



D1900V2, Serial No. 5d182 Extended Dipole Calibrations

Referring to KDB 865664 D01 v01r02, if dipoles are verified in return loss ($< -20\text{dB}$, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

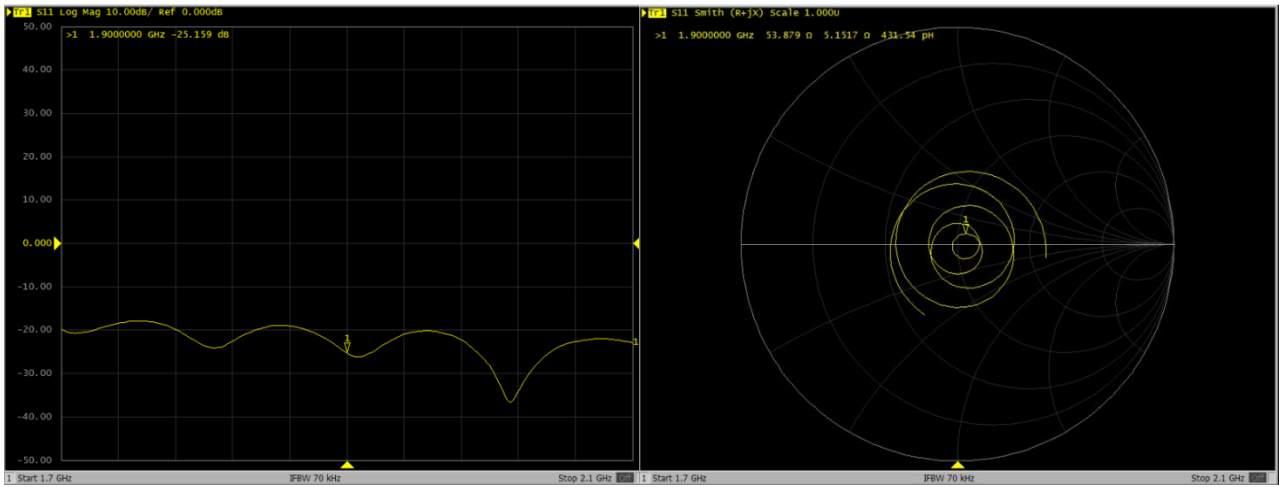
D1900V2 – serial no. 5d182												
	1900 Head						1900 Body					
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018.12.7	-25		52.1		5.35		-24		48.9		6.19	
2019.11.25	-25.2	-0.8	53.9	1.8	5.15	-0.2	-24.2	-0.8	48.7	-0.2	5.93	-0.26

<Justification of the extended calibration>

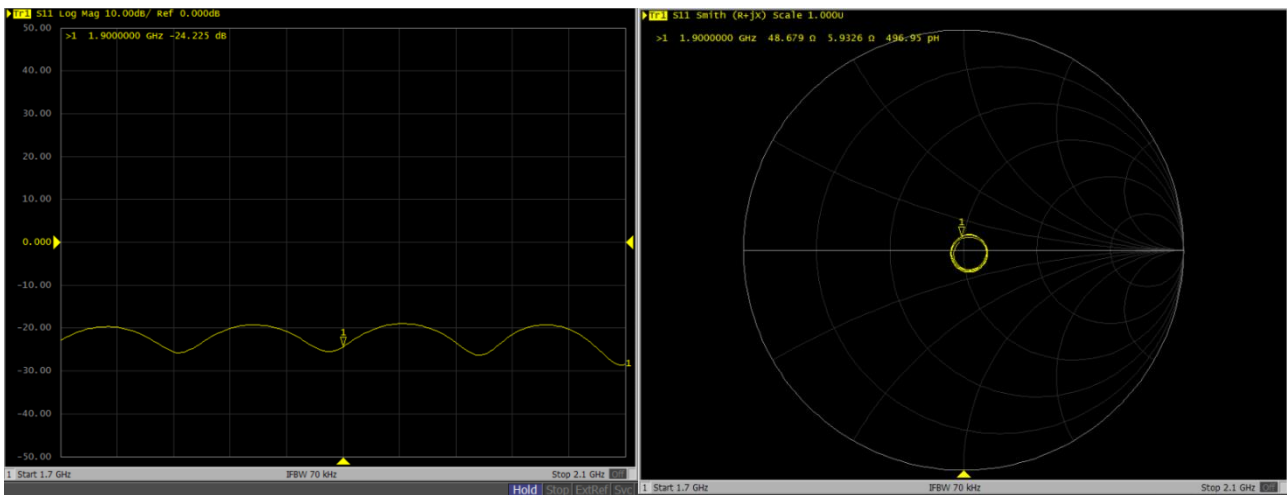
The return loss is $< -20\text{dB}$, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data> D1900V2, serial no. 5d182

1900MHz - Head



1900MHz - Body





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CNAS L0570

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Client **Sporton**

Certificate No: **Z19-60134**

CALIBRATION CERTIFICATE

Object **D2450V2 - SN: 924**

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

Calibration date: **April 15, 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)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106277	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Power sensor NRP8S	104291	20-Aug-18 (CTTL, No.J18X06862)	Aug-19
Reference Probe EX3DV4 DAE4	SN 3617	31-Jan-19(SPEAG,No.EX3-3617_Jan19)	Jan-20
	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
Calibrated by:	Zhao Jing	SAR Test Engineer
Reviewed by:	Lin Hao	SAR Test Engineer
Approved by:	Qi Dianyuan	SAR Project Leader

Signature

Issued: April 20, 2019

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Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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



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Measurement Conditions

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

DASY Version	DASY52	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	40.4 ± 6 %	1.85 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	52.1 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.99 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	23.9 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	54.3 ± 6 %	2.01 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	12.6 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	50.1 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Body TSL	Condition	
SAR measured	250 mW input power	5.83 W/kg
SAR for nominal Body TSL parameters	normalized to 1W	23.3 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	51.9Ω+ 2.68 jΩ
Return Loss	- 29.9dB

Antenna Parameters with Body TSL

Impedance, transformed to feed point	48.8Ω+ 4.17 jΩ
Return Loss	- 27.2dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.019 ns
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 04.15.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 924

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

Medium parameters used: $f = 2450$ MHz; $\sigma = 1.85$ S/m; $\epsilon_r = 40.35$; $\rho = 1000$ kg/m³

Phantom section: Right Section

DASY5 Configuration:

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

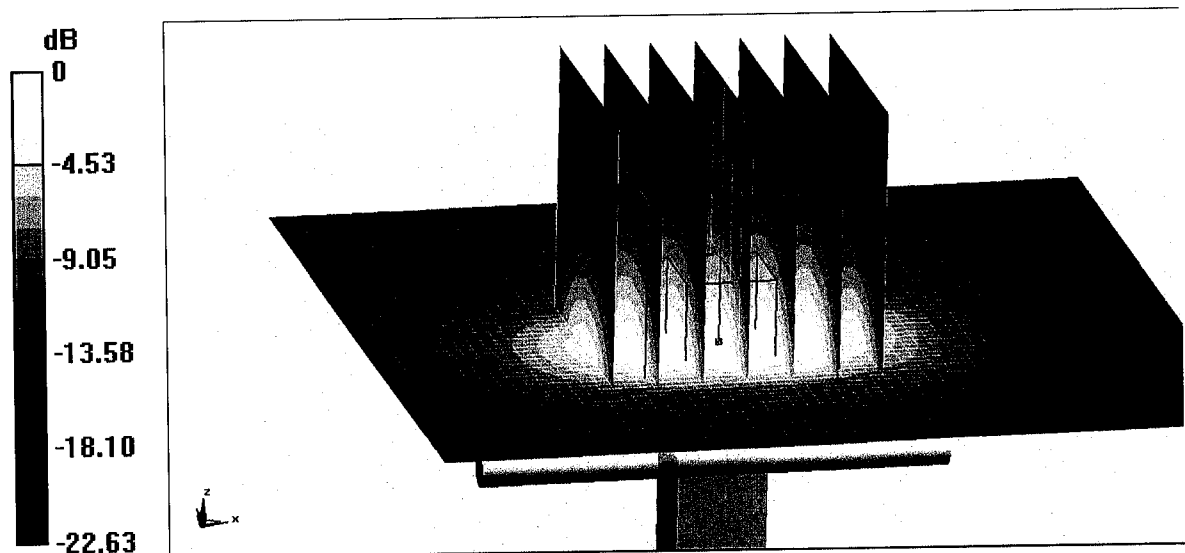
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 86.73 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 28.0 W/kg

SAR(1 g) = 13.1 W/kg; SAR(10 g) = 5.99 W/kg

Maximum value of SAR (measured) = 22.2 W/kg

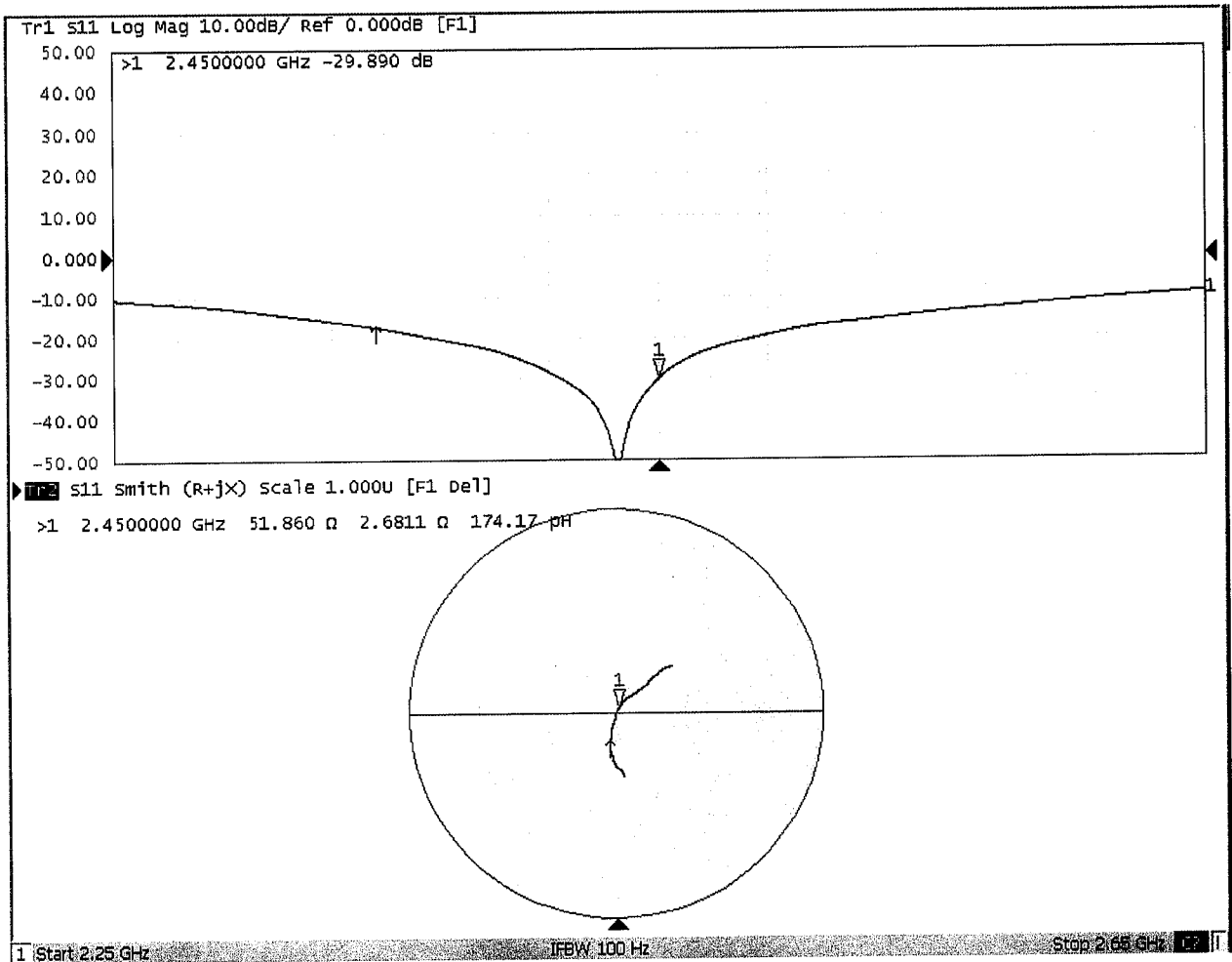


0 dB = 22.2 W/kg = 13.46 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 04.15.2019

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 2450 MHz; Type: D2450V2; Serial: D2450V2 - SN: 924

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

Medium parameters used: $f = 2450$ MHz; $\sigma = 2.005$ S/m; $\epsilon_r = 54.25$; $\rho = 1000$ kg/m³

Phantom section: Center Section

DASY5 Configuration:

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

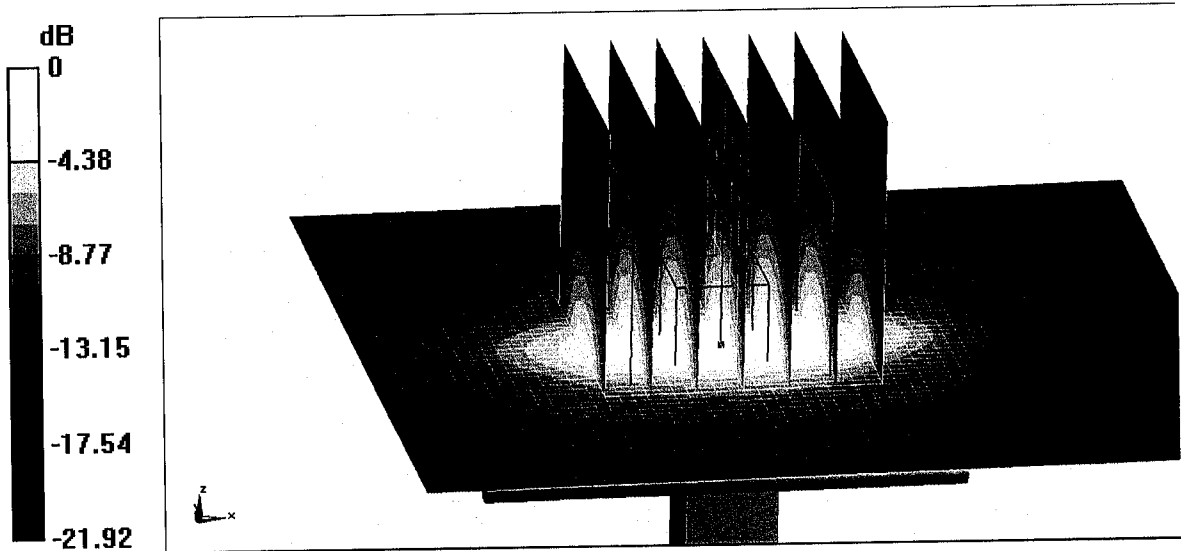
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 95.46 V/m; Power Drift = -0.02 dB

Peak SAR (extrapolated) = 26.3 W/kg

SAR(1 g) = 12.6 W/kg; SAR(10 g) = 5.83 W/kg

Maximum value of SAR (measured) = 20.9 W/kg

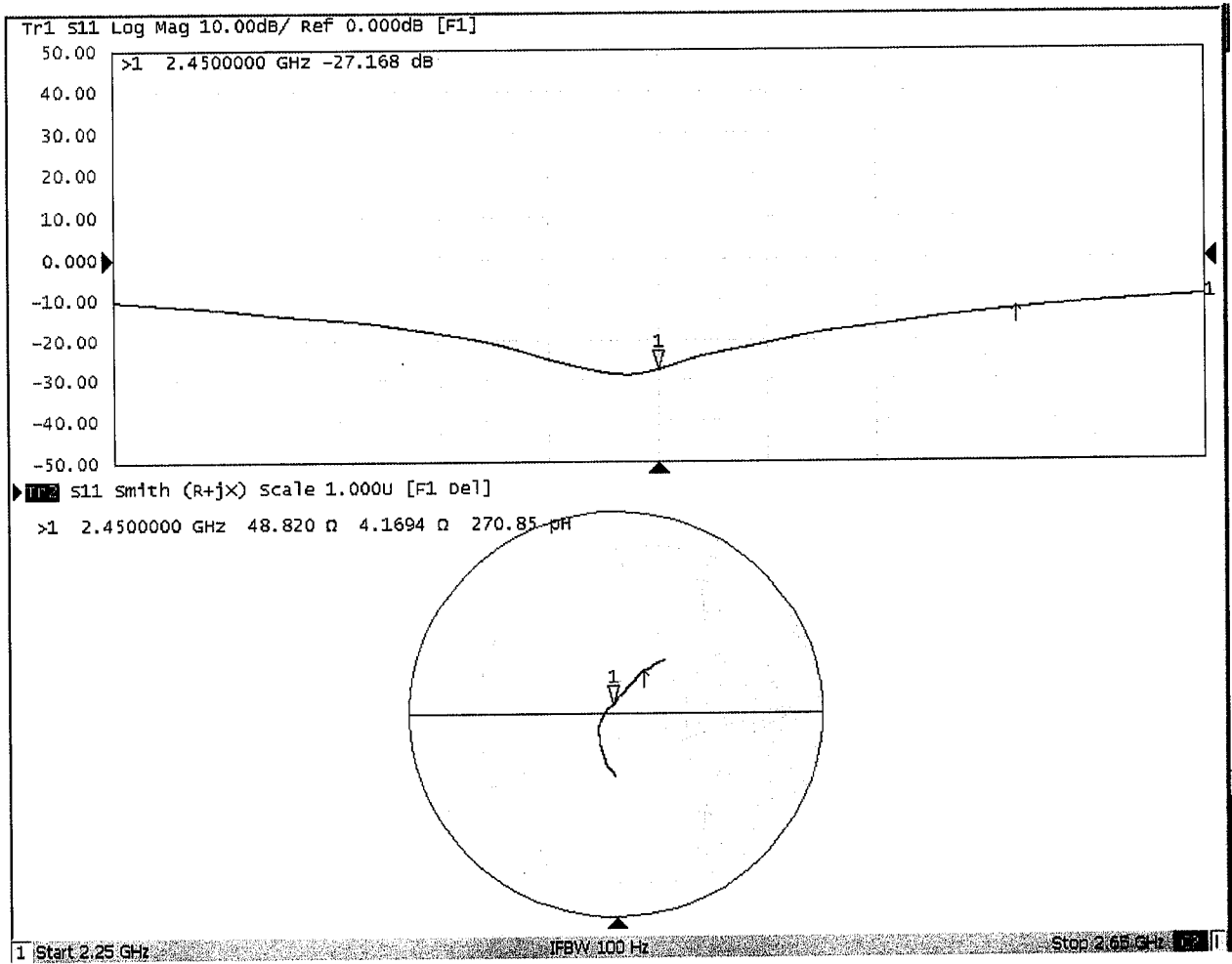


0 dB = 20.9 W/kg = 13.20 dBW/kg



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Impedance Measurement Plot for Body TSL





D2450V2, Serial No. 924 Extended Dipole Calibrations

Referring to KDB 865664 D01 v01r02, if dipoles are verified in return loss ($< -20\text{dB}$, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

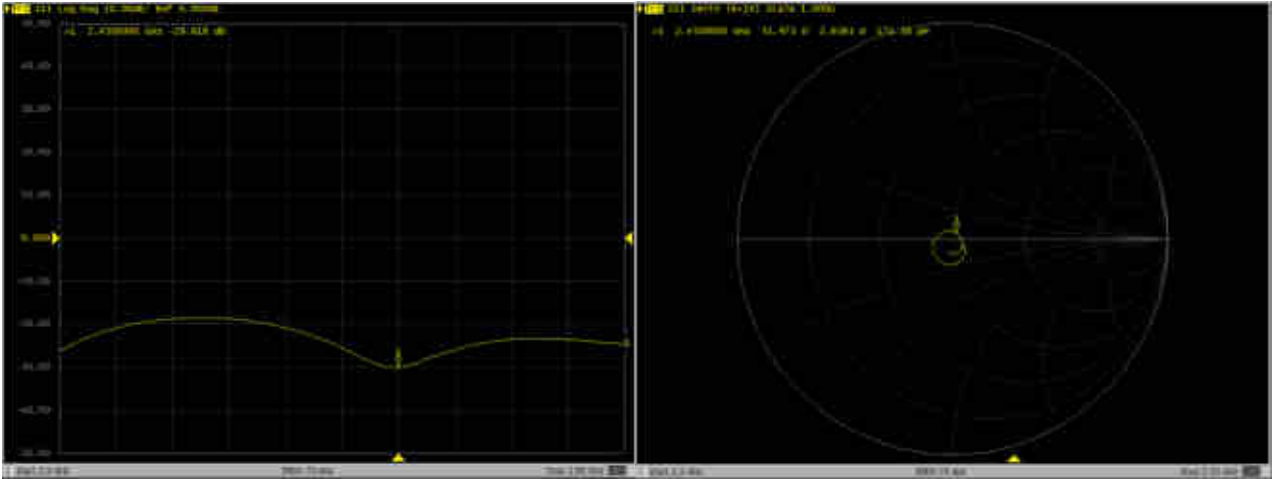
D2450V2 – serial no. 924												
	2450 Head						2450 Body					
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2019.04.15	-29.9		51.90		2.68		-27.2		48.80		4.17	
2020.04.11	-29.8	0.3	51.97	0.07	2.64	-0.04	-26.5	2.6	48.80	0	4.52	0.35

<Justification of the extended calibration>

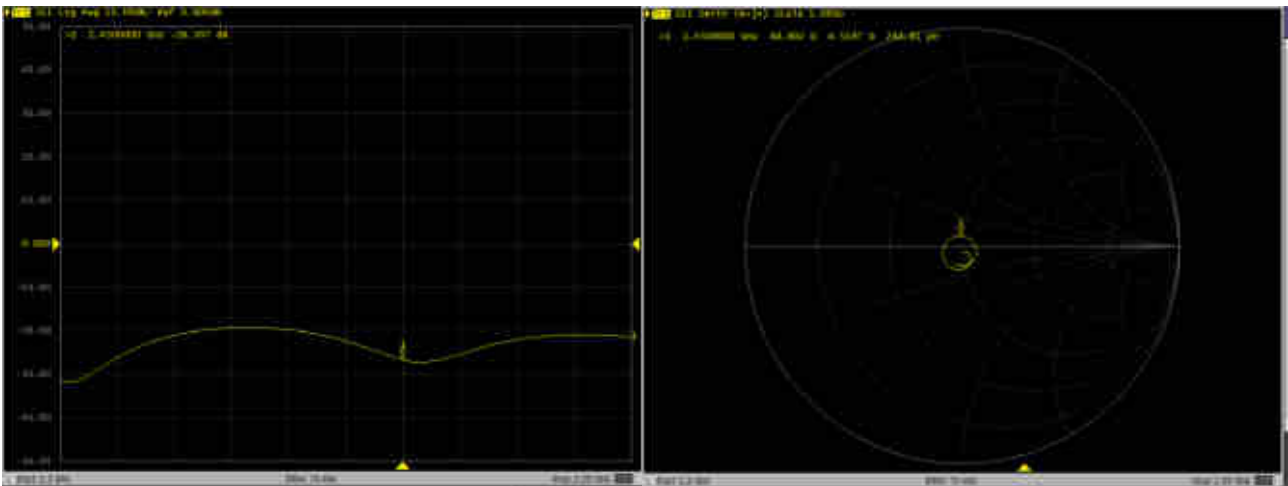
The return loss is $< -20\text{dB}$, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data> D2450V2, serial no. 924

2450MHz - Head



2450MHz - Body





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Client **Sporton**

Certificate No: **Z18-60537**

CALIBRATION CERTIFICATE

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)°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	Signature
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

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Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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



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Measurement Conditions

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

DASY Version	DASY52	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
Nominal Body TSL parameters	22.0 °C	52.5	2.16 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	51.0 ± 6 %	2.18 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL

SAR averaged over 1 cm ³ (1 g) of Body TSL	Condition	
SAR measured	250 mW input power	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
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After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 12.06.2018

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
- 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)

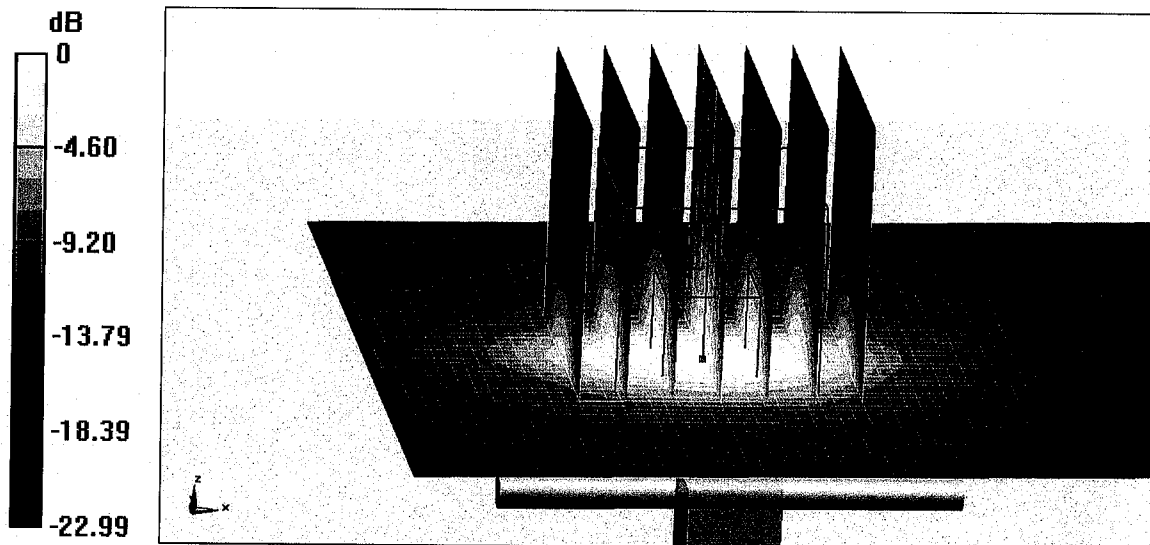
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

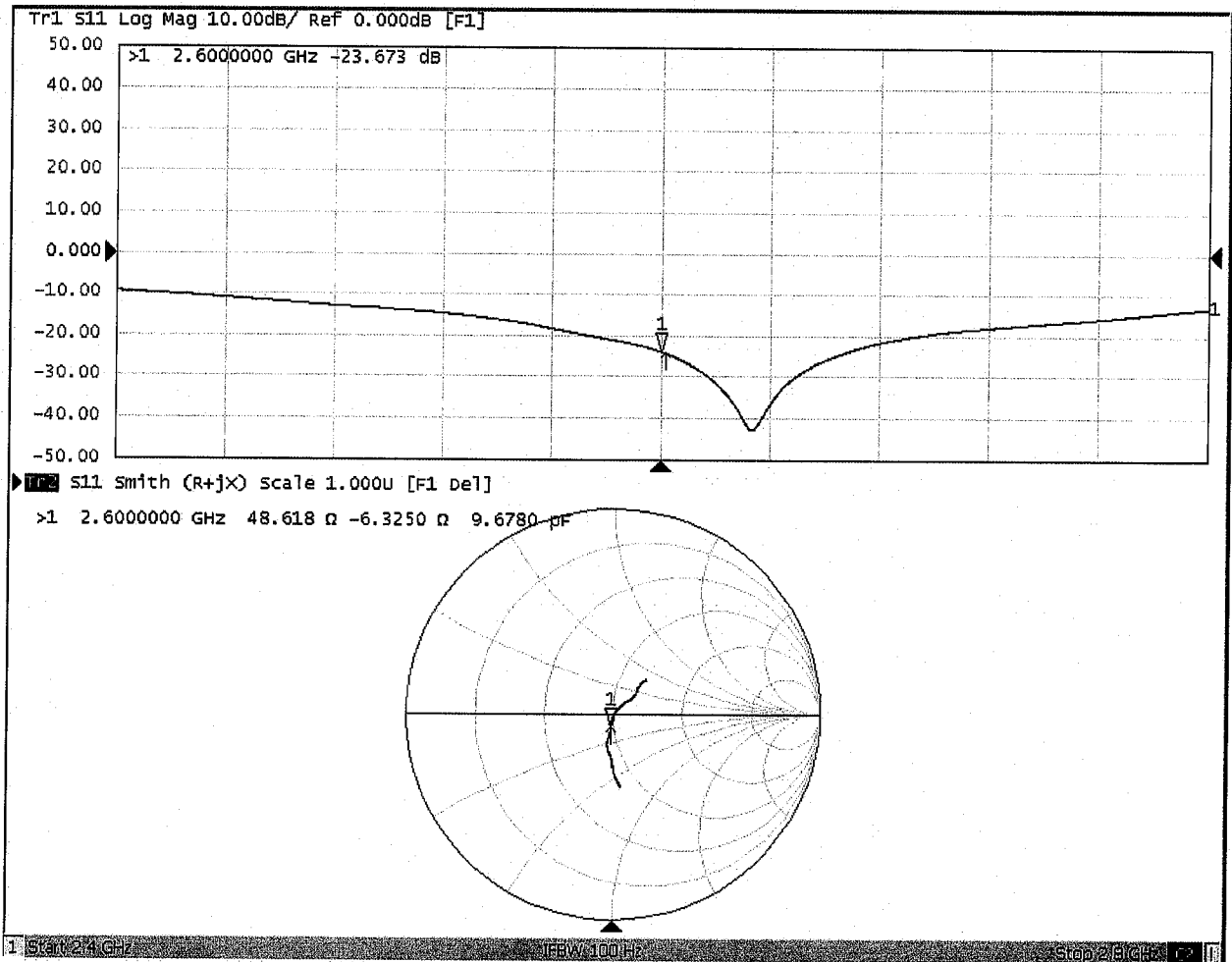


0 dB = 24.7 W/kg = 13.93 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 12.06.2018

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
- 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)

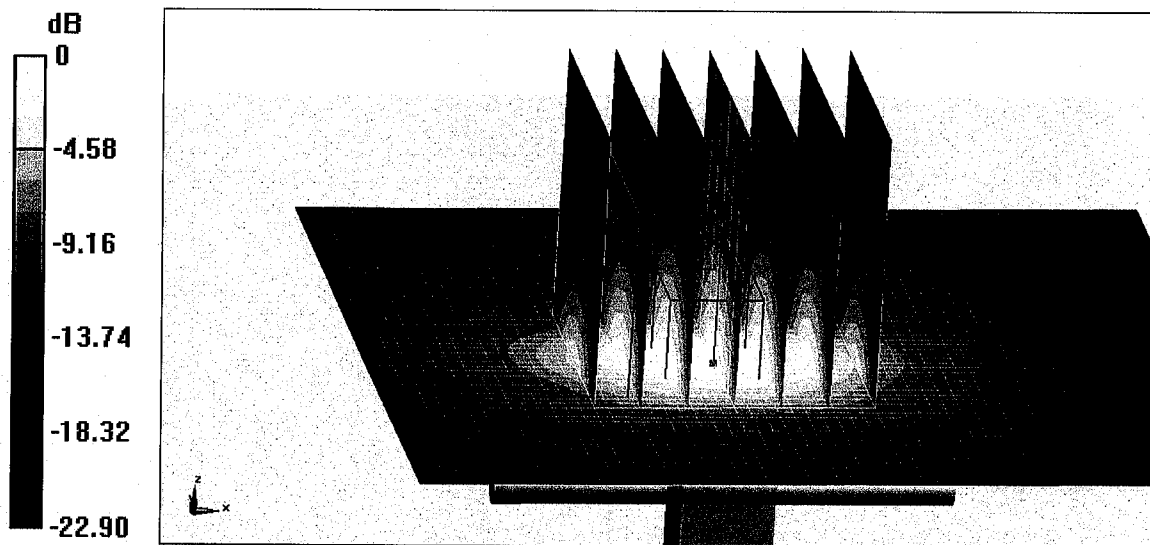
Dipole Calibration/Zoom Scan (7x7x7) (7x7x7)/Cube 0: Measurement grid: dx=5mm, dy=5mm, dz=5mm

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

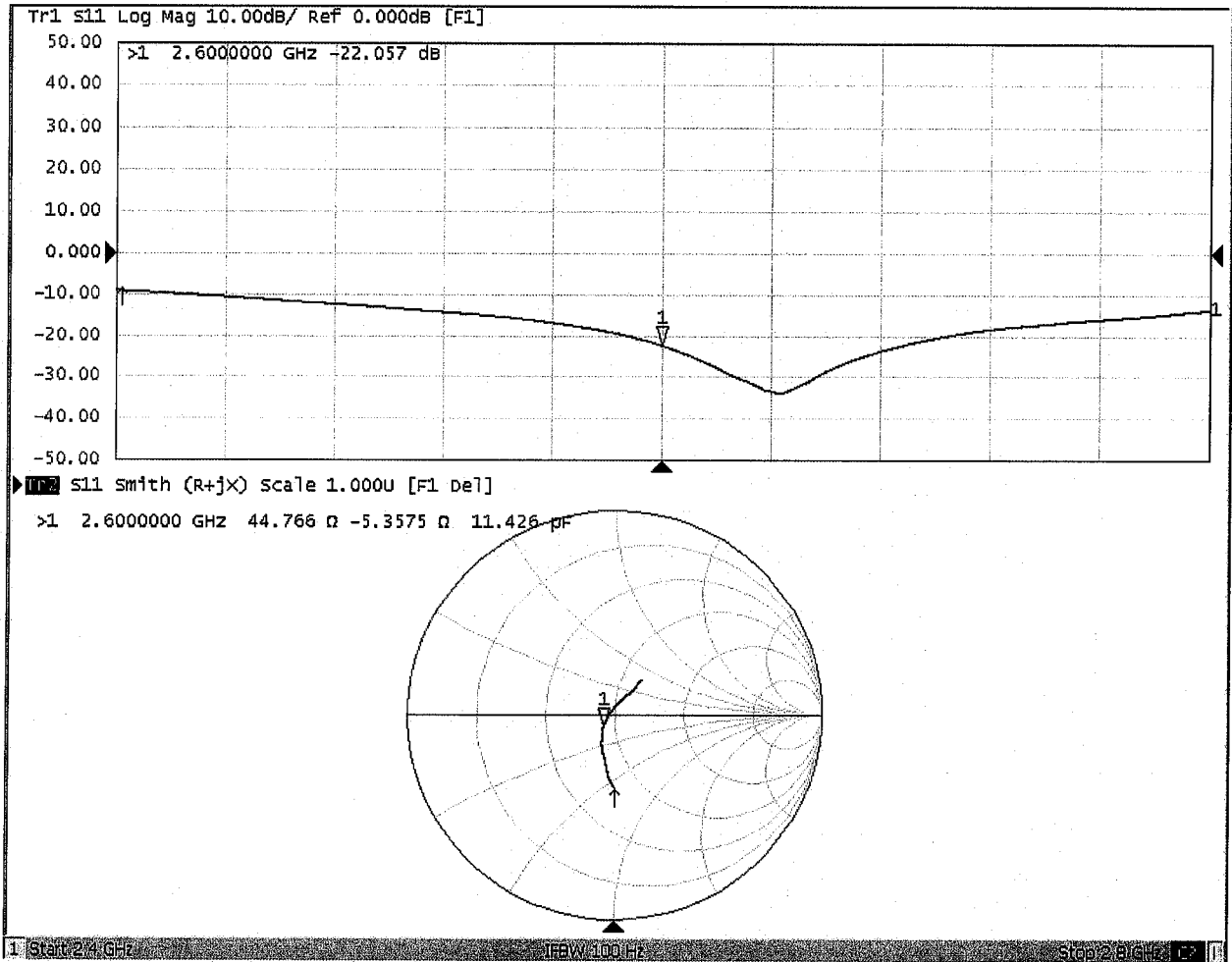


0 dB = 23.6 W/kg = 13.73 dBW/kg



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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 ($< -20\text{dB}$, within 20% of prior calibration), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

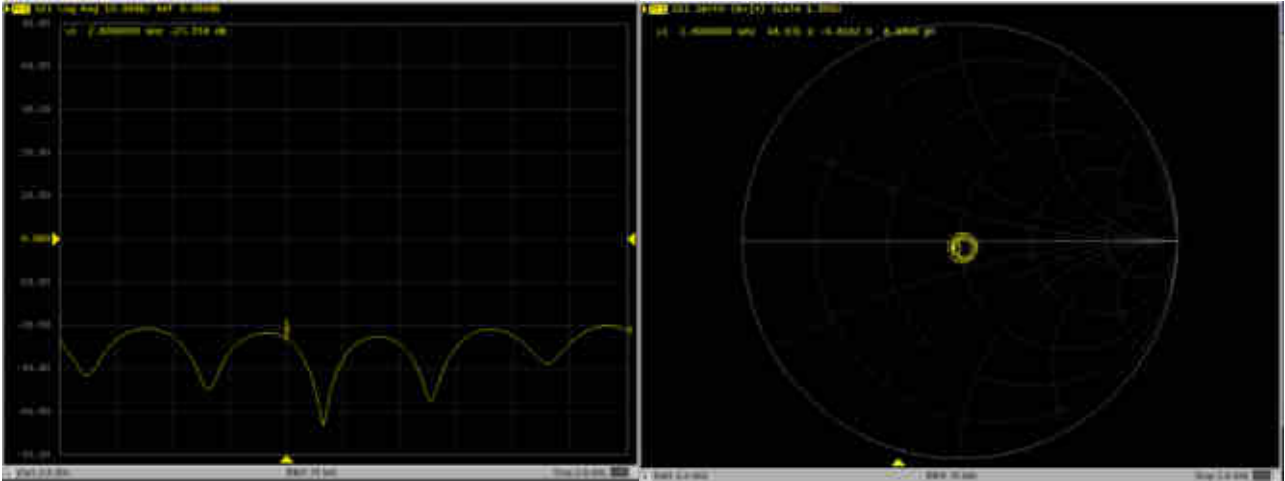
D2600V2 – serial no. 1070												
	2600 Head						2600 Body					
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
2018.12.7	-23.7		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

<Justification of the extended calibration>

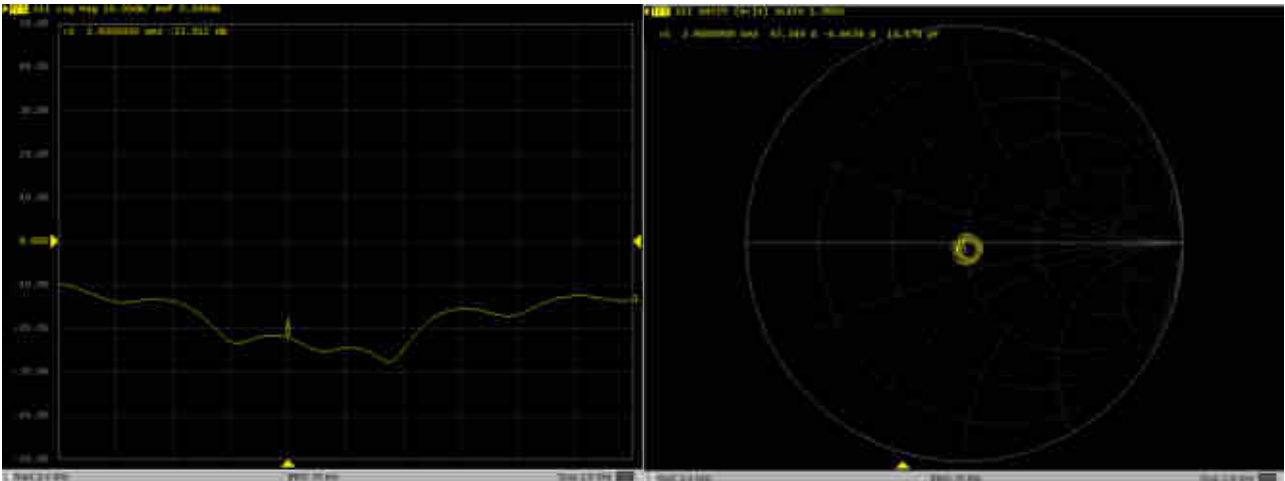
The return loss is $< -20\text{dB}$, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data> D2600V2, serial no. 1070

2600MHz - Head



2600MHz - Body





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 CNAS L0570

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Client **Sporton**

Certificate No: **Z18-60259**

CALIBRATION CERTIFICATE

Object **D5GHzV2 - SN: 1167**

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

Calibration date: **August 03, 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)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	102083	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
Power sensor NRP-Z91	100542	01-Nov-17 (CTTL, No.J17X08756)	Oct-18
ReferenceProbe EX3DV4	SN 7464	12-Sep-17(SPEAG,No.EX3-7464_Sep17)	Sep-18
DAE4	SN 1524	13-Sep-17(SPEAG,No.DAE4-1524_Sep17)	Sep-18
Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	23-Jan-18 (CTTL, No.J18X00560)	Jan-19
NetworkAnalyzerE5071C	MY46110673	24-Jan-18 (CTTL, No.J18X00561)	Jan-19

	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: August 6, 2018

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



Glossary:

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

Calibration is Performed According to the Following Standards:

- IEEE Std 1528-2013, "IEEE Recommended Practice for Determining the Peak Spatial-Averaged Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques", June 2013
- IEC 62209-1, "Measurement procedure for assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices- Part 1: Device used next to the ear (Frequency range of 300MHz to 6GHz)", July 2016
- IEC 62209-2, "Procedure to measure the Specific Absorption Rate (SAR) For wireless communication devices used in close proximity to the human body (frequency range of 30MHz to 6GHz)", March 2010
- KDB865664, SAR Measurement Requirements for 100 MHz to 6 GHz

Additional Documentation:

- DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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



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Measurement Conditions

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

DASY Version	DASY52	52.10.1.1476
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy = 4 mm, dz = 1.4 mm	Graded Ratio = 1.4 (Z direction)
Frequency	5250 MHz ± 1 MHz 5600 MHz ± 1 MHz 5750 MHz ± 1 MHz	

Head TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.9	4.71 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.9 ± 6 %	4.82 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5250 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.69 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	77.0 mW / g ± 24.4 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.20 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	22.0 mW / g ± 24.2 % (k=2)



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Head TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.5	5.07 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	35.1 ± 6 %	5.18 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5600 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	8.09 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	80.8 mW / g ± 24.4 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.32 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	23.2 mW / g ± 24.2 % (k=2)

Head TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	35.4	5.22 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	34.9 ± 6 %	5.37 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	----	----

SAR result with Head TSL at 5750 MHz

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	7.70 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	76.9 mW / g ± 24.4 % (k=2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.17 mW / g
SAR for nominal Head TSL parameters	normalized to 1W	21.6 mW / g ± 24.2 % (k=2)



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Body TSL parameters at 5250 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.9	5.36 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.4 ± 6 %	5.32 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL at 5250 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.46 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	74.4 mW / g ± 24.4 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.10 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.9 mW / g ± 24.2 % (k=2)

Body TSL parameters at 5600 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.5	5.77 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	47.7 ± 6 %	5.79 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL at 5600 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.73 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	77.1 mW / g ± 24.4 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.16 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	21.5 mW / g ± 24.2 % (k=2)



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Body TSL parameters at 5750 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Body TSL parameters	22.0 °C	48.3	5.94 mho/m
Measured Body TSL parameters	(22.0 ± 0.2) °C	48.5 ± 6 %	5.93 mho/m ± 6 %
Body TSL temperature change during test	<1.0 °C	----	----

SAR result with Body TSL at 5750 MHz

SAR averaged over 1 cm³ (1 g) of Body TSL	Condition	
SAR measured	100 mW input power	7.43 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	74.3 mW /g ± 24.4 % (k=2)
SAR averaged over 10 cm³ (10 g) of Body TSL	Condition	
SAR measured	100 mW input power	2.08 mW / g
SAR for nominal Body TSL parameters	normalized to 1W	20.8 mW /g ± 24.2 % (k=2)



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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL at 5250 MHz

Impedance, transformed to feed point	50.3 Ω - 9.42j Ω
Return Loss	- 20.6dB

Antenna Parameters with Head TSL at 5600 MHz

Impedance, transformed to feed point	58.1 Ω - 7.15j Ω
Return Loss	- 20.0dB

Antenna Parameters with Head TSL at 5750 MHz

Impedance, transformed to feed point	53.5 Ω - 7.66j Ω
Return Loss	- 21.8dB

Antenna Parameters with Body TSL at 5250 MHz

Impedance, transformed to feed point	49.5 Ω - 7.40j Ω
Return Loss	- 22.6dB

Antenna Parameters with Body TSL at 5600 MHz

Impedance, transformed to feed point	58.0 Ω - 6.37j Ω
Return Loss	- 20.5dB

Antenna Parameters with Body TSL at 5750 MHz

Impedance, transformed to feed point	54.5 Ω - 7.07j Ω
Return Loss	- 21.9dB



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General Antenna Parameters and Design

Electrical Delay (one direction)	1.065 ns
----------------------------------	----------

After long term use with 100W radiated power, only a slight warming of the dipole near the feedpoint can be measured.

The dipole is made of standard semirigid coaxial cable. The center conductor of the feeding line is directly connected to the second arm of the dipole. The antenna is therefore short-circuited for DC-signals. On some of the dipoles, small end caps are added to the dipole arms in order to improve matching when loaded according to the position as explained in the "Measurement Conditions" paragraph. The SAR data are not affected by this change. The overall dipole length is still according to the Standard. No excessive force must be applied to the dipole arms, because they might bend or the soldered connections near the feedpoint may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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DASY5 Validation Report for Head TSL

Date: 07.27.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1167

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz,
Frequency: 5750 MHz,

Medium parameters used: $f = 5250$ MHz; $\sigma = 4.822$ S/m; $\epsilon_r = 35.92$; $\rho = 1000$ kg/m³,
Medium parameters used: $f = 5600$ MHz; $\sigma = 5.184$ S/m; $\epsilon_r = 35.14$; $\rho = 1000$ kg/m³,
Medium parameters used: $f = 5750$ MHz; $\sigma = 5.365$ S/m; $\epsilon_r = 34.88$; $\rho = 1000$ kg/m³,

Phantom section: Center Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7464; ConvF(5.68, 5.68, 5.68) @ 5250 MHz; Calibrated: 9/12/2017, ConvF(4.98, 4.98, 4.98) @ 5600 MHz; Calibrated: 9/12/2017, ConvF(5.04, 5.04, 5.04) @ 5750 MHz; Calibrated: 9/12/2017,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1524; Calibrated: 9/13/2017
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

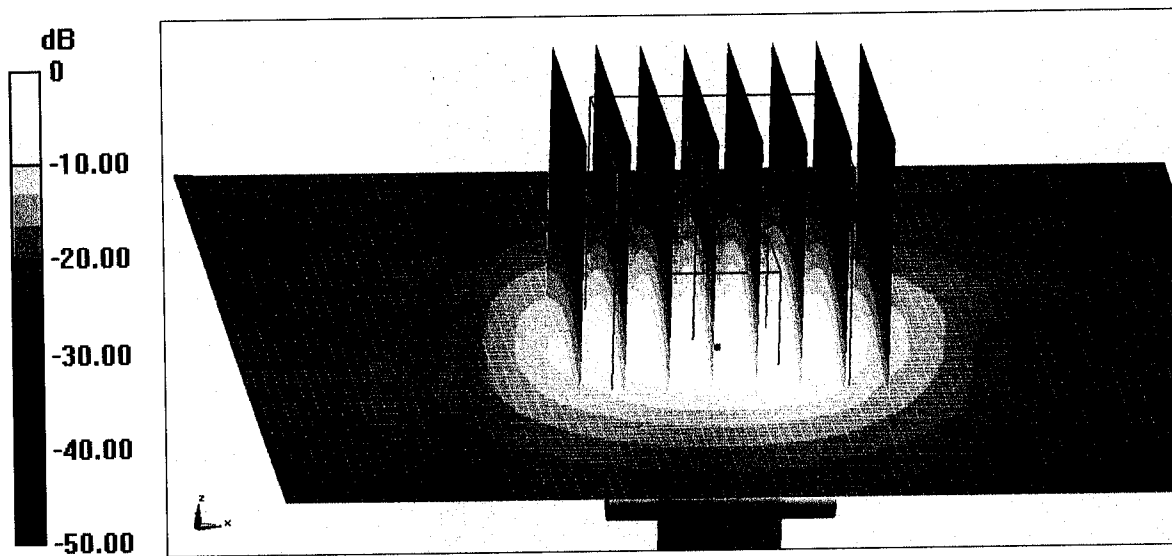
Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 65.09 V/m; Power Drift = -0.02 dB
Peak SAR (extrapolated) = 32.4 W/kg
SAR(1 g) = 7.69 W/kg; SAR(10 g) = 2.2 W/kg
Maximum value of SAR (measured) = 18.0 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.53 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 36.2 W/kg
SAR(1 g) = 8.09 W/kg; SAR(10 g) = 2.32 W/kg
Maximum value of SAR (measured) = 19.7 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.79 V/m; Power Drift = 0.01 dB
Peak SAR (extrapolated) = 36.2 W/kg
SAR(1 g) = 7.7 W/kg; SAR(10 g) = 2.17 W/kg
Maximum value of SAR (measured) = 19.0 W/kg



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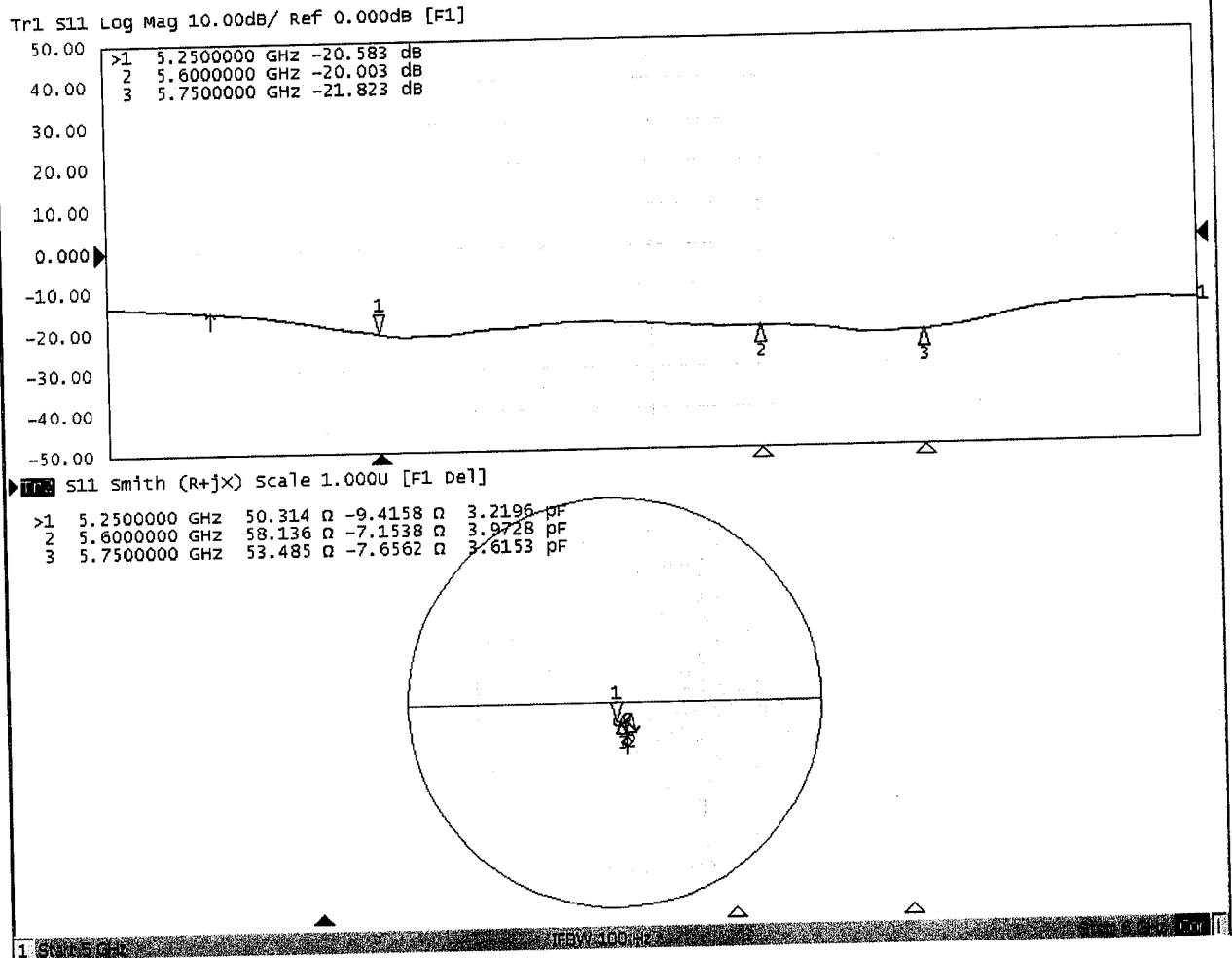


0 dB = 19.0 W/kg = 12.79 dBW/kg



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Impedance Measurement Plot for Head TSL





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DASY5 Validation Report for Body TSL

Date: 08.02.2018

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1167

Communication System: CW; Frequency: 5250 MHz, Frequency: 5600 MHz,
Frequency: 5750 MHz,

Medium parameters used: $f = 5250$ MHz; $\sigma = 5.316$ S/m; $\epsilon_r = 48.42$; $\rho = 1000$ kg/m³,
Medium parameters used: $f = 5600$ MHz; $\sigma = 5.789$ S/m; $\epsilon_r = 47.7$; $\rho = 1000$ kg/m³,
Medium parameters used: $f = 5750$ MHz; $\sigma = 5.926$ S/m; $\epsilon_r = 48.45$; $\rho = 1000$ kg/m³,

Phantom section: Right Section

DASY5 Configuration:

- Probe: EX3DV4 - SN7464; ConvF(5.29, 5.29, 5.29) @ 5250 MHz; Calibrated: 9/12/2017, ConvF(4.5, 4.5, 4.5) @ 5600 MHz; Calibrated: 9/12/2017, ConvF(4.59, 4.59, 4.59) @ 5750 MHz; Calibrated: 9/12/2017,
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1524; Calibrated: 9/13/2017
- Phantom: MFP_V5.1C ; Type: QD 000 P51CA; Serial: 1062
- Measurement SW: DASY52, Version 52.10 (1); SEMCAD X Version 14.6.11 (7439)

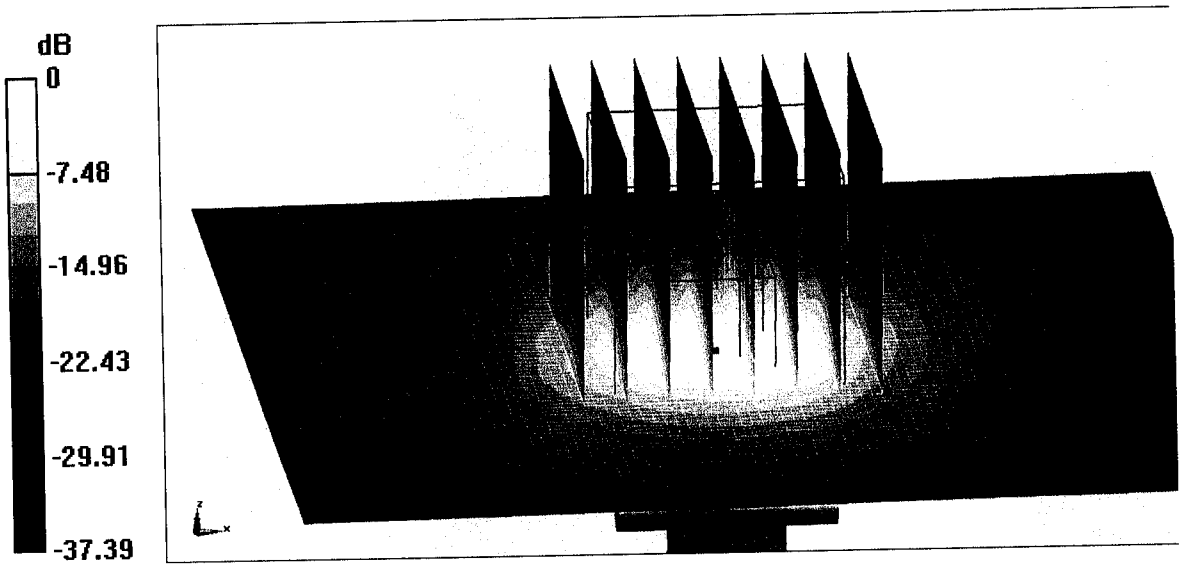
Dipole Calibration /Pin=100mW, d=10mm, f=5250 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 64.14 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 31.9 W/kg
SAR(1 g) = 7.46 W/kg; SAR(10 g) = 2.1 W/kg
Maximum value of SAR (measured) = 17.6 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5600 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 62.32 V/m; Power Drift = -0.01 dB
Peak SAR (extrapolated) = 36.3 W/kg
SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.16 W/kg
Maximum value of SAR (measured) = 19.1 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=5750 MHz/Zoom Scan, dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm
Reference Value = 63.99 V/m; Power Drift = 0.02 dB
Peak SAR (extrapolated) = 35.2 W/kg
SAR(1 g) = 7.43 W/kg; SAR(10 g) = 2.08 W/kg
Maximum value of SAR (measured) = 18.0 W/kg



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0 dB = 18.0 W/kg = 12.55 dBW/kg

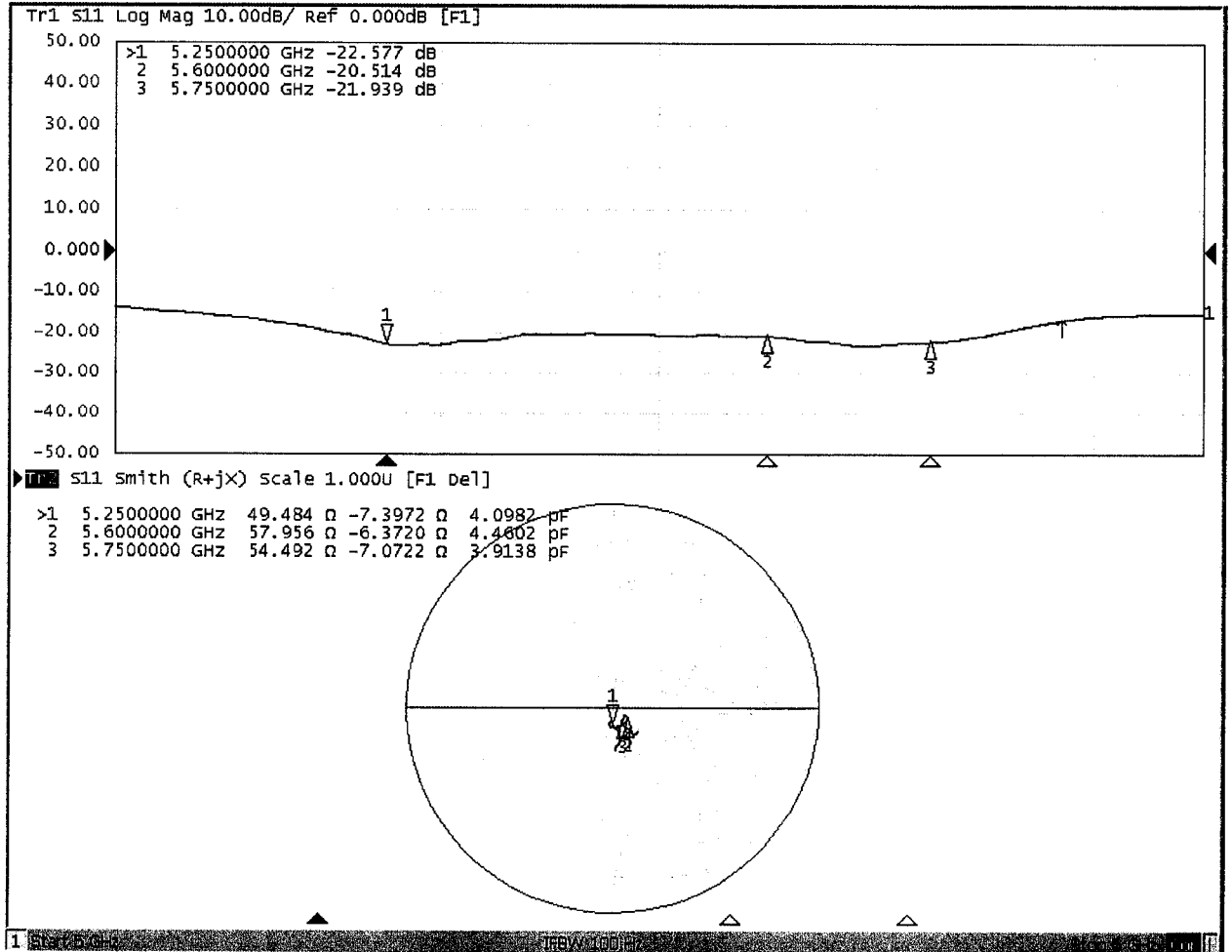


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Impedance Measurement Plot for Body TSL

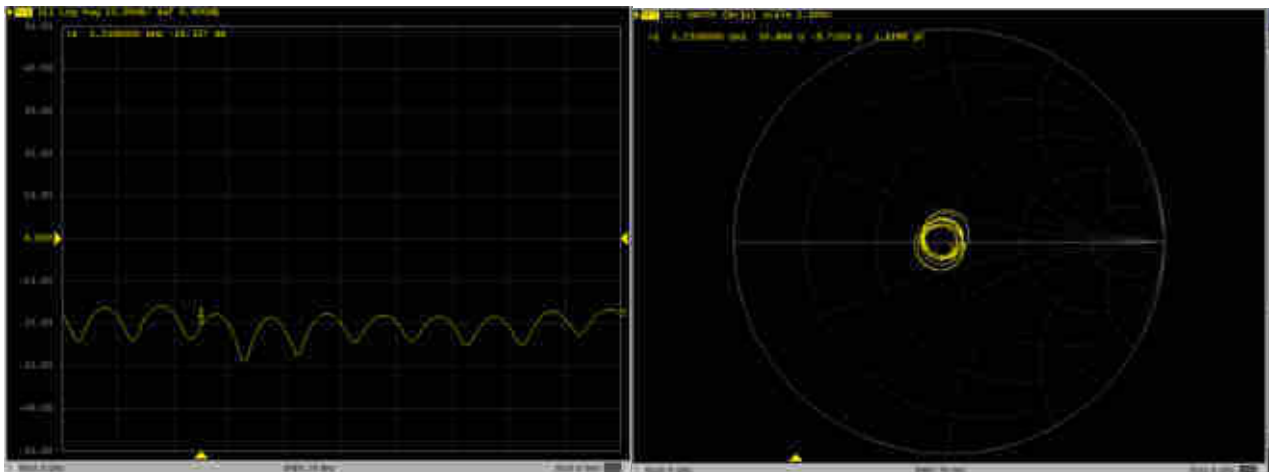


<Justification of the extended calibration>

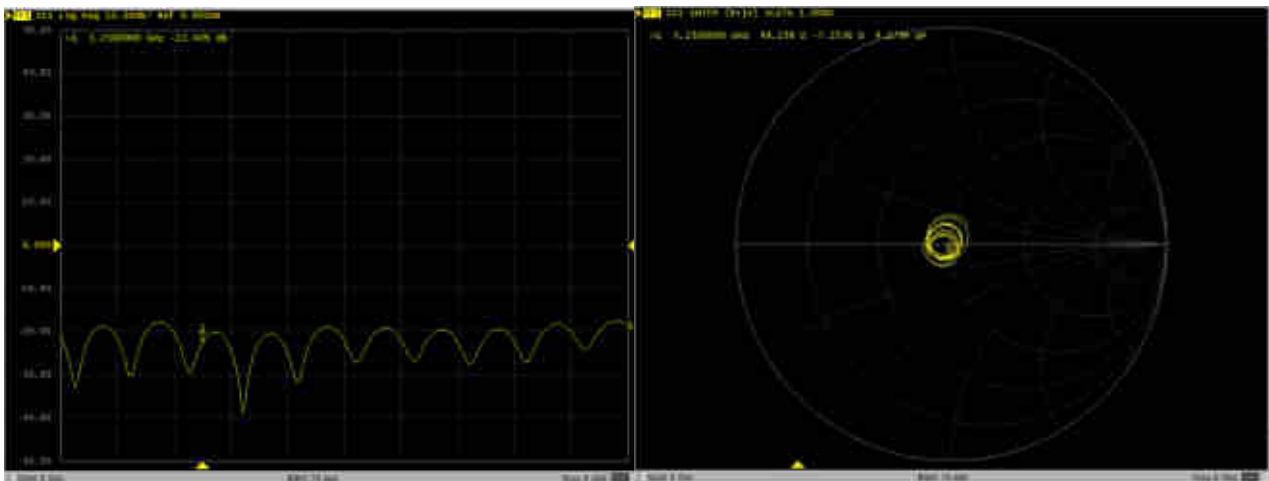
The return loss is $< -20\text{dB}$, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

Dipole Verification Data> D5GHzV3, serial no. 1167

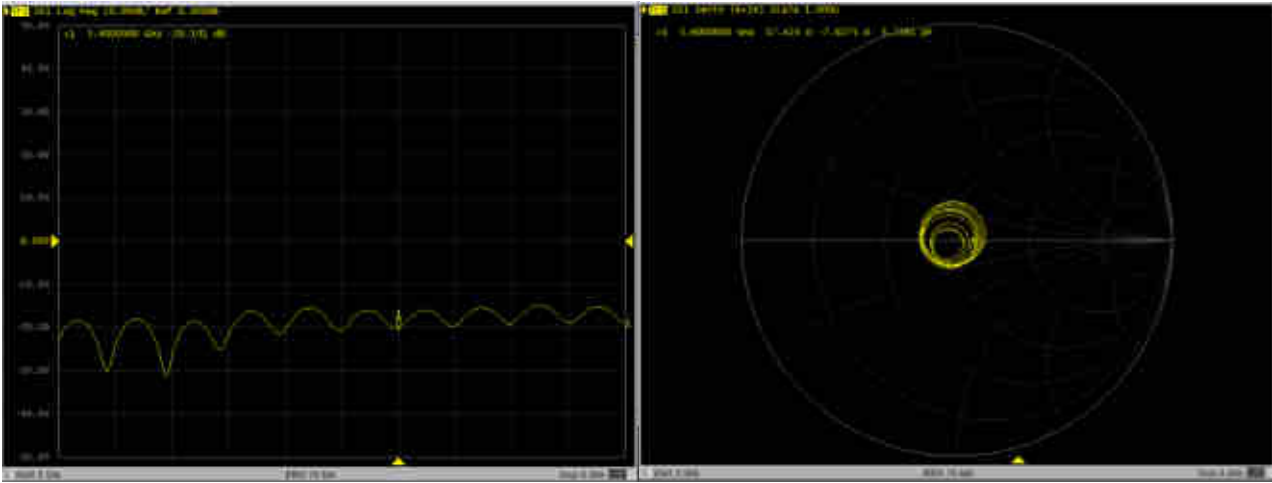
5250MHz - Head



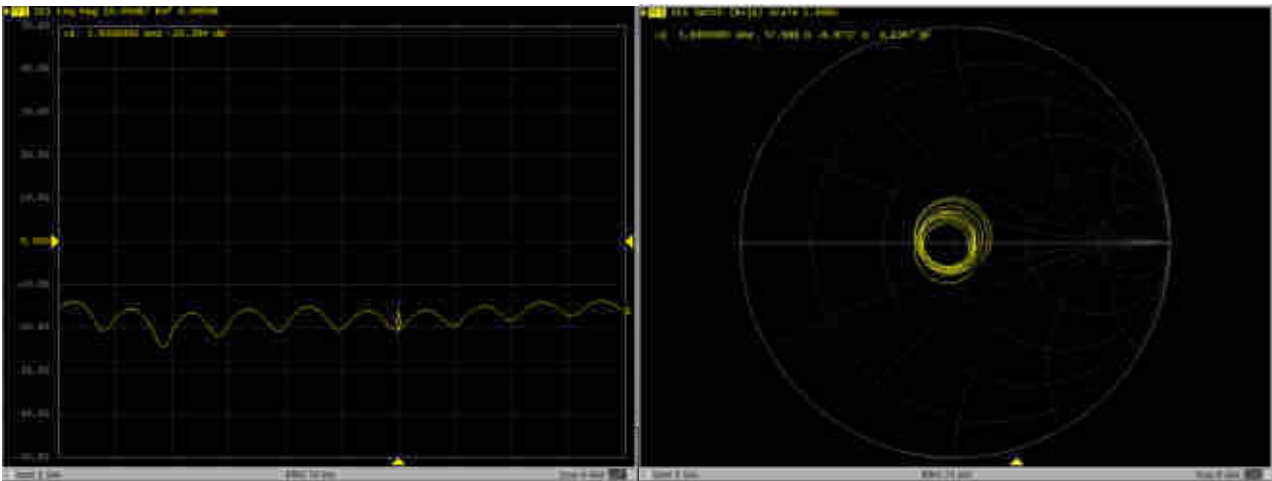
5250MHz - Body



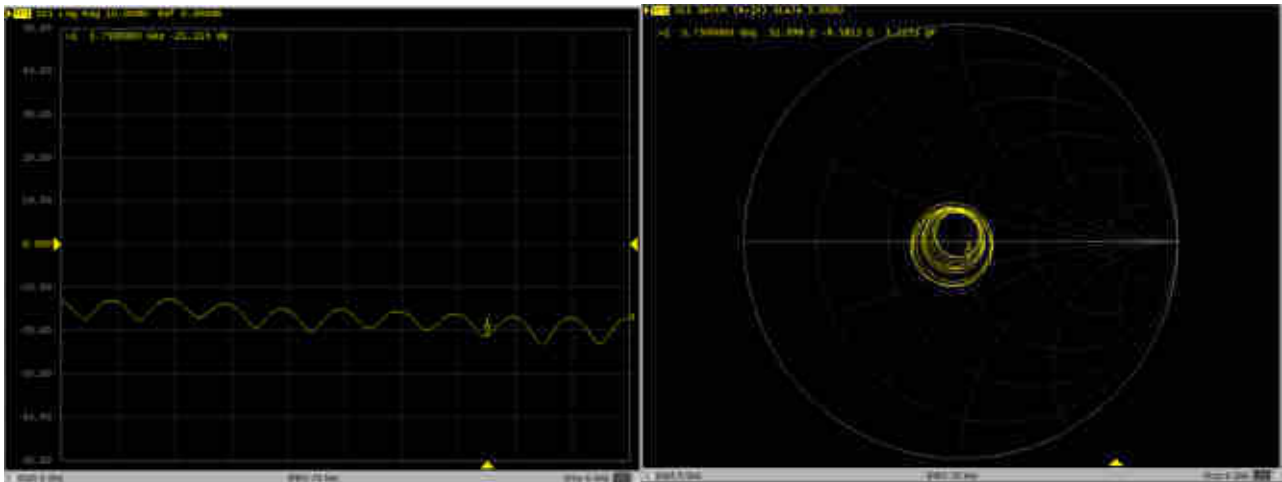
5600MHz – Head



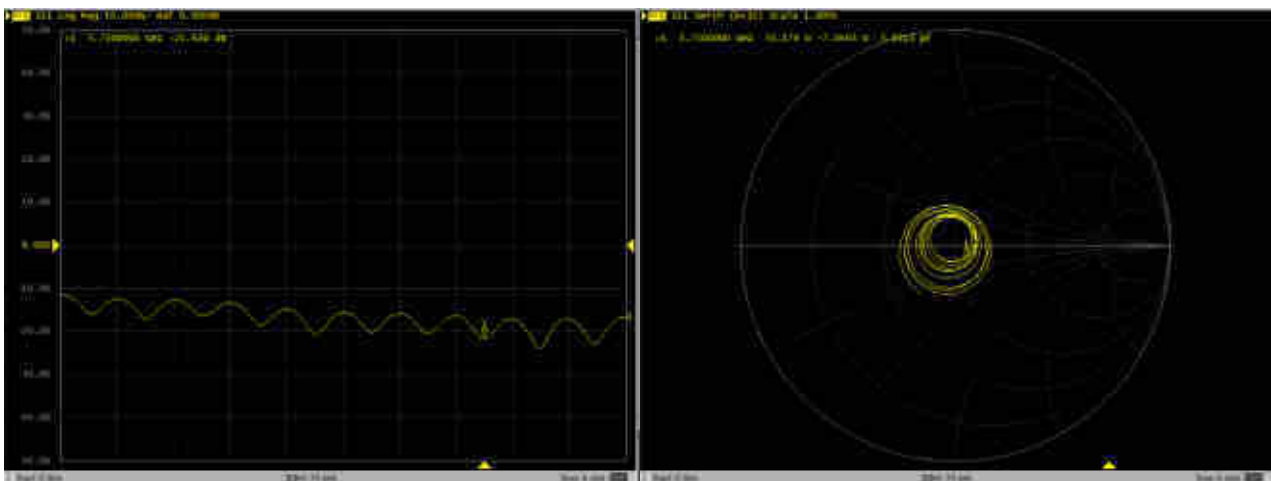
5600MHz – Body



5750MHz – Head



5750MHz – Body





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Certificate No: Z19-60436

Client : **Sporton**

CALIBRATION CERTIFICATE

Object: DAE4 - SN: 1437

Calibration Procedure(s): FF-Z11-002-01
Calibration Procedure for the Data Acquisition Electronics (DAEx)

Calibration date: November 19, 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)°C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
Process Calibrator 753	1971018	24-Jun-19 (CTTL, No.J19X05126)	Jun-20

	Name	Function
Calibrated by:	Yu Zongying	SAR Test Engineer
Reviewed by:	Zhao Jing	SAR Test Engineer
Approved by:	Qi Dianyuan	SAR Project Leader

Signature

Issued: November 21, 2019

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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 report provide only calibration results for DAE, it does not contain other performance test results.



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DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 μ V, 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	404.110 \pm 0.15% (k=2)	403.634 \pm 0.15% (k=2)	404.056 \pm 0.15% (k=2)
Low Range	3.95185 \pm 0.7% (k=2)	3.93955 \pm 0.7% (k=2)	3.90561 \pm 0.7% (k=2)

Connector Angle

Connector Angle to be used in DASY system	65 $^{\circ}$ \pm 1 $^{\circ}$
---	----------------------------------

1210
Speag - K3

IMPORTANT NOTICE

USAGE OF THE DAE4

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

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

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

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

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

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

Important Note:

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

Important Note:

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

Important Note:

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



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Accreditation No.: SCS 0108

Client Sporton

Certificate No: DAE4-1210_Jul20

CALIBRATION CERTIFICATE

Object DAE4 - SD 000 D04 BM - SN: 1210

Calibration procedure(s) QA CAL-06.v30
Calibration procedure for the data acquisition electronics (DAE)

Calibration date: July 27, 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 $(22 \pm 3)^{\circ}\text{C}$ and humidity $< 70\%$.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID #	Cal Date (Certificate No.)	Scheduled Calibration
Kelthley 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 008 AA 1002	09-Jan-20 (in house check)	In house check: Jan-21

Calibrated by: Adrian Gehring Name: Adrian Gehring Function: Laboratory Technician

Approved by: Sven Kühn Name: Sven Kühn Function: Deputy Manager

Signature

Issued: July 27, 2020

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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.

DC Voltage Measurement

A/D - Converter Resolution nominal

High Range: 1LSB = 6.1 μ V, full range = -100...+300 mV

Low Range: 1LSB = 61 nV, full range = -1.....+3mV

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

Calibration Factors	X	Y	Z
High Range	404.162 \pm 0.02% (k=2)	404.982 \pm 0.02% (k=2)	405.090 \pm 0.02% (k=2)
Low Range	3.99951 \pm 1.50% (k=2)	3.99092 \pm 1.50% (k=2)	3.95059 \pm 1.50% (k=2)

Connector Angle

Connector Angle to be used in DASY system	346.0 $^{\circ}$ \pm 1 $^{\circ}$
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Appendix (Additional assessments outside the scope of SCS0108)

1. DC Voltage Linearity

High Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	199996.55	0.86	0.00
Channel X + Input	20003.46	1.82	0.01
Channel X - Input	-19999.22	2.95	-0.01
Channel Y + Input	199995.01	-0.81	-0.00
Channel Y + Input	20000.50	-0.99	-0.00
Channel Y - Input	-20001.74	0.48	-0.00
Channel Z + Input	199993.65	-2.05	-0.00
Channel Z + Input	20000.87	-0.52	-0.00
Channel Z - Input	-20002.17	0.12	-0.00

Low Range	Reading (μV)	Difference (μV)	Error (%)
Channel X + Input	2001.48	0.71	0.04
Channel X + Input	202.17	0.99	0.49
Channel X - Input	-198.74	-0.08	0.04
Channel Y + Input	2001.11	0.41	0.02
Channel Y + Input	200.90	-0.24	-0.12
Channel Y - Input	-199.54	-0.82	0.42
Channel Z + Input	2000.50	-0.11	-0.01
Channel Z + Input	200.24	-0.82	-0.41
Channel Z - Input	-199.89	-1.02	0.52

2. Common mode sensitivity

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

	Common mode Input Voltage (mV)	High Range Average Reading (μV)	Low Range Average Reading (μV)
Channel X	200	-6.78	-8.90
	- 200	10.13	8.29
Channel Y	200	-8.84	-9.15
	- 200	8.75	8.46
Channel Z	200	12.20	12.07
	- 200	-14.74	-14.25

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	-	2.65	-4.04
Channel Y	200	8.36	-	2.84
Channel Z	200	9.58	7.02	-

4. AD-Converter Values with inputs shorted

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

	High Range (LSE)	Low Range (LSB)
Channel X	15961	15923
Channel Y	15952	15701
Channel Z	15867	16022

5. Input Offset Measurement

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

Input 10M Ω

	Average (μ V)	min. Offset (μ V)	max. Offset (μ V)	Std. Deviation (μ V)
Channel X	-0.08	-1.17	1.37	0.42
Channel Y	-0.23	-1.47	0.68	0.40
Channel Z	0.14	-0.59	1.76	0.36

6. Input Offset Current

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

7. Input Resistance (Typical values for information)

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

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

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

9. Power Consumption (Typical values for information)

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



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Accreditation No.: SCS 0108

Client **Tejet (Auden)**

Certificate No: **ES3-3241_May20**

CALIBRATION CERTIFICATE

Object **ES3DV3 - SN:3241**

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

Calibration date: **May 14, 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 $(22 \pm 3)^\circ\text{C}$ 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-18)	In house check: Jun-20
Power sensor E4412A	SN: MY41498087	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
Power sensor E4412A	SN: 000110210	06-Apr-16 (in house check Jun-18)	In house check: Jun-20
RF generator HP 8648C	SN: US3642U01700	04-Aug-99 (in house check Jun-18)	In house check: Jun-20
Network Analyzer E8358A	SN: US41080477	31-Mar-14 (in house check Oct-10)	In house check: Oct-20

Calibrated by:	Name Jeton Kastrati	Function Laboratory Technician	Signature
Approved by:	Name Katja Pokovic	Technical Manager	
			Issued: May 16, 2020
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Accreditation No.: SCS 0108

Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A, B, C, D	modulation dependent linearization parameters
Polarization ϕ	ϕ rotation around probe axis
Polarization ϑ	ϑ rotation around an axis that is in the plane normal to probe axis (at measurement center), i.e., $\vartheta = 0$ 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:

- 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 hand-held 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\vartheta = 0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: R22 waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not affect the E²-field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,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.
- DCP_{x,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
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; D_{x,y,z}; VR_{x,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 $f \leq 800$ 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 NORM_{x,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 NORM_x (no uncertainty required).

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3241

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc (k=2)
Norm ($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	1.16	0.84	1.11	$\pm 10.1 \%$
DCP (mV) ^B	103.3	108.0	103.8	

Calibration Results for Modulation Response

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Max dev.	Unc ^C (k=2)
0	CW	X	0.0	0.0	1.0	0.00	177.6	$\pm 3.3 \%$	$\pm 4.7 \%$
		Y	0.0	0.0	1.0		168.8		
		Z	0.0	0.0	1.0		173.6		

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

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

^B Numerical linearization parameter: uncertainty not required.

^C 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:3241

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	69
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

DASY/EASY - Parameters of Probe: ES3DV3 - SN:3241

Calibration Parameter Determined in Head Tissue Simulating Media

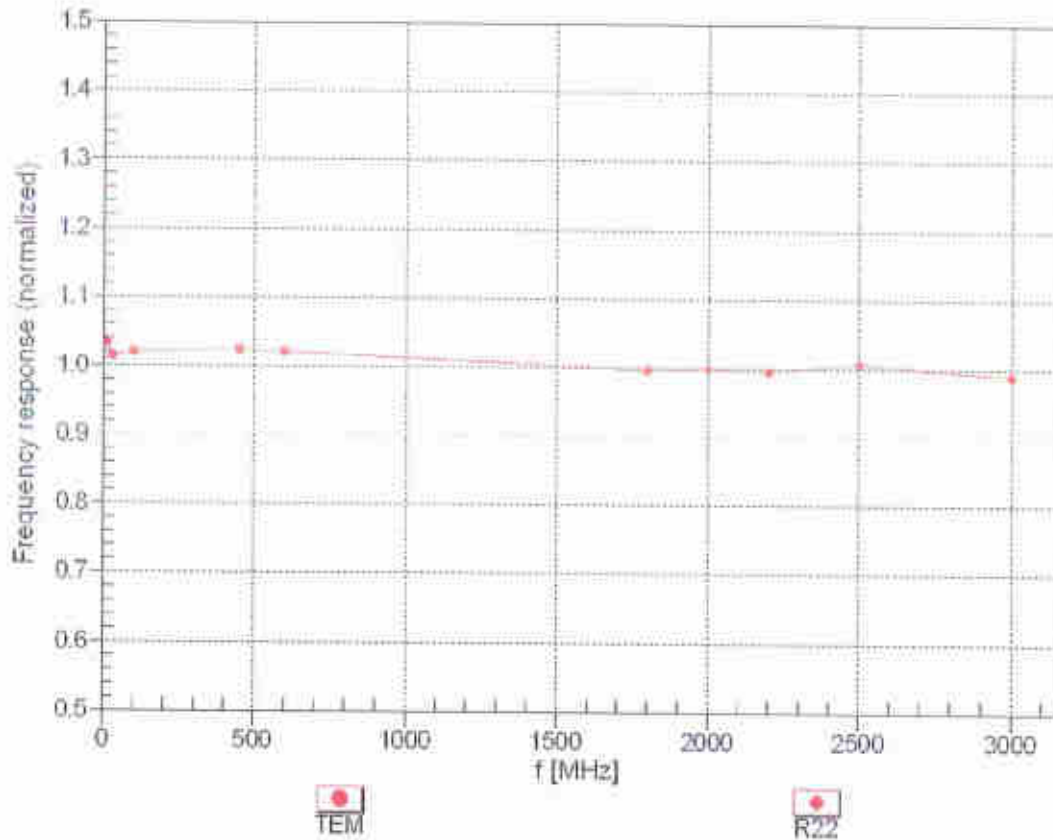
f (MHz) ^c	Relative Permittivity ^f	Conductivity (S/m) ^f	ConvF X	ConvF Y	ConvF Z	Alpha ^g	Depth (mm) ^g	Unc (k=2)
750	41.9	0.89	6.45	6.45	6.45	0.80	1.25	± 12.0 %
835	41.5	0.90	6.26	6.26	6.26	0.60	1.38	± 12.0 %
1750	40.1	1.37	5.22	5.22	5.22	0.31	1.81	± 12.0 %
1900	40.0	1.40	5.04	5.04	5.04	0.49	1.42	± 12.0 %
2000	40.0	1.40	4.99	4.99	4.99	0.47	1.43	± 12.0 %
2300	39.5	1.67	4.81	4.81	4.81	0.62	1.50	± 12.0 %
2450	39.2	1.80	4.59	4.59	4.59	0.56	1.60	± 12.0 %
2600	39.0	1.96	4.42	4.42	4.42	0.65	1.50	± 12.0 %

^c Frequency validity above 300 MHz of ± 100 MHz only applies for DASY v4.4 and higher (see Page 2), else it is restricted to ± 50 MHz. The uncertainty is the RSS of the ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25, 40, 50 and 70 MHz for ConvF assessments at 30, 64, 128, 160 and 220 MHz respectively. Validity of ConvF assessed at 6 MHz is 4-9 MHz, and ConvF assessed at 13 MHz is 9-19 MHz. Above 5 GHz frequency validity can be extended to ± 110 MHz.

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

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

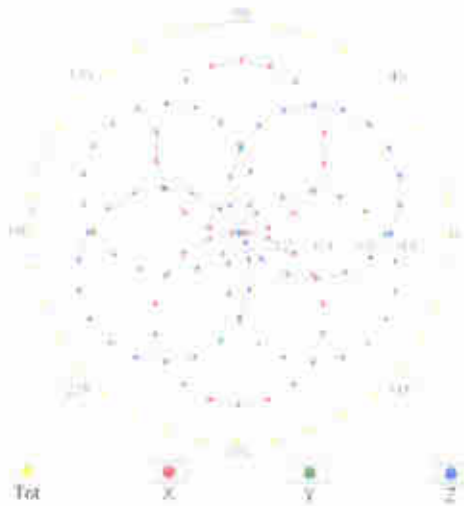
Frequency Response of E-Field (TEM-Cell:ifi110 EXX, Waveguide: R22)



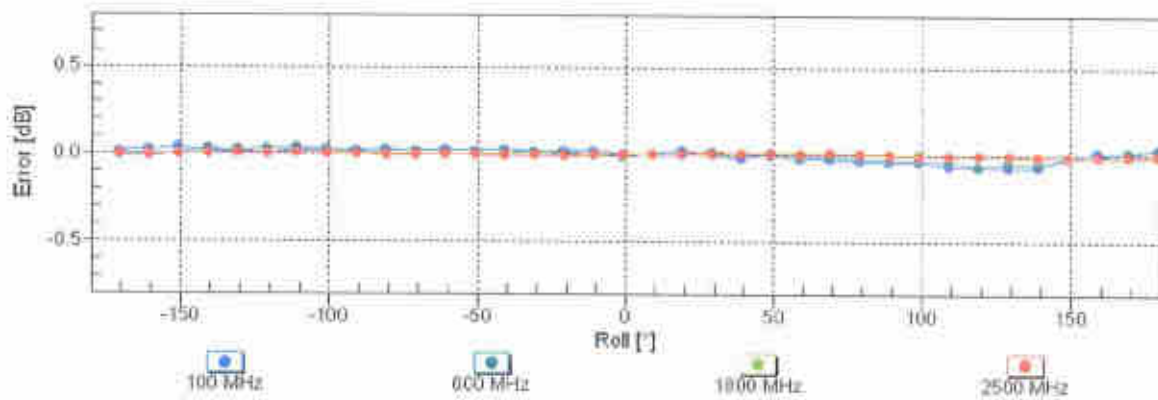
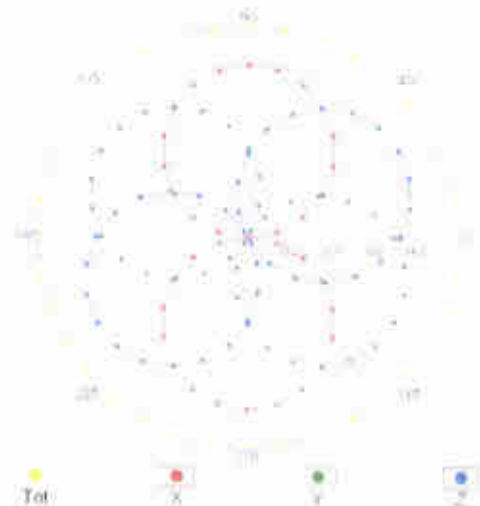
Uncertainty of Frequency Response of E-field: $\pm 6.3\%$ (k=2)

Receiving Pattern (ϕ), $\theta = 0^\circ$

f=600 MHz,TEM

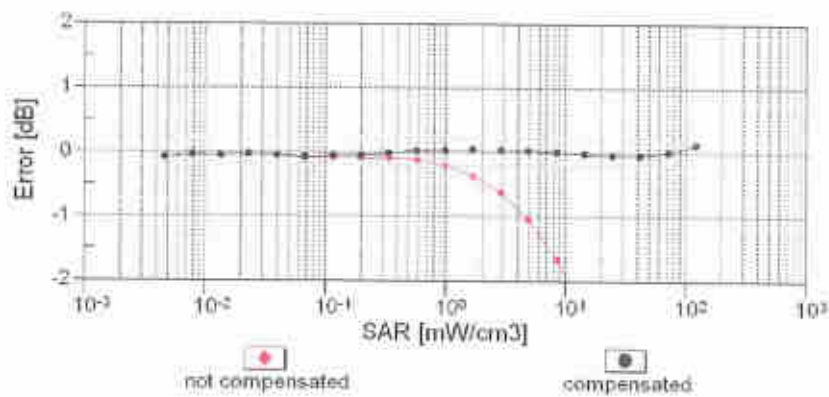
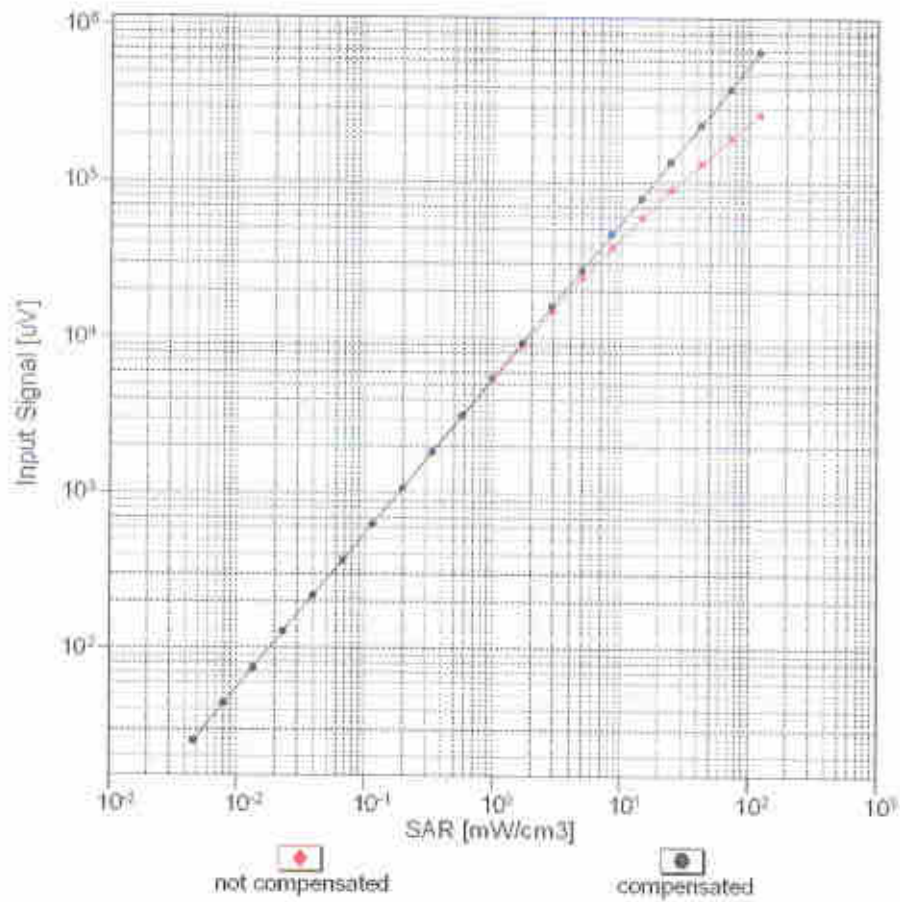


f=1800 MHz,R22



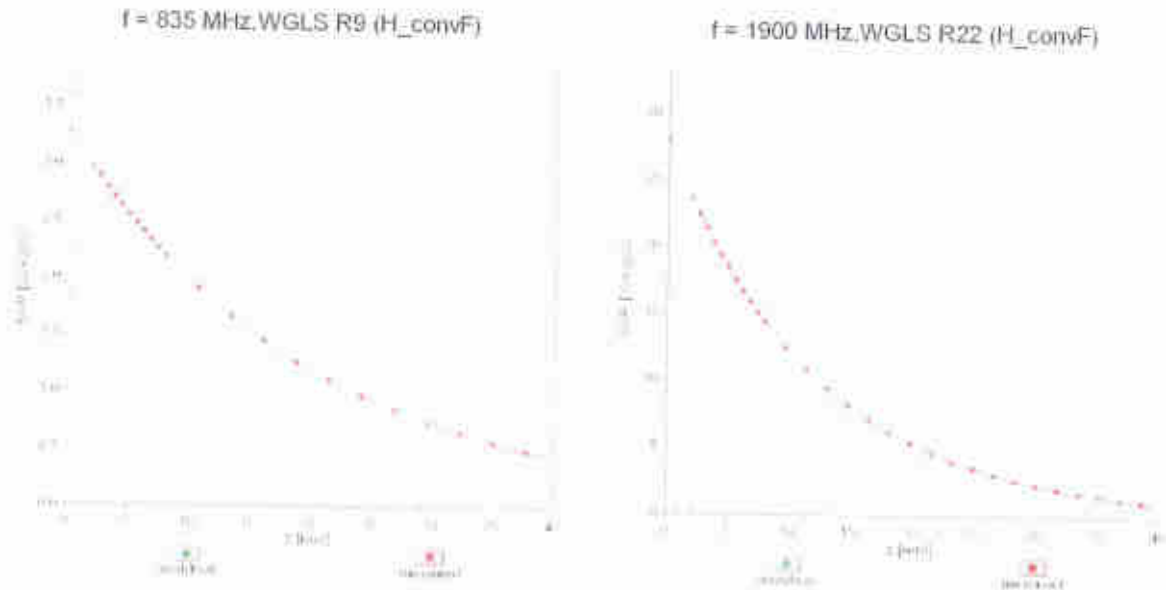
Uncertainty of Axial Isotropy Assessment: $\pm 0.5\%$ (k=2)

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

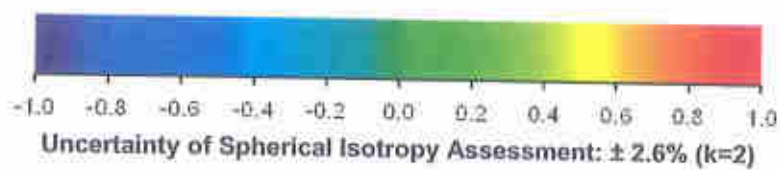
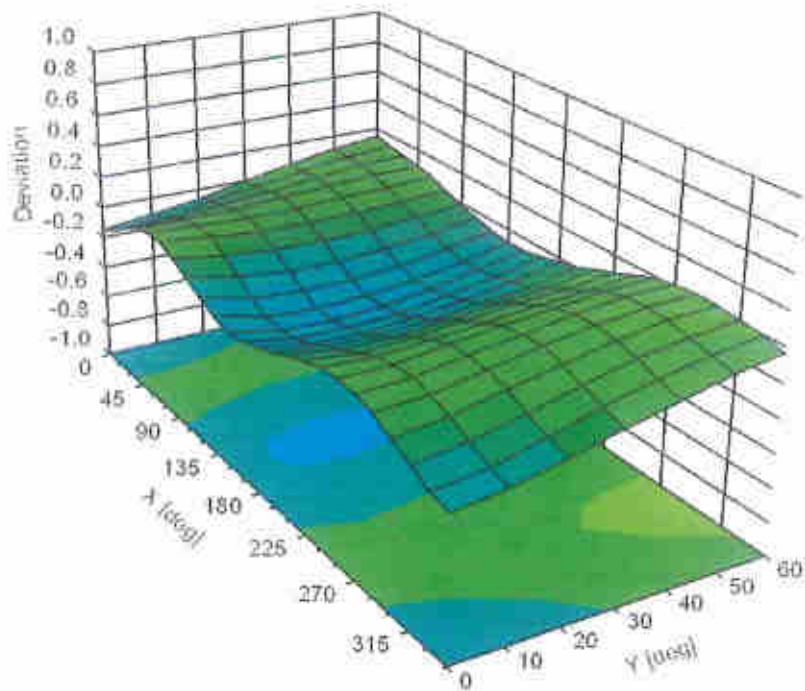


Uncertainty of Linearity Assessment: $\pm 0.6\%$ (k=2)

Conversion Factor Assessment



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



CALIBRATION CERTIFICATE

Object **EX3DV4 - SN : 3826**

Calibration Procedure(s) **FF-Z11-004-01
Calibration Procedures for Dosimetric E-field Probes**

Calibration date: **May 20, 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)℃ 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	101919	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Power sensor NRP-Z91	101547	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Power sensor NRP-Z91	101548	18-Jun-19(CTTL, No.J19X05125)	Jun-20
Reference 10dBAttenuator	18N50W-10dB	10-Feb-20(CTTL, No.J20X00525)	Feb-22
Reference 20dBAttenuator	18N50W-20dB	10-Feb-20(CTTL, No.J20X00526)	Feb-22
Reference Probe EX3DV4	SN 3617	30-Jan-20(SPEAG, No.EX3-3617_Jan20/2)	Jan-21
DAE4	SN 1556	4-Feb-20(SPEAG, No.DAE4-1556_Feb20)	Feb-21

Secondary Standards	ID #	Cal Date(Calibrated by, Certificate No.)	Scheduled Calibration
SignalGenerator MG3700A	6201052605	18-Jun-19(CTTL, No.J19X05127)	Jun-20
Network Analyzer E5071C	MY46110673	10-Feb-20(CTTL, No.J20X00515)	Feb-21

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

Issued: May 22, 2020

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



In Collaboration with

s p e a g
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Glossary:

TSL	tissue simulating liquid
NORM _{x,y,z}	sensitivity in free space
ConvF	sensitivity in TSL / NORM _{x,y,z}
DCP	diode compression point
CF	crest factor (1/duty_cycle) of the RF signal
A,B,C,D	modulation dependent linearization parameters
Polarization Φ	Φ rotation around probe axis
Polarization θ	θ rotation around an axis that is in the plane normal to probe axis (at measurement center), $\theta=0$ 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:

- 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 hand-held 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
- KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Methods Applied and Interpretation of Parameters:

- NORM_{x,y,z}**: Assessed for E-field polarization $\theta=0$ ($f \leq 900$ MHz in TEM-cell; $f > 1800$ MHz: waveguide). NORM_{x,y,z} are only intermediate values, i.e., the uncertainties of NORM_{x,y,z} does not effect the E^2 -field uncertainty inside TSL (see below ConvF).
- NORM(f)_{x,y,z} = NORM_{x,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.
- DCP_{x,y,z}**: DCP are numerical linearization parameters assessed based on the data of power sweep (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.
- A_{x,y,z}; B_{x,y,z}; C_{x,y,z}; VR_{x,y,z}; A,B,C** 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 $f \leq 800$ 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 valued are given. These parameters are used in DASY4 software to improve probe accuracy close to the boundary. The sensitivity in TSL corresponds to NORM_{x,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 NORM_x (no uncertainty required).



DASY/EASY – Parameters of Probe: EX3DV4 – SN:3826

Basic Calibration Parameters

	Sensor X	Sensor Y	Sensor Z	Unc ($k=2$)
Norm($\mu\text{V}/(\text{V}/\text{m})^2$) ^A	0.48	0.41	0.36	$\pm 10.0\%$
DCP(mV) ^B	100.2	99.8	103.2	

Modulation Calibration Parameters

UID	Communication System Name		A dB	B dB $\sqrt{\mu\text{V}}$	C	D dB	VR mV	Unc ^E ($k=2$)
0	CW	X	0.0	0.0	1.0	0.00	160.2	$\pm 2.7\%$
		Y	0.0	0.0	1.0		141.6	
		Z	0.0	0.0	1.0		130.8	

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

^A The uncertainties of Norm X, Y, Z do not affect the E²-field uncertainty inside TSL (see Page 4).

^B Numerical linearization parameter; uncertainty not required.

^E Uncertainty is determined using the max. deviation from linear response applying rectangular distribution and is expressed for the square of the field value.



DASY/EASY – Parameters of Probe: EX3DV4 – SN:3826

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)	Unct. (k=2)
750	41.9	0.89	9.37	9.37	9.37	0.40	0.80	±12.1%
835	41.5	0.90	9.12	9.12	9.12	0.17	1.26	±12.1%
900	41.5	0.97	9.10	9.10	9.10	0.18	1.30	±12.1%
1750	40.1	1.37	7.98	7.98	7.98	0.19	1.14	±12.1%
1900	40.0	1.40	7.67	7.67	7.67	0.22	1.14	±12.1%
2000	40.0	1.40	7.77	7.77	7.77	0.24	1.10	±12.1%
2300	39.5	1.67	7.35	7.35	7.35	0.51	0.73	±12.1%
2450	39.2	1.80	7.12	7.12	7.12	0.53	0.72	±12.1%
2600	39.0	1.96	6.94	6.94	6.94	0.45	0.85	±12.1%
3500	37.9	2.91	6.62	6.62	6.62	0.39	0.98	±13.3%
5250	35.9	4.71	5.09	5.09	5.09	0.45	1.30	±13.3%
5600	35.5	5.07	4.66	4.66	4.66	0.45	1.40	±13.3%
5750	35.4	5.22	4.68	4.68	4.68	0.45	1.40	±13.3%

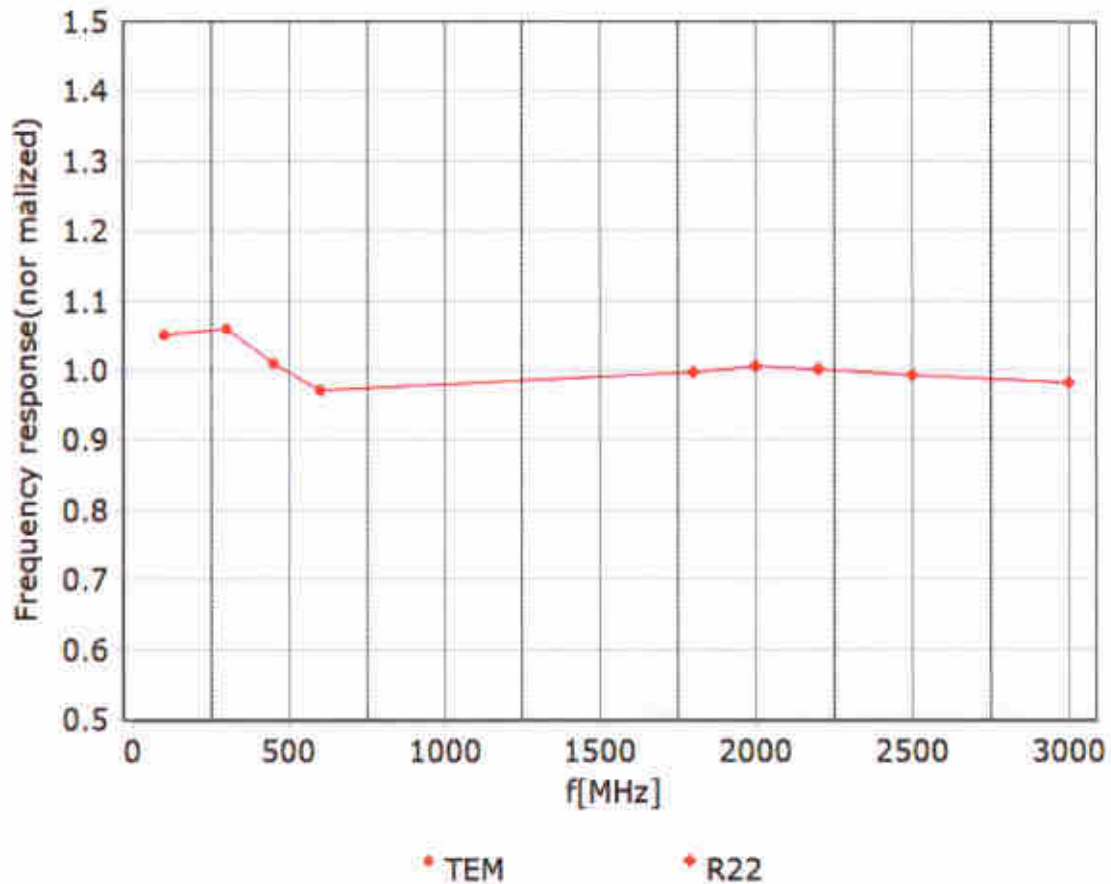
^C Frequency validity above 300 MHz of ±100MHz only applies for DASY v4.4 and higher (Page 2), else it is restricted to ±50MHz. The uncertainty is the RSS of ConvF uncertainty at calibration frequency and the uncertainty for the indicated frequency band. Frequency validity below 300 MHz is ± 10, 25,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

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

^G Alpha/Depth are determined during calibration. SPEAG warrants that the remaining deviation due to the boundary effect after compensation is always less than ± 1% for frequencies below 3 GHz and below ± 2% for the 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)



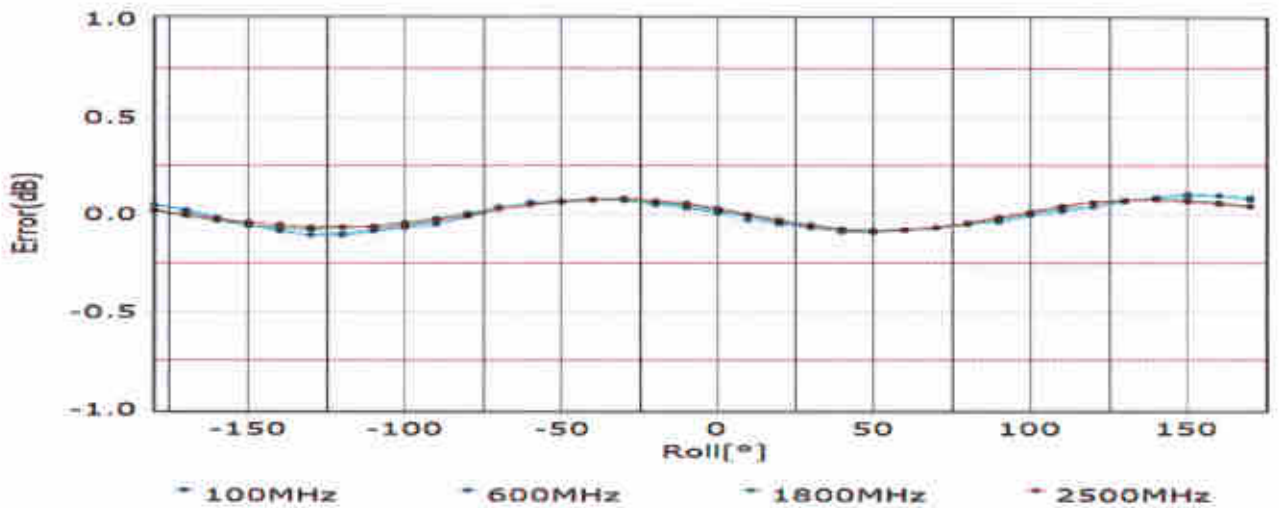
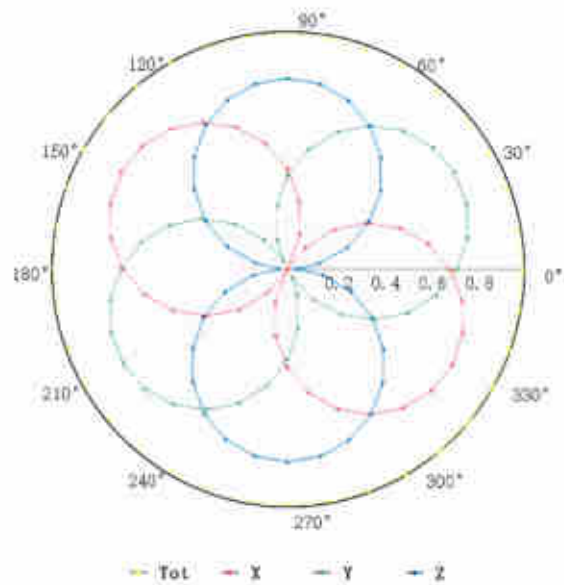
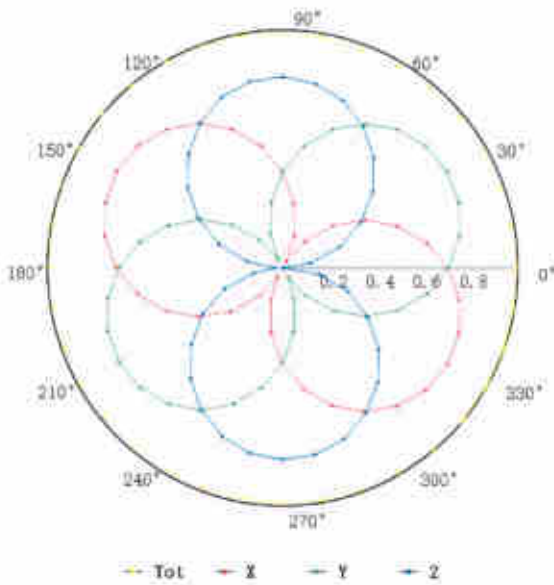
Uncertainty of Frequency Response of E-field: $\pm 7.4\%$ ($k=2$)



Receiving Pattern (Φ), $\theta=0^\circ$

f=600 MHz, TEM

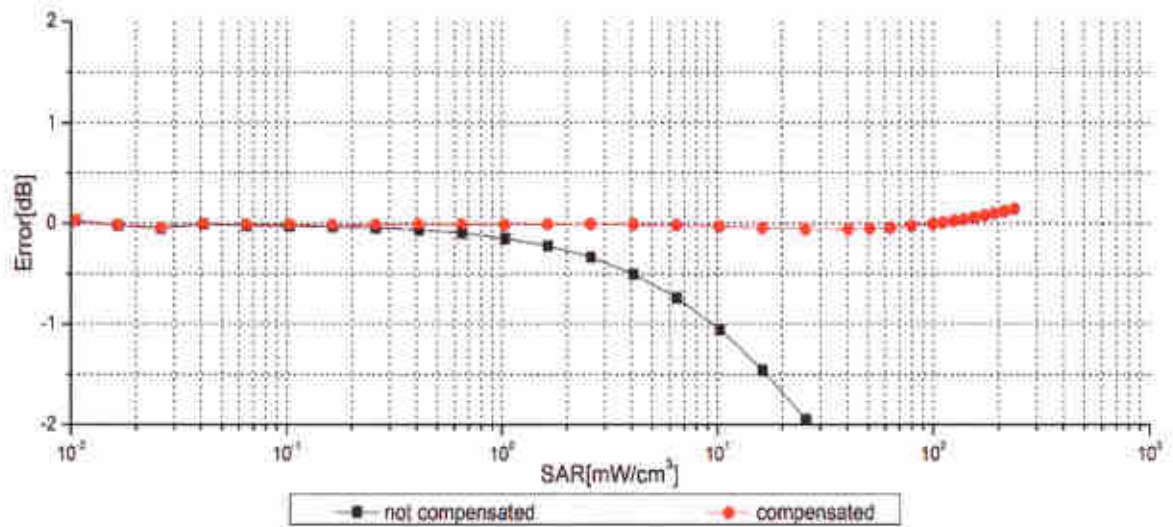
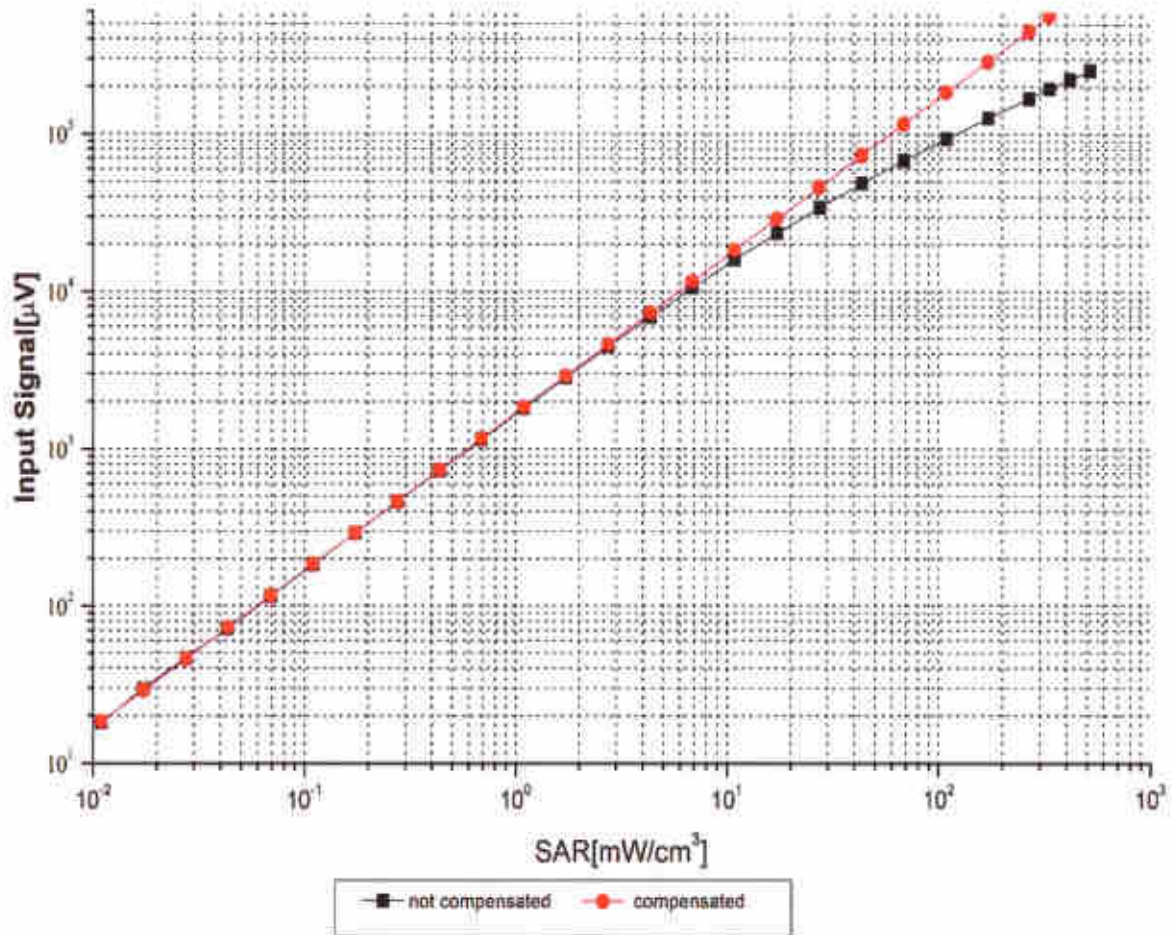
f=1800 MHz, R22



Uncertainty of Axial Isotropy Assessment: $\pm 1.2\%$ ($k=2$)



Dynamic Range f(SAR_{head}) (TEM cell, f = 900 MHz)



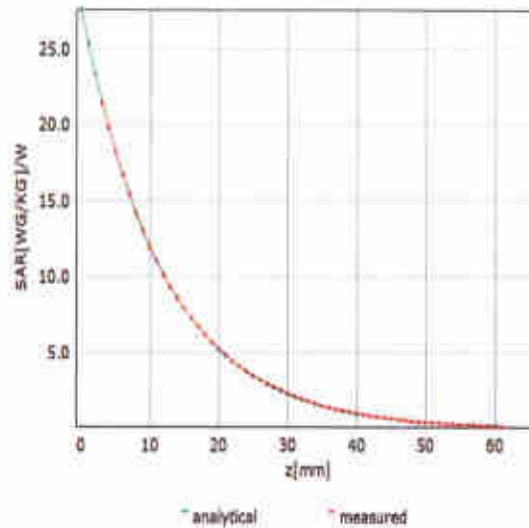
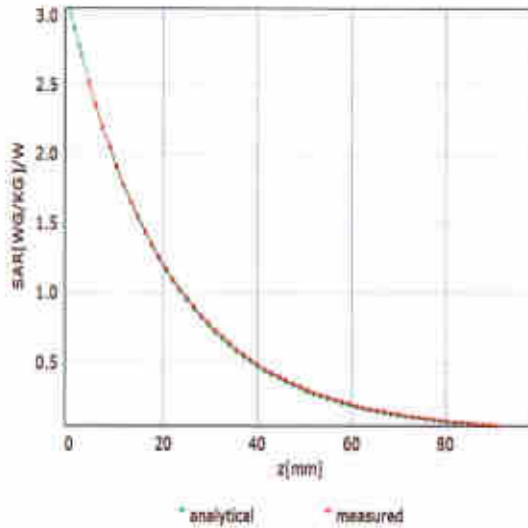
Uncertainty of Linearity Assessment: ±0.9% (k=2)



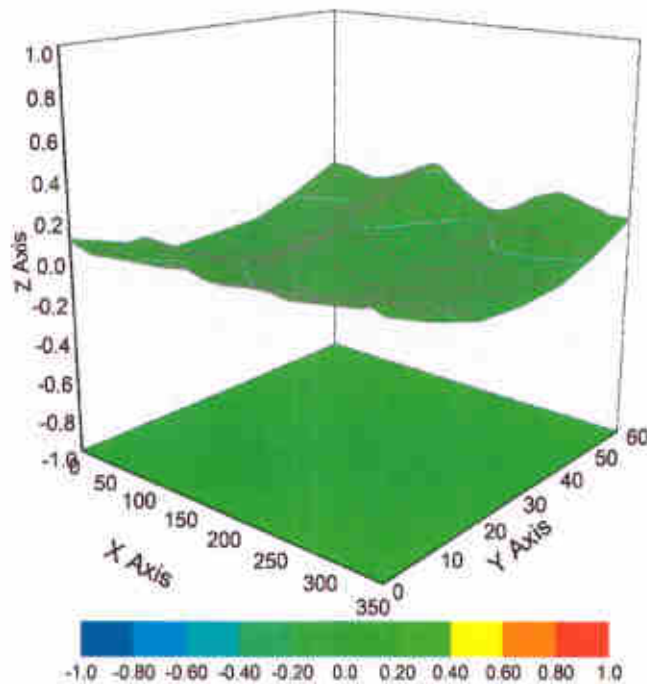
Conversion Factor Assessment

f=750 MHz,WGLS R9(H_convF)

f=1750 MHz,WGLS R22(H_convF)



Deviation from Isotropy in Liquid



Uncertainty of Spherical Isotropy Assessment: $\pm 3.2\%$ ($k=2$)



DASY/EASY – Parameters of Probe: EX3DV4 – SN:3826

Other Probe Parameters

Sensor Arrangement	Triangular
Connector Angle (°)	51.5
Mechanical Surface Detection Mode	enabled
Optical Surface Detection Mode	disable
Probe Overall Length	337mm
Probe Body Diameter	10mm
Tip Length	10mm
Tip Diameter	2.5mm
Probe Tip to Sensor X Calibration Point	1mm
Probe Tip to Sensor Y Calibration Point	1mm
Probe Tip to Sensor Z Calibration Point	1mm
Recommended Measurement Distance from Surface	1.4mm



Appendix E. Conducted RF Output Power Table

The detailed power table are shown as follows.



Full Power

GSM850 TX Channel	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	125	169	251		125	169	251	
Frequency (MHz)	824.2	836.4	848.8		824.2	836.4	848.8	
GSM 1 Tx slot	32.81	32.99	32.87	33.50	23.81	23.99	23.87	24.50
GPRS 1 Tx slots	32.80	32.97	32.83	33.50	23.80	23.97	23.83	24.50
GPRS 2 Tx slots	31.46	31.28	31.16	32.00	25.46	25.28	25.16	26.00
GPRS 3 Tx slots	28.78	28.76	28.76	29.50	24.52	24.50	24.50	25.24
GPRS 4 Tx slots	26.22	26.31	26.25	27.00	23.22	23.31	23.25	24.00
EDGE 1 Tx slot	26.64	26.92	26.77	27.50	17.84	17.92	17.77	18.50
EDGE 2 Tx slots	24.56	24.58	24.44	25.50	18.56	18.58	18.44	19.50
EDGE 3 Tx slots	22.34	22.36	22.29	23.00	18.08	18.10	18.03	18.74
EDGE 4 Tx slots	20.09	20.13	20.04	21.00	17.09	17.13	17.04	18.00

GSM1900 TX Channel	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	512	661	810		512	661	810	
Frequency (MHz)	1852.2	1858	1869.8		1852.2	1860	1869.8	
GSM 1 Tx slot	29.63	29.75	29.77	30.50	20.63	20.75	20.77	21.50
GPRS 1 Tx slot	29.58	29.74	29.73	30.50	20.58	20.74	20.73	21.50
GPRS 2 Tx slots	28.32	28.51	28.50	29.50	22.32	22.51	22.50	23.50
GPRS 3 Tx slots	25.97	26.12	26.10	27.00	21.71	21.86	21.84	22.74
GPRS 4 Tx slots	23.59	23.72	23.68	24.50	20.59	20.72	20.68	21.50
EDGE 1 Tx slot	25.48	25.62	25.46	26.50	16.48	16.62	16.46	17.50
EDGE 2 Tx slots	23.16	23.26	23.13	24.00	17.16	17.26	17.13	18.00
EDGE 3 Tx slots	20.95	20.97	20.89	22.00	16.69	16.71	16.63	17.74
EDGE 4 Tx slots	18.55	18.65	18.44	19.50	15.55	15.65	15.44	16.50

Band	WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)	
	9262	9400	9538		1312	1413	1513		4132	4182	4233		
TX Channel	9662	9800	9938		1537	1638	1738		4357	4407	4458		
Frequency (MHz)	1952.4	1958	1969.8		1924	1923	1926.8		245.4	245.4	245.6		
3GPP Rel 99	AMR 12.2Kbps	23.07	23.10	23.24	24.00	22.70	22.65	22.74	24.00	22.72	23.03	23.12	24.00
3GPP Rel 99	RMC 12.2Kbps	23.08	23.11	23.28	24.00	22.72	22.68	22.77	24.00	22.74	23.08	23.13	24.00
3GPP Rel 6	HSDPA Subtest-1	22.27	22.30	22.44	23.00	21.34	21.17	21.35	23.00	21.81	22.16	22.20	23.00
3GPP Rel 6	HSDPA Subtest-2	22.30	22.29	22.52	23.00	21.38	21.22	21.41	23.00	21.84	22.13	22.19	23.00
3GPP Rel 6	HSDPA Subtest-3	21.79	21.81	22.01	22.50	20.84	20.79	20.91	22.50	21.30	21.66	21.69	22.50
3GPP Rel 6	HSDPA Subtest-4	21.80	21.82	21.96	22.50	20.87	20.77	20.87	22.50	21.29	21.65	21.72	22.50
3GPP Rel 6	DC-HSDPA Subtest-1	22.14	22.17	22.32	23.00	21.20	21.11	21.28	23.00	21.73	22.07	22.09	23.00
3GPP Rel 6	DC-HSDPA Subtest-2	22.24	22.16	22.38	23.00	21.22	21.15	21.33	23.00	21.75	22.03	22.13	23.00
3GPP Rel 6	DC-HSDPA Subtest-3	21.65	21.75	21.86	22.50	20.73	20.65	20.88	22.50	21.23	21.54	21.63	22.50
3GPP Rel 6	DC-HSDPA Subtest-4	21.74	21.72	21.81	22.50	20.77	20.64	20.84	22.50	21.19	21.56	21.65	22.50
3GPP Rel 6	HSUPA Subtest-1	22.10	22.11	22.16	23.00	21.34	21.25	21.39	23.00	22.25	22.27	22.44	23.00
3GPP Rel 6	HSUPA Subtest-2	20.12	20.14	20.18	21.00	19.35	19.24	19.57	21.00	20.28	20.30	20.45	21.00
3GPP Rel 6	HSUPA Subtest-3	21.07	21.10	21.18	22.00	20.22	20.15	20.36	22.00	21.26	21.31	21.45	22.00
3GPP Rel 6	HSUPA Subtest-4	20.12	20.15	20.16	21.00	19.36	19.30	19.48	21.00	20.22	20.28	20.43	21.00
3GPP Rel 6	HSUPA Subtest-5	22.20	22.20	22.20	23.00	21.30	21.20	21.40	23.00	22.30	22.30	22.50	23.00
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	19.77	19.83	19.86	20.50	18.92	18.77	19.03	20.50	19.78	19.81	19.92	20.50

Band	CDMA BC0			Tune-up Limit (dBm)	CDMA BC1			Tune-up Limit (dBm)	CDMA BC10			Tune-up Limit (dBm)
	1013	384	777		25	600	1175		476	580	684	
TX Channel	824.7	836.52	848.31		1831.25	1860	1908.75		817.9	820.5	823.1	
Frequency (MHz)	23.97	24.06	24.10	25.00	24.04	24.19	24.12	25.00	23.80	23.90	23.97	25.00
RC1 S055	23.95	24.06	24.09	25.00	24.04	24.18	24.12	25.00	23.80	23.89	23.96	25.00
RC3 S055	23.92	24.04	24.06	25.00	24.02	24.17	24.10	25.00	23.78	23.88	23.94	25.00
RC3 S032 (F+SCH)	23.88	24.02	24.04	25.00	24.00	24.15	24.08	25.00	23.76	23.85	23.92	25.00
RTAP 153.6Kbps	23.96	24.04	24.08	25.00	24.03	24.17	24.10	25.00	23.79	23.88	23.94	25.00
RETAP 4096Bits	23.93	24.01	24.06	25.00	24.02	24.16	24.10	25.00	23.78	23.86	23.93	25.00



Band 2 (1900MHz Band)										
Part 24E										
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)		
Channel										
Frequency (MHz)										
20	QPSK	1	0	22.69	22.76	22.82	24	0		
20	QPSK	1	49	22.70	22.80	22.70				
20	QPSK	1	99	22.62	22.83	22.67	23	1		
20	QPSK	50	0	21.81	21.84	21.80				
20	QPSK	50	24	21.77	21.82	21.78	23	1		
20	QPSK	50	50	21.72	21.74	21.75				
20	QPSK	100	0	21.73	21.79	21.88	23	1		
20	16QAM	1	0	22.04	22.09	22.02				
20	16QAM	1	49	22.02	22.05	22.08	23	1		
20	16QAM	1	99	21.86	22.01	22.05				
20	16QAM	50	0	20.86	20.90	20.76	22	2		
20	16QAM	50	24	20.90	20.88	20.85				
20	16QAM	50	50	20.78	20.83	20.82	22.5	1.5		
20	16QAM	100	0	20.86	20.84	20.76				
20	64QAM	1	0	20.98	20.97	20.89	21	3		
20	64QAM	1	49	20.96	21.02	21.01				
20	64QAM	1	99	20.81	20.88	20.99	21	3		
20	64QAM	50	0	19.90	19.85	19.76				
20	64QAM	50	24	19.88	19.94	19.88	21	3		
20	64QAM	50	50	19.84	19.86	19.84				
20	64QAM	100	0	19.84	19.90	19.84	21	3		
20	64QAM	100	0	19.87	19.90	19.87				
Channel										
Frequency (MHz)										
15	QPSK	1	0	22.74	22.79	22.74	24	0		
15	QPSK	1	37	22.69	22.74	22.68				
15	QPSK	1	74	22.65	22.66	22.66	23	1		
15	QPSK	36	0	21.75	21.81	21.72				
15	QPSK	36	20	21.76	21.83	21.81	23	1		
15	QPSK	36	39	21.73	21.78	21.75				
15	QPSK	75	0	21.70	21.87	21.75	23	1		
15	16QAM	1	0	22.10	22.11	22.10				
15	16QAM	1	37	22.02	22.06	22.08	23	1		
15	16QAM	1	74	21.92	22.02	22.03				
15	16QAM	36	0	20.87	20.92	20.84	22	2		
15	16QAM	36	20	20.89	20.89	20.91				
15	16QAM	36	39	20.83	20.84	20.87	22.5	1.5		
15	16QAM	75	0	21.01	21.02	21.05				
15	64QAM	1	0	20.87	20.95	20.95	21	3		
15	64QAM	36	0	19.90	19.92	19.87				
15	64QAM	36	20	19.93	19.95	19.88	21	3		
15	64QAM	36	39	19.81	19.89	19.89				
15	64QAM	75	0	19.87	19.90	19.87	21	3		
15	64QAM	75	0	19.88	19.87	19.84				
Channel										
Frequency (MHz)										
10	QPSK	1	0	22.73	22.79	22.72	24	0		
10	QPSK	1	25	22.70	22.74	22.70				
10	QPSK	1	49	22.68	22.75	22.68	23	1		
10	QPSK	25	0	21.75	21.80	21.74				
10	QPSK	25	12	21.79	21.78	21.75	23	1		
10	QPSK	25	25	21.71	21.78	21.73				
10	QPSK	50	0	21.77	21.76	21.71	23	1		
10	16QAM	1	0	22.04	22.07	22.10				
10	16QAM	1	25	22.00	22.07	22.07	23	1		
10	16QAM	1	49	21.95	22.09	22.04				
10	16QAM	25	0	20.87	20.86	20.84	22	2		
10	16QAM	25	12	20.86	20.90	20.87				
10	16QAM	25	25	20.83	20.90	20.89	22.5	1.5		
10	16QAM	50	0	20.85	20.89	20.82				
10	64QAM	1	0	21.02	20.99	21.05	21	3		
10	64QAM	1	25	20.86	20.95	21.01				
10	64QAM	1	49	20.88	20.84	20.88	21	3		
10	64QAM	25	0	19.87	19.90	19.87				
10	64QAM	25	12	19.87	19.88	19.88	21	3		
10	64QAM	25	25	19.86	19.88	19.84				
10	64QAM	50	0	19.88	19.87	19.84	21	3		
10	64QAM	50	0	19.89	19.89	19.85				
Channel										
Frequency (MHz)										
5	QPSK	1	0	22.75	22.77	22.69	24	0		
5	QPSK	1	12	22.72	22.78	22.66				
5	QPSK	1	24	22.73	22.78	22.69	23	1		
5	QPSK	12	0	21.75	21.75	21.75				
5	QPSK	12	7	21.80	21.79	21.74	23	1		
5	QPSK	12	13	21.72	21.78	21.72				
5	QPSK	25	0	21.72	21.79	21.72	23	1		
5	16QAM	1	0	22.10	22.09	22.04				
5	16QAM	1	12	22.10	22.05	22.06	23	1		
5	16QAM	1	24	22.06	22.06	22.04				
5	16QAM	12	0	20.86	20.88	20.85	22	2		
5	16QAM	12	7	20.87	20.90	20.91				
5	16QAM	12	13	20.85	20.83	20.85	22.5	1.5		
5	16QAM	25	0	20.85	20.86	20.81				
5	64QAM	1	0	21.04	20.99	20.97	21	3		
5	64QAM	1	12	20.96	21.04	20.99				
5	64QAM	1	24	20.97	21.00	20.99	21	3		
5	64QAM	12	0	19.93	19.90	19.90				
5	64QAM	12	7	19.90	19.82	19.95	21	3		
5	64QAM	12	13	19.87	19.87	19.89				
5	64QAM	25	0	19.89	19.89	19.85	21	3		
5	64QAM	25	0	19.89	19.89	19.85				
Channel										
Frequency (MHz)										
1.4	QPSK	1	0	22.67	22.71	22.60	24	0		
1.4	QPSK	1	5	22.73	22.75	22.68				
1.4	QPSK	1	5	22.66	22.69	22.60	23	1		
1.4	QPSK	3	0	22.68	22.69	22.65				
1.4	QPSK	3	7	22.77	22.78	22.69	23	1		
1.4	QPSK	3	3	22.69	22.69	22.65				
1.4	QPSK	6	0	21.67	21.69	21.67	23	1		
1.4	16QAM	1	0	22.01	22.03	21.98				
1.4	16QAM	1	3	22.09	22.12	22.05	23	1		
1.4	16QAM	1	5	21.99	21.98	22.00				
1.4	16QAM	3	0	21.77	21.83	21.79	22	2		
1.4	16QAM	3	1	21.83	21.86	21.79				
1.4	16QAM	3	3	21.77	21.79	21.74	22	2		
1.4	16QAM	6	0	20.87	20.88	20.82				
1.4	64QAM	1	0	20.95	20.96	20.92	22.5	1.5		
1.4	64QAM	1	3	20.97	21.03	20.99				
1.4	64QAM	1	5	20.65	20.96	20.93	21	3		
1.4	64QAM	3	0	20.92	20.91	20.90				
1.4	64QAM	3	1	20.97	20.97	20.94	21	3		
1.4	64QAM	3	3	20.92	20.94	20.88				
1.4	64QAM	6	0	19.79	19.80	19.80	21	3		
1.4	64QAM	6	0	19.79	19.80	19.80				

Band 4 (AWS Band)										
Part 27L (only on channel required)										
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)		
Channel										
Frequency (MHz)										
20	QPSK	1	0	22.17	22.17	22.16	24	0		
20	QPSK	1	49	22.20	22.33	22.18				
20	QPSK	1	99	22.19	22.05	22.13	23	1		
20	QPSK	50	0	21.21	21.20	21.14				
20	QPSK	50	24	21.23	21.34	21.20	23	1		
20	QPSK	50	50	21.20	21.18	21.18				
20	QPSK	100	0	21.27	21.32	21.14	22	2		
20	16QAM	1	0	21.61	21.82	21.60				
20	16QAM	1	49	21.43	21.45	21.44	23	1		
20	16QAM	1	99	21.49	21.66	21.47				
20	16QAM	50	0	20.36	20.38	20.34	22	2		
20	16QAM	50	24	20.32	20.34	20.32				
20	16QAM	50	50	20.40	20.30	20.28	22	2		
20	16QAM	100	0	20.41	20.35	20.32				
20	64QAM	1	0	20.56	20.51	20.33	22	2		
20	64QAM	1	49	20.60	20.44	20.49				
20	64QAM	1	99	20.45	20.29	20.35	21	3		
20	64QAM	50	0	19.42	19.29	19.22				
20	64QAM	50	24	19.42	19.24	19.25	21	3		
20	64QAM	50	50	19.38	19.29	19.26				
20	64QAM	100	0	19.37	19.29	19.27	21	3		
20	64QAM	100	0	19.37	19.29	19.27				
Channel										
Frequency (MHz)										
15	QPSK	1	0	22.05	22.18	22.05	24	0		
15	QPSK	1	37	22.04	22.05	22.15				
15	QPSK	1	74	22.06	22.02	22.31	23	1		
15	QPSK	36	0	21.02						



Band 7 (2600MHz Band)										
Part 27										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)		
Channel				20350	21100	21350				
Frequency (MHz)										
20	QPSK	1	0	22.54	22.78	22.78				
20	QPSK	1	49	22.51	22.82	22.77	24	0		
20	QPSK	1	99	22.54	22.83	22.90				
20	QPSK	50	0	21.57	21.83	21.80				
20	QPSK	50	24	21.61	21.84	21.86	23	1		
20	QPSK	50	50	21.62	21.81	21.85				
20	QPSK	100	0	21.59	21.82	21.86				
20	16QAM	1	0	21.80	22.13	22.04				
20	16QAM	1	49	21.78	22.20	22.13	23	1		
20	16QAM	1	99	21.91	22.08	22.28				
20	16QAM	50	0	20.62	20.98	20.88				
20	16QAM	50	24	20.66	20.96	20.92	22	2		
20	16QAM	50	50	20.69	21.01	20.94				
20	16QAM	100	0	20.63	20.94	20.91				
20	84QAM	1	0	20.75	21.08	20.90				
20	84QAM	1	49	20.75	21.10	21.05	22	2		
20	84QAM	1	99	20.85	20.99	21.13				
20	84QAM	50	0	19.64	19.96	19.89				
20	84QAM	50	24	19.68	20.00	19.92	21	3		
20	84QAM	50	50	19.68	19.99	19.99				
20	84QAM	100	0	19.67	19.99	19.92				
Channel				20325	21100	21375				
Frequency (MHz)										
15	QPSK	1	0	22.54	22.83	22.77				
15	QPSK	1	37	22.52	22.85	22.79	24	0		
15	QPSK	1	74	22.56	22.83	22.88				
15	QPSK	36	0	21.55	21.83	21.80				
15	QPSK	36	20	21.56	21.90	21.87	23	1		
15	QPSK	36	39	21.57	21.96	21.91				
15	QPSK	75	0	21.54	21.86	21.83				
15	16QAM	1	0	21.83	22.17	22.05				
15	16QAM	1	37	21.77	22.18	22.17	23	1		
15	16QAM	1	74	21.86	22.18	22.30				
15	16QAM	36	0	20.62	20.98	20.88				
15	16QAM	36	20	20.63	20.99	20.99	22	2		
15	16QAM	36	39	20.61	21.03	21.00				
15	16QAM	75	0	20.64	20.96	20.96				
15	84QAM	1	0	20.76	21.13	20.95				
15	84QAM	1	37	20.72	21.11	21.07	22	2		
15	84QAM	1	74	20.81	21.12	21.21				
15	84QAM	36	0	19.66	19.99	19.91				
15	84QAM	36	20	19.66	20.05	20.01	21	3		
15	84QAM	36	39	19.65	20.03	20.00				
15	84QAM	75	0	19.65	19.98	19.95				
Channel				20300	21100	21400				
Frequency (MHz)										
10	QPSK	1	0	22.50	22.80	22.76				
10	QPSK	1	25	22.50	22.81	22.81	24	0		
10	QPSK	1	49	22.53	22.87	22.86				
10	QPSK	25	0	21.54	21.86	21.83				
10	QPSK	25	12	21.56	21.85	21.87	23	1		
10	QPSK	25	25	21.56	21.88	21.87				
10	QPSK	50	0	21.53	21.89	21.85				
10	16QAM	1	0	21.75	22.16	22.14				
10	16QAM	1	25	21.77	22.20	22.16	23	1		
10	16QAM	1	49	21.82	22.21	22.27				
10	16QAM	25	0	20.58	20.92	20.92				
10	16QAM	25	12	20.62	20.96	20.95	22	2		
10	16QAM	25	25	20.57	20.98	20.99				
10	16QAM	50	0	20.59	20.98	20.95				
10	84QAM	1	0	20.74	21.05	21.04				
10	84QAM	1	25	20.68	21.15	21.11	22	2		
10	84QAM	1	49	20.73	21.16	21.18				
10	84QAM	25	0	19.57	19.93	19.92				
10	84QAM	25	12	19.64	20.00	19.97	21	3		
10	84QAM	25	25	19.60	19.98	19.97				
10	84QAM	50	0	19.60	19.96	19.96				
Channel				20775	21100	21425				
Frequency (MHz)										
5	QPSK	1	0	22.47	22.81	22.80				
5	QPSK	1	12	22.49	22.82	22.78	24	0		
5	QPSK	1	24	22.51	22.87	22.83				
5	QPSK	12	0	21.51	21.83	21.83				
5	QPSK	12	7	21.56	21.88	21.87	23	1		
5	QPSK	12	13	21.54	21.87	21.83				
5	QPSK	25	0	21.52	21.88	21.83				
5	16QAM	1	0	21.76	22.20	22.10				
5	16QAM	1	12	21.74	22.20	22.14	23	1		
5	16QAM	1	24	21.78	22.20	22.19				
5	16QAM	12	0	20.56	20.94	20.92				
5	16QAM	12	7	20.59	21.00	20.95	22	2		
5	16QAM	12	13	20.55	20.94	20.98				
5	16QAM	25	0	20.56	20.96	20.91				
5	84QAM	1	0	20.68	21.07	21.04				
5	84QAM	1	12	20.72	21.10	21.08	22	2		
5	84QAM	1	24	20.68	21.08	21.12				
5	84QAM	12	0	19.61	20.01	19.96				
5	84QAM	12	7	19.64	20.04	20.01	21	3		
5	84QAM	12	13	19.60	20.05	20.00				
5	84QAM	25	0	19.59	19.94	19.90				

Band 12 (700MHz Low Band)										
Part 27F(only on channel required)										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)		
Channel				23060	23095	23130				
Frequency (MHz)										
10	QPSK	1	0	22.76	22.76	22.70				
10	QPSK	1	25	22.77	22.78	22.74	24	0		
10	QPSK	1	49	22.79	22.81	22.78				
10	QPSK	25	0	21.81	21.85	21.76				
10	QPSK	25	12	21.86	21.89	21.83	23	1		
10	QPSK	25	25	21.85	21.82	21.81				
10	QPSK	50	0	21.80	21.88	21.82				
10	16QAM	1	0	22.16	22.03	22.04				
10	16QAM	1	25	22.08	22.11	22.10	23	1		
10	16QAM	1	49	22.13	22.07	22.15				
10	16QAM	25	0	20.95	20.90	20.90				
10	16QAM	25	12	20.94	20.92	20.88	22	2		
10	16QAM	25	25	20.92	20.87	20.87				
10	16QAM	50	0	20.96	20.95	20.91				
10	84QAM	1	0	21.09	20.98	20.98				
10	84QAM	1	25	21.06	20.99	21.05	22	2		
10	84QAM	1	49	21.02	21.01	21.13				
10	84QAM	25	0	19.94	19.88	19.86				
10	84QAM	25	12	19.96	19.96	19.94	21	3		
10	84QAM	25	25	19.94	19.93	19.89				
10	84QAM	50	0	19.93	19.92	19.88				
Channel				23035	23095	23165				
Frequency (MHz)										
5	QPSK	1	0	22.77	22.73	22.69				
5	QPSK	1	12	22.77	22.76	22.78	24	0		
5	QPSK	1	24	22.79	22.75	22.80				
5	QPSK	12	0	21.85	21.80	21.74				
5	QPSK	12	7	21.91	21.86	21.90	23	1		
5	QPSK	12	13	21.84	21.82	21.86				
5	QPSK	25	0	21.83	21.79	21.74				
5	16QAM	1	0	22.13	22.02	22.01				
5	16QAM	1	12	22.08	22.08	22.13	23	1		
5	16QAM	1	24	22.06	22.12	22.14				
5	16QAM	12	0	20.97	20.89	20.84				
5	16QAM	12	7	20.96	20.92	20.95	22	2		
5	16QAM	12	13	20.94	20.88	20.92				
5	16QAM	25	0	20.92	20.87	20.82				
5	84QAM	1	0	21.08	21.01	20.94				
5	84QAM	1	12	21.05	21.01	21.06	22	2		
5	84QAM									



Band 14 (700MHz Band)									
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MFR (dB)	
Channel				23330					
Frequency (MHz)									
10	QPSK	1	0	22.64	22.72	22.87	24	0	
10	QPSK	1	25	22.59	22.77	22.77			
10	QPSK	1	49	22.70	22.77	22.77			
10	QPSK	25	0	21.70	21.89	21.82	23	1	
10	QPSK	25	12	21.69	21.89	21.89			
10	QPSK	25	25	21.67	21.89	21.87			
10	QPSK	50	0	21.85	21.85	21.89	23	1	
10	16QAM	1	0	21.85	21.85	21.89			
10	16QAM	1	25	21.84	21.84	21.84			
10	16QAM	1	49	21.94	21.94	22.03	22	2	
10	16QAM	25	0	20.73	20.73	20.73			
10	16QAM	25	12	20.75	20.75	20.75			
10	16QAM	25	25	20.72	20.72	20.72	22	2	
10	16QAM	50	0	20.75	20.75	20.75			
10	8QAM	1	0	20.80	20.80	20.80			
10	8QAM	1	25	20.85	20.85	20.85	22	2	
10	8QAM	1	49	20.88	20.88	20.88			
10	8QAM	25	0	19.73	19.73	19.73			
10	8QAM	25	12	19.75	19.75	19.75	21	3	
10	8QAM	25	25	19.70	19.70	19.70			
10	8QAM	50	0	19.75	19.75	19.75			
Channel				23305 23330 23355					
Frequency (MHz)									
5	QPSK	1	0	22.66	22.61	22.60	24	0	
5	QPSK	1	12	22.63	22.62	22.69			
5	QPSK	1	24	22.59	22.68	22.67			
5	QPSK	12	0	21.68	21.66	21.67	23	1	
5	QPSK	12	7	21.70	21.70	21.68			
5	QPSK	12	13	21.68	21.67	21.75			
5	QPSK	25	0	21.72	21.65	21.65	23	1	
5	16QAM	1	0	21.83	21.80	21.85			
5	16QAM	1	12	21.84	21.84	21.95			
5	16QAM	1	24	21.86	21.95	21.87	22	2	
5	16QAM	12	0	20.73	20.70	20.72			
5	16QAM	12	7	20.78	20.76	20.73			
5	16QAM	12	13	20.74	20.71	20.80	22	2	
5	16QAM	25	0	20.75	20.71	20.71			
5	8QAM	1	0	20.84	20.79	20.80			
5	8QAM	1	12	20.82	20.81	20.93	22	2	
5	8QAM	1	24	20.81	20.89	20.85			
5	8QAM	12	0	19.77	19.77	19.74			
5	8QAM	12	7	19.82	19.81	19.80	21	3	
5	8QAM	12	13	19.79	19.75	19.82			
5	8QAM	25	0	19.76	19.73	19.71			

Band 17 (700MHz Band) Part 27H(only on channel required)									
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MFR (dB)	
Channel				23760 23790 23800					
Frequency (MHz)									
10	QPSK	1	0	22.71	22.72	22.87	24	0	
10	QPSK	1	25	22.74	22.80	22.78			
10	QPSK	1	49	22.73	22.79	22.77			
10	QPSK	25	0	21.79	21.89	21.82	23	1	
10	QPSK	25	12	21.91	21.92	21.89			
10	QPSK	25	25	21.85	21.85	21.87			
10	QPSK	50	0	21.90	21.91	21.89	23	1	
10	16QAM	1	0	22.01	21.98	21.99			
10	16QAM	1	25	22.05	22.15	22.14			
10	16QAM	1	49	22.16	22.14	22.13	22	2	
10	16QAM	25	0	20.86	20.94	20.96			
10	16QAM	25	12	20.99	20.96	20.94			
10	16QAM	25	25	20.93	20.92	20.92	22	2	
10	16QAM	50	0	20.99	20.99	20.97			
10	8QAM	1	0	20.95	20.94	20.95			
10	8QAM	1	25	20.98	21.10	21.06	22	2	
10	8QAM	1	49	21.08	21.11	21.06			
10	8QAM	25	0	19.86	19.97	19.94			
10	8QAM	25	12	19.97	20.01	20.00	21	3	
10	8QAM	25	25	19.99	19.98	19.92			
10	8QAM	50	0	19.98	19.97	19.94			
Channel				23765 23790 23825					
Frequency (MHz)									
5	QPSK	1	0	22.72	22.69	22.78	24	0	
5	QPSK	1	12	22.72	22.78	22.75			
5	QPSK	1	24	22.73	22.78	22.75			
5	QPSK	12	0	21.81	21.88	21.79	23	1	
5	QPSK	12	7	21.82	21.89	21.88			
5	QPSK	12	13	21.82	21.89	21.83			
5	QPSK	25	0	21.77	21.89	21.80	23	1	
5	16QAM	1	0	22.02	22.02	22.07			
5	16QAM	1	12	22.03	22.17	22.07			
5	16QAM	1	24	22.05	22.11	22.04	22	2	
5	16QAM	12	0	20.87	20.93	20.93			
5	16QAM	12	7	20.90	21.00	20.93			
5	16QAM	12	13	20.90	20.94	20.90	22	2	
5	16QAM	25	0	20.85	20.94	20.87			
5	8QAM	1	0	20.97	20.94	21.07			
5	8QAM	1	12	20.96	21.07	21.00	22	2	
5	8QAM	1	24	20.99	21.06	21.01			
5	8QAM	12	0	19.89	20.02	19.94			
5	8QAM	12	7	19.95	20.04	20.00	21	3	
5	8QAM	12	13	19.92	20.02	19.95			
5	8QAM	25	0	19.91	19.96	19.93			

Band 25 (1900MHz Band) Part 24E									
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MFR (dB)	
Channel				26140 26340 26590					
Frequency (MHz)									
20	QPSK	1	0	22.96	22.81	22.96	24	0	
20	QPSK	1	49	22.67	22.84	22.75			
20	QPSK	1	99	22.66	22.74	22.70			
20	QPSK	50	0	21.71	21.86	21.68	23	1	
20	QPSK	50	24	21.71	21.84	21.66			
20	QPSK	50	50	21.80	21.77	21.67			
20	QPSK	100	0	21.59	21.81	21.69	23	1	
20	16QAM	1	0	22.01	22.05	22.01			
20	16QAM	1	49	21.97	22.08	22.02			
20	16QAM	1	99	22.02	22.11	22.17	23	1	
20	16QAM	50	0	20.79	20.96	20.78			
20	16QAM	50	24	20.81	20.96	20.90			
20	16QAM	50	50	20.85	20.90	20.86	22	2	
20	16QAM	100	0	20.85	20.92	20.74			
20	8QAM	1	0	20.97	21.09	20.92			
20	8QAM	1	49	20.95	21.05	21.01	22	2	
20	8QAM	1	99	20.89	21.08	20.95			
20	8QAM	50	0	19.78	19.93	19.80			
20	8QAM	50	24	19.80	19.98	19.92	21	3	
20	8QAM	50	50	19.85	19.94	19.87			
20	8QAM	100	0	19.87	19.99	19.80			
Channel				26115 26340 26615					
Frequency (MHz)									
15	QPSK	1	0	22.65	22.81	22.72	24	0	
15	QPSK	1	37	22.65	22.81	22.75			
15	QPSK	1	74	22.62	22.72	22.71			
15	QPSK	36	0	21.67	21.86	21.78	23	1	
15	QPSK	36	20	21.72	21.90	21.79			
15	QPSK	36	39	21.64	21.83	21.76			
15	QPSK	75	0	21.71	21.90	20.87	23	1	
15	16QAM	1	0	22.02	22.08	22.09			
15	16QAM	1	37	22.00	22.10	22.13			
15	16QAM	1	74	21.93	22.10	22.01	22	2	
15	16QAM	36	0	20.78	20.90	20.88			
15	16QAM	36	20	20.79	20.93	20.90			
15	16QAM	36	39	20.76	20.88	20.90	22	2	
15	16QAM	75	0	20.85	20.90	20.87			
15	8QAM	1	0	20.95	21.04	21.07			
15	8QAM	1	37	20.95	21.03	20.99	22	2	
15	8QAM	1	74	20.83	20.97	20.96			
15	8QAM	36	0	19.84	19.93	19.88			
15	8QAM	36	20	19.83	19.97	19.94	21	3	
15	8QAM	36	39	19.74	19.87	19.84			
15	8QAM	75	0	19.79	19.89	19.87			
Channel				26090 26340 26640					
Frequency (MHz)									
10	QPSK	1	0	22.79	22.80	22.73	24	0	
10	QPSK	1	25	22.66	22.81	22.74			
10	QPSK	1	49	22.71	22.81	22.73			
10	QPSK	25	0	21.69	21.85	21.77	23	1	
10	QPSK	25	12	21.74	21.88	21.77			
10	QPSK	25	25	21.68	21.83	21.76			
10	QPSK	50	0	21.69	21.84	21.76	23	1	
10	16QAM	1	0	22.11	22.22	22.12			
10	16QAM	1	25	22.04	22.16	22.11			
10	16QAM	1	49	22.00	22.21	22.00	22	2	
10	16QAM	25	0	20.81	20.94	20.86			
10	16QAM	2							



Band 26 for FCC (only on channel required)									
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)	
Channel									
Frequency (MHz)									
15	QPSK	1	0	22.64	22.74	22.83			
15	QPSK	1	37	22.66	22.79	22.84	24	0	
15	QPSK	1	74	22.65	22.78	22.80			
15	QPSK	36	0	21.73	21.86	21.79			
15	QPSK	36	20	21.83	21.87	21.91	23	1	
15	QPSK	36	39	21.81	21.78	21.83			
15	QPSK	75	0	21.81	21.81	21.81			
15	16QAM	1	0	22.11	22.23	22.20			
15	16QAM	1	37	22.04	22.25	22.20	23	1	
15	16QAM	1	74	22.21	22.16	22.13			
15	16QAM	36	0	20.81	21.01	20.92			
15	16QAM	36	20	20.91	20.98	20.97	22	2	
15	16QAM	36	39	20.93	20.91	20.99			
15	16QAM	75	0	20.92	20.92	20.90			
15	64QAM	1	0	21.10	21.11	21.11			
15	64QAM	1	37	20.93	21.20	21.11	22	2	
15	64QAM	1	74	21.16	21.08	21.10			
15	64QAM	36	0	19.84	20.08	19.93			
15	64QAM	36	20	19.98	20.01	20.02	21	3	
15	64QAM	36	39	19.95	19.94	19.97			
15	64QAM	75	0	19.94	19.94	19.94			
Channel									
Frequency (MHz)									
10	QPSK	1	0	22.68	22.69	22.82			
10	QPSK	1	25	22.67	22.77	22.83	24	0	
10	QPSK	1	49	22.74	22.76	22.78			
10	QPSK	25	0	21.72	21.83	21.88			
10	QPSK	25	12	21.72	21.85	21.88	23	1	
10	QPSK	25	25	21.80	21.78	21.81			
10	QPSK	50	0	21.83	21.81	21.87			
10	16QAM	1	0	22.11	22.20	22.22			
10	16QAM	1	25	22.04	22.25	22.28	23	1	
10	16QAM	1	49	22.14	22.13	22.09			
10	16QAM	25	0	20.82	20.96	20.96			
10	16QAM	25	12	20.82	20.96	20.96	22	2	
10	16QAM	25	25	20.87	20.91	20.95			
10	16QAM	50	0	20.92	20.94	20.98			
10	64QAM	1	0	21.05	21.03	21.18			
10	64QAM	1	25	20.99	21.16	21.18	22	2	
10	64QAM	1	49	21.08	21.02	21.08			
10	64QAM	25	0	19.83	20.00	19.97			
10	64QAM	25	12	19.84	19.99	20.02	21	3	
10	64QAM	25	25	19.94	19.98	19.98			
10	64QAM	50	0	19.93	19.97	19.97			
Channel									
Frequency (MHz)									
5	QPSK	1	0	22.71	22.80	22.81			
5	QPSK	1	12	22.66	22.76	22.80	24	0	
5	QPSK	1	24	22.68	22.73	22.76			
5	QPSK	12	0	21.76	21.87	21.84			
5	QPSK	12	7	21.76	21.88	21.85	23	1	
5	QPSK	12	13	21.82	21.84	21.88			
5	QPSK	25	0	21.72	21.82	21.80			
5	16QAM	1	0	22.09	22.27	22.18			
5	16QAM	1	12	22.08	22.19	22.13	23	1	
5	16QAM	1	24	22.04	22.14	22.06			
5	16QAM	12	0	20.86	21.01	20.97			
5	16QAM	12	7	20.87	21.03	21.00	22	2	
5	16QAM	12	13	20.94	20.96	20.98			
5	16QAM	25	0	20.85	20.91	20.94			
5	64QAM	1	0	21.05	21.18	21.19			
5	64QAM	1	12	21.05	21.14	21.11	22	2	
5	64QAM	1	24	20.95	21.07	21.03			
5	64QAM	12	0	19.89	20.04	20.00			
5	64QAM	12	7	19.93	20.05	20.02	21	3	
5	64QAM	12	13	19.96	20.01	20.06			
5	64QAM	25	0	19.82	19.94	19.92			
Channel									
Frequency (MHz)									
3	QPSK	1	0	22.69	22.76	22.81			
3	QPSK	1	8	22.69	22.80	22.81	24	0	
3	QPSK	1	14	22.68	22.77	22.78			
3	QPSK	8	0	21.75	21.81	21.82			
3	QPSK	8	4	21.76	21.83	21.82	23	1	
3	QPSK	8	7	21.79	21.79	21.80			
3	QPSK	15	0	21.70	21.81	21.83			
3	16QAM	1	0	22.09	22.21	22.15			
3	16QAM	1	8	22.10	22.23	22.12	23	1	
3	16QAM	1	14	22.09	22.22	22.07			
3	16QAM	8	0	20.93	21.03	20.99			
3	16QAM	8	4	20.92	21.03	21.01	22	2	
3	16QAM	8	7	20.90	20.97	20.96			
3	16QAM	15	0	20.85	20.95	20.94			
3	64QAM	1	0	21.04	21.15	21.12			
3	64QAM	1	8	21.10	21.19	21.09	22	2	
3	64QAM	1	14	21.06	21.10	21.06			
3	64QAM	8	0	19.95	19.99	20.01			
3	64QAM	8	4	19.94	20.02	20.04	21	3	
3	64QAM	8	7	19.97	20.02	20.00			
3	64QAM	15	0	19.84	19.95	19.95			
Channel									
Frequency (MHz)									
1.4	QPSK	1	0	22.65	22.72	22.74			
1.4	QPSK	1	5	22.71	22.76	22.81	24	0	
1.4	QPSK	1	5	22.61	22.69	22.73			
1.4	QPSK	3	0	22.69	22.79	22.78			
1.4	QPSK	3	1	22.71	22.80	22.79			
1.4	QPSK	3	3	22.70	22.76	22.79			
1.4	QPSK	6	0	21.69	21.79	21.78	23	1	
1.4	16QAM	1	0	22.02	22.18	22.08			
1.4	16QAM	1	3	22.13	22.24	22.15			
1.4	16QAM	1	5	22.05	22.16	22.01	23	1	
1.4	16QAM	3	0	21.84	21.91	21.87			
1.4	16QAM	3	1	21.85	21.97	21.90			
1.4	16QAM	3	3	21.82	21.90	21.82			
1.4	16QAM	6	0	20.86	20.93	20.92	22	2	
1.4	64QAM	1	0	21.04	21.08	21.08			
1.4	64QAM	1	3	21.04	21.14	21.04			
1.4	64QAM	1	5	20.99	21.10	20.99	22	2	
1.4	64QAM	3	0	20.97	21.08	21.00			
1.4	64QAM	3	1	21.03	21.13	21.06			
1.4	64QAM	3	3	20.99	21.02	21.00			
1.4	64QAM	6	0	19.80	19.89	19.88	21	3	

Band 66									
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)	
Channel									
Frequency (MHz)									
20	QPSK	1	0	22.16	22.09	22.19			
20	QPSK	1	49	22.13	22.08	22.34	24	1	
20	QPSK	1	99	22.18	22.12	22.41			
20	QPSK	50	0	21.45	21.35	21.44			
20	QPSK	50	24	21.45	21.38	21.43	23	1	
20	QPSK	50	50	21.46	21.39	21.55			
20	QPSK	100	0	21.43	21.38	21.47			
20	16QAM	1	0	21.87	21.66	21.62			
20	16QAM	1	49	21.83	21.57	21.73	23	1	
20	16QAM	1	99	21.71	21.68	21.75			
20	16QAM	50	0	20.60	20.43	20.44			
20	16QAM	50	24	20.63	20.47	20.54	22	2	
20	16QAM	50	50	20.53	20.43	20.50			
20	16QAM	100	0	20.57	20.43	20.46			
20	64QAM	1	0	20.76	20.54	20.67			
20	64QAM	1	49	20.80	20.51	20.62	22	2	
20	64QAM	1	99	20.65	20.59	20.74			
20	64QAM	50	0	19.63	19.48	19.48			
20	64QAM	50	24	19.64	19.46	19.62	21	3	
20	64QAM	50	50	19.56	19.43	19.47			
20	64QAM	100	0	19.63	19.45	19.60			
Channel									
Frequency (MHz)									
15	QPSK	1	0	22.31	22.20	22.10			
15	QPSK	1	37	22.13	22.33	22.15	24	1	
15	QPSK	1	74	22.10	22.38	22.35			
15	QPSK	36	0	21.47	21.49	21.27			
15	QPSK	36	20	21.37	21.61	21.43	23	1	
15	QPSK	36	39	21.33	21.65	21.62			
15</									



Band 38 (only on channel required)										
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch / Freq	Power Med Ch / Freq	Power High Ch / Freq	Tune-up limit (dBm)	MPR (dB)		
Channel										
Frequency (MHz)										
37650	38000	38150								
20	QPSK	1	0	22.86	22.66	22.72	24	0		
20	QPSK	1	48	22.81	22.76	22.71				
20	QPSK	1	80	22.90	22.72	22.80				
20	QPSK	50	0	21.03	21.89	21.85	23	1		
20	QPSK	50	24	21.81	21.68	21.74				
20	QPSK	50	48	21.88	21.86	21.84				
20	QPSK	100	0	21.41	21.84	21.83				
20	HQAM	1	0	21.97	21.77	21.80	23	1		
20	HQAM	1	48	21.93	21.82	21.86				
20	HQAM	1	96	22.13	21.82	21.84				
20	HQAM	50	0	21.08	20.93	20.98	22	2		
20	HQAM	50	24	21.08	20.91	20.96				
20	HQAM	50	48	21.15	20.94	20.92				
20	HQAM	100	0	21.14	20.87	20.87				
20	8QAM	1	0	20.61	20.51	20.55	22	2		
20	8QAM	1	48	20.67	20.64	20.58				
20	8QAM	1	96	20.78	20.65	20.75				
20	8QAM	50	0	19.86	19.79	19.78	21	3		
20	8QAM	50	24	19.95	19.87	19.87				
20	8QAM	50	48	20.19	19.82	19.89				
20	8QAM	100	0	20.02	19.89	19.93				
Channel										
Frequency (MHz)										
37625	38050	38175								
15	QPSK	1	0	22.89	22.69	22.82	24	0		
15	QPSK	1	48	22.84	22.76	22.80				
15	QPSK	1	74	22.90	22.76	22.89				
15	QPSK	36	0	21.02	21.86	21.80	23	1		
15	QPSK	36	36	21.03	21.81	21.77				
15	QPSK	75	0	21.87	21.88	21.71				
15	HQAM	1	0	21.99	21.79	21.82	23	1		
15	HQAM	1	37	21.91	21.74	21.87				
15	HQAM	1	74	22.08	21.86	21.91				
15	HQAM	50	0	20.81	20.78	20.86	22	2		
15	HQAM	50	24	21.00	20.79	20.96				
15	HQAM	50	48	20.95	20.75	20.95				
15	HQAM	100	0	20.74	20.59	20.64				
15	8QAM	1	0	20.02	19.78	19.79	22	2		
15	8QAM	1	74	20.14	20.70	20.73				
15	8QAM	36	0	19.82	19.77	19.83	21	3		
15	8QAM	36	36	19.87	19.88	20.00				
15	8QAM	75	0	20.02	19.88	19.94				
Channel										
Frequency (MHz)										
37675	38000	38175								
5	QPSK	1	0	22.86	22.71	22.77	24	0		
5	QPSK	1	12	22.87	22.69	22.74				
5	QPSK	1	24	22.88	22.71	22.76				
5	QPSK	12	0	21.01	21.74	21.82	23	1		
5	QPSK	12	7	21.83	21.78	21.88				
5	QPSK	12	13	21.81	21.77	21.87				
5	QPSK	25	0	21.89	21.72	21.83	23	1		
5	QPSK	25	1	21.92	21.77	21.91				
5	HQAM	1	0	22.01	21.81	21.85	23	1		
5	HQAM	1	12	22.01	21.81	21.85				
5	HQAM	1	24	21.98	21.85	22.00				
5	HQAM	12	0	20.93	20.79	20.88	22	2		
5	HQAM	12	7	20.95	20.82	20.90				
5	HQAM	12	13	20.95	20.81	20.88				
5	8QAM	1	0	19.98	19.82	19.96	22	2		
5	8QAM	1	12	20.70	20.55	20.67				
5	8QAM	1	12	20.78	20.58	20.72	22	2		
5	8QAM	1	24	20.75	20.62	20.75				
5	8QAM	12	0	19.97	19.81	19.93	21	3		
5	8QAM	12	7	19.98	19.84	19.95				
5	8QAM	12	13	19.98	19.87	19.97				
5	8QAM	25	0	20.01	19.85	19.98				

Band 41 (2.6G Band)-PC3										
BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch / Freq	Power Med Ch / Freq	Power High Ch / Freq	Tune-up limit (dBm)	MPR (dB)		
Channel										
Frequency (MHz)										
39750	40185	40620	41055	41490						
20	QPSK	1	0	23.54	23.73	23.65	25	0		
20	QPSK	1	48	23.44	23.80	23.70				
20	QPSK	1	96	23.67	23.75	23.73				
20	QPSK	50	0	21.10	21.33	21.29	23	2		
20	QPSK	50	24	21.11	21.36	21.30				
20	QPSK	50	48	21.09	21.33	21.28				
20	QPSK	100	0	21.10	21.27	21.28	23	2		
20	QPSK	100	1	21.25	21.51	21.30				
20	16QAM	1	0	21.07	21.41	21.48	23	2		
20	16QAM	1	96	21.19	21.51	21.34				
20	16QAM	50	0	20.78	20.40	20.38	22	3		
20	16QAM	50	24	20.71	20.45	20.38				
20	16QAM	50	48	20.17	20.41	20.36	22	3		
20	16QAM	100	0	20.79	20.33	20.35				
20	64QAM	1	0	20.02	20.20	20.24	22	3		
20	64QAM	1	48	19.81	20.16	20.01				
20	64QAM	1	96	19.96	20.21	20.13	22	3		
20	64QAM	50	0	19.15	19.38	19.34				
20	64QAM	50	24	19.22	19.49	19.33	21	4		
20	64QAM	50	48	19.17	19.46	19.32				
20	64QAM	100	0	19.21	19.36	19.33				
Channel										
Frequency (MHz)										
39725	40170	40600	41035	41470						
15	QPSK	1	0	23.53	23.80	23.79	25	0		
15	QPSK	1	37	23.53	23.72	23.71				
15	QPSK	1	74	23.62	23.75	23.68				
15	QPSK	36	0	21.02	21.24	21.24	23	2		
15	QPSK	36	36	21.02	21.31	21.24				
15	QPSK	75	0	21.06	21.26	21.27	23	2		
15	QPSK	75	37	21.12	21.48	21.42				
15	16QAM	1	0	21.15	21.42	21.42	23	2		
15	16QAM	1	74	21.19	21.50	21.40				
15	16QAM	50	0	20.93	20.29	20.42	22	3		
15	16QAM	50	24	20.95	20.42	20.27				
15	16QAM	50	48	20.95	20.33	20.40	22	3		
15	16QAM	100	0	20.14	20.33	20.33				
15	64QAM	1	0	20.02	20.22	20.13	22	3		
15	64QAM	1	37	20.02	20.21	20.13				
15	64QAM	1	74	20.05	20.21	20.10	21	4		
15	64QAM	36	0	19.99	19.33	19.30				
15	64QAM	36	36	19.07	19.43	19.30	21	4		
15	64QAM	75	0	19.17	19.33	19.32				
Channel										
Frequency (MHz)										
39700	40135	40570	41005	41440						
10	QPSK	1	0	23.39	23.66	23.67	25	0		
10	QPSK	1	25	23.37	23.73	23.67				
10	QPSK	1	49	23.31	23.70	23.66				
10	QPSK	25	0	21.06	21.30	21.27	23	2		
10	QPSK	25	12	21.05	21.31	21.31				
10	QPSK	25	25	21.00	21.28	21.28				
10	QPSK	50	0	21.05	21.30	21.28	23	2		
10	QPSK	50	1	21.05	21.27	21.29				
10	16QAM	1	0	21.05	21.27	21.29	23	2		
10	16QAM	1	25	21.03	21.45	21.28				
10	16QAM	1	49	21.07	21.41	21.39	22	3		
10	16QAM	25	0	20.93	20.32	20.32				
10	16QAM	25	12	20.94	20.42	20.40	22	3		
10	16QAM	25	25	20.90	20.42	20.32				
10	16QAM	50	0	20.93	20.33	20.32	22	3		
10	16QAM	50	1	20.93	20.17	20.07				
10	64QAM	1	0	20.10	20.17	20.04	22	3		
10	64QAM	1	49	20.01	20.15	20.09				
10	64QAM	25	0	19.99	19.32	19.36	21	4		
10	64QAM	25	12	19.95	19.49	19.37				
10	64QAM	25	25	19.93	19.42	19.38	21	4		
10	64QAM	50	0	19.93	19.31	19.32				
Channel										
Frequency (MHz)										
39675	40120	40555	41000	41435						
5	QPSK	1	0	23.38	23.61	23.62	25	0		
5	QPSK	1	12	23.33	23.69	23.65				
5	QPSK	1	24							



Reduced Power Mode for P-Sensor On

GSM850 TX Channel Frequency (MHz)	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	125	169	251		125	169	251	
	824.2	836.4	848.8	32.50	824.2	836.4	848.8	23.50
GSM 1 Tx slot	31.87	31.61	31.55	32.50	22.87	22.61	22.55	23.50
GPRS 1 Tx slots	31.85	31.59	31.53	32.50	22.85	22.59	22.53	23.50
GPRS 2 Tx slots	30.18	30.17	30.06	31.00	24.18	24.17	24.06	25.00
GPRS 3 Tx slots	27.81	27.80	27.65	28.50	23.55	23.54	23.39	24.24
GPRS 4 Tx slots	24.98	24.99	25.05	26.00	21.99	21.99	22.05	23.00
EDGE 1 Tx slots	26.01	25.99	25.84	26.50	17.91	16.99	16.84	17.50
EDGE 2 Tx slots	23.77	23.77	23.56	24.50	17.77	17.77	17.56	18.50
EDGE 3 Tx slots	21.58	21.56	21.42	22.00	17.32	17.29	17.16	17.74
EDGE 4 Tx slots	19.48	19.40	19.27	20.00	16.48	16.40	16.27	17.00

GSM1900 TX Channel Frequency (MHz)	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	512	661	810		512	661	810	
	1859.2	1858	1859.3	23.50	1859.2	1860	1859.3	14.50
GSM 1 Tx slot	22.94	22.85	22.59	23.50	13.94	13.85	13.59	14.50
GPRS 1 Tx slot	22.92	22.82	22.57	23.50	13.92	13.82	13.57	14.50
GPRS 2 Tx slots	21.64	21.73	21.71	22.50	15.64	15.73	15.71	16.50
GPRS 3 Tx slots	19.27	19.33	19.37	20.00	15.01	15.07	15.11	15.74
GPRS 4 Tx slots	16.96	17.11	17.08	17.50	13.96	14.11	14.08	14.50
EDGE 1 Tx slot	18.60	18.66	18.73	19.50	9.60	9.66	9.73	10.50
EDGE 2 Tx slots	16.36	16.41	16.48	17.00	10.36	10.41	10.48	11.00
EDGE 3 Tx slots	14.24	14.43	14.45	15.00	9.98	10.17	10.19	10.74
EDGE 4 Tx slots	11.70	11.84	11.83	12.50	8.70	8.84	8.83	9.50

Band TX Channel Frequency (MHz)	WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)	
	9262	9400	9538		1312	1413	1513		4132	4182	4233		
	9662	9800	9938	17.00	1337	1638	1738	17.00	4357	4407	4458	23.00	
	1852.4	1858	1907.3	17.00	1712.4	1722.3	1752.5	17.00	326.4	336.4	346.8	23.00	
3GPP Rel 99	AMR 12.2Kbps	15.08	15.16	15.18	16.00	15.65	15.62	15.85	17.00	21.82	21.85	21.88	23.00
3GPP Rel 99	AMR 12.2Kbps	15.40	15.46	15.47	16.00	15.67	15.60	15.87	17.00	21.85	21.87	21.90	23.00
3GPP Rel 6	HSDPA Subtest-1	14.15	14.20	14.05	15.00	14.57	14.42	14.75	16.00	20.94	20.95	20.96	22.00
3GPP Rel 6	HSDPA Subtest-2	14.22	14.25	14.06	15.00	14.56	14.45	14.78	16.00	20.90	20.93	21.00	22.00
3GPP Rel 6	HSDPA Subtest-3	13.69	13.71	13.60	14.50	14.06	13.98	14.29	15.50	20.44	20.46	20.52	21.50
3GPP Rel 6	HSDPA Subtest-4	13.88	13.72	13.60	14.50	14.12	13.89	14.28	15.50	20.44	20.40	20.16	21.50
3GPP Rel 8	DC-HSDPA Subtest-1	14.13	14.11	13.96	15.00	14.20	14.11	14.28	16.00	20.73	21.07	21.09	22.00
3GPP Rel 8	DC-HSDPA Subtest-2	14.18	14.15	13.99	15.00	14.22	14.15	14.33	16.00	20.75	21.03	21.13	22.00
3GPP Rel 8	DC-HSDPA Subtest-3	13.60	13.65	13.48	14.50	13.73	13.65	13.88	15.50	20.23	20.54	20.63	21.50
3GPP Rel 8	DC-HSDPA Subtest-4	13.58	13.62	13.49	14.50	13.77	13.64	13.84	15.50	20.19	20.56	20.65	21.50
3GPP Rel 6	HSUPA Subtest-1	14.15	14.21	14.31	15.00	14.28	14.22	14.50	16.00	21.12	21.15	21.19	22.00
3GPP Rel 6	HSUPA Subtest-2	12.19	12.25	12.29	13.00	12.24	12.18	12.42	14.00	19.15	19.10	19.15	20.00
3GPP Rel 6	HSUPA Subtest-3	13.20	13.22	13.33	14.00	13.25	13.19	13.41	15.00	20.10	19.97	20.12	21.00
3GPP Rel 6	HSUPA Subtest-4	12.20	12.29	12.35	13.00	12.20	12.15	12.39	14.00	19.14	19.16	19.23	20.00
3GPP Rel 6	HSUPA Subtest-5	14.20	14.20	14.30	15.00	14.20	14.10	14.30	16.00	21.10	21.10	21.20	22.00
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	11.85	11.88	11.97	12.50	11.88	11.82	11.95	13.50	18.79	18.84	18.88	19.50

Band TX Channel Frequency (MHz)	CDMA BC0			Tune-up Limit (dBm)	CDMA BC1			Tune-up Limit (dBm)	CDMA BC10			Tune-up Limit (dBm)
	1013	384	777		25	600	1175		476	580	684	
	224.7	33.32	845.31	24.00	16.95	17.00	16.98	17.50	23.00	23.02	23.05	24.00
RC1 S055	22.99	23.01	23.04	24.00	16.95	17.00	16.98	17.50	23.00	23.02	23.05	24.00
RC3 S055	22.97	22.99	23.00	24.00	16.94	16.97	16.95	17.50	23.01	23.01	23.04	24.00
RC3 S032 (F+SCH)	22.95	22.97	22.99	24.00	16.96	16.97	16.95	17.50	23.03	23.03	23.04	24.00
RC3 S032 (F+SCH)	22.94	22.94	22.97	24.00	16.94	16.96	16.93	17.50	23.01	23.00	22.97	24.00
RTAP 153.6Kbps	22.98	22.98	23.01	24.00	16.95	16.97	16.94	17.50	22.99	23.02	23.03	24.00
RETAP 4096Bits	22.97	22.93	22.97	24.00	16.93	16.96	16.90	17.50	22.98	22.95	23.03	24.00



Band 2 (1900MHz Band)										
Part 24E										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch./Freq.	Power Middle Ch./Freq.	Power High Ch./Freq.	Tune-up limit (dBm)	MPR (dB)		
Channel										
Frequency (MHz)										
20	QPSK	1	0	15.80	15.94	15.83				
20	QPSK	1	49	15.82	16.00	15.88	17	0		
20	QPSK	1	99	15.81	15.72	15.83				
20	QPSK	50	0	15.81	15.96	15.86				
20	QPSK	50	24	15.80	15.89	15.84	17	0		
20	QPSK	50	50	15.78	15.88	15.83				
20	QPSK	100	0	15.80	15.85	15.85				
20	16QAM	1	0	15.88	15.93	15.85				
20	16QAM	1	49	15.91	15.99	15.94	17	0		
20	16QAM	1	99	15.88	15.87	15.77				
20	16QAM	50	0	15.93	15.83	15.96				
20	16QAM	50	24	15.97	15.78	15.89	17	0		
20	16QAM	50	50	15.81	15.77	15.95				
20	64QAM	1	0	15.97	15.86	15.76				
20	64QAM	1	49	15.89	15.96	15.95	17	0		
20	64QAM	1	99	15.86	15.87	15.88				
20	64QAM	50	0	15.95	15.86	15.88				
20	64QAM	50	24	15.96	15.87	15.85	17	0		
20	64QAM	50	50	15.79	15.82	15.95				
20	64QAM	100	0	15.89	15.90	15.92				
Channel										
Frequency (MHz)										
15	QPSK	1	0	15.74	15.85	15.87				
15	QPSK	1	37	15.66	15.89	15.93	17	0		
15	QPSK	1	74	15.61	15.68	15.84				
15	QPSK	36	0	15.78	15.76	15.67				
15	QPSK	36	20	15.75	15.70	15.61	17	0		
15	QPSK	36	39	15.75	15.69	15.69				
15	QPSK	75	0	15.69	15.79	15.86				
15	16QAM	1	0	15.82	15.86	15.86				
15	16QAM	1	37	15.88	15.98	15.91	17	0		
15	16QAM	1	74	15.92	15.85	15.71				
15	16QAM	36	0	15.87	15.61	15.88				
15	16QAM	36	20	15.77	15.58	15.67	17	0		
15	16QAM	36	39	15.59	15.71	15.96				
15	16QAM	75	0	15.79	15.78	15.81				
15	64QAM	1	0	15.79	15.85	15.75				
15	64QAM	1	37	15.94	15.89	15.94	17	0		
15	64QAM	1	74	15.86	15.82	15.85				
15	64QAM	36	0	15.98	15.86	15.81				
15	64QAM	36	20	16.00	15.85	15.76	17	0		
15	64QAM	36	39	15.61	15.67	15.98				
15	64QAM	75	0	15.80	15.80	15.92				
Channel										
Frequency (MHz)										
10	QPSK	1	0	15.65	15.87	15.73				
10	QPSK	1	25	15.67	15.99	15.80	17	0		
10	QPSK	1	49	15.72	15.70	15.81				
10	QPSK	25	0	15.74	15.78	15.66				
10	QPSK	25	12	15.77	15.78	15.69	17	0		
10	QPSK	25	25	15.83	15.93	15.88				
10	QPSK	50	0	15.85	15.95	15.76				
10	16QAM	1	0	15.74	15.88	15.63				
10	16QAM	1	25	15.70	15.84	15.77	17	0		
10	16QAM	1	49	15.82	15.99	15.67				
10	16QAM	25	0	15.84	15.61	15.84				
10	16QAM	25	12	15.94	15.53	15.81	17	0		
10	16QAM	25	25	15.82	15.78	15.87				
10	16QAM	50	0	15.72	15.76	15.81				
10	64QAM	1	0	15.82	15.70	15.55				
10	64QAM	1	25	15.79	15.85	15.97	17	0		
10	64QAM	1	49	15.91	15.83	15.76				
10	64QAM	25	0	15.99	15.70	15.76				
10	64QAM	25	12	15.99	15.52	15.74	17	0		
10	64QAM	25	25	15.83	15.83	15.89				
10	64QAM	50	0	15.80	15.91	15.80				
Channel										
Frequency (MHz)										
5	QPSK	1	0	15.79	15.90	15.77				
5	QPSK	1	12	15.77	15.94	15.92	17	0		
5	QPSK	1	24	15.59	15.88	15.60				
5	QPSK	12	0	15.73	15.93	15.84				
5	QPSK	12	7	15.83	15.88	15.85	17	0		
5	QPSK	12	13	15.81	15.68	15.82				
5	QPSK	25	0	15.71	15.95	15.77				
5	16QAM	1	0	15.74	15.92	15.67				
5	16QAM	1	12	15.90	15.75	15.78	17	0		
5	16QAM	1	24	15.93	15.82	15.75				
5	16QAM	12	0	15.87	15.85	16.00				
5	16QAM	12	7	15.98	15.63	15.80	17	0		
5	16QAM	12	13	15.81	15.64	15.82				
5	16QAM	25	0	15.68	15.95	15.71				
5	64QAM	1	0	15.95	15.64	15.51				
5	64QAM	1	12	15.77	15.82	15.88	17	0		
5	64QAM	1	24	15.80	15.90	15.94				
5	64QAM	12	0	15.78	15.88	15.89				
5	64QAM	12	7	15.74	15.84	15.83	17	0		
5	64QAM	12	13	15.82	15.83	15.75				
5	64QAM	25	0	15.63	15.93	15.87				
Channel										
Frequency (MHz)										
3	QPSK	1	0	15.73	15.83	15.61				
3	QPSK	1	8	15.73	15.76	15.76	17	0		
3	QPSK	1	14	15.58	15.72	15.63				
3	QPSK	8	0	15.72	15.82	15.79				
3	QPSK	8	4	15.68	15.86	15.84	17	0		
3	QPSK	8	7	15.78	15.86	15.87				
3	QPSK	15	0	15.67	15.98	15.73				
3	16QAM	1	0	15.93	15.75	15.67				
3	16QAM	1	8	15.95	15.90	15.78	17	0		
3	16QAM	1	14	15.86	15.83	15.81				
3	16QAM	8	0	15.78	15.73	15.91				
3	16QAM	8	4	15.92	15.83	15.83	17	0		
3	16QAM	8	7	15.65	15.89	15.89				
3	16QAM	15	0	15.84	15.77	15.87				
3	64QAM	1	0	15.80	15.86	15.59				
3	64QAM	1	8	15.90	15.73	15.95	17	0		
3	64QAM	1	14	15.86	15.68	15.89				
3	64QAM	8	0	15.83	15.66	15.88				
3	64QAM	8	4	15.87	15.87	15.76	17	0		
3	64QAM	8	7	15.80	15.83	15.85				
3	64QAM	15	0	15.82	15.74	15.75				
Channel										
Frequency (MHz)										
1.4	QPSK	1	0	15.70	15.85	15.83				
1.4	QPSK	1	3	15.81	15.97	15.80	17	0		
1.4	QPSK	1	5	15.79	15.75	15.80				
1.4	QPSK	3	0	15.82	15.80	15.84				
1.4	QPSK	3	1	15.84	15.84	15.89				
1.4	QPSK	3	3	15.58	15.71	15.85				
1.4	QPSK	6	0	15.77	15.71	15.80	17	0		
1.4	16QAM	1	0	15.88	15.87	15.73				
1.4	16QAM	1	3	15.74	15.80	15.97				
1.4	16QAM	1	5	15.86	15.83	15.85	17	0		
1.4	16QAM	3	0	15.83	15.87	16.00				
1.4	16QAM	3	1	15.80	15.74	15.89				
1.4	16QAM	3	3	15.84	15.83	15.86				
1.4	16QAM	6	0	15.79	15.98	15.88	17	0		
1.4	64QAM	1	0	15.95	15.70	15.58				
1.4	64QAM	1	3	15.66	15.96	15.95				
1.4	64QAM	1	5	15.77	15.80	15.79	17	0		
1.4	64QAM	3	0	15.85	15.85	15.94				
1.4	64QAM	3	1	15.77	15.73	15.77				
1.4	64QAM	3	3	15.55	15.82	15.72				
1.4	64QAM	6	0	15.61	15.74	15.79	17	0		

Band 4 (AWS Band)										
Part 27L (only on channel required)										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch./Freq.	Power Middle Ch./Freq.	Power High Ch./Freq.	Tune-up limit (dBm)	MPR (dB)		



Band 7 (2600MHz Band)									
Part 27									
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)	
Channel				2050	2100	2150			
Frequency (MHz)									
20	QPSK	1	0	19.65	19.50	19.65			
20	QPSK	1	49	19.70	19.59	19.72		21	0
20	QPSK	1	99	19.72	19.61	19.80			
20	QPSK	50	0	19.87	19.56	19.73			
20	QPSK	50	24	19.70	19.60	19.76		21	0
20	QPSK	50	50	19.85	19.55	19.70			
20	QPSK	100	0	19.88	19.58	19.79			
20	16QAM	1	0	19.78	19.78	19.78			
20	16QAM	1	49	19.77	19.73	19.77		21	0
20	16QAM	1	99	19.49	19.74	19.79			
20	16QAM	50	0	19.57	19.56	19.29			
20	16QAM	50	24	19.67	19.66	19.67		21	0
20	16QAM	50	50	19.62	19.65	19.67			
20	16QAM	100	0	19.62	19.57	19.63			
20	84QAM	1	0	19.84	19.61	19.63			
20	84QAM	1	49	19.59	19.48	19.58		21	0
20	84QAM	1	99	19.52	19.52	19.33			
20	84QAM	50	0	19.63	19.60	19.65			
20	84QAM	50	24	19.72	19.60	19.62		21	0
20	84QAM	50	50	19.65	19.65	19.65			
20	84QAM	100	0	19.64	19.57	19.59			
Channel				20925	21100	21375			
Frequency (MHz)									
15	QPSK	1	0	19.54	19.30	19.57			
15	QPSK	1	37	19.46	19.46	19.77		21	0
15	QPSK	1	74	19.59	19.48	19.69			
15	QPSK	36	0	19.65	19.32	19.55			
15	QPSK	36	20	19.68	19.38	19.78		21	0
15	QPSK	36	39	19.67	19.57	19.74			
15	QPSK	75	0	19.54	19.48	19.65			
15	16QAM	1	0	19.73	19.71	19.60			
15	16QAM	1	37	19.63	19.75	19.61		21	0
15	16QAM	1	74	19.43	19.74	19.79			
15	16QAM	36	0	19.55	19.35	19.31			
15	16QAM	36	20	19.65	19.63	19.59		21	0
15	16QAM	36	39	19.40	19.70	19.74			
15	16QAM	75	0	19.44	19.48	19.65			
15	84QAM	1	0	19.54	19.63	19.58			
15	84QAM	1	37	19.53	19.32	19.49		21	0
15	84QAM	1	74	19.36	19.39	19.15			
15	84QAM	36	0	19.67	19.48	19.55			
15	84QAM	36	20	19.62	19.62	19.58		21	0
15	84QAM	36	39	19.46	19.57	19.57			
15	84QAM	75	0	19.61	19.61	19.40			
Channel				20990	21100	21375			
Frequency (MHz)									
10	QPSK	1	0	19.42	19.41	19.70			
10	QPSK	1	25	19.70	19.57	19.70		21	0
10	QPSK	1	49	19.53	19.47	19.56			
10	QPSK	25	0	19.53	19.44	19.70			
10	QPSK	25	12	19.66	19.55	19.77		21	0
10	QPSK	25	25	19.61	19.36	19.60			
10	QPSK	50	0	19.68	19.33	19.59			
10	16QAM	1	0	19.72	19.56	19.78			
10	16QAM	1	25	19.61	19.53	19.62		21	0
10	16QAM	1	49	19.36	19.50	19.67			
10	16QAM	25	0	19.60	19.40	19.27			
10	16QAM	25	12	19.58	19.57	19.42		21	0
10	16QAM	25	25	19.67	19.47	19.52			
10	16QAM	50	0	19.42	19.61	19.46			
10	84QAM	1	0	19.55	19.55	19.26			
10	84QAM	1	25	19.34	19.31	19.35		21	0
10	84QAM	1	49	19.30	19.40	19.25			
10	84QAM	25	0	19.39	19.45	19.62			
10	84QAM	25	12	19.49	19.57	19.45		21	0
10	84QAM	25	25	19.59	19.35	19.63			
10	84QAM	50	0	19.56	19.33	19.47			
Channel				20775	21100	21425			
Frequency (MHz)									
5	QPSK	1	0	19.43	19.40	19.70			
5	QPSK	1	12	19.62	19.62	19.74		21	0
5	QPSK	1	24	19.63	19.66	19.56			
5	QPSK	12	0	19.44	19.34	19.74			
5	QPSK	12	7	19.64	19.49	19.70		21	0
5	QPSK	12	13	19.54	19.59	19.47			
5	QPSK	25	0	19.57	19.62	19.74			
5	16QAM	1	0	19.77	19.64	19.70			
5	16QAM	1	12	19.72	19.49	19.52		21	0
5	16QAM	1	24	19.46	19.65	19.69			
5	16QAM	12	0	19.32	19.35	19.20			
5	16QAM	12	7	19.36	19.44	19.58		21	0
5	16QAM	12	13	19.63	19.69	19.52			
5	16QAM	25	0	19.45	19.45	19.43			
5	84QAM	1	0	19.63	19.44	19.48			
5	84QAM	1	12	19.41	19.35	19.35		21	0
5	84QAM	1	24	19.55	19.34	19.27			
5	84QAM	12	0	19.40	19.37	19.46			
5	84QAM	12	7	19.63	19.50	19.62		21	0
5	84QAM	12	13	19.53	19.57	19.66			
5	84QAM	25	0	19.39	19.58	19.41			

Band 14 (700MHz Band)									
Part 27									
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)	
Channel				23305	23330	23355			
Frequency (MHz)									
10	QPSK	1	0	22.09	22.09	22.09			
10	QPSK	1	25	22.14	22.14	22.14		23.5	0
10	QPSK	1	49	22.20	22.20	22.20			
10	QPSK	25	0	21.74	21.74	21.74			
10	QPSK	25	12	21.72	21.72	21.72		23	0.5
10	QPSK	25	25	21.70	21.70	21.70			
10	QPSK	50	0	21.81	21.81	21.81			
10	16QAM	1	0	21.85	21.85	21.85			
10	16QAM	1	49	21.90	21.90	21.90		23	0.5
10	16QAM	25	0	20.70	20.70	20.70			
10	16QAM	25	12	20.76	20.76	20.76		22	1.5
10	16QAM	25	25	20.69	20.69	20.69			
10	16QAM	50	0	20.80	20.72	20.72			
10	84QAM	1	0	20.80	20.80	20.80			
10	84QAM	1	25	20.82	20.82	20.82		22	1.5
10	84QAM	1	49	20.85	20.85	20.85			
10	84QAM	25	0	19.73	19.73	19.73			
10	84QAM	25	12	19.75	19.75	19.75		21	2.5
10	84QAM	25	25	19.75	19.75	19.75			
10	84QAM	50	0	19.74	19.74	19.74			
Channel				23305	23330	23355			
Frequency (MHz)									
5	QPSK	1	0	22.13	22.01	22.02			
5	QPSK	1	12	22.02	22.07	21.97		23.5	0
5	QPSK	1	24	22.04	22.05	22.15			
5	QPSK	12	0	21.76	21.71	21.51			
5	QPSK	12	7	21.65	21.74	21.55		23	0.5
5	QPSK	12	13	21.67	21.63	21.55			
5	QPSK	25	0	21.69	21.69	21.69			
5	16QAM	1	0	21.64	21.63	21.63			
5	16QAM	1	12	21.67	21.65	21.68		23	0.5
5	16QAM	1	24	21.90	21.85	21.86			
5	16QAM	12	0	20.60	20.66	20.68			
5	16QAM	12	7	20.67	20.64	20.68		22	1.5
5	16QAM	12	13	20.52	20.70	20.71			
5	16QAM	25	0	20.62	20.71	20.66			
5	84QAM	1	0	20.55	20.70	20.85			
5	84QAM	1	12	20.72	20.85	20.77		22	1.5
5	84QAM	1	24	20.75	20.66	20.84			
5	84QAM	12	0	19.51	19.77	19.73			
5	84QAM	12	7	19.67	19.61	19.51		21	2.5
5	84QAM	12	13	19.71	19.73	19.58			
5	84QAM	25	0	19.77	19.82	19.65			

Band 25 (2600MHz Band)									
Part 24E									
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)	
Channel				26140	26340	26590			
Frequency (MHz)									
20</									



Band 26 for FCC (only on channel required)										
BW [MHz]	Modulation	RB Size	RB Offset	Power			Tune-up limit (dBm)	MPR (dB)		
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.				
Channel				821.5	831.5	841.5				
Frequency (MHz)										
15	QPSK	1	0	21.83	21.85	21.95				
15	QPSK	1	37	21.84	21.88	21.96	23	0		
15	QPSK	1	74	21.80	21.83	21.93				
15	QPSK	36	0	21.77	21.82	21.87				
15	QPSK	36	20	21.82	21.86	21.94	23	0		
15	QPSK	36	39	21.78	21.80	21.88				
15	QPSK	75	0	21.80	21.85	21.91				
15	16QAM	1	0	21.81	21.85	21.92				
15	16QAM	1	37	21.86	21.82	21.81	23	0		
15	16QAM	1	74	21.86	21.87	21.75				
15	16QAM	36	0	21.08	21.17	21.03				
15	16QAM	36	20	21.06	21.15	20.98	22	1		
15	16QAM	36	39	21.19	21.05	21.18				
15	16QAM	75	0	21.21	21.19	21.08				
15	64QAM	1	0	21.22	20.98	21.28				
15	64QAM	1	37	21.23	21.11	21.23	22	1		
15	64QAM	1	74	21.09	21.04	21.38				
15	64QAM	36	0	20.09	20.15	20.09				
15	64QAM	36	20	20.12	20.26	20.05	21	2		
15	64QAM	36	39	20.18	20.06	20.21				
15	64QAM	75	0	20.27	20.16	20.10				
Channel				26740	26865	26990				
Frequency (MHz)				819	831.5	844				
10	QPSK	1	0	21.87	21.81	21.87	23	0		
10	QPSK	1	25	21.79	21.81	21.85				
10	QPSK	1	49	21.83	21.58	21.90				
10	QPSK	25	0	21.89	21.82	21.81				
10	QPSK	25	12	21.87	21.83	21.73	23	0		
10	QPSK	25	25	21.87	21.95	21.87				
10	QPSK	50	0	21.81	21.71	21.89				
10	16QAM	1	0	21.83	21.73	21.73				
10	16QAM	1	25	21.89	21.62	21.58	23	0		
10	16QAM	1	49	21.82	21.66	21.67				
10	16QAM	25	0	21.08	21.20	21.04				
10	16QAM	25	12	20.83	21.19	20.87	22	1		
10	16QAM	25	25	21.06	20.92	21.14				
10	16QAM	50	0	21.08	21.19	20.99				
10	64QAM	1	0	21.04	20.98	21.16				
10	64QAM	1	25	21.01	21.07	21.23	22	1		
10	64QAM	1	49	21.05	20.86	21.16				
10	64QAM	25	0	20.03	20.20	20.08				
10	64QAM	25	12	19.99	20.19	20.09	21	2		
10	64QAM	25	25	20.10	20.03	20.11				
10	64QAM	50	0	20.28	20.16	20.14				
Channel				26715	26865	27015				
Frequency (MHz)				816.5	831.5	846.5				
5	QPSK	1	0	21.87	21.87	21.87	23	0		
5	QPSK	1	12	21.87	21.82	21.91				
5	QPSK	1	24	21.81	21.83	21.89				
5	QPSK	12	0	21.88	21.80	21.90				
5	QPSK	12	7	21.59	21.78	21.94	23	0		
5	QPSK	12	14	21.89	21.83	21.88				
5	QPSK	25	0	21.81	21.79	21.89				
5	16QAM	1	0	21.70	21.72	21.90				
5	16QAM	1	12	21.91	21.81	21.77	23	0		
5	16QAM	1	24	21.82	21.85	21.68				
5	16QAM	12	0	21.02	20.97	20.87				
5	16QAM	12	7	20.86	21.07	20.74	22	1		
5	16QAM	12	13	21.01	21.02	21.08				
5	16QAM	25	0	21.20	21.04	21.07				
5	64QAM	1	0	21.01	20.87	21.27				
5	64QAM	1	12	21.17	20.91	21.15	22	1		
5	64QAM	1	24	21.01	20.82	21.29				
5	64QAM	12	0	19.84	20.03	19.87				
5	64QAM	12	7	19.91	20.15	19.96	21	2		
5	64QAM	12	13	20.15	19.86	20.23				
5	64QAM	25	0	20.09	20.01	19.90				
Channel				26705	26865	27025				
Frequency (MHz)				815.5	831.5	847.5				
3	QPSK	1	0	21.80	21.85	21.73	23	0		
3	QPSK	1	8	21.77	21.84	21.76				
3	QPSK	1	14	21.82	21.78	21.93				
3	QPSK	8	0	21.80	21.86	21.86				
3	QPSK	8	4	21.80	21.71	21.92	23	0		
3	QPSK	8	7	21.66	21.70	21.78				
3	QPSK	15	0	21.56	21.69	21.68				
3	16QAM	1	0	21.73	21.83	21.71				
3	16QAM	1	8	21.81	21.73	21.72	23	0		
3	16QAM	1	14	21.85	21.69	21.56				
3	16QAM	8	0	20.87	21.07	20.78				
3	16QAM	8	4	20.87	21.19	20.77	22	1		
3	16QAM	8	7	21.23	20.88	20.98				
3	16QAM	15	0	21.10	21.06	21.01				
3	64QAM	1	0	20.98	20.92	21.05				
3	64QAM	1	8	20.98	21.14	21.01	22	1		
3	64QAM	1	14	21.11	21.07	21.27				
3	64QAM	8	0	20.07	19.90	20.10				
3	64QAM	8	4	20.00	20.02	19.82	21	2		
3	64QAM	8	7	20.22	19.92	20.23				
3	64QAM	15	0	20.28	20.14	20.11				
Channel				26697	26865	27033				
Frequency (MHz)				814.7	831.5	848.3				
1.4	QPSK	1	0	21.64	21.85	21.91	23	0		
1.4	QPSK	1	3	21.76	21.66	21.92				
1.4	QPSK	1	5	21.80	21.74	21.86				
1.4	QPSK	3	0	21.69	21.85	21.92				
1.4	QPSK	3	1	21.83	21.87	21.85				
1.4	QPSK	3	3	21.93	21.63	21.79				
1.4	QPSK	6	0	21.83	21.85	21.83	23	0		
1.4	16QAM	1	0	21.71	21.80	21.70				
1.4	16QAM	1	3	21.76	21.74	21.79				
1.4	16QAM	1	5	21.73	21.80	21.69	23	0		
1.4	16QAM	3	0	21.58	21.83	21.83				
1.4	16QAM	3	1	21.83	21.74	21.87				
1.4	16QAM	3	3	21.86	21.75	21.77				
1.4	16QAM	6	0	20.98	21.18	21.01	22	1		
1.4	64QAM	1	0	21.27	20.95	21.16				
1.4	64QAM	1	3	21.09	21.05	21.27				
1.4	64QAM	1	5	21.00	21.08	21.24	22	1		
1.4	64QAM	3	0	21.00	20.74	21.10				
1.4	64QAM	3	1	21.17	20.99	21.01				
1.4	64QAM	3	3	20.90	20.82	21.14				
1.4	64QAM	6	0	20.04	20.11	19.94	21	2		

Band 66										
BW [MHz]	Modulation	RB Size	RB Offset	Power			Tune-up limit (dBm)	MPR (dB)		
				Low Ch. / Freq.	Middle Ch. / Freq.	High Ch. / Freq.				
Channel				132072	132322	132572				
Frequency (MHz)				1745	1745	1745				
20	QPSK	1	0	17.60	17.55	17.70				
20	QPSK	1	49	17.55	17.49	17.61	19	0		
20	QPSK	1	99	17.65	17.59	17.81				
20	QPSK	50	0	17.54	17.55	17.52				
20	QPSK	50	24	17.60	17.46	17.65	19	0		
20	QPSK	50	50	17.62	17.57	17.78				
20	QPSK	100	0	17.60	17.54	17.76				
20	16QAM	1	0	17.50	17.54	17.54				
20	16QAM	1	49	17.48	17.49	17.45	19	0		
20	16QAM	1	99	17.47	17.55	17.43				
20	16QAM	50	0	17.48	17.58	17.49				
20	16QAM	50	24	17.46	17.52	17.42	19	0		
20	16QAM	50	50	17.37	17.45	17.37				
20										



Band 38 (only on channel required)										
BW (MHz)	Modulation	RB Size	RB Offset	Power Floor Ch./Freq.	Power Max Ch./Freq.	Power High Ch./Freq.	Power Floor Ch./Freq.	Power High Ch./Freq.	Tune-up limit (dBm)	MFR (dB)
Channel										
Frequency (MHz)										
30	QPSK	1	0	20.78	20.82	20.76			22	0
30	QPSK	1	49	20.79	20.80	20.74				
30	QPSK	1	99	20.80	20.80	20.80				
30	QPSK	50	0	20.80	20.88	20.80				
30	QPSK	50	24	20.88	20.80	20.78				
30	QPSK	50	50	20.88	20.78	20.78				
30	QPSK	100	0	20.85	20.85	20.77				
30	HQAM	1	0	20.85	20.83	20.86				
30	HQAM	1	49	20.86	20.85	20.85				
30	HQAM	1	99	20.86	20.86	20.83				
30	HQAM	50	0	20.86	20.86	20.83				
30	HQAM	50	24	20.81	20.87	20.89				
30	HQAM	50	50	20.84	20.84	20.81				
30	HQAM	100	0	20.88	20.82	20.81				
30	HQAM	1	0	20.87	20.87	20.81				
30	HQAM	1	49	20.87	20.83	20.79				
30	HQAM	1	99	20.78	20.78	20.72				
30	HQAM	50	0	19.94	19.92	19.85				
30	HQAM	50	24	19.94	19.89	19.89				
30	HQAM	50	50	19.92	19.89	19.85				
30	HQAM	100	0	19.97	19.93	19.88				
Channel										
Frequency (MHz)										
15	QPSK	1	0	20.73	20.76	20.63				
15	QPSK	1	37	20.74	20.72	20.61				
15	QPSK	1	74	20.75	20.79	20.64				
15	QPSK	36	0	20.70	20.87	20.80				
15	QPSK	36	20	20.88	20.68	20.81				
15	QPSK	36	38	20.82	20.67	20.73				
15	HQAM	75	0	20.64	20.67	20.74				
15	HQAM	1	37	20.68	20.68	20.63				
15	HQAM	1	74	20.68	20.68	20.66				
15	HQAM	36	0	20.59	20.64	20.68				
15	HQAM	36	20	20.59	20.68	20.70				
15	HQAM	36	38	20.58	20.62	20.62				
15	HQAM	75	0	20.65	20.68	20.62				
15	HQAM	1	0	20.67	20.63	20.59				
15	HQAM	1	37	20.61	20.62	20.61				
15	HQAM	1	74	20.52	20.62	20.51				
15	HQAM	36	0	19.70	19.88	19.84				
15	HQAM	36	20	19.89	19.84	19.81				
15	HQAM	36	38	19.93	19.87	19.81				
15	HQAM	75	0	19.85	19.79	19.86				
Channel										
Frequency (MHz)										
10	QPSK	1	0	20.67	20.67	20.61				
10	QPSK	1	49	20.68	20.61	20.62				
10	QPSK	25	0	20.61	20.68	20.61				
10	QPSK	25	12	20.69	20.78	20.72				
10	QPSK	25	25	20.67	20.77	20.69				
10	QPSK	50	0	20.68	20.62	20.65				
10	HQAM	1	0	20.67	20.72	20.66				
10	HQAM	1	25	20.64	20.63	20.60				
10	HQAM	1	49	20.64	20.58	20.60				
10	HQAM	25	0	20.58	20.76	20.66				
10	HQAM	25	12	20.66	20.65	20.68				
10	HQAM	25	25	20.74	20.60	20.55				
10	HQAM	50	0	20.54	20.60	20.77				
10	HQAM	1	0	20.46	20.70	20.66				
10	HQAM	1	25	20.64	20.58	20.45				
10	HQAM	1	49	20.56	20.66	20.66				
10	HQAM	25	0	19.98	19.92	19.84				
10	HQAM	25	12	19.77	19.98	19.92				
10	HQAM	25	25	19.98	19.78	19.96				
10	HQAM	50	0	19.89	19.88	19.81				
Channel										
Frequency (MHz)										
5	QPSK	1	0	20.73	20.69	20.66				
5	QPSK	1	12	20.80	20.55	20.96				
5	QPSK	1	24	20.84	20.71	20.77				
5	QPSK	12	0	20.66	20.78	20.79				
5	QPSK	12	7	20.81	20.67	20.79				
5	QPSK	12	13	20.65	20.58	20.81				
5	QPSK	25	0	20.67	20.72	20.70				
5	HQAM	1	0	20.67	20.66	20.64				
5	HQAM	1	12	20.75	20.72	20.64				
5	HQAM	1	24	20.75	20.55	20.68				
5	HQAM	12	0	20.70	20.73	20.71				
5	HQAM	12	7	20.69	20.50	20.70				
5	HQAM	12	13	20.68	20.62	20.67				
5	HQAM	25	0	20.50	20.55	20.69				
5	HQAM	1	0	20.56	20.52	20.53				
5	HQAM	1	12	20.61	20.46	20.46				
5	HQAM	1	24	20.68	20.59	20.50				
5	HQAM	12	0	19.92	19.75	19.80				
5	HQAM	12	7	19.89	19.86	19.77				
5	HQAM	12	13	19.85	19.85	19.85				
5	HQAM	25	0	19.96	19.87	19.86				

Band 41 (2.6G Band)-PC3										
BW (MHz)	Modulation	RB Size	RB Offset	Power Floor Ch./Freq.	Power Max Ch./Freq.	Power High Ch./Freq.	Power Floor Ch./Freq.	Power High Ch./Freq.	Tune-up limit (dBm)	MFR (dB)
Channel										
Frequency (MHz)										
30	QPSK	1	0	22.09	21.88	21.80			23	0
30	QPSK	1	49	21.79	21.87	21.88				
30	QPSK	1	99	21.86	21.80	21.85				
30	QPSK	50	0	21.86	21.28	21.42				
30	QPSK	50	24	21.57	21.46	21.57				
30	QPSK	50	50	21.52	21.33	21.56				
30	QPSK	100	0	21.50	21.44	21.55				
30	HQAM	1	0	21.40	21.45	21.46				
30	HQAM	1	49	21.32	21.38	21.53				
30	HQAM	1	99	21.38	21.45	21.55				
30	HQAM	50	0	20.90	20.90	20.92				
30	HQAM	50	24	20.50	20.41	20.55				
30	HQAM	50	50	20.38	20.42	20.59				
30	HQAM	100	0	20.45	20.36	20.56				
30	64QAM	1	0	21.19	21.19	21.27				
30	64QAM	1	49	21.08	21.16	21.20				
30	64QAM	1	99	21.15	21.15	21.27				
30	64QAM	50	0	20.33	20.31	20.45				
30	64QAM	50	24	20.43	20.36	20.54				
30	64QAM	50	50	20.32	20.34	20.49				
30	64QAM	100	0	20.50	20.37	20.50				
Channel										
Frequency (MHz)										
15	QPSK	1	0	21.81	21.80	21.93				
15	QPSK	1	37	21.74	21.76	21.84				
15	QPSK	1	74	21.74	21.78	21.92				
15	QPSK	36	0	21.38	21.23	21.38				
15	QPSK	36	20	21.53	21.49	21.62				
15	QPSK	36	38	21.36	21.37	21.59				
15	HQAM	75	0	21.45	21.45	21.49				
15	HQAM	1	37	21.49	21.51	21.57				
15	HQAM	1	74	21.30	21.36	21.60				
15	HQAM	36	0	20.35	20.39	20.48				
15	HQAM	36	20	20.45	20.35	20.54				
15	HQAM	36	38	20.35	20.42	20.52				
15	HQAM	75	0	20.52	20.32	20.49				
15	64QAM	1	0	21.21	21.15	21.34				
15	64QAM	1	37	21.03	21.17	21.23				
15	64QAM	1	74	21.14	21.22	21.22				
15	64QAM	36	0	20.39	20.45	20.48				
15	64QAM	36	20	20.37	20.35	20.58				
15	64QAM	36	38	20.35	20.29	20.48				
15	64QAM	75	0	20.53	20.43	20.55				
Channel										
Frequency (MHz)										
10	QPSK	1	0	21.70	21.47	21.63				
10	QPSK	1	25	21.81	21.79	21.79				
10	QPSK	1	49	21.72	21.80	21.59				
10	QPSK	45	0	21.44	21.20	21.32				
10	QPSK	25	12	21.58	21.44					



Reduced Power Mode for HotSpot On

GSM900 TX Channel Frequency (MHz)	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	125	169	251		125	169	251	
	824.2	836.4	848.8	32.50	824.2	836.4	848.8	23.50
GSM 1 Tx slot	31.87	31.61	31.55	32.50	22.87	22.61	22.55	23.50
GPRS 1 Tx slot	31.85	31.59	31.53	32.50	22.85	22.59	22.53	23.50
GPRS 2 Tx slots	30.18	30.17	30.06	31.00	24.18	24.17	24.06	25.00
GPRS 3 Tx slots	27.81	27.80	27.65	28.50	23.55	23.54	23.39	24.24
GPRS 4 Tx slots	24.98	24.99	25.05	26.00	21.99	21.99	22.05	23.00
EDGE 1 Tx slot	26.01	25.99	25.84	26.50	17.91	16.99	16.84	17.50
EDGE 2 Tx slots	23.77	23.77	23.56	24.50	17.77	17.77	17.56	18.50
EDGE 3 Tx slots	21.58	21.56	21.42	22.00	17.32	17.29	17.16	17.74
EDGE 4 Tx slots	19.48	19.40	19.27	20.00	16.48	16.40	16.27	17.00

GSM1900 TX Channel Frequency (MHz)	Burst Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	512	661	810		512	661	810	
	1859.2	1858	1859.3	21.50	12.07	12.08	11.93	12.50
GSM 1 Tx slot	21.07	21.06	20.93	21.50	12.07	12.08	11.93	12.50
GPRS 1 Tx slot	20.75	20.85	20.77	21.50	11.75	11.85	11.77	12.50
GPRS 2 Tx slots	19.38	19.40	19.20	20.50	13.38	13.40	13.20	14.50
GPRS 3 Tx slots	17.23	17.31	17.31	18.00	12.97	13.05	13.05	13.74
GPRS 4 Tx slots	15.01	14.95	15.07	15.50	12.01	11.95	12.07	12.50
EDGE 1 Tx slot	16.90	16.91	16.92	17.50	7.90	7.91	7.92	8.50
EDGE 2 Tx slots	14.58	14.66	14.74	15.00	8.58	8.68	8.74	9.00
EDGE 3 Tx slots	11.75	11.86	11.75	13.00	7.49	7.60	7.49	8.74
EDGE 4 Tx slots	9.77	9.80	9.67	10.50	6.77	6.80	6.67	7.50

Band TX Channel Frequency (MHz)	WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	WCDMA V			Tune-up Limit (dBm)	
	9262	9400	9538		1312	1413	1513		4132	4182	4233		
	9662	9800	9938	14.50	1337	1638	1738	4357	4407	4458	23.00		
	1852.4	1858	1907.3	14.50	1722.4	1722.3	1723.3	32.4	33.4	34.6	23.00		
3GPP Rel 99	AMR 12.2Kbps	13.81	13.92	13.93	14.50	14.89	14.85	15.01	16.00	21.82	21.85	21.88	23.00
3GPP Rel 99	RM-C 12.2Kbps	13.83	13.94	13.96	14.50	14.92	14.88	15.04	16.00	21.85	21.87	21.90	23.00
3GPP Rel 6	HSDPA Subtest-1	12.91	12.97	12.83	13.50	13.71	13.58	14.03	15.00	20.94	20.95	20.96	22.00
3GPP Rel 6	HSDPA Subtest-2	12.99	12.99	12.85	13.50	13.72	13.56	14.03	15.00	20.90	20.93	21.00	22.00
3GPP Rel 6	HSDPA Subtest-3	12.51	12.52	12.36	13.00	13.17	13.05	13.48	14.50	20.44	20.46	20.52	21.50
3GPP Rel 6	HSDPA Subtest-4	12.43	12.46	12.32	13.00	13.20	13.07	13.46	14.50	20.44	20.40	20.16	21.50
3GPP Rel 8	DC-HSDPA Subtest-1	12.78	12.85	12.72	13.50	13.65	13.50	13.93	15.00	20.73	21.07	21.09	22.00
3GPP Rel 8	DC-HSDPA Subtest-2	12.96	12.88	12.73	13.50	13.66	13.48	13.90	15.00	20.75	21.03	21.13	22.00
3GPP Rel 8	DC-HSDPA Subtest-3	12.44	12.46	12.28	13.00	13.10	12.98	13.38	14.50	20.23	20.54	20.63	21.50
3GPP Rel 8	DC-HSDPA Subtest-4	12.37	12.39	12.26	13.00	13.12	12.99	13.37	14.50	20.19	20.56	20.65	21.50
3GPP Rel 6	HSUPA Subtest-1	12.62	12.68	12.75	13.50	13.70	13.63	13.96	15.00	21.12	21.15	21.19	22.00
3GPP Rel 6	HSUPA Subtest-2	10.71	10.85	10.98	11.50	11.73	11.65	11.93	13.00	19.15	19.10	19.15	20.00
3GPP Rel 6	HSUPA Subtest-3	11.61	11.72	11.85	12.50	12.72	12.64	12.90	14.00	20.10	19.97	20.12	21.00
3GPP Rel 6	HSUPA Subtest-4	10.68	10.74	10.83	11.50	11.66	11.56	11.87	13.00	19.14	19.16	19.23	20.00
3GPP Rel 6	HSUPA Subtest-5	12.80	12.80	12.90	13.50	13.65	13.55	13.85	15.00	21.10	21.10	21.20	22.00
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	10.21	10.26	10.35	11.00	11.17	11.08	11.25	12.50	18.79	18.84	18.88	19.50

Band TX Channel Frequency (MHz)	CDMA BC0			Tune-up Limit (dBm)	CDMA BC1			Tune-up Limit (dBm)	CDMA BC10			Tune-up Limit (dBm)
	1013	384	777		25	600	1175		476	580	684	
	224.7	33.32	845.31	24.00	14.83	15.03	15.00	23.00	23.02	23.05	24.00	
RC1 SO55	22.99	23.01	23.04	24.00	14.83	15.03	15.00	23.00	23.02	23.05	24.00	
RC3 SO55	22.97	22.99	23.00	24.00	14.79	15.01	14.98	15.50	23.01	23.01	23.04	24.00
RC3 SO32 (F+SCH)	22.95	22.97	22.99	24.00	14.83	14.99	14.97	15.50	23.03	23.03	23.04	24.00
RC3 SO32 (H+SCH)	22.94	22.94	22.97	24.00	14.80	14.97	14.96	15.50	23.01	23.00	22.97	24.00
RTAP 153.6Kbps	22.98	22.98	23.01	24.00	14.80	14.98	14.96	15.50	22.99	23.02	23.03	24.00
RETAP 4096Bits	22.97	22.93	22.97	24.00	14.78	14.96	14.95	15.50	22.98	22.95	23.03	24.00



Band 2 (1800MHz Band)										
Part 24E										
BW (MHz)	Modulation	RB Size	RB Offset	Low Ch. / Freq.	Middle Ch. / Freq.	Power High / Freq.	Tune-up limit (dBm)	MPR (dB)		
Channel										
Frequency (MHz)										
20	QPSK	1	0	13.70	13.87	13.89				
20	QPSK	1	49	13.72	13.92	13.72	14.5	0		
20	QPSK	1	99	13.64	13.77	13.70				
20	QPSK	50	0	13.70	13.90	13.70				
20	QPSK	50	24	13.68	13.83	13.69	14.5	0		
20	QPSK	50	50	13.62	13.78	13.61				
20	QPSK	100	0	13.68	13.86	13.89				
20	16QAM	1	0	13.82	13.87	13.90				
20	16QAM	1	49	13.79	13.87	13.81	14.5	0		
20	16QAM	1	99	13.75	13.84	13.75				
20	16QAM	50	0	13.90	13.91	13.79				
20	16QAM	50	24	13.82	13.81	13.78	14.5	0		
20	16QAM	50	50	13.87	13.81	13.85				
20	16QAM	100	0	13.89	13.73	13.77				
20	64QAM	1	0	13.87	13.89	13.88				
20	64QAM	1	49	13.74	13.78	13.54	14.5	0		
20	64QAM	1	99	13.72	13.87	13.82				
20	64QAM	50	0	13.81	13.73	13.72				
20	64QAM	50	24	13.89	13.75	13.76	14.5	0		
20	64QAM	50	50	13.87	13.88	13.86				
20	64QAM	100	0	13.83	13.73	13.80				
Channel										
Frequency (MHz)										
15	QPSK	1	0	13.51	13.69	13.60				
15	QPSK	1	37	13.58	13.90	13.68	14.5	0		
15	QPSK	1	74	13.50	13.78	13.67				
15	QPSK	36	0	13.66	13.85	13.55				
15	QPSK	36	20	13.48	13.62	13.44	14.5	0		
15	QPSK	36	39	13.50	13.57	13.61				
15	QPSK	75	0	13.71	13.64	13.70				
15	16QAM	1	0	13.74	13.90	13.91				
15	16QAM	1	37	13.62	13.91	13.48	14.5	0		
15	16QAM	1	74	13.63	13.89	13.68				
15	16QAM	36	0	13.86	13.84	13.78				
15	16QAM	36	20	13.72	13.56	13.78	14.5	0		
15	16QAM	36	39	13.72	13.71	13.81				
15	16QAM	75	0	13.81	13.54	13.53				
15	64QAM	1	0	13.66	13.63	13.43				
15	64QAM	1	37	13.57	13.60	13.40	14.5	0		
15	64QAM	1	74	13.53	13.81	13.72				
15	64QAM	36	0	13.64	13.73	13.70				
15	64QAM	36	20	13.69	13.66	13.67	14.5	0		
15	64QAM	36	39	13.65	13.72	13.65				
15	64QAM	75	0	13.82	13.69	13.75				
Channel										
Frequency (MHz)										
10	QPSK	1	0	13.56	13.63	13.61				
10	QPSK	1	25	13.50	13.80	13.73	14.5	0		
10	QPSK	1	49	13.64	13.79	13.74				
10	QPSK	25	0	13.64	13.74	13.54				
10	QPSK	25	12	13.62	13.68	13.66	14.5	0		
10	QPSK	25	25	13.60	13.71	13.64				
10	QPSK	50	0	13.69	13.75	13.55				
10	16QAM	1	0	13.61	13.65	13.70				
10	16QAM	1	25	13.58	13.90	13.56	14.5	0		
10	16QAM	1	49	13.50	13.60	13.64				
10	16QAM	25	0	13.85	13.84	13.82				
10	16QAM	25	12	13.75	13.73	13.69	14.5	0		
10	16QAM	25	25	13.89	13.78	13.88				
10	16QAM	50	0	13.65	13.62	13.62				
10	64QAM	1	0	13.78	13.73	13.38				
10	64QAM	1	25	13.78	13.69	13.30	14.5	0		
10	64QAM	1	49	13.48	13.70	13.84				
10	64QAM	25	0	13.71	13.69	13.77				
10	64QAM	25	12	13.88	13.57	13.71	14.5	0		
10	64QAM	25	25	13.90	13.75	13.91				
10	64QAM	50	0	13.76	13.67	13.63				
Channel										
Frequency (MHz)										
5	QPSK	1	0	13.52	13.66	13.67				
5	QPSK	1	12	13.59	13.70	13.54	14.5	0		
5	QPSK	1	24	13.51	13.61	13.71				
5	QPSK	12	0	13.45	13.90	13.56				
5	QPSK	12	7	13.65	13.70	13.53	14.5	0		
5	QPSK	12	13	13.60	13.75	13.64				
5	QPSK	25	0	13.67	13.68	13.65				
5	16QAM	1	0	13.79	13.71	13.90				
5	16QAM	1	12	13.61	13.65	13.64	14.5	0		
5	16QAM	1	24	13.59	13.73	13.66				
5	16QAM	12	0	13.90	13.75	13.55				
5	16QAM	12	7	13.76	13.85	13.78	14.5	0		
5	16QAM	12	13	13.78	13.66	13.83				
5	16QAM	25	0	13.88	13.72	13.81				
5	64QAM	1	0	13.82	13.52	13.45				
5	64QAM	1	12	13.74	13.78	13.42	14.5	0		
5	64QAM	1	24	13.87	13.67	13.74				
5	64QAM	12	0	13.77	13.65	13.48				
5	64QAM	12	7	13.69	13.59	13.61	14.5	0		
5	64QAM	12	13	13.66	13.79	13.73				
5	64QAM	25	0	13.59	13.60	13.87				
Channel										
Frequency (MHz)										
3	QPSK	1	0	13.73	13.85	13.54				
3	QPSK	1	8	13.73	13.90	13.67	14.5	0		
3	QPSK	1	14	13.62	13.53	13.69				
3	QPSK	8	0	13.58	13.90	13.50				
3	QPSK	8	4	13.48	13.69	13.58	14.5	0		
3	QPSK	8	7	13.59	13.61	13.48				
3	QPSK	15	0	13.70	13.66	13.72				
3	16QAM	1	0	13.57	13.68	13.75				
3	16QAM	1	8	13.69	13.90	13.59	14.5	0		
3	16QAM	1	14	13.70	13.72	13.71				
3	16QAM	8	0	13.69	13.81	13.72				
3	16QAM	8	4	13.71	13.65	13.61	14.5	0		
3	16QAM	8	7	13.87	13.62	13.67				
3	16QAM	15	0	13.82	13.66	13.82				
3	64QAM	1	0	13.78	13.60	13.50				
3	64QAM	1	8	13.51	13.70	13.31	14.5	0		
3	64QAM	1	14	13.66	13.81	13.79				
3	64QAM	8	0	13.78	13.55	13.77				
3	64QAM	8	4	13.71	13.79	13.63	14.5	0		
3	64QAM	8	7	13.77	13.68	13.65				
3	64QAM	15	0	13.84	13.64	13.74				
Channel										
Frequency (MHz)										
1.4	QPSK	1	0	13.55	13.64	13.72				
1.4	QPSK	1	3	13.57	13.90	13.55	14.5	0		
1.4	QPSK	1	5	13.66	13.63	13.62				
1.4	QPSK	3	0	13.71	13.90	13.57				
1.4	QPSK	3	1	13.65	13.76	13.55				
1.4	QPSK	3	3	13.66	13.69	13.41	14.5	0		
1.4	QPSK	3	5	13.78	13.78	13.44				
1.4	16QAM	1	0	13.70	13.76	13.90				
1.4	16QAM	1	3	13.72	13.86	13.66				
1.4	16QAM	1	5	13.76	13.80	13.54	14.5	0		
1.4	16QAM	3	0	13.65	13.91	13.59				
1.4	16QAM	3	1	13.65	13.86	13.71				
1.4	16QAM	3	3	13.80	13.74	13.79				
1.4	16QAM	3	5	13.85	13.62	13.73	14.5	0		
1.4	64QAM	1	0	13.81	13.52	13.60				
1.4	64QAM	1	3	13.50	13.68	13.51				
1.4	64QAM	1	5	13.68	13.66	13.77				
1.4	64QAM	3	0	13.73	13.70	13.51	14.5	0		
1.4	64QAM	3	1	13.72	13.67	13.65				
1.4	64QAM	3	3	13.84	13.67	13.79				
1.4	64QAM	6	0	13.69	13.67	13.75	14.5	0		



Band 7 (2600MHz Band)											
Part 27											
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)			
Channel				20850	21100	21350					
Frequency (MHz)				2510	2535	2560					
20	QPSK	1	0	19.65	19.50	19.68					
20	QPSK	1	49	19.70	19.59	19.72	21	0			
20	QPSK	1	99	19.72	19.61	19.80					
20	QPSK	50	0	19.67	19.56	19.73					
20	QPSK	50	24	19.70	19.60	19.78	21	0			
20	QPSK	50	50	19.65	19.56	19.70					
20	16QAM	100	0	19.58	19.50	19.75					
20	16QAM	1	0	19.78	19.78	19.78					
20	16QAM	1	49	19.77	19.73	19.77	21	0			
20	16QAM	1	99	19.49	19.74	19.79					
20	16QAM	50	0	19.57	19.56	19.29					
20	16QAM	50	24	19.67	19.66	19.67	21	0			
20	16QAM	50	50	19.62	19.65	19.67					
20	16QAM	100	0	19.62	19.57	19.63					
20	84QAM	1	0	19.84	19.81	19.50					
20	84QAM	1	49	19.59	19.46	19.56	21	0			
20	84QAM	1	99	19.52	19.52	19.33					
20	84QAM	50	0	19.63	19.60	19.65					
20	84QAM	50	24	19.72	19.60	19.62	21	0			
20	84QAM	50	50	19.65	19.65	19.65					
20	84QAM	100	0	19.64	19.57	19.56					
Channel				20825	21100	21375					
Frequency (MHz)				2507.5	2535	2562.5					
15	QPSK	1	0	19.54	19.30	19.57					
15	QPSK	1	37	19.46	19.46	19.77	21	0			
15	QPSK	1	74	19.59	19.48	19.69					
15	QPSK	36	0	19.65	19.32	19.53					
15	QPSK	36	20	19.68	19.38	19.78	21	0			
15	QPSK	36	39	19.42	19.57	19.74					
15	QPSK	75	0	19.55	19.49	19.78					
15	16QAM	1	0	19.73	19.71	19.60					
15	16QAM	1	37	19.63	19.75	19.61	21	0			
15	16QAM	1	74	19.43	19.71	19.79					
15	16QAM	36	0	19.55	19.35	19.31					
15	16QAM	36	20	19.65	19.63	19.59	21	0			
15	16QAM	36	39	19.40	19.70	19.58					
15	16QAM	75	0	19.44	19.48	19.65					
15	84QAM	1	0	19.54	19.63	19.45					
15	84QAM	1	37	19.53	19.32	19.59	21	0			
15	84QAM	1	74	19.36	19.39	19.15					
15	84QAM	36	0	19.67	19.48	19.55					
15	84QAM	36	20	19.62	19.62	19.59	21	0			
15	84QAM	36	39	19.44	19.57	19.57					
15	84QAM	75	0	19.49	19.61	19.35					
Channel				20800	21100	21400					
Frequency (MHz)				2505	2535	2565					
10	QPSK	1	0	19.42	19.41	19.70					
10	QPSK	1	25	19.70	19.57	19.70	21	0			
10	QPSK	1	49	19.53	19.47	19.56					
10	QPSK	25	0	19.53	19.44	19.70					
10	QPSK	25	12	19.66	19.55	19.77	21	0			
10	QPSK	25	25	19.61	19.35	19.60					
10	QPSK	50	0	19.68	19.33	19.59					
10	16QAM	1	0	19.72	19.56	19.78					
10	16QAM	1	25	19.61	19.53	19.62	21	0			
10	16QAM	1	49	19.36	19.50	19.67					
10	16QAM	25	0	19.60	19.40	19.27					
10	16QAM	25	12	19.58	19.57	19.42	21	0			
10	16QAM	25	25	19.57	19.47	19.52					
10	16QAM	50	0	19.42	19.61	19.46					
10	84QAM	1	0	19.55	19.55	19.26					
10	84QAM	1	25	19.34	19.31	19.35	21	0			
10	84QAM	1	49	19.30	19.40	19.25					
10	84QAM	25	0	19.39	19.45	19.62					
10	84QAM	25	12	19.49	19.57	19.45	21	0			
10	84QAM	25	25	19.59	19.55	19.63					
10	84QAM	50	0	19.56	19.33	19.47					
Channel				20775	21100	21425					
Frequency (MHz)				2502.5	2535	2567.5					
5	QPSK	1	0	19.43	19.40	19.70					
5	QPSK	1	12	19.62	19.62	19.74	21	0			
5	QPSK	1	24	19.63	19.66	19.56					
5	QPSK	12	0	19.44	19.34	19.74					
5	QPSK	12	7	19.64	19.49	19.70	21	0			
5	QPSK	12	13	19.54	19.59	19.47					
5	QPSK	25	0	19.57	19.62	19.74					
5	16QAM	1	0	19.77	19.64	19.70	21	0			
5	16QAM	1	12	19.72	19.49	19.52					
5	16QAM	1	24	19.46	19.65	19.69					
5	16QAM	12	0	19.32	19.35	19.29					
5	16QAM	12	7	19.56	19.44	19.56	21	0			
5	16QAM	12	13	19.63	19.69	19.52					
5	16QAM	25	0	19.45	19.45	19.43					
5	84QAM	1	0	19.63	19.44	19.48					
5	84QAM	1	12	19.41	19.35	19.35	21	0			
5	84QAM	1	24	19.55	19.34	19.27					
5	84QAM	12	0	19.40	19.37	19.46					
5	84QAM	12	7	19.63	19.50	19.62	21	0			
5	84QAM	12	13	19.53	19.57	19.66					
5	84QAM	25	0	19.39	19.58	19.41					

Band 14 (700MHz Band)											
Part 23											
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)			
Channel				23300	23300	23300					
Frequency (MHz)				793							
10	QPSK	1	0		22.09						
10	QPSK	1	25		22.14		23.5	0			
10	QPSK	1	49		22.20						
10	QPSK	25	0		21.74						
10	QPSK	25	12		21.72		23	0.5			
10	QPSK	25	25		21.70						
10	16QAM	50	0		21.74						
10	16QAM	1	0		21.81						
10	16QAM	1	25		21.85		23	0.5			
10	16QAM	1	49		21.90						
10	16QAM	25	0		20.70						
10	16QAM	25	12		20.76		22	1.5			
10	16QAM	25	25		20.69						
10	16QAM	50	0		20.72						
10	84QAM	1	0		20.80						
10	84QAM	1	25		20.82		22	1.5			
10	84QAM	1	49		20.85						
10	84QAM	25	0		19.73						
10	84QAM	25	12		19.75		21	2.5			
10	84QAM	25	25		19.75						
10	84QAM	50	0		19.74						
Channel				23305	23300	23355					
Frequency (MHz)				790.5	793	795.5					
5	QPSK	1	0	22.13	22.01	22.02					
5	QPSK	1	12	22.02	22.07	21.97	23.5	0			
5	QPSK	1	24	22.04	22.05	22.15					
5	QPSK	12	0	21.78	21.71	21.51					
5	QPSK	12	7	21.65	21.74	21.55	23	0.5			
5	QPSK	12	13	21.67	21.63	21.55					
5	QPSK	25	0	21.69	21.69	21.69					
5	16QAM	1	0	21.64	21.63	21.83					
5	16QAM	1	12	21.67	21.65	21.88	23	0.5			
5	16QAM	1	24	21.90	21.85	21.86					
5	16QAM	12	0	20.60	20.66	20.68					
5	16QAM	12	7	20.67	20.64	20.68					
5	16QAM	12	13	20.52	20.70	20.71	22	1.5			
5	16QAM	25	0	20.62	20.71	20.56					
5	84QAM	1	0	20.55	20.70	20.85					
5	84QAM	1	12	20.72							



Band 26 for FCC (only on channel required)										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)		
Channel				26765	26865	26965				
Frequency (MHz)				821.5	831.5	841.5				
15	QPSK	1	0	21.83	21.85	21.95				
15	QPSK	1	37	21.84	21.88	21.96	23	0		
15	QPSK	1	74	21.80	21.83	21.93				
15	QPSK	36	0	21.77	21.82	21.87				
15	QPSK	36	20	21.82	21.86	21.94	23	0		
15	QPSK	36	39	21.78	21.80	21.88				
15	16QAM	75	0	21.80	21.85	21.91				
15	16QAM	1	0	21.81	21.85	21.92				
15	16QAM	1	37	21.86	21.82	21.81	23	0		
15	16QAM	1	74	21.86	21.87	21.75				
15	16QAM	36	0	21.08	21.17	21.03				
15	16QAM	36	20	21.06	21.15	20.98				
15	16QAM	36	39	21.19	21.05	21.18				
15	16QAM	75	0	21.21	21.19	21.08				
15	64QAM	1	0	21.22	20.98	21.28				
15	64QAM	1	37	21.27	21.11	21.23	22	1		
15	64QAM	1	74	21.09	21.04	21.38				
15	64QAM	36	0	20.09	20.15	20.09				
15	64QAM	36	20	20.12	20.26	20.05				
15	64QAM	36	39	20.18	20.06	20.21				
15	64QAM	75	0	20.27	20.16	20.10				
Channel				26740	26855	26990				
Frequency (MHz)				819	831.5	844				
10	QPSK	1	0	21.87	21.81	21.87				
10	QPSK	1	25	21.79	21.81	21.85	23	0		
10	QPSK	1	49	21.83	21.88	21.90				
10	QPSK	25	0	21.89	21.82	21.81				
10	QPSK	25	12	21.87	21.83	21.73				
10	QPSK	25	25	21.87	21.85	21.87	23	0		
10	QPSK	50	0	21.81	21.71	21.89				
10	16QAM	1	0	21.63	21.73	21.73				
10	16QAM	1	25	21.89	21.62	21.58	23	0		
10	16QAM	1	49	21.82	21.86	21.87				
10	16QAM	25	0	21.08	21.20	21.04				
10	16QAM	25	12	20.83	21.19	20.87				
10	16QAM	25	25	21.06	20.92	21.14				
10	16QAM	50	0	21.08	21.19	20.99				
10	64QAM	1	0	21.04	20.98	21.16				
10	64QAM	1	25	21.01	21.07	21.23	22	1		
10	64QAM	1	49	21.05	20.86	21.16				
10	64QAM	25	12	20.03	20.20	20.08				
10	64QAM	25	12	19.99	20.19	20.09				
10	64QAM	25	25	20.10	20.03	20.11				
10	64QAM	50	0	20.28	20.21	20.14	21	2		
Channel				26715	26865	27015				
Frequency (MHz)				816.5	831.5	846.5				
5	QPSK	1	0	21.87	21.87	21.87				
5	QPSK	1	12	21.87	21.82	21.91	23	0		
5	QPSK	1	24	21.81	21.83	21.89				
5	QPSK	12	0	21.88	21.60	21.90				
5	QPSK	12	7	21.89	21.76	21.94				
5	QPSK	12	13	21.89	21.83	21.88	23	0		
5	QPSK	25	0	21.81	21.79	21.89				
5	16QAM	1	0	21.70	21.72	21.90				
5	16QAM	1	12	21.91	21.81	21.77	23	0		
5	16QAM	1	24	21.82	21.85	21.68				
5	16QAM	12	0	21.02	20.97	20.87				
5	16QAM	12	7	20.86	21.07	20.74				
5	16QAM	12	13	21.01	21.02	21.08	22	1		
5	16QAM	25	0	21.30	21.04	21.07				
5	64QAM	1	0	21.01	20.87	21.27				
5	64QAM	1	12	21.17	20.91	21.15	22	1		
5	64QAM	1	24	21.01	20.82	21.29				
5	64QAM	12	0	19.84	20.03	19.87				
5	64QAM	12	7	19.91	20.15	19.96				
5	64QAM	12	13	20.18	19.86	20.23				
5	64QAM	25	0	20.09	20.01	19.90	21	2		
Channel				26705	26865	27025				
Frequency (MHz)				815.5	831.5	847.5				
3	QPSK	1	0	21.80	21.85	21.73				
3	QPSK	1	8	21.77	21.84	21.76	23	0		
3	QPSK	1	14	21.82	21.78	21.93				
3	QPSK	8	0	21.80	21.86	21.86				
3	QPSK	8	4	21.80	21.71	21.92	23	0		
3	QPSK	8	7	21.86	21.70	21.78				
3	QPSK	15	0	21.56	21.69	21.68				
3	16QAM	1	0	21.73	21.83	21.71				
3	16QAM	1	8	21.81	21.73	21.72	23	0		
3	16QAM	1	14	21.85	21.69	21.56				
3	16QAM	8	0	20.87	21.07	20.78				
3	16QAM	8	4	20.87	21.19	20.77				
3	16QAM	8	7	21.23	20.88	20.98	22	1		
3	16QAM	15	0	21.10	21.06	21.01				
3	64QAM	1	0	20.98	20.92	21.05				
3	64QAM	1	8	20.98	21.14	21.01	22	1		
3	64QAM	1	14	21.11	21.07	21.27				
3	64QAM	8	0	20.07	19.90	20.10				
3	64QAM	8	4	20.00	20.02	19.82				
3	64QAM	8	7	20.22	19.92	20.23	21	2		
3	64QAM	15	0	20.28	20.14	20.11				
Channel				26697	26865	27033				
Frequency (MHz)				814.7	831.5	848.3				
1.4	QPSK	1	0	21.64	21.85	21.91				
1.4	QPSK	1	3	21.76	21.66	21.92	23	0		
1.4	QPSK	1	5	21.80	21.74	21.86				
1.4	QPSK	3	0	21.89	21.85	21.92				
1.4	QPSK	3	1	21.83	21.87	21.85				
1.4	QPSK	3	3	21.93	21.63	21.79				
1.4	QPSK	6	0	21.83	21.85	21.83	23	0		
1.4	16QAM	1	0	21.71	21.60	21.70				
1.4	16QAM	1	3	21.76	21.74	21.79				
1.4	16QAM	1	5	21.73	21.80	21.69	23	0		
1.4	16QAM	3	0	21.58	21.83	21.83				
1.4	16QAM	3	1	21.83	21.74	21.87				
1.4	16QAM	3	3	21.86	21.75	21.77				
1.4	64QAM	1	0	20.98	20.18	21.01	22	1		
1.4	64QAM	1	3	21.09	21.05	21.27				
1.4	64QAM	1	5	21.00	21.08	21.24				
1.4	64QAM	3	0	21.00	20.74	21.10				
1.4	64QAM	3	1	21.17	20.99	21.01				
1.4	64QAM	3	3	20.90	20.82	21.14				
1.4	64QAM	6	0	20.04	20.11	19.94	21	2		

Band 66										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)		
Channel				132072	132322	132572				
Frequency (MHz)				1720	1745	1770				
20	QPSK	1	0	15.50	15.50	15.66				
20	QPSK	1	49	15.60	15.46	15.56	17	0		
20	QPSK	1	99	15.67	15.54	15.72				
20	QPSK	50	0	15.59	15.50	15.68				
20	QPSK	50	24	15.47	15.46	15.56	17	0		
20	QPSK	50	50	15.65	15.52	15.70				
20	16QAM	100	0	15.62	15.50	15.62				
20	16QAM	1	0	15.81	15.69	15.67				
20	16QAM	1	49	15.63	15.68	15.46	17	0		
20	16QAM	1	99	15.55	15.50	15.42				
20	16QAM	50	0	15.53	15.56	15.47				
20	16QAM	50	24	15.54	15.55	15.41				
20	16QAM	50	50	15.53	15.57	15.48				
20	16QAM	100	0	15.47	15.52	15.41				
20	64QAM	1	0	15.39	15.32					



Band 3(only on channel required)										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch / Freq	Power Mid Ch / Freq	Power High Ch / Freq	Power Hgt Ch / Freq	Tune-up Int (min)	MPR (dB)	
Channel										
Frequency (MHz)										
30	QPSK	1	0	20.78	20.82	20.70		22	0	
30	QPSK	1	49	20.79	20.89	20.74				
30	QPSK	1	99	20.81	20.91	20.84				
30	QPSK	50	0	20.82	20.88	20.80				
30	QPSK	50	24	20.88	20.80	20.78				
30	QPSK	50	50	20.88	20.78	20.78		22	0	
30	QPSK	100	0	20.93	20.88	20.77				
30	QPSK	1	0	20.85	20.83	20.88				
30	QPSK	1	49	20.96	20.89	20.86				
30	QPSK	1	99	20.92	20.95	20.93				
30	QPSK	50	0	20.96	20.88	20.86				
30	QPSK	50	24	20.91	20.87	20.93				
30	QPSK	50	50	20.91	20.87	20.93		22	0	
30	QPSK	100	0	20.94	20.84	20.81				
30	QPSK	100	0	20.98	20.92	20.91				
30	QPSK	1	0	20.87	20.87	20.81				
30	QPSK	1	49	20.87	20.83	20.70				
30	QPSK	1	99	20.76	20.73	20.72				
30	QPSK	50	0	19.94	19.92	19.85				
30	QPSK	50	24	19.94	19.80	19.81				
30	QPSK	50	50	19.92	19.89	19.95		21	1	
30	QPSK	100	0	19.97	19.93	19.98				
Channel										
Frequency (MHz)										
15	QPSK	1	0	20.73	20.76	20.63		22	0	
15	QPSK	1	49	20.73	20.73	20.64				
15	QPSK	1	99	20.63	20.79	20.64				
15	QPSK	36	0	20.70	20.87	20.80				
15	QPSK	36	20	20.69	20.89	20.86				
15	QPSK	36	36	20.82	20.87	20.73		22	0	
15	QPSK	79	0	20.64	20.87	20.74				
15	QPSK	79	20	20.69	20.81	20.66				
15	QPSK	1	37	20.89	20.84	20.90				
15	QPSK	1	74	20.73	20.79	20.91				
15	QPSK	36	0	20.68	20.86	20.86				
15	QPSK	36	20	20.68	20.86	20.76		22	0	
15	QPSK	79	0	20.65	20.88	20.82				
15	QPSK	79	20	20.67	20.83	20.90				
15	QPSK	1	37	20.87	20.82	20.91				
15	QPSK	1	74	20.52	20.62	20.51		22	0	
15	QPSK	36	0	19.70	19.85	19.82				
15	QPSK	36	20	19.83	19.87	19.81				
15	QPSK	36	36	19.79	19.81	19.95		21	1	
15	QPSK	79	0	19.85	19.79	19.86				
Channel										
Frequency (MHz)										
10	QPSK	1	0	20.67	20.67	20.65		22	0	
10	QPSK	1	25	20.78	20.53	20.65				
10	QPSK	1	49	20.85	20.61	20.82				
10	QPSK	25	0	20.61	20.68	20.64				
10	QPSK	25	12	20.69	20.76	20.72				
10	QPSK	25	25	20.67	20.77	20.85		22	0	
10	QPSK	50	0	20.68	20.65	20.65				
10	QPSK	1	0	20.67	20.72	20.86				
10	QPSK	1	25	20.64	20.68	20.81				
10	QPSK	1	49	20.64	20.68	20.81				
10	QPSK	25	0	20.63	20.76	20.86				
10	QPSK	25	12	20.66	20.67	20.80				
10	QPSK	25	25	20.74	20.80	20.90		22	0	
10	QPSK	50	0	20.84	20.86	20.77				
10	QPSK	1	0	20.46	20.70	20.68				
10	QPSK	1	25	20.64	20.65	20.46				
10	QPSK	1	49	20.56	20.66	20.66				
10	QPSK	25	0	19.96	19.92	19.84				
10	QPSK	25	12	19.77	19.88	19.92		21	1	
10	QPSK	25	25	19.90	19.79	19.86				
10	QPSK	50	0	19.89	19.89	20.00				
Channel										
Frequency (MHz)										
5	QPSK	1	0	20.63	20.69	20.66		22	0	
5	QPSK	1	12	20.80	20.56	20.56				
5	QPSK	1	24	20.84	20.71	20.77				
5	QPSK	12	0	20.68	20.75	20.79				
5	QPSK	12	7	20.91	20.67	20.70				
5	QPSK	12	13	20.65	20.68	20.83		22	0	
5	QPSK	25	0	20.87	20.72	20.70				
5	QPSK	1	0	20.70	20.79	20.71				
5	QPSK	12	7	20.69	20.60	20.70				
5	QPSK	12	13	20.58	20.62	20.87				
5	QPSK	25	0	20.80	20.65	20.69				
5	QPSK	1	0	20.58	20.52	20.53		22	0	
5	QPSK	1	12	20.61	20.46	20.46				
5	QPSK	1	24	20.66	20.60	20.60				
5	QPSK	12	0	19.82	19.75	19.82				
5	QPSK	12	7	19.89	19.86	19.77		21	1	
5	QPSK	12	13	19.85	19.85	19.85				
5	QPSK	25	0	19.96	19.87	19.98				

Band 41 (2.6G Band-PCC3)										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch / Freq	Power Mid Ch / Freq	Power High Ch / Freq	Power Hgt Ch / Freq	Tune-up Int (min)	MPR (dB)	
Channel										
Frequency (MHz)										
30	QPSK	1	0	22.09	21.98	21.90	22.15	22.20	23	0
30	QPSK	1	49	21.79	21.87	21.88	21.89	22.00		
30	QPSK	1	99	21.98	21.90	21.85	21.88	21.93		
30	QPSK	50	0	21.35	21.28	21.42	21.37	21.53		
30	QPSK	50	24	21.52	21.46	21.57	21.49	21.87		
30	QPSK	50	50	21.52	21.33	21.56	21.37	21.47	23	0
30	QPSK	100	0	21.50	21.44	21.55	21.48	21.65		
30	QPSK	1	0	21.47	21.46	21.56	21.46	21.94		
30	QPSK	1	49	21.35	21.36	21.53	21.63	21.57		
30	QPSK	1	99	21.38	21.45	21.55	21.60	21.45		
30	QPSK	50	0	20.39	20.50	20.44	20.49	20.58		
30	QPSK	50	24	20.50	20.41	20.59	20.51	20.61		
30	QPSK	50	50	20.38	20.42	20.59	20.56	20.44		
30	QPSK	100	0	20.45	20.36	20.56	20.48	20.54		
30	QPSK	1	0	21.19	21.19	21.27	21.30	21.37		
30	QPSK	1	49	21.08	21.15	21.20	21.28	21.32		
30	QPSK	1	99	21.15	21.15	21.07	21.37	21.19		
30	QPSK	50	0	20.33	20.31	20.45	20.48	20.51		
30	QPSK	50	24	20.43	20.38	20.54	20.55	20.52		
30	QPSK	50	50	20.32	20.34	20.49	20.52	20.40		
30	QPSK	100	0	20.50	20.37	20.60	20.52	20.50	21	2
Channel										
Frequency (MHz)										
15	QPSK	1	0	21.81	21.80	21.93	21.79	21.95	23	0
15	QPSK	1	37	21.74	21.84	21.83	21.82	21.92		
15	QPSK	1	74	21.74	21.78	21.92	21.92	21.71		
15	QPSK	36	0	21.38	21.23	21.36	21.33	21.47		
15	QPSK	36	20	21.53	21.46	21.56	21.48	21.60		
15	QPSK	36	36	21.38	21.37	21.59	21.38	21.44	23	0
15	QPSK	79	0	21.48	21.45	21.49	21.52	21.83		
15	QPSK	79	20	21.49	21.51	21.07	21.61	21.69		
15	QPSK	1	37	21.30	21.36	21.60	21.61	21.59		
15	QPSK	1	74	21.31	21.32	21.47	21.38	21.41		
15	QPSK	36	0	20.35	20.35	20.49	20.48	20.53		
15	QPSK	36	20	20.45	20.35	20.54	20.62	20.55		
15	QPSK	79	0	20.38	20.42	20.59	20.56	20.44		
15	QPSK	79	20	20.35	20.43	20.65	20.46	20.57	22	1
15	QPSK	1	0	21.21	21.15	21.34	21.24	21.37		
15	QPSK	1	37	21.03	21.03	21.22	21.24	21.37		
15	QPSK	1	74	21.14	21.22	21.22	21.34	21.37		
15	QPSK	36	0	20.38	20.25	20.48	20.46	20.49		
15	QPSK	36	20	20.42	20.36	20.58	20.53	20.49		



Reduced Power Mode for Handheld On

	Sms-Average Power (dBm)			Tune-up Limit (dBm)	Frame-Average Power (dBm)			Tune-up Limit (dBm)
	512	661	810		512	661	810	
CSM1900								
TX Channel	1850.2	1880	1909.8	27.00	1850.2	1880	1909.8	18.00
Frequency (MHz)	26.08	26.20	26.23	27.00	17.08	17.20	17.23	18.00
GSM 1 Tx slot	26.05	26.17	26.21	27.00	17.05	17.17	17.21	18.00
GPRS 1 Tx slot	24.41	24.48	24.43	26.00	18.41	18.48	18.43	20.00
GPRS 2 Tx slots	22.63	22.71	22.73	23.50	18.37	18.45	18.47	19.24
GPRS 3 Tx slots	20.22	20.35	20.33	21.00	17.22	17.35	17.33	18.00
GPRS 4 Tx slots	21.82	21.92	21.83	23.00	12.82	12.92	12.83	14.00
EDGE 1 Tx slot	19.53	19.64	19.53	20.50	13.53	13.64	13.53	14.50
EDGE 2 Tx slots	17.17	17.07	17.06	18.50	12.91	12.81	12.80	14.24
EDGE 3 Tx slots	14.64	14.72	14.73	16.00	11.64	11.72	11.73	13.00
EDGE 4 Tx slots								

Band	WCDMA II			Tune-up Limit (dBm)	WCDMA IV			Tune-up Limit (dBm)	
	TX Channel	9262	9400		9538	TX Channel	1312		1419
Rx Channel	9662	9800	9938		1537	1638	1738		
Frequency (MHz)	1852.4	1880	1907.6		1712.4	1732.6	1752.6		
3GPP Rel 99	AMR 12.2Kbps	18.88	18.92	18.96	19.50	19.25	19.20	19.35	20.50
3GPP Rel 99	RMC 12.2Kbps	18.90	18.95	18.99	19.50	19.27	19.20	19.37	20.50
3GPP Rel 6	HSDPA Subtest-1	17.93	17.84	17.96	18.50	17.98	17.82	17.99	19.50
3GPP Rel 6	HSDPA Subtest-2	17.98	17.80	17.98	18.50	17.97	17.91	17.88	19.50
3GPP Rel 6	HSDPA Subtest-3	17.46	17.38	17.47	18.00	17.32	17.33	17.51	19.00
3GPP Rel 6	HSDPA Subtest-4	17.49	17.35	17.51	18.00	17.40	17.35	17.41	19.00
3GPP Rel 8	DC-HSDPA Subtest-1	17.85	17.77	17.87	18.50	17.82	17.76	17.86	19.50
3GPP Rel 8	DC-HSDPA Subtest-2	17.91	17.75	17.90	18.50	17.82	17.84	17.83	19.50
3GPP Rel 8	DC-HSDPA Subtest-3	17.38	17.25	17.40	18.00	17.27	17.14	17.39	19.00
3GPP Rel 8	DC-HSDPA Subtest-4	17.38	17.27	17.42	18.00	17.30	17.14	17.35	19.00
3GPP Rel 6	HSUPA Subtest-1	17.93	17.84	18.01	18.50	17.97	17.85	18.04	19.50
3GPP Rel 6	HSUPA Subtest-2	16.00	15.90	15.96	16.50	15.92	15.99	16.12	17.50
3GPP Rel 6	HSUPA Subtest-3	16.97	16.88	17.01	17.50	16.91	16.76	17.04	18.50
3GPP Rel 6	HSUPA Subtest-4	15.94	15.83	16.01	16.50	15.87	15.85	15.94	17.50
3GPP Rel 6	HSUPA Subtest-5	18.00	17.90	18.00	18.50	17.80	17.90	17.90	19.50
3GPP Rel 7	HSPA+ (16QAM) Subtest-1	15.52	15.47	15.63	16.00	15.42	15.38	15.51	17.00

Band	CDMA BC0			Tune-up Limit (dBm)	CDMA BC1			Tune-up Limit (dBm)
	TX Channel	1013	384		777	TX Channel	25	
Frequency (MHz)	824.7	836.52	848.31		1851.25	1880	1902.72	
RC1 SO55					19.55	19.69	19.60	20.00
RC3 SO55					19.54	19.57	19.58	20.00
RC3 SO32 (F+SCH)					19.52	19.61	19.54	20.00
RC3 SO32 (+SCH)					19.55	19.57	19.57	20.00
RTAP 153.6Kbps					19.53	19.60	19.59	20.00
RETAP 4996bits					19.52	19.59	19.58	20.00



Band 2 (1900MHz Band)										
Part 24E										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch./Freq. (1850)	Power Middle Ch./Freq. (1875)	Power High Ch./Freq. (1900)	Tune-up limit (dBm)	MPR (dB)		
Channel				1850	1875	1900				
Frequency (MHz)				1850	1875	1900				
20	QPSK	1	0	18.15	18.32	18.32				
20	QPSK	1	49	18.21	18.39	18.34	19.5	0		
20	QPSK	1	99	18.16	18.18	18.30				
20	QPSK	50	0	18.19	18.36	18.32				
20	QPSK	50	24	18.11	18.32	18.31	19.5	0		
20	QPSK	50	50	18.17	18.28	18.30				
20	QPSK	100	0	18.16	18.33	18.30				
20	16QAM	1	0	18.25	18.38	18.10				
20	16QAM	1	49	18.36	18.33	18.27	19.5	0		
20	16QAM	1	99	18.28	18.17	18.16				
20	16QAM	50	0	18.14	18.25	18.12				
20	16QAM	50	24	18.16	18.28	18.16	19.5	0		
20	16QAM	50	50	18.18	18.25	18.13				
20	16QAM	100	0	18.20	18.21	18.16				
20	64QAM	1	0	17.82	18.25	18.11				
20	64QAM	1	49	17.91	18.16	18.18	19.5	0		
20	64QAM	1	99	17.83	18.04	18.23				
20	64QAM	50	0	18.22	18.27	18.17				
20	64QAM	50	24	18.09	18.19	18.25	19.5	0		
20	64QAM	50	50	18.22	18.17	18.15				
20	64QAM	100	0	18.25	18.16	18.10				
Channel				1867.5	1890	1912.5	Tune-up limit (dBm)	MPR (dB)		
Frequency (MHz)				1867.5	1890	1912.5				
15	QPSK	1	0	18.05	18.14	18.23				
15	QPSK	1	37	18.03	18.26	18.13	19.5	0		
15	QPSK	1	74	17.96	18.17	18.34				
15	QPSK	36	0	18.21	18.20	18.17				
15	QPSK	36	20	18.02	18.09	18.27	19.5	0		
15	QPSK	36	39	18.10	18.06	18.24				
15	QPSK	75	0	18.18	18.21	18.11				
15	16QAM	1	0	18.23	18.28	18.01				
15	16QAM	1	37	18.23	18.12	18.15	19.5	0		
15	16QAM	1	74	17.92	18.03	18.15				
15	16QAM	36	0	17.90	18.16	18.07				
15	16QAM	36	20	18.14	18.14	18.07	19.5	0		
15	16QAM	36	39	18.01	18.28	17.99				
15	16QAM	75	0	18.21	18.10	18.13				
15	64QAM	1	0	17.87	18.04	18.04				
15	64QAM	1	37	17.75	18.03	18.02	19.5	0		
15	64QAM	1	74	17.71	17.99	18.19				
15	64QAM	36	0	18.06	18.16	18.14				
15	64QAM	36	20	18.00	18.04	18.26	19.5	0		
15	64QAM	36	39	18.20	18.00	17.97				
15	64QAM	75	0	18.25	18.03	18.05				
Channel				1865.0	1890.0	1915.0	Tune-up limit (dBm)	MPR (dB)		
Frequency (MHz)				1865.0	1890.0	1915.0				
10	QPSK	1	0	18.01	18.26	18.30				
10	QPSK	1	25	18.04	18.36	18.20	19.5	0		
10	QPSK	1	49	18.14	17.94	18.22				
10	QPSK	25	0	18.01	18.30	18.29				
10	QPSK	25	12	18.05	18.16	18.16	19.5	0		
10	QPSK	25	25	18.14	18.19	18.34				
10	QPSK	50	0	17.96	18.21	18.29				
10	16QAM	1	0	18.09	18.25	18.00				
10	16QAM	1	25	18.36	18.16	18.14	19.5	0		
10	16QAM	1	49	18.16	18.11	18.17				
10	16QAM	25	0	18.17	18.30	17.95				
10	16QAM	25	12	17.83	18.12	18.15	19.5	0		
10	16QAM	25	25	17.94	18.17	18.01				
10	16QAM	50	0	17.89	18.18	18.13				
10	64QAM	1	0	17.87	18.28	18.11				
10	64QAM	1	25	17.87	17.99	18.07	19.5	0		
10	64QAM	1	49	17.80	17.84	18.28				
10	64QAM	25	0	18.12	18.23	17.94				
10	64QAM	25	12	18.07	18.11	18.07	19.5	0		
10	64QAM	25	25	18.23	18.13	17.91				
10	64QAM	50	0	18.02	17.93	18.02				
Channel				1862.5	1890.0	1907.5	Tune-up limit (dBm)	MPR (dB)		
Frequency (MHz)				1862.5	1890.0	1907.5				
5	QPSK	1	0	18.10	18.21	18.22				
5	QPSK	1	12	18.11	18.14	18.29	19.5	0		
5	QPSK	1	24	17.92	18.10	18.33				
5	QPSK	12	0	17.95	18.31	18.09				
5	QPSK	12	7	18.16	18.14	18.19	19.5	0		
5	QPSK	12	13	18.16	18.31	18.09				
5	QPSK	25	0	18.14	18.22	18.24				
5	16QAM	1	0	18.02	18.30	18.11				
5	16QAM	1	12	18.02	18.12	18.24	19.5	0		
5	16QAM	1	24	18.08	18.03	18.06				
5	16QAM	12	0	17.97	18.00	18.08				
5	16QAM	12	7	18.10	18.11	18.14	19.5	0		
5	16QAM	12	13	18.06	18.08	18.09				
5	16QAM	25	0	18.20	18.12	17.96				
5	64QAM	1	0	17.78	18.27	18.01				
5	64QAM	1	12	17.83	17.98	18.12	19.5	0		
5	64QAM	1	24	17.82	18.05	18.00				
5	64QAM	12	0	18.22	18.16	18.02				
5	64QAM	12	7	17.89	18.04	18.30	19.5	0		
5	64QAM	12	13	18.07	18.20	18.13				
5	64QAM	25	0	18.25	17.97	18.14				
Channel				1861.5	1890.0	1918.5	Tune-up limit (dBm)	MPR (dB)		
Frequency (MHz)				1861.5	1890.0	1918.5				
3	QPSK	1	0	18.03	18.37	18.28				
3	QPSK	1	8	18.16	18.35	18.39	19.5	0		
3	QPSK	1	14	17.87	18.32	18.34				
3	QPSK	8	0	18.09	18.30	18.17				
3	QPSK	8	4	17.94	18.35	18.17	19.5	0		
3	QPSK	8	7	18.07	18.33	18.31				
3	QPSK	15	0	18.14	18.30	18.22				
3	16QAM	1	0	18.20	18.14	17.90				
3	16QAM	1	8	18.20	18.29	18.13	19.5	0		
3	16QAM	1	14	18.10	18.10	18.20				
3	16QAM	8	0	18.14	18.05	17.91				
3	16QAM	8	4	18.02	18.16	18.16	19.5	0		
3	16QAM	8	7	18.06	18.11	18.19				
3	16QAM	15	0	18.23	18.12	17.89				
3	64QAM	1	0	17.80	18.23	18.09				
3	64QAM	1	8	17.87	17.97	18.03	19.5	0		
3	64QAM	1	14	17.85	17.96	18.26				
3	64QAM	8	0	18.18	18.13	18.10				
3	64QAM	8	4	18.09	17.97	18.27	19.5	0		
3	64QAM	8	7	18.15	18.14	17.98				
3	64QAM	15	0	18.01	17.93	17.97				
Channel				1859.7	1890.0	1919.3	Tune-up limit (dBm)	MPR (dB)		
Frequency (MHz)				1859.7	1890.0	1919.3				
1.4	QPSK	1	0	18.14	18.32	18.18				
1.4	QPSK	1	3	18.18	18.32	18.33	19.5	0		
1.4	QPSK	1	5	18.00	18.19	18.05				
1.4	QPSK	3	0	18.12	18.16	18.25				
1.4	QPSK	3	1	17.98	18.15	18.17				
1.4	QPSK	3	3	17.86	18.32	18.23	19.5	0		
1.4	QPSK	3	5	18.04	18.18	18.33				
1.4	16QAM	1	0	18.29	18.38	18.14				
1.4	16QAM	1	3	18.28	18.29	18.30				
1.4	16QAM	1	5	18.16	18.18	18.06	19.5	0		
1.4	16QAM	3	0	18.11	18.21	17.89				
1.4	16QAM	3	1	17.97	18.32	18.18				
1.4	16QAM	3	3	18.21	18.07	17.91				
1.4	16QAM	6	0	18.22	18.05	17.94	19.5	0		
1.4	64QAM	1	0	17.84	18.11	18.04				
1.4	64QAM	1	3	17.79	18.14	18.14				
1.4	64QAM	1	5	17.86	17.80	18.13				
1.4	64QAM	3	0	18.23	18.13	18.12	19.5	0		
1.4	64QAM	3	1	17.88	17.96	18.16				
1.4	64QAM	3	3	18.01	18.13	18.15				
1.4	64QAM	6	0	18.12	18.10	17.90	19.5	0		

Band 4 (AWS Band)										
Part 27L (only on Channel Required)										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch./Freq. (2050)	Power Middle Ch./Freq. (2075)	Power High Ch./Freq. (2100)	Tune-up limit (dBm)	MPR (dB)		
Channel				2050	2075	2100				
Frequency (MHz)				2050	2075	2100				
20	QPSK	1	0	18.56	18.55	18.64				
20	QPSK	1	49	18.55	18.68	18.60	20	0		
20	QPSK	1	99	18.53	18.56	18.51				
20	QPSK	50	0	18.67	18.67	18.53				
20	QPSK	50	24	18.53	18.65	18.58	20	0		
20	QPSK	50	50	18.59	18.60	18.51				
20	QPSK	100	0	18.56	18.51	18.55				
20	16QAM	1	0	18.52	18.64	18.59				



Band 25 (1900MHz Band)										
Part 24E										
BW (MHz)	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	Tune-up limit (dBm)	MPR (dB)		
Channel				26140	26340	26540				
Frequency (MHz)				1860	1880	1905				
20	QPSK	1	0	18.26	18.50	18.27	19.5	0		
20	QPSK	1	49	18.42	18.53	18.37				
20	QPSK	1	99	18.37	18.31	18.33				
20	QPSK	50	0	18.40	18.50	18.35				
20	QPSK	50	24	18.33	18.42	18.34	19.5	0		
20	QPSK	50	50	18.36	18.36	18.32				
20	QPSK	100	0	18.37	18.50	18.33				
20	16QAM	1	0	18.40	18.47	18.28				
20	16QAM	1	49	18.39	18.38	18.36	19.5	0		
20	16QAM	1	99	18.40	18.35	18.49				
20	16QAM	50	0	18.30	18.40	18.30				
20	16QAM	50	24	18.32	18.47	18.39	19.5	0		
20	16QAM	50	50	18.39	18.42	18.43				
20	16QAM	100	0	18.42	18.41	18.38				
20	64QAM	1	0	18.32	18.44	18.37				
20	64QAM	1	49	18.32	18.19	18.48	19.5	0		
20	64QAM	1	99	18.48	18.42	18.46				
20	64QAM	50	0	18.36	18.40	18.35				
20	64QAM	50	24	18.39	18.47	18.51	19.5	0		
20	64QAM	50	50	18.44	18.40	18.44				
20	64QAM	100	0	18.42	18.40	18.34				
Channel				26115	26340	26515				
Frequency (MHz)				1857.5	1880	1907.5				
15	QPSK	1	0	18.23	18.40	18.13	19.5	0		
15	QPSK	1	37	18.38	18.50	18.30				
15	QPSK	1	74	18.33	18.32	18.35				
15	QPSK	36	0	18.42	18.48	18.11				
15	QPSK	36	20	18.26	18.34	18.15	19.5	0		
15	QPSK	36	39	18.28	18.22	18.31				
15	QPSK	75	0	18.31	18.27	18.12				
15	16QAM	1	0	18.23	18.27	18.33				
15	16QAM	1	37	18.33	18.19	18.12	19.5	0		
15	16QAM	1	74	18.32	18.14	18.34				
15	16QAM	36	0	18.17	18.18	18.05				
15	16QAM	36	20	18.30	18.22	18.30	19.5	0		
15	16QAM	36	39	18.25	18.18	18.31				
15	16QAM	75	0	18.20	18.27	18.26				
15	64QAM	1	0	18.35	18.39	18.23				
15	64QAM	1	37	18.13	18.08	18.49	19.5	0		
15	64QAM	1	74	18.24	18.45	18.22				
15	64QAM	36	0	18.27	18.36	18.26				
15	64QAM	36	20	18.14	18.50	18.50	19.5	0		
15	64QAM	36	39	18.41	18.17	18.28				
15	64QAM	75	0	18.41	18.26	18.18				
Channel				26090	26340	26640				
Frequency (MHz)				1855	1880	1910				
10	QPSK	1	0	18.04	18.48	18.06	19.5	0		
10	QPSK	1	25	18.42	18.52	18.27				
10	QPSK	1	49	18.14	18.08	18.37				
10	QPSK	25	0	18.35	18.47	18.36				
10	QPSK	25	12	18.16	18.30	18.18	19.5	0		
10	QPSK	25	25	18.13	18.13	18.28				
10	QPSK	50	0	18.13	18.27	18.19				
10	16QAM	1	0	18.24	18.47	18.09				
10	16QAM	1	25	18.18	18.22	18.32	19.5	0		
10	16QAM	1	49	18.32	18.31	18.38				
10	16QAM	25	0	18.15	18.25	18.16				
10	16QAM	25	12	18.31	18.38	18.30	19.5	0		
10	16QAM	25	25	18.18	18.41	18.19				
10	16QAM	50	0	18.33	18.20	18.15				
10	64QAM	1	0	18.19	18.19	18.28				
10	64QAM	1	25	18.21	18.08	18.32	19.5	0		
10	64QAM	1	49	18.49	18.47	18.36				
10	64QAM	25	0	18.41	18.45	18.37				
10	64QAM	25	12	18.35	18.46	18.46	19.5	0		
10	64QAM	25	25	18.44	18.39	18.28				
10	64QAM	50	0	18.21	18.21	18.19				
Channel				26065	26340	26565				
Frequency (MHz)				1852.5	1880	1912.5				
5	QPSK	1	0	19.25	19.27	18.07	19.5	0		
5	QPSK	1	12	18.40	18.32	18.42				
5	QPSK	1	24	18.42	18.27	18.13				
5	QPSK	12	0	18.34	18.33	18.36				
5	QPSK	12	7	18.21	18.41	18.10	19.5	0		
5	QPSK	12	13	18.15	18.18	18.25				
5	QPSK	25	0	18.24	18.47	18.16				
5	16QAM	1	0	18.15	18.35	18.22				
5	16QAM	1	12	18.34	18.34	18.14	19.5	0		
5	16QAM	1	24	18.32	18.19	18.38				
5	16QAM	12	0	18.20	18.22	18.11				
5	16QAM	12	7	18.23	18.52	18.37	19.5	0		
5	16QAM	12	13	18.25	18.40	18.23				
5	16QAM	25	0	18.21	18.24	18.17				
5	64QAM	1	0	18.19	18.27	18.25				
5	64QAM	1	12	18.17	17.95	18.40	19.5	0		
5	64QAM	1	24	18.37	18.41	18.23				
5	64QAM	12	0	18.30	18.23	18.27				
5	64QAM	12	7	18.16	18.23	18.50	19.5	0		
5	64QAM	12	13	18.28	18.32	18.37				
5	64QAM	25	0	18.38	18.19	18.31				
Channel				26065	26340	26565				
Frequency (MHz)				1851.5	1880	1913.5				
3	QPSK	1	0	18.12	18.33	18.13	19.5	0		
3	QPSK	1	8	18.21	18.38	18.29				
3	QPSK	1	14	18.24	18.15	18.30				
3	QPSK	8	0	18.28	18.48	18.39				
3	QPSK	8	4	18.14	18.18	18.13	19.5	0		
3	QPSK	8	7	18.23	18.29	18.13				
3	QPSK	15	0	18.14	18.27	18.26				
3	16QAM	1	0	18.25	18.36	18.28				
3	16QAM	1	8	18.22	18.38	18.19	19.5	0		
3	16QAM	1	14	18.45	18.14	18.29				
3	16QAM	8	0	18.35	18.27	18.30				
3	16QAM	8	4	18.28	18.33	18.19	19.5	0		
3	16QAM	8	7	18.19	18.24	18.41				
3	16QAM	15	0	18.25	18.34	18.33				
3	64QAM	1	0	18.30	18.37	18.29				
3	64QAM	1	8	18.26	18.09	18.30	19.5	0		
3	64QAM	1	14	18.53	18.45	18.50				
3	64QAM	8	0	18.11	18.19	18.28				
3	64QAM	8	4	18.40	18.44	18.50	19.5	0		
3	64QAM	8	7	18.43	18.35	18.19				
3	64QAM	15	0	18.40	18.40	18.36				
Channel				26047	26340	26583				
Frequency (MHz)				1850.7	1880	1914.3				
1.4	QPSK	1	0	18.02	18.51	18.14	19.5	0		
1.4	QPSK	1	3	18.47	18.33	18.39				
1.4	QPSK	1	5	18.13	18.36	18.34				
1.4	QPSK	3	0	18.15	18.51	18.12				
1.4	QPSK	3	1	18.23	18.26	18.18	19.5	0		
1.4	QPSK	3	3	18.37	18.38	18.15				
1.4	QPSK	6	0	18.15	18.44	18.32				
1.4	16QAM	1	0	18.45	18.50	18.08				
1.4	16QAM	1	3	18.39	18.30	18.17				
1.4	16QAM	1	5	18.24	18.38	18.34	19.5	0		
1.4	16QAM	3	0	18.11	18.19	18.35				
1.4	16QAM	3	1	18.20	18.29	18.29				
1.4	16QAM	3	3	18.42	18.25	18.19				
1.4	16QAM	6	0	18.39	18.35	18.36	19.5	0		
1.4	64QAM	1	0	18.35	18.37	18.12				

UL CA

CA_41C-Class 3

Combination 20MHz+20MHz (100RB+100RB)

PCC Channel	SCC Channel	Modulation	PCC		SCC		Total RB Size	Target MPR Level (dB)	Power Reduction	Measured Power (dBm)	Tune up Power (dBm)
			RB Size	RB offset	RB Size	RB offset					
39750	39948	QPSK	1	0	0	0	1	0	Full	23.63	25.00
40185	39987	QPSK	1	0	0	0	1	0	Full	23.81	25.00
40620	40422	QPSK	1	0	0	0	1	0	Full	23.82	25.00
41055	40857	QPSK	1	0	0	0	1	0	Full	23.97	25.00
41490	41292	QPSK	1	0	0	0	1	0	Full	23.99	25.00
39750	39948	QPSK	1	0	0	0	1	0	Sensor on	21.76	23.00
40185	39987	QPSK	1	0	0	0	1	0	Sensor on	21.73	23.00
40620	40422	QPSK	1	0	0	0	1	0	Sensor on	21.83	23.00
41055	40857	QPSK	1	0	0	0	1	0	Sensor on	21.89	23.00
41490	41292	QPSK	1	0	0	0	1	0	Sensor on	21.96	23.00
39750	39948	QPSK	1	0	0	0	1	0	Hospot on	21.76	23.00
40185	39987	QPSK	1	0	0	0	1	0	Hospot on	21.73	23.00
40620	40422	QPSK	1	0	0	0	1	0	Hospot on	21.83	23.00
41055	40857	QPSK	1	0	0	0	1	0	Hospot on	21.89	23.00
41490	41292	QPSK	1	0	0	0	1	0	Hospot on	21.96	23.00



DL CA Full Power

2CC		Configure	CA Configuration (BCS)	PCC					SCC				Power		
	LTE Band			BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band		CA_2A-13A	2	20	1880	18900	QPSK	1	49	13	10	751	5230	22.70	22.80
		CA_4A-5A	4	20	1745	20300	QPSK	1	99	5	10	881.5	2525	22.20	22.33
		CA_4A-13A	4	20	1745	20300	QPSK	1	99	13	10	751	5230	22.21	22.33
		CA_5A-66A	5	10	829	20450	QPSK	1	49	66	20	2155	66886	22.43	22.66
		CA_7A-66A	7	20	2560	21350	QPSK	1	99	66	20	2155	66886	22.73	22.90
		CA_13A-66A	13	10	782	23230	QPSK	1	25	66	20	2155	66886	22.47	22.60
Inter-Band	Non-Contiguous	CA_25A-41A	25	20	1880	26340	QPSK	1	49	41	20	2593	40620	22.72	22.84
		CA_41A-41A	41	20	2680	41490	QPSK	1	0	41	5	2498.5	39675	24.00	24.02
	Contiguous	CA_5A-5A	5	10	829	20450	QPSK	1	49	5	5	891.5	2625	22.60	22.66
		CA_7B	7	15	2557.7	21327	QPSK	1	99	7	5	2687.00	3420	22.83	22.90
		CA_66B	66	15	1772.5	132597	QPSK	1	99	66	5	2188.20	67218	22.37	22.41

3CC		Configure	CA Configuration (BCS)	PCC					SCC1				SCC2				Power		
	LTE Band			BW (MHz)	UL Freq. (MHz)	UL Channel	Mod.	UL# RB	UL RB Offset	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	LTE Band	BW (MHz)	DL Freq. (MHz)	DL Channel	With CA Tx.Power (dBm)	W/O CA Tx.Power (dBm)
Inter-Band		CA_2A-2A-4A	2	20	1880	18900	QPSK	1	49	2	5	1987.5	1175	4	20	2132.5	2175	22.75	22.80
		CA_2A-2A-12A	2	20	1880	18900	QPSK	1	49	2	5	1987.5	1175	12	10	737.5	5095	22.72	22.80
		CA_2A-2A-14A	2	20	1880	18900	QPSK	1	49	2	5	1987.5	1175	14	10	763	5330	22.77	22.80
		CA_2A-2A-29A	2	20	1880	18900	QPSK	1	49	2	5	1987.5	1175	29	10	722.5	9715	22.76	22.80
		CA_2A-2A-66A	2	20	1880	18900	QPSK	1	49	2	5	1987.5	1175	66	20	2155	66886	21.74	22.80
		CA_2A-2A-71A	2	20	1880	18900	QPSK	1	49	2	5	1987.5	1175	71	20	637	68786	21.72	22.80
		CA_2A-4A-4A	2	20	1880	18900	QPSK	1	49	4	20	2132.5	2175	4	5	2152.5	2375	22.78	22.80
		CA_2A-4A-5A	2	20	1880	18900	QPSK	1	49	4	20	2132.5	2175	5	10	881.5	2525	22.75	22.80
		CA_2A-4A-7A	2	20	1880	18900	QPSK	1	49	4	20	2132.5	2175	7	20	2655	3100	22.79	22.80
		CA_2A-4A-12A	2	20	1880	18900	QPSK	1	49	4	20	2132.5	2175	12	10	737.5	5095	22.72	22.80
		CA_2A-4A-29A	2	20	1880	18900	QPSK	1	49	4	20	2132.5	2175	29	10	722.5	9715	22.73	22.80
		CA_2A-4A-71A	2	20	1880	18900	QPSK	1	49	4	20	2132.5	2175	71	20	637	68786	22.74	22.80
		CA_2A-7A-7A	2	20	1880	18900	QPSK	1	49	7	20	2655	3100	7	5	2687.5	3425	22.73	22.80
		CA_2A-12A-66A	2	20	1880	18900	QPSK	1	49	12	10	737.5	5095	66	20	2155	66886	22.70	22.80
		CA_2A-14A-66A	2	20	1880	18900	QPSK	1	49	14	10	763	5330	66	20	2155	66886	22.74	22.80
		CA_2A-66A-66A	2	20	1880	18900	QPSK	1	49	66	20	2155	66886	66	5	2197.5	67311	22.72	22.80
		CA_2A-66A-71A	2	20	1880	18900	QPSK	1	49	66	20	2155	66886	71	20	637	68786	22.72	22.80
		CA_2A-5B	2	20	1880	18900	QPSK	1	49	5	10	829	2450	5	10	883.9	2549	22.73	22.80
		CA_2A-12B	2	20	1880	18900	QPSK	1	49	12	5	702.8	5048	12	10	740	5120	22.72	22.80
		CA_2C-66A	2	20	1880	18900	QPSK	1	49	2	20	1979.8	1098	66	20	2155	66886	22.71	22.80
		CA_4A-4A-12A	4	20	1745	20300	QPSK	1	99	4	5	2112.5	1975	12	10	737.5	5095	22.22	22.33
		CA_4A-4A-29A	4	20	1745	20300	QPSK	1	99	4	5	2112.5	1975	29	10	722.5	9715	22.15	22.33
		CA_4A-4A-71A	4	20	1745	20300	QPSK	1	99	4	5	2112.5	1975	71	20	637	68786	22.18	22.33
		CA_4A-7A-7A	4	20	1745	20300	QPSK	1	99	7	20	2655	3100	7	5	2687.5	3425	22.13	22.33
		CA_4A-7A-12A	4	20	1745	20300	QPSK	1	99	7	20	2655	3100	12	10	737.5	5095	22.11	22.33
		CA_5A-7A-7A	5	10	829	20450	QPSK	1	49	7	20	2630	2850	7	20	2680	3350	22.56	22.68
		CA_5A-7C	5	10	829	20450	QPSK	1	49	7	20	2655	3100	7	20	2674.8	3298	22.57	22.68
		CA_5B-66A	5	10	829	20450	QPSK	1	49	5	10	883.9	2549	66	20	2155	66886	22.57	22.68
		CA_12A-66A-66A	12	10	707.5	23095	QPSK	1	49	66	20	2155	66886	66	5	2197.5	67311	22.75	22.81
		CA_12A-66C	12	10	707.5	23095	QPSK	1	49	66	20	2155	66886	66	20	2174.8	67084	22.73	22.81
		CA_14A-66A-66A	14	10	793	23330	QPSK	1	49	66	20	2155	66886	66	5	2197.5	67311	22.68	22.70
		CA_25A-25A-26A	25	20	1880	26340	QPSK	1	49	25	5	1992.5	8665	26	5	876.5	8865	22.79	22.84
	CA_25A-41C	25	20	1880	26340	QPSK	1	49	41	20	2660.2	41292	41	20	2680	41490	22.80	22.84	
	CA_41A-41C	41	20	2680	41490	QPSK	1	0	41	5	2498.2	39675	41	20	2509.9	39792	23.95	24.02	
	CA_66A-66A-71A	66	20	1770	132572	QPSK	1	99	66	5	2112.5	66461	71	20	637	68786	22.35	22.41	
	CA_66C-71A	66	20	1770	132572	QPSK	1	99	66	20	2189.8	67234	71	20	637	68786	22.36	22.41	
Intra-Band	Contiguous	CA_41D	41	20	2680	41490	QPSK	1	0	41	20	2525.8	39948	41	20	2545.6	40146	23.96	24.02



Bluetooth BR/EDR

Mode	Channel	Frequency (MHz)	Average power (dBm)									Tune-up Limit
			Packet Type									
			DH1	DH3	DH5	2DH1	2DH3	2DH5	3DH1	3DH3	3DH5	
Bluetooth	CH 0	2402	8.70	8.60	8.60	6.70	6.60	6.50	6.70	6.60	6.50	9
	CH 39	2441	8.10	8.00	8.00	5.70	5.60	5.60	5.70	5.60	5.60	
	CH 78	2480	7.60	7.50	7.40	5.70	5.60	5.60	5.70	5.60	5.60	

Bluetooth LE v4.0

Mode	Channel	Frequency (MHz)	Average power (dBm)
			GFSK
LE	CH 00	2402	3.00
	CH 19	2440	2.20
	CH 39	2480	3.00
Tune-up Limit			4

Bluetooth LE v5.0

Mode	Channel	Frequency (MHz)	Average power (dBm)
			2Mbps
LE	CH 00	2402	2.60
	CH 19	2440	1.90
	CH 39	2480	2.90
Tune-up Limit			4



Full Power

2.4GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
2.4GHz WLAN	802.11b 1Mbps	1	2412	21.60	23.00	99.02
		6	2437	22.00	23.00	
		11	2462	22.10	23.00	
802.11g 6Mbps	802.11g 6Mbps	1	2412	19.00	21.00	99.28
		6	2437	19.40	21.00	
		11	2462	19.60	21.00	
802.11n-HT20 MCS0	802.11n-HT20 MCS0	1	2412	19.00	21.00	98.15
		6	2437	19.30	21.00	
		11	2462	19.40	21.00	

5GHz WLAN		Ant 1					
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %		
5.2GHz WLAN	802.11a 6Mbps	36	5180	17.86	19.50	98.13	
		40	5200	17.72	19.50		
		44	5220	17.63	19.50		
		48	5240	17.99	19.50		
	802.11n-HT20 MCS0	802.11n-HT20 MCS0	36	5180	17.67	19.50	97.57
			40	5200	17.64	19.50	
			44	5220	17.60	19.50	
			48	5240	17.93	19.50	
	802.11n-HT40 MCS0	802.11n-HT40 MCS0	38	5190	17.68	19.50	95.15
			46	5230	17.73	19.50	
	802.11ac-VHT20 MCS0	802.11ac-VHT20 MCS0	36	5180	17.17	19.00	97.57
			40	5200	17.10	19.00	
44			5220	17.15	19.00		
48			5240	17.22	19.00		
802.11ac-VHT40 MCS0	802.11ac-VHT40 MCS0	38	5190	17.21	19.00	95.59	
		46	5230	17.22	19.00		
802.11ac-VHT80 MCS0	802.11ac-VHT80 MCS0	42	5210	17.45	19.00	91.78	

5GHz WLAN		Ant 1					
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %		
5.3GHz WLAN	802.11a 6Mbps	52	5260	17.78	19.50	98.13	
		56	5280	17.77	19.50		
		60	5300	17.81	19.50		
		64	5320	17.83	19.50		
	802.11n-HT20 MCS0	802.11n-HT20 MCS0	52	5260	17.68	19.50	97.57
			56	5280	17.76	19.50	
			60	5300	17.72	19.50	
			64	5320	17.91	19.50	
	802.11n-HT40 MCS0	802.11n-HT40 MCS0	54	5270	17.80	19.50	95.15
			62	5310	17.88	19.50	
	802.11ac-VHT20 MCS0	802.11ac-VHT20 MCS0	52	5260	17.08	19.00	97.57
			56	5280	17.15	19.00	
60			5300	17.26	19.00		
64			5320	17.13	19.00		
802.11ac-VHT40 MCS0	802.11ac-VHT40 MCS0	54	5270	17.25	19.00	95.59	
		62	5310	17.16	19.00		
802.11ac-VHT80 MCS0	802.11ac-VHT80 MCS0	58	5290	17.06	19.00	91.78	

5GHz WLAN		Ant 1					
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %		
5.5GHz WLAN	802.11a 6Mbps	100	5500	16.36	17.50	98.13	
		116	5580	16.38	17.50		
		132	5660	16.22	17.50		
		140	5700	16.34	17.50		
	802.11n-HT20 MCS0	802.11n-HT20 MCS0	100	5500	16.26	17.50	97.57
			116	5580	16.25	17.50	
			132	5660	16.13	17.50	
			140	5700	16.18	17.50	
	802.11n-HT40 MCS0	802.11n-HT40 MCS0	102	5510	16.32	17.50	95.15
			110	5550	16.42	17.50	
			134	5670	16.77	17.50	
			140	5700	16.18	17.50	
802.11ac-VHT20 MCS0	802.11ac-VHT20 MCS0	100	5500	15.66	17.00	97.57	
		116	5580	15.77	17.00		
		132	5660	15.66	17.00		
		140	5700	15.74	17.00		
802.11ac-VHT40 MCS0	802.11ac-VHT40 MCS0	102	5510	15.83	17.00	95.59	
		110	5550	15.64	17.00		
		134	5670	15.69	17.00		
802.11ac-VHT80 MCS0	802.11ac-VHT80 MCS0	106	5530	14.15	16.00	91.78	

5GHz WLAN		Ant 1					
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %		
5.8GHz WLAN	802.11a 6Mbps	149	5745	15.65	17.00	98.13	
		157	5785	15.78	17.50		
		165	5825	16.02	17.50		
	802.11n-HT20 MCS0	802.11n-HT20 MCS0	149	5745	15.55	17.00	97.57
			157	5785	15.77	17.50	
			165	5825	16.03	17.50	
	802.11n-HT40 MCS0	802.11n-HT40 MCS0	151	5755	15.12	16.00	95.15
			159	5795	15.44	16.50	
			149	5745	14.55	16.00	
	802.11ac-VHT20 MCS0	802.11ac-VHT20 MCS0	157	5785	14.62	16.50	97.57
			165	5825	14.73	16.50	
			151	5755	14.51	16.00	
802.11ac-VHT40 MCS0	802.11ac-VHT40 MCS0	159	5795	14.65	16.50	95.59	
		155	5775	14.59	16.00		



Reduced Power Mode for Head

2.4GHz WLAN		Ant 1				
2.4GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
	802.11b 1Mbps	1	2412	17.90	19.00	99.02
		6	2437	18.20	19.00	
		11	2462	18.30	19.00	
	802.11g 6Mbps	1	2412	15.10	17.00	99.28
		6	2437	15.70	17.00	
		11	2462	15.70	17.00	
	802.11n-HT20 MCS0	1	2412	15.20	17.00	99.15
		6	2437	15.60	17.00	
		11	2462	15.50	17.00	



Reduced Power Mode for Hotspot on

5GHz WLAN	Ant 1					
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.2GHz WLAN	802.11a 6Mbps	36	5180	9.38	11.00	98.13
		40	5200	9.24	11.00	
		44	5220	9.18	11.00	
		48	5240	9.50	11.00	
	802.11n-HT20 MCS0	36	5180	9.21	11.00	97.57
		40	5200	9.18	11.00	
		44	5220	9.29	11.00	
	802.11n-HT40 MCS0	38	5190	9.32	11.00	95.15
		46	5230	9.35	11.00	
	802.11ac-VHT20 MCS0	36	5180	8.71	10.00	97.57
		40	5200	8.68	10.00	
		44	5220	8.81	10.00	
		48	5240	8.77	10.00	
	802.11ac-VHT40 MCS0	38	5190	8.74	10.00	95.59
		46	5230	9.17	10.00	
	802.11ac-VHT80 MCS0	42	5210	8.97	10.00	91.78

5GHz WLAN	Ant 1					
	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %
5.8GHz WLAN	802.11a 6Mbps	149	5745	8.56	9.50	98.13
		157	5785	8.83	10.00	
		165	5825	9.12	10.00	
	802.11n-HT20 MCS0	149	5745	8.51	9.50	97.57
		157	5785	8.75	10.00	
		165	5825	9.08	10.00	
	802.11n-HT40 MCS0	151	5755	8.10	8.50	95.15
		159	5795	8.40	9.00	
	802.11ac-VHT20 MCS0	149	5745	7.51	8.50	97.57
		157	5785	7.69	9.00	
		165	5825	7.93	9.00	
	802.11ac-VHT40 MCS0	151	5755	7.54	8.50	95.59
		159	5795	7.80	9.00	
	802.11ac-VHT80 MCS0	155	5775	7.57	8.50	91.78



Reduced Power Mode for Sensor On

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
5.2GHz WLAN	802.11a 6Mbps	36	5180	9.38	11.00	98.13
		40	5200	9.24	11.00	
		44	5220	9.18	11.00	
		48	5240	9.50	11.00	
	802.11n-HT20 MCSO	36	5180	9.21	11.00	97.57
		40	5200	9.18	11.00	
		44	5220	9.29	11.00	
		48	5240	9.51	11.00	
	802.11n-HT40 MCSO	38	5190	9.32	11.00	95.15
		46	5230	9.35	11.00	
	802.11ac-VHT20 MCSO	36	5180	8.71	10.00	97.57
		40	5200	8.68	10.00	
44		5220	8.81	10.00		
48		5240	8.77	10.00		
802.11ac-VHT40 MCSO	38	5190	8.74	10.00	95.59	
	46	5230	9.17	10.00		
802.11ac-VHT80 MCSO	42	5210	8.97	10.00	91.78	

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
5.3GHz WLAN	802.11a 6Mbps	52	5260	9.24	11.00	98.13
		56	5280	9.30	11.00	
		60	5300	9.34	11.00	
		64	5320	9.33	11.00	
	802.11n-HT20 MCSO	52	5260	9.23	11.00	97.57
		56	5280	9.36	11.00	
		60	5300	9.24	11.00	
		64	5320	9.44	11.00	
	802.11n-HT40 MCSO	54	5270	9.44	11.00	95.15
		62	5310	9.52	11.00	
	802.11ac-VHT20 MCSO	52	5260	8.65	10.00	97.57
		56	5280	8.76	10.00	
60		5300	8.82	10.00		
64		5320	8.72	10.00		
802.11ac-VHT40 MCSO	54	5270	8.86	10.00	95.59	
	62	5310	8.67	10.00		
802.11ac-VHT80 MCSO	58	5290	8.59	10.00	91.78	

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
5.5GHz WLAN	802.11a 6Mbps	100	5500	8.86	10.00	98.13
		116	5580	8.88	10.00	
		132	5660	8.90	10.00	
		140	5700	8.95	10.00	
	802.11n-HT20 MCSO	100	5500	8.68	10.00	97.57
		116	5580	8.77	10.00	
		132	5660	8.71	10.00	
		140	5700	8.54	10.00	
	802.11n-HT40 MCSO	102	5510	8.81	10.00	95.15
		110	5550	9.01	10.00	
	802.11ac-VHT20 MCSO	100	5500	8.15	9.00	97.57
		116	5580	8.37	9.00	
132		5660	8.30	9.00		
140		5700	8.24	9.00		
802.11ac-VHT40 MCSO	102	5510	8.31	9.00	95.59	
	110	5550	8.21	9.00		
802.11ac-VHT80 MCSO	106	5530	8.54	9.00	91.78	

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
5.8GHz WLAN	802.11a 6Mbps	149	5745	8.56	9.50	98.13
		157	5785	8.83	10.00	
		165	5825	9.12	10.00	
	802.11n-HT20 MCSO	149	5745	8.51	9.50	97.57
		157	5785	8.75	10.00	
		165	5825	9.08	10.00	
	802.11n-HT40 MCSO	151	5755	8.10	8.50	95.15
		159	5795	8.40	9.00	
	802.11ac-VHT20 MCSO	149	5745	7.51	8.50	97.57
		157	5785	7.69	9.00	
		165	5825	7.93	9.00	
	802.11ac-VHT40 MCSO	151	5755	7.54	8.50	95.59
159		5795	7.80	9.00		
802.11ac-VHT80 MCSO	155	5775	7.57	8.50	91.78	



Reduced Power Mode for Handheld On

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
5.2GHz WLAN	802.11a 6Mbps	36	5180	15.64	17.50	98.13
		40	5200	15.87	17.50	
		44	5220	15.69	17.50	
		48	5240	15.85	17.50	
	802.11n-HT20 MCS0	36	5180	15.71	17.50	97.57
		40	5200	15.64	17.50	
		44	5220	15.79	17.50	
	802.11n-HT40 MCS0	38	5190	15.78	17.50	95.15
		46	5230	15.88	17.50	
	802.11ac-VHT20 MCS0	36	5180	15.21	17.00	97.57
		40	5200	15.16	17.00	
		44	5220	15.31	17.00	
48		5240	15.33	17.00		
802.11ac-VHT40 MCS0	38	5190	15.25	17.00	95.59	
	46	5230	15.26	17.00		
802.11ac-VHT80 MCS0	42	5210	15.47	17.00	91.78	

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
5.3GHz WLAN	802.11a 6Mbps	52	5260	15.91	17.50	98.13
		56	5280	15.91	17.50	
		60	5300	15.88	17.50	
		64	5320	15.88	17.50	
	802.11n-HT20 MCS0	52	5260	15.77	17.50	97.57
		56	5280	15.76	17.50	
		60	5300	15.77	17.50	
	802.11n-HT40 MCS0	54	5270	15.82	17.50	95.15
		62	5310	15.92	17.50	
	802.11ac-VHT20 MCS0	52	5260	15.10	17.00	97.57
		56	5280	15.15	17.00	
		60	5300	15.41	17.00	
64		5320	15.17	17.00		
802.11ac-VHT40 MCS0	54	5270	15.32	17.00	95.59	
	62	5310	15.16	17.00		
802.11ac-VHT80 MCS0	58	5290	15.22	17.00	91.78	

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
5.5GHz WLAN	802.11a 6Mbps	100	5500	14.42	16.00	98.13
		116	5580	14.40	16.00	
		132	5660	14.21	16.00	
		140	5700	14.41	16.00	
	802.11n-HT20 MCS0	100	5500	14.21	16.00	97.57
		116	5580	14.22	16.00	
		132	5660	14.18	16.00	
	802.11n-HT40 MCS0	140	5700	14.16	16.00	95.15
		102	5510	14.33	16.00	
	802.11ac-VHT20 MCS0	110	5550	14.46	16.00	97.57
		134	5670	14.48	16.00	
		100	5500	13.66	15.50	
116		5580	13.86	15.50		
802.11ac-VHT40 MCS0	132	5660	13.70	15.50	95.59	
	140	5700	13.68	15.50		
	102	5510	13.83	15.50		
802.11ac-VHT80 MCS0	110	5550	13.64	15.50	91.78	
	134	5670	13.85	15.50		

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
5.8GHz WLAN	802.11a 6Mbps	149	5745	14.11	15.50	98.13
		157	5785	14.33	16.00	
		165	5825	14.41	16.00	
	802.11n-HT20 MCS0	149	5745	14.11	15.50	97.57
		157	5785	14.27	16.00	
		165	5825	14.39	16.00	
	802.11n-HT40 MCS0	151	5755	13.60	14.50	95.15
		159	5795	13.97	15.00	
	802.11ac-VHT20 MCS0	149	5745	13.01	14.50	97.57
		157	5785	13.11	15.00	
		165	5825	13.31	15.00	
	802.11ac-VHT40 MCS0	151	5755	13.05	14.50	95.59
159		5795	13.15	15.00		
802.11ac-VHT80 MCS0	155	5775	13.01	14.50	91.78	



Reduced Power Mode for Handheld On - Simultaneous

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
802.11a 6Mbps	36	5180	14.29	16.00	98.13	
	40	5200	14.25	16.00		
	44	5220	14.18	16.00		
	48	5240	14.42	16.00		
802.11n-HT20 MCS0	36	5180	14.19	16.00	97.57	
	40	5200	14.18	16.00		
	44	5220	14.18	16.00		
	48	5240	14.42	16.00		
802.11n-HT40 MCS0	38	5190	14.36	16.00	95.15	
	46	5230	14.44	16.00		
802.11ac-VHT20 MCS0	36	5180	13.66	15.00	97.57	
	40	5200	13.63	15.00		
	44	5220	13.68	15.00		
	48	5240	13.70	15.00		
802.11ac-VHT40 MCS0	38	5190	13.78	15.00	95.59	
	46	5230	13.67	15.00		
802.11ac-VHT80 MCS0	42	5210	14.06	15.00	91.78	

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
802.11a 6Mbps	52	5260	14.32	16.00	98.13	
	56	5280	14.35	16.00		
	60	5300	14.42	16.00		
	64	5320	14.36	16.00		
802.11n-HT20 MCS0	52	5260	14.26	16.00	97.57	
	56	5280	14.27	16.00		
	60	5300	14.23	16.00		
	64	5320	14.36	16.00		
802.11n-HT40 MCS0	54	5270	14.34	16.00	95.15	
	62	5310	14.55	16.00		
802.11ac-VHT20 MCS0	52	5260	13.56	15.00	97.57	
	56	5280	13.70	15.00		
	60	5300	13.78	15.00		
	64	5320	13.64	15.00		
802.11ac-VHT40 MCS0	54	5270	13.77	15.00	95.59	
	62	5310	13.73	15.00		
802.11ac-VHT80 MCS0	58	5290	13.55	15.00	91.78	

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
802.11a 6Mbps	100	5500	13.44	15.00	98.13	
	116	5580	13.42	15.00		
	132	5660	13.30	15.00		
	140	5700	13.20	15.00		
802.11n-HT20 MCS0	100	5500	13.17	15.00	97.57	
	116	5580	13.24	15.00		
	132	5660	13.30	15.00		
	140	5700	13.16	15.00		
802.11n-HT40 MCS0	102	5510	13.30	15.00	95.15	
	110	5550	13.39	15.00		
	134	5670	13.45	15.00		
802.11ac-VHT20 MCS0	100	5500	12.58	14.00	97.57	
	116	5580	12.78	14.00		
	132	5660	12.61	14.00		
	140	5700	12.61	14.00		
802.11ac-VHT40 MCS0	102	5510	12.86	14.00	95.59	
	110	5550	12.69	14.00		
	134	5670	12.67	14.00		
802.11ac-VHT80 MCS0	106	5530	13.13	14.00	91.78	
	138	5690	13.23	14.00		

5GHz WLAN		Ant 1				
Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Duty Cycle %	
802.11a 6Mbps	149	5745	13.14	14.50	98.13	
	157	5785	13.34	15.00		
	165	5825	13.45	15.00		
802.11n-HT20 MCS0	149	5745	13.08	14.50	97.57	
	157	5785	13.31	15.00		
	165	5825	13.43	15.00		
802.11n-HT40 MCS0	151	5755	12.67	13.50	95.15	
	159	5795	12.92	14.00		
802.11ac-VHT20 MCS0	149	5745	12.01	13.50	97.57	
	157	5785	12.31	14.00		
	165	5825	12.44	14.00		
802.11ac-VHT40 MCS0	151	5755	12.00	13.50	95.59	
	159	5795	12.30	14.00		
802.11ac-VHT80 MCS0	155	5775	12.02	13.50	91.78	