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CNAS L0570

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Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Client

B.V.ADT

Certificate No: **Z21-60336**

CALIBRATION CERTIFICATE

Object

D1900V2 - SN: 5d159

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

September 16, 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 (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Power sensor NRP8S	104291	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Reference Probe EX3DV4	SN 7517	03-Feb-21(CTTL-SPEAG,No.Z21-60001)	Feb-22
DAE4	SN 1556	15-Jan-21(SPEAG,No.DAE4-1556_Jan21)	Jan-22
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J21X00593)	Jan-22
NetworkAnalyzer E5071C	MY46110673	14-Jan-21 (CTTL, No.J21X00232)	Jan-22

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: September 21, 2021

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

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:

- 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
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- 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	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1900 MHz $\pm$ 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 $\pm$ 0.2) °C	40.2 $\pm$ 6 %	1.42 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.97 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	39.7 W/kg $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.08 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.3 W/kg $\pm$ 18.7 % (k=2)

Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
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Head TSL parameters

The following parameters and calculations were applied.

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Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
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SAR for nominal Head TSL parameters	normalized to 1W	39.7 W/kg $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
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SAR for nominal Head TSL parameters	normalized to 1W	20.3 W/kg $\pm$ 18.7 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	54.2Ω+ 7.76jΩ
Return Loss	- 21.4dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.106 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

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DASY5 Validation Report for Head TSL

Date: 09.16.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d159

Communication System: UID 0, CW; Frequency: 1900 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 1900$ MHz; $\sigma = 1.416$ S/m; $\epsilon_r = 40.23$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.81, 7.81, 7.81) @ 1900 MHz; Calibrated: 2021-02-03
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2021-01-15
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid:

$dx=5$ mm, $dy=5$ mm, $dz=5$ mm

Reference Value = 99.85 V/m; Power Drift = 0.00 dB

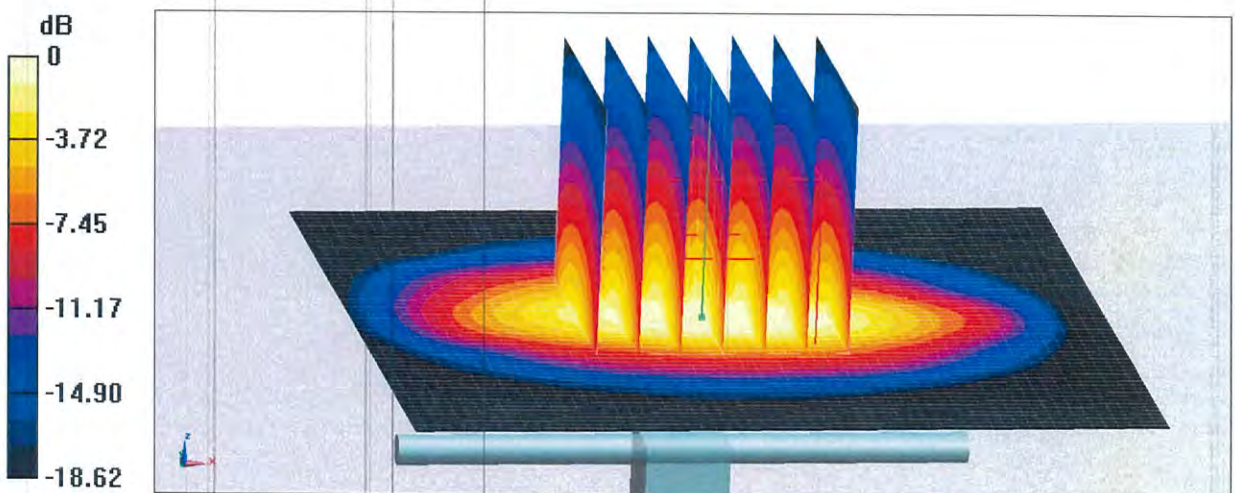
Peak SAR (extrapolated) = 19.4 W/kg

SAR(1 g) = 9.97 W/kg; SAR(10 g) = 5.08 W/kg

Smallest distance from peaks to all points 3 dB below = 10 mm

Ratio of SAR at M2 to SAR at M1 = 51.3%

Maximum value of SAR (measured) = 15.9 W/kg



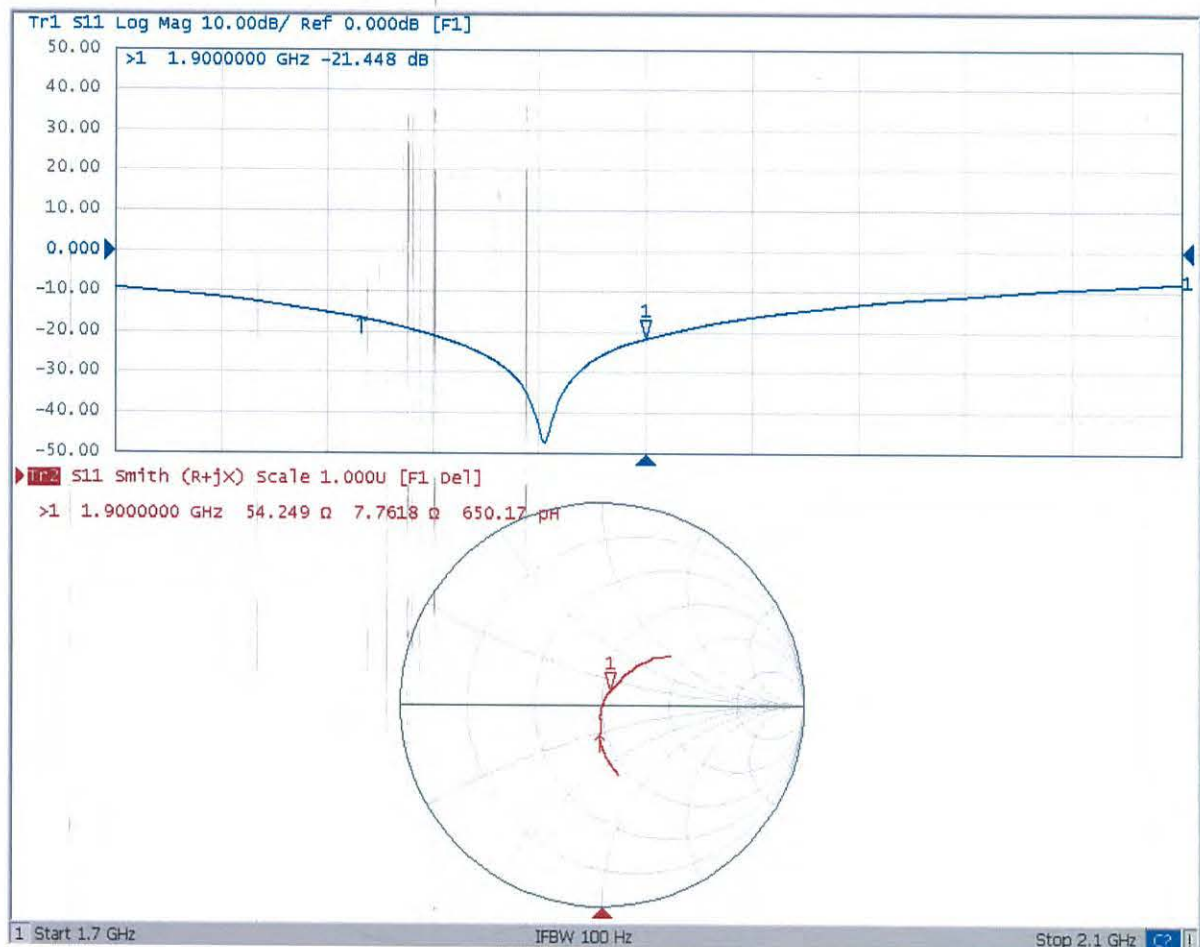
0 dB = 15.9 W/kg = 12.01 dBW/kg



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Impedance Measurement Plot for Head TSL





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Client

7layers

Certificate No: Z21-60425

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 1048

Calibration Procedure(s) FF-Z11-003-01
Calibration Procedures for dipole validation kits

Calibration date: October 21, 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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Power sensor NRP8S	104291	24-Sep-21 (CTTL, No.J21X08326)	Sep-22
Reference Probe EX3DV4	SN 7517	03-Feb-21(CTTL-SPEAG,No.Z21-60001)	Feb-22
DAE4	SN 1556	15-Jan-21(SPEAG,No.DAE4-1556_Jan21)	Jan-22
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J21X00593)	Jan-22
NetworkAnalyzer E5071C	MY46110673	14-Jan-21 (CTTL, No.J21X00232)	Jan-22

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: October 27, 2021

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Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China

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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:

- 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
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- 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%.



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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz $\pm$ 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 $\pm$ 0.2) °C	39.5 $\pm$ 6 %	1.81 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.2 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.8 W/kg $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.05 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.2 W/kg $\pm$ 18.7 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.6Ω+ 8.39jΩ
Return Loss	- 21.6dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.057 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
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E-mail: cttl@chinattl.com

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DASY5 Validation Report for Head TSL

Date: 10.21.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 1048

Communication System: UID 0, CW; Frequency: 2450 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.809$ S/m; $\epsilon_r = 39.51$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.34, 7.34, 7.34) @ 2450 MHz; Calibrated: 2021-02-03
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2021-01-15
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7501)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 108.6 V/m; Power Drift = -0.02 dB

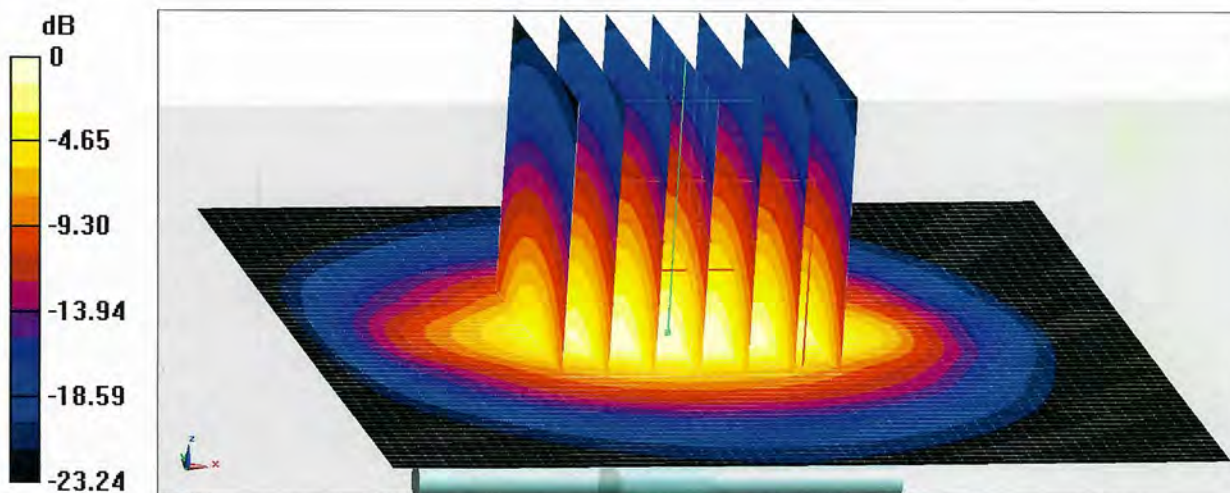
Peak SAR (extrapolated) = 28.0 W/kg

SAR(1 g) = 13.2 W/kg; SAR(10 g) = 6.05 W/kg

Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 47.1%

Maximum value of SAR (measured) = 22.5 W/kg



0 dB = 22.5 W/kg = 13.52 dBW/kg



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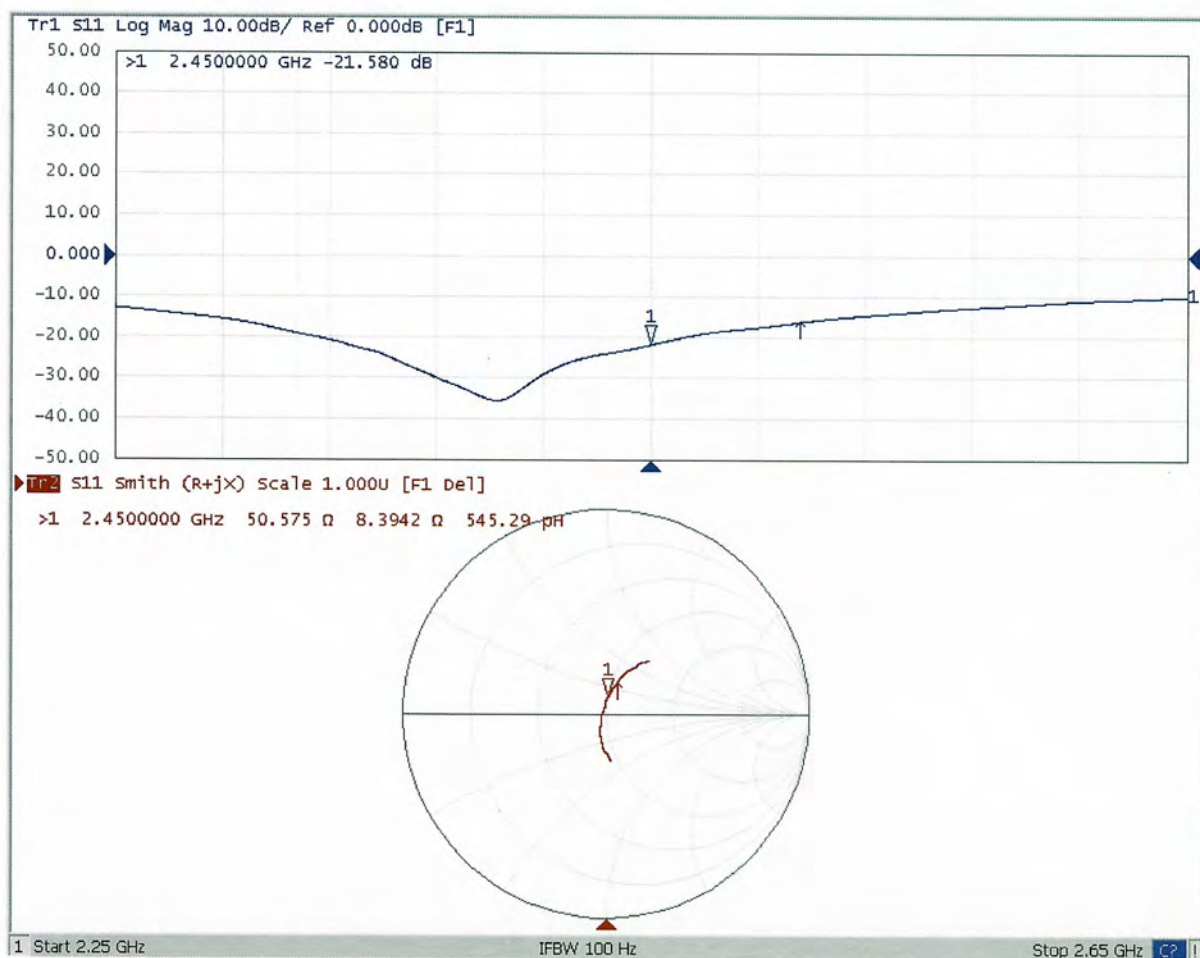
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Impedance Measurement Plot for Head TSL



D2450V2 - SN: 1048 Extended Dipole Calibrations

Referring to KDB 865664 D01, if dipoles are verified in return loss (<-20dB, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

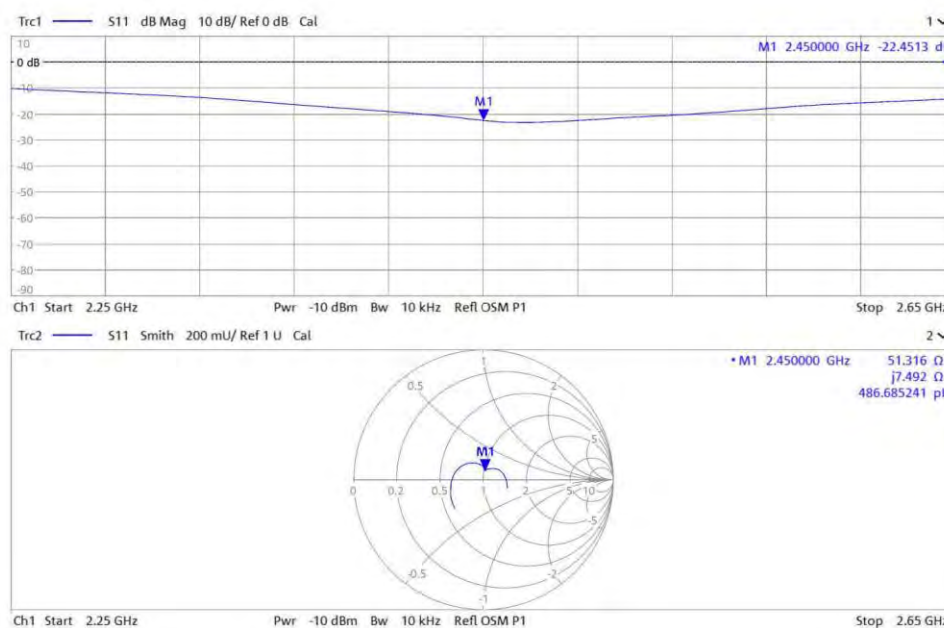
D2450V2 - SN: 1048						
2450MHz Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
10.21.2021	-21.6		50.6		8.39	
10.20.2022	-22.5	3.94	51.3	0.72	7.5	-0.90

<Justification of the extended calibration>

The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

<Dipole Verification Data>

Head 2450MHz _2022.10.20





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Certificate No: **Z21-60339**

CALIBRATION CERTIFICATE

Object

D2600V2 - SN: 1110

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

September 16, 2021

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Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
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Power sensor NRP8S	104291	23-Sep-20 (CTTL, No.J20X08336)	Sep-21
Reference Probe EX3DV4	SN 7517	03-Feb-21(CTTL-SPEAG,No.Z21-60001)	Feb-22
DAE4	SN 1556	15-Jan-21(SPEAG,No.DAE4-1556_Jan21)	Jan-22
Secondary Standards	ID #	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	01-Feb-21 (CTTL, No.J21X00593)	Jan-22
Network Analyzer E5071C	MY46110673	14-Jan-21 (CTTL, No.J21X00232)	Jan-22

	Name	Function	Signature
Calibrated by:	Zhao Jing	SAR Test Engineer	
Reviewed by:	Lin Hao	SAR Test Engineer	
Approved by:	Qi Dianyuan	SAR Project Leader	

Issued: September 21, 2021

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Glossary:

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ConvF	sensitivity in TSL / NORM _{x,y,z}
N/A	not applicable or not measured

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- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- 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.
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- Electrical Delay:** One-way delay between the SMA connector and the antenna feed point. No uncertainty required.
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- 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.

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2600 MHz $\pm$ 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 $\pm$ 0.2) °C	39.0 $\pm$ 6 %	1.95 mho/m $\pm$ 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.9 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	55.8 W/kg $\pm$ 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.6 W/kg $\pm$ 18.7 % (k=2)



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s p e a g
CALIBRATION LABORATORY

Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China

Tel: +86-10-62304633-2079

Fax: +86-10-62304633-2504

E-mail: cttl@chinattl.com

http://www.chinattl.cn

Appendix(Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	51.1Ω- 5.12jΩ
Return Loss	- 25.7dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.058 ns
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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
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Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Head TSL

Date: 09.16.2021

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1110

Communication System: UID 0, CW; Frequency: 2600 MHz; Duty Cycle: 1:1

Medium parameters used: $f = 2600$ MHz; $\sigma = 1.949$ S/m; $\epsilon_r = 39.04$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7517; ConvF(7.1, 7.1, 7.1) @ 2600 MHz; Calibrated: 2021-02-03
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1556; Calibrated: 2021-01-15
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 105.3 V/m; Power Drift = 0.01 dB

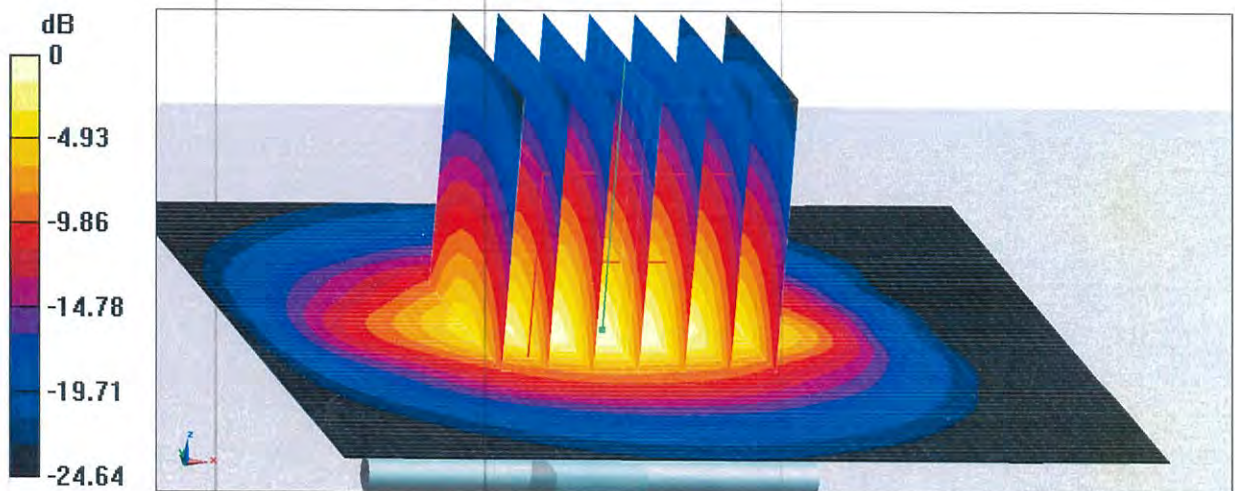
Peak SAR (extrapolated) = 30.6 W/kg

SAR(1 g) = 13.9 W/kg; SAR(10 g) = 6.13 W/kg

Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 45.2%

Maximum value of SAR (measured) = 24.1 W/kg



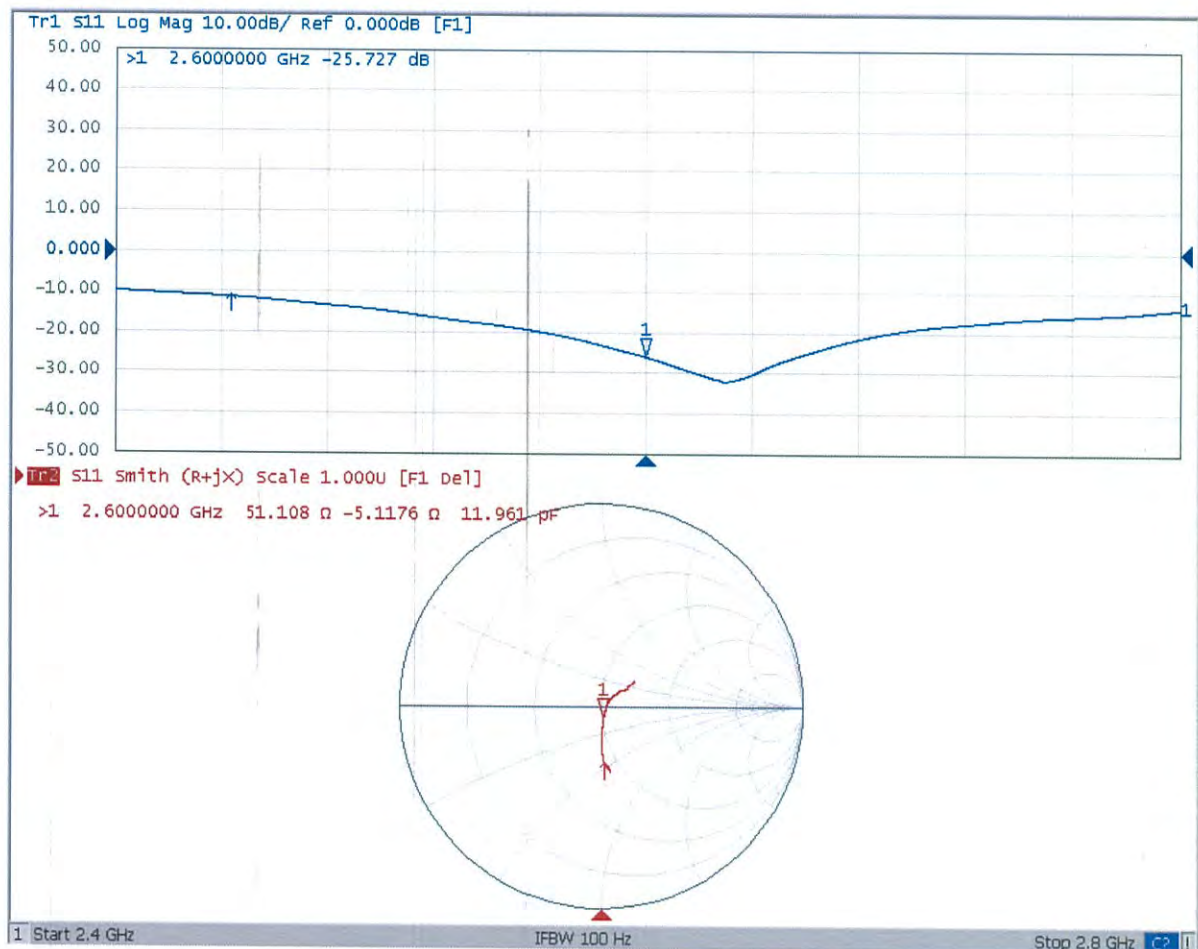
0 dB = 24.1 W/kg = 13.82 dBW/kg



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Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China
Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504
E-mail: cttl@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Head TSL



D2600V2 - SN: 1110 Extended Dipole Calibrations

Referring to KDB 865664 D01, if dipoles are verified in return loss ($< -20\text{dB}$, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

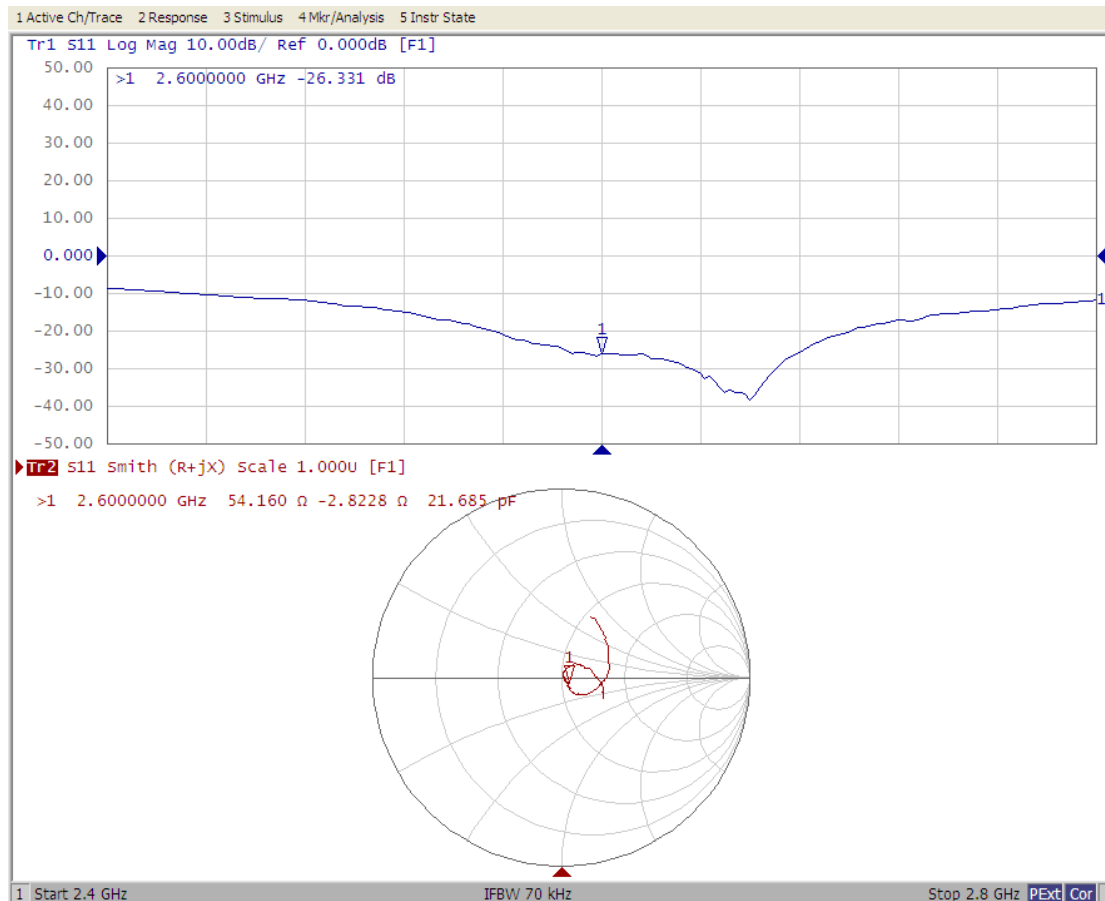
D2600V2 - SN: 1110						
2600 Head						
Date of Measurement	Return-loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2021.09.16	-25.7		51.1		-5.1	
2022.09.16	-26.3	2.7	54.2	3.1	-2.8	2.3

<Justification of the extended calibration>

The return loss is $< -20\text{dB}$, within 20% of prior calibration, and the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

<Dipole Verification Data>

Head 2600MHz _2022.09.16



Appendix D. Conducted Power Result

Band	GSM850				GSM1900			
Channel	128	189	251	Max. Tune-up Power	512	661	810	Max. Tune-up Power
Frequency	824.2	836.4	848.8		1850.2	1880	1909.8	
GSM	32.39	32.37	32.38	33.50	29.68	29.93	29.90	31.00
GPRS 1Tx Slot	32.46	32.41	32.37	33.50	29.75	29.95	29.97	31.00
GPRS 2Tx Slot	30.75	30.62	30.58	31.50	27.89	27.76	27.83	28.50
GPRS 3Tx Slot	29.05	28.91	28.84	30.00	26.37	26.24	26.28	27.00
GPRS 4Tx Slot	27.49	27.38	27.28	28.50	24.35	24.30	24.29	25.00
EDGE 1Tx Slot	26.42	26.36	26.20	27.50	26.23	26.67	26.66	27.50
EDGE 2Tx Slot	25.15	24.68	24.83	26.00	24.79	25.48	25.28	26.50
EDGE 3Tx Slot	22.40	21.98	22.18	23.00	22.52	23.37	23.06	24.00
EDGE 4Tx Slot	19.48	19.21	19.32	20.50	19.30	20.25	20.12	21.00

Source-Based Time-Averaged Power								
Band	GSM850				GSM1900			
Channel	128	189	251	Max. Tune-up Power	512	661	810	Max. Tune-up Power
GSM	23.39	23.37	23.38	24.50	20.68	20.93	20.90	22.00
GPRS 1Tx Slot	23.46	23.41	23.37	24.50	20.75	20.95	20.97	22.00
GPRS 2Tx Slot	24.75	24.62	24.58	25.50	21.89	21.76	21.83	22.50
GPRS 3Tx Slot	24.79	24.65	24.58	25.74	22.11	21.98	22.02	22.74
GPRS 4Tx Slot	24.49	24.38	24.28	25.50	21.35	21.30	21.29	22.00
EDGE 1Tx Slot	17.42	17.36	17.20	18.50	17.23	17.67	17.66	18.50
EDGE 2Tx Slot	19.15	18.68	18.83	20.00	18.79	19.48	19.28	20.50
EDGE 3Tx Slot	18.14	17.72	17.92	18.74	18.26	19.11	18.80	19.74
EDGE 4Tx Slot	16.48	16.21	16.32	17.50	16.30	17.25	17.12	18.00

Band	WCDMA II			WCDMA II	WCDMA V			WCDMA V	WCDMA IV			WCDMA V	
TX Channel	9262	9400	9538	Max. Tune-up Power	4132	4182	4233	Max. Tune-up Power	1312	1413	1513	Max. Tune-up Power	
Rx Channel	9662	9800	9938		4357	4407	4458		4357	4407	4458		
Frequency	1852.4	1880	1907.6		826.4	836.4	846.6		1712.4	1732.6	1752.6		
RMC 12.2K	23.21	23.26	23.31	24.00	24.27	24.29	24.31	25.00	21.45	21.46	21.42	22.50	Proposal
HSDPA Subtest-1	22.63	22.68	22.73	23.50	23.49	23.51	23.53	24.50	20.87	20.88	20.84	21.50	0
HSDPA Subtest-2	22.62	22.67	22.72	23.50	23.48	23.50	23.52	24.50	20.86	20.87	20.83	21.50	0
HSDPA Subtest-3	22.11	22.16	22.21	23.00	22.97	22.99	23.01	24.00	20.35	20.36	20.32	21.00	0.5
HSDPA Subtest-4	22.10	22.15	22.20	23.00	22.96	22.98	23.00	24.00	20.34	20.35	20.31	21.00	0.5
DC-HSDPA Subtest-1	22.55	22.62	22.65	23.50	23.41	23.45	23.45	24.50	20.79	20.82	20.76	21.50	0
DC-HSDPA Subtest-2	22.54	22.61	22.64	23.50	23.40	23.44	23.44	24.50	20.78	20.81	20.75	21.50	0
DC-HSDPA Subtest-3	22.12	22.10	22.15	23.00	22.98	22.93	22.95	24.00	20.36	20.30	20.26	21.00	0.5
DC-HSDPA Subtest-4	22.11	22.09	22.14	23.00	22.97	22.92	22.94	24.00	20.35	20.29	20.25	21.00	0.5
HSUPA Subtest-1	22.59	22.64	22.69	23.50	23.45	23.47	23.49	24.50	20.83	20.84	20.80	21.50	0
HSUPA Subtest-2	21.58	21.63	21.68	22.50	22.44	22.46	22.48	23.50	19.82	19.83	19.79	20.50	2
HSUPA Subtest-3	22.06	22.12	22.17	23.00	22.92	22.95	22.97	24.00	20.30	20.32	20.28	21.00	1
HSUPA Subtest-4	21.55	21.61	21.66	22.50	22.41	22.44	22.46	23.50	19.79	19.81	19.77	20.50	2
HSUPA Subtest-5	22.54	22.60	22.65	23.50	23.40	23.43	23.45	24.50	20.78	20.80	20.76	21.50	0
HSPA+ Subtest-1	21.30	21.37	21.42	22.00	22.16	22.20	22.22	23.00	19.54	19.57	19.53	20.50	2.5

LTE Band 2									
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	Max. Time-up (dBm)		
		Channel		1870	1880	1910			
		Frequency (MHz)		1868	1880	1908			
20M	QPSK	1	0	23.66	23.71	23.72	24.50		
		1	50	23.71	23.76	23.75	24.50		
		1	99	23.73	23.81	23.79	24.50		
		50	0	22.64	22.72	22.73	23.50		
		50	25	22.73	22.65	22.71	23.50		
		50	50	22.68	22.61	22.68	23.50		
		100	0	22.67	22.72	22.73	23.50		
		1	0	22.34	22.36	22.41	23.50		
	16QAM	1	50	22.52	22.39	22.65	23.50		
		1	99	22.48	22.44	22.71	23.50		
		50	0	21.87	21.81	21.91	22.50		
		50	25	21.81	21.83	21.93	22.50		
		50	50	21.80	21.86	21.87	22.50		
		100	0	21.71	21.79	21.89	22.50		
		1	0	21.97	22.04	21.96	22.50		
		1	50	21.89	21.99	22.01	22.50		
	64QAM	1	99	21.94	22.11	22.04	22.50		
		50	0	20.95	20.95	21.01	21.50		
		50	25	21.00	20.96	20.98	21.50		
		50	50	21.01	20.98	20.99	21.50		
		100	0	20.89	20.93	21.02	21.50		
BW	MCS Index	Channel		1887.5	18900	19125	Max. Time-up		
		Frequency (MHz)		1887.5	18900	1912.5			
15M	QPSK	1	0	23.65	23.67	23.64	24.50		
		1	37	23.67	23.73	23.69	24.50		
		1	74	23.71	23.80	23.75	24.50		
		36	0	22.58	22.70	22.72	23.50		
		36	19	22.72	22.63	22.66	23.50		
		36	39	22.60	22.54	22.66	23.50		
		75	0	22.66	22.68	22.66	23.50		
		1	0	22.31	22.35	22.35	23.50		
	16QAM	1	37	22.48	22.34	22.33	23.50		
		1	74	22.42	22.42	22.68	23.50		
		36	0	21.85	21.73	21.90	22.50		
		36	19	21.73	21.79	21.88	22.50		
		36	39	21.77	21.80	21.85	22.50		
		75	0	21.70	21.74	21.81	22.50		
		1	0	21.91	22.01	21.92	22.50		
		1	37	21.87	21.92	21.96	22.50		
10M	QPSK	1	0	21.88	22.03	22.02	22.50		
		36	0	20.94	20.93	20.93	21.50		
		36	19	20.93	20.88	20.92	21.50		
		36	39	20.99	20.97	20.95	21.50		
		75	0	20.87	20.85	20.91	21.50		
	16QAM	1	0	21.89	22.00	21.91	22.50		
		1	24	21.86	21.93	21.99	22.50		
		1	49	21.92	22.04	21.99	22.50		
		25	0	20.89	20.87	20.90	21.50		
		25	12	20.99	20.94	20.90	21.50		
		25	25	20.96	20.90	20.93	21.50		
		50	0	20.88	20.87	21.00	21.50		
BW	MCS Index	Channel		1882.5	18900	19175	Max. Time-up		
		Frequency (MHz)		1882.5	18900	1917.5			
5M	QPSK	1	0	23.61	23.64	23.67	24.50		
		1	12	23.69	23.68	23.74	24.50		
		1	24	23.68	23.73	23.78	24.50		
		12	0	22.60	22.70	22.68	23.50		
		12	6	22.65	22.64	22.66	23.50		
		12	13	22.64	22.56	22.67	23.50		
		25	0	22.61	22.70	22.64	23.50		
		1	0	22.27	22.31	22.39	23.50		
	16QAM	1	12	22.44	22.37	22.60	23.50		
		1	24	22.46	22.36	22.69	23.50		
		12	0	21.79	21.75	21.83	22.50		
		12	6	21.75	21.81	21.87	22.50		
		12	13	21.73	21.81	21.85	22.50		
		25	0	21.65	21.72	21.84	22.50		
		1	0	21.90	21.99	21.94	22.50		
		1	12	21.81	21.97	21.95	22.50		
3M	QPSK	1	0	23.58	23.67	23.67	24.50		
		1	2	23.68	23.70	23.73	24.50		
		1	5	23.71	23.74	23.74	24.50		
		3	0	23.58	23.67	23.71	24.50		
		3	1	23.72	23.63	23.63	24.50		
		3	3	23.63	23.53	23.62	24.50		
		6	0	22.66	22.66	22.67	23.50		
		1	0	22.29	22.29	22.36	23.50		
	16QAM	1	2	22.50	22.31	22.63	23.50		
		1	5	22.43	22.36	22.70	23.50		
		3	0	22.83	22.76	22.86	23.50		
		3	1	22.73	22.82	22.88	23.50		
		3	3	22.76	22.81	22.85	23.50		
		6	0	21.65	21.77	21.84	22.50		
		1	0	21.90	21.99	21.94	22.50		
		1	2	21.81	21.97	21.96	22.50		
1.4M	QPSK	1	0	21.87	21.99	21.92	22.50		
		1	5	21.92	22.03	22.02	22.50		
		3	0	21.87	21.89	21.93	22.50		
		3	1	21.94	21.94	21.92	22.50		
		3	3	21.96	21.90	21.98	22.50		
		6	0	20.85	20.88	20.97	21.50		
	16QAM	1	0	21.80	21.83	21.83	22.50		
		1	2	21.89	21.89	21.91	22.50		
		1	5	21.82	21.82	21.82	22.50		
		3	0	21.87	21.89	21.93	22.50		
		3	1	21.94	21.94	21.92	22.50		
		3	3	21.96	21.90	21.98	22.50		
		6	0	20.85	20.88	20.97	21.50		
		6	0	20.85	20.88	20.97	21.50		

LTE Band 4										
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	Max. Tune-up (dBm)			
		Channel		2050	2075	2090				
		Frequency (MHz)		1728	1732.5	1736				
20M	QPSK	1	0	21.45	21.49	21.53	22.50			
		1	50	21.49	21.55	21.58	22.50			
		1	99	21.67	21.60	21.66	22.50			
		50	0	20.74	20.54	20.66	21.50			
		50	25	20.61	20.63	20.70	21.50			
		50	50	20.67	20.60	20.80	21.50			
		100	0	20.66	20.58	20.71	21.50			
		1	0	21.04	21.11	21.13	22.00			
	16QAM	1	50	21.08	21.15	21.16	22.00			
		1	99	20.37	21.17	21.14	22.00			
		50	0	19.82	19.71	19.78	20.50			
		50	25	19.80	19.75	19.85	20.50			
		50	50	19.77	19.72	19.80	20.50			
		100	0	19.85	19.79	19.83	20.50			
		1	0	19.87	19.88	19.73	20.50			
		1	50	19.97	20.04	19.96	20.50			
64QAM	1	99	19.85	20.06	19.94	20.50				
	50	0	19.84	19.32	19.89	20.50				
	50	25	19.18	19.33	19.17	20.50				
	50	50	19.56	19.65	19.63	20.50				
	100	0	19.15	19.47	19.29	20.50				
	15M	QPSK	1	0	21.75	21.75	21.75	22.50		
			1	37	21.45	21.45	21.45	22.50		
			1	74	21.65	21.59	21.62	22.50		
36			0	20.68	20.49	20.65	21.50			
36			19	20.60	20.61	20.65	21.50			
36			39	20.59	20.53	20.78	21.50			
75			0	20.65	20.54	20.68	21.50			
1			0	21.01	21.10	21.07	22.00			
16QAM		1	37	21.04	21.10	21.14	22.00			
		1	74	20.26	21.15	21.11	22.00			
		36	0	19.80	19.63	19.77	20.50			
		36	19	19.72	19.71	19.80	20.50			
		36	39	19.74	19.66	19.78	20.50			
		75	0	19.84	19.74	19.75	20.50			
		1	0	19.81	19.85	19.69	20.50			
		1	37	19.85	19.97	19.91	20.50			
64QAM	1	74	19.57	19.88	19.92	20.50				
	36	0	19.93	19.30	19.91	20.50				
	36	19	19.11	19.25	19.11	20.50				
	36	39	19.54	19.64	19.59	20.50				
	75	0	19.39	19.39	19.28	20.50				
	1	0	19.80	19.83	19.71	20.50				
	1	24	19.84	19.84	19.68	20.50				
	1	49	19.61	19.99	19.89	20.50				
10M	QPSK	1	0	21.37	21.45	21.48	22.50			
		1	24	21.47	21.47	21.57	22.50			
		1	49	21.59	21.56	21.61	22.50			
		25	0	20.71	20.48	20.64	21.50			
		25	12	20.59	20.56	20.65	21.50			
		25	25	20.61	20.52	20.67	21.50			
		25	0	20.65	20.56	20.63	21.50			
		1	0	20.97	21.03	21.07	22.00			
	16QAM	1	24	21.05	21.09	21.14	22.00			
		1	49	20.30	21.10	21.09	22.00			
		25	0	19.76	19.63	19.76	20.50			
		25	12	19.67	19.67	19.84	20.50			
		25	25	19.69	19.68	19.75	20.50			
		50	0	19.83	19.71	19.82	20.50			
		1	0	19.79	19.84	19.68	20.50			
		1	24	19.94	19.98	19.94	20.50			
64QAM	1	49	19.61	19.99	19.89	20.50				
	25	0	19.88	19.24	19.87	20.50				
	25	12	19.31	19.31	19.09	20.50				
	25	25	19.51	19.57	19.57	20.50				
	50	0	19.14	19.41	19.27	20.50				
	5M	QPSK	1	0	21.40	21.47	21.47	22.50		
			1	12	21.47	21.47	21.56	22.50		
			1	24	21.62	21.52	21.65	22.50		
12			0	20.70	20.69	20.61	21.50			
12			6	20.53	20.62	20.65	21.50			
12			13	20.63	20.55	20.79	21.50			
12			0	20.60	20.56	20.66	21.50			
1			0	20.97	21.06	21.11	22.00			
16QAM		1	12	21.00	21.13	21.11	22.00			
		1	24	20.29	21.09	21.12	22.00			
		12	0	19.74	19.65	19.78	20.50			
		12	6	19.74	19.73	19.79	20.50			
		12	13	19.70	19.67	19.78	20.50			
		25	0	19.79	19.72	19.78	20.50			
		1	0	19.80	19.83	19.71	20.50			
		1	12	19.89	20.02	19.98	20.50			
64QAM	1	24	19.55	19.55	19.92	20.50				
	12	0	19.90	19.27	19.91	20.50				
	12	6	19.10	19.32	19.15	20.50				
	12	13	19.52	19.60	19.55	20.50				
	25	0	19.09	19.45	19.25	20.50				
	3M	QPSK	1	0	21.37	21.45	21.48	22.50		
			1	2	21.42	21.50	21.56	22.50		
			1	14	21.61	21.53	21.61	22.50		
8			0	20.67	20.49	20.64	21.50			
8			3	20.53	20.61	20.64	21.50			
8			7	20.59	20.59	20.78	21.50			
15			0	20.02	20.53	20.63	21.50			
1			0	20.96	21.16	21.11	22.00			
16QAM		1	7	21.03	21.10	21.12	22.00			
		1	14	20.30	21.09	21.13	22.00			
		8	0	19.74	19.67	19.73	20.50			
		8	3	19.77	19.69	19.83	20.50			
		8	7	19.75	19.65	19.75	20.50			
		15	0	19.78	19.71	19.81	20.50			
		1	0	19.98	19.86	19.85	20.50			
		1	7	19.92	19.96	19.90	20.50			
64QAM	1	14	19.62	20.00	19.92	20.50				
	8	0	19.89	19.30	19.92	20.50				
	8	3	19.16	19.25	19.16	20.50				
	8	7	19.48	19.61	19.58	20.50				
	15	0	19.39	19.39	19.28	20.50				
	1.4M	QPSK	1	0	21.37	21.45	21.48	22.50		
			1	2	21.46	21.49	21.56	22.50		
			1	5	21.65	21.53	21.61	22.50		
3			0	21.68	21.46	21.64	22.50			
3			1	21.60	21.61	21.62	22.50			
3			3	21.52	21.52	21.74	22.50			
6			0	20.65	20.52	20.69	21.50			
1			0	20.99	21.04	21.08	22.00			
16QAM		1	2	21.06	21.07	21.14	22.00			
		1	5	20.27	21.09	21.13	22.00			
		3	0	21.18	21.06	21.13	22.00			
		3	1	21.12	21.14	21.26	22.00			
		3	3	21.13	21.07	21.19	22.00			
		6	0	19.79	19.77	19.78	20.50			
		1	0	19.80	19.83	19.71	20.50			
		1	2	19.89	20.02	19.91	20.50			
64QAM	1	5	19.61	19.82	19.92	20.50				
	3	0	19.85	19.26	19.23	20.50				
	3	1	19.31	19.31	19.11	20.50				
	3	3	19.88	19.57	19.62	20.50				
	6	0	19.11	19.42	19.24	20.50				
	BW	MCS Index	Channel	1995	2015	2035	Max. Tune-up			
			Frequency (MHz)	1716.5	1732.5	1752.5	Max. Tune-up			
		QPSK	1	0	21.37	21.45	21.47	22.50		
1			2	21.42	21.50	21.56	22.50			
1			14	21.61	21.53	21.61	22.50			
8			0	20.67	20.49	20.64	21.50			
8			3	20.53	20.61	20.64	21.50			
8			7	20.59	20.59	20.78	21.50			
15			0	20.02	20.53	20.63	21.50			
1			0	20.96	21.16	21.11	22.00			
16QAM		1	7	21.03	21.10	21.12	22.00			
		1	14	20.30	21.09	21.13	22.00			
		8	0	19.74	19.67	19.73	20.50			
		8	3	19.77	19.69	19.83	20.50			
		8	7	19.75	19.65	19.75	20.50			
		15	0	19.78	19.71	19.81	20.50			
	1	0	19.98	19.86	19.85	20.50				
	1	7	19.92	19.96	19.90	20.50				
64QAM	1	14	19.62	20.00	19.92	20.50				
	8	0	19.89	19.30	19.92	20.50				
	8	3	19.16	19.25	19.16	20.50				
	8	7	19.48	19.61	19.58	20.50				
	15	0	19.39	19.39	19.28	20.50				
	BW	MCS Index	Channel	1995	2015	2035	Max. Tune-up			
			Frequency (MHz)	1716.5	1732.5	1754.3	Max. Tune-up			
		QPSK	1	0	21.37	21.45	21.48	22.50		
1			2	21.46	21.49	21.56	22.50			
1			5	21.65	21.53	21.61	22.50			
3			0	21.68	21.46	21.64	22.50			
3			1	21.60	21.61	21.62	22.50			
3			3	21.52	21.52	21.74	22.50			
6			0	20.65	20.52	20.69	21.50			
1			0	20.99	21.04	21.08	22.00			
16QAM		1	2	21.06	21.07	21.14	22.00			
		1	5	20.27	21.09	21.13	22.00			
		3	0	21.18	21.06	21.13	22.00			
		3	1	21.12	21.14	21.26	22.00			
		3	3	21.13	21.07	21.19	22.00			
		6	0	19.79	19.77	19.78	20.50			
	1	0	19.80	19.83	19.71	20.50				
	1	2	19.89	20.02	19.91	20.50				
64QAM	1	5	19.61	19.82	19.92	20.50				
	3	0	19.85	19.26	19.23	20.50				
	3	1	19.31	19.31	19.11	20.50				
	3	3	19.88	19.57	19.62	20.50				
	6	0	19.11	19.42	19.24	20.50				

LTE Band 7							
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	Max. Tune-up (dBm)
		Channel		2085	2100	2135	
		Frequency (MHz)		2615	2635	2665	
20M	QPSK	1	0	22.01	21.98	21.89	22.50
		1	50	21.98	21.96	21.77	22.50
		1	99	22.07	21.77	21.81	22.50
		50	0	21.27	21.19	21.01	22.00
		50	25	21.10	21.14	21.00	22.00
		50	50	21.26	20.95	20.89	22.00
		100	0	21.09	21.04	20.97	22.00
		1	0	20.72	20.73	20.69	21.50
		1	50	20.69	20.65	20.49	21.50
		1	99	20.77	20.76	20.01	21.50
		50	0	20.40	20.45	20.17	21.50
		50	25	20.38	20.38	20.13	21.50
	16QAM	50	50	20.41	20.12	20.06	21.50
		100	0	20.13	20.25	20.11	21.50
	64QAM	1	0	20.29	20.23	20.09	21.00
		1	50	20.18	20.08	19.99	21.00
		1	99	20.12	20.02	20.02	21.00
		50	0	19.43	19.36	19.27	20.50
		50	25	19.59	19.27	19.21	20.50
		50	50	19.44	19.36	19.38	20.50
		100	0	19.37	19.29	19.27	20.50
15M	QPSK	1	0	20.85	21.00	21.35	22.50
		1	37	21.04	21.03	21.71	22.50
		1	74	22.05	21.76	21.57	22.50
		36	0	21.21	21.14	21.00	22.00
		36	19	21.09	21.12	20.95	22.00
		36	39	21.18	20.88	20.87	22.00
		75	0	21.08	21.00	20.94	22.00
		1	0	20.69	20.72	20.63	21.50
		1	37	20.65	20.60	20.47	21.50
		1	74	20.71	20.74	19.98	21.50
		36	0	20.38	20.37	20.16	21.50
		36	19	20.30	20.34	20.08	21.50
	16QAM	36	39	20.38	20.06	20.04	21.50
		75	0	20.12	20.20	20.03	21.50
		1	0	20.23	20.20	20.05	21.00
		1	37	20.16	20.01	19.94	21.00
		1	74	20.06	19.94	20.00	21.00
		36	0	19.42	19.34	19.19	20.50
		36	19	19.52	19.19	19.15	20.50
		36	39	19.42	19.35	19.34	20.50
		75	0	19.35	19.21	19.26	20.50
10M	QPSK	1	0	21.93	21.94	21.84	22.50
		1	24	21.96	21.88	21.76	22.50
		1	49	21.99	21.73	21.56	22.50
		25	0	21.24	21.13	20.99	22.00
		25	12	21.08	21.07	20.95	22.00
		25	25	21.20	20.87	20.87	22.00
		50	0	21.08	21.02	20.89	22.00
		1	0	20.65	20.65	20.63	21.50
		1	24	20.66	20.59	20.47	21.50
		1	49	20.75	20.69	19.96	21.50
		25	0	20.34	20.37	20.15	21.50
		25	12	20.36	20.30	20.12	21.50
	16QAM	25	25	20.33	20.08	20.01	21.50
		50	0	20.11	20.17	20.10	21.50
		1	0	20.21	20.19	20.04	21.00
		1	24	20.15	20.02	19.97	21.00
		1	49	20.10	19.95	19.97	21.00
		25	0	19.37	19.28	19.25	20.50
		25	12	19.58	19.25	19.13	20.50
		25	25	19.39	19.28	19.32	20.50
		50	0	19.36	19.23	19.25	20.50
5M	QPSK	1	0	20.75	21.00	21.45	22.50
		1	12	21.96	21.88	21.75	22.50
		1	24	22.02	21.89	21.60	22.50
		12	0	21.23	21.14	20.96	22.00
		12	6	21.02	21.13	20.95	22.00
		12	13	21.22	20.90	20.88	22.00
		25	0	21.03	21.02	20.92	22.00
		1	0	20.65	20.68	20.67	21.50
		1	12	20.61	20.63	20.44	21.50
		1	24	20.75	20.68	19.99	21.50
		12	0	20.32	20.39	20.09	21.50
		12	6	20.32	20.36	20.07	21.50
	16QAM	12	13	20.34	20.07	20.04	21.50
		25	0	20.07	20.18	20.06	21.50
		1	0	20.22	20.18	20.07	21.00
		1	12	20.10	20.06	19.93	21.00
		1	24	20.04	20.01	20.00	21.00
		12	0	19.39	19.31	19.19	20.50
		12	6	19.51	19.26	19.19	20.50
		12	13	19.40	19.31	19.30	20.50
		25	0	19.31	19.27	19.24	20.50

LTE Band 12									
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	Max. Tune-up (dBm)		
		Channel		2306	2306	2310			
		Frequency (MHz)		704	707.5	711			
10M	QPSK	1	0	23.52	23.50	23.49	24.50		
		1	24	23.49	23.56	23.51	24.50		
		1	49	23.43	23.57	23.52	24.50		
		25	0	22.44	22.55	22.50	23.50		
		25	12	22.56	22.66	22.63	23.50		
		25	25	22.61	22.50	22.64	23.50		
		50	0	22.51	22.64	22.52	23.50		
		1	0	22.77	22.68	22.97	23.50		
		1	24	22.74	22.68	22.91	23.50		
		1	49	22.78	22.72	22.75	23.50		
		25	0	21.62	21.66	21.76	22.50		
		25	12	21.65	21.71	21.79	22.50		
16QAM	QPSK	25	25	21.69	21.63	21.68	22.50		
		50	0	21.67	21.72	21.74	22.50		
		1	0	21.72	21.75	21.71	22.50		
		1	24	21.96	21.83	21.73	22.50		
		1	49	21.77	21.79	21.75	22.50		
		25	0	20.67	20.69	20.54	21.50		
		25	12	20.53	20.61	20.64	21.50		
		25	25	20.68	20.63	20.54	21.50		
		50	0	20.57	20.71	20.67	21.50		
		64QAM	QPSK	1	0	23.47	23.43	23.44	24.50
				1	12	23.47	23.48	23.49	24.50
				1	24	23.38	23.49	23.51	24.50
12	0			22.40	22.50	22.45	23.50		
12	6			22.48	22.64	22.58	23.50		
12	13			22.57	22.45	22.63	23.50		
25	0			22.45	22.52	22.47	23.50		
1	0			22.70	22.59	22.95	23.50		
1	12			22.66	22.66	22.86	23.50		
1	24			22.76	22.64	22.73	23.50		
12	0			21.54	21.60	21.68	22.50		
12	6			21.59	21.69	21.73	22.50		
16QAM	QPSK	12	13	21.62	21.58	21.86	22.50		
		25	0	21.61	21.65	21.69	22.50		
		1	0	21.65	21.70	21.69	22.50		
		1	12	21.88	21.81	21.87	22.50		
		1	24	21.69	21.78	21.73	22.50		
		12	0	20.63	20.64	20.46	21.50		
		12	6	20.45	20.60	20.62	21.50		
		12	13	20.62	20.58	20.86	21.50		
		25	0	20.51	20.69	20.64	21.50		
		64QAM	QPSK	1	0	23.46	23.48	23.43	24.50
				1	7	23.42	23.51	23.49	24.50
				1	14	23.37	23.50	23.47	24.50
8	0			22.37	22.50	22.48	23.50		
8	3			22.48	22.63	22.57	23.50		
8	7			22.53	22.49	22.62	23.50		
15	0			22.47	22.49	22.44	23.50		
1	0			22.69	22.63	22.95	23.50		
1	7			22.69	22.63	22.87	23.50		
1	14			22.76	22.64	22.74	23.50		
8	0			21.54	21.62	21.71	22.50		
8	3			21.62	21.65	21.77	22.50		
16QAM	QPSK	8	7	21.67	21.56	21.83	22.50		
		15	0	21.61	21.64	21.72	22.50		
		1	0	21.71	21.73	21.63	22.50		
		1	7	21.91	21.75	21.67	22.50		
		1	14	21.76	21.73	21.73	22.50		
		8	0	20.62	20.67	20.47	21.50		
		8	3	20.51	20.53	20.63	21.50		
		8	7	20.58	20.59	20.89	21.50		
		15	0	20.55	20.63	20.66	21.50		
		64QAM	QPSK	1	0	23.44	23.46	23.44	24.50
				1	2	23.46	23.50	23.49	24.50
				1	5	23.41	23.50	23.47	24.50
3	0			23.38	23.47	23.48	24.50		
3	1			23.55	23.63	23.55	24.50		
3	3			23.56	23.42	23.58	24.50		
6	0			22.50	22.48	22.50	23.50		
6	2			22.51	22.49	22.52	23.50		
1	2			22.72	22.60	22.89	23.50		
1	5			22.73	22.64	22.74	23.50		
3	1			22.57	22.58	22.74	23.50		
3	3			22.65	22.70	22.87	23.50		
16QAM	QPSK	3	1	21.61	21.70	21.68	22.50		
		1	0	21.65	21.70	21.69	22.50		
		1	2	21.88	21.81	21.88	22.50		
		1	5	21.75	21.71	21.73	22.50		
		1	0	21.59	21.63	21.48	22.50		
		1	2	21.47	21.54	21.48	22.50		
		3	3	21.61	21.55	21.93	22.50		
		6	0	20.53	20.66	20.62	21.50		
		64QAM	QPSK	6	0	20.53	20.66	20.62	21.50
				3	1	21.59	21.63	21.48	22.50
				3	3	21.61	21.55	21.93	22.50
				6	0	20.53	20.66	20.62	21.50

LTE Band 17							
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	Max. Tune-up (dBm)
		Channel		23780	23790	23800	
		Frequency (MHz)		716	717	718	
10M	QPSK	1	0	23.46	23.50	23.51	24.50
		1	24	23.37	23.42	23.37	24.50
		1	49	23.42	23.48	23.42	24.50
		25	0	22.51	22.53	22.72	23.50
		25	12	22.50	22.70	22.57	23.50
		25	25	22.59	22.59	22.59	23.50
		50	0	22.49	22.58	22.61	23.50
		1	0	22.86	22.75	22.90	23.50
		1	24	22.82	22.74	22.77	23.50
		1	49	22.55	22.65	22.57	23.50
	16QAM	25	0	21.67	22.65	21.58	22.50
		25	12	21.66	21.63	21.61	22.50
		25	25	21.63	21.58	21.82	22.50
		50	0	21.59	21.68	21.60	22.50
		1	0	21.70	21.79	21.84	22.50
		1	24	21.81	21.55	21.75	22.50
		1	49	21.77	21.64	21.61	22.50
		25	0	20.74	20.81	20.50	21.50
		25	12	20.55	20.82	20.52	21.50
		25	25	20.99	21.07	21.06	21.50
		50	0	20.61	20.78	20.71	21.50
	64QAM	Channel		23786	23790	23805	Max. Tune-up
		Frequency (MHz)		716.5	716	715.5	
		1	0	23.41	23.43	23.46	24.50
		1	12	23.35	23.34	23.35	24.50
		1	24	23.37	23.40	23.41	24.50
		12	0	22.47	22.48	22.67	23.50
		12	6	22.42	22.69	22.52	23.50
		12	13	22.55	22.54	22.58	23.50
		25	0	22.43	22.58	22.56	23.50
		1	0	22.73	22.70	22.58	23.50
		1	12	22.54	22.72	22.72	23.50
		1	24	22.53	22.57	22.55	23.50
		12	0	21.59	22.59	21.50	22.50
		12	6	21.60	21.61	21.55	22.50
		12	13	21.58	21.53	21.80	22.50
5M	QPSK	25	0	21.53	21.61	21.55	22.50
		1	0	21.83	21.74	21.82	22.50
		1	12	21.73	21.53	21.69	22.50
		1	24	21.69	21.63	21.59	22.50
		12	0	20.70	20.76	20.42	21.50
		12	6	20.47	20.81	20.50	21.50
		12	13	20.95	21.02	20.98	21.50
		25	0	20.55	20.78	20.68	21.50
	16QAM	Channel		23786	23790	23805	Max. Tune-up
		Frequency (MHz)		716.5	716	715.5	
		1	0	23.41	23.43	23.46	24.50
		1	12	23.35	23.34	23.35	24.50
		1	24	23.37	23.40	23.41	24.50
		12	0	22.47	22.48	22.67	23.50
		12	6	22.42	22.69	22.52	23.50
		12	13	22.55	22.54	22.58	23.50
		25	0	22.43	22.58	22.56	23.50
		1	0	22.73	22.70	22.58	23.50
	64QAM	Channel		23786	23790	23805	Max. Tune-up
		Frequency (MHz)		716.5	716	715.5	
		1	0	23.41	23.43	23.46	24.50
		1	12	23.35	23.34	23.35	24.50
		1	24	23.37	23.40	23.41	24.50
		12	0	22.47	22.48	22.67	23.50
		12	6	22.42	22.69	22.52	23.50
		12	13	22.55	22.54	22.58	23.50
		25	0	22.43	22.58	22.56	23.50
		1	0	22.73	22.70	22.58	23.50
		1	12	22.54	22.72	22.72	23.50
		1	24	22.53	22.57	22.55	23.50
		12	0	21.59	22.59	21.50	22.50
		12	6	21.60	21.61	21.55	22.50
		12	13	21.58	21.53	21.80	22.50

LTE Band 66									
BW	MCS Index	RB Size	RB Offset	Low	Mid	High	Max. Tune-up (dBm)		
		Channel		132072	132322	132672			
20M									
QPSK		Frequency (MHz)		1729	1745	1776			
		1	0	21.59	21.61	21.65	22.50		
		1	50	21.67	21.63	21.78	22.50		
		1	99	21.72	21.69	21.85	22.50		
		50	0	20.80	20.75	20.75	21.50		
		50	25	20.80	20.77	20.85	21.50		
		50	50	20.86	20.83	20.88	21.50		
		100	0	20.76	20.85	20.87	21.50		
		16QAM		1	0	20.78	21.18	20.79	22.00
				1	50	20.87	21.21	20.98	22.00
1	99			20.95	21.26	21.01	22.00		
50	0			19.91	19.94	19.86	21.00		
50	25			19.92	19.98	19.90	21.00		
50	50			19.89	20.01	19.98	21.00		
100	0			19.85	19.88	19.84	21.00		
64QAM				1	0	19.79	20.17	19.95	21.00
				1	50	19.91	20.04	19.97	21.00
				1	99	20.20	20.36	20.07	21.00
		50	0	19.02	19.06	19.76	20.50		
		50	25	19.19	19.35	19.67	20.50		
		50	50	19.63	19.81	19.95	20.50		
		100	0	19.15	19.49	19.82	20.50		
		Channel		132072	132322	132672	Max. Tune-up		
		Frequency (MHz)		1729	1745	1776			
		15M							
QPSK		1	0	21.58	21.57	21.57	22.50		
		1	37	21.63	21.60	21.72	22.50		
		1	74	21.70	21.68	21.81	22.50		
		36	0	20.74	20.70	20.74	21.50		
		36	19	20.79	20.75	20.80	21.50		
		36	39	20.78	20.76	20.86	21.50		
		75	0	20.75	20.81	20.84	21.50		
		1	0	20.75	21.17	20.73	22.00		
		16QAM		1	37	20.83	21.16	20.96	22.00
				1	74	20.89	21.24	20.98	22.00
36	0			19.89	19.86	19.85	21.00		
36	19			19.84	19.94	19.85	21.00		
36	39			19.86	19.95	19.96	21.00		
75	0			19.84	19.83	19.76	21.00		
1	0			19.73	20.14	19.91	21.00		
64QAM				1	37	19.89	19.97	19.92	21.00
				1	74	20.14	20.28	20.05	21.00
				36	0	19.01	19.04	19.68	20.50
		36	19	19.12	19.27	19.61	20.50		
		36	39	19.61	19.80	19.91	20.50		
		75	0	19.13	19.41	19.61	20.50		
		Channel		132022	132322	132622	Max. Tune-up		
		Frequency (MHz)		1715	1745	1775			
		10M							
		QPSK		1	0	21.51	21.57	21.60	22.50
1	24			21.65	21.55	21.77	22.50		
1	49			21.64	21.65	21.80	22.50		
25	0			20.77	20.69	20.73	21.50		
25	12			20.78	20.70	20.80	21.50		
25	25			20.80	20.75	20.86	21.50		
50	0			20.75	20.83	20.79	21.50		
16QAM				1	0	20.71	21.10	20.73	22.00
				1	24	20.84	21.15	20.96	22.00
				1	49	20.93	21.19	20.96	22.00
		25	0	19.85	19.86	19.84	21.00		
		25	12	19.90	19.90	19.89	21.00		
		25	25	19.81	19.97	19.93	21.00		
		50	0	19.83	19.80	19.83	21.00		
		64QAM		1	0	19.71	20.13	19.90	21.00
				1	24	19.88	19.98	19.95	21.00
				1	49	20.18	20.29	20.02	21.00
25	0			18.96	18.98	19.74	20.50		
25	12			19.18	19.33	19.59	20.50		
25	25			19.58	19.73	19.88	20.50		
50	0			19.14	19.43	19.80	20.50		
Channel				131997	132322	132647	Max. Tune-up		
Frequency (MHz)				1712.5	1745	1777.5			
5M									
QPSK		12	0	20.76	20.70	20.70	21.50		
		12	6	20.72	20.76	20.80	21.50		
		12	13	20.82	20.78	20.87	21.50		
		25	0	20.70	20.83	20.82	21.50		
		16QAM		1	0	20.71	21.13	20.77	22.00
				1	12	20.79	21.19	20.93	22.00
				1	24	20.93	21.18	20.99	22.00
				12	0	19.63	19.88	19.78	21.00
				12	6	19.86	19.96	19.84	21.00
				12	13	19.82	19.96	19.96	21.00
25	0			19.79	19.81	19.79	21.00		
64QAM				1	0	19.72	20.12	19.95	21.00
				1	12	19.83	20.02	19.91	21.00
				1	24	20.12	20.35	20.05	21.00
		12	0	18.98	19.01	19.68	20.50		
		12	6	19.11	19.34	19.65	20.50		
		12	13	19.59	19.76	19.87	20.50		
		25	0	18.09	19.47	19.79	20.50		
		Channel		131987	132322	132657	Max. Tune-up		
		Frequency (MHz)		1711.5 <td>1745</td> <td>1777.5</td> <th></th>	1745	1777.5			
		3M							
QPSK		1	0	21.53	21.59	21.59	22.50		
		1	7	21.60	21.58	21.76	22.50		
		1	14	21.66	21.62	21.80	22.50		
		8	0	20.73	20.70	20.73	21.50		
		8	3	20.72	20.75	20.79	21.50		
		8	7	20.78	20.82	20.86	21.50		
		15	0	20.72	20.80	20.79	21.50		
		1	0	20.70	21.17	20.77	22.00		
		16QAM		1	7	20.82	21.16	20.94	22.00
				1	14	20.93	21.18	21.00	22.00
8	0			19.83	19.90	19.81	21.00		
8	3			19.89	19.92	19.88	21.00		
7	7			19.87	19.94	19.93	21.00		
15	0			19.77	19.80	19.82	21.00		
1	0			19.78	20.15	19.97	21.00		
64QAM				1	7	19.86	19.96	19.91	21.00
				1	14	20.19	20.30	20.05	21.00
				8	0	18.97	19.04	19.69	20.50
		8	3	19.17	19.27	19.66	20.50		
		7	7	19.60	19.71	19.80	20.50		
		15	0	19.13	19.41	19.61	20.50		
		Channel		131979	132322	132645	Max. Tune-up		
		Frequency (MHz)		1710.7 <td>1745</td> <td>1779.3</td> <th></th>	1745	1779.3			
		1.4M							
		QPSK		1	0	21.51	21.57	21.60	22.50
1	2			21.64	21.57	21.78	22.50		
1	5			21.70	21.62	21.80	22.50		
3	0			21.74	21.67	21.73	22.50		
3	1			21.79	21.75	21.77	22.50		
3	3			21.81	21.75	21.82	22.50		
6	0			20.75	20.79	20.85	21.50		
1	0			20.73	21.13	20.74	22.00		
16QAM				1	2	20.85	21.11	20.96	22.00
				1	5	20.90	21.18	21.00	22.00
		0	20.67	20.66	20.67	22.00			
		3	1	20.84	20.97	20.85	22.00		
		3	3	20.85	20.96	20.97	22.00		
		6	0	19.79	19.86	19.79	21.00		
		1	0	19.72	20.12	19.93	21.00		
		64QAM		1	2	19.83	20.02	19.92	21.00
				1	5	20.18	20.28	20.05	21.00
				3	0	19.94	19.73	19.88	21.00
3	1			19.83	20.03	19.81	21.00		
3	3			19.78	19.93	20.14	21.00		
6	0			19.11	19.44	19.77	20.50		

2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit
	802.11b 1Mbps	1	2412	15.21	16.00
		6	2437	17.56	18.50
		11	2462	14.82	15.50
	802.11g 6Mbps	1	2412	14.13	15.00
		6	2437	16.14	17.00
		11	2462	13.77	14.50
	802.11n-HT20 MCS0	1	2412	14.91	15.50
		6	2437	16.52	17.50
		11	2462	14.19	15.00

BR / EDR	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit
	GFSK	CH 0	2402	7.51	8.00
		CH 39	2441	7.19	8.00
		CH 78	2480	5.56	7.00
	DQPSK	CH 0	2402	6.67	8.00
		CH 39	2441	5.42	7.00
		CH 78	2480	4.07	5.00
	8DPSK	CH 0	2402	6.66	8.00
		CH 39	2441	5.42	7.00
		CH 78	2480	4.11	5.00
BLE	1M	CH 0	2402	-0.76	1.00
		CH 19	2440	-1.16	0.00
		CH 39	2480	-2.73	-1.00