

MPE TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC/IC ID: PPD-QCMD335 / 4104A-QCMD335

Equipment Under Test : SAMSUNG NOTE PC

Model Name : QCMD335
(Tested inside of Samsung Notebook PC NP455R4J)

Applicant : Qualcomm Atheros, Inc.

Manufacturer : SAMSUNG ELECTRONICS CO., LTD.

Date of Test(s) : 2014. 03. 04 ~ 2014. 03. 21

Date of Issue : 2014. 06. 25

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Date:

2014.06.25

Wonjun Sim

Approved By:



Date:

2014.06.25

Hyunchae You

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

-Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040 (Lab)

-413-15, Gomae-Dong, Giheung-Gu, Yongin-Si, Gyeonggi-Do, South Korea. (Chamber)

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

Phone No. : + 82 31 428 5700

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1.2. Details of Applicant

Applicant : Qualcomm Atheros, Inc.
Address : 1700 Technology Drive, San Jose, CA 95110
Contact Person : Stanley Lin
Phone No. : +1 408 773 5200
Fax No. : +1 408 773 9940

1.3. Description of EUT

Kind of Product	SAMGSUNG NOTE PC
Model Name	QCMD335 (Tested inside of Samsung Notebook PC NP455R4J)
Power Supply	DC 11.4V
Frequency Range	2 402 MHz ~ 2 480 MHz (BT, BT LE), 2 412 MHz ~ 2 462 MHz (11b/g/n_HT20), 2 422 MHz ~ 2 452 MHz (11n_HT40)
Modulation Technique	DSSS, OFDM, GFSK, π/4DQPSK, 8DPSK
Number of Channels	11 channel (11b/g/n_HT20), 7 channel (11n_HT40), 79 channel (BT), 40 channel (BT LE)
Antenna Type	Internal type(SISO)
Antenna Gain	0.84 dB i

1.4. Test report revision

Revision	Report number	Description
0	F690501/RF-RTL007694	Initial
1	F690501/RF-RTL007694-1	Correct Max. Tolerance Power
2	F690501/RF-RTL007694-2	Re- Correct Max. Tolerance Power

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RTT5041-20(2013.07.27)(1)

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A4(210mm x 297mm)

2. RF Exposure Evaluation

2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b)

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
(A) Limits for Occupational /Control Exposures				
300 – 1 500	--	--	F/300	6
1 500 – 100 000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300 – 1 500	--	--	F/1500	6
<u>1 500 – 100 000</u>	--	--	<u>1</u>	<u>30</u>

2.1.1. Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where P_d = power density in mW/cm^2

P_{out} = 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

P_d the limit of MPE, 1 mW/cm^2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

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2.2. RF exposure limit according to IC RSS-102

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (W/m ²)	Average Time (minutes)
0.003 – 1	280	2.19	-	6
1 – 10	280 / f	2.19 / f	-	6
10 – 30	28	2.19 / f	-	6
30 – 300	28	0.073	2*	6
300 – 1 500	1.585 $f^{0.5}$	0.004 2 $f^{0.5}$	$f / 150$	6
1 500 – 15 000	61.4	0.163	10	6
15 000 – 150 000	61.4	0.163	10	616 000 / $f^{1.2}$
150 000 – 300 000	0.158 $f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	616 000 / $f^{1.2}$

Note: f is frequency in MHz

*Power density limit is applicable at frequencies greater than 100 MHz

2.2.1. Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where P_d = power density in W/m^2

P_{out} = output power to antenna in W

G = gain of antenna in linear scale

$\pi = 3.1416$

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

P_d the limit of MPE, 10 W/m^2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

2.3. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data

Test Mode : Normal Operation

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A4(210mm x 297mm)

2.3.1. Output Power into Antenna & RF Exposure Evaluation Distance

BT: Maximum average power

Mode	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Power Density at 20 cm (W/m ²)	FCC Limits (mW/cm ²)	IC Limits (W/m ²)
Max. tolerance	4.50	0.84	0.000 439	0.004 389	1	10

BT LE: Maximum average power

Mode	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Power Density at 20 cm (W/m ²)	FCC Limits (mW/cm ²)	IC Limits (W/m ²)
Max. tolerance	4.50	0.84	0.000 439	0.004 389	1	10

WLAN: Maximum average power

Mode	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	Power Density at 20 cm (W/m ²)	FCC Limits (mW/cm ²)	IC Limits (W/m ²)
Max. tolerance	19.00	0.84	0.019 368	0.193	1	10

Note :

1. The power density P_d (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm² and 10 W/m².