

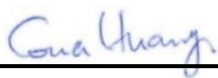
RF EXPOSURE EVALUATION REPORT

FCC ID : TX2-RTL8852BE
Equipment : 11ax RTL8852BE Combo module
Brand Name : REALTEK
Model Name : RTL8852BE
Applicant : Realtek Semiconductor Corp.
No.2, Innovation Road II, Hsinchu Science
Park, Hsinchu300, Taiwan
Standard : 47 CFR Part 2.1093

We, SPORTON INTERNATIONAL INC has been evaluated this product in accordance with 47 CFR Part2.1093 and it complies with applicable limit.

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.

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



Approved by: Cona Huang / Deputy Manager



SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory



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History of this test report

Report No.	Version	Description	Issued Date
FA2D2007	Rev. 01	Initial issue of report	Jan. 03, 2023

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	11ax RTL8852BE Combo module
Brand Name	REALTEK
Model Name	RTL8852BE
FCC ID	TX2-RTL8852BE
Wireless Technology and Frequency Range	WLAN 2.4 GHz Band: 2400 MHz ~ 2483.5 MHz WLAN 5.2 GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3 GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.6 GHz Band: 5470 MHz ~ 5725 MHz WLAN 5.8 GHz Band: 5725 MHz ~ 5850 MHz
Mode	WLAN: 802.11a/b/g/n/ac/ax HT20/HT40/VHT20/VHT40/VHT80/HE20/HE40/HE80 Bluetooth BR/EDR/LE

Reviewed by: **Jason Wang**

Report Producer: **Daisy Peng**

Host Information	
Equipment Name	Notebook Computer
Brand Name	Lenovo
HMN	Lenovo 100w Gen 4
EUT Stage	Production Unit

Antenna Information					
Antenna 1	Manufacturer	AWAN			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	025.90276.0011		025.90277.0011	
	Peak gain (dBi)	Main Antenna :		Aux Antenna :	
		WLAN(2.4G):	2.17 dBi	BT/WLAN(2.4G):	1.03 dBi
		WLAN(5G B1):	0.87 dBi	WLAN(5G B1):	-0.87 dBi
		WLAN(5G B2):	0.87 dBi	WLAN(5G B2):	-0.87 dBi
		WLAN(5G B3):	1.62 dBi	WLAN(5G B3):	-0.03 dBi
		WLAN(5G B4):	2.94 dBi	WLAN(5G B4):	1.60 dBi
Antenna 2	Manufacturer	High-Tek Electronics Co., Ltd			
	Antenna Type	PIFA Antenna		PIFA Antenna	
	Part number	025.90276.0001		025.90277.0001	
	Peak gain (dBi)	Main Antenna :		Aux Antenna :	
		WLAN(2.4G):	1.72 dBi	BT/WLAN(2.4G):	2.81 dBi
		WLAN(5G B1):	0.81 dBi	WLAN(5G B1):	-0.62 dBi
		WLAN(5G B2):	1.33 dBi	WLAN(5G B2):	-0.51 dBi
		WLAN(5G B3):	0.32 dBi	WLAN(5G B3):	1.32 dBi
		WLAN(5G B4):	0.46 dBi	WLAN(5G B4):	2.39 dBi

2. Maximum RF average output power among production units

<WLAN>

2.4GHz WLAN				Main	Aux	Main + Aux
	Mode	Channel	Frequency (MHz)	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
2.4GHz WLAN	802.11b 1Mbps	1	2412	20.00	20.00	23.00
		6	2437	20.00	20.00	23.00
		11	2462	20.00	20.00	23.00
		12	2467	15.50	15.50	18.50
		13	2472	12.00	12.00	15.00
	802.11g 6Mbps	1	2412	17.00	17.00	20.00
		6	2437	22.00	22.00	25.00
		11	2462	17.00	17.00	20.00
		12	2467	13.00	13.00	16.00
		13	2472	12.00	12.00	15.00
	802.11n-HT20 MCS0	1	2412	16.00	16.00	19.00
		6	2437	22.00	22.00	25.00
		11	2462	16.00	16.00	19.00
		12	2467	13.00	13.00	16.00
		13	2472	12.00	12.00	15.00
	802.11n-HT40 MCS0	3	2422	15.00	15.00	18.00
		6	2437	18.00	18.00	21.00
		9	2452	15.00	15.00	18.00
		10	2457	12.00	12.00	15.00
		11	2462	11.00	11.00	14.00
	802.11ac-VHT20 MCS0	1	2412	16.00	16.00	19.00
		6	2437	22.00	22.00	25.00
		11	2462	16.00	16.00	19.00
		12	2467	13.00	13.00	16.00
		13	2472	12.00	12.00	15.00
	802.11ac-VHT40 MCS0	3	2422	15.00	15.00	18.00
		6	2437	18.00	22.00	21.00
		9	2452	15.00	15.00	18.00
		10	2457	12.00	12.00	15.00
		11	2462	11.00	11.00	14.00
	802.11ax-HE20 MCS0	1	2412	16.00	16.00	19.00
		6	2437	22.00	22.00	25.00
		11	2462	16.50	16.50	19.50
		12	2467	13.50	13.50	16.50
		13	2472	12.00	12.00	15.00
	802.11ax-HE40 MCS0	3	2422	15.00	15.00	18.00
		6	2437	22.00	22.00	21.50
		9	2452	15.00	15.00	18.00
		10	2457	12.50	12.50	15.50
		11	2462	11.00	11.00	14.00



5.2GHz WLAN				Main	Aux	Main + Aux
5.2GHz WLAN	Mode	Channel	Frequency (MHz)	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
	802.11a 6Mbps	36	5180	19.00	19.00	22.00
		40	5200	19.00	19.00	22.00
		44	5220	19.00	19.00	22.00
		48	5240	19.00	19.00	22.00
	802.11n-HT20 MCS0	36	5180	19.00	19.00	22.00
		40	5200	19.00	19.00	22.00
		44	5220	19.00	19.00	22.00
		48	5240	19.00	19.00	22.00
	802.11n-HT40 MCS0	38	5190	17.00	17.00	20.00
		46	5230	21.00	21.00	24.00
	802.11ac-VHT20 MCS0	36	5180	19.00	16.00	22.00
		40	5200	19.00	19.00	22.00
		44	5220	19.00	19.00	22.00
		48	5240	19.00	19.00	22.00
	802.11ac-VHT40 MCS0	38	5190	17.00	17.00	20.00
		46	5230	21.00	21.00	24.00
	802.11ac-VHT80 MCS0	42	5210	16.00	16.00	19.00
	802.11ax-HE20 MCS0	36	5180	19.50	19.50	22.50
		40	5200	19.50	19.50	22.50
		44	5220	19.50	19.50	22.50
		48	5240	19.50	19.50	22.50
	802.11ax-HE40 MCS0	38	5190	17.00	17.00	20.00
		46	5230	21.00	21.00	24.00
	802.11ax-HE80 MCS0	42	5210	16.00	16.00	19.00

5.3GHz WLAN				Main	Aux	Main + Aux
	Mode	Channel	Frequency (MHz)	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
5.3GHz WLAN	802.11a 6Mbps	52	5260	19.00	19.00	22.00
		56	5280	19.00	19.00	22.00
		60	5300	19.00	19.00	22.00
		64	5320	19.00	19.00	22.00
	802.11n-HT20 MCS0	52	5260	19.00	19.00	22.00
		56	5280	19.00	19.00	22.00
		60	5300	19.00	19.00	22.00
		64	5320	19.00	19.00	22.00
	802.11n-HT40 MCS0	54	5270	21.00	21.00	24.00
		62	5310	17.00	17.00	20.00
	802.11ac-VHT20 MCS0	52	5260	17.00	17.00	22.00
		56	5280	19.00	19.00	22.00
		60	5300	19.00	19.00	22.00
		64	5320	19.00	19.00	22.00
	802.11ac-VHT40 MCS0	54	5270	21.00	21.00	24.00
		62	5310	17.00	17.00	20.00
	802.11ac-VHT80 MCS0	58	5290	17.00	17.00	20.00
	802.11ax-HE20 MCS0	52	5260	19.50	19.50	22.50
		56	5280	19.50	19.50	22.50
		60	5300	19.50	19.50	22.50
		64	5320	19.50	19.50	22.50
	802.11ax-HE40 MCS0	54	5270	21.00	21.00	24.00
		62	5310	17.00	17.00	20.00
	802.11ax-HE80 MCS0	58	5290	17.00	17.00	20.00

5.5GHz WLAN				Main	Aux	Main + Aux
5.5GHz WLAN	Mode	Channel	Frequency (MHz)	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
	802.11a 6Mbps	100	5500	18.50	18.50	21.50
		116	5580	19.00	19.00	22.00
		124	5620	18.50	18.50	21.50
		132	5660	18.50	18.50	21.50
		144	5720	18.50	18.50	21.50
	802.11n-HT20 MCS0	100	5500	18.50	18.50	21.50
		116	5580	19.00	19.00	22.00
		124	5620	18.50	18.50	21.50
		132	5660	18.50	18.50	21.50
		144	5720	18.50	18.50	21.50
	802.11n-HT40 MCS0	102	5510	15.50	15.50	18.50
		110	5550	21.00	21.00	24.00
		126	5630	19.00	19.00	22.00
		134	5670	19.00	19.00	22.00
		142	5710	19.00	19.00	22.00
	802.11ac-VHT20 MCS0	100	5500	18.50	18.50	21.50
		116	5580	19.00	19.00	22.00
		124	5620	18.50	18.50	21.50
		132	5660	18.50	18.50	21.50
		144	5720	18.50	18.50	21.50
	802.11ac-VHT40 MCS0	102	5510	15.50	15.50	18.50
		110	5550	21.00	21.00	24.00
		126	5630	19.00	19.00	22.00
		134	5670	19.00	19.00	22.00
		142	5710	19.00	19.00	22.00
	802.11ac-VHT80 MCS0	106	5530	15.50	15.50	18.50
		122	5610	19.00	19.00	22.00
		138	5690	19.00	19.00	22.00
	802.11ax-HE20 MCS0	100	5500	19.00	19.00	22.00
		116	5580	19.50	19.50	22.50
		124	5620	18.50	18.50	21.50
		132	5660	18.50	18.50	21.50
		144	5720	18.50	18.50	21.50
	802.11ax-HE40 MCS0	102	5510	15.50	15.50	18.50
		110	5550	21.00	21.00	24.00
		126	5630	19.00	19.00	22.00
		134	5670	19.00	19.00	22.00
		142	5710	19.00	19.00	22.00
	802.11ax-HE80 MCS0	106	5530	15.50	15.50	18.50
		122	5610	19.50	19.50	22.50
		138	5690	19.50	19.50	22.50

5.8GHz WLAN				Main	Aux	Main + Aux
5.8GHz WLAN	Mode	Channel	Frequency (MHz)	Tune-Up Limit	Tune-Up Limit	Tune-Up Limit
	802.11a 6Mbps	149	5745	21.00	21.00	24.00
		157	5785	21.50	21.50	24.50
		165	5825	21.00	21.00	24.00
	802.11n-HT20 MCS0	149	5745	21.00	21.00	24.00
		157	5785	21.00	21.00	24.00
		165	5825	21.00	21.00	24.00
	802.11n-HT40 MCS0	151	5755	20.00	20.00	23.00
		159	5795	20.00	20.00	23.00
	802.11ac-VHT20 MCS0	149	5745	21.00	21.00	24.00
		157	5785	21.00	21.00	24.00
		165	5825	21.00	21.00	24.00
	802.11ac-VHT40 MCS0	151	5755	20.00	20.00	23.00
		159	5795	20.00	20.00	23.00
	802.11ac-VHT80 MCS0	155	5775	19.50	19.50	22.50
	802.11ax-HE20 MCS0	149	5745	21.50	21.50	24.50
		157	5785	21.00	21.00	24.00
		165	5825	21.00	21.00	24.00
	802.11ax-HE40 MCS0	151	5755	20.50	20.50	23.50
		159	5795	20.50	20.50	23.50
	802.11ax-HE80 MCS0	155	5775	20.50	20.50	23.50

<Bluetooth>

Mode	Tune-up Limit (dBm)		
	1Mbps	2Mbps	3Mbps
BR / EDR	12.50	10.00	10.00

Mode	Tune-up Limit (dBm)	
	1Mbps	2Mbps
LE	12.50	12.50

3. RF Exposure Evaluation

3.1. Standalone assessment

General Note:

- The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
- Maximum power is the source-based time-average power and represents the maximum RF output power among production units
- 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.
- 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.
- 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(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
- 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
 - [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · (f(MHz)/150)] mW, at 100 MHz to 1500 MHz
 - [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · 10] mW at > 1500 MHz and ≤ 6 GHz

Exposure Position	Wireless Interface	BT Aux Ant	2.4GHz WLAN Main Aux	2.4GHz WLAN Aux Ant	5GHz WLAN Main Aux	5GHz WLAN Aux Ant
	Calculated Frequency (MHz)	2441	2472	2472	5825	5825
	Maximum power (dBm)	12.5	22.0	22.0	21.5	21.5
	Maximum rated power(mW)	17.78	158.49	158.49	141.25	141.25
Bottom of Laptop	Separation distance(mm)	194.2	194.2	194.2	194.2	194.2
	exclusion threshold	1538.0	1538.0	1538.0	1504.0	1504.0
	Testing required?	No	No	No	No	No

3.2. Collocated assessment

General Note:

- For simultaneous transmission analysis, SAR is estimated per KDB 447498 D01v06.
 - 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.

WLAN Main Estimated 1g SAR W/kg	WLAN Aux Estimated 1g SAR W/kg	BT Aux Estimated 1g SAR W/kg	Σ (SAR) of WLAN + Bluetooth (W/kg)
0.4	0.4	0.4	1.2