TESTING CERT #3478.01

TEST REPORT

EUT Description	**WiGig / WLAN and BT , 2x2 PCIe M.2 2230 adapter card**
Brand Name	**Intel® Tri-Band Wireless-AC 18265**
Model Name	**18265NGW, 18265NGW LC**
Serial Number	**TA#: J30458-002** **WLAN MAC: 34.13.E8.34.58.40** **BT MAC: 34.13.E8.34.58.44** (see *section 4*)
FCC/IC ID	**FCC ID: PD918265NG** **IC ID: 1000M-18265NG**
Antenna type	**SkyCross WIMAX/WLAN Reference Antenna, Type PIFA**
Hardware/Software Version	**HW config: 33.1O** **Test SW: DRTU version: 1.9.0-03789 & 1.8.9-03293** **Op SW: 99.0.19.1**
Date of Sample Receipt	**2016-08-30**
Date of Test Start/End	**2016-09-07 / 2016-10-20**
Features	**802.11 a/b/g/n/ac Wireless LAN + BDR/EDR 2.1 + BLE 4.2** (see *section 7*)

Applicant	**Intel Mobile Communications**
Address	**100 Center Point Circle, Suite 200** **Columbia, South Carolina 29210** **United States**
Contact Person	**Steven Hackett**
Telephone/Fax/Email	**steven.c.hackett@intel.com**

Reference Standards	**FCC 47 CFR Part §2.1093** **RSS-102, Issue 5** (see *section 1*)	
RF Exposure Environment	**Portable devices - General population/uncontrolled exposure**	
	SAR Result	SAR Limit
Maximum SAR Result & Limit	**0.67 W/kg (1g)**	**1.6 W/kg (1g)**
Min. test separation distance	**13mm**	

Test Report number	**160830-01.TR47**
Revision Control	**Rev. 00**

The test results relate only to the samples tested.
The test report shall not be reproduced in full, without written approval of the laboratory.

Issued by	Reviewed by
Digitally signed by Mezouar Nasser Date: 2016.11.09 14:56:55 +01'00'	Digitally signed by Olivier FARGANT DN: cn=Olivier FARGANT, o=Intel Mobile Communications, ou=WRF Lab, email=olivier.fargant@intel.com, c=FR Date: 2016.11.09 20:34:25 +01'00'
Nasser MEZOUAR (Test Engineer)	Olivier FARGANT (Technical Manager)

Intel Mobile Communications France S.A.S – WRF Lab
425 rue de Goa – Le Cargo B6 – 06600, Antibes, France
Tel. +33493001400 / Fax +33493001401

Table of Contents

1. Standards, reference documents and applicable test methods

1. FCC 47 CFR Part §2.1093 - Radiofrequency radiation exposure evaluation: portable devices.
2. FCC OET KDB 248227 D01 v02r02 – SAR guidance for IEEE 802.11 (Wi-Fi) transmitters.
3. FCC OET KDB 447498 D01 v06 – RF exposure procedures and equipment authorization policies for mobile and portable devices.
4. FCC OET KDB 616217 D04 v01r02 – SAR Evaluation Considerations for Laptop, Notebook, Netbook and Tablet Computers.
5. FCC OET KDB 865664 D01 v01r04 – SAR Measurement Requirements for 100 MHz to 6 GHz.
6. FCC OET KDB 865664 D02 v01r02 – RF Exposure Compliance Reporting and Documentation Considerations.
7. IC RSS 102, Issue 5 – Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands).
8. IC Notice 2012-DRS0529 – SAR correction for measured conductivity and relative permittivity based on IEC 62209-2 standard.
9. IC Notice 2012-DRS1203 – Applicability of latest FCC RF Exposure KDB procedures (publication date October 24, 2012) and other procedures.
10. IC Notice 2013-DRS0911 – Latest publication of IEEE 1528-2013 and power exemption limits.
11. IEEE Std 1528-2013 – IEEE Recommended Practice Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communication Devices: Measurement Techniques.

2. General conditions, competences and guarantees

- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a testing laboratory accredited by the American Association for Laboratory Accreditation (A2LA).
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm listed by the FCC, with Designation Number FR0011.
- ✓ Intel Mobile Communications Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by IC, with IC Assigned Code 1000Y.
- ✓ Test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.
- ✓ Complete or partial reproduction of the report cannot be made without written permission of Intel WRF Lab.

3. Environmental Conditions

✓ All tests were performed in a laboratory with an environment which avoids influence on SAR measurements by ambient EM sources and any reflection from the environment itself, and the following limits were not exceeded during the tests:

Temperature	22ºC ± 2ºC
Humidity	45% ± 15%
Liquid Temperature	22ºC ± 2ºC

4. Test samples

Sample	Test Item #	Description	Model	Serial #	Date of reception
#01	160830-01.S15	Wireless Module	18265NGW	WFMAC: 34.13.E8.34.58.40 BTMAC: 34.13.E8.34.58.44	2016-08-30
	160830-01.S19	NGFF extender	PCDB00469	ASS00469-001 4694213-097	2016-09-02
	160830-01.S12	Laptop PC	Latitude E5420	CFVSWL1	-
	160321-01.S14	PCI Cable	Semtech	-	2016-04-14
	160321-01.S19	Reference Antenna	Sky-Cross	SN2	2016-05-13

✓ Sample #01 has undergone all the test(s) requested by the applicant, following the standards specified in section 1.

5. Remarks and comments

1. Only the plots for the test positions with the highest measured SAR per band/mode are included in *Annex C. Test System Plots*, as required per FCC OET KDB 865664 D02, paragraph 2.3.8.

6. Document Revision History

Revision #	Date	Modified by	Details
Rev. 00	2016-11-02	Rafael Quiroz	First Issue

7. Equipment Under Test

Brand Name	Intel® Tri Band Wireless-AC 18265
Model Name	18265NGW, 18265NGW LC
FCC/IC ID	FCC ID: PD918265NG IC ID: 1000M-18265NG
Software Version	1.9.0-03789 & 1.8.9-03293
Driver Version	99.0.19.1
Prototype / Production	Engineering sample
Exposure Conditions	Body worn
Supported Radios	2x2 802.11a/b/g/n/ac BDR/EDR 2.1 + BLE 4.2
Antenna Information	**Main WLAN:** PIFA antenna. WiFi 2.4GHz & 5GHz **Aux WLAN:** PIFA antenna. WiFi 2.4GHz & 5GHz & BT. See *Annex F. Photographs*.
Simultaneous Transmission Configurations	WLAN 5GHz Main + WLAN 5GHz Aux WLAN 5GHz Main + WLAN 5GHz Aux + BT Aux WLAN 5GHz Main + BT Aux WLAN 2.4GHz Main + WLAN 2.4GHz Aux WLAN 2.4GHz Main + WLAN 2.4GHz Aux + BT Aux WLAN 2.4GHz Main + BT Aux
Additional Information	No WWAN transmitter is considered in this report
	5.60-5.65 GHz band (TDWR) is supported by the device
	Band gap is supported by the device

Supported Radios

Mode	Duty Cycle	Modulation	Band	UL Freq Range (MHz)	Measured Max. Conducted Power (dBm)
802.11b/g/n	100%	BPSK QPSK 16QAM 64QAM	2.4GHz	2400-2483.5	20.28
802.11a/n/ac	100%	BPSK QPSK 16QAM 64QAM 256QAM	5.2GHz	5150-5250	NM*
			5.3GHz	5250-5350	20.30
			5.6GHz	5475-5725	20.30
			5.8GHz	5725-5850	20.25
BDR/EDR v2.1	77%	GFSK π/4 DQPSK 8DPSK	2.4GHz	2400-2483.5	11.84
Bluetooth LE v4.2	64%	GFSK	2.4GHz	2400-2483.5	8.99

*Not Measured

Maximum Output power specification + Tune up tolerance limit				Antenna	
Frequency	Equipment Class	Mode	BW [MHz]	Main [dBm]	Aux [dBm]
2.4GHz	DTS	802.11b	20	21.00	20.50
		802.11g	20	21.00	21.00
		802.11n20	20	20.50	21.00
		802.11n40	40	18.50	19.50
5.2GHz	UNII-1	802.11a	20	21.00	20.50
		802.11n20	20	20.50	20.50
		802.11n40	40	21.00	21.00
		802.11ac80	80	15.00	14.50
5.3GHz	UNII-2A	802.11a	20	20.50	20.00
		802.11n20	20	20.50	20.00
		802.11n40	40	20.50	20.50
		802.11ac80	80	13.00	12.50
5.6GHz	UNII-2C	802.11a	20	20.00	20.00
		802.11n20	20	21.00	20.50
		802.11n40	40	21.00	20.50
		802.11ac80	80	19.00	19.50
5.8GHz	UNII-3	802.11a	20	21.00	20.50
		802.11n20	20	21.00	20.00
		802.11n40	40	21.00	20.50
		802.11ac80	80	20.00	20.00
2.4GHz	BT	BT v4.2 BDR	20		12.00
		BT v4.2 EDR2	20		9.00
		BT v4.2 EDR3	20		9.00
		BLE	20		9.00

8. Test Verdicts summary

Mode	Band	Highest Reported SAR (1g) (W/kg)	Verdict
802.11b/g/n	DTS	0.54	P
802.11a/n/ac	UNII-2A	0.67	P
	UNII-2C	0.59	P
	UNII-3	0.53	P
Bluetooth	DSSS	0.06	P

P: Pass
F: Fail
NM: Not Measured
NA: Not Applicable

According to the FCC OET KDB 690783 D01, this is the summary of the values for the Grant Listing:

Highest Reported SAR (1g) (W/kg)			
Exposure Condition	Equipment Class		
	DTS	DSSS	UNII
Body Worn	0.54	0.06	0.67
Simultaneous Tx	Sum-SAR: 1.02	Sum-SAR: 0.73	Sum-SAR: 1.27

Considering the results of the performed test according to FCC 47CFR Part 2.1093 and IC RSS 102, Issue 5 the item under test is IN COMPLIANCE with the requested specifications specified in section *1. Standards, reference documents and applicable test methods.*

Annex A. Test & System Description

A.1 SAR Definition

Specific Absorption rate is defined as the time derivative of the incremental energy (dW) absorbed by (dissipated in) and incremental mass (dm) contained in a volume element (dV) of a given density (ρ).

$$SAR = \frac{d}{dt} \cdot \left(\frac{dW}{dm}\right) = \frac{d}{dt} \cdot \left(\frac{dW}{\rho \cdot dV}\right)$$

SAR is expressed in units of watts per kilogram (W/kg). SAR can be related to the electric field at a point by

$$SAR = \frac{\sigma |E|^2}{\rho}$$

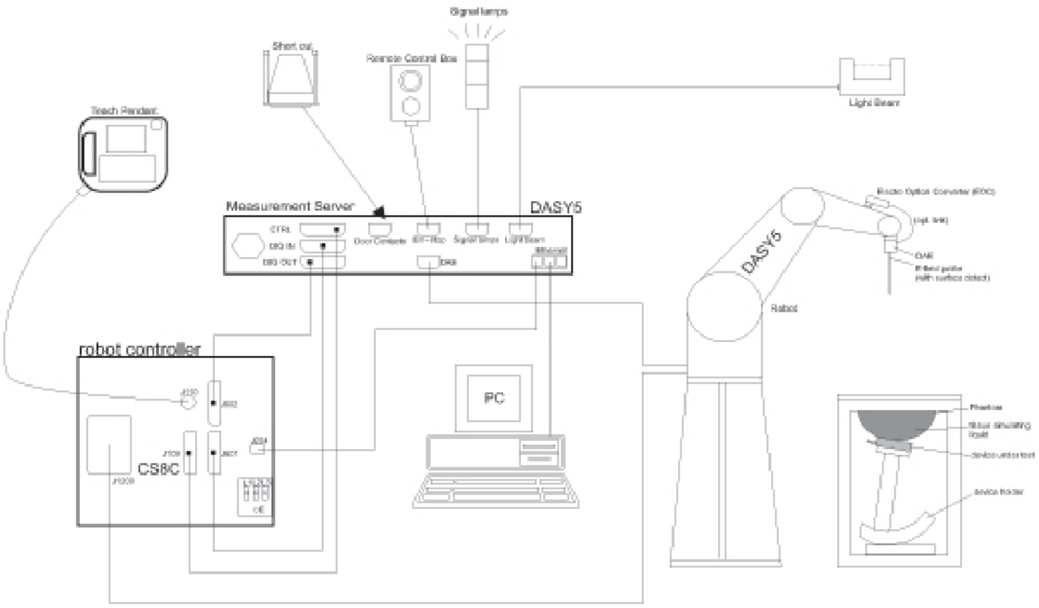
Where:

σ = Conductivity of the tissue (S/m)
ρ = Mass density of the tissue (kg/m3)
E = RMS electric field strength (V/m)

A.2 SPEAG SAR Measurement System

A.2.1 SAR Measurement Setup

The DASY5 system for performing compliance tests consists of the following items:



- ✓ A standard high precision 6-axis robot (Staübli TX/RX family) with controller, teach pendant and software. It includes an arm extension for accommodating the data acquisition electronics (DAE)
- ✓ An isotropic field probe optimized and calibrated for the targeted measurements.
- ✓ A data acquisition electronics (DAE) which performs the signal amplification, signal multiplexing, AD-conversion, offset measurements, mechanical surface detection, collision detection, etc. The unit is battery powered with standard or rechargeable batteries. The signal is optically transmitted to the EOC.
- ✓ The Electro-optical Converter (EOC) performs the conversion from optical to electrical signals for the digital communication to the DAE. The EOC signal is transmitted to the measurement server.
- ✓ The function of the measurement server is to perform the time critical tasks such as signal filtering, control of the robot operation and fast movements interrupts.
- ✓ The Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- ✓ A computer running Win7 professional operating system and the DASY5 software.
- ✓ Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- ✓ The phantom, the device holder and other accessories according to the targeted measurement.
- ✓ Tissue simulating liquid.
- ✓ System Validation dipoles.
- ✓ Network emulator or RF test tool

A.2.2 E-Field Measurement Probe

The probe is constructed using three orthogonal dipole sensors arranged on an interlocking, triangular prism core. The probe has built-in shielding against static charges and is contained within a PEEK cylindrical enclosure material at the tip.

The probe's characteristics are:

Frequency Range	30MHz – 6GHz
Length	337 mm
Probe tip external diameter	2.5 mm
Typical distance between dipoles and the probe tip	1 mm
Axial Isotropy (in human-equivalent liquids)	±0.3 dB
Hemispherical Isotropy (in human-equivalent liquids)	±0.5 dB
Linearity	±0.2 dB
Maximum operating SAR	100 W/kg
Lower SAR detection threshold	0.001 W/kg

A.2.3 SAM Phantom

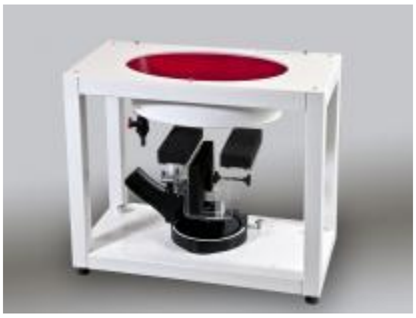
The shell corresponds to the specifications of the Specific Anthropomorphic Mannequin (SAM) phantom defined in IEEE 1528 and IEC 62209-1. It enables the dosimetric evaluation of left and right hand phone usage as well as body mounted usage at the flat phantom region. A cover prevents evaporation of the liquid. Reference markings on the phantom allow the complete setup of all predefined phantom positions and measurement grids by teaching three points with the robot.

The phantom's characteristics are:

Material	Vinylester, glass fiber reinforced (VE-GF)
Shell thickness	2 mm ± 0.2 mm
Shell thickness at ERP	6 ± 0.2 mm
Filling volume	25 Liters
Dimensions	Length: 1000mm / Width: 500mm

A.2.4 Flat Phantom

Phantom for compliance testing of handheld and body-mounted wireless devices in the frequency range of 30 MHz to 6 GHz. ELI is fully compatible with the IEC 62209-2 standard and all known tissue simulating liquids. ELI has been optimized regarding its performance and can be integrated into our standard phantom tables. A cover prevents evaporation of the liquid. Reference markings on the phantom allow installation of the complete setup, including all predefined phantom positions and measurement grids, by teaching three points. The phantom is compatible with all SPEAG dosimetric probes and dipoles.



The phantom's characteristics are:

Material	Vinylester, glass fiber reinforced (VE-GF)
Shell thickness	2 mm ± 0.2 mm
Filling volume	30 Liters approx.
Dimensions	Major axis: 600mm / Minor axis: 400mm

A.2.5 Device Positioner

The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of 0.5 mm would produce a SAR uncertainty of 20%. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

The DASY device holder is designed to cope with the different positions given in the standard. It has two scales for device rotation (with respect to the body axis) and device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (ERP). Thus the device needs no repositioning when changing the angles.

The DASY device holder is constructed of low-loss POM material having the following dielectric parameters: relative permittivity ε=3 and loss tangent δ=0.02. The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.

A simple but effective and easy-to-use extension for the Mounting Device; facilitates testing of larger devices according to IEC 62209-2 (e.g., laptops, cameras, etc.); lightweight and fits easily on the upper part of the Mounting Device in place of the phone positioner. The extension is fully compatible with the Twin SAM, ELI and other Flat Phantoms.

A.3 Data Evaluation

- **Power Reference measurement**

The robot measures the E field in a specified reference position that can be either the selected section's grid reference point or a user point in this section at 4mm of the inner surface of the phantom, 2mm for frequencies above 3GHz.

- **Area Scan**

Measurement procedures for evaluating SAR from wireless handsets typically start with a coarse measurement grid to determine the approximate location of the local peak SAR values. This is known as the area-scan procedure. The SAR distribution is scanned along the inside surface of one side of the phantom head, at least for an area larger than the projection of the handset and antenna. The distance between the measured points and phantom surface should be less than 8 mm, and should remain constant (with variation less than ± 1 mm) during the entire scan in order to determine the locations of the local peak SAR with sufficient accuracy. The angle between the probe axis and the surface normal line is recommended but not required to be less than 30°. If this angle is larger than 30° and the closest point on the probe-tip housing to the phantom surface is closer than a probe diameter, the boundary effect may become larger and polarization dependent. This additional uncertainty needs to be analyzed and accounted for. To achieve this, modified test procedures and additional uncertainty analyses not described in this recommended practice may be required. The measurement and interpolation point spacing should be chosen such as to allow identification of the local peak locations to within one-half of the linear dimension of a side of the zoom-scan volume. Because a local peak having specific amplitude and steep gradients may produce a lower peak spatial-average SAR compared to peaks with slightly lower amplitude and less steep gradients, it is necessary to evaluate these other peaks as well. However, since the spatial gradients of local SAR peaks are a function of the wavelength inside the tissue-equivalent liquid and the incident magnetic field strength, it is not necessary to evaluate local peaks that are less than 2 dB or more below the global maximum peak. Two-dimensional spline algorithms (Brishoual et al. 2001; Press et al., 1996) are typically used to determine the peaks and gradients within the scanned area. If a peak is found at a distance from the scan border of less than one-half the edge dimension of the desired 1 g or 10 g cube, the measurement area should be enlarged if possible.

- **Zoom Scan**

To evaluate the peak spatial-average SAR values for 1 g or 10 g cubes, fine resolution volume scans, called zoom scans, are performed at the peak SAR locations identified during the area scan. The minimum zoom scan volume size should extend at least 1.5 times the edge dimension of a 1 g cube in all directions from the center of the scan volume, for both 1 g and 10 g peak spatial-average SAR evaluations. Along the phantom curved surfaces, the front face of the volume facing the tissue/liquid interface conforms to the curved boundary, to ensure that all SAR peaks are captured. The back face should be equally distorted to maintain the correct averaging mass. The flatness and orientation of the four side faces are unchanged from that of a cube whose orientation is within ± 30° of the line normal to the phantom at the center of the cube face next to the phantom surface. The peak local SAR locations that were determined in the area scan (interpolated values) should be used for the centers of the zoom scans. If a scan volume cannot be centered due to proximity of a phantom shape feature, the probe should be tilted to allow scan volume enlargement. If probe tilt is not feasible, the zoom-scan origin may be shifted, but not by more than half of the 1 g or 10 g cube edge dimension.

After the zoom-scan measurement, extrapolations from the closest measured points to the surface, for example along lines parallel to the zoom-scan centerline, and interpolations to a finer resolution between all measured and extrapolated points are performed. Extrapolation algorithm considerations are described in 6.5.3, and 3-D spline methods (Brishoual et al., 2001; Kreyszig, 1983; Press et al., 1996) can be used for interpolation. The peak spatial-average SAR is finally determined by a numerical averaging of the local SAR values in the interpolation grid, using for example a trapezoidal algorithm for the integration (averaging).

In some areas of the phantom, such as the jaw and upper head regions, the angle of the probe with respect to the line normal to the surface may be relatively large, e.g., greater than ± 30º, which could increase the boundary effect error to a larger level. In these cases, during the zoom scan a change in the orientation of the probe, the phantom, or both is recommended but not required for the duration of the zoom scan, so that the angle between the probe axis and the line normal to the surface is within 30º for all measurement points.

- **Power Drift measurement**

The robot re-measures the E-Field in the same reference location measured at the Power Reference. The drift measurement gives the field difference in dB from the first to the last reference reading. This allows a user to monitor the power drift of the device under test that must remain within a maximum variation of ±5%.

- **Post-processing**

The procedure for spatial peak SAR evaluation has been implemented according to the IEEE1528 and IEC 62209-1/2 standards. It can be conducted for 1g and 10g.

The software allows evaluations that combine measured data and robot positions, such as:

- ✓ Maximum search
- ✓ Extrapolation
- ✓ Boundary correction
- ✓ Peak search for averaged SAR

Interpolation between the measured points is performed when the resolution of the grid is not fine enough to compute the average SAR over a given mass.

Extrapolation routines are used to obtain SAR values between the lowest measurement points and the inner phantom surface. The extrapolation is determined by the surface detection distance and the probe sensor offset. Several measurements at different distances are necessary for the extrapolation.

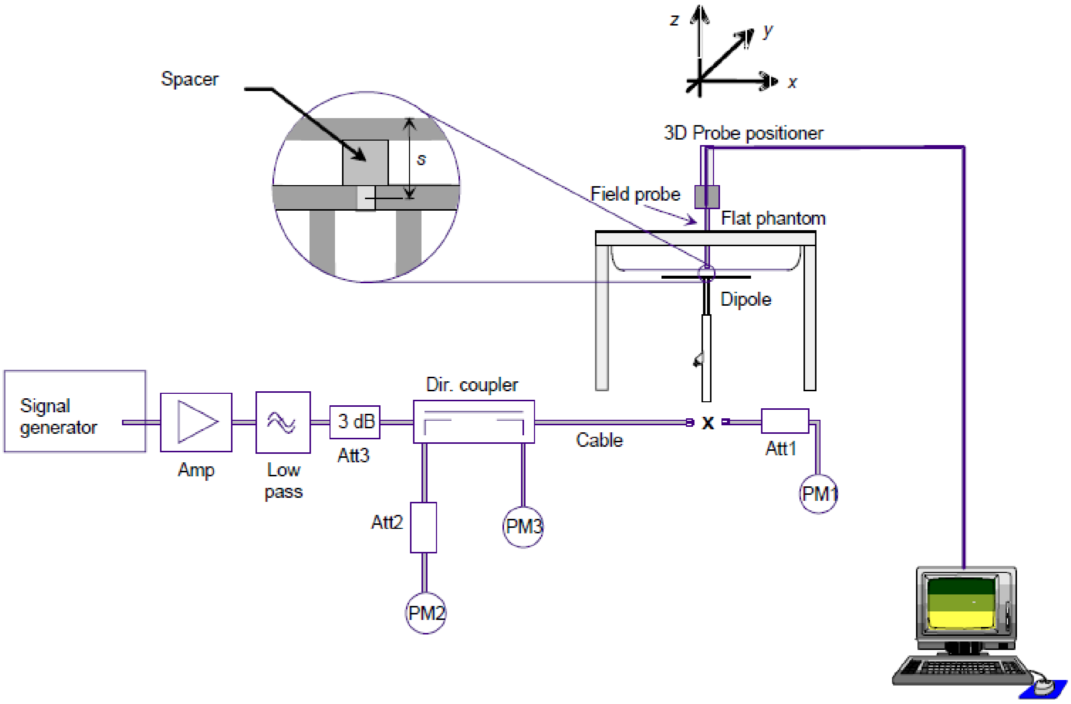
A.4 System and Liquid Check

A.4.1 System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results.

The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. This setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

In the simplified setup for system check, the EUT is replaced by a calibrated dipole and the power source is replaced by a controlled continuous wave generated by a signal generator. The calibrated dipole must be placed beneath the flat phantom section of the phantom at the correct distance.



The equipment setup is shown below:

- ✓ Signal Generator
- ✓ Amplifier
- ✓ Directional coupler
- ✓ Power meter
- ✓ Calibrated dipole

The output power on dipole port must be set to 20dBm (100mW) and SAR results are normalized to a forward power of 1W to compare the values with the calibration reports results as described at IEEE 1528 and IEC 62209 standards.

A.4.2 Liquid Check

The dielectric parameters check is done prior to the use of the tissue simulating liquid. The verification is made by comparing the relative permittivity and conductivity to the values recommended by the applicable standards.

The liquid verification was performed using the following test setup:

- ✓ VNA (Vector Network Analyzer)
- ✓ Open-Short-Load calibration kit
- ✓ RF Cable
- ✓ Open-Ended Coaxial probe
- ✓ DAK software tool
- ✓ SAR Liquid
- ✓ De-ionized water
- ✓ Thermometer

These are the target dielectric properties of the tissue-equivalent liquid material as defined in FCC OET KDB 865664 D01.

Frequency	Body SAR	
(MHz)	ε_r	σ (S/m)
150	61.9	0.80
300	58.2	0.92
450	56.7	0.94
835	55.2	0.97
900	55.0	1.05
1450	54.0	1.30
1800-2000	53.3	1.52
2450	52.7	1.95
3000	52.0	2.73
5800	48.2	6.00

(ε_r = relative permittivity, σ = conductivity and ρ = 1000 kg/m3)

The measurement system implement a SAR error compensation algorithm as documented in IEEE Std 1528-2013 (equivalent to draft standard IEEE P1528-2011) to automatically compensate the measured SAR results for deviations between the measured and required tissue dielectric parameters (applied to only scale up the measured SAR, and not downward) so, according to FCC OET KDB 865664 D01, the tolerance for ε_r and σ may be relaxed to ± 10%.

A.5 Test Equipment List

SPEAG SAR System 2

ID	Device	Type/Model	Serial Number	Manufacturer	Calibration Date	Calibration Due
0236	Dosimetric E-field Probe	EX3DV4	3978	SPEAG	2016-06-21	2017-06-21
0242	Data Acquisition Electronics	DAE4	1429	SPEAG	2016-06-16	2017-06-16
0456	Electro-Optical Converter	EOC60	1098	SPEAG	NA	NA
0459	Light Beam Unit	SE UKS 030 AA	-	Di-soric	NA	NA
0451	6-axis Robot	TX60 L	F16/55FXA1/A/01	STAÜBLI	NA	NA
0453	Robot Controller	CS8C	F16/55FXA1/C/01	STAÜBLI	NA	NA
0455	Measurement Server	DASY6 SE UMS 028 BB	1489	SPEAG	NA	NA
0221	SAM Phantom	Twin SAM v5.0	1838	SPEAG	NA	NA
0460	Oval Flat Phantom	ELI v8.0	2048	SPEAG	NA	NA
0464	Handset Positioner	SD 000 H01 KA	-	SPEAG	NA	NA
0462	Measurement SW	DASY52	v52.8.8.1258	SPEAG	NA	NA
0225	Post processing SW	SEMCAD X	v14.6.10	SPEAG	NA	NA

Shared Instrumentation

ID	Device	Type/Model	Serial Number	Manufacturer	Calibration Date	Calibration Due Date
0398	Temperature & Humidity Logger	TR-72NW-H + HHA-3151	Logger: 62180216 / Sensor: 0202622A	TandD	2016-02-01	2018-02-01
0099	USB Power Sensor	NRP-Z81	102278	R&S	2015-09-10	2017-09-10
0098	USB Power Sensor	NRP-Z81	102279	R&S	2015-09-10	2017-09-10
0114	Vector Signal Generator	ESG E4438C	MY45092885	Agilent	NA	NA
0239	2450MHz System Validation Dipole	D2450V2	937	SPEAG	2016-06-22	2018-06-22
0124	5GHz System Validation Dipole	D5GHzv2	1164	SPEAG	2015-06-18	2017-06-18
0230	Vector Reflectometer	PLANAR R140	0131013	Copper Mountain Technologies	2015-06-08	2018-06-08
0237	Dielectric Probe Kit	DAKS-3.5	1037	SPEAG	2016-06-14	2018-06-14
0408	Thermometer	TESTO 922	33622932	Testo	2015-09-29	2017-09-29
0170	Power Amplifier	SAM-01	151922	ETS-Lindgren	NA	NA
0412	Coupler	CD0.5-8-20-30	1251-002	Amd-group	NA	NA

Tissue Simulant Liquids

TSL	Manufacturer / Model	Freq Range (MHz)	Main Ingredients
Body WideBand	SPEAG MBBL600-6000V6 Batch 160603-01	600-6000	Ethanediol, Sodium petroleum sulfonate, Hexylene Glycol / 2-Methyl-pentane-2.4-diol, Alkoxylated alcohol

A.6 Measurement Uncertainty Evaluation

DASY5 Uncertainty Budget According to IEEE 1528-2013 and IEC 62209-1/2011 (3 - 6 GHz range)								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) veff
Measurement System								
Probe Calibration	±6.55 %	N	1	1	1	±6.55 %	±6.55 %	∞
Axial Isotropy	±4.7 %	R	√3	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	√3	0.7	0.7	±3.9 %	±3.9 %	∞
Boundary Effects	±2.0 %	R	√3	1	1	±1.2 %	±1.2 %	∞
Linearity	±4.7 %	R	√3	1	1	±2.7 %	±2.7 %	∞
System Detection Limits	±1.0 %	R	√3	1	1	±0.6 %	±0.6 %	∞
Modulation Responsem	±2.4 %	R	√3	1	1	±1.4 %	±1.4 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	√3	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	√3	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	√3	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	√3	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.8 %	R	√3	1	1	±0.5 %	±0.5 %	∞
Probe Positioning	±6.7 %	R	√3	1	1	±3.9 %	±3.9 %	∞
Max. SAR Eval.	±4.0 %	R	√3	1	1	±2.3 %	±2.3 %	∞
Test Sample Related								
Device Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Power Drift	±5.0 %	R	√3	1	1	±2.9 %	±2.9 %	∞
Power Scaling	±0 %	R	√3	1	1	±0.0 %	±0.0 %	∞
Phantom and Setup								
Phantom Uncertainty	±6.6 %	R	√3	1	1	±3.8 %	±3.8 %	∞
SAR correction	±1.9 %	R	√3	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.)DAK	±2.5 %	R	√3	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.) DAK	±2.5 %	R	√3	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity BB	±3.4 %	R	√3	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity BB	±0.4 %	R	√3	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±12.3 %	±12.2 %	748
Expanded STD Uncertainty						**±24.6 %**	**±24.5 %**	

SPEAG System Uncertainty budget (IEEE 1528-2013 & IEC 62209-1:2011)

DASY5 Uncertainty Budget According to IEC 62209-2/2010 [3] (30 MHz - 6 GHz range)								
Error Description	Uncert. value	Prob. Dist.	Div.	(ci) 1g	(ci) 10g	Std. Unc. (1g)	Std. Unc. (10g)	(vi) veff
Measurement System								
Probe Calibration	±6.55 %	N	1	1	1	±6.55 %	±6.55 %	∞
Axial Isotropy	±4.7 %	R	√3	0.7	0.7	±1.9 %	±1.9 %	∞
Hemispherical Isotropy	±9.6 %	R	√3	0.7	0.7	±3.9 %	±3.9 %	∞
Linearity	±4.7 %	R	√3	1	1	±2.7 %	±2.7 %	∞
Modulation Response	±2.4 %	R	√3	1	1	±1.4 %	±1.4 %	∞
System Detection Limits	±1.0 %	R	√3	1	1	±0.6 %	±0.6 %	∞
Boundary Effects	±2.0 %	R	√3	1	1	±1.2 %	±1.2 %	∞
Readout Electronics	±0.3 %	N	1	1	1	±0.3 %	±0.3 %	∞
Response Time	±0.8 %	R	√3	1	1	±0.5 %	±0.5 %	∞
Integration Time	±2.6 %	R	√3	1	1	±1.5 %	±1.5 %	∞
RF Ambient Noise	±3.0 %	R	√3	1	1	±1.7 %	±1.7 %	∞
RF Ambient Reflections	±3.0 %	R	√3	1	1	±1.7 %	±1.7 %	∞
Probe Positioner	±0.8 %	R	√3	1	1	±0.5 %	±0.5 %	∞
Probe Positioning	±6.7 %	R	√3	1	1	±3.9 %	±3.9 %	∞
Post-processing	±4.0 %	R	√3	1	1	±2.3 %	±2.3 %	∞
Test Sample Related								
Device Holder	±3.6 %	N	1	1	1	±3.6 %	±3.6 %	5
Test sample Positioning	±2.9 %	N	1	1	1	±2.9 %	±2.9 %	145
Power Scaling	±0 %	R	√3	1	1	±0.0 %	±0.0 %	∞
Power Drift	±5.0 %	R	√3	1	1	±2.9 %	±2.9 %	∞
Phantom and Setup								
Phantom Uncertainty	±7.9 %	R	√3	1	1	±4.4 %	±4.4 %	∞
SAR correction	±1.9 %	R	√3	1	0.84	±1.1 %	±0.9 %	∞
Liquid Conductivity (mea.)DAK	±2.5 %	R	√3	0.78	0.71	±1.1 %	±1.0 %	∞
Liquid Permittivity (mea.) DAK	±2.5 %	R	√3	0.26	0.26	±0.3 %	±0.4 %	∞
Temp. unc. - Conductivity BB	±3.4 %	R	√3	0.78	0.71	±1.5 %	±1.4 %	∞
Temp. unc. - Permittivity BB	±0.4 %	R	√3	0.23	0.26	±0.1 %	±0.1 %	∞
Combined Std. Uncertainty						±12.5 %	±12.4 %	748
Expanded STD Uncertainty						**±25.1 %**	**±25.0 %**	

SPEAG System Uncertainty budget (IEC 62209-2:2010)

A.7 RF Exposure Limits

SAR assessments have been made in line with the requirements of FCC 47 CFR Part §2.1093 and RSS 102, Issue 5 on the limitation of exposure of the general population / uncontrolled exposure for portable devices.

Exposure Type	General Population / Uncontrolled Environment
Peak spatial-average SAR (averaged over any 1 gram of tissue)	**1.6 W/kg**
Whole body average SAR	**0.08 W/kg**
Peak spatial-average SAR (extremities) (averaged over any 10 grams of tissue)	**4.0 W/kg**

Annex B. Test Results

B.1 Test Conditions

B.1.1 SAR Test positions relative to the phantom

The device under test was the Intel® Tri-Band Wireless-AC 18265 card using a SkyCross Electronics antenna as reference antenna. The transmitter was placed more than 10cm away from the phantom to avoid interferences, and using a host laptop to control it.

The card was operated utilizing proprietary software (DRTU version 1.9.0-03789) and each channel was measured using a broadband power meter to determine the maximum average power.

All six sides of the antenna were tested for SAR compliance with the antenna placed at 13mm beneath the phantom. The adjacent edges of the antenna were positioned perpendicular to the phantom.

Considering the antenna sides in *Annex F*, the surfaces/edges to be measured for each antenna are:

Position	Distance	Antenna	
		Main	Aux
	13mm	• Back face • Front face • Top edge • Bottom edge • Right edge • Left edge	• Back face • Front face • Top edge • Bottom edge • Right edge • Left edge

B.1.2 Test signal, Output power and Test Frequencies

The device was put into operation by using an own control software (DRTU version 1.9.0-03789) to program the test mode required for select the continuous transmission with 100% duty cycle for WLAN testing and the relative measured one for BT and BLE

The output power of the device was set to transmit at maximum power for all tests.

B.1.3 Evaluation Exclusion and Test Reductions

SAR test reduction

General SAR test reduction

According to FCC OET KDB 447498 D01, testing of other required channels within the operating mode of a frequency band is not required when the reported 1-g or 10-g SAR for the mid-band or highest output power channel is:

- ≤ 0.8 W/kg or 2.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≤ 100 MHz
- ≤ 0.6 W/kg or 1.5 W/kg, for 1-g or 10-g respectively, when the transmission band is between 100 MHz and 200 MHz
- ≤ 0.4 W/kg or 1.0 W/kg, for 1-g or 10-g respectively, when the transmission band is ≥ 200 MHz

WLAN SAR Test reduction

Transmission Mode	SAR test exclusion/reduction
DSSS	According to FCC OET KDB 248227 D01, SAR is measured for 2.4 GHz 802.11b, SAR test reduction is determined according to the following: ▪ When the reported SAR of the highest measured maximum output power channel for the exposure configuration is ≤ 0.8 W/kg, no further SAR testing is required for 802.11b DSSS in that exposure configuration. ▪ When the reported SAR is > 0.8 W/kg, SAR is required for that exposure configuration using the next highest measured output power channel. When any reported SAR is > 1.2 W/kg, SAR is required for the third channel. According to FCC OET KDB 248227 D01, SAR is not required for 2.4 GHz OFDM conditions when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg.
OFDM	According to FCC OET KDB 248227 D01, 802.11a/g/n/ac modes have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac or 802.11g is chosen over 802.11n. According to FCC OET KDB 248227 D01, an *initial test configuration* is determined for OFDM and DSSS transmission modes according to the channel bandwidth, modulation and data rate combination(s) with the highest maximum output power specified for production units in each standalone and aggregated frequency band. SAR is measured using the highest measured maximum output power channel. SAR test reduction for subsequent highest output test channels is determined according to reported SAR of the initial test configuration. The *initial test configuration* for 5 GHz OFDM transmission modes is determined by the 802.11 configuration with the highest maximum output power specified for production units, including tune-up tolerance, in each standalone and aggregated frequency band. SAR for the initial test configuration is measured using the highest maximum output power channel determined by the default power measurement procedures. According to FCC OET KDB 248227 D01, when the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until reported SAR is ≤ 1.2 W/kg or all required channels are tested.

B.2 Conducted Power Measurements

B.2.1 WLAN 2.4GHz (DTS)

Band	Mode Data Rate	Ch #	Freq [MHz]	Main Avg Pwr [dBm]	Main Tune-up Pwr[dBm]	Aux Avg Pwr [dBm]	Aux Tune-up Pwr [dBm]	SAR Test?
2.4GHz (DTS)	802.11b 1Mbps	1	2412	18.49	18.50	19.00	19.00	Yes
		6	2437	**20.23**	21.00	20.19	20.50	
		11	2462	NR[1]	17.50	17.50	17.50	
	802.11g 6Mbps	1	2412		19.00	19.00	19.00	Yes
		6	2437		21.00	**20.28**	21.00	
		11	2462		18.50	NR[1]	18.50	No[2]
	802.11n20 HT0	1	2412		18.00		18.50	
		6	2437		20.50		21.00	
		11	2462		16.00		16.00	
	802.11n40 HT0	3	2422		18.50		19.50	No[2]
		6	2437		18.50		18.00	
		9	2452		17.00		17.00	

Initial test configuration

1. NR: Not Required
2. As per FCC OET KDB 248227 D01, conducted output power and SAR testing are not required for 802.11g/n20/n40 channels when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2W/kg.

B.2.2 WLAN 5GHz (UNII)

5.2GHz and 5.3GHz (UNII-1 and UNII-2A)

Band	Mode Data Rate	Ch #	Freq [MHz]	Main Avg Pwr [dBm]	Main Tune-up Pwr [dBm]	Aux Avg Pwr [dBm]	Aux Tune-up Pwr [dBm]	SAR Test?
5.2GHz (UNII-1)	802.11a 6Mbps	36	5180	NR[1]	19.00	NR[1]	19.00	No[2]
		40	5200		21.00		20.00	
		44	5220		21.00		20.00	
		48	5240		19.50		20.50	
	802.11n20 HT0	36	5180		18.50		19.00	
		40	5200		20.50		20.00	
		44	5220		20.50		20.00	
		48	5240		19.50		20.50	
	802.11n40 HT0	38	5190		16.00		17.00	
		46	5230		21.00		21.00	
	802.11ac80 VHT0	42	5210		15.00		14.50	

Initial test configuration

1. NR: Not Required
2. When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band (see §B.5.2 in this document).

Band	Mode Data Rate	Ch #	Freq [MHz]	Main Avg Pwr [dBm]	Main Tune-up Pwr [dBm]	Aux Avg Pwr [dBm]	Aux Tune-up Pwr [dBm]	SAR Test?
5.3GHz (UNII-2A)	802.11a 6Mbps	52	5260	NR[1]	20.50	NR[1]	20.00	No[2,3]
		56	5280		20.00		20.00	
		60	5300		20.00		20.00	
		64	5320		18.50		18.50	
	802.11n20 HT0	52	5260		20.50		20.00	No[2,3]
		56	5280		19.00		20.00	
		60	5300		20.00		20.00	
		64	5320		18.50		18.50	
	802.11n40 HT0	54	5270	**20.30**	20.50	**20.22**	20.50	Yes
		62	5310	NR[1]	13.50	NR[1]	13.50	No[2,3]
	802.11ac80 VHT0	58	5290		13.00		12.50	

Initial test configuration

1. NR: Not Required
2. When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, lowest order 802.11 mode is selected (i.e. a, g, n, then ac)
3. According to FCC OET KDB 248227 D01 v02r02, when the reported SAR of the initial test configuration is < 0.8 W/kg, SAR measurement is not required for subsequent configuration

5.6GHz (UNII-2C)

Band	Mode Data Rate	Ch #	Freq [MHz]	Main Avg Pwr [dBm]	Main Tune-up Pwr [dBm]	Aux Avg Pwr [dBm]	Aux Tune-up Pwr [dBm]	SAR Test?
5.6GHz (UNII-2C)	802.11a 6Mbps	100	5500	NR[1]	17.00	NR[1]	17.50	No[3,4]
		104	5520		17.00		17.50	
		108	5540		17.00		17.50	
		112	5560		17.00		17.50	
		116	5580		20.00		20.00	
		120	5600		20.00		20.00	
		124	5620		20.00		20.00	
		128	5640		20.00		20.00	
	802.11n20 HT0	100	5500		17.00		17.50	No[3,4]
		104	5520		17.00		17.50	
		108	5540		17.00		17.50	
		112	5560		17.00		17.50	
		116	5580		21.00		20.50	
		120	5600		21.00		20.50	
		124	5620		20.00		20.00	
		128	5640		20.00		20.00	
	802.11n40 HT0	102	5510	NR[1]	15.50	NR[1]	14.00	Yes
		110	5550	20.20	21.00	20.16	20.50	
		118	5590	20.20	21.00	20.30	20.50	
		126	5630	**20.25**	21.00	**20.30**	20.50	
	802.11ac80 VHT0	106	5530	NR[1]	14.00	NR[1]	13.50	No[3,4]
		122	5610		19.00		19.50	

Initial test configuration

1. NR: Not Required
2. When band gap channels between UNII-2C and UNII-3 band are supported channels in UNII-2C band below 5.65 GHz are considered as one band and channels above 5.65 GHz, together with channels in 5.8 GHz U-NII-3 or §15.247 band, are considered as a separate band
3. When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, lowest order 802.11 mode is selected (i.e. a, g, n, then ac)
4. According to FCC OET KDB 248227 D01 v02r02, when the reported SAR of the initial test configuration is < 0.8 W/kg, SAR measurement is not required for subsequent configuration

5.6GHz and 5.8GHz (UNII-3)

Band	Mode Data Rate	Ch #	Freq [MHz]	Main Avg Pwr [dBm]	Main Tune-up Pwr [dBm]	Aux Avg Pwr [dBm]	Aux Tune-up Pwr [dBm]	SAR Test?
5.6-5.8GHz (UNII-3)	802.11a 6Mbps	132	5660	NR[1]	20.00	NR[1]	20.00	No[3,4]
		136	5680		20.00		20.00	
		140	5700		18.50		17.00	
		149	5745		20.50		20.00	
		153	5765		20.00		20.00	
		157	5785		20.00		20.50	
		161	5805		20.00		20.00	
		165	5825		21.00		20.00	
	802.11n20 HT0	132	5660		20.00		20.00	No[3,4]
		136	5680		20.00		20.00	
		140	5700		18.50		17.00	
		149	5745		20.00		20.00	
		153	5765		20.00		20.00	
		157	5785		20.00		20.00	
		161	5805		20.00		20.00	
		165	5825		21.00		19.50	
	802.11n40 HT0	134	5670		18.00		17.50	
		151	5755	19.50	19.50	20.00	20.00	Yes
		159	5795	**20.25**	21.00	**20.22**	20.50	
	802.11ac80 VHT0	138	5690	20.00	20.00	19.98	20.00	
		155	5795	NR[1]	17.00	NR[1]	17.50	No[3]

Initial test configuration

1. NR: Not Required
2. When band gap channels between UNII-2C and UNII-3 band are supported channels in UNII-2C band below 5.65 GHz are considered as one band and channels above 5.65 GHz, together with channels in 5.8 GHz U-NII-3 or §15.247 band, are considered as a separate band
3. When multiple transmission modes (802.11a/g/n/ac) have the same specified maximum output power, largest channel bandwidth, lowest order modulation and lowest data rate, lowest order 802.11 mode is selected (i.e. a, g, n, then ac)
4. When the reported SAR of the initial test configuration is > 0.8 W/kg, SAR measurement is required for subsequent next highest measured output power channel(s) in the initial test configuration until reported SAR is ≤ 1.2 W/kg or all required channels are tested.

B.2.3 Bluetooth

Band	Mode	Data Rate	Channel	Frequency (MHz)	Antenna	Avg Pwr [dBm])	Max output Pwr [dBm])
2.4GHz	Bluetooth v4.2	Basic rate GFSK	0	2402	Aux	11.82	12.00
			39	2441		**11.84**	12.00
			78	2480		10.33	12.00
		Basic rate π/4 DQPSK	0	2402		NR[1]	9.00
			39	2441			9.00
			78	2480			9.00
		Basic rate 8-DPSK	0	2402			9.00
			39	2441			9.00
			78	2480			9.00
		Low energy GFSK	0	2412			9.00
			20	2437			9.00
			39	2480			9.00

Initial test configuration

1. NR: Not Required

B.3 Tissue Parameters Measurement

Body TSL

Freq. (MHz)	Target Parameters		Measured TSL Parameters		Deviation (%)		Date
	ε'	σ	ε'	σ	ε'	σ	
2450	52.70	1.95	51.17	2.00	-2.90	2.65	2016/09/14
5300	48.88	5.41	46.17	5.41	-5.54	-0.16	2016/09/09
5600	48.47	5.75	44.22	5.83	-8.76	1.25	2016/10/20
5800	48.20	5.99	45.23	6.10	-6.16	1.93	2016/09/09

See *Annex E* for more details.

B.4 System Check Measurements

Body Measurements

Frequency (MHz)	Average	Target SAR (W/g)	Measured SAR (W/g)	Deviation to target (%)	Limit (%)	Date
2450	1g	49.40	46.69	-5.49	±10	2016/09/14
	10g	23.40	21.79	-6.87		
5300	1g	75.60	75.80	0.26		2016/09/09
	10g	21.20	21.60	1.89		
5600	1g	78.20	85.77	9.68		2016/10/20
	10g	21.70	23.83	9.81		
5800	1g	76.20	73.80	-3.15		2016/09/09
	10g	21.00	19.56	-6.86		

See Annex C for more details.

B.5 SAR Test Results

B.5.1 802.11b/g/n – 2.4GHz - DTS

Ant	Mode Data rate	BW (MHz)	Ch #	Freq (MHz)	Position	Correct. Factor (dB)	SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Main	802.11b 1Mbps	20	6	2437	Left Edge	0.77	0.37	0.44	
					Back Face	0.77	**0.45**	**0.54**	**1**
					Front Face	0.77	0.39	0.46	
					Bottom Edge	0.77	0.09	0.11	
					Right Edge	0.77	0.14	0.17	
					Top Edge	0.77	0.15	0.17	
Aux	802.11g 6Mbps	20	6	2437	Left Edge	0.72	0.36	0.42	
					Back Face	0.72	**0.45**	**0.53**	**2**
					Front Face	0.72	0.40	0.47	
					Bottom Edge	0.72	0.09	0.10	
					Right Edge	0.72	0.13	0.16	
					Top Edge	0.72	0.14	0.16	

B.5.2 802.11a/n/ac – 5.3 GHz – UNII-2A

Ant	Mode Data rate	BW (MHz)	Ch #	Freq (MHz)	Position	Correct. Factor (dB)	SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Main	802.11n HT0	40	54	5270	Left Edge	0.20	**0.64**	**0.67**	**3**
					Back Face	0.20	0.50	0.53	
					Front Face	0.20	0.47	0.50	
					Bottom Edge	0.20	0.16	0.17	
					Right Edge	0.20	0.05	0.05	
					Top Edge	0.20	0.53	0.55	
Aux	802.11n HT0	40	54	5270	Left Edge	0.28	**0.57**	**0.60**	**4**
					Back Face	0.28	0.52	0.56	
					Front Face	0.28	0.54	0.58	
					Bottom Edge	0.28	0.19	0.20	
					Right Edge	0.28	0.05	0.05	
					Top Edge	0.28	0.50	0.53	

B.5.3 802.11a/n/ac – 5.6 GHz – UNII-2C

Ant	Mode Data rate	BW (MHz)	Ch #	Freq (MHz)	Position	Correct. Factor (dB)	SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Main	802.11n40	40	126	5630	Left Edge	0.75	**0.48**	**0.57**	**5**
					Back Face	0.75	0.46	0.54	
					Front Face	0.75	0.47	0.55	
					Bottom Edge	0.75	0.16	0.20	
					Right Edge	0.75	0.04	0.04	
					Top Edge	0.75	0.43	0.51	
Aux	802.11n40	40	126	5630	Left Edge	0.20	**0.57**	**0.59**	**6**
					Back Face	0.20	0.39	0.41	
					Front Face	0.20	0.55	0.58	
					Bottom Edge	0.20	0.15	0.15	
					Right Edge	0.20	0.04	0.05	
					Top Edge	0.20	0.40	0.41	

B.5.4 802.11a/n/ac – 5.8 GHz – UNII-3

Ant	Mode Data rate	BW (MHz)	Ch #	Freq (MHz)	Position	Correct. Factor (dB)	SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Main	802.11n40	40	159	5795	Left Edge	0.75	0.39	0.46	
					Back Face	0.75	0.37	0.44	
					Front Face	0.75	**0.44**	**0.53**	**7**
					Bottom Edge	0.75	0.13	0.16	
					Right Edge	0.75	0.05	0.06	
					Top Edge	0.75	0.41	0.49	
Aux	802.11n40	40	159	5795	Left Edge	0.28	0.39	0.42	
					Back Face	0.28	0.33	0.35	
					Front Face	0.28	**0.44**	**0.46**	**8**
					Bottom Edge	0.28	0.14	0.14	
					Right Edge	0.28	0.05	0.06	
					Top Edge	0.28	0.30	0.32	

B.5.5 Bluetooth – 2.4GHz – DSSS

Ant	Mode Data rate	BW (MHz)	Ch #	Freq (MHz)	Position	Correct. Factor (dB)	SAR 1g (W/kg)	Reported SAR 1g (W/kg)	Plot #
Aux	802.15 DH5	20	39	2441	Left Edge	0.16	0.04	0.05	
					Back Face	0.16	**0.06**	**0.06**	**9**
					Front Face	0.16	0.05	0.05	
					Bottom Edge	0.16	0.01	0.01	
					Right Edge	0.16	0.01	0.01	
					Top Edge	0.16	0.02	0.02	

B.6 SAR Measurement Variability

According to FCC OET KDB 865664, SAR Measurement variability is assessed when the maximum initial measured SAR is >0.8 W/kg for a certain band/mode.

As all measured SAR results are below 0.8W/Kg, therefore SAR variability is not required.

B.7 Simultaneous Transmission SAR Evaluation

According to FCC OET KDB 447498 D01, when the sum of 1g SAR for all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit, SAR test exclusion applies to that simultaneous transmission configuration.

Chain	Position	Highest Reported SAR (1g)		
		WLAN 5GHz	WLAN 2.4GHz	Bluetooth
Main	Left Edge	0.67	0.44	
	Back Face	0.54	0.54	
	Front Face	0.55	0.46	
	Bottom Edge	0.20	0.11	
	Right Edge	0.06	0.17	
	Top Edge	0.55	0.17	
Aux	Left Edge	0.60	0.42	0.05
	Back Face	0.56	0.53	0.06
	Front Face	0.58	0.47	0.05
	Bottom Edge	0.20	0.10	0.01
	Right Edge	0.06	0.16	0.01
	Top Edge	0.53	0.16	0.02

Position	Simultaneous Tx Antenna Combination		Σ SAR 1g (W/Kg)	Limit (W/kg)
	Main Antenna	Aux Antenna		
Left Edge	WLAN 5GHz	WLAN 5GHz	1.27	1.6
	WLAN 5GHz	WLAN 5GHz + BT	1.32	
	WLAN 5GHz	BT	0.72	
	WLAN 2.4GHz	WLAN 2.4GHz	0.86	
	WLAN 2.4GHz	WLAN 2.4GHz + BT	0.91	
	WLAN 2.4GHz	BT	0.49	
Back Face	WLAN 5GHz	WLAN 5GHz	1.09	
	WLAN 5GHz	WLAN 5GHz + BT	1.15	
	WLAN 5GHz	BT	0.60	
	WLAN 2.4GHz	WLAN 2.4GHz	1.07	
	WLAN 2.4GHz	WLAN 2.4GHz + BT	1.13	
	WLAN 2.4GHz	BT	0.60	
Front Face	WLAN 5GHz	WLAN 5GHz	1.13	
	WLAN 5GHz	WLAN 5GHz + BT	1.18	
	WLAN 5GHz	BT	0.60	
	WLAN 2.4GHz	WLAN 2.4GHz	0.93	
	WLAN 2.4GHz	WLAN 2.4GHz + BT	0.98	
	WLAN 2.4GHz	BT	0.51	
Bottom Edge	WLAN 5GHz	WLAN 5GHz	0.37	
	WLAN 5GHz	WLAN 5GHz + BT	0.38	
	WLAN 5GHz	BT	0.21	
	WLAN 2.4GHz	WLAN 2.4GHz	0.21	
	WLAN 2.4GHz	WLAN 2.4GHz + BT	0.22	
	WLAN 2.4GHz	BT	0.12	
Right Edge	WLAN 5GHz	WLAN 5GHz	0.12	
	WLAN 5GHz	WLAN 5GHz + BT	0.13	
	WLAN 5GHz	BT	0.07	
	WLAN 2.4GHz	WLAN 2.4GHz	0.33	
	WLAN 2.4GHz	WLAN 2.4GHz + BT	0.34	
	WLAN 2.4GHz	BT	0.18	
Top Edge	WLAN 5GHz	WLAN 5GHz	1.08	
	WLAN 5GHz	WLAN 5GHz + BT	1.10	
	WLAN 5GHz	BT	0.57	
	WLAN 2.4GHz	WLAN 2.4GHz	0.33	
	WLAN 2.4GHz	WLAN 2.4GHz + BT	0.35	
	WLAN 2.4GHz	BT	0.19	

Considering the results described above and according to the simultaneous transmission evaluation exclusions described in FCC OET KDB 447498 D01, no SAR to peak location measurement is required.