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10899	AAD	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.67	± 9.6 %
10900	AAD	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10901	AAD	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10902	AAD	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10903	AAD	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10904	AAD	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10905	AAD	5G NR (DFT-s-OFDM, 1 RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10906	AAD	5G NR (DFT-s-OFDM, 1 RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.68	± 9.6 %
10907	AAD	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.78	± 9.6 %
10908	AAD	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10909	AAD	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.96	± 9.6 %
10910	AAD	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10911	AAD	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.93	± 9.6 %
10912	AAD	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10913	AAD	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10914	AAD	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.85	± 9.6 %
10915	AAD	5G NR (DFT-s-OFDM, 50% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.83	± 9.6 %
10916	AAD	5G NR (DFT-s-OFDM, 50% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10917	AAD	5G NR (DFT-s-OFDM, 50% RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10918	AAD	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10919	AAD	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.86	± 9.6 %
10920	AAD	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.87	± 9.6 %
10921	AAD	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10922	AAD	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.82	± 9.6 %
10923	AAD	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10924	AAD	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10925	AAD	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.95	± 9.6 %
10926	AAD	5G NR (DFT-s-OFDM, 100% RB, 60 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.84	± 9.6 %
10927	AAD	5G NR (DFT-s-OFDM, 100% RB, 80 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	5.94	± 9.6 %
10928	AAD	5G NR (DFT-s-OFDM, 1 RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10929	AAD	5G NR (DFT-s-OFDM, 1 RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10930	AAD	5G NR (DFT-s-OFDM, 1 RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.52	± 9.6 %
10931	AAD	5G NR (DFT-s-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10932	AAB	5G NR (DFT-s-OFDM, 1 RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10933	AAA	5G NR (DFT-s-OFDM, 1 RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10934	AAA	5G NR (DFT-s-OFDM, 1 RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10935	AAA	5G NR (DFT-s-OFDM, 1 RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.51	± 9.6 %
10936	AAC	5G NR (DFT-s-OFDM, 50% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10937	AAB	5G NR (DFT-s-OFDM, 50% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.77	± 9.6 %
10938	AAB	5G NR (DFT-s-OFDM, 50% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.90	± 9.6 %
10939	AAB	5G NR (DFT-s-OFDM, 50% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.82	± 9.6 %
10940	AAB	5G NR (DFT-s-OFDM, 50% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.89	± 9.6 %
10941	AAB	5G NR (DFT-s-OFDM, 50% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10942	AAB	5G NR (DFT-s-OFDM, 50% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10943	AAB	5G NR (DFT-s-OFDM, 50% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5,95	± 9.6 %
10944	AAB	5G NR (DFT-s-OFDM, 100% RB, 5 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.81	± 9.6 %
10945	AAB	5G NR (DFT-s-OFDM, 100% RB, 10 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.85	± 9.6 %
10946	AAC	5G NR (DFT-s-OFDM, 100% RB, 15 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.83	± 9.6 %
10947	AAB	5G NR (DFT-s-OFDM, 100% RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10948	AAB	5G NR (DFT-s-OFDM, 100% RB, 25 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10949	AAB	5G NR (DFT-s-OFDM, 100% RB, 30 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.87	± 9.6 %
10950	AAB	5G NR (DFT-s-OFDM, 100% RB, 40 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5.94	± 9.6 %
10951	AAB	5G NR (DFT-s-OFDM, 100% RB, 50 MHz, QPSK, 15 kHz)	5G NR FR1 FDD	5,92	± 9.6 %
10952	AAB	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.25	± 9.6 %
10953	AAB	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.15	± 9.6 %
10954	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.23	± 9.6 %
10955	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.42	± 9.6 %
10956	AAB	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.14	± 9.6 %
10957	AAC	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.31	± 9.6 %



In Collaboration with

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10958	LAAD	EC NE DI (CE CEDM TM CA AS NILL CA CAM COLLIA)	I solve en l'en l	1	
10958	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.61	± 9.6 %
10959	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.33	± 9.6 %
10960	AAB	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.32	± 9.6 %
	AAB	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.36	± 9.6 %
10962	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.40	± 9.6 %
10963	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10964	AAB	5G NR DL (CP-OFDM, TM 3.1, 5 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.29	± 9.6 %
10965	AAB	5G NR DL (CP-OFDM, TM 3.1, 10 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9,37	± 9.6 %
10966	AAB	5G NR DL (CP-OFDM, TM 3.1, 15 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.55	± 9.6 %
10967	AAB	5G NR DL (CP-OFDM, TM 3.1, 20 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.42	± 9.6 %
10968	AAB	5G NR DL (CP-OFDM, TM 3.1, 100 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.49	± 9.6 %
10972	AAB	5G NR (CP-OFDM, 1 RB, 20 MHz, QPSK, 15 kHz)	5G NR FR1 TDD	11.59	± 9.6 %
10973	AAB	5G NR (DFT-s-OFDM, 1 RB, 100 MHz, QPSK, 30 kHz)	5G NR FR1 TDD	9.06	± 9.6 %
10974	AAB	5G NR (CP-OFDM, 100% RB, 100 MHz, 256-QAM, 30 kHz)	5G NR FR1 TDD	10.28	± 9.6 %
10978	AAA	ULLA BDR	ULLA	1.16	± 9.6 %
10979	AAA	ULLA HDR4	ULLA	8.58	± 9.6 %
10980	AAA	ULLA HDR8	ULLA	10.32	± 9.6 %
10981	AAA	ULLA HDRp4	ULLA	3.19	± 9.6 %
10982	AAA	ULLA HDRp8	ULLA	3.43	± 9.6 %
10983	AAC	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.31	± 9.6 %
10984	AAB	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	9.42	± 9.6 %
10985	AAC	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.54	± 9.6 %
10986	AAB	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.50	± 9.6 %
10987	AAC	5G NR DL (CP-OFDM, TM 3.1, 60 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.53	± 9.6 %
10988	AAB	5G NR DL (CP-OFDM, TM 3.1, 70 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.38	± 9.6 %
10989	AAC	5G NR DL (CP-OFDM, TM 3.1, 80 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.33	± 9.6 %
10990	AAB	5G NR DL (CP-OFDM, TM 3.1, 90 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	9.52	± 9.6 %
11003	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 15 kHz)	5G NR FR1 TDD	10.24	± 9.6 %
11004	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 30 kHz)	5G NR FR1 TDD	10.73	± 9.6 %
11005	AAA	5G NR DL (CP-OFDM, TM 3.1, 25 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.70	± 9.6 %
11006	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.55	± 9.6 %
11007	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.46	± 9.6 %
11008	AAA	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 15 kHz)	5G NR FR1 FDD	8.51	± 9.6 %
11009	AAA	5G NR DL (CP-OFDM, TM 3.1, 25 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.76	± 9.6 %
11010	AAA	5G NR DL (CP-OFDM, TM 3.1, 30 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.95	± 9.6 %
11011	AAA	5G NR DL (CP-OFDM, TM 3.1, 40 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.96	± 9.6 %
11012	AAA	5G NR DL (CP-OFDM, TM 3.1, 50 MHz, 64-QAM, 30 kHz)	5G NR FR1 FDD	8.68	± 9.6 %
11013	AAB	IEEE 802.11be (320MHz, MCS1, 99pc duty cycle)	WLAN	8.47	± 9.6 %
11014	AAB	IEEE 802.11be (320MHz, MCS2, 99pc duty cycle)	WLAN	8.45	± 9.6 %
11015	AAB	IEEE 802.11be (320MHz, MCS3, 99pc duty cycle)	WLAN	8.44	± 9.6 %
11016	AAB	IEEE 802.11be (320MHz, MCS4, 99pc duty cycle)			± 9.6 %
11017	AAB	IEEE 802.11be (320MHz, MCS5, 99pc duty cycle)	WLAN WLAN	8.44	
11018	AAB	IEEE 802.11be (320MHz, MCS6, 99pc duty cycle)	WLAN		± 9.6 %
11019	AAB	IEEE 802.11be (320MHz, MCS7, 99pc duty cycle)	WLAN	8.40	± 9.6 %
11020	AAB	IEEE 802.11be (320MHz, MCS8, 99pc duty cycle)	WLAN	8.29	± 9.6 %
11021	AAB	IEEE 802.11be (320MHz, MCS9, 99pc duty cycle)		8.27	± 9.6 %
11022	AAB	IEEE 802.11be (320MHz, MCS9, 99pc duty cycle)	WLAN	8.46	± 9.6 %
11023	AAB	IEEE 802.11be (320MHz, MCS11, 99pc duty cycle)	WLAN	8.36	± 9.6 %
11023	AAB	IEEE 802.11be (320MHz, MCS11, 99pc duty cycle)	WLAN	8.09	± 9.6 %
11024	AAB		WLAN	8.42	± 9.6 %
11025	AAB	IEEE 802.11be (320MHz, MCS13, 99pc duty cycle)	WLAN	8.37	± 9.6 %
11020	LAND	IEEE 802.11be (320MHz, MCS0, 99pc duty cycle)	WLAN	8.39	± 9.6 %

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



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Client: 7layers Certificate No: 24J02Z000853

CALIBRATION CERTIFICATE

Object D750V3 - SN: 1200

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

November 7, 2024

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	106276	17-May-24 (CTTL, No. J24X04107)	May-25
Power sensor NRP6A	101369	17-May-24 (CTTL, No. J24X04107)	May-25
Reference Probe EX3DV4	SN 7517	21-Feb-24(CTTL-SPEAG, No. 24J02Z80008)	Feb-25
DAE4	SN 1588	13-Sep-24(CTTL-SPEAG, No. 24J02Z000713)	Sep-25
Secondary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Dec-23 (CTTL, No. J23X13426)	Dec-24
NetworkAnalyzer E5071C	MY46110673	25-Dec-23 (CTTL, No. J23X13425)	Dec-24
OCP DAK-3.5(weighted)	1040	22-Jan-24(SPEAG, No.OCP-DAK3.5-1040_Jan24)	Jan-25

Name Function Signature

Calibrated by: Zhao Jing SAR Test Engineer

Reviewed by: Lin Jun SAR Test Engineer

Approved by: Qi Dianyuan SAR Project Leader

Issued: November 15, 2024

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

Certificate No: 24J02Z000853





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Glossary:

TSL tissue simulating liquid

ConvF sensitivity in TSL / NORMx,y,z N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	750 MHz ± 1 MHz	

Head TSL parameters
The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.9	0.89 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.7 ± 6 %	0.90 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		100 EM EM EM

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	2.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	8.42 W/kg ± 18.8 % (<i>k</i> =2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.40 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	5.55 W/kg ± 18.7 % (<i>k</i> =2)

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.5Ω- 5.04jΩ
Return Loss	- 25.2dB

General Antenna Parameters and Design

Electrical Delay (one direction)	0.939 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Manufactured by	SPEAG
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Certificate No: 24J02Z000853 Page 4 of 6





Date: 2024-11-07

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DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 750 MHz; Type: D750V3; Serial: D750V3 - SN: 1200

Communication System: UID 0, CW; Frequency: 750 MHz

Medium parameters used: f = 750 MHz; $\sigma = 0.903$ S/m; $\varepsilon_r = 41.65$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 SN7517; ConvF(9.85, 9.85, 9.85) @ 750 MHz; Calibrated: 2024-02-21
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1588; Calibrated: 2024-09-13
- Phantom: MFP V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

dy=5mm, dz=5mm

Reference Value = 54.97 V/m; Power Drift = -0.01 dB

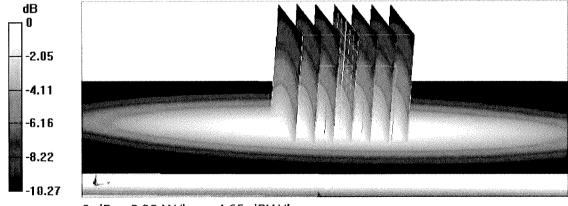
Peak SAR (extrapolated) = 3.39 W/kg

SAR(1 g) = 2.13 W/kg; SAR(10 g) = 1.4 W/kg

Smallest distance from peaks to all points 3 dB below = 17 mm

Ratio of SAR at M2 to SAR at M1 = 63.5%

Maximum value of SAR (measured) = 2.92 W/kg



0 dB = 2.92 W/kg = 4.65 dBW/kg

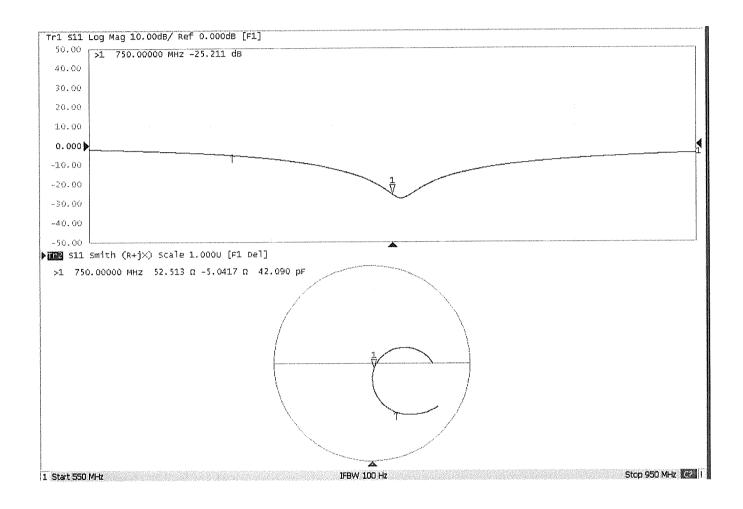
Certificate No: 24J02Z000853 Page 5 of 6



Tel: +86-10-62304633-2117

E-mail: emf@caict.ac.cn http://www.caict.ac.cn

Impedance Measurement Plot for Head TSL







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

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Client

7layers

Certificate No:

24J02Z000854

CALIBRATION CERTIFICATE

Object

D835V2 - SN: 4d265

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

November 4, 2024

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	106276	17-May-24 (CTTL, No. J24X04107)	May-25
Power sensor NRP6A	101369	17-May-24 (CTTL, No. J24X04107)	May-25
Reference Probe EX3DV4	SN 7517	21-Feb-24(CTTL-SPEAG, No. 24J02Z80008)	Feb-25
DAE4	SN 1588	13-Sep-24(CTTL-SPEAG, No. 24J02Z000713)	Sep-25
Secondary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Dec-23 (CTTL, No. J23X13426)	Dec-24
NetworkAnalyzer E5071C	MY46110673	25-Dec-23 (CTTL, No. J23X13425)	Dec-24
OCP DAK-3.5(weighted)	1040	22-Jan-24(SPEAG, No.OCP-DAK3.5-1040_Jan24)	Jan-25

Name

Function

Signature

Calibrated by:

Zhao Jing

SAR Test Engineer

Reviewed by:

Lin Jun

SAR Test Engineer

Approved by:

Qi Dianyuan

SAR Project Leader

Issued: November 15, 2024

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

Certificate No: 24J02Z000854

Page 1 of 6





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Glossary:

TSL tissue simulating liquid

ConvF sensitivity in TSL / NORMx,y,z N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: 24J02Z000854 Page 2 of 6





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Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	15 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	835 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	41.5	0.90 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.6 ± 6 %	0.92 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	2.44W/kg
SAR for nominal Head TSL parameters	normalized to 1W	9.63 W/kg ± 18.8 % (<i>k</i> =2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	1.60 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	6.33 W/kg ± 18.7 % (<i>k</i> =2)

Certificate No: 24J02Z000854 Page 3 of 6





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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	48.4Ω- 1.88jΩ
Return Loss	- 32.1dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.304 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Manufactured by	SPEAG

Certificate No: 24J02Z000854 Page 4 of 6





Date: 2024-11-04

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

Tel: +86-10-62304633-2117

E-mail: emf@caict.ac.cn http://www.caict.ac.cn

DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 835 MHz; Type: D835V2; Serial: D835V2 - SN: 4d265

Communication System: UID 0, CW; Frequency: 835 MHz

Medium parameters used: f = 835 MHz; $\sigma = 0.916$ S/m; $\varepsilon_r = 41.57$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 SN7517; ConvF(9.85, 9.85, 9.85) @ 835 MHz; Calibrated:
 2024-02-21
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1588; Calibrated: 2024-09-13
- Phantom: MFP V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

dy=5mm, dz=5mm

Reference Value = 58.33 V/m; Power Drift = -0.01 dB

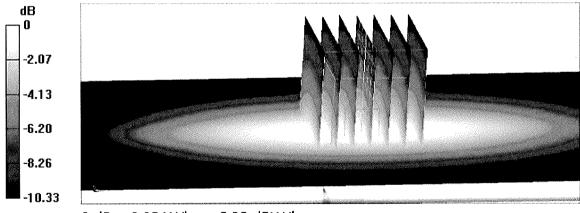
Peak SAR (extrapolated) = 3.87 W/kg

SAR(1 g) = 2.44 W/kg; SAR(10 g) = 1.6 W/kg

Smallest distance from peaks to all points 3 dB below = 17.5 mm

Ratio of SAR at M2 to SAR at M1 = 63.5%

Maximum value of SAR (measured) = 3.35 W/kg



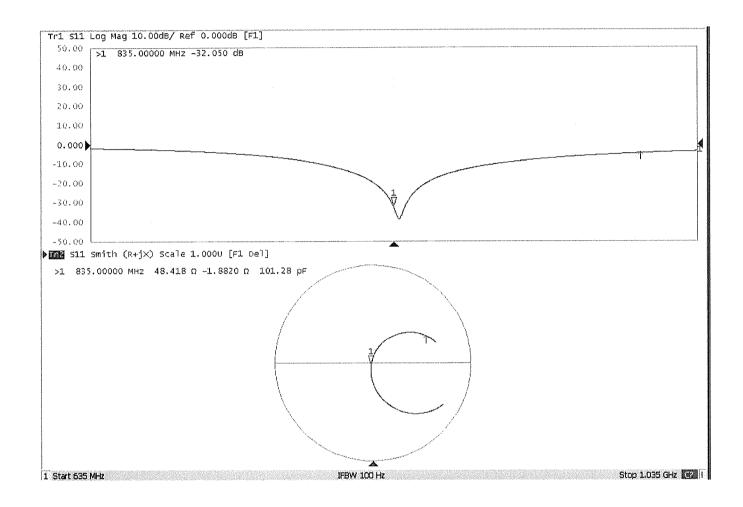
0 dB = 3.35 W/kg = 5.25 dBW/kg



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Impedance Measurement Plot for Head TSL





中国认可国际互认 校准 CAICT CAIBRATION CNAS L0570

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7layers

Certificate No: 24J02Z000856

CALIBRATION CERTIFICATE

Object

D1750V2 - SN: 1176

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

November 6, 2024

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 $(22\pm3)^{\circ}$ C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	17-May-24 (CTTL, No. J24X04107)	May-25
Power sensor NRP6A	101369	17-May-24 (CTTL, No. J24X04107)	May-25
Reference Probe EX3DV4	SN 7517	21-Feb-24(CTTL-SPEAG, No. 24J02Z80008)	Feb-25
DAE4	SN 1588	13-Sep-24(CTTL-SPEAG, No. 24J02Z000713)	Sep-25
Secondary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Dec-23 (CTTL, No. J23X13426)	Dec-24
NetworkAnalyzer E5071C	MY46110673	25-Dec-23 (CTTL, No. J23X13425)	Dec-24
OCP DAK-3.5(weighted)	1040	22-Jan-24(SPEAG, No.OCP-DAK3.5-1040_Jan24)	Jan-25

Name Function Signature

Calibrated by: Zhao Jing SAR Test Engineer

Lin Jun SAR Test Engineer

Approved by: Qi Dianyuan SAR Project Leader

Issued: November 15, 2024

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

Certificate No: 24J02Z000856

Reviewed by:





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Glossary:

TSL tissue simulating liquid

ConvF sensitivity in TSL / NORMx,y,z N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: 24J02Z000856 Page 2 of 6



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Measurement Conditions

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

DASY Version	DASY52	52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1750 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.1	1.37 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	41.1 ± 6 %	1.38 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	9.17 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	36.7 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
SAR measured	250 mW input power	4.87 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	19.5 W/kg ± 18.7 % (k=2)

Certificate No: 24J02Z000856 Page 3 of 6





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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	50.6Ω- 2.87jΩ
Return Loss	- 30.7dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.135 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Manufactured by	SPEAG

Certificate No: 24J02Z000856 Page 4 of 6





Date: 2024-11-06

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

Tel: +86-10-62304633-2117

E-mail: emf@caict.ac.cn http://www.caict.ac.cn

DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1750 MHz; Type: D1750V2; Serial: D1750V2 - SN: 1176

Communication System: UID 0, CW; Frequency: 1750 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1750 MHz; $\sigma = 1.384$ S/m; $\varepsilon_r = 41.11$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 SN7517; ConvF(8.22, 8.22, 8.22) @ 1750 MHz; Calibrated: 2024-02-21
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1588; Calibrated: 2024-09-13
- Phantom: MFP V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 97.34 V/m; Power Drift = -0.03 dB

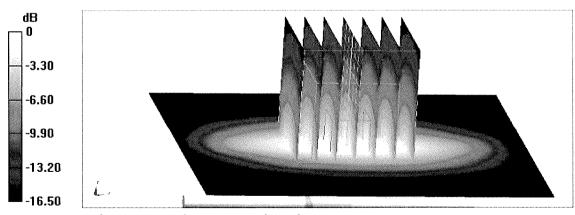
Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 9.17 W/kg; SAR(10 g) = 4.87 W/kg

Smallest distance from peaks to all points 3 dB below = 9.5 mm

Ratio of SAR at M2 to SAR at M1 = 54.8%

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



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

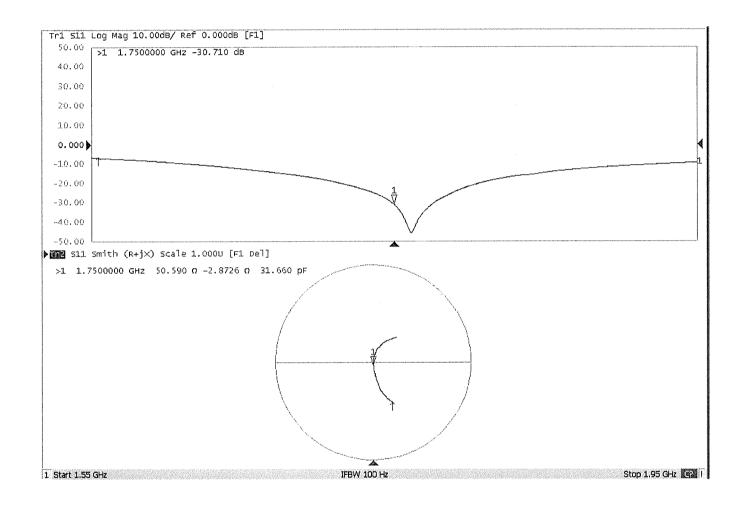
Certificate No: 24J02Z000856 Page 5 of 6



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Impedance Measurement Plot for Head TSL



中国认可国际互认 校准 CNAS LOS70



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Client:

7layers

Certificate No: 24J02Z000857

CALIBRATION CERTIFICATE

Object

D1950V3 - SN: 1229

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

November 7, 2024

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	106276	17-May-24 (CTTL, No. J24X04107)	May-25
Power sensor NRP6A	101369	17-May-24 (CTTL, No. J24X04107)	May-25
Reference Probe EX3DV4	SN 7517	21-Feb-24(CTTL-SPEAG, No. 24J02Z80008)	Feb-25
DAE4	SN 1588	13-Sep-24(CTTL-SPEAG, No. 24J02Z000713)	Sep-25
Secondary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Dec-23 (CTTL, No. J23X13426)	Dec-24
NetworkAnalyzer E5071C	MY46110673	25-Dec-23 (CTTL, No. J23X13425)	Dec-24
OCP DAK-3.5(weighted)	1040	22-Jan-24(SPEAG, No.OCP-DAK3.5-1040_Jan24)	Jan-25

Name

Function

Calibrated by:

Zhao Jing

SAR Test Engineer

Reviewed by:

Lin Jun

SAR Test Engineer

Approved by:

Qi Dianyuan

SAR Project Leader

Issued: November 15, 2024

Signature

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Glossary:

TSL tissue simulating liquid

ConvF sensitivity in TSL / NORMx,y,z N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: 24J02Z000857 Page 2 of 6





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Measurement Conditions

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

DASY Version	DASY52	52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	1950 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	40.0	1.40 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	40.7 ± 6 %	1.39 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	10.1 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	40.8 W/kg ± 18.8 % (k=2)
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	5.18 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	20.9 W/kg ± 18.7 % (k=2)

Certificate No: 24J02Z000857 Page 3 of 6





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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.3Ω+ 2.24jΩ
Return Loss	- 28.9dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.098 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Manufactured by	SPEAG

Certificate No: 24J02Z000857 Page 4 of 6





Date: 2024-11-07

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

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

DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 1950 MHz; Type: D1950V2; Serial: D1950V2 - SN: 1229

Communication System: UID 0, CW; Frequency: 1950 MHz; Duty Cycle: 1:1

Medium parameters used: f = 1950 MHz; $\sigma = 1.385$ S/m; $\varepsilon_r = 40.68$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 SN7517; ConvF(7.95, 7.95, 7.95) @ 1950 MHz; Calibrated: 2024-02-21
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1588; Calibrated: 2024-09-13
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

dy=5mm, dz=5mm

Reference Value = 103.1 V/m; Power Drift = 0.00 dB

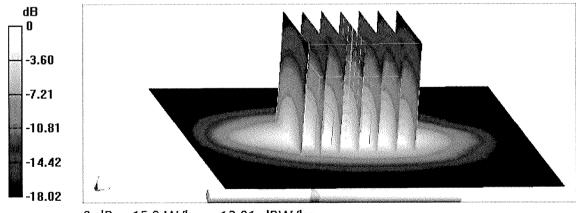
Peak SAR (extrapolated) = 19.3 W/kg

SAR(1 g) = 10.1 W/kg; SAR(10 g) = 5.18 W/kg

Smallest distance from peaks to all points 3 dB below = 9.1 mm

Ratio of SAR at M2 to SAR at M1 = 53.3%

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



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

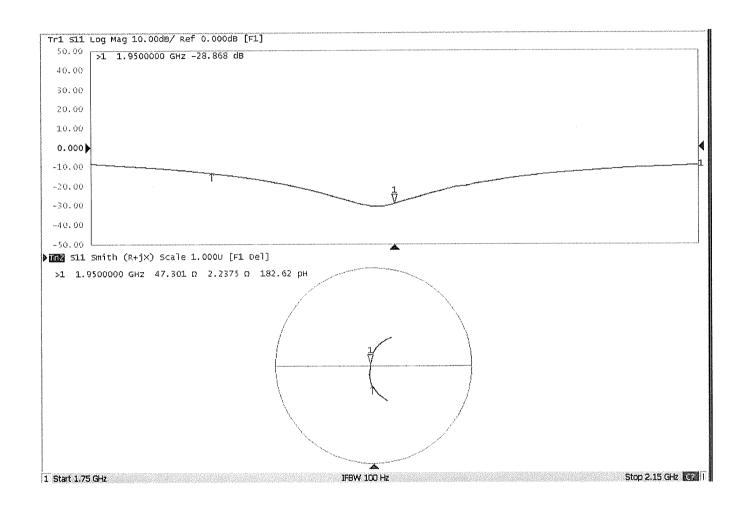
Certificate No: 24J02Z000857 Page 5 of 6



Tel: +86-10-62304633-2117

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Impedance Measurement Plot for Head TSL





中国认可 国际互认 校准 CALIBRATION CNAS L0570



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

Tel: +86-10-62304633-2117

E-mail: cttl@chinattl.com

http://www.caict.ac.cn

Client

7layers

Certificate No: 24J02Z000859

CALIBRATION CERTIFICATE

Object D2450V2 - SN: 1048

Calibration Procedure(s) FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date: November 6, 2024

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	106276	17-May-24 (CTTL, No. J24X04107)	May-25
Power sensor NRP6A	101369	17-May-24 (CTTL, No. J24X04107)	May-25
Reference Probe EX3DV4	SN 7517	21-Feb-24(CTTL-SPEAG, No. 24J02Z80008)	Feb-25
DAE4	SN 1588	13-Sep-24(CTTL-SPEAG, No. 24J02Z000713)	Sep-25
Secondary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Dec-23 (CTTL, No. J23X13426)	Dec-24
NetworkAnalyzer E5071C	MY46110673	25-Dec-23 (CTTL, No. J23X13425)	Dec-24
OCP DAK-3.5(weighted)	1040	22-Jan-24(SPEAG, No.OCP-DAK3.5-1040_Jan24)	Jan-25

Name Function Signature

Calibrated by: Zhao Jing SAR Test Engineer

Reviewed by: Lin Jun SAR Test Engineer

Approved by: Qi Dianyuan SAR Project Leader

Certificate No: 24J02Z000859

Issued: November 15, 2024

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



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Glossary:

TSL tissue simulating liquid

ConvF sensitivity in TSL / NORMx,y,z N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: 24J02Z000859 Page 2 of 6



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Measurement Conditions

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

DASY Version	DASY52	52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Triple Flat Phantom 5.1C	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2450 MHz ± 1 MHz	

Head TSL parametersThe 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	40.1 ± 6 %	1.81 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		

SAR result with Head TSL

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.3 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.3 W/kg ± 18.8 % (<i>k</i> =2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	250 mW input power	6.14 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.6 W/kg ± 18.7 % (<i>k</i> =2)

Certificate No: 24J02Z000859 Page 3 of 6





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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	47.4Ω+ 9.16jΩ
Return Loss	- 20.2dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.059 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

	SPEAG
Manufactured by	SPEAG

Certificate No: 24J02Z000859 Page 4 of 6



Date: 2024-11-06

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

Tel: +86-10-62304633-2117

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

DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

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

Communication System: UID 0, CW; Frequency: 2450 MHz

Medium parameters used: f = 2450 MHz; $\sigma = 1.809$ S/m; $\varepsilon_r = 40.08$; $\rho = 1000$ kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 SN7517; ConvF(7.37, 7.37, 7.37) @ 2450 MHz; Calibrated: 2024-02-21
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1588; Calibrated: 2024-09-13
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial: 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Reference Value = 107.2 V/m; Power Drift = 0.00 dB

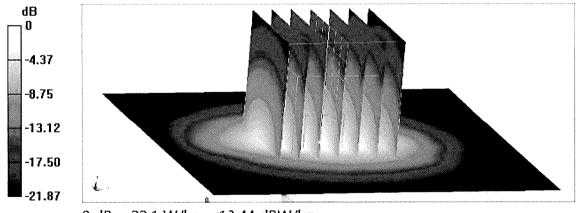
Peak SAR (extrapolated) = 27.1 W/kg

SAR(1 g) = 13.3 W/kg; SAR(10 g) = 6.14 W/kg

Smallest distance from peaks to all points 3 dB below = 8.5 mm

Ratio of SAR at M2 to SAR at M1 = 49.5%

Maximum value of SAR (measured) = 22.1 W/kg



0 dB = 22.1 W/kq = 13.44 dBW/kq

Certificate No: 24J02Z000859 Page 5 of 6

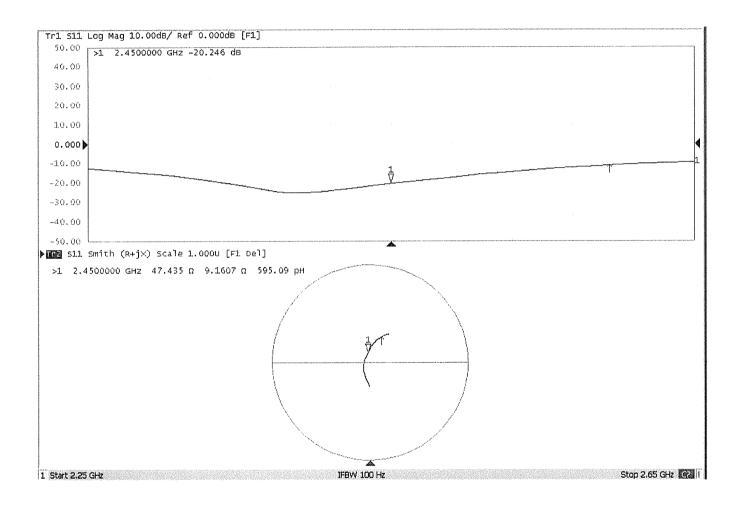




Tel: +86-10-62304633-2117

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

Impedance Measurement Plot for Head TSL



Calibration Laboratory of

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





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

Accredited by the Swiss Accreditation Service (SAS)

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

Client

7-Layers (Auden)

Accreditation No.: SCS 0108

Certificate No: D2550V2-1022 Sep22

CALIBRATION CERTIFICATE

CALIBRATION CERTIFICATE

Object D2550V2 - SN:1022

Calibration procedure(s) QA CAL-05.v11

Calibration Procedure for SAR Validation Sources between 0.7-3 GHz

Calibration date: September 22, 2022

This calibration certificate documents the traceability to national standards, which realize the physical units of measurements (SI). The measurements and the uncertainties with confidence probability are given on the following pages and are part of the certificate.

All calibrations have been conducted in the closed laboratory facility: environment temperature (22 ± 3)°C and humidity < 70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID#	Cal Date (Certificate No.)	Scheduled Calibration
Power meter NRP	SN: 104778	04-Apr-22 (No. 217-03525/03524)	Apr-23
Power sensor NRP-Z91	SN: 103244	04-Apr-22 (No. 217-03524)	Apr-23
Power sensor NRP-Z91	SN: 103245	04-Apr-22 (No. 217-03525)	Apr-23
Reference 20 dB Attenuator	SN: BH9394 (20k)	04-Apr-22 (No. 217-03527)	Apr-23
Type-N mismatch combination	SN: 310982 / 06327	04-Apr-22 (No. 217-03528)	Apr-23
Reference Probe EX3DV4	SN: 7349	31-Dec-21 (No. EX3-7349 Dec21)	Dec-22
DAE4	SN: 601	31-Aug-22 (No. DAE4-601_Aug22)	Aug-23
Secondary Standards	ID#	Check Date (in house)	Scheduled Check
Power meter E4419B	SN: GB39512475	30-Oct-14 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: US37292783	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
Power sensor HP 8481A	SN: MY41093315	07-Oct-15 (in house check Oct-20)	In house check: Oct-22
RF generator R&S SMT-06	SN: 100972	15-Jun-15 (in house check Oct-20)	In house check: Oct-22
Network Analyzer Agilent E8358A	SN: US41080477	31-Mar-14 (in house check Oct-20)	In house check: Oct-22
	Name	Function	Signature
Calibrated by:	Jeton Kastrati	Laboratory Technician	+=le
Approved by:	Sven Kühn	Technical Manager	C

Issued: September 23, 2022

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Certificate No: D2550V2-1022_Sep22

Page 1 of 6

Calibration Laboratory of Schmid & Partner Engineering AG

Zeughausstrasse 43, 8004 Zurich, Switzerland





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

Accreditation No.: SCS 0108

Accredited by the Swiss Accreditation Service (SAS)

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

Multilateral Agreement for the recognition of calibration certificates

Glossary:

TSL

tissue simulating liquid

ConvF

N/A

sensitivity in TSL / NORM x,y,z not applicable or not measured

Calibration is Performed According to the Following Standards:

- a) IEC/IEEE 62209-1528, "Measurement Procedure For The Assessment Of Specific Absorption Rate Of Human Exposure To Radio Frequency Fields From Hand-Held And Body-Worn Wireless Communication Devices - Part 1528: Human Models, Instrumentation And Procedures (Frequency Range of 4 MHz to 10 GHz)", October 2020.
- b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY System Handbook

Methods Applied and Interpretation of Parameters:

- Measurement Conditions: Further details are available from the Validation Report at the end
 of the certificate. All figures stated in the certificate are valid at the frequency indicated.
- Antenna Parameters with TSL: The source is mounted in a touch configuration below the center marking of the flat phantom.
- Return Loss: This parameter is measured with the source positioned under the liquid filled phantom (as described in the measurement condition clause). The Return Loss ensures low reflected power. No uncertainty required.
- SAR measured: SAR measured at the stated antenna input power.
- SAR normalized: SAR as measured, normalized to an input power of 1 W at the antenna connector.
- SAR for nominal TSL parameters: The measured TSL parameters are used to calculate the nominal SAR result.

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

Measurement Conditions

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

DASY Version	DASY52	V52.10.4
Extrapolation	Advanced Extrapolation	
Phantom	Modular Flat Phantom	
Distance Dipole Center - TSL	10 mm	with Spacer
Zoom Scan Resolution	dx, dy, dz = 5 mm	
Frequency	2550 MHz ± 1 MHz	

Head TSL parameters

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	39.1	1.91 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.4 ± 6 %	1.95 mho/m ± 6 %
Head TSL temperature change during test	< 0.5 °C	100	

SAR result with Head TSL

SAR averaged over 1 cm ³ (1 g) of Head TSL	Condition	
SAR measured	250 mW input power	13.5 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	53.0 W/kg ± 17.0 % (k=2)

SAR averaged over 10 cm ³ (10 g) of Head TSL	condition	
SAR measured	250 mW input power	6.13 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	24.2 W/kg ± 16.5 % (k=2)

Appendix (Additional assessments outside the scope of SCS 0108)

Antenna Parameters with Head TSL

Impedance, transformed to feed point	52.0 Ω - 4.0 jΩ	
Return Loss	- 27.1 dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.157 ns	-11
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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
-----------------	-------

Certificate No: D2550V2-1022_Sep22

DASY5 Validation Report for Head TSL

Date: 22.09.2022

Test Laboratory: SPEAG, Zurich, Switzerland

DUT: Dipole 2550 MHz; Type: D2550V2; Serial: D2550V2 - SN:1022

Communication System: UID 0 - CW; Frequency: 2550 MHz

Medium parameters used: f = 2550 MHz; $\sigma = 1.95$ S/m; $\varepsilon_r = 37.4$; $\rho = 1000$ kg/m³

Phantom section: Flat Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2011)

DASY52 Configuration:

Probe: EX3DV4 - SN7349; ConvF(7.85, 7.85, 7.85) @ 2550 MHz; Calibrated: 31.12.2021

Sensor-Surface: 1.4mm (Mechanical Surface Detection)

Electronics: DAE4 Sn601; Calibrated: 31.08.2022

Phantom: Flat Phantom 5.0 (front); Type: QD 000 P50 AA; Serial: 1001

DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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

Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 113.1 V/m; Power Drift = 0.06 dB

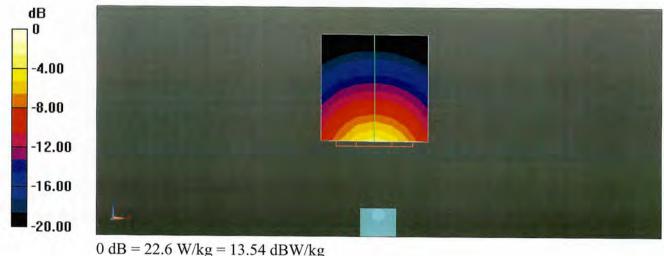
Peak SAR (extrapolated) = 27.5 W/kg

SAR(1 g) = 13.5 W/kg; SAR(10 g) = 6.13 W/kg

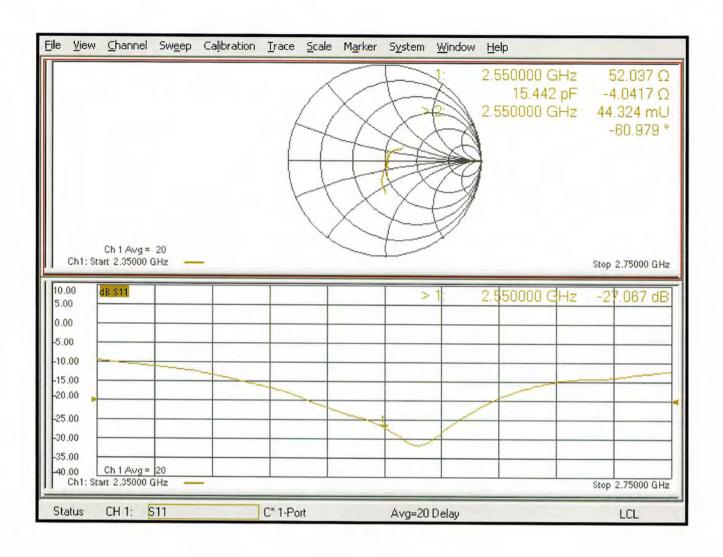
Smallest distance from peaks to all points 3 dB below = 9 mm

Ratio of SAR at M2 to SAR at M1 = 49%

Maximum value of SAR (measured) = 22.6 W/kg



Impedance Measurement Plot for Head TSL



D2550V2 - SN: 1022 Extended Dipole Calibrations

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

D2550V2 - SN: 1022						
2550MHz Head						
Date of Measurement	Return-Loss (dB)	Delta (%)	Real Impedance (ohm)	Delta (ohm)	Imaginary Impedance (ohm)	Delta (ohm)
9.22.2022	-27.1		52		-4	
9.21.2023	-23.13	-14.66	54.77	2.77	-5.52	-1.52

< Justification of the extended calibration >

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





Pwr -10 dBm Bw 10 kHz Refl OSM P1

Trc2 S11 Smith 200 mU/ Ref 1 U Cal

0.5

0.2

-0.5

0.5

Ch1 Start 2.35 GHz

• M1 2.550000 GHz 54.773 Ω -j5.522 Ω 11.302750 pF

Ch1 Start 2.35 GHz

Pwr -10 dBm Bw 10 kHz Refl OSM P1

Stop 2.75 GHz

Stop 2.75 GHz

2 🗸



中国认可国际互认 校准 CNAS LOS70

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Certificate No:

24J02Z000860

CALIBRATION CERTIFICATE

Object

D3500V2 - SN: 1111

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

November 11, 2024

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 $(22\pm3)^{\circ}$ C and humidity<70%.

Calibration Equipment used (M&TE critical for calibration)

Primary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Power Meter NRP2	106276	17-May-24 (CTTL, No. J24X04107)	May-25
Power sensor NRP6A	101369	17-May-24 (CTTL, No. J24X04107)	May-25
Reference Probe EX3DV4	SN 7517	21-Feb-24(CTTL-SPEAG, No. 24J02Z80008)	Feb-25
DAE4	SN 1588	13-Sep-24(CTTL-SPEAG, No. 24J02Z000713)	Sep-25
Secondary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Dec-23 (CTTL, No. J23X13426)	Dec-24
NetworkAnalyzer E5071C	MY46110673	25-Dec-23 (CTTL, No. J23X13425)	Dec-24
OCP DAK-3.5(weighted)	1040	22-Jan-24(SPEAG, No.OCP-DAK3.5-1040_Jan24)	Jan-25

Name

Function

Signatur

Calibrated by:

Zhao Jing

SAR Test Engineer

Reviewed by:

Lin Jun

SAR Test Engineer

Approved by:

Qi Dianyuan

SAR Project Leader

Issued: November 15, 2024

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

Certificate No: 24J02Z000860

Page 1 of 7



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Glossary:

TSL tissue simulating liquid

ConvF sensitivity in TSL / NORMx,y,z N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: 24J02Z000860 Page 2 of 7





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Measurement Conditions

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

DASY Version	DASY52	52.10.4
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	3400 MHz ± 1 MHz 3500 MHz ± 1 MHz	

Head TSL parameters at 3400 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	38.0	2.81 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	38.0 ± 6 %	2.80 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		

SAR result with Head TSL at 3400 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition	
SAR measured	100 mW input power	6.74 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	67.5 W/kg ± 24.4 % (<i>k</i> =2)
SAR averaged over 10 cm ³ (10 g) of Head TSL	Condition	
SAR measured	100 mW input power	2.55 W/kg
SAR for nominal Head TSL parameters	normalized to 1W	25.5 W/kg ± 24.2 % (<i>k</i> =2)

Head TSL parameters at 3500 MHz

The following parameters and calculations were applied.

	Temperature	Permittivity	Conductivity
Nominal Head TSL parameters	22.0 °C	37.9	2.91 mho/m
Measured Head TSL parameters	(22.0 ± 0.2) °C	37.8 ± 6 %	2.92 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		

SAR result with Head TSL at 3500 MHz

SAR averaged over 1 cm^3 (1 g) of Head TSL	Condition		
SAR measured	100 mW input power	6.58 W/kg	
SAR for nominal Head TSL parameters	normalized to 1W	65.7 W/kg ± 24.4 % (<i>k</i> =2)	
SAR averaged over 10 cm^3 (10 g) of Head TSL	Condition		
SAR measured	100 mW input power	2.48 W/kg	
SAR for nominal Head TSL parameters	normalized to 1W	24.8 W/kg ± 24.2 % (<i>k</i> =2)	

Certificate No: 24J02Z000860 Page 3 of 7





Tel: +86-10-62304633-2117

E-mail: emf@caict.ac.cn

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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL at 3400 MHz

Impedance, transformed to feed point	42.4Ω- 0.85jΩ	
Return Loss	- 21.6dB	

Antenna Parameters with Head TSL at 3500 MHz

Impedance, transformed to feed point	48.6Ω+ 3.70jΩ
Return Loss	- 27.9dB

General Antenna Parameters and Design

Electrical Delay (one direction)	1.043 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Name of a Council by	ODEAG
Manufactured by	SPEAG

Certificate No: 24J02Z000860 Page 4 of 7



Date: 2024-11-11

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

Tel: +86-10-62304633-2117

E-mail: emf@caict.ac.cn http://www.caict.ac.cn

DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 3500 MHz; Type: D3500V2; Serial: D3500V2 - SN: 1111

Communication System: CW; Frequency: 3400 MHz, CW; Frequency: 3500 MHz, Medium parameters used: f = 3400 MHz; $\sigma = 2.8$ S/m; $\epsilon_r = 38.04$; $\rho = 1000$ kg/m³, Medium parameters used: f = 3500 MHz; $\sigma = 2.922$ S/m; $\epsilon_r = 37.75$; $\rho = 1000$ kg/m³,

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

- Probe: EX3DV4 SN7517; ConvF(6.95, 6.95, 6.95) @ 3400 MHz;
 ConvF(6.72, 6.72, 6.72) @ 3500 MHz; Calibrated: 2024-02-21
- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1588; Calibrated: 2024-09-13
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial:
 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

Dipole Calibration /Pin=100mW, d=10mm, f=3400 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 57.90 V/m; Power Drift = 0.04 dB

Peak SAR (extrapolated) = 17.0 W/kg

SAR(1 g) = 6.74 W/kg; SAR(10 g) = 2.55 W/kg

Smallest distance from peaks to all points 3 dB below = 8 mm

Ratio of SAR at M2 to SAR at M1 = 77.3%

Maximum value of SAR (measured) = 12.2 W/kg

Dipole Calibration /Pin=100mW, d=10mm, f=3500 MHz/Zoom Scan,

dist=1.4mm (8x8x7)/Cube 0: Measurement grid: dx=4mm, dy=4mm, dz=1.4mm

Reference Value = 56.01 V/m; Power Drift = 0.05 dB

Peak SAR (extrapolated) = 16.9 W/kg

SAR(1 g) = 6.58 W/kg; SAR(10 g) = 2.48 W/kg

Smallest distance from peaks to all points 3 dB below = 8 mm

Ratio of SAR at M2 to SAR at M1 = 76.5%

Maximum value of SAR (measured) = 12.1 W/kg

Certificate No: 24J02Z000860 Page 5 of 7

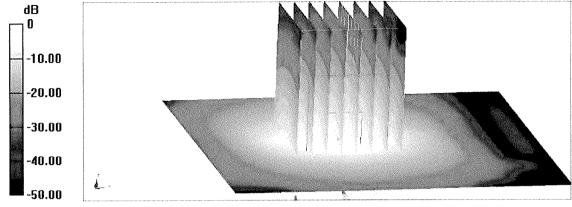




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0 dB = 12.1 W/kg = 10.83 dBW/kg

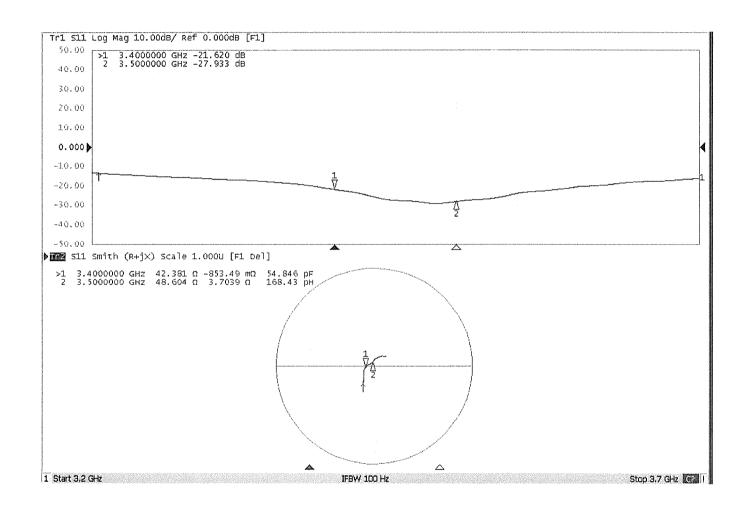
Certificate No: 24J02Z000860 Page 6 of 7



Add: No.52 HuaYuanBei Road, Haidian District, Beijing, 100191, China Tel: +86-10-62304633-2117

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Impedance Measurement Plot for Head TSL









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Client

7layers

Certificate No: 24J02Z000865

CALIBRATION CERTIFICATE

Object D5GHzV2 - SN: 1315

Calibration Procedure(s)

FF-Z11-003-01

Calibration Procedures for dipole validation kits

Calibration date:

Reviewed by:

November 5, 2024

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	106276	17-May-24 (CTTL, No. J24X04107)	May-25
Power sensor NRP6A	101369	17-May-24 (CTTL, No. J24X04107)	May-25
Reference Probe EX3DV4	SN 7517	21-Feb-24(CTTL-SPEAG, No. 24J02Z80008)	Feb-25
DAE4	SN 1588	13-Sep-24(CTTL-SPEAG, No. 24J02Z000713)	Sep-25
Secondary Standards	ID#	Cal Date (Calibrated by, Certificate No.)	Scheduled Calibration
Signal Generator E4438C	MY49071430	25-Dec-23 (CTTL, No. J23X13426)	Dec-24
NetworkAnalyzer E5071C	MY46110673	25-Dec-23 (CTTL, No. J23X13425)	Dec-24
OCP DAK-3.5(weighted)	1040	22-Jan-24(SPEAG, No.OCP-DAK3.5-1040_Jan24)	Jan-25

Name Function Signature

Calibrated by: Zhao Jing SAR Test Engineer

Lin Jun SAR Test Engineer

Approved by: Qi Dianyuan SAR Project Leader

Issued: November 15, 2024

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

Certificate No: 24J02Z000865 Page 1 of 8



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Glossary:

TSL tissue simulating liquid

ConvF sensitivity in TSL / NORMx,y,z N/A not applicable or not measured

Calibration is Performed According to the Following Standards:

a) IEC/IEEE 62209-1528, "Measurement Procedure for The Assessment of Specific Absorption Rate of Human Exposure to Radio Frequency Fields from Hand-held and Body-mounted Wireless Communication Devices- Part 1528: Human Models, Instrumentation and Procedures (Frequency range of 4 MHz to 10 GHz)", October 2020

b) KDB 865664, "SAR Measurement Requirements for 100 MHz to 6 GHz"

Additional Documentation:

c) DASY4/5 System Handbook

Methods Applied and Interpretation of Parameters:

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

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

Certificate No: 24J02Z000865 Page 2 of 8





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Measurement Conditions

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

DASY Version	DASY52	52.10.4
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 5250MHz

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	35.8 ± 6 %	4.70 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	44 40 101 40	100 TO TOTAL CO.

SAR result with Head TSL at 5250MHz

SAR averaged over 1 (1	g) of Head TSL	Condition	
SAR measured		100 mW input power	7.73 W/kg
SAR for nominal Head TSL parameters		normalized to 1W	77.3 W/kg ± 24.4 % (<i>k</i> =2)
SAR averaged over 10 (10 g) of Head TSL	Condition	
SAR measured		100 mW input power	2.16 W/kg
SAR for nominal Head TSL parameters		normalized to 1W	21.6 W/kg ± 24.2 % (<i>k</i> =2)

Certificate No: 24J02Z000865 Page 3 of 8





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Head TSL parameters at 5600MHz

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	35.2 ± 6 %	5.08 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C		

SAR result with Head TSL at 5600MHz

SAR averaged over 1	(1 g) of Head TSL	Condition		
SAR measured		100 mW input power	8.18 W/kg	
SAR for nominal Head TSL parameters		normalized to 1W	81.7 W/kg ± 24.4 % (<i>k</i> =2)	
SAR averaged over 10	(10 g) of Head TSL	Condition		
SAR measured		100 mW input power	2.27 W/kg	
SAR for nominal Head TSL parameters		normalized to 1W	22.7 W/kg ± 24.2 % (k=2)	

Head TSL parameters at 5750MHz

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	35.0 ± 6 %	5.24 mho/m ± 6 %
Head TSL temperature change during test	<1.0 °C	400 Allo T (0 P (0 P)	

SAR result with Head TSL at 5750MHz

SAR averaged over 1	(1 g) of Head TSL	Condition		
SAR measured		100 mW input power	7.73 W/kg	
SAR for nominal Head TSL parameters		normalized to 1W	77.1 W/kg ± 24.4 % (<i>k</i> =2)	
SAR averaged over 10	(10 g) of Head TSL	Condition		
SAR measured		100 mW input power	2.13 W/kg	
SAR for nominal Head TSL p	parameters	normalized to 1W	21.2 W/kg ± 24.2 % (<i>k</i> =2)	

Certificate No: 24J02Z000865 Page 4 of 8





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Appendix (Additional assessments outside the scope of CNAS L0570)

Antenna Parameters with Head TSL at 5250MHz

Impedance, transformed to feed point	49.2Ω- 1.60jΩ
Return Loss	- 34.8dB

Antenna Parameters with Head TSL at 5600MHz

Impedance, transformed to feed point	53.2Ω+ 4.15jΩ
Return Loss	- 25.9dB

Antenna Parameters with Head TSL at 5750MHz

Impedance, transformed to feed point	49.3Ω+ 4.49jΩ	
Return Loss	- 26.8dB	

General Antenna Parameters and Design

Electrical Delay (one direction)	1.099 ns

After long term use with 100W radiated power, only a slight warming of the dipole near the feed-point 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 feed-point may be damaged.

Additional EUT Data

Manufactured by	SPFAG
Wallulaciuleu by	of LAG

Certificate No: 24J02Z000865 Page 5 of 8



Date: 2024-11-05

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Tel: +86-10-62304633-2117

E-mail: emf@caict.ac.cn http://www.caic.ac.cn

DASY5 Validation Report for Head TSL

Test Laboratory: CTTL, Beijing, China

DUT: Dipole 5GHz; Type: D5GHzV2; Serial: D5GHzV2 - SN: 1315

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

Frequency: 5750 MHz

Medium parameters used: f = 5250 MHz; σ = 4.698 S/m; ϵ_r = 35.84; ρ = 1000 kg/m³ Medium parameters used: f = 5600 MHz; σ = 5.077 S/m; ϵ_r = 35.24; ρ = 1000 kg/m³ Medium parameters used: f = 5750 MHz; σ = 5.241 S/m; ϵ_r = 35.02; ρ = 1000 kg/m³

Phantom section: Right Section

Measurement Standard: DASY5 (IEEE/IEC/ANSI C63.19-2007)

DASY5 Configuration:

Probe: EX3DV4 - SN7517; ConvF(5.43, 5.43, 5.43) @ 5250 MHz;
 ConvF(4.83, 4.83, 4.83) @ 5600 MHz; ConvF(4.95, 4.95, 4.95) @ 5750 MHz; Calibrated: 2024-02-21

- Sensor-Surface: 1.4mm (Mechanical Surface Detection)
- Electronics: DAE4 Sn1588; Calibrated: 2024-09-13
- Phantom: MFP_V5.1C (20deg probe tilt); Type: QD 000 P51 Cx; Serial:
 1062
- DASY52 52.10.4(1535); SEMCAD X 14.6.14(7501)

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 = 61.02 V/m; Power Drift = -0.04 dB

Peak SAR (extrapolated) = 32.1 W/kg

SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.16 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 64.4%

Maximum value of SAR (measured) = 18.7 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 = 60.79 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 38.0 W/kg

SAR(1 g) = 8.18 W/kg; SAR(10 g) = 2.27 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 60.8%

Maximum value of SAR (measured) = 20.4 W/kg

Certificate No: 24J02Z000865 Page 6 of 8



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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 = 59.50 V/m; Power Drift = -0.08 dB

Peak SAR (extrapolated) = 37.3 W/kg

SAR(1 g) = 7.73 W/kg; SAR(10 g) = 2.13 W/kg

Smallest distance from peaks to all points 3 dB below = 7.2 mm

Ratio of SAR at M2 to SAR at M1 = 59.4%

Maximum value of SAR (measured) = 19.7 W/kg

Certificate No: 24J02Z000865 Page 7 of 8



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Impedance Measurement Plot for Head TSL

Certificate No: 24J02Z000865 Page 8 of 8



Appendix D. Conducted RF Output Power Table

The detailed power table are shown as follows.

Report Format Version 5.0.0 Issued Date : Dec. 11, 2024

Report No.: PSU-QBJ2409140110SA05

GSM WCDMA Default Power

Band		GSM85	0 (Ant0)	=.		GSM190	0 (Ant1)	_
Channel	128	189	251	Max. Tune-	512	661	810	Max. Tune-
Frequency (MHz)	824.2	836.4	848.8	up Power (dBm)	1850.2	1880	1909.8	up Power (dBm)
GSM	32.21	32.22	32.09	33.00	24.96	25.08	25.03	25.50
GPRS 1Tx Slot	32.24	32.21	32.11	33.00	24.95	25.10	25.04	25.50
GPRS 2Tx Slot	31.69	31.68	31.60	32.00	23.92	24.07	24.01	24.50
GPRS 3Tx Slot	30.40	30.05	29.94	31.00	22.33	22.49	22.40	23.50
GPRS 4Tx Slot	28.90	28.88	28.78	30.00	20.90	21.04	20.94	22.50
EDGE 1Tx Slot	27.21	27.22	27.02	28.00	20.74	20.57	20.57	22.50
EDGE 2Tx Slot	26.10	26.17	25.65	27.00	19.67	19.56	19.58	21.50
EDGE 3Tx Slot	23.98	24.01	23.76	25.00	18.04	17.89	17.96	19.50
EDGE 4Tx Slot	22.83	22.72	22.55	24.00	16.29	16.50	16.24	17.50

Band	W	CDMA II (Ant	:1)	WCDMA II	W	CDMA IV (Ant	t1)	WCDMA IV	W	CDMA V (An	t0)	WCDMA V
TX Channel	9262	9400	9538	Max. Tune-	1312	1413	1513	Max. Tune-	4132	4182	4233	Max. Tune-
Rx Channel	9662	9800	9938	up Power	1537	1638	1738	up Power	4357	4407	4458	up Power
Frequency (MHz)	1852.4	1880	1907.6	(dBm)	1712.4	1732.6	1752.6	(dBm)	826.4	836.4	846.6	(dBm)
RMC 12.2K	20.11	20.07	19.99	20.50	20.13	19.87	19.91	20.50	23.92	23.93	23.83	24.50
HSDPA Subtest-1	19.20	19.47	19.21	20.00	19.39	19.12	19.17	20.00	22.93	22.97	22.91	24.00
HSDPA Subtest-2	19.08	19.09	19.10	20.00	19.28	19.03	19.05	20.00	22.89	22.93	22.95	24.00
HSDPA Subtest-3	18.83	18.71	18.72	20.00	18.93	18.65	18.71	20.00	22.56	22.59	22.51	24.00
HSDPA Subtest-4	18.70	18.72	18.71	20.00	18.93	18.63	18.70	20.00	22.40	22.45	22.36	24.00
DC-HSDPA Subtest-1	19.18	19.41	19.11	20.00	19.35	18.98	19.06	20.00	22.90	22.89	22.85	24.00
DC-HSDPA Subtest-2	18.93	18.98	19.01	20.00	19.22	18.91	19.01	20.00	22.82	22.88	22.87	24.00
DC-HSDPA Subtest-3	18.72	18.64	18.69	20.00	18.89	18.51	18.57	20.00	22.46	22.48	22.40	24.00
DC-HSDPA Subtest-4	18.61	18.57	18.56	20.00	18.82	18.49	18.59	20.00	22.27	22.40	22.26	24.00
HSUPA Subtest-1	17.02	17.08	17.04	18.00	17.05	16.66	16.72	18.00	21.36	21.38	21.32	22.00
HSUPA Subtest-2	17.11	17.18	17.16	18.00	17.38	17.11	17.15	18.00	20.90	20.91	20.84	22.00
HSUPA Subtest-3	17.91	17.86	17.81	18.00	17.84	17.86	17.88	18.00	20.91	20.90	20.83	22.00
HSUPA Subtest-4	16.71	16.77	16.72	18.00	16.91	16.68	16.67	18.00	20.40	20.41	20.34	22.00
HSUPA Subtest-5	18.15	18.17	18.19	19.00	18.38	18.09	18.11	19.00	21.85	21.87	21.79	23.00
HSPA+ Subtest-1	18.63	18.65	18.64	20.00	18.83	18.58	18.63	20.00	22.49	22.53	22.41	24.00

LTE Default Power

				d 12 (Ant0)				
BW	MCS	RB Size	RB Offset nnel	Low 23060	Mid 23095	High 23130	Max.	
BW	Index		ce (MHz)	704	707.5	711	Tune-up (dBm)	
		1	0	23.27	23.28	23.31	24	
		1	24	23.16	23.22	23.24	24	
		1	49	23.24	23.20	23.19	24	
	QPSK	25	0	22.23	22.25	22.30	23	
		25	12	22.22	22.21	22.28	23	
		25	25		22.18	22.25	23	
		50 1	0	22.16 22.53	22.23	22.26 22.39	23 23	
		1	24	22.46	22.44	22.39	23	
		1	49	22.50	22.31	22.41	23	
10M	16QAM	25	0	21.16	21.18	21.25	22	
		25	12	21.20	21.17	21.21	22	
		25	25	21.17	21.24	21.16	22	
		50	0	21.15	21.22	21.23	22	
		1	0	21.38	21.41	21.46	22	
		1	24	21.27	21.26	21.30	22	
		1	49	21.27	21.31	21.27	22	
	64QAM	25	0	20.15	20.17	20.13	21	
		25	12	20.09	20.07	20.09	21	
		25	25	20.08	20.08	20.13	21	
		50	0	20.10	20.15	20.13	21	
BW	MCS		nnel	23035	23095	23155	Max.	
	Index	Frequen 1		701.5	707.5	713.5	Tune-up	
		1	12	23.23	23.18 23.10	23.30 23.22	24 24	
		1	24	23.02	23.10	23.22	24	
	QPSK	12	0	22.13	22.10	22.15	23	
		12	6	22.20	22.14	22.27	23	
	1	12	13	22.10	22.06	22.23	23	
		25	0	22.07	22.13	22.17	23	
		1	0	22.41	22.40	22.31	23	
		1	12	22.38	22.20	22.25	23	
		1 12	24	22.48 21.01	22.17	22.36	23	
5M	16QAM		0		21.10	21.22	22	
		12	6	21.05	21.07	21.06	22	
		25	13	21.12	21.12	21.10 21.13	22	
		1	0	21.32	21.38	21.38	22	
		1	12	21.13	21.11	21.27	22	
		1	24	21.19	21.28	21.17	22	
	64QAM	64QAM	12	0	20.05	20.09	20.06	21
		12	6	19.96	19.93	19.99	21	
		12	13	19.94	20.05	19.99	21	
		25	0	20.07	20.09	20.05	21	
BW	MCS	Cha	nnel	23025	23095	23165	Max.	
DW	Index	Frequen	ce (MHz)	700.5	707.5	714.5	Tune-up	
		1	0	23.21	23.13	23.27	24	
	1	1	7	23.05	23.16	23.16	24	
	QPSK	8	14	23.26 22.08	23.06 22.15	23.17	24	
	uran	8	3	22.08	22.15	22.18	23	
		8	7	22.10	22.06	22.13	23	
		15	0	22.01	22.17	22.21	23	
		1	0	22.45	22.43	22.24	23	
		1	7	22.43	22.21	22.35	23	
	1	1	14	22.40	22.27	22.35	23	
ЗМ	16QAM	- 8	0	21.13	21.07	21.15	22	
		- 8	3	21.17	21.08	21.11	22	
		8	7	21.13	21.15	21.02	22	
		15	0	21.03	21.15	21.14	22	
	1	1	0	21.28	21.36	21.35	22	
		1	7	21.26	21.19	21.16	22	
	640***			21.12	21.30	21.25	22	
	64QAM	8	0	20.07	21.30 20.08	21.25 20.12	21	
	64QAM	8	0	20.07 20.02	21.30 20.08 19.97	21.25 20.12 19.99	21	
	64QAM	8 8 8	0 3 7	20.07 20.02 20.03	21.30 20.08 19.97 19.93	21.25 20.12 19.99 20.04	21	
		8 8 8 15	0 3 7 0	20.07 20.02 20.03 20.05	21.30 20.08 19.97 19.93 20.01	21.25 20.12 19.99 20.04 20.00	21 21 21 21	
BW	64QAM MCS Index	8 8 8 15	0 3 7 0	20.07 20.02 20.03 20.05 23017	21.30 20.08 19.97 19.93	21.25 20.12 19.99 20.04	21 21 21	
BW	MCS	8 8 8 15	0 3 7 0	20.07 20.02 20.03 20.05	21.30 20.08 19.97 19.93 20.01 23095	21.25 20.12 19.99 20.04 20.00 23173	21 21 21 21 21 Max.	
BW	MCS	8 8 8 15	0 3 7 0 nnel	20.07 20.02 20.03 20.05 23017 699.7	21.30 20.08 19.97 19.93 20.01 23095 707.5	21.25 20.12 19.99 20.04 20.00 23173 715.3	21 21 21 21 21 Max.	
BW	MCS Index	8 8 8 15 Cha Frequen 1	0 3 7 0 nnel ce (MHz) 0	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.08 23.19	21.30 20.08 19.97 19.93 20.01 23095 707.5 23.17 23.10 23.15	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10	21 21 21 21 21 Max. Tune-up 24 24	
BW	MCS	8 8 8 15 Charles Frequent 1 1 1 1 3	0 3 7 0 nnel ce (MHz) 0 2	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.08 23.19 23.09	21.30 20.08 19.97 19.93 20.01 23095 707.5 23.17 23.10 23.15 23.14	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.26	21 21 21 21 21 Max. Tune-up 24 24 24 24	
BW	MCS Index	8 8 8 15 Charles Frequent 1 1 1 3 3 3	0 3 7 0 nnel ce (MHz) 0 2 5 0	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.08 23.19 23.09 23.19	21.30 20.08 19.97 19.93 20.01 23095 707.5 23.17 23.10 23.15 23.14 23.12	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.26 23.21	21 21 21 21 21 Max. Tune-up 24 24 24 24 24	
BW	MCS Index	8 8 8 15 Cha Frequent 1 1 1 3 3 3 3 3 3	0 3 7 0 nnel ce (MHz) 0 2 5 0	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.08 23.19 23.19 23.19 23.16	21.30 20.08 19.97 19.93 20.01 23095 707.5 23.17 23.10 23.15 23.14 23.12 23.08	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.26 23.21 23.11	21 21 21 21 21 Max. Tune-up 24 24 24 24 24 24	
BW	MCS Index	8 8 8 15 Cha Frequent 1 1 1 3 3 3 6 6	0 3 7 0 nnel ce (MHz) 0 2 5 0 1	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.08 23.19 23.19 23.19 23.16 22.15	21.30 20.08 19.97 19.93 20.01 23095 707.5 23.17 23.10 23.15 23.14 23.12 23.08 22.11	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.26 23.21 23.21	21 21 21 21 21 21 Max. Tune-up 24 24 24 24 24 24 24 24	
BW	MCS Index	8 8 8 15 Cha Frequen 1 1 1 3 3 3 3 6 6 1 1	0 3 7 0 nnel ce (MHz) 0 2 5 0 1 3	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.08 23.19 23.09 23.19 23.19 23.19 23.16 22.15	21.30 20.08 19.97 19.93 20.01 23.05 707.5 23.17 23.10 23.15 23.14 23.12 23.08 22.11 22.35	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.26 23.21 23.11 22.21	21 21 21 21 21 21 Max. Tune-up 24 24 24 24 24 24 24 23	
BW	MCS Index	8 8 8 15 Cha Frequent 1 1 1 3 3 3 6 6	0 3 7 0 nnel ce (MHz) 0 2 5 0 1	20.07 20.02 20.03 20.05 23017 689.7 23.18 23.08 23.19 23.09 23.19 23.16 22.15 22.41 22.39	21.30 20.08 19.97 19.93 20.01 23095 707.5 23.17 23.15 23.14 23.12 23.08 22.11 22.35 22.22	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.26 23.21 23.21 23.21 22.21 22.22	21 21 21 21 21 21 Max. Tune-up 24 24 24 24 24 24 24 23 23 23	
	MCS Index	8 8 8 15 Chamber 1 1 1 1 3 3 3 3 6 6 1 1 1 1	0 3 7 0 nnel ce (MHz) 0 2 5 0 1 1 3 0	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.08 23.19 23.09 23.19 23.19 23.19 23.16 22.15	21.30 20.08 19.97 19.93 20.01 23.05 707.5 23.17 23.10 23.15 23.14 23.12 23.08 22.11 22.35	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.26 23.21 23.11 22.21	21 21 21 21 21 21 Max. Tune-up 24 24 24 24 24 24 24 23	
BW 1.4M	MCS Index	8 8 8 8 15 Chas Frequen 1 1 1 1 3 3 3 6 6 1 1 1 1 1 1 1 1	0 3 7 0 0 nnel 0 2 5 0 1 3 0 0 2 5 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	20.07 20.02 20.03 20.05 20.05 23.17 699.7 23.18 23.08 23.19 23.19 23.16 22.15 22.41 22.39 22.49	21.30 20.08 19.97 19.93 20.01 23095 707.5 23.17 23.10 23.15 23.14 23.12 23.08 22.11 22.35 22.22 22.27	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.26 23.21 23.21 22.21 22.22 22.23 22.37	21 21 21 21 21 Max. Tune-up 24 24 24 24 24 24 23 23 23	
	MCS Index	8 8 8 8 15 Chas 15 Cha	0 0 3 7 7 0 0 nntel cce (MHz) 0 2 5 0 0 1 1 3 0 0 0 2 5 5 0 1 1 1 3 1 0 0 0 1 1 1 1 1 1 1 1 1 1 1	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.08 23.19 23.19 23.16 22.15 22.24 22.39 22.41 22.39 22.41 22.05	21.30 20.08 19.97 19.93 20.01 23095 723.17 23.10 23.15 23.14 23.12 23.08 22.11 22.35 22.22 22.17	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.26 23.21 23.21 22.21 22.28 22.23 22.37 22.17	21 21 21 21 21 21 24 24 24 24 24 24 23 23 23 23 23	
	MCS Index	8 8 8 8 15 Cha 15 Cha 15 Cha 16 1 1 1 1 1 3 3 3 3 6 6 1 1 1 1 1 3 3 3 3	0 3 7 0 nnel 0 2 5 0 1 1 3 0 0	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.19 23.09 23.19 23.16 22.15 22.41 22.39 22.49 22.05	21.30 20.08 19.97 19.93 20.01 23095 707.5 23.17 23.16 23.14 23.12 23.08 22.11 22.35 22.22 22.17 22.11	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.26 23.21 23.21 22.21 22.28 22.23 22.37 22.17	21 21 21 21 21 21 Max. Tune-up 24 24 24 24 24 24 24 23 23 23 23 23	
	MCS Index	8 8 8 8 15 Cha 11 1 1 3 3 3 6 6 1 1 1 1 3 3 3 3 3 3 3	0 3 7 0 0 nnel ce (MHz) 0 2 5 0 1 1 3 0 0 2 5 0 0 1 1 3 0 0 1 1 3 0 0 1 1 1 1 1 1 1 1	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.08 23.19 23.19 23.16 22.15 22.41 22.39 22.49 22.06	21.30 20.08 19.97 19.93 20.01 23.05 23.17 23.10 23.15 23.14 23.12 23.08 22.11 22.35 22.22 22.17 22.17 22.17	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.21 23.21 23.21 22.21 22.28 22.23 22.37 22.17 22.18	21 21 21 21 21 24 24 24 24 24 23 23 23 23 23 23 23 23 23 23 23 23 23	
	MCS Index	8 8 8 8 15 Cha Frequen 1 1 1 3 3 3 3 6 6 1 1 1 3 3 3 3 6 6 6 1 1 1 5 6 6 6 6 6 6 6 6 6 6 6 6 6	0 3 7 0 0 nnet ce (MHz) 0 2 5 0 0 1 3 0 0 0 0 2 5 0 0 1 1 3 0 0 0 1 1 3 0 0 0 1 1 3 0 0 0 1 1 1 1	20.07 20.02 20.03 20.05 23017 6987 23.18 23.08 23.19 23.19 23.16 22.15 22.41 22.39 22.49 22.49 22.06 22.15 22.15 22.16	21.30 20.08 19.97 19.93 20.01 23.05 23.17 23.10 23.15 23.14 23.12 23.08 22.21 22.35 22.22 22.17 22.11 22.02 22.11 22.03	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.26 23.21 22.21 22.21 22.22 22.23 22.27 22.17 22.16	21 21 21 21 21 21 21 21 24 24 24 24 24 23 23 23 23 23 23 23 23	
	MCS Index	8 8 8 8 15 Cha Frequent 1 1 1 1 1 3 3 3 3 6 6 1 1 1 1 1 1 1 1 1	0 3 7 0 nnel 2 5 0 1 3 0 0 2 5 0 0 1 3 0 0 1 3 0 0 0 0 0 0 0 0 0 0 0 0	20.07 20.02 20.03 20.05 23017 69.7 23.18 23.08 23.19 23.19 23.16 22.41 22.39 22.41 22.39 22.42 22.05 22.06 22.15 22.15 23.15 24.15 25.	21.30 20.08 19.97 19.93 20.01 23.05 707.5 23.17 23.15 23.14 23.12 23.08 22.11 22.35 22.22 22.17 22.02 22.21 22.02	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.21 23.21 23.21 23.21 22.21 22.21 22.22 22.37 22.17 22.18 22.10	21 21 21 21 21 21 21 21 22 24 24 24 24 23 23 23 23 23 23 23 23 22 22 22 22	
	MCS Index	8 8 8 15 Change of the control of th	0 0 3 7 7 0 0 mnel cee (MHz) 0 2 5 5 0 1 1 3 0 0 2 5 5 0 1 1 3 3 0 0 2 2 5 5 0 0 1 1 3 3 0 0 0 2 2 5 5 0 0 0 1 1 2 5 5 5 0 0 0 1 1 2 5 5 5 0 0 0 1 1 2 5 5 5 0 0 0 1 1 2 5 5 5 0 0 0 1 1 2 5 5 5 0 0 0 1 1 2 5 5 5 0 0 0 1 1 2 5 5 5 0 0 0 1 1 2 5 5 5 0 0 0 1 1 2 5 5 5 0 0 0 1 1 2 5 5 5 5 0 0 0 1 1 2 5 5 5 5 5 0 0 0 1 1 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	20.07 20.02 20.03 20.05 23017 23.18 23.09 23.19 23.19 23.19 22.15 22.41 22.41 22.42 22.62 22.15	21.30 20.08 19.97 19.93 20.01 23.05 707.5 23.17 23.15 23.15 23.14 23.12 23.08 22.11 22.35 22.21 22.17 22.11	21.25 20.12 19.99 20.04 20.00 23173 23.17 23.18 23.26 23.21 23.21 22.21 22.23 22.23 22.37 22.18 22.10 21.16 21.32 21.12 22.18 22.10 21.12 21.13 21.13 21.13 21.13 21.13 21.13 21.13 21.13 21.13	21 21 21 21 21 21 21 21 22 24 24 24 24 23 23 23 23 23 23 23 22 22 22 22 22	
	MCS Index	8 8 8 15 Change of the control of th	0 0 3 7 7 0 0 nnel ce (MHz) 0 0 2 5 5 0 0 1 1 3 0 0 0 2 5 5 0 0 1 1 3 0 0 0 2 5 5 0 0 1 5 5 0 0 1 5 5 0 0 0 1 5 5 0 0 0 0	20.07 20.02 20.03 20.05 23017 699.7 23.18 23.09 23.19 23.19 23.16 22.15 22.41 22.39 22.41 22.39 22.49 22.06 22.15 21.09 21.35 21.35	21.30 20.08 19.97 19.93 20.01 23.95 707.5 23.17 23.15 23.14 23.12 23.08 22.11 22.35 22.22 22.17 22.11 22.02 23.13 23.14 23.15 23.14 23.15 23.16 23.16 23.16 23.17 23.17 23.17 23.18	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.26 23.21 23.11 22.21 22.28 22.23 22.27 22.17 22.18 21.16 21.32 21.16 21.32	21 21 21 21 21 Max. Tune-up 24 24 24 24 24 23 23 23 23 23 23 23 22 22 22 22 22 22	
	MCS Index	8 8 8 15 C C had a second a se	0 3 7 7 0 mnel ce (MHz) 0 2 5 5 0 0 1 1 3 3 0 0 0 2 5 5 0 0 0 1 1 3 3 0 0 0 0 0 0 0 0 0 0 0 0 0	20.07 20.02 20.03 20.05 23.07 23.18 23.09 23.19 23.09 23.19 23.16 22.15 22.41 22.39 22.49 22.20 22.15 22.41 22.30 22.15 22	21.30 20.08 19.97 19.93 20.01 23.05 707.5 23.16 23.15 23.15 23.12 23.32 22.11 22.35 22.17	21.25 20.12 19.99 20.04 20.00 23173 715.3 23.17 23.18 23.10 23.21 23.21 22.21 22.21 22.21 22.23 22.37 22.17 22.18 22.10 21.13 21.10 21.13 21.10 21.13 21.10 21.13 21.10 21.13 21.10 21.13 21.10 21.13	21 21 21 21 21 21 21 21 22 22 22 22 22 2	

	1	RB Size	RB Offset	nd 41 (2496 Low	~ 2690MH	z) (Ant0) Mid	High Mid	High	
BW	MCS		nnel	39750	40185	40620	41055	41490	Max. Tune-up
	Index		ice (MHz)	2506	2549.5	2593	2636.5	2680	(dBm)
		1	0	19.16	19.18	19.28	19.18	19.06	20
		1	50	19.12	19.15	19.20	19.17	19.04	20
		1	99	19.02	19.06	19.11	18.99	18.97	20
	QPSK	50	0	19.16	19.18	19.19 19.14	19.18	19.10	20
		50 50	25 50	19.11	19.16 19.13	19.14	19.13 19.09	19.07 19.04	20
		100	0	19.14	19.13	19.11	19.09	19.04	20
		1	0	19.08	19.12	19.12	19.14	18.99	20
		1	50	19.07	19.10	19.12	19.11	18.95	20
		1	99	18.94	19.01	19.05	18.98	18.92	20
20M	16QAM	50	0	19.01	19.03	19.02	19.02	18.93	20
		50	25	19.01	19.02	19.00	18.97	18.93	20
		50	50	18.97	18.98	19.00	18.96	18.89	20
		100	0	19.00	18.99	19.00	18.96	18.91	20
		1	0	19.01	18.86	18.83	18.84	18.76	20
		1	50 99	18.79 18.70	18.82 18.75	18.87 18.76	18.81 18.70	18.72 18.66	20 20
	64QAM	50	0	19.06	18.95	19.02	18.82	19.12	20
	04d/iii	50	25	19.00	19.03	19.04	18.99	18.95	20
		50	50	18.96	18.98	18.99	18.95	18.91	20
		100	0	18.98	19.00	19.01	18.96	18.92	20
BW	MCS	Cha	nnel	39725	40173	40620	41068	41515	Max.
Diff	Index	Frequer	ice (MHz)	2503.5	2548.3	2593	2637.8	2682.5	Tune-up
	I	1	0	19.07	19.09	19.23	19.06	18.95	20
	1	1	37	19.08	19.08	19.17	19.14	18.89	20
	QPSK	1 36	74 0	19.00 19.14	18.91 19.13	18.98 19.04	18.94 19.09	18.83	20 20
	ursk.	36	19	19.14	19.13	19.04	19.09	19.07	20
	I	36	39	19.02	18.99	19.09	19.01	18.91	20
	L_	75	0	19.12	19.13	19.13	19.04	18.94	20
		1	0	19.03	19.01	18.99	19.05	18.90	20
	I	1	37	19.05	19.03	19.06	18.98	18.81	20
		1 36	74 0	18.80 18.92	18.93 18.94	18.98	18.83	18.83 18.84	20
15M	16QAM	36	19	18.92	18.94	18.95 18.89	18.91 18.94	18.84	20
		36	39	18.87	18.89	18.90	18.94	18.86	20
		75	0	18.91	18.94	18.97	18.95	18.81	20
		1	0	19.00	18.74	18.78	18.73	18.66	20
		1	37	18.76	18.71	18.85	18.66	18.63	20
		- 1	74	18.60	18.60	18.72	18.56	18.56	20
	64QAM	36	0	19.02	18.86	18.95	18.80	19.00	20
		36	19	18.97	18.88	18.95	18.84	18.90	20
		36	39	18.95	18.85	18.93	18.81	18.78	20
		75	0	18.93	18.98	18.93	18.89	18.91	20
BW	MCS Index		nnel	39700 2501	40160 2547	40620 2593	41080 2639	41540 2685	Max. Tune-up
		1	ce (MHz)	19.13	19.15	19.13	19.13	18.96	20
		1	24	19.01	19.06	19.16	19.07	18.91	20
		1	49	18.91	18.98	19.00	18.85	18.94	20
	QPSK	25	0	19.09	19.04	19.08	19.08	19.07	20
		25	12	19.10	19.10	19.01		19.04	
		25					19.09		20
			25	19.09	18.99	19.03	19.05	18.99	20
		50	0	19.09 19.06	18.99 19.09	19.06	19.05 19.07	18.99 18.90	20 20
				19.09 19.06 19.01	18.99 19.09 19.08	19.06 19.03	19.05 19.07 19.09	18.99 18.90 18.90	20 20 20
		50 1	0	19.09 19.06	18.99 19.09	19.06	19.05 19.07	18.99 18.90	20 20
10M	16QAM	50 1 1	0 0 24	19.09 19.06 19.01 18.97	18.99 19.09 19.08 19.04	19.06 19.03 19.05	19.05 19.07 19.09 18.99	18.99 18.90 18.90 18.93	20 20 20 20
10M	16QAM	50 1 1 1 1 25 25	0 0 24 49 0	19.09 19.06 19.01 18.97 18.80 18.90 18.88	18.99 19.09 19.08 19.04 18.99 18.90	19.06 19.03 19.05 19.03	19.05 19.07 19.09 18.99 18.85 18.90 18.83	18.99 18.90 18.90 18.93 18.85	20 20 20 20 20 20 20 20 20
10M	16QAM	50 1 1 1 25 25 25	0 0 24 49 0 12 25	19.09 19.06 19.01 18.97 18.80 18.90 18.88	18.99 19.09 19.08 19.04 18.99 18.90 18.91 18.85	19.06 19.03 19.05 19.03 18.99 18.94	19.05 19.07 19.09 18.99 18.85 18.90 18.83	18.99 18.90 18.90 18.93 18.85 18.81 18.90 18.77	20 20 20 20 20 20 20 20 20 20
10M	16QAM	50 1 1 1 25 25 25 25	0 0 24 49 0 12 25	19.09 19.06 19.01 18.97 18.80 18.90 18.88 18.95 18.99	18.99 19.09 19.08 19.04 18.99 18.90 18.91 18.85	19.06 19.03 19.05 19.03 18.99 18.94 18.92	19.05 19.07 19.09 18.99 18.85 18.90 18.83 18.88 18.91	18.99 18.90 18.90 18.93 18.85 18.81 18.90 18.77 18.82	20 20 20 20 20 20 20 20 20 20 20
10M	16QAM	50 1 1 1 25 25 25 50	0 0 24 49 0 12 25 0	19.09 19.06 19.01 18.97 18.80 18.90 18.88 18.95 18.99 18.95	18.99 19.09 19.08 19.04 18.99 18.90 18.91 18.85 18.85	19.06 19.03 19.05 19.03 18.99 18.94 18.92 18.88 18.73	19.05 19.07 19.09 18.99 18.85 18.90 18.83 18.88 18.91 18.70	18.99 18.90 18.90 18.93 18.85 18.81 18.90 18.77 18.82 18.68	20 20 20 20 20 20 20 20 20 20 20 20
10M	16QAM	50 1 1 1 25 25 25 25 50 1	0 0 24 49 0 12 25 0	19.09 19.06 19.01 18.97 18.80 18.90 18.88 18.95 18.99 18.95 18.77	18.99 19.09 19.08 19.04 18.99 18.90 18.91 18.85 18.85 18.79 18.69	19.06 19.03 19.05 19.03 18.99 18.94 18.92 18.88 18.73	19.05 19.07 19.09 18.99 18.85 18.90 18.83 18.88 18.91 18.70	18.99 18.90 18.90 18.93 18.85 18.81 18.90 18.77 18.82 18.68	20 20 20 20 20 20 20 20 20 20 20 20 20 2
10M		50 1 1 1 25 25 25 50 1 1	0 0 24 49 0 12 25 0 0 24 49	19.09 19.06 19.01 18.97 18.80 18.80 18.88 18.95 18.99 18.95 18.77 18.61	18.99 19.09 19.08 19.04 18.99 18.90 18.91 18.85 18.85 18.79 18.69	19.06 19.03 19.05 19.03 18.99 18.94 18.92 18.88 18.73 18.77	19.05 19.07 19.09 18.99 18.85 18.90 18.83 18.88 18.91 18.70 18.72 18.59	18.99 18.90 18.90 18.93 18.85 18.81 18.90 18.77 18.82 18.68 18.60 18.63	20 20 20 20 20 20 20 20 20 20 20 20 20 2
10M	16QAM 64QAM	50 1 1 1 25 25 25 50 1 1 1 25	0 0 24 49 0 12 25 0 0 24 49	19.09 19.06 19.01 18.97 18.80 18.90 18.88 18.95 18.99 18.95 18.77 18.61	18.99 19.09 19.08 19.04 18.99 18.90 18.91 18.85 18.85 18.79 18.69 18.64	19.06 19.03 19.05 19.03 18.99 18.94 18.92 18.88 18.73 18.77 18.63 19.01	19.05 19.07 19.09 18.99 18.85 18.90 18.83 18.88 18.91 18.70 18.72 18.59	18.99 18.90 18.90 18.93 18.85 18.81 18.90 18.77 18.82 18.68 18.60 18.63	20 20 20 20 20 20 20 20 20 20 20 20 20 2
10M		50 1 1 1 25 25 25 50 1 1 1 25 25 50 50 50 50 50 50 50 50 50 5	0 0 24 49 0 12 25 0 0 0 24 49 0	19.09 19.06 19.01 18.97 18.80 18.90 18.88 18.95 18.99 18.95 18.95 18.97	18.99 19.09 19.08 19.04 18.99 18.90 18.91 18.85 18.85 18.79 18.69	19.06 19.03 19.05 19.03 18.99 18.94 18.92 18.88 18.73 18.77 18.63 19.01	19.05 19.07 19.09 18.99 18.85 18.90 18.83 18.88 18.91 18.70 18.72 18.59	18.99 18.90 18.90 18.93 18.85 18.81 18.90 18.77 18.82 18.68 18.60 18.63 19.11	20 20 20 20 20 20 20 20 20 20 20 20 20 2
10M		50 1 1 1 25 25 25 50 1 1 1 25	0 0 24 49 0 12 25 0 0 24 49	19.09 19.06 19.01 18.97 18.80 18.90 18.88 18.95 18.99 18.95 18.77 18.61	18.99 19.09 19.08 19.04 18.99 18.90 18.91 18.85 18.85 18.79 18.69 18.64 18.87	19.06 19.03 19.05 19.03 18.99 18.94 18.92 18.88 18.73 18.77 18.63 19.01	19.05 19.07 19.09 18.99 18.85 18.90 18.83 18.88 18.91 18.70 18.72 18.59 18.74	18.99 18.90 18.90 18.93 18.85 18.81 18.90 18.77 18.82 18.68 18.60 18.63	20 20 20 20 20 20 20 20 20 20 20 20 20 2
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BW	64QAM MCS Index	50 1 1 1 1 25 25 50 1 1 1 1 25 50 6 6 6 6 6 6 7 7 7 1 1 1 1 1 1 1 1 1 1 1	0 0 24 49 90 125 00 125 125 125 125 125 125 125 125 125 125	19.09 19.06 19.01 18.97 18.80 18.90 18.95 18.95 18.95 18.77 18.61 19.00 18.97 18.98 18.97 19.00 18.97 19.00 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 18.93 18.86 18.86 18.86 18.86 18.86 18.86 18.86 18.90 19.07	18.99 19.09 19.09 19.04 18.99 18.90 18.91 18.85 18.85 18.87 18.69 18.69 18.69 18.69 18.93 40148 19.15 19.00 19.10 19.10 19.10 19.10 19.03 19.04 19.04 19.05 18.97 18.89 19.05 18.97 18.89	19.06 19.03 19.03 18.94 18.94 18.92 18.88 18.73 18.63 19.01 18.87 40629 19.05	19.05 19.07 19.09 18.99 18.85 18.80 18.81 18.91 18.70 18.72 18.72 18.72 18.74 18.86 41003 2640.3 19.07 19.09 19.07 19.09 19.11 18.92 19.07 19.11 18.92 19.09 19.11 18.93 19.11 18.93 19.11 18.93 18.94 19.94 19.95	18.99 18.90 18.90 18.93 18.81 18.90 18.93 18.81 18.90 18.77 18.82 18.60 18.63 18.60 18.63 19.11 18.91 18.91 18.91 18.91 19.00 18.95 18.91	20 20 20 20 20 20 20 20 20 20 20 20 20 2
BW	64QAM MCS Index	50 1 1 1 1 25 25 50 1 1 1 1 25 50 60 1 1 1 1 25 50 Chr Frequer 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 24 49 0 0 12 25 0 0 0 12 24 49 0 0 12 25 0 0 0 12 24 49 0 0 12 25 0 0 12 24 24 25 0 0 12 24 24 25 0 0 0 0 12 24 26 0 0 0 0 12 25 0 0 0 0 12 25 0 0 0 0 0 12 25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.09 19.06 19.01 18.97 18.80 18.90 18.95 18.95 18.95 18.95 18.97 18.61 19.00 18.97 18.61 19.00 18.97 19.00 19.07 19.08 18.88 18.89 18.89 18.89 18.89 18.89 18.89 18.90 19.07	18.99 19.08 19.04 18.90 18.90 18.90 18.85 18.85 18.85 18.87 18.69 18.90	19.06 19.03 19.05 19.05 19.03 18.99 18.94 18.92 18.83 18.73 18.63 19.01 18.85 18.97 40620 2583 19.05 19.05 19.05 19.05 19.05 19.05 19.10 1	19.05 19.07 19.09 18.89 18.85 18.80 18.81 18.81 18.81 18.81 18.91 18.74 18.82 18.74 18.83 18.81 18.91 18.82 18.91 18.82 19.09 19.09 18.92 19.09 18.92 19.09 18.93	18.99 18.90 18.90 18.93 18.81 18.81 18.81 18.81 18.90 18.77 18.82 18.63 19.11 18.93 18.84 18.60 18.90 18.91	20 20 20 20 20 20 20 20 20 20 20 20 20 2
BW	64QAM MCS Index QPSK 16QAM	50 1 1 1 1 25 25 50 1 1 1 1 25 50 6 6 6 6 6 6 7 7 7 1 1 1 1 1 1 1 1 1 1 1	0 0 24 49 90 125 00 125 125 125 125 125 125 125 125 125 125	19.09 19.06 19.01 18.97 18.80 18.90 18.95 18.95 18.95 18.77 18.61 19.00 18.97 18.98 18.97 19.00 18.97 19.00 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 19.07 18.93 18.86 18.86 18.86 18.86 18.86 18.86 18.86 18.90 19.07	18.99 19.09 19.09 19.04 18.99 18.90 18.91 18.85 18.85 18.87 18.69 18.69 18.69 18.69 18.93 40148 19.15 19.00 19.10 19.10 19.10 19.10 19.03 19.04 19.04 19.04 19.05 18.97 18.89 19.05 18.97 18.89	19.06 19.03 19.03 18.94 18.94 18.92 18.88 18.73 18.63 19.01 18.87 40629 19.05	19.05 19.07 19.09 18.99 18.85 18.80 18.81 18.91 18.70 18.72 18.72 18.72 18.74 18.86 41003 2640.3 19.07 19.09 19.07 19.09 19.11 18.92 19.07 19.11 18.92 19.09 19.11 18.93 19.11 18.93 19.11 18.93 18.94 19.94 19.95	18.99 18.90 18.90 18.93 18.81 18.90 18.93 18.81 18.90 18.77 18.82 18.60 18.63 18.60 18.63 19.11 18.91 18.91 18.91 18.91 19.00 18.95 18.91	20 20 20 20 20 20 20 20 20 20 20 20 20 2
BW	64QAM MCS Index	50 1 1 1 1 25 25 50 1 1 1 1 25 50 6 1 1 1 1 25 50 Chi Frequer 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 0 24 49 0 12 25 0 0 12 24 49 0 12 25 0 0 12 24 6 6 13 0 0 0 12 22 24 0 0 0 12 22 24 0 0 0 12 22 24 0 0 0 12 22 24 0 0 0 12 22 24 0 0 0 12 22 24 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.09 19.06 19.01 18.97 18.80 18.90 18.95 18.95 18.95 18.95 18.97 18.61 19.00 18.97 18.88 18.87 18.89 18.97 18.90 19.07 19.08 19.07 19.08 19.07 19.08 19.07 19.08 18.99 18.99 18.99 18.99 18.99 19.07 19.08 18.99 18.99 18.99 18.99 19.07 19.08 18.99 18.99 18.99 18.99 18.99 18.99 18.99 19.07 19.08 18.99 18.99 18.99 18.99 19.07 19.08 18.99 18.99 18.99 18.99 18.99 18.99 18.99 18.99 18.99 18.99 19.07 19.08 18.99	18.99 19.08 19.04 18.90 19.08 19.04 18.90 18.90 18.90 18.85 18.85 18.87 18.89 18.93	19.06 19.03 19.05 19.05 19.03 18.99 18.94 18.92 18.83 18.77 18.63 19.01 18.85 18.97 40620 2693 19.05 19.04 19.12 18.96 18.86 1	19.05 19.07 19.09 18.89 18.85 18.90 18.85 18.83 18.81 18.70 18.72 18.74 18.85 18.74 18.85 18.91 18.83 244.03 19.07 19.09 18.92 19.07 19.11 18.83 18.91	18.99 18.90 18.90 18.90 18.93 18.85 18.81 18.81 18.63 19.11 18.93 18.63 19.11 18.93 18.84 18.69 19.91 18.91	20 20 20 20 20 20 20 20 20 20 20 20 20 2
BW	64QAM MCS Index QPSK 16QAM	50 1 1 1 1 25 25 50 1 1 1 1 25 25 50 60 60 60 60 60 60 60 60 60 60 60 60 60	0 0 0 24 49 90 125 0 0 0 0 125	19.09 19.06 19.01 18.97 18.80 18.90 18.95 18.95 18.95 18.77 18.61 19.00 18.97 18.67 19.00 18.97 19.08 19.01 19.07	18.99 19.08 19.04 18.99 18.90 18.90 18.85 18.85 18.87 18.69 18.64 18.93 4014 18.93 4014 19.00 19.10 19.10 19.10 19.10 19.01 19.10 19.01 19.01 19.03 19.04 19.05 18.97 18	19.06 19.03 19.05 19.03 18.94 18.94 18.92 18.88 18.77 18.63 19.01 18.91 18.92 18.96 19.03 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.06 18.96 18.96 19.90 18.96 19.90 18.96 18.97	19.05 19.07 19.09 18.99 18.85 18.90 18.87 18.87 18.70 18.72 18.72 18.74 18.82 41093 19.07 19.07 19.07 19.07 19.07 19.07 19.11 18.82 41093 19.07 19.07 19.07 19.09 19.00	18.99 18.90 18.90 18.93 18.81 18.81 18.81 18.62 18.63 18.63 18.63 18.60 18.63 19.11 18.91 19.01 18.91 19.02 19.02 19.02 19.02 19.03 19.02 19.03 19.02 19.03 19.02 19.03 19.03 19.03 19.03 19.03 19.04 18.91	20 20 20 20 20 20 20 20 20 20 20 20 20 2
BW	64QAM MCS Index QPSK 16QAM	50 1 1 1 1 25 25 25 50 1 1 1 25 25 50 1 1 1 1 25 25 1 1 1 1 25 25 1 1 1 1 1 1	0 0 0 24 49 0 0 12 25 0 0 0 12 24 49 0 0 12 25 0 0 12 24 49 0 0 12 22 25 0 0 12 24 0 0 12 22 24 0 0 6 6 13 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.09 19.06 19.01 18.97 18.80 18.90 18.95 18.95 18.95 18.95 18.77 18.61 19.00 18.97 18.61 19.00 18.97 18.88 18.87 19.06 18.90 19.07	18.99 19.08 19.04 18.99 18.90 18.90 18.89 18.85 18.85 18.87 18.64 18.87 18.64 18.93	19.06 19.03 19.05 19.03 18.94 18.94 18.94 18.96 18.77 18.63 19.07 18.91 18.91 18.92 18.99 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.05 19.01 18.86 18.87	19.05 19.07 19.09 18.99 18.85 18.90 18.83 18.81 18.70 18.72 18.72 18.72 18.74 18.86 18.91 18.83 244.03 19.07 19.07 19.07 19.11 18.82 19.07 19.11 18.83 19.07 19.11 18.83 19.07 19.11 18.83 19.07 19.11 18.83 19.07 19.09 18.91 19.09 19.11 18.83 18.81 18.81 18.83 18.81 18.83 18.81 18.83 18.81 18.83 18.84 18.84 18.85	18.99 18.90 18.90 18.93 18.81 18.81 18.81 18.82 18.63 19.11 18.93 18.63 19.11 18.93 18.63 19.11 18.93 18.84 18.80 18.60 18.63 19.11 18.91 18.89 18.81 18.80 18.81 18.81	20 20 20 20 20 20 20 20 20 20 20 20 20 2

		I TE	Rand 42	Part27Q (A	nt()		
		RB Size	RB Offset	Low	Mid	High	Max.
BW	MCS Index	Cha	annel	42190	42590	42990	Tune-up
	IIIdex	Frequen	ice (MHz)	3460	3500	3540	(dBm)
		1	0	19.27	19.32	19.27	20.5
		1	50 99	19.25 19.53	19.44 19.48	19.26 19.29	20.5
	QPSK	50	0	19.53	19.48	19.29	20.5
	QFSK	50	25	19.27	19.31	19.23	20.5
		50	50	19.46	19.36	19.30	20.5
		100	0	19.47	19.38	19.27	20.5
		- 1	0	19.38	19.41	19.37	20.5
		1	50	19.34	19.35	19.25	20.5
		1	99	19.27	19.33	19.31	20.5
20M	16QAM	50 50	0 25	19.30 19.28	19.41 19.32	19.29 19.28	20.5
		50	50	19.29	19.32	19.20	20.5
		100	0	19.29	19.17	19.28	20.5
		1	0	18.96	19.23	18.95	20.5
		1	50	18.91	19.33	18.94	20.5
		1	99	18.96	19.18	18.91	20.5
	64QAM	50	0	19.31	19.24	19.29	20.5
		50 50	25 50	19.32 19.28	19.39 19.25	19.30	20.5
		100	0	19.28	19.25	19.31 19.29	20.5
	MCS		annel	42165	42590	43015	Max.
BW	Index		ice (MHz)	3457.5	3500	3542.5	Max. Tune-up
		1	0	19.21	19.27	19.25	20.5
		1	37	19.20	19.42	19.21	20.5
	00000	1 20	74	19.46	19.42	19.25	20.5
	QPSK	36 36	0 19	19.27	19.27	19.13 19.08	20.5
		36	19 39	19.22	19.28	19.08	20.5
		75	0	19.37	19.29	19.22	20.5
		1	0	19.32	19.26	19.32	20.5
		1	37	19.19	19.21	19.12	20.5
		- 1	74	19.16	19.30	19.19	20.5
15M	16QAM	36 36	0 19	19.16 19.24	19.40 19.26	19.19 19.26	20.5
		36	39	19.24	19.26	19.20	20.5
		75	0	19.17	19.09	19.16	20.5
		1	0	18.85	19.13	18.81	20.5
	64QAM	1	37	18.86	19.30	18.83	20.5
		1	74	18.86	19.05	18.90	20.5
		36	0	19.30	19.20	19.23	20.5
		36	19	19.18	19.29	19.25	20.5
		36 75	39 0	19.14 19.16	19.17	19.30 19.28	20.5
	MCS	Cha		42140	42590	43040	May
BW	MCS Index		annel ace (MHz)	42140 3455	42590 3500	43040 3545	Max. Tune-up
BW		Frequent 1	ennel nce (MHz)	3455 19.13	3500 19.17	3545 19.16	Tune-up 20.5
BW		Frequent 1	oce (MHz) 0 24	3455 19.13 19.17	3500 19.17 19.34	3545 19.16 19.19	20.5 20.5
BW		Frequent 1	ennel nce (MHz)	3455 19.13 19.17 19.40	3500 19.17 19.34 19.37	3545 19.16 19.19 19.23	20.5 20.5 20.5 20.5
BW	Index	Frequent 1 1 1	0 24 49	3455 19.13 19.17 19.40 19.24	3500 19.17 19.34	3545 19.16 19.19	20.5 20.5
BW	Index	1 1 1 25	0 24 49 0	3455 19.13 19.17 19.40	19.17 19.34 19.37 19.21	3545 19.16 19.19 19.23 19.25	20.5 20.5 20.5 20.5 20.5
BW	Index	1 1 1 25 25 25 50	one (MHz) 0 24 49 0 12 25 0	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42	3500 19.17 19.34 19.37 19.21 19.30 19.25 19.35	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.25	20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
BW	Index	1 1 1 25 25 25 50 1	one (MHz) 0 24 49 0 12 25 0 0	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32	3500 19.17 19.34 19.37 19.21 19.30 19.25 19.35 19.40	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.25 19.34	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
BW	Index	1 1 1 25 25 25 50 1 1 1	sinnel 0 24 49 0 12 25 0 0 24	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32 19.24	3500 19.17 19.34 19.37 19.21 19.30 19.25 19.35 19.40 19.34	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.25 19.34 19.10	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	Index	1 1 1 25 25 25 50 1	one (MHz) 0 24 49 0 12 25 0 0	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32	3500 19.17 19.34 19.37 19.21 19.30 19.25 19.35 19.40	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.25 19.34	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
BW 10M	Index QPSK	Frequent 1 1 1 1 25 25 25 50 1 1 1 1	sinnel 100 (MHz) 100 (24	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32 19.24 19.17	3500 19.17 19.34 19.37 19.21 19.30 19.25 19.35 19.40 19.34 19.20	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.25 19.34 19.10	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	Index QPSK	Frequent 1 1 1 1 25 25 25 25 1 1 1 25 25	senel (MHz) 0 24 49 0 12 25 0 0 24 49 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32 19.24 19.17 19.26	3500 19.17 19.34 19.37 19.21 19.30 19.25 19.35 19.40 19.34 19.20 19.27	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.34 19.10 19.18 19.14	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	Index QPSK	Frequent 1 1 1 1 1 25 25 25 25 25 25 25 25 25 25 25 25 25	nnel sce (MHz) 0 24 49 0 12 25 0 0 12 24 49 0 12 25 0 0 12 24 0 0 12	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32 19.24 19.17 19.26 19.19 19.18	19.17 19.34 19.37 19.25 19.35 19.40 19.34 19.27 19.19 19.27 19.19	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.34 19.10 19.18 19.14 19.27	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	Index QPSK	Frequent 1 1 1 1 1 25 25 25 50 1 1 1 25 25 50 1 1 1 1 1 1 1 1 25 1 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	nnel sce (MHz) 0 24 49 0 12 25 0 24 49 0 0 12 25 0 0 12 0 0 0 12 0 0 0 0 0 0 0 0 0 0 0 0 0	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32 19.24 19.17 19.26 19.19 19.18 19.23	19.17 19.34 19.37 19.21 19.30 19.25 19.35 19.34 19.20 19.27 19.19 19.07 19.08	3545 19.16 19.19 19.25 19.25 19.25 19.25 19.25 19.24 19.10 19.14 19.14 19.27 19.19	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	Index QPSK	Frequent 1 1 1 1 25 25 25 50 1 1 1 25 25 25 50 1 1 1 1 1 25 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	nnel co (MHz) 0 0 24 49 0 12 25 0 0 12 25 0 0 12 24 49 0 0 12 25 0 0 24 49 0 12 25 0 0 12 25 0 0 12 25 0 0 12 25 0 0 12 24 49	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.42 19.24 19.17 19.26 19.19 19.19 19.18	19.17 19.34 19.37 19.21 19.30 19.25 19.35 19.40 19.27 19.27 19.19 19.08 19.22	3545 19.16 19.19 19.25 19.25 19.25 19.25 19.25 19.10 19.10 19.18 19.14 19.27 19.19 19.20 18.82	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	QPSK 16QAM	Frequent 1 1 1 1 25 25 25 50 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	nnel coe (MHz) 0 24 49 0 12 25 0 0 24 49 0 12 25 0 0 14 49 0 24 49 0 0 24 49 0 12 25 0 24 49 0 14 25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.13 19.17 19.40 19.24 19.17 19.42 19.42 19.42 19.32 19.24 19.17 19.26 19.19 19.18 19.23 18.93 18.87 18.89	19.17 19.34 19.37 19.21 19.30 19.25 19.35 19.40 19.34 19.27 19.19 19.07 19.08 19.22 19.22	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.34 19.10 19.14 19.27 19.19 19.20 18.83 18.77	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	Index QPSK	Frequent 1 1 1 1 25 25 25 50 1 1 1 25 25 25 50 1 1 1 1 1 25 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	nnel co (MHz) 0 0 24 49 0 12 25 0 0 12 25 0 0 12 24 49 0 0 12 25 0 0 24 49 0 12 25 0 0 12 25 0 0 12 25 0 0 12 25 0 0 12 24 49	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.32 19.32 19.32 19.17 19.26 19.19 19.18 19.23 18.93 18.93 18.89 19.27	19.17 19.34 19.37 19.21 19.30 19.25 19.35 19.40 19.27 19.27 19.19 19.08 19.22	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.25 19.34 19.19 19.10 19.18 19.14 19.27 19.19 19.20 18.82 18.83 18.77 19.26	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	QPSK 16QAM	Frequen 1 1 1 1 25 25 50 1 1 25 50 1 1 1 25 50 1 1 25 50 1 1 25 50 1 1 25 50 1 1 25 50 1 1 25 50 1 1 25 50 1 1 1 25 50 1 1 1 25 50 1 1 1 25 50 1 1 1 25	nnel co (MHz) 0 0 24 49 0 12 25 0 0 24 49 0 0 0 24 49 0 0 0 24 49 0 0 12 25 0 0 0 49 0 0 14 12 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	19.13 19.17 19.40 19.24 19.17 19.42 19.42 19.42 19.32 19.24 19.17 19.26 19.19 19.18 19.23 18.93 18.87 18.89	19.17 19.34 19.37 19.21 19.30 19.25 19.40 19.34 19.20 19.27 19.19 19.07 19.08 19.22 19.25 19.19	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.34 19.10 19.14 19.27 19.19 19.20 18.83 18.77	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	QPSK 16QAM	Frequen 1 1 1 1 25 25 50 1 1 25 25 50 1 1 25 25 50 1 1 25 25 25 25 25 25 25 25	nnel coe (MHz) 0 0 24 49 0 12 25 0 0 12 25 0 0 12 25 0 0 12 24 49 0 0 12 25 0 0 12 25 0 0 12 25 0 0 12 25 0 0 12 25 0 0 0 12 25 0 0 0 12 25 0 0 0 12 24 49 0 12 25	3455 19.13 19.17 19.40 19.24 19.17 19.42 19.32 19.24 19.17 19.26 19.19 19.18 19.23 18.87 18.87 18.87 18.93	19.17 19.37 19.30 19.30 19.30 19.30 19.35 19.40 19.34 19.27 19.19 19.07 19.07 19.08 19.22 19.20 19.20 19.21 19.20	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.25 19.34 19.10 19.18 19.14 19.19 19.19 19.18 19.18 19.18 19.17 19.19 19.27	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	QPSK 16QAM	Frequen 1 1 1 1 1 25 25 25 50 1 1 1 25 50 1 1 1 25 25 25 50 1 1 1 25 25 50 50 50 50	nnel (Mtz) 0 0 24 49 0 12 25 0 0 0 12 25 0 0 0 0 24 49 0 0 0 12 25 0 0 12 25 0 0 12 25 0 0 12 25 0 0 12 25 0 0 0 12 25 0 0 0 12 25 0 0 0 12 25 0 0 0 0 12 25 0 0 0 0 0 12 25 0 0 0 0 0 12 25 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32 19.32 19.17 19.26 19.19 19.18 19.23 18.93 18.87 18.89 19.27	19.17 19.37 19.21 19.35 19.25 19.35 19.40 19.20 19.27 19.19 19.07 19.08 19.22 19.25 19.19 19.07 19.19 19.20 19.27 19.27 19.27	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.34 19.10 19.18 19.14 19.27 19.20 18.83 18.77 19.26 19.26	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
	OPSK 16QAM	Frequen 1	mnel coc (MHz) none (MHz) 0 24 49 0 12 25 0 24 49 0 12 25 0 24 49 0 12 25 0 24 49 0 12 25 0 0 22 49 0 0 24 49 0 10 25 0 0 26 0 27 0 0 28 0 0 29 0 0 0 0	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32 19.24 19.17 19.26 19.19 19.18 19.23 18.93 18.93 18.93 18.93 19.27 19.27 19.29 19.27 19.27 19.27 19.22	3500 19.17 19.34 19.34 19.25 19.35 19.40 19.30 19.27 19.19 19.27 19.19 19.29 19.27 19.19 19.20 19.27 19.19 19.27 19.	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.25 19.25 19.25 19.25 19.24 19.10 19.14 19.27 19.19 19.20 18.82 18.83 18.77 19.26 19.26 19.25 19.27 19.20 18.82	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	OPSK 16QAM	Frequen 1 1 1 1 25 25 25 25 2	nnel nnel nnel nnel nnel nnel nnel nnel	3455 19.13 19.17 19.40 19.24 19.17 19.42 19.24 19.25 19.26 19.19 19.18 19.23 18.87 18.87 18.89 19.27 19.29 19.20 19.21 19.22 19.24 19.32 19.32 19.32 19.32 19.32 19.33 19.34 19.35 1	3500 19.17 19.34 19.35 19.20 19.30 19.20 19.30 19.20 19.20 19.21 19.08 19.22 19.21 19.08 19.22 19.20 19.35 19.34 19.20 19.35 19.34 19.20 19.35 19.36 19.37 19.37 19.38 19.38 19.39 19.39 19.30 19.	3848 19.16 19.19 19.23 19.25 19.25 19.25 19.34 19.10 19.19 19.19 19.20 18.82 18.83 18.77 19.26 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	OPSK 16QAM	Frequen 1 1 1 1 25 25 25 50 1 1 1 25 25 25 50 1 1 1 25 25 25 50 1 1 1 25 25 25 25 25	med model	3455 19.13 19.17 19.40 19.24 19.32 19.24 19.32 19.24 19.17 19.26 19.19 19.18 19.23 18.93 18.87 18.89 19.27 19.19 19.19 19.19 19.22 19.22 19.24	3500 19.17 19.37 19.37 19.25 19.30 19.25 19.35 19.40 19.34 19.27 19.19 19.27 19.19 19.07 19.08 19.22 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.17 19.17 19.18	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.34 19.10 19.14 19.27 19.19 19.20 18.83 18.77 19.29 18.83 18.77 19.29 19.19 19.19 19.20 18.83 18.77 19.25 19.36 19.37 1	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	OPSK 16QAM	Frequen 1 1 1 1 25 25 25 25 2	nnel nnel nnel nnel nnel nnel nnel nnel	3455 19.13 19.17 19.40 19.24 19.17 19.42 19.24 19.25 19.26 19.19 19.18 19.23 18.87 18.87 18.89 19.27 19.29 19.20 19.21 19.22 19.24 19.32 19.32 19.32 19.32 19.32 19.33 19.34 19.35 1	3500 19.17 19.34 19.35 19.20 19.30 19.20 19.30 19.20 19.20 19.21 19.08 19.22 19.21 19.08 19.22 19.20 19.35 19.34 19.20 19.35 19.34 19.20 19.35 19.36 19.37 19.37 19.38 19.38 19.39 19.39 19.30 19.	3848 19.16 19.19 19.23 19.25 19.25 19.25 19.34 19.10 19.19 19.19 19.20 18.82 18.83 18.77 19.26 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	GAGAM 64QAM MCS Index	Frequent 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	wheel coe (MHz) 24 49 0 12 25 0 24 49 0 12 25 0 24 49 0 12 25 0 12 26 12 27 0 12 28 0 12 29 10 10 10 10 10 10 10 10 10 1	3455 19.13 19.17 19.40 19.24 19.17 19.44 19.42 19.32 19.24 19.17 19.26 19.19 19.18 19.23 18.89 19.27 19.19 19.19 19.19 19.19 19.19 19.19 19.19 19.21 19.22 19.27 19.19 19.29 19.29 19.29 19.20 19.20 19.20 19.21 19.21 19.21	3500 19.17 19.37 19.37 19.25 19.30 19.25 19.40 19.27 19.27 19.27 19.20 19.27 19.20 19.21 19.20 19.27 19.20 19.21 19.23 19.24 19.25 19.27 19.20 19.27 19.20 19.27 19.27 19.28 19.29 19.29 19.21 1	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.25 19.25 19.26 19.30 19.10 19.10 19.10 19.27 19.20 18.82 18.77 19.20 18.82 19.25 19.20 18.83 18.77 19.26 19.27 19.20 1	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	GAGAM 64QAM MCS Index	Frequent 1 1 1 1 25 25 25 50 1 1 1 25 25 50 1 1 1 25 25 50 1 1 1 25 25 50 1 1 1 25 25 25 50 1 1 1 25 25 25 30 1 1 1 25 25 25 30 30 30 30 30 30 30 3	wheel coe (MHz) 0 24 49 0 12 25 0 0 24 49 0 12 25 0 0 24 49 0 12 25 0 0 12 25 0 o 12 26 0 o 12 12 27 10 10 10 10 10 10 10 10 10 1	3455 19.13 19.17 19.40 19.24 19.17 19.42 19.27 19.27 19.26 19.19 19.28 19.27 19.19 19.28 19.29 19.29 19.29 19.20 19.19 19.20 19.21 19.21 19.21 19.21 19.22 19.21 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21	3500 19.17 19.34 19.37 19.27 19.30 19.25 19.35 19.40 19.20 19.27 19.19 19.07 19.08 19.22 19.20 19.15 19.15 19.16 19.27 19.13 19.27 19.13 19.27 19.13 19.27 19.13 19.27 19.13 19.27 19.13 19.27 19.13 19.27 19.13 19.27 1	3546 19.16 19.19 19.23 19.25 19.18 19.25 19.34 19.19 19.10 19.11 19.12 19.27 19.19 19.20 18.82 18.82 18.77 19.26 19.19 19.26 19.19 19.27 19.19 19.20 19.20 19.20 19.21 19.19 19.21 19.19 19.21 19.19 19.21 19.19 19.21 19.19	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	GAGAM 64QAM MCS Index	Frequent 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	annel coe (MHz)	3455 19.13 19.17 19.40 19.24 19.17 19.41 19.42 19.17 19.26 19.19 19.27 19.19 19.29 19.19 19.23 18.37 18.87 18.89 19.21 19.19 19.22 19.22 19.22 19.19	3000 10-17 10-34 10-37 10-34 10-37 10-37 10-37 10-37 10-37 10-37 10-35 1	3646 19.19 19.19 19.23 19.25 19.18 19.25 19.25 19.25 19.25 19.27 19.30 19.41 19.27 19.20 18.83 18.77 19.26 19.26 19.27 19.29 19.20 18.83 18.77 19.26 19.27 19.29 19.20 1	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	GAGAM 64QAM MCS Index	Frequent 1 1 1 1 1 25 25 50 1 1 1 1 25 50 Charter 1 1 1 1 1 25 1 25 50 Charter 1 1 1 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	mnel co (MHz) co (MHz	3455 19.13 19.17 19.40 19.24 19.17 19.40 19.24 19.17 19.41 19.42 19.32 19.19 19.19 19.19 19.19 19.19 19.19 19.19 19.20 18.89 19.27 18.89 19.27 18.89 19.21 19.19 19.22 42115 3452.5 19.15	\$600 19.17 19.34 19.37 19.37 19.37 19.37 19.30 19.35 19.40 19.25 19.45	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.34 19.10 19.18 19.14 19.27 19.19 19.20 18.82 18.77 19.20 18.82 18.77 19.20 18.83 18.77 19.22 19.25 19.25 19.20 1	Tunsup 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	GAGAM 64QAM MCS Index	Frequent 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	annel coe (MHz)	3455 19.13 19.17 19.40 19.41 19.42 19.47 19.41 19.42 19.24 19.17 19.44 19.25 19.29 19.21 19.19 19.19 19.19 19.19 19.29 19.21 19.21 19.21 19.21 19.21 19.22 19.22 19.21 19.21 19.22 19.22 19.23 18.89	300e 19.17 19.34 19.37 19.39 19.25 19.40 19.21	3546 19.16 19.19 19.23 19.25 19.18 19.25 19.34 19.19 19.19 19.19 19.19 19.20 18.82 18.83 18.77 19.26 19.19 19.20 19.20 19.20 19.20 19.20 19.20 19.20 19.20 19.20 19.20 19.20 19.20 19.20	Tunseup 205 205 205 205 205 205 205 205 205 205
10M	GAGAM 64QAM MCS Index	Frequent 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	annel coe (MHz)	3455 19.13 19.17 19.40 19.24 19.17 19.40 19.24 19.17 19.41 19.42 19.32 19.19 19.19 19.19 19.19 19.19 19.19 19.19 19.20 18.89 19.27 18.89 19.27 18.89 19.21 19.19 19.22 42115 3452.5 19.15	\$600 19.17 19.34 19.37 19.37 19.37 19.37 19.30 19.35 19.40 19.25 19.45	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.34 19.10 19.18 19.14 19.27 19.19 19.20 18.82 18.77 19.20 18.82 18.77 19.20 18.83 18.77 19.22 19.25 19.25 19.20 1	Tunsup 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	G4QAM G4QAM MCS Index	Frequen 1 1 1 1 1 25 25 50 1 1 1 25 25 50 1 1 1 1 25 25 50 1 1 1 1 1 1 25 25 50 1 1 1 1 1 1 1 1 1 1 1 1 1	wheel coe (MHz)	3455 19.13 19.17 19.40 19.24 19.17 19.41 19.42 19.32 19.19 19.45 19.19 19.26 19.19 19.27 19.19 19.28 19.19 19.29 18.89 19.29 18.89 19.20 19.19 19.22 19.19 19.22 19.19 19.22 19.19 19.22 19.19 19.22 19.19 19.22 19.31 19.31	3000 19.17 19.34 19.37 19.37 19.30 19.30 19.20 19.25 19.35 19.40 19.20 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 1	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.34 19.25 19.34 19.16 19.17 19.18 19.19 19.27 19.20 18.82 18.77 19.19 19.19 19.19 19.19 19.19 19.19 19.19 19.20 18.83 18.77 19.19 19.19 19.20 19.21 19.21 19.21 19.21 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22	Tunseup 205 205 205 205 205 205 205 205 205 205
10M	G4QAM G4QAM MCS Index	Frequent 1 1 1 25 25 50 1 1 1 25 25 50 1 1 1 25 25 50 1 1 1 25 25 50 1 1 1 25 25 25 50 1 1 1 25 25 25 25 25	wheel coe (MHz) 24 49 0 12 25 0 24 49 0 12 25 0 24 49 0 12 25 0 12 25 0 12 25 0 12 25 0 12 25 0 12 25 0 12 25 0 12 25 0 12 25 0 12 25 0 12 25 0 12 24 49 0 12 25 0 0 12 24 49 0 12 25 0 0 12 24 49 0 12 25 0 0 13 13	3455 19.13 19.17 19.40 19.24 19.17 19.41 19.42 19.32 19.19 19.19 19.19 19.19 19.19 19.19 19.19 19.19 19.19 19.22 42115 3482.5 19.19 19.24 19.17 19.18 19.24 19.19 19.25 19.35 19.37 19.35 19.41 19.26 19.36 19.37 19.38 19.39 19.39 19.39 19.30 19.31 19.35 19.35 19.35 19.36 19.37 19.38 19.38 19.39 19.39 19.39 19.30 19.31 19.31 19.31 19.32 19.33 19.34 19.30 19.31 19.31	\$600 19.17 19.30 19.31 19.31 19.31 19.31 19.32 19.35 19.35 19.35 19.35 19.35 19.36 19.37 19.30 19.37 19.19 19.37 19.19 19.37 19.19 19.38 19.29 19.38 19.29 19.38 19.39 19.38 19.39 19.38 19.39 19.38 19.39 19.38	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.34 19.10 19.18 19.27 19.19 19.20 18.82 18.77 19.20 18.82 18.77 19.20 18.82 18.77 19.20 18.82 19.20 19.20 19.20 19.20 19.20 19.21 19.21 19.21 19.21 19.21 19.22	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	G4QAM G4QAM MCS Index	Frequent 1 1 1 1 1 2 5 2 5 5 0 1 1 1 1 2 5 2 5 5 0 Charter 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	annel coe (MHz)	3455 19.13 19.17 19.40 19.24 19.17 19.41 19.42 19.22 19.17 19.48 19.19 19.18 19.29 19.19 19.18 19.29 19.21 18.93 18.93 18.93 18.93 18.93 18.91 19.27 19.19 19.19 19.22 19.22 19.25 19.15 19.16 19.41 19.15 19.45 19.47 19.17 19.19 19.27 19.27 19.29 19.29 19.29 19.29 19.29 19.29 19.29 19.29 19.29 19.29 19.29 19.29 19.29 19.20 19.20 19.20 19.21 19.21 19.21 19.22 19.23 19.24 19.25 19.33 19.14 19.20 19.27 19.27	\$600 19.17 19.34 19.37 19.37 19.37 19.37 19.35 19.40 19.37 19.35 19.40 19.35 19.40 19.35 19.40 19.27 19.19 19.07 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.28 19.29	3545 19.16 19.19 19.23 19.25 19.18 19.25 19.25 19.26 19.27 19.19 19.19 19.20 18.83 18.77 19.26 19.19 19.20 18.83 18.77 19.26 19.27 19.20 1	Tunseup 205 205 205 205 205 205 205 205 205 205
10M	G4QAM G4QAM MCS Index	Frequent 1 1 1 1 1 2 5 2 5 2 5 5 0 1 1 1 1 1 2 5 2 5 2 5 5 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	annel coc (MHz)	3455 19.13 19.17 19.40 19.24 19.17 19.42 19.17 19.42 19.27 19.19 19.26 19.19 19.23 18.87 18.89 19.23 18.93 18.89 19.24 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.15 19.16 19.24 19.24 19.25 19.35 19.35 19.35 19.35 19.35 19.36 19.27 19.39 19.30 19.31 19.35 19.35 19.35 19.35 19.35 19.35 19.35 19.36 19.37 19.38 19.39 19.30 19.30 19.31 19.35 1	3000 19.17 19.34 19.37 19.37 19.30 19.20 19.25 19.35 19.40 19.20 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 19.19 19.27 1	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.25 19.30 19.27 19.10 19.20 1	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	G4QAM G4QAM MCS Index	Frequent 1 1 1 1 1 2 5 2 5 5 0 Char Frequent 1 1 1 1 1 1 2 1 2 1 1 1 1 1 1 1 2 1 1 2 1	ennel coe (MHz)	3455 19.13 19.17 19.40 19.24 19.17 19.42 19.27 19.27 19.26 19.19 19.28 19.27 19.17 19.29 19.21 19.21 19.21 19.21 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.23 19.24 19.25 19.26 19.27 19.27 19.27 19.28 19.29 19.29 19.20 19.20 19.21 19.20 19.21 19.21 19.22 19.33	\$600 19.17 19.30 19.31 19.32 19.33 19.33 19.33 19.33 19.33 19.33 19.34 19.33 19.35	3546 19.16 19.19 19.23 19.25 19.25 19.25 19.34 19.19 19.27 19.19 19.20 18.82 18.82 18.77 19.26 19.19 19.20 18.82 18.77 19.26 19.19 19.20 19.21 19.21 19.21 19.21 19.21 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.22 19.23 19.27 19.25 19.27 19.27 19.27 19.28 19.29 19.29 19.29 19.20 19.20 19.21 19.21 19.21 19.21 19.25 19.29 19.29 19.21 19.21 19.21 19.21 19.21 19.21 19.21 19.22 19.22 19.23 19.24 19.25 19.27 19.27 19.28 19.29 19.21 19.21 19.21 19.21 19.21 19.21 19.22 19.22 19.23 19.24 19.27 19.27 19.28	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	16QAM 64QAM MCS Index 16QAM	Frequent 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	annel (MHz) 10	3455 19.13 19.17 19.40 19.24 19.17 19.42 19.47 19.42 19.49 19.49 19.40 19.40 19.40 19.40 19.40 19.41 19.42 19.41 19.42 19.41 19.42 19.41 19.43 18.89 18.89 18.89 18.89 18.89 18.89 18.89 19.15 19.15 19.48 19.24 19.15 19.48 19.24 19.19 19.21 19.35 19.11 19.20 19.35 19.15 19.48 19.24 19.25 19.15 19.48 19.24 19.25 19.15 19.48 19.24 19.25 19.15 19.48 19.27 19.19 19.29 19.30 19.11 19.20 19.31 19.31 19.31 19.31 19.31 19.31 19.31 19.31 19.32 19.33 19.34 19.25 19.35 19.36 19.37 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38	3000 10.17 10.37 10.37 10.37 10.37 10.37 10.37 10.37 10.37 10.37 10.30 10.37 10.30 1	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.25 19.34 19.10 19.10 19.10 19.10 19.20 18.83 18.77 19.20 18.83 18.77 19.19 19.20 18.83 18.77 19.19 19.20 18.83 18.77 19.15 19.15 19.15 19.17 19.19 19.22 19.22 19.25 19.27 19.29 19.29 19.29 19.29 19.20 1	Tunseup 205 205 205 205 205 205 205 205 205 205
10M	G4QAM G4QAM MCS Index	Frequent 1 1 1 1 1 2 5 2 5 2 5 5 0 Che Frequent 1 1 1 1 1 2 1 2 2 5 1 1 1 1 1 1 2 1 2 1	whether the control of the control o	3455 19.13 19.17 19.40 19.24 19.17 19.41 19.42 19.32 19.32 19.37 19.19 19.19 19.19 19.19 19.19 19.19 19.19 19.19 19.22 42115 3492 42115 3492 42115 19.19 19.21 19.35 19.37 19.41 19.24 19.17 19.18 19.27	\$600 19.17 19.30 19.31	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.25 19.34 19.10 19.18 19.27 19.19 19.20 18.82 18.87 19.15 19.15 19.22 19.29 19.21 19.21 19.21 19.21 19.21 19.22 19.21 19.21 19.22 19.22 19.22 19.27 19.25 19.29 19.21 19.21 19.21 19.21 19.21 19.22 19.22 19.22 19.27 19.25 19.29 19.21 19.21 19.21 19.22 19.21 19.22 19.21 19.22 19.21 19.22 19.22 19.23 19.24 19.25 19.26 19.27 19.27 19.28 19.28 19.29 19.29 19.21 19.21 19.21 19.21 19.21 19.22 19.21 19.22 19.21 19.22 19.23 19.24 19.25 19.26 19.27 19.27 19.28 19.29 19.21	Tune-up 20.5 20.5 20.5 20.5 20.5 20.5 20.5 20.5
10M	16QAM 64QAM MCS Index 16QAM	Frequent 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	annel (MHz) 10	3455 19.13 19.17 19.40 19.24 19.17 19.42 19.47 19.42 19.49 19.49 19.40 19.40 19.40 19.40 19.40 19.41 19.42 19.41 19.42 19.41 19.42 19.41 19.43 18.89 18.89 18.89 18.89 18.89 18.89 18.89 19.15 19.15 19.48 19.24 19.15 19.48 19.24 19.19 19.21 19.35 19.11 19.20 19.35 19.15 19.48 19.24 19.25 19.15 19.48 19.24 19.25 19.15 19.48 19.24 19.25 19.15 19.48 19.27 19.19 19.29 19.30 19.11 19.20 19.31 19.31 19.31 19.31 19.31 19.31 19.31 19.31 19.32 19.33 19.34 19.25 19.35 19.36 19.37 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38 19.38	3000 10.17 10.37 10.37 10.37 10.37 10.37 10.37 10.37 10.37 10.37 10.30 10.37 10.30 1	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.25 19.34 19.10 19.10 19.10 19.10 19.20 18.83 18.77 19.20 18.83 18.77 19.19 19.20 18.83 18.77 19.19 19.20 18.83 18.77 19.15 19.15 19.15 19.17 19.19 19.22 19.22 19.25 19.27 19.29 19.29 19.29 19.29 19.20 1	Tunseup 205 205 205 205 205 205 205 205 205 205
10M	16QAM 64QAM MCS Index 16QAM	Frequent 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	annel coe (MHz)	3455 19.13 19.17 19.40 19.24 19.17 19.42 19.17 19.42 19.19 19.26 19.19 19.27 19.19 19.29 19.19 19.23 18.89 18.89 18.89 19.24 24211 19.15 19.48 19.24 19.15 19.48 19.24 19.17 19.19 1	3000 19.17 19.34 19.37 19.39 19.39 19.39 19.29 19.39 19.29 19.29 19.29 19.29 19.29 19.29 19.29 19.20 1	3545 19.16 19.19 19.23 19.25 19.25 19.25 19.25 19.25 19.26 19.10 19.11 19.27 19.20 18.83 18.77 19.26 19.26 19.27 19.29 19.20 18.83 18.77 19.26 19.27 19.27 19.29 19.20 1	Tunsey 205 205 205 205 205 205 205 205 205 205

LTE Default Power

				C	A_41C An	it0											
	Combination 20MHz+20MHz (100RB+100RB)																
PCC	PCC SCC SCC Modulation			Modulation	P	CC	S	CC	Measured	Max							
Channel	Frequency	Channel	Frequency	Modulation	RB Size	RB offset	RB Size	RB offset	Power	Tune-up							
				QPSK	1	99	1	0	19.12	20.0							
39750	2506	39948	2525.8	16QAM	1	99	1	0	19.29	20.0							
				64QAM	1	99	1	0	18.85	20.0							
				QPSK	1	99	1	0	19.39	20.0							
40521	2583.1	40719	2602.9	16QAM	1	99	1	0	19.31	20.0							
				64QAM	1	99	1	0	18.97	20.0							
											QPSK	1	99	1	0	19.09	20.0
41292	2660.2	41490	2680	16QAM	1	99	1	0	19.21	20.0							
				64QAM	1	99	1	0	18.79	20.0							

				Part2	7 CA_42C	Ant0				
	Combination 20MHz+20MHz (100RB+100RB)									
PCC	PCC	SCC	SCC	Modulation	P	CC	SC	CC	Measured	Max
Channel	Frequency	Channel	Frequency	Modulation	RB Size	RB offset	RB Size	RB offset	Power	Tune-up
				QPSK	1	99	1	0	19.34	20.5
42190	3460	42388	3479.8	16QAM	1	99	1	0	19.45	20.5
				64QAM	1	99	1	0	19.02	20.5
				QPSK	1	99	1	0	19.79	20.5
42491	3490.1	42689	3509.9	16QAM	1	99	1	0	19.72	20.5
				64QAM	1	99	1	0	19.57	20.5
				QPSK	1	99	1	0	19.25	20.5
42792	3520.2	42990	3540	16QAM	1	99	1	0	19.29	20.5
				64QAM	1	99	1	0	19.01	20.5

WLAN Default Power

2.4GHz WLAN			Ant6			
			Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting
		- 1	2412	13.05	14.00	12.00
	802.11b 1Mbps	6	2437	13.01	14.00	12.00
		- 11	2462	13.08	14.00	12.00
		- 1	2412	12.95	14.00	12.00
	802.11g 6Mbps	6	2437	12.96	14.00	12.00
		- 11	2462	13.00	14.00	12.00
		1	2412	12.97	14.00	12.00
	802.11n-HT20 MCS0	6	2437	12.92	14.00	12.00
		- 11	2462	12.92	14.00	12.00
		- 1	2412	13.06	14.00	12.00
	802.11n-HT40 MCS0	6	2437	13.05	14.00	12.00
		11	2462	13.07	14.00	12.00
SGHz WI AN			Ant8			
5GHz WLAN	Mode	Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting
		36	5180	12.90	14.50	12.00
	802.11a 6Mbps	40	5200	12.79	14.50	12.00
	GOZ. 1 12 ONIDPS	44	5220	12.86	14.50	12.00
		48	5240	13.09	14.50	12.00

5GHz WLAN	Ant8							
			Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting		
		36	5180	12.90	14.50	12.00		
	802.11a 6Mbps	40	5200	12.79	14.50	12.00		
		44	5220	12.86	14.50	12.00		
		48	5240	13.09	14.50	12.00		
		36	5180	12.55	14.50	12.00		
	802 11p.HT20 MCS0	40	5200	12.53	14.50	12.00		
5.2GHz WLAN	802.11n-H120 MCS0	44	5220	12.65	14.50	12.00		
5.2GHZ WUAN		48	5240	12.70	14.50	12.00		
	802 11p.HT40 MCS0	38	5190	12.62	14.50	12.00		
	802.11n-H140 MCS0	46	5230	12.70	14.50	12.00		
		36	5180	12.51	14.50	12.00		
	802.11ac-VHT20	40	5200	12.83	14.50	12.00		
	MCS0	44	5220	12.92	14.50	12.00		
		48	5240	12.96	14.50	12.00		
	802.11ac-VHT40	38	5190	12.51	14.50	12.00		
	MCS0	46	5230	12.94	14.50	12.00		
	802.11ac-VHT80 MCS0	42	5210	12.53	14.50	12.00		

5GHz WLAN			Ant8			
			Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting
		52	5260	13.01	14.50	12.00
	802.11a 6Mbps	56	5280	13.08	14.50	12.00
	802.11a owops	60	5300	13.13	14.50	12.00
		64	5320	13.10	14.50	12.00
		52	5260	12.58	14.50	12.00
	802 11n.HT20 MCS0	56	5280	12.60	14.50	12.00
5.3GHz WLAN	802.11II-H120 MC80	60	5300	12.62	14.50	12.00
		64	5320	12.67	14.50	12.00
	802 11n.HT40 MCS0	54	5270	12.65	14.50	12.00
	002.11II-R140 MC30	62	5310	12.79	14.50	12.00
		52	5260	12.82	14.50	12.00
	802.11ac-VHT20	56	5280	12.94	14.50	12.00
	MCS0	60	5300	13.06	14.50	12.00
		64	5320	12.93	14.50	12.00
	802.11ac-VHT40	54	5270	12.79	14.50	12.00
	MCS0	62	5310	13.04	14.50	12.00
	802.11ac-VHT80	58	5290	12.80	14.50	12.00

5GHz WLAN			Ant8			
	Mode		Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting
		100	5500	13.08	14.50	12.00
		116	5580	13.12	14.50	12.00
		124	5620	13.15	14.50	12.00
	802.11a 6Mbps	132	5660	13.19	14.50	12.00
		140	5700	13.20	14.50	12.00
		144	5720	13.48	14.50	12.00
		100	5500	12.52	14.50	12.00
		116	5580	12.63	14.50	12.00
	802.11n-HT20 MCS0	124	5620	12.76	14.50	12.00
	802.11n-H120 MCS0	132	5660	12.88	14.50	12.00
		140	5700	13.15	14.50	12.00
		144	5720	13.44	14.50	12.00
		102	5510	12.61	14.50	12.00
5.5GHz WLAN		110	5550	12.58	14.50	12.00
5.5GHZ WLAN	802.11n-HT40 MCS0	126	5630	12.97	14.50	12.00
	002.11111140 111000	134	5670	13.23	14.50	12.00
		142	5710	13.41	14.50	12.00
		100	5500	12.70	14.50	12.00
		116	5580	12.79	14.50	12.00
	802.11ac-VHT20	124	5620	12.84	14.50	12.00
	MCS0	132	5660	12.93	14.50	12.00
		140	5700	13.06	14.50	12.00
		144	5720	13.82	14.50	12.00
		102	5510	12.51	14.50	12.00
		110	5550	12.52	14.50	12.00
	802.11ac-VHT40 MCS0	126	5630	12.77	14.50	12.00
		134	5670	12.86	14.50	12.00
		142	5710	13.26	14.50	12.00
		105	5530	12.57	14.50	12.00
	802.11ac-VHT80 MCS0	122	5610	12.76	14.50	12.00
		138	5690	12.75	14.50	12.00

		Ant	6			
ВТ		Channel	Frequency (MHz)	Average power (dBm)	Tune-Up Limit	Power Setting
		0	2402	5.41	6.00	7.00
	1M	19	2440	5.37	6.00	7.00
		39	2480	5.14	6.00	7.00
		1	2404	5.46	6.00	7.00
	2M	19	2440	5.41	6.00	7.00
BLE		38	2478	5.19	6.00	7.00
DCC		0	2402	5.41	6.00	7.00
	S2	19	2440	5.36	6.00	7.00
		39	2480	5.11	6.00	7.00
		0	2402	5.38	6.00	7.00
	SB	19	2440	5.33	6.00	7.00
		39	2480	5.09	6.00	7.00
		0	2402	13.28	14.00	8.00
	GFSK	39	2441	13.53	14.00	8.00
		78	2480	13.49	14.00	8.00
		0	2402	9.72	10.00	8.00
BR/EDR	DQPSK	39	2441	9.95	10.00	8.00
		78	2480	9.93	10.00	8.00
		0	2402	9.50	10.00	8.00
	8DPSK	39	2441	9.72	10.00	8.00
		78	2480	9.70	10.00	8.00





Appendix E. Photographs of EUT and Setup

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