

Report No.: SEWA2312000147RG01

Rev.: 01

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TEST REPORT

Application No: SEWA2312000147RG
Applicant: Rolling Wireless S.à r.l.
Address of Applicant: 15, rue Edward Steichen, 2540 Luxembourg
Manufacturer: Rolling Wireless S.à r.l.
Address of Manufacturer: 15, rue Edward Steichen, 2540 Luxembourg
EUT Description: RN932A
Model No.: RN932A
Trade Mark: Rolling Wireless
FCC ID: 2AX2URN932A
Standard(s): FCC 47 CFR Part 15, Subpart B
Date of Receipt: 2023/12/12
Date of Test: 2024/03/18 to 2024/03/19
Date of Issue: 2024/03/19

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Well Wei

Well Wei

Wireless Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2024/03/19		Original

Prepared By		King-p Li
		(King-p Li) / Test Engineer
Checked By		Stone Gu
		(Stone Gu) / Reviewer



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Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at Mains Terminals (150kHz-30MHz)	FCC 47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass
Radiated Emissions (30MHz-1GHz)	FCC 47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass
Radiated Emissions (above 1GHz)	FCC 47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass

Internal Source	Upper Frequency
Below 1.705MHz	30MHz
1.705MHz to 108MHz	1GHz
108MHz to 500MHz	2GHz
500MHz to 1GHz	5GHz
Above 1GHz	5th harmonic of the highest frequency or 40GHz, whichever is lower



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1 General Information

EUT Description:	RN932A		
Model No.:	RN932A		
Trade Mark:	Rolling Wireless		
Hardware Version:	1		
Software Version:	AFPQ52XA_00.12.05.00		
IMEI:	357110890000017		
Frequency Bands:	Band	TX	RX
	UMTS Band II	1850 to 1910 MHz	1930 to 1990 MHz
	UMTS Band IV	1710 to 1755 MHz	2110 to 2155 MHz
	UMTS Band V	824 to 849 MHz	869 to 894 MHz
	LTE Band 2	1850 to 1910 MHz	1930 to 1990 MHz
	LTE Band 4	1710 to 1755 MHz	2110 to 2155 MHz
	LTE Band 5	824 to 849 MHz	869 to 894 MHz
	LTE Band 7	2500 to 2570 MHz	2620 to 2690 MHz
	LTE Band 12	699 to 716 MHz	729 to 746 MHz
	LTE Band 13	777 to 787 MHz	746 to 756 MHz
	LTE Band 14	788 to 798 MHz	758 to 768 MHz
	LTE Band 17	704 to 716 MHz	734 to 746 MHz
	LTE Band 25	1850 to 1915MHz	1930 to 1995 MHz
	LTE Band 26 (814 to 824 MHz)	814 to 824MHz	859 to 869 MHz
	LTE Band 26 (824 to 849 MHz)	824 to 849 MHz	869 to 894 MHz
	LTE Band 66	1710 to 1780 MHz	2110 to 2200 MHz
	NR Band n2	1850 to 1910 MHz	1930 to 1990 MHz
	NR Band n5	824 to 849 MHz	869 to 894 MHz
	NR Band n66	1710 to 1780 MHz	2110 to 2200 MHz
	NR Band n71	663 to 698 MHz	617 to 652 MHz
	NR Band n77	3700 to 3980 MHz	3700 to 3980 MHz
		3450 to 3550 MHz	3450 to 3550 MHz
	NR Band n78	3700 to 3800 MHz	3700 to 3800 MHz
		3450 to 3550 MHz	3450 to 3550 MHz
	LTE CA:		



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	LTE Band CA_2C, LTE Band CA_5B, LTE Band CA_7C, LTE Band CA_66B, LTE Band CA_66C; NR CA: CA_n66A-n77A, CA_n5A-n78A, CA_n5A-n77A, CA_n2A-n77A, CA_n71A-n77A, CA_n66A-n78A, CA_n71A-n78A, CA_n2A-n78A, ENDC: DC_12A_n77A, DC_12A_n78A, DC_13A_n77A, DC_13A_n78A, DC_14A_n77A, DC_25A_n77A, DC_25A_n78A, DC_26A_n78A, DC_2A_n77A, DC_2A_n78A, DC_4A_n78A, DC_5A_n77A, DC_5A_n78A, DC_66A_n77A, DC_66A_n78A, DC_7A_n77A, DC_7A_n78A.		
	GNSS (Beidou+Galileo+GPS+ QZSS+ SBAS)	/	1559~1610 1164~1215
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1.1 Description of Support Units

The EUT has been tested as an independent unit.

1.2 Test Location

All tests were performed at:

Company:	SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.
Address:	South of No. 6 Plant, No. 1, Runsheng Road, Suzhou Industrial Park, Suzhou Area, China (Jiangsu) Pilot Free Trade Zone
Post code:	215000
Test engineer:	King-p Li

1.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA (Certificate No. 6336.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

• Innovation, Science and Economic Development Canada

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

• FCC –Designation Number: CN1312

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327

1.4 Deviation from Standards

None

1.5 Abnormalities from Standard Conditions

None



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2 Emission Test Results

2.1 Conducted Emissions at Mains Terminals (150kHz-30MHz)

Test Requirement:	47 CFR Part 15, Subpart B		
Test Method:	ANSI C63.4:2014		
Frequency Range:	150kHz to 30MHz		
Receiver Setup:	RBW = 9kHz, VBW = 30kHz		
Limit:	Frequency Range (MHz)	Limit(dBμV)	
		Quasi-peak	average
	0.15M-0.5MHz	66 ~ 56*	56 ~ 46*
	0.5M-5MHz	56	46
	5M-30MHz	60	50
*Decreases with the logarithm of the frequency Detector: Peak for pre-scan (9kHz resolution bandwidth) 0.15M to 30MHz			

2.1.1 E.U.T. Operation

Operating Environment:

Temperature:	22~23°C
Humidity:	44~46%RH
Atmospheric Pressure:	101.0kPa
Pretest these modes to find the worst case:	a: USB (adapter input)+GNSS+WCDMA Band 5 (RX) Low b: USB (adapter input)+GNSS+LTE Band 5 (RX) Mid c: USB (adapter input)+GNSS+LTE Band 12 (RX) High d: USB (adapter input)+GNSS+LTE Band 13 (RX) Low e: USB (adapter input)+GNSS+LTE Band 17 (RX) Mid f: USB (adapter input)+GNSS+LTE Band 26 (RX) High g: USB (adapter input)+GNSS+SA Band 5 (RX) Low h: USB (adapter input)+GNSS+SA Band 71 (RX) Mid
The worst case for final test:	b: USB (adapter input)+GNSS+LTE Band 5 (RX) Mid



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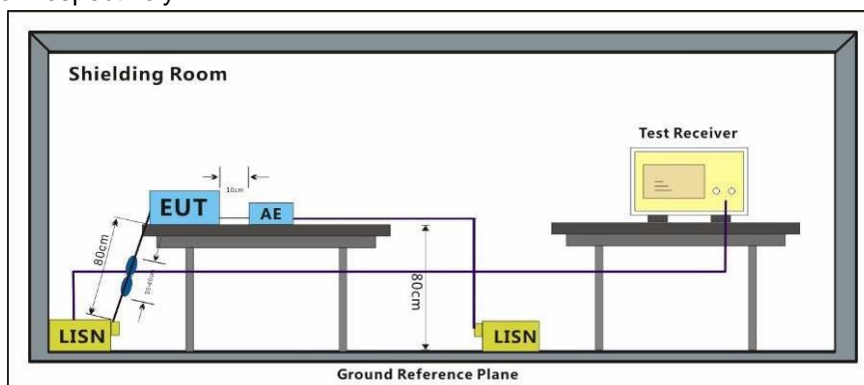
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2.1.2 Test Setup Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.



2.1.3 Measurement Data

An initial pre-scan was performed with peak detector. Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.



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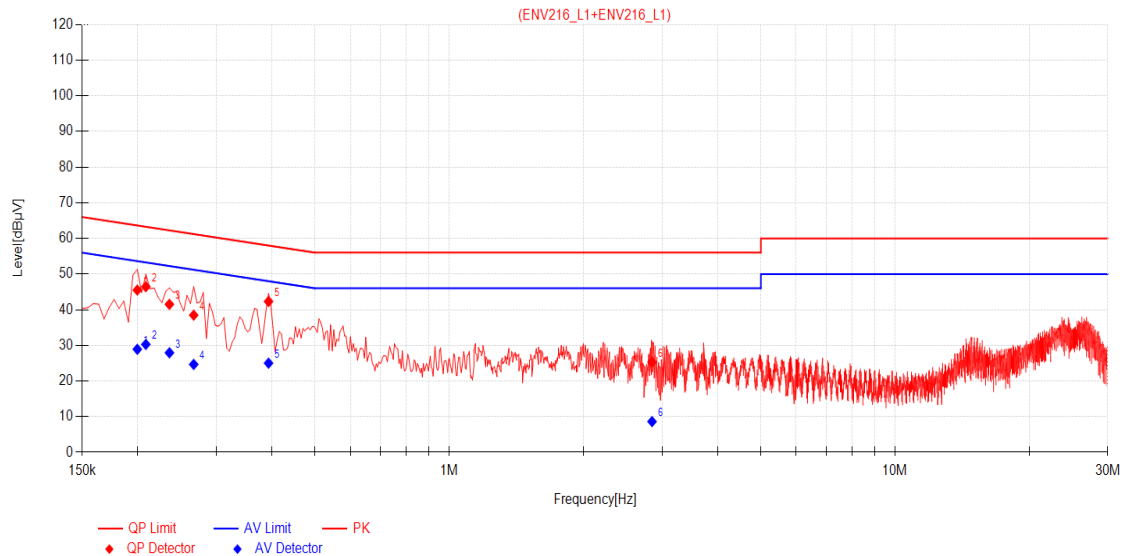
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Final Test Mode:

Mode b

Phase:

Line



Data List

NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.1995	10.93	34.58	45.51	63.63	18.12	17.97	28.90	53.63	24.73	PASS
2	0.2085	10.93	35.53	46.46	63.26	16.80	19.34	30.27	53.26	22.99	PASS
3	0.2355	10.93	30.58	41.51	62.25	20.74	16.99	27.92	52.25	24.33	PASS
4	0.2670	10.94	27.52	38.46	61.21	22.75	13.71	24.65	51.21	26.56	PASS
5	0.3930	10.89	31.43	42.32	58.00	15.68	14.11	25.00	48.00	23.00	PASS
6	2.8500	10.62	14.67	25.29	56.00	30.71	-2.00	8.62	46.00	37.38	PASS

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Value = Reading[dBμV] + Factor(Lisn factor[dB] + cable loss[dB]).
3. Margin = Limit[dBμV] – Value[dBμV]



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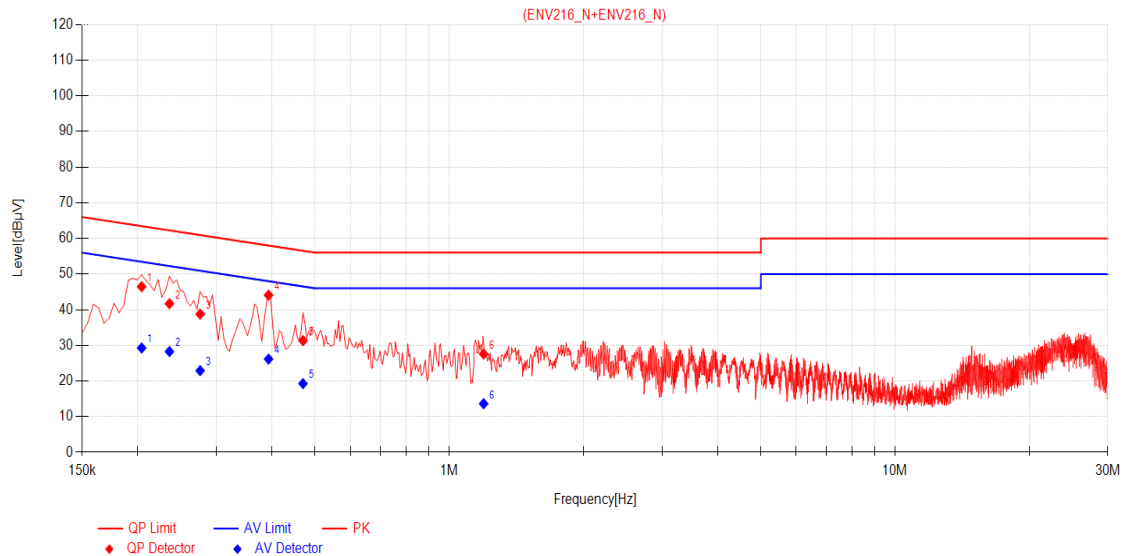
Page: 11 of 23

Final Test Mode:

Mode b

Phase:

Neutral



Data List

NO.	Frequency [MHz]	Factor [dB]	QP Reading [dBμV]	QP Value [dBμV]	QP Limit [dBμV]	QP Margin [dB]	AV Reading [dBμV]	AV Value [dBμV]	AV Limit [dBμV]	AV Margin [dB]	Verdict
1	0.2040	10.98	35.48	46.46	63.45	16.99	18.28	29.26	53.45	24.19	PASS
2	0.2355	11.02	30.67	41.69	62.25	20.56	17.24	28.26	52.25	23.99	PASS
3	0.2760	11.05	27.72	38.77	60.94	22.17	11.86	22.91	50.94	28.03	PASS
4	0.3930	11.03	33.04	44.07	58.00	13.93	15.13	26.16	48.00	21.84	PASS
5	0.4695	10.99	20.34	31.33	56.52	25.19	8.29	19.28	46.52	27.24	PASS
6	1.1940	10.72	16.86	27.58	56.00	28.42	2.91	13.63	46.00	32.37	PASS

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Value = Reading[dBμV] + Factor(Lisn factor[dB] + cable loss[dB]).
3. Margin = Limit[dBμV] – Value[dBμV]



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2.2 Radiated Emissions (30MHz-1GHz)

Test Requirement:	47 CFR Part 15, Subpart B		
Test Method:	ANSI C63.4:2014		
Frequency Range:	30MHz to 1GHz		
Measurement Distance:	3m		
Limit:	Frequency Range (MHz)	Limit(dBμV/m)	Detector
	30MHz -88MHz	40.0	Quasi-peak
	88MHz-216MHz	43.5	Quasi-peak
	216MHz-960MHz	46.0	Quasi-peak
	960MHz-1000MHz	54.0	Quasi-peak
Detector:	Peak for pre-scan (120kHz resolution bandwidth) 30M to1000MHz		

2.2.1 E.U.T. Operation

Temperature:	22~23°C
Humidity:	44~46%RH
Atmospheric Pressure:	101.0kPa
Pretest these modes to find the worst case:	a: USB (adapter input)+GNSS+WCDMA Band 5 (RX) Low b: USB (adapter input)+GNSS+LTE Band 5 (RX) Mid c: USB (adapter input)+GNSS+LTE Band 12 (RX) High d: USB (adapter input)+GNSS+LTE Band 13 (RX) Low e: USB (adapter input)+GNSS+LTE Band 17 (RX) Mid f: USB (adapter input)+GNSS+LTE Band 26 (RX) High g: USB (adapter input)+GNSS+SA Band 5 (RX) Low h: USB (adapter input)+GNSS+SA Band 71 (RX) Mid
The worst case for final test:	e: USB (adapter input)+GNSS+LTE Band 17 (RX) Mid



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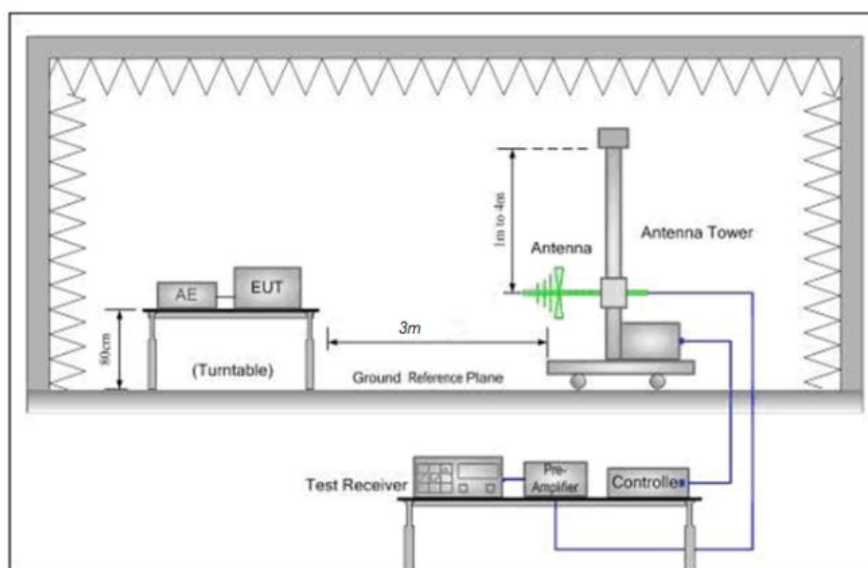
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2.2.2 Test Setup Procedures

1. The EUT was placed in a semi Anechoic Chamber as show below
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna height is adjusted between 1 to 4 meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function with specified bandwidth with Maximum Hold Mode, and the trace was allowed to stabilize.
7. If the emission level of the EUT in peak mode was 6 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.



2.2.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasi-peak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

The three polarities of X,Y,Z were measured by EUT, but only the worst data had been displayed.

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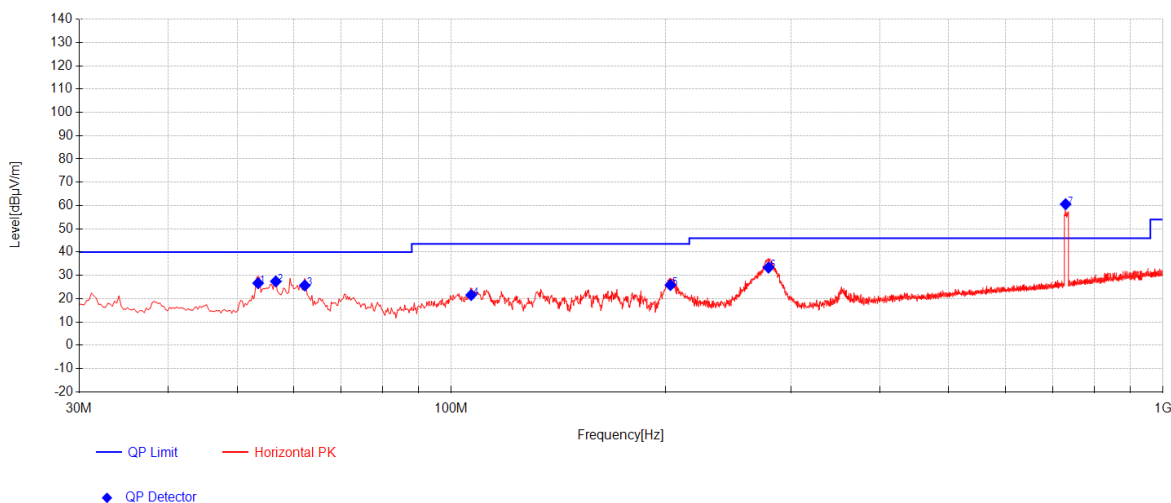
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Final Test Mode:

Mode e

Polarization:

Horizontal



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Polarity
1	53.5225	41.82	18.79	-33.94	26.68	40.00	13.32	Horizontal
2	56.675	42.62	18.70	-33.90	27.42	40.00	12.58	Horizontal
3	62.2525	41.26	18.28	-33.83	25.71	40.00	14.29	Horizontal
4	106.63	38.83	16.16	-33.42	21.57	43.50	21.93	Horizontal
5	203.145	43.24	15.33	-32.69	25.88	43.50	17.62	Horizontal
6	279.0475	48.66	17.01	-32.29	33.38	46.00	12.62	Horizontal
7*	729.6125	63.48	26.98	-29.88	60.58	-	-	Horizontal

Remark:

1. The Quasi-Peak measurements were performed on the EUT.

2. Value = Reading + AF + Factor:

AF = Antenna Factor(dB/m)

Factor = Cable Factor(dB) - Preamplifier (dB)

Margin = Limit[dBμV/m] - Value[dBμV/m]

Note*: #7 30M-1G is system simulator signal which can be ignored.



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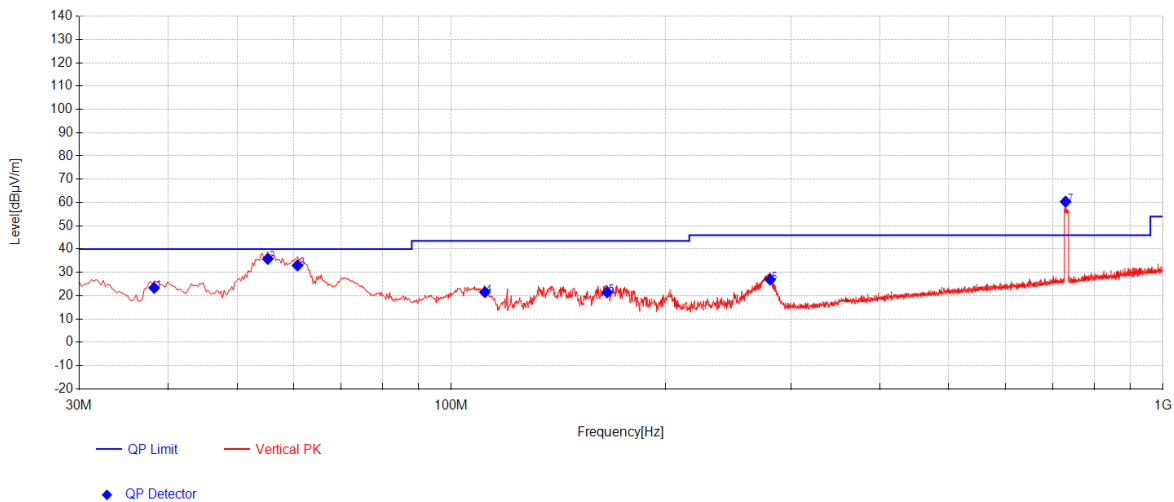
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Final Test Mode:

Mode e

Polarization:

Vertical



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Polarity
1	38.245	38.07	19.28	-34.00	23.36	40.00	16.64	Vertical
2	55.22	50.97	18.74	-33.92	35.80	40.00	4.20	Vertical
3	60.7975	48.36	18.49	-33.85	33.00	40.00	7.00	Vertical
4	111.48	38.42	16.50	-33.38	21.54	43.50	21.96	Vertical
5	165.5575	36.46	18.00	-33.00	21.46	43.50	22.04	Vertical
6	280.5025	42.23	17.01	-32.29	26.95	46.00	19.05	Vertical
7*	729.6125	63.28	26.98	-29.88	60.38	-	-	Vertical

Remark:

1. The Quasi-Peak measurements were performed on the EUT.

2. Value = Reading + AF + Factor:

AF = Antenna Factor(dB/m)

Factor = Cable Factor(dB) - Preamplifier (dB)

Margin = Limit[dBμV/m] - Value[dBμV/m]

Note*: #7 30M-1G is system simulator signal which can be ignored.



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2.3 Radiated Emissions (above 1GHz)

Test Requirement:	47 CFR Part 15, Subpart B		
Test Method:	ANSI C63.4:2014		
Frequency Range:	Above 1GHz		
Measurement Distance:	3m		
Limit:	Frequency (MHz)	Limit (dBμV/m)	Detector
	Above 1GHz	74 54	Peak Average
Detector:	Peak for pre-scan (1000kHz resolution bandwidth) 5th harmonic of the highest frequency or 40GHz, whichever is lower.		

2.3.1 E.U.T. Operation

Temperature:	22~23°C
Humidity:	44~46%RH
Atmospheric Pressure:	101.0kPa
Pretest these modes to find the worst case:	a: USB (adapter input)+GNSS+WCDMA Band 5 (RX) Low b: USB (adapter input)+GNSS+LTE Band 5 (RX) Mid c: USB (adapter input)+GNSS+LTE Band 12 (RX) High d: USB (adapter input)+GNSS+LTE Band 13 (RX) Low e: USB (adapter input)+GNSS+LTE Band 17 (RX) Mid f: USB (adapter input)+GNSS+LTE Band 26 (RX) High g: USB (adapter input)+GNSS+SA Band 5 (RX) Low h: USB (adapter input)+GNSS+SA Band 71 (RX) Mid
The worst case for final test:	e: USB (adapter input)+GNSS+LTE Band 17 (RX) Mid



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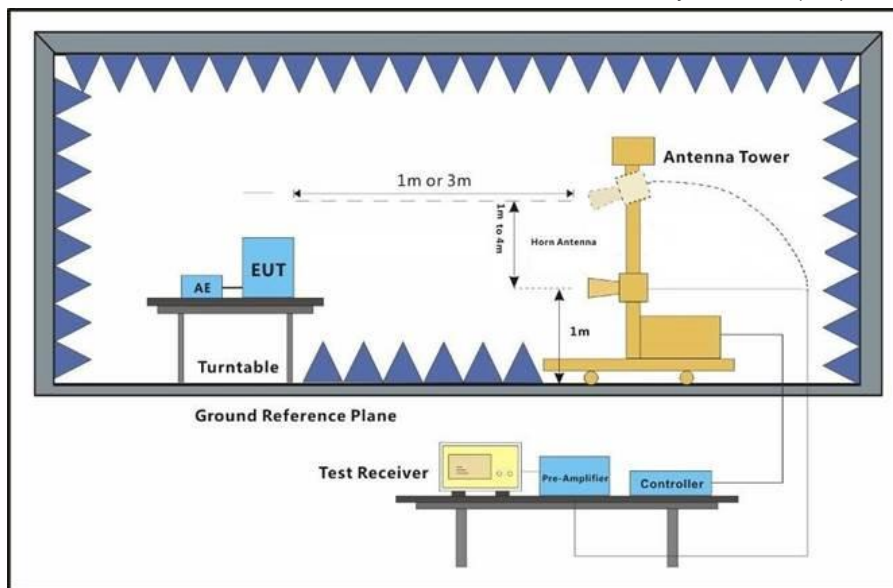
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2.3.2 Test Setup Procedures

1. The EUT was placed in a full Anechoic Chamber as show below
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation
(Distance from antenna to EUT is 1m for measurements >18GHz).
4. The antenna height is adjusted between 1 to 4 meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak and AV Detect Function with specified bandwidth with Maximum Hold Mode, and the trace was allowed to stabilize.
7. At a measurement distance of 1 meter the limit line was increased by $20 \cdot \log(3/1) = 9.54$ dB.



2.3.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Average measurements were conducted based on the peak sweep graph. The EUT was measured by Horn antenna with 2 orthogonal polarities.

The three polarities of X, Y, Z were measured by EUT, but only the worst data had been displayed.

Scan from 5th harmonic of the highest frequency or 40GHz, whichever is lower, the disturbance above 18GHz was very low. The points marked on below plots are the highest emissions could be found when testing, so only below points had been displayed.

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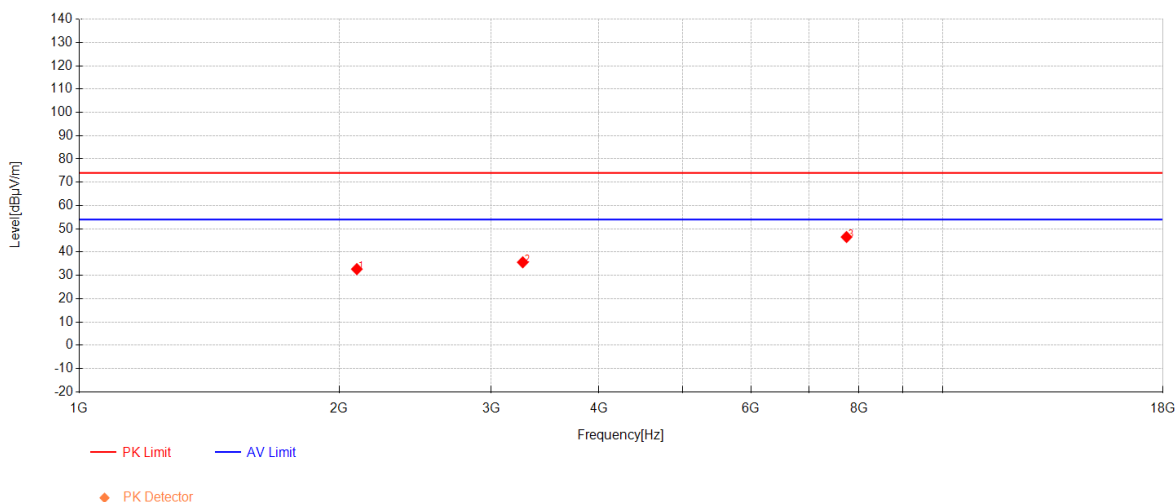
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Final Test Mode:

Mode e

Polarization:

Horizontal



Data List

NO.	Frequency [MHz]	Reading [dBμV]	AF [dB/m]	Factor [dB]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Polarity
1	2096.925	51.90	26.51	-45.70	32.71	74.00	41.29	Horizontal
2	3263.975	49.77	29.55	-43.68	35.64	74.00	38.36	Horizontal
3	7739.225	46.78	36.84	-37.14	46.48	74.00	27.52	Horizontal

Remark:

1. The Peak and Average measurements were performed on the EUT.

2. Level = Reading Level + AF + Factor:

AF = Antenna Factor(dB/m)

Factor = Cable Factor(dB) - Preamplifier gain(dB)

Margin = Limit[dBμV/m] – Level[dBμV/m]



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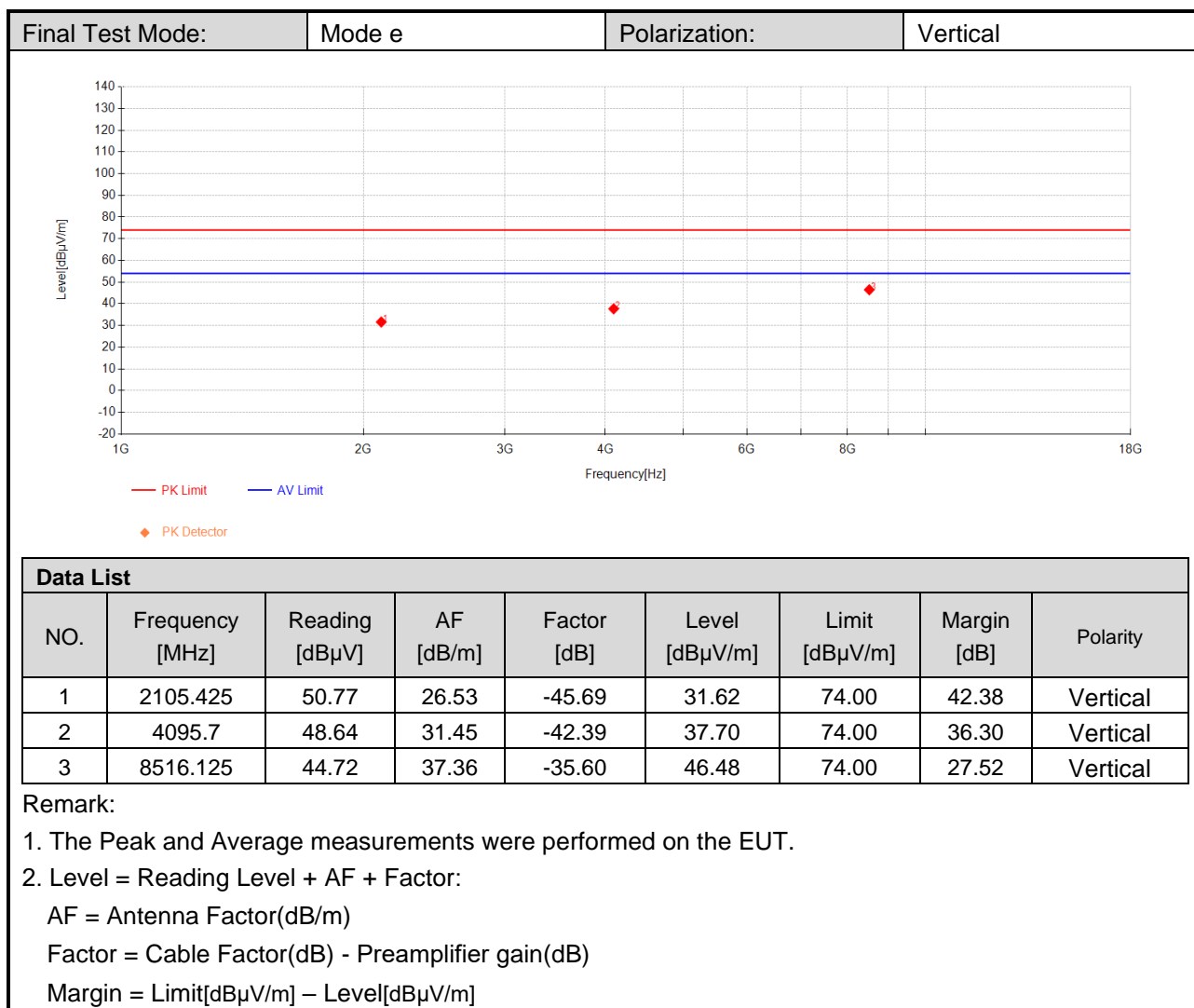
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3 Equipment List

CE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date (yyyy/mm/dd)	Cal Due Date (yyyy/mm/dd)
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2024/02/01	2025/01/31
Wideband Radio Communication Tester	Anritsu	MT8820C	SUWI-01-26-01	2023/09/13	2024/09/12
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-06	2024/02/04	2025/02/03
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-03	2024/02/04	2025/02/03
Artificial network	ROHDE&SCHWARZ	ENV216	SUWI-01-19-04	2024/02/04	2025/02/03
Measurement Software	Tonscend	JS32-CE 4.0.0.2	SUWI-02-09-05	NCR	NCR
Radio Communication Analyzer	StarPoint	SP9500E	SUWI-01-28-03	2023/05/11	2024/05/10

Remark: NCR=No Calibration Requirement



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RE Test System					
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date (yyyy/mm/dd)	Cal Due Date (yyyy/mm/dd)
Semi-Anechoic Chamber	Brilliant-emc	N/A	SUWI-04-02-01	2021/05/08	2024/05/07
Temperature and humidity meter	MingGao	TH101B	SUWI-01-01-05	2024/02/18	2025/02/17
Signal Analyzer	KEYSIGHT	N9020A	SUWI-01-02-07	2023/11/21	2024/11/20
Test receiver	ROHDE&SCHWARZ	ESR7	SUWI-01-10-01	2024/02/01	2025/01/31
Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	VULB 9163	SUWI-01-11-01	2023/05/13	2024/05/12
Receiving antenna	SCHWRZBECK MESS- ELEKTRONIK	BBHA 9120D	SUWI-01-11-02	2023/05/13	2024/05/12
Amplifier	Tonscend	TAP9K3G40	SUWI-01-14-01	2024/02/04	2025/02/03
Amplifier	Tonscend	TAP01018050	SUWI-01-14-02	2024/02/04	2025/02/03
Wideband Radio Communication Tester	Anritsu	MT8820C	SUWI-01-26-01	2023/09/13	2024/09/12
Measurement Software	Tonscend	JS32-RE V4.0.0.0	SUWI-02-09-04	NCR	NCR
Radio Communication Analyzer	StarPoint	SP9500E	SUWI-01-28-03	2023/05/11	2024/05/10

Remark: NCR=No Calibration Requirement



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4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Conduction Emission	$\pm 2.9\text{dB}$ (150kHz to 30MHz)
2	Radiated Emission	$\pm 4.8\text{dB}$ (30M -1GHz)
		$\pm 4.8\text{dB}$ (1GHz to 18GHz)

Remark:

The U_{lab} (lab Uncertainty) is less than $U_{\text{CISPR/ETSI}}$ (CISPR/ETSI Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.



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5 Photographs

5.1 Test Setup

Refer to Appendix A.1 15B Setup Photos.

---End of Report---



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