RADIO PERFORMANCE TEST REPORT

Test Report No.	**: OT-20O-RWD-013**
Reception No.	**: 2009003777**
Applicant	**: C&A Marketing Inc.**
Address	**: 114 Tived Lane East, Edison NJ 08837**
Manufacturer	**: C&A Marketing Inc.**
Address	**: 114 Tived Lane East, Edison NJ 08837**
Type of Equipment	**: KODAK STEP INSTANT MOBILE PHOTO PRINTER**
FCC ID.	**: 2AD2W-RODMP2O**
Model Name	**: RODMP2O**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 76 pages (including this page)**
Date of Incoming	**: September 25, 2020**
Date of issue	**: October 13, 2020**

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
/ Su-Min Yoo / Assistant Manager	/ Ha-Ram Lee / Manager	/ Ki-Hong, Nam / General Manager
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

It should not be reproduced except in full, without the written approval of 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)

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. 8

4. EUT MODIFICATIONS **8**

5. SYSTEM TEST CONFIGURATION **9**

5.1 JUSTIFICATION 9

5.2 PERIPHERAL EQUIPMENT 9

5.3 MODE OF OPERATION DURING THE TEST 9

5.4 CONFIGURATION OF TEST SYSTEM 12

5.5 ANTENNA REQUIREMENT 12

6. PRELIMINARY TEST **12**

6.1 AC POWER LINE CONDUCTED EMISSIONS TESTS 12

6.2 GENERAL RADIATED EMISSIONS TESTS 12

7. MINIMUM 20 DB BANDWIDTH **13**

7.1 OPERATING ENVIRONMENT 13

7.2 TEST SET-UP 13

7.3 TEST DATE 13

7.4 TEST DATA FOR 1 MBPS 14

7.5 TEST DATA FOR 2 MBPS 16

7.6 TEST DATA FOR 3 MBPS 18

8. HOPPING FREQUENCY SEPARATION **20**

8.1 OPERATING ENVIRONMENT 20

8.2 TEST SET-UP 20

8.3 TEST DATE 20

It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

8.4 TEST DATA FOR 1 MBPS 21
8.5 TEST DATA FOR 2 MBPS 22
8.6 TEST DATA FOR 3 MBPS 23
9. NUMBER OF HOPPING CHANNELS **24**
9.1 OPERATING ENVIRONMENT 24
9.2 TEST SET-UP 24
9.3 TEST DATE 24
9.4 TEST DATA FOR 1 MBPS 25
9.5 TEST DATA FOR 2 MBPS 28
9.6 TEST DATA FOR 3 MBPS 31
10. TIME OF OCCUPANCY **34**
10.1 OPERATING ENVIRONMENT 34
10.2 TEST SET-UP 34
10.3 TEST DATE 34
10.4 TEST DATA FOR 1 MBPS 35
10.5 TEST DATA FOR 2 MBPS 37
10.6 TEST DATA FOR 3 MBPS 39
11. MAXIMUM PEAK OUTPUT POWER **41**
11.1 OPERATING ENVIRONMENT 41
11.2 TEST SET-UP 41
11.3 TEST DATE 41
11.4 TEST DATA FOR 1 MBPS 42
11.5 TEST DATA FOR 2 MBPS 44
11.6 TEST DATA FOR 3 MBPS 46
12. 100 KHZ BANDWIDTH OUTSIDE THE FREQUENCY BAND **48**
12.1 OPERATING ENVIRONMENT 48
12.2 TEST SET-UP FOR CONDUCTED MEASUREMENT 48
12.3 TEST SET-UP FOR RADIATED MEASUREMENT 48
12.4 TEST DATE 48
12.5 TEST DATA FOR CONDUCTED EMISSION 49
12.5.1 Test data for 1 Mbps *49*
12.5.2 Test data for 2 Mbps *54*
12.5.3 Test data for 3 Mbps *59*
12.6 TEST DATA FOR TRANSMITTING MODE RADIATED EMISSION 64
12.6.1 Radiated Emission which fall in the Restricted Band *64*
12.6.2 Spurious & Harmonic Radiated Emission above 1 GHz *67*

It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

13. RADIATED EMISSION TEST 70

13.1 OPERATING ENVIRONMENT 70

13.2 TEST SET-UP 70

13.3 TEST DATE 70

13.4 TEST DATA FOR 30 MHZ ~ 1000 MHZ 71

13.5 TEST DATA FOR BELOW 30 MHZ 72

13.6 TEST DATA FOR ABOVE 1 GHZ 72

14. CONDUCTED EMISSION TEST 73

14.1 OPERATING ENVIRONMENT 73

14.2 TEST SET-UP 73

14.3 TEST DATE 73

14.4 TEST DATA 74

15. LIST OF TEST EQUIPMENT 76

It should not be reproduced except in full, without the written approval of 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)

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-20O-RWD-013	October 13, 2020	Initial Release	All

It should not be reproduced except in full, without the written approval of 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)

1. VERIFICATION OF COMPLIANCE

Applicant : C&A Marketing Inc.

Address : 114 Tived Lane East, Edison NJ 08837

Contact Person : Chaim Piekarski / Chief Executive Officer

Telephone No. : 8482442000

FCC ID : 2AD2W-RODMP2O

Model Name : RODMP2O

Brand Name : KODAK

Serial Number : N/A

Date : October 13, 2020

EQUIPMENT CLASS	DSS – PART 15 SPREAD SPECTRUM TRANSMITTER
E.U.T. DESCRIPTION	KODAK STEP INSTANT MOBILE PHOTO PRINTER
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.247 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.

It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

2. TEST SUMMARY

2.1 Test items and results

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

2.2 Additions, deviations, exclusions from standards

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

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

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

2.5 Test Methodology

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

2.6 Test Facility

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

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

-. Site Filing:

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

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

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

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

It should not be reproduced except in full, without the written approval of 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)

3. GENERAL INFORMATION

3.1 Product Description

The C&A Marketing Inc. , Model RODMP2O (referred to as the EUT in this report) is a KODAK STEP INSTANT MOBILE PHOTO PRINTER. The product specification described herein was obtained from product data sheet or user's manual.

Device Type	KODAK STEP INSTANT MOBILE PHOTO PRINTER		
Operating Frequency	Bluetooth	2 402 MHz ~ 2 480 MHz	
	Bluetooth LE		
RF Output Power	Bluetooth	1 Mbps	1.80 dBm
		2 Mbps	0.95 dBm
		3 Mbps	1.39 dBm
	Bluetooth LE	0.10 dBm	
Number of Channel	Bluetooth	79 Channels	
	Bluetooth LE	40 Channels	
Modulation Type	Bluetooth	GFSK for 1 Mbps, π/4-DQPSK for 2 Mbps, 8-DPSK for 3 Mbps	
	Bluetooth LE	GFSK	
Antenna Type	Bluetooth	Dielectric Chip Antenna	
	Bluetooth LE		
Antenna Gain	Bluetooth	1.8 dBi	
	Bluetooth LE		
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)	24 MHz		
Rated Supply Voltage	DC 7.4 V		

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	C&A Marketing Inc.	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
RODMP2O	C&A Marketing Inc.	KODAK STEP INSTANT MOBILE PHOTO PRINTER (EUT)	
TC-3000C	TESCOM	BLUETOOTH TESTER	EUT
HP Probook	HP	Notebook PC	EUT
PPP009L-E	LIE-ON TECHNOLOGY (CHANGZHOU)CO.,LTD.	AC Adapter	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, 2 441 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.

-. Frequency / Channel Operations

Channel	Frequency
0	2 402
39	2 441
78	2 480

It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

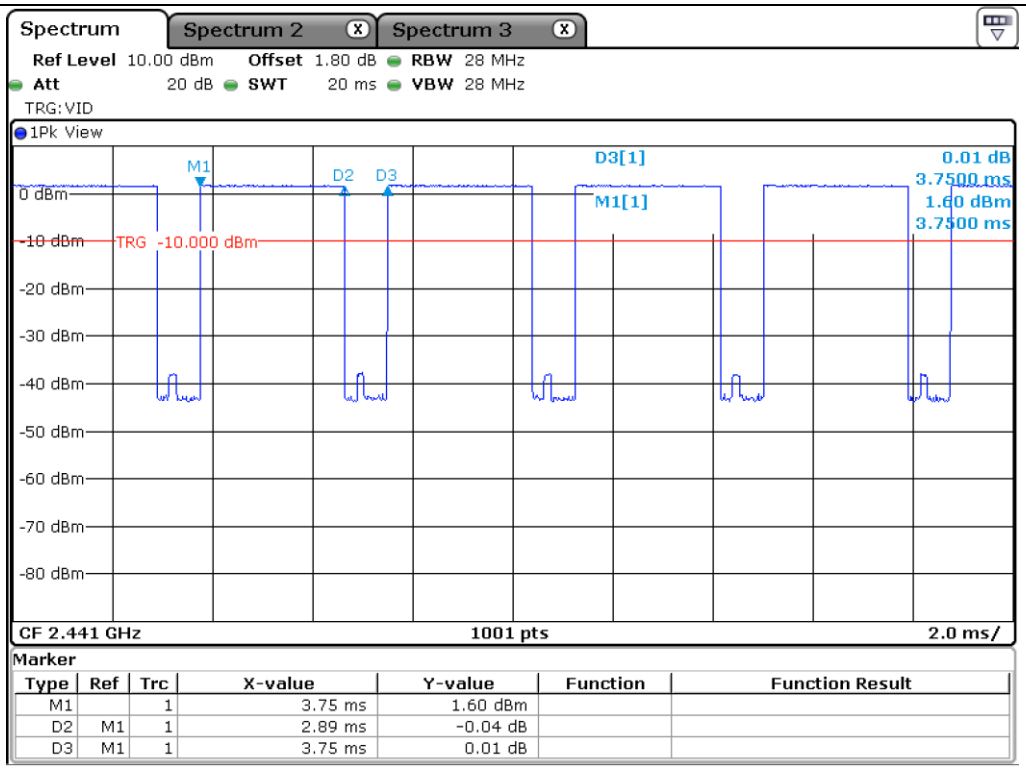
-. Duty Cycle

Mode	Tx On Time [ms]	Tx Off Time [ms]	Duty Cycle [%]	Correction Factor [dB]
Bluetooth [1 Mbps]	2.89	0.86	77.07	1.13
Bluetooth [2 Mbps]	2.90	0.86	77.13	1.13
Bluetooth [3 Mbps]	2.90	0.86	77.13	1.13

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

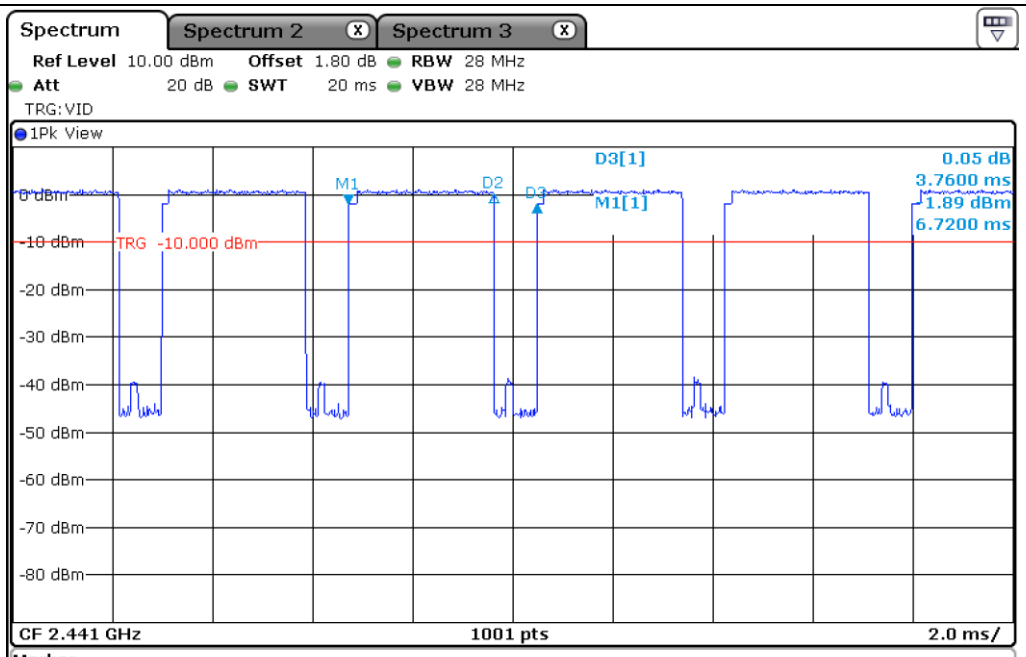
Correction Factor : 10 * Log(1 / (Duty Cycle / 100))

-. Test Plot



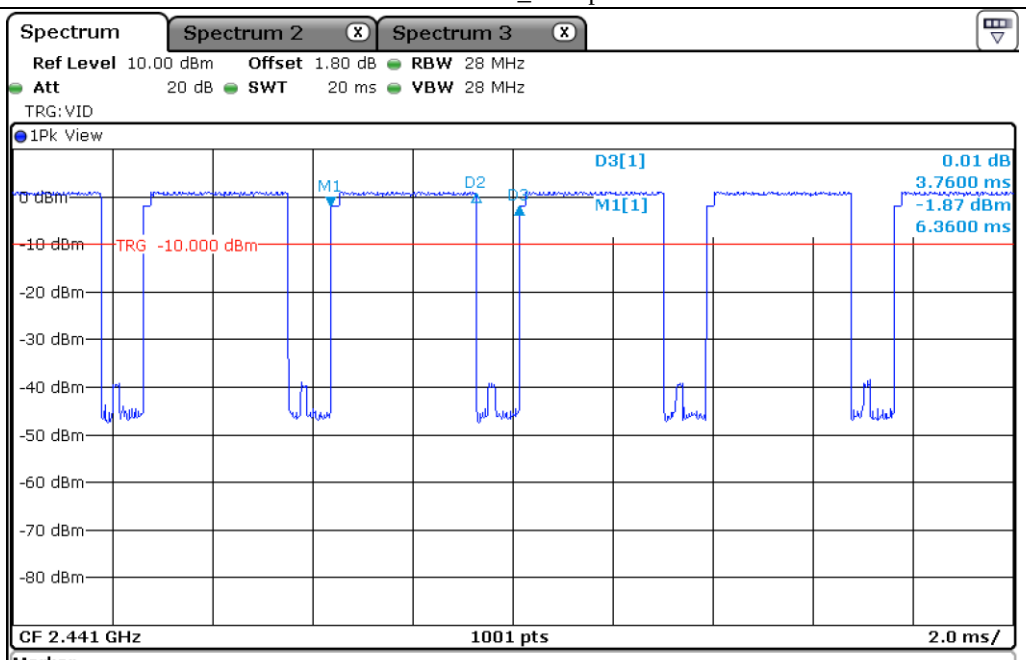
Bluetooth_1 Mbps

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



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	6.72 ms	-1.89 dBm		
D2	M1	1	2.9 ms	2.01 dB		
D3	M1	1	3.76 ms	0.05 dB		

Bluetooth_2 Mbps



Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	6.36 ms	-1.87 dBm		
D2	M1	1	2.9 ms	2.44 dB		
D3	M1	1	3.76 ms	0.01 dB		

Bluetooth_3 Mbps

It should not be reproduced except in full, without the written approval of 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)

5.4 Configuration of Test System

Line Conducted Test: The EUT was tested in the Transmitting mode. All supporting equipment were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions.

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

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

5.5 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

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

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Test, the following operating mode was investigated.

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

It should not be reproduced except in full, without the written approval of 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)

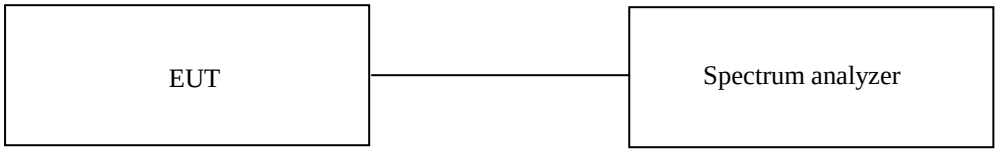
7. MINIMUM 20 dB BANDWIDTH

7.1 Operating environment

Temperature	:	24 °C
Relative humidity	:	48 % 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 the video bandwidth is set to 3 times the resolution bandwidth, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.



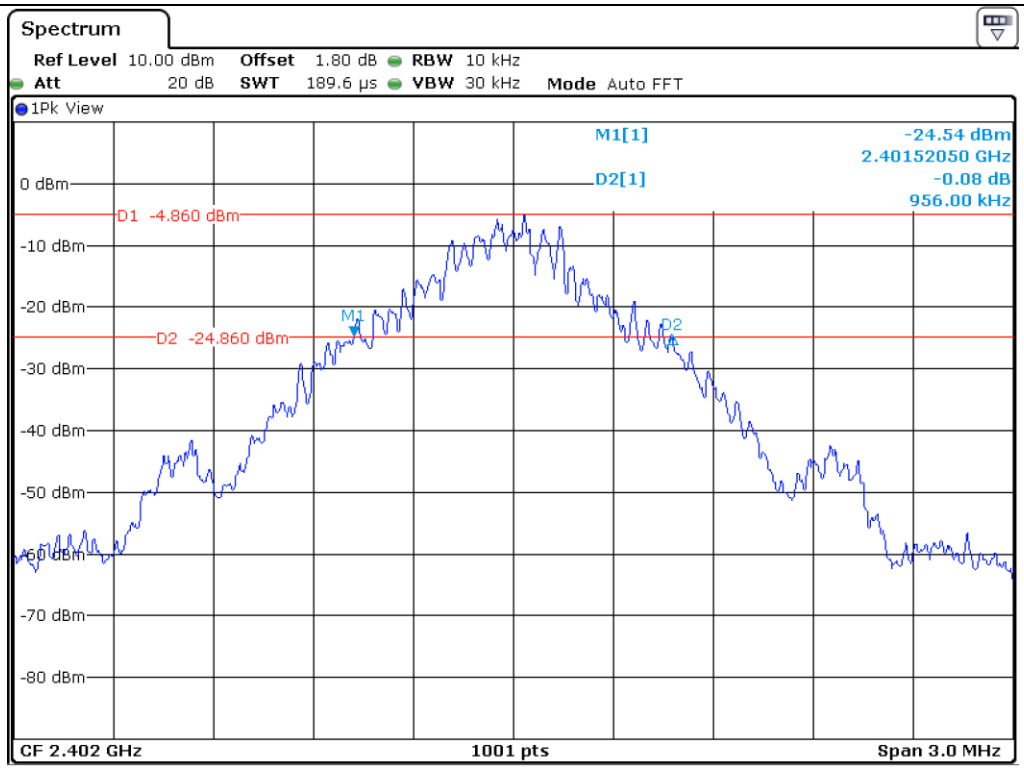
7.3 Test Date

September 28, 2020 ~ October 12, 2020

It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

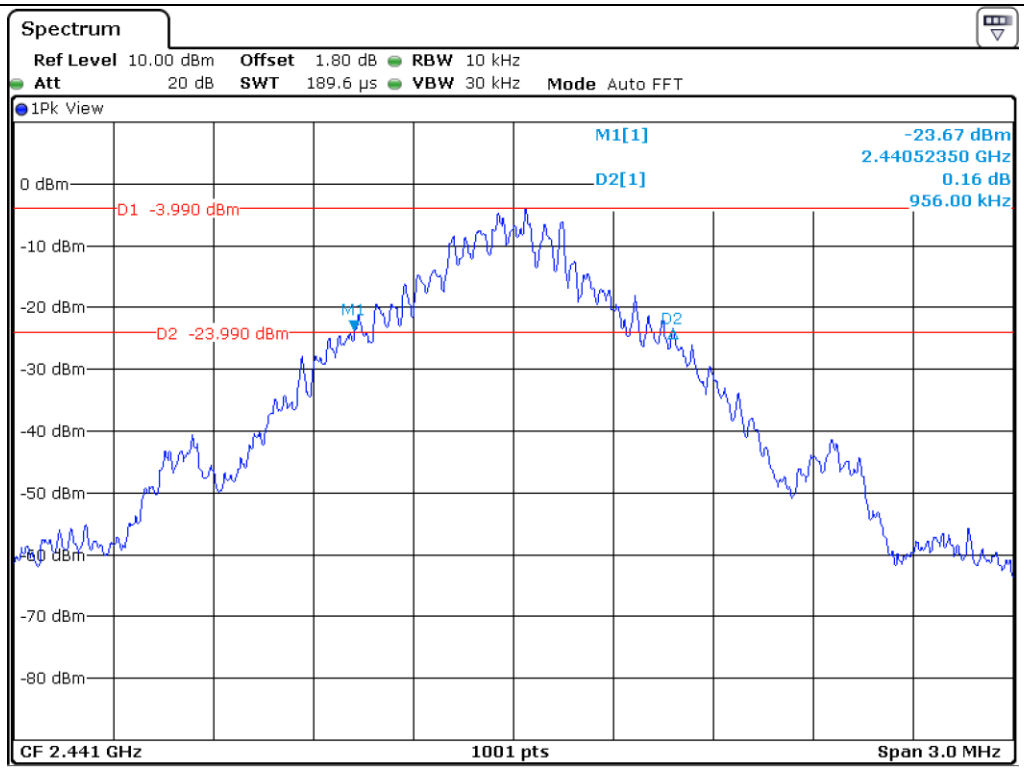
7.4 Test data for 1 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	956.00
Middle	2 441.00	956.00
High	2 480.00	953.00

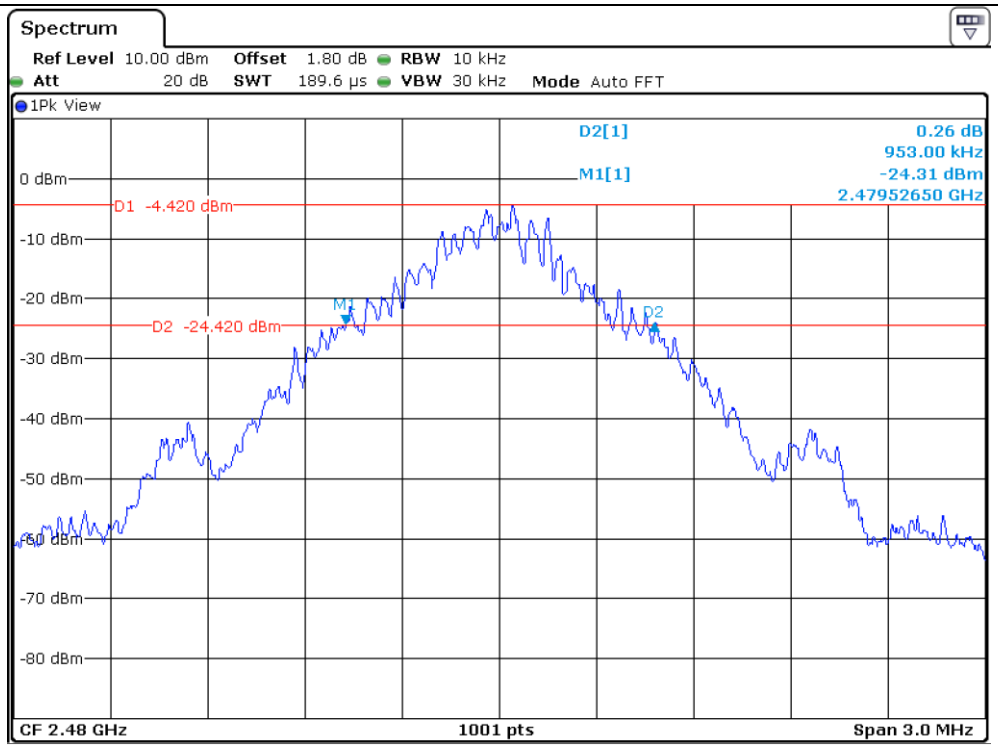


Low Channel

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

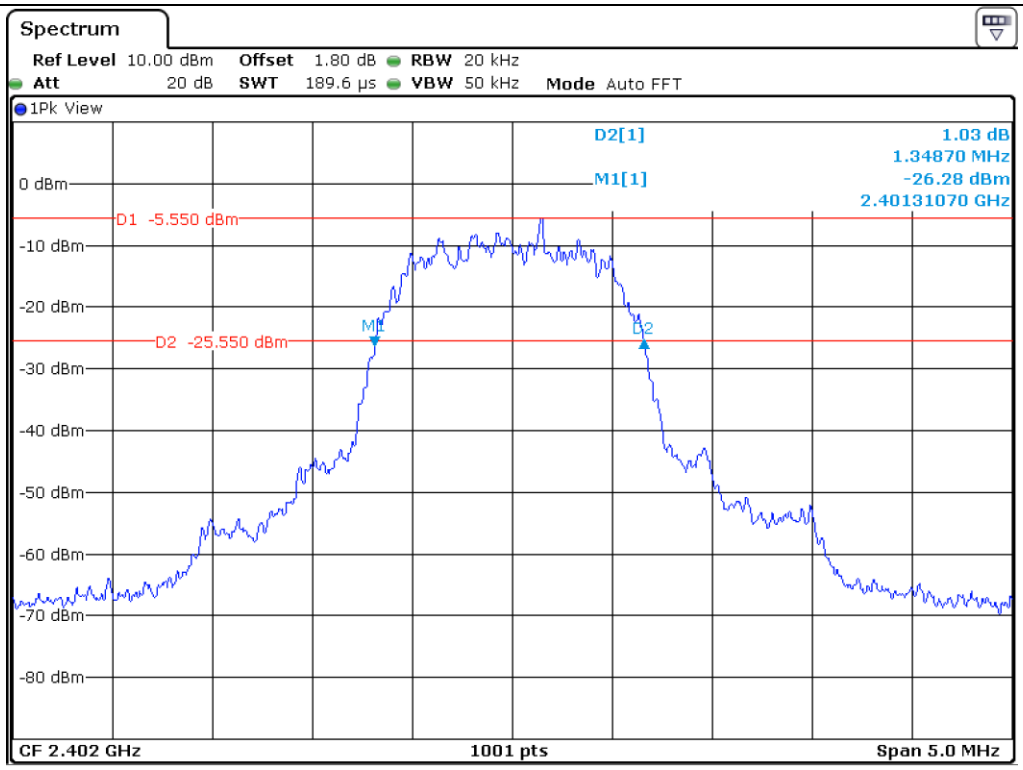


High Channel

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

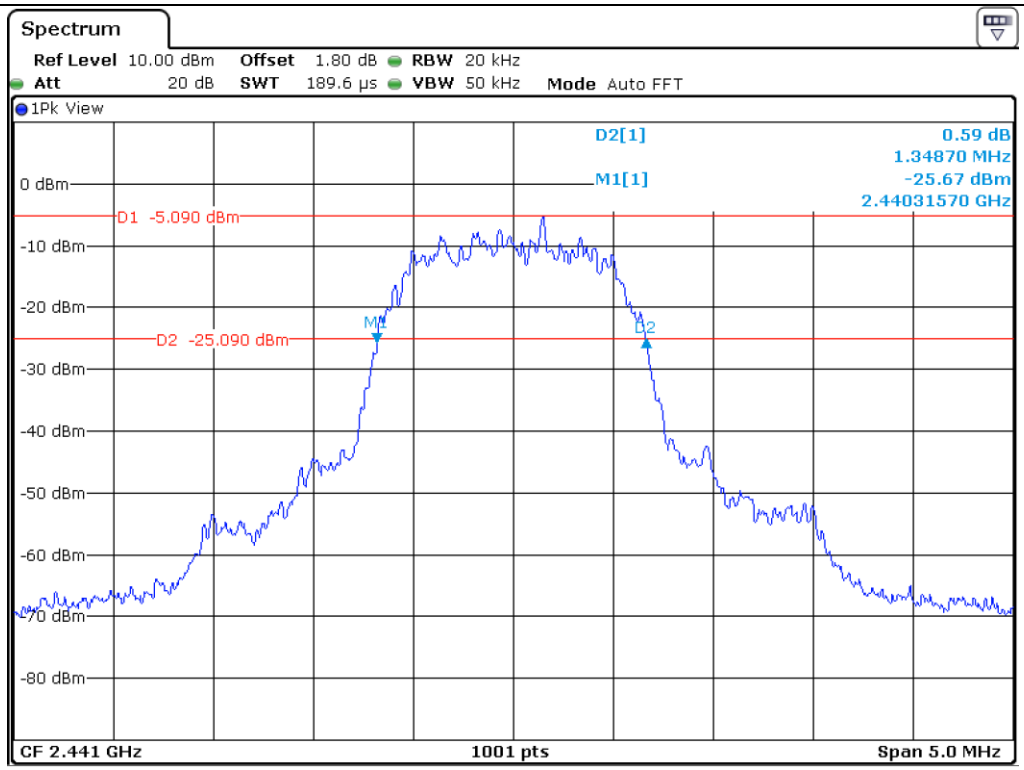
7.5 Test data for 2 Mbps

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

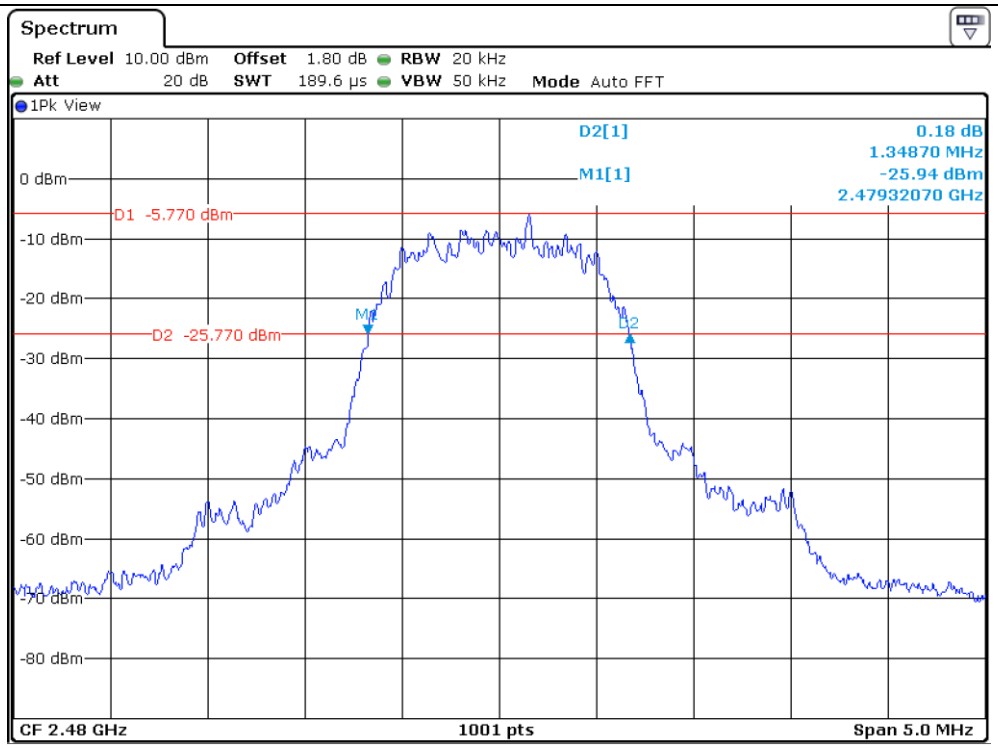


Low Channel

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

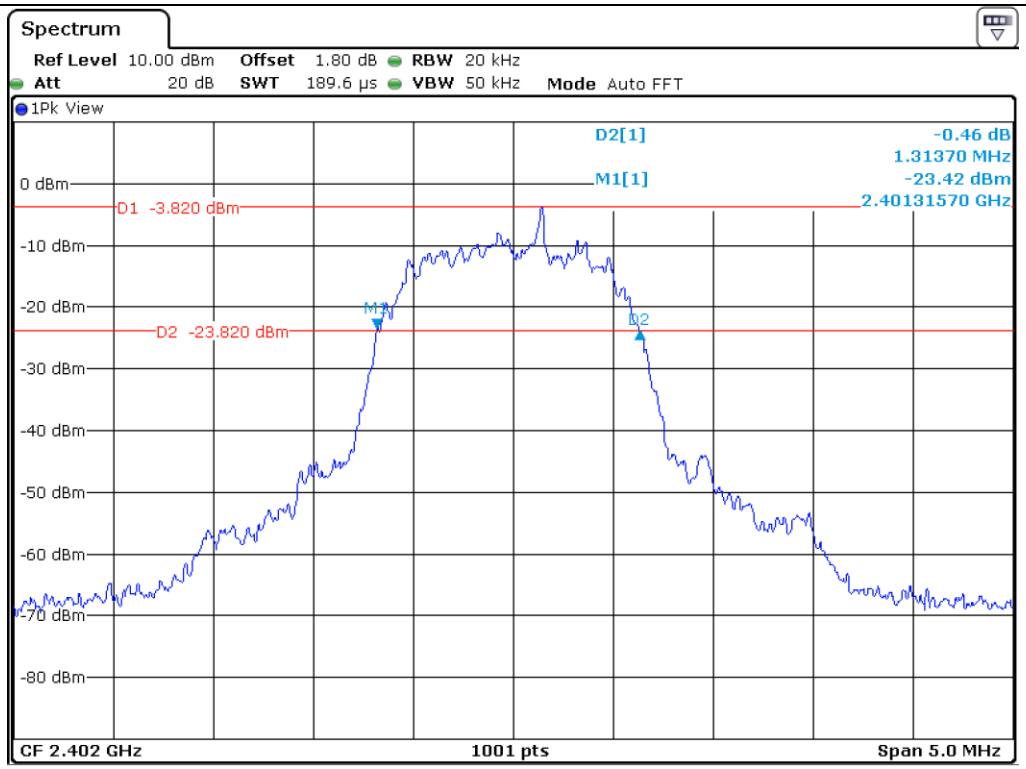


High Channel

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

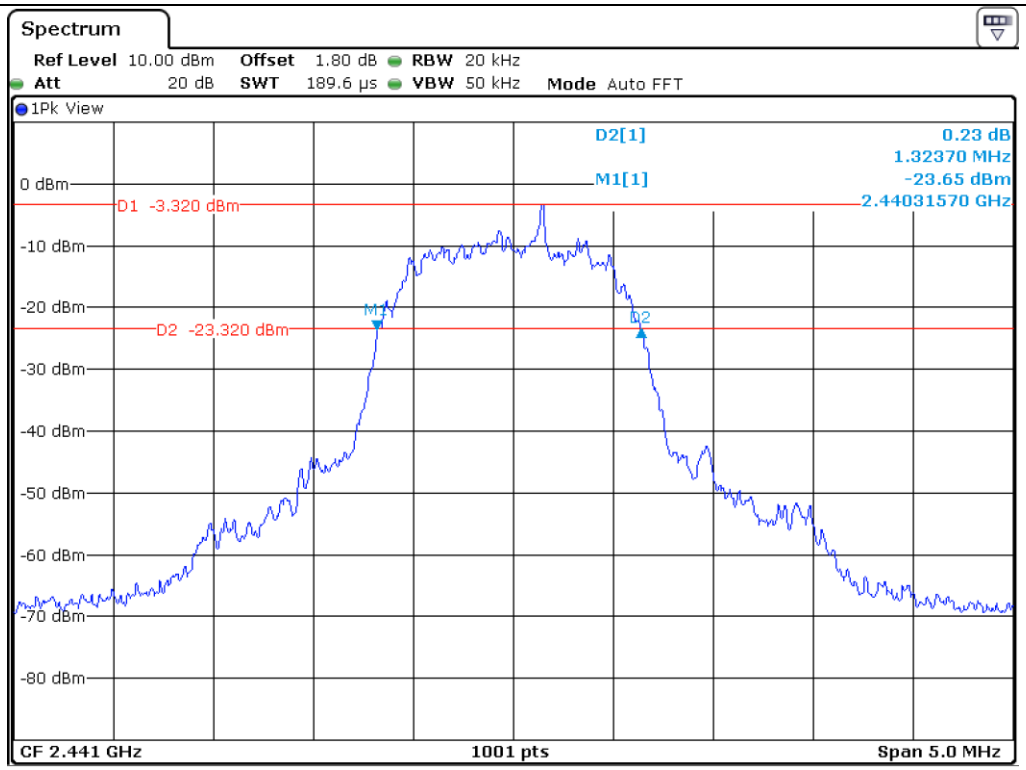
7.6 Test data for 3 Mbps

CHANNEL	FREQUENCY (MHz)	20 dB Bandwidth (kHz)
Low	2 402.00	1 313.70
Middle	2 441.00	1 323.70
High	2 480.00	1 323.70

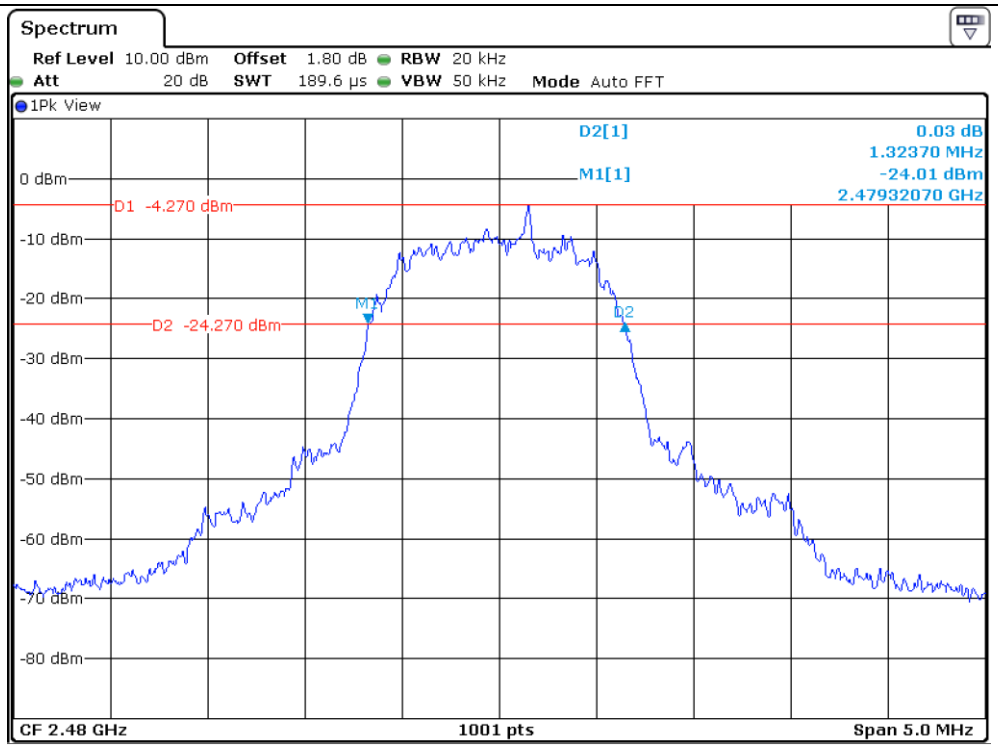


Low Channel

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. HOPPING FREQUENCY SEPARATION

8.1 Operating environment

Temperature	:	24 °C
Relative humidity	:	48 % 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 5 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

September 28, 2020 ~ October 12, 2020

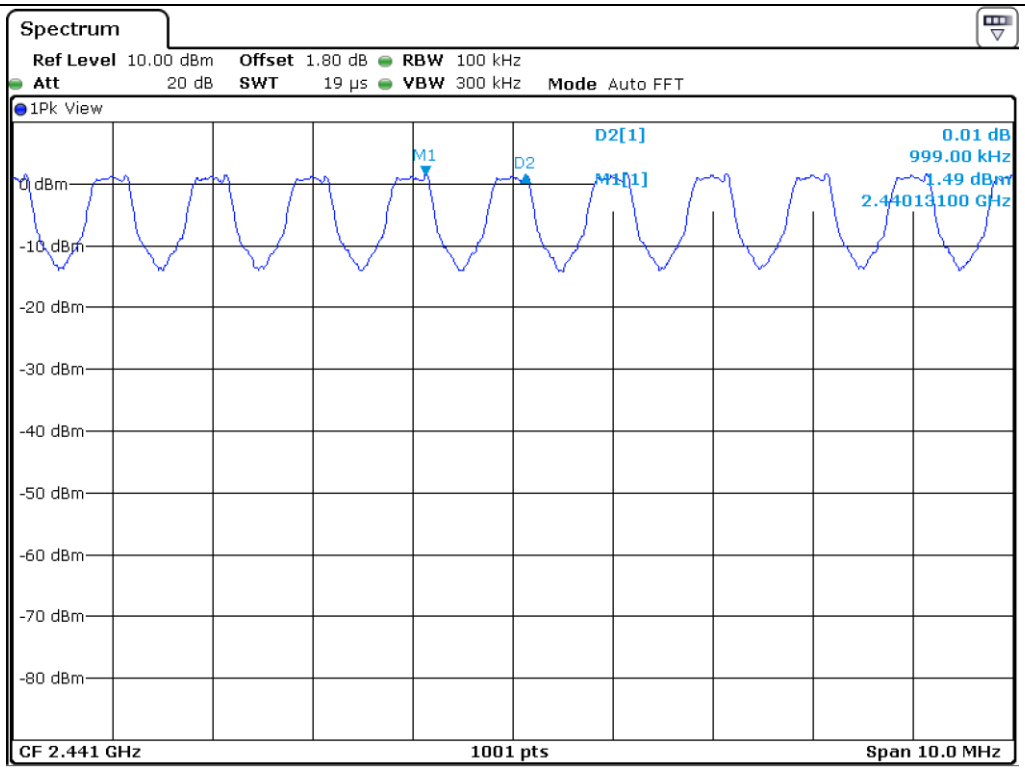
It should not be reproduced except in full, without the written approval of ONETECH Corp.

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

8.4 Test data for 1 Mbps

-. Test Result : Pass

Measured Value (kHz)	Two-third of 20 dB Bandwidth (kHz)	Limit
999	637.33	Separated by a minimum of 637.33 kHz

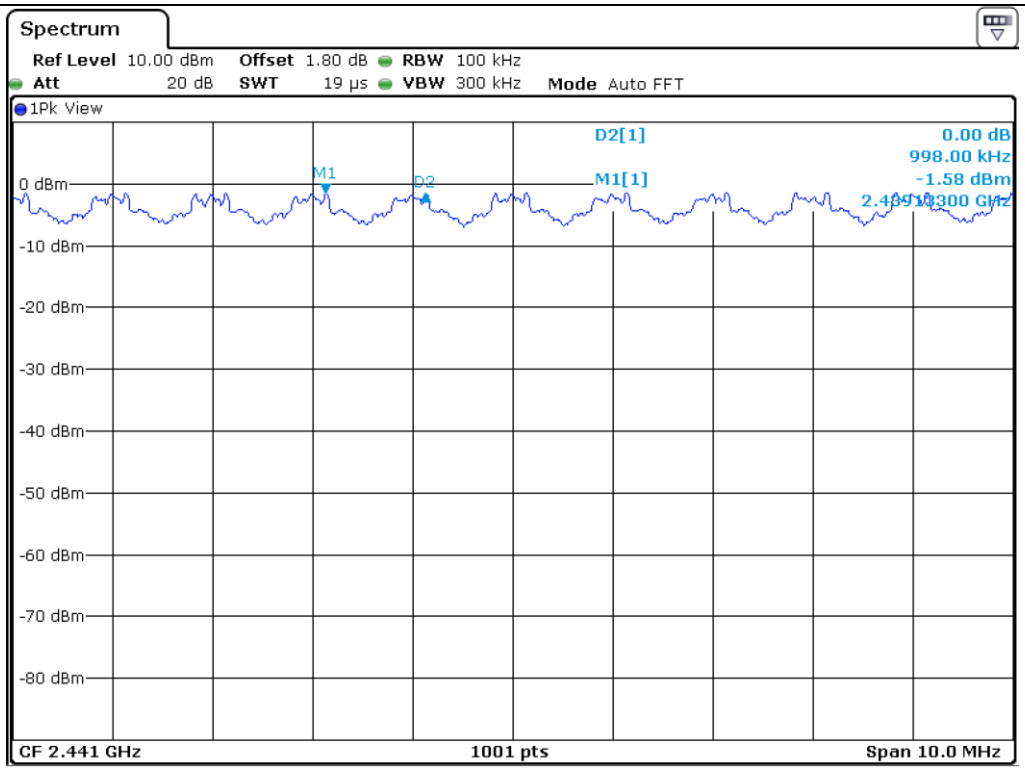


ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

8.5 Test data for 2 Mbps

-. Test Result : Pass

Measured Value (kHz)	Two-third of 20 dB Bandwidth (kHz)	Limit
998	899.13	Separated by a minimum of 899.13 kHz

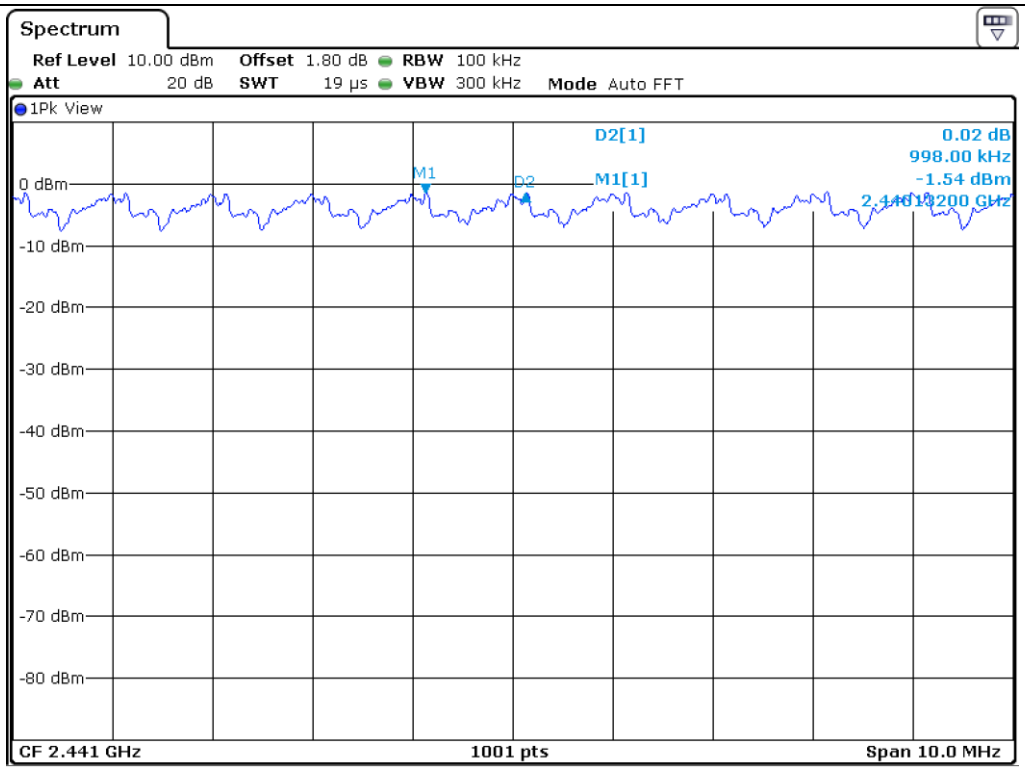


ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

8.6 Test data for 3 Mbps

-. Test Result : Pass

Measured Value (kHz)	Two-third of 20 dB Bandwidth (kHz)	Limit
998	882.47	Separated by a minimum of 882.47 kHz



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. NUMBER OF HOPPING CHANNELS

9.1 Operating environment

Temperature	:	24 °C
Relative humidity	:	48 % 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 MHz and the resolution bandwidth is set to 100 kHz. The analyzer is set to peak hold and then complete pseudo-random hopping sequence of the transmitter is captured.

9.3 Test Date

September 28, 2020 ~ October 12, 2020

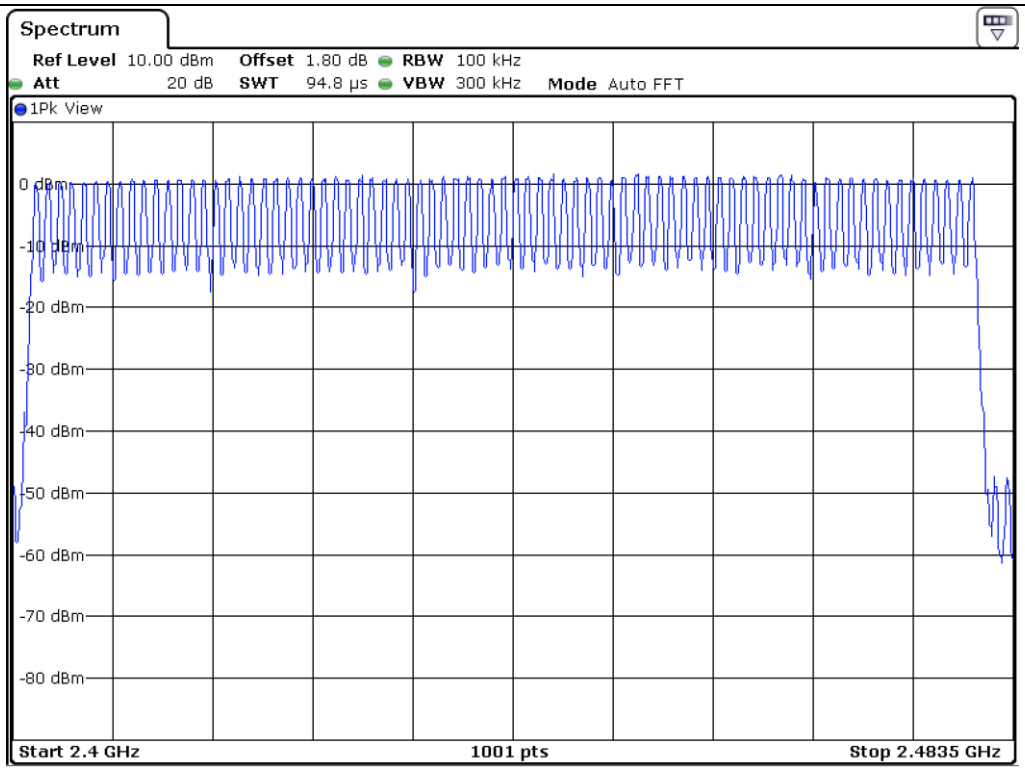
It should not be reproduced except in full, without the written approval of ONETECH Corp.

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

9.4 Test data for 1 Mbps

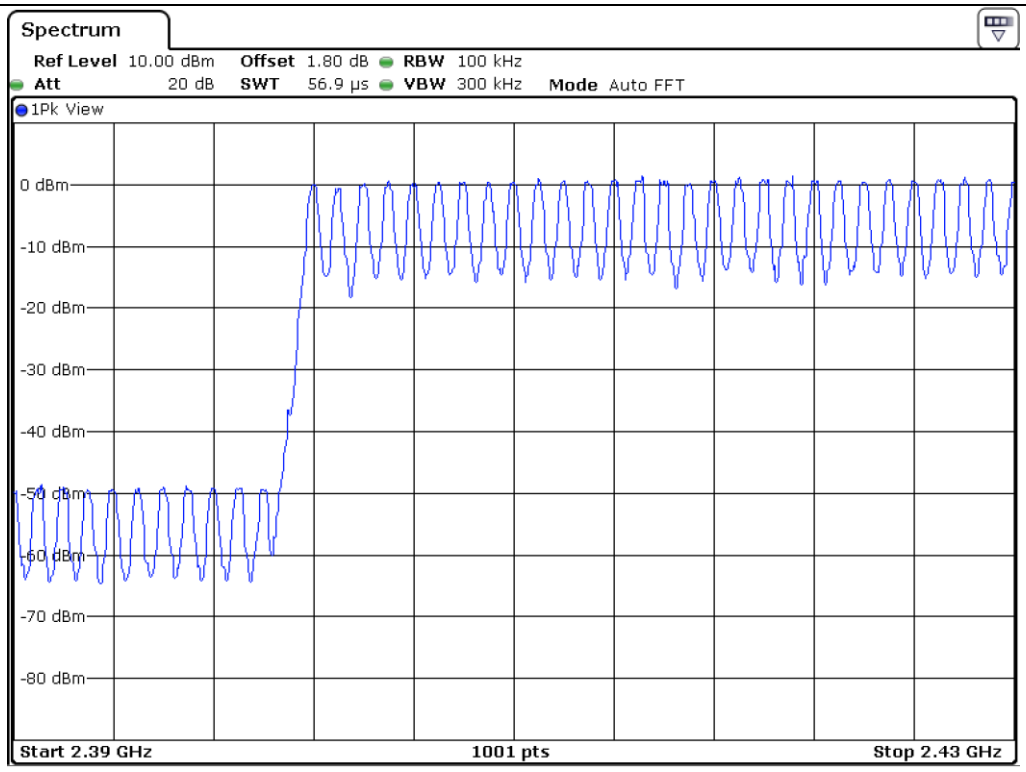
-. Test Result : Pass

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

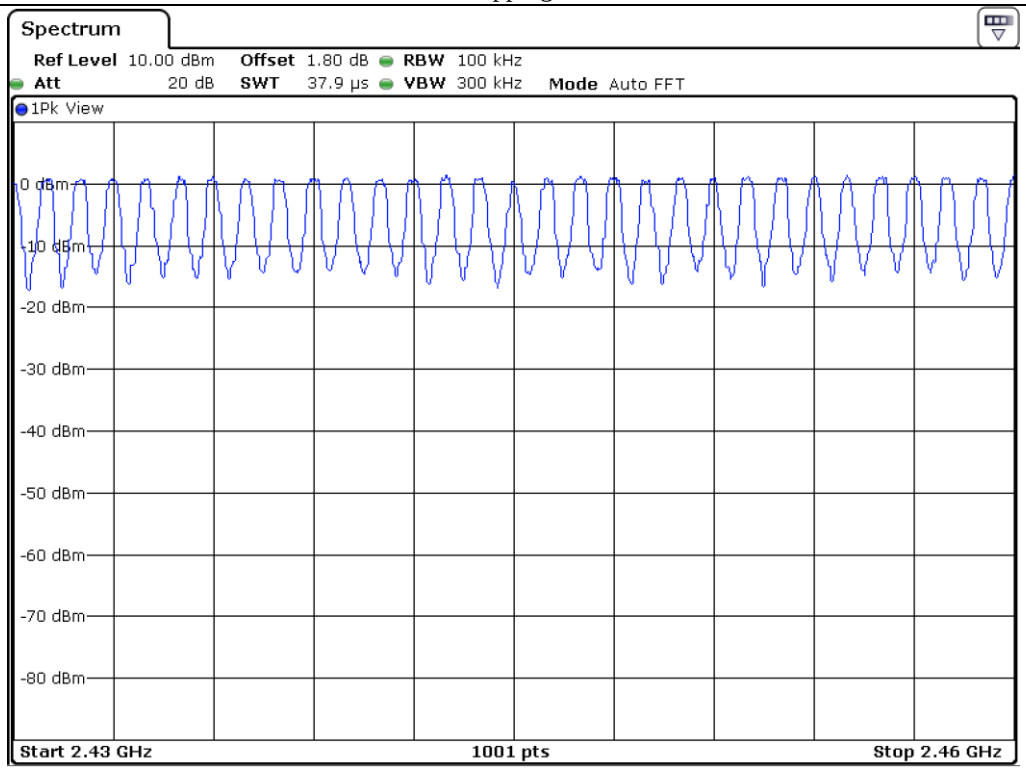


Total number of hopping channel: 28+30+21 = 79

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

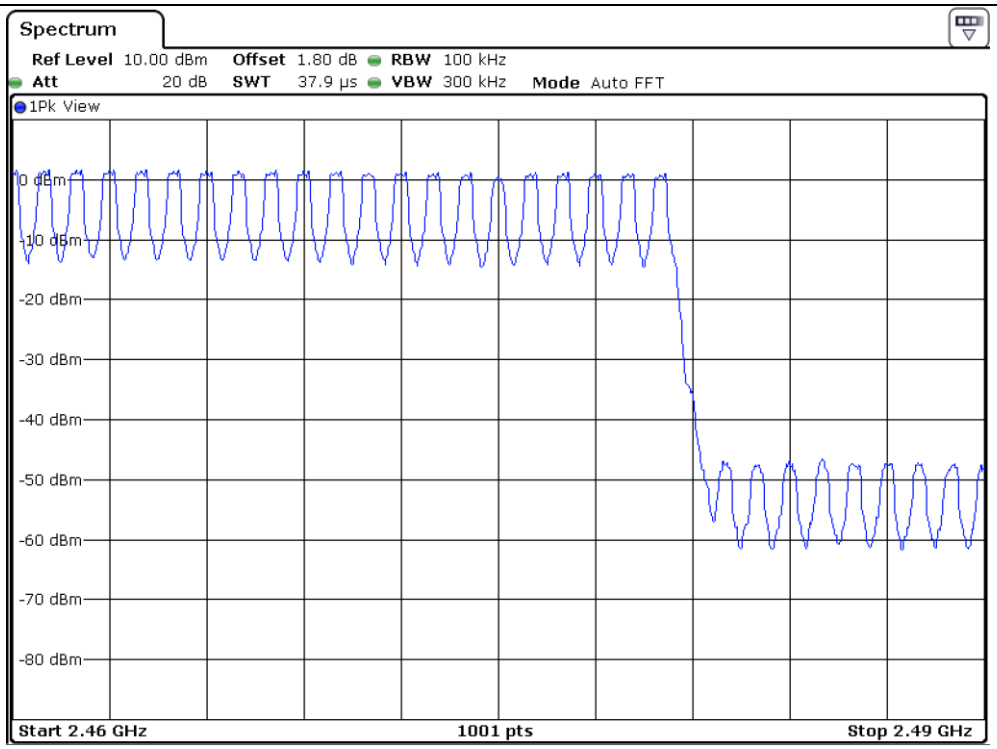


Number of hopping channel: 28



Number of hopping channel: 30

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



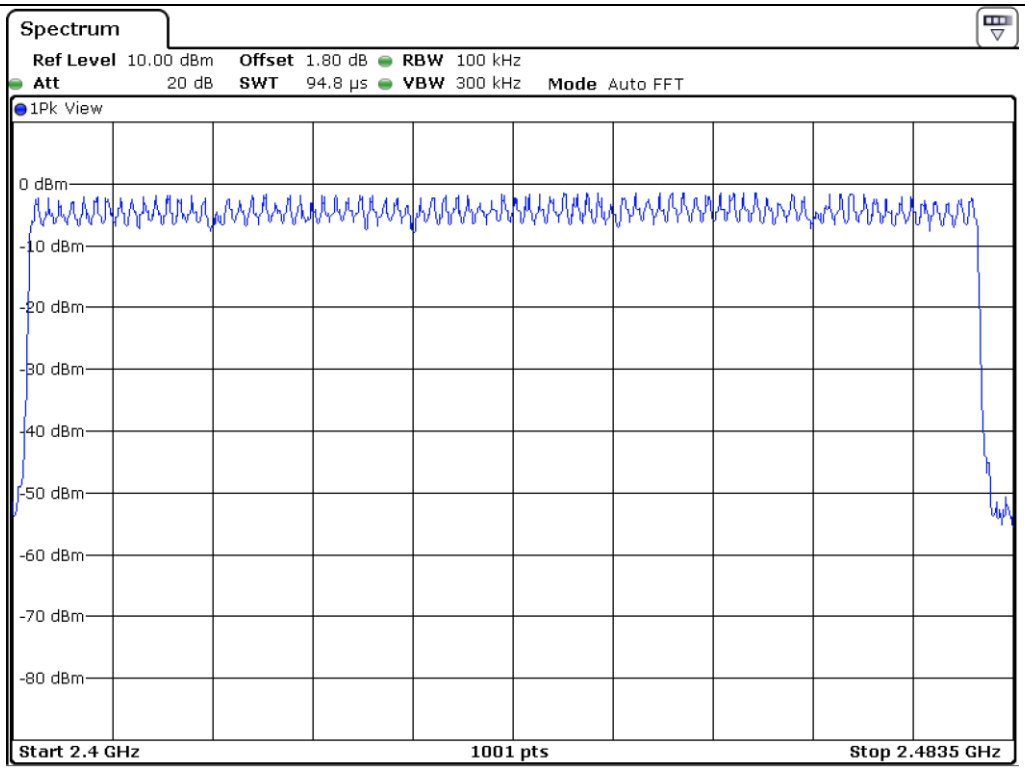
Number of hopping channel: 21

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

9.5 Test data for 2 Mbps

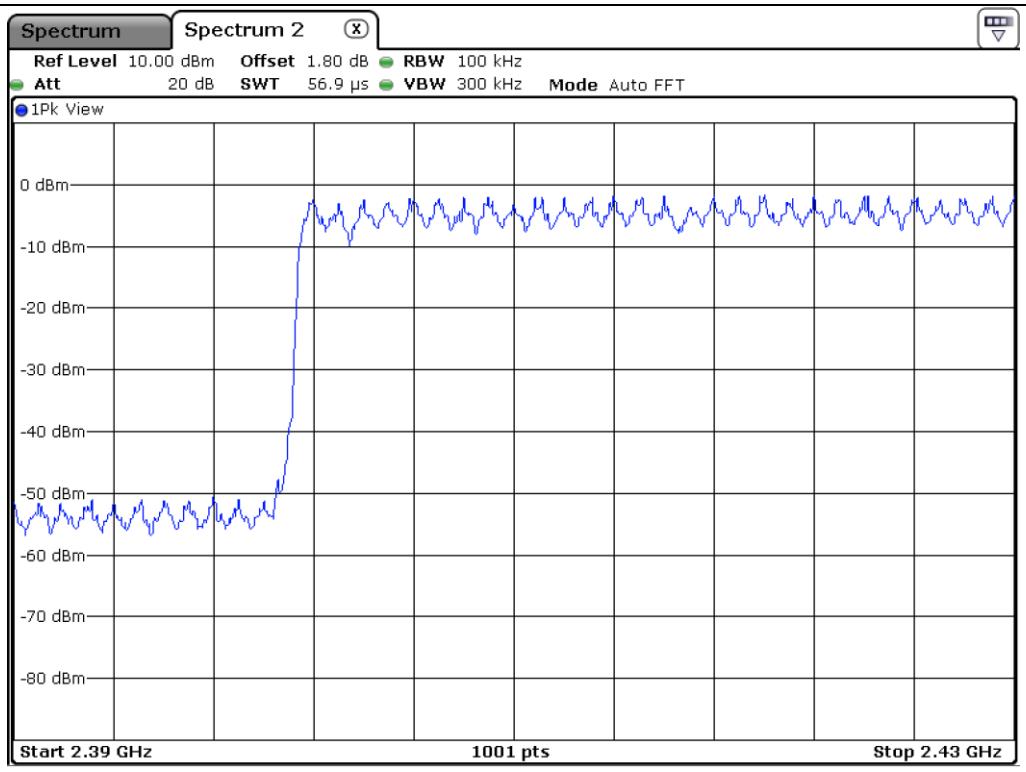
-. Test Result : Pass

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

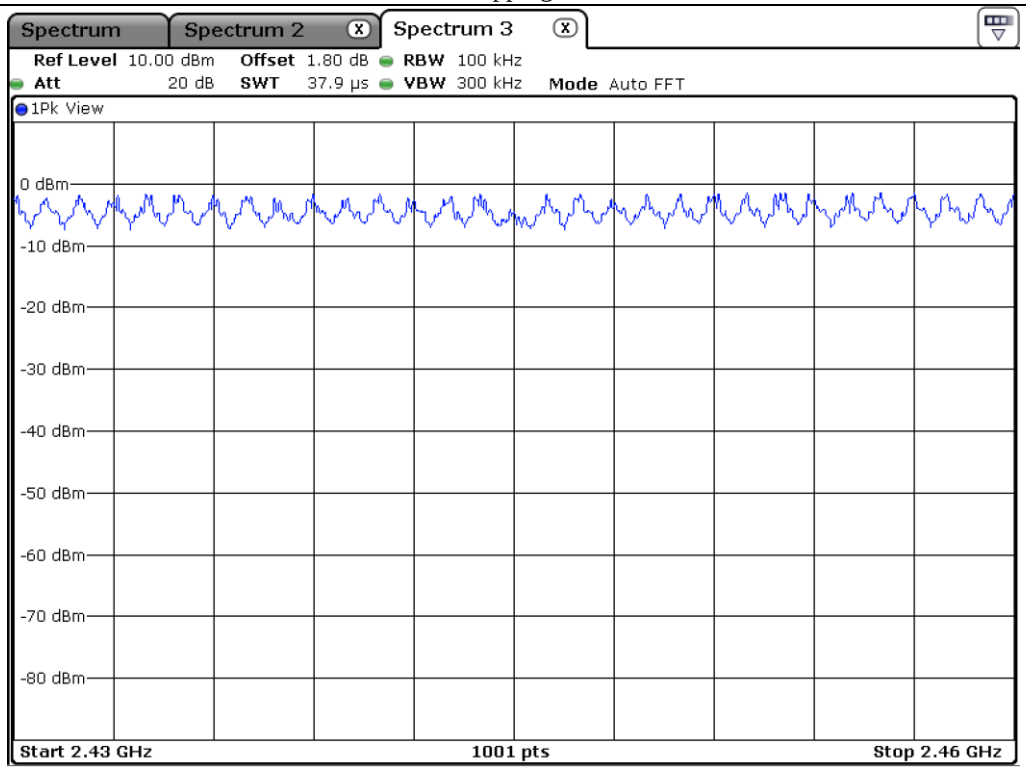


Total number of hopping channel: 28+30+21 = 79

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

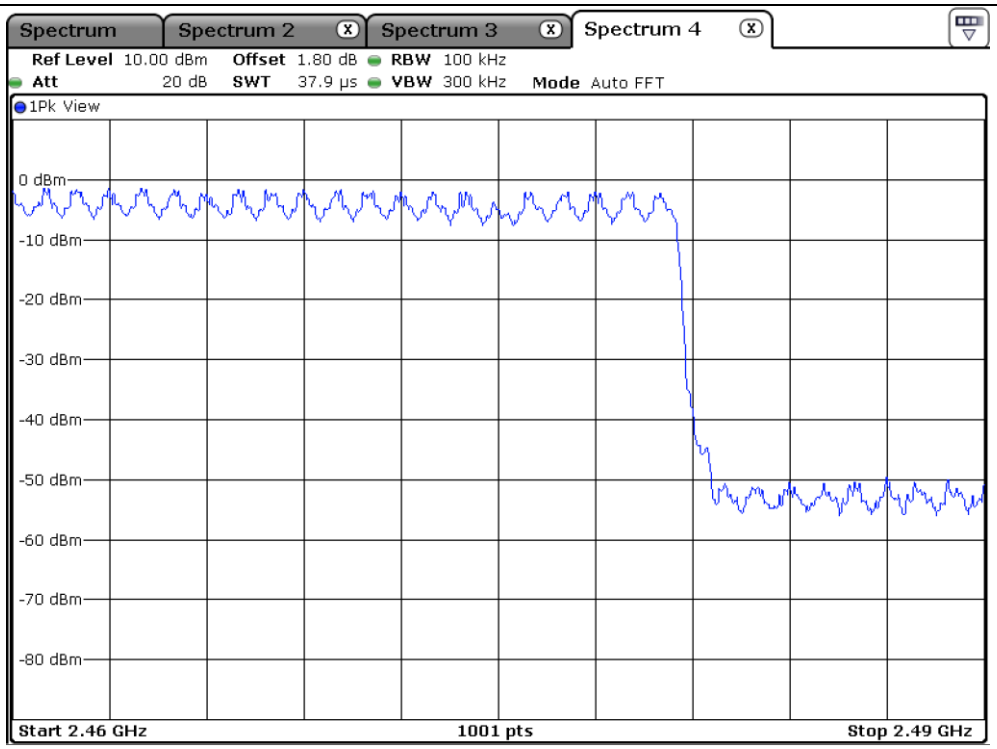


Number of hopping channel: 28



Number of hopping channel: 30

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



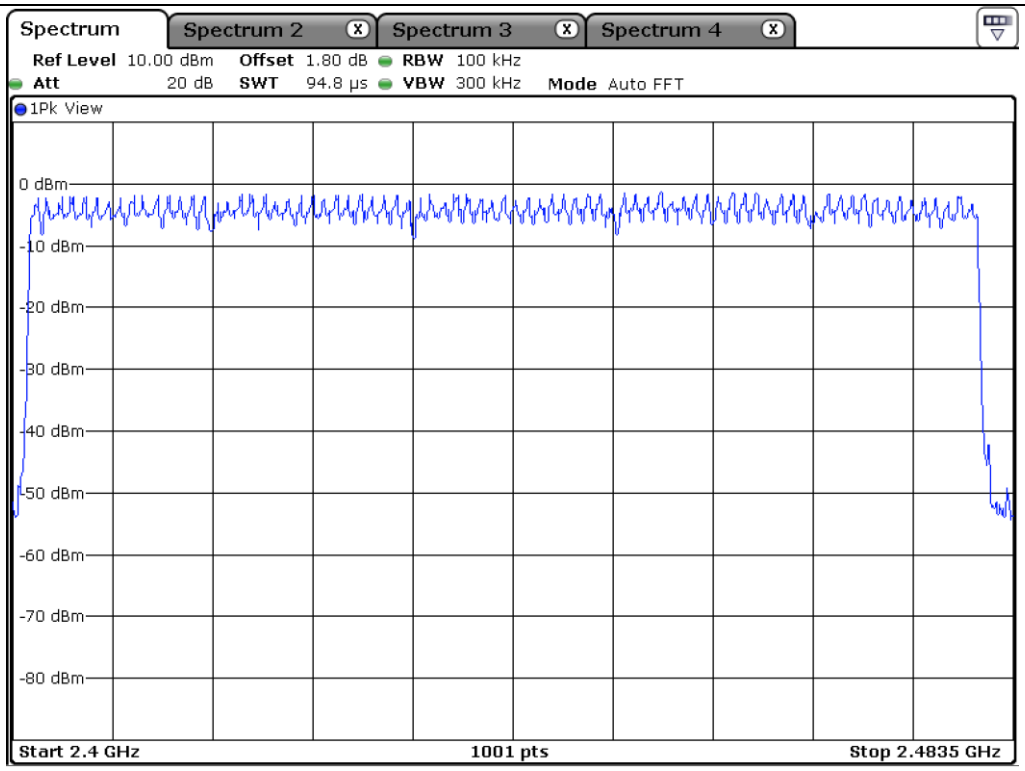
Number of hopping channel: 21

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

9.6 Test data for 3 Mbps

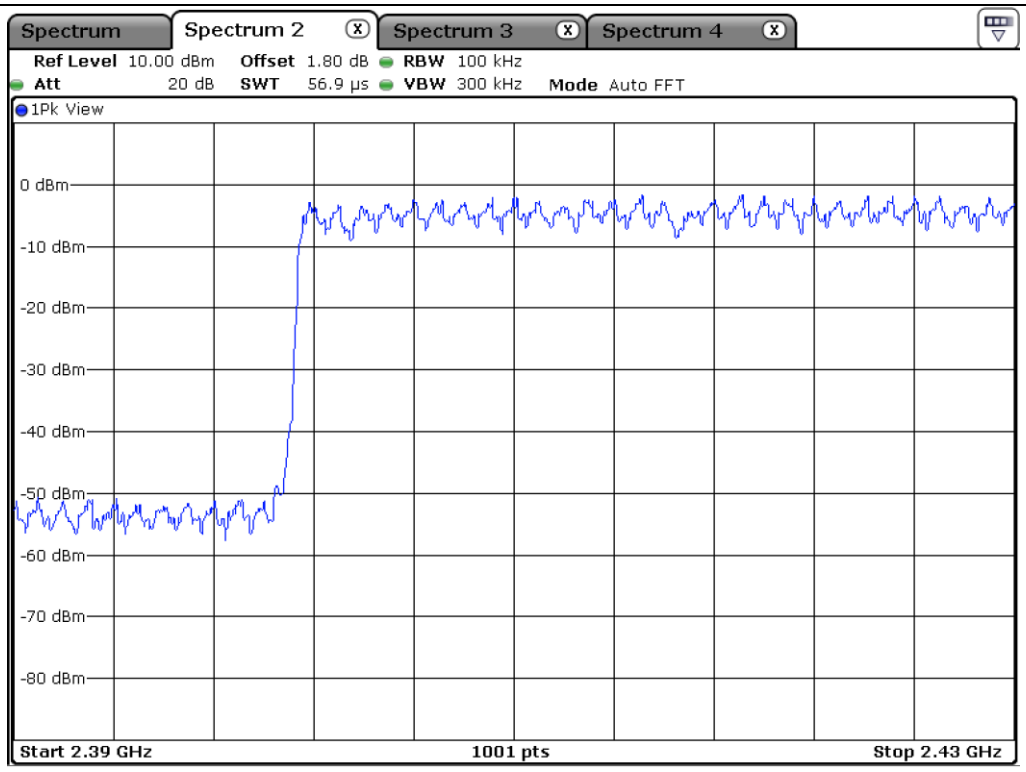
-. Test Result : Pass

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

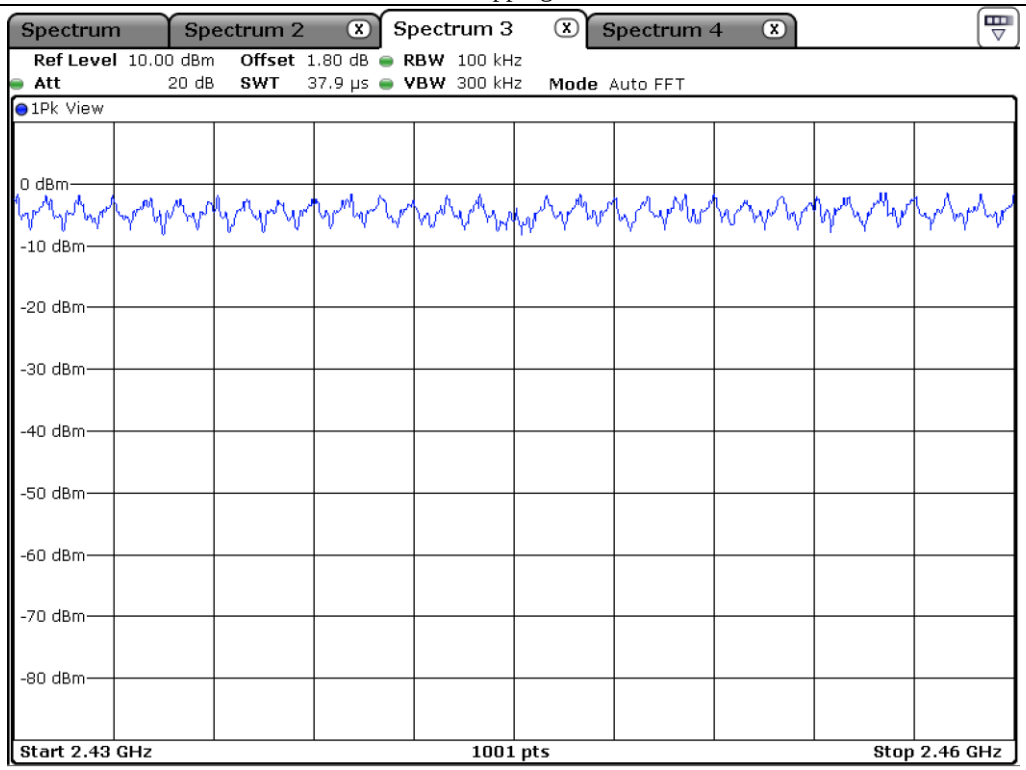


Total number of hopping channel: 28+30+21 = 79

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

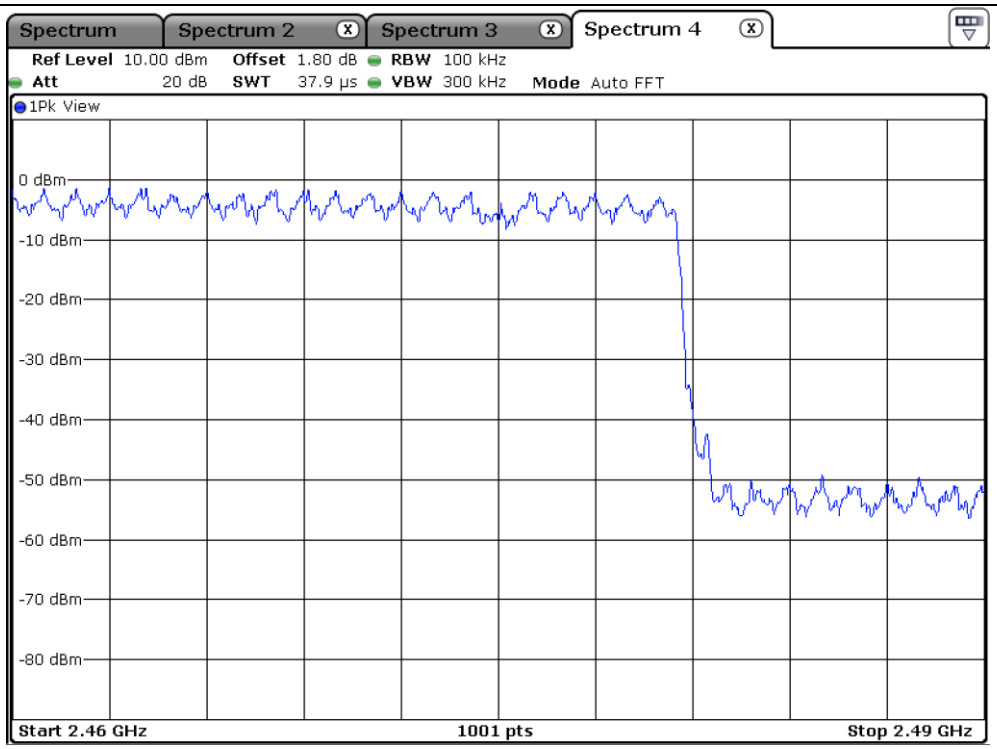


Number of hopping channel: 28



Number of hopping channel: 30

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



Number of hopping channel: 21

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

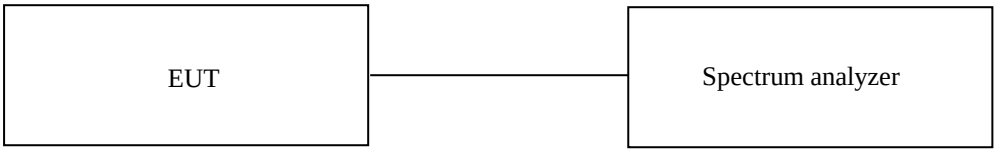
10. TIME OF OCCUPANCY

10.1 Operating environment

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

10.2 Test set-up

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



10.3 Test Date

September 28, 2020 ~ October 12, 2020

It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

10.4 Test data for 1 Mbps

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

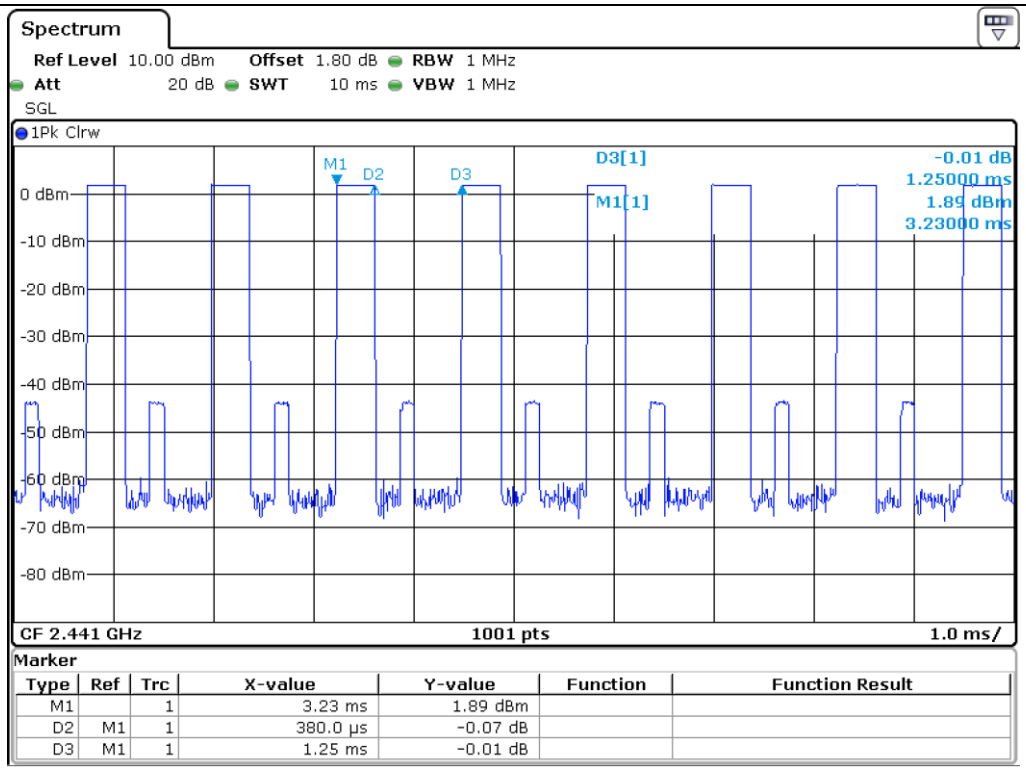
For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So, The EUT has each channel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

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.380	10.13	31.60	121.64	400	PASS
DH3	1.640	5.06	31.60	262.23	400	
DH5	2.890	3.38	31.60	308.68	400	

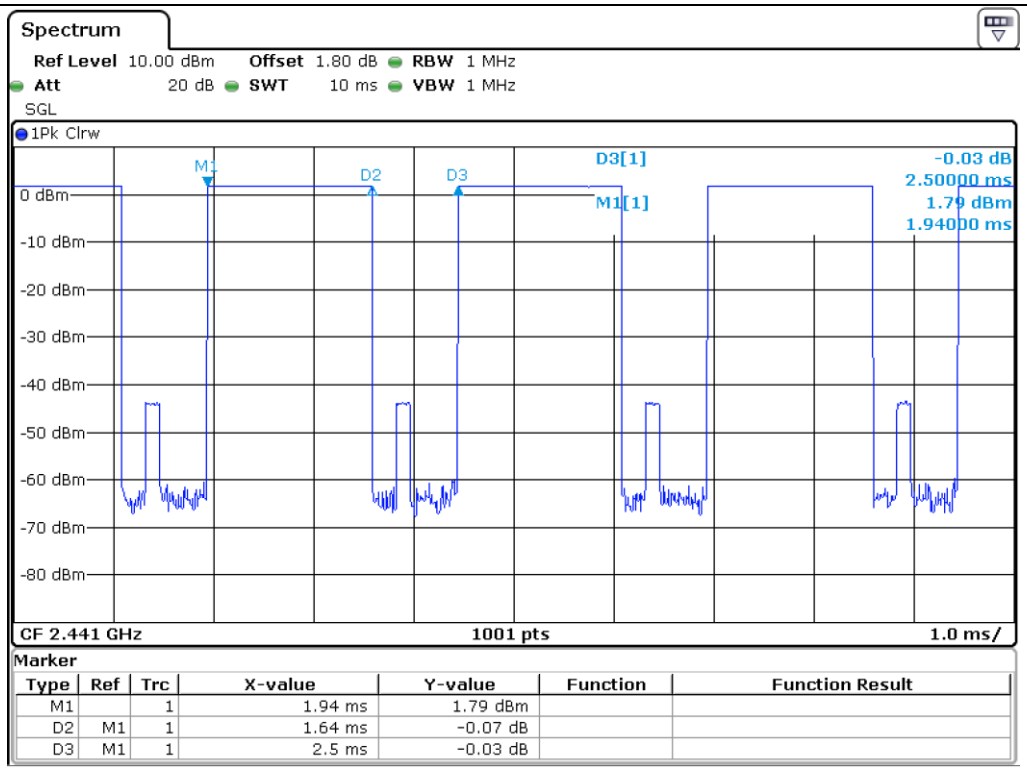
Total dwell time is calculated as following.

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

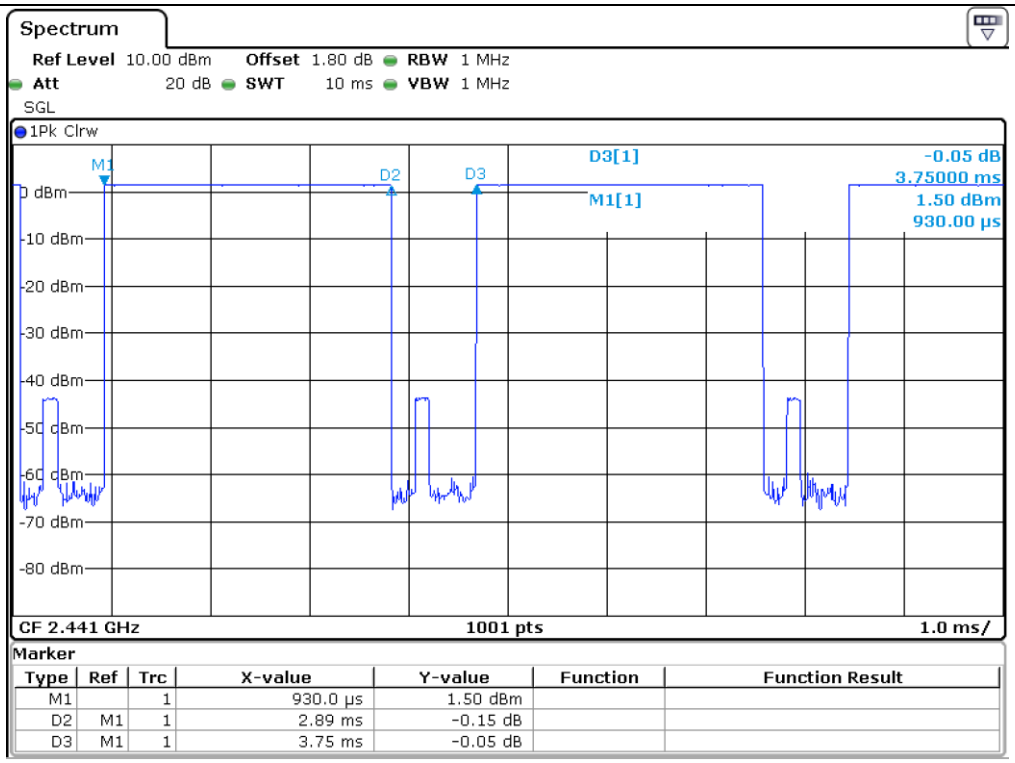
Remark: See next page for an overview sweep performed with peak detector.



DH1



DH3



DH5

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

10.5 Test data for 2 Mbps

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

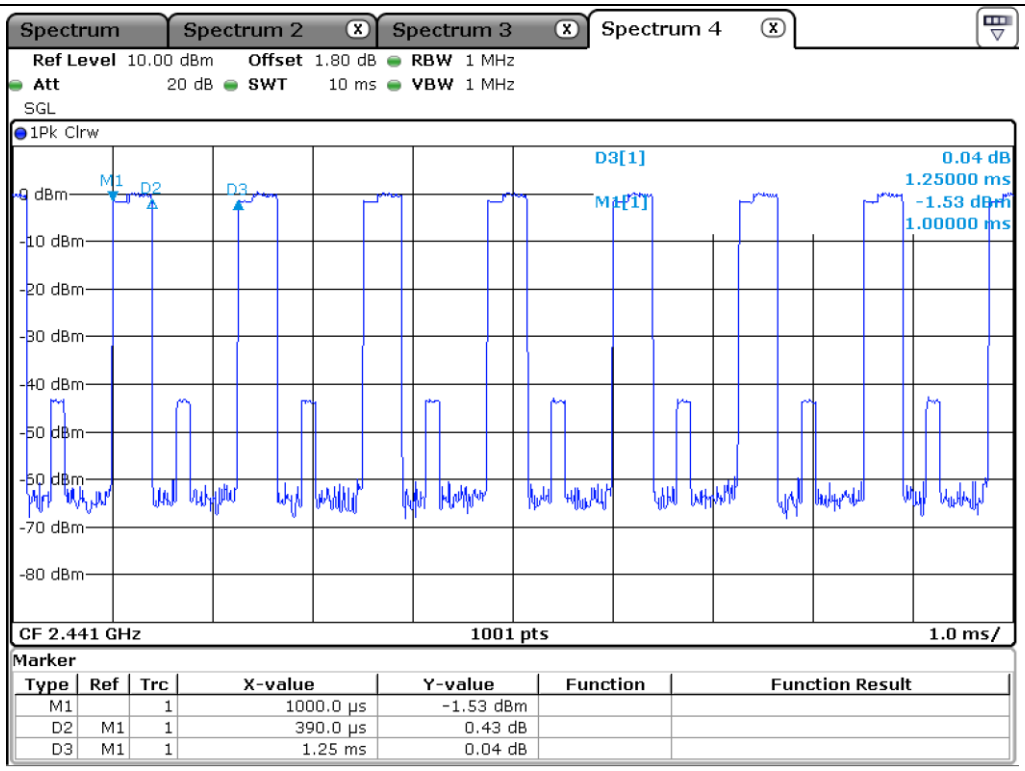
For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So, The EUT has each channel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

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.390	10.13	31.60	124.84	400	PASS
DH3	1.640	5.06	31.60	262.23	400	
DH5	2.890	3.38	31.60	308.68	400	

Total dwell time is calculated as following.

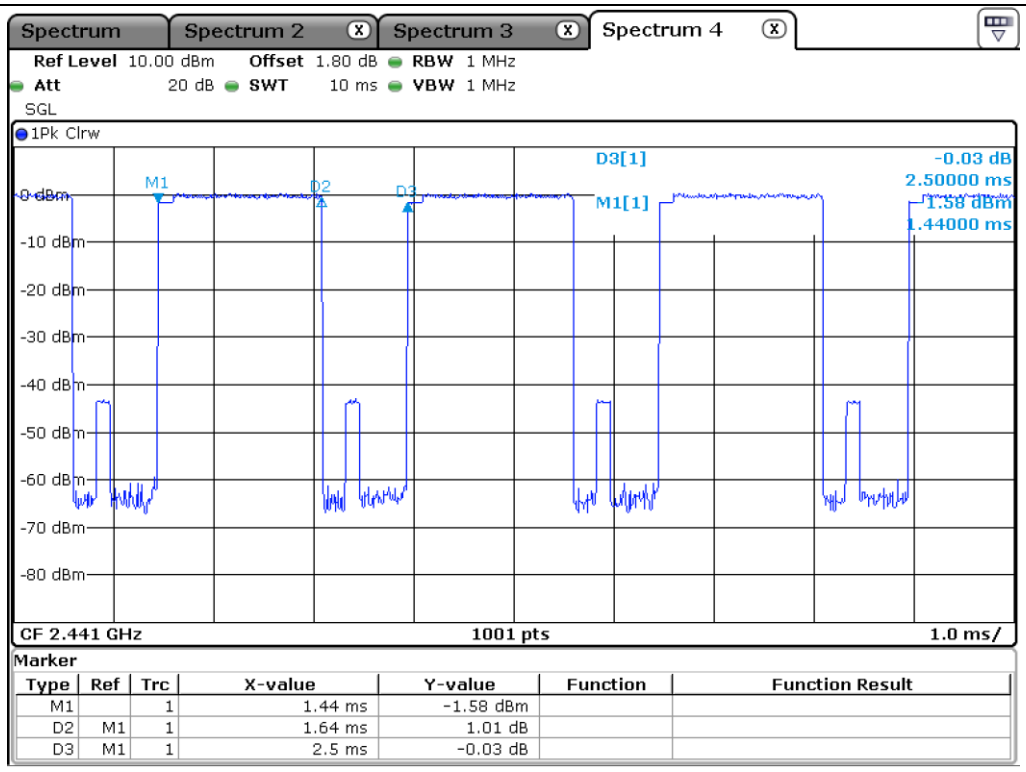
Total Dwell Time = Pulse time * Hops per second with channels * period time

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

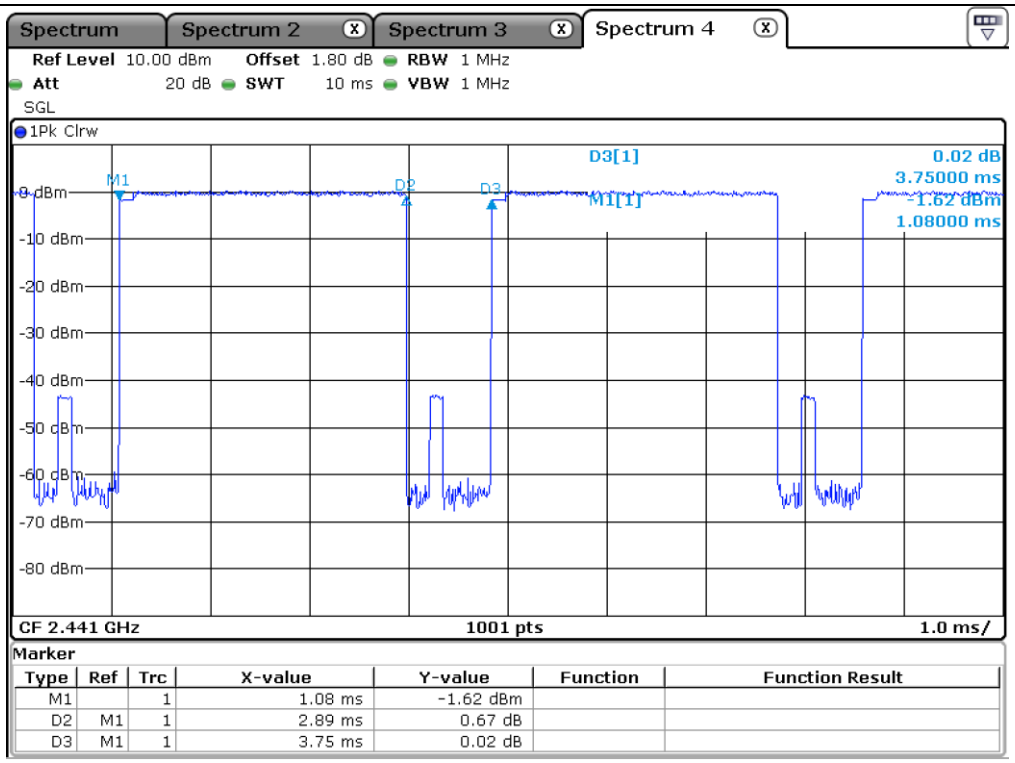


DH1

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



DH3



DH5

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

10.6 Test data for 3 Mbps

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

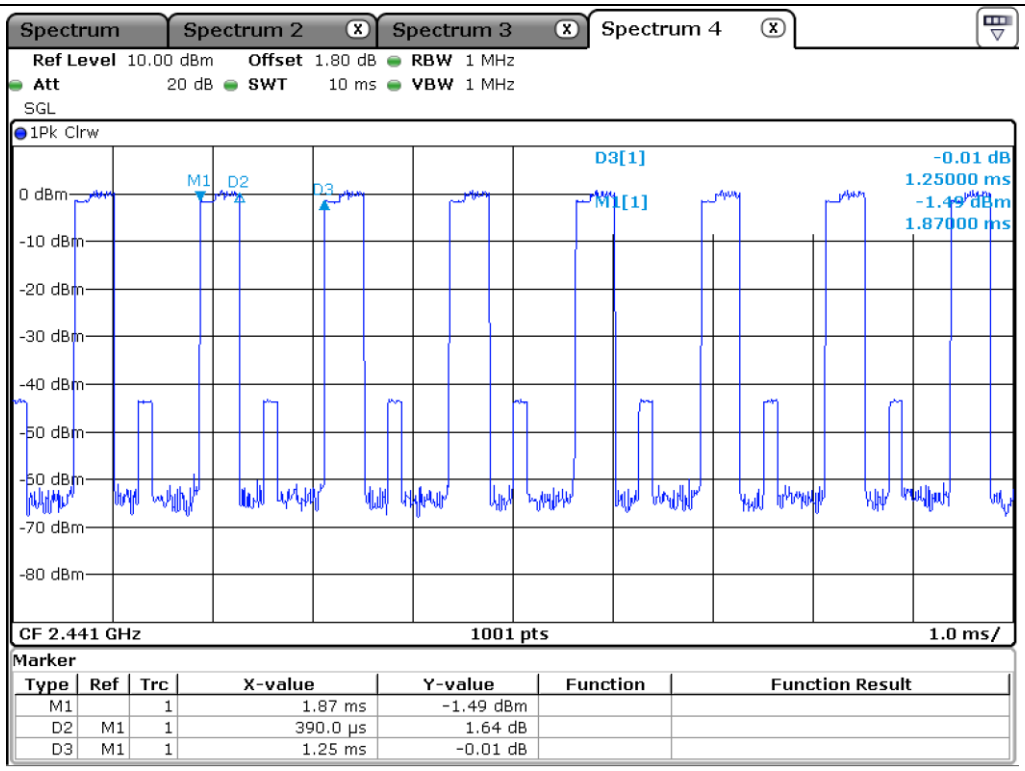
For DH1 packet type, the EUT needs 1 time slot for transmitting and 1 time slot for receiving and for DH3 packet type, the EUT needs 3 times slots for transmitting and 1 time slot for receiving, and DH5 packet needs 5 times slots for transmitting and 1 time slot for receiving. So, The EUT has each channel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

Packet Type	Pulse Time (ms)	Hops per second with channels	Period Time (ms)	Total Dwell Time (ms)	Limit (ms)	Test Result
DH1	0.390	10.13	31.60	124.84	400	PASS
DH3	1.640	5.06	31.60	262.23	400	
DH5	2.900	3.38	31.60	309.74	400	

Total dwell time is calculated as following.

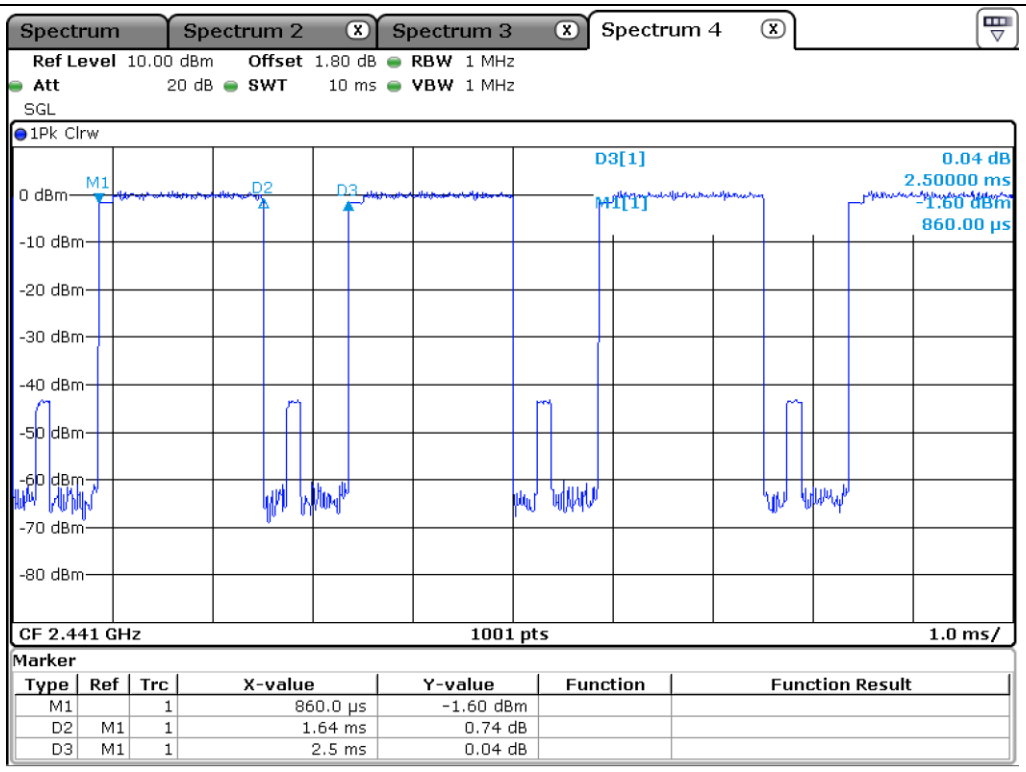
Total Dwell Time = Pulse time * Hops per second with channels * period time

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

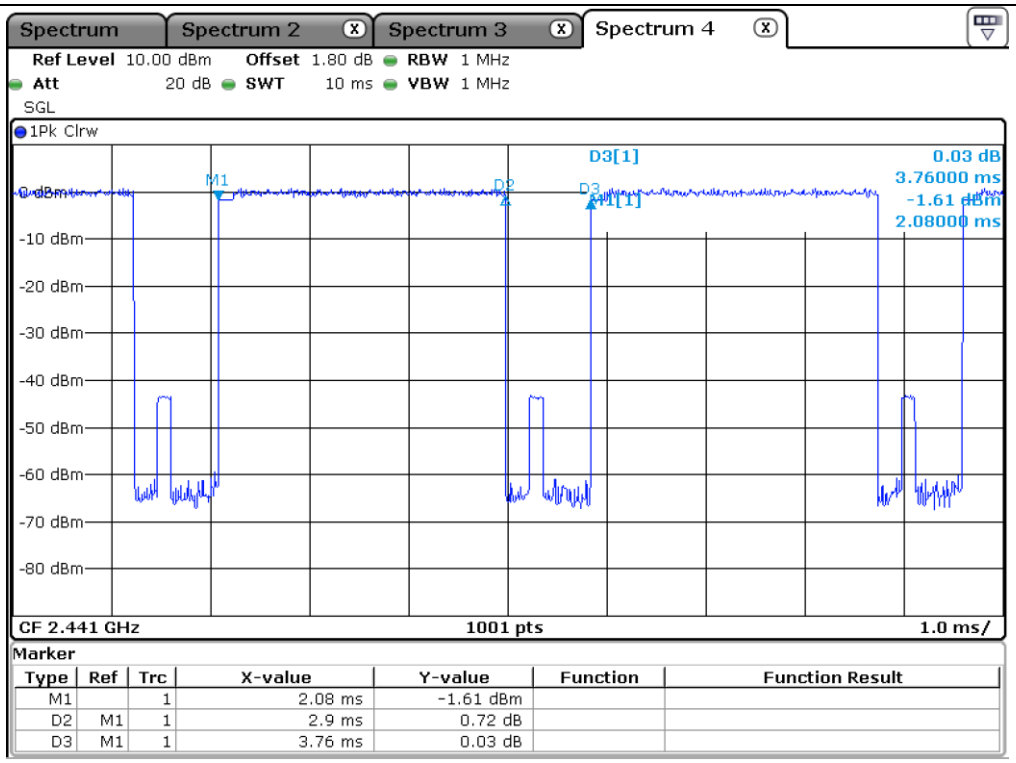


DH1

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


Spectrum
Spectrum 2
Spectrum 3
Spectrum 4
Ref Level 10.00 dBm Offset 1.80 dB RBW 1 MHz
Att 20 dB SWT 10 ms VBW 1 MHz
SGL
1Pk Clrw
D3[1] 0.04 dB
2.50000 ms
M1[1] -1.60 dBm
860.00 µs
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz 1001 pts 1.0 ms/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 860.0 µs -1.60 dBm
D2 M1 1 1.64 ms 0.74 dB
D3 M1 1 2.5 ms 0.04 dB

DH3


Spectrum
Spectrum 2
Spectrum 3
Spectrum 4
Ref Level 10.00 dBm Offset 1.80 dB RBW 1 MHz
Att 20 dB SWT 10 ms VBW 1 MHz
SGL
1Pk Clrw
D3[1] 0.03 dB
3.76000 ms
M1[1] -1.61 dBm
2.08000 ms
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.441 GHz 1001 pts 1.0 ms/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 2.08 ms -1.61 dBm
D2 M1 1 2.9 ms 0.72 dB
D3 M1 1 3.76 ms 0.03 dB

DH5

11. MAXIMUM PEAK OUTPUT POWER

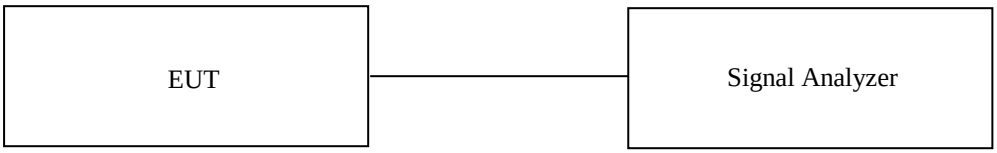
11.1 Operating environment

Temperature	:	24 °C
Relative humidity	:	48 % 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 ≥ DTS Bandwidth, the video bandwidth is set to 3 times the resolution bandwidth.



11.3 Test Date

September 28, 2020 ~ October 12, 2020

It should not be reproduced except in full, without the written approval of ONETECH Corp.

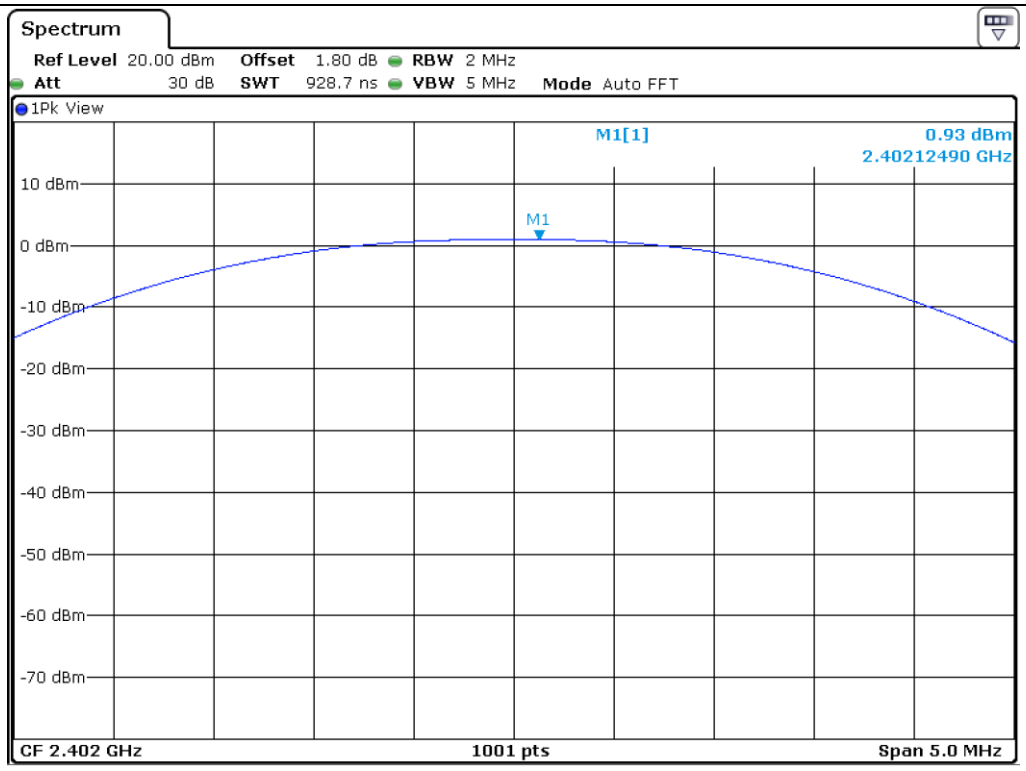
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

11.4 Test data for 1 Mbps

-. Test Result : Pass

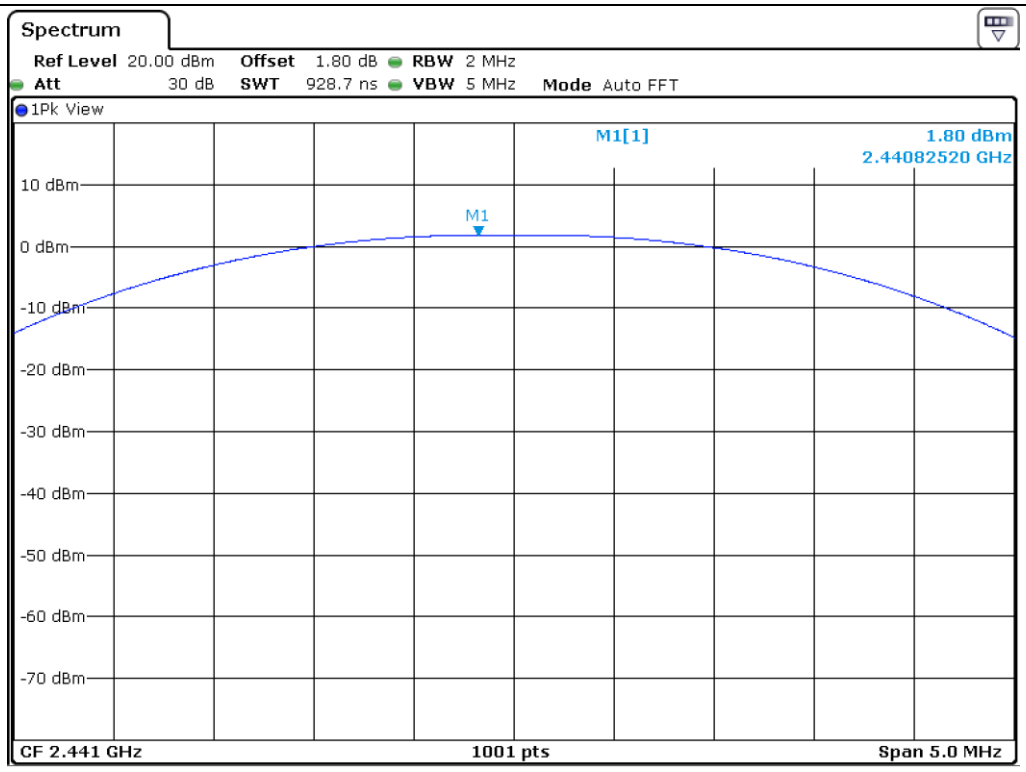
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	0.93	21.00	20.07
MIDDLE	2 441.00	1.80	21.00	19.20
HIGH	2 480.00	1.39	21.00	19.61

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

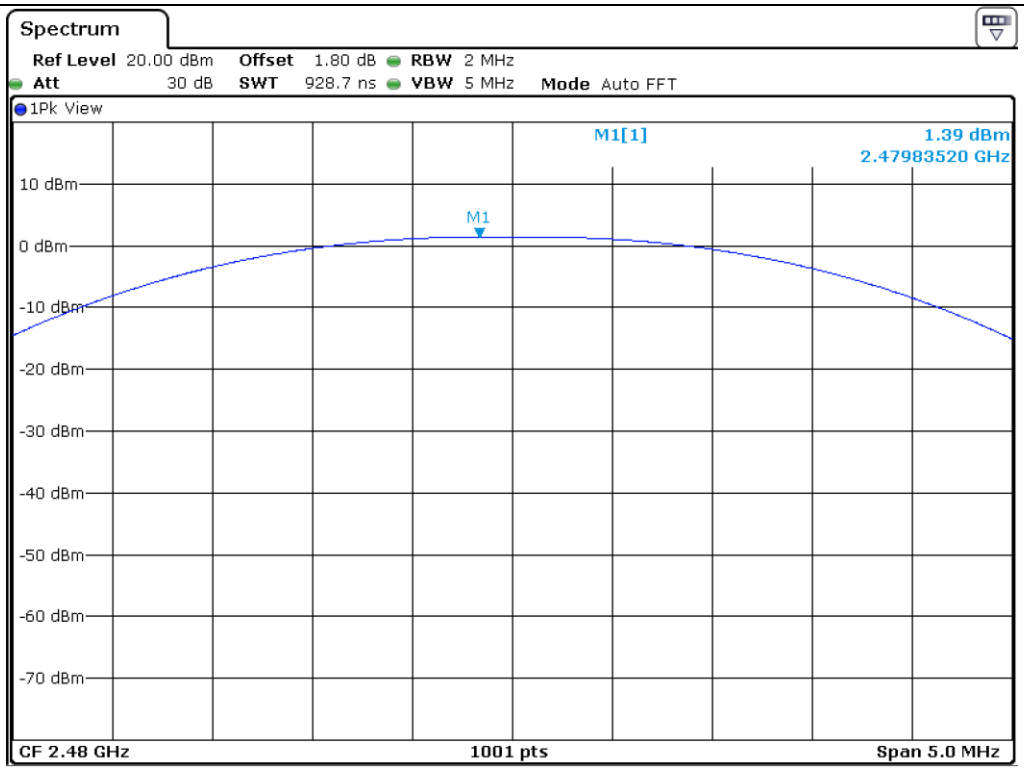


Low Channel

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



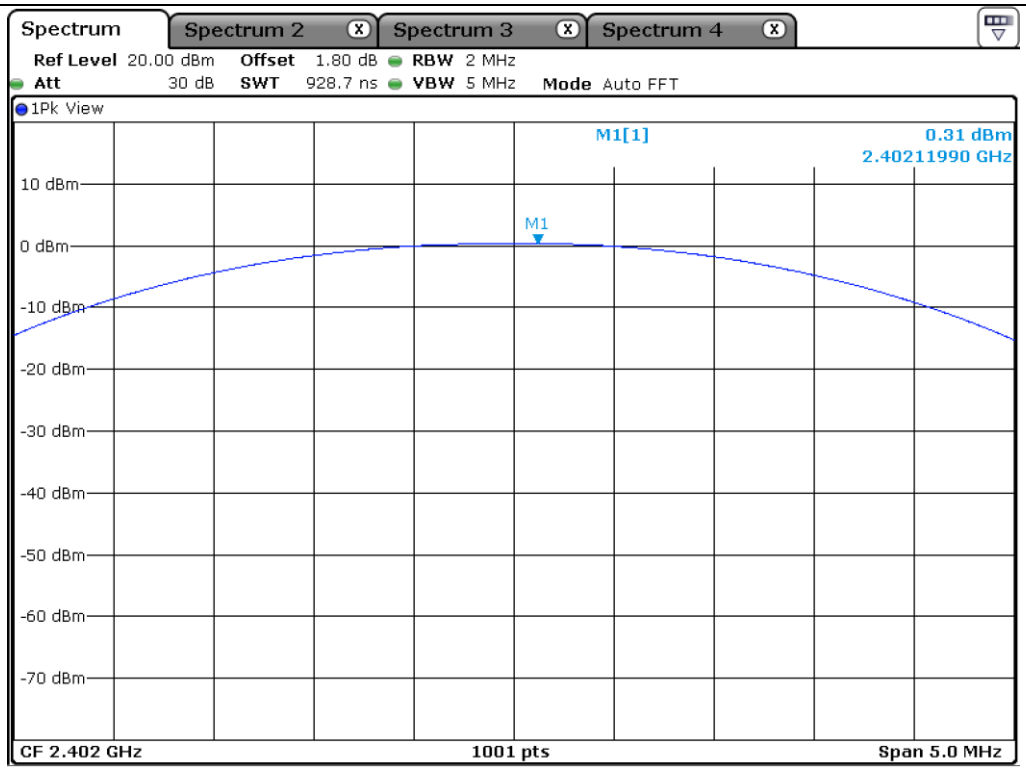
High Channel

11.5 Test data for 2 Mbps

-. Test Result : Pass

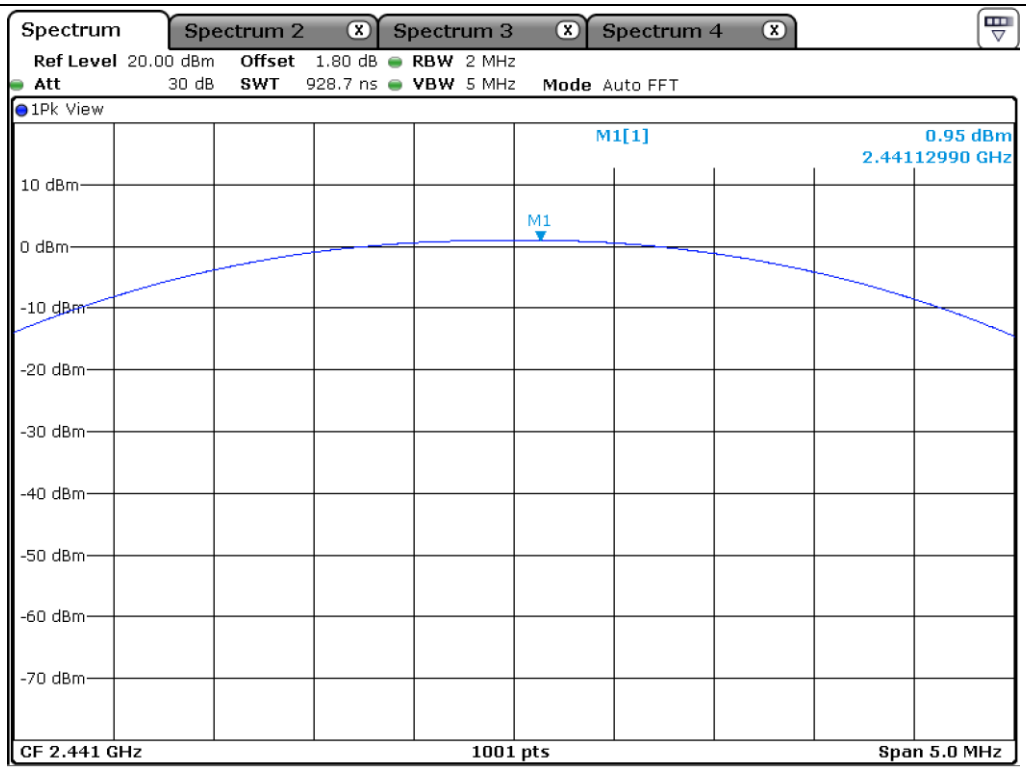
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	0.31	21.00	20.69
MIDDLE	2 441.00	0.95	21.00	20.05
HIGH	2 480.00	0.39	21.00	20.61

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

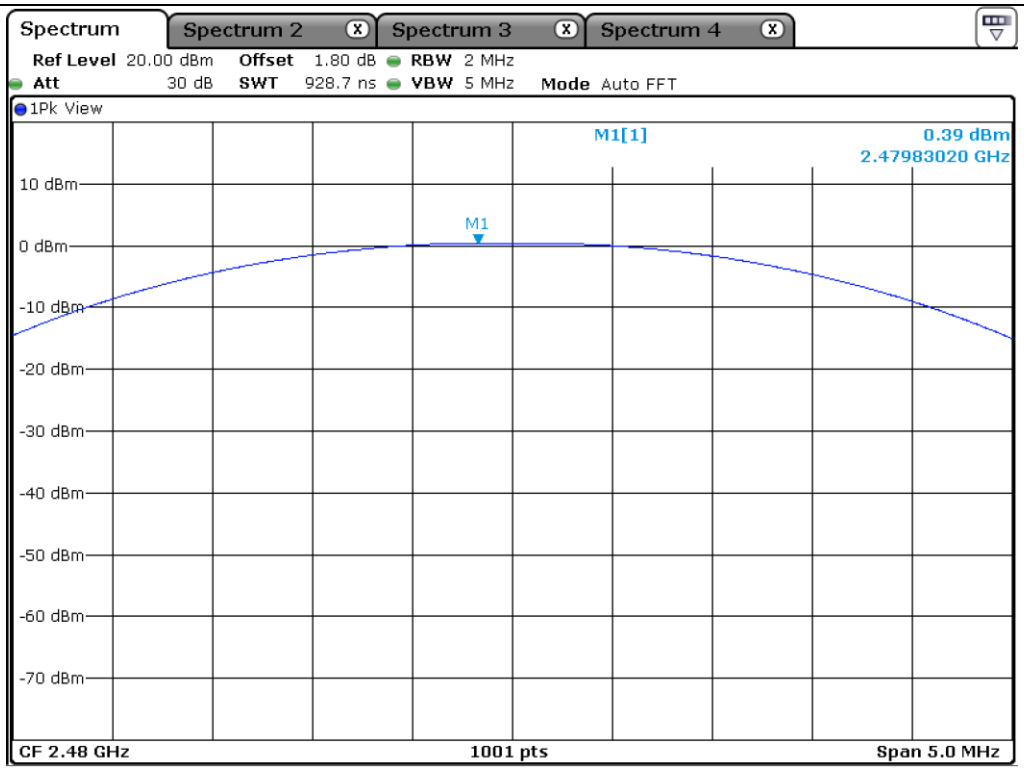


Low Channel

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



Middle Channel



High Channel

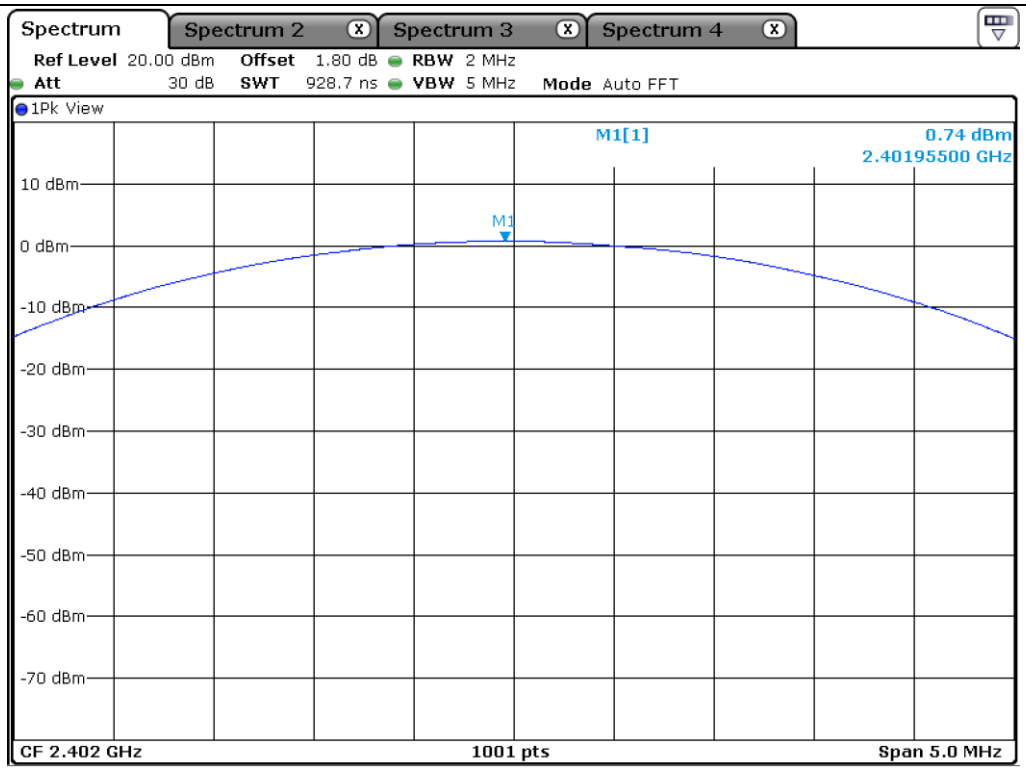
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

11.6 Test data for 3 Mbps

-. Test Result : Pass

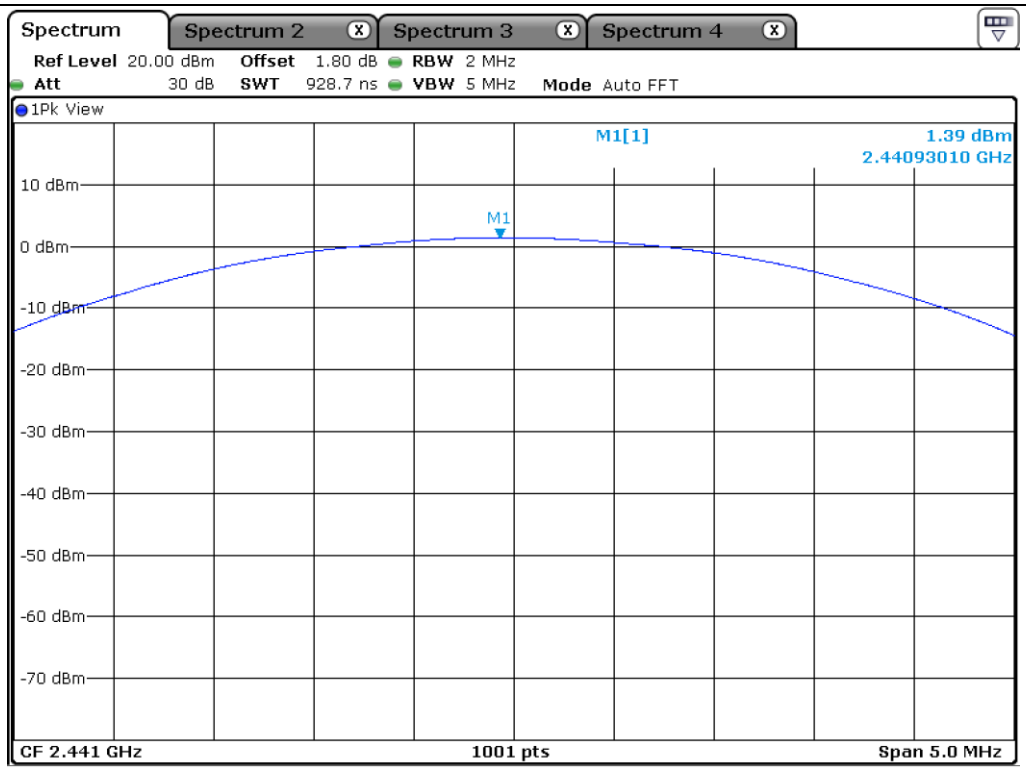
CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
LOW	2 402.00	0.74	21.00	20.26
MIDDLE	2 441.00	1.39	21.00	19.61
HIGH	2 480.00	0.88	21.00	20.12

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

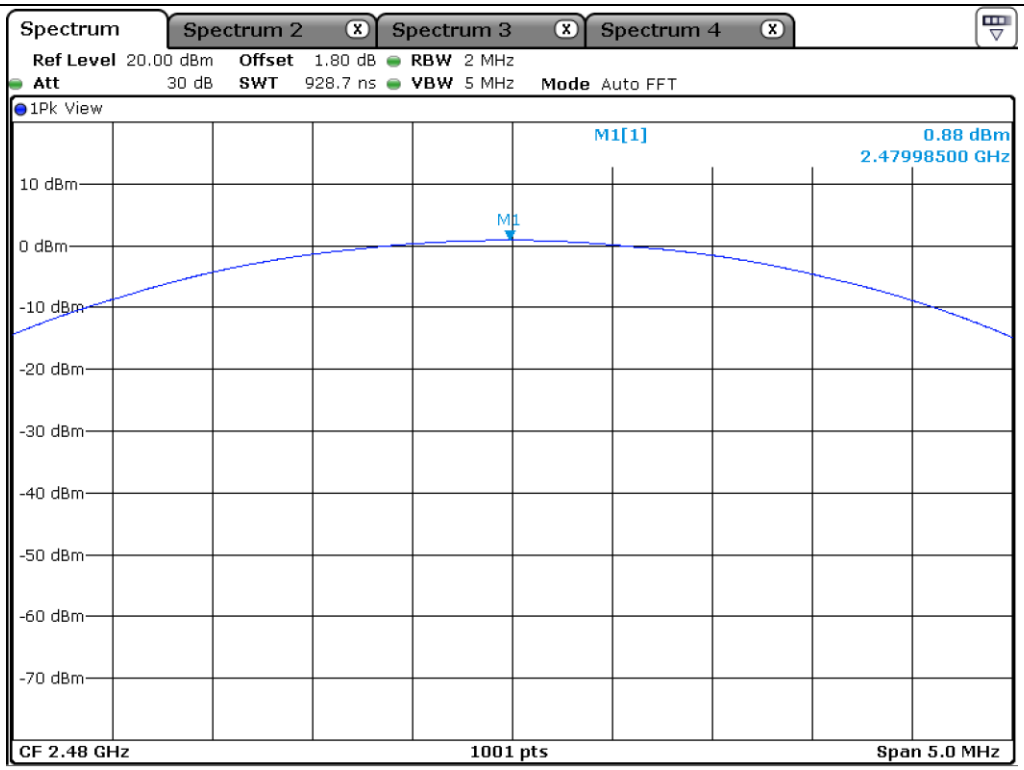


Low Channel

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



Middle Channel



High Channel

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

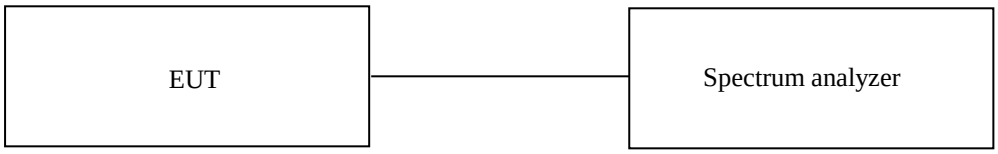
12. 100 kHz BANDWIDTH OUTSIDE THE FREQUENCY BAND

12.1 Operating environment

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

12.2 Test set-up for conducted measurement

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



12.3 Test set-up for radiated measurement

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

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

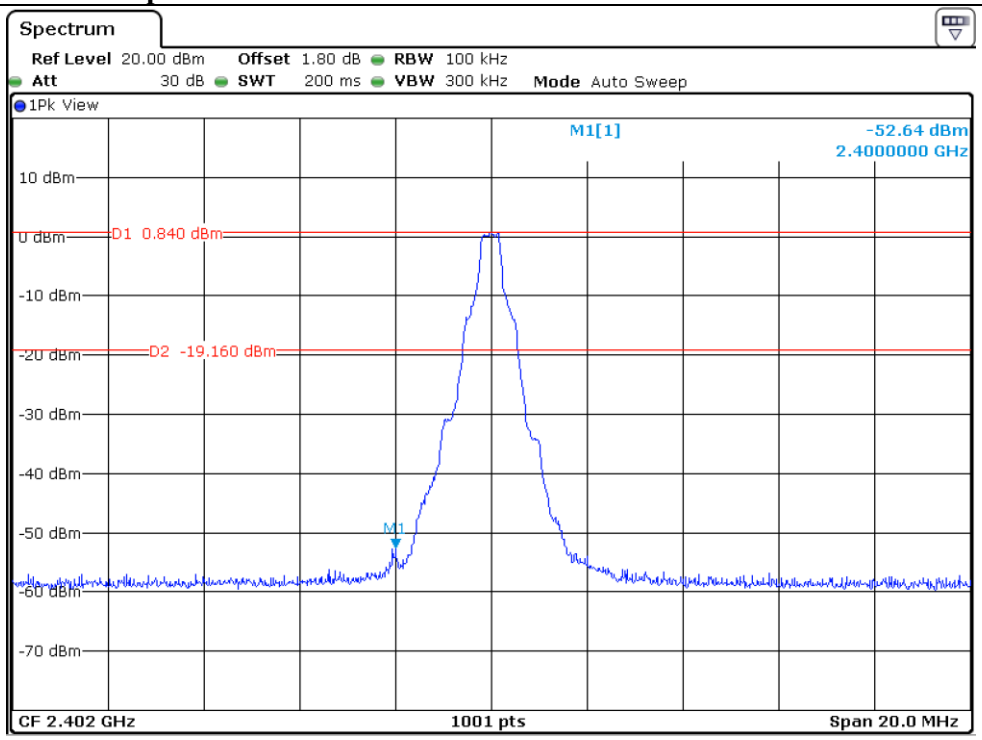
12.4 Test Date

September 28, 2020 ~ October 12, 2020

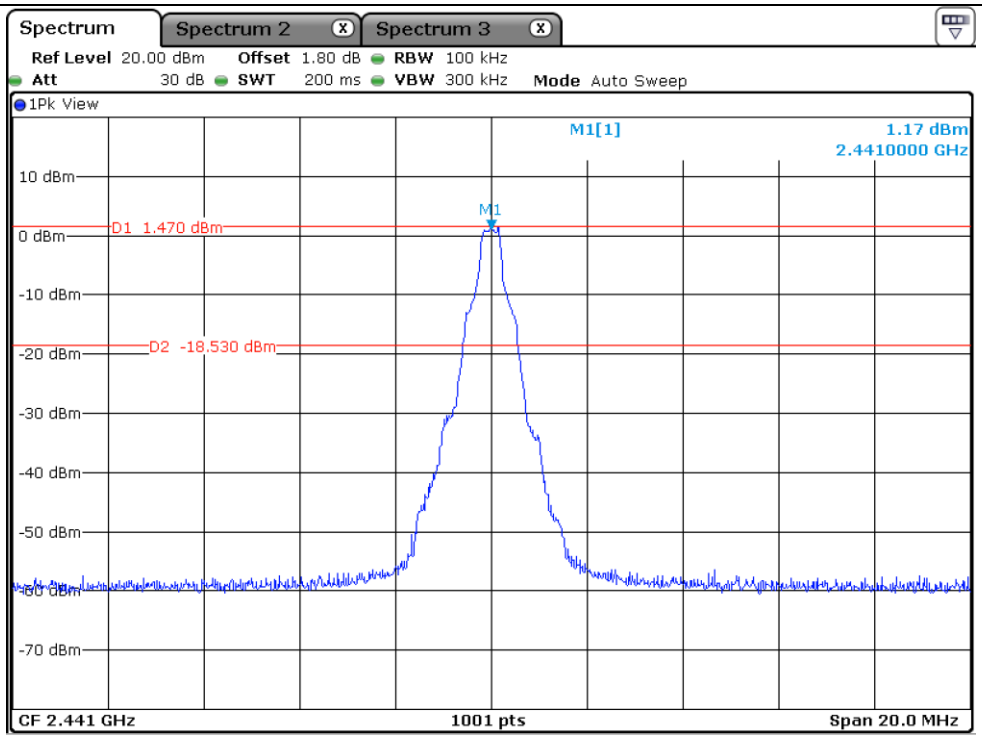
It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

12.5 Test data for conducted emission

12.5.1 Test data for 1 Mbps



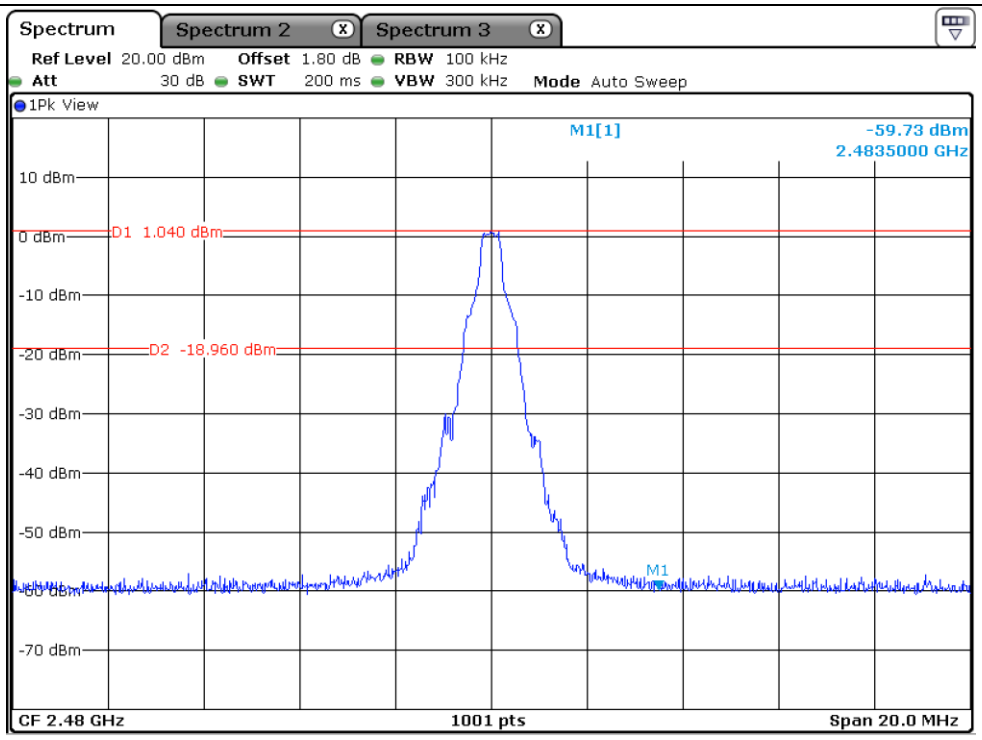
Low Channel



Middle Channel

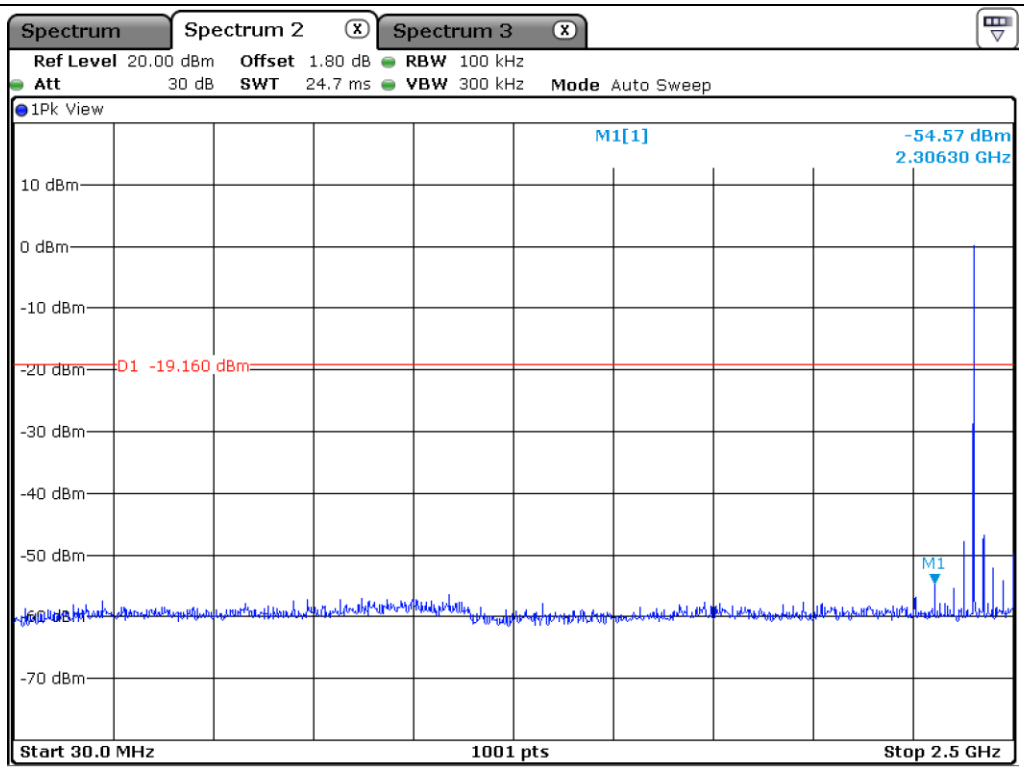
It should not be reproduced except in full, without the written approval of ONETECH Corp.

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

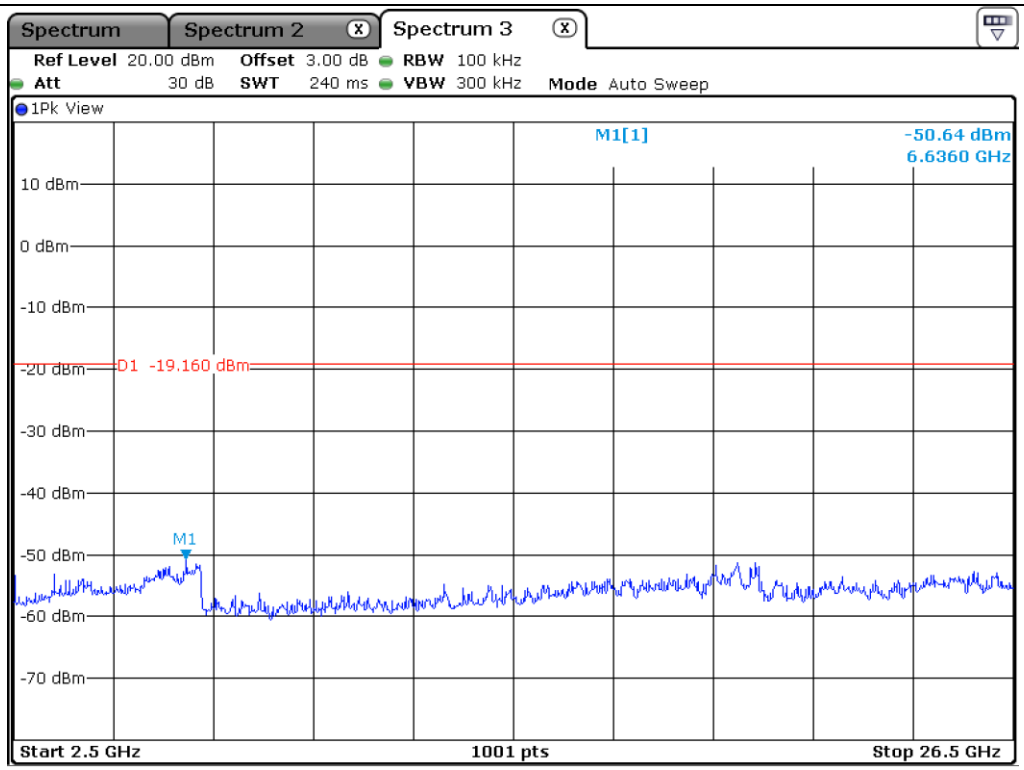


High Channel

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

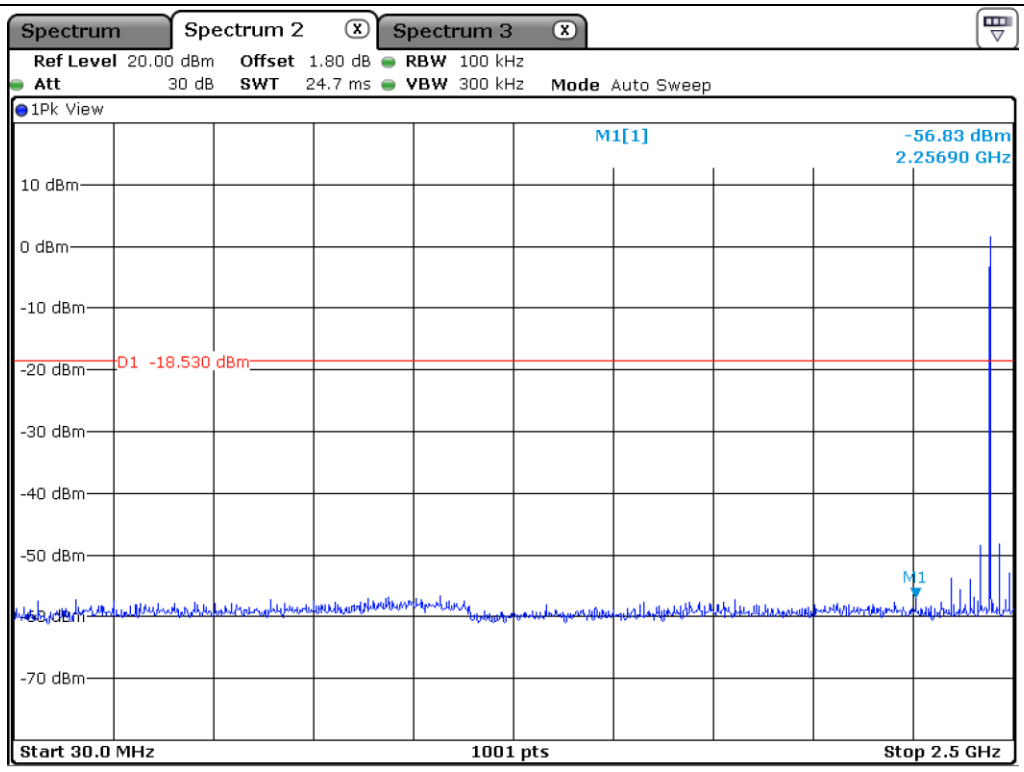


Low Channel

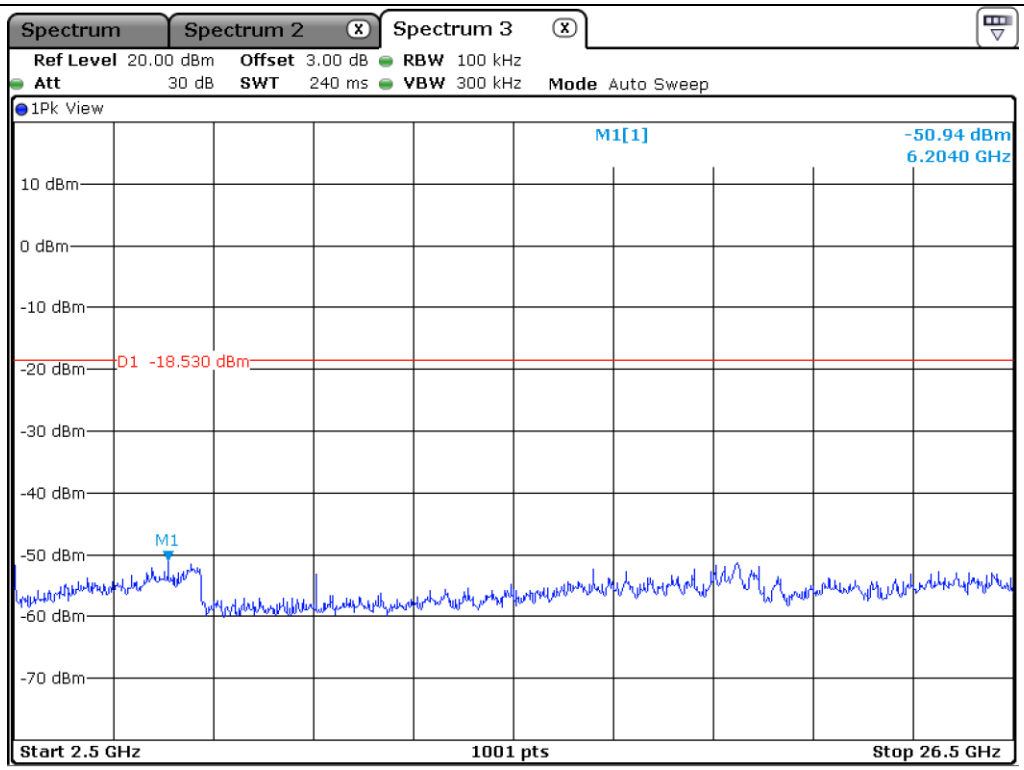


Low Channel

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

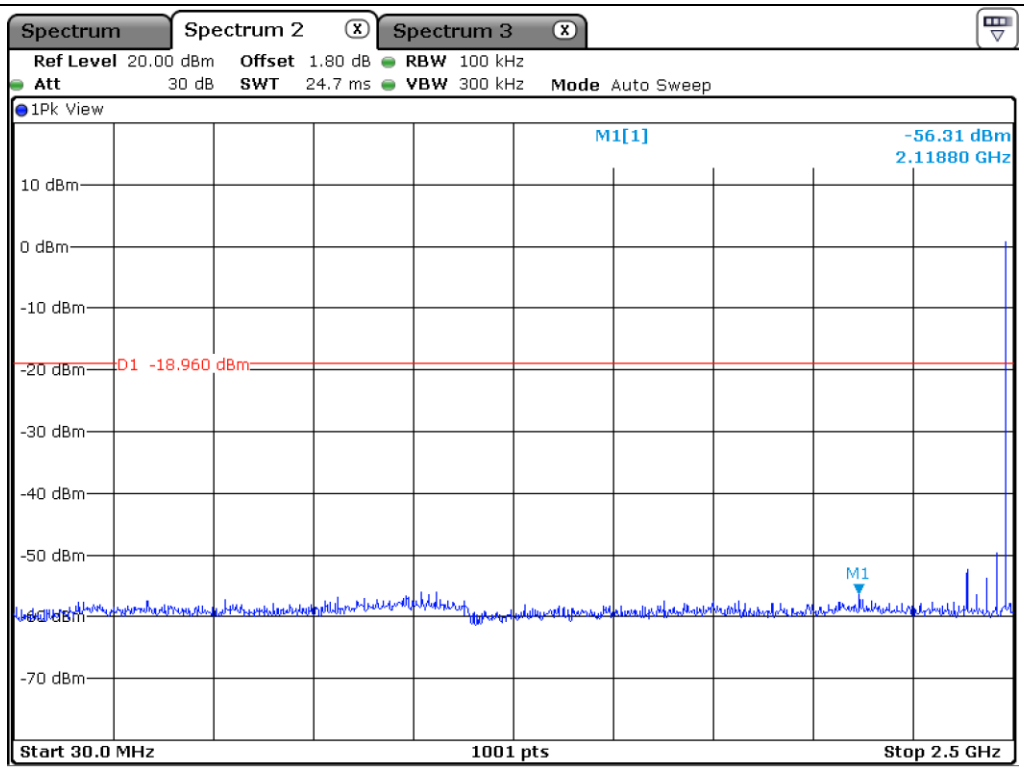


Middle Channel

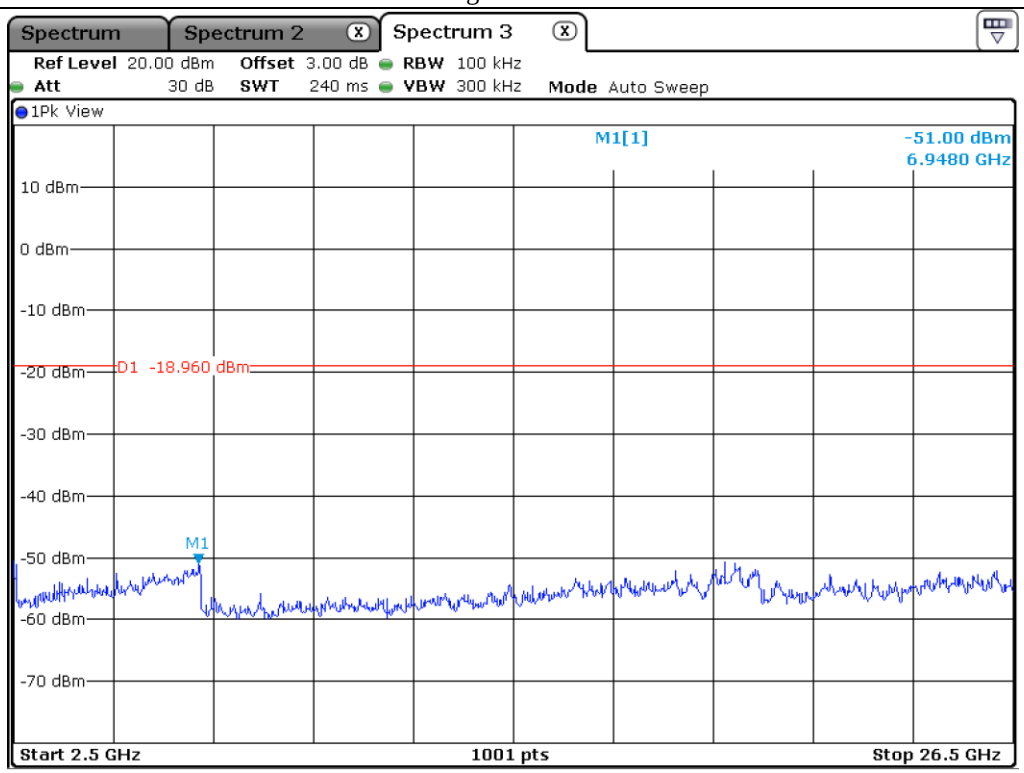


Middle Channel

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



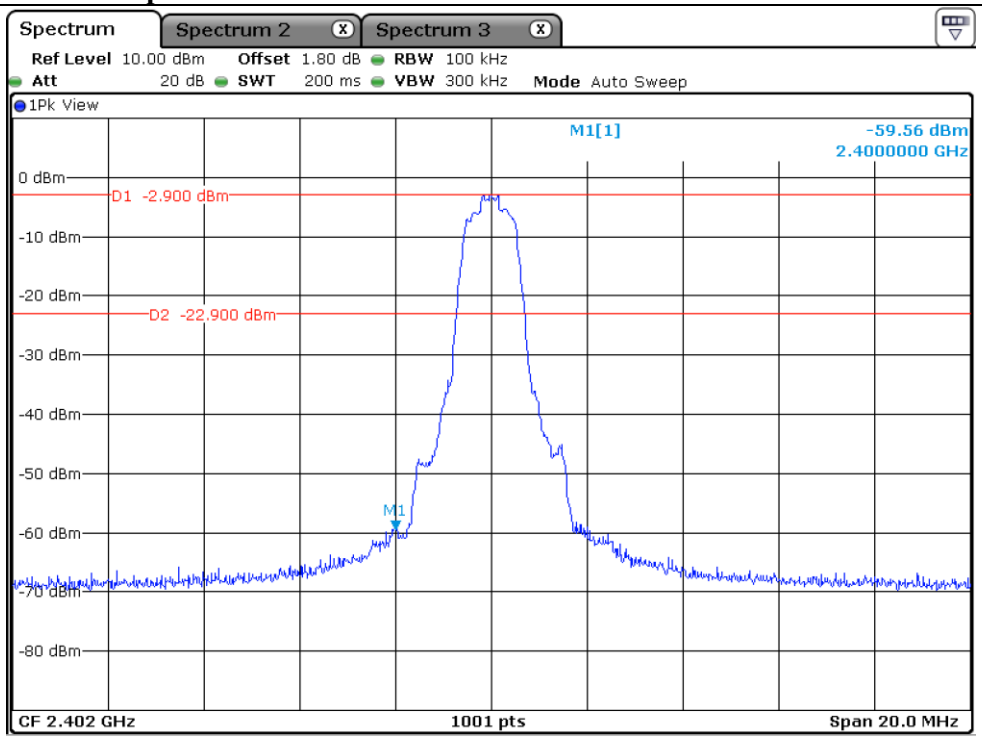
High Channel



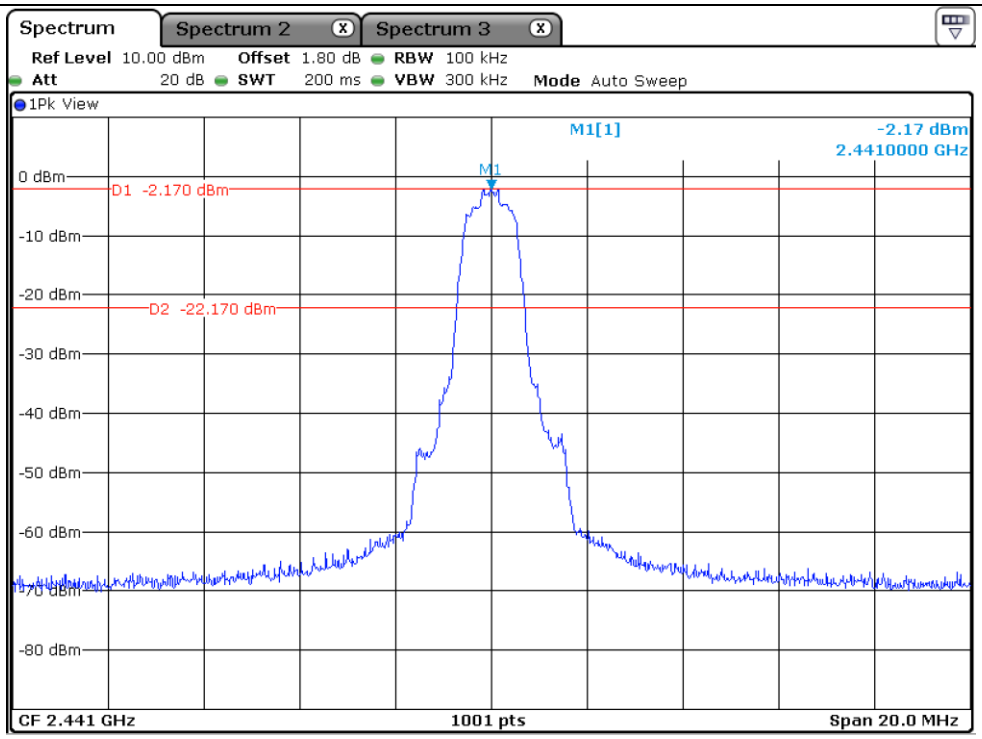
High Channel

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

12.5.2 Test data for 2 Mbps

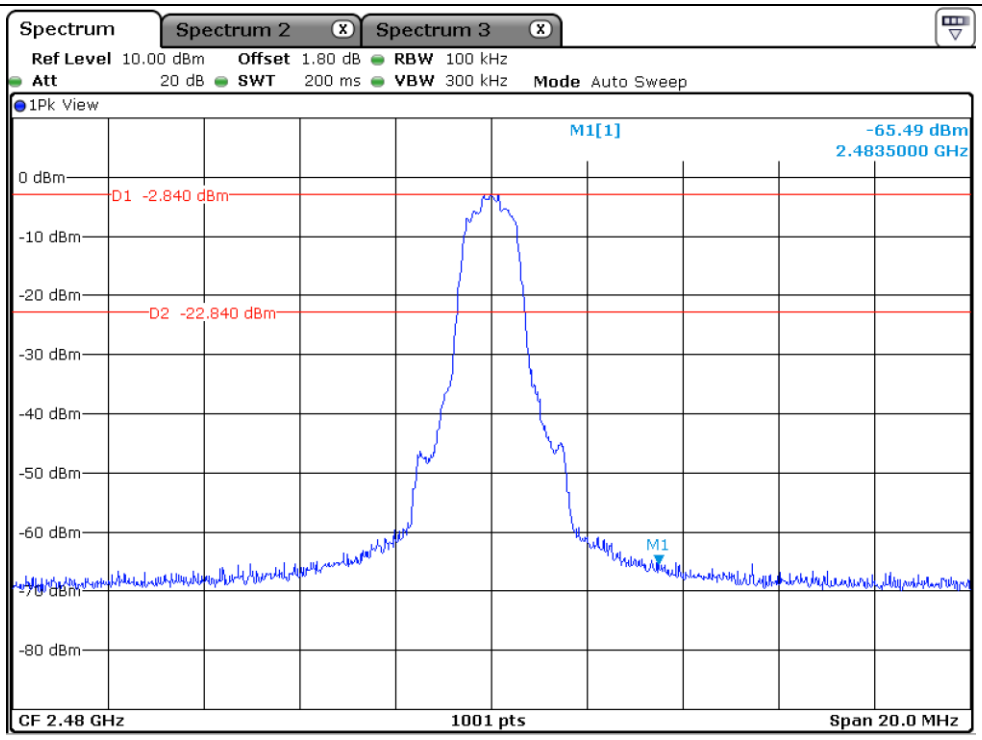


Low Channel



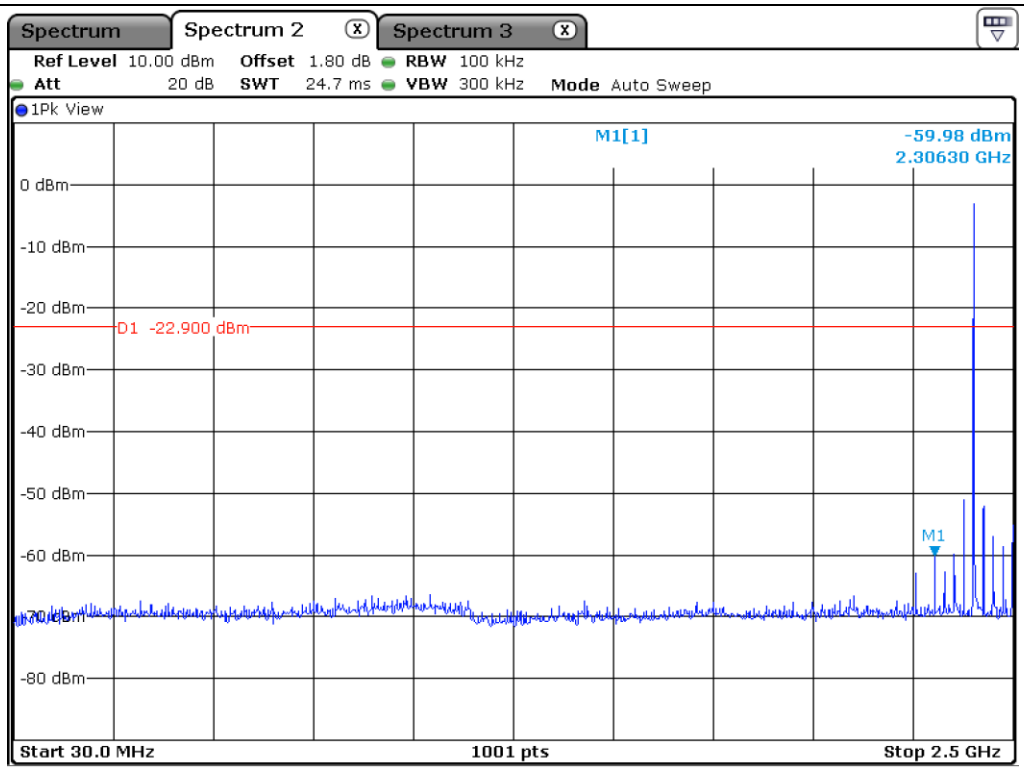
Middle Channel

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

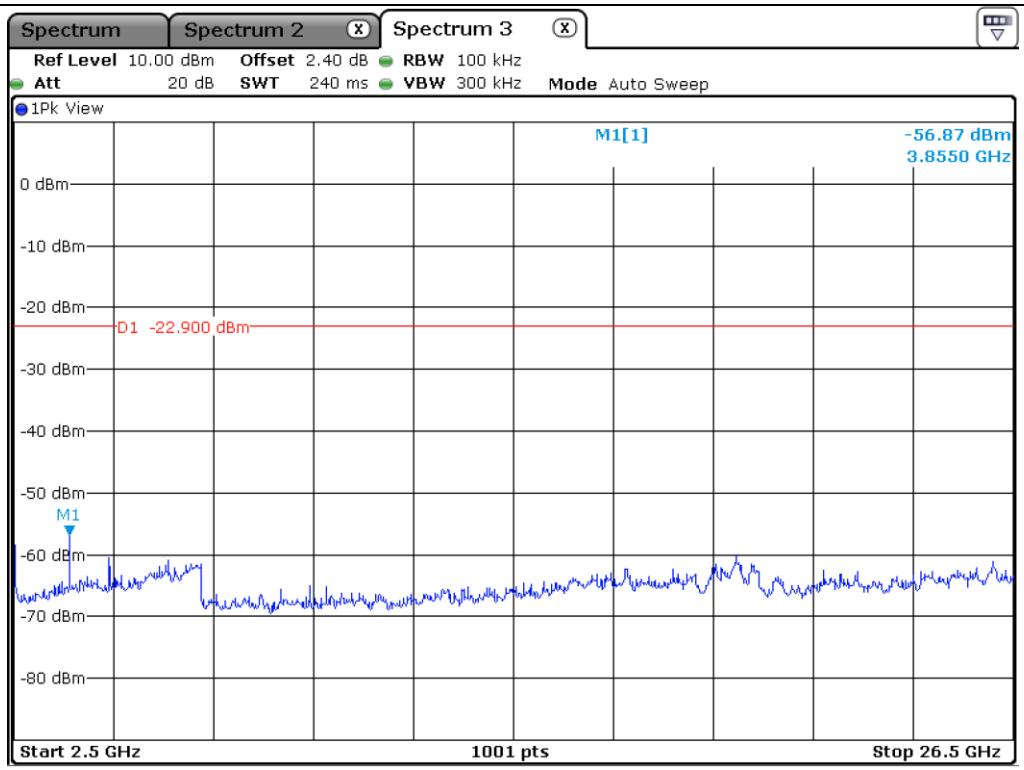


High Channel

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

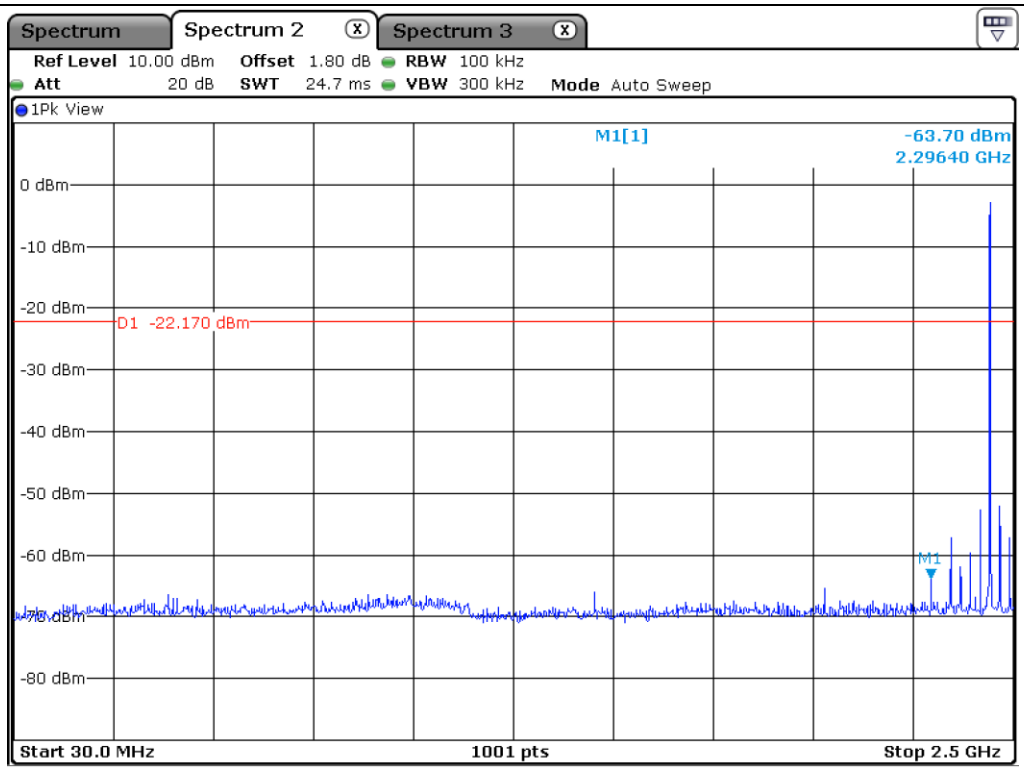


Low Channel

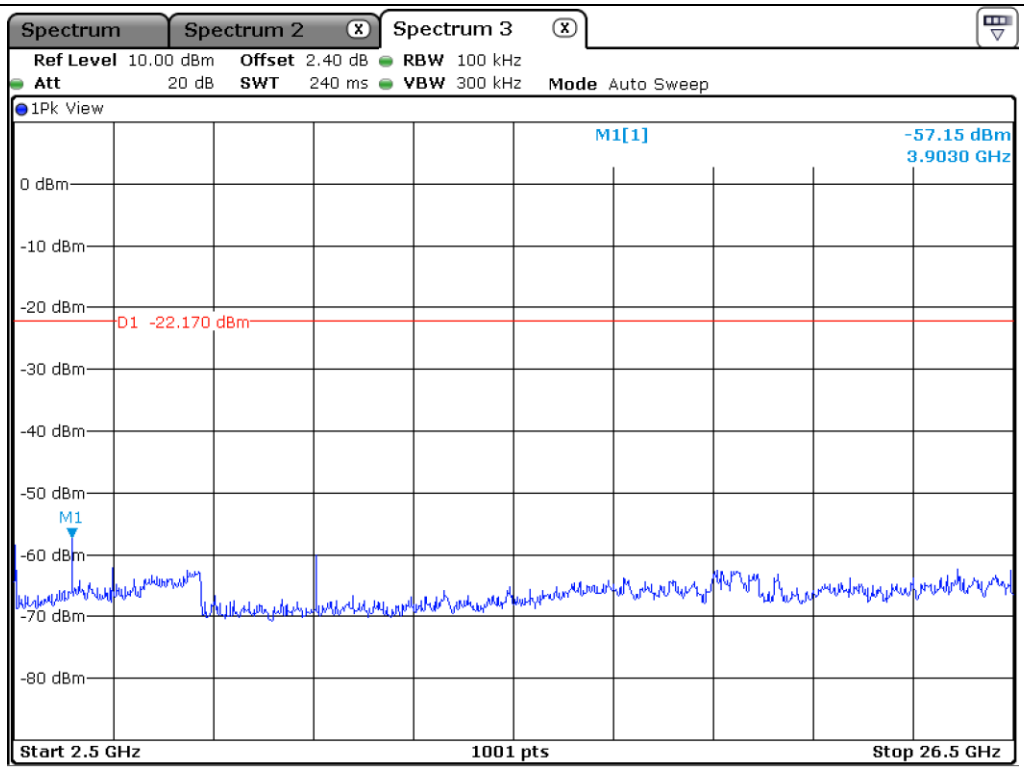


Low Channel

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

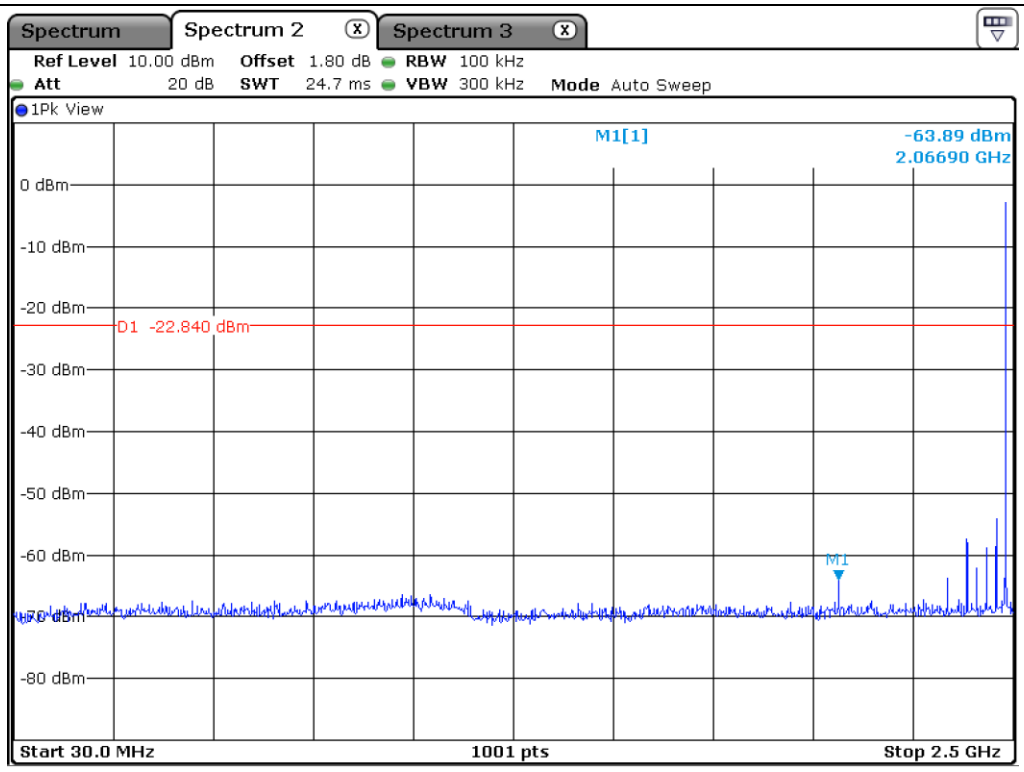


Middle Channel

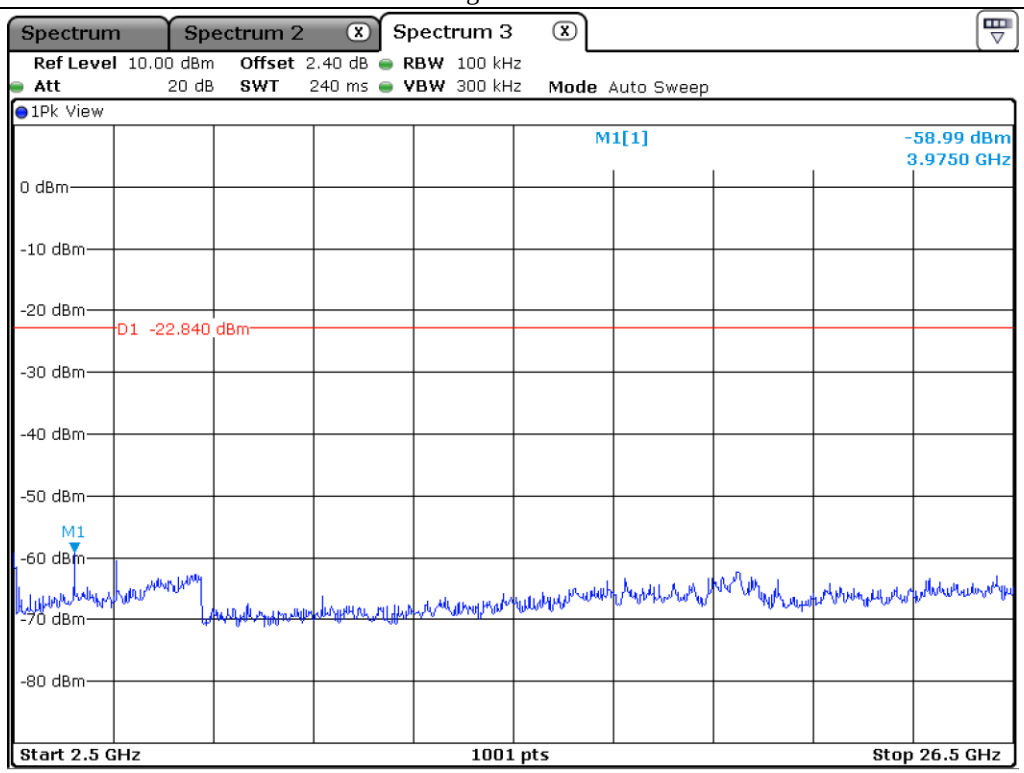


Middle Channel

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

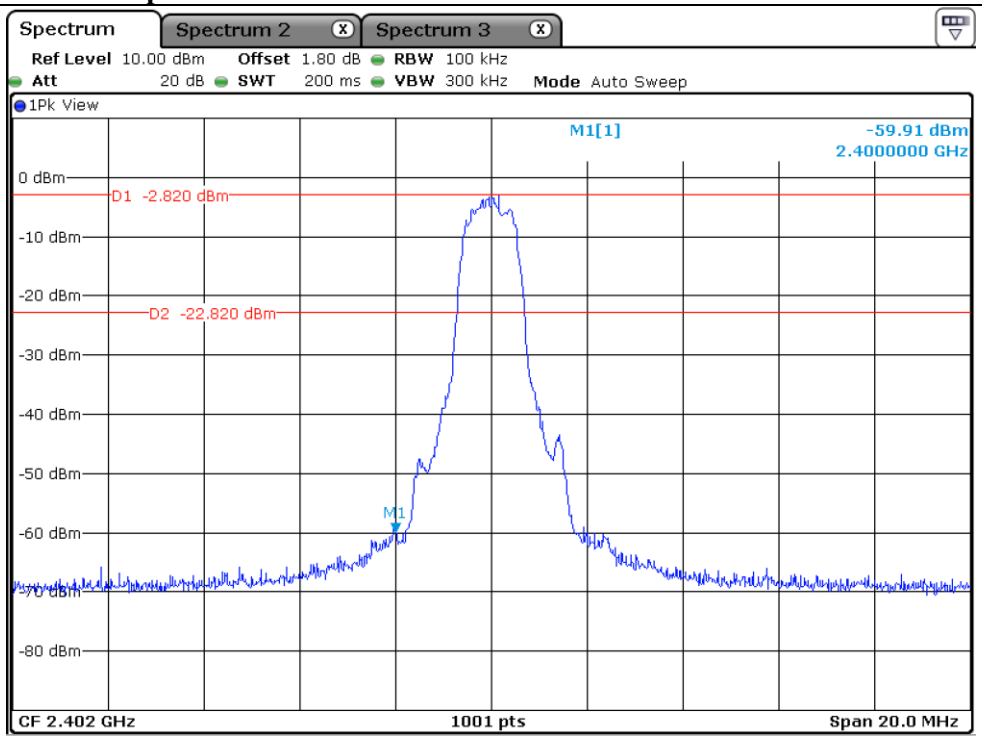


High Channel

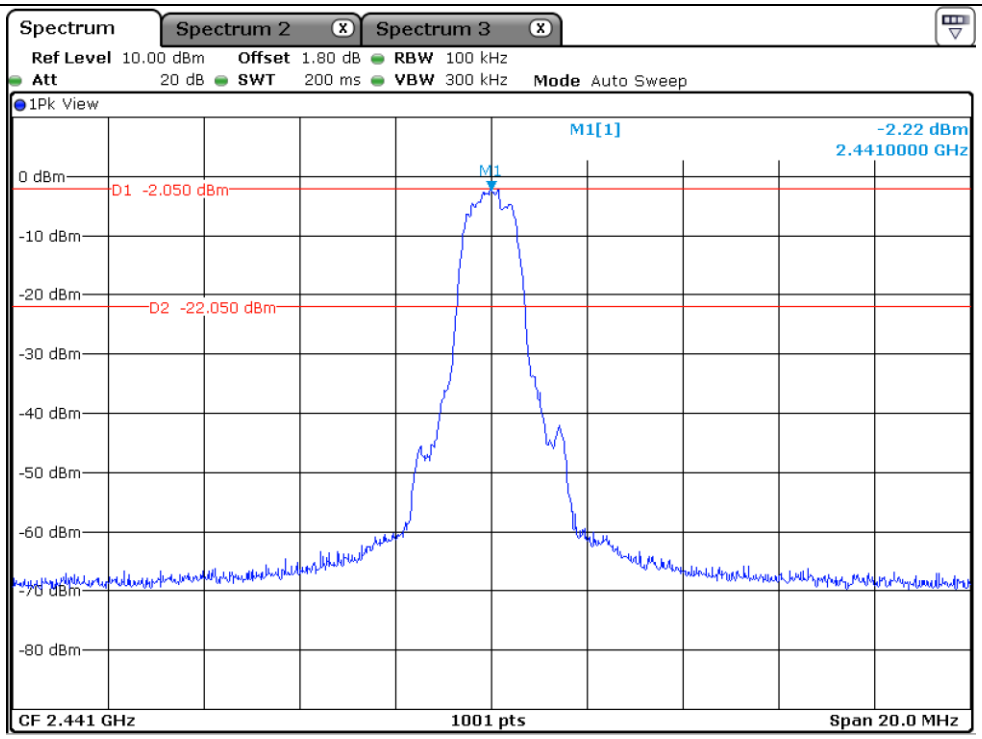
It should not be reproduced except in full, without the written approval of ONETECH Corp.

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

12.5.3 Test data for 3 Mbps

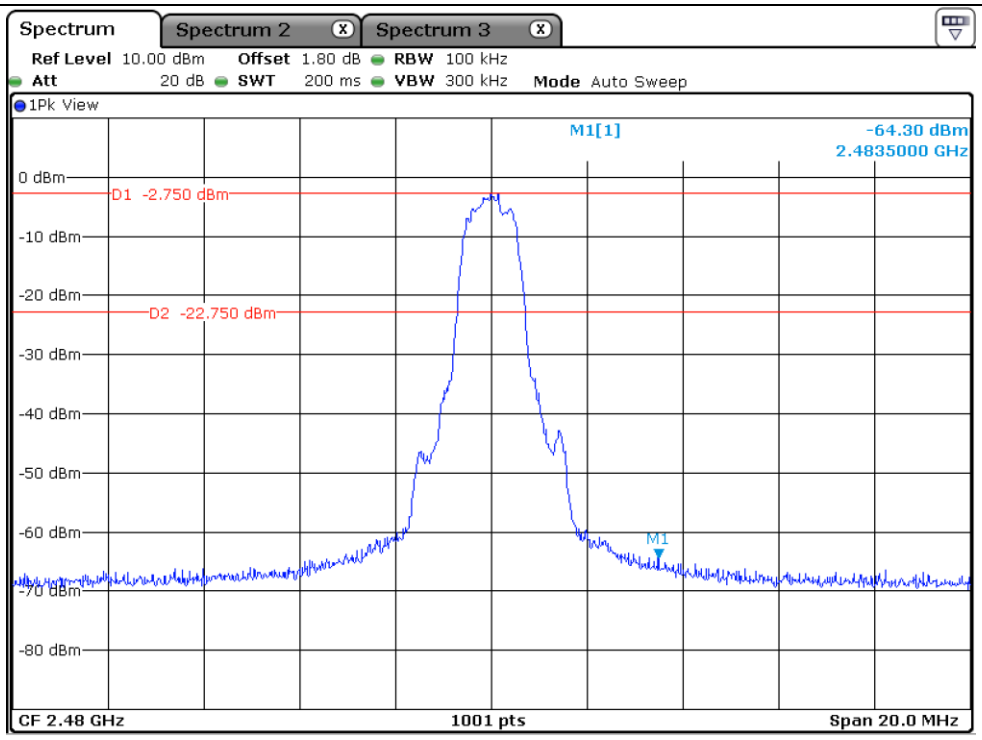


Low Channel



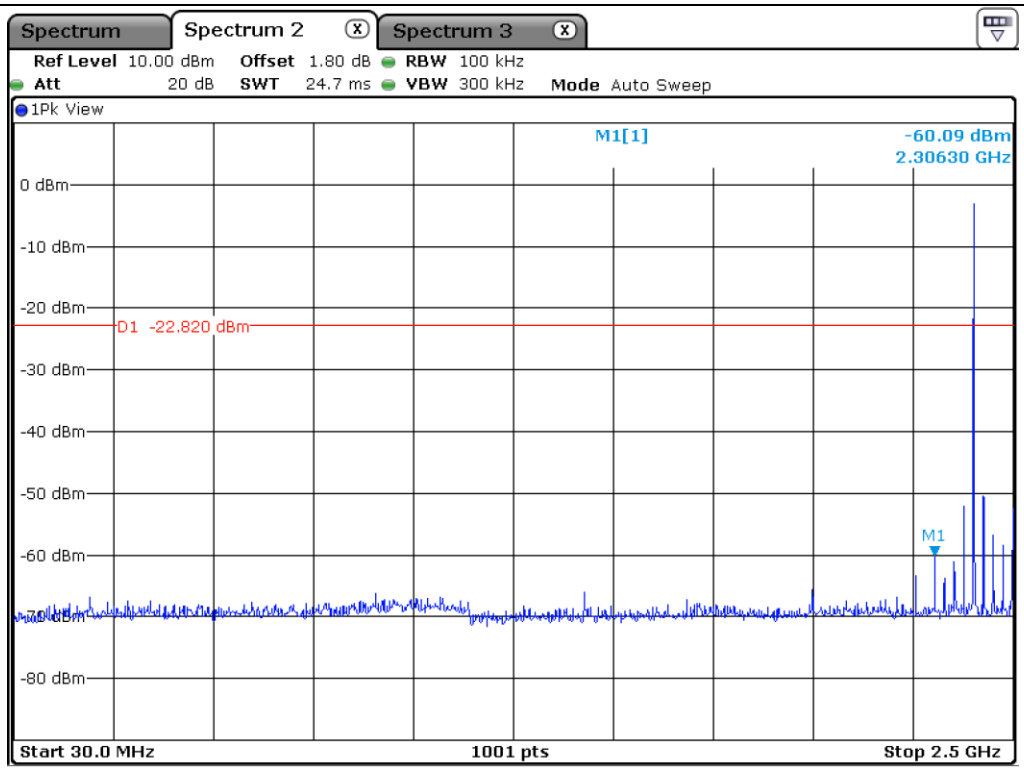
Middle Channel

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

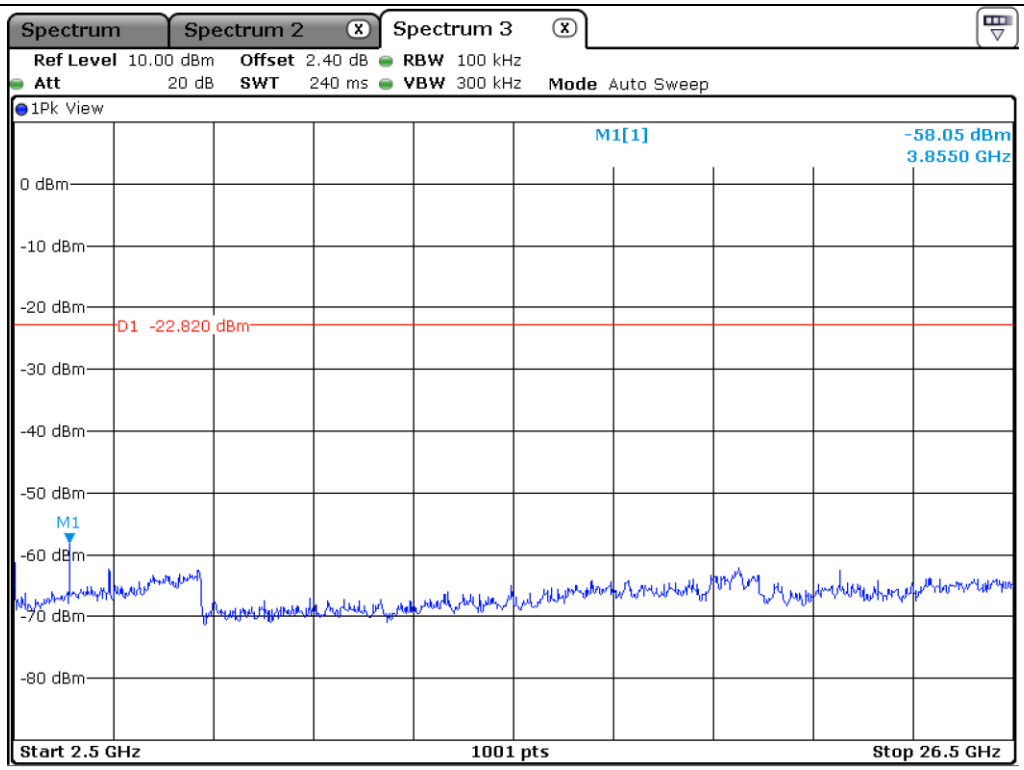


High Channel

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

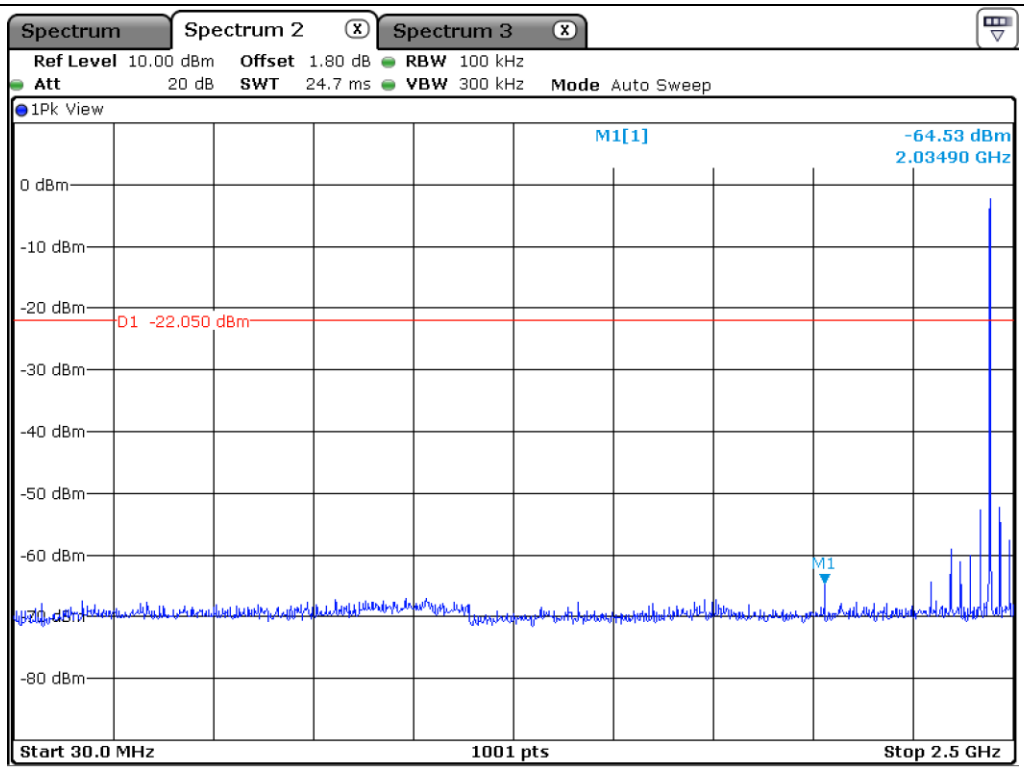


Low Channel

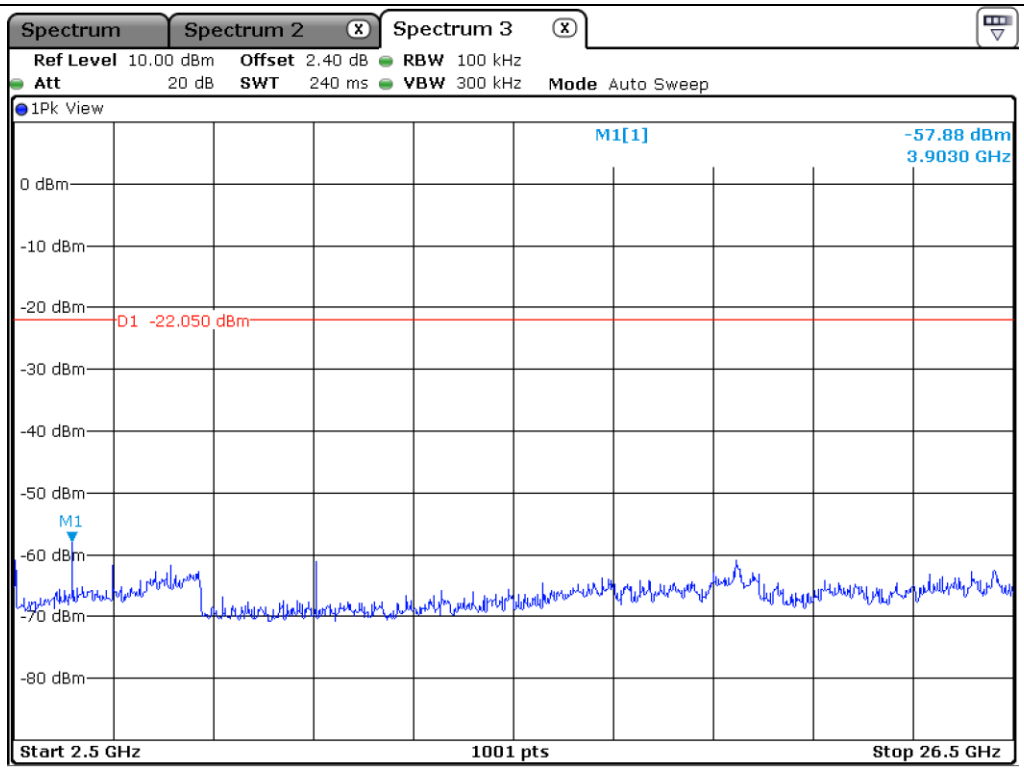


Low Channel

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

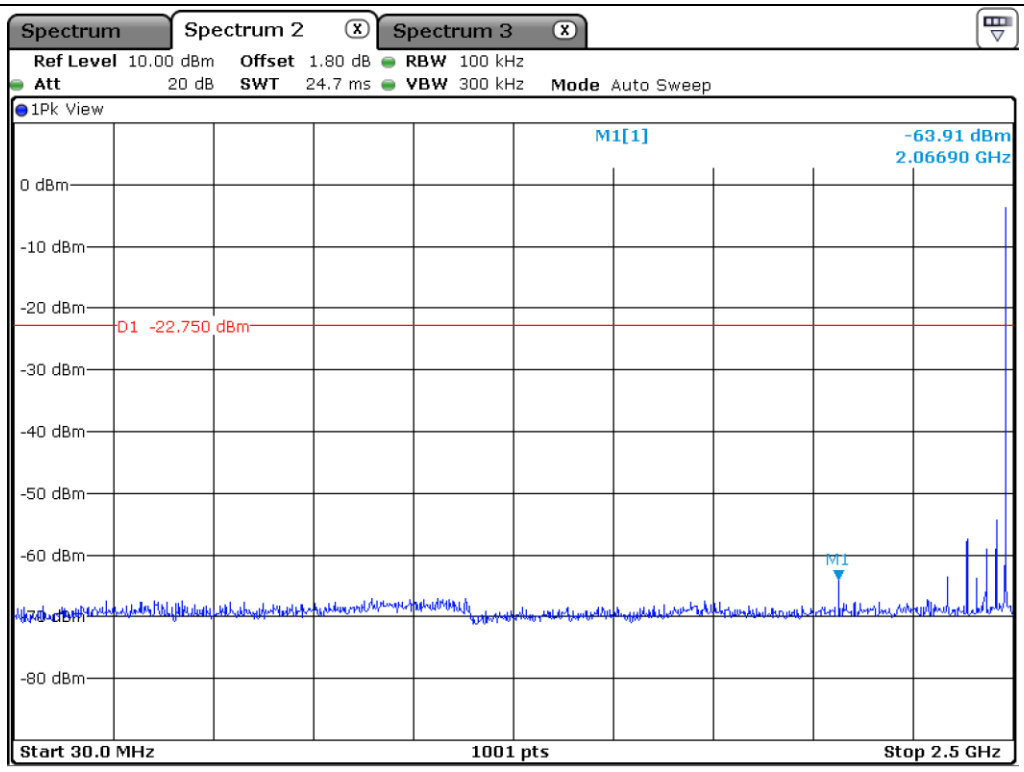


Middle Channel

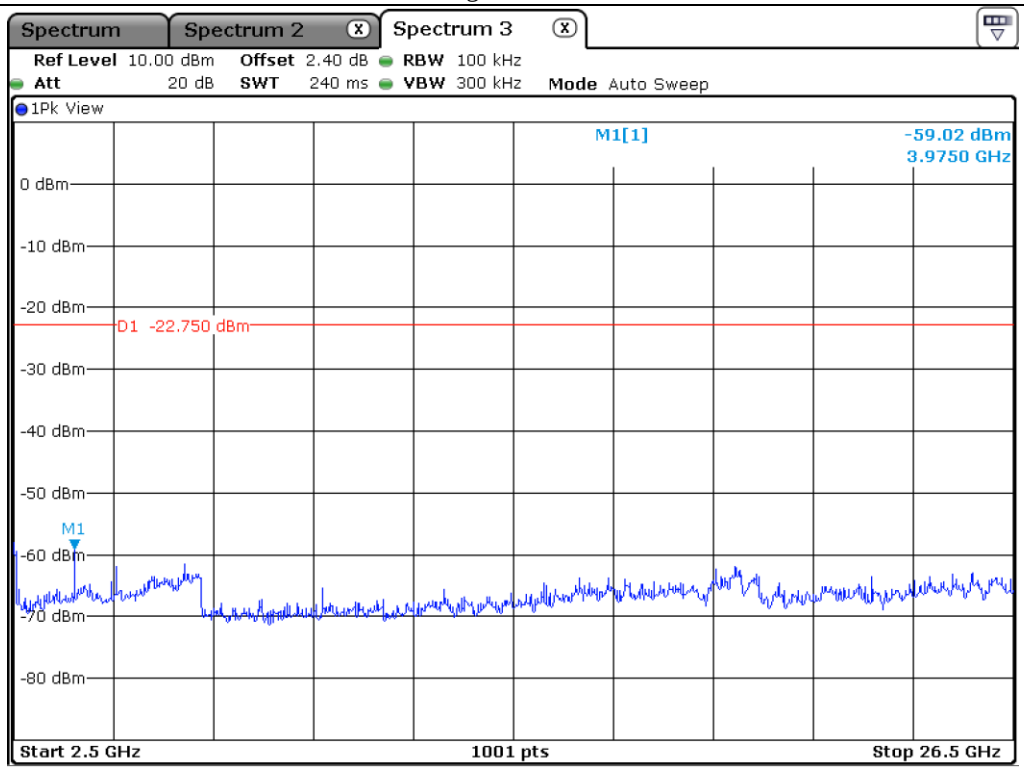


Middle Channel

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)

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 : 77.07 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel									
2 377.73	17.23	Peak	H	28.30	8.09	-	53.62	74.00	20.38
2 377.97	10.56	Average	H	28.30	8.09	1.13	48.08	54.00	5.92
2 344.08	15.30	Peak	V	27.90	8.09	-	51.29	74.00	22.71
2 340.64	5.94	Average	V	27.90	8.09	1.13	43.06	54.00	10.94
Test Data for High Channel									
2 485.70	15.47	Peak	H	29.00	8.30	-	52.77	74.00	21.23
2 489.88	5.32	Average	H	29.00	8.30	1.13	43.75	54.00	10.25
2 483.50	16.16	Peak	V	29.00	8.30	-	53.46	74.00	20.54
2 485.37	5.21	Average	V	29.00	8.30	1.13	43.64	54.00	10.36

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

12.6.1.2 Test data for 2 Mbps

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

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

-. Measurement distance : 3 m

-. Duty Cycle : 77.13 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
2 378.13	16.73	Peak	H	28.30	8.09	-	53.12	74.00	20.88
2 377.89	7.90	Average	H	28.30	8.09	1.13	45.42	54.00	8.58
2 369.90	15.76	Peak	V	28.30	8.09	-	52.15	74.00	21.85
2 346.72	5.63	Average	V	27.90	8.09	1.13	42.75	54.00	11.25
Test Data for High Channel									
2 484.58	15.73	Peak	H	29.00	8.30	-	53.03	74.00	20.97
2 484.28	5.59	Average	H	29.00	8.30	1.13	44.02	54.00	9.98
2 493.06	16.22	Peak	V	29.00	8.30	-	53.52	74.00	20.48
2 489.14	5.39	Average	V	29.00	8.30	1.13	43.82	54.00	10.18

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

It should not be reproduced except in full, without the written approval of 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)

12.6.1.3 Test data for 3 Mbps

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

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

-. Measurement distance : 3 m

-. Duty Cycle : 77.13 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel									
2 369.34	16.38	Peak	H	28.30	8.09	-	52.77	74.00	21.23
2 377.97	8.21	Average	H	28.30	8.09	1.13	45.73	54.00	8.27
2 343.44	15.91	Peak	V	27.90	8.09	-	51.90	74.00	22.10
2 346.00	5.52	Average	V	27.90	8.09	1.13	42.64	54.00	11.36
Test Data for High Channel									
2 498.14	15.44	Peak	H	29.00	8.30	-	52.74	74.00	21.26
2 496.84	5.37	Average	H	29.00	8.30	1.13	43.80	54.00	10.20
2 487.72	14.50	Peak	V	29.00	8.30	-	51.80	74.00	22.20
2 492.01	5.01	Average	V	29.00	8.30	1.13	43.44	54.00	10.56

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

It should not be reproduced except in full, without the written approval of 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)

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 : 77.07 %

-. Result : PASSED

Frequency (MHz)	Reading (dBµV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	C.F (dB)	Total (dBµV/m)	Limits (dBµV/m)	Margin (dB)
Test Data for Low Channel									
4 804	45.93	Peak	H	33.40	11.60	-	45.04	74.00	28.96
4 804	35.24	Average	H	33.40	11.60	1.13	35.48	54.00	18.52
4 804	46.39	Peak	V	33.40	11.60	-	45.50	74.00	28.50
4 804	35.83	Average	V	33.40	11.60	1.13	36.07	54.00	17.93
Test Data for Middle Channel									
4 882	46.46	Peak	H	33.40	11.80	-	45.77	74.00	28.23
4 882	35.03	Average	H	33.40	11.80	1.13	35.47	54.00	18.53
4 882	45.80	Peak	V	33.40	11.80	-	45.11	74.00	28.89
4 882	36.20	Average	V	33.40	11.80	1.13	36.64	54.00	17.36
Test Data for High Channel									
4 960	46.18	Peak	H	33.70	12.00	-	45.99	74.00	28.01
4 960	34.54	Average	H	33.70	12.00	1.13	35.48	54.00	18.52
4 960	45.73	Peak	V	33.70	12.00	-	45.54	74.00	28.46
4 960	35.84	Average	V	33.70	12.00	1.13	36.78	54.00	17.22

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

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

Total Level = Reading + Antenna Factor + Cable Loss + Correction Factor-Amp Gain (45.89 dB)

It should not be reproduced except in full, without the written approval of 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)

12.6.2.2 Test data for 2 Mbps

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

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

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Duty Cycle : 77.13 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 804	45.59	Peak	H	33.40	11.60	-	44.70	74.00	29.30
4 804	35.46	Average	H	33.40	11.60	1.13	35.70	54.00	18.30
4 804	45.80	Peak	V	33.40	11.60	-	44.91	74.00	29.09
4 804	35.23	Average	V	33.40	11.60	1.13	35.47	54.00	18.53
Test Data for Middle Channel									
4 882	45.90	Peak	H	33.40	11.80	-	45.21	74.00	28.79
4 882	35.26	Average	H	33.40	11.80	1.13	35.70	54.00	18.30
4 882	45.73	Peak	V	33.40	11.80	-	45.04	74.00	28.96
4 882	35.73	Average	V	33.40	11.80	1.13	36.17	54.00	17.83
Test Data for High Channel									
4 960	45.41	Peak	H	33.70	12.00	-	45.22	74.00	28.78
4 960	35.17	Average	H	33.70	12.00	1.13	36.11	54.00	17.89
4 960	45.77	Peak	V	33.70	12.00	-	45.58	74.00	28.42
4 960	35.19	Average	V	33.70	12.00	1.13	36.13	54.00	17.87

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

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

Total Level = Reading + Antenna Factor + Cable Loss + Correction Factor-Amp Gain (45.89 dB)

12.6.2.3 Test data for 3 Mbps

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

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

-. Frequency range : 1 GHz ~ 26.5 GHz

-. Measurement distance : 3 m

-. Duty Cycle : 77.13 %

-. Result : PASSED

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	C.F (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Test Data for Low Channel									
4 804	46.01	Peak	H	33.40	11.60	-	45.12	74.00	28.88
4 804	35.52	Average	H	33.40	11.60	1.13	35.76	54.00	18.24
4 804	46.34	Peak	V	33.40	11.60	-	45.45	74.00	28.55
4 804	35.60	Average	V	33.40	11.60	1.13	35.84	54.00	18.16
Test Data for Middle Channel									
4 882	46.04	Peak	H	33.40	11.80	-	45.35	74.00	28.65
4 882	34.95	Average	H	33.40	11.80	1.13	35.39	54.00	18.61
4 882	46.13	Peak	V	33.40	11.80	-	45.44	74.00	28.56
4 882	35.24	Average	V	33.40	11.80	1.13	35.68	54.00	18.32
Test Data for High Channel									
4 960	46.34	Peak	H	33.70	12.00	-	46.15	74.00	27.85
4 960	34.84	Average	H	33.70	12.00	1.13	35.78	54.00	18.22
4 960	45.51	Peak	V	33.70	12.00	-	45.32	74.00	28.68
4 960	34.77	Average	V	33.70	12.00	1.13	35.71	54.00	18.29

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

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

Total Level = Reading + Antenna Factor + Cable Loss + Correction Factor-Amp Gain (45.89 dB)

It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

13. RADIATED EMISSION TEST

13.1 Operating environment

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

13.2 Test set-up

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

The frequency spectrum from 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.

13.3 Test Date

September 28, 2020 ~ October 12, 2020

It should not be reproduced except in full, without the written approval of ONETECH Corp.

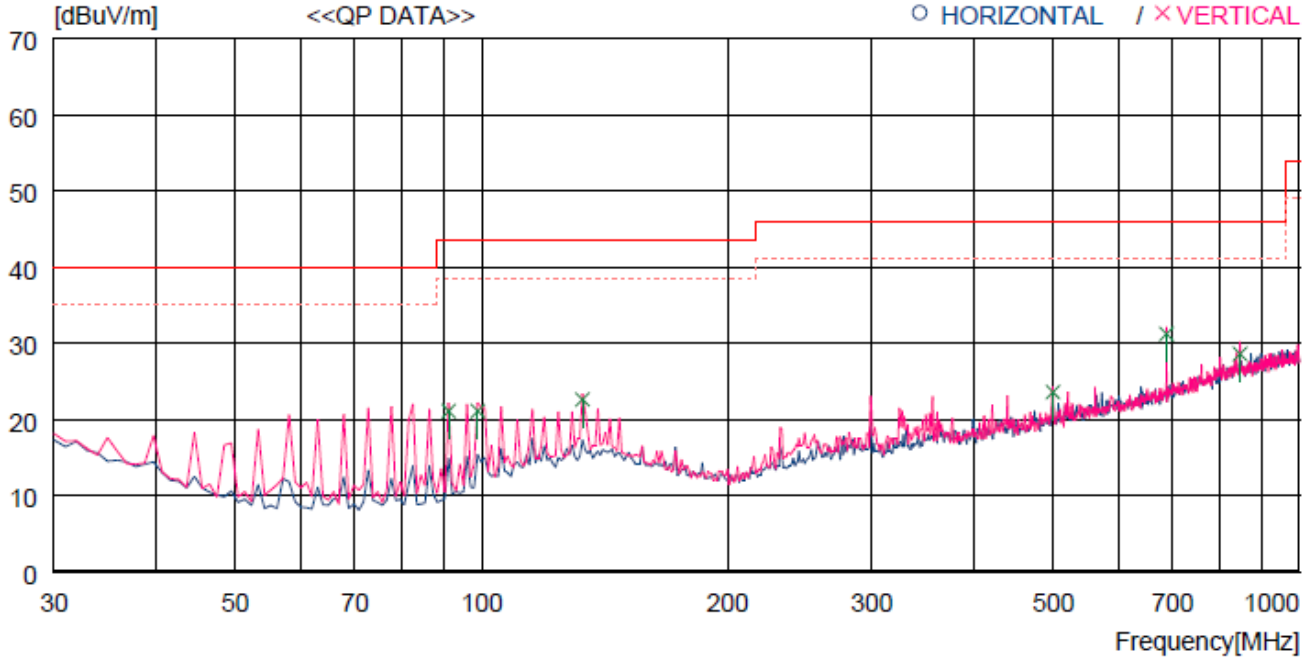
ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

13.4 Test data for 30 MHz ~ 1000 MHz

-. Resolution bandwidth : 120 kHz

-. Frequency range : 30 MHz ~ 1 000 MHz

-. Measurement distance : 3 m



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Vertical ------										
1	91.110	38.9	**13.7**	1.2	32.7	21.1	43.5	22.4	100	200
2	98.870	37.5	**15.1**	1.2	32.7	21.1	43.5	22.4	100	0
3	132.820	34.7	**19.2**	1.4	32.7	22.6	43.5	20.9	100	0
4	499.481	30.8	**23.1**	2.6	32.9	23.6	46.0	22.4	100	175
5	687.655	35.3	**25.4**	3.4	32.9	31.2	46.0	14.8	100	258
6	845.761	29.4	**27.3**	4.2	32.3	28.6	46.0	17.4	200	359

It should not be reproduced except in full, without the written approval of 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)

13.5 Test data for Below 30 MHz

-. Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)

-. Frequency range : 9 kHz ~ 30 MHz

-. Measurement distance : 3 m

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

13.6 Test data for above 1 GHz

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

-. Video bandwidth : 1 MHz for Peak Mode, 10 Hz for 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.								

It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

14. CONDUCTED EMISSION TEST

14.1 Operating environment

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

14.2 Test set-up

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

14.3 Test Date

September 28, 2020 ~ October 12, 2020

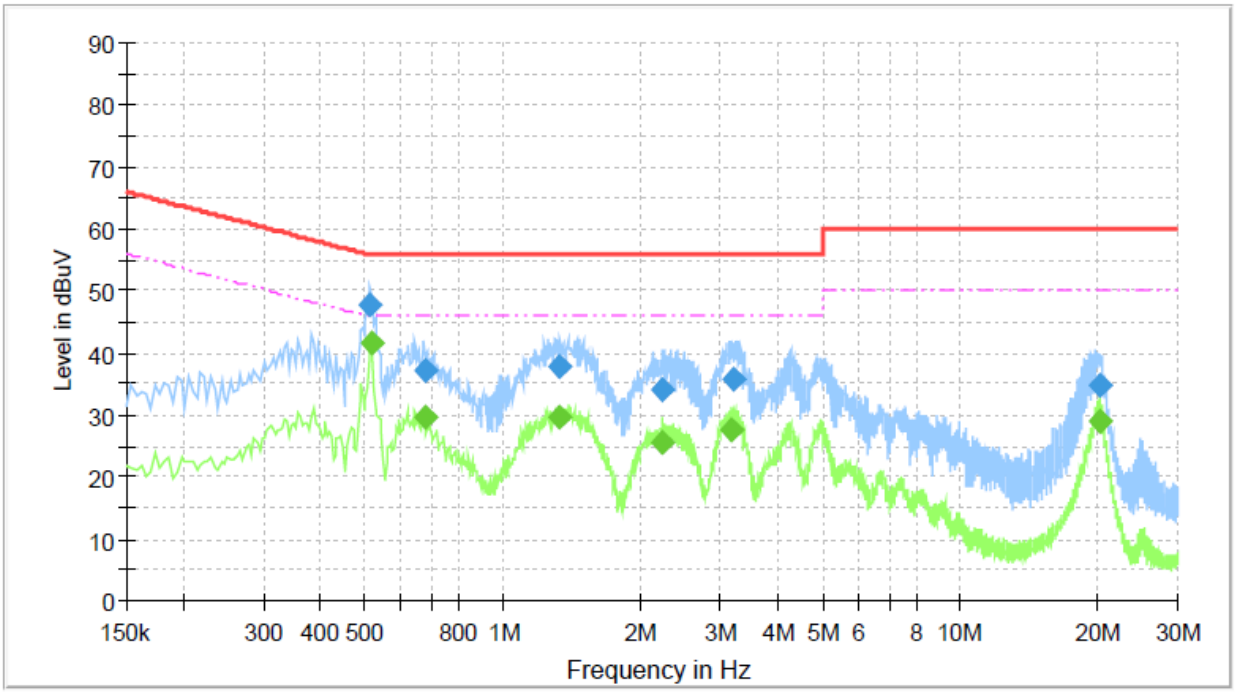
It should not be reproduced except in full, without the written approval of ONETECH Corp. OTC-TRF-RF-001(0)

14.4 Test data

-. Resolution bandwidth : 9 kHz

-. Frequency range : 0.15 MHz ~ 30 MHz

-. Tested Line : HOT LINE



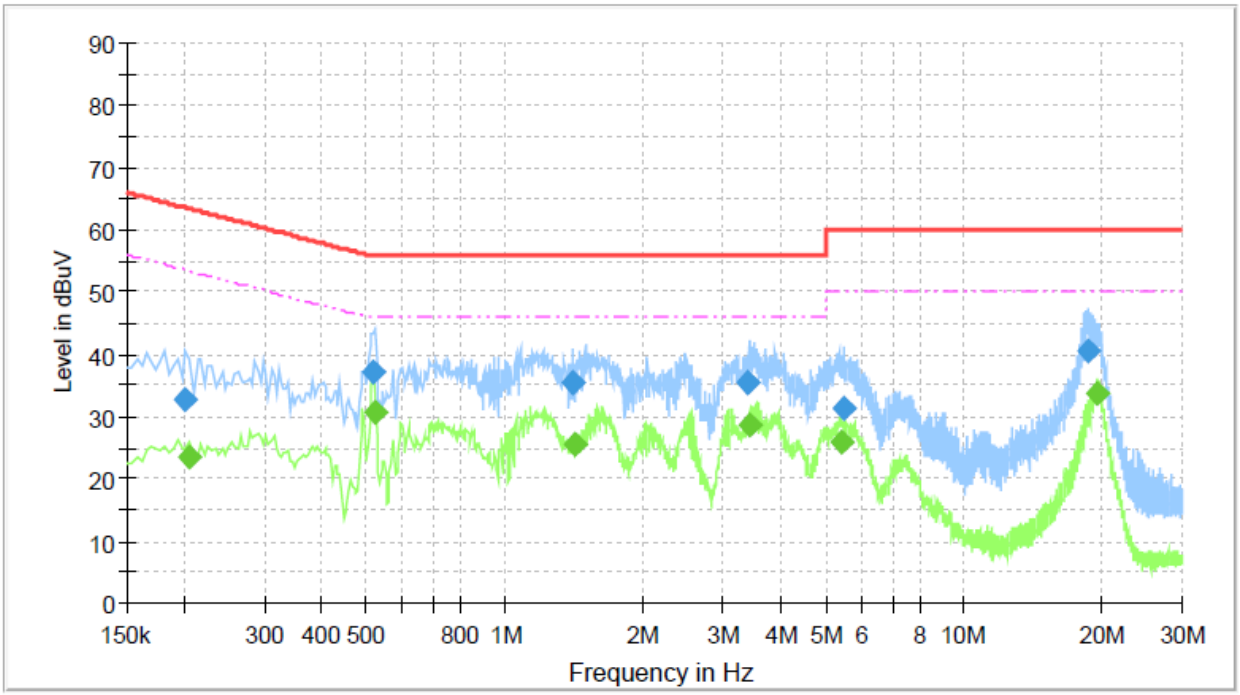
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.514	47.77	---	56.00	8.23	3000.0	9.0	L1	9.93
0.518	---	41.71	46.00	4.29	3000.0	9.0	L1	9.93
0.675	---	29.57	46.00	16.43	3000.0	9.0	L1	9.95
0.675	37.02	---	56.00	18.98	3000.0	9.0	L1	9.95
1.331	---	29.61	46.00	16.39	3000.0	9.0	L1	10.00
1.335	37.98	---	56.00	18.02	3000.0	9.0	L1	10.00
2.227	---	25.71	46.00	20.29	3000.0	9.0	L1	10.02
2.243	34.11	---	56.00	21.89	3000.0	9.0	L1	10.02
3.170	---	27.70	46.00	18.30	3000.0	9.0	L1	10.04
3.194	35.91	---	56.00	20.09	3000.0	9.0	L1	10.04
20.133	---	29.11	50.00	20.89	3000.0	9.0	L1	10.60
20.165	34.76	---	60.00	25.24	3000.0	9.0	L1	10.60

It should not be reproduced except in full, without the written approval of 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)

-. Tested Line : NEUTRAL LINE



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.202	32.88	---	63.55	30.67	3000.0	9.0	N	9.93
0.207	---	23.46	53.35	29.89	3000.0	9.0	N	9.93
0.518	37.21	---	56.00	18.79	3000.0	9.0	N	9.94
0.523	---	30.56	46.00	15.44	3000.0	9.0	N	9.94
1.411	35.53	---	56.00	20.47	3000.0	9.0	N	10.01
1.421	---	25.67	46.00	20.33	3000.0	9.0	N	10.01
3.393	35.45	---	56.00	20.55	3000.0	9.0	N	10.07
3.409	---	28.51	46.00	17.49	3000.0	9.0	N	10.07
5.455	---	25.99	50.00	24.01	3000.0	9.0	N	10.13
5.463	31.48	---	60.00	28.52	3000.0	9.0	N	10.13
18.720	40.68	---	60.00	19.32	3000.0	9.0	N	10.69
19.652	---	33.92	50.00	16.08	3000.0	9.0	N	10.72

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.

It should not be reproduced except in full, without the written approval of 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)

15. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSV30	Rohde & Schwarz	Signal Analyzer	101199	Feb. 20, 2020 (1Y)
TC-3000C	TESCOM	BLUETOOTH TESTER	3000C000634	Feb. 19, 2020 (1Y)
ESW	Rohde & Schwarz	EMI Test Receiver	101851	Mar. 27, 2020 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	312544	Mar. 16, 2020 (1Y)
BBV 9718 B	Schwarzbeck	Broadband Preamplifier	00009	Mar. 16, 2020 (1Y)
SCU40A	Rohde & Schwarz	Signal Conditioning unit	100436	Feb. 20, 2020 (1Y)
SCU18	Rohde & Schwarz	Signal Conditioning unit	102266	Jul. 15, 2020 (1Y)
DT3000-3t	Innco System	Turn Table	DT3000/093	N/A
MA-4000XPET	Innco System	Antenna Master	MA4000/509	N/A
HLP-2008	TDK RF Solutions	Hybrid Antenna	131316	Feb. 27, 2020 (1Y)
AH-118	Com-Power	Horn Antenna	10050061	Oct. 15, 2020 (1Y)
VULB9163	Schwarzbeck	TRILOG Broadband Antenna	777	Apr. 08, 2020 (2Y)
BBHA 9120D	Schwarzbeck	Horn Antenna	9120D-1366	Jul. 23, 2020 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170178	Jan. 07, 2020(1Y)
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar. 24, 2020(2Y)
HPF 3GHz	Rohde & Schwarz	High Pass Filter	N/A	Feb. 19, 2020 (1Y)
ESR	Rohde & Schwarz	EMI Test Receiver	102602	Mar. 17, 2020 (1Y)
ESH3Z2	Rohde & Schwarz	PULSE LIMITER	357.8810.52	Mar. 16, 2020 (1Y)
NSLK8126	Schwarzbeck	LISN	8126404	Mar. 16, 2020 (1Y)
3825/2	EMCO	AMN	9109-1869	Mar. 16, 2020 (1Y)

It should not be reproduced except in full, without the written approval of 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)