

RADIO PERFORMANCE TEST REPORT

Test Report No. : OT-234-RWD-007

Reception No. : 2303000622

Applicant : Westcom Wireless Inc.

Address : 2773 Leechburg Road, Lower Burrell, Pennsylvania, 15068, United States

Manufacturer : Westcom Wireless Inc.

Address : 2773 Leechburg Road, Lower Burrell, Pennsylvania, 15068, United States

Type of Equipment : ProCom

FCC ID. : 2AO37-ATLASPRO

Model Name : Atlas Pro

Multiple Model Name : N/A

Serial number : N/A

Total page of Report : 92 pages (including this page)

Date of Incoming : March 17, 2023

Date of issue : April 05, 2023

SUMMARY

The equipment complies with the regulation; **FCC PART 15 SUBPART C Section 15.247**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

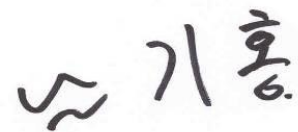
This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.



Tested by
/ Soon-Ki, Choi / Prj. Engineer
ONETECH Corp.



Reviewed by
Tae-Ho, Kim / Chief Engineer
ONETECH Corp.



Approved by
Ki-Hong, Nam / Chief Engineer
ONETECH Corp.

CONTENTS

	Page
1. VERIFICATION OF COMPLIANCE	6
2. TEST SUMMARY	7
2.1 Test items and results	7
2.2 Additions, deviations, exclusions from standards	8
2.3 Related Submittal(s) / Grant(s).....	8
2.4 Purpose of the test.....	8
2.5 Test Methodology	8
2.6 Test Facility	8
3. GENERAL INFORMATION	9
3.1 Product Description	9
3.2 Alternative type(s)/model(s); also covered by this test report.....	9
4. EUT MODIFICATIONS.....	9
5. SYSTEM TEST CONFIGURATION	10
5.1 Justification	10
5.2 Peripheral equipment	10
5.3 Mode of operation during the test	10
5.4 Configuration of Test System	16
5.5 Antenna Requirement	16
6. PRELIMINARY TEST	16
6.1 AC Power line Conducted Emissions Tests	16
6.2 General Radiated Emissions Tests	16
7. MAXIMUM PEAK OUTPUT POWER	17
7.1 Operating environment	17
7.2 Test set-up	17
7.3 Test Date.....	17
7.4 Test data for Mode 1_Normal.....	18
7.5 Test data for Mode 2_Long.....	20
7.6 Test data for Mode 3_Repeat.....	22
8. BAND EDGES	24
8.1 Operating environment	24
8.2 Test set-up	24

8.3 Test Date.....	24
8.4 Test data for Mode 1_Normal.....	25
8.5 Test data for Mode 2_Long.....	27
8.6 Test data for Mode 3_Repeat.....	29
9. FREQUENCY SEPARATION / OCCUPIED BANDWIDTH (20 dB BANDWIDTH).....	31
9.1 Operating environment	31
9.2 Test set-up	31
9.3 Test Date.....	31
9.4 Test data for Mode 1_Normal.....	32
9.4.1 Carrier Frequency Separation / 20 dB Bandwidth	32
9.5 Test data for Mode 2_Long.....	35
9.5.1 Carrier Frequency Separation / 20 dB Bandwidth	35
9.6 Test data for Mode 3_Repeat.....	38
9.6.1 Carrier Frequency Separation / 20 dB Bandwidth	38
10. NUMBER OF HOPPING FREQUENCY	41
10.1 Operating environment	41
10.2 Test set-up	41
10.3 Test Date.....	41
10.4 Test data for Mode 1_Normal.....	42
10.5 Test data for Mode 2_Long.....	43
10.6 Test data for Mode 3_Repeat.....	44
11. TIME OF OCCUPANCY (DWELL TIME)	45
11.1 Operating environment	45
11.2 Test set-up	45
11.3 Test Date.....	45
11.4 Test data for Mode 1_Normal.....	46
11.5 Test data for Mode 2_Long.....	48
11.6 Test data for Mode 3_Repeat.....	50
12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND	52
12.1 Operating environment	52
12.2 Test set-up for conducted / radiated measurement.....	52
12.3 Test Date.....	53
12.4 Test data for conducted emission	54
12.4.1 Test data for Mode 1_Normal	54
12.4.2 Test data for Mode 2_Long	61
12.4.3 Test data for Mode 3_Repeat.....	68

12.5 Test data for Transmitting mode radiated emission (Transmitting Mode)	75
12.5.1 Spurious & Harmonic Radiated Emission above 1 GHz.....	75
13. RADIATED EMISSION TEST	78
13.1 Operating environment	78
13.2 Test set-up	78
13.3 Test Date	78
13.4 Test data for Transmitting Mode	79
13.4.1 Test data for Mode 1_Normal	79
13.4.2 Test data for Mode 2_Long	81
13.4.3 Test data for Mode 3_Repeat.....	83
14. CONDUCTED EMISSION TEST	85
14.1 Operating environment	85
14.2 Test set-up	85
14.3 Test Date	85
14.4 Test Data for Trasmitting Mode.....	86
14.4.1 Test data for Mode 1_Normal	86
14.4.2 Test data for Mode 2_Long	88
14.4.3 Test data for Mode 3_Repeat.....	90
15. LIST OF TEST EQUIPMENT	92

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-234-RWD-007	April 05, 2023	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : Westcom Wireless Inc.
Address : 2773 Leechburg Road, Lower Burrell, Pennsylvania, 15068, United States
Manufacturer : Westcom Wireless Inc.
Address : 2773 Leechburg Road, Lower Burrell, Pennsylvania, 15068, United States
Contact Person : Frank Girardi / President
Telephone No. : +1-724-337-1400
FCC ID : 2AO37-ATLASPRO
Model Name : Atlas Pro
Brand Name : -
Serial Number : N/A
Date : April 05, 2023

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
E.U.T. DESCRIPTION	ProCom
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247 558074 D01 15.247 Meas Guidance v05r02
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.247(a)(1)(i)	20 dB Bandwidth	Met the Limit / PASS
15.247(b)(2)	Conducted Maximum Peak Output Power	Met the Limit / PASS
15.247(a)(1)	Carrier Frequency Separation	Met the Limit / PASS
15.247(a)(1)(i)	Number of Hopping Frequencies	Met the Limit / PASS
15.247(a)(1)(i)	Time of Occupancy	Met the Limit / PASS
15.247(d)	Conducted Spurious Emissions	Met the Limit / PASS
15.247(d)	Band Edge(Out of Band Emissions)	Met the Limit / PASS
15.207(a)	AC Power line Conducted Emissions	Met the Limit / PASS
15.247(d), 15.205(a), 15.209(a)	Radiated Spurious Emissions	Met the Limit / PASS
15.247(d), 15.205(a), 15.209(a)	Radiated Restricted Band Edge	Met the Limit / PASS

Note.: All test items have been performed for each Normal (CH 20 ~ CH 220), Long (CH12 ~ CH 138) and Repeat (CH 20 ~ CH 220) Mode. And the conducted Emissions and Radiated Spurious Emissions have been performed for Transmitting mode.

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART C Section 15.247.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-14617/ G-10666/ T-11842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. GENERAL INFORMATION

3.1 Product Description

The Westcom Wireless Inc., Model Atlas Pro(referred to as the EUT in this report) is a ProCom. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	ProCom	
Temperature Range	-10 °C ~ 50 °C	
OPERATING FREQUENCY	902 MHz ~ 928 MHz	
MODULATION TYPE	GFSK	
RF OUTPUT POWER	Mode 1_Normal	25.78 dBm
	Mode 2_Long	27.96 dBm
	Mode 3_Repeat	27.67 dBm
ANTENNA TYPE	Helical Antenna	
ANTENNA GAIN	-0.65 dBi	
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	48 MHz	

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None

5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	Westcom Wireless Inc.	Atlas Pro	N/A
Power Board	Westcom Wireless Inc.	Atlas Pro	N/A
Battery	Mirim Technology	MS35E-M	N/A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
Atlas Pro	Westcom Wireless Inc.	ProCom (EUT)	-
HP ProBook 450 G7	HP	NoteBook PC	Test JIG
Battery	Westcom Wireless Inc.	Battery	EUT
JIG	Bicom	Test JIG	NetBook PC

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing EUT was set as below to get a maximum emission levels from the EUT.

Mode 1 (Normal): 902.5 MHz, 915.0 MHz, and 927.5 MHz (Low/Middle/High)

Mode 2 (Long): 902.4 MHz, 914.8 MHz, and 927.6 MHz (Low/Middle/High)

Mode 3 (Repeat): 902.5 MHz, 915.0 MHz, and 927.5 MHz (Low/Middle/High)

The EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XZ” axis, but the worst data was recorded in this report.

-. Duty Cycle

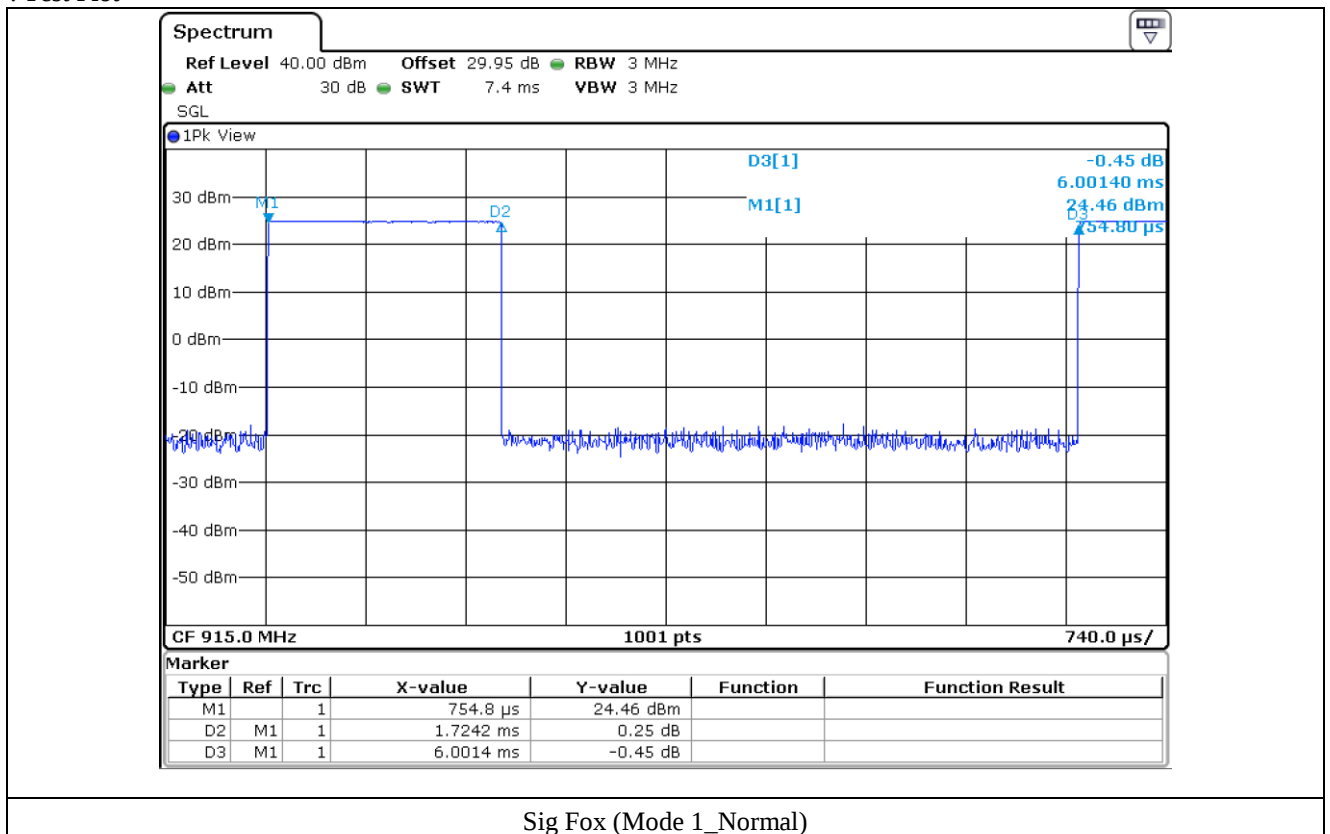
Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
GFSK (Mode 1_Normal)	1.7242	4.2772	28.73	-
GFSK (Mode 2_Long)	2.7300	3.2800	45.42	-
GFSK (Mode 3_Repeat)	1.2284	4.7730	20.46	-

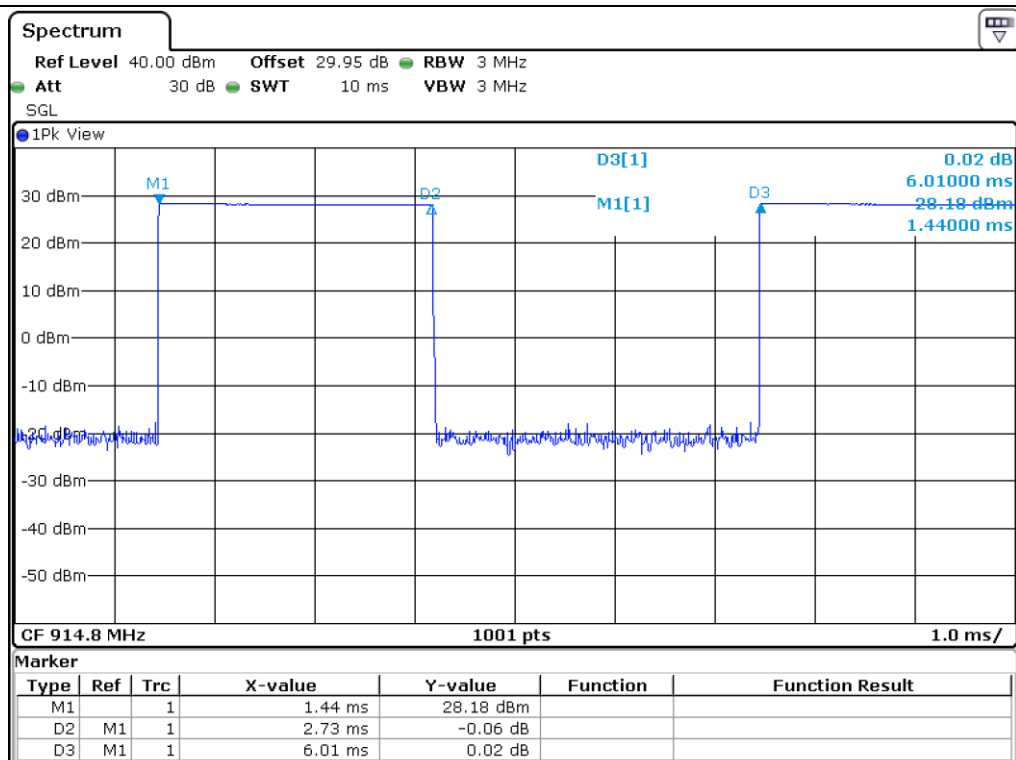
Note – Duty Cycle : (Tx On Time / (Tx On Time + Tx Off Time)) * 100

Correction Factor : 10 * Log(1 / (Duty Cycle / 100))

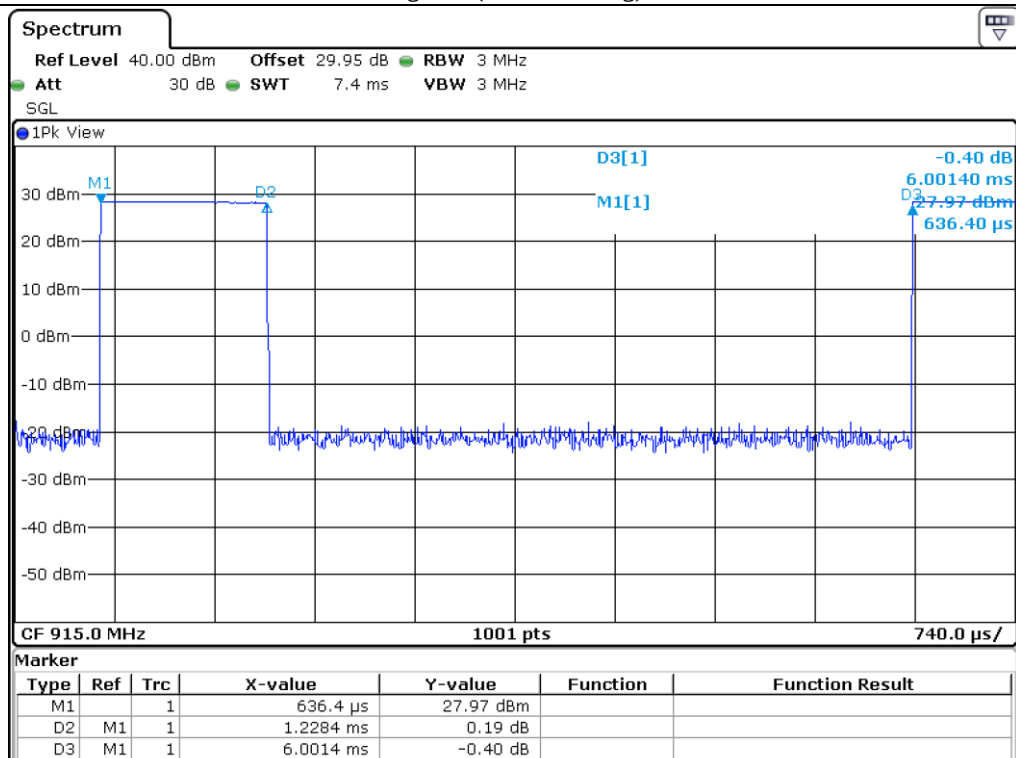
The test was measured under the duty, and other test items were measured under the full duty.

-. Test Plot





Sig Fox (Mode 2_Long)



Sig Fox (Mode 3_Repeat)

-. Channel List

[Mode 1_Normal]

Channel	Frequency[MHz]	Channel	Frequency[MHz]	Channel	Frequency[MHz]
20	902.500	96	912.000	172	921.500
24	903.000	100	912.500	176	922.000
28	903.500	104	913.000	180	922.500
32	904.000	108	913.500	184	923.000
36	904.500	112	914.000	188	923.500
40	905.000	116	914.500	192	924.000
44	905.500	120	915.000	196	924.500
48	906.000	124	915.500	200	925.000
52	906.500	128	916.000	204	925.500
56	907.000	132	916.500	208	926.000
60	907.500	136	917.000	212	926.500
64	908.000	140	917.500	216	927.000
68	908.500	144	918.000	220	927.500
72	909.000	148	918.500	-	-
76	909.500	152	919.000	-	-
80	910.000	156	919.500	-	-
84	910.500	160	920.000	-	-
88	911.000	164	920.500	-	-
92	911.500	168	921.000	-	-

[Mode 2_Long]

Channel	Frequency[MHz]	Channel	Frequency[MHz]	Channel	Frequency[MHz]
12	902.400	60	912.000	108	921.600
14	902.800	62	912.400	110	922.000
16	903.200	64	912.800	112	922.400
18	903.600	66	913.200	114	922.800
20	904.000	68	913.600	116	923.200
22	904.400	70	914.000	118	923.600
24	904.800	72	914.400	120	924.000
26	905.200	74	914.800	122	924.400
28	905.600	76	915.200	124	924.800
30	906.000	78	915.600	126	925.200
32	906.400	80	916.000	128	925.600
34	906.800	82	916.400	130	926.000
36	907.200	84	916.800	132	926.400
38	907.600	86	917.200	134	926.800
40	908.000	88	917.600	136	927.200
42	908.400	90	918.000	138	927.600
44	908.800	92	918.400	-	-
46	909.200	94	918.800	-	-
48	909.600	96	919.200	-	-
50	910.000	98	919.600	-	-
52	910.400	100	920.000	-	-
54	910.800	102	920.400	-	-
56	911.200	104	920.800	-	-
58	911.600	106	921.200	-	-

[Mode 3_Repeat]

Channel	Frequency[MHz]	Channel	Frequency[MHz]	Channel	Frequency[MHz]
20	902.500	92	911.500	164	920.500
24	903.000	96	912.000	168	921.000
28	903.500	100	912.500	172	921.500
32	904.000	104	913.000	176	922.000
36	904.500	108	913.500	180	922.500
40	905.000	112	914.000	184	923.000
44	905.500	116	914.500	188	923.500
48	906.000	120	915.000	192	924.000
52	906.500	124	915.500	196	924.500
56	907.000	128	916.000	200	925.000
60	907.500	132	916.500	204	925.500
64	908.000	136	917.000	208	926.000
68	908.500	140	917.500	212	926.500
72	909.000	144	918.000	216	927.000
76	909.500	148	918.500	220	927.500
80	910.000	152	919.000	-	-
84	910.500	156	919.500	-	-
88	911.000	160	920.000	-	-

5.4 Configuration of Test System

Line Conducted Test: Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter Semi Anechoic Chamber.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

5.5 Antenna Requirement

For intentional device, according to section 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.

Antenna Construction:

The antenna of the EUT is Helical Antenna on the main board in the EUT, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

6.2 General Radiated Emissions Tests

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

7. MAXIMUM PEAK OUTPUT POWER

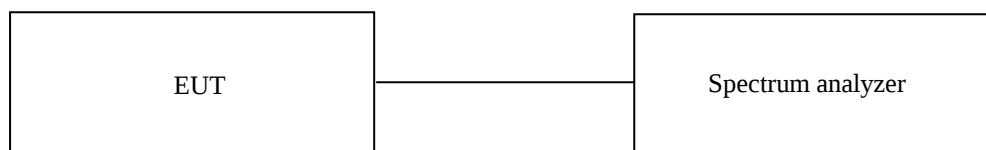
7.1 Operating environment

Temperature : 24 °C
Relative humidity : 48 % R.H.

7.2 Test set-up

The maximum peak output power of the intentional radiator shall not exceed the following:

1. For frequency hopping systems operating in the 902-928 MHz band: 1 watt (30 dBm) for systems employing at least 50 hopping channels; and, 0.25 watts (24 dBm) for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.
2. The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.
3. The e.i.r.p of this module not exceed 4 W because the antenna gain not exceed not 6 dBi.



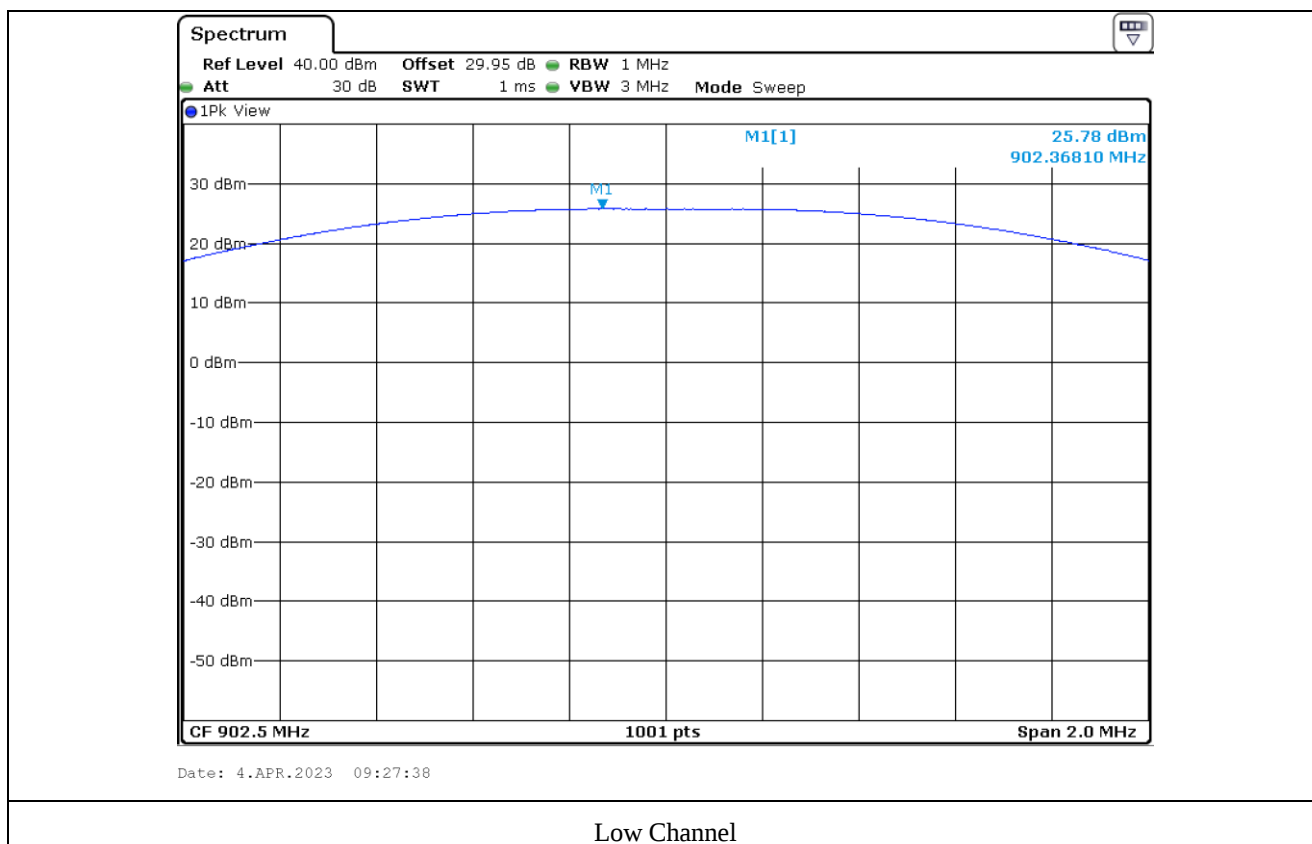
7.3 Test Date

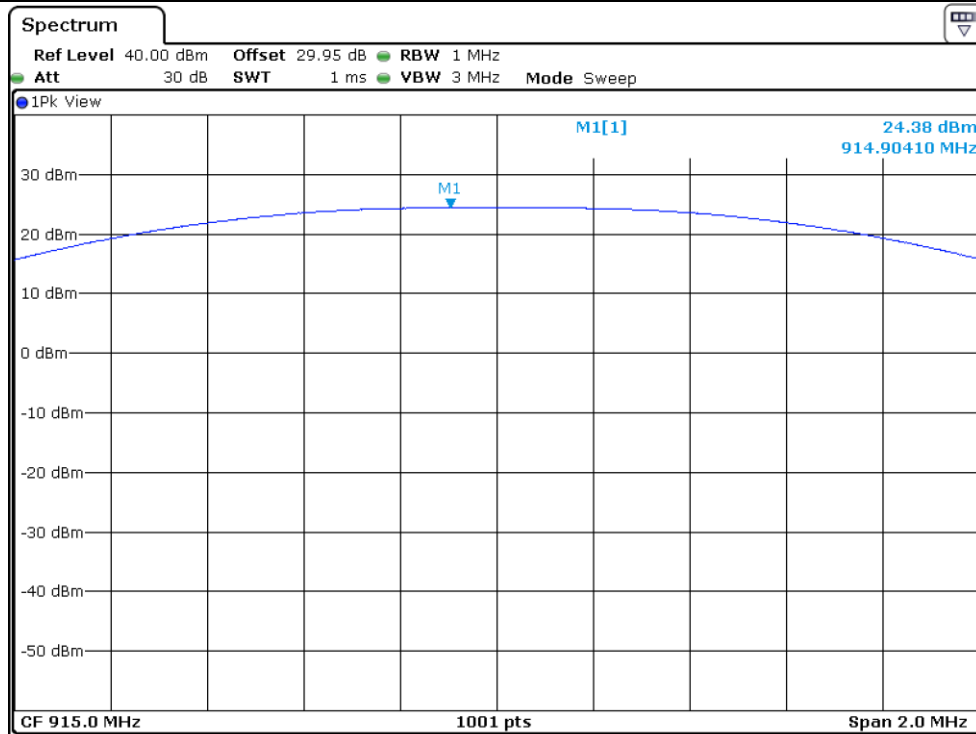
March 17, 2023 ~ April 04, 2023

7.4 Test data for Mode 1_Normal

-. Test Result : Pass

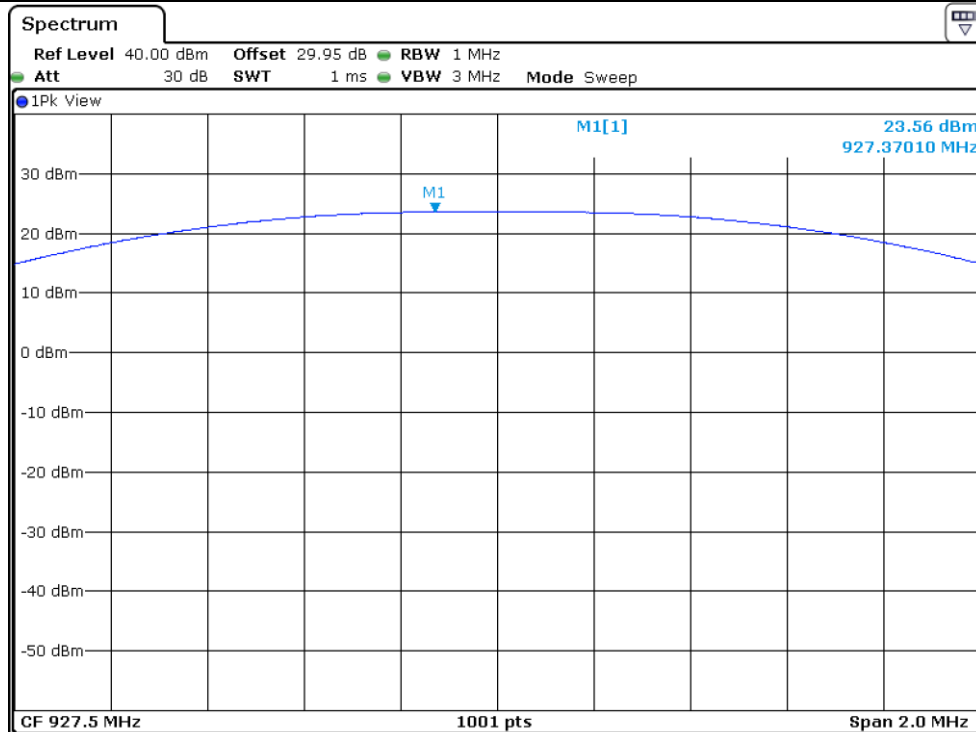
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE		LIMIT (mW)	MARGIN (mW)
		(dBm)	(mW)		
LOW	902.5000	25.78	378.44	1 000	621.56
MIDDLE	915.0000	24.38	274.16	1 000	725.84
HIGH	927.5000	23.56	226.99	1 000	773.01





Date: 4.APR.2023 09:28:21

Middle Channel



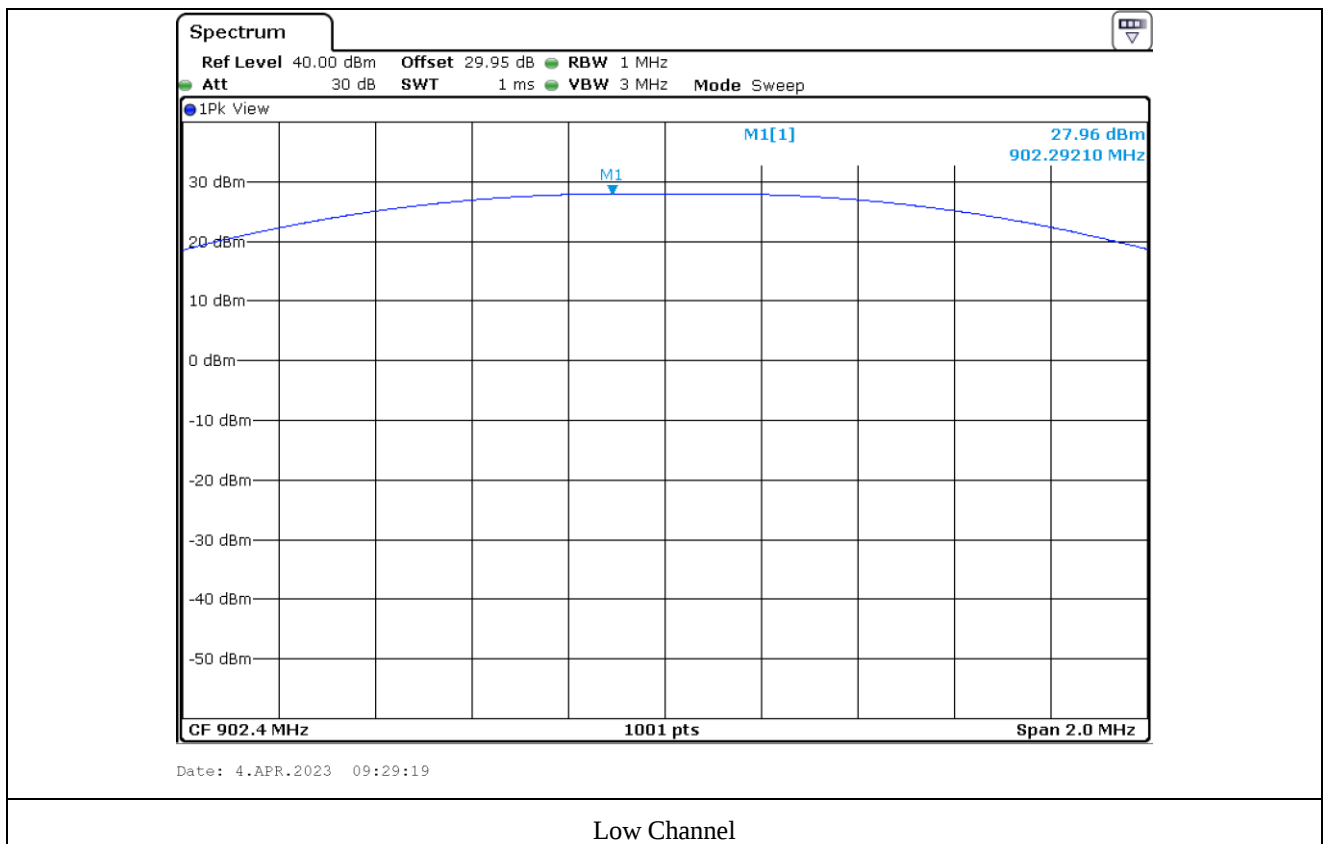
Date: 4.APR.2023 09:28:52

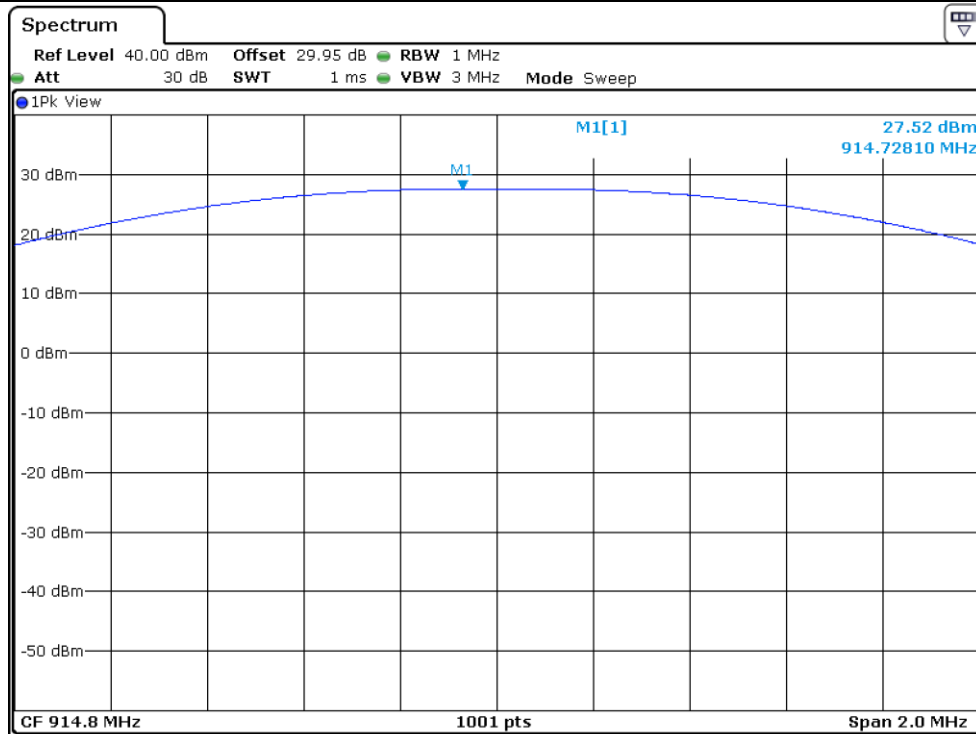
High Channel

7.5 Test data for Mode 2_Long

-. Test Result : Pass

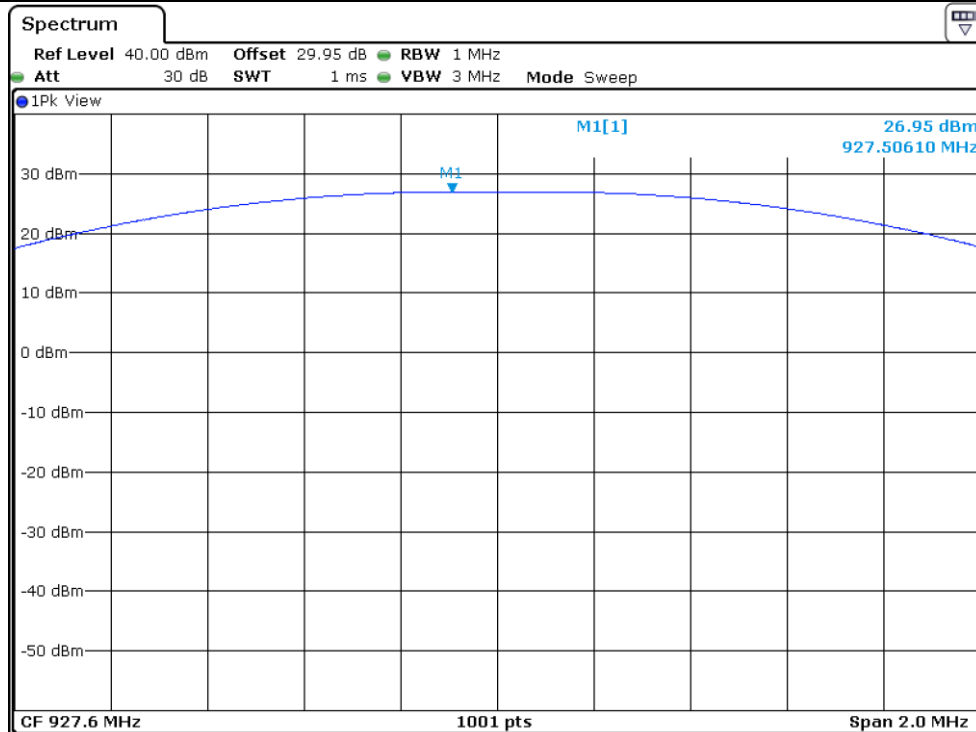
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE		LIMIT (mW)	MARGIN (mW)
		(dBm)	(mW)		
LOW	902.4000	27.96	625.17	1 000.00	374.83
MIDDLE	914.8000	27.52	564.94	1 000.00	435.06
HIGH	927.6000	26.95	495.45	1 000.00	504.55





Date: 4.APR.2023 09:29:45

Middle Channel



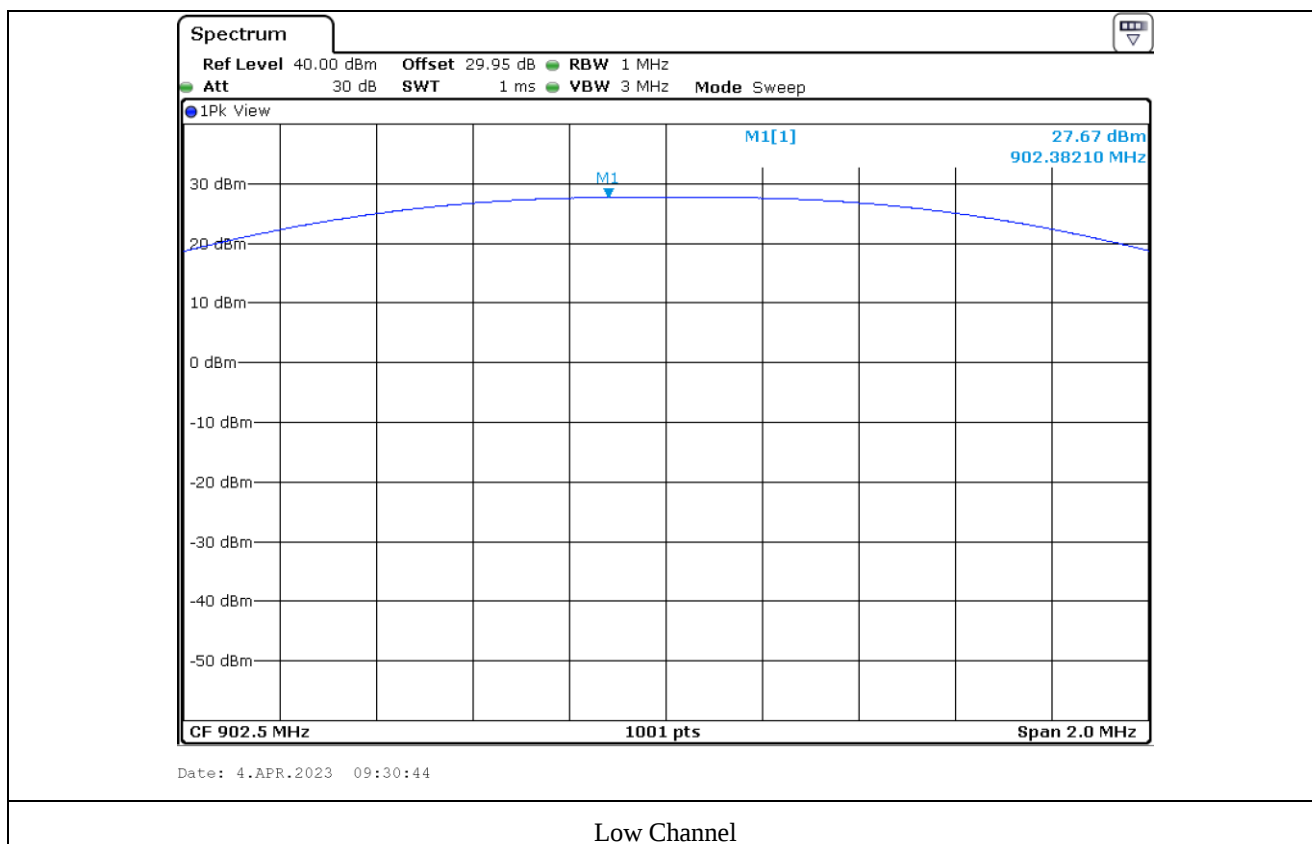
Date: 4.APR.2023 09:30:12

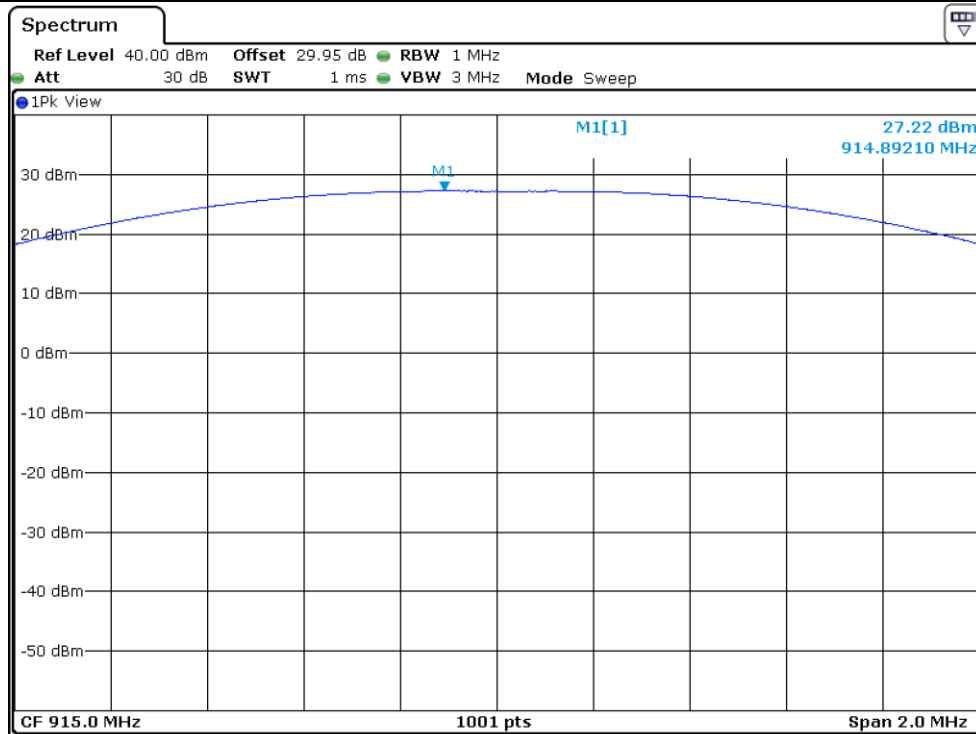
High Channel

7.6 Test data for Mode 3_Repeat

-. Test Result : Pass

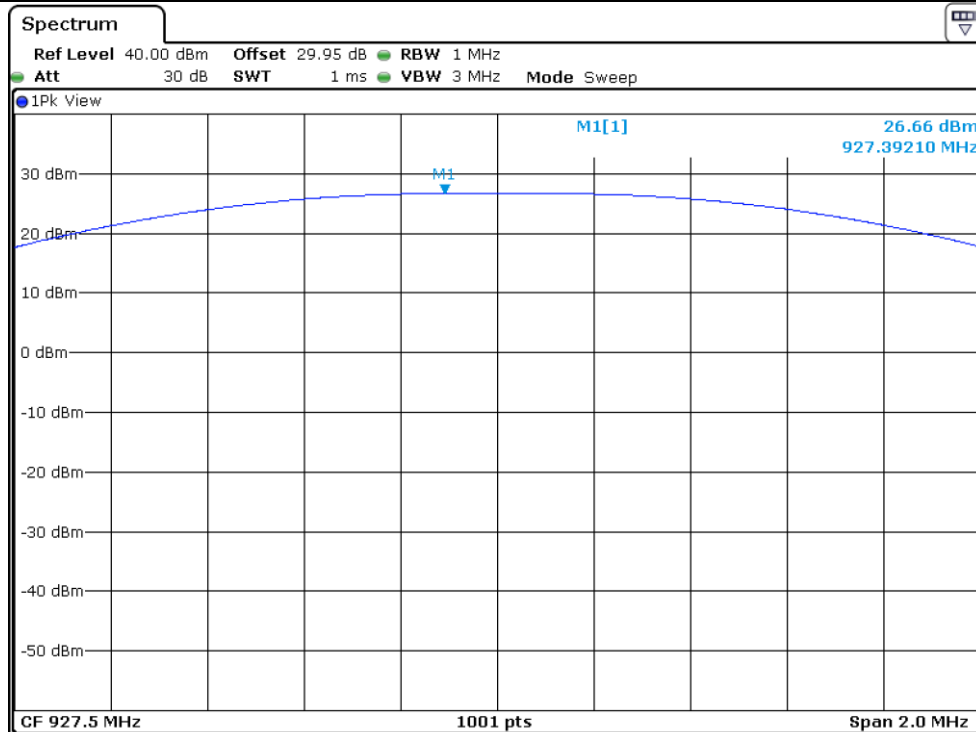
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE		LIMIT (mW)	MARGIN (mW)
		(dBm)	(mW)		
LOW	902.5000	27.67	584.79	1 000.00	415.21
MIDDLE	915.0000	27.22	527.23	1 000.00	472.77
HIGH	927.5000	26.66	463.45	1 000.00	536.55





Date: 4.APR.2023 09:31:21

Middle Channel



Date: 4.APR.2023 09:32:06

High Channel

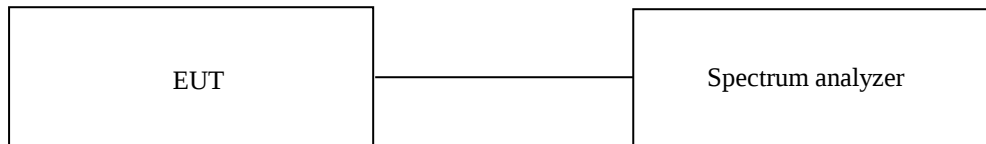
8. BAND EDGES

8.1 Operating environment

Temperature : 24 °C
Relative humidity : 48 % R.H.

8.2 Test set-up

According to §15.247(d) in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.



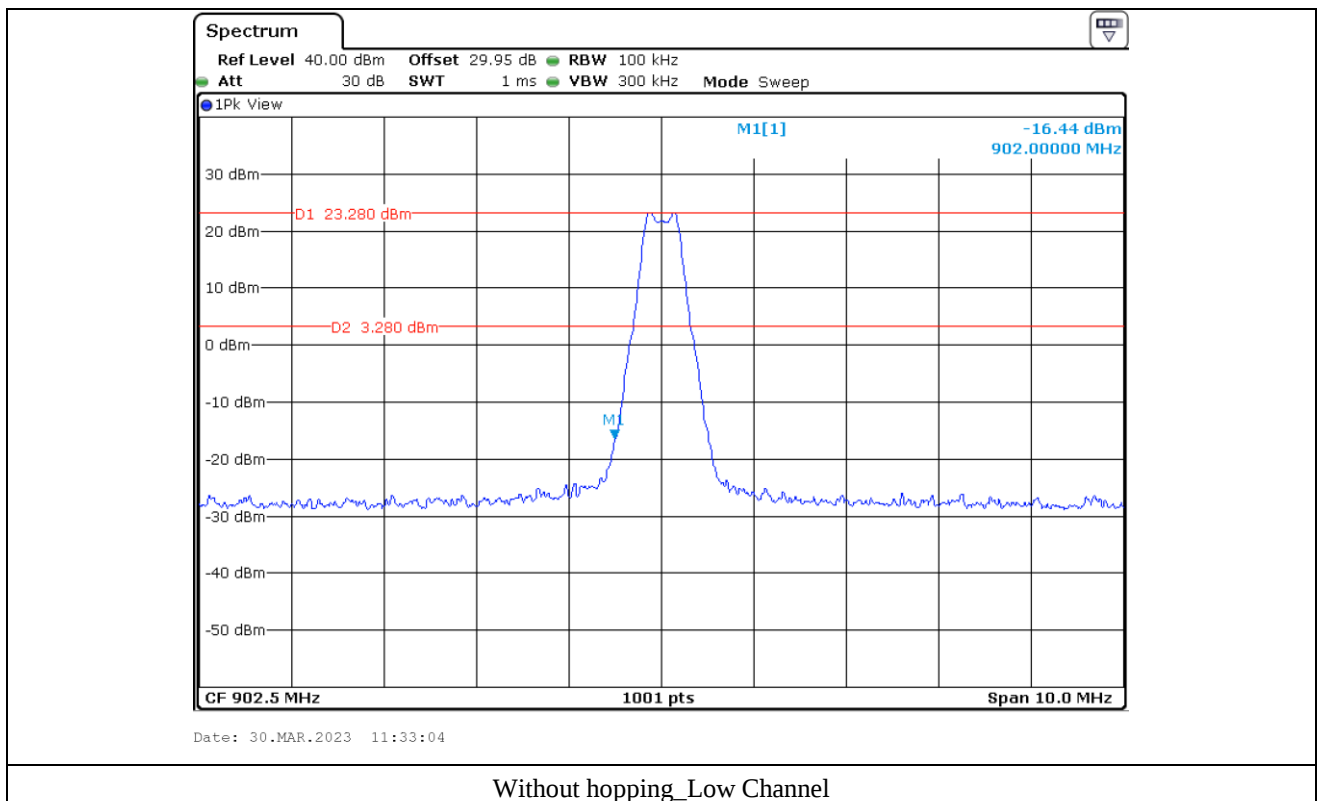
8.3 Test Date

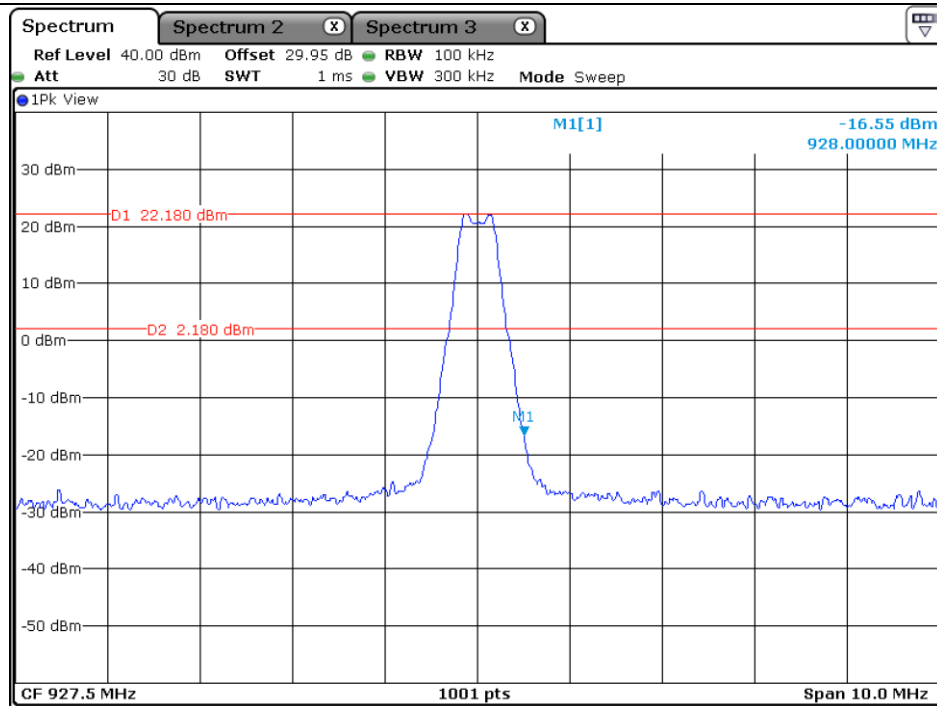
March 17, 2023 ~ April 04, 2023

8.4 Test data for Mode 1_Normal

-. Test Result : Pass

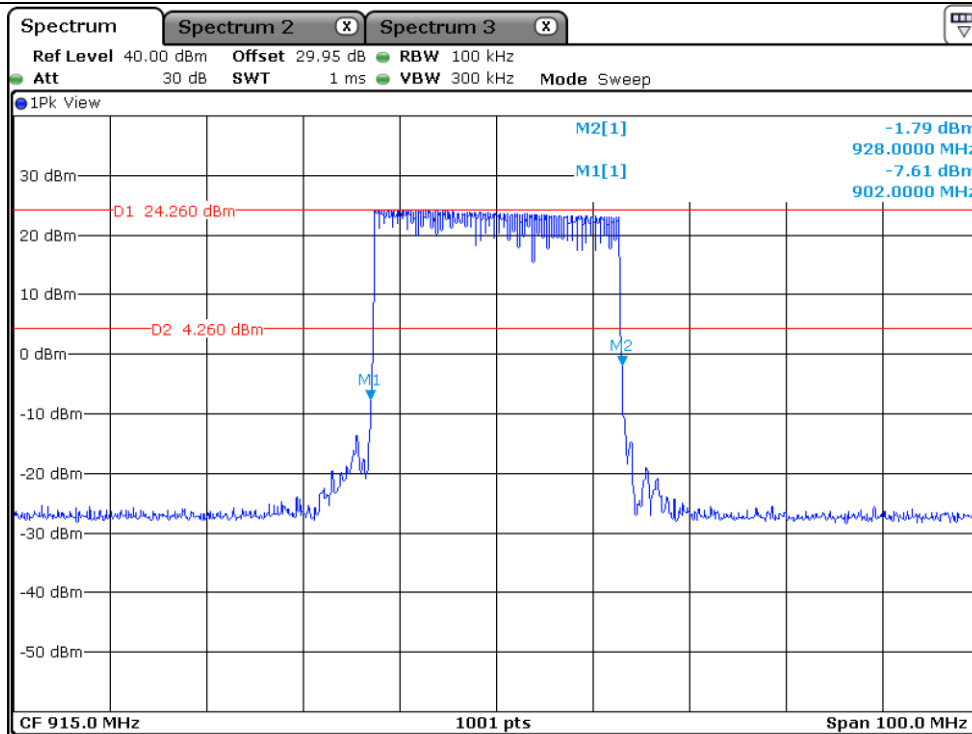
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dB)	LIMIT (dBc)	MARGIN (dB)
Without hopping				
LOW	902.5000	39.72	20.00	19.72
HIGH	927.5000	38.73	20.00	18.73
With Hopping				
LOW	902.5000	31.87	20.00	11.87
HIGH	927.5000	26.05	20.00	6.05





Date: 30.MAR.2023 13:32:52

Without hopping_High Channel



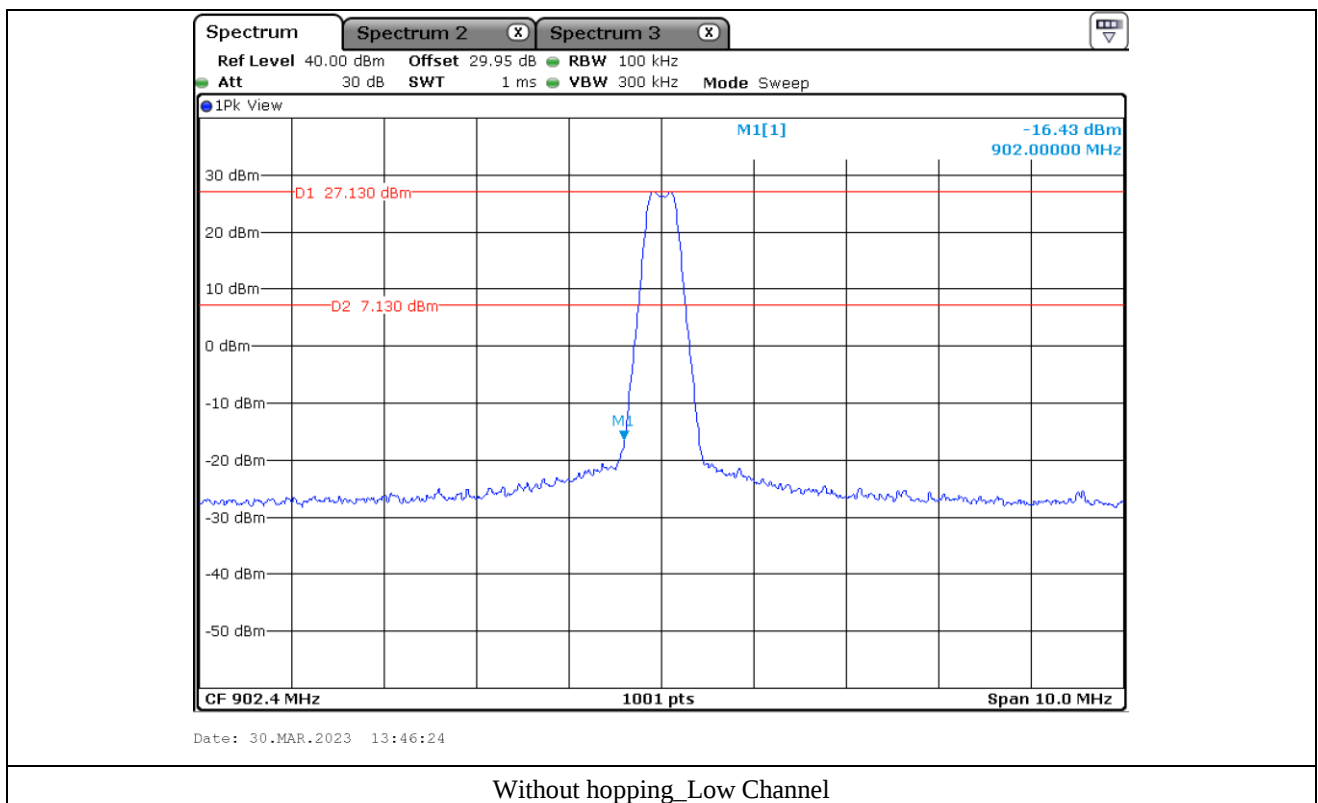
Date: 30.MAR.2023 13:37:33

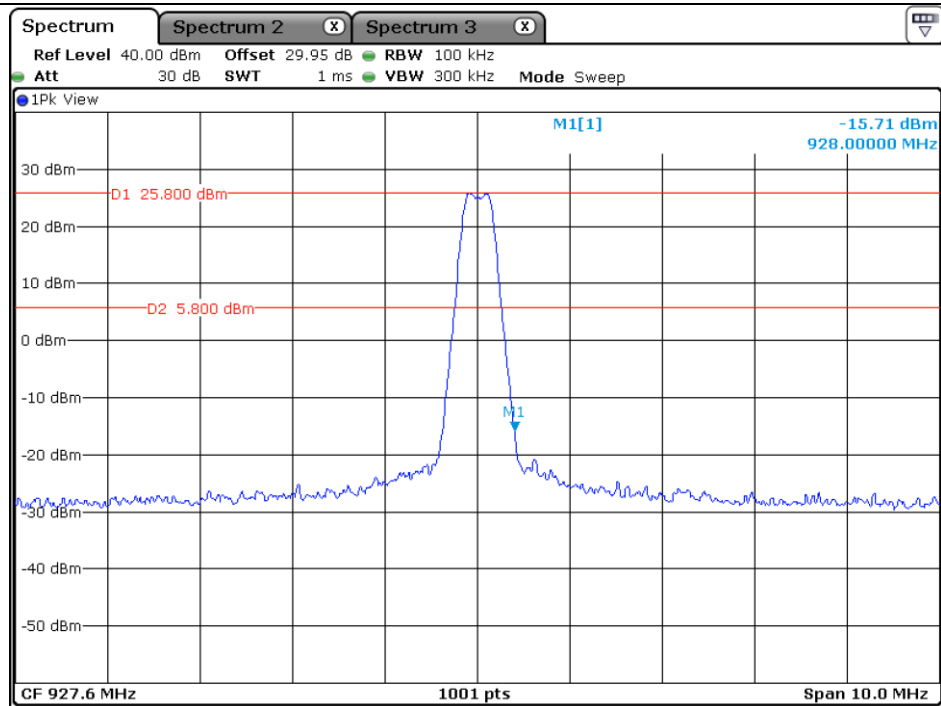
With Hopping

8.5 Test data for Mode 2_Long

-. Test Result : Pass

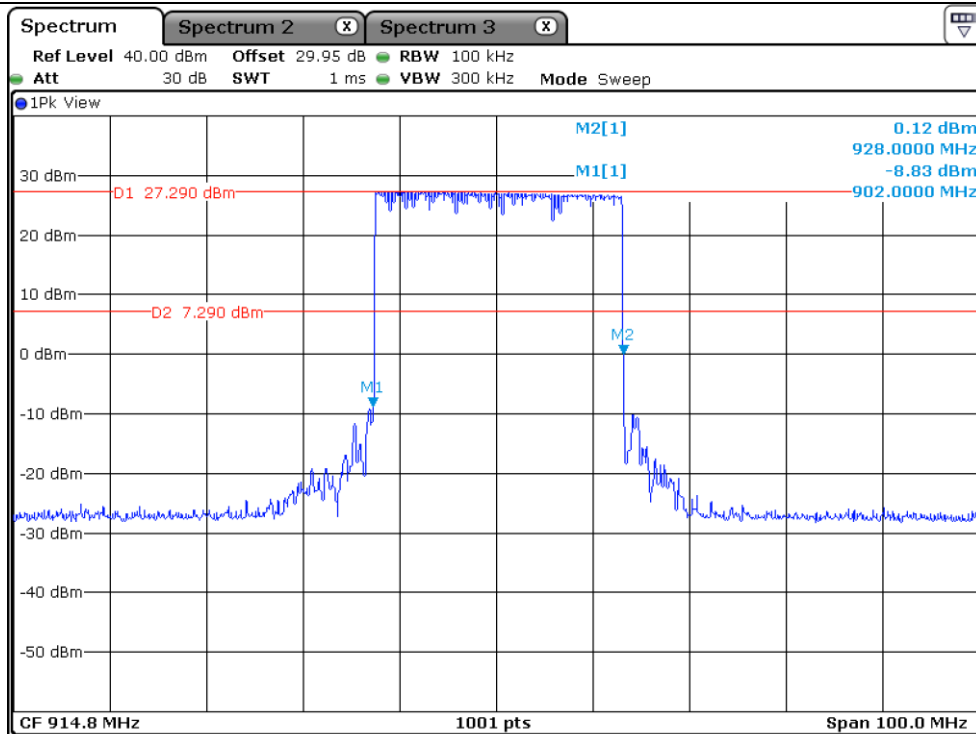
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dB)	LIMIT (dBc)	MARGIN (dB)
Without hopping				
LOW	902.4000	43.56	20.00	23.56
HIGH	927.6000	41.51	20.00	21.51
With Hopping				
LOW	902.4000	36.12	20.00	16.12
HIGH	927.6000	27.17	20.00	7.17





Date: 30.MAR.2023 14:06:15

Without hopping_High Channel



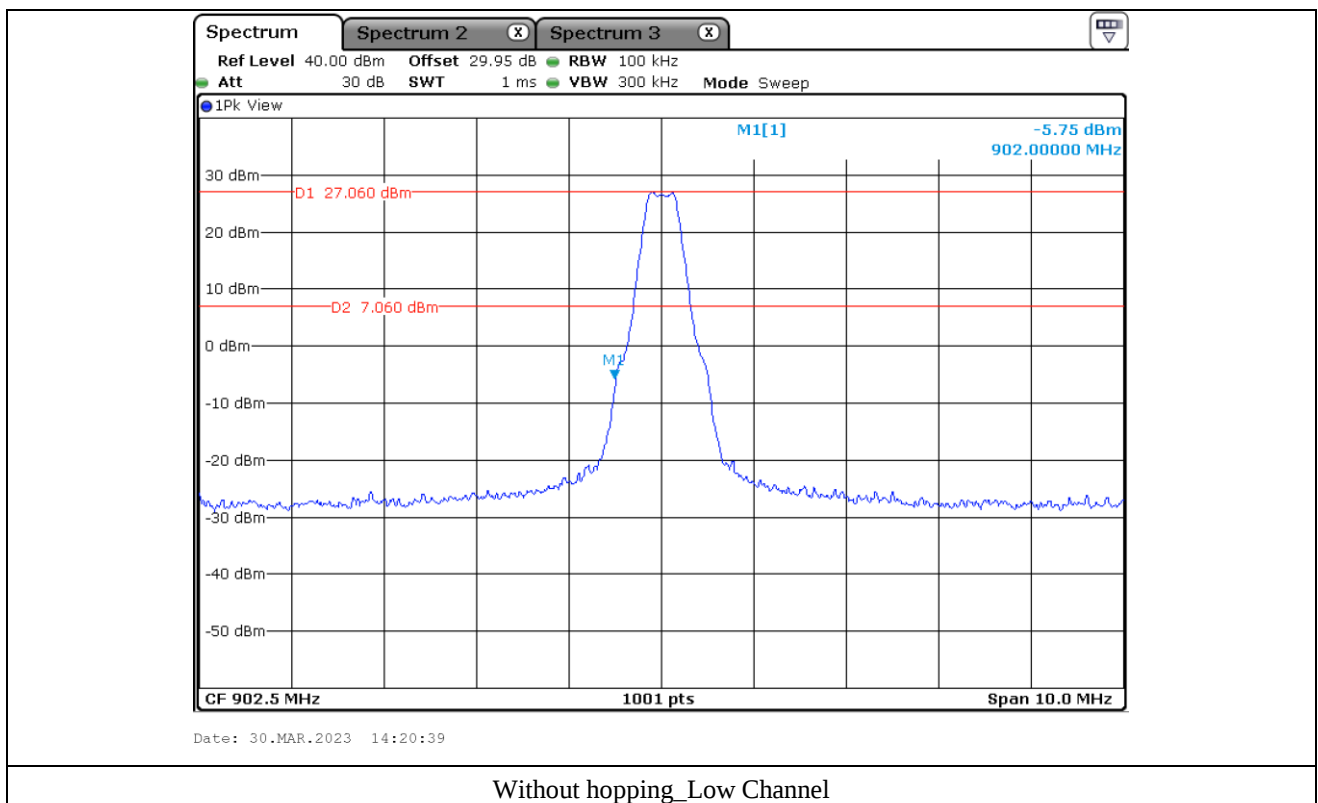
Date: 30.MAR.2023 14:15:39

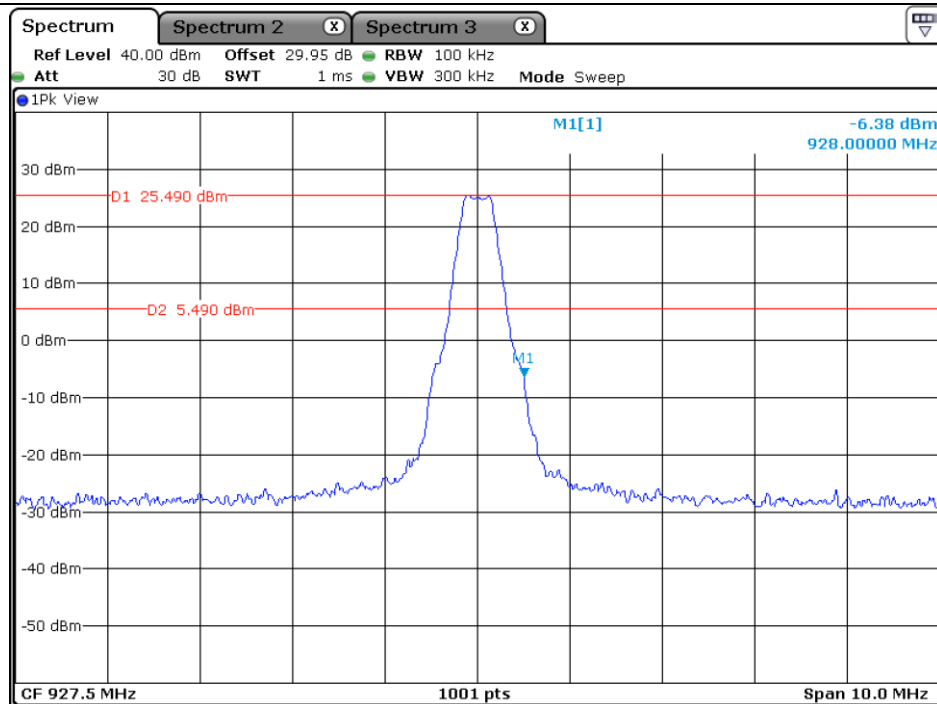
With Hopping

8.6 Test data for Mode 3_Repeat

-. Test Result : Pass

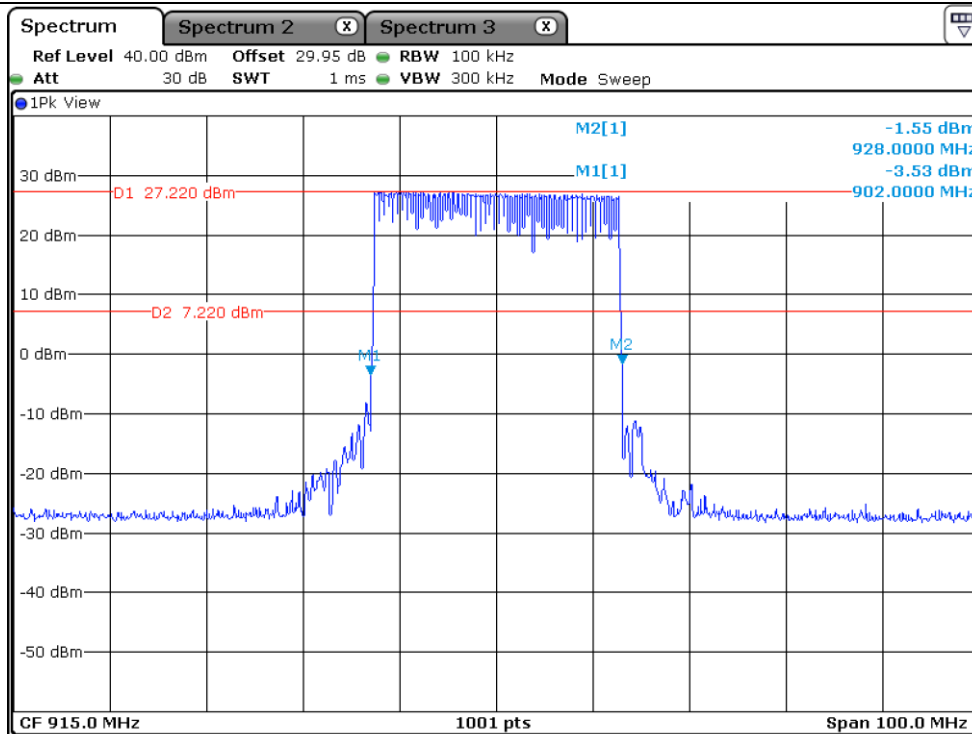
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dB)	LIMIT (dBc)	MARGIN (dB)
Without hopping				
LOW	902.5000	32.81	20.00	12.81
HIGH	927.5000	31.87	20.00	11.87
With Hopping				
LOW	902.5000	30.75	20.00	10.75
HIGH	927.5000	28.77	20.00	8.77





Date: 30.MAR.2023 14:30:13

Without hopping_High Channel



Date: 30.MAR.2023 14:34:34

With Hopping

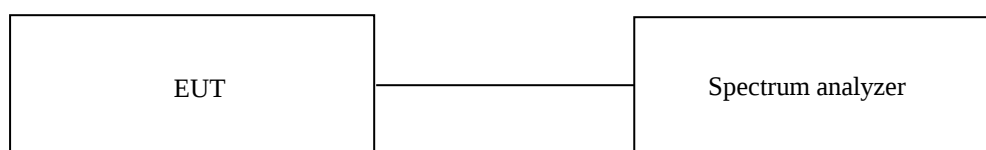
9. FREQUENCY SEPARATION / OCCUPIED BANDWIDTH (20 dB BANDWIDTH)

9.1 Operating environment

Temperature : 24 °C
Relative humidity : 48 % R.H.

9.2 Test set-up

According to §15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.



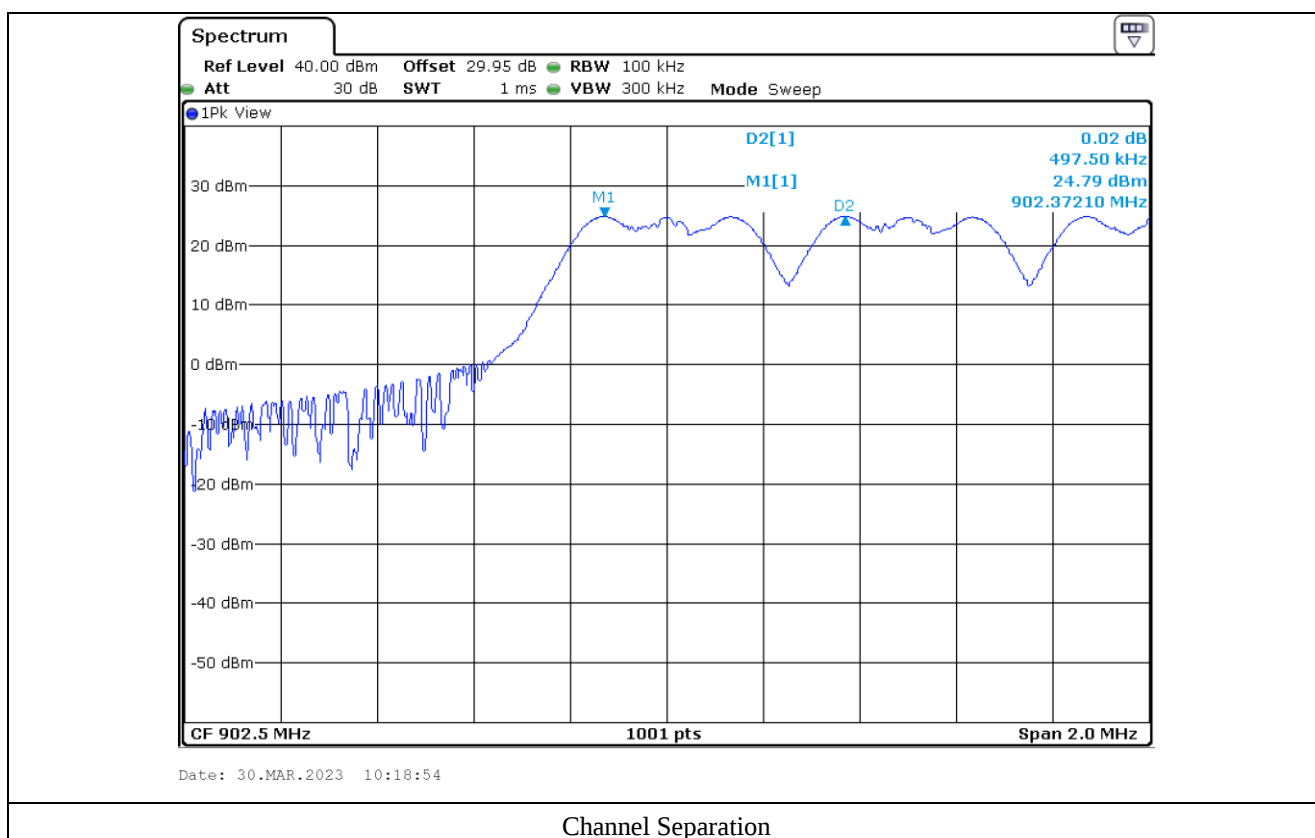
9.3 Test Date

March 17, 2023 ~ April 04, 2023

9.4 Test data for Mode 1_Normal

9.4.1 Carrier Frequency Separation / 20 dB Bandwidth

Channel Separation		Limit (kHz)	Result
Channel	Measured Value (kHz)		
LOW	497.50	500	Pass
MIDDLE	497.50		
HIGH	497.50		
20 dB Bandwidth		Limit (kHz)	Result
Channel	Measured Value (kHz)		
LOW	361.60	> 25 Or > 20 dB B.W. of Hopping Channel	Pass
MIDDLE	365.60		
HIGH	363.60		





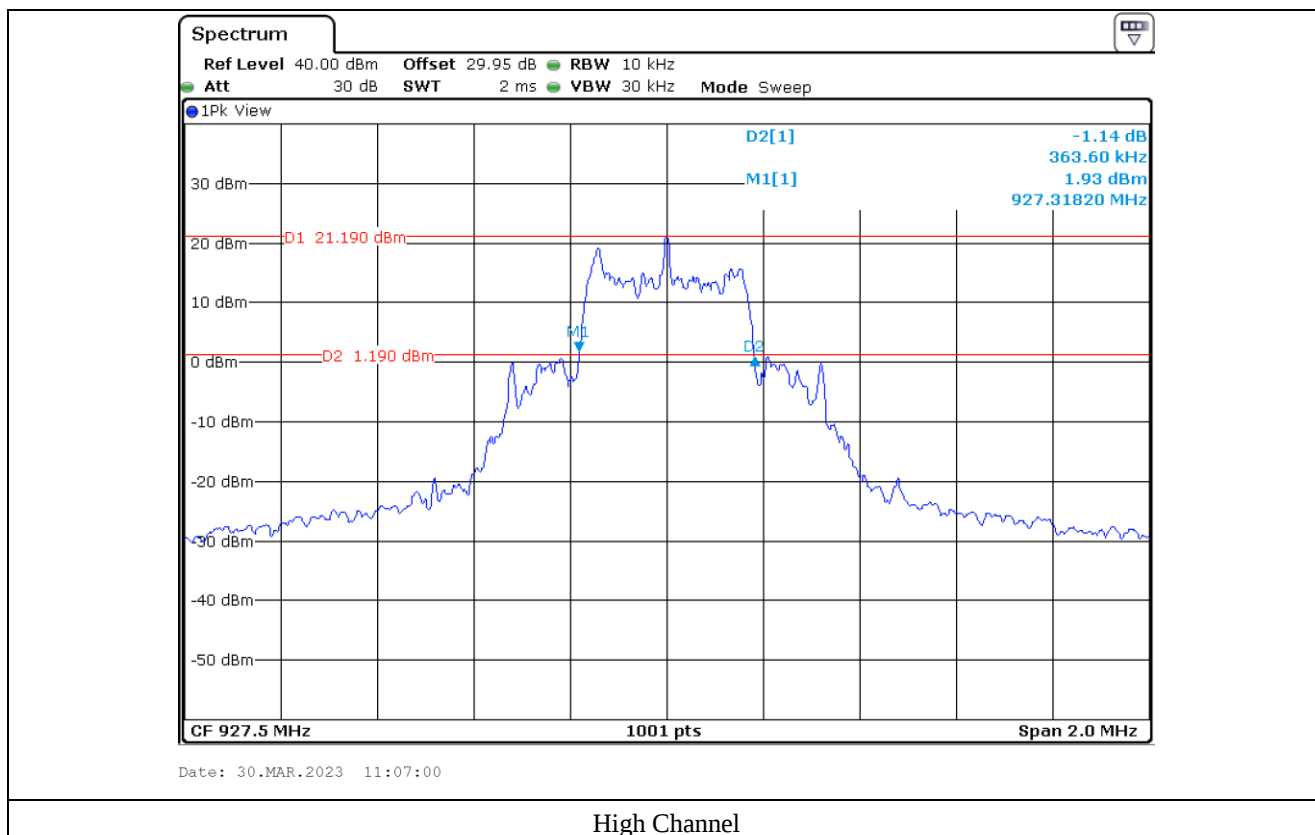
Date: 30.MAR.2023 11:02:37

Low Channel



Date: 30.MAR.2023 11:05:22

Middle Channel

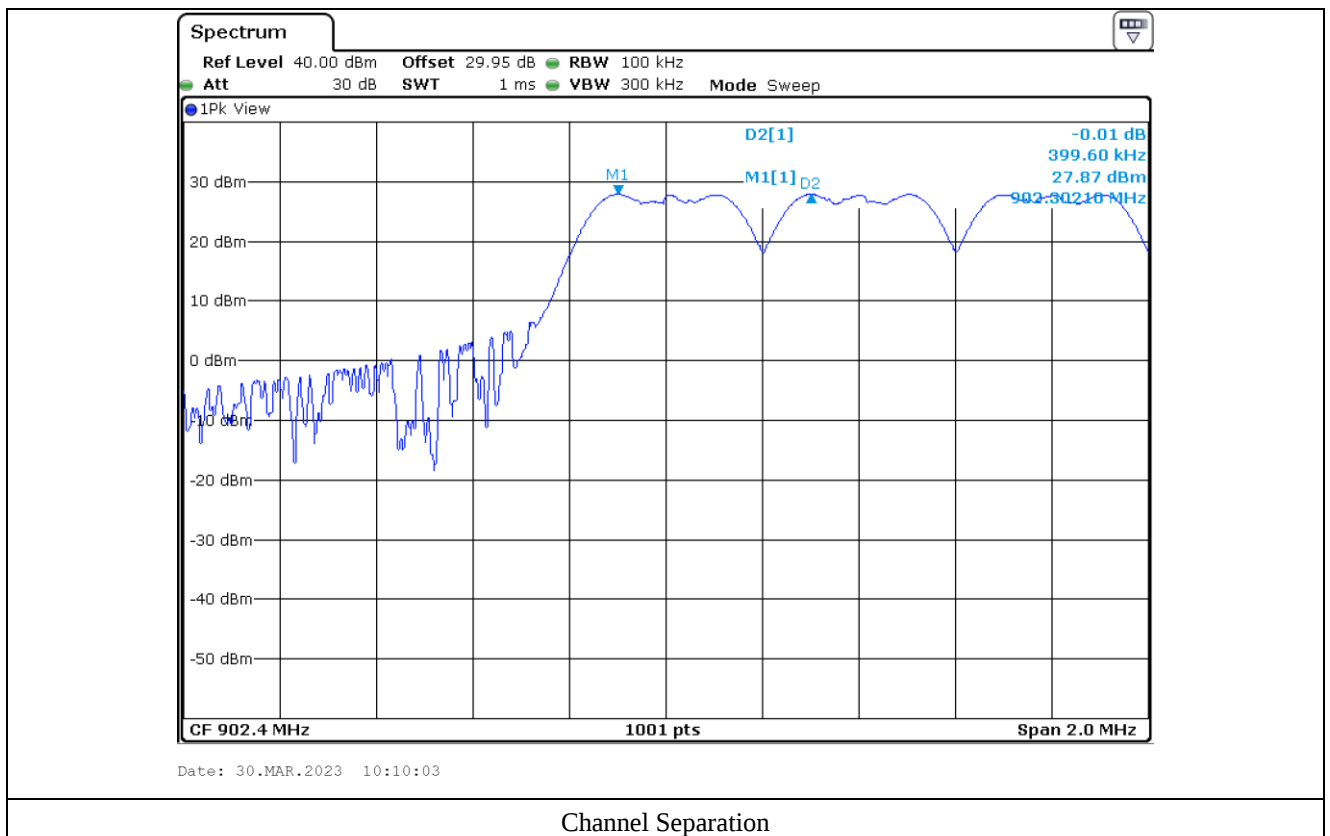


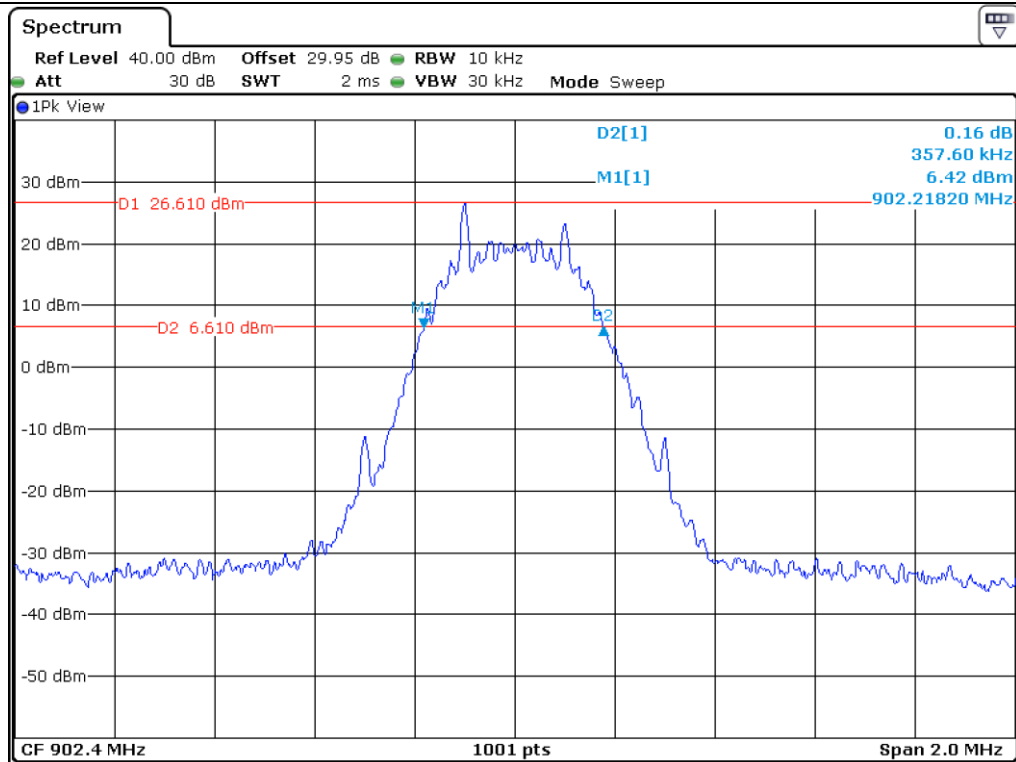
9.5 Test data for Mode 2_Long

9.5.1 Carrier Frequency Separation / 20 dB Bandwidth

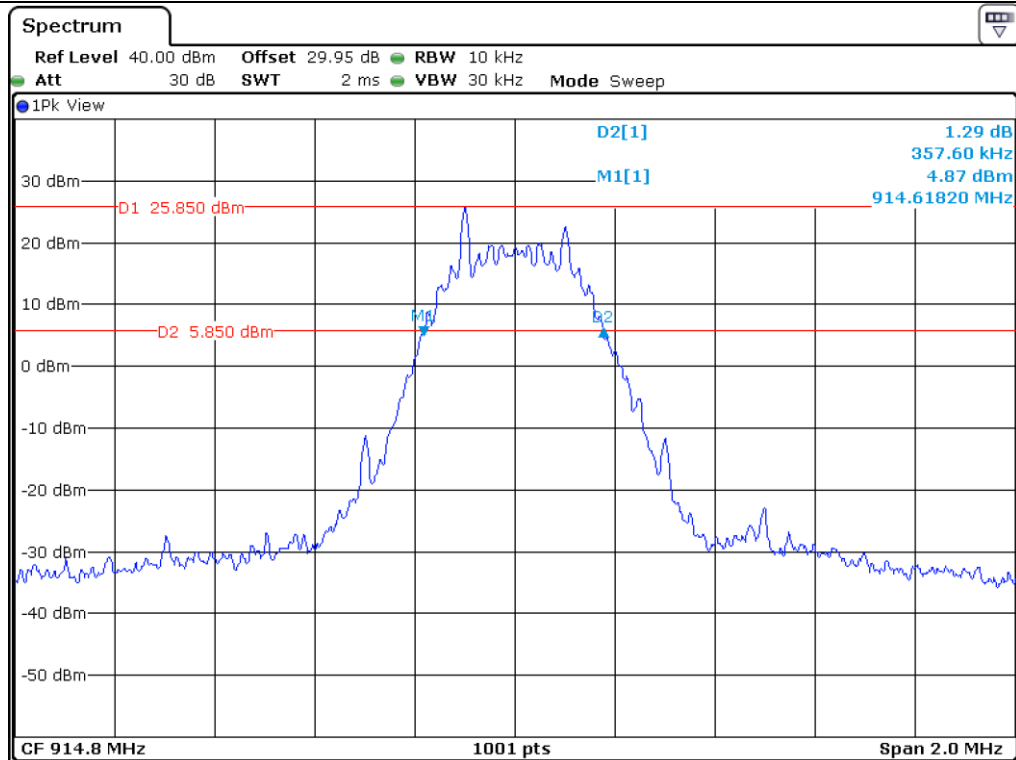
-. Test Result : Pass

Channel Seperation		Limit	Result
Channel	Measured Value (kHz)	(kHz)	
LOW	399.60	500	Pass
MIDDLE	401.60		
HIGH	403.60		
20 dB Bandwidth		Limit	Result
Channel	Measured Value (kHz)	(kHz)	
LOW	357.60	> 25 Or > 20 dB B.W. of Hopping Channel	Pass
MIDDLE	357.60		
HIGH	357.60		





Low Channel



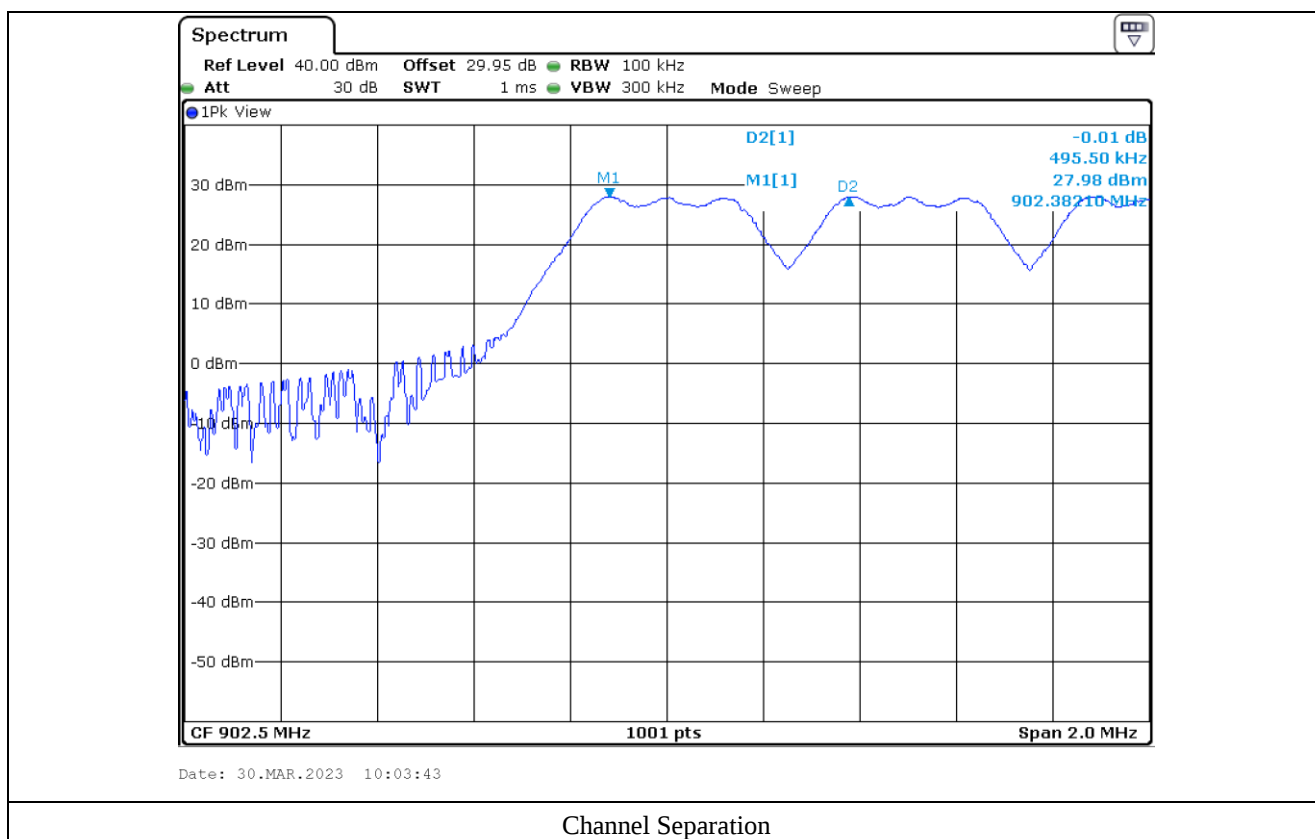
Middle Channel

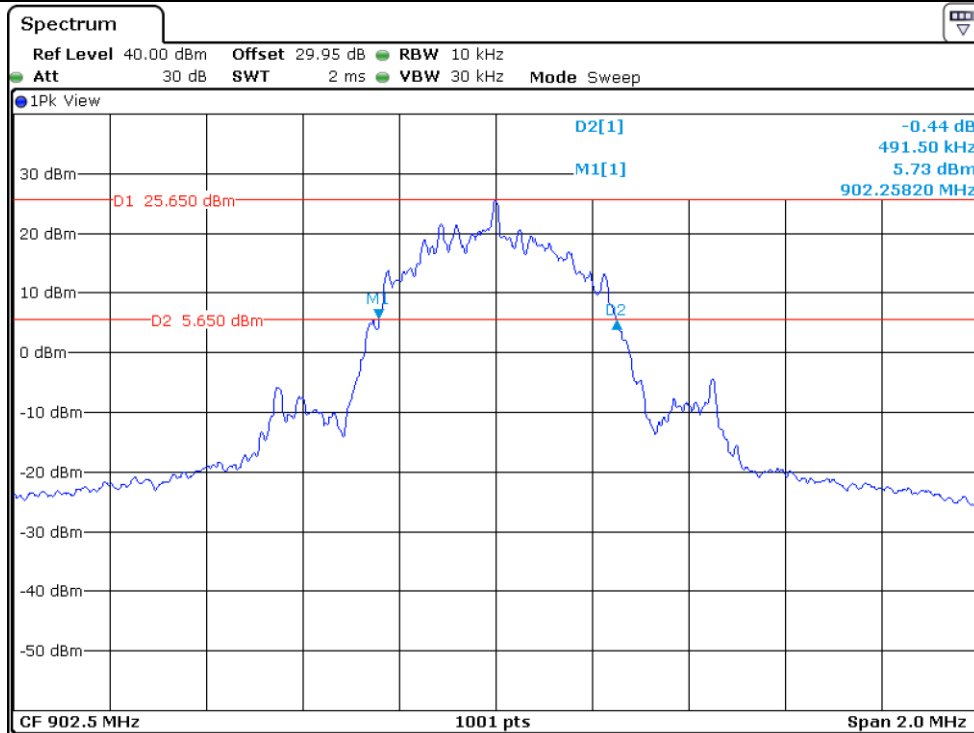
9.6 Test data for Mode 3_Repeat

9.6.1 Carrier Frequency Separation / 20 dB Bandwidth

-. Test Result : Pass

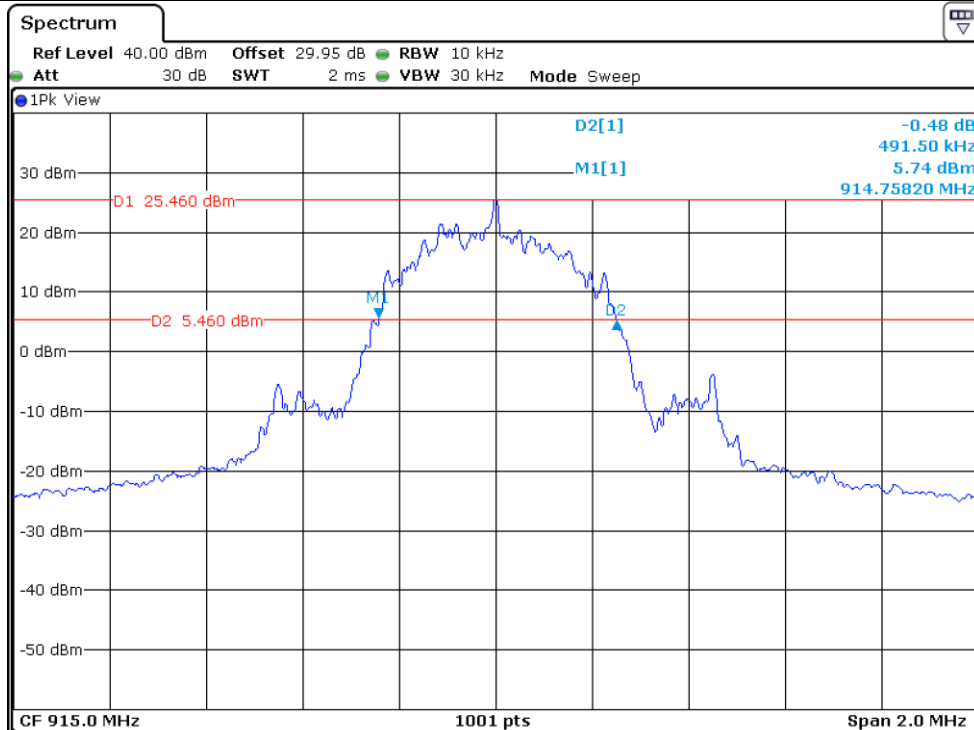
Channel Seperation		Limit	Result
Channel	Measured Value (kHz)	(kHz)	
LOW	495.50	500	Pass
MIDDLE	493.50		
HIGH	487.50		
20 dB Bandwidth		Limit	Result
Channel	Measured Value (kHz)	(kHz)	
LOW	491.50	> 25 Or > 20 dB B.W. of Hopping Channel	Pass
MIDDLE	491.50		
HIGH	491.50		





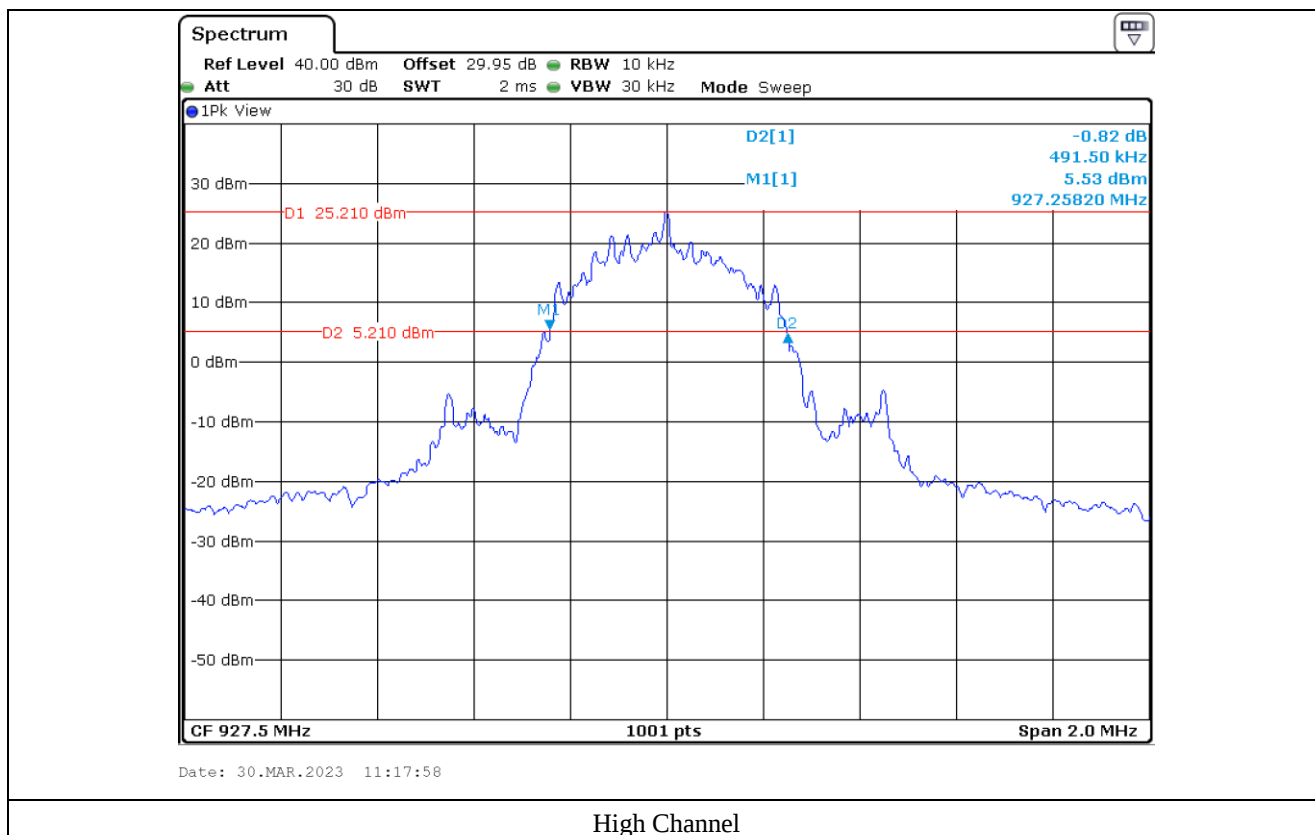
Date: 30.MAR.2023 11:13:38

Low Channel



Date: 30.MAR.2023 11:16:22

Middle Channel



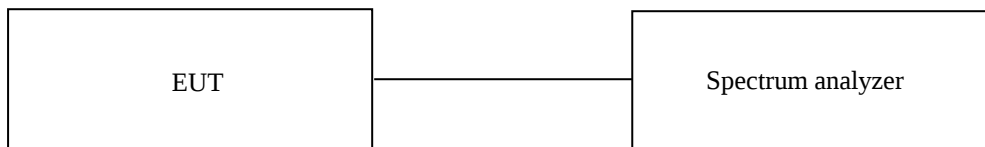
10. NUMBER OF HOPPING FREQUENCY

10.1 Operating environment

Temperature : 24 °C
Relative humidity : 48 % R.H.

10.2 Test set-up

According to §15.247(a)(1)(i) if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 20-second period. If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping channels and the average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10-second period. The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.



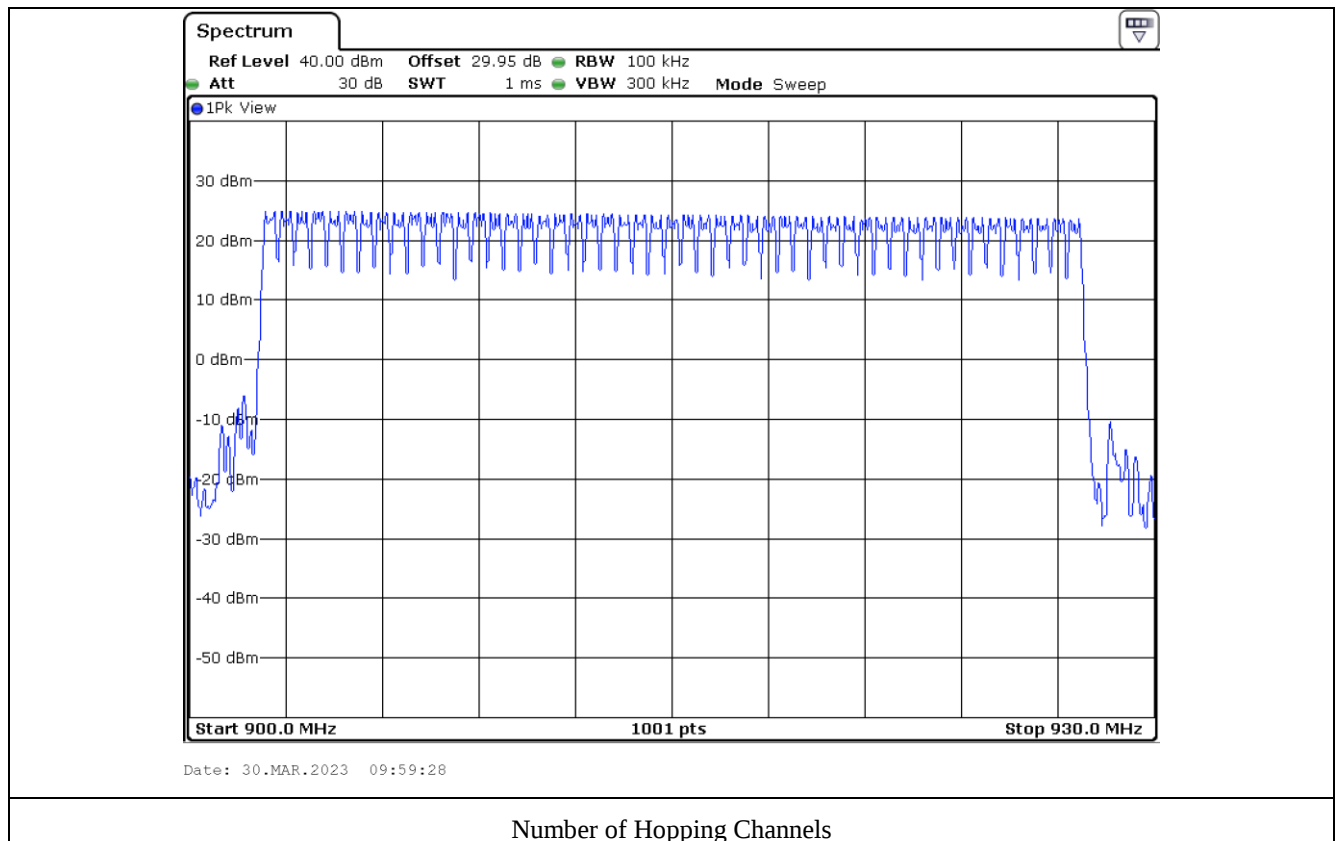
10.3 Test Date

March 17, 2023 ~ April 04, 2023

10.4 Test data for Mode 1_Normal

-. Test Result : Pass

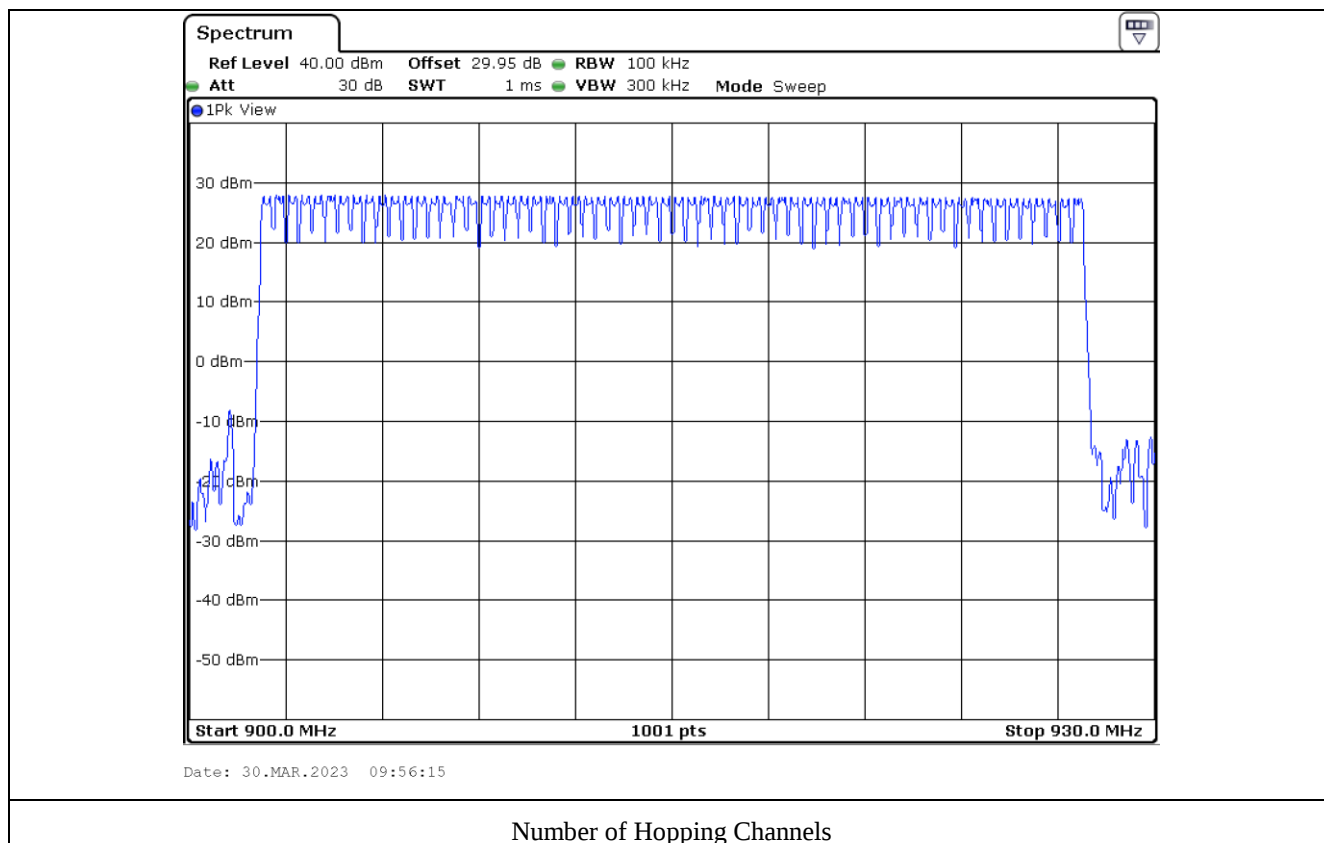
Number of Hopping Frequencies	Limit (EA)
51	25 ≤



10.5 Test data for Mode 2_Long

-. Test Result : Pass

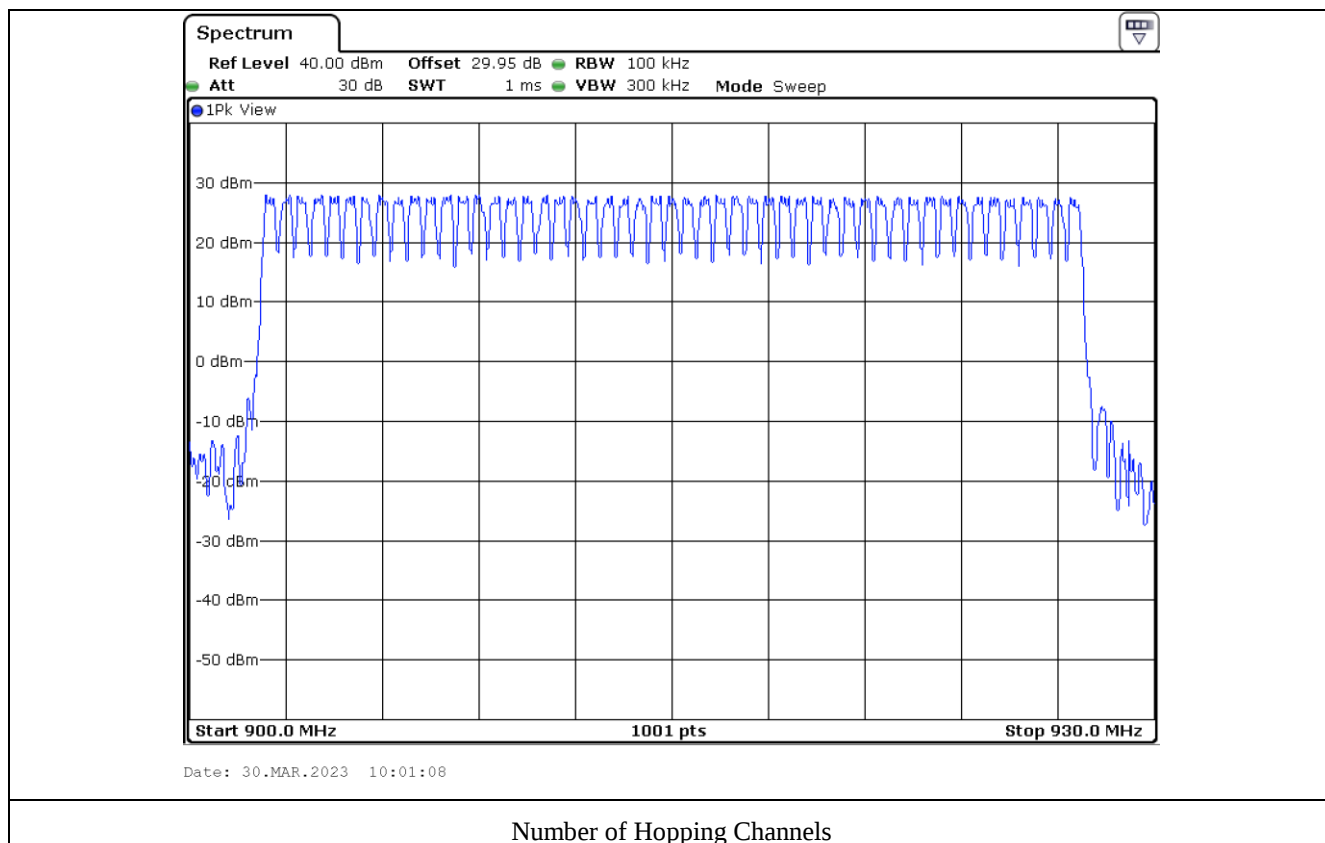
Number of Hopping Frequencies	Limit (EA)
64	25 ≤



10.6 Test data for Mode 3_Repeat

-. Test Result : Pass

Number of Hopping Frequencies	Limit (EA)
51	25 ≤



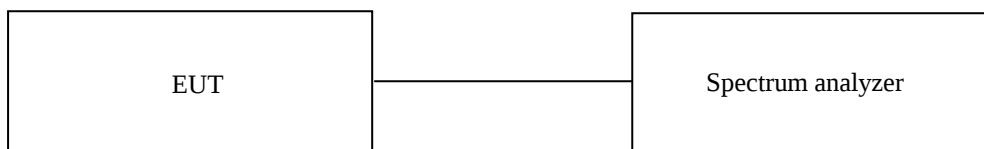
11. TIME OF OCCUPANCY (DWELL TIME)

11.1 Operating environment

Temperature : 24 °C
Relative humidity : 48 % R.H.

11.2 Test set-up

According to §15.247(a)(1)(i) / RSS-247 5.1.3, Frequency hopping systems operating in the 902 MHz ~ 928 MHz bands. if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.



11.3 Test Date

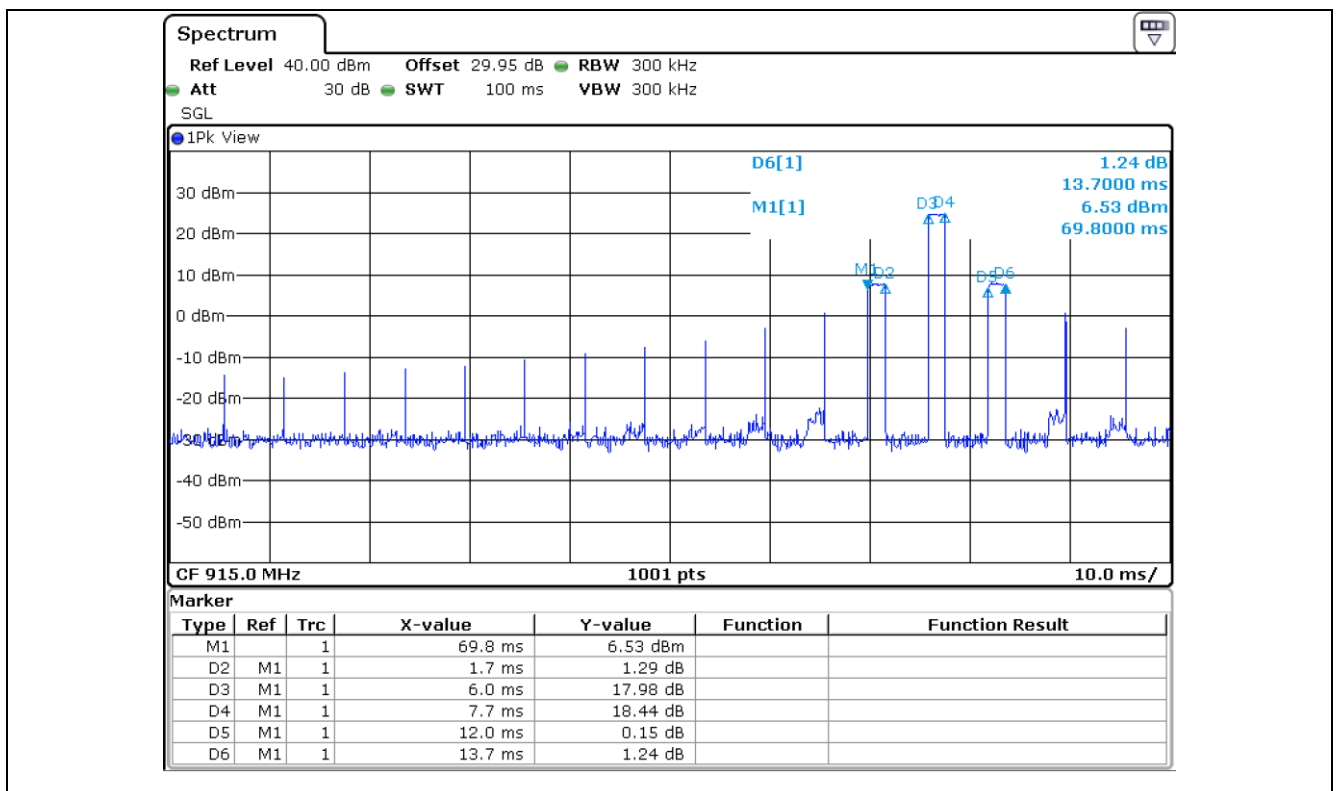
March 17, 2023 ~ April 04, 2023

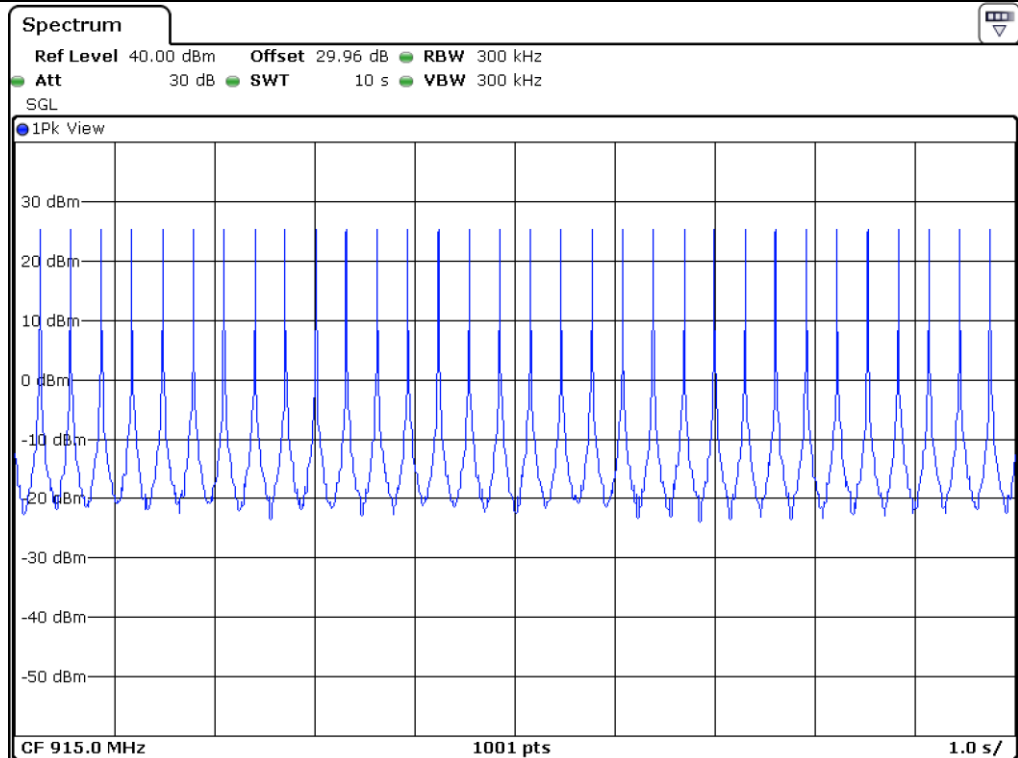
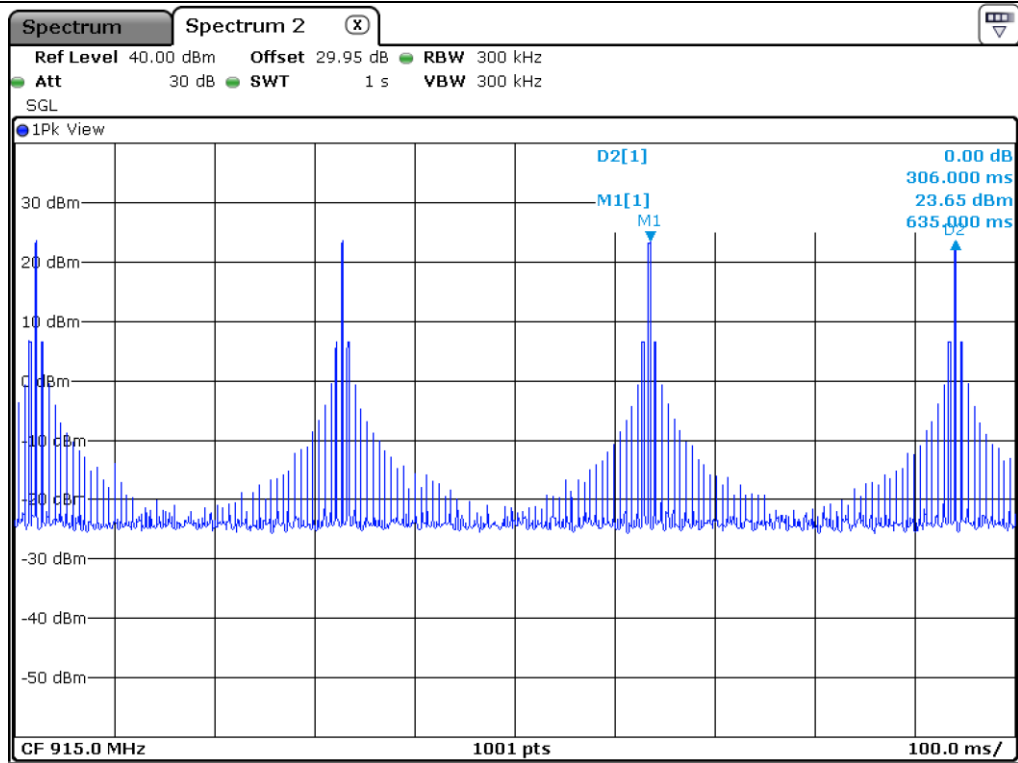
11.4 Test data for Mode 1_Normal

-. Test Result : Pass

Channel	Average Time of Occupancy(ms)	Number of Pulse in 10 seconds	Total(ms)	Limit(ms)
MIDDLE	5.1	33.00	168.3	400.00

Note : Total : Average Time of Occupancy * Number of Pulse in 10 seconds.



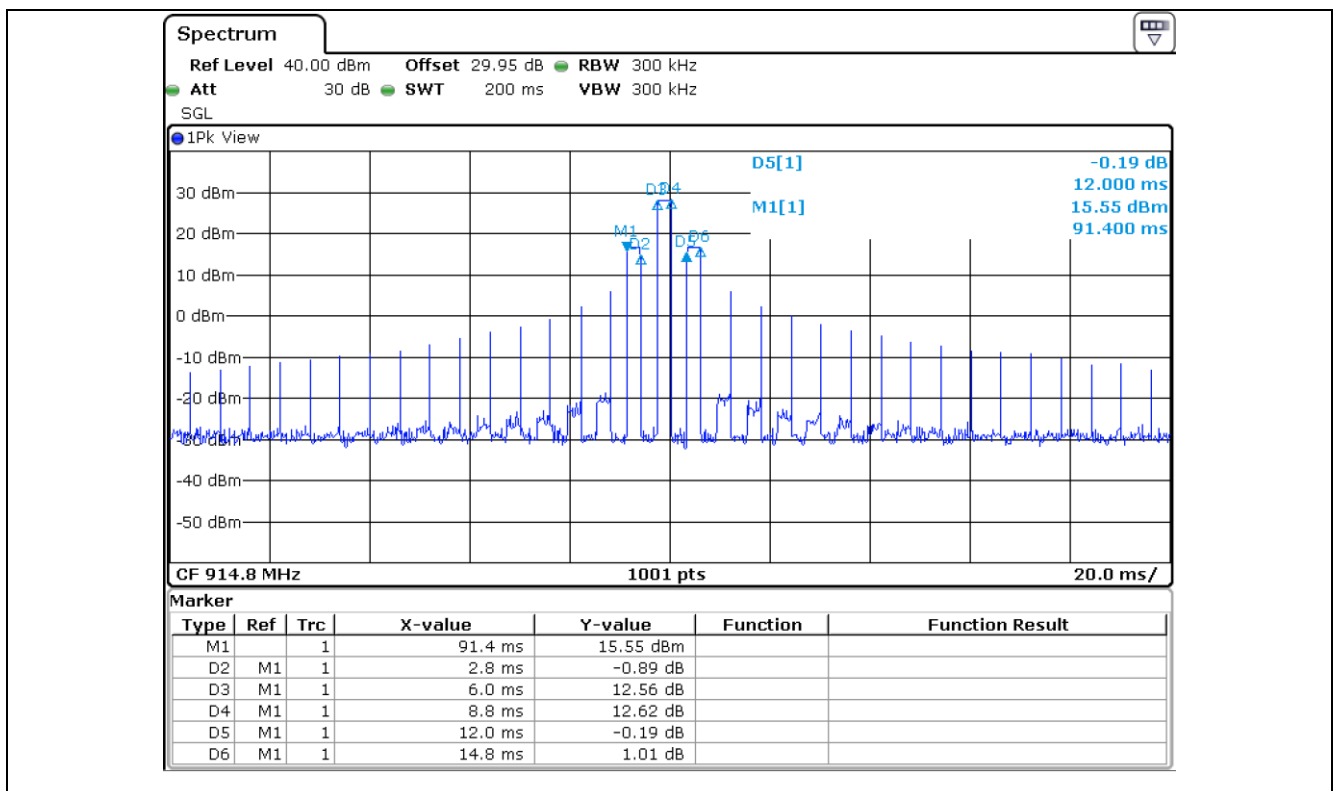


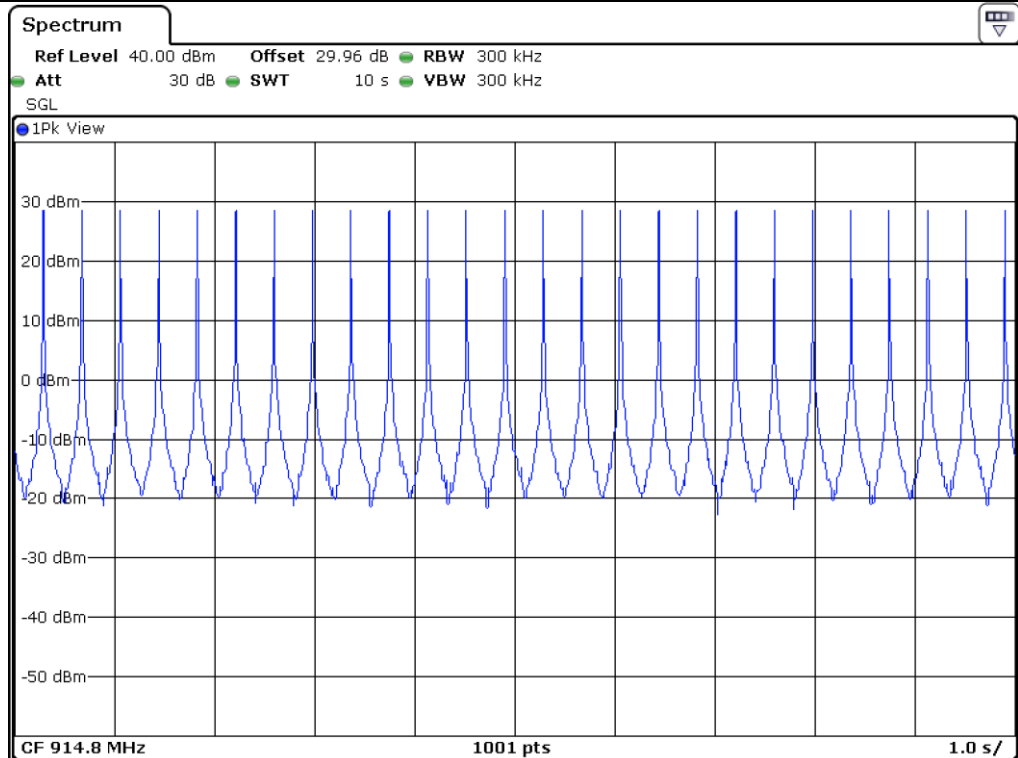
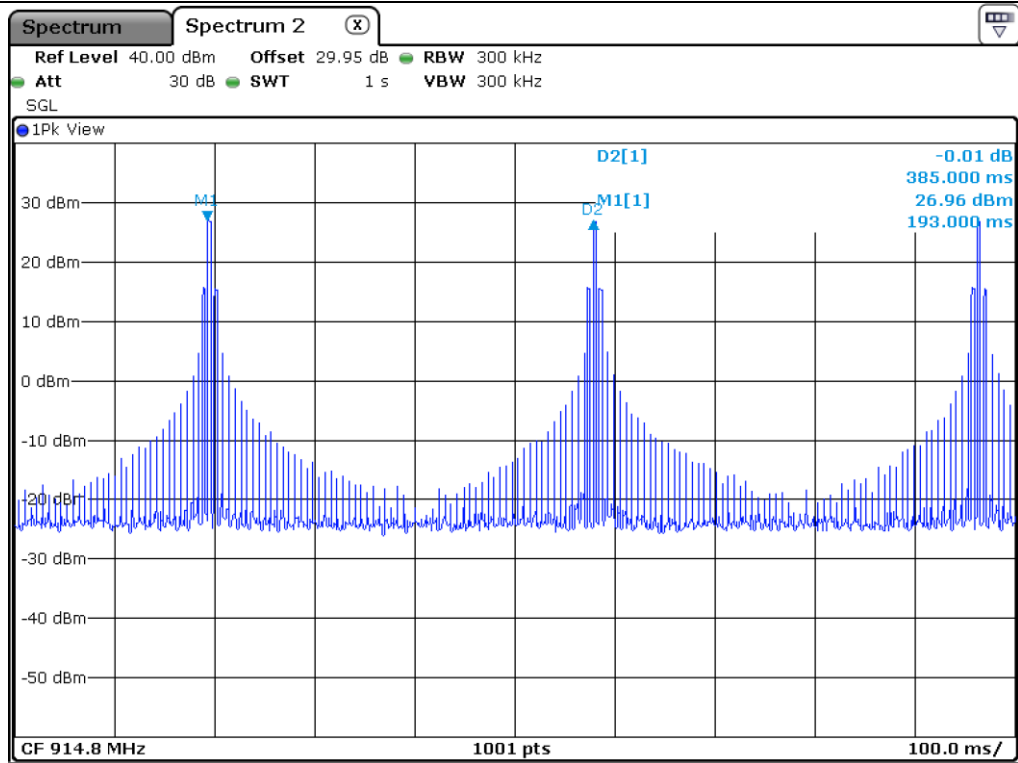
11.5 Test data for Mode 2_Long

-. Test Result : Pass

Channel	Average Time of Occupancy(ms)	Number of Pulse in 10 seconds	Total(ms)	Limit(ms)
MIDDLE	8.4	26.0	218.4	400.00

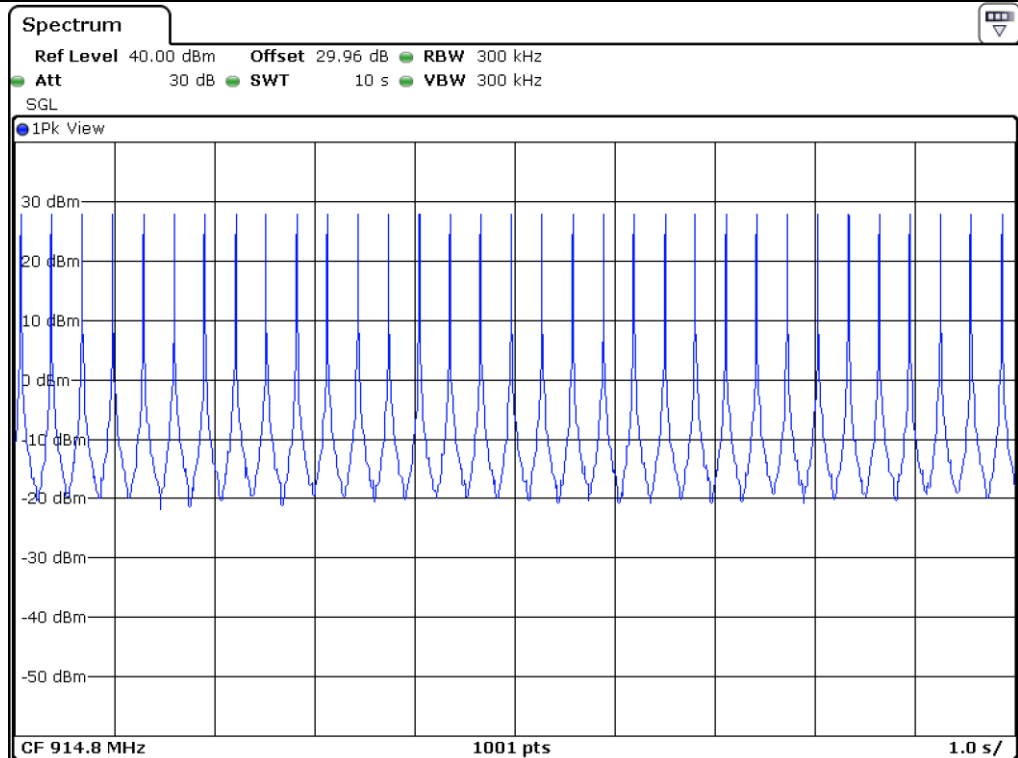
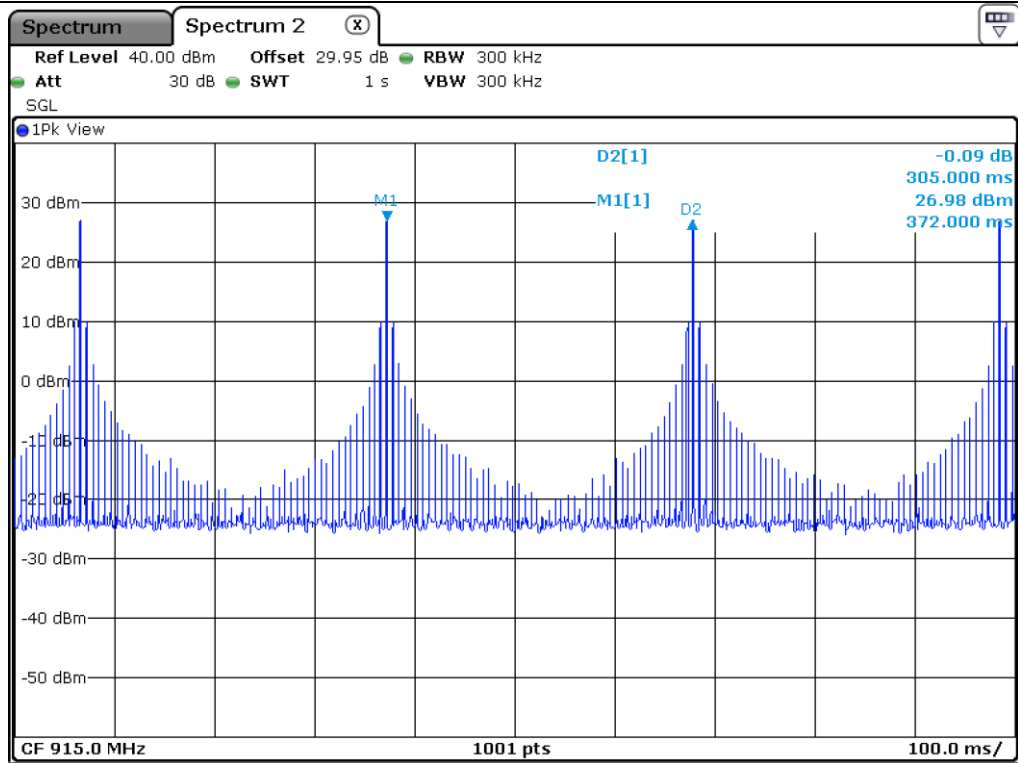
Note : Total : Average Time of Occupancy * Number of Pulse in 10 seconds.





-. Test Result : Pass

Note : Total : Average Time of Occupancy * Number of Pulse in 10 seconds.



12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

12.1 Operating environment

Temperature : 24 °C
Relative humidity : 48 % R.H.

12.2 Test set-up for conducted / radiated measurement

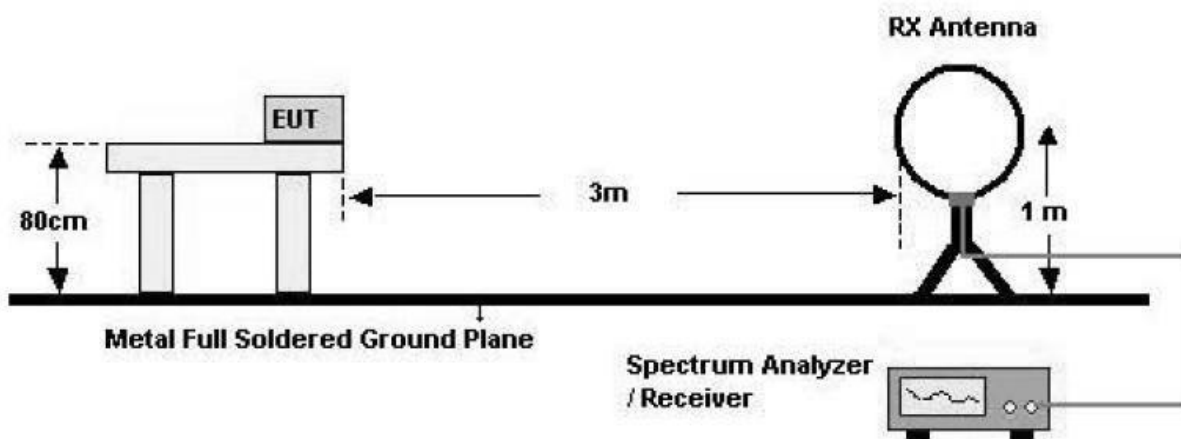
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

- Conducted Configuration

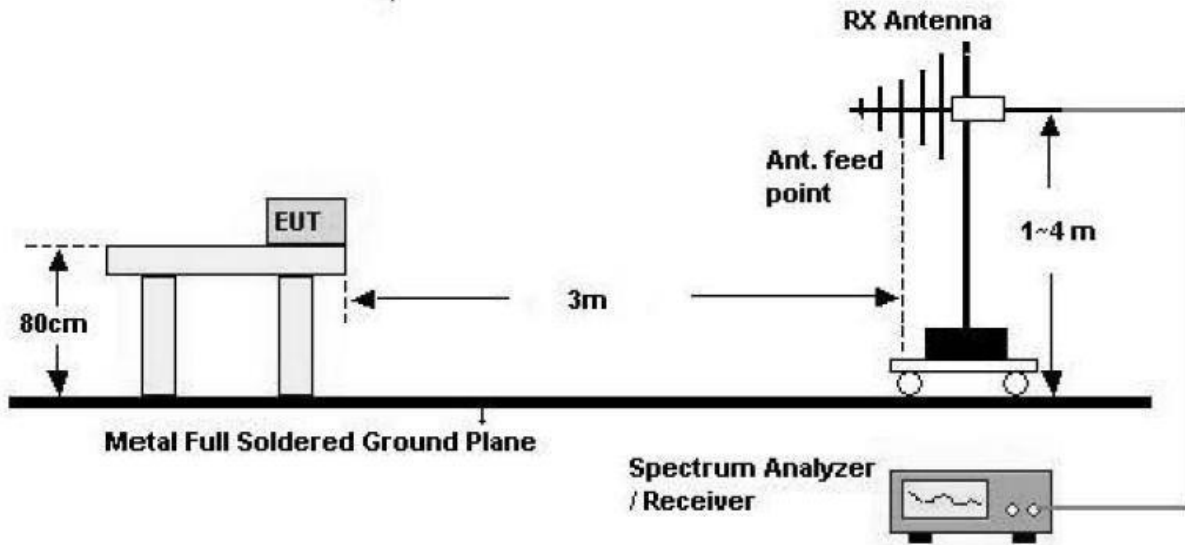


- Radiated Configuration

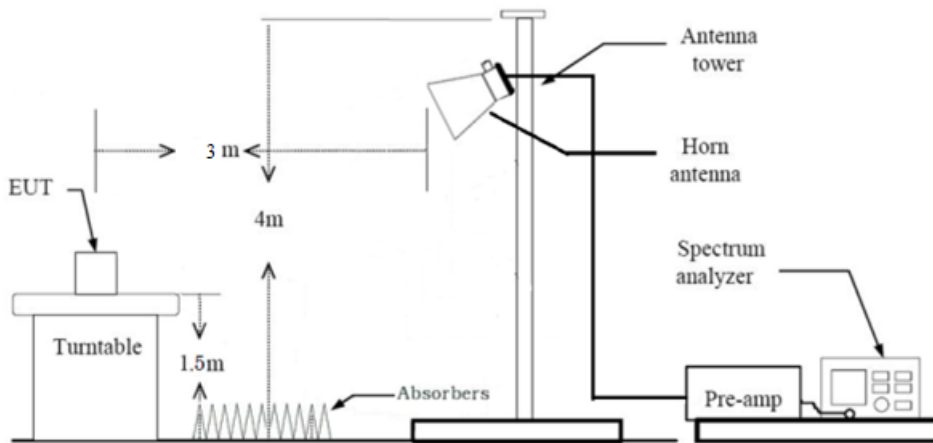
1. Below 30 MHz



2. 30 MHz - 1 GHz



3. Above 1 GHz



12.3 Test Date

March 17, 2023 ~ April 04, 2023

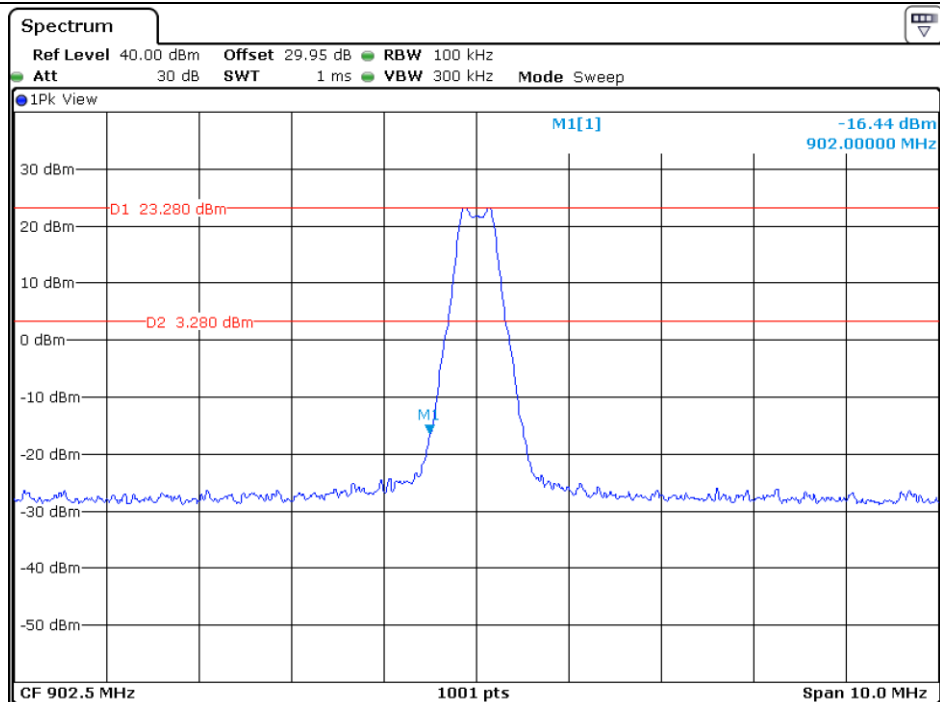
12.4 Test data for conducted emission

12.4.1 Test data for Mode 1_Normal

- . Resolution bandwidth : 100 kHz
- . Video bandwidth : 300 kHz
- . Detector : Peak
- . Result : PASS

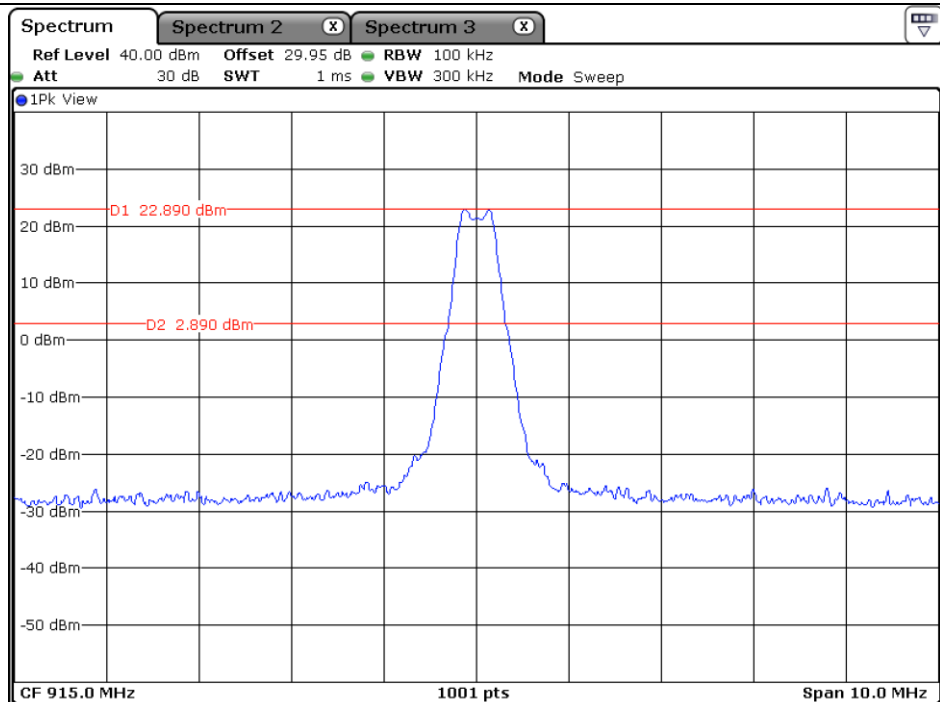
Channel	Frequency Range	Measured Value(dBm)	Limit(dBm)	Margin(dB)
Low	30 M ~ 1 GHz	-25.71	3.28	28.99
	1 GHz ~ 26.5 GHz	-15.32	3.28	18.60
Middle	30 M ~ 1 GHz	-26.00	2.89	28.89
	1 GHz ~ 26.5 GHz	-14.65	2.89	17.54
High	30 M ~ 1 GHz	-25.04	2.18	27.22
	1 GHz ~ 26.5 GHz	-14.8	2.18	16.98
Hopping	30 M ~ 1 GHz	-25.78	4.26	30.04
	1 GHz ~ 26.5 GHz	-15.73	4.26	19.99

Tabulated test data for Restricted Band



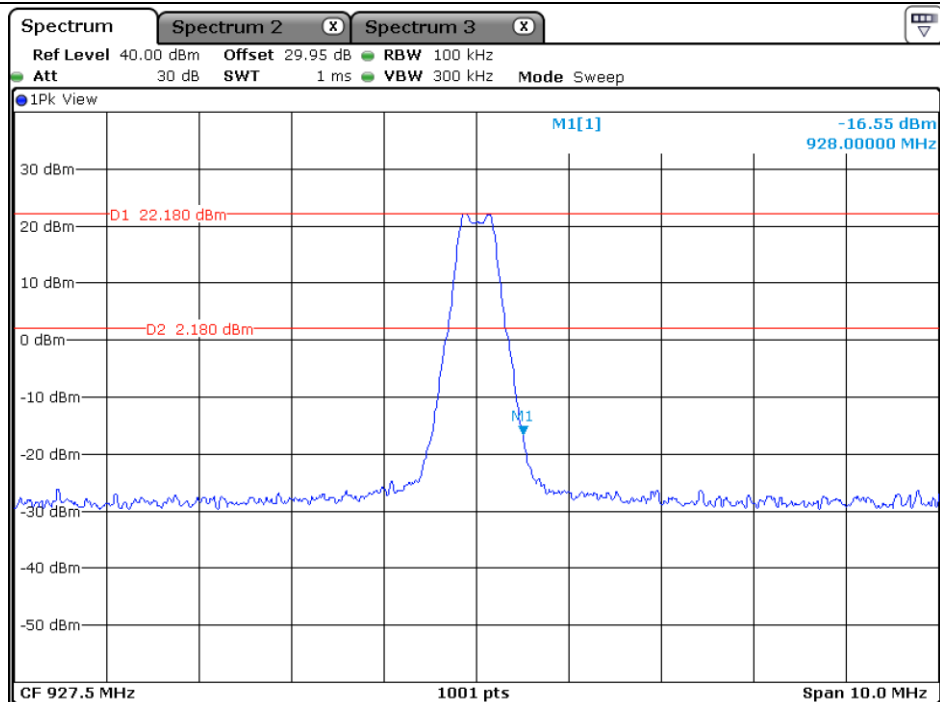
Date: 30.MAR.2023 11:33:04

Low Channel

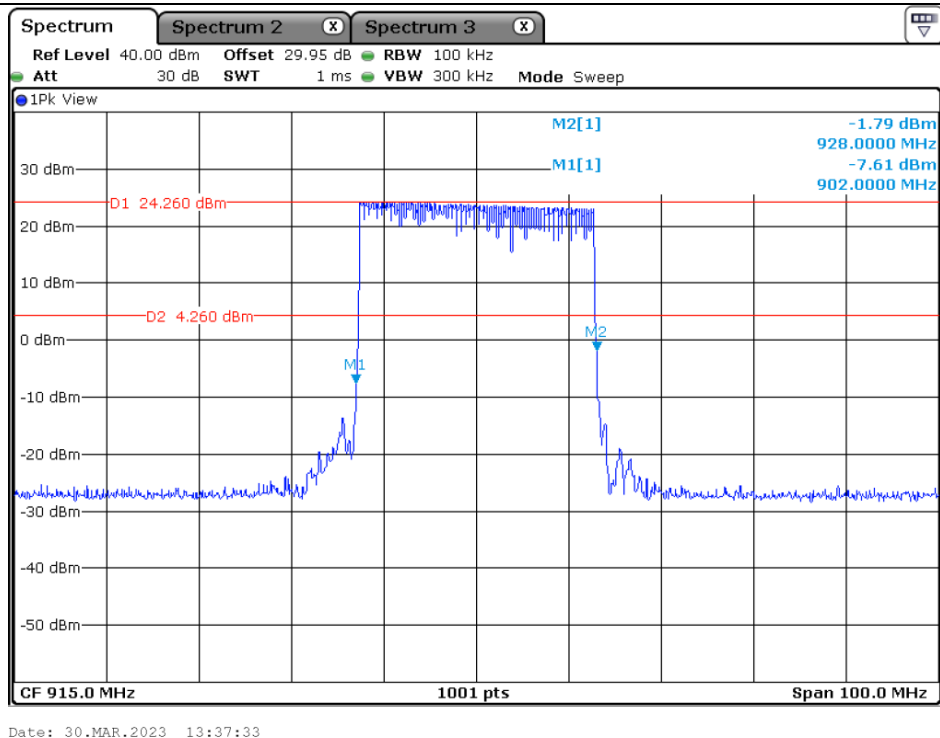


Date: 30.MAR.2023 13:27:38

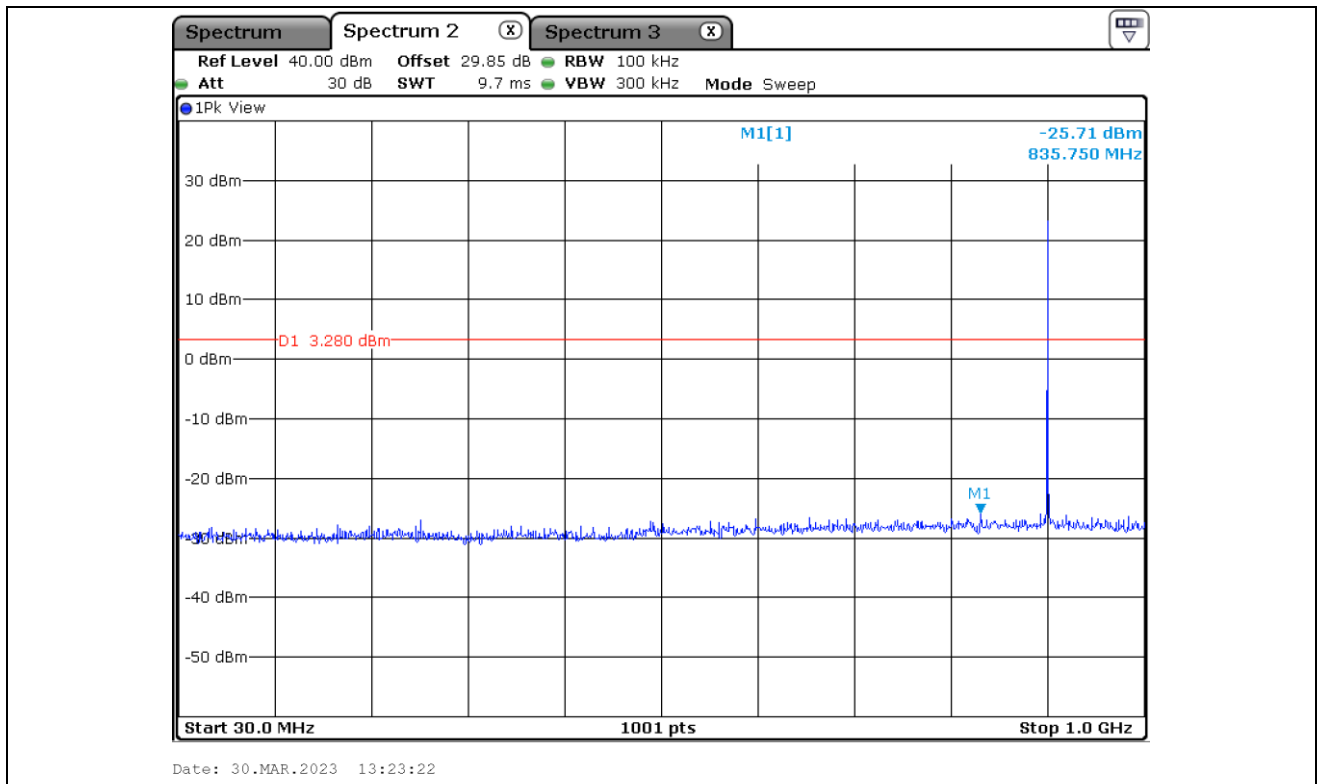
Middle Channel



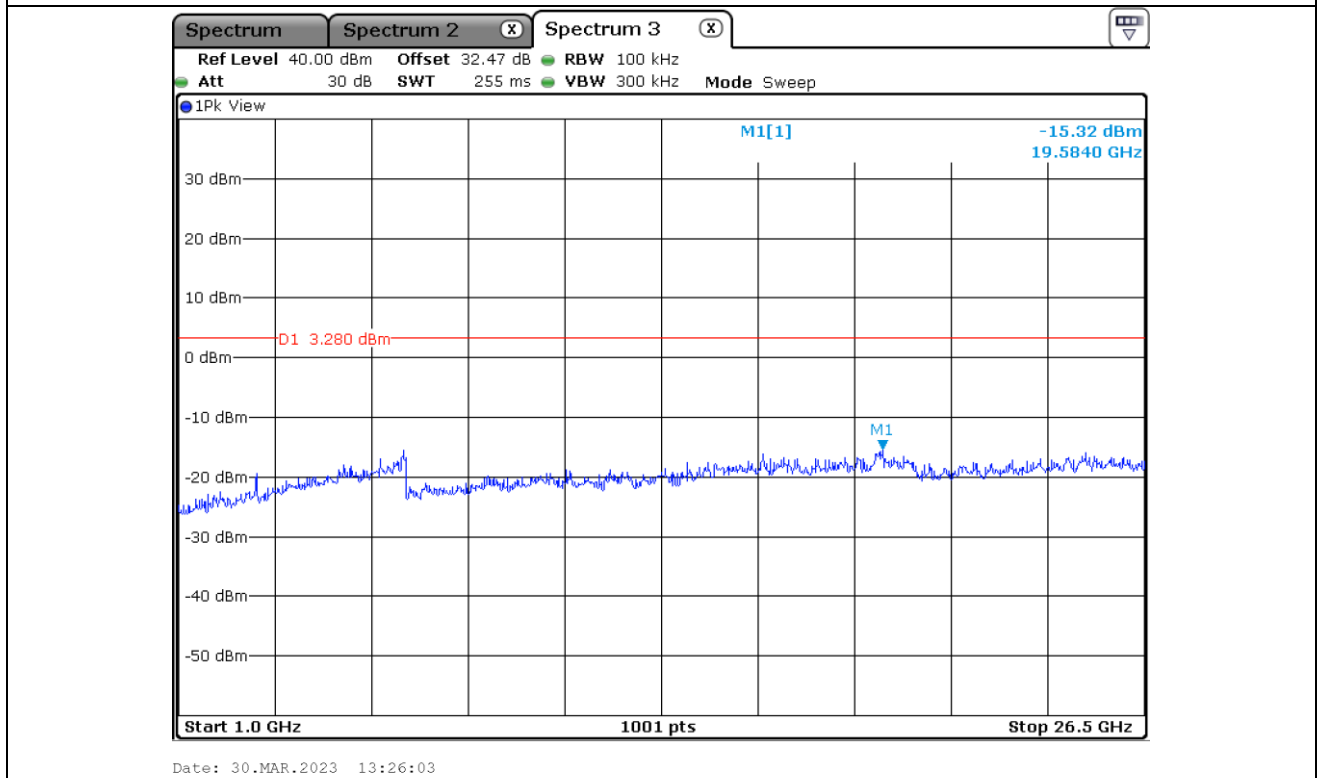
High Channel



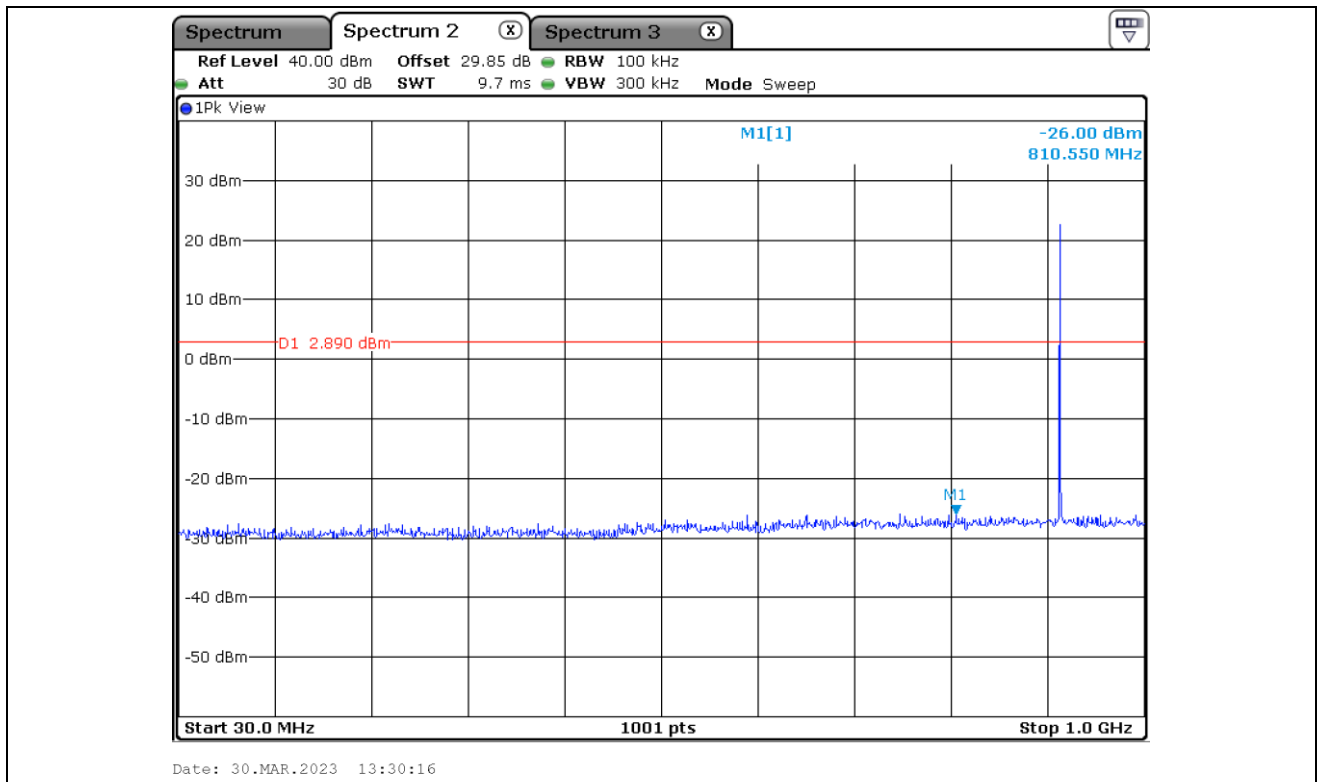
Hopping Channel



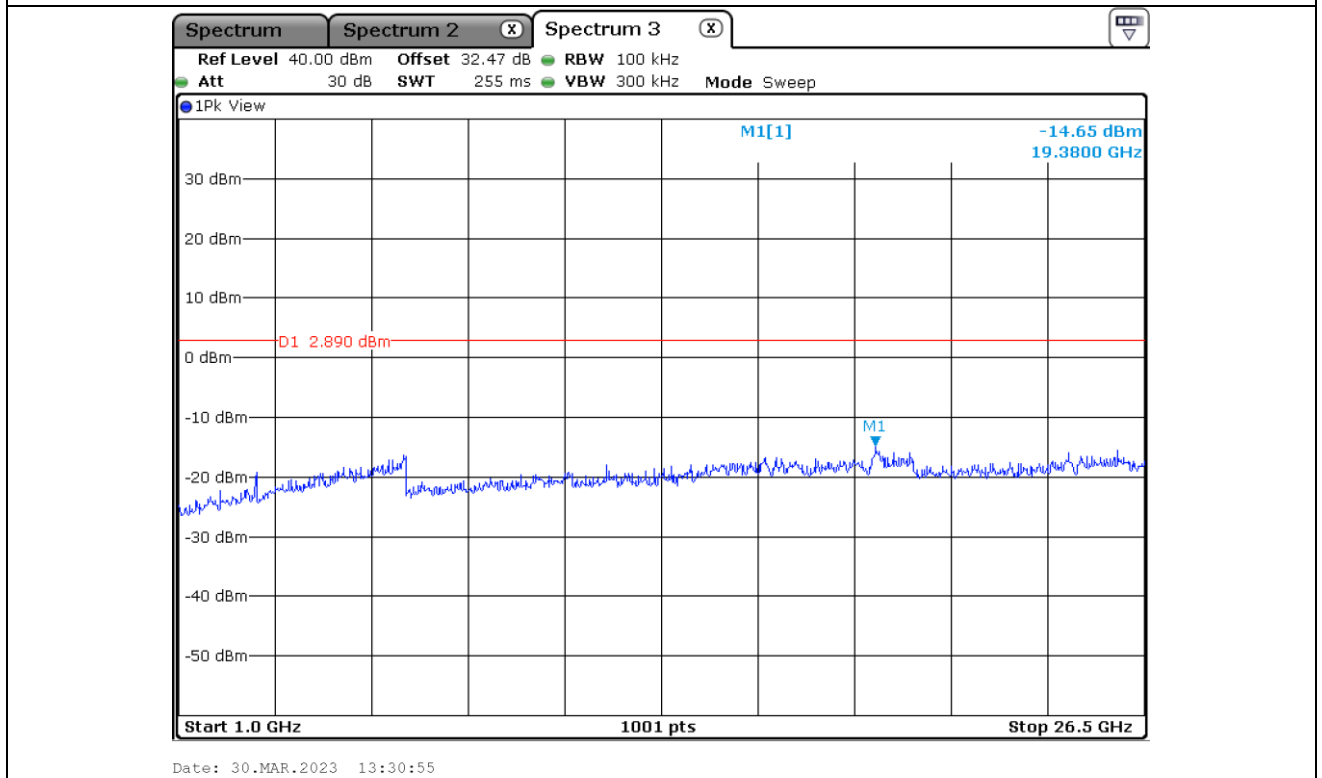
Low Channel



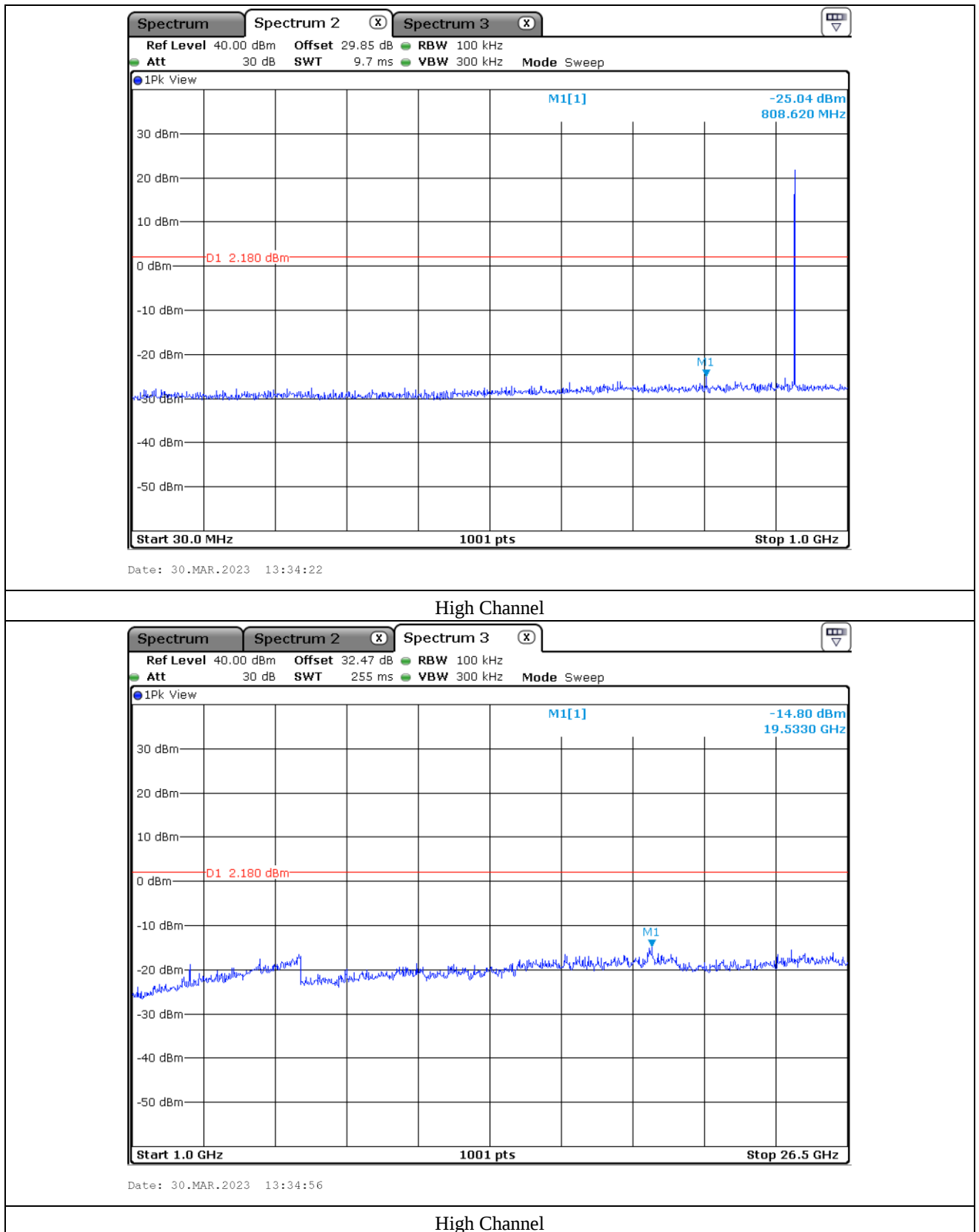
Low Channel

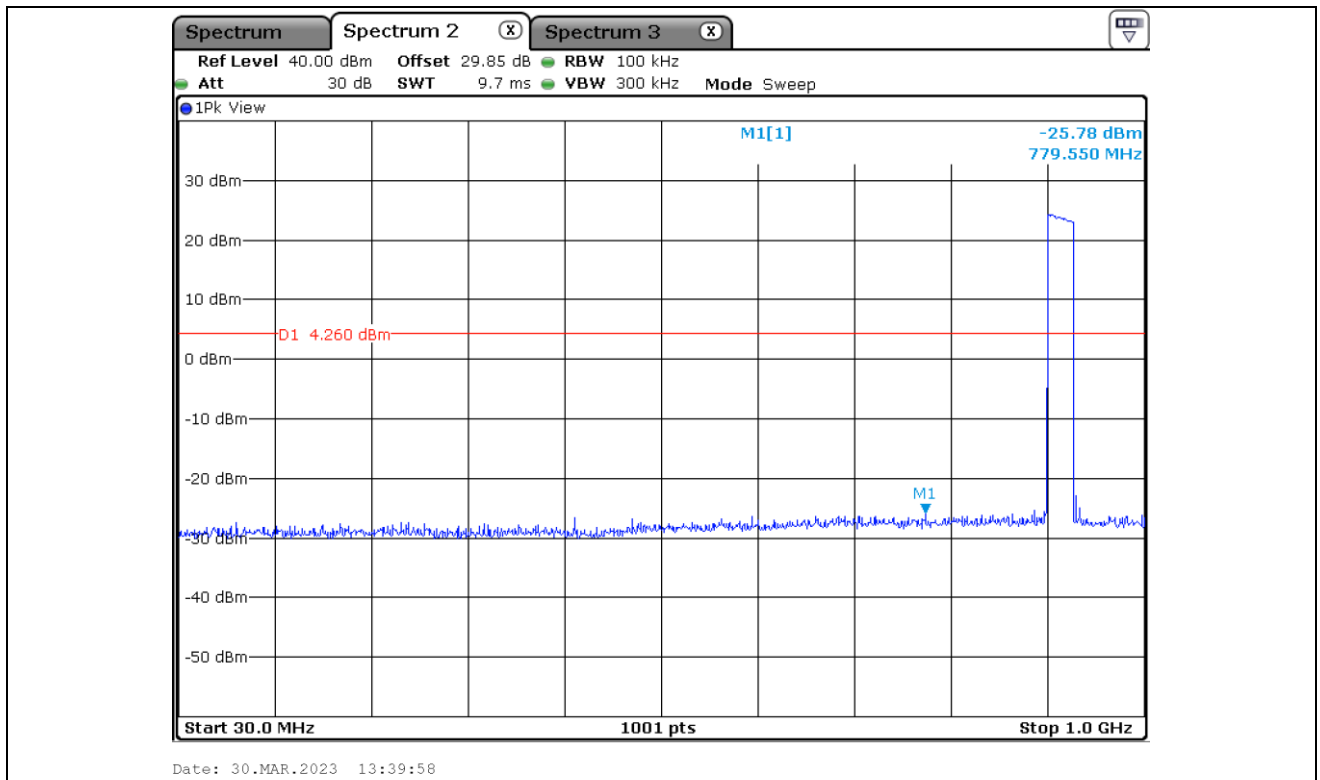


Middle Channel

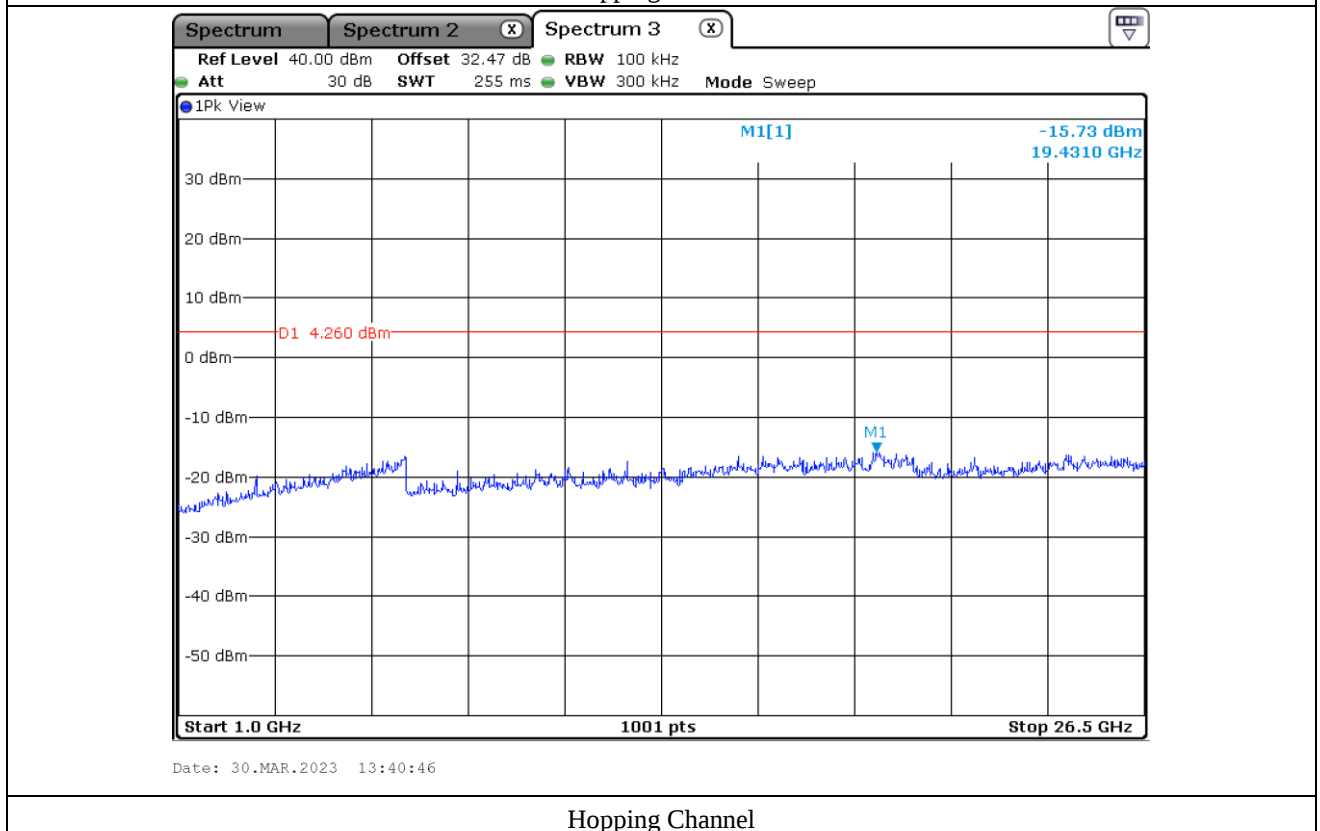


Middle Channel





Hopping Channel



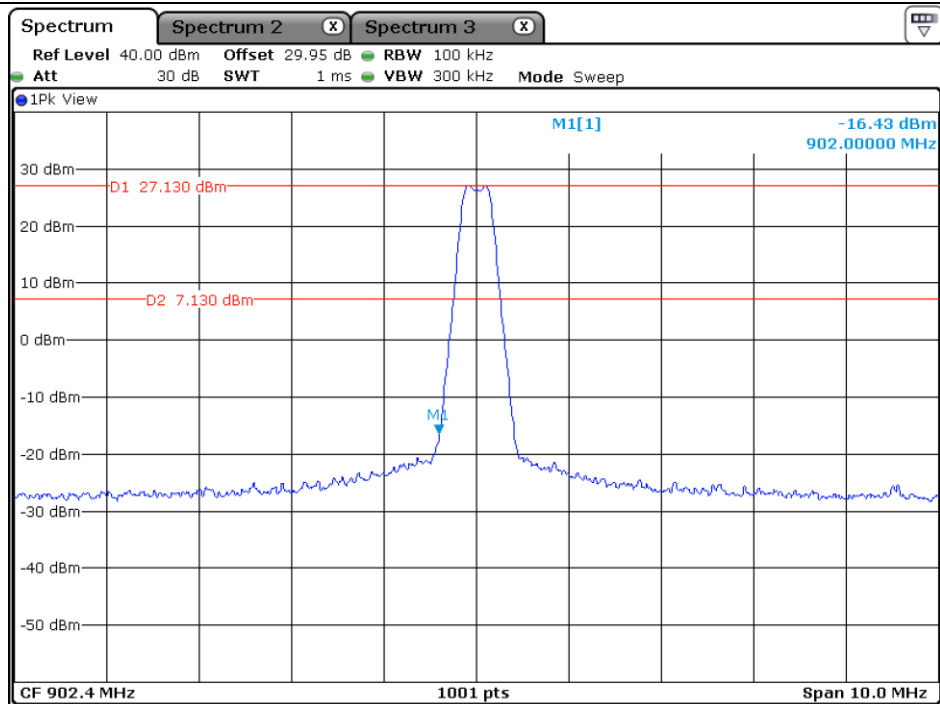
Hopping Channel

12.4.2 Test data for Mode 2_Long

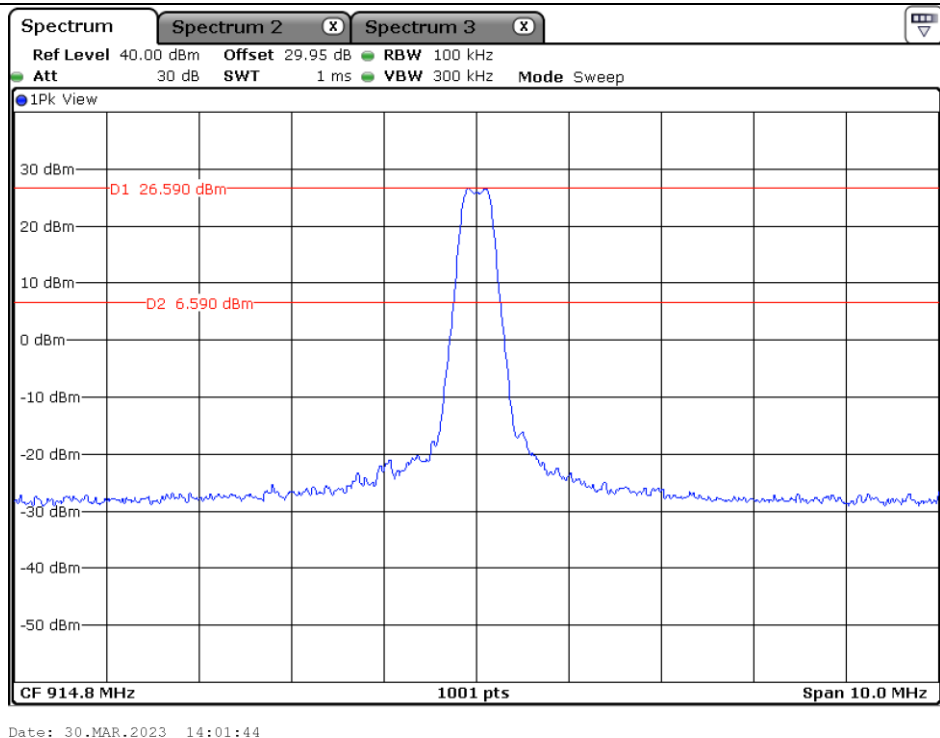
-. Resolution bandwidth : 100 kHz
 -. Video bandwidth : 300 kHz
 -. Detector : Peak
 -. Result : PASS

Channel	Frequency Range	Measured Value(dBm)	Limit(dBm)	Margin(dB)
Low	30 M ~ 1 GHz	-25.51	7.13	32.64
	1 GHz ~ 26.5 GHz	-15.11	7.13	22.24
Middle	30 M ~ 1 GHz	-25.77	6.59	32.36
	1 GHz ~ 26.5 GHz	-15.25	6.59	21.84
High	30 M ~ 1 GHz	-25.25	5.80	31.05
	1 GHz ~ 26.5 GHz	-15.53	5.80	21.33
Hopping	30 M ~ 1 GHz	-25.51	7.29	32.80
	1 GHz ~ 26.5 GHz	-14.96	7.29	22.25

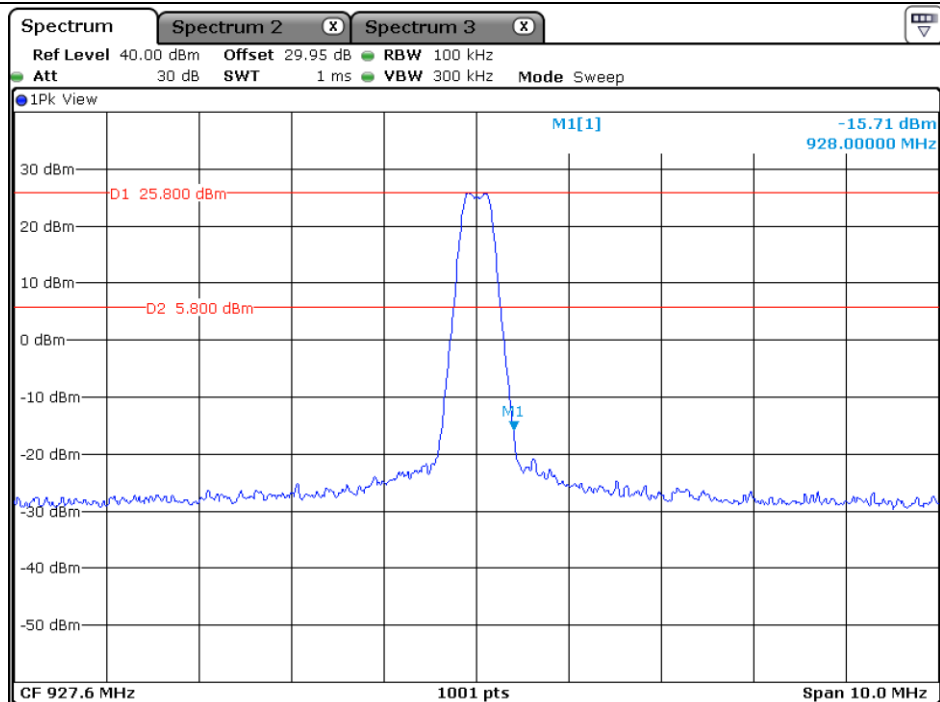
Tabulated test data for Restricted Band



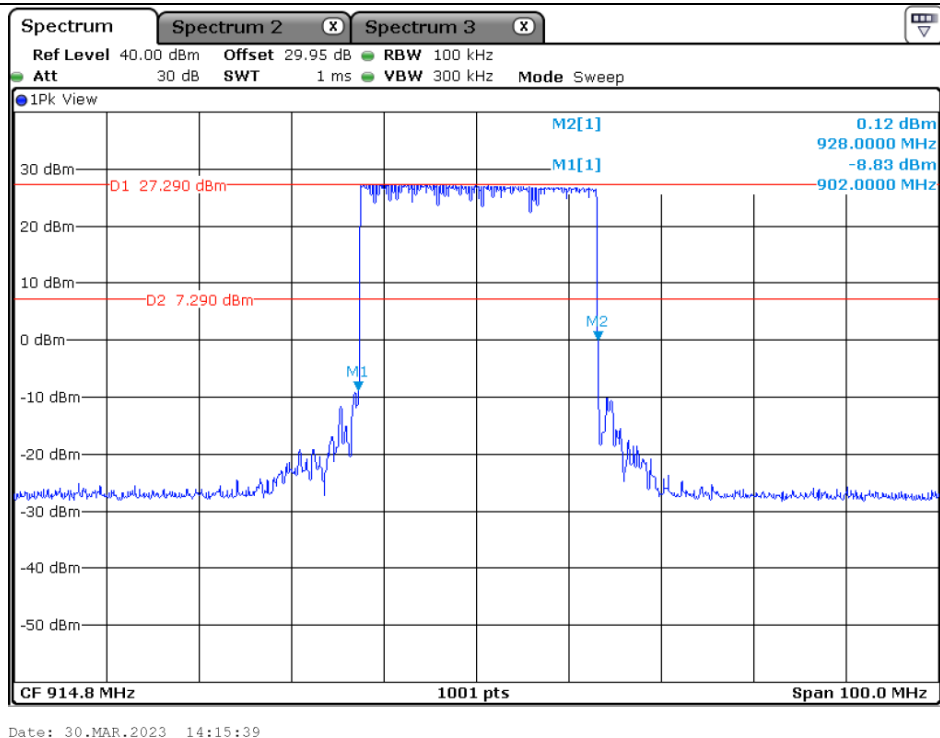
Low Channel



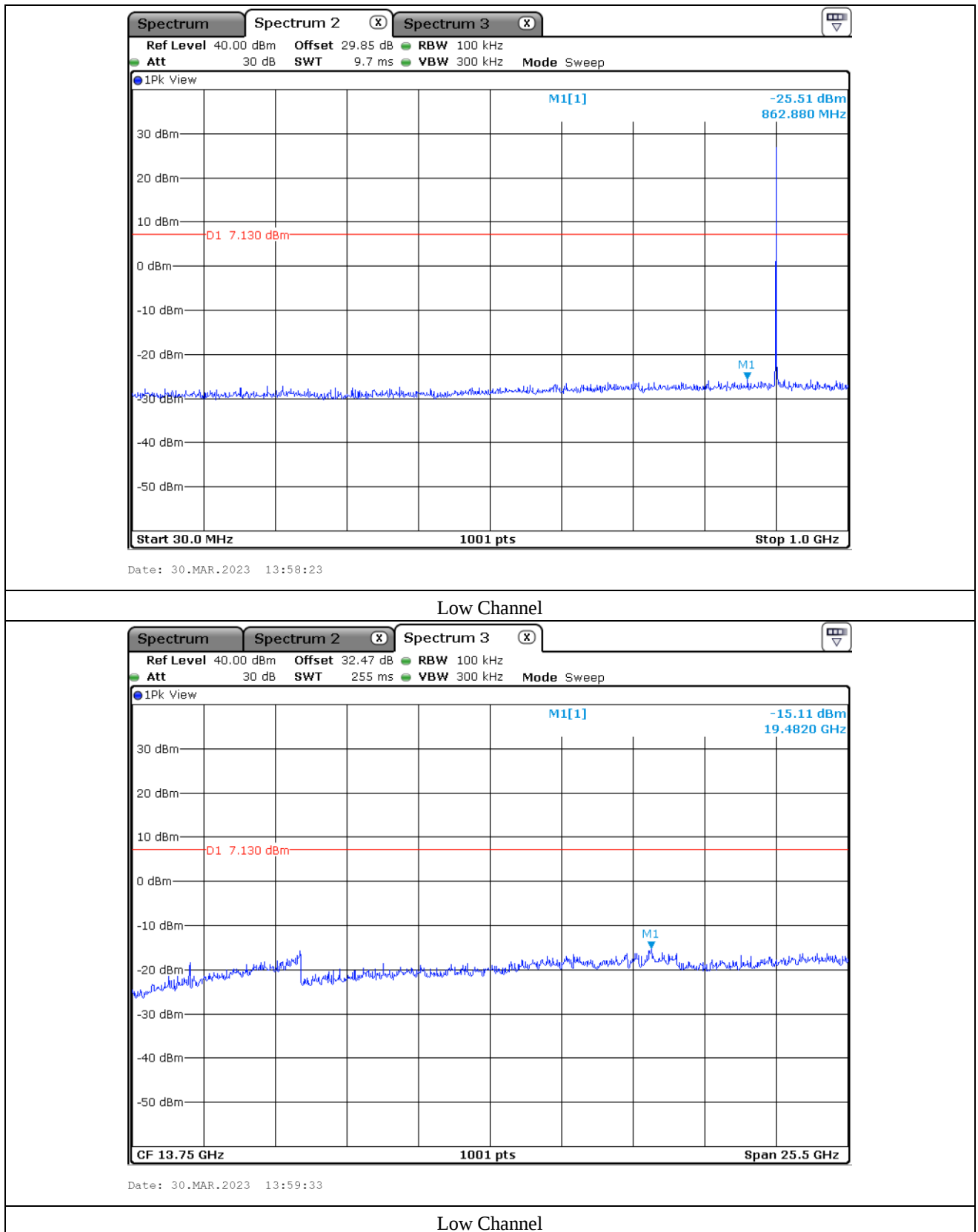
Middle Channel

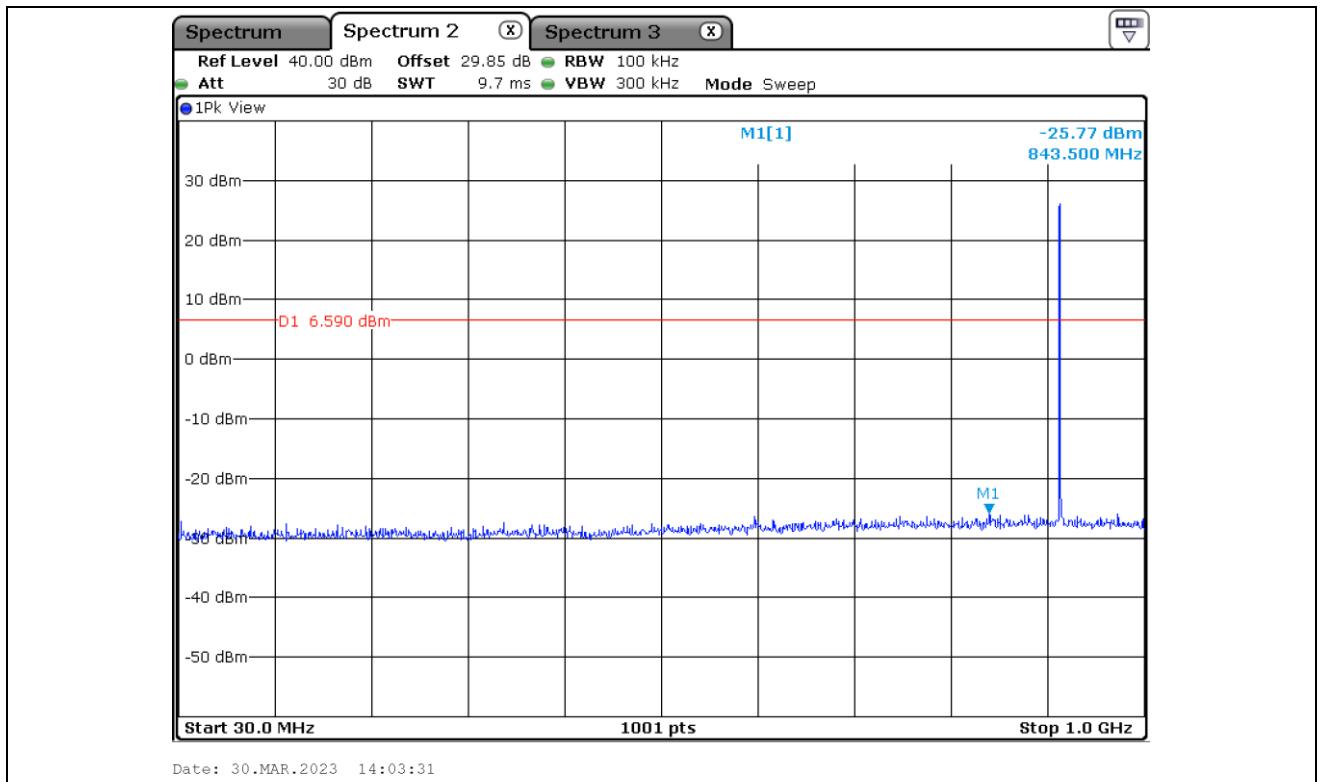


High Channel

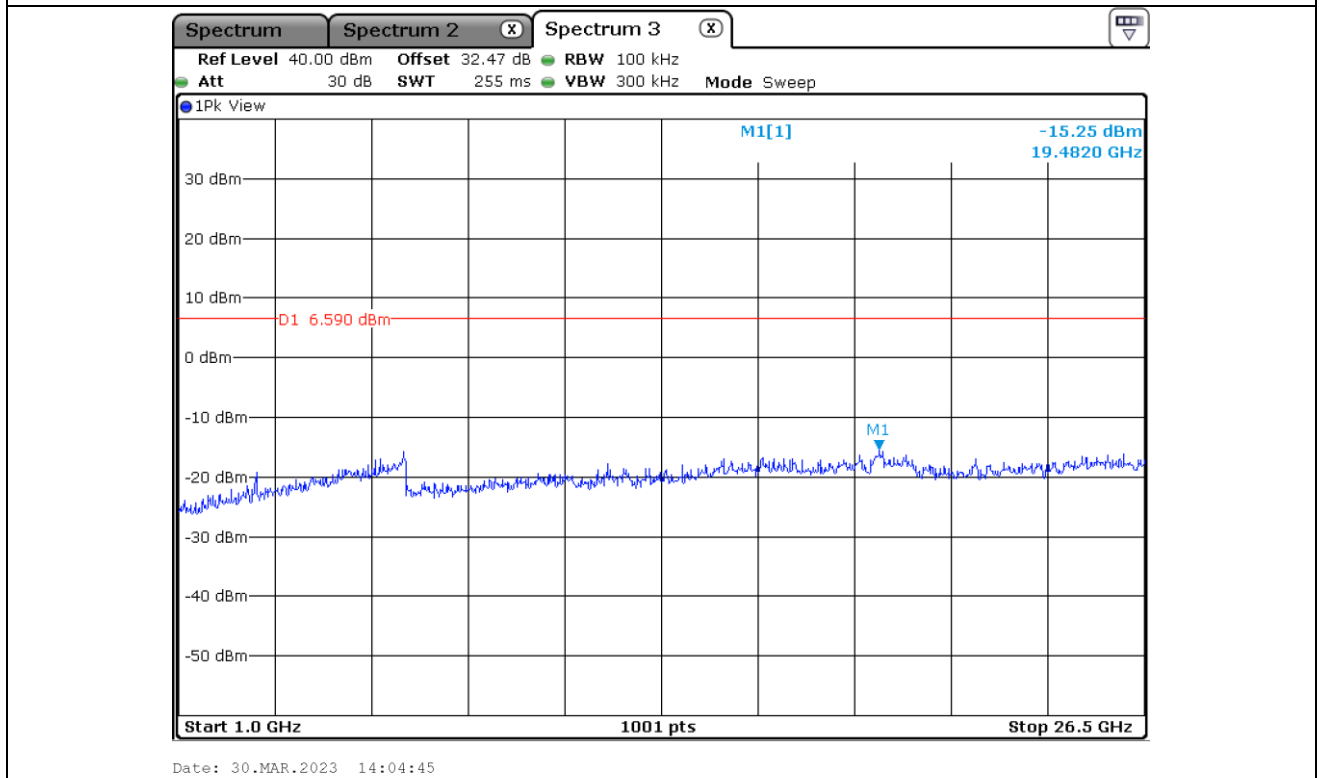


Hopping Channel

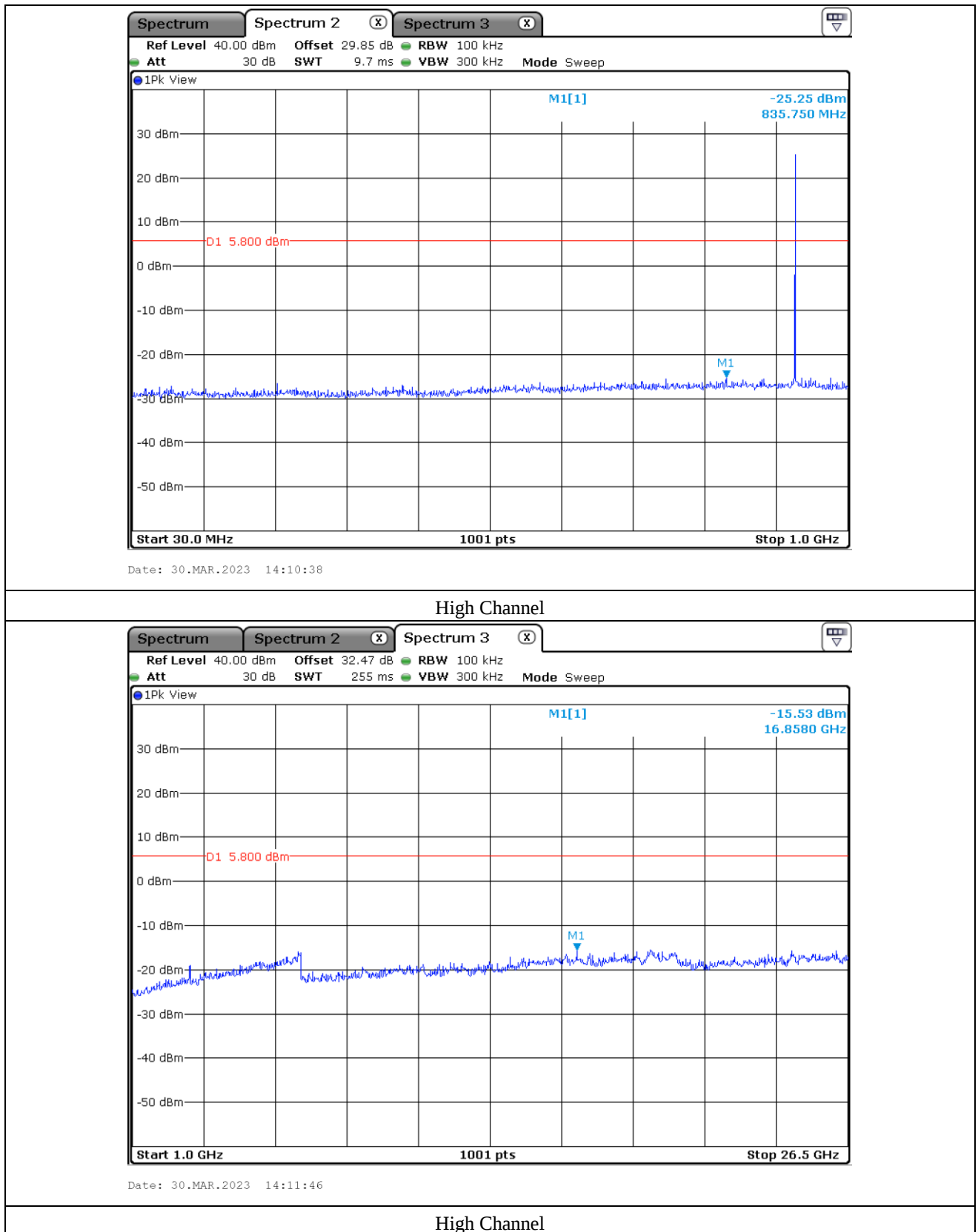


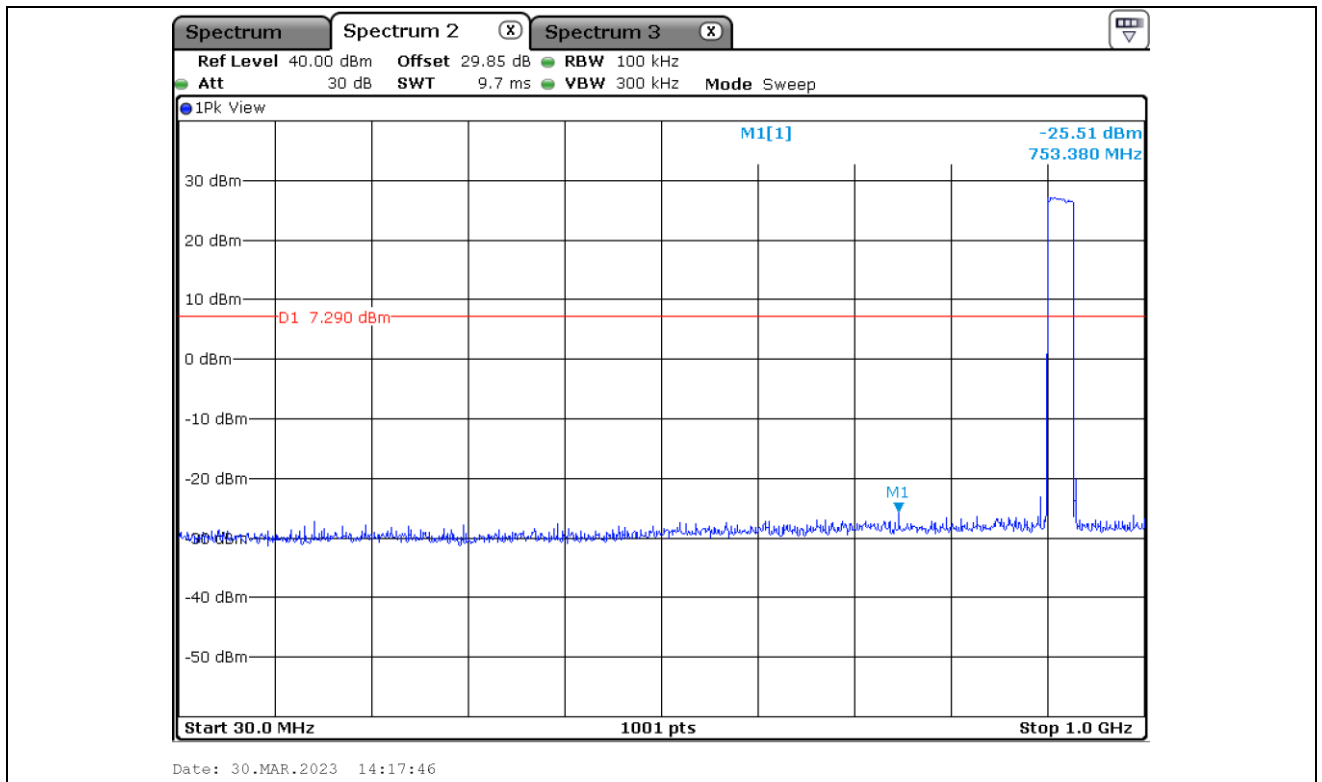


Middle Channel

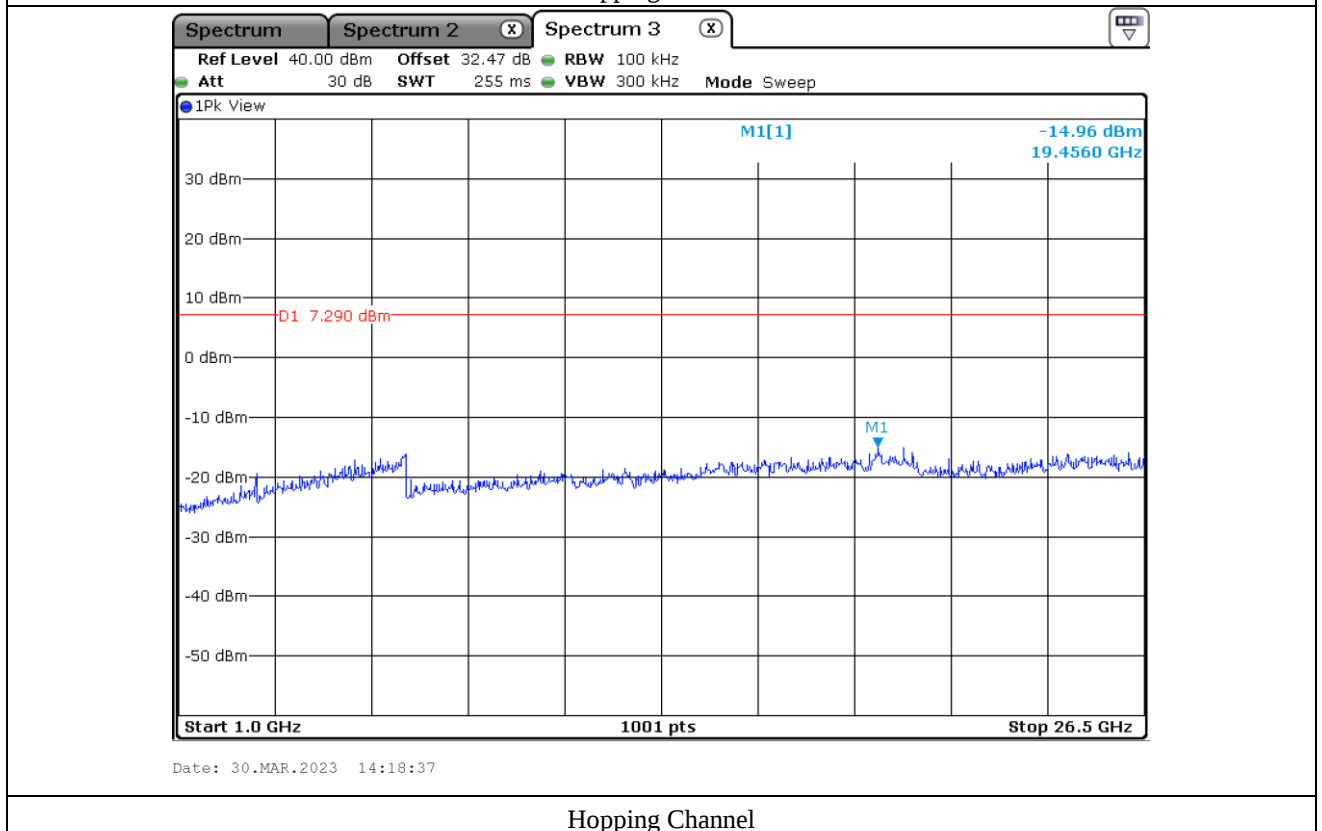


Middle Channel





Hopping Channel



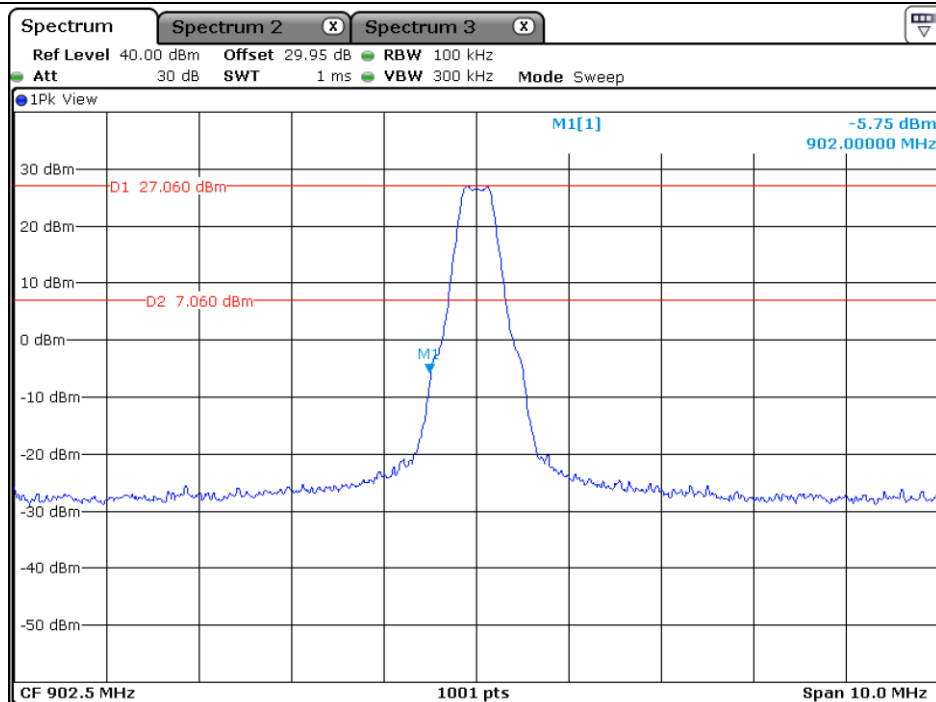
Hopping Channel

12.4.3 Test data for Mode 3_Repeat

-. Resolution bandwidth : 100 kHz
 -. Video bandwidth : 300 kHz
 -. Detector : Peak
 -. Result : PASS

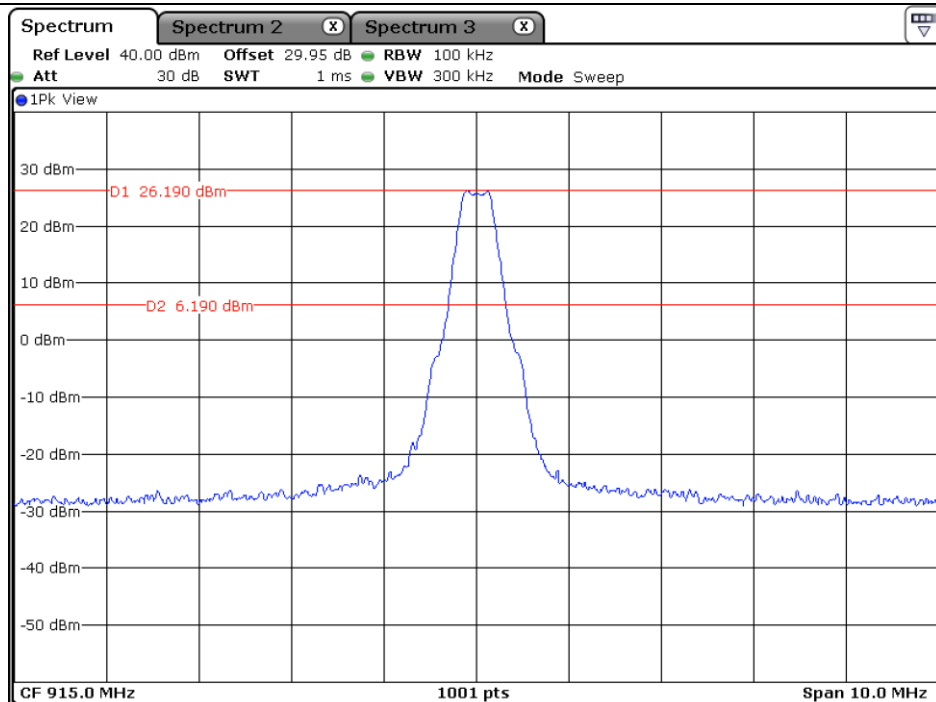
Channel	Frequency Range	Measured Value(dBm)	Limit(dBm)	Margin(dB)
Low	30 M ~ 1 GHz	-25.58	7.06	32.64
	1 GHz ~ 26.5 GHz	-14.59	7.06	21.65
Middle	30 M ~ 1 GHz	-25.60	6.19	31.79
	1 GHz ~ 26.5 GHz	-14.20	6.19	20.39
High	30 M ~ 1 GHz	-25.79	5.49	31.28
	1 GHz ~ 26.5 GHz	-14.69	5.49	20.18
Hopping	30 M ~ 1 GHz	-26.07	7.22	33.29
	1 GHz ~ 26.5 GHz	-15.31	7.22	22.53

Tabulated test data for Restricted Band



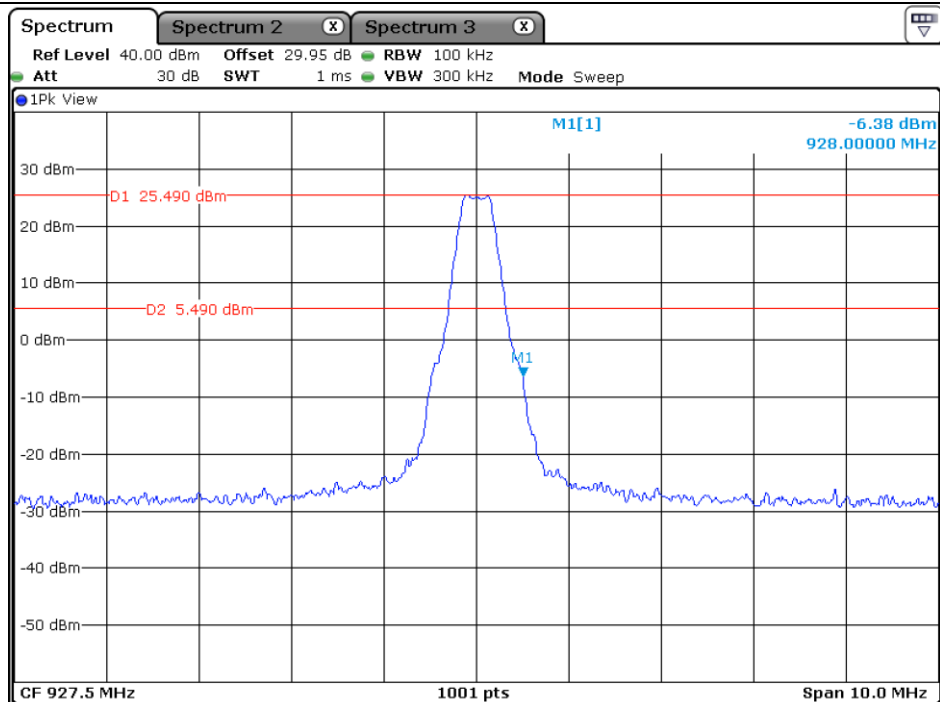
Date: 30.MAR.2023 14:20:39

Low Channel

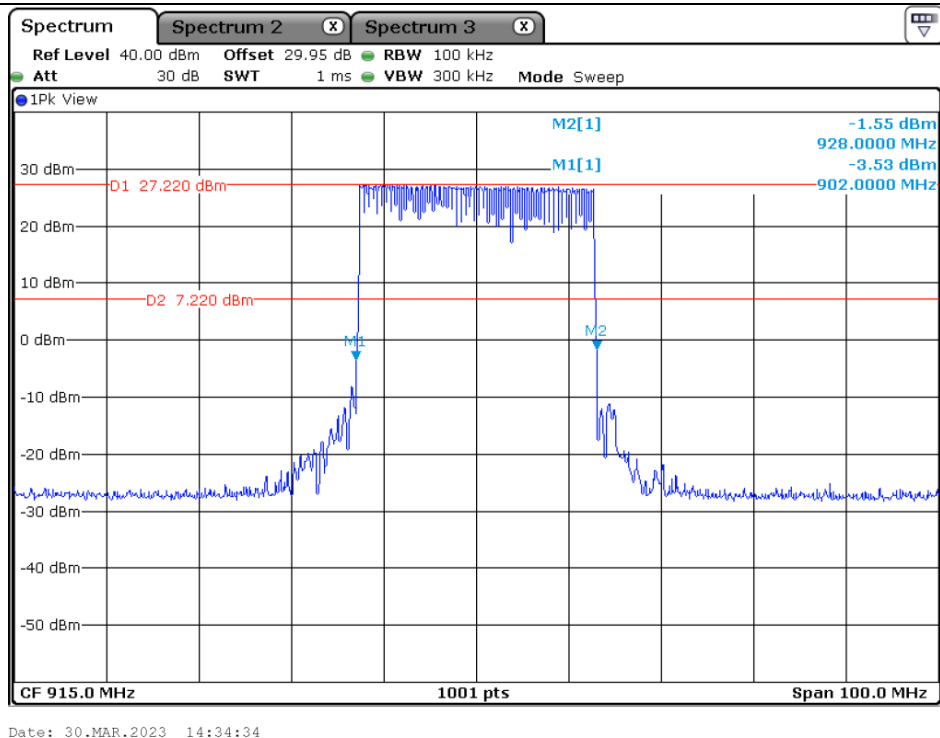


Date: 30.MAR.2023 14:26:16

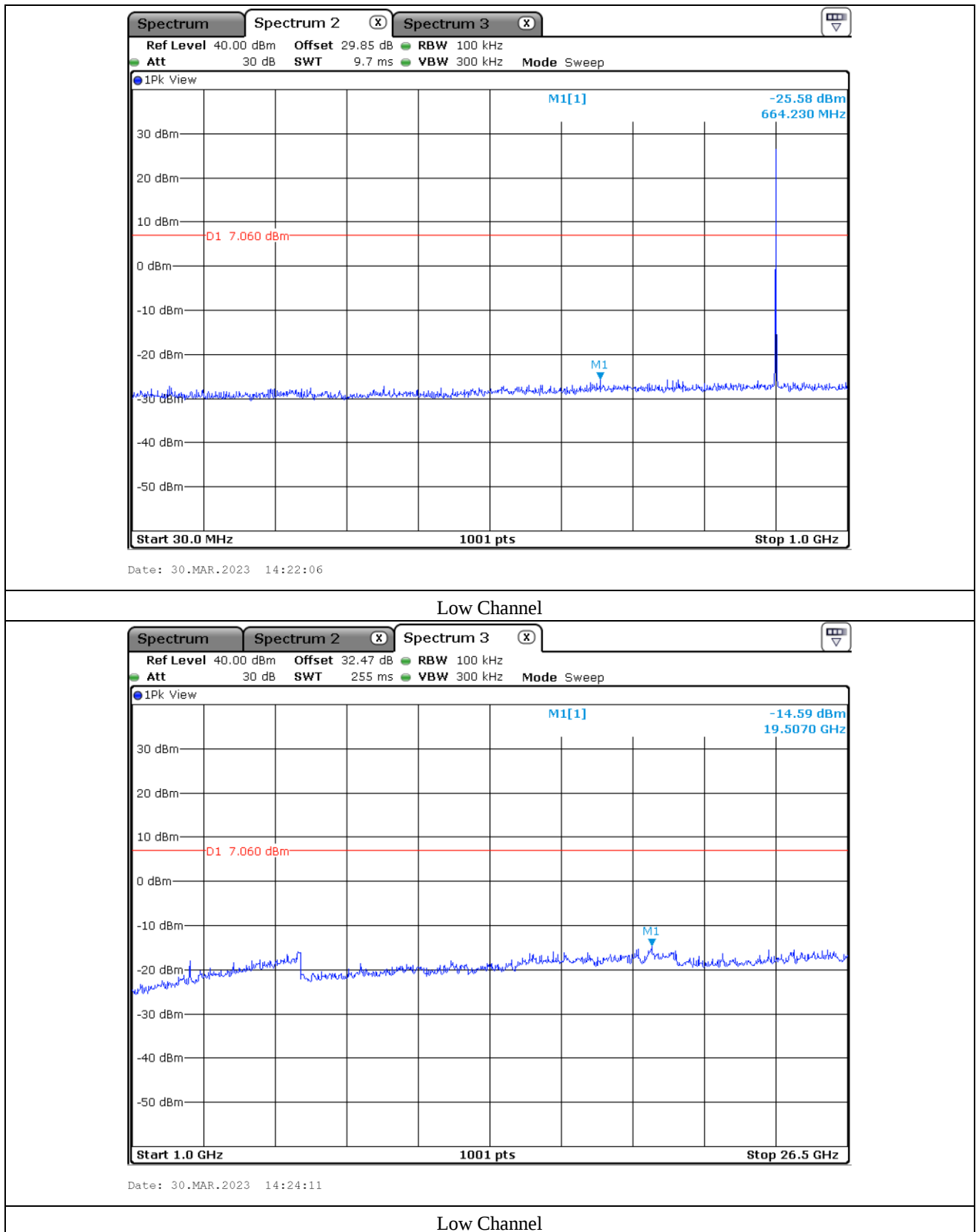
Middle Channel

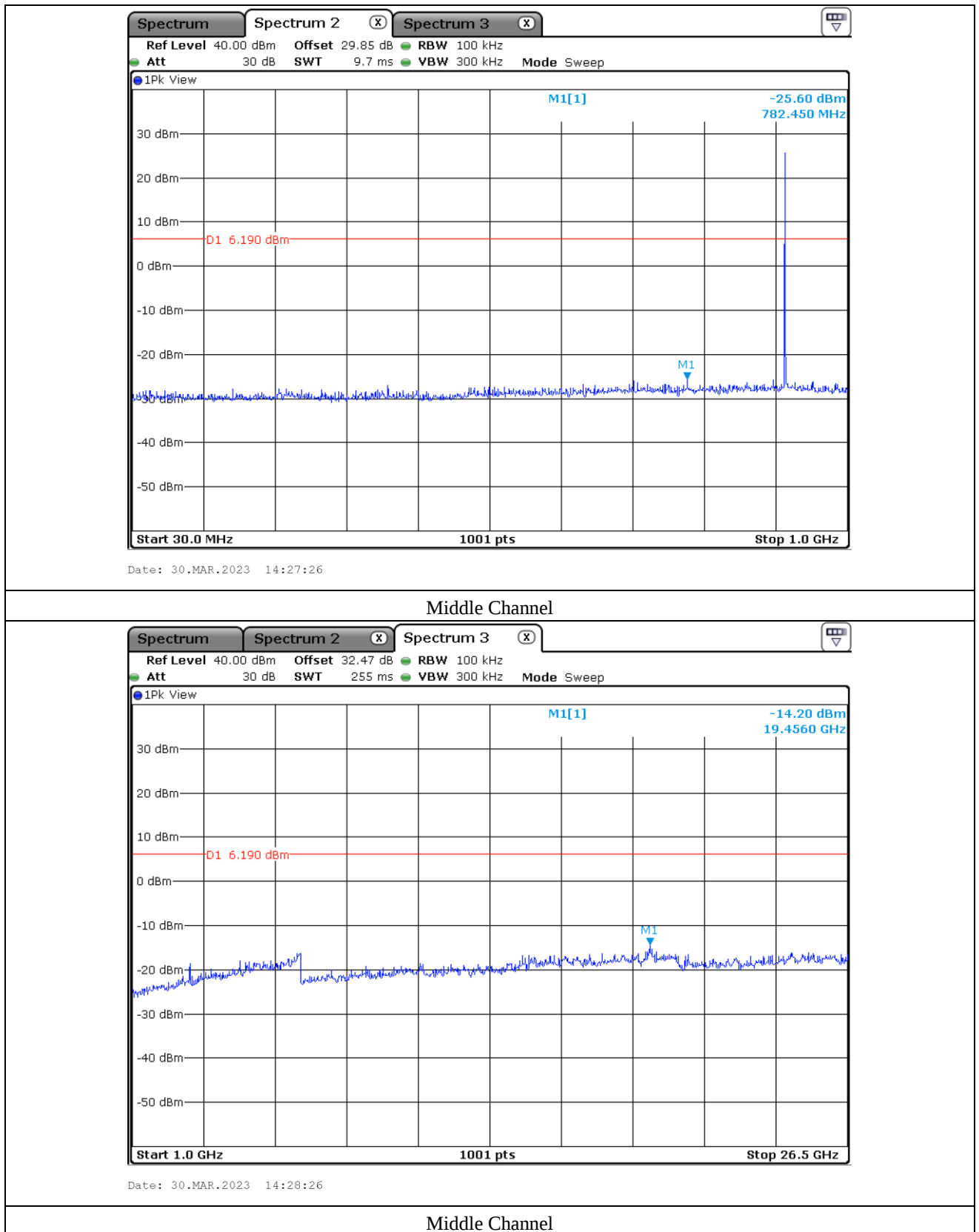


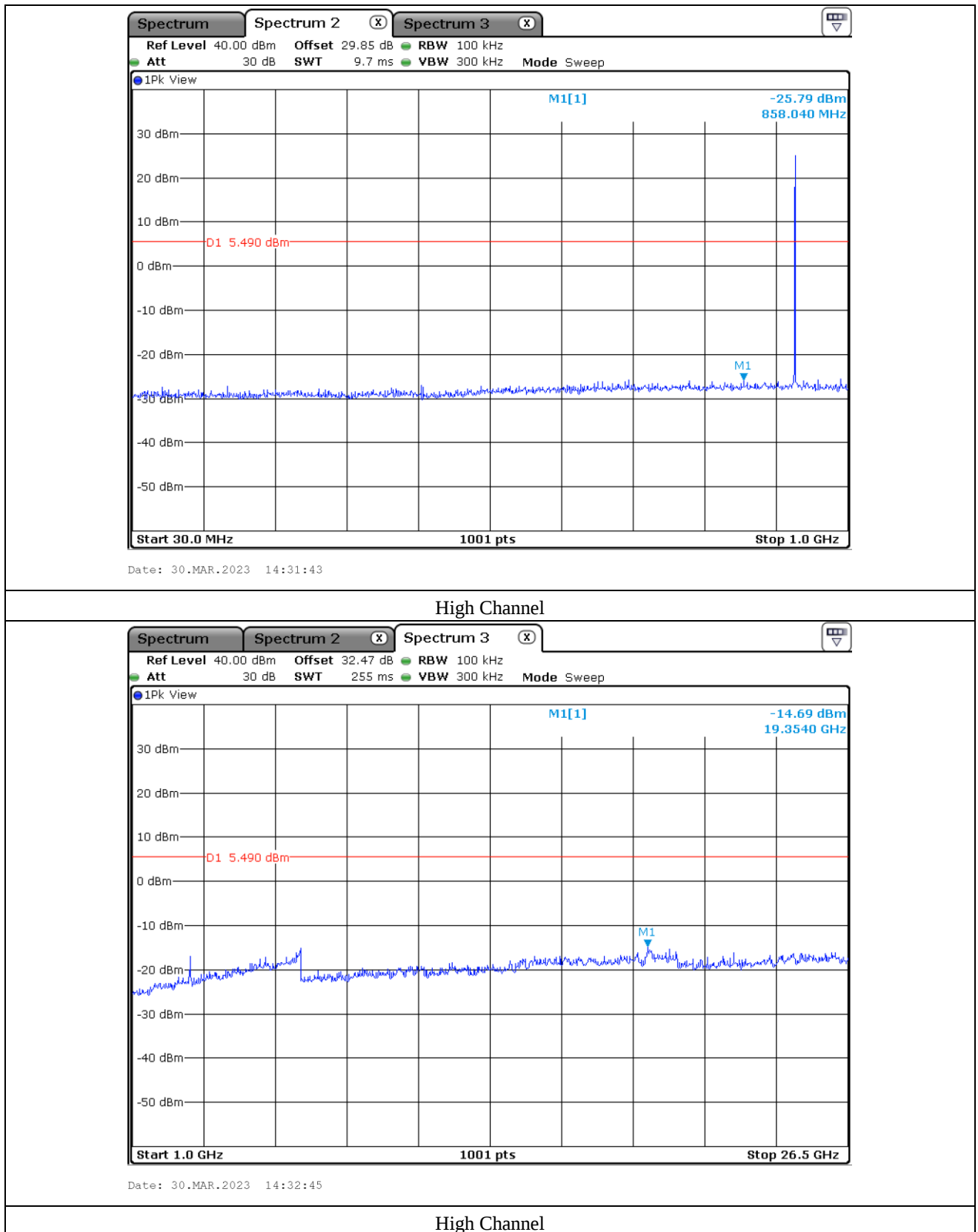
High Channel

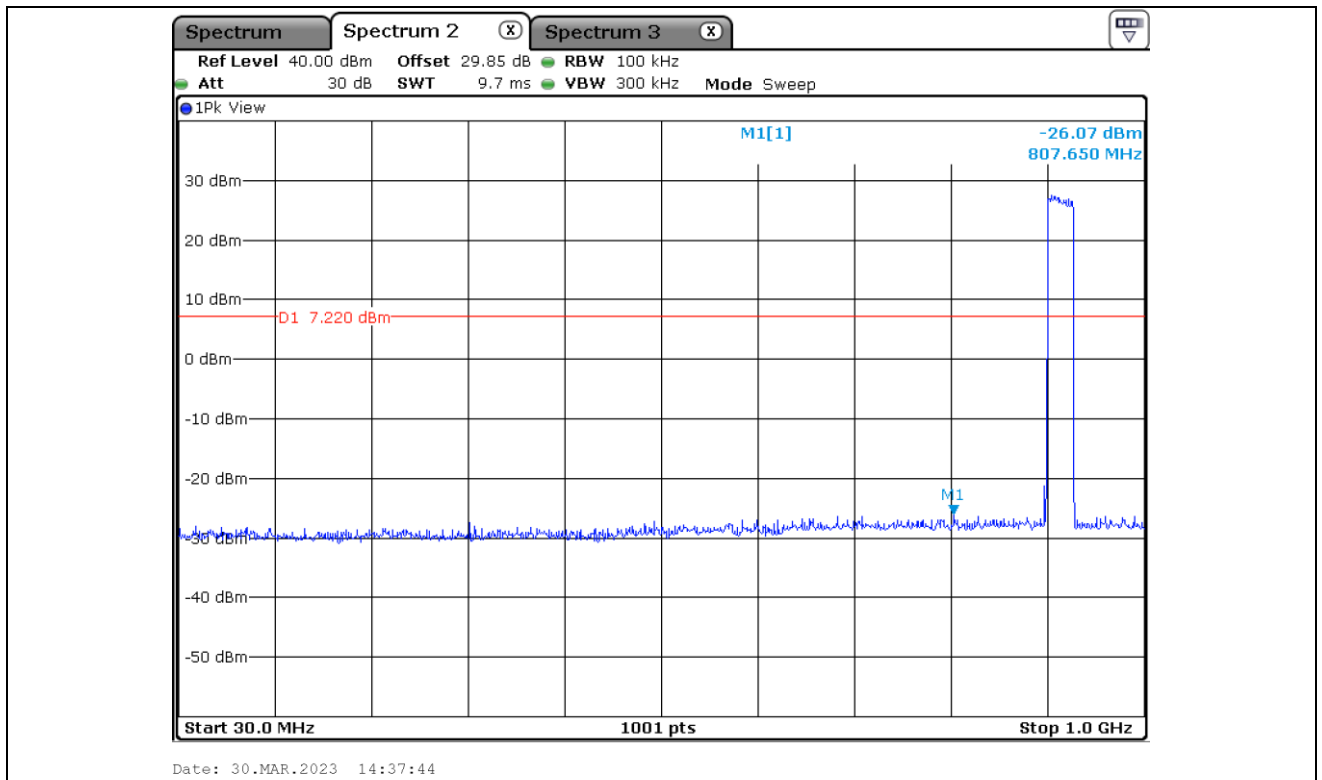


Hopping Channel

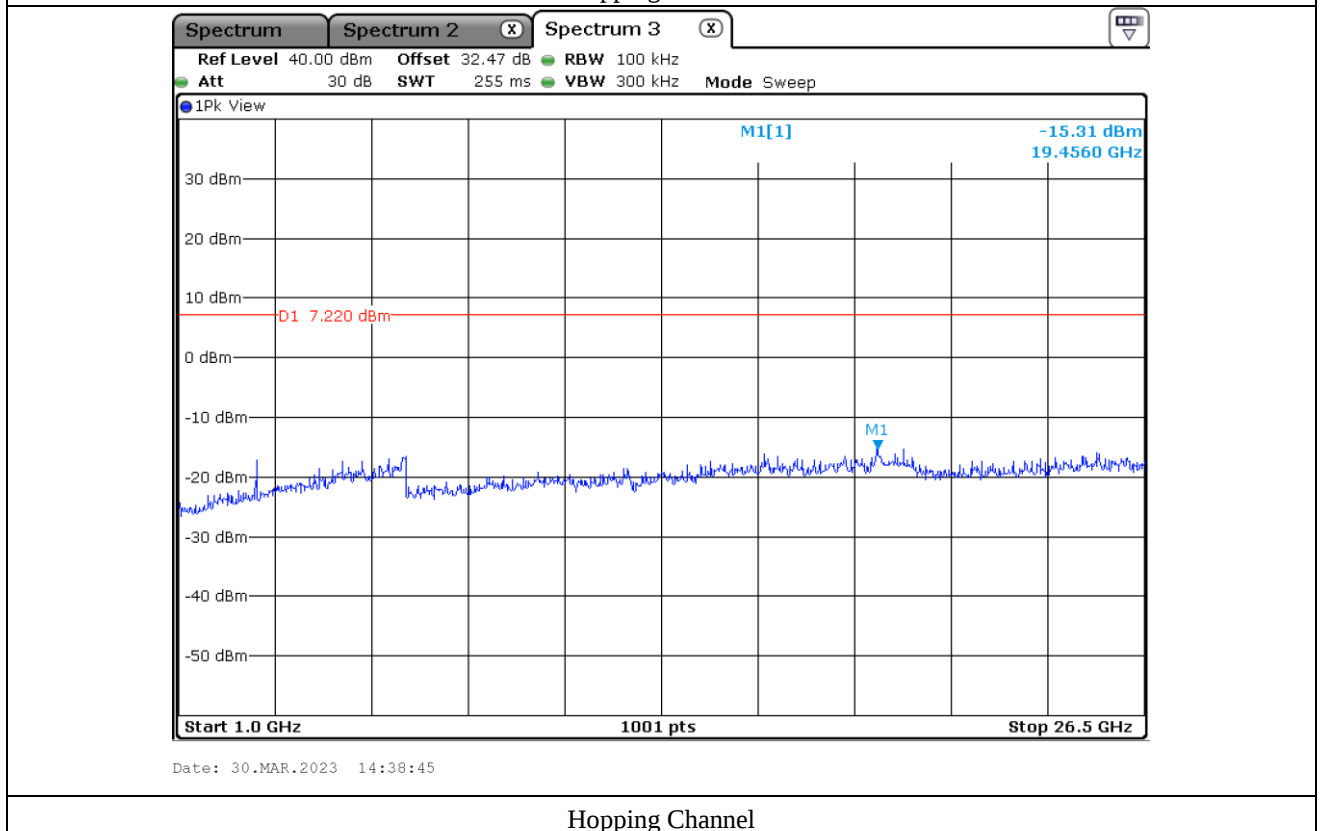








Hopping Channel



Hopping Channel

12.5 Test data for Transmitting mode radiated emission (Transmitting Mode)

12.5.1 Spurious & Harmonic Radiated Emission above 1 GHz

12.5.1.1 Test data for Mode 1_Normal

- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 3 MHz for Peak Mode(Peak Detector), 3 MHz for Average Mode(RMS Detector)
- . Frequency range : 1 GHz ~ 10.0 GHz
- . Measurement distance : 3 m
- . Duty cycle : 100%
- . Result : PASS

Channel	Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Low ch. Harmonic	1 805.00	53.24	Peak	H	25.30	9.14	45.10	42.58	74.00	31.42
		47.76	Average	H	25.30	9.14	45.10	37.10	54.00	16.90
		52.99	Peak	V	25.30	9.14	45.10	42.33	74.00	31.67
		46.07	Average	V	25.30	9.14	45.10	35.41	54.00	18.59
Middle ch. Harmonic	1 830.00	54.27	Peak	H	25.60	10.24	45.10	45.01	74.00	28.99
		49.00	Average	H	25.60	10.24	45.10	39.74	54.00	14.26
		53.95	Peak	V	25.60	10.24	45.10	44.69	74.00	29.31
		48.65	Average	V	25.60	10.24	45.10	39.39	54.00	14.61
High ch. Harmonic	1 855.00	54.12	Peak	H	25.60	12.00	45.10	46.62	74.00	27.38
		48.57	Average	H	25.60	12.00	45.10	41.07	54.00	12.93
		53.25	Peak	V	25.60	12.00	45.10	45.75	74.00	28.25
		47.15	Average	V	25.60	12.00	45.10	39.65	54.00	14.35

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band

12.5.1.2 Test data for Mode 2_Long

- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 3 MHz for Peak Mode(Peak Detector), 3 MHz for Average Mode(RMS Detector)
- . Frequency range : 1 GHz ~ 10.0 GHz
- . Measurement distance : 3 m
- . Duty cycle : 100%
- . Result : PASS

Channel	Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Low ch. Harmonic	1 804.80	53.58	Peak	H	25.30	19.70	45.10	53.48	74.00	20.52
		48.26	Average	H	25.30	19.70	45.10	48.16	54.00	5.84
		53.72	Peak	V	25.30	19.70	45.10	53.62	74.00	20.38
		47.42	Average	V	25.30	19.70	45.10	47.32	54.00	6.68
Middle ch. Harmonic	1 829.60	53.28	Peak	H	25.60	20.79	45.10	54.57	74.00	19.43
		47.63	Average	H	25.60	20.79	45.10	48.92	54.00	5.08
		52.57	Peak	V	25.60	20.79	45.10	53.86	74.00	20.14
		46.81	Average	V	25.60	20.79	45.10	48.10	54.00	5.90
High ch. Harmonic	1 855.20	52.96	Peak	H	25.60	22.58	45.10	56.04	74.00	17.96
		46.67	Average	H	25.60	22.58	45.10	49.75	54.00	4.25
		51.80	Peak	V	25.60	22.58	45.10	54.88	74.00	19.12
		45.41	Average	V	25.60	22.58	45.10	48.49	54.00	5.51

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band

12.5.1.3 Test data for Mode 3_Repeat

- Resolution bandwidth : 1 MHz for Peak and Average Mode
- Video bandwidth : 3 MHz for Peak Mode(Peak Detector), 3 MHz for Average Mode(RMS Detector)
- Frequency range : 1 GHz ~ 10.0 GHz
- Measurement distance : 3 m
- Duty cycle : 100%
- Result : PASS

Channel	Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Low ch. Harmonic	1 805.00	53.79	Peak	H	25.30	19.70	45.10	53.69	74.00	20.31
		48.63	Average	H	25.30	19.70	45.10	48.53	54.00	5.47
		53.07	Peak	V	25.30	19.70	45.10	52.97	74.00	21.03
		47.81	Average	V	25.30	19.70	45.10	47.71	54.00	6.29
Middle ch. Harmonic	1 830.00	52.93	Peak	H	25.60	20.79	45.10	54.22	74.00	19.78
		47.39	Average	H	25.60	20.79	45.10	48.68	54.00	5.32
		52.25	Peak	V	25.60	20.79	45.10	53.54	74.00	20.46
		46.55	Average	V	25.60	20.79	45.10	47.84	54.00	6.16
High ch. Harmonic	1 855.00	52.78	Peak	H	25.60	22.58	45.10	55.86	74.00	18.14
		45.71	Average	H	25.60	22.58	45.10	48.79	54.00	5.21
		52.03	Peak	V	25.60	22.58	45.10	55.11	74.00	18.89
		45.25	Average	V	25.60	22.58	45.10	48.33	54.00	5.67

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band

13. RADIATED EMISSION TEST

13.1 Operating environment

Temperature : 24 °C
Relative humidity : 48 % R.H.

13.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 9 kHz to 10.0 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

13.3 Test Date

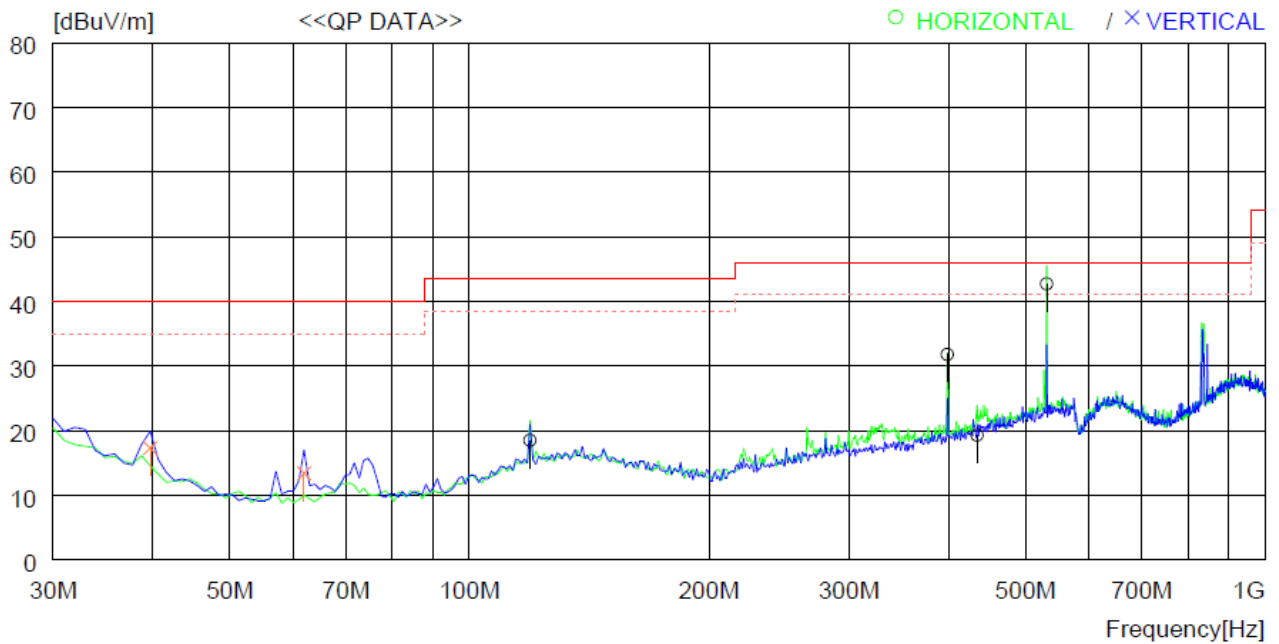
March 17, 2023 ~ April 04, 2023

13.4 Test data for Transmitting Mode

13.4.1 Test data for Mode 1_Normal

13.4.1.1 Test data for 30 MHz ~ 1 000 MHz

- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m
- The highest value is the fundamental.



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
		QP	FACTOR							
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	119.240	30.6	18.5	1.4	32.0	18.5	43.5	25.0	200	99
2	398.600	40.7	20.6	2.5	32.0	31.8	46.0	14.2	100	1
3	434.491	27.1	21.5	2.7	32.0	19.3	46.0	26.7	100	282
4	531.490	48.4	23.4	3.0	32.1	42.7	46.0	3.3	100	305
----- Vertical -----										
5	39.700	31.5	17.1	0.8	32.1	17.3	40.0	22.7	100	359
6	62.010	32.1	12.3	1.0	32.0	13.4	40.0	26.6	100	359

13.4.1.2 Test data for Below 30 MHz

- . Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- . Frequency range : 9 kHz ~ 30 MHz
- . Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.								

13.4.1.3 Test data for above 1 GHz

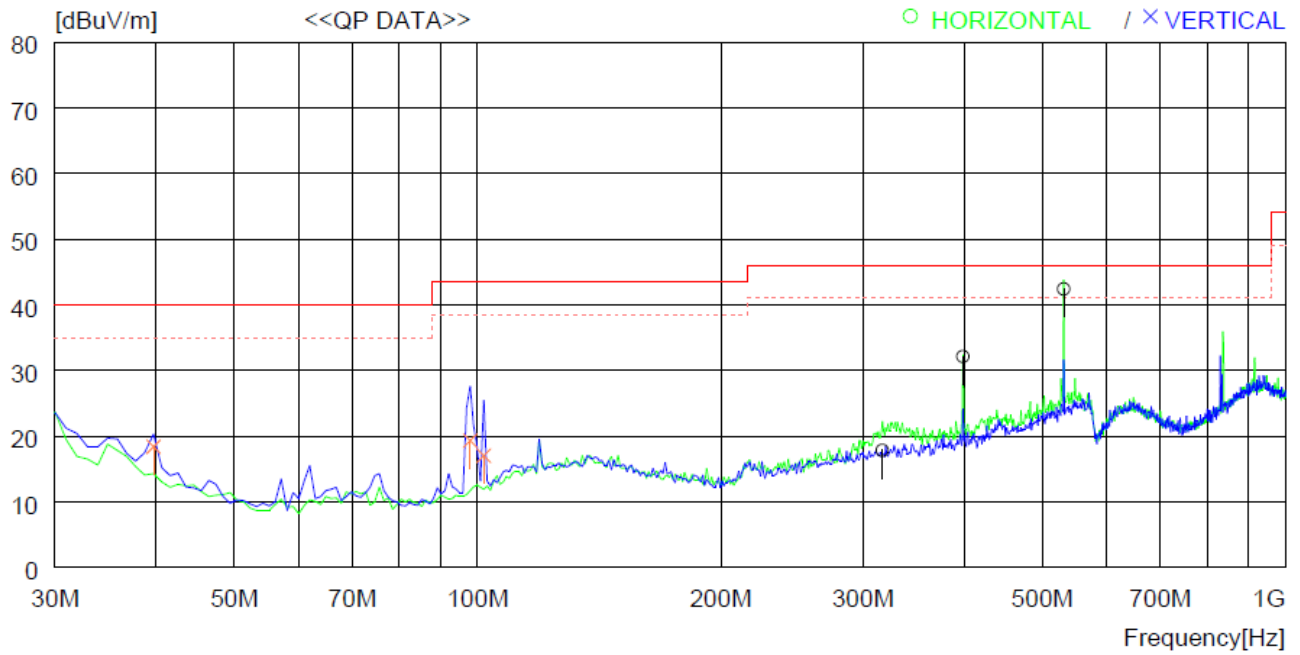
- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- . Frequency range : 1 GHz ~ 10.0 GHz
- . Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.								

13.4.2 Test data for Mode 2_Long

13.4.2.1 Test data for 30 MHz ~ 1 000 MHz

- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m
- The highest value is the fundamental.



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	FACTOR	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	317.120	28.1	19.4	2.3	32.0	17.8	46.0	28.2	100	0
2	398.600	41.0	20.6	2.5	32.0	32.1	46.0	13.9	100	280
3	531.490	48.1	23.4	3.0	32.1	42.4	46.0	3.6	100	303
----- Vertical -----										
4	39.700	32.6	17.1	0.8	32.1	18.4	40.0	21.6	100	105
5	97.900	35.1	14.9	1.3	32.0	19.3	43.5	24.2	100	65
6	101.780	32.1	15.6	1.3	32.0	17.0	43.5	26.5	100	358

13.4.2.2 Test data for Below 30 MHz

- . Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- . Frequency range : 9 kHz ~ 30 MHz
- . Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.								

13.4.2.3 Test data for above 1 GHz

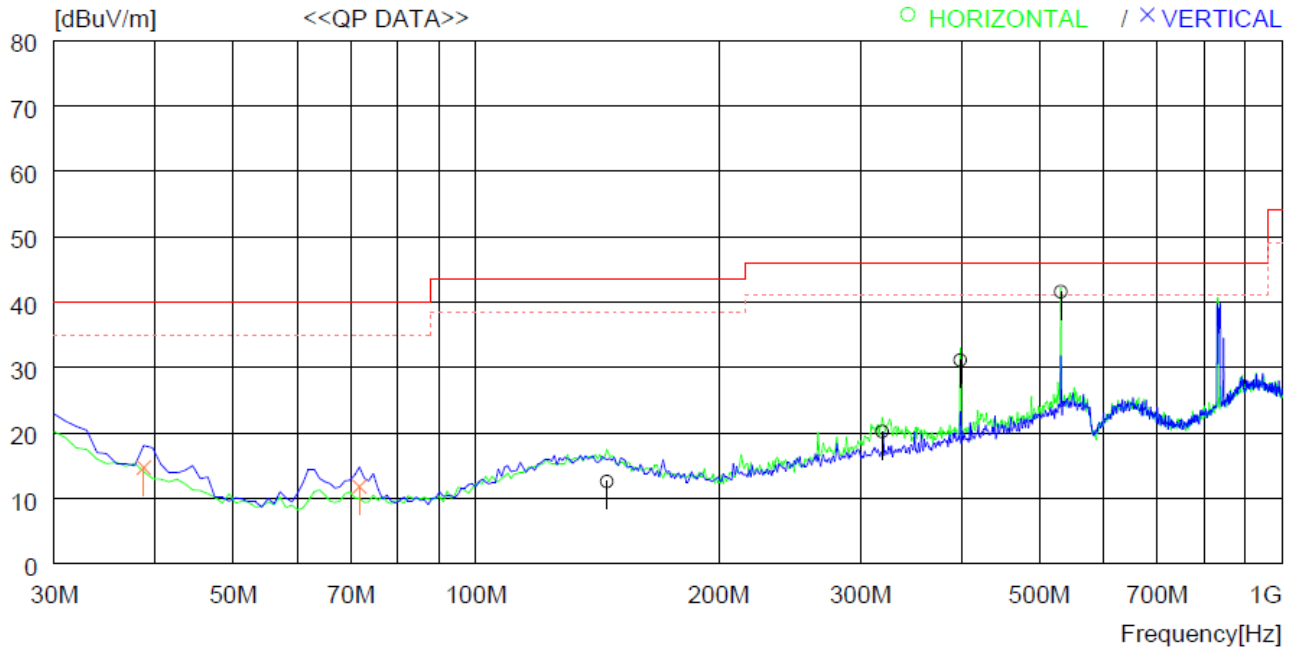
- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- . Frequency range : 1 GHz ~ 10.0 GHz
- . Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.								

13.4.3 Test data for Mode 3_Repeat

13.4.3.1 Test data for 30 MHz ~ 1 000 MHz

- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m
- The highest value is the fundamental.



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	FACTOR	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	145.430	24.3	18.8	1.5	32.0	12.6	43.5	30.9	300	359
2	398.600	40.0	20.6	2.5	32.0	31.1	46.0	14.9	100	359
3	531.490	47.3	23.4	3.0	32.1	41.6	46.0	4.4	200	274
4	319.060	30.4	19.5	2.3	32.0	20.2	46.0	25.8	100	2
----- Vertical -----										
5	38.730	28.4	17.6	0.8	32.1	14.7	40.0	25.3	100	0
6	71.710	29.6	13.1	1.1	32.0	11.8	40.0	28.2	100	164

13.4.3.2 Test data for Below 30 MHz

- . Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- . Frequency range : 9 kHz ~ 30 MHz
- . Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.								

13.4.3.3 Test data for above 1 GHz

- . Resolution bandwidth : 1 MHz for Peak and Average Mode
- . Video bandwidth : 1 MHz for Peak Mode, 10 Hz for Average Mode
- . Frequency range : 1 GHz ~ 10.0 GHz
- . Measurement distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Amp Gain	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.								

14. CONDUCTED EMISSION TEST

14.1 Operating environment

Temperature : 24 °C
Relative humidity : 48 % R.H.

14.2 Test set-up

The EUT was placed on a wooden table, 0.8 m height above the floor. Power was fed to the EUT through a $50\ \Omega$ / $50\ \mu\text{H}$ + $5\ \Omega$ Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

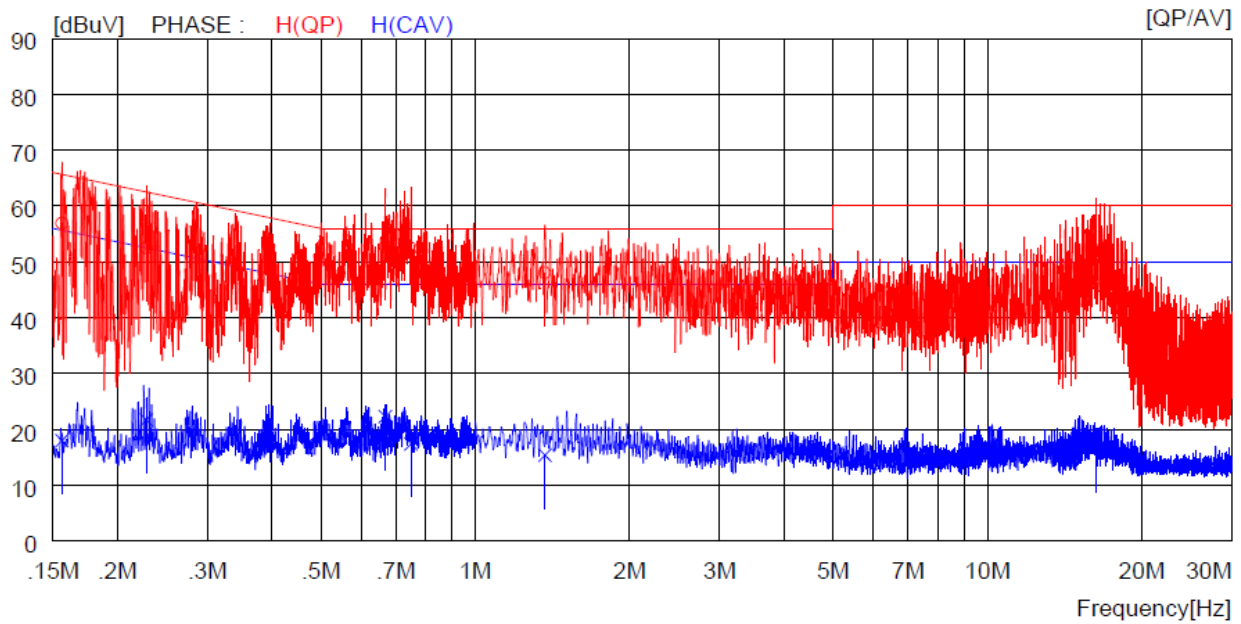
14.3 Test Date

March 17, 2023 ~ April 04, 2023

14.4 Test Data for Trasmitting Mode

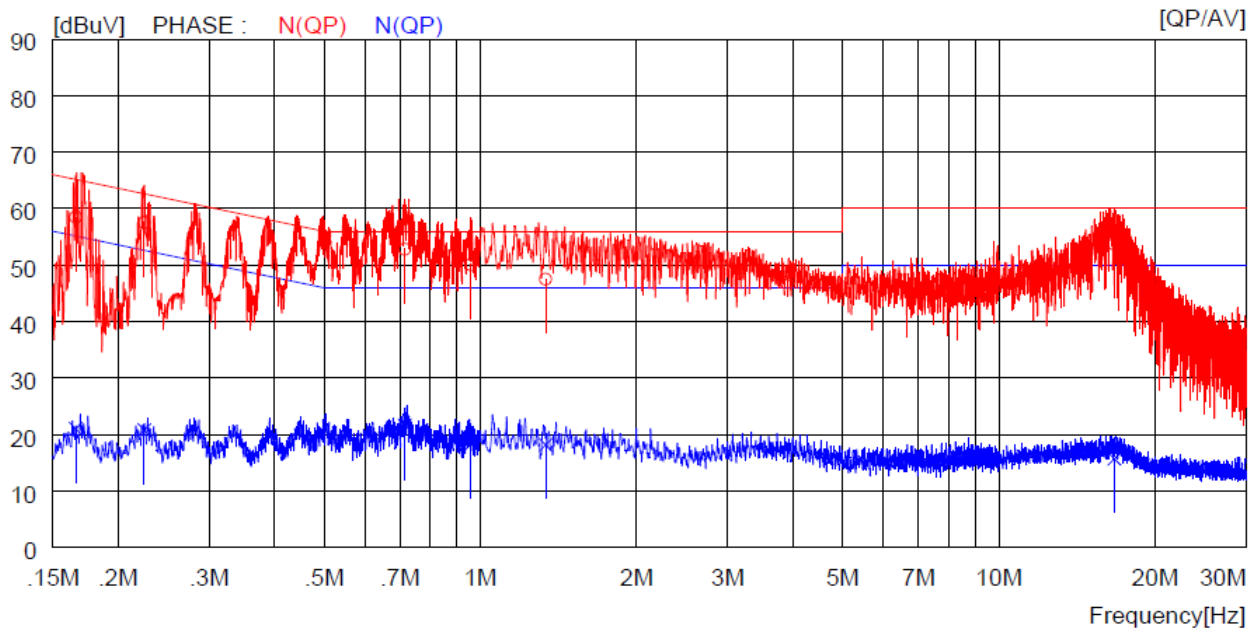
14.4.1 Test data for Mode 1_Normal

- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Tested Line : HOT LINE



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.15600	46.9	----	10.0	56.9	----	65.7	----	8.8	----	H (QP)
2	0.22800	42.5	----	10.0	52.5	----	62.5	----	10.0	----	H (QP)
3	0.66800	42.7	----	10.0	52.7	----	56.0	----	3.3	----	H (QP)
4	0.75000	42.4	----	10.0	52.4	----	56.0	----	3.6	----	H (QP)
5	1.36800	37.9	----	10.1	48.0	----	56.0	----	8.0	----	H (QP)
6	16.28000	41.2	----	10.8	52.0	----	60.0	----	8.0	----	H (QP)
7	0.15600	----	8.0	10.0	----	18.0	----	55.7	----	37.7	H (CAV)
8	0.22800	----	11.7	10.0	----	21.7	----	52.5	----	30.8	H (CAV)
9	0.66800	----	12.3	10.0	----	22.3	----	46.0	----	23.7	H (CAV)
10	0.75000	----	7.4	10.0	----	17.4	----	46.0	----	28.6	H (CAV)
11	1.36800	----	5.3	10.1	----	15.4	----	46.0	----	30.6	H (CAV)
12	16.28000	----	7.4	10.8	----	18.2	----	50.0	----	31.8	H (CAV)

-. Tested Line : NEUTRAL LINE



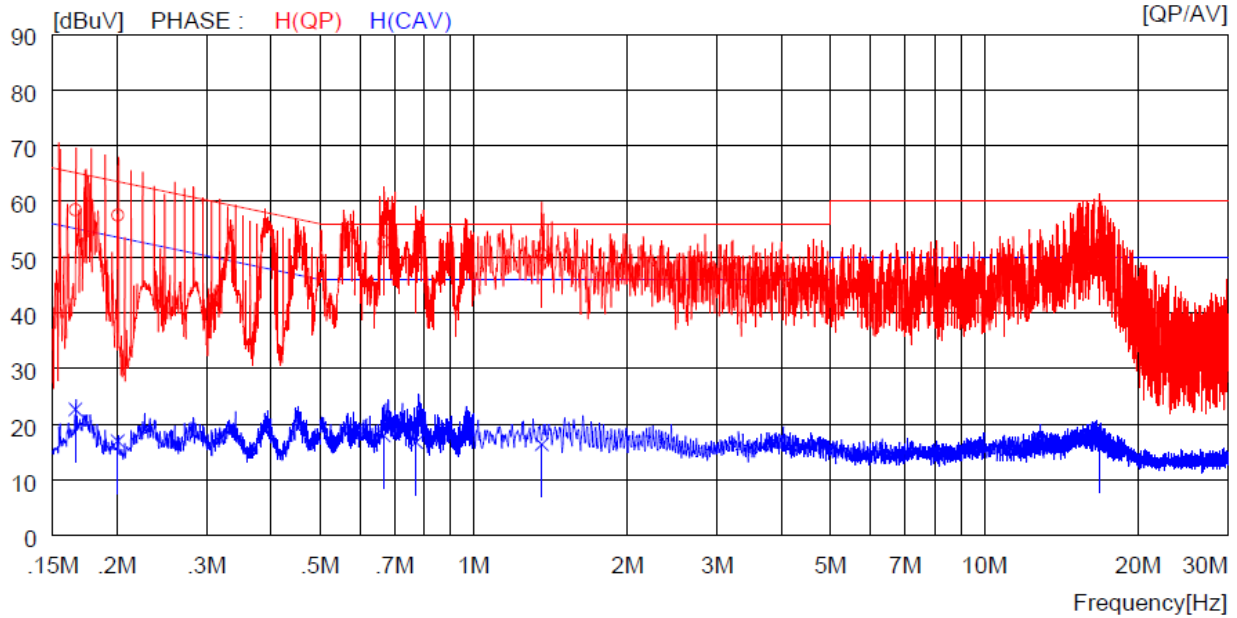
NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.16600	48.5	----	10.0	58.5	----	65.2	----	6.7	----	N (QP)
2	0.22500	47.5	----	10.0	57.5	----	62.6	----	5.1	----	N (QP)
3	0.71500	42.8	----	10.0	52.8	----	56.0	----	3.2	----	N (QP)
4	0.96000	40.1	----	10.0	50.1	----	56.0	----	5.9	----	N (QP)
5	1.33600	37.4	----	10.1	47.5	----	56.0	----	8.5	----	N (QP)
6	16.71000	42.8	----	10.9	53.7	----	60.0	----	6.3	----	N (QP)
7	0.16600	----	11.0	10.0	----	21.0	----	55.2	----	34.2	N (CAV)
8	0.22500	----	10.8	10.0	----	20.8	----	52.6	----	31.8	N (CAV)
9	0.71500	----	11.6	10.0	----	21.6	----	46.0	----	24.4	N (CAV)
10	0.96000	----	8.3	10.0	----	18.3	----	46.0	----	27.7	N (CAV)
11	1.33600	----	8.1	10.1	----	18.2	----	46.0	----	27.8	N (CAV)
12	16.71000	----	4.8	10.9	----	15.7	----	50.0	----	34.3	N (CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

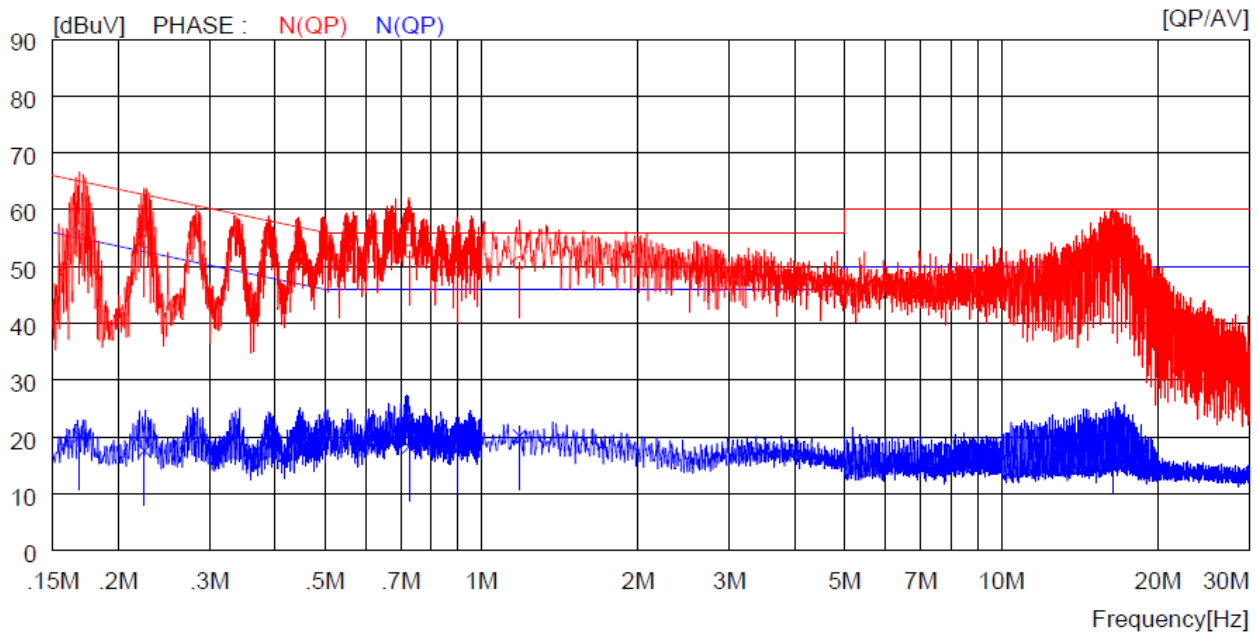
14.4.2 Test data for Mode 2_Long

- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Tested Line : HOT LINE



NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.16600	48.5	----	10.0	58.5	----	65.2	----	6.7	----	H (QP)
2	0.20100	47.5	----	10.0	57.5	----	63.6	----	6.1	----	H (QP)
3	0.66700	42.8	----	10.0	52.8	----	56.0	----	3.2	----	H (QP)
4	0.77100	39.5	----	10.0	49.5	----	56.0	----	6.5	----	H (QP)
5	1.36000	40.4	----	10.1	50.5	----	56.0	----	5.5	----	H (QP)
6	16.78000	40.0	----	10.9	50.9	----	60.0	----	9.1	----	H (QP)
7	0.16600	----	12.7	10.0	----	22.7	----	55.2	----	32.5	H (CAV)
8	0.20100	----	7.0	10.0	----	17.0	----	53.6	----	36.6	H (CAV)
9	0.66700	----	8.0	10.0	----	18.0	----	46.0	----	28.0	H (CAV)
10	0.77100	----	6.8	10.0	----	16.8	----	46.0	----	29.2	H (CAV)
11	1.36000	----	6.3	10.1	----	16.4	----	46.0	----	29.6	H (CAV)
12	16.78000	----	6.4	10.9	----	17.3	----	50.0	----	32.7	H (CAV)

-. Tested Line : NEUTRAL LINE



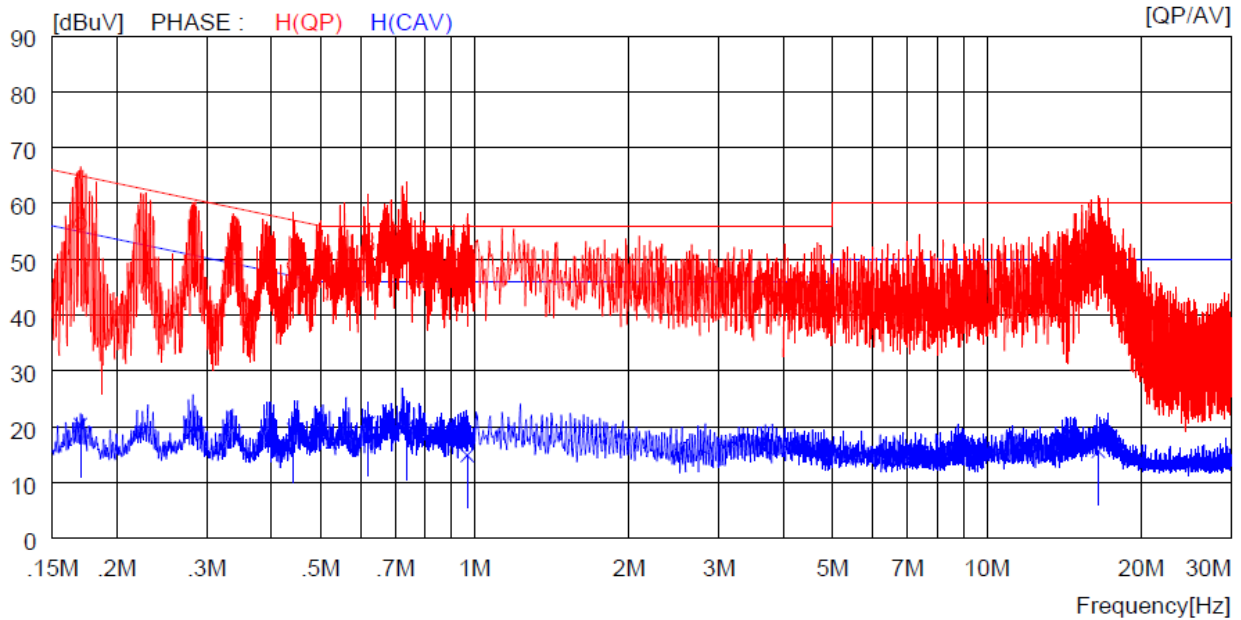
NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.16900	46.5	----	10.0	56.5	----	65.0	----	8.5	----	N (QP)
2	0.22500	44.3	----	10.0	54.3	----	62.6	----	8.3	----	N (QP)
3	0.72600	42.7	----	10.0	52.7	----	56.0	----	3.3	----	N (QP)
4	0.89900	39.5	----	10.0	49.5	----	56.0	----	6.5	----	N (QP)
5	1.18400	40.5	----	10.1	50.6	----	56.0	----	5.4	----	N (QP)
6	16.45000	40.1	----	10.8	50.9	----	60.0	----	9.1	----	N (QP)
7	0.16900	----	10.2	10.0	----	20.2	----	55.0	----	34.8	N (CAV)
8	0.22500	----	7.6	10.0	----	17.6	----	52.6	----	35.0	N (CAV)
9	0.72600	----	8.3	10.0	----	18.3	----	46.0	----	27.7	N (CAV)
10	0.89900	----	9.6	10.0	----	19.6	----	46.0	----	26.4	N (CAV)
11	1.18400	----	10.1	10.1	----	20.2	----	46.0	----	25.8	N (CAV)
12	16.45000	----	8.8	10.8	----	19.6	----	50.0	----	30.4	N (CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

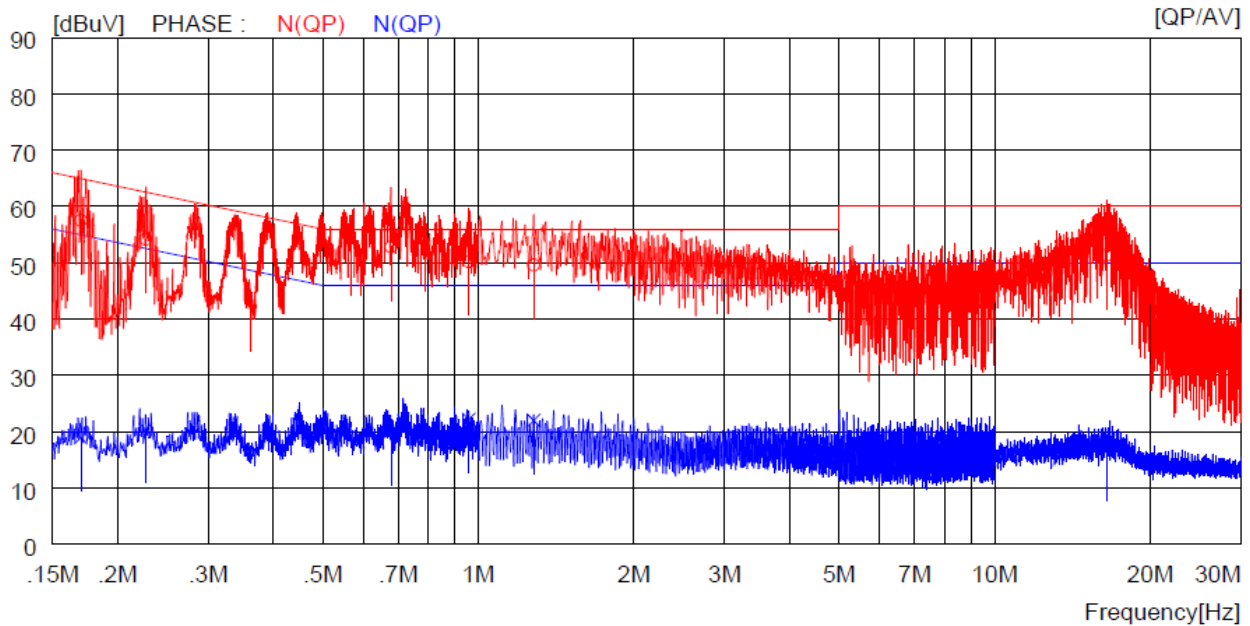
14.4.3 Test data for Mode 3_Repeat

- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz
- Tested Line : HOT LINE



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.17000	46.4	----	10.0	56.4	----	65.0	----	8.6	----	H (QP)
2	0.44300	38.9	----	10.0	48.9	----	57.0	----	8.1	----	H (QP)
3	0.62000	42.3	----	10.0	52.3	----	56.0	----	3.7	----	H (QP)
4	0.73600	42.5	----	10.0	52.5	----	56.0	----	3.5	----	H (QP)
5	0.96700	37.5	----	10.0	47.5	----	56.0	----	8.5	----	H (QP)
6	16.51000	40.4	----	10.9	51.3	----	60.0	----	8.7	----	H (QP)
7	0.17000	----	10.4	10.0	----	20.4	----	55.0	----	34.6	H (CAV)
8	0.44300	----	9.5	10.0	----	19.5	----	47.0	----	27.5	H (CAV)
9	0.62000	----	10.7	10.0	----	20.7	----	46.0	----	25.3	H (CAV)
10	0.73600	----	9.9	10.0	----	19.9	----	46.0	----	26.1	H (CAV)
11	0.96700	----	4.9	10.0	----	14.9	----	46.0	----	31.1	H (CAV)
12	16.51000	----	4.7	10.9	----	15.6	----	50.0	----	34.4	H (CAV)

-. Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.17000	47.5	----	10.0	57.5	----	65.0	----	7.5	----	N (QP)
2	0.22700	44.2	----	10.0	54.2	----	62.6	----	8.4	----	N (QP)
3	0.67800	42.8	----	10.0	52.8	----	56.0	----	3.2	----	N (QP)
4	0.95900	40.2	----	10.0	50.2	----	56.0	----	5.8	----	N (QP)
5	1.28000	39.5	----	10.1	49.6	----	56.0	----	6.4	----	N (QP)
6	16.49000	40.4	----	10.9	51.3	----	60.0	----	8.7	----	N (QP)
7	0.17000	----	9.0	10.0	----	19.0	----	55.0	----	36.0	N (CAV)
8	0.22700	----	10.4	10.0	----	20.4	----	52.6	----	32.2	N (CAV)
9	0.67800	----	10.1	10.0	----	20.1	----	46.0	----	25.9	N (CAV)
10	0.95900	----	12.2	10.0	----	22.2	----	46.0	----	23.8	N (CAV)
11	1.28000	----	11.9	10.1	----	22.0	----	46.0	----	24.0	N (CAV)
12	16.49000	----	6.4	10.9	----	17.3	----	50.0	----	32.7	N (CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

15. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV30	Rohde & Schwarz	Signal Analyzer	101372	Jul. 14, 2022 (1Y)
ESR	Rohde & Schwarz	EMI Test Receiver	101470	Oct. 18, 2022 (1Y)
DT2000-2t	Innco System GmgH	Turn table	N/A	N/A
MA4000-EP	Innco System GmgH	Antenna Master	N/A	N/A
310N	Sonoma Instrument	Pre-Amplifier	312544	Mar. 14, 2023 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	392756	Oct. 13, 2022 (1Y)
SCU18	Rohde & Schwarz	Signal Conditioning unit	102266	Jul. 12, 2022 (1Y)
DT2000-2t	Innco System	Turn Table	N/A	N/A
MA-4000XPET	Innco System	Tilt Antenna Master	MA4000/509/3 7211215/L	N/A
HLP-2008	TDK RF Solutions	Hybrid Antenna	131313	Fed. 21, 2022 (2Y)
HLP-2008	TDK RF Solutions	Hybrid Antenna	131316	Mar. 07, 2022 (2Y)
BBHA9120D	Schwarzbeck	Horn Antenna	9120D-1366	Jul. 05, 2022 (1Y)
89-30-11	WEINSCHL	Fixed Coaxial Attenuator(30 dB)	687	Jan. 04, 2023 (1Y)
10 dB Attenuator	Rohde & Schwarz	10 dB Attenuator	14100882-3	Jul. 14, 2022 (1Y)
HPF 1.5GHz	Rohde & Schwarz	High Pass Filter	N/A	Jan. 16, 2023 (1Y)
N/A	PHELCOM.CO	Band Reject Filter	N/A	Jan. 17, 2023 (1Y)
3825/2	EMCO	LISN(AMN)	9109-1869	Mar. 15, 2023 (1Y)
ESH3-Z2	Rohde & Schwarz	Pulse Limiter	100655	Mar. 13, 2023 (1Y)
ESCI	Rohde & Schwarz	Test Receiver	101012	Oct. 12, 2022 (1Y)
NSLK8128	SCHWARZ BECK	V - LISN (4*32/50A)	8128216	Mar. 14, 2023 (1Y)
SMB100A	Rohde & Schwarz	SIGNAL GENERATOR	177648	Jan. 18, 2023 (1Y)
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar. 24, 2022 (2Y)