



FCC SAR Test Report

APPLICANT : Hewlett-Packard Company
EQUIPMENT : Notebook PC
BRAND NAME : HP
MODEL NAME : HSTNN-W91C
FCC ID : B94HNNW91CSWWH
STANDARD : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2003
FCC OET Bulletin 65 Supplement C (Edition 01-01)

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Reviewed by:

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Table of Contents

1. Statement of Compliance 4

2. Administration Data 5

 2.1 Testing Laboratory..... 5

 2.2 Applicant 5

3. General Information 6

 3.1 Description of Equipment Under Test (EUT) 6

 3.2 Applied Standard..... 7

 3.3 Device Category and SAR Limits 7

4. Exposure Positions Consideration..... 8

5. Simultaneous Transmission SAR Analysis and Measurements10

6. References.....15



Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA2N2103-01	Rev. 03	Based on original SAR report. Report No. 2N2103-01 Rev.02 include co-location analysis with PD962205ANH	Feb. 19, 2013



1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) for **Hewlett-Packard Company, HSTNN-W91C**, are as follows.

<Highest Simultaneous transmission SAR>

Frequency Band	Equipment Class	Exposure Position	Highest Reported Simultaneous Transmission 1g-SAR (W/kg)
WCDMA V	PCB	Bottom Face (0 cm Gap)	1.51
WLAN2.4G 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 and FCC OET Bulletin 65 Supplement C (Edition 01-01).



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	Hewlett-Packard Company
Address	3000 Hanover Street, Palo Alto, California 94304, USA



3. General Information

3.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT	Notebook PC
Brand Name	HP
Model Name	HSTNN-W91C
FCC ID	B94HNNW91CSWWH
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz CDMA2000 BC0 : 824.70 MHz ~ 848.31 MHz CDMA2000 BC1 : 1851.25 MHz ~ 1908.75 MHz
Antenna Type	PIFA Antenna
Uplink Modulations	GPRS : GMSK EDGE : GMSK / 8PSK WCDMA (Rel 99) : QPSK HSDPA (Rel 6) : QPSK HSUPA (Rel 6) : QPSK CDMA2000 : QPSK
EUT Stage	Identical Prototype
Remark:	<ol style="list-style-type: none">1. Voice call over circuit-switched domain of WWAN is not supported2. WLAN module FCC ID: PD962205ANH is also integrated into this host, and C2PC filing was granted on 2013/01/23. WLAN power and SAR test data is referred to SGS FCC SAR Report, Report No: ES2012B0010, available on FCC website



3.2 Applied Standard

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

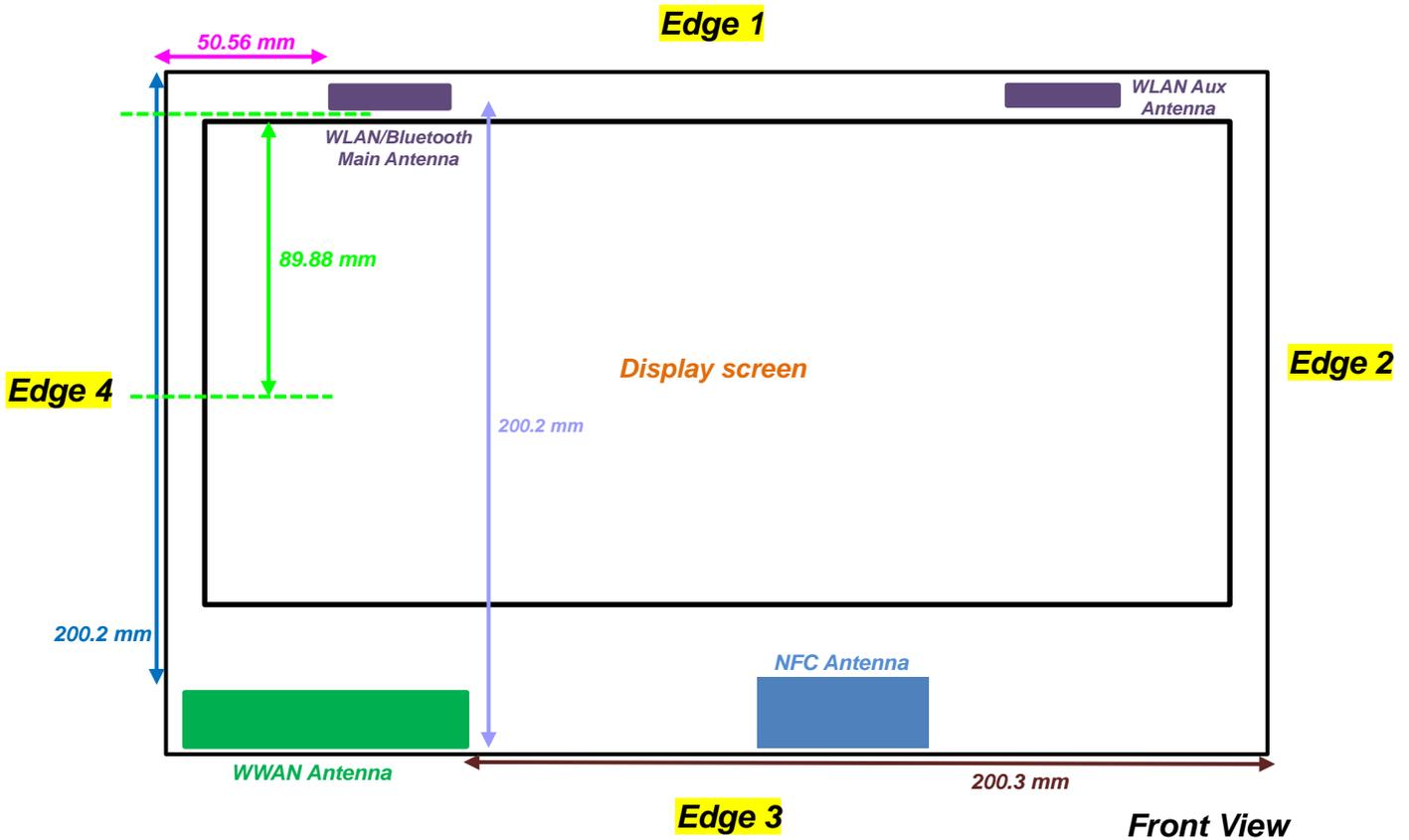
- FCC 47 CFR Part 2 (2.1093)
- ANSI/IEEE C95.1-1992
- IEEE 1528-2003
- FCC OET Bulletin 65 Supplement C (Edition 01-01)
- FCC KDB 447498 D01 v05
- FCC KDB 616217 D04 v01
- FCC KDB 941225 D01 v02
- FCC KDB 941225 D03 v01

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. Exposure Positions Consideration

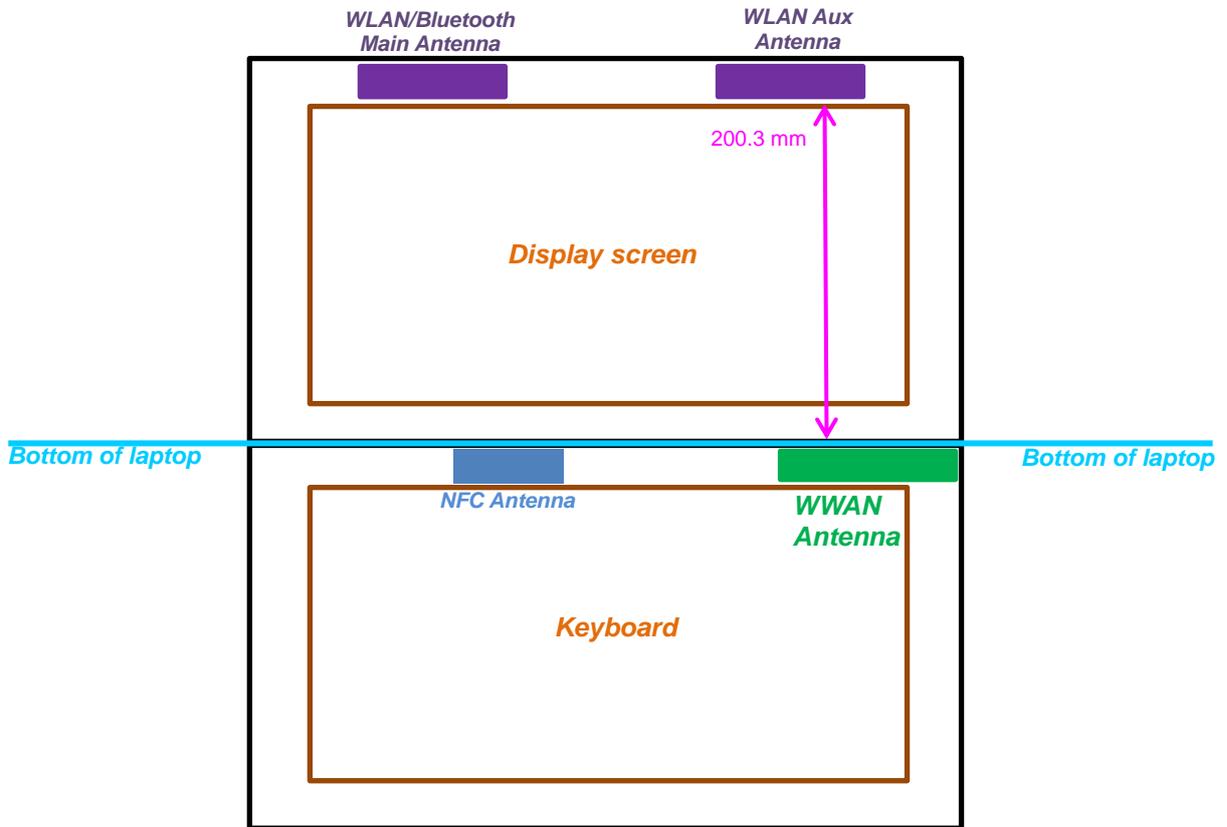
<Tablet PC>



Note:

1. The display screen can be fold onto the keypad and the device is in tablet mode

<Laptop>



Antennas	Wireless Interface
WWAN Antenna (Tx/Rx)	GSM850
	GSM1900
	WCDMA Band V
	WCDMA Band IV
	WCDMA Band II
	CDMA BC0
	CDMA BC1



5. Simultaneous Transmission SAR Analysis

No.	Applicable Simultaneous Transmission Combination
1.	WWAN(data)+WLAN(router)

Note:

1. WLAN module FCC ID: PD962205ANH is also integrated into this host via the module insertion only, while the WLAN RF cable and antenna are not changed. For the purpose of co-location analysis with another WLAN module FCC ID: PD962205ANH, WWAN SAR data is reference from original FCC equipment authorization Sporton test report, Report No. 2N2103-01 Rev.02. The original WWAN SAR test data is representative in the host configuration with this WLAN module.
2. WLAN module FCC ID: PD962205ANH C2PC filing for integration into this host device was granted on 2013/01/23. WLAN power and SAR test data is referred to SGS FCC SAR Report, Report No: ES2012B0010, available on FCC website.
3. By design, WLAN 5GHz frequency band does not support mobile hotspot operation
4. The Scaled SAR summation is calculated based on the same configuration and test position.
5. Per KDB 447498 D01v05, simultaneous transmission SAR is compliant if,
 - i) Scalar SAR summation < 1.6W/kg.
 - ii) $SPLSR = (SAR_1 + SAR_2)^{1.5} / (min. \text{ separation distance, mm})$, 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 $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary
 - iii) Simultaneously transmission SAR measurement, and the reported multi-band SAR < 1.6W/kg



<Tablet PC mode>

WWAN + WLAN Main Antenna (DTS)

Position	WWAN			WLAN-DTS	Sum WWAN + WLAN (W/kg)	SPLSR	Case No
	WWAN Band	Plot No	Max. Reported SAR (W/kg)	Max. Reported SAR (W/kg)			
Bottom Face At 0cm	GSM850	3	1.446	0.014	1.46		
	GSM1900	71	0.963	0.014	0.98		
	WCDMA V	18	1.489	0.014	1.50		
	WCDMA IV	105	0.781	0.014	0.80		
	WCDMA II	87	0.77	0.014	0.78		
	CDMA BC0	47	1.432	0.014	1.45		
Edge3 At 0cm	CDMA BC01	61	0.793	0.014	0.81		
	GSM850	6	1.316		1.32		
	GSM1900	74	1.065		1.07		
	WCDMA V	19	1.364		1.36		
	WCDMA IV	107	1.086		1.09		
	WCDMA II	90	0.85		0.85		
Edge4 At 0cm	CDMA BC0	51	1.443		1.44		
	CDMA BC01	62	1.023		1.02		
	GSM850	8	0.873		0.87		
	GSM1900	77	1.434		1.43		
	WCDMA V	34	0.796		0.80		
	WCDMA IV	109	1.483		1.48		
Bottom Face At 1 cm	WCDMA II	96	1.497		1.50		
	CDMA BC0	53	1.023		1.02		
	CDMA BC01	67	1.479		1.48		
	GSM850	15	1.062	0.014	1.08		
	GSM1900	84	0.725	0.014	0.74		
	WCDMA V	44	0.636	0.014	0.65		
Bottom Face At 1 cm	WCDMA IV	119	0.726	0.014	0.74		
	WCDMA II	104	0.692	0.014	0.71		
	CDMA BC0	60	0.584	0.014	0.60		
	CDMA BC01	70	0.575	0.014	0.59		



<Tablet PC mode>

WWAN + WLAN Aux Antenna (DTS)

Position	WWAN			WLAN-DTS	Sum WWAN + WLAN (W/kg)	SPLSR ≤ 0.04	Case No
	WWAN Band	Plot No	Max. Reported SAR (W/kg)	Max. Reported SAR (W/kg)			
Bottom Face At 0cm	GSM850	3	1.446	0.016	1.46		
	GSM1900	71	0.963	0.016	0.98		
	WCDMA V	18	1.489	0.016	1.51		
	WCDMA IV	105	0.781	0.016	0.80		
	WCDMA II	87	0.77	0.016	0.79		
	CDMA BC0	47	1.432	0.016	1.45		
	CDMA BC01	61	0.793	0.016	0.81		
Edge3 At 0cm	GSM850	6	1.316		1.32		
	GSM1900	74	1.065		1.07		
	WCDMA V	19	1.364		1.36		
	WCDMA IV	107	1.086		1.09		
	WCDMA II	90	0.85		0.85		
	CDMA BC0	51	1.443		1.44		
	CDMA BC01	62	1.023		1.02		
Edge4 At 0cm	GSM850	8	0.873		0.87		
	GSM1900	77	1.434		1.43		
	WCDMA V	34	0.796		0.80		
	WCDMA IV	109	1.483		1.48		
	WCDMA II	96	1.497		1.50		
	CDMA BC0	53	1.023		1.02		
	CDMA BC01	67	1.479		1.48		
Bottom Face At 1 cm	GSM850	15	1.062	0.016	1.08		
	GSM1900	84	0.725	0.016	0.74		
	WCDMA V	44	0.636	0.016	0.65		
	WCDMA IV	119	0.726	0.016	0.74		
	WCDMA II	104	0.692	0.016	0.71		
	CDMA BC0	60	0.584	0.016	0.60		
	CDMA BC01	70	0.575	0.016	0.59		



<Tablet PC mode>

WWAN + WLAN MIMO Antenna (DTS)

Position	WWAN			WLAN-DTS	Sum WWAN + WLAN (W/kg)	SPLSR ≤ 0.04	Case No
	WWAN Band	Plot No	Max. Reported SAR (W/kg)	Max. WLAN SAR (W/kg)			
Bottom Face At 0cm	GSM850	3	1.446	0.0082	1.45		
	GSM1900	71	0.963	0.0082	0.97		
	WCDMA V	18	1.489	0.0082	1.50		
	WCDMA IV	105	0.781	0.0082	0.79		
	WCDMA II	87	0.77	0.0082	0.78		
	CDMA BC0	47	1.432	0.0082	1.44		
Edge3 At 0cm	CDMA BC01	61	0.793	0.0082	0.80		
	GSM850	6	1.316		1.32		
	GSM1900	74	1.065		1.07		
	WCDMA V	19	1.364		1.36		
	WCDMA IV	107	1.086		1.09		
	WCDMA II	90	0.85		0.85		
Edge4 At 0cm	CDMA BC0	51	1.443		1.44		
	CDMA BC01	62	1.023		1.02		
	GSM850	8	0.873		0.87		
	GSM1900	77	1.434		1.43		
	WCDMA V	34	0.796		0.80		
	WCDMA IV	109	1.483		1.48		
Bottom Face At 1 cm	WCDMA II	96	1.497		1.50		
	CDMA BC0	53	1.023		1.02		
	CDMA BC01	67	1.479		1.48		
	GSM850	15	1.062	0.0082	1.07		
	GSM1900	84	0.725	0.0082	0.73		
	WCDMA V	44	0.636	0.0082	0.64		
Bottom Face At 1 cm	WCDMA IV	119	0.726	0.0082	0.73		
	WCDMA II	104	0.692	0.0082	0.70		
	CDMA BC0	60	0.584	0.0082	0.59		
	CDMA BC01	70	0.575	0.0082	0.58		



<Laptop mode>
WWAN + WLAN 2.4GHz

Position	WWAN				WLAN-DTS				Summation ⁽³⁾
	WWAN Band	Plot No	Max. Reported SAR (W/kg)	Reported SAR / 1.6	WLAN maximum rated power (dBm)	WLAN antenna gain (dBi)	⁽¹⁾ MPE estimation (mW/cm ²)	MPE estimation / MPE limit ⁽²⁾	
Bottom (0 cm gap)	GSM850	12	1.385	0.866	16.5	3.2	0.02	0.02	0.886
	GSM1900	80	0.928	0.580	16.5	3.2	0.02	0.02	0.600
	WCDMA V	37	1.208	0.755	16.5	3.2	0.02	0.02	0.775
	WCDMA IV	118	0.95	0.594	16.5	3.2	0.02	0.02	0.614
	WCDMA II	103	0.824	0.515	16.5	3.2	0.02	0.02	0.535
	CDMA BC0	58	1.473	0.921	16.5	3.2	0.02	0.02	0.941
	CDMA BC1	69	0.789	0.493	16.5	3.2	0.02	0.02	0.513

Note:

1. In WLAN module C2PC filing, bottom face SAR in laptop mode was not performed due to larger than 20cm separation distance. MPE estimation is at 20cm separation distance.
2. MPE limit for general population in 1.5GHz-100GHz is 1 mW/cm²
3. Per KDB 447498 D01v05, The [Σ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + [Σ of MPE ratios] is ≤ 1.0 , simultaneous transmission of mixed mobile and portable exposure conditions is compliant.



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] FCC OET Bulletin 65 (Edition 97-01) Supplement C (Edition 01-01), “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields”, June 2001
- [5] SPEAG DASY System Handbook
- [6] FCC KDB 447498 D01 v05, “Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies”, October 2012
- [7] FCC KDB 616217 D04 v01, “SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers”, October 2012
- [8] FCC KDB 941225 D01 v02, “SAR Measurement Procedures for 3G Devices – CDMA 2000 / Ev-Do / WCDMA / HSDPA / HSPA”, October 2007
- [9] FCC KDB 941225 D03 v01, “Recommended SAR Test Reduction Procedures for GSM / GPRS / EDGE”, December 2008