 D01v06, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
 - a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · (f(MHz)/150)] mW, at 100 MHz to 1500 MHz
 - b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · 10] mW at > 1500 MHz and ≤ 6 GHz

| | Wireless Interface | BT | 2.4GHz WLAN ANT 1 | 2.4GHz WLAN ANT 2 | 5GHz WLAN ANT 1 | 5GHz WLAN ANT 2 |
|-------------------|-------------------------|---------|-------------------|-------------------|-----------------|-----------------|
| Exposure Position | Calculated Frequency | 2480MHz | 2472MHz | 2472MHz | 5825MHz | 5825MHz |
| | Maximum power (dBm) | 6 | 20 | 20 | 20.5 | 20.5 |
| | Maximum rated power(mW) | 4.0 | 100.0 | 100.0 | 112.0 | 112.0 |
| | Separation distance(mm) | 192.55 | 192.55 | 192.55 | 192.55 | 192.55 |
| Bottom of Laptop | exclusion threshold | 1521.0 | 1521.0 | 1521.0 | 1488.0 | 1488.0 |
| | Testing required? | No | No | No | No | No |



4. Simultaneous Transmission Analysis

| NO. | Simultaneous Transmission Configurations | Body |
|-----|--|------|
| 1. | 2.4GHz WLAN ANT 1 + 2.4GHz WLAN ANT 2 | Yes |
| 2. | 5GHz WLAN ANT 1 + 5GHz WLAN ANT 2 | Yes |
| 3. | 2.4GHz WLAN ANT 2 + Bluetooth ANT 1 | Yes |
| 4. | 5GHz WLAN ANT 2 + Bluetooth ANT 1 | Yes |

General Note:

1. EUT will choose either WLAN 2.4GHz or WLAN 5GHz according to the network signal condition; therefore, 2.4GHz WLAN and 5GHz WLAN will not operate simultaneously at any moment.
2. Per KDB 447498 D01v06, simultaneous transmission SAR is compliant if,
 - i) Scalar SAR summation < 1.6W/kg.
 - ii) SPLSR = $(\text{SAR1} + \text{SAR2})^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where $(x1, y1, z1)$ and $(x2, y2, z2)$ are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - iii) If SPLSR ≤ 0.04 , simultaneously transmission SAR measurement is not necessary.
 - iv) Simultaneously transmission SAR measurement, and the reported multi-band SAR $< 1.6\text{W/kg}$.
3. For simultaneous transmission analysis, WALN & Bluetooth SAR is estimated per KDB 447498 D01v06 based on the formula below.
 - i) $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) \cdot [\sqrt{f(\text{GHz})/x}] \text{ W/kg}$ for test separation distances ≤ 50 mm; where $x = 7.5$ for 1-g SAR, and $x = 18.75$ for 10-g SAR.
 - ii) When the minimum separation distance is $< 5\text{mm}$, the distance is used 5mm to determine SAR test exclusion.
 - iii) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is > 50 mm.

4.1 Body Exposure Conditions

| Exposure Position | 1 | 2 | 3 | 4 | 5 | 1+2 Summed 1g SAR (W/kg) | 3+4 Summed 1g SAR (W/kg) | 2+5 Summed 1g SAR (W/kg) | 4+5 Summed 1g SAR (W/kg) |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| | 2.4GHz WLAN Ant 1 | 2.4GHz WLAN Ant 2 | 5GHz WLAN Ant 1 | 5GHz WLAN Ant 2 | Bluetooth Ant 1 | | | | |
| | Estimated 1g SAR (W/kg) | | | | |
| Bottom of Laptop at 0 mm | 0.400 | 0.400 | 0.400 | 0.400 | 0.400 | 0.800 | 0.800 | 0.800 | 0.800 |



5. References

- [1] FCC 47 CFR Part 2 "Frequency Allocations and Radio Treaty Matters; General Rules and Regulations"
- [2] ANSI/IEEE Std. C95.1-1992, "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", September 1992
- [3] IEEE Std. 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", Sep 2013
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 248227 D01 v02r02, "SAR Guidance for IEEE 802.11 (WiFi) Transmitters", Oct 2015.
- [6] FCC KDB 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [7] FCC KDB 616217 D04 v01r02, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", Oct 2015
- [8] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.