5 GHz Dipole Calibration Certificate

Calibration Laboratory of
Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland

S Schweizerischer Kalibrierdienst
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Accreditation No.: SCS 0108

Client CTTL-BJ (Auden)

Certificate No: D5GHzV2-1060_Jul16

CALIBRATION CERTIFICATE

Object	D5GHzV2 - SN:1060
Calibration procedure(s)	QA CAL-22.v2 Calibration procedure for dipole validation kits between 3-6 GHz
Calibration date:	July 27, 2016

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI).
The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	06-Apr-16 (No. 217-02288/02289)	Apr-17
Power sensor NRP-Z91	SN: 103244	06-Apr-16 (No. 217-02288)	Apr-17
Power sensor NRP-Z91	SN: 103245	06-Apr-16 (No. 217-02289)	Apr-17
Reference 20 dB Attenuator	SN: 5058 (20k)	05-Apr-16 (No. 217-02292)	Apr-17
Type-N mismatch combination	SN: 5047.2 / 06327	05-Apr-16 (No. 217-02295)	Apr-17
Reference Probe EX3DV4	SN: 3503	30-Jun-16 (No. EX3-3503_Jun16)	Jun-17
DAE4	SN: 601	30-Dec-15 (No. DAE4-601_Dec15)	Dec-16

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter EPM-442A	SN: GB37480704	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (No. 217-02222)	In house check: Oct-16
Power sensor HP 8481A	SN: MY41092317	07-Oct-15 (No. 217-02223)	In house check: Oct-16
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Jun-15)	In house check: Oct-16
Network Analyzer HP 8753E	SN: US37390585	18-Oct-01 (in house check Oct-15)	In house check: Oct-16

	Name	Function	Signature
Calibrated by:	Claudio Leubler	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: July 27, 2016

This calibration certificate shall not be reproduced except in full without written approval of the laboratory.

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Accreditation No.: **SCS 0108**

Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORM x,y,z
N/A	not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
c) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

d) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

- *Measurement Conditions:* Further details are available from the Validation Report at the end of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- *Antenna Parameters with TSL:* The dipole is mounted with the spacer to position its feed point exactly below the center marking of the flat phantom section, with the arms oriented parallel to the body axis.
- *Feed Point Impedance and Return Loss:* These parameters are measured with the dipole positioned under the liquid filled phantom. The impedance stated is transformed from the measurement at the SMA connector to the feed point. The Return Loss ensures low reflected power. No uncertainty required.
- *Electrical Delay:* One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
- *SAR measured:* SAR measured at the stated antenna input power.
- *SAR normalized:* SAR as measured, normalized to an input power of 1 W at the antenna connector.
- *SAR for nominal TSL parameters:* The measured TSL parameters are used to calculate the nominal SAR result.

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

Measurement Conditions

DASY system configuration, as far as not given on page 1.

DASY Version	DASY5	V52.8.8
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom V5.0	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4.0 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.4 ± 6 %	4.52 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.94 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**78.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.28 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.5 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.9 ± 6 %	4.86 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.27 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**81.8 W / kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.4 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	33.7 ± 6 %	5.02 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**79.8 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**22.7 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.1 ± 6 %	5.42 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.62 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**75.6 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.14 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.2 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.5 ± 6 %	5.88 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.97 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**79.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.23 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.1 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	46.2 ± 6 %	6.11 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.51 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**74.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.10 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**20.8 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	48.6 Ω - 4.9 jΩ
Return Loss	- 25.7 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	54.1 Ω - 0.1 jΩ
Return Loss	- 28.1 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	51.9 Ω - 0.5 jΩ
Return Loss	- 34.4 dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	49.7 Ω - 1.5 jΩ
Return Loss	- 36.0 dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	56.8 Ω + 2.3 jΩ
Return Loss	- 23.5 dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	54.6 Ω + 3.4 jΩ
Return Loss	- 25.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.210 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard.
No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
Manufactured on	November 27, 2006

DASY5 Validation Report for Head TSL

Date: 27.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1060

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.52 S/m; ε_r = 34.4; ρ = 1000 kg/m^3
Medium parameters used: f = 5600 MHz; σ = 4.86 S/m; ε_r = 33.9; ρ = 1000 kg/m^3
Medium parameters used: f = 5750 MHz; σ = 5.02 S/m; ε_r = 33.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

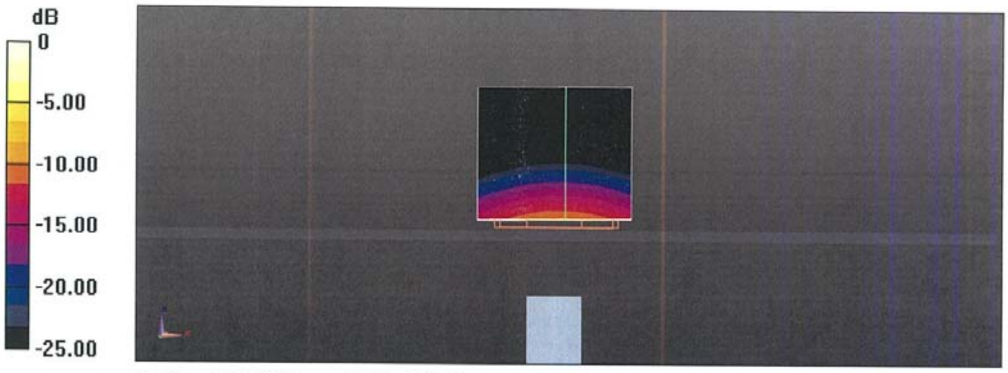
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(5.42, 5.42, 5.42); Calibrated: 30.06.2016, ConvF(4.89, 4.89, 4.89); Calibrated: 30.06.2016, ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (front); Type: QD000P50AA; Serial: 1001
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.54 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 29.0 W/kg
SAR(1 g) = 7.94 W/kg; SAR(10 g) = 2.28 W/kg
Maximum value of SAR (measured) = 17.9 W/kg

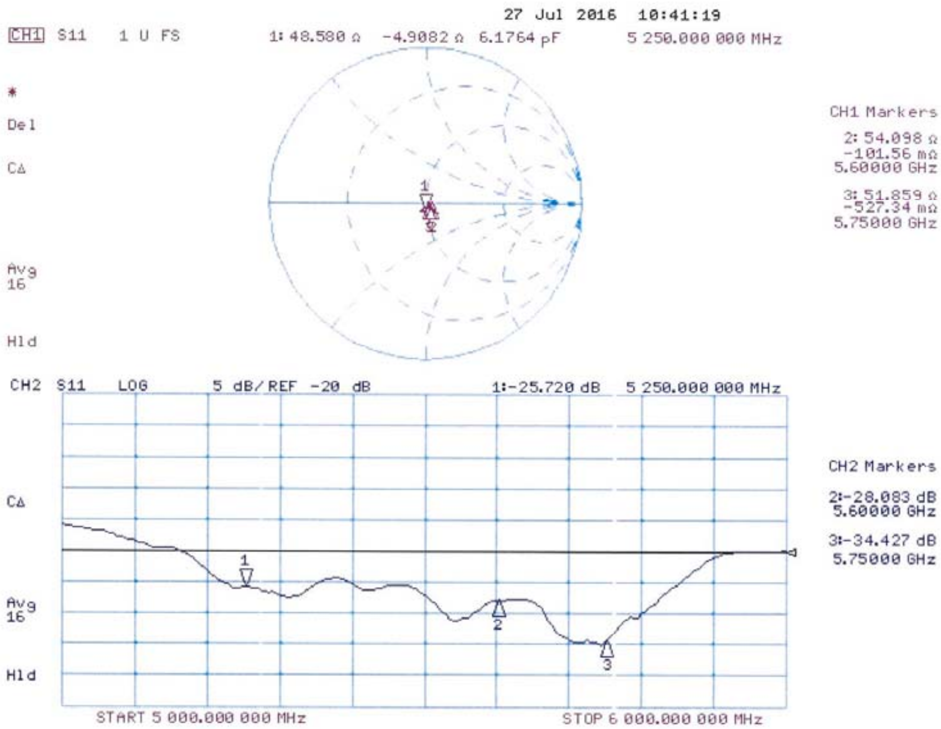
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 72.22 V/m; Power Drift = 0.04 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 8.27 W/kg; SAR(10 g) = 2.37 W/kg
Maximum value of SAR (measured) = 19.3 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 71.12 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 32.8 W/kg
SAR(1 g) = 8.07 W/kg; SAR(10 g) = 2.3 W/kg
Maximum value of SAR (measured) = 19.2 W/kg



0 dB = 17.9 W/kg = 12.53 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 26.07.2016

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1060

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency: 5750 MHz
Medium parameters used: f = 5250 MHz; σ = 5.42 S/m; ε_r = 47.1; ρ = 1000 kg/m^3
Medium parameters used: f = 5600 MHz; σ = 5.88 S/m; ε_r = 46.5; ρ = 1000 kg/m^3
Medium parameters used: f = 5750 MHz; σ = 6.11 S/m; ε_r = 46.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

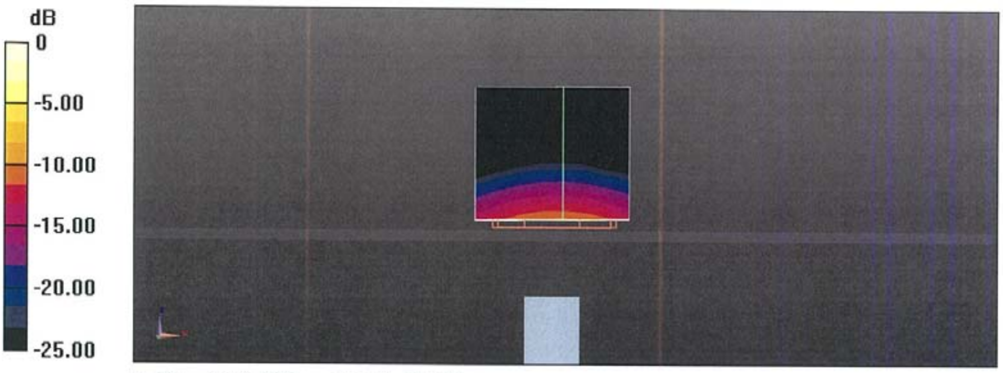
DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(4.85, 4.85, 4.85); Calibrated: 30.06.2016, ConvF(4.35, 4.35, 4.35); Calibrated: 30.06.2016, ConvF(4.3, 4.3, 4.3); Calibrated: 30.06.2016;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 30.12.2015
- Phantom: Flat Phantom 5.0 (back); Type: QD000P50AA; Serial: 1002
- DASY52 52.8.8(1258); SEMCAD X 14.6.10(7372)

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5250MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.69 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 28.9 W/kg
SAR(1 g) = 7.62 W/kg; SAR(10 g) = 2.14 W/kg
Maximum value of SAR (measured) = 18.0 W/kg

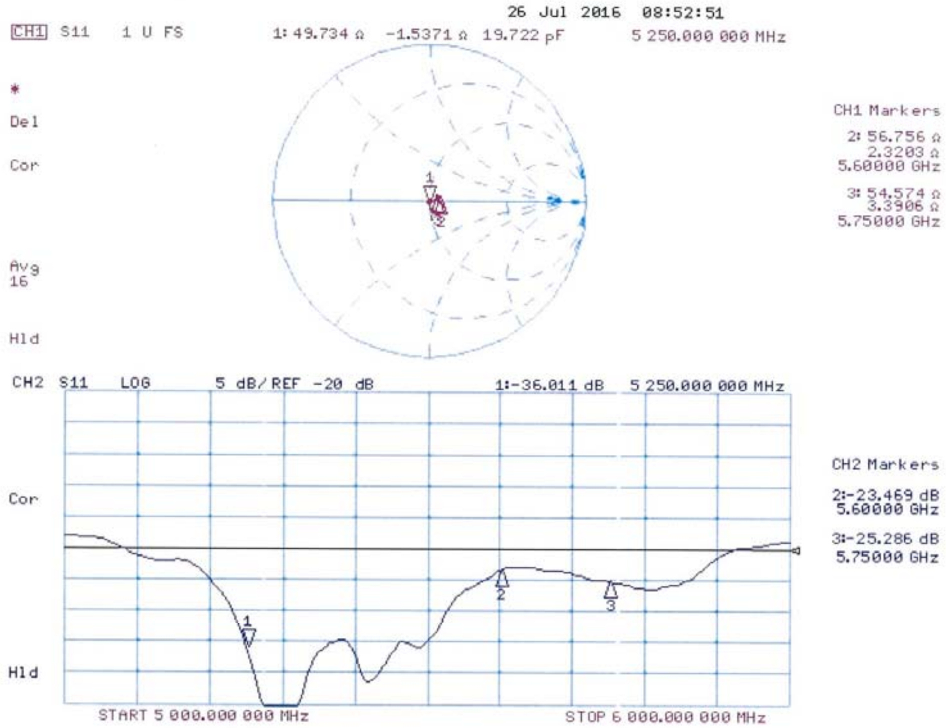
Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.99 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 33.0 W/kg
SAR(1 g) = 7.97 W/kg; SAR(10 g) = 2.23 W/kg
Maximum value of SAR (measured) = 19.2 W/kg

Dipole Calibration for Body Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.44 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 7.51 W/kg; SAR(10 g) = 2.1 W/kg
Maximum value of SAR (measured) = 18.2 W/kg



0 dB = 18.2 W/kg = 12.60 dBW/kg

Impedance Measurement Plot for Body TSL



ANNEX I Sensor Triggering Data Summary

I.1 Head

For Head exposure condition, device tilt angle influences to proximity sensor triggering is determined as below:

Firstly, the DUT was positioned directly touch the SAM phantom (Left&Right hand touch cheek position) for each band. Rotate the DUT around the ear reference point of the phantom in 5° increments until the DUT is 15° or more away from the touch cheek position at 0°

Then the DUT is positioned at 15° or more away from the touch cheek position and moved towards the phantom in 5°increments until the DUT directly touch the SAM phantom at 0°(Left & Right hand touch cheek position).

The DUT is moved towards and away from SAM phantom.

angle between phantom to DUT in degree	0	5	10	15
Condition of Sensor	on	on	on	on

Based on the validation results above, angle tilt coverage can ensure that the proximity sensor is triggered for all the Head test positions(Left/Right Hand Touched cheek, Left/Right Hand tiled 15 °)

I.2 Body

Per FCC KDB Publication 616217 D04v01r02, this device was tested by the manufacturer to determine the proximity sensor triggering distances for the rear and top edge of the device. The measured output power within ±5mm of the triggering points (or until touching the phantom) is included for rear and each applicable edge.

To ensure all production units are compliant it is necessary to test SAR at a distance 1mm less than the smallest distance from the device and SAR phantom (determined from these triggering tests according to the KDB 616217 D04v01r02) with the device at maximum output power without power reduction. These SAR tests are included in addition to the SAR tests for the device touching the SAR phantom, with reduced power.

We tested the power with the mode at highest reported SAR and got the different proximity sensor triggering distances for rear and top edge. But the manufacturer has declared 5mm is the most conservative triggering distance for all bands and all positions. So base on the most conservative triggering distance of 5mm, additional SAR measurements were required at 4mm from the rear and top edge.

Moving device toward the phantom:

W1700 (dbm)

	Front		Rear		Bottom
10mm	23.02		23.03		23.01
9mm	23.02		23.04		23.01
8mm	23.01		23.03		22.98
7mm	23.01		23.02		22.99
6mm	23.02		21.68		21.7
5mm	21.66		21.67		21.72
4mm	21.66		21.69		21.72
3mm	21.67		21.69		21.73
2mm	21.67		21.68		21.73
1mm	21.66		21.68		21.72
0mm	21.67		21.69		21.72

W1900 (dbm)

	Front		Rear		Bottom
10mm	22.86		22.84		22.81
9mm	22.86		22.83		22.81
8mm	22.85		22.81		22.79
7mm	22.83		22.82		22.79
6mm	22.82		22.83		22.81
5mm	21.67		21.66		21.66
4mm	21.68		21.67		21.66
3mm	21.69		21.67		21.67
2mm	21.68		21.68		21.67
1mm	21.67		21.68		21.67
0mm	21.69		21.69		21.68

LTE Band2 (dbm)

	Front		Rear		Bottom
10mm	24.32		24.33		24.32
9mm	24.3		24.32		24.33
8mm	24.31		24.34		24.34
7mm	24.32		24.33		24.33
6mm	22.77		22.79		22.83
5mm	22.77		22.78		22.82
4mm	22.78		22.78		22.81
3mm	22.78		22.77		22.82
2mm	22.77		22.78		22.79
1mm	22.78		22.79		22.79
0mm	22.79		22.8		22.8

LTE Band4 (dbm)

	Front		Rear		Bottom
10mm	23.18		23.2		23.23
9mm	23.18		23.21		23.22
8mm	23.19		23.19		23.22
7mm	23.19		23.18		23.23
6mm	23.18		23.18		21.63
5mm	21.61		21.59		21.62
4mm	21.6		21.58		21.6
3mm	21.58		21.57		21.61
2mm	21.59		21.57		21.59
1mm	21.59		21.56		21.59
0mm	21.58		21.57		21.6

LTE Band30 (dbm)

	Front		Rear		Bottom
10mm	22.15		22.2		22.22
9mm	22.16		22.18		22.22
8mm	22.16		22.18		22.23
7mm	22.15		22.19		22.23
6mm	21.76		21.81		21.82
5mm	21.76		21.81		21.82
4mm	21.77		21.8		21.83
3mm	21.78		21.82		21.83
2mm	21.78		21.82		21.81
1mm	21.77		21.8		21.81
0mm	21.78		21.79		21.8

Moving device away from the phantom:

W1700 (dbm)

	Front		Rear		Bottom
0mm	21.68		21.69		21.7
1mm	21.68		21.69		21.69
2mm	21.68		21.68		21.68
3mm	21.67		21.68		21.68
4mm	21.67		21.68		21.69
5mm	21.67		21.68		21.68
6mm	23.01		23.02		23.01
7mm	23.01		23.02		23.02
8mm	23.02		23.03		23.01
9mm	23.01		23.02		22.99
10mm	22.99		23.01		22.99

W1900 (dbm)

	Front		Rear		Bottom
0mm	21.7		21.68		21.67
1mm	21.69		21.69		21.67
2mm	21.68		21.69		21.68
3mm	21.69		21.68		21.66
4mm	21.7		21.69		21.67
5mm	21.68		21.69		21.68
6mm	22.81		22.81		22.81
7mm	22.83		22.81		22.82
8mm	22.84		22.82		22.8
9mm	22.83		22.82		22.82
10mm	22.84		22.8		22.83

LTE Band2 (dbm)

	Front		Rear		Bottom
0mm	22.78		22.79		22.82
1mm	22.79		22.79		22.8
2mm	22.79		22.78		22.8
3mm	22.78		22.8		22.81
4mm	22.79		22.79		22.8
5mm	22.78		22.81		22.8
6mm	23.31		23.32		23.34
7mm	23.33		23.33		23.35
8mm	23.33		23.34		23.34
9mm	23.31		23.32		23.32
10mm	23.33		23.33		23.34

LTE Band4 (dbm)

	Front		Rear		Bottom
0mm	21.59		21.56		21.59
1mm	21.59		21.56		21.58
2mm	21.6		21.57		21.58
3mm	21.58		21.57		21.59
4mm	21.59		21.58		21.58
5mm	21.58		21.57		21.59
6mm	23.18		23.19		23.2
7mm	23.18		23.18		23.22
8mm	23.19		23.18		23.2
9mm	23.17		23.19		23.21
10mm	23.18		23.19		23.23

LTE Band30 (dbm)

	Front		Rear		Bottom
0mm	21.76		21.8		21.82
1mm	21.76		21.82		21.82
2mm	21.77		21.81		21.83
3mm	21.77		21.82		21.82
4mm	21.78		21.8		21.83
5mm	21.77		21.8		21.84
6mm	22.18		22.22		22.23
7mm	22.17		22.22		22.24
8mm	22.18		22.23		22.24
9mm	22.19		22.23		22.23
10mm	22.19		22.21		22.22

ANNEX J Accreditation Certificate

ilac-MRA CNAS

China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L0570)

Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT

No.52, Huayuan North Road, Haidian District, Beijing, China

is accredited in accordance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence to undertake the service described in the schedule attached to this certificate.

The scope of accreditation is detailed in the attached schedule bearing the same registration number as above. The schedule form an integral part of this certificate.

Date of Issue：2017-05-05

Date of Expiry：2023-06-19

Date of Initial Accreditation：1998-07-03

Signed on behalf of China National Accreditation Service for Conformity Assessment

China National Accreditation Service for Conformity Assessment(CNAS) is authorized by Certification and Accreditation Administration of the People' s Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is a signatory of the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) and the Asia Pacific Laboratory Accreditation Cooperation Mutual Recognition Arrangement (APLAC MRA).

The validity of the certificate can be checked on CNAS website at http://www.cnas.org.cn/english/findanaccreditedbody/index.shtml