38_LTE Band 7_20M_QPSK_1RB_0Offset_Back_0mm_Ch21100

Communication System: UID 0, LTE-FDD (0); Frequency: 2535 MHz; Duty Cycle: 1:1 Medium: HSL_2600 Medium parameters used: f = 2535 MHz; $\sigma = 1.958$ S/m; $\epsilon_r = 38.262$; $\rho = 1000$ kg/m³

Date: 2020.12.19

Ambient Temperature: 23.2 °C; Liquid Temperature: 22.9 °C

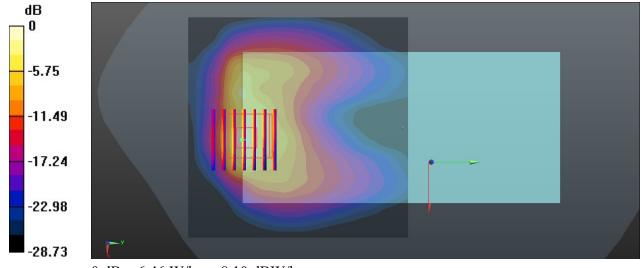
DASY5 Configuration:

- Probe: ES3DV3 SN3293; ConvF(4.38, 4.38, 4.38); Calibrated: 2020.9.23
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 2020.7.7
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (91x91x1): Interpolated grid: dx=1.200 mm, dy=1.200 mm Maximum value of SAR (interpolated) = 5.61 W/kg

Zoom Scan (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm Reference Value = 2.031 V/m; Power Drift = -0.02 dB Peak SAR (extrapolated) = 13.7 W/kg

SAR(1 g) = 4.32 W/kg; SAR(10 g) = 1.48 W/kgMaximum value of SAR (measured) = 6.46 W/kg



0 dB = 6.46 W/kg = 8.10 dBW/kg

39_LTE Band 66_20M_QPSK_1RB_49Offset_Back_0mm_Ch132572

Communication System: UID 0, LTE-FDD (0); Frequency: 1770 MHz; Duty Cycle: 1:1 Medium: HSL_1750 Medium parameters used: f = 1770 MHz; $\sigma = 1.371$ S/m; $\epsilon_r = 40.307$; $\rho = 1000$ kg/m³

Date: 2020.12.21

Ambient Temperature: 23.3 °C; Liquid Temperature: 22.6 °C

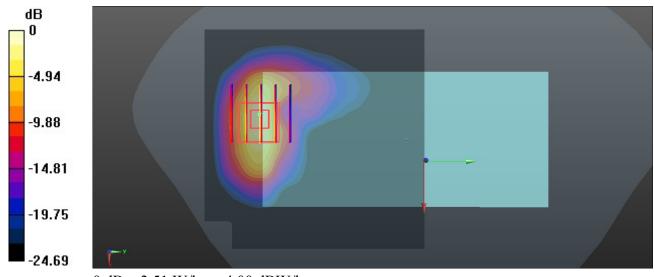
DASY5 Configuration:

- Probe: ES3DV3 SN3293; ConvF(5.37, 5.37, 5.37); Calibrated: 2020.9.23
- Sensor-Surface: 3mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1303; Calibrated: 2020.7.7
- Phantom: SAM2; Type: SAM; Serial: TP-1503
- Measurement SW: DASY52, Version 52.10 (4); SEMCAD X Version 14.6.14 (7483)

Area Scan (81x81x1): Interpolated grid: dx=1.500 mm, dy=1.500 mm Maximum value of SAR (interpolated) = 2.53 W/kg

Zoom Scan (5x5x7)/Cube 0: Measurement grid: dx=8mm, dy=8mm, dz=5mm Reference Value = 0 V/m; Power Drift = 0.01 dB Peak SAR (extrapolated) = 3.71 W/kg SAR(1 g) = 1.73 W/kg; SAR(10 g) = 0.765 W/kg

Maximum value of SAR (measured) = 2.51 W/kg



0 dB = 2.51 W/kg = 4.00 dBW/kg

Appendix C. DASY Calibration Certificate

Report No.: FA0N1002

The DASY calibration certificates are shown as follows.

Sporton International (Kunshan) Inc.



n Collaboration with

CALIBRATION LABORATORY

Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Fax: +86-10-62304633-2504 http://www.chinattl.cn



Client

Sporton

Certificate No:

Z19-60082

CALIBRATION CERTIFICATE

Tel: +86-10-62304633-2079

E-mail: cttl/a/chinattl.com

Object

D835V2 - SN: 4d151

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

March 27, 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 Calibratio	
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	越
Reviewed by:	Lin Hao	SAR Test Engineer	林岩
Approved by:	Qi Dianyuan	SAR Project Leader	-200

Issued: March 30, 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%.

Certificate No: Z19-60082 Page 2 of 8

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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	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters
The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	42.7 ± 6 %	0.93 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	:200	1945

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.36 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.30 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.56 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.16 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	55.2	0.97 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	56.7 ± 6 %	0.94 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	***	2666

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	2.32 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	9.53 W /kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	1.52 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	6.20 W/kg ± 18.7 % (k=2)

Certificate No: Z19-60082 Page 3 of 8 Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 http://www.chinattl.cn

Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.8Ω- 3.28jΩ	
Return Loss	- 29.5dB	

Antenna Parameters with Body TSL

Impedance, transformed to feed point	46.7Ω- 3.98jΩ	
Return Loss	- 25.5dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.253 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

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d151

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1 Medium parameters used: f = 835 MHz; $\sigma = 0.925$ S/m; $\epsilon_r = 42.68$; $\rho = 1000$ kg/m3

Phantom section: Right Section

DASY5 Configuration:

 Probe: EX3DV4 - SN3617; ConvF(9.75, 9.75, 9.75) @ 835 MHz; Calibrated: 1/31/2019

Date: 03.26,2019

- 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,

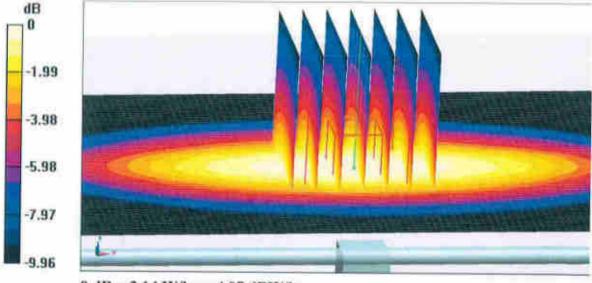
dy=5mm, dz=5mm

Reference Value = 57.34 V/m; Power Drift = 0.00 dB

Peak SAR (extrapolated) = 3.55 W/kg

SAR(1 g) = 2.36 W/kg; SAR(10 g) = 1.56 W/kg

Maximum value of SAR (measured) = 3.14 W/kg

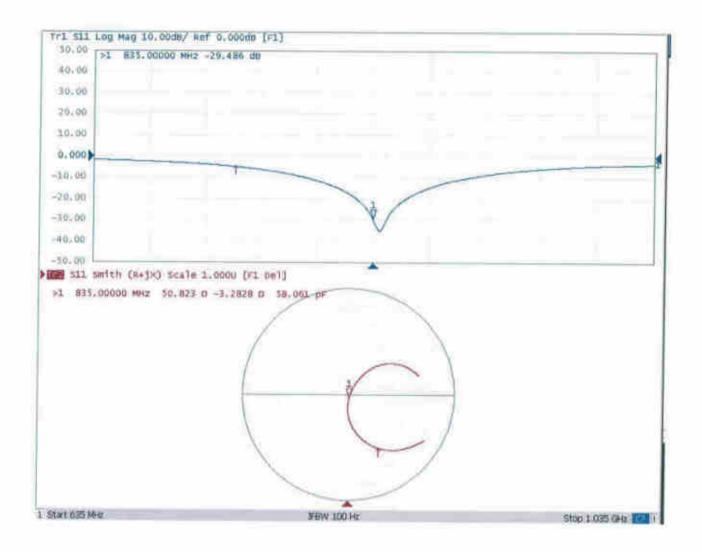


0 dB = 3.14 W/kg = 4.97 dBW/kg

Certificate No: Z19-60082 Page 5 of 8

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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 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d151

Communication System: UID 0, CW; Frequency: 835 MHz; Duty Cycle: 1:1

Medium parameters used: f = 835 MHz; $\sigma = 0.944$ S/m; $\varepsilon_r = 56.66$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 SN3617; ConvF(9.61, 9.61, 9.61) @ 835 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,

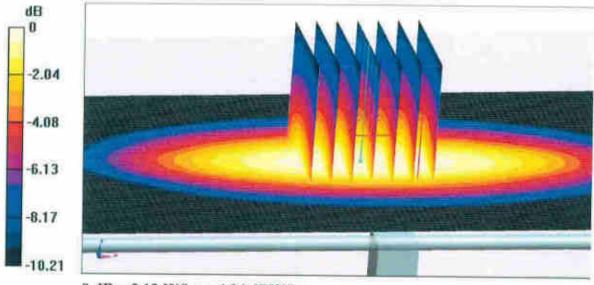
dy=5mm, dz=5mm

Reference Value = 56.03 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 3.53 W/kg

SAR(1 g) = 2.32 W/kg; SAR(10 g) = 1.52 W/kg

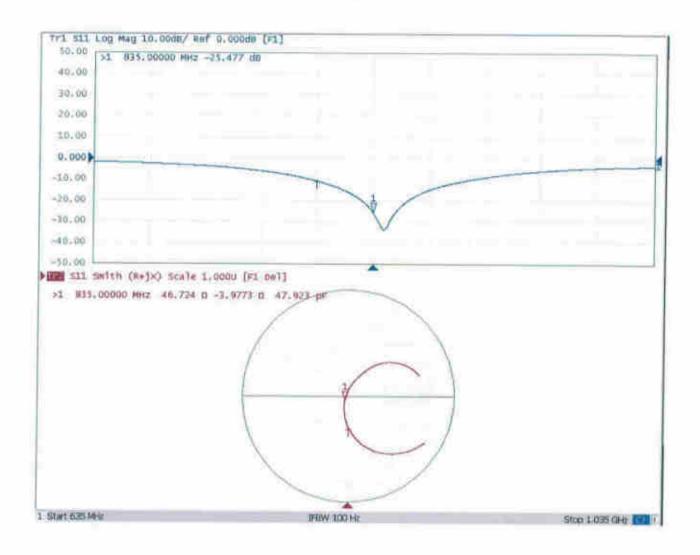
Maximum value of SAR (measured) = 3.12 W/kg



0 dB = 3.12 W/kg = 4.94 dBW/kg

Certificate No: Z19-60082 Page 7 of 8 Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: cttl@chinattl.com http://www.chinattl.cn

Impedance Measurement Plot for Body TSL





D835V2, Serial No. 4d151 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.

835V2 – serial no. 4d151												
835 Head				835 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	-29.3		52.4		-2.6		-27.7		51.6		-3.9	
2020.3.26	-30.7	-0.05	49.0	3.44	-2.7	0.10	-24.9	0.10	50.6	0.94	-5.7	1.84

<Justification of the extended calibration>

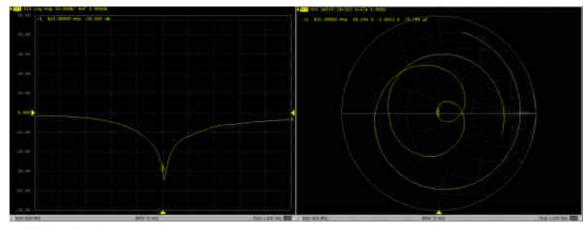
The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

TEL: 86-0512-5790-0158 FAX: 86-0512-5790-0958

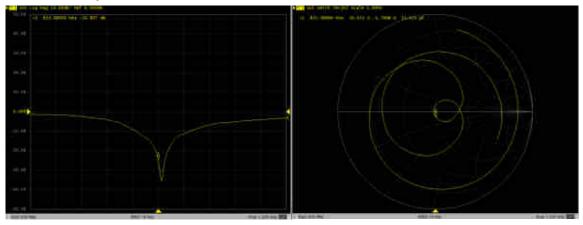


Dipole Verification Data> D835V2, serial no. 4d151

835MHz - Head



835MHz - Body



TEL: 86-0512-5790-0158 FAX: 86-0512-5790-0958



In Collaboration with



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Client

Sporton

Certificate No:

Z19-60084

CALIBRATION CERTIFICATE

Object

D1750V2 - SN: 1090

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

March 27, 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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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	1750 MHz ± 1 MHz	

Head TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) *C	41.3 ± 6 %	1.37 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	1 41100	

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.04 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.4 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	4.79 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.2 W/kg ± 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	53.4	1.49 mha/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	55.0 ± 6 %	1.45 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	Page 1	

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	9.21 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	37.7 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	4.89 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	19.9 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	47.5Ω- 2.34 jΩ		
Return Loss	- 29,2 dB		

Antenna Parameters with Body TSL

Impedance, transformed to feed point	43.9Ω- 2.19 jΩ		
Return Loss	- 23.2 dB		

General Antenna Parameters and Design

Electrical Delay (one direction)	1.085 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

Certificate No: Z19-60084 Page 4 of 8

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DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1090

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1 Medium parameters used: f = 1750 MHz; $\sigma = 1.37$ S/m; $\varepsilon_r = 41.27$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

 Probe: EX3DV4 - SN3617; ConvF(8.38, 8.38, 8.38) @ 1750 MHz; Calibrated: 1/31/2019

Date: 03.26.2019

- 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:

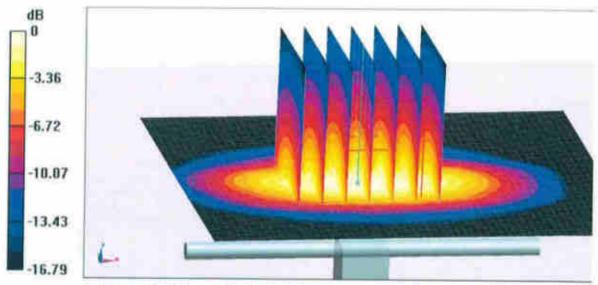
dx=5mm, dy=5mm, dz=5mm

Reference Value = 89.03 V/m; Power Drift = 0.03 dB

Peak SAR (extrapolated) = 17.1 W/kg

SAR(1 g) = 9.04 W/kg; SAR(10 g) = 4.79 W/kg

Maximum value of SAR (measured) = 14.2 W/kg

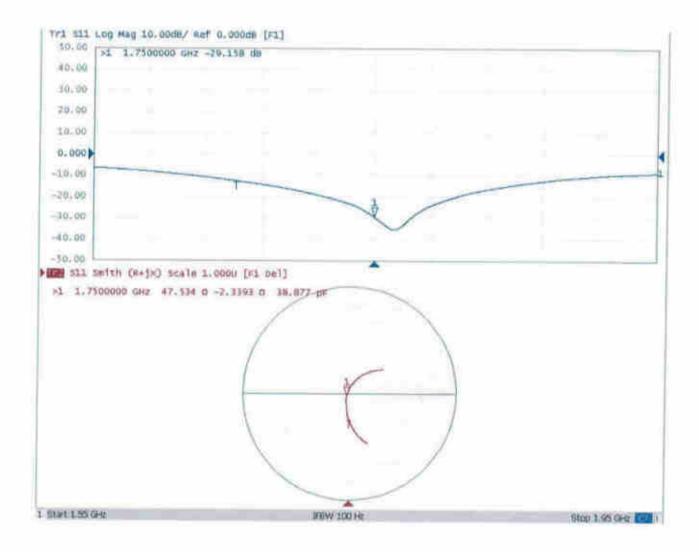


0 dB = 14.2 W/kg = 11.52 dBW/kg

Certificate No: Z19-60084 Page 5 of 8

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Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1090

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1 Medium parameters used: f = 1750 MHz; $\sigma = 1.449$ S/m; $\varepsilon_r = 54.97$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY5 Configuration:

 Probe: EX3DV4 - SN3617; ConvF(8.03, 8.03, 8.03) @ 1750 MHz; Calibrated: 1/31/2019

Date: 03.26.2019

- 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:

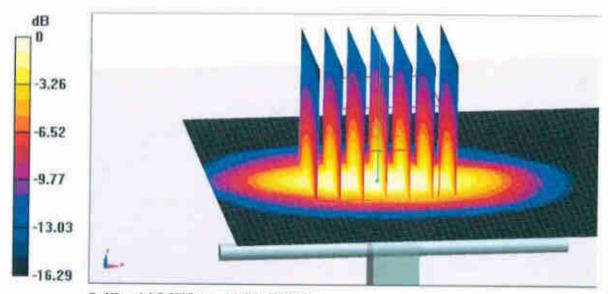
dx=5mm, dy=5mm, dz=5mm

Reference Value = 93.13 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 16.8 W/kg

SAR(1 g) = 9.21 W/kg; SAR(10 g) = 4.89 W/kg

Maximum value of SAR (measured) = 14.2 W/kg

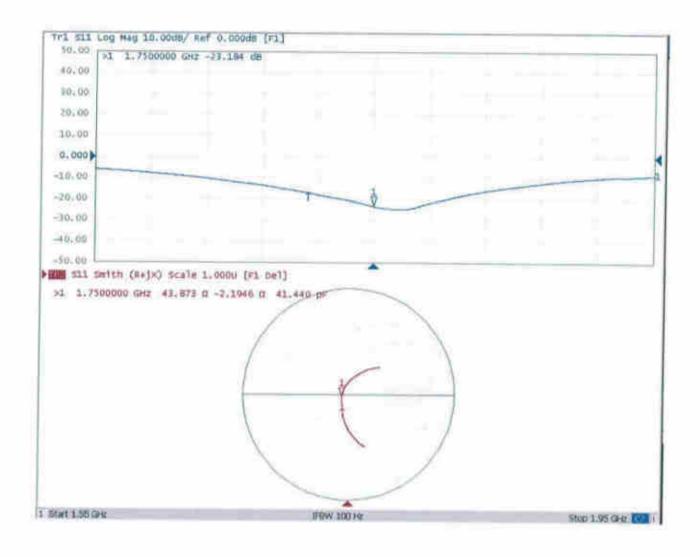


0 dB = 14.2 W/kg = 11.52 dBW/kg

Certificate No: Z19-60084 Page 7 of 8

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Impedance Measurement Plot for Body TSL





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. 1	090					
	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>

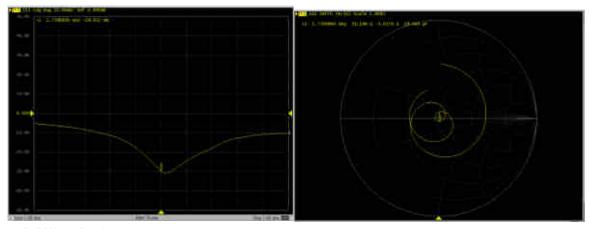
The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

TEL: 86-0512-5790-0158 FAX: 86-0512-5790-0958

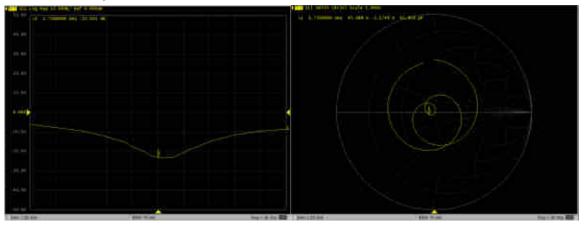


Dipole Verification Data> D1750V2, serial no. 1090

1750MHz - Head



1750MHz - Body



TEL: 86-0512-5790-0158 FAX: 86-0512-5790-0958



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CALIBRATION **CNAS L0570**

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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) to 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		M++1

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 cm3 (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
Electrical Delay (offe difection)	T,UDD HS

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

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; $\sigma = 1.441 \text{ S/m}$; $\varepsilon_r = 40.48$; $\rho = 1000 \text{ kg/m}3$

Phantom section: Center Section

DASY5 Configuration:

 Probe: EX3DV4 - SN3617; ConvF(8.14, 8.14, 8.14) @ 1900 MHz; Calibrated: 1/31/2019

Date: 03.26,2019

- 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:

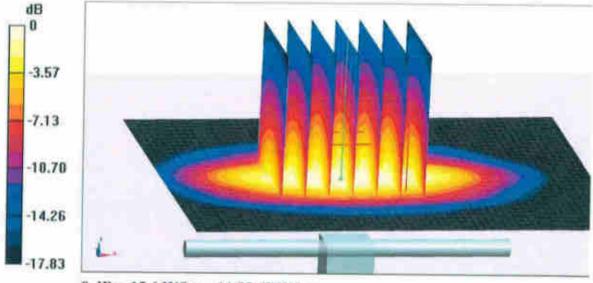
dx=5mm, dy=5mm, dz=5mm

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

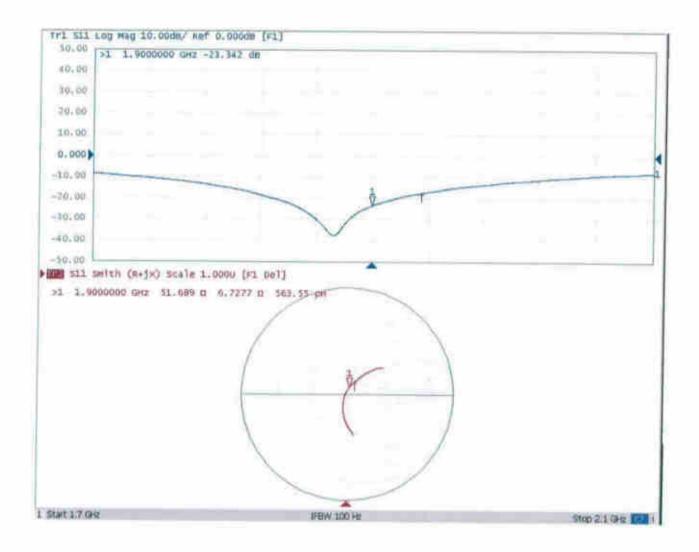
Maximum value of SAR (measured) = 15.6 W/kg



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

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; $\sigma = 1.56$ S/m; $\varepsilon_r = 54.52$; $\rho = 1000$ kg/m3

Phantom section: Right Section

DASY5 Configuration:

 Probe: EX3DV4 - SN3617; ConvF(7.78, 7.78, 7.78) @ 1900 MHz; Calibrated: 1/31/2019

Date: 03.26.2019

- 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:

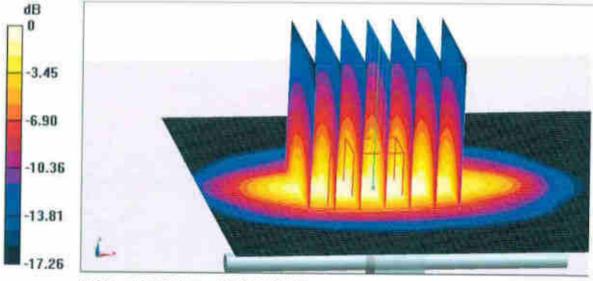
dx=5mm, dy=5mm, dz=5mm

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

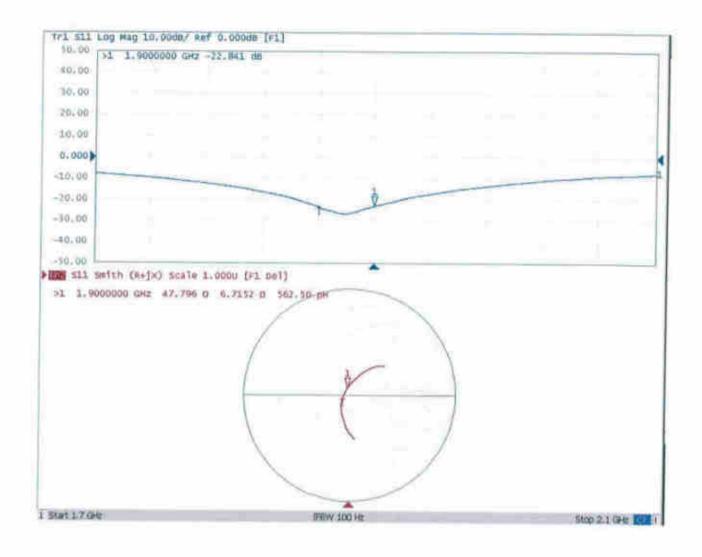


0 dB = 15.7 W/kg = 11.96 dBW/kg

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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>

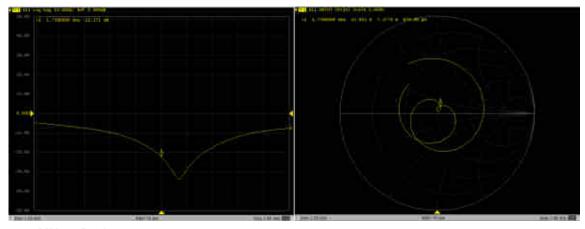
The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

TEL: 86-0512-5790-0158 FAX: 86-0512-5790-0958

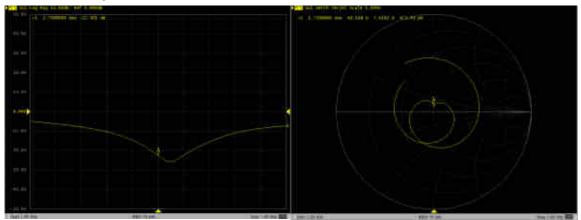


Dipole Verification Data> D1900V2, serial no. 5d170

1900MHz - Head



1900MHz - Body



TEL: 86-0512-5790-0158 FAX: 86-0512-5790-0958



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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%.

Certificate No: Z19-60087 Page 2 of 8

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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		244

SAR result with Head TSL

SAR averaged over 1 cm3 (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 mha/m ± 6 %
Body TSL temperature change during test	<1.0 °C	inner	

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)

Certificate No: Z19-60087 Page 3 of 8 Add: No.51 Xueyuan Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2079 Fax: +86-10-62304633-2504 E-mail: cttl@chinattl.com http://www.chinattl.cn

Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	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
Ciscinesi Beisy (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

Certificate No: Z19-60087 Page 4 of 8

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DASY5 Validation Report for Head TSL

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; $\sigma = 1.841$ S/m; $\varepsilon_t = 39.63$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

 Probe: EX3DV4 - SN3617; ConvF(7.62, 7.62, 7.62) @ 2450 MHz; Calibrated: 1/31/2019

Date: 03.25.2019

- 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)

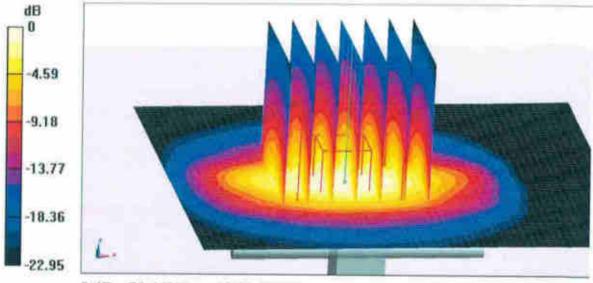
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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



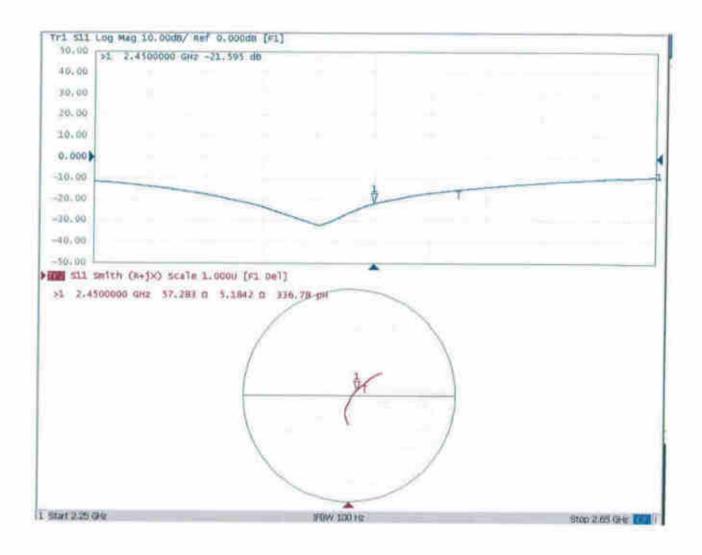
0 dB = 22.4 W/kg = 13.50 dBW/kg

Certificate No: Z19-60087



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Impedance Measurement Plot for Head TSL



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DASY5 Validation Report for Body TSL

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; $\sigma = 2.003$ S/m; $\varepsilon_r = 53.78$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY5 Configuration:

 Probe: EX3DV4 - SN3617; ConvF(7.79, 7.79, 7.79) @ 2450 MHz; Calibrated: 1/31/2019

Date: 03.25.2019

- 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,

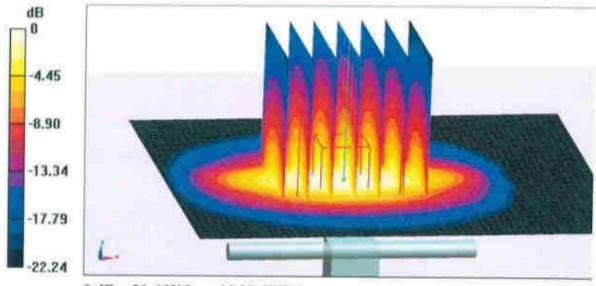
dy=5mm, dz=5mm

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

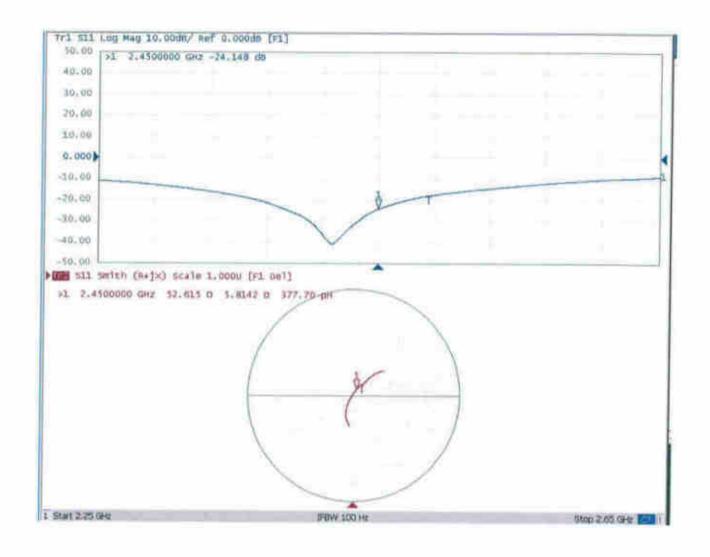


0 dB = 21.4 W/kg = 13.30 dBW/kg

Certificate No: Z19-60087 Page 7 of 8



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>

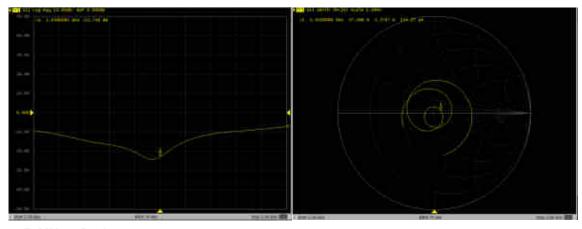
The return loss is < -20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

TEL: 86-0512-5790-0158 FAX: 86-0512-5790-0958

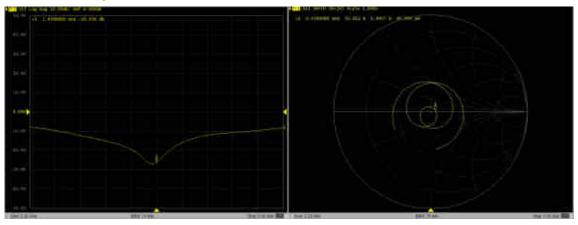


Dipole Verification Data> D2450V2, serial no. 908

2450MHz - Head



2450MHz - Body



TEL: 86-0512-5790-0158 FAX: 86-0512-5790-0958



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Client

Sporton

Certificate No:

Z18-60537

CALIBRATION GERTIFICATIE

Object

D2600V2 - SN: 1070

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

December 7, 2018

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) $^{\circ}$ C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID#	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRVD	102196	07-Mar-18 (CTTL, No.J18X01510)	Mar-19
Power sensor NRV-Z5	100596	07-Mar-18 (CTTL, No.J18X01510)	Mar-19
Reference Probe EX3DV4	SN 7514	27-Aug-18(SPEAG,No.EX3-7514_Aug18)	Aug-19
DAE4	SN 1555	20-Aug-18(SPEAG,No.DAE4-1555_Aug18)	Aug-19
Secondary Standards	ID#	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	23-Jan-18 (CTTL, No.J18X00560)	Jan-19
Network Analyzer E5071C	MY46110673	24-Jan-18 (CTTL, No.J18X00561)	Jan-19
			·.

Name

Function

Calibrated by:

Zhao Jing

SAR Test Engineer

Reviewed by:

Lin Hao

SAR Test Engineer

Approved by:

Qi Dianyuan

SAR Project Leader

Issued: December 10, 2018

Signature

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

Certificate No: Z18-60537

Page 1 of 8



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Glossary:

TSL ConvF tissue simulating liquid

sensitivity in TSL / NORMx, v, 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%.

Certificate No: Z18-60537



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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	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	39.1 ± 6 %	1.93 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	14.4 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	58.1 mW /g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.50 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	26.1 mW /g ± 18.7 % (k=2)

Body TSL parameters

The following parameters and calculations were applied.

Temperature	Permittivity	Conductivity
22.0 °C	52.5	2.16 mho/m
(22.0 ± 0.2) °C	51.0 ± 6 %	2.18 mho/m ± 6 %
<1.0 °C		
	22.0 °C (22.0 ± 0.2) °C	22.0 °C 52.5 (22.0 ± 0.2) °C 51.0 ± 6 %

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	13.8 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	54.6 mW /g ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	6.18 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	24.6 mW /g ± 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	48.6Ω- 6.33jΩ
Return Loss	- 23.7dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	44.8Ω- 5.36jΩ
Return Loss	- 22.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.015 ns
	1.010110

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

Certificate No: Z18-60537



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DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1070

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

Medium parameters used: f = 2600 MHz; $\sigma = 1.926$ S/m; $\epsilon_r = 39.1$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY5 Configuration:

Probe: EX3DV4 - SN7514; ConvF(6.92, 6.92, 6.92) @ 2600 MHz; Calibrated: 8/27/2018

Date: 12.06.2018

- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

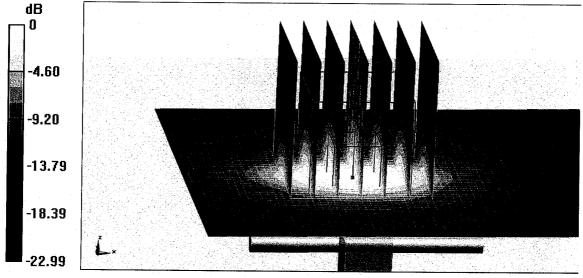
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 99.07 V/m; Power Drift = 0.01 dB

Peak SAR (extrapolated) = 31.1 W/kg

SAR(1 g) = 14.4 W/kg; SAR(10 g) = 6.5 W/kg

Maximum value of SAR (measured) = 24.7 W/kg



0 dB = 24.7 W/kg = 13.93 dBW/kg

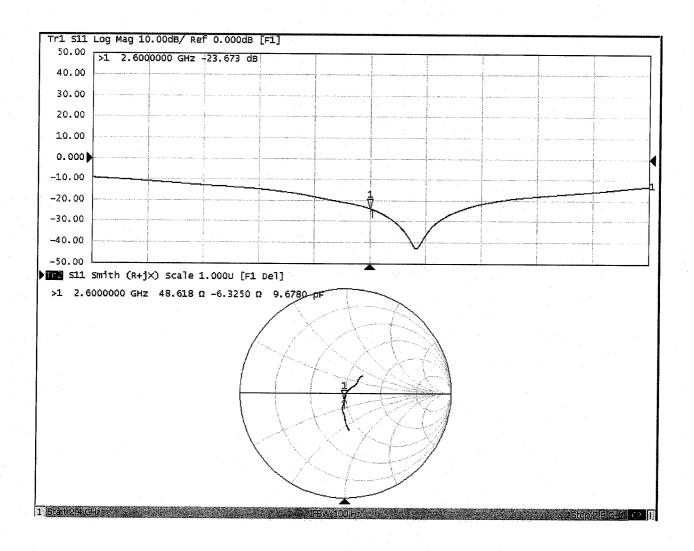


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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2600 MHz; Type: D2600V2; Serial: D2600V2 - SN: 1070

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

Medium parameters used: f = 2600 MHz; $\sigma = 2.181$ S/m; $\epsilon_r = 51.03$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

 Probe: EX3DV4 - SN7514; ConvF(7.06, 7.06, 7.06) @ 2600 MHz; Calibrated: 8/27/2018

Date: 12.06.2018

- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1555; Calibrated: 8/20/2018
- Phantom: MFP_V5.1C; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (2); SEMCAD X Version 14.6.12 (7450)

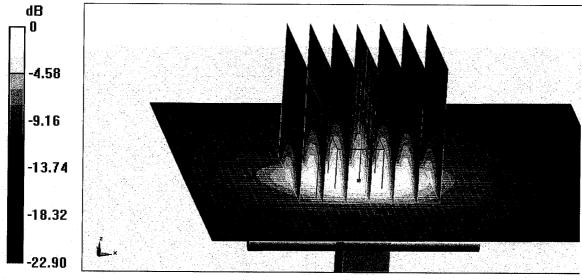
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 87.90 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 29.5 W/kg

SAR(1 g) = 13.8 W/kg; SAR(10 g) = 6.18 W/kg

Maximum value of SAR (measured) = 23.6 W/kg



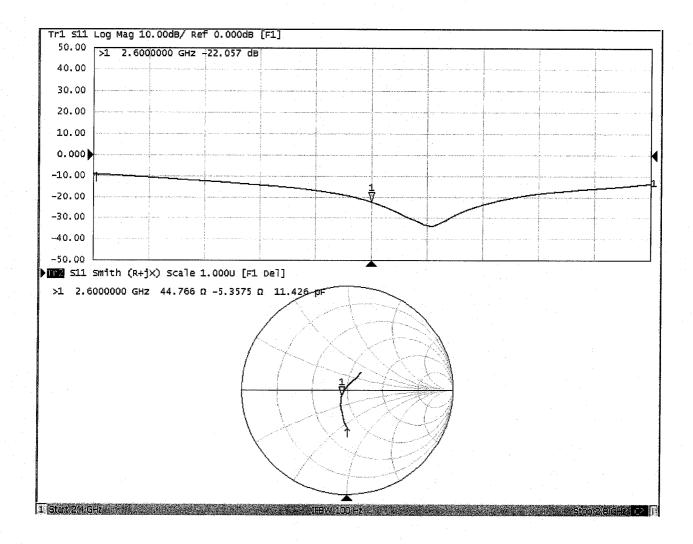
0 dB = 23.6 W/kg = 13.73 dBW/kg



S D E A G

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Impedance Measurement Plot for Body TSL





D2600V2, Serial No. 1070 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.

					D2600V2 – s	serial no.	1070					
			2600 He	ad					2600 B	ody		
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)
2018.12.7	-23.7		48.6		-6.33		-22.1		44.8		-5.36	
2019.11.25	-23.1	2.5	48.6	0	-6.82	-0.49	-22.0	0.5	45.3	0.5	-4.65	0.71
2020.11.25	-23.5	0.8	48.8	0.2	-5.93	0.4	-22.0	0.5	44.5	-0.3	-5.04	0.32

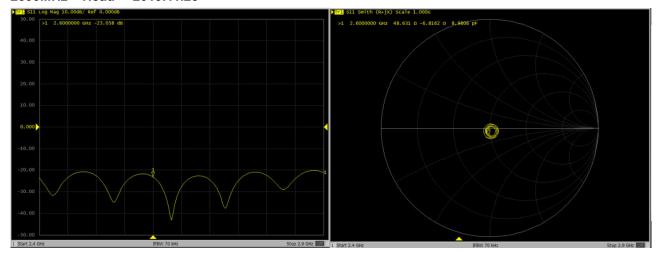
<Justification of the extended calibration>

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.

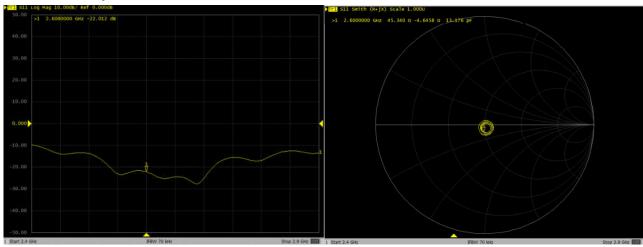


Dipole Verification Data> D2600V2, serial no. 1070

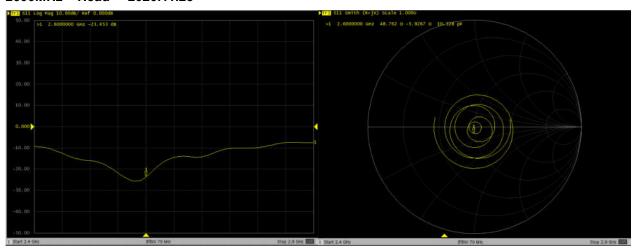
2600MHz - Head----2019.11.25



2600MHz - Body----2019.11.25

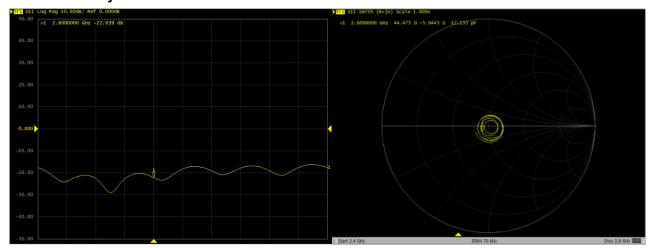


2600MHz - Head----2020.11.25





2600MHz - Body----2020.11.25



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





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

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Client

Sporton

Accreditation No.: SCS 0108

S

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

Calibrated by:

Name

Function

Signature

Cambrated by

Approved by:

Eric Hainfeld

Sven Kühn

Laboratory Technician

Deputy Manager

Issued: July 7, 2020

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Certificate No: DAE4-1303_Jul20

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Calibration Laboratory of Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland





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

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA

Multilateral Agreement for the recognition of calibration certificates

Accreditation No.: SCS 0108

Glossary

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.

Certificate No: DAE4-1303_Jul20 Page 2 of 5

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		4.00177 ± 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

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	8	0.82	-4.08
Channel Y	200	7.63		2.53
Channel Z	200	10.14	5.17	<u>:</u>

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 10MO

	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)

hannel Y	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

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





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

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

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

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

Issued: September 29, 2020

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

Calibration Laboratory of

Schmid & Partner
Engineering AG
Zeughausstrasse 43, 8004 Zurich, Switzerland





S Schweizerischer Kalibrierdienst
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Swiss Calibration Service

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

The Swiss Accreditation Service is one of the signatories to the EA Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL NORMx,y,z tissue simulating liquid sensitivity in free space

ConvF DCP

sensitivity in TSL / NORMx,y,z diode compression point

CF A, B, C, D crest factor (1/duty_cycle) of the RF signal modulation dependent linearization parameters

Polarization φ

o rotation around probe axis

Polarization 9

9 rotation around an axis that is in the plane normal to probe axis (at measurement center),

i.e., 9 = 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
- iEC 62209-1, ", "Measurement procedure for the assessment of Specific Absorption Rate (SAR) from handheld and body-mounted devices used next to the ear (frequency range of 300 MHz to 6 GHz)", July 2016
- 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 9 = 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 E²-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).

Certificate No: ES3-3293_Sep20 Page 2 of 9

ES3DV3 - SN:3293

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

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm (µV/(V/m) ²) ^A	1.10	0.90	0.73	± 10.1 %
DCP (mV) ⁸	102.3	109.5	106.9	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB√μV	С	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%.

^B Numerical linearization parameter: uncertainty not required.

A The uncertainties of Norm X,Y,Z do not affect the E2-field uncertainty inside TSL (see Page 5).

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

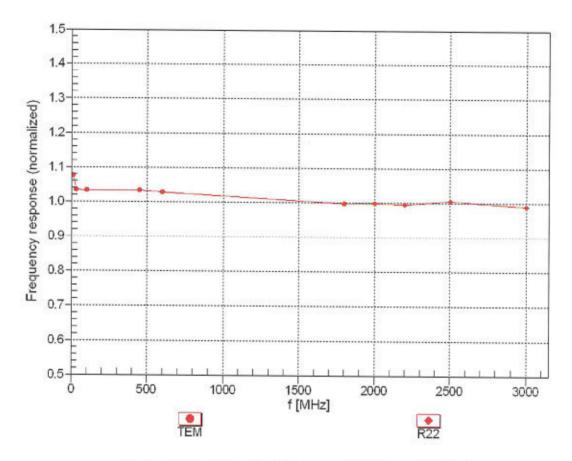
f (MHz) ^C	Relative Permittivity F	Conductivity (S/m) ^F	ConvF X	ConvF Y	ConvF Z	Alpha ^G	Depth ^G (mm)	Unc (k=2)
750	41.9	0.89	6.51	6.51	6.51	0.80	1.18	± 12.0 %
835	41.5	0.90	6.43	6.43	6.43	0.78	1.16	± 12.0 %
900	41.5	0.97	6.24	6.24	6.24	0.80	1.18	± 12.0 %
1750	40.1	1.37	5.37	5.37	5.37	0.63	1.28	± 12.0 %
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 %

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.

At frequencies below 3 GHz, the validity of tissue parameters (ϵ and σ) can be relaxed to \pm 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 \pm 5%. The uncertainty is the RSS of the ConvF uncertainty for indicated target tissue parameters.

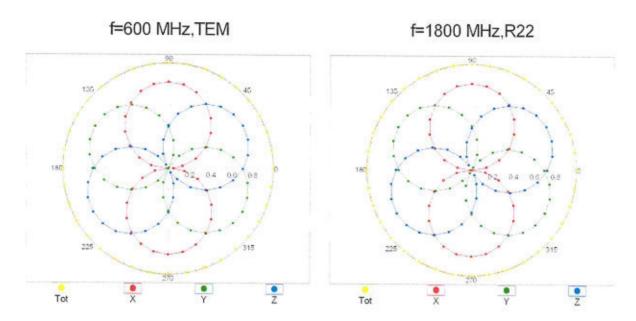
⁶ Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for frequencies between 3-6 GHz at any distance larger than half the probe tip diameter from the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

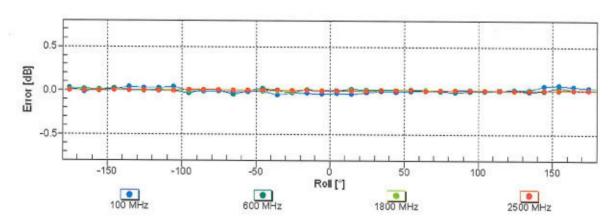
Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



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

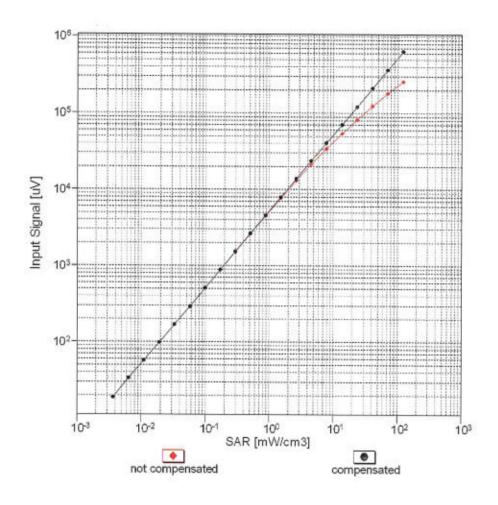
Receiving Pattern (ϕ), $\vartheta = 0^{\circ}$

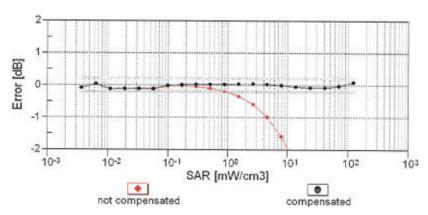




Uncertainty of Axial Isotropy Assessment: ± 0.5% (k=2)

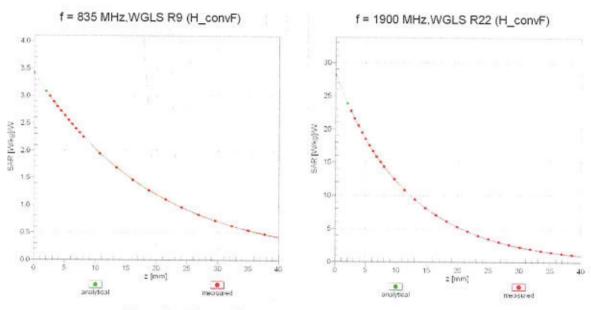
Dynamic Range f(SAR_{head}) (TEM cell , f_{eval}= 1900 MHz)



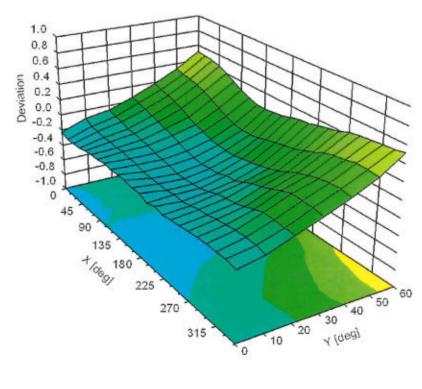


Uncertainty of Linearity Assessment: ± 0.6% (k=2)

Conversion Factor Assessment



Deviation from Isotropy in Liquid Error (φ, θ), f = 900 MHz



Appendix E. Conducted RF Output Power Table

Report No. : FA0N1002

The detailed power table are shown as follows.

Sporton International (Kunshan) Inc.

FCC ID : IHDT56YS4 Page E1 of E1 Form version. : 200414



GSM850	Burst.	Average Powe	r (dBm)	Tune-up	Frame	Tune-up		
TX Channel	128	189	251	Limit	128	189	251	Limit
Frequency (MHz)	824.2	836.4	848.8	(dBm)	824.2	836.4	848.8	(dBm)
GSM 1 Tx slot	32.42	32.38	32.41	33.50	23.42	23.38	23.41	24.50
GPRS 1 Tx slot	32.41	32.36	32.40	33.50	23.41	23.36	23.40	24.50
GPRS 2 Tx slots	30.41	30.28	30.18	31.00	24.41	24.28	24.18	25.00
GPRS 3 Tx slots	28.49	28.50	28.31	29.50	24.23	24.24	24.05	25.24
GPRS 4 Tx slots	26.34	26.23	26.19	27.00	23.34	23.23	23.19	24.00
EDGE 1 Tx slot	25.36	25.71	25.26	26.50	16.36	16.71	16.26	17.50
EDGE 2 Tx slots	24.45	24.66	24.29	25.50	18.45	18.66	18.29	19.50
EDGE 3 Tx slots	21.73	21.99	21.64	22.50	17.47	17.73	17.38	18.24
EDGE 4 Tx slots	19.28	19.64	19.36	20.50	16.28	16.64	16.36	17.50

			Receiver On					
GSM1900	Burst	Average Powe	r (dBm)	Tune-up	Frame-	Tune-up		
TX Channel	512	661	810	Limit	512	661	810	Limit
Frequency (MHz)	1850.2	1880	1909.8	(dBm)	1850.2	1880	1909.8	(dBm)
GSM 1 Tx slot	29.16	29.20	29.29	30.50	20.16	20.20	20.29	21.50
GPRS 1 Tx slot	29.15	29.19	29.27	30.50	20.15	20.19	20.27	21.50
GPRS 2 Tx slots	26.98	26.88	26.76	27.50	20.98	20.88	20.76	21.50
GPRS 3 Tx slots	25.49	25.50	25.26	26.50	21.23	21.24	21.00	22.24
GPRS 4 Tx slots	23.48	23.35	23.21	24.50	20.48	20.35	20.21	21.50
EDGE 1 Tx slot	25.20	25.45	25.12	26.50	16.20	16.45	16.12	17.50
EDGE 2 Tx slots	23.20	23.14	23.10	24.00	17.20	17.14	17.10	18.00
EDGE 3 Tx slots	20.07	20.43	20.36	21.50	15.81	16.17	16.10	17.24
EDGE 4 Tx slots	17.32	17.54	17.16	18.50	14.32	14.54	14.16	15.50

					Recei	ver On				Receiver On	/ Receiver O	ff / Hotspot O	n / Extremity
	Band		WCDMA II			WCDMA IV							
	TX Channel	9262	9400	9538	Tune-up	1312	1413	1513	Tune-up	4132	4182	4233	Tune-up
	Rx Channel	9662	9800	9938	Limit (dBm)	1537	1638	1738	Limit (dBm)	4357	4407	4458	Limit (dBm)
Fre	equency (MHz)	1852.4	1880	1907.6	(GDIII)	1712.4	1732.6	1752.6	(GDIII)	826.4	836.4	846.6	(00111)
3GPP Rel 99	AMR 12.2Kbps	23.20	23.24	23.22	24.00	23.10	23.11	22.84	24.00	23.19	23.20	23.21	24.00
3GPP Rel 99	RMC 12.2Kbps	23.21	23.26	23.24	24.00	23.16	23.17	22.99	24.00	23.22	23.23	23.22	24.00
3GPP Rel 6	HSDPA Subtest-1	22.56	22.47	22.61	23.00	22.32	22.33	22.23	23.00	22.44	22.52	22.69	23.00
3GPP Rel 6	HSDPA Subtest-2	22.43	22.34	22.21	23.00	22.45	22.23	22.54	23.00	22.23	22.28	22.41	23.00
3GPP Rel 6	HSDPA Subtest-3	22.03	22.12	22.01	22.50	22.07	22.00	22.17	22.50	21.99	21.99	22.12	22.50
3GPP Rel 6	HSDPA Subtest-4	22.01	21.98	22.01	22.50	22.08	22.04	22.18	22.50	21.95	21.91	22.03	22.50
3GPP Rel 8	DC-HSDPA Subtest-1	22.53	22.45	22.58	23.00	22.29	22.31	22.20	23.00	22.42	22.48	22.66	23.00
3GPP Rel 8	DC-HSDPA Subtest-2	22.40	22.32	22.18	23.00	22.42	22.21	22.51	23.00	22.21	22.24	22.38	23.00
3GPP Rel 8	DC-HSDPA Subtest-3	22.00	22.10	21.98	22.50	22.04	21.98	22.14	22.50	21.97	21.95	22.09	22.50
3GPP Rel 8	DC-HSDPA Subtest-4	21.98	21.96	21.98	22.50	22.05	22.02	22.15	22.50	21.93	21.87	22.00	22.50
3GPP Rel 6	HSUPA Subtest-1	22.45	22.54	22.55	23.00	22.12	22.22	22.32	23.00	22.65	22.67	22.57	23.00
3GPP Rel 6	HSUPA Subtest-2	20.56	20.62	20.25	21.00	19.97	19.96	20.14	21.00	20.98	20.77	20.87	21.00
3GPP Rel 6	HSUPA Subtest-3	21.44	21.43	21.31	22.00	20.44	20.43	20.61	22.00	21.77	21.78	21.86	22.00
3GPP Rel 6	HSUPA Subtest-4	20.63	20.68	20.80	21.00	20.27	19.99	20.44	21.00	20.88	20.92	20.73	21.00
3GPP Rel 6	HSUPA Subtest-5	22.55	22.65	22.65	23.00	22.10	22.20	22.20	23.00	22.50	22.40	22.50	23.00
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	20.31	20.15	20.21	20.50	20.01	19.95	19.97	20.50	20.01	20.11	20.13	20.50



			Band :	2 (1900MHz 24E Receiv	Band) er On			
BW [MHz]	Modulation Cha		RB Offset	Power Low Ch. / Freq. 18700	Power Middle Ch. / Freq. 18900	Power High Ch. / Freq. 19100	Tune-up limit (dBm)	MPR (dB)
20 20	Frequent QPSK QPSK	1	0	1860 22.57 22.58	1880 22.76 22.73	1900 22.72 22.60	24	0
20 20 20	QPSK QPSK QPSK	1 50 50	99 0 24	22.51 21.63 21.63	22.57 21.72 21.71	22.59 21.53 21.54	23	1
20 20 20	QPSK QPSK 16QAM	50 100 1	50 0 0	21.47 21.70 21.45	21.56 21.71 21.08	21.54 21.52 21.50	23	
20 20 20	16QAM 16QAM 16QAM	1 1 50	49 99 0	21.53 21.32 20.26	21.10 21.05 20.25	21.48 21.28 20.32	23	1
20 20	16QAM 16QAM	50 50	24 50	20.13 20.18	20.37 20.09	20.15 20.23	22	2
20 20 20	16QAM 64QAM 64QAM	100 1 1	0 0 49	20.14 20.33 20.39	20.36 20.68 20.25	20.39 20.73 20.43	22	2
20 20 20	64QAM 64QAM 64QAM	1 50 50	99 0 24	20.43 19.55 19.37	20.27 19.65 19.58	20.50 19.51 19.38	21	3
20 20	64QAM 64QAM Cha	50 100	50 0	19.48 19.45 18675	19.47 19.66 18900	19.50 19.50 19125	Tune-up	MPR
15	Frequent QPSK	cy (MHz) 1	0	1857.5 22.63	1880 22.50	1902.5 22.56	limit (dBm)	(dB)
15 15 15	QPSK QPSK QPSK	1 1 36	37 74 0	22.57 22.60 21.62	22.55 22.43 21.65	22.56 22.57 21.52	24	0
15 15 15	QPSK QPSK QPSK	36 36 75	20 39 0	21.54 21.61 21.66	21.57 21.54 21.53	21.56 21.54 21.53	23	1
15 15 15	16QAM 16QAM 16QAM	1 1	0 37 74	21.51 21.58 21.20	21.33 21.59 21.25	21.56 21.49 21.62	23	1
15 15	16QAM 16QAM	36 36	0 20	20.22 20.26	20.43 20.32	20.26 20.29	22	2
15 15 15	16QAM 16QAM 64QAM	36 75 1	39 0 0	20.17 20.07 20.73	20.20 20.20 20.71	20.26 20.16 20.34		
15 15 15	64QAM 64QAM 64QAM	1 1 36	37 74 0	20.69 20.35 19.62	20.59 20.37 19.78	20.36 20.80 19.67	22	2
15 15 15	64QAM 64QAM	36 36	20 39	19.63 19.56	19.65 19.45	19.45 19.68 19.41	21	3
15	64QAM Cha Frequent		0	18650 1855	18900 1880	19150 1905	Tune-up limit (dBm)	MPR (dB)
10 10 10	QPSK QPSK QPSK	1 1	0 25 49	22.53 22.57 22.58	22.52 22.51 22.44	22.51 22.55 22.54	24	0
10 10	QPSK QPSK QPSK	25 25 25	0 12 25	21.59 21.63 21.59	21.74 21.61 21.64	21.49 21.57 21.53	23	1
10 10	QPSK 16QAM	50 1	0	21.55 21.43	21.64 21.92	21.58 21.85		
10 10 10	16QAM 16QAM 16QAM	1 1 25	25 49 0	21.72 21.48 20.13	21.48 21.57 20.07	21.47 21.74 20.16	23	1
10 10 10	16QAM 16QAM	25 25	12 25 0	20.19 20.18 20.17	20.14 20.21 20.19	20.14 20.20 20.14	22	2
10 10	16QAM 64QAM 64QAM	50 1 1	0 25	20.68 20.45	20.44 20.74	20.55 20.73	22	2
10 10 10	64QAM 64QAM 64QAM	25 25	49 0 12	20.47 19.52 19.65	20.46 19.55 19.63	20.50 19.37 19.46	21	3
10 10	64QAM 64QAM Cha	25 50 nnel	25 0	19.33 19.46 18625	19.39 19.67 18900	19.44 19.45 19175	Tune-up	MPR
5	Frequent QPSK	cy (MHz) 1	0	1852.5 22.74	1880 22.71	1907.5 22.59	limit (dBm)	(dB)
5 5 5	QPSK QPSK QPSK	1 1 12	12 24 0	22.63 22.62 21.43	22.52 22.50 21.70	22.53 22.59 21.60	24	0
5 5 5	QPSK QPSK QPSK	12 12 25	7 13 0	21.65 21.54 21.61	21.58 21.55 21.68	21.61 21.61 21.56	23	1
5 5 5	16QAM 16QAM 16QAM	1 1	0 12 24	21.63 21.76 21.50	21.47 21.43 21.46	21.75 21.35 21.52	23	1
5	16QAM 16QAM	12	0 7	20.49 20.19	20.36 20.09	20.08 20.21	22	2
5 5 5	16QAM 16QAM 64QAM	12 25 1	13 0 0	20.22 20.11 20.52	20.24 20.14 20.43	20.35 20.22 20.13		
5 5	64QAM 64QAM	1 1 12	12 24 0	20.36 20.28 19.27	20.21 20.35 19.54	20.51 20.31 19.39	22	2
5 5 5	64QAM 64QAM 64QAM	12 12 25	7 13 0	19.26 19.33 19.38	19.23 19.22 19.41	19.21 19.50 19.49	21	3
	Cha Frequent	nnel		18615 1851.5	18900 1880	19185 1908.5	Tune-up limit (dBm)	MPR (dB)
3 3 3	QPSK QPSK QPSK	1 1 1	0 8 14	22.46 22.53 22.43	22.64 22.57 22.70	22.43 22.42 22.35	24	0
3 3 3	QPSK QPSK QPSK	8 8 8	0 4 7	21.63 21.57 21.55	21.64 21.68 21.64	21.67 21.53 21.54	23	1
3 3	QPSK 16QAM 16QAM	15 1	0	21.66 21.55	21.51 21.35	21.60 21.58 21.58	22	,
3	16QAM 16QAM	1 8	8 14 0	21.33 21.59 20.42	21.21 21.19 20.25	21.43 20.39	23	1
3 3 3	16QAM 16QAM 16QAM	8 8 15	4 7 0	20.26 20.28 20.22	20.38 20.19 20.20	20.03 20.30 20.32	22	2
	64QAM 64QAM	1 1	0 8 14	20.32 20.41 20.36	20.25 20.27 20.47	20.66 20.44 20.52	22	2
3		8	0 4	19.41 19.53	19.69 19.52	19.33 19.32	21	3
3 3 3 3	64QAM 64QAM 64QAM	8			19.47	19.52 19.47		
3 3 3 3	64QAM 64QAM 64QAM 64QAM Cha	8 15 nnel	7	19.26 19.43 18607	19.59 18900	19193	Tune-up limit	MPR
3 3 3 3 3 3 3	64QAM 64QAM 64QAM 64QAM	8 15 nnel	7	19.43	18900 1880 22.51	19193 1909.3 22.46 22.38	Tune-up limit (dBm)	MPR (dB)
3 3 3 3 3 3 3 3 3 4 1.4 1.4 1.4	64QAM 64QAM 64QAM Cha Frequent QPSK QPSK QPSK QPSK	8 15 nnel cy (MHz) 1 1 1	7 0 3 5	19.43 18607 1850.7 22.52 22.48 22.52 22.60	18900 1880 22.51 22.71 22.56 22.64	19193 1909.3 22.46 22.38 22.57 22.63		
3 3 3 3 3 3 3 3 3 4 1.4 1.4 1.4 1.4 1.4 1.4	64QAM 64QAM 64QAM 64QAM Cha Frequent QPSK QPSK QPSK QPSK QPSK QPSK QPSK QPSK	8 15 nnel cy (MHz) 1 1 1 3 3 3	7 0 3 5 0 1 3	19.43 18607 1850.7 22.52 22.48 22.52 22.60 22.67 22.65 21.60	18900 1880 22.51 22.71 22.56 22.64 22.74 22.66 21.60	19193 1909.3 22.46 22.38 22.57 22.63 22.69 22.56 21.50	limit (dBm)	(dB)
3 3 3 3 3 3 3 3 3 4 1.4 1.4 1.4 1.4 1.4	64QAM 64QAM 64QAM Cha Frequent QPSK QPSK QPSK QPSK QPSK QPSK QPSK QPSK	8 15 nnel cy (MHz) 1 1 1 3 3	7 0 3 5 0	19.43 18607 1850.7 22.52 22.48 22.52 22.60 22.67 22.65	18900 1880 22.51 22.71 22.56 22.64 22.74 22.66	19193 1909.3 22.46 22.38 22.57 22.63 22.69 22.56	limit (dBm) 24 23	(dB)
3 3 3 3 3 3 3 3 3 3 3 4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1	64QAM 64QAM 64QAM Cha Frequent QPSK QPSK QPSK QPSK QPSK QPSK QPSK QPSK	8 15 nnel cy (MHz) 1 1 1 3 3 3 6 1 1 1 1 3 3 3 3 3 6 1 1 1 1	7 0 3 5 0 1 3 0 0 0 3 5	19.43 1850.7 1850.7 22.52 22.48 22.52 22.60 22.67 22.65 21.60 21.35 21.17 21.18 21.38 21.43	18900 1880 22.51 22.71 22.56 22.64 22.74 22.66 21.60 21.23 21.55 21.42 21.33 21.33	19193 1909.3 22.46 22.38 22.57 22.63 22.69 22.56 21.50 21.52 21.62 21.66 21.38 21.43	limit (dBm)	(dB) 0
3 3 3 3 3 3 3 3 3 3 3 3 3 4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1	640AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM	8 15 15 15 15 15 15 15 15 15 15 15 15 15	7 0 3 5 5 0 1 1 3 0 0 0 3 5 5 0 1 1 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.43 18607 1850.7 22.52 22.48 22.52 22.60 22.67 21.35 21.17 21.18 21.38 21.43 21.43 21.49 20.05 20.73	18900 1880 22.51 22.71 22.56 22.64 22.74 22.66 21.62 21.23 21.33 21.33 21.37 20.19 20.75	19193 1909.3 22.46 22.38 22.57 22.63 22.69 22.56 21.50 21.52 21.62 21.62 21.62 21.43 21.43 21.41 20.23	limit (dBm) 24 23	(dB)
3 3 3 3 3 3 3 3 3 3 3 3 3 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.4	640AM 640AM 640AM 640AM 640AM 640AM 640AM 0PSK 0PSK 0PSK 0PSK 0PSK 0PSK 0PSK 160AM 160AM 160AM 160AM 160AM	8 15 nnel cy (MHz) 1 1 1 3 3 3 6 1 1 1 3 3 3 3 6 6 6 6 6 6	7 0 3 5 0 1 3 0 0 0 3 5	19.43 18607 1850.7 22.52 22.48 22.52 22.60 22.67 22.65 21.60 21.35 21.17 21.18 21.38 21.49 20.05	18900 1880 22.51 22.71 22.56 22.64 22.74 22.66 21.62 21.23 21.33 21.33 21.33 21.37 21.27	19193 1909.3 22.46 22.38 22.57 22.63 22.56 21.50 21.52 21.62 21.62 21.62 21.41 21.41 20.23	24 23 23	0 1 1

		Part 27		d 4 (AWS B		iver On		
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit	MPR
20	Cha Frequen QPSK	nnel cy (MHz)	0	20050 1720 22.68	20175 1732.5 22.89	20300 1745 22.81	(dBm)	(dB)
20 20	QPSK QPSK	1	49 99	22.73 22.50	22.74 22.75	22.69 22.55	24	0
20 20 20 20	QPSK QPSK QPSK QPSK	50 50 50 100	0 24 50 0	21.78 21.85 21.70 21.81	21.86 21.65 21.75 21.82	21.72 21.68 21.63 21.63	23	1
20 20	16QAM 16QAM	1	0 49	21.73 21.76	21.76 21.79	21.41	23	1
20 20 20	16QAM 16QAM 16QAM	50 50	99 0 24	21.57 20.28 20.07	21.48 20.44 20.38	21.54 20.45 20.13		
20 20	16QAM 16QAM	50 100	50 0	20.51 20.42	20.32 20.41	20.25 20.36	22	2
20 20 20 20	64QAM 64QAM	1 1 1 50	0 49 99 0	20.04 20.19 20.05 19.68	20.34 20.35 20.14 19.65	20.37 20.24 20.35 19.73	22	2
20 20 20	64QAM 64QAM	50 50	24 50	19.50 19.91	19.65 19.58	19.63 19.59	21	3
20	64QAM Cha		0	19.66 20025 1717.5	19.69 20175 1732.5	19.46 20325 1747.5	Tune-up limit	MPR (dB)
15 15	Frequen QPSK QPSK	1 1	0	22.61 22.69	22.71	22.68 22.55	(dBm) 24	0
15 15	QPSK QPSK QPSK	1 36 36	74 0	22.59	22.65	22.52		
15 15 15	QPSK QPSK QPSK	36 75	20 39 0	21.77 21.73 21.82	21.64 21.66 21.67	21.63 21.60 21.70	23	1
15 15	16QAM 16QAM 16QAM	1	37	21.61	21.99 21.93 21.50	21.71	23	1
15 15 15	16QAM 16QAM	1 36 36	74 0 20	21.95 20.37 20.35	20.35 20.30	21.76 20.37 20.42		
15 15	16QAM 16QAM	36 75	39 0	20.21 20.45	20.30 20.36	20.32 20.32	22	2
15 15 15	64QAM 64QAM	1 1	0 37 74	20.61 20.62 20.59	20.95 20.83 20.59	20.78 20.53 20.50	22	2
15 15	64QAM 64QAM	36 36	0 20	19.64 19.71	19.59 19.63	19.75 19.85	21	3
15 15	64QAM 64QAM Cha	36 75 nnel	39 0	19.68 19.69 20000	19.54 19.70 20175	19.56 19.57 20350	Tune-up	MPR
10	Frequen		0	1715 22.63	1732.5 22.64	1750 22.69	limit (dBm)	(dB)
10 10	QPSK QPSK	1	25 49	22.65 22.77	22.70 22.62	22.60 22.49	24	0
10 10 10	QPSK QPSK QPSK	25 25 25	0 12 25	21.77 21.75 21.74	21.78 21.70 21.74	21.61 21.57 21.66	23	1
10 10	QPSK 16QAM	50 1	0	21.83 21.81	21.71 21.89	21.69 21.81		
10 10 10	16QAM 16QAM 16QAM	1 1 25	25 49 0	21.78 21.82 20.40	21.53 21.81 20.39	21.56 21.57 20.20	23	1
10 10	16QAM 16QAM	25 25	12 25	20.23	20.24	20.12	22	2
10	16QAM 64QAM	50 1	0	20.25	20.30	20.33	22	2
10 10 10	64QAM 64QAM 64QAM	1 1 25	25 49 0	20.63 20.40 19.59	20.85 20.44 19.62	20.54 20.41 19.37	22	2
10 10	64QAM 64QAM	25 25	12 25	19.71 19.65	19.80 19.68	19.32 19.41	21	3
10	64QAM Cha Frequen		0	19.58 19975 1712.5	19.67 20175 1732.5	19.58 20375 1752.5	Tune-up limit	MPR (dB)
5 5	QPSK QPSK	1	0 12	22.40 22.60	22.71 22.69	22.58 22.41	(dBm) 24	0
5 5 5	QPSK QPSK QPSK	1 12 12	24 0 7	22.60 21.73 21.70	22.75 21.66 21.66	22.47 21.50 21.69		
5 5	QPSK QPSK	12 25	13 0	21.72 21.78	21.69 21.63	21.55 21.67	23	1
5 5 5	16QAM 16QAM 16QAM	1 1	0 12 24	21.77 21.81 21.75	21.89 21.76 21.77	21.50 21.47 21.83	23	1
5	16QAM 16QAM	12	0 7	20.43	20.55	20.05	22	2
5 5 5	16QAM 16QAM 64QAM	12 25 1	13 0 0	20.34	20.12	20.16 20.14 20.28	22	2
5 5	64QAM 64QAM	1 1	12 24	20.67 20.63 20.75	20.72 20.51 20.39	20.64	22	2
5 5 5	64QAM 64QAM	12 12 12	0 7 13	19.43 19.42	19.44 19.54 19.34	19.18 19.06 19.29	21	3
5	64QAM Cha	25	0	19.49 19965	19.52 20175	19.41 20385	Tune-up	MPR
3	Frequen QPSK	1	0	1711.5 22.73	1732.5 22.66	1753.5 22.55	limit (dBm)	(dB)
3 3 3	QPSK QPSK QPSK	1 1 8	8 14 0	22.74 22.74 21.80	22.53 22.53 21.71	22.46 22.54 21.62	24	0
3	QPSK QPSK	8	4 7	21.74 21.84	21.75 21.69	21.61 21.58	23	1
3 3 3	16QAM 16QAM	15 1	0 0 8	21.69 21.82 21.39	21.72 21.84 21.76	21.65 21.71 21.66	23	1
3	16QAM 16QAM	1 8	14 0	21.74 20.51	21.51 20.51	21.59 20.33		
3 3 3	16QAM 16QAM	8 8 15	4 7 0	20.35 20.24 20.41	20.47 20.37 20.31	20.15 20.31 20.32	22	2
3	64QAM 64QAM	1	0 8	20.29 20.55	20.62 20.26	20.69 20.59	22	2
3 3 3	64QAM 64QAM 64QAM	1 8 8	14 0 4	20.64 19.68 19.50	20.66 19.46 19.67	20.63 19.23 19.26		
3	64QAM 64QAM	8 15	7	19.56 19.65	19.46 19.63	19.31 19.49	21 Tune-up	3
1.4	Cha Frequen QPSK		0	19957 1710.7 22.60	20175 1732.5 22.68	20393 1754.3 22.62	limit (dBm)	MPR (dB)
1.4 1.4	QPSK QPSK	1	3 5	22.66 22.74	22.64 22.57	22.54 22.58	24	0
1.4 1.4 1.4	QPSK QPSK QPSK	3 3 3	1 3	22.69 22.73 22.68	22.75 22.71 22.65	22.69 22.56 22.69		
1.4 1.4 1.4	QPSK QPSK 16QAM	6 1	0	21.67 21.57	21.69 21.49	21.64 21.48	23	1
1.4 1.4	16QAM 16QAM	1	3 5	21.84 21.81	21.85	21.38 21.57	23	1
1.4 1.4 1.4	16QAM 16QAM 16QAM	3 3 3	0 1 3	21.57 21.60 21.59	21.50 21.49 21.40	21.38 21.10 21.43		
1.4 1.4	16QAM 64QAM	6 1	0	20.32 20.55	20.31 20.67	20.09 20.97	22	2
1.4 1.4 1.4	64QAM 64QAM 64QAM	1 1 3	3 5 0	20.52 20.65 20.64	20.49 20.50 20.80	20.88 20.97 20.54	22	2
1.4 1.4	64QAM 64QAM	3	1 3	20.74 20.88	20.47 20.63	20.50 20.74		
1.4	64QAM	6	0	19.40	19.61	19.35	21	3

			Band Part 22H(on	5 (Celluar	Band)	n			
		Receive	On / Recei	ver Off / Ho	tspot On / E	extremity			
BW [MHz]	Modulation		RB Offset	Power Low	Power Middle	Power High		MPR	
	Cha	nnel		Ch. / Freq. 20450	Ch. / Freq. 20525	Ch. / Freq. 20600	limit (dBm)	(dB)	
	Frequen			829	836.5	844	` '		
10 10	QPSK QPSK	1	0 25	23.23	23.46	23.29	24	0	
10	QPSK	1	49	23.20	23.27	23.31	24		
10	QPSK	25	0	22.19	22.38	22.16			
10	QPSK QPSK	25 25	12 25	22.24	22.37	22.08	23	1	
10	QPSK	25 50	0	22.23	22.31	22.19			
10	16QAM	1	0	21.52	21.49	21.70			
10	16QAM	1	25	21.37	21.34	21.20	23	1	
10 10	16QAM 16QAM	1 25	49 0	21.54	21.35	21.27			
10	16QAM	25	12	20.43	20.50	20.43			
10	16QAM	25	25	20.59	20.52	20.32	22	2	
10 10	16QAM 64QAM	50 1	0	20.23	20.31	20.30			
10	64QAM	1	25	20.77	20.63	20.79	22	2	
10	64QAM	1	49	20.54	20.83	20.54			
10	64QAM	25	0	19.79	19.64	19.63			
10 10	64QAM 64QAM	25 25	12 25	19.68 19.73	19.76 19.82	19.60 19.49	21	3	
10	64QAM	50	0	19.48	19.62	19.52			
	Cha			20425	20525	20625	Tune-up limit	MPR	
	Frequen			826.5	836.5	846.5	(dBm)	(dB)	
5 5	QPSK QPSK	1	0 12	23.18	23.30 23.10	23.15	24	0	
5	QPSK	1	24	23.34	23.10	23.11	2.4		
5	QPSK	12	0	22.32	22.32	22.08			
5	QPSK	12	7	22.11	22.10	22.10	23	1	
5 5	QPSK QPSK	12 25	13	22.28	22.30	22.08			
5	16QAM	1	0	21.53	21.57	21.67			
5	16QAM	1	12	21.57	21.66	21.97	23	1	
5 5	16QAM 16QAM	1 12	24 0	22.00	22.01	21.55			
5	16QAM	12	7	20.25	20.33	20.40	22	2	
5	16QAM	12	13	20.38	20.32	20.10	22	2	
5	16QAM	25	0	20.39	20.49	20.16			
5 5	64QAM 64QAM	1	0 12	20.77	20.59	20.70	22	2	
5	64QAM	1	24	20.52	20.66	20.40		_	
5	64QAM	12	0	19.47	19.67	19.31			
5 5	64QAM 64QAM	12 12	7 13	19.47 19.30	19.68 19.70	19.34 19.32	21	3	
5	64QAM		0	19.58	19.70	19.32			
	Cha	nnel		20415	20525	20635	Tune-up	MPR	
		cy (MHz)		825.5	836.5	847.5	limit (dBm)	(dB)	
3	QPSK QPSK	1	0 8	22.91	23.30	23.16	24	0	
3	QPSK	1	14	23.13	23.35	23.06	24		
3	QPSK	8	0	22.19					
					22.29	22.18			
	QPSK		4	22.25	22.25	22.27	23	1	
3	QPSK QPSK	8	7		22.25 22.38		23	1	
3	QPSK QPSK 16QAM	8	7	22.25 22.28 22.22 21.56	22.25 22.38 22.28 21.62	22.27 22.22 22.38 21.83			
3 3 3 3	QPSK QPSK 16QAM 16QAM	8 15 1	7 0 0 8	22.25 22.28 22.22 21.56 21.49	22.25 22.38 22.28 21.62 21.56	22.27 22.22 22.38 21.83 21.70	23	1	
3 3	QPSK QPSK 16QAM 16QAM	8 15 1 1	7 0 0 8 14	22.25 22.28 22.22 21.56 21.49 21.48	22.25 22.38 22.28 21.62 21.56 21.47	22.27 22.22 22.38 21.83 21.70 21.72			
3 3 3 3 3	QPSK QPSK 16QAM 16QAM 16QAM 16QAM	8 15 1	7 0 0 8	22.25 22.28 22.22 21.56 21.49	22.25 22.38 22.28 21.62 21.56	22.27 22.22 22.38 21.83 21.70	23	1	
3 3 3 3 3 3 3	QPSK QPSK 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM	8 15 1 1 1 8 8	7 0 0 8 14 0 4	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.30 20.51	22.25 22.38 22.28 21.62 21.56 21.47 20.24 20.35 20.49	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.06 20.23			
3 3 3 3 3 3 3 3	QPSK QPSK 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM	8 15 1 1 1 8	7 0 0 8 14 0 4 7	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.30 20.51 20.36	22.25 22.38 22.28 21.62 21.56 21.47 20.24 20.35 20.49 20.08	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.06 20.23 20.26	23	1	
3 3 3 3 3 3 3	QPSK QPSK 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 64QAM	8 15 1 1 1 8 8	7 0 0 8 14 0 4	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.30 20.51	22.25 22.38 22.28 21.62 21.56 21.47 20.24 20.35 20.49	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.06 20.23	23	1	
3 3 3 3 3 3 3 3 3	QPSK QPSK 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 64QAM 64QAM	8 15 1 1 1 8 8 8 8 15 1	7 0 0 8 14 0 4 7 0 0 8	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.30 20.51 20.36 20.46 20.37 20.36	22.25 22.38 22.28 21.62 21.56 21.47 20.24 20.35 20.49 20.08 20.59 20.60 20.47	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.06 20.23 20.26 20.67 20.36	23	1 2	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	QPSK QPSK 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 64QAM 64QAM 64QAM	8 15 1 1 1 8 8 8 15 1 1	7 0 0 8 14 0 4 7 0 0 8 14	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.30 20.51 20.36 20.46 20.37 20.36	22.25 22.38 22.28 21.62 21.56 21.47 20.24 20.35 20.49 20.08 20.59 20.60 20.47	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.06 20.23 20.26 20.67 20.36 20.31	23	1 2	
3 3 3 3 3 3 3 3 3 3 3	QPSK QPSK 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 64QAM 64QAM 64QAM 64QAM	8 15 1 1 1 8 8 8 8 15 1	7 0 0 8 14 0 4 7 0 0 8	22.25 22.28 22.22 21.56 21.49 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31	22.25 22.38 22.28 21.62 21.57 20.24 20.35 20.49 20.08 20.59 20.60 20.60 20.57 19.52	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.06 20.23 20.26 20.67 20.31 19.25	23	1 2	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 640AM 640AM 640AM 640AM 640AM	8 15 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 8 8	7 0 0 8 14 0 4 7 0 0 8 14	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42	22.25 22.38 22.28 21.62 21.56 21.47 20.24 20.35 20.49 20.60 20.60 20.47 19.52 19.63 19.63	22.27 22.28 21.83 21.70 21.72 20.23 20.06 20.23 20.26 20.36 20.31 19.25 19.40 19.34	23 22 22 21	2	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM	8 8 15 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 1 1 1	7 0 0 8 14 0 4 7 0 0 8 14 7	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.48 20.407	22.25 22.38 22.28 21.62 21.62 21.47 20.24 20.49 20.08 20.59 20.60 20.47 19.52 19.66 19.63 19.46	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.26 20.67 20.31 19.25 19.40 19.31 19.34	23 22 22	1 2 2 2 3 MPR	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM	8 15 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 5 1	7 0 0 8 14 0 4 7 0 0 8 14 0 0 4 7 0 0 8	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.42 19.42 19.43	22.25 22.38 22.28 22.162 21.62 21.47 20.24 20.35 20.49 20.08 20.59 20.60 20.47 19.52 19.56 19.63 19.63	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.26 20.67 20.31 19.25 19.40 19.31 19.34 20.643 848.3	23 22 22 21	2 2	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 640AM	8 8 15 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 1 1 1	7 0 0 8 14 0 4 7 0 0 8 14 0 0 4 7 7 0 0 8	22.25 22.28 22.22 21.49 21.48 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.48 20.49	22.25 22.38 22.28 21.62 21.56 21.47 20.35 20.49 20.08 20.59 20.60 20.47 19.52 19.63 19.46 20.55 20.59 20.50	22.27 22.22 22.38 21.83 21.70 21.72 20.06 20.23 20.26 20.26 20.31 19.25 19.40 19.31 19.34 20.64 20.31	23 22 22 21	1 2 2 3 MPR	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM	8 15 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 5 1	7 0 0 8 14 0 4 7 0 0 8 14 0 0 4 7 0 0 8	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.42 19.42 19.43	22.25 22.38 22.28 22.162 21.62 21.47 20.24 20.35 20.49 20.08 20.59 20.60 20.47 19.52 19.56 19.63 19.63	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.26 20.67 20.31 19.25 19.40 19.31 19.34 20.643 848.3	22 22 21 Tune-up limit (dBm)	1 2 2 3 MPR (dB)	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM	8 15 1 1 1 8 8 15 1 1 1 1 8 8 8 15 1 1 1 1	7 0 0 8 14 0 4 7 0 8 14 0 0 8 14 0 0 0 8 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22.25 22.28 22.22 21.56 21.49 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.48 20.40 32.47 23.13 23.15 23.11 23.29	22.25 22.38 22.28 21.62 21.56 21.56 20.24 20.35 20.69 20.69 20.69 20.47 19.52 19.56 19.63 19.46 20.59 20.69 20.47 20.35 20.47	22.27 22.22 22.38 21.83 21.70 20.23 20.26 20.67 20.31 19.25 19.40 20.31 19.31 19.34 20.43	23 22 22 21	1 2 2 3 MPR	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM	8 15 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 1 1 1	7 0 0 8 14 0 4 7 0 0 8 14 0 4 7 7 0 0 8 14 0 0 0 8 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22.25 22.28 22.22 21.56 21.49 21.48 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.48 20.407 32.47 23.13 23.15 23.11 23.29 23.30	22.25 22.38 22.28 21.62 21.56 21.47 20.24 20.35 20.49 20.08 20.59 20.69 20.47 19.63 19.63 19.63 19.63 20.52	22.27 22.22 22.38 21.83 21.70 21.72 20.23 20.06 20.23 20.26 20.31 19.25 19.40 19.31 19.31 19.34 20.343 348.3 22.28 22.83 22.28	22 22 21 Tune-up limit (dBm)	1 2 2 3 MPR (dB)	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM	8 15 1 1 1 8 8 15 1 1 1 1 8 8 8 15 1 1 1 1	7 0 0 8 14 0 4 7 0 8 14 0 0 8 14 0 0 0 8 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22.25 22.28 22.22 21.56 21.49 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.48 20.40 32.47 23.13 23.15 23.11 23.29	22.25 22.38 22.28 21.62 21.56 21.56 20.24 20.35 20.69 20.69 20.69 20.47 19.52 19.56 19.63 19.46 20.59 20.69 20.47 20.35 20.47	22.27 22.22 22.38 21.83 21.70 20.23 20.26 20.67 20.31 19.25 19.40 20.31 19.31 19.34 20.43	22 22 21 Tune-up limit (dBm)	1 2 2 3 MPR (dB)	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM 64	8 15 1 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 1 1 1	7 0 0 8 14 0 0 4 7 0 0 8 8 14 0 0 4 7 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22.25 22.28 22.22 21.56 21.49 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.42 19.42 19.43 20.40 19.31 19.42 20.40 19.31 19.42 19.43 20.40	22.25 22.38 22.28 21.62 21.47 20.24 20.35 20.60 20.60 20.60 20.7 19.52 19.56 19.66 19.63 19.46 20.52 33.65 23.19 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.40 23.10 23.20 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.30 23.40 23.30 2	22.27 22.22 22.38 21.83 21.83 21.70 21.72 20.23 20.06 20.23 20.26 20.36 20.36 20.31 19.25 19.40 19.34 20.64 20.31 19.34 20.65 20.31 20.26 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.31 20.36 20.37 20.36 20.37 20.36 20.37	22 22 21 Tune-up limit (dBm) 24	1 2 2 3 MPR (dB) 0	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM 6	8 15 1 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 1 1 1	7 0 0 8 14 0 4 7 0 0 8 14 4 7 0 0 0 4 7 7 0 0 0 3 5 5 0 0 1 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0	22.25 22.28 22.22 21.56 21.48 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.43 20.40 19.31 19.42 19.43 20.40 19.31 19.42 19.43 20.40 19.43 20.40	22.25 22.38 22.28 21.62 21.62 21.47 20.24 20.35 20.49 20.69 20.69 20.67 19.56 19.63 19.63 19.63 23.30	22.27 22.28 22.38 21.83 21.70 21.72 20.26 20.06 20.23 20.26 20.67 20.36 20.31 19.25 19.40 19.31 19.31 19.31 20.33 23.11 23.23 24.83 23.28 23.28 23.28 23.28 23.28 23.28 23.28	22 22 21 Tune-up limit (dBm) 24	1 2 2 3 MPR (dB) 0	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM	8 15 1 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 1 1 1	7 0 0 8 14 0 4 7 0 0 0 8 14 0 4 7 0 0 0 3 5 0 0 4 7 0 0 0 0 0 1 1 0 0 0 0 0 0 0 1 1 0 0 0 0 1 1 0	22.25 22.28 22.22 21.56 21.49 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42 20.40 32.47 23.13 23.11 23.29 23.30	22.25 22.38 22.28 21.62 21.62 21.47 20.24 20.35 20.60 20.60 20.60 20.60 20.60 20.47 19.52 19.56 19.66 33.65 33.65 23.19 23.20 23.33 23.30 23.31 21.76 21.76 21.76	22.27 22.27 22.27 22.28 22.38 21.83 21.83 21.70 21.72 20.23 20.06 20.23 20.67 20.36 20.31 19.25 19.40 20.31 19.34 20.43 348.3 23.11 23.24 23.28 23.28 23.19 22.14 21.74 21.59	22 22 21 Tune-up limit (dBm) 24	1 2 2 3 MPR (dB) 0	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM	8 15 1 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 1 1 1	7 0 0 8 14 0 4 7 0 0 8 14 4 7 0 0 0 4 7 7 0 0 0 3 5 5 0 0 1 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0	22.25 22.28 22.22 21.56 21.48 20.12 20.30 20.51 20.36 20.46 20.37 20.36 19.31 19.42 19.42 19.43 20.40 19.31 19.42 19.43 20.40 19.31 19.42 19.43 20.40 19.43 20.40	22.25 22.38 22.28 21.62 21.62 21.47 20.24 20.35 20.49 20.69 20.69 20.67 19.56 19.63 19.63 19.63 23.30	22.27 22.28 22.38 21.83 21.70 21.72 20.26 20.06 20.23 20.26 20.67 20.36 20.31 19.25 19.40 19.31 19.31 19.31 20.33 23.11 23.23 24.83 23.28 23.28 23.28 23.28 23.28 23.28 23.28	23 22 21 Tune-up limit (dBm) 24	1 2 2 3 MPR (dB) 0	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 160AM	8 8 15 1 1 1 1 8 8 8 15 15 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 3 3	7 0 0 8 14 0 4 7 0 0 8 14 0 0 3 5 0 1 1 3 5 0 1 1 1 1 0 0 0 1 1 1 1 1 1 1 1 1 1 1	22.25 22.28 22.28 22.29 22.55 22.65 22.65 22.65 20.30 20.56 20.37 20.38 19.31 19.42 19.42 20.07 20.37 20.38 20.47 20.39 20.47 20.31 20.39 20.47 20.31 20.39 20.47 20.31	22.25 22.38 22.38 21.52 21.52 21.52 20.35 20.49 20.59	22.27 22.27 22.27 22.27 22.27 22.28 21.83 21.83 21.83 20.06 20.23 20.06 20.23 20.07 20.23 20.06 20.31 19.25 20.31 19.34 20.54 20.31 22.33 23.24 23.28 23.24 23.29 21.24 21.59 21.35	22 22 21 Tune-up limit (dBm) 24 23 23	1 2 2 3 MPR (dB) 0 1 1	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 160AM	8 15 1 1 1 1 8 8 8 15 1 1 1 1 8 8 8 8 15 1 1 1 1	7 0 0 0 8 14 0 0 8 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22.25 22.28 22.28 22.22 21.56 20.12 20.13 20.30 20.30 20.46 20.37 20.31 19.42 19.42 19.42 23.15 23.15 23.15 23.15 23.12 23.23	22.28 22.38 22.28 22.28 21.62 21.62 20.47 20.38 20.09 20.69 20.47 20.59 20.69 20.59	22.27 22.27 22.27 22.27 22.28 21.89 21.80 20.28	23 22 21 Tune-up limit (dBm) 24	1 2 2 3 MPR (dB) 0	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK 160AM 1	8 8 15 1 1 1 1 8 8 8 15 15 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 3 3	7 0 0 0 8 14 0 4 7 0 0 0 8 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22.25 22.28 22.28 22.29 22.55 22.65 22.65 22.65 20.56 20.57 20.30 20.57 20.36 20.49 20.40 20.57 20.37 20.38 20.49 20.47 20.31 20.37 20.38 20.47 20.31 20.21 20.21 20.21 20.21 20.21 20.21 20.20	22.25 22.28 22.28 21.52 21.52 21.52 21.52 21.52 21.52 21.52 21.52 21.52 20.59	22.72 22.83 21.87 21.87 20.02 20.03 20.03 20.05	22 22 21 Tune-up limit (dBm) 24 23 23	1 2 2 3 MPR (dB) 0 1 1	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 160AM 640AM 640AM 640AM 640AM 640AM 640AM 640AM 160AM	8 8 15 1 1 1 1 8 8 8 15 15 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 3 3	7 0 0 0 8 14 0 0 8 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22.25 22.28 22.28 22.22 21.56 20.12 20.13 20.30 20.30 20.46 20.37 20.31 19.42 19.42 19.42 23.15 23.15 23.15 23.15 23.12 23.23	22.28 22.38 22.28 22.28 21.62 21.62 20.47 20.38 20.09 20.69 20.47 20.59 20.69 20.59	22.27 22.27 22.27 22.27 22.28 21.89 21.80 20.28	23 22 21 1 Ture-up limit (dbm) 24 23 23	1 2 2 3 3 MAPR (dB) 0 1 1 1 2 2	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK 160AM 1	8 8 15 1 1 1 1 8 8 8 15 15 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 3 3	7 0 0 0 8 14 0 4 7 0 0 8 15 14 0 0 0 8 15 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22.28 22.28 22.28 22.28 22.29 22.27 21.56 20.12 20.30 20.30 20.37 20.38 20.47 19.42 21.49 23.19 23.19 23.30 23.39 23.39 23.30 23.39 23.21 22.17 22.17 22.17 22.17 22.17 22.17 22.17 22.17 22.17 23.11	22.25 22.28 22.28 22.28 22.28 22.28 22.28 22.28 22.28 22.28 22.28 22.49 20.39 20.47 20.39 20.69 20.60 20.60 20.60 20.50 20.60 20.60 20.20	22 27 22 22 22 22 23 8 21 8 2	22 22 21 Tune-up limit (dBm) 24 23 23	1 2 2 3 MPR (dB) 0 1 1	
3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3	OPSK 160AM 1	8 8 15 1 1 1 1 8 8 8 15 15 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 3 3	7 0 0 0 8 14 4 7 0 0 0 8 14 7 0 0 0 14 7 0 0 0 15 5 0 0 1 1 3 3 5 5 0 0 1 1 3 3 5 5 0 0 1 1 3 3 5 5 0 0 1 1 3 3 5 5 0 0 1 1 3 3 5 5 0 0 1 1 3 3 5 5 0 0 1 1 3 3 5 5 0 0 0 1 1 3 3 5 5 0 0 0 1 1 3 3 5 5 0 0 0 1 1 3 3 5 5 0 0 0 1 1 3 3 5 5 0 0 0 1 1 3 3 5 5 0 0 0 1 1 3 3 5 5 0 0 0 0 0 3 3 5 5 0 0 0 0 0 3 5 5 5 0 0 0 0	22.28 22.28 22.28 22.29 21.59 21.69 20.12 20.40 20.37 20.30 20.30 20.30 20.30 20.30 20.31 20.31 20.32 20.30 20.30 20.30 20.31 20.31 20.32 20.30	22.25 22.28 22.28 22.28 22.26 21.52 21.52 21.52 20.59	22.27 22.28 22.38 21.57 21.27 20.08 20.28 20.29 20.29 20.29 20.29 20.29 20.29 20.38 20.31	23 22 21 1 Ture-up limit (dbm) 24 23 23	1 2 2 3 3 MFR (dB) 0 1 1 1 2 2	



			Band Part	7 (2600MHz 27 Receive	Band) r On			
BW [MHz]	Modulation Cha	RB Size	RB Offset	Power Low Ch. / Freq. 20850	Power Middle Ch. / Freq. 21100	Power High Ch. / Freq. 21350	Tune-up limit (dBm)	MPR (dB)
20 20	QPSK QPSK	cy (MHz) 1 1	0 49	2510 22.95 23.12	2535 23.30 23.12	2560 22.88 23.18	24	0
20 20 20	QPSK QPSK QPSK	1 50 50	99 0 24	23.05 22.21 22.09	23.07 22.32 22.13	23.29 22.24 22.16	23	1
20 20 20	QPSK QPSK 16QAM	50 100 1	50 0 0	22.14 22.14 21.83	22.27 22.27 21.84	22.31 22.26 21.98		
20 20 20	16QAM 16QAM 16QAM	1 1 50	49 99 0	21.74 21.83 20.68	22.09 21.96 20.46	21.96 22.20 20.84	23	1
20 20 20 20	16QAM 16QAM 16QAM	50 50 100	24 50 0	20.66 20.66 20.67 20.86	20.71 20.66 20.86 21.23	20.86 20.79 20.81 20.97	22	2
20 20 20 20	64QAM 64QAM 64QAM	1 1 50	49 99 0	21.01 21.14 19.98	20.93 21.22 19.90	21.03 21.18 20.02	22	2
20 20 20 20	64QAM 64QAM 64QAM	50 50 100	24 50 0	19.88 19.92 19.88	19.98 20.12 19.90	20.02 20.14 20.04 20.02	21	3
15	Cha Frequen QPSK	nnel	0	20825 2507.5 23.12	21100 2535 22.91	21375 2562.5 22.94	Tune-up limit (dBm)	MPR (dB)
15 15 15	QPSK QPSK QPSK	1 1 36	37 74 0	22.89 22.91 22.00	22.87 23.09 22.08	23.13 23.21 22.17	24	0
15 15 15	QPSK QPSK QPSK	36 36 75	20 39 0	22.15 22.00 22.00	22.02 22.19 22.08	22.13 22.19 22.18	23	1
15 15 15	16QAM 16QAM 16QAM	1 1 1	0 37 74	22.08 21.96 22.00	22.33 22.03 22.08	22.31 22.14 22.05	23	1
15 15 15 15	16QAM 16QAM 16QAM 16QAM	36 36 36 75	0 20 39 0	20.71 20.63 20.65 20.68	20.62 20.73 20.86 20.81	20.84 20.83 20.86 20.86	22	2
15 15 15 15	64QAM 64QAM 64QAM	1 1	0 37 74	20.84 21.12 21.05	20.81 20.83 20.87	20.86 20.98 21.27 21.13	22	2
15 15 15	64QAM 64QAM 64QAM	36 36 36	0 20 39	19.99 20.02 19.96	20.25 20.10 20.15	20.11 20.29 20.32	21	3
15	64QAM Cha Frequen	75 nnel cv (MHz)	0	19.90 20800 2505	19.71 21100 2535	20.11	Tune-up limit	MPR (dB)
10 10 10	QPSK QPSK QPSK	1 1 1	0 25 49	22.93 22.83 23.06	22.89 22.92 23.01	2565 23.04 23.00 22.05	(dBm) 24	0
10 10 10	QPSK QPSK QPSK	25 25 25	0 12 25	21.95 22.03 22.02	21.95 22.07 21.99	22.12 22.17 22.16	23	1
10 10 10	QPSK 16QAM 16QAM	50 1 1	0 0 25	22.11 22.02 22.03	21.97 22.10 22.38	22.24 22.02 22.16	23	1
10 10 10	16QAM 16QAM 16QAM	1 25 25 25	49 0 12	21.99 20.54 20.62 20.61	22.38 20.73 20.72 20.49	22.49 20.66 20.73	22	2
10 10 10	16QAM 16QAM 64QAM	25 50 1	25 0 0 25	20.71	20.49 20.45 20.81 20.86	20.89 20.82 21.23	22	2
10 10 10	64QAM 64QAM 64QAM	1 1 25 25	49 0 12	20.87 21.29 19.85 19.87	21.24 19.68 19.64	21.15 21.10 20.09 19.92		
10	64QAM 64QAM Cha	25 50 nnel	25 0	20.00 19.96 20775	19.99 19.98 21100	20.12 20.00 21425	21 Tune-up limit	3 MPR
5	Frequen QPSK	1	0	2502.5 23.01	2535 22.99	2567.5 22.91	(dBm)	(dB)
5 5 5	QPSK QPSK QPSK QPSK	1 1 12 12	12 24 0 7	22.93 22.99 22.16	22.94 22.86 21.95	23.12 23.18 22.24	24	0
5 5 5	QPSK QPSK QPSK 16QAM	12 12 25 1	7 13 0	22.01 22.06 21.90 21.97	22.01 22.02 22.11 22.07	22.28 22.16 22.22 22.34	23	1
5 5 5	16QAM 16QAM 16QAM 16QAM	1 1 1 12	0 12 24 0	21.97 21.90 22.00 20.74	22.07 22.37 21.93 20.65	22.34 21.93 22.31 20.89	23	1
5 5 5	16QAM 16QAM 16QAM	12 12 12 25	7 13 0	20.74 20.60 20.67 20.57	20.62 20.62 20.57	20.89 20.84 20.72 20.73	22	2
5 5 5	64QAM 64QAM 64QAM	1 1 1	0 12 24	20.86 20.74 20.75	20.63 21.10 20.77	20.98 21.04 20.95	22	2
5 5 5	64QAM 64QAM 64QAM	12 12 12	0 7 13	19.66 19.66 19.64	19.61 19.65 19.58	19.96 19.82 19.90	21	3
5	64QAM	25	0	19.73	19.79	19.83		

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	MPR (dB)		
20	Cha Frequen QPSK	innel cy (MHz)	0	132072 1720 22.52	132322 1745 22.90	132572 1770 22.76	(dBm)	(db)		
20 20	QPSK QPSK	1	49 99	22.50 22.52	22.48 22.65	22.56 22.43	24	0		
20 20 20	QPSK QPSK QPSK	50 50 50	0 24 50	21.51 21.47 21.55	21.59 21.56 21.40	21.42 21.43 21.43	23	1		
20 20	QPSK 16QAM	100 1	0	21.53 21.66	21.54	21.36 21.73				
20 20 20	16QAM 16QAM 16QAM	1 1 50	49 99 0	21.70 21.60 20.27	21.39 21.80 20.23	21.53 21.41 20.16	23	1		
20 20	16QAM 16QAM	50 50	24 50	20.12	20.16	20.11	22	2		
20 20 20	16QAM 64QAM	100	0 0 49	20.22 20.42 20.41	20.23 20.53 20.51	20.14 20.27 20.18	22	2		
20 20	64QAM 64QAM	1 50	99 0	20.25 19.44	20.12 19.43	20.21 19.39		_		
20 20 20	64QAM 64QAM	50 50 100	24 50 0	19.45 19.45 19.34	19.54 19.34 19.36	19.26 19.26 19.23	21	3		
	Cha	nnel		132047 1717.5	132322 1745	132597 1772.5	Tune-up limit (dBm)	MPR (dB)		
15 15 15	QPSK QPSK QPSK	1 1	0 37 74	22.42 22.41 22.48	22.65 22.55 22.48	22.50 22.40 22.46	24	0		
15 15 15	QPSK QPSK QPSK	36 36	0 20	21.52 21.50	21.51 21.55	21.53 21.45	23	1		
15 15	QPSK QPSK	36 75	39	21.62	21.41	21.52	23			
15 15 15	16QAM 16QAM 16QAM	1 1	0 37 74	21.34 21.55 21.20	21.54 21.14 21.34	21.23 21.28 21.15	23	1		
15 15	16QAM 16QAM	36 36	20	20.09 20.00	20.46 20.45	20.17 20.19	22	2		
15 15 15	16QAM 16QAM 64QAM	36 75 1	39 0 0	20.16 20.43 20.31	20.18 20.19 20.47	20.28 20.06 20.45				
15 15	64QAM 64QAM	1 1	37 74	20.34 20.67	20.65 20.58	20.30 20.36	22	2		
15 15 15	64QAM 64QAM	36 36 36	0 20 39	19.46 19.38 19.47	19.57 19.64 19.50	19.47 19.45 19.39	21	3		
15	64QAM Cha	75 innel	0	19.58 132022	19.38 132322	19.33 132622	Tune-up limit	MPR		
10	Prequent QPSK QPSK	cy (MHz) 1	0 25	1715 22.60 22.64	1745 22.61 22.39	1775 22.46 22.37	(dBm)	(dB)		
10 10	QPSK QPSK	1 25	49 0	22.60 21.47	22.52	22.26 21.42		·		
10 10 10	QPSK QPSK QPSK	25 25 50	12 25 0	21.58 21.43 21.50	21.52 21.37 21.56	21.42 21.42 21.37	23	1		
10 10	16QAM 16QAM	1	0 25	21.71 21.72	21.78 21.47	21.37 21.78	23	1		
10 10 10	16QAM 16QAM 16QAM	1 25 25	49 0 12	21.67 20.35 20.43	21.75 20.08 20.12	21.46 20.11 20.07				
10 10	16QAM 16QAM	25 50	25 0	20.23 20.13	20.13 20.14	20.21	22	2		
10 10 10	64QAM 64QAM 64QAM	1 1	0 25 49	20.48 20.28 20.52	20.16 20.09 20.23	20.33 20.27 20.33	22	2		
10 10	64QAM 64QAM	25 25	0 12	19.45 19.34	19.16 19.17	19.44 19.42	21	3		
10	64QAM	25	25	19.41	19.35	19.36		-		
10	64QAM Cha	50 nnel	0	19.39	19.42	19.30	Tune-up	MDD		
10 5	64QAM Cha Frequen QPSK	nnel	0			19.30 132647 1777.5 22.58	Tune-up limit (dBm)	MPR (dB)		
5 5 5	Cha Frequent QPSK QPSK QPSK	nnel cy (MHz) 1 1	0 12 24	19.39 131997 1712.5 22.43 22.40 22.38	19.42 132322 1745 22.63 22.44 22.37	19.30 132647 1777.5 22.58 22.54 22.59				
5 5 5 5 5	Cha Frequen QPSK QPSK QPSK QPSK QPSK QPSK	innel cy (MHz) 1	0 12	19.39 131997 1712.5 22.43 22.40 22.38 21.41 21.47 21.46	19.42 132322 1745 22.63 22.44 22.37 21.59 21.54	19.30 132647 1777.5 22.58 22.54 22.59 21.44 21.37 21.45	limit (dBm)	(dB)		
5 5 5 5 5 5 5	Cha Frequent QPSK QPSK QPSK QPSK QPSK QPSK QPSK QPSK	nnel cy (MHz) 1 1 1 1 2 12 12 12 25 1	0 12 24 0 7 13 0	19.39 131997 1712.5 22.43 22.40 22.38 21.41 21.47 21.46 21.40 21.51	19.42 132322 1745 22.63 22.44 22.37 21.59 21.54 21.54 21.50 21.66	19.30 132647 1777.5 22.58 22.54 22.59 21.44 21.37 21.45 21.43 21.21	limit (dBm) 24 23	0 1		
5 5 5 5 5 5	Cha Frequent QPSK QPSK QPSK QPSK QPSK QPSK QPSK QPSK	nnel cy (MHz) 1 1 1 1 12 12 12 12 25	0 12 24 0 7	19.39 131997 1712.5 22.43 22.40 22.38 21.41 21.47 21.46 21.40	19.42 132322 1745 22.63 22.44 22.37 21.59 21.54 21.54	19.30 132647 1777.5 22.58 22.54 22.59 21.44 21.37 21.45 21.43	limit (dBm)	(dB)		
5 5 5 5 5 5 5 5 5 5	Cha Frequent QPSK QPSK QPSK QPSK QPSK QPSK QPSK QPSK	nnel cy (MHz) 1 1 1 1 1 1 1 1 1 2 1 2 1 2 1 2 1 2 1	0 12 24 0 7 13 0 0 12 24 0 7	19.39 131997 1712.5 22.43 22.40 22.38 21.41 21.47 21.46 21.40 21.51 21.35 21.44 20.19	19.42 132322 1745 22.63 22.44 22.37 21.59 21.54 21.50 21.66 21.63 21.63 21.67 20.27 20.28 20.15	19.30 132847 1777.5 22.58 22.59 21.44 21.37 21.45 21.45 21.21 21.61 21.51 20.17	limit (dBm) 24 23	0 1		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cha Frequen QPSK QPSK QPSK QPSK QPSK QPSK QPSK 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM	nnel cy (MHz) 1 1 1 12 12 12 12 12 12 12	0 12 24 0 7 13 0 0 12 24 0 7 13 0 0	19.39 131997 1712.5 22.43 22.40 22.38 21.41 21.46 21.40 21.51 21.35 21.44 20.01 20.14 20.01 20.14 20.01 20.14 20.04	19.42 192322 1745 22.63 22.44 22.37 21.59 21.54 21.50 21.66 21.63 21.67 20.27 20.28 20.15 20.04 20.17 20.21	19.30 132847 1777.5 22.58 22.59 21.44 21.37 21.43 21.21 21.61 21.51 20.15 20.17 20.22 20.06 20.24	24 23 23	0 1 1		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cha Frequen QPSK QPSK QPSK QPSK QPSK QPSK 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM 16QAM	nnel cy (MHz) 1	0 12 24 0 7 13 0 0 12 24 0 7 7 3 0 0 12 24 0 0 7	19.39 131997 1712-5 22.43 22.40 22.38 21.41 21.47 21.46 21.51 21.35 21.42 20.19 20.14 20.19 20.17 20.64 20.34 20.34 20.34 20.34 20.38	19.42 132322 1745 22.63 22.44 22.37 21.59 21.54 21.50 21.66 21.63 21.67 20.27 20.28 20.15 20.17 20.21 20.21	19.30 132647 1777.5 22.58 22.59 22.54 22.59 21.44 21.37 21.45 21.43 21.21 21.61 20.15 20.17 20.22 20.06 20.24 20.48 20.48 20.48	24 23 23 22 22 22	(dB) 0 1 1 2		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cha Frequen QPSK QPSK QPSK QPSK QPSK QPSK QPSK QPSK	mel ey (MHz) 1 1 1 1 12 12 25 1 1 1 12 12	0 12 24 0 7 13 0 0 12 24 0 7 13 0 0	19.39 131997 17112.5 22.43 22.40 22.38 21.41 21.47 21.46 21.40 21.51 21.35 21.44 20.19 20.11 20.17 20.01 20.17 20.64 20.38	19.42 132322 1745 22.63 22.44 22.37 21.59 21.54 21.54 21.63 21.67 20.27 20.28 20.15 20.04 20.17 20.21	19.30 132647 1777.5 22.58 22.54 22.59 21.44 21.37 21.45 21.43 21.21 21.61 21.61 20.17 20.22 20.06 20.24 20.48 20.58	24 23 23 22 22 21	(dB) 0 1 2		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cha Frequen OPSK OPSK OPSK OPSK OPSK OPSK OPSK OPSK	mel cy (MHz) 1 1 1 1 1 1 1 2 1 2 1 2 1 1 1 1 1 1 1	0 12 24 0 7 13 0 0 12 24 0 7 7 13 0 0 12 24 0 7 7 13 0 0 7 7 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 131937 1712.5 22.43 22.40 22.38 21.41 21.47 21.46 21.40 21.51 21.35 21.44 20.19 20.14 20.01 20.17 20.64 20.38 19.21 19.00 19.16 19.33 19.33 19.33	19.42 1323/22 1745 22.63 22.44 22.37 21.59 21.54 21.50 21.63 21.67 20.27 20.28 20.15 20.04 20.17 20.21 20.23 19.17 19.12 19.05 19.47 19.17	19.30 132821 1777.5 22.58 22.54 22.59 21.44 21.37 21.45 21.43 21.21 21.51 20.15 20.17 20.22 20.06 20.24 20.48 19.24 19.24 19.21 19.24 19.25	24 23 23 22 22 22	(dB) 0 1 1 2		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cha Frequen OPSK OPSK OPSK OPSK OPSK OPSK OPSK OPSK	nnel cy (MHz) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 12 24 0 7 13 0 0 12 24 0 7 13 0 0 0 7 12 24 0 7 7 13 0 0 7 7 13 0 0 7 7 7 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 131997 1712.5 22.43 22.40 22.38 21.41 21.47 21.40 21.51 21.44 20.19 20.14 20.01 20.17 20.64 20.38 19.21 19.00 19.16 19.33 19.18	19.42 19262 1745 22.63 22.44 22.37 21.59 21.54 21.50 21.66 21.63 21.67 20.27 20.27 20.04 20.15 20.04 20.17 20.21 20.23 19.17 19.12	19.30 132647 132647 22.58 22.54 22.59 21.44 21.37 21.43 21.21 21.61 20.15 20.17 20.22 20.06 20.24 20.58 19.24 19.11 19.14 19.25 19.25 19.25	24 23 23 22 22 21 Tune-up limit	(dB) 0 1 1 2 2 3 MPR		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cha Frequen QPSK QPSK QPSK QPSK QPSK QPSK QPSK QPSK	mel cy (MHz) 1 1 1 1 1 1 12 12 25 1 1 1 12 25 1 1 12 25 1 1 1 12 25 1 1 1 12 25 1 1 1 12 25 1 1 1 12 25 1 1 1 12 25 1 1 1 12 25 1 1 1 12 25 1 1 1 12 25 1 1 1 12 12	0 12 24 0 7 13 0 0 12 24 0 7 13 0 0 0 12 24 0 7 13 0 0 7 13 0 0 7 13 0 0 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0	19.39 131997 1712.5 22.43 22.40 22.38 21.41 21.47 21.46 21.40 21.51 21.35 21.44 20.19 20.19 20.19 20.19 20.19 20.19 20.38 19.21 19.00 19.16 19.33 131967 1711.5 22.51 22	19.42 12.52 12.53 12.54 12.55	19.30 132647 1777.5 22.58 22.59 22.59 21.44 21.37 21.45 21.21 21.51 20.15 20.17 20.22 20.06 20.24 20.24 20.48 20.58 19.24 19.21 19.2	24 23 23 22 22 21 Tune-up limit (dBm) (dBm)	(dB) 0 1 1 2 2 MPR (dB)		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cha Frequen OPSK OPSK OPSK OPSK OPSK OPSK OPSK OPSK	mel cy (MHz) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 12 24 24 0 7 13 0 0 0 12 24 0 7 13 0 0 0 7 13 0 0 0 7 7 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 131997 1712.5 22.43 22.40 22.38 21.41 21.46 21.40 21.51 21.45 20.19 20.14 20.19 20.14 20.19 20.14 20.19 20.14 20.19 20.14 20.19 20.16 19.21 19.21 19.21 19.21 19.21 19.21 19.21 20.24 20.34 20.34 20.34 20.34 20.34 20.34 20.35 20.36	19.42 132322 1745 22.63 22.44 22.37 21.59 21.54 21.54 21.50 21.66 21.67 20.27 20.28 20.15 20.17 20.21 20.21 20.23 19.17 19.05 19.44 20.17 20.21 20.23 20.17 20.21 20.23 20.17 20.21 20.23 20.17 20.21 20.23 20.17 20.21 20.23 20.17 20.21 20.23 20.17 20.21 20.23 20.17 20.21 20.23 20.17 20.21 20.23 20.24 20.25 20.26 20.27 20.27 20.21 20.21 20.21 20.23 20.21 20.23 20.24 20.25 20.26 20.27 20.27 20.21 20.21 20.23 20.21 20.23 20.24 20.25 20.26 20.27 20.27 20.21 20.21 20.23 20.24 20.25 20.26 20.27 20.27 20.28 20.29 20.29 20.29 20.20 20	19.30 132647 1777.5 22.58 22.59 21.44 22.59 21.43 21.21 21.51 20.15 20.17 20.22 20.08 20.24 20.48 20.24 20.49 19.24 19.14 19.25 19.24 19.14 19.25 19.24 19.24 19.24 19.24 20.25 20.2	24 23 23 22 22 21 Tune-up limit (dBm) 24	(dB) 0 1 1 2 2 3 MPR (dB) 0		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cheba	onnel y (MHz) 1 1 1 1 1 1 1 1 1 1 1 1 1	0 12 24 0 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 7 7 13 0 0 0 7 7 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 1712:5 1712:5 122:43 122:40 123:8 124:41 121:41 121:45 121:	19.42 153322 1745 1745 1745 1745 1745 1745 1745 1745	19.30 19.25 19.21 19.20 19.21 19.20 19.21	24 23 23 22 22 21 Tune-up limit (dBm) 24	(dB) 0 1 1 2 2 3 MPR (dB) 0		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cheba Cores	nnel ey (MHz) 1	0 1 12 24 0 7 7 13 0 0 0 12 24 1 0 0 7 7 13 0 0 0 0 14 2 24 0 0 7 7 13 0 0 0 0 14 2 24 0 0 0 0 0 14 2 2 4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 1431967 1712.5 22.43 22.40 20.14 20.14 20.14 20.14 20.14 20.14 20.14 20.14 20.14 20.14 20.14 20.15 20.14 20.15 20.14 20.17 20.15 20.	19.42 22.45 22.151 22.45	19.30 133547 1777.5 22.58 22.59 22.59 22.59 22.59 22.59 22.59 22.59 22.59 22.59 22.59 22.59 22.59 22.50 25.5	Init	(dB) 0 1 1 2 2 3 MPR (dB) 0		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Cheharan Carlon Cheharan Cheha	representation of the control of the	0 12 24 0 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 7 7 13 0 0 0 7 7 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 177.12-5 177.12-5 177.12-5 177.12-5 177.13	19.42 22.83 22.84 22.15 21.50 20.21 21.65 20.22 21.65 20.21 20.25 20.21 20.22 21.50 20.21 20.22	19.30 1 132647 1177.5 2 125.5	Initial Init	(dB) 0 1 1 2 2 2 3 3 MAPR (dB) 0 1 1 1 1 2 2 2 2 3 3 4 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Chahaman Cha	representation of the control of the	0 12 24 0 7 7 13 0 0 0 12 24 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.30 17(2.2)	19.42 22.44 12.63 12.63 12.63 12.63 12.64 12.65 12.67	19.30 133847 1777.9 22.58 22.59 22.5	24 23 23 22 22 21 Turse-up Init (5thm) 24 23 23 23 23 23 24 24 23 23 23	(dB) 0 1 1 2 2 3 MMPR (dB) 0 1 1		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Chair Frequent Chair Cha	annel (1970) (19	0 12 24 24 0 7 7 13 0 0 0 14 4 7 7 0 0 0 8 14 0 0 4 4 7 7 0 0 0 8 14 0 0 4 4 7 7 0 0 0 8 14 0 0 4 4 7 7 0 0 0 8 14 0 0 0 8 14 0 0 0 0 8 14 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 177.22 177.22 177.22 177.22 177.23 177.23 177.24 177.25 177	19.42 17245	(19.30) 19.30 19.3	Initial Init	(dB) 0 1 1 2 2 2 3 3 MAPR (dB) 0 1 1 1 1 2 2 2 2 3 3 4 4 5 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Chair Frequent Chair Cha	annel (y (MHz)) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 12 24 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 12 14 15 15 15 15 15 15 15 15 15 15 15 15 15	19.39 177.25 177	19.42 12.63 12.65	(19.30) 19.30 19.3	Innt	(dB) 0 1 1 2 2 3 3 MAPPR (dB) 0 0 1 1 1 2 2 2 2 2 3 3 MAPPR (dB) 0 0 1 1 1 2 2 2 2 3 3 MAPPR (dB) 0 0 1 1 1 1 2 2 2 2 3 3 MAPPR (dB) 0 0 1 1 1 1 2 2 2 3 3 MAPPR (dB) 0 0 1 1 1 1 1 2 2 3 3 MAPPR (dB) 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Chahaman Cha	sy (MHz) 1 1 1 1 1 1 1 1 1	0 0 12 24 24 0 7 13 0 0 0 12 24 0 0 7 7 13 13 0 0 0 0 12 24 0 0 7 7 7 13 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.30 19.31 19.32 19.32 19.32 19.32 19.32 19.33	19.42 22.63 22.63 22.64 22.65	19.30 17775 22.58 22.58 22.54 23.54 24.55 24.55 24.55 22.55 22.54 24.55 24.55 24.55 24.55 25.55	Innt	(dB) 0 1 1 2 2 3 3 MMPR 1 2 2 3 3 MMPR 1 3 3 3 MMPR 1		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Chamber of the comment of the commen	sy (MHz) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 12 24 24 0 7 13 0 0 0 12 24 0 0 7 7 13 13 0 0 0 0 12 24 0 0 7 7 7 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 177225 1243 12441	19.42 22.65 22.45	19.30 1777.5 22.59 22.54 22.54 22.55	Innt	(dB) 0 1 1 2 2 3 3 MMPR 1 2 2 3 3 MMPR 1 3 3 3 MMPR 1		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Chair Frequent Control of the Contro	annel (y (MHz)) 1 1 1 1 1 1 1 1 1	0 0 12 24 0 7 13 0 0 0 12 24 0 7 7 13 13 0 0 7 7 13 13 0 0 0 12 24 0 0 7 7 13 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 177.12 178.21 179	19.42 17245 19.22 19.24	19.30 1770 22 25 8 22 25 1 24 24 24 25 22 25 22 25 22 25 20 20 26	Initial Init	(dB) 0 1 1 2 2 3 MPR (dB) 1 1 2 3 MPR (dB)		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Chair Frequent Grant Gra	sy (MHz) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 12 22 24 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 0 12 24 0 0 7 7 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 177.12 178.21 179	19.42 1245 1237 1245 1245 1245 1245 1245 1245 1245 1245	19.30 1/32 1/32 1/32 1/32 1/32 1/32 1/32 1/32	Initial Init	(dB) 0 1 1 2 2 3 3 MPR (dB) 0 0 1 1 1 1 2 2 1 3 3 MPR (dB) 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Progress of the Colombia of th	Section Sect	0 0 12 22 24 0 0 7 13 0 0 0 12 24 0 0 7 7 13 13 0 0 0 12 24 0 0 7 7 7 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 1772.5 131997 1772.5 124.9 125.9 126	19.42 12.65	19.30 17773 2259 2259 2259 2259 2259 2259 2259 225	Initial Init	(dB) 0 1 1 2 2 3 3 MPPR (dB) 0 0 1 1 1 2 2 2 3 3 MPPR (dB) 0 0 1 1 1 1 2 2 2 3 3 MPPR (dB) 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Progress of the Colombia of th	sy (MHz) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 12 22 24 0 0 7 13 0 0 0 12 24 0 0 7 7 13 13 0 0 0 12 24 0 0 7 7 7 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 1772.5 131997 1772.5 124.9 125.9 126	19.42 12.65 12.15	19.30 17779 2 22.47 12.24 17779 3 12.25 17.15 19.16 19.30 19.22 2.31 19.24 19.25 19.	Initial Init	(dB) 0 1 1 2 2 3 3 MPR (dB) 0 0 1 1 1 1 2 2 1 3 3 MPR (dB) 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	Chair Frequent Chair Cha	annel (1975) (19	0 0 12 24 0 7 13 0 0 0 12 24 0 7 7 13 13 0 0 0 12 24 0 7 7 13 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.39 177.25 177.27 177 177 177 177 177 177 177 177 177 1	19.42 12.53 12.54 12.55	19.30 1 22.51 22.51 22.51 22.52 23.52 22.53 22.53 22.53 22.53 22.55 22.55 22.55 22.55 23.5	Initial Init	(dB) (dB) (dB) (dB) (dB) (dB) (dB) (dB)		
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	FINE PROPERTY OF THE PROPERTY	y (MHz) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 12 24 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 12 24 0 0 7 7 13 0 0 0 0 12 24 0 0 7 7 13 0 0 0 0 12 12 12 12 12 12 12 12 12 12 12 12 12	19.39 1772.5 131997 1772.5 124.9 124	19.42 12.65 12.15 12.15 12.15 12.15 12.15 13.32 12.15 13.32 12.15 13.32 12.15 13.32 12.15 13.15	19.30 177773 2258 2259 2254 2145 22135 22135 22135 22238 22238 2259 2254 2447 2272 2272 2273 2273 2273 2273 227	Initial Column Init	(dB) 0 1 1 2 2 3 3 MPPR (dB) 2 2 3 3 MPPR (dB) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		



			Hotspot On					
GSM1900	Burst	Average Powe	r (dBm)	Tune-up	Frame	Frame-Average Power (dBm)		
TX Channel	512	661	810	Limit	512	661	810	Limit
Frequency (MHz)	1850.2	1880	1909.8	(dBm)	1850.2	1880	1909.8	(dBm)
GSM 1 Tx slot	25.45	25.44	25.40	27.00	16.45	16.44	16.40	18.00
GPRS 1 Tx slot	25.42	25.43	25.39	27.00	16.42	16.43	16.39	18.00
GPRS 2 Tx slots	23.42	23.39	23.35	24.00	17.42	17.39	17.35	18.00
GPRS 3 Tx slots	21.76	21.82	21.77	23.00	17.50	17.56	17.51	18.74
GPRS 4 Tx slots	19.27	19.20	19.11	21.00	16.27	16.20	16.11	18.00
EDGE 1 Tx slot	25.20	25.45	25.12	26.50	16.20	16.45	16.12	17.50
EDGE 2 Tx slots	23.20	23.14	23.10	24.00	17.20	17.14	17.10	18.00
EDGE 3 Tx slots	20.07	20.43	20.36	21.50	15.81	16.17	16.10	17.24
EDGE 4 Tx slots	17.32	17.54	17.16	18.50	14.32	14.54	14.16	15.50

				lotspot On					
	Band		WCDMA II		Tune-up	WCDMA IV			Tune-up
	TX Channel	9262	9400	9538	Limit	1312	1413	1513	Limit
	Rx Channel	9662 9800 9938	9938	(dBm)	1537	1638	1738	(dBm)	
	equency (MHz)	1852.4	1880	1907.6		1712.4	1732.6	1752.6	. ,
3GPP Rel 99	AMR 12.2Kbps	17.10	17.30	17.26	18.00	16.30	16.23	16.12	17.00
3GPP Rel 99	RMC 12.2Kbps	17.13	17.32	17.31	18.00	16.35	16.36	16.13	17.00
3GPP Rel 6	HSDPA Subtest-1	16.68	16.69	16.82	17.00	15.54	15.45	15.45	16.00
3GPP Rel 6	HSDPA Subtest-2	16.37	16.44	16.49	17.00	15.12	15.27	15.17	16.00
3GPP Rel 6	HSDPA Subtest-3	16.56	16.62	16.67	16.50	15.11	15.27	15.16	15.50
3GPP Rel 6	HSDPA Subtest-4	16.20	16.27	16.32	16.50	15.13	15.28	15.17	15.50
3GPP Rel 8	DC-HSDPA Subtest-1	16.68	16.64	16.79	17.00	14.42	14.58	14.63	16.00
3GPP Rel 8	DC-HSDPA Subtest-2	16.40	16.43	16.47	17.00	15.07	15.31	15.14	16.00
3GPP Rel 8	DC-HSDPA Subtest-3	16.53	16.51	16.70	16.50	15.05	15.21	15.16	15.50
3GPP Rel 8	DC-HSDPA Subtest-4	16.09	16.30	16.38	16.50	15.08	15.36	15.24	15.50
3GPP Rel 6	HSUPA Subtest-1	16.58	16.43	16.34	17.00	15.21	15.22	14.98	16.00
3GPP Rel 6	HSUPA Subtest-2	14.43	14.54	14.45	15.00	12.92	13.07	13.07	14.00
3GPP Rel 6	HSUPA Subtest-3	15.21	15.47	15.30	16.00	13.61	13.98	13.99	15.00
3GPP Rel 6	HSUPA Subtest-4	14.22	14.45	14.34	15.00	13.18	13.36	13.34	14.00
3GPP Rel 6	HSUPA Subtest-5	16.54	16.67	16.66	17.00	15.10	15.20	15.10	16.00
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	14.11	14.12	14.15	14.50	13.02	13.15	13.11	13.50



		Receiv	er Off / Extre	emity				
GSM1900	Burst /	Average Powe	r (dBm)	Tune-up	Frame	Tune-up		
TX Channel	512	661	810	Limit	512	661	810	
Frequency (MHz)	1850.2	1880	1909.8	(dBm)	1850.2	1880	1909.8	(dBm)
GSM 1 Tx slot	27.43	27.28	27.31	28.50	18.43	18.28	18.31	19.50
GPRS 1 Tx slot	27.41	27.36	27.29	28.50	18.41	18.36	18.29	19.50
GPRS 2 Tx slots	25.11	25.15	25.12	25.50	19.11	19.15	19.12	19.50
GPRS 3 Tx slots	23.86	23.77	23.71	24.50	19.60	19.51	19.45	20.24
GPRS 4 Tx slots	21.76	21.73	21.61	22.50	18.76	18.73	18.61	19.50
EDGE 1 Tx slot	25.75	25.92	25.45	26.50	16.75	16.92	16.45	17.50
EDGE 2 Tx slots	24.30	24.36	24.21	25.50	18.30	18.36	18.21	19.50
EDGE 3 Tx slots	21.20	21.54	21.33	22.50	16.94	17.28	17.07	18.24
EDGE 4 Tx slots	17.35	17.65	17.45	18.50	14.35	14.65	14.45	15.50

	Band		WCDMA II	er Off / Extre			WCDMA IV		
	TX Channel		9400	9538	Tune-up	1312	1312 1413 1513		Tune-up
	Rx Channel	9662	9800	9938	Limit (dBm)	1537	1638	1738	Limit (dBm)
Fr	equency (MHz)	1852.4	1880	1907.6	(GEATT)	1712.4	1732.6	1752.6	(00111)
3GPP Rel 99	AMR 12.2Kbps	18.02	18.18	18.19	19.00	16.14	16.15	15.95	17.00
3GPP Rel 99	RMC 12.2Kbps	18.21	18.26	18.24	19.00	16.16	16.17	15.99	17.00
3GPP Rel 6	HSDPA Subtest-1	17.61	17.48	17.62	18.00	15.21	15.23	15.12	16.00
3GPP Rel 6	HSDPA Subtest-2	17.39	17.67	17.48	18.00	15.16	15.43	15.23	16.00
3GPP Rel 6	HSDPA Subtest-3	16.93	17.11	17.08	17.50	14.65	14.56	14.55	15.50
3GPP Rel 6	HSDPA Subtest-4	17.06	17.01	17.06	17.50	14.65	14.43	14.43	15.50
3GPP Rel 8	DC-HSDPA Subtest-1	17.65	17.51	17.55	18.00	15.18	15.21	15.10	16.00
3GPP Rel 8	DC-HSDPA Subtest-2	17.48	17.52	17.40	18.00	15.13	15.41	15.21	16.00
3GPP Rel 8	DC-HSDPA Subtest-3	17.02	17.05	17.22	17.50	14.62	14.54	14.53	15.50
3GPP Rel 8	DC-HSDPA Subtest-4	17.08	16.99	17.17	17.50	14.62	14.41	14.41	15.50
3GPP Rel 6	HSUPA Subtest-1	17.44	17.55	17.66	18.00	15.10	14.99	14.98	16.00
3GPP Rel 6	HSUPA Subtest-2	15.22	15.42	15.18	16.00	12.98	13.03	13.07	14.00
3GPP Rel 6	HSUPA Subtest-3	16.27	16.63	16.28	17.00	13.41	13.55	13.59	15.00
3GPP Rel 6	HSUPA Subtest-4	15.50	15.32	15.60	16.00	12.99	13.37	13.35	14.00
3GPP Rel 6	HSUPA Subtest-5	17.42	17.49	17.38	18.00	15.10	15.30	15.10	16.00
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	15.02	15.11	15.03	15.50	13.21	13.08	13.14	13.50