

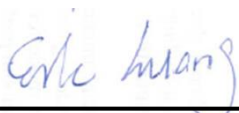
RF Exposure Evaluation Report

APPLICANT : Hewlett-Packard Company
EQUIPMENT : LTE Module
BRAND NAME : hp
MODEL NAME : ME936
FCC ID : B94-HWME936
STANDARD : FCC 47 CFR Part 2 (2.1093)
ANSI/IEEE C95.1-1992
IEEE 1528-2003

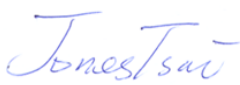
The product was installed into Notebook PC (Brand Name: hp, Model Name: TPN-Q166) during test.

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 / Deputy 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
FA560915-04	Rev. 01	Initial issue of report	Jul. 31, 2015



1. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for **Hewlett-Packard Company, LTE Module, ME936** are as follows.

Equipment Class	Highest SAR Summary	
	Body 1g SAR (W/kg)	Simultaneous Transmission 1g SAR (W/kg)
PCB	0.40	1.19

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 KDB publications.

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

Manufacturer	
Company Name	Huawei Technologies Co., Ltd.
Address	Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District Shenzhen, China



3. Guidance 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 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r03
- FCC KDB 865664 D02 SAR Reporting v01r01
- FCC KDB 447498 D01 General RF Exposure Guidance v05r02
- FCC KDB 616217 D04 SAR for laptop and tablets v01r01

4. Equipment Under Test (EUT)

4.1 General Information

Product Feature & Specification	
Equipment Name	LTE Module
Brand Name	hp
Model Name	ME936
FCC ID	B94-HWME936
IMEI Code	351850060009803
Wireless Technology and Frequency Range	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 IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 7: 2502.5 MHz ~ 2567.5 MHz
Mode	• GSM/GPRS/EGPRS • RMC/AMR 12.2Kbps • HSDPA • HSUPA • DC-HSDPA • LTE: QPSK, 16QAM
EUT Stage	Identical Prototype

Antenna Information						
Antenna 1 WNC	Main	Ant. Type	PIFA	Aux	Ant. Type	PIFA
		Model No.	DQ6R15GFH00		Model No.	DQ6R15GFH00
		Peak Gain	2.47(dBi)		Peak Gain	1.77(dBi)
Antenna 2 INPAQ	Main	Ant. Type	PIFA	Aux	Ant. Type	PIFA
		Model No.	DQ6LTE8LB00		Model No.	DQ6LTE8LB00
		Peak Gain	2.23(dBi)		Peak Gain	1.93(dBi)

Battery Option				
Battery 1	Brand Name	hp	Model Name	HSTNN-IB7G
	Power Rating	7.6Vdc, 4810mAh	Type	Li-ion

4.2 Maximum Tune-up Limit

Mode	Burst average power(dBm)	
	GSM 850	GSM 1900
GPRS (GMSK, 1 Tx slot)	33.50	30.50
GPRS (GMSK, 2 Tx slots)	31.50	28.50
GPRS (GMSK, 3 Tx slots)	30.50	27.50
GPRS (GMSK, 4 Tx slots)	28.50	25.50
EDGE (8PSK, 1 Tx slot)	28.00	27.00
EDGE (8PSK, 2 Tx slots)	26.00	25.00
EDGE (8PSK, 3 Tx slots)	25.00	24.00
EDGE (8PSK, 4 Tx slots)	23.00	22.00

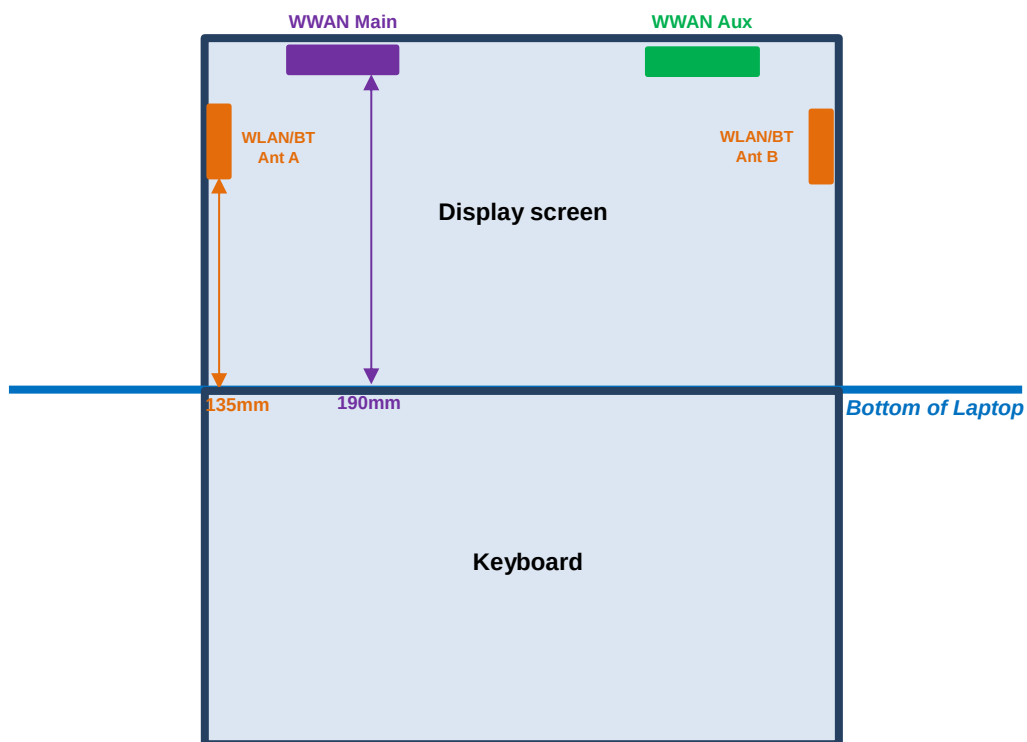
Mode	Average power(dBm)		
	WCDMA Band V	WCDMA Band II	WCDMA Band IV
RMC 12.2Kbps	24.50	24.50	24.50
HSDPA Subtest-1	24.50	24.50	24.50
DC-HSDPA Subtest-1	24.50	24.50	24.50
HSUPA Subtest-5	23.50	23.50	23.50

Mode		Average Power (dBm)
LTE	Band 17	24.00
	Band 13	24.00
	Band 5	24.00
	Band 4	24.00
	Band 2	24.00
	Band 7	24.00

**4.3 General LTE SAR Test and Reporting Considerations**

Summarized necessary items addressed in KDB 941225 D05 v02r03												
FCC ID			B94-HWME936									
Equipment Name			LTE Module									
Operating Frequency Range of each LTE transmission band			LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 05: 824.7 MHz ~ 848.3 MHz LTE Band 04: 1710.7 MHz ~ 1754.3 MHz LTE Band 02: 1850.7 MHz ~ 1909.3 MHz LTE Band 07: 2502.5 MHz ~ 2567.5 MHz									
Channel Bandwidth			LTE Band 17: 5MHz, 10MHz LTE Band 13: 5MHz, 10MHz LTE Band 05:1.4MHz, 3MHz, 5MHz, 10MHz LTE Band 04:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 02:1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE Band 07: 5MHz, 10MHz, 15MHz, 20MHz									
uplink modulations used			QPSK, and 16QAM									
LTE Voice / Data requirements			Data only									
LTE MPR permanently built-in by design			Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3									
			Modulation		Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)	
					1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz		
			QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1		
			16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1		
			16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2		
LTE A-MPR			In the base station simulator configuration, Network Setting value is set to NS_01 to disable A-MPR during SAR testing and the LTE SAR tests was transmitting on all TTI frames (Maximum TTI)									
Spectrum plots for RB configuration			A properly configured base station simulator was used for the SAR and power measurement; therefore, spectrum plots for each RB allocation and offset configuration are not included in the SAR report.									
Transmission (H, M, L) channel numbers and frequencies in each LTE band												
LTE Band 17												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq. (MHz)					
L	23755		706.5		23780		709					
M	23790		710		23790		710					
H	23825		713.5		23800		711					
LTE Band 13												
	Bandwidth 5 MHz				Bandwidth 10 MHz							
	Channel #		Freq.(MHz)		Channel #		Freq.(MHz)					
L	23205		779.5		23230		782					
M	23230		782									
H	23255		784.5									
LTE Band 5												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20407	824.7	20415	825.5	20425	826.5	20450	829				
M	20525	836.5	20525	836.5	20525	836.5	20525	836.5				
H	20643	848.3	20635	847.5	20625	846.5	20600	844				
LTE Band 4												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	19957	1710.7	19965	1711.5	19975	1712.5	20000	1715	20025	1717.5	20050	1720
M	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5	20175	1732.5
H	20393	1754.3	20385	1753.5	20375	1752.5	20350	1750	20325	1747.5	20300	1745
LTE Band 2												
	Bandwidth 1.4 MHz		Bandwidth 3 MHz		Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz	
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	18607	1850.7	18615	1851.5	18625	1852.5	18650	1855	18675	1857.5	18700	1860
M	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880	18900	1880
H	19193	1909.3	19185	1908.5	19175	1907.5	19150	1905	19125	1902.5	19100	1900
LTE Band 7												
	Bandwidth 5 MHz		Bandwidth 10 MHz		Bandwidth 15 MHz		Bandwidth 20 MHz					
	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)	Ch. #	Freq. (MHz)
L	20775	2502.5	20800	2505	20825	2507.5	20850	2510				
M	21100	2535	21100	2535	21100	2535	21100	2535	21100	2535		
H	21425	2567.5	21400	2565	21375	2562.5	21350	2560				

5. Antenna Location





<SAR test exclusion table>

General Note:

1. The below table, when the distance is < 50 mm exclusion threshold is "Ratio", when the distance is > 50 mm exclusion threshold is "mW"
2. Maximum power is the source-based time-average power and represents the maximum RF output power among production units
3. Per KDB 447498 D01v05r02, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
4. Per KDB 447498 D01v05r02, standalone SAR test exclusion threshold is applied; If the test separation distance is < 5mm, 5mm is used to determine SAR exclusion threshold.
5. Per KDB 447498 D01v05r02, 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
6. Per KDB 447498 D01v05r02, at 100 MHz to 6 GHz and for *test separation distances* > 50 mm, the SAR test exclusion threshold is determined according to the following
 - a) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · (f(MHz)/150)] mW, at 100 MHz to 1500 MHz
 - b) [Threshold at 50 mm in step 1) + (test separation distance - 50 mm) · 10] mW at > 1500 MHz and ≤ 6 GHz
7. According to KDB 447498 D01v05r02 exclusion threshold, the SAR testing is not necessary and the 0.4W/kg estimated SAR is applied to use conservative simultaneous transmission analysis.

Exposure Position	Wireless Interface	GPRS 850 Class 10	GPRS 1900 Class 10	WCDMA Band V	WCDMA Band IV	WCDMA Band II	LTE Band 17	LTE Band 13	LTE Band 5	LTE Band 4	LTE Band 2	LTE Band 7
	Calculated Frequency	848MHz	1909MHz	846MHz	1750MHz	1907MHz	713MHz	784MHz	848MHz	1754MHz	1909MHz	2570MHz
	Maximum power (dBm)	26.24	23.24	24.5	24.5	24.5	24.0	24.0	24.0	24.0	24.0	24.0
	Maximum rated power(mW)	421.0	211.0	282.0	282.0	282.0	251.0	251.0	251.0	251.0	251.0	251.0
Bottom of Laptop	Separation distance(mm)	190.0										
	exclusion threshold	954.0	1509.0	953.0	1513.0	1509.0	843.0	901.0	954.0	1513.0	1509.0	1494.0
	Testing required?	No	No	No	No	No	No	No	No	No	No	No

6. Simultaneous Transmission Analysis

NO.	Simultaneous Transmission Configurations	NB
		Body
1.	GPRS/EDGE(Data) + WLAN2.4GHz(data)	Yes
2.	WCDMA(Data) + WLAN2.4GHz(data)	Yes
3.	LTE(Data) + WLAN2.4GHz(data)	Yes
4.	GPRS/EDGE(Data) + Bluetooth(data)	Yes
5.	WCDMA(Data) + Bluetooth(data)	Yes
6.	LTE(Data) + Bluetooth(data)	Yes
7.	GPRS/EDGE(data) + WLAN5GHz(data)	Yes
8.	WCDMA(data) + WLAN5GHz(data)	Yes
9.	LTE(data) + WLAN5GHz(data)	Yes

General Note:

- The RTL8723BE / BCM943142Y / 3165NGW, WLAN/Bluetooth modules are also integrated into this host, and the RTL8723BE (FCC ID: TX2-RTL8723BE) and the BCM943142Y(FCC ID: QDA-BRCM1079) maximum power is small than original filing except Intel 3165NGW (FCC ID: PD93165NG), therefore, according to KDB447498 D01v05r02 test exclusion, the RTL8723BE and BCM43142Y SAR testing is not necessary and the maximum power please refer to Tune-up exhibit, the detail exclusion threshold calculated please see the below table.
- For the simultaneous transmission analysis with Intel 3165NGW, the SAR testing result is referred to RF Exposure Lab SAR report, FCC ID: PD93165NG, Report No.: SAR20150103.
- Per KDB 447498 D01v05r02, simultaneous transmission SAR is compliant if,
 - Scalar SAR summation $< 1.6\text{W/kg}$.
 - $\text{SPLSR} = (\text{SAR1} + \text{SAR2})^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x1-x2)^2 + (y1-y2)^2 + (z1-z2)^2]$, where $(x1, y1, z1)$ and $(x2, y2, z2)$ are the coordinates of the extrapolated peak SAR locations in the zoom scan.
 - If $\text{SPLSR} \leq 0.04$, simultaneously transmission SAR measurement is not necessary.
 - Simultaneously transmission SAR measurement, and the reported multi-band SAR $< 1.6\text{W/kg}$.

**<For RTL8723BE test exclusion>**

Exposure Position	Wireless Interface	Bluetooth	802.11b
	Calculated Frequency	2480MHz	2462MHz
	Maximum power (dBm)	8.5	16
	Maximum rated power(mW)	7.0	40.0
Bottom of Laptop	Separation distance(mm)	135.0	135.0
	exclusion threshold	946.0	946.0
	Testing required?	No	No

General Note:

- According the section5 antenna location the WLAN antenna to the bottom of laptop distance is 135mm.
- Per KDB 447498 D01v05r02, 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:
$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$
 for 1-g SAR and ≤ 7.5 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 D01v05r02, 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
- Per KDB 447498 D01v05r02, if SAR testing is not required, the 0.4W/kg estimated SAR is applied to use conservative simultaneous transmission analysis.

<For BCM43142Y test exclusion>

Exposure Position	Wireless Interface	802.11b	802.11b
	Calculated Frequency	2480MHz	2462MHz
	Maximum power (dBm)	-0.9	15.0
	Maximum rated power(mW)	1.0	32.0
Bottom of Laptop	Separation distance(mm)	135.0	135.0
	exclusion threshold	946.0	946.0
	Testing required?	No	No

General Note:

- According the section12 antenna location the WLAN antenna to the bottom of laptop distance is 135mm.
- Per KDB 447498 D01v05r02, 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:
$$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$$
 for 1-g SAR and ≤ 7.5 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 D01v05r02, 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
- Per KDB 447498 D01v05r02, if SAR testing is not required, the 0.4W/kg estimated SAR is applied to use conservative simultaneous transmission analysis.

**6.1 Body Exposure Conditions****<Sim-Tx Analysis with RTL8723BE>**

1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
WWAN	2.4GHz WLAN	Bluetooth		
Max 1g SAR (W/kg)	Max 1g SAR (W/kg)	Max 1g SAR (W/kg)		
0.400	0.400	0.400	0.80	0.80

<Sim-Tx Analysis with BCM43142Y>

1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
WWAN	2.4GHz WLAN	Bluetooth		
Max 1g SAR (W/kg)	Max 1g SAR (W/kg)	Max 1g SAR (W/kg)		
0.400	0.400	0.400	0.80	0.80

<Sim-Tx Analysis with 3165NGW>

1	2	3	1+2 Summed 1g SAR (W/kg)	1+3 Summed 1g SAR (W/kg)
WWAN	2.4GHz WLAN	Bluetooth		
Max 1g SAR (W/kg)	Max 1g SAR (W/kg)	Max 1g SAR (W/kg)		
0.400	0.790	0.130	1.19	0.53



7. 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 447498 D01 v05r02, "Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies", Feb 2014
- [6] FCC KDB 616217 D04 v01r01, "SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers", May 2013
- [7] FCC KDB 865664 D01 v01r03, "SAR Measurement Requirements for 100 MHz to 6 GHz", Feb 2014.
- [8] FCC KDB 865664 D02 v01r01, "RF Exposure Compliance Reporting and Documentation Considerations" May 2013.