



FCC SAR Test Report

APPLICANT : Qualcomm Atheros, Inc.
EQUIPMENT : 1X1 802.11b/g/n-BT4.0 PCIe/USB M.2 Combo Module
BRAND NAME : Qualcomm Atheros
MODEL NAME : QCNFA335
FCC ID : PPD-QCNFA335
STANDARD : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2003

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Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA382432-01	Rev. 01	Base on original SAR report, Report No: FA382432, Rev.04, and FCC ID: PPD-QCNFA335 was additional simultaneous transmission analysis with Bluetooth.	Jan. 17, 2014



1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Qualcomm Atheros, Inc. 1X1 802.11b/g/n-BT4.0 PCIe/USB M.2 Combo Module, QCNFA335** are as follows.

<Highest Simultaneous transmission SAR>

Frequency Band	Equipment Class	Exposure Position	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
Bluetooth	DSS	Body	0.83
WLAN 2.4GHz Band	DTS		

This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2003.

2. Administration Data

2.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

2.2 Applicant

Company Name	Qualcomm Atheros, Inc.
Address	1700 Technology Drive, San Jose, CA95110



3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	1X1 802.11b/g/n-BT4.0 PCIe/USB M.2 Combo Module
Brand Name	Qualcomm Atheros
Model Name	QCNFA335
FCC ID	PPD-QCNFA335
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	• 802.11b/g/n HT20/HT40 • Bluetooth v2.1+EDR • Bluetooth v3.0+EDR • Bluetooth v4.0+LE
Antenna Type	WLAN: PIFA Antenna Bluetooth: PIFA Antenna
EUT Stage	Identical Prototype
Remark:	
1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.	

3.2 Applied Standard

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

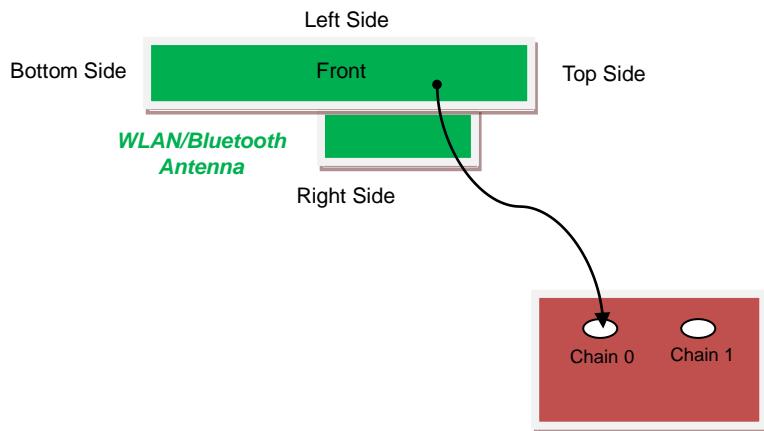
- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC KDB 447498 D01 v05r01
- FCC KDB 248227 D01 v01r02
- FCC KDB 616217 D04 v01r01

3.3 Device Category and SAR Limits

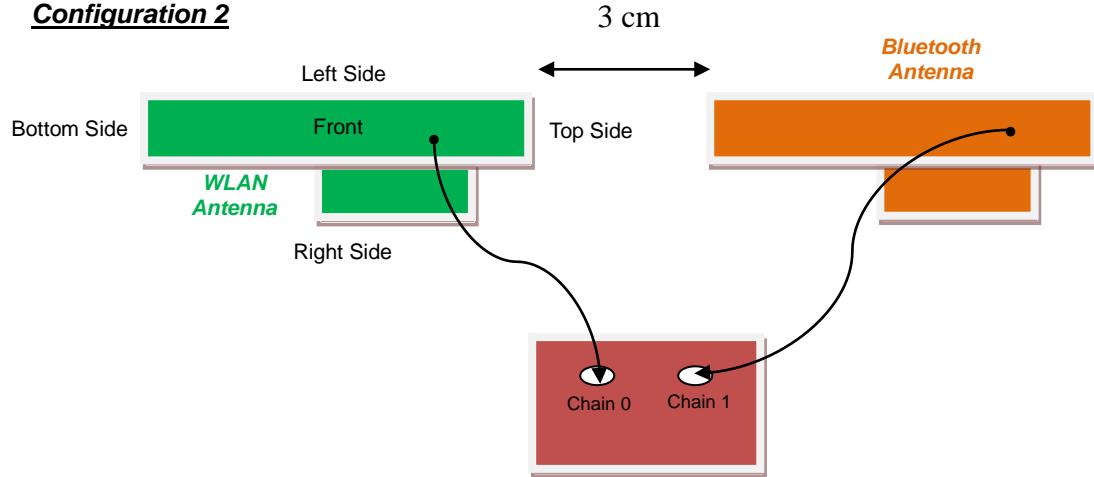
This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

4. Antenna location

Configuration 1



Configuration 2



Note: The separation distance between WLAN and Bluetooth antennas is 3cm.



5. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	Supported
1.	WLAN2.4GHz 802.11b/g/n + Bluetooth	Yes

Note:

1. When the WLAN and Bluetooth share the same antenna (chain 0) cannot transmit simultaneously, and when the WLAN operating in chain 0 and Bluetooth operating in chain 1 can transmit simultaneously.
2. The Scaled SAR summation is calculated based on the same configuration and test position.
3. Per KDB 447498 D01v05r01, simultaneous transmission SAR is compliant if,
 - i) Scalar SAR summation < 1.6W/kg.
 - ii) SPLSR = $(\text{SAR}_1 + \text{SAR}_2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x_1-x_2)^2 + (y_1-y_2)^2 + (z_1-z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan
If SPLSR ≤ 0.04 , simultaneously transmission SAR measurement is not necessary
 - iii) Simultaneously transmission SAR measurement, and the reported multi-band SAR $< 1.6\text{W/kg}$
4. For simultaneous transmission analysis, Bluetooth SAR is estimated per KDB 447498 D01v05r01 based on the formula below.
 - i) $(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm}) [\sqrt{f(\text{GHz})/x}] \text{ W/kg}$ 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 test 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.

Bluetooth Max Power	Exposure Position	Body
	Test separation	7 mm
5.41 dBm	Estimated SAR (W/kg)	0.09 W/kg

5.1 Body Exposure Conditions

Position	WLAN		Bluetooth	Summed SAR (W/kg)
	Plot No	SAR (W/kg)	Estimated SAR (W/kg)	
Front	8	0.670	0.09	0.76
Back	9	0.741	0.09	0.83
Left Side	10	0.268	0.09	0.36
Right Side	11	0.093	0.09	0.18
Top Side	12	0.039	0.09	0.13
Bottom Side	13	0.079	0.09	0.17



6. 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. 1528-2003, "Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", December 2003
- [4] SPEAG DASY System Handbook
- [5] FCC KDB 248227 D01 v01r02, "SAR Measurement Procedures for 802.11 a/b/g Transmitters", May 2007
- [6] FCC KDB 447498 D01 v05r01, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", May 2013
- [7] FCC KDB 616217 D04 v01r01, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", May 2013