

Prüfbericht-Nr.: <i>Test report no.:</i>	CN257220 004	Auftrags-Nr.: <i>Order no.:</i>	168544897	Seite 1 von 21 Page 1 of 21
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2025-03-25	
Auftraggeber: <i>Client:</i>	Sound Devices, LLC E7556 State Road 23 and 33, Reedsburg, WI 53959, United States Of America			
Prüfgegenstand: <i>Test item:</i>	Professional Handheld Wireless Microphone			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	Astral HH (Trademark: SOUND DEVICES)			
Auftrags-Inhalt: <i>Order content:</i>	Test Report			
Prüfgrundlage: <i>Test specification:</i>	CFR Title 47 FCC Part 15: Subpart C Section 15.236			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2025-05-09	Please refer to Photo Document		
Prüfmuster-Nr.: <i>Test sample no.:</i>	STS2505036E03 STS2505036E04			
Prüfzeitraum: <i>Testing period:</i>	2025-05-13 - 2025-09-06			
Ort der Prüfung: <i>Place of testing:</i>	Refer to section 2.1			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	X  Lin Lin		genehmigt von: <i>authorized by:</i>	X  Hardy Suo
Datum: <i>Date:</i>	2025-10-15		Ausstellungsdatum: <i>Issue date:</i>	2025-10-15
Stellung / Position:	Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert
Sonstiges / <i>Other:</i>	FCC ID: 2AKLX-28297			
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:	P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet			
* Legend:	P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable 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 above mentioned 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>				

Prüfbericht-Nr.: CN25722O 004
Test report no.:

Seite 2 von 21
Page 2 of 21

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. <i>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i>
2	Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. Informationen zur Verifizierung der Authentizität unserer Dokumente erhalten Sie auf folgender Webseite: go.tuv.com/digital-signature <i>As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. For information on verifying the authenticity of our documents, please visit the following website: go.tuv.com/digital-signature</i>
3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2023, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. <i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2023, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i>

Prüfbericht - Nr.: CN25722O 004
Test Report No.:

Seite 3 von 21
Page 3 of 21

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM EIRP

RESULT: Pass

5.1.3 OCCUPIED BANDWIDTH

RESULT: Pass

5.1.4 FREQUENCY TOLERANCE

RESULT: Pass

5.1.5 EMISSIONS MARK

RESULT: Pass

5.1.6 RADIATED SPURIOUS EMISSION

RESULT: Pass

5.1.7 CONDUCTED EMISSION ON AC MAINS

RESULT: Pass

Contents

1	GENERAL REMARKS	5
1.1	COMPLEMENTARY MATERIALS	5
2	TEST SITES	6
2.1	TEST FACILITIES	6
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS.....	6
2.3	TRACEABILITY	7
2.4	CALIBRATION	7
2.5	MEASUREMENT UNCERTAINTY.....	7
2.6	LOCATION OF ORIGINAL DATA.....	7
2.7	STATUS OF FACILITY USED FOR TESTING.....	8
3	GENERAL PRODUCT INFORMATION	9
3.1	PRODUCT FUNCTION AND INTENDED USE.....	9
3.2	RATINGS AND SYSTEM DETAILS	9
3.3	INDEPENDENT OPERATION MODES	10
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	10
3.5	SUBMITTED DOCUMENTS.....	10
4	TEST SET-UP AND OPERATION MODES	11
4.1	PRINCIPLE OF CONFIGURATION SELECTION	11
4.2	TEST OPERATION AND TEST SOFTWARE.....	11
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	11
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....	11
4.5	TEST SETUP DIAGRAM	12
5	TEST RESULTS	14
5.1	TRANSMITTER REQUIREMENT & TEST SUITES	14
5.1.1	<i>Antenna Requirement</i>	<i>14</i>
5.1.2	<i>Maximum EIRP</i>	<i>15</i>
5.1.3	<i>Occupied Bandwidth</i>	<i>16</i>
5.1.4	<i>Frequency tolerance.....</i>	<i>17</i>
5.1.5	<i>Emissions Mark</i>	<i>18</i>
5.1.6	<i>Radiated Spurious Emission</i>	<i>19</i>
5.1.7	<i>Conducted Emission on AC Mains.....</i>	<i>20</i>
6	PHOTOGRAPHS OF THE TEST SET-UP.....	21
7	LIST OF TABLES.....	21

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 614MHz -616MHz;

Appendix B: Photographs of Test Set-up.

2 Test Sites

2.1 Test Facilities

SHENZHEN STS TEST SERVICES CO., LTD.

101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

A2LA Certificate Number: 4338.01

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

RF Radiation Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2025.02.24	2026.02.23
Wireless Communications Test Set	R&S	CMW 500	117239	2024.09.23	2025.09.22
Pre-Amplifier(0.1M-3GHz)	EM	EM330	060665	2025.02.22	2026.02.21
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2024.09.23	2025.09.22
Pre-Amplifier(18G-40GHz)	SKET	LNPA_1840-50	SK2018101801	2025.02.22	2026.02.21
Positioning Controller	MF	MF-7802	MF-780208587	N/A	N/A
Signal Analyzer	R&S	FSV 40-N	101823	2024.09.23	2025.09.22
Switch Control Box	N/A	N/A	N/A	N/A	N/A
Filter Box	BALUN Technology	SU319E	BL-SZ1530051	N/A	N/A
Video Controller	SKET	FCS C-3	N/A	N/A	N/A
Bilog Antenna	TESEQ	CBL6111D	34678	2024.09.30	2025.09.29
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2024.09.25	2025.09.24
Horn Antenna	A-INFOMW	LB-180400-KF	J211020657	2023.10.10	2025.10.09
Antenna Mast	MF	MFA-440H	N/A	N/A	N/A
Turn Table	MF	N/A	N/A	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A
DC Power Supply	Zhaoxin	RXN 605D	20R605D11010081	N/A	N/A
Test SW	EMC Test Software	15.2.0.339			
AC Connected Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Test Receiver	R&S	ESCI	101427	2024.09.24	2025.09.23
Limtter	CYBERTEK	EM5010	N/A	2024.09.24	2025.09.23
LISN	R&S	ENV216	101242	2024.09.24	2025.09.23
LISN	EMCO	3810/2NM	23625	2024.09.24	2025.09.23
Temperature & Humidity	SW-108	SuWei	N/A	2025.02.24	2026.02.23
Test SW	EZ-EMC	Ver.STSLAB-03A1 CE			
RF Connected Test Equipment					

Prüfbericht - Nr.: CN25722O 004
Test Report No.:

Seite 7 von 21
Page 7 of 21

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2025.02.24	2026.02.23
Universal Radio communication tester	R&S	CMU200	119907	2025.02.22	2026.02.21
Signal Generator	Agilent	N5182A	MY46240556	2024.09.23	2025.09.22
Signal Analyzer	Agilent	N9020A	MY52440124	2025.02.22	2026.02.21
Temperature & Humidity Test Chamber	Safety test	AG80L	171200018	2025.02.22	2026.02.21
Programmable Power Supply	Agilent	E3642A	MY40002025	2024.09.23	2025.09.22
Attenuator	HP	8494B	DC-18G	2025.02.25	2026.02.24
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A

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.

Table 2: Measurement Uncertainty

No.	Item	Uncertainty
1	RF output power, conducted	±0.755dB
2	Unwanted Emissions, conducted	±2.874dB
3	All emissions, radiated 9K-30MHz	±3.80dB
4	All emissions, radiated 30M-1GHz	±4.18dB
5	All emissions, radiated 1G-6GHz	±4.90dB
6	All emissions, radiated>6G	±5.24dB
7	Conducted Emission (9KHz-150KHz)	±2.19dB
8	Conducted Emission (150KHz-30MHz)	±2.53dB
9	Occupied Channel Bandwidth	±3.5%
10	Power Spectral Density, conducted	±1.245dB
11	Duty Cycle	±3.2%

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.

Prüfbericht - Nr.: CN25722O 004
Test Report No.:

Seite 8 von 21
Page 8 of 21

2.7 Status of Facility Used for Testing

The SHENZHEN STS TEST SERVICES CO., LTD. Test facility located at 101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, 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 EUT is a Professional Handheld Wireless Microphone, which supports Bluetooth low energy, 2.4GHz NexLink and Microphone functions.

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

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	Professional Handheld Wireless Microphone
Type Designation:	Astral HH
Trademark:	SOUND DEVICES
FCC ID:	2AKLX-28297
Operating Voltage:	USB-C operated, or Battery operated (3.7Vdc, 4000mAh)
Operating Temperature Range:	-10 °C ~ +40 °C
Technical Specification of 614 MHz to 616 MHz	
Operating Frequency:	614 MHz to 616 MHz
Type of Modulation:	Digital modulation
Channel Number:	73 channels
Channel Spacing:	25KHz
Antenna Type:	Integrated Antenna
Antenna Gain:	0.28 dBi (Provided by the Client)

Note: The correctness of all data provided by customer in the test report is ensured and responsible of the customer. Any misjudgment of the test results caused by the use of incorrect data provided by customer shall be borne by the customer.

Table 4: RF Channel and Frequency

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
1	614.100	2	614.125	3	614.15	4	614.175
.....		37	615				
70	615.825	71	615.850	72	615.875	73	615.900

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Wireless transmitting mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- B. On, Charging
- C. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- | | |
|-------------------------|----------------------------------|
| - Application Form | - User Manual |
| - Operation Description | - FCC/IC Label and Location Info |

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 C63.10:2020.

According to clause 3.1, all tests were performed on model *Astral HH* in this report.

4.3 Special Accessories and Auxiliary Equipment

Table 5: List of Accessories and Auxiliary Equipment

Item	Equipment	Mfr/Brand	Model/Type No.	Note
E-1	Adapter	ZTC	NB-A515A	N/A
C-1	USB Cable	N/A	TTL-232R-3V3	N/A

Item	Equipment	Mfr/Brand	Length	Note
C-1	Shielded	NO	100cm	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)

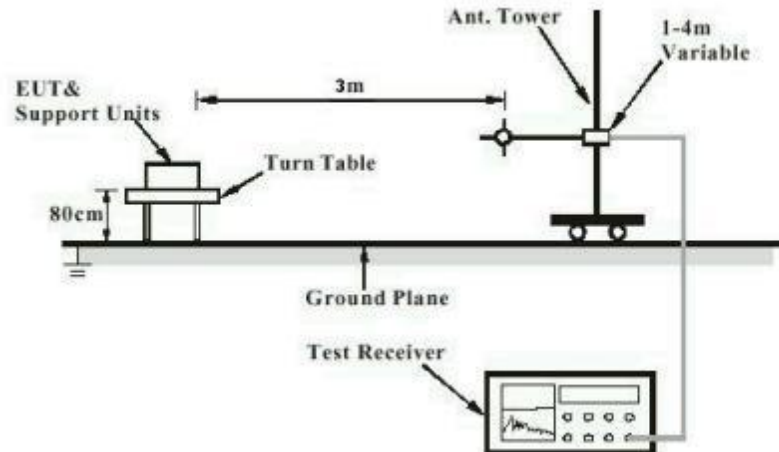


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

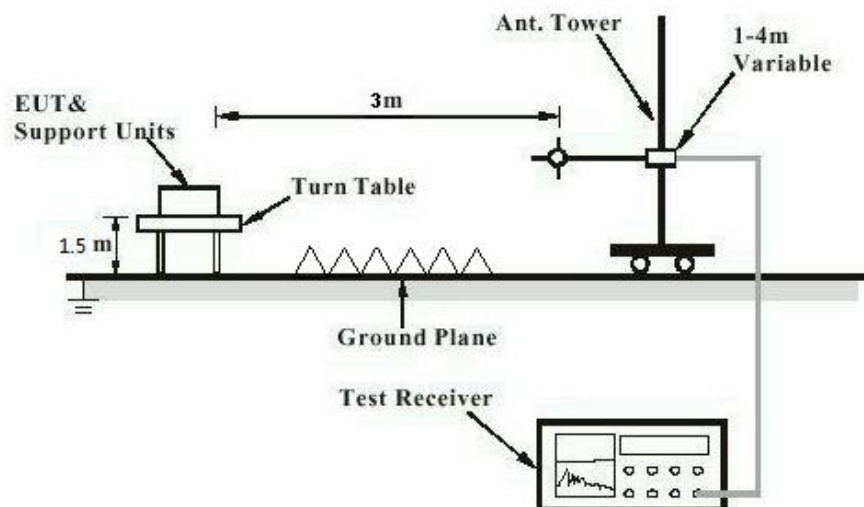


Diagram of Measurement Configuration for Mains Conduction Measurement

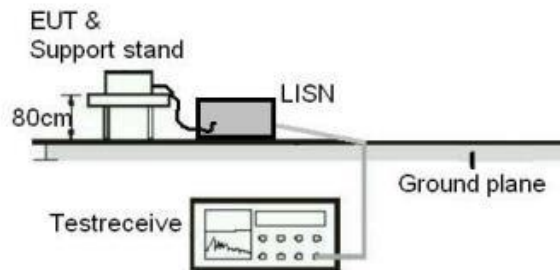
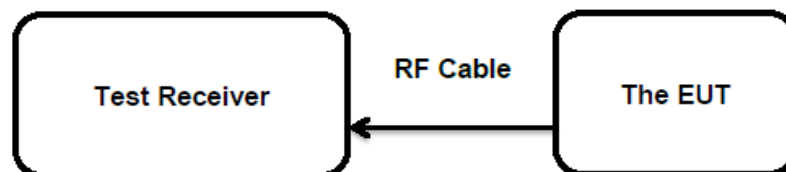


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.203

According to the manufacturer declared, the EUT has Integral antenna, permanent attachment and no consideration of replacement, refer to section 3.2 for details.

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

Refer to EUT Photo for further details.

Prüfbericht - Nr.: CN25722O 004
Test Report No.:Seite 15 von 21
Page 15 of 21

5.1.2 Maximum EIRP

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

Test standard	: FCC 15.236(d)(2)
Basic standard	: ANSI C63.10:2020
Limits	: $\leq 20\text{mW}$
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-05-14
Input voltage	: Battery operated (3.7Vdc)
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24.4 °C
Relative humidity	: 55 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

5.1.3 Occupied Bandwidth

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

Test standard	: FCC 15.236(f)(1)
Basic standard	: ANSI C63.10:2020
Limits	: Within assigned band 614-616MHz
	: The channel spacing is 25KHz or an integral multiple
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-05-14
Input voltage	: Battery operated (3.7Vdc)
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24.4 °C
Relative humidity	: 55 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

Prüfbericht - Nr.: CN25722O 004
Test Report No.:Seite 17 von 21
Page 17 of 21

5.1.4 Frequency tolerance

RESULT:

Pass

Test Specification

Test standard	: FCC 15.236(f)(1)
Basic standard	: ANSI C63.10:2020
Limits	: Frequency tolerance $\pm 0.005\%$
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-05-14
Input voltage	: Battery operated (3.7Vdc)
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24.4 °C
Relative humidity	: 55 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

Prüfbericht - Nr.: CN257220 004
Test Report No.:

Seite 18 von 21
Page 18 of 21

5.1.5 Emissions Mark

RESULT:

Pass

Test Specification

Test standard	: FCC 15.236(g)
Basic standard	: ANSI C63.10:2020
Limits	: Refer to 300 422-1 V2.2.1 (4.2.4.2.2)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-05-14
Input voltage	: Battery operated (3.7Vdc)
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24.4 °C
Relative humidity	: 55 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

Prüfbericht - Nr.: CN25722O 004
Test Report No.:Seite 19 von 21
Page 19 of 21

5.1.6 Radiated Spurious Emission

RESULT:

Pass

Test Specification

Test standard	: FCC 15.236(g)(4)
Basic standard	: ANSI C63.10:2020
Limits	: Refer to 300 422-1 V2.2.1 (4.2.4.1.2)
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 2025-05-13 to 2025-09-06
Input voltage	: Battery operated (3.7Vdc)
Operation mode	: A
Test channel	: Low / Middle / High
Ambient temperature	: 24.4 °C
Relative humidity	: 55 %
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.

Prüfbericht - Nr.: **CN25722O 004**
Test Report No.:Seite 20 von 21
Page 20 of 21

5.1.7 Conducted Emission on AC Mains

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

Test standard	: FCC Part 15.207(a)
Basic standard	: ANSI C63.10:2020
Frequency range	: 0.15 – 30MHz
Classification	: Class B
Limits	: FCC Part 15.207(a)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-05-13 to 2025-09-06
Input voltage	: AC 120V, 60Hz
Operation mode	: B
Ambient temperature	: 25.1 °C
Relative humidity	: 59 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A.

6 Photographs of the Test Set-Up

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

7 List of Tables

Table 1: List of Test and Measurement Equipment.....	6
Table 2: Measurement Uncertainty.....	7
Table 3: Technical Specification of EUT	9
Table 4: RF Channel and Frequency	9
Table 5: List of Accessories and Auxiliary Equipment.....	11

Appendix A: Test Results of 614MHz -616MHz

APPENDIX A: TEST RESULTS OF 614MHZ -616MHZ.....	1
APPENDIX A.1: TEST RESULTS OF MAXIMUM EIRP	2
Test Result.....	2
Test Graphs.....	3
APPENDIX A.2: TEST RESULTS OF OCCUPIED BANDWIDTH	5
Test Graphs.....	5
APPENDIX A.3: TEST RESULTS OF FREQUENCY TOLERANCE	7
Test Result.....	7
APPENDIX A.4: TEST RESULTS OF RADIATED SPURIOUS EMISSIONS	9
Below 25 MHz.....	9
Above 25 MHz.....	10
APPENDIX A.5: TEST RESULTS OF EMISSION MASK.....	16
Test Graphs.....	16
APPENDIX A.6: TEST RESULTS OF CONDUCTED EMISSION ON AC MAINS.....	18

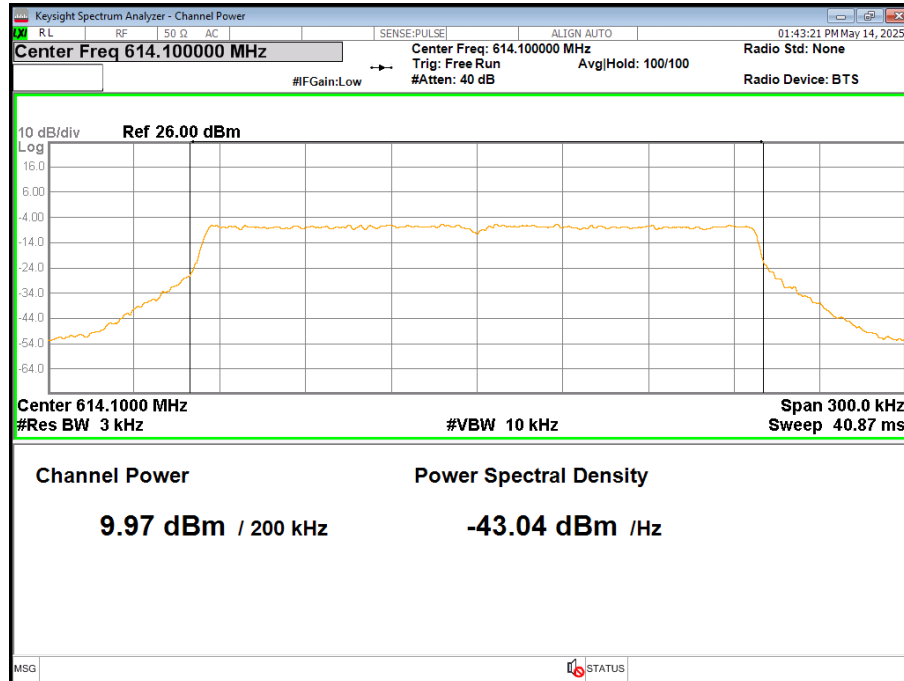
Appendix A.1: Test Results of Maximum EIRP

Test Result

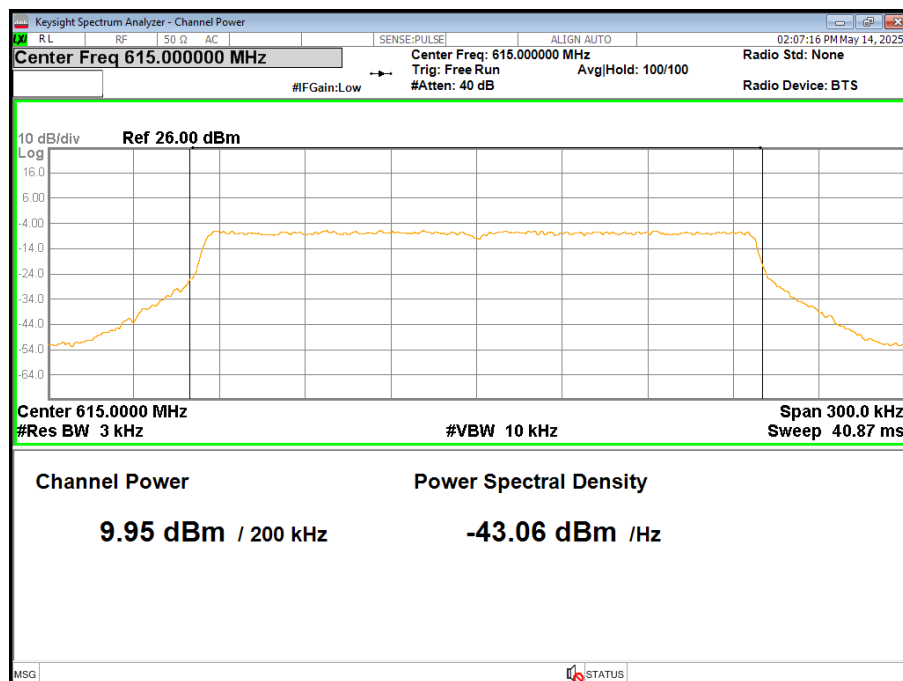
Frequency Channel (MHz)	Conducted Output Power (dBm)	Ant Gain (dBi)	EIRP (dBm)	EIRP (mW)	Limits (mW)
614.100	9.97	0.28	10.25	10.593	20
615.000	9.95	0.28	10.23	10.544	20
615.900	9.99	0.28	10.27	10.641	20

Test Graphs

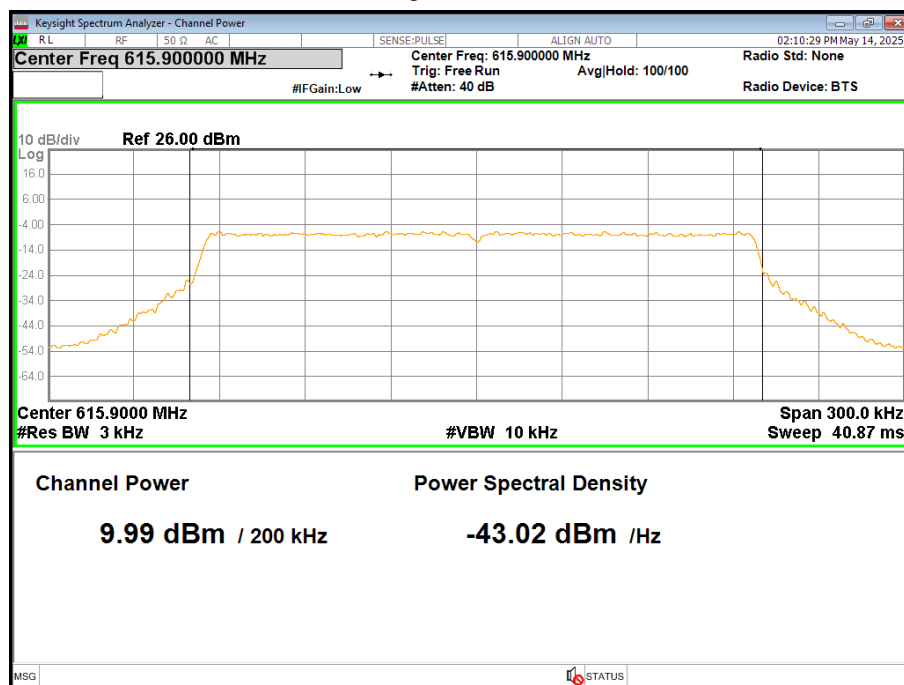
Low Channel



Mid Channel



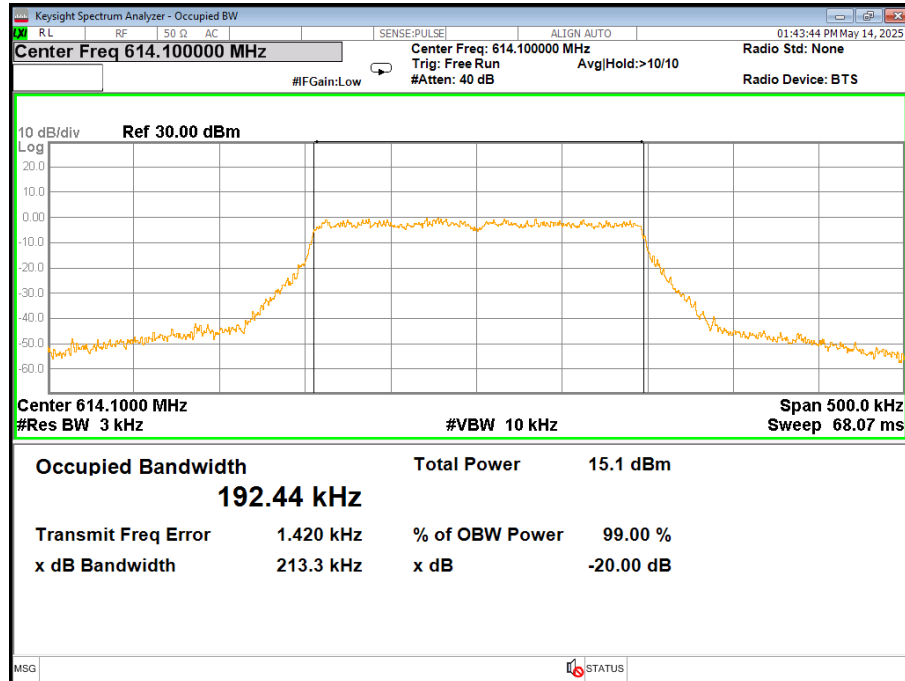
High Channel



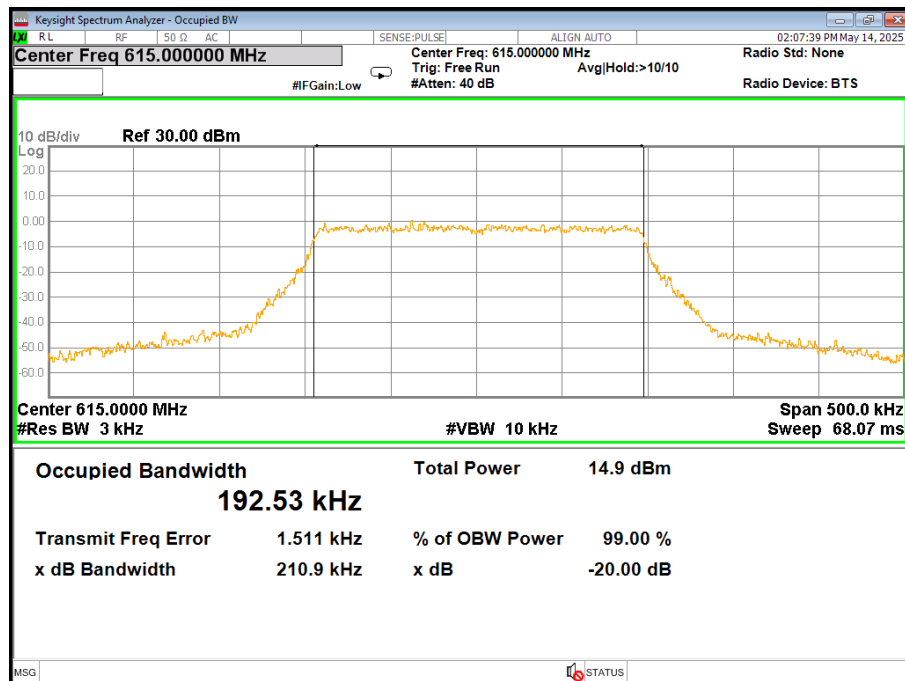
Appendix A.2: Test Results of Occupied Bandwidth

Test Graphs

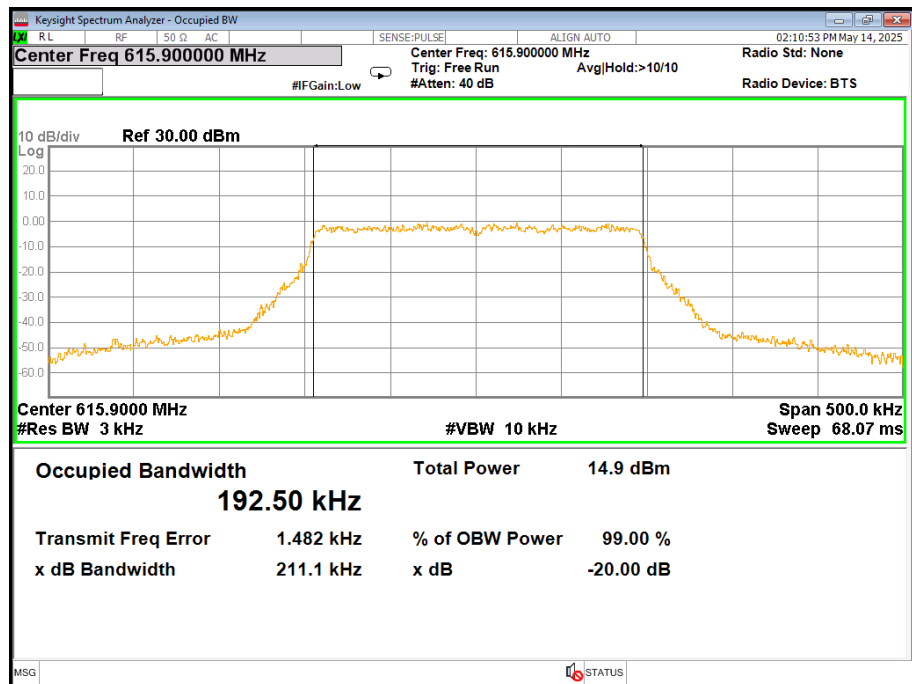
614.100 MHz



615.000 MHz



615.900 MHz



Appendix A.3: Test Results of Frequency tolerance

Test Result

- (1) Frequency stability versus input voltage (Supply Nominal voltage is DC 3.7V)
- (2) Frequency stability versus input voltage (Supply battery operating end point which shall be specified by the manufacturer DC 4.07V)

614MHz -616MHz Low

Environment		Frequency Deviation measured with time Elapse(30 minutes)					
Temperature (°c)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Results
50	Normal Voltage	614.1000	614.1005	500	0.0001	0.0050	PASS
40		614.1000	614.0981	-1900	-0.0003		
30		614.1000	614.1003	300	0.0000		
20		614.1000	614.1010	1000	0.0002		
10		614.1000	614.0985	-1500	-0.0002		
0		614.1000	614.1019	1900	0.0003		
-10		614.1000	614.1013	1300	0.0002		
-20		614.1000	614.0991	-900	-0.0001		
-30		614.1000	614.1014	1400	0.0002		
20	Maximum Voltage	614.1000	614.1018	1800	0.0003	0.0050	PASS
-30	BEP	614.1000	614.0991	-900	-0.0001		

Mid

Environment		Frequency Deviation measured with time Elapse(30 minutes)					
Temperature (°c)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Results
50	Normal Voltage	615.0000	614.9991	-900	-0.0001	0.0050	PASS
40		615.0000	615.0002	200	0.0000		
30		615.0000	614.9990	-1000	-0.0002		
20		615.0000	615.0010	1000	0.0002		
10		615.0000	614.9995	-500	-0.0001		
0		615.0000	615.0001	100	0.0000		
-10		615.0000	615.0005	500	0.0001		
-20		615.0000	614.9992	-800	-0.0001		
-30		615.0000	615.0002	200	0.0000		
20	Maximum Voltage	615.0000	615.0020	2000	0.0003	0.0050	PASS
-30	BEP	615.0000	615.0022	2200	0.0004		

Environment		High Frequency Deviation measured with time Elapse(30 minutes)					
Temperature (°c)	Voltage (V)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Results
50	Normal Voltage	615.9000	615.9020	2000	0.0003	0.0050	PASS
40		615.9000	615.9037	3700	0.0006		
30		615.9000	615.9009	900	0.0001		
20		615.9000	615.9005	500	0.0001		
10		615.9000	615.8990	-1000	-0.0002		
0		615.9000	615.9008	800	0.0001		
-10		615.9000	615.8993	-700	-0.0001		
-20		615.9000	615.9004	400	0.0001		
-30		615.9000	615.9028	2800	0.0005		
20	Maximum Voltage	615.9000	615.8974	-2600	-0.0004		
-30	BEP	615.9000	615.9016	1600	0.0003		

Appendix A.4: Test Results of Radiated Spurious Emissions

Below 25 MHz

Temperature:	23.4°C	Relative Humidity:	60%
Test Voltage:	DC 3.7V	Test Mode:	Mode A

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

Above 25 MHz

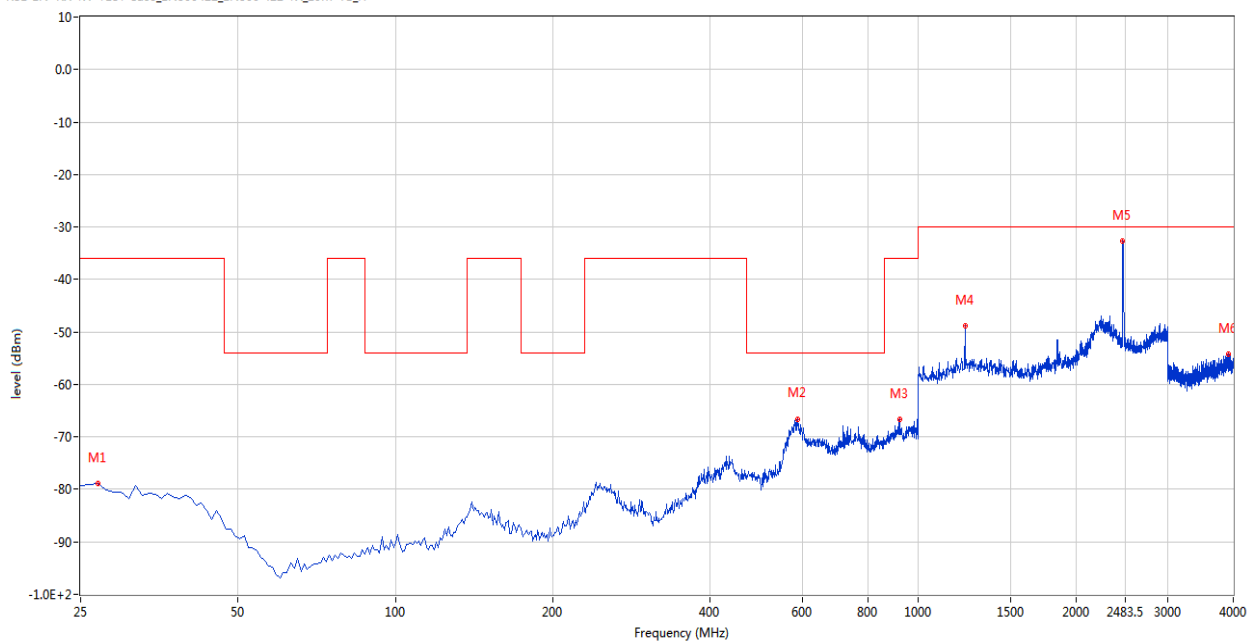
Temperature:	23.4°C	Relative Humidity:	60%
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	Mode A.1		

Frequency (MHz)	Result (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
26.950	-78.93	-1.94	-36.0	42.93	185.60	Horizontal	Vertical	Pass
588.550	-66.57	6.42	-54.0	12.57	72.50	Horizontal	Vertical	Pass
920.050	-66.67	9.60	-36.0	30.67	249.50	Horizontal	Vertical	Pass
1228.000	-48.91	12.67	-30.0	18.91	78.70	Horizontal	Vertical	Pass
2460.000	-32.78	16.84	-30.0	2.78	227.50	Horizontal	Vertical	Pass
3922.000	-54.29	2.83	-30.0	24.29	346.60	Horizontal	Vertical	Pass

Remark:

1. Margin = Result (Result = Reading + Factor)-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

RSE-EN RX-TX TEST Case_EN300422_EN300 422-TX_25M-4G_H



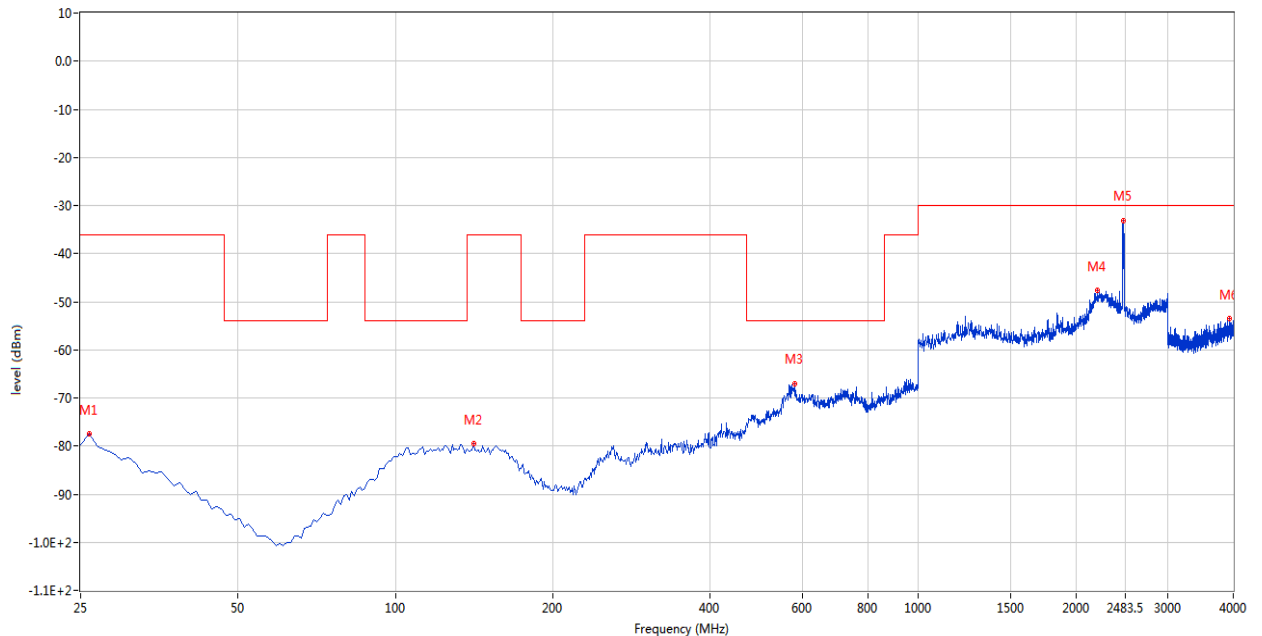
Temperature:	23.4°C	Relative Humidity:	60%
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	Mode A.1		

Frequency (MHz)	Result (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
25.975	-77.53	-1.09	-36.0	41.53	55.00	Vertical	Vertical	Pass
141.025	-79.50	-1.19	-36.0	43.50	344.70	Vertical	Vertical	Pass
580.750	-67.04	5.51	-54.0	13.04	331.30	Vertical	Vertical	Pass
2200.000	-47.64	19.61	-30.0	17.64	171.00	Vertical	Vertical	Pass
2470.000	-33.16	16.66	-30.0	3.16	214.90	Vertical	Vertical	Pass
3933.000	-53.47	2.81	-30.0	23.47	290.20	Vertical	Vertical	Pass

Remark:

1. Margin = Result (Result = Reading + Factor)-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

RSE-EN RX-TX TEST Case_EN300422_EN300 422-TX_25M-4G_V



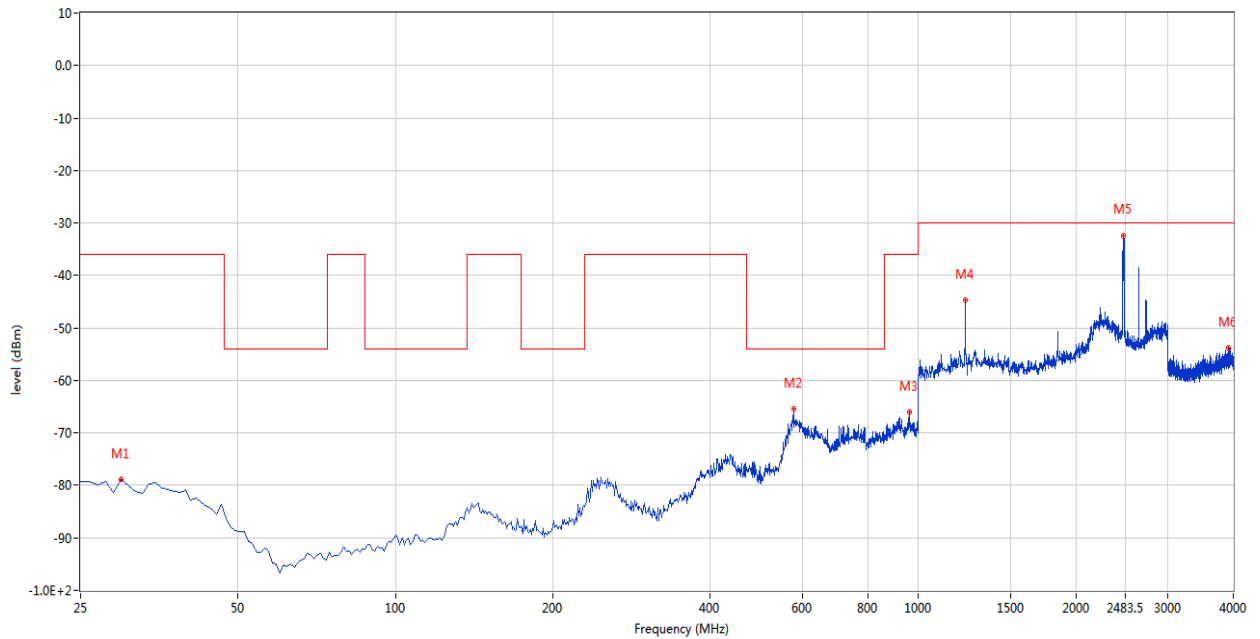
Temperature:	23.4°C	Relative Humidity:	60%
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	Mode A.2		

Frequency (MHz)	Result (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
29.875	-78.94	-1.92	-36.0	42.94	156.50	Horizontal	Vertical	Pass
576.850	-65.45	6.45	-54.0	11.45	74.00	Horizontal	Vertical	Pass
960.025	-66.07	9.64	-36.0	30.07	40.20	Horizontal	Vertical	Pass
1230.000	-44.70	12.68	-30.0	14.70	93.60	Horizontal	Vertical	Pass
2470.000	-32.55	16.66	-30.0	2.55	284.10	Horizontal	Vertical	Pass
3918.000	-53.73	2.84	-30.0	23.73	122.90	Horizontal	Vertical	Pass

Remark:

1. Margin = Result (Result = Reading + Factor)-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

RSE-EN RX-TX TEST Case_EN300422_EN300 422-TX_25M-4G_H



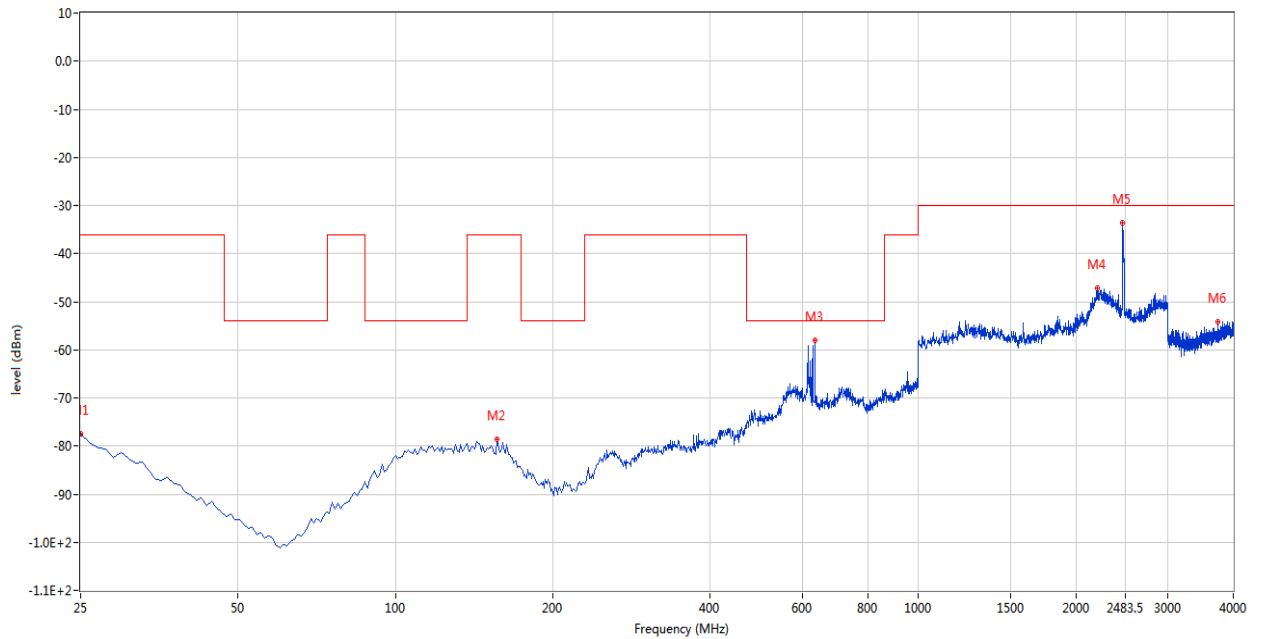
Temperature:	23.4°C	Relative Humidity:	60%
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	Mode A.2		

Frequency (MHz)	Result (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
25.000	-77.54	-0.46	-36.0	41.54	6.20	Vertical	Vertical	Pass
156.625	-78.52	-1.89	-36.0	42.52	42.40	Vertical	Vertical	Pass
634.375	-58.12	5.21	-54.0	4.12	72.10	Vertical	Vertical	Pass
2202.000	-47.23	19.61	-30.0	17.23	229.80	Vertical	Vertical	Pass
2460.000	-33.72	16.84	-30.0	3.72	209.40	Vertical	Vertical	Pass
3744.000	-54.28	1.81	-30.0	24.28	217.80	Vertical	Vertical	Pass

Remark:

1. Margin = Result (Result = Reading + Factor)-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

RSE-EN RX-TX TEST Case_EN300422_EN300 422-TX_25M-4G_V



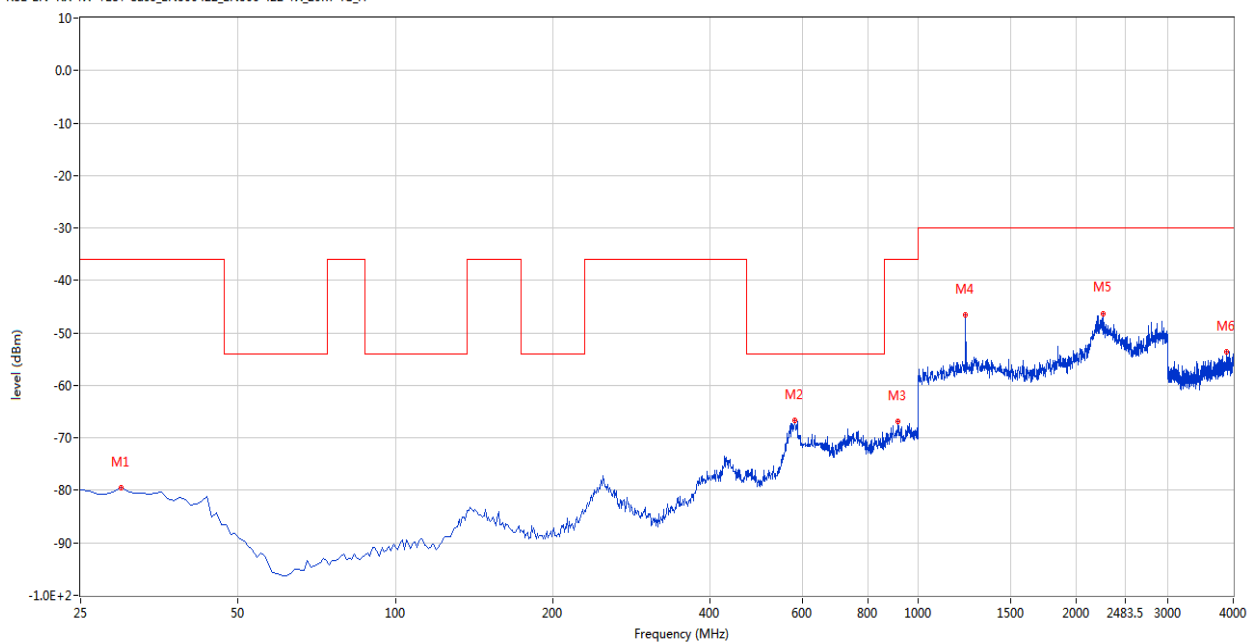
Temperature:	23.4°C	Relative Humidity:	60%
Test Voltage:	DC 3.7V	Phase:	Horizontal
Test Mode:	Mode A.3		

Frequency (MHz)	Result (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
29.875	-79.49	-1.92	-36.0	43.49	194.40	Horizontal	Vertical	Pass
580.750	-66.74	6.68	-54.0	12.74	35.10	Horizontal	Vertical	Pass
915.175	-66.86	9.41	-36.0	30.86	154.20	Horizontal	Vertical	Pass
1232.000	-46.60	12.68	-30.0	16.60	70.60	Horizontal	Vertical	Pass
2252.000	-46.26	19.66	-30.0	16.26	199.60	Horizontal	Vertical	Pass
3881.000	-53.52	2.71	-30.0	23.52	78.30	Horizontal	Vertical	Pass

Remark:

1. Margin = Result (Result = Reading + Factor)-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

RSE-EN RX-TX TEST Case_EN300422_EN300 422-TX_25M-4G_H



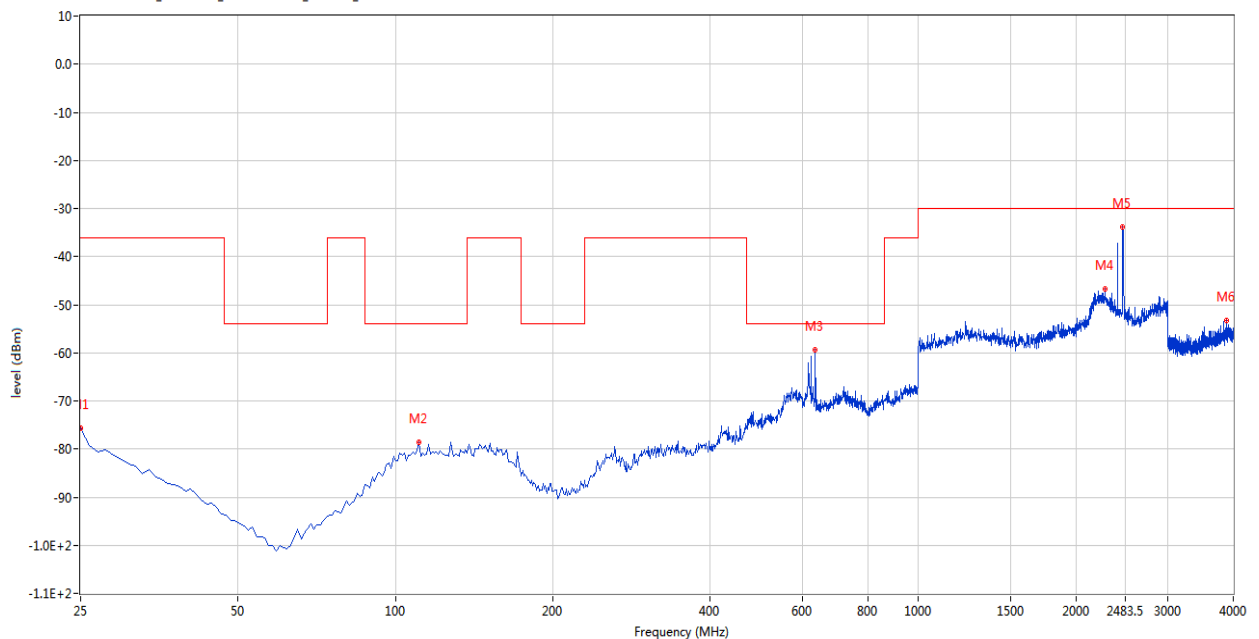
Temperature:	23.4°C	Relative Humidity:	60%
Test Voltage:	DC 3.7V	Phase:	Vertical
Test Mode:	Mode A.3		

Frequency (MHz)	Result (dBm)	Factor (dB)	Limit (dBm)	Margin (dB)	Table (o)	ANT	EUT	Verdict
25.000	-75.74	-0.46	-36.0	39.74	242.00	Vertical	Vertical	Pass
110.800	-78.57	-2.35	-54.0	24.57	238.70	Vertical	Vertical	Pass
635.350	-59.40	5.19	-54.0	5.40	63.90	Vertical	Vertical	Pass
2272.000	-46.68	19.45	-30.0	16.68	33.70	Vertical	Vertical	Pass
2460.000	-33.83	16.84	-30.0	3.83	294.90	Vertical	Vertical	Pass
3891.000	-53.24	2.79	-30.0	23.24	3.80	Vertical	Vertical	Pass

Remark:

1. Margin = Result (Result = Reading + Factor)-Limit
2. Factor= Antenna factor+Cable attenuation factor(cable loss)-Amplifier gain

RSE-EN RX-TX TEST Case_EN300422_EN300 422-TX_25M-4G_V



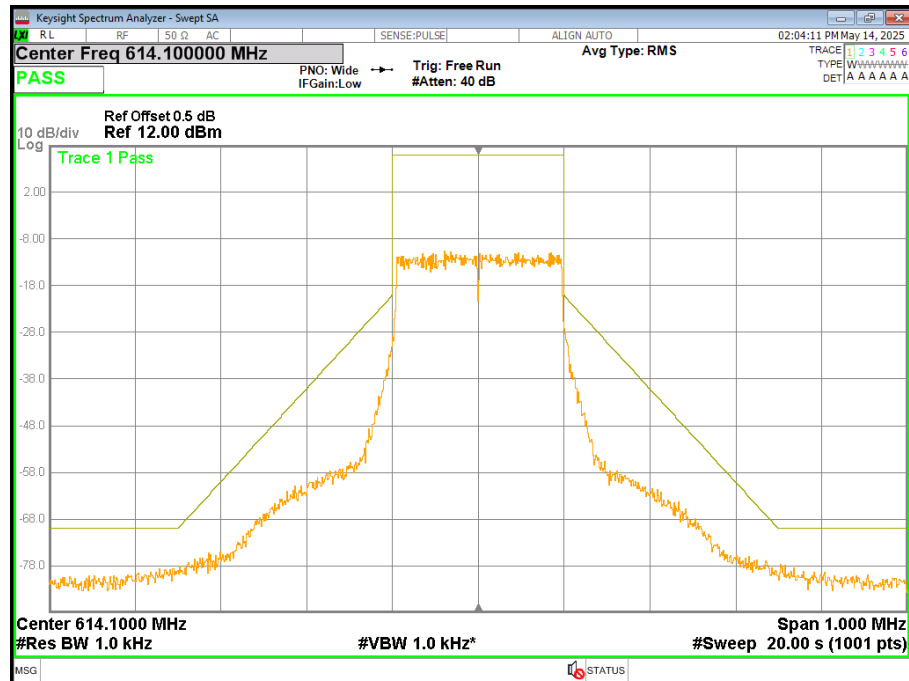
Note:

- 1) Factor = Antenna Factor + Cable Loss – Pre-amplifier.
Emission Level = Reading + Factor
- 2) The frequency emission of peak points that did not show above the forms are at least 20dB below the limit, the frequency emission is mainly from the environment noise.

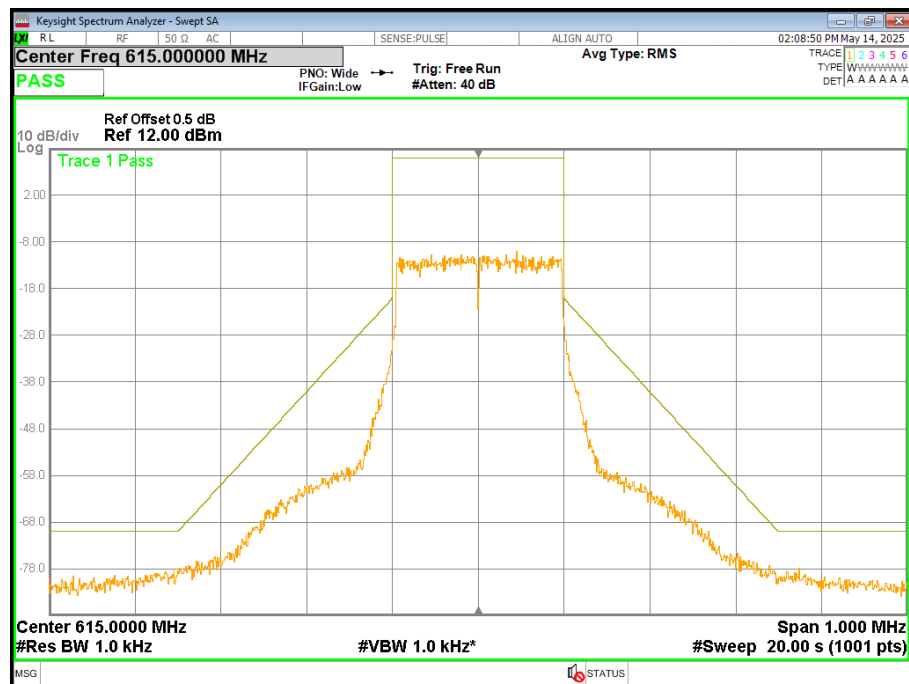
Appendix A.5: Test Results of Emission Mask

Test Graphs

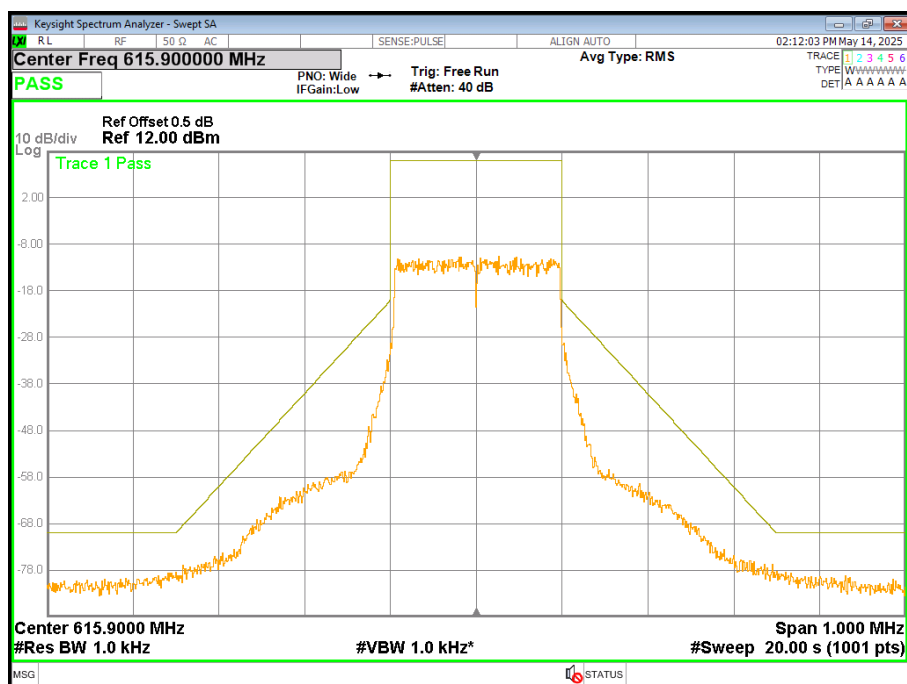
Low



Mid



High



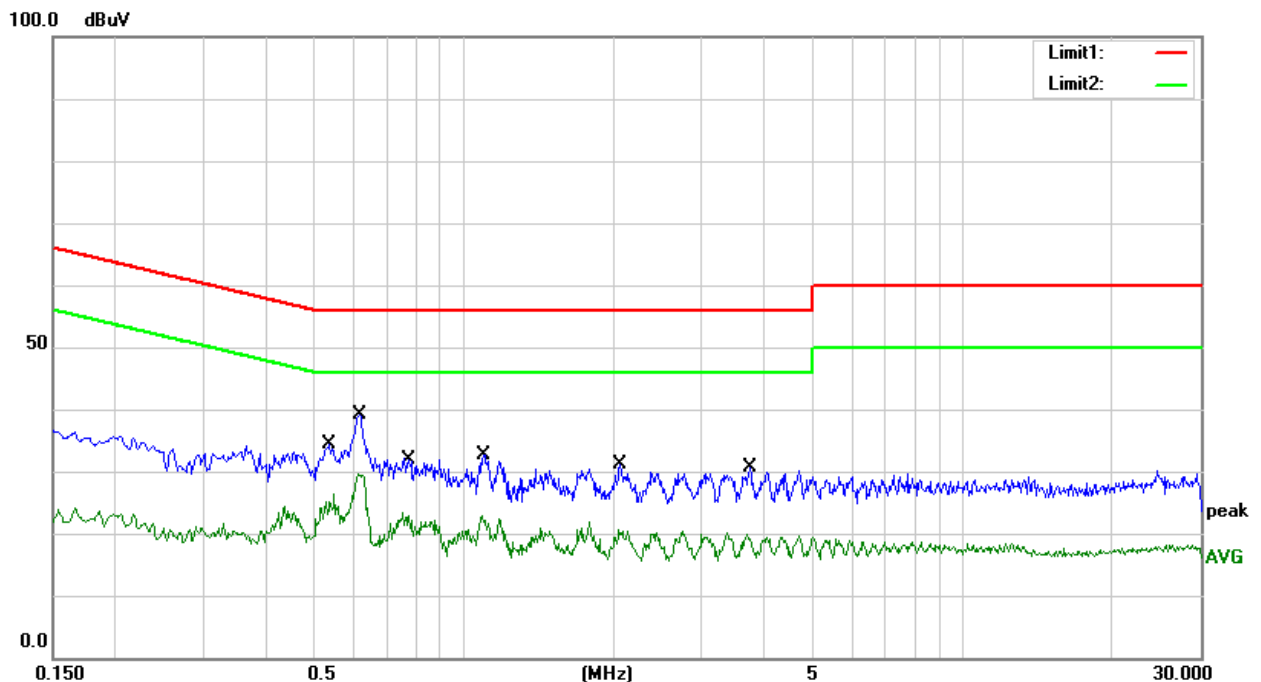
Appendix A.6: Test Results of Conducted Emission on AC Mains

Temperature:	25.1°C	Relative Humidity:	59%
Test Voltage:	AC 120V/60Hz	Phase:	L
Test Mode:	Mode B		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.5380	14.34	19.97	34.31	56.00	-21.69	QP
2	0.5380	5.23	19.97	25.20	46.00	-20.80	AVG
3	0.6180	19.19	19.90	39.09	56.00	-16.91	QP
4	0.6180	9.80	19.90	29.70	46.00	-16.30	AVG
5	0.7780	12.10	19.81	31.91	56.00	-24.09	QP
6	0.7780	3.55	19.81	23.36	46.00	-22.64	AVG
7	1.0980	12.82	19.77	32.59	56.00	-23.41	QP
8	1.0980	3.09	19.77	22.86	46.00	-23.14	AVG
9	2.0580	11.46	19.79	31.25	56.00	-24.75	QP
10	2.0580	2.14	19.79	21.93	46.00	-24.07	AVG
11	3.7500	10.73	19.84	30.57	56.00	-25.43	QP
12	3.7500	0.21	19.84	20.05	46.00	-25.95	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) – Limit
3. Factor = LISN factor + Cable loss + Limiter (10dB)



Temperature:	25.1°C	Relative Humidity:	59%
Test Voltage:	AC 120V/60Hz	Phase:	N
Test Mode:	Mode B		

No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.4940	11.86	19.96	31.82	56.10	-24.28	QP
2	0.4940	7.30	19.96	27.26	46.10	-18.84	AVG
3	0.6180	19.59	19.89	39.48	56.00	-16.52	QP
4	0.6180	13.64	19.89	33.53	46.00	-12.47	AVG
5	0.8700	11.45	19.80	31.25	56.00	-24.75	QP
6	0.8700	3.51	19.80	23.31	46.00	-22.69	AVG
7	1.4500	9.91	19.82	29.73	56.00	-26.27	QP
8	1.4500	3.27	19.82	23.09	46.00	-22.91	AVG
9	2.1100	9.40	19.88	29.28	56.00	-26.72	QP
10	2.1100	2.32	19.88	22.20	46.00	-23.80	AVG
11	3.3580	10.01	19.94	29.95	56.00	-26.05	QP
12	3.3580	0.80	19.94	20.74	46.00	-25.26	AVG

Remark:

1. All readings are Quasi-Peak and Average values
2. Margin = Result (Result = Reading + Factor) - Limit
3. Factor = LISN factor + Cable loss + Limiter (10dB)

100.0 dBuV

