FCC RF Test Report

APPLICANT	:	**Amazon.com Services LLC**
EQUIPMENT	:	**Digital Media Receiver**
MODEL NAME	:	**SY7323**
FCC ID	:	**2A4DH-7323**
STANDARD	:	**47 CFR Part 15 Subpart C §15.247** **47 CFR Part 15 Subpart E §15.407**
TEST DATE(S)	:	**Nov. 15, 2023 ~ Jan. 15, 2024**

We, Sporton International Inc. (Shenzhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

Sporton International Inc. (ShenZhen)
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People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
382312A	Rev. 01	Initial issue of report	Jan. 23, 2024
382312A	Rev. 02	Additional CBP full test result in section 4.2.6	Apr. 11, 2024
382312A	Rev. 03	1. Update wifi6E conclusion description on page 10 2. Corrected antenna Gain of U-NII-8 11a 6875MHz on page 18 3. Add Duty Cycle Plots in Appendix B 4. Add section 4.4 directional gain calculations 5. Add remark: The EUT does not support channel puncturing mode, on page 22	Apr. 19, 2024
382312A	Rev. 04	Revise typo on Page 25	Apr. 26, 2024
382312A	Rev. 05	Modified detector of RSE in Appendix A	May 20, 2024
382312A	Rev. 06	Removed the related test data for LoRa-FHSS 125kbps, LoRa FSK 150kbps & FSK 250kbps	May 31, 2024

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
4.1	15.407(a)(8)	Fundamental Maximum EIRP	24dBm	Pass	-
4.2	15.407(d)(6)	Contention Based Protocol	-62dBm	Pass	-
4.3	15.247(d)	Radiated Band Edges and Spurious Emission	15.209(a) & 15.247(d)	Pass	-

Conformity Assessment Condition:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.
2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”
Disclaimer:
The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

Amazon.com Services LLC
410 Terry Avenue N Seattle, WA 98109-5210 United States

1.2 Product Feature of Equipment Under Test

Product Feature	
Equipment	Digital Media Receiver
Model Name	SY7323
FCC ID	2A4DH-7323
SN	Conducted: P0B3DV0133860072 Radiation: G0B3GD0134760014 CBP: P0B3DV0133860041

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ DFS01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (Shenzhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH03-SZ	CN1256	421272

1.5 Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH03-SZ	AUDIX	E3	6.2009-8-24
2.	DFS01-SZ	Sporton	Test Tools	1.0

1.6 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC KDB 484596 D01 Referencing Test Data v02r02
- 47 CFR Part 15 Subpart C §15.247
- 47 CFR Part 15 Subpart E §15.407
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Re-use of Measured Data

2.1 Introduction Section

This application re-uses data collected on a similar device. The subject device of this application (Model: SY7323, FCC ID: 2A4DH-7323) is electrically identical to the reference device (Model: CP38RE, FCC ID: 2A4DH-3877) for the portions of the circuitry corresponding to the data being re-used. Based on their similarity, the FCC Part 15C (equipment class: DTS, DSS) and FCC Part 15E (equipment class: NII, 6XD) referencing the original model's result and do spot-check, following the FCC KDB 484596 D01 Referencing Test Data v02r02.

The applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID: 2A4DH-7323 .

2.2 Model Difference Information

All the details of similarity and difference between FCC ID: 2A4DH-3877 and FCC ID: 2A4DH-7323 can be found in the confidential documents (SY7323_Operational Description of Product Equality Declaration).

2.3 Reference detail Section:

Rule Part	Equipment Class	Frequency Band (MHz)	Reference FCC ID (Parent)	Type Grant/ Permissive Change	Reference Title	FCC ID Filling (Variant)	Report Title/Section
15C	DSS (BR/EDR)	2400~2483.5	2A4DH-3877	Original Grant	FR353104-01A	2A4DH-7323	All sections applicable
	DTS (BLE)	2400~2483.5	2A4DH-3877	Original Grant	FR353104-01B	2A4DH-7323	All sections applicable
	DTS (Zigbee)	2400~2483.5	2A4DH-3877	Original Grant	FR353104-01C	2A4DH-7323	All sections applicable except for RSE
	DTS (WLAN)	2400~2483.5	2A4DH-3877	Original Grant	FR353104-01D	2A4DH-7323	All sections applicable
	DTS (LoRa)	902~928	2A4DH-3877	Original Grant	FR353104-01E	2A4DH-7323	All sections applicable except for RSE
	DSS (LoRa)	902~928	2A4DH-3877	Original Grant	FR353104-01G	2A4DH-7323	All sections applicable except for RSE
15E	U-NII	5180~5240	2A4DH-3877	Original Grant	FR353104-01H	2A4DH-7323	All sections applicable
		5260~5320	2A4DH-3877	Original Grant	FR353104-01H	2A4DH-7323	All sections applicable
		5500~5720	2A4DH-3877	Original Grant	FR353104-01H	2A4DH-7323	All sections applicable
		5745~5825	2A4DH-3877	Original Grant	FR353104-01H	2A4DH-7323	All sections applicable
		5260~5320 5500~5720	2A4DH-3877	Original Grant	FZ353104-01	2A4DH-7323	All sections applicable
	6XD	5925~7125	2A4DH-3877	Original Grant	FR353104-01I	2A4DH-7323	All sections applicable except for EIRP/CBP

Note: WIFI 6E EIRP and CBP test results are issued based on the new antenna gain.

2.4 Spot Check Verification Data Section

Conducted power test and radiated spurious emission test against the variant model based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model.
All test procedures follow the related section of parent report.

Spot-check measurements, while being always compliant with the applicable rule part(s) for the test under consideration, show a deviation d_{dB} from the reference data no larger than 3 dB:

$$d_{dB} = | V_{dB} - R_{dB} | \leq 3 \text{ dB} \quad (1)$$

V_{dB}, the variant spot-check level
R_{dB}, the corresponding measurement level for the reference model

An alternative to the limit of eq. (1) is available, and is based on considering how far the reference data R_{dB} is from the compliance threshold C_{dB} (also expressed in dB), for the particular test under consideration. In this case, if $M_{dB} = |C_{dB} - R_{dB}|$ is the margin in dB from the compliance limit, a spot check may be considered acceptable when the deviation ddB from the reference data satisfies the following condition:

$$d_{dB} = | V_{dB} - R_{dB} | \leq (3 + M_{dB}/20) \text{ dB} \text{ , for } 0 \leq M_{dB} \leq 60 \text{ dB}$$

$$d_{dB} = | V_{dB} - R_{dB} | = 6 \text{ dB} \text{ , for } M_{dB} > 60 \text{ dB} \quad (2)$$

where "| |" is the absolute value of the measured quantity.
When using the option in eq. (2), d_{dB} increases linearly from 3 dB to 6 dB.

Summary for power and RSE spot check for each rule entry and technology is listed as below:

Test Item	Mode	2A4DH-3877 Parent Worst mode Test Result	2A4DH-7323 Variant Check Test Result	Deviation (dB)	Limit (dB)
Conducted Power (dBm)	BT BR/EDR 3DH5 CH78	15.84	15.56	0.28	3
	BLE 1Mbps CH39	8.67	8.14	0.53	3
	Zigbee 250kbps CH17	18.28	18.23	0.05	3
	Wi-Fi 2.4GHz 11g CH06	27.73	27.62	0.11	3
	LoRa-DTS SF7 CH16	24.48	24.39	0.09	3
	LoRa FSK-FHSS 50kbps 915MHz	24.62	24.45	0.17	3
	LoRa OFDM-LR CH16	25.31	24.40	0.91	3
	Wi-Fi 5GHz UNII-3 11a CH157 Full RU	21.39	21.03	0.36	3
	Wi-Fi 6GHz UNII-8 HE40 6925MHz RU242/61	2.55	0.04	2.51	3

Test Item	Mode	2A4DH-3877 Parent Worst Result	2A4DH-7323 Variant Check Result	Deviation (dB)	Limit (dB)
Radiated Spurious Emission (dBuV/m)	BT BR/EDR CH78	50.71	47.83	2.88	3
	BLE 2Mbps CH39	44.19	41.21	2.98	3
	Wi-Fi 2.4GHz 11n HT20 CH12	50.91	48.82	2.09	3
	Wi-Fi 5GHz UNII-1 11ax HE40 CH38 Full RU	50.21	48.38	1.83	3
	Wi-Fi 6GHz UNII-8 11ax HE20 CH229 Partial_RU_26/8	41.12	39.26	1.86	3
	Co-location mode 802.11ax20 CH233	61.15	60.63	0.52	3

Conclusion:
Radiated spurious emission test against the variant model based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model.

Based on the spot check test result, the test data from the original model is representative for the variant model. The power level and RSE spot check are shown within expected level compliant to limit line.

We are using power and EIRP (Except WIFI 6E) measurements from the original parent model reports to list on the grant.

WIFI 6E grant will base on the new EIRP results.

The same DFS detection mechanism/software is used in the variant. Hence, there is no spot check data for DFS.

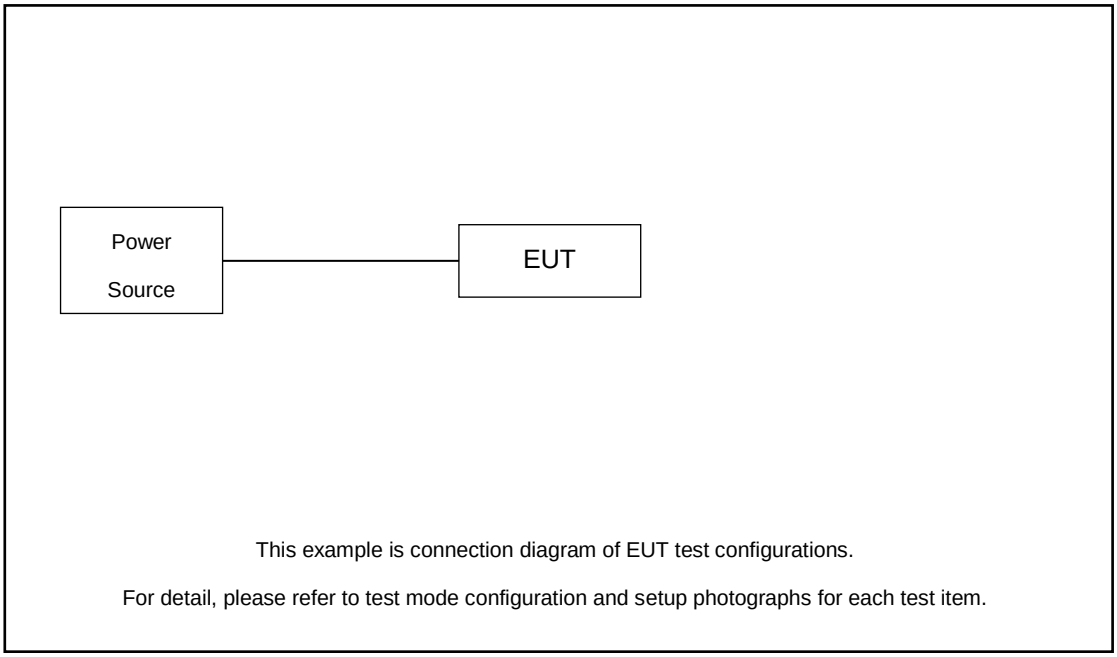
We confirm that the test data referencing policy of FCC KDB 484596 D01 Referencing Test Data v02r02 has been followed and the test data as referenced from the parent model report represents compliance with new FCC ID.

3 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report. Final RSE test modes are considering the modulation and worse data rates refer to Appendix A.

3.1 Connection Diagram of Test System

Radiated Emission for Zigbee & LoRa:



3.2 EUT Operation Test Setup

For RF function, the engineering test program was provided and enabled to make EUT continuous transmit.

4 Test Result

4.1 Maximum conducted Output Power and Fundamental Maximum EIRP Measurement

4.1.1 Limit of Fundamental Maximum EIRP

<FCC 14-30 CFR 15.407>

(a)(8) For client devices operating under the control of an indoor access point in the 5.925-7.125 GHz bands, the maximum e.i.r.p. over the frequency band of operation must not exceed 24 dBm.

4.1.2 Measuring Instruments

See list of measuring equipment of this test report.

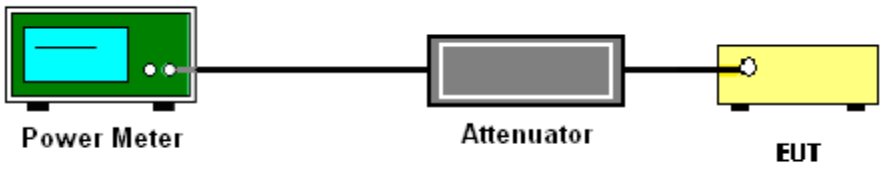
4.1.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.
4. For MIMO mode, the measure-and-sum technique should be used for measuring the in-band transmit power of a device.

4.1.4 Test Setup



4.1.5 Test Result of Fundamental Maximum EIRP

Maximum EIRP	**<5925 MHz ~ 7125 MHz >** **SISO Ant.0:** 802.11a : 10.72 dBm / 0.0118 W **MIMO Ant.0+1:** 802.11a : 6.47 dBm / 0.0044 W 802.11ax HE20 : 8.48 dBm / 0.0070 W 802.11ax HE40 : 10.53 dBm / 0.0113 W 802.11ax HE80 : 12.46 dBm / 0.0176 W
Antenna Type / Gain	**<5925 MHz ~ 6425 MHz >** <Ant. 0> : PCB dipole with gain 4.68 dBi <Ant. 1> : PCB dipole with gain 3.54 dBi **<6425 MHz ~ 6525 MHz >** <Ant. 0> : PCB dipole with gain 5.39 dBi <Ant. 1> : PCB dipole with gain 2.05 dBi **<6525 MHz ~ 6875 MHz >** <Ant. 0> : PCB dipole with gain 6.46 dBi <Ant. 1> : PCB dipole with gain 2.46 dBi **<6875 MHz ~ 7125 MHz >** <Ant. 0> : PCB dipole with gain 4.60 dBi <Ant. 1> : PCB dipole with gain 3.10 dBi

Remark:

1. For 802.11ax SISO & MIMO mode, the whole testing has assessed only MIMO mode by referring to the higher normal conducted power.
2. 802.11a supports SISO ant.0 & MIMO ant.0+1 mode.
3. WIFI MIMO support CDD by manufacturer declared.
4. The EUT does not support channel puncturing mode.

<SISO Ant.0>

U-NII-5										
Mod.	Data Rate	NTX	Freq. (MHz)	Duty Factor (dB)	Conducted Power with duty factor (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
11a	6Mbps	1	5955	0.41	4.37	4.68	9.05	24.00	Pass	3.5
11a	6Mbps	1	6195	0.41	3.78	4.68	8.46	24.00	Pass	3.5
11a	6Mbps	1	6415	0.41	3.96	4.68	8.64	24.00	Pass	4

U-NII-6										
Mod.	Data Rate	NTX	Freq. (MHz)	Duty Factor (dB)	Conducted Power with duty factor (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
11a	6Mbps	1	6435	0.41	4.09	5.39	9.48	24.00	Pass	4.5
11a	6Mbps	1	6475	0.41	4.03	5.39	9.42	24.00	Pass	4.5
11a	6Mbps	1	6515	0.41	4.19	5.39	9.58	24.00	Pass	4.5

U-NII-7										
Mod.	Data Rate	NTX	Freq. (MHz)	Duty Factor (dB)	Conducted Power with duty factor (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
11a	6Mbps	1	6535	0.41	3.77	6.46	10.23	24.00	Pass	4
11a	6Mbps	1	6695	0.41	4.26	6.46	10.72	24.00	Pass	4.5
11a	6Mbps	1	6855	0.41	3.75	6.46	10.21	24.00	Pass	4.5

U-NII-8										
Mod.	Data Rate	NTX	Freq. (MHz)	Duty Factor (dB)	Conducted Power with duty factor (dBm)	DG (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
11a	6Mbps	1	6875	0.41	3.86	6.46	10.32	24.00	Pass	4.5
11a	6Mbps	1	6895	0.41	4.55	4.60	9.15	24.00	Pass	4.5
11a	6Mbps	1	6995	0.41	4.51	4.60	9.11	24.00	Pass	5
11a	6Mbps	1	7095	0.41	3.51	4.60	8.11	24.00	Pass	4
11a	6Mbps	1	7115	0.41	3.46	4.60	8.06	24.00	Pass	4

<MIMO Ant.0+1>

U-NII-5														
Mod.	Data Rate	NTX	Freq. (MHz)	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
				Ant 0	Ant1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	SUM			
11a	6Mbps	2	5955	0.42	0.42	-2.92	-3.02	0.04	4.68		4.72	24.00	Pass	-3
11a	6Mbps	2	6195	0.42	0.42	-3.24	-3.40	-0.31	4.68		4.37	24.00	Pass	-2.5
11a	6Mbps	2	6415	0.42	0.42	-2.84	-2.98	0.10	4.68		4.78	24.00	Pass	-2

U-NII-5															
Mod.	Data Rate	NTX	Freq. (MHz)	RU Config.	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
					Ant 0	Ant1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	SUM			
HE20	MCS0	2	5955	Full	0.44	0.44	-1.97	-2.02	1.01	4.68		5.69	24.00	Pass	-2.5
HE20	MCS0	2	5955	26/0	2.88	2.88	-9.58	-9.56	-6.56	4.68		-1.88	24.00	Pass	-12
HE20	MCS0	2	5955	52/37	3.04	3.04	-7.16	-7.24	-4.19	4.68		0.49	24.00	Pass	-9
HE20	MCS0	2	5955	106/53	3.27	3.38	-4.89	-4.88	-1.87	4.68		2.81	24.00	Pass	-6.5
HE20	MCS0	2	6195	Full	0.44	0.44	-2.07	-2.29	0.83	4.68		5.51	24.00	Pass	-2
HE20	MCS0	2	6195	26/4	2.91	2.91	-8.44	-8.94	-5.68	4.68		-1.00	24.00	Pass	-10
HE20	MCS0	2	6195	52/39	3.02	3.02	-6.84	-7.55	-4.17	4.68		0.51	24.00	Pass	-8
HE20	MCS0	2	6195	106/53	3.27	3.38	-4.71	-5.25	-1.96	4.68		2.72	24.00	Pass	-6
HE20	MCS0	2	6415	Full	0.44	0.44	-2.05	-2.01	0.98	4.68		5.66	24.00	Pass	-1.5
HE20	MCS0	2	6415	26/8	2.93	2.95	-9.13	-9.31	-6.21	4.68		-1.53	24.00	Pass	-11
HE20	MCS0	2	6415	52/40	3.08	3.05	-6.84	-7.17	-3.99	4.68		0.69	24.00	Pass	-8
HE20	MCS0	2	6415	106/54	3.27	3.29	-4.71	-4.99	-1.84	4.68		2.84	24.00	Pass	-5.5
HE40	MCS0	2	5965	Full	0.69	0.66	-0.83	-0.74	2.22	4.68		6.90	24.00	Pass	-1
HE40	MCS0	2	5965	242/61	1.93	1.93	-4.09	-3.38	-0.71	4.68		3.97	24.00	Pass	-3
HE40	MCS0	2	6205	Full	0.69	0.66	-0.36	-0.79	2.44	4.68		7.12	24.00	Pass	-0.5
HE40	MCS0	2	6205	242/61	1.93	1.93	-4.13	-4.20	-1.16	4.68		3.52	24.00	Pass	-3
HE40	MCS0	2	6405	Full	0.69	0.66	0.12	0.38	3.26	4.68		7.94	24.00	Pass	0.5
HE40	MCS0	2	6405	242/62	1.83	1.87	-3.25	-2.89	-0.06	4.68		4.62	24.00	Pass	-2
HE80	MCS0	2	5985	Full	1.31	1.27	2.98	2.61	5.81	4.68		10.49	24.00	Pass	2.5
HE80	MCS0	2	5985	484/65	3.85	3.85	0.88	0.75	3.82	4.68		8.50	24.00	Pass	0.5
HE80	MCS0	2	6225	Full	1.31	1.27	2.57	2.14	5.37	4.68		10.05	24.00	Pass	2.5
HE80	MCS0	2	6225	484/65	3.85	3.85	0.74	-0.21	3.30	4.68		7.98	24.00	Pass	0.5
HE80	MCS0	2	6385	Full	1.31	1.27	3.02	2.71	5.88	4.68		10.56	24.00	Pass	3.5
HE80	MCS0	2	6385	484/66	3.79	3.85	0.64	0.56	3.61	4.68		8.29	24.00	Pass	1

U-NII-6														
Mod.	Data Rate	NTX	Freq. (MHz)	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
				Ant 0	Ant1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	SUM			
11a	6Mbps	2	6435	0.42	0.42	-2.97	-2.36	0.35	5.39		5.74	24.00	Pass	-2
11a	6Mbps	2	6475	0.42	0.42	-3.04	-2.54	0.22	5.39		5.61	24.00	Pass	-2
11a	6Mbps	2	6515	0.42	0.42	-3.12	-3.07	-0.09	5.39		5.30	24.00	Pass	-2.5

U-NII-6																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
						Ant 0	Ant 1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	SUM			
HE20	MCS0	2	097	6435	Full	0.44	0.44	-1.74	-1.66	1.31	5.39		6.70	24.00	Pass	-1.5
HE20	MCS0	2	097	6435	26/0	2.88	2.88	-10.07	-10.02	-7.03	5.39		-1.64	24.00	Pass	-11
HE20	MCS0	2	097	6435	52/37	3.04	3.04	-7.49	-7.44	-4.46	5.39		0.93	24.00	Pass	-8
HE20	MCS0	2	097	6435	106/53	3.27	3.38	-5.13	-5.22	-2.16	5.39		3.23	24.00	Pass	-5.5
HE20	MCS0	2	105	6475	Full	0.44	0.44	-1.85	-1.75	1.21	5.39		6.60	24.00	Pass	-1.5
HE20	MCS0	2	105	6475	26/4	2.91	2.91	-9.23	-9.28	-6.25	5.39		-0.86	24.00	Pass	-10
HE20	MCS0	2	105	6475	52/39	3.02	3.02	-7.29	-7.46	-4.36	5.39		1.03	24.00	Pass	-8
HE20	MCS0	2	105	6475	106/54	3.27	3.29	-5.16	-5.42	-2.28	5.39		3.11	24.00	Pass	-5.5
HE20	MCS0	2	113	6515	Full	0.44	0.44	-2.21	-2.25	0.78	5.39		6.17	24.00	Pass	-2
HE20	MCS0	2	113	6515	26/8	2.93	2.95	-10.16	-10.51	-7.32	5.39		-1.93	24.00	Pass	-11.5
HE20	MCS0	2	113	6515	52/40	3.08	3.05	-7.56	-7.92	-4.72	5.39		0.67	24.00	Pass	-8.5
HE20	MCS0	2	113	6515	106/54	3.27	3.29	-5.33	-5.85	-2.57	5.39		2.82	24.00	Pass	-6
HE40	MCS0	2	099	6445	Full	0.69	0.66	-0.43	-0.43	2.58	5.39		7.97	24.00	Pass	0
HE40	MCS0	2	099	6445	242/61	1.93	1.93	-3.92	-3.61	-0.76	5.39		4.63	24.00	Pass	-2.5
HE40	MCS0	2	107	6485	Full	0.69	0.66	-0.50	0.04	2.78	5.39		8.17	24.00	Pass	0
HE40	MCS0	2	107	6485	242/62	1.83	1.87	-3.93	-3.64	-0.77	5.39		4.62	24.00	Pass	-2.5
HE40	MCS0	2	115	6525	Full	0.69	0.66	-0.46	0.11	2.84	6.46		9.30	24.00	Pass	0
HE40	MCS0	2	115	6525	242/62	1.83	1.87	-3.94	-3.59	-0.75	6.46		5.71	24.00	Pass	-2.5
HE80	MCS0	2	103	6465	Full	1.31	1.27	3.16	3.14	6.16	5.39		11.55	24.00	Pass	3.5
HE80	MCS0	2	103	6465	484/65	3.85	3.85	0.45	0.56	3.51	5.39		8.90	24.00	Pass	1
HE80	MCS0	2	119	6545	Full	1.31	1.27	2.52	2.75	5.65	6.46		12.11	24.00	Pass	3
HE80	MCS0	2	119	6545	484/66	3.79	3.85	0.71	0.36	3.55	6.46		10.01	24.00	Pass	1

U-NII-7														
Mod.	Data Rate	NTX	Freq. (MHz)	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
				Ant 0	Ant1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	SUM			
11a	6Mbps	2	6535	0.42	0.42	-3.23	-2.77	0.01	6.46		6.47	24.00	Pass	-2.5
11a	6Mbps	2	6695	0.42	0.42	-3.86	-3.03	-0.42	6.46		6.04	24.00	Pass	-2.5
11a	6Mbps	2	6855	0.42	0.42	-3.86	-2.72	-0.25	6.46		6.21	24.00	Pass	-2.5

U-NII-7															
Mod.	Data Rate	NTX	Freq. (MHz)	RU Config.	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
					Ant 0	Ant1	Ant 0	Ant 1	SUM	Ant 0	Ant1	SUM			
HE20	MCS0	2	6535	Full	0.44	0.44	-1.87	-2.28	0.94	6.46		7.40	24.00	Pass	-2
HE20	MCS0	2	6535	26/0	2.88	2.88	-8.80	-9.42	-6.09	6.46		0.37	24.00	Pass	-10
HE20	MCS0	2	6535	52/37	3.04	3.04	-6.78	-7.41	-4.07	6.46		2.39	24.00	Pass	-7.5
HE20	MCS0	2	6535	106/53	3.27	3.38	-4.48	-5.07	-1.75	6.46		4.71	24.00	Pass	-5
HE20	MCS0	2	6695	Full	0.44	0.44	-2.49	-1.81	0.87	6.46		7.33	24.00	Pass	-2
HE20	MCS0	2	6695	26/4	2.91	2.91	-8.04	-9.84	-5.84	6.46		0.62	24.00	Pass	-9.5
HE20	MCS0	2	6695	52/38	3.02	3.02	-6.88	-8.42	-4.57	6.46		1.89	24.00	Pass	-8
HE20	MCS0	2	6695	106/53	3.27	3.38	-4.51	-4.86	-1.67	6.46		4.79	24.00	Pass	-5
HE20	MCS0	2	6855	Full	0.44	0.44	-2.46	-1.89	0.84	6.46		7.30	24.00	Pass	-2
HE20	MCS0	2	6855	26/8	2.93	2.95	-8.84	-9.16	-5.99	6.46		0.47	24.00	Pass	-9.5
HE20	MCS0	2	6855	52/40	3.08	3.05	-6.67	-7.04	-3.84	6.46		2.62	24.00	Pass	-7
HE20	MCS0	2	6855	106/54	3.27	3.29	-4.13	-4.48	-1.29	6.46		5.17	24.00	Pass	-4
HE40	MCS0	2	6565	Full	0.69	0.66	-0.51	0.13	2.83	6.46		9.29	24.00	Pass	0
HE40	MCS0	2	6565	242/61	1.93	1.93	-3.52	-3.19	-0.34	6.46		6.12	24.00	Pass	-2
HE40	MCS0	2	6685	Full	0.69	0.66	-0.62	-0.15	2.63	6.46		9.09	24.00	Pass	-0.5
HE40	MCS0	2	6685	242/61	1.93	1.93	-3.52	-3.10	-0.30	6.46		6.16	24.00	Pass	-2
HE40	MCS0	2	6845	Full	0.69	0.66	-1.30	-0.60	2.07	6.46		8.53	24.00	Pass	-0.5
HE40	MCS0	2	6845	242/62	1.83	1.87	-3.17	-2.79	0.04	6.46		6.50	24.00	Pass	-1.5
HE80	MCS0	2	6625	Full	1.31	1.27	3.11	2.87	6.00	6.46		12.46	24.00	Pass	3
HE80	MCS0	2	6625	484/65	3.85	3.85	1.42	1.64	4.54	6.46		11.00	24.00	Pass	1.5
HE80	MCS0	2	6705	Full	1.31	1.27	2.47	2.69	5.59	6.46		12.05	24.00	Pass	3
HE80	MCS0	2	6705	484/65	3.85	3.85	1.46	1.68	4.58	6.46		11.04	24.00	Pass	2
HE80	MCS0	2	6785	Full	1.31	1.27	2.24	2.84	5.56	6.46		12.02	24.00	Pass	3.5
HE80	MCS0	2	6785	484/66	3.79	3.85	0.99	1.69	4.36	6.46		10.82	24.00	Pass	2.5
HE80	MCS0	2	6865	Full	1.31	1.27	2.42	2.80	5.62	6.46		12.08	24.00	Pass	3
HE80	MCS0	2	6865	484/66	3.79	3.85	1.34	1.46	4.41	6.46		10.87	24.00	Pass	2

U-NII-8														
Mod.	Data Rate	NTX	Freq. (MHz)	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
				Ant 0	Ant1	Ant 0	Ant 1	SUM	Ant 0	Ant 1	SUM			
11a	6Mbps	2	6875	0.42	0.42	-4.24	-3.43	-0.81	6.46		5.65	24.00	Pass	-3
11a	6Mbps	2	6895	0.42	0.42	-4.00	-2.80	-0.35	4.60		4.25	24.00	Pass	-2.5
11a	6Mbps	2	6995	0.42	0.42	-4.26	-4.00	-1.12	4.60		3.48	24.00	Pass	-2.5
11a	6Mbps	2	7095	0.42	0.42	-4.25	-3.76	-0.99	4.60		3.61	24.00	Pass	-3.5
11a	6Mbps	2	7115	0.42	0.40	-3.94	-3.66	-0.79	4.60		3.81	24.00	Pass	-3

U-NII-8															
Mod.	Data Rate	NTX	Freq. (MHz)	RU Config.	Duty Factor (dB)		Conducted Power with duty factor (dBm)			DG (dBi)		EIRP Power (dBm)	EIRP Power Limit (dBm)	Pass /Fail	setting
					Ant 0	Ant1	Ant 0	Ant1	SUM	Ant 0	Ant1	SUM			
HE20	MCS0	2	6875	Full	0.44	0.44	-1.05	-0.93	2.02	6.46		8.48	24.00	Pass	-1
HE20	MCS0	2	6875	26/8	2.93	2.95	-8.69	-8.92	-5.79	6.46		0.67	24.00	Pass	-9.5
HE20	MCS0	2	6875	52/40	3.08	3.05	-7.04	-7.38	-4.19	6.46		2.27	24.00	Pass	-7.5
HE20	MCS0	2	6875	106/54	3.27	3.29	-4.84	-5.16	-1.98	6.46		4.48	24.00	Pass	-5
HE20	MCS0	2	6895	Full	0.44	0.44	-2.04	-1.93	1.02	4.60		5.62	24.00	Pass	-2
HE20	MCS0	2	6895	26/0	2.88	2.88	-8.48	-8.86	-5.65	4.60		-1.05	24.00	Pass	-9.5
HE20	MCS0	2	6895	52/37	3.04	3.04	-6.36	-6.78	-3.56	4.60		1.04	24.00	Pass	-7
HE20	MCS0	2	6895	106/53	3.27	3.38	-4.56	-4.74	-1.64	4.60		2.96	24.00	Pass	-4.5
HE20	MCS0	2	6995	Full	0.44	0.44	-3.52	-3.17	-0.33	4.60		4.27	24.00	Pass	-3
HE20	MCS0	2	6995	26/4	2.91	2.91	-8.54	-8.73	-5.63	4.60		-1.03	24.00	Pass	-9
HE20	MCS0	2	6995	52/38	3.02	3.02	-7.22	-7.46	-4.32	4.60		0.28	24.00	Pass	-7.5
HE20	MCS0	2	6995	106/53	3.27	3.38	-5.03	-5.14	-2.07	4.60		2.53	24.00	Pass	-5
HE20	MCS0	2	7095	Full	0.44	0.44	-2.66	-1.96	0.71	4.60		5.31	24.00	Pass	-2.5
HE20	MCS0	2	7095	26/8	2.93	2.95	-10.54	-10.17	-7.34	4.60		-2.74	24.00	Pass	-11.5
HE20	MCS0	2	7095	52/40	3.08	3.05	-8.55	-8.48	-5.50	4.60		-0.90	24.00	Pass	-9.5
HE20	MCS0	2	7095	106/54	3.27	3.29	-6.11	-6.07	-3.08	4.60		1.52	24.00	Pass	-6.5
HE20	MCS0	2	7115	Full	0.44	0.44	-2.82	-2.31	0.45	4.60		5.05	24.00	Pass	-2.5
HE20	MCS0	2	7115	26/8	2.93	2.95	-11.36	-10.91	-8.12	4.60		-3.52	24.00	Pass	-12
HE20	MCS0	2	7115	52/40	3.08	3.05	-9.14	-8.70	-5.90	4.60		-1.30	24.00	Pass	-9.5
HE20	MCS0	2	7115	106/54	3.27	3.29	-6.39	-5.94	-3.15	4.60		1.45	24.00	Pass	-6.5
HE40	MCS0	2	6885	Full	0.69	0.66	0.95	1.17	4.07	6.46		10.53	24.00	Pass	1
HE40	MCS0	2	6885	242/62	1.83	1.87	-3.29	-3.01	-0.14	6.46		6.32	24.00	Pass	-2
HE40	MCS0	2	6925	Full	0.69	0.66	0.07	0.89	3.51	4.60		8.11	24.00	Pass	1
HE40	MCS0	2	6925	242/61	1.93	1.93	-3.48	-2.51	0.04	4.60		4.64	24.00	Pass	-1.5
HE40	MCS0	2	7005	Full	0.69	0.66	-2.85	-2.60	0.28	4.60		4.88	24.00	Pass	-2
HE40	MCS0	2	7005	242/62	1.83	1.87	-6.26	-5.90	-3.07	4.60		1.53	24.00	Pass	-4.5
HE40	MCS0	2	7085	Full	0.69	0.66	-2.23	-1.58	1.11	4.60		5.71	24.00	Pass	-1.5
HE40	MCS0	2	7085	242/62	1.83	1.87	-6.05	-4.97	-2.47	4.60		2.13	24.00	Pass	-4
HE80	MCS0	2	6945	Full	1.31	1.27	3.03	3.53	6.30	4.60		10.90	24.00	Pass	4
HE80	MCS0	2	6945	484/65	3.85	3.85	1.02	1.43	4.24	4.60		8.84	24.00	Pass	2
HE80	MCS0	2	7025	Full	1.31	1.27	0.76	0.82	3.80	4.60		8.40	24.00	Pass	1
HE80	MCS0	2	7025	484/66	3.79	3.85	-1.23	-1.47	1.66	4.60		6.26	24.00	Pass	-1

4.2 Contention Based Protocol

4.2.1 Limit of Contention Based Protocol

<FCC 14-30 CFR 15.407>

(d)(6) Indoor access points, subordinate devices and client devices operating in the 5.925-7.125 GHz band must employ a contention-based protocol.

Unlicensed low-power indoor devices must detect co-channel radio frequency power that is at least -62 dBm or lower. Upon detection of energy in the band, unlicensed low power indoor devices must vacate the channel and stay off the channel as long as detected radio frequency power is equal to or greater than the threshold (-62 dBm). The -62 dBm (or lower) threshold is referenced to a 0 dBi antenna gain. To ensure incumbent operations are reliably detected in the band, low power indoor devices must detect RF energy throughout their intended operating channel. For example, an 802.11 device that plans to transmit a 40 MHz- wide signal (on a primary 20 MHz channel and a secondary 20 MHz channel) must detect energy throughout the entire 40 MHz channel. Additionally, low-power indoor devices must detect co-channel energy with 90% or greater certainty.

Table 1. Criteria to determine number of times detection threshold test may be performed

If	Number of Tests	Placement of Incumbent Transmission
$BW_{EUT} \leq BW_{Inc}$	Once	Tune incumbent and EUT transmissions ($f_{c1} = f_{c2}$)
$BW_{Inc} < BW_{EUT} \leq 2BW_{Inc}$	Once	Incumbent transmission is contained within BW_{EUT}
$2BW_{Inc} < BW_{EUT} \leq 4BW_{Inc}$	Twice. Incumbent transmission is contained within BW_{EUT}	Incumbent transmission is located as closely as possible to the lower edge and upper edge, respectively, of the EUT channel
$BW_{EUT} > 4BW_{Inc}$	Three times	Incumbent transmission is located as closely as possible to the lower edge of the EUT channel, in the middle of EUT channel, and as closely as possible to the upper edge of the EUT channel

where:
$BWEUT$: Transmission bandwidth of EUT signal
$BWInc$: Transmission bandwidth of the simulated incumbent signal (10 MHz wide AWGN signal)
$fc1$: Center frequency of EUT transmission
$fc2$: Center frequency of simulated incumbent signal

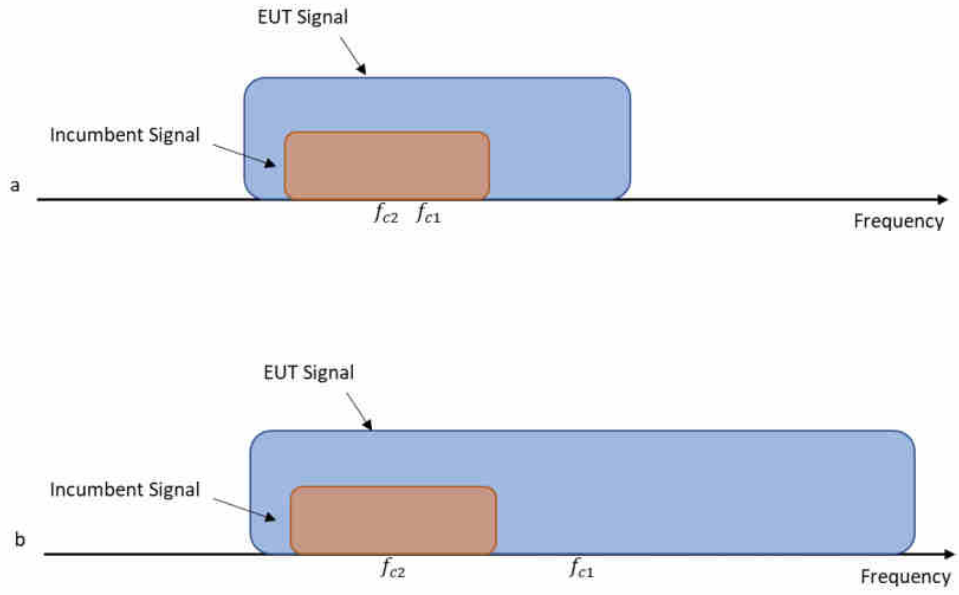


Figure 1. Two possible scenarios where a) center frequency of EUT transmission falls within incumbent's bandwidth, or b) outside of it

4.2.2 Measuring Instruments

See list of measuring equipment of this test report.

4.2.3 Test Procedures

1. To ensure EUT reliably detects an incumbent signal in both scenarios shown in Figure 1, the detection threshold test may be repeated more than once with the incumbent signal (having center frequency $fc2$) tuned to different center frequencies within the UT transmission bandwidth. The criteria specified in Table 1 determines how many times the detection threshold test must be performed
2. Using an AWGN signal source, generate (but do not transmit, i.e., RF OFF) a 10 MHz-wide AWGN signal. Use Table 1 to determine the center frequency of the 10 MHz AWGN signal relative to the EUT's channel bandwidth and center frequency.
3. Monitor the signal analyzer to verify if the AWGN signal has been detected and the EUT has ceased transmission. If the EUT continues to transmit, then incrementally increase the AWGN signal power level until the EUT stops transmitting.
4. (Including all losses in the RF paths) Determine and record the AWGN signal power level (at the EUT's antenna port) at which the EUT ceased transmission. Repeat the procedure at least 10 times to verify the EUT can detect an AWGN signal with 90% (or better) level of certainty.
5. Refer to Table 1 to determine number of times the detection threshold testing needs to be repeated. If testing is required more than once, then go back to step 2, choose a different center

frequency for the AWGN signal and repeat the process.

6. EUT was driven in MIMO mode, the interferer signal was injected to both chains to monitor the performance, while the interferer level is determined according to the lowest antenna gain among both antennas.

4.2.4 Test Setup

Conducted Setup

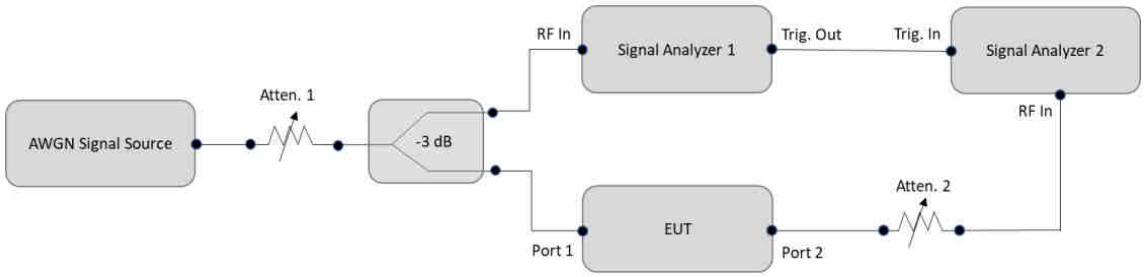


Figure 2. Contention-based protocol test setup, conducted method Step-by-Step Procedure, Conducted Setup

4.2.5 Support Unit used in test configuration and system

Instrument	Brand Name	Model No.	Characteristics
WLAN AP	ASUS	GT-AXE11000	Dual Band AP
Notebook	Acer	N15C1	LAN

4.2.6 Test Summary of Contention Based Protocol Test

Remark: The EUT does not support channel puncturing mode.

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 5	6135	20	6135	-63.19	100	-62	-66.73	4.73
					Result: Stop Transmission			
				-64.19	<90	-62	-67.73	5.73
					Result: Minimal Operation			
				-65.19	=0	-62	-68.73	6.73
					Result: Normal Operation			
	6145	80	6110	-65.71	100	-62	-69.25	7.25
					Result: Stop Transmission			
				-66.71	<90	-62	-70.25	8.25
					Result: Minimal Operation			
				-67.71	=0	-62	-71.25	9.25
					Result: Normal Operation			
			6145	-61.16	100	-62	-64.70	2.70
					Result: Stop Transmission			
				-62.16	<90	-62	-65.70	3.70
					Result: Minimal Operation			
				-63.16	=0	-62	-66.70	4.70
					Result: Normal Operation			
			6180	-63.23	100	-62	-66.77	4.77
					Result: Stop Transmission			
				-64.23	<90	-62	-67.77	5.77
					Result: Minimal Operation			
				-65.23	=0	-62	-68.77	6.77
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 1, gain = 3.54dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

Note 3: Margin = Regulated Threshold level - Adjusted Power

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 6	6455	20	6455	-62.19	100	-62	-64.24	2.24
					Result: Stop Transmission			
				-63.19	<90	-62	-65.24	3.24
					Result: Minimal Operation			
				-64.19	=0	-62	-66.24	4.24
					Result: Normal Operation			
	6465	80	6430	-66.68	100	-62	-68.73	6.73
					Result: Stop Transmission			
				-67.68	<90	-62	-69.73	7.73
					Result: Minimal Operation			
				-68.68	=0	-62	-70.73	8.73
					Result: Normal Operation			
			6465	-61.05	100	-62	-63.10	1.10
					Result: Stop Transmission			
				-62.05	<90	-62	-64.10	2.10
					Result: Minimal Operation			
				-63.05	=0	-62	-65.10	3.10
					Result: Normal Operation			
			6500	-61.96	100	-62	-64.01	2.01
					Result: Stop Transmission			
				-62.96	<90	-62	-65.01	3.01
					Result: Minimal Operation			
				-63.96	=0	-62	-66.01	4.01
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 1, gain = 2.05dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

Note 3: Margin = Regulated Threshold level - Adjusted Power

Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 7	6695	20	6695	-63.86	100	-62	-66.32	4.32
					Result: Stop Transmission			
				-64.86	<90	-62	-67.32	5.32
					Result: Minimal Operation			
				-65.86	=0	-62	-68.32	6.32
					Result: Normal Operation			
	6625	80	6590	-67.18	100	-62	-69.64	7.64
					Result: Stop Transmission			
				-68.18	<90	-62	-70.64	8.64
					Result: Minimal Operation			
				-69.18	=0	-62	-71.64	9.64
					Result: Normal Operation			
			6625	-60.55 **(worst)**	100	-62	-63.01	1.01
					Result: Stop Transmission			
				-61.55	<90	-62	-64.01	2.01
					Result: Minimal Operation			
				-62.55	=0	-62	-65.01	3.01
					Result: Normal Operation			
			6660	-63.29	100	-62	-65.75	3.75
					Result: Stop Transmission			
				-64.29	<90	-62	-66.75	4.75
					Result: Minimal Operation			
				-65.29	=0	-62	-67.75	5.75
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 1, gain = 2.46dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

Note 3: Margin = Regulated Threshold level - Adjusted Power

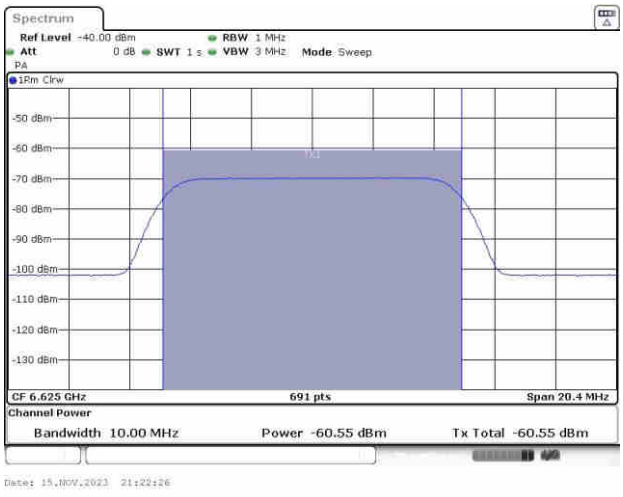
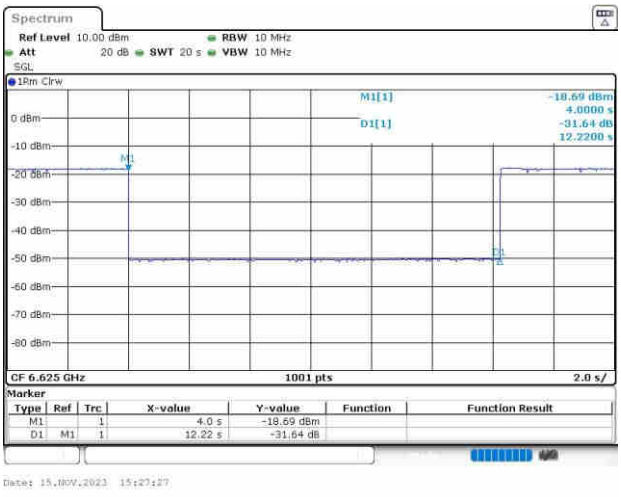
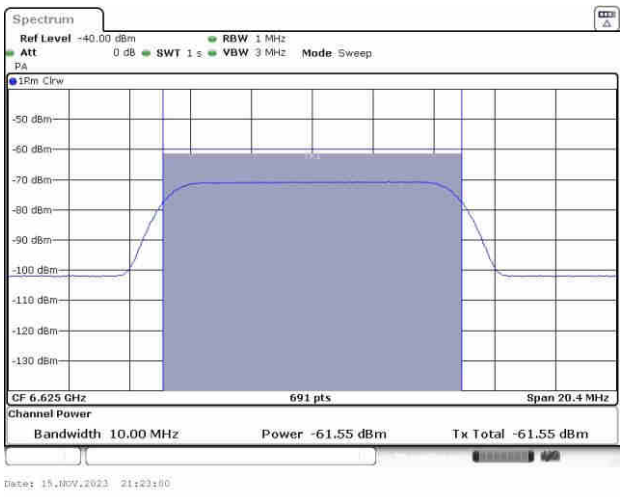
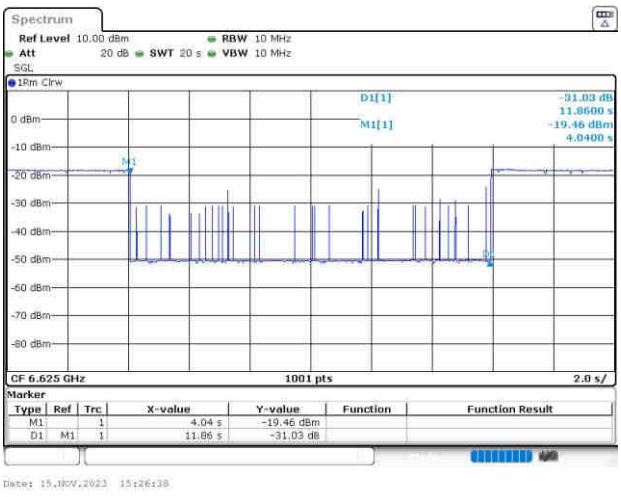
Band	Channel Freq. (MHz)	Channel BW (MHz)	Incumbent freq. (MHz)	Injected AWGN Level (dBm)	Detection Rate (%)	Regulated Threshold level (dBm)	Adjusted Power (dBm)	Margin (dB)
UNII Band 8	6705	20	7015	-62.86	100	-62	-65.96	3.96
					Result: Stop Transmission			
				-63.86	<90	-62	-66.96	4.96
					Result: Minimal Operation			
				-64.86	=0	-62	-67.96	5.96
					Result: Normal Operation			
	6945	80	6910	-62.26	100	-62	-65.36	3.36
					Result: Stop Transmission			
				-63.26	<90	-62	-66.36	4.36
					Result: Minimal Operation			
				-64.26	=0	-62	-67.36	5.36
					Result: Normal Operation			
			6945	-61.54	100	-62	-64.64	2.64
					Result: Stop Transmission			
				-62.54	<90	-62	-65.64	3.64
					Result: Minimal Operation			
				-63.54	=0	-62	-66.64	4.64
					Result: Normal Operation			
			6980	-67.55	100	-62	-70.65	8.65
					Result: Stop Transmission			
				-68.55	<90	-62	-71.65	9.65
					Result: Minimal Operation			
				-69.55	=0	-62	-72.65	10.65
					Result: Normal Operation			

Note 1: Adjusted Power = Injected AWGN Level - minimum antenna gain (Antenna 1, gain = 3.1dBi)

Note 2: Path Loss between antenna and RF connector is negligible. (0 dB)

Note 3: Margin = Regulated Threshold level - Adjusted Power

4.2.7 Worst Case Plots of Contention Based Protocol

Contention Based Protocol Result Plots on U-NII 7 (AWGN Interference)	
802.11ax (HE80) / 6625MHz Threshold Level (TL) = -60.55dBm	802.11ax (HE80) / 6625MHz Test result is pass due to no transmission occur.
	
802.11ax (HE80) / 6625MHz Threshold Level (TL) = -61.55dBm	802.11ax (HE80) / 6625MHz Transmit when the interferer is 1dB lower.
	

Remark: M1: Injection of AWGN signal, D1: Removal of AWGN signal

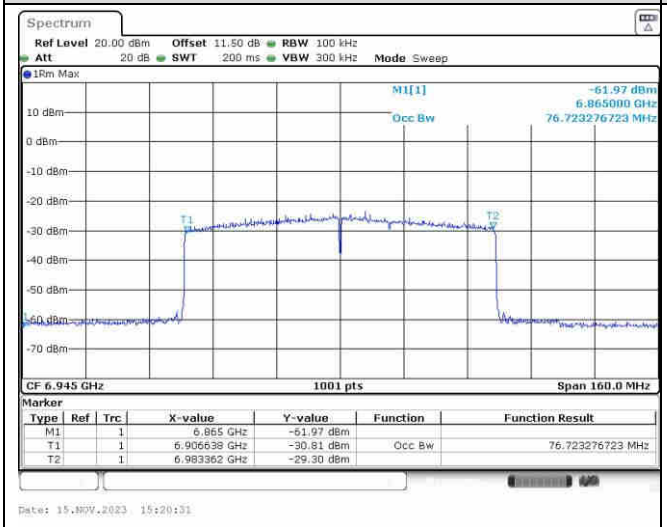
4.2.8 Worst Case of Contention Based Protocol Transmission Bandwidth

Verify transmission absence when Incumbent signal at different frequency (frequency domain plots).

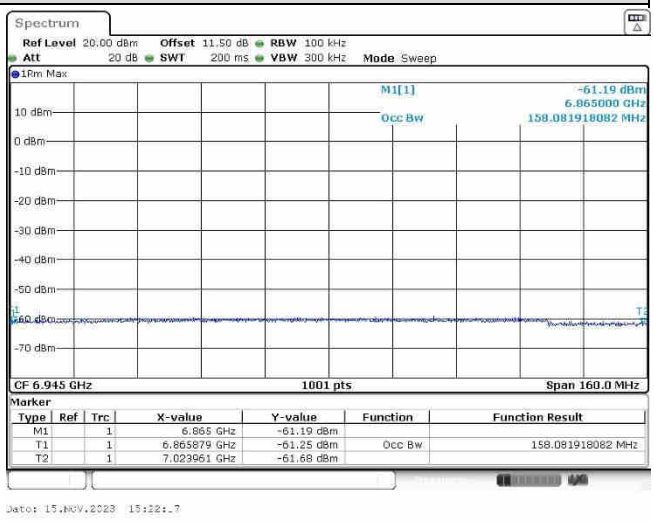
1. When Incumbent Signal inject at lowest frequency, the whole 80MHz bandwidth stop transmission;
2. When Incumbent Signal inject at middle frequency, the transmission bandwidth reduced to 20MHz;
3. When Incumbent Signal inject at highest frequency, the transmission bandwidth reduced to 40MHz;

UNII 8_CH199 (6945MHz / BW=80MHz)

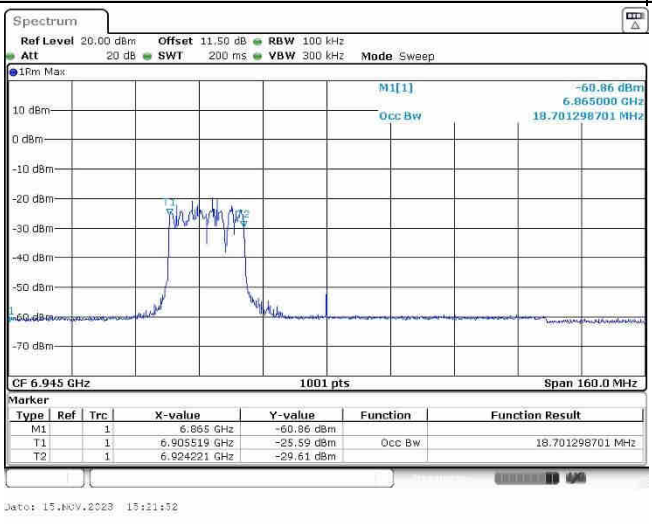
Non-Incumbent Signal (full 80MHz)



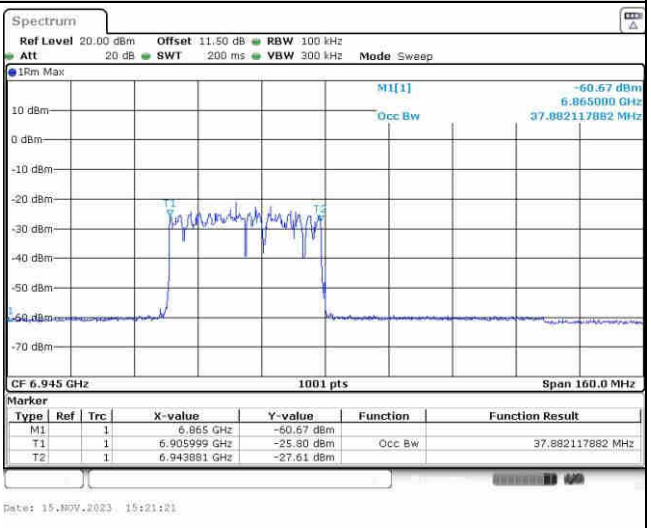
Incumbent Signal @ Lowest Frequency



Incumbent Signal @ Middle Frequency



Incumbent Signal @ Highest Frequency



4.3 Radiated Band Edges and Spurious Emission Measurement

4.3.1 Limit of Radiated Band Edges and Spurious Emission

Emissions which fall in the restricted bands must also comply with the limits as below.

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
Above 960	500	3

4.3.2 Measuring Instruments

The section 5.0 of List of Measuring Equipment of this test report is used for test.

4.3.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. 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. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;

(2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;

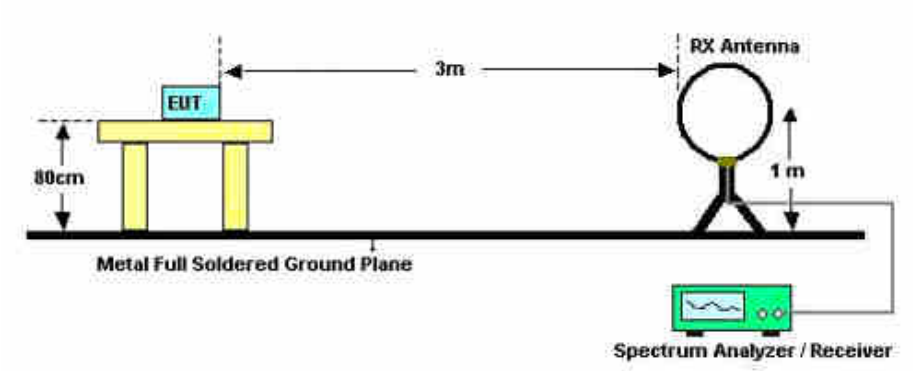
(3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.

For average measurement:

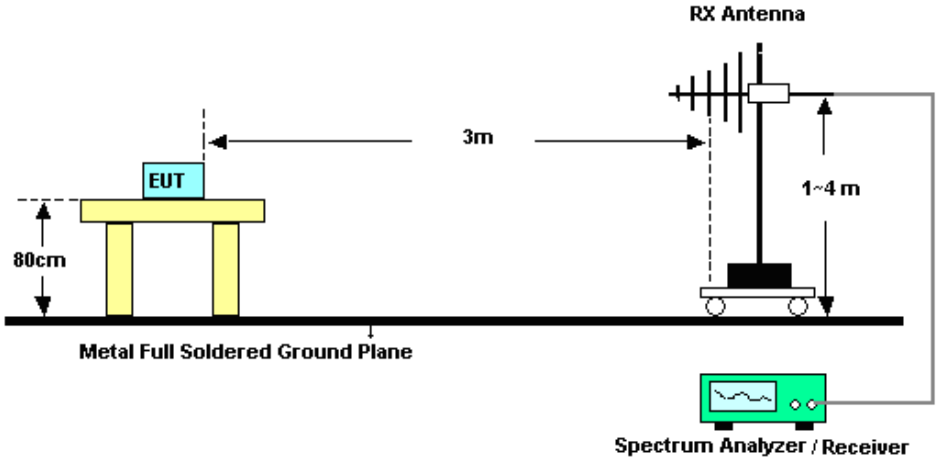
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

4.3.4 Test Setup

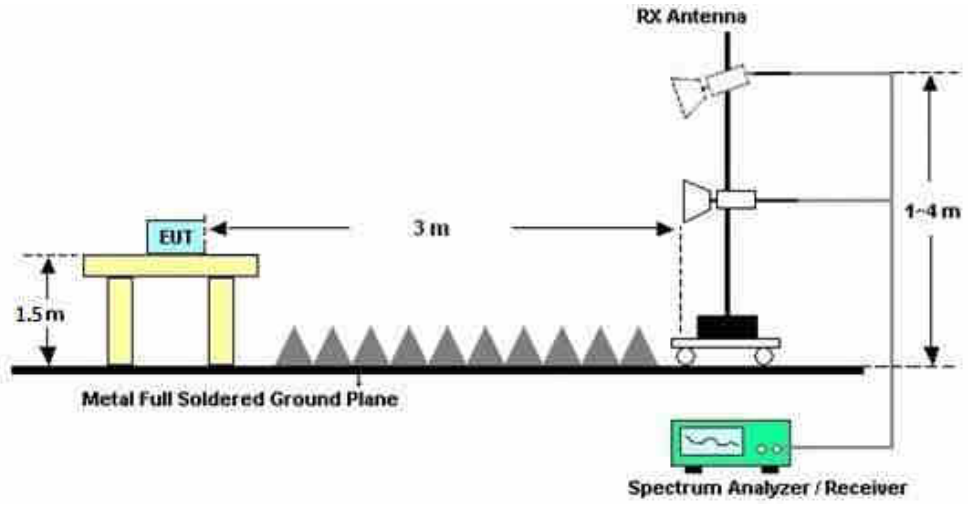
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



4.3.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

4.3.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A.

4.3.7 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix A.

4.3.8 Duty Cycle

Mode	Duty Cycle
LoRa DTS SF7	100%
LoRa DTS SF11	100%
LoRa OFDM-LR	100%
LoRa FSK 50kbps	100%

Please refer to Appendix B for duty cycle plots of Zigbee.

4.4 Antenna Requirements

4.4.1 Standard Applicable

§15.203: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used. The EUT complies with the requirement of 15.203.

4.4.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

For CDD transmissions, directional gain is calculated as

For power, the directional gain GANT is set equal to the antenna having the highest gain, i.e.,

Directional gain = $G_{ANT\ MAX}$(Ant.1 Gain, Ant.2 Gain,…) + Array Gain, as following table for Power, where Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

For PSD, the directional gain calculation is following,

Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{Gn/20})^2 / N_{ANT}]$ dBi, as following table for PSD.

N_{ANT} = number of transmit antennas

N_{SS} = number of spatial streams. (The worst case directional gain will occur when NSS = 1)

For completely uncorrelated transmissions, directional gain is calculated as,

Directional gain = $G_{ANT\ MAX}$(Ant.1 Gain, Ant.2 Gain,…), as following table

	Ant. 0 (dBi)	Ant. 1 (dBi)	DG for Power (dBi)	DG for PSD (dBi)
UNII-5	4.68	3.54	4.68	7.14
UNII-6	5.39	2.05	5.39	6.89
UNII-7	6.46	2.46	6.46	7.70
UNII-8	4.60	3.10	4.60	6.89

Calculation example (UNII-5):

DG for Power = $G_{ANT\ MAX}$(Ant.1 Gain, Ant.2 Gain,…) + Array Gain = 4.68dBi.(NANT ≤ 4)

DG for PSD = $10*\text{Log}[(10^{G0/20} + 10^{G1/20} + \ldots + 10^{Gn/20})^2 / N_{ANT}]$

= $10*\text{Log}[(10^{(4.68/20)}+10^{(3.54/20)})^2/2]$ = 7.14dBi

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 06, 2023	Jan. 12, 2024~ Jan. 15, 2024	Apr. 05, 2024	Conducted (TH01-SZ)
Pulse Power Senor	Anritsu	MA2411B	1339473	30MHz~40GHz	Dec. 26, 2023	Jan. 12, 2024~ Jan. 15, 2024	Dec. 25, 2024	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1542004	50MHz Bandwidth	Dec. 26, 2023	Jan. 12, 2024~ Jan. 15, 2024	Dec. 25, 2024	Conducted (TH01-SZ)
Attenuator	MICROWAV	EMVE2214-10	2	30MHz-26.5GHz	Feb. 22, 2023	Jan. 12, 2024~ Jan. 15, 2024	Feb. 21, 2024	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr. 04, 2023	Dec. 30, 2023~ Jan. 12, 2024	Apr. 03, 2024	Radiation (03CH03-SZ)
EXA Spectrum Anaiyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr. 04, 2023	Dec. 30, 2023~ Jan. 12, 2024	Apr. 03, 2024	Radiation (03CH03-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jul. 28, 2022	Dec. 30, 2023~ Jan. 12, 2024	Jul. 27, 2024	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz-2GHz	Aug. 20, 2023	Dec. 30, 2023~ Jan. 12, 2024	Aug. 19, 2025	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	Apr. 08, 2023	Dec. 30, 2023~ Jan. 12, 2024	Apr. 07, 2024	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 07, 2023	Dec. 30, 2023~ Jan. 12, 2024	Jul. 06, 2024	Radiation (03CH03-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz-40GHz	Apr. 08, 2023	Dec. 30, 2023~ Jan. 12, 2024	Apr. 07, 2024	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023	Dec. 30, 2023~ Jan. 12, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
HF Amplifier	MITEQ	AMF-7D-00101800-30-10P-R	1943528	1GHz~18GHz	Oct. 18, 2023	Dec. 30, 2023~ Jan. 12, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Dec. 25, 2023	Dec. 30, 2023~ Jan. 12, 2024	Dec. 24, 2024	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Dec. 30, 2023~ Jan. 12, 2024	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Dec. 30, 2023~ Jan. 12, 2024	NCR	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010002729	1 N/A	Oct. 18, 2023	Dec. 30, 2023~ Jan. 12, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
Signal Analyzer	R&S	FSV7	101473	10Hz~7GHz	Dec. 27, 2022	Nov. 15, 2023	Dec. 26, 2023	CBP (DFS01-SZ)
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200424	9kHz~6GHz	Apr. 04, 2023	Nov. 15, 2023	Apr. 03, 2024	CBP (DFS01-SZ)
Combiner	TOJOIN	PS-2AM-0460	SZE14011007	0.4~6GHz	Sep. 05, 2023	Nov. 15, 2023	Sep. 04, 2024	CBP (DFS01-SZ)

NCR: No Calibration Required

6 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±1.34 dB

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Contention Based Protocol	0.62dB

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.9dB

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB

---------- THE END ----------

Appendix A. Radiated Spurious Emission

Test Engineer :	Reid Huang	Relative Humidity :	48~50%
		Temperature :	20~25℃

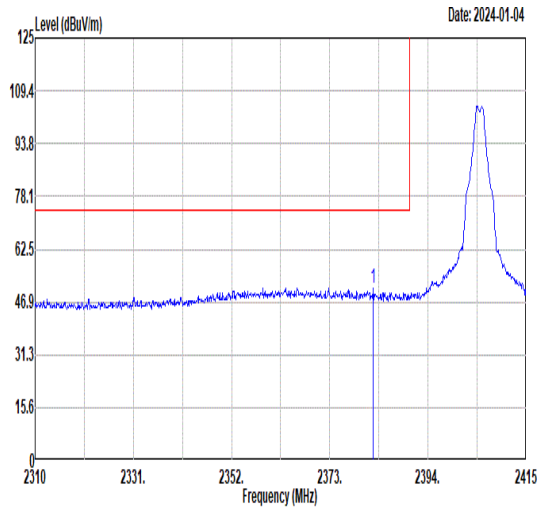
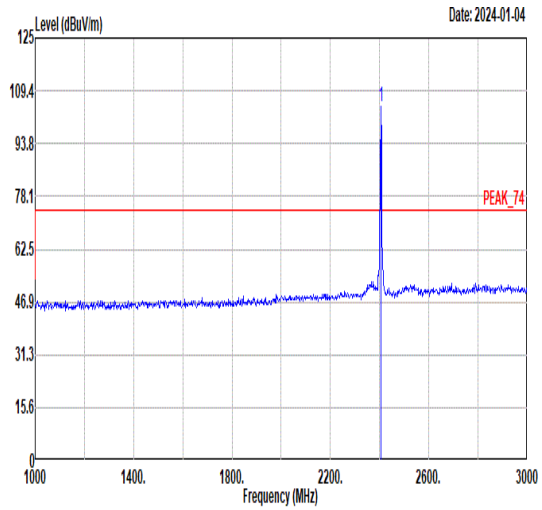
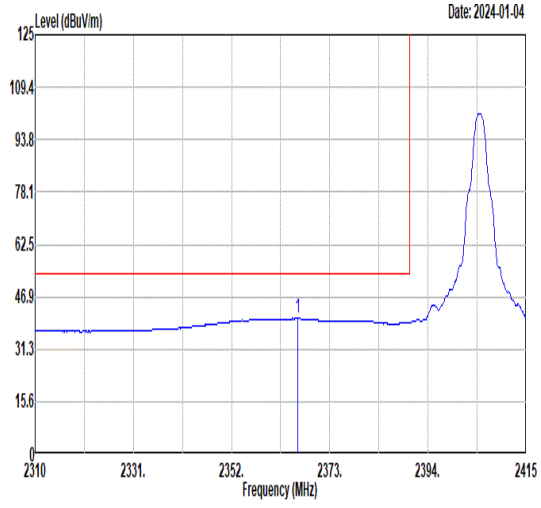
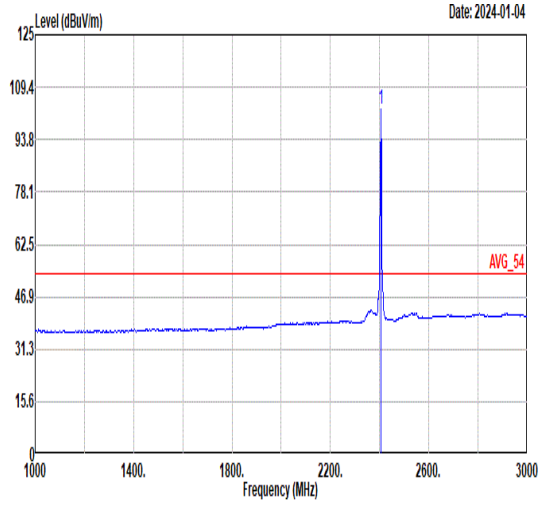
<For Zigbee test results>:

Test Modes:

Mode	Band (MHz)	Function	Modulation	Channel	Frequency	Data Rate	Remark
1	2400-2483.5	ZigBee	O-QPSK	11	2405	250k	-
2	2400-2483.5	ZigBee	O-QPSK	17	2445	250k	-
3	2400-2483.5	ZigBee	O-QPSK	25	2475	250k	-
4	2400-2483.5	ZigBee	O-QPSK	25	2475	250k	LF

Summary of each worse mode:

Mode	Function	Ch.	Freq. (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Pol.	Peak Avg.	Result	Remark
1	ZigBee	11	2366.18	45.43	54.00	-8.57	V	Average	Pass	Band Edge
1	ZigBee	11	4810.00	42.40	74.00	-31.60	V	Peak	Pass	Harmonic
2	ZigBee	17	2381.54	46.44	54.00	-7.56	V	Average	Pass	Band Edge
2	ZigBee	17	7335.00	44.16	74.00	-29.84	H	Peak	Pass	Harmonic
3	ZigBee	25	2483.52	47.41	54.00	-6.59	V	Average	Pass	Band Edge
3	ZigBee	25	7425.00	43.97	74.00	-30.03	H	Peak	Pass	Harmonic
4	ZigBee	25	31.94	25.65	40.00	-14.35	V	Peak	Pass	LF

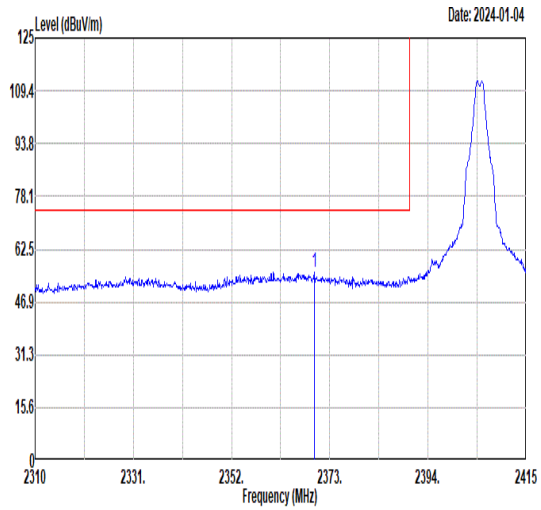
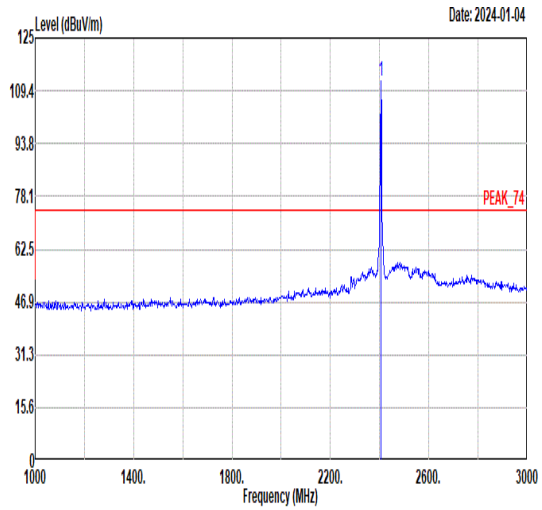
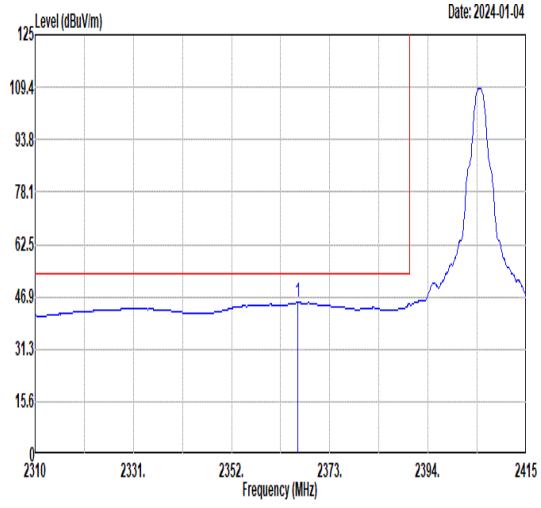
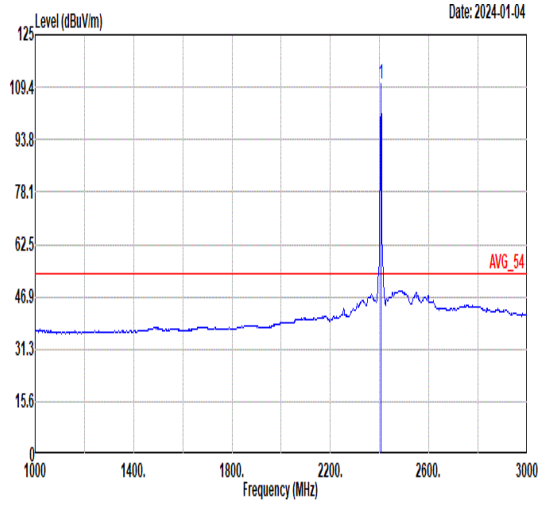
Mode	1	
	Band Edge	
	2400-2483.5_ZigBee _CH11_2405MHz	
Pol.	Horizontal	Fundamental
Peak		
Avg		

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2382.35	51.16	74.00	-22.84	47.69	32.35	4.79	33.67	348	246	Peak

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2405.00	104.84	------	------	101.33	32.36	4.81	33.66	348	246	Peak

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2366.18	40.57	54.00	-13.43	37.13	32.35	4.77	33.68	348	246	Average

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2405.00	103.01	------	------	99.50	32.36	4.81	33.66	348	246	Average

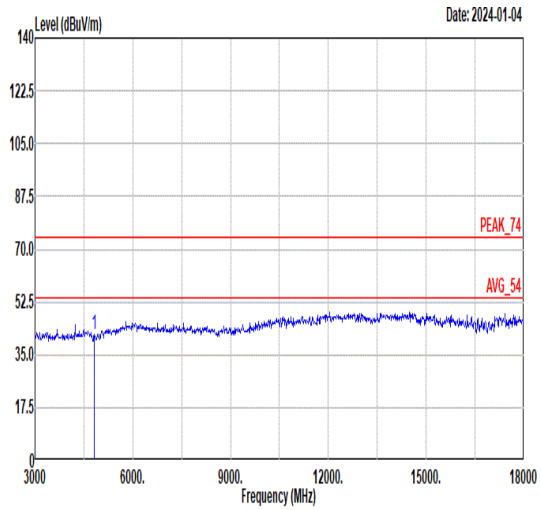
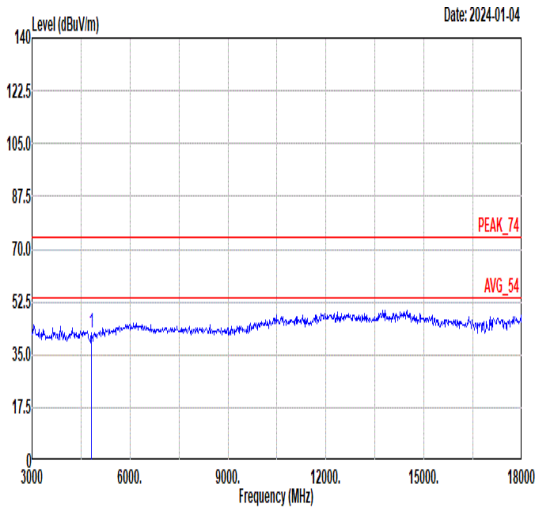
Mode	1	
	Band Edge	
	2400-2483.5_ZigBee _CH11_2405MHz	
Pol.	Vertical	Fundamental
Peak		
Avg		

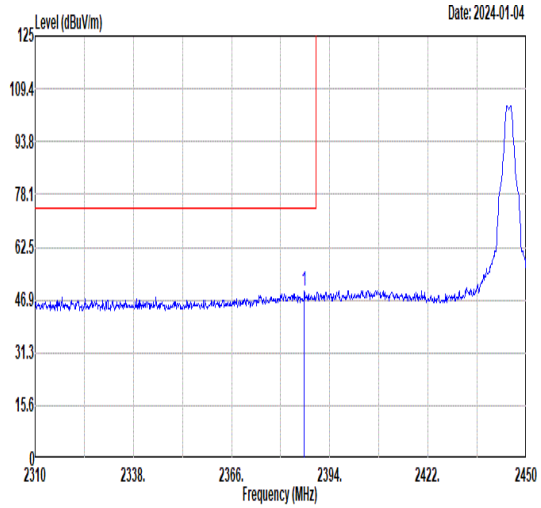
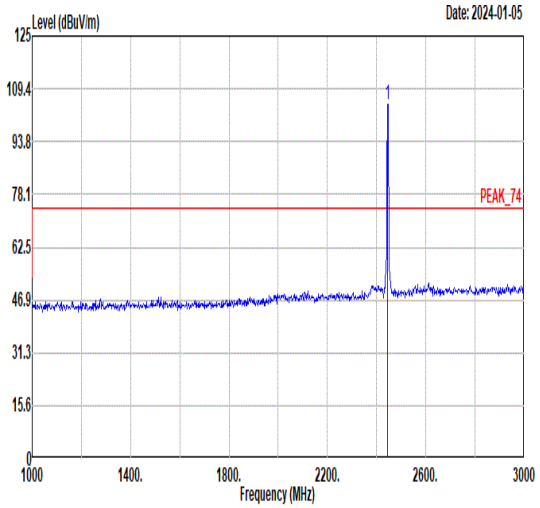
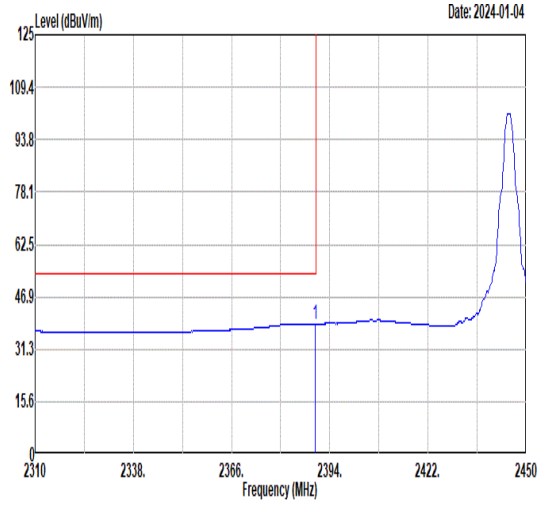
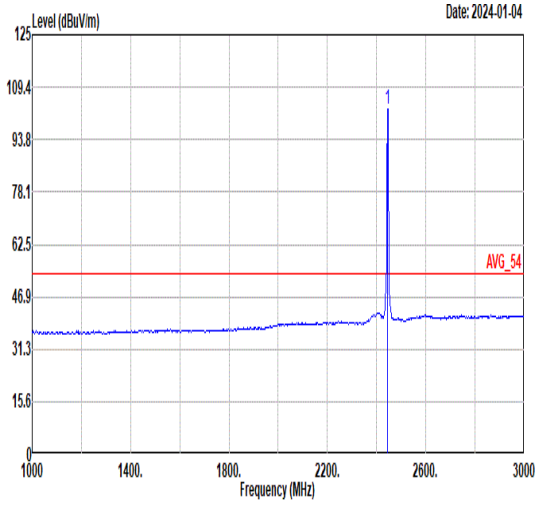
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2369.64	55.82	74.00	-18.18	52.38	32.35	4.77	33.68	172	37	Peak

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2405.00	112.35	------	------	108.84	32.36	4.81	33.66	172	37	Peak

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2366.18	45.43	54.00	-8.57	41.99	32.35	4.77	33.68	172	37	Average

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2405.00	110.46	------	------	106.95	32.36	4.81	33.66	172	37	Average

Mode	1	
	Harmonic	
	2400-2483.5_ZigBee _CH11_2405MHz	
Pol.	Horizontal	Vertical
Peak Avg	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm deg 1 4810.00 41.75 74.00 -32.25 57.07 34.41 7.74 57.47 -- -- Peak	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm deg 1 4810.00 42.40 74.00 -31.60 57.72 34.41 7.74 57.47 -- -- Peak

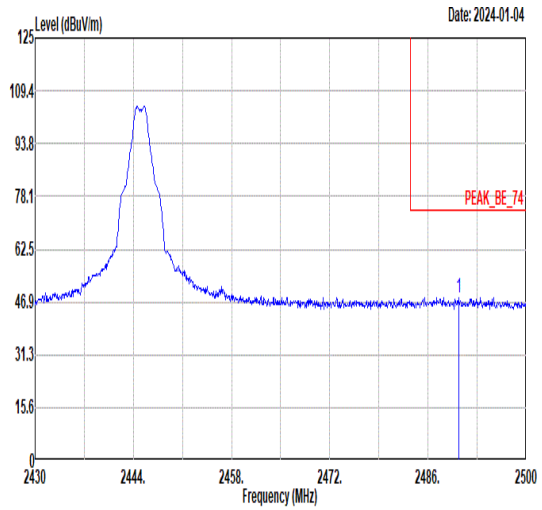
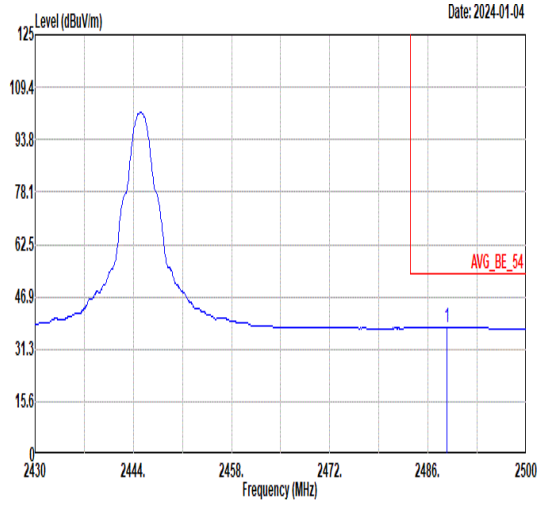
Mode	2	
	Band Edge - L	
	2400-2483.5_ZigBee _GSFK _CH17_2445MHz	
Pol.	Horizontal	Fundamental
Peak		
Avg		

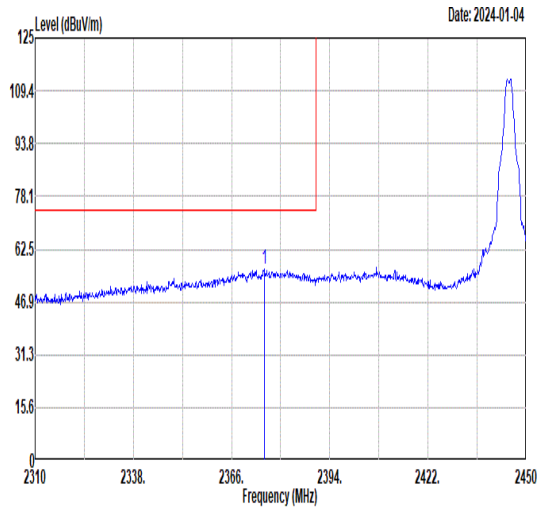
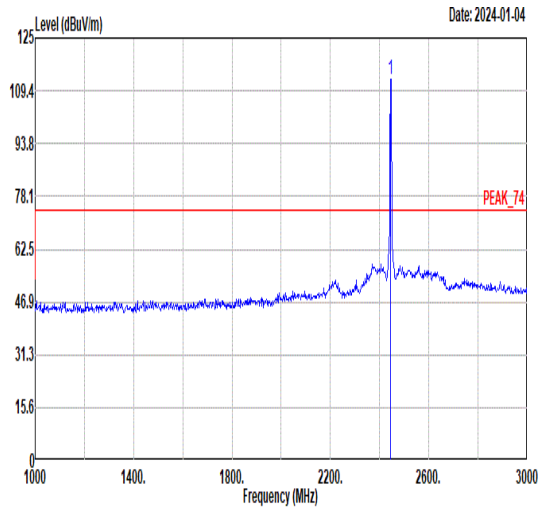
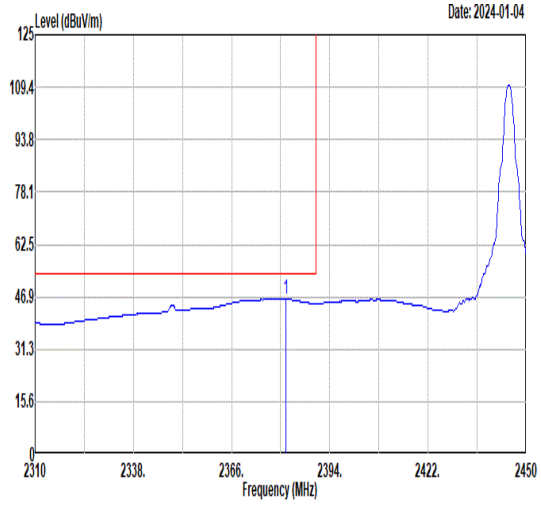
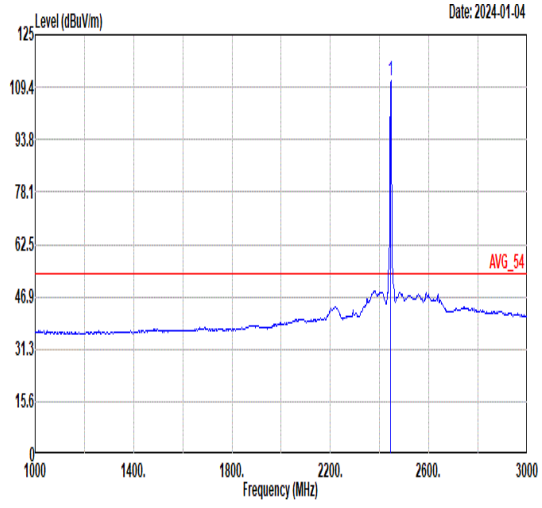
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2386.72	49.40	74.00	-24.60	45.92	32.36	4.79	33.67	336	246	Peak

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2445.00	104.76	------	------	101.14	32.38	4.87	33.63	336	246	Peak

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2389.94	38.91	54.00	-15.09	35.42	32.36	4.80	33.67	336	246	Average

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2445.00	103.00	------	------	99.38	32.38	4.87	33.63	336	246	Average

Mode	2	
	Band Edge - R	
	2400-2483.5_ZigBee _CH17_2445MHz	
Pol.	Horizontal	Fundamental
Peak	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm deg 1 2490.41 48.30 74.00 -25.70 44.58 32.40 4.93 33.61 336 246 Peak	Blank
Avg	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm deg 1 2488.73 37.84 54.00 -16.16 34.12 32.40 4.93 33.61 336 246 Average	Blank

Mode	2	
	Band Edge - L	
	2400-2483.5_ZigBee _CH17_2445MHz	
Pol.	Vertical	Fundamental
Peak		
Avg		

Vertical – Peak

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2375.38	56.62	74.00	-17.38	53.17	32.35	4.78	33.68	168	46	Peak

Fundamental – Peak

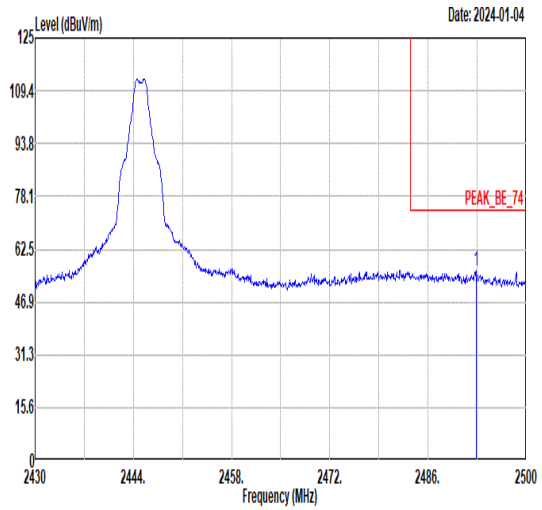
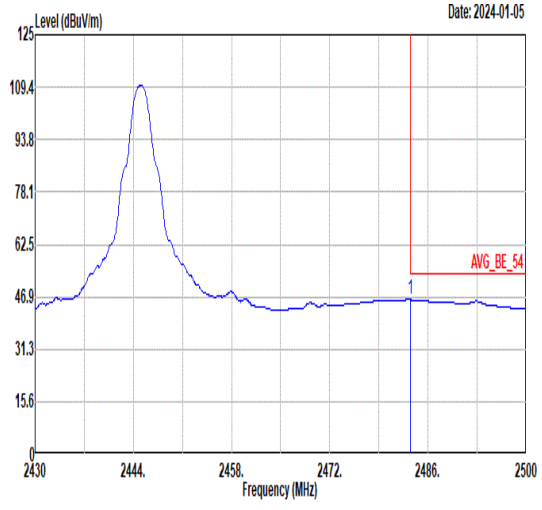
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2445.00	112.89	------	------	109.27	32.38	4.87	33.63	168	46	Peak

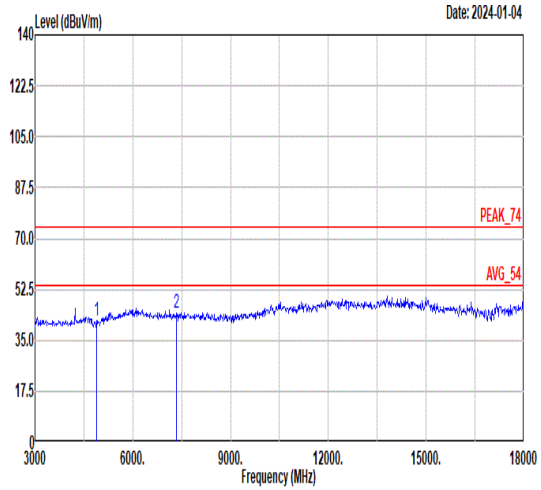
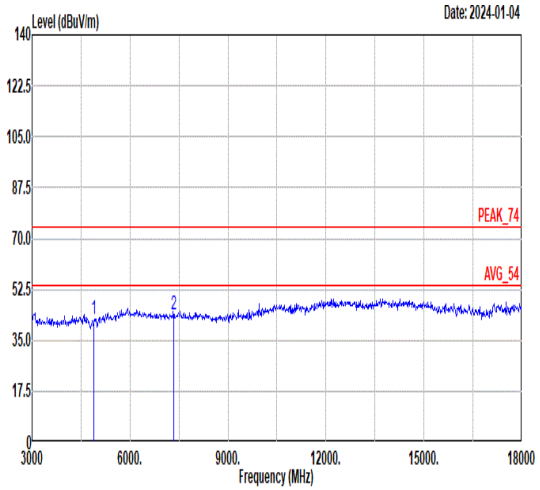
Vertical – Avg

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2381.54	46.44	54.00	-7.56	42.97	32.35	4.79	33.67	168	46	Average

Fundamental – Avg

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2445.00	111.11	------	------	107.49	32.38	4.87	33.63	168	46	Average

Mode	2	
	Band Edge - R	
	2400-2483.5_ZigBee _CH17_2445MHz	
Pol.	Vertical	Fundamental
Peak	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm deg 1 2492.86 56.21 74.00 -17.79 52.49 32.40 4.93 33.61 168 46 Peak	Blank
Avg	 Freq Level Limit Line Margin Read Level Ant Factor Cable Loss Preamp Factor APos TPos Remark MHz dBuV/m dBuV/m dB dBuV dB/m dB dB cm deg 1 2483.50 46.02 54.00 -7.98 42.32 32.39 4.92 33.61 168 46 Average	Blank

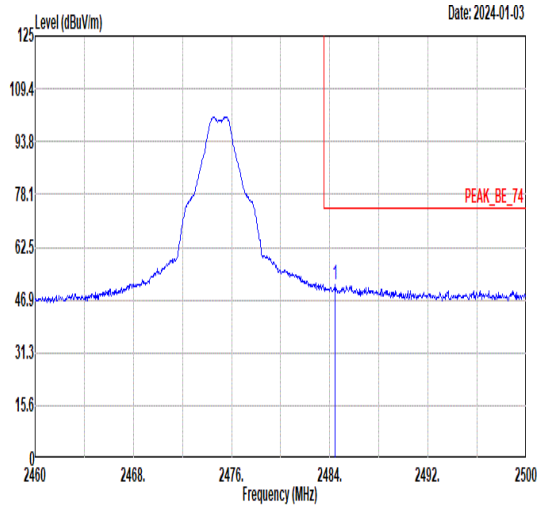
Mode	2	
	Harmonic	
	2400-2483.5_ZigBee _CH17_2445MHz	
Pol.	Horizontal	Vertical
Peak Avg		

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	4890.00	41.50	74.00	-32.50	56.89	34.36	7.78	57.53	--	--	Peak
2	7335.00	44.16	74.00	-29.84	58.05	36.03	9.01	58.93	--	--	Peak

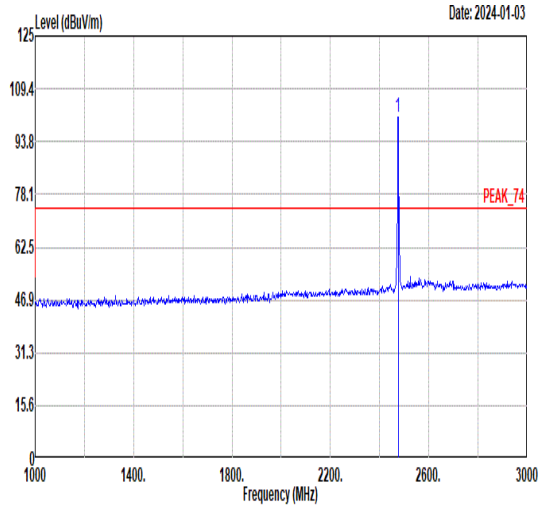
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	4890.00	42.13	74.00	-31.87	57.52	34.36	7.78	57.53	--	--	Peak
2	7335.00	43.70	74.00	-30.30	57.59	36.03	9.01	58.93	--	--	Peak

Mode	3	
	Band Edge	
	2400-2483.5_ZigBee _CH25_2475MHz	
Pol.	Horizontal	Fundamental

Peak

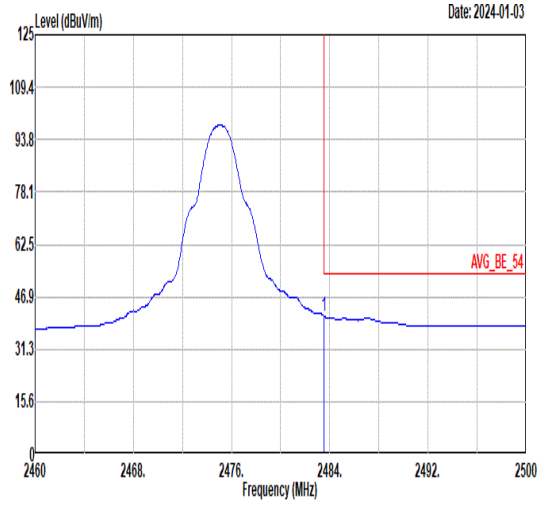


	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2484.40	51.20	74.00	-22.80	47.49	32.40	4.92	33.61	100	334	Peak

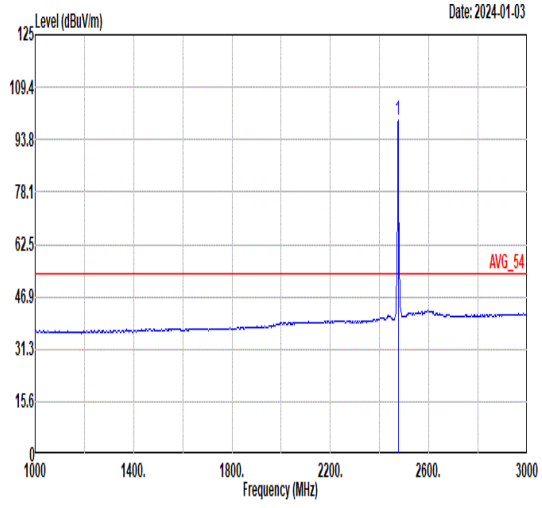


	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2475.00	101.10	------	------	97.42	32.39	4.91	33.62	100	334	Peak

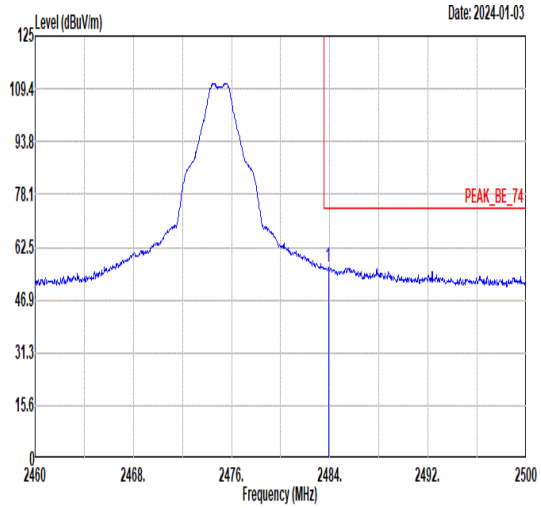
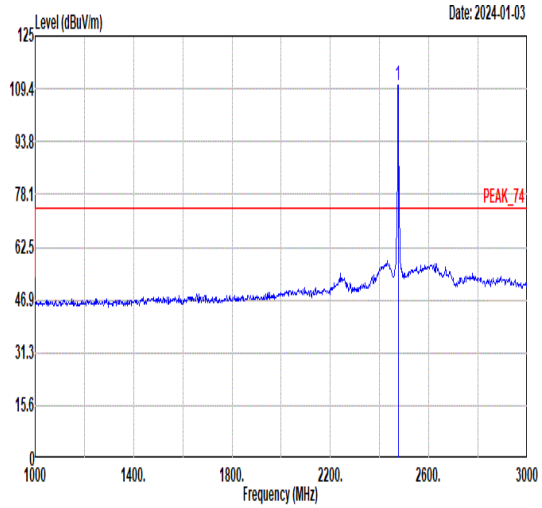
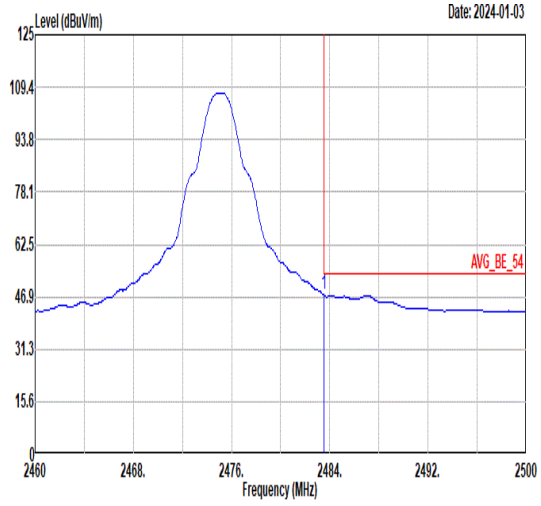
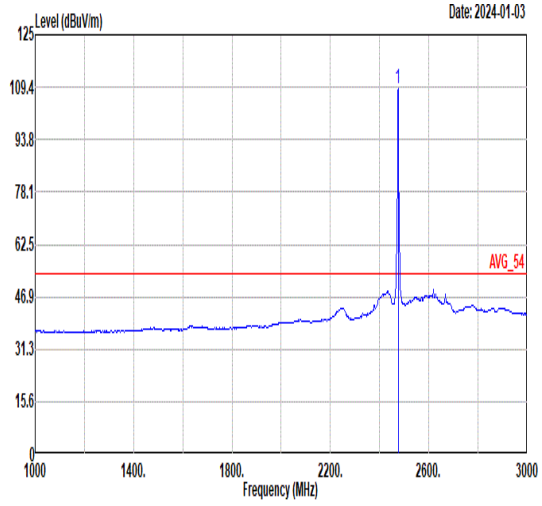
Avg



	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2483.52	41.15	54.00	-12.85	37.45	32.39	4.92	33.61	100	334	Average



	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2475.00	99.35	------	------	95.67	32.39	4.91	33.62	100	334	Average

Mode	3	
	Band Edge	
	2400-2483.5_ZigBee _CH25_2475MHz	
Pol.	Vertical	Fundamental
Peak		
Avg		

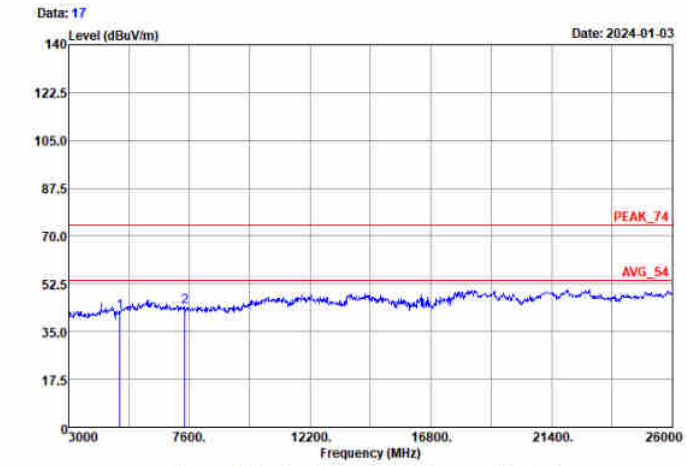
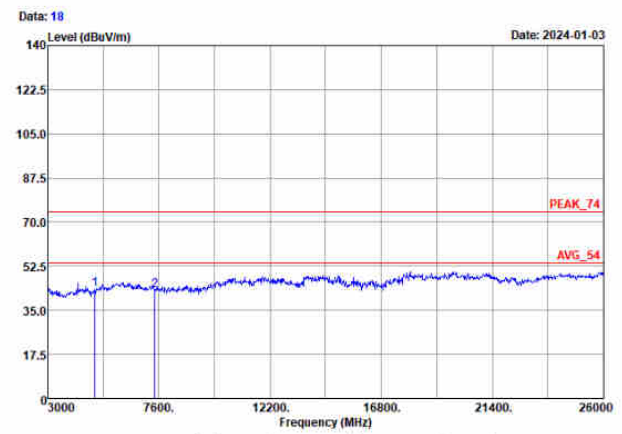
	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2483.88	56.48	74.00	-17.52	52.77	32.40	4.92	33.61	100	138	Peak

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2475.00	110.53	------	------	106.85	32.39	4.91	33.62	100	138	Peak

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2483.52	47.41	54.00	-6.59	43.71	32.39	4.92	33.61	100	138	Average

	Freq	Level	Limit Line	Margin	Read Level	Ant Factor	Cable Loss	Preamp Factor	APos	TPos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg	
1	2475.00	108.81	------	------	105.13	32.39	4.91	33.62	100	138	Average

Mode	3
	Harmonic
	2400-2483.5_ZigBee _CH25_2475MHz

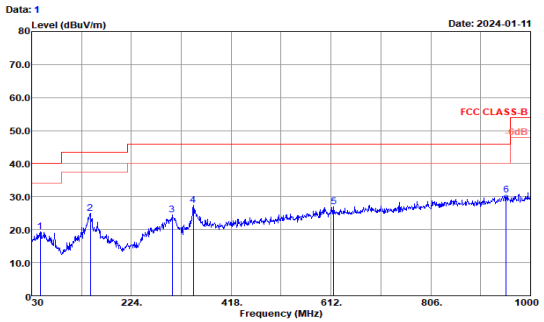
Pol.	Horizontal	Vertical
Peak Avg	 Freq Level Over Limit Limit Line Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4950.00 42.11 -31.89 74.00 57.44 34.43 7.80 57.56 --- --- Peak 2 7425.00 43.97 -30.03 74.00 58.34 35.41 9.19 58.97 --- --- Peak	 Freq Level Over Limit Limit Line Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 4950.00 43.33 -30.67 74.00 58.66 34.43 7.80 57.56 --- --- Peak 2 7425.00 43.02 -30.98 74.00 57.39 35.41 9.19 58.97 --- --- Peak

Note: Only the worst case has assessed 18G ~26GHz to test.

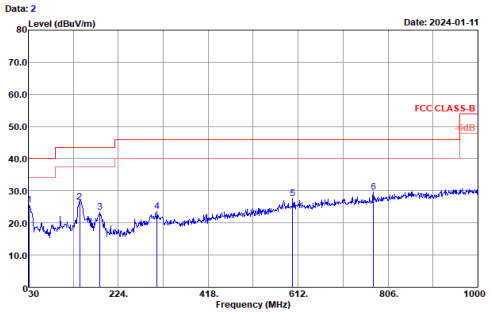
Mode	4
	LF
	2400-2483.5_ZigBee _CH25_2475MHz

Pol.	Horizontal	Vertical

Peak



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	46.49	19.33	-20.67	40.00	34.02	19.62	0.69	35.00	---	---	Peak
2	144.46	25.06	-18.44	43.50	40.00	18.51	1.26	34.71	---	---	Peak
3	303.54	24.62	-21.38	46.00	38.21	19.20	1.81	34.60	---	---	Peak
4	344.28	27.39	-18.61	46.00	39.98	20.09	1.92	34.60	---	---	Peak
5	616.85	26.93	-19.07	46.00	32.72	26.14	2.64	34.57	---	---	Peak
6	952.47	30.48	-15.52	46.00	31.72	29.78	3.27	34.29	---	---	Peak



	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	31.94	25.65	-14.35	40.00	41.88	18.01	0.56	34.80	---	---	Peak
2	140.58	26.62	-16.88	43.50	41.90	18.20	1.24	34.72	---	---	Peak
3	184.23	23.38	-20.12	43.50	39.72	16.93	1.43	34.70	---	---	Peak
4	307.42	23.72	-22.28	46.00	37.21	19.29	1.82	34.60	---	---	Peak
5	600.36	27.64	-18.36	46.00	33.54	26.09	2.61	34.60	---	---	Peak
6	774.96	29.56	-16.44	46.00	33.20	27.72	2.99	34.35	---	---	Peak

<For LoRa test results>:

LoRa DTS SF=7 (LF 30Mhz-1Ghz@ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.5MHz		131.85	28.53	-14.97	43.5	44.57	17.49	1.21	34.74	-	-	P	H
		304.51	31.91	-14.09	46	45.47	19.23	1.81	34.6	-	-	P	H
	*	902.5	117.53	-	-	120.01	28.67	3.15	34.3	-	-	P	H
		131.85	29.15	-14.35	43.5	45.19	17.49	1.21	34.74	-	-	P	V
		304.51	33.37	-12.63	46	46.93	19.23	1.81	34.6	-	-	P	V
	*	902.5	114.86	-	-	117.34	28.67	3.15	34.3	-	-	P	V
914.5MHz		131.85	29.26	-14.24	43.5	45.3	17.49	1.21	34.74	-	-	P	H
		286.08	33.27	-12.73	46	47.45	18.69	1.76	34.63	-	-	P	H
	*	914.5	114.8	-	-	116.96	28.96	3.18	34.3	-	-	P	H
		150.28	28.99	-14.51	43.5	43.43	18.98	1.28	34.7	-	-	P	V
		291.9	29.06	-16.94	46	43.03	18.88	1.77	34.62	-	-	P	V
	*	914.5	118.28	-	-	120.44	28.96	3.18	34.3	-	-	P	V
926.5MHz		131.85	29.26	-14.24	43.5	45.3	17.49	1.21	34.74	-	-	P	H
		291.9	33.07	-12.93	46	47.04	18.88	1.77	34.62	-	-	P	H
	*	926.5	111.19	-	-	113.05	29.23	3.21	34.3	-	-	P	H
		157.07	26.68	-16.82	43.5	41.5	18.57	1.31	34.7	-	-	P	V
		304.51	31.58	-14.42	46	45.14	19.23	1.81	34.6	-	-	P	V
	*	926.5	115.07	-	-	116.93	29.23	3.21	34.3	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 30dB.												

LoRa DTS SF=7 (Band Edge @ 3m)

	Note	Frequency	Level	Margin	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
		(MHz)	(dBμV/m)	(dB)	Line (dBμV/m)	Level (dBμV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Pos (cm)	Pos (deg)	Avg. (P/A)	(H/V)
902.5MHz		862.26	51.26	-46.27	97.53	53.69	28.76	3.11	34.3	-	-	P	H
	*	902.5	117.53	----	----	120.01	28.67	3.15	34.3	-	-	P	H
		942.77	49.48	-48.05	97.53	50.94	29.6	3.24	34.3	-	-	P	H
		862.26	48.04	-46.82	94.86	50.47	28.76	3.11	34.3	-	-	P	V
	*	902.5	114.86	----	----	117.34	28.67	3.15	34.3	-	-	P	V
		941.8	48.07	-46.79	94.86	49.55	29.58	3.24	34.3	-	-	P	V
914.5MHz		873.9	45.72	-49.08	94.8	48.18	28.72	3.12	34.3	-	-	P	H
	*	914.5	114.8	----	----	116.96	28.96	3.18	34.3	-	-	P	H
		954.41	46.85	-47.95	94.8	48.08	29.79	3.27	34.29	-	-	P	H
		874.87	51.52	-46.76	98.28	53.98	28.72	3.12	34.3	-	-	P	V
	*	914.5	118.28	----	----	120.44	28.96	3.18	34.3	-	-	P	V
		954.41	49.99	-48.29	98.28	51.22	29.79	3.27	34.29	-	-	P	V
926.5MHz		887.48	43.26	-47.93	91.19	45.75	28.67	3.14	34.3	-	-	P	H
	*	926.5	111.19	----	----	113.05	29.23	3.21	34.3	-	-	P	H
		967.02	41.9	-49.29	91.19	43.01	29.86	3.29	34.26	-	-	P	H
		886.51	48.6	-46.47	95.07	51.08	28.68	3.14	34.3	-	-	P	V
	*	926.5	115.07	----	----	116.93	29.23	3.21	34.3	-	-	P	V
		967.02	45.41	-49.66	95.07	46.52	29.86	3.29	34.26	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

LoRa DTS SF=7 (Harmonic @ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.5MHz		1805	36.56	-60.97	97.53	60.91	29.4	4.21	57.96	-	-	P	H
		2707.5	39.29	-34.71	74	60	31.6	5.2	57.51	-	-	P	H
		3610	40.98	-33.02	74	59.07	32.77	6.19	57.05	-	-	P	H
		1805	37.28	-37.28	94.86	61.63	29.4	4.21	57.96	-	-	P	V
		2707.5	39.22	-34.78	74	59.93	31.6	5.2	57.51	-	-	P	V
		3610	41.85	-32.15	74	59.94	32.77	6.19	57.05	-	-	P	V
914.5MHz		1829	36.3	-58.5	94.8	60.46	29.6	4.21	57.97	-	-	P	H
		2743.5	39.28	-34.72	74	59.92	31.6	5.24	57.48	-	-	P	H
		3658	40.39	-33.61	74	58.43	32.82	6.18	57.04	-	-	P	H
		1829	36.46	-61.82	98.28	60.62	29.6	4.21	57.97	-	-	P	V
		2743.5	39.2	-34.8	74	59.84	31.6	5.24	57.48	-	-	P	V
		3658	42.41	-31.59	74	60.45	32.82	6.18	57.04	-	-	P	V
926.5MHz		1853	36.46	-54.73	91.19	60.48	29.7	4.25	57.97	-	-	P	H
		2779.5	39.4	-34.6	74	59.9	31.67	5.28	57.45	-	-	P	H
		3706	41.42	-32.58	74	59.38	32.89	6.17	57.02	-	-	P	H
		1853	36.51	-58.56	95.07	60.53	29.7	4.25	57.97	-	-	P	V
		2779.5	39.48	-34.52	74	59.98	31.67	5.28	57.45	-	-	P	V
		3706	40.78	-33.22	74	58.74	32.89	6.17	57.02	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

LoRa DTS SF= 11 (LF 30Mhz-1Ghz@ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
903.3MHz		159.01	24.81	-18.69	43.5	39.74	18.45	1.32	34.7	-	-	P	H
		304.51	27.51	-18.49	46	41.07	19.23	1.81	34.6	-	-	P	H
	*	903.3	115.25	-	-	117.69	28.7	3.16	34.3	-	-	P	H
		131.85	28.89	-14.61	43.5	44.93	17.49	1.21	34.74	-	-	P	V
		304.51	32.55	-13.45	46	46.11	19.23	1.81	34.6	-	-	P	V
	*	903.3	118.55	-	-	120.99	28.7	3.16	34.3	-	-	P	V
914.5MHz		131.85	29.58	-13.92	43.5	45.62	17.49	1.21	34.74	-	-	P	H
		304.51	33.88	-12.12	46	47.44	19.23	1.81	34.6	-	-	P	H
	*	914.5	115.53	-	-	117.69	28.96	3.18	34.3	-	-	P	H
		150.28	28.06	-15.44	43.5	42.5	18.98	1.28	34.7	-	-	P	V
		304.51	30.96	-15.04	46	44.52	19.23	1.81	34.6	-	-	P	V
	*	914.5	118.36	-	-	120.52	28.96	3.18	34.3	-	-	P	V
926.5MHz		131.85	29.62	-13.88	43.5	45.66	17.49	1.21	34.74	-	-	P	H
		291.9	33.8	-12.2	46	47.77	18.88	1.77	34.62	-	-	P	H
	*	926.5	112.44	-	-	114.3	29.23	3.21	34.3	-	-	P	H
		150.28	28.85	-14.65	43.5	43.29	18.98	1.28	34.7	-	-	P	V
		304.51	31.46	-14.54	46	45.02	19.23	1.81	34.6	-	-	P	V
	*	926.5	114.98	-	-	116.84	29.23	3.21	34.3	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 30dB.												

LoRa DTS SF= 11 (Band Edge @ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
903.3MHz		862.26	43.47	-51.78	95.25	45.9	28.76	3.11	34.3	-	-	P	H
	*	903.3	115.25	----	----	117.69	28.7	3.16	34.3	-	-	P	H
		942.77	43.34	-51.91	95.25	44.8	29.6	3.24	34.3	-	-	P	H
		862.26	49.22	-49.33	98.55	51.65	28.76	3.11	34.3	-	-	P	V
	*	903.3	118.55	----	----	120.99	28.7	3.16	34.3	-	-	P	V
		942.77	49.38	-49.17	98.55	50.84	29.6	3.24	34.3	-	-	P	V
914.5MHz		873.9	46.33	-49.2	95.53	48.79	28.72	3.12	34.3	-	-	P	H
	*	914.5	115.53	----	----	117.69	28.96	3.18	34.3	-	-	P	H
		954.41	47.69	-47.84	95.53	48.92	29.79	3.27	34.29	-	-	P	H
		874.87	51.32	-47.04	98.36	53.78	28.72	3.12	34.3	-	-	P	V
	*	914.5	118.36	----	----	120.52	28.96	3.18	34.3	-	-	P	V
		954.41	50.87	-47.49	98.36	52.1	29.79	3.27	34.29	-	-	P	V
926.5MHz		886.51	43.81	-48.63	92.44	46.29	28.68	3.14	34.3	-	-	P	H
	*	926.5	112.44	----	----	114.3	29.23	3.21	34.3	-	-	P	H
		967.02	42.23	-50.21	92.44	43.34	29.86	3.29	34.26	-	-	P	H
		887.48	47.23	-47.75	94.98	49.72	28.67	3.14	34.3	-	-	P	V
	*	926.5	114.98	----	----	116.84	29.23	3.21	34.3	-	-	P	V
		967.02	45.87	-49.11	94.98	46.98	29.86	3.29	34.26	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

LoRa DTS SF= 11 (Harmonic @ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
903.3MHz		1806.6	36.45	-58.8	95.25	60.8	29.4	4.21	57.96	-	-	P	H
		2709.9	39.21	-34.79	74	59.91	31.6	5.2	57.5	-	-	P	H
		3613.2	41.19	-32.81	74	59.28	32.77	6.19	57.05	-	-	P	H
		1806.6	36.36	-62.19	98.55	60.71	29.4	4.21	57.96	-	-	P	V
		2709.9	38.36	-35.64	74	59.06	31.6	5.2	57.5	-	-	P	V
		3613.2	41.24	-32.76	74	59.33	32.77	6.19	57.05	-	-	P	V
914.5MHz		1829	37.2	-58.33	95.53	61.36	29.6	4.21	57.97	-	-	P	H
		2743.5	40.35	-33.65	74	60.99	31.6	5.24	57.48	-	-	P	H
		3658	41.04	-32.96	74	59.08	32.82	6.18	57.04	-	-	P	H
		1829	37.01	-61.35	98.36	61.17	29.6	4.21	57.97	-	-	P	V
		2743.5	38.84	-35.16	74	59.48	31.6	5.24	57.48	-	-	P	V
		3658	41.17	-32.83	74	59.21	32.82	6.18	57.04	-	-	P	V
926.5MHz		1853	35.99	-56.45	92.44	60.01	29.7	4.25	57.97	-	-	P	H
		2779.5	39.85	-34.15	74	60.35	31.67	5.28	57.45	-	-	P	H
		3706	41.07	-32.93	74	59.03	32.89	6.17	57.02	-	-	P	H
		1853	36.01	-58.97	94.98	60.03	29.7	4.25	57.97	-	-	P	V
		2779.5	38.85	-35.15	74	59.35	31.67	5.28	57.45	-	-	P	V
		3706	40.71	-33.29	74	58.67	32.89	6.17	57.02	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

FSK 50kbps (LF 30Mhz-1Ghz@ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.2MHz		131.85	29.7	-13.8	43.5	45.74	17.49	1.21	34.74	-	-	P	H
		304.51	32.78	-13.22	46	46.34	19.23	1.81	34.6	-	-	P	H
		902.2	113.22	-	-	115.7	28.67	3.15	34.3	-	-	P	H
		131.85	28.97	-14.53	43.5	45.01	17.49	1.21	34.74	-	-	P	V
		304.51	30.83	-15.17	46	44.39	19.23	1.81	34.6	-	-	P	V
		902.2	117.28	-	-	119.76	28.67	3.15	34.3	-	-	P	V
915MHz		144.46	28.91	-14.59	43.5	43.85	18.51	1.26	34.71	-	-	P	H
		286.08	32.58	-13.42	46	46.76	18.69	1.76	34.63	-	-	P	H
		915	117.59	-	-	119.75	28.96	3.18	34.3	-	-	P	H
		150.28	27.03	-16.47	43.5	41.47	18.98	1.28	34.7	-	-	P	V
		304.51	30.25	-15.75	46	43.81	19.23	1.81	34.6	-	-	P	V
		915	117.81	-	-	119.97	28.96	3.18	34.3	-	-	P	V
927.8MHz		137.67	23.71	-19.79	43.5	39.25	17.96	1.23	34.73	-	-	P	H
		283.17	24.73	-21.27	46	39.02	18.6	1.75	34.64	-	-	P	H
		927.8	117.48	-	-	119.3	29.27	3.21	34.3	-	-	P	H
		137.67	28.84	-14.66	43.5	44.38	17.96	1.23	34.73	-	-	P	V
		281.23	24.72	-21.28	46	39.08	18.54	1.74	34.64	-	-	P	V
		927.8	110.89	-	-	112.71	29.27	3.21	34.3	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

FSK 50kbps (Band Edge @ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.2MHz		862.26	46.85	-46.37	93.22	49.28	28.76	3.11	34.3	-	-	P	H
	*	902.2	113.22	----	----	115.7	28.67	3.15	34.3	-	-	P	H
		942.77	48.36	-44.86	93.22	49.82	29.6	3.24	34.3	-	-	P	H
		862.26	52.13	-45.15	97.28	54.56	28.76	3.11	34.3	-	-	P	V
	*	902.2	117.28	----	----	119.76	28.67	3.15	34.3	-	-	P	V
		942.77	49.92	-47.36	97.28	51.38	29.6	3.24	34.3	-	-	P	V
915MHz		874.87	49.47	-48.12	97.59	51.93	28.72	3.12	34.3	-	-	P	H
	*	915	117.59	----	----	119.75	28.96	3.18	34.3	-	-	P	H
		954.41	49.22	-48.37	97.59	50.45	29.79	3.27	34.29	-	-	P	H
		874.87	49.17	-48.64	97.81	51.63	28.72	3.12	34.3	-	-	P	V
	*	915	117.81	----	----	119.97	28.96	3.18	34.3	-	-	P	V
		954.41	50.27	-47.54	97.81	51.5	29.79	3.27	34.29	-	-	P	V
927.8MHz		886.51	42.33	-48.4	90.73	44.81	28.68	3.14	34.3	-	-	P	H
	*	927.8	110.73	----	----	112.55	29.27	3.21	34.3	-	-	P	H
		967.02	42.55	-48.18	90.73	43.66	29.86	3.29	34.26	-	-	P	H
		887.48	47.06	-48.07	95.13	49.55	28.67	3.14	34.3	-	-	P	V
	*	927.8	115.13	----	----	116.95	29.27	3.21	34.3	-	-	P	V
		967.02	45.15	-49.98	95.13	46.26	29.86	3.29	34.26	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

FSK 50kbps (Harmonic @ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
902.2MHz		1804.4	36.68	-56.54	93.22	61.03	29.4	4.21	57.96	-	-	P	H
		2706.6	39.03	-34.97	74	59.74	31.6	5.2	57.51	-	-	P	H
		3608.8	40.52	-33.48	74	58.65	32.74	6.19	57.06	-	-	P	H
		1804.4	36.18	-61.1	97.28	60.53	29.4	4.21	57.96	-	-	P	V
		2706.6	40.19	-33.81	74	60.9	31.6	5.2	57.51	-	-	P	V
		3608.8	41.27	-32.73	74	59.4	32.74	6.19	57.06	-	-	P	V
915MHz		1830	38.65	-58.94	97.59	62.81	29.6	4.21	57.97	-	-	P	H
		2745	40.39	-33.61	74	61.03	31.6	5.24	57.48	-	-	P	H
		3660	41.69	-32.31	74	59.73	32.82	6.18	57.04	-	-	P	H
		1830	36.56	-61.25	97.81	60.72	29.6	4.21	57.97	-	-	P	V
		2745	39.84	-34.16	74	60.48	31.6	5.24	57.48	-	-	P	V
		3660	41.15	-32.85	74	59.19	32.82	6.18	57.04	-	-	P	V
927.8MHz		1855.6	36.59	-54.14	90.73	60.61	29.7	4.25	57.97	-	-	P	H
		2783.4	40.36	-33.64	74	60.86	31.67	5.28	57.45	-	-	P	H
		3711.2	40.72	-33.28	74	58.69	32.89	6.16	57.02	-	-	P	H
		1855.6	36.3	-61.51	97.81	60.32	29.7	4.25	57.97	-	-	P	V
		2783.4	38.94	-35.06	74	59.44	31.67	5.28	57.45	-	-	P	V
		3711.2	41.23	-32.77	74	59.2	32.89	6.16	57.02	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

OFDM-LR (LF 30Mhz-1Ghz@ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
903.3MHz		144.46	28.39	-15.11	43.5	43.33	18.51	1.26	34.71	-	-	P	H
		291.9	32	-14	46	45.97	18.88	1.77	34.62	-	-	P	H
		903.3	113.63	-	-	116.07	28.7	3.16	34.3	-	-	P	H
		131.85	28.85	-14.65	43.5	44.89	17.49	1.21	34.74	-	-	P	V
		304.51	31.15	-14.85	46	44.71	19.23	1.81	34.6	-	-	P	V
		903.3	118.14	-	-	120.58	28.7	3.16	34.3	-	-	P	V
914.5MHz		131.85	28.58	-14.92	43.5	44.62	17.49	1.21	34.74	-	-	P	H
		286.08	32.42	-13.58	46	46.6	18.69	1.76	34.63	-	-	P	H
		914.5	114.51	-	-	116.67	28.96	3.18	34.3	-	-	P	H
		144.46	27.77	-15.73	43.5	42.71	18.51	1.26	34.71	-	-	P	V
		291.9	29.66	-16.34	46	43.63	18.88	1.77	34.62	-	-	P	V
		914.5	118.01	-	-	120.17	28.96	3.18	34.3	-	-	P	V
926.5MHz		126.03	28.97	-14.53	43.5	45.52	17.02	1.18	34.75	-	-	P	H
		291.9	32.65	-13.35	46	46.62	18.88	1.77	34.62	-	-	P	H
		926.5	113.96	-	-	115.82	29.23	3.21	34.3	-	-	P	H
		131.85	30.07	-13.43	43.5	46.11	17.49	1.21	34.74	-	-	P	V
		304.51	32.35	-13.65	46	45.91	19.23	1.81	34.6	-	-	P	V
		926.5	114.65	-	-	116.51	29.23	3.21	34.3	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

OFDM-LR (Band Edge @ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
903.3MHz		863.23	44.26	-49.37	93.63	46.7	28.75	3.11	34.3	-	-	P	H
	*	903.3	113.63	----	----	116.07	28.7	3.16	34.3	-	-	P	H
		942.77	46.14	-47.49	93.63	47.6	29.6	3.24	34.3	-	-	P	H
		863.23	52.07	-46.07	98.14	54.51	28.75	3.11	34.3	-	-	P	V
	*	903.3	118.14	----	----	120.58	28.7	3.16	34.3	-	-	P	V
		942.77	50.53	-47.61	98.14	51.99	29.6	3.24	34.3	-	-	P	V
914.5MHz		874.87	45.01	-49.5	94.51	47.47	28.72	3.12	34.3	-	-	P	H
	*	914.5	114.51	----	----	116.67	28.96	3.18	34.3	-	-	P	H
		954.41	46.82	-47.69	94.51	48.05	29.79	3.27	34.29	-	-	P	H
		874.87	50.9	-47.11	98.01	53.36	28.72	3.12	34.3	-	-	P	V
	*	914.5	118.01	----	----	120.17	28.96	3.18	34.3	-	-	P	V
		954.41	50.5	-47.51	98.01	51.73	29.79	3.27	34.29	-	-	P	V
926.5MHz		886.51	44.52	-49.44	93.96	47	28.68	3.14	34.3	-	-	P	H
	*	926.5	113.96	----	----	115.82	29.23	3.21	34.3	-	-	P	H
		967.02	44.23	-49.73	93.96	45.34	29.86	3.29	34.26	-	-	P	H
		886.51	46.6	-48.05	94.65	49.08	28.68	3.14	34.3	-	-	P	V
	*	926.5	114.65	----	----	116.51	29.23	3.21	34.3	-	-	P	V
		967.02	43.86	-50.79	94.65	44.97	29.86	3.29	34.26	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

OFDM-LR (Harmonic @ 3m)

	Note	Frequency	Level	Margin	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
903.3MHz		1806.6	36.57	-57.06	93.63	60.92	29.4	4.21	57.96	-	-	P	H
		2709.9	39.4	-34.6	74	60.1	31.6	5.2	57.5	-	-	P	H
		3613.2	40.64	-33.36	74	58.73	32.77	6.19	57.05	-	-	P	H
		1806.6	35.84	-62.3	98.14	60.19	29.4	4.21	57.96	-	-	P	V
		2709.9	39.43	-34.57	74	60.13	31.6	5.2	57.5	-	-	P	V
		3613.2	42.75	-31.25	74	60.84	32.77	6.19	57.05	-	-	P	V
914.5MHz		1829	36.54	-57.97	94.51	60.7	29.6	4.21	57.97	-	-	P	H
		2743.5	39	-35	74	59.64	31.6	5.24	57.48	-	-	P	H
		3658	40.74	-33.26	74	58.78	32.82	6.18	57.04	-	-	P	H
		1829	36.29	-61.72	98.01	60.45	29.6	4.21	57.97	-	-	P	V
		2743.5	39.41	-34.59	74	60.05	31.6	5.24	57.48	-	-	P	V
		3658	41.03	-32.97	74	59.07	32.82	6.18	57.04	-	-	P	V
926.5MHz		1853	36.26	-57.7	93.96	60.28	29.7	4.25	57.97	-	-	P	H
		2779.5	39.33	-34.67	74	59.83	31.67	5.28	57.45	-	-	P	H
		3706	41.15	-32.85	74	59.11	32.89	6.17	57.02	-	-	P	H
		1853	35.68	-58.97	94.65	59.7	29.7	4.25	57.97	-	-	P	V
		2779.5	39.93	-34.07	74	60.43	31.67	5.28	57.45	-	-	P	V
		3706	40.64	-33.36	74	58.6	32.89	6.17	57.02	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line. 3. Non-restricted band limit is 100kHz-PSD down 20dB.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
902.2MHz		136.7	23.47	-20.03	43.5	39.09	17.88	1.23	34.73	-	-	P	H
		259.89	23.87	-22.13	46	39.01	17.87	1.67	34.68	-	-	P	H
	*	902.2	118.37	-	-	120.85	28.67	3.15	34.3	-	-	P	H

1. Level(dBμV/m) = Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 136.7MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 17.88(dB/m) + 1.23(dB) + 39.09(dBμV) – 34.73 (dB)

= 23.47 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 23.47(dBμV/m) – 43.5(dBμV/m)

= -20.03(dB)

Non-Restricted band：

	Note	Frequency (MHz)	Level (dBμV/m)	Margin (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
902.2MHz		862.26	50.22	-48.15	98.37	51.37	28.76	4.39	34.3	-	-	P	H
	*	902.2	118.37	----	----	119.58	28.67	4.42	34.3	-	-	P	H

1. Limit Line(dBμV/m) = Fundamental Level(dBμV/m) – 20(dBc)

For Peak Limit @ 862.26MHz:

1. Limit Line(dBμV/m)

= Fundamental Level(dBμV/m) – 20(dBc)

= 118.37(dBμV/m) – 20(dBc)

= 98.37 (dBμV/m)

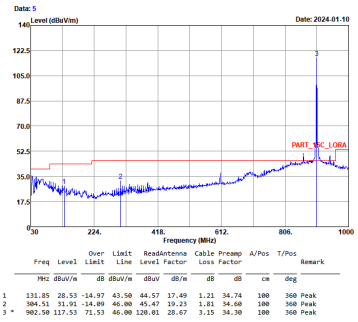
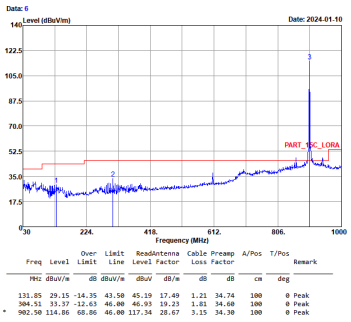
The peak measured complies with the limit line, so test result is “PASS”.

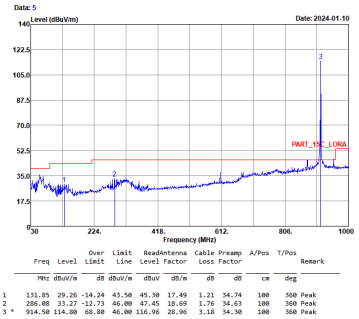
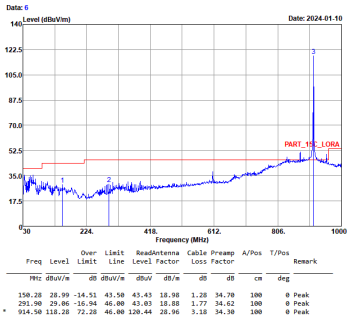
Test plots:

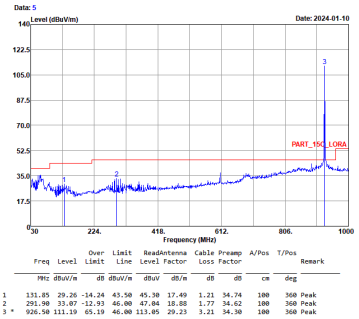
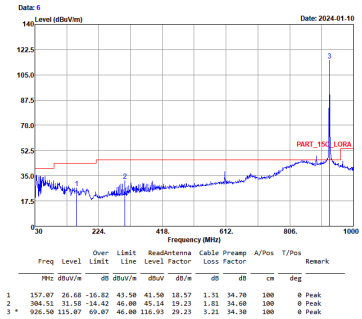
Note symbol

-L	**Low channel location**
-R	**High channel location**

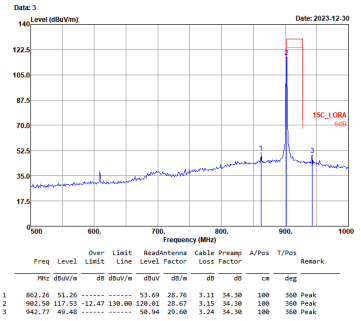
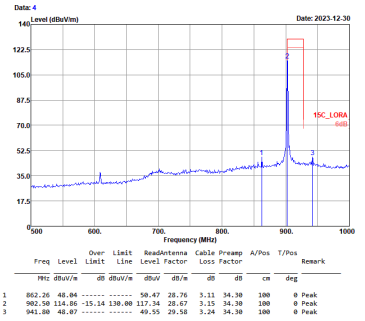
LoRa 500KHz DTS SF=7 (LF 30Mhz-1Ghz@ 3m)

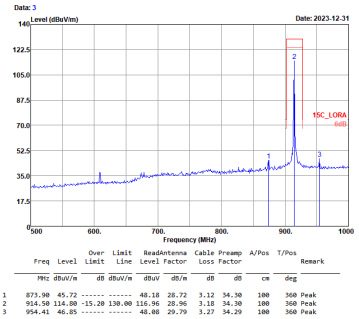
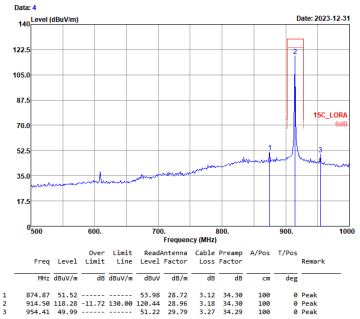
LoRa	**902.5~926.5 LF 30Mhz-1Ghz@ 3m**	
ANT	**LoRa 500KHz DTS SF=7 CH01 902.5**	
	Horizontal	**Vertical**
Peak		

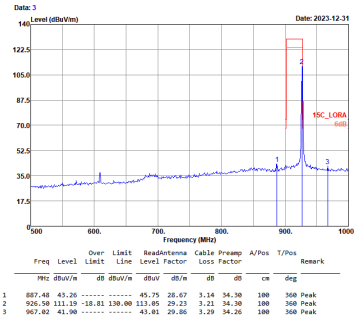
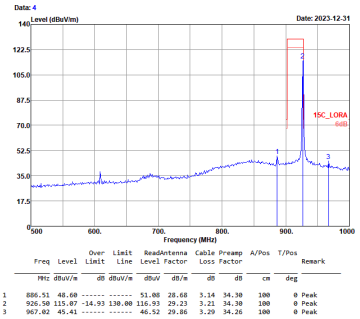
LoRa	902.5~926.5 LF 30Mhz-1Ghz@ 3m	
ANT	LoRa 500KHz DTS SF=7 CH16 914.5	
	Horizontal	Vertical
Peak		

LoRa	902.5~926.5 LF 30Mhz-1Ghz@ 3m	
ANT	LoRa 500KHz DTS SF=7 CH31 926.5	
	Horizontal	Vertical
Peak	 Freq Level Over Limit Limit Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 131.85 29.26 -14.24 43.50 45.30 17.49 1.21 34.74 100 360 Peak 2 291.90 33.07 -12.93 46.00 47.04 18.88 1.77 34.62 100 360 Peak 3 * 926.50 111.19 65.19 46.00 113.05 29.23 3.21 34.30 100 360 Peak	 Freq Level Over Limit Limit Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 157.07 26.68 -16.82 43.50 41.50 18.57 1.31 34.70 100 0 Peak 2 304.51 31.58 -14.42 46.00 45.14 19.23 1.81 34.60 100 0 Peak 3 * 926.50 115.07 69.07 46.00 116.93 29.23 3.21 34.30 100 0 Peak

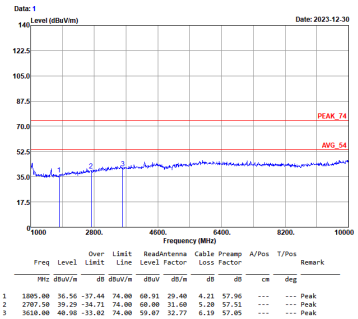
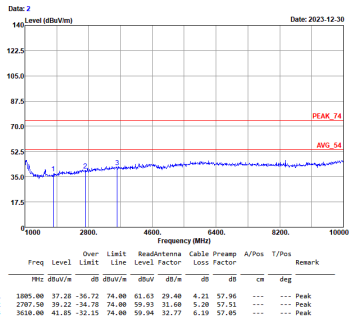
LoRa 500KHz DTS SF=7 (Band Edge @ 3m)

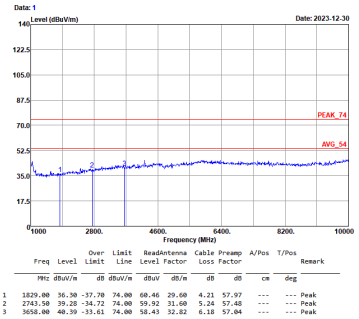
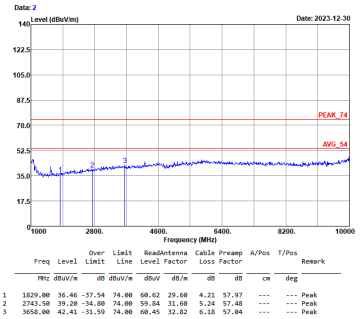
LoRa	902.5~926.5 Band Edge @ 3m	
ANT	LoRa 500KHz DTS SF=7 CH01 902.5	
	Horizontal	Vertical
Peak		

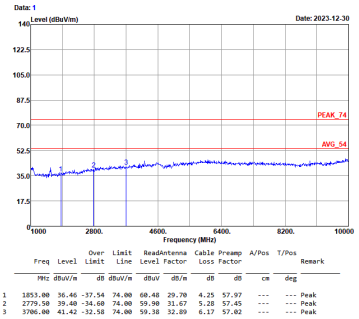
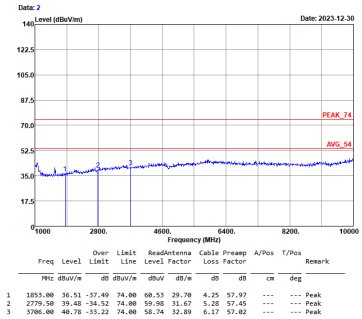
LoRa	902.5~926.5 Band Edge @ 3m	
ANT	LoRa 500KHz DTS SF=7 CH16 914.5	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 873.90 45.72 ------ ------ 48.18 28.72 3.12 34.30 100 360 Peak 2 914.50 114.80 -15.20 130.00 116.96 28.96 3.18 34.30 100 360 Peak 3 954.41 46.85 ------ ------ 48.88 29.79 3.27 34.29 100 360 Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 874.87 51.52 ------ ------ 55.98 28.72 3.12 34.30 100 0 Peak 2 914.50 118.28 -11.72 130.00 120.44 28.96 3.18 34.30 100 0 Peak 3 954.41 49.99 ------ ------ 51.22 29.79 3.27 34.29 100 0 Peak

LoRa	902.5~926.5 Band Edge @ 3m	
ANT	LoRa 500KHz DTS SF=7 CH31 926.5	
	Horizontal	Vertical
Peak		

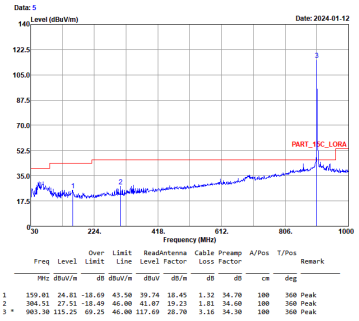
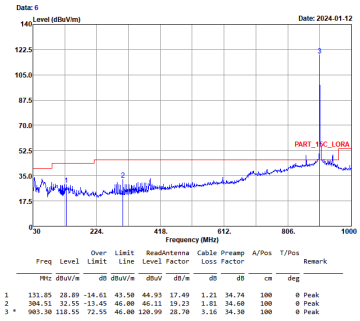
LoRa 500KHz DTS SF=7 (Harmonic @ 3m)

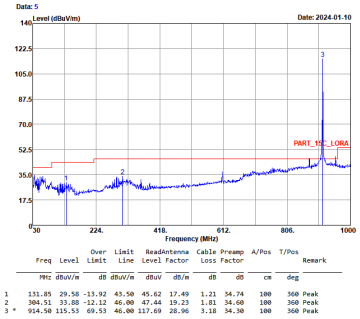
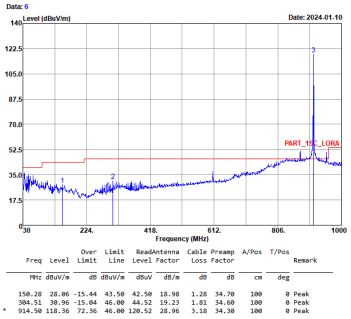
LoRa	902.5~926.5 Harmonic @ 3m	
ANT	LoRa 500KHz DTS SF=7 CH01 902.5	
	Horizontal	Vertical
Peak		

LoRa	902.5~926.5 Harmonic @ 3m	
ANT	LoRa 500KHz DTS SF=7 CH16 914.5	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1829.00 36.50 -37.70 74.00 60.46 29.60 4.21 57.97 --- --- Peak 2 2743.50 39.28 -34.72 74.00 59.92 31.60 5.24 57.48 --- --- Peak 3 3658.00 40.39 -33.61 74.00 58.43 32.82 6.18 57.04 --- --- Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1829.00 36.46 -37.54 74.00 60.62 29.60 4.21 57.97 --- --- Peak 2 2743.50 39.20 -34.80 74.00 59.84 31.60 5.24 57.48 --- --- Peak 3 3658.00 42.41 -31.59 74.00 60.45 32.82 6.18 57.04 --- --- Peak

LoRa	902.5~926.5 Harmonic @ 3m	
ANT	LoRa 500KHz DTS SF=7 CH31 926.5	
	Horizontal	Vertical
Peak	 Freq Level Over Limit Limit Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1853.00 36.46 -37.54 74.00 60.48 29.70 4.25 57.97 --- --- Peak 2 2779.50 39.40 -34.60 74.00 59.90 31.67 5.28 57.45 --- --- Peak 3 3706.00 41.42 -32.58 74.00 59.38 32.89 6.17 57.02 --- --- Peak	 Freq Level Over Limit Limit Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1853.00 36.51 -37.49 74.00 60.53 29.70 4.25 57.97 --- --- Peak 2 2779.50 39.48 -34.52 74.00 59.98 31.67 5.28 57.45 --- --- Peak 3 3706.00 40.78 -33.22 74.00 58.74 32.89 6.17 57.02 --- --- Peak

LoRa 500KHz DTS SF=11 (LF 30Mhz-1Ghz@ 3m)

LoRa	903.3~926.5 LF 30Mhz-1Ghz@ 3m	
ANT	LoRa 500KHz DTS SF=11 CH02 903.3	
	Horizontal	Vertical
Peak		

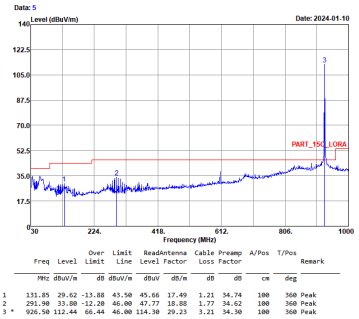
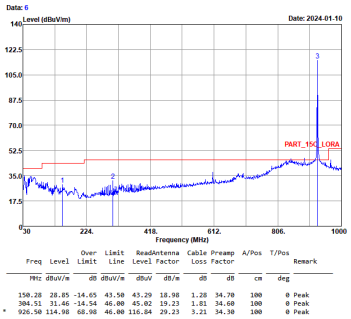
LoRa	903.3~926.5 LF 30Mhz-1Ghz@ 3m	
ANT	LoRa 500KHz DTS SF=11 CH16 914.5	
	Horizontal	Vertical
Peak		

Data: 5

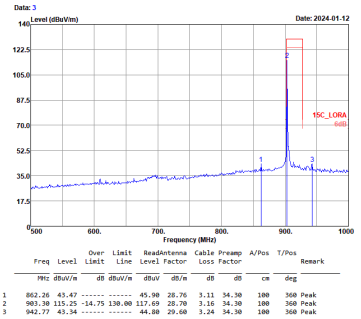
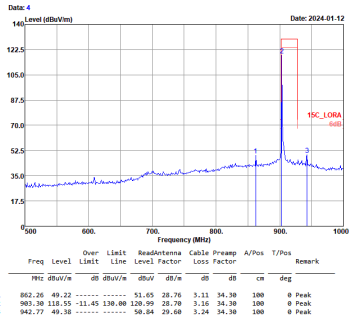
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	131.85	29.58	-13.92	43.50	45.62	17.49	1.21	34.74	100	360	Peak
2	304.51	33.88	-12.12	46.00	47.44	19.23	1.81	34.60	100	360	Peak
3 *	914.50	115.53	69.53	46.00	117.69	28.96	3.18	34.30	100	360	Peak

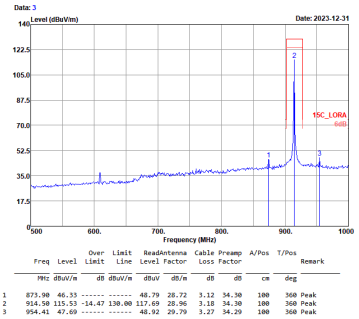
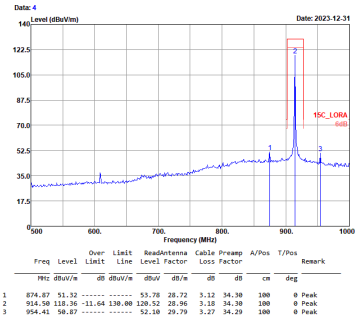
Data: 6

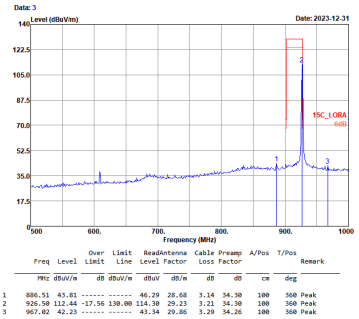
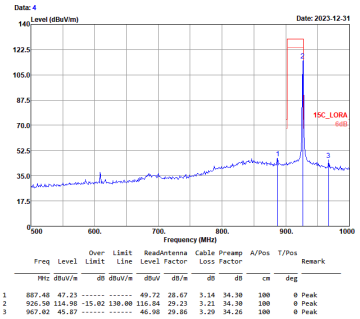
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	150.28	28.06	-15.44	43.50	42.50	18.98	1.28	34.70	100	0	Peak
2	304.51	30.96	-15.04	46.00	44.52	19.23	1.81	34.60	100	0	Peak
3 *	914.50	118.36	72.36	46.00	120.52	28.96	3.18	34.30	100	0	Peak

LoRa	903.3~926.5 LF 30Mhz-1Ghz@ 3m	
ANT	LoRa 500KHz DTS SF=11 CH31 926.5	
	Horizontal	Vertical
Peak		

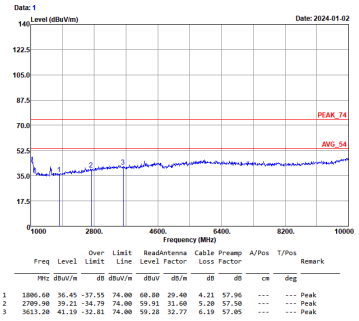
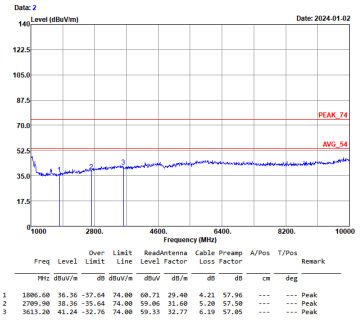
LoRa 500KHz DTS SF=11 (Band Edge @ 3m)

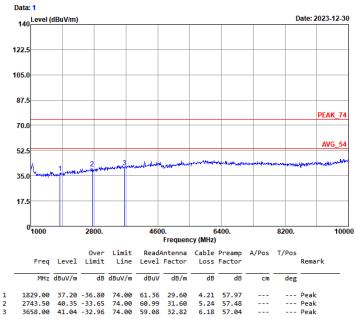
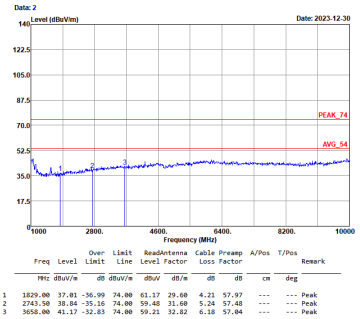
LoRa	903.3~926.5 Band Edge @ 3m	
ANT	LoRa 500KHz DTS SF=11 CH02 903.3	
	Horizontal	Vertical
Peak		

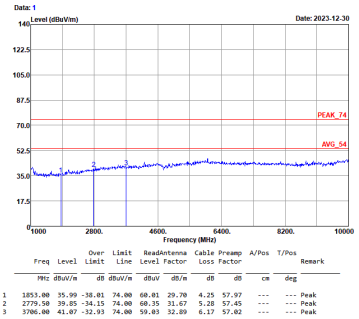
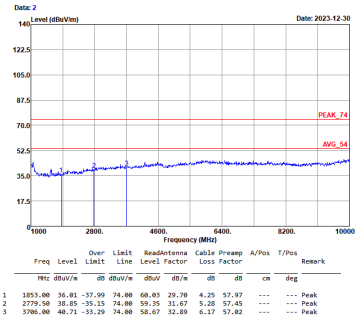
LoRa	903.3~926.5 Band Edge @ 3m	
ANT	LoRa 500KHz DTS SF=11 CH16 914.5	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 873.90 46.53 ------ ------ 40.79 28.72 3.12 34.30 100 360 Peak 2 914.50 115.53 -14.47 130.00 117.69 28.96 3.18 34.30 100 360 Peak 3 954.41 47.69 ------ ------ 48.92 29.79 3.27 34.29 100 360 Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 874.87 51.32 ------ ------ 53.78 28.72 3.12 34.30 100 0 Peak 2 914.50 118.36 -11.64 130.00 120.52 28.96 3.18 34.30 100 0 Peak 3 954.41 50.87 ------ ------ 52.10 29.79 3.27 34.29 100 0 Peak

LoRa	903.3~926.5 Band Edge @ 3m	
ANT	LoRa 500KHz DTS SF=11 CH31 926.5	
	Horizontal	Vertical
Peak	 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 886.51 43.81 ------ ------ 46.29 28.68 3.14 34.30 100 360 Peak 2 926.50 112.44 -17.56 130.00 114.30 29.23 3.21 34.30 100 360 Peak 3 967.02 42.23 ------ ------ 43.34 29.86 3.29 34.26 100 360 Peak	 Freq Level Over Limit Limit Line ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 887.48 47.23 ------ ------ 49.72 28.67 3.14 34.30 100 0 Peak 2 926.50 114.98 -15.02 130.00 116.84 29.23 3.21 34.30 100 0 Peak 3 967.02 45.87 ------ ------ 46.98 29.86 3.29 34.26 100 0 Peak

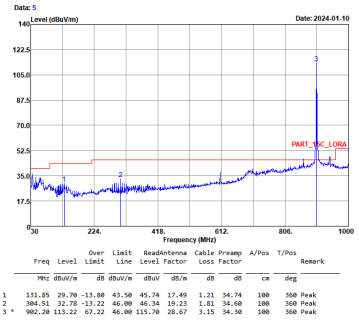
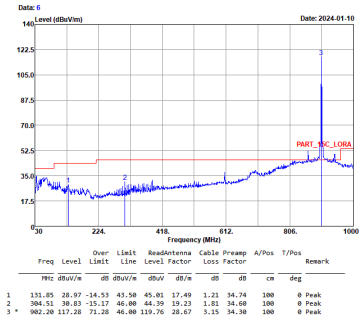
LoRa 500KHz DTS SF=11 (Harmonic @ 3m)

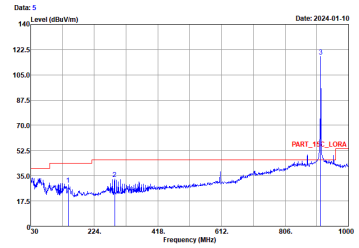
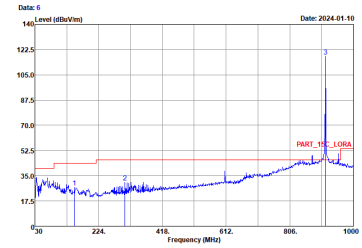
LoRa	903.3~926.5 Band Harmonic @ 3m	
ANT	LoRa 500KHz DTS SF=11 CH01 902.5	
	Horizontal	Vertical
Peak		

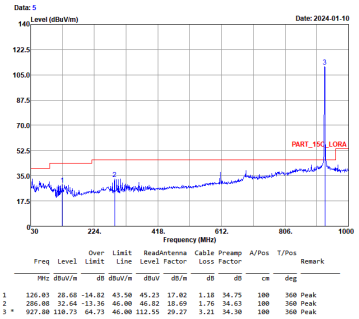
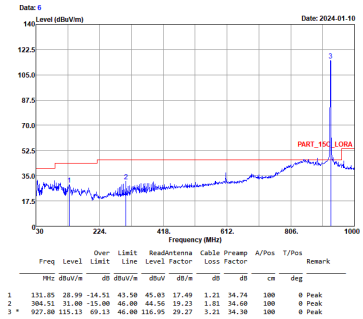
LoRa	903.3~926.5 Harmonic @ 3m	
ANT	LoRa 500KHz DTS SF=11 CH16 914.5	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1829.00 57.20 -36.80 74.00 61.36 29.60 4.21 57.97 --- --- Peak 2 2743.50 40.35 -33.65 74.00 60.99 31.60 5.24 57.48 --- --- Peak 3 3658.00 41.04 -32.96 74.00 59.88 32.82 6.18 57.84 --- --- Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1829.00 37.01 -36.99 74.00 61.17 29.60 4.21 57.97 --- --- Peak 2 2743.50 38.04 -35.16 74.00 59.48 31.60 5.24 57.48 --- --- Peak 3 3658.00 41.17 -32.83 74.00 59.21 32.82 6.18 57.84 --- --- Peak

LoRa	903.3~926.5 Harmonic @ 3m	
ANT	LoRa 500KHz DTS SF=11 CH31 926.5	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1853.00 35.99 -38.01 74.00 60.01 29.70 4.25 57.97 --- --- Peak 2 2779.50 39.85 -34.15 74.00 60.35 31.67 5.28 57.45 --- --- Peak 3 3706.00 41.07 -32.93 74.00 59.03 32.89 6.17 57.02 --- --- Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1853.00 36.01 -37.99 74.00 60.03 29.70 4.25 57.97 --- --- Peak 2 2779.50 38.85 -35.15 74.00 59.35 31.67 5.28 57.45 --- --- Peak 3 3706.00 40.71 -33.29 74.00 58.67 32.89 6.17 57.02 --- --- Peak

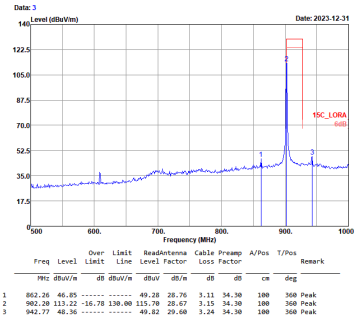
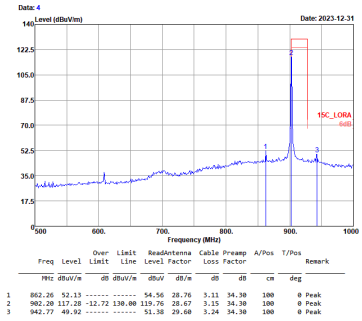
FSK 50Kbps FHSS 50Kbps (LF 30Mhz-1Ghz@ 3m)

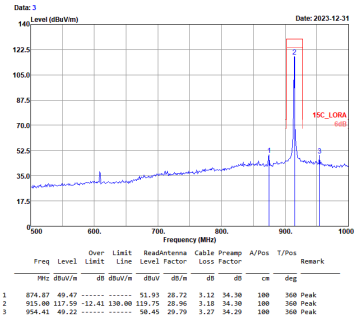
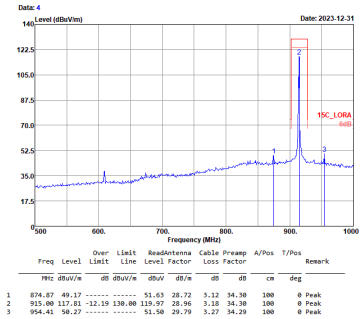
LoRa	902.2~927.8 LF 30Mhz-1Ghz@ 3m	
ANT	FSK 50Kbps FHSS 50Kbps CH01 902.2	
	Horizontal	Vertical
Peak		

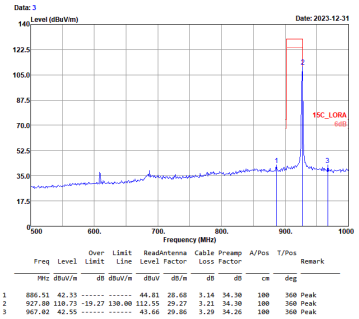
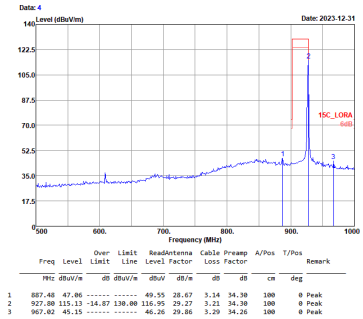
LoRa	902.2~927.8 LF 30Mhz-1Ghz@ 3m	
ANT	FSK 50Kbps FHSS 50Kbps CH65 915	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 144.46 28.91 -14.59 43.50 43.85 18.51 1.26 34.71 100 360 Peak 2 286.08 32.58 -13.42 46.00 46.76 18.69 1.76 34.63 100 360 Peak 3 * 915.00 117.59 71.59 46.00 119.75 28.96 3.18 34.30 100 360 Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 150.28 27.03 -16.47 43.50 41.47 18.98 1.28 34.70 100 0 Peak 2 304.51 30.25 -15.75 46.00 43.81 19.23 1.81 34.60 100 0 Peak 3 * 915.00 117.81 71.81 46.00 119.97 28.96 3.18 34.30 100 0 Peak

LoRa	902.2~927.8 LF 30Mhz-1Ghz@ 3m	
ANT	FSK 50Kbps FHSS 50Kbps CH129 927.8	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 126.03 28.68 -14.82 43.50 45.23 17.02 1.18 34.75 100 360 Peak 2 286.08 32.64 -13.36 46.00 46.82 18.69 1.76 34.63 100 360 Peak 3 * 927.80 110.73 64.73 46.00 112.55 29.27 3.21 34.30 100 360 Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 131.85 28.99 -14.51 43.50 45.03 17.49 1.21 34.74 100 0 Peak 2 304.51 31.00 -15.00 46.00 44.56 19.23 1.81 34.60 100 0 Peak 3 * 927.80 115.13 69.13 46.00 116.95 29.27 3.21 34.30 100 0 Peak

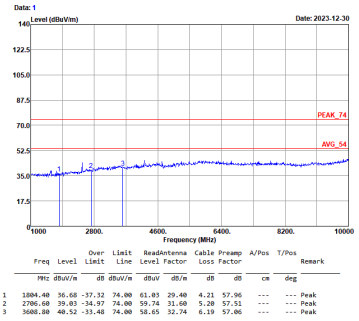
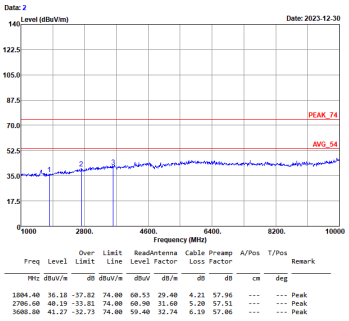
FSK 50Kbps FHSS 50Kbps (Band Edge @ 3m)

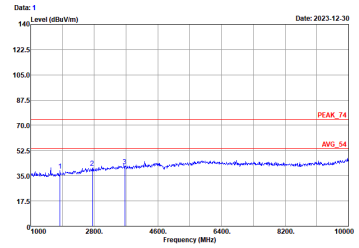
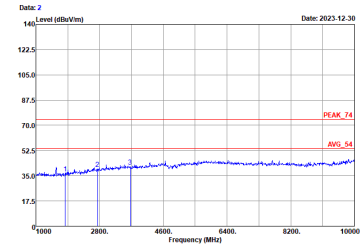
LoRa	902.2~927.8 Band Edge @ 3m	
ANT	FSK 50Kbps FHSS 50Kbps CH01 902.2	
	Horizontal	Vertical
Peak		

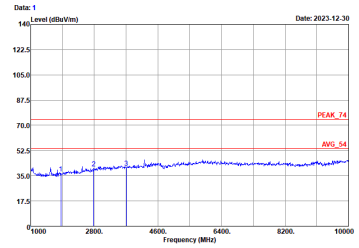
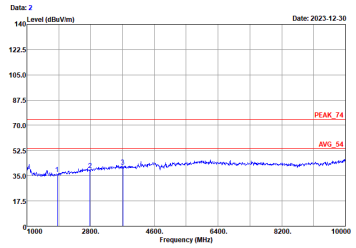
LoRa	902.2~927.8 Band Edge @ 3m	
ANT	FSK 50Kbps FHSS 50Kbps CH65 915	
	Horizontal	Vertical
Peak		

LoRa	902.2~927.8 Band Edge @ 3m	
ANT	FSK 50Kbps FHSS 50Kbps CH129 927.8	
	Horizontal	Vertical
Peak	 Freq / Level / Over Limit / Limit Line / ReadAntenna Level / Cable Factor / Preamp Loss / A/Pos / T/Pos / Remark MHz / dBuV/m / dB / dBuV/m / dBuV / dB/m / dB / dB / cm / deg 1 886.51 42.33 ----- ------ 44.81 28.68 3.14 34.30 100 360 Peak 2 927.80 110.73 -19.27 130.00 112.55 29.27 3.21 34.30 100 360 Peak 3 967.02 42.55 ----- ------ 43.66 29.86 3.29 34.26 100 360 Peak	 Freq / Level / Over Limit / Limit Line / ReadAntenna Level / Cable Factor / Preamp Loss / A/Pos / T/Pos / Remark MHz / dBuV/m / dB / dBuV/m / dBuV / dB/m / dB / dB / cm / deg 1 887.48 47.06 ----- ------ 49.55 28.67 3.14 34.30 100 0 Peak 2 927.80 115.13 -14.87 130.00 116.95 29.27 3.21 34.30 100 0 Peak 3 967.02 45.15 ----- ------ 46.26 29.86 3.29 34.26 100 0 Peak

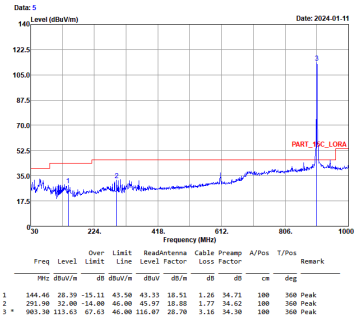
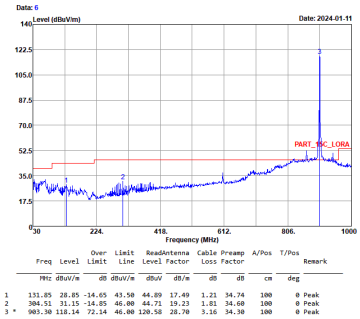
FSK 50Kbps FHSS 50Kbps (Harmonic @ 3m)

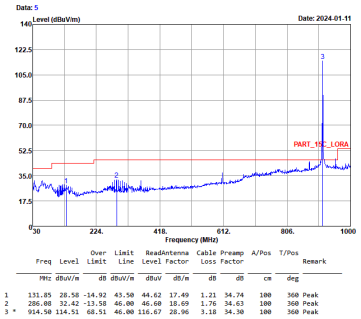
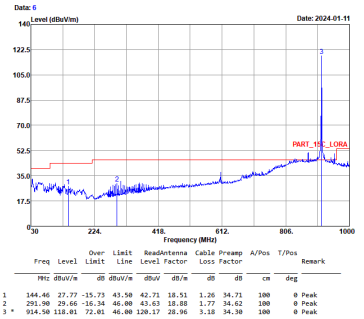
LoRa	902.2~927.8 Harmonic @ 3m	
ANT	FSK 50Kbps FHSS 50Kbps CH01 902.2	
	Horizontal	Vertical
Peak		

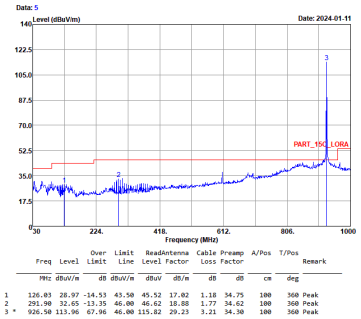
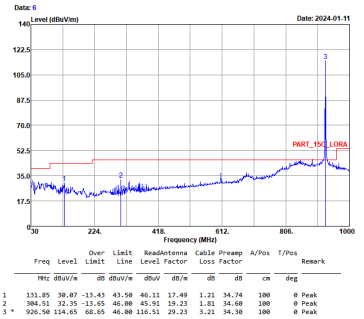
LoRa	902.2~927.8 Harmonic @ 3m	
ANT	FSK 50Kbps FHSS 50Kbps CH65 915	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1830.00 38.65 -35.35 74.00 62.81 29.60 4.21 57.97 --- --- Peak 2 2745.00 40.39 -33.61 74.00 61.03 31.60 5.24 57.48 --- --- Peak 3 3660.00 41.69 -32.31 74.00 59.73 32.82 6.18 57.04 --- --- Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1830.00 36.56 -37.44 74.00 60.72 29.60 4.21 57.97 --- --- Peak 2 2745.00 39.84 -34.16 74.00 60.48 31.60 5.24 57.48 --- --- Peak 3 3660.00 41.15 -32.85 74.00 59.19 32.82 6.18 57.04 --- --- Peak

LoRa	902.2~927.8 Harmonic @ 3m	
ANT	FSK 50Kbps FHSS 50Kbps CH129 927.8	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1855.60 36.59 -37.41 74.00 60.61 29.70 4.25 57.97 --- --- Peak 2 2783.40 40.36 -33.64 74.00 60.86 31.67 5.28 57.45 --- --- Peak 3 3711.20 40.72 -33.28 74.00 58.69 32.89 6.16 57.02 --- --- Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1855.60 36.30 -37.70 74.00 60.32 29.70 4.25 57.97 --- --- Peak 2 2783.40 38.94 -35.06 74.00 59.44 31.67 5.28 57.45 --- --- Peak 3 3711.20 41.23 -32.77 74.00 59.20 32.89 6.16 57.02 --- --- Peak

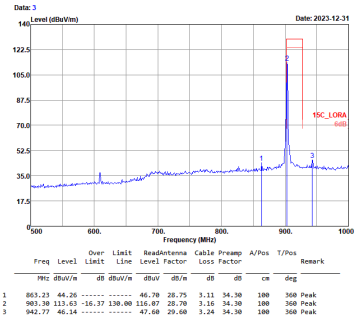
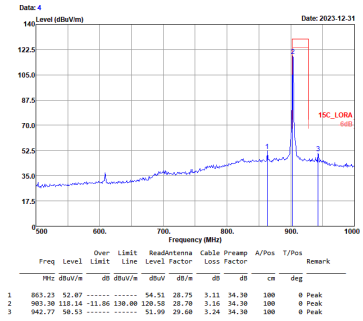
OFDM-LR 1.4Kbps (LF 30Mhz-1Ghz@ 3m)

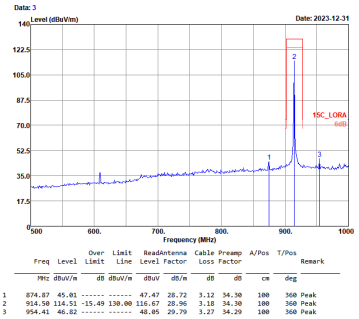
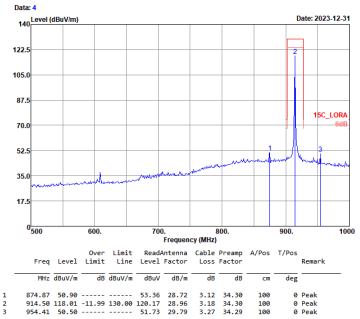
LoRa	902.5~926.5 LF 30Mhz-1Ghz@ 3m	
ANT	OFDM-LR 1.4Kbps CH02 903.3	
	Horizontal	Vertical
Peak		

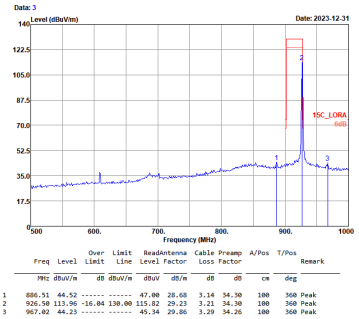
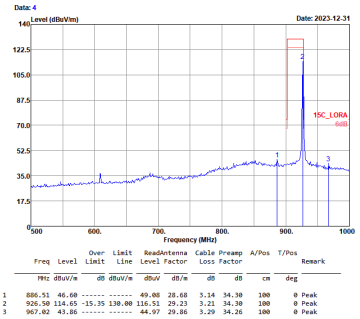
LoRa	902.5~926.5 LF 30Mhz-1Ghz@ 3m	
ANT	OFDM-LR 1.4Kbps CH16 914.5	
	Horizontal	Vertical
Peak	 Freq Level Over Limit Limit Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 131.85 28.58 -14.92 43.50 44.62 17.49 1.21 34.74 100 360 Peak 2 286.08 32.42 -13.58 46.00 46.60 18.69 1.76 34.63 100 360 Peak 3 * 914.50 114.51 68.51 46.00 116.67 28.96 3.18 34.30 100 360 Peak	 Freq Level Over Limit Limit Read Level Antenna Factor Cable Loss Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 144.46 27.77 -15.73 43.50 42.71 18.51 1.26 34.71 100 0 Peak 2 291.90 29.66 -16.34 46.00 43.63 18.88 1.77 34.62 100 0 Peak 3 * 914.50 118.01 72.01 46.00 120.17 28.96 3.18 34.30 100 0 Peak

LoRa	902.5~926.5 LF 30Mhz-1Ghz@ 3m	
ANT	OFDM-LR 1.4Kbps CH31 926.5	
	Horizontal	Vertical
Peak	 Freq Level Over Limit Limit ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 126.03 28.97 -14.53 43.50 45.52 17.02 1.18 34.75 100 360 Peak 2 291.90 32.65 -13.35 46.00 46.62 18.88 1.77 34.62 100 360 Peak 3 * 926.50 113.96 67.96 46.00 115.82 29.23 3.21 34.30 100 360 Peak	 Freq Level Over Limit Limit ReadAntenna Level Factor Cable Loss Factor Preamp Factor A/Pos T/Pos Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 131.85 30.07 -13.43 43.50 46.11 17.49 1.21 34.74 100 0 Peak 2 304.51 32.35 -13.65 46.00 45.91 19.23 1.81 34.60 100 0 Peak 3 * 926.50 114.65 68.65 46.00 116.51 29.23 3.21 34.30 100 0 Peak

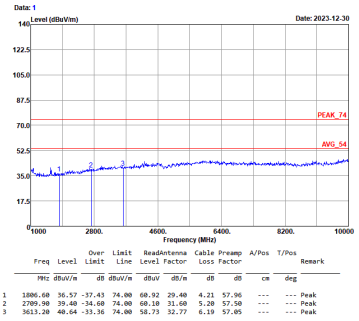
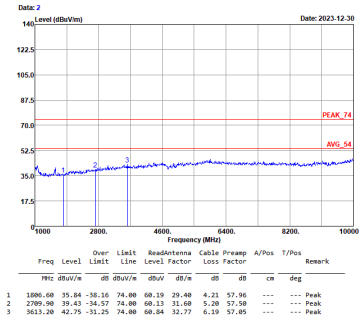
OFDM-LR 1.4Kbps (Band Edge @ 3m)

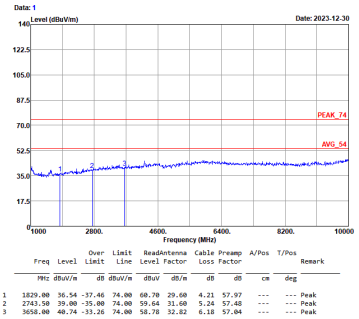
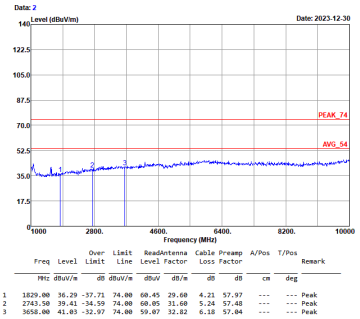
LoRa	902.5~926.5 Band Edge @ 3m	
ANT	OFDM-LR 1.4Kbps CH02 903.3	
	Horizontal	Vertical
Peak		

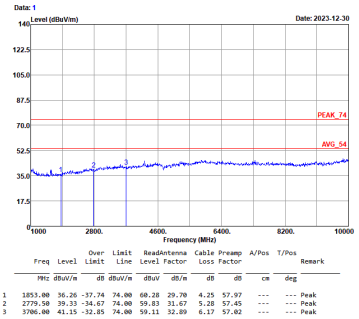
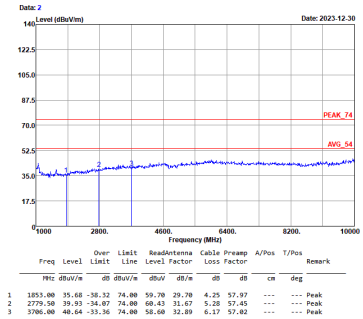
LoRa	902.5~926.5 Band Edge @ 3m	
ANT	OFDM-LR 1.4Kbps CH16 914.5	
	Horizontal	Vertical
Peak	 Freq / Level / Over Limit / Limit Line / ReadAntenna Level / Cable Factor / Preamp Loss / A/Pos / T/Pos / Remark MHz / dBuV/m / dB / dBuV/m / dBuV / dB/m / dB / dB / cm / deg 1 874.87 45.01 ------ ------ 47.47 28.72 3.12 34.30 100 360 Peak 2 914.50 114.51 -15.49 130.00 116.67 28.96 3.18 34.30 100 360 Peak 3 954.41 46.82 ------ ------ 48.05 29.79 3.27 34.29 100 360 Peak	 Freq / Level / Over Limit / Limit Line / ReadAntenna Level / Cable Factor / Preamp Loss / A/Pos / T/Pos / Remark MHz / dBuV/m / dB / dBuV/m / dBuV / dB/m / dB / dB / cm / deg 1 874.87 50.90 ------ ------ 53.36 28.72 3.12 34.30 100 0 Peak 2 914.50 118.01 -11.99 130.00 120.17 28.96 3.18 34.30 100 0 Peak 3 954.41 50.50 ------ ------ 51.73 29.79 3.27 34.29 100 0 Peak

LoRa	902.5~926.5 Band Edge @ 3m	
ANT	OFDM-LR 1.4Kbps CH31 926.5	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 886.51 44.52 ------ ------ 47.00 28.68 3.14 34.30 100 360 Peak 2 926.50 113.96 -16.04 130.00 115.82 29.23 3.21 34.30 100 360 Peak 3 967.02 44.23 ------ ------ 45.34 29.86 3.29 34.26 100 360 Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 886.51 46.60 ------ ------ 49.08 28.68 3.14 34.30 100 0 Peak 2 926.50 114.65 -15.35 130.00 116.51 29.23 3.21 34.30 100 0 Peak 3 967.02 43.86 ------ ------ 44.97 29.86 3.29 34.26 100 0 Peak

OFDM-LR 1.4Kbps (Harmonic @ 3m)

LoRa	902.5~926.5 Harmonic @ 3m	
ANT	OFDM-LR 1.4Kbps CH02 903.3	
	Horizontal	Vertical
Peak		

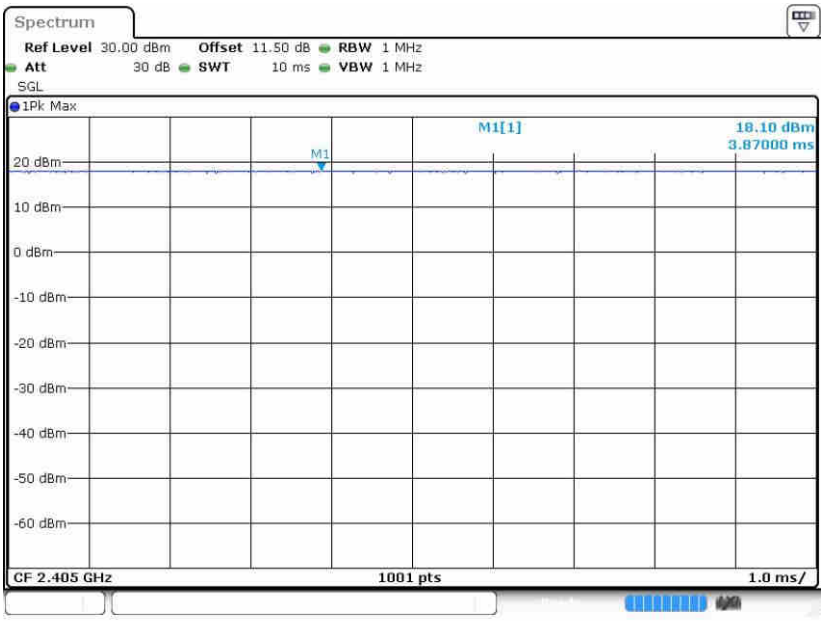
LoRa	902.5~926.5 Harmonic @ 3m	
ANT	OFDM-LR 1.4Kbps CH16 914.5	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1829.00 36.54 -37.46 74.00 60.70 29.60 4.21 57.97 --- --- Peak 2 2743.50 39.00 -35.00 74.00 59.64 31.60 5.24 57.48 --- --- Peak 3 3658.00 40.74 -33.26 74.00 58.78 32.82 6.18 57.04 --- --- Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1829.00 36.29 -37.71 74.00 60.45 29.60 4.21 57.97 --- --- Peak 2 2743.50 39.41 -34.59 74.00 60.05 31.60 5.24 57.48 --- --- Peak 3 3658.00 41.03 -32.97 74.00 59.07 32.82 6.18 57.04 --- --- Peak

LoRa	902.5~926.5 Harmonic @ 3m	
ANT	OFDM-LR 1.4Kbps CH31 926.5	
	Horizontal	Vertical
Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1853.00 36.26 -37.74 74.00 60.28 29.70 4.25 57.97 --- --- Peak 2 2779.50 39.33 -34.67 74.00 59.83 31.67 5.28 57.45 --- --- Peak 3 3706.00 41.15 -32.85 74.00 59.11 32.89 6.17 57.02 --- --- Peak	 Over Limit ReadAntenna Cable Preamp A/Pos T/Pos Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB cm deg 1 1853.00 35.68 -38.32 74.00 59.70 29.70 4.25 57.97 --- --- Peak 2 2779.50 39.93 -34.07 74.00 60.43 31.67 5.28 57.45 --- --- Peak 3 3706.00 40.64 -33.36 74.00 58.60 32.89 6.17 57.02 --- --- Peak

Appendix B. Duty Cycle Plots

Mode	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
Zigbee	100	-	-	10Hz

Zigbee mode



WIFI 6E

Antenna	Band	Duty Cycle(%)	Duty Factor
0	802.11a	91.06	0.41
0+1(0)	802.11a	90.87	0.42
0+1(1)	802.11a	90.85	0.42

Full RU

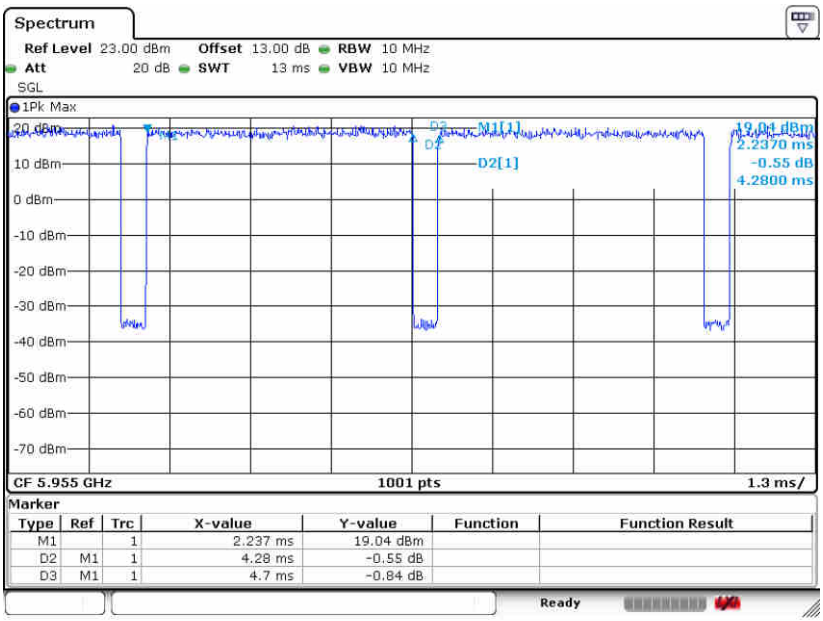
Antenna	Band	Duty Cycle(%)	Duty Factor
0+1(0)	802.11ax HE20	90.33	0.44
0+1(1)	802.11ax HE20	90.47	0.44
0+1(0)	802.11ax HE40	85.37	0.69
0+1(1)	802.11ax HE40	85.99	0.66
0+1(0)	802.11ax HE80	73.91	1.31
0+1(1)	802.11ax HE80	74.67	1.27

Partial RU

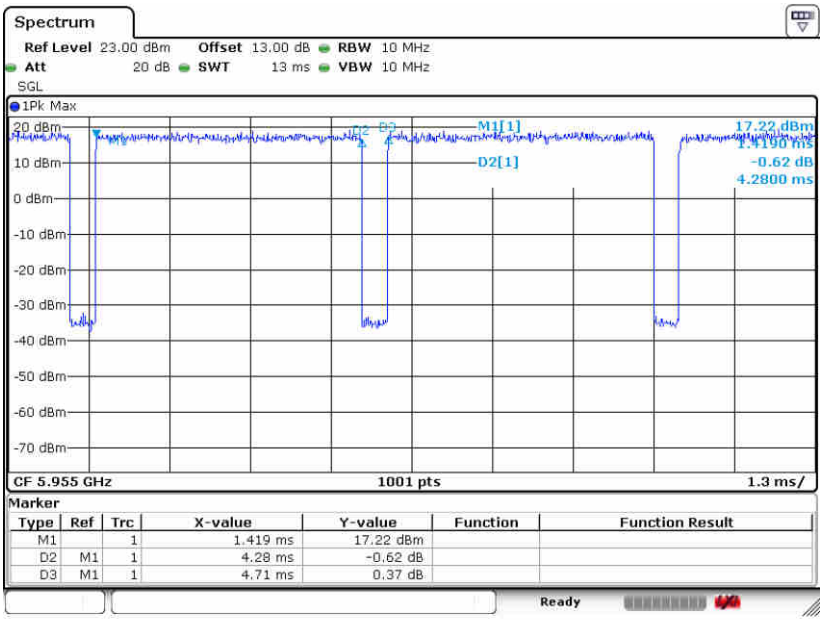
Antenna	Band	Duty Cycle(%)	Duty Factor
0+1(0)	802.11ax HE20 26RU0	51.50	2.88
0+1(1)	802.11ax HE20 26RU0	51.50	2.88
0+1(0)	802.11ax HE20 52RU37	49.67	3.04
0+1(1)	802.11ax HE20 52RU37	49.67	3.04
0+1(0)	802.11ax HE20 106RU53	47.06	3.27
0+1(1)	802.11ax HE20 106RU53	45.92	3.38
0+1(0)	802.11ax HE20 26RU4	51.20	2.91
0+1(1)	802.11ax HE20 26RU4	51.20	2.91
0+1(0)	802.11ax HE20 52RU39	49.84	3.02
0+1(1)	802.11ax HE20 52RU39	49.84	3.02
0+1(0)	802.11ax HE20 26RU8	50.89	2.93
0+1(1)	802.11ax HE20 26RU8	50.74	2.95
0+1(0)	802.11ax HE20 52RU40	49.19	3.08
0+1(1)	802.11ax HE20 52RU40	49.51	3.05
0+1(0)	802.11ax HE20 106RU54	47.06	3.27
0+1(1)	802.11ax HE20 106RU54	46.88	3.29
0+1(0)	802.11ax HE20 52RU38	49.84	3.02
0+1(1)	802.11ax HE20 52RU38	49.84	3.02
0+1(0)	802.11ax HE40 242RU61	64.17	1.93
0+1(1)	802.11ax HE40 242RU61	64.17	1.93

Antenna	Band	Duty Cycle(%)	Duty Factor
0+1(0)	802.11ax HE40 242RU62	65.57	1.83
0+1(1)	802.11ax HE40 242RU62	65.03	1.87
0+1(0)	802.11ax HE80 484RU65	41.24	3.85
0+1(1)	802.11ax HE80 484RU65	41.24	3.85
0+1(0)	802.11ax HE80 484RU66	41.81	3.79
0+1(1)	802.11ax HE80 484RU66	41.24	3.85

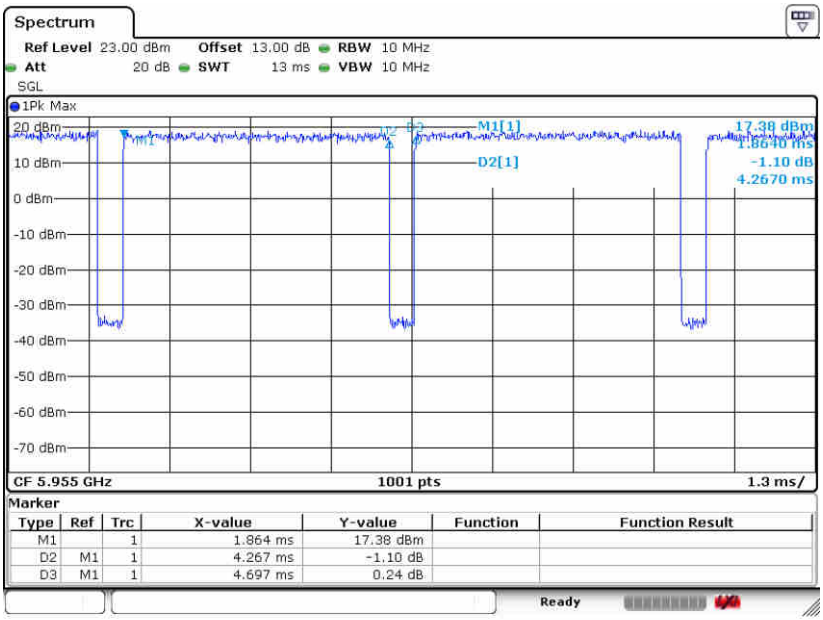
802.11a - Ant.0



802.11a - Ant.0+1(0)

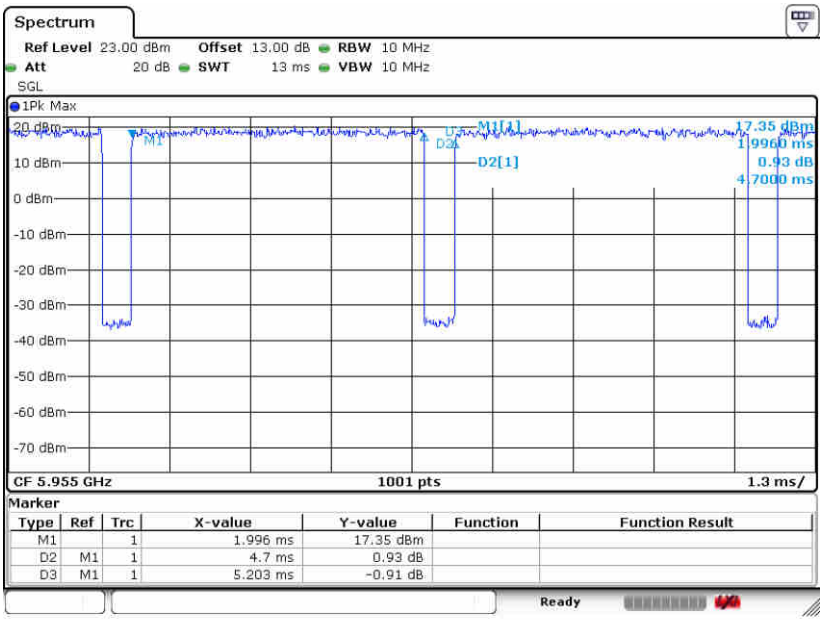


802.11a - Ant.0+1(1)

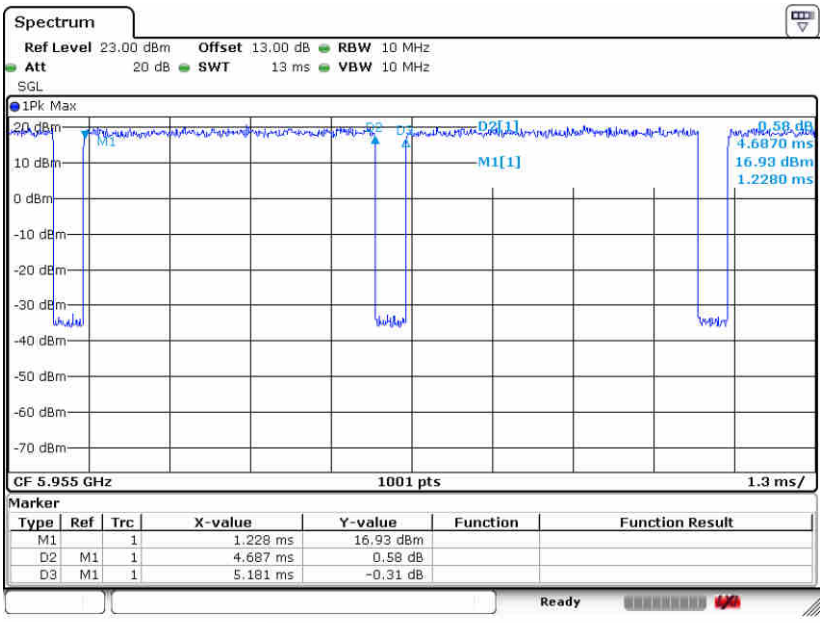


Full RU

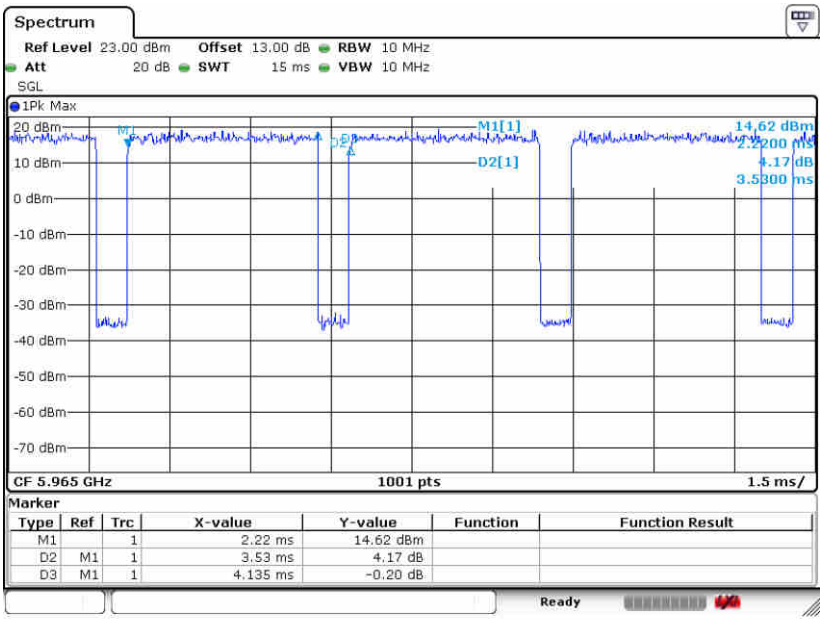
802.11ax HE20 - Ant.0+1(0)



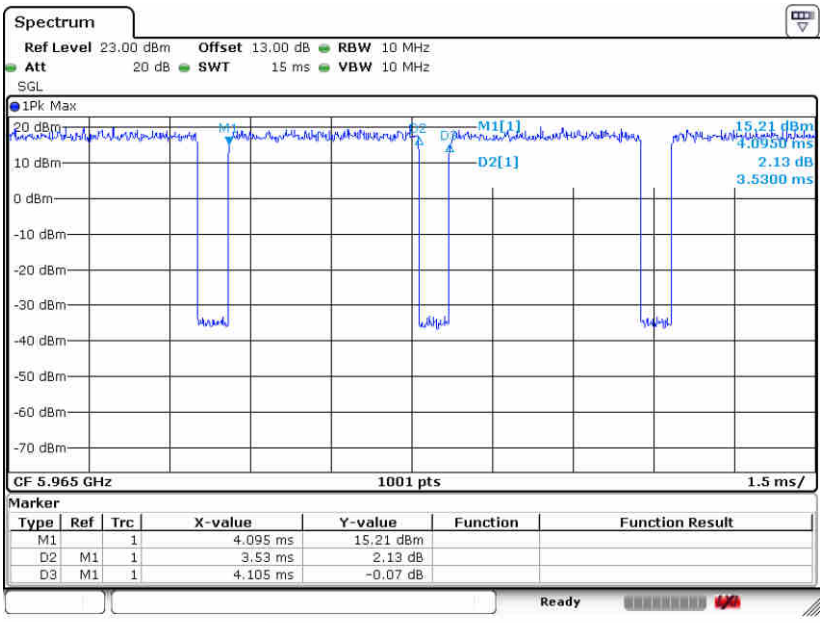
802.11ax HE20 - Ant.0+1(1)



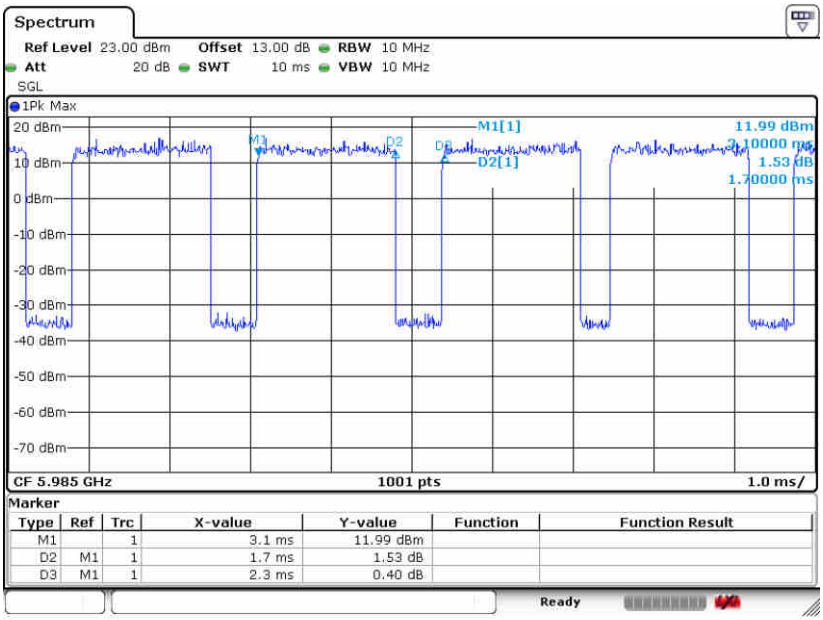
802.11ax HE40 - Ant.0+1(0)



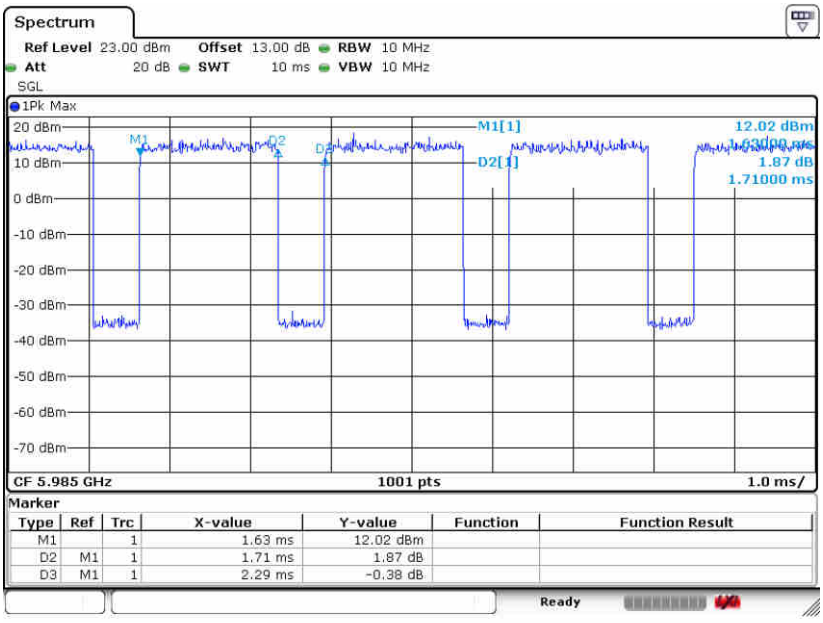
802.11ax HE40 - Ant.0+1(1)



802.11ax HE80 - Ant.0+1(0)

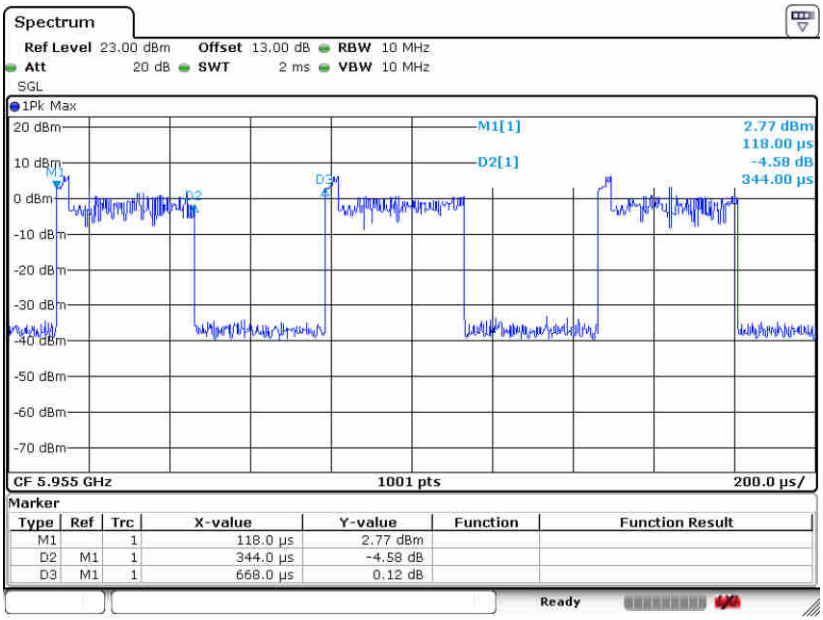


802.11ax HE80 - Ant.0+1(1)

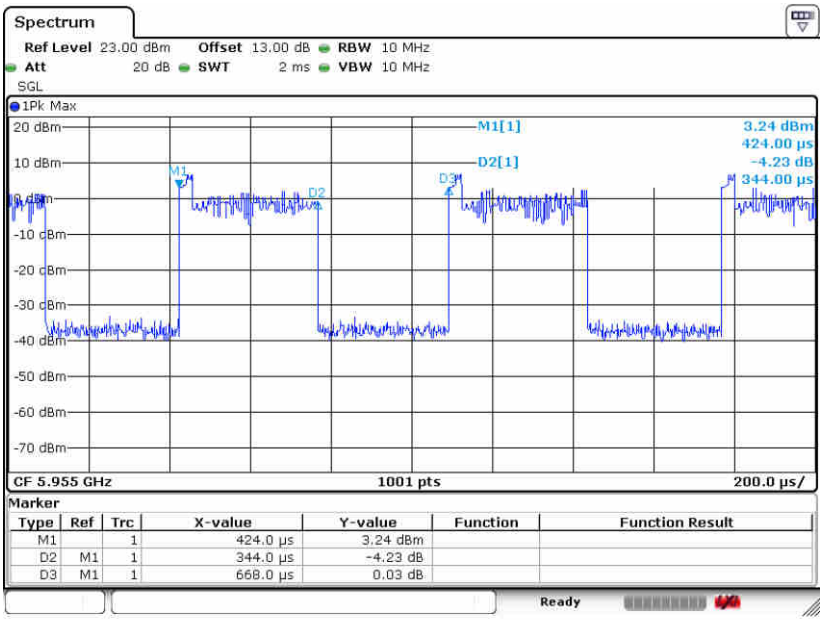


Partial RU

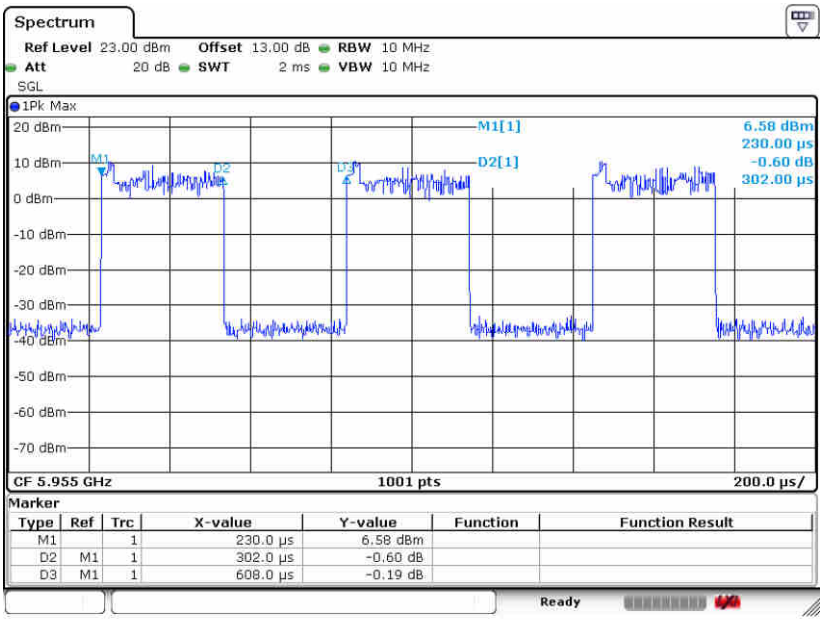
802.11ax HE20 26RU0- Ant.0+1(0)



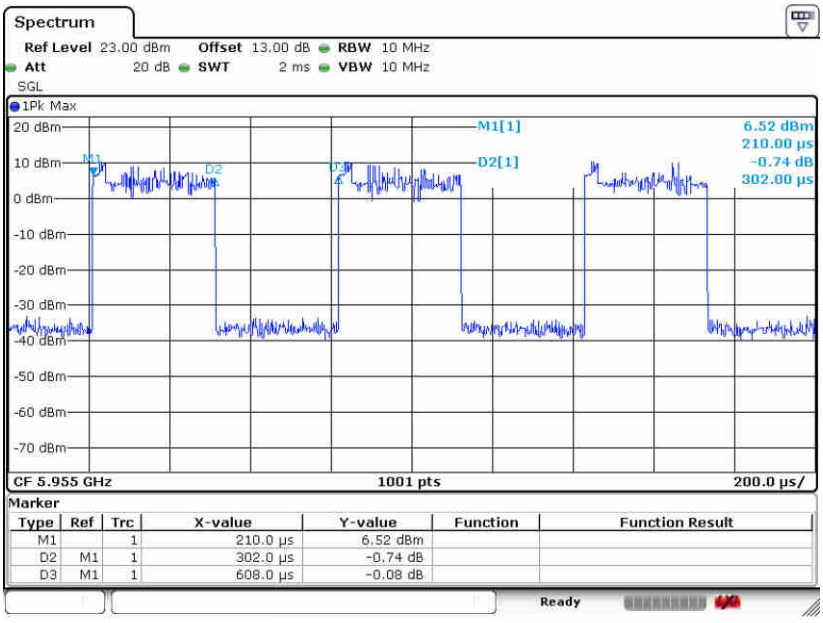
802.11ax HE20 26RU0- Ant.0+1(1)



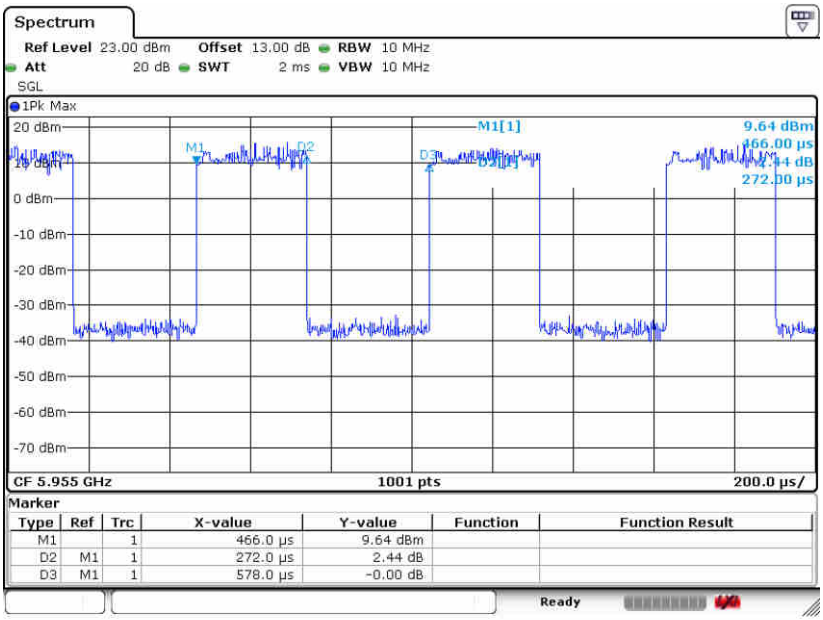
802.11ax HE20 52RU37- Ant.0+1(0)



802.11ax HE20 52RU37- Ant.0+1(1)



802.11ax HE20 106RU53- Ant.0+1(0)



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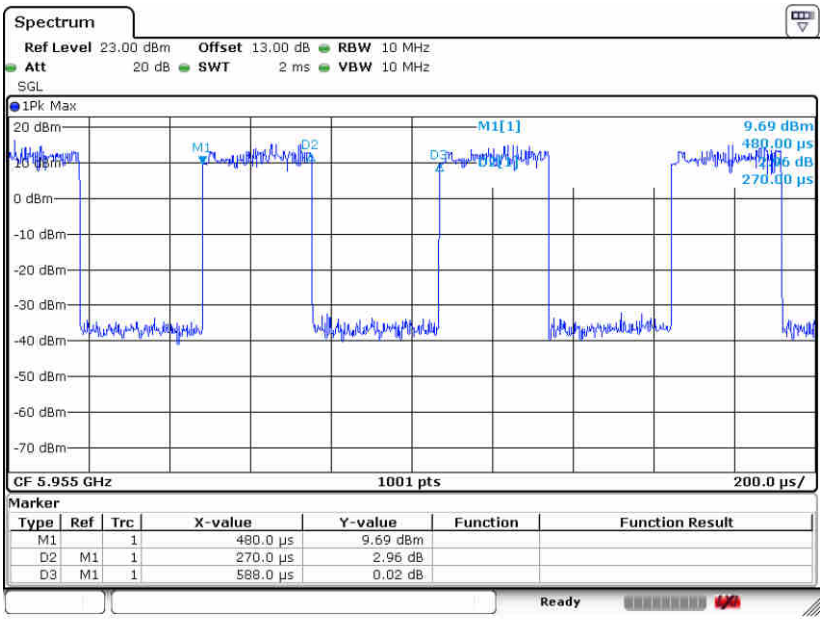

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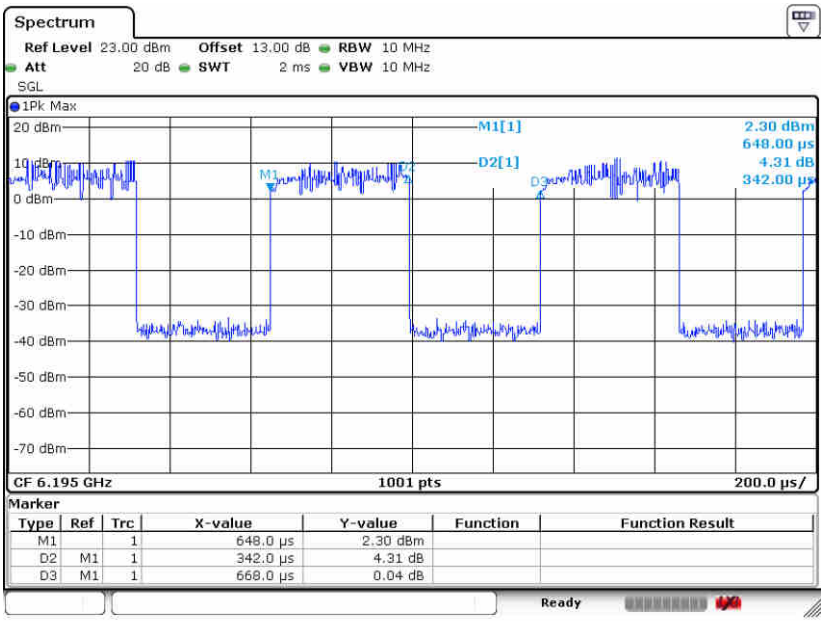

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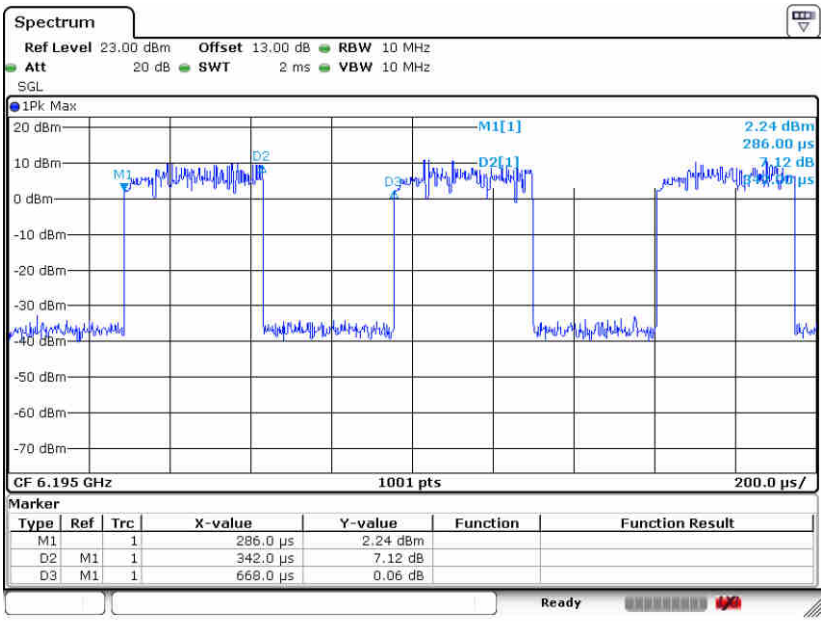

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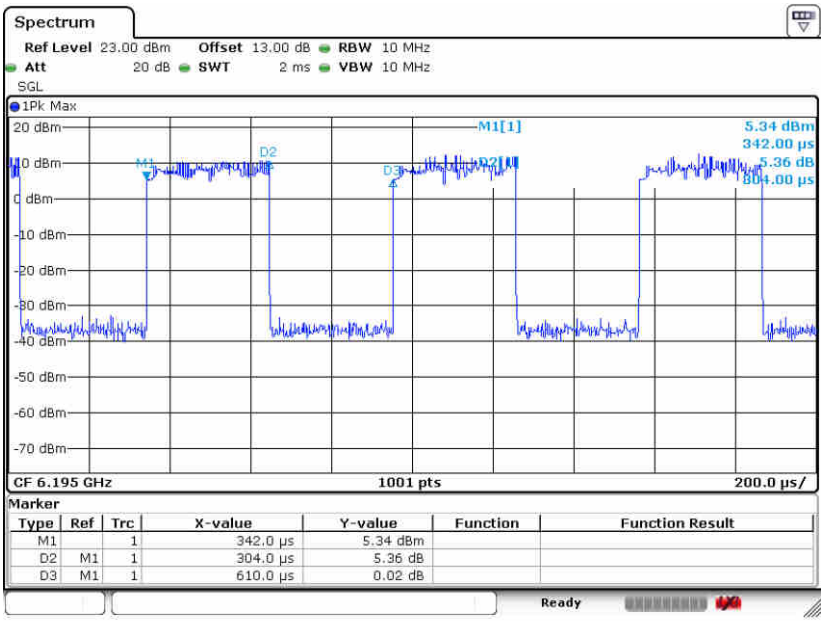

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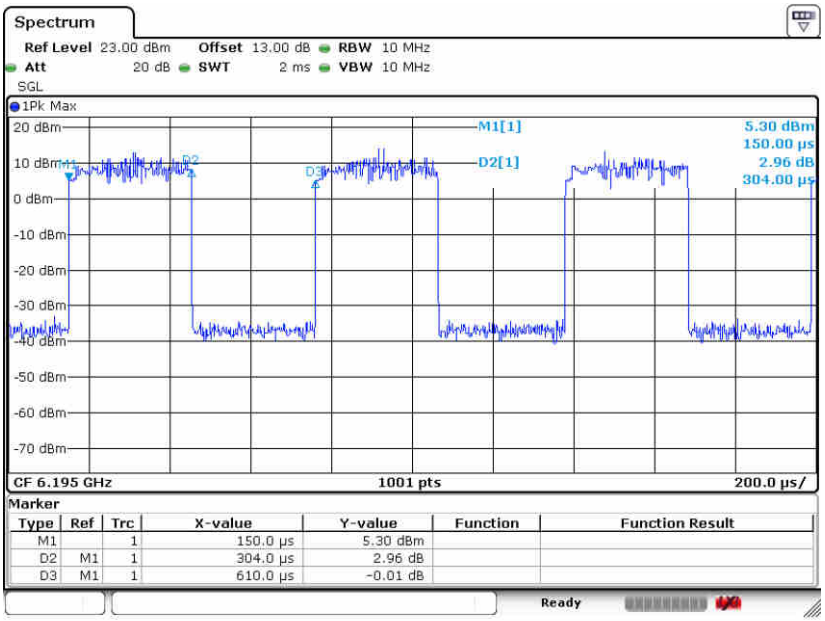

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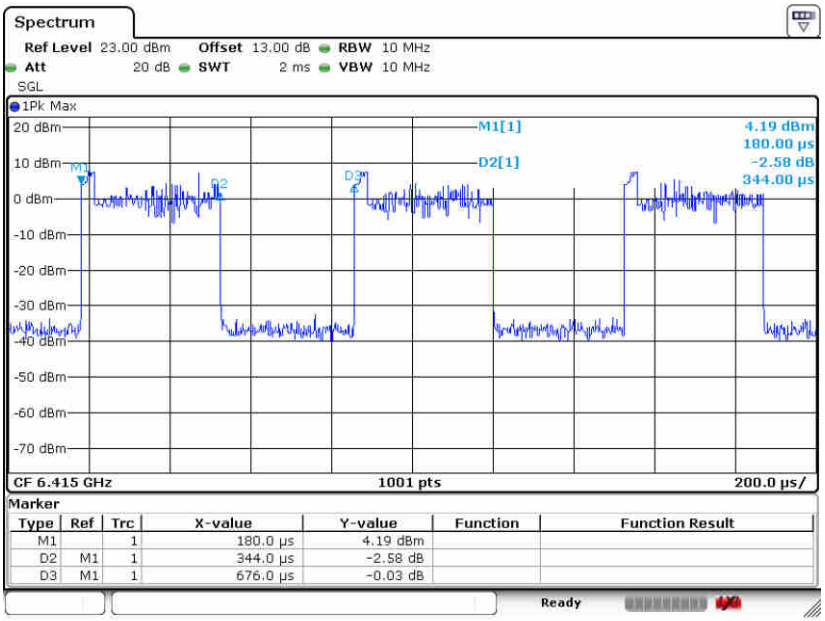

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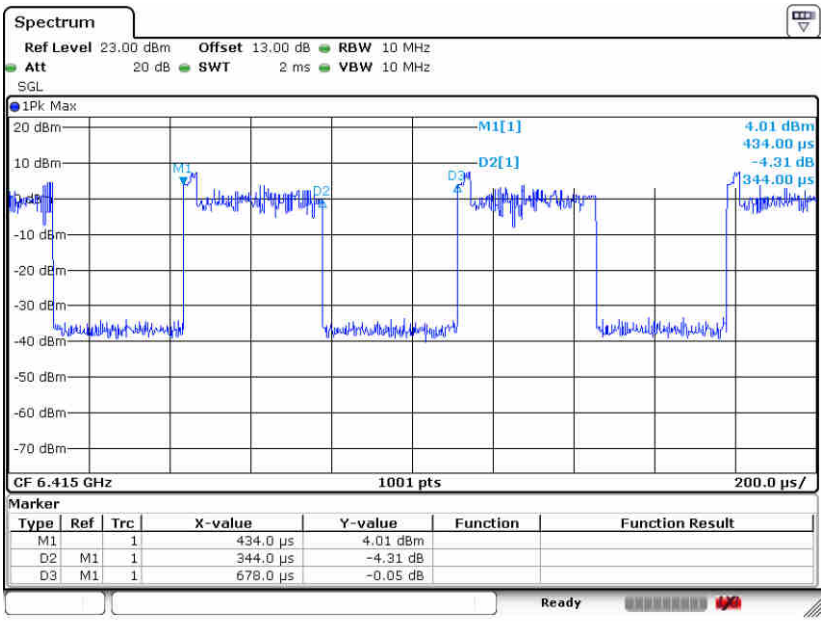

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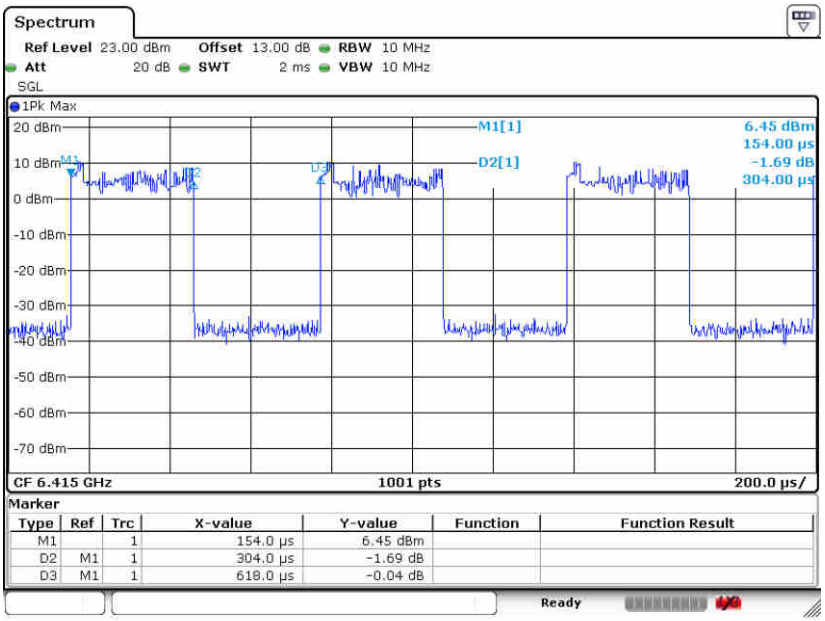

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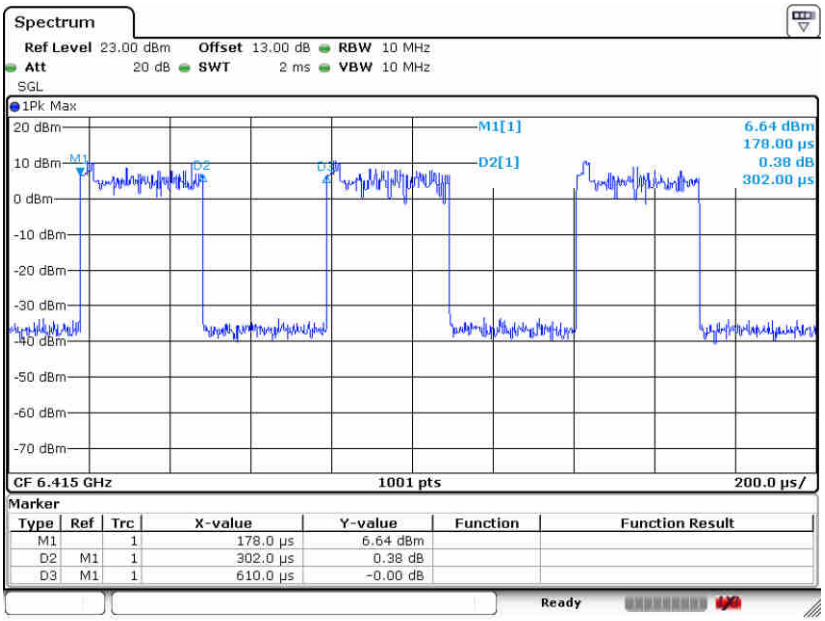

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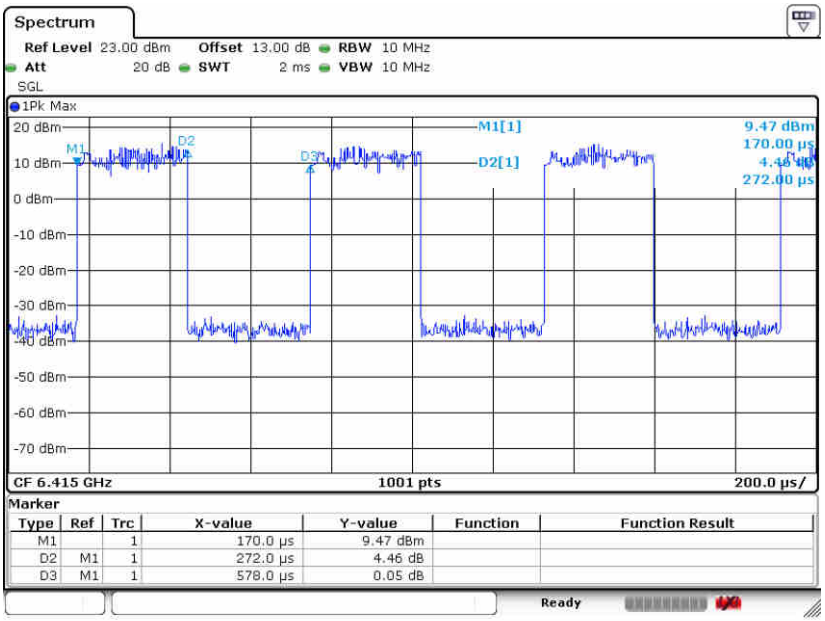

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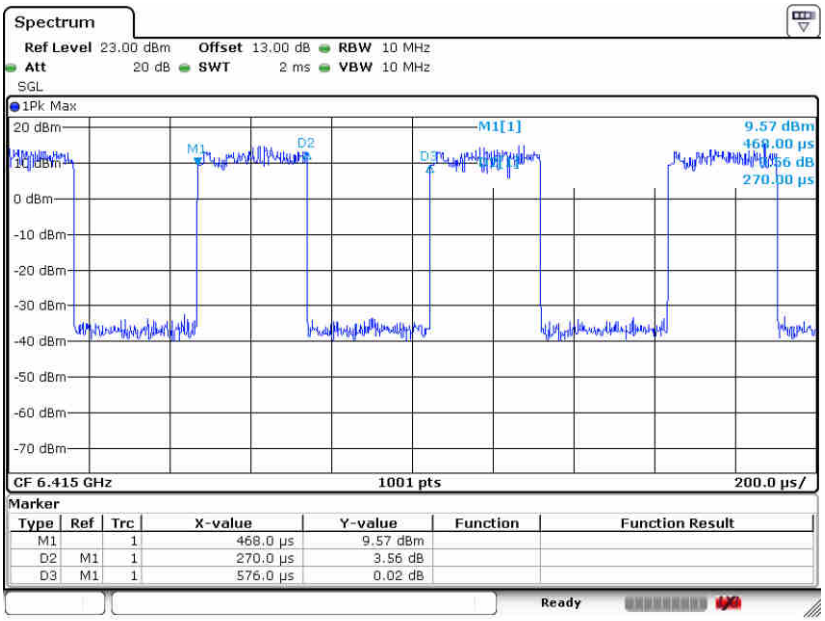

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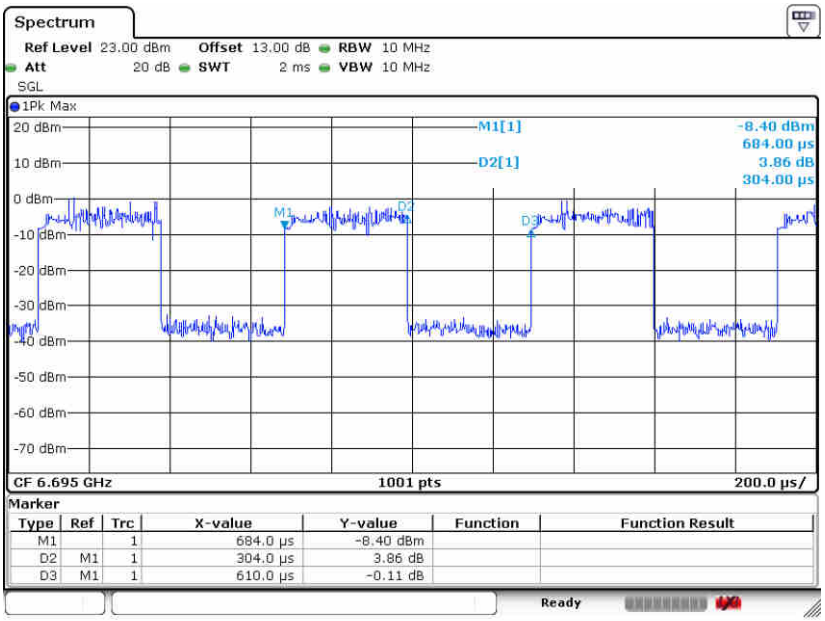

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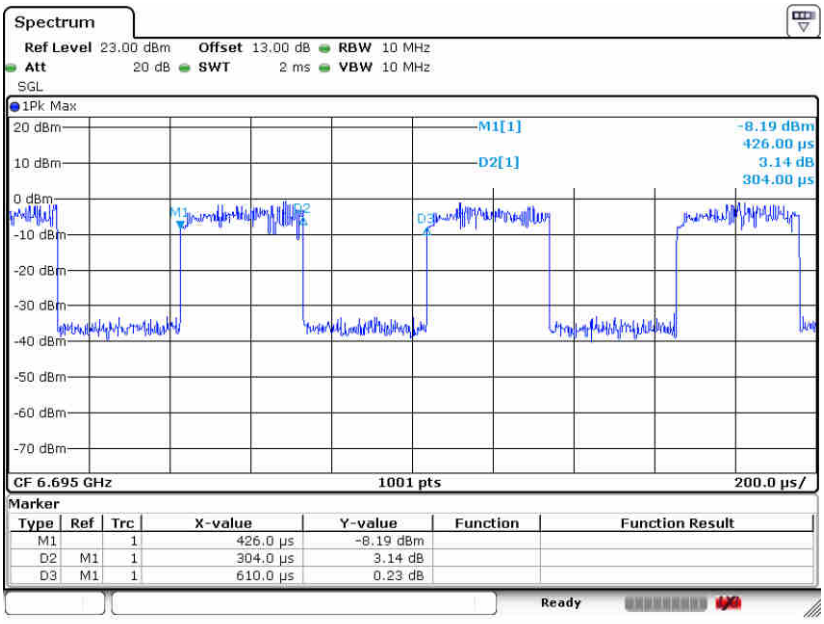

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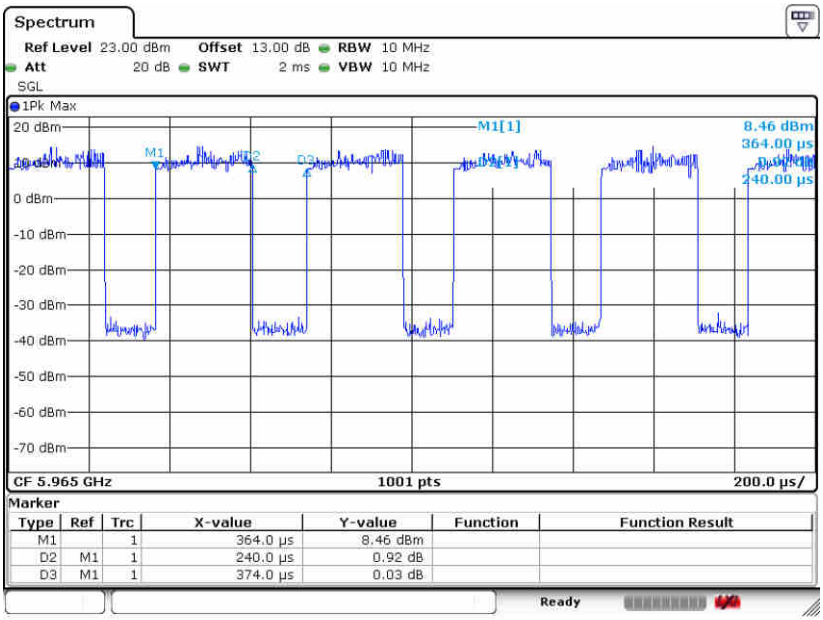

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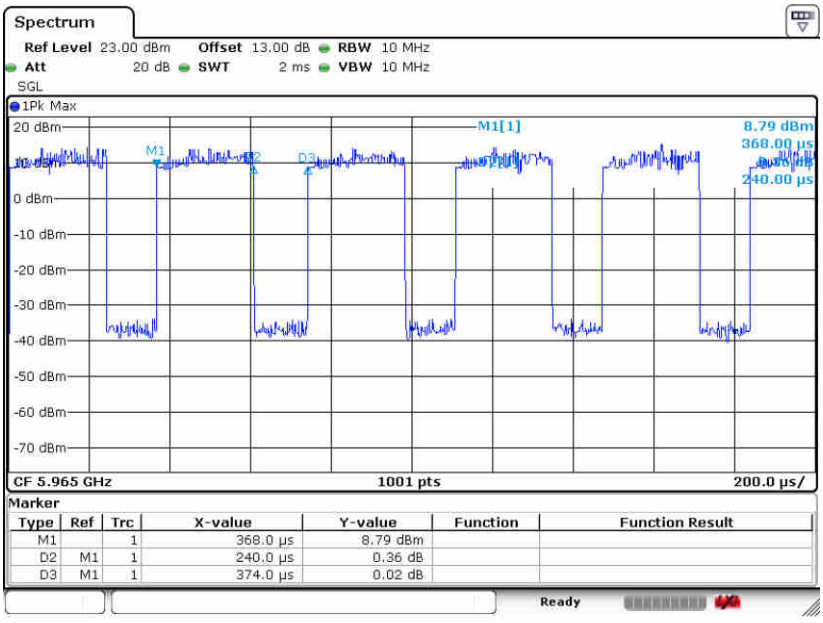

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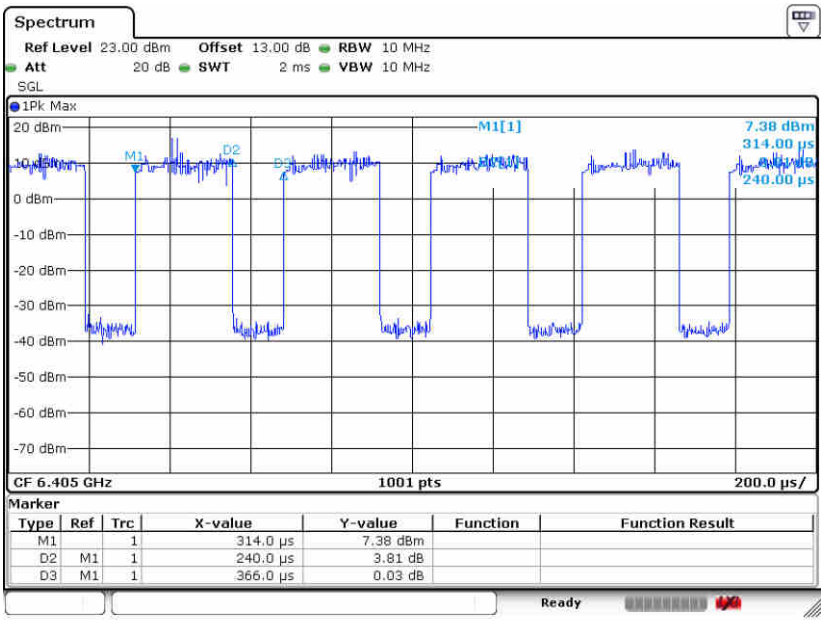

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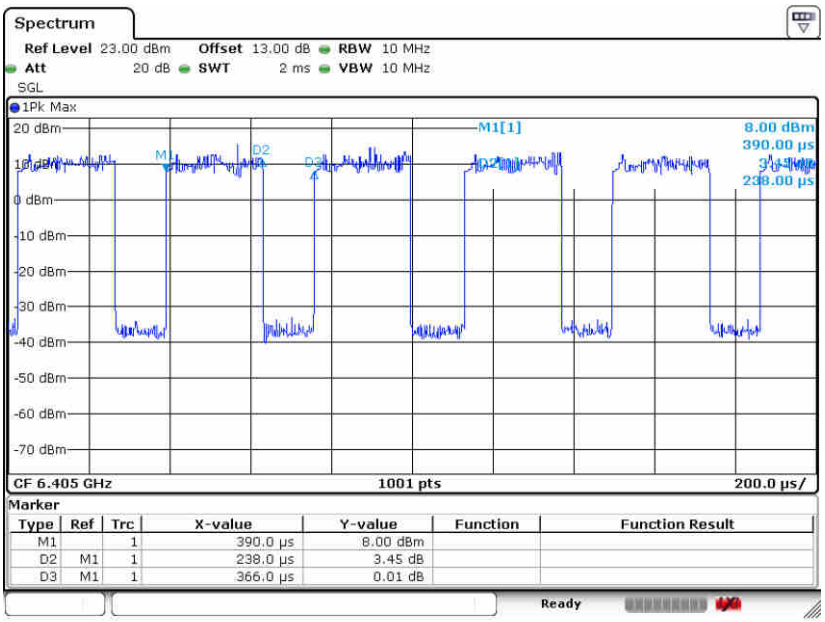

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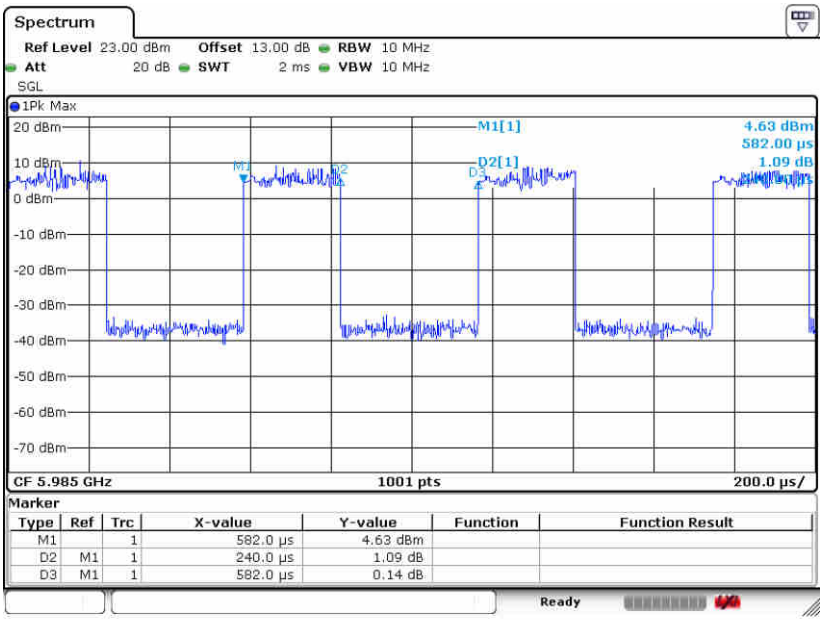

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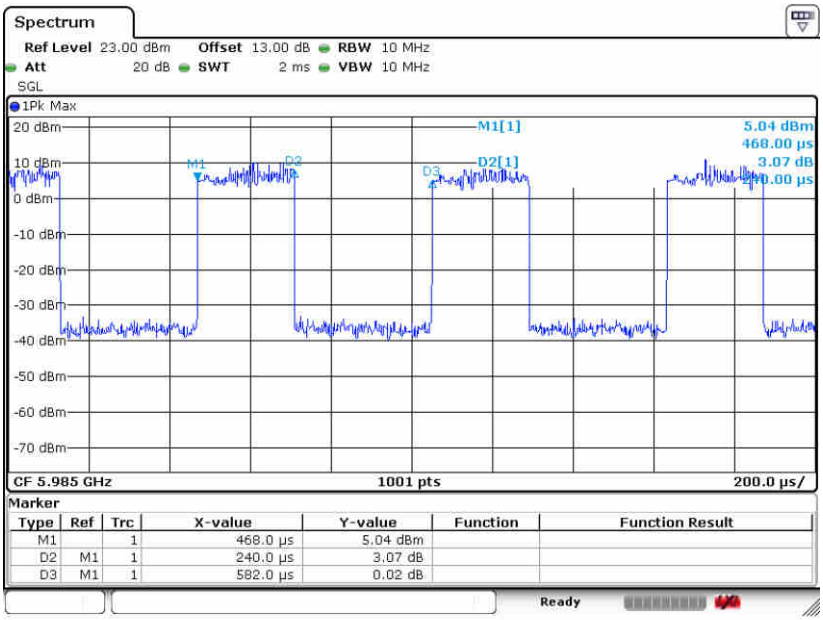

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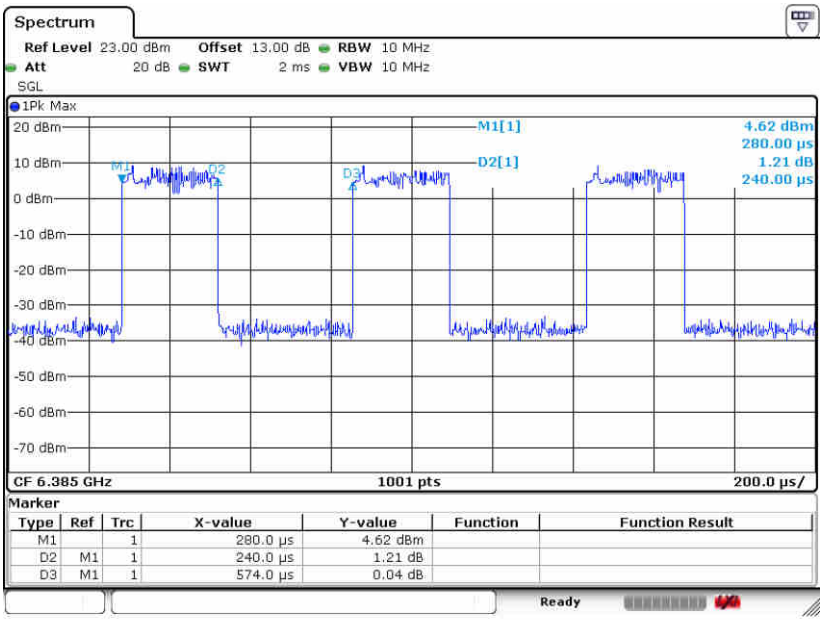

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