


Prüfbericht-Nr.: <i>Test report no.:</i>	CN2328SA 001	Auftrags-Nr.: <i>Order no.:</i>	168398034	Seite 1 von 25 <i>Page 1 of 25</i>
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2022-09-12	
Auftraggeber: <i>Client:</i>	PURSPEC Technology (China) Ltd. 501 and 601,G4 Building,No.88 Jinjihu Avenue, Suzhou Industrial Park,Suzhou, Jiangsu,China.			
Prüfgegenstand: <i>Test item:</i>	Portable Mass Spectrometry System			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	C3001, MC3001			
Auftrags-Inhalt: <i>Order content:</i>	Test Report			
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part 15: Subpart C Section 15.247 RSS-247 Issue 2 February 2017 RSS-Gen Issue 5 March 2019			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2022-11-15	Please refer to Photo Document		
Prüfmuster-Nr.: <i>Test sample no:</i>	A003371695-001 A003371384-001~012			
Prüfzeitraum: <i>Testing period:</i>	2023-11-15 - 2023-02-20			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>		genehmigt von: <i>authorized by:</i>		
Datum: <i>Date:</i>	2023-04-23 <small>Signed by: Bell Hu</small>	Ausstellungsdatum: <i>Issue date:</i>	2023-04-23 <small>Signed by: Lin Lin</small>	
Stellung / Position:	Project Manager	Stellung / Position:	Reviewer	
Sonstiges / Other:	FCC ID: 2A9POC30012023 IC: 29937-C30012023 PMN: Portable MS System HVIN: C3001, MC3001			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

Test Summary

5.1.1 ANTENNA REQUIREMENT*RESULT: Pass***5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER***RESULT: Pass***5.1.3 CONDUCTED POWER SPECTRAL DENSITY***RESULT: Pass***5.1.4 6dB BANDWIDTH***RESULT: Pass***5.1.5 99% BANDWIDTH***RESULT: Pass***5.1.6 20dB BANDWIDTH***RESULT: Pass***5.1.7 CARRIER FREQUENCY SEPARATION***RESULT: Pass***5.1.8 NUMBER OF HOPPING FREQUENCY***RESULT: Pass***5.1.9 TIME OF OCCUPANCY***RESULT: Pass***5.1.10 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHZ BANDWIDTH***RESULT: Pass***5.1.11 RADIATED SPURIOUS EMISSION***RESULT: Pass***5.1.12 CONDUCTED EMISSION ON AC MAINS***RESULT: Pass*

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1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of Wi-Fi 802.11 b/g/n

Appendix B: Test Results of 900MHz RFID

Appendix C: Photographs of the Test Set-up

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China

FCC Registration No.: 694916

ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing (SRD-Tonscend)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
EXA Signal Analyzer, Multi-touch	Keysight	N9010B	MY60241175	2023-10-10
MXG X-Series RF Vector Signal Generator	Keysight	N5182B	MY61250137	2023-10-10
EXG X-Series Microwave Analog Signal Generator	Keysight	N5173B	MY61250141	2023-10-10
DC power supply	Keysight	E3642A	MY61276100	2023-10-10
Power Control Unit	Tonscend	JS0806-4ADC	N/A	2023-10-10
Automation Control Unit	Tonscend	JS0806-2	21C8060396	2023-10-10
Test Software	Tonscend	JS1120-3	N/A	N/A
Control PC	Lenovo	TianYi510S-071MB	YLX23JMF	N/A
Shielding Room 8#	Albatross	SR8	APC17151-SR8	2024-06-22
Unwanted Emission Testing (TS9975)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
EMI Test Receiver	R&S	ESR 7	102021	2023-08-02
Signal Analyzer	R&S	FSV 40	101439	2023-08-01
System Controller Interface	R&S	SCI-100	S10010038	N/A
Filterbank	R&S	Wlan	100759	2023-08-01
OSP	R&S	OSP 120	102040	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2023-08-02
Amplifier	R&S	SCU-18F	180070	2023-08-02
Amplifier	R&S	SCU40A	100475	2023-08-02
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2024-08-06
Double-Ridged	ETS-LINDGREN	3117	00218717	2024-08-06

Antenna (1 -18 GHz)				
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2024-08-27
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2023-08-06
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2024-06-22
EMI Test Receiver	R&S	ESR 7	102021	2023-08-02

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Parameter	Uncertainty (k=2)
RF output power, conducted	± 0.99 dB
Occupied Channel Bandwidth	± 2.08 %
RF power density, conducted	± 0.99 dB
Unwanted Emissions, conducted	± 0.89 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	±4.17 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	±4.17 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

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2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 362 Huanguan Road Middle Longhua District, Shenzhen 518110 People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The Product is Portable Mass Spectrometry System, which supports 2.4GHz Wi-Fi and 900MHz RFID wireless technology.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 2: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	Portable Mass Spectrometry System
Type Designation:	C3001, MC3001(They are identical in schematics and PCB layout design, only different in model number for marketing purpose)
Trade mark:	PURSPEC
FCC ID:	2A9POC30012023
IC:	29937-C30012023
PMN:	Portable MS System
HVIN:	C3001, MC3001
Operating Voltage:	Powered by DC 20V from adapter or bulit-battery (DC 14.76V, 9100mAh /134.3Wh)
Testing Voltage:	120V AC/60Hz via adapter or fully charged battery
Operating temperature:	15°C~35°C
Technical Specification of Wi-Fi 802.11 b/g/n	
Operating Frequency:	2412 - 2462 MHz for 802.11b/g/n(HT20)
Type of Modulation:	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate:	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 Mbps for 802.11n(HT20) (All data rates considered, only the Worst-cases reported)
Channel Number:	11 channels for 802.11b/g/n(HT20)
Channel Separation:	5 MHz
Antenna Type:	Integral Antenna
Antenna Number:	2, Only SISO supported.
Antenna Gain :	3.15 dBi Max (as listed in antenna data sheet)
Technical Specification of 900MHz RFID	
Operating Frequency:	902.25MHz~927.25MHz
Type of Modulation:	OOK
Channel Number:	51 channels
Channel Separation:	500 KHz
Antenna Type:	Integral Antenna
Antenna Number:	1
Antenna Gain:	3.0 dBi Max(as listed in antenna data sheet)

Table 3: RF Channel and Frequency of Wi-Fi 802.11 b/g/n

802.11 b/g/n(HT20)			
RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437	/	/

Table 4: RF Channel and Frequency of 900MHz RFID

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	902.25	14	908.75	27	915.25	40	921.75
2	902.75	15	909.25	28	915.75	41	922.25
3	903.25	16	909.75	29	916.25	42	922.75
4	903.75	17	910.25	30	916.75	43	923.25
5	904.25	18	910.75	31	917.25	44	923.75
6	904.75	19	911.25	32	917.75	45	924.25
7	905.25	20	911.75	33	918.25	46	924.75
8	905.75	21	912.25	34	918.75	47	925.25
9	906.25	22	912.75	35	919.25	48	925.75
10	906.75	23	913.25	36	919.75	49	926.25
11	907.25	24	913.75	37	920.25	50	926.75
12	907.75	25	914.25	38	920.75	51	927.25
13	908.25	26	914.75	39	921.25	/	/

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Wi-Fi 802.11 b/g/n wireless transmitting mode
 Low/Middle/High Channel
- B. On, 900MHz RFID transmitting mode
 Low/Middle/High Channel
- C. On, 900MHz RFID Transmitting on Hopping channel

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form
- User Manual
- ID Label and Location Info
- Operation Description

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10: 2013.

According to clause 3.1, all tests were performed on model C3001 in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 5: Auxiliary Equipment Used during Test

Description	Manufacturer	Model	S/N	Rating
Power Supply	CHICONY POWER TECHNOLOGY HONG KONG LIMITED	ADL170SCC3A	/	Input:100-240v ~2.5A 50- 60Hz Output:20.0v 8.5A 170.0W
Laptop	Lenovo	T480	PF-16A6N8	N/A

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

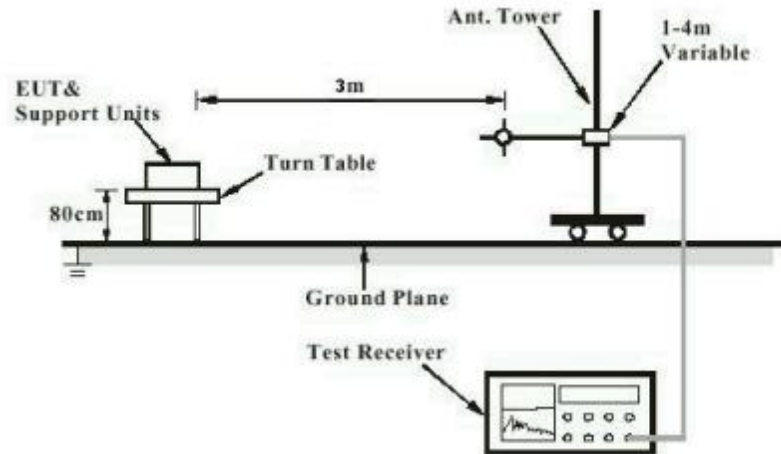


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

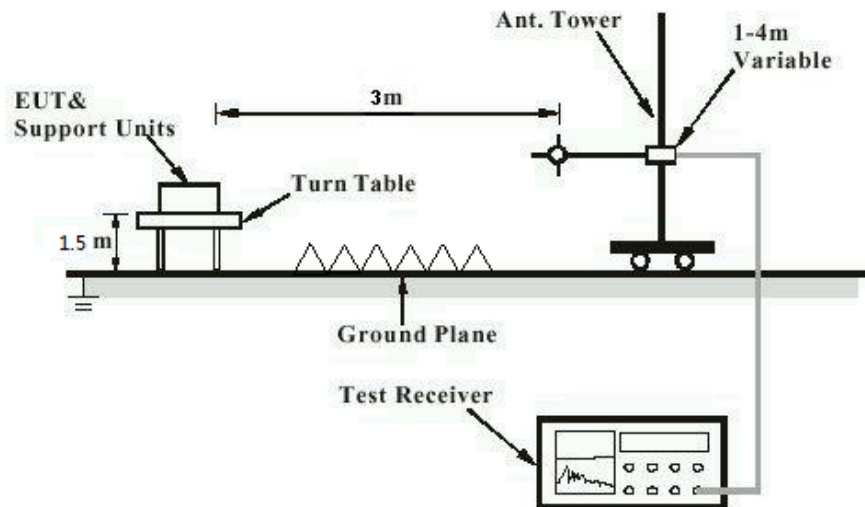
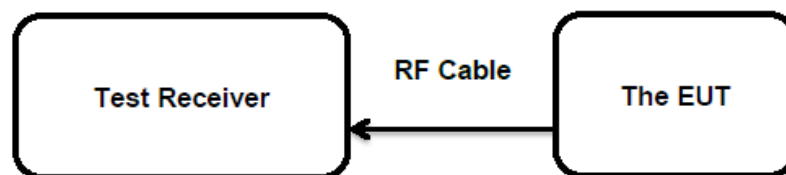


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(b)(4) and Part 15.203
RSS-Gen Clause 6.8

The EUT has Integral Antennas, the maximum antenna gain of antenna is 3.15 dBi for 2.4GHz Wi-Fi and 3.0 dBi for 900MHz RFID, and the antenna connector is designed with permanent attachment and no consideration of replacement.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

5.1.2 Maximum Peak Conducted Output Power

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(b)(1)&(3) RSS-247 Clause 5.4(b)&(d)
Basic standard	: ANSI C63.10: 2013
Limits	: FHSS <1 Watts, DSSS < 1.0 Watts
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2022-11-18 to 2023-02-10
Input voltage	: Fully charged battery
Operation mode	: A, B
Test channel	: Low / Middle / High
Ambient temperature	: 25.8 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101 kPa

Table 6: Test Result of Maximum Peak Conducted Output Power, 900MHz RF ID

Test Mode	Test Channel (MHz)	Measured Peak Power		Limit (W)
		(dBm)	(W)	
900MHz RF ID	902.25	18.33	0.0681	< 1.0
	914.75	18.61	0.0726	
	927.25	19.07	0.0807	
Maximum Measured Value		19.07	0.0807	

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): 3.0 dBi
 $e.i.r.p.=P_{(Peak\ power)}+ G$, which is far below the 4 W

Table 7: Test Result of Maximum Peak Conducted Output Power, 2.4GHz Wi-Fi

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power				Limit (W)
			Ant 0		Ant 1		
			(dBm)	(W)	(dBm)	(W)	
802.11b	1 Mbps	2412	20.08	0.1019	20.24	0.1057	< 1.0
		2437	20.21	0.1050	20.20	0.1047	
		2462	20.29	0.1069	19.95	0.0989	
802.11g	6 Mbps	2412	25.38	0.3451	25.31	0.3396	
		2437	25.23	0.3334	25.19	0.3304	
		2462	25.04	0.3192	24.95	0.3126	
802.11n (HT20)	MCS0	2412	23.49	0.2234	23.31	0.2143	
		2437	23.09	0.2037	22.92	0.1959	
		2462	22.95	0.1972	22.70	0.1862	

 Note: Both the RF Ports tested, only the worst-case reported.
 Only SISO mode supported.

Note:

- 3) The cable loss is taken into account in results.
- 4) Antenna gain(G): 3.15 dBi.
 $e.i.r.p.=P_{(Peak\ power)}+ G$, which is far below the 4 W

5.1.3 Conducted Power Spectral Density

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(e) RSS-247 Clause 5.2(b)
Basic standard	: ANSI C63.10: 2013
Limits	: < 8 dBm / 3kHz
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2022-11-18 to 2023-02-10
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 25.8 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

5.1.4 6dB Bandwidth

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(a)(2) RSS-247 Clause 5.2(a)
Basic standard	: ANSI C63.10: 2013
Limits	: > 500 KHz
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2022-11-18 to 2023-02-10
Input voltage	: Fully charged battery
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 25.8 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

5.1.5 99% Bandwidth

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(a)
RSS-Gen Clause 6.7
Basic standard : ANSI C63.10: 2013
Kind of test site : Shielded Room

Test Setup

Date of testing : 2022-11-18 to 2023-02-10
Input voltage : Fully charged battery
Operation mode : A, B
Test channel : Low / Middle / High
Ambient temperature : 25.8 °C
Relative humidity : 53 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A & B.

5.1.6 20dB Bandwidth

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(a)(1)
RSS-247 Clause 5.1(a)
Basic standard : ANSI C63.10: 2013
Kind of test site : Shielded Room

Test Setup

Date of testing : 2022-11-18 to 2023-02-10
Input voltage : Fully charged battery
Operation mode : A
Test channel : Low / Middle / High
Ambient temperature : 25.8 °C
Relative humidity : 53 %
Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix B.

5.1.7 Carrier Frequency Separation

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(a)(1) RSS-247 Clause 5.1(b)
Basic standard	: ANSI C63.10: 2013
Limits	: $\geq 25\text{kHz}$ or 2/3 of 20dB bandwidth, whichever is greater
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2022-11-18 to 2023-02-10
Input voltage	: Fully charged battery
Operation mode	: C
Test channel	: Low / Middle / High
Ambient temperature	: 25.8 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

5.1.8 Number of Hopping Frequency

RESULT:**Pass****Test Specification**

Test standard	: FCC part 15.247(a)(1)(iii) RSS-247 Clause 5.1(d)
Basic standard	: ANSI C63.10: 2013
Limits	: ≥ 15 non-overlapping channels
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2022-11-18 to 2023-02-10
Input voltage	: Fully charged battery
Operation mode	: B
Ambient temperature	: 25.8 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

5.1.9 Time of Occupancy

RESULT:**Pass****Test Specification**

Test standard	: FCC part 15.247(a)(1)(iii) RSS-247 Clause 5.1(d)
Basic standard	: ANSI C63.10: 2013
Limits	: < 0.4s
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2022-11-18 to 2023-02-10
Input voltage	: Fully charged battery
Operation mode	: B
Test channel	: Low / Middle / High
Ambient temperature	: 25.8 °C
Relative humidity	: 53 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix B.

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5.1.10 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(d)
RSS-247 Clause 5.5

Basic standard : ANSI C63.10: 2013

Limits : 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power);
In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)

Kind of test site : Shielded Room

Test Setup

Date of testing : 2022-11-18 to 2023-02-10

Input voltage : Fully charged battery

Operation mode : A, B, C

Test channel : Low / Middle / High

Ambient temperature : 25.8 °C

Relative humidity : 53 %

Atmospheric pressure : 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix A & B.

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5.1.11 Radiated Spurious Emission

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(d) & FCC Part 15.205
RSS-247 Clause 3.3

Basic standard : ANSI C63.10: 2013

Limits : Refer to 15.209(a) of FCC part 15.247(d)
RSS-Gen Section 8.9 & 8.10

Kind of test site : 3m Semi-anechoic Chamber

Test Setup

Date of testing : 2022-11-18 to 2023-02-10

Input voltage : Fully charged battery

Operation mode : A, B

Test channel : Low / Middle / High

Ambient temperature : Refer to test result

Relative humidity : Refer to test result

Atmospheric pressure : 101 kPa

Remark:

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A & B.

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Page 24 of 25**5.1.12 Conducted Emission on AC Mains****RESULT:****Pass****Test Specification**

Test standard : FCC Part 15.207(a)
RSS-Gen Clause 8.8

Basic standard : ANSI C63.10: 2013

Frequency range : 0.15 – 30MHz

Classification : Class B

Limits : FCC Part 15.207(a)
RSS-Gen Table 3

Kind of test site : Shielded Room

Test Setup

Date of testing : 2022-11-24

Input voltage : AC 120V, 60Hz

Operation mode : ON

Earthing : Not connected

Ambient temperature : 24.1 °C

Relative humidity : 52.8 %

Atmospheric pressure : 101 kPa

For the measurement records, refer to the appendix A & B.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix C.

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