ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : **OT-219-RWD-067**

Reception No. : **2109004037**

Applicant : **C&A Marketing Inc.**

Address : **114 Tived Lane East, Edison, New Jersey, 08837, United States**

Manufacturer : **C&A Marketing Inc.**

Address : **114 Tived Lane East, Edison, New Jersey, 08837, United States**

Type of Equipment : **Sprocket 3x4 Printer**

FCC ID. : **2AD2W-HPISP3X4W**

Model Name : **HPISP3X4W**

Serial number : **N/A**

Total page of Report : **80 pages (including this page)**

Date of Incoming : **September 01, 2021**

Date of issue : **September 30, 2021**

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.

Tested by	Reviewed by	Approved by
Myeong-Hwa, Jang / Manager	Tae-Ho, Kim / Senior Manager	Ki-Hong, Nam / General Manager
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-219-RWD-067	September 30, 2021	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

Applicant : C&A Marketing Inc.

Address : 114 Tived Lane East, Edison, New Jersey, 08837, United States

Contact Person : Chaim, Piekarski / Chief Executive Officer

Telephone No. : +8482442000

FCC ID : 2AD2W-HPISP3X4W

Model Name : HPISP3X4W

Brand Name : hp

Serial Number : N/A

Date : September 30, 2021

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
E.U.T. DESCRIPTION	Sprocket 3x4 Printer
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2020
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 KDB 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.

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2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.247 (a) (1)	Carrier Frequency Separation	Met the Limit / PASS
15.247 (a) (1) (iii)	Minimum Number of Hopping Channels	Met the Limit / PASS
15.247 (a) (1) (iii)	Average Time of Occupancy	Met the Limit / PASS
15.247 (b) (1)	Maximum Peak Conducted Output Power	Met the Limit / PASS
15.247 (d)	100 kHz Bandwidth Outside the Frequency Band	Met the Limit / PASS
15.247 (d)	Radiated Emission which fall in the Restricted Band	Met the Limit / PASS
15.209	Radiated Emission Limits, General Requirement	Met the Limit / PASS
15.207	Conducted Limits	Met the Limit / PASS
15.203	Antenna Requirement	Met requirement / PASS

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: 2020. 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-20122/ 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

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3. GENERAL INFORMATION

3.1 Product Description

The C&A Marketing Inc., Model HPISP3X4W (referred to as the EUT in this report) is a Sprocket 3x4 Printer. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Sprocket 3x4 Printer		
Temperature Range	0 °C ~ 45 °C		
OPERATING FREQUENCY	Bluetooth LE	2 402 MHz ~ 2 480 MHz	
	Bluetooth	2 402 MHz ~ 2 480 MHz	
MODULATION TYPE	Bluetooth LE	GFSK for 1 Mbps	
	Bluetooth	GFSK for 1Mbps, π/4-DQPSK for 2Mbps, 8-DPSK for 3Mbps	
RF OUTPUT POWER	Bluetooth LE	1.28 dBm	
	Bluetooth	1 Mbps	4.07 dBm
		2 Mbps	0.26 dBm
		3 Mbps	0.65 dBm
ANTENNA TYPE	Chip Antenna		
ANTENNA GAIN	1.8 dBi		
List of each Osc. or crystal Freq. (Freq. >= 1 MHz)	24 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	N/A	HP400 V1.0	N/A
SUB Board 1	N/A	N/A	N/A
SUB Board 2	N/A	N/A	N/A
SUB Board 3	N/A	N/A	N/A
Battery	EVE Energy Co., Ltd	P0887B-LF	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
HPISP3X4W	C&A Marketing Inc.	Sprocket 3x4 Printer (EUT)	
HP Probook	HP	Notebook PC	EUT
PPP009L-E	LIE-ON TECHNOLOGY (CHANGZHOU)CO.,LTD.	AC Adapter	

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, the EUT was set at 2 402 MHz, 2 441MHz, and 2 480 MHz to get a maximum emission levels from the EUT. The EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XY” axis, but the worst data was recorded in this report.

-. Frequency / Channel Operations

Channel	Frequency
0	2 402
39	2 441
78	2 480

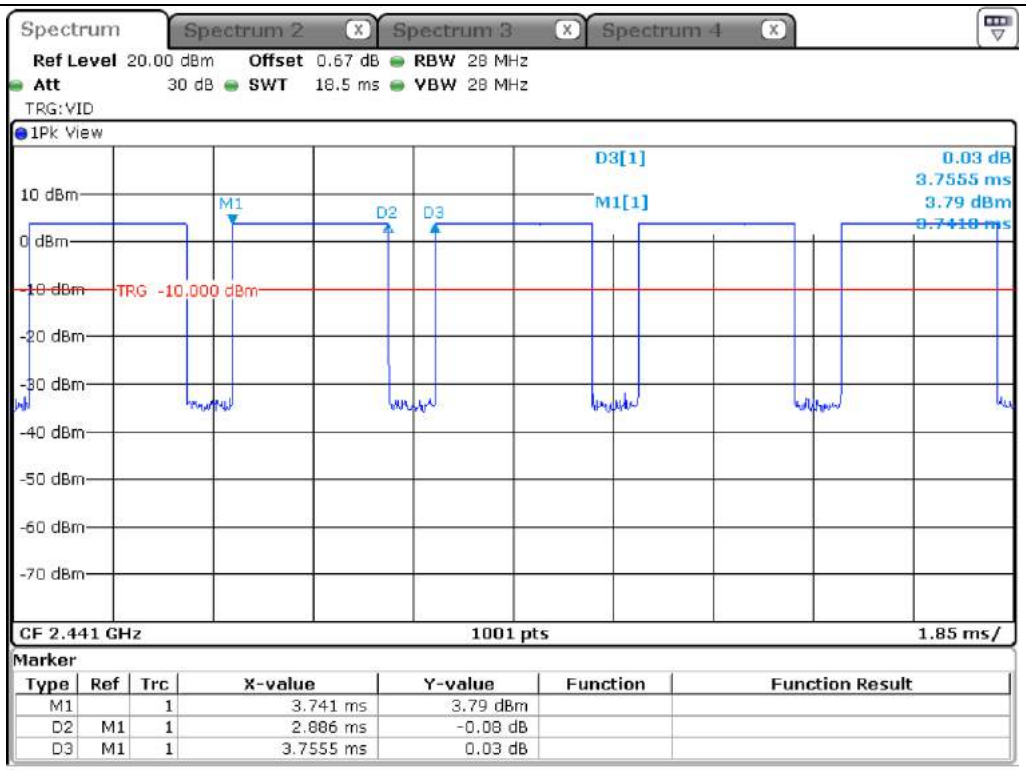
-. Duty Cycle

Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
Bluetooth [1 Mbps]	2.886	0.870	76.84	1.14
Bluetooth [2 Mbps]	2.886	0.851	77.23	1.14
Bluetooth [3 Mbps]	2.886	0.851	77.23	1.14

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

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

-. Test Plot



Bluetooth_1 Mbps

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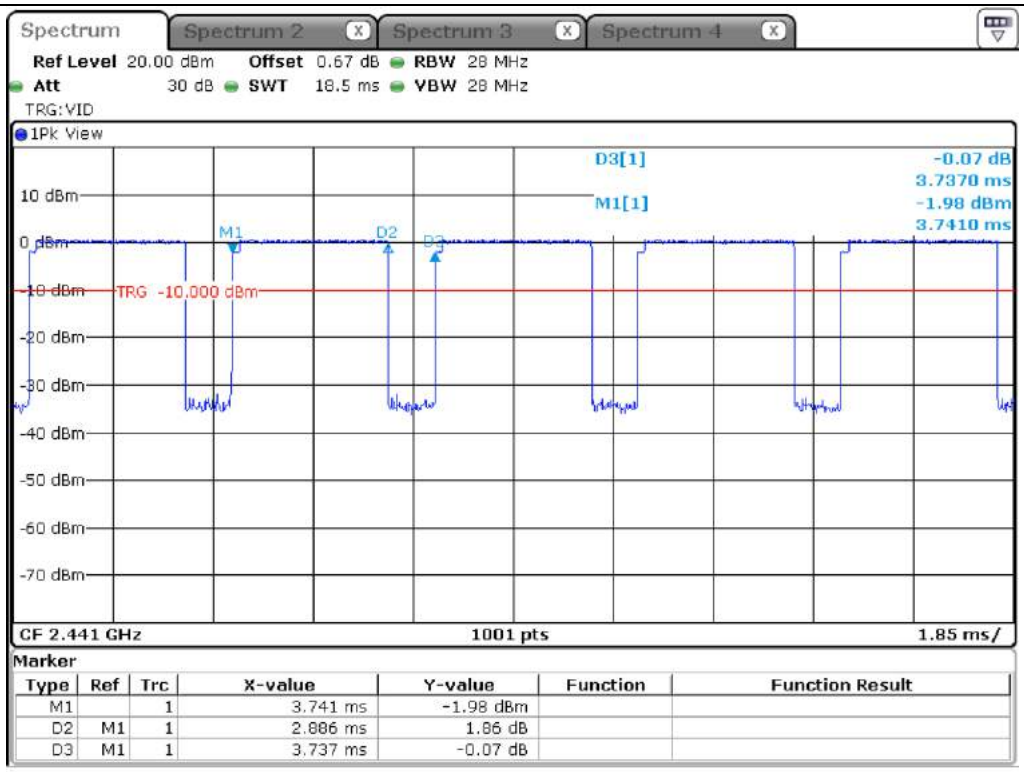
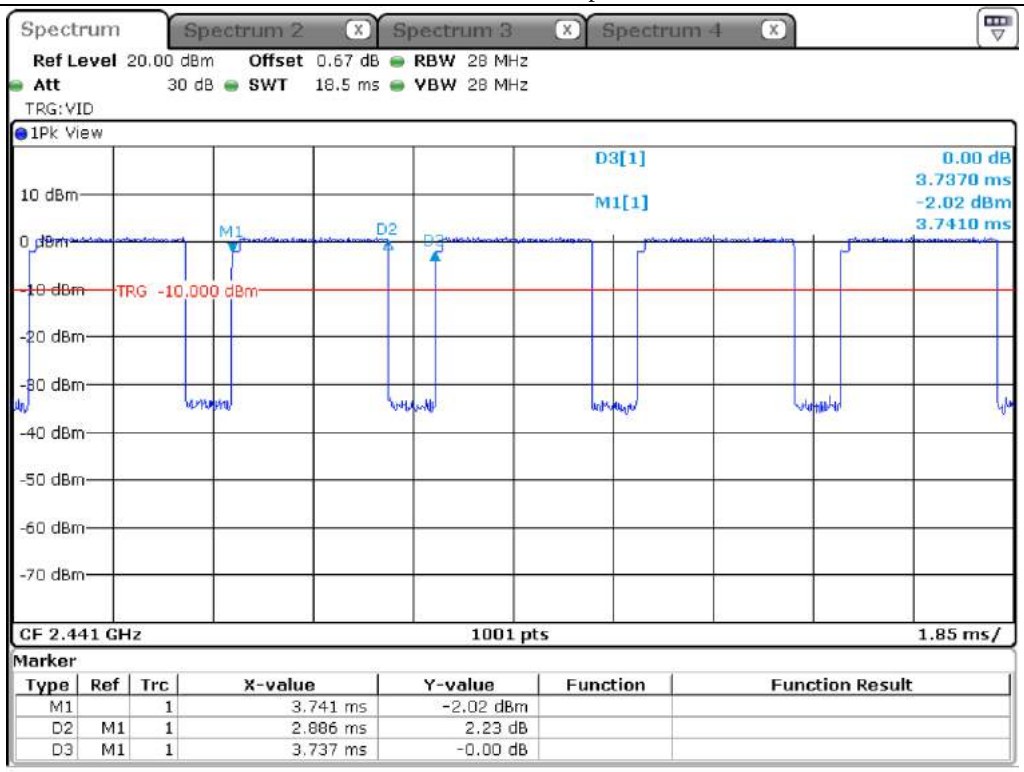


Bluetooth_2 Mbps



Bluetooth_3 Mbps

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5.4 Configuration of Test System

Line Conducted Test: The EUT was connected to LISN. All supporting equipment's were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2020 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2020 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 a Chip 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)
Charging 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

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7. MINIMUM 20 dB BANDWIDTH

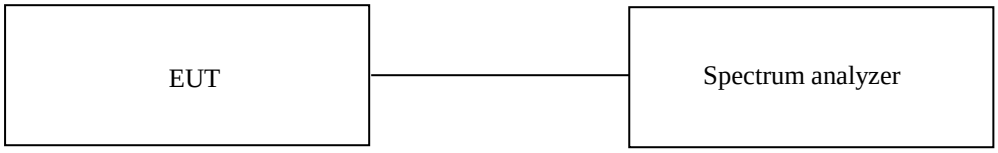
7.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

7.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to the range 1% to 5% of the OBW, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.



7.3 Test Date

September 06, 2021 ~ September 15, 2021

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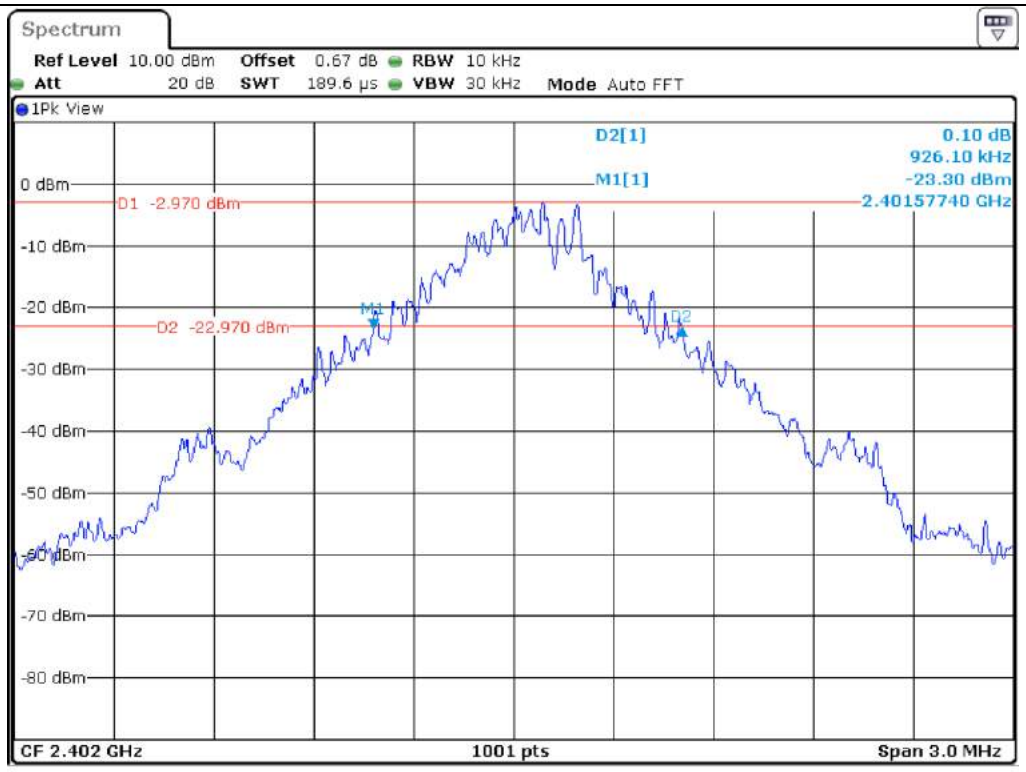
7.4 Test data for 1 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	926.10
Middle	2 441.00	923.10
High	2 480.00	929.10



Low Channel

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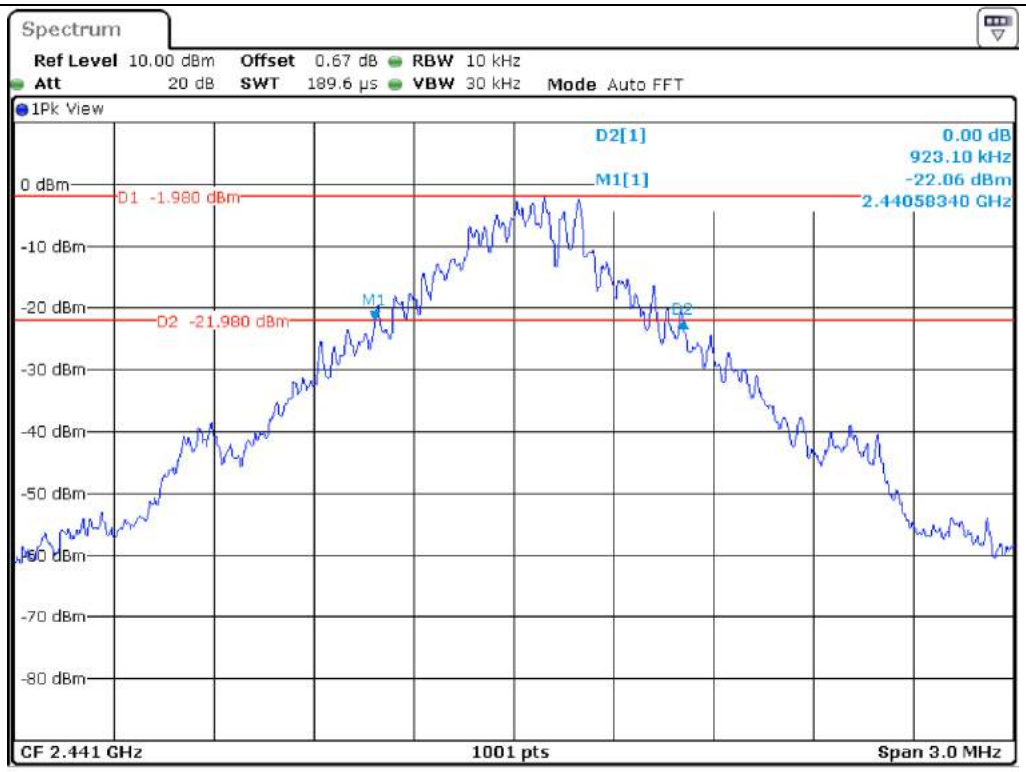
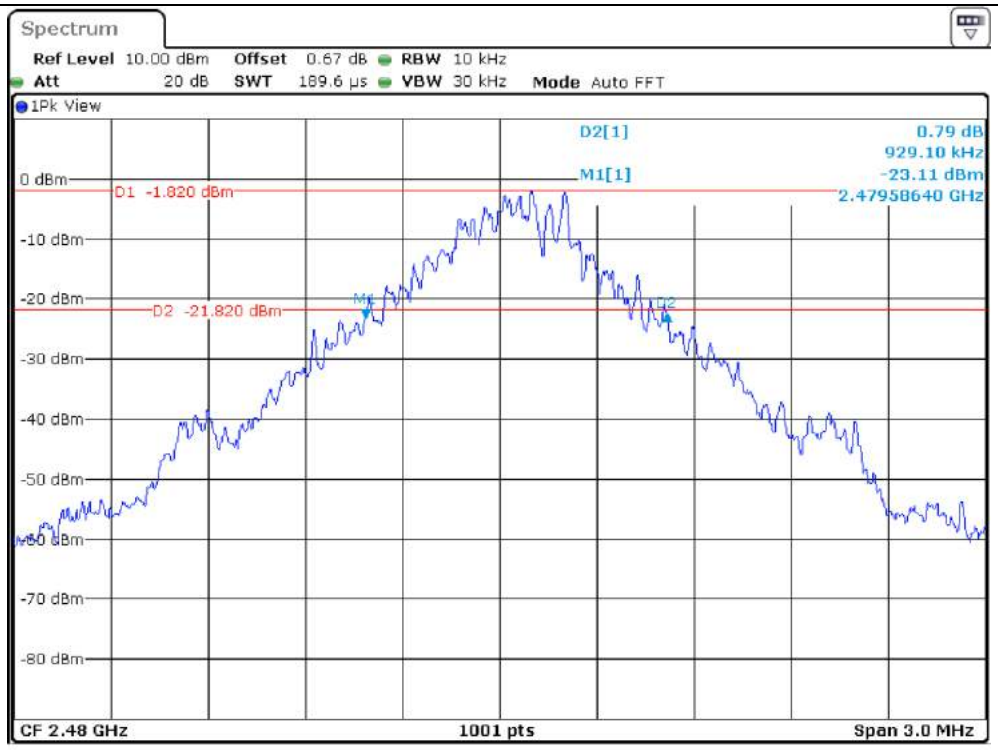


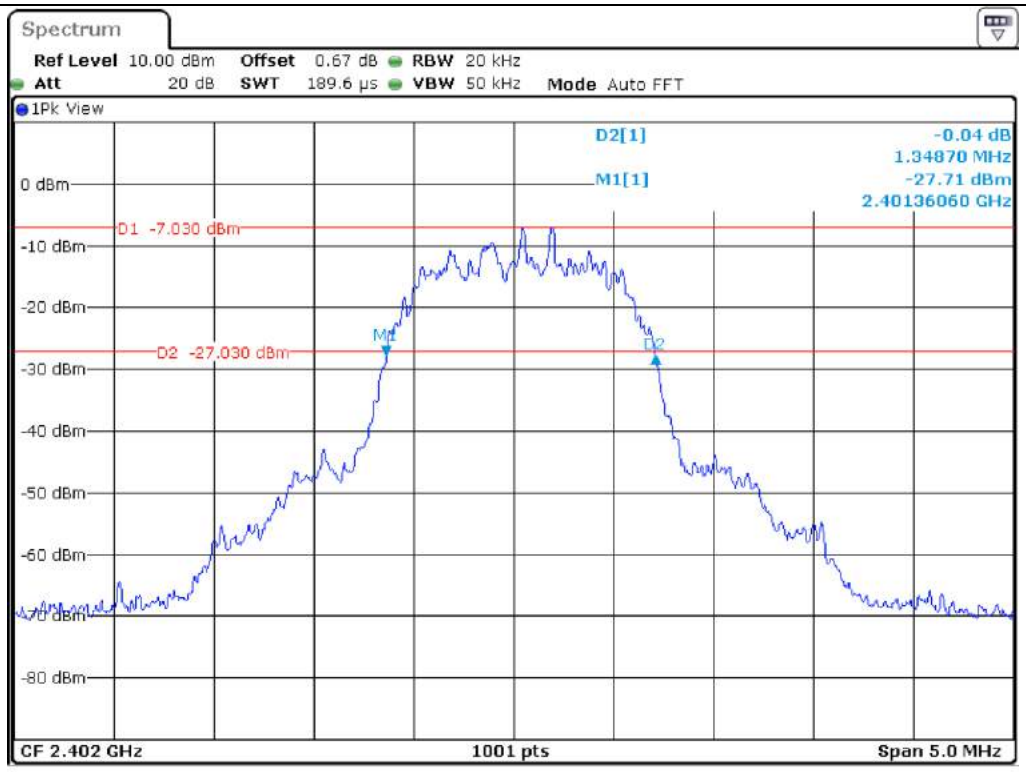
Middle Channel



High Channel

7.5 Test data for 2 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 348.70
Middle	2 441.00	1 348.70
High	2 480.00	1 348.70



Low Channel

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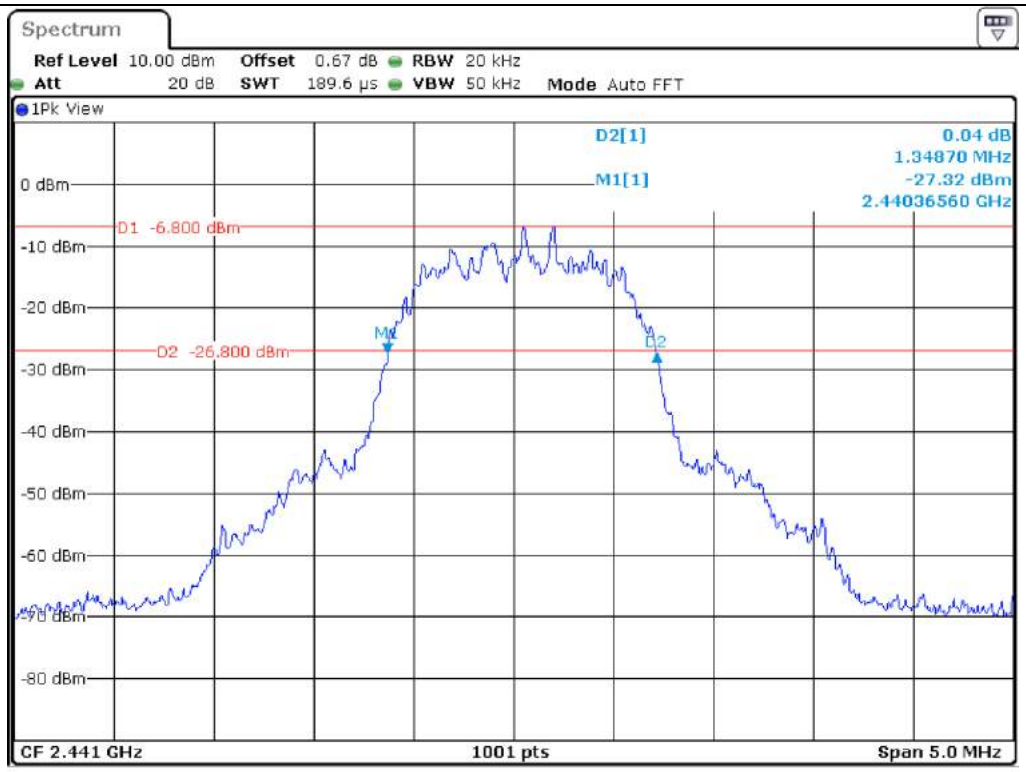
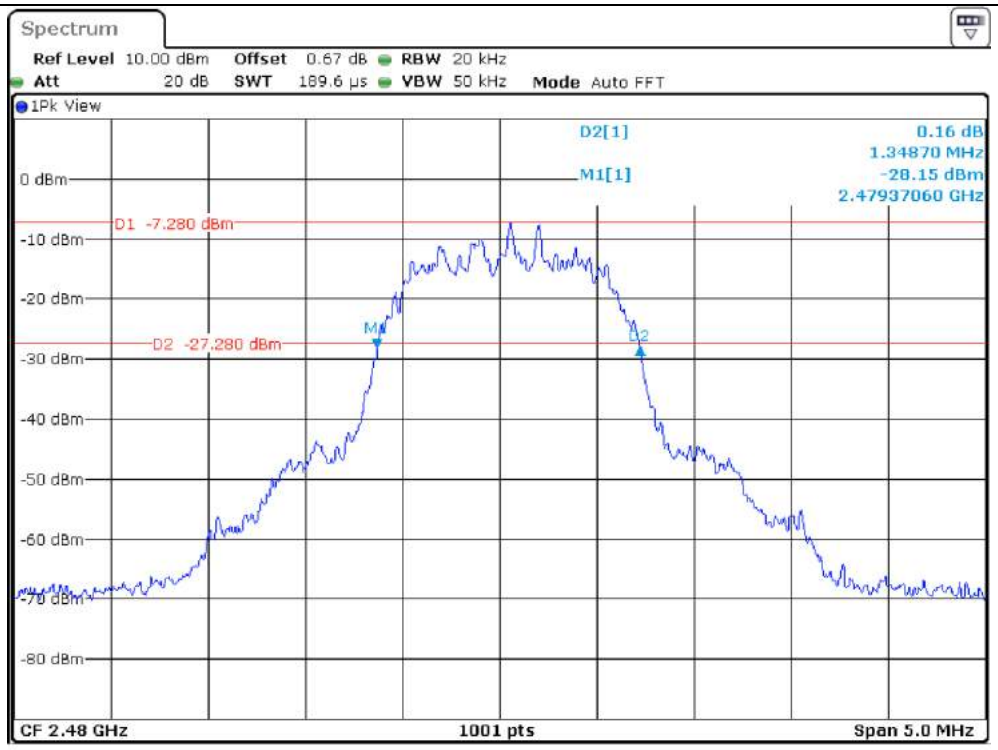


Middle Channel



High Channel

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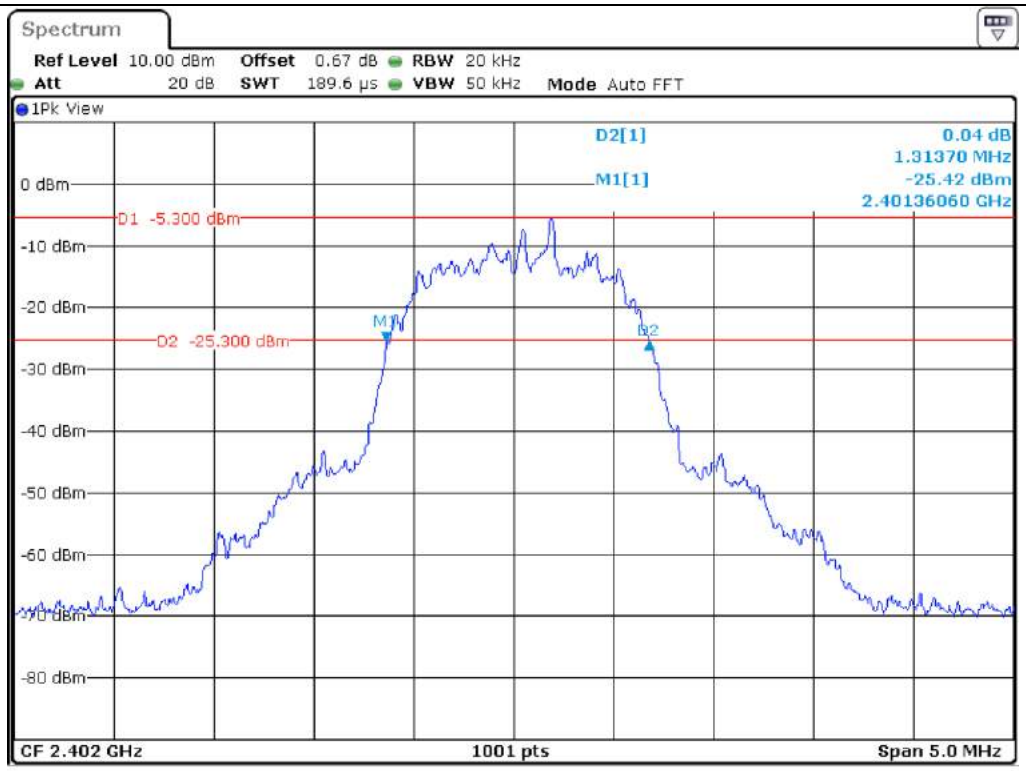
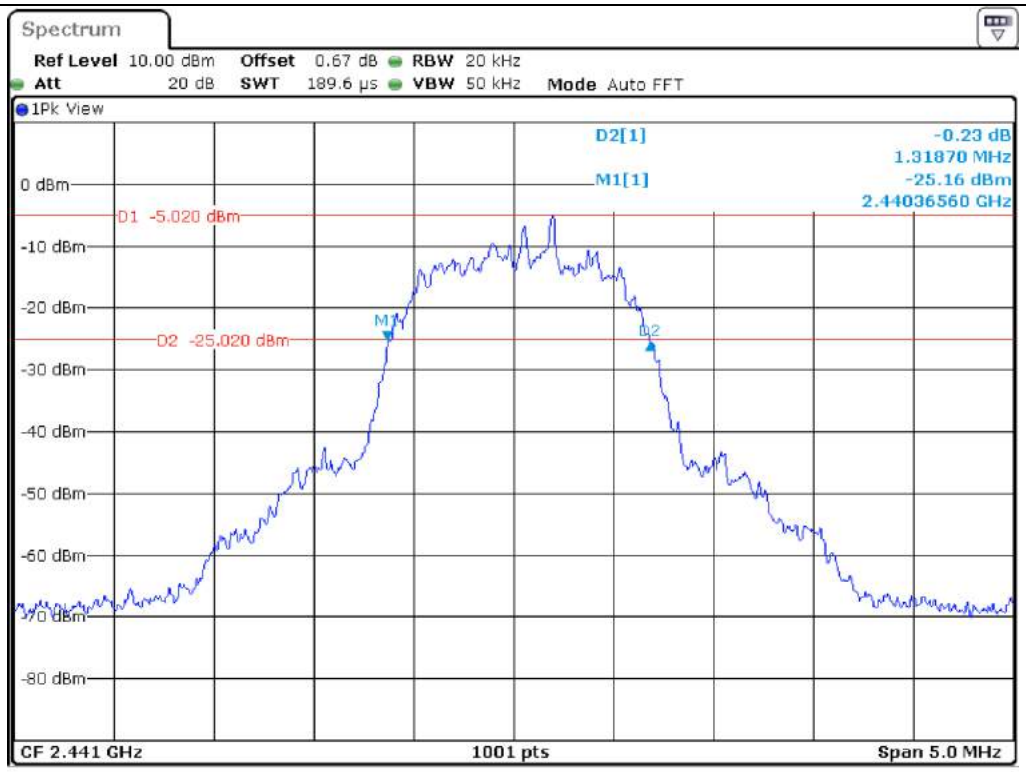
7.6 Test data for 3 Mbps

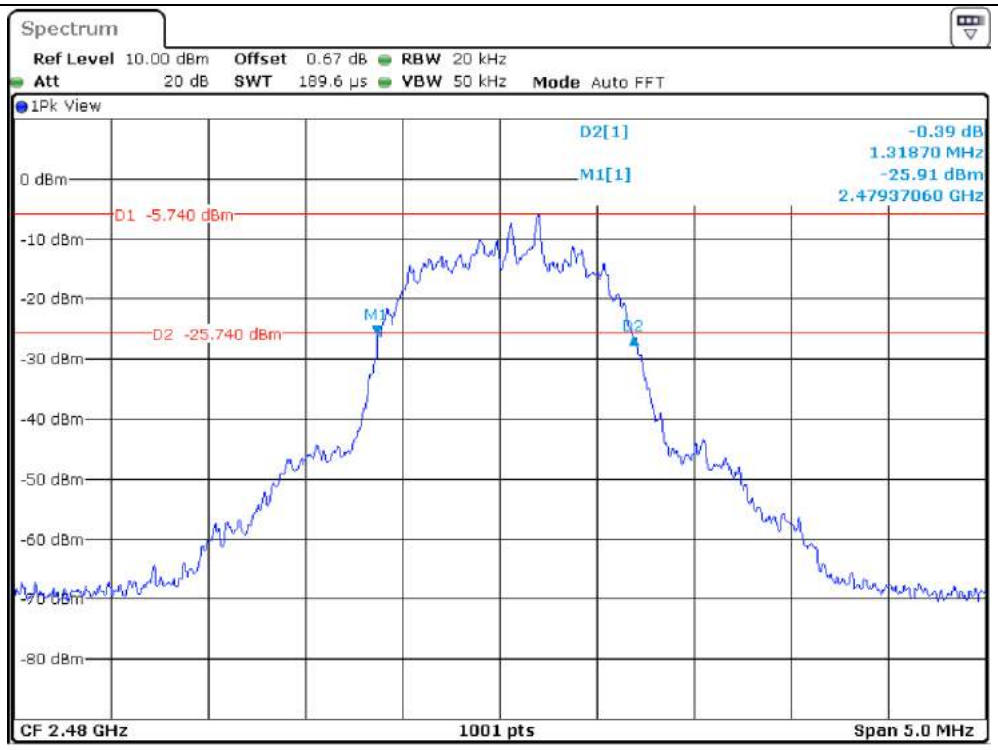
CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 313.70
Middle	2 441.00	1 318.70
High	2 480.00	1 318.70



Low Channel



Middle Channel



High Channel

8. HOPPING FREQUENCY SEPARATION

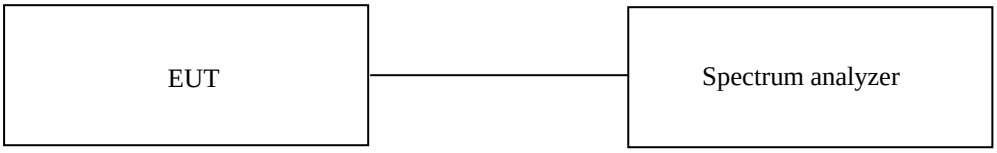
8.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

8.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The frequency span is set to 10 MHz. The analyzer is set to peak hold then a pseudo-random hopping sequence of the transmitter is captured. The mark delta function was used to measure the frequency separation between two adjacent hopping channels.



8.3 Test Date

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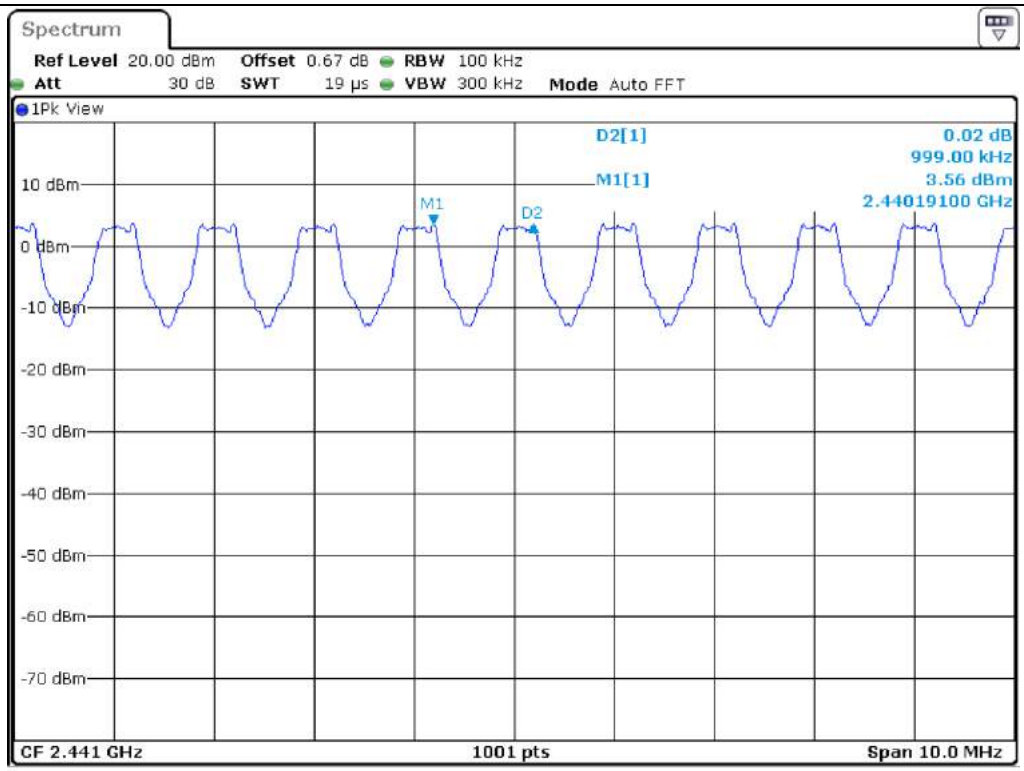
8.4 Test data for 1 Mbps

-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	615.40	Separated by a minimum of 615.40 kHz



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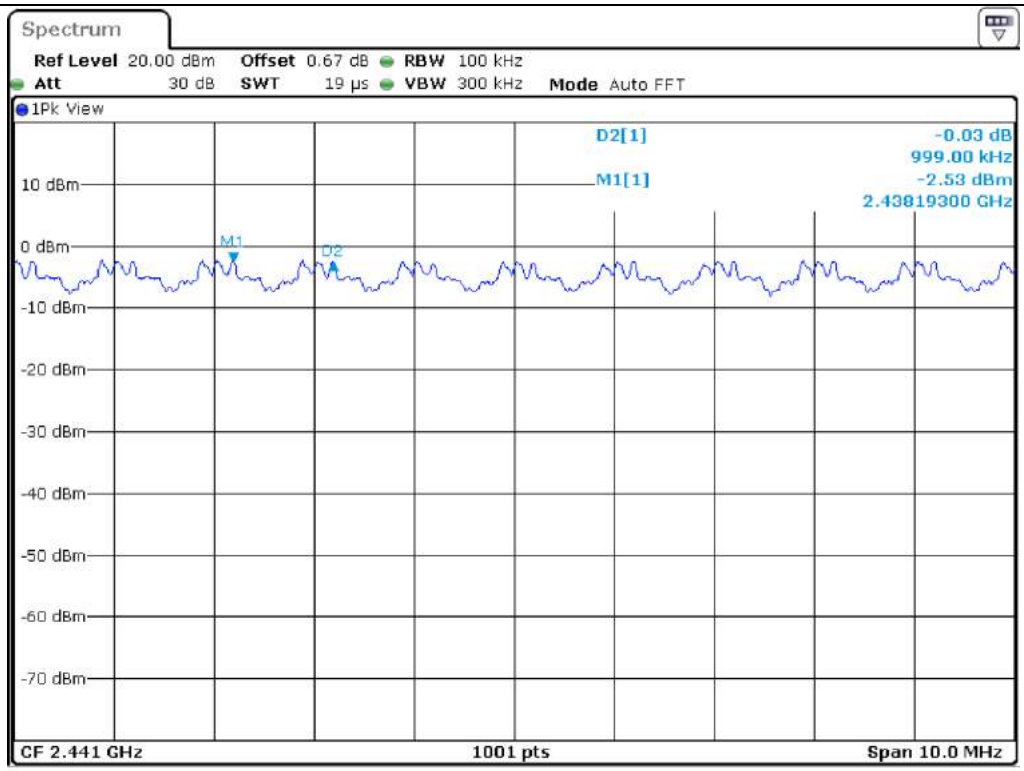
8.5 Test data for 2 Mbps

-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	899.13	Separated by a minimum of 899.13 kHz



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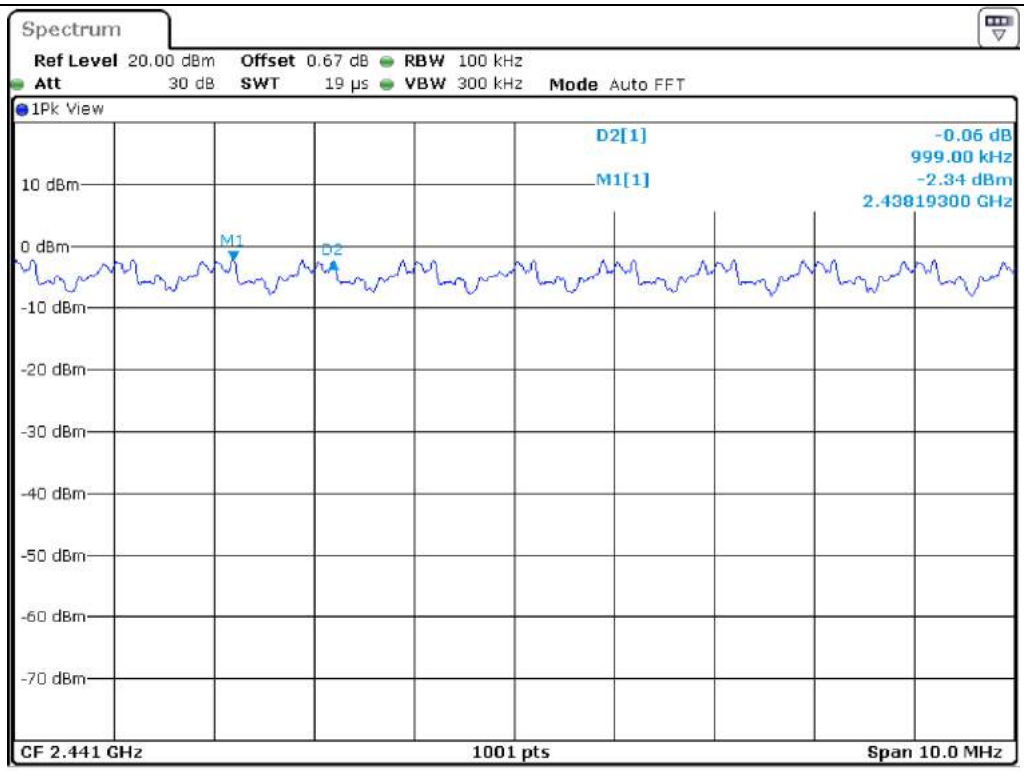
8.6 Test data for 3 Mbps

-. Test Result : Pass

MEASURED VLAUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	879.13	Separated by a minimum of 879.13 kHz



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9. NUMBER OF HOPPING CHANNELS

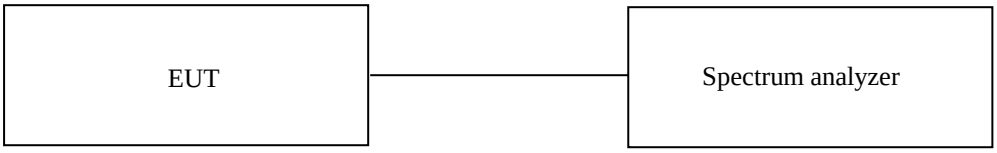
9.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

9.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The frequency span is set to the range 2 400 MHz to 2 483.5 MHz and the resolution bandwidth is set to 100 kHz. The analyzer is set to peak hold and then complete pseudo-random hopping sequence of the transmitter is captured.



9.3 Test Date

September 06, 2021 ~ September 15, 2021

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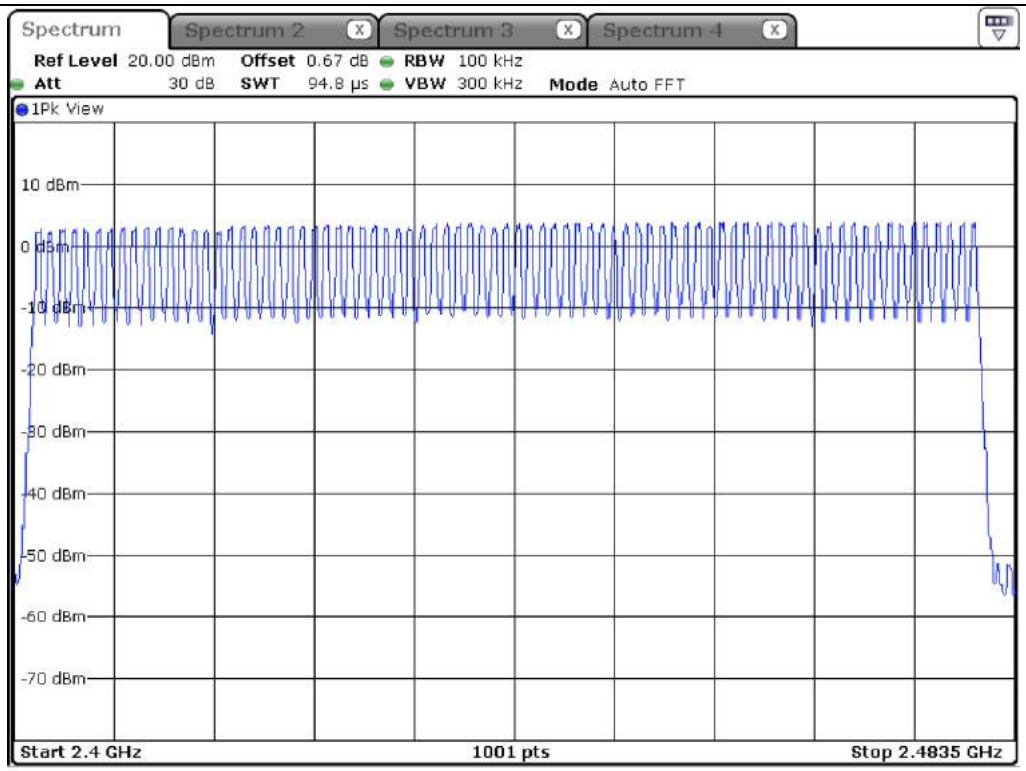
9.4 Test data for 1 Mbps

-. Test Result : Pass

Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
1 Mbps	79	Minimum of 15	64



Total number of hopping channel: 28+30+21 = 79

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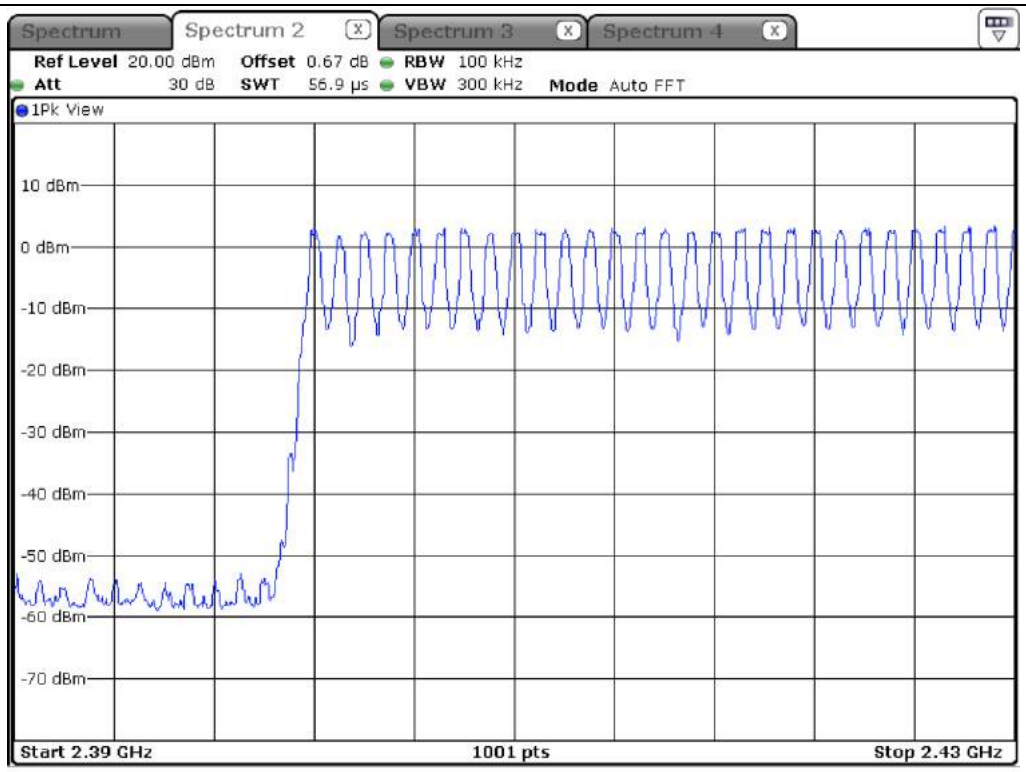
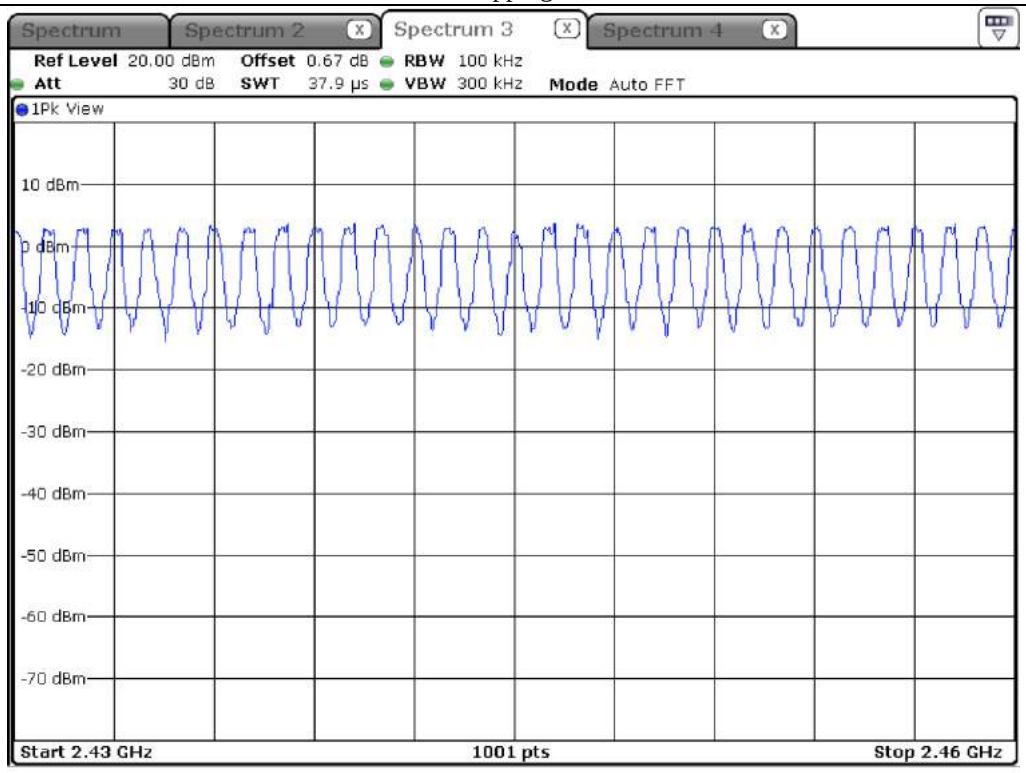


Number of hopping channel: 28



Number of hopping channel: 30

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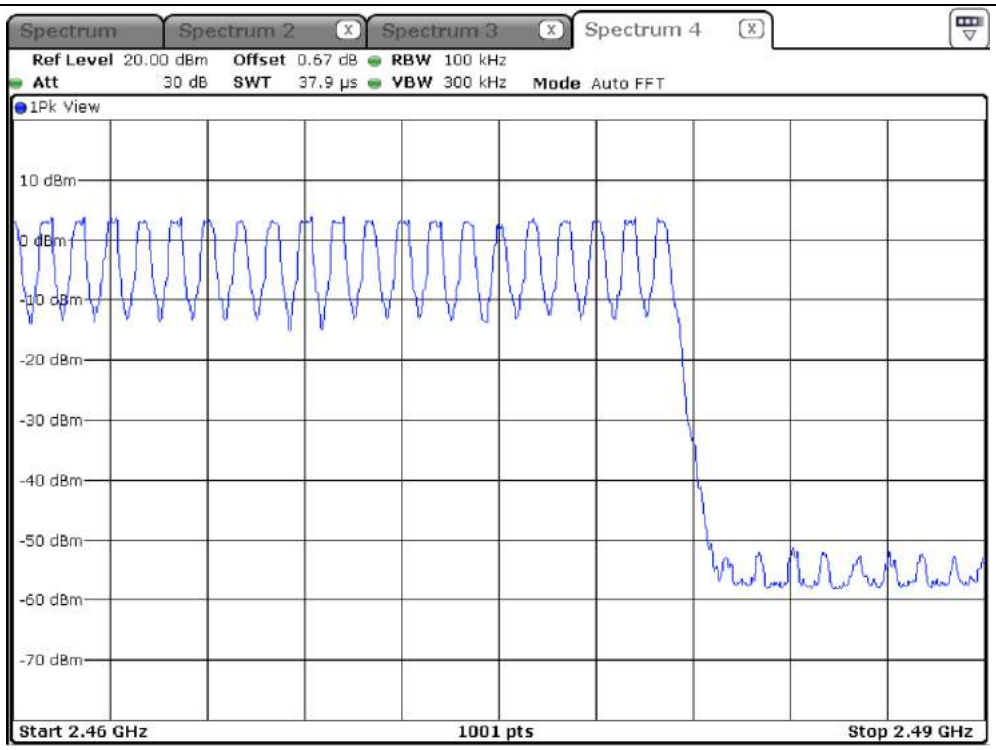

Number of hopping channel: 21

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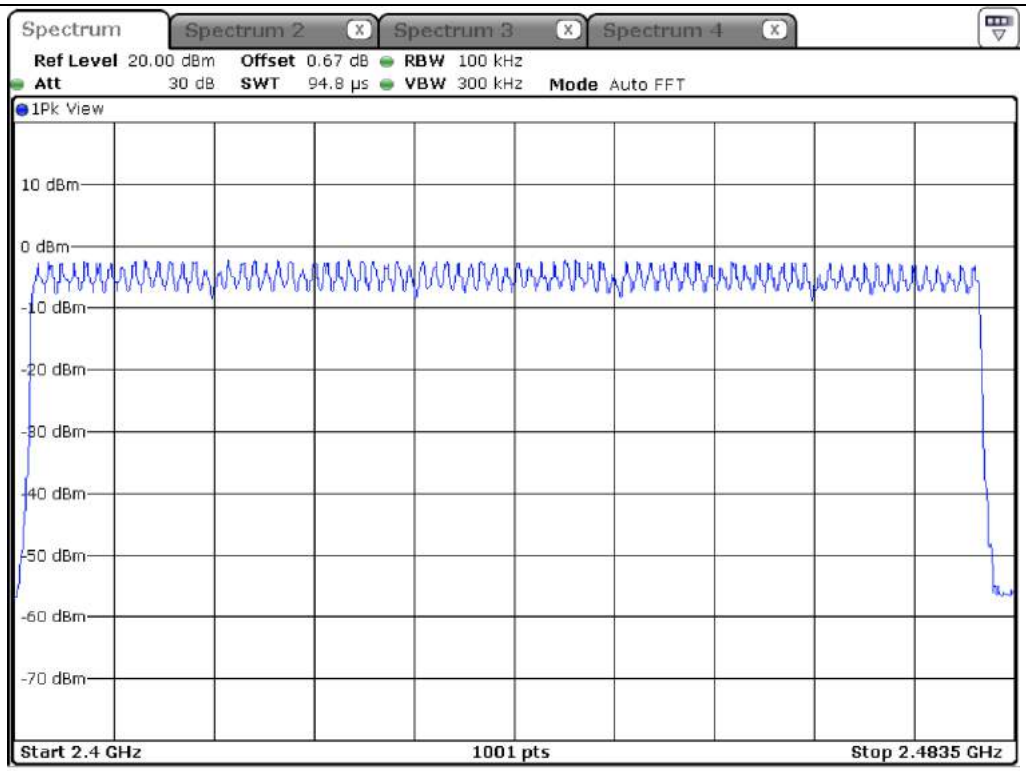
9.5 Test data for 2 Mbps

-. Test Result : Pass

Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
2 Mbps	79	Minimum of 15	64



Total number of hopping channel: 28+30+21 = 79

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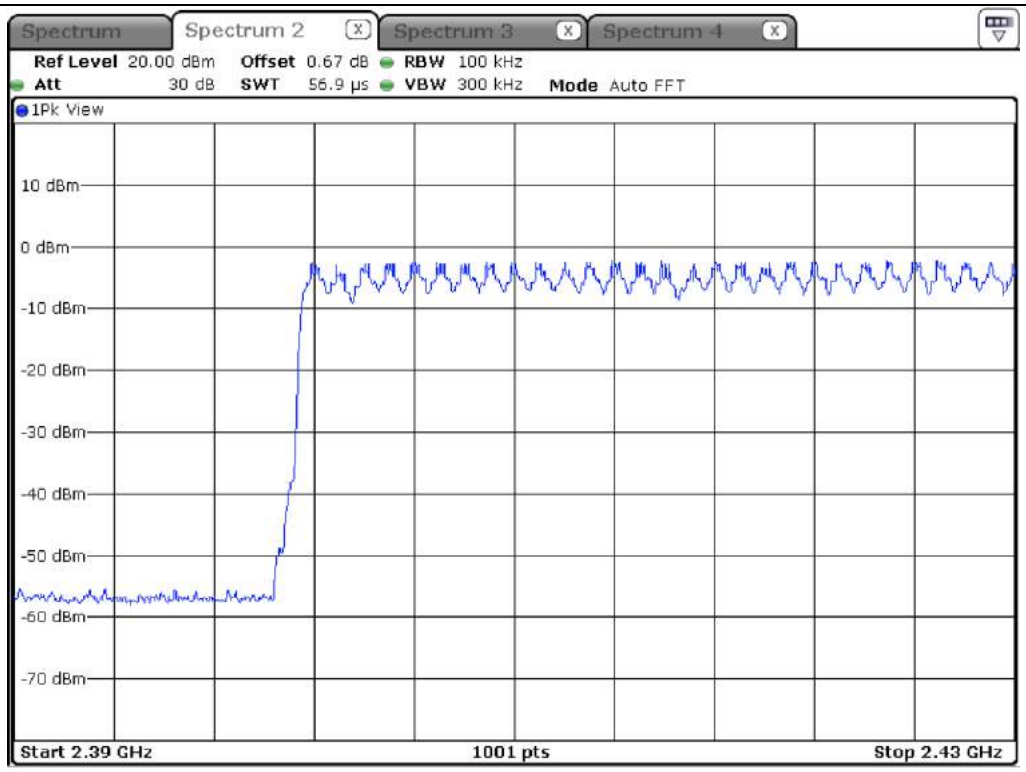
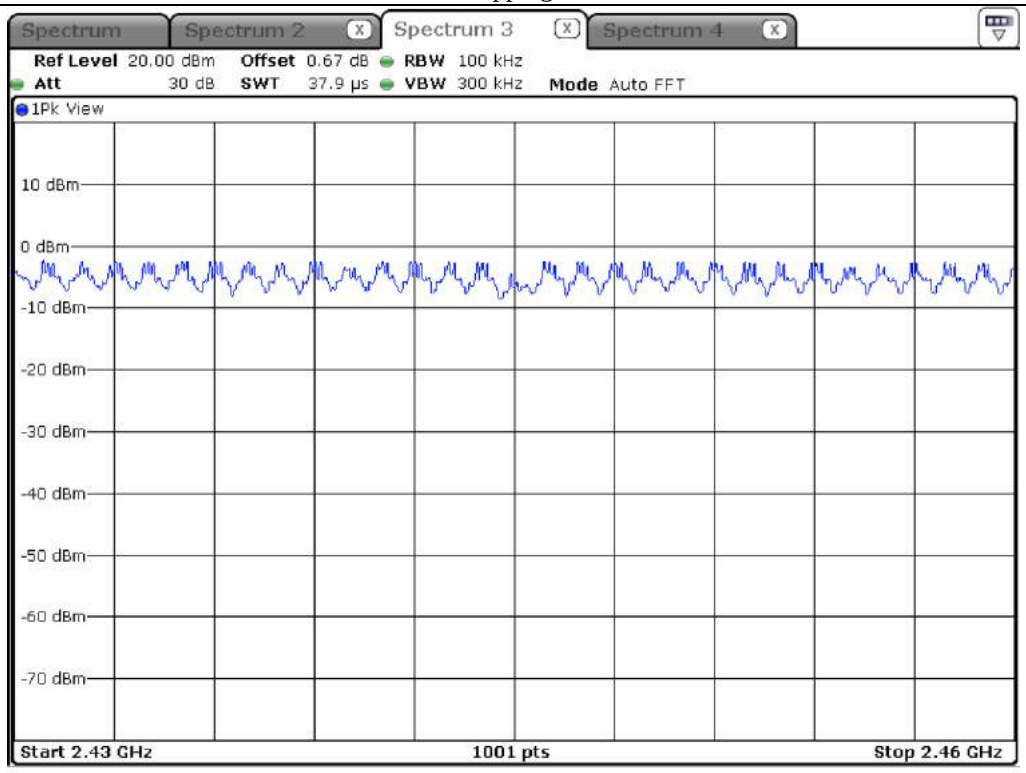
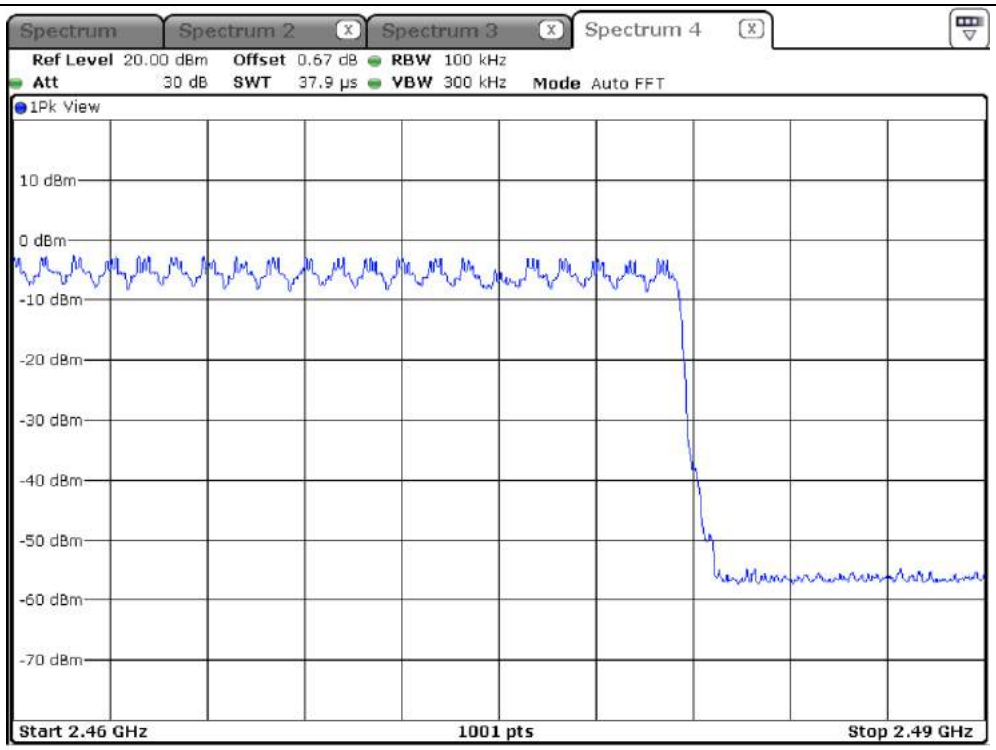


Number of hopping channel: 28



Number of hopping channel: 30

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



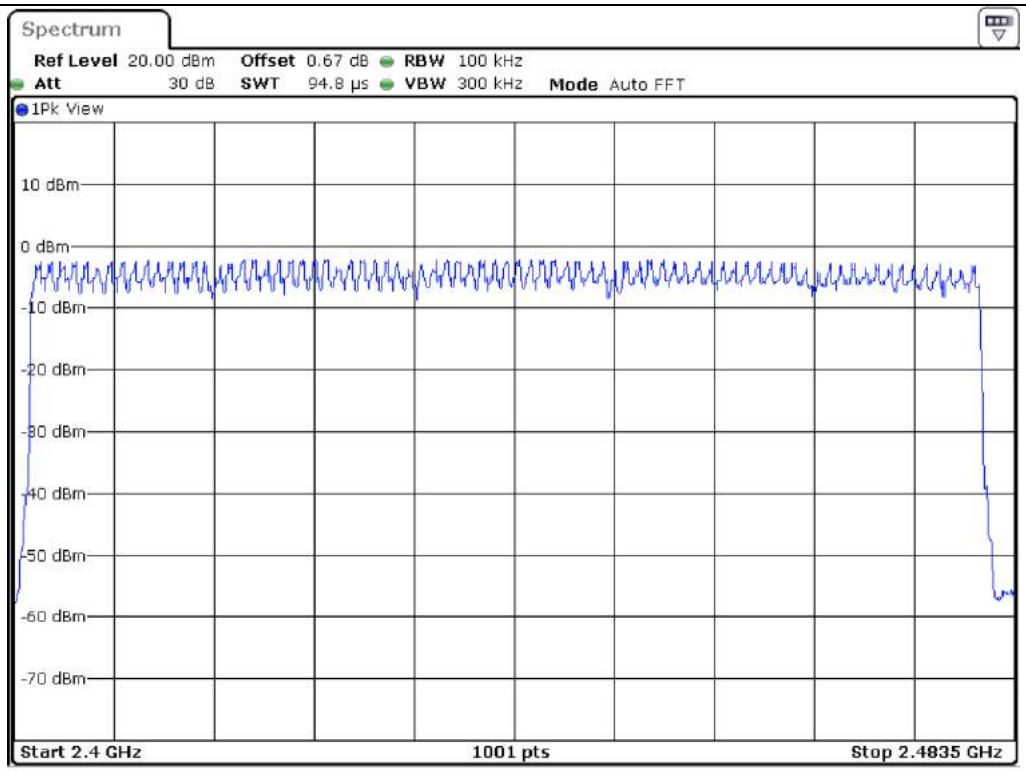
Number of hopping channel: 21

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

9.6 Test data for 3 Mbps

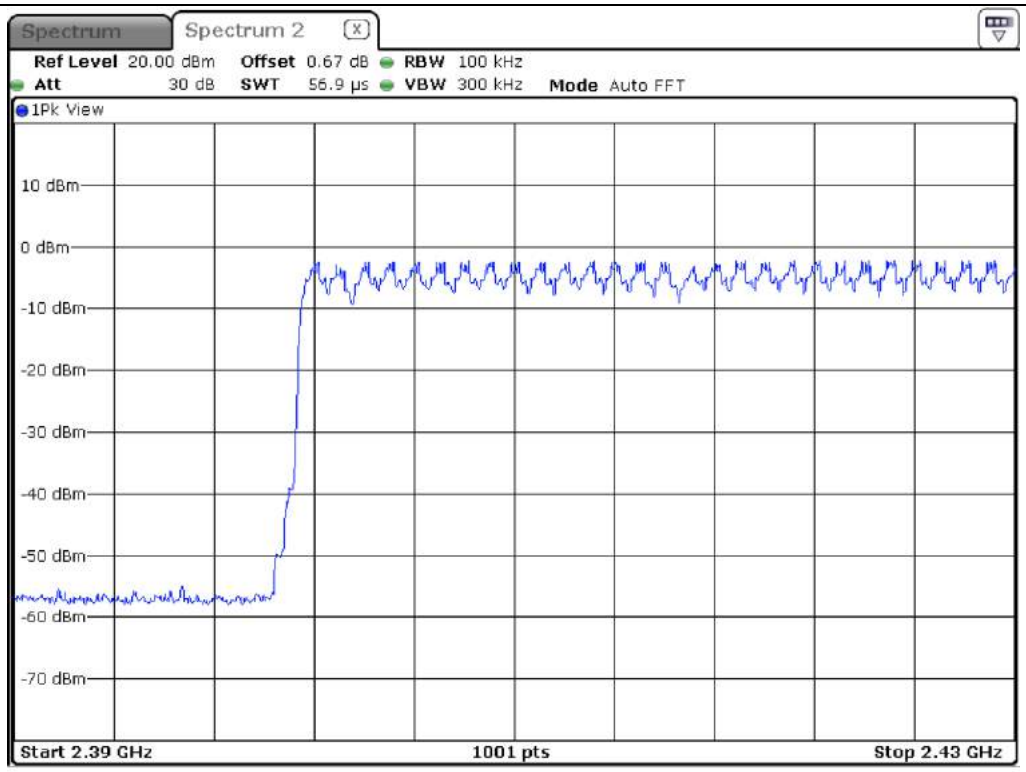
-. Test Result : Pass

Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
3 Mbps	79	Minimum of 15	64

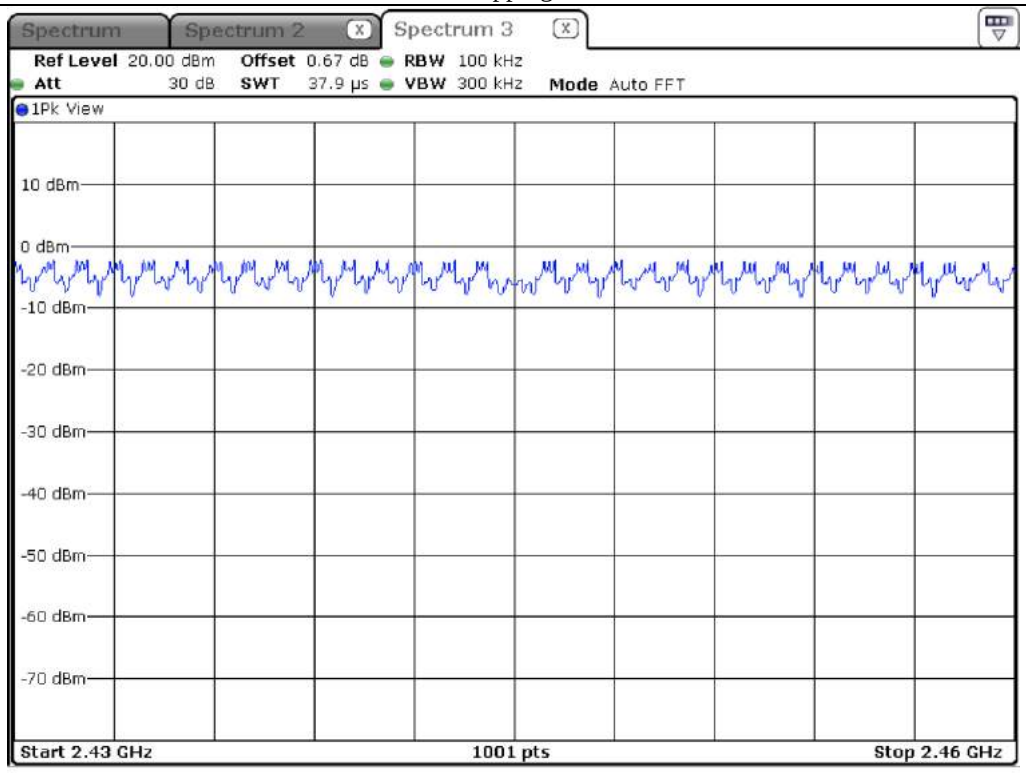


Total number of hopping channel: 28+30+21 = 79

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

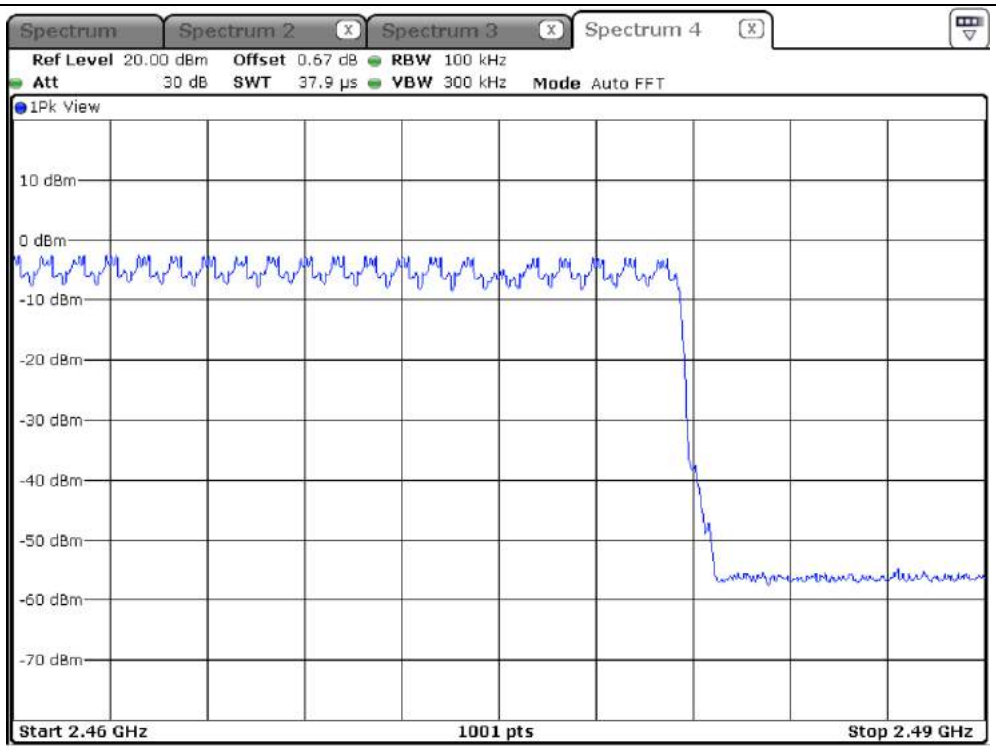


Number of hopping channel: 28



Number of hopping channel: 30

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



Number of hopping channel: 21

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

10. TIME OF OCCUPANCY

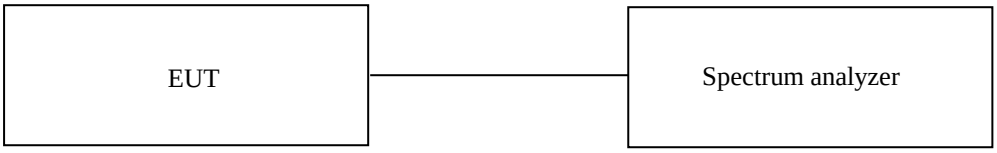
10.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

10.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The transmitter is set to operate in its normal frequency hopping mode. The center frequency of the spectrum analyzer is set to one of hopping channels near the center of the operating band and span is set to zero Hz. The sweep time is set to display one complete pulse. The mark delta function is used to measure the duration of the pulses.



10.3 Test Date

September 06, 2021 ~ September 15, 2021

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

10.4 Test data for 1 Mbps

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 μs with 79 channels.

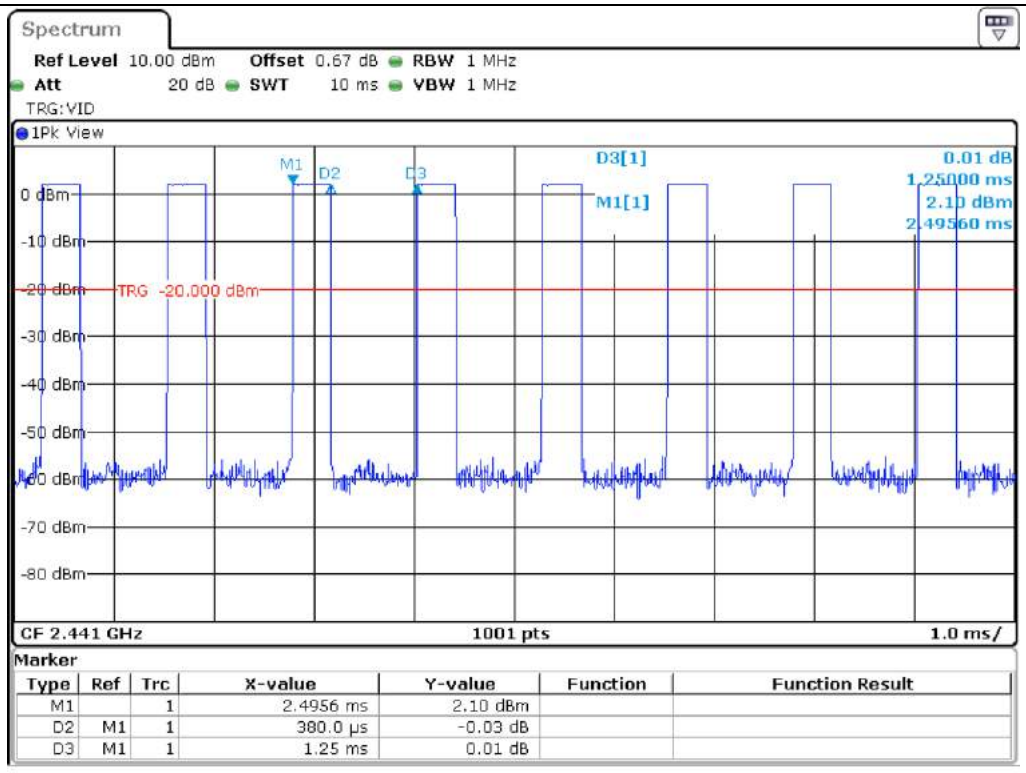
For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second (= 1 600/2/79) for DH1, and 5.06 times (= 1 600/4/79) for DH3, and 3.38 times (= 1 600/6/79) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.38	10.13	31.60	121.64	400.00	PASS
DH3	1.64	5.06	31.60	262.23	400.00	
DH5	2.89	3.38	31.60	308.68	400.00	

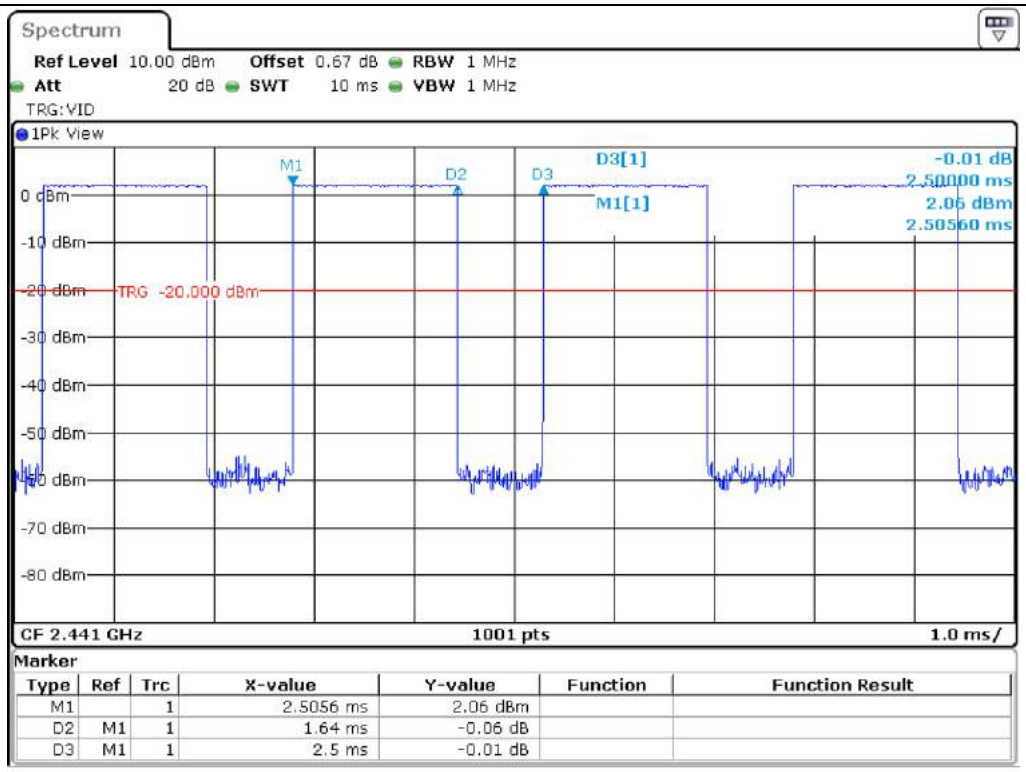
Total dwell time is calculated as following.

Total Dwell Time = Pulse time * Hops per second with channels * period time

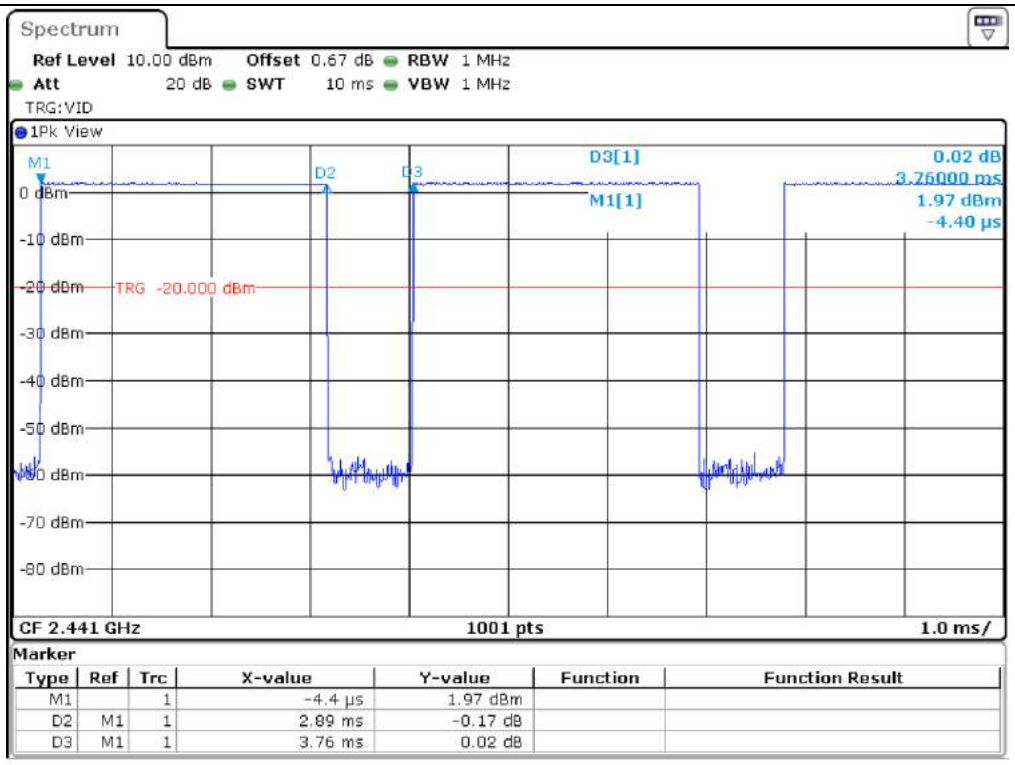
Remark: See next page for an overview sweep performed with peak detector.



DH1



DH3



DH5

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

10.5 Test data for 2 Mbps

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 μs with 79 channels.

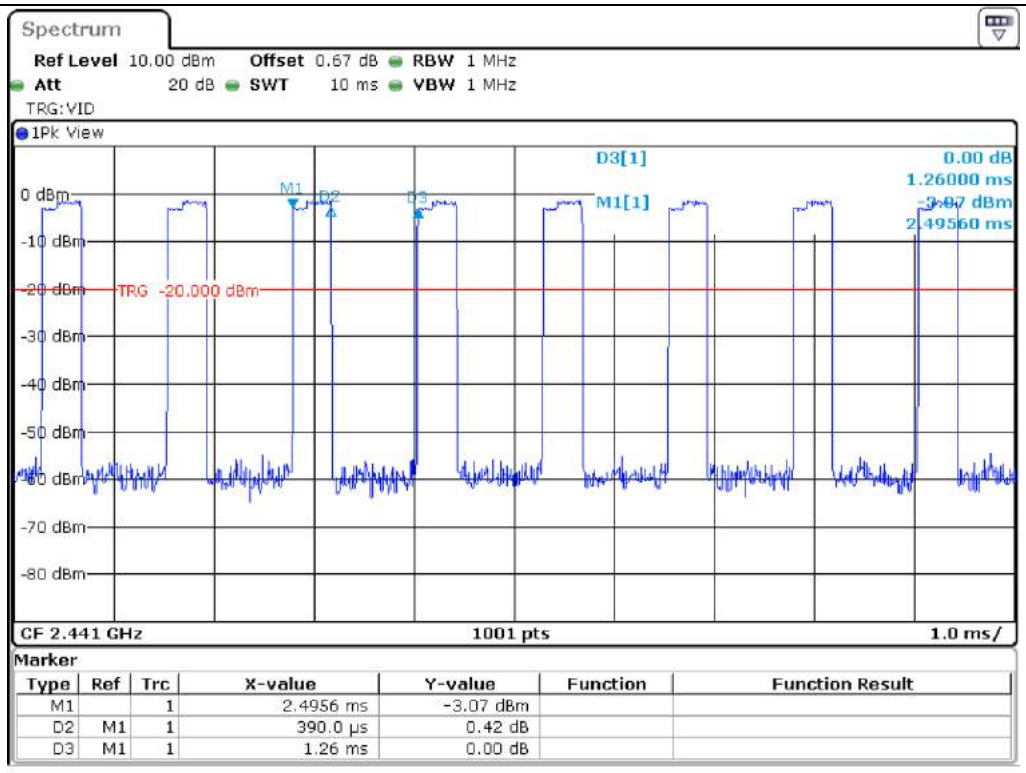
For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second (= 1 600/2/79) for DH1, and 5.06 times (= 1 600/4/79) for DH3, and 3.38 times (= 1 600/6/79) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.39	10.13	31.60	124.84	400.00	PASS
DH3	1.64	5.06	31.60	262.23	400.00	
DH5	2.89	3.38	31.60	308.68	400.00	

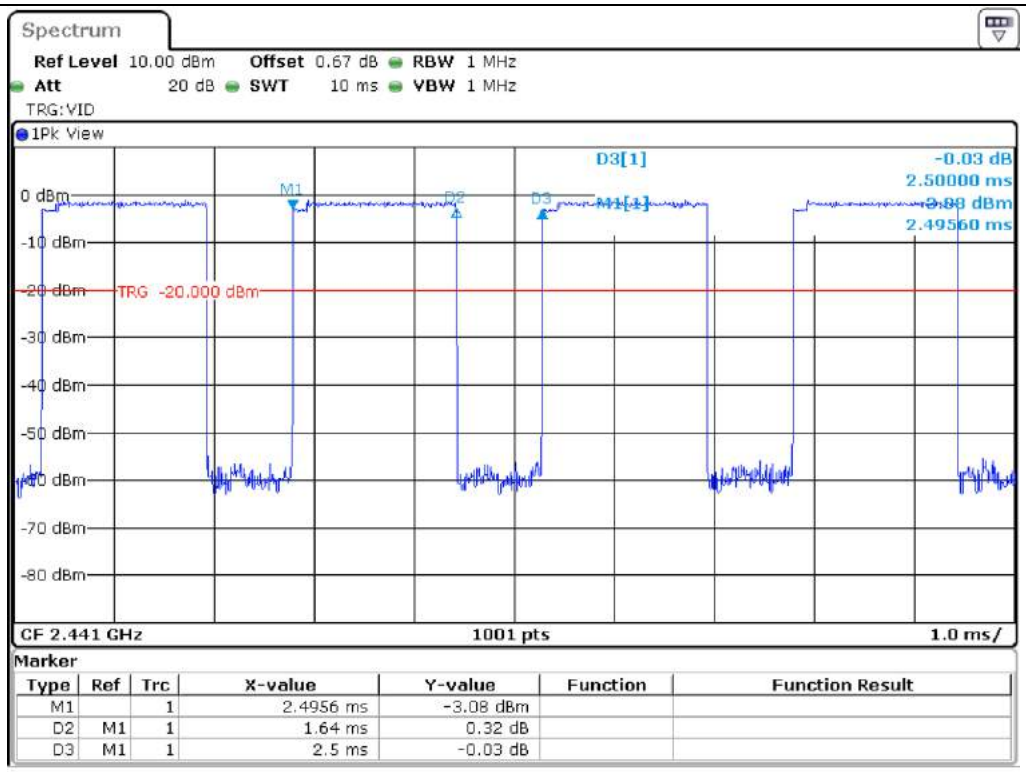
Total dwell time is calculated as following.

Total Dwell Time = Pulse time * Hops per second with channels * period time

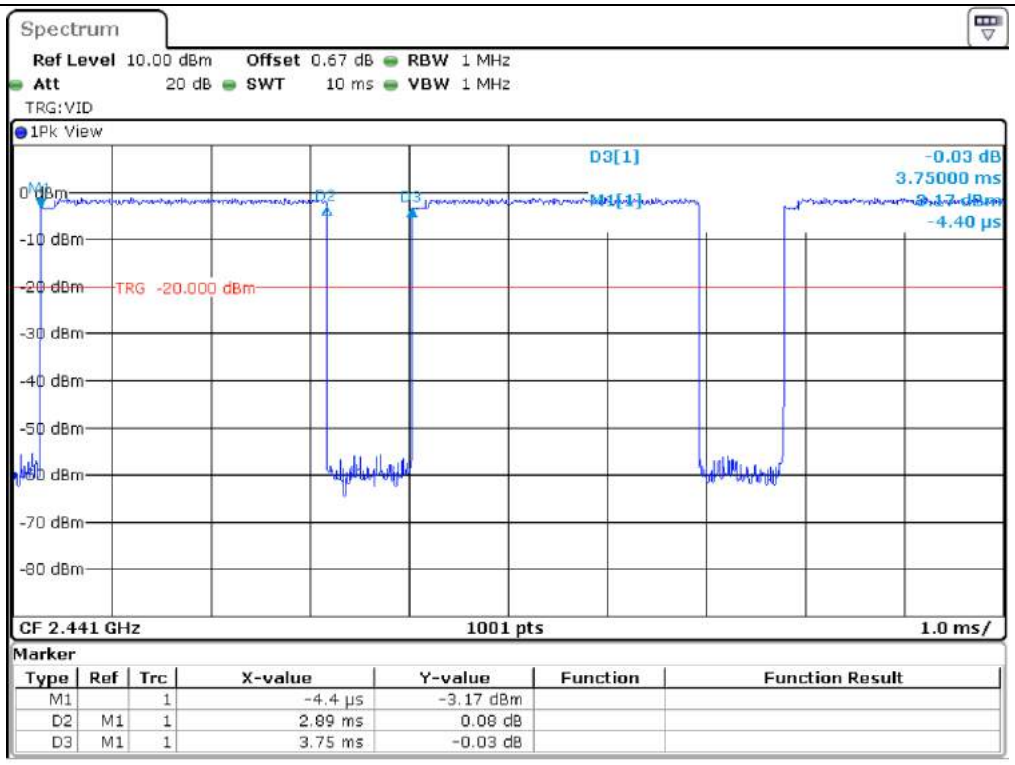
Remark: See next page for an overview sweep performed with peak detector.



DH1



DH3



DH5

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

10.6 Test data for 3 Mbps

The system makes worst case 1 600 hops per second or 1 time slot has a length of 625 μs with 79 channels.

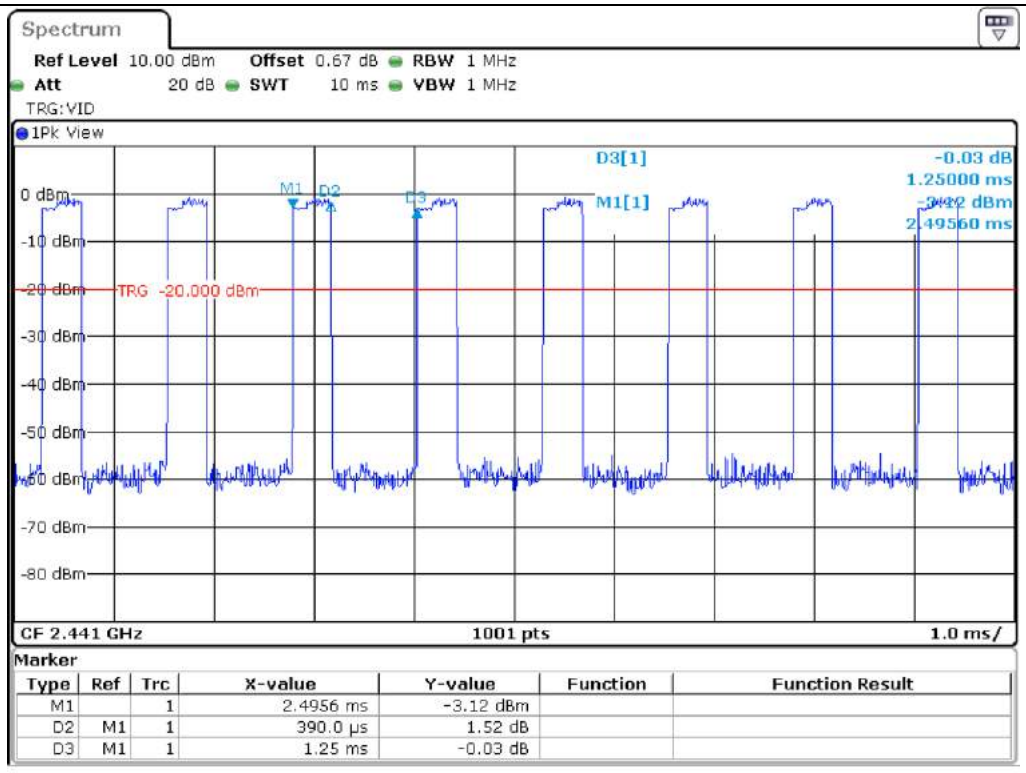
For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel for 10.13 times per second (= 1 600/2/79) for DH1, and 5.06 times (= 1 600/4/79) for DH3, and 3.38 times (= 1 600/6/79) for DH5.

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.39	10.13	31.60	124.84	400.00	PASS
DH3	1.64	5.06	31.60	262.23	400.00	
DH5	2.89	3.38	31.60	308.68	400.00	

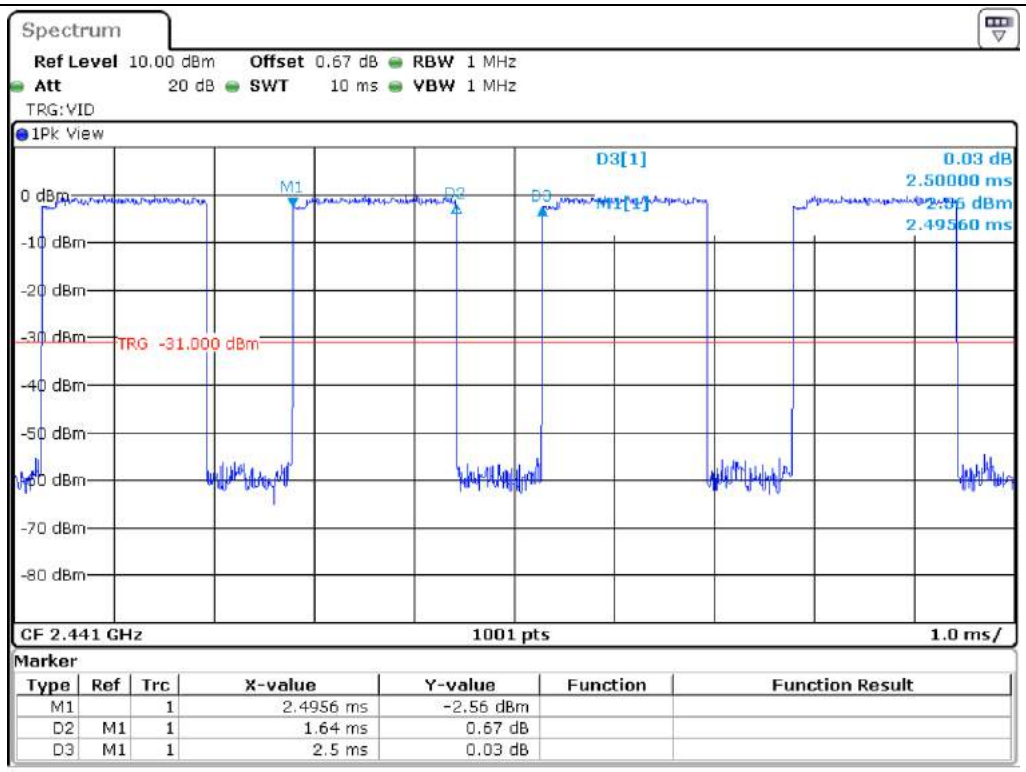
Total dwell time is calculated as following.

Total Dwell Time = Pulse time * Hops per second with channels * period time

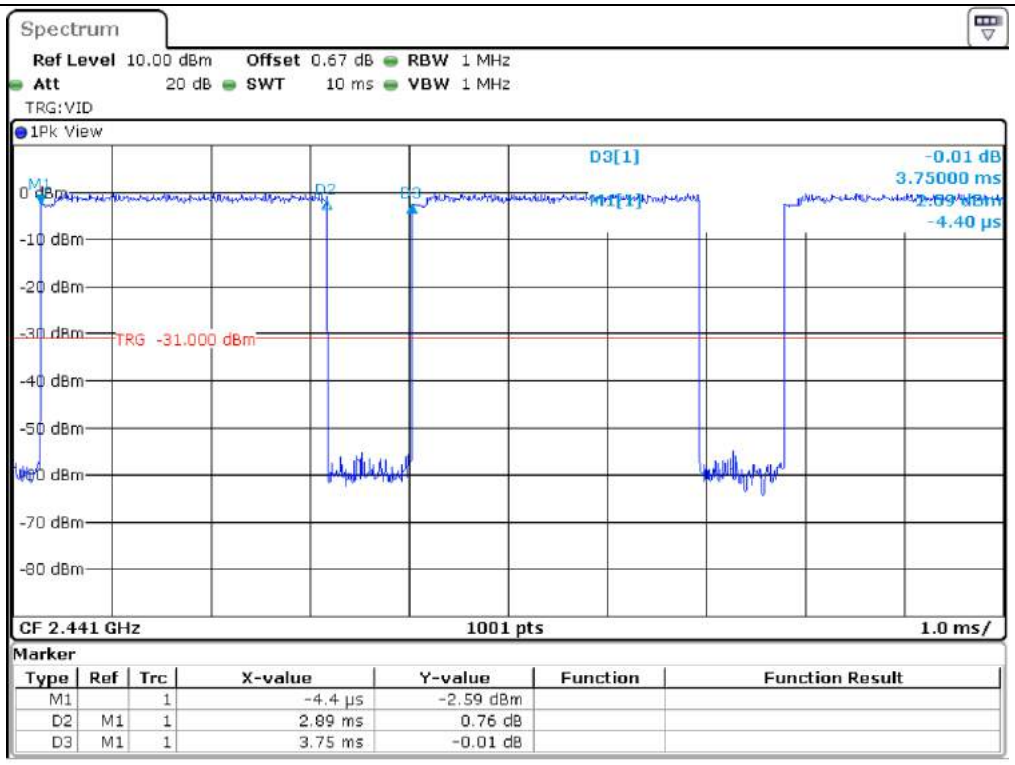
Remark: See next page for an overview sweep performed with peak detector.



DH1



DH3



DH5

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

11. MAXIMUM PEAK OUTPUT POWER

11.1 Operating environment

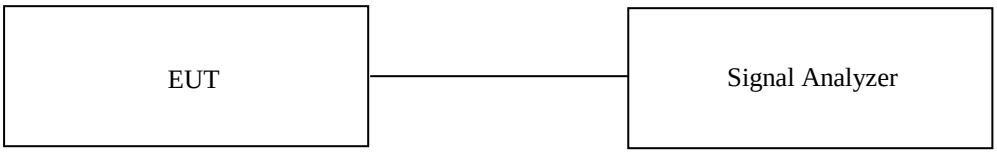
Temperature : 23 °C

Relative humidity : 46 % R.H.

11.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to > 20 dB Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.



11.3 Test Date

September 06, 2021 ~ September 15, 2021

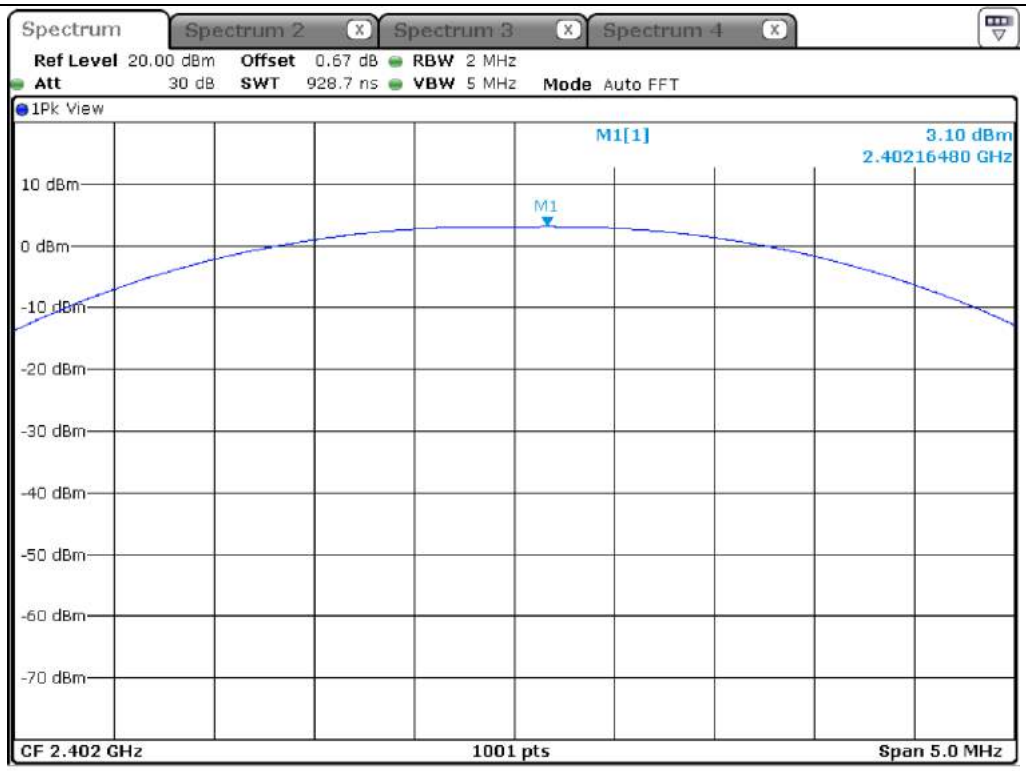
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

11.4 Test data for 1 Mbps

-. Test Result : Pass

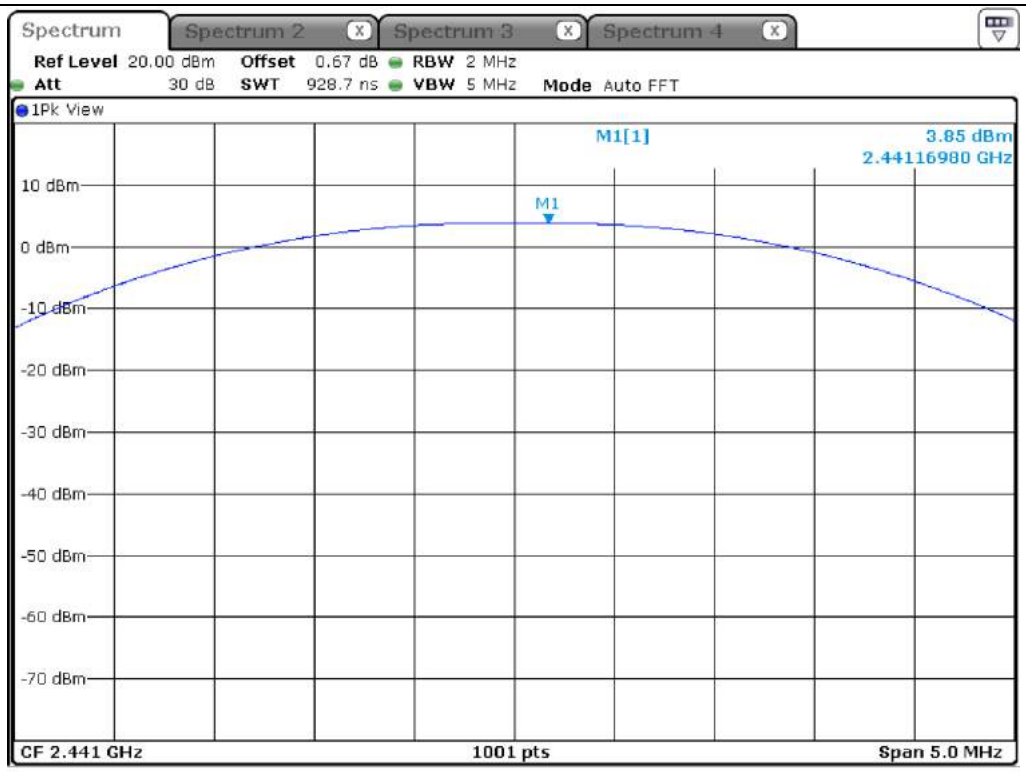
CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	3.10	21.00	17.90
MIDDLE	2 441.00	3.85	21.00	17.15
HIGH	2 480.00	4.07	21.00	16.93

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

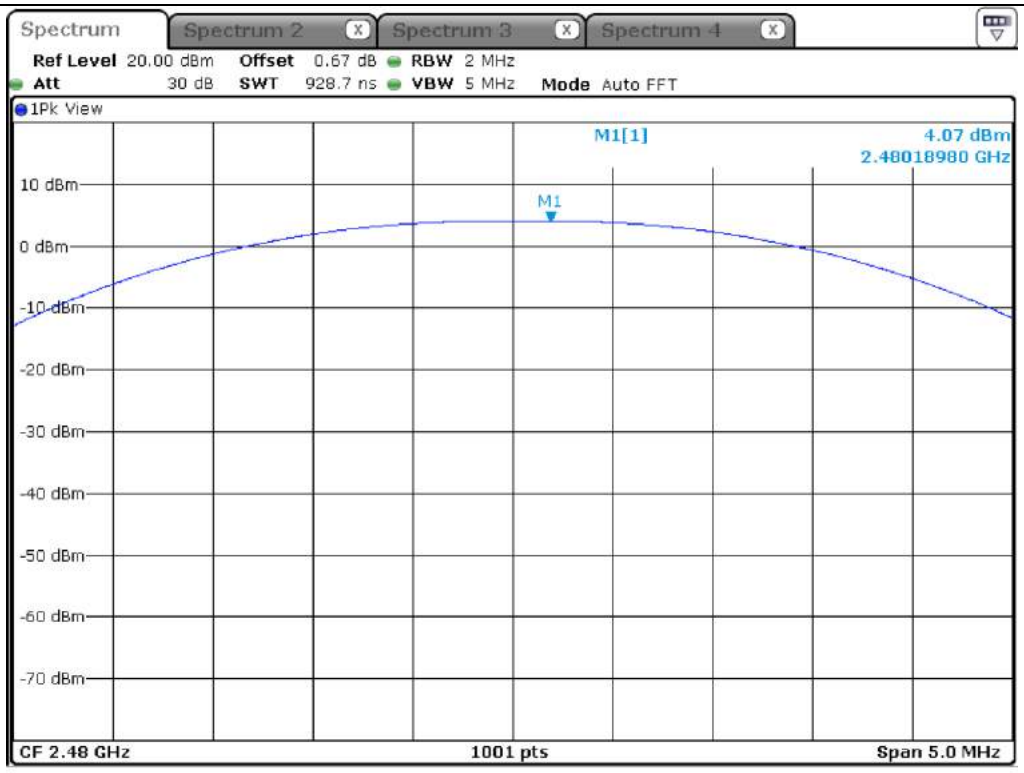


Low Channel

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



Middle Channel



High Channel

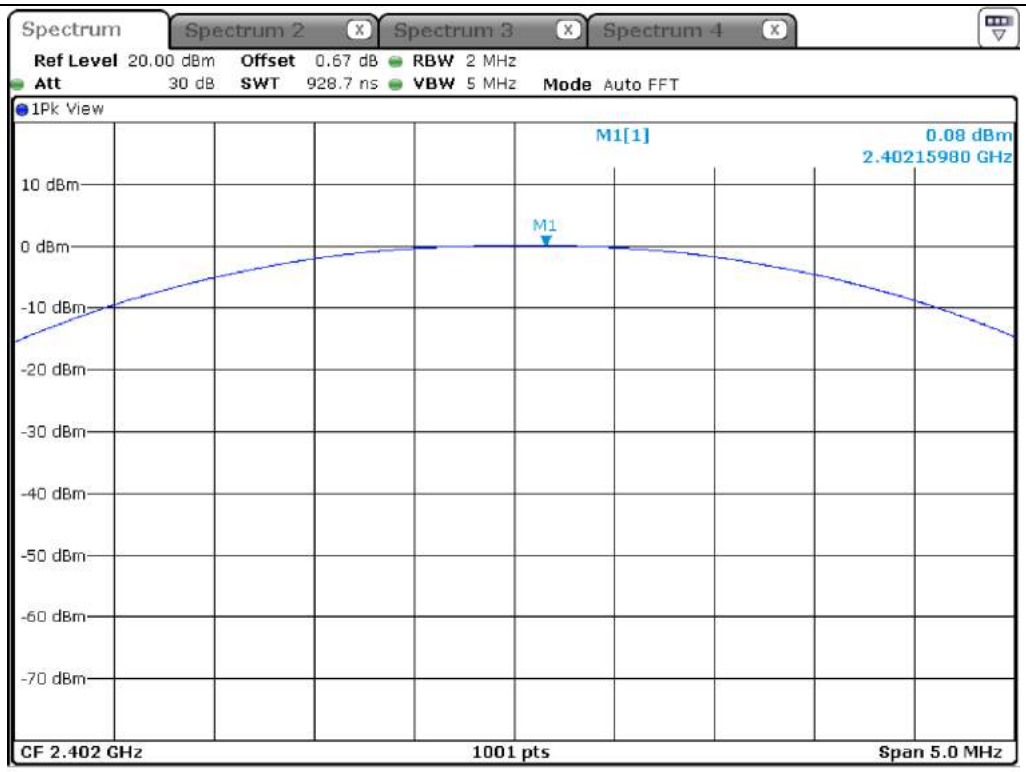
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

11.5 Test data for 2 Mbps

-. Test Result : Pass

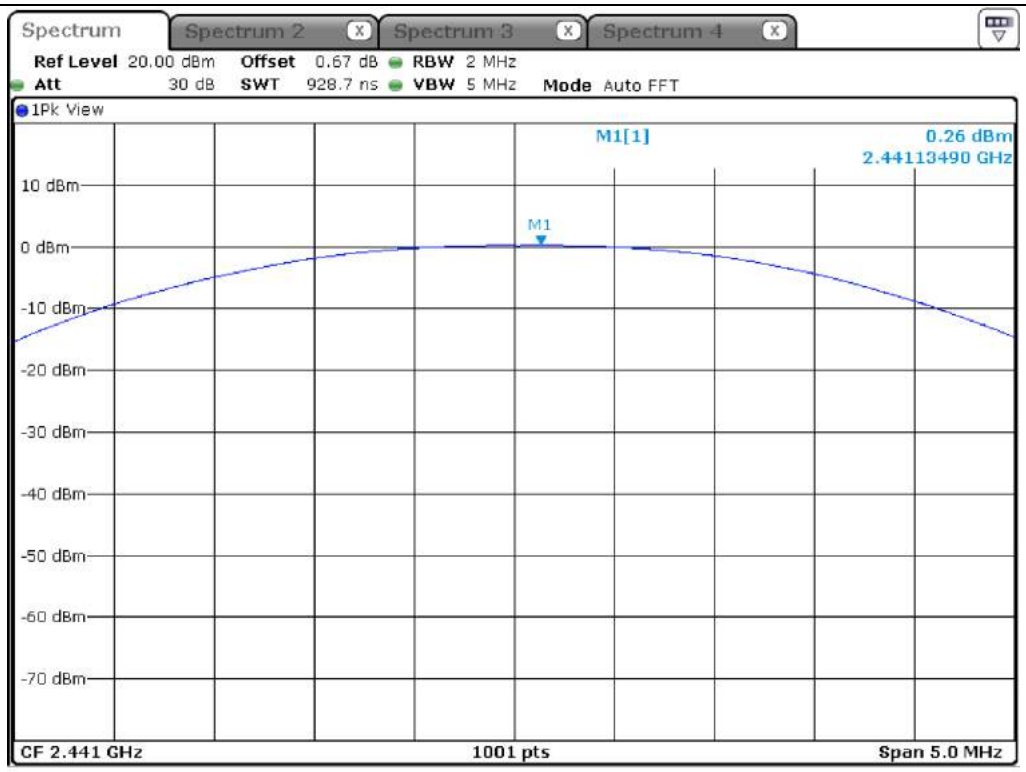
CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	0.08	21.00	20.92
MIDDLE	2 441.00	0.26	21.00	20.74
HIGH	2 480.00	-0.36	21.00	21.36

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

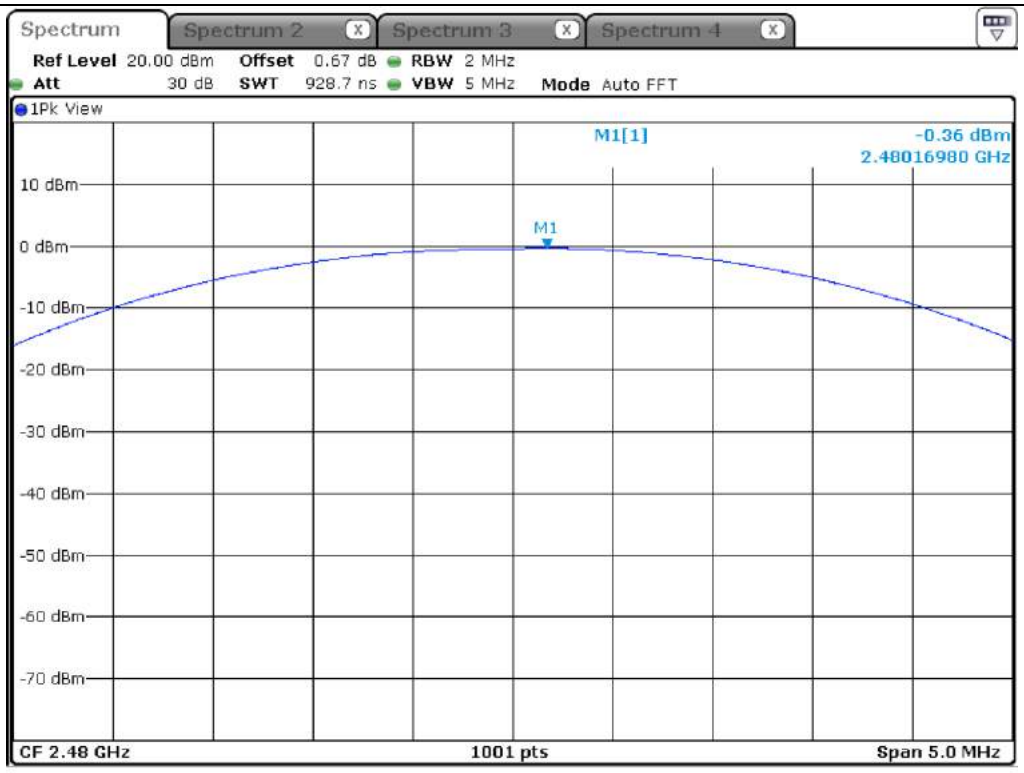


Low Channel

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



Middle Channel



High Channel

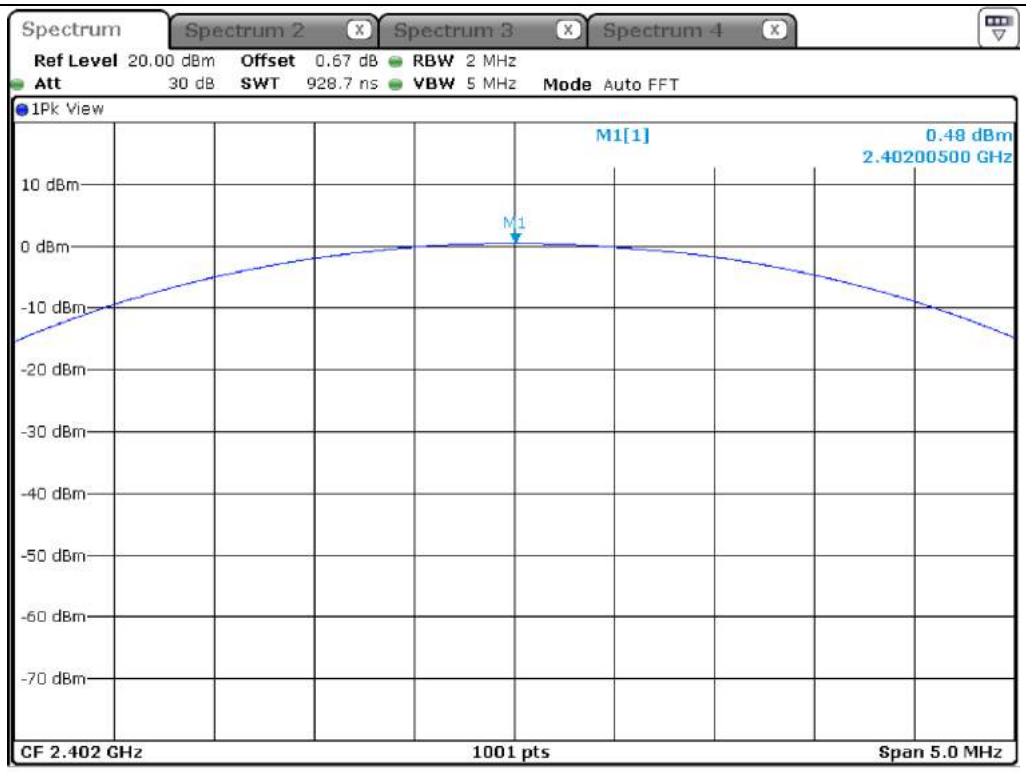
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

11.6 Test data for 3 Mbps

-. Test Result : Pass

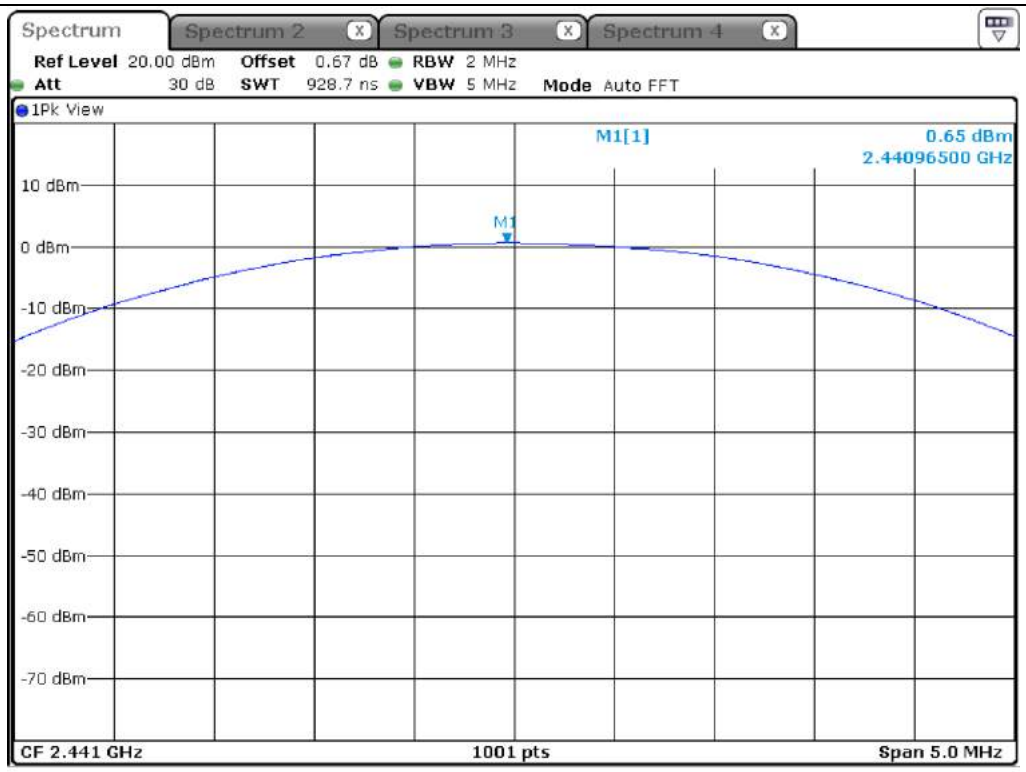
CHANNEL	FREQUENCY (MHz)	MEASURED VLAUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	0.48	21.00	20.52
MIDDLE	2 441.00	0.65	21.00	20.35
HIGH	2 480.00	-0.04	21.00	21.04

Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)

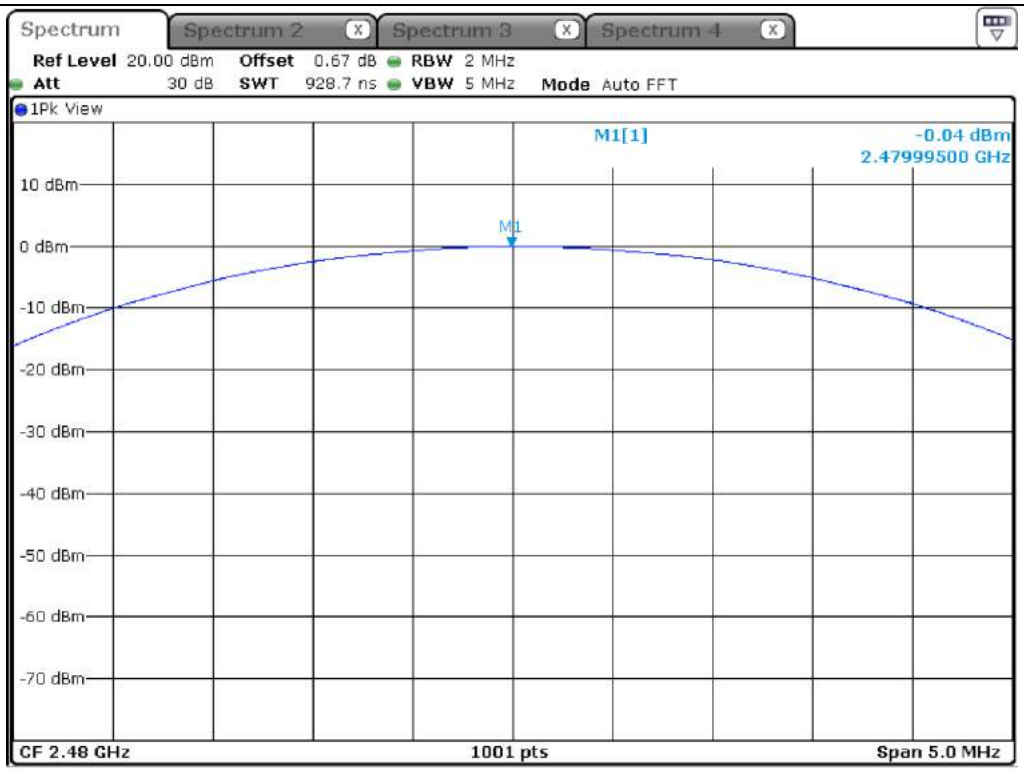


Low Channel

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



Middle Channel



High Channel

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

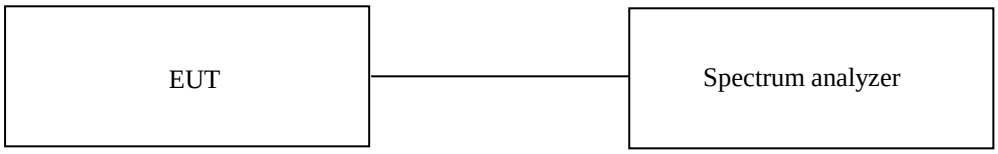
12.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

12.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution and video bandwidth is set to 100 kHz, and peak detection was used.



12.3 Test set-up for radiated measurement

The radiated emissions measurements were performed on the 3 m semi anechoic chamber. The EUT was placed on turntable approximately 1.5 m above the ground plane.

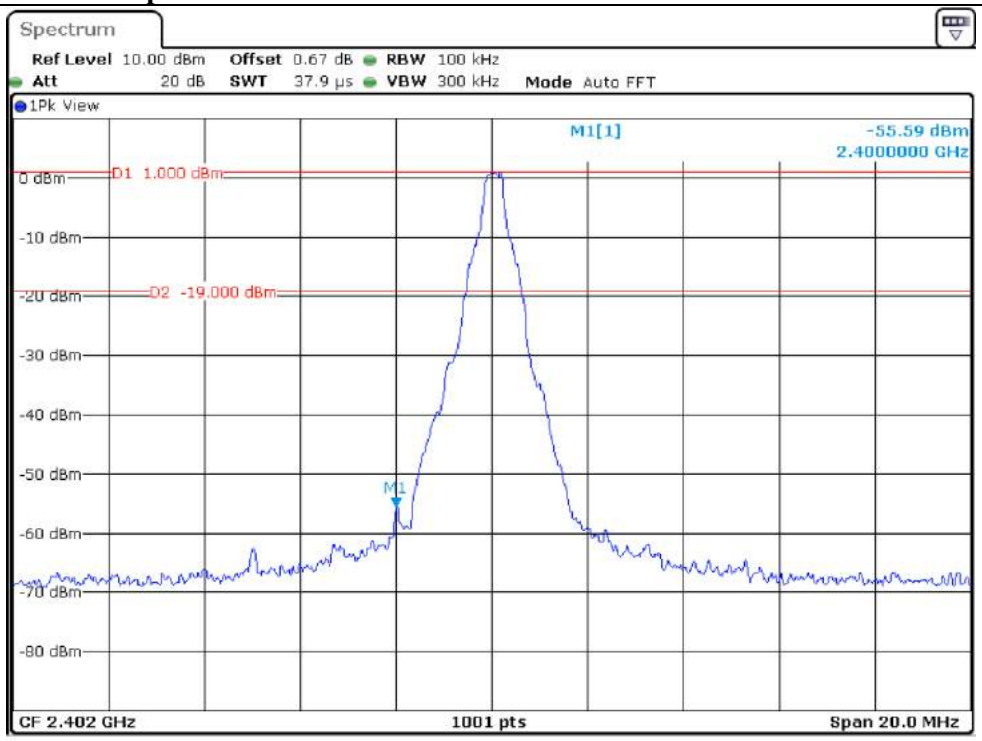
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

12.4 Test Date

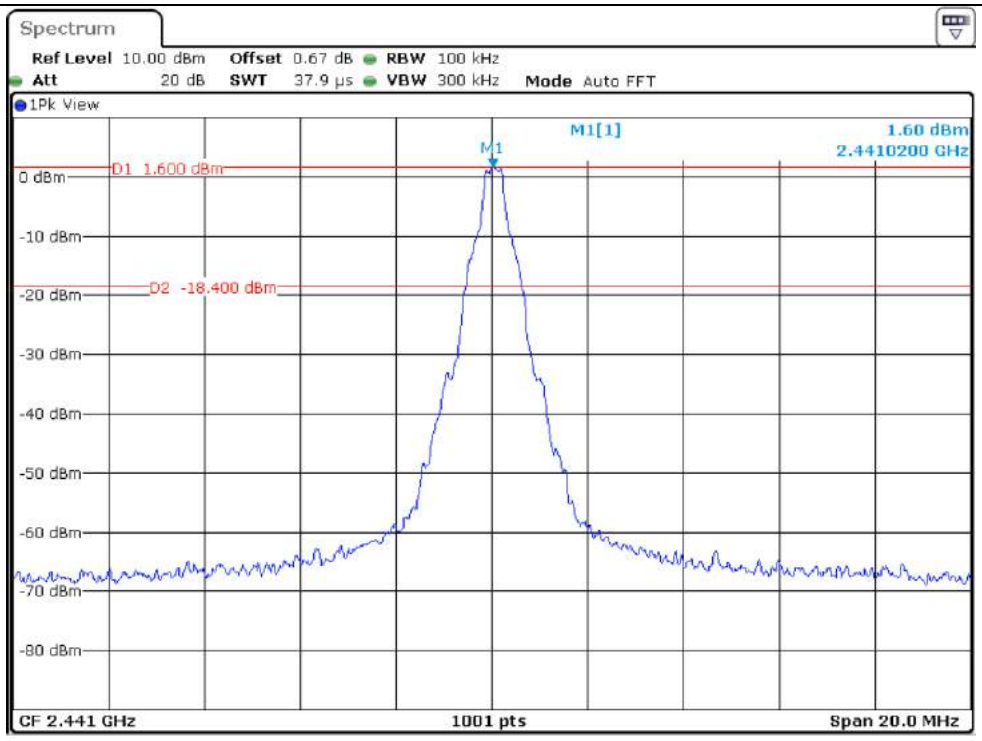
September 06, 2021 ~ September 15, 2021

12.5 Test data for conducted emission

12.5.1 Test data for 1 Mbps

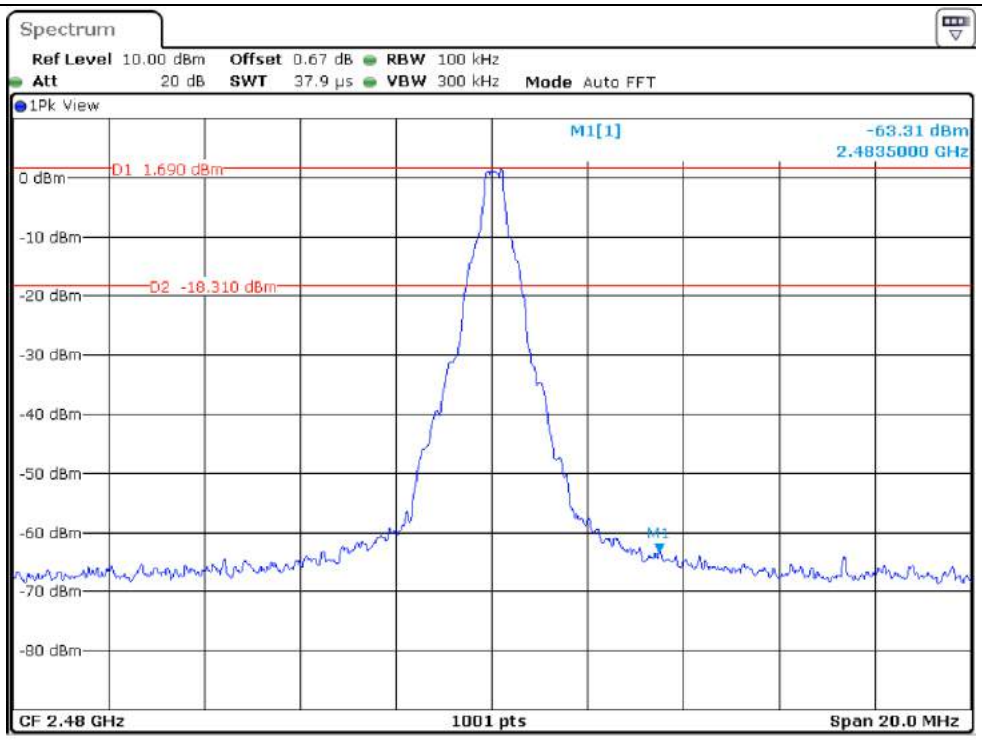


Low Channel

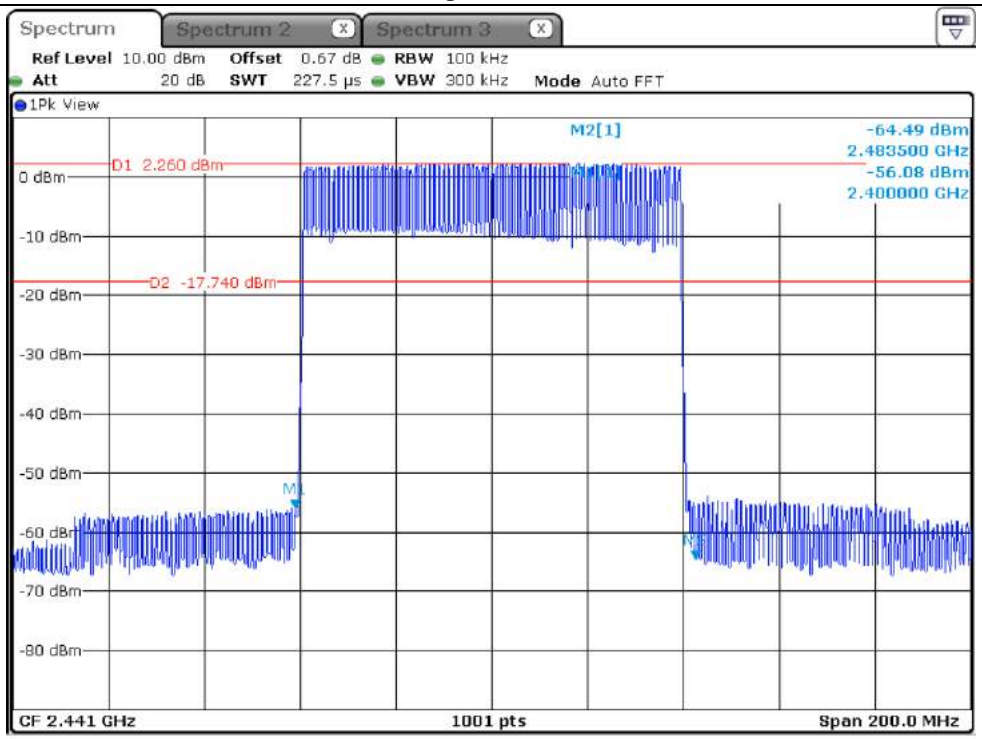


Middle Channel

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

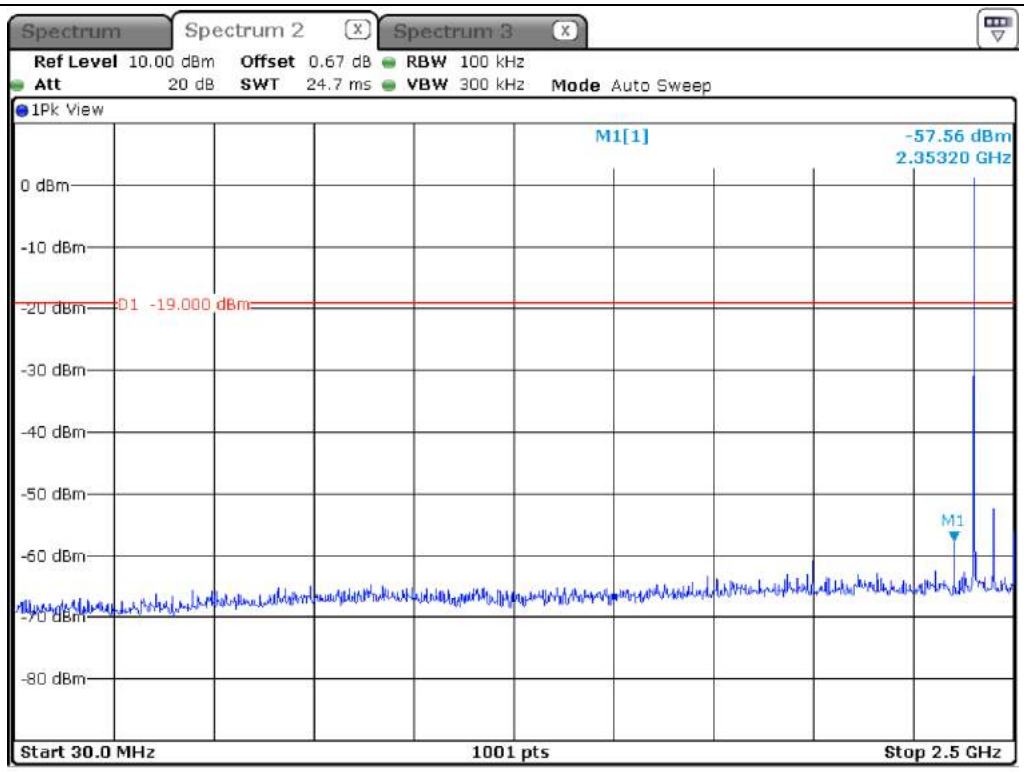


High Channel

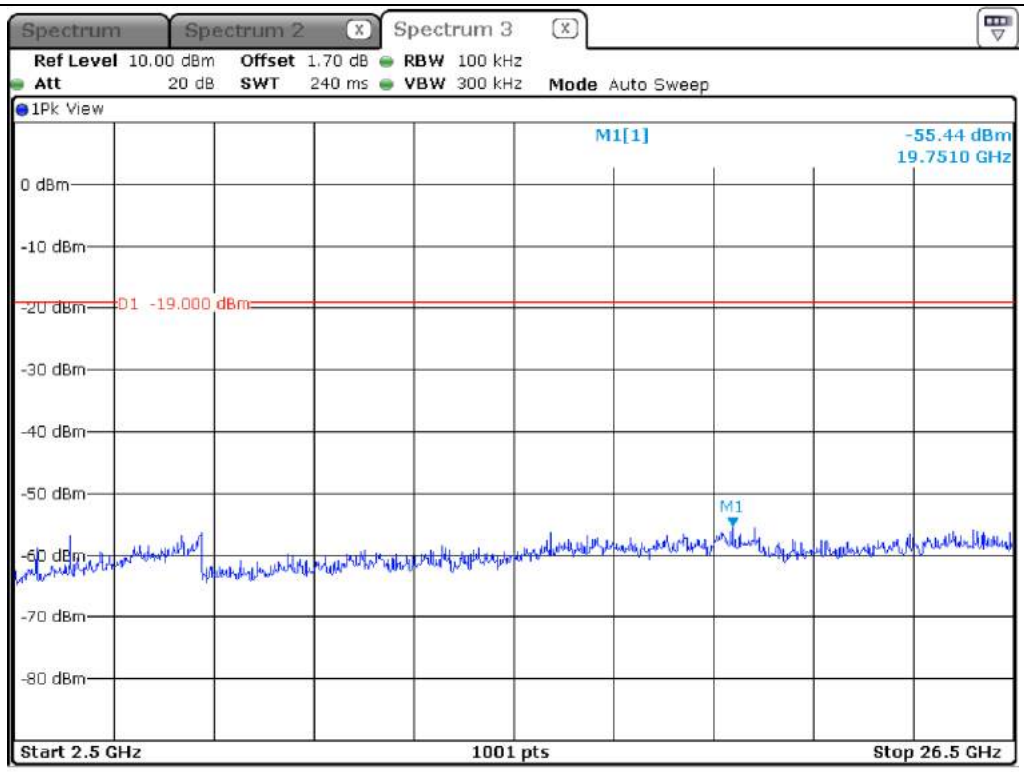


Hopping Mode

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

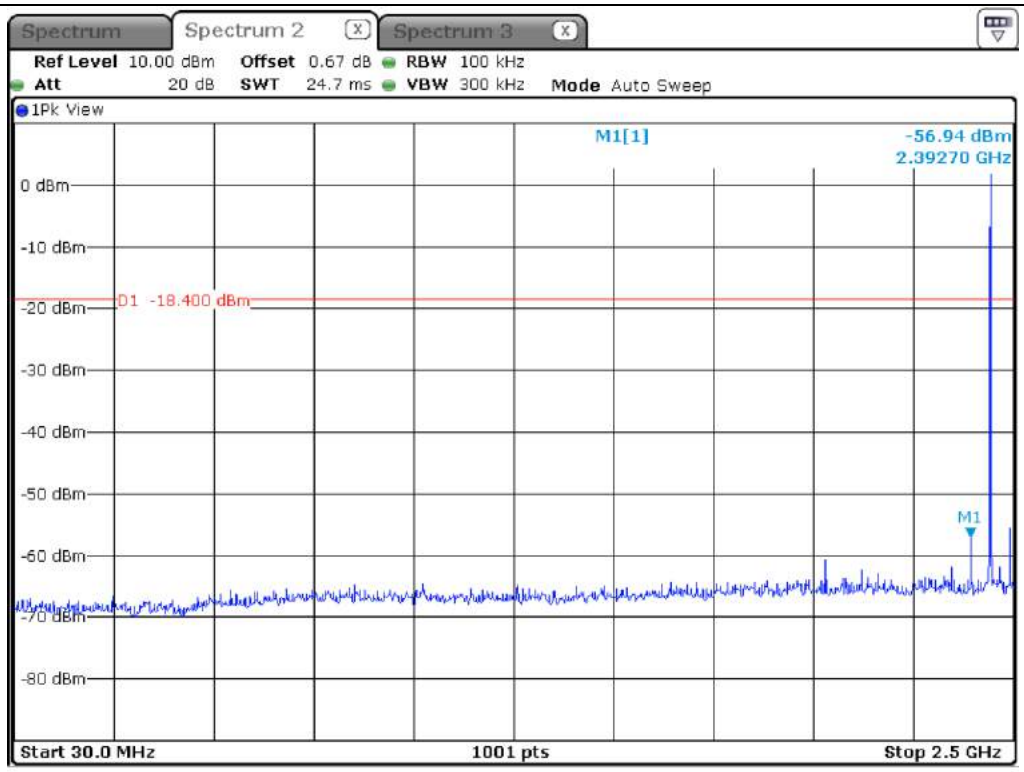


Low Channel

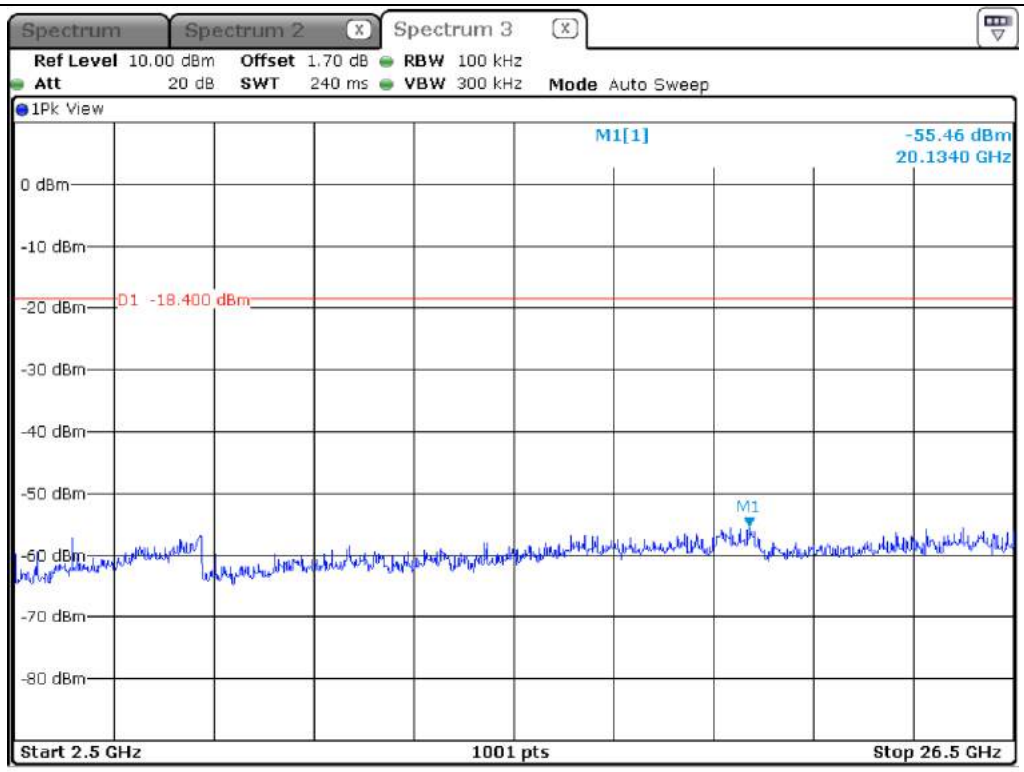


Low Channel

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

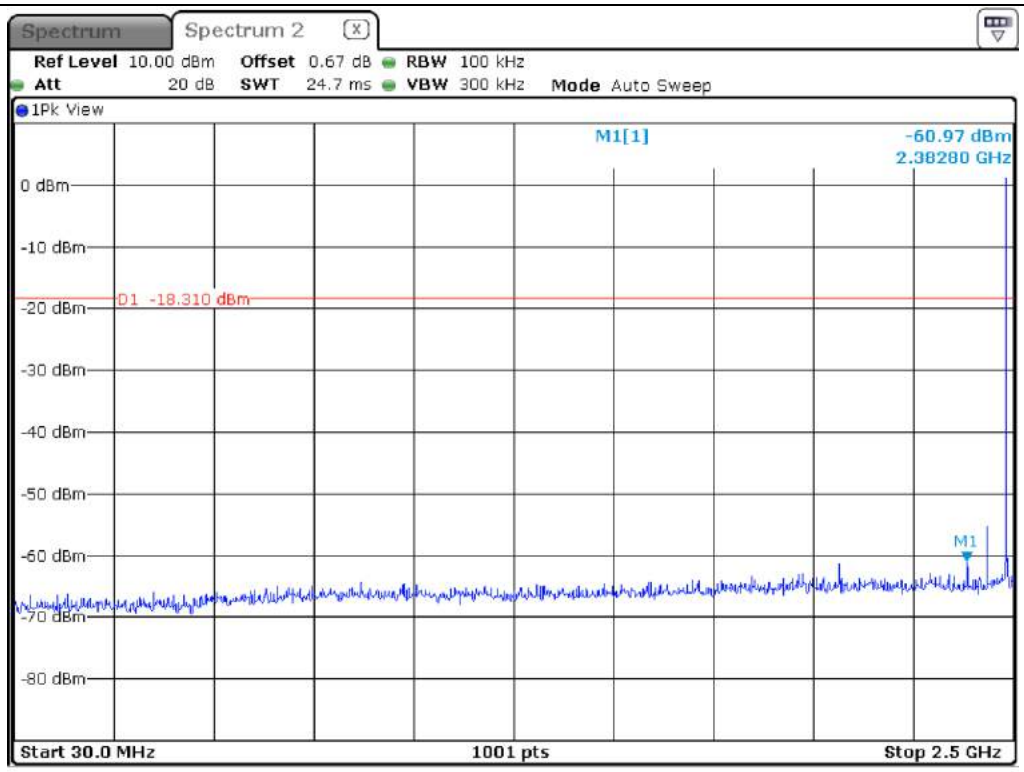


Middle Channel

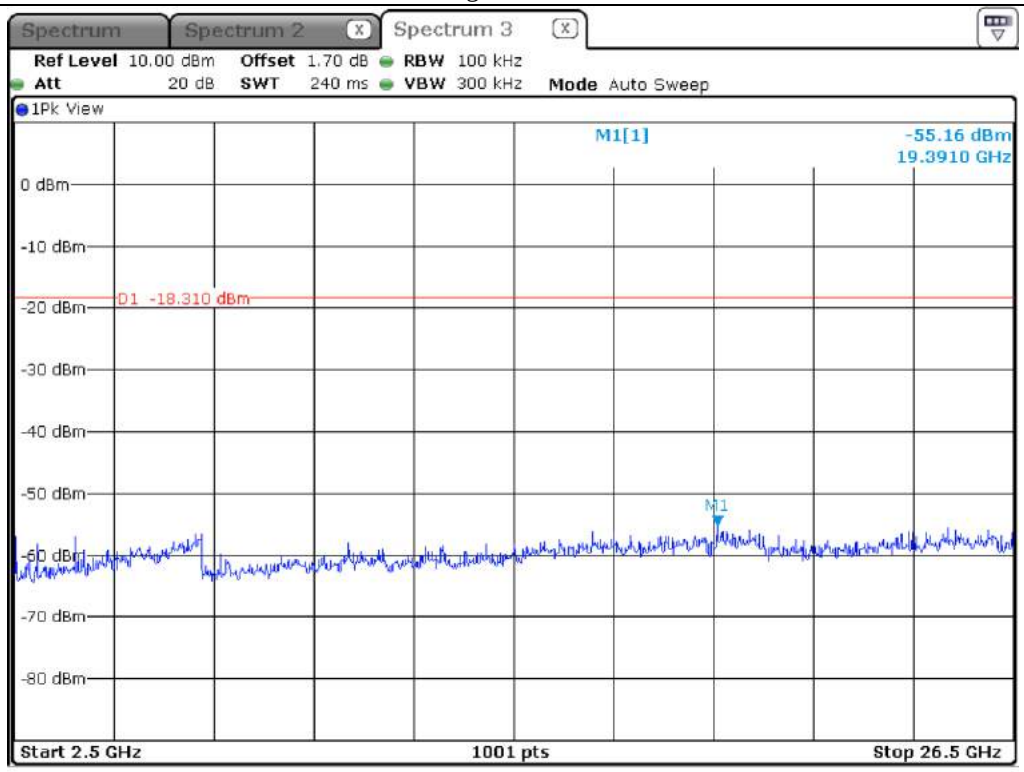


Middle Channel

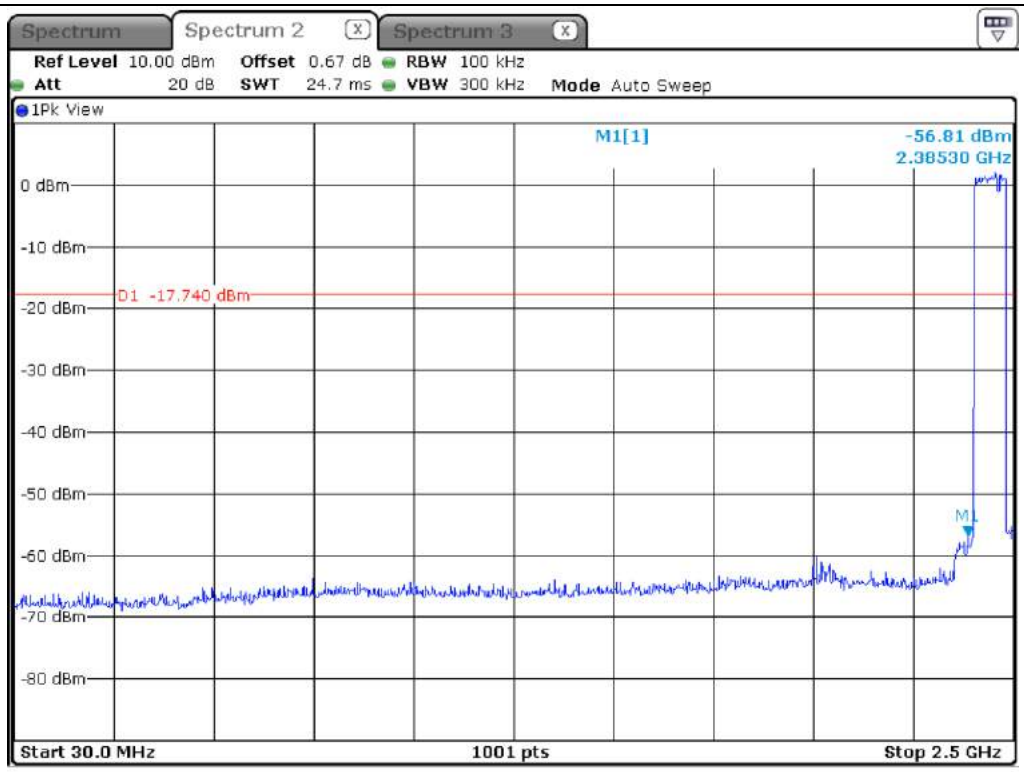
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



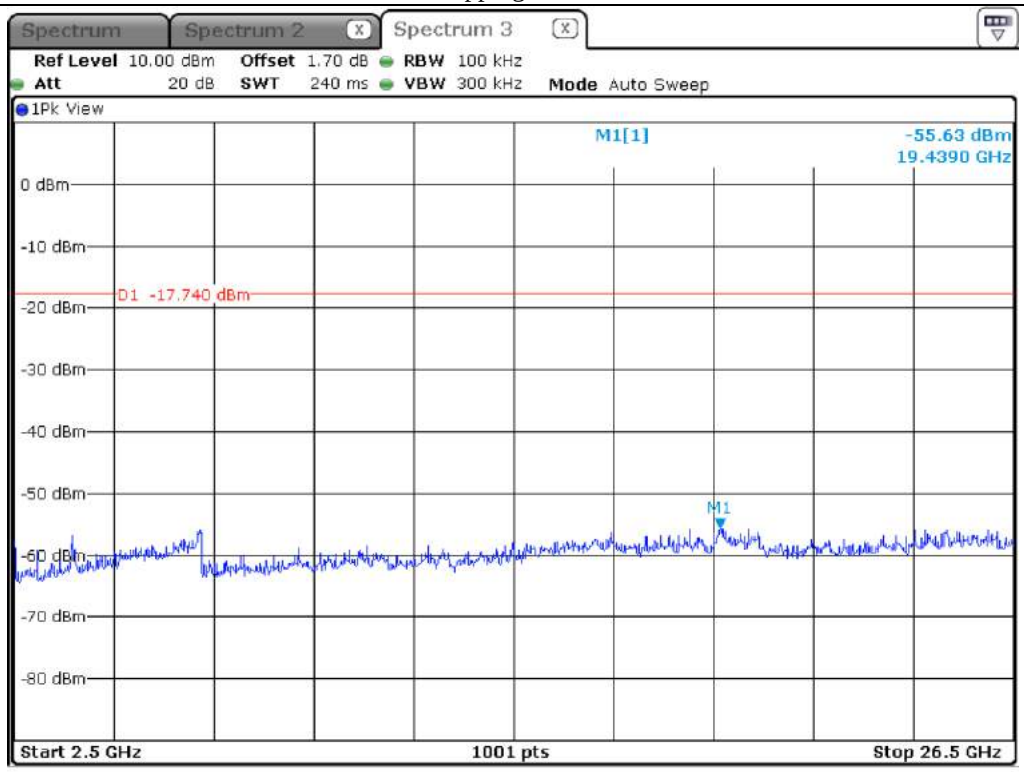
High Channel



High Channel

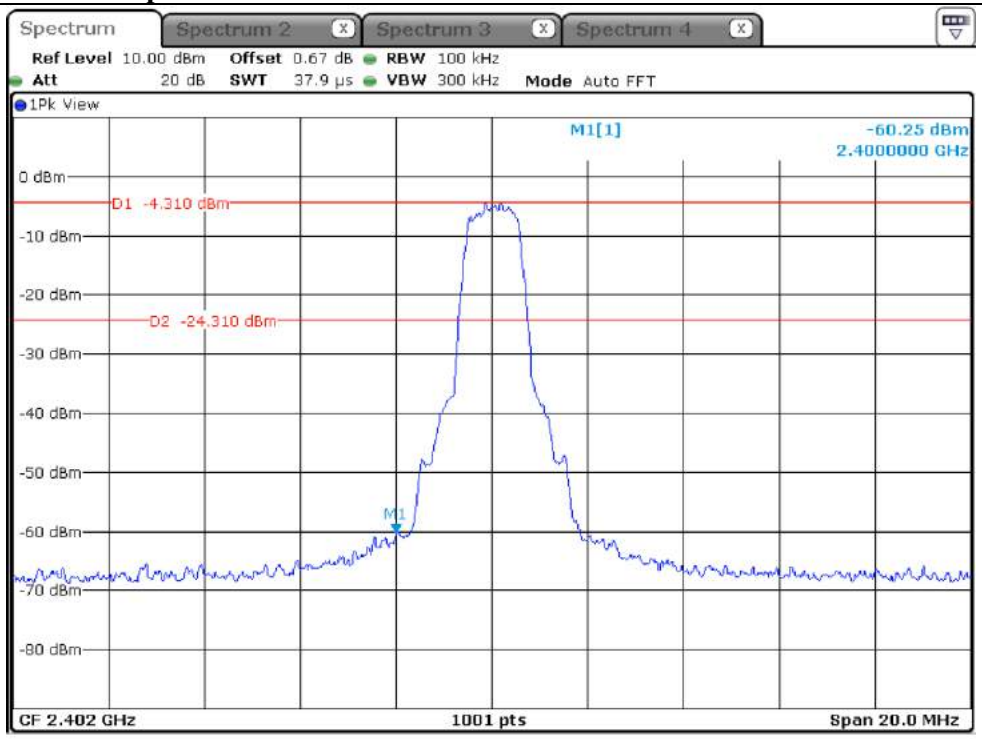


Hopping Mode

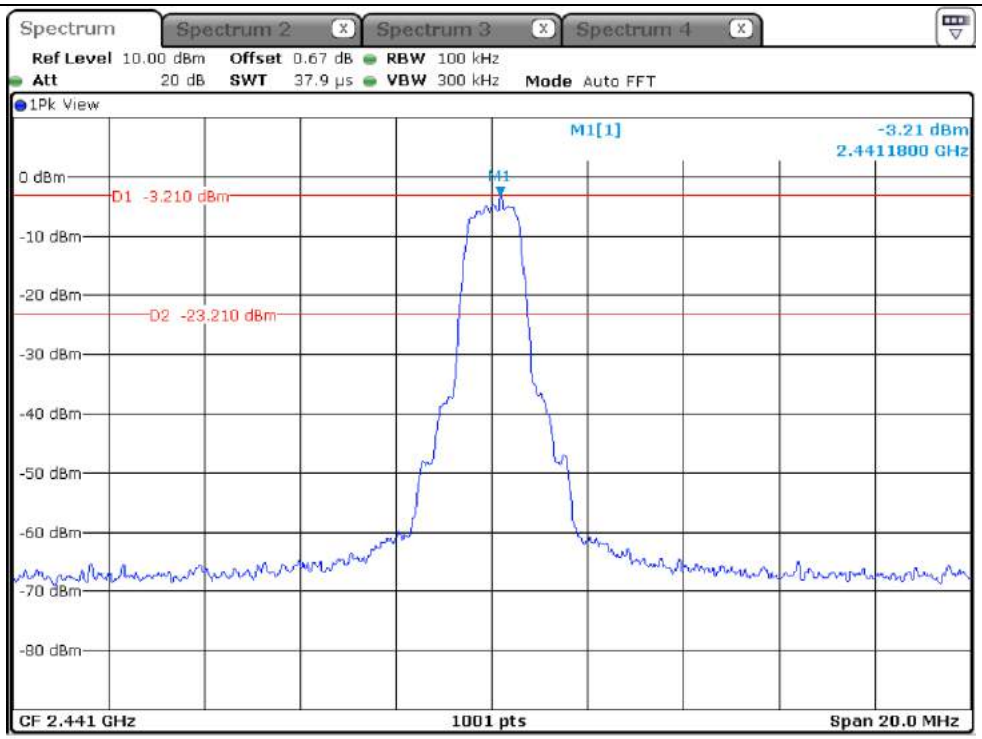


Hopping Mode

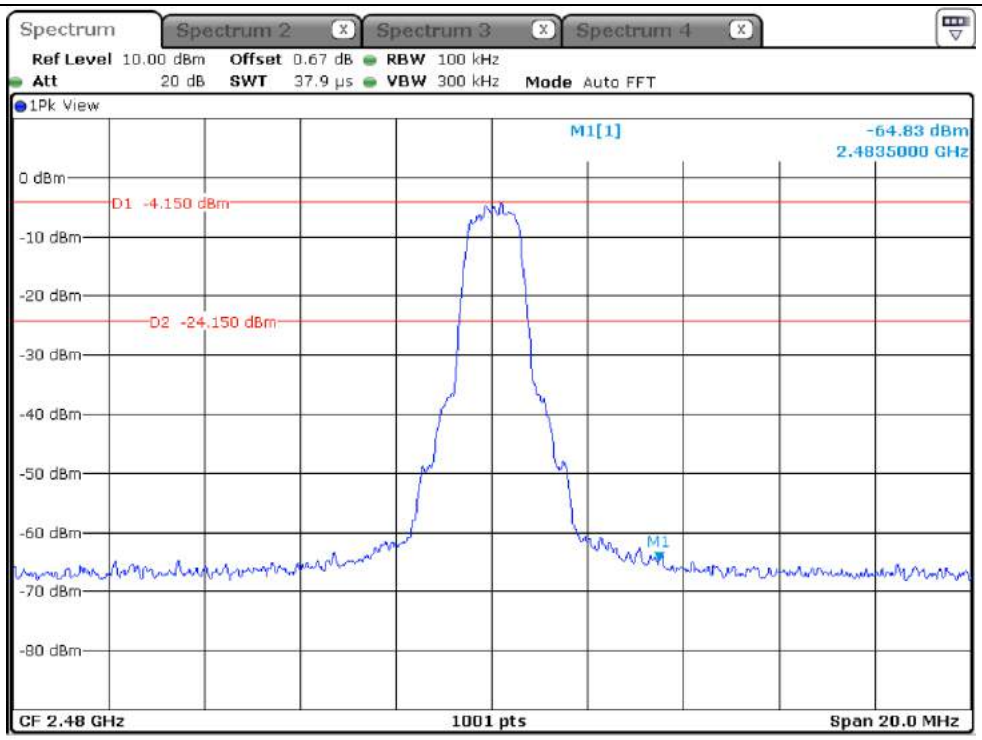
12.5.2 Test data for 2 Mbps



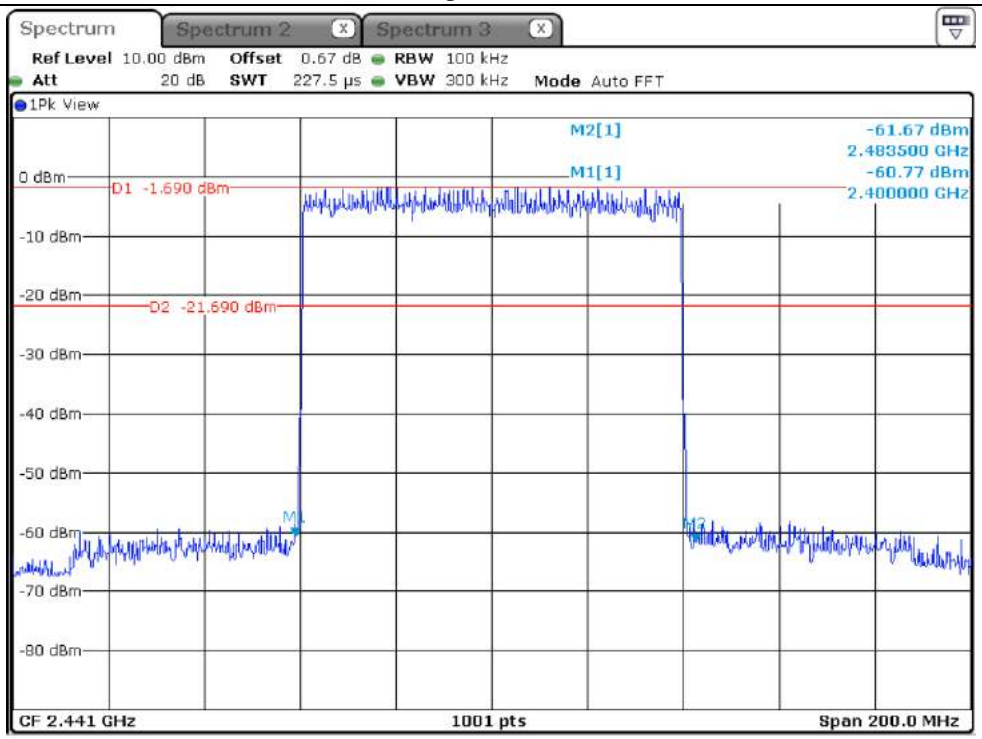
Low Channel



Middle Channel



High Channel



Hopping Mode

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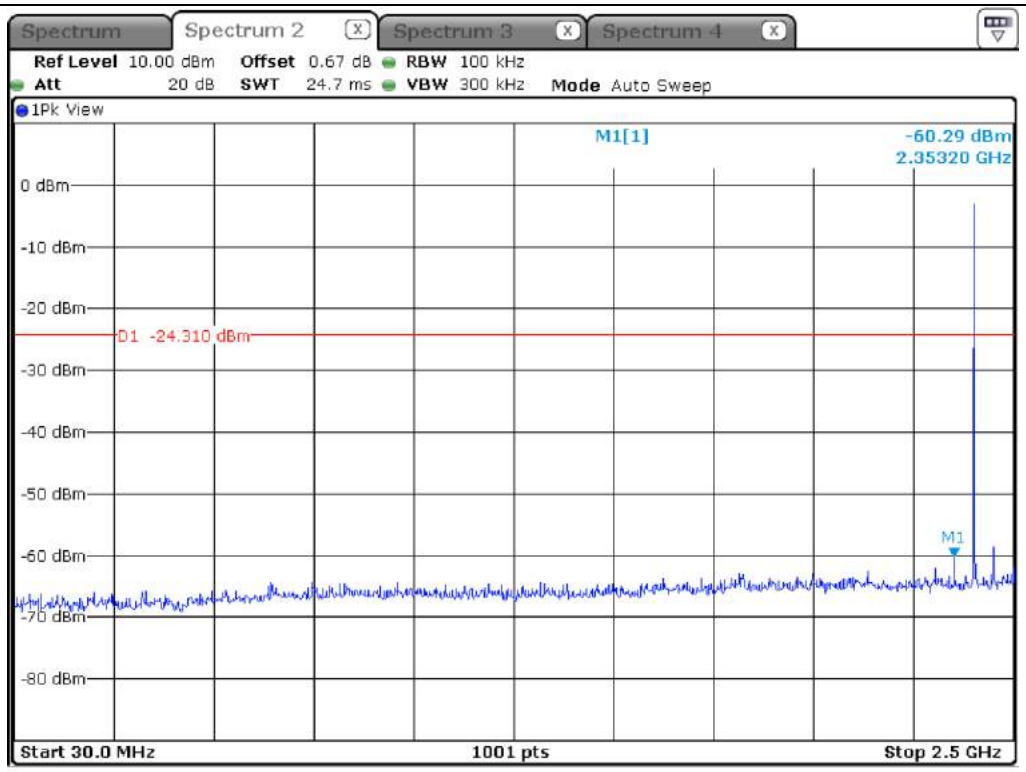
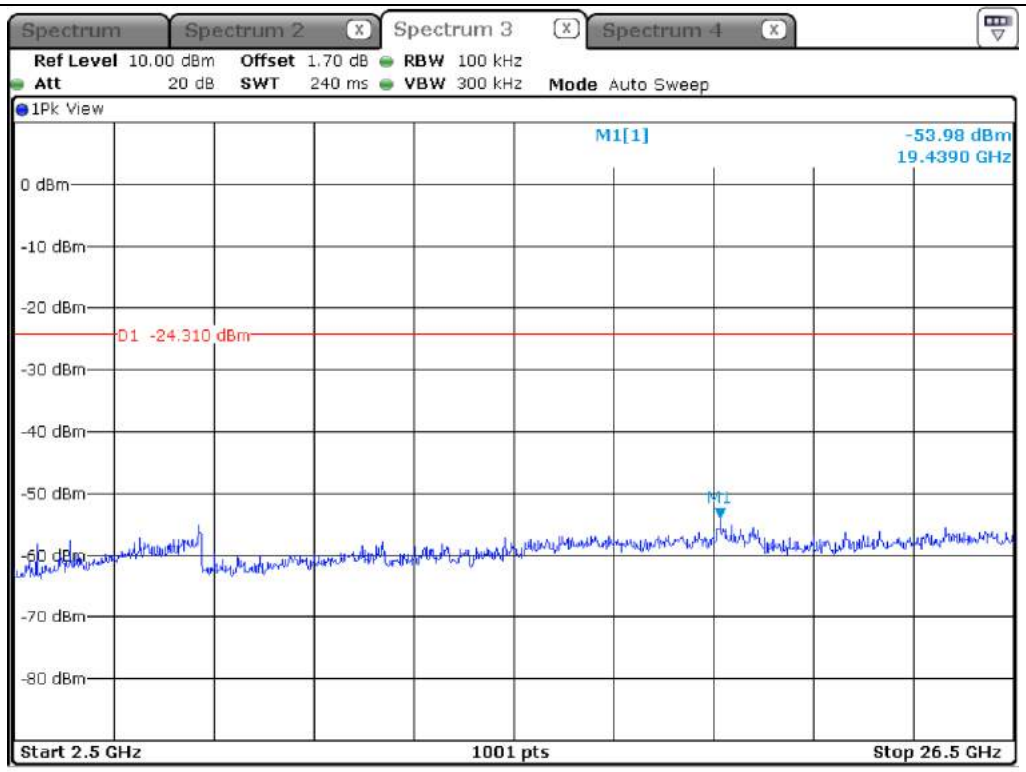
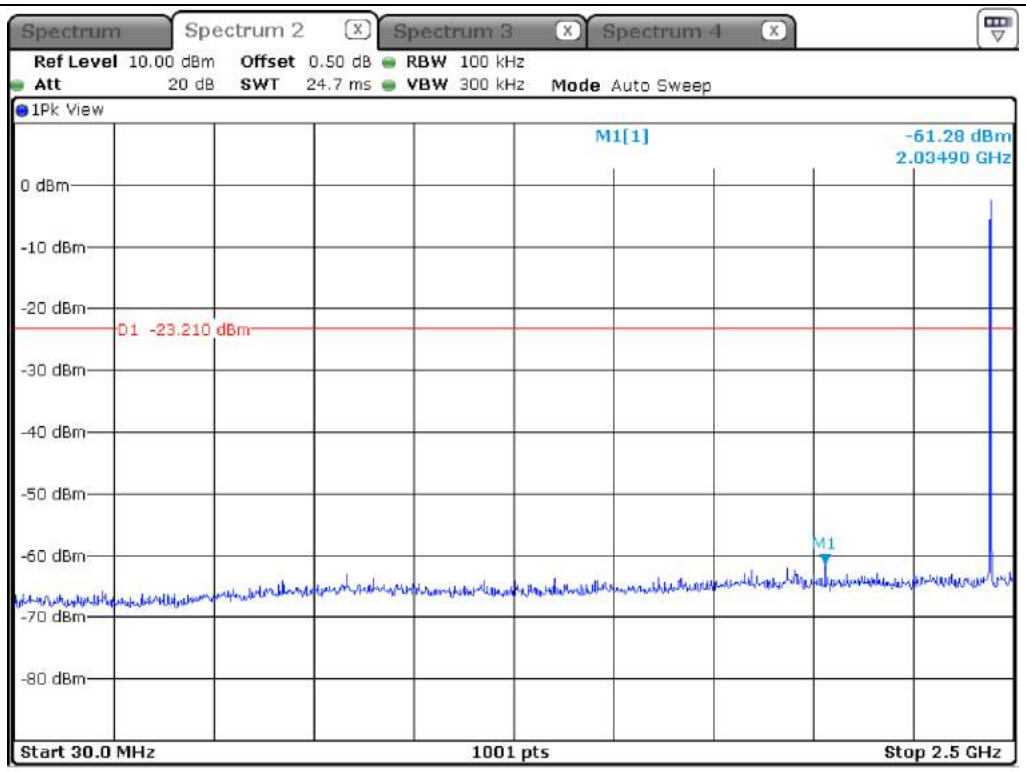


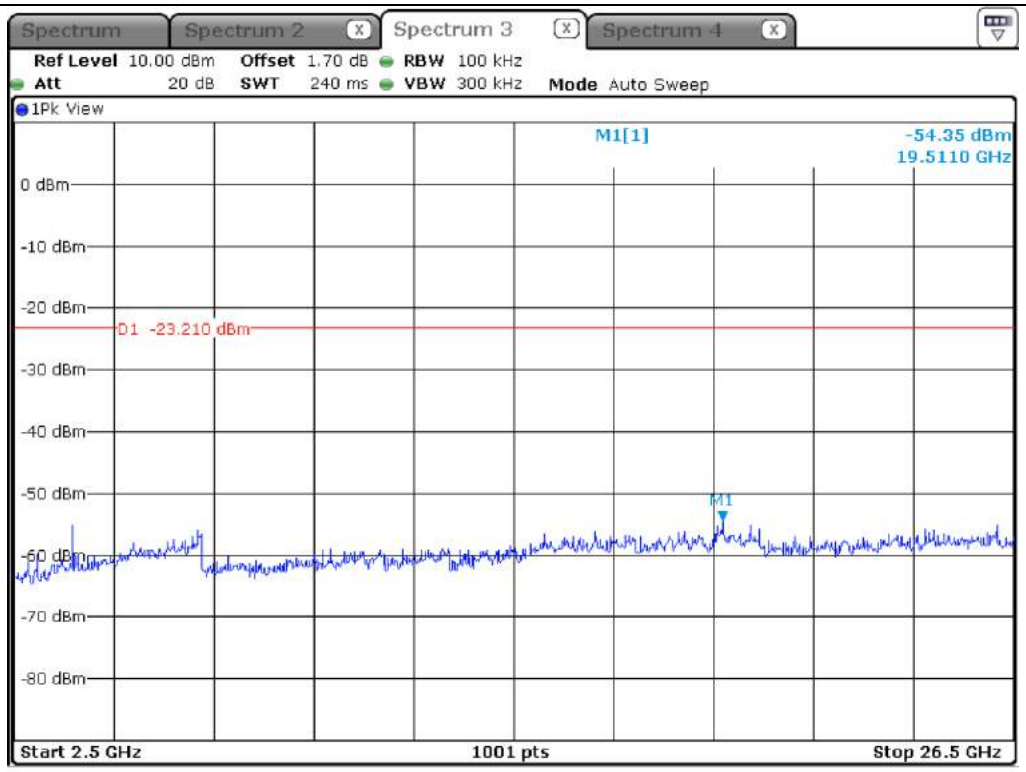
Low Channel



Low Channel



Middle Channel



Middle Channel

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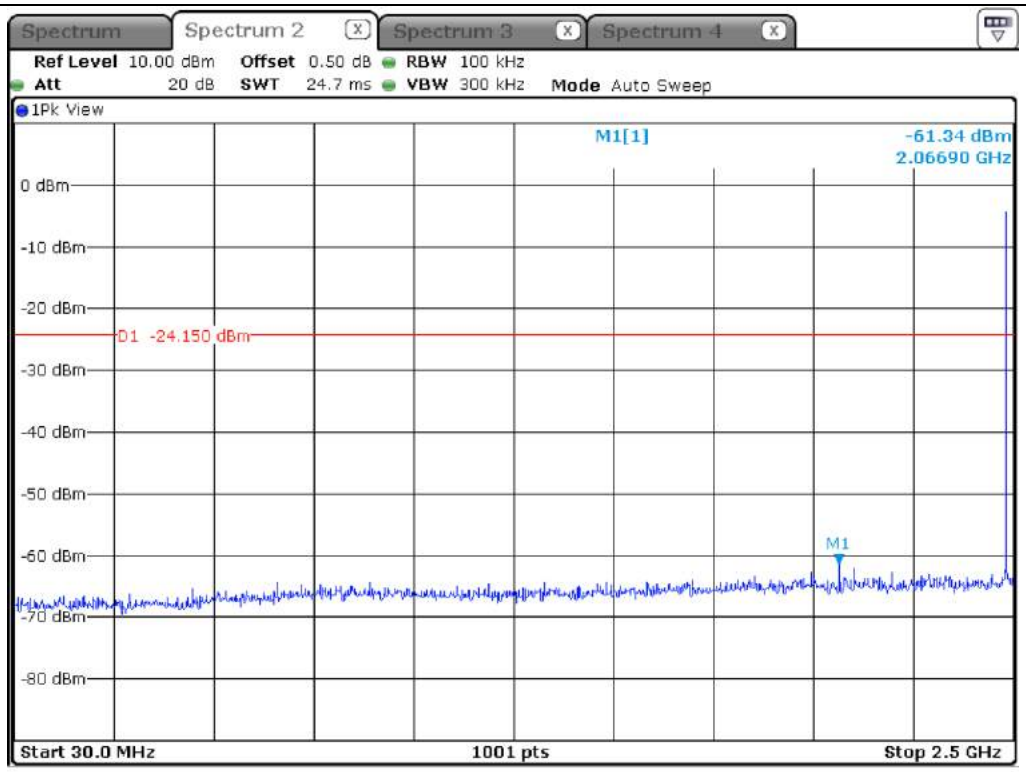
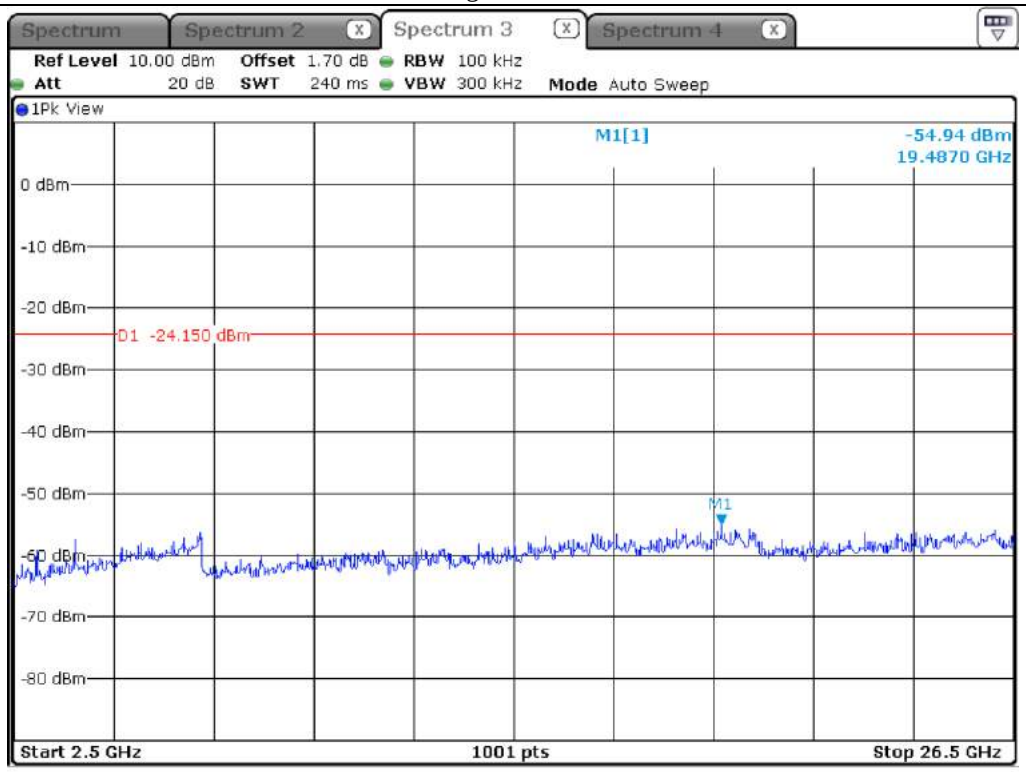
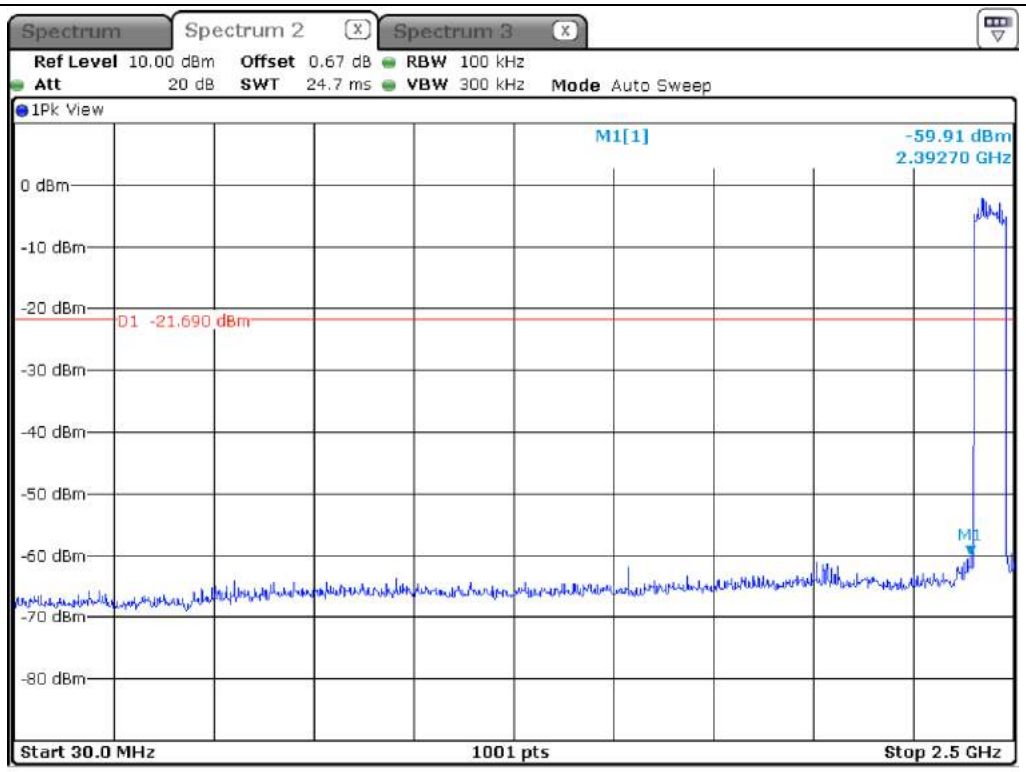


High Channel

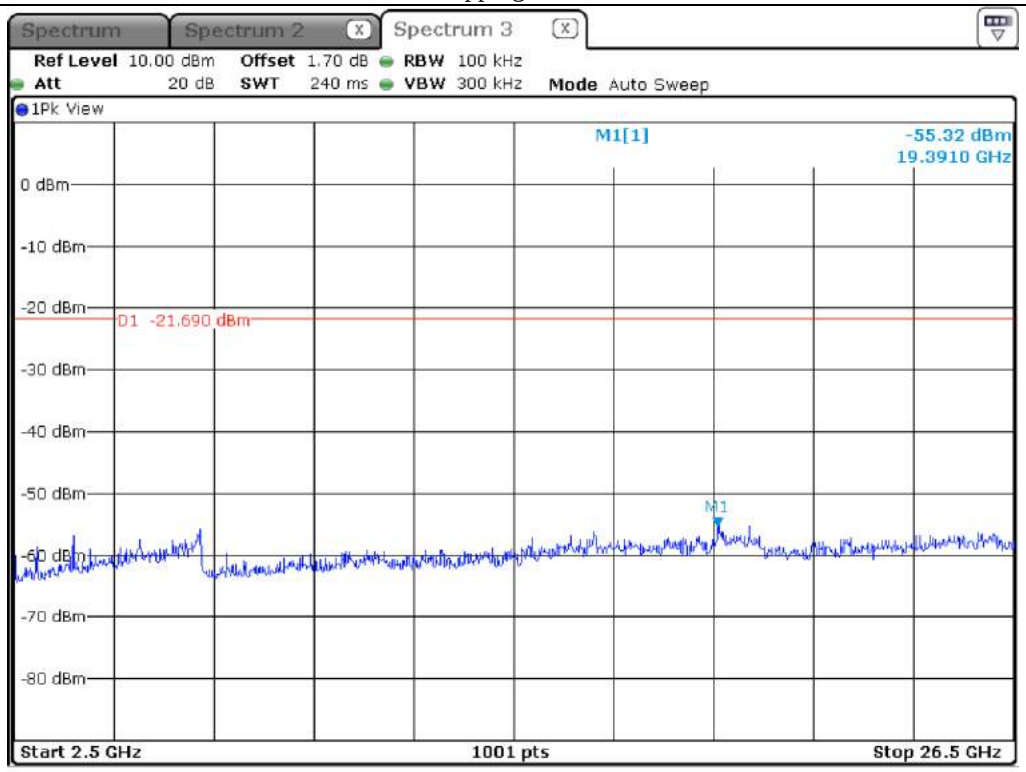


High Channel

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



Hopping Mode



Hopping Mode

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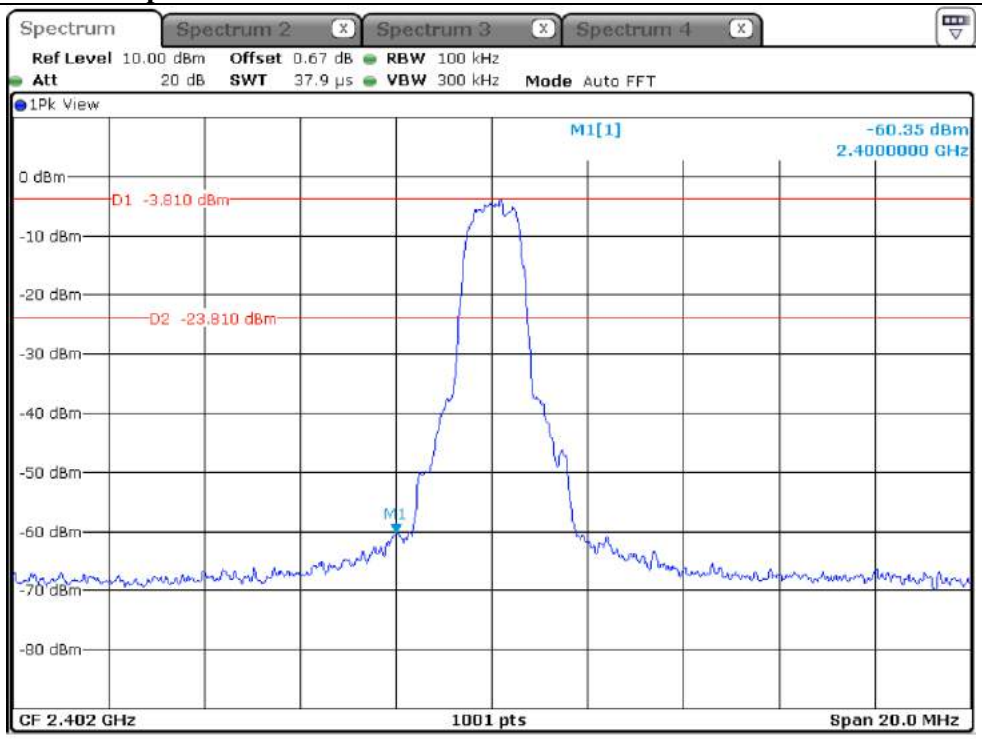
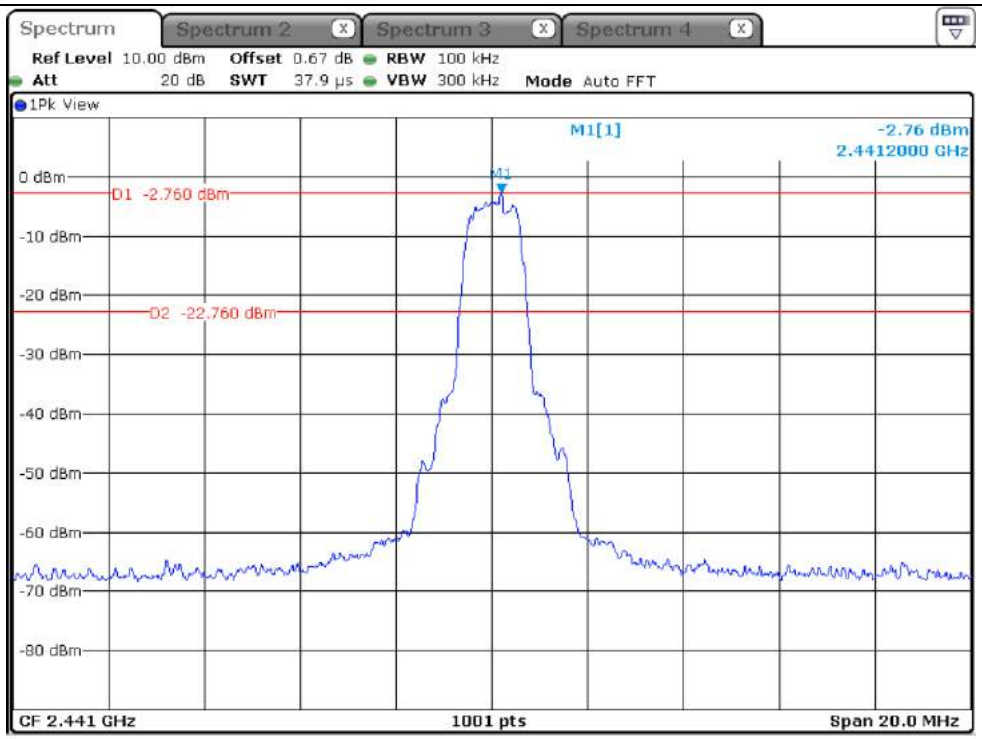
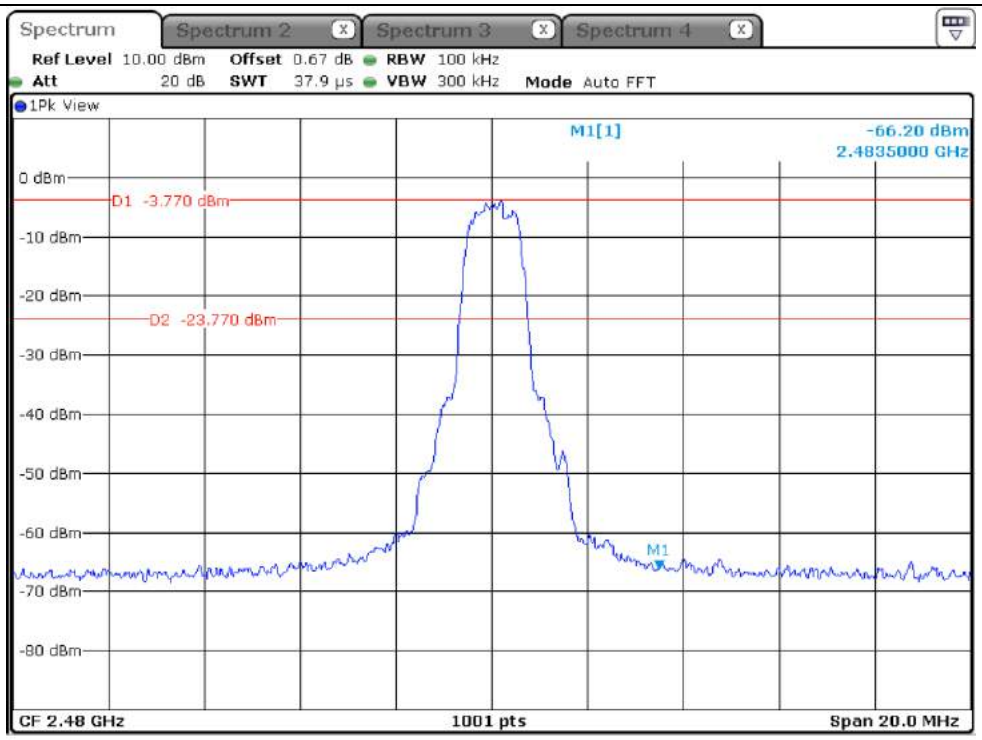
12.5.3 Test data for 3 Mbps



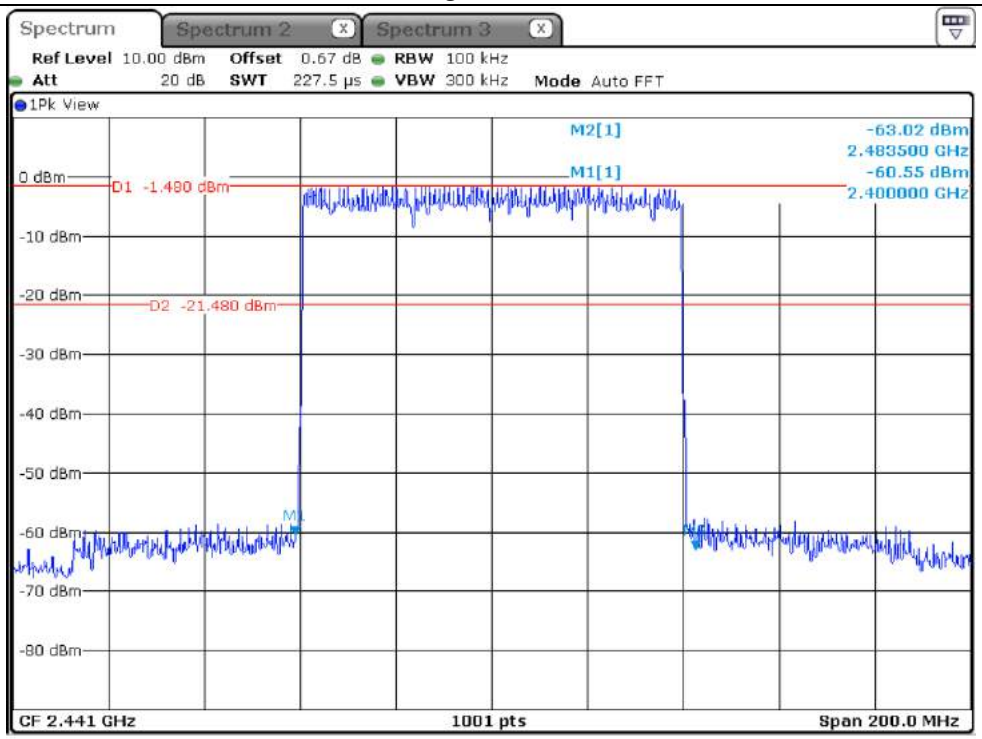
Low Channel



Middle Channel



High Channel



Hopping Mode

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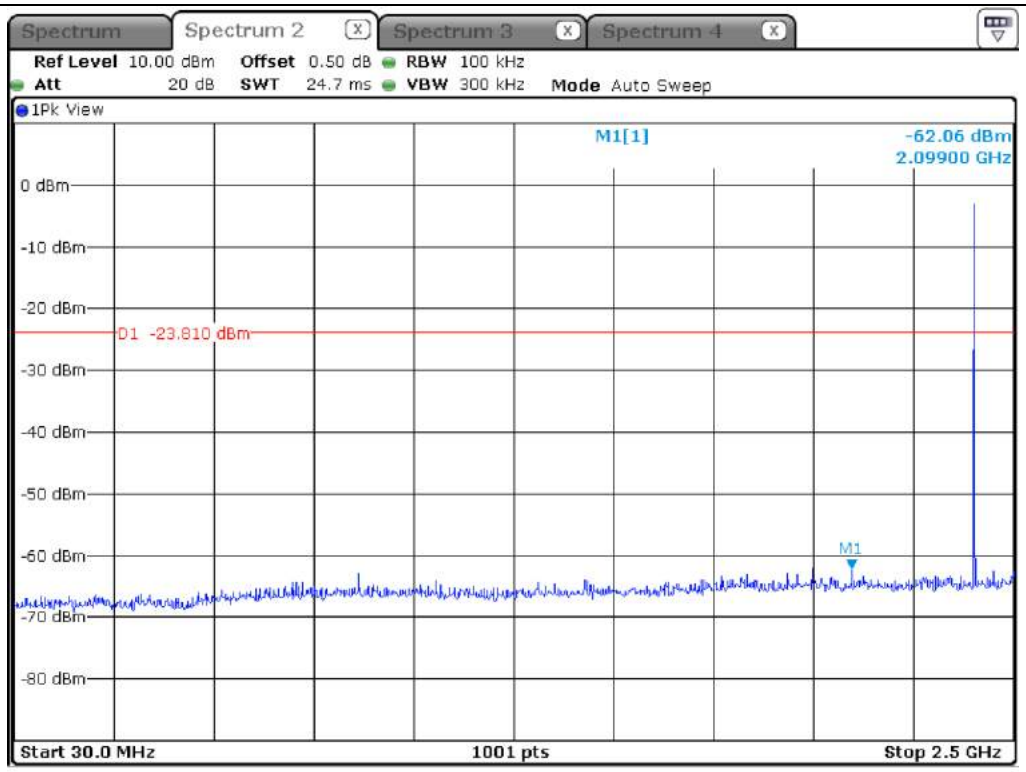
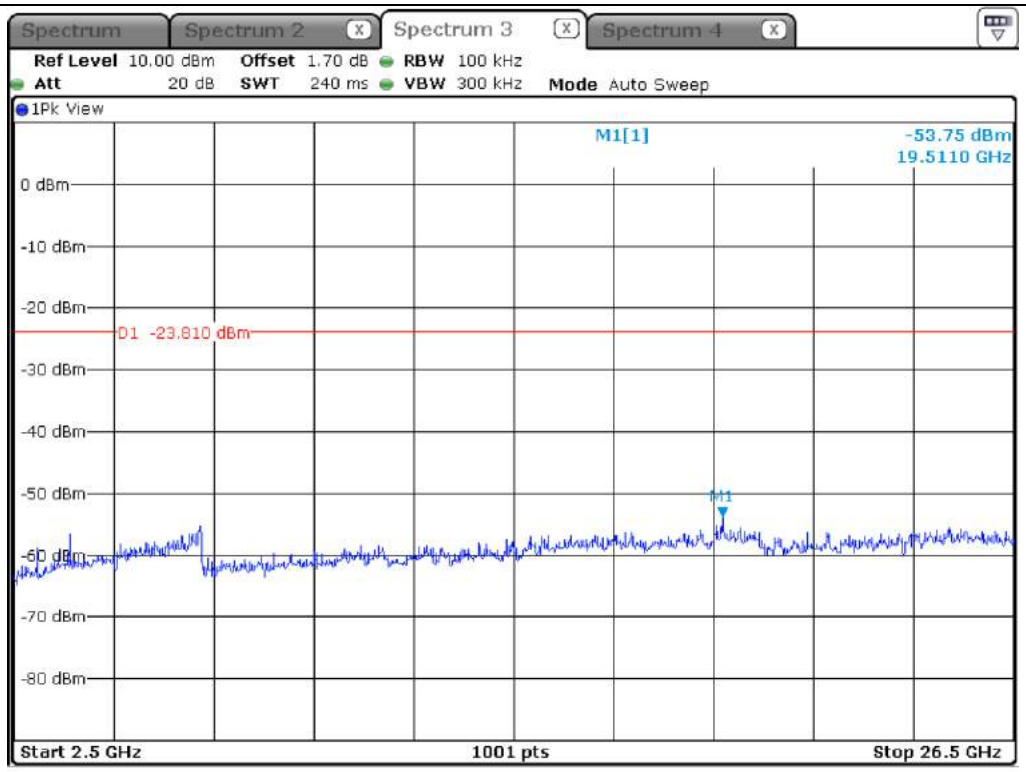
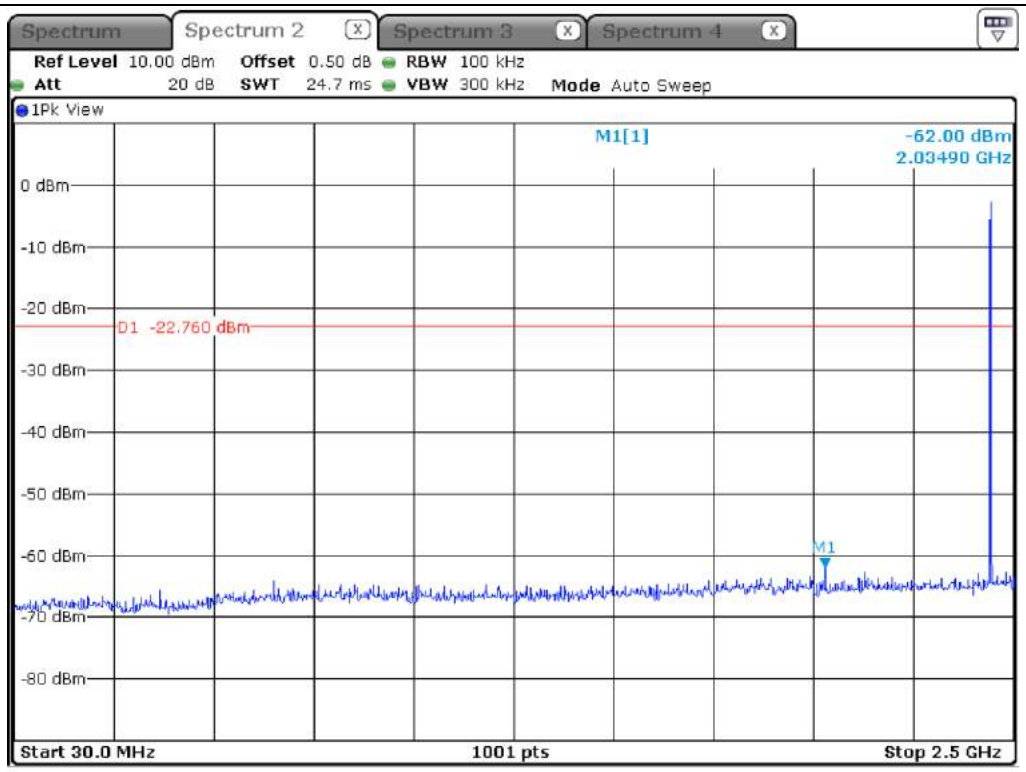


Low Channel

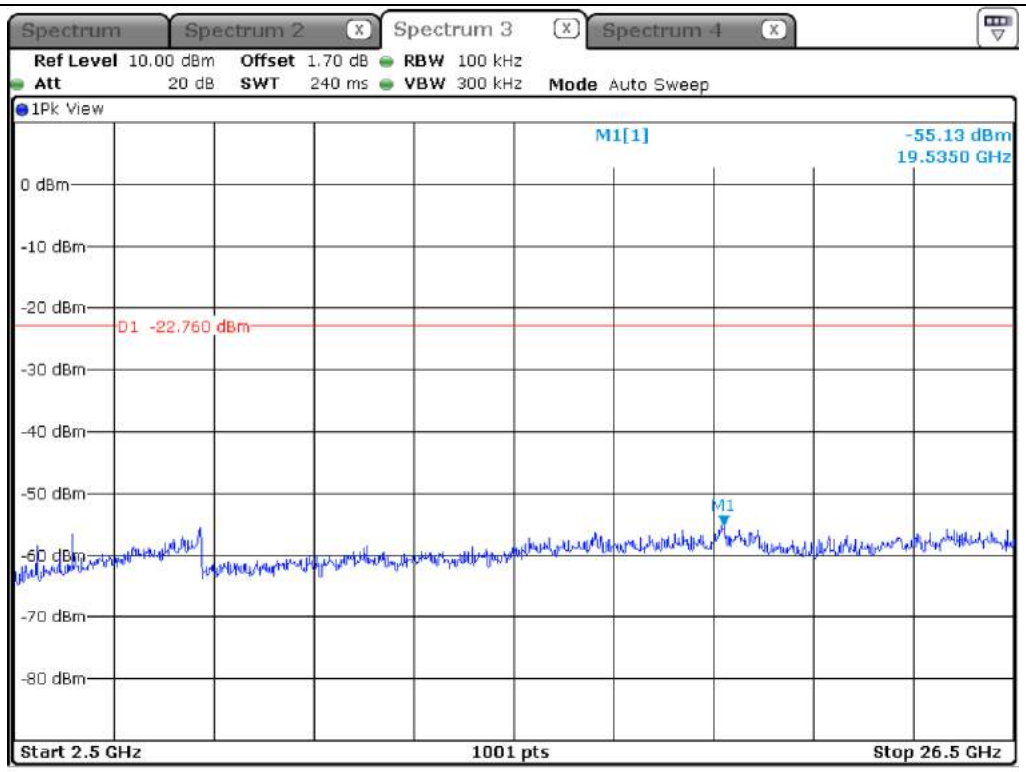


Low Channel

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

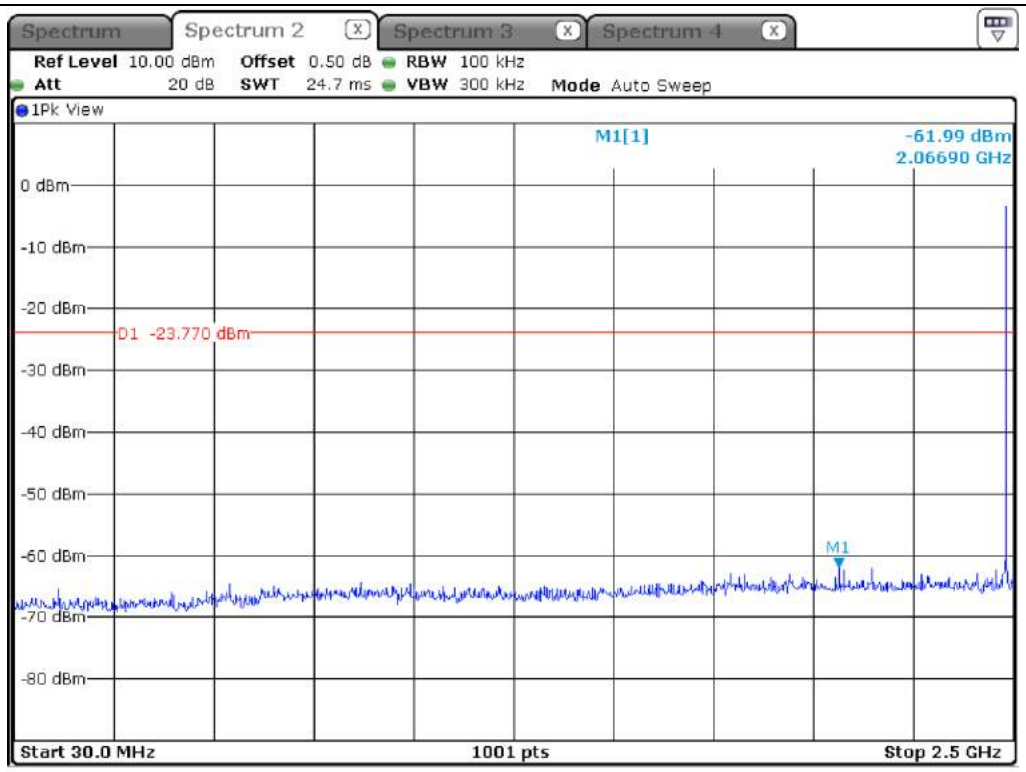


Middle Channel

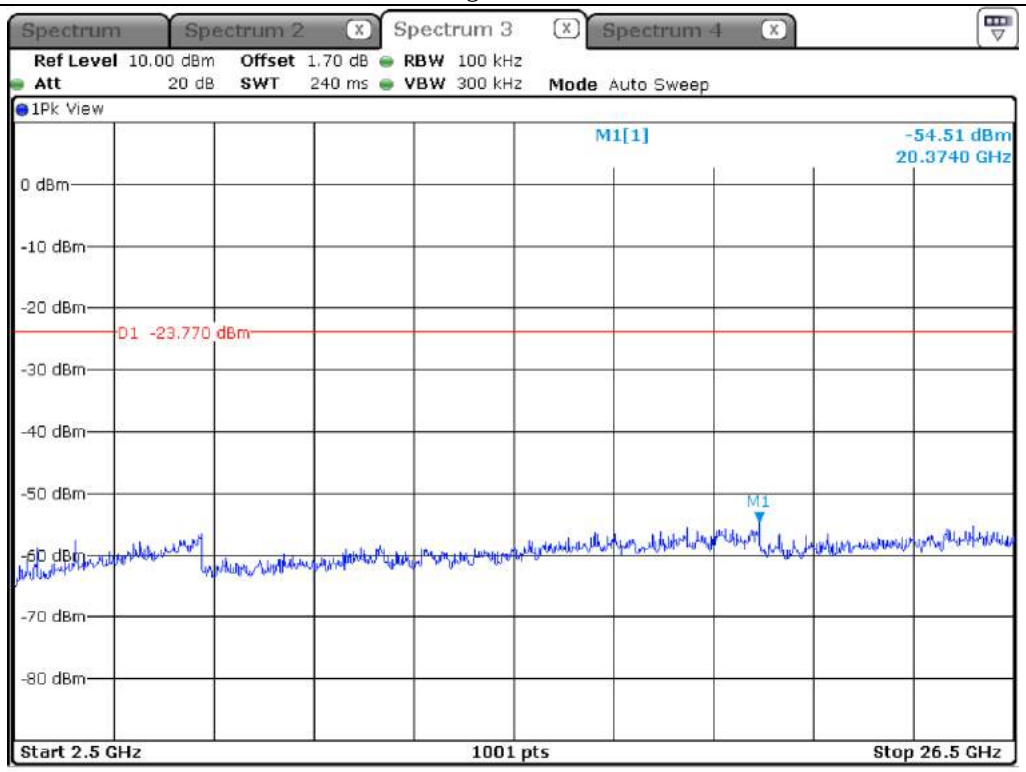


Middle Channel

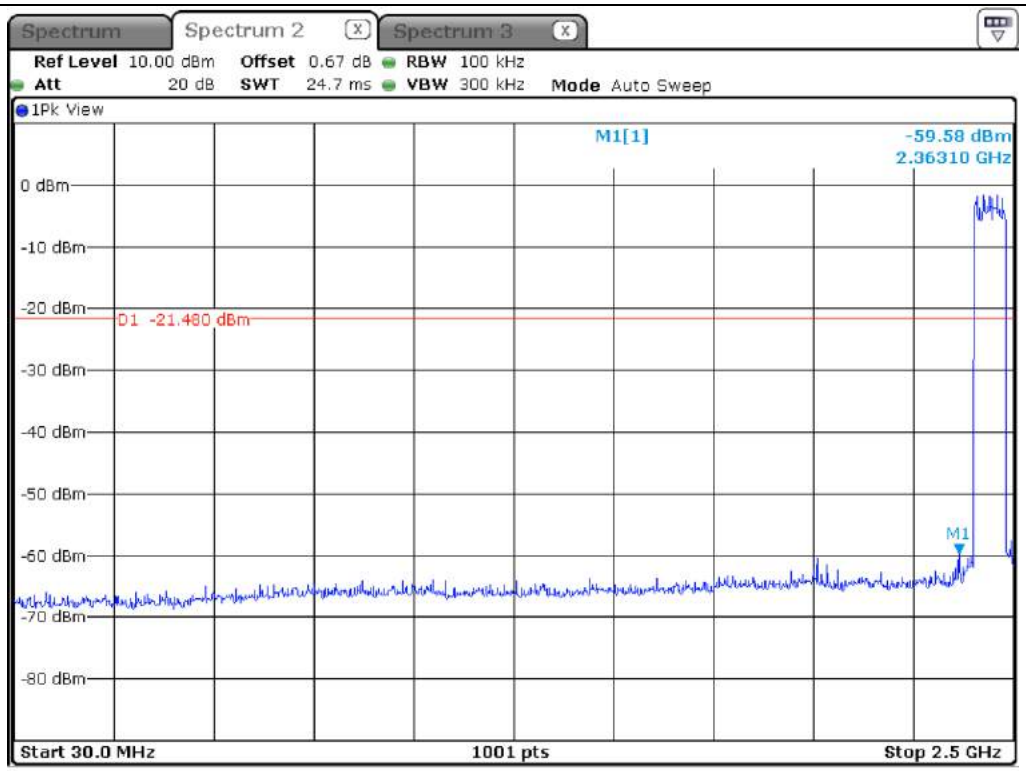
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



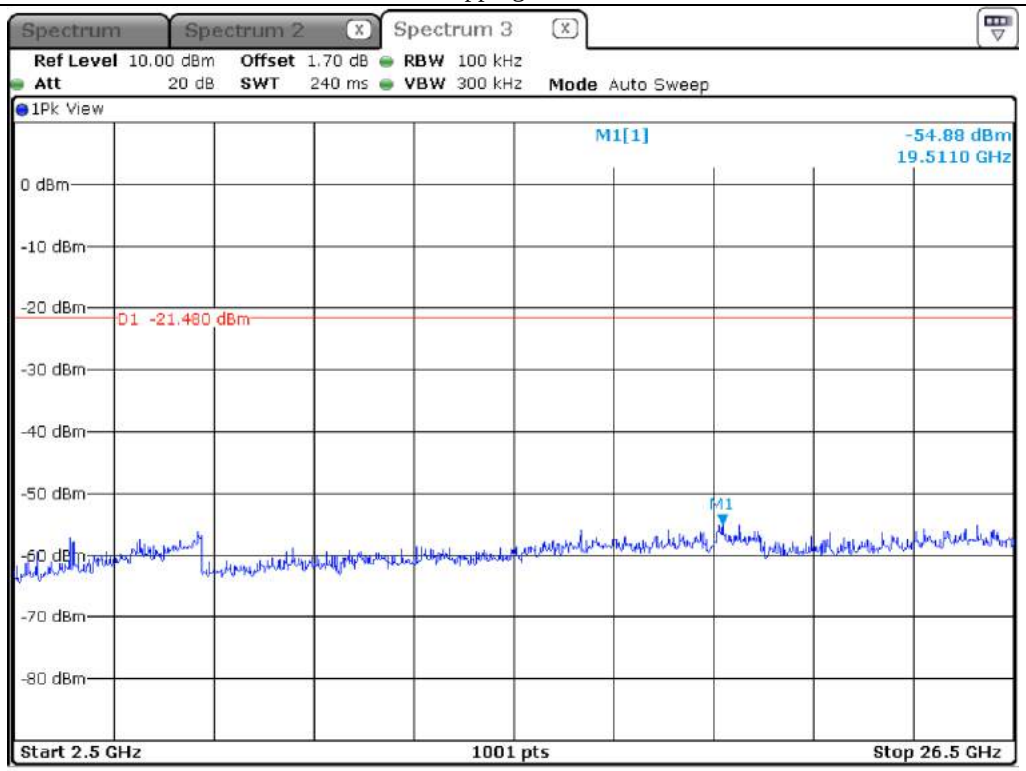
High Channel



High Channel



Hopping Mode



Hopping Mode

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12.6 Test data for Transmitting mode radiated emission

12.6.1 Radiated Emission which fall in the Restricted Band

12.6.1.1 Test data for 1 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Measurement distance : 3 m

-. Duty Cycle : 76.86 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Duty Factor (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
2 360.87	51.06	Peak	H	28.30	5.39	45.66	-	39.09	74.00	34.91
2 357.01	41.12	Average	H	28.30	5.39	45.66	1.14	30.29	54.00	23.71
2 368.68	52.74	Peak	V	28.30	5.39	45.66	-	40.77	74.00	33.23
2 373.55	40.98	Average	V	28.30	5.39	45.66	1.14	30.15	54.00	23.85
Test Data for High Channel										
2 486.10	50.68	Peak	H	27.70	5.46	45.79	-	38.05	74.00	35.95
2 498.93	41.03	Average	H	27.70	5.46	45.79	1.14	29.54	54.00	24.46
2 491.34	52.15	Peak	V	27.70	5.46	45.79	-	39.52	74.00	34.48
2 488.48	40.76	Average	V	27.70	5.46	45.79	1.14	29.27	54.00	24.73

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – AMP Gain + Duty Factor

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12.6.1.2 Test data for 2 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Measurement distance : 3 m

-. Duty Cycle : 77.27 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Duty Factor (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
2 352.23	51.23	Peak	H	28.30	5.39	45.66	-	39.26	74.00	34.74
2 335.60	40.95	Average	H	28.30	5.39	45.66	1.14	30.12	54.00	23.88
2 330.27	51.88	Peak	V	28.30	5.39	45.66	-	39.91	74.00	34.09
2 360.87	40.40	Average	V	28.30	5.39	45.66	1.14	29.57	54.00	24.43
Test Data for High Channel										
2 491.06	51.01	Peak	H	27.70	5.46	45.79	-	38.38	74.00	35.62
2 489.98	40.36	Average	H	27.70	5.46	45.79	1.14	28.87	54.00	25.13
2 495.55	51.36	Peak	V	27.70	5.46	45.79	-	38.73	74.00	35.27
2 497.95	40.78	Average	V	27.70	5.46	45.79	1.14	29.29	54.00	24.71

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – AMP Gain + Duty Factor

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12.6.1.3 Test data for 3 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Measurement distance : 3 m

-. Duty Cycle : 77.27 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Duty Factor (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
2 359.68	51.69	Peak	H	28.30	5.39	45.66	-	39.72	74.00	34.28
2 367.49	40.86	Average	H	28.30	5.39	45.66	1.14	30.03	54.00	23.97
2 326.77	51.63	Peak	V	28.30	5.39	45.66	-	39.66	74.00	34.34
2 361.42	41.00	Average	V	28.30	5.39	45.66	1.14	30.17	54.00	23.83
Test Data for High Channel										
2 490.60	51.04	Peak	H	27.70	5.46	45.79	-	38.41	74.00	35.59
2 498.25	40.76	Average	H	27.70	5.46	45.79	1.14	29.27	54.00	24.73
2 488.26	51.11	Peak	V	27.70	5.46	45.79	-	38.48	74.00	35.52
2 492.92	40.37	Average	V	27.70	5.46	45.79	1.14	28.88	54.00	25.12

Tabulated test data for Restricted Band

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBµV/m) - Total Level (dBµV/m)

Total Level = Reading + Antenna Factor + Cable Loss – AMP Gain + Duty Factor

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12.6.2 Spurious & Harmonic Radiated Emission above 1 GHz

12.6.2.1 Test data for 1 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Duty Cycle : 76.86 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	50.82	Peak	H	31.30	7.77	45.06	-	44.83	74.00	29.17
4 804.00	42.19	Average	H	31.30	7.77	45.06	1.14	37.34	54.00	16.66
4 804.00	51.13	Peak	V	31.30	7.77	45.06	-	45.14	74.00	28.86
4 804.00	43.05	Average	V	31.30	7.77	45.06	1.14	38.20	54.00	15.80
Test Data for Middle Channel										
4 882.00	51.48	Peak	H	31.10	7.85	45.04	-	45.39	74.00	28.61
4 882.00	42.17	Average	H	31.10	7.85	45.04	1.14	37.22	54.00	16.78
4 882.00	50.62	Peak	V	31.10	7.85	45.04	-	44.53	74.00	29.47
4 882.00	42.83	Average	V	31.10	7.85	45.04	1.14	37.88	54.00	16.12
Test Data for High Channel										
4 960.00	50.61	Peak	H	31.50	7.94	45.03	-	45.02	74.00	28.98
4 960.00	39.76	Average	H	31.50	7.94	45.03	1.14	35.31	54.00	18.69
4 960.00	49.98	Peak	V	31.50	7.94	45.03	-	44.39	74.00	29.61
4 960.00	40.36	Average	V	31.50	7.94	45.03	1.14	35.91	54.00	18.09

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – AMP Gain + Duty Factor

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12.6.2.2 Test data for 2 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Duty Cycle : 77.27 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	50.21	Peak	H	31.30	7.77	45.06	-	44.22	74.00	29.78
4 804.00	40.25	Average	H	31.30	7.77	45.06	1.14	35.40	54.00	18.60
4 804.00	50.85	Peak	V	31.30	7.77	45.06	-	44.86	74.00	29.14
4 804.00	40.36	Average	V	31.30	7.77	45.06	1.14	35.51	54.00	18.49
Test Data for Middle Channel										
4 882.00	50.38	Peak	H	31.10	7.85	45.04	-	44.29	74.00	29.71
4 882.00	39.77	Average	H	31.10	7.85	45.04	1.14	34.82	54.00	19.18
4 882.00	49.68	Peak	V	31.10	7.85	45.04	-	43.59	74.00	30.41
4 882.00	40.16	Average	V	31.10	7.85	45.04	1.14	35.21	54.00	18.79
Test Data for High Channel										
4 960.00	50.34	Peak	H	31.50	7.94	45.03	-	44.75	74.00	29.25
4 960.00	39.37	Average	H	31.50	7.94	45.03	1.14	34.92	54.00	19.08
4 960.00	40.56	Peak	V	31.50	7.94	45.03	-	34.97	74.00	39.03
4 960.00	39.44	Average	V	31.50	7.94	45.03	1.14	34.99	54.00	19.01

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – AMP Gain + Duty Factor

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12.6.2.3 Test data for 3 Mbps

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Duty Cycle : 77.27 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	Duty Factor (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	50.43	Peak	H	31.30	7.77	45.06	-	44.44	74.00	29.56
4 804.00	40.38	Average	H	31.30	7.77	45.06	1.14	35.53	54.00	18.47
4 804.00	50.24	Peak	V	31.30	7.77	45.06	-	44.25	74.00	29.75
4 804.00	40.56	Average	V	31.30	7.77	45.06	1.14	35.71	54.00	18.29
Test Data for Middle Channel										
4 882.00	50.47	Peak	H	31.10	7.85	45.04	-	44.38	74.00	29.62
4 882.00	40.22	Average	H	31.10	7.85	45.04	1.14	35.27	54.00	18.73
4 882.00	50.39	Peak	V	31.10	7.85	45.04	-	44.30	74.00	29.70
4 882.00	39.82	Average	V	31.10	7.85	45.04	1.14	34.87	54.00	19.13
Test Data for High Channel										
4 960.00	50.16	Peak	H	31.50	7.94	45.03	-	44.57	74.00	29.43
4 960.00	39.62	Average	H	31.50	7.94	45.03	1.14	35.17	54.00	18.83
4 960.00	50.39	Peak	V	31.50	7.94	45.03	-	44.80	74.00	29.20
4 960.00	39.63	Average	V	31.50	7.94	45.03	1.14	35.18	54.00	18.82

Remark: “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBμV/m) - Total Level (dBμV/m)

Total Level = Reading + Antenna Factor + Cable Loss – AMP Gain + Duty Factor

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13. RADIATED EMISSION TEST

13.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % R.H.

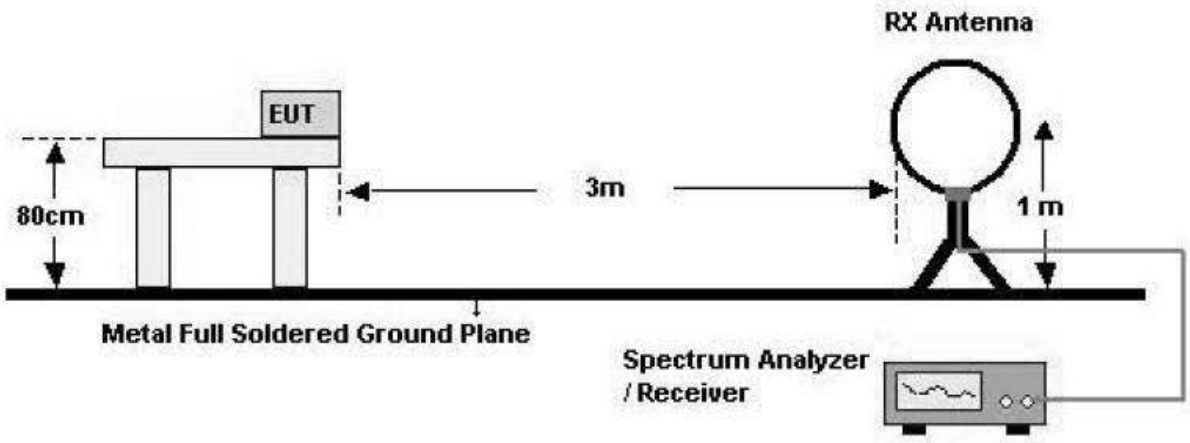
13.2 Test set-up

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.

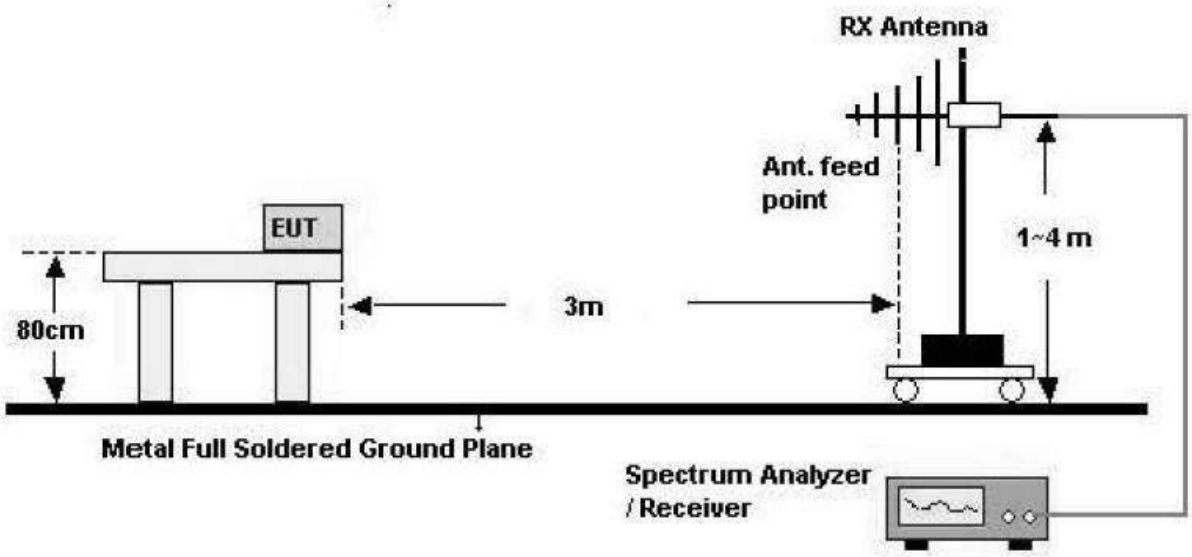
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

- Test Configuration

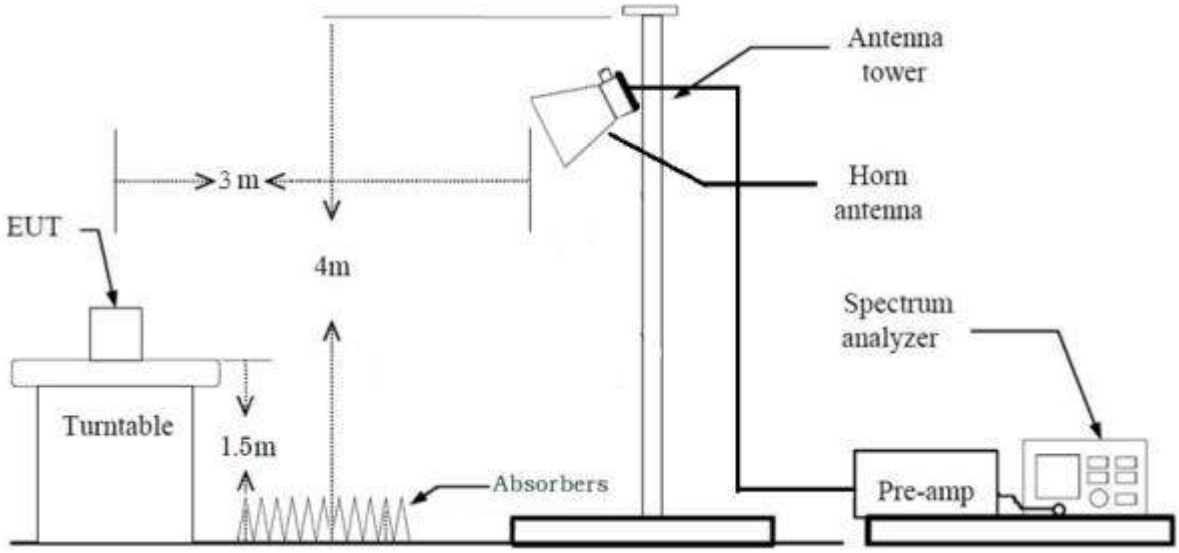
1. Below 30 MHz



2. 30 MHz - 1 GHz



3. Above 1 GHz



13.3 Test Date

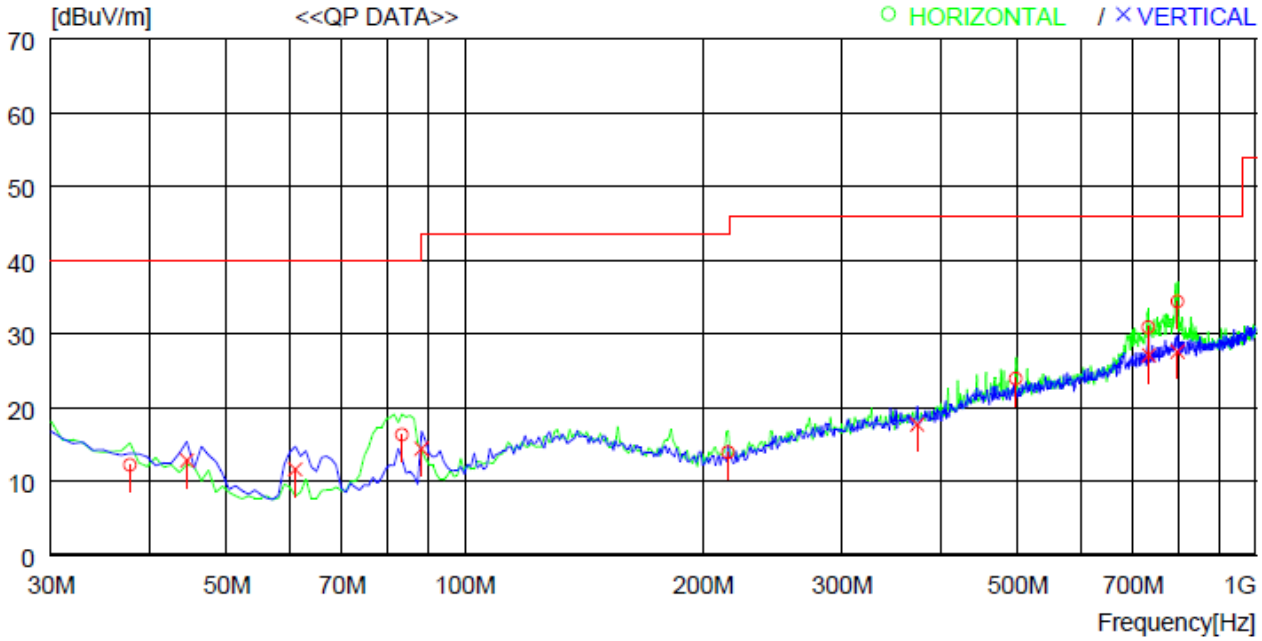
September 06, 2021 ~ September 15, 2021

13.4 Test data for 30 MHz ~ 1 000 MHz

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	37.760	24.9	18.1	1.8	32.6	12.2	40.0	27.8	400	359
2	83.350	33.2	13.0	2.6	32.5	16.3	40.0	23.7	400	359
3	215.270	26.4	15.7	4.3	32.5	13.9	43.5	29.6	300	150
4	497.541	26.6	23.1	6.6	32.4	23.9	46.0	22.1	200	359
5	731.304	29.3	26.1	8.0	32.5	30.9	46.0	15.1	100	0
6	796.292	31.3	27.0	8.3	32.2	34.4	46.0	11.6	100	0
----- Vertical ------										
7	44.550	28.1	15.3	1.9	32.5	12.8	40.0	27.2	100	359
8	61.040	29.6	12.2	2.3	32.5	11.6	40.0	28.4	300	359
9	88.200	30.9	13.3	2.7	32.5	14.4	43.5	29.1	100	359
10	373.380	24.2	20.3	5.6	32.4	17.7	46.0	28.3	300	359
11	732.274	25.5	26.1	8.0	32.5	27.1	46.0	18.9	300	359
12	796.292	24.5	27.0	8.3	32.2	27.6	46.0	18.4	200	96

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13.5 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.								

13.6 Test data for above 1 GHz

-. Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode

1 MHz and RMS Detector for Average Mode

-. Video bandwidth : 3 MHz for Peak and Average Mode

-. Frequency range : 1 GHz ~ 26.5 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.								

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14. CONDUCTED EMISSION TEST

14.1 Operating environment

Temperature : 23 °C

Relative humidity : 46 % 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 Ω / 50 μH + 5 Ω 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

September 06, 2021 ~ September 15, 2021

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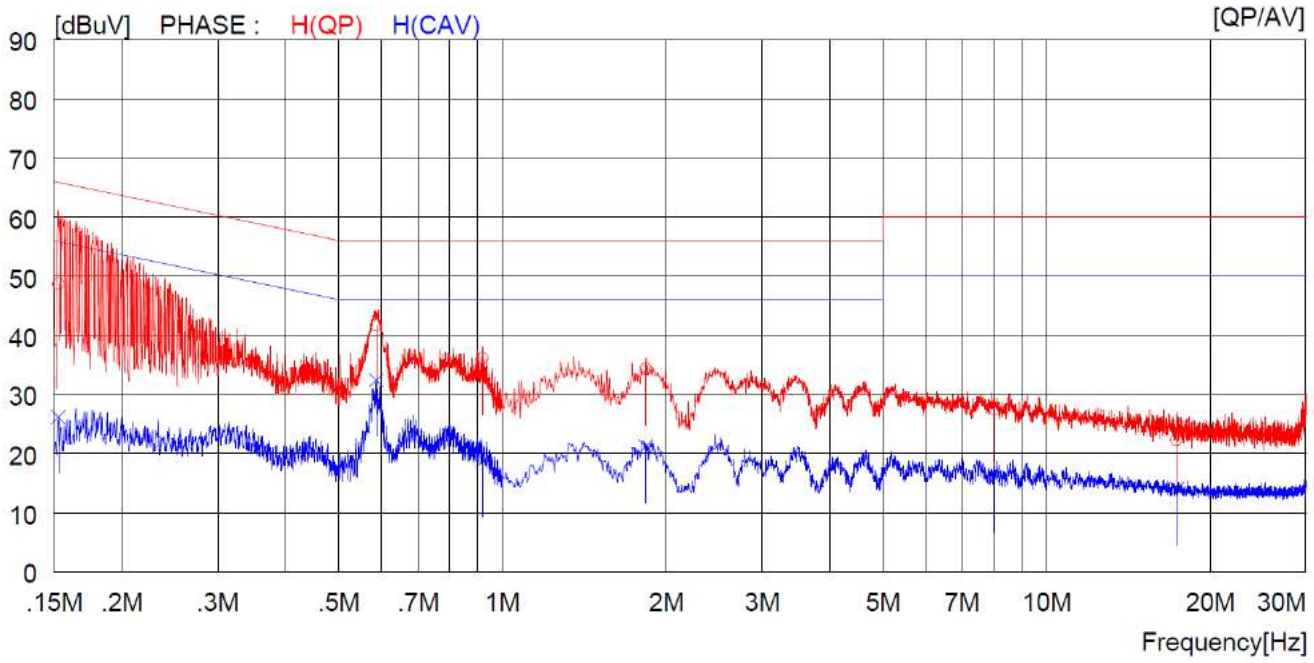
14.4 Test data

-. Resolution bandwidth : 9 kHz

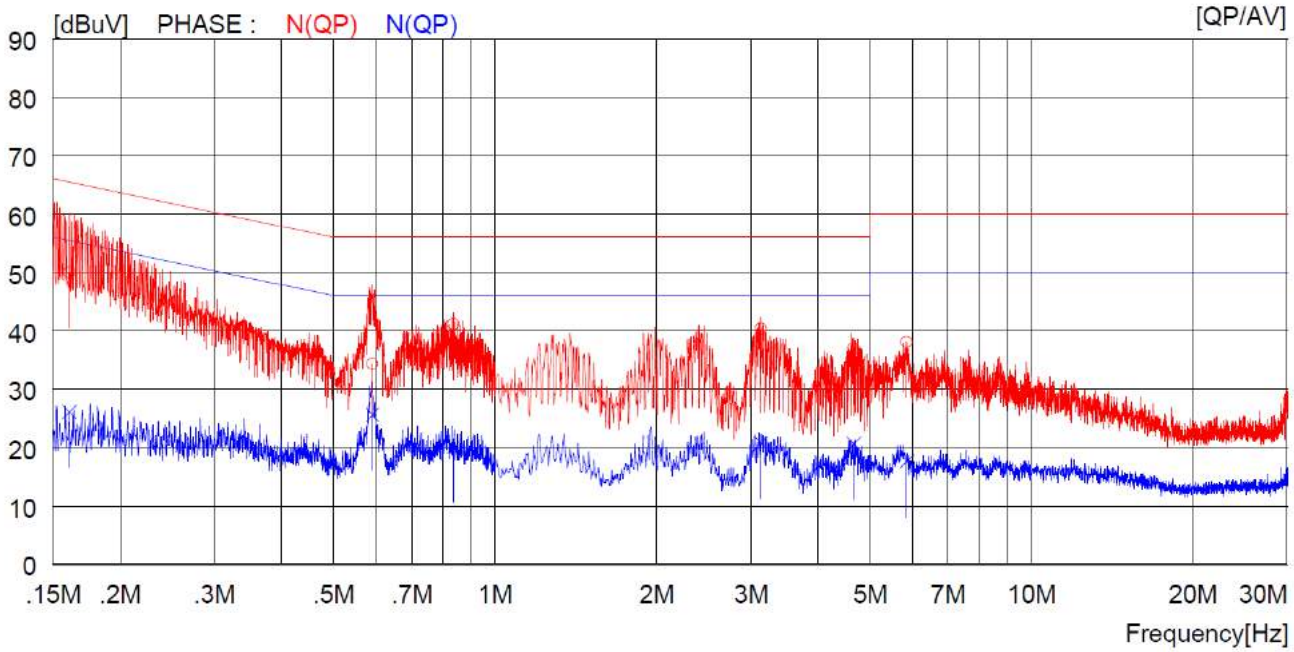
-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : HOT LINE



NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.15300	38.6	----	10.0	48.6	----	65.8	----	17.2	----	H(QP)
2	0.58700	31.7	----	10.0	41.7	----	56.0	----	14.3	----	H(QP)
3	0.92100	26.1	----	10.0	36.1	----	56.0	----	19.9	----	H(QP)
4	1.83600	24.2	----	10.1	34.3	----	56.0	----	21.7	----	H(QP)
5	8.04500	17.3	----	10.2	27.5	----	60.0	----	32.5	----	H(QP)
6	17.35000	12.0	----	10.3	22.3	----	60.0	----	37.7	----	H(QP)
7	0.15300	----	16.2	10.0	----	26.2	----	55.8	----	29.6	H(CAV)
8	0.58700	----	22.4	10.0	----	32.4	----	46.0	----	13.6	H(CAV)
9	0.92100	----	8.8	10.0	----	18.8	----	46.0	----	27.2	H(CAV)
10	1.83600	----	11.1	10.1	----	21.2	----	46.0	----	24.8	H(CAV)
11	8.04500	----	5.8	10.2	----	16.0	----	50.0	----	34.0	H(CAV)
12	17.35000	----	3.7	10.3	----	14.0	----	50.0	----	36.0	H(CAV)

-. Tested Line : NEUTRAL LINE



NO	FREQ	READING QP	READING AV	C.FACTOR	RESULT QP	RESULT AV	LIMIT QP	LIMIT AV	MARGIN QP	MARGIN AV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.16100	40.0	----	10.0	50.0	----	65.4	----	15.4	----	N(QP)
2	0.59100	24.3	----	10.0	34.3	----	56.0	----	21.7	----	N(QP)
3	0.83800	31.1	----	10.0	41.1	----	56.0	----	14.9	----	N(QP)
4	3.13600	30.2	----	10.1	40.3	----	56.0	----	15.7	----	N(QP)
5	4.66400	26.7	----	10.2	36.9	----	56.0	----	19.1	----	N(QP)
6	5.86000	27.9	----	10.2	38.1	----	60.0	----	21.9	----	N(QP)
7	0.16100	----	16.1	10.0	----	26.1	----	55.4	----	29.3	N(CAV)
8	0.59100	----	15.6	10.0	----	25.6	----	46.0	----	20.4	N(CAV)
9	0.83800	----	10.2	10.0	----	20.2	----	46.0	----	25.8	N(CAV)
10	3.13600	----	10.6	10.1	----	20.7	----	46.0	----	25.3	N(CAV)
11	4.66400	----	10.4	10.2	----	20.6	----	46.0	----	25.4	N(CAV)
12	5.86000	----	7.5	10.2	----	17.7	----	50.0	----	32.3	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.

15. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV40-N	Rohde & Schwarz	Signal Analyzer	102196	Apr. 16, 2021 (1Y)
ZUP36-6	NEMIC-LAMBDA	DC Power Supply	1305531	Apr. 16, 2021 (1Y)
ESU	Rohde & Schwarz	EMI Test Receiver	100261	Mar. 15, 2021 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	392756	Oct. 16, 2020 (1Y)
SCU18	Rohde & Schwarz	Pre-Amplifier	102266	Jul. 14, 2021 (1Y)
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar. 24, 2020 (2Y)
HLP-2008	TDK	Hybrid Antenna	131316	Feb. 27, 2020 (2Y)
AH-118	Com-Power	Horn Antenna	10050061	Oct. 15, 2020 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Jan. 07, 2021 (1Y)
ESCI	Rohde & Schwarz	EMI Test Receiver	101012	Oct. 19, 2020 (1Y)
NSLK8128	Schwarzbeck	AMN	8128216	Oct. 19, 2020 (1Y)
ESH3-Z2	Rohde & Schwarz	Pulse Limiter	100655	Mar. 15, 2021 (1Y)
DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A