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

Test Report No.	**: OT-218-RWD-109**
Reception No.	**: 2107003430**
Applicant	**: Samsung Electronics Co., Ltd.**
Address	**: 1, Samsung-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Korea**
Manufacturer	**: Samsung Electronics Co., Ltd.**
Address	**: 1, Samsung-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Korea**
Type of Equipment	**: IoT Module**
FCC ID.	**: 2AR3A-ITM-G2**
Model Name	**: ITM-G2**
Serial number	**: N/A**
Total page of Report	**: 77 pages (including this page)**
Date of Incoming	**: August 20, 2021**
Date of issue	**: August 31, 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
Hyung-Kwon, Oh / 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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ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-218-RWD-109	August 31, 2021	Initial Release	All

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1. VERIFICATION OF COMPLIANCE

Applicant : Samsung Electronics Co., Ltd.

Address : 1, Samsung-ro, Giheung-gu, Yongin-si, Gyeonggi-do, Korea

Contact Person : Moungjin, Jang / Staff Engineer

Telephone No. : +070-7142-1361

FCC ID : 2AR3A-ITM-G2

Model Name : ITM-G2

Brand Name : -

Serial Number : N/A

Date : August 31, 2021

EQUIPMENT CLASS	DTS – DIGITAL TRNSMISSION SYSTEM
E.U.T. DESCRIPTION	IoT Module
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 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) (2)	Minimum 6 dB Bandwidth & 99 % Occupied Bandwidth	Met the Limit / PASS
15.247 (b) (3)	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
15.247 (e)	Peak Power Spectral Density	Met the Limit / PASS
15.209	Radiated Emission Limits	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 Samsung Electronics Co., Ltd., Model ITM-G2 (referred to as the EUT in this report) is a IoT Module. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	IoT Module	
Temperature Range	-20 °C ~ 50 °C	
OPERATING FREQUENCY	Bluetooth LE	2 402 MHz ~ 2 480 MHz
	Zigbee	2 405 MHz ~ 2 480 MHz
MODULATION TYPE	Bluetooth LE	GFSK
	Zigbee	O-QPSK
RF OUTPUT POWER	Bluetooth LE	Coded_125 kbps: 8.08 dBm Coded_500 kbps: 8.10 dBm 1 Mpbs: 8.01 dBm 2 Mpbs: 8.03 dBm
	Zigbee	7.19 dBm
Number of Channel	Bluetooth LE	40 Channel
	Zigbee	16 Channel
ANTENNA TYPE		PCB Antenna
ANTENNA GAIN		-0.80 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)		32 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	Samsung Electronics Co Ltd	ITM TYPE1	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
ITM-G2	Samsung Electronics Co., Ltd.	IoT Module (EUT)	-
ITM_EV KIT REV 0.3	Samsung Electronics Co., Ltd.	Jig Board	EUT
PROBOOK	HP	Notebook 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, the EUT was set at 2 402 MHz, 2 440 MHz, 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.

-. Channel List (Bluetooth LE)

Channel	Frequency[MHz]	Channel	Frequency[MHz]	Channel	Frequency[MHz]
0	2 402.00	14	2 430.00	28	2 458.00
1	2 404.00	15	2 432.00	29	2 460.00
2	2 406.00	16	2 434.00	30	2 462.00
3	2 408.00	17	2 436.00	31	2 464.00
4	2 410.00	18	2 438.00	32	2 466.00
5	2 412.00	19	2 440.00	33	2 468.00
6	2 414.00	20	2 442.00	34	2 470.00
7	2 416.00	21	2 444.00	35	2 472.00
8	2 418.00	22	2 446.00	36	2 474.00
9	2 420.00	23	2 448.00	37	2 476.00
10	2 422.00	24	2 450.00	38	2 478.00
11	2 424.00	25	2 452.00	39	2 480.00
12	2 426.00	26	2 454.00		
13	2 428.00	27	2 456.00		

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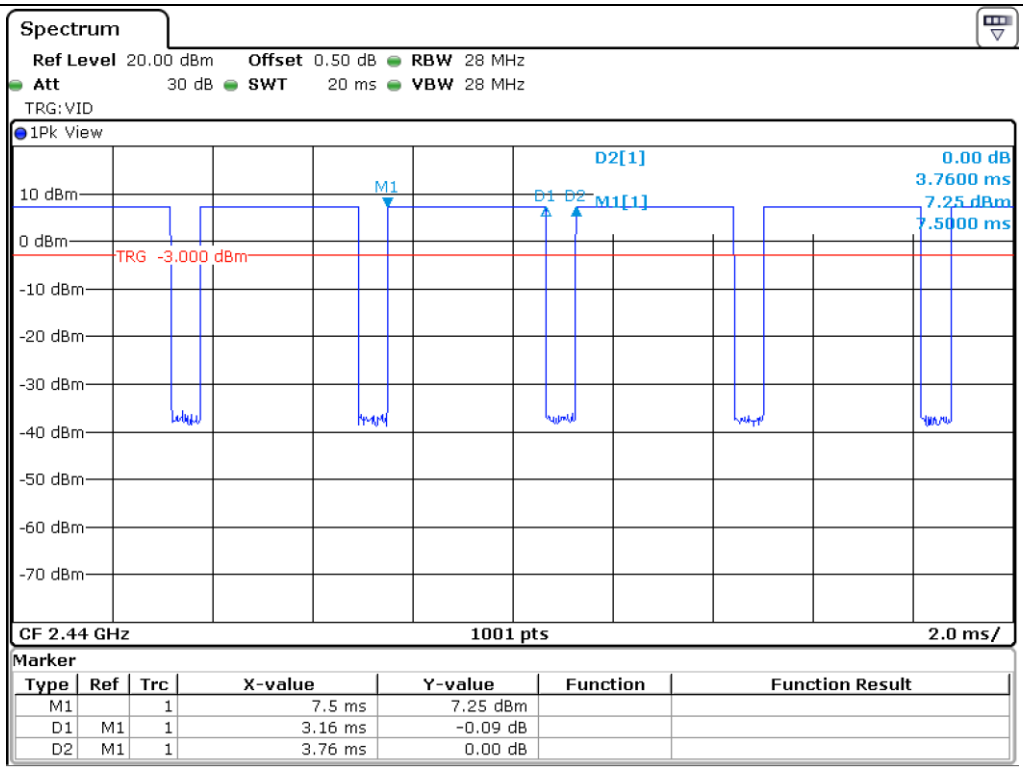
-. Duty Cycle

Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
Coded_125 kbps	3.160	0.600	84.04	0.76
Coded_500 kbps	1.110	0.140	88.80	0.52
1 Mbps	0.435	0.190	69.60	1.57
2 Mbps	0.250	0.376	39.94	3.99

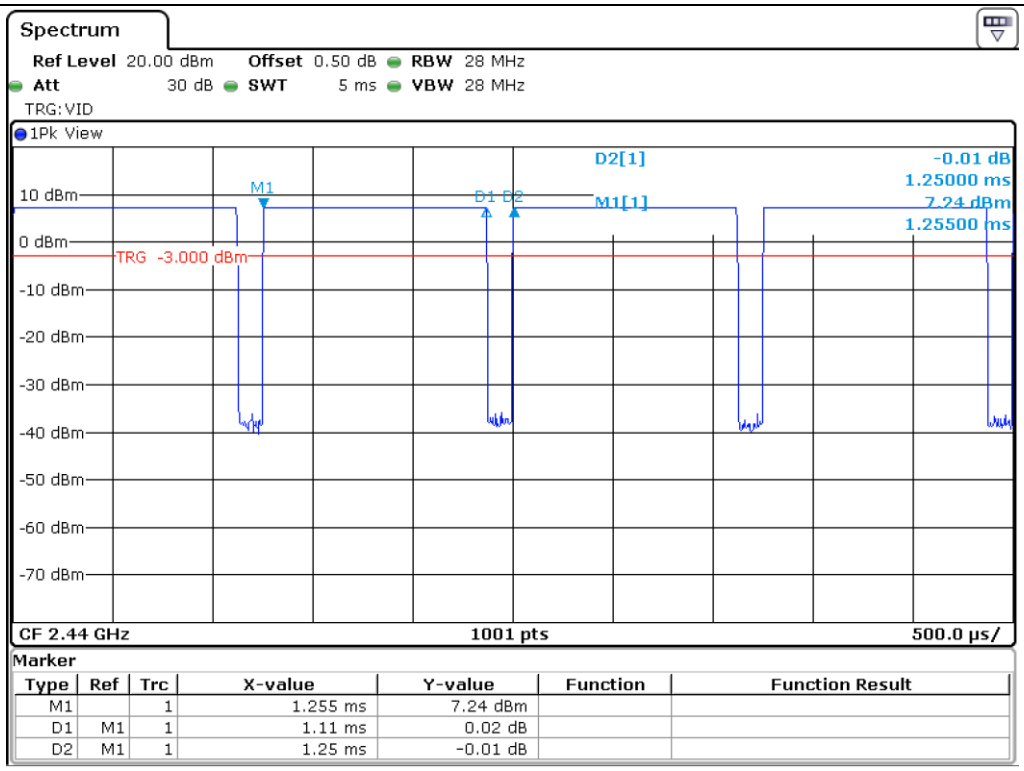
Note – Duty Cycle : (Tx On Time / (Tx On Time + Tx Off Time)) * 100

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

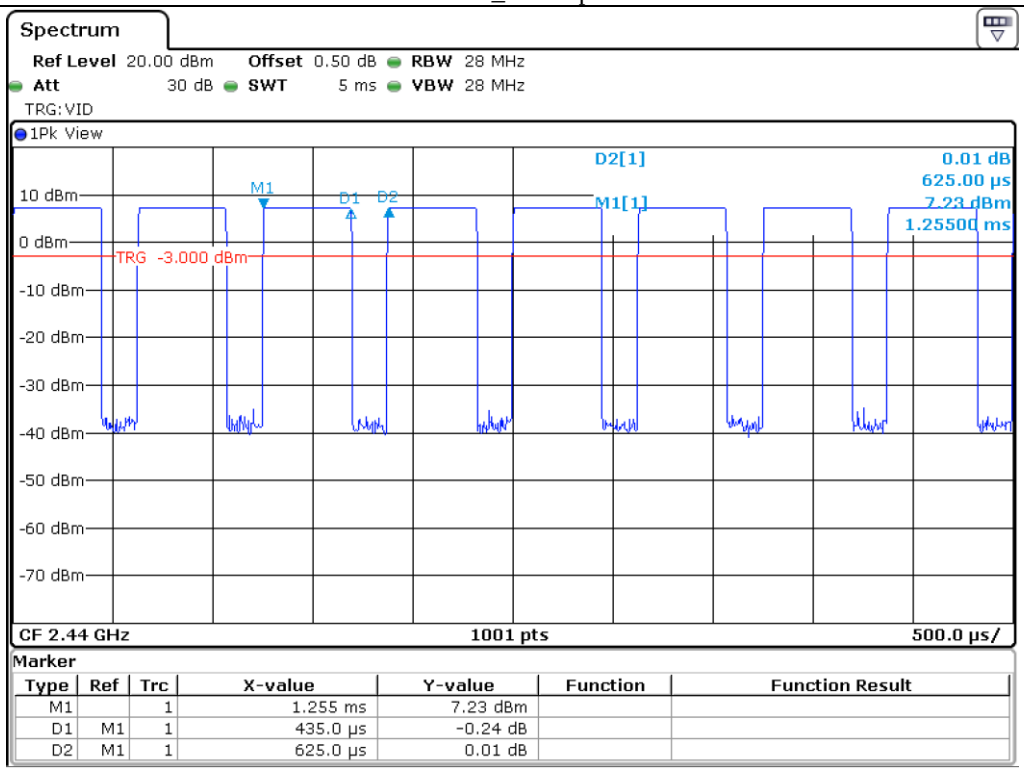
-. Test Plot



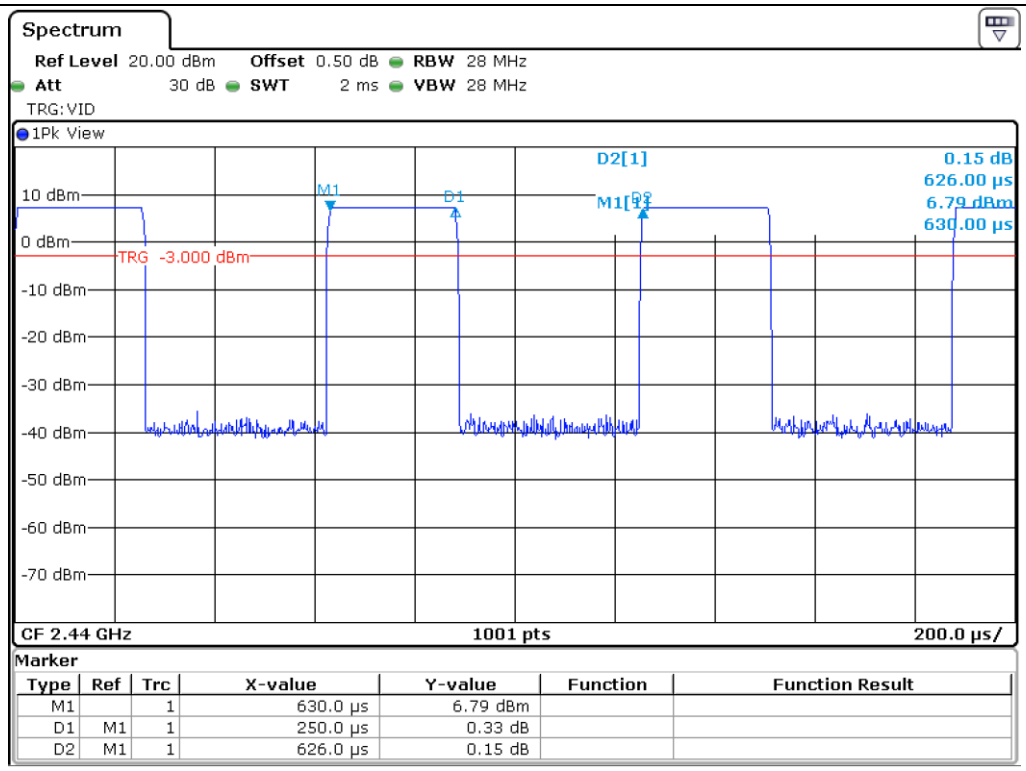
Coded_125 kbps



Coded_500 kbps



1 Mbps


Spectrum
Ref Level 20.00 dBm Offset 0.50 dB RBW 28 MHz
Att 30 dB SWT 2 ms VBW 28 MHz
TRG: VID
1Pk View
D2[1] 0.15 dB
626.00 µs
M1[1] 6.79 dBm
630.00 µs
10 dBm
0 dBm
TRG -3.000 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.44 GHz
1001 pts
200.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 630.0 µs 6.79 dBm
D1 M1 1 250.0 µs 0.33 dB
D2 M1 1 626.0 µs 0.15 dB

2 Mbps

5.4 Configuration of Test System

Line Conducted Test: The EUT was connected to Jig Board and the power of USB was connected to Notebook PC. All supporting equipments 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 PCB 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. MINIMUM 6 dB BANDWIDTH

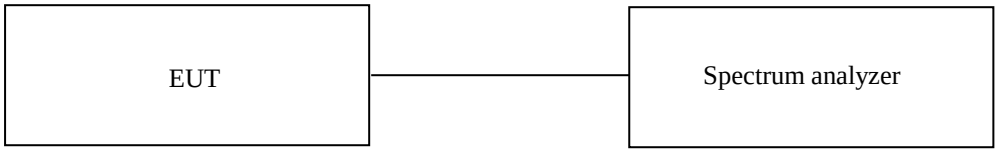
7.1 Operating environment

Temperature : 23 °C

Relative humidity : 45 % 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 100 kHz, and peak detection was used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.



7.3 Test Date

August 20, 2021 ~ August 26, 2021

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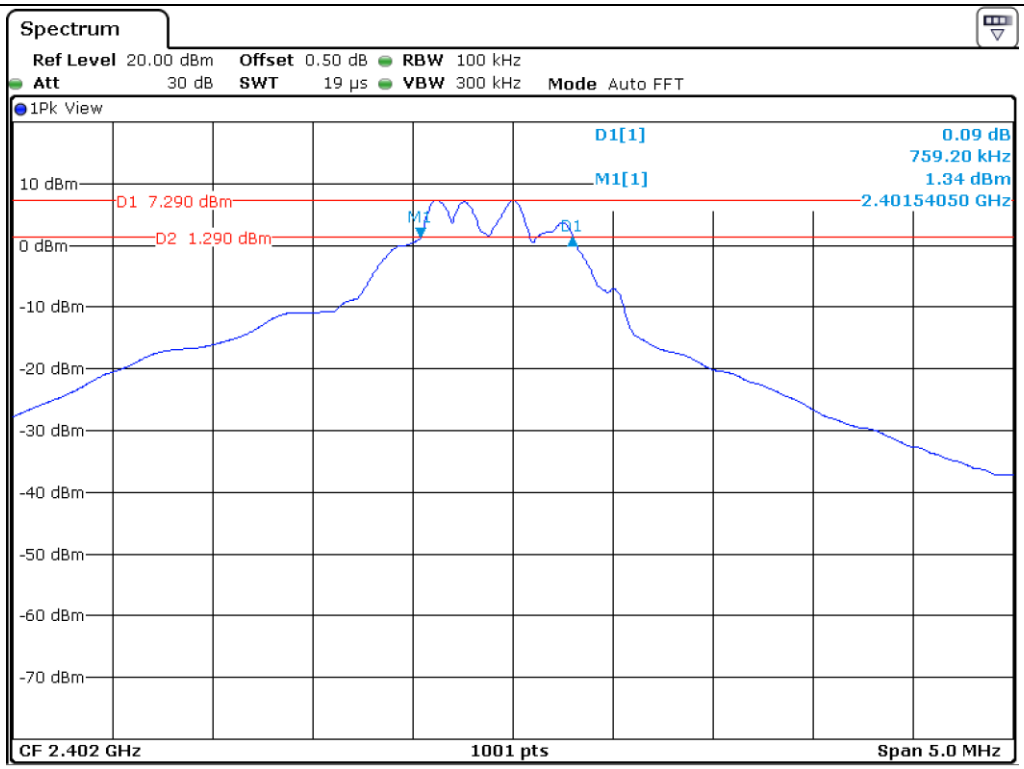
7.4 Test data for Coded_125 kbps

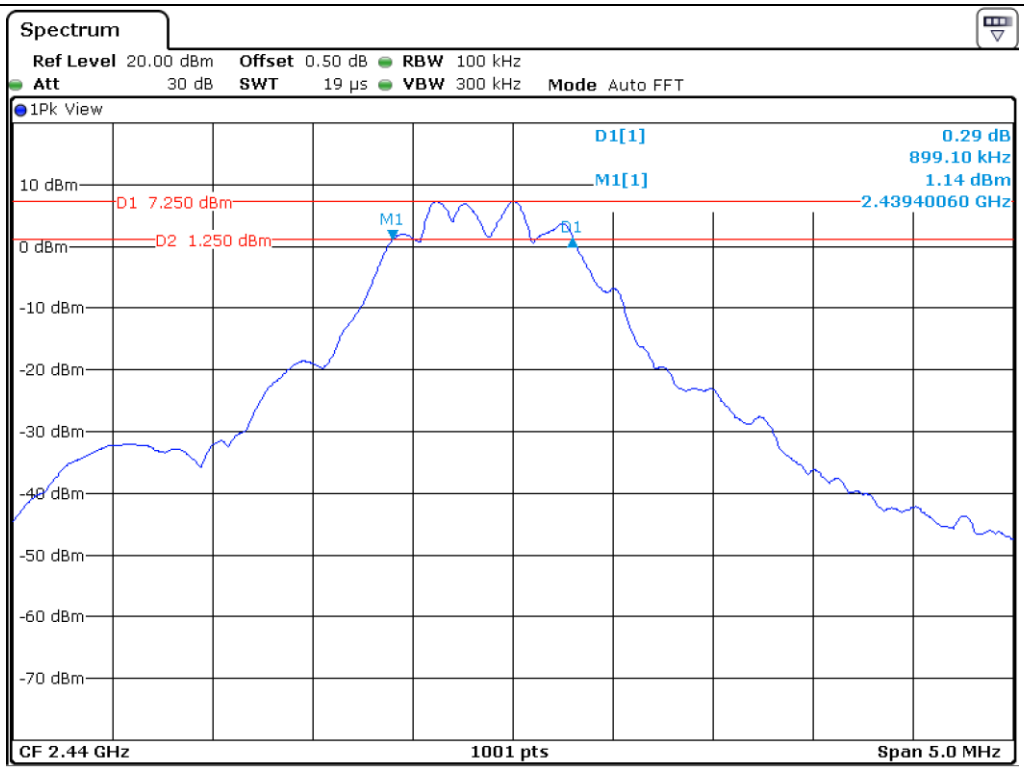
-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402.00	759.20	500.00	259.20
Middle	2 440.00	899.10	500.00	399.10
High	2 480.00	884.10	500.00	384.10

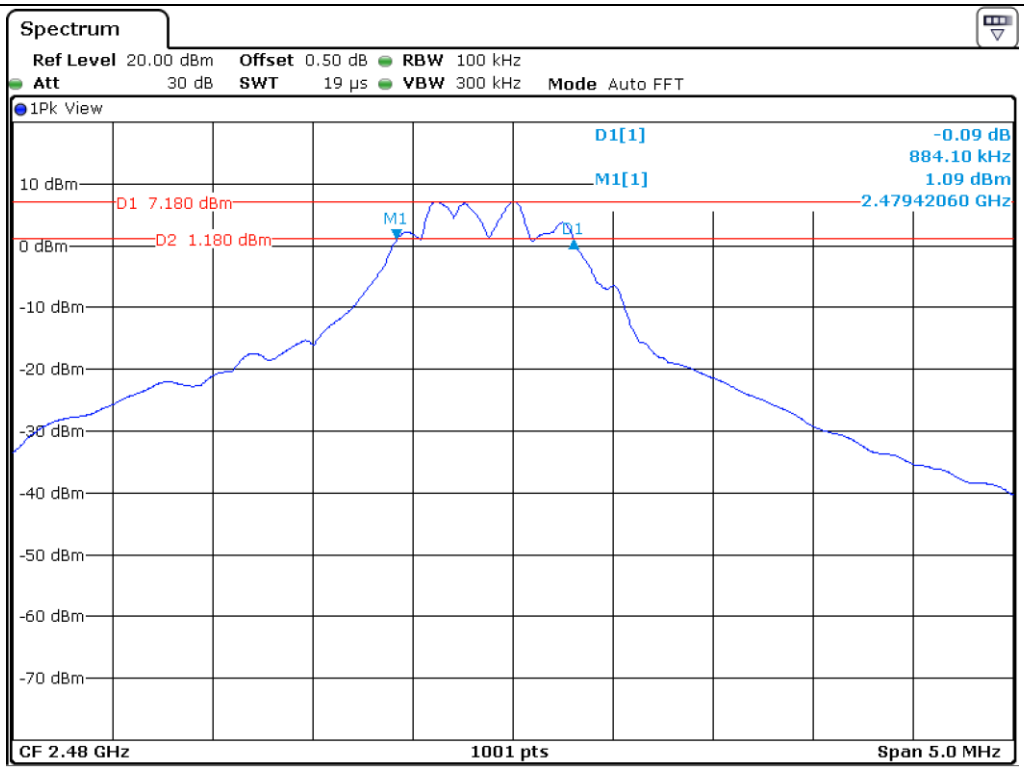
Remark. Margin = Measured Value – Limit



Low Channel



Middle Channel



High Channel

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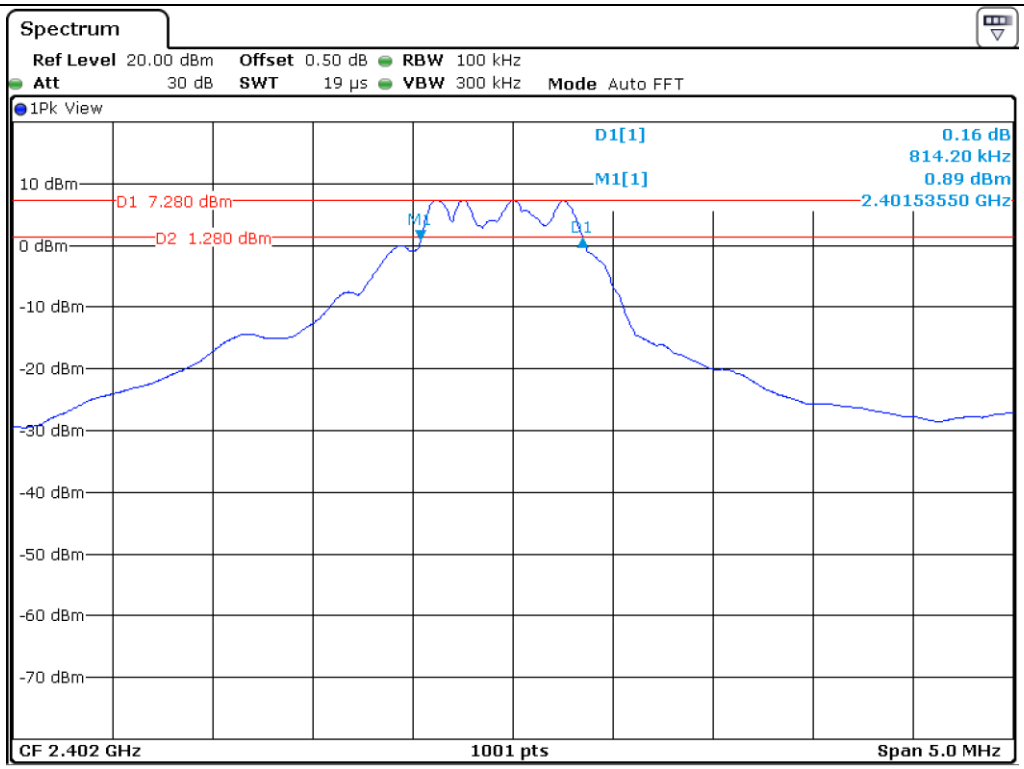
7.5 Test data for Coded_500 kbps

-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402.00	814.20	500.00	314.20
Middle	2 440.00	979.00	500.00	479.00
High	2 480.00	959.00	500.00	459.00

Remark. Margin = Measured Value – Limit



Low Channel

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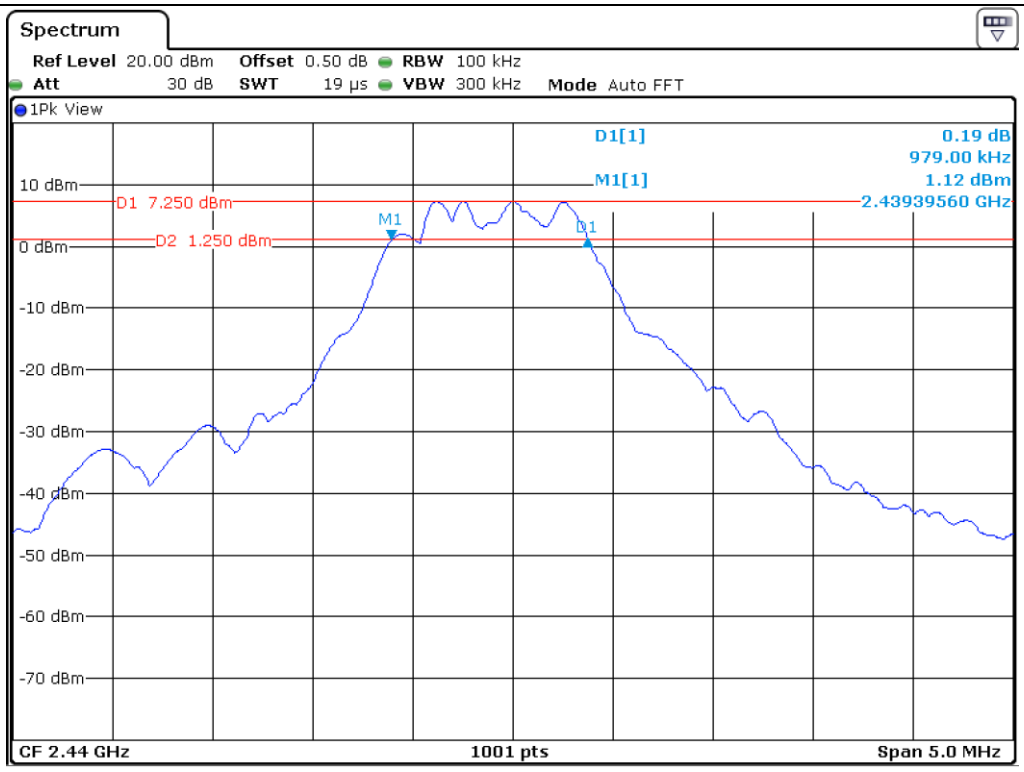
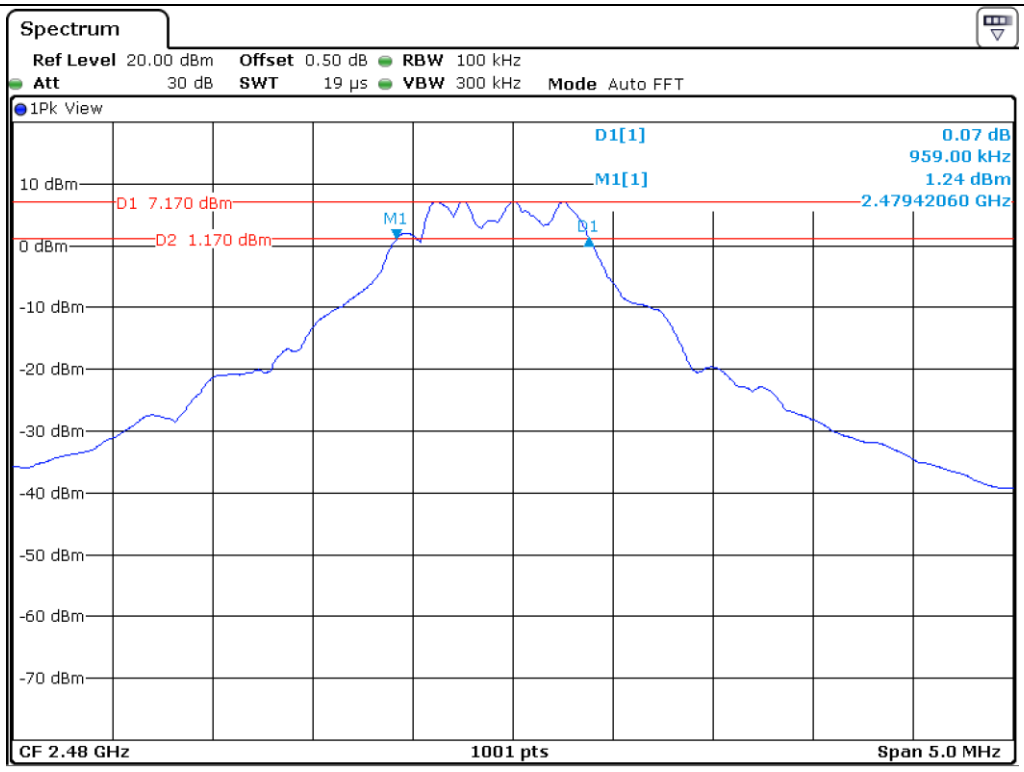


Middle Channel



High Channel

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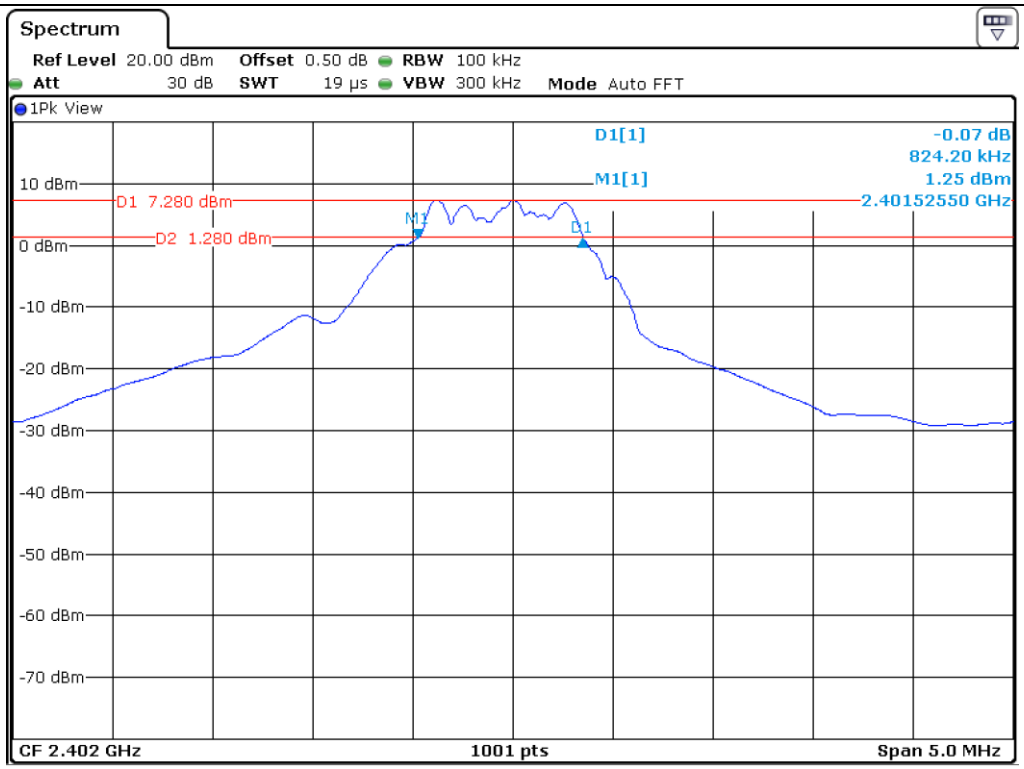
7.6 Test data for 1 Mbps

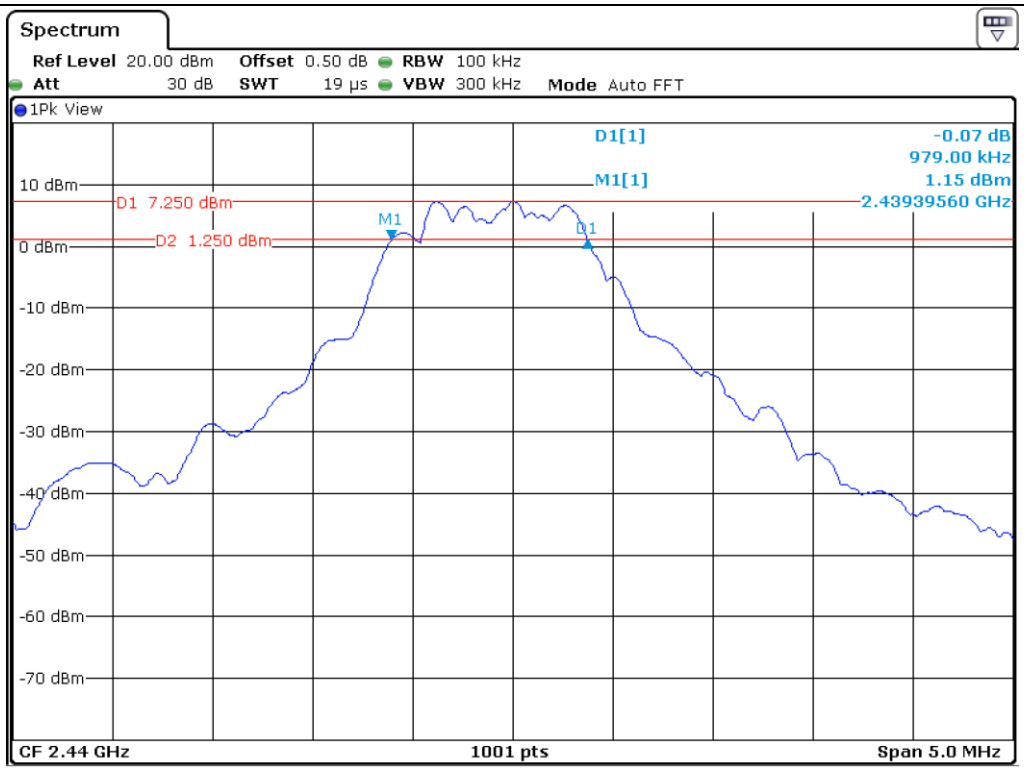
-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402.00	824.20	500.00	324.20
Middle	2 440.00	979.00	500.00	479.00
High	2 480.00	964.00	500.00	464.00

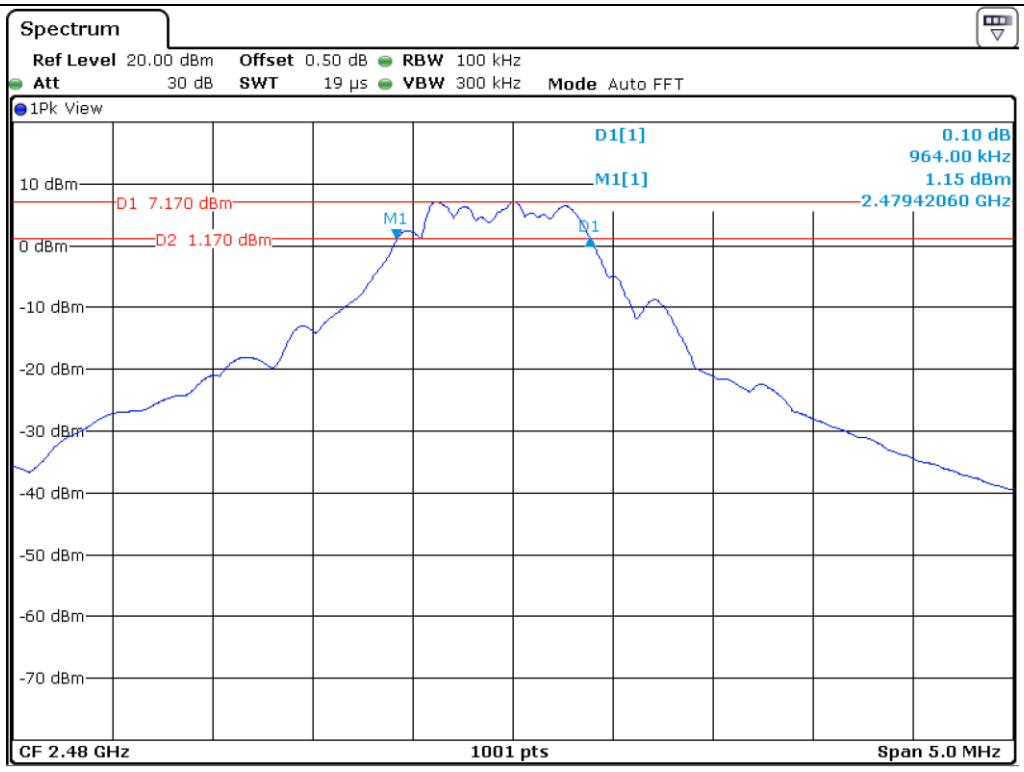
Remark. Margin = Measured Value – Limit



Low Channel



Middle Channel



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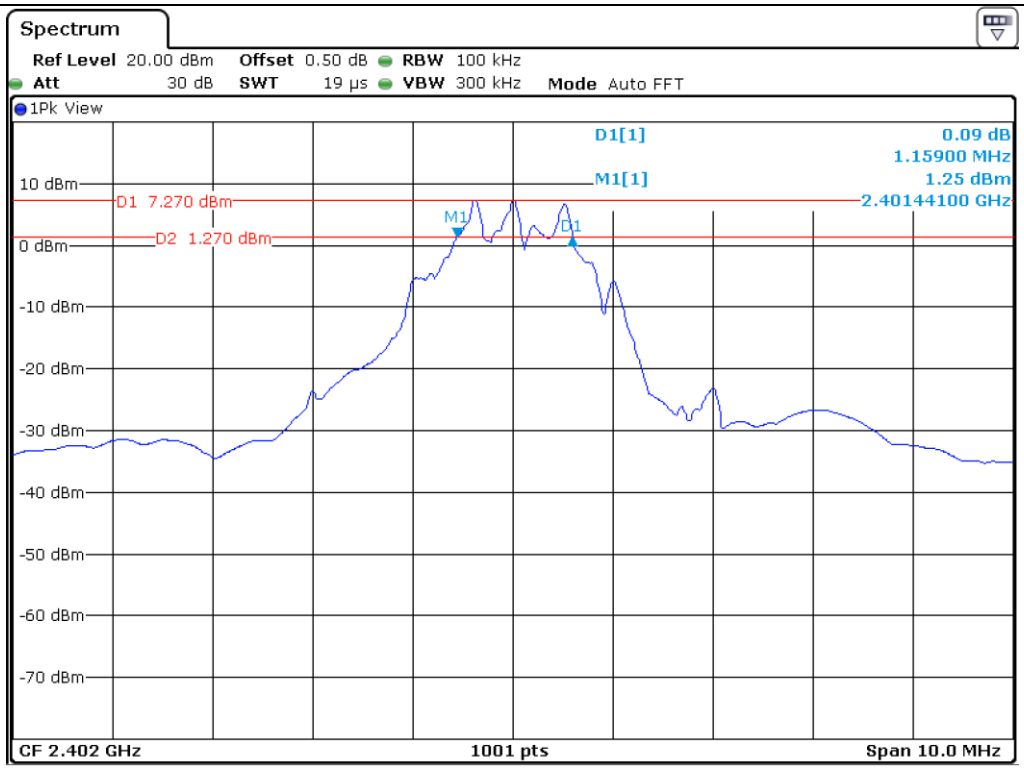
7.7 Test data for 2 Mbps

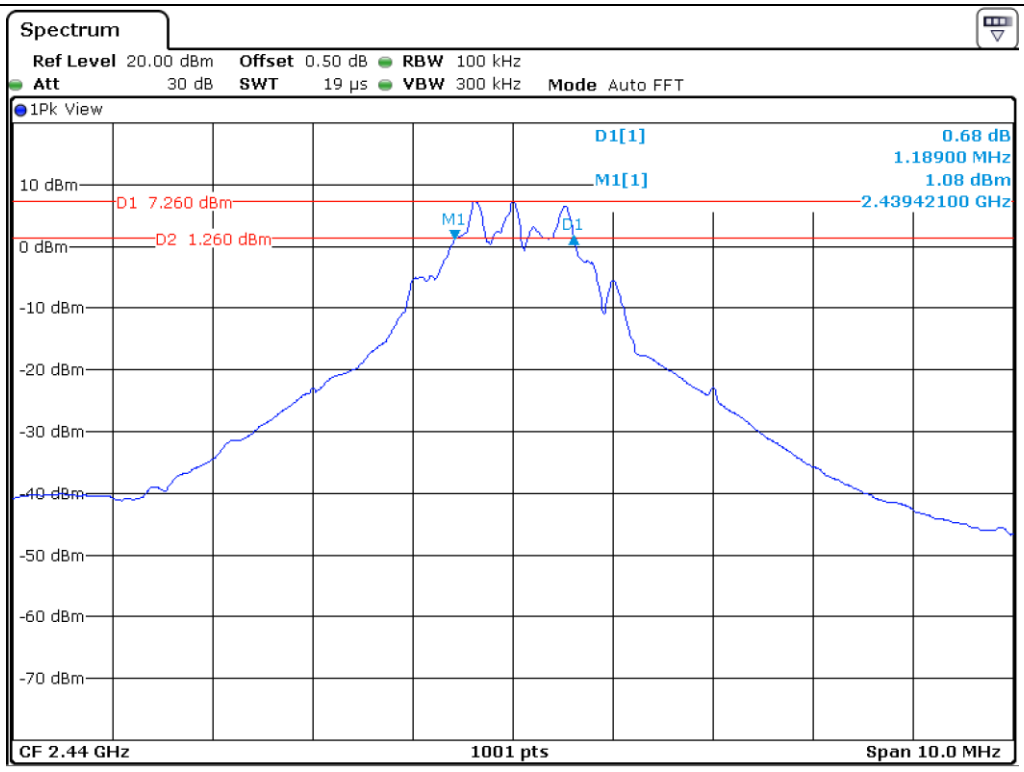
-. Test Result : Pass

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (kHz)	LIMIT (kHz)	MARGIN (kHz)
Low	2 402.00	1 159.00	500.00	659.00
Middle	2 440.00	1 189.00	500.00	689.00
High	2 480.00	1 279.00	500.00	779.00

Remark. Margin = Measured Value – Limit



Low Channel



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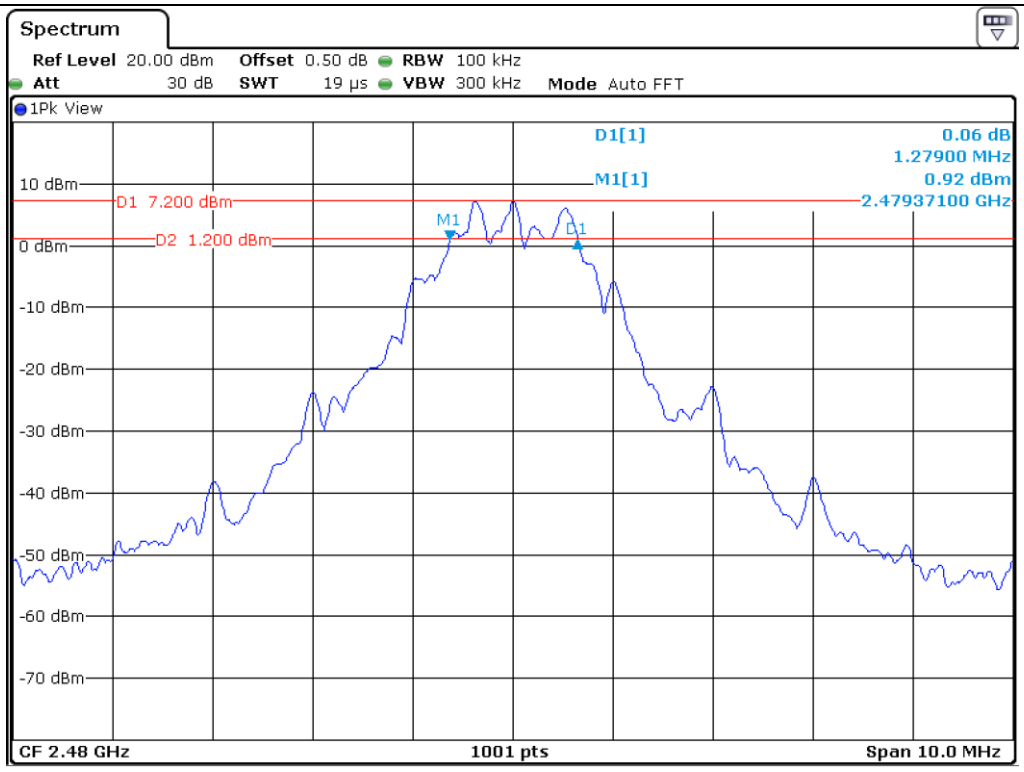

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8. MAXIMUM PEAK OUTPUT POWER

8.1 Operating environment

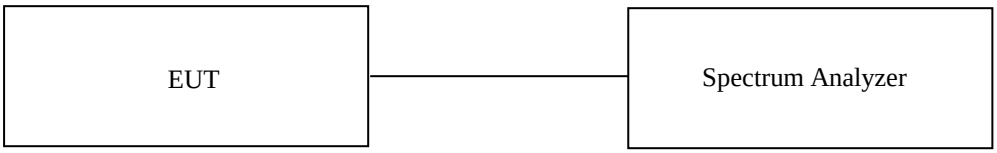
Temperature : 23 °C

Relative humidity : 45 % R.H.

8.2 Test set-up

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

The resolution bandwidth is set to ≥ DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.



8.3 Test Date

August 20, 2021 ~ August 26, 2021

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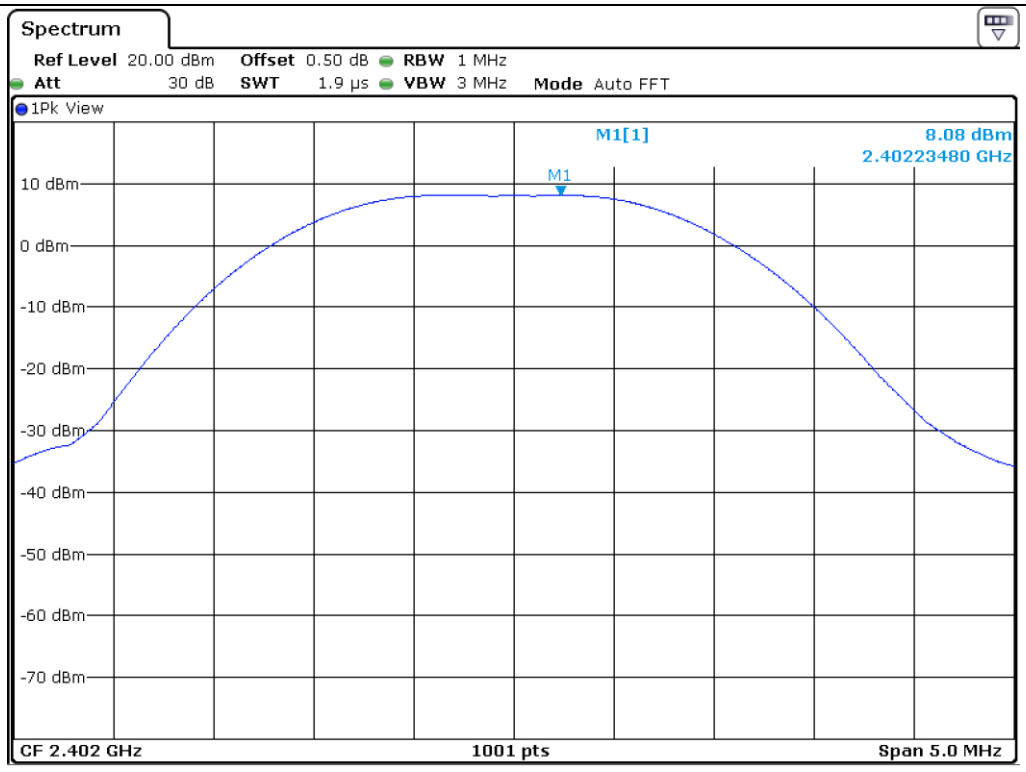
8.4 Test data for Coded_125 kbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	8.08	30.00	21.92
MIDDLE	2 440.00	8.04	30.00	21.96
HIGH	2 480.00	7.95	30.00	22.05

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



Low Channel

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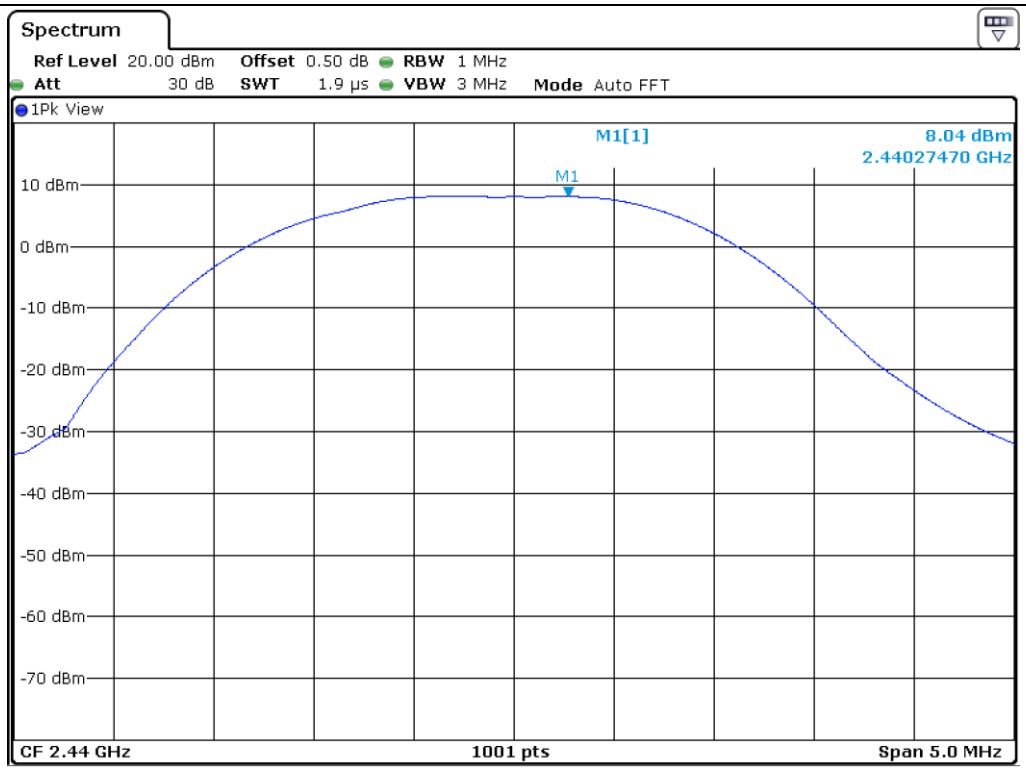
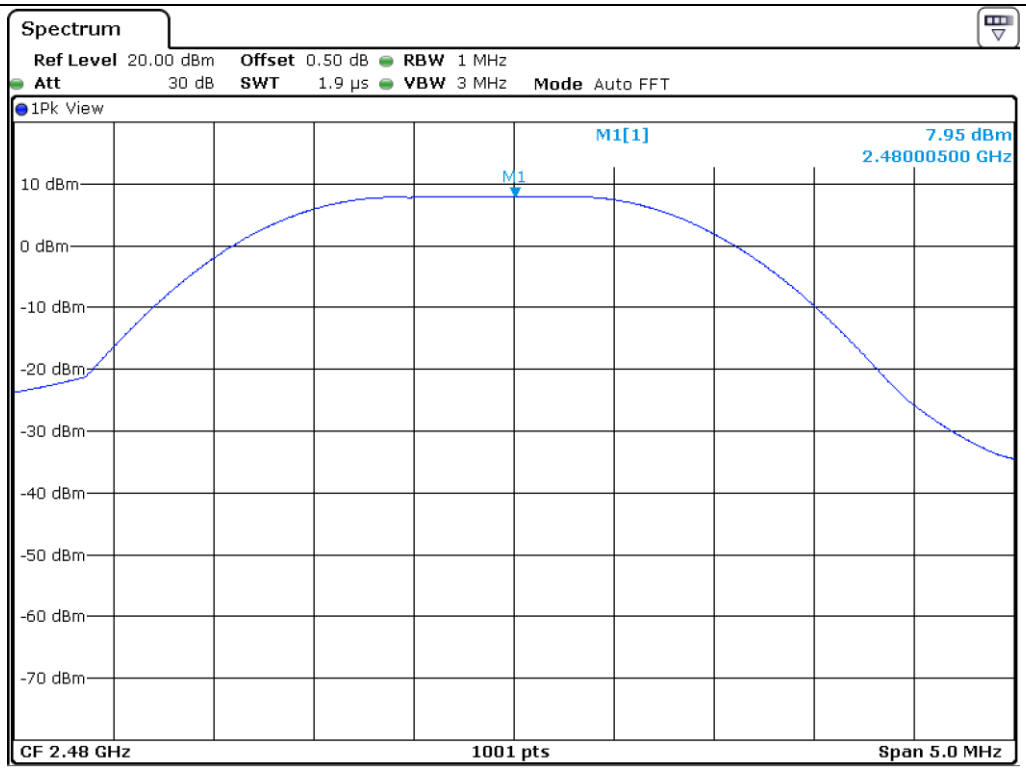


Middle Channel



High Channel

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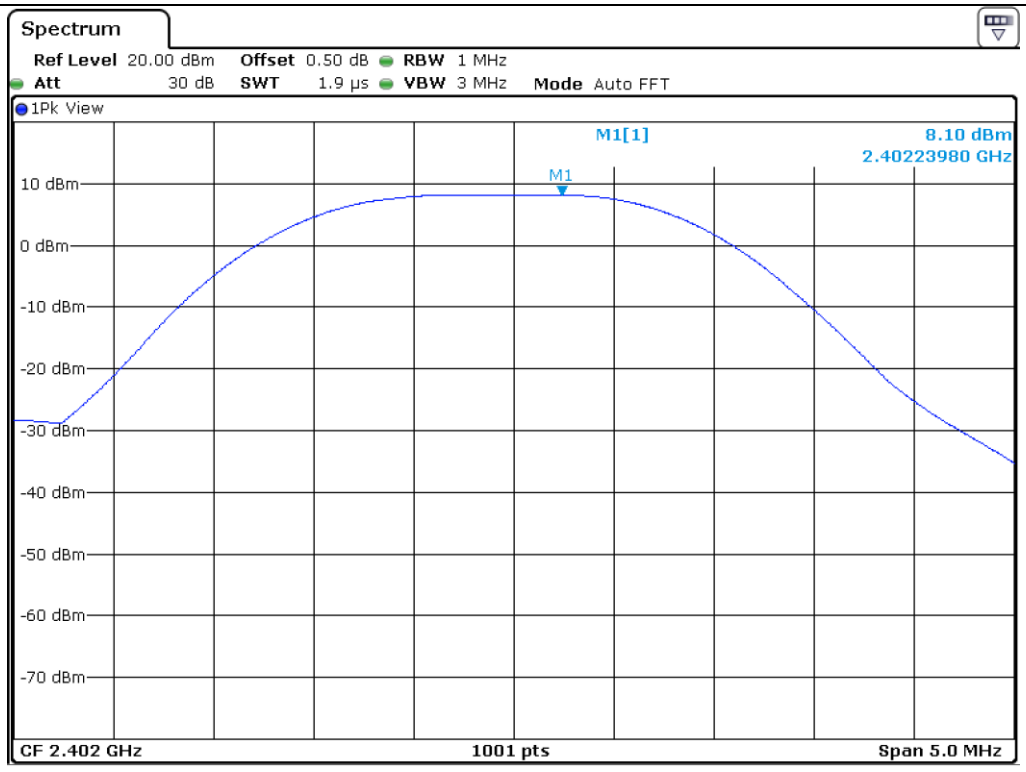
8.5 Test data for Coded_500 kbps

-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	8.10	30.00	21.90
MIDDLE	2 440.00	8.05	30.00	21.95
HIGH	2 480.00	7.97	30.00	22.03

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



Low Channel

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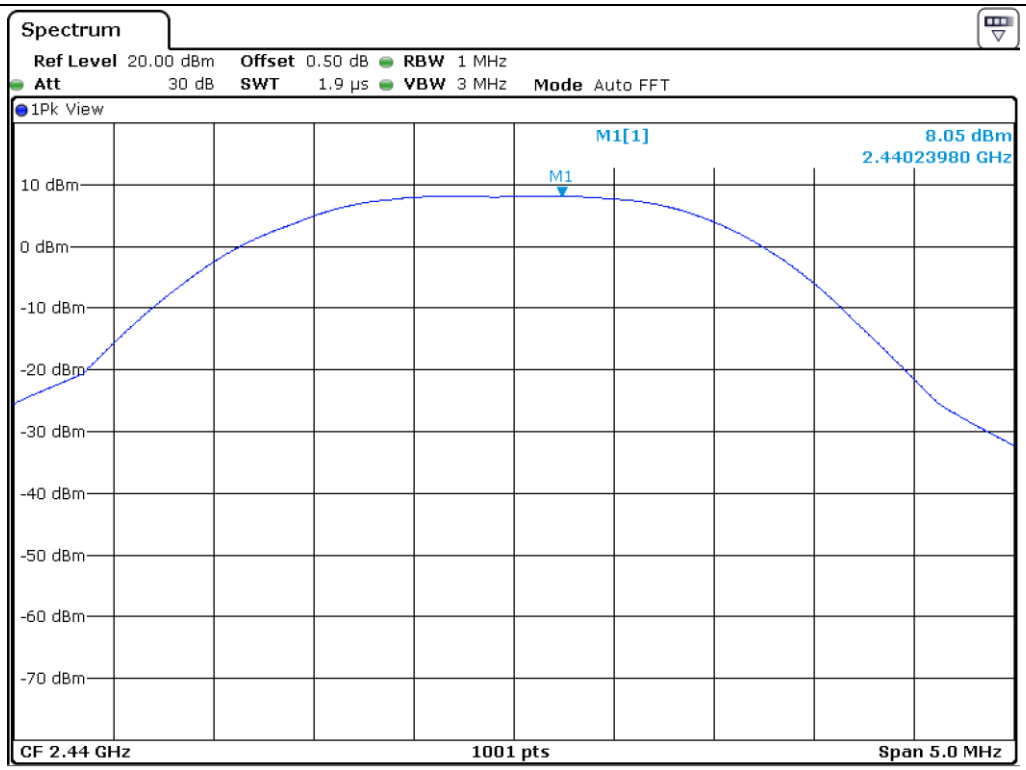
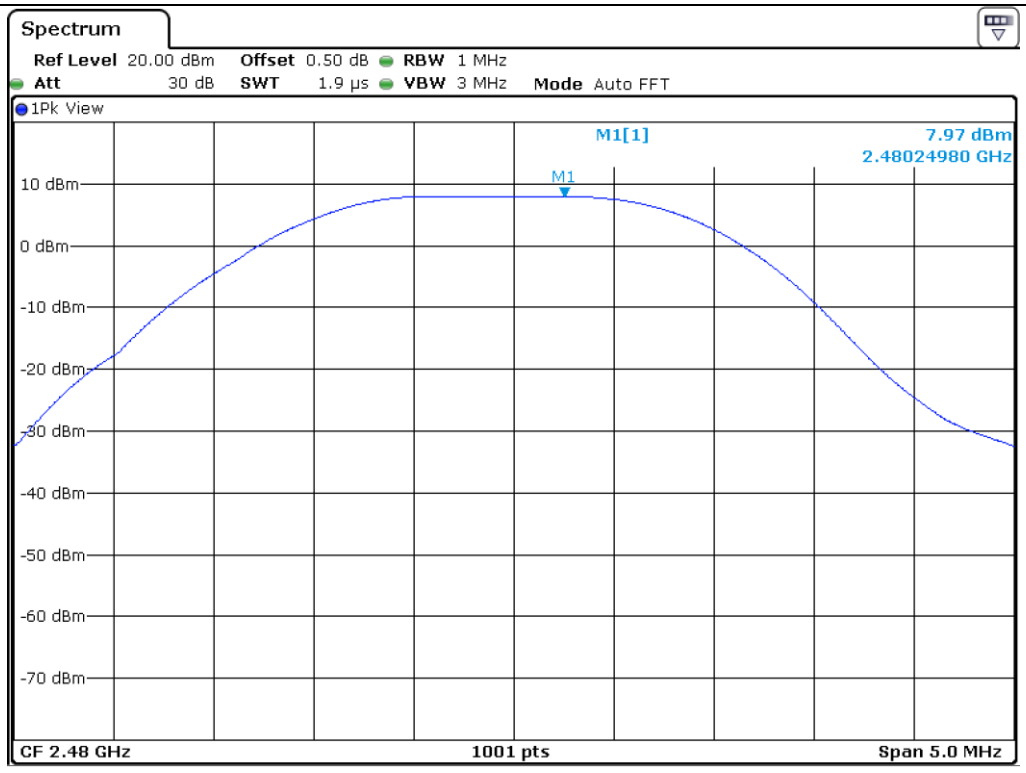


Middle Channel



High Channel

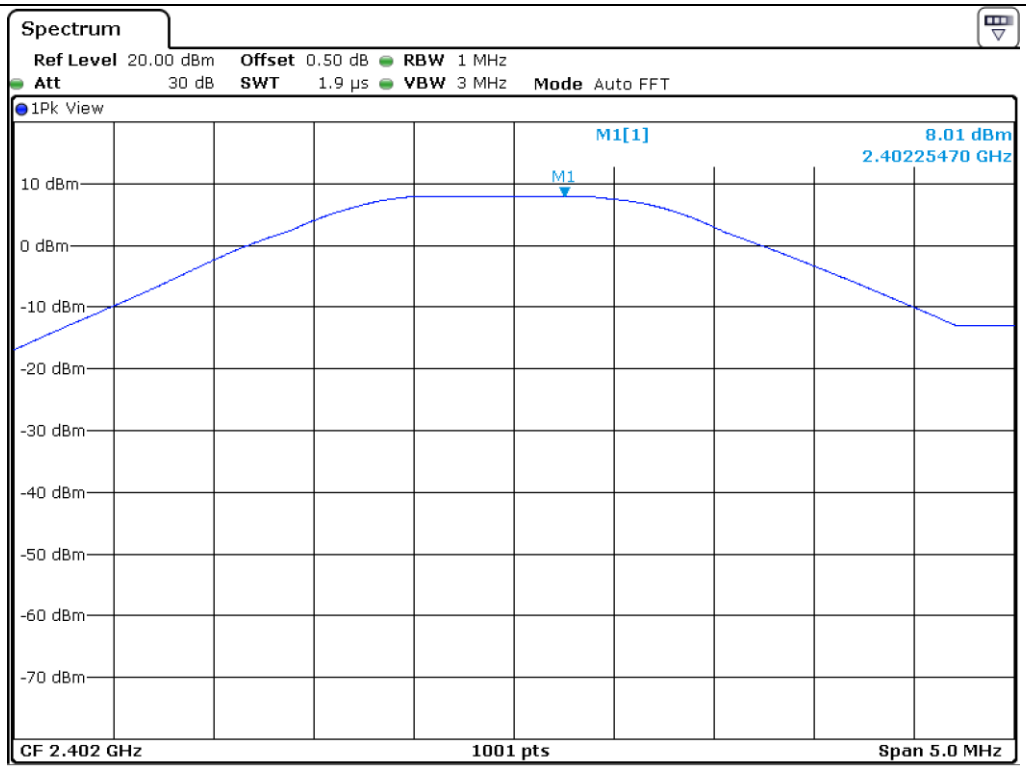
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

8.6 Test data for 1 Mbps

-. Test Result : Pass

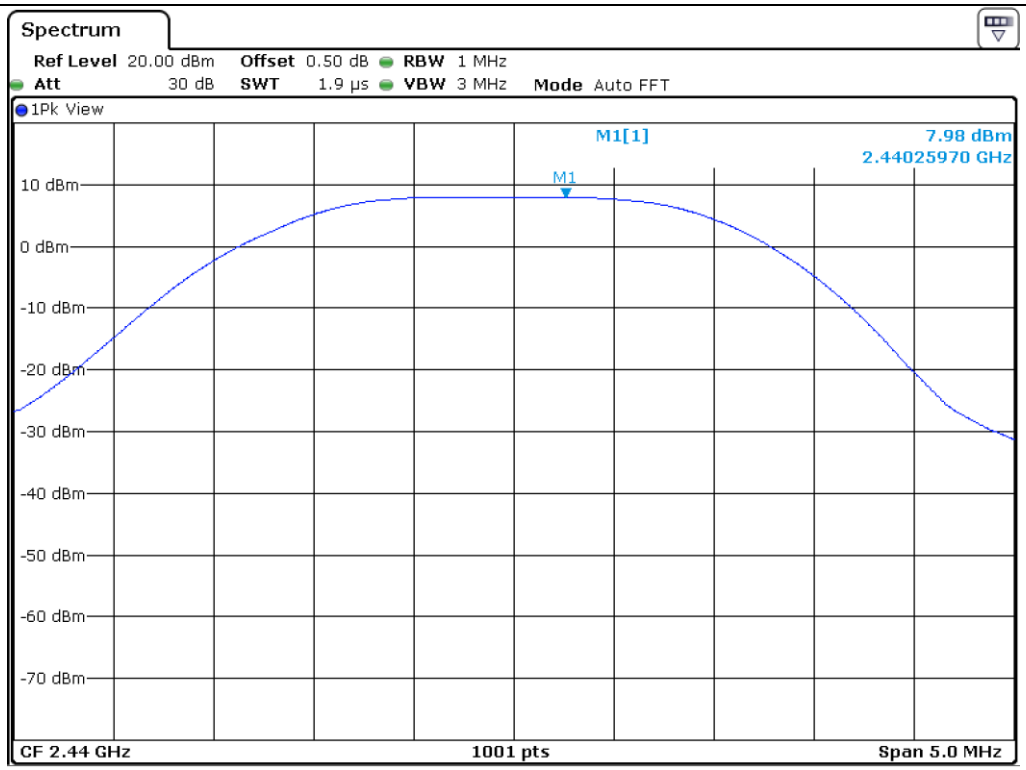
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	8.01	30.00	21.99
MIDDLE	2 440.00	7.98	30.00	22.02
HIGH	2 480.00	7.91	30.00	22.09

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

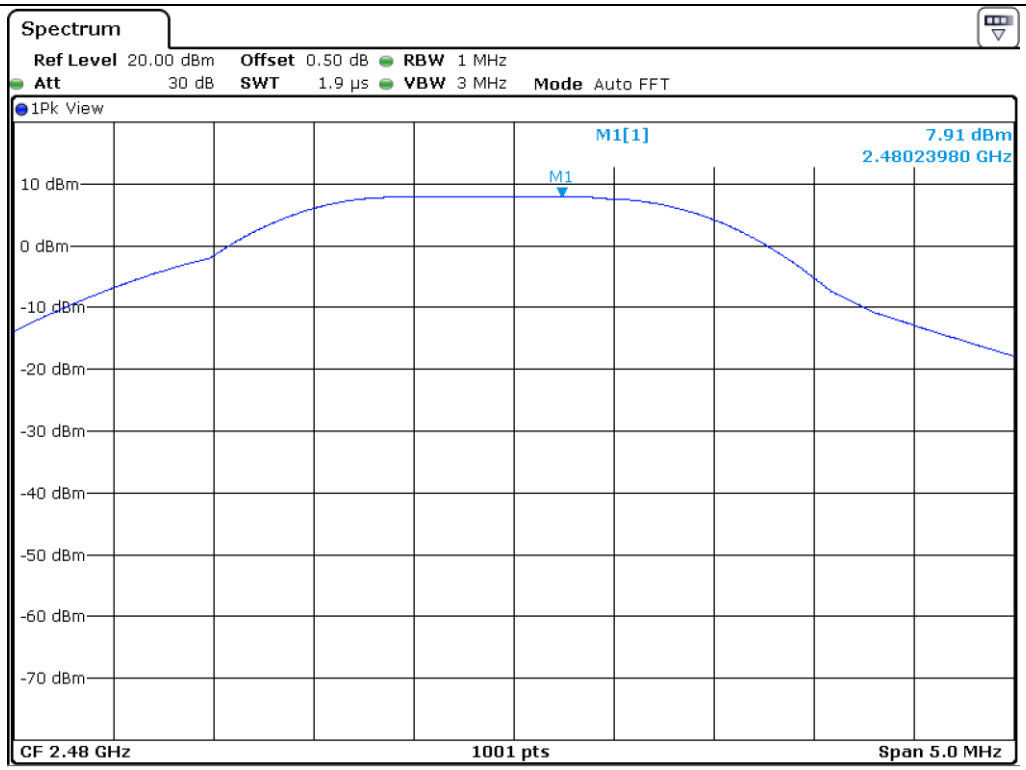


Low Channel

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

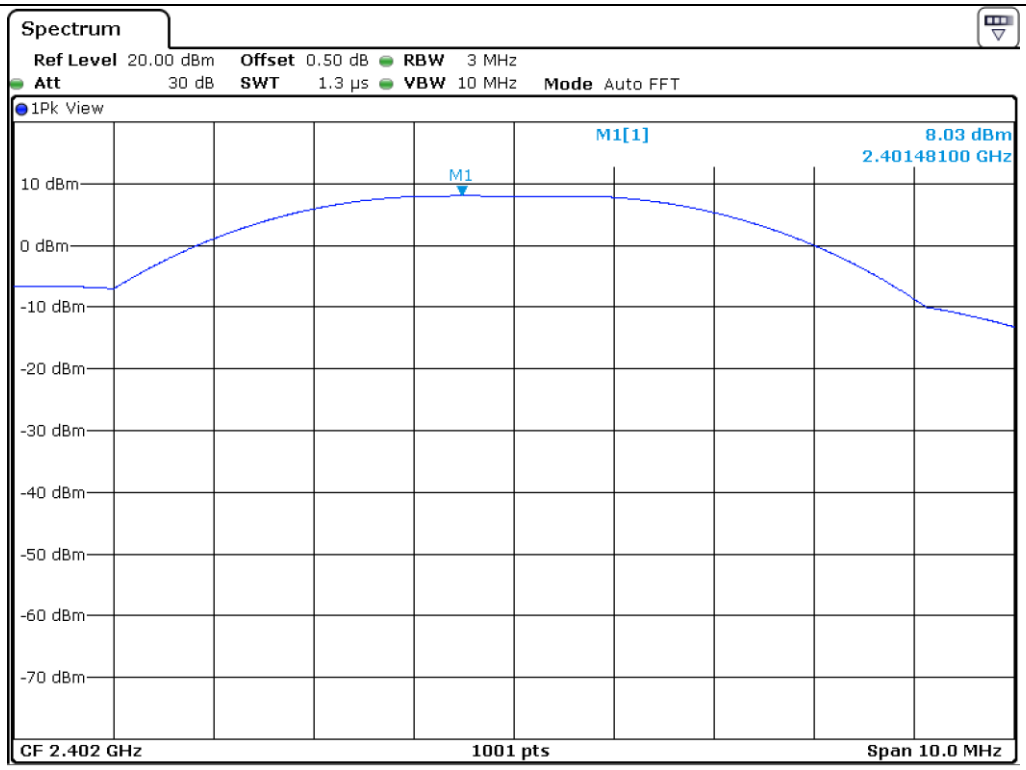
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

8.7 Test data for 2 Mbps

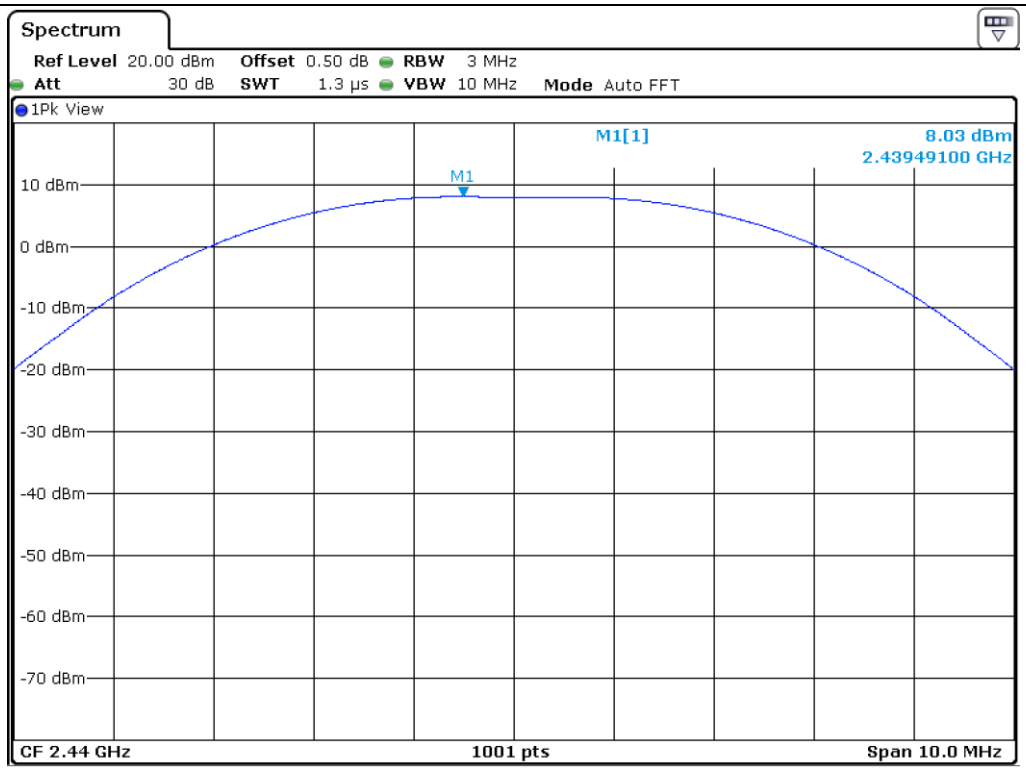
-. Test Result : Pass

CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	8.03	30.00	21.97
MIDDLE	2 440.00	8.03	30.00	21.97
HIGH	2 480.00	7.97	30.00	22.03

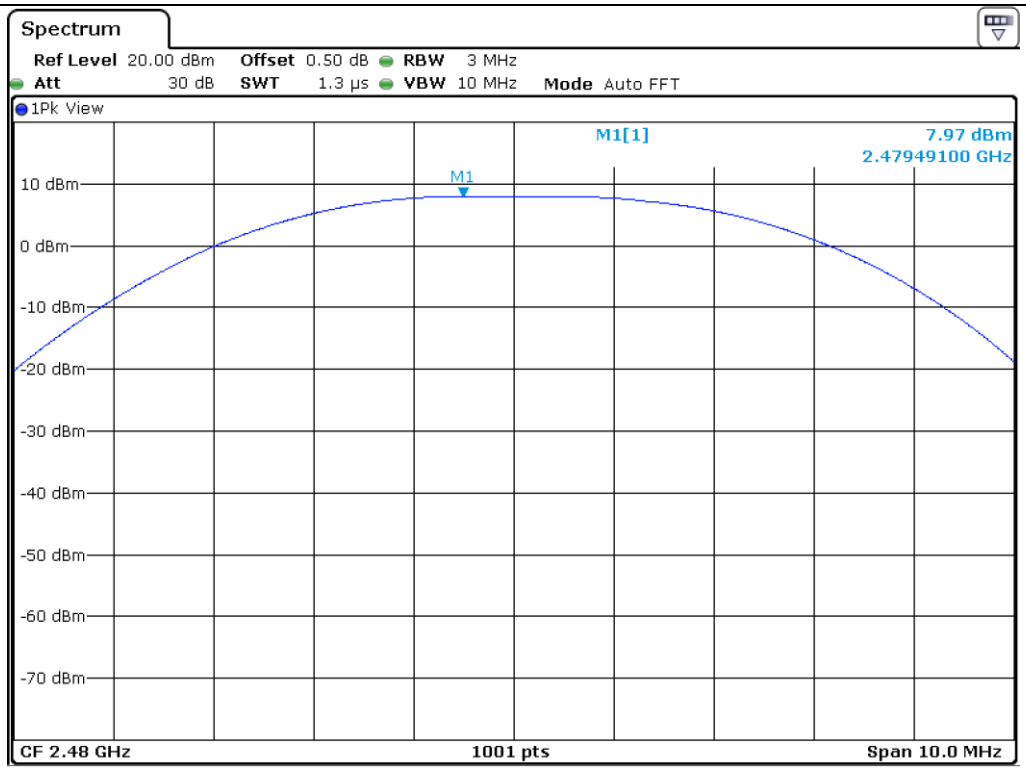
Remark. Margin = Limit – Measured Value (=Receiver Reading + Cable Loss)



Low Channel



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)

9. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

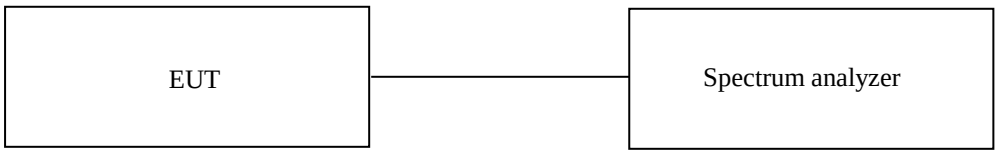
9.1 Operating environment

Temperature : 23 °C

Relative humidity : 45 % R.H.

9.2 Test set-up for conducted measurement

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, the video bandwidth is set to 3 times the resolution bandwidth and peak detection was used.



9.3 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.

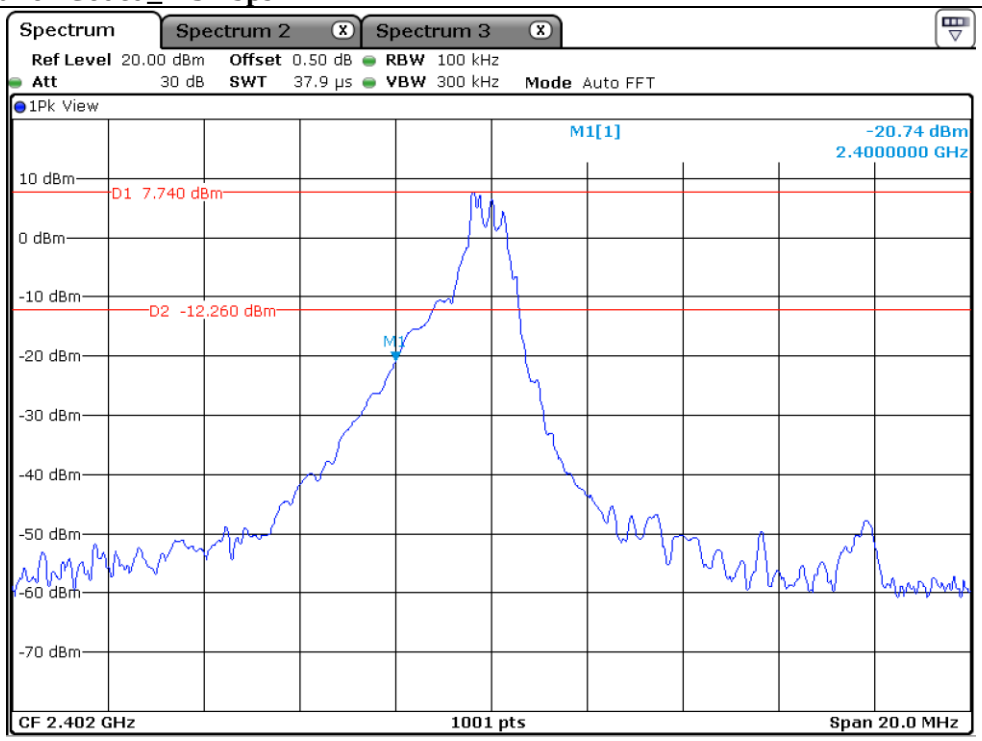
9.4 Test Date

August 20, 2021 ~ August 26, 2021

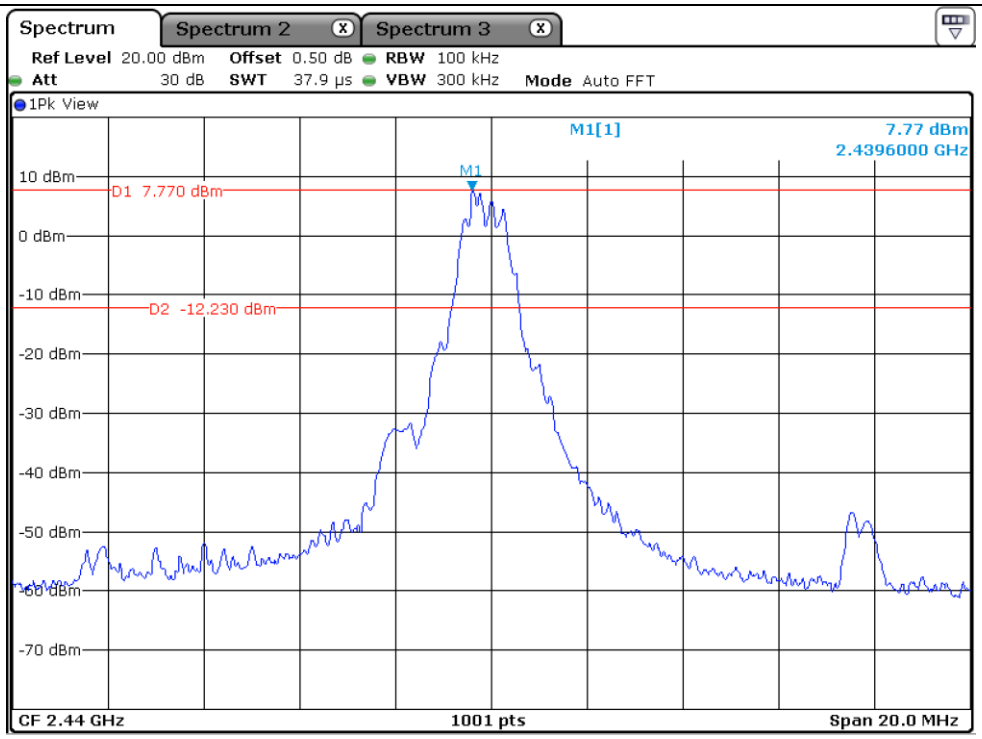
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

9.5 Test data for conducted emission

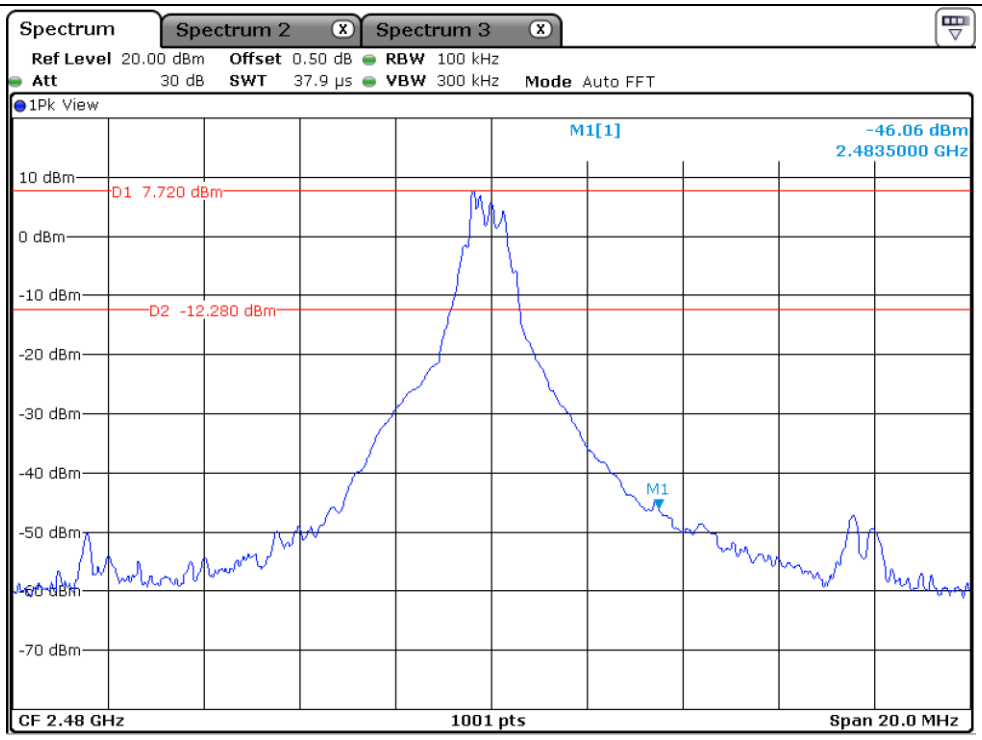
9.6.1 Test data for Coded_125 kbps



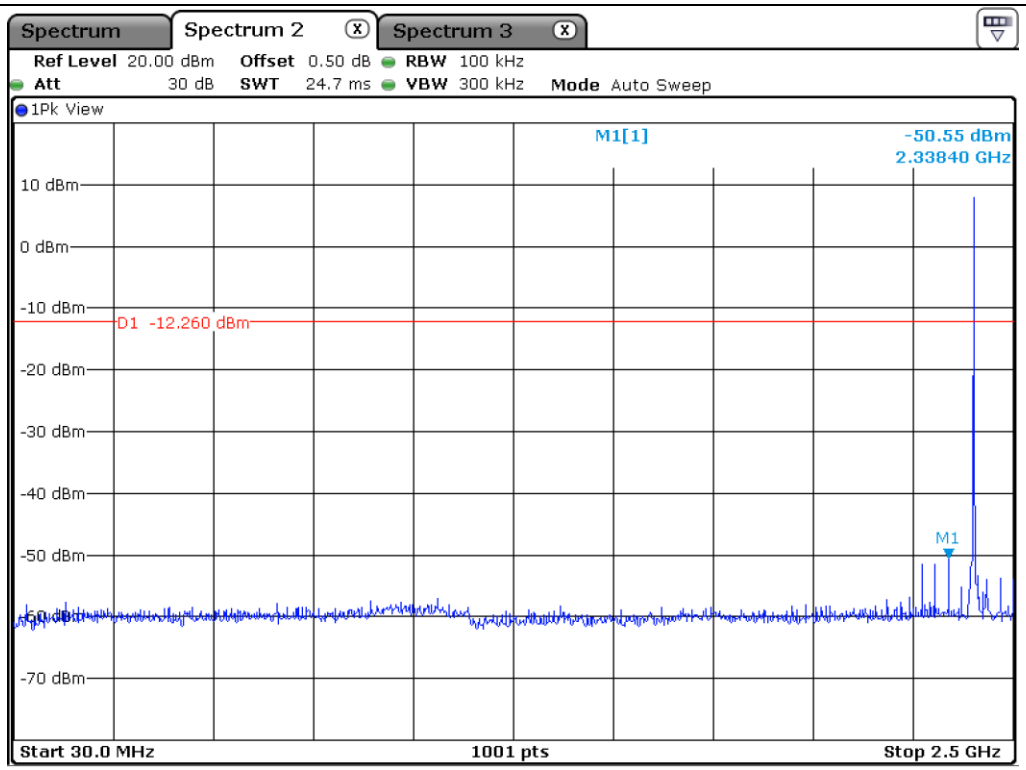
Low Channel



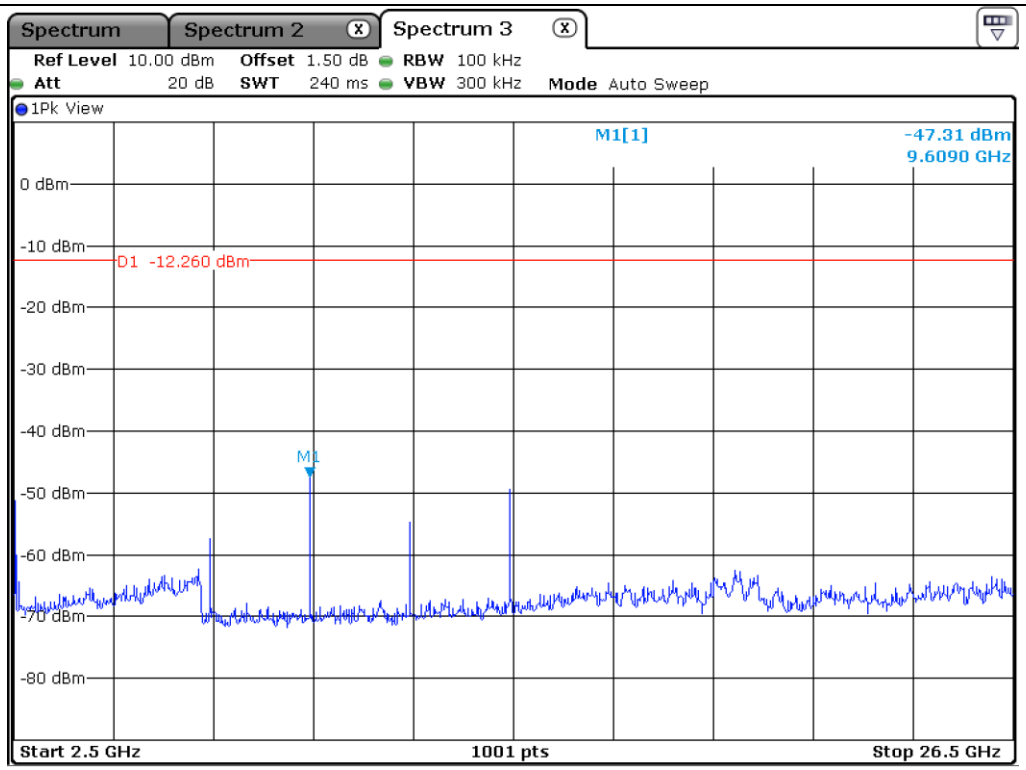
Middle Channel



High Channel

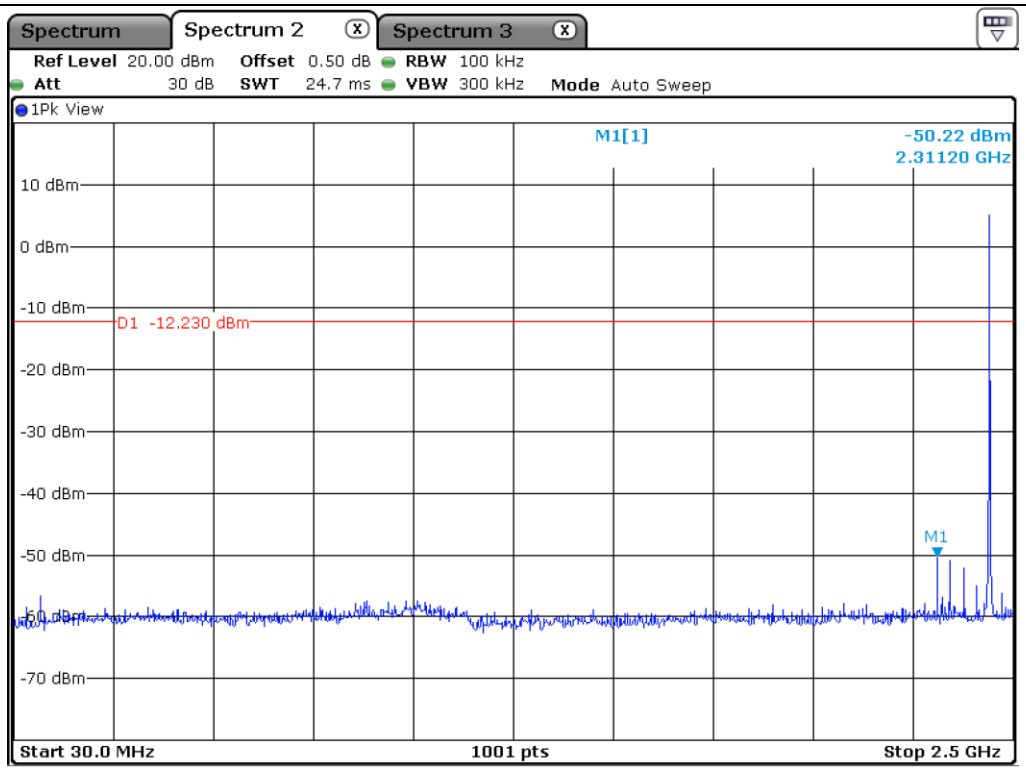


Low Channel

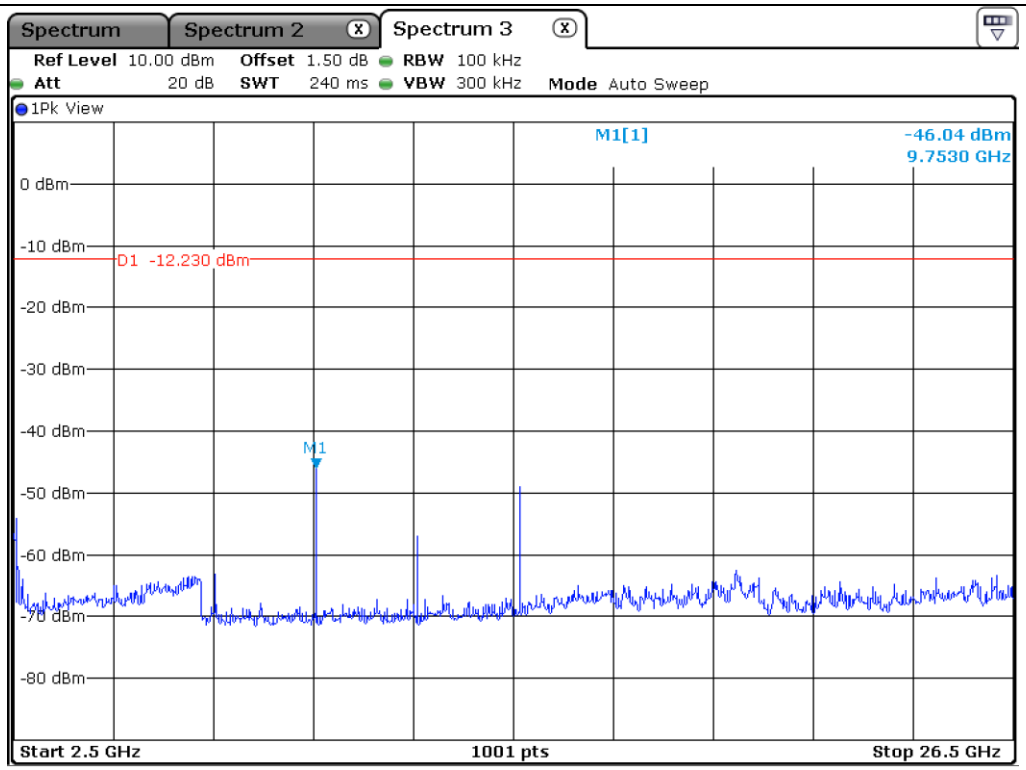


Low Channel

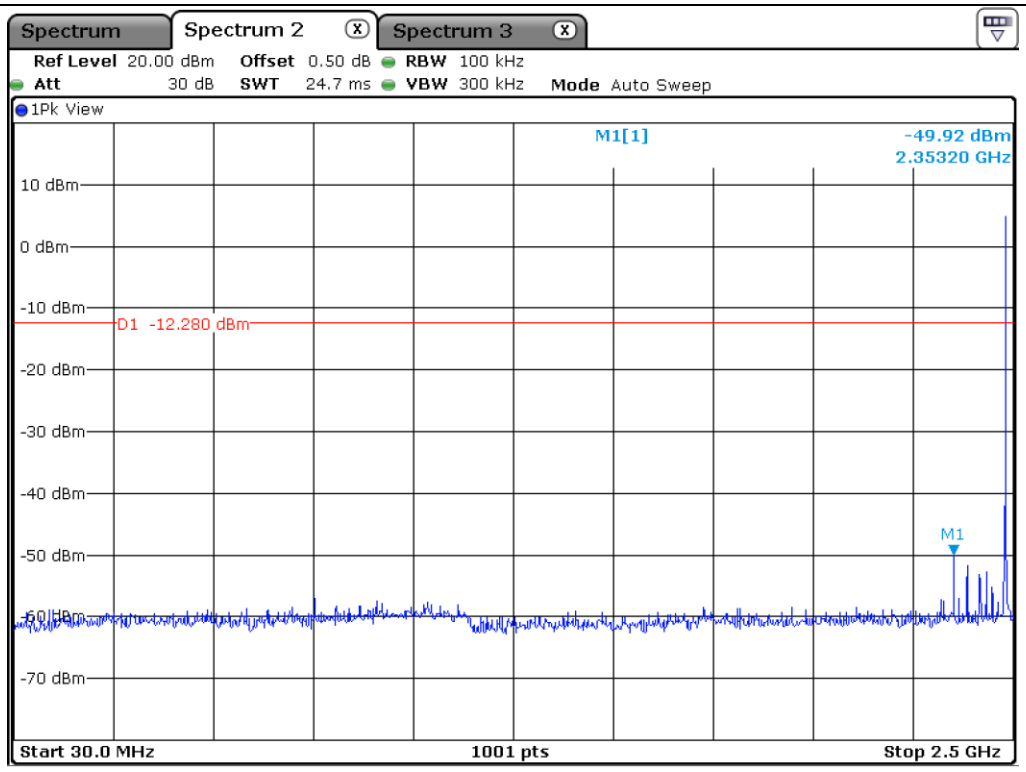
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



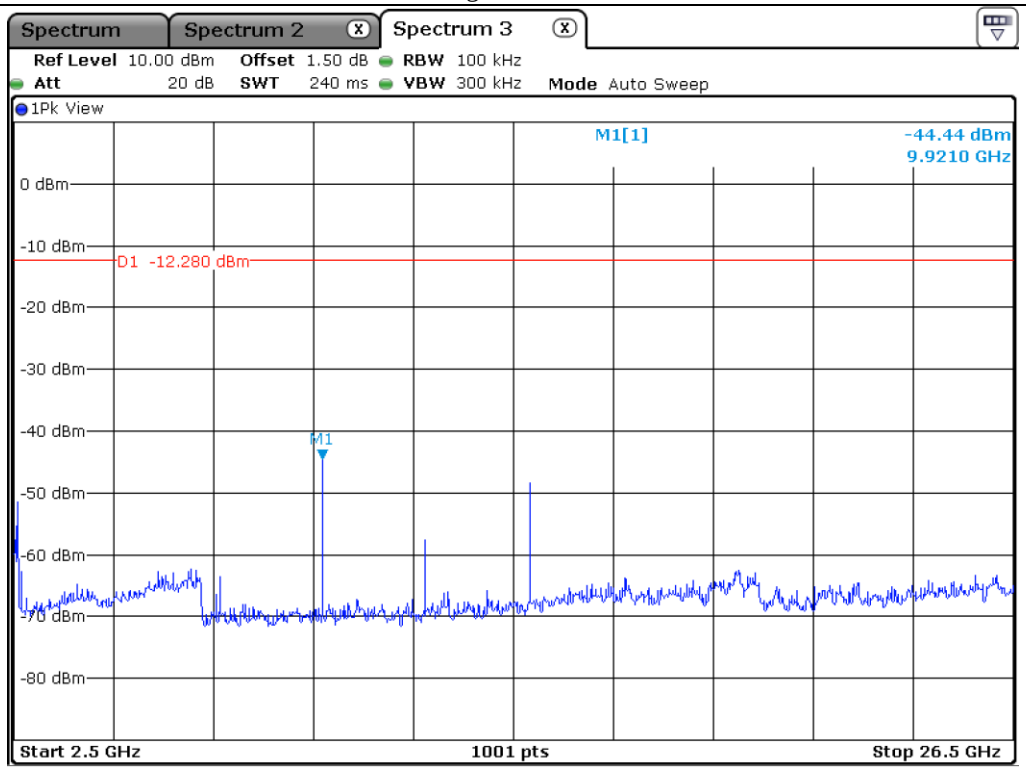
Middle Channel



Middle Channel



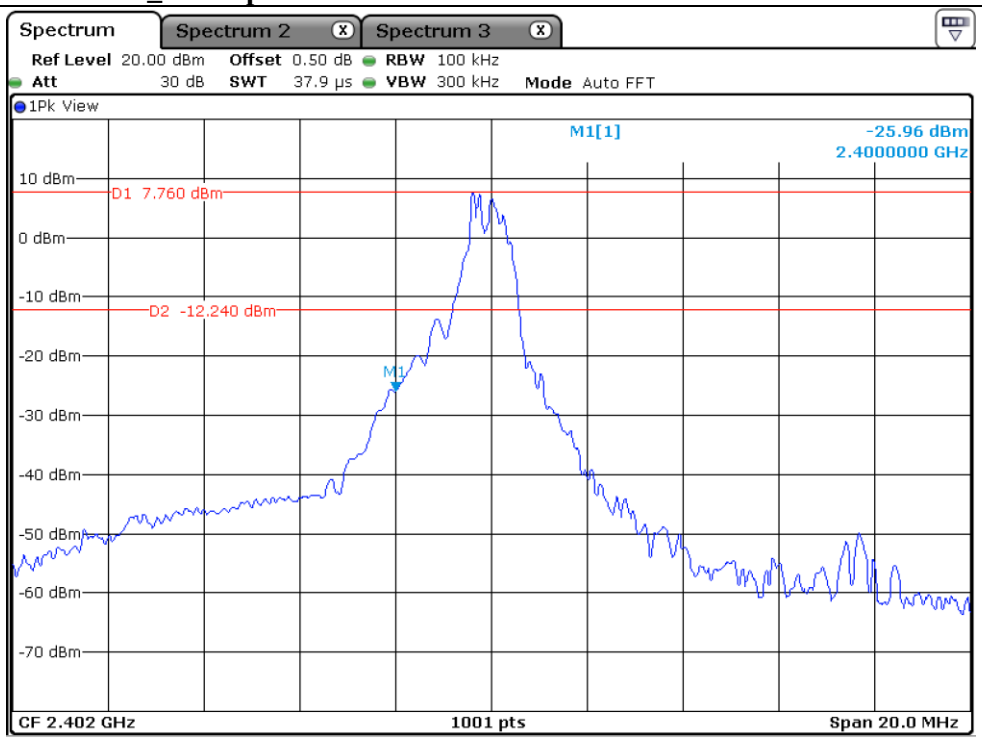
High Channel



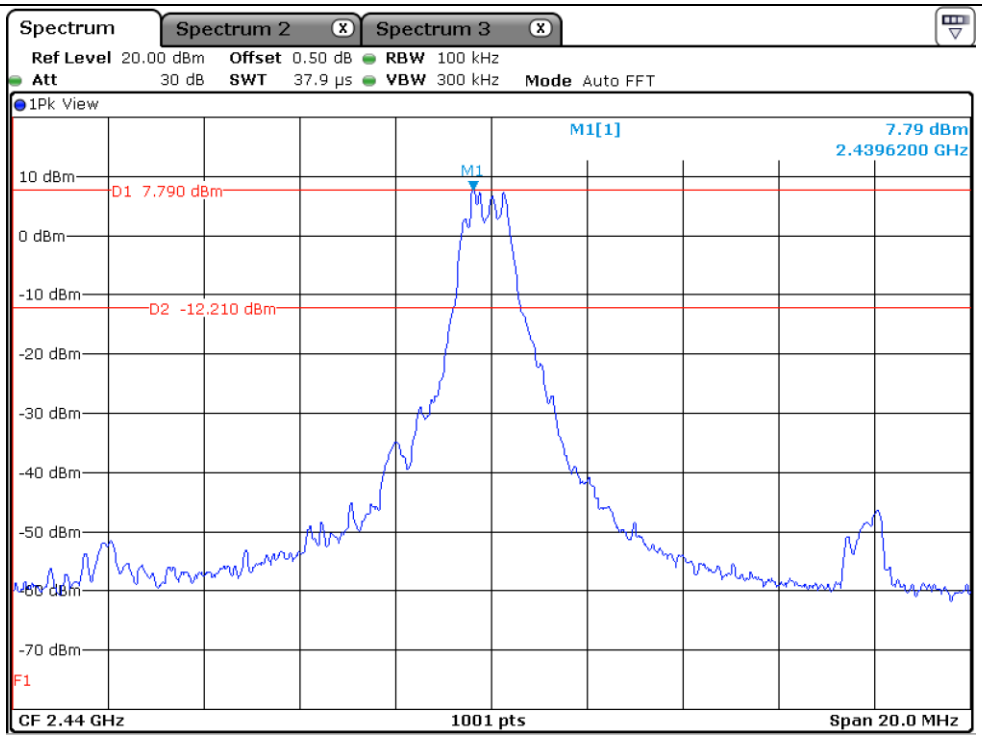
High Channel

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

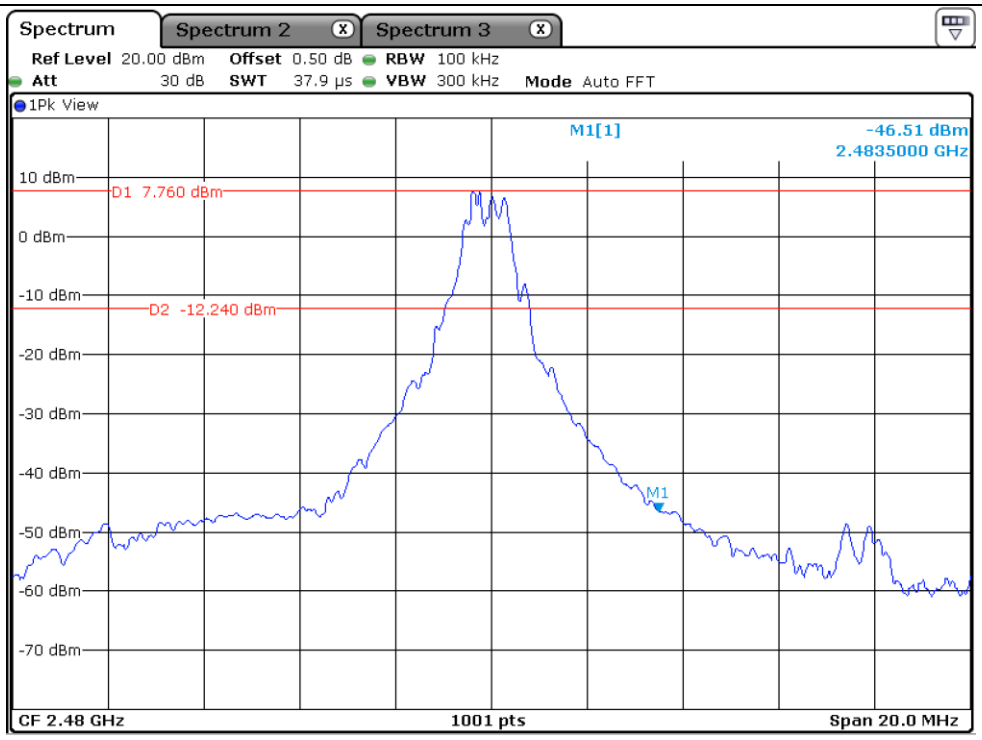
9.6.2 Test data for Coded_500 kbps



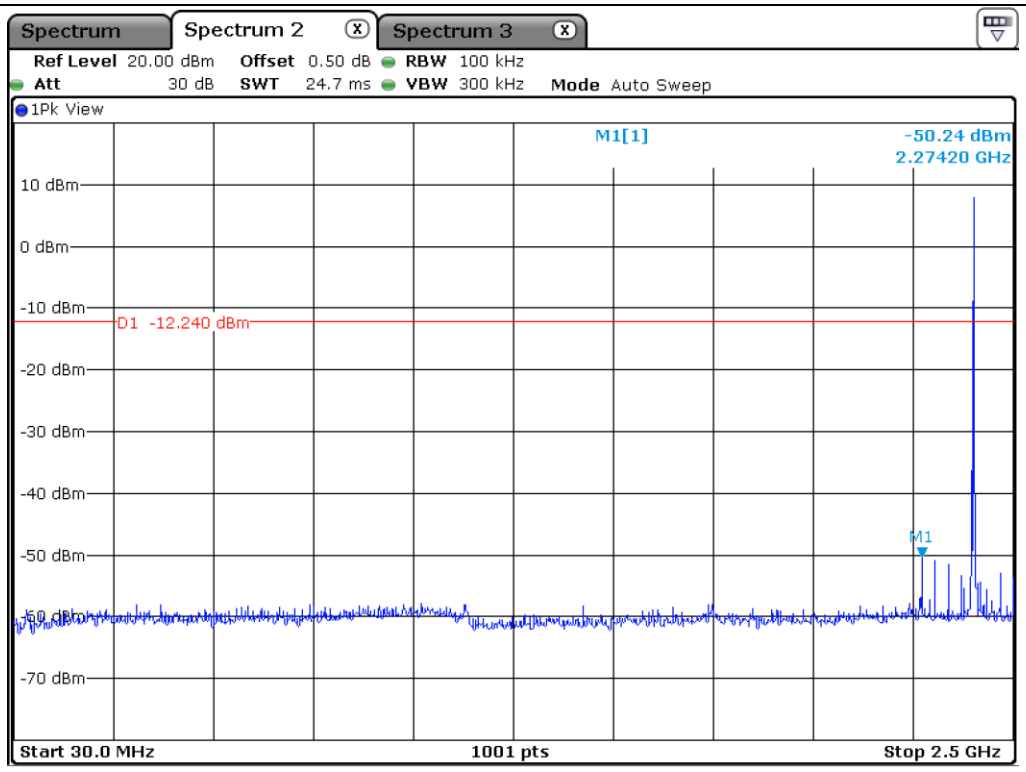
Low Channel



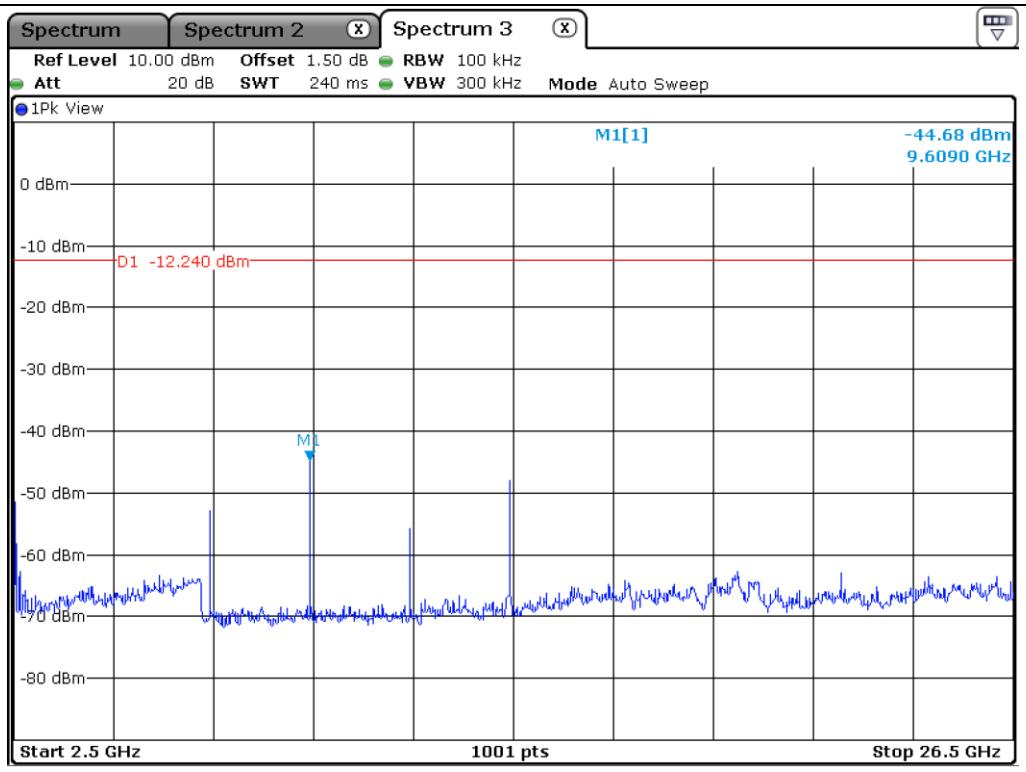
Middle Channel



High Channel

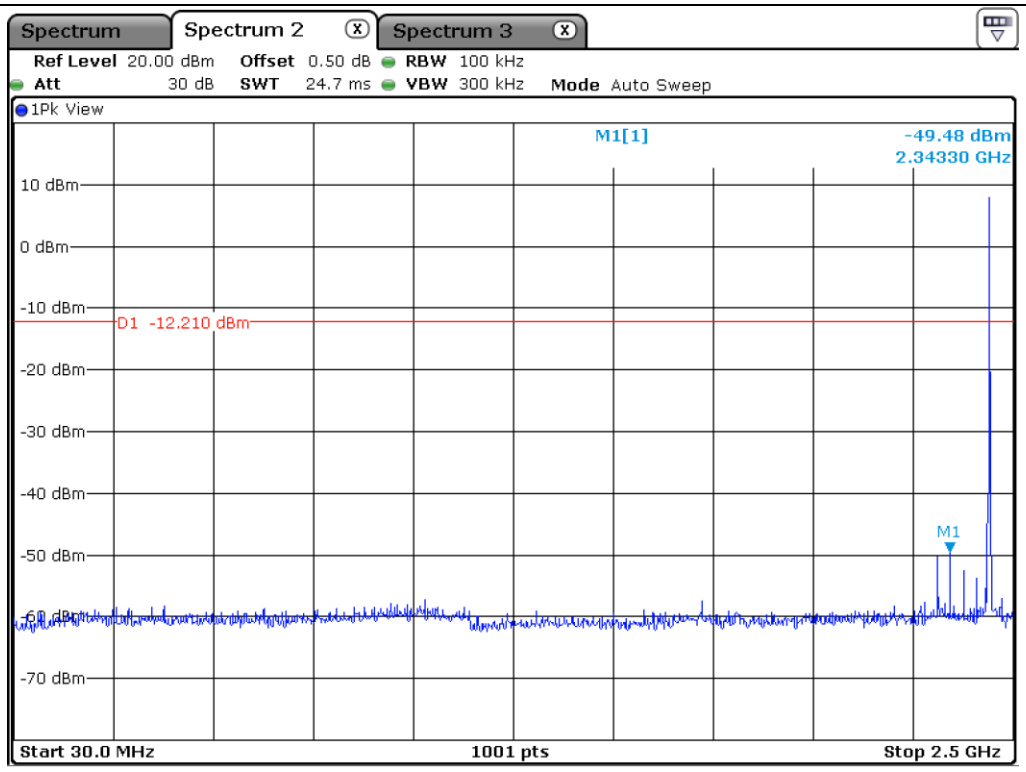


Low Channel

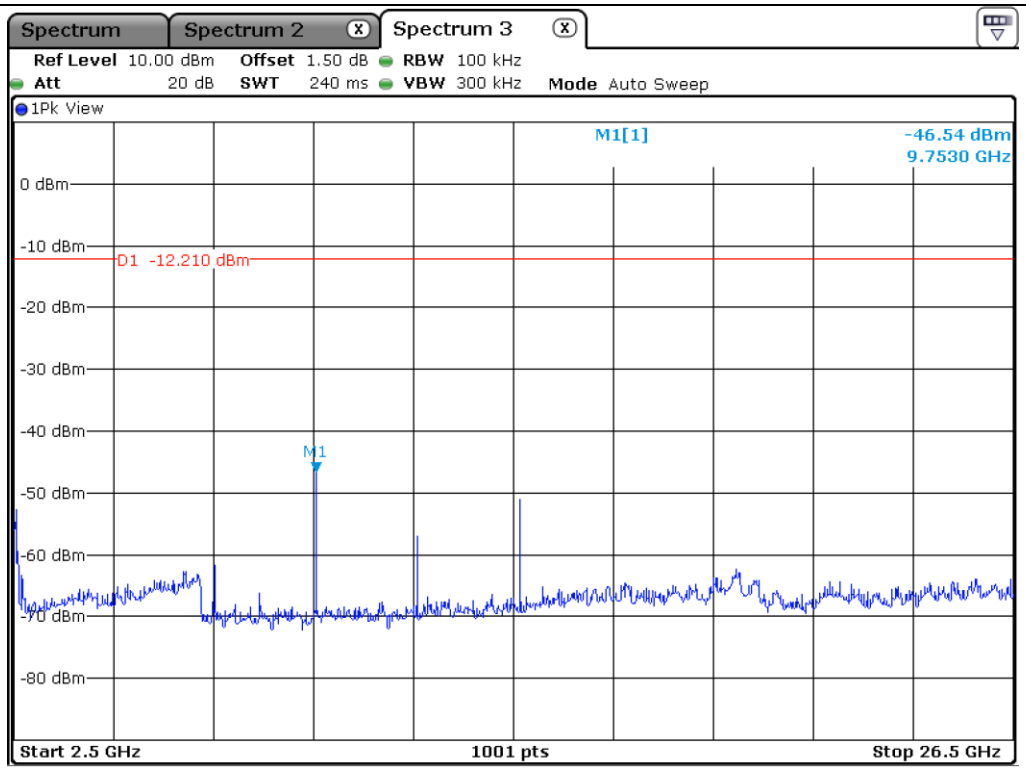


Low Channel

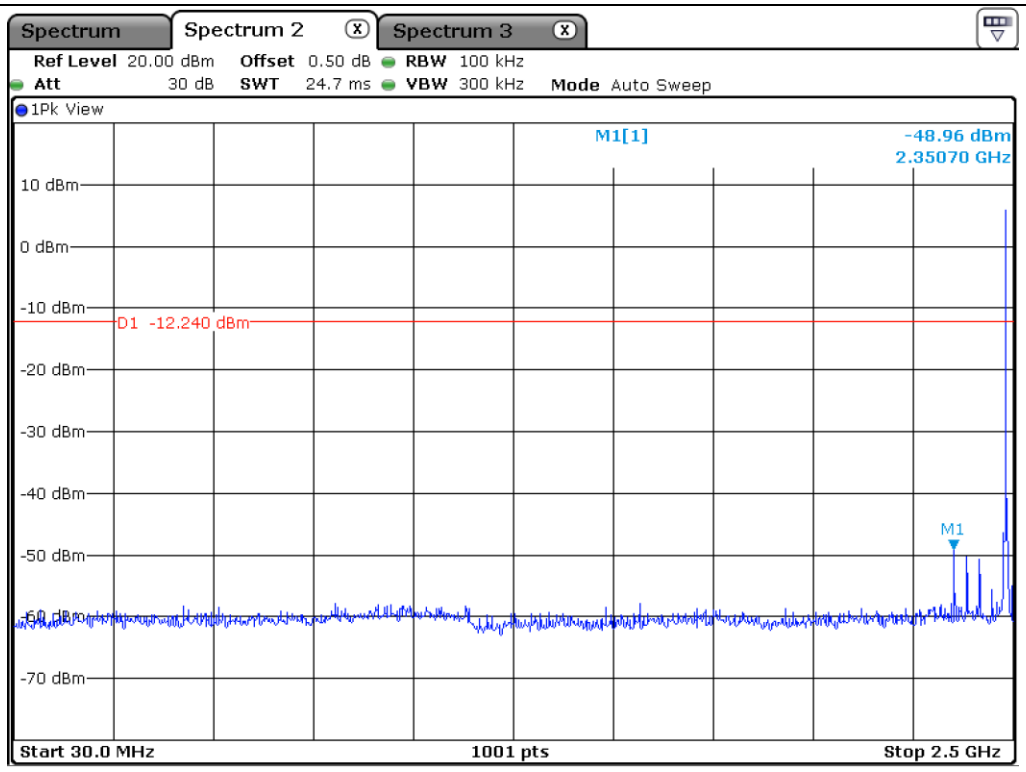
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)



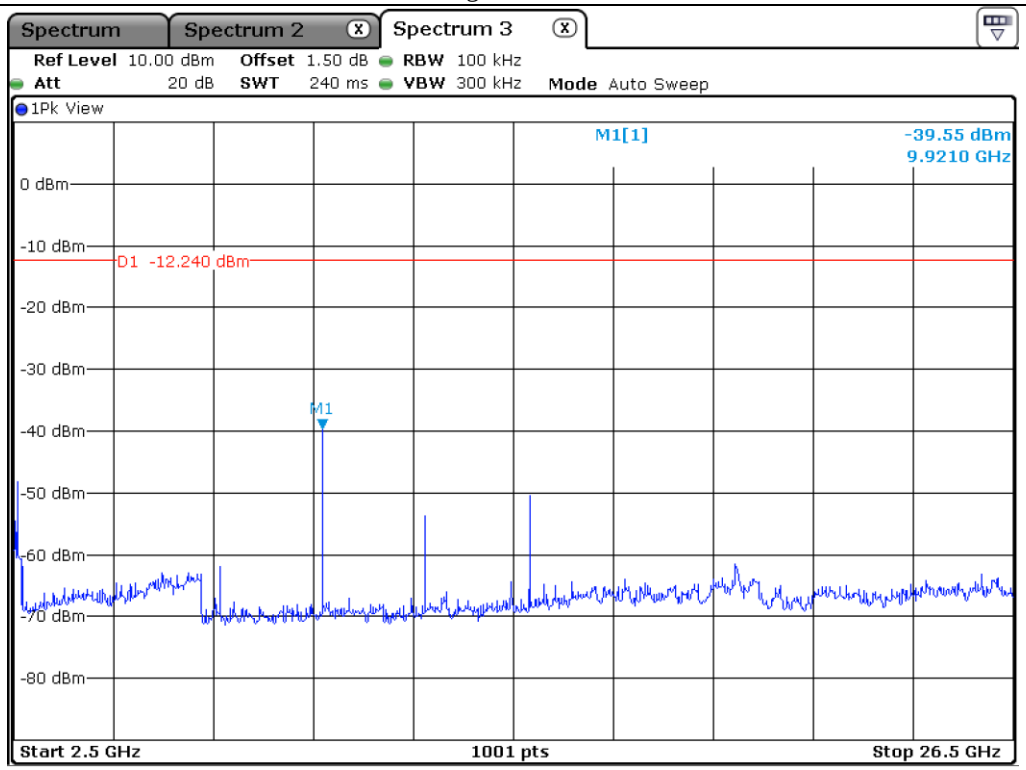
Middle Channel



Middle Channel



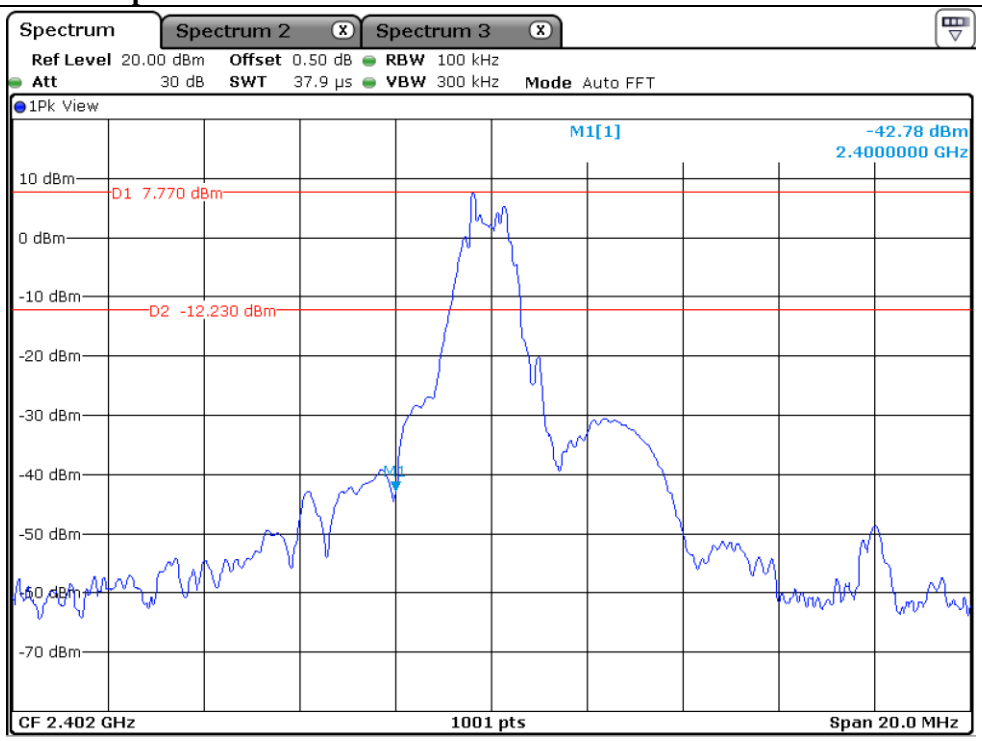
High Channel



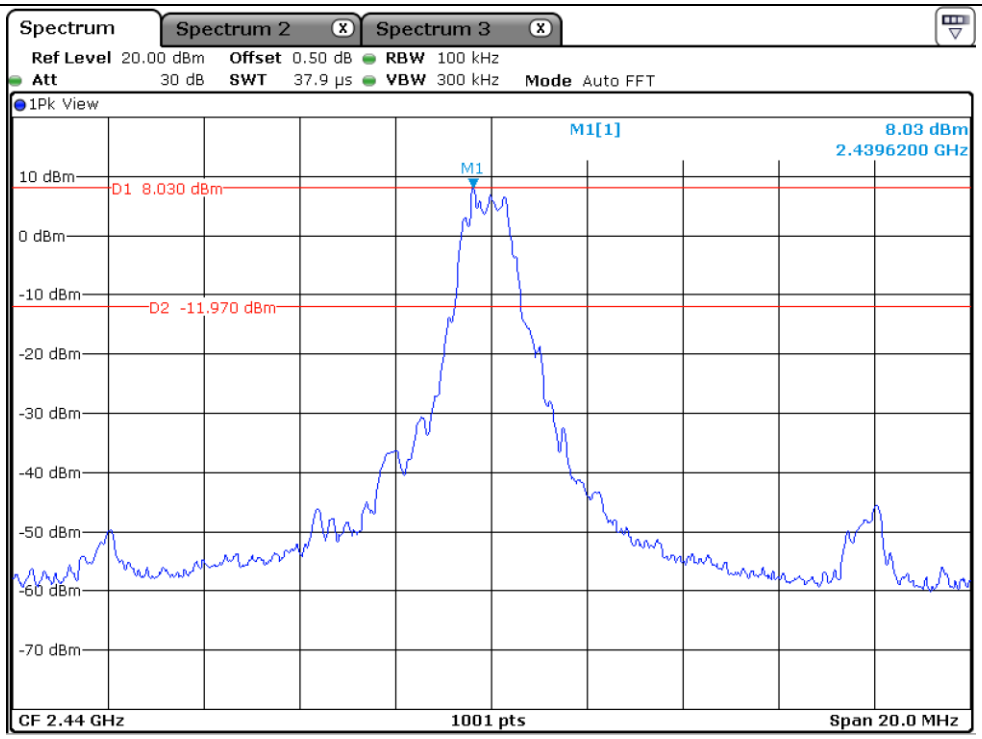
High Channel

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

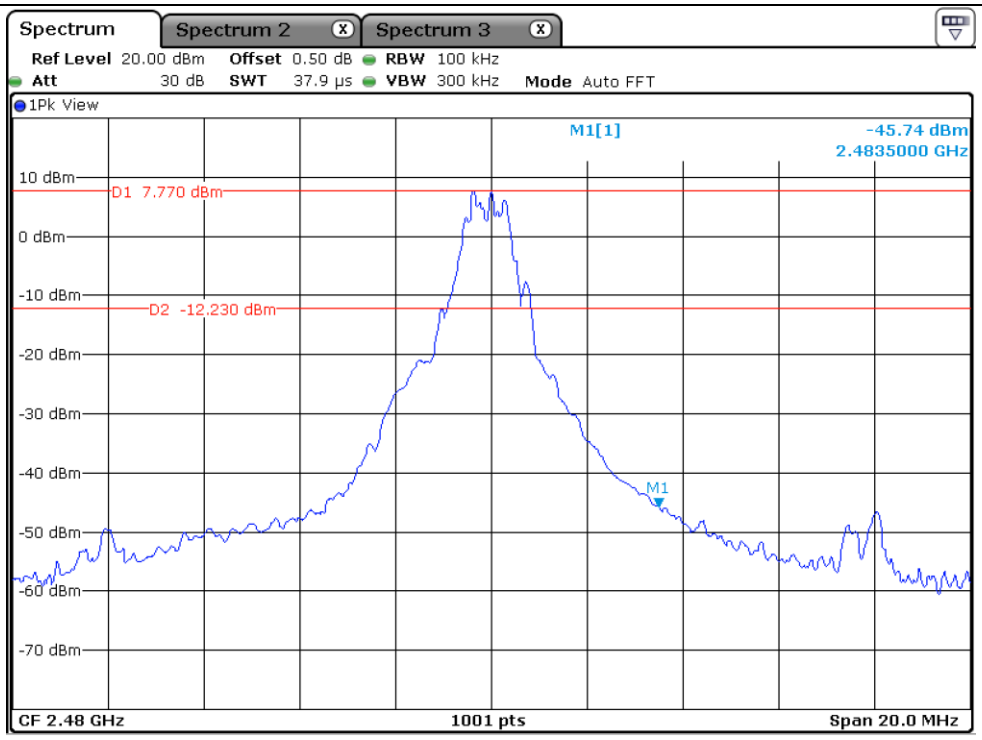
9.6.3 Test data for 1 Mbps



Low Channel

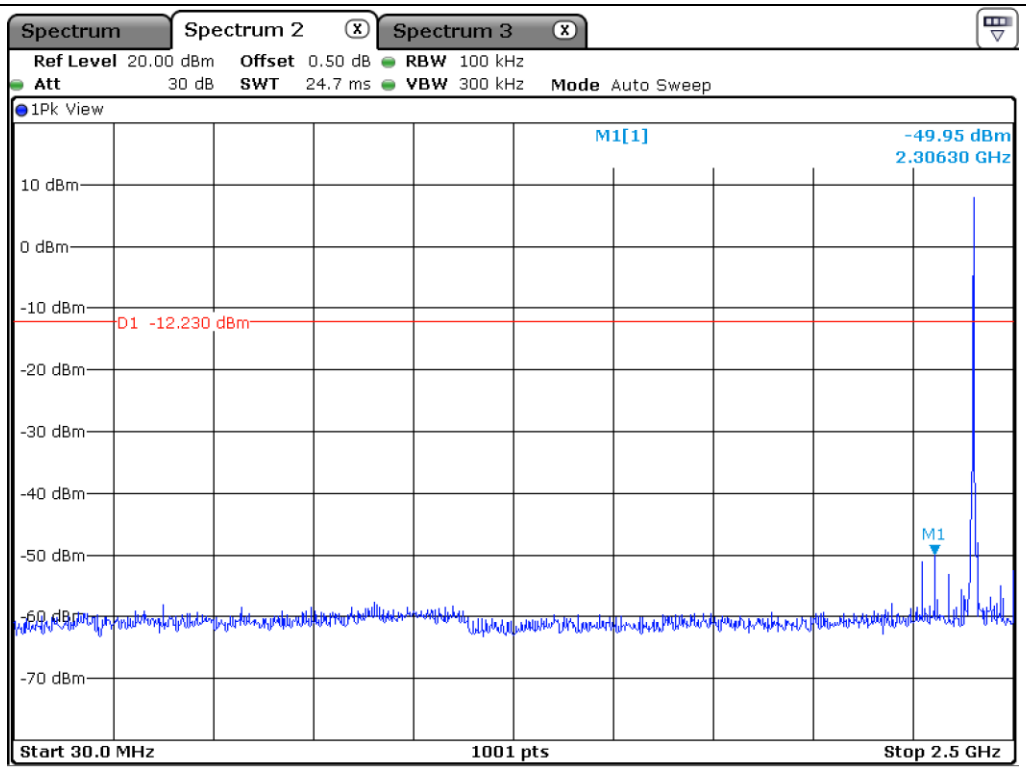


Middle Channel

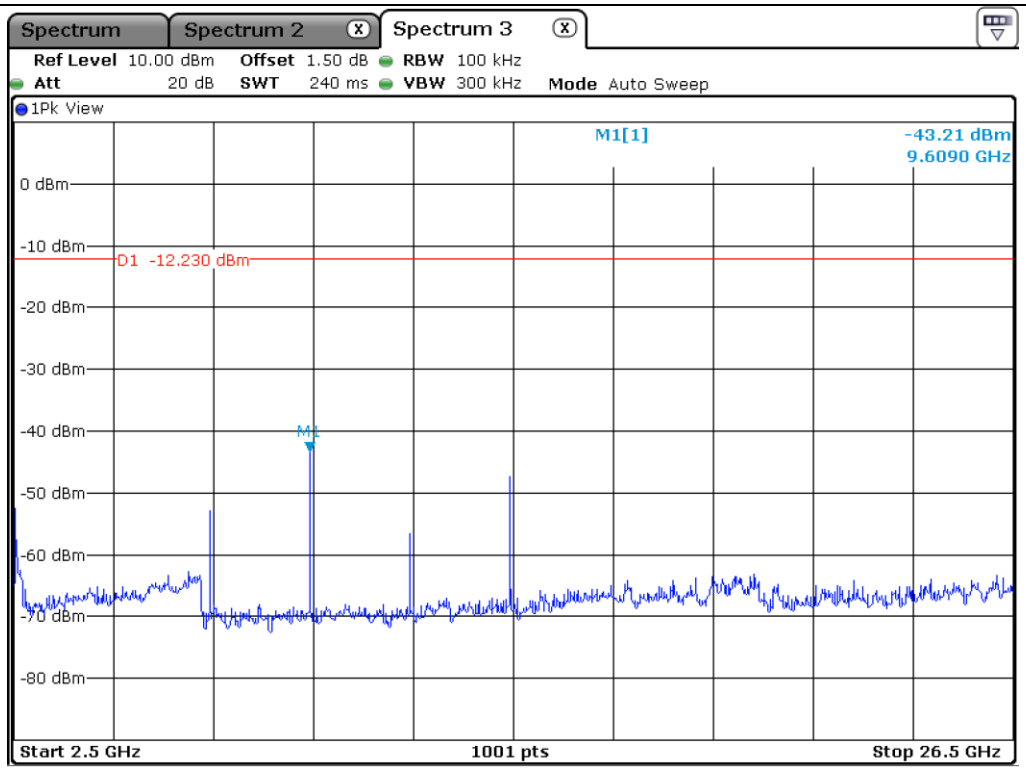


High Channel

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

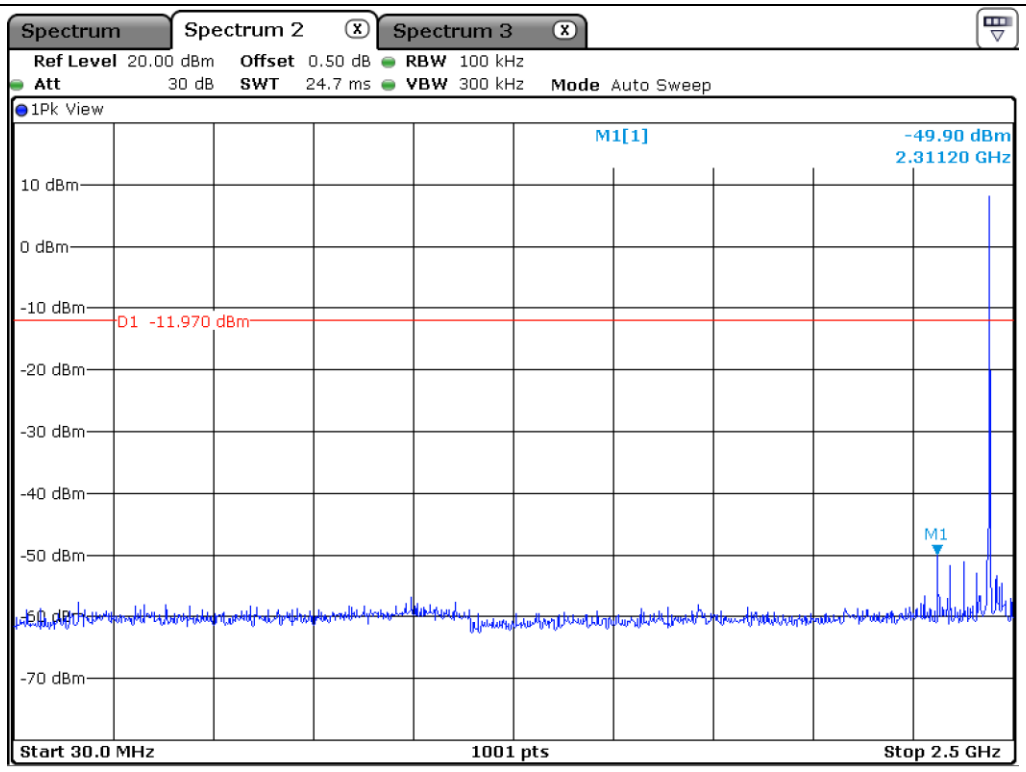


Low Channel

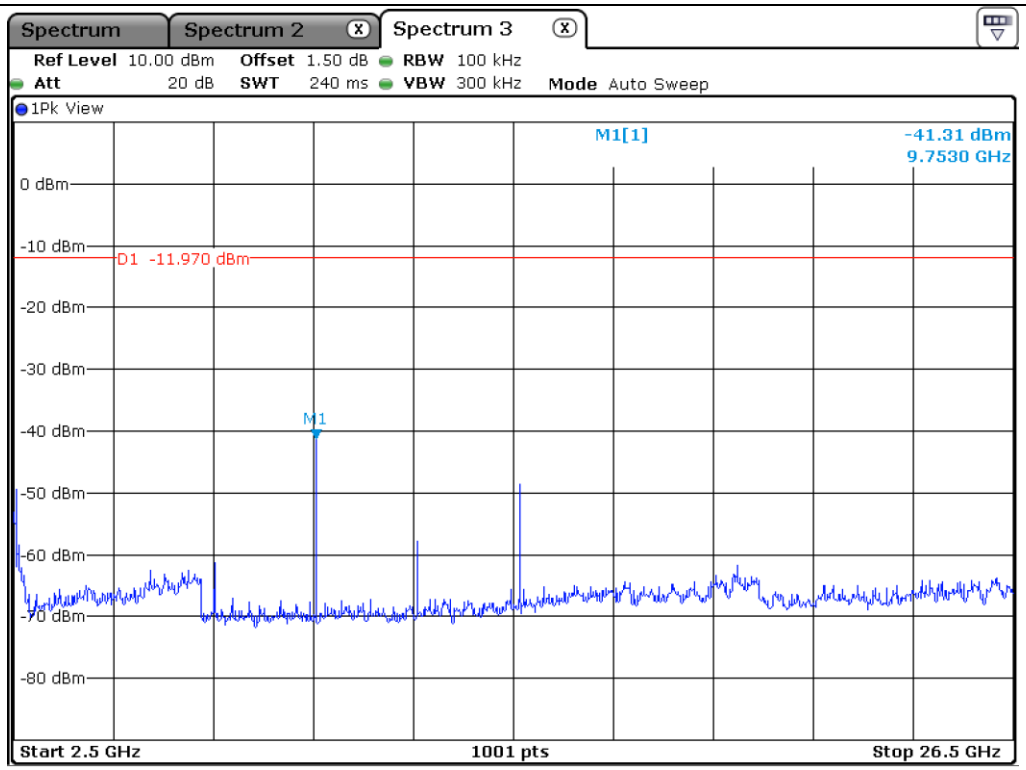


Low Channel

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

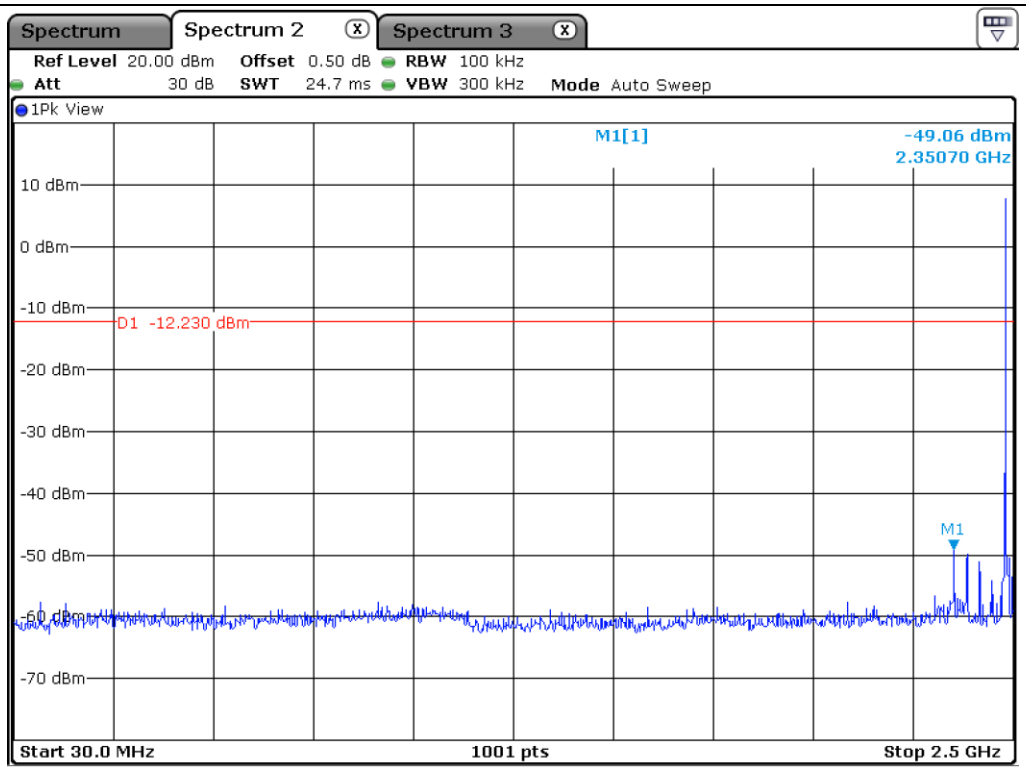


Middle Channel

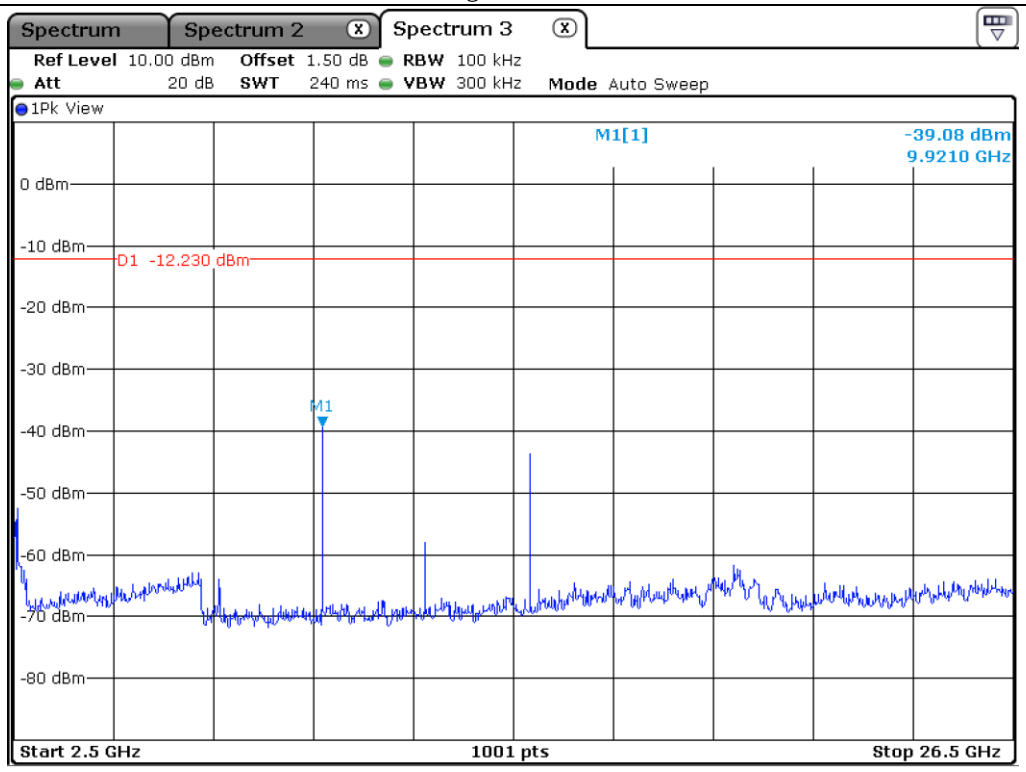


Middle Channel

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



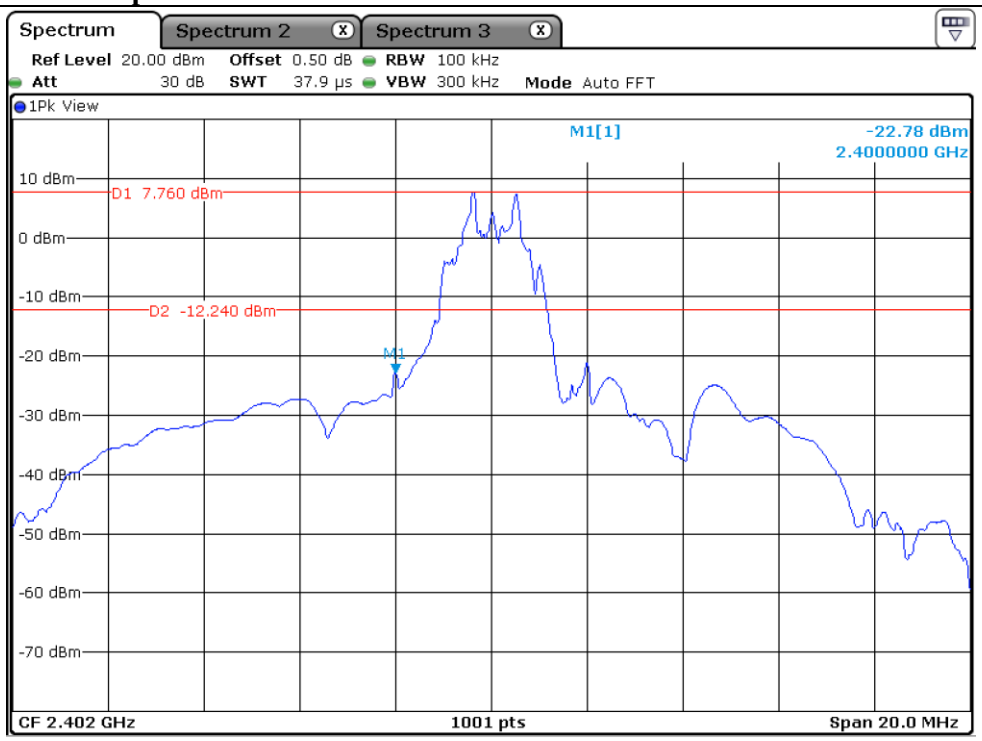
High Channel



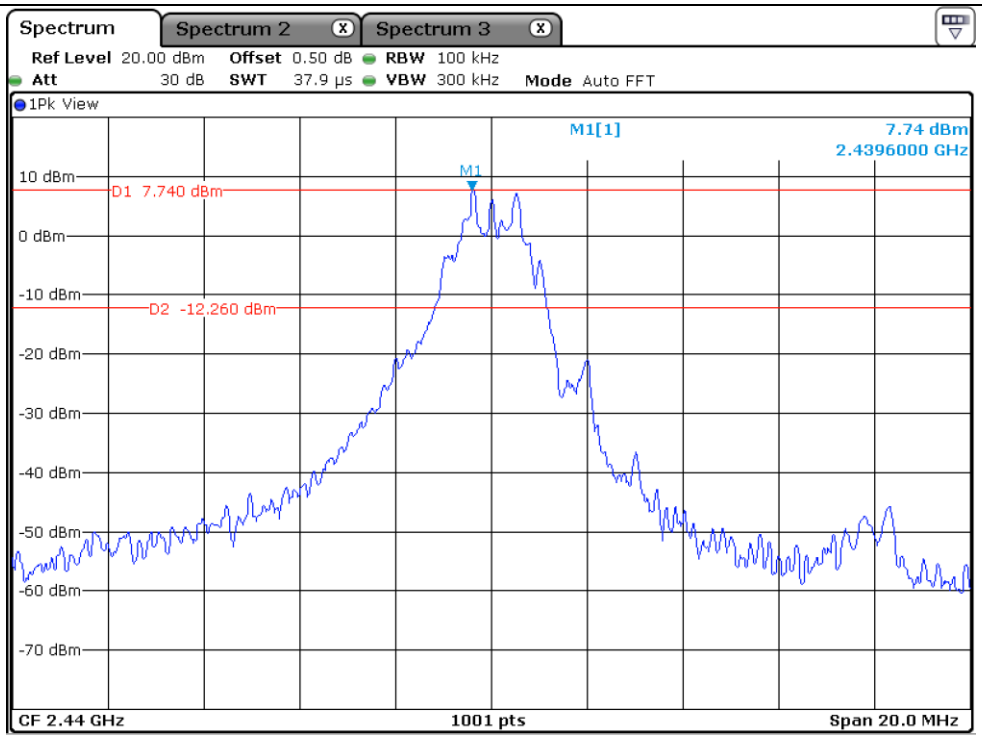
High Channel

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

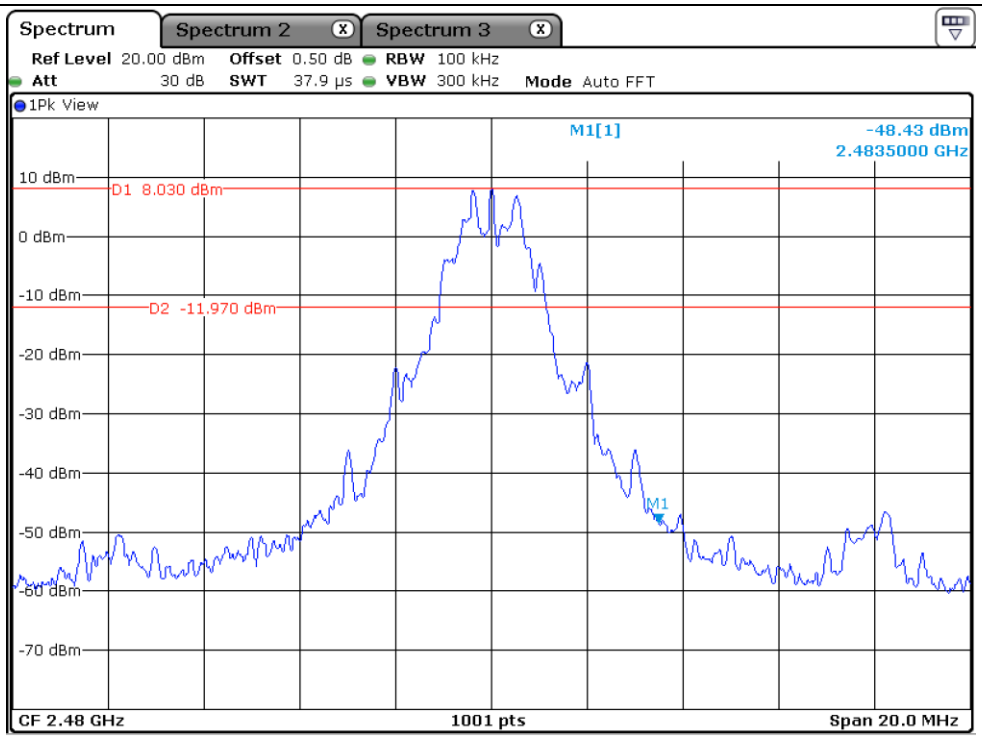
9.6.4 Test data for 2 Mbps



Low Channel

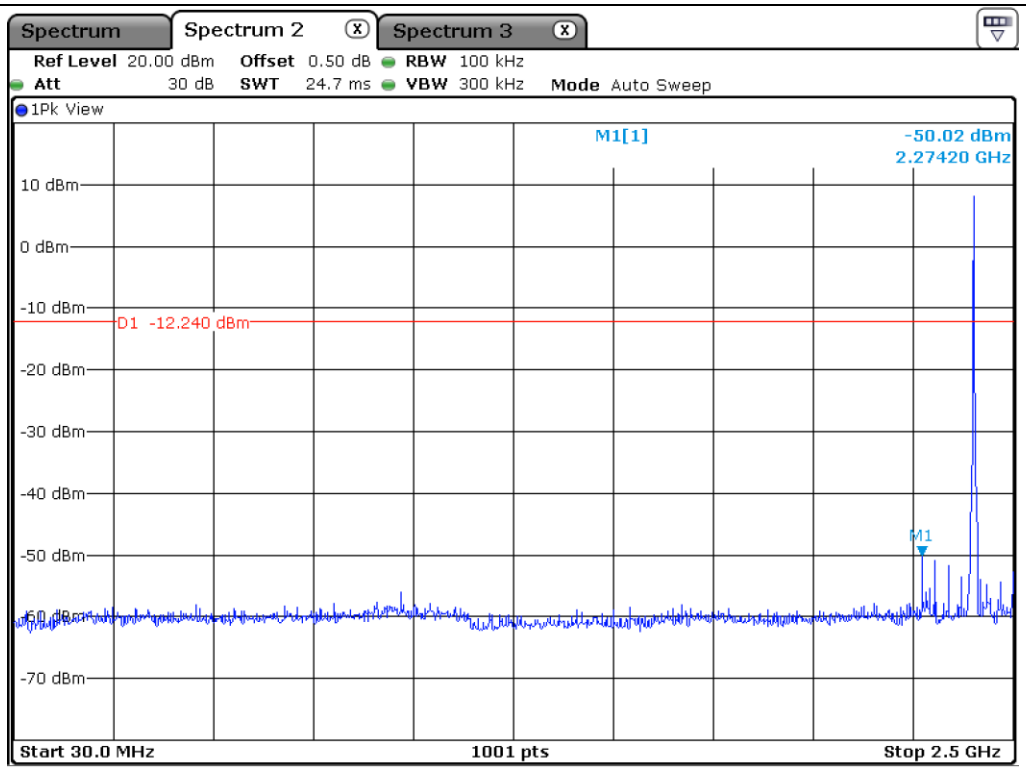


Middle Channel

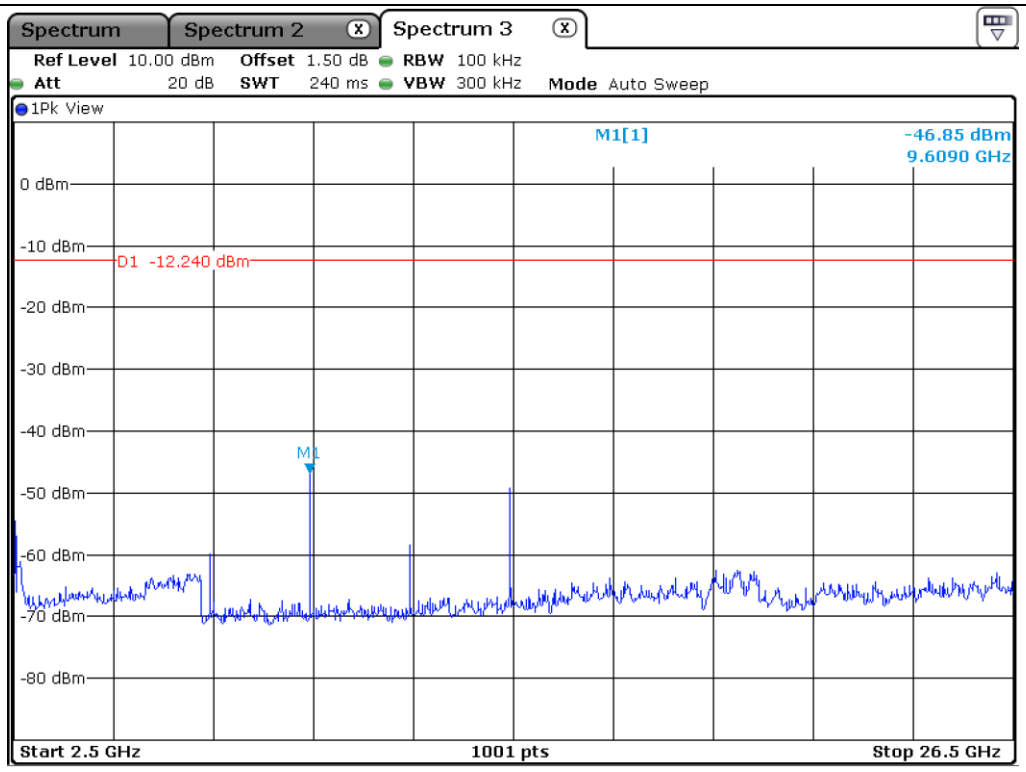


High Channel

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

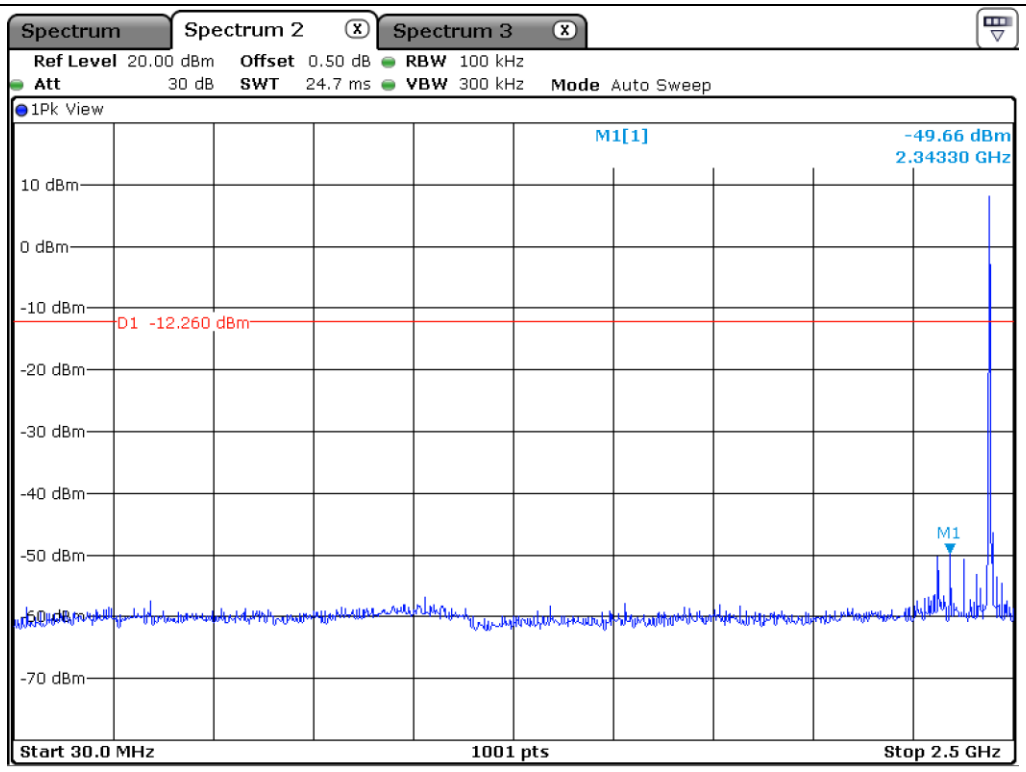


Low Channel

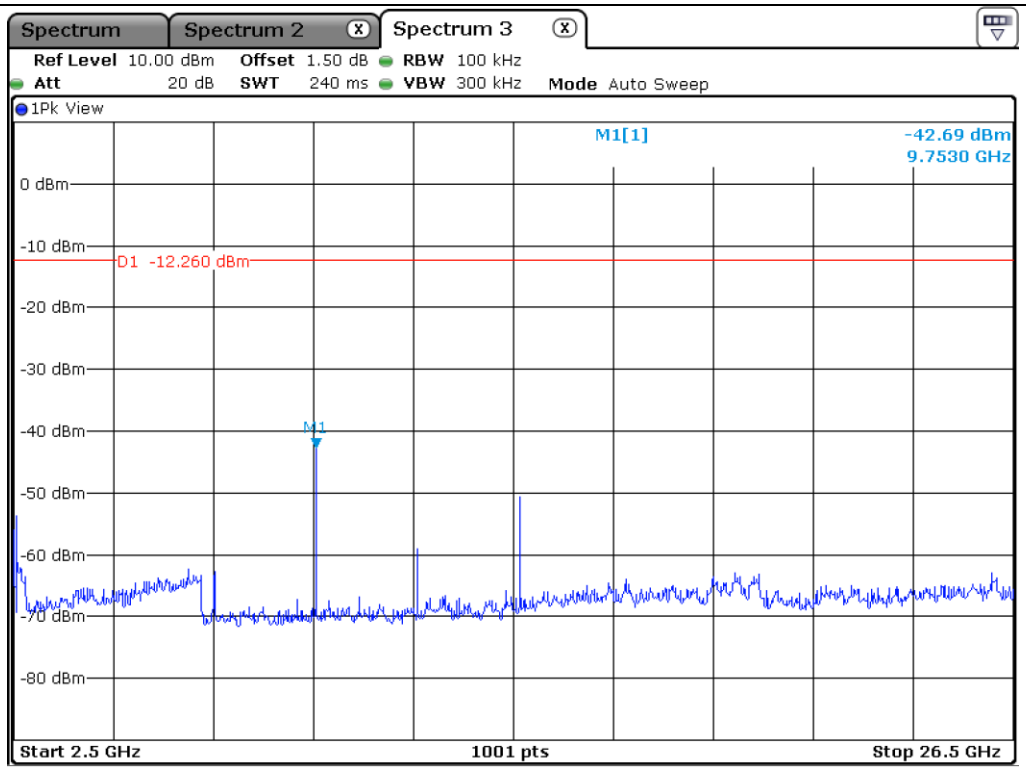


Low Channel

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

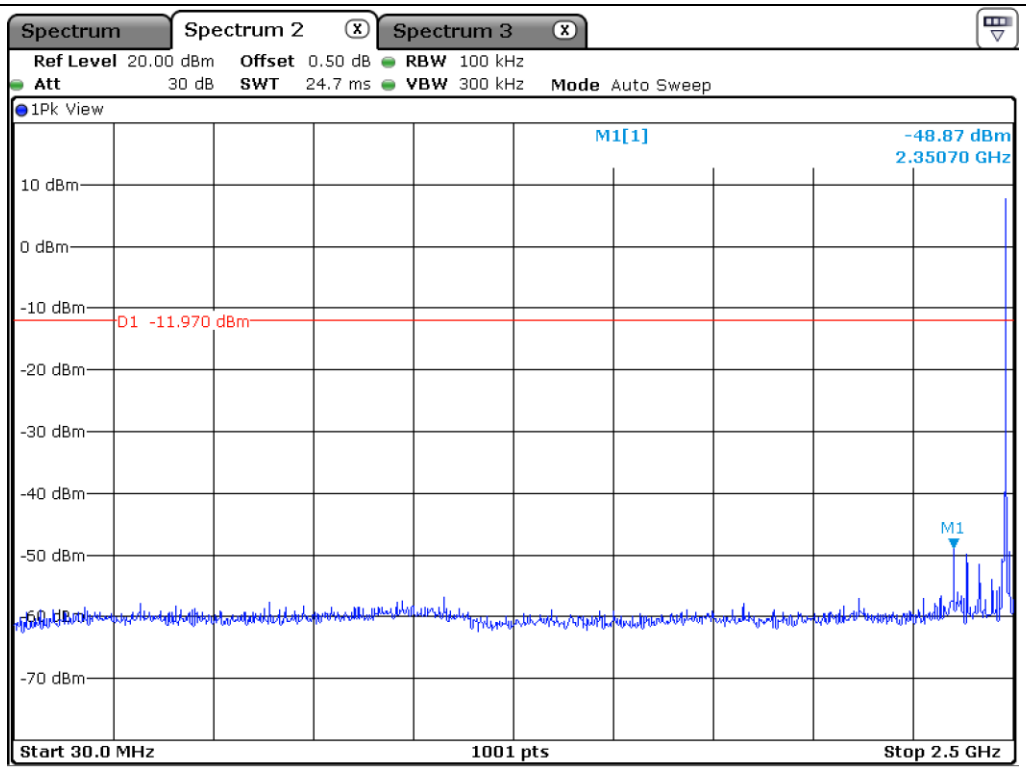


Middle Channel

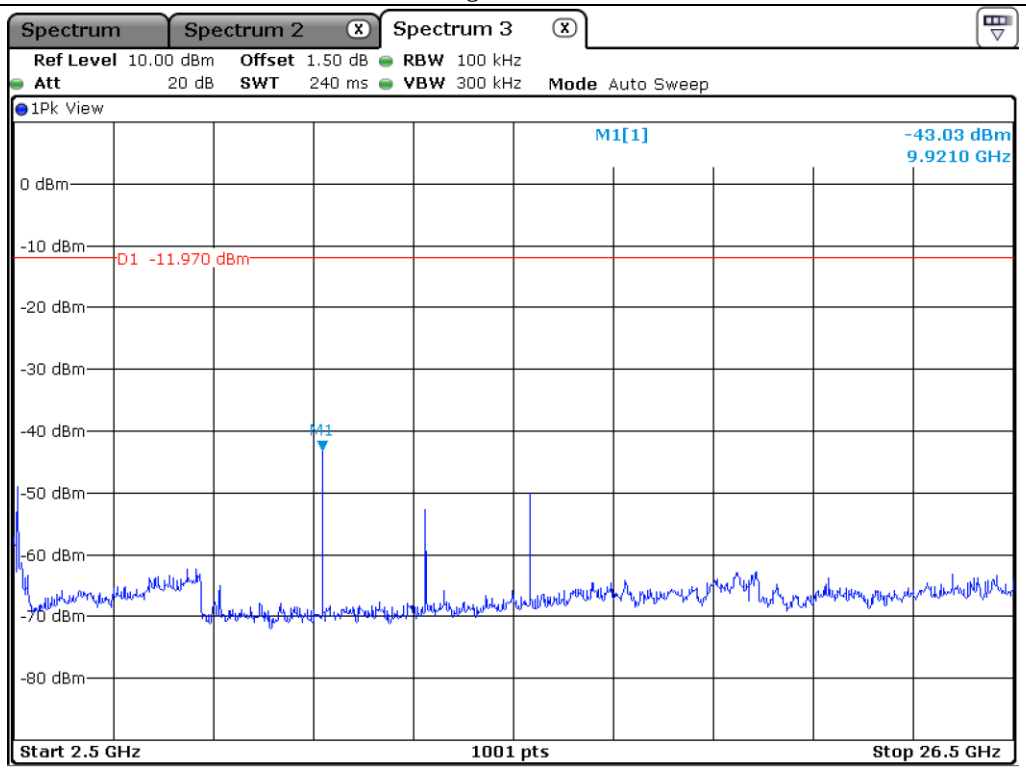


Middle Channel

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

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 radiated emission

9.6.1 Radiated Emission which fall in the Restricted Band

9.6.1.1 Test data for Coded_125 kbps

-. 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 : 84.04 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
2 326.264	53.23	Peak	H	28.30	8.20	46.10	-	43.63	74.00	30.37
2 338.092	43.59	Average	H				0.76	34.75	54.00	19.25
2 315.794	52.97	Peak	V				-	43.37	74.00	30.63
2 319.311	42.15	Average	V				0.76	33.31	54.00	20.69
Test Data for High Channel										
2 483.508	62.00	Peak	H	28.70	8.35	46.15	-	52.90	74.00	21.10
2 483.508	42.45	Average	H				0.76	34.11	54.00	19.89
2 498.591	52.46	Peak	V				-	43.36	74.00	30.64
2 489.640	41.37	Average	V				0.76	33.03	54.00	20.97

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 + Correction Factor – AMP Factor

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9.6.1.2 Test data for Coded_500 kbps

-. 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 : 88.80 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
2 318.751	53.73	Peak	H	28.30	8.20	46.10	-	44.13	74.00	29.87
2 338.012	43.94	Average	H				0.52	34.86	54.00	19.14
2 318.192	53.12	Peak	V				-	43.52	74.00	30.48
2 318.272	41.93	Average	V				0.52	32.85	54.00	21.15
Test Data for High Channel										
2 483.508	73.95	Peak	H	28.70	8.35	46.15	-	64.85	74.00	9.15
2 483.508	49.15	Average	H				0.52	40.57	54.00	13.43
2 483.508	60.44	Peak	V				-	51.34	74.00	22.66
2 499.992	41.26	Average	V				0.52	32.68	54.00	21.32

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 + Correction Factor – AMP Factor

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9.6.1.3 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 : 69.60 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
2 357.752	53.16	Peak	H	28.30	8.20	46.10	-	43.56	74.00	30.44
2 337.932	43.80	Average	H				1.57	35.77	54.00	18.23
2 322.108	53.20	Peak	V				-	43.60	74.00	30.40
2 330.420	41.79	Average	V				1.57	33.76	54.00	20.24
Test Data for High Channel										
2 483.508	70.12	Peak	H	28.70	8.35	46.15	-	61.02	74.00	12.98
2 483.508	44.43	Average	H				1.57	36.90	54.00	17.10
2 483.508	56.97	Peak	V				-	47.87	74.00	26.13
2 499.580	41.24	Average	V				1.57	33.71	54.00	20.29

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 + Correction Factor – AMP Factor

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9.6.1.4 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 : 39.94 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
2 330.420	53.22	Peak	H	28.30	8.20	46.10	-	43.62	74.00	30.38
2 338.012	42.68	Average	H				3.99	37.07	54.00	16.93
2 319.391	52.77	Peak	V				-	43.17	74.00	30.83
2 310.280	41.81	Average	V				3.99	36.20	54.00	17.80
Test Data for High Channel										
2 483.508	69.02	Peak	H	28.70	8.35	46.15	-	59.92	74.00	14.08
2 483.508	47.64	Average	H				3.99	42.53	54.00	11.47
2 483.508	57.94	Peak	V				-	48.84	74.00	25.16
2 483.508	41.23	Average	V				3.99	36.12	54.00	17.88

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 + Correction Factor – AMP Factor

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9.6.2 Spurious & Harmonic Radiated Emission

9.6.2.1 Test data for Coded_125 kbps

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz 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 : 84.04 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	54.73	Peak	H	33.40	11.21	45.80	-	53.54	74.00	20.46
	45.25	Average	H				0.76	44.82	54.00	9.18
	52.46	Peak	V				-	51.27	74.00	22.73
	44.08	Average	V				0.76	43.65	54.00	10.35
Test Data for Middle Channel										
4 880.00	54.21	Peak	H	33.50	11.23	45.83	-	53.11	74.00	20.89
	45.57	Average	H				0.76	45.23	54.00	8.77
	51.97	Peak	V				-	50.87	74.00	23.13
	43.31	Average	V				0.76	42.97	54.00	11.03
Test Data for High Channel										
4 960.00	54.45	Peak	H	33.40	11.31	45.89	-	53.27	74.00	20.73
	45.09	Average	H				0.76	44.67	54.00	9.33
	52.37	Peak	V				-	51.19	74.00	22.81
	44.19	Average	V				0.76	43.77	54.00	10.23

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

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

Total Level = Reading + Antenna Factor + Cable Loss + Correction Factor – AMP Factor

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9.6.2.2 Test data for Coded_500 kbps

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz 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 : 88.80 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	54.36	Peak	H	33.40	11.21	45.80	-	53.17	74.00	20.83
	45.09	Average	H				0.52	44.42	54.00	9.58
	52.51	Peak	V				-	51.32	74.00	22.68
	44.06	Average	V				0.52	43.39	54.00	10.61
Test Data for Middle Channel										
4 880.00	54.34	Peak	H	33.50	11.23	45.83	-	53.24	74.00	20.76
	45.84	Average	H				0.52	45.26	54.00	8.74
	51.90	Peak	V				-	50.80	74.00	23.20
	43.67	Average	V				0.52	43.09	54.00	10.91
Test Data for High Channel										
4 960.00	53.48	Peak	H	33.40	11.31	45.89	-	52.30	74.00	21.70
	45.52	Average	H				0.52	44.86	54.00	9.14
	52.41	Peak	V				-	51.23	74.00	22.77
	43.75	Average	V				0.52	43.09	54.00	10.91

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

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

Total Level = Reading + Antenna Factor + Cable Loss + Correction Factor – AMP Factor

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9.6.2.3 Test data for 1 Mbps

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz 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 : 69.60 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	54.31	Peak	H	33.40	11.21	45.80	-	53.12	74.00	20.88
	45.03	Average	H				1.57	45.41	54.00	8.59
	52.72	Peak	V				-	51.53	74.00	22.47
	43.68	Average	V				1.57	44.06	54.00	9.94
Test Data for Middle Channel										
4 880.00	53.71	Peak	H	33.50	11.23	45.83	-	52.61	74.00	21.39
	45.12	Average	H				1.57	45.59	54.00	8.41
	52.11	Peak	V				-	51.01	74.00	22.99
	43.43	Average	V				1.57	43.90	54.00	10.10
Test Data for High Channel										
4 960.00	53.46	Peak	H	33.40	11.31	45.89	-	52.28	74.00	21.72
	45.82	Average	H				1.57	46.21	54.00	7.79
	52.50	Peak	V				-	51.32	74.00	22.68
	43.79	Average	V				1.57	44.18	54.00	9.82

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

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

Total Level = Reading + Antenna Factor + Cable Loss + Correction Factor – AMP Factor

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9.6.2.4 Test data for 2 Mbps

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz 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 : 39.94 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Factor	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	54.01	Peak	H	33.40	11.21	45.80	-	52.82	74.00	21.18
	44.60	Average	H				3.99	47.40	54.00	6.60
	52.81	Peak	V				-	51.62	74.00	22.38
	43.21	Average	V				3.99	46.01	54.00	7.99
Test Data for Middle Channel										
4 880.00	54.21	Peak	H	33.50	11.23	45.83	-	53.11	74.00	20.89
	45.63	Average	H				3.99	48.52	54.00	5.48
	51.69	Peak	V				-	50.59	74.00	23.41
	43.86	Average	V				3.99	46.75	54.00	7.25
Test Data for High Channel										
4 960.00	54.02	Peak	H	33.40	11.31	45.89	-	52.84	74.00	21.16
	45.65	Average	H				3.99	48.46	54.00	5.54
	51.88	Peak	V				-	50.70	74.00	23.30
	43.53	Average	V				3.99	46.34	54.00	7.66

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

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

Total Level = Reading + Antenna Factor + Cable Loss + Correction Factor – AMP Factor

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10. PEAK POWER SPECTRAL DENSITY

10.1 Operating environment

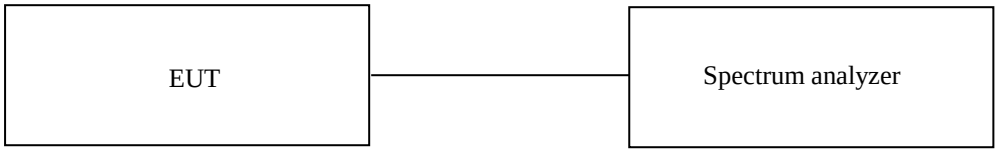
Temperature : 23 °C

Relative humidity : 45 % R.H.

10.2 Test set-up

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

The resolution bandwidth is set to 3 kHz ≤ RBW ≤100 kHz, the video bandwidth is set to 3 times the resolution bandwidth.



10.3 Test Date

August 20, 2021 ~ August 26, 2021

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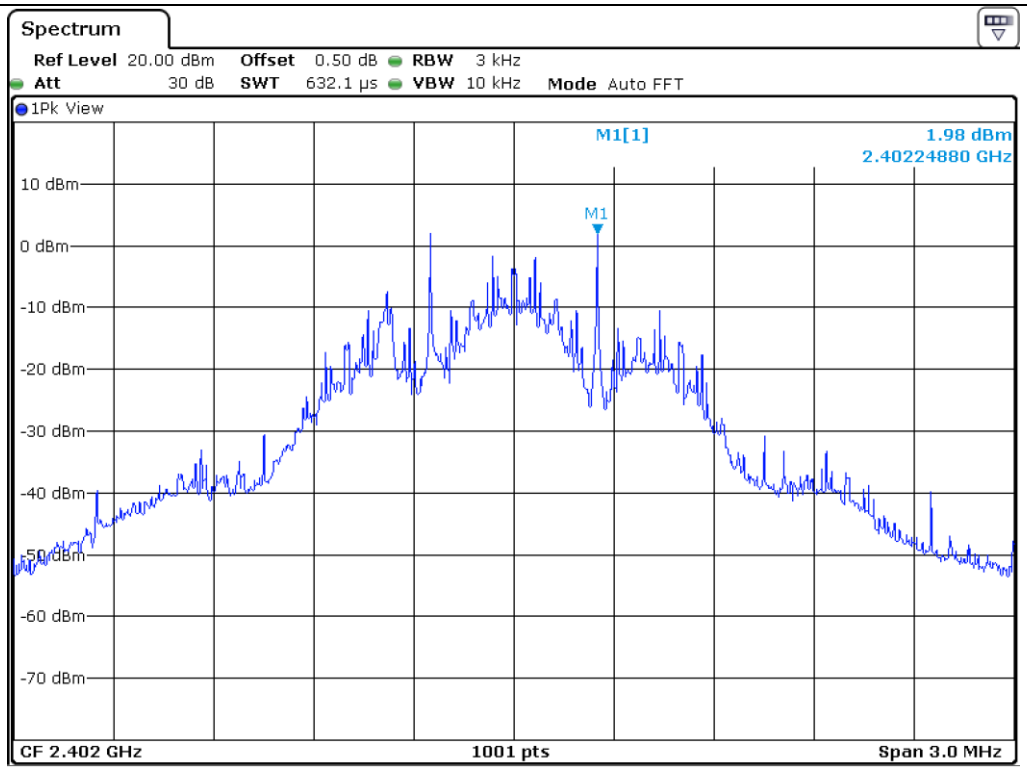
10.4 Test data for Coded_125 kbps

-. Test Result : Pass

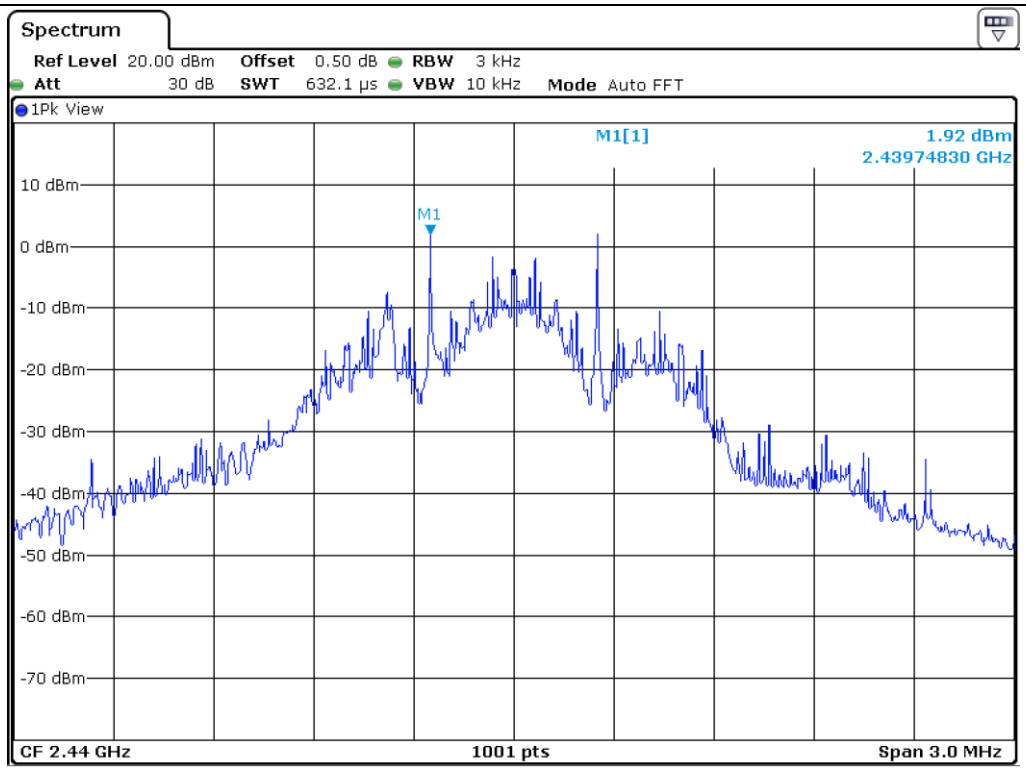
-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	1.98	8.00	6.02
Middle	2 440.00	1.92	8.00	6.08
High	2 480.00	1.86	8.00	6.14

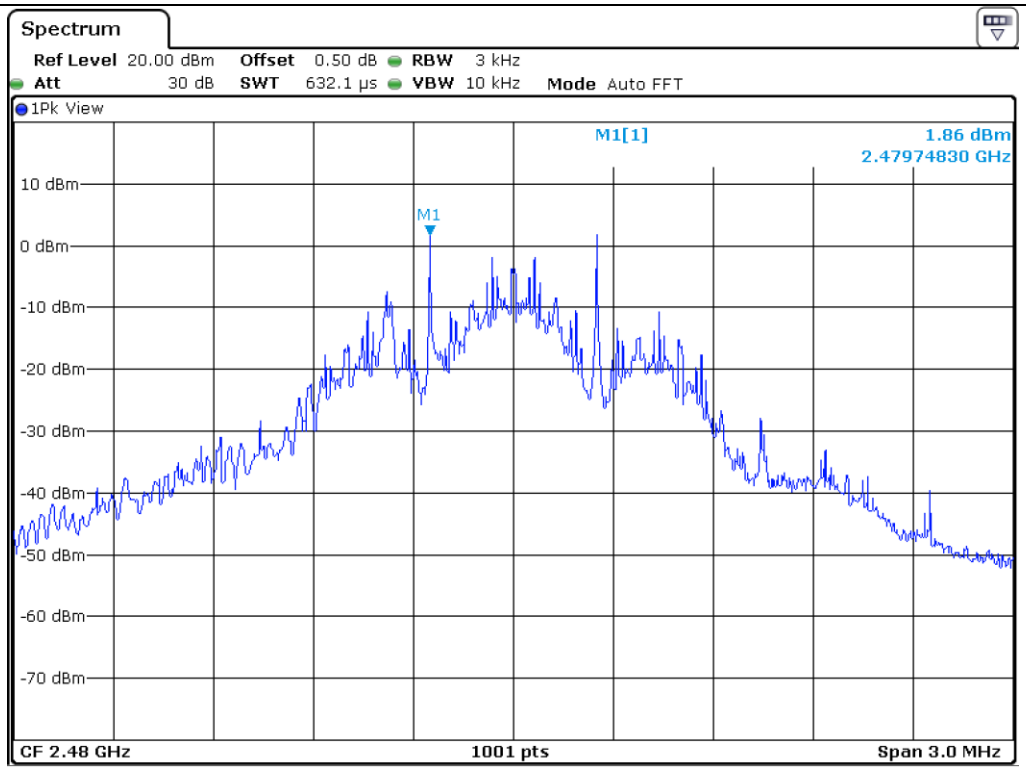
Remark. Margin = Limit – Measured value



Low Channel



Middle Channel



High Channel

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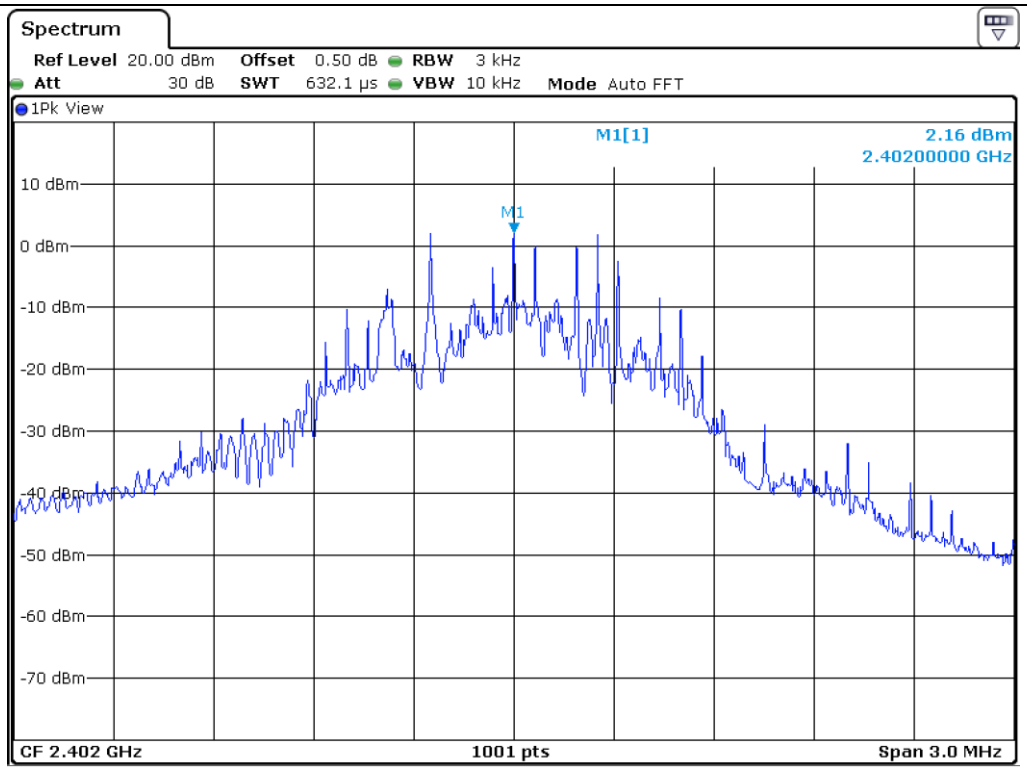
10.5 Test data for Coded_500 kbps

-. Test Result : Pass

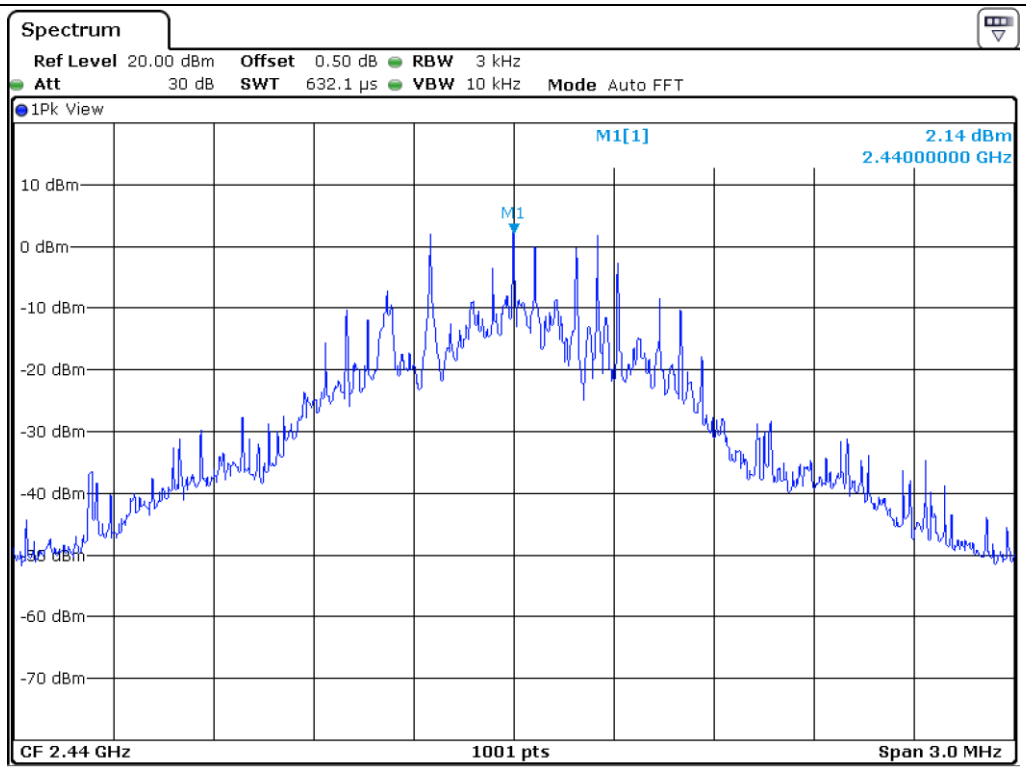
-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	2.16	8.00	5.84
Middle	2 440.00	2.14	8.00	5.86
High	2 480.00	2.10	8.00	5.90

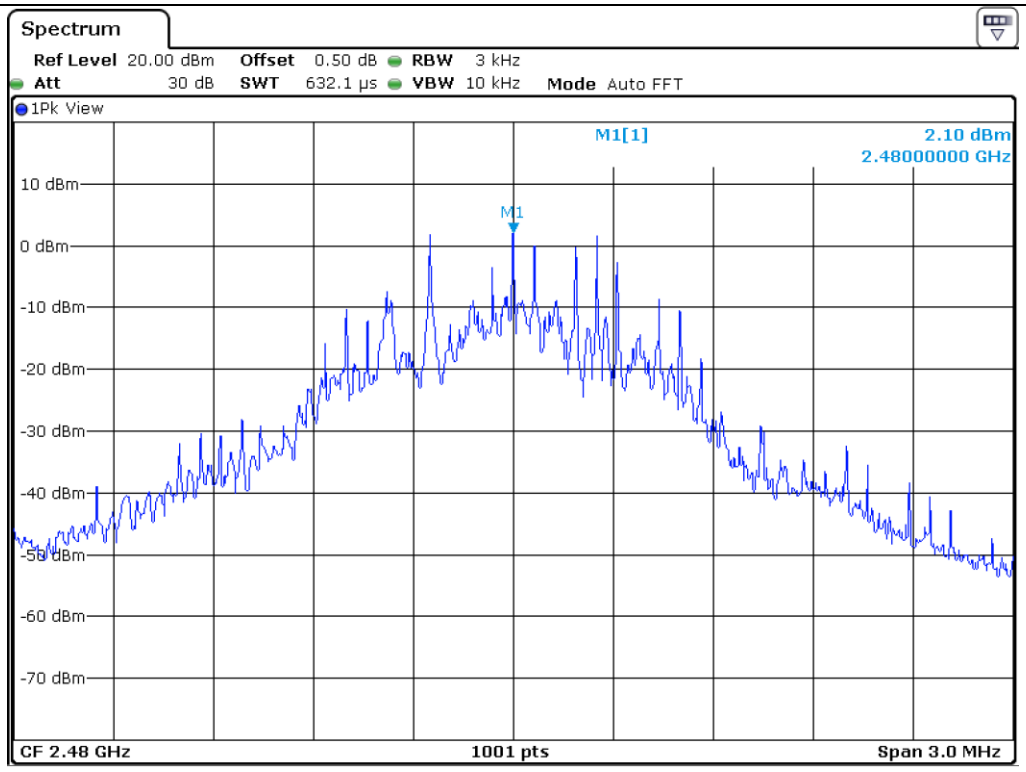
Remark. Margin = Limit – Measured value



Low Channel



Middle Channel



High Channel

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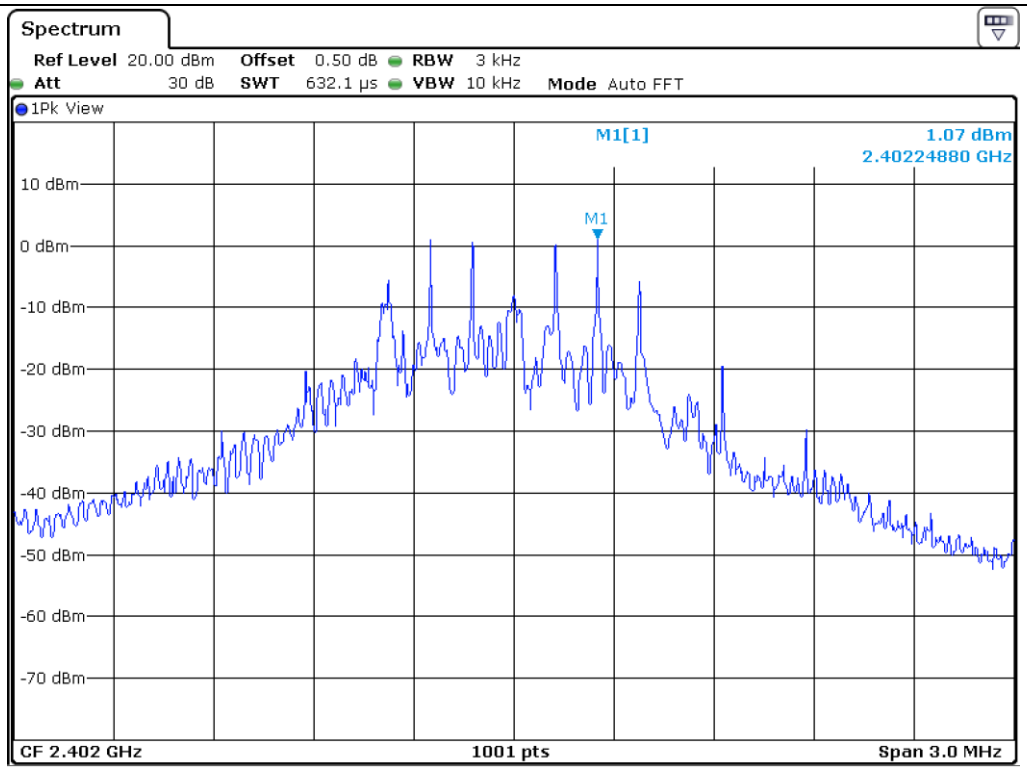
10.6 Test data for 1 Mbps

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	1.07	8.00	6.93
Middle	2 440.00	1.04	8.00	6.96
High	2 480.00	0.94	8.00	7.06

Remark. Margin = Limit – Measured value



Low Channel

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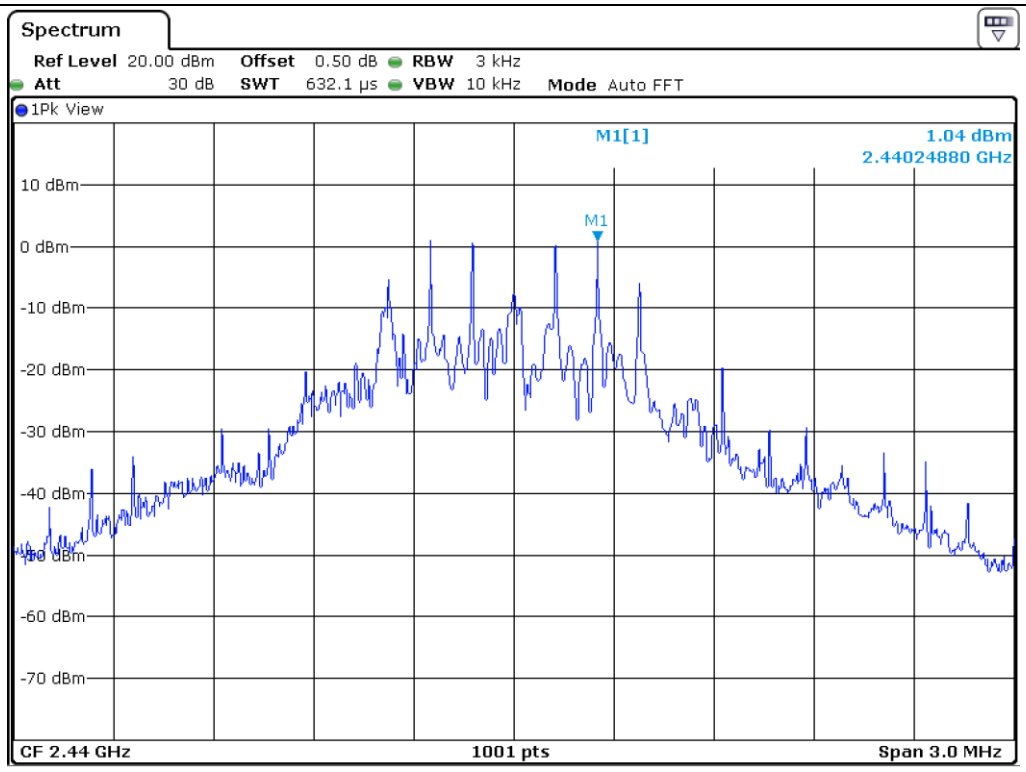
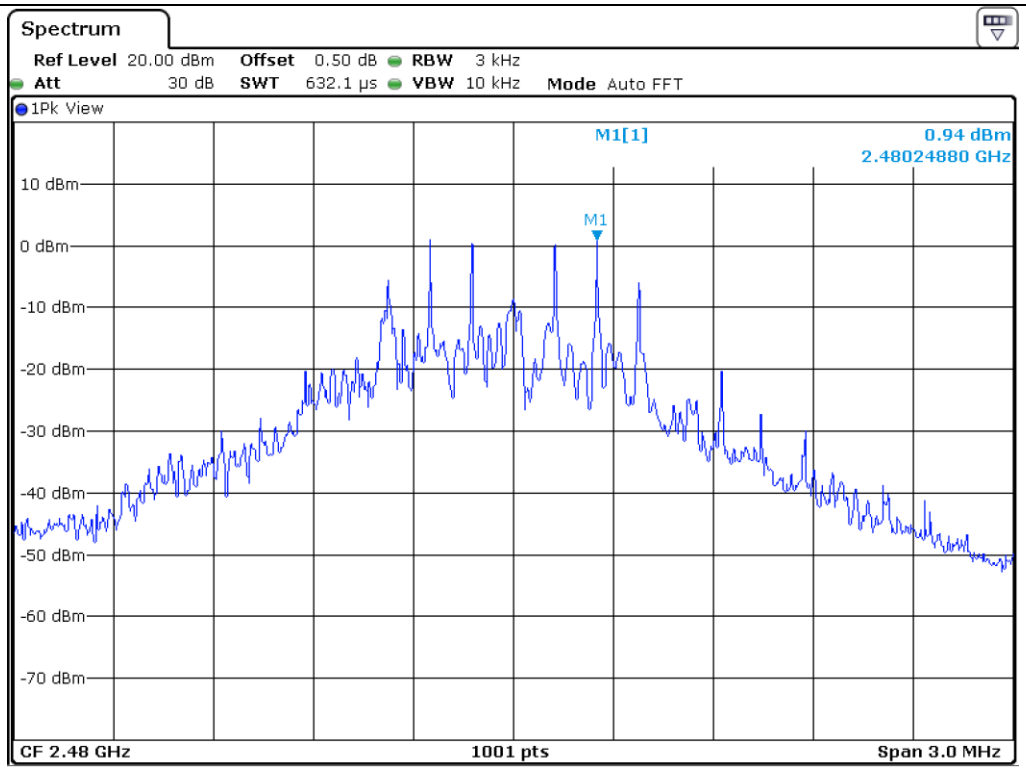


Middle Channel



High Channel

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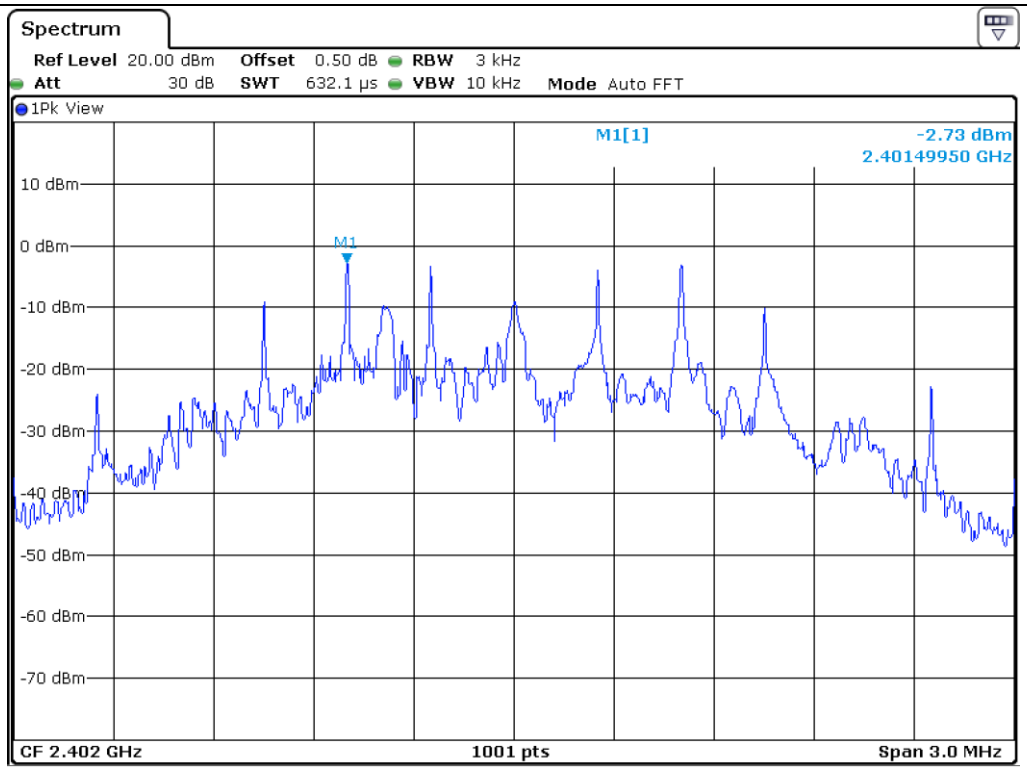
10.7 Test data for 2 Mbps

-. Test Result : Pass

-. Operating Condition : Continuous transmitting mode

CHANNEL	FREQUENCY(MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
Low	2 402.00	-2.73	8.00	10.73
Middle	2 440.00	-2.78	8.00	10.78
High	2 480.00	-2.97	8.00	10.97

Remark. Margin = Limit – Measured value



Low Channel

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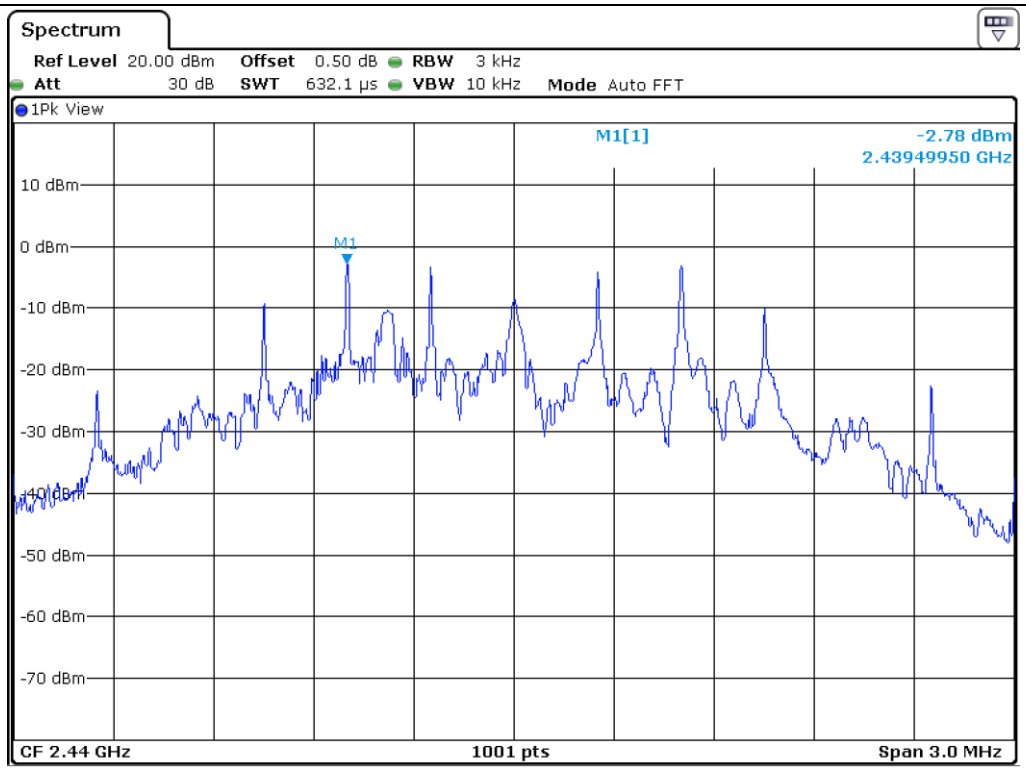
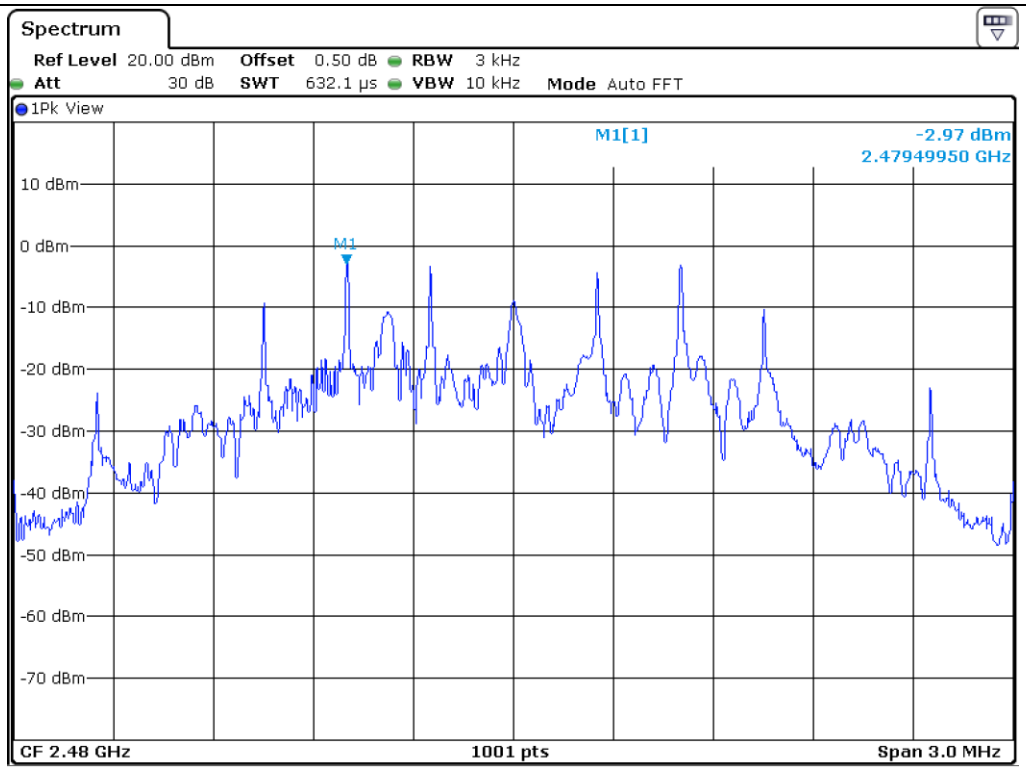


Middle Channel



High Channel

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11. RADIATED EMISSION TEST

11.1 Operating environment

Temperature : 23 °C

Relative humidity : 45 % R.H.

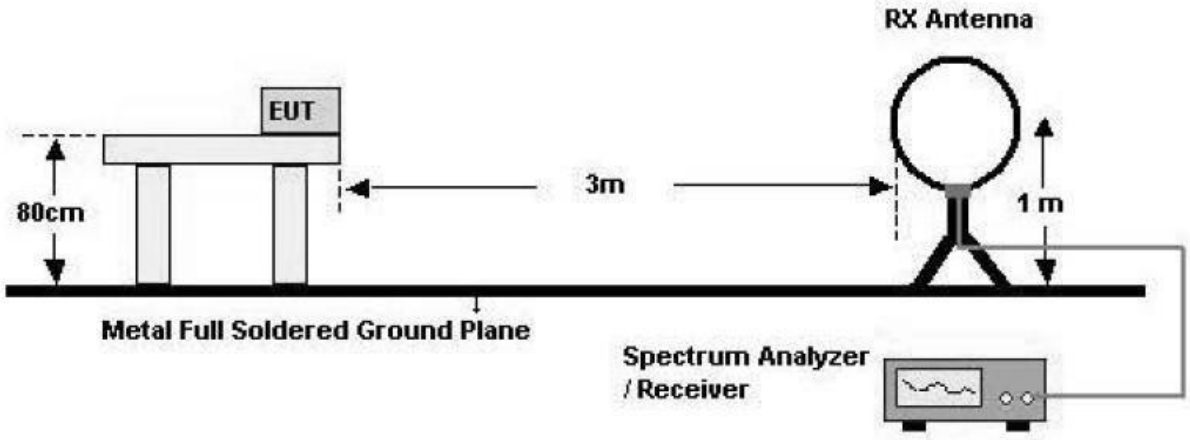
11.2 Test set-up

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.

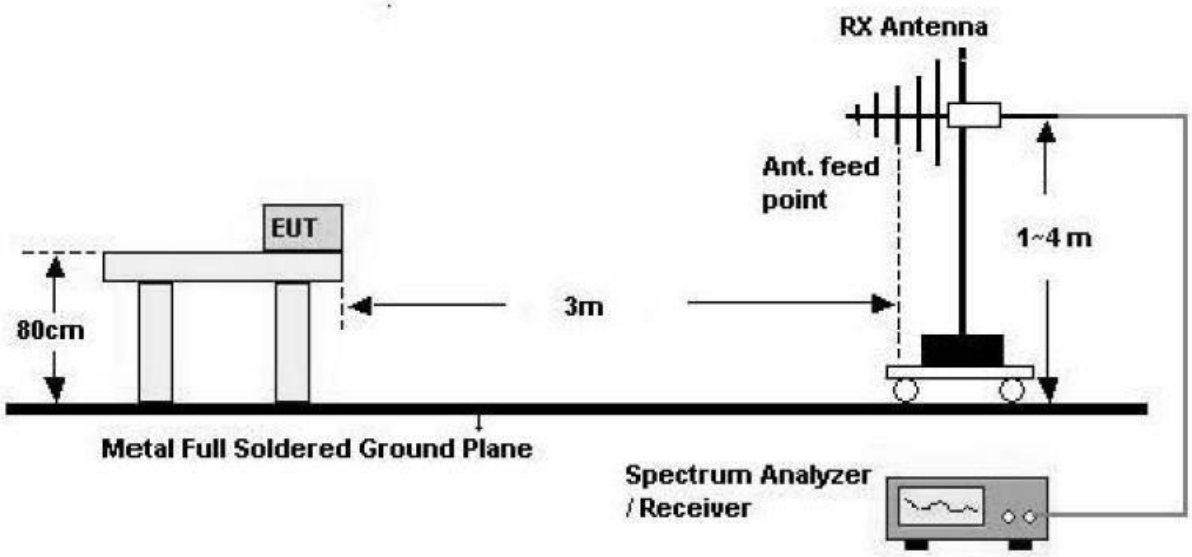
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal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

- Test Configuration

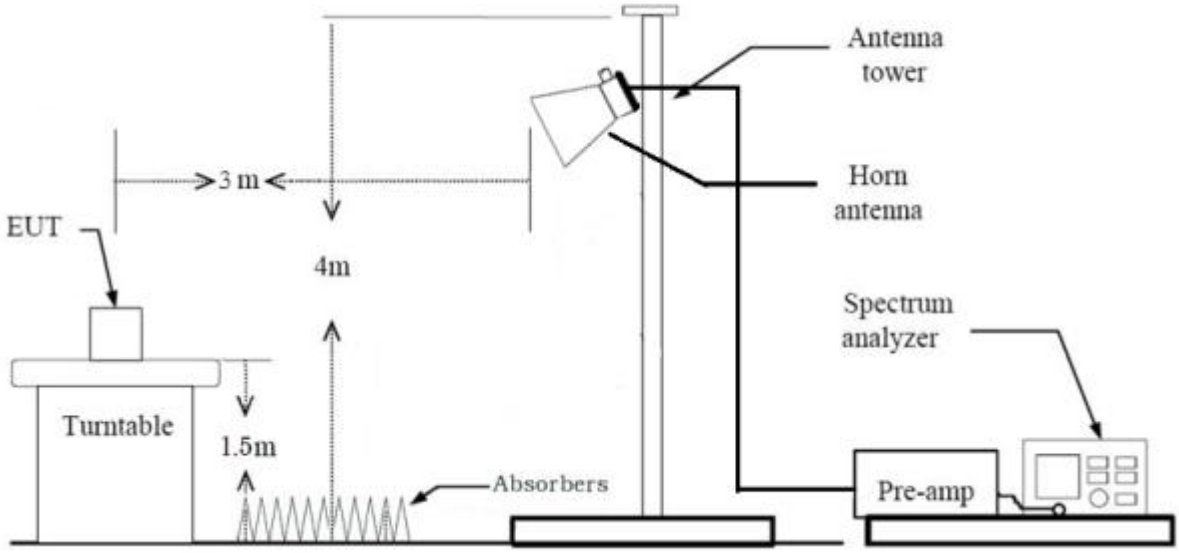
1. Below 30 MHz



2. 30 MHz - 1 GHz



3. Above 1 GHz



11.3 Test Date

August 20, 2021 ~ August 26, 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)

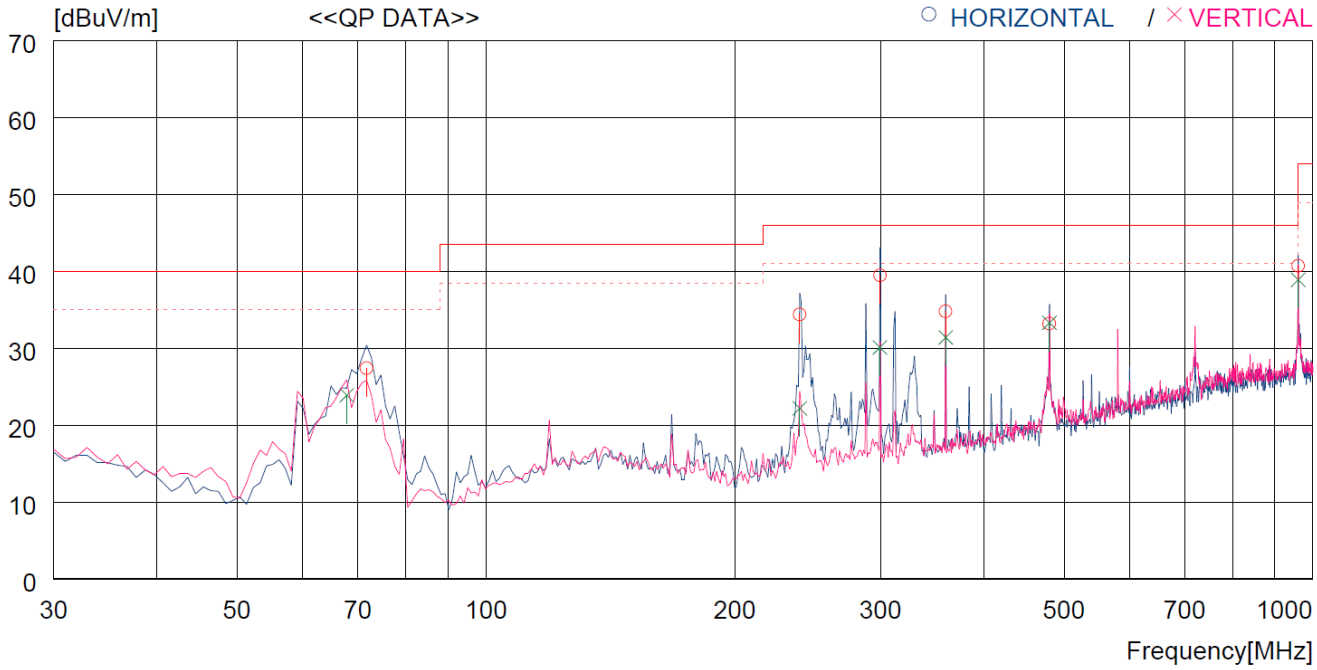
11.4 Test data for 30 MHz ~ 1 GHz

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : IoT Module

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



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	71.710	45.7	12.9	0.9	32.1	27.4	40.0	12.6	100	341
2	239.520	47.2	17.3	1.9	32.0	34.4	46.0	11.6	100	309
3	299.660	50.3	19.2	2.0	32.0	39.5	46.0	6.5	100	309
4	359.800	44.6	20.1	2.2	32.1	34.8	46.0	11.2	100	354
5	480.081	40.2	22.6	2.7	32.3	33.2	46.0	12.8	100	309
6	960.217	39.9	28.1	4.1	31.4	40.7	54.0	13.3	100	309
----- Vertical ------										
7	67.830	42.4	12.7	0.9	32.1	23.9	40.0	16.1	100	264
8	239.520	35.0	17.3	1.9	32.0	22.2	46.0	23.8	100	256
9	299.660	40.9	19.2	2.0	32.0	30.1	46.0	15.9	100	134
10	359.800	41.2	20.1	2.2	32.1	31.4	46.0	14.6	100	166
11	480.081	40.3	22.6	2.7	32.3	33.3	46.0	12.7	100	192
12	960.217	38.1	28.1	4.1	31.4	38.9	54.0	15.1	100	134

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11.5 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

-.Operating mode : Transmitting mode

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

11.6 Test data for above 1 GHz

-. Resolution bandwidth : 1 MHz for Peak and Average Mode for the emissions fall in restricted band,
1 MHz 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

-.Operating mode : Transmitting mode

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

12. CONDUCTED EMISSION TEST

12.1 Operating environment

Temperature : 23 °C

Relative humidity : 45 % R.H.

12.2 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.

12.3 Test Date

August 20, 2021 ~ August 26, 2021

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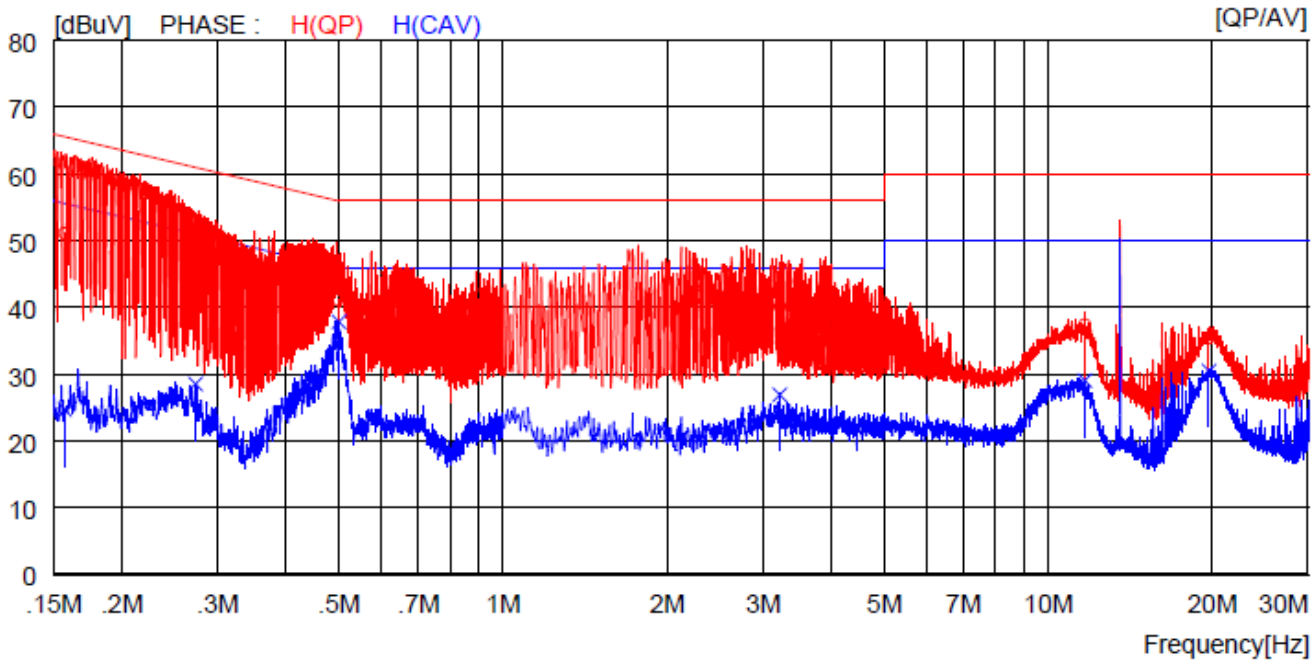
12.4 Test data

-. 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	0.15700	41.1	----	10.0	51.1	----	65.6	----	14.5	----	H(QP)
2	0.27300	33.6	----	9.9	43.5	----	61.0	----	17.5	----	H(QP)
3	0.50000	31.1	----	10.0	41.1	----	56.0	----	14.9	----	H(QP)
4	3.22000	30.0	----	10.1	40.1	----	56.0	----	15.9	----	H(QP)
5	11.69000	27.2	----	10.2	37.4	----	60.0	----	22.6	----	H(QP)
6	19.72000	25.0	----	10.4	35.4	----	60.0	----	24.6	----	H(QP)
7	0.15700	----	14.7	10.0	----	24.7	----	55.6	----	30.9	H(CAV)
8	0.27300	----	18.6	9.9	----	28.5	----	51.0	----	22.5	H(CAV)
9	0.50000	----	27.8	10.0	----	37.8	----	46.0	----	8.2	H(CAV)
10	3.22000	----	16.8	10.1	----	26.9	----	46.0	----	19.1	H(CAV)
11	11.69000	----	18.8	10.2	----	29.0	----	50.0	----	21.0	H(CAV)
12	19.72000	----	20.1	10.4	----	30.5	----	50.0	----	19.5	H(CAV)

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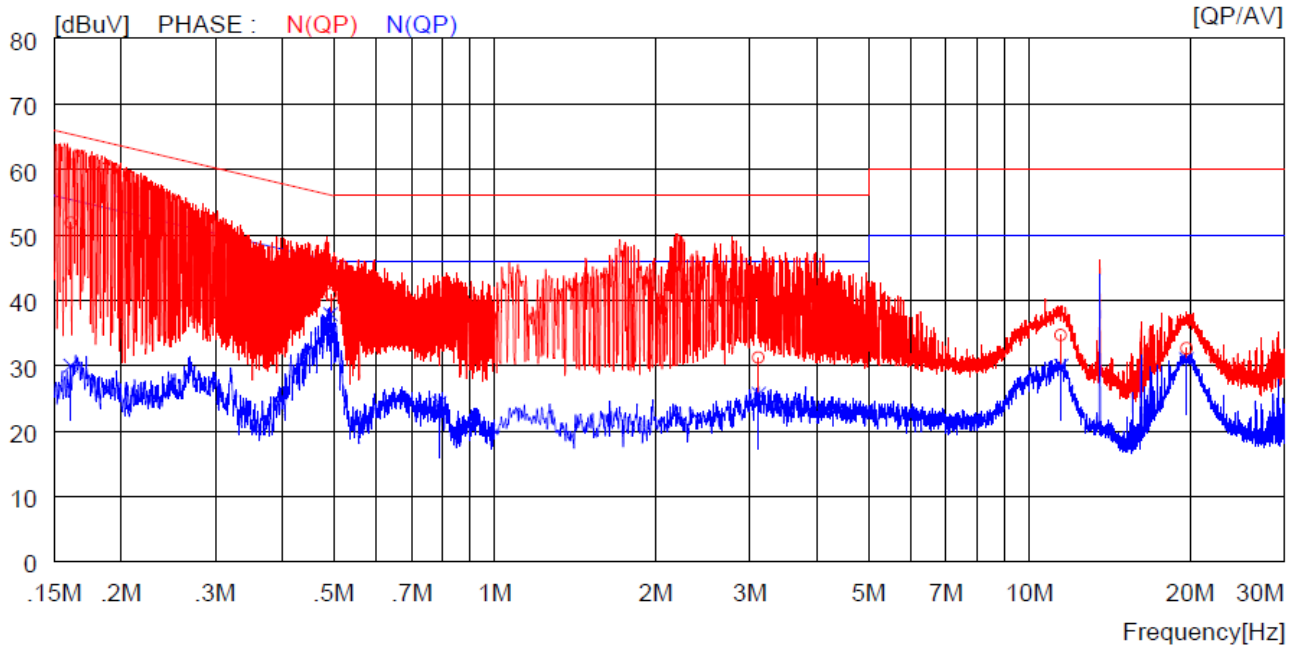
-. Tested Line : NEUTRAL LINE



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	0.16100	41.8	----	10.0	51.8	----	65.4	----	13.6	----	N(QP)
2	0.49300	31.0	----	9.9	40.9	----	56.1	----	15.2	----	N(QP)
3	0.78700	28.5	----	10.0	38.5	----	56.0	----	17.5	----	N(QP)
4	3.11600	21.1	----	10.1	31.2	----	56.0	----	24.8	----	N(QP)
5	11.46000	24.5	----	10.2	34.7	----	60.0	----	25.3	----	N(QP)
6	19.69000	22.2	----	10.4	32.6	----	60.0	----	27.4	----	N(QP)
7	0.16100	----	20.0	10.0	----	30.0	----	55.4	----	25.4	N(CAV)
8	0.49300	----	28.0	9.9	----	37.9	----	46.1	----	8.2	N(CAV)
9	0.78700	----	14.3	10.0	----	24.3	----	46.0	----	21.7	N(CAV)
10	3.11600	----	15.6	10.1	----	25.7	----	46.0	----	20.3	N(CAV)
11	11.46000	----	19.8	10.2	----	30.0	----	50.0	----	20.0	N(CAV)
12	19.69000	----	20.6	10.4	----	31.0	----	50.0	----	19.0	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.

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13. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV40	Rohde & Schwarz	Signal Analyzer	101009	Feb. 09, 2021 (1Y)
ESW	Rohde & Schwarz	EMI Test Receiver	101851	Mar. 23, 2021 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	392756	Oct. 16, 2020 (1Y)
SCU18	Rohde & Schwarz	Signal Conditioning unit	102266	Jul. 14, 2021 (1Y)
SCU40A	Rohde & Schwarz	Signal Conditioning unit	100436	Feb. 08, 2021 (1Y)
DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
CO3000	Innco Systems GmbH	Controller	N/A	N/A
VULB9168	Schwarzbeck	Hybrid Antenna	01088	Dec. 09, 2019 (2Y)
AH-118	Com-Power	Horn Antenna	10050061	Oct. 15, 2020 (1Y)
VULB9163	Schwarzbeck	TRILOG Broadband Antenna	777	Apr. 08, 2020 (2Y)
BBHA9120D	Schwarzbeck	Horn Antenna	9120D-1366	Jul. 20, 2021 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Jan. 07, 2021 (1Y)
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar. 24, 2020 (2Y)
ESCI	Rohde & Schwarz	Test Receiver	101420	Mar. 23, 2021 (1Y)
LT32C/10	Afj Instruments	LISN	32032039322	Oct. 22, 2020 (1Y)
3825/2	EMCO	AMN	9109-1867	Mar. 22, 2021 (1Y)
11947A	Hewlett Packard	Transient Limiter	3107A02762	Mar. 22, 2021(1Y)

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