D1750V2, Serial No. 1090 Extended Dipole Calibrations

Referring to KDB 865664 D01 v01r02, 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.

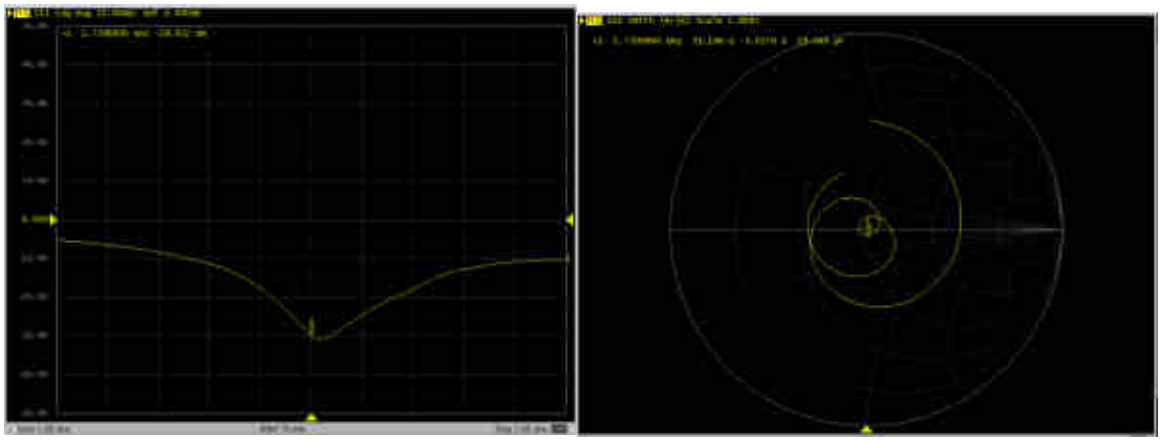
1750V2 – serial no. 1090												
	1750 Head						1750 Body					
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2019.3.27	-29.2		47.5		-2.3		-23.2		43.9		-2.2	
2020.3.26	-29.8	-0.02	51.2	-3.66	-3.0	0.70	-25.0	-0.08	45.1	-1.22	-2.17	-0.02

<Justification of the extended calibration>

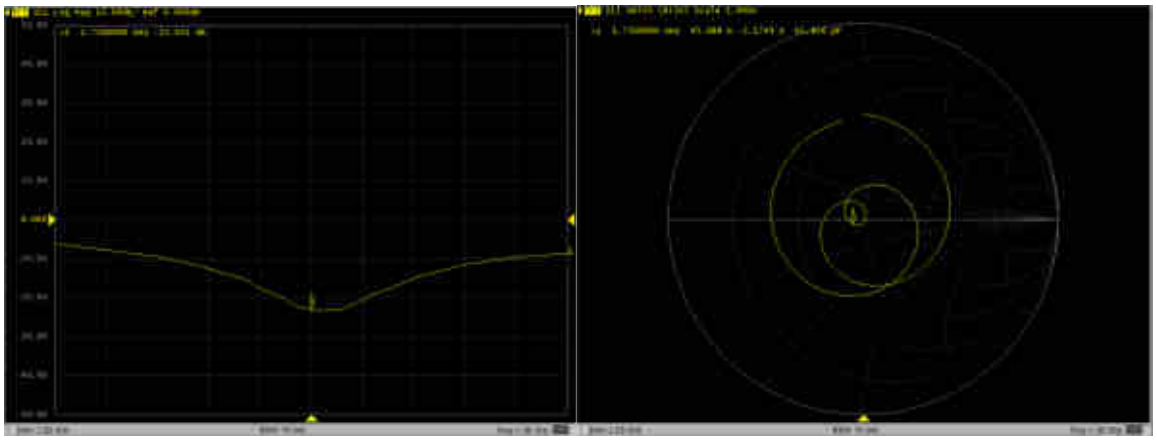
The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data> D1750V2, serial no. 1090

1750MHz – Head



1750MHz – Body



SPORTON INTERNATIONAL (KUNSHAN) INC.
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FAX : 86-0512-5790-0958

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CNAS L0570

Client **Sporton** **Certificate No: Z19-60085**

CALIBRATION CERTIFICATE

Object	D1900V2 - SN: 5d170
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	March 26, 2019

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)℃ 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	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

	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: March 29, 2019

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lossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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 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

c) 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

d) KDB865664, 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%.

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Measurement Conditions

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

DASY Version	DASY52	52.10.2.1495
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 ± 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	40.5 ± 6 %	1.44 mho/m ± 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	9.90 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**39.0 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.12 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**20.3 W/kg ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	53.3	1.52 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	54.5 ± 6 %	1.56 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	10.1 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**40.0 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.28 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**21.0 W/kg ± 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	51.7Ω+ 6.73jΩ
Return Loss	- 23.3dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	47.8Ω+ 6.72jΩ
Return Loss	- 22.8dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.066 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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DASY5 Validation Report for Head TSL Date: 03.26.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d170

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

Medium parameters used: f = 1900 MHz; σ = 1.441 S/m; ε_r = 40.48; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(8.14, 8.14, 8.14) @ 1900 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

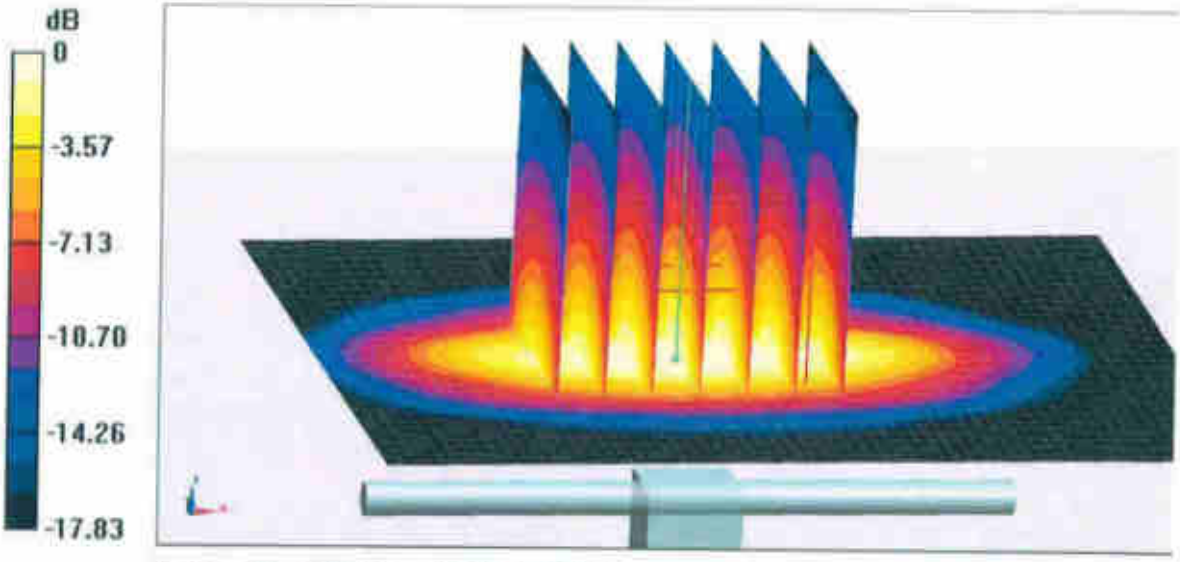
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 97.54 V/m; Power Drift = 0.08 dB

Peak SAR (extrapolated) = 18.9 W/kg

SAR(1 g) = 9.9 W/kg; SAR(10 g) = 5.12 W/kg

Maximum value of SAR (measured) = 15.6 W/kg



0 dB = 15.6 W/kg = 11.93 dBW/kg

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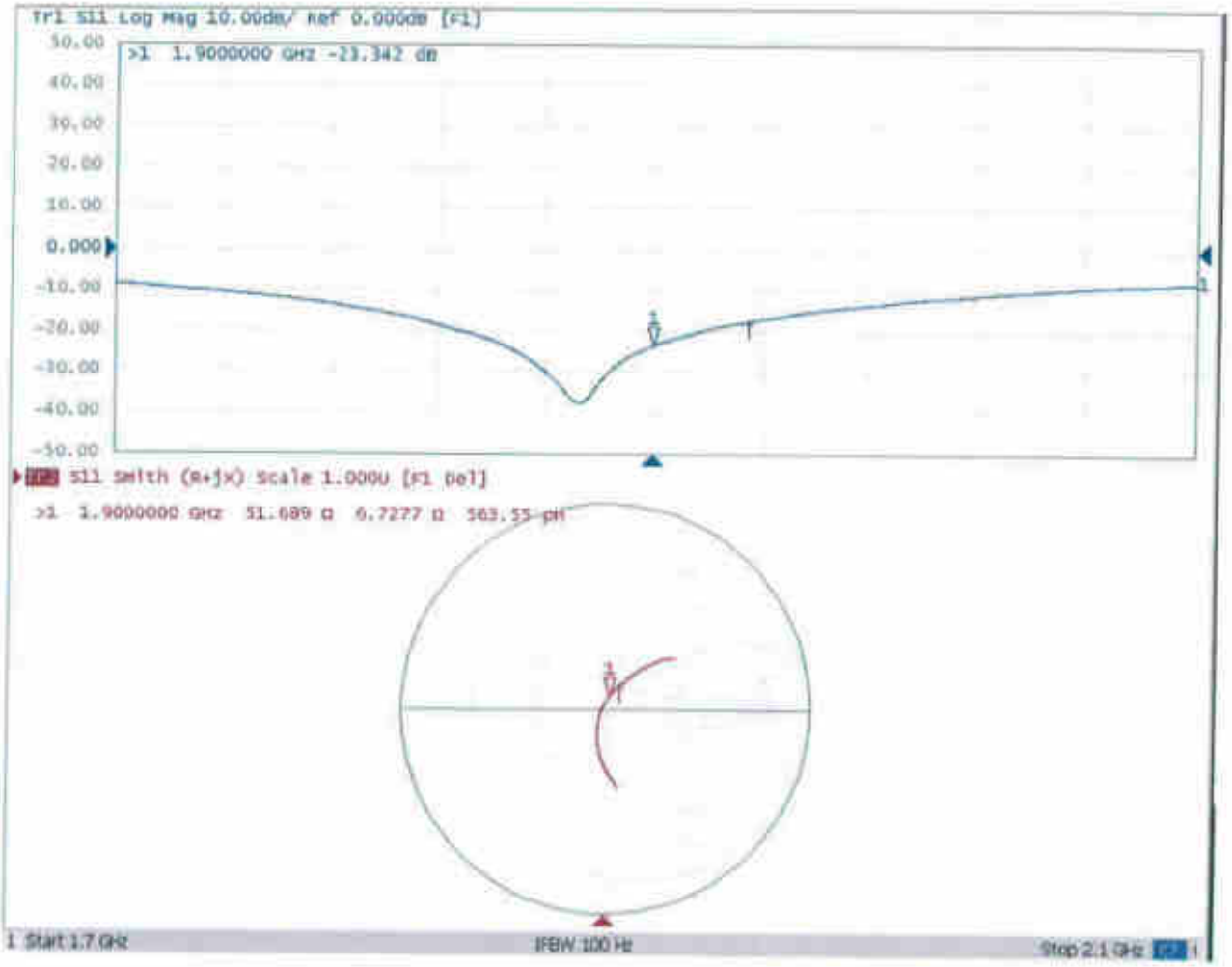
Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL Date: 03.26.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1900 MHz; Type: D1900V2; Serial: D1900V2 - SN: 5d170

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

Medium parameters used: f = 1900 MHz; σ = 1.56 S/m; ε_r = 54.52; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.78, 7.78, 7.78) @ 1900 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

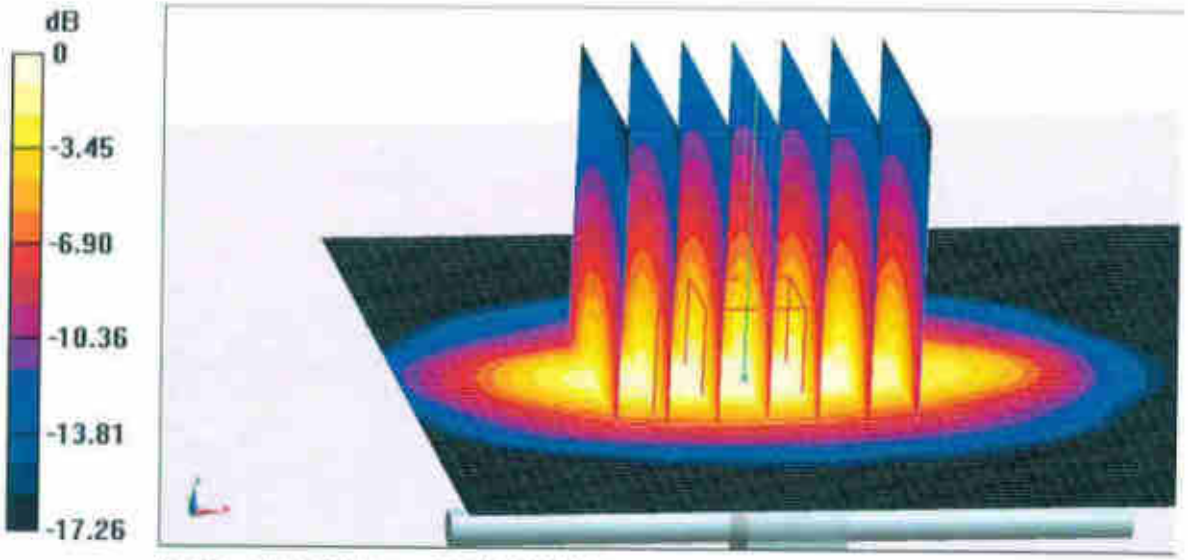
System Performance Check/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.48 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 18.6 W/kg

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.28 W/kg

Maximum value of SAR (measured) = 15.7 W/kg



0 dB = 15.7 W/kg = 11.96 dBW/kg

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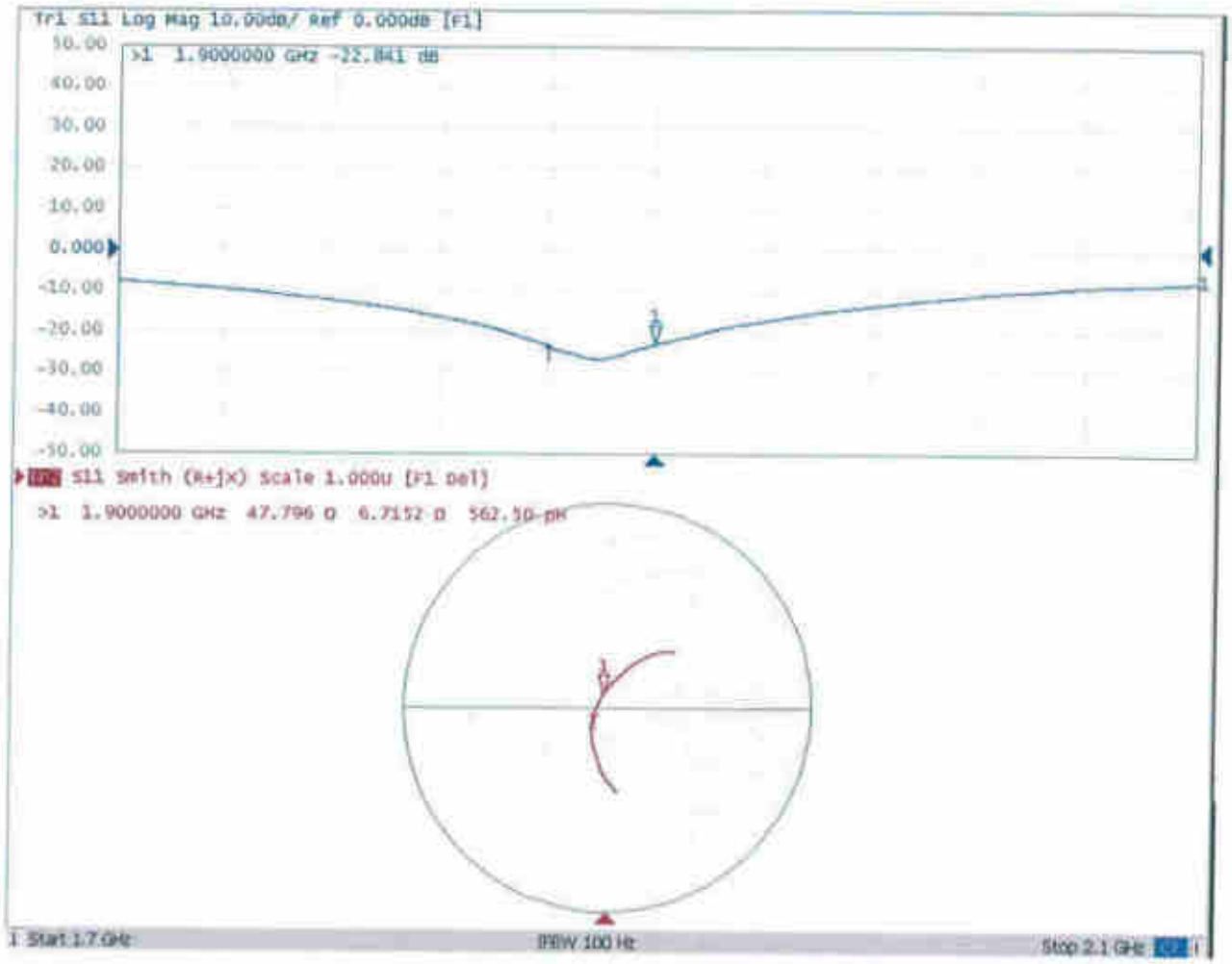
Impedance Measurement Plot for Body TSL



D1900V2, Serial No. 5d170 Extended Dipole Calibrations

Referring to KDB 865664 D01 v01r02, 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.

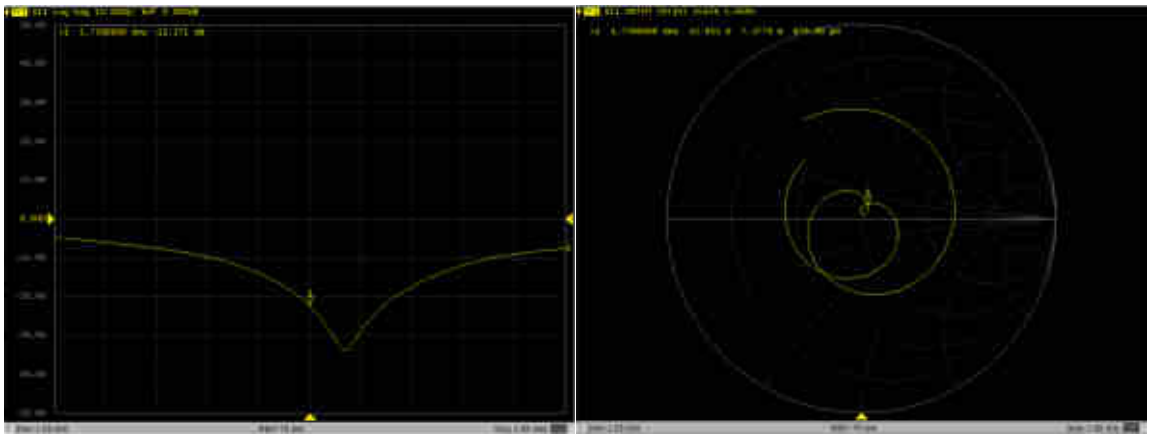
1900V2 – serial no. 5d170												
	1900 Head						1900 Body					
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2019.3.26	-23.3		51.7		6.7		-22.8		47.8		6.7	
2020.3.25	-22.3	0.05	53.0	-1.26	7.4	-0.64	-22.5	0.01	49.2	-1.37	7.41	-0.69

<Justification of the extended calibration>

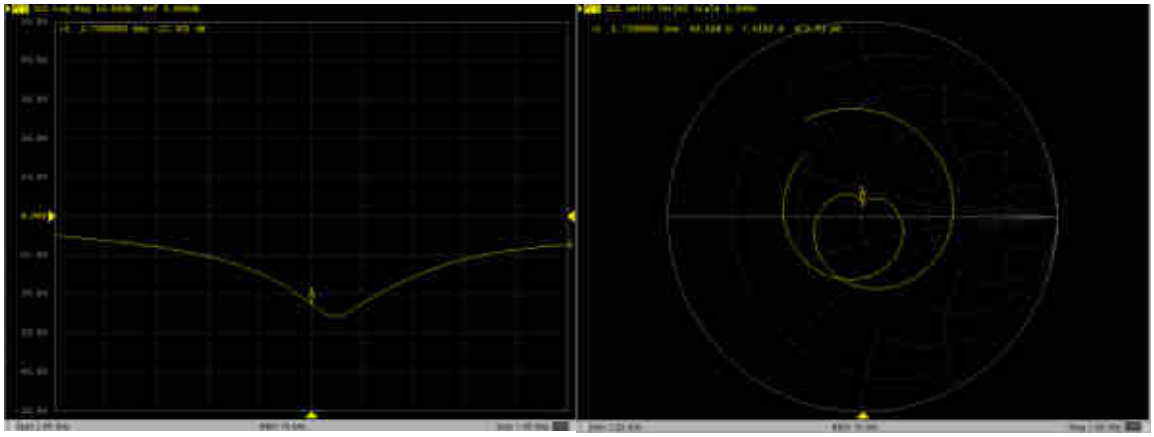
The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data> D1900V2, serial no. 5d170

1900MHz – Head



1900MHz – Body



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CNAS L0570

Client **Sporton** **Certificate No: Z19-60087**

CALIBRATION CERTIFICATE

Object	D2450V2 - SN: 908
Calibration Procedure(s)	FF-Z11-003-01 Calibration Procedures for dipole validation kits
Calibration date:	March 25, 2019

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)℃ 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	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
DAE4	SN 1331	06-Feb-19(SPEAG,No.DAE4-1331_Feb19)	Feb-20
Secondary Standards	**ID #**	**Cal Date(Calibrated by, Certificate No.)**	**Scheduled Calibration**
Signal Generator E4438C	MY49071430	23-Jan-19 (CTTL, No.J19X00336)	Jan-20
NetworkAnalyzer E5071C	MY46110673	24-Jan-19 (CTTL, No.J19X00547)	Jan-20

	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: March 28, 2019

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Glossary:

TSL	tissue simulating liquid
ConvF	sensitivity in TSL / NORMx,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 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

c) 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

d) KDB865664, 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%.

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Measurement Conditions

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

DASY Version	DASY52	52.10.2.1495
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 ± 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	39.6 ± 6 %	1.84 mho/m ± 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	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**52.8 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.07 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**24.2 W/kg ± 18.7 % (k=2)**

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	**Permittivity**	**Conductivity**
Nominal Body TSL parameters	22.0 °C	52.7	1.95 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	53.8 ± 6 %	2.00 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	---	---

SAR result with Body TSL

SAR averaged over 1 cm^3 (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.8 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**50.8 W/kg ± 18.8 % (k=2)**
SAR averaged over 10 cm^3 (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.91 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	**23.6 W/kg ± 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	57.3Ω+ 5.18 jΩ
Return Loss	- 21.6dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	52.6Ω+ 5.81 jΩ
Return Loss	- 24.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.020 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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DASY5 Validation Report for Head TSL Date: 03.25.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 908

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

Medium parameters used: f = 2450 MHz; σ = 1.841 S/m; ε_r = 39.63; ρ = 1000 kg/m3

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.62, 7.62, 7.62) @ 2450 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

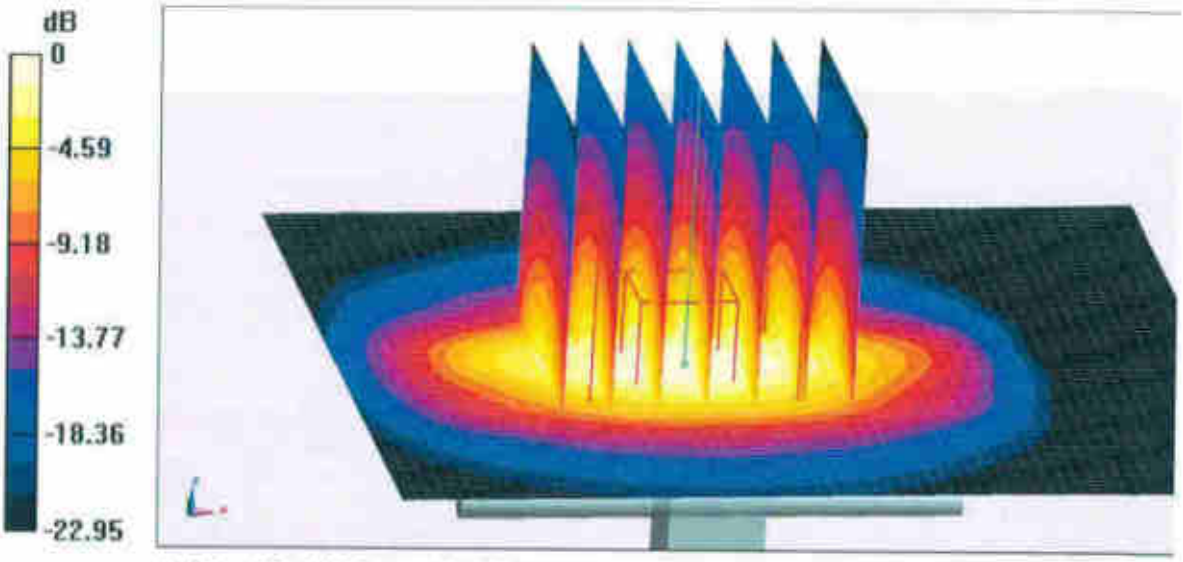
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 96.04 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 28.3 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.07 W/kg

Maximum value of SAR (measured) = 22.4 W/kg



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

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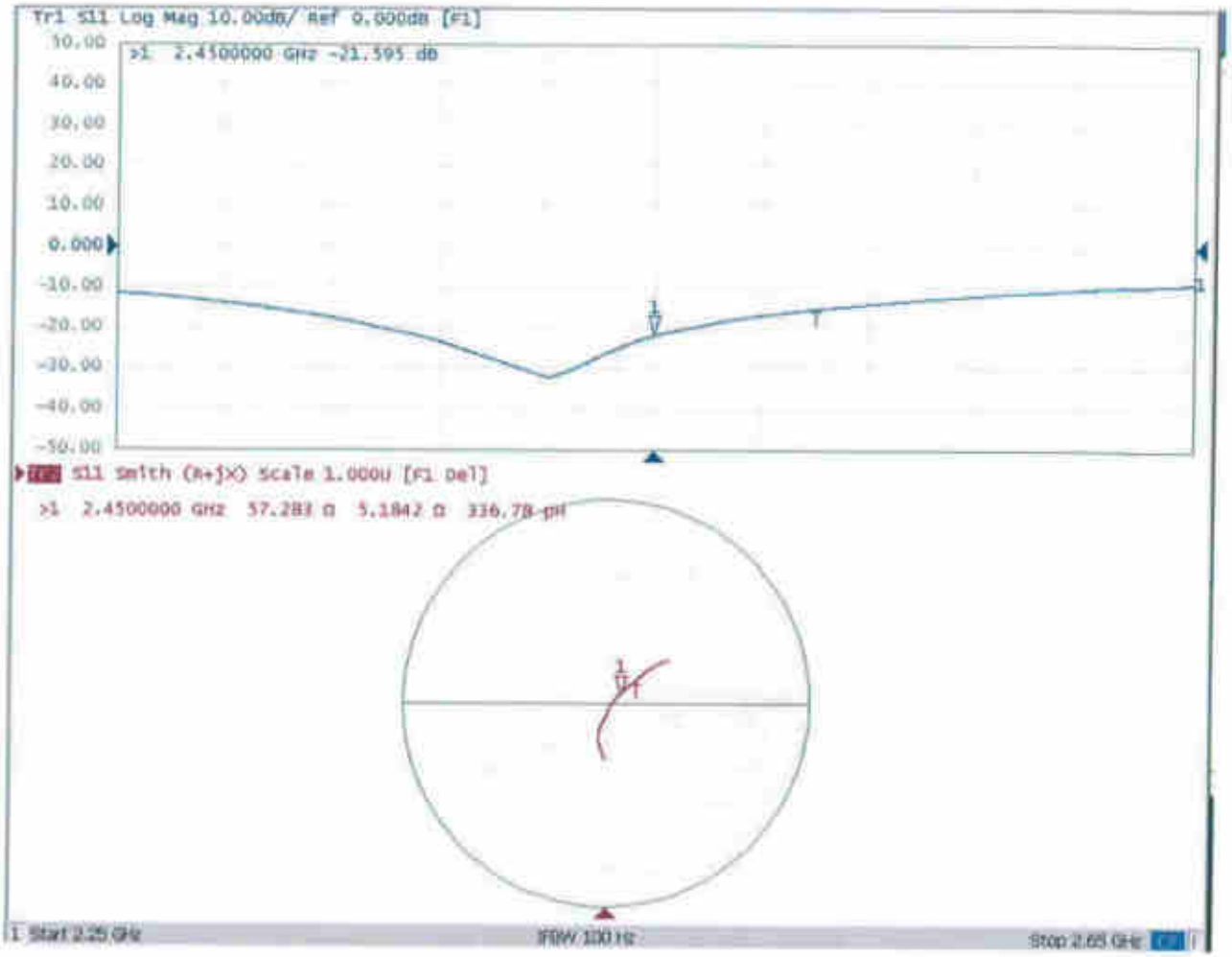
Impedance Measurement Plot for Head TSL



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E-mail: cttl@chinattl.com http://www.chinattl.cn

DASY5 Validation Report for Body TSL Date: 03.25.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 908

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

Medium parameters used: f = 2450 MHz; σ = 2.003 S/m; ε_r = 53.78; ρ = 1000 kg/m3

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN3617; ConvF(7.79, 7.79, 7.79) @ 2450 MHz; Calibrated: 1/31/2019
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1331; Calibrated: 2/6/2019
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

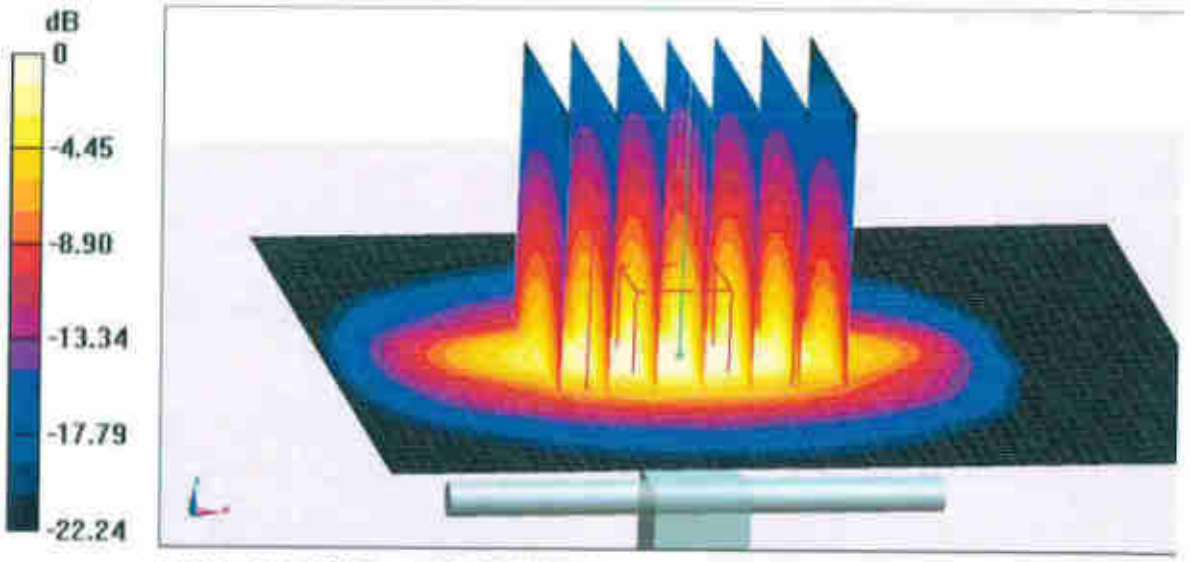
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.51 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 27.1 W/kg

SAR(1 g) = 12.8 W/kg; SAR(10 g) = 5.91 W/kg

Maximum value of SAR (measured) = 21.4 W/kg



0 dB = 21.4 W/kg = 13.30 dBW/kg

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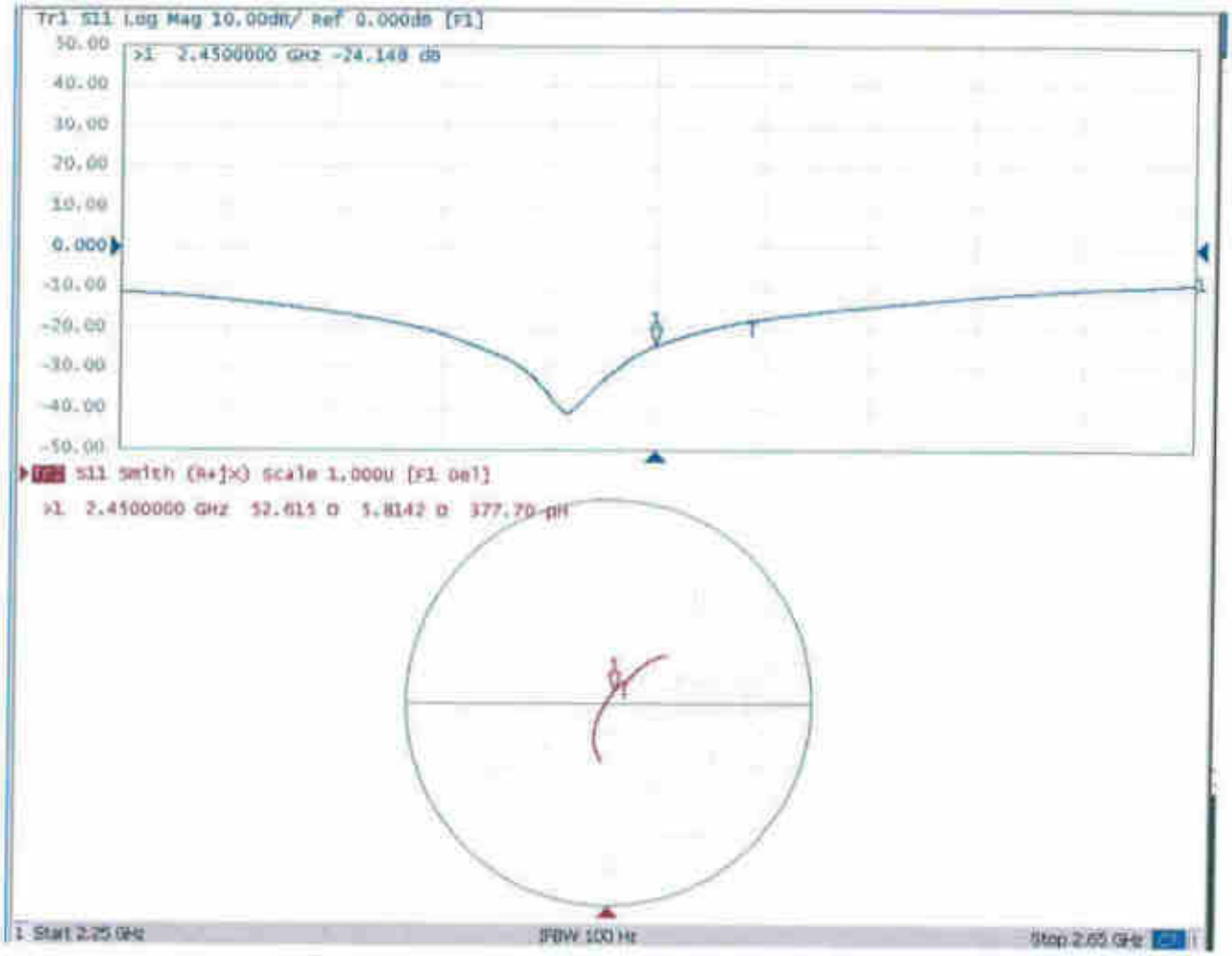
Impedance Measurement Plot for Body TSL



D2450V2, Serial No. 908 Extended Dipole Calibrations

Referring to KDB 865664 D01 v01r02, 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.

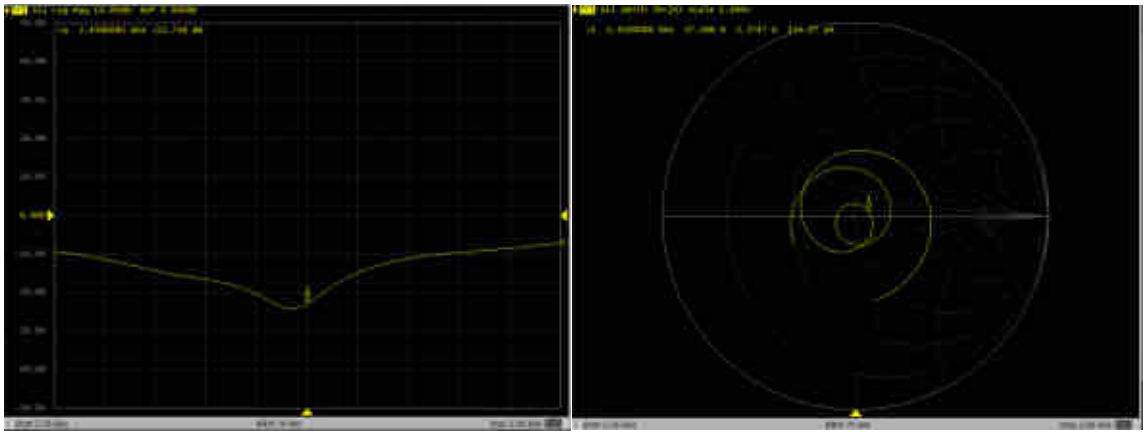
2450V2 – serial no. 908												
	2450 Head						2450 Body					
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2019.3.25	-21.6		57.3		5.2		-24.1		52.6		5.8	
2020.3.24	-22.7	-0.05	57.5	-0.18	2.4	2.81	-26.1	-0.08	55.01	-2.40	1.493	4.32

<Justification of the extended calibration>

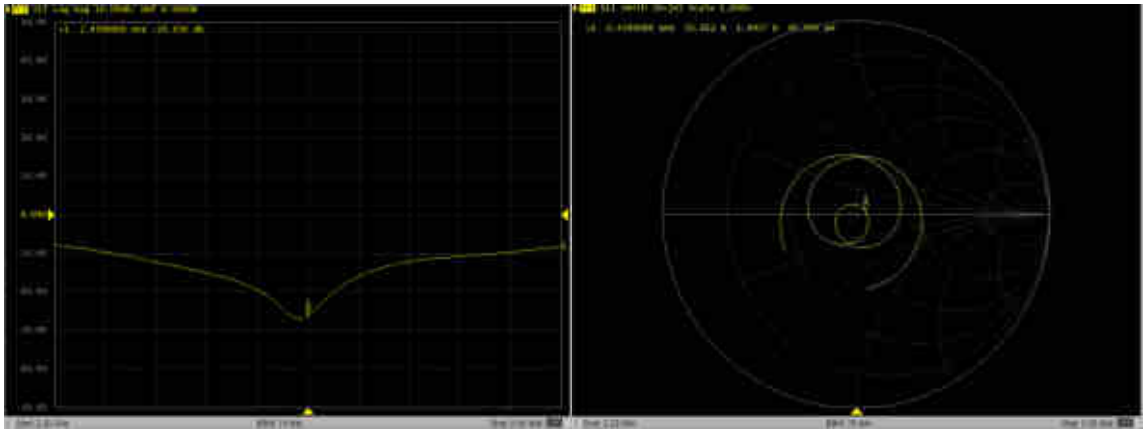
The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data> D2450V2, serial no. 908

2450MHz – Head



2450MHz – Body



SPORTON INTERNATIONAL (KUNSHAN) INC.
TEL : 86-0512-5790-0158
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Calibration Laboratory of
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Accreditation No.: SCS 0108

Client **Sporton**

Certificate No: D2600V2-1061_Nov20

CALIBRATION CERTIFICATE

Object: D2600V2 - SN:1061

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

Calibration date: November 26, 2020

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: 7405	29-Jun-20 (No. EX3-7405_Jun20)	Jun-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: November 26, 2020

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	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	37.6 ± 6 %	2.03 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	14.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**56.6 W/kg ± 17.0 % (k=2)**

SAR averaged over 10 cm^3 (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.37 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	**25.1 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	55.6 Ω - 2.3 jΩ
Return Loss	- 24.8 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

Date: 26.11.2020

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN:1061

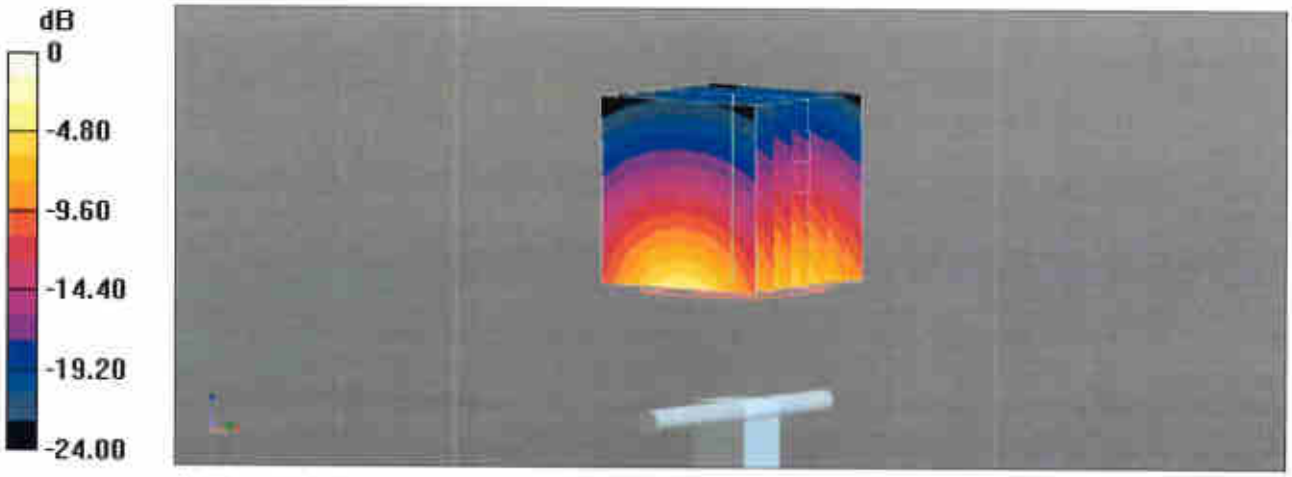
Communication System: UID 0 - CW; Frequency: 2600 MHz
Medium parameters used: f = 2600 MHz; σ = 2.03 S/m; ε_r = 37.6; ρ = 1000 kg/m^3
Phantom section: Flat Section
Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

- Probe: EX3DV4 - SN7405; ConvF(7.54, 7.54, 7.54) @ 2600 MHz; Calibrated: 29.06.2020
- 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)

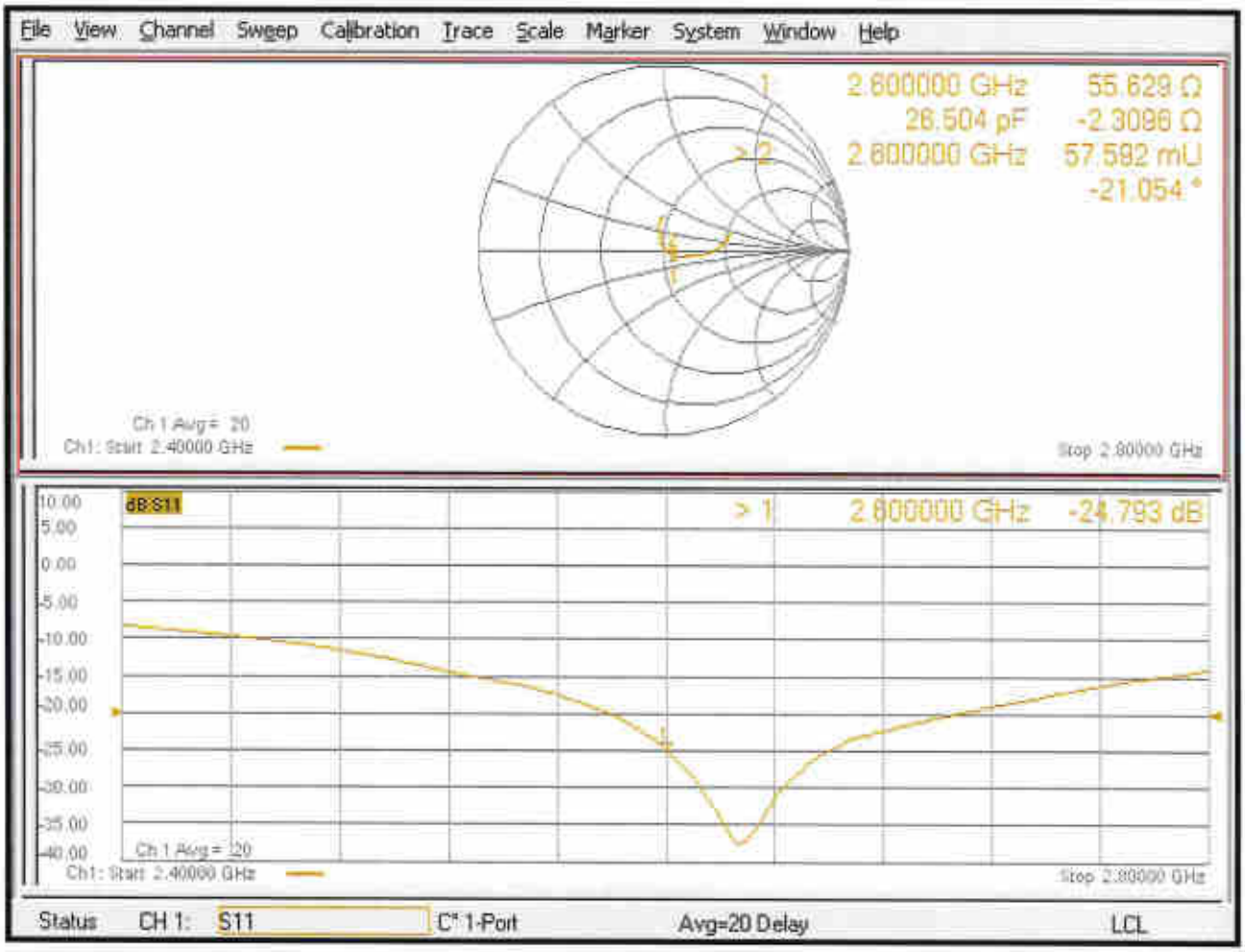
Dipole Calibration for Head Tissue/Pin=250 mW, d=10mm/Zoom Scan (7x7x7)/Cube 0:

Measurement grid: dx=5mm, dy=5mm, dz=5mm
Reference Value = 119.2 V/m; Power Drift = -0.04 dB
Peak SAR (extrapolated) = 30.9 W/kg
SAR(1 g) = 14.5 W/kg; SAR(10 g) = 6.37 W/kg
Smallest distance from peaks to all points 3 dB below = 8.9 mm
Ratio of SAR at M2 to SAR at M1 = 47%
Maximum value of SAR (measured) = 25.0 W/kg



0 dB = 25.0 W/kg = 13.98 dBW/kg

Impedance Measurement Plot for Head TSL



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IMPORTANT NOTICE

USAGE OF THE DAE4

The DAE unit is a delicate, high precision instrument and requires careful treatment by the user. There are no serviceable parts inside the DAE. Special attention shall be given to the following points:

Battery Exchange: The battery cover of the DAE4 unit is fixed using a screw, over tightening the screw may cause the threads inside the DAE to wear out.

Shipping of the DAE: Before shipping the DAE to SPEAG for calibration, remove the batteries and pack the DAE in an antistatic bag. This antistatic bag shall then be packed into a larger box or container which protects the DAE from impacts during transportation. The package shall be marked to indicate that a fragile instrument is inside.

E-Stop Failures: Touch detection may be malfunctioning due to broken magnets in the E-stop. Rough handling of the E-stop may lead to damage of these magnets. Touch and collision errors are often caused by dust and dirt accumulated in the E-stop. To prevent E-stop failure, the customer shall always mount the probe to the DAE carefully and keep the DAE unit in a non-dusty environment if not used for measurements.

Repair: Minor repairs are performed at no extra cost during the annual calibration. However, SPEAG reserves the right to charge for any repair especially if rough unprofessional handling caused the defect.

DASY Configuration Files: Since the exact values of the DAE input resistances, as measured during the calibration procedure of a DAE unit, are not used by the DASY software, a nominal value of 200 MOhm is given in the corresponding configuration file.

Important Note:
Warranty and calibration is void if the DAE unit is disassembled partly or fully by the Customer.

Important Note:
Never attempt to grease or oil the E-stop assembly. Cleaning and readjusting of the E-stop assembly is allowed by certified SPEAG personnel only and is part of the annual calibration procedure.

Important Note:
To prevent damage of the DAE probe connector pins, use great care when installing the probe to the DAE. Carefully connect the probe with the connector notch oriented in the mating position. Avoid any rotational movement of the probe body versus the DAE while turning the locking nut of the connector. The same care shall be used when disconnecting the probe from the DAE.

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Accreditation No.: SCS 0108

Client Sporton

Certificate No: DAE4-1279_Aug20

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BM - SN: 1279
Calibration procedure(s)	QA CAL-06.v30 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	August 25, 2020

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
Keithley Multimeter Type 2001	SN: 0810278	03-Sep-19 (No:25949)	Sep-20
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	09-Jan-20 (in house check)	In house check: Jan-21
Calibrator Box V2.1	SE UMS 006 AA 1002	09-Jan-20 (in house check)	In house check: Jan-21

	Name	Function	Signature
Calibrated by:	Dominique Steffen	Laboratory Technician	
Approved by:	Sven Kühn	Deputy Manager	

Issued: August 25, 2020

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	403.992 ± 0.02% (k=2)	403.936 ± 0.02% (k=2)	404.671 ± 0.02% (k=2)
Low Range	3.98386 ± 1.50% (k=2)	3.98923 ± 1.50% (k=2)	3.99029 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	114.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	199992.98	-3.60	-0.00
Channel X	+ Input	20004.41	2.27	0.01
Channel X	- Input	-20000.14	1.42	-0.01
Channel Y	+ Input	199993.98	-2.71	-0.00
Channel Y	+ Input	20004.10	2.00	0.01
Channel Y	- Input	-20002.55	-0.86	0.00
Channel Z	+ Input	199996.29	-0.02	-0.00
Channel Z	+ Input	20001.83	-0.15	-0.00
Channel Z	- Input	-20002.45	-0.66	0.00

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2001.76	0.43	0.02
Channel X	+ Input	201.97	0.41	0.20
Channel X	- Input	-197.75	0.55	-0.28
Channel Y	+ Input	2001.59	0.39	0.02
Channel Y	+ Input	201.77	0.37	0.18
Channel Y	- Input	-198.61	-0.14	0.07
Channel Z	+ Input	2001.73	0.62	0.03
Channel Z	+ Input	202.53	1.20	0.60
Channel Z	- Input	-198.78	-0.27	0.13

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-18.13	-19.89
	- 200	20.83	19.81
Channel Y	200	5.56	5.45
	- 200	-5.67	-5.95
Channel Z	200	6.42	6.28
	- 200	-7.70	-7.94

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	3.63	-3.17
Channel Y	200	8.74	-	3.69
Channel Z	200	9.20	7.14	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	15970	16495
Channel Y	15941	15166
Channel Z	15692	14666

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.79	-0.20	1.79	0.42
Channel Y	-0.22	-1.72	0.62	0.46
Channel Z	0.74	-0.45	2.00	0.50

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	–0.01	-8	-9

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Accreditation No.: SCS 0108

Client Sporton

Certificate No: DAE4-1303_Jul20

CALIBRATION CERTIFICATE

Object	DAE4 - SD 000 D04 BO - SN: 1303
Calibration procedure(s)	QA CAL-06.v30 Calibration procedure for the data acquisition electronics (DAE)
Calibration date:	July 07, 2020

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
Keithley Multimeter Type 2001	SN: 0810278	03-Sep-19 (No:25949)	Sep-20
Secondary Standards	**ID #**	**Check Date (in house)**	**Scheduled Check**
Auto DAE Calibration Unit	SE UWS 053 AA 1001	09-Jan-20 (in house check)	In house check: Jan-21
Calibrator Box V2.1	SE UMS 006 AA 1002	09-Jan-20 (in house check)	In house check: Jan-21

	Name	Function	Signature
Calibrated by:	Eric Hainfeld	Laboratory Technician	
Approved by:	Sven Kühn	Deputy Manager	

Issued: July 7, 2020

Glossary

DAE	data acquisition electronics
Connector angle	information used in DASY system to align probe sensor X to the robot coordinate system.

Methods Applied and Interpretation of Parameters

- *DC Voltage Measurement:* Calibration Factor assessed for use in DASY system by comparison with a calibrated instrument traceable to national standards. The figure given corresponds to the full scale range of the voltmeter in the respective range.
- *Connector angle*: The angle of the connector is assessed measuring the angle mechanically by a tool inserted. Uncertainty is not required.
- The following parameters as documented in the Appendix contain technical information as a result from the performance test and require no uncertainty.
  - *DC Voltage Measurement Linearity:* Verification of the Linearity at +10% and -10% of the nominal calibration voltage. Influence of offset voltage is included in this measurement.
  - *Common mode sensitivity:* Influence of a positive or negative common mode voltage on the differential measurement.
  - *Channel separation:* Influence of a voltage on the neighbor channels not subject to an input voltage.
  - *AD Converter Values with inputs shorted:* Values on the internal AD converter corresponding to zero input voltage
  - *Input Offset Measurement*: Output voltage and statistical results over a large number of zero voltage measurements.
  - *Input Offset Current:* Typical value for information; Maximum channel input offset current, not considering the input resistance.
  - *Input resistance:* Typical value for information: DAE input resistance at the connector, during internal auto-zeroing and during measurement.
  - *Low Battery Alarm Voltage:* Typical value for information. Below this voltage, a battery alarm signal is generated.
  - *Power consumption:* Typical value for information. Supply currents in various operating modes.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range:	1LSB =	6.1μV ,	full range =	-100...+300 mV
Low Range:	1LSB =	61nV ,	full range =	-1.....+3mV

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

Calibration Factors	X	Y	Z
High Range	405.621 ± 0.02% (k=2)	405.288 ± 0.02% (k=2)	405.521 ± 0.02% (k=2)
Low Range	3.95970 ± 1.50% (k=2)	4.00177 ± 1.50% (k=2)	4.00559 ± 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	36.0 ° ± 1 °

Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	200028.13	-4.41	-0.00
Channel X	+ Input	20005.33	0.15	0.00
Channel X	- Input	-20003.94	1.66	-0.01
Channel Y	+ Input	200034.95	3.01	0.00
Channel Y	+ Input	20004.62	-0.42	-0.00
Channel Y	- Input	-20006.63	-0.88	0.00
Channel Z	+ Input	200029.72	-2.88	-0.00
Channel Z	+ Input	20001.10	-3.93	-0.02
Channel Z	- Input	-20007.10	-1.35	0.01

Low Range		Reading (μV)	Difference (μV)	Error (%)
Channel X	+ Input	2000.83	-0.06	-0.00
Channel X	+ Input	201.48	0.52	0.26
Channel X	- Input	-198.72	0.43	-0.22
Channel Y	+ Input	2000.87	0.12	0.01
Channel Y	+ Input	199.93	-0.88	-0.44
Channel Y	- Input	-199.89	-0.62	0.31
Channel Z	+ Input	2000.93	0.20	0.01
Channel Z	+ Input	200.16	-0.59	-0.30
Channel Z	- Input	-199.91	-0.57	0.28

2. Common mode sensitivity

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-2.91	-4.53
	- 200	5.99	4.24
Channel Y	200	1.24	1.13
	- 200	-2.94	-3.20
Channel Z	200	-1.62	-1.40
	- 200	-0.52	-0.26

3. Channel separation

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	Input Voltage (mV)	Channel X (μV)	Channel Y (μV)	Channel Z (μV)
Channel X	200	-	0.82	-4.08
Channel Y	200	7.63	-	2.53
Channel Z	200	10.14	5.17	-

4. AD-Converter Values with inputs shorted

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec

	High Range (LSB)	Low Range (LSB)
Channel X	16198	15926
Channel Y	15904	15641
Channel Z	16229	15177

5. Input Offset Measurement

DASY measurement parameters: Auto Zero Time: 3 sec; Measuring time: 3 sec
Input 10MΩ

	Average (μV)	min. Offset (μV)	max. Offset (μV)	Std. Deviation (μV)
Channel X	0.70	-0.97	2.67	0.58
Channel Y	-0.62	-1.86	0.89	0.42
Channel Z	-0.13	-1.67	0.85	0.41

6. Input Offset Current

Nominal Input circuitry offset current on all channels: <25fA

7. Input Resistance (Typical values for information)

	Zeroing (kOhm)	Measuring (MOhm)
Channel X	200	200
Channel Y	200	200
Channel Z	200	200

8. Low Battery Alarm Voltage (Typical values for information)

Typical values	Alarm Level (VDC)
Supply (+ Vcc)	+7.9
Supply (- Vcc)	-7.6

9. Power Consumption (Typical values for information)

Typical values	Switched off (mA)	Stand by (mA)	Transmitting (mA)
Supply (+ Vcc)	+0.01	+6	+14
Supply (- Vcc)	-0.01	-8	-9

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Accreditation No.: SCS 0108

Client Sporton

Certificate No: ES3-3293_Sep20

CALIBRATION CERTIFICATE

Object: ES3DV3 - SN:3293

Calibration procedure(s): QA CAL-01.v9, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

Calibration date: September 23, 2020

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: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

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

Issued: September 29, 2020

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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
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

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"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3293

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	1.10	0.90	0.73	± 10.1 %
DCP (mV)[B]	102.3	109.5	106.9	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max dev.	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	199.2	± 3.5 %	± 4.7 %
		Y	0.0	0.0	1.0		179.4		
		Z	0.0	0.0	1.0		183.6		

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%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 5).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3293

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-5.0
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	10 mm
Tip Diameter	4 mm
Probe Tip to Sensor X Calibration Point	2 mm
Probe Tip to Sensor Y Calibration Point	2 mm
Probe Tip to Sensor Z Calibration Point	2 mm
Recommended Measurement Distance from Surface	3 mm

Note: Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3293

Calibration Parameter Determined in Head Tissue Simulating Media

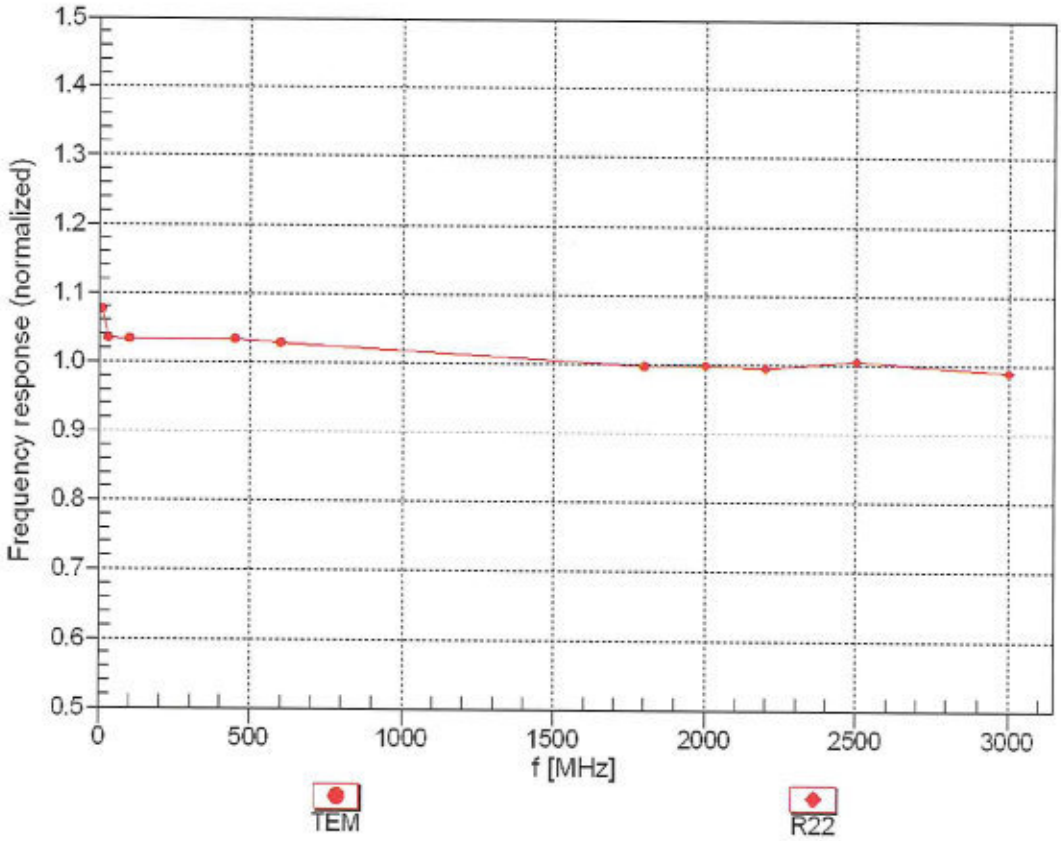
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	6.51	6.51	6.51	0.80	1.18	± 12.0 %
835	41.5	0.90	6.43	6.43	6.43	0.78	1.16	± 12.0 %
900	41.5	0.97	6.24	6.24	6.24	0.80	1.18	± 12.0 %
1750	40.1	1.37	5.37	5.37	5.37	0.63	1.28	± 12.0 %
1900	40.0	1.40	5.14	5.14	5.14	0.50	1.44	± 12.0 %
2000	40.0	1.40	5.11	5.11	5.11	0.72	1.25	± 12.0 %
2300	39.5	1.67	4.81	4.81	4.81	0.65	1.34	± 12.0 %
2450	39.2	1.80	4.51	4.51	4.51	0.57	1.50	± 12.0 %
2600	39.0	1.96	4.38	4.38	4.38	0.80	1.23	± 12.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies below 3 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. At frequencies above 3 GHz, the validity of tissue parameters (ε and σ) is restricted to ± 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

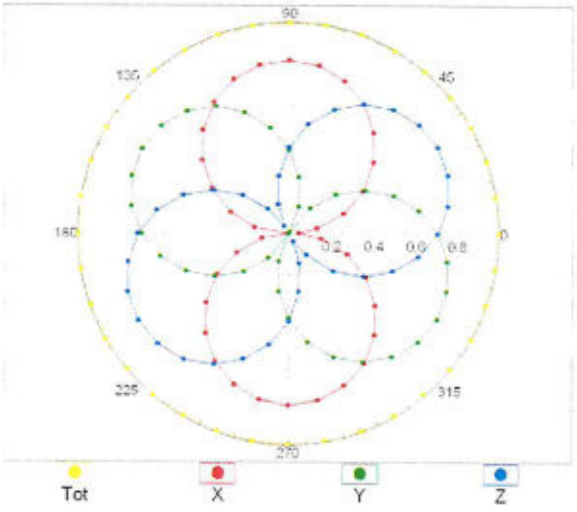
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



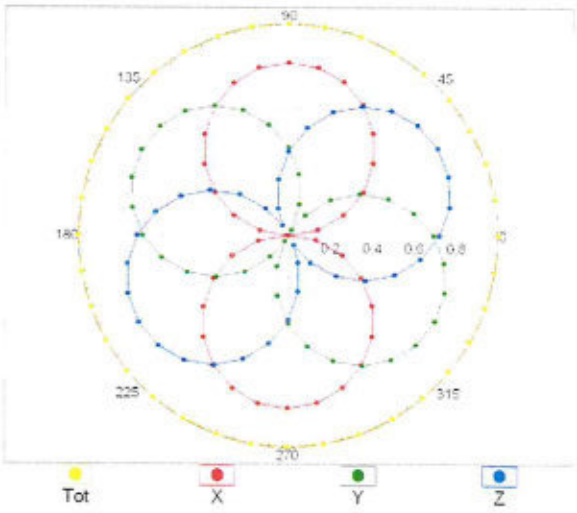
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

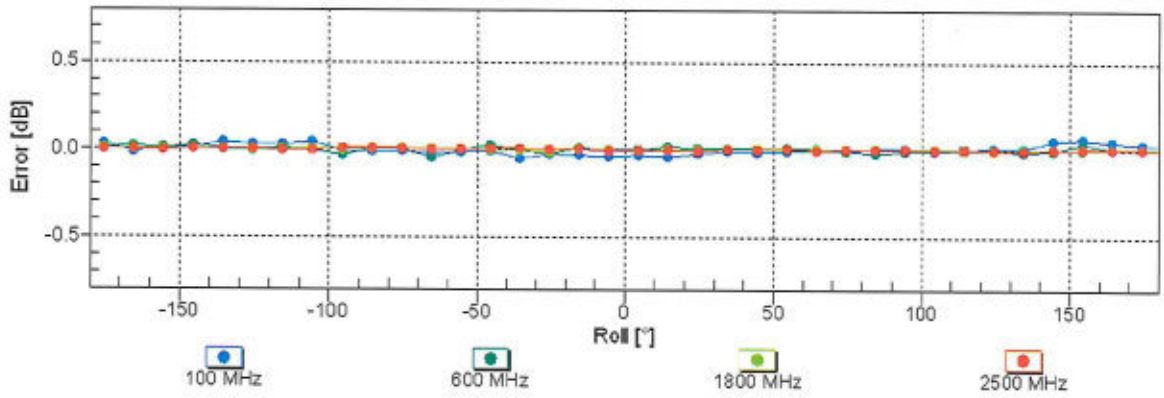
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



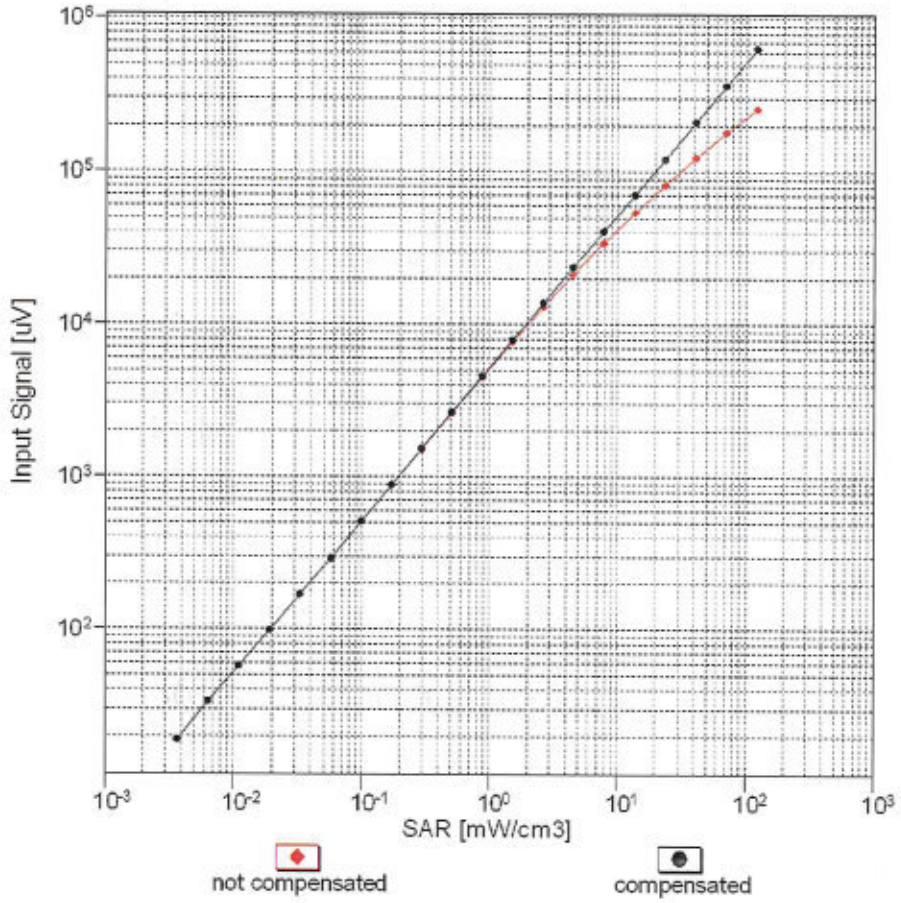
f=1800 MHz,R22

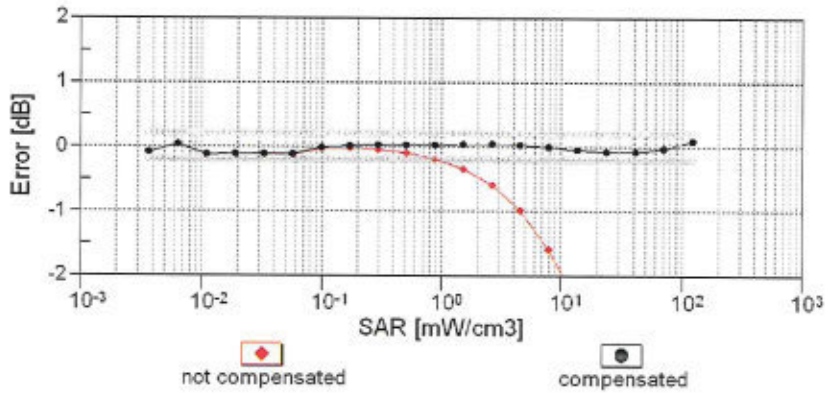




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

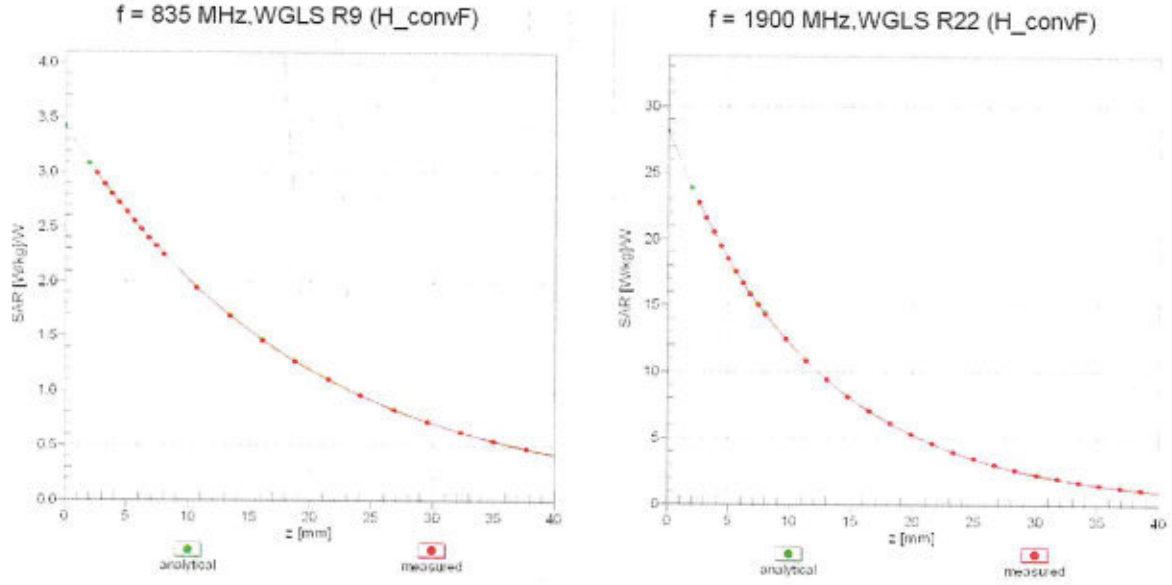
Dynamic Range f(SAR$_{head}$)
(TEM cell , f_{eval}= 1900 MHz)





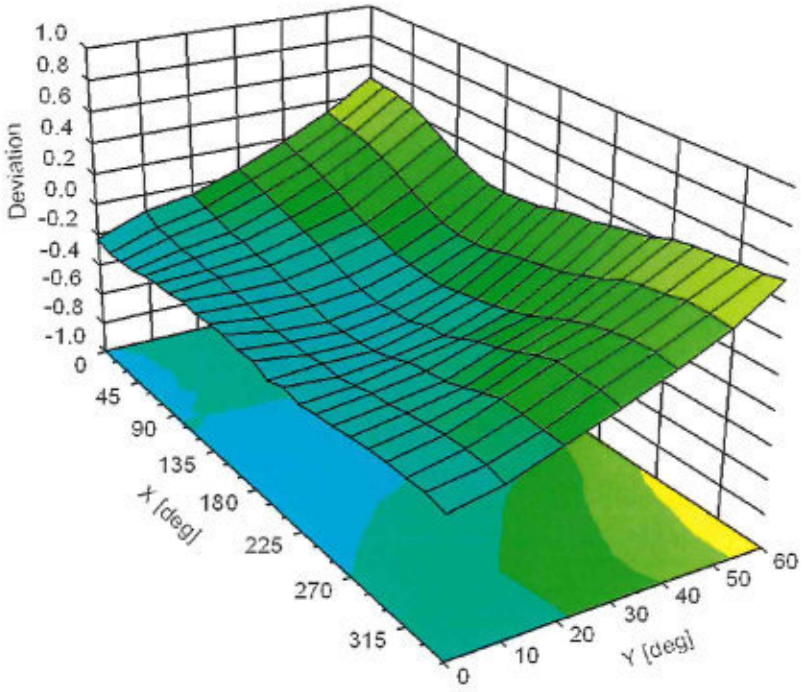
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

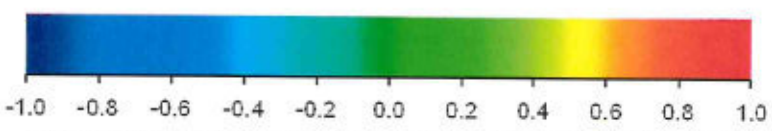
Conversion Factor Assessment



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

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Accreditation No.: SCS 0108

Client Sporton

Certificate No: EX3-3857_Sep20

CALIBRATION CERTIFICATE

Object: EX3DV4 - SN:3857

Calibration procedure(s): QA CAL-01.v9, QA CAL-14.v6, QA CAL-23.v5, QA CAL-25.v7
Calibration procedure for dosimetric E-field probes

Calibration date: September 25, 2020

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: CC2552 (20x)	31-Mar-20 (No. 217-03106)	Apr-21
DAE4	SN: 660	27-Dec-19 (No. DAE4-660_Dec19)	Dec-20
Reference Probe ES3DV2	SN: 3013	31-Dec-19 (No. ES3-3013_Dec19)	Dec-20
Secondary Standards	ID	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB41293874	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-20)	In house check: Jun-22
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-20)	In house check: Jun-22
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-19)	In house check: Oct-20

	Name	Function	Signature
Calibrated by:	Leif Klysner	Laboratory Technician	
Approved by:	Katja Pokovic	Technical Manager	

Issued: September 30, 2020

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Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
NORMx,y,z	sensitivity in free space
ConvF	sensitivity in TSL / NORMx,y,z
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization φ	φ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., ϑ = 0 is normal to probe axis
Connector Angle	information used in DASY system to align probe sensor X to the robot coordinate system

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"

Methods Applied and Interpretation of Parameters:

- *NORMx,y,z:* Assessed for E-field polarization ϑ = 0 (f ≤ 900 MHz in TEM-cell; f > 1800 MHz: R22 waveguide). NORMx,y,z are only intermediate values, i.e., the uncertainties of NORMx,y,z does not affect the E^2-field uncertainty inside TSL (see below *ConvF*).
- *NORM(f)x,y,z = NORMx,y,z * frequency_response* (see Frequency Response Chart). This linearization is implemented in DASY4 software versions later than 4.2. The uncertainty of the frequency response is included in the stated uncertainty of *ConvF*.
- *DCPx,y,z:* DCP are numerical linearization parameters assessed based on the data of power sweep with CW signal (no uncertainty required). DCP does not depend on frequency nor media.
- *PAR:* PAR is the Peak to Average Ratio that is not calibrated but determined based on the signal characteristics
- *Ax,y,z; Bx,y,z; Cx,y,z; Dx,y,z; VRx,y,z: A, B, C, D* are numerical linearization parameters assessed based on the data of power sweep for specific modulation signal. The parameters do not depend on frequency nor media. *VR* is the maximum calibration range expressed in RMS voltage across the diode.
- *ConvF and Boundary Effect Parameters:* Assessed in flat phantom using E-field (or Temperature Transfer Standard for f ≤ 800 MHz) and inside waveguide using analytical field distributions based on power measurements for f > 800 MHz. The same setups are used for assessment of the parameters applied for boundary compensation (alpha, depth) of which typical uncertainty values are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to *NORMx,y,z * ConvF* whereby the uncertainty corresponds to that given for *ConvF*. A frequency dependent *ConvF* is used in DASY version 4.4 and higher which allows extending the validity from ± 50 MHz to ± 100 MHz.
- *Spherical isotropy (3D deviation from isotropy)*: in a field of low gradients realized using a flat phantom exposed by a patch antenna.
- *Sensor Offset*: The sensor offset corresponds to the offset of virtual measurement center from the probe tip (on probe axis). No tolerance required.
- *Connector Angle*: The angle is assessed using the information gained by determining the *NORMx* (no uncertainty required).

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3857

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu V/(V/m)^2$)[A]	0.18	0.43	0.46	± 10.1 %
DCP (mV)[B]	99.3	100.5	102.2	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	C	D dB	VR mV	Max dev.	Unc[E] (k=2)
0	CW	X	0.0	0.0	1.0	0.00	182.0	± 3.0 %	± 4.7 %
		Y	0.0	0.0	1.0		178.6		
		Z	0.0	0.0	1.0		188.1		

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%.

[A] The uncertainties of Norm X,Y,Z do not affect the E^2-field uncertainty inside TSL (see Page 5).
[B] Numerical linearization parameter: uncertainty not required.
[E] Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3857

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	-118.9
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disabled
Probe Overall Length	337 mm
Probe Body Diameter	10 mm
Tip Length	9 mm
Tip Diameter	2.5 mm
Probe Tip to Sensor X Calibration Point	1 mm
Probe Tip to Sensor Y Calibration Point	1 mm
Probe Tip to Sensor Z Calibration Point	1 mm
Recommended Measurement Distance from Surface	1.4 mm

Note: Measurement distance from surface can be increased to 3-4 mm for an *Area Scan* job.

DASY/EASY - Parameters of Probe: EX3DV4 - SN:3857

Calibration Parameter Determined in Head Tissue Simulating Media

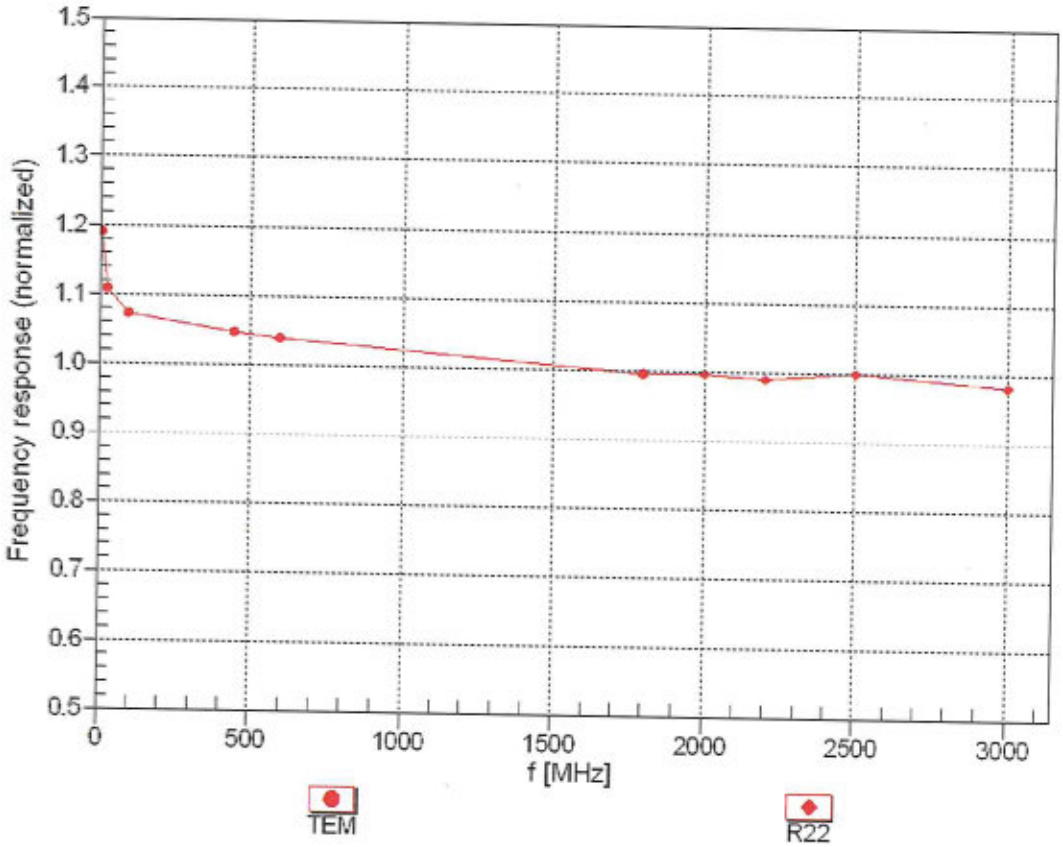
f (MHz) [C]	Relative Permittivity [F]	Conductivity (S/m) [F]	ConvF X	ConvF Y	ConvF Z	Alpha [G]	Depth [G] (mm)	Unc (k=2)
750	41.9	0.89	9.50	9.50	9.50	0.32	0.99	± 12.0 %
835	41.5	0.90	9.18	9.18	9.18	0.45	0.80	± 12.0 %
900	41.5	0.97	9.10	9.10	9.10	0.47	0.80	± 12.0 %
1750	40.1	1.37	8.06	8.06	8.06	0.27	0.86	± 12.0 %
1900	40.0	1.40	7.81	7.81	7.81	0.37	0.86	± 12.0 %
2000	40.0	1.40	7.78	7.78	7.78	0.40	0.86	± 12.0 %
2300	39.5	1.67	7.56	7.56	7.56	0.31	0.92	± 12.0 %
2450	39.2	1.80	7.44	7.44	7.44	0.40	0.92	± 12.0 %
2600	39.0	1.96	7.19	7.19	7.19	0.37	0.92	± 12.0 %
3300	38.2	2.71	6.70	6.70	6.70	0.30	1.35	± 14.0 %
3500	37.9	2.91	6.67	6.67	6.67	0.30	1.35	± 14.0 %
3700	37.7	3.12	6.61	6.61	6.61	0.30	1.35	± 14.0 %
3900	37.5	3.32	6.58	6.58	6.58	0.40	1.50	± 14.0 %
4100	37.2	3.53	6.08	6.08	6.08	0.35	1.50	± 14.0 %
4200	37.1	3.63	5.99	5.99	5.99	0.35	1.50	± 14.0 %
4400	36.9	3.84	5.93	5.93	5.93	0.35	1.70	± 14.0 %
4600	36.7	4.04	5.91	5.91	5.91	0.40	1.70	± 14.0 %
4800	36.4	4.25	5.76	5.76	5.76	0.40	1.80	± 14.0 %
4950	36.3	4.40	5.45	5.45	5.45	0.40	1.80	± 14.0 %
5250	35.9	4.71	5.04	5.04	5.04	0.40	1.80	± 14.0 %
5600	35.5	5.07	4.67	4.67	4.67	0.40	1.80	± 14.0 %
5750	35.4	5.22	4.93	4.93	4.93	0.40	1.80	± 14.0 %

[C] Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 150 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

[F] At frequencies up to 6 GHz, the validity of tissue parameters (ε and σ) can be relaxed to ± 10% if liquid compensation formula is applied to measured SAR values. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

[G] Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the boundary.

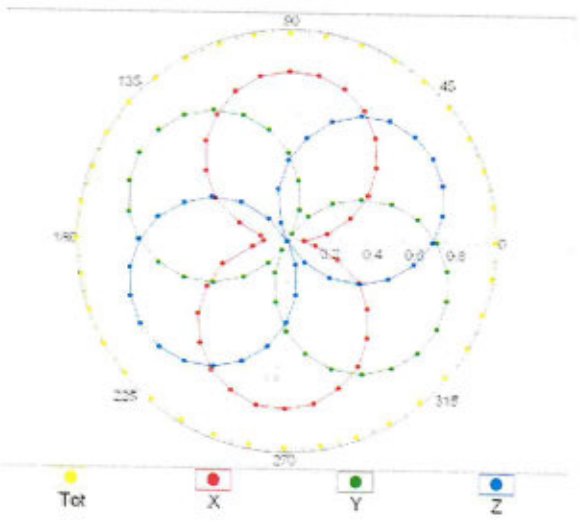
Frequency Response of E-Field
(TEM-Cell:ifi110 EXX, Waveguide: R22)



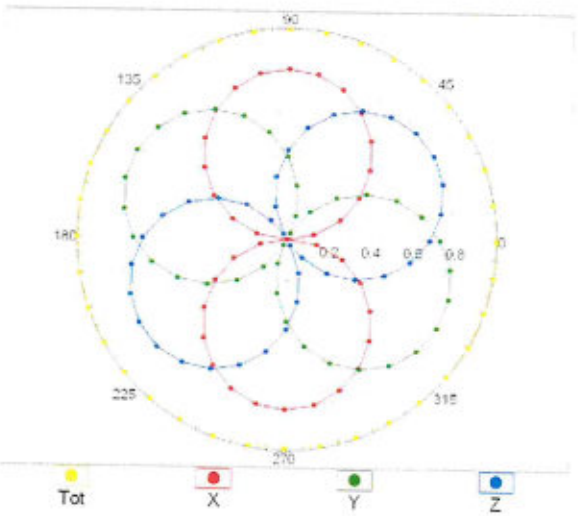
Uncertainty of Frequency Response of E-field: ± 6.3% (k=2)

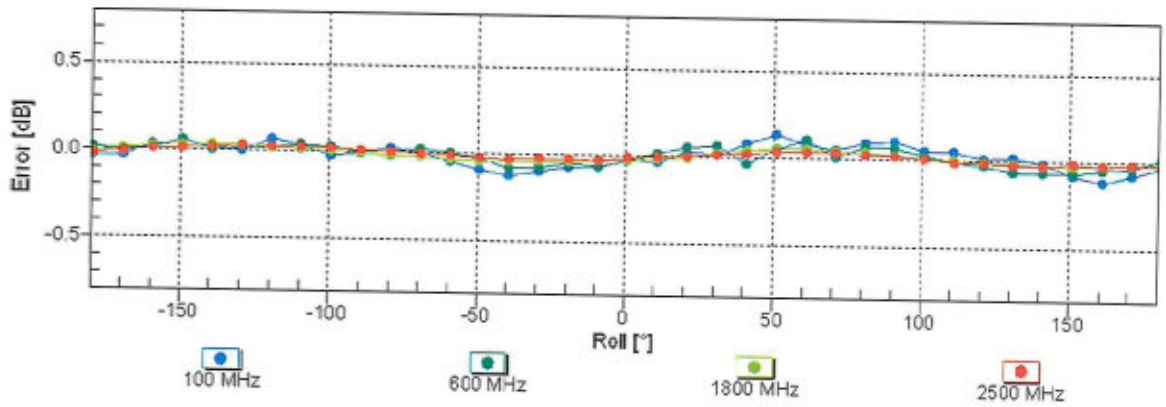
Receiving Pattern (ϕ), ϑ = 0°

f=600 MHz,TEM



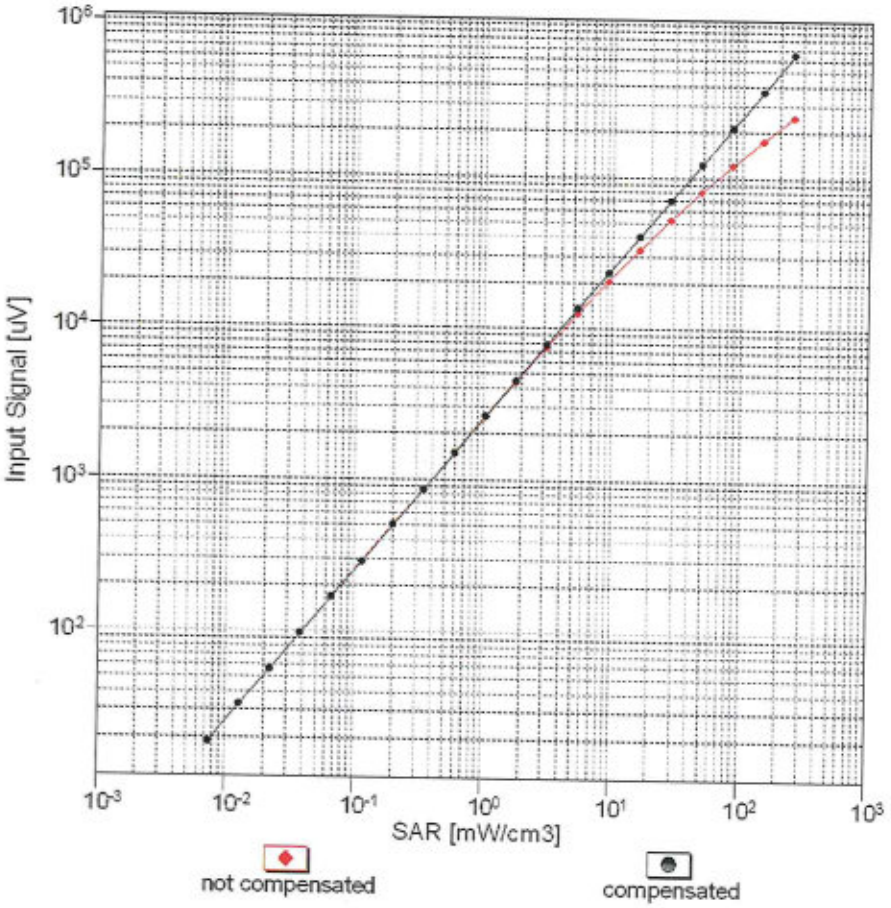
f=1800 MHz,R22

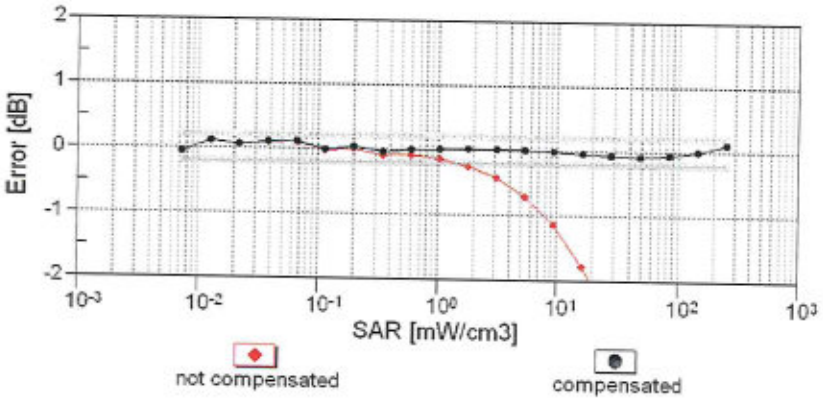




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

Dynamic Range f(SAR$_{head}$)
(TEM cell , f_{eval}= 1900 MHz)

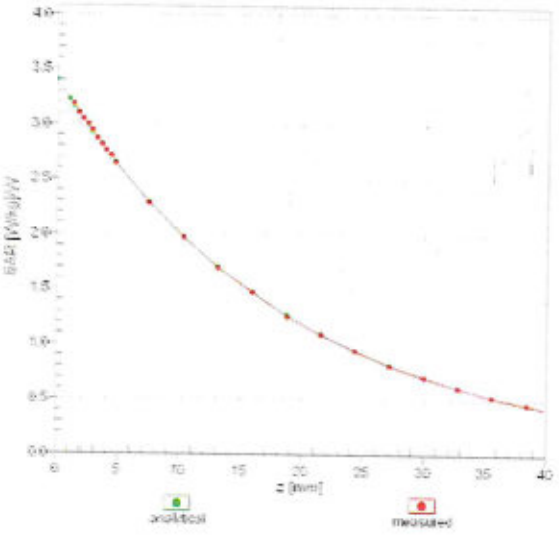




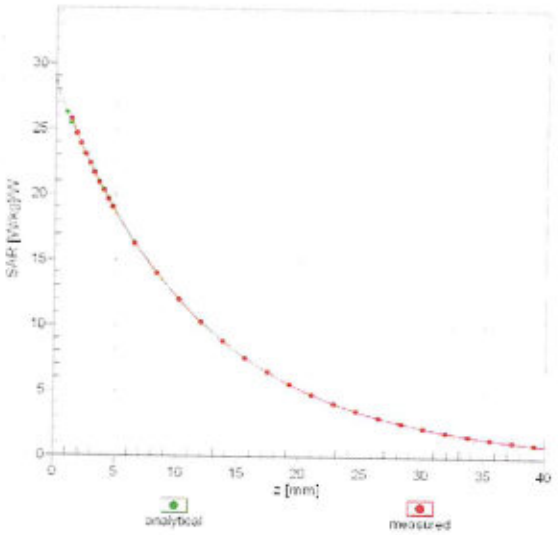
Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment

f = 835 MHz.WGLS R9 (H_convF)

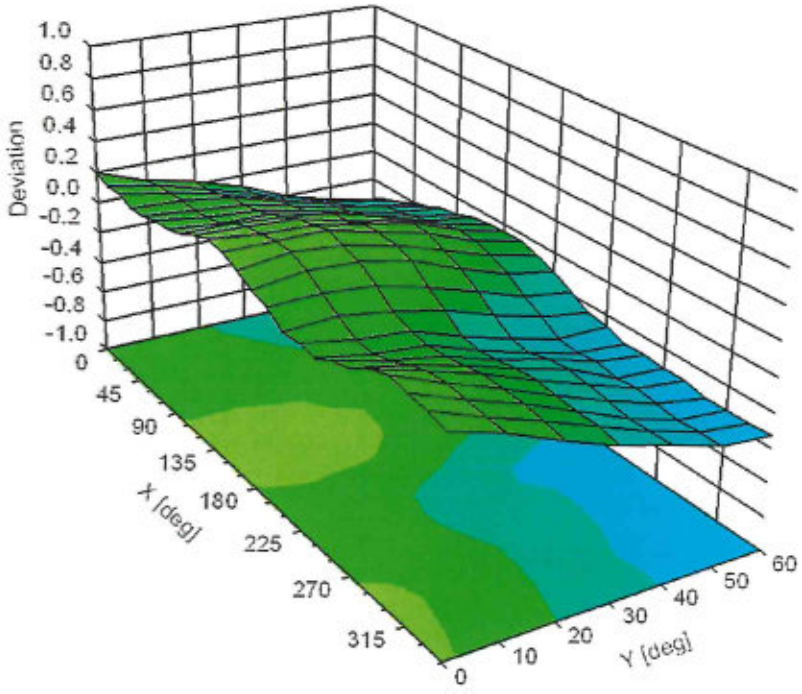


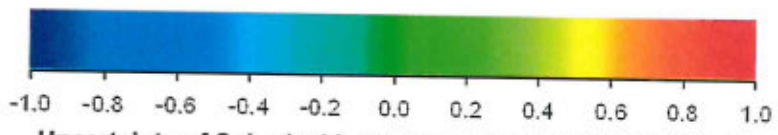
f = 1900 MHz.WGLS R22 (H_convF)



Deviation from Isotropy in Liquid

Error (ϕ, ϑ), f = 900 MHz





Uncertainty of Spherical Isotropy Assessment: ± 2.6% (k=2)

Appendix E. Conducted RF Output Power Table

The detailed power table are shown as follows.

Receiver On / Receiver Off / Hotspot On / Extremity

GSM850	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	128	189	251		128	189	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GSM 1 Tx slot	33.21	33.14	33.17	33.50	24.21	24.14	24.17	24.50
GPRS 1 Tx slot	33.19	33.13	33.16	33.50	24.19	24.13	24.16	24.50
GPRS 2 Tx slots	31.04	31.06	30.96	32.00	25.04	25.06	24.96	26.00
GPRS 3 Tx slots	29.19	29.22	29.21	30.50	24.93	24.96	24.95	26.24
GPRS 4 Tx slots	27.20	27.14	27.20	28.50	24.20	24.14	24.20	25.50
EDGE 1 Tx slot	25.65	25.60	25.50	26.50	16.65	16.60	16.50	17.50
EDGE 2 Tx slots	24.24	24.30	24.30	25.50	18.24	18.30	18.30	19.50
EDGE 3 Tx slots	21.60	21.72	21.64	22.50	17.34	17.46	17.38	18.24
EDGE 4 Tx slots	18.80	19.00	18.84	19.50	15.80	16.00	15.84	16.50

Receiver On / Receiver Off / Extremity

GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GSM 1 Tx slot	29.35	29.53	29.82	30.50	20.35	20.53	20.82	21.50
GPRS 1 Tx slot	29.34	29.51	29.81	30.50	20.34	20.51	20.81	21.50
GPRS 2 Tx slots	27.21	27.54	27.53	28.50	21.21	21.54	21.53	22.50
GPRS 3 Tx slots	25.68	25.79	25.97	26.50	21.42	21.53	21.71	22.24
GPRS 4 Tx slots	23.69	23.82	23.95	24.50	20.69	20.82	20.95	21.50
EDGE 1 Tx slot	28.31	27.96	27.85	28.50	19.31	18.96	18.85	19.50
EDGE 2 Tx slots	27.08	26.92	26.90	27.50	21.08	20.92	20.90	21.50
EDGE 3 Tx slots	25.13	24.67	24.68	25.50	20.87	20.41	20.42	21.24
EDGE 4 Tx slots	22.70	22.56	22.35	23.50	19.70	19.56	19.35	20.50

Receiver On **Receiver On** **Receiver On / Receiver Off / Hotspot On / Extremity**

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513		4132	4182	4233	
Rx Channel		9662	9800	9938		1537	1638	1738		4357	4407	4458	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6		826.4	836.4	846.6	
3GPP Rel 99	AMR 12.2Kbps	23.71	23.56	23.24	24.00	23.57	23.62	23.67	24.00	23.52	23.55	23.43	24.00
3GPP Rel 99	RMC 12.2Kbps	23.58	23.73	23.23	24.00	23.59	23.69	23.68	24.00	23.53	23.58	23.44	24.00
3GPP Rel 6	HSDPA Subtest-1	22.61	22.65	22.65	23.00	22.54	22.31	22.50	23.00	22.67	22.65	22.66	23.00
3GPP Rel 6	HSDPA Subtest-2	22.56	22.83	22.75	23.00	22.94	22.75	22.89	23.00	22.76	22.56	22.86	23.00
3GPP Rel 6	HSDPA Subtest-3	22.12	22.05	21.98	22.50	22.10	22.12	22.21	22.50	22.23	22.23	22.32	22.50
3GPP Rel 6	HSDPA Subtest-4	22.09	22.03	22.04	22.50	22.24	22.21	22.12	22.50	22.32	22.12	22.21	22.50
3GPP Rel 8	DC-HSDPA Subtest-1	22.58	22.63	22.61	23.00	22.52	22.27	22.47	23.00	22.63	22.62	22.64	23.00
3GPP Rel 8	DC-HSDPA Subtest-2	22.53	22.81	22.71	23.00	22.92	22.71	22.86	23.00	22.72	22.53	22.84	23.00
3GPP Rel 8	DC-HSDPA Subtest-3	22.09	22.03	21.94	22.50	22.08	22.08	22.18	22.50	22.19	22.20	22.30	22.50
3GPP Rel 8	DC-HSDPA Subtest-4	22.06	22.01	22.00	22.50	22.22	22.17	22.09	22.50	22.28	22.09	22.19	22.50
3GPP Rel 6	HSUPA Subtest-1	22.23	22.25	22.54	23.00	22.44	22.54	22.43	23.00	22.65	22.56	22.74	23.00
3GPP Rel 6	HSUPA Subtest-2	20.36	20.21	20.30	21.00	20.84	20.86	20.93	21.00	20.56	20.54	20.67	21.00
3GPP Rel 6	HSUPA Subtest-3	21.49	21.52	21.54	22.00	21.31	21.29	21.39	22.00	21.38	20.99	21.24	22.00
3GPP Rel 6	HSUPA Subtest-4	20.25	20.32	20.43	21.00	20.86	20.87	20.56	21.00	20.34	20.76	20.81	21.00
3GPP Rel 6	HSUPA Subtest-5	22.65	22.54	22.45	23.00	22.50	22.65	22.56	23.00	22.65	22.56	22.67	23.00
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	20.13	20.06	19.97	20.50	20.04	20.17	20.08	20.50	20.26	20.17	20.23	20.50

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Band 2 (1900MHz Band)
Part 24E
Receiver On / Receiver Off / Extremity

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	23.67	23.85	23.75		
20	QPSK	1	49	23.60	23.84	23.67	24	0
20	QPSK	1	99	23.72	23.64	23.52		
20	QPSK	50	0	22.59	22.96	22.72		
20	QPSK	50	24	22.70	22.93	22.72	23	1
20	QPSK	50	50	22.74	22.80	22.58		
20	QPSK	100	0	22.61	22.89	22.73		
20	16QAM	1	0	22.63	22.44	22.54		
20	16QAM	1	49	22.64	22.46	22.45	23	1
20	16QAM	1	99	22.76	22.34	22.50		
20	16QAM	50	0	21.46	21.46	21.25		
20	16QAM	50	24	21.23	21.55	21.31	22	2
20	16QAM	50	50	21.31	21.34	21.15		
20	16QAM	100	0	21.29	21.34	21.33		
20	64QAM	1	0	21.30	21.38	21.53		
20	64QAM	1	49	21.36	21.40	21.41	22	2
20	64QAM	1	99	21.50	21.27	21.17		
20	64QAM	50	0	20.58	20.68	20.46		
20	64QAM	50	24	20.40	20.66	20.47	21	3
20	64QAM	50	50	20.46	20.55	20.30		
20	64QAM	100	0	20.36	20.56	20.45		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	23.54	23.80	23.67		
15	QPSK	1	37	23.60	23.80	23.60	24	0
15	QPSK	1	74	23.72	23.62	23.44		
15	QPSK	36	0	22.67	22.96	22.79		
15	QPSK	36	20	22.63	22.97	22.64	23	1
15	QPSK	36	39	22.65	22.84	22.64		
15	QPSK	75	0	22.67	22.95	22.65		
15	16QAM	1	0	22.66	22.99	22.75		
15	16QAM	1	37	22.67	22.94	22.69	23	1
15	16QAM	1	74	22.78	22.76	22.53		
15	16QAM	36	0	21.48	21.46	21.31		
15	16QAM	36	20	21.44	21.64	21.25	22	2
15	16QAM	36	39	21.34	21.55	21.41		
15	16QAM	75	0	21.48	21.74	21.25		
15	64QAM	1	0	21.33	21.57	21.39		
15	64QAM	1	37	21.46	21.67	21.42	22	2
15	64QAM	1	74	21.38	21.38	21.22		
15	64QAM	36	0	20.71	20.76	20.44		
15	64QAM	36	20	20.65	20.76	20.49	21	3
15	64QAM	36	39	20.50	20.67	20.63		
15	64QAM	75	0	20.52	20.67	20.37		
Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	23.62	23.56	23.52		
10	QPSK	1	25	23.63	23.56	23.65	24	0
10	QPSK	1	49	23.61	23.54	23.65		
10	QPSK	25	0	22.60	22.86	22.65		
10	QPSK	25	12	22.67	22.99	22.60	23	1
10	QPSK	25	25	22.65	22.92	22.60		
10	QPSK	50	0	22.57	22.65	22.63		
10	16QAM	1	0	22.64	22.45	22.60		
10	16QAM	1	25	22.64	22.54	22.43	23	1
10	16QAM	1	49	22.66	22.85	22.57		
10	16QAM	25	0	21.56	21.47	21.23		
10	16QAM	25	12	21.60	21.54	21.34	22	2
10	16QAM	25	25	21.59	21.64	21.56		
10	16QAM	50	0	21.41	21.45	21.17		
10	64QAM	1	0	21.25	21.63	21.55		
10	64QAM	1	25	21.24	21.56	21.34	22	2
10	64QAM	1	49	21.29	21.46	21.34		
10	64QAM	25	0	20.61	20.77	20.51		
10	64QAM	25	12	20.47	20.66	20.40	21	3
10	64QAM	25	25	20.63	20.68	20.48		
10	64QAM	50	0	20.52	20.56	20.32		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	23.62	23.44	23.68		
5	QPSK	1	12	23.57	23.54	23.56	24	0
5	QPSK	1	24	23.63	23.78	23.54		
5	QPSK	12	0	22.53	22.76	22.63		
5	QPSK	12	7	22.51	22.96	22.64	23	1
5	QPSK	12	13	22.50	22.93	22.57		
5	QPSK	25	0	22.51	22.98	22.64		
5	16QAM	1	0	22.51	22.80	22.45		
5	16QAM	1	12	22.45	22.83	22.54	23	1
5	16QAM	1	24	22.43	22.72	22.41		
5	16QAM	12	0	21.37	21.79	21.45		
5	16QAM	12	7	21.41	21.53	21.47	22	2
5	16QAM	12	13	21.38	21.52	21.42		
5	16QAM	25	0	21.53	21.91	21.63		
5	64QAM	1	0	21.38	21.77	21.37		
5	64QAM	1	12	21.31	21.78	21.44	22	2
5	64QAM	1	24	21.40	21.52	21.35		
5	64QAM	12	0	20.54	20.65	20.62		
5	64QAM	12	7	20.40	20.75	20.62	21	3
5	64QAM	12	13	20.58	20.74	20.35		
5	64QAM	25	0	20.61	20.97	20.65		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	23.48	23.55	23.54		
3	QPSK	1	8	23.41	23.82	23.58	24	0
3	QPSK	1	14	23.65	23.83	23.60		
3	QPSK	8	0	22.56	23.00	22.68		
3	QPSK	8	4	22.65	22.78	22.66	23	1
3	QPSK	8	7	22.60	22.54	22.63		
3	QPSK	15	0	22.60	22.91	22.53		
3	16QAM	1	0	22.63	22.56	22.66		
3	16QAM	1	8	22.55	22.58	22.55	23	1
3	16QAM	1	14	22.50	22.60	22.50		
3	16QAM	8	0	21.45	21.80	21.56		
3	16QAM	8	4	21.42	21.50	21.48	22	2
3	16QAM	8	7	21.44	21.53	21.53		
3	16QAM	15	0	21.38	21.79	21.51		
3	64QAM	1	0	21.28	21.49	21.34		
3	64QAM	1	8	21.29	21.59	21.28	22	2
3	64QAM	1	14	21.21	21.54	21.26		
3	64QAM	8	0	20.42	20.88	20.53		
3	64QAM	8	4	20.41	20.62	20.57	21	3
3	64QAM	8	7	20.51	20.50	20.51		
3	64QAM	15	0	20.53	20.91	20.61		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	23.37	23.66	23.54		
1.4	QPSK	1	3	23.44	23.67	23.60		
1.4	QPSK	1	5	23.42	23.83	23.55	24	0
1.4	QPSK	3	0	23.51	23.56	23.59		
1.4	QPSK	3	1	23.57	23.56	23.63		
1.4	QPSK	3	3	23.53	23.78	23.67		
1.4	QPSK	6	0	22.59	22.93	22.65	23	1
1.4	16QAM	1	0	22.56	22.55	22.54		
1.4	16QAM	1	3	22.57	22.56	22.58		
1.4	16QAM	1	5	22.59	22.31	22.35	23	1
1.4	16QAM	3	0	22.27	22.50	22.25		
1.4	16QAM	3	1	22.32	22.38	22.30		
1.4	16QAM	3	3	22.29	22.38	22.30		
1.4	16QAM	6	0	21.01	21.32	21.09	22	2
1.4	64QAM	1	0	21.30	21.37	21.29		
1.4	64QAM	1	3	21.24	21.46	21.26		
1.4	64QAM	1	5	21.22	21.37	21.24	22	2
1.4	64QAM	3	0	21.17	21.45	21.32		
1.4	64QAM	3	1	21.17	21.34	21.34		
1.4	64QAM	3	3	21.18	21.43	21.37		
1.4	64QAM	6	0	20.44	20.91	20.46	21	3

Band 4 (AWS Band)
Part 27L (only on channel required)
Receiver On

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	23.20	23.33	23.15		
20	QPSK	1	49	23.13	23.15	23.27	24	0
20	QPSK	1	99	23.09	23.05	22.99		
20	QPSK	50	0	22.31	22.32	22.27		
20	QPSK	50	24	22.30	22.25	22.16	23	1
20	QPSK	50	50	22.22	22.18	22.26		
20	QPSK	100	0	22.21	22.29	22.17		
20	16QAM	1	0	22.29	22.29	22.43		
20	16QAM	1	49	22.23	22.22	22.38	23	1
20	16QAM	1	99	22.08	22.22	22.17		
20	16QAM	50	0	20.85	20.71	21.06		
20	16QAM	50	24	20.80	21.03	20.85	22	2
20	16QAM	50	50	20.73	20.81	20.75		
20	16QAM	100	0	20.83	21.03	20.84		
20	64QAM	1	0	21.02	20.97	21.21		
20	64QAM	1	49	20.94	20.93	21.14	22	2
20	64QAM	1	99	20.76	20.94	21.02		
20	64QAM	50	0	19.96	19.86	20.29		
20	64QAM	50	24	19.99	20.13	19.97	21	3
20	64QAM	50	50	19.85	19.93	19.94		
20	64QAM	100	0	19.96	20.16	19.94		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	23.19	23.18	23.23		
15	QPSK	1	37	23.17	23.07	23.32	24	0
15	QPSK	1	74	23.03	23.06	22.92		
15	QPSK	36	0	22.25	22.16	22.18		
15	QPSK	36	20	22.33	22.24	22.25	23	1
15	QPSK	36	39	22.25	22.12	22.20		
15	QPSK	75	0	22.28	22.23	22.25		
15	16QAM	1	0	22.24	22.11	22.23		
15	16QAM	1	37	22.33	22.20	22.23	23	1
15	16QAM	1	74	22.10	22.14	21.92		
15	16QAM	36	0	20.84	20.66	20.94		
15	16QAM	36	20	20.95	21.13	20.92	22	2
15	16QAM	36	39	21.15	20.85	20.80		
15	16QAM	75	0	20.88	21.08	20.81		
15	64QAM	1	0	20.92	20.85	20.97		
15	64QAM	1	37	21.06	20.94	21.03	22	2
15	64QAM	1	74	20.83	20.82	20.69		
15	64QAM	36	0	20.13	19.80	20.11		
15	64QAM	36	20	20.17	20.28	20.16	21	3
15	64QAM	36	39	20.26	20.06	19.99		
15	64QAM	75	0	19.99	20.20	19.93		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	23.21	23.30	23.29		
10	QPSK	1	25	23.20	23.12	23.17	24	0
10	QPSK	1	49	23.10	23.09	23.01		
10	QPSK	25	0	22.29	22.17	22.31		
10	QPSK	25	12	22.25	22.19	22.18	23	1
10	QPSK	25	25	22.31	22.26	22.05		
10	QPSK	50	0	22.20	22.22	22.27		
10	16QAM	1	0	22.14	22.28	22.06		
10	16QAM	1	25	22.09	22.09	21.97	23	1
10	16QAM	1	49	22.05	22.04	21.87		
10	16QAM	25	0	20.78	20.81	21.10		
10	16QAM	25	12	20.99	21.00	21.06	22	2
10	16QAM	25	25	21.08	20.94	20.88		
10	16QAM	50	0	20.86	21.02	20.89		
10	64QAM	1	0	21.15	20.96	20.99		
10	64QAM	1	25	20.98	21.12	21.00	22	2
10	64QAM	1	49	21.02	20.91	20.87		
10	64QAM	25	0	19.97	19.93	20.03		
10	64QAM	25	12	20.05	20.26	20.13	21	3
10	64QAM	25	25	19.97	20.02	19.92		
10	64QAM	50	0	19.96	20.24	20.03		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	23.20	23.28	22.96		
5	QPSK	1	12	23.18	23.27	22.89	24	0
5	QPSK	1	24	23.30	23.16	22.83		
5	QPSK	12	0	22.23	22.28	22.19		
5	QPSK	12	7	22.22	22.27	22.04	23	1
5	QPSK	12	13	22.27	22.20	22.11		
5	QPSK	25	0	22.25	22.25	22.13		
5	16QAM	1	0	22.11	22.08	22.09		
5	16QAM	1	12	22.08	22.06	22.00	23	1
5	16QAM	1	24	22.25	22.07	22.06		
5	16QAM	12	0	20.85	20.82	20.79		
5	16QAM	12	7	20.85	21.03	20.65	22	2
5	16QAM	12	13	20.84	21.09	20.63		
5	16QAM	25	0	20.95	20.98	20.60		
5	64QAM	1	0	21.08	20.94	20.91		
5	64QAM	1	12	21.08	21.11	20.97	22	2
5	64QAM	1	24	20.94	20.87	20.83		
5	64QAM	12	0	19.81	19.80	19.97		
5	64QAM	12	7	20.04	20.29	19.83	21	3
5	64QAM	12	13	20.04	20.25	19.84		
5	64QAM	25	0	20.08	20.29	19.90		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	23.22	23.20	22.97		
3	QPSK	1	8	23.20	23.14	23.00	24	0
3	QPSK	1	14	23.18	23.09	22.93		
3	QPSK	8	0	22.31	22.26	22.10		
3	QPSK	8	4	22.36	22.28	22.12	23	1
3	QPSK	8	7	22.33	22.26	22.11		
3	QPSK	15	0	22.31	22.25	22.03		
3	16QAM	1	0	22.28	22.24	21.97		
3	16QAM	1	8	22.27	22.26	22.25	23	1
3	16QAM	1	14	22.31	22.22	21.98		
3	16QAM	8	0	20.91	20.95	20.75		
3	16QAM	8	4	20.92	21.13	20.77	22	2
3	16QAM	8	7	20.94	21.19	20.96		
3	16QAM	15	0	20.91	21.18	20.95		
3	64QAM	1	0	21.02	21.03	21.12		
3	64QAM	1	8	20.88	20.96	21.07	22	2
3	64QAM	1	14	20.91	20.93	21.03		
3	64QAM	8	0	19.97	20.00	19.70		
3	64QAM	8	4	19.85	19.95	19.69	21	3
3	64QAM	8	7	19.99	19.98	19.52		
3	64QAM	15	0	20.00	20.28	19.88		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	23.17	23.17	22.95		
1.4	QPSK	1	3	23.25	23.17	22.92		
1.4	QPSK	1	5	23.20	23.14	22.84	24	0
1.4	QPSK	3	0	23.29	23.25	23.17		
1.4	QPSK	3	1	22.98	23.20	23.13		
1.4	QPSK	3	3	23.29	23.15	23.04		
1.4	QPSK	6	0	22.28	22.24	22.07	23	1
1.4	16QAM	1	0	22.22	22.17	22.24		
1.4	16QAM	1	3	22.24	22.28	22.20		
1.4	16QAM	1	5	22.27	22.07	22.21	23	1
1.4	16QAM	3	0	21.98	21.99	21.83		
1.4	16QAM	3	1	22.02	22.03	21.78		
1.4	16QAM	3	3	22.03	21.98	21.74		
1.4	16QAM	6	0	20.67	20.96	20.51	22	2
1.4	64QAM	1	0	20.97	20.90	21.11		
1.4	64QAM	1	3	21.04	21.18	21.04		
1.4	64QAM	1	5	20.94	20.92	21.04	22	2
1.4	64QAM	3	0	21.07	21.11	20.90		
1.4	64QAM	3	1	21.08	21.07	20.68		
1.4	64QAM	3	3	21.07	20.93	20.71		
1.4	64QAM	6	0	19.92	20.17	19.86	21	3

Band 5 (Celluar Band)
Part 22H(only on channel required)
Receiver On / Receiver Off / Hotspot On / Extremity

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20450	20525	20600		
Frequency (MHz)				829	836.5	844		
10	QPSK	1	0	23.73	23.79	23.61		
10	QPSK	1	25	23.77	23.71	23.54	24	0
10	QPSK	1	49	23.64	23.57	23.58		
10	QPSK	25	0	22.70	22.72	22.63		
10	QPSK	25	12	22.67	22.65	22.51	23	1
10	QPSK	25	25	22.67	22.59	22.61		
10	QPSK	50	0	22.55	22.66	22.44		
10	16QAM	1	0	22.31	22.53	22.49		
10	16QAM	1	25	22.65	22.48	22.40	23	1
10	16QAM	1	49	22.62	22.35	22.54		
10	16QAM	25	0	21.67	21.94	21.85		
10	16QAM	25	12	21.56	21.78	21.89	22	2
10	16QAM	25	25	21.65	21.84	21.54		
10	16QAM	50	0	21.82	21.66	21.65		
10	64QAM	1	0	21.55	21.66	21.63		
10	64QAM	1	25	21.62	21.65	21.47	22	2
10	64QAM	1	49	21.67	21.58	21.67		
10	64QAM	25	0	20.74	20.84	20.94		
10	64QAM	25	12	20.67	20.74	20.67	21	3
10	64QAM	25	25	20.98	20.73	20.96		
10	64QAM	50	0	20.70	20.85	20.61		
Channel				20425	20525	20625	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				826.5	836.5	846.5		
5	QPSK	1	0	23.61	23.62	23.63		
5	QPSK	1	12	23.61	23.57	23.68	24	0
5	QPSK	1	24	23.64	23.62	23.64		
5	QPSK	12	0	22.63	22.55	22.59		
5	QPSK	12	7	22.70	22.65	22.59	23	1
5	QPSK	12	13	22.73	22.62	22.57		
5	QPSK	25	0	22.67	22.59	22.47		
5	16QAM	1	0	22.54	22.60	22.56		
5	16QAM	1	12	22.77	22.66	22.38	23	1
5	16QAM	1	24	22.66	22.59	22.56		
5	16QAM	12	0	21.44	21.61	21.47		
5	16QAM	12	7	21.44	21.58	21.59	22	2
5	16QAM	12	13	21.50	21.53	21.55		
5	16QAM	25	0	21.61	21.80	21.47		
5	64QAM	1	0	21.58	21.76	21.52		
5	64QAM	1	12	21.73	21.56	21.63	22	2
5	64QAM	1	24	21.89	21.68	21.61		
5	64QAM	12	0	20.77	20.71	20.76		
5	64QAM	12	7	20.60	20.66	20.86	21	3
5	64QAM	12	13	20.84	20.89	20.89		
5	64QAM	25	0	20.86	20.78	20.92		
Channel				20415	20525	20635	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				825.5	836.5	847.5		
3	QPSK	1	0	23.64	23.51	23.49		
3	QPSK	1	8	23.51	23.40	23.48	24	0
3	QPSK	1	14	23.44	23.38	23.57		
3	QPSK	8	0	22.67	22.61	22.49		
3	QPSK	8	4	22.52	22.64	22.56	23	1
3	QPSK	8	7	22.74	22.69	22.56		
3	QPSK	15	0	22.60	22.68	22.49		
3	16QAM	1	0	22.49	22.77	22.31		
3	16QAM	1	8	22.44	22.55	22.40	23	1
3	16QAM	1	14	22.70	22.49	22.43		
3	16QAM	8	0	21.52	21.71	21.64		
3	16QAM	8	4	21.50	21.63	21.69	22	2
3	16QAM	8	7	21.58	21.58	21.30		
3	16QAM	15	0	21.56	21.62	21.69		
3	64QAM	1	0	21.70	21.74	21.60		
3	64QAM	1	8	21.45	21.59	21.59	22	2
3	64QAM	1	14	21.72	21.68	21.54		
3	64QAM	8	0	20.56	20.67	20.74		
3	64QAM	8	4	20.49	20.86	20.79	21	3
3	64QAM	8	7	20.64	20.53	20.52		
3	64QAM	15	0	20.75	20.88	20.93		
Channel				20407	20525	20643	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				824.7	836.5	848.3		
1.4	QPSK	1	0	23.53	23.58	23.49		
1.4	QPSK	1	3	23.48	23.43	23.53		
1.4	QPSK	1	5	23.45	23.39	23.52	24	0
1.4	QPSK	3	0	23.78	23.68	23.69		
1.4	QPSK	3	1	23.67	23.62	23.70		
1.4	QPSK	3	3	23.60	23.66	23.63		
1.4	QPSK	6	0	22.63	22.62	22.61	23	1
1.4	16QAM	1	0	22.47	22.66	22.28		
1.4	16QAM	1	3	22.42	22.53	22.28		
1.4	16QAM	1	5	22.36	22.51	22.31	23	1
1.4	16QAM	3	0	22.57	22.64	22.46		
1.4	16QAM	3	1	22.55	22.64	22.52		
1.4	16QAM	3	3	22.41	22.49	22.51		
1.4	16QAM	6	0	21.11	21.35	21.10	22	2
1.4	64QAM	1	0	21.47	21.72	21.49		
1.4	64QAM	1	3	21.43	21.50	21.48		
1.4	64QAM	1	5	21.45	21.44	21.43	22	2
1.4	64QAM	3	0	21.57	21.72	21.67		
1.4	64QAM	3	1	21.63	21.78	21.71		
1.4	64QAM	3	3	21.67	21.72	21.67		
1.4	64QAM	6	0	20.67	20.76	20.51	21	3

Band 7 (2600MHz Band)
Part 27
Receiver On

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	23.12	23.15	23.11	24	0
20	QPSK	1	49	23.11	22.77	22.95		
20	QPSK	1	99	22.91	22.88	23.13		
20	QPSK	50	0	22.36	22.39	22.22	23	1
20	QPSK	50	24	22.36	21.91	22.04		
20	QPSK	50	50	22.09	21.89	22.27		
20	QPSK	100	0	22.14	22.25	22.06		
20	16QAM	1	0	22.02	21.89	22.03	23	1
20	16QAM	1	49	22.12	21.67	22.14		
20	16QAM	1	99	21.91	21.69	22.08		
20	16QAM	50	0	20.65	20.46	20.65	22	2
20	16QAM	50	24	20.88	20.43	20.63		
20	16QAM	50	50	20.58	20.68	20.69		
20	16QAM	100	0	20.44	20.44	20.58		
20	64QAM	1	0	20.72	20.68	20.59	22	2
20	64QAM	1	49	20.95	20.45	20.80		
20	64QAM	1	99	20.58	20.48	20.72		
20	64QAM	50	0	20.01	19.63	19.82	21	3
20	64QAM	50	24	20.02	19.56	19.85		
20	64QAM	50	50	19.80	19.81	19.93		
20	64QAM	100	0	20.09	19.80	19.80		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	22.73	22.99	22.78	24	0
15	QPSK	1	37	22.84	22.53	22.79		
15	QPSK	1	74	22.88	22.68	22.88		
15	QPSK	36	0	22.09	21.77	21.97	23	1
15	QPSK	36	20	22.03	21.87	21.92		
15	QPSK	36	39	21.65	21.81	22.07		
15	QPSK	75	0	21.79	21.79	22.03		
15	16QAM	1	0	21.86	21.77	21.88	23	1
15	16QAM	1	37	21.83	21.48	21.86		
15	16QAM	1	74	21.47	21.45	21.95		
15	16QAM	36	0	20.14	20.24	20.43	22	2
15	16QAM	36	20	20.58	20.17	20.38		
15	16QAM	36	39	20.29	20.53	20.51		
15	16QAM	75	0	20.01	20.27	20.45		
15	64QAM	1	0	20.38	20.44	20.34	22	2
15	64QAM	1	37	20.56	20.23	20.66		
15	64QAM	1	74	20.45	20.37	20.50		
15	64QAM	36	0	19.82	19.46	19.69	21	3
15	64QAM	36	20	19.62	19.55	19.59		
15	64QAM	36	39	19.62	19.58	19.88		
15	64QAM	75	0	19.56	19.56	19.74		
Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	23.03	22.94	22.60	24	0
10	QPSK	1	25	23.02	22.58	22.90		
10	QPSK	1	49	22.81	22.69	23.06		
10	QPSK	25	0	22.25	21.95	21.90	23	1
10	QPSK	25	12	22.25	21.80	21.87		
10	QPSK	25	25	21.99	21.77	22.10		
10	QPSK	50	0	22.29	21.99	21.82		
10	16QAM	1	0	21.89	21.77	21.81	23	1
10	16QAM	1	25	22.05	21.68	21.90		
10	16QAM	1	49	21.89	21.68	22.00		
10	16QAM	25	0	20.49	20.26	20.46	22	2
10	16QAM	25	12	20.69	20.39	20.45		
10	16QAM	25	25	20.54	20.63	20.63		
10	16QAM	50	0	20.28	20.27	20.33		
10	64QAM	1	0	20.69	20.58	20.37	22	2
10	64QAM	1	25	20.74	20.29	20.61		
10	64QAM	1	49	20.45	20.24	20.54		
10	64QAM	25	0	19.77	19.35	19.60	21	3
10	64QAM	25	12	19.83	19.37	19.68		
10	64QAM	25	25	19.78	19.55	19.60		
10	64QAM	50	0	19.96	19.69	19.72		
Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	23.08	22.93	22.65	24	0
5	QPSK	1	12	22.96	22.62	22.77		
5	QPSK	1	24	22.82	22.81	22.92		
5	QPSK	12	0	22.24	21.93	21.93	23	1
5	QPSK	12	7	22.09	21.80	21.86		
5	QPSK	12	13	21.87	21.84	22.09		
5	QPSK	25	0	22.01	21.61	21.88		
5	16QAM	1	0	21.68	21.64	21.87	23	1
5	16QAM	1	12	21.65	21.45	21.66		
5	16QAM	1	24	21.65	21.56	21.80		
5	16QAM	12	0	20.32	20.29	20.55	22	2
5	16QAM	12	7	20.69	20.37	20.45		
5	16QAM	12	13	20.45	20.43	20.46		
5	16QAM	25	0	20.32	20.32	20.42		
5	64QAM	1	0	20.52	20.51	20.47	22	2
5	64QAM	1	12	20.55	20.30	20.56		
5	64QAM	1	24	20.21	20.24	20.69		
5	64QAM	12	0	19.69	19.49	19.69	21	3
5	64QAM	12	7	19.75	19.35	19.73		
5	64QAM	12	13	19.41	19.72	19.71		
5	64QAM	25	0	19.82	19.67	19.67		

Band 66
Receiver On

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				132072	132322	132572		
Frequency (MHz)				1720	1745	1770		
20	QPSK	1	0	23.21	23.38	23.18	24	0
20	QPSK	1	49	23.16	23.09	23.13		
20	QPSK	1	99	23.20	23.08	23.09		
20	QPSK	50	0	22.23	22.28	22.27	23	1
20	QPSK	50	24	22.21	22.16	22.27		
20	QPSK	50	50	22.25	22.16	22.22		
20	QPSK	100	0	22.17	22.24	22.16		
20	16QAM	1	0	22.36	22.41	22.24	23	1
20	16QAM	1	49	22.25	22.31	22.22		
20	16QAM	1	99	22.18	22.25	22.12		
20	16QAM	50	0	20.83	20.82	20.77	22	2
20	16QAM	50	24	20.85	20.80	20.80		
20	16QAM	50	50	20.78	20.72	20.79		
20	16QAM	100	0	20.85	20.82	20.84		
20	64QAM	1	0	21.02	21.22	20.96	22	2
20	64QAM	1	49	20.97	21.17	20.95		
20	64QAM	1	99	20.89	21.05	20.87		
20	64QAM	50	0	20.05	19.93	19.97	21	3
20	64QAM	50	24	19.98	19.93	20.00		
20	64QAM	50	50	19.94	19.92	19.90		
20	64QAM	100	0	19.95	19.90	19.92		
Channel				132047	132322	132597	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1745	1772.5		
15	QPSK	1	0	23.19	23.28	23.17	24	0
15	QPSK	1	37	23.16	23.16	23.17		
15	QPSK	1	74	23.16	23.12	23.10		
15	QPSK	36	0	22.29	22.18	22.22	23	1
15	QPSK	36	20	22.17	22.18	22.16		
15	QPSK	36	39	22.17	22.19	22.16		
15	QPSK	75	0	22.25	22.28	22.16		
15	16QAM	1	0	22.30	22.20	22.36	23	1
15	16QAM	1	37	22.24	22.15	22.25		
15	16QAM	1	74	22.04	22.11	22.14		
15	16QAM	36	0	20.80	20.86	20.78	22	2
15	16QAM	36	20	20.91	20.87	20.77		
15	16QAM	36	39	20.86	20.85	20.83		
15	16QAM	75	0	20.82	20.87	20.78		
15	64QAM	1	0	20.99	20.94	20.99	22	2
15	64QAM	1	37	20.94	20.94	20.98		
15	64QAM	1	74	20.89	20.99	20.96		
15	64QAM	36	0	20.00	20.14	19.98	21	3
15	64QAM	36	20	20.10	19.97	20.04		
15	64QAM	36	39	20.04	20.07	20.01		
15	64QAM	75	0	19.91	19.95	19.95		
Channel				132022	132322	132622	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1745	1775		
10	QPSK	1	0	23.20	23.16	23.20	24	0
10	QPSK	1	25	23.18	23.25	23.21		
10	QPSK	1	49	23.27	23.22	23.14		
10	QPSK	25	0	22.31	22.19	22.22	23	1
10	QPSK	25	12	22.33	22.22	22.26		
10	QPSK	25	25	22.24	22.17	22.30		
10	QPSK	50	0	22.25	22.32	22.25		
10	16QAM	1	0	22.28	22.04	22.30	23	1
10	16QAM	1	25	22.20	22.02	22.14		
10	16QAM	1	49	22.14	21.98	22.22		
10	16QAM	25	0	21.01	20.85	20.80	22	2
10	16QAM	25	12	21.00	20.99	21.03		
10	16QAM	25	25	20.81	20.99	20.96		
10	16QAM	50	0	20.87	20.85	20.84		
10	64QAM	1	0	21.12	21.05	21.10	22	2
10	64QAM	1	25	21.13	20.99	21.04		
10	64QAM	1	49	21.06	21.00	20.99		
10	64QAM	25	0	20.03	20.10	20.06	21	3
10	64QAM	25	12	20.11	20.06	20.06		
10	64QAM	25	25	20.08	20.07	20.06		
10	64QAM	50	0	20.03	19.97	20.01		
Channel				131997	132322	132647	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1745	1777.5		
5	QPSK	1	0	23.29	23.26	23.32	24	0
5	QPSK	1	12	23.18	23.18	23.31		
5	QPSK	1	24	23.14	23.14	23.27		
5	QPSK	12	0	22.23	22.25	22.29	23	1
5	QPSK	12	7	22.25	22.30	22.28		
5	QPSK	12	13	22.23	22.21	22.18		
5	QPSK	25	0	22.29	22.18	22.21		
5	16QAM	1	0	22.25	22.10	22.18	23	1
5	16QAM	1	12	22.30	22.16	22.20		
5	16QAM	1	24	22.16	22.20	22.14		
5	16QAM	12	0	20.90	20.78	20.87	22	2
5	16QAM	12	7	20.90	20.79	20.91		
5	16QAM	12	13	20.87	20.84	20.89		
5	16QAM	25	0	21.04	20.79	21.03		
5	64QAM	1	0	21.12	20.97	20.96	22	2
5	64QAM	1	12	21.10	21.08	21.05		
5	64QAM	1	24	20.94	20.89	21.06		
5	64QAM	12	0	20.06	20.04	19.83	21	3
5	64QAM	12	7	20.07	20.02	20.03		
5	64QAM	12	13	19.86	20.03	20.03		
5	64QAM	25	0	20.09	20.03	20.12		
Channel				131987	132322	132657	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1745	1778.5		
3	QPSK	1	0	23.19	23.15	23.23	24	0
3	QPSK	1	8	23.23	23.15	23.17		
3	QPSK	1	14	23.17	23.09	23.26		
3	QPSK	8	0	22.28	22.15	22.29	23	1
3	QPSK	8	4	22.35	22.21	22.30		
3	QPSK	8	7	22.29	22.09	22.26		
3	QPSK	15	0	22.26	22.17	22.24		
3	16QAM	1	0	22.27	22.30	22.21	23	1
3	16QAM	1	8	22.22	22.32	22.22		
3	16QAM	1	14	22.24	22.25	22.14		
3	16QAM	8	0	20.97	20.90	20.95	22	2
3	16QAM	8	4	20.94	20.93	20.95		
3	16QAM	8	7	20.97	20.94	20.94		
3	16QAM	15	0	20.93	20.89	20.88		
3	64QAM	1	0	20.97	21.42	20.98	22	2
3	64QAM	1	8	21.01	21.24	20.94		
3	64QAM	1	14	20.96	21.18	20.97		
3	64QAM	8	0	19.89	19.77	19.88	21	3
3	64QAM	8	4	20.00	19.87	19.98		
3	64QAM	8	7	20.00	19.77	19.99		
3	64QAM	15	0	20.03	20.03	20.03		
Channel				131979	132322	132665	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1745	1779.3		
1.4	QPSK	1	0	23.19	23.15	23.15	24	0
1.4	QPSK	1	3	23.14	23.09	23.15		
1.4	QPSK	1	5	23.24	23.08	23.20		
1.4	QPSK	3	0	23.22	23.26	23.28		
1.4	QPSK	3	1	23.30	23.31	23.27		
1.4	QPSK	3	3	23.22	23.27	23.37		
1.4	QPSK	6	0	22.29	22.19	22.29	23	1
1.4	16QAM	1	0	22.26	22.38	22.15	23	1
1.4	16QAM	1	3	22.29	22.39	22.26		
1.4	16QAM	1	5	22.25	22.36	22.25		
1.4	16QAM	3	0	21.98	21.83	21.99		
1.4	16QAM	3	1	22.03	21.94	22.02		
1.4	16QAM	3	3	22.01	21.95	21.99		
1.4	16QAM	6	0	20.69	20.58	20.55	22	2
1.4	64QAM	1	0	20.96	21.20	21.02	22	2
1.4	64QAM	1	3	21.02	21.20	20.94		
1.4	64QAM	1	5	20.89	21.20	20.95		
1.4	64QAM	3	0	20.91	20.98	21.12		
1.4	64QAM	3	1	21.15	21.05	21.14		
1.4	64QAM	3	3	20.91	20.90	21.00		
1.4	64QAM	6	0	19.94	19.75	19.94	21	3

		Receiver Off / Extremity				Receiver Off / Extremity			
Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513	
Rx Channel		9662	9800	9938		1537	1638	1738	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6	
3GPP Rel 99	AMR 12.2Kbps	22.48	22.51	22.47	23.00	16.94	17.16	17.06	17.50
3GPP Rel 99	RMC 12.2Kbps	22.44	22.52	22.48	23.00	16.95	17.17	17.07	17.50
3GPP Rel 6	HSDPA Subtest-1	21.84	21.54	21.64	22.00	15.91	15.86	16.08	16.50
3GPP Rel 6	HSDPA Subtest-2	21.49	21.18	21.31	22.00	15.95	15.82	15.95	16.50
3GPP Rel 6	HSDPA Subtest-3	21.30	21.34	21.38	21.50	15.94	15.80	15.91	16.00
3GPP Rel 6	HSDPA Subtest-4	21.23	21.12	21.22	21.50	15.98	15.82	15.92	16.00
3GPP Rel 8	DC-HSDPA Subtest-1	21.77	21.47	21.37	22.00	16.12	15.81	16.02	16.50
3GPP Rel 8	DC-HSDPA Subtest-2	21.42	21.44	21.24	22.00	15.11	15.06	15.28	16.50
3GPP Rel 8	DC-HSDPA Subtest-3	21.23	21.27	21.41	21.50	15.71	15.58	15.71	16.00
3GPP Rel 8	DC-HSDPA Subtest-4	21.16	21.11	21.06	21.50	15.70	15.56	15.67	16.00
3GPP Rel 6	HSUPA Subtest-1	20.52	20.61	20.72	22.00	16.00	15.80	16.03	16.50
3GPP Rel 6	HSUPA Subtest-2	18.63	18.57	18.38	20.00	14.27	14.08	14.12	14.50
3GPP Rel 6	HSUPA Subtest-3	19.71	19.62	19.56	21.00	14.93	14.66	14.74	15.50
3GPP Rel 6	HSUPA Subtest-4	18.87	18.79	18.66	20.00	14.03	14.20	14.11	14.50
3GPP Rel 6	HSUPA Subtest-5	20.60	20.70	20.50	22.00	16.50	16.30	16.50	16.50
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	18.08	18.17	18.02	19.50	13.97	13.82	13.88	14.00

Hotspot On

GSM1900	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
TX Channel	512	661	810		512	661	810	
Frequency (MHz)	1850.2	1880	1909.8		1850.2	1880	1909.8	
GSM 1 Tx slot	27.40	27.42	27.35	28.50	18.40	18.42	18.35	19.50
GPRS 1 Tx slot	27.45	27.62	27.51	28.50	18.45	18.62	18.51	19.50
GPRS 2 Tx slots	25.62	25.68	25.51	26.50	19.62	19.68	19.51	20.50
GPRS 3 Tx slots	23.75	23.98	23.82	24.50	19.49	19.72	19.56	20.24
GPRS 4 Tx slots	21.61	21.75	21.68	22.50	18.61	18.75	18.68	19.50
EDGE 1 Tx slot	28.31	27.96	27.85	28.50	19.31	18.96	18.85	19.50
EDGE 2 Tx slots	27.08	26.92	26.90	27.50	21.08	20.92	20.90	21.50
EDGE 3 Tx slots	25.13	24.67	24.68	25.50	20.87	20.41	20.42	21.24
EDGE 4 Tx slots	22.70	22.56	22.35	23.50	19.70	19.56	19.35	20.50

Hotspot On **Hotspot On**

Band		WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)
TX Channel		9262	9400	9538		1312	1413	1513	
Rx Channel		9662	9800	9938		1537	1638	1738	
Frequency (MHz)		1852.4	1880	1907.6		1712.4	1732.6	1752.6	
3GPP Rel 99	AMR 12.2Kbps	19.40	19.35	19.51	20.00	16.44	16.55	16.51	17.00
3GPP Rel 99	RMC 12.2Kbps	19.52	19.54	19.48	20.00	16.69	16.75	16.73	17.00
3GPP Rel 6	HSDPA Subtest-1	18.63	18.80	18.34	19.00	15.54	15.44	15.70	16.00
3GPP Rel 6	HSDPA Subtest-2	18.21	18.45	18.01	19.00	15.58	15.48	15.69	16.00
3GPP Rel 6	HSDPA Subtest-3	18.45	18.12	18.22	18.50	15.12	15.16	15.06	15.50
3GPP Rel 6	HSDPA Subtest-4	18.08	18.27	17.86	18.50	15.06	15.05	15.19	15.50
3GPP Rel 8	DC-HSDPA Subtest-1	18.56	18.73	18.27	19.00	15.45	15.44	15.61	16.00
3GPP Rel 8	DC-HSDPA Subtest-2	18.14	18.38	17.94	19.00	15.51	15.48	15.69	16.00
3GPP Rel 8	DC-HSDPA Subtest-3	18.38	18.35	18.15	18.50	15.22	15.21	15.05	15.50
3GPP Rel 8	DC-HSDPA Subtest-4	18.01	18.20	17.79	18.50	15.16	15.07	15.01	15.50
3GPP Rel 6	HSUPA Subtest-1	18.08	17.99	17.98	19.00	15.05	15.16	15.32	16.00
3GPP Rel 6	HSUPA Subtest-2	16.59	16.74	16.71	17.00	13.42	13.44	13.25	14.00
3GPP Rel 6	HSUPA Subtest-3	17.09	16.77	16.76	18.00	14.60	14.32	14.53	15.00
3GPP Rel 6	HSUPA Subtest-4	16.88	16.77	16.80	17.00	13.50	13.75	13.65	14.00
3GPP Rel 6	HSUPA Subtest-5	18.47	18.57	18.41	19.00	15.60	15.50	15.70	16.00

Band 4 (AWS Band)
Part 27L (only on channel required)
Receiver Off / Extremity

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	17.10	17.18	17.08	17.5	0
20	QPSK	1	49	16.85	16.77	17.07		
20	QPSK	1	99	16.80	16.76	16.92		
20	QPSK	50	0	16.10	16.14	16.12	16.5	1
20	QPSK	50	24	15.84	15.92	15.88		
20	QPSK	50	50	16.02	16.13	16.07		
20	QPSK	100	0	15.91	16.11	16.02		
20	16QAM	1	0	16.32	16.47	16.50	16.5	1
20	16QAM	1	49	16.16	16.04	16.14		
20	16QAM	1	99	16.27	16.24	16.07		
20	16QAM	50	0	15.14	15.15	15.04	15.5	2
20	16QAM	50	24	15.12	15.12	15.02		
20	16QAM	50	50	15.11	15.01	15.07		
20	16QAM	100	0	15.09	15.12	15.22		
20	64QAM	1	0	15.13	15.08	15.06	15.5	2
20	64QAM	1	49	15.17	15.02	15.02		
20	64QAM	1	99	15.07	15.14	15.03		
20	64QAM	50	0	14.18	14.48	14.11	14.5	3
20	64QAM	50	24	14.44	14.32	14.14		
20	64QAM	50	50	14.40	14.11	14.24		
20	64QAM	100	0	14.09	14.09	14.34		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	16.84	16.88	16.81	17.5	0
15	QPSK	1	37	16.68	16.64	16.84		
15	QPSK	1	74	16.48	16.65	16.82		
15	QPSK	36	0	15.94	15.85	15.85	16.5	1
15	QPSK	36	20	15.56	15.69	15.67		
15	QPSK	36	39	15.79	16.02	15.85		
15	QPSK	75	0	15.69	15.97	15.89		
15	16QAM	1	0	16.00	16.22	16.12	16.5	1
15	16QAM	1	37	15.89	15.87	15.92		
15	16QAM	1	74	16.16	16.07	15.83		
15	16QAM	36	0	14.89	14.91	14.94	15.5	2
15	16QAM	36	20	14.98	14.84	14.84		
15	16QAM	36	39	14.93	14.78	14.87		
15	16QAM	75	0	14.81	14.79	14.91		
15	64QAM	1	0	14.95	14.91	14.82	15.5	2
15	64QAM	1	37	15.00	14.77	14.74		
15	64QAM	1	74	14.85	14.87	14.90		
15	64QAM	36	0	14.02	14.12	13.94	14.5	3
15	64QAM	36	20	14.32	14.17	13.91		
15	64QAM	36	39	14.30	13.87	14.11		
15	64QAM	75	0	13.98	13.87	14.05		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	16.79	16.88	16.79	17.5	0
10	QPSK	1	25	16.60	16.54	16.75		
10	QPSK	1	49	16.53	16.44	16.82		
10	QPSK	25	0	15.95	15.87	15.82	16.5	1
10	QPSK	25	12	15.66	15.77	15.78		
10	QPSK	25	25	15.88	15.82	15.86		
10	QPSK	50	0	15.68	15.80	15.78		
10	16QAM	1	0	16.05	16.11	16.12	16.5	1
10	16QAM	1	25	16.02	15.76	16.02		
10	16QAM	1	49	16.00	15.92	15.75		
10	16QAM	25	0	14.88	14.88	14.83	15.5	2
10	16QAM	25	12	15.00	14.98	14.88		
10	16QAM	25	25	14.99	14.77	14.90		
10	16QAM	50	0	14.98	14.81	14.92		
10	64QAM	1	0	15.01	14.85	14.79	15.5	2
10	64QAM	1	25	14.86	14.81	14.85		
10	64QAM	1	49	14.90	14.90	14.87		
10	64QAM	25	0	13.91	14.21	13.79	14.5	3
10	64QAM	25	12	14.20	14.06	13.90		
10	64QAM	25	25	14.13	13.93	14.01		
10	64QAM	50	0	13.78	13.97	14.16		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	16.93	16.88	16.91	17.5	0
5	QPSK	1	12	16.72	16.59	16.83		
5	QPSK	1	24	16.70	16.61	16.80		
5	QPSK	12	0	15.85	15.94	15.95	16.5	1
5	QPSK	12	7	15.57	15.60	15.66		
5	QPSK	12	13	15.89	15.94	15.94		
5	QPSK	25	0	15.75	15.96	15.74		
5	16QAM	1	0	16.05	16.12	16.31	16.5	1
5	16QAM	1	12	15.91	15.85	16.00		
5	16QAM	1	24	16.16	15.93	15.81		
5	16QAM	12	0	14.98	15.01	14.82	15.5	2
5	16QAM	12	7	14.89	14.96	14.88		
5	16QAM	12	13	14.88	14.76	14.87		
5	16QAM	25	0	14.83	14.83	14.99		
5	64QAM	1	0	14.88	14.98	14.83	15.5	2
5	64QAM	1	12	14.92	14.91	14.86		
5	64QAM	1	24	14.93	14.90	14.85		
5	64QAM	12	0	14.07	14.38	13.96	14.5	3
5	64QAM	12	7	14.29	14.02	13.94		
5	64QAM	12	13	14.27	13.89	14.05		
5	64QAM	25	0	13.88	13.75	14.20		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	16.96	16.90	16.86	17.5	0
3	QPSK	1	8	16.69	16.46	16.85		
3	QPSK	1	14	16.51	16.47	16.76		
3	QPSK	8	0	15.91	15.81	15.86	16.5	1
3	QPSK	8	4	15.68	15.77	15.58		
3	QPSK	8	7	15.78	15.91	15.94		
3	QPSK	15	0	15.70	15.97	15.71		
3	16QAM	1	0	16.18	16.03	16.12	16.5	1
3	16QAM	1	8	16.02	15.70	15.83		
3	16QAM	1	14	16.06	15.98	15.95		
3	16QAM	8	0	14.90	14.85	14.87	15.5	2
3	16QAM	8	4	14.97	15.02	14.77		
3	16QAM	8	7	14.93	14.89	14.96		
3	16QAM	15	0	14.98	14.96	15.06		
3	64QAM	1	0	14.80	14.87	14.76	15.5	2
3	64QAM	1	8	14.99	14.74	14.92		
3	64QAM	1	14	14.79	14.94	14.71		
3	64QAM	8	0	13.96	14.25	13.79	14.5	3
3	64QAM	8	4	14.21	14.14	13.83		
3	64QAM	8	7	14.25	13.93	14.01		
3	64QAM	15	0	13.85	13.83	14.19		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	16.79	16.88	16.81	17.5	0
1.4	QPSK	1	3	16.59	16.62	16.87		
1.4	QPSK	1	5	16.46	16.51	16.69		
1.4	QPSK	3	0	16.56	16.69	16.59		
1.4	QPSK	3	1	16.28	16.49	16.35		
1.4	QPSK	3	3	16.61	16.67	16.50		
1.4	QPSK	6	0	15.70	15.96	15.87	16.5	1
1.4	16QAM	1	0	15.97	16.03	16.01	16.5	1
1.4	16QAM	1	3	15.57	15.63	15.78		
1.4	16QAM	1	5	15.69	15.77	15.55		
1.4	16QAM	3	0	15.60	15.57	15.62		
1.4	16QAM	3	1	15.66	15.53	15.50		
1.4	16QAM	3	3	15.50	15.56	15.61		
1.4	16QAM	6	0	14.81	14.88	14.93	15.5	2
1.4	64QAM	1	0	14.93	14.80	14.71	15.5	2
1.4	64QAM	1	3	14.88	14.70	14.80		
1.4	64QAM	1	5	14.82	14.96	14.83		
1.4	64QAM	3	0	14.60	14.50	14.41		
1.4	64QAM	3	1	14.53	14.36	14.65		
1.4	64QAM	3	3	14.53	14.70	14.56		
1.4	64QAM	6	0	13.91	13.87	14.09	14.5	3

Band 7 (2600MHz Band)
Part 27
Receiver Off / Extremity

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	19.57	19.61	19.48	20.5	0
20	QPSK	1	49	19.42	19.32	19.47		
20	QPSK	1	99	19.21	19.41	19.46		
20	QPSK	50	0	18.79	19.04	18.90	19.5	1
20	QPSK	50	24	19.02	18.91	18.93		
20	QPSK	50	50	18.94	18.89	18.86		
20	QPSK	100	0	18.99	19.04	18.86		
20	16QAM	1	0	19.12	19.10	18.97	19.5	1
20	16QAM	1	49	19.08	18.82	18.85		
20	16QAM	1	99	19.00	19.26	18.84		
20	16QAM	50	0	18.17	17.89	17.90	18.5	2
20	16QAM	50	24	18.29	17.81	17.86		
20	16QAM	50	50	18.21	17.95	17.89		
20	16QAM	100	0	18.12	17.91	17.88		
20	64QAM	1	0	18.23	18.22	17.79	18.5	2
20	64QAM	1	49	18.21	17.81	17.77		
20	64QAM	1	99	18.12	18.12	17.82		
20	64QAM	50	0	17.16	16.89	16.90	17.5	3
20	64QAM	50	24	17.29	16.80	16.86		
20	64QAM	50	50	17.22	16.95	16.89		
20	64QAM	100	0	17.23	16.91	16.89		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	19.39	19.40	19.24	20.5	0
15	QPSK	1	37	19.26	19.10	19.28		
15	QPSK	1	74	18.99	19.15	19.19		
15	QPSK	36	0	18.66	18.87	18.62	19.5	1
15	QPSK	36	20	18.91	18.83	18.81		
15	QPSK	36	39	18.81	18.71	18.61		
15	QPSK	75	0	18.82	18.82	18.75		
15	16QAM	1	0	19.02	18.93	18.66	19.5	1
15	16QAM	1	37	18.88	18.67	18.62		
15	16QAM	1	74	18.85	19.03	18.73		
15	16QAM	36	0	17.89	17.74	17.82	18.5	2
15	16QAM	36	20	18.05	17.89	17.73		
15	16QAM	36	39	17.96	17.72	17.81		
15	16QAM	75	0	17.93	17.60	17.69		
15	64QAM	1	0	18.00	18.11	17.99	18.5	2
15	64QAM	1	37	17.94	17.74	17.85		
15	64QAM	1	74	18.04	17.88	17.65		
15	64QAM	36	0	16.92	16.58	16.69	17.5	3
15	64QAM	36	20	16.85	16.50	16.76		
15	64QAM	36	39	16.92	16.70	16.65		
15	64QAM	75	0	16.99	16.64	16.61		
Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	19.33	19.45	19.19	20.5	0
10	QPSK	1	25	19.22	19.23	19.28		
10	QPSK	1	49	19.20	19.12	19.38		
10	QPSK	25	0	18.69	18.79	18.80	19.5	1
10	QPSK	25	12	18.75	18.68	18.75		
10	QPSK	25	25	18.82	18.66	18.74		
10	QPSK	50	0	18.71	18.97	18.73		
10	16QAM	1	0	18.84	18.86	18.74	19.5	1
10	16QAM	1	25	18.98	18.69	18.61		
10	16QAM	1	49	18.92	19.07	18.62		
10	16QAM	25	0	17.56	17.62	17.63	18.5	2
10	16QAM	25	12	17.61	17.68	17.67		
10	16QAM	25	25	17.97	17.68	17.75		
10	16QAM	50	0	17.82	17.77	17.73		
10	64QAM	1	0	18.12	18.08	18.05	18.5	2
10	64QAM	1	25	17.90	18.10	17.65		
10	64QAM	1	49	17.93	18.02	17.68		
10	64QAM	25	0	16.55	16.65	16.70	17.5	3
10	64QAM	25	12	16.68	16.56	16.59		
10	64QAM	25	25	16.61	16.77	16.59		
10	64QAM	50	0	16.46	16.71	16.65		
Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	19.31	19.33	19.41	20.5	0
5	QPSK	1	12	19.31	19.22	19.32		
5	QPSK	1	24	18.97	19.15	19.29		
5	QPSK	12	0	18.51	18.82	18.66	19.5	1
5	QPSK	12	7	18.93	18.63	18.68		
5	QPSK	12	13	18.86	18.65	18.64		
5	QPSK	25	0	18.86	18.93	18.57		
5	16QAM	1	0	18.87	18.93	18.87	19.5	1
5	16QAM	1	12	18.90	18.56	18.65		
5	16QAM	1	24	18.93	18.96	18.71		
5	16QAM	12	0	18.10	17.64	17.69	18.5	2
5	16QAM	12	7	18.00	17.60	17.70		
5	16QAM	12	13	17.98	17.74	17.65		
5	16QAM	25	0	18.01	17.63	17.79		
5	64QAM	1	0	17.95	17.98	17.62	18.5	2
5	64QAM	1	12	17.93	17.66	17.53		
5	64QAM	1	24	17.96	17.84	17.68		
5	64QAM	12	0	16.94	16.81	16.70	17.5	3
5	64QAM	12	7	17.15	16.71	16.73		
5	64QAM	12	13	17.08	16.88	16.79		
5	64QAM	25	0	17.05	16.63	16.66		

Band 66
Receiver Off / Extremity

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				132072	132322	132572		
Frequency (MHz)				1720	1745	1770		
20	QPSK	1	0	17.09	17.19	17.13	17.5	0
20	QPSK	1	49	16.69	16.89	16.78		
20	QPSK	1	99	16.79	16.73	16.80		
20	QPSK	50	0	15.71	15.86	15.62	16.5	1
20	QPSK	50	24	15.66	15.48	15.67		
20	QPSK	50	50	15.45	15.85	15.74		
20	QPSK	100	0	15.45	15.59	15.52		
20	16QAM	1	0	15.41	15.63	15.42	16.5	1
20	16QAM	1	49	15.46	15.18	15.42		
20	16QAM	1	99	15.52	15.55	15.46		
20	16QAM	50	0	14.65	14.68	14.92	15.5	2
20	16QAM	50	24	14.69	14.61	14.66		
20	16QAM	50	50	14.77	14.78	14.82		
20	16QAM	100	0	14.74	14.79	14.84		
20	64QAM	1	0	15.12	14.90	15.24	15.5	2
20	64QAM	1	49	15.29	15.05	15.25		
20	64QAM	1	99	15.14	15.24	14.84		
20	64QAM	50	0	14.06	14.17	14.13	14.5	3
20	64QAM	50	24	14.29	14.24	14.26		
20	64QAM	50	50	14.27	14.19	14.42		
20	64QAM	100	0	14.38	14.23	14.21		
Channel				132047	132322	132597	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1745	1772.5		
15	QPSK	1	0	16.77	16.68	16.86	17.5	0
15	QPSK	1	37	16.52	16.56	16.65		
15	QPSK	1	74	16.47	16.43	16.53		
15	QPSK	36	0	15.45	15.50	15.33	16.5	1
15	QPSK	36	20	15.46	15.22	15.41		
15	QPSK	36	39	15.27	15.52	15.41		
15	QPSK	75	0	15.23	15.23	15.21		
15	16QAM	1	0	15.08	15.44	15.22	16.5	1
15	16QAM	1	37	15.26	15.54	15.24		
15	16QAM	1	74	15.30	15.26	15.11		
15	16QAM	36	0	14.44	14.47	14.69	15.5	2
15	16QAM	36	20	14.55	14.34	14.30		
15	16QAM	36	39	14.53	14.61	14.68		
15	16QAM	75	0	14.37	14.51	14.59		
15	64QAM	1	0	14.96	14.66	15.01	15.5	2
15	64QAM	1	37	14.96	14.82	15.01		
15	64QAM	1	74	14.89	14.98	14.56		
15	64QAM	36	0	13.76	14.01	13.79	14.5	3
15	64QAM	36	20	14.16	14.04	14.02		
15	64QAM	36	39	13.97	13.97	14.06		
15	64QAM	75	0	14.04	13.96	13.89		
Channel				132022	132322	132622	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1745	1775		
10	QPSK	1	0	16.80	16.95	16.79	17.5	0
10	QPSK	1	25	16.53	16.55	16.61		
10	QPSK	1	49	16.57	16.59	16.48		
10	QPSK	25	0	15.43	15.60	15.44	16.5	1
10	QPSK	25	12	15.42	15.23	15.51		
10	QPSK	25	25	15.25	15.69	15.38		
10	QPSK	50	0	15.09	15.32	15.21		
10	16QAM	1	0	15.23	15.42	15.27	16.5	1
10	16QAM	1	25	15.33	15.15	15.14		
10	16QAM	1	49	15.34	15.33	15.29		
10	16QAM	25	0	14.29	14.49	14.76	15.5	2
10	16QAM	25	12	14.43	14.37	14.31		
10	16QAM	25	25	14.61	14.53	14.56		
10	16QAM	50	0	14.55	14.48	14.48		
10	64QAM	1	0	14.98	14.57	14.94	15.5	2
10	64QAM	1	25	14.88	14.88	15.01		
10	64QAM	1	49	14.80	14.99	14.64		
10	64QAM	25	0	13.75	14.00	13.95	14.5	3
10	64QAM	25	12	13.99	13.97	14.00		
10	64QAM	25	25	13.96	13.90	14.18		
10	64QAM	50	0	14.17	14.01	13.93		
Channel				131997	132322	132647	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1745	1777.5		
5	QPSK	1	0	16.72	16.60	16.56	17.5	0
5	QPSK	1	12	16.49	16.58	16.48		
5	QPSK	1	24	16.43	16.46	16.27		
5	QPSK	12	0	15.43	15.58	15.25	16.5	1
5	QPSK	12	7	15.33	15.25	15.42		
5	QPSK	12	13	15.19	15.48	15.43		
5	QPSK	25	0	15.03	15.29	15.22		
5	16QAM	1	0	15.05	15.37	15.02	16.5	1
5	16QAM	1	12	15.09	15.25	15.22		
5	16QAM	1	24	15.25	15.27	15.13		
5	16QAM	12	0	14.45	14.47	14.49	15.5	2
5	16QAM	12	7	14.29	14.40	14.40		
5	16QAM	12	13	14.49	14.51	14.52		
5	16QAM	25	0	14.49	14.45	14.51		
5	64QAM	1	0	14.79	14.56	14.94	15.5	2
5	64QAM	1	12	14.90	14.70	15.03		
5	64QAM	1	24	14.77	14.86	14.55		
5	64QAM	12	0	13.77	13.75	13.76	14.5	3
5	64QAM	12	7	14.07	13.98	14.01		
5	64QAM	12	13	13.98	13.94	14.14		
5	64QAM	25	0	14.15	13.90	13.84		
Channel				131987	132322	132657	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1745	1778.5		
3	QPSK	1	0	16.80	16.78	16.60	17.5	0
3	QPSK	1	8	16.33	16.51	16.47		
3	QPSK	1	14	16.41	16.35	16.39		
3	QPSK	8	0	15.35	15.50	15.27	16.5	1
3	QPSK	8	4	15.24	15.18	15.27		
3	QPSK	8	7	15.15	15.44	15.40		
3	QPSK	15	0	15.06	15.38	15.25		
3	16QAM	1	0	15.07	15.35	15.22	16.5	1
3	16QAM	1	8	15.24	15.35	15.05		
3	16QAM	1	14	15.12	15.18	15.07		
3	16QAM	8	0	14.39	14.44	14.50	15.5	2
3	16QAM	8	4	14.32	14.38	14.45		
3	16QAM	8	7	14.44	14.49	14.51		
3	16QAM	15	0	14.51	14.47	14.49		
3	64QAM	1	0	14.78	14.60	14.94	15.5	2
3	64QAM	1	8	15.04	14.68	15.05		
3	64QAM	1	14	14.85	14.82	14.64		
3	64QAM	8	0	13.85	13.76	13.75	14.5	3
3	64QAM	8	4	13.88	13.91	13.88		
3	64QAM	8	7	13.92	13.89	14.02		
3	64QAM	15	0	14.04	14.01	13.98		
Channel				131979	132322	132665	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1745	1779.3		
1.4	QPSK	1	0	16.86	16.88	16.82	17.5	0
1.4	QPSK	1	3	16.57	16.53	16.86		
1.4	QPSK	1	5	16.50	16.47	16.63		
1.4	QPSK	3	0	16.59	16.64	16.64		
1.4	QPSK	3	1	16.35	16.38	16.36		
1.4	QPSK	3	3	16.58	16.79	16.51		
1.4	QPSK	6	0	15.67	15.88	15.85	16.5	1
1.4	16QAM	1	0	16.03	16.02	16.03	16.5	1
1.4	16QAM	1	3	15.59	15.58	15.80		
1.4	16QAM	1	5	15.62	15.88	15.56		
1.4	16QAM	3	0	15.53	15.56	15.58		
1.4	16QAM	3	1	15.69	15.50	15.58		
1.4	16QAM	3	3	15.41	15.45	15.57		
1.4	16QAM	6	0	14.75	14.98	14.97	15.5	2
1.4	64QAM	1	0	14.90	14.86	14.63	15.5	2
1.4	64QAM	1	3	14.82	14.63	14.81		
1.4	64QAM	1	5	14.71	14.84	14.73		
1.4	64QAM	3	0	14.53	14.44	14.53		
1.4	64QAM	3	1	14.49	14.43	14.75		
1.4	64QAM	3	3	14.62	14.59	14.66		
1.4	64QAM	6	0	13.87	13.75	14.20	14.5	3

SPORTON LAB.

Band 2 (1900MHz Band)
Part 24E
Hotspot On

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				18700	18900	19100		
Frequency (MHz)				1860	1880	1900		
20	QPSK	1	0	19.59	19.78	19.68	20.5	0
20	QPSK	1	49	19.71	19.77	19.73		
20	QPSK	1	99	19.76	19.59	19.70		
20	QPSK	50	0	19.10	19.14	18.95	19.5	1
20	QPSK	50	24	18.80	19.11	18.99		
20	QPSK	50	50	19.13	18.86	18.77		
20	QPSK	100	0	18.82	19.00	18.93		
20	16QAM	1	0	18.70	18.62	18.76	19.5	1
20	16QAM	1	49	18.80	18.79	18.66		
20	16QAM	1	99	18.98	18.76	18.72		
20	16QAM	50	0	18.05	18.05	17.92	18.5	2
20	16QAM	50	24	17.95	17.74	17.93		
20	16QAM	50	50	17.75	18.08	17.94		
20	16QAM	100	0	17.91	18.04	17.82		
20	64QAM	1	0	18.13	18.00	18.24	18.5	2
20	64QAM	1	49	18.03	18.02	17.91		
20	64QAM	1	99	18.21	17.99	17.94		
20	64QAM	50	0	16.93	16.91	17.09	17.5	3
20	64QAM	50	24	17.00	16.91	16.85		
20	64QAM	50	50	16.92	17.03	17.00		
20	64QAM	100	0	17.00	17.22	16.90		
Channel				18675	18900	19125	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1857.5	1880	1902.5		
15	QPSK	1	0	19.40	19.71	19.64	20.5	0
15	QPSK	1	37	19.52	19.58	19.56		
15	QPSK	1	74	19.63	19.41	19.51		
15	QPSK	36	0	18.98	18.97	18.79	19.5	1
15	QPSK	36	20	18.70	18.98	18.92		
15	QPSK	36	39	19.09	18.70	18.59		
15	QPSK	75	0	18.68	18.92	18.79		
15	16QAM	1	0	18.61	18.53	18.72	19.5	1
15	16QAM	1	37	18.57	18.76	18.60		
15	16QAM	1	74	18.72	18.69	18.67		
15	16QAM	36	0	17.83	17.83	17.88	18.5	2
15	16QAM	36	20	17.69	17.61	17.90		
15	16QAM	36	39	17.71	18.01	17.85		
15	16QAM	75	0	17.88	17.84	17.69		
15	64QAM	1	0	17.88	17.88	17.97	18.5	2
15	64QAM	1	37	17.97	17.81	17.80		
15	64QAM	1	74	18.14	17.86	17.78		
15	64QAM	36	0	16.70	16.75	16.82	17.5	3
15	64QAM	36	20	16.90	16.68	16.74		
15	64QAM	36	39	16.69	16.88	16.76		
15	64QAM	75	0	16.92	17.03	16.78		
Channel				18650	18900	19150	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1855	1880	1905		
10	QPSK	1	0	19.42	19.70	19.42	20.5	0
10	QPSK	1	25	19.66	19.69	19.60		
10	QPSK	1	49	19.60	19.53	19.44		
10	QPSK	25	0	18.85	19.03	18.89	19.5	1
10	QPSK	25	12	18.69	18.86	18.79		
10	QPSK	25	25	18.96	18.60	18.55		
10	QPSK	50	0	18.59	18.91	18.88		
10	16QAM	1	0	18.53	18.58	18.70	19.5	1
10	16QAM	1	25	18.75	18.73	18.63		
10	16QAM	1	49	18.94	18.53	18.64		
10	16QAM	25	0	17.96	17.81	17.87	18.5	2
10	16QAM	25	12	17.76	17.63	17.90		
10	16QAM	25	25	17.60	17.96	17.78		
10	16QAM	50	0	17.74	17.87	17.67		
10	64QAM	1	0	18.09	17.79	18.07	18.5	2
10	64QAM	1	25	17.92	17.85	17.67		
10	64QAM	1	49	18.08	17.77	17.78		
10	64QAM	25	0	16.77	16.68	17.03	17.5	3
10	64QAM	25	12	16.85	16.72	16.75		
10	64QAM	25	25	16.73	16.96	16.94		
10	64QAM	50	0	16.94	17.13	16.86		
Channel				18625	18900	19175	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1852.5	1880	1907.5		
5	QPSK	1	0	19.36	19.49	19.58	20.5	0
5	QPSK	1	12	19.53	19.50	19.44		
5	QPSK	1	24	19.56	19.47	19.55		
5	QPSK	12	0	18.81	18.88	18.72	19.5	1
5	QPSK	12	7	18.54	18.78	18.87		
5	QPSK	12	13	19.00	18.66	18.66		
5	QPSK	25	0	18.64	18.69	18.61		
5	16QAM	1	0	18.50	18.33	18.62	19.5	1
5	16QAM	1	12	18.59	18.63	18.40		
5	16QAM	1	24	18.68	18.47	18.55		
5	16QAM	12	0	17.78	17.72	17.81	18.5	2
5	16QAM	12	7	17.84	17.65	17.63		
5	16QAM	12	13	17.44	17.88	17.69		
5	16QAM	25	0	17.69	17.76	17.58		
5	64QAM	1	0	17.93	17.79	18.11	18.5	2
5	64QAM	1	12	17.82	17.72	17.75		
5	64QAM	1	24	17.91	17.75	17.64		
5	64QAM	12	0	16.61	16.62	16.82	17.5	3
5	64QAM	12	7	16.74	16.78	16.58		
5	64QAM	12	13	16.79	16.77	16.71		
5	64QAM	25	0	16.86	17.00	16.59		
Channel				18615	18900	19185	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1851.5	1880	1908.5		
3	QPSK	1	0	19.32	19.52	19.40	20.5	0
3	QPSK	1	8	19.40	19.61	19.46		
3	QPSK	1	14	19.61	19.34	19.48		
3	QPSK	8	0	18.94	18.75	18.82	19.5	1
3	QPSK	8	4	18.56	18.92	18.69		
3	QPSK	8	7	18.84	18.73	18.48		
3	QPSK	15	0	18.57	18.83	18.79		
3	16QAM	1	0	18.54	18.36	18.44	19.5	1
3	16QAM	1	8	18.57	18.65	18.53		
3	16QAM	1	14	18.66	18.60	18.50		
3	16QAM	8	0	17.89	17.87	17.79	18.5	2
3	16QAM	8	4	17.84	17.49	17.68		
3	16QAM	8	7	17.43	17.92	17.84		
3	16QAM	15	0	17.65	17.90	17.60		
3	64QAM	1	0	17.84	17.74	17.97	18.5	2
3	64QAM	1	8	17.85	17.82	17.59		
3	64QAM	1	14	18.03	17.83	17.65		
3	64QAM	8	0	16.63	16.79	16.78	17.5	3
3	64QAM	8	4	16.73	16.59	16.67		
3	64QAM	8	7	16.61	16.89	16.85		
3	64QAM	15	0	16.72	16.92	16.72		
Channel				18607	18900	19193	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1850.7	1880	1909.3		
1.4	QPSK	1	0	19.36	19.51	19.53	20.5	0
1.4	QPSK	1	3	19.46	19.59	19.51		
1.4	QPSK	1	5	19.48	19.37	19.40		
1.4	QPSK	3	0	19.41	19.44	19.40		
1.4	QPSK	3	1	19.33	19.50	19.52		
1.4	QPSK	3	3	19.54	19.36	19.22		
1.4	QPSK	6	0	18.59	18.84	18.74	19.5	1
1.4	16QAM	1	0	18.53	18.34	18.62	19.5	1
1.4	16QAM	1	3	18.53	18.56	18.34		
1.4	16QAM	1	5	18.76	18.59	18.53		
1.4	16QAM	3	0	18.54	18.47	18.32		
1.4	16QAM	3	1	18.38	18.28	18.32		
1.4	16QAM	3	3	18.14	18.45	18.37		
1.4	16QAM	6	0	17.76	17.91	17.56	18.5	2
1.4	64QAM	1	0	17.86	17.70	18.02	18.5	2
1.4	64QAM	1	3	17.79	17.69	17.66		
1.4	64QAM	1	5	17.88	17.68	17.75		
1.4	64QAM	3	0	17.47	17.32	17.61		
1.4	64QAM	3	1	17.57	17.49	17.46		
1.4	64QAM	3	3	17.38	17.43	17.42		
1.4	64QAM	6	0	16.72	17.07	16.62	17.5	3

Band 4 (AWS Band)
Part 27L (only on channel required)
Hotspot On

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20050	20175	20300		
Frequency (MHz)				1720	1732.5	1745		
20	QPSK	1	0	17.10	17.18	17.08	17.5	0
20	QPSK	1	49	16.85	16.77	17.07		
20	QPSK	1	99	16.80	16.76	16.92		
20	QPSK	50	0	16.10	16.14	16.12	16.5	1
20	QPSK	50	24	15.84	15.92	15.88		
20	QPSK	50	50	16.02	16.13	16.07		
20	QPSK	100	0	15.91	16.11	16.02		
20	16QAM	1	0	16.32	16.47	16.50	16.5	1
20	16QAM	1	49	16.16	16.04	16.14		
20	16QAM	1	99	16.27	16.24	16.07		
20	16QAM	50	0	15.14	15.15	15.04	15.5	2
20	16QAM	50	24	15.12	15.12	15.02		
20	16QAM	50	50	15.11	15.01	15.07		
20	16QAM	100	0	15.09	15.12	15.22		
20	64QAM	1	0	15.13	15.08	15.06	15.5	2
20	64QAM	1	49	15.17	15.02	15.02		
20	64QAM	1	99	15.07	15.14	15.03		
20	64QAM	50	0	14.18	14.48	14.11	14.5	3
20	64QAM	50	24	14.44	14.32	14.14		
20	64QAM	50	50	14.40	14.11	14.24		
20	64QAM	100	0	14.09	14.09	14.34		
Channel				20025	20175	20325	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1732.5	1747.5		
15	QPSK	1	0	16.84	16.88	16.81	17.5	0
15	QPSK	1	37	16.68	16.64	16.84		
15	QPSK	1	74	16.48	16.65	16.82		
15	QPSK	36	0	15.94	15.85	15.85	16.5	1
15	QPSK	36	20	15.56	15.69	15.67		
15	QPSK	36	39	15.79	16.02	15.85		
15	QPSK	75	0	15.69	15.97	15.89		
15	16QAM	1	0	16.00	16.22	16.12	16.5	1
15	16QAM	1	37	15.89	15.87	15.92		
15	16QAM	1	74	16.16	16.07	15.83		
15	16QAM	36	0	14.88	14.91	14.94	15.5	2
15	16QAM	36	20	14.98	14.84	14.84		
15	16QAM	36	39	14.93	14.78	14.87		
15	16QAM	75	0	14.81	14.79	14.91		
15	64QAM	1	0	14.95	14.91	14.82	15.5	2
15	64QAM	1	37	15.00	14.77	14.74		
15	64QAM	1	74	14.85	14.87	14.90		
15	64QAM	36	0	14.02	14.12	13.94	14.5	3
15	64QAM	36	20	14.32	14.17	13.91		
15	64QAM	36	39	14.30	13.87	14.11		
15	64QAM	75	0	13.98	13.87	14.05		
Channel				20000	20175	20350	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1732.5	1750		
10	QPSK	1	0	16.79	16.88	16.79	17.5	0
10	QPSK	1	25	16.60	16.54	16.75		
10	QPSK	1	49	16.53	16.44	16.82		
10	QPSK	25	0	15.95	15.87	15.82	16.5	1
10	QPSK	25	12	15.66	15.77	15.78		
10	QPSK	25	25	15.88	15.82	15.86		
10	QPSK	50	0	15.68	15.80	15.78		
10	16QAM	1	0	16.05	16.11	16.12	16.5	1
10	16QAM	1	25	16.02	15.76	16.02		
10	16QAM	1	49	16.00	15.92	15.75		
10	16QAM	25	0	14.88	14.88	14.83	15.5	2
10	16QAM	25	12	15.00	14.98	14.88		
10	16QAM	25	25	14.99	14.77	14.90		
10	16QAM	50	0	14.98	14.81	14.92		
10	64QAM	1	0	15.01	14.85	14.79	15.5	2
10	64QAM	1	25	14.86	14.81	14.85		
10	64QAM	1	49	14.90	14.90	14.87		
10	64QAM	25	0	13.91	14.21	13.79	14.5	3
10	64QAM	25	12	14.20	14.06	13.90		
10	64QAM	25	25	14.13	13.93	14.01		
10	64QAM	50	0	13.78	13.97	14.16		
Channel				19975	20175	20375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1732.5	1752.5		
5	QPSK	1	0	16.93	16.88	16.91	17.5	0
5	QPSK	1	12	16.72	16.59	16.83		
5	QPSK	1	24	16.70	16.61	16.80		
5	QPSK	12	0	15.85	15.94	15.95	16.5	1
5	QPSK	12	7	15.57	15.60	15.66		
5	QPSK	12	13	15.89	15.94	15.94		
5	QPSK	25	0	15.75	15.96	15.74		
5	16QAM	1	0	16.05	16.12	16.31	16.5	1
5	16QAM	1	12	15.91	15.85	16.00		
5	16QAM	1	24	16.16	15.93	15.81		
5	16QAM	12	0	14.98	15.01	14.82	15.5	2
5	16QAM	12	7	14.89	14.96	14.88		
5	16QAM	12	13	14.88	14.76	14.87		
5	16QAM	25	0	14.83	14.83	14.99		
5	64QAM	1	0	14.88	14.98	14.83	15.5	2
5	64QAM	1	12	14.92	14.91	14.86		
5	64QAM	1	24	14.93	14.90	14.85		
5	64QAM	12	0	14.07	14.38	13.96	14.5	3
5	64QAM	12	7	14.29	14.02	13.94		
5	64QAM	12	13	14.27	13.89	14.05		
5	64QAM	25	0	13.88	13.75	14.20		
Channel				19965	20175	20385	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1732.5	1753.5		
3	QPSK	1	0	16.96	16.90	16.86	17.5	0
3	QPSK	1	8	16.69	16.46	16.85		
3	QPSK	1	14	16.51	16.47	16.76		
3	QPSK	8	0	15.91	15.81	15.86	16.5	1
3	QPSK	8	4	15.68	15.77	15.58		
3	QPSK	8	7	15.78	15.91	15.94		
3	QPSK	15	0	15.70	15.97	15.71		
3	16QAM	1	0	16.18	16.03	16.12	16.5	1
3	16QAM	1	8	16.02	15.70	15.83		
3	16QAM	1	14	16.06	15.98	15.95		
3	16QAM	8	0	14.90	14.85	14.87	15.5	2
3	16QAM	8	4	14.97	15.02	14.77		
3	16QAM	8	7	14.93	14.89	14.96		
3	16QAM	15	0	14.98	14.96	15.06		
3	64QAM	1	0	14.80	14.87	14.76	15.5	2
3	64QAM	1	8	14.99	14.74	14.92		
3	64QAM	1	14	14.79	14.94	14.71		
3	64QAM	8	0	13.96	14.25	13.79	14.5	3
3	64QAM	8	4	14.21	14.14	13.83		
3	64QAM	8	7	14.25	13.93	14.01		
3	64QAM	15	0	13.85	13.83	14.19		
Channel				19957	20175	20393	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1732.5	1754.3		
1.4	QPSK	1	0	16.79	16.88	16.81	17.5	0
1.4	QPSK	1	3	16.59	16.62	16.87		
1.4	QPSK	1	5	16.46	16.51	16.69		
1.4	QPSK	3	0	16.56	16.69	16.59		
1.4	QPSK	3	1	16.28	16.49	16.35		
1.4	QPSK	3	3	16.61	16.67	16.50		
1.4	QPSK	6	0	15.70	15.96	15.87	16.5	1
1.4	16QAM	1	0	15.97	16.03	16.01	16.5	1
1.4	16QAM	1	3	15.57	15.63	15.78		
1.4	16QAM	1	5	15.69	15.77	15.55		
1.4	16QAM	3	0	15.60	15.57	15.62		
1.4	16QAM	3	1	15.66	15.53	15.50		
1.4	16QAM	3	3	15.50	15.56	15.61		
1.4	16QAM	6	0	14.81	14.88	14.93	15.5	2
1.4	64QAM	1	0	14.93	14.80	14.71	15.5	2
1.4	64QAM	1	3	14.88	14.70	14.80		
1.4	64QAM	1	5	14.82	14.96	14.83		
1.4	64QAM	3	0	14.60	14.50	14.41		
1.4	64QAM	3	1	14.53	14.36	14.65		
1.4	64QAM	3	3	14.53	14.70	14.56		
1.4	64QAM	6	0	13.91	13.87	14.09	14.5	3

Band 7 (2600MHz Band)
Part 27
Hotspot On

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				20850	21100	21350		
Frequency (MHz)				2510	2535	2560		
20	QPSK	1	0	19.57	19.61	19.48	20.5	0
20	QPSK	1	49	19.42	19.32	19.47		
20	QPSK	1	99	19.21	19.41	19.46		
20	QPSK	50	0	18.79	19.04	18.90	19.5	1
20	QPSK	50	24	19.02	18.91	18.93		
20	QPSK	50	50	18.94	18.89	18.86		
20	QPSK	100	0	18.99	19.04	18.86		
20	16QAM	1	0	19.12	19.10	18.97	19.5	1
20	16QAM	1	49	19.08	18.82	18.85		
20	16QAM	1	99	19.00	19.26	18.84		
20	16QAM	50	0	18.17	17.89	17.90	18.5	2
20	16QAM	50	24	18.29	17.81	17.86		
20	16QAM	50	50	18.21	17.95	17.89		
20	16QAM	100	0	18.12	17.91	17.88		
20	64QAM	1	0	18.23	18.22	17.79	18.5	2
20	64QAM	1	49	18.21	17.81	17.77		
20	64QAM	1	99	18.12	18.12	17.82		
20	64QAM	50	0	17.16	16.89	16.90	17.5	3
20	64QAM	50	24	17.29	16.80	16.86		
20	64QAM	50	50	17.22	16.95	16.89		
20	64QAM	100	0	17.23	16.91	16.89		
Channel				20825	21100	21375	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2507.5	2535	2562.5		
15	QPSK	1	0	19.39	19.40	19.24	20.5	0
15	QPSK	1	37	19.26	19.10	19.28		
15	QPSK	1	74	18.99	19.15	19.19		
15	QPSK	36	0	18.66	18.87	18.62	19.5	1
15	QPSK	36	20	18.91	18.83	18.81		
15	QPSK	36	39	18.81	18.71	18.61		
15	QPSK	75	0	18.82	18.82	18.75		
15	16QAM	1	0	19.02	18.93	18.66	19.5	1
15	16QAM	1	37	18.88	18.67	18.62		
15	16QAM	1	74	18.85	19.03	18.73		
15	16QAM	36	0	17.89	17.74	17.82	18.5	2
15	16QAM	36	20	18.05	17.69	17.73		
15	16QAM	36	39	17.96	17.72	17.81		
15	16QAM	75	0	17.93	17.60	17.69		
15	64QAM	1	0	18.00	18.11	17.99	18.5	2
15	64QAM	1	37	17.94	17.74	17.85		
15	64QAM	1	74	18.04	17.88	17.65		
15	64QAM	36	0	16.92	16.58	16.69	17.5	3
15	64QAM	36	20	16.85	16.50	16.76		
15	64QAM	36	39	16.92	16.70	16.65		
15	64QAM	75	0	16.99	16.64	16.61		
Channel				20800	21100	21400	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2505	2535	2565		
10	QPSK	1	0	19.33	19.45	19.19	20.5	0
10	QPSK	1	25	19.22	19.23	19.28		
10	QPSK	1	49	19.20	19.12	19.38		
10	QPSK	25	0	18.69	18.79	18.80	19.5	1
10	QPSK	25	12	18.75	18.68	18.75		
10	QPSK	25	25	18.82	18.66	18.74		
10	QPSK	50	0	18.71	18.97	18.73		
10	16QAM	1	0	18.84	18.86	18.74	19.5	1
10	16QAM	1	25	18.98	18.69	18.61		
10	16QAM	1	49	18.92	19.07	18.62		
10	16QAM	25	0	17.56	17.62	17.63	18.5	2
10	16QAM	25	12	17.61	17.68	17.67		
10	16QAM	25	25	17.97	17.68	17.75		
10	16QAM	50	0	17.82	17.77	17.73		
10	64QAM	1	0	18.12	18.08	18.05	18.5	2
10	64QAM	1	25	17.90	18.10	17.65		
10	64QAM	1	49	17.93	18.02	17.68		
10	64QAM	25	0	16.55	16.65	16.70	17.5	3
10	64QAM	25	12	16.68	16.56	16.59		
10	64QAM	25	25	16.61	16.77	16.59		
10	64QAM	50	0	16.46	16.71	16.65		
Channel				20775	21100	21425	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				2502.5	2535	2567.5		
5	QPSK	1	0	19.31	19.33	19.41	20.5	0
5	QPSK	1	12	19.31	19.22	19.32		
5	QPSK	1	24	18.97	19.15	19.29		
5	QPSK	12	0	18.51	18.82	18.66	19.5	1
5	QPSK	12	7	18.93	18.63	18.68		
5	QPSK	12	13	18.66	18.65	18.64		
5	QPSK	25	0	18.86	18.93	18.57		
5	16QAM	1	0	18.87	18.93	18.87	19.5	1
5	16QAM	1	12	18.90	18.56	18.65		
5	16QAM	1	24	18.93	18.96	18.71		
5	16QAM	12	0	18.10	17.64	17.69	18.5	2
5	16QAM	12	7	18.00	17.60	17.70		
5	16QAM	12	13	17.98	17.74	17.65		
5	16QAM	25	0	18.01	17.63	17.79		
5	64QAM	1	0	17.95	17.98	17.62	18.5	2
5	64QAM	1	12	17.93	17.66	17.53		
5	64QAM	1	24	17.96	17.84	17.68		
5	64QAM	12	0	16.94	16.81	16.70	17.5	3
5	64QAM	12	7	17.15	16.71	16.73		
5	64QAM	12	13	17.08	16.88	16.79		
5	64QAM	25	0	17.05	16.63	16.66		

Band 66
Hotspot On

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)
Channel				132072	132322	132572		
Frequency (MHz)				1720	1745	1770		
20	QPSK	1	0	17.09	17.19	17.13	17.5	0
20	QPSK	1	49	16.69	16.89	16.78		
20	QPSK	1	99	16.79	16.73	16.88		
20	QPSK	50	0	15.71	15.86	15.62	16.5	1
20	QPSK	50	24	15.66	15.48	15.67		
20	QPSK	50	50	15.45	15.85	15.74		
20	QPSK	100	0	15.45	15.59	15.52		
20	16QAM	1	0	15.41	15.63	15.42	16.5	1
20	16QAM	1	49	15.46	15.18	15.42		
20	16QAM	1	99	15.52	15.55	15.46		
20	16QAM	50	0	14.65	14.68	14.92	15.5	2
20	16QAM	50	24	14.69	14.61	14.66		
20	16QAM	50	50	14.77	14.78	14.82		
20	16QAM	100	0	14.74	14.79	14.84		
20	64QAM	1	0	15.12	14.90	15.24	15.5	2
20	64QAM	1	49	15.29	15.05	15.25		
20	64QAM	1	99	15.14	15.24	14.84		
20	64QAM	50	0	14.06	14.17	14.13	14.5	3
20	64QAM	50	24	14.29	14.24	14.26		
20	64QAM	50	50	14.27	14.19	14.42		
20	64QAM	100	0	14.38	14.23	14.21		
Channel				132047	132322	132597	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1717.5	1745	1772.5		
15	QPSK	1	0	16.77	16.68	16.86	17.5	0
15	QPSK	1	37	16.52	16.56	16.65		
15	QPSK	1	74	16.47	16.43	16.53		
15	QPSK	36	0	15.45	15.50	15.33	16.5	1
15	QPSK	36	20	15.46	15.22	15.41		
15	QPSK	36	39	15.27	15.52	15.41		
15	QPSK	75	0	15.23	15.23	15.21		
15	16QAM	1	0	15.08	15.44	15.22	16.5	1
15	16QAM	1	37	15.26	15.54	15.24		
15	16QAM	1	74	15.30	15.26	15.11		
15	16QAM	36	0	14.44	14.47	14.69	15.5	2
15	16QAM	36	20	14.55	14.34	14.30		
15	16QAM	36	39	14.53	14.61	14.68		
15	16QAM	75	0	14.37	14.51	14.59		
15	64QAM	1	0	14.96	14.66	15.01	15.5	2
15	64QAM	1	37	14.96	14.82	15.01		
15	64QAM	1	74	14.89	14.98	14.56		
15	64QAM	36	0	13.76	14.01	13.79	14.5	3
15	64QAM	36	20	14.16	14.04	14.02		
15	64QAM	36	39	13.97	13.97	14.06		
15	64QAM	75	0	14.04	13.96	13.89		
Channel				132022	132322	132622	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1715	1745	1775		
10	QPSK	1	0	16.80	16.95	16.79	17.5	0
10	QPSK	1	25	16.53	16.55	16.61		
10	QPSK	1	49	16.57	16.59	16.48		
10	QPSK	25	0	15.43	15.60	15.44	16.5	1
10	QPSK	25	12	15.42	15.23	15.51		
10	QPSK	25	25	15.25	15.69	15.38		
10	QPSK	50	0	15.09	15.32	15.21		
10	16QAM	1	0	15.23	15.42	15.27	16.5	1
10	16QAM	1	25	15.33	15.15	15.14		
10	16QAM	1	49	15.34	15.33	15.29		
10	16QAM	25	0	14.29	14.49	14.76	15.5	2
10	16QAM	25	12	14.43	14.37	14.31		
10	16QAM	25	25	14.61	14.53	14.56		
10	16QAM	50	0	14.55	14.48	14.48		
10	64QAM	1	0	14.98	14.57	14.94	15.5	2
10	64QAM	1	25	14.88	14.88	15.01		
10	64QAM	1	49	14.80	14.99	14.64		
10	64QAM	25	0	13.75	14.00	13.95	14.5	3
10	64QAM	25	12	13.99	13.97	14.00		
10	64QAM	25	25	13.96	13.90	14.18		
10	64QAM	50	0	14.17	14.01	13.93		
Channel				131997	132322	132647	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1712.5	1745	1777.5		
5	QPSK	1	0	16.72	16.60	16.56	17.5	0
5	QPSK	1	12	16.49	16.58	16.48		
5	QPSK	1	24	16.43	16.46	16.27		
5	QPSK	12	0	15.43	15.58	15.25	16.5	1
5	QPSK	12	7	15.33	15.25	15.42		
5	QPSK	12	13	15.19	15.48	15.43		
5	QPSK	25	0	15.03	15.29	15.22		
5	16QAM	1	0	15.05	15.37	15.02	16.5	1
5	16QAM	1	12	15.09	15.25	15.22		
5	16QAM	1	24	15.25	15.27	15.13		
5	16QAM	12	0	14.45	14.47	14.49	15.5	2
5	16QAM	12	7	14.29	14.40	14.40		
5	16QAM	12	13	14.49	14.51	14.52		
5	16QAM	25	0	14.49	14.45	14.51		
5	64QAM	1	0	14.79	14.56	14.94	15.5	2
5	64QAM	1	12	14.90	14.70	15.03		
5	64QAM	1	24	14.77	14.86	14.55		
5	64QAM	12	0	13.77	13.75	13.76	14.5	3
5	64QAM	12	7	14.07	13.98	14.01		
5	64QAM	12	13	13.98	13.94	14.14		
5	64QAM	25	0	14.15	13.90	13.84		
Channel				131987	132322	132657	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1711.5	1745	1778.5		
3	QPSK	1	0	16.80	16.78	16.60	17.5	0
3	QPSK	1	8	16.33	16.51	16.47		
3	QPSK	1	14	16.41	16.35	16.39		
3	QPSK	8	0	15.35	15.50	15.27	16.5	1
3	QPSK	8	4	15.24	15.18	15.27		
3	QPSK	8	7	15.15	15.44	15.40		
3	QPSK	15	0	15.06	15.38	15.25		
3	16QAM	1	0	15.07	15.35	15.22	16.5	1
3	16QAM	1	8	15.24	15.35	15.05		
3	16QAM	1	14	15.12	15.18	15.07		
3	16QAM	8	0	14.39	14.44	14.50	15.5	2
3	16QAM	8	4	14.32	14.38	14.45		
3	16QAM	8	7	14.44	14.49	14.51		
3	16QAM	15	0	14.51	14.47	14.49		
3	64QAM	1	0	14.78	14.60	14.94	15.5	2
3	64QAM	1	8	15.04	14.68	15.05		
3	64QAM	1	14	14.85	14.82	14.64		
3	64QAM	8	0	13.85	13.76	13.75	14.5	3
3	64QAM	8	4	13.88	13.91	13.88		
3	64QAM	8	7	13.92	13.89	14.02		
3	64QAM	15	0	14.04	14.01	13.98		
Channel				131979	132322	132665	Tune-up limit (dBm)	MPR (dB)
Frequency (MHz)				1710.7	1745	1779.3		
1.4	QPSK	1	0	16.86	16.88	16.82	17.5	0
1.4	QPSK	1	3	16.57	16.53	16.86		
1.4	QPSK	1	5	16.50	16.47	16.63		
1.4	QPSK	3	0	16.59	16.64	16.64		
1.4	QPSK	3	1	16.35	16.38	16.36		
1.4	QPSK	3	3	16.58	16.79	16.51		
1.4	QPSK	6	0	15.67	15.88	15.85	16.5	1
1.4	16QAM	1	0	16.03	16.02	16.03	16.5	1
1.4	16QAM	1	3	15.59	15.58	15.80		
1.4	16QAM	1	5	15.62	15.88	15.56		
1.4	16QAM	3	0	15.53	15.56	15.58		
1.4	16QAM	3	1	15.69	15.50	15.58		
1.4	16QAM	3	3	15.41	15.45	15.57		
1.4	16QAM	6	0	14.75	14.98	14.97	15.5	2
1.4	64QAM	1	0	14.90	14.86	14.63	15.5	2
1.4	64QAM	1	3	14.82	14.63	14.81		
1.4	64QAM	1	5	14.71	14.84	14.73		
1.4	64QAM	3	0	14.53	14.44	14.53		
1.4	64QAM	3	1	14.49	14.43	14.75		
1.4	64QAM	3	3	14.62	14.59	14.66		
1.4	64QAM	6	0	13.87	13.75	14.20	14.5	3

WLAN Power

2.4GHz WLAN						
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
2.4GHz WLAN	802.11b 1Mbps	1	2412	18.46	19	100.00
		6	2437	18.45	19	
		11	2462	17.97	19	
	802.11g 6Mbps	1	2412	13.18	14	96.50
		2	2417	16.68	17	
		6	2437	16.20	17	
		9	2452	16.03	17	
		10	2457	12.99	14	
		11	2462	11.55	12	
	802.11n-HT20 MCS0	1	2412	11.17	12	97.28
		2	2417	16.58	17	
		6	2437	16.08	17	
		8	2447	16.38	17	
		9	2452	13.65	14	
		10	2457	11.85	12	
		11	2462	10.55	11	

BT BR / EDR

Mode	Channel	Frequency (MHz)	Average power (dBm)		
			1Mbps	2Mbps	3Mbps
BR / EDR	CH 00	2402	10.64	8.36	8.42
	CH 39	2441	10.04	7.59	7.54
	CH 78	2480	9.85	7.50	7.54
Tune-up Limit			11	9	9

BT LE

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
LE	CH 00	2402	0.65
	CH 19	2440	2.93
	CH 39	2480	2.27
Tune-up Limit			3