

FCC Radio Test Report

FCC ID: 2ARF2MC-350R

Report No. : BTL-FCCP-1-2308T058
Equipment : Wireless Connect Natural Gas Alarm/Wireless Connect 2-in-1 Natural Gas and Carbon Monoxide Alarm
Model Name : DD624NVW, DD626NCVW
Brand Name : DeNova Detect
Applicant : New Cosmos Electric Co., Ltd.
Address : 2-5-4 Mitsuya-naka, Yodogawa-ku, Osaka, Japan 5320036

Radio Function : Short Range Devices

FCC Rule Part(s) : FCC CFR Title 47, Part 15, Subpart C (15.249)
Measurement Procedure(s) : ANSI C63.10-2013

Date of Receipt : 2023/8/16
Date of Test : 2023/8/25 ~ 2023/9/6
Issued Date : 2024/3/26

The above equipment has been tested and found in compliance with the requirement of the above standards by BTL Inc.

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Declaration

BTL represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with standards traceable to international standard(s) and/or national standard(s).

BTL's reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

The report must not be used by the client to claim product certification, approval, or endorsement by NIST, A2LA, or any agency of the U.S. Government.

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BTL's laboratory quality assurance procedures are in compliance with the **ISO/IEC 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

BTL is not responsible for the sampling stage, so the results only apply to the sample as received.

The information, data and test plan are provided by manufacturer which may affect the validity of results, so it is manufacturer's responsibility to ensure that the apparatus meets the essential requirements of applied standards and in all the possible configurations as representative of its intended use.

Limitation

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

Please note that the measurement uncertainty is provided for informational purpose only and are not use in determining the Pass/Fail results.

CONTENTS

REVISION HISTORY	4
1 SUMMARY OF TEST RESULTS	5
1.1 TEST FACILITY	6
1.2 MEASUREMENT UNCERTAINTY	6
1.3 TEST ENVIRONMENT CONDITIONS	6
1.4 DUTY CYCLE	7
2 GENERAL INFORMATION	8
2.1 DESCRIPTION OF EUT	8
2.2 TEST MODES	9
2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.4 SUPPORT UNITS	10
3 RADIATED EMISSIONS TEST	11
3.1 LIMIT	11
3.2 TEST PROCEDURE	12
3.3 DEVIATION FROM TEST STANDARD	12
3.4 TEST SETUP	12
3.5 EUT OPERATING CONDITIONS	14
3.6 TEST RESULT – BELOW 30 MHZ	14
3.7 TEST RESULT – 30 MHZ TO 1 GHZ	14
3.8 TEST RESULT – ABOVE 1 GHZ	14
4 BANDWIDTH TEST	15
4.1 APPLIED PROCEDURES / LIMIT	15
4.2 TEST PROCEDURE	15
4.3 DEVIATION FROM STANDARD	15
4.4 TEST SETUP	15
4.5 EUT OPERATION CONDITIONS	15
4.6 TEST RESULTS	15
5 LIST OF MEASURING EQUIPMENTS	16
6 EUT TEST PHOTO	17
7 EUT PHOTOS	17
APPENDIX A RADIATED EMISSIONS - 30 MHZ TO 1 GHZ	18
APPENDIX B RADIATED EMISSIONS - ABOVE 1 GHZ	23
APPENDIX C BANDWIDTH	26

REVISION HISTORY

Report No.	Version	Description	Issued Date	Note
BTL-FCCP-1-2308T058	R00	Original Report.	2024/3/26	Valid

1 SUMMARY OF TEST RESULTS

Test procedures according to the technical standards.

Standard(s) Section	Description	Test Result	Judgement	Remark
15.207	AC Power Line Conducted Emissions	-----	N/A	NOTE (1)
15.205 15.209 15.249(a)(d)	Radiated Emissions	APPENDIX A APPENDIX B	Pass	-----
15.215(c)	Bandwidth	APPENDIX C	Pass	-----

NOTE:

- (1) "N/A" denotes test is not applicable in this Test Report.
- (2) The report format version is TP.1.1.1.
- (3) Supply from battery.

1.1 TEST FACILITY

The test locations stated below are under the TAF Accreditation Number 0659.

The test location(s) used to collect the test data in this report are:

No. 68-1, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
(FCC DN: TW0659)

☐ C05 ☐ CB08 ☐ CB11 ☒ SR10 ☐ SR11

No. 72, Ln. 169, Sec. 2, Datong Rd., Xizhi Dist., New Taipei City 221, Taiwan
(FCC DN: TW0659)

☐ C06 ☒ CB21 ☐ CB22

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k = 2$, providing a level of confidence of approximately **95 %**. The measurement instrumentation uncertainty considerations contained in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2 U_{CISPR} requirement.

A. Radiated emissions test :

Test Site	Measurement Frequency Range	U (dB)
CB21	0.03 GHz ~ 0.2 GHz	4.17
	0.2 GHz ~ 1 GHz	4.72
	1 GHz ~ 6 GHz	5.21
	6 GHz ~ 18 GHz	5.51
	18 GHz ~ 26 GHz	3.69
	26 GHz ~ 40 GHz	4.23

B. Conducted test :

Test Item	U (dB)
Bandwidth	1.13

NOTE:

Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

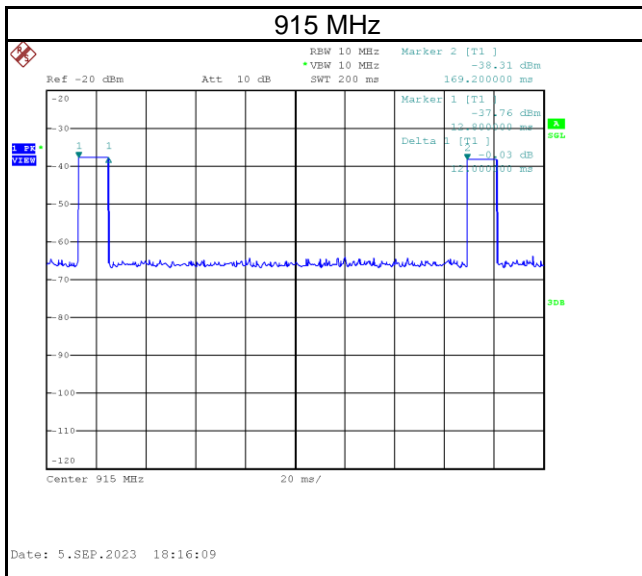
1.3 TEST ENVIRONMENT CONDITIONS

Test Item	Environment Condition	Test Voltage	Tested by
Radiated emissions below 1 GHz	Refer to data	DC 3V	Eddie Lee
Radiated emissions above 1 GHz	Refer to data	DC 3V	Eddie Lee
Bandwidth	26.4 °C, 40 %	DC 3V	Sean Huang

1.4 DUTY CYCLE

If duty cycle is $\geq 98\%$, duty factor is not required.
If duty cycle is $< 98\%$, duty factor shall be considered.

Remark	Delta 1			Delta 2	On Time/Period	10 log(1/Duty Cycle)
Mode	ON (ms)	Numbers (ON)	On Time (B) (ms)	Period (ON+OFF) (ms)	Duty Cycle (%)	Duty Factor (dB)
915 MHz	12.000	1	12.000	169.200	7.09%	11.49



2 GENERAL INFORMATION

2.1 DESCRIPTION OF EUT

Equipment	Wireless Connect Natural Gas Alarm/Wireless Connect 2-in-1 Natural Gas and Carbon Monoxide Alarm
Model Name	DD624NVW, DD626NCVW
Brand Name	DeNova Detect
Model Difference	DD624NVW is electrically identical to DD626NCVW except without CARBON MONOXIDE sensor and indicator light.
Power Source	Supply from battery.
Power Rating	DC 3V
Products Covered	3 * Battery: FDK / CR17500EP(3V)
Operation Frequency	915 MHz
Modulation Technology	FSK
Transfer Rate	40 Kbps
Field Strength	94.31 dBuV/m
Test Model	DD626NCVW
Sample Status	Engineering Sample
EUT Modification(s)	N/A

NOTE:

(1) The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

(2) Channel List:

Channel	Frequency (MHz)
01	915

(3) Table for Filed Antenna:

Ant.	Brand	Model	Antenna Type	Connector	Gain (dBi)
1	ARISTOTLE	BSC032	Coil	N/A	2.47

(4) The above Antenna information are derived from the antenna data sheet provided by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.2 TEST MODES

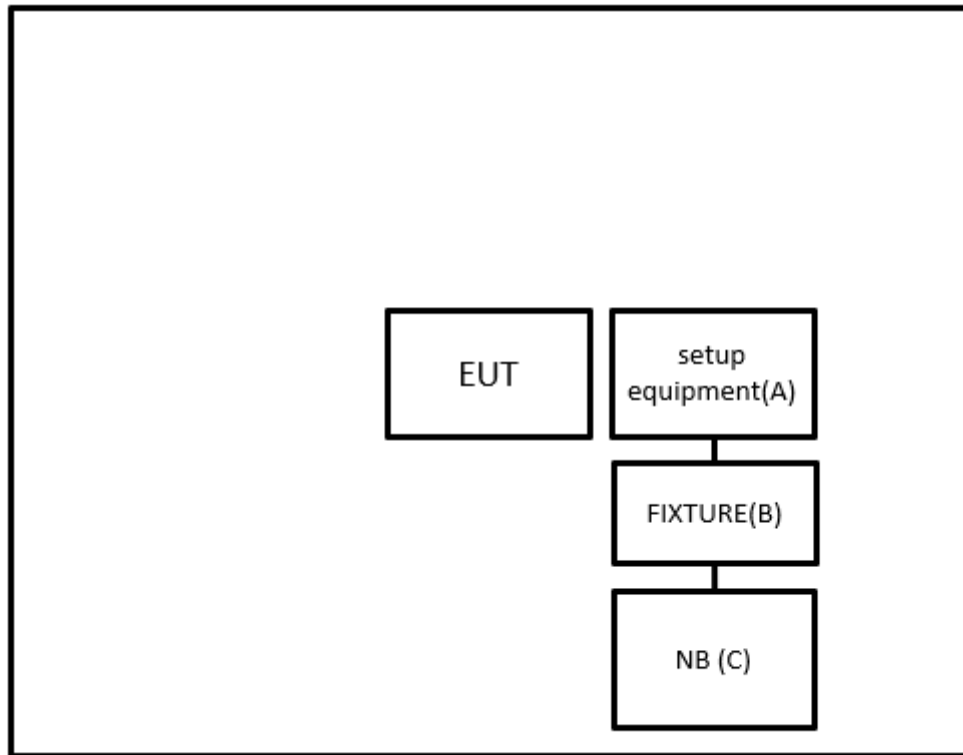
Test Items	Test mode	Channel	Note
Transmitter Radiated Emissions (below 1GHz)	TX	01	-
Transmitter Radiated Emissions (above 1GHz)	TX	01	Harmonic
Bandwidth	TX	01	-

NOTE:

- (1) For radiated emission band edge test, both Vertical and Horizontal are evaluated, but only the worst case (Horizontal) is recorded.
- (2) All X, Y and Z axes are evaluated, but only the worst case (X axis) is recorded.

2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Equipment letters and Cable numbers refer to item numbers described in the tables of clause 2.4.



2.4 SUPPORT UNITS

Item	Equipment	Brand	Model No.	Series No.	Remarks
A	setup equipment	N/A	N/A	N/A	Supplied by test requester.
B	FIXTURE	N/A	N/A	N/A	Supplied by test requester.
C	NB	HP	TPN-I119	N/A	Furnished by test lab.

Item	Shielded	Ferrite Core	Length	Cable Type	Remarks
-	-	-	-	-	-

3 RADIATED EMISSIONS TEST

3.1 LIMIT

In case the emission fall within the restricted band specified on 15.205, then the 15.209 limit in the table below has to be followed.

LIMITS OF RADIATED EMISSIONS MEASUREMENT (9 kHz to 1000 MHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

LIMITS OF RADIATED EMISSIONS MEASUREMENT (Above 1000 MHz)

Frequency (MHz)	Radiated Emissions (dBuV/m)		Measurement Distance (meters)
	Peak	Average	
Above 1000	74	54	3

NOTE:

- (1) The limit for radiated test was performed according to FCC CFR Title 47, Part 15, Subpart C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).
- (4) The test result calculated as following:

Measurement Value = Reading Level + Correct Factor

Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use)

Margin Level = Measurement Value - Limit Value

Calculation example:

Reading Level		Correct Factor		Measurement Value
41.91	+	-8.36	=	33.55

Measurement Value		Limit Value		Margin Level
33.55	-	43.50	=	-9.95

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average

Spectrum Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector
Start ~ Stop Frequency	90KHz~110KHz for QP detector
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

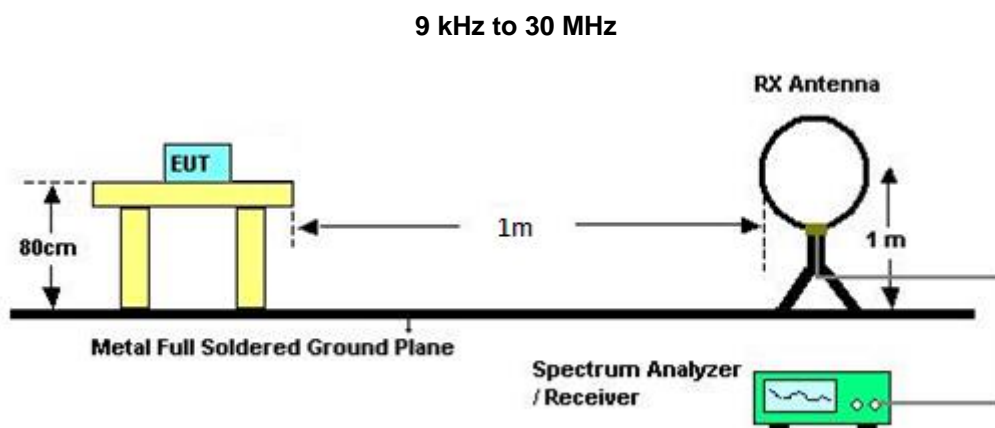
3.2 TEST PROCEDURE

- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- The measuring distance of 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5 m, the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights find the maximum reading (used Bore sight function).
- The receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1GHz.
- The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- All readings are Peak unless otherwise stated QP in column of Note. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform. (below 1GHz)
- All readings are Peak Mode value unless otherwise stated AVG in column of Note. If the Peak Mode Measured value compliance with the Peak Limits and lower than AVG Limits, the EUT shall be deemed to meet both Peak & AVG Limits and then only Peak Mode was measured, but AVG Mode didn't perform. (above 1GHz)
- For the actual test configuration, please refer to the related Item – EUT TEST PHOTO.

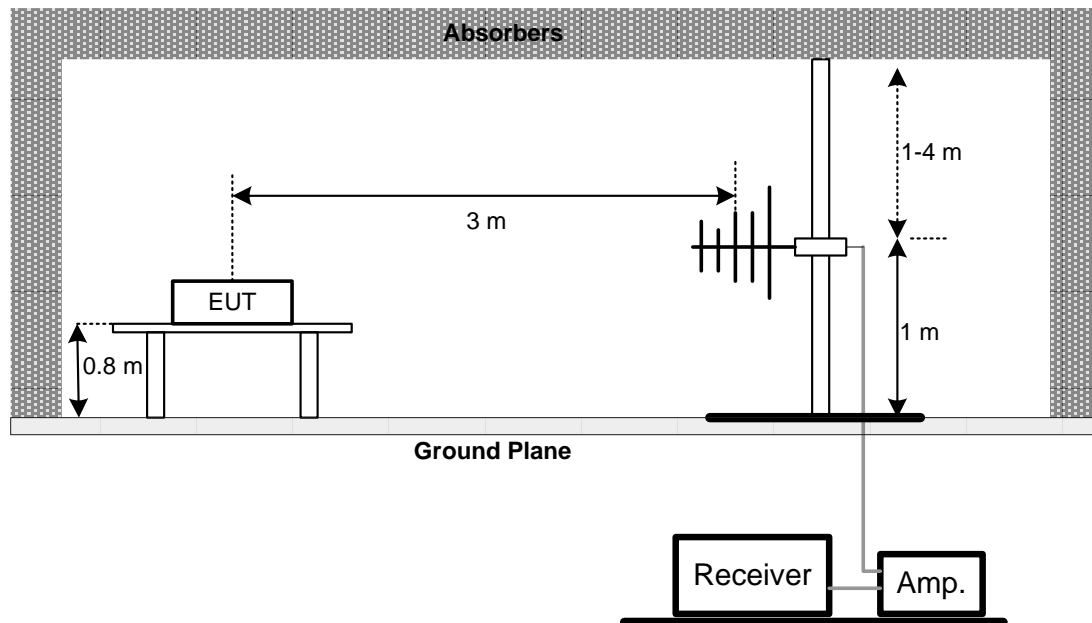
3.3 DEVIATION FROM TEST STANDARD

No deviation.

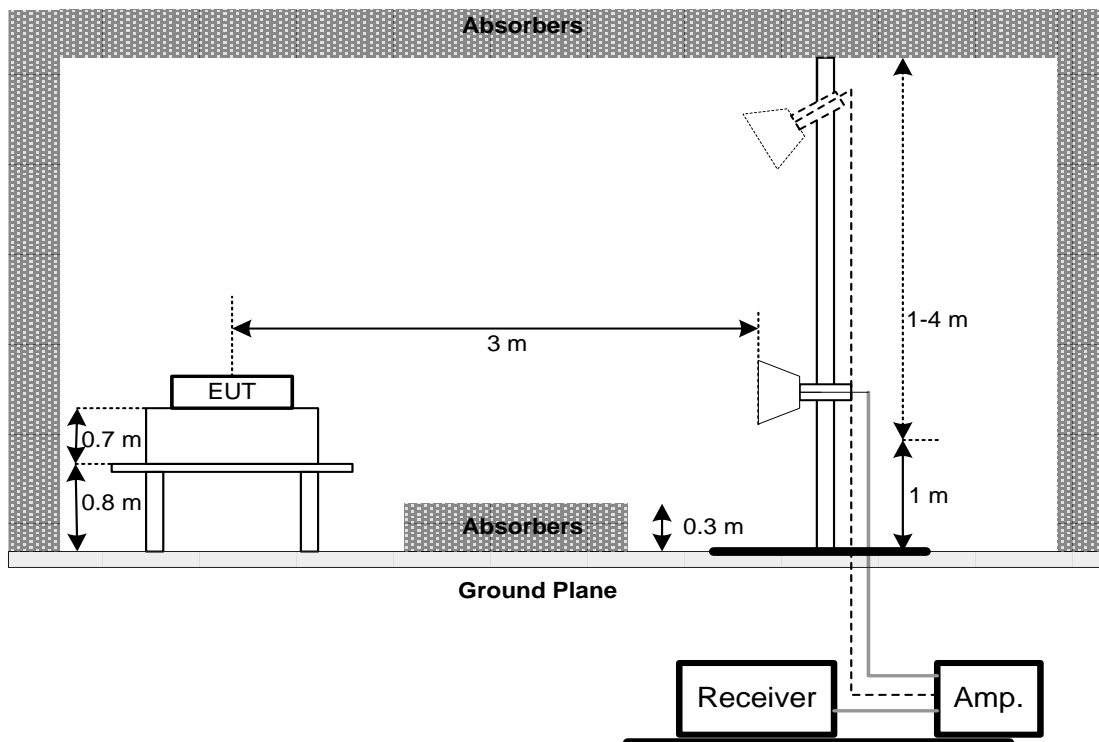
3.4 TEST SETUP



30 MHz to 1 GHz



Above 1 GHz



3.5 EUT OPERATING CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

3.6 TEST RESULT – BELOW 30 MHZ

There were no emissions found below 30 MHz within 20 dB of the limit.

3.7 TEST RESULT – 30 MHZ TO 1 GHZ

Please refer to the APPENDIX A.

3.8 TEST RESULT – ABOVE 1 GHZ

Please refer to the APPENDIX B.

NOTE:

- (1) No limit: This is fundamental signal, the judgment is not applicable.
For fundamental signal judgment was referred to Peak output test.

4 BANDWIDTH TEST

4.1 APPLIED PROCEDURES / LIMIT

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

4.2 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting : RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



4.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 3.5 unless otherwise a special operating condition is specified in the follows during the testing.

4.6 TEST RESULTS

Please refer to the APPENDIX C.

5 LIST OF MEASURING EQUIPMENTS

Radiated Emissions						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Preamplifier	EMCI	EMC330N	980850	2022/9/19	2023/9/18
2	Preamplifier	EMCI	EMC118A45SE	980819	2023/3/7	2024/3/5
3	Preamplifier	EMCI	EMC001340	980579	2022/9/30	2023/9/29
4	Test Cable	EMCI	EMC104-SM-100 0	180809	2023/7/10	2024/7/9
5	Test Cable	EMCI	EMC104-SM-SM- 3000	220322	2023/3/14	2024/3/13
6	Test Cable	EMCI	EMC104-SM-SM- 7000	220324	2023/3/14	2024/3/13
7	EXA Signal Analyzer	keysight	N9020B	MY57120120	2023/2/24	2024/2/23
8	Loop Ant	Electro-Metrics	EMCI-LPA600	291	2022/9/19	2023/9/18
9	Horn Antenna	RFSPIN	DRH18-E	211202A18EN	2023/5/12	2024/5/11
10	Log-bicon Antenna	Schwarzbeck	VULB9168	1369	2023/5/9	2024/5/8
11	6dB Attenuator	EMCI	EMCI-N-6-06	AT-06001	2023/5/9	2024/5/8
12	Measurement Software	EZ	EZ EMC (Version NB-03A1-01)	N/A	N/A	N/A

Bandwidth						
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated Date	Calibrated Until
1	Spectrum Analyzer	R&S	FSP 40	101139	2023/3/9	2024/3/8

Remark: "N/A" denotes no model name, no serial no. or no calibration specified.
All calibration period of equipment list is one year.

6 EUT TEST PHOTO

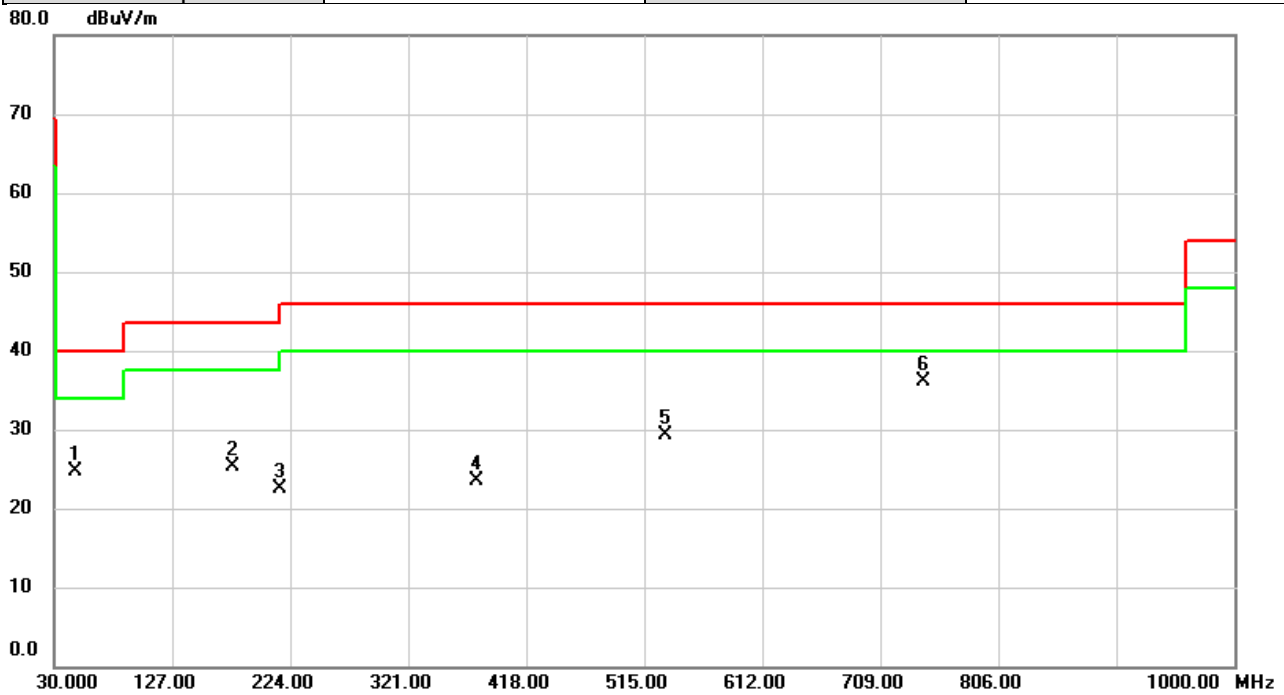
Please refer to document Appendix No.: TP-2308T058-FCCP-1 (APPENDIX-TEST PHOTOS).

7 EUT PHOTOS

Please refer to document Appendix No.: EP-2308T058-1 (APPENDIX-EUT PHOTOS).

APPENDIX A RADIATED EMISSIONS - 30 MHZ TO 1 GHZ

Test Mode	TX	Test Date	2023/8/25
Test Frequency	915MHz	Polarization	Vertical
Temp	21°C	Hum.	52%

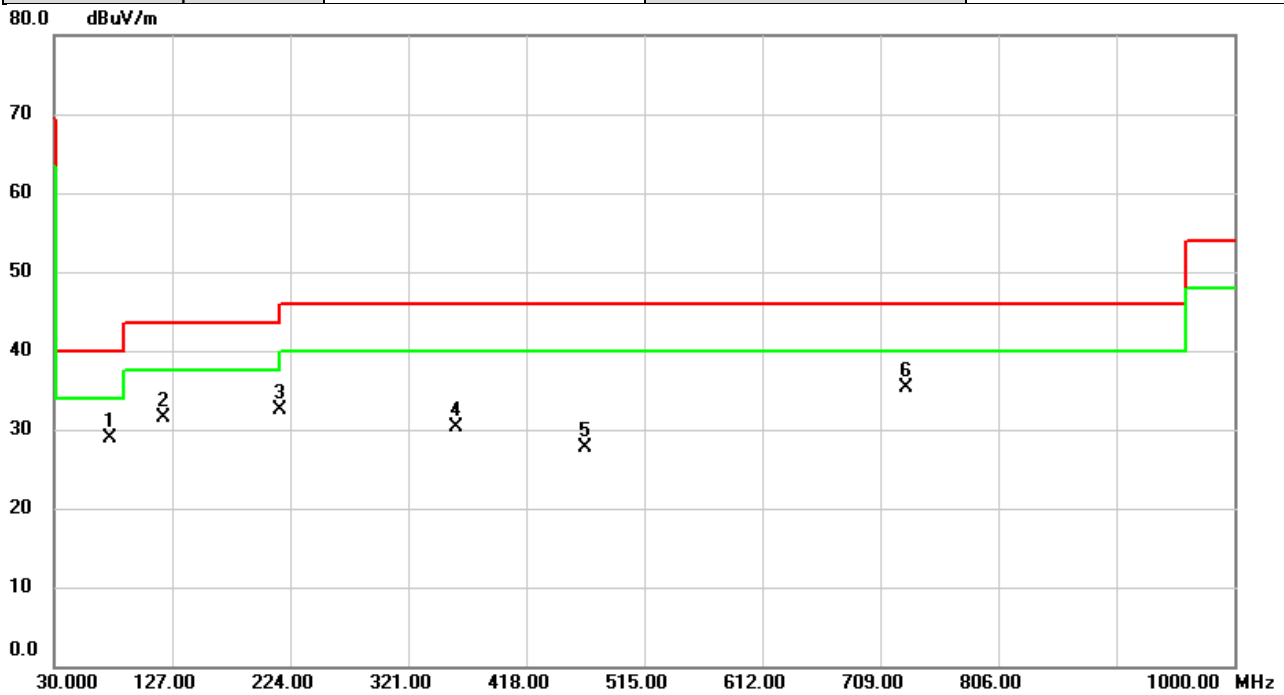


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		47.0073	35.87	-11.15	24.72	40.00	-15.28	peak	
2		176.5993	38.11	-12.85	25.26	43.50	-18.24	peak	
3		215.9813	37.55	-15.14	22.41	43.50	-21.09	peak	
4		377.2923	32.82	-9.27	23.55	46.00	-22.45	peak	
5		532.3307	34.86	-5.62	29.24	46.00	-16.76	peak	
6	*	745.0193	37.59	-1.47	36.12	46.00	-9.88	peak	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX	Test Date	2023/8/25
Test Frequency	915MHz	Polarization	Horizontal
Temp	21°C	Hum.	52%

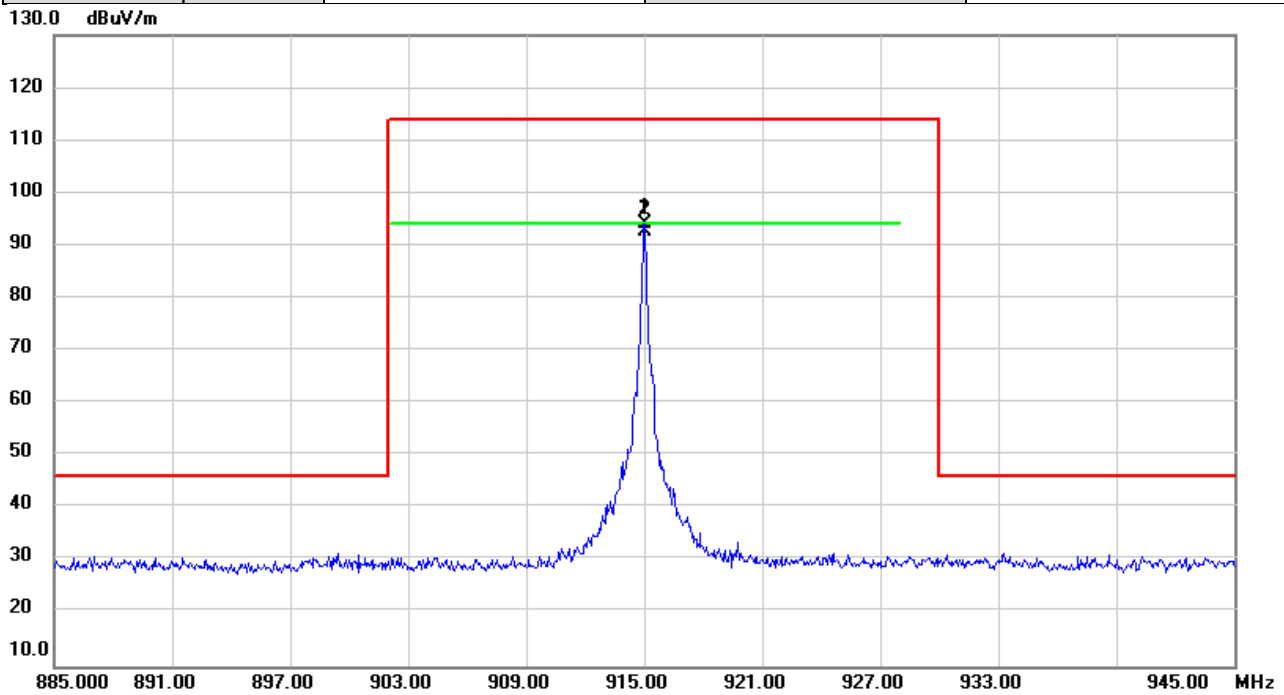


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		76.4953	44.46	-15.57	28.89	40.00	-11.11	peak	
2		120.0160	45.85	-14.25	31.60	43.50	-11.90	peak	
3		216.0137	47.60	-15.14	32.46	46.00	-13.54	peak	
4		360.0263	40.14	-9.80	30.34	46.00	-15.66	peak	
5		466.7587	34.45	-6.80	27.65	46.00	-18.35	peak	
6	*	730.4370	37.09	-1.81	35.28	46.00	-10.72	peak	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX	Test Date	2023/9/6
Test Frequency	915MHz	Polarization	Vertical
Temp	23°C	Hum.	55%

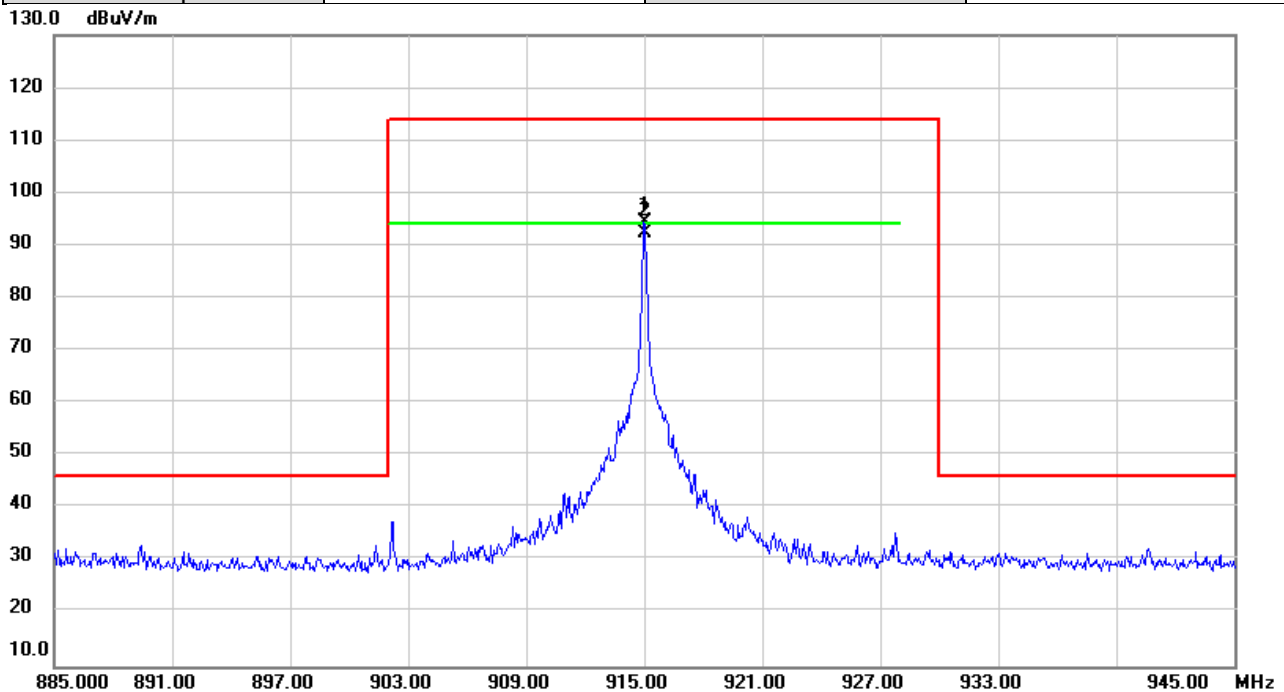


No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		915.0000	93.36	0.82	94.18	114.00	-19.82	peak	
2	*	915.0000	91.91	0.82	92.73	94.00	-1.27	AVG	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX	Test Date	2023/9/6
Test Frequency	915MHz	Polarization	Horizontal
Temp	23°C	Hum.	55%



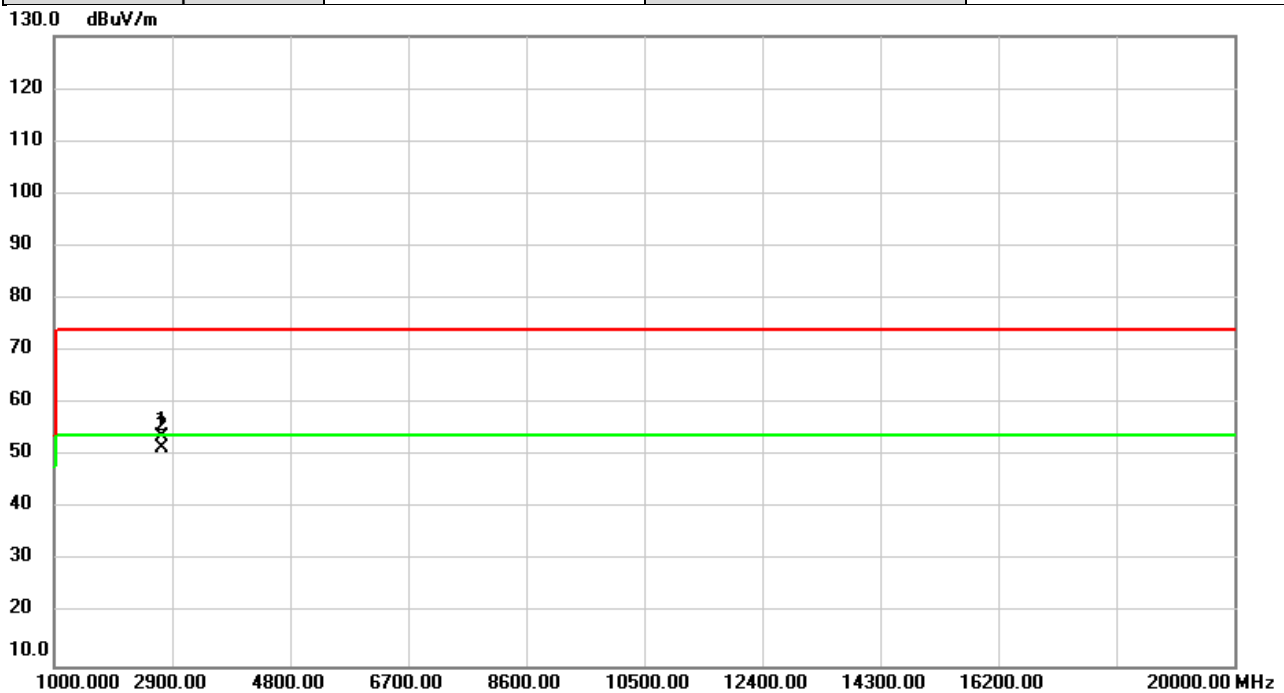
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		915.0000	93.49	0.82	94.31	114.00	-19.69	peak	
2	*	915.0000	91.47	0.82	92.29	94.00	-1.71	AVG	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

APPENDIX B RADIATED EMISSIONS - ABOVE 1 GHZ

Test Mode	TX	Test Date	2023/8/26
Test Frequency	915MHz	Polarization	Vertical
Temp	22°C	Hum.	51%

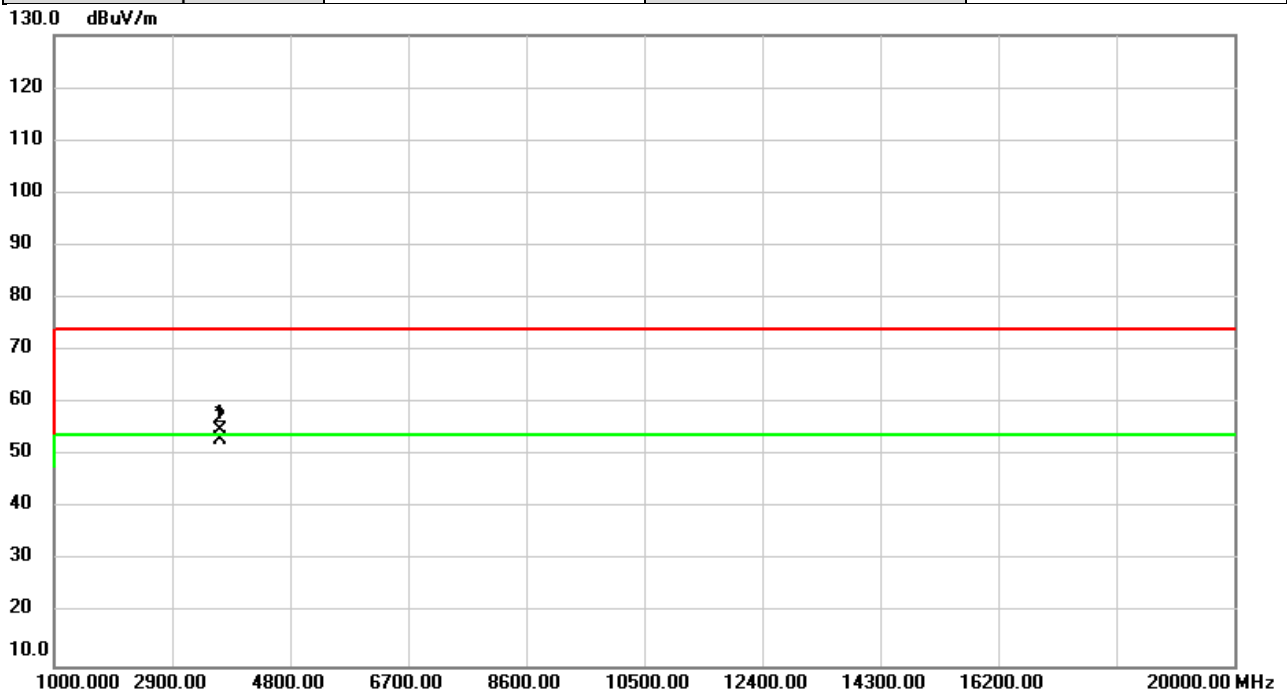


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		2745.000	58.10	-4.56	53.54	74.00	-20.46	peak	
2	*	2745.000	56.23	-4.56	51.67	54.00	-2.33	AVG	

REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

Test Mode	TX	Test Date	2023/8/26
Test Frequency	915MHz	Polarization	Horizontal
Temp	22°C	Hum.	51%



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over		
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	Comment
1		3660.000	57.03	-2.13	54.90	74.00	-19.10	peak	
2	*	3660.000	55.14	-2.13	53.01	54.00	-0.99	AVG	

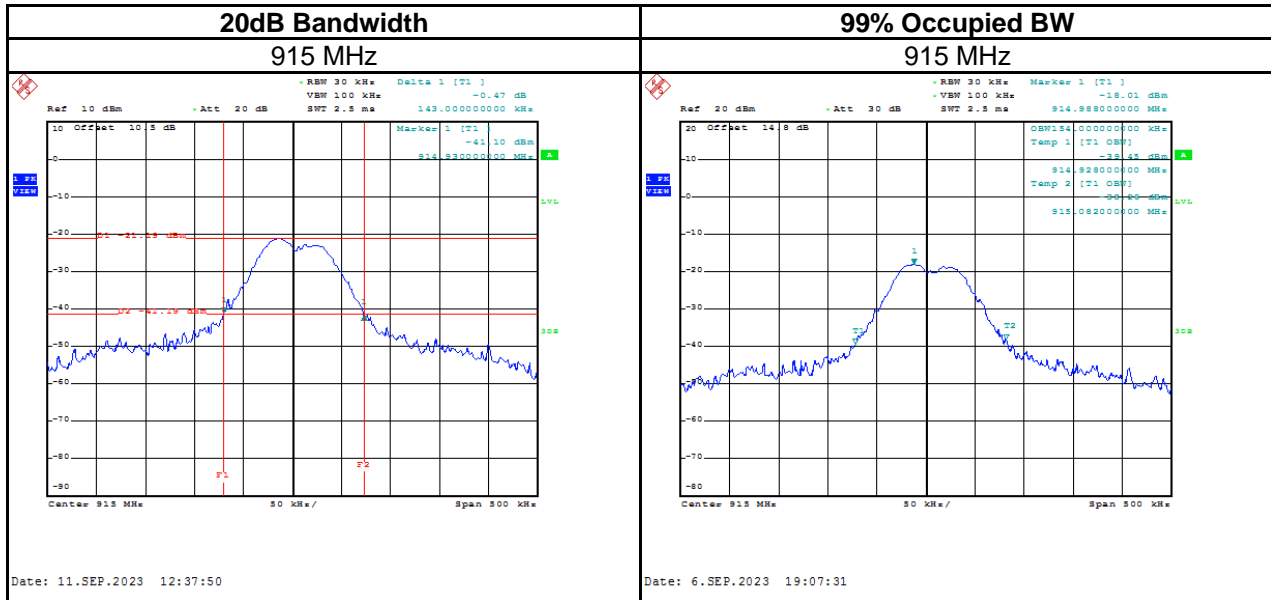
REMARKS:

- (1) Measurement Value = Reading Level + Correct Factor.
- (2) Margin Level = Measurement Value - Limit Value.

APPENDIX C BANDWIDTH

Test Mode:	TX Mode
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Frequency (MHz)	20dB Bandwidth (MHz)	99% Occupied BW (MHz)
915	0.14	0.15



End of Test Report