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RF Exposure Report

Report No.: SA131205E01E

FCC ID: TX2RTL8812AEBT

Test Model: RTL8812AEBT

Received Date: Dec. 21, 2015

Test Date: Jan. 06, 2016

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Release Control Record

Issue No.	Description	Date Issued
SA131205E01E	Original release.	Jan. 28, 2016



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1 Certificate of Conformity

Product: 802.11a/b/g/n/ac RTL8812AE Combo module

Brand: Realtek

Test Model: RTL8812AEBT

Sample Status: ENGINEERING SAMPLE

Applicant: Realtek Semiconductor Corp.

Test Date: Jan. 06, 2016

Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE Std C95.1-2005

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 :

Date:

Jan. 28, 2016

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Date:

Jan. 28, 2016

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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				
300-1500	F/1500	30
1500-100,000	1.0	30

F = Frequency in MHz

2.2 MPE Calculation Formula

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 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 20cm away from the body of the user.
So, this device is classified as **Mobile Device**.

3 Antenna Gain

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

No.	Brand	Model	Antenna Type	Peak gain with cable loss (dBi) (2.4GHz)	Peak gain with cable loss(dBi) (5GHz)	Cable Loss (dB) (2.4GHz)	Cable Loss (dB) (5GHz)	Connector Type
1	LYNwave	ALA110-222050-300010 (Main) ALA110-222050-300010 (Aux)	PIFA	3.5 3.5	5 5	NA NA	NA NA	IPEX
2	JOYMAX	TWF-614XMPXX-500 (Main) TWF-614XMPXX-500 (Aux)	Dipole	3 3	5 5	NA NA	NA NA	IPEX
3	WGT	SKA91WMPB02+A (Tx1) SKA91WMPB01+A (Tx2)	PIFA	0.82 -2.23	0.94 2.18	-1.32 -0.75	-2.04 -1.17	IPEX
4	JEM	1510-0122-0027 (Tx1) 1510-0122-0027 (Tx2)	PIFA	3.23 2.31	4.89 1.89	NA NA	NA NA	RF
5	FVC	K05007014501(6-23-7W25H-010) (Tx1) K05007014501(6-23-7W25H-010) (Tx2)	PIFA	2.85 1.59	2.46 2.91	NA NA	NA NA	IPEX
6	JEM	1510-0122-0022(IA-120073) (Tx1) 1510-0122-0022(IA-120073) (Tx2)	PIFA	2.23 2.21	1.69 1.84	NA NA	NA NA	RF
7	WGT	SK81WMPB01+A (Tx1) SK81WMPB02+A (Tx2)	PIFA	1.79 0.66	1.49 -0.40	-1.88 -2.95	-3.17 -4.96	IPEX
8	WGT	SKW2UWMPB01+A (Tx1) SKW2UWMPB01+A (Tx2)	PIFA	1.36 2.88	1.92 3.16	NA NA	NA NA	IPEX
9	WGT	SKW25WMPB01+A (Tx1) SKW25WMPB01+A (Tx2)	PIFA	0.72 0.49	-0.72 -0.71	-1.41 -1.39	-2.18 -2.15	IPEX
10	WGT	SK549WMPB01+A (Tx1) SK549WMPB02+A (Tx2)	PIFA	-0.17 -2.24	-0.13 0.03	-1.04 -0.88	-1.94 -1.64	IPEX
11	WGT	SK110WMPB01+A (Tx1) SK110WMPB02+A (Tx2)	PIFA	1.05 -0.41	1.08 2.32	-0.98 -0.99	-1.52 -1.54	IPEX
12	WGT	SKW31WMPB01+A (Tx1) SKW31WMPB01+A (Tx2)	PIFA	1.85 3.14	1.74 2.10	NA NA	NA NA	IPEX
13	FVC	6-23-7B51M-031 (Tx1) 6-23-7B51M-031 (Tx2)	PIFA	1.58 1.75	2.54 2.24	NA NA	NA NA	IPEX
14	FVC	6-23-7E51Q-011 (Tx1) 6-23-7E51Q-011 (Tx2)	PIFA	2.70 2.19	1.57 2.94	NA NA	NA NA	IPEX
15	FVC	6-23-7B710-022 (WM1) 6-23-7B710-022 (WM2)	PIFA	1.51 2.04	2.99 3.02	NA NA	NA NA	IPEX
16	WGT	SKM11WMPB03+A (Tx1) SKM11WMPB02+D (Tx2)	PIFA	-1.84 -2.93	0.44 1.35	1.17 0.89	2.02 1.54	IPEX
17	WGT	SKW23WMPB01+A (Tx1) SKW23WMPB02+A (Tx2)	PIFA	-1.61 -2.84	-0.14 -0.96	-2.10 -2.07	-3.25 -3.20	IPEX
18	WGT	SKW24WMPB01+B (WM1) SKW24WMPB01+B (WM2)	PIFA	1.25 3.17	1.95 2.42	NA NA	NA NA	IPEX

No.	Brand	Model	Antenna Type	Peak gain with cable loss (dBi) (2.4GHz)	Peak gain with cable loss(dBi) (5GHz)	Cable Loss (dB) (2.4GHz)	Cable Loss (dB) (5GHz)	Connector Type
19	FVC	K05007015501(6-23-7W244-020-1) (Tx1) K05007015501(6-23-7W244-020-1) (Tx2)	PIFA	2.53 2.28	2.86 2.97	NA NA	NA NA	IPEX
20	FVC	K05007014201(6-23-7W25P-020) (Tx1) K05007014201(6-23-7W25P-020) (Tx2)	PIFA	3.00 1.52	2.82 2.21	NA NA	NA NA	IPEX
21	WGT	SKW10WMPB01+A (Tx1) SKW10WMPB02+A (Tx2)	PIFA	0.85 0.44	0.75 1.24	-1.56 -1.53	-2.42 -2.36	IPEX
22	WGT	SKCZTWMPB01+A (Tx1) SKCZTWMPB02+A (Tx2)	PIFA	0.46 -0.79	2.80 1.03	-1.56 -1.53	-2.42 -2.36	IPEX
23	JEM	IA-120266 (Tx1) IA-120267 (Tx2)	PIFA	2.60 0.53	2.61 2.60	2.12 1.76	3.48 2.87	IPEX
24	WGT	SK547WMPB01+A (Tx1) SK549WMPB02+A (Tx2)	PIFA	-0.66 0.78	-0.19 2.06	-1.42 -1.43	-2.20 -2.21	IPEX
25	WGT	SK555WMPB01+B (Tx1) SK555WMPB02+B (Tx2)	PIFA	0.76 0.09	1.97 0.56	-1.83 -1.80	-2.83 -2.78	IPEX
26	WGT	SK65EWMPB01+A (Tx1) SK650WMPB02+A (Tx2)	PIFA	0.42 -0.13	0.11 1.27	-1.56 -0.61	-2.41 -0.94	IPEX
27	WGT	SK670WMPB01+A (Tx1) SK670WMPB02+A (Tx2)	PIFA	1.48 1.15	-0.44 0.42	-2.47 -1.93	-3.82 -2.99	IPEX
28	WGT	SK740WMPB01+A (Tx1) SK740WMPB02+A (Tx2)	PIFA	-0.93 0.20	0.96 0.86	-1.39 -1.26	-2.16 -1.95	IPEX
29	WGT	SK840WMPB01+B_SN (Tx1) SK840WMPB01+B_SN (Tx2)	PIFA	3.03 0.55	4.16 0.90	-1.12 -1.20	-1.74 -1.86	IPEX
30	WGT	SK94SWMPB01+B (TX1) SK94SWMPB01+B (TX2)	PIFA	0.76 0.46	1.12 1.44	-0.32 -0.44	-0.50 -0.68	IPEX
31	WGT	SK94TWMPB01+B (TX1) SK94TWMPB01+B (TX2)	PIFA	1.32 1.86	2.59 1.57	-0.59 -0.71	-0.91 -1.10	IPEX
32	WGT	SK50SWMPB01+A (TX1) SK50SWMPB02+A (TX2)	PIFA	-0.03 -0.13	1.25 2.13	-0.86 -0.72	-1.32 -1.12	IPEX
33	WGT	SK94TWMPB01+D (TX1) SK94TWMPB01+D (TX2)	PIFA	1.32 1.86	2.59 1.57	-0.59 -0.71	-0.91 -1.10	IPEX
34	WGT	SKC45WMPB03+B (WM1) SKC45WMPB03+B (WM2)	PIFA	2.46 2.91	2.90 2.67	NA NA	NA NA	IPEX
35	FVC	K05007015801 (WM1) K05007015901 (WM2)	PIFA	3.12 1.01	3.51 1.93	NA NA	NA NA	RF
36	WGT	SK345WMPB01+A (WM1) SK345WMPB02+A (WM2)	PIFA	0.86 2.51	2.94 3.25	NA NA	NA NA	IPEX
37	FVC	K05007014901 (WM1) K05007015001 (WM2)	PIFA	1.85 1.94	1.35 1.99	NA NA	NA NA	IPEX
38	WGT	SKX51WMPB01+C (WM1) SKX51WMPB02+C (WM2)	PIFA	3.2 2.76	2.28 2.51	NA NA	NA NA	IPEX

No.	Brand	Model	Antenna Type	Peak gain with cable loss (dBi) (2.4GHz)	Peak gain with cable loss(dBi) (5GHz)	Cable Loss (dB) (2.4GHz)	Cable Loss (dB) (5GHz)	Connector Type
39	INPAQ	WA-P-LB-02-122 (Main) WA-P-LB-01-072 (Aux)	PIFA	-1.41 -0.33	-2.44 -3.87	1.23 1.86	2.06 3.12	IPEX
40	Smart Approach	SE-ECZ50-001 (Tx1) SE-ECZ50-002 (Tx2)	PIFA	-1.37 -2.17	1.83 1.86	0.96 1.45	1.73 2.62	IPEX
41	INPAQ	WA-P-LB-02-121 (Main) WA-P-LB-01-071 (Aux)	PIFA	-2.26 -4.63	-2.87 -2.49	1.32 1.95	2.22 3.28	IPEX
42	Smart Approach	SE-ECZ70-001 (Tx1) SE-ECZ70-002 (Tx2)	PIFA	-0.65 -2.39	1.52 0.58	1.03 1.52	1.87 2.76	IPEX

4 Calculation Result Of Maximum Conducted Power

For BT-EDR, BT-LE, WLAN (2.4GHz) & WLAN (5GHz - U-NII-1, U-NII-2A, U-NII-2C) data was copied from the original test report (Report No.: SA131205E01).

WLAN

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412 - 2462	572.434	6.51	20	0.50986	1
5180 - 5240, 5260 - 5320, 5500 - 5580 & 5660 - 5700	147.582	8.01	20	0.18568	1
5745-5825	132.621	8.01	20	0.16686	1

NOTE:

2.4GHz: Directional gain = 3.5dBi + 10log(2) = 6.51dBi

5GHz: Directional gain = 5dBi + 10log(3) = 8.01dBi

BT-EDR

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2402-2480	2.723	3.5	20	0.00121	1

BT-LE

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2402 - 2480	2.415	3.5	20	0.00108	1

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 2.4GHz + WLAN 5GHz = 0.50986 + 0.00121 = 0.511

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

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