Appendix A.5 Dipole Calibration certificate (D750V3_SN1183)

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client: Eurofins KCTL (Dymstec)

Certificate No: D750V3-1183_Sep22

CALIBRATION CERTIFICATE

Object: D750V3 - SN:1183

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: September 21, 2022

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	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	31-Aug-22 (No. DAE4-601_Aug22)	Aug-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT 06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: September 23, 2022

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Certificate No: D750V3-1183_Sep22 Page 1 of 6

Calibration Laboratory of
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Accredited by the Swiss Accreditation Service (SAS)
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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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.7 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.44 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.53 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.3 Ω - 1.5 jΩ
Return Loss	- 27.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.033 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

DASY5 Validation Report for Head TSL

Date: 21.09.2022

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1183

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.9 S/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

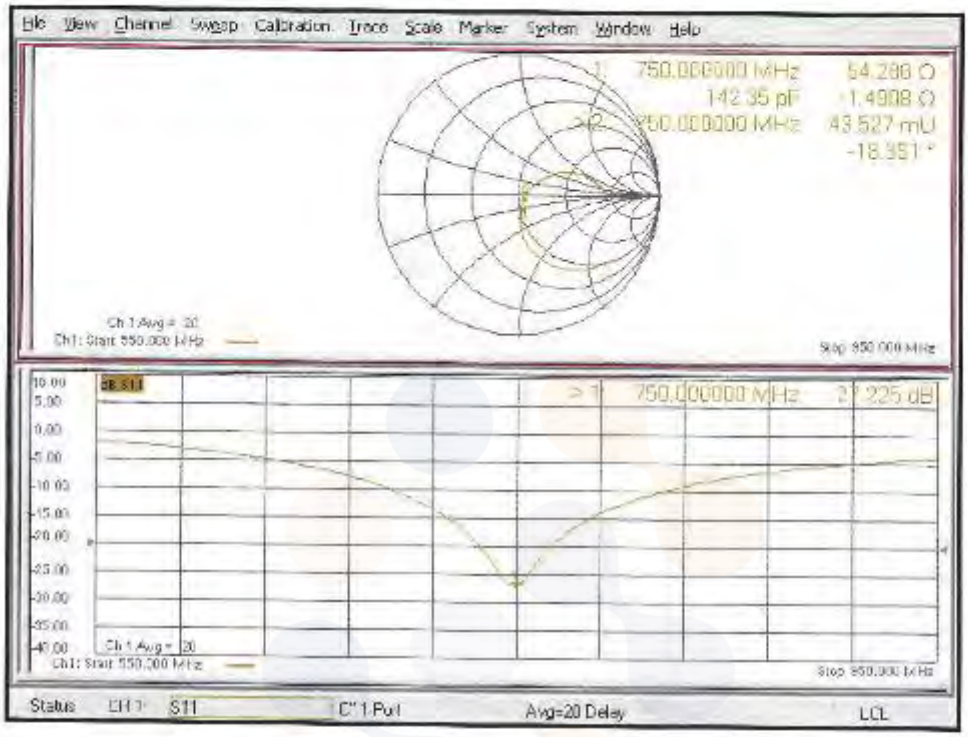
DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.11, 10.11, 10.11) @ 750 MHz; Calibrated: 31.12.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 31.08.2022
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 58.91 V/m; Power Drift = 0.00 dB
Peak SAR (extrapolated) = 3.24 W/kg
SAR(1 g) = 2.14 W/kg; SAR(10 g) = 1.40 W/kg
Smallest distance from peaks to all points 3 dB below = 18.9 mm
Ratio of SAR at M2 to SAR at M1 = 65.9%
Maximum value of SAR (measured) = 2.87 W/kg

0 dB = 2.87 W/kg = 4.57 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix A.6 Dipole Calibration certificate (D750V3_SN1224)

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

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Accreditation No.: SCS 0108

Client: Eurofins KCTL (Dymstec)

Certificate No: D750V3-1224_Oct22

CALIBRATION CERTIFICATE

Object: D750V3 - SN:1224

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: October 12, 2022

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	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	31-Aug-22 (No. DAE4-601_Aug22)	Aug-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-22)	In house check: Oct-24
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by:	Jelen Kastelic	Laboratory Technician	
Approved by:	Niels Kuster	Quality Manager	

Issued: October 13, 2022

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Certificate No: D750V3-1224_Oct22 Page 1 of 6

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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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.7 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**8.55 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.42 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.62 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	53.9 Ω - 1.3 jΩ
Return Loss	- 27.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.034 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

DASY5 Validation Report for Head TSL

Date: 12.10.2022

Test Laboratory: SPEAG, Zurich, Switzerland

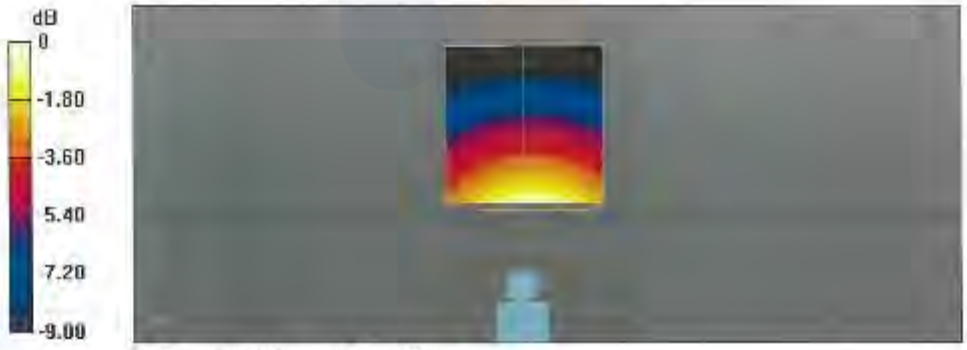
DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1224

Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.9 S/m; ε_r = 40.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

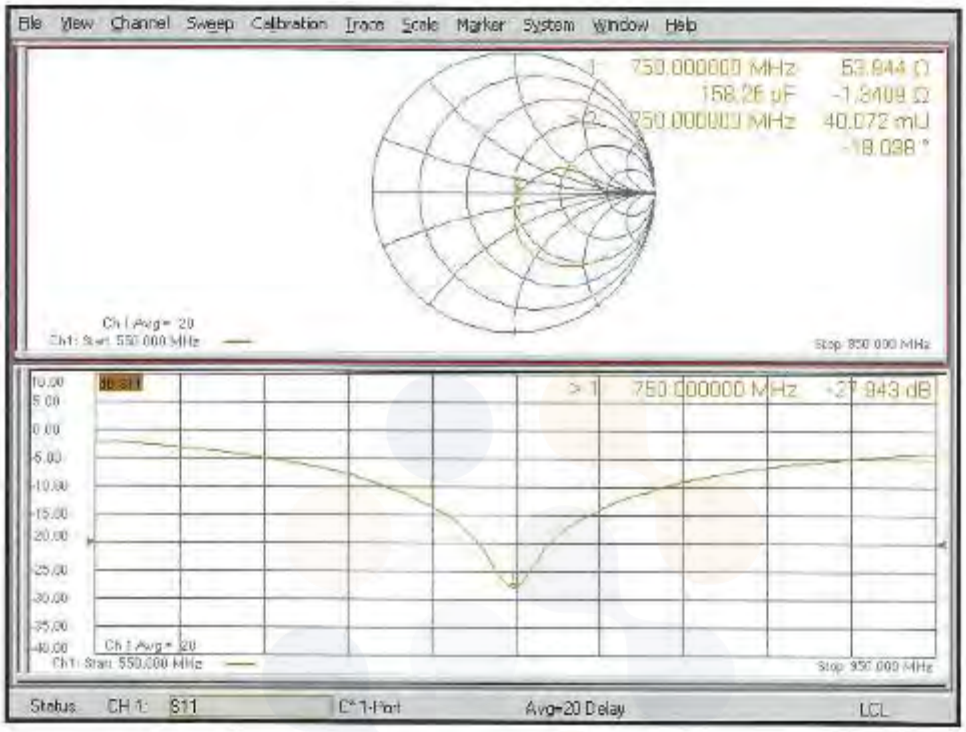
- Probe: EX3DV4 - SN7349; ConvF(10.11, 10.11, 10.11) @ 750 MHz; Calibrated: 31.12.2021
- Sensor Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 31.08.2022
- Phantom: Flat Phantom 4.9 (front); Type: QD 000 P49 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.57 V/m; Power Drift = -0.06 dB
Peak SAR (extrapolated) = 3.35 W/kg
SAR(1 g) = 2.17 W/kg; SAR(10 g) = 1.42 W/kg
Smallest distance from peaks to all points 3 dB below = 16.8 mm
Ratio of SAR at M2 to SAR at M1 = 64.9%
Maximum value of SAR (measured) = 2.93 W/kg



0 dB = 2.93 W/kg = 4.67 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix A.7 Dipole Calibration certificate (D850V2_SN1030)

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 0108

Client: Eurofins KCTL (Dymstec) Certificate No: D850V2-1030_Oct22

CALIBRATION CERTIFICATE

Object: D850V2 - SN:1030

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: October 26, 2022

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 calibration 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	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	31-Aug-22 (No. DAE4-601_Aug22)	Aug-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-22)	In house check: Oct-24
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: October 26, 2022

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Certificate No: D850V2-1030_Oct22 Page 1 of 6

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Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	850 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	41.5	0.92 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.5 ± 6 %	0.94 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.59 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**10.1 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.68 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.61 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	49.7 Ω - 1.6 jΩ
Return Loss	- 35.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.438 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

DASY5 Validation Report for Head TSL

Date: 26.10.2022

Test Laboratory: SPEAG, Zurich, Switzerland

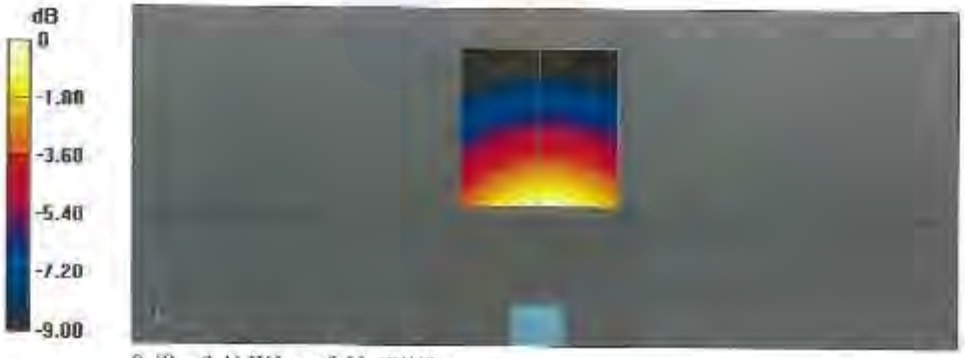
DUT: Dipole 850 MHz; Type: D850V2; Serial: D850V2 - SN:1030

Communication System: UID 0 - CW; Frequency: 850 MHz
Medium parameters used: f = 850 MHz; σ = 0.94 S/m; ε_r = 40.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

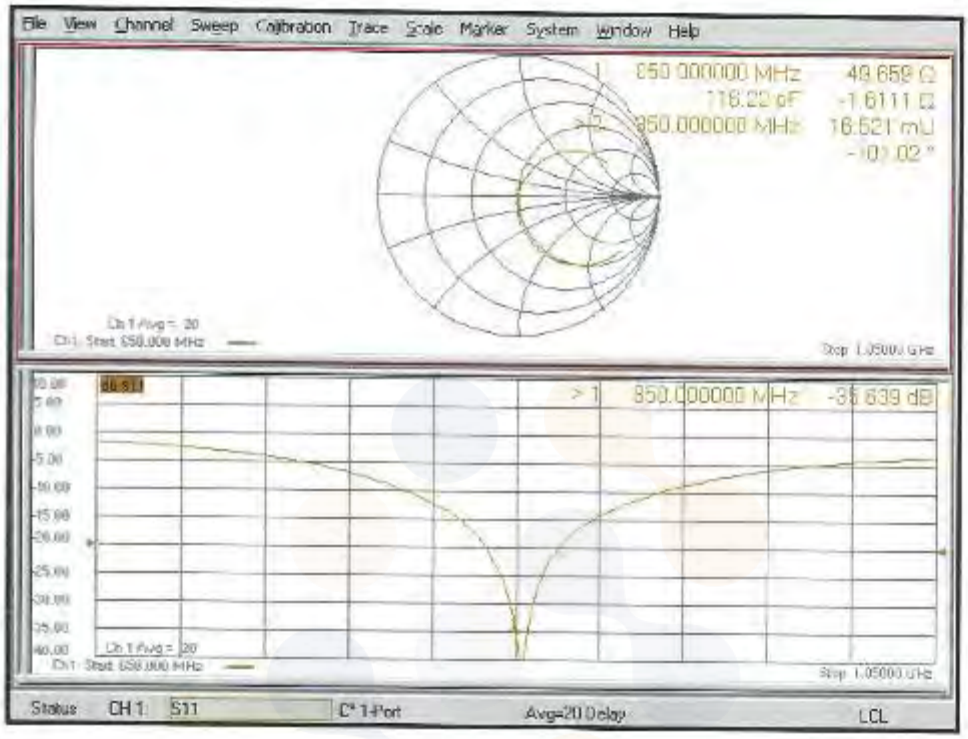
- Probe: EX3DV4 SN7349; ConvF(9.63, 9.63, 9.63) @ 850 MHz; Calibrated: 31.12.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 31.08.2022
- Phantom: Flat Phantom 4.9 (front); Type: QD 000 P49 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 64.08 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 3.94 W/kg
SAR(1 g) = 2.59 W/kg; SAR(10 g) = 1.68 W/kg
Smallest distance from peaks to all points 3 dB below = 17 mm
Ratio of SAR at M2 to SAR at M1 = 65.5%
Maximum value of SAR (measured) = 3.46 W/kg



0 dB = 3.46 W/kg = 5.39 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix A.8 Dipole Calibration certificate (D1750V2_SN1195)

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client: Eurofins KCTL (Dymstec) Certificate No: D1750V2-1195_Oct22

CALIBRATION CERTIFICATE

Object: D1750V2 - SN:1195

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: October 26, 2022

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	04-Apr-22 (No. 217-03525/03521)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	31-Aug-22 (No. DAE4-601_Aug22)	Aug-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-22)	In house check: Oct-24
Network Analyzer Agilent 8753ES	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct 24

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: October 26, 2022

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

Certificate No: D1750V2-1195_Oct22 Page 1 of 6

Calibration Laboratory of
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Engineering AG
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S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	39.3 ± 6 %	1.35 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm² (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**36.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm² (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.79 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**19.2 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.6 Ω + 3.2 jΩ
Return Loss	- 28.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.217 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

DASY5 Validation Report for Head TSL

Date: 26.10.2022

Test Laboratory: SPEAG, Zurich, Switzerland

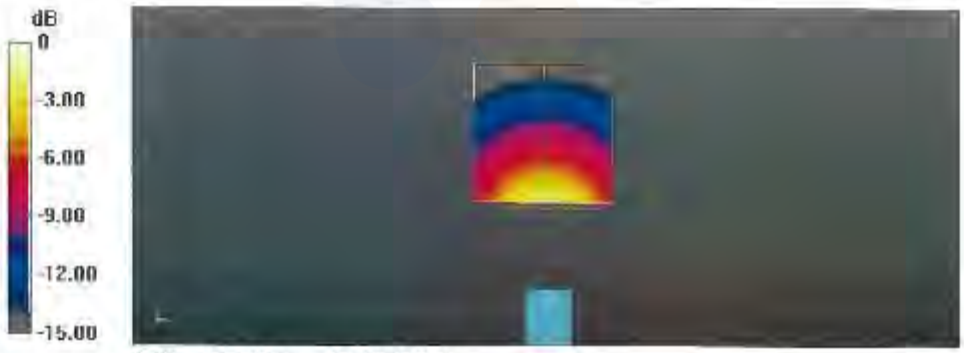
DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN:1195

Communication System: UID 0 - CW; Frequency: 1750 MHz
Medium parameters used: f = 1750 MHz; σ = 1.35 S/m; ε_r = 39.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

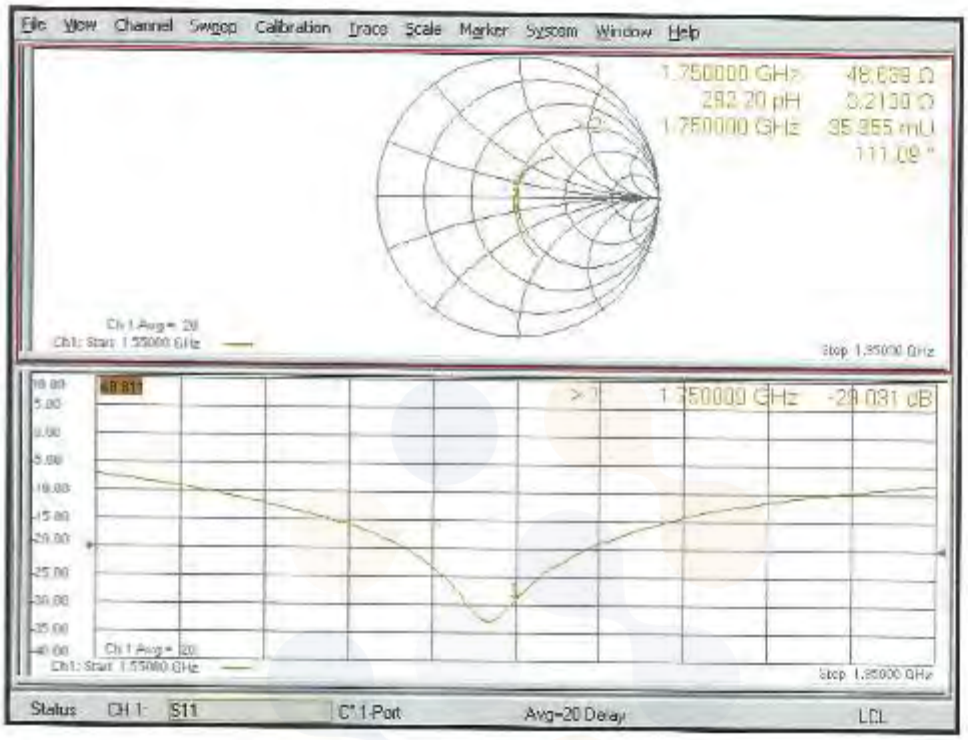
- Probe: EX3DV4 - SN7349; ConvF(8.67, 8.67, 8.67) @ 1750 MHz; Calibrated: 31.12.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 31.08.2022
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 107.3 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 16.8 W/kg
SAR(1 g) = 9.04 W/kg; SAR(10 g) = 4.79 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 54.3%
Maximum value of SAR (measured) = 14.1 W/kg



0 dB = 14.1 W/kg = 11.48 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix A.9 Dipole Calibration certificate (D1900V2_SN5d248)

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client: Eurofins KCTL (Dymstec)

Certificate No: D1900V2-5d248_Oct22

CALIBRATION CERTIFICATE

Object: D1900V2 - SN:5d248

Calibration procedure(s): QA CAL-05.v11
Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: October 20, 2022

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	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349_Dec21)	Dec-22
DAE4	SN: 601	31-Aug-22 (No. DAE4-601_Aug22)	Aug-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-22)	In house check: Oct-24
Network Analyzer Agilent 8753A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: October 28, 2022

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

Certificate No: D1900V2-5d248_Oct22 Page 1 of 5

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

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C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.7 ± 6 %	1.39 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.97 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.7 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.19 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.7 W/kg ± 16.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.0 Ω + 7.0 jΩ
Return Loss	- 23.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.193 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

DASY5 Validation Report for Head TSL

Date: 20.10.2022

Test Laboratory: SPEAG, Zurich, Switzerland

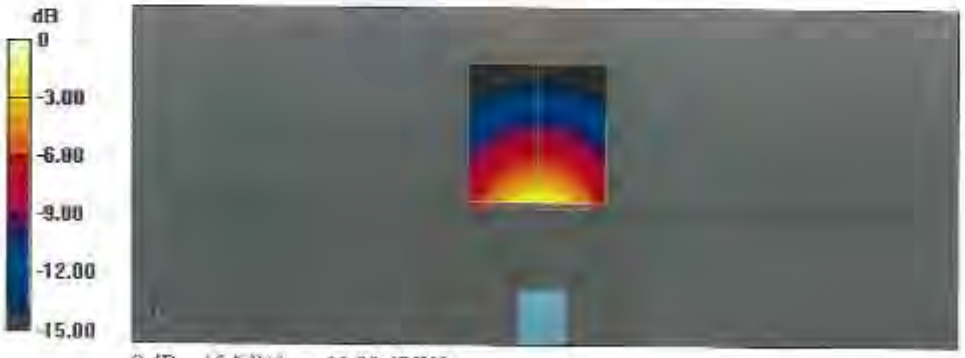
DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d248

Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.39 S/m; ε_r = 38.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

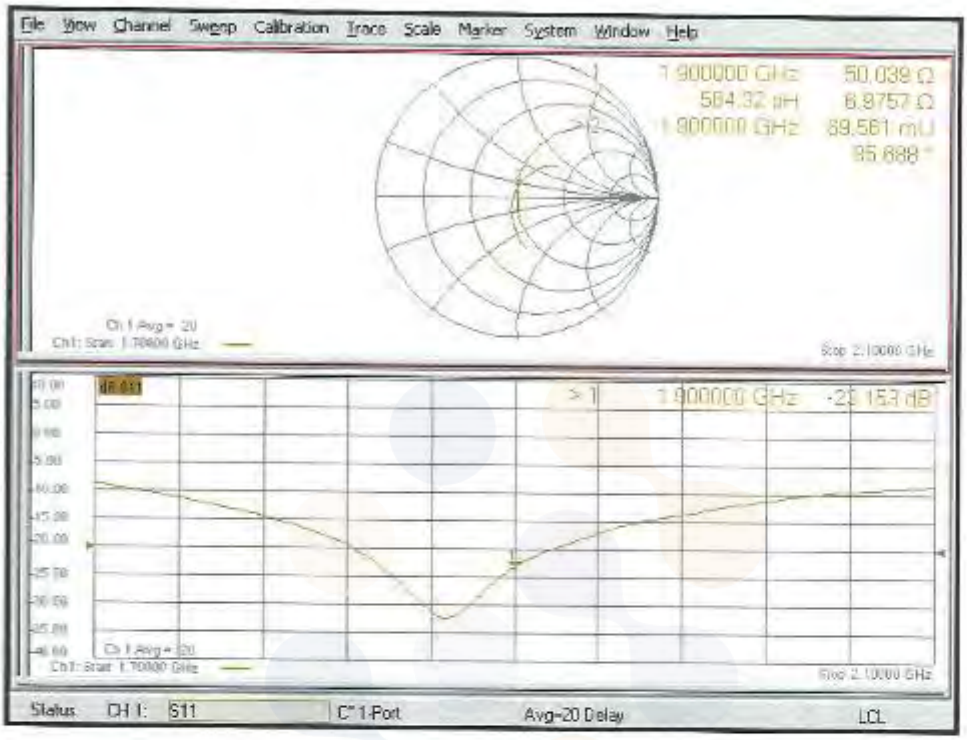
- Probe: EX3DV4 - SN7349; ConvF(8.43, 8.43, 8.43) @ 1900 MHz; Calibrated: 31.12.2021
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 31.08.2022
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:
Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 111.4 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 18.5 W/kg
SAR(1 g) = 9.97 W/kg; SAR(10 g) = 5.19 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 54.2%
Maximum value of SAR (measured) = 15.5 W/kg



0 dB = 15.5 W/kg = 11.90 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix A.10 Dipole Calibration certificate (D3500V2_SN1146)

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client: Eurofins KCTL (Dymstec) Certificate No: D3500V2-1146_Nov22

CALIBRATION CERTIFICATE

Object: D3500V2 - SN:1146

Calibration procedure(s): QA CAL-22.v6
Calibration Procedure for SAR Validation Sources between 3-10 GHz

Calibration date: November 1, 2022

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	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 3503	06-Mar-22 (No. EX3-3503_Mar22)	Mar-23
DAE4	SN: 601	31-Aug-22 (No. DAE4-601_Aug22)	Aug-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-22)	In house check: Oct-24
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by:	[redacted]	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: November 1, 2022

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Certificate No: D3500V2-1146_Nov22 Page 1 of 6

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Engineering AG
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S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	3500 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	37.9	2.91 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.8 ± 6 %	2.97 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.64 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**66.0 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.49 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.8 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.7 Ω - 1.0 jΩ
Return Loss	- 38.2 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.135 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

DASY5 Validation Report for Head TSL

Date: 01.11.2022

Test Laboratory: SPEAG, Zurich, Switzerland

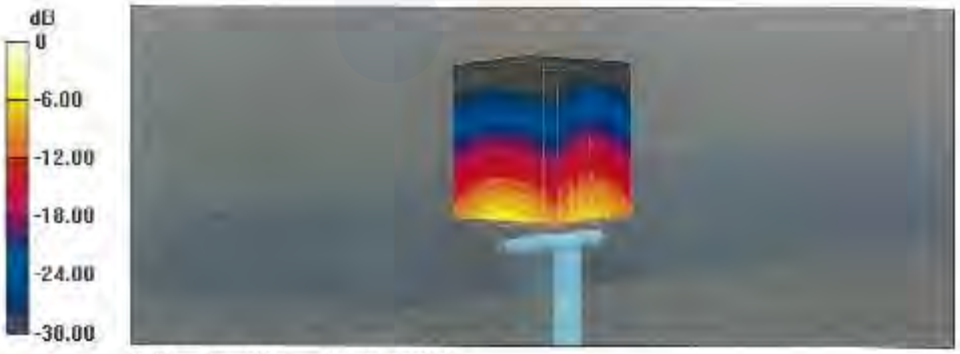
DUT: Dipole 3500 MHz; Type: D3500V2; Serial: D3500V2 - SN:1146

Communication System: UID 0 - CW; Frequency: 3500 MHz
Medium parameters used: f = 3500 MHz; σ = 2.97 S/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

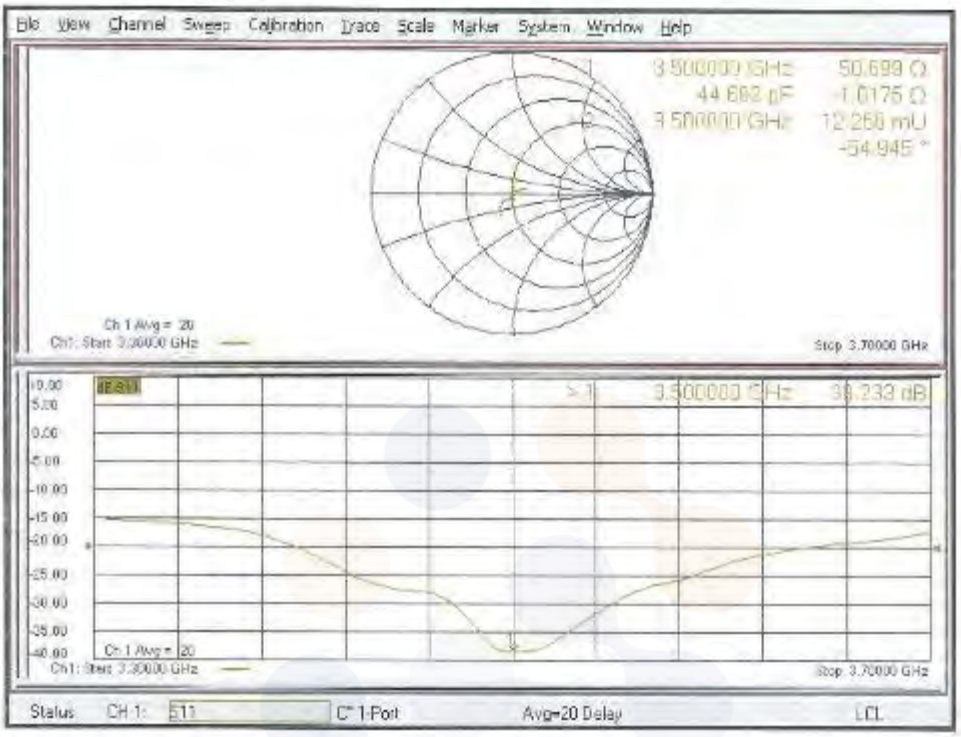
- Probe: EX3DV4 - SN3503; ConvF(7.91, 7.91, 7.91) @ 3500 MHz; Calibrated: 08.03.2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 31.08.2022
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm, f=3500MHz/Zoom Scan, dist=1.4mm (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.80 V/m; Power Drift = 0.07 dB
Peak SAR (extrapolated) = 18.2 W/kg
SAR(1 g) = 6.64 W/kg; SAR(10 g) = 2.49 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 74.4%
Maximum value of SAR (measured) = 12.5 W/kg



0 dB = 12.5 W/kg = 10.97 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix A.11 Dipole Calibration certificate (D3700V2_SN1027)

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

S Schweizerischer Kalibrierdienst
C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Client: Eurofins KCTL (Dymstec)

Certificate No: D3700V2-1027_Aug22

CALIBRATION CERTIFICATE

Object: D3700V2 - SN:1027

Calibration procedure(s): QA CAL-22.v8
Calibration Procedure for SAR Validation Sources between 3-10 GHz

Calibration date: August 19, 2022

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	04-Apr-22 (No. 217-03525/03584)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 3503	06-Mar-22 (No. EX3-3503_Mar22)	Mar-23
DAE4	SN: 601	02-May-22 (No. DAE4-601_May22)	May-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22

	Name	Function	Signature
Calibrated by:	Jeffrey Ketterson	Laboratory Technician	
Approved by:	Sven Kühn	Technical Manager	

Issued: August 22, 2022

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

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

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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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	3700 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	37.7	3.12 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.1 ± 6 %	3.12 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	—	—

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.87 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**66.5 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.49 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.6 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	46.2 Ω + 2.7 jΩ
Return Loss	- 26.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.131 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

DASY5 Validation Report for Head TSL

Date: 19.08.2022

Test Laboratory: SPEAG, Zurich, Switzerland

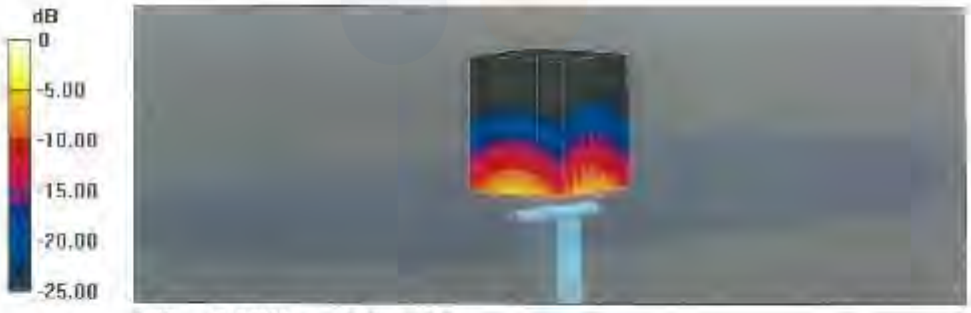
DUT: Dipole 3700 MHz; Type: D3700V2; Serial: D3700V2 - SN:1027

Communication System: UID 0 - CW; Frequency: 3700 MHz
Medium parameters used: f = 3700 MHz; σ = 3.12 S/m; ε_r = 37.1; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

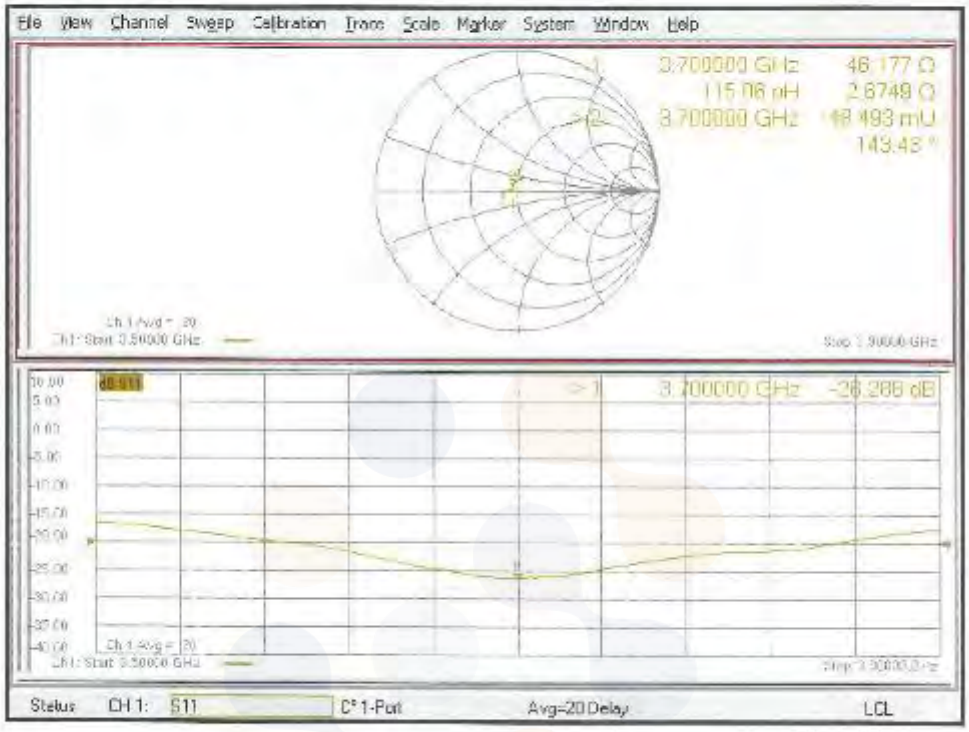
- Probe: EX3DV4 - SN3503; ConvF(7.73, 7.73, 7.73) @ 3700 MHz; Calibrated: 08.03.2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.05.2022
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm, f=3700MHz/Zoom Scan, dist=1.4mm (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 70.24 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 19.7 W/kg
SAR(1 g) = 6.87 W/kg; SAR(10 g) = 2.49 W/kg
Smallest distance from peaks to all points 3 dB below = 8.2 mm
Ratio of SAR at M2 to SAR at M1 = 73.1%
Maximum value of SAR (measured) = 13.5 W/kg



0 dB = 13.5 W/kg = 11.29 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix A.12 Dipole Calibration certificate (D3900V2_SN1037)

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

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C Service suisse d'étalonnage
S Servizio svizzero di taratura
S Swiss Calibration Service

Accredited by the Swiss Accreditation Service (SAS)
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Accreditation No.: SCS 0108

Client Dt&C

Certificate No: D3900V2-1037_Feb23

CALIBRATION CERTIFICATE

Object	D3900V2 - SN:1037
Calibration procedure(s)	QA CAL-22.v7 Calibration Procedure for SAR Validation Sources between 3-10 GHz
Calibration date:	February 27, 2023

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	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 313982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 3503	08-Mar-22 (No. EX3-3503_Mar22)	Mar-23
DAE4	SN: 601	19-Dec-22 (No. DAE4-601_Dec22)	Dec-23

Secondary Standards	ID #	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-22)	In house check: Oct-24
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-22)	In house check: Oct-24
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-22)	In house check: Oct-24

	Name	Function	Signature
Calibrated by:	Paulo Pina	Laboratory Technician	
Approved by:	Niels Kuster	Quality Manager	

Issued: February 28, 2023

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

Certificate No: D3900V2-1037_Feb23 Page 1 of 11

Calibration Laboratory of
Schmid & Partner
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Accredited by the Swiss Accreditation Service (SAS)
The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY 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 source is mounted in a touch configuration below the center marking of the flat phantom.
- *Return Loss:* This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. 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	DASY52	V52.10.4
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	3900 MHz ± 1 MHz 4100 MHz ± 1 MHz	

Head TSL parameters at 3900 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	37.5	3.32 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.0 ± 6 %	3.26 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL at 3900 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.89 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**69.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 4100 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	37.2	3.53 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.6 ± 6 %	3.45 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL at 4100 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.70 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**67.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.33 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.4 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 3900 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	50.8	3.78 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.0 ± 6 %	3.82 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL at 3900 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	6.46 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**65.1 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.25 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.5 W/kg ± 19.5 % (k=2)**

Body TSL parameters at 4100 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	50.5	4.01 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	50.7 ± 6 %	3.86 mho/m ± 6 %
Body TSL temperature change during test	< 0.5 °C	---	---

SAR result with Body TSL at 4100 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	6.39 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**64.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Body TSL	condition	
SAR measured	100 mW input power	2.20 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**22.1 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 3900 MHz

Impedance, transformed to feed point	47.4 Ω - 7.2 jΩ
Return Loss	- 22.1 dB

Antenna Parameters with Head TSL at 4100 MHz

Impedance, transformed to feed point	59.5 Ω - 3.8 jΩ
Return Loss	- 20.6 dB

Antenna Parameters with Body TSL at 3900 MHz

Impedance, transformed to feed point	48.2 Ω - 4.8 jΩ
Return Loss	- 25.6 dB

Antenna Parameters with Body TSL at 4100 MHz

Impedance, transformed to feed point	61.0 Ω - 0.4 jΩ
Return Loss	- 20.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.098 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

DASY5 Validation Report for Head TSL

Date: 27.02.2023

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 3900 MHz; Type: D3900V2; Serial: D3900V2 - SN:1037

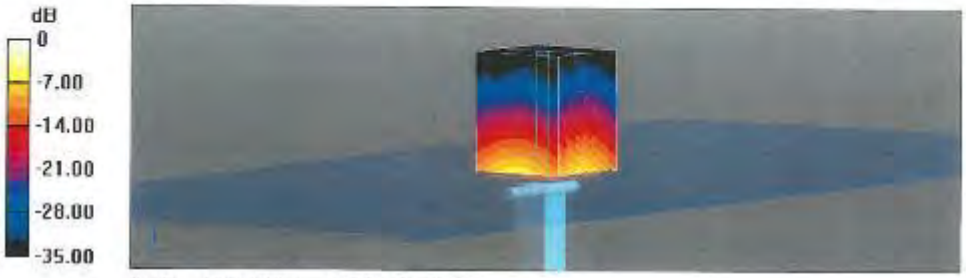
Communication System: UID 0 - CW; Frequency: 3900 MHz; Frequency: 4100 MHz
Medium parameters used: f = 3900 MHz; σ = 3.26 S/m; ε_r = 38; ρ = 1000 kg/m^3
Medium parameters used: f = 4100 MHz; σ = 3.45 S/m; ε_r = 37.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(7.39, 7.39, 7.39) @ 3900 MHz; ConvF(7.26, 7.26, 7.26) @ 4100 MHz; Calibrated: 08.03.2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 19.12.2022
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

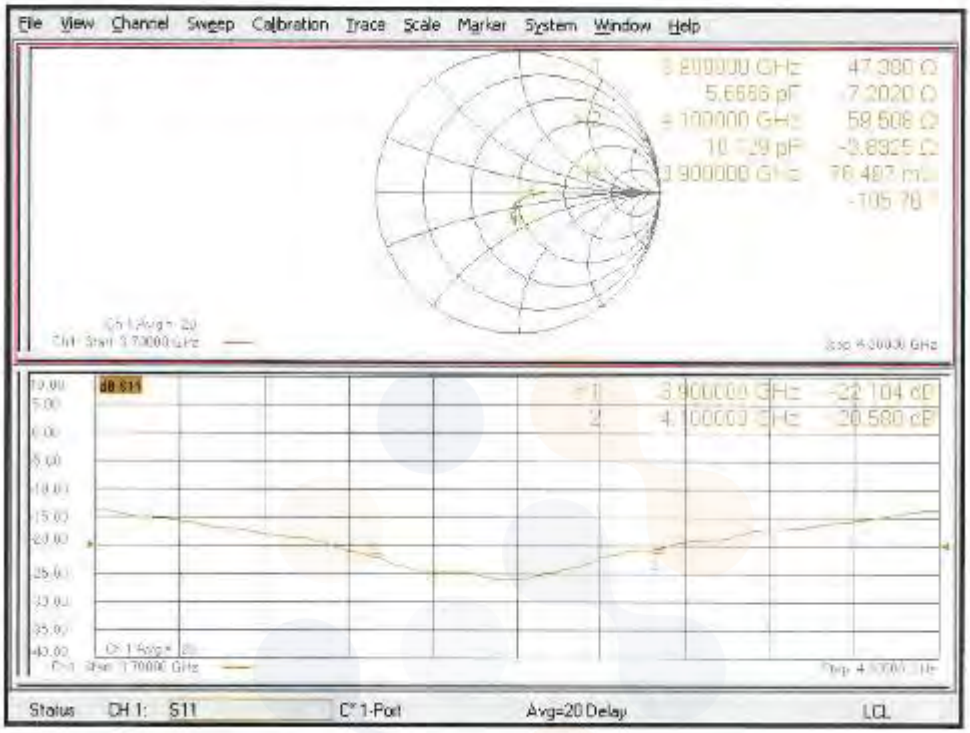
Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm, f=3900MHz/Zoom Scan, dist=1.4mm (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.60 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 19.4 W/kg
SAR(1 g) = 6.89 W/kg; SAR(10 g) = 2.41 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 74.7%
Maximum value of SAR (measured) = 13.4 W/kg

Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm, f=4100MHz/Zoom Scan, dist=1.4mm (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 67.39 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 19.0 W/kg
SAR(1 g) = 6.70 W/kg; SAR(10 g) = 2.33 W/kg
Smallest distance from peaks to all points 3 dB below = 8 mm
Ratio of SAR at M2 to SAR at M1 = 74.1%
Maximum value of SAR (measured) = 13.2 W/kg



0 dB = 13.4 W/kg = 11.26 dBW/kg

Impedance Measurement Plot for Head TSL



DASY5 Validation Report for Body TSL

Date: 27.02.2023

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 3900 MHz; Type: D3900V2; Serial: D3900V2 - SN:1037

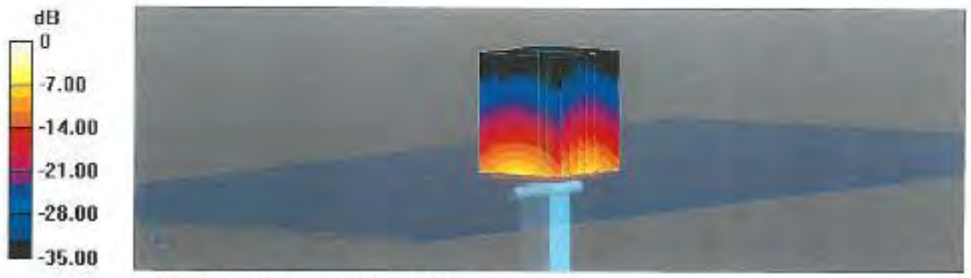
Communication System: UID 0 - CW; Frequency: 3900 MHz, Frequency: 4100 MHz
Medium parameters used: f = 3900 MHz; σ = 3.62 S/m; ε_r = 51; ρ = 1000 kg/m^3
Medium parameters used: f = 4100 MHz; σ = 3.86 S/m; ε_r = 50.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN3503; ConvF(7.18, 7.18, 7.18) @ 3900 MHz, ConvF(6.88, 6.88, 6.88) @ 4100 MHz; Calibrated: 08.03.2022
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 19.12.2022
- Phantom: Flat Phantom 5.0 (back); Type: QD 000 P50 AA; Serial: 1002
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

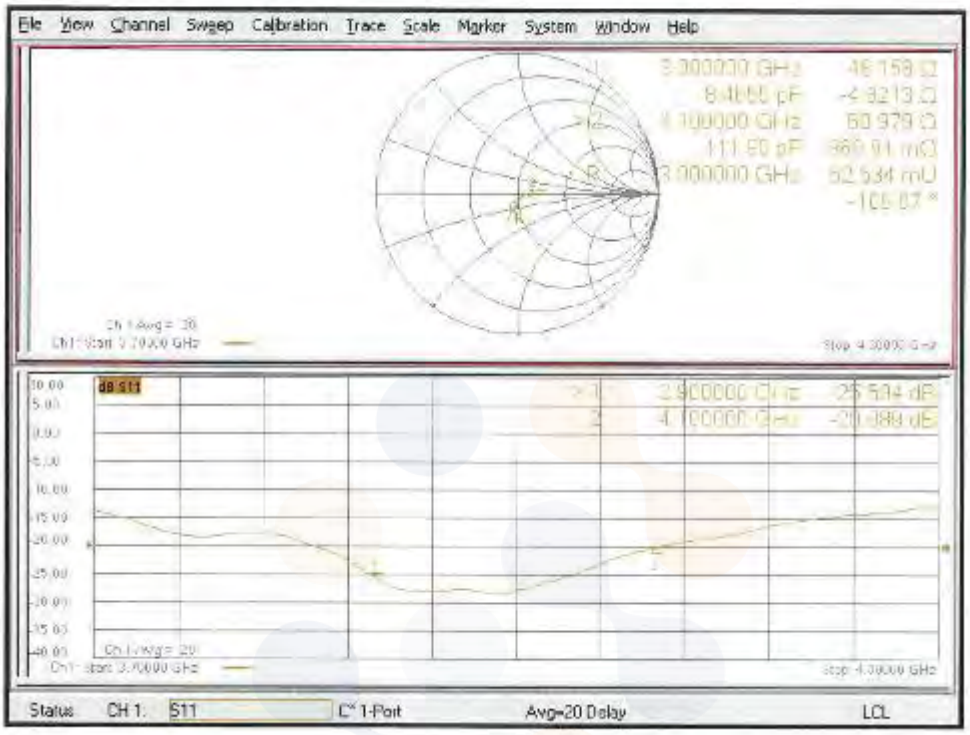
Dipole Calibration for Body Tissue/Pin=100 mW, d=10mm, f=3900MHz/Zoom Scan , dist=1.4mm (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 62.30 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 6.46 W/kg; SAR(10 g) = 2.25 W/kg
Smallest distance from peaks to all points 3 dB below = 7.9 mm
Ratio of SAR at M2 to SAR at M1 = 74.3%
Maximum value of SAR (measured) = 12.8 W/kg

Dipole Calibration for Body Tissue/Pin=100 mW, d=10mm, f=4100MHz/Zoom Scan , dist=1.4mm (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 60.42 V/m; Power Drift = -0.08 dB
Peak SAR (extrapolated) = 19.0 W/kg
SAR(1 g) = 6.39 W/kg; SAR(10 g) = 2.20 W/kg
Smallest distance from peaks to all points 3 dB below = 7.9 mm
Ratio of SAR at M2 to SAR at M1 = 73%
Maximum value of SAR (measured) = 12.9 W/kg



0 dB = 12.9 W/kg = 11.10 dBW/kg

Impedance Measurement Plot for Body TSL



Appendix B. SAR Tissue Specification

The brain mixtures consist of a viscous gel using hydrox-ethl cellullose(HEC) gelling agent and saline solution. Preservation with a bacteriacide is added and visual inspection is made to make sure air bubbles are not trapped during the mixing process. The mixture is calibrated to obtain proper dielectric constant (permittivity) and conductivity of the desired tissue.

Frequency (㎒)	**750 ~ 835**		**1 750**		**1 900**		**2 450**		**5 200 ~ 5 800**	
Tissue Type	Head	Body	Head	Body	Head	Body	Head	Body	Head	Body
Ingredient	**% by weight**									
Water	40.29	51.97	53.00	68.00	55.00	70.50	72.00	73.00	65.52	80.00
Salt (NaCl)	1.38	0.93	0.40	0.20	0.35	0.30	0.10	0.10	0	0
Sugar	57.90	47.00	0	0	0	0	0	0	0	0
HEC	0.24	0	0	0	0	0	0	0	0	0
Bactericide	0.19	0.10	0	0	0	0	0	0	0	0
Triton X-100	0	0	0	0	0	0	20.00	0	17.24	0
DGBE	0	0	46.60	31.80	44.65	29.20	0	26.90	0	0
Diethylene glycol hexyl ether	0	0	0	0	0	0	7.90	0	17.24	0
Polysorbate (Tween) 80	0	0	0	0	0	0	0	0	0	20.00
Tissue parameter target by C. Gabriel and G. Harts grove.										

Salt: 99 % Pure Sodium Chloride
Sucrose: 98 % Pure Sucrose
Water: De-ionized, 16 M resistivity
HEC: Hydroxyethyl Cellulose
DGBE: 99 % Di(ethylene glycol) butyl ether, [2-(2-butoxyethoxy) ethanol]
Triton X-100(ultra-pure): Polyethylene glycol mono[4-(1,1,3,3-tetramethybutyl)phenyl] ether

Appendix C. LTE CA RF Conducted Power

C.1 LTE Intra Uplink Carrier Aggregation

LTE Intra-Band Contiguous Carrier Aggregation

UL CA shall be tested based on the worst-case SAR configuration determined from non-CA SAR testing result. The channel BW, channel number, RB allocation, etc. would be selected to allow contiguous CA of PCC and SCC. Uplink output power for UL CA is the total power measured across the PCC and SCC.

UL CA power measurements were performed for each antennas at with QPSK modulation based on the worst-case standalone SAR.

The UL CA mode power measurements represent the total power across both carriers. Measurements were made for all supported PCC bandwidths using the channel/RB combination resulting in the highest standalone output power at the least MPR (0 dB). SCCs were set to use configurations similar to the PCC to establish conservative or worst case equivalent SAR test conditions (highest maximum power with MPR of 0 dB).

The standalone power measurement is the power for the PCC in the non-CA mode (i.e. single carrier power). In all cases the UL CA power is less than or equal to the standalone power, which is in accordance with the tune-up limits in table below.

According to November 2017 TCB workshop, Uplink CA SAR Test Guidance as follows:

a) When the maximum output for UL CA is ≤ standalone LTE mode (without CA)

- PCC is configured according to the highest standalone SAR configuration tested
- SCC and subsequent CCs are configured according to procedures used for power measurement and parameters (BW, RB etc.) similar to that used for the PCC

b) When the Reported SAR for UL CA configuration, described above, is > 1.2 W/kg, UL CA SAR is also required for all required test channels(PCC based)

c) UL CA SAR is also required for standalone SAR configurations > 1.2 W/kg when they are scaled to the UL CA power level

LTE UL CA 2C Measured Results

Combination	PCC						SCC 1						Power	
	BW [MHz]	(UL) Ch.	(UL) Freq. [MHz]	Mod.	(UL) RB Size	(UL) RB Offset	BW [MHz]	(UL) Ch.	(UL) Freq. [MHz]	Mod.	(UL) RB Size	(UL) RB Offset	LTE Tx. Power with UL CA Enabled (PCC+SCC) (dBm)	LTE Single Carrier Tx Power (dBm)
CA_2C	20	18700	1860.0	QPSK	1	99	20	18898	1879.8	QPSK	1	0	23.51	23.54
CA_2C	20	18700	1860.0	QPSK	50	24	20	18898	1879.8	QPSK	50	0	16.41	16.66
CA_2C	20	19100	1900.0	QPSK	50	24	20	18902	1880.2	QPSK	50	50	13.67	13.70

LTE UL CA 5B Measured Results

Combination	PCC						SCC 1						Power	
	BW [MHz]	(UL) Ch.	(UL) Freq. [MHz]	Mod.	(UL) RB Size	(UL) RB Offset	BW [MHz]	(UL) Ch.	(UL) Freq. [MHz]	Mod.	(UL) RB Size	(UL) RB Offset	LTE Tx. Power with UL CA Enabled (PCC+SCC) (dBm)	LTE Single Carrier Tx Power (dBm)
CA_5B	10	20525	836.5	QPSK	1	0	5	20453	829.3	QPSK	1	24	23.63	23.64
CA_5B	10	20525	836.5	QPSK	50	0	5	20453	829.3	QPSK	25	0	21.72	21.89
CA_5B	10	20525	836.5	QPSK	25	25	5	20597	843.7	QPSK	12	0	20.20	19.96

LTE UL CA 66B Measured Results

Combination	PCC						SCC 1						Power	
	BW [MHz]	(UL) Ch.	(UL) Freq. [MHz]	Mod.	(UL) RB Size	(UL) RB Offset	BW [MHz]	(UL) Ch.	(UL) Freq. [MHz]	Mod.	(UL) RB Size	(UL) RB Offset	LTE Tx. Power with UL CA Enabled (PCC+SCC) (dBm)	LTE Single Carrier Tx Power (dBm)
CA_66B	15	132322	1745.0	QPSK	1	0	5	132229	1735.7	QPSK	1	24	23.61	23.62
CA_66B	15	132322	1745.0	QPSK	1	0	5	132229	1735.7	QPSK	1	24	14.34	14.76
CA_66B	15	132597	1772.5	QPSK	1	0	5	132504	1763.2	QPSK	1	24	13.81	13.78

LTE UL CA 66C Measured Results

Combination	PCC						SCC 1						Power	
	BW [MHz]	(UL) Ch.	(UL) Freq. [MHz]	Mod.	(UL) RB Size	(UL) RB Offset	BW [MHz]	(UL) Ch.	(UL) Freq. [MHz]	Mod.	(UL) RB Size	(UL) RB Offset	LTE Tx. Power with UL CA Enabled (PCC+SCC) (dBm)	LTE Single Carrier Tx Power (dBm)
CA_66C	20	132322	1745.0	QPSK	1	0	20	132124	1725.2	QPSK	1	99	23.55	23.60
CA_66C	20	132322	1745.0	QPSK	50	50	20	132520	1764.8	QPSK	50	0	14.38	14.66
CA_66C	20	132572	1770.0	QPSK	1	0	20	132374	1750.2	QPSK	1	99	13.72	13.78

C.2 LTE Inter Uplink Carrier Aggregation

LTE Inter-Band Uplink Carrier Aggregation –Interim Procedures

According to October 2018 TCB workshop, Uplink CA SAR test Guidance as follows;

1) If the single uplink 1 -g SAR values for each band are both less than 0.8 W/kg and the algebraic summation of the 1-g SAR values are less than 1.45 W/kg no additional measurements need to be performed.
2) If one of the single uplink 1 -g SAR values is greater than 0.8 W/kg, instead of algebraically summing the 1-g SAR values, sum up the SAR distributions, similar to the enlarged zoom scan (volume scan) procedures found in FCC KDB Publication 865664 D01.
3) If the algebraic sum of the 1-g SAR values is > 1.45 W/kg additional measurements may have to be made.

Combination	RF Exposure Condition	Band/Antenna		Worst Standalone SAR				UL CA [W/kg] (Worst Algebraic Summation)
		PCC	SCC	Maximum Tune-up Power (dBm)		Reported SAR (W/kg)		
				PCC	SCC	PCC	SCC	
CA_2A-4A	Notebook mode	B2 / Ant.0	B4(66) / Ant.2	18.0	16.0	1.199	0.436	1.635
	Tablet			15.0	15.0	0.936	0.869	1.805
CA_2A-4A	Notebook mode	B4(66) / Ant.2	B2 / Ant.0	16.0	18.0	0.436	1.199	1.635
	Tablet			15.0	15.0	0.869	0.936	1.805
CA_2A-5A	Notebook mode	B5 / Ant.0	B2 / Ant.2	23.0	24.0	1.015	0.499	1.514
	Tablet			21.0	15.0	1.270	0.465	1.735
CA_2A-12A	Notebook mode	B12 / Ant.0	B2 / Ant.2	21.0	24.0	0.560	0.499	1.059
	Tablet			16.0	15.0	0.424	0.465	0.889
CA_2A-66A	Notebook mode	B2 / Ant.0	B66 / Ant.2	18.0	16.0	1.199	0.436	1.635
	Tablet			15.0	15.0	0.936	0.869	1.805
CA_2A-66A	Notebook mode	B66 / Ant.2	B2 / Ant.0	16.0	18.0	0.436	1.199	1.635
	Tablet			15.0	15.0	0.869	0.936	1.805
CA_4A-12A	Notebook mode	B12 / Ant.0	B4(66) / Ant.2	21.0	16.0	0.560	0.436	0.996
	Tablet			16.0	15.0	0.424	0.869	1.293
CA_4A-5A	Notebook mode	B5 / Ant.0	B4(66) / Ant.2	23.0	16.0	1.015	0.436	1.451
	Tablet			21.0	15.0	1.270	0.869	2.139
CA_5A-66A	Notebook mode	B5 / Ant.0	B66 / Ant.2	23.0	16.0	1.015	0.436	1.451
	Tablet			21.0	15.0	1.270	0.869	2.139
CA_12A-66A	Notebook mode	B12 / Ant.0	B66 / Ant.2	21.0	16.0	0.560	0.436	0.996
	Tablet			16.0	15.0	0.424	0.869	1.293

Note: When the sum of SAR-1g is greater than the SAR limit (SAR1g 1.6 W/kg), SAR test exclusion is determined by the SPLSR. (Section 13.5)

C.3 LTE Downlink Carrier Aggregation

The tables below show the supported frequency bands of the device for DL Inter-band and DL Intra-band combinations.

Power measurements were performed on the channel with the highest maximum output power from Tune-up Procedure.

In applying the power measurement procedures of KDB 941225 D05A for DL CA to qualify for UL SAR test exclusion, power measurement is required only for the subset in each row with the largest combination of frequency bands and CCs

Index	2CC	Restriction	Completely Covered by Measurement Superset	Reverse
2CC #1	CA_2A-2A	N/A	3CC #1	N/A
2CC #2	CA_2C	N/A	3CC #20	N/A
2CC #3	CA_2A-4A	N/A	3CC #7	Yes
2CC #4	CA_2A-5A	N/A	3CC #11	Yes
2CC #5	CA_2A-12A	N/A	3CC #13	Yes
2CC #6	CA_2A-14A	N/A	3CC #15	Yes
2CC #7	CA_2A-29A	B29 SCC Only	3CC #16	N/A
2CC #8	CA_2A-66A	N/A	3CC #17	Yes
2CC #9	CA_4A-4A	N/A	3CC #25	N/A
2CC #10	CA_4A-5A	N/A	3CC #27	Yes
2CC #11	CA_4A-12A	N/A	3CC #24	Yes
2CC #12	CA_4A-29A	B29 SCC Only	3CC #26	N/A
2CC #13	CA_5A-5A	N/A	3CC #29	N/A
2CC #14	CA_5B	N/A	3CC #12	N/A
2CC #15	CA_5A-66A	N/A	3CC #29	Yes
2CC #16	CA_12A-12A	N/A	3CC #13	N/A
2CC #17	CA_12A-66A	N/A	3CC #34	Yes
2CC #18	CA_14A-66A	N/A	3CC #36	Yes
2CC #19	CA_66A-66A	N/A	3CC #37	N/A
2CC #20	CA_66B	N/A	3CC #31	N/A
2CC #21	CA_66C	N/A	3CC #32	N/A

Index	3CC	Restriction	Completely Covered by Measurement Superset	Reverse
3CC #1	CA_2A-2A-12A	N/A	4CC #1	Yes
3CC #2	CA_2A-2A-14A	N/A	4CC #3	Yes
3CC #3	CA_2A-2A-29A	B29 Only SCC	4CC #4	Yes
3CC #4	CA_2A-2A-4A	N/A	4CC #5	Yes
3CC #5	CA_2A-2A-5A	N/A	4CC #8	Yes
3CC #6	CA_2A-2A-66A	N/A	4CC #10	Yes
3CC #7	CA_2A-4A-12A	N/A	4CC #5	Yes
3CC #8	CA_2A-4A-29A	B29 Only SCC	No	Yes
3CC #9	CA_2A-4A-4A	N/A	4CC #6	Yes
3CC #10	CA_2A-4A-5A	N/A	4CC #7	Yes
3CC #11	CA_2A-5A-66A	N/A	No	Yes
3CC #12	CA_2A-5B	N/A	4CC #9	Yes
3CC #13	CA_2A-12A-12A	N/A	4CC #1	Yes
3CC #14	CA_2A-12A-66A	N/A	4CC #2	Yes
3CC #15	CA_2A-14A-66A	N/A	4CC #3	Yes
3CC #16	CA_2A-29A-66A	B29 Only SCC	4CC #4	Yes
3CC #17	CA_2A-66A-66A	N/A	4CC #10	Yes
3CC #18	CA_2A-66B	N/A	4CC #11	Yes
3CC #19	CA_2A-66C	N/A	4CC #12	Yes
3CC #20	CA_2C-12A	N/A	No	Yes
3CC #21	CA_2C-29A	B29 Only SCC	No	No
3CC #22	CA_2C-5A	N/A	No	Yes
3CC #23	CA_2C-66A	N/A	4CC #28	Yes
3CC #24	CA_4A-12A-12A	N/A	4CC #29	Yes
3CC #25	CA_4A-4A-12A	N/A	4CC #29	Yes
3CC #26	CA_4A-4A-29A	B29 Only SCC	No	No
3CC #27	CA_4A-4A-5A	N/A	4CC #14	Yes
3CC #28	CA_4A-5B	N/A	4CC #15	Yes
3CC #29	CA_5A-5A-66A	N/A	4CC #31	Yes
3CC #30	CA_5A-66A-66A	N/A	4CC #31	Yes
3CC #31	CA_5A-66B	N/A	4CC #32	Yes
3CC #32	CA_5A-66C	N/A	4CC #18	Yes
3CC #33	CA_5B-66A	N/A	4CC #19	Yes
3CC #34	CA_12A-66A-66A	N/A	4CC #20	Yes
3CC #35	CA_12A-66C	N/A	4CC #21	Yes
3CC #36	CA_14A-66A-66A	N/A	4CC #22	Yes
3CC #37	CA_66A-66A-66A	N/A	4CC #24	Yes
3CC #38	CA_66A-66B	N/A	4CC #25	Yes
3CC #39	CA_66A-66C	N/A	4CC #26	Yes
3CC #40	CA_66D	N/A	4CC #27	N/A
3CC #41	CA_29A-66A-66A	B29 Only SCC	4CC #23	Yes

Index	4CC	Restriction	Completely Covered by Measurement Superset	Reverse
4CC #1	CA_2A-2A-12A-12A	N/A	No	Yes
4CC #2	CA_2A-2A-12A-66A	N/A	5CC #1	Yes
4CC #3	CA_2A-2A-14A-66A	N/A	No	Yes
4CC #4	CA_2A-2A-29A-66A	B29 Only SCC	5CC #3	Yes
4CC #5	CA_2A-2A-4A-12A	N/A	No	Yes
4CC #6	CA_2A-2A-4A-4A	N/A	No	Yes
4CC #7	CA_2A-2A-4A-5A	N/A	No	Yes
4CC #8	CA_2A-2A-5A-66A	N/A	5CC #4	Yes
4CC #9	CA_2A-2A-5B	N/A	5CC #7	Yes
4CC #10	CA_2A-2A-66A-66A	N/A	No	Yes
4CC #11	CA_2A-2A-66B	N/A	No	Yes
4CC #12	CA_2A-2A-66C	N/A	No	Yes
4CC #13	CA_2A-4A-4A-12A	N/A	No	Yes
4CC #14	CA_2A-4A-4A-5A	N/A	No	Yes
4CC #15	CA_2A-4A-5B	N/A	No	Yes
4CC #16	CA_2A-5A-66A-66A	N/A	5CC #4	Yes
4CC #17	CA_2A-5A-66B	N/A	5CC #5	Yes
4CC #18	CA_2A-5A-66C	N/A	5CC #6	Yes
4CC #19	CA_2A-5B-66A	N/A	5CC #7	Yes
4CC #20	CA_2A-12A-66A-66A	N/A	5CC #1	No
4CC #21	CA_2A-12A-66C	N/A	No	No
4CC #22	CA_2A-14A-66A-66A	N/A	5CC #2	No
4CC #23	CA_2A-29A-66A-66A	B29 Only SCC	5CC #3	No
4CC #24	CA_2A-66A-66A-66A	N/A	No	No
4CC #25	CA_2A-66A-66B	N/A	5CC #8	No
4CC #26	CA_2A-66A-66C	N/A	5CC #9	No
4CC #27	CA_2A-66D	N/A	No	No
4CC #28	CA_2C-66A-66A	N/A	No	No
4CC #29	CA_4A-4A-12A-12A	N/A	No	No
4CC #30	CA_4A-4A-5B	N/A	No	No
4CC #31	CA_5A-5A-66A-66A	N/A	No	No
4CC #32	CA_5A-5A-66B	N/A	No	No
4CC #33	CA_5A-5A-66C	N/A	No	No
4CC #34	CA_5A-66A-66B	N/A	No	No
4CC #35	CA_5A-66A-66C	N/A	No	No
4CC #36	CA_5A-66D	N/A	No	No
4CC #37	CA_5B-66A-66A	N/A	5CC #10	No
4CC #38	CA_5B-66B	N/A	5CC #11	No
4CC #39	CA_5B-66C	N/A	5CC #12	No
4CC #40	CA_14A-66A-66A-66A	N/A	No	No

Index	5CC	Restriction	Completely Covered by Measurement Superset	Reverse
5CC #1	CA_2A-2A-12A-66A-66A	N/A	No	Yes
5CC #2	CA_2A-2A-14A-66A-66A	N/A	No	Yes
5CC #3	CA_2A-2A-29A-66A-66A	B29 Only SCC	No	Yes
5CC #4	CA_2A-2A-5A-66A-66A	N/A	No	Yes
5CC #5	CA_2A-2A-5A-66B	N/A	No	Yes
5CC #6	CA_2A-2A-5A-66C	N/A	No	Yes
5CC #7	CA_2A-2A-5B-66A	N/A	No	Yes
5CC #8	CA_2A-2A-66A-66B	N/A	No	Yes
5CC #9	CA_2A-2A-66A-66C	N/A	No	Yes
5CC #10	CA_2A-5B-66A-66A	N/A	No	Yes
5CC #11	CA_2A-5B-66B	N/A	No	Yes
5CC #12	CA_2A-5B-66C	N/A	No	Yes
5CC #13	CA_5B-66A-66B	N/A	No	Yes
5CC #14	CA_5B-66A-66C	N/A	No	Yes

Note: Only yellow highlight cells need power measurement according to LTE DL CA SAR test Exclusion in TCB workshop (April 2018).

In applying the power measurement procedures of KDB 941225 D05A for DL CA to qualify for UL SAR test exclusion, power measurement is required only for the CA configuration with the largest aggregated DL CA BW in each frequency band, independently for contiguous and non-contiguous CA; however, if the same frequency band is used for both contiguous and non-contiguous CA, power measurement was performed using the configuration with the largest aggregated BW and maximum output power among contiguous and non-contiguous CA.

C.3.1 Downlink Carrier Aggregation RF Conducted Powers

C.3.1.1 LTE Band 2 as PCC

Combination	PCC									SCC 1				SCC 2				SCC 3				SCC 4				Power	
	Band	BW [MHz]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_2A-4A-29A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B4	20	2175	2132.5	B29	10	9715	722.5	N/A								23.77	23.79
CA_2A-5A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B5	10	2525	881.5	B66	20	66786	2145.0	N/A								23.75	23.79
CA_2C-12A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	898	1959.8	B12	10	5095	737.5	N/A								23.70	23.79
CA_2C-29A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	898	1959.8	B29	10	9715	722.5	N/A								23.71	23.79
CA_2C-5A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	898	1959.8	B5	10	2525	881.5	N/A								23.68	23.79
CA_2A-2A-12A-12A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B12	5	5095	737.5	B12	5	5143	742.3	N/A				23.66	23.79
CA_2A-2A-14A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B14	10	5330	763.0	B66	20	66786	2145.0	N/A				23.70	23.79
CA_2A-2A-4A-12A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B4	20	2175	2132.5	B12	10	5095	737.5	N/A				23.65	23.79
CA_2A-2A-4A-4A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A				23.65	23.79
CA_2A-2A-4A-5A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B4	20	2175	2132.5	B5	10	2525	881.5	N/A				23.61	23.79
CA_2A-2A-66A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	67036	2170.0	N/A				23.71	23.79
CA_2A-2A-66B	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	15	66786	2145.0	B66	5	66879	2154.3	N/A				23.65	23.79
CA_2A-2A-66C	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	66984	2164.8	N/A				23.66	23.79
CA_2A-4A-4A-12A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B4	20	2050	2120.0	B4	20	2300	2145.0	B12	10	5095	737.5	N/A				23.71	23.79
CA_2A-4A-4A-5A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B4	20	2050	2120.0	B4	20	2300	2145.0	B5	10	2525	881.5	N/A				23.65	23.79
CA_2A-4A-5B	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B4	20	2050	2120.0	B5	10	2525	881.5	B5	5	2453	874.3	N/A				23.66	23.79
CA_2A-12A-66C	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B12	10	5095	737.5	B66	20	66786	2145.0	B66	20	66984	2164.8	N/A				23.79	23.79
CA_2A-66A-66A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B66	20	67036	2170.0	N/A				23.54	23.79
CA_2A-66D	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B66	20	66786	2145.0	B66	20	66588	2125.2	B66	20	66984	2164.8	N/A				23.58	23.79
CA_2C-66A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	898	1959.8	B66	20	66786	2145.0	B66	20	66536	2120.0	N/A				23.61	23.79
CA_2A-2A-12A-66A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B12	10	5095	737.5	B66	20	66786	2145.0	B66	20	67036	2170.0	23.66	23.79
CA_2A-2A-14A-66A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B14	10	5330	763.0	B66	20	66786	2145.0	B66	20	67036	2170.0	23.70	23.79
CA_2A-2A-29A-66A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B29	10	9715	722.5	B66	20	66786	2145.0	B66	20	67036	2170.0	23.64	23.79
CA_2A-2A-5A-66A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B66	20	66786	2145.0	B66	20	67036	2170.0	23.61	23.79
CA_2A-2A-5A-66B	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B66	15	66786	2145.0	B66	5	66879	2154.3	23.70	23.79
CA_2A-2A-5A-66C	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B66	20	66786	2145.0	B66	20	66984	2164.8	23.68	23.79
CA_2A-2A-5B-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B5	5	2453	874.3	B66	20	66786	2145.0	23.66	23.79
CA_2A-2A-66A-66B	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66536	2120.0	B66	15	67061	2172.5	B66	5	66968	2163.2	23.64	23.79
CA_2A-2A-66A-66C	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66536	2120.0	B66	20	67036	2170.0	B66	20	66838	2150.2	23.67	23.79
CA_2A-5B-66A-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B5	10	2525	881.5	B5	5	2453	874.3	B66	20	66786	2145.0	B66	20	67036	2170.0	23.68	23.79
CA_2A-5B-66B	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B5	10	2525	881.5	B5	5	2453	874.3	B66	15	66786	2145.0	B66	5	66879	2154.3	23.69	23.79
CA_2A-5B-66C	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B5	10	2525	881.5	B5	5	2453	874.3	B66	20	66786	2145.0	B66	20	66984	2164.8	23.64	23.79

C.3.1.2 LTE Band 4 as PCC

Combination	PCC									SCC 1					SCC 2					SCC 3					SCC 4					Power	
	Band	BW [MHz]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.		Band	BW [MHz]	(DL) Ch.	(DL) Freq.		Band	BW [MHz]	(DL) Ch.	(DL) Freq.		Band	BW [MHz]	(DL) Ch.	(DL) Freq.		LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_2A-4A-29A	B4	20	20175	1732.5	QPSK	1	0	2175	2132.5	B2	20	900	1960.0		B29	10	9715	722.5		N/A										23.71	23.73
CA_4A-4A-29A	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B29	10	9715	722.5		N/A										23.45	23.59
CA_2A-2A-4A-12A	B4	20	20175	1732.5	QPSK	1	0	2175	2132.5	B2	20	900	1960.0		B2	20	1100	1980.0		B12	10	5095	737.5		N/A					23.70	23.73
CA_2A-2A-4A-4A	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B2	20	900	1960.0		B2	20	1100	1980.0		N/A					23.43	23.59
CA_2A-2A-4A-5A	B4	20	20175	1732.5	QPSK	1	0	2175	2132.5	B2	20	900	1960.0		B2	20	1100	1980.0		B5	10	2525	881.5		N/A					23.66	23.73
CA_2A-4A-4A-12A	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B2	20	900	1960.0		B12	10	5095	737.5		N/A					23.45	23.59
CA_2A-4A-4A-5A	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B2	20	900	1960.0		B5	10	2525	881.5		N/A					23.44	23.59
CA_2A-4A-4A-5B	B4	20	20175	1732.5	QPSK	1	0	2175	2132.5	B2	20	900	1960.0		B5	10	2525	881.5		B5	5	2453	874.3		N/A					23.62	23.73
CA_4A-4A-12A-12A	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B12	5	5095	737.5		B12	5	5143	742.3		N/A					23.50	23.59
CA_4A-4A-5B	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B5	10	2525	881.5		B5	5	2453	874.3		N/A					23.51	23.59

C.3.1.3 LTE Band 5 as PCC

Combination	PCC									SCC 1				SCC 2				SCC 3				SCC 4				Power	
	Band	BW [㎒]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_2A-5A-66A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B66	20	66786	2145.0	N/A								23.80	23.86
CA_2C-5A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1098	1979.8	N/A								23.81	23.86
CA_2A-2A-4A-5A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B4	20	2175	2132.5	N/A				23.77	23.86
CA_2A-4A-4A-5A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A				23.70	23.86
CA_2A-4A-5B	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B5	5	2453	874.3	B2	20	1100	1980.0	B4	20	2175	2132.5	N/A				23.75	23.86
CA_4A-4A-5B	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B5	5	2453	874.3	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A				23.77	23.86
CA_5A-5A-66A-66A	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2600	889.0	B66	20	66786	2145.0	B66	20	67036	2170.0	N/A				23.66	23.72
CA_5A-5A-66B	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2600	889.0	B66	15	66786	2145.0	B66	5	66879	2154.3	N/A				23.60	23.72
CA_5A-5A-66C	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2600	889.0	B66	20	66786	2145.0	B66	20	66984	2164.8	N/A				23.61	23.72
CA_5A-66A-66B	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B66	20	66536	2120.0	B66	15	67061	2172.5	B66	5	66968	2163.2	N/A				23.68	23.86
CA_5A-66A-66C	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B66	20	66536	2120.0	B66	20	67036	2170.0	B66	20	66838	2150.2	N/A				23.69	23.86
CA_5A-66D	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B66	20	66786	2145.0	B66	20	66588	2125.2	B66	20	66984	2164.8	N/A				23.77	23.86
CA_2A-2A-5A-66A-66A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	67036	2170.0	23.75	23.86
CA_2A-2A-5A-66B	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	15	66786	2145.0	B66	5	66879	2154.3	23.79	23.86
CA_2A-2A-5A-66C	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	66984	2164.8	23.74	23.86
CA_2A-2A-5B-66A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B5	5	2453	874.3	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	23.72	23.86
CA_2A-5B-66A-66A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B5	5	2453	874.3	B2	20	900	1960.0	B66	20	66786	2145.0	B66	20	67036	2170.0	23.70	23.86
CA_2A-5B-66B	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B5	5	2453	874.3	B2	20	900	1960.0	B66	15	67061	2172.5	B66	5	66968	2163.2	23.75	23.86
CA_2A-5B-66C	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B5	5	2453	874.3	B2	20	900	1960.0	B66	20	67036	2170.0	B66	20	66838	2150.2	23.77	23.86
CA_5B-66A-66B	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B5	5	2453	874.3	B66	20	66536	2120.0	B66	15	67061	2172.5	B66	5	66968	2163.2	23.74	23.86
CA_5B-66A-66C	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B5	5	2453	874.3	B66	20	66536	2120.0	B66	20	67036	2170.0	B66	20	66838	2150.2	23.71	23.86

C.3.1.4 LTE Band 12 as PCC

Combination	PCC									SCC 1				SCC 2				SCC 3				SCC 4				Power	
	Band	BW [㎒]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_2C-12A	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B2	20	1098	1979.8	N/A								23.80	23.87
CA_2A-2A-12A-12A	B12	5	23035	701.5	QPSK	1	12	5035	731.5	B12	5	5155	743.5	B2	20	900	1960.0	B2	20	1100	1980.0	N/A				23.81	23.88
CA_2A-2A-4A-12A	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B2	20	1100	1980.0	B4	20	2175	2132.5	N/A				23.82	23.87
CA_2A-4A-4A-12A	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A				23.79	23.87
CA_2A-12A-66C	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B66	20	66786	2145.0	B66	20	66984	2164.8	N/A				23.82	23.87
CA_4A-4A-12A-12A	B12	5	23035	701.5	QPSK	1	12	5035	731.5	B12	5	5155	743.5	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A				23.80	23.88
CA_2A-2A-12A-66A-66A	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	67036	2170.0	23.81	23.87

C.3.1.5 LTE Band 14 as PCC

Combination	PCC									SCC 1				SCC 2				SCC 3				SCC 4				Power	
	Band	BW [MHz]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_2A-2A-14A-66A	B14	10	23330	793.0	QPSK	1	0	5330	763.0	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	N/A				23.88	23.93
CA_14A-66A-66A-66A	B14	10	23330	793.0	QPSK	1	0	5330	763.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B66	20	67036	2170.0	N/A				23.85	23.93
CA_2A-2A-14A-66A-66A	B14	10	23330	793.0	QPSK	1	0	5330	763.0	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	66536	2120.0	23.87	23.93

C.3.1.6 LTE Band 66 as PCC

Combination	PCC									SCC 1				SCC 2				SCC 3				SCC 4				Power	
	Band	BW [MHz]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_2A-5A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B2	20	900	1960.0	B5	10	2525	881.5	N/A								23.50	23.64
CA_2A-2A-14A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B2	20	900	1960.0	B2	20	1100	1980.0	B14	10	5330	763.0	N/A				23.55	23.64
CA_2A-2A-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	N/A				23.61	23.64
CA_2A-2A-66B	B66	15	132597	1772.5	QPSK	1	74	67061	2172.5	B66	5	66968	2163.2	B2	20	900	1960.0	B2	20	1100	1980.0	N/A				23.58	23.81
CA_2A-2A-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B2	20	900	1960.0	B2	20	1100	1980.0	N/A				23.60	23.64
CA_2A-12A-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B2	20	900	1960.0	B12	10	5095	737.5	N/A				23.57	23.64
CA_2A-66A-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B2	20	900	1960.0	N/A				23.58	23.64
CA_2A-66D	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B66	20	66640	2130.4	B2	20	900	1960.0	N/A				23.54	23.64
CA_2C-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1098	1979.8	N/A				23.54	23.64
CA_5A-5A-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B5	10	2450	874.0	B5	10	2600	889.0	N/A				23.58	23.64
CA_5A-5A-66B	B66	15	132597	1772.5	QPSK	1	74	67061	2172.5	B66	5	66968	2163.2	B5	10	2450	874.0	B5	10	2600	889.0	N/A				23.77	23.81
CA_5A-5A-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B5	10	2450	874.0	B5	10	2600	889.0	N/A				23.58	23.64
CA_5A-66A-66B	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	15	66511	2117.5	B66	5	66604	2126.8	B5	10	2600	889.0	N/A				23.59	23.64
CA_5A-66A-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B66	20	66734	2139.8	B5	10	2600	889.0	N/A				23.54	23.64
CA_5A-66D	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B66	20	66640	2130.4	B5	10	2600	889.0	N/A				23.57	23.64
CA_14A-66A-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B14	10	5330	763.0	N/A				23.58	23.64
CA_2A-2A-12A-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B12	10	5095	737.5	23.59	23.64
CA_2A-2A-14A-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B14	10	5330	763.0	23.50	23.64
CA_2A-2A-29A-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B29	10	9715	722.5	23.51	23.64
CA_2A-2A-5A-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2600	889.0	23.52	23.64
CA_2A-2A-5A-66B	B66	15	132597	1772.5	QPSK	1	74	67061	2172.5	B66	5	66968	2163.2	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2600	889.0	23.77	23.81
CA_2A-2A-5A-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2600	889.0	23.58	23.64
CA_2A-2A-5B-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2450	874.0	B5	10	2549	883.9	23.54	23.64
CA_2A-2A-66A-66B	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	15	66511	2117.5	B66	5	66604	2126.8	B2	20	900	1960.0	B2	20	1100	1980.0	23.56	23.64
CA_2A-2A-66A-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B66	20	66734	2139.8	B2	20	900	1960.0	B2	20	1100	1980.0	23.54	23.64
CA_2A-5B-66A-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B5	10	2525	881.5	B5	5	2453	874.3	23.49	23.64
CA_2A-5B-66B	B66	15	132597	1772.5	QPSK	1	74	67061	2172.5	B66	5	66968	2163.2	B2	20	900	1960.0	B5	10	2525	881.5	B5	5	2453	874.3	23.69	23.81
CA_2A-5B-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B2	20	900	1960.0	B5	10	2525	881.5	B5	5	2453	874.3	23.54	23.64
CA_5B-66A-66B	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	15	66511	2117.5	B66	5	66604	2126.8	B5	10	2525	881.5	B5	5	2453	874.3	23.58	23.64
CA_5B-66A-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B66	20	66734	2139.8	B5	10	2525	881.5	B5	5	2453	874.3	23.52	23.64

C.4 LTE Downlink Carrier Aggregation with 4X4 MIMO

This device supports downlink 4x4 MIMO operations for some LTE bands.

Uplink transmission is limited to a single output stream. When carrier aggregation was applicable, the general test selection and setup procedures described in Appendix C.1 were applied.

According to LTE Test conditions in TCB workshop(May, 2017), SAR is excluded for LTE downlink 4x4 MIMO operation when uplink output with DL MIMO does not exceed highest uplink output power configuration without DL MIMO by more than a 1/4 dB. And for DL MIMO with carrier aggregation, the same SAR test exclusion procedure is considered.

Index	2CC	Restriction	Completely Covered by Measurement Superset	Reverse
2CC #1	CA_[2A]-[2A]	N/A	3CC #1	N/A
2CC #2	CA_[2C]	N/A	3CC #20	N/A
2CC #3	CA_[2A]-[4A]	N/A	3CC #7	Yes
2CC #4	CA_[2A]-5A	N/A	3CC #11	Yes
2CC #5	CA_[2A]-12A	N/A	3CC #13	Yes
2CC #6	CA_[2A]-14A	N/A	3CC #15	Yes
2CC #7	CA_[2A]-29A	B29 SCC Only	3CC #16	N/A
2CC #8	CA_[2A]-[66A]	N/A	3CC #17	Yes
2CC #9	CA_[4A]-[4A]	N/A	3CC #25	N/A
2CC #10	CA_[4A]-5A	N/A	3CC #27	Yes
2CC #11	CA_[4A]-12A	N/A	3CC #24	Yes
2CC #12	CA_[4A]-29A	B29 SCC Only	3CC #26	N/A
2CC #13	CA_5A-[66A]	N/A	3CC #29	Yes
2CC #14	CA_12A-[66A]	N/A	3CC #34	Yes
2CC #15	CA_14A-[66A]	N/A	3CC #36	Yes
2CC #16	CA_[66A]-[66A]	N/A	3CC #37	N/A
2CC #17	CA_[66B]	N/A	3CC #31	N/A
2CC #18	CA_[66C]	N/A	3CC #32	N/A

Index	3CC	Restriction	Completely Covered by Measurement Superset	Reverse
3CC #1	CA_[2A]-[2A]-12A	N/A	4CC #1	Yes
3CC #2	CA_[2A]-[2A]-14A	N/A	4CC #3	Yes
3CC #3	CA_[2A]-[2A]-29A	B29 Only SCC	4CC #4	Yes
3CC #4	CA_[2A]-[2A]-[4A]	N/A	4CC #5	Yes
3CC #5	CA_[2A]-[2A]-5A	N/A	4CC #8	Yes
3CC #6	CA_[2A]-[2A]-[66A]	N/A	4CC #10	Yes
3CC #7	CA_[2A]-[4A]-12A	N/A	4CC #5	Yes
3CC #8	CA_[2A]-[4A]-29A	B29 Only SCC	No	Yes
3CC #9	CA_[2A]-[4A]-[4A]	N/A	4CC #6	Yes
3CC #10	CA_[2A]-[4A]-5A	N/A	4CC #7	Yes
3CC #11	CA_[2A]-5A-[66A]	N/A	No	Yes
3CC #12	CA_[2A]-5B	N/A	4CC #9	Yes
3CC #13	CA_[2A]-12A-12A	N/A	4CC #1	Yes
3CC #14	CA_[2A]-12A-[66A]	N/A	4CC #2	Yes
3CC #15	CA_[2A]-14A-[66A]	N/A	4CC #3	Yes
3CC #16	CA_[2A]-29A-[66A]	B29 Only SCC	4CC #4	Yes
3CC #17	CA_[2A]-[66A]-[66A]	N/A	4CC #10	Yes
3CC #18	CA_[2A]-[66B]	N/A	4CC #11	Yes
3CC #19	CA_[2A]-[66C]	N/A	4CC #12	Yes
3CC #20	CA_[2C]-12A	N/A	No	Yes
3CC #21	CA_[2C]-29A	B29 Only SCC	No	Yes
3CC #22	CA_[2C]-5A	N/A	No	Yes
3CC #23	CA_[2C]-[66A]	N/A	4CC #28	Yes
3CC #24	CA_[4A]-12A-12A	N/A	4CC #29	Yes
3CC #25	CA_[4A]-[4A]-12A	N/A	4CC #29	Yes
3CC #26	CA_[4A]-[4A]-29A	B29 Only SCC	No	Yes
3CC #27	CA_[4A]-[4A]-5A	N/A	4CC #14	Yes
3CC #28	CA_[4A]-5B	N/A	4CC #15	Yes
3CC #29	CA_5A-5A-[66A]	N/A	4CC #31	Yes
3CC #30	CA_5A-[66A]-[66A]	N/A	4CC #31	Yes
3CC #31	CA_5A-[66B]	N/A	4CC #32	Yes
3CC #32	CA_5A-[66C]	N/A	4CC #18	Yes
3CC #33	CA_5B-[66A]	N/A	4CC #19	Yes
3CC #34	CA_12A-[66A]-[66A]	N/A	4CC #20	Yes
3CC #35	CA_12A-[66C]	N/A	4CC #21	Yes
3CC #36	CA_14A-[66A]-[66A]	N/A	4CC #22	Yes
3CC #37	CA_[66A]-[66A]-[66A]	N/A	4CC #24	Yes
3CC #38	CA_[66A]-[66B]	N/A	4CC #25	Yes
3CC #39	CA_[66A]-[66C]	N/A	4CC #26	Yes
3CC #40	CA_[66D]	N/A	4CC #27	N/A
3CC #41	CA_29A-[66A]-[66A]	B29 Only SCC	4CC #23	Yes

Index	4CC	Restriction	Completely Covered by Measurement Superset	Reverse
4CC #1	CA_[2A]-[2A]-12A-12A	N/A	No	Yes
4CC #2	CA_[2A]-[2A]-12A-[66A]	N/A	5CC #1	Yes
4CC #3	CA_[2A]-[2A]-14A-[66A]	N/A	No	Yes
4CC #4	CA_[2A]-[2A]-29A-[66A]	B29 Only SCC	5CC #3	Yes
4CC #5	CA_[2A]-[2A]-[4A]-12A	N/A	No	Yes
4CC #6	CA_[2A]-[2A]-[4A]-[4A]	N/A	No	Yes
4CC #7	CA_[2A]-[2A]-[4A]-5A	N/A	No	Yes
4CC #8	CA_[2A]-[2A]-5A-[66A]	N/A	5CC #4	Yes
4CC #9	CA_[2A]-[2A]-5B	N/A	5CC #7	Yes
4CC #10	CA_[2A]-[2A]-[66A]-[66A]	N/A	No	Yes
4CC #11	CA_[2A]-[2A]-[66B]	N/A	No	Yes
4CC #12	CA_[2A]-[2A]-[66C]	N/A	No	Yes
4CC #13	CA_[2A]-[4A]-[4A]-12A	N/A	No	Yes
4CC #14	CA_[2A]-[4A]-[4A]-5A	N/A	No	Yes
4CC #15	CA_[2A]-[4A]-5B	N/A	No	Yes
4CC #16	CA_[2A]-5A-[66A]-[66A]	N/A	5CC #4	Yes
4CC #17	CA_[2A]-5A-[66B]	N/A	5CC #5	Yes
4CC #18	CA_[2A]-5A-[66C]	N/A	5CC #6	Yes
4CC #19	CA_[2A]-5B-[66A]	N/A	5CC #7	Yes
4CC #20	CA_[2A]-12A-[66A]-[66A]	N/A	5CC #1	No
4CC #21	CA_[2A]-12A-[66C]	N/A	No	No
4CC #22	CA_[2A]-14A-[66A]-[66A]	N/A	5CC #2	No
4CC #23	CA_[2A]-29A-[66A]-[66A]	B29 Only SCC	5CC #3	No
4CC #24	CA_[2A]-[66A]-[66A]-66A	N/A	No	No
4CC #25	CA_2A-[66A]-[66A]-[66A]	N/A	No	No
4CC #26	CA_[2A]-[66A]-[66B]	N/A	5CC #8	No
4CC #27	CA_[2A]-[66A]-[66C]	N/A	5CC #9	No
4CC #28	CA_[2A]-[66D]	N/A	No	No
4CC #29	CA_[2C]-[66A]-[66A]	N/A	No	No
4CC #30	CA_[4A]-[4A]-12A-12A	N/A	No	No
4CC #31	CA_[4A]-[4A]-5B	N/A	No	No
4CC #32	CA_5A-5A-[66A]-[66A]	N/A	No	No
4CC #33	CA_5A-5A-[66B]	N/A	No	No
4CC #34	CA_5A-5A-[66C]	N/A	No	No
4CC #35	CA_5A-[66A]-[66B]	N/A	No	No
4CC #36	CA_5A-[66A]-[66C]	N/A	No	No
4CC #37	CA_5A-[66D]	N/A	No	No
4CC #38	CA_5B-[66A]-[66A]	N/A	5CC #10	No
4CC #39	CA_5B-[66B]	N/A	5CC #11	No
4CC #40	CA_5B-[66C]	N/A	5CC #12	No
4CC #41	CA_14A-[66A]-[66A]-[66A]	N/A	No	No

Index	5CC	Restriction	Completely Covered by Measurement Superset	Reverse
5CC #1	CA_[2A]-[2A]-12A-[66A]-66A	N/A	No	Yes
5CC #2	CA_2A-[2A]-12A-[66A]-[66A]	N/A	No	Yes
5CC #3	CA_[2A]-[2A]-14A-[66A]-66A	N/A	No	Yes
5CC #4	CA_2A-[2A]-14A-[66A]-[66A]	N/A	No	Yes
5CC #5	CA_[2A]-[2A]-29A-[66A]-66A	B29 Only SCC	No	Yes
5CC #6	CA_2A-[2A]-29A-[66A]-[66A]	B29 Only SCC	No	Yes
5CC #7	CA_[2A]-[2A]-5A-[66A]-66A	N/A	No	Yes
5CC #8	CA_2A-[2A]-5A-[66A]-[66A]	N/A	No	Yes
5CC #9	CA_[2A]-[2A]-5A-66B	N/A	No	Yes
5CC #10	CA_2A-[2A]-5A-[66B]	N/A	No	Yes
5CC #11	CA_[2A]-[2A]-5A-66C	N/A	No	Yes
5CC #12	CA_2A-[2A]-5A-[66C]	N/A	No	Yes
5CC #13	CA_[2A]-[2A]-5B-[66A]	N/A	No	Yes
5CC #14	CA_[2A]-[2A]-[66A]-66B	N/A	No	Yes
5CC #15	CA_2A-[2A]-66A-[66B]	N/A	No	Yes
5CC #16	CA_[2A]-[2A]-[66A]-66C	N/A	No	Yes
5CC #17	CA_2A-[2A]-66A-[66C]	N/A	No	Yes
5CC #18	CA_[2A]-5B-[66A]-[66A]	N/A	No	Yes
5CC #19	CA_[2A]-5B-[66B]	N/A	No	Yes
5CC #20	CA_[2A]-5B-[66C]	N/A	No	Yes
5CC #21	CA_5B-[66A]-[66B]	N/A	No	Yes
5CC #22	CA_5B-[66A]-[66C]	N/A	No	Yes

Note: “[ ]” is 4X4 MIMO Configuration.

C.4.1 Downlink Carrier Aggregation RF Conducted Powers

C.4.1.1 LTE 4X4 MIMO DL Standalone Powers

LTE Band	BW [MHz]	Ch.	Freq. [MHz]	Mod.	RB Size	RB Offset	4X4 DL MIMO Tx. Power (dBm)	Single Antenna Tx Power (dBm)
2	20	18700	1860.0	QPSK	1	49	23.71	23.79
4	20	20175	1732.5	QPSK	1	0	23.66	23.73
66	20	132572	1770.0	QPSK	1	0	23.55	23.64

C.4.1.2 LTE Band 2 as PCC

Combination	PCC									SCC 1					SCC 2					SCC 3					SCC 4				Power	
	Band	BW [MHz]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	Band	BW [MHz]	(DL) Ch.	(DL) Freq.	LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_[2A]-[4A]-29A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B4	20	2175	2132.5	B29	10	9715	722.5	N/A								23.77	23.79
CA_[2A]-5A-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B5	10	2525	881.5	B66	20	66786	2145.0	N/A								23.70	23.79
CA_[2C]-12A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	898	1959.8	B12	10	5095	737.5	N/A								23.58	23.79
CA_[2C]-29A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	898	1959.8	B29	10	9715	722.5	N/A								23.66	23.79
CA_[2C]-5A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	898	1959.8	B5	10	2525	881.5	N/A								23.69	23.79
CA_[2A]-[2A]-12A-12A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B12	5	5095	737.5	B12	5	5143	742.3	N/A				23.71	23.79
CA_[2A]-[2A]-14A-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B14	10	5330	763.0	B66	20	66786	2145.0	N/A				23.66	23.79
CA_[2A]-[2A]-[4A]-12A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B4	20	2175	2132.5	B12	10	5095	737.5	N/A				23.62	23.79
CA_[2A]-[2A]-[4A]-[4A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A				23.72	23.79
CA_[2A]-[2A]-[4A]-5A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B4	20	2175	2132.5	B5	10	2525	881.5	N/A				23.70	23.79
CA_[2A]-[2A]-[66A]-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	67036	2170.0	N/A				23.72	23.79
CA_[2A]-[2A]-[66B]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	15	66786	2145.0	B66	5	66879	2154.3	N/A				23.74	23.79
CA_[2A]-[2A]-[66C]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	66984	2164.8	N/A				23.70	23.79
CA_[2A]-[4A]-[4A]-12A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B4	20	2050	2120.0	B4	20	2300	2145.0	B12	10	5095	737.5	N/A				23.68	23.79
CA_[2A]-[4A]-[4A]-5A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B4	20	2050	2120.0	B4	20	2300	2145.0	B5	10	2525	881.5	N/A				23.66	23.79
CA_[2A]-[4A]-5B	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B4	20	2050	2120.0	B5	10	2450	874.0	B5	10	2549	883.9	N/A				23.70	23.79
CA_[2A]-12A-[66C]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B12	10	5095	737.5	B66	20	66786	2145.0	B66	20	66984	2164.8	N/A				23.72	23.79
CA_[2A]-[66A]-[66A]-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B66	20	67036	2170.0	N/A				23.77	23.79
CA_2A-[66A]-[66A]-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B66	20	67036	2170.0	N/A				23.74	23.79
CA_[2A]-[66D]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B66	20	66786	2145.0	B66	20	66588	2125.2	B66	20	66984	2164.8	N/A				23.72	23.79
CA_[2C]-[66A]-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	898	1959.8	B66	20	66786	2145.0	B66	20	66536	2120.0	N/A				23.70	23.79
CA_[2A]-[2A]-12A-[66A]-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B12	10	5095	737.5	B66	20	66786	2145.0	B66	20	67036	2170.0	23.74	23.79
CA_2A-[2A]-12A-[66A]-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B12	10	5095	737.5	B66	20	66786	2145.0	B66	20	67036	2170.0	23.68	23.79
CA_[2A]-[2A]-14A-[66A]-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B14	10	5330	763.0	B66	20	66786	2145.0	B66	20	67036	2170.0	23.70	23.79
CA_2A-[2A]-14A-[66A]-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B14	10	5330	763.0	B66	20	66786	2145.0	B66	20	67036	2170.0	23.72	23.79
CA_[2A]-[2A]-29A-[66A]-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B29	10	9715	722.5	B66	20	66786	2145.0	B66	20	67036	2170.0	23.74	23.79
CA_2A-[2A]-29A-[66A]-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B29	10	9715	722.5	B66	20	66786	2145.0	B66	20	67036	2170.0	23.70	23.79
CA_[2A]-[2A]-5A-[66A]-66A	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B66	20	66786	2145.0	B66	20	67036	2170.0	23.65	23.79
CA_2A-[2A]-5A-[66A]-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B66	20	66786	2145.0	B66	20	67036	2170.0	23.68	23.79
CA_[2A]-[2A]-5A-66B	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B66	15	66786	2145.0	B66	5	66879	2154.3	23.66	23.79
CA_2A-[2A]-5A-[66B]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B66	15	66786	2145.0	B66	5	66879	2154.3	23.69	23.79
CA_[2A]-[2A]-5A-66C	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B66	20	66786	2145.0	B66	20	66984	2164.8	23.69	23.79
CA_2A-[2A]-5A-[66C]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B66	20	66786	2145.0	B66	20	66984	2164.8	23.70	23.79
CA_[2A]-[2A]-5B-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B5	10	2525	881.5	B5	5	2597	888.7	B66	20	66786	2145.0	23.70	23.79
CA_[2A]-[2A]-[66A]-66B	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66536	2120.0	B66	15	67061	2172.5	B66	5	66968	2163.2	23.71	23.79
CA_2A-[2A]-66A-[66B]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66536	2120.0	B66	15	67061	2172.5	B66	5	66968	2163.2	23.64	23.79
CA_[2A]-[2A]-[66A]-66C	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66536	2120.0	B66	20	67036	2170.0	B66	20	66838	2150.2	23.70	23.79
CA_2A-[2A]-66A-[66C]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B2	20	1100	1980.0	B66	20	66536	2120.0	B66	20	67036	2170.0	B66	20	66838	2150.2	23.65	23.79
CA_[2A]-5B-[66A]-[66A]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B5	10	2525	881.5	B5	5	2597	888.7	B66	20	66786	2145.0	B66	20	67036	2170.0	23.68	23.79
CA_[2A]-5B-[66B]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B5	10	2450	874.0	B5	10	2549	883.9	B66	15	66786	2145.0	B66	5	66879	2154.3	23.71	23.79
CA_[2A]-5B-[66C]	B2	20	18700	1860.0	QPSK	1	49	700	1940.0	B5	10	2450	874.0	B5	10	2549	883.9	B66	20	66786	2145.0	B66	20	66984	2164.8	23.66	23.79

C.4.1.2 LTE Band 4 as PCC

Combination	PCC									SCC 1					SCC 2					SCC 3					SCC 4					Power	
	Band	BW [㎒]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.		Band	BW [㎒]	(DL) Ch.	(DL) Freq.		Band	BW [㎒]	(DL) Ch.	(DL) Freq.		Band	BW [㎒]	(DL) Ch.	(DL) Freq.		LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_[2A]-[4A]-29A	B4	20	20175	1732.5	QPSK	1	0	2175	2132.5	B2	20	900	1960.0		B29	10	9715	722.5		N/A										23.71	23.73
CA_[4A]-[4A]-29A	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B29	10	9715	722.5		N/A										23.52	23.59
CA_[2A]-[2A]-[4A]-12A	B4	20	20175	1732.5	QPSK	1	0	2175	2132.5	B2	20	900	1960.0		B2	20	1100	1980.0		B12	10	5095	737.5		N/A					23.68	23.73
CA_[2A]-[2A]-[4A]-[4A]	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B2	20	900	1960.0		B2	20	1100	1980.0		N/A					23.54	23.59
CA_[2A]-[2A]-[4A]-5A	B4	20	20175	1732.5	QPSK	1	0	2175	2132.5	B2	20	900	1960.0		B2	20	1100	1980.0		B5	10	2525	881.5		N/A					23.68	23.73
CA_[2A]-[4A]-[4A]-12A	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B2	20	900	1960.0		B12	10	5095	737.5		N/A					23.52	23.59
CA_[2A]-[4A]-[4A]-5A	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B2	20	900	1960.0		B5	10	2525	881.5		N/A					23.50	23.59
CA_[2A]-[4A]-5B	B4	20	20175	1732.5	QPSK	1	0	2175	2132.5	B2	20	900	1960.0		B5	10	2525	881.5		B5	5	2597	888.7		N/A					23.66	23.73
CA_[4A]-[4A]-12A-12A	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B12	5	5095	737.5		B12	5	5143	742.3		N/A					23.51	23.59
CA_[4A]-[4A]-5B	B4	20	20050	1720.0	QPSK	1	0	2050	2120.0	B4	20	2300	2145.0		B5	10	2525	881.5		B5	5	2597	888.7		N/A					23.54	23.59

C.4.1.3 LTE Band 5 as PCC

Combination	PCC									SCC 1					SCC 2					SCC 3					SCC 4					Power	
	Band	BW [㎒]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_[2A]-5A-[66A]	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B66	20	66786	2145.0	N/A											23.71	23.86
CA_[2C]-5A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1098	1979.8	N/A											23.77	23.86
CA_[2A]-[2A]-[4A]-5A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B4	20	2175	2132.5	N/A							23.80	23.86
CA_[2A]-[4A]-[4A]-5A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A							23.75	23.86
CA_[2A]-[4A]-5B	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2549	883.9	B2	20	1100	1980.0	B4	20	2175	2132.5	N/A							23.66	23.72
CA_[4A]-[4A]-5B	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2549	883.9	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A							23.65	23.72
CA_5A-5A-[66A]-[66A]	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2600	889.0	B66	20	66786	2145.0	B66	20	67036	2170.0	N/A							23.64	23.72
CA_5A-5A-[66B]	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2600	889.0	B66	15	66786	2145.0	B66	5	66879	2154.3	N/A							23.59	23.72
CA_5A-5A-[66C]	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2600	889.0	B66	20	66786	2145.0	B66	20	66984	2164.8	N/A							23.60	23.72
CA_5A-[66A]-[66B]	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B66	20	66536	2120.0	B66	15	67061	2172.5	B66	5	66968	2163.2	N/A							23.71	23.86
CA_5A-[66A]-[66C]	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B66	20	66536	2120.0	B66	20	67036	2170.0	B66	20	66838	2150.2	N/A							23.80	23.86
CA_5A-[66D]	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B66	20	66786	2145.0	B66	20	66588	2125.2	B66	20	66984	2164.8	N/A							23.79	23.86
CA_[2A]-[2A]-5A-[66A]-66A	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	67036	2170.0				23.77	23.86
CA_2A-[2A]-5A-[66A]-[66A]	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	67036	2170.0				23.75	23.86
CA_[2A]-[2A]-5A-66B	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	15	66786	2145.0	B66	5	66879	2154.3				23.70	23.86
CA_2A-[2A]-5A-[66B]	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	15	66786	2145.0	B66	5	66879	2154.3				23.65	23.86
CA_[2A]-[2A]-5A-66C	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	66984	2164.8				23.71	23.86
CA_2A-[2A]-5A-[66C]	B5	10	20525	836.5	QPSK	1	25	2525	881.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	66984	2164.8				23.77	23.86
CA_[2A]-[2A]-5B-[66A]	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2549	883.9	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0				23.65	23.72
CA_[2A]-5B-[66A]-[66A]	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2549	883.9	B2	20	900	1960.0	B66	20	66786	2145.0	B66	20	67036	2170.0				23.60	23.72
CA_[2A]-5B-[66B]	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2549	883.9	B2	20	900	1960.0	B66	15	67061	2172.5	B66	5	66968	2163.2				23.62	23.72
CA_[2A]-5B-[66C]	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2549	883.9	B2	20	900	1960.0	B66	20	67036	2170.0	B66	20	66838	2150.2				23.60	23.72
CA_5B-[66A]-[66B]	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2549	883.9	B66	20	66536	2120.0	B66	15	67061	2172.5	B66	5	66968	2163.2				23.66	23.72
CA_5B-[66A]-[66C]	B5	10	20450	829.0	QPSK	1	0	2450	874.0	B5	10	2549	883.9	B66	20	66536	2120.0	B66	20	67036	2170.0	B66	20	66838	2150.2				23.67	23.72

C.4.1.4 LTE Band 12 as PCC

Combination	PCC									SCC 1					SCC 2					SCC 3					SCC 4					Power	
	Band	BW [㎒]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_[2C]-12A	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B2	20	1098	1979.8	N/A											23.85	23.87
CA_[2A]-[2A]-12A-12A	B12	5	23035	701.5	QPSK	1	12	5035	731.5	B12	5	5155	743.5	B2	20	900	1960.0	B2	20	1100	1980.0	N/A							23.79	23.88
CA_[2A]-[2A]-[4A]-12A	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B2	20	1100	1980.0	B4	20	2175	2132.5	N/A							23.80	23.87
CA_[2A]-[4A]-[4A]-12A	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A							23.81	23.87
CA_[2A]-12A-[66C]	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B66	20	66786	2145.0	B66	20	66984	2164.8	N/A							23.79	23.87
CA_[4A]-[4A]-12A-12A	B12	5	23035	701.5	QPSK	1	12	5035	731.5	B12	5	5155	743.5	B4	20	2050	2120.0	B4	20	2300	2145.0	N/A							23.82	23.88
CA_[2A]-[2A]-12A-[66A]-66A	B12	10	23095	707.5	QPSK	1	0	5095	737.5	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	67036	2170.0				23.79	23.87

C.4.1.5 LTE Band 14 as PCC

Combination	PCC									SCC 1				SCC 2				SCC 3				SCC 4				Power	
	Band	BW [MHz]	(UL) Ch.	(UL) Freq. [MHz]	Mod.	(UL) RB Size	(UL) RB Offset	(DL) Ch.	(DL) Freq. [MHz]	Band	BW [MHz]	(DL) Ch.	(DL) Freq. [MHz]	Band	BW [MHz]	(DL) Ch.	(DL) Freq. [MHz]	Band	BW [MHz]	(DL) Ch.	(DL) Freq. [MHz]	Band	BW [MHz]	(DL) Ch.	(DL) Freq. [MHz]	LTE Tx. Power with DL CA Enabled (dBm)	LTE Single Carrier Tx Power (dBm)
CA_[2A]-[2A]-14A-[66A]	B14	10	23330	793.0	QPSK	1	0	5330	763.0	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	N/A				23.90	23.93
CA_14A-[66A]-[66A]-[66A]	B14	10	23330	793.0	QPSK	1	0	5330	763.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B66	20	67036	2170.0	N/A				23.91	23.93
CA_[2A]-[2A]-14A-[66A]-66A	B14	10	23330	793.0	QPSK	1	0	5330	763.0	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	66536	2120.0	23.85	23.93
CA_2A-[2A]-14A-[66A]-[66A]	B14	10	23330	793.0	QPSK	1	0	5330	763.0	B2	20	900	1960.0	B2	20	1100	1980.0	B66	20	66786	2145.0	B66	20	66536	2120.0	23.88	23.93

C.4.1.6 LTE Band 66 as PCC

Combination	PCC									SCC 1					SCC 2				SCC 3				SCC 4				Power	
	Band	BW [㎒]	(UL) Ch.	(UL) Freq.	Mod.	(UL) RB Size	(UL) RB	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	Band	BW [㎒]	(DL) Ch.	(DL) Freq.	LTE Tx. Power with DL CA	LTE Single Carrier Tx
CA_[2A]-5A-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B2	20	900	1960.0	B5	10	2525	881.5	N/A								23.55	23.64
CA_[2A]-[2A]-14A-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B2	20	900	1960.0	B2	20	1100	1980.0	B14	10	5330	763.0	N/A				23.54	23.64
CA_[2A]-[2A]-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	N/A				23.61	23.64
CA_[2A]-[2A]-[66B]	B66	15	132597	1772.5	QPSK	1	74	67061	2172.5	B66	5	66968	2163.2	B2	20	900	1960.0	B2	20	1100	1980.0	N/A				23.75	23.81
CA_[2A]-[2A]-[66C]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B2	20	900	1960.0	B2	20	1100	1980.0	N/A				23.59	23.64
CA_[2A]-12A-[66C]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B2	20	900	1960.0	B12	10	5095	737.5	N/A				23.61	23.64
CA_[2A]-[66A]-[66A]-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B2	20	900	1960.0	N/A				23.57	23.64
CA_2A-[66A]-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B2	20	900	1960.0	N/A				23.55	23.64
CA_[2A]-[66D]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B66	20	66640	2130.4	B2	20	900	1960.0	N/A				23.59	23.64
CA_[2C]-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1098	1979.8	N/A				23.57	23.64
CA_5A-5A-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B5	10	2450	874.0	B5	10	2600	889.0	N/A				23.55	23.64
CA_5A-5A-[66B]	B66	15	132597	1772.5	QPSK	1	74	67061	2172.5	B66	5	66968	2163.2	B5	10	2450	874.0	B5	10	2600	889.0	N/A				23.70	23.81
CA_5A-5A-[66C]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B5	10	2450	874.0	B5	10	2600	889.0	N/A				23.58	23.64
CA_5A-[66A]-[66B]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	15	66511	2117.5	B66	5	66604	2126.8	B5	10	2600	889.0	N/A				23.55	23.64
CA_5A-[66A]-[66C]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B66	20	66734	2139.8	B5	10	2600	889.0	N/A				23.54	23.64
CA_5A-[66D]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B66	20	66640	2130.4	B5	10	2600	889.0	N/A				23.50	23.64
CA_14A-[66A]-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66786	2145.0	B66	20	66536	2120.0	B14	10	5330	763.0	N/A				23.49	23.64
CA_[2A]-[2A]-12A-[66A]-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B12	10	5095	737.5	23.51	23.64
CA_2A-[2A]-12A-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B12	10	5095	737.5	23.55	23.64
CA_[2A]-[2A]-14A-[66A]-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B14	10	5330	763.0	23.58	23.64
CA_2A-[2A]-14A-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B14	10	5330	763.0	23.54	23.64
CA_[2A]-[2A]-29A-[66A]-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B29	10	9715	722.5	23.52	23.64
CA_2A-[2A]-29A-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B29	10	9715	722.5	23.55	23.64
CA_[2A]-[2A]-5A-[66A]-66A	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2600	889.0	23.54	23.64
CA_2A-[2A]-5A-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2600	889.0	23.59	23.64
CA_[2A]-[2A]-5A-66B	B66	15	132597	1772.5	QPSK	1	74	67061	2172.5	B66	5	66968	2163.2	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2600	889.0	23.70	23.81
CA_2A-[2A]-5A-[66B]	B66	15	132597	1772.5	QPSK	1	74	67061	2172.5	B66	5	66968	2163.2	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2600	889.0	23.71	23.81
CA_[2A]-[2A]-5A-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2600	889.0	23.57	23.64
CA_2A-[2A]-5A-[66C]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2600	889.0	23.60	23.64
CA_[2A]-[2A]-5B-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B2	20	900	1960.0	B2	20	1100	1980.0	B5	10	2450	874.0	B5	10	2549	883.9	23.59	23.64
CA_[2A]-[2A]-[66A]-66B	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	15	66511	2117.5	B66	5	66604	2126.8	B2	20	900	1960.0	B2	20	1100	1980.0	23.54	23.64
CA_2A-[2A]-66A-[66B]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	15	66511	2117.5	B66	5	66604	2126.8	B2	20	900	1960.0	B2	20	1100	1980.0	23.50	23.64
CA_[2A]-[2A]-[66A]-66C	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B66	20	66734	2139.8	B2	20	900	1960.0	B2	20	1100	1980.0	23.50	23.64
CA_2A-[2A]-66A-[66C]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B66	20	66734	2139.8	B2	20	900	1960.0	B2	20	1100	1980.0	23.55	23.64
CA_[2A]-5B-[66A]-[66A]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B2	20	900	1960.0	B5	10	2450	874.0	B5	10	2549	883.9	23.58	23.64
CA_[2A]-5B-[66B]	B66	15	132597	1772.5	QPSK	1	74	67061	2172.5	B66	5	66968	2163.2	B2	20	900	1960.0	B5	10	2450	874.0	B5	10	2549	883.9	23.69	23.81
CA_[2A]-5B-[66C]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66838	2150.2	B2	20	900	1960.0	B5	10	2450	874.0	B5	10	2549	883.9	23.54	23.64
CA_5B-[66A]-[66B]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	15	66511	2117.5	B66	5	66604	2126.8	B5	10	2450	874.0	B5	10	2549	883.9	23.59	23.64
CA_5B-[66A]-[66C]	B66	20	132572	1770.0	QPSK	1	0	67036	2170.0	B66	20	66536	2120.0	B66	20	66734	2139.8	B5	10	2450	874.0	B5	10	2549	883.9	23.60	23.64

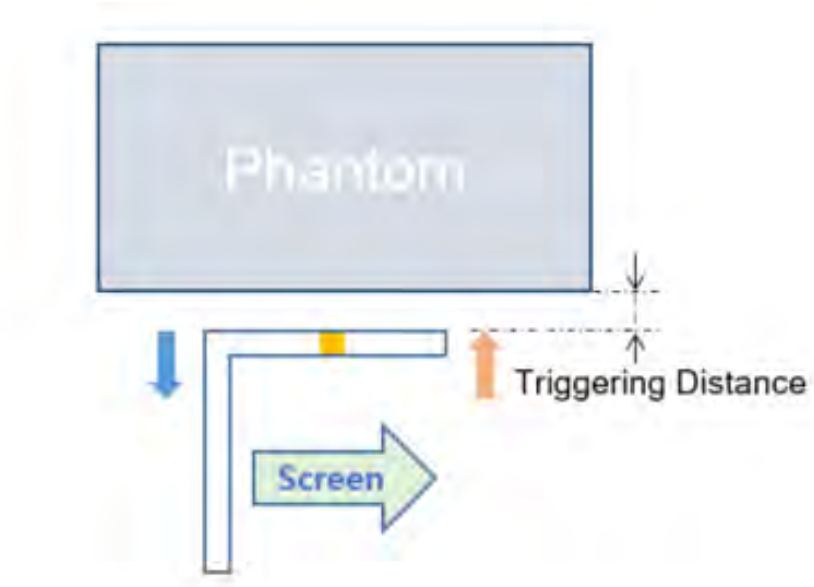
Appendix D. Power Reduction Verification

Proximity Sensor Triggering Distance (KDB 616217 §6.2)

Rear of the DUT was placed directly below the flat phantom. The DUT was moved toward the phantom in accordance with the steps outlined in KDB 616217 §6.2 to determine the trigger distance for enabling power reduction. The DUT was moved away from the phantom to determine the trigger distance for resuming full power.

The DUT featured a visual indicator on its display that showed the status of the proximity sensor (Triggered or not triggered).This was used to determine the status of the sensor during the proximity sensor assessment as monitoring the output power directly was not practical without affecting the measurement.

It was confirmed separately that the output power was altered according to the proximity sensor status indication. This was achieved by observing the proximity sensor status at the same time as monitoring the conducted power contains both the full and reduced conducted power measurements.



LEGEND
Direction of DUT travel for determination of power reduction triggering point
Direction of DUT travel for determination of full power resumption triggering point

Resulting test positions for SAR mearsurementes

Tissue simulating liquid	Band	Trigger distance – Rear		
		Moving toward phantom	Moving from phantom	Worst case distance for SAR
750 Head	LTE Band 12	13 mm	13 mm	12 mm
	LTE Band 14			
850 Head	WCDMA Band 5	13 mm	13 mm	12 mm
	LTE Band 5			
	5G NR n5			
1750 Head	WCDMA Band 4	13 mm	13 mm	12 mm
	LTE Band 4 Ant.0			
	LTE Band 4 Ant.2			
	LTE Band 66 Ant.0			
	LTE Band 66 Ant.2			
	5G NR n66 Ant.0			
	5G NR n66 Ant.2			
1900 Head	WCDMA Band 2	13 mm	13 mm	12 mm
	LTE Band 2 Ant.0			
	LTE Band 2 Ant.2			
	5G NR n2 Ant.0			
	5G NR n2 Ant.2			
3500 Head	5G NR n77 DoD	13 mm	13 mm	12 mm
3700 Head	5G NR n77	13 mm	13 mm	12 mm

Proximity Sensor Triggering Distance Measurement Results – Rear Side

DUT Moving Toward (Trigger) to the Phantom

Distance to DUT Output Power (dBm)										
Distance (mm)	18	17	16	15	14	13	12	11	10	9
WCDMA Band 2	23.46	23.49	23.42	23.42	23.40	17.07	16.98	17.04	16.97	17.07
WCDMA Band 4	23.59	23.62	23.56	23.62	23.56	14.94	14.93	14.95	14.92	14.91
WCDMA Band 5	23.52	23.56	23.55	23.58	23.56	22.06	22.03	22.09	22.11	22.09
LTE Band 2 Ant.0	23.76	23.75	23.78	23.72	23.73	16.67	16.70	16.63	16.66	16.72
LTE Band 2 Ant.2	22.82	22.88	22.88	22.85	22.89	16.75	16.70	16.75	16.79	16.76
LTE Band 4 Ant.0	23.71	23.77	23.69	23.70	23.77	14.71	14.77	14.74	14.71	14.76
LTE Band 4 Ant.2	22.73	22.79	22.76	22.80	22.83	14.91	14.98	14.97	14.88	14.96
LTE Band 5	23.87	23.89	23.90	23.92	23.90	21.93	21.95	21.89	21.91	21.89
LTE Band 12	23.88	23.85	23.90	23.83	23.82	19.91	19.88	19.86	19.91	19.85
LTE Band 14	23.94	23.96	23.96	23.94	23.91	21.29	21.26	21.19	21.26	21.22
LTE Band 66 Ant.0	23.61	23.65	23.59	23.68	23.61	14.79	14.70	14.71	14.69	14.77
LTE Band 66 Ant.2	22.88	22.85	22.86	22.84	22.92	15.01	14.99	14.93	14.97	14.95
5G NR n2 Ant.0	23.98	23.95	23.90	23.96	23.89	16.70	16.78	16.73	16.76	16.74
5G NR n2 Ant.2	23.75	23.74	23.73	23.76	23.77	16.79	16.82	16.75	16.82	16.77
5G NR n5	24.56	24.51	24.59	24.56	24.59	22.62	22.57	22.61	22.62	22.62
5G NR n66 Ant.0	24.01	24.01	24.02	24.01	23.98	14.94	14.97	14.92	14.90	14.95
5G NR n66 Ant.2	23.85	23.85	23.87	23.87	23.93	15.04	14.95	15.03	14.97	15.03
5G NR n77 DoD	24.83	24.76	24.77	24.78	24.75	11.30	11.23	11.22	11.29	11.28
5G NR n77	24.66	24.72	24.73	24.69	24.72	11.10	11.14	11.08	11.11	11.14

DUT Moving Away (Release) from the Phantom

Distance to DUT Output Power (dBm)										
Distance (mm)	9	10	11	12	13	14	15	16	17	18
WCDMA Band 2	17.03	17.02	17.02	17.00	16.99	23.43	23.40	23.41	23.44	23.41
WCDMA Band 4	14.88	14.94	14.97	14.90	14.87	23.66	23.60	23.60	23.64	23.63
WCDMA Band 5	22.07	22.05	22.07	22.04	22.11	23.53	23.55	23.57	23.55	23.54
LTE Band 2 Ant.0	16.63	16.66	16.66	16.64	16.63	23.80	23.74	23.81	23.77	23.76
LTE Band 2 Ant.2	16.73	16.74	16.77	16.70	16.74	22.83	22.89	22.82	22.81	22.88
LTE Band 4 Ant.0	14.69	14.69	14.68	14.75	14.69	23.69	23.70	23.77	23.78	23.72
LTE Band 4 Ant.2	14.98	14.97	14.91	14.94	14.97	22.80	22.81	22.76	22.83	22.73
LTE Band 5	21.95	21.90	21.94	21.94	21.98	23.91	23.92	23.86	23.82	23.91
LTE Band 12	19.86	19.83	19.86	19.84	19.83	23.89	23.88	23.81	23.82	23.89
LTE Band 14	21.27	21.29	21.21	21.23	21.23	23.90	23.95	23.95	23.97	23.91
LTE Band 66 Ant.0	14.73	14.78	14.79	14.76	14.77	23.62	23.60	23.68	23.62	23.66
LTE Band 66 Ant.2	15.01	14.94	15.00	14.92	14.93	22.88	22.86	22.85	22.88	22.86
5G NR n2 Ant.0	16.71	16.71	16.79	16.73	16.75	23.88	23.90	23.96	23.91	23.90
5G NR n2 Ant.2	16.76	16.80	16.82	16.77	16.83	23.71	23.77	23.79	23.73	23.73
5G NR n5	22.58	22.52	22.60	22.58	22.61	24.51	24.54	24.51	24.56	24.58
5G NR n66 Ant.0	14.96	14.92	14.92	14.93	14.89	24.00	23.98	24.02	23.96	23.99
5G NR n66 Ant.2	14.97	14.97	15.02	15.03	15.05	23.91	23.92	23.90	23.93	23.85
5G NR n77 DoD	11.22	11.25	11.29	11.23	11.26	24.78	24.73	24.79	24.78	24.83
5G NR n77	11.17	11.18	11.10	11.14	11.15	24.74	24.75	24.71	24.75	24.74

Hall Effect and Gravity Sensor Guidance (Nov. 2019 TCB Workshop Notes)

The Power verification was performed according to the following procedure:

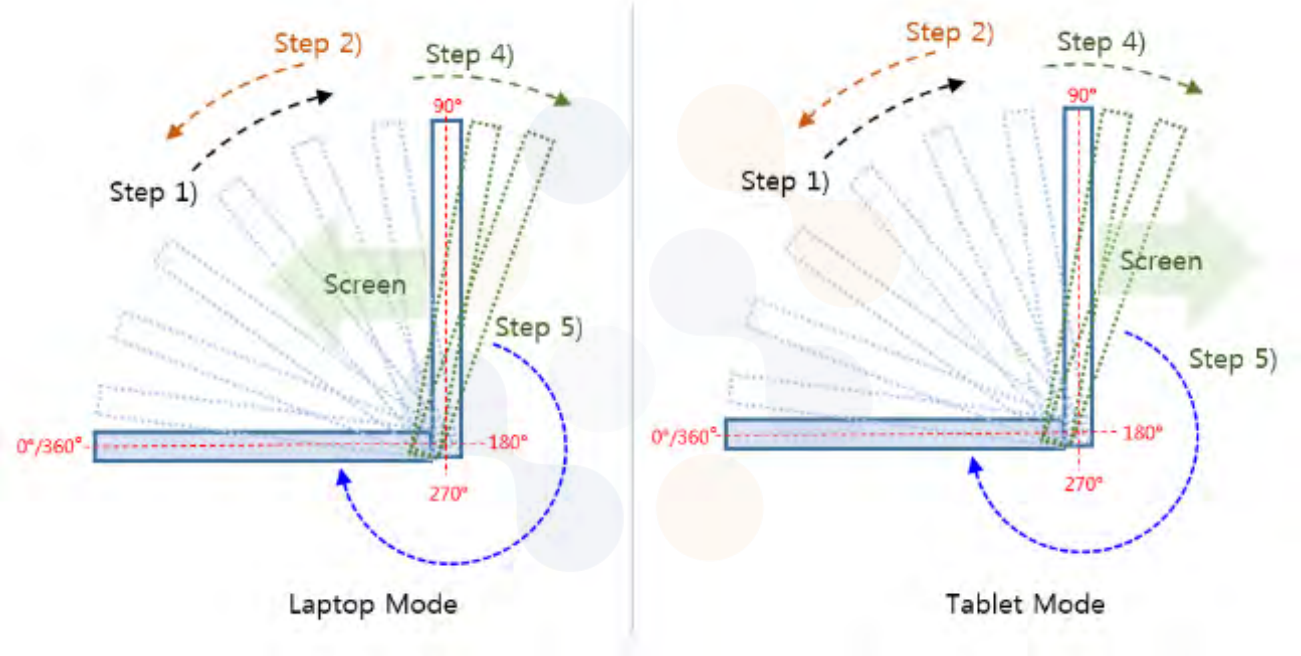
Step 1) With the lid is in closed mode (0 degrees), open the screen in 10 degree steps until laptop mode or tablet mode is obtained.

Step 2) Lower the screen 5 degrees. Closed mode should be reobtained. If not keep lowering in 5 degree steps.

Step 3) Open the screen in 1 degree steps until laptop mode or tablet mode is reobtained. Continue opening the screen in 1 degree steps until at least 5 degrees past where laptop mode or tablet mode (90 degree) was obtained.

Step 4) Then continue opening the screen in 10 degree steps until tablet mode or laptop mode is obtained.

Step 5) Power measurements should be taken at each step.



Laptop Mode																				
Degrees	Band	WCDMA Band2	WCDMA Band4	WCDMA Band5	LTEBand2 Ant0	LTEBand2 Ant2	LTEBand4 Ant0	LTEBand4 Ant2	LTEBand5	LTEBand12	LTEBand14	LTEBand66 Ant0	LTEBand66 Ant2	5G NR n2 Ant.0	5G NR n2 Ant.0	5G NR n5	5G NR n2 Ant.0	5G NR n2 Ant.0	5G NR n77 DoD	5G NR n77
	Mode	RMC			QPSK									DFT-s-OFDM QPSK						
Step 1) With the lid is in closed mode (0 degrees), open the screen in 10 degree steps until laptop mode is obtained.																				
0	Notebook	**Closed Mode**																		
10																				
20																				
30																				
40		23.50	23.55	23.47	23.82	22.84	23.75	22.84	23.91	23.90	24.01	23.59	22.87	23.89	23.72	24.54	23.97	23.85	24.76	24.70
50		23.38	23.58	23.53	23.74	22.81	23.79	22.74	23.85	23.82	23.86	23.68	22.85	23.84	23.70	24.52	24.05	23.95	24.79	24.79
60		23.39	23.61	23.58	23.80	22.90	23.79	22.73	23.83	23.92	24.01	23.64	22.91	23.97	23.78	24.59	23.99	23.92	24.74	24.76
70		23.39	23.67	23.49	23.71	22.92	23.80	22.82	23.79	23.83	23.92	23.64	22.98	23.93	23.78	24.49	24.06	23.88	24.82	24.76
80		23.46	23.68	23.50	23.86	22.83	23.74	22.74	23.83	23.92	23.93	23.69	22.87	23.95	23.72	24.47	24.00	23.96	24.83	24.73
90		23.48	23.56	23.52	23.77	22.87	23.69	22.75	23.94	23.86	24.01	23.71	22.90	23.87	23.79	24.49	24.01	23.94	24.85	24.73
100		23.38	23.67	23.60	23.77	22.76	23.69	22.73	23.82	23.87	23.93	23.67	22.82	23.96	23.77	24.57	24.00	23.90	24.81	24.73
110		23.40	23.54	23.54	23.77	22.78	23.81	22.77	23.81	23.91	23.96	23.67	22.90	23.90	23.73	24.60	24.03	23.85	24.70	24.71
120		23.50	23.55	23.54	23.84	22.86	23.66	22.84	23.78	23.94	24.01	23.67	22.95	23.99	23.81	24.55	23.94	23.98	24.80	24.67
130		23.48	23.65	23.63	23.84	22.90	23.69	22.80	23.86	23.82	23.92	23.62	22.87	23.96	23.68	24.51	24.03	23.84	24.82	24.69
140		23.46	23.64	23.48	23.72	22.77	23.67	22.75	23.93	23.86	23.85	23.60	22.92	23.99	23.81	24.49	23.90	23.96	24.82	24.78
150		23.42	23.68	23.63	23.78	22.83	23.81	22.74	23.83	23.84	23.88	23.64	22.98	23.91	23.83	24.55	23.97	23.88	24.71	24.78
160		23.42	23.55	23.57	23.78	22.91	23.69	22.71	23.94	23.90	23.99	23.71	22.89	23.96	23.80	24.46	24.04	23.97	24.69	24.68
170		23.43	23.59	23.54	23.85	22.87	23.67	22.74	23.83	23.90	24.00	23.62	22.94	23.95	23.69	24.46	23.93	23.85	24.73	24.80
180		23.44	23.55	23.56	23.72	22.87	23.69	22.71	23.89	23.83	23.93	23.59	22.88	23.92	23.68	24.54	23.90	23.85	24.79	24.69
190	Tablet	13.87	13.82	20.12	13.76	14.09	13.71	13.81	19.93	15.06	19.15	13.75	14.15	13.70	13.80	20.59	14.03	13.98	6.21	6.09
Step 2) Lower the screen 5 degrees. Closed mode should be reobtained. If not keep lowering in 5 degree steps.																				
190	Tablet	13.85	13.76	20.02	13.63	14.22	13.73	13.87	20.04	14.90	19.14	13.74	14.22	13.90	13.89	20.69	14.13	13.98	6.32	5.95
185		13.93	13.92	20.06	13.64	14.14	13.81	13.85	19.89	14.98	19.14	13.85	14.19	13.80	13.92	20.71	14.02	14.11	6.25	5.99
180		13.92	13.75	20.04	13.80	14.22	13.67	13.85	19.91	15.04	19.14	13.91	14.11	13.74	13.93	20.57	14.13	14.05	6.20	6.14
175		13.94	13.83	20.02	13.73	14.14	13.76	13.78	19.97	14.95	19.17	13.77	14.20	13.84	13.91	20.71	13.94	14.05	6.26	6.03
170	Notebook	23.45	23.52	23.49	23.93	22.87	23.68	22.78	23.87	23.84	24.08	23.51	22.89	24.01	23.82	24.47	24.04	23.85	24.87	24.73
165~40	Notebook	23.51	23.58	23.50	23.86	22.78	23.76	22.86	23.86	23.93	24.01	23.58	22.97	23.92	23.72	24.55	24.05	23.86	24.79	24.74
35~0		**Closed Mode**																		
Step 3) Continue opening the screen in 1 degree steps until at least 5 degrees past where laptop mode was obtained.																				
0~39	Notebook	**Closed Mode**																		
40~189		23.51	23.67	23.51	23.72	22.77	23.68	22.86	23.92	23.89	23.98	23.65	22.92	23.93	23.78	24.56	23.98	23.97	24.84	24.81
190	Tablet	13.83	13.94	20.11	13.81	14.17	13.76	13.90	19.98	15.04	19.26	13.73	14.00	13.82	13.76	20.52	14.11	13.96	6.28	6.19
191		13.93	13.95	20.17	13.73	14.12	13.68	13.91	20.03	14.94	19.16	13.77	14.06	13.67	13.75	20.60	14.03	14.00	6.27	6.08
192		13.94	13.94	20.15	13.83	14.12	13.67	13.84	19.93	15.03	19.24	13.70	14.10	13.67	13.72	20.65	13.96	14.08	6.25	6.17
193		13.83	13.91	20.09	13.83	14.16	13.82	13.88	19.98	14.90	19.30	13.75	14.15	13.73	13.87	20.55	14.01	14.03	6.13	6.19
194		13.81	13.87	20.05	13.75	14.10	13.75	13.84	19.94	14.93	19.27	13.73	14.13	13.81	13.73	20.63	14.11	13.97	6.14	6.10
195		13.84	13.84	20.03	13.76	14.09	13.74	13.94	20.03	14.98	19.16	13.72	14.03	13.78	13.74	20.54	14.09	14.07	6.27	6.07
Step 4) Then continue opening the screen in 10 degree steps until tablet mode is obtained.																				
200	Tablet	13.95	13.85	20.06	13.80	14.16	13.80	13.83	19.96	15.01	19.28	13.74	14.10	13.81	13.87	20.57	14.00	14.03	6.25	6.07
210		13.93	13.93	20.14	13.82	14.11	13.70	13.80	19.95	14.93	19.22	13.71	14.07	13.83	13.77	20.67	14.08	13.96	6.25	6.18
220		13.82	13.86	20.12	13.82	14.05	13.75	13.89	20.04	14.93	19.19	13.77	14.12	13.81	13.72	20.68	14.02	14.02	6.25	6.12
230		13.84	13.88	20.18	13.80	14.14	13.73	13.91	19.99	14.91	19.15	13.75	14.03	13.69	13.82	20.68	14.12	13.97	6.21	6.18
240		13.96	13.95	20.08	13.69	14.05	13.69	13.94	19.99	14.97	19.31	13.85	14.03	13.69	13.80	20.67	14.08	14.03	6.29	6.07
250		13.85	13.88	20.05	13.67	14.16	13.78	13.84	20.07	15.00	19.27	13.73	14.07	13.78	13.79	20.66	14.08	13.96	6.16	6.09
260		13.87	13.96	20.06	13.69	14.14	13.80	13.92	20.06	14.95	19.24	13.72	14.00	13.76	13.78	20.56	14.09	14.04	6.22	6.17
270		13.83	13.85	20.06	13.81	14.09	13.83	13.95	20.05	15.01	19.26	13.79	14.09	13.77	13.86	20.53	14.12	14.00	6.27	6.07
280		13.84	13.82	20.10	13.82	14.10	13.68	13.92	19.94	14.95	19.20	13.82	14.15	13.75	13.74	20.59	14.00	14.02	6.22	6.18
290		13.85	13.95	20.09	13.69	14.21	13.73	13.90	20.02	14.97	19.17	13.70	14.01	13.76	13.77	20.59	14.10	13.92	6.21	6.17
300		13.92	13.81	20.19	13.81	14.13	13.68	13.87	19.98	14.91	19.27	13.85	14.00	13.74	13.79	20.54	14.04	13.92	6.19	6.13
310		13.92	13.94	20.19	13.68	14.18	13.69	13.91	19.92	15.00	19.30	13.79	14.00	13.76	13.76	20.63	13.97	13.95	6.20	6.14
320		13.94	13.84	20.17	13.77	14.09	13.79	13.89	20.01	15.05	19.26	13.83	14.05	13.70	13.73	20.55	14.00	13.93	6.26	6.21
330		13.83	13.84	20.15	13.71	14.16	13.78	13.80	20.05	14.92	19.23	13.86	14.09	13.76	13.72	20.62	13.99	14.08	6.13	6.07
340		13.89	13.82	20.06	13.69	14.14	13.82	13.88	19.97	14.94	19.23	13.72	14.03	13.79	13.82	20.68	14.07	14.03	6.22	6.05
350		13.93	13.89	20.15	13.76	14.09	13.71	13.95	19.94	14.99	19.29	13.83	14.13	13.79	13.75	20.62	14.06	14.00	6.19	6.07
360		13.92	13.86	20.05	13.77	14.10	13.77	13.87	19.85	15.06	19.20	13.80	14.21	13.75	13.69	20.68	13.97	14.07	6.14	6.11

Tablet Mode																					
Degrees	Band	WCDMA Band2	WCDMA Band4	WCDMA Band5	LTE Band2 Ant0	LTE Band2 Ant2	LTE Band4 Ant0	LTE Band4 Ant2	LTE Band5	LTE Band12	LTE Band14	LTE Band66 Ant0	LTE Band66 Ant2	5G NR n2 Ant.0	5G NR n2 Ant.0	5G NR n5	5G NR n2 Ant.0	5G NR n2 Ant.0	5G NR n77 DoD	5G NR n77
	Mode	RMC			QPSK									DFT-s-OFDM QPSK							
Step 1) With the lid is in closed mode (0 degrees), open the screen in 10 degree steps until laptop mode is obtained.																					
0	Tablet	13.86	13.82	20.07	13.74	14.17	13.71	13.82	19.93	15.04	19.16	13.77	14.11	13.76	13.82	20.67	14.10	14.01	6.15	6.12
10		13.93	13.82	20.18	13.76	14.09	13.70	13.87	20.04	15.06	19.29	13.79	14.00	13.68	13.73	20.56	14.07	13.97	6.20	6.07
20		13.92	13.81	20.10	13.83	14.05	13.82	13.93	20.08	14.98	19.17	13.78	14.06	13.67	13.80	20.68	14.12	14.03	6.21	6.17
30		13.84	13.97	20.15	13.80	14.17	13.71	13.82	20.00	14.95	19.27	13.83	14.12	13.68	13.81	20.55	14.12	13.97	6.22	6.07
40		13.81	13.88	20.13	13.73	14.09	13.78	13.82	19.95	15.03	19.23	13.86	14.10	13.80	13.81	20.66	14.04	14.08	6.20	6.14
50		13.89	13.91	20.03	13.68	14.05	13.80	13.81	19.94	15.02	19.21	13.74	14.13	13.72	13.76	20.64	13.99	14.06	6.22	6.14
60		13.91	13.93	20.19	13.81	14.11	13.71	13.94	19.93	14.99	19.28	13.78	14.10	13.74	13.79	20.58	14.12	13.98	6.28	6.15
70		13.93	13.93	20.06	13.67	14.10	13.78	13.88	20.07	14.99	19.27	13.80	14.16	13.67	13.85	20.60	13.98	13.96	6.24	6.10
80		13.87	13.89	20.07	13.74	14.11	13.79	13.89	20.01	14.90	19.15	13.73	14.01	13.73	13.73	20.56	14.00	13.99	6.23	6.08
90		13.91	13.83	20.14	13.80	14.12	13.68	13.84	19.92	14.98	19.15	13.74	14.05	13.67	13.75	20.59	14.04	14.01	6.29	6.18
100		13.80	13.89	20.04	13.76	14.08	13.70	13.83	20.05	14.95	19.23	13.78	14.10	13.78	13.86	20.68	14.10	14.06	6.25	6.08
110		13.85	13.84	20.08	13.72	14.17	13.76	13.92	19.96	14.98	19.18	13.77	14.12	13.79	13.78	20.67	14.00	13.92	6.25	6.10
120		13.82	13.85	20.08	13.77	14.10	13.75	13.96	19.92	14.92	19.18	13.71	14.02	13.71	13.77	20.63	14.05	13.97	6.29	6.09
130		13.80	13.91	20.13	13.70	14.13	13.81	13.94	20.03	14.92	19.27	13.80	14.07	13.82	13.77	20.65	14.07	14.06	6.15	6.07
140		13.87	13.82	20.19	13.74	14.07	13.67	13.80	20.01	14.94	19.24	13.86	14.14	13.67	13.80	20.54	14.01	13.99	6.15	6.10
150		13.96	13.90	20.12	13.79	14.06	13.77	13.80	20.00	14.94	19.30	13.78	14.10	13.77	13.81	20.61	14.01	13.92	6.24	6.09
160		13.92	13.82	20.02	13.85	14.15	13.77	13.73	19.93	14.84	19.30	13.72	14.14	13.72	13.82	20.63	14.09	13.89	6.21	6.18
170		14.06	13.97	20.07	13.71	14.09	13.70	13.86	20.07	14.85	19.27	13.85	14.07	13.76	13.83	20.60	14.08	14.02	6.21	6.17
180		14.00	13.80	20.04	13.81	14.15	13.83	13.79	20.02	14.94	19.24	13.68	14.05	13.77	13.71	20.67	14.06	13.93	6.28	6.14
190	Notebook	23.39	23.54	23.61	23.84	22.87	23.80	22.87	23.89	23.83	24.00	23.70	22.89	23.93	23.84	24.48	23.93	23.93	24.76	24.67
Step 2) Lower the screen 5 degrees. Closed mode should be reobtained. If not keep lowering in 5 degree steps.																					
190	Notebook	23.40	23.66	23.57	23.87	22.92	23.65	22.80	23.85	23.92	23.89	23.71	22.87	23.87	23.72	24.60	23.94	23.88	24.71	24.72
185		23.35	23.75	23.60	23.85	23.00	23.70	22.74	23.95	23.84	23.92	23.77	22.94	23.78	23.79	24.65	23.94	23.96	24.77	24.63
180		23.47	23.58	23.47	23.80	23.02	23.71	22.78	23.93	23.83	23.95	23.81	22.97	23.84	23.81	24.64	24.03	23.88	24.77	24.80
175		23.30	23.63	23.59	23.90	22.89	23.71	22.81	23.81	23.97	23.89	23.80	22.97	23.87	23.82	24.63	23.91	23.94	24.76	24.78
170~0	Tablet	13.91	13.95	20.16	13.71	14.15	13.77	13.82	19.97	14.93	19.31	13.75	14.14	13.73	13.78	20.56	14.00	13.93	6.29	6.20
Step 3) Continue opening the screen in 1 degree steps until at least 5 degrees past where laptop mode was obtained.																					
0~188	Tablet	13.84	13.96	20.03	13.70	14.08	13.74	13.84	19.97	14.91	19.17	13.79	14.01	13.71	13.83	20.61	13.98	13.94	6.17	6.11
189		13.96	13.82	20.08	13.75	14.19	13.78	13.90	20.07	14.91	19.16	13.75	14.15	13.69	13.88	20.65	14.02	13.99	6.29	6.07
190	Notebook	23.47	23.69	23.53	23.81	22.86	23.75	22.74	23.80	23.81	23.91	23.57	22.89	23.96	23.73	24.54	24.02	23.83	24.80	24.69
191		23.44	23.57	23.61	23.81	22.76	23.79	22.86	23.94	23.90	23.85	23.63	22.87	23.96	23.68	24.51	24.01	23.82	24.69	24.74
192		23.37	23.62	23.59	23.74	22.86	23.74	22.86	23.87	23.79	23.85	23.66	22.86	23.95	23.69	24.51	23.94	23.88	24.84	24.78
193		23.52	23.64	23.61	23.80	22.92	23.66	22.77	23.79	23.94	23.94	23.71	22.84	23.98	23.83	24.57	23.92	23.97	24.76	24.70
194		23.41	23.69	23.62	23.75	22.85	23.80	22.71	23.91	23.88	23.91	23.72	22.97	23.87	23.75	24.55	24.04	23.87	24.79	24.74
195		23.48	23.65	23.58	23.72	22.83	23.65	22.71	23.80	23.84	23.94	23.63	22.83	23.88	23.71	24.49	23.94	23.83	24.69	24.79
Step 4) Then continue opening the screen in 10 degree steps until tablet mode is obtained.																					
195	Notebook	23.49	23.66	23.51	23.72	22.79	23.71	22.78	23.82	23.93	23.91	23.57	22.87	23.99	23.78	24.57	23.97	23.89	24.84	24.77
200		23.46	23.61	23.54	23.77	22.82	23.70	22.74	23.92	23.89	23.91	23.60	22.92	23.88	23.70	24.50	23.97	23.87	24.79	24.76
210		23.45	23.56	23.54	23.82	22.91	23.70	22.87	23.90	23.87	23.93	23.59	22.97	23.85	23.74	24.50	24.06	23.89	24.69	24.76
220		23.49	23.66	23.53	23.72	22.90	23.78	22.84	23.80	23.83	23.91	23.64	22.88	23.85	23.80	24.52	23.99	23.97	24.80	24.68
230		23.52	23.59	23.58	23.73	22.91	23.68	22.78	23.79	23.95	24.01	23.67	22.89	23.89	23.78	24.61	23.90	23.91	24.84	24.68
240		23.37	23.68	23.62	23.85	22.79	23.71	22.87	23.92	23.95	23.99	23.61	22.96	23.92	23.74	24.45	23.95	23.91	24.76	24.67
255		23.40	23.67	23.50	23.72	22.78	23.78	22.75	23.81	23.87	23.95	23.59	22.98	23.96	23.80	24.46	24.02	23.91	24.80	24.71
260		23.53	23.57	23.53	23.75	22.76	23.76	22.74	23.78	23.88	24.00	23.58	22.97	23.92	23.68	24.46	24.05	23.96	24.69	24.72
270		23.52	23.57	23.61	23.85	22.89	23.75	22.80	23.80	23.88	24.01	23.58	22.90	23.98	23.77	24.61	23.97	23.92	24.69	24.74
280		23.42	23.67	23.47	23.76	22.82	23.79	22.81	23.86	23.85	23.93	23.56	22.84	24.00	23.76	24.52	23.91	23.89	24.70	24.69
290		23.41	23.63	23.54	23.79	22.89	23.75	22.87	23.92	23.90	23.95	23.69	22.86	23.84	23.71	24.48	24.04	23.92	24.71	24.68
300		23.48	23.64	23.57	23.78	22.92	23.76	22.87	23.91	23.79	23.85	23.65	22.96	23.95	23.75	24.46	24.01	23.83	24.73	24.80
310		23.51	23.58	23.63	23.77	22.88	23.76	22.87	23.88	23.92	23.85	23.59	22.83	23.85	23.71	24.59	23.92	23.92	24.84	24.76
320		23.47	23.66	23.57	23.76	22.89	23.80	22.80	23.80	23.94	24.01	23.63	22.87	23.97	23.72	24.61	24.05	23.95	24.72	24.74
330		Closed Mode																			
340																					
350																					
360																					