

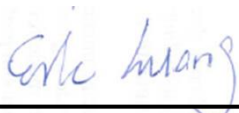
FCC SAR Test Report

APPLICANT : Sierra Wireless Inc
EQUIPMENT : PCIe wireless WAN card
BRAND NAME : SIERRA WIRELESS
MODEL NAME : EM7455
FCC ID : N7NEM7455
STANDARD : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2013

The product was installed into Portable Computer (Brand Name DELL, Model Name: P28S) during test.

We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and had 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., the test report shall not be reproduced except in full.



Reviewed by: Eric Huang / Manager



Approved by: Jones Tsai / Manager



SPORTON INTERNATIONAL INC.

No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA742813	Rev. 01	Initial issue of report	Jul. 06, 2017

1. Administration Data

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	Sierra Wireless Inc
Address	13811 Wireless Way, Richmond, BC, N/A V6V 3A4, Canada

Manufacturer	
Company Name	Sierra Wireless Inc
Address	13811 Wireless Way, Richmond, BC, N/A V6V 3A4, Canada

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. Equipment Under Test (EUT) Information

3.1 General Information

Product Feature & Specification	
Equipment Name	PCIe wireless WAN card
Brand Name	SIERRA WIRELESS
Model Name	EM7455
FCC ID	N7NEM7455
Wireless Technology and Frequency Range	WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz LTE Band 12: 699.7 MHz ~ 715.3 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 25: 1850.7 MHz ~ 1914.3 MHz LTE Band 26: 814.7 MHz ~ 848.3 MHz LTE Band 41: 2498.5 MHz ~ 2687.5 MHz
Mode	RMC 12.2Kbps HSDPA HSUPA DC-HSDPA LTE: QPSK, 16QAM

Host Information		
Equipment Name		Portable Computer
Brand Name		DELL
Model Name		P28S
Integrated WLAN module 1	Brand Name	Intel
	Model Name	8265NGW
	Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
	Mode	WLAN 2.4GHz : 802.11b/g/n HT20/HT40 WLAN 5GHz : 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
Integrated WLAN module 2	Brand Name	QUALCOMM
	Model Name	QCNA344A
	Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5700 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
	Mode	WLAN 2.4GHz : 802.11b/g/n/ac HT20/HT40/VHT20/VHT40 WLAN 5GHz : 802.11a/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
Integrated Module	Brand Name	DELL
	Model Name	DWRFID1602
	Wireless Technology and Frequency Range	RFID : 13.56 MHz
	Mode	RFID : ASK
EUT Stage		Identical Prototype

Remark:

- There are two WLAN/BT modules integrated in this host, one is Intel 8265NGW and other one is QUALCOMM QCNA344A :
 - For Intel 8265NGW WLAN and Bluetooth Tune-up power are referenced from the report of FCC ID: PD98265NGU, certified on 06/03/2016 (Intel Report No. 160321-01.TR05)
 - For QUALCOMM QCNA344A WLAN and Bluetooth Tune-up power are referenced from the report of FCC ID: PPD-QCNA344AH, certified on 05/28/2015 (QUALCOMM Report No. SA150107E06B)

Batteries Option				
Battery 1	Brand Name	DELL	Model Name	F3YGT
	Power Rating	7.6Vdc, 60Wh	Type	Li-ion
Battery 2	Brand Name	DELL	Model Name	DJ1J0
	Power Rating	11.4Vdc, 42Wh	Type	Li-ion

WWAN Antenna Information		
Manufacturer	Hong-Bo	
Parts Number	260-24161 (DC330020U2L)	
Ant. Type	PIFA	
Peak Gain (dBi)	698-821MHz	0.8
	824-960MHz	0.47
	1425-1515MHz	-0.96
	1710-2170MHz	2.68
	2300-2690MHz	2.40
Manufacturer	WNC	
Parts Number	81ELAN15.G22 (DC330020X2L)	
Ant. Type	PIFA	
Peak Gain (dBi)	698-821MHz	1.46
	824-960MHz	1.14
	1425-1515MHz	1.05
	1710-2170MHz	2.88
	2300-2690MHz	2.16

WLAN Antenna Information									
Antenna 1	Ant. Type	PIFA	Manufacturer	Hong-Bo	Antenna 2	Ant. Type	PIFA	Manufacturer	Hong-Bo
	Model No.	DC330020U2L (260-24161)				Model No.	DC330020U2L (260-24161)		
	Peak Gain (dBi)					Peak Gain (dBi)			
	2400~2483.5MHz	1.6	5470~5725MHz	1.55		2400~2483.5MHz	0.97	5470~5725MHz	2.42
	5150~5250MHz	2.27	5725~5850MHz	2.24		5150~5250MHz	2.67	5725~5850MHz	2.55
	5250~5350MHz	2.27				5250~5350MHz	2.67		
Antenna 1	Ant. Type	PIFA	Manufacturer	WNC	Antenna 2	Ant. Type	PIFA	Manufacturer	WNC
	Model No.	DC330020X2L (81ELAN15.G22)				Model No.	DC330020X2L (81ELAN15.G22)		
	Peak Gain (dBi)					Peak Gain (dBi)			
	2400~2483.5MHz	0.23	5470~5725MHz	-0.52		2400~2483.5MHz	1.2	5470~5725MHz	-0.52
	5150~5250MHz	0.67	5725~5850MHz	-0.67		5150~5250MHz	-0.38	5725~5850MHz	-1.94
	5250~5350MHz	0.67				5250~5350MHz	-0.38		

4. Maximum Tune-up power (Unit: dBm)

<Sierra EM7455>

Mode		Maximum Tune-up Power (dBm)
WCDMA	Band II	24.0
	Band IV	24.0
	Band V	24.0
LTE	Band 2	24.0
	Band 4	24.0
	Band 5	24.0
	Band 7	23.0
	Band 12	24.0
	Band 13	24.0
	Band 25	24.0
	Band 26	24.0
	Band 41	23.0

<Intel 8265NGW>

Mode		Maximum Tune-up Power (dBm)
2.4GHz WLAN	Ant 1	20.3
	Ant 2	20.3
5GHz WLAN	Ant 1	20.3
	Ant 2	20.3
Bluetooth		12.0

Note :

The WLAN/BT module, Intel 8265NGW is also integrated into the host, for WLAN and Bluetooth Tune-up power are referenced from the report of FCC ID: PD98265NG, certified on 06/03/2016 (Intel Report No. 160321-01.TR05).

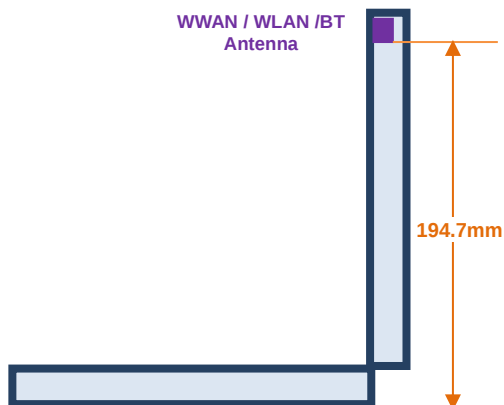
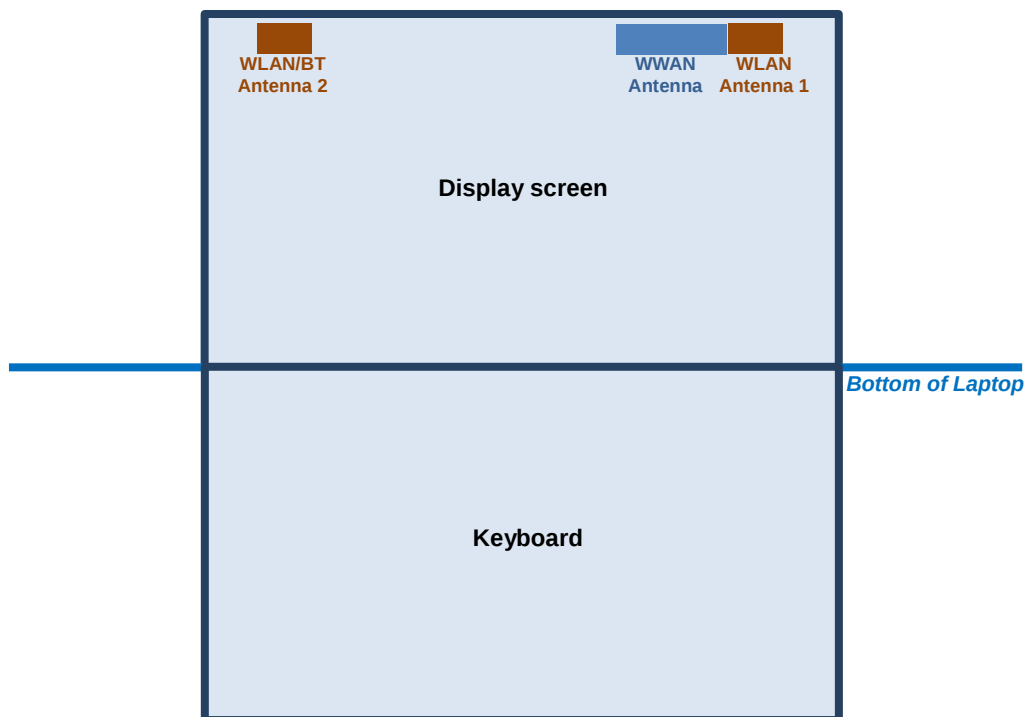
<QUALCOMM QCNFA344A>

Mode		Maximum Tune-up Power (dBm)
2.4GHz WLAN	Ant 1 + 2	23.5
5GHz WLAN	Ant 1 + 2	22.5
Bluetooth		13.0

Note :

The WLAN/BT module, QUALCOMM QCNFA344A is also integrated into the host, for WLAN and Bluetooth Tune-up power are referenced from the report of FCC ID: PPD-QCNFA344AH, certified on 05/28/2015 (Intel Report No. SA150107E06B).

5. Antenna Location



<Side View>

6. SAR Test Exclusion Applied

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

Integrated Module		EM7455										8265NGW					QCNFA344A		
Exposure Position	Wireless Interface	WCDMA Band V	WCDMA Band IV	WCDMA Band II	LTE Band 12	LTE Band 13	LTE Band 5 / 26	LTE Band 4	LTE Band 2 / 25	LTE Band 7	LTE Band 41	BT	2.4GHz WLAN ANT 1	2.4GHz WLAN ANT 2	5GHz WLAN ANT 1	5GHz WLAN ANT 2	BT	2.4GHz WLAN ANT 1+2	5GHz WLAN ANT 1+2
	Calculated Frequency (MHz)	846	1750	1907	715	784	848	1754	1914	2570	2688	2480	2462	2462	5825	5825	2480	2462	5825
	Maximum power (dBm)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	23.0	23.0	12.0	20.3	20.3	20.3	20.3	13.0	23.5	22.5
	Maximum rated power(mW)	251.0	251.0	251.0	251.0	251.0	251.0	251.0	251.0	200.0	200.0	16.0	107.0	107.0	107.0	107.0	20.0	224.0	178.0
Bottom of Laptop	Separation distance(mm)	194.7										194.7					194.7		
	exclusion threshold	979.0	1560.0	1556.0	867.0	926.0	981.0	1560.0	1555.0	1541.0	1538.0	1542.0	1543.0	1543.0	1509.0	1509.0	1542.0	1543.0	1509.0
	Testing required?	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No

Conclusion: According to table above, standalone SAR is not require in this report.

7. Simultaneous Transmission Analysis

< EM7455 with 8265NGW >

NO.	Simultaneous Transmission Configurations	Body
1.	WWAN + WLAN Ant 1 + WLAN Ant 2	Yes
2.	WWAN + WLAN Ant 1 + BT Ant 2	Yes

< EM7455 with QCNFA344A >

NO.	Simultaneous Transmission Configurations	Body
1.	WWAN + WLAN 2.4GHz + BT	Yes
2.	WWAN + WLAN 5GHz + BT	Yes

General Note:

- There are two WLAN/BT modules integrated in this host, one is Intel 8265NGW and other one is QUALCOMM QCNFA344A :
- 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.
- Per KDB 447498 D01v06 SAR test exclusion in section6, the standalone SAR testing is not required for this device, 0.4 W/kg is used for simultaneous transmission analysis when the test separation distance is > 50mm.

<EM7455 with 8265NGW>

Exposure Position	1	2	3	1+2+3 Summed 1g SAR (W/kg)
	WWAN	WLAN Ant 1	WLAN/BT Ant 2	
	Estimated 1g SAR (W/kg)			
Body	0.4	0.4	0.4	1.2

<EM7455 with QCNFA344A >

Exposure Position	1	2	3	1+2+3 Summed 1g SAR (W/kg)
	WWAN	WLAN	BT	
	Estimated 1g SAR (W/kg)			
Body	0.4	0.4	0.4	1.2

Conclusion:

In the table above, the summed SAR is compliant 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.

8. 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 447498 D01 v06, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Oct 2015
- [6] FCC KDB 616217 D04 v01r02, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", Oct 2015
- [7] FCC KDB 865664 D01 v01r04, "SAR Measurement Requirements for 100 MHz to 6 GHz", Aug 2015.
- [8] FCC KDB 865664 D02 v01r02, "RF Exposure Compliance Reporting and Documentation Considerations" Oct 2015.