

RADIO PERFORMANCE TEST REPORT

Test Report No. : OT-221-RWD-063

Reception No. : 2109004007

Applicant : LG Electronics USA

Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States

Manufacturer : LG Electronics Inc.

Address : 222 LG-ro, Jinwi-Myeon, Pyeongtaek -Si, Gyeonggi-Do, 451-713, Korea

Type of Equipment : Silverbox RADIO ASM-RECEIVER

FCC ID. : BEJVCUEB

Model Name : VCUEB

Multiple Model Name : N/A

Serial number : N/A

Total page of Report : 82 pages (including this page)

Date of Incoming : November 25, 2021

Date of issue : January 26, 2022

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.

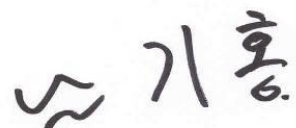
It is not a generally valid assessment of the features of the respective products of the mass-production.



Tested by
Si-eon Lee / Assistant Manager
ONETECH Corp.



Reviewed by
Tae-Ho, Kim / Senior Manager
ONETECH Corp.



Approved by
Ki-Hong, Nam / General Manager
ONETECH Corp.

CONTENTS

PAGE

1. VERIFICATION OF COMPLIANCE	6
2. TEST SUMMARY	7
2.1 TEST ITEMS AND RESULTS	7
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS	7
2.3 RELATED SUBMITTAL(S) / GRANT(S)	7
2.4 PURPOSE OF THE TEST	7
2.5 TEST METHODOLOGY	7
2.6 TEST FACILITY	7
3. GENERAL INFORMATION	8
3.1 PRODUCT DESCRIPTION	8
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT	10
4. EUT MODIFICATIONS	10
5. SYSTEM TEST CONFIGURATION	11
5.1 JUSTIFICATION	11
5.2 PERIPHERAL EQUIPMENT	11
5.3 MODE OF OPERATION DURING THE TEST	12
5.4 CONFIGURATION OF TEST SYSTEM	15
5.5 ANTENNA REQUIREMENT	15
6. PRELIMINARY TEST	15
6.1 AC POWER LINE CONDUCTED EMISSIONS TESTS	15
6.2 GENERAL RADIATED EMISSIONS TESTS	15
7. MINIMUM 20 DB BANDWIDTH	16
7.1 OPERATING ENVIRONMENT	16
7.2 TEST SET-UP	16
7.3 TEST DATE	16
7.4 TEST DATA FOR 1 MBPS	17
7.5 TEST DATA FOR 2 MBPS	19
7.6 TEST DATA FOR 3 MBPS	21
8. HOPPING FREQUENCY SEPARATION	23
8.1 OPERATING ENVIRONMENT	23
8.2 TEST SET-UP	23
8.3 TEST DATE	23

8.4 TEST DATA FOR 1 MBPS	24
8.5 TEST DATA FOR 2 MBPS	25
8.6 TEST DATA FOR 3 MBPS	26
9. NUMBER OF HOPPING CHANNELS	27
9.1 OPERATING ENVIRONMENT	27
9.2 TEST SET-UP	27
9.3 TEST DATE	27
9.4 TEST DATA FOR 1 MBPS	28
9.5 TEST DATA FOR 2 MBPS	31
9.6 TEST DATA FOR 3 MBPS	34
10. TIME OF OCCUPANCY	37
10.1 OPERATING ENVIRONMENT	37
10.2 TEST SET-UP	37
10.3 TEST DATE	37
10.4 TEST DATA FOR 1 MBPS	38
10.5 TEST DATA FOR 2 MBPS	40
10.6 TEST DATA FOR 3 MBPS	42
11. MAXIMUM PEAK OUTPUT POWER	44
11.1 OPERATING ENVIRONMENT	44
11.2 TEST SET-UP	44
11.3 TEST DATE	44
11.4 TEST DATA FOR 1 MBPS	45
11.5 TEST DATA FOR 2 MBPS	47
11.6 TEST DATA FOR 3 MBPS	49
12. 100 KHZ BANDWIDTH OUTSIDE THE FREQUENCY BAND	51
12.1 OPERATING ENVIRONMENT	51
12.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	51
12.3 TEST SET-UP FOR RADIATED MEASUREMENT	51
12.4 TEST DATE	51
12.5 TEST DATA FOR CONDUCTED EMISSION	52
12.5.1 Test data for 1 Mbps	52
12.5.2 Test data for 2 Mbps	58
12.5.3 Test data for 3 Mbps	64
12.6 TEST DATA FOR TRANSMITTING MODE RADIATED EMISSION	70
12.6.1 Radiated Emission which fall in the Restricted Band	70
12.6.2 Spurious & Harmonic Radiated Emission above 1 GHz	73

13. RADIATED EMISSION TEST	76
13.1 OPERATING ENVIRONMENT	76
13.2 TEST SET-UP	76
13.3 TEST DATE	77
13.4 TEST DATA FOR 30 MHz ~ 1 000 MHz	78
13.4.1 Test data for Bluetooth Mode_Internal Antenna.....	78
13.4.2 Test data for Intermodulation Mode(Bluetooth + WLAN 2.4 GHz)	79
13.4.3 Test data for Intermodulation Mode(Bluetooth + WLAN 5 GHz)	80
13.4 TEST DATA FOR BELOW 30 MHz	81
13.5 TEST DATA FOR ABOVE 1 GHz	81
14. LIST OF TEST EQUIPMENT	82

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-221-RWD-063	January 26, 2022	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : LG Electronics USA

Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States

Contact Person : Sung Soo Kim / Director, Regulatory and Environmental Affairs

Telephone No. : +201-266-2215

FCC ID : BEJVCUEB

Model Name : VCUEB

Brand Name : -

Serial Number : N/A

Date : January 26, 2022

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
E.U.T. DESCRIPTION	Silverbox RADIO ASM-RECEIVER
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.

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	N/A (See Note)
15.203	Antenna Requirement	Met requirement / PASS

Note: This test is not performed because the EUT is operated by DC Power.

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

3. GENERAL INFORMATION

3.1 Product Description

The LG Electronics USA, Model VCUEB (referred to as the EUT in this report) is a Silverbox RADIO ASM-RECEIVER. The product specification described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Silverbox RADIO ASM-RECEIVER	
Temperature Range	-30 °C ~ 85 °C	
OPERATING FREQUENCY	Bluetooth	2 402 MHz ~ 2 480 MHz
	WLAN 2.4 GHz	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20))
	5 150 MHz ~ 5 250 MHz Band	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20)/ac(VHT20))
		5 190 MHz ~ 5 230 MHz (802.11n(HT40)/ac(VHT40))
		5 210 MHz (802.11ac(VHT80))
	5 725 MHz ~ 5 850 MHz Band	5 745 MHz ~ 5 825 MHz (802.11a/n(HT20)/ac(VHT20))
		5 755 MHz ~ 5 795 MHz (802.11n(HT40)/ac(VHT40))
		5 775 MHz (802.11ac(VHT80))
MODULATION TYPE	Bluetooth	GFSK for 1 Mbps, $\pi/4$ -DQPSK for 2 Mbps, 8-DPSK for 3 Mbps
	WLAN 2.4 GHz	802.11b: DSSS Modulation(DBPSK/DQPSK/CCK) 802.11g/n(HT20): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)
	WLAN 5 GHz	802.11a/n(HT20)/n(HT40)/ac(VHT80): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)

RF OUTPUT POWER	Bluetooth	1 Mbps	4.12 dBm
		2 Mbps	6.20 dBm
		3 Mbps	6.64 dBm
	WLAN 2.4 GHz	12.77 dBm(802.11b) 12.53 dBm(802.11g) 12.45 dBm(802.11n_HT20)	
	5 150 MHz ~ 5 250 MHz Band (UNII I)	Internal Antenna	14.58 dBm(802.11a) 15.54 dBm(802.11n_HT20) 12.50 dBm(802.11n_HT40) 10.36 dBm(802.11ac_VHT80)
		External Antenna	11.68 dBm(802.11a) 12.65 dBm(802.11n_HT20) 10.99 dBm(802.11n_HT40) 6.62 dBm(802.11ac_VHT80)
	5 725 MHz ~ 5 850 MHz Band (UNII 3)	Internal Antenna	13.94 dBm(802.11a) 14.97 dBm(802.11n_HT20) 13.89 dBm(802.11n_HT40) 9.87 dBm(802.11ac_VHT80)
		External Antenna	11.03 dBm(802.11a) 11.89 dBm(802.11n_HT20) 10.49 dBm(802.11n_HT40) 5.84 dBm(802.11ac_VHT80)

ANTENNA TYPE	Bluetooth	PCB Antenna	
	WLAN 2.4 GHz	PCB Antenna	
	WLAN 5 GHz	Internal Antenna	PCB Antenna
		External Antenna	PCB Antenna
ANTENNA GAIN	Bluetooth	4.73 dBi	
	WLAN 2.4 GHz	2.10 dBi	
	5 150 MHz ~	Internal Antenna	5.29 dBi
	5 250 MHz Band	External Antenna	2.60 dBi
	5 725 MHz ~	Internal Antenna	4.29 dBi
	5 850 MHz Band	External Antenna	2.80 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)		37.4 MHz, 100 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	N/A	N/A
Module	N/A	N/A	N/A
Antenna	N/A	N/A	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
VCUEB	LG Electronics Inc.	Silverbox RADIO ASM-RECEIVER (EUT)	
TC-3000C	TESCOM	BLUETOOTH TESTER	EUT
GP-4303D	LG Precision Co.,Ltd	DC Power Supply (DC 30 V 3 A)	

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, 2 441 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)

Channel	Frequency[MHz]	Channel	Frequency[MHz]	Channel	Frequency[MHz]
0	2 402.00	27	2 429.00	54	2 456.00
1	2 403.00	28	2 430.00	55	2 457.00
2	2 404.00	29	2 431.00	56	2 458.00
3	2 405.00	30	2 432.00	57	2 459.00
4	2 406.00	31	2 433.00	58	2 460.00
5	2 407.00	32	2 434.00	59	2 461.00
6	2 408.00	33	2 435.00	60	2 462.00
7	2 409.00	34	2 436.00	61	2 463.00
8	2 410.00	35	2 437.00	62	2 464.00
9	2 411.00	36	2 438.00	63	2 465.00
10	2 412.00	37	2 439.00	64	2 466.00
11	2 413.00	38	2 440.00	65	2 467.00
12	2 414.00	39	2 441.00	66	2 468.00
13	2 415.00	40	2 442.00	67	2 469.00
14	2 416.00	41	2 443.00	68	2 470.00
15	2 417.00	42	2 444.00	69	2 471.00
16	2 418.00	43	2 445.00	70	2 472.00
17	2 419.00	44	2 446.00	71	2 473.00
18	2 420.00	45	2 447.00	72	2 474.00
19	2 421.00	46	2 448.00	73	2 475.00
20	2 422.00	47	2 449.00	74	2 476.00
21	2 423.00	48	2 450.00	75	2 477.00
22	2 424.00	49	2 451.00	76	2 478.00
23	2 425.00	50	2 452.00	77	2 479.00
24	2 426.00	51	2 453.00	78	2 480.00
25	2 427.00	52	2 454.00		
26	2 428.00	53	2 455.00		

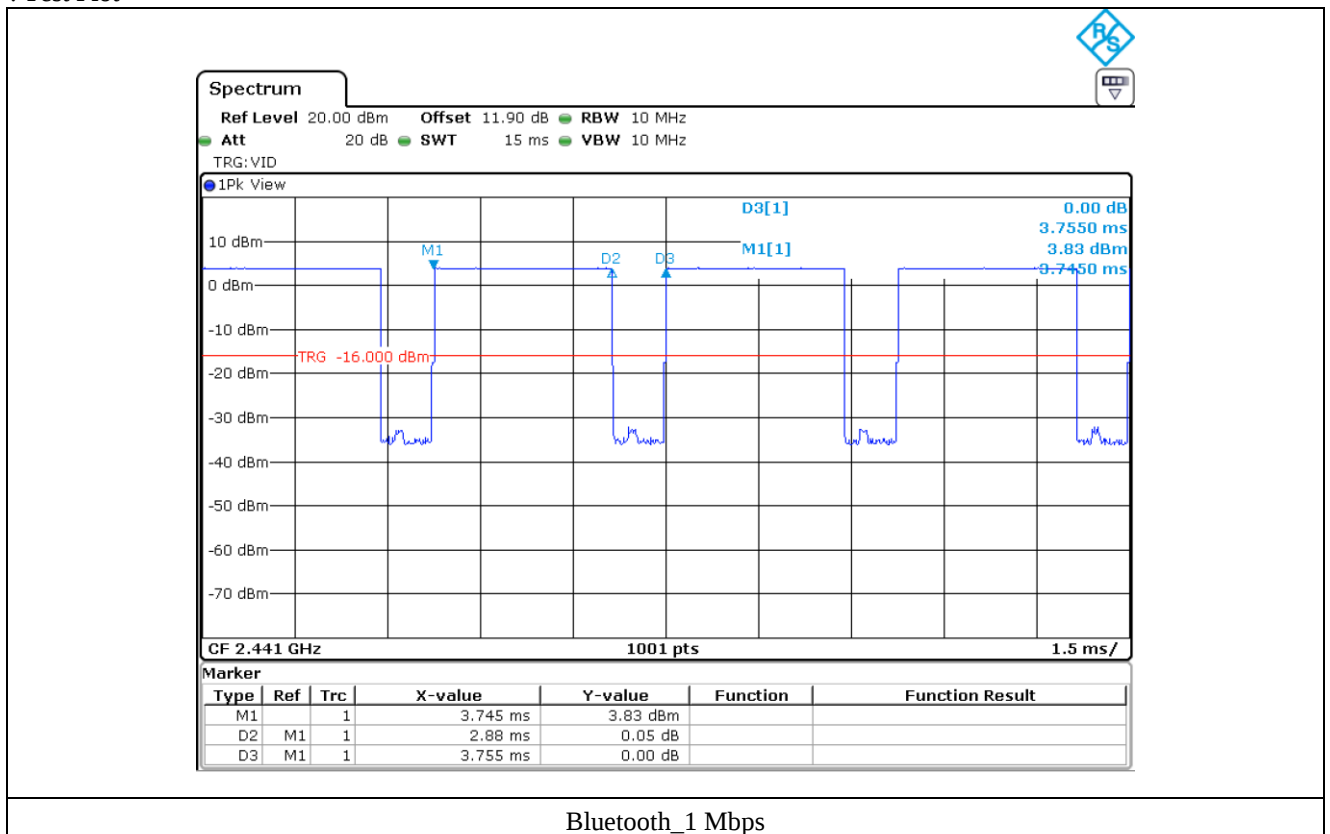
-. Duty Cycle

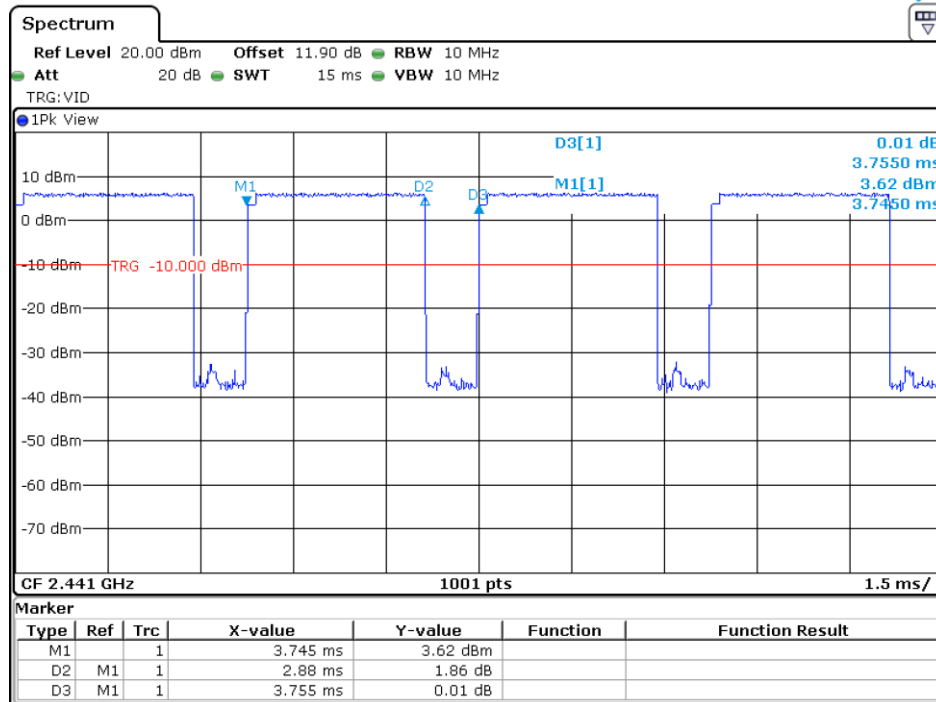
Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
Bluetooth [1 Mbps]	2.880	0.875	76.70	1.15
Bluetooth [2 Mbps]	2.880	0.875	76.70	1.15
Bluetooth [3 Mbps]	2.880	0.875	76.70	1.15

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

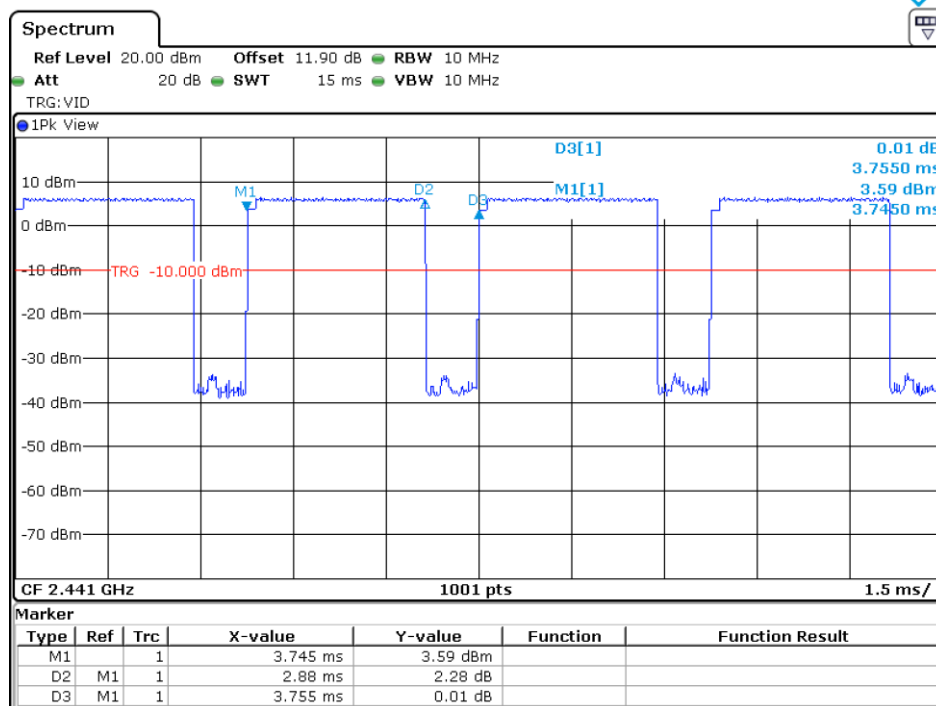
Correction Factor : 10 * Log(1 / (Duty Cycle / 100))

-. Test Plot





Bluetooth_2 Mbps



Bluetooth_3 Mbps

5.4 Configuration of Test System

Line Conducted Test: It is not need to test this requirement, because the EUT shall be operated by DC Power.

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 PCB Antenna on the main board in the EUT and a PCB antenna connected to the outside of the EUT by a special connector type, 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)
It is not need to test this requirement, because the power of the EUT is supplied by DC Power.	

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 20 dB BANDWIDTH

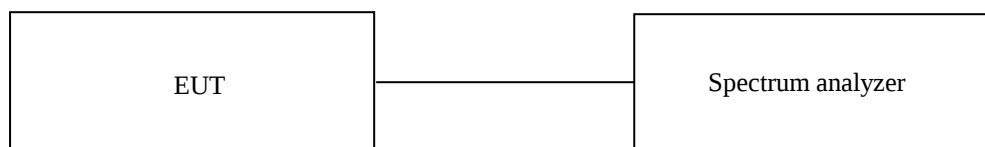
7.1 Operating environment

Temperature : 23 °C

Relative humidity : 41 % 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 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.

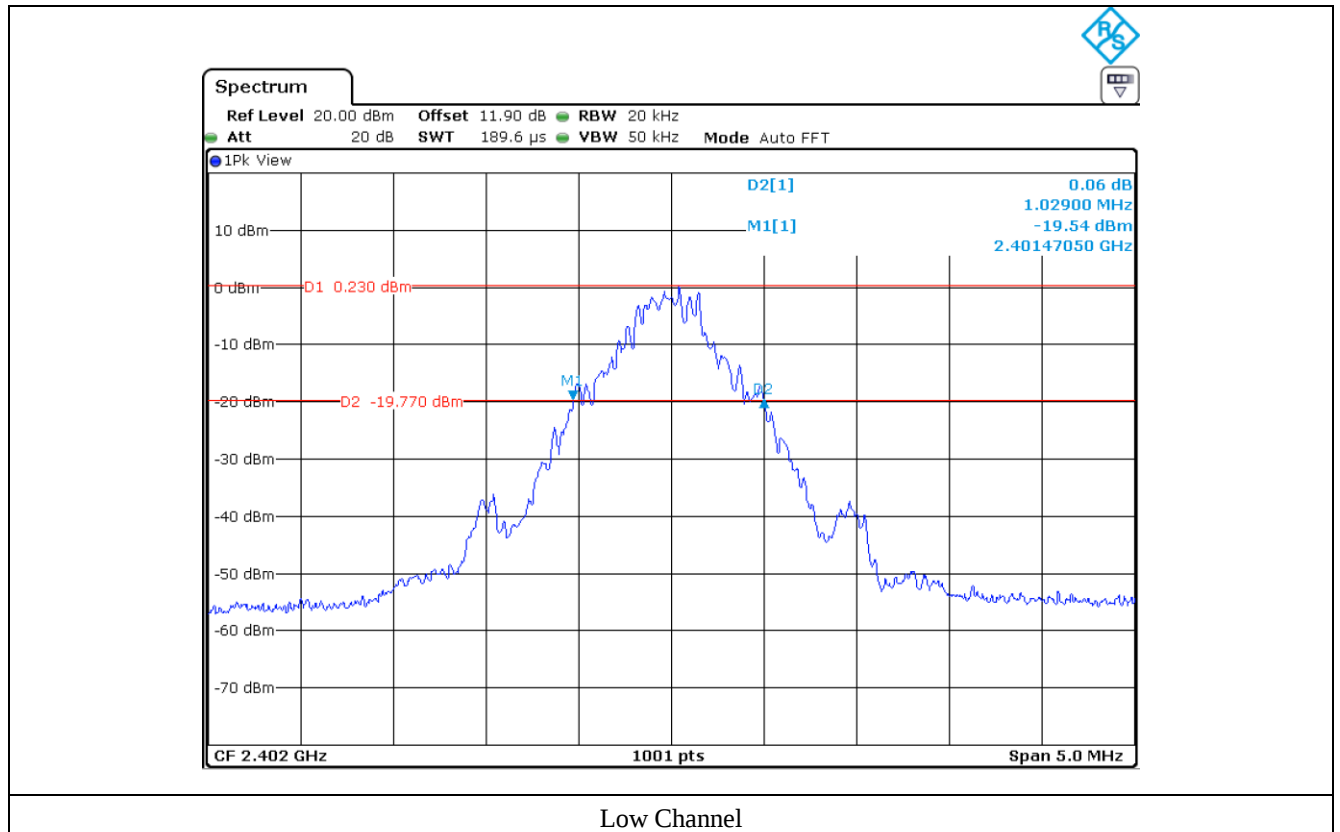


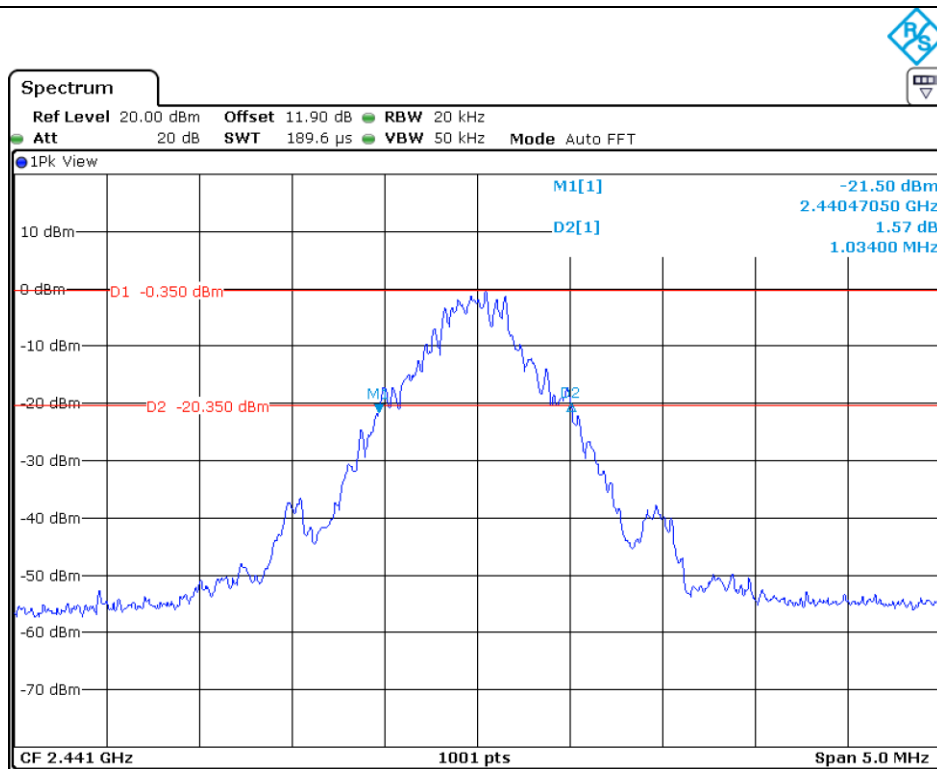
7.3 Test Date

November 25, 2021 ~ January 18, 2022

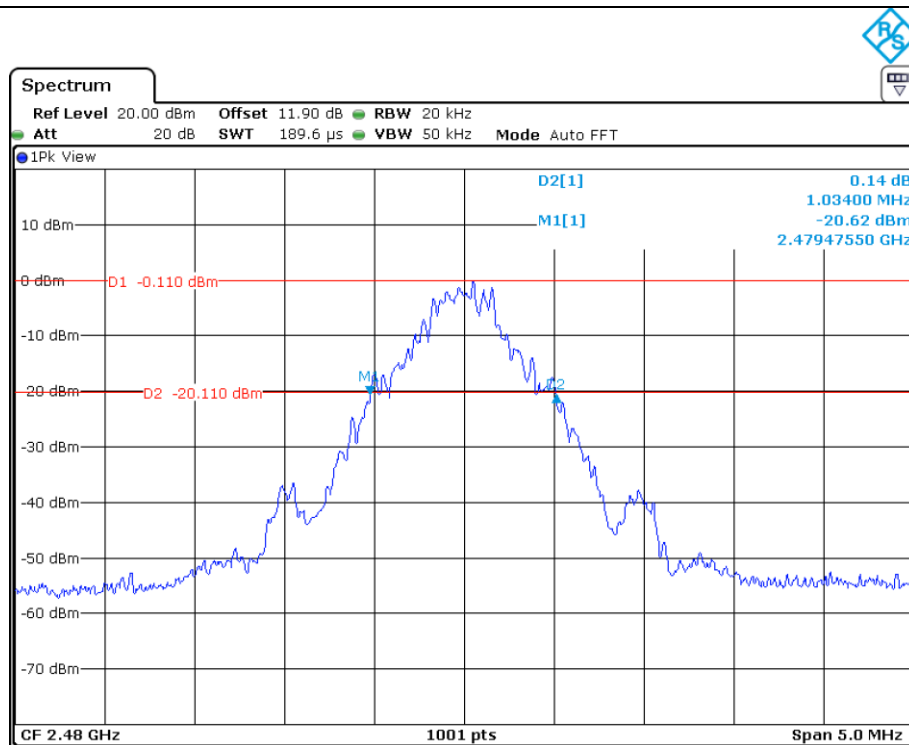
7.4 Test data for 1 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 029.00
Middle	2 441.00	1 034.00
High	2 480.00	1 034.00





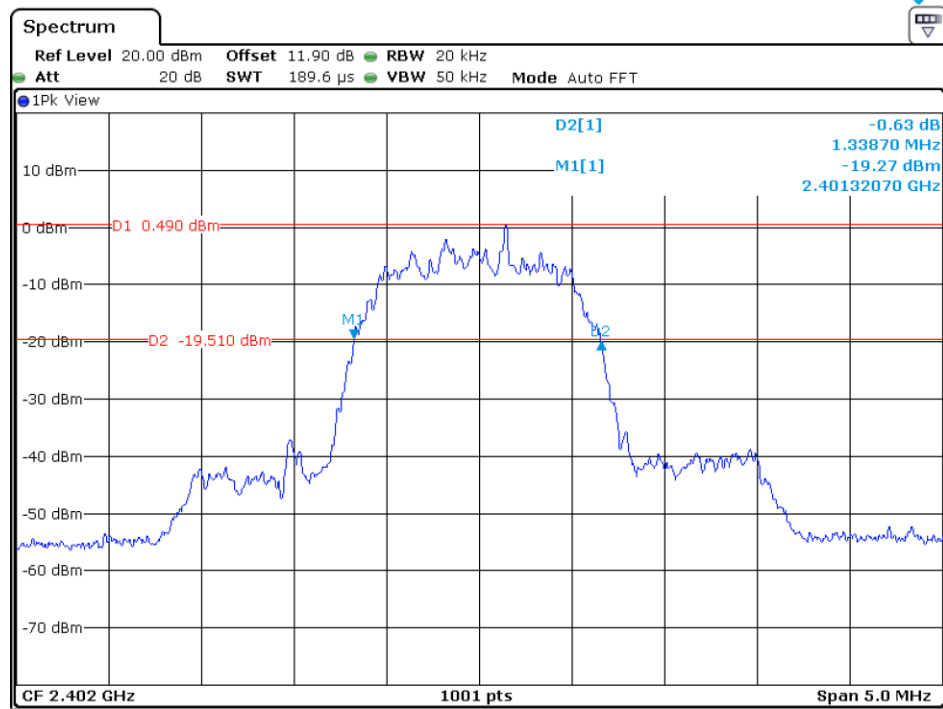
Middle Channel



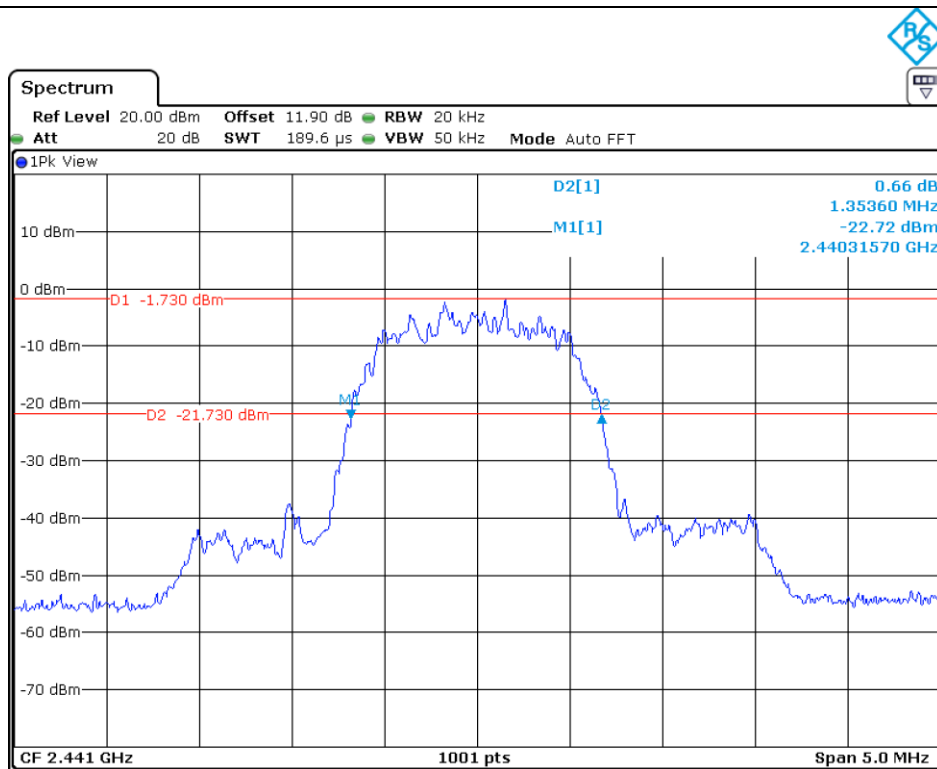
High Channel

7.5 Test data for 2 Mbps

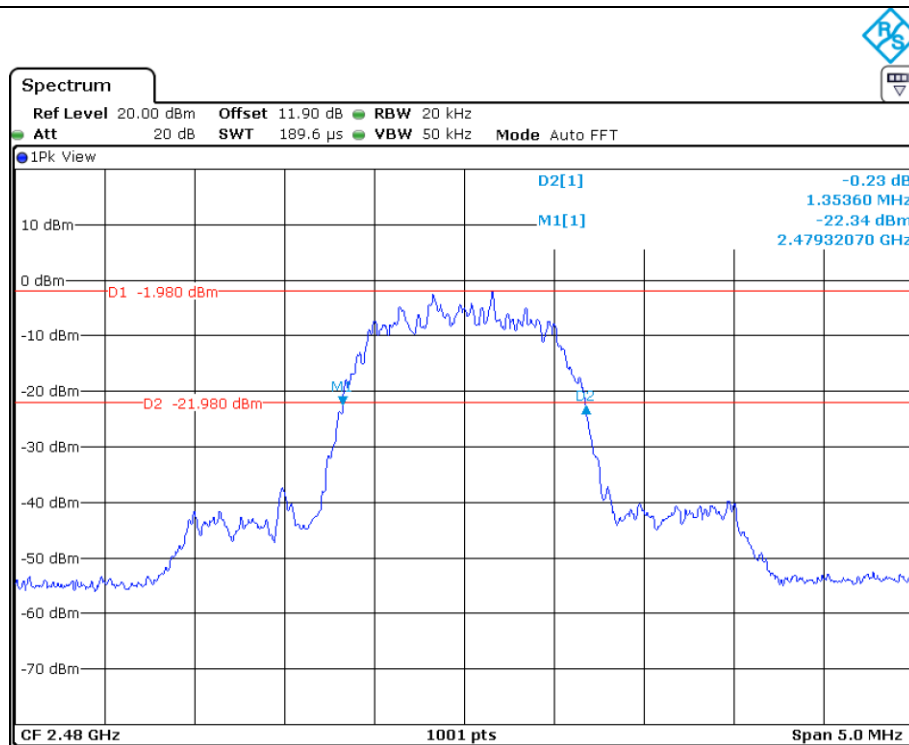
CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 338.70
Middle	2 441.00	1 353.60
High	2 480.00	1 353.60



Low Channel



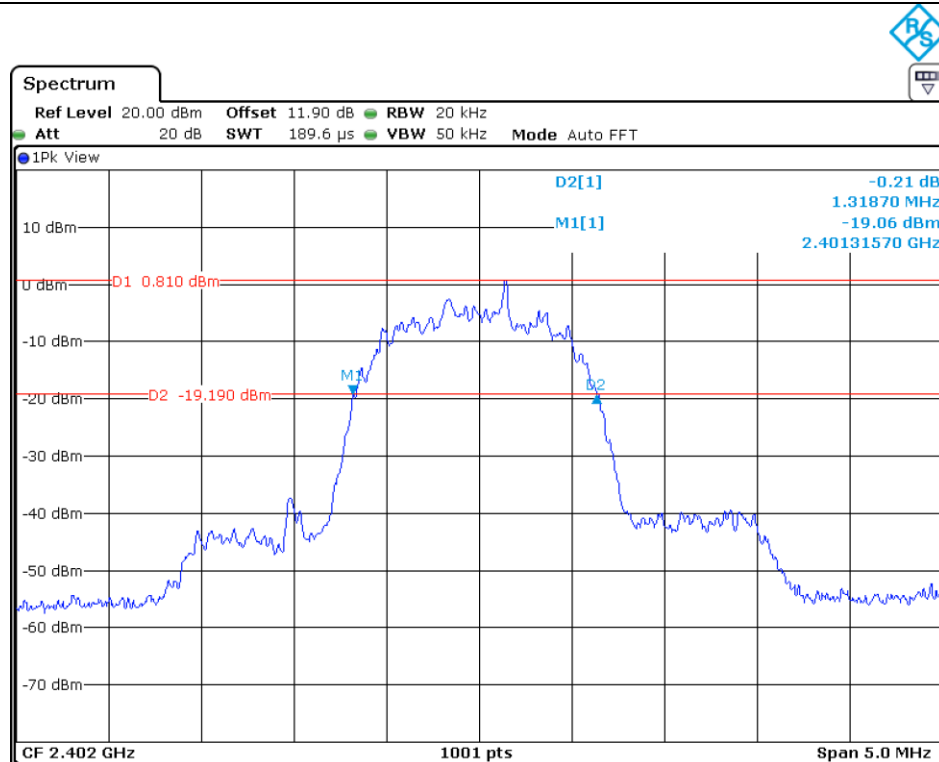
Middle Channel



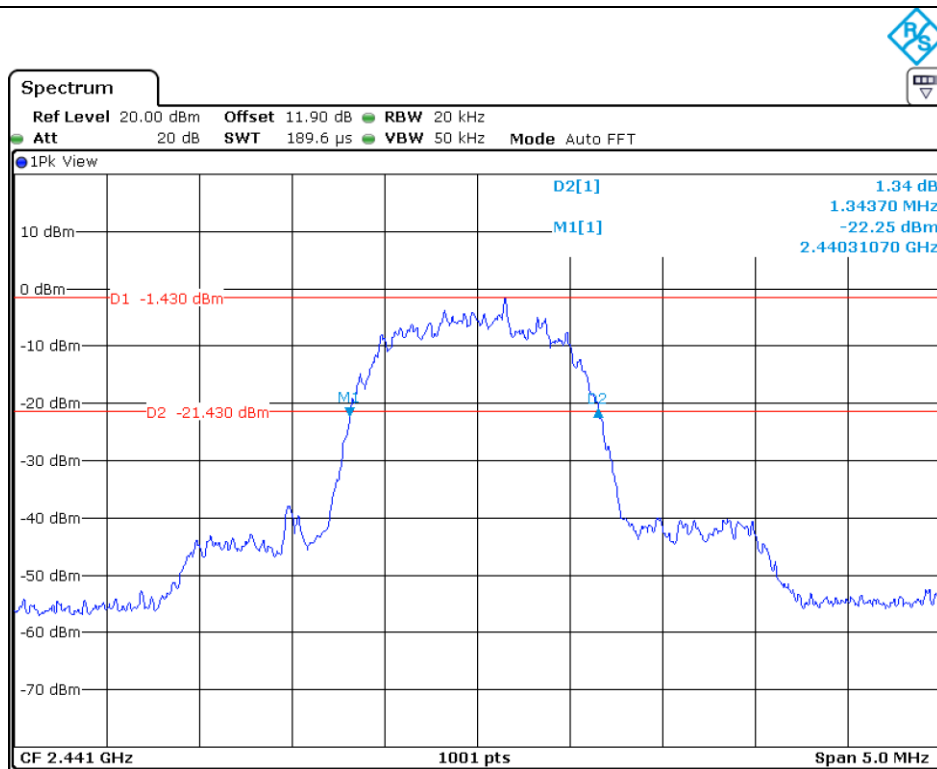
High Channel

7.6 Test data for 3 Mbps

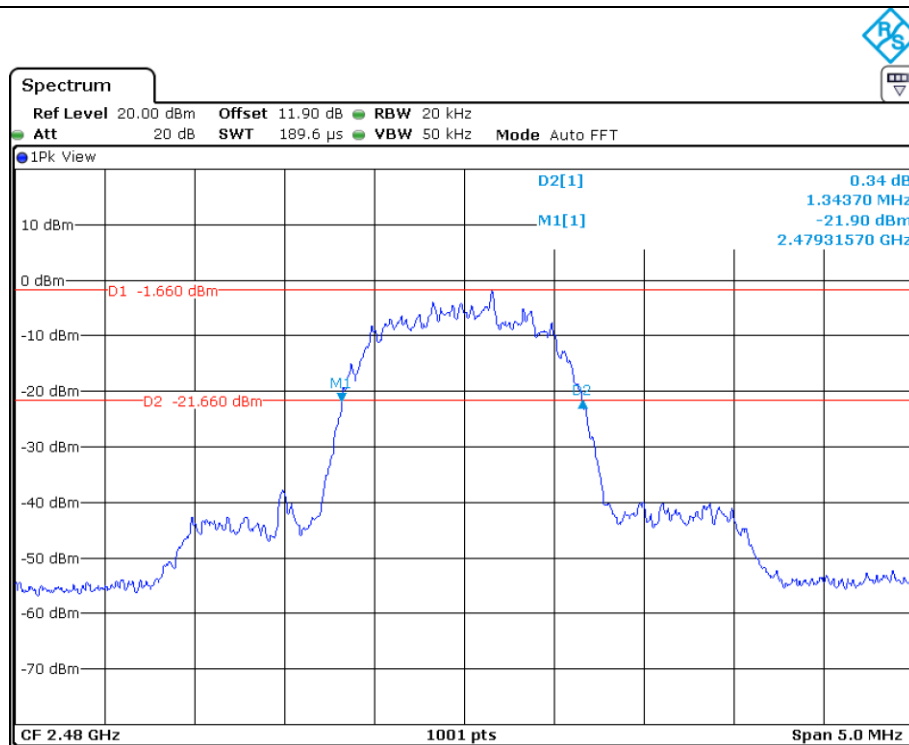
CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 318.70
Middle	2 441.00	1 343.70
High	2 480.00	1 343.70



Low Channel



Middle Channel



High Channel

8. HOPPING FREQUENCY SEPARATION

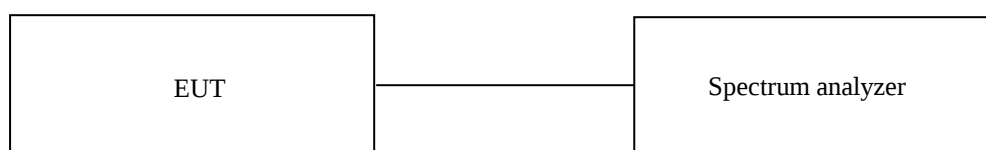
8.1 Operating environment

Temperature : 23 °C

Relative humidity : 41 % 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.



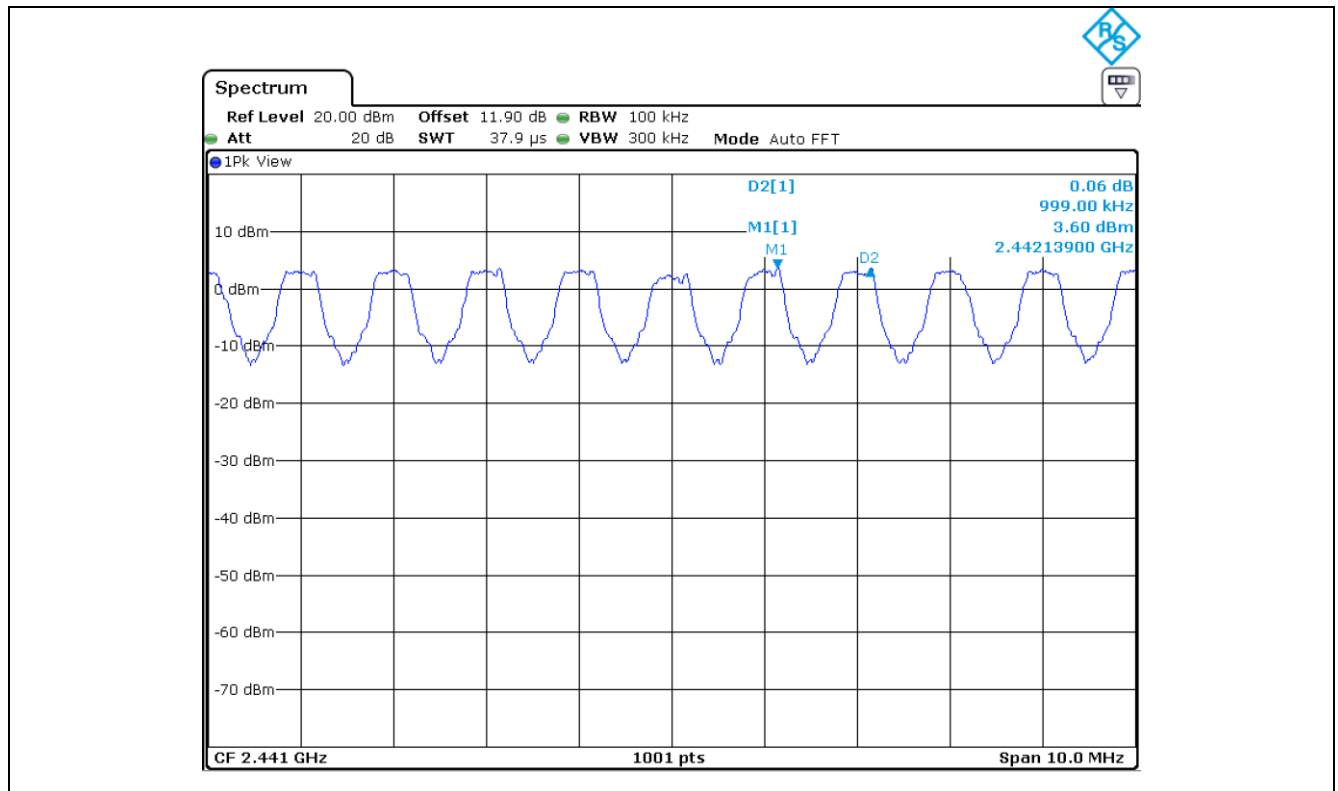
8.3 Test Date

November 25, 2021 ~ January 18, 2022

8.4 Test data for 1 Mbps

-. Test Result : Pass

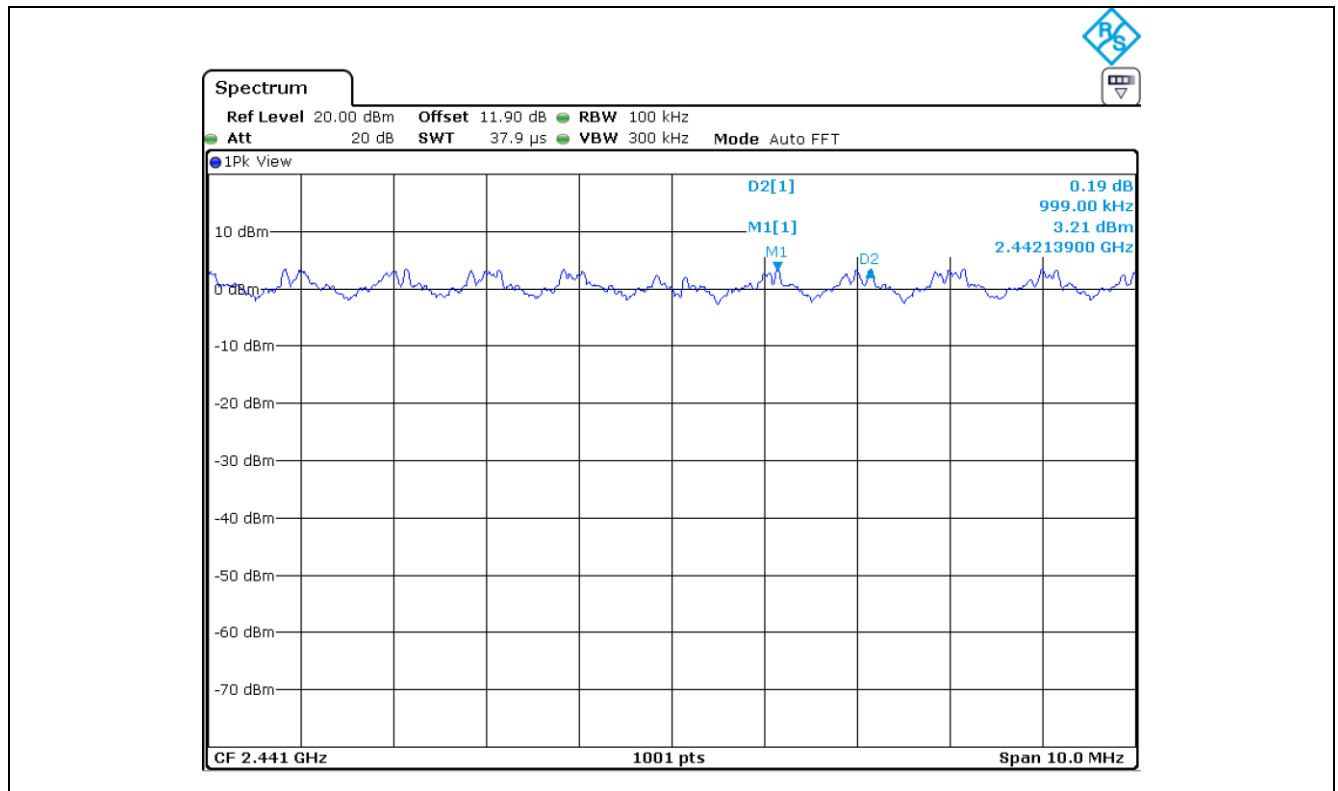
MEASURED VALUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	689.33	Separated by a minimum of 689.33 kHz



8.5 Test data for 2 Mbps

-. Test Result : Pass

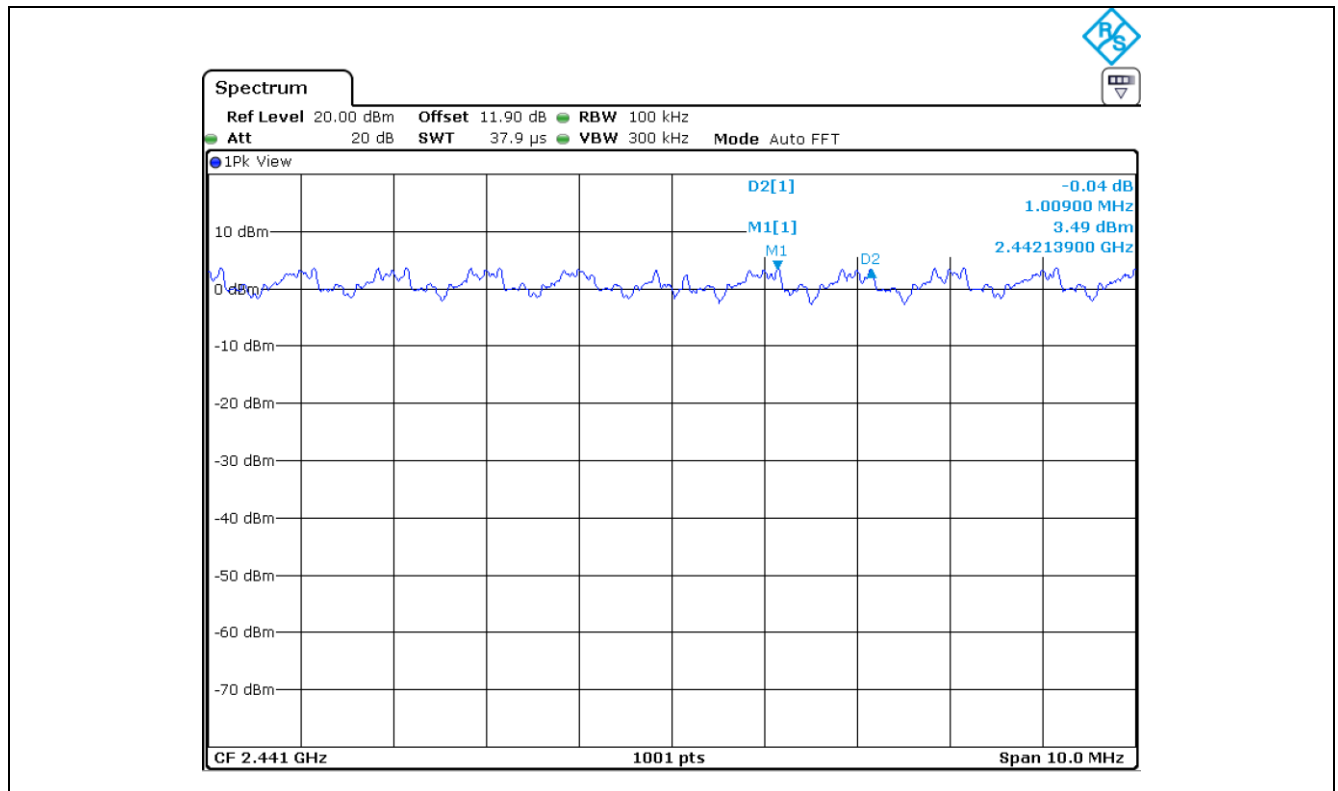
MEASURED VALUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
999.00	902.40	Separated by a minimum of 902.40 kHz



8.6 Test data for 3 Mbps

-. Test Result : Pass

MEASURED VALUE (kHz)	Two-third of 20 dB Bandwidth (kHz)	LIMIT
1 009.00	895.80	Separated by a minimum of 895.80 kHz



9. NUMBER OF HOPPING CHANNELS

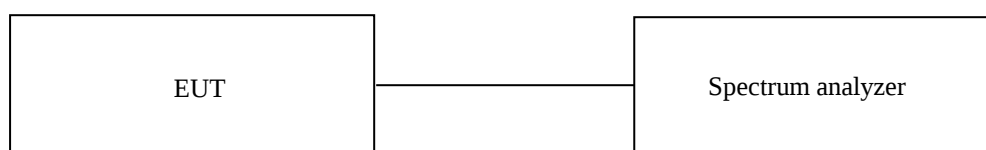
9.1 Operating environment

Temperature : 23 °C

Relative humidity : 41 % 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 100 kHz and the resolution bandwidth is set to 300 kHz. The analyzer is set to peak hold and then complete pseudo-random hopping sequence of the transmitter is captured.



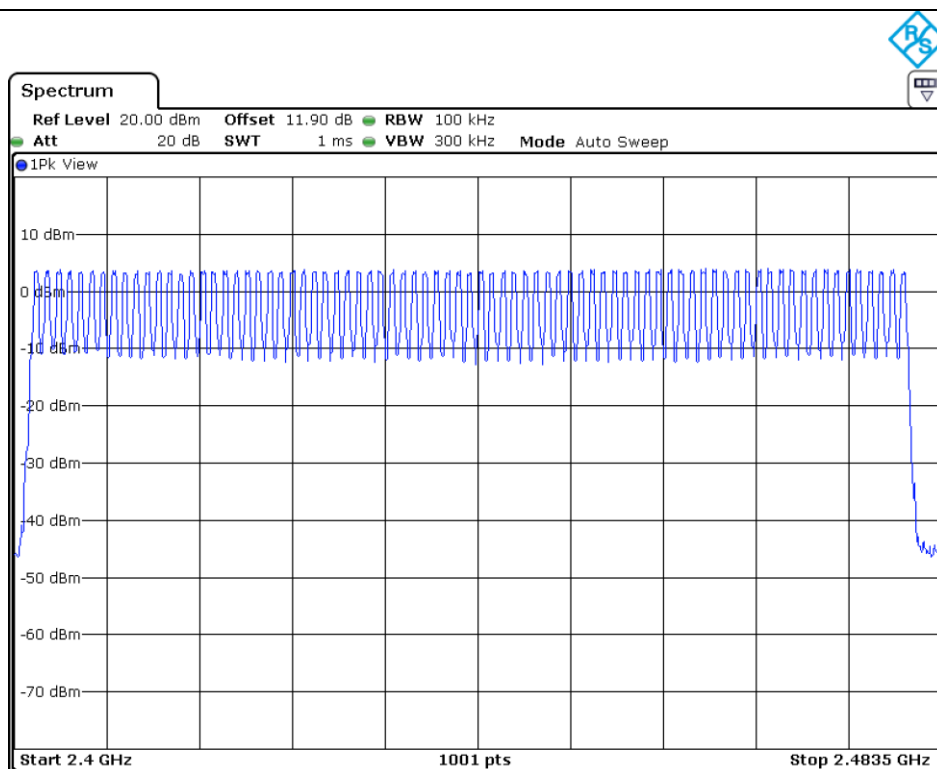
9.3 Test Date

November 25, 2021 ~ January 18, 2022

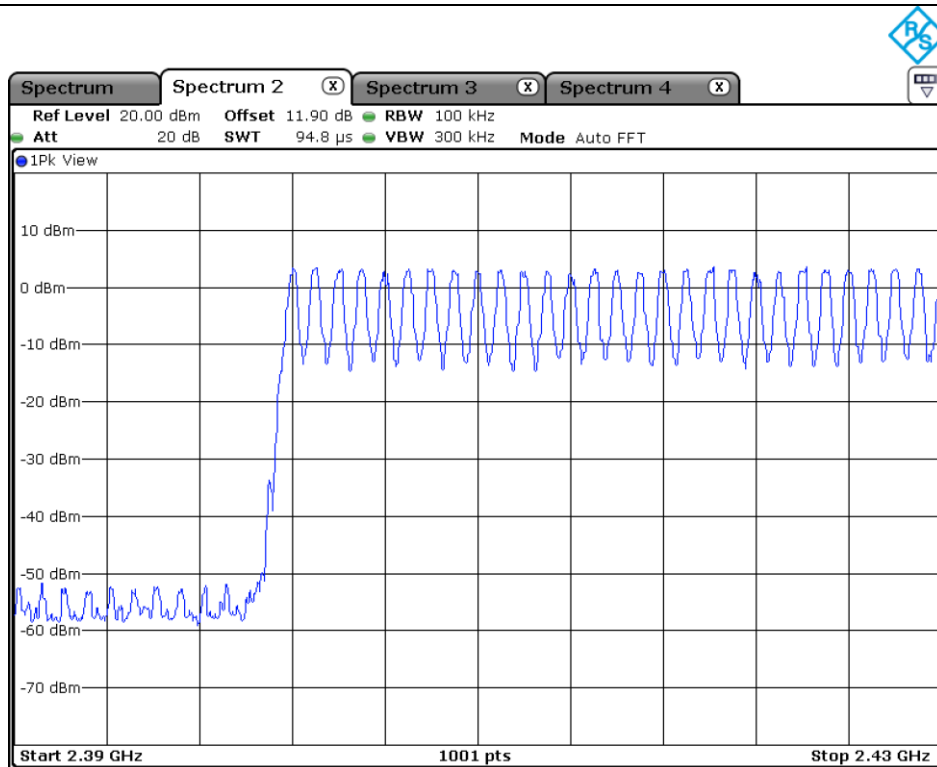
9.4 Test data for 1 Mbps

-. Test Result : Pass

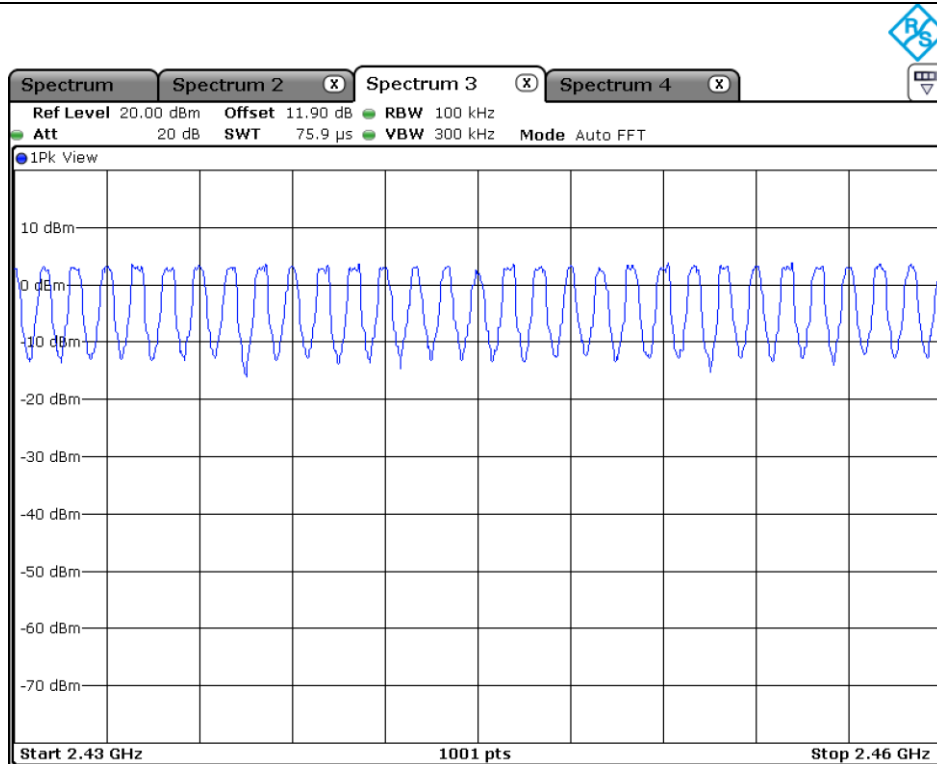
Data Transfer Rate	Measured value (Number)	Limit (Number)	Margin (Number)
1 Mbps	79	Minimum of 15	64



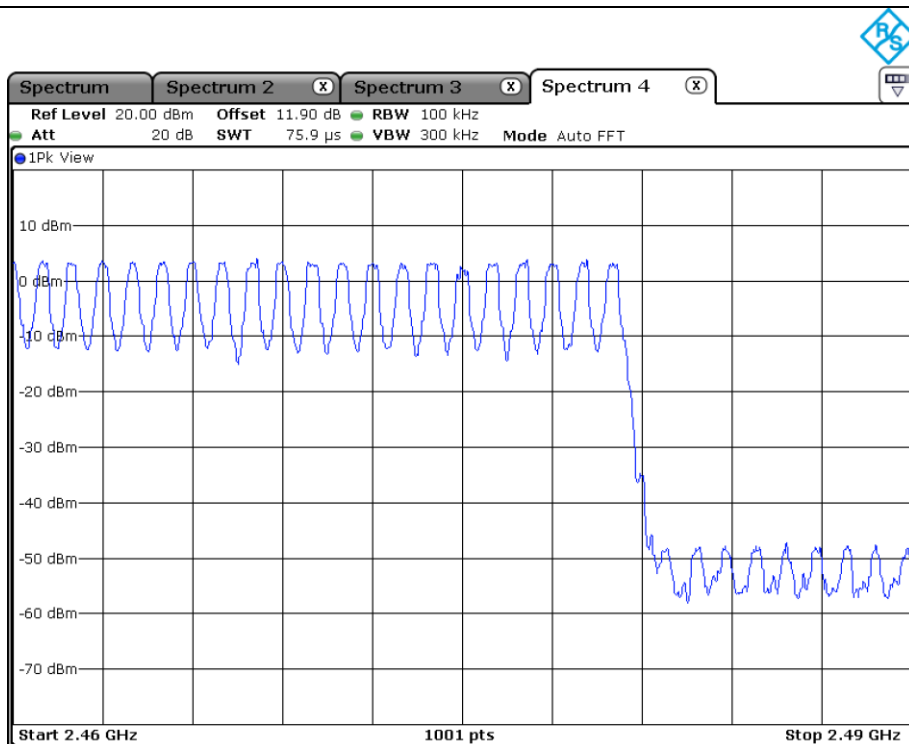
Total number of hopping channel: $28+30+21 = 79$



Number of hopping channel: 28



Number of hopping channel: 30

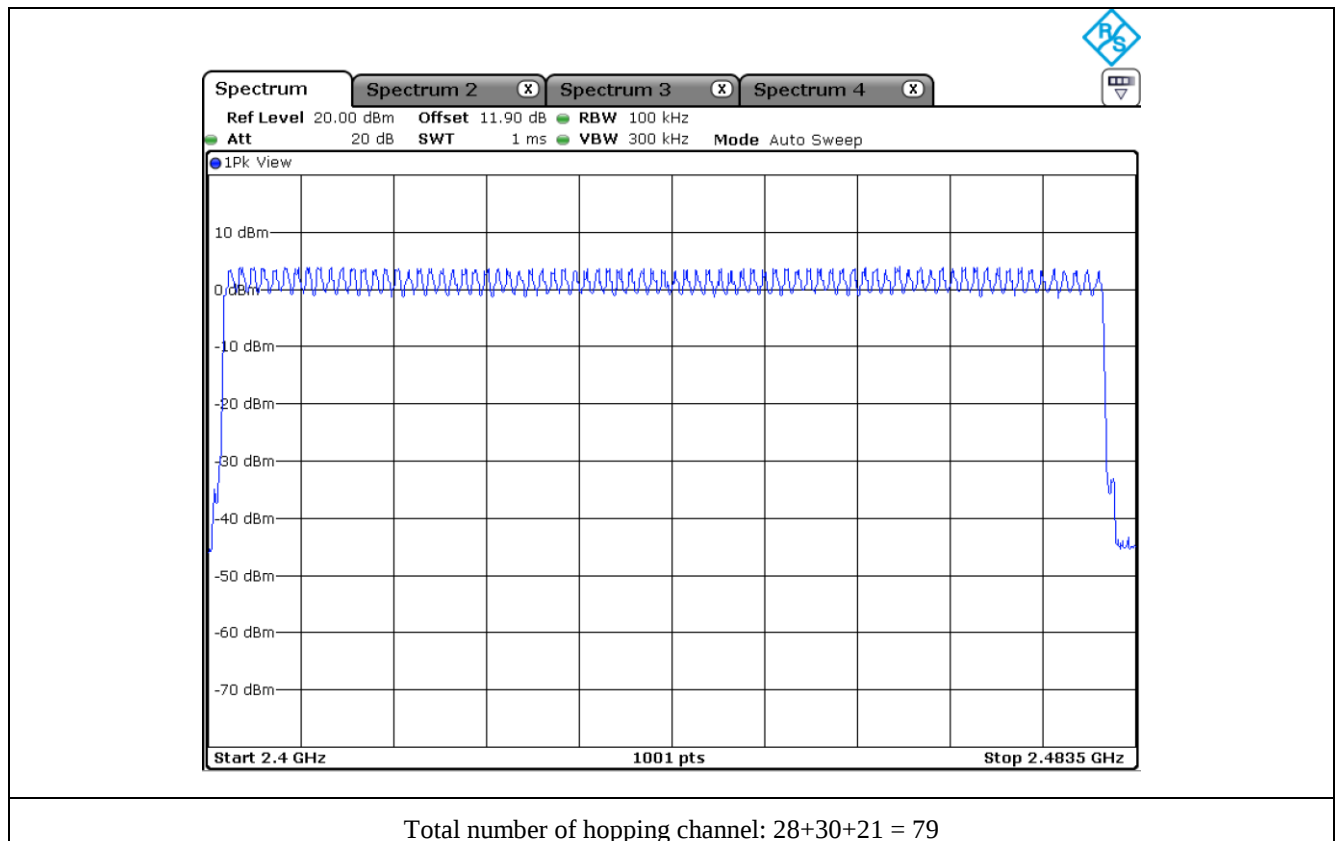


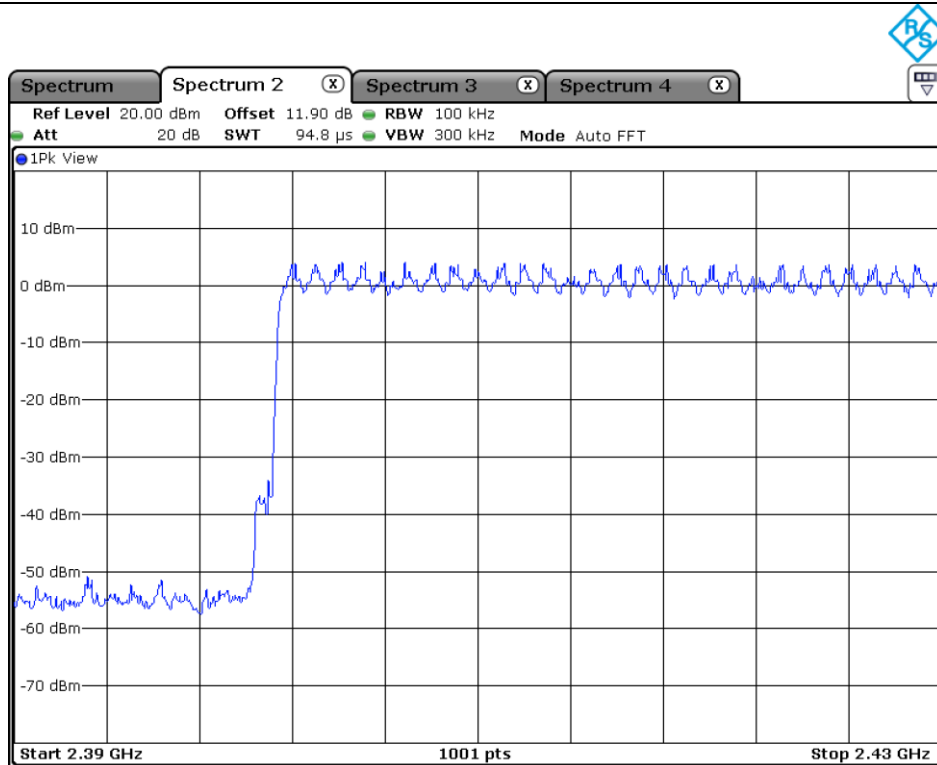
Number of hopping channel: 21

9.5 Test data for 2 Mbps

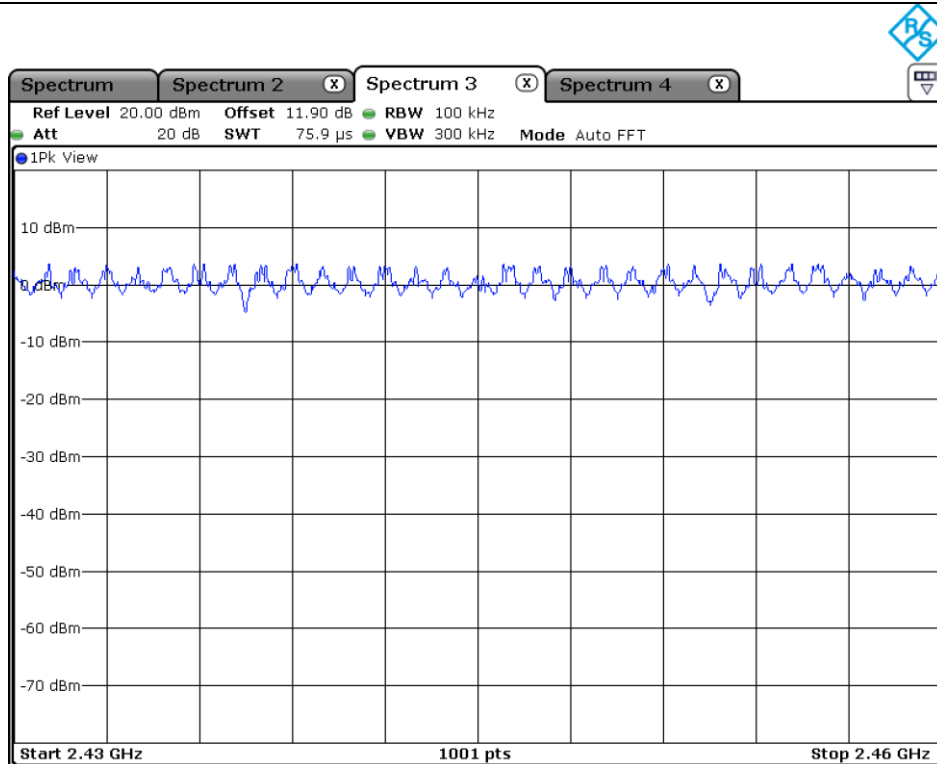
-. Test Result : Pass

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

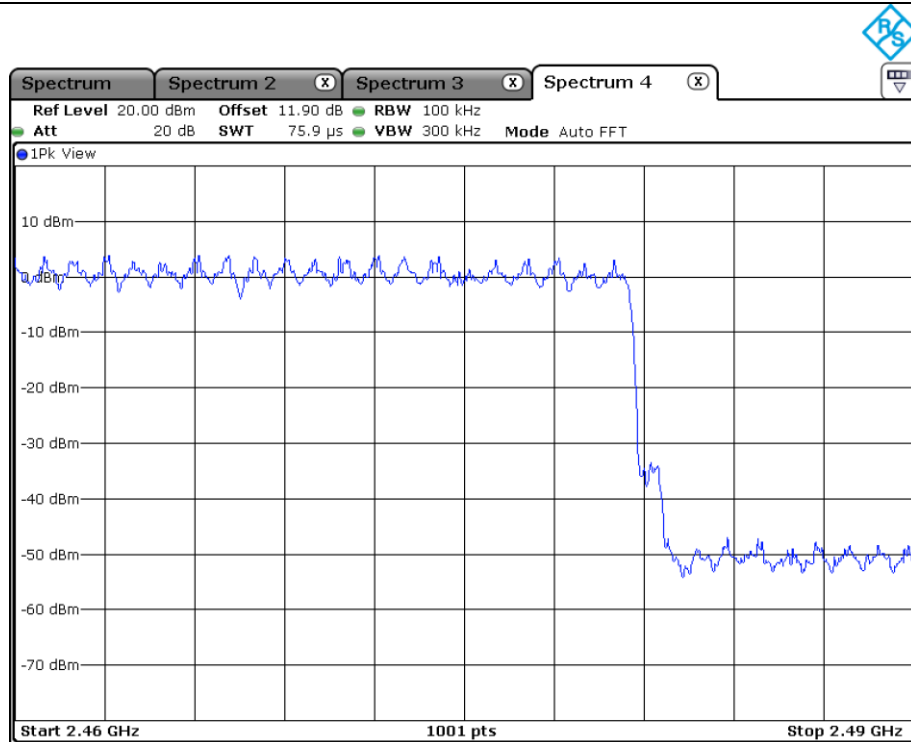




Number of hopping channel: 28



Number of hopping channel: 30

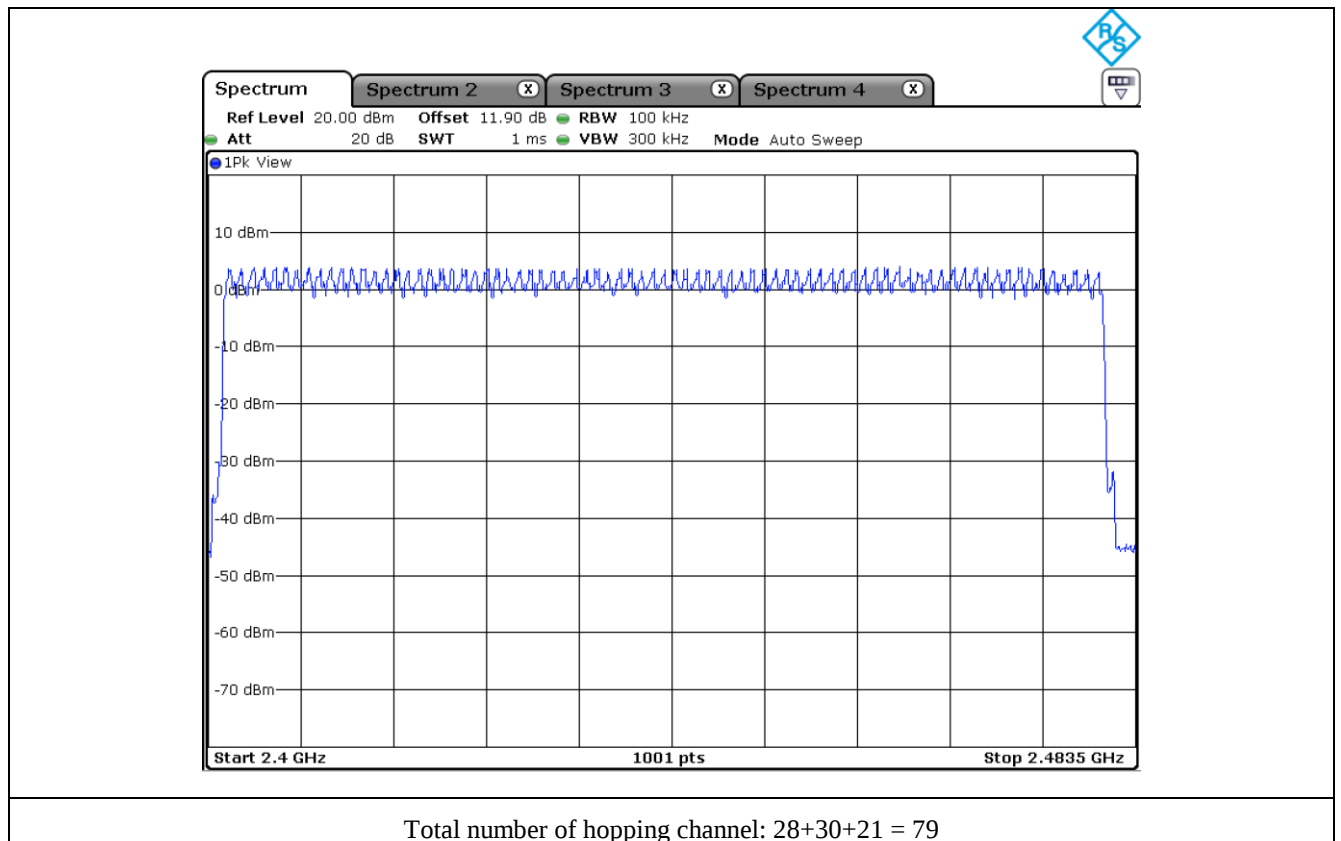


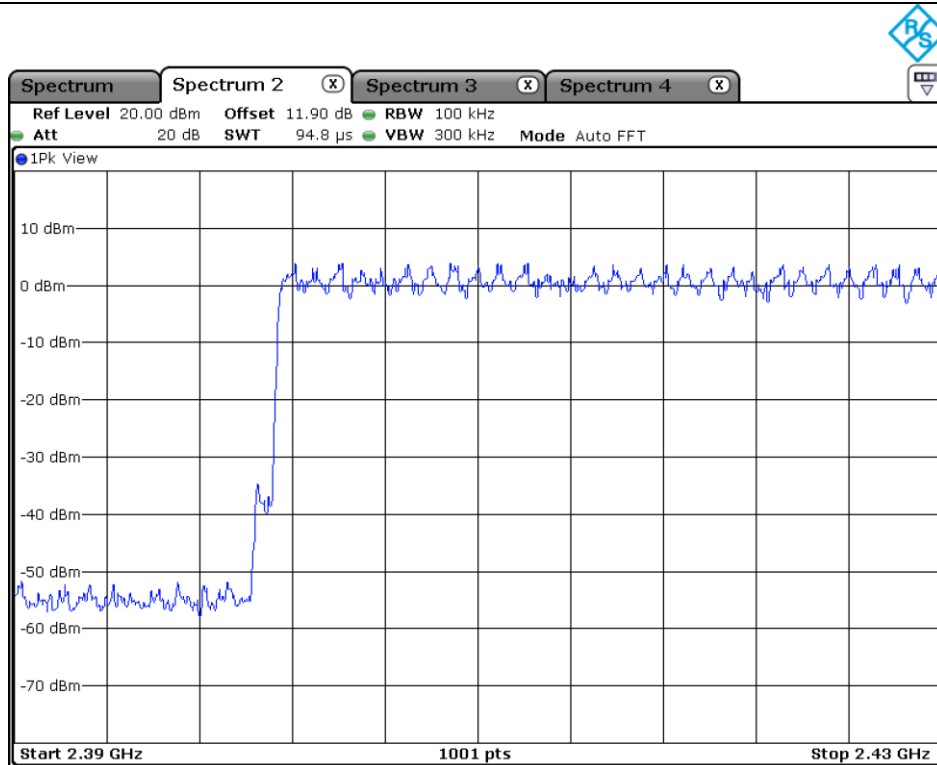
Number of hopping channel: 21

9.6 Test data for 3 Mbps

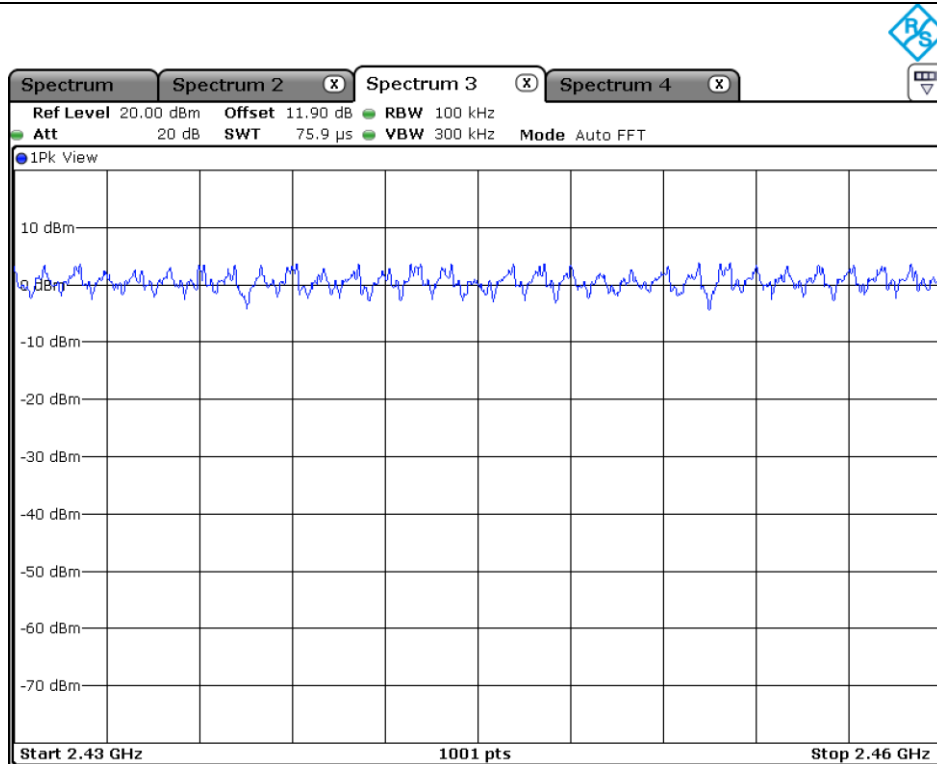
-. Test Result : Pass

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

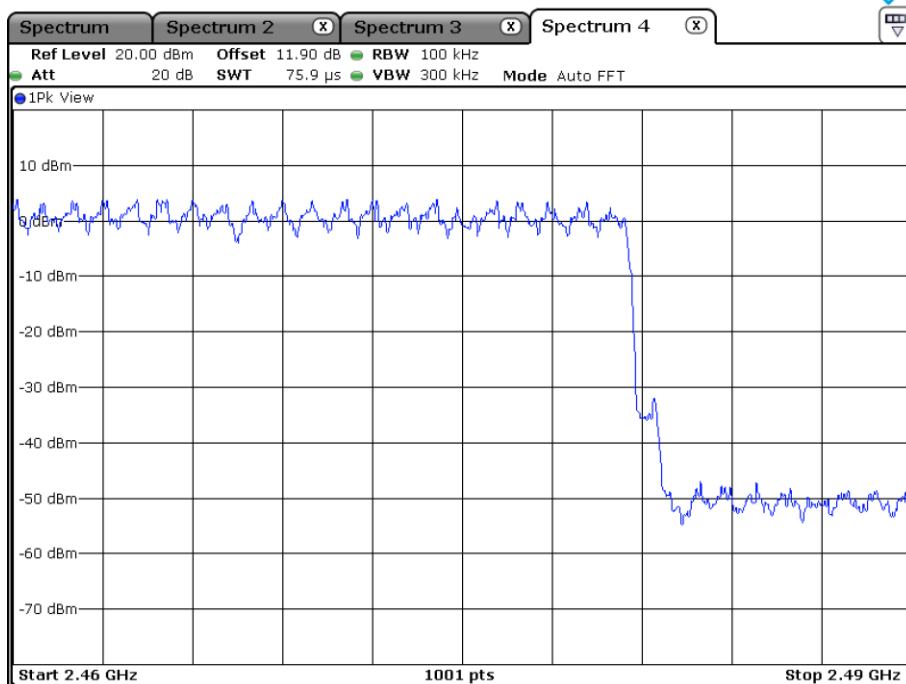




Number of hopping channel: 28



Number of hopping channel: 30



Number of hopping channel: 21

10. TIME OF OCCUPANCY

10.1 Operating environment

Temperature : 23 °C

Relative humidity : 41 % 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

November 25, 2021 ~ January 18, 2022

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 μ s with 79 channels.

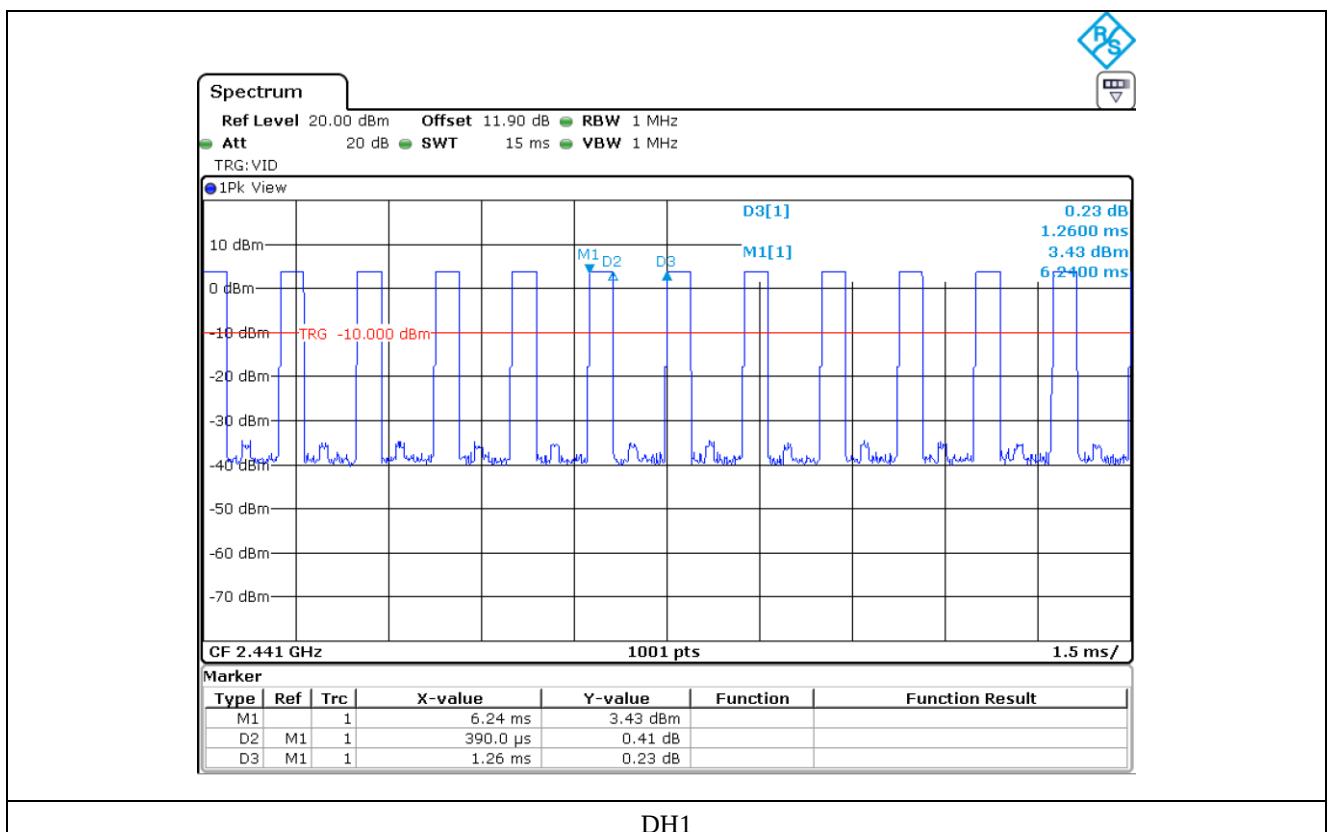
For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel 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.

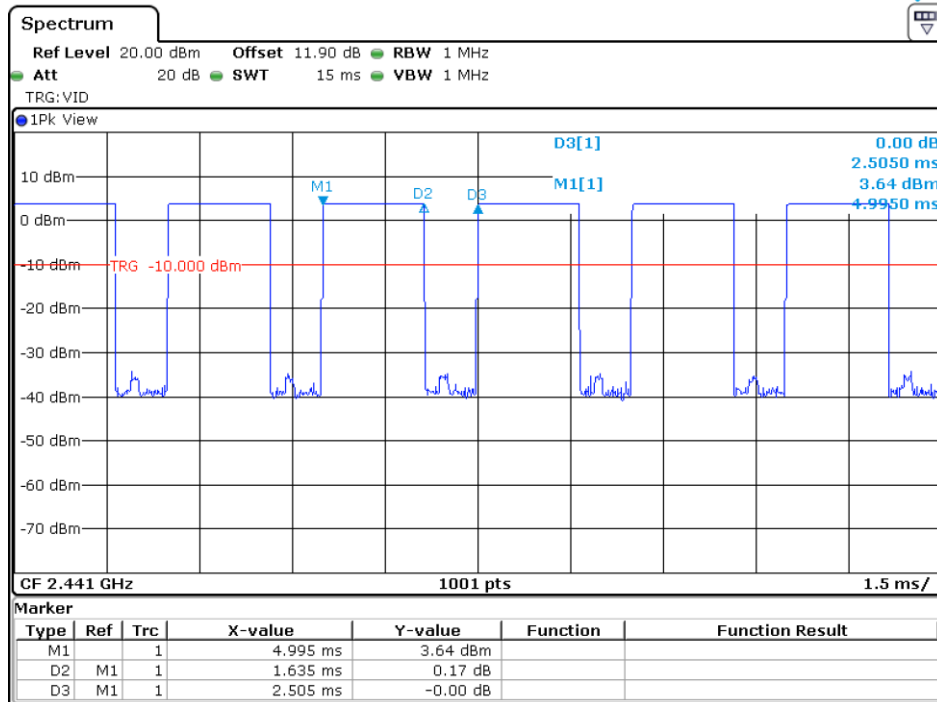
Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.390	10.13	31.60	124.84	400.00	PASS
DH3	1.635	5.06	31.60	261.43	400.00	
DH5	2.880	3.38	31.60	307.61	400.00	

Total dwell time is calculated as following.

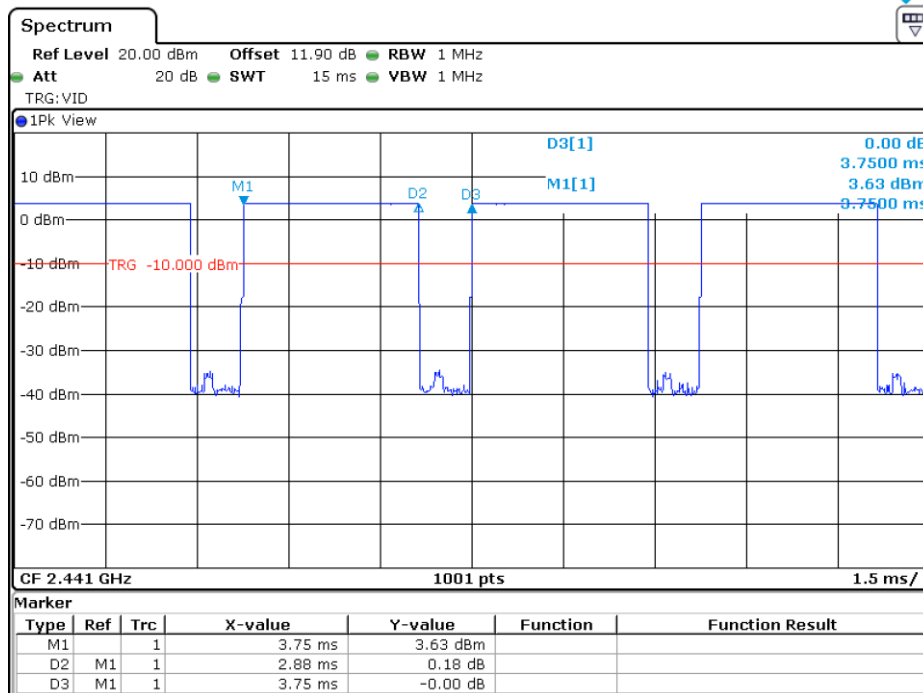
Total Dwell Time = Pulse time * Hops per second with channels * period time

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





DH3



DH5

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 μ s with 79 channels.

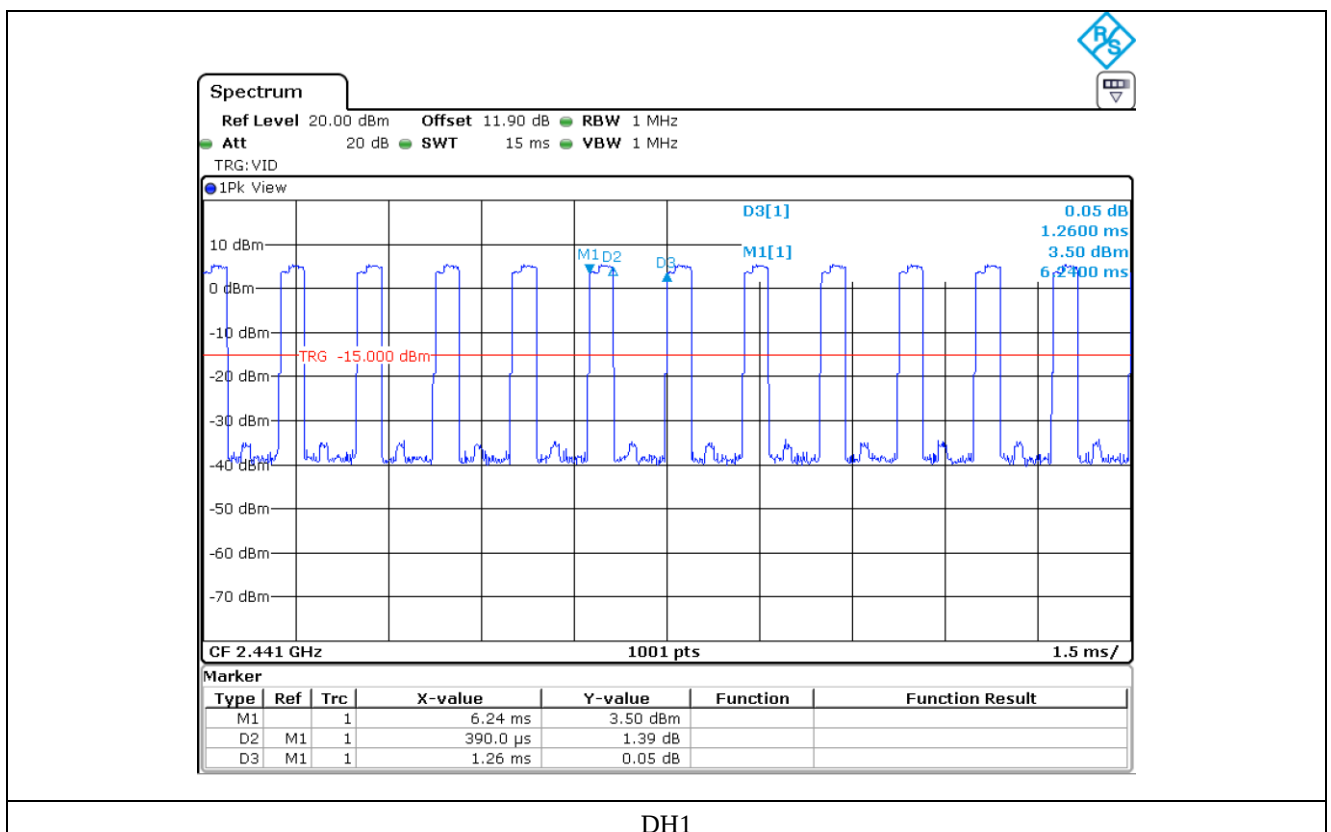
For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel 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.

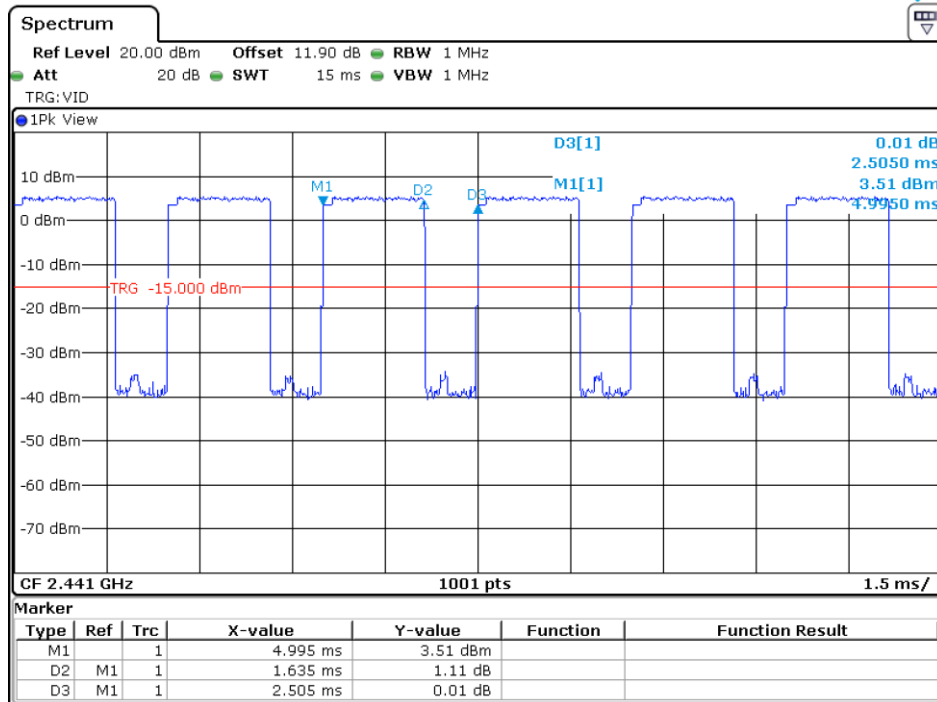
Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.390	10.13	31.60	124.84	400.00	PASS
DH3	1.635	5.06	31.60	261.43	400.00	
DH5	2.880	3.38	31.60	307.61	400.00	

Total dwell time is calculated as following.

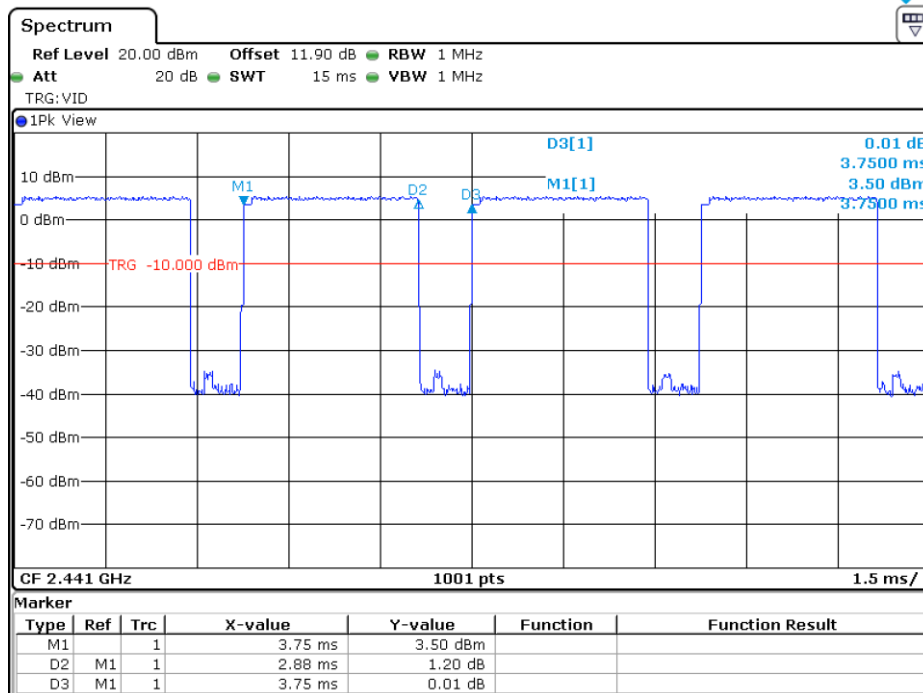
Total Dwell Time = Pulse time * Hops per second with channels * period time

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





DH3



DH5

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 μ s with 79 channels.

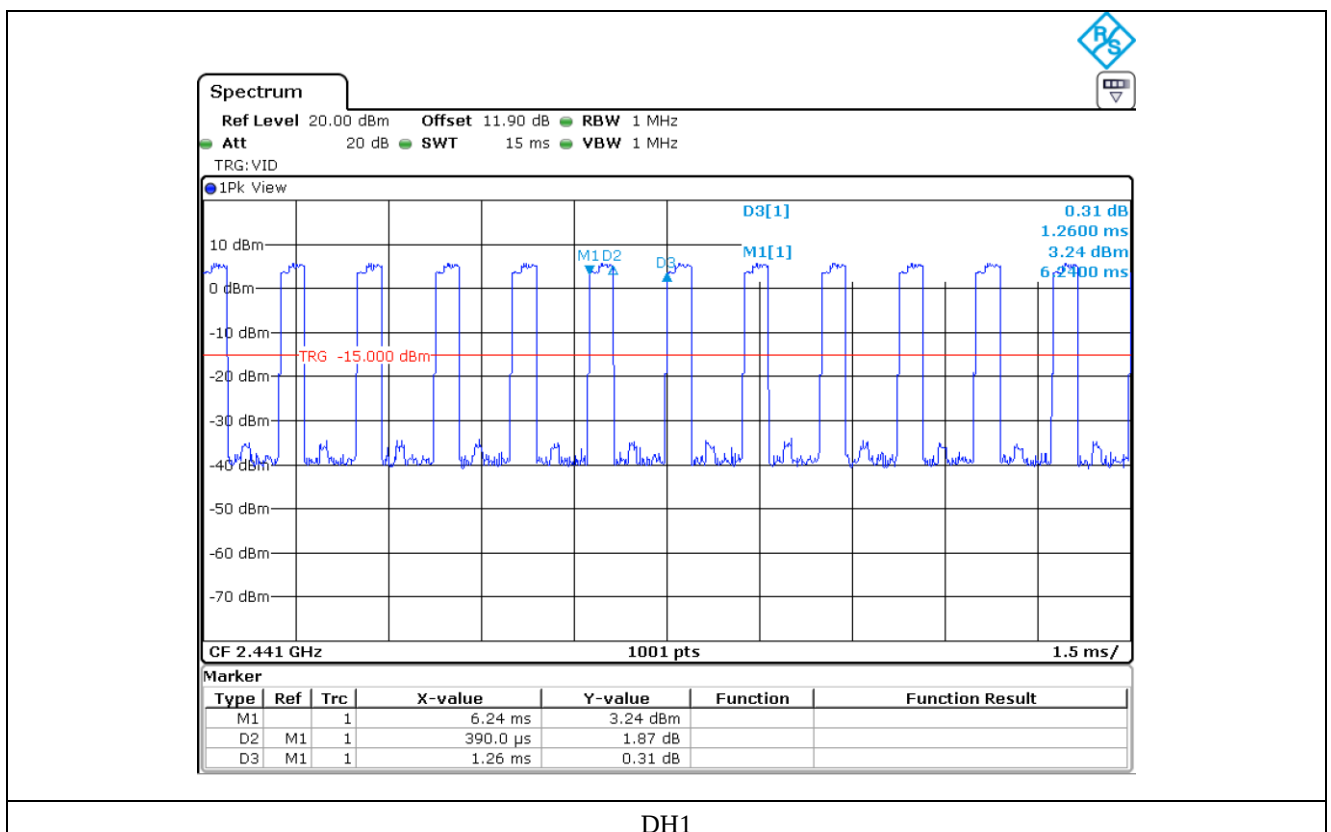
For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So The EUT has each channel 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.

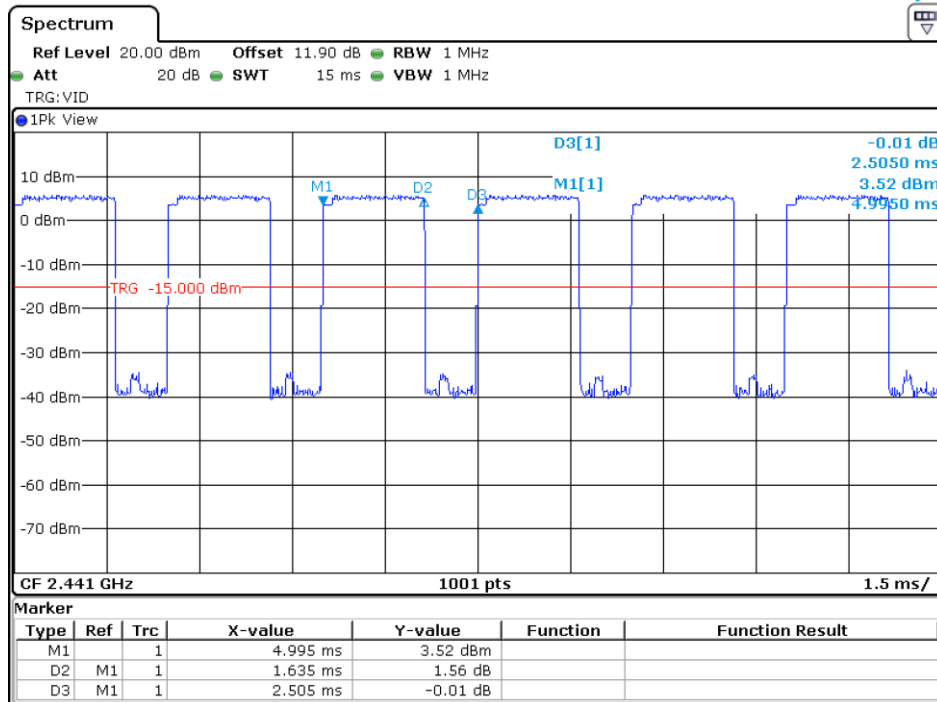
Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.390	10.13	31.60	124.84	400.00	PASS
DH3	1.635	5.06	31.60	261.43	400.00	
DH5	2.895	3.38	31.60	309.21	400.00	

Total dwell time is calculated as following.

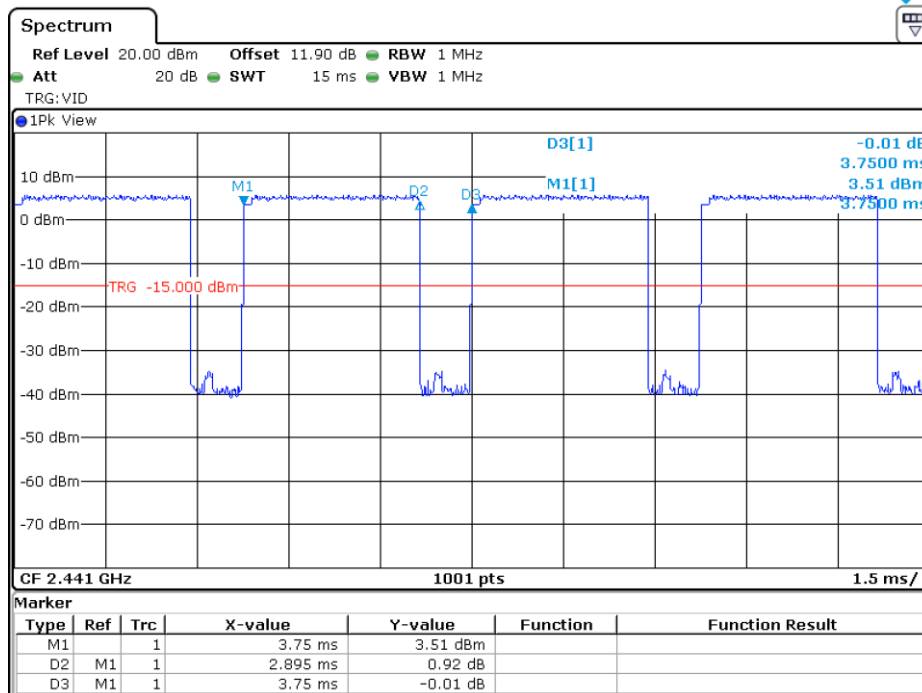
Total Dwell Time = Pulse time * Hops per second with channels * period time

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





DH3



DH5

11. MAXIMUM PEAK OUTPUT POWER

11.1 Operating environment

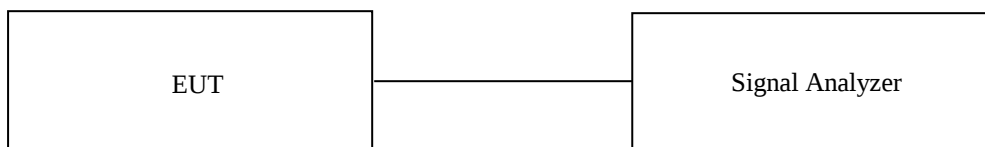
Temperature : 23 °C

Relative humidity : 41 % 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 $\geq$ DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.



11.3 Test Date

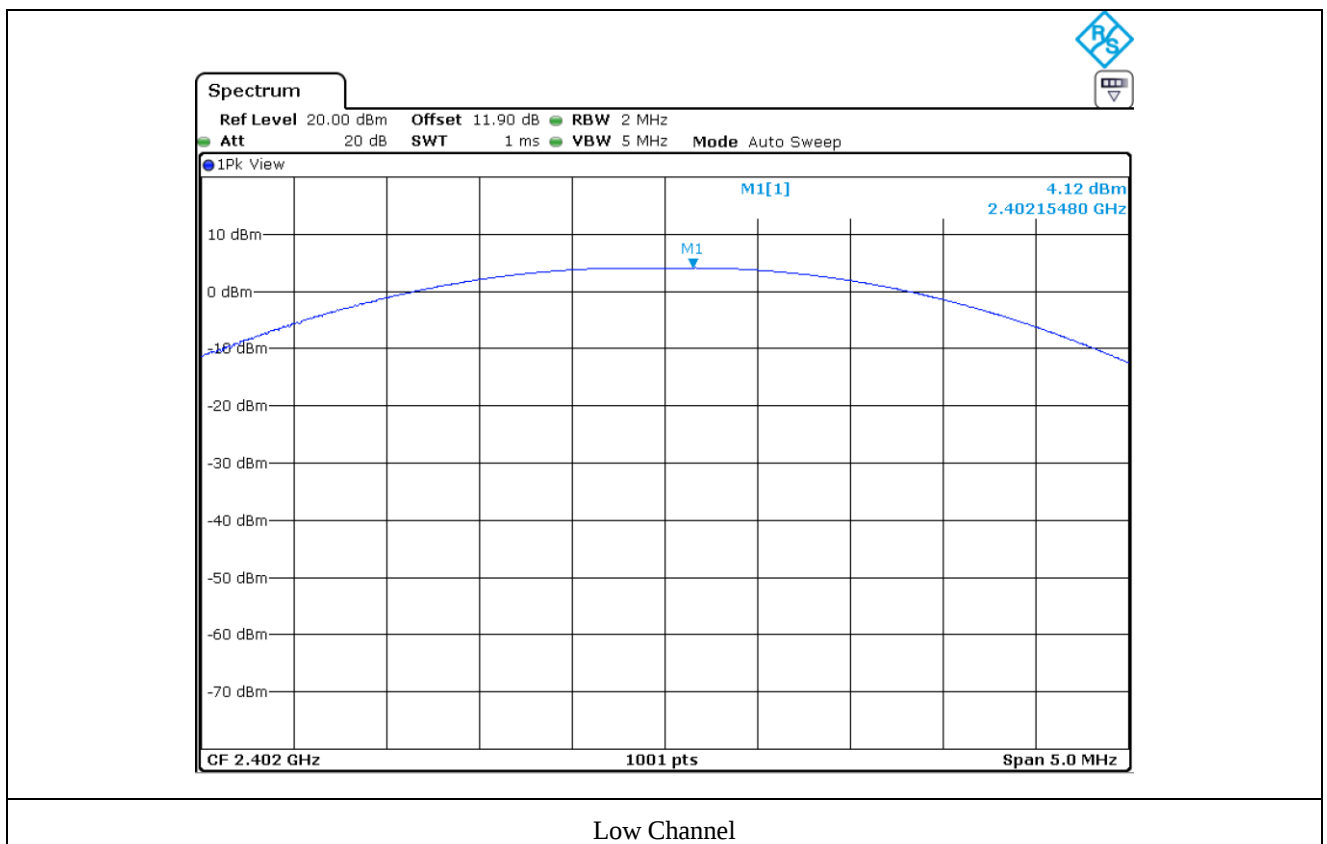
November 25, 2021 ~ January 18, 2022

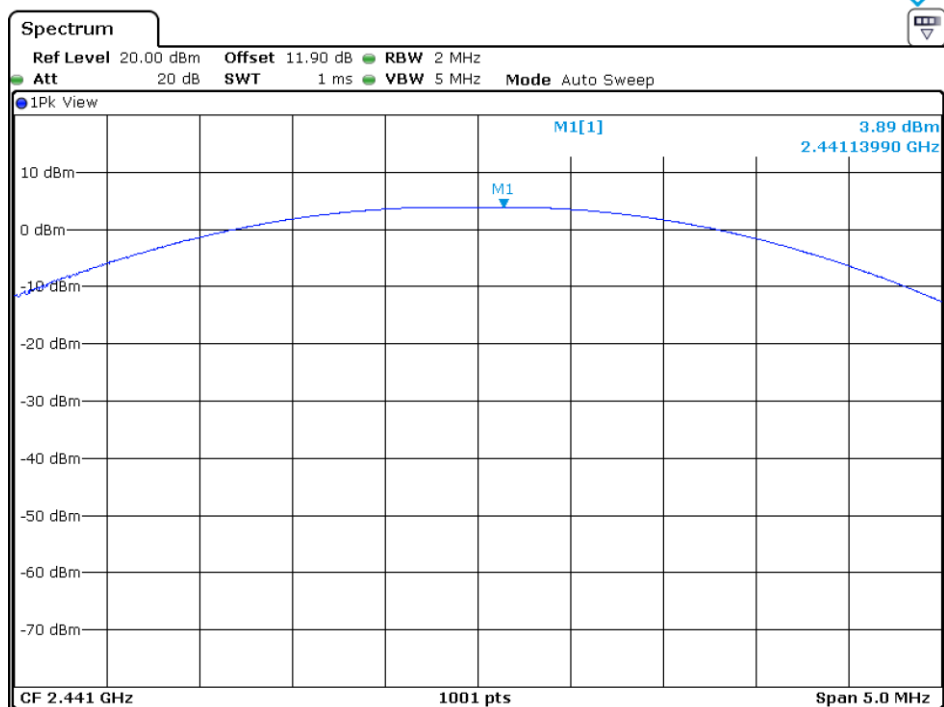
11.4 Test data for 1 Mbps

-. Test Result : Pass

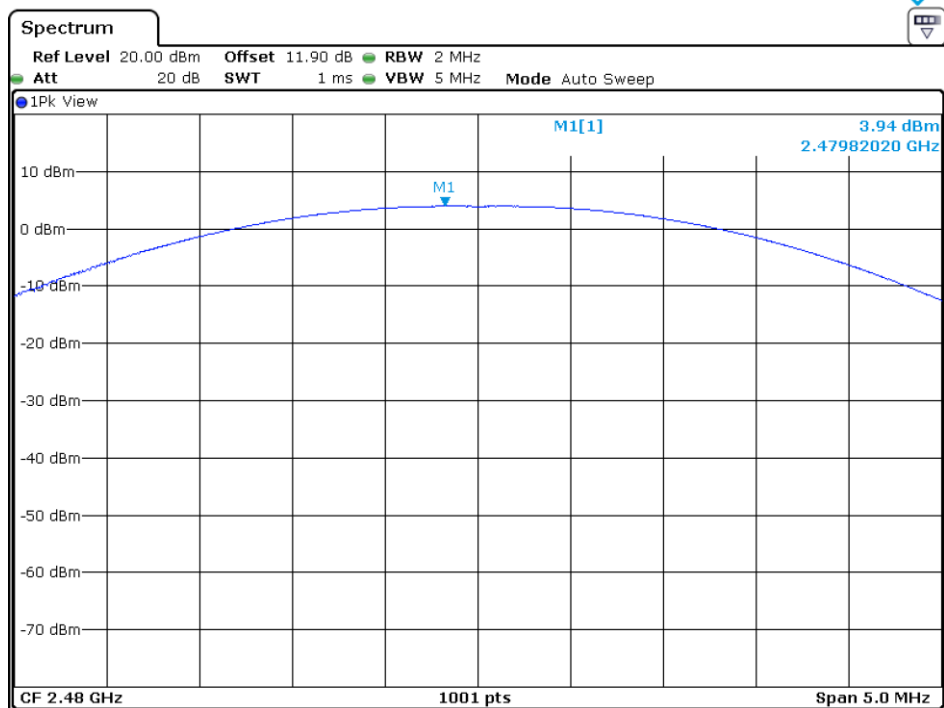
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	4.12	21.00	16.88
MIDDLE	2 441.00	3.89	21.00	17.11
HIGH	2 480.00	3.94	21.00	17.06

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





Middle Channel



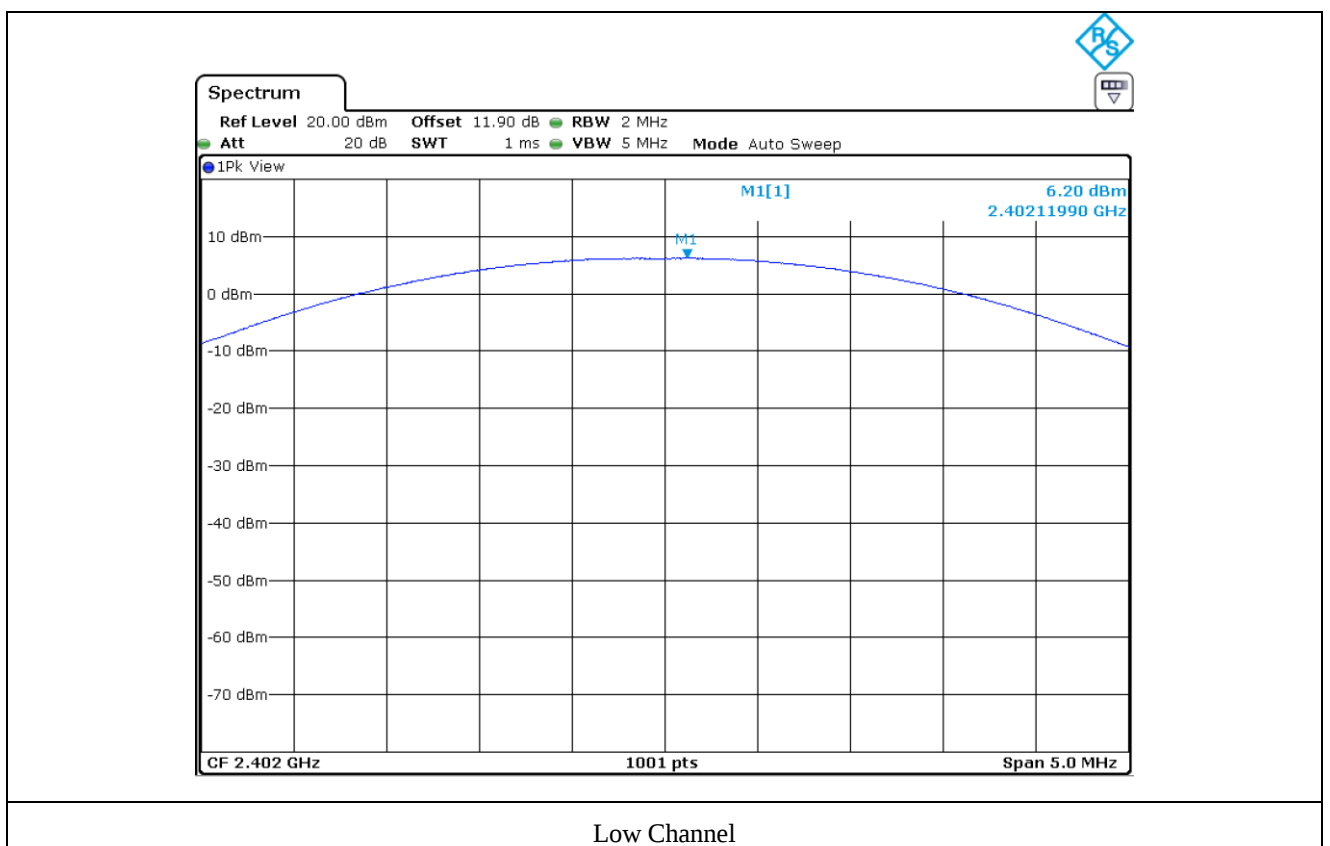
High Channel

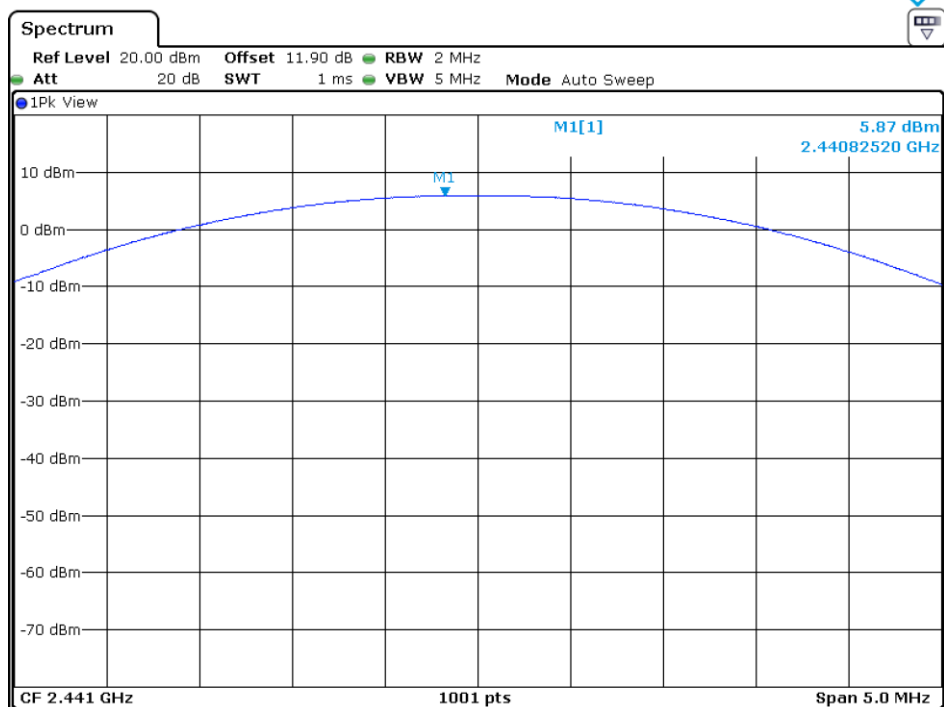
11.5 Test data for 2 Mbps

-. Test Result : Pass

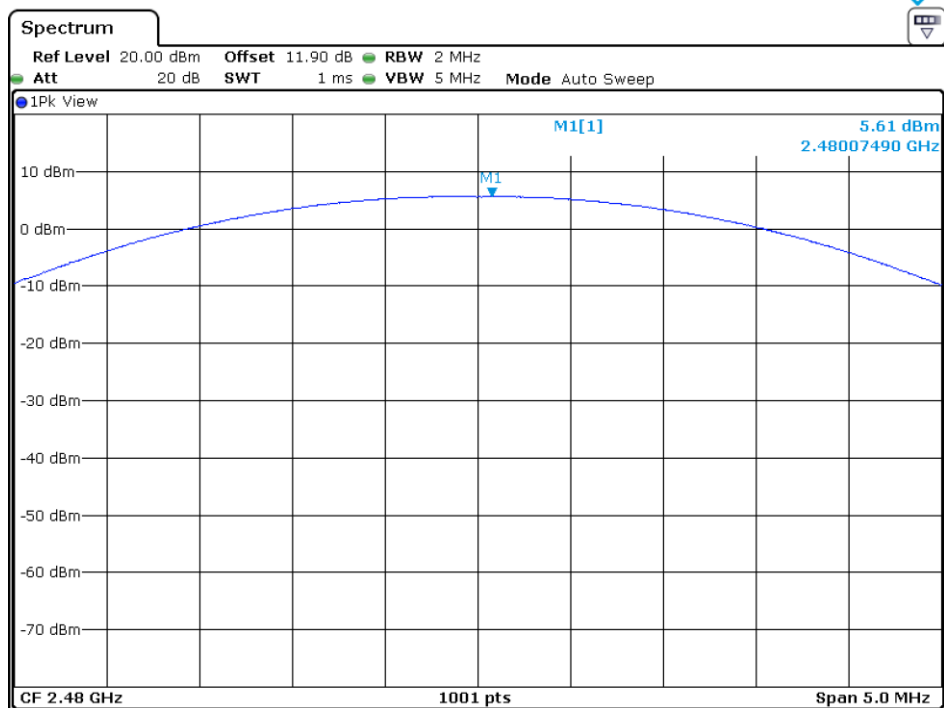
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	6.20	21.00	14.80
MIDDLE	2 441.00	5.87	21.00	15.13
HIGH	2 480.00	5.61	21.00	15.39

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





Middle Channel



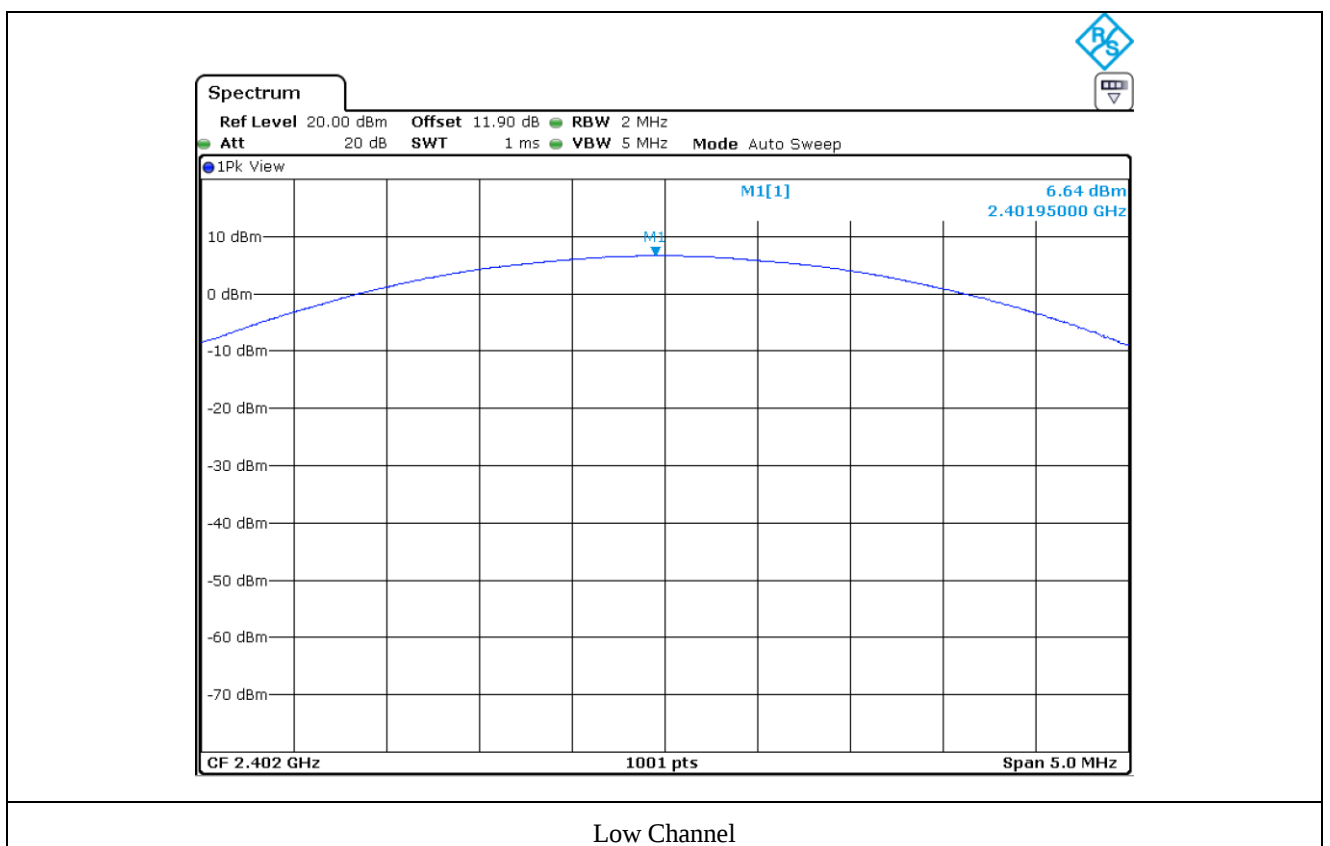
High Channel

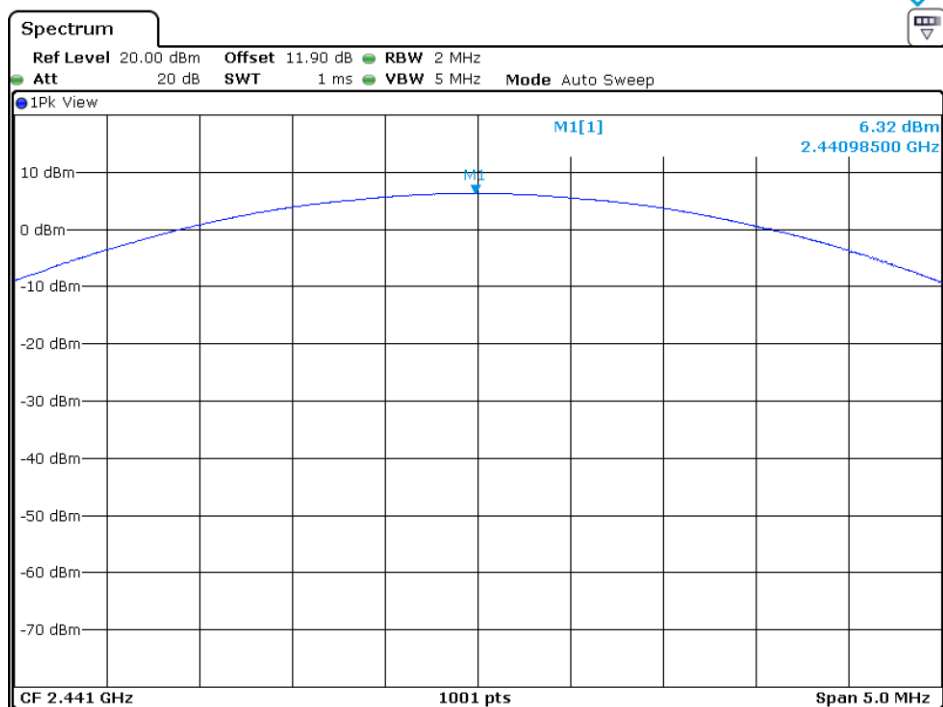
11.6 Test data for 3 Mbps

-. Test Result : Pass

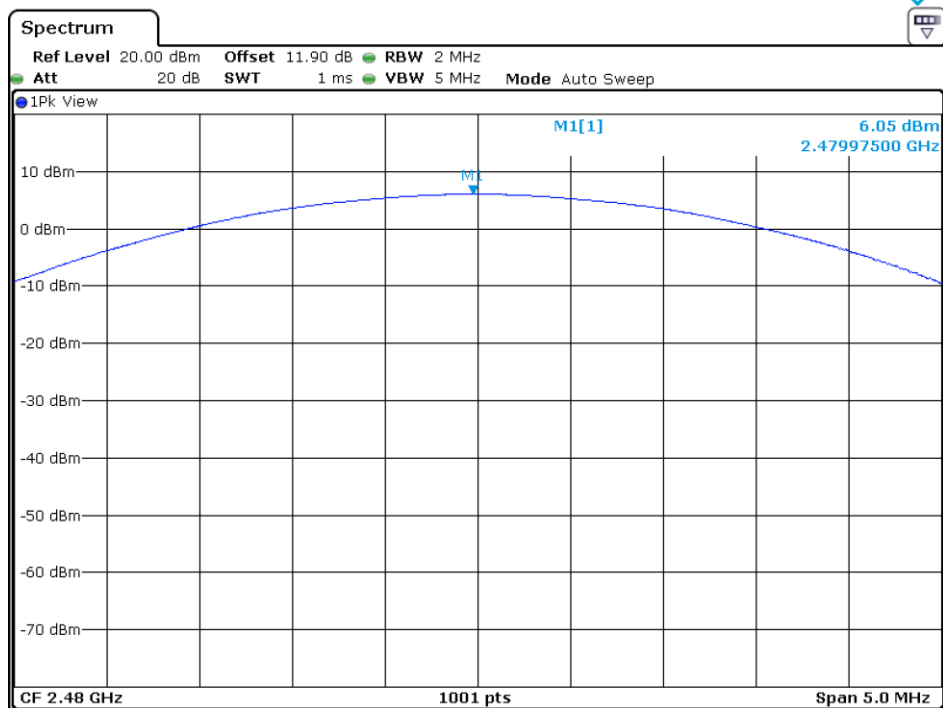
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	6.64	21.00	14.36
MIDDLE	2 441.00	6.32	21.00	14.68
HIGH	2 480.00	6.05	21.00	14.95

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





Middle Channel



High Channel

12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

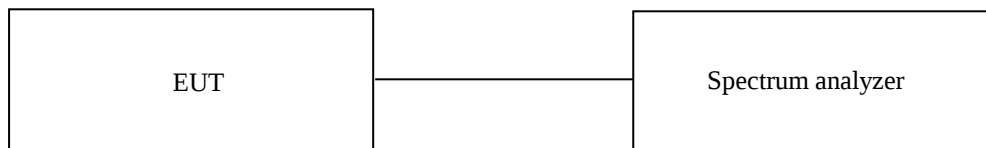
12.1 Operating environment

Temperature : 23 °C

Relative humidity : 41 % R.H.

12.2 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 and video bandwidth is set to 300 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.

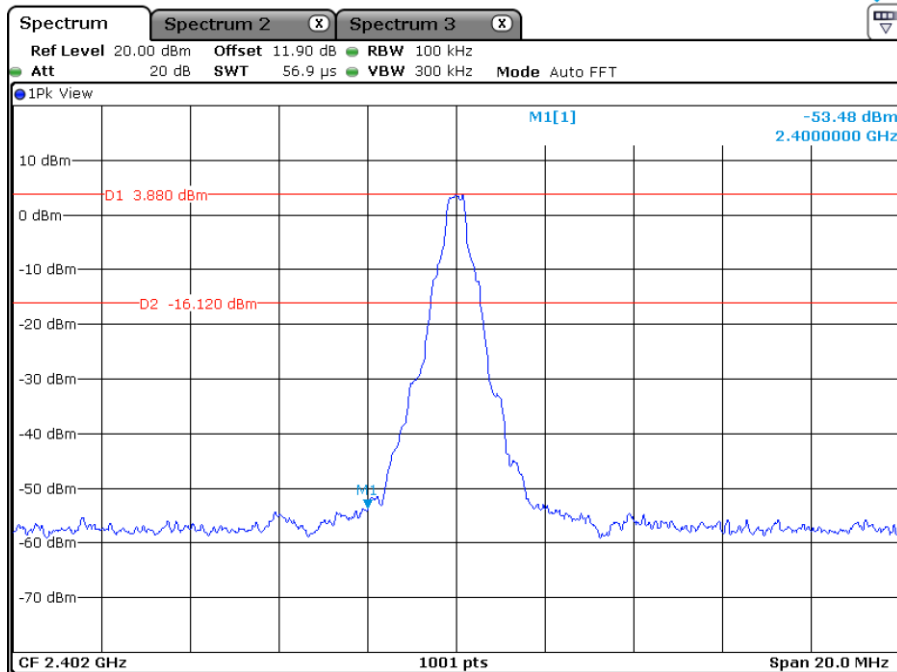
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal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

12.4 Test Date

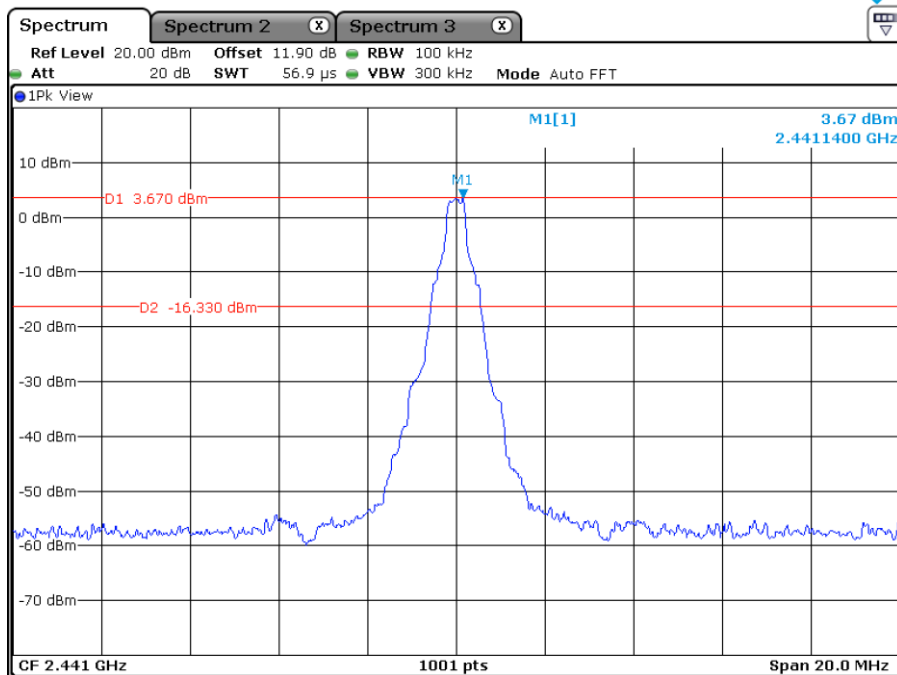
November 25, 2021 ~ January 18, 2022

12.5 Test data for conducted emission

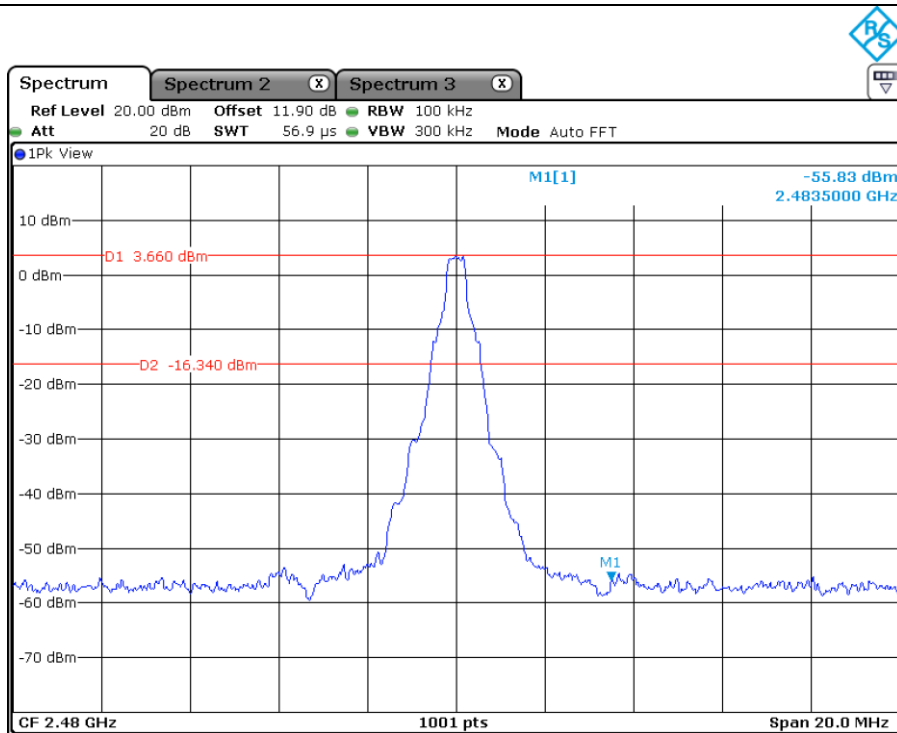
12.5.1 Test data for 1 Mbps



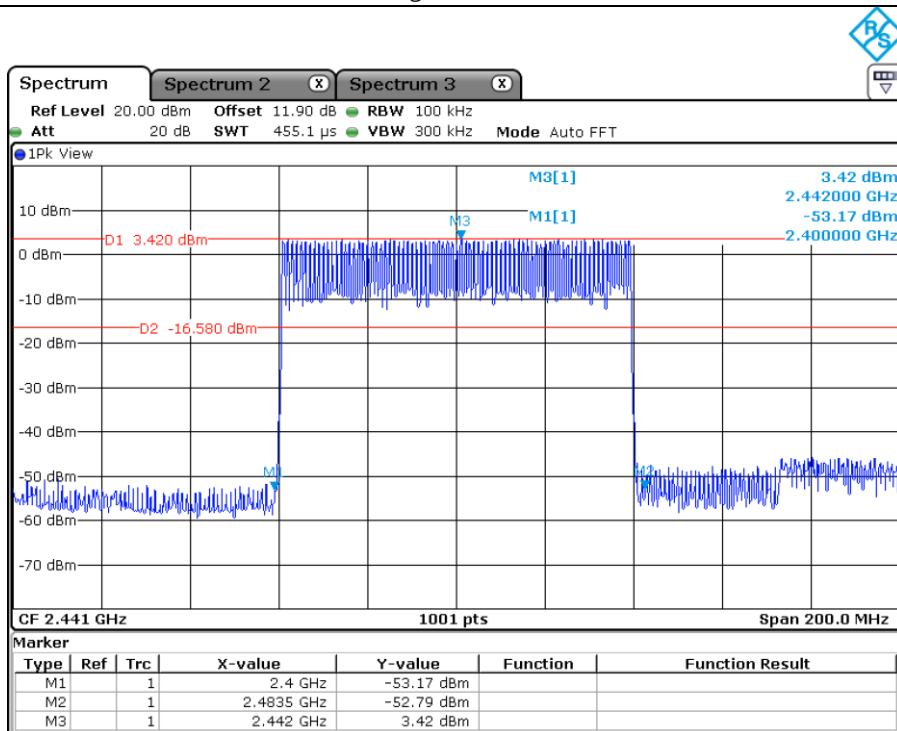
Low Channel



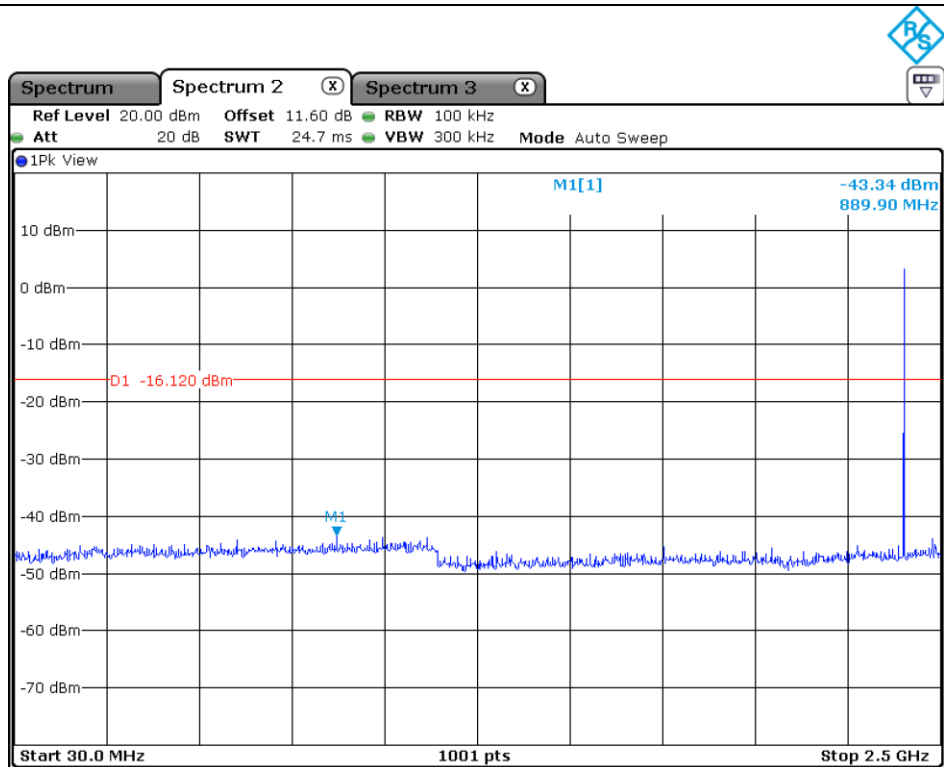
Middle Channel



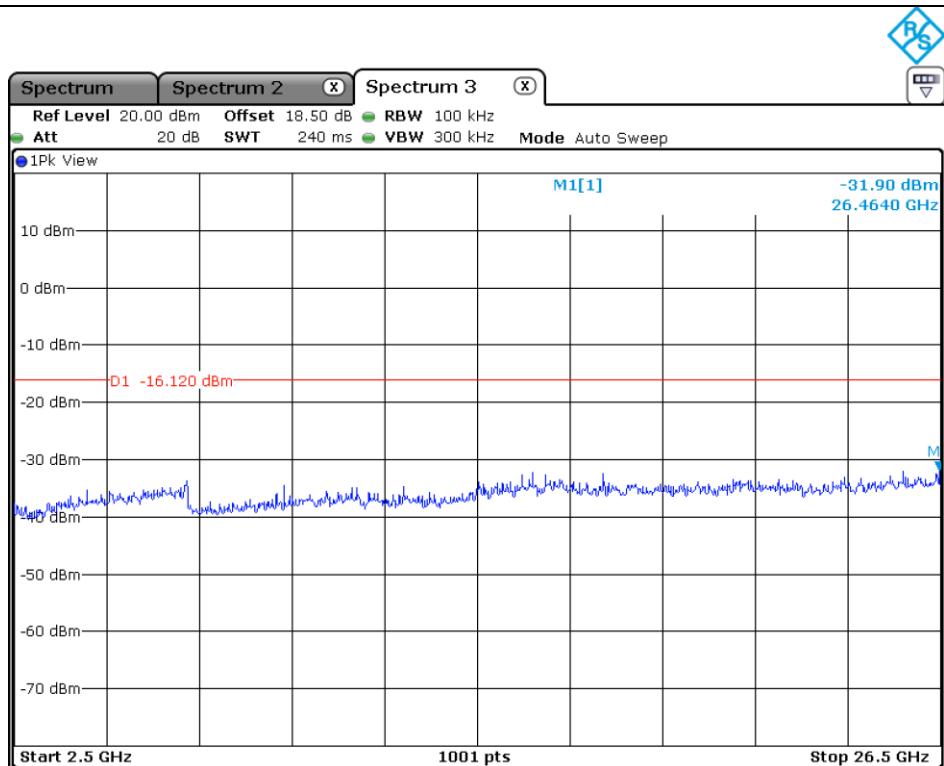
High Channel



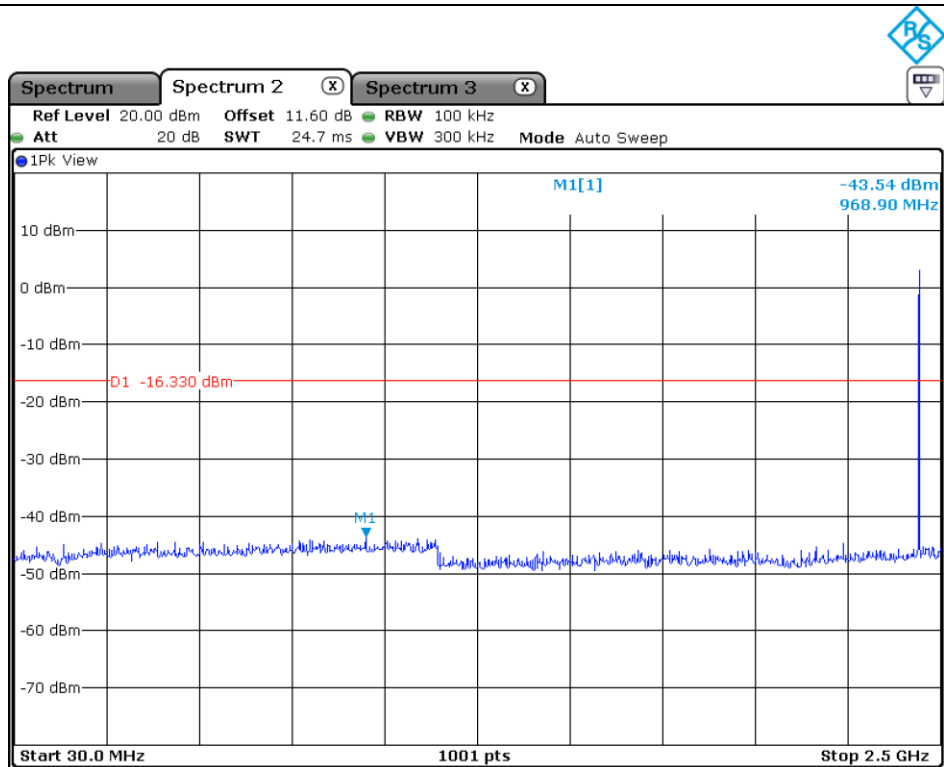
Hopping Mode



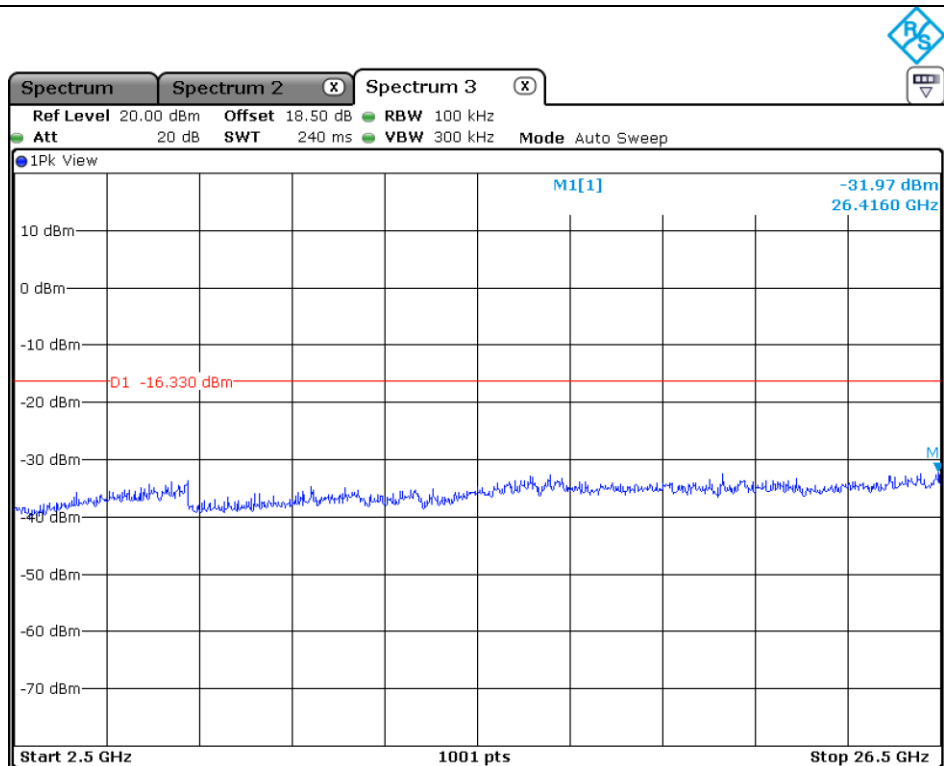
Low Channel



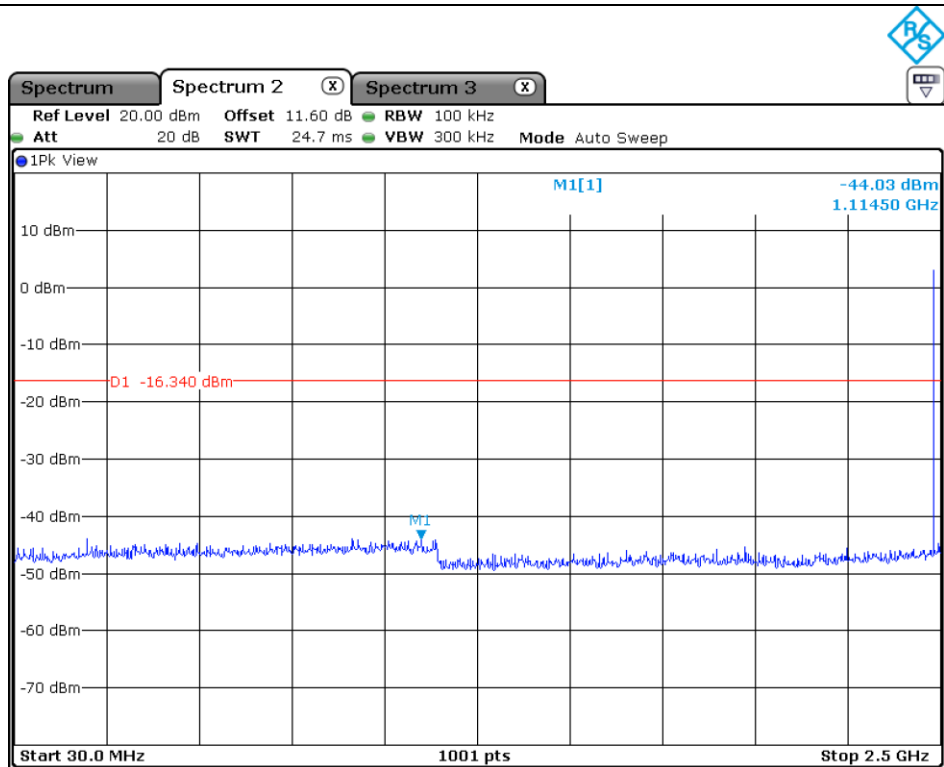
Low Channel



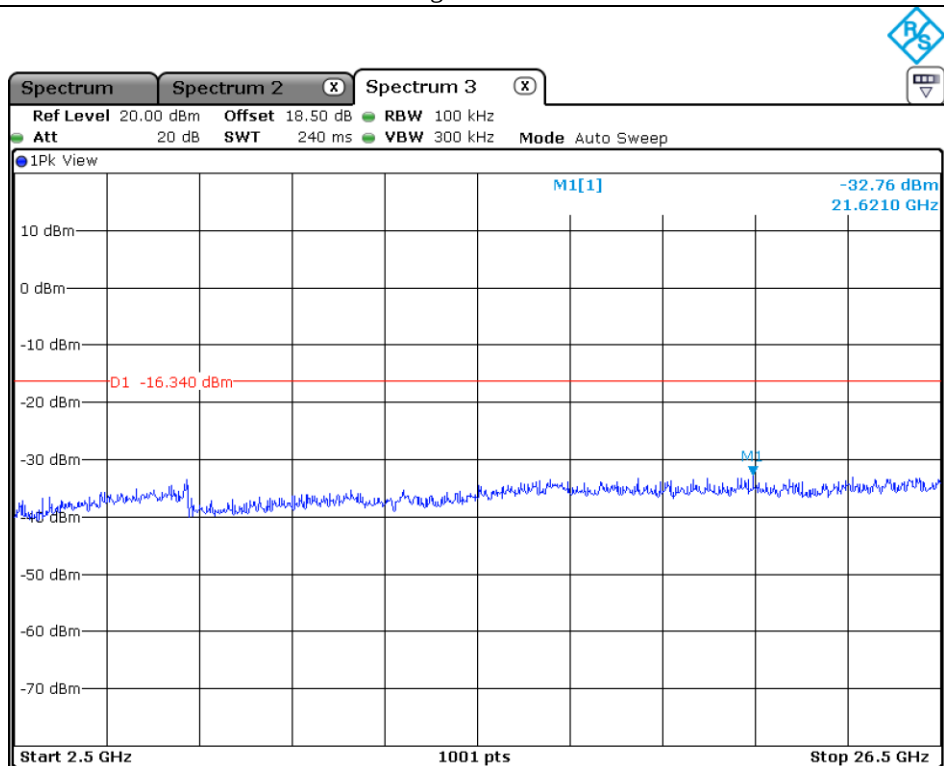
Middle Channel



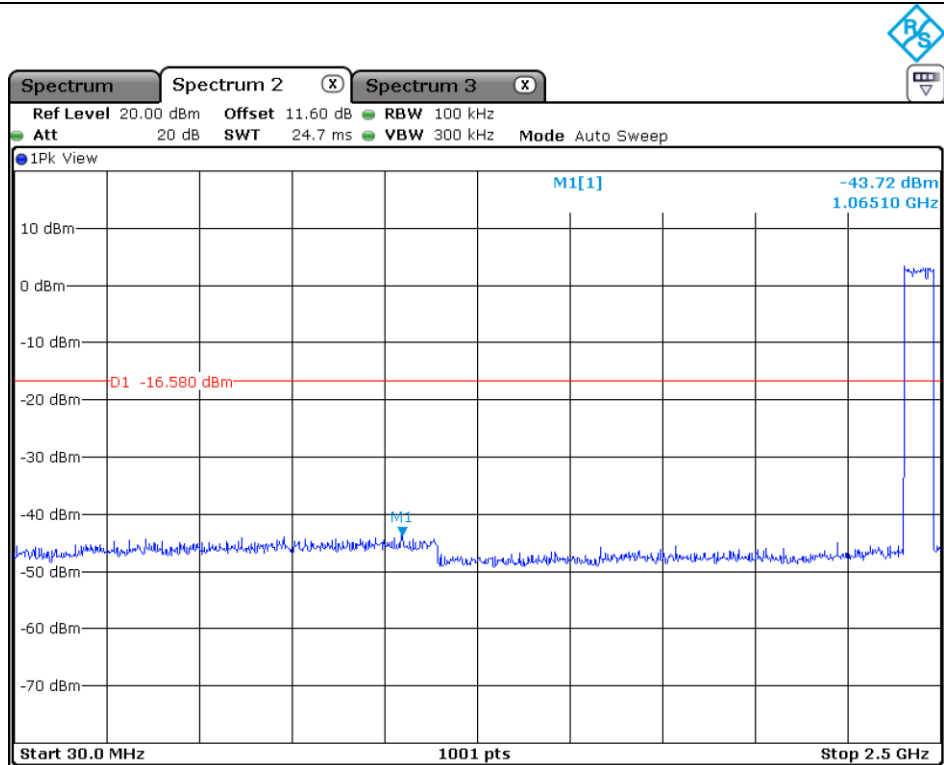
Middle Channel



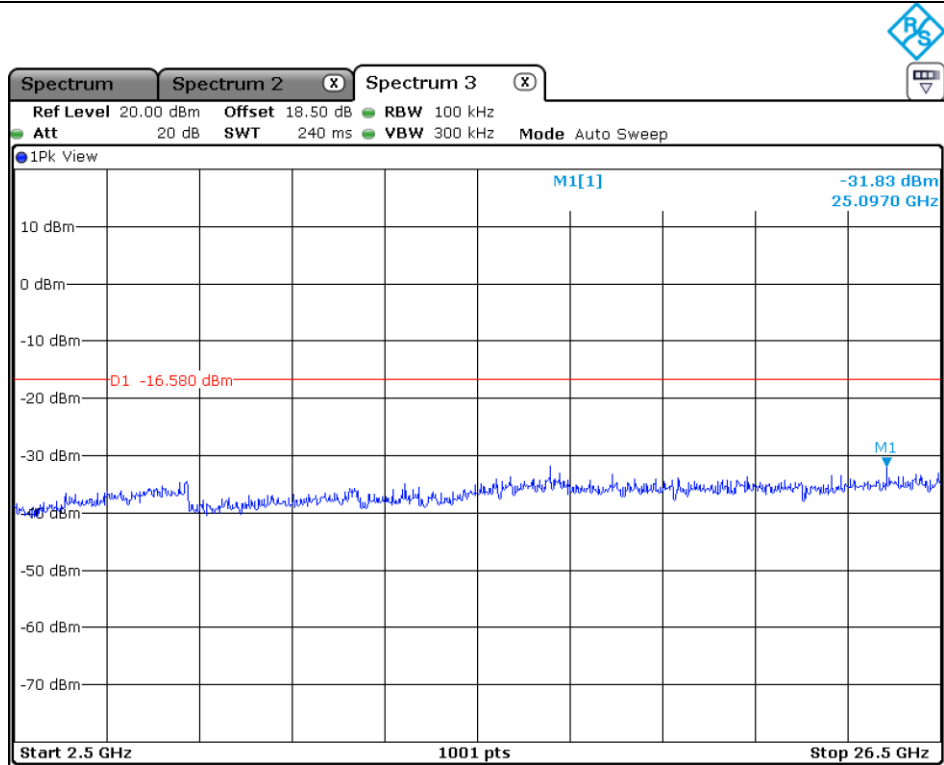
High Channel



High Channel

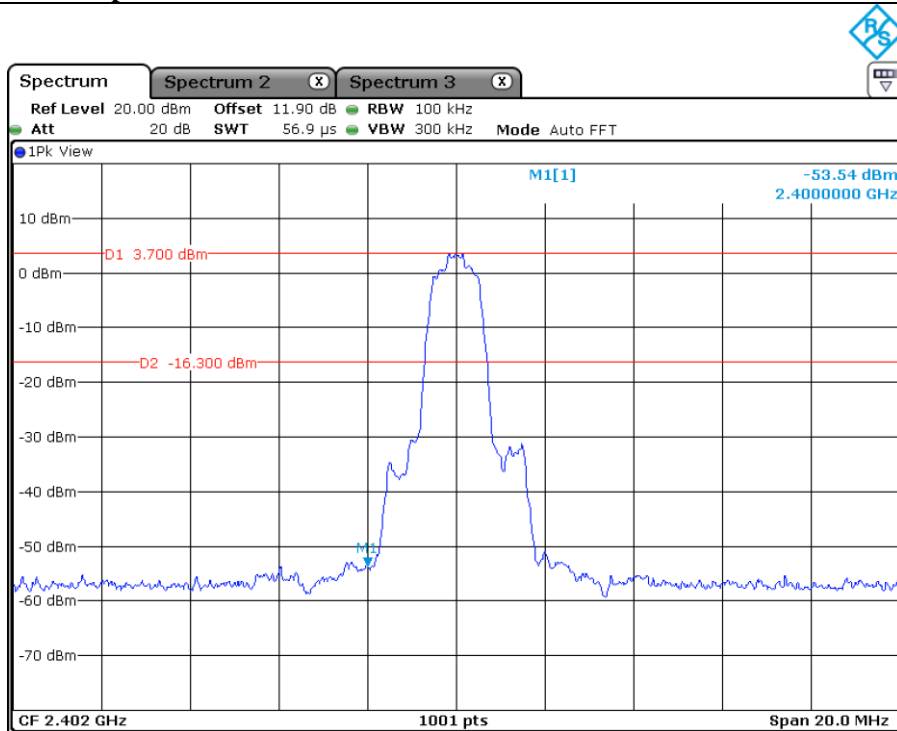


Hopping Mode

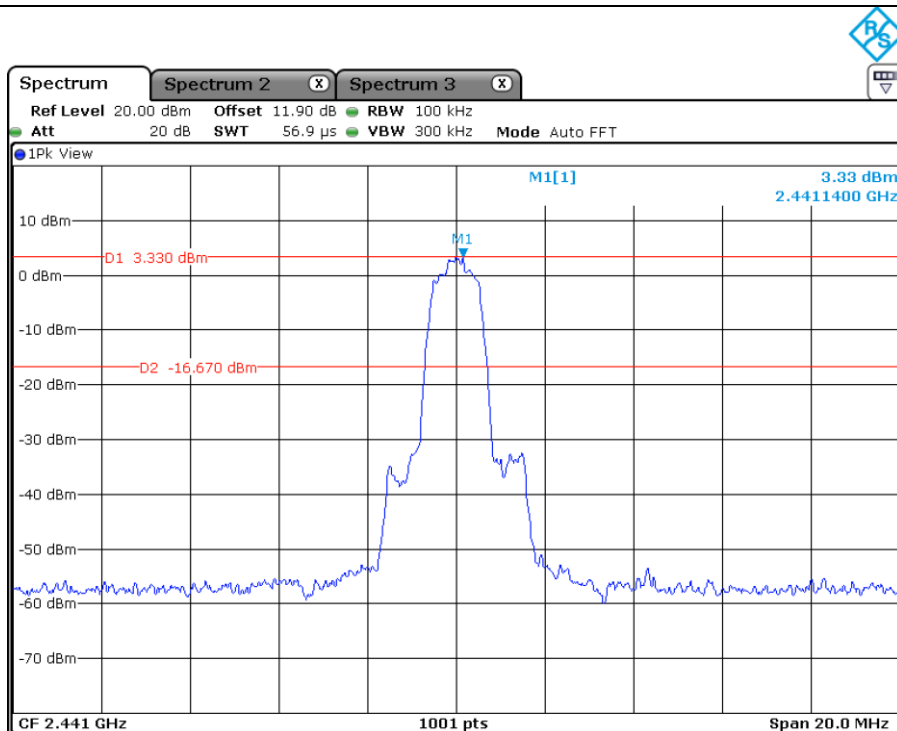


Hopping Mode

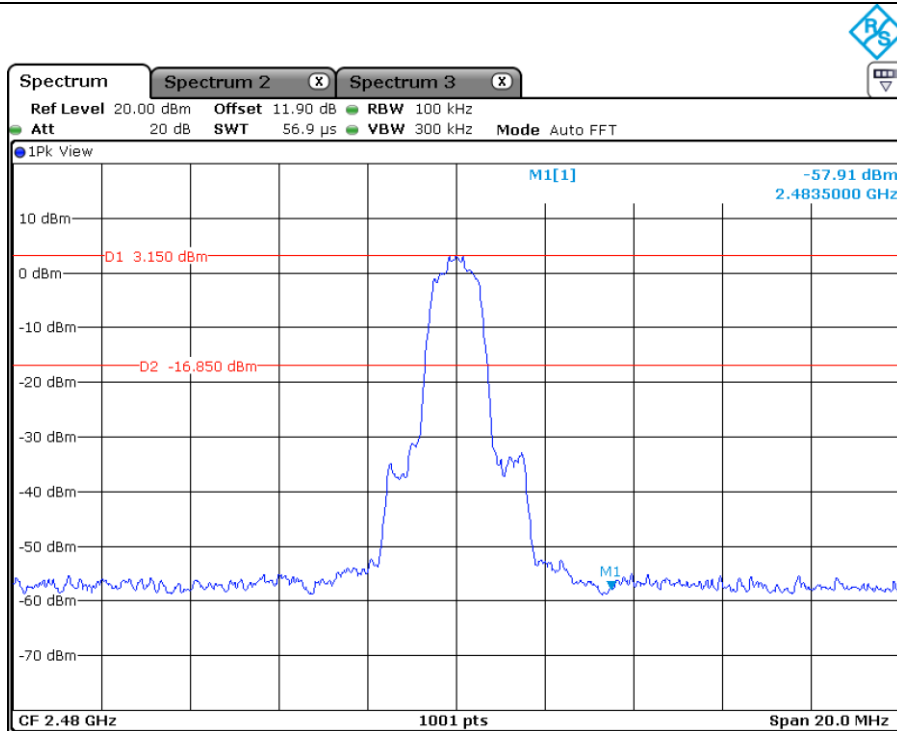
12.5.2 Test data for 2 Mbps



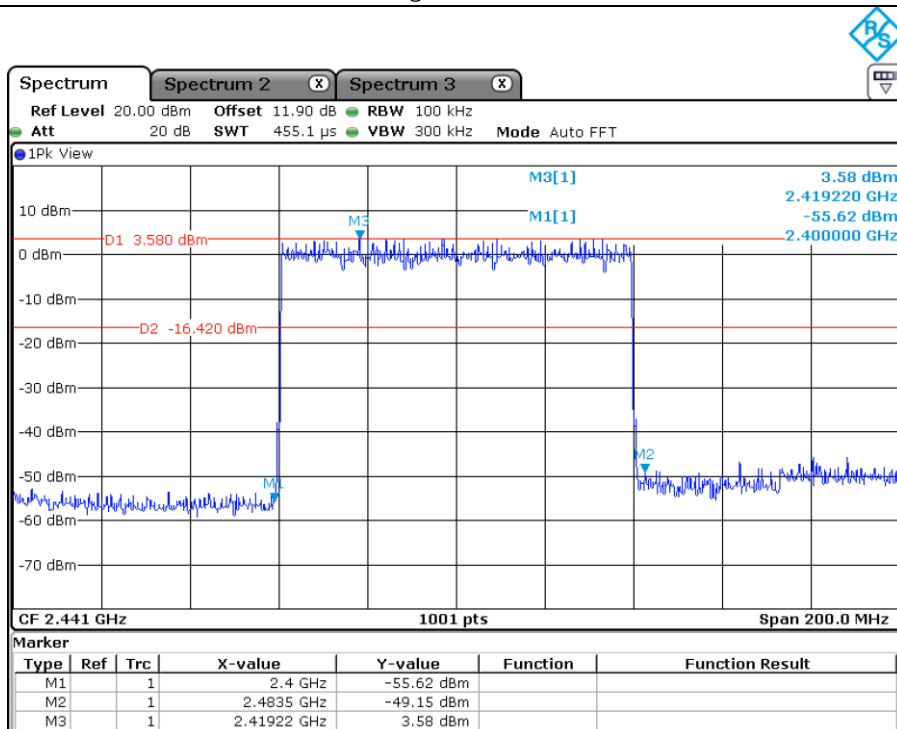
Low Channel



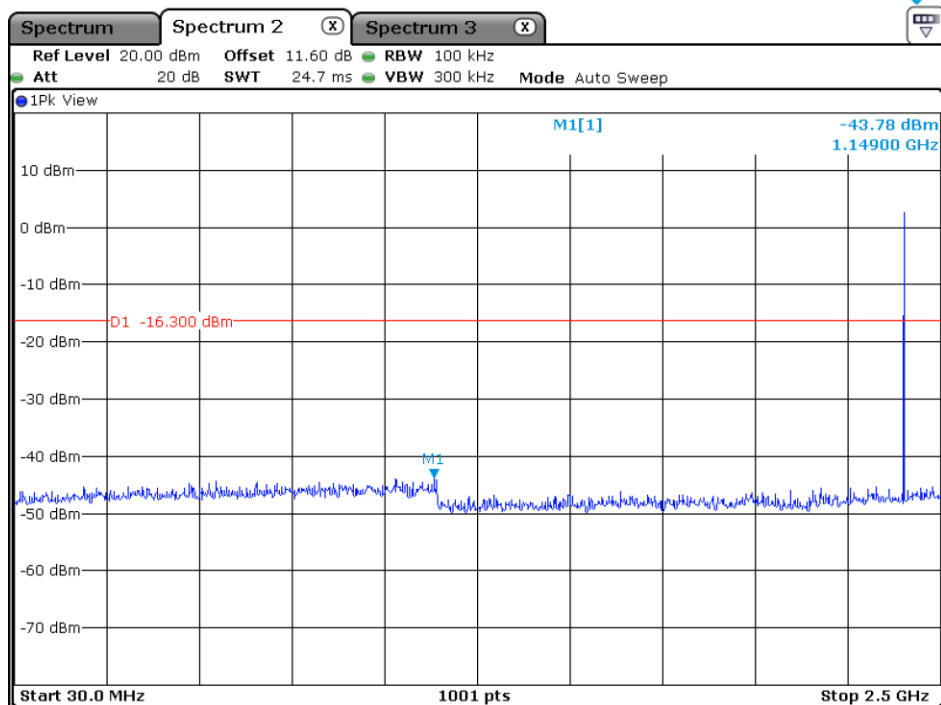
Middle Channel



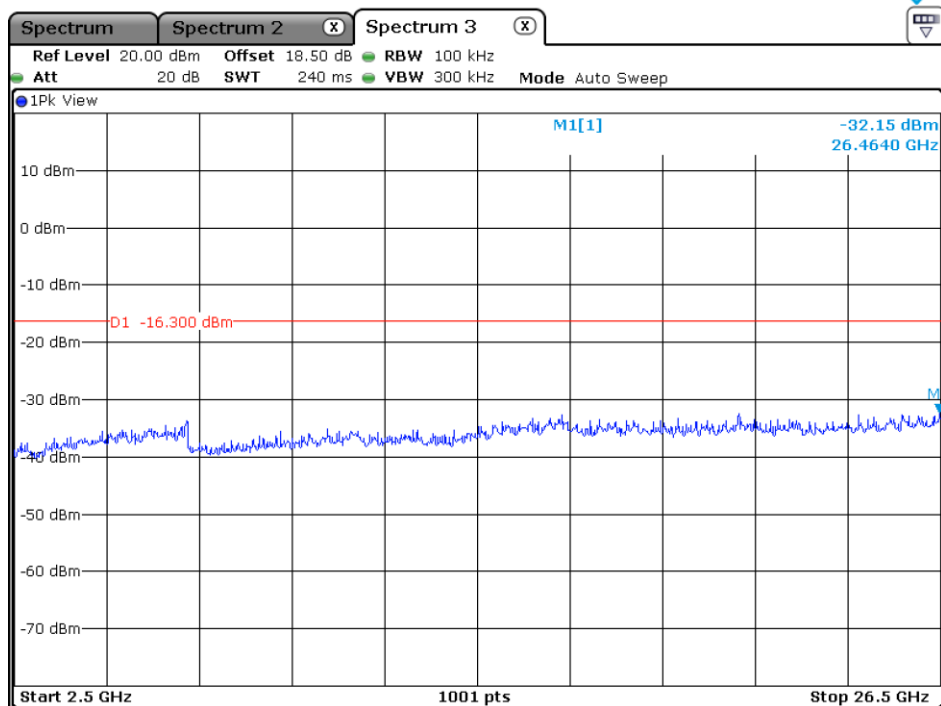
High Channel



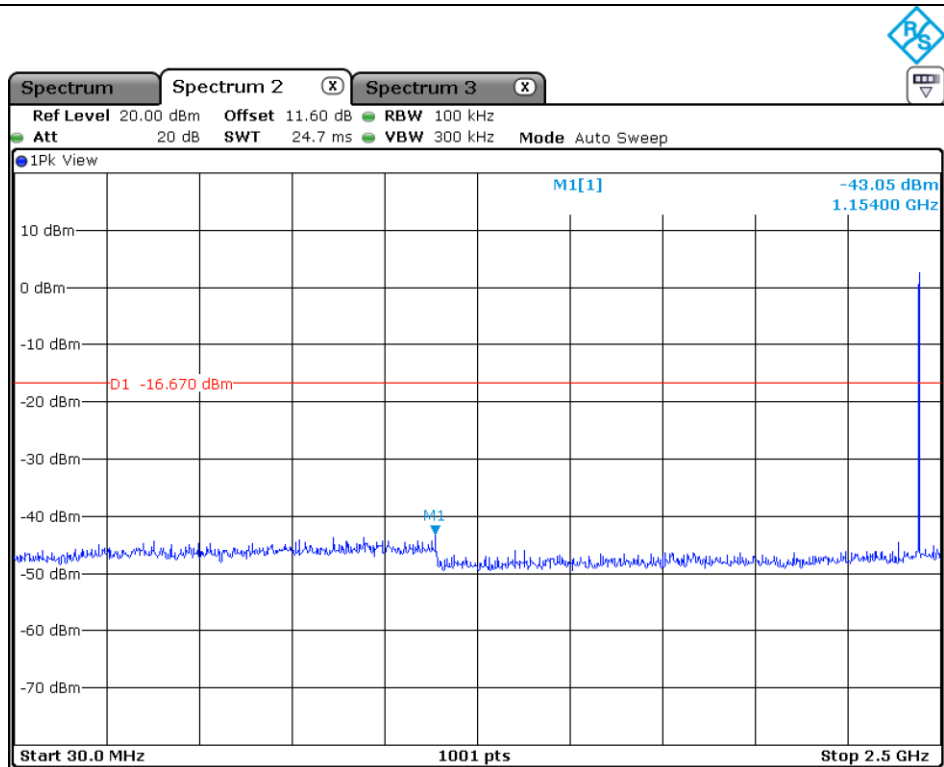
Hopping Mode



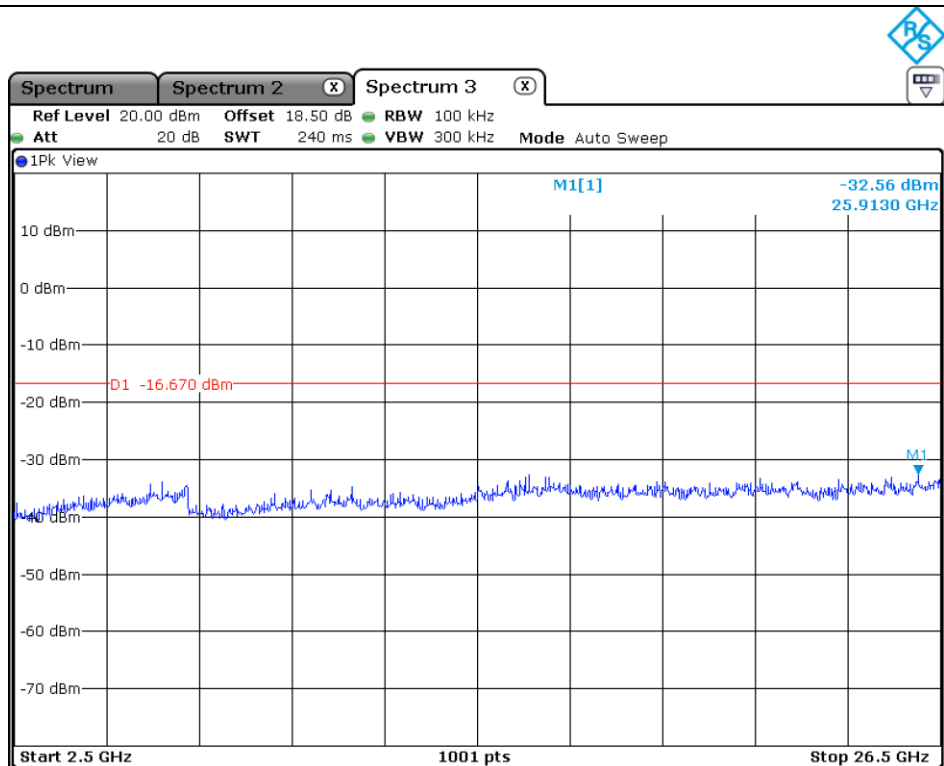
Low Channel



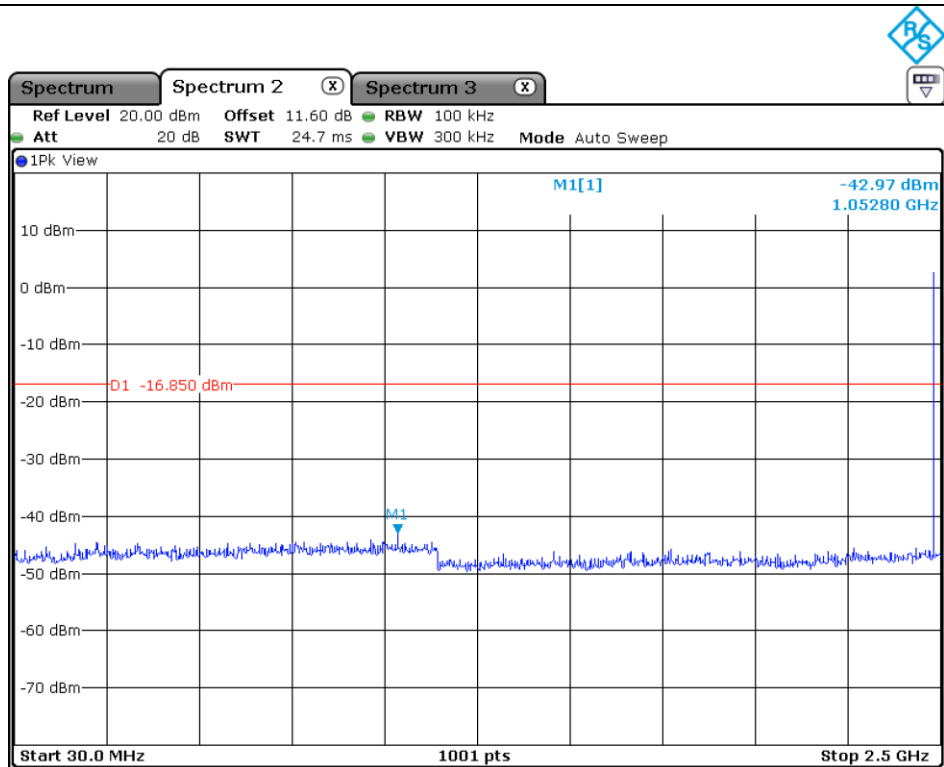
Low Channel



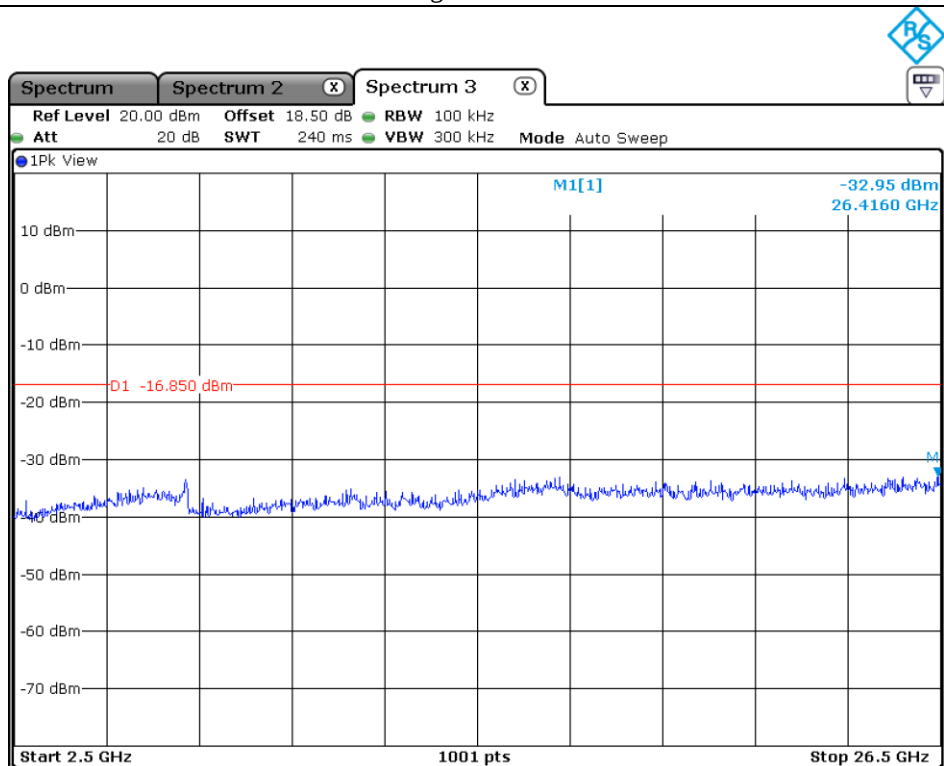
Middle Channel



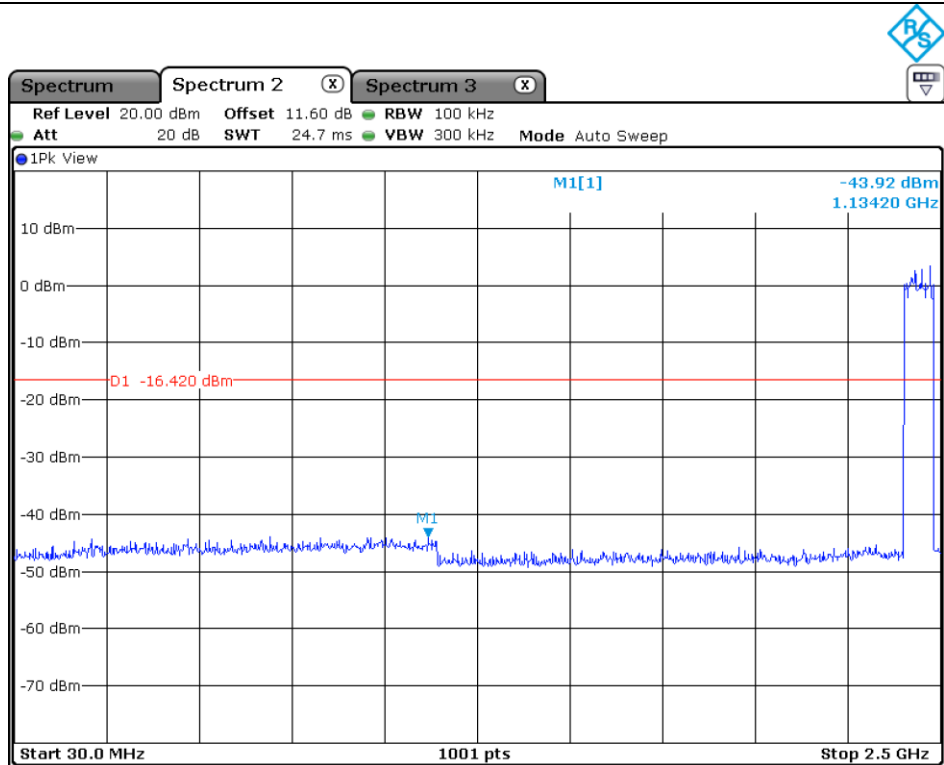
Middle Channel



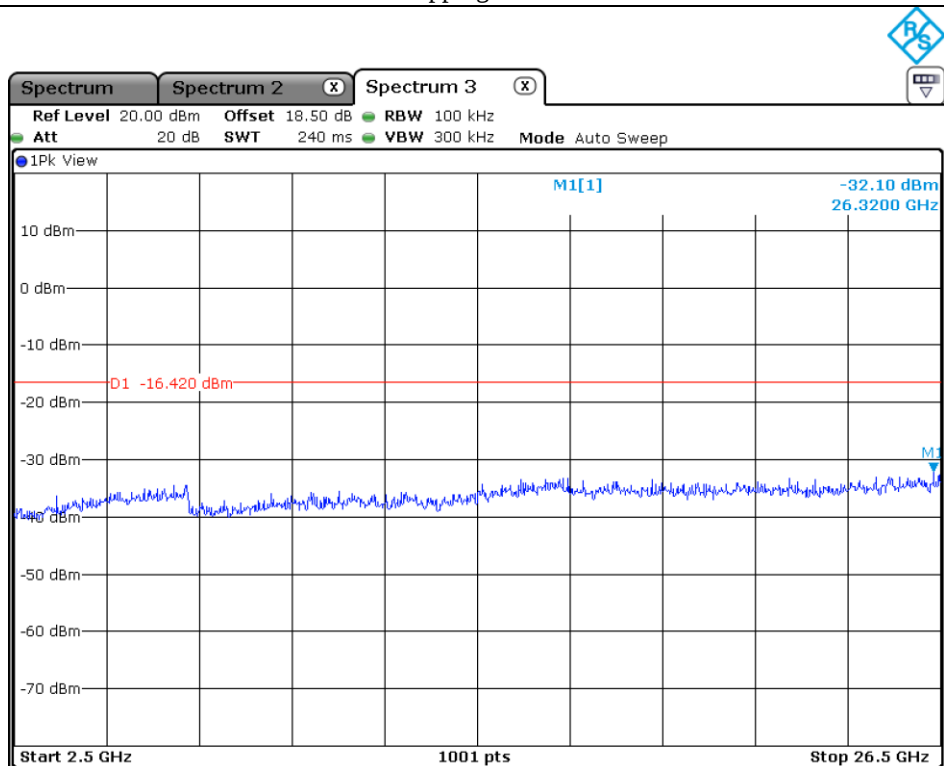
High Channel



High Channel

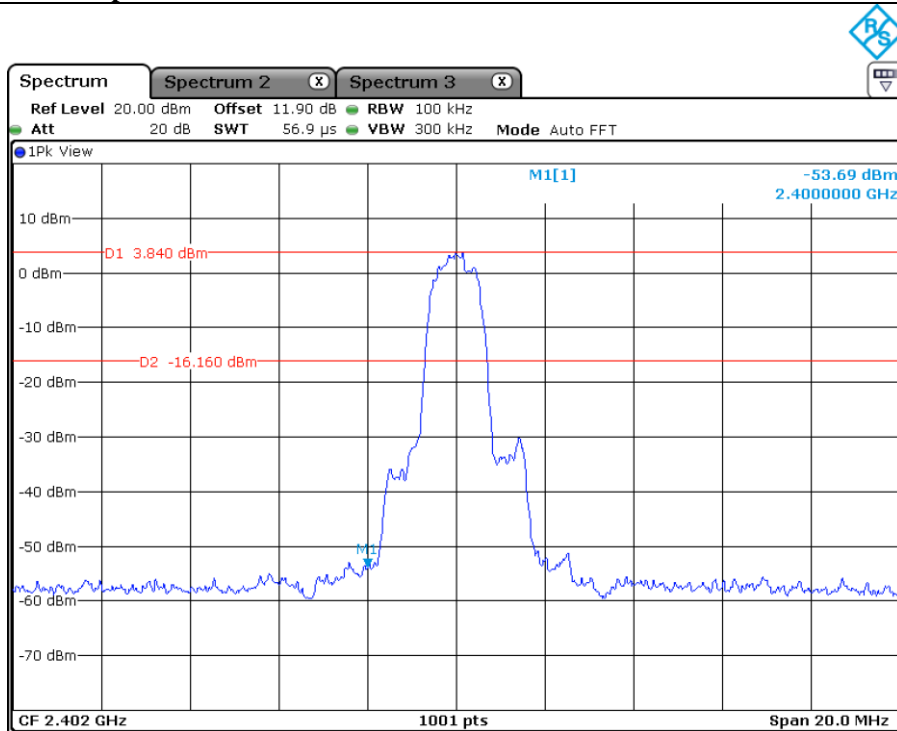


Hopping Mode

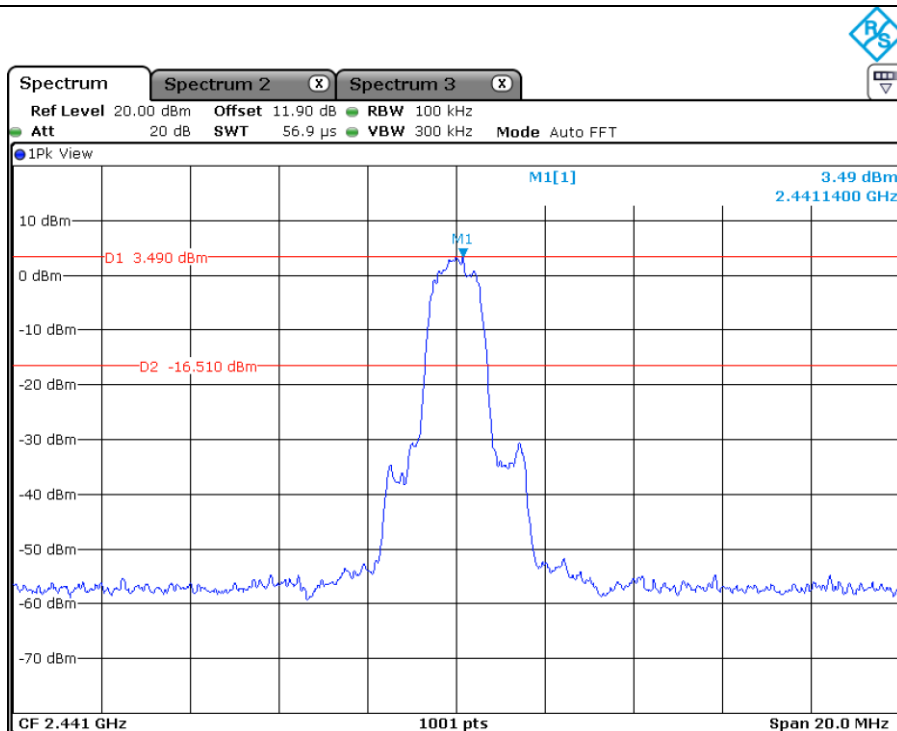


Hopping Mode

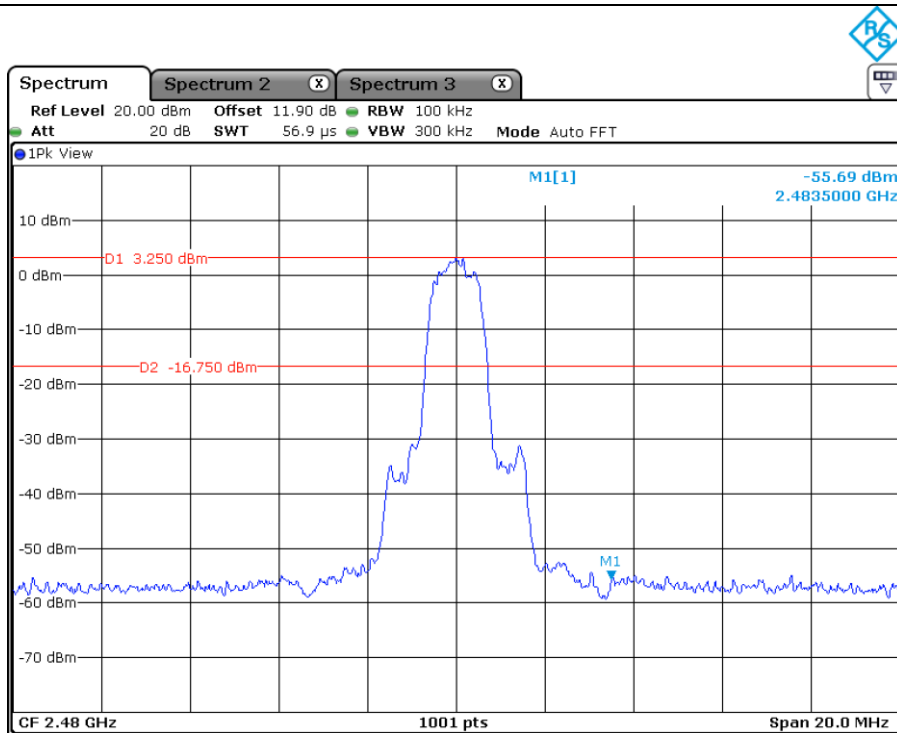
12.5.3 Test data for 3 Mbps



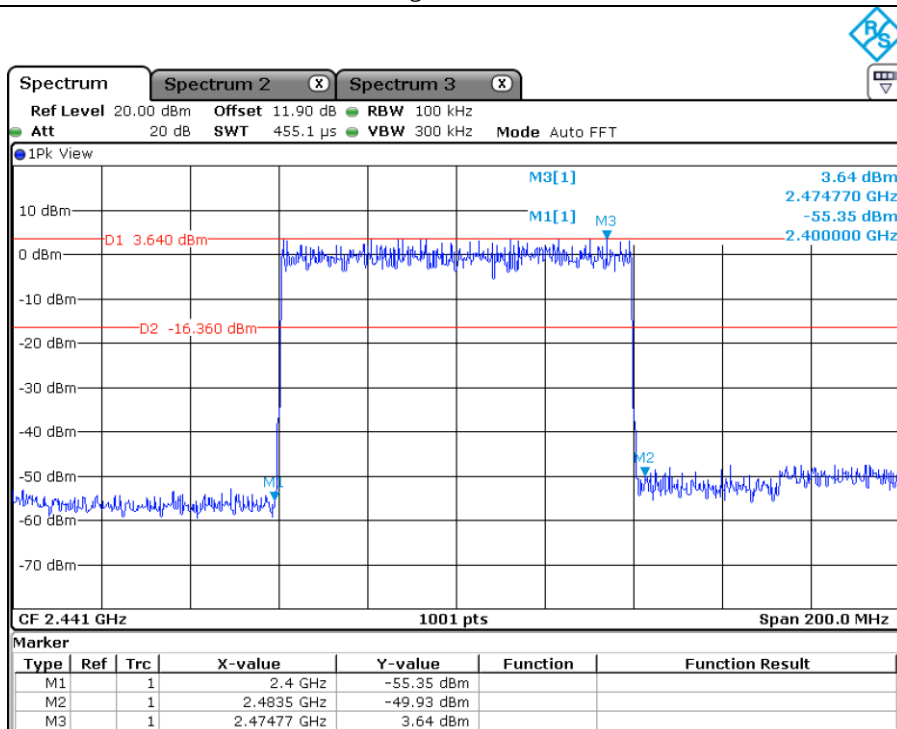
Low Channel



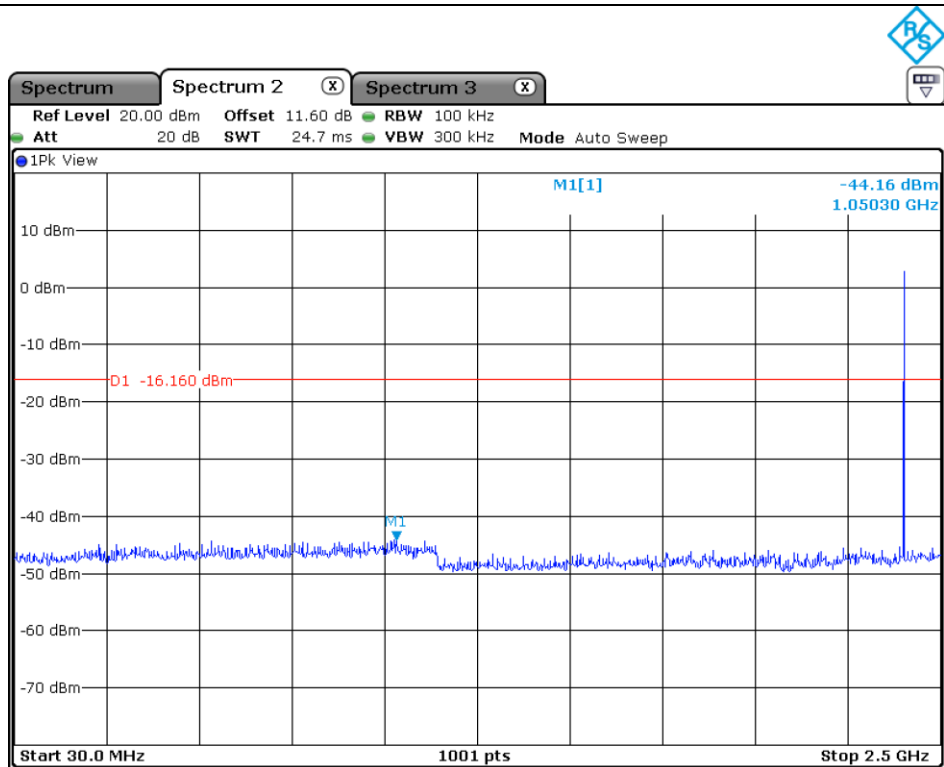
Middle Channel



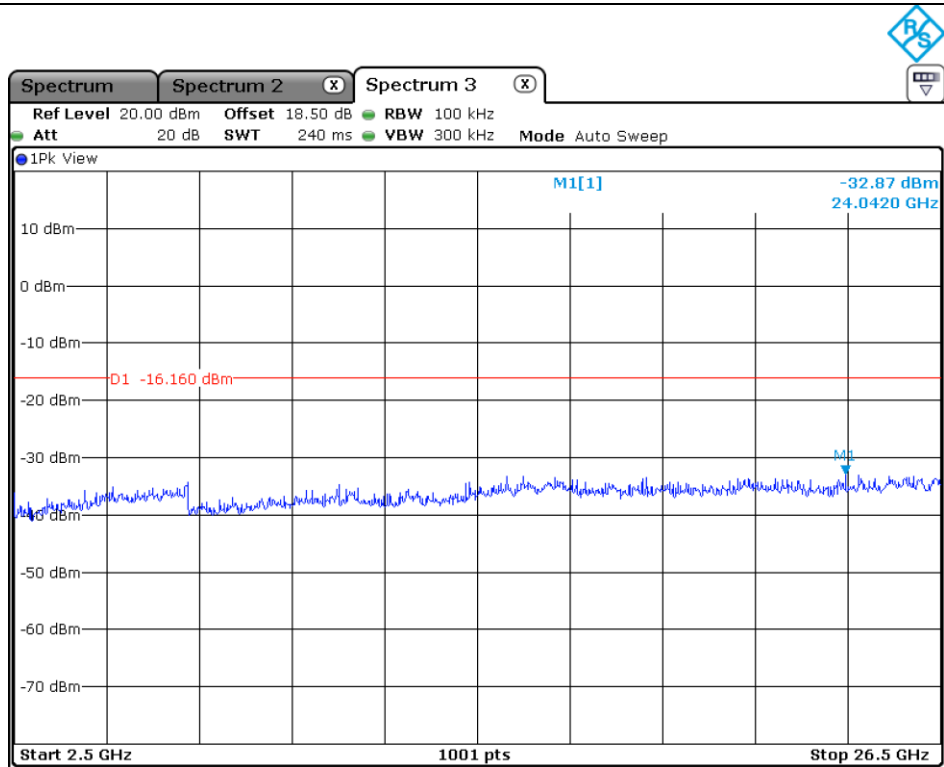
High Channel



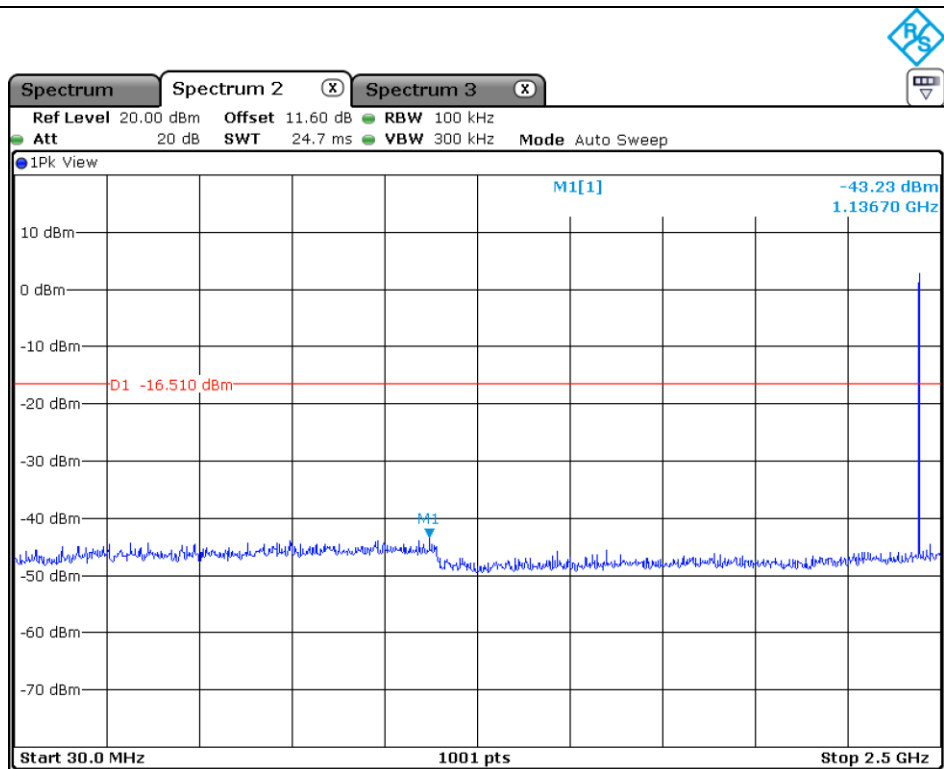
Hopping Mode



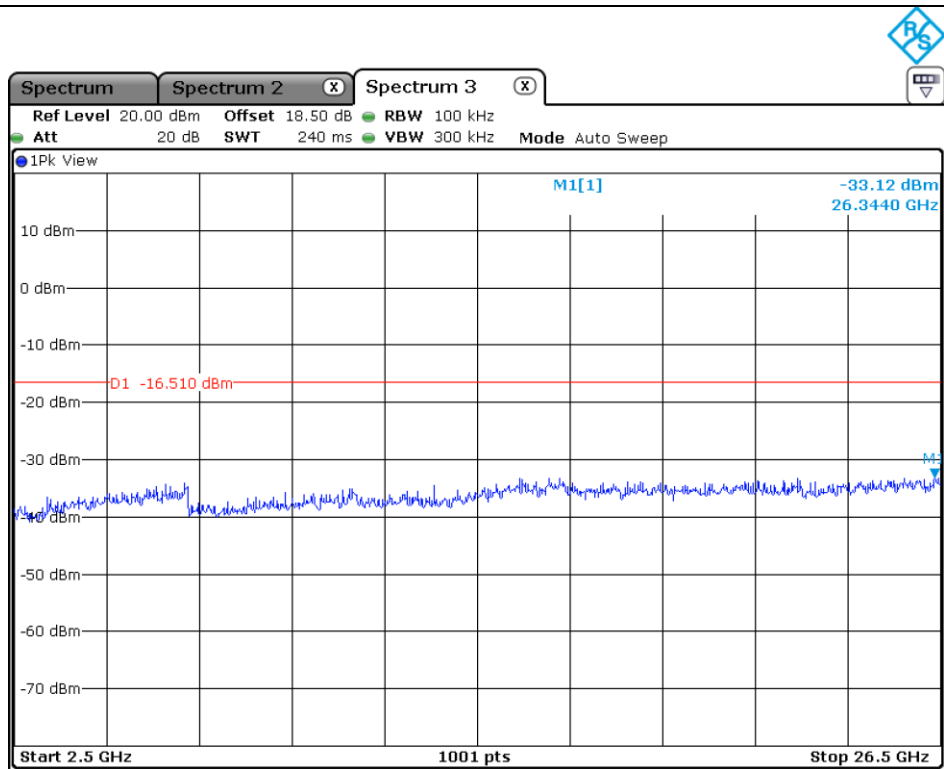
Low Channel



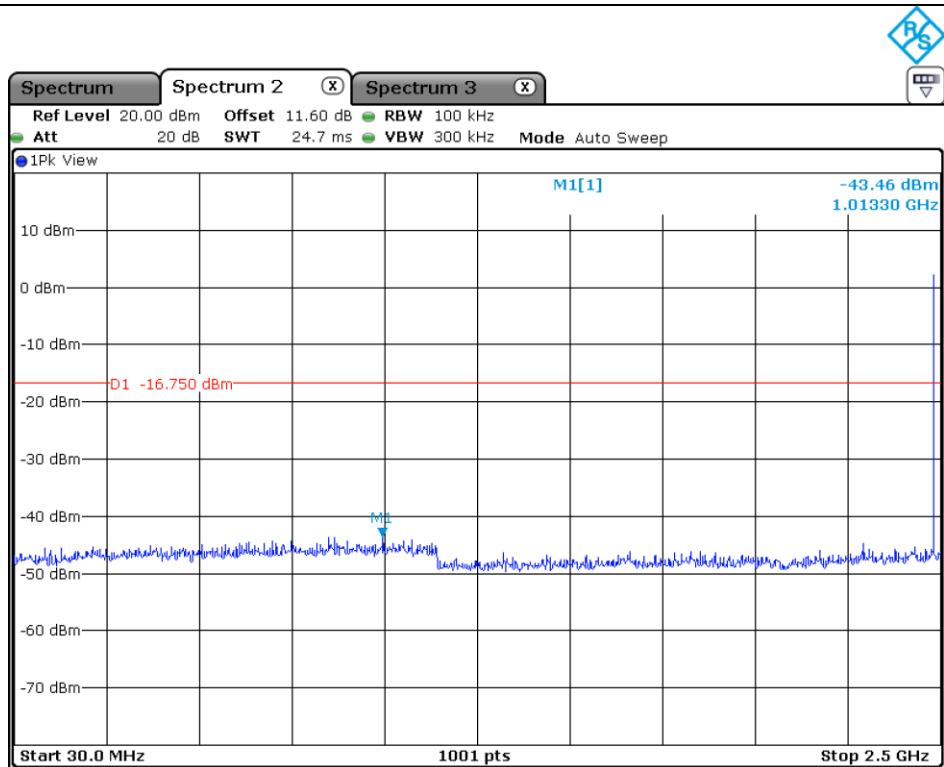
Low Channel



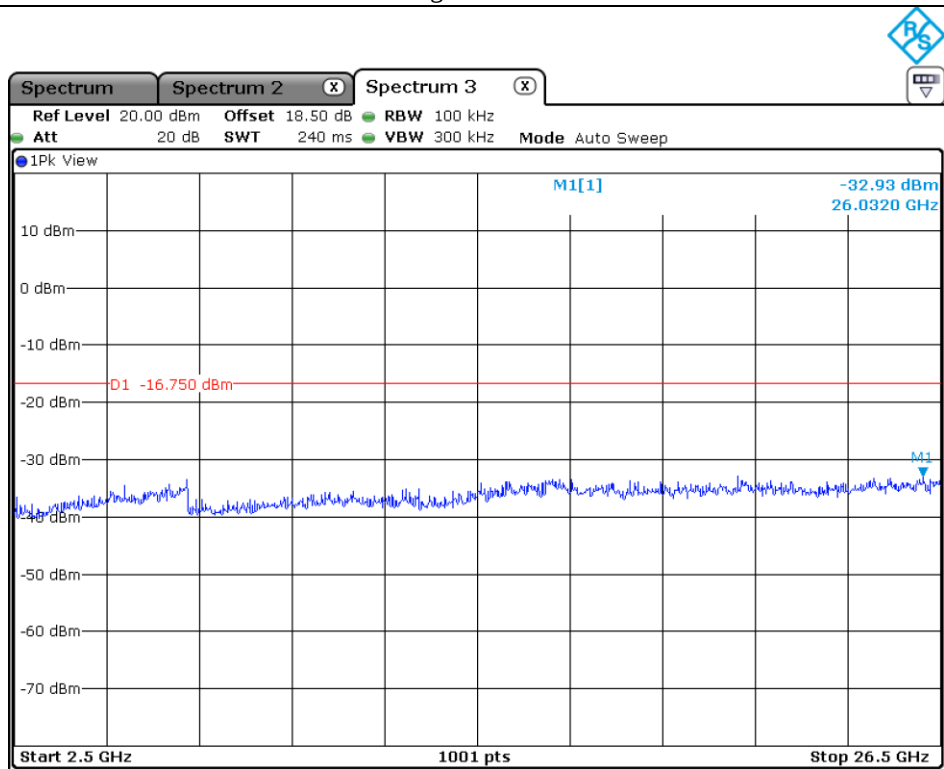
Middle Channel



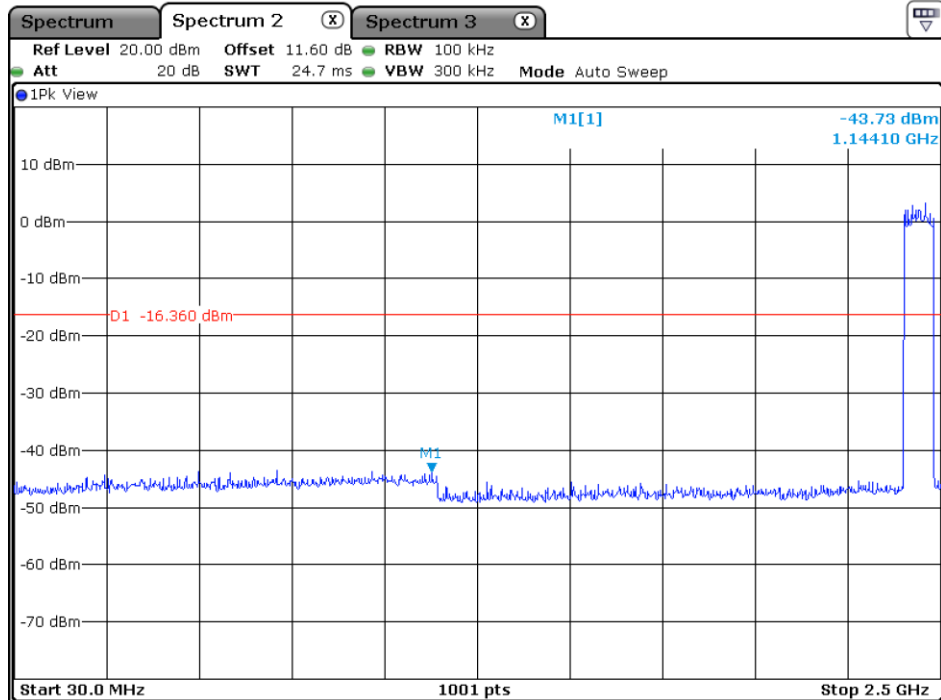
Middle Channel



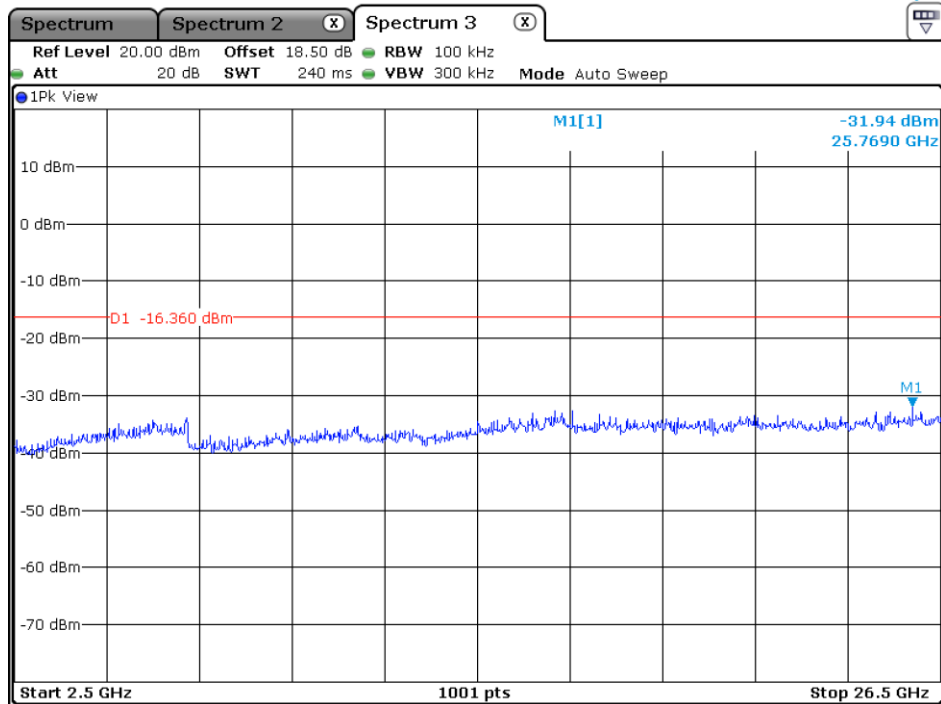
High Channel



High Channel



Hopping Mode



Hopping Mode

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 : 76.70 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
2 327.03	57.70	Peak	H	27.50	8.20	45.79	-	47.61	74.00	26.39
2 327.21	51.04	Average	H	27.50	8.20	45.79	1.15	42.10	54.00	11.90
2 327.21	55.78	Peak	V	27.50	8.20	45.79	-	45.69	74.00	28.31
2 327.21	49.56	Average	V	27.50	8.20	45.79	1.15	40.62	54.00	13.38
Test Data for High Channel										
2 483.50	58.41	Peak	H	27.30	8.33	45.79	-	48.25	74.00	25.75
2 483.50	47.19	Average	H	27.30	8.33	45.79	1.15	38.18	54.00	15.82
2 487.89	54.72	Peak	V	27.30	8.33	45.79	-	44.56	74.00	29.44
2 483.50	44.54	Average	V	27.30	8.33	45.79	1.15	35.53	54.00	18.47

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amp Gain} + \text{Correction Factor}$$

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 : 76.70 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
2 390.00	57.40	Peak	H	27.50	8.20	45.79	-	47.31	74.00	26.69
2 327.21	50.28	Average	H	27.50	8.20	45.79	1.15	41.34	54.00	12.66
2 327.30	55.59	Peak	V	27.50	8.20	45.79	-	45.50	74.00	28.50
2 327.21	49.04	Average	V	27.50	8.20	45.79	1.15	40.10	54.00	13.90
Test Data for High Channel										
2 483.92	57.73	Peak	H	27.30	8.33	45.79	-	47.57	74.00	26.43
2 483.50	46.91	Average	H	27.30	8.33	45.79	1.15	37.90	54.00	16.10
2 483.50	54.78	Peak	V	27.30	8.33	45.79	-	44.62	74.00	29.38
2 483.50	44.06	Average	V	27.30	8.33	45.79	1.15	35.05	54.00	18.95

Remark: "H": Horizontal, "V": Vertical

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

Total Level = Reading + Antenna Factor + Cable Loss - Amp Gain + Correction Factor

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 : 76.70 %
- . Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
2 327.15	57.50	Peak	H	27.50	8.20	45.79	-	47.41	74.00	26.59
2 327.21	50.13	Average	H	27.50	8.20	45.79	1.15	41.19	54.00	12.81
2 327.12	55.54	Peak	V	27.50	8.20	45.79	-	45.45	74.00	28.55
2 327.21	48.58	Average	V	27.50	8.20	45.79	1.15	39.64	54.00	14.36
Test Data for High Channel										
2 483.50	57.06	Peak	H	27.30	8.33	45.79	-	46.90	74.00	27.10
2 483.50	46.85	Average	H	27.30	8.33	45.79	1.15	37.84	54.00	16.16
2 483.92	53.65	Peak	V	27.30	8.33	45.79	-	43.49	74.00	30.51
2 483.50	44.50	Average	V	27.30	8.33	45.79	1.15	35.49	54.00	18.51

Remark: "H": Horizontal, "V": Vertical

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

Total Level = Reading + Antenna Factor + Cable Loss - Amp Gain + Correction Factor

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 : 76.70 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	50.17	Peak	H	31.10	11.19	45.10	-	47.36	74.00	26.64
4 804.00	40.27	Average	H	31.10	11.19	45.10	1.15	38.61	54.00	15.39
4 804.00	51.45	Peak	V	31.10	11.19	45.10	-	48.64	74.00	25.36
4 804.00	40.84	Average	V	31.10	11.19	45.10	1.15	39.18	54.00	14.82
Test Data for Middle Channel										
4 882.00	50.49	Peak	H	31.10	11.24	45.10	-	47.73	74.00	26.27
4 882.00	40.84	Average	H	31.10	11.24	45.10	1.15	39.23	54.00	14.77
4 882.00	51.23	Peak	V	31.10	11.24	45.10	-	48.47	74.00	25.53
4 882.00	40.44	Average	V	31.10	11.24	45.10	1.15	38.83	54.00	15.17
Test Data for High Channel										
4 960.00	50.46	Peak	H	31.20	11.33	45.03	-	47.96	74.00	26.04
4 960.00	40.07	Average	H	31.20	11.33	45.03	1.15	38.72	54.00	15.28
4 960.00	51.03	Peak	V	31.20	11.33	45.03	-	48.53	74.00	25.47
4 960.00	40.09	Average	V	31.20	11.33	45.03	1.15	38.74	54.00	15.26

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amp Gain} + \text{Correction Factor}$$

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 : 76.70 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	50.61	Peak	H	31.10	11.19	45.10	-	47.80	74.00	26.20
4 804.00	40.72	Average	H	31.10	11.19	45.10	1.15	39.06	54.00	14.94
4 804.00	51.00	Peak	V	31.10	11.19	45.10	-	48.19	74.00	25.81
4 804.00	40.74	Average	V	31.10	11.19	45.10	1.15	39.08	54.00	14.92
Test Data for Middle Channel										
4 882.00	50.63	Peak	H	31.10	11.24	45.10	-	47.87	74.00	26.13
4 882.00	40.11	Average	H	31.10	11.24	45.10	1.15	38.50	54.00	15.50
4 882.00	51.17	Peak	V	31.10	11.24	45.10	-	48.41	74.00	25.59
4 882.00	40.45	Average	V	31.10	11.24	45.10	1.15	38.84	54.00	15.16
Test Data for High Channel										
4 960.00	50.50	Peak	H	31.20	11.33	45.03	-	48.00	74.00	26.00
4 960.00	40.33	Average	H	31.20	11.33	45.03	1.15	38.98	54.00	15.02
4 960.00	51.03	Peak	V	31.20	11.33	45.03	-	48.53	74.00	25.47
4 960.00	40.75	Average	V	31.20	11.33	45.03	1.15	39.40	54.00	14.60

Remark: "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Total Level (dB}\mu\text{V/m)}$$

$$\text{Total Level} = \text{Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amp Gain} + \text{Correction Factor}$$

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 : 76.70 %
- Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	AMP Gain	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel										
4 804.00	50.38	Peak	H	31.10	11.19	45.10	-	47.57	74.00	26.43
4 804.00	40.12	Average	H	31.10	11.19	45.10	1.15	38.46	54.00	15.54
4 804.00	51.02	Peak	V	31.10	11.19	45.10	-	48.21	74.00	25.79
4 804.00	40.52	Average	V	31.10	11.19	45.10	1.15	38.86	54.00	15.14
Test Data for Middle Channel										
4 882.00	50.94	Peak	H	31.10	11.24	45.10	-	48.18	74.00	25.82
4 882.00	40.23	Average	H	31.10	11.24	45.10	1.15	38.62	54.00	15.38
4 882.00	50.70	Peak	V	31.10	11.24	45.10	-	47.94	74.00	26.06
4 882.00	40.45	Average	V	31.10	11.24	45.10	1.15	38.84	54.00	15.16
Test Data for High Channel										
4 960.00	50.42	Peak	H	31.20	11.33	45.03	-	47.92	74.00	26.08
4 960.00	40.06	Average	H	31.20	11.33	45.03	1.15	38.71	54.00	15.29
4 960.00	50.95	Peak	V	31.20	11.33	45.03	-	48.45	74.00	25.55
4 960.00	40.30	Average	V	31.20	11.33	45.03	1.15	38.95	54.00	15.05

Remark: "H": Horizontal, "V": Vertical

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

Total Level = Reading + Antenna Factor + Cable Loss - Amp Gain + Correction Factor

13. RADIATED EMISSION TEST

13.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 % R.H.

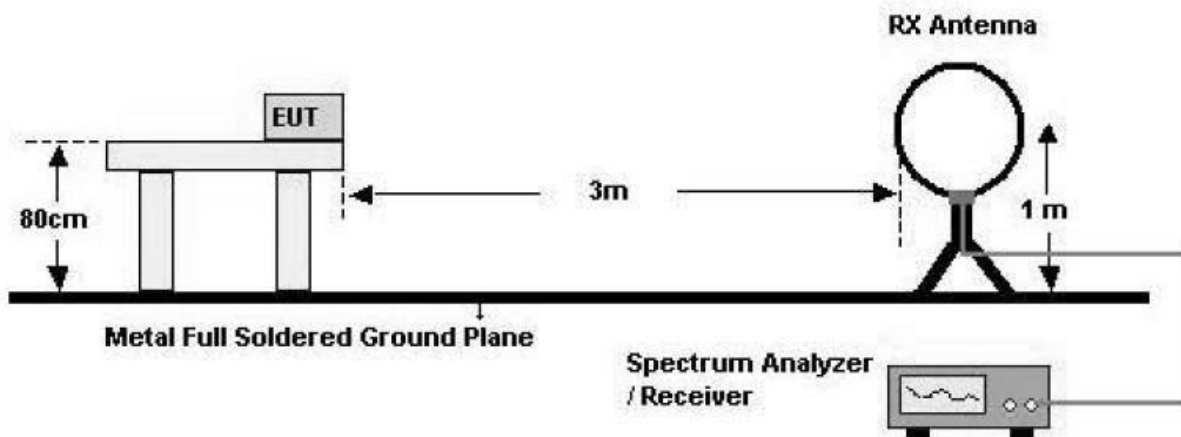
13.2 Test set-up

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.

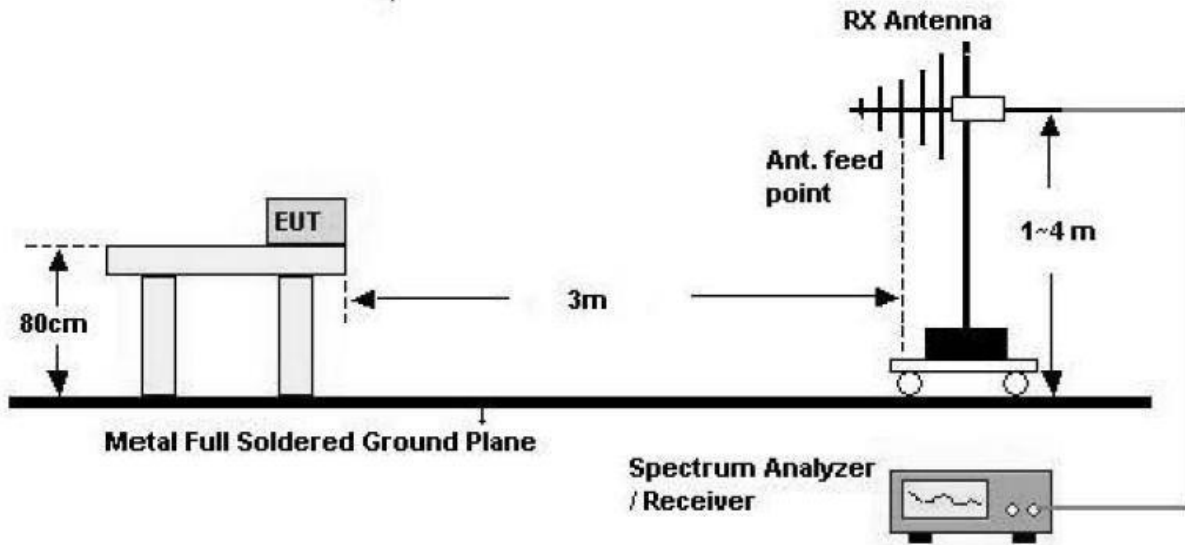
The frequency spectrum from 30 MHz to 26.5 GHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal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

- Test Configuration

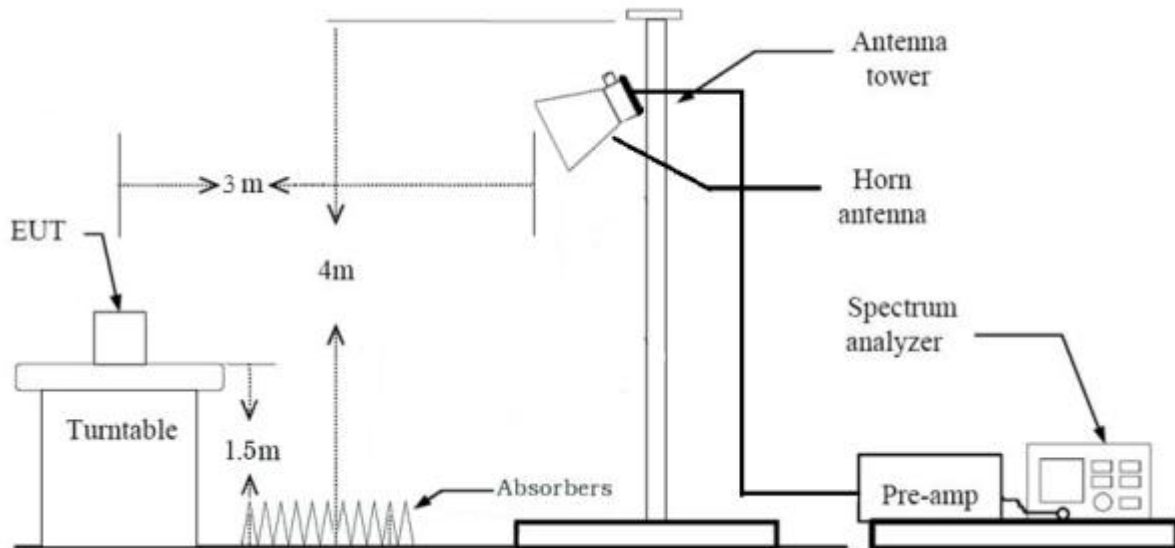
1. Below 30 MHz



2. 30 MHz - 1 GHz



3. Above 1 GHz



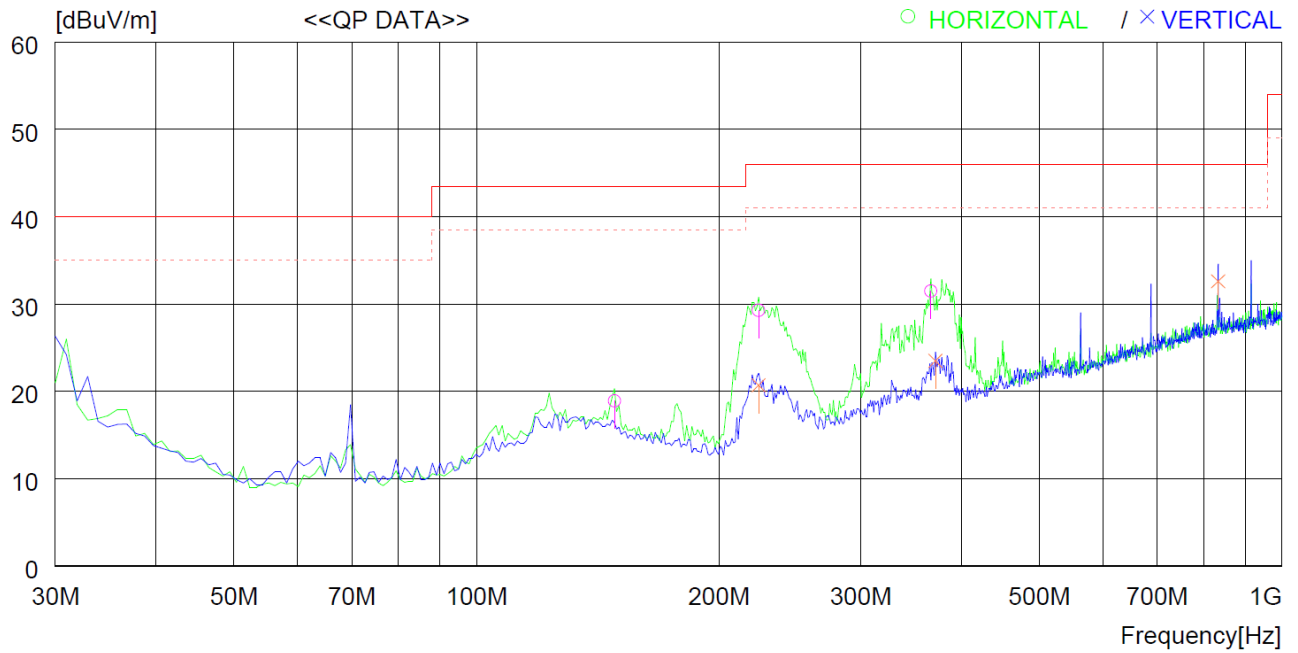
13.3 Test Date

November 25, 2021 ~ January 18, 2022

13.4 Test data for 30 MHz ~ 1 000 MHz

13.4.1 Test data for Bluetooth Mode_Internal Antenna

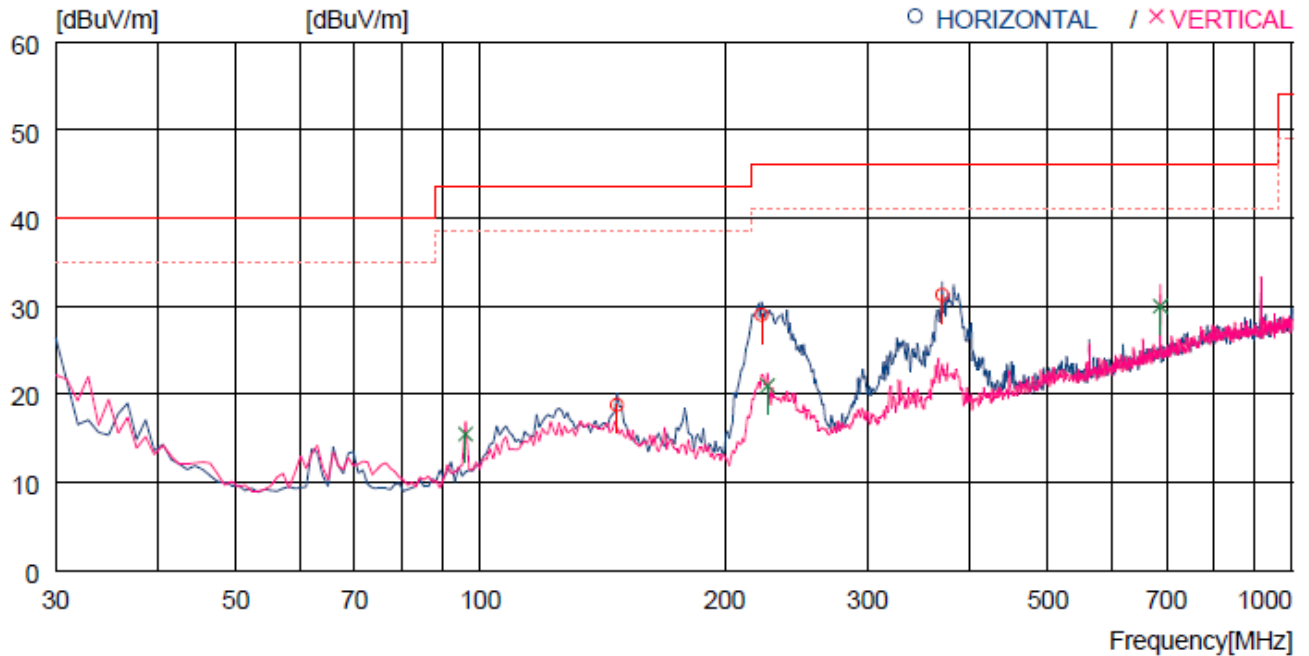
- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	QP	FACTOR	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal -----										
1	148.340	30.1	18.8	2.1	32.1	18.9	43.5	24.6	400	279
2	224.000	42.1	16.7	2.6	32.1	29.3	46.0	16.7	200	154
3	366.590	40.2	20.2	3.3	32.2	31.5	46.0	14.5	100	162
----- Vertical -----										
4	224.000	33.5	16.7	2.6	32.1	20.7	46.0	25.3	200	0
5	371.440	32.1	20.3	3.3	32.2	23.5	46.0	22.5	400	0
6	833.151	32.5	27.2	5.1	32.2	32.6	46.0	13.4	200	0

13.4.2 Test data for Intermodulation Mode(Bluetooth + WLAN 2.4 GHz)

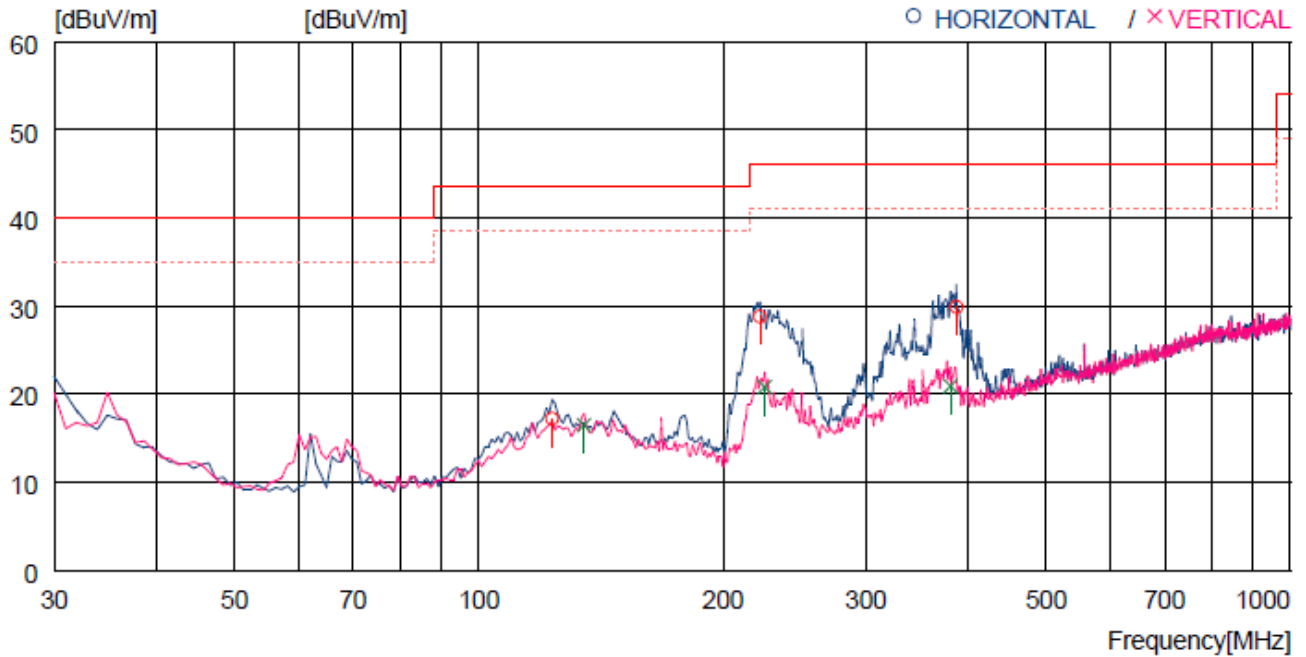
- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
---- Horizontal ----										
1	147.370	29.9	18.9	2.1	32.1	18.8	43.5	24.7	200	0
2	222.060	41.9	16.6	2.6	32.1	29.0	46.0	17.0	200	157
3	370.470	39.9	20.3	3.3	32.2	31.3	46.0	14.7	100	359
---- Vertical ----										
4	95.960	31.2	14.6	1.8	32.1	15.5	43.5	28.0	400	359
5	225.940	33.8	16.7	2.6	32.1	21.0	46.0	25.0	200	359
6	687.655	32.4	25.4	4.6	32.4	30.0	46.0	16.0	100	0

13.4.3 Test data for Intermodulation Mode(Bluetooth + WLAN 5 GHz)

- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 3 m



No.	FREQ	READING	ANT	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
---- Horizontal ----										
1	123.120	28.6	18.7	2.0	32.1	17.2	43.5	26.3	300	130
2	222.060	41.7	16.6	2.6	32.1	28.8	46.0	17.2	200	359
3	387.930	38.2	20.5	3.4	32.2	29.9	46.0	16.1	100	0
---- Vertical ----										
4	134.760	27.2	19.3	2.1	32.1	16.5	43.5	27.0	100	359
5	224.970	33.6	16.7	2.6	32.1	20.8	46.0	25.2	200	344
6	381.140	29.3	20.4	3.4	32.2	20.9	46.0	25.1	300	359

13.4 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.								

13.5 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.								

14. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV40-N	Rohde & Schwarz	Signal Analyzer	102177	Apr. 16, 2021 (1Y)
ESW	Rohde & Schwarz	EMI Test Receiver	101851	Mar. 22, 2021 (1Y)
GP-4303D	LG Precision Co.,Ltd	DC POWER SUPPLY	5071069	Jan. 03, 2022 (1Y)
HPF 3GHz	Rohde & Schwarz	High Pass Filter	N/A	Feb. 08, 2021 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	392756	Oct. 14, 2021 (1Y)
SCU18	Rohde & Schwarz	Pre-Amplifier	102266	Jul. 14, 2021 (1Y)
SCU40A	Rohde & Schwarz	Signal Conditioning unit	100436	Feb. 08, 2021 (1Y)
4226-10	narda	Directional Coupler	04389	Apr. 16, 2021 (1Y)
TC-3000C	TESCOM	BLUETOOTH TESTER	3000C000634	Feb. 09, 2021 (1Y)
DT2000-2t	Innco System	Turn Table	N/A	N/A
MA-4640-XPET	Innco System	Antenna Master	MA4640/652/43100318/P	N/A
HLP-2008	TDK	Hybrid Antenna	131316	Feb. 27, 2020 (2Y)
AH-118	Com-Power	Horn Antenna	10050061	Oct. 15, 2021 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Jan. 06, 2022 (1Y)
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar. 24, 2020 (2Y)