Appendix G. – Dipole Calibration Data

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 HCT (Dymstec) Certificate No: D750V3-1014_Jun21

CALIBRATION CERTIFICATE

결재	담당자	확인자
재	이재성 2021.06.10	이경화 2021.06.10

Object D750V3 - SN:1014

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

Calibration date: June 01, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

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: MY41092317	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-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	M.Weber
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 1, 2021

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**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
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	42.7 ± 6 %	0.91 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	2.16 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	1.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**5.57 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 + 3.3 jΩ
Return Loss	- 26.3 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.039 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: 01.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN:1014

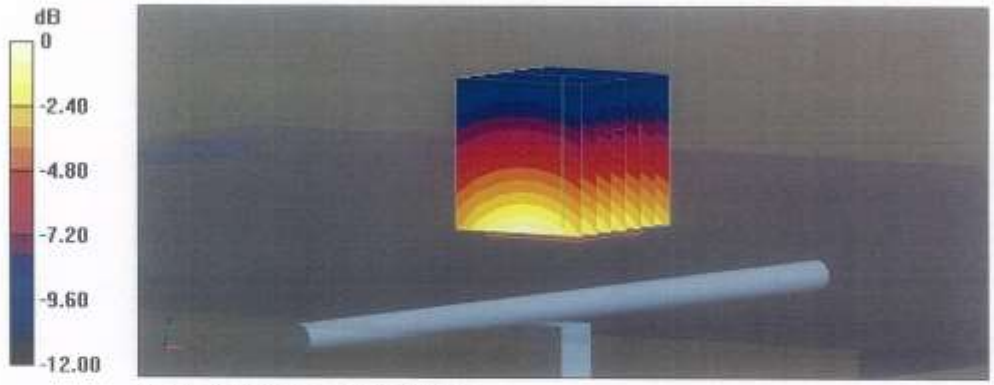
Communication System: UID 0 - CW; Frequency: 750 MHz
Medium parameters used: f = 750 MHz; σ = 0.91 S/m; ε_r = 42.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(10.11, 10.11, 10.11) @ 750 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

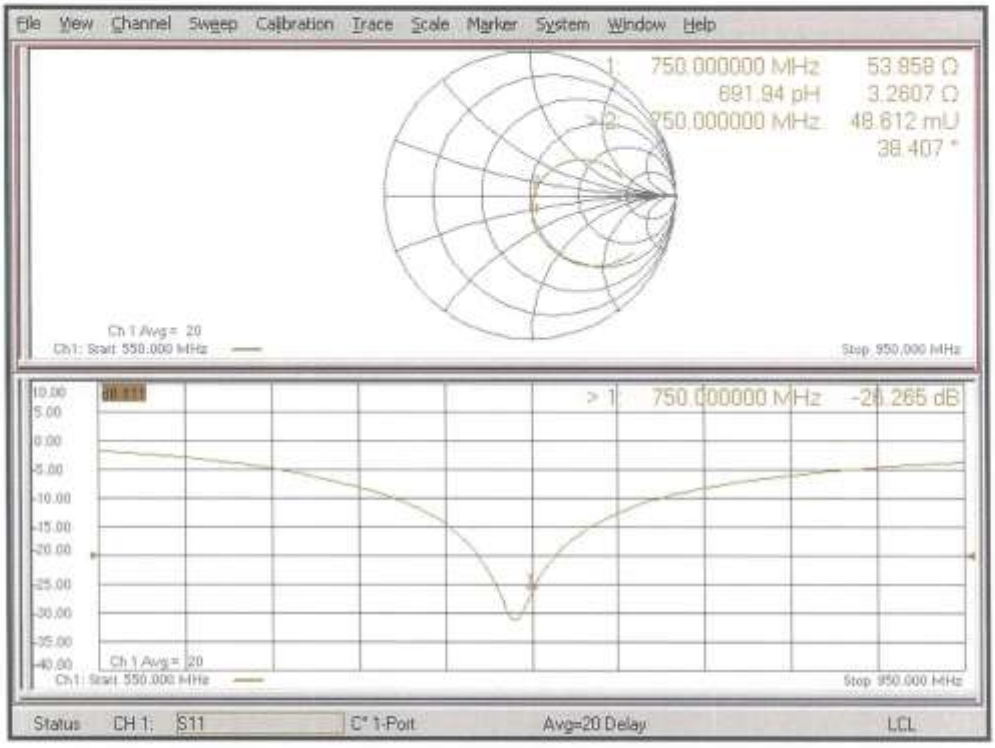
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 60.13 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 3.32 W/kg
SAR(1 g) = 2.16 W/kg; SAR(10 g) = 1.41 W/kg
Smallest distance from peaks to all points 3 dB below = 18.4 mm
Ratio of SAR at M2 to SAR at M1 = 65.2%
Maximum value of SAR (measured) = 2.92 W/kg



0 dB = 2.92 W/kg = 4.66 dBW/kg

Impedance Measurement Plot for Head TSL



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 HCT (Dymstec) Certificate No: D835V2-4d165_Aug21

CALIBRATION CERTIFICATE

Object D835V2 - SN:4d165

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

Calibration date: August 03, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

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: MY41092317	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-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 3, 2021

결재	담당자	확인자
	DL 박경호 2021. 08. 11	허경용 2021. 08. 11

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

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	835 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	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.2 ± 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	2.49 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**9.68 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	1.60 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**6.25 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	50.9 Ω - 2.0 jΩ
Return Loss	- 33.1 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.389 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: 03.08.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN:4d165

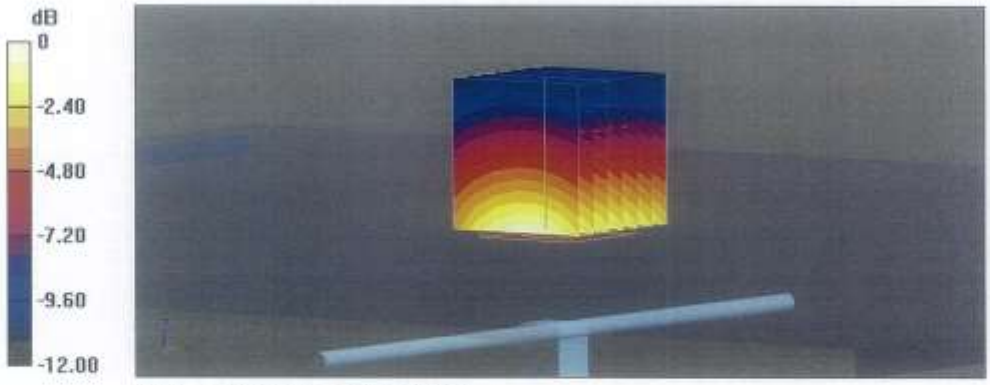
Communication System: UID 0 - CW; Frequency: 835 MHz
Medium parameters used: f = 835 MHz; σ = 0.94 S/m; ε_r = 42.2; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(9.69, 9.69, 9.69) @ 835 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

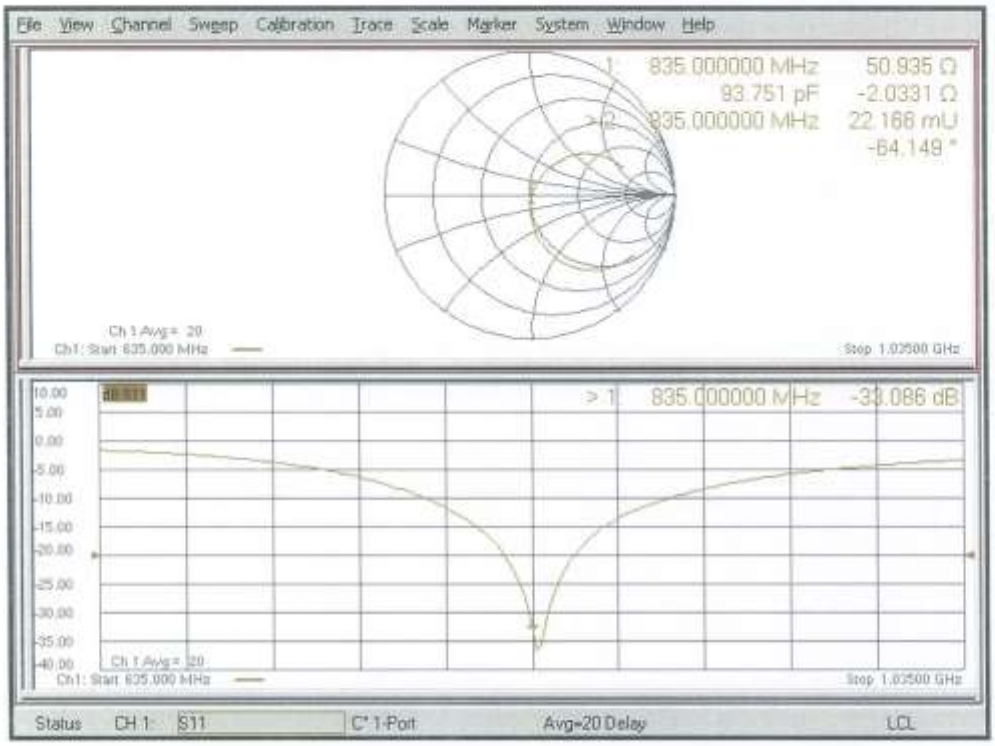
Dipole Calibration for Head Tissue/Pin=250 mW, d=15mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 63.23 V/m; Power Drift = -0.03 dB
Peak SAR (extrapolated) = 3.83 W/kg
SAR(1 g) = 2.49 W/kg; SAR(10 g) = 1.6 W/kg
Smallest distance from peaks to all points 3 dB below = 16 mm
Ratio of SAR at M2 to SAR at M1 = 65.2%
Maximum value of SAR (measured) = 3.34 W/kg



0 dB = 3.34 W/kg = 5.24 dBW/kg

Impedance Measurement Plot for Head TSL



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 HCT (Dymstec) Certificate No: D1800V2-2d015_Jul21

CALIBRATION CERTIFICATE

Object D1800V2 - SN:2d015

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

Calibration date: July 30, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

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: MY41092317	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-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 3, 2021

결재	담당자	확인자
	DL 박정철 2021. 08. 11	김경자 2021.08.11

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

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	1800 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	40.4 ± 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	9.63 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**38.8 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	4.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.0 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	49.1 Ω - 2.8 jΩ
Return Loss	- 30.4 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.214 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: 30.07.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1800 MHz; Type: D1800V2; Serial: D1800V2 - SN:2d015

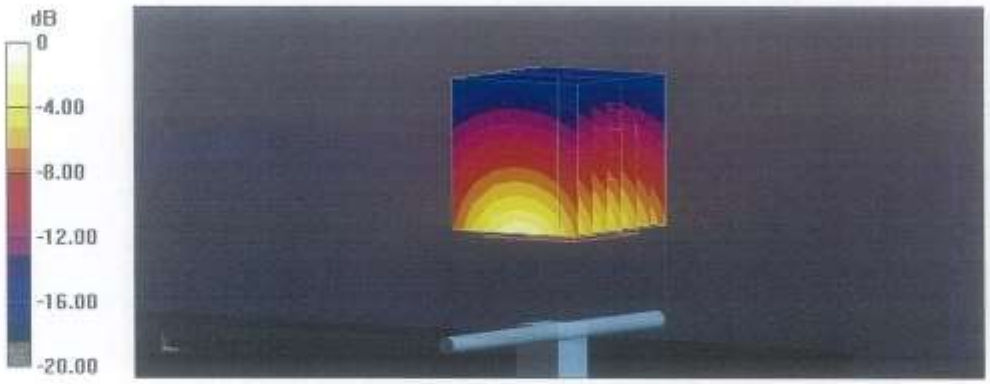
Communication System: UID 0 - CW; Frequency: 1800 MHz
Medium parameters used: f = 1800 MHz; σ = 1.39 S/m; ε_r = 40.4; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.63, 8.63, 8.63) @ 1800 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 4.9 (front); Type: QD 00L P49 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

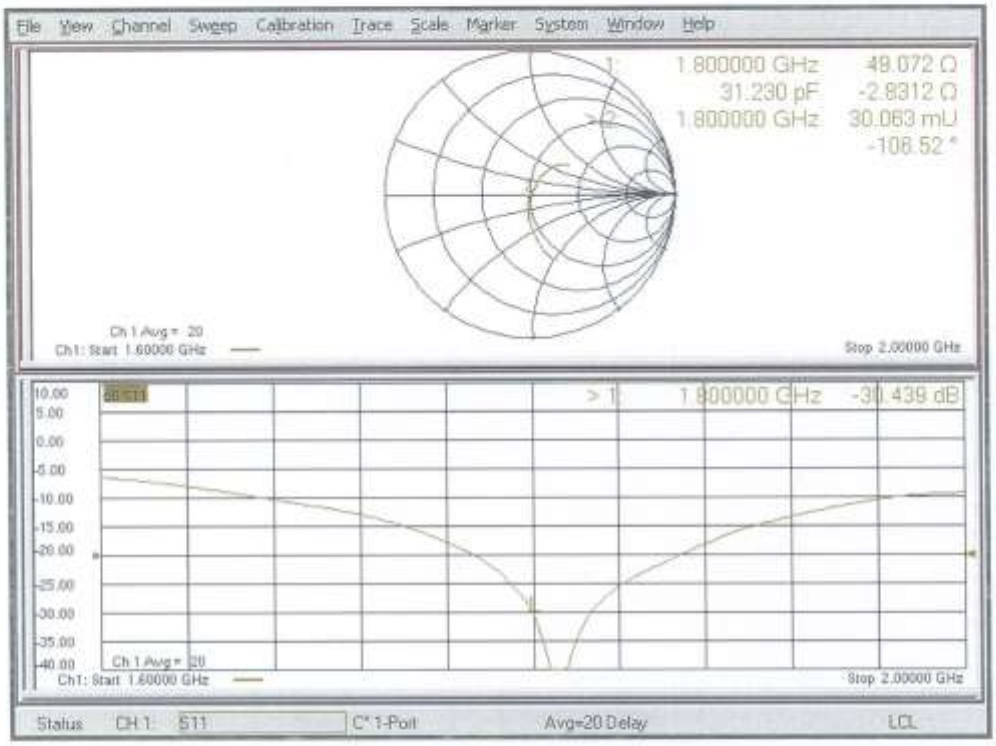
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 109.5 V/m; Power Drift = -0.09 dB
Peak SAR (extrapolated) = 18.3 W/kg
SAR(1 g) = 9.63 W/kg; SAR(10 g) = 4.99 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 53%
Maximum value of SAR (measured) = 15.2 W/kg



0 dB = 15.2 W/kg = 11.82 dBW/kg

Impedance Measurement Plot for Head TSL



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 **HCT (Dymstec)** Certificate No: **D1900V2-5d061_Nov21**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN:5d061
Calibration procedure(s)	QA CAL-05.v11 Calibration Procedure for SAR Validation Sources between 0.7-3 GHz
Calibration date:	November 24, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	01-Nov-21 (No. DAE4-601_Nov21)	Nov-22

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: MY41092317	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 Katzman	Laboratory Technician	
Approved by:	Niels Kuster	Quality Manager	

Issued: November 25, 2021

	담 당 자	확 인 자
결		
재	PL 박정훈 2021.12.04	CP 허경철 2021.12.09

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

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	39.9 ± 6 %	1.40 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	10.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**41.2 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	5.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**21.4 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	50.9 Ω + 7.2 jΩ
Return Loss	- 22.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.194 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: 24.11.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN:5d061

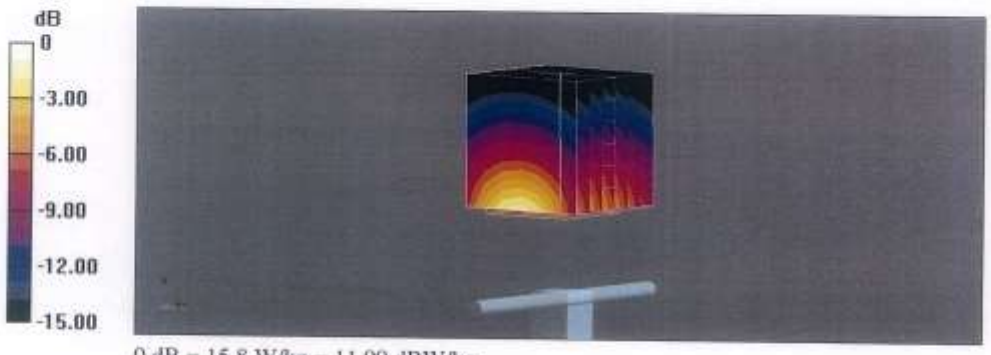
Communication System: UID 0 - CW; Frequency: 1900 MHz
Medium parameters used: f = 1900 MHz; σ = 1.4 S/m; ε_r = 39.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(8.43, 8.43, 8.43) @ 1900 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 01.11.2021
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

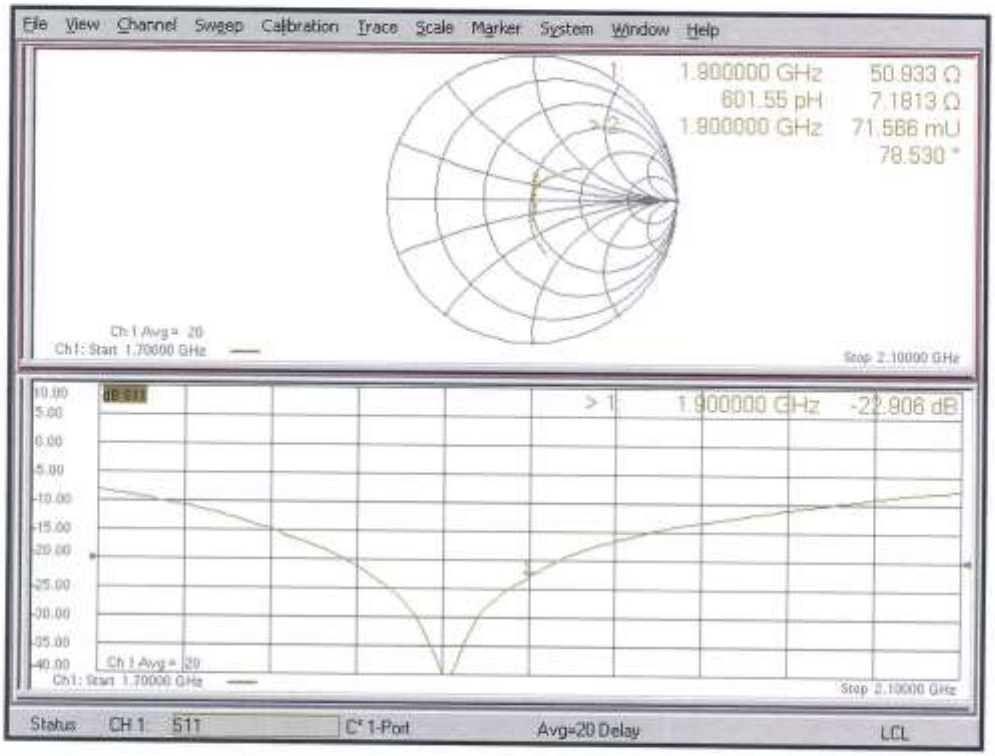
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 111.1 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.9 W/kg
SAR(1 g) = 10.3 W/kg; SAR(10 g) = 5.36 W/kg
Smallest distance from peaks to all points 3 dB below = 10 mm
Ratio of SAR at M2 to SAR at M1 = 55.1%
Maximum value of SAR (measured) = 15.8 W/kg



0 dB = 15.8 W/kg = 11.99 dBW/kg

Impedance Measurement Plot for Head TSL



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 HCT (Dymstec) Certificate No: D2450V2-965_Jun21

CALIBRATION CERTIFICATE

결재	담당자	확인자

Object D2450V2 - SN:965

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

Calibration date: June 15, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

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: MY41092317	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-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 16, 2021

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

Accreditation No.: SCS 0108

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

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	39.2	1.80 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.7 ± 6 %	1.87 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	13.7 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**53.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.30 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.8 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	57.8 Ω + 6.6 jΩ
Return Loss	- 20.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.153 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: 15.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN:965

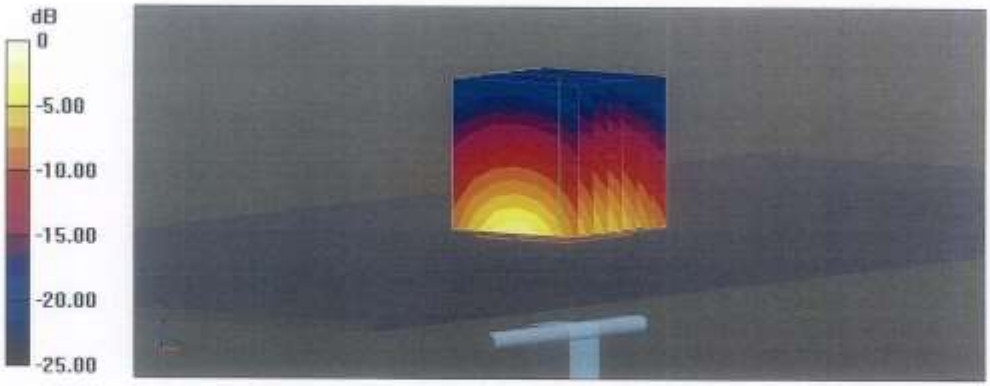
Communication System: UID 0 - CW; Frequency: 2450 MHz
Medium parameters used: f = 2450 MHz; σ = 1.87 S/m; ε_r = 37.7; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7349; ConvF(7.96, 7.96, 7.96) @ 2450 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

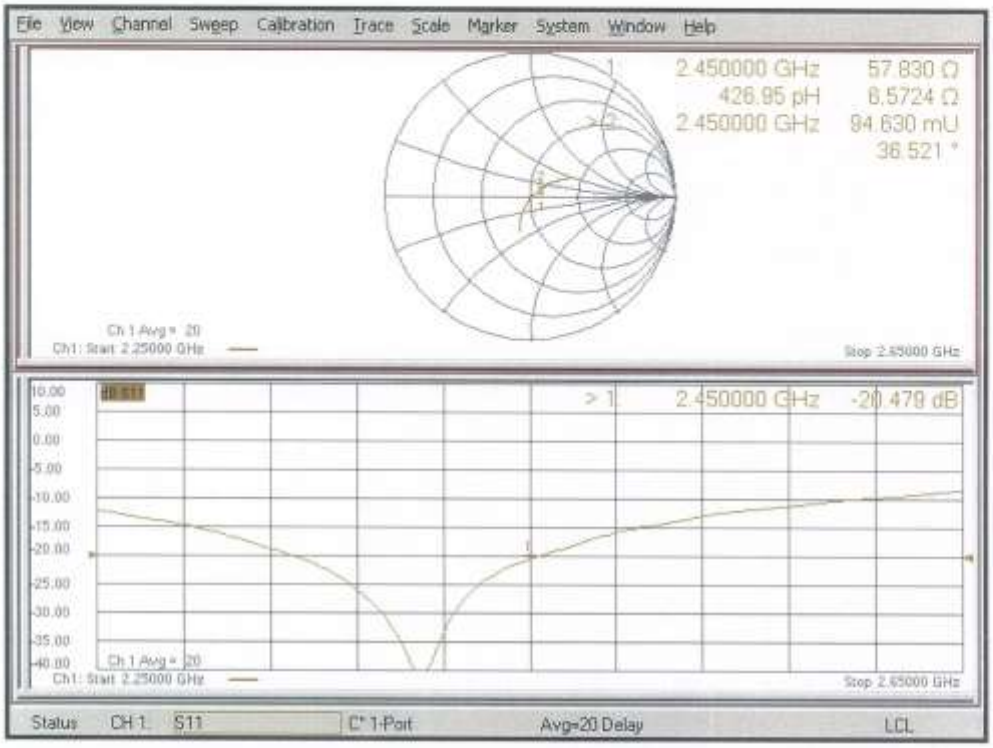
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 116.7 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 27.3 W/kg
SAR(1 g) = 13.7 W/kg; SAR(10 g) = 6.30 W/kg
Smallest distance from peaks to all points 3 dB below = 9 mm
Ratio of SAR at M2 to SAR at M1 = 50%
Maximum value of SAR (measured) = 22.4 W/kg



0 dB = 22.4 W/kg = 13.50 dBW/kg

Impedance Measurement Plot for Head TSL



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 HCT (Dymstec) Certificate No: D2600V2-1106_Jul21

CALIBRATION CERTIFICATE

Object D2600V2 - SN:1106

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

Calibration date: July 30, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 7349	28-Dec-20 (No. EX3-7349_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

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: MY41092317	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-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: August 3, 2021

결재	담당자	확인자
	OL 박정희 2021. 08. 11	허중재 2021. 08. 11

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

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	2600 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.0	1.96 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.3 ± 6 %	2.05 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	14.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**56.3 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.41 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.2 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	49.1 Ω - 6.2 jΩ
Return Loss	- 24.0 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.149 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: 30.07.2021

Test Laboratory: SPEAG, Zurich, Switzerland

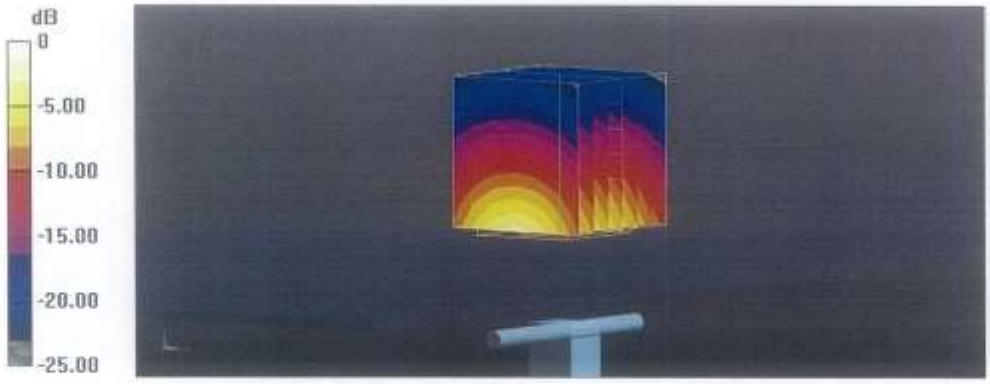
DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1106

Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.05 S/m; ε_r = 37.3; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

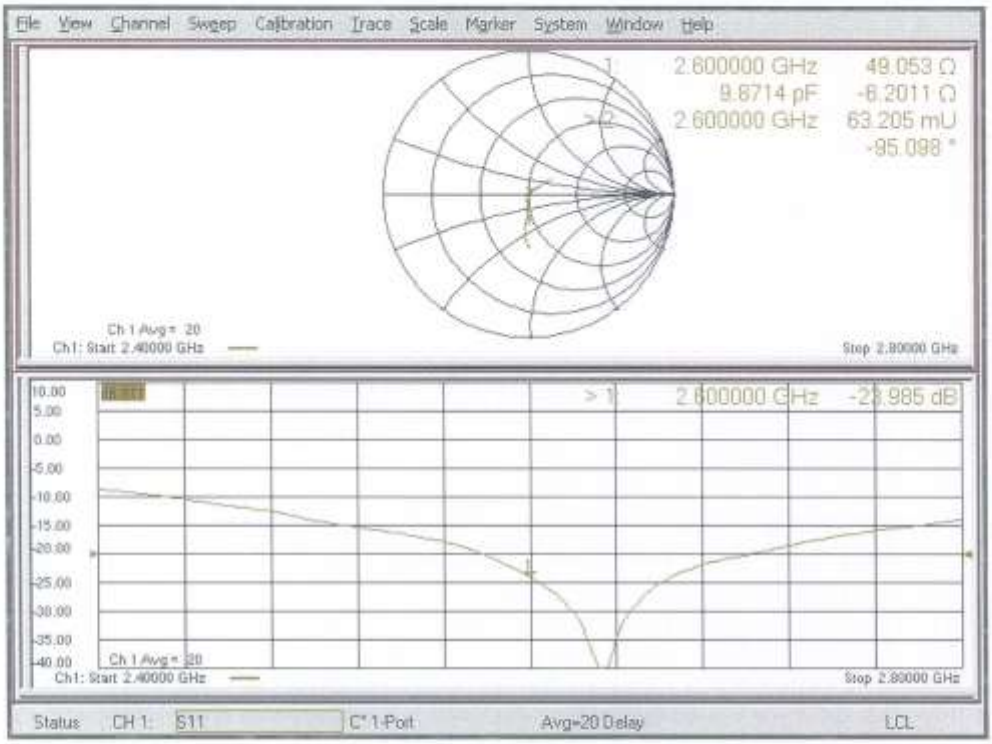
- Probe: EX3DV4 - SN7349; ConvF(7.84, 7.84, 7.84) @ 2600 MHz; Calibrated: 28.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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 = 118.1 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 29.0 W/kg
SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.41 W/kg
Smallest distance from peaks to all points 3 dB below = 8.9 mm
Ratio of SAR at M2 to SAR at M1 = 50%
Maximum value of SAR (measured) = 24.1 W/kg



0 dB = 24.1 W/kg = 13.82 dBW/kg

Impedance Measurement Plot for Head TSL



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 **HCT (Dymstec)** Certificate No: **D3500V2-1040_Feb21**

CALIBRATION CERTIFICATE

	담 당 자	확 인 자
결 재	DL 박건홍 2021. 03. 04	이 하성경 2021. 03. 04

Object D3500V2 - SN:1040

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

Calibration date: February 17, 2021

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	01-Apr-20 (No. 217-03100/03101)	Apr-21
Power sensor NRP-Z91	SN: 103244	01-Apr-20 (No. 217-03100)	Apr-21
Power sensor NRP-Z91	SN: 103245	01-Apr-20 (No. 217-03101)	Apr-21
Reference 20 dB Attenuator	SN: BH9394 (20k)	31-Mar-20 (No. 217-03106)	Apr-21
Type-N mismatch combination	SN: 310982 / 06327	31-Mar-20 (No. 217-03104)	Apr-21
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

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: MY41092317	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-21

	Name	Function	Signature
Calibrated by:	Michael Weber	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: February 23, 2021

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
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) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
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	37.1 ± 6 %	2.93 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	6.67 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**66.3 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.50 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.9 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	54.5 Ω - 5.2 jΩ
Return Loss	- 23.6 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.140 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: 17.02.2021

Test Laboratory: SPEAG, Zurich, Switzerland

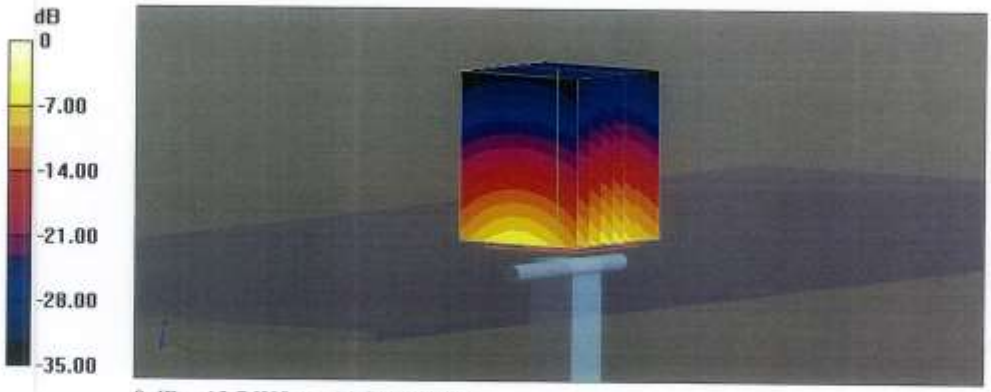
DUT: Dipole 3500 MHz; Type: D3500V2; Serial: D3500V2 - SN:1040

Communication System: UID 0 - CW; Frequency: 3500 MHz
Medium parameters used: f = 3500 MHz; σ = 2.93 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:

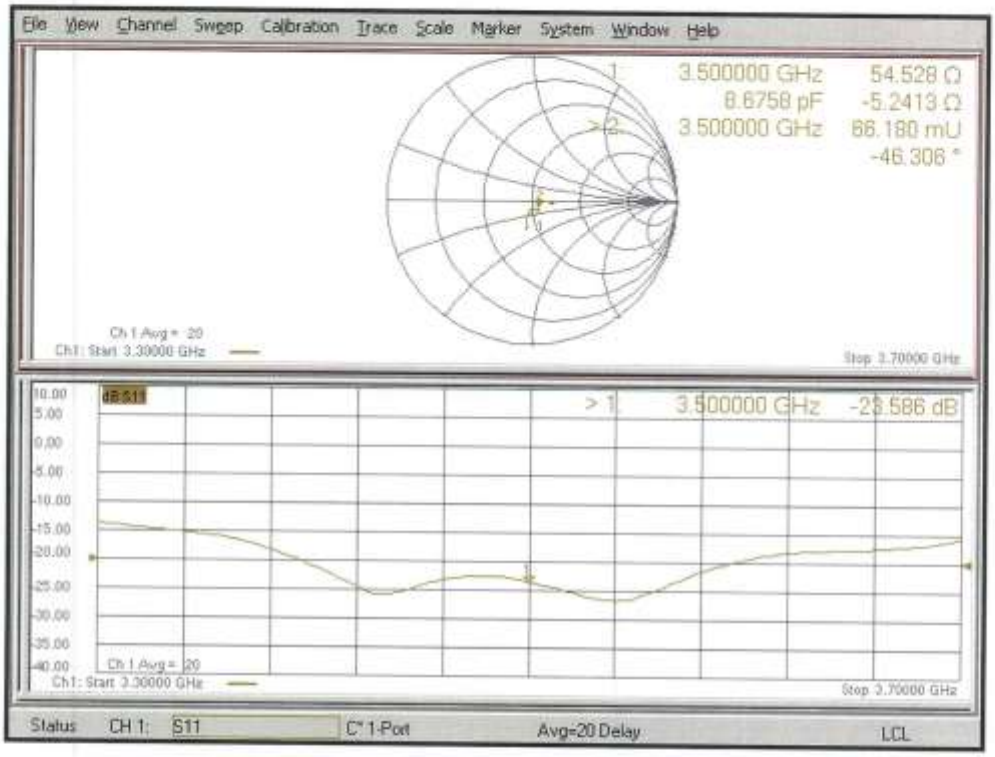
- Probe: EX3DV4 - SN3503; ConvF(7.91, 7.91, 7.91) @ 3500 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

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 = 71.60 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 18.1 W/kg
SAR(1 g) = 6.67 W/kg; SAR(10 g) = 2.5 W/kg
Smallest distance from peaks to all points 3 dB below = 8.6 mm
Ratio of SAR at M2 to SAR at M1 = 75.1%
Maximum value of SAR (measured) = 12.7 W/kg



0 dB = 12.7 W/kg = 11.04 dBW/kg

Impedance Measurement Plot for Head TSL



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 **HCT (Dymstec)** Certificate No: **D3700V2-1105_Nov21**

CALIBRATION CERTIFICATE

Object D3700V2 - SN:1105

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

Calibration date: November 22, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	01-Nov-21 (No. DAE4-601_Nov21)	Nov-22

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: MY41092317	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 Katzman	Laboratory Technician	
Approved by:	Niels Kuster	Quality Manager	

Issued: November 24, 2021

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

	담 당 자	확 인 자
결 재	DL 박경덕 2021.12.09	CJ 박경덕 2021.12.09

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
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 V5.0	
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 at 3700 MHz

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	37.9 ± 6 %	3.10 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL at 3700 MHz

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	**66.6 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	**24.1 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 3700 MHz

Impedance, transformed to feed point	46.0 Ω + 0.1 jΩ
Return Loss	- 27.7 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: 22.11.2021

Test Laboratory: SPEAG, Zurich, Switzerland

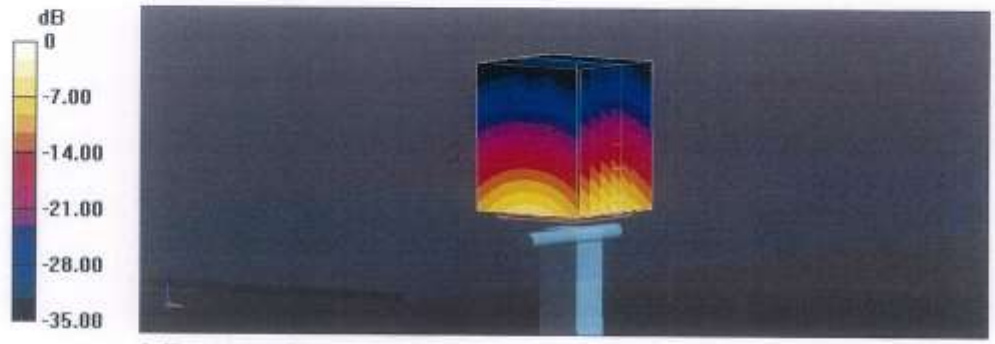
DUT: Dipole 3700 MHz; Type: D3700V2; Serial: D3700V2 - SN:1105

Communication System: UID 0 - CW; Frequency: 3700 MHz
Medium parameters used: f = 3700 MHz; σ = 3.10 S/m; ε_r = 37.9; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

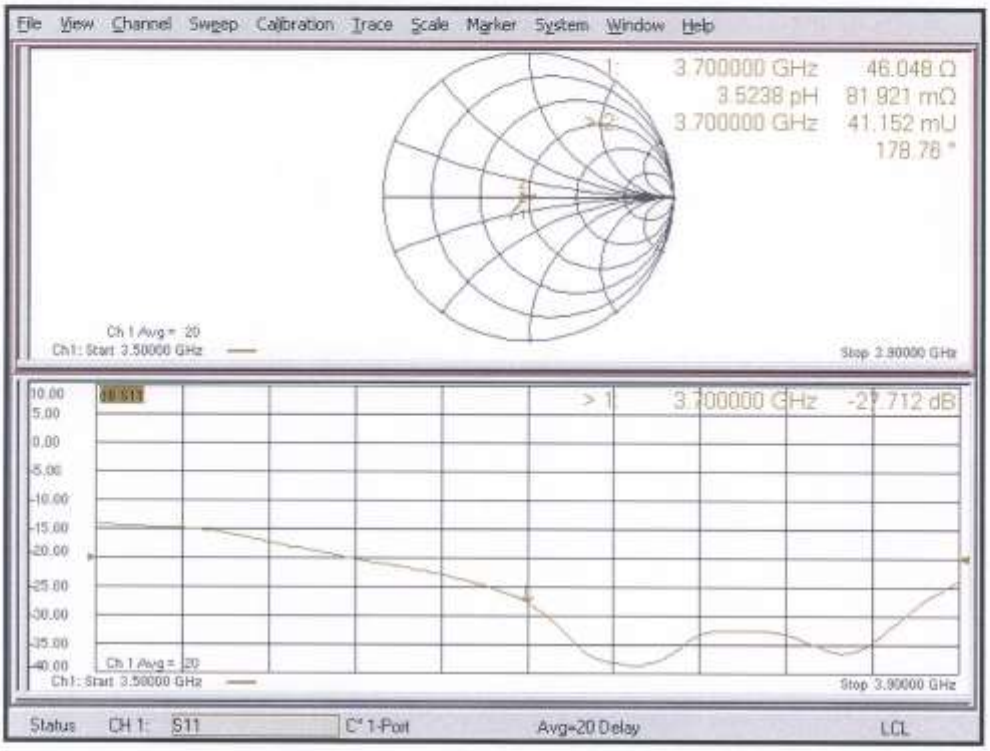
- Probe: EX3DV4 - SN3503; ConvF(7.73, 7.73, 7.73) @ 3700 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 01.11.2021
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=100 mW, d=10mm 3700/Zoom Scan, dist=1.4mm (8x8x8)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 69.84 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 18.4 W/kg
SAR(1 g) = 6.64 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 = 74.1%
Maximum value of SAR (measured) = 12.7 W/kg



0 dB = 12.7 W/kg = 11.04 dBW/kg

Impedance Measurement Plot for Head TSL



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 HCT (Dymstec) Certificate No: D5GHzV2-1107_Jul21

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN:1107

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

Calibration date: July 22, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

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: MY41092317	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-21

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

Issued: July 23, 2021

결재	담당자	확인자
	DL 박정훈 2021.08.11	2021.08.11

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

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	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.6 ± 6 %	4.60 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.6 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	**23.2 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.1 ± 6 %	4.95 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.44 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**84.2 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.43 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 W/kg ± 19.5 % (k=2)**

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.8 ± 6 %	5.11 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**80.9 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm³ (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.34 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**23.3 W/kg ± 19.5 % (k=2)**

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	48.4 Ω - 6.5 jΩ
Return Loss	- 23.4 dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	54.2 Ω - 2.6 jΩ
Return Loss	- 26.5 dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	56.5 Ω - 2.9 jΩ
Return Loss	- 23.5 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.199 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: 22.07.2021

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole D5GHzV2; Type: D5GHzV2; Serial: D5GHzV2 - SN:1107

Communication System: UID 0 - CW; Frequency: 5250 MHz, Frequency: 5600 MHz, Frequency:5750 MHz
Medium parameters used: f = 5250 MHz; σ = 4.6 S/m; ε_r = 35.6; ρ = 1000 kg/m^3 ,
Medium parameters used: f = 5600 MHz; σ = 4.95 S/m; ε_r = 35.1; ρ = 1000 kg/m^3
Medium parameters used: f = 5750 MHz; σ = 5.11 S/m; ε_r = 34.8; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

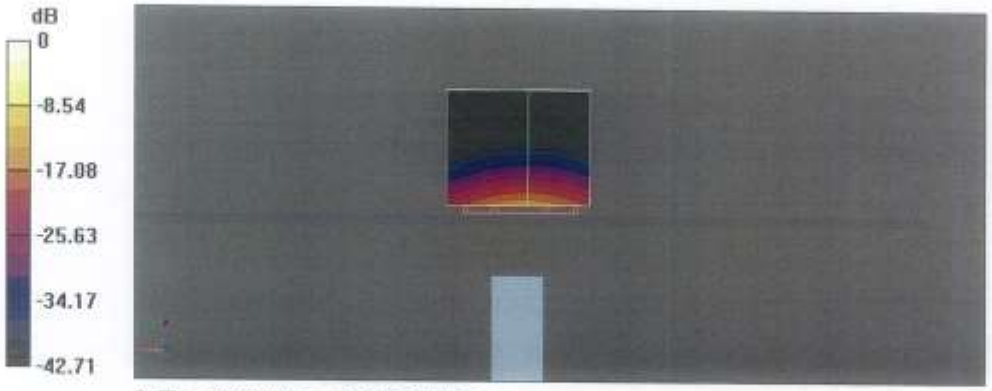
- Probe: EX3DV4 - SN3503; ConvF(5.5, 5.5, 5.5) @ 5250 MHz, ConvF(5.1, 5.1, 5.1) @ 5600 MHz, ConvF(5.08, 5.08, 5.08) @ 5750 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 77.05 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 27.4 W/kg
SAR(1 g) = 8.08 W/kg; SAR(10 g) = 2.33 W/kg
Smallest distance from peaks to all points 3 dB below = 7.5 mm
Ratio of SAR at M2 to SAR at M1 = 71.4%
Maximum value of SAR (measured) = 18.3 W/kg

Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 76.80 V/m; Power Drift = 0.03 dB
Peak SAR (extrapolated) = 31.0 W/kg
SAR(1 g) = 8.44 W/kg; SAR(10 g) = 2.43 W/kg
Smallest distance from peaks to all points 3 dB below = 7.5 mm
Ratio of SAR at M2 to SAR at M1 = 68.7%
Maximum value of SAR (measured) = 19.7 W/kg

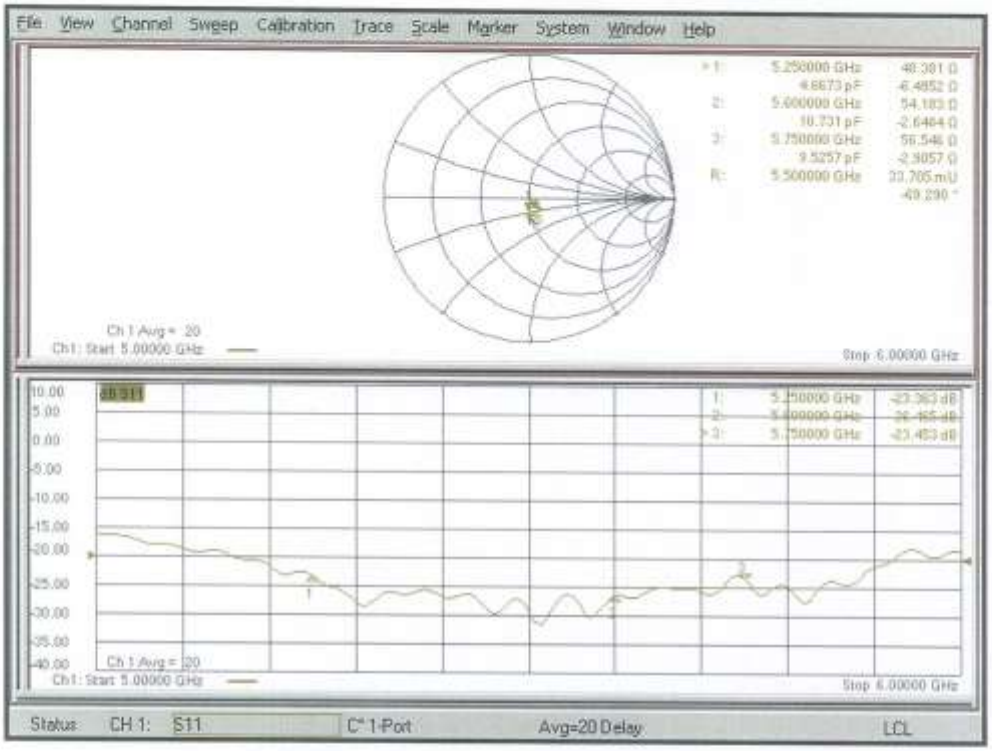
Dipole Calibration for Head Tissue/Pin=100mW, dist=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 74.42 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 31.4 W/kg
SAR(1 g) = 8.13 W/kg; SAR(10 g) = 2.34 W/kg
Smallest distance from peaks to all points 3 dB below = 7.6 mm

Ratio of SAR at M2 to SAR at M1 = 66.9%
Maximum value of SAR (measured) = 19.3 W/kg



0 dB = 18.3 W/kg = 12.62 dBW/kg

Impedance Measurement Plot for Head TSL



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 HCT (Dymstec) Certificate No: D3900V2-1019_Jun21

CALIBRATION CERTIFICATE

결재	담 당 자	확 인 자

Object D3900V2 - SN:1019

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

Calibration date: June 09, 2021

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	09-Apr-21 (No. 217-03291/03292)	Apr-22
Power sensor NRP-Z91	SN: 103244	09-Apr-21 (No. 217-03291)	Apr-22
Power sensor NRP-Z91	SN: 103245	09-Apr-21 (No. 217-03292)	Apr-22
Reference 20 dB Attenuator	SN: BH9394 (20k)	09-Apr-21 (No. 217-03343)	Apr-22
Type-N mismatch combination	SN: 310982 / 06327	09-Apr-21 (No. 217-03344)	Apr-22
Reference Probe EX3DV4	SN: 3503	30-Dec-20 (No. EX3-3503_Dec20)	Dec-21
DAE4	SN: 601	02-Nov-20 (No. DAE4-601_Nov20)	Nov-21

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: MY41092317	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-21

	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: June 10, 2021

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**

Glossary:

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

Calibration is Performed According to the Following Standards:

a) IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
b) IEC 62209-1, "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from hand-held and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
c) IEC 62209-2, "Procedure to determine the Specific Absorption Rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)", March 2010
d) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

e) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Measurement Conditions

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

DASY Version	DASY5	V52.10.4
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	

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	36.5 ± 6 %	3.29 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	---	---

SAR result with Head TSL at 3900 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**70.4 W/kg ± 19.9 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	100 mW input power	2.44 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.3 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	48.3 Ω - 6.8 jΩ
Return Loss	- 22.9 dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.103 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: 09.06.2021

Test Laboratory: SPEAG, Zurich, Switzerland

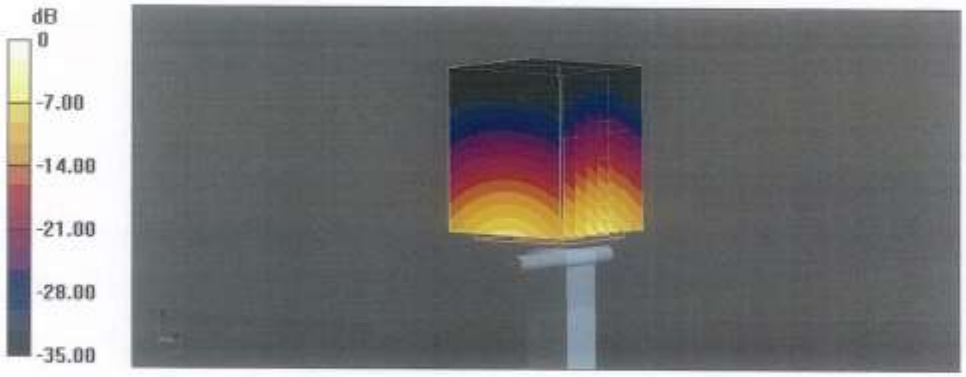
DUT: Dipole 3900 MHz; Type: D3900V2; Serial: D3900V2 - SN:1019

Communication System: UID 0 - CW; Frequency: 3900 MHz
Medium parameters used: f = 3900 MHz; σ = 3.29 S/m; ε_r = 36.5; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

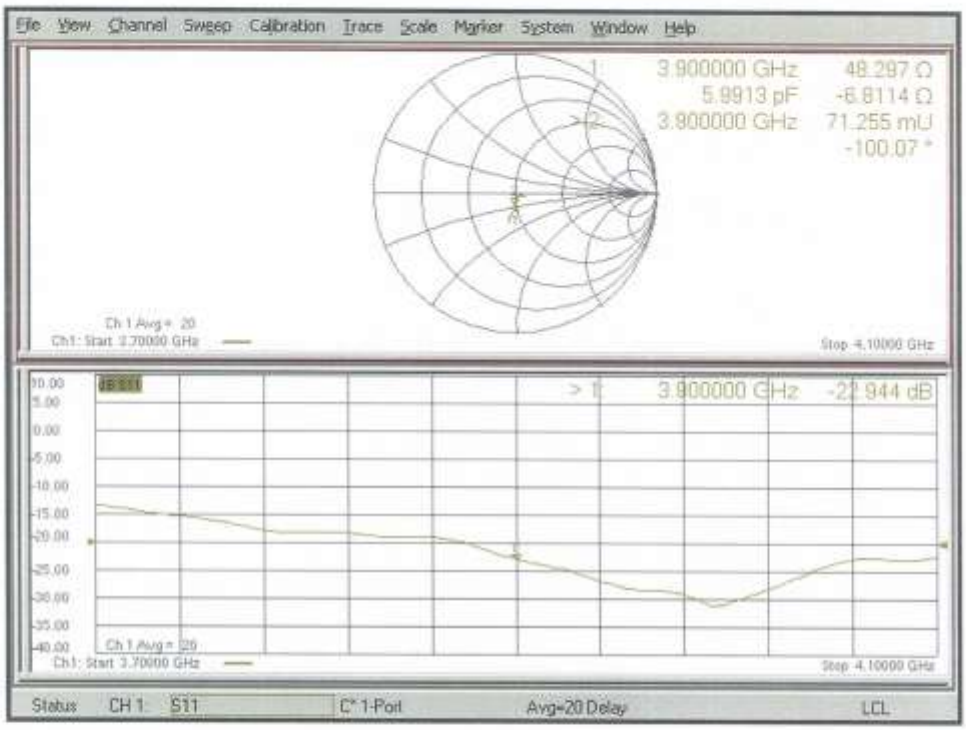
- Probe: EX3DV4 - SN3503; ConvF(7.39, 7.39, 7.39) @ 3900 MHz; Calibrated: 30.12.2020
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn601; Calibrated: 02.11.2020
- Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001
- DASY52 52.10.4(1527); SEMCAD X 14.6.14(7483)

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 = 72.33 V/m; Power Drift = 0.05 dB
Peak SAR (extrapolated) = 20.6 W/kg
SAR(1 g) = 7.07 W/kg; SAR(10 g) = 2.44 W/kg
Smallest distance from peaks to all points 3 dB below = 7.4 mm
Ratio of SAR at M2 to SAR at M1 = 72.9%
Maximum value of SAR (measured) = 14.3 W/kg



0 dB = 14.3 W/kg = 11.54 dBW/kg

Impedance Measurement Plot for Head TSL



Appendix H. – Power reduction verification

Per the May 2017 TCBC Workshop notes, demonstration of proper functioning of the power reduction mechanism is required to support the corresponding SAR Configurations.

The verification process was divided into two parts:

1). Evaluation of output power levels for individual triggering mechanism

2) Evaluation of the triggering distances for proximity-based sensors.

1. Power Reduction Verification for Main Ant#1, #2 Sub Ant#3

The Power verification was performed according to the following procedure:

1. A base station simulator was used to establish a conducted RF connection and output power was monitored. The Power measurements were conformed to be within expected tolerances for all states before and after a power reduction mechanism was triggered.
2. Step 1 was repeated for all relevant modes and frequency bands for the mechanism being investigated.
3. Step 1 and 2 were repeated for all individual power reduction mechanism and combinations thereof. For the combination cases, one mechanism was switched to a “triggered” state at a time; powers were conformed to be within tolerance after each additional mechanism was activated.

Main Antenna Verification Summary

Mechanism(s)	Mode/Band	Power reduction Mechanism (RSI Index)		
		Un-triggered (Max Power)	Mechanism 1 (Reduced Power)	Mechanism 2 (Reduced Power)
Grip	GSM1900	0	3	
Grip	WCDMA B2	0	3	
Grip	LTE Band 2	0	3	
Grip	LTE Band 4	0	3	
Grip	LTE Band 7	0	3	
Grip	LTE Band 66	0	3	
Grip	Sub 6 Band n2	0	3	
Grip	Sub 6 Band n66	0	3	
Hotspot On	GSM1900	0	2	
Hotspot On	WCDMA B2	0	2	
Hotspot On	LTE Band 2	0	2	
Hotspot On	LTE Band 4	0	2	
Hotspot On	LTE Band 7	0	2	
Hotspot On	LTE Band 48	0	2	
Hotspot On	LTE Band 66	0	2	
Hotspot On	Sub 6 Band n2	0	2	
Hotspot On	Sub 6 Band n66	0	2	
Hotspot On, Then Grip	GSM1900	0	2	3
Hotspot On, Then Grip	WCDMA B2	0	2	3
Hotspot On, Then Grip	LTE Band 2	0	2	3
Hotspot On, Then Grip	LTE Band 4	0	2	3
Hotspot On, Then Grip	LTE Band 7	0	2	3
Hotspot On, Then Grip	LTE Band 66	0	2	3
Hotspot On, Then Grip	Sub 6 Band n2	0	2	3
Hotspot On, Then Grip	Sub 6 Band n66	0	2	3

Grip, then Hotspot On	GSM1900	0	3	2
Grip, then Hotspot On	WCDMA B2	0	3	2
Grip, then Hotspot On	LTE Band 2	0	3	2
Grip, then Hotspot On	LTE Band 4	0	3	2
Grip, then Hotspot On	LTE Band 7	0	3	2
Grip, then Hotspot On	LTE Band 66	0	3	2
Grip, then Hotspot On	Sub 6 Band n2	0	3	2
Grip, then Hotspot On	Sub 6 Band n66	0	3	2

Note : This Device uses different Radio SAR Index(RSI) to configure different time averaged power levels based on certain exposure scenarios. For this Device, RSI = 2 represents the case when Hotspot mode is active. RSI =3 represents the case when grip sensor is active, and RSI = 0 is configured when the device cannot detect the use condition

1.1. Distance Verification Procedure

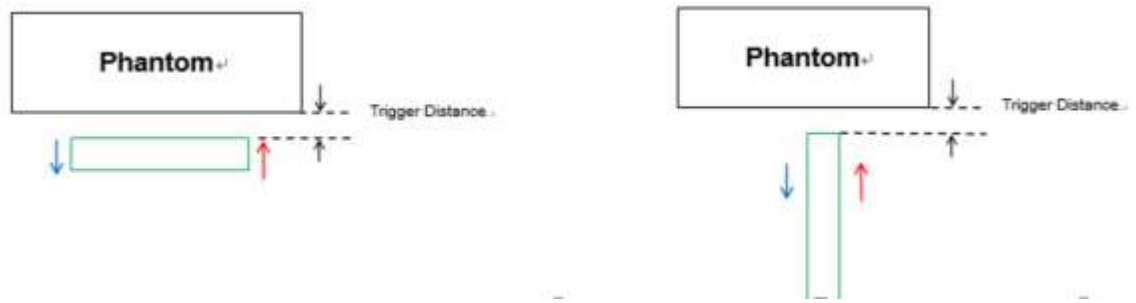
Procedures for determining proximity sensor triggering distances

(KDB 616217D04v01r02§6.2)

The distance verification procedure was performed according to the following procedure:

1. A base station simulator was used to establish an RF connection and to monitor the power levels. The device being tested was placed below the relevant section of the phantom with the relevant side or edge of the device facing toward the phantom.
2. The device was moved toward and away from the phantom to determine the distance at which the mechanism triggers and the output power is reduced per KDB Publication 616217 D04v01r02 .Each applicable test position was evaluated. The distance were conformed to be the same or larger (more conservative) than the minimum distances provided by the manufacturer.
3. Step 1 and 2 were repeated for the relevant modes, as appropriate
4. Steps1 through 3 were repeated for all distance-based power reduction mechanisms.

For detailed measurement conducted power results, please refer to the Section .11



Proximity Sensor Trigger Distance Assessment KDB 616217 D04§6.2

LEGEND

→ Direction of DUT travel for determination of power reduction triggering point

→ Direction of DUT travel for determination of full power resumption triggering point

Main Ant#1

Tissue simulating liquid	Triggering Distance					
	Rear		Front		Bottom	
	Moving toward phantom [mm]	Moving away from phantom [mm]	Moving toward phantom [mm]	Moving away from phantom [mm]	Moving toward phantom [mm]	Moving away from phantom [mm]
1800MHz Tissue	12	13	8	9	14	15
1900MHz Tissue	12	13	8	9	14	15

Distance Measurement verification for Proximity sensor

Rear side (Main Ant#1) – EUT Moving toward (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	17[mm]	16[mm]	15[mm]	14[mm]	13[mm]	12[mm]	11[mm]	10[mm]	9[mm]	8[mm]
GSM1900	23.84	23.86	23.94	23.85	23.99	21.10	21.11	21.15	21.19	21.22
WCDMA B2	24.74	24.72	24.73	24.72	24.70	21.56	21.68	21.59	21.68	21.74
LTE Band 2	23.54	23.46	23.56	23.52	23.50	20.63	20.52	20.64	20.55	20.52
LTE Band 4	23.23	23.21	23.21	23.13	23.13	19.28	19.27	19.28	19.25	19.34
LTE Band 66	23.84	23.77	23.71	23.71	23.71	19.35	19.33	19.34	19.38	19.37
Sub 6 Band n2	23.83	23.85	23.85	23.90	23.81	20.82	20.80	20.81	20.95	20.90
Sub 6 Band n66	23.74	23.91	23.87	23.83	23.91	19.92	19.90	19.90	19.86	19.99

Rear side (Main Ant#1) – EUT Moving away (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	9[mm]	10[mm]	11[mm]	12[mm]	13[mm]	14[mm]	15[mm]	16[mm]	17[mm]	18[mm]
GSM1900	21.02	21.17	21.13	21.13	21.16	23.85	24.00	23.94	23.89	23.86
WCDMA B2	21.68	21.57	21.75	21.56	21.74	24.71	24.70	24.75	24.58	24.72
LTE Band 2	20.45	20.59	20.53	20.45	20.54	23.38	23.44	23.41	23.49	23.52
LTE Band 4	19.29	19.41	19.25	19.26	19.32	23.12	23.09	23.21	23.15	23.18
LTE Band 66	19.33	19.29	19.44	19.30	19.31	23.84	23.68	23.72	23.87	23.68
Sub 6 Band n2	20.83	20.84	20.80	20.94	20.93	23.94	23.84	23.90	23.93	23.89
Sub 6 Band n66	19.98	19.94	19.93	19.94	19.84	23.74	23.89	23.87	23.89	23.80

Based on the most conservative measured triggering distance of 12mm, additional Phablet SAR measurements were required at 11mm from rear side for the above modes.

Front side (Main Ant#1) – EUT Moving toward (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	13[mm]	12[mm]	11[mm]	10[mm]	9[mm]	8[mm]	7[mm]	6[mm]	5[mm]	4[mm]
GSM1900	23.97	24.00	23.92	24.01	23.97	21.15	21.16	21.18	21.04	21.12
WCDMA B2	24.60	24.65	24.64	24.76	24.74	21.64	21.73	21.66	21.59	21.71
LTE Band 2	23.48	23.44	23.47	23.39	23.57	20.49	20.47	20.52	20.48	20.61
LTE Band 4	23.17	23.14	23.14	23.11	23.10	19.24	19.34	19.29	19.26	19.40
LTE Band 66	23.71	23.70	23.69	23.84	23.79	19.39	19.30	19.28	19.30	19.30
Sub 6 Band n2	23.93	23.89	23.82	23.83	23.95	20.90	20.97	20.80	20.77	20.82
Sub 6 Band n66	23.93	23.89	23.73	23.88	23.93	19.84	19.98	19.92	19.97	19.71

Front side (Main Ant#1) – EUT Moving away (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	5[mm]	6[mm]	7[mm]	8[mm]	9[mm]	10[mm]	11[mm]	12[mm]	13[mm]	14[mm]
GSM1900	21.02	21.18	21.14	21.04	21.21	23.96	23.91	23.90	23.88	23.94
WCDMA B2	21.62	21.66	21.72	21.56	21.64	24.68	24.65	24.73	24.62	24.64
LTE Band 2	20.60	20.65	20.45	20.60	20.50	23.55	23.49	23.44	23.46	23.37
LTE Band 4	19.34	19.34	19.29	19.27	19.39	23.15	23.24	23.14	23.18	23.23
LTE Band 66	19.43	19.37	19.38	19.41	19.40	23.71	23.68	23.84	23.71	23.77
Sub 6 Band n2	20.89	20.81	20.86	20.87	20.86	23.93	23.78	23.85	23.92	23.90
Sub 6 Band n66	19.90	19.91	19.88	19.84	19.91	23.91	23.81	23.73	23.75	23.74

Based on the most conservative measured triggering distance of 8mm, additional Phablet SAR measurements were required at 7mm from front side for the above modes

Bottom side (Main Ant#1) – EUT Moving toward (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	19[mm]	18[mm]	17[mm]	16[mm]	15[mm]	14[mm]	13[mm]	12[mm]	11[mm]	10[mm]
GSM1900	23.97	24.00	23.92	24.01	23.97	21.15	21.16	21.18	21.04	21.12
WCDMA B2	24.60	24.65	24.64	24.76	24.74	21.64	21.73	21.66	21.59	21.71
LTE Band 2	23.48	23.44	23.47	23.39	23.57	20.49	20.47	20.52	20.48	20.61
LTE Band 4	23.17	23.14	23.14	23.11	23.10	19.34	19.38	19.32	19.24	19.36
LTE Band 66	23.71	23.70	23.69	23.84	23.79	19.39	19.30	19.28	19.30	19.30
Sub 6 Band n2	23.93	23.89	23.82	23.83	23.95	20.90	20.97	20.80	20.77	20.82
Sub 6 Band n66	23.93	23.89	23.73	23.88	23.93	19.89	19.98	19.92	19.97	19.93

Bottom side (Main Ant#1) – EUT Moving away (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	11[mm]	12[mm]	13[mm]	14[mm]	15[mm]	16[mm]	17[mm]	18[mm]	19[mm]	20[mm]
GSM1900	21.20	21.20	21.19	21.09	21.08	23.94	24.00	23.99	23.83	23.87
WCDMA B2	21.75	21.55	21.60	21.57	21.55	24.76	24.71	24.58	24.68	24.64
LTE Band 2	20.64	20.51	20.50	20.51	20.47	23.50	23.52	23.43	23.44	23.50
LTE Band 4	19.32	19.39	19.32	19.25	19.29	23.15	23.06	23.22	23.25	23.08
LTE Band 66	19.40	19.37	19.24	19.25	19.43	23.79	23.70	23.83	23.80	23.78
Sub 6 Band n2	20.81	20.84	20.96	20.90	20.85	23.92	23.83	23.85	23.78	23.94
Sub 6 Band n66	19.82	19.86	19.97	19.99	19.86	23.88	23.82	23.83	23.81	23.88

Based on the most conservative measured triggering distance of 14mm, additional Phablet SAR measurements were required at 13mm from bottom side for the above modes.

Main Ant#2

Tissue simulating liquid	Triggering Distance					
	Rear		Left		Bottom	
	Moving toward phantom [mm]	Moving away from phantom [mm]	Moving toward phantom [mm]	Moving away from phantom [mm]	Moving toward phantom [mm]	Moving away from phantom [mm]
2600 MHz Tissue	12	13	8	9	14	15

Rear side (Main Ant#2) – EUT Moving toward (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	17[mm]	16[mm]	15[mm]	14[mm]	13[mm]	12[mm]	11[mm]	10[mm]	9[mm]	8[mm]
LTE Band 7	22.67	22.68	22.86	22.87	22.73	20.17	20.08	20.20	20.06	20.04

Rear side (Main Ant#2) – EUT Moving away (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	9[mm]	10[mm]	11[mm]	12[mm]	13[mm]	14[mm]	15[mm]	16[mm]	17[mm]	18[mm]
LTE Band 7	20.01	20.01	20.21	20.06	20.19	22.73	22.68	22.85	22.85	22.71

Based on the most conservative measured triggering distance of 12mm, additional Phablet SAR measurements were required at 11mm from rear side for the above modes.

Front side (Main Ant#2) – EUT Moving toward (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	13[mm]	12[mm]	11[mm]	10[mm]	9[mm]	8[mm]	7[mm]	6[mm]	5[mm]	4[mm]
LTE Band 7	22.73	22.77	22.69	22.85	22.70	20.16	20.19	20.06	20.18	20.18

Front side (Main Ant#2) – EUT Moving away (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	5[mm]	6[mm]	7[mm]	8[mm]	9[mm]	10[mm]	11[mm]	12[mm]	13[mm]	14[mm]
LTE Band 7	20.05	20.01	20.19	20.09	20.02	22.72	22.79	22.84	22.70	22.85

Based on the most conservative measured triggering distance of 8mm, additional Phablet SAR measurements were required at 7mm from front side for the above modes

Bottom side (Main Ant#2) – EUT Moving toward (Release) from the Phantom

Mode	Distance to DUT Output power (dBm)									
	19[mm]	18[mm]	17[mm]	16[mm]	15[mm]	14[mm]	13[mm]	12[mm]	11[mm]	10[mm]
LTE Band 7	22.87	22.87	22.78	22.75	22.78	20.20	20.20	20.10	20.13	20.19

Bottom side (Main Ant#2) – EUT Moving away (trigger) to the Phantom

Mode	Distance to DUT Output power (dBm)									
	11[mm]	12[mm]	13[mm]	14[mm]	15[mm]	16[mm]	17[mm]	18[mm]	19[mm]	20[mm]
LTE Band 7	20.05	20.05	20.03	20.03	20.13	22.67	22.83	22.77	22.76	22.80

Based on the most conservative measured triggering distance of 14mm, additional Phablet SAR measurements were required at 13mm from bottom side for the above modes.

1.2 Proximity Sensor Coverage for SAR measurements

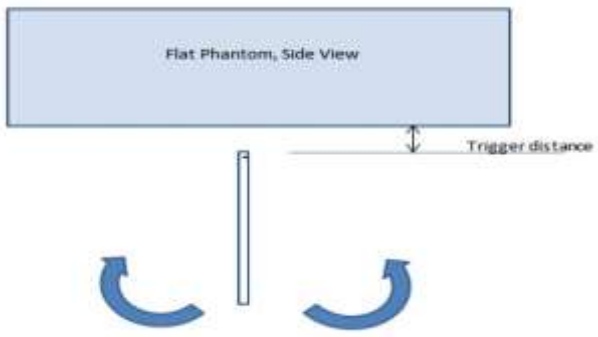
(KDB 616217 D04v01r02§6.3)

As there is no spatial offset between the antenna and the proximity sensor element, proximity sensor coverage did not need to be assessed.

1.3 Proximity Sensor Tilt Angle Assessment

(KDB 616217 D04v01r02 §6.4)

The DUT was positioned directly below the flat phantom at the minimum measured trigger distance with Bottom side parallel to the base of the flat phantom for each band.The EUT was rotated about Bottom side for angles up to ±45°. If the output power increased during the rotation the DUT was moved 1mm toward the phantom and the rotation repeated. This procedure was repeated until the power remained reduced for all angles up±45°.



Proximity sensor tilt angle assessment (Bottom For MainAnt#1, #2) KDB 616217 §6.4

Summary of Tablet Tilt Angle influence to Proximity Sensor Triggering (Bottom side for Main Ant#1)

Tissue	Minimum distance At which power reduction was maintained over-45°	Power reduction status										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
1800 MHz Tissue	14mm	On	On	On	On	On	On	On	On	On	On	On
1900 MHz Tissue	14mm	On	On	On	On	On	On	On	On	On	On	On

Summary of Tablet Tilt Angle influence to Proximity Sensor Triggering (Bottom side for Main Ant#2)

Tissue	Minimum distance At which power reduction was maintained over-45°	Power reduction status										
		-45°	-40°	-30°	-20°	-10°	0°	10°	20°	30°	40°	45°
2600 MHz Tissue	14mm	On	On	On	On	On	On	On	On	On	On	On

1.4 Resulting test positions for Phablet SAR measurements

Wireless technologies	Position	§6.2 Triggering Distance [mm]	§6.3 Coverage	§6.4 Tilt Angle	Worst case distance for Phablet SAR [mm]
WWAN (GSM1900/WCDMA B2/ /LTEB2/B4/B7/B66 /SUB6 n2/n66)	Rear	12	N/A	N/A	11
	Front	8	N/A	N/A	7
	Bottom	14	N/A	N/A	13

Note:FCC KDB Publication 616217 D04v01r02 Section 6 was used as a guideline for selecting SAR test distances for this device when being used in phablet use conditions

2. Power reduction Verification for RCV-ON

This device uses a power reduction mechanism for SAR compliance for operations during voice held to ear scenarios.

When a user makes or receives a voice call for Sub Ant#3 the audio of the call is sent through the Receiver at the top of the device will trigger the Power reduction for Sub Ant#3 (i.e. reducing output power for Head SAR compliance)

Detailed descriptions of the power reduction mechanism are included in the Main operational description document

Sub Ant#3

Condition For Power reduction	Wireless Technologies	Power reduction Mechanism (RSI Index)	
		Un-Triggered (Max Power)	Triggered (Reduced Power)
RCV-on	LTE 48	0	1

Note : This Device uses different Radio SAR Index(RSI) to configure different time averaged power levels based on certain exposure scenarios. For this Device, RSI = 1 represents the case where the device is held to ear(RCV), and RSI = 0 is configured when the device cannot detect the use condition

3. Power reduction Verification for WLAN/Bluetooth Ant

This device uses a power reduction mechanism for SAR compliance for WLAN operations during voice or VoIP held to ear scenarios.

When a user makes or receives a WLAN voice or WLAN VOIP call for WLAN Ant the audio of the call is sent through the Receiver at the top of the device will trigger the Power reduction for WLAN Ant (i.e. reducing output power for Head SAR compliance)

Detailed descriptions of the power reduction mechanism are included in the Main operational description document

Power Measurement Verification for WLAN/Bluetooth Ant

Condition For Power reduction	Wireless Technologies	Conducted Power[dBm]	
		Un-Triggered (Max Power)	Triggered (Reduced Power)
RCV-on	2.4GHz 802.11b	20.4	12.43
RCV-on	2.4GHz 802.11g	18.25	12.27
RCV-on	2.4GHz 802.11n	17.80	12.28
RCV-on	5GHz 802.11a	18.95	10.19
RCV-on	5GHz 802.11n 20MHz	18.52	10.13
RCV-on	5GHz 802.11n 40MHz	17.77	10.31
RCV-on	5GHz 802.11ac 20MHz	17.62	10.16
RCV-on	5GHz 802.11ac 40MHz	17.67	10.3
RCV-on	5GHz 802.11ac 80MHz	13.69	10.53
RCV-on	Bluetooth(BDR)	16.55	8.45
RCV-on	Bluetooth(EDR)	12.16	3.69
RCV-on	Bluetooth LE(2Mbps)	13.47	5.69
RCV-on	Bluetooth LE(1Mbps)	13.29	5.44

Appendix I. – Down-link CA Power Measurement / 5G NR Call Box Setup

1. LTE Down-link Carrier Aggregation Conducted Powers

SAR test exclusion for LTE downlink Carrier Aggregation is determined by power measurements according to the number component carriers(CCs) supported by test product implementation. For those configurations required by April 2018 TCBC Workshop notes, conducted power measurements with LTE Carrier Aggregation(CA) (downlink only) active are made in accordance to KDB Publication 941225 D05Av01r02. The RRC connection is only handled by one cell, the primary component carrier (PCC) for downlink and uplink communications. After making a data connection to the PCC, the UE device adds secondary component carrier(s)(SCC) on the downlink only.

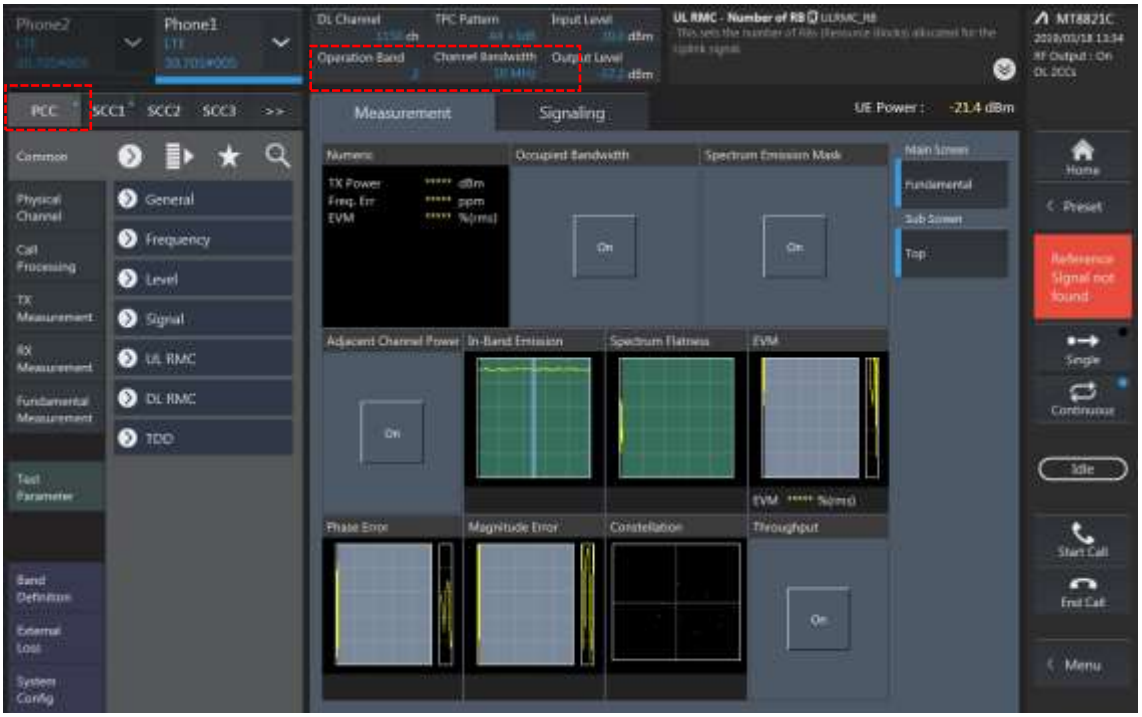
Downlink Carrier aggregation:

1. This device only supports downlink carrier aggregation. For every supported combination of downlink carrier aggregation, power measurements were performed with the downlink carrier aggregation active for the configuration with highest measured maximum conducted power with downlink carrier aggregation inactive measured among the channel bandwidth, modulation, and RB combinations in each frequency band.
2. All control and acknowledge data is sent on uplink channels that operate identical to specifications when downlink carrier aggregation is inactive.
3. Per FCC KDB publication 941225 D05A v01r02, Section C)3)b)ii), PCC uplink channel was selected at downlink carrier aggregation combinations. The downlink PCC channel was paired with the selected PCC uplink channel according to normal configurations without carrier aggregation.
4. For continuous intra-band carrier aggregation, the downlink channel spacing between the component carriers was set to multiple of 300kHz less than the nominal channel spacing defined in section 5.4.1A of 3GPP TS 36.521.
5. For non-continuous intra-band carrier aggregation, the downlink channel spacing between the component carriers was set to be larger than the nominal channel spacing and provided maximum separation between the component carriers.
6. All selected downlink channels remained fully within the downlink transmission band of the respective component carrier.

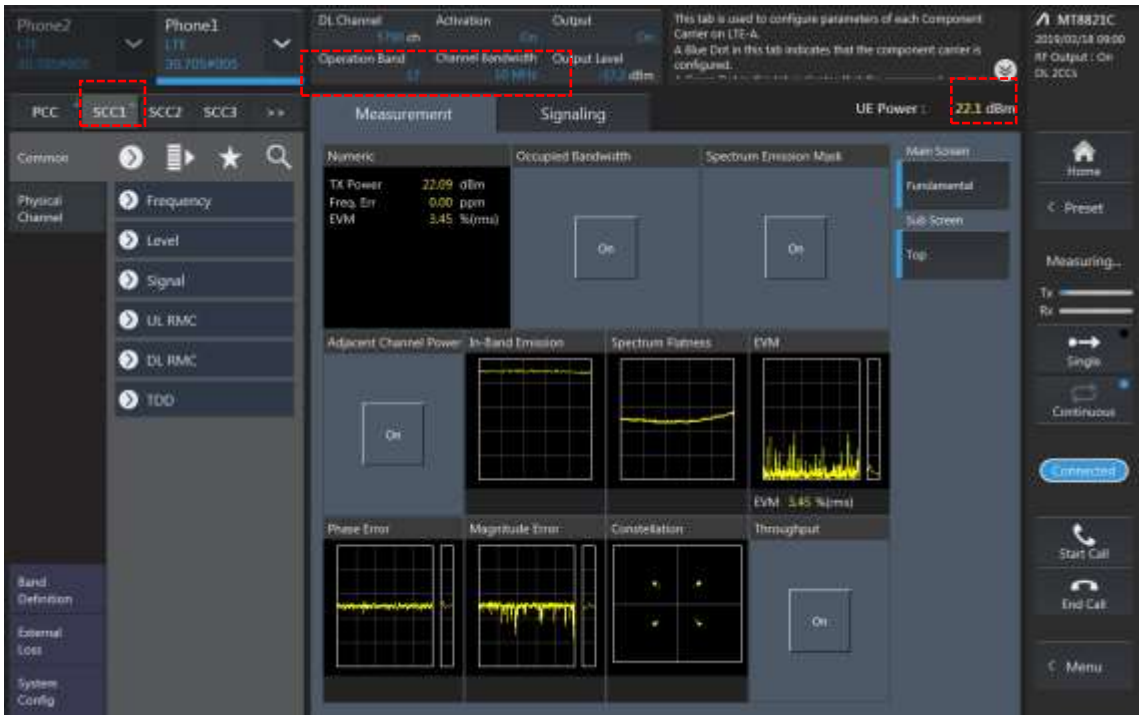
Power Measurement setup

LTE Down Link 2CA Call Setup

PCC Setting : Channel/ RB/ BW/ Modulation



SCC Setting : Channel/ RB/ BW/ Modulation and call Connection

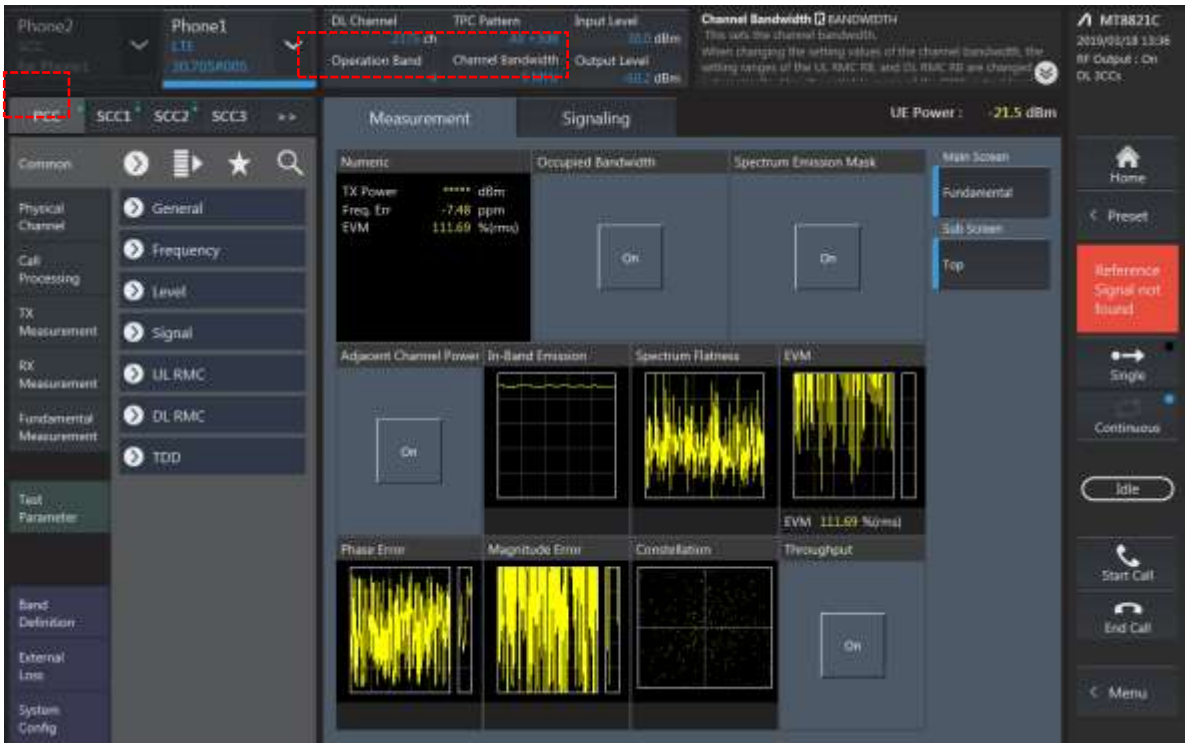


2CA Downlink Carrier aggregation Maximum conducted Powers

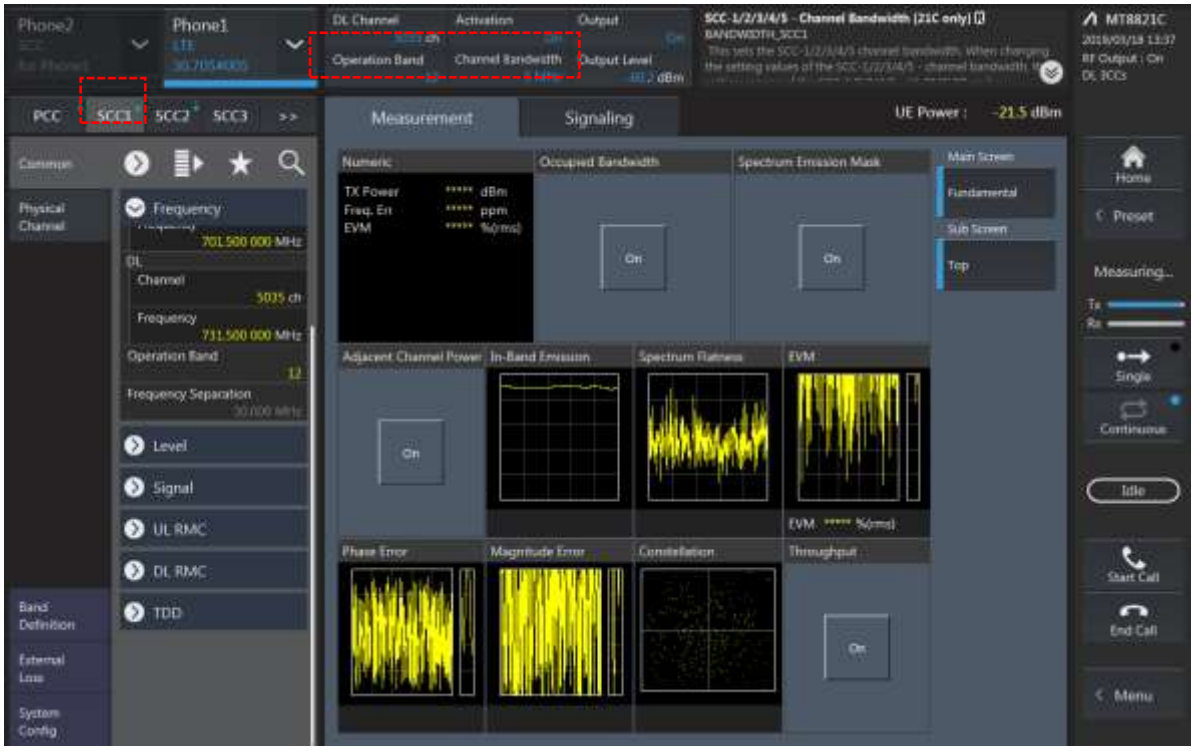
Combination	PCC									SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
48A-48A	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	56640	3690	22.74	22.68	-0.06
48A-66A	48	20	55340	3560	55340	3560	QPSK	1	49	66	20	66786	2145	22.74	22.7	-0.04
48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	23.78	23.75	-0.03

LTE Down Link 3CA Call Setup

1) PCC Setting: Channel /RB/BW/Modulation



2) SCC1 Setting : Channel /RB/BW/Modulation



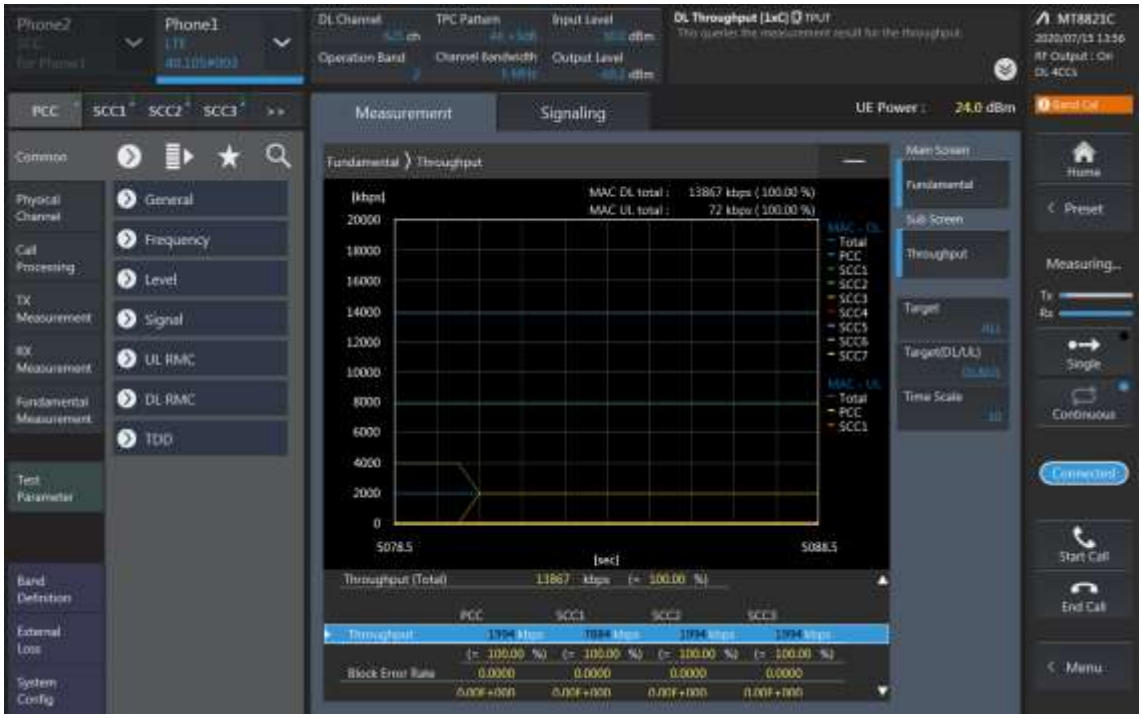
3) SCC2 Setting (Channel /RB/BW/Modulation)and call Connection

3CA Downlink Carrier aggregation Maximum conducted Powers

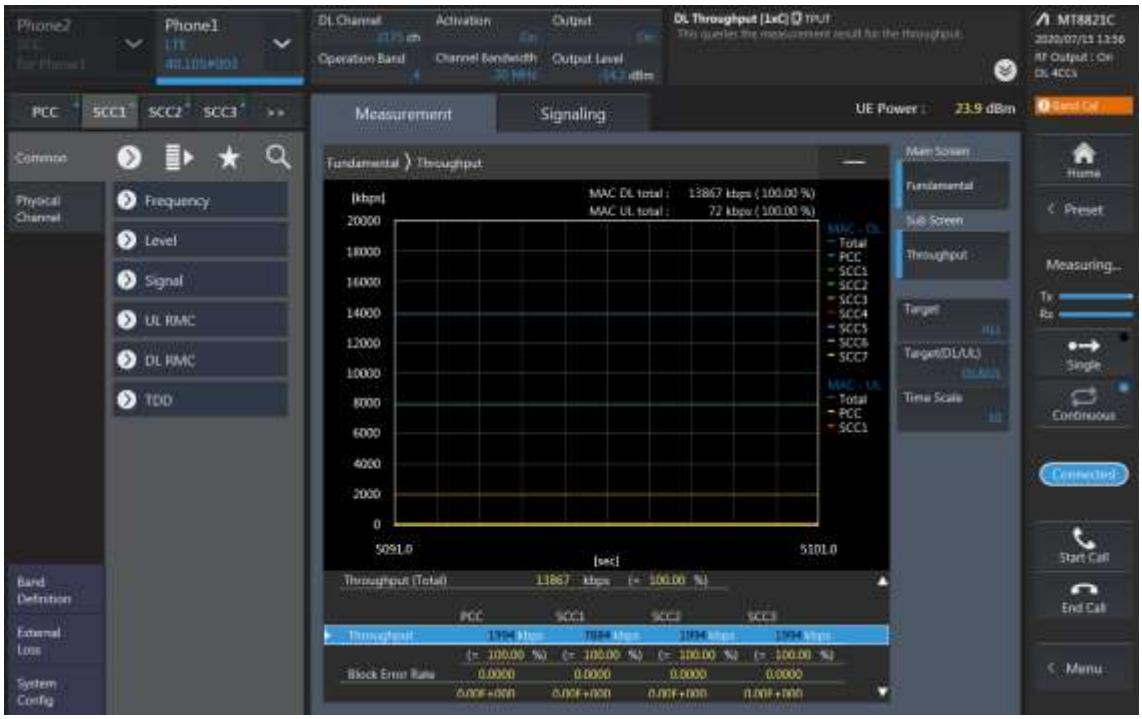
Combination	PCC									SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
2A-4A-13A	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	13	10	5230	751	23.72	23.75	0.03
2A-4A-13A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	2	20	900	1960	13	10	5230	751	23.56	23.65	0.09
2A-4A-13A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	4	20	2175	2132.5	23.97	23.89	-0.08
2A-46A-46A	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	47090	5180	23.72	23.75	0.03
4A-4A-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	23.56	23.54	-0.02
4A-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	4	20	2175	2132.5	4	10	2350	2150	24.15	24.13	-0.02
4A-4A-13A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	13	10	5230	751	23.56	23.47	-0.09
4A-4A-13A	13	10	23230	782	5230	751	QPSK	1	0	4	20	2175	2132.5	4	10	2350	2150	23.97	23.91	-0.06
4A-46A-46A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	46	20	50665	5537.5	46	20	47090	5180	23.56	23.64	0.08
46A-46A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	46	20	50665	5537.5	46	20	47090	5180	23.78	23.73	-0.05
46A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	46	20	50665	5537.5	23.78	23.86	0.08
66A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66786	2145	66	20	67236	2190	23.78	23.68	-0.1
66A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67038	2170.2	66	20	67236	2190	23.78	23.77	-0.01
66A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	66	20	67236	2190	23.78	23.87	0.09

LTE Down Link 4CA Call Setup

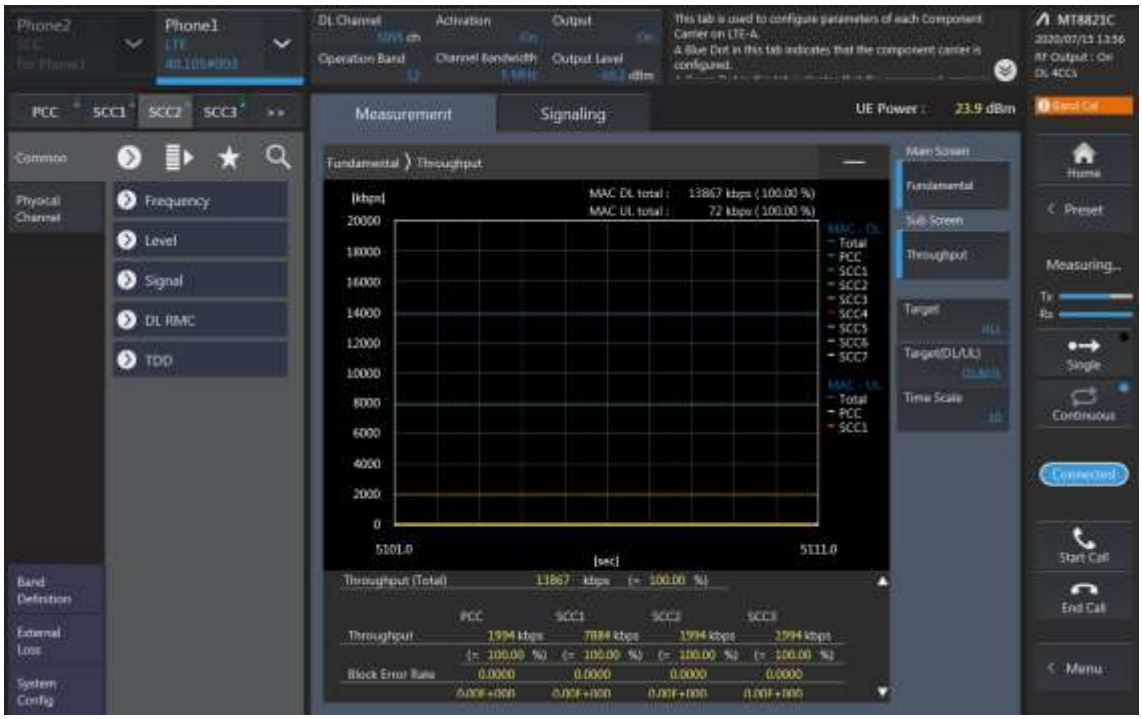
PCC Setting: Channel /RB/BW/Modulation



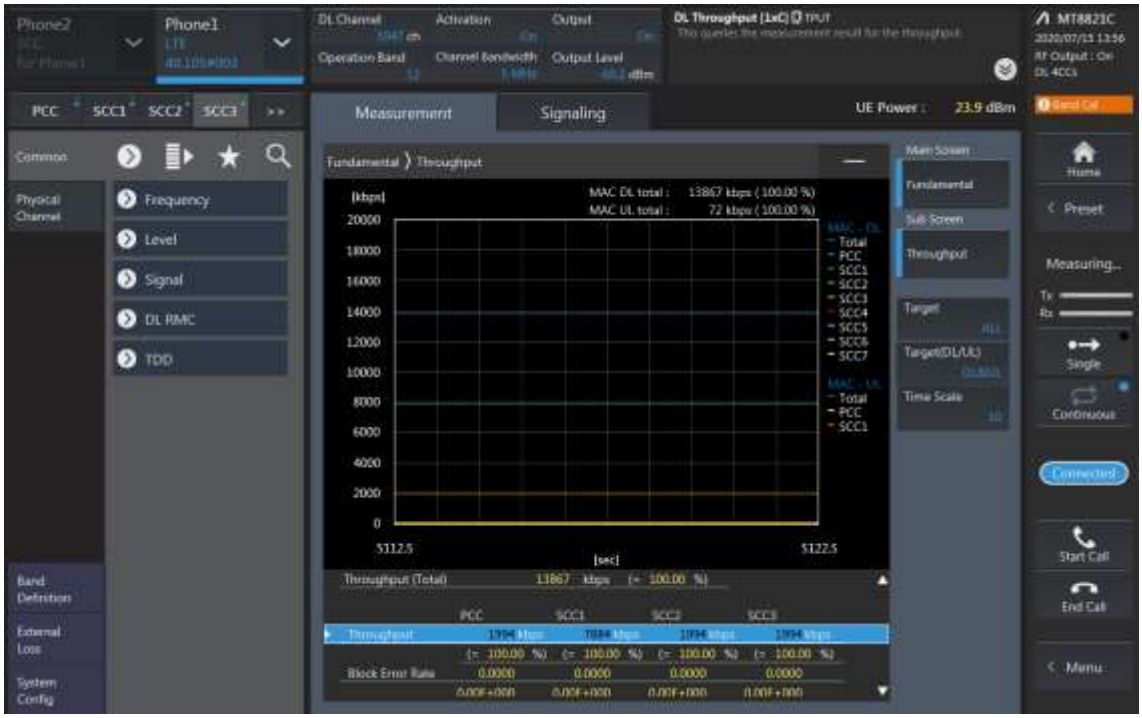
SCC1 Setting (Channel /RB/BW/Modulation)and call Connection



SCC2 Setting (Channel /RB/BW/Modulation)and call Connection



SCC3 Setting (Channel /RB/BW/Modulation)and call Connection



4CA Downlink Carrier aggregation Maximum conducted Powers

Combination	PCC									SCC				SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
2A-2A-4A-4A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	4	10	2350	2150	23.72	23.71	-0.01
2A-2A-4A-4A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	2	20	1100	1980	23.56	23.5	-0.06
2A-2A-4A-5A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	5	10	2525	881.5	23.72	23.69	-0.03
2A-2A-4A-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.56	23.66	0.1
2A-2A-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	4	20	2175	2132.5	24.15	24.25	0.1
2A-2A-5B	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	5	10	2525	881.5	5	5	2453	874.3	23.72	23.76	0.04
2A-2A-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	2	20	1100	1980	24.15	24.11	-0.04
2A-2A-5A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	5	10	2525	881.5	66	20	66786	2145	23.72	23.82	0.1
2A-2A-5A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	66	20	66786	2145	24.15	24.11	-0.04
2A-2A-5A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.78	23.77	-0.01
2A-2A-13A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	13	10	5230	751	66	20	66786	2145	23.72	23.77	0.05
2A-2A-13A-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	2	20	1100	1980	66	20	66786	2145	23.97	23.92	-0.05
2A-2A-13A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	2	20	1100	1980	13	10	5230	751	23.78	23.83	0.05
2A-2A-46C	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	46	20	50665	5537.5	46	20	50467	5517.7	23.72	23.73	0.01
2A-2A-66A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.63	-0.09
2A-2A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.76	-0.02
2A-2A-66B	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	15	66786	2145	66	5	66879	2154.3	23.72	23.69	-0.03
2A-2A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	2	20	1100	1980	23.71	23.64	-0.07
2A-2A-66C	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	66984	2164.8	23.72	23.68	-0.04
2A-2A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	66	20	66786	2145	66	20	66984	2164.8	23.78	23.69	-0.09
2A-4A-4A-5A	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	4	10	2350	2150	5	10	2525	881.5	23.72	23.69	-0.03
2A-4A-4A-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	5	10	2525	881.5	23.56	23.65	0.09
2A-4A-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	4	20	2175	2132.5	4	10	2350	2150	24.15	24.2	0.05
2A-4A-5B	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	5	10	2525	881.5	5	5	2453	874.3	23.72	23.68	-0.04
2A-4A-5B	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	5	5	2453	874.3	23.56	23.62	0.06
2A-4A-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	4	20	2175	2132.5	24.15	24.15	0
2A-5A-5A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	5	5	2425	871.5	66	20	66786	2145	23.72	23.73	0.01
2A-5A-5A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	2	20	900	1960	66	20	66786	2145	24.15	24.22	0.07
2A-5A-5A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	5	5	2425	871.5	23.78	23.86	0.08
2A-5B-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	5	5	2453	874.3	66	20	66786	2145	23.72	23.67	-0.05
2A-5B-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	66	20	66786	2145	24.15	24.11	-0.04
2A-5B-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	5	5	2453	874.3	23.78	23.7	-0.08
2A-5A-46C	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	46	20	50665	5537.5	46	20	50467	5517.7	23.72	23.64	-0.08
2A-5A-46C	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	46	20	50665	5537.5	46	20	50467	5517.7	24.15	24.18	0.03
2A-5A-48A-48A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.72	23.65	-0.07
2A-5A-48A-48A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	24.15	24.13	-0.02
2A-5A-48C	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	48	20	56188	3644.8	23.72	23.62	-0.1
2A-5A-48C	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	24.15	24.19	0.04
2A-5A-48A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	66	20	66786	2145	23.72	23.62	-0.1
2A-5A-48A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	66	20	66786	2145	24.15	24.13	-0.02
2A-5A-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	48	20	55990	3625	23.78	23.85	0.07
2A-5A-66A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	20	66786	2145	66	20	67236	2190	23.72	23.73	0.01
2A-5A-66A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	24.15	24.25	0.1
2A-5A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	5	10	2525	881.5	23.78	23.82	0.04

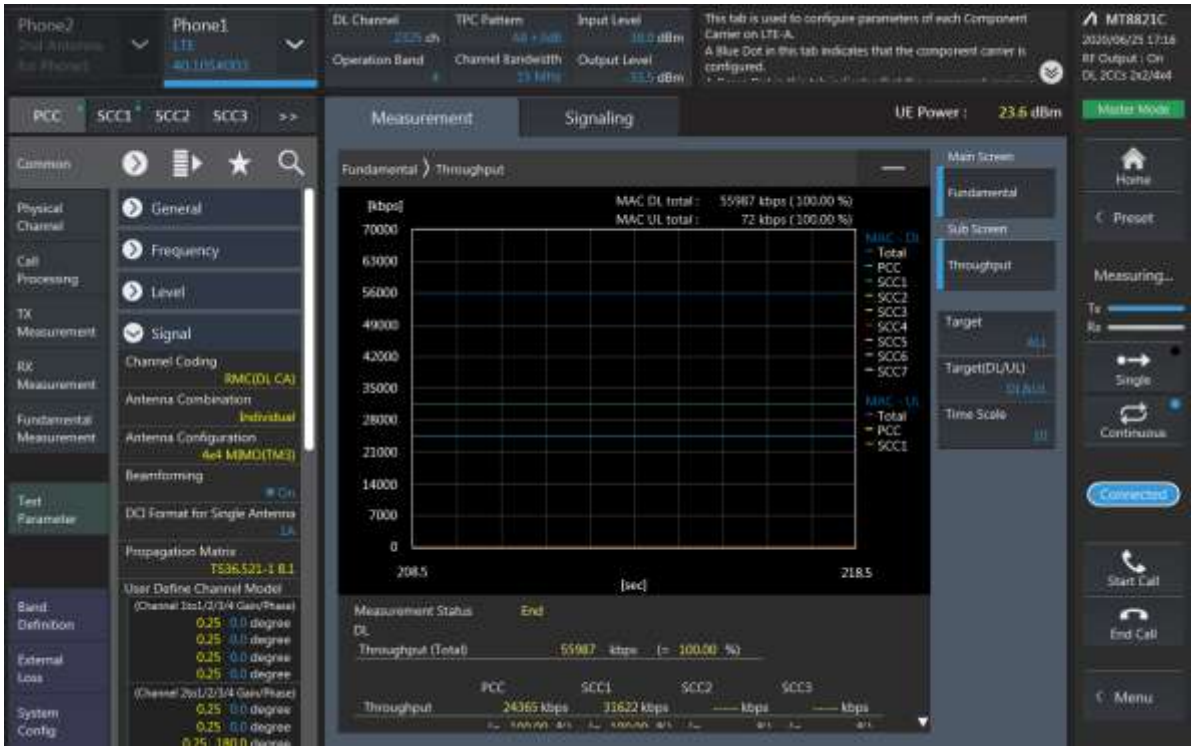
Combination	PCC									SCC				SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
2A-5A-66B	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	15	66786	2145	66	5	66879	2154.3	23.72	23.72	0
2A-5A-66B	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	15	66786	2145	66	5	66879	2154.3	24.15	24.23	0.08
2A-5A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	5	10	2525	881.5	23.71	23.7	-0.01
2A-5A-66C	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	20	66786	2145	66	20	66984	2164.8	23.72	23.65	-0.07
2A-5A-66C	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	20	66786	2145	66	20	66984	2164.8	24.15	24.25	0.1
2A-5A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	2	20	900	1960	5	10	2525	881.5	23.78	23.78	0
2A-13A-46C	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	46	20	50665	5537.5	46	20	50467	5517.7	23.72	23.72	0
2A-13A-46C	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	46	20	50665	5537.5	46	20	50467	5517.7	23.97	23.89	-0.08
2A-13A-48A-48A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.72	23.8	0.08
2A-13A-48A-48A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.97	23.99	0.02
2A-13A-48C	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	48	20	56188	3644.8	23.72	23.73	0.01
2A-13A-48C	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	23.97	24.07	0.1
2A-13A-48A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	66	15	66786	2145	23.72	23.71	-0.01
2A-13A-48A-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	66	15	66786	2145	23.97	23.93	-0.04
2A-13A-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	13	10	5230	751	48	20	55990	3625	23.78	23.71	-0.07
2A-13A-66A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	20	66786	2145	66	20	67236	2190	23.72	23.71	-0.01
2A-13A-66A-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	23.97	24.06	0.09
2A-13A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	13	10	5230	751	23.78	23.72	-0.06
2A-13A-66B	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	15	66786	2145	66	5	66879	2154.3	23.72	23.81	0.09
2A-13A-66B	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	15	66786	2145	66	5	66879	2154.3	23.97	23.94	-0.03
2A-13A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	13	10	5230	751	23.71	23.8	0.09
2A-13A-66C	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	20	66786	2145	66	20	66984	2164.8	23.72	23.74	0.02
2A-13A-66C	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	20	66786	2145	66	20	66984	2164.8	23.97	24.06	0.09
2A-13A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	2	20	900	1960	13	10	5230	751	23.78	23.7	-0.08
2A-46A-46C	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	46	20	53540	5825	23.72	23.62	-0.1
2A-46D	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	46	20	50863	5557.3	23.72	23.68	-0.04
2A-46C-48A	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	48	20	55990	3625	23.72	23.72	0
2A-46C-66A	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	66	20	66786	2145	23.72	23.82	0.1
2A-46C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	46	20	50665	5537.5	46	20	50467	5517.7	23.78	23.84	0.06
2A-46A-48C	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	48	20	55990	3625	48	20	56188	3644.8	23.72	23.77	0.05
2A-48A-48C	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.72	23.71	-0.01
2A-48D	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56188	3644.8	48	20	56386	3664.6	23.72	23.76	0.04
2A-48A-48A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.72	23.78	0.06
2A-48A-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.78	23.69	-0.09
2A-48C-66A	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	23.72	23.74	0.02
2A-48C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	23.78	23.68	-0.1
2A-66A-66B	2	10	19150	1905	1150	1985	QPSK	1	49	66	20	66786	2145	66	5	67168	2183.2	66	15	67261	2192.5	23.72	23.66	-0.06
2A-66A-66B	66	20	132072	1720	66536	2120	QPSK	1	99	66	5	67168	2183.2	66	15	67261	2192.5	2	20	900	1960	23.78	23.78	0
2A-66A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	66	20	67236	2190	2	20	900	1960	23.71	23.64	-0.07
4A-4A-5B	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	5	5	2453	874.3	23.56	23.51	-0.05
4A-4A-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	4	20	2175	2132.5	4	10	2350	2150	24.15	24.12	-0.03
4A-46A-46C	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	46	20	50665	5537.5	46	20	50467	5517.7	46	20	53540	5825	23.56	23.53	-0.03
4A-46D	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	46	20	50665	5537.5	46	20	50467	5517.7	46	20	50863	5557.3	23.56	23.6	0.04
4A-48D	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	48	20	55990	3625	48	20	56188	3644.8	48	20	56386	3664.6	23.56	23.47	-0.09
5A-5A-66A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	66	20	66786	2145	66	20	67236	2190	24.15	24.2	0.05
5A-5A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	5	10	2525	881.5	5	5	2425	871.5	23.78	23.81	0.03

Combination	PCC									SCC				SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
5A-5A-66B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	66	15	66786	2145	66	5	66879	2154.3	24.15	24.22	0.07
5A-5A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	5	10	2525	881.5	5	5	2425	871.5	23.71	23.65	-0.06
5A-5A-66C	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	66	20	66786	2145	66	20	66984	2164.8	24.15	24.05	-0.1
5A-5A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	5	10	2525	881.5	5	5	2425	871.5	23.78	23.85	0.07
5B-46C	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	46	20	50665	5537.5	46	20	50467	5517.7	24.15	24.22	0.07
5A-46D	5	5	20425	826.5	2425	871.5	QPSK	1	24	46	20	50665	5537.5	46	20	50467	5517.7	46	20	50863	5557.3	24.15	24.09	-0.06
5A-46C-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	46	20	50665	5537.5	46	20	50467	5517.7	66	20	66786	2145	24.15	24.24	0.09
5A-46C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	46	20	50665	5537.5	46	20	50467	5517.7	23.78	23.76	-0.02
5B-66A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	66	20	66786	2145	66	20	67236	2190	24.15	24.07	-0.08
5B-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	5	10	2525	881.5	5	5	2453	874.3	23.78	23.86	0.08
5B-66B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	66	15	66786	2145	66	5	66879	2154.3	24.15	24.22	0.07
5B-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	5	10	2525	881.5	5	5	2453	874.3	23.71	23.78	0.07
5B-66C	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	66	20	66786	2145	66	20	66984	2164.8	24.15	24.21	0.06
5B-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	5	10	2525	881.5	5	5	2453	874.3	23.78	23.81	0.03
5A-48A-48C	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	24.15	24.12	-0.03
5A-48D	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56188	3644.8	48	20	56386	3664.6	24.15	24.14	-0.01
5A-48A-48A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	24.15	24.17	0.02
5A-48A-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.78	23.86	0.08
5A-48C-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	24.15	24.11	-0.04
5A-48C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	48	20	55990	3625	48	20	56188	3644.8	23.78	23.71	-0.07
13A-46D	13	10	23230	782	5230	751	QPSK	1	0	46	20	50665	5537.5	46	20	50467	5517.7	46	20	50863	5557.3	23.97	23.94	-0.03
13A-46C-66A	13	10	23230	782	5230	751	QPSK	1	0	46	20	50665	5537.5	46	20	50467	5517.7	66	20	66786	2145	23.97	24.04	0.07
13A-46C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	46	20	50665	5537.5	46	20	50467	5517.7	23.78	23.72	-0.06
13A-48A-48C	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.97	23.89	-0.08
13A-48D	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56188	3644.8	48	20	56386	3664.6	23.97	23.88	-0.09
13A-48A-48A-66A	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.97	24.02	0.05
13A-48A-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.78	23.74	-0.04
13A-48C-66A	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	23.97	24.01	0.04
13A-48C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	48	20	55990	3625	48	20	56188	3644.8	23.78	23.77	-0.01
13A-48A-66B	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	66	15	66786	2145	66	5	66879	2154.3	23.97	23.91	-0.06
13A-48A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	13	10	5230	751	48	20	55990	3625	23.71	23.78	0.07
13A-48A-66C	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	66	20	66786	2145	66	20	66984	2164.8	23.97	23.88	-0.09
13A-48A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	13	10	5230	751	48	20	55990	3625	23.78	23.69	-0.09
13A-66A-66B	13	10	23230	782	5230	751	QPSK	1	0	66	20	66786	2145	66	5	67168	2183.2	66	15	67261	2192.5	23.97	24.01	0.04
13A-66A-66B	66	20	132072	1720	66536	2120	QPSK	1	99	66	5	67168	2183.2	66	15	67261	2192.5	13	10	5230	751	23.78	23.74	-0.04
13A-66A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	66	20	67236	2190	13	10	5230	751	23.71	23.65	-0.06
46A-46C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	46	20	50665	5537.5	46	20	50467	5517.7	46	20	53540	5825	23.78	23.82	0.04
46D-66A	66	20	132072	1720	66536	2120	QPSK	1	99	46	20	50665	5537.5	46	20	50467	5517.7	46	20	50863	5557.3	23.78	23.83	0.05
48A-48A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56640	3690	23.78	23.67	-0.11
48A-48A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	48	20	55990	3625	48	20	56640	3690	23.71	23.79	0.08
48A-48A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	48	20	55990	3625	48	20	56640	3690	23.78	23.85	0.07
48A-48C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.78	23.76	-0.02
48A-48D	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	56244	3650.4	48	20	56442	3670.2	48	20	56640	3690	22.74	22.66	-0.08
48A-48D	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	55538	3579.8	48	20	55736	3599.6	48	20	56640	3690	22.74	22.65	-0.09

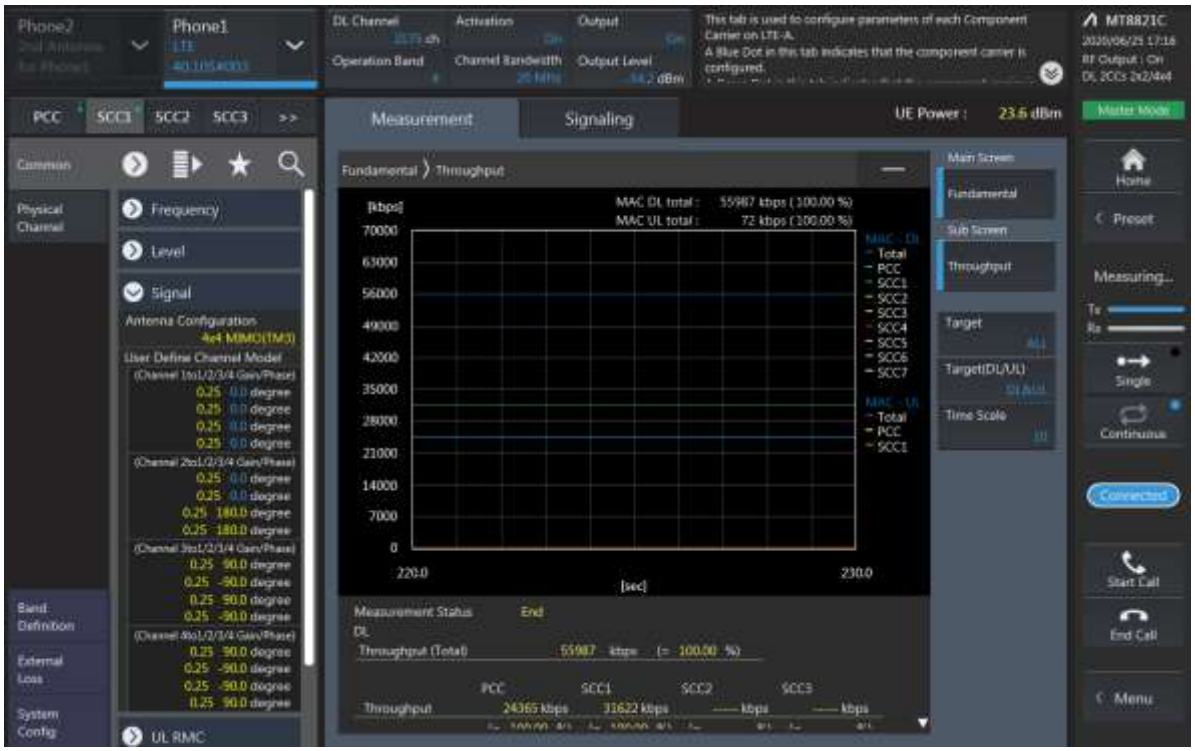
Combination	PCC									SCC				SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
48C-48C	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	55538	3579.8	48	20	56442	3670.2	48	20	56640	3690	22.74	22.83	0.09
48C-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56188	3644.8	23.78	23.76	-0.02
48C-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	48	20	55990	3625	48	20	56188	3644.8	23.71	23.65	-0.06
48C-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	48	20	55990	3625	48	20	56188	3644.8	23.78	23.69	-0.09
48D-66A	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	48	20	56188	3644.8	48	20	56386	3664.6	23.78	23.73	-0.05
48E	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	55538	3579.8	48	20	55736	3599.6	48	20	55934	3619.4	22.74	22.7	-0.04

LTE Down Link 2CA 4x4 MIMO Call Setup

PCC Setting : Channel/ RB/ BW/ Modulation



SCC Setting : Channel/ RB/ BW/ Modulation and call Connection

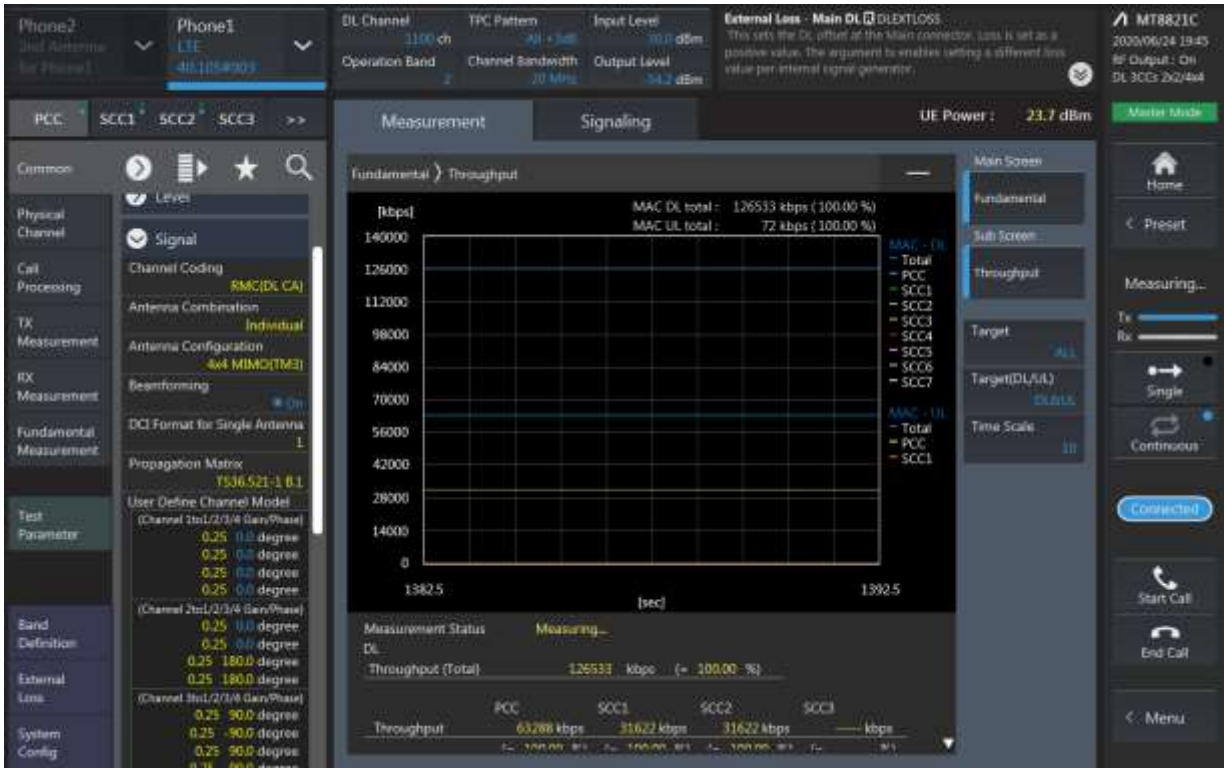


LTE Downlink 2CA 4X4 MIMO Maximum Conducted Power

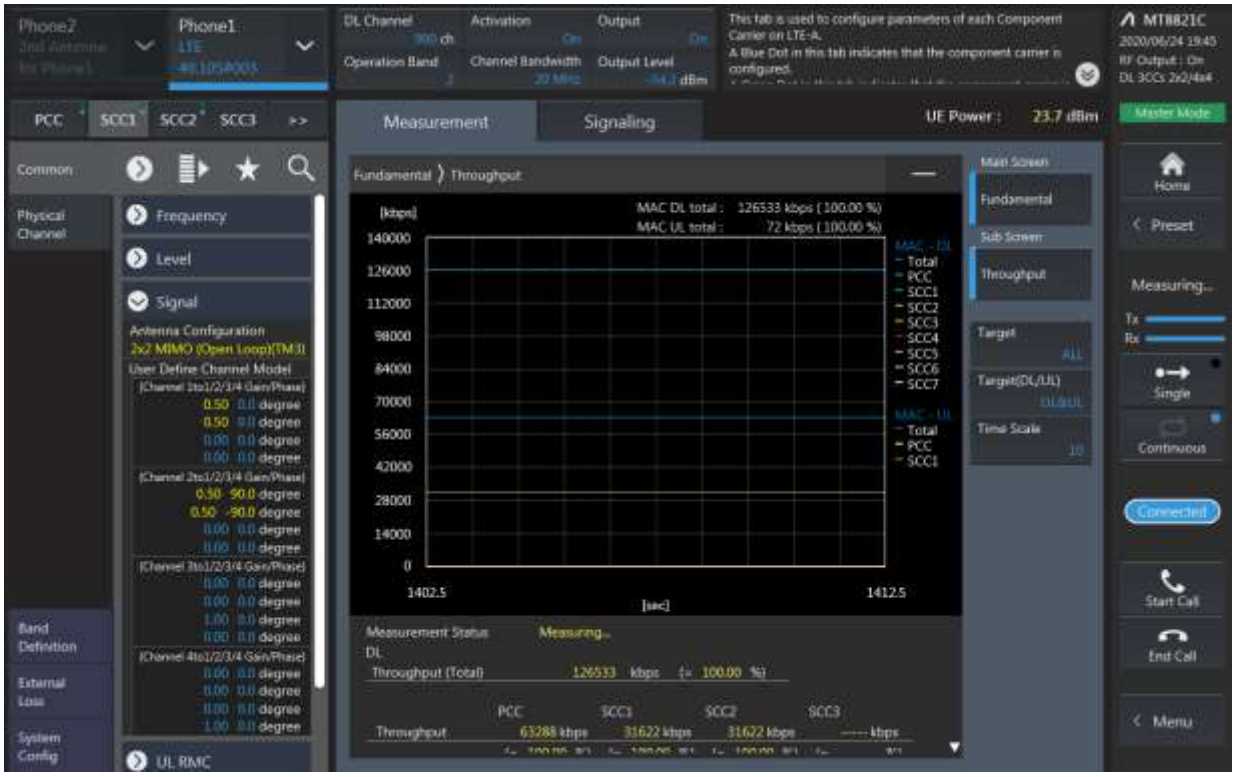
Combination	PCC									SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
[48A]-48A	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	56640	3690	22.74	22.79	0.05
[48A]-[48A]	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	56640	3690	22.74	22.73	-0.01
[48A]-66A	48	20	55340	3560	55340	3560	QPSK	1	49	66	20	66786	2145	22.74	22.65	-0.09
48A-[66A]	48	20	55340	3560	55340	3560	QPSK	1	49	66	20	66786	2145	22.74	22.75	0.01
[48A]-[66A]	48	20	55340	3560	55340	3560	QPSK	1	49	66	20	66786	2145	22.74	22.66	-0.08
[48A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	23.78	23.77	-0.01
48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	23.78	23.83	0.05
[48A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	23.78	23.76	-0.02

LTE Down Link 3CA 4x4 MIMO Call Setup

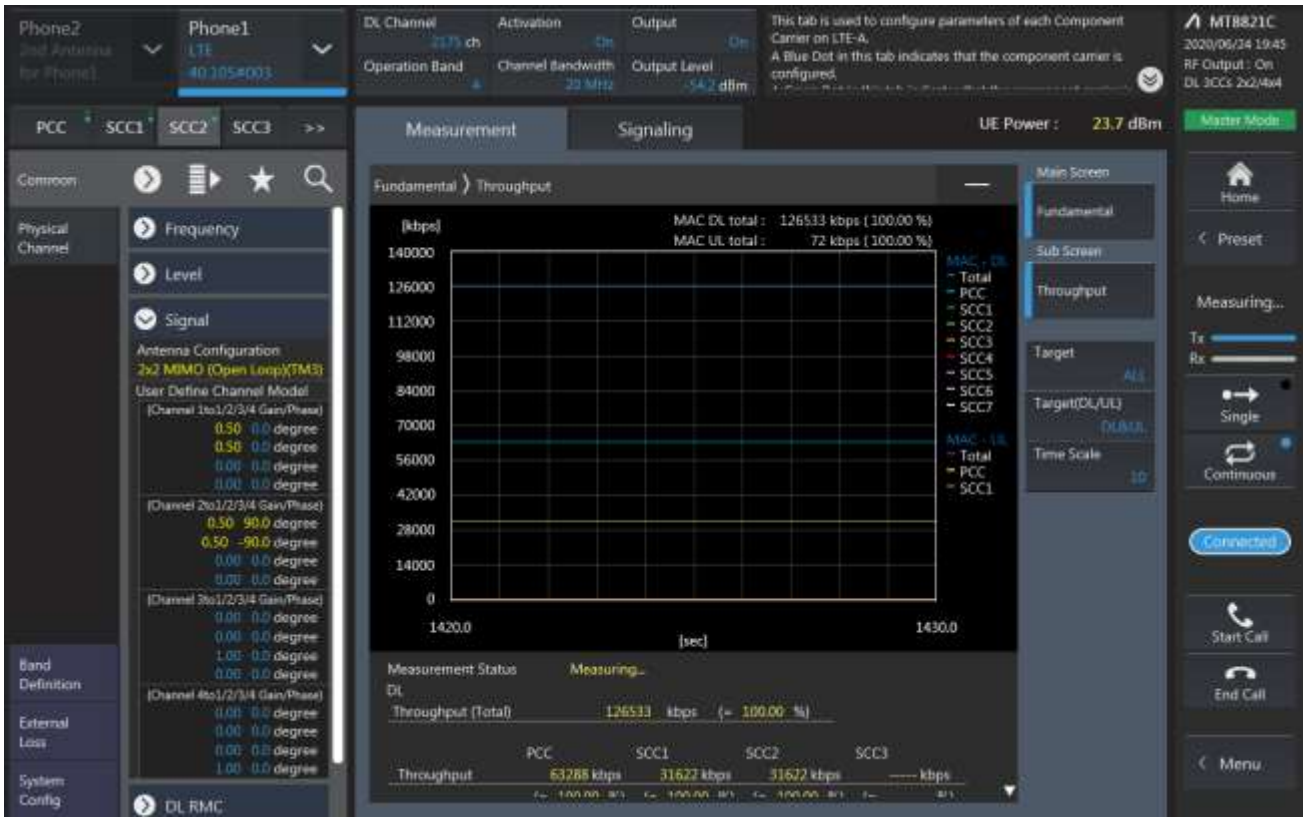
PCC Setting: Channel /RB/BW/Modulation



CC1 Setting : Channel /RB/BW/Modulation



SCC2 Setting (Channel /RB/BW/Modulation)and call Connection

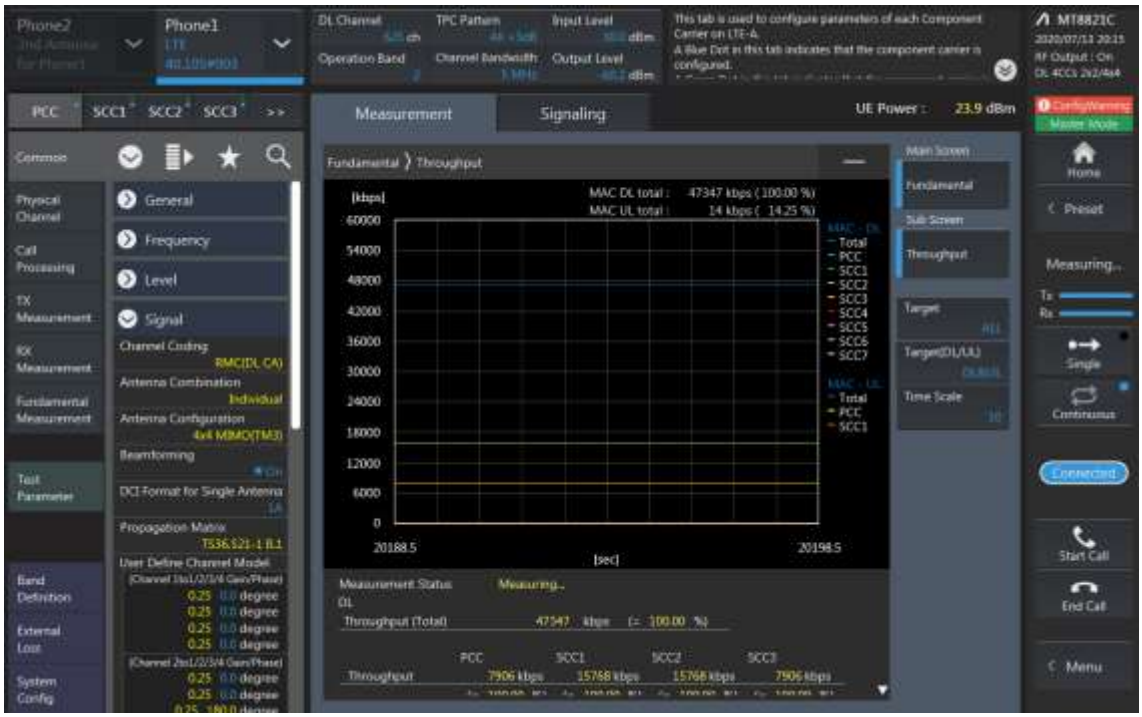


LTE Downlink 3CA 4X4 MIMO Maximum Conducted Power

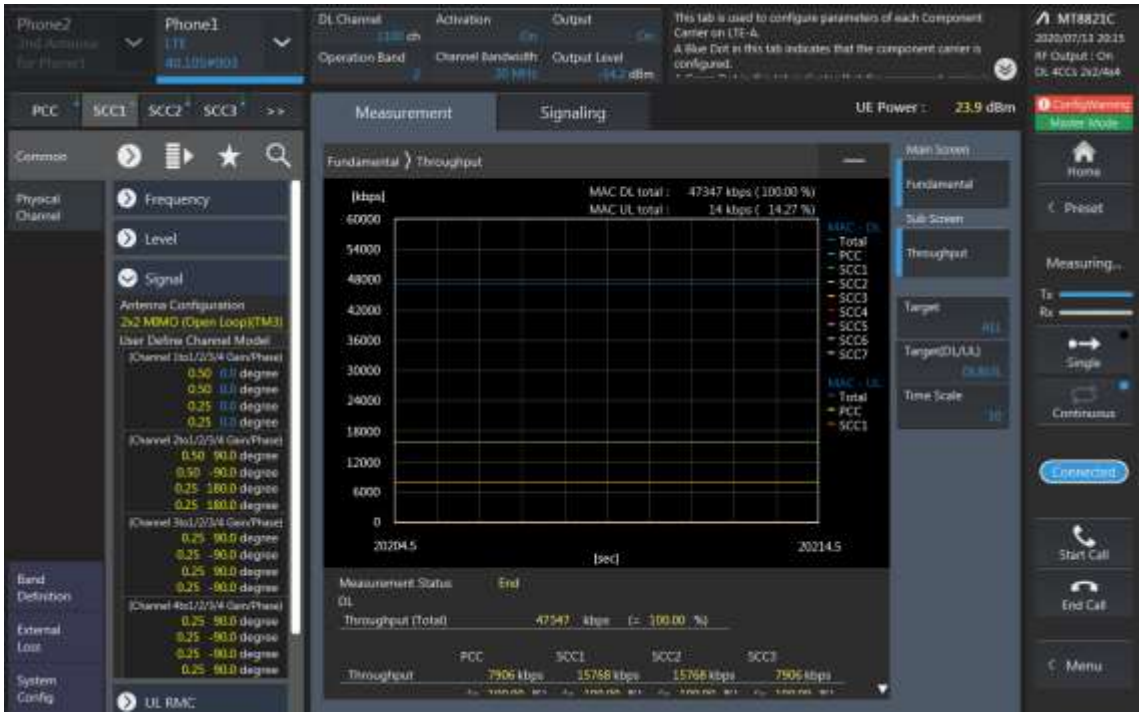
Combination	PCC									SCC				SCC				Tx Power		Delta (2)-(1)
	Band	BW	PCC UL Ch.	PCC UL Freq.	PCC DL Ch.	PCC DL Freq.	Modulation	RB	RB offset	Band	BW	SCC DL Ch.	SCC DL Freq.	Band	BW	SCC DL Ch.	SCC DL Freq.	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled (dBm) (2)	
2A-[4A]-13A	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	13	10	5230	751	23.72	23.66	-0.06
[2A]-4A-13A	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	13	10	5230	751	23.72	23.63	-0.09
[2A]-[4A]-13A	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	13	10	5230	751	23.72	23.78	0.06
2A-[4A]-13A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	2	20	900	1960	13	10	5230	751	23.56	23.65	0.09
[2A]-4A-13A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	2	20	900	1960	13	10	5230	751	23.56	23.62	0.06
[2A]-[4A]-13A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	2	20	900	1960	13	10	5230	751	23.56	23.6	0.04
2A-[4A]-13A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	4	20	2175	2132.5	23.97	23.96	-0.01
[2A]-4A-13A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	4	20	2175	2132.5	23.97	24.03	0.06
[2A]-[4A]-13A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	4	20	2175	2132.5	23.97	23.94	-0.03
[2A]-46A-46A	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	47090	5180	23.72	23.74	0.02
[4A]-4A-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	23.56	23.53	-0.03
[4A]-[4A]-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	23.56	23.54	-0.02
[4A]-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	4	20	2175	2132.5	4	10	2350	2150	24.15	24.13	-0.02
[4A]-[4A]-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	4	20	2175	2132.5	4	10	2350	2150	24.15	24.24	0.09
[4A]-4A-13A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	13	10	5230	751	23.56	23.61	0.05
[4A]-[4A]-13A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	13	10	5230	751	23.56	23.61	0.05
[4A]-4A-13A	13	10	23230	782	5230	751	QPSK	1	0	4	20	2175	2132.5	4	10	2350	2150	23.97	23.99	0.02
[4A]-[4A]-13A	13	10	23230	782	5230	751	QPSK	1	0	4	20	2175	2132.5	4	10	2350	2150	23.97	23.87	-0.1
[4A]-46A-46A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	46	20	50665	5537.5	46	20	47090	5180	23.56	23.46	-0.1
46A-46A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	46	20	50665	5537.5	46	20	47090	5180	23.78	23.79	0.01
46A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	46	20	50665	5537.5	23.78	23.82	0.04
46A-66A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	46	20	50665	5537.5	23.78	23.79	0.01
46A-[66A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	46	20	50665	5537.5	23.78	23.68	-0.1
[66A]-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67038	2170.2	66	20	67236	2190	23.78	23.83	0.05
66A-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67038	2170.2	66	20	67236	2190	23.78	23.79	0.01
[66A]-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67038	2170.2	66	20	67236	2190	23.78	23.87	0.09
[66A]-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	66	20	67236	2190	23.78	23.8	0.02
66A-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	66	20	67236	2190	23.78	23.79	0.01
[66A]-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	66	20	67236	2190	23.78	23.75	-0.03

LTE Down Link 4CA 4x4 MIMO Call Setup

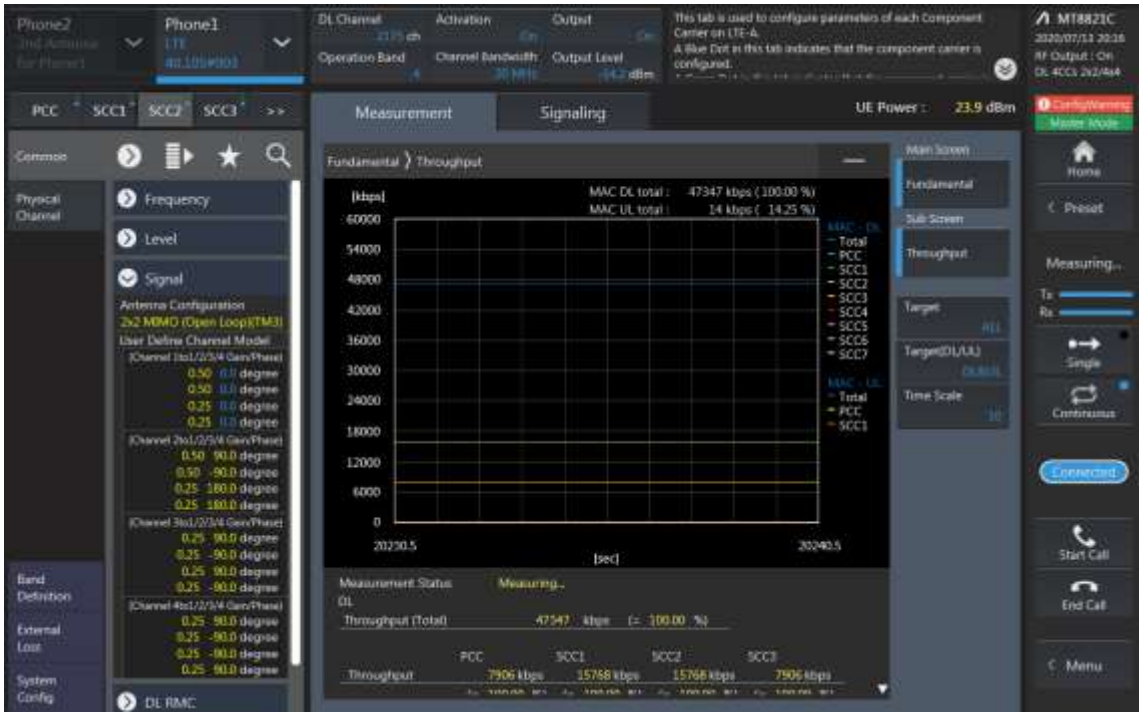
PCC Setting: Channel /RB/BW/Modulation



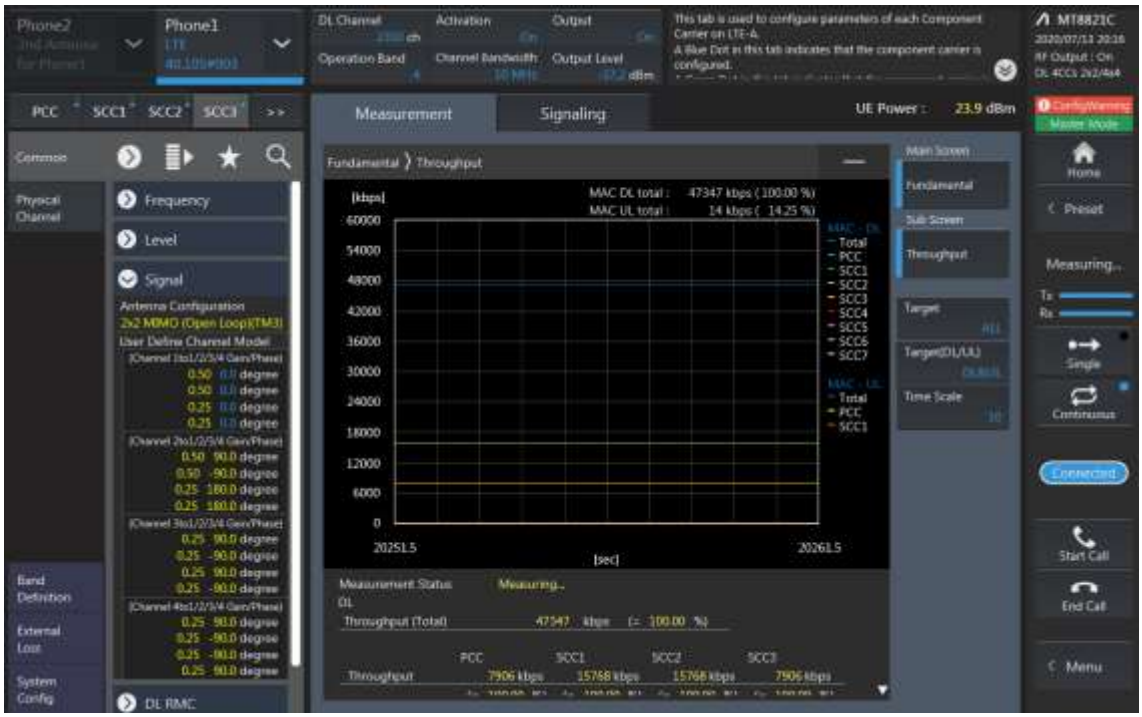
SCC1 Setting : Channel /RB/BW/Modulation



SCC2 Setting (Channel /RB/BW/Modulation) and call Connection



SCC3 Setting (Channel /RB/BW/Modulation) and call Connection



LTE Downlink 4CA 4X4 MIMO Maximum Conducted Power

Combination	PCC									SCC				SCC				SCC				Tx Power		
	Band	BW	PCC UL Channel	PCC UL Frequency	PCC DL Channel	PCC DL Frequency	Modulation	RB	offset	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	Band	BW	SCC DL Channel	SCC DL Frequency	LTE Single Carrier Tx Power (dBm) (1)	LTE Tx Power with DL CA Enabled(dBm) (2)	Deviaion (2)-(1)
2A-2A-[4A]-4A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	4	10	2350	2150	23.72	23.7	-0.02
[2A]-2A-4A-4A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	4	10	2350	2150	23.72	23.72	0
2A-2A-[4A]-[4A]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	4	10	2350	2150	23.72	23.72	0
[2A]-2A-[4A]-4A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	4	10	2350	2150	23.72	23.77	0.05
[2A]-[2A]-4A-4A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	4	10	2350	2150	23.72	23.69	-0.03
2A-2A-[4A]-4A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	2	20	1100	1980	23.56	23.62	0.06
[2A]-2A-4A-4A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	2	20	1100	1980	23.56	23.47	-0.09
2A-2A-[4A]-[4A]	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	2	20	1100	1980	23.56	23.66	0.1
[2A]-2A-[4A]-4A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	2	20	1100	1980	23.56	23.52	-0.04
[2A]-[2A]-4A-4A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	2	20	1100	1980	23.56	23.56	0
2A-2A-[4A]-5A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	5	10	2525	881.5	23.72	23.69	-0.03
[2A]-2A-4A-5A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	5	10	2525	881.5	23.72	23.81	0.09
[2A]-2A-[4A]-5A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	5	10	2525	881.5	23.72	23.62	-0.1
[2A]-[2A]-4A-5A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	4	20	2175	2132.5	5	10	2525	881.5	23.72	23.79	0.07
2A-2A-[4A]-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.56	23.58	0.02
[2A]-2A-4A-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.56	23.64	0.08
[2A]-2A-[4A]-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.56	23.63	0.07
[2A]-[2A]-4A-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.56	23.55	-0.01
2A-2A-[4A]-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	4	20	2175	2132.5	24.15	24.16	0.01
[2A]-2A-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	4	20	2175	2132.5	24.15	24.22	0.07
[2A]-2A-[4A]-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	4	20	2175	2132.5	24.15	24.05	-0.1
[2A]-[2A]-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	4	20	2175	2132.5	24.15	24.12	-0.03
[2A]-2A-5B	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	5	10	2525	881.5	5	5	2453	874.3	23.72	23.77	0.05
[2A]-[2A]-5B	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	5	10	2525	881.5	5	5	2453	874.3	23.72	23.71	-0.01
[2A]-2A-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	2	20	1100	1980	24.15	24.25	0.1
[2A]-[2A]-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	2	20	1100	1980	24.15	24.06	-0.09
2A-2A-5A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	5	10	2525	881.5	66	20	66786	2145	23.72	23.73	0.01
[2A]-2A-5A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	5	10	2525	881.5	66	20	66786	2145	23.72	23.71	-0.01
[2A]-2A-5A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	5	10	2525	881.5	66	20	66786	2145	23.72	23.62	-0.1
[2A]-[2A]-5A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	5	10	2525	881.5	66	20	66786	2145	23.72	23.66	-0.06
2A-2A-5A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	66	20	66786	2145	24.15	24.23	0.08
[2A]-2A-5A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	66	20	66786	2145	24.15	24.05	-0.1
[2A]-2A-5A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	66	20	66786	2145	24.15	24.23	0.08
[2A]-[2A]-5A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	2	20	1100	1980	66	20	66786	2145	24.15	24.25	0.1
2A-2A-5A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.78	23.83	0.05
[2A]-2A-5A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.78	23.83	0.05
[2A]-2A-5A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.78	23.71	-0.07
[2A]-[2A]-5A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	2	20	1100	1980	5	10	2525	881.5	23.78	23.8	0.02
2A-2A-13A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	13	10	5230	751	66	20	66786	2145	23.72	23.69	-0.03
[2A]-2A-13A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	13	10	5230	751	66	20	66786	2145	23.72	23.69	-0.03
[2A]-2A-13A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	13	10	5230	751	66	20	66786	2145	23.72	23.76	0.04
2A-2A-13A-[66A]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	2	20	1100	1980	66	20	66786	2145	23.97	23.95	-0.02
[2A]-2A-13A-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	2	20	1100	1980	66	20	66786	2145	23.97	24.06	0.09
[2A]-2A-13A-[66A]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	2	20	1100	1980	66	20	66786	2145	23.97	23.97	0
2A-2A-13A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	2	20	1100	1980	13	10	5230	751	23.78	23.86	0.08
[2A]-2A-13A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	2	20	1100	1980	13	10	5230	751	23.78	23.84	0.06
[2A]-2A-13A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	2	20	1100	1980	13	10	5230	751	23.78	23.86	0.08
2A-[2A]-46C	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	46	20	50665	5537.5	46	20	50467	5517.7	23.72	23.76	0.04
[2A]-2A-46C	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	46	20	50665	5537.5	46	20	50467	5517.7	23.72	23.65	-0.07
[2A]-[2A]-46C	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	46	20	50665	5537.5	46	20	50467	5517.7	23.72	23.82	0.1
2A-2A-66A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.78	0.06
2A-2A-[66A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.65	-0.07
2A-[2A]-66A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.76	0.04
[2A]-2A-66A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.79	0.07
2A-2A-[66A]-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.64	-0.08
2A-[2A]-66A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.74	0.02
[2A]-2A-66A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.82	0.1
2A-[2A]-[66A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.66	-0.06

[2A]-2A-[66A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.74	0.02
[2A]-[2A]-66A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	67236	2190	23.72	23.69	-0.03
2A-2A-66A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.74	-0.04
2A-2A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.82	0.04
2A-[2A]-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.88	0.1
[2A]-2A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.8	0.02
2A-2A-[66A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.75	-0.03
2A-[2A]-66A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.8	0.02
[2A]-2A-66A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.79	0.01
2A-[2A]-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.83	0.05
[2A]-2A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.7	-0.08
[2A]-[2A]-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	2	20	1100	1980	23.78	23.87	0.09
2A-2A-[66B]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	15	66786	2145	66	5	66879	2154.3	23.72	23.64	-0.08
[2A]-2A-66B	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	15	66786	2145	66	5	66879	2154.3	23.72	23.69	-0.03
[2A]-[2A]-66B	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	15	66786	2145	66	5	66879	2154.3	23.72	23.63	-0.09
2A-2A-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	2	20	1100	1980	23.71	23.7	-0.01
[2A]-2A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	2	20	1100	1980	23.71	23.76	0.05
[2A]-[2A]-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	2	20	1100	1980	23.71	23.63	-0.08
2A-2A-[66C]	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	66984	2164.8	23.72	23.68	-0.04
[2A]-2A-66C	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	66984	2164.8	23.72	23.77	0.05
[2A]-[2A]-66C	2	10	19150	1905	1150	1985	QPSK	1	49	2	20	700	1940	66	20	66786	2145	66	20	66984	2164.8	23.72	23.78	0.06
2A-2A-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	66	20	66786	2145	66	20	66984	2164.8	23.78	23.77	-0.01
[2A]-2A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	66	20	66786	2145	66	20	66984	2164.8	23.78	23.74	-0.04
[2A]-[2A]-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	66	20	66786	2145	66	20	66984	2164.8	23.78	23.71	-0.07
2A-[4A]-4A-5A	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	4	10	2350	2150	5	10	2525	881.5	23.72	23.67	-0.05
[2A]-4A-4A-5A	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	4	10	2350	2150	5	10	2525	881.5	23.72	23.8	0.08
[2A]-[4A]-4A-5A	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	4	10	2350	2150	5	10	2525	881.5	23.72	23.64	-0.08
2A-[4A]-[4A]-5A	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	4	10	2350	2150	5	10	2525	881.5	23.72	23.66	-0.06
2A-[4A]-4A-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	5	10	2525	881.5	23.56	23.6	0.04
[2A]-4A-4A-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	5	10	2525	881.5	23.56	23.49	-0.07
[2A]-[4A]-4A-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	5	10	2525	881.5	23.56	23.54	-0.02
2A-[4A]-[4A]-5A	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	2	20	900	1960	5	10	2525	881.5	23.56	23.47	-0.09
2A-[4A]-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	4	20	2175	2132.5	4	10	2350	2150	24.15	24.22	0.07
[2A]-4A-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	4	20	2175	2132.5	4	10	2350	2150	24.15	24.18	0.03
[2A]-[4A]-4A-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	4	20	2175	2132.5	4	10	2350	2150	24.15	24.07	-0.08
2A-[4A]-[4A]-5A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	4	20	2175	2132.5	4	10	2350	2150	24.15	24.17	0.02
2A-[4A]-5B	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	5	10	2525	881.5	5	5	2453	874.3	23.72	23.71	-0.01
[2A]-4A-5B	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	5	10	2525	881.5	5	5	2453	874.3	23.72	23.64	-0.08
[2A]-[4A]-5B	2	10	19150	1905	1150	1985	QPSK	1	49	4	20	2175	2132.5	5	10	2525	881.5	5	5	2453	874.3	23.72	23.77	0.05
2A-[4A]-5B	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	5	5	2453	874.3	23.56	23.5	-0.06
[2A]-4A-5B	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	5	5	2453	874.3	23.56	23.54	-0.02
[2A]-[4A]-5B	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	5	5	2453	874.3	23.56	23.66	0.1
2A-[4A]-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	4	20	2175	2132.5	24.15	24.09	-0.06
[2A]-4A-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	4	20	2175	2132.5	24.15	24.05	-0.1
[2A]-[4A]-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	4	20	2175	2132.5	24.15	24.05	-0.1
2A-5A-5A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	5	5	2425	871.5	66	20	66786	2145	23.72	23.69	-0.03
[2A]-5A-5A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	5	5	2425	871.5	66	20	66786	2145	23.72	23.65	-0.07
[2A]-5A-5A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	5	5	2425	871.5	66	20	66786	2145	23.72	23.72	0
2A-5A-5A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	2	20	900	1960	66	20	66786	2145	24.15	24.16	0.01
[2A]-5A-5A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	2	20	900	1960	66	20	66786	2145	24.15	24.18	0.03
[2A]-5A-5A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	2	20	900	1960	66	20	66786	2145	24.15	24.1	-0.05
2A-5A-5A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	5	5	2425	871.5	23.78	23.78	0
[2A]-5A-5A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	5	5	2425	871.5	23.78	23.85	0.07
[2A]-5A-5A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	5	5	2425	871.5	23.78	23.7	-0.08
2A-5B-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	5	5	2453	874.3	66	20	66786	2145	23.72	23.79	0.07
[2A]-5B-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	5	5	2453	874.3	66	20	66786	2145	23.72	23.76	0.04
[2A]-5B-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	5	5	2453	874.3	66	20	66786	2145	23.72	23.72	0
2A-5B-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	66	20	66786	2145	24.15	24.14	-0.01
[2A]-5B-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	66	20	66786	2145	24.15	24.09	-0.06
[2A]-5B-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	2	20	900	1960	66	20	66786	2145	24.15	24.17	0.02

2A-5B-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	5	5	2453	874.3	23.78	23.69	-0.09
[2A]-5B-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	5	5	2453	874.3	23.78	23.69	-0.09
[2A]-5B-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	5	5	2453	874.3	23.78	23.82	0.04
[2A]-5A-46C	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	46	20	50665	5537.5	46	20	50467	5517.7	23.72	23.74	0.02
[2A]-5A-46C	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	46	20	50665	5537.5	46	20	50467	5517.7	24.15	24.18	0.03
2A-5A-[48A]-48A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.72	23.66	-0.06
[2A]-5A-48A-48A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.72	23.69	-0.03
2A-5A-[48A]-[48A]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.72	23.65	-0.07
[2A]-5A-[48A]-48A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.72	23.63	-0.09
2A-5A-[48A]-48A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	24.15	24.18	0.03
[2A]-5A-48A-48A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	24.15	24.17	0.02
2A-5A-[48A]-[48A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	24.15	24.12	-0.03
[2A]-5A-[48A]-48A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	24.15	24.13	-0.02
2A-5A-[48C]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	48	20	56188	3644.8	23.72	23.77	0.05
[2A]-5A-48C	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	48	20	56188	3644.8	23.72	23.72	0
2A-5A-[48C]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	24.15	24.2	0.05
[2A]-5A-48C	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	24.15	24.11	-0.04
2A-5A-48A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	66	20	66786	2145	23.72	23.73	0.01
2A-5A-[48A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	66	20	66786	2145	23.72	23.8	0.08
[2A]-5A-48A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	66	20	66786	2145	23.72	23.79	0.07
2A-5A-[48A]-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	66	20	66786	2145	23.72	23.72	0
[2A]-5A-[48A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	66	20	66786	2145	23.72	23.71	-0.01
[2A]-5A-48A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	48	20	55990	3625	66	20	66786	2145	23.72	23.65	-0.07
2A-5A-48A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	66	20	66786	2145	24.15	24.21	0.06
2A-5A-[48A]-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	66	20	66786	2145	24.15	24.2	0.05
[2A]-5A-48A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	66	20	66786	2145	24.15	24.14	-0.01
2A-5A-[48A]-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	66	20	66786	2145	24.15	24.19	0.04
[2A]-5A-[48A]-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	66	20	66786	2145	24.15	24.14	-0.01
[2A]-5A-48A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	48	20	55990	3625	66	20	66786	2145	24.15	24.14	-0.01
2A-5A-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	48	20	55990	3625	23.78	23.88	0.1
2A-5A-[48A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	48	20	55990	3625	23.78	23.78	0
[2A]-5A-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	48	20	55990	3625	23.78	23.82	0.04
2A-5A-[48A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	48	20	55990	3625	23.78	23.74	-0.04
[2A]-5A-[48A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	48	20	55990	3625	23.78	23.8	0.02
[2A]-5A-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	5	10	2525	881.5	48	20	55990	3625	23.78	23.78	0
2A-5A-[66A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	20	66786	2145	66	20	67236	2190	23.72	23.69	-0.03
[2A]-5A-66A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	20	66786	2145	66	20	67236	2190	23.72	23.68	-0.04
2A-5A-[66A]-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	20	66786	2145	66	20	67236	2190	23.72	23.73	0.01
[2A]-5A-[66A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	20	66786	2145	66	20	67236	2190	23.72	23.79	0.07
2A-5A-[66A]-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	24.15	24.16	0.01
[2A]-5A-66A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	24.15	24.07	-0.08
2A-5A-[66A]-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	24.15	24.12	-0.03
[2A]-5A-[66A]-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	24.15	24.06	-0.09
2A-5A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	5	10	2525	881.5	23.78	23.77	-0.01
[2A]-5A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	5	10	2525	881.5	23.78	23.86	0.08
2A-5A-[66A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	5	10	2525	881.5	23.78	23.79	0.01
[2A]-5A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	5	10	2525	881.5	23.78	23.76	-0.02
2A-5A-[66B]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	15	66786	2145	66	5	66879	2154.3	23.72	23.65	-0.07
[2A]-5A-66B	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	15	66786	2145	66	5	66879	2154.3	23.72	23.71	-0.01
2A-5A-[66B]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	15	66786	2145	66	5	66879	2154.3	24.15	24.1	-0.05
[2A]-5A-66B	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	15	66786	2145	66	5	66879	2154.3	24.15	24.22	0.07
2A-5A-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	5	10	2525	881.5	23.71	23.79	0.08
[2A]-5A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	5	10	2525	881.5	23.71	23.72	0.01
2A-5A-[66C]	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	20	66786	2145	66	20	66984	2164.8	23.72	23.63	-0.09
[2A]-5A-66C	2	10	19150	1905	1150	1985	QPSK	1	49	5	10	2525	881.5	66	20	66786	2145	66	20	66984	2164.8	23.72	23.79	0.07
2A-5A-[66C]	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	20	66786	2145	66	20	66984	2164.8	24.15	24.18	0.03
[2A]-5A-66C	5	5	20425	826.5	2425	871.5	QPSK	1	24	2	20	900	1960	66	20	66786	2145	66	20	66984	2164.8	24.15	24.19	0.04
2A-5A-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	2	20	900	1960	5	10	2525	881.5	23.78	23.85	0.07
[2A]-5A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	2	20	900	1960	5	10	2525	881.5	23.78	23.68	-0.1
[2A]-13A-46C	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	46	20	50665	5537.5	46	20	50467	5517.7	23.72	23.74	0.02

[2A]-13A-46C	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	46	20	50665	5537.5	46	20	50467	5517.7	23.97	23.89	-0.08
2A-13A-[48A]-48A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.72	23.68	-0.04
[2A]-13A-48A-48A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.72	23.71	-0.01
2A-13A-[48A]-[48A]	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.72	23.72	0
[2A]-13A-[48A]-48A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.72	23.67	-0.05
2A-13A-[48A]-48A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.97	24.03	0.06
[2A]-13A-48A-48A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.97	23.89	-0.08
2A-13A-[48A]-[48A]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.97	23.89	-0.08
[2A]-13A-[48A]-48A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.97	24.06	0.09
2A-13A-[48C]	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	48	20	56188	3644.8	23.72	23.65	-0.07
[2A]-13A-48C	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	48	20	56188	3644.8	23.72	23.63	-0.09
2A-13A-[48C]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	23.97	23.89	-0.08
[2A]-13A-48C	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	23.97	24.06	0.09
2A-13A-48A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	66	15	66786	2145	23.72	23.71	-0.01
2A-13A-[48A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	66	15	66786	2145	23.72	23.71	-0.01
[2A]-13A-48A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	66	15	66786	2145	23.72	23.67	-0.05
2A-13A-[48A]-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	66	15	66786	2145	23.72	23.82	0.1
[2A]-13A-48A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	66	15	66786	2145	23.72	23.64	-0.08
[2A]-13A-[48A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	48	20	55990	3625	66	15	66786	2145	23.72	23.63	-0.09
2A-13A-48A-[66A]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	66	15	66786	2145	23.97	24.03	0.06
2A-13A-[48A]-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	66	15	66786	2145	23.97	24.04	0.07
[2A]-13A-48A-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	66	15	66786	2145	23.97	24	0.03
2A-13A-[48A]-[66A]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	66	15	66786	2145	23.97	23.98	0.01
[2A]-13A-48A-[66A]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	66	15	66786	2145	23.97	23.9	-0.07
[2A]-13A-[48A]-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	48	20	55990	3625	66	15	66786	2145	23.97	24.03	0.06
2A-13A-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	13	10	5230	751	48	20	55990	3625	23.78	23.81	0.03
2A-13A-[48A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	13	10	5230	751	48	20	55990	3625	23.78	23.76	-0.02
[2A]-13A-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	13	10	5230	751	48	20	55990	3625	23.78	23.86	0.08
2A-13A-[48A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	13	10	5230	751	48	20	55990	3625	23.78	23.72	-0.06
[2A]-13A-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	13	10	5230	751	48	20	55990	3625	23.78	23.87	0.09
[2A]-13A-[48A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	13	10	5230	751	48	20	55990	3625	23.78	23.86	0.08
2A-13A-[66A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	20	66786	2145	66	20	67236	2190	23.72	23.73	0.01
[2A]-13A-66A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	20	66786	2145	66	20	67236	2190	23.72	23.71	-0.01
2A-13A-[66A]-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	20	66786	2145	66	20	67236	2190	23.72	23.71	-0.01
[2A]-13A-[66A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	20	66786	2145	66	20	67236	2190	23.72	23.8	0.08
2A-13A-[66A]-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	23.97	23.89	-0.08
[2A]-13A-66A-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	23.97	23.95	-0.02
2A-13A-[66A]-[66A]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	23.97	23.96	-0.01
[2A]-13A-[66A]-66A	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	20	66786	2145	66	20	67236	2190	23.97	24	0.03
2A-13A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	13	10	5230	751	23.78	23.88	0.1
[2A]-13A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	13	10	5230	751	23.78	23.83	0.05
2A-13A-[66A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	13	10	5230	751	23.78	23.86	0.08
[2A]-13A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	2	20	900	1960	13	10	5230	751	23.78	23.68	-0.1
2A-13A-[66B]	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	15	66786	2145	66	5	66879	2154.3	23.72	23.79	0.07
[2A]-13A-66B	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	15	66786	2145	66	5	66879	2154.3	23.72	23.73	0.01
2A-13A-[66B]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	15	66786	2145	66	5	66879	2154.3	23.97	23.87	-0.1
[2A]-13A-66B	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	15	66786	2145	66	5	66879	2154.3	23.97	23.96	-0.01
2A-13A-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	13	10	5230	751	23.71	23.72	0.01
[2A]-13A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	2	20	900	1960	13	10	5230	751	23.71	23.76	0.05
2A-13A-[66C]	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	20	66786	2145	66	20	66984	2164.8	23.72	23.62	-0.1
[2A]-13A-66C	2	10	19150	1905	1150	1985	QPSK	1	49	13	10	5230	751	66	20	66786	2145	66	20	66984	2164.8	23.72	23.75	0.03
2A-13A-[66C]	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	20	66786	2145	66	20	66984	2164.8	23.97	23.99	0.02
[2A]-13A-66C	13	10	23230	782	5230	751	QPSK	1	0	2	20	900	1960	66	20	66786	2145	66	20	66984	2164.8	23.97	23.97	0
2A-13A-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	2	20	900	1960	13	10	5230	751	23.78	23.73	-0.05
[2A]-13A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	2	20	900	1960	13	10	5230	751	23.78	23.79	0.01
[2A]-46A-46C	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	46	20	53540	5825	23.72	23.77	0.05
[2A]-46D	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	46	20	50863	5557.3	23.72	23.82	0.1
2A-46C-[48A]	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	48	20	55990	3625	23.72	23.66	-0.06
2A-46C-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	66	20	66786	2145	23.72	23.76	0.04
[2A]-46C-66A	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	66	20	66786	2145	23.72	23.73	0.01

[2A]-46C-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	46	20	50467	5517.7	66	20	66786	2145	23.72	23.65	-0.07
2A-46C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	46	20	50665	5537.5	46	20	50467	5517.7	23.78	23.73	-0.05
[2A]-46C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	46	20	50665	5537.5	46	20	50467	5517.7	23.78	23.83	0.05
[2A]-46C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	46	20	50665	5537.5	46	20	50467	5517.7	23.78	23.74	-0.04
2A-46A-[48C]	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	48	20	55990	3625	48	20	56188	3644.8	23.72	23.8	0.08
[2A]-46A-48C	2	10	19150	1905	1150	1985	QPSK	1	49	46	20	50665	5537.5	48	20	55990	3625	48	20	56188	3644.8	23.72	23.72	0
2A-48A-[48C]	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.72	23.78	0.06
2A-[48A]-48C	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.72	23.72	0
[2A]-48A-48C	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.72	23.75	0.03
[2A]-[48A]-48C	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.72	23.79	0.07
[2A]-48D	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56188	3644.8	48	20	56386	3664.6	23.72	23.68	-0.04
2A-48A-48A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.72	23.63	-0.09
2A-[48A]-48A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.72	23.72	0
[2A]-48A-48A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.72	23.79	0.07
2A-[48A]-48A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.72	23.76	0.04
[2A]-48A-48A-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.72	23.66	-0.06
2A-[48A]-[48A]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.72	23.69	-0.03
[2A]-[48A]-48A-66A	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.72	23.8	0.08
2A-48A-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.78	23.76	-0.02
2A-[48A]-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.78	23.82	0.04
[2A]-48A-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.78	23.78	0
2A-[48A]-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.78	23.7	-0.08
[2A]-48A-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.78	23.84	0.06
2A-[48A]-[48A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.78	23.75	-0.03
[2A]-[48A]-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56640	3690	23.78	23.87	0.09
2A-48C-[66A]	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	23.72	23.73	0.01
2A-[48C]-66A	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	23.72	23.77	0.05
[2A]-48C-66A	2	10	19150	1905	1150	1985	QPSK	1	49	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	23.72	23.78	0.06
2A-48C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	23.78	23.69	-0.09
2A-[48C]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	23.78	23.72	-0.06
[2A]-48C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	2	20	900	1960	48	20	55990	3625	48	20	56188	3644.8	23.78	23.82	0.04
[2A]-66A-66B	2	10	19150	1905	1150	1985	QPSK	1	49	66	20	66786	2145	66	5	67168	2183.2	66	15	67261	2192.5	23.72	23.64	-0.08
2A-[66A]-66B	2	10	19150	1905	1150	1985	QPSK	1	49	66	20	66786	2145	66	5	67168	2183.2	66	15	67261	2192.5	23.72	23.71	-0.01
2A-66A-[66B]	2	10	19150	1905	1150	1985	QPSK	1	49	66	20	66786	2145	66	5	67168	2183.2	66	15	67261	2192.5	23.72	23.78	0.06
[2A]-[66A]-66B	2	10	19150	1905	1150	1985	QPSK	1	49	66	20	66786	2145	66	5	67168	2183.2	66	15	67261	2192.5	23.72	23.71	-0.01
[2A]-66A-66B	66	20	132072	1720	66536	2120	QPSK	1	99	66	5	67168	2183.2	66	15	67261	2192.5	2	20	900	1960	23.78	23.72	-0.06
2A-[66A]-66B	66	20	132072	1720	66536	2120	QPSK	1	99	66	5	67168	2183.2	66	15	67261	2192.5	2	20	900	1960	23.78	23.83	0.05
2A-66A-[66B]	66	20	132072	1720	66536	2120	QPSK	1	99	66	5	67168	2183.2	66	15	67261	2192.5	2	20	900	1960	23.78	23.75	-0.03
[2A]-[66A]-66B	66	20	132072	1720	66536	2120	QPSK	1	99	66	5	67168	2183.2	66	15	67261	2192.5	2	20	900	1960	23.78	23.78	0
[2A]-66A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	66	20	67236	2190	2	20	900	1960	23.71	23.63	-0.08
2A-[66A]-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	66	20	67236	2190	2	20	900	1960	23.71	23.66	-0.05
2A-66A-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	66	20	67236	2190	2	20	900	1960	23.71	23.65	-0.06
[2A]-[66A]-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	66	20	67236	2190	2	20	900	1960	23.71	23.78	0.07
[4A]-4A-5B	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	5	5	2453	874.3	23.56	23.59	0.03
[4A]-[4A]-5B	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	4	20	2050	2120	5	10	2525	881.5	5	5	2453	874.3	23.56	23.54	-0.02
[4A]-4A-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	4	20	2175	2132.5	4	10	2350	2150	24.15	24.15	0
[4A]-[4A]-5B	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	4	20	2175	2132.5	4	10	2350	2150	24.15	24.25	0.1
[4A]-46A-46C	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	46	20	50665	5537.5	46	20	50467	5517.7	46	20	53540	5825	23.56	23.6	0.04
[4A]-46D	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	46	20	50665	5537.5	46	20	50467	5517.7	46	20	50863	5557.3	23.56	23.65	0.09
[4A]-48D	4	5	20375	1752.5	2375	2152.5	QPSK	1	24	48	20	55990	3625	48	20	56188	3644.8	48	20	56386	3664.6	23.56	23.48	-0.08
5A-5A-[66A]-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	66	20	66786	2145	66	20	67236	2190	24.15	24.09	-0.06
5A-5A-[66A]-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	66	20	66786	2145	66	20	67236	2190	24.15	24.14	-0.01
5A-5A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	5	10	2525	881.5	5	5	2425	871.5	23.78	23.88	0.1
5A-5A-[66A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	5	10	2525	881.5	5	5	2425	871.5	23.78	23.82	0.04
5A-5A-[66B]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	66	15	66786	2145	66	5	66879	2154.3	24.15	24.05	-0.1
5A-5A-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	5	10	2525	881.5	5	5	2425	871.5	23.71	23.63	-0.08
5A-5A-[66C]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2600	889	66	20	66786	2145	66	20	66984	2164.8	24.15	24.14	-0.01
5A-5A-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	5	10	2525	881.5	5	5	2425	871.5	23.78	23.8	0.02
5A-46C-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	46	20	50665	5537.5	46	20	50467	5517.7	66	20	66786	2145	24.15	24.13	-0.02
5A-46C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	46	20	50665	5537.5	46	20	50467	5517.7	23.78	23.71	-0.07

5B-[66A]-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	66	20	66786	2145	66	20	67236	2190	24.15	24.09	-0.06
5B-[66A]-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	66	20	66786	2145	66	20	67236	2190	24.15	24.05	-0.1
5B-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	5	10	2525	881.5	5	5	2453	874.3	23.78	23.86	0.08
5B-[66A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	5	10	2525	881.5	5	5	2453	874.3	23.78	23.81	0.03
5B-[66B]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	66	15	66786	2145	66	5	66879	2154.3	24.15	24.19	0.04
5B-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	5	10	2525	881.5	5	5	2453	874.3	23.71	23.69	-0.02
5B-[66C]	5	5	20425	826.5	2425	871.5	QPSK	1	24	5	10	2497	878.7	66	20	66786	2145	66	20	66984	2164.8	24.15	24.19	0.04
5B-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	5	10	2525	881.5	5	5	2453	874.3	23.78	23.79	0.01
5A-48A-[48C]	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	24.15	24.23	0.08
5A-[48A]-48C	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	24.15	24.07	-0.08
5A-48A-48A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	24.15	24.21	0.06
5A-[48A]-48A-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	24.15	24.21	0.06
5A-[48A]-[48A]-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	24.15	24.24	0.09
5A-[48A]-48A-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	24.15	24.16	0.01
5A-48A-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.78	23.82	0.04
5A-[48A]-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.78	23.71	-0.07
5A-[48A]-[48A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.78	23.83	0.05
5A-[48A]-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	48	20	55990	3625	48	20	56640	3690	23.78	23.82	0.04
5A-48C-[66A]	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	24.15	24.18	0.03
5A-[48C]-66A	5	5	20425	826.5	2425	871.5	QPSK	1	24	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	24.15	24.05	-0.1
5A-48C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	48	20	55990	3625	48	20	56188	3644.8	23.78	23.7	-0.08
5A-[48C]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	5	10	2525	881.5	48	20	55990	3625	48	20	56188	3644.8	23.78	23.77	-0.01
13A-46C-[66A]	13	10	23230	782	5230	751	QPSK	1	0	46	20	50665	5537.5	46	20	50467	5517.7	66	20	66786	2145	23.97	24.07	0.1
13A-46C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	46	20	50665	5537.5	46	20	50467	5517.7	23.78	23.73	-0.05
13A-48A-[48C]	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.97	24.06	0.09
13A-[48A]-48C	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.97	23.98	0.01
13A-48A-48A-[66A]	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.97	24.04	0.07
13A-[48A]-48A-66A	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.97	23.87	-0.1
13A-[48A]-48A-[66A]	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.97	24.03	0.06
13A-[48A]-[48A]-66A	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56640	3690	66	20	66786	2145	23.97	23.91	-0.06
13A-48A-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.78	23.74	-0.04
13A-[48A]-48A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.78	23.82	0.04
13A-[48A]-48A-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.78	23.86	0.08
13A-[48A]-[48A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	48	20	55990	3625	48	20	56640	3690	23.78	23.81	0.03
13A-48C-[66A]	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	23.97	23.97	0
13A-[48C]-66A	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	48	20	56188	3644.8	66	20	66786	2145	23.97	24.03	0.06
13A-48C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	48	20	55990	3625	48	20	56188	3644.8	23.78	23.7	-0.08
13A-[48C]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	13	10	5230	751	48	20	55990	3625	48	20	56188	3644.8	23.78	23.85	0.07
13A-48A-[66B]	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	66	15	66786	2145	66	5	66879	2154.3	23.97	23.9	-0.07
13A-[48A]-66B	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	66	15	66786	2145	66	5	66879	2154.3	23.97	23.98	0.01
13A-48A-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	13	10	5230	751	48	20	55990	3625	23.71	23.76	0.05
13A-[48A]-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	13	10	5230	751	48	20	55990	3625	23.71	23.81	0.1
13A-48A-[66C]	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	66	20	66786	2145	66	20	66984	2164.8	23.97	23.92	-0.05
13A-[48A]-66C	13	10	23230	782	5230	751	QPSK	1	0	48	20	55990	3625	66	20	66786	2145	66	20	66984	2164.8	23.97	24	0.03
13A-48A-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	13	10	5230	751	48	20	55990	3625	23.78	23.82	0.04
13A-[48A]-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	13	10	5230	751	48	20	55990	3625	23.78	23.78	0
13A-[66A]-66B	13	10	23230	782	5230	751	QPSK	1	0	66	20	66786	2145	66	5	67168	2183.2	66	15	67261	2192.5	23.97	23.88	-0.09
13A-66A-[66B]	13	10	23230	782	5230	751	QPSK	1	0	66	20	66786	2145	66	5	67168	2183.2	66	15	67261	2192.5	23.97	23.87	-0.1
13A-[66A]-66B	66	20	132072	1720	66536	2120	QPSK	1	99	66	5	67168	2183.2	66	15	67261	2192.5	13	10	5230	751	23.78	23.69	-0.09
13A-66A-[66B]	66	20	132072	1720	66536	2120	QPSK	1	99	66	5	67168	2183.2	66	15	67261	2192.5	13	10	5230	751	23.78	23.7	-0.08
13A-[66A]-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	66	20	67236	2190	13	10	5230	751	23.71	23.8	0.09
13A-66A-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	66	20	67236	2190	13	10	5230	751	23.71	23.81	0.1
46A-46C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	46	20	50665	5537.5	46	20	50467	5517.7	46	20	53540	5825	23.78	23.74	-0.04
46D-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	46	20	50665	5537.5	46	20	50467	5517.7	46	20	50863	5557.3	23.78	23.75	-0.03
[48A]-48A-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56640	3690	23.78	23.85	0.07
48A-48A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56640	3690	23.78	23.83	0.05
[48A]-[48A]-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56640	3690	23.78	23.84	0.06
[48A]-48A-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56640	3690	23.78	23.68	-0.1
48A-48A-[66A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56640	3690	23.78	23.77	-0.01
[48A]-48A-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	48	20	55990	3625	48	20	56640	3690	23.71	23.65	-0.06

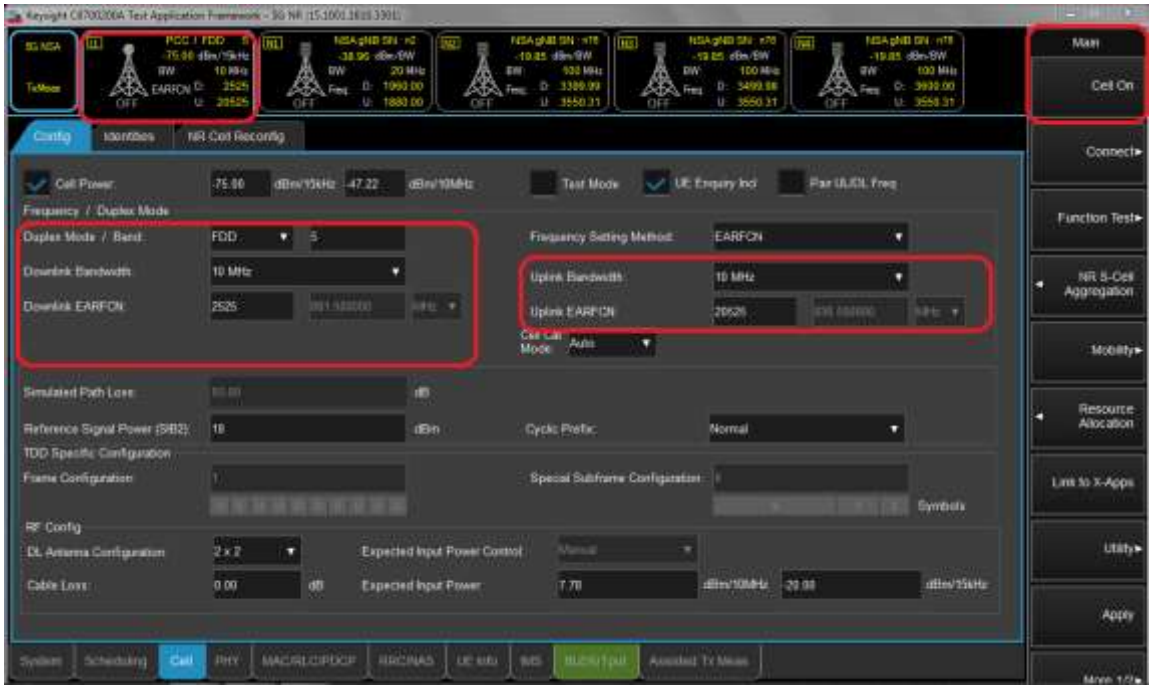
48A-48A-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	48	20	55990	3625	48	20	56640	3690	23.71	23.8	0.09
[48A]-[48A]-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	48	20	55990	3625	48	20	56640	3690	23.71	23.72	0.01
[48A]-48A-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	48	20	55990	3625	48	20	56640	3690	23.78	23.85	0.07
48A-48A-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	48	20	55990	3625	48	20	56640	3690	23.78	23.69	-0.09
[48A]-[48A]-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	48	20	55990	3625	48	20	56640	3690	23.78	23.78	0
[48A]-48C-66A	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.78	23.74	-0.04
48A-[48C]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.78	23.75	-0.03
48A-48C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.78	23.77	-0.01
[48A]-48C-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	48	20	56442	3670.2	48	20	56640	3690	23.78	23.84	0.06
[48A]-48D	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	56244	3650.4	48	20	56442	3670.2	48	20	56640	3690	22.74	22.64	-0.1
[48A]-48D	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	55538	3579.8	48	20	55736	3599.6	48	20	56640	3690	22.74	22.77	0.03
[48C]-48C	48	20	55340	3560	55340	3560	QPSK	1	49	48	20	55538	3579.8	48	20	56442	3670.2	48	20	56640	3690	22.74	22.71	-0.03
[48C]-66A-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56188	3644.8	23.78	23.77	-0.01
48C-[66A]-66A	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56188	3644.8	23.78	23.81	0.03
48C-[66A]-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	67236	2190	48	20	55990	3625	48	20	56188	3644.8	23.78	23.71	-0.07
[48C]-66B	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	48	20	55990	3625	48	20	56188	3644.8	23.71	23.71	0
48C-[66B]	66	5	131997	1712.5	66461	2112.5	QPSK	1	24	66	15	66554	2121.8	48	20	55990	3625	48	20	56188	3644.8	23.71	23.67	-0.04
[48C]-66C	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	48	20	55990	3625	48	20	56188	3644.8	23.78	23.88	0.1
48C-[66C]	66	20	132072	1720	66536	2120	QPSK	1	99	66	20	66734	2139.8	48	20	55990	3625	48	20	56188	3644.8	23.78	23.68	-0.1
48D-[66A]	66	20	132072	1720	66536	2120	QPSK	1	99	48	20	55990	3625	48	20	56188	3644.8	48	20	56386	3664.6	23.78	23.73	-0.05

2. 5G NR Call Box Setup

Procedure used to establish output Power measurement for NR Bands

Select operating band, BW and Channel.

- Click Cell on button in the right of Test application screen.
- Turn the LTE Cell On using “ON/OFF” Key.

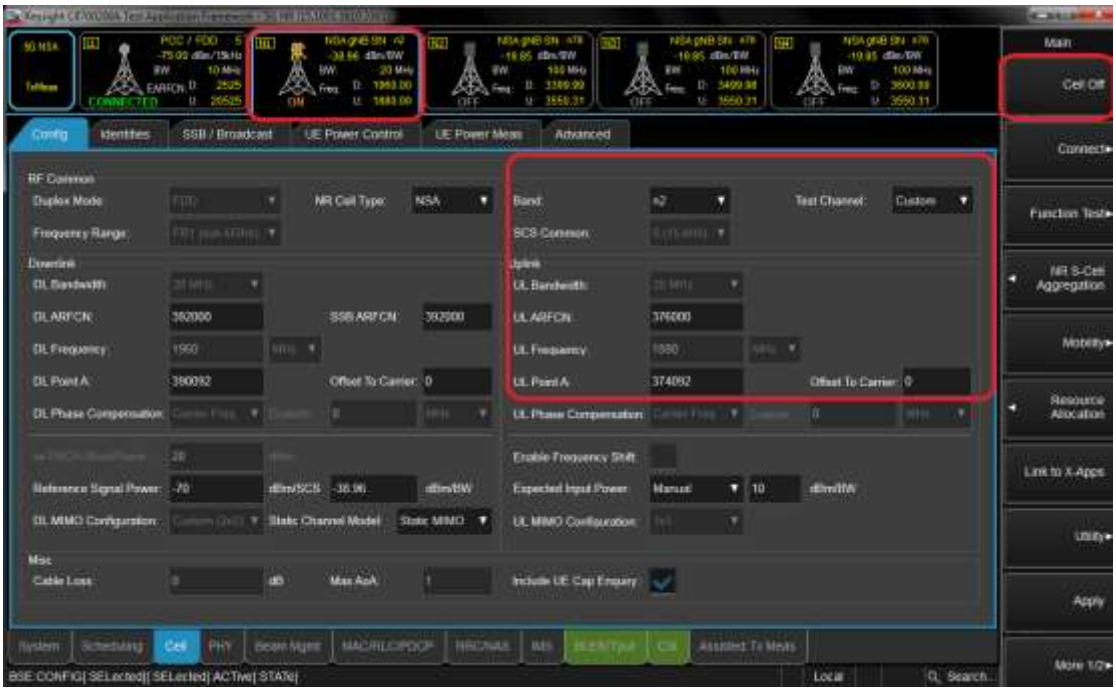


- Turn the Airplane Mode On and then turn the Airplane mode off.
- Select All down bits for UL Power control Mode in LTE.

Setup for NR Band

- Select waveform for Setting NR Band (PHY->PUSCH->Enable Transform Precoder)
  - Enable : DFT-s-OFDM, Disable : CP-OFDM

- Select operating band, BW, SCS and Channel.
- Turn the NR Cell On using “ON/OFF” Key.

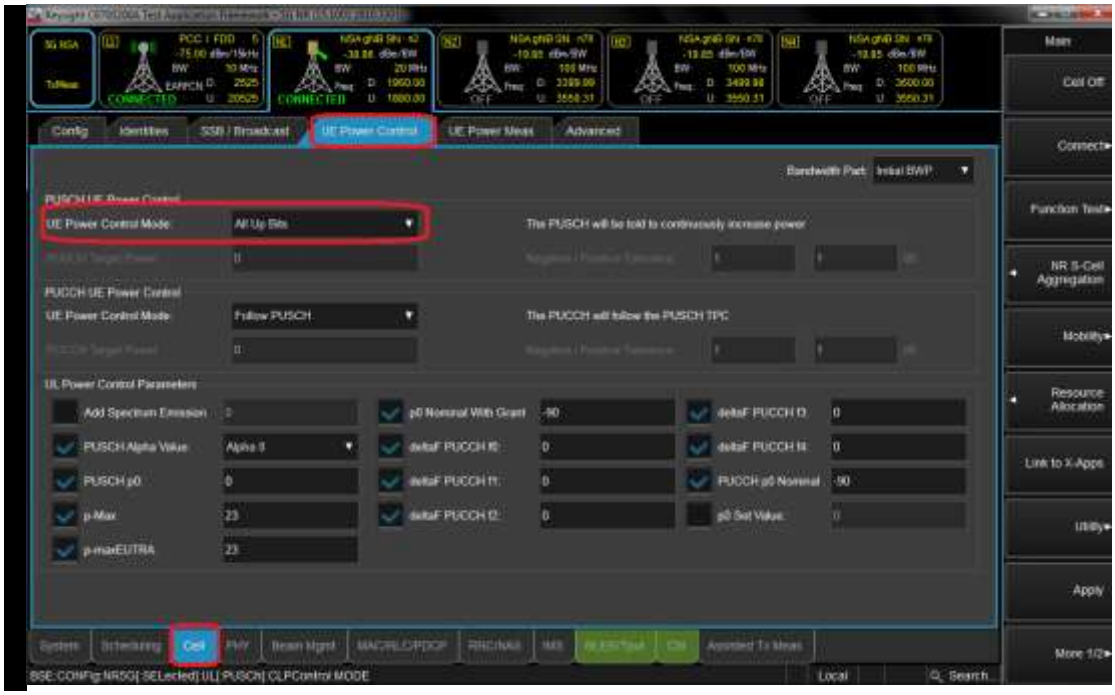


Connect NR S-Cell Aggregation

- Click NR S-Cell Aggregation
- Check the Cell 1's DL and UL box(PCC) and than Click Apply.
- Check the message summary If message shows NR Msg 5, It is connected.

Max Power setting

- Click "Cell in the bottom of screen.
- Click "UE Power control" than change UE Power control mode to All Up bits.



Selecting Start RB/Count/MCS

- Select the each test configurating (Start RB, Count, MCS).

View Tx Power

- Click “Link to X-Apps.”(Please refer to Figure-7)
- Select “Channel Power”.


Main
Call Off
Connect
Function Test
NR S-Cell Aggregation
Mobility
Resource Allocation
Link to X-Apps
Utility
Apply
More 1/2
Quick Config
TDD UL-DL Config
Scheduling Map
Slot Config
PDSCH TDRA
PUSCH TDRA
Link Adaptation
Rate Matching
Copy to all SC's
Radio Frame Map
Frame Config Palette
Add FC1
Clear All
Slot Map
Slot Config Palette
SC0
Symbol Map
Add SC1
Clear All
System
Scheduling
Cell
PHY
Local