



시험 성적서

TEST REPORT

페이지(page) : (1) / (총(Total) 83)

성적서 번호 Report No.		ICRT-TR-E222082-0A	
신청자 Client	기관명 Name	PITTASOFT CO.,LTD.	
	주 소 Address	A4th floor, ABN Tower, 331, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea	
시험대상품목 Sample description		Car Dashcam	
모델명 Type designation		DR970X LTE	
정 격 Ratings		DC 12.0 V / DC 24.0 V	
시험장소 Place of test		☒ 고정시험(Inside test) ☐ 현장시험(Field test) 주소지(Address): 112, 113 Hwanggeum 3-ro 7beon-gil, Hagun-ri, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea	
시험기간 Date of test		31.May. 2022 ~ 08. Aug. 2022	
시험방법/항목 Test Method/Item		FCC Part 15 Subpart C §15.247	
시험결과 Test Results		Refer to 3. Test Summary	
확 인 Affirmation	작성자 Tested by	기술책임자 Technical Manager	
	성 명 Name	성 명 Name	
	Yeong-Hwan, Hong (서명) (Signature)	Min-Gi, Son (서명) (Signature)	
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Contents

1. Applicant & Manufacturer & Test Laboratory Information	4
1.1 Applicant information	4
1.2 Manufacturer Information	4
1.3 Test Laboratory Information	4
2. Equipment under Test(EUT) Information	5
2.1 General Information	5
2.2 Additional Information	5
2.3 Mode of operation during the test	5
2.4 Test Frequency	5
2.5 Worst-Case	6
2.6 Modifications of EUT	6
2.7 Reason of Additional Model Name	6
3. Test Summary	7
3.1 Test standards and results	7
3.2 Purpose of the test	7
3.3 Test Methodology	7
3.4 Configuration of Test System	7
3.5 Antenna requirement	8
4. Used equipment on test	9
5. 20 dB Bandwidth & 99 % Bandwidth	10
5.1 Operating environment	10
5.2 Measurement method	10
5.3 Limit	10
5.4 Test data	10
6. Carrier Frequency Separation	27
6.1 Operating environment	27
6.2 Measurement method	27
6.3 Limit	27
6.4 Test data	27
7. Number of Hopping Frequency	36
7.1 Operating environment	36
7.2 Measurement method	36
7.3 Limit	36
7.4 Test data	36
8. Time of Occupancy (Dwell Time)	39
8.1 Operating environment	39
8.2 Measurement method	39
8.3 Limit	39
8.4 Test data	39



9. Output Power	43
9.1 Operating environment	43
9.2 Measurement method	43
9.3 Limit	43
9.4 Test data	43
10. Conducted Spurious Emission & Band edge (Non-Restricted band)	44
10.1 Operating environment	44
10.2 Measurement method	44
10.3 Limit	44
10.4 Test data	44
10.4.1 Measured Results for DC 12 V.....	45
11. Radiated Spurious Emission(Restricted band)	61
11.1 Operating environment	61
11.2 Measurement method	61
11.3 Limit	61
11.4 Test data	61
12. Power Line Conducted Emission	81
12.1 Operating environment	81
12.2 Measurement method	81
12.3 Test setup	81
12.4 Test data	81

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
ICRT-TR-E222082-0A	10-Aug-2022	Initial Issue	All



1. Applicant & Manufacturer & Test Laboratory Information

1.1 Applicant information

Applicant	PITTASOFT CO.,LTD.
Address	A4th floor, ABN Tower, 331, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea
Contact Person	MINHO SHIN
Telephone No.	+82-31-8039-7789
Fax No.	+82-31-8039-5260
E-mail	shinmh@pittasoft.com

1.2 Manufacturer Information

Manufacturer	PITTASOFT CO.,LTD.
Address	A4th floor, ABN Tower, 331, Pangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, Republic of Korea

1.3 Test Laboratory Information

Conducted tests were performed at	
Laboratory	ICR Co., Ltd.
Address	112, Hwanggeum 3-ro 7beon-gil, Hagun-ri, Yangchon-eup, Gimpo-si, Gyeonggi-do, Korea
Telephone No.	+82-2-6351-9002
Fax No.	+82-2-6351-9007
RRA No.	KR0165
KOLAS No.	KT652
Test Firm Registration Number	490614



2. Equipment under Test(EUT) Information

2.1 General Information

Product Name	Car Dashcam
Brand Name	-
Model Name	DR970X LTE
Additional Model Name	DR970X-1CH LTE, DR970X-2CH LTE, DR970X-2CH IR LTE, DR970X-2CH DMS LTE, DR970X-2CH Truck LTE, DR970X-2CH ELD LTE
FCC ID	YCK-DR970XLTE
Power Supply	DC 12.0 V / DC 24.0 V

2.2 Additional Information

Equipment Class	DSS - Frequency Hopping Spread Spectrum systems	
Device Type	Stand-alone	
Operating Frequency	Bluetooth BDR / EDR	2 402 MHz ~ 2 480
RF Output Power	Bluetooth BDR	10.55 dBm
	Bluetooth EDR	13.46 dBm
Number of Channel	79	
Modulation Type	GFSK / $\pi/4$ -DQPSK / 8DPSK	
Antenna Type	Chip Antenna	
Antenna Gain	1.88 dBi	
Antenna Operating Mode	Single Antenna Equipment with only one antenna	

2.3 Mode of operation during the test

- The EUT is continuous transmission mode during the test with set to each of the Low Channel, Middle Channel, and High Channel at the worst case data rate. The worst case data rate for each modulation is determined Bluetooth BDR / EDR.

2.4 Test Frequency

Test mode	Test frequency (MHz)		
	Lowest frequency	Middle frequency	High frequency
GFSK	2 402	2 441	2 480
$\pi/4$ -DQPSK	2 402	2 441	2 480
8DPSK	2 402	2 441	2 480



2.5 Worst-Case

BDR	DH5(GFSK)
EDR	3-DH5(8DPSK)

Note: The power measurement has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.

2.6 Modifications of EUT

- None

2.7 Reason of Additional Model Name

NO	Family Model Name	Difference
1	DR970X-1CH LTE	The basic model and electrical specifications, structure, and circuit are the same, but a simple derivative model name added due to a different seller
2	DR970X-2CH LTE	
3	DR970X-2CH IR LTE	
4	DR970X-2CH DMS LTE	
5	DR970X-2CH Truck LTE	
6	DR970X-2CH ELD LTE	



3. Test Summary

3.1 Test standards and results

FCC Part 15 Subpart C			
Clause	Test items	Applied	Results
§15.247 (a)(1)(i)	20 dB Bandwidth & 99 % Bandwidth	☒	PASS
§15.247 (a)(1)	Carrier Frequency Separation	☒	PASS
§15.247 (a)(1) (iii)	Number of Hopping Frequencies	☒	PASS
§15.247 (a)(1) (iii)	Time of Occupancy (dwell Time)	☒	PASS
§15.247 (a)(1)	Output Power	☒	PASS
§15.247 (d)	Conducted Spurious Emission & Band edge (Non-Restricted band)	☒	PASS
§15.209 & §15.205	Radiated Spurious Emission(Restricted band)	☒	PASS
§15.207	Power Line Conducted Emission	☒	PASS

3.2 Purpose of the test

- To determine whether the equipment under test fulfills the requirements of the standards stated in FCC Part 15 Subpart C Section 15.247

3.3 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.

3.4 Configuration of Test System

3.4.1 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 m 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.

3.4.2 AC powerline conducted emission test

The EUT was connected to LISN. All supporting equipments 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.



3.5 Antenna requirement

According to §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.

The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section.

The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.5.1 Result: Pass

The transmitter has a **Chip Antenna**. The directional gain of the antenna is **1.88 dBi**.



4. Used equipment on test

	Description	Model Name	Serial Number	Manufacturer	Next Cal. (cycle)
☒	Spectrum analyzer	FSV40	101455	R&S	2023. 03. 02 (1Y)
☒	Signal Generator	SMB100A	180607	R&S	2023. 03. 03 (1Y)
☒	Wideband Power Sensor	NRP-Z81	102999	R&S	2023. 03. 03 (1Y)
☒	DC Power Supply	XDL 35-5P	J00385373	Sorensen	2023. 03. 03 (1Y)
☒	Loop Antenna	HFH2-Z2	100506	Rohde & Schwarz	2023. 07. 05 (2Y)
☒	TRILOG BROADBAND ANTENNA	VULB9162	120	SCHWARZBECK	2022. 12. 15 (2Y)
☒	RF Pre Amplifier	SCU08	100747	Rohde & Schwarz	2023. 04. 13 (1Y)
☒	DOUBLE-RIDGE WAVEGUIDE HORN ANTENNA	HF907	102556	Rohde & Schwarz	2022. 08. 18 (1Y)
☒	RF Pre Amplifier	SCU18	102342	Rohde & Schwarz	2023. 04. 13 (1Y)
☒	Horn Antenna	LB-42-10-C-KF	J202024625	AINFO Inc.	2023. 03. 10 (1Y)
☒	RF Pre Amplifier	AMF-4F-18265-35-8P-1	771846	MITEQ	2023 .03. 07 (1Y)
☒	Horn Antenna	LB-28-10-C-KF	J202024627	AINFO Inc.	2023. 03. 10 (1Y)
☒	RF Pre Amplifier	AMF-4D-260400-45-6P	779919	MITEQ	2023 .03. 07 (1Y)
☒	EMI Test Receiver	ESR26	101461	Rohde & Schwarz	2023. 05. 18 (1Y)
☒	EMI Test Receiver	ESR26	101462	Rohde & Schwarz	2023. 04. 13 (1Y)
☒	LISN	ENV216	102194	Rohde & Schwarz	2023. 04. 14 (1Y)
☒	EMI Test Receiver	ESR3	102119	Rohde & Schwarz	2023. 04. 13 (1Y)

※ All test equipment used is calibration on a regular basis.



5. 20 dB Bandwidth & 99 % Bandwidth

5.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 %

5.2 Measurement method

Standard : ANSI 63.10 (6.9.2)

5.3 Limit

Standard : §15.247 (a)(1)(i)

5.4 Test data

Operating mode : Transmit mode

Test Result : Pass

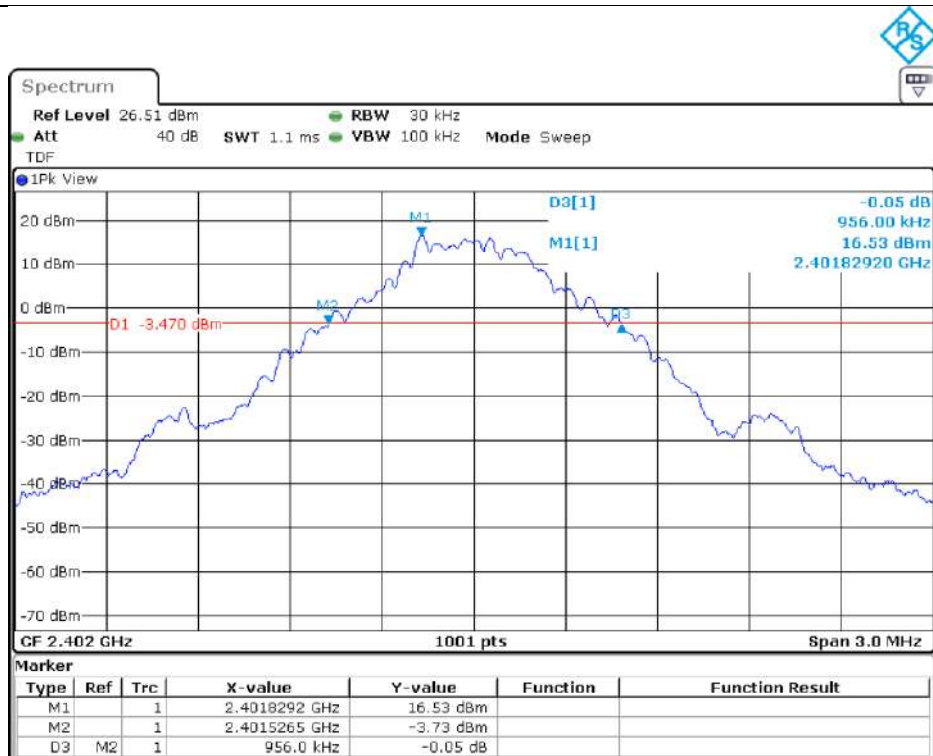
5.4.1 Measured Results for DC 12 V

Modulation Type	Channel (Frequency)	20 dB Bandwidth (kHz)	99 % Occupied Bandwidth (kHz)
DH5	0 (2 402 MHz)	960.00	870.00
	19 (2 441 MHz)	950.00	880.00
	39 (2 480 MHz)	950.00	880.00
3-DH5	0 (2 402 MHz)	1 280.00	1 170.00
	19 (2 441 MHz)	1 300.00	1 190.00
	39 (2 480 MHz)	1 290.00	1 190.00

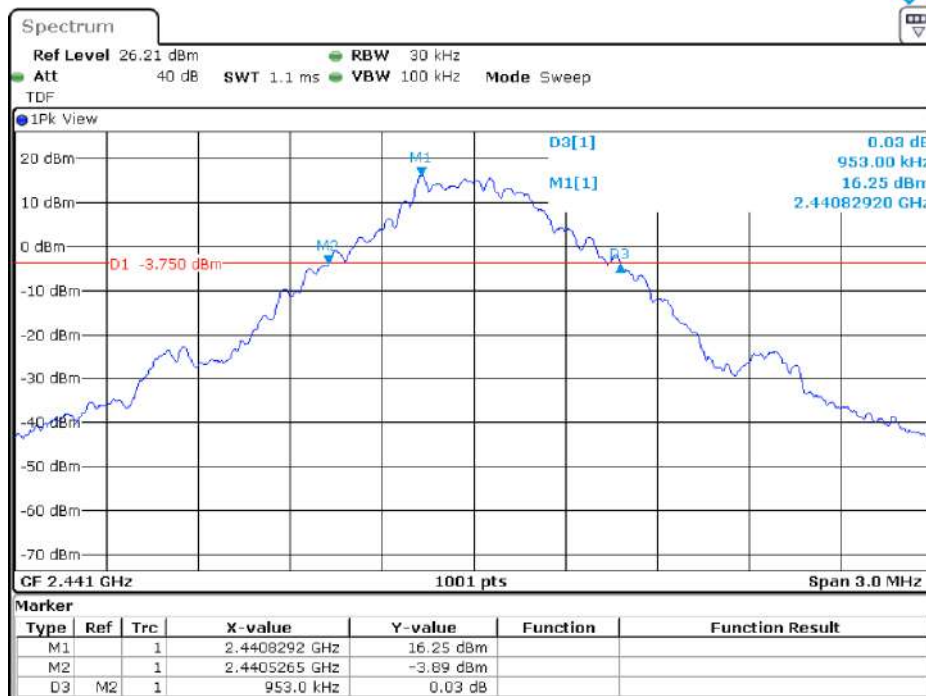


5.4.1.1 Measured Graph for DC 12 V

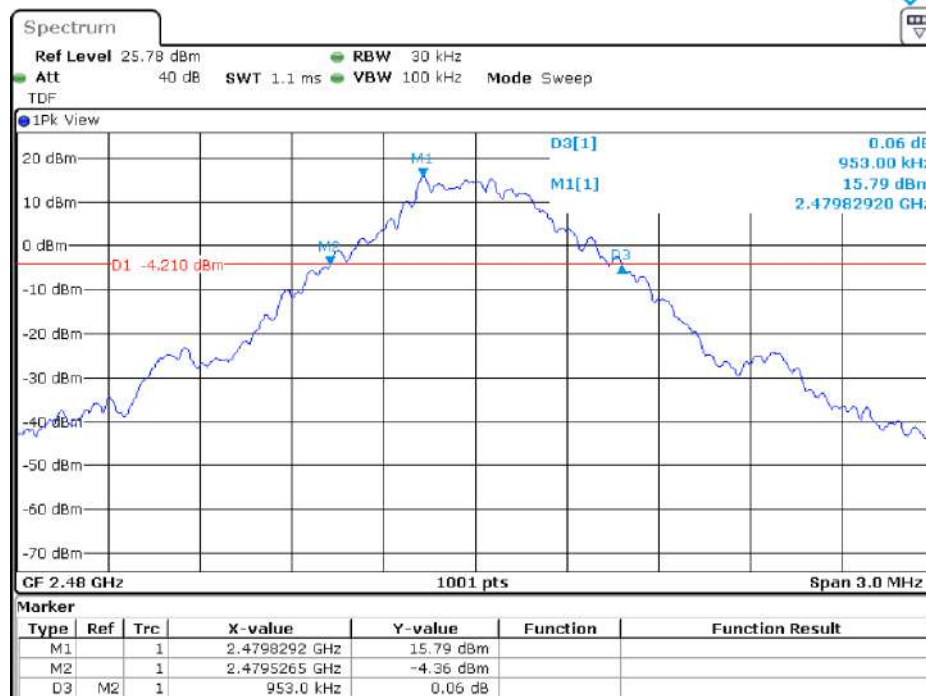
- 20dB Bandwidth



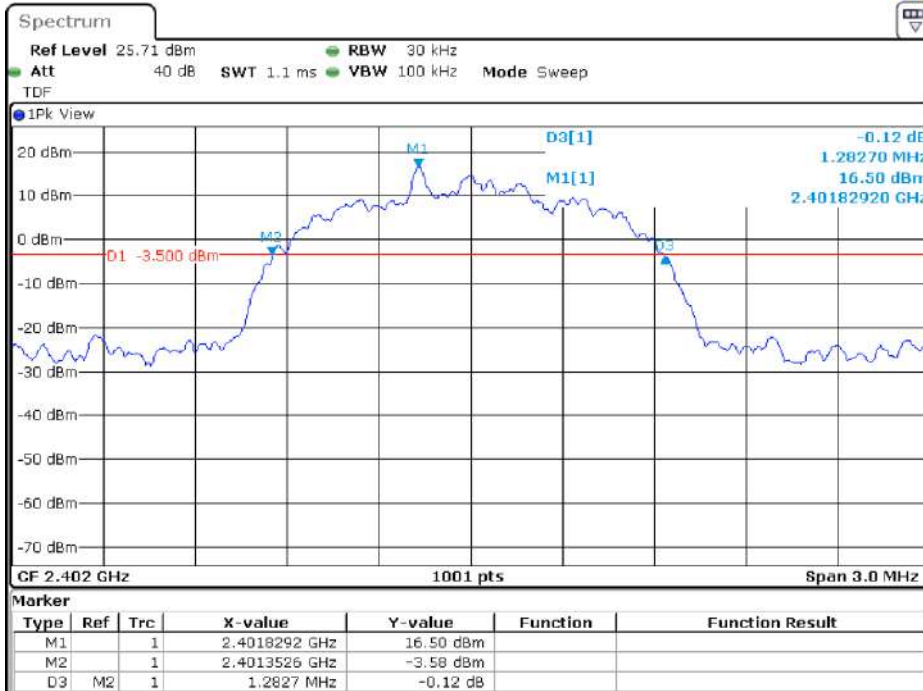
DH5_Low CH



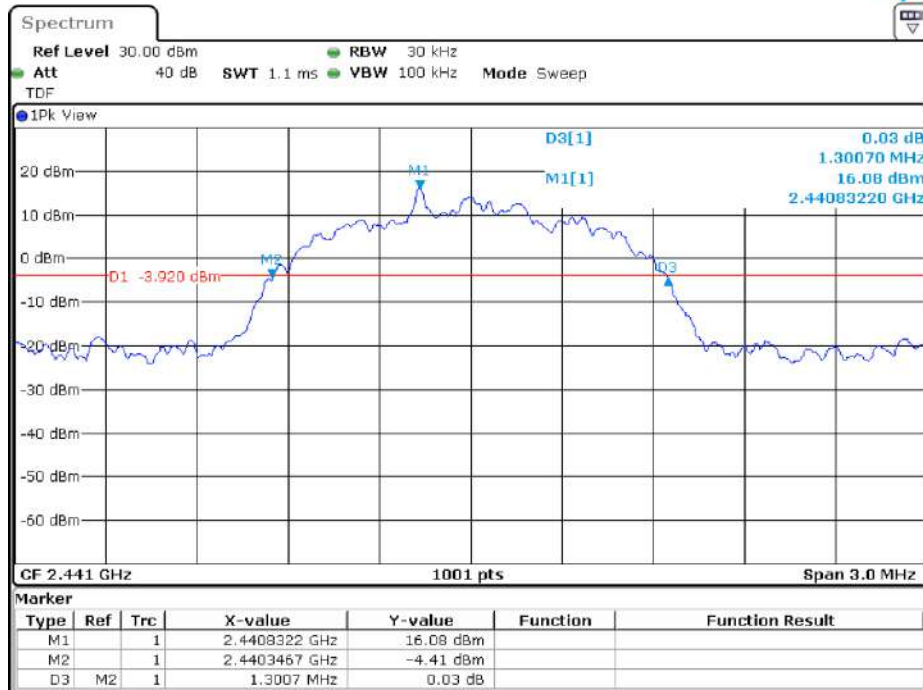
DH5_Mid CH



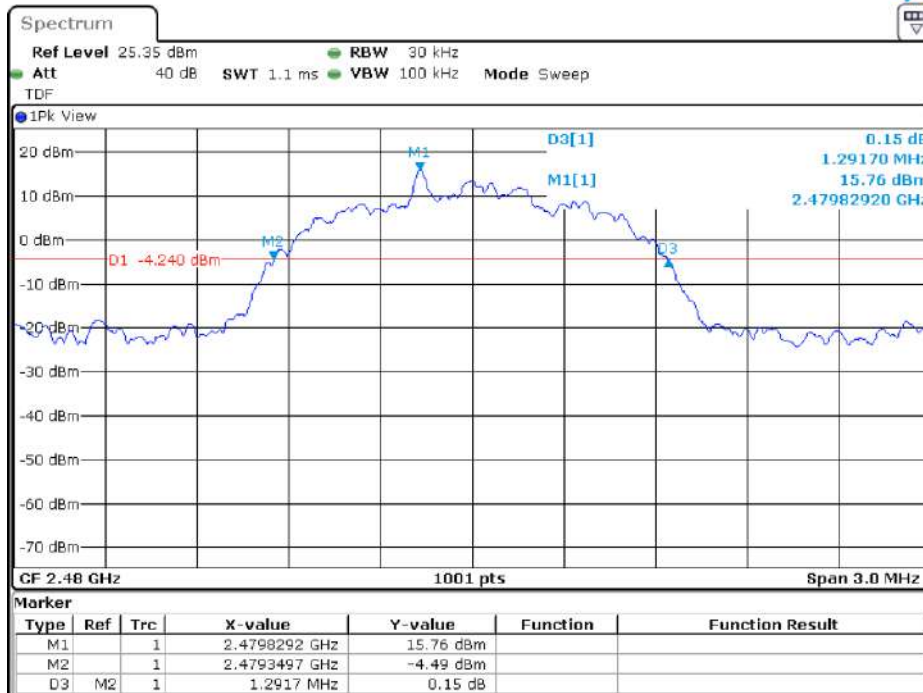
DH5_High CH



3-DH5_Low CH



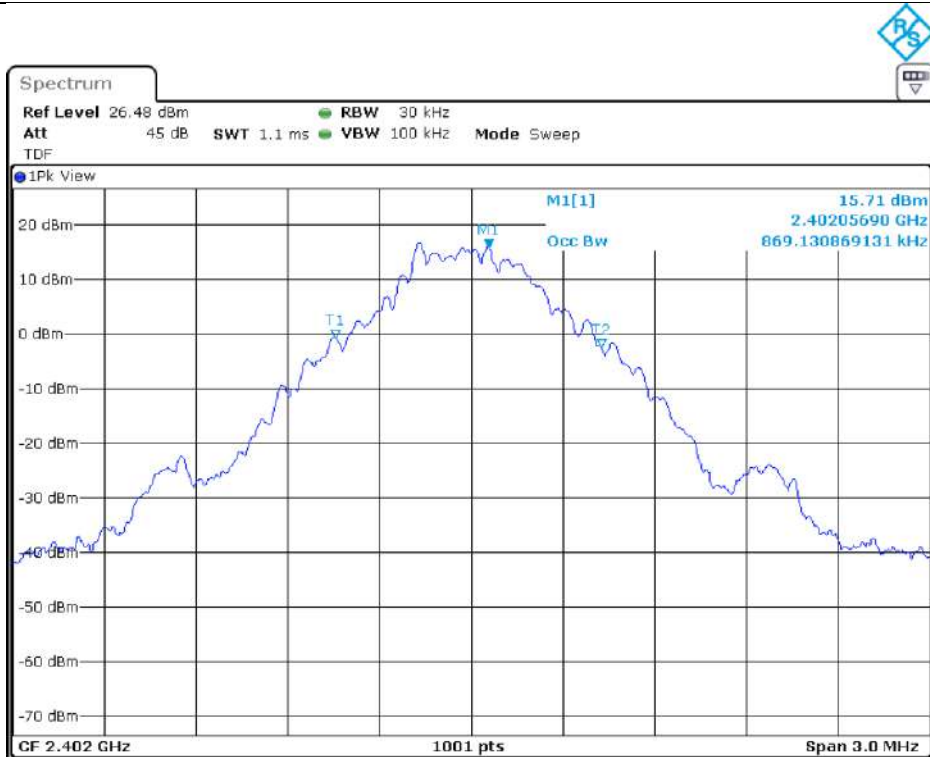
3-DH5_Mid CH



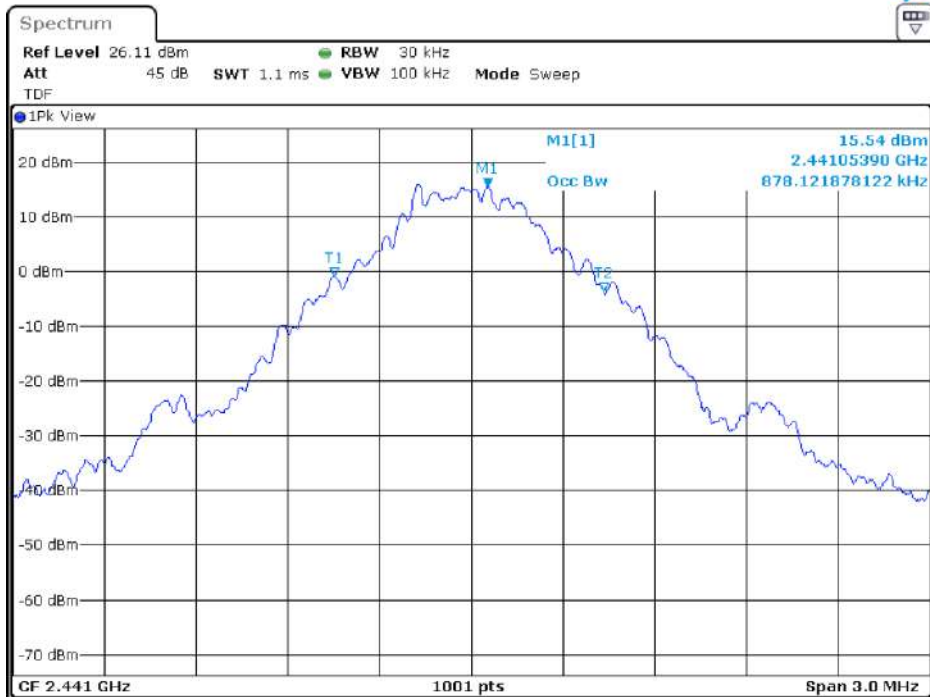
3-DH5_High CH



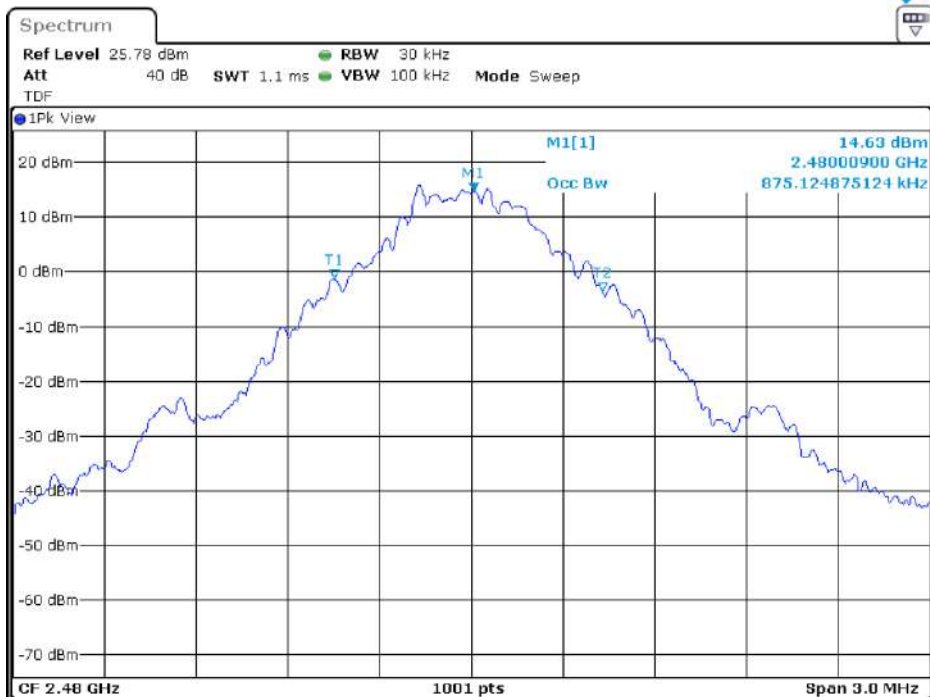
- 99% Bandwidth



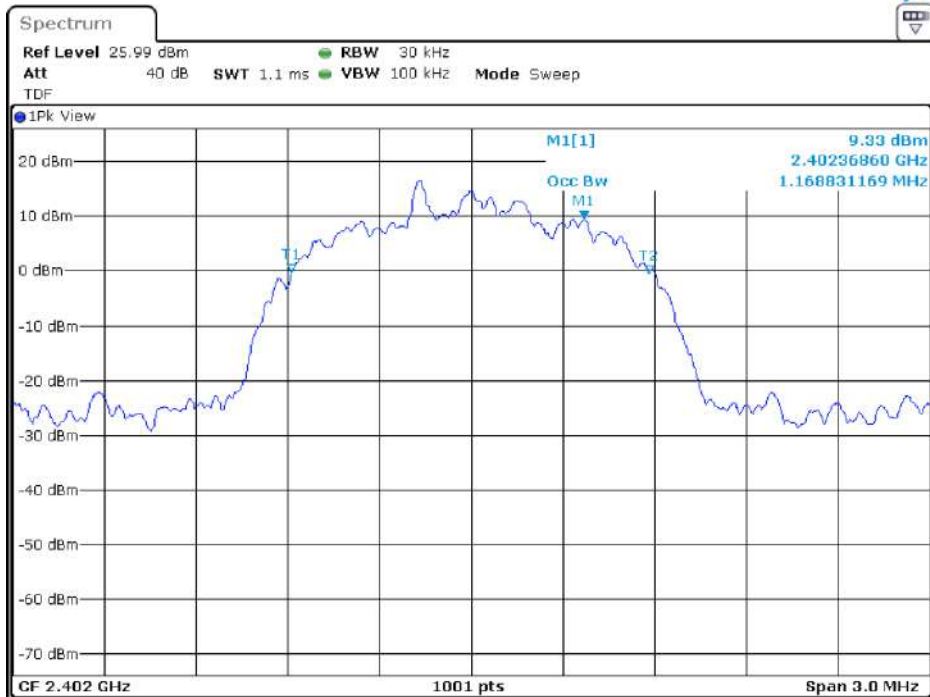
DH5_Low CH



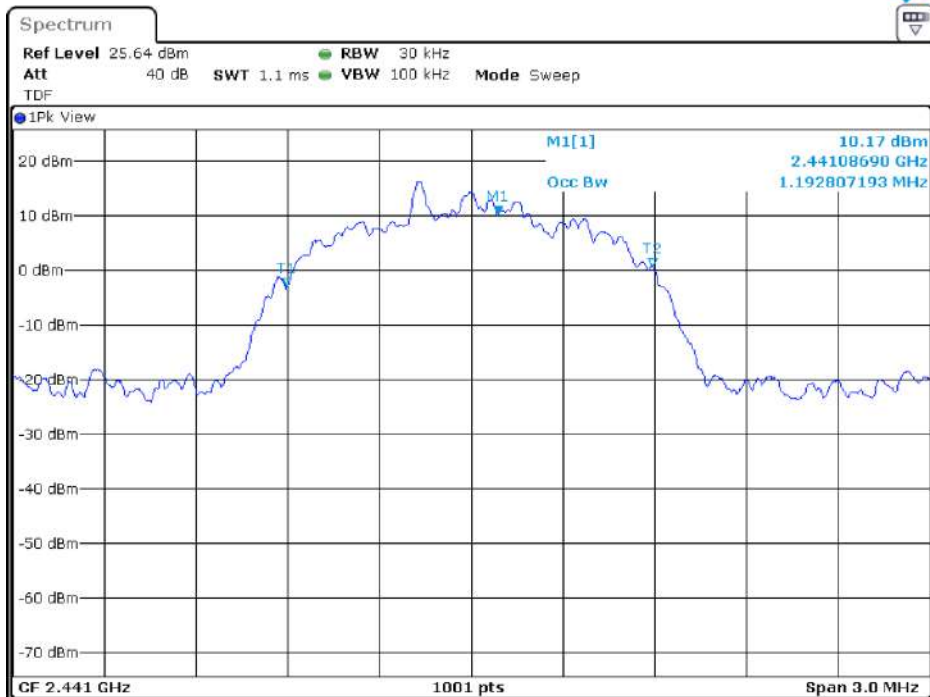
DH5_Mid CH



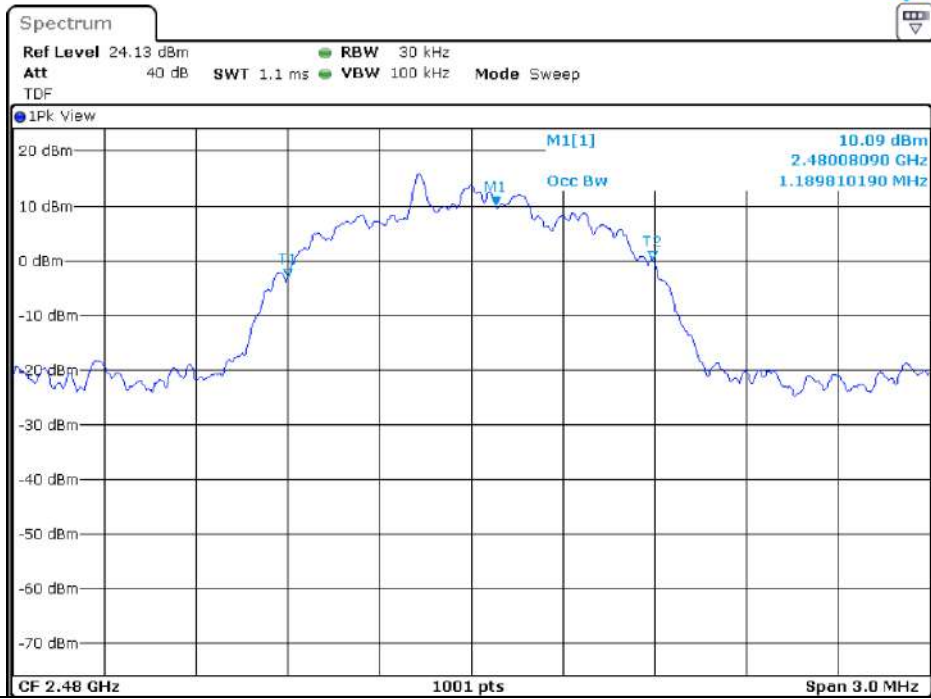
DH5_High CH



3-DH5_Low CH



3-DH5_Mid CH



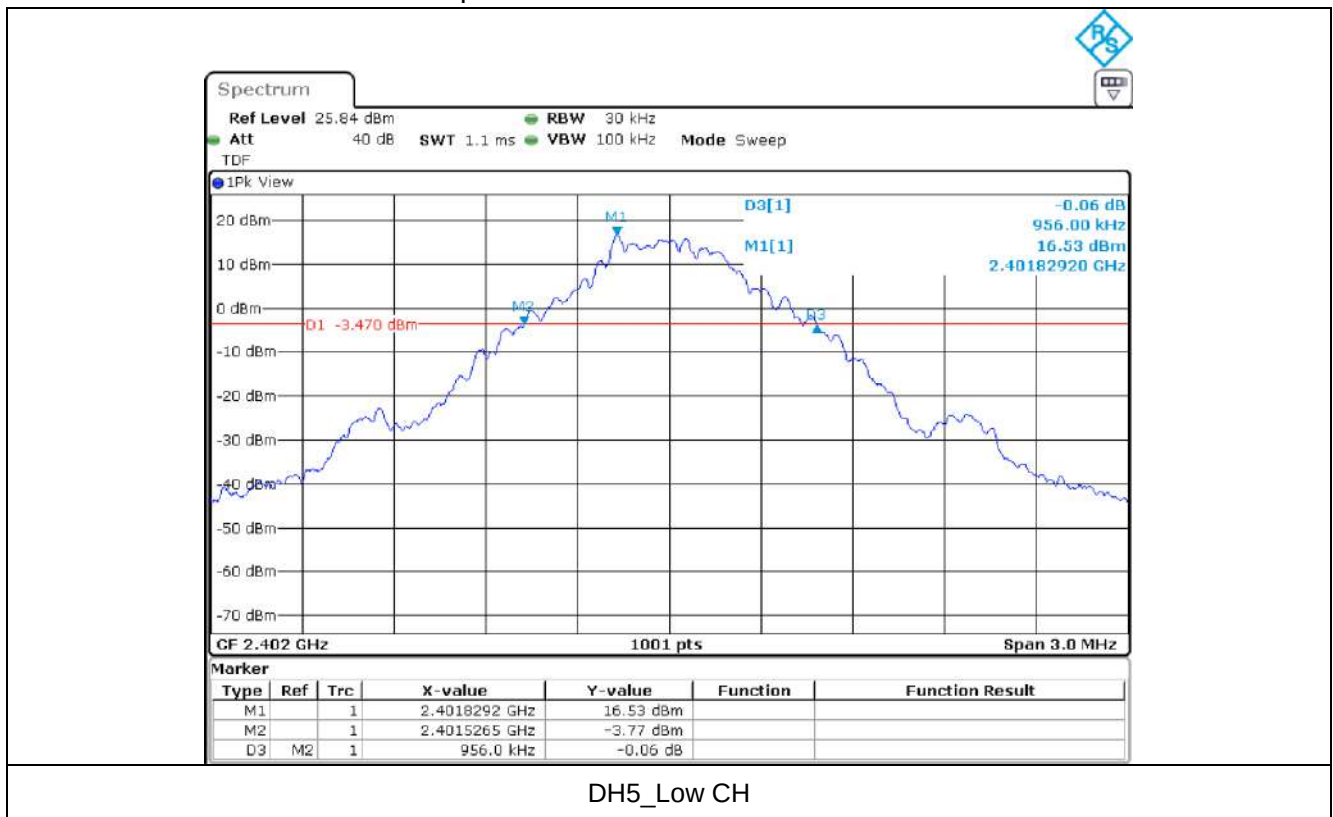
3-DH5_High CH

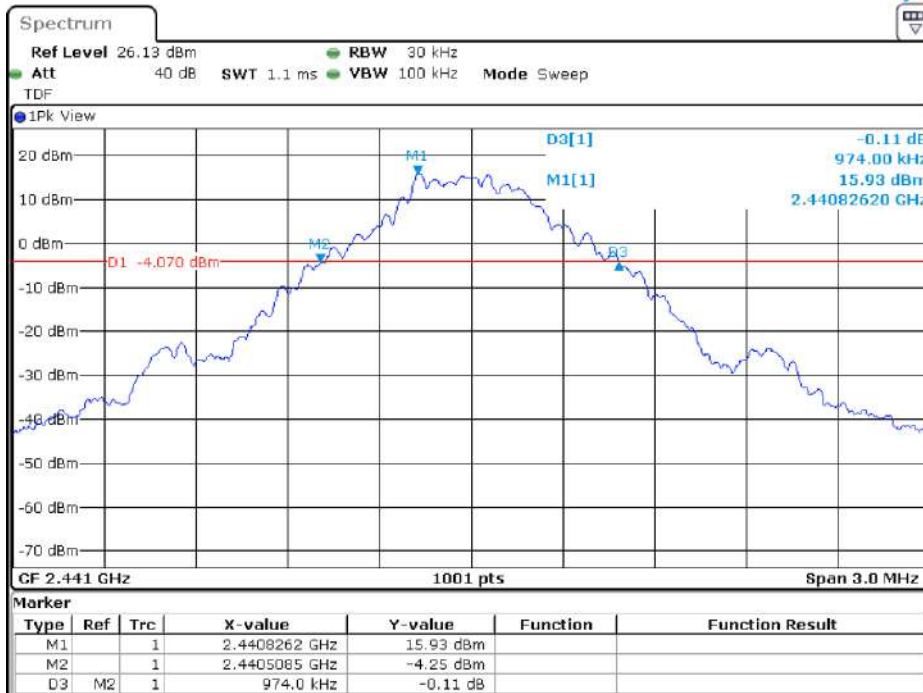


5.4.2 Measured Results for DC 24 V

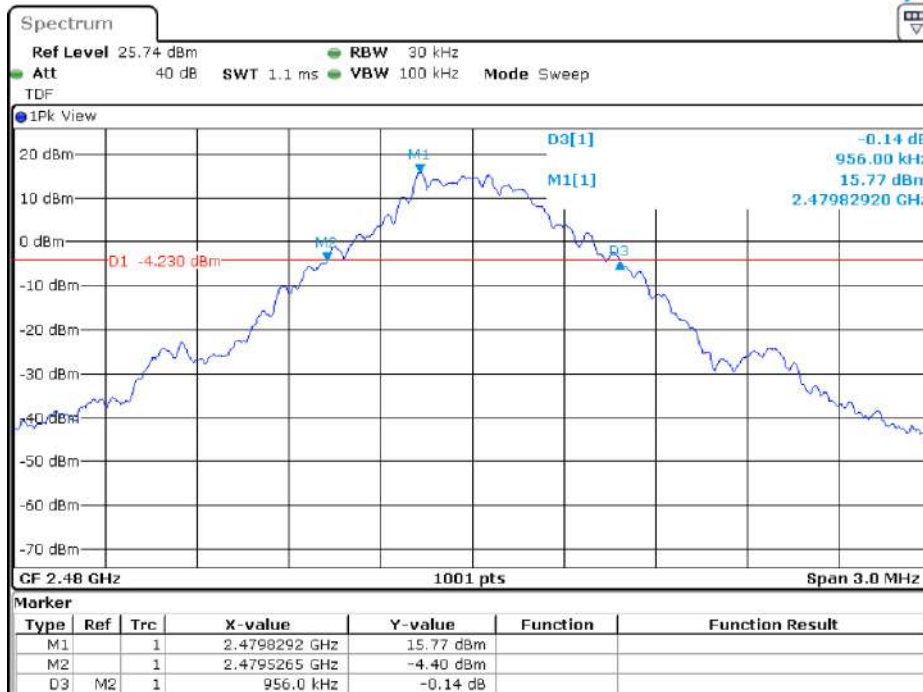
Modulation Type	Channel (Frequency)	20 dB Bandwidth (kHz)	99 % Occupied Bandwidth (kHz)
DH5	0 (2 402 MHz)	960.00	870.00
	19 (2 441 MHz)	970.00	870.00
	960.00	935.10	880.00
3-DH5	0 (2 402 MHz)	1 290.00	1 170.00
	19 (2 441 MHz)	1 300.00	1 190.00
	39 (2 480 MHz)	1 290.00	1 190.00

5.4.2.1 Measured Graph for DC 24 V

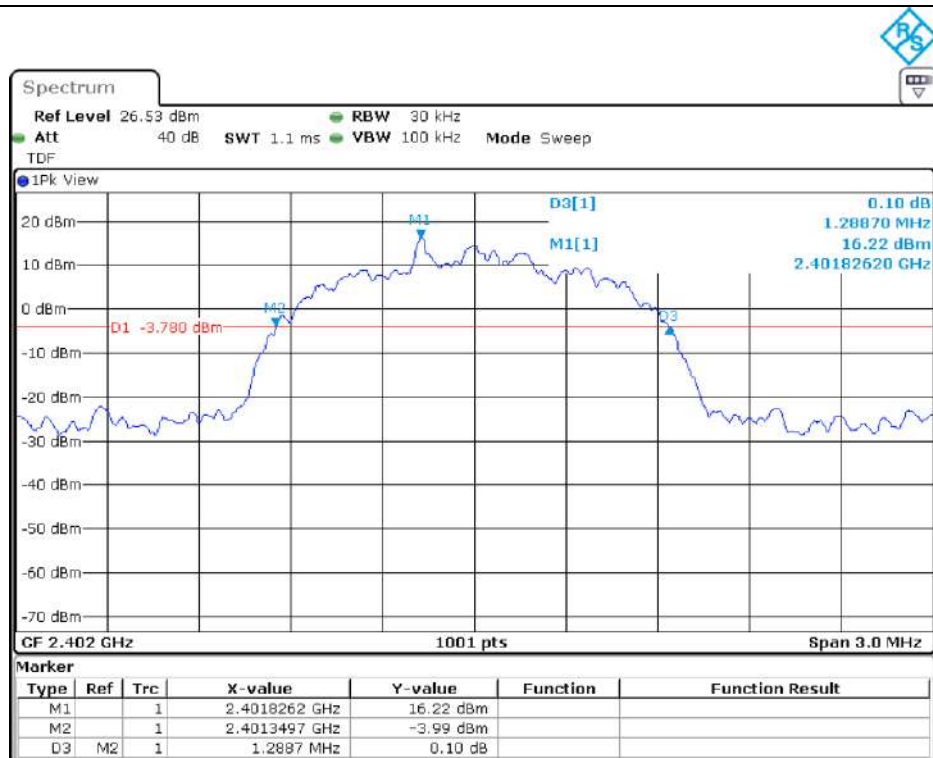




DH5_Mid CH



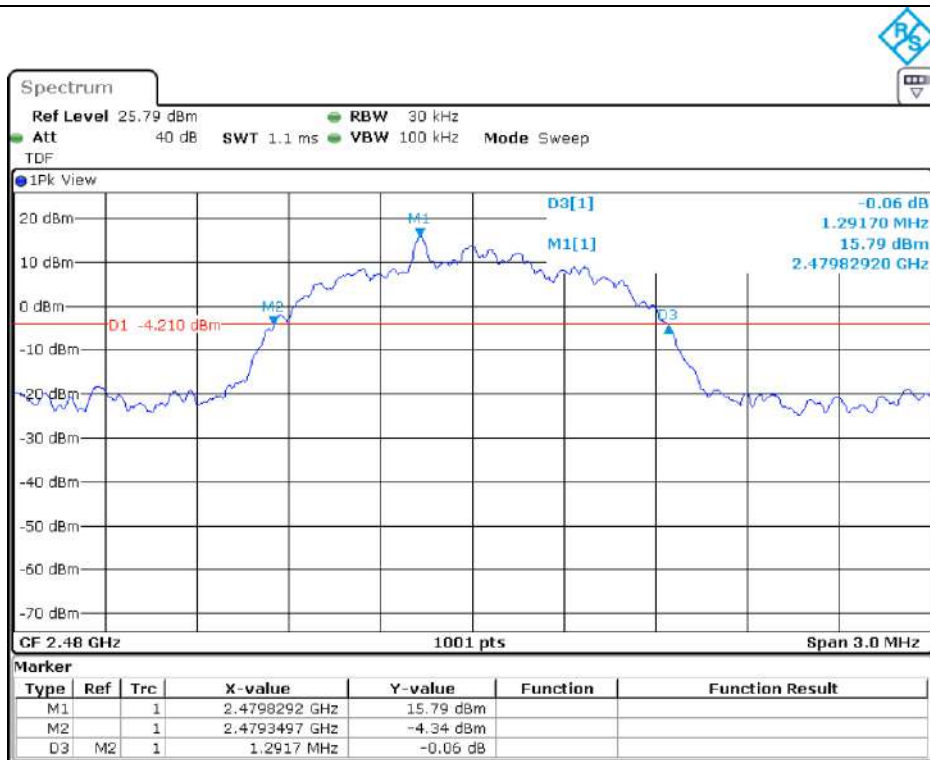
DH5_High CH



3-DH5_Low CH



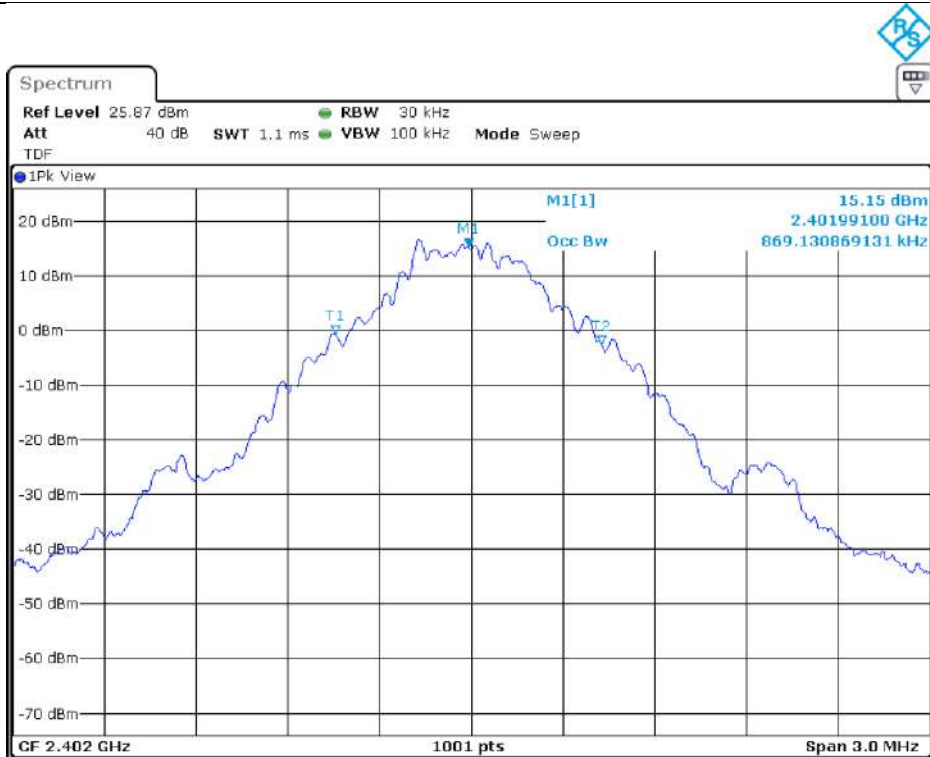
3-DH5_Mid CH



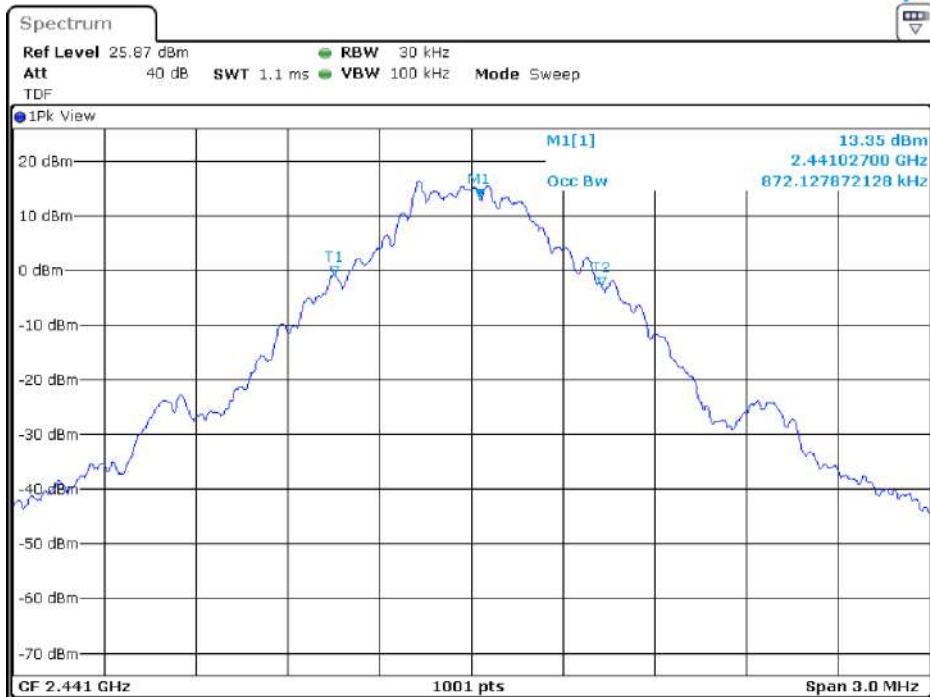
3-DH5_High CH



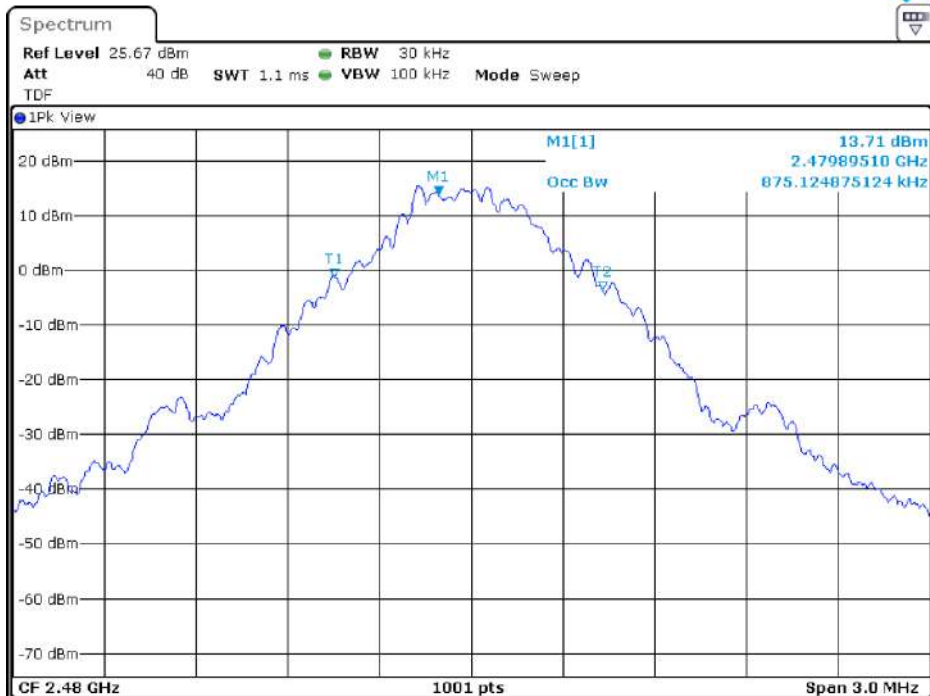
- 99% Bandwidth



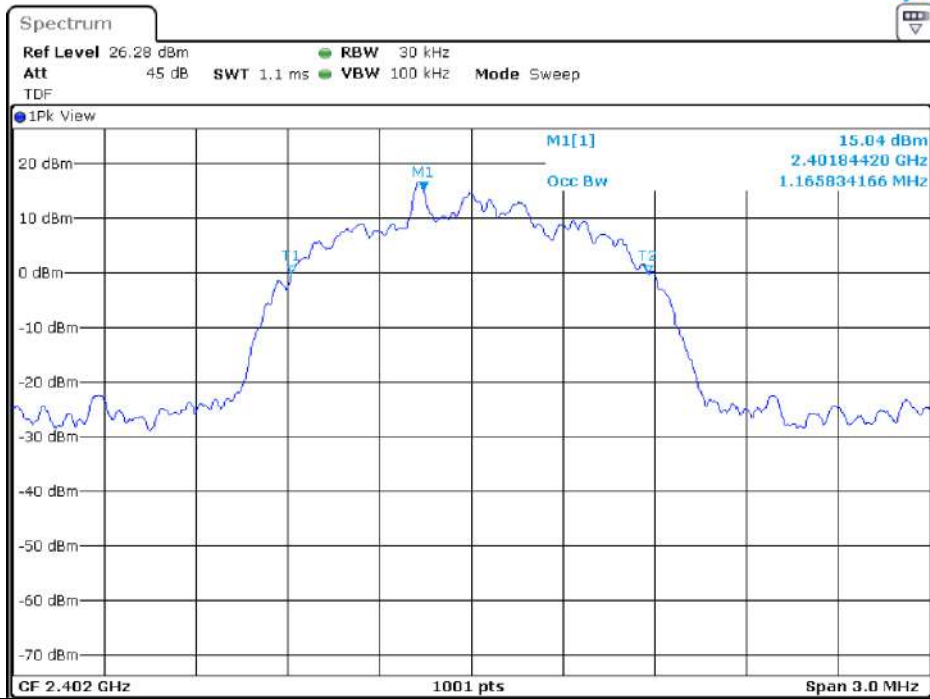
DH5_Low CH



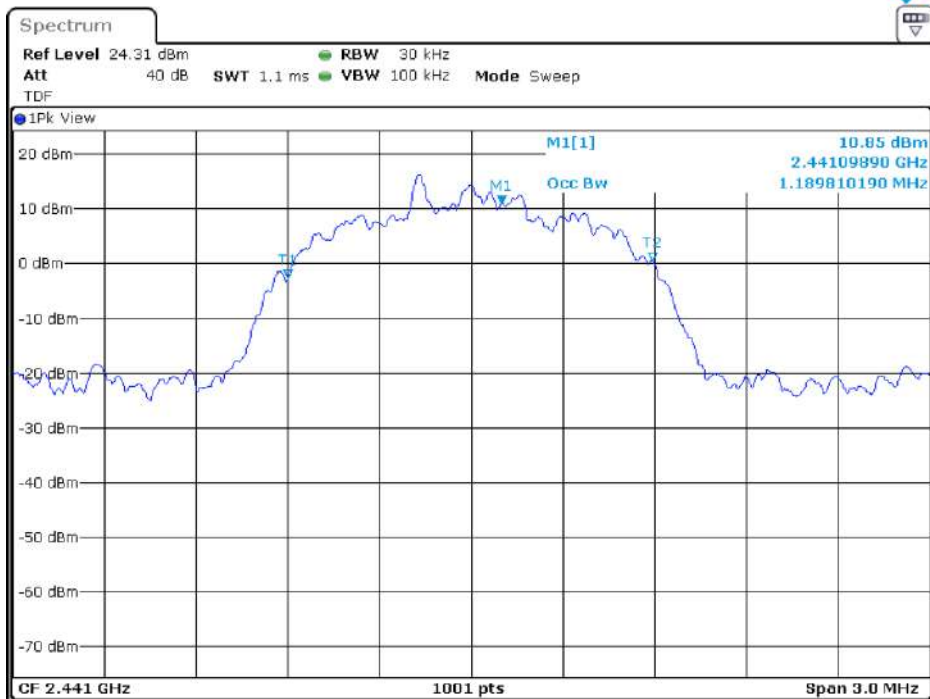
DH5_Mid CH



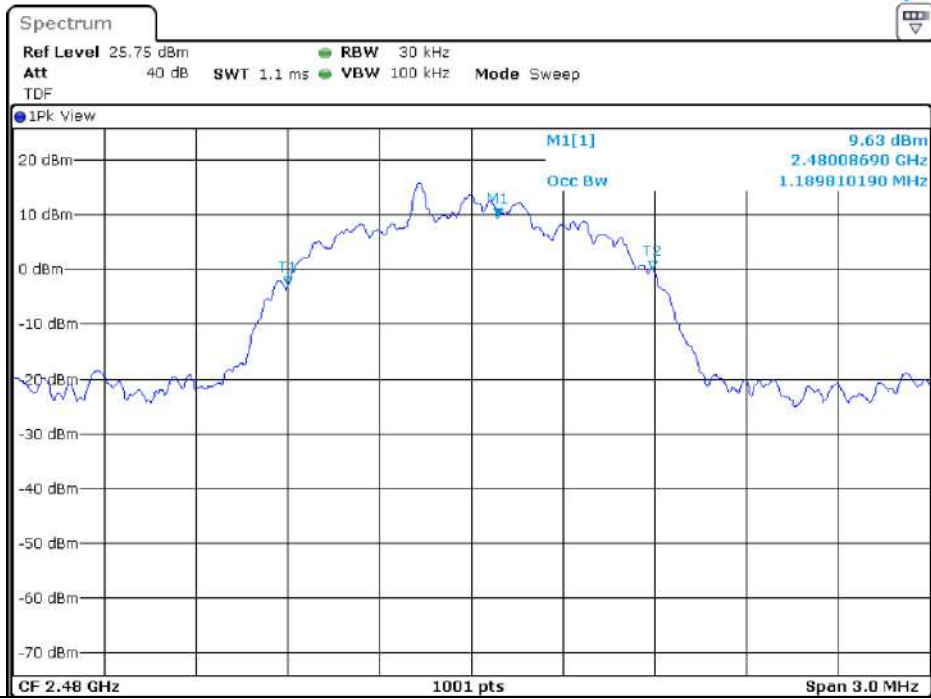
DH5_High CH



3-DH5_Low CH



3-DH5_Mid CH



3-DH5_High CH



6. Carrier Frequency Separation

6.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 %

6.2 Measurement method

Standard : ANSI 63.10 (7.8.2)

6.3 Limit

Standard : 15.247 (a)(1)

6.4 Test data

Operating mode : Transmit mode

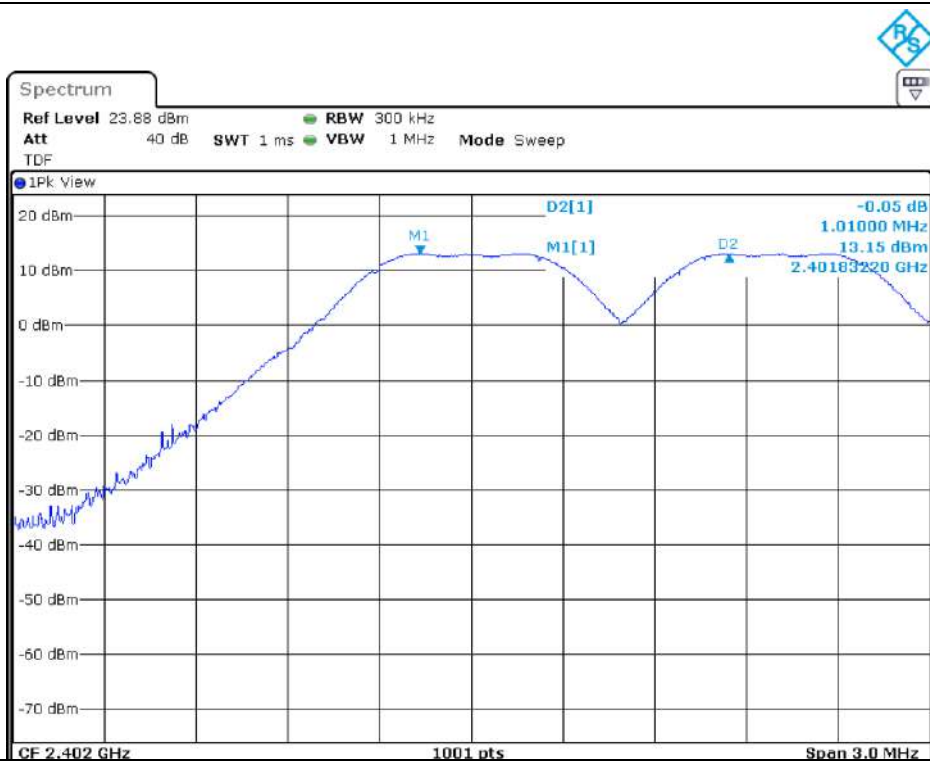
Test Result : Pass

6.4.1 Measured Results for DC 12 V

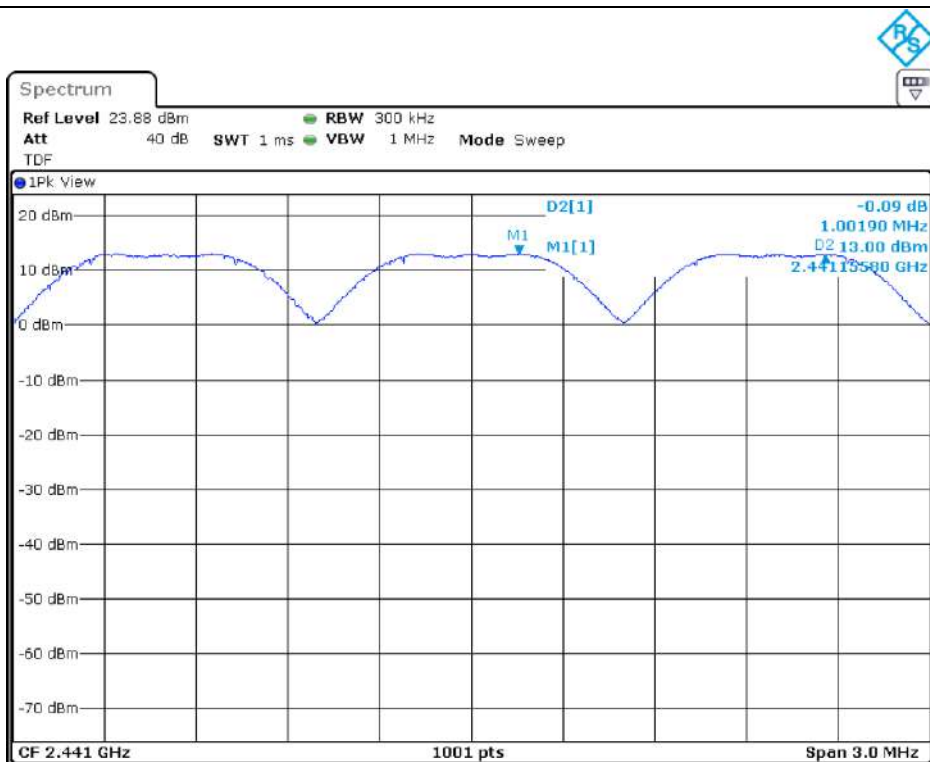
Modulation type	Channel (Frequency)	Separation (kHz)	Two-third 20 dB bandwidth of the hopping channel (kHz)	Limit
DH5	0 (2 402 MHz)	1 010.00	640.00	25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater
	39 (2 441 MHz)	1 000.00	633.00	
	78 (2 480 MHz)	1 000.00	633.00	
3-DH5	0 (2 402 MHz)	1 000.00	853.00	
	39 (2 441 MHz)	1 010.00	867.00	
	78 (2 480 MHz)	1 010.00	860.00	



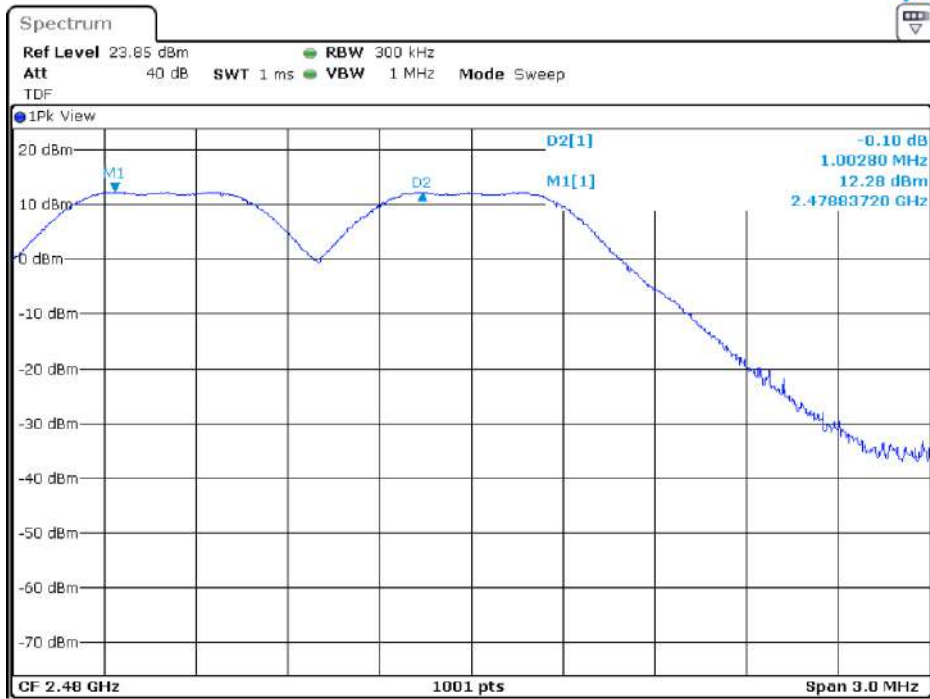
6.4.1.1 Measured Graph for DC 12 V



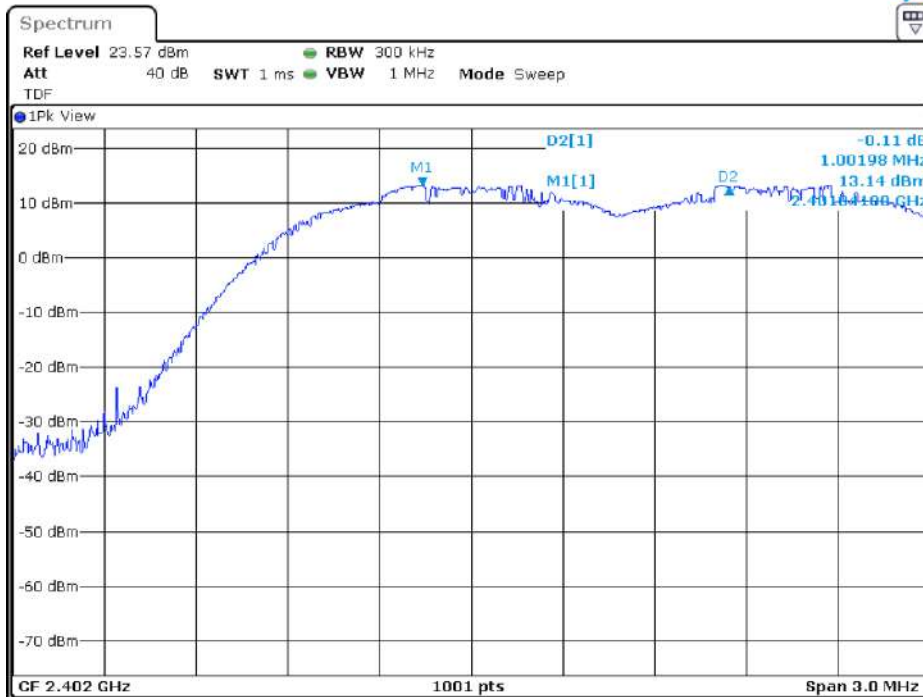
DH5_Low CH



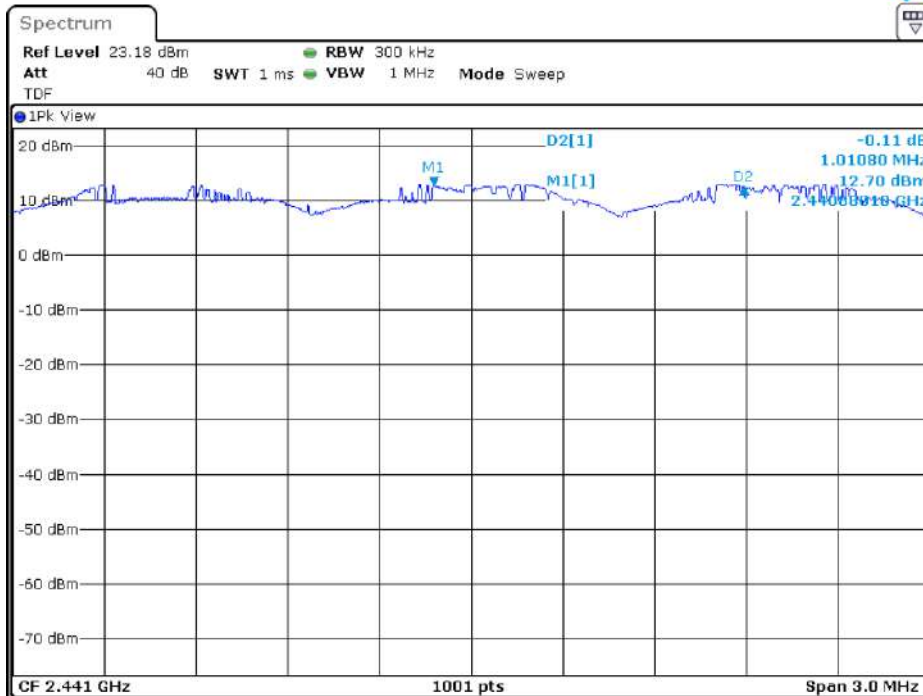
DH5_Mid CH



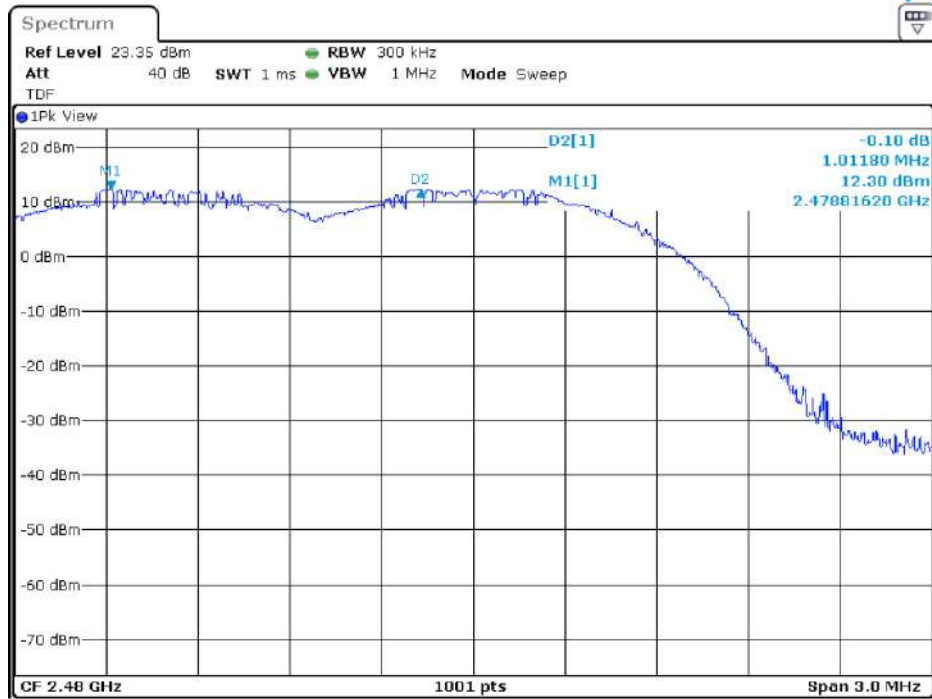
DH5_High CH



3-DH5_Low CH



3-DH5_Mid CH



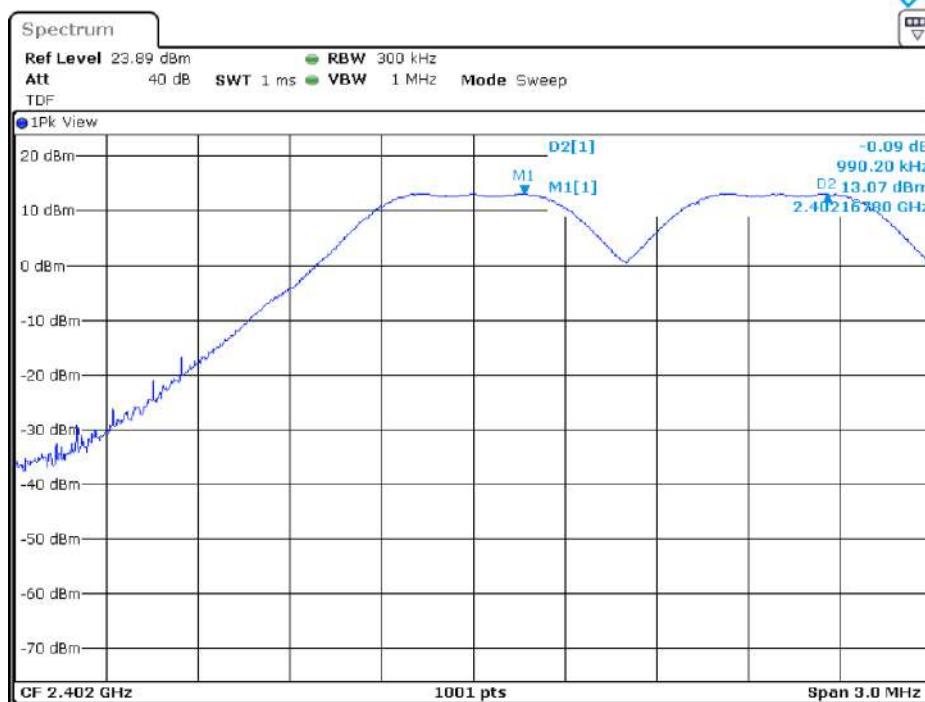
3-DH5_High CH



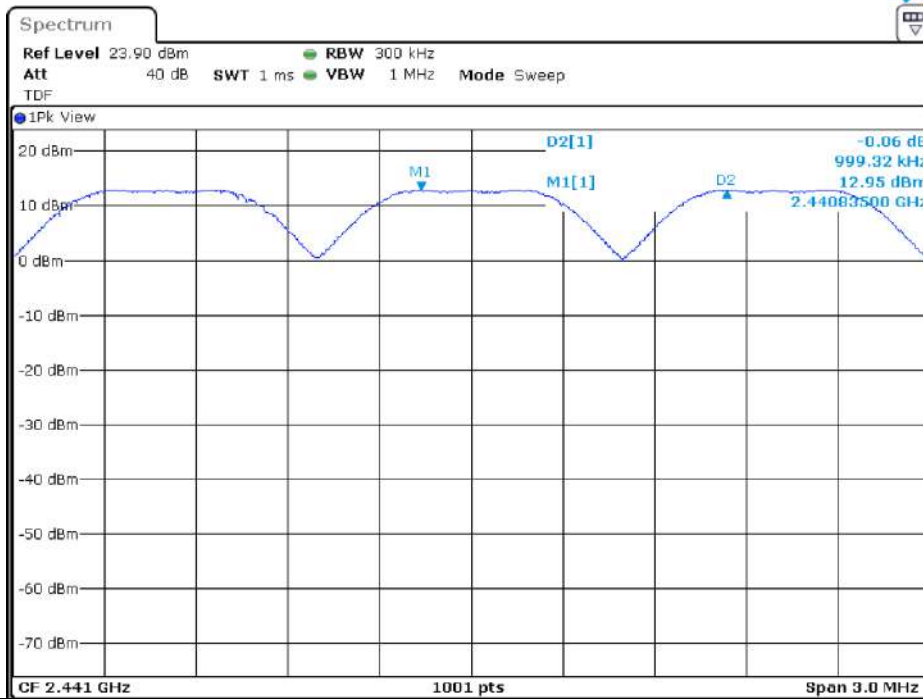
6.4.2 Measured Results for DC 24 V

Modulation type	Channel (Frequency)	Separation (kHz)	Two-third 20 dB bandwidth of the hopping channel (kHz)	Limit
DH5	0 (2 402 MHz)	990.00	640.00	25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater
	39 (2 441 MHz)	1 000.00	647.00	
	78 (2 480 MHz)	1 000.00	640.00	
3-DH5	0 (2 402 MHz)	1 010.00	860.00	
	39 (2 441 MHz)	1 010.00	867.00	
	78 (2 480 MHz)	1 010.00	860.00	

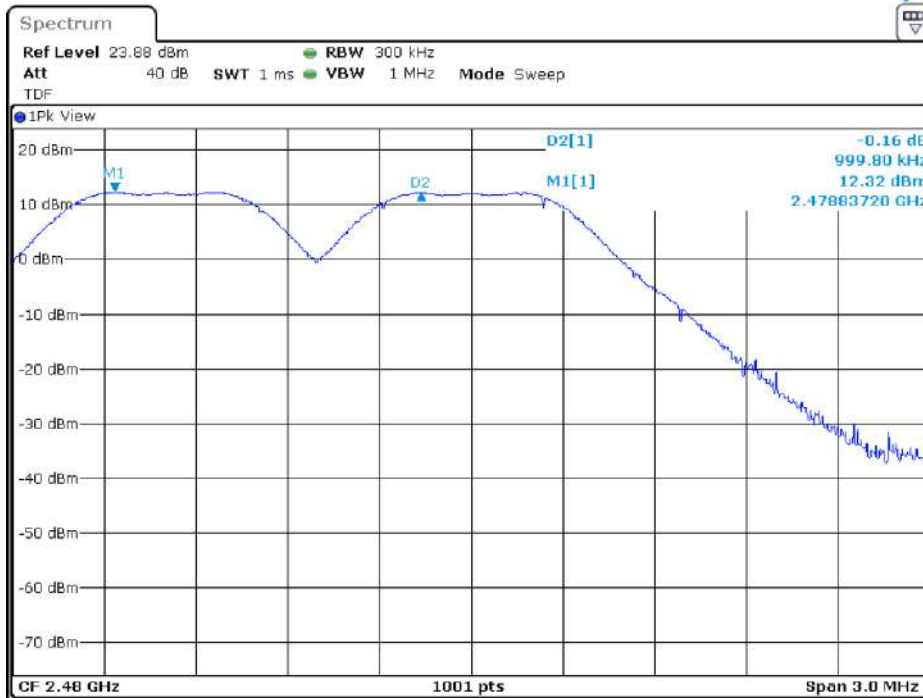
6.4.2.1 Measured Graph for DC 24 V



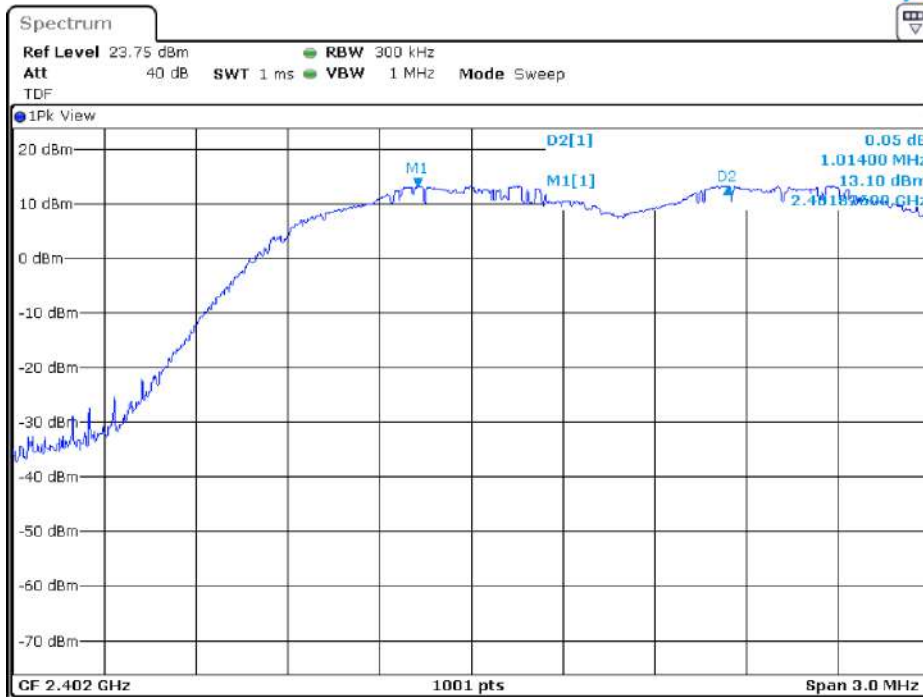
DH5_Low CH



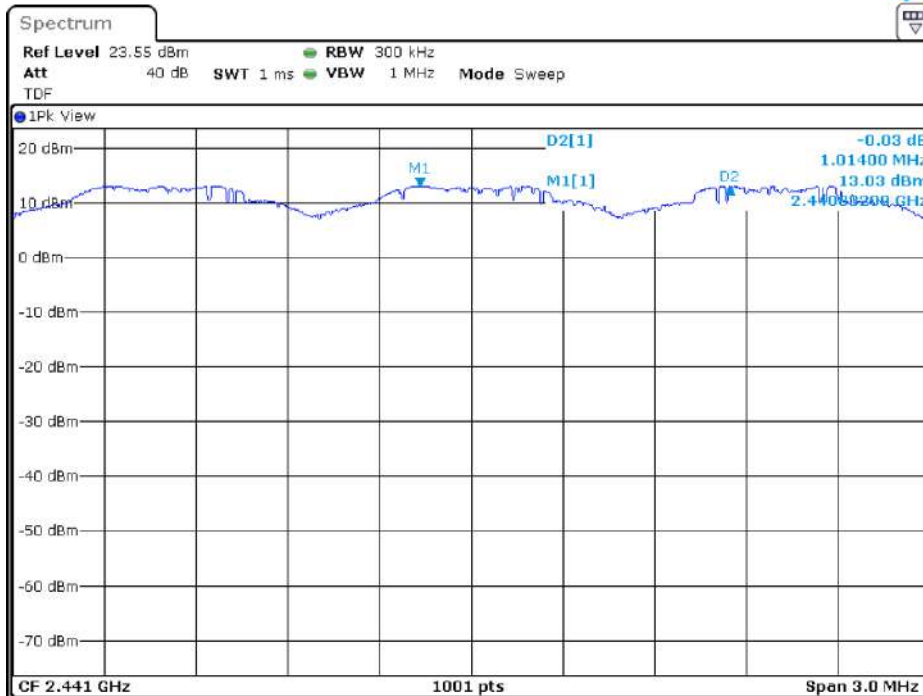
DH5_Mid CH



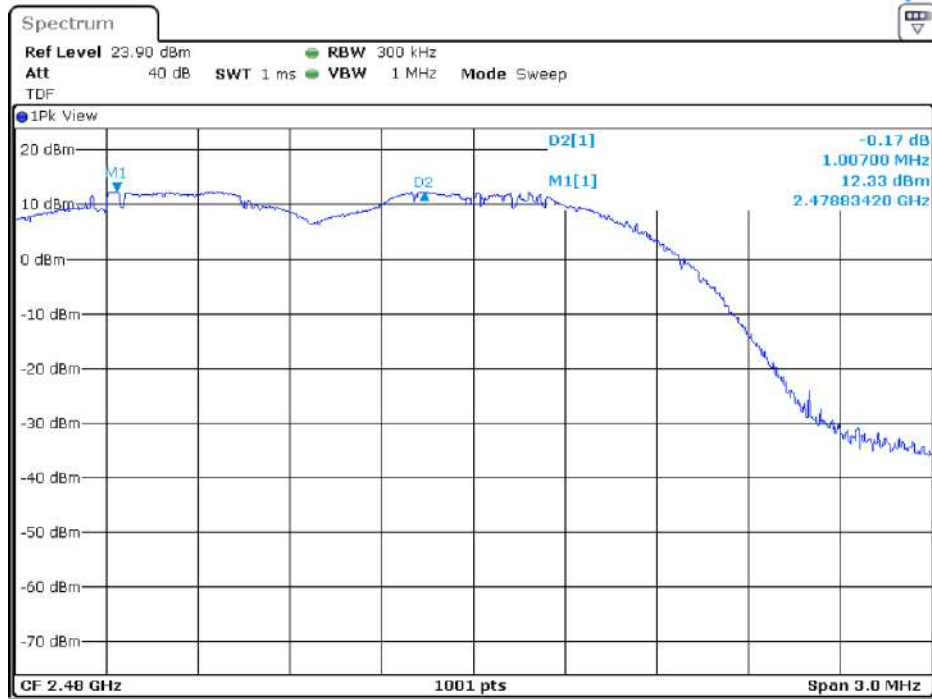
DH5_High CH



3-DH5_Low CH



3-DH5_Mid CH



3-DH5_High CH



7. Number of Hopping Frequency

7.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 %

7.2 Measurement method

Standard : ANSI 63.10 (7.8.3)

7.3 Limit

Standard : 15.247 (a)(1)(iii)

7.4 Test data

Operating mode : Hopping mode

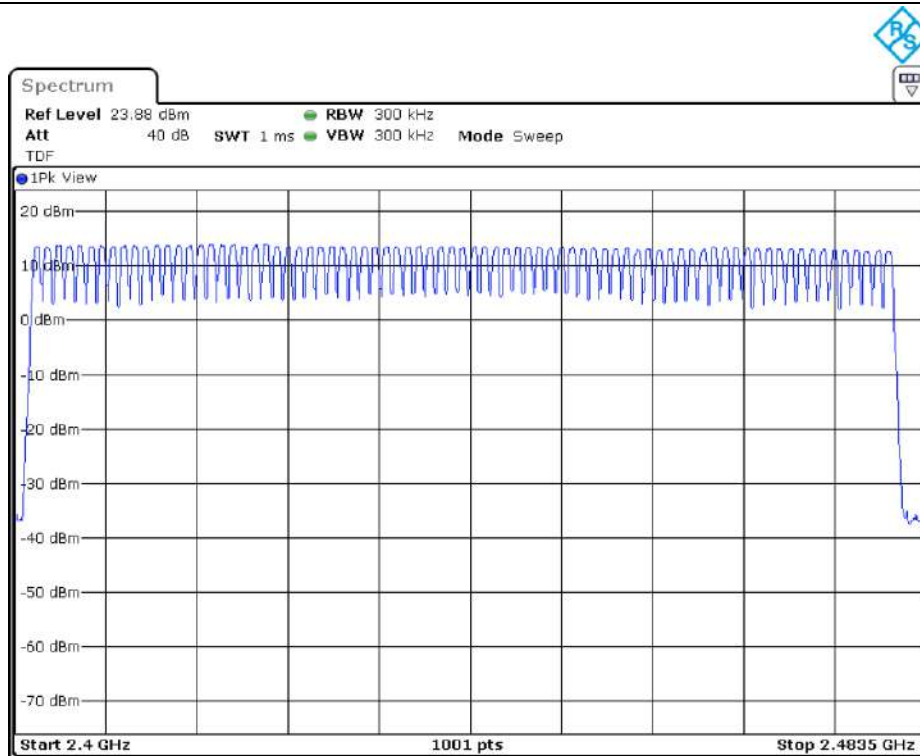
Test Result : Pass

7.4.1 Measured Results

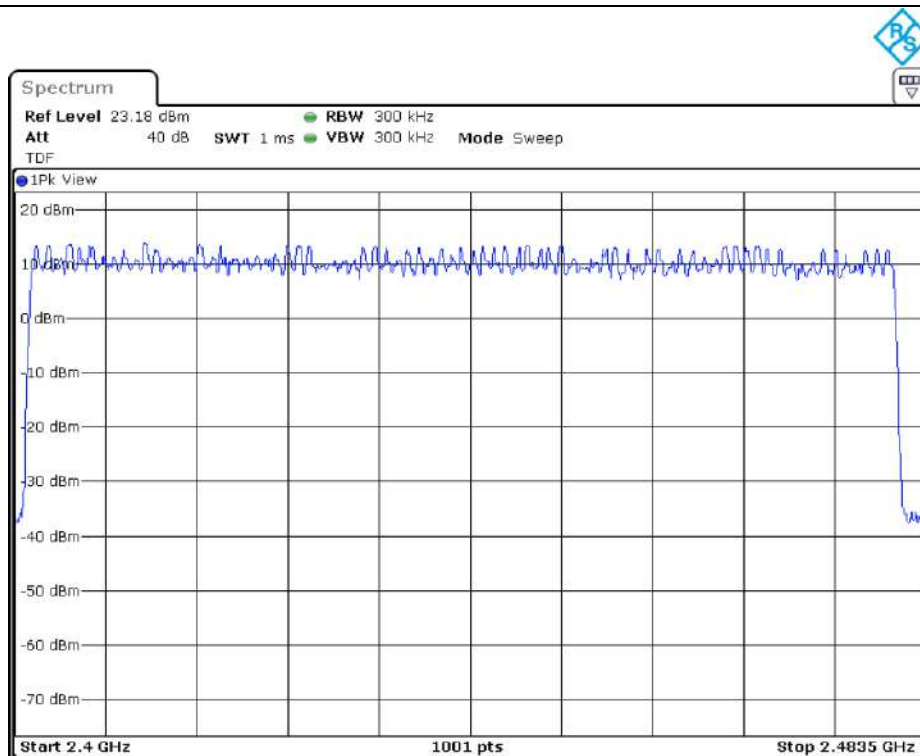
Modulation type	Hopping Channel Number	Limit
DH5(non-AFH)	79	> 15
3-DH5(non-AFH)	79	



7.4.1.1 Measured Graph for DC 12 V



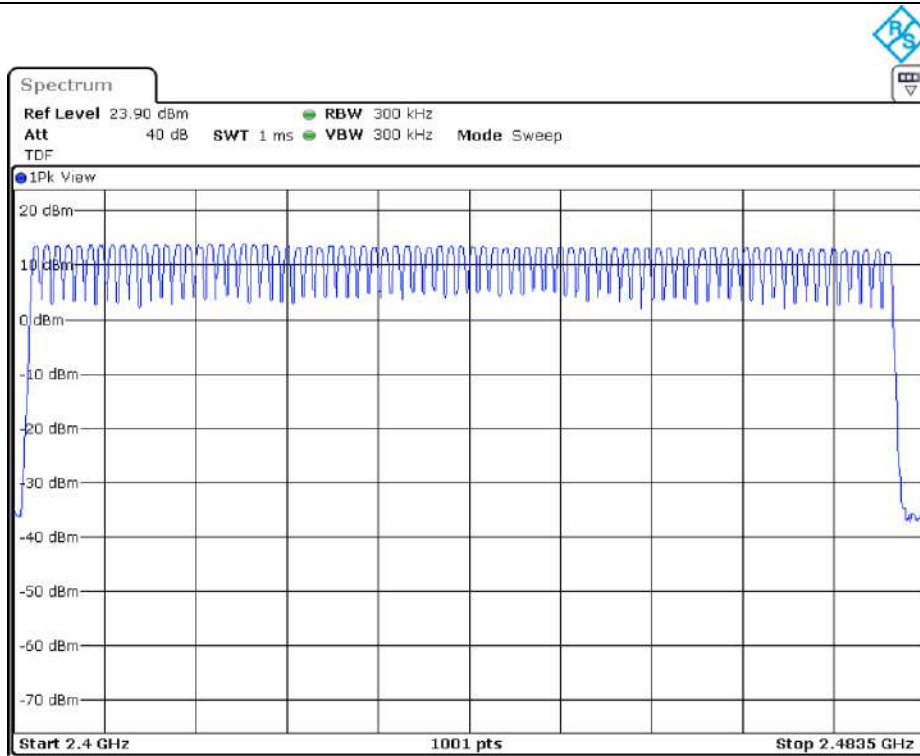
DH5_Non-AFH



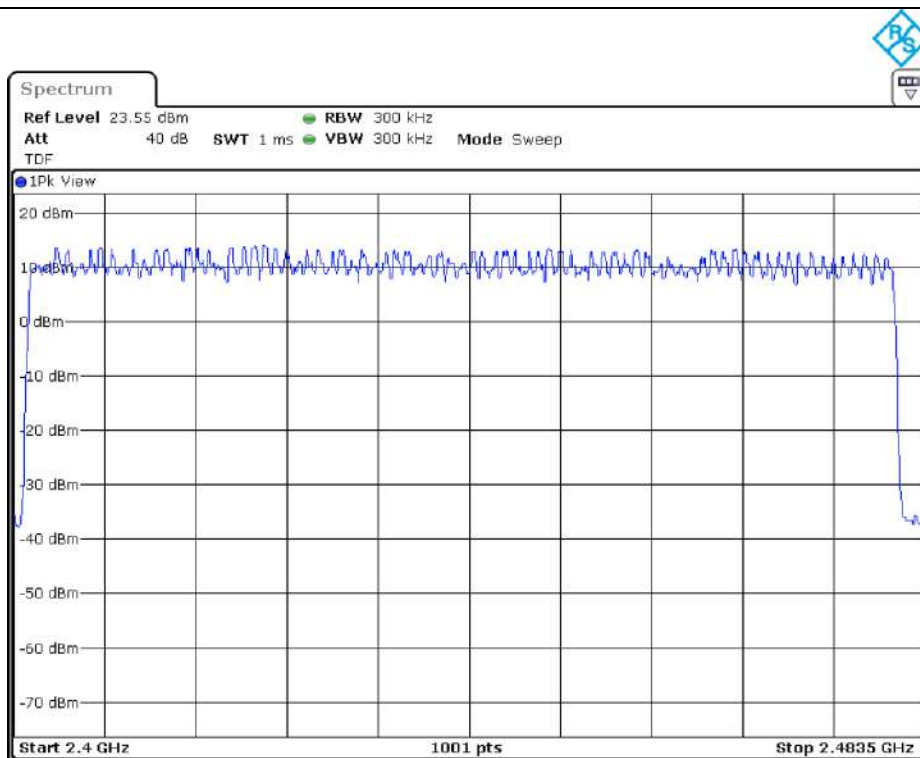
3-DH5_Non-AFH



7.4.1.2 Measured Graph for DC 24 V



DH5_Non-AFH



3-DH5_Non-AFH



8. Time of Occupancy (Dwell Time)

8.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 %

8.2 Measurement method

Standard : ANSI 63.10 (7.8.4)

8.3 Limit

Standard : §15.247 (a)(1)(iii)

8.4 Test data

Test Result : Pass

In Theory,

- non-AFH mode: hopping rate is 1 600 hops/s with 6 slots in 79 hopping channels. With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s).

Hops Over Occupancy Time comes to $(1\ 600 / 6 / 79) \times (0.4 \times 79) = 106.67$ hops.

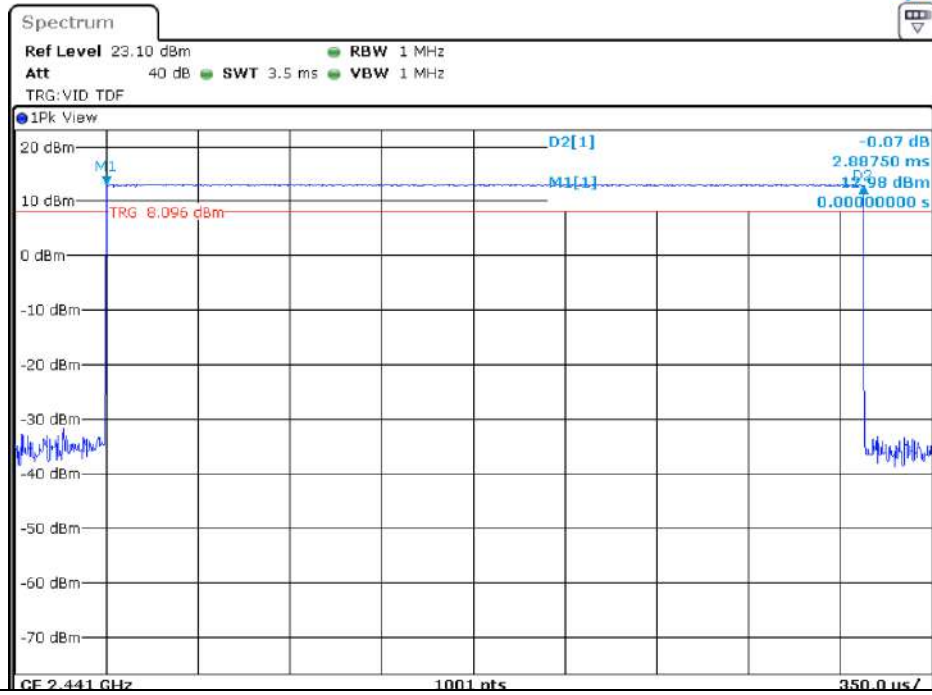
8.4.1 Measured Results for DC 12 V

Operating Mode	Mode	Hopping Channel Number	Hops Over Occupancy Time (ms/hops)	Package Transfer Time (ms)	Occupancy Time (s)	Limit (s)
Hopping	DH5(non-AFH)	79	106.67	2.89	0.31	0.4
	3-DH5(non-AFH)	79	106.67	2.89	0.31	

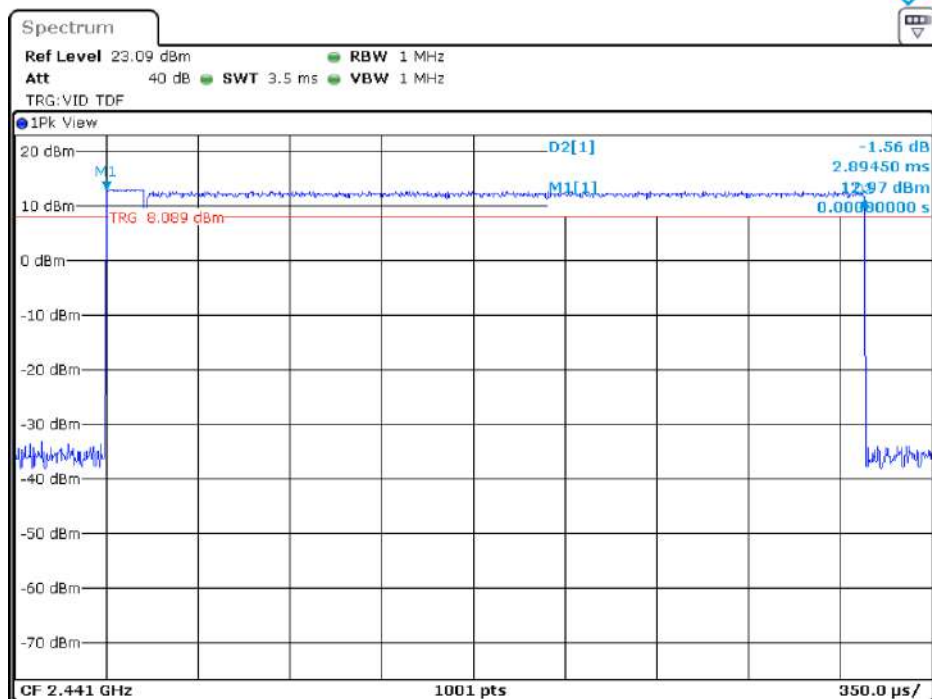
※ Occupancy Time (s) = Hops Over Occupancy Time (hops) x Package Transfer Time (ms)



8.4.1.1 Measured Graph for DC 12 V



DH5(non-AFH)



3-DH5(non-AFH)

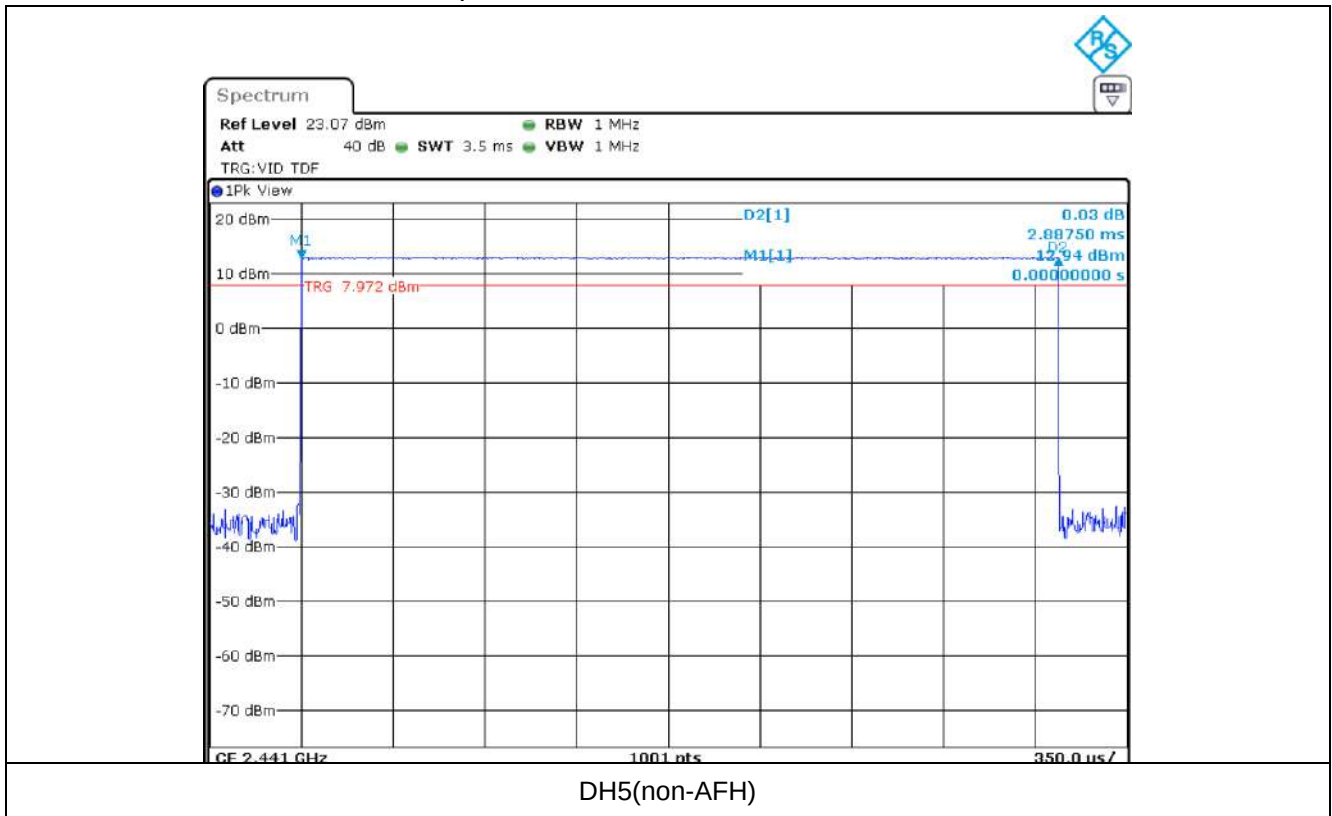


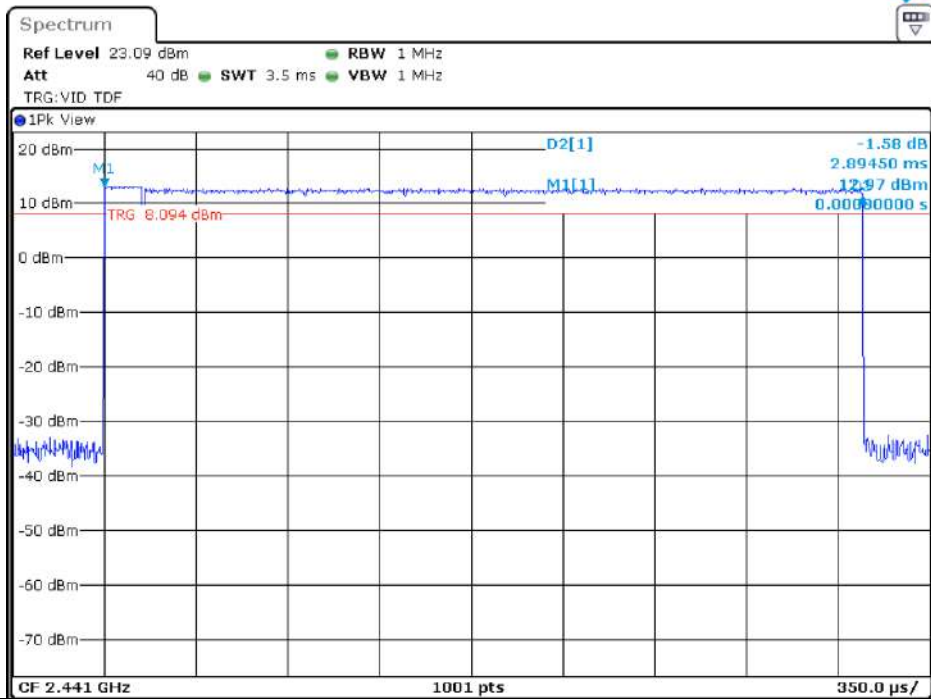
8.4.2 Measured Results for DC 24 V

Operating Mode	Mode	Hopping Channel Number	Hops Over Occupancy Time (ms/hops)	Package Transfer Time (ms)	Occupancy Time (s)	Limit (s)
Hopping	DH5(non-AFH)	79	106.67	2.87	0.31	0.4
	3-DH5(non-AFH)	79	106.67	2.88	0.31	

※ Occupancy Time (s) = Hops Over Occupancy Time (hops) x Package Transfer Time (ms)

8.4.2.1 Measured Graph for DC 24 V





3-DH5(non-AFH)



9. Output Power

9.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 %

9.2 Measurement method

Standard : ANSI 63.10 (7.8.5)

9.3 Limit

Standard : §15.247 (a)(1)

9.4 Test data

Operating mode : Transmit mode

Test Result : Pass

9.4.1 Measured Results for DC 12 V

Modulation Type	Channel (Frequency)	Maximum Conducted Output Power			e.i.r.p.	
		Measured value (dBm)	Average Power(dBm)	Limit	Measured value (dBm)	Limit
DH5	0 (2 402 MHz)	8.67	7.29	30 (dBm) (1 Watt)	10.55	36 (dBm) (4 Watt)
	39 (2 441 MHz)	8.57	7.18		10.45	
	78 (2 480 MHz)	8.57	7.17		10.45	
3-DH5	0 (2 402 MHz)	11.58	7.86		13.46	
	39 (2 441 MHz)	11.48	7.83		13.36	
	78 (2 480 MHz)	11.48	7.87		13.36	

9.4.2 Measured Results for DC 24 V

Modulation Type	Channel (Frequency)	Maximum Conducted Output Power			e.i.r.p.	
		Measured value (dBm)	Average Power(dBm)	Limit	Measured value (dBm)	Limit
DH5	0 (2 402 MHz)	8.57	7.17	30 (dBm) (1 Watt)	10.45	36 (dBm) (4 Watt)
	39 (2 441 MHz)	8.57	7.16		10.45	
	78 (2 480 MHz)	8.57	7.18		10.45	
3-DH5	0 (2 402 MHz)	11.48	7.85		13.36	
	39 (2 441 MHz)	11.58	7.86		13.46	
	78 (2 480 MHz)	11.58	7.87		13.46	

※ Antenna Gain : 1.88 dBi



10. Conducted Spurious Emission & Band edge (Non-Restricted band)

10.1 Operating environment

Temperature : 22 °C

Relative humidity : 46 %

10.2 Measurement method

Standard : ANSI 63.10 (7.8.8) / ANSI 63.10 6.10.4

10.3 Limit

Standard : §15.247 (d)

10.4 Test data

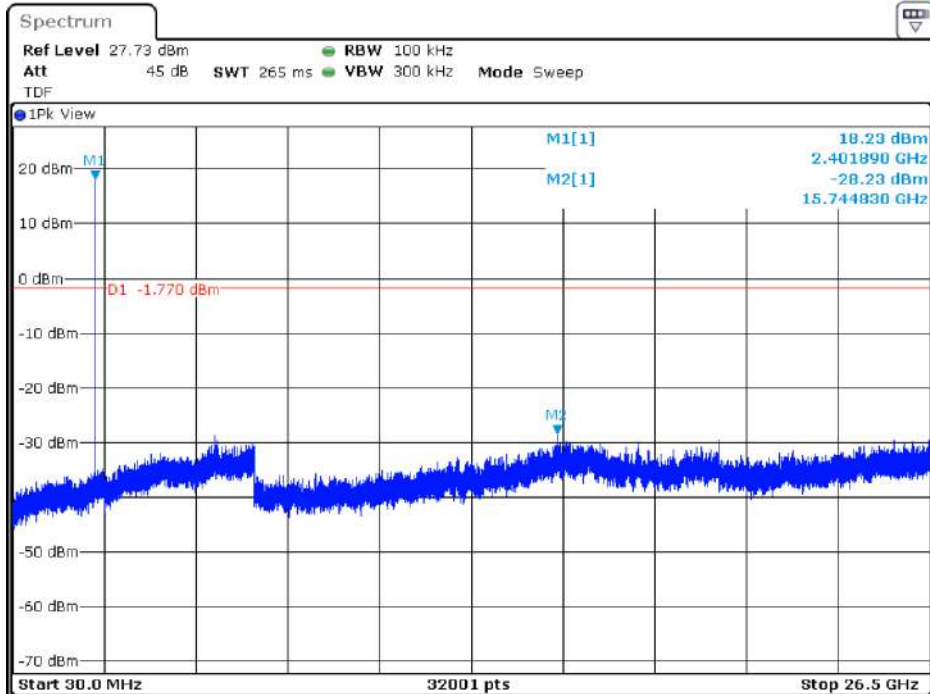
Operating mode : Transmit mode

Test Result : Pass

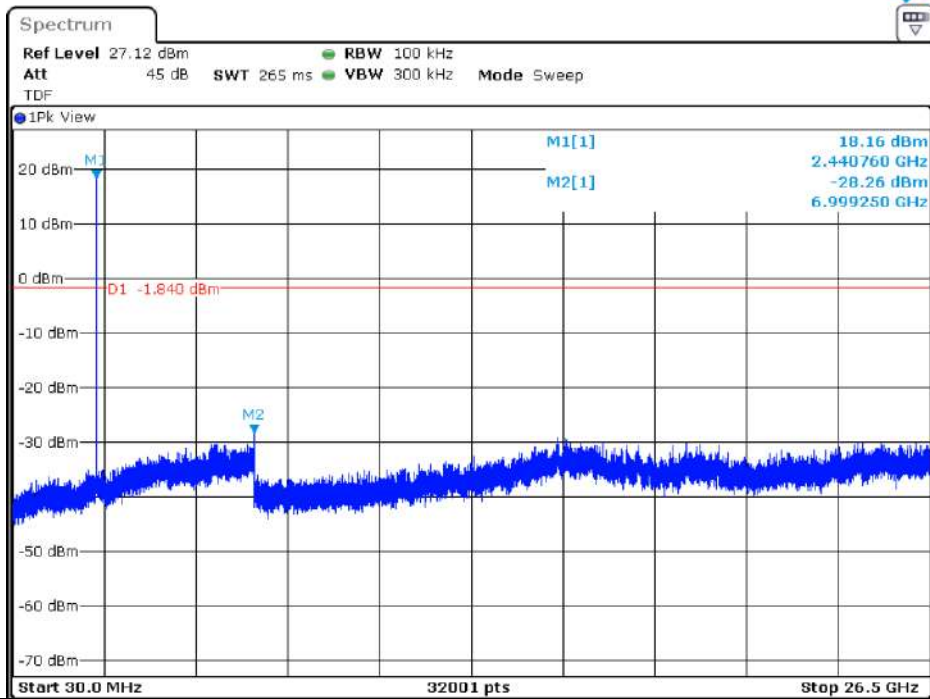


10.4.1 Measured Results for DC 12 V

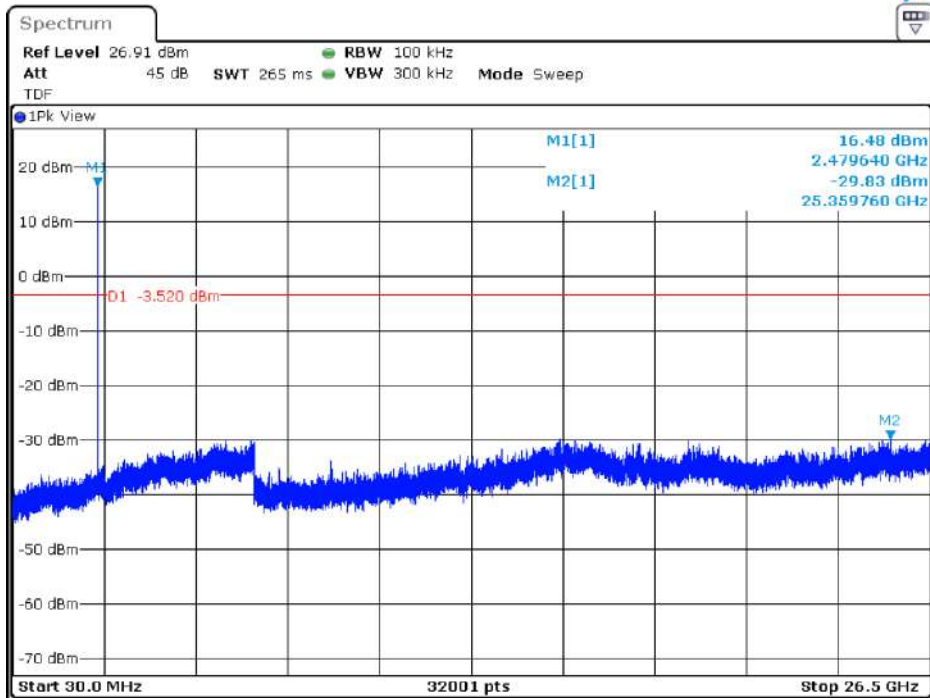
10.4.1.1 Unwanted Emissions In Non-Restricted Frequency Bands_DC 12 V



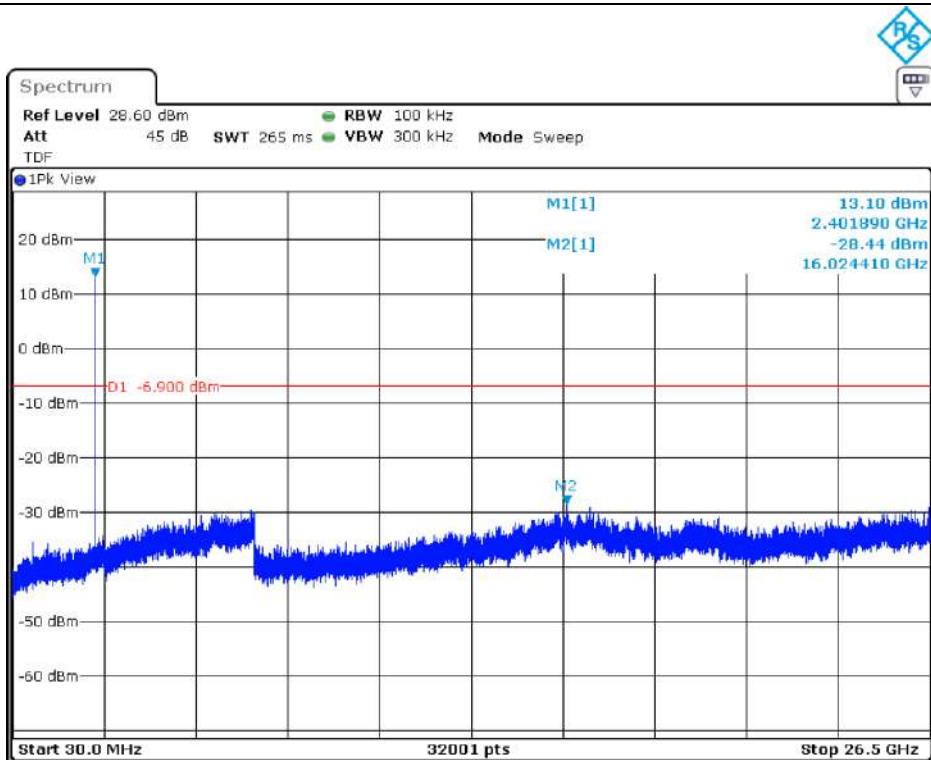
DH5_Low CH



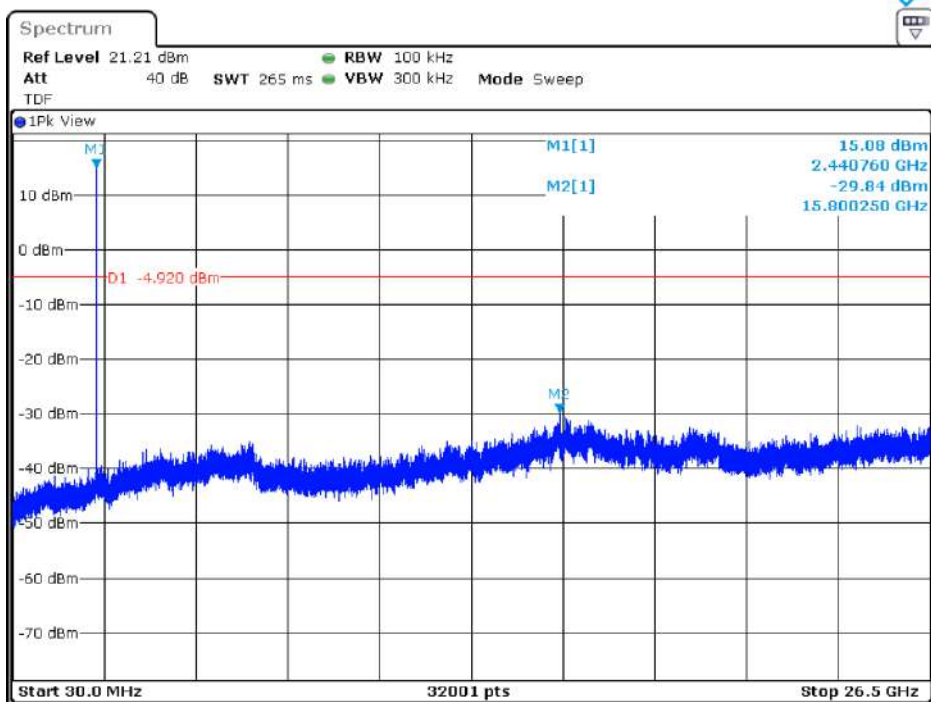
DH5_Mid CH



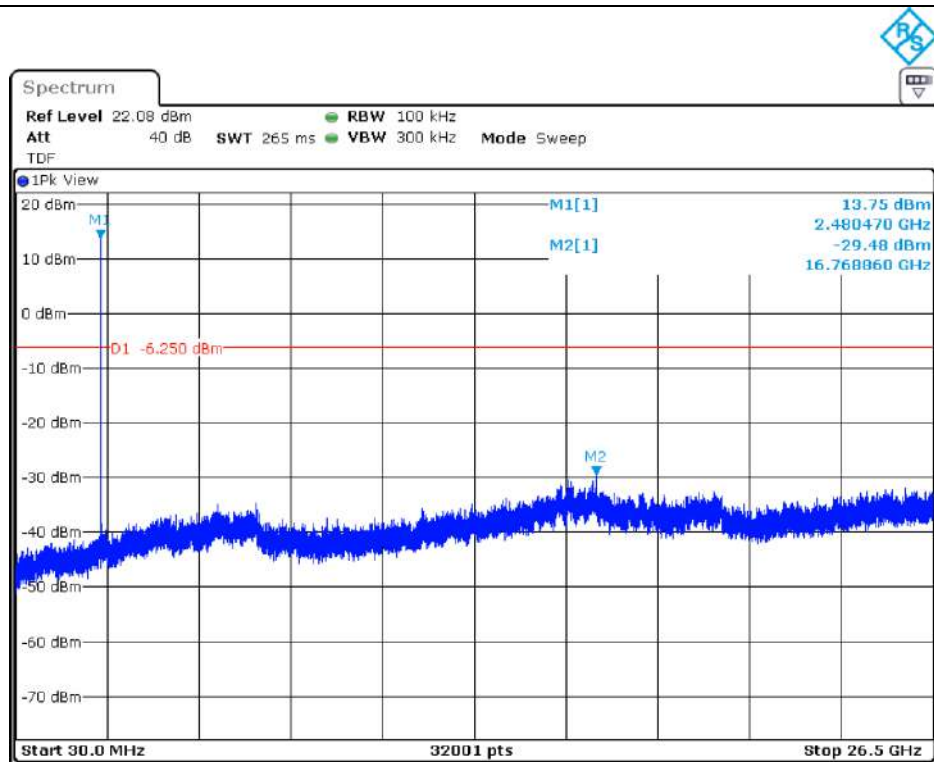
DH5_High CH



3-DH5_Low CH

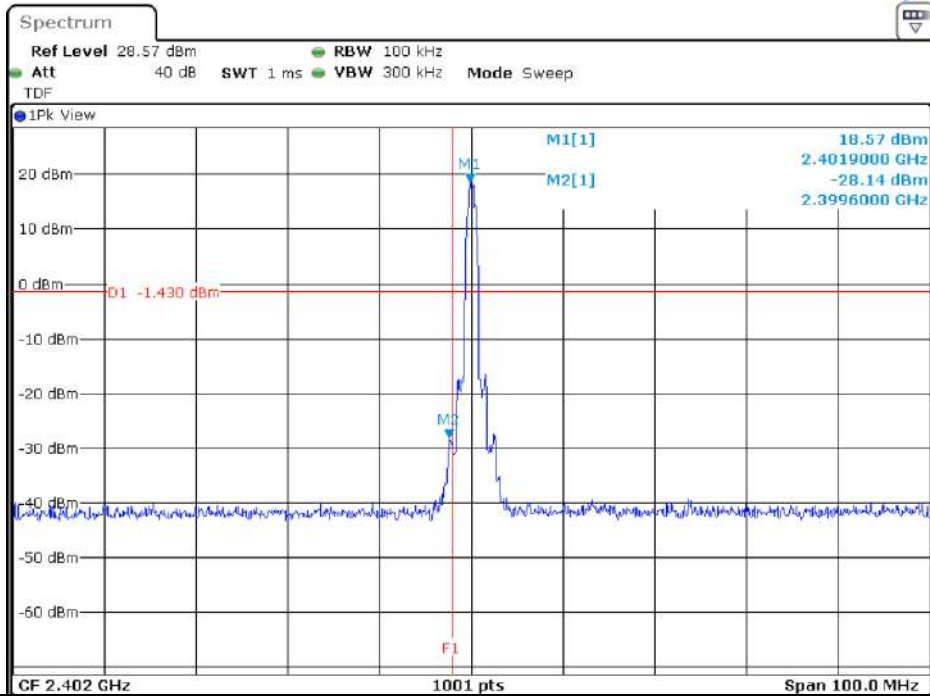


3-DH5_Mid CH

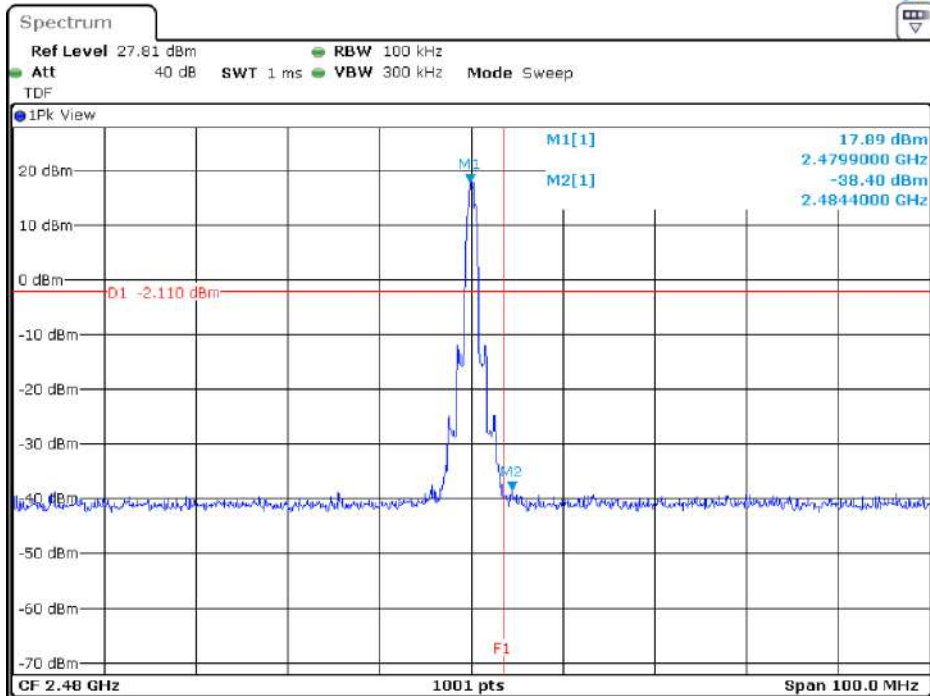


3-DH5_High CH

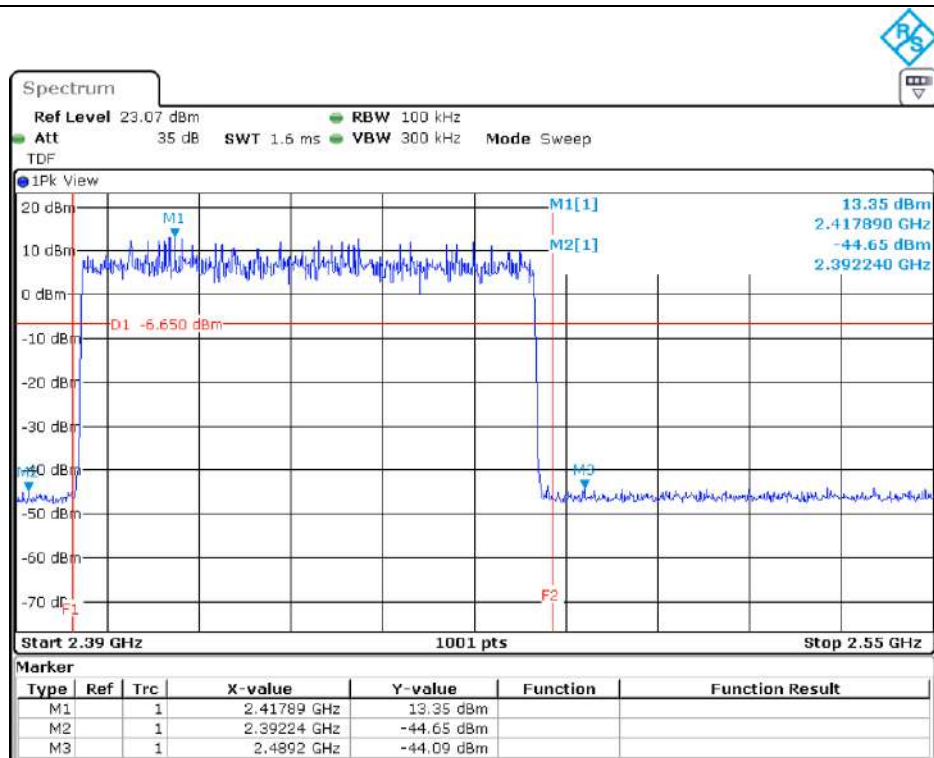




3-DH5_Low CH



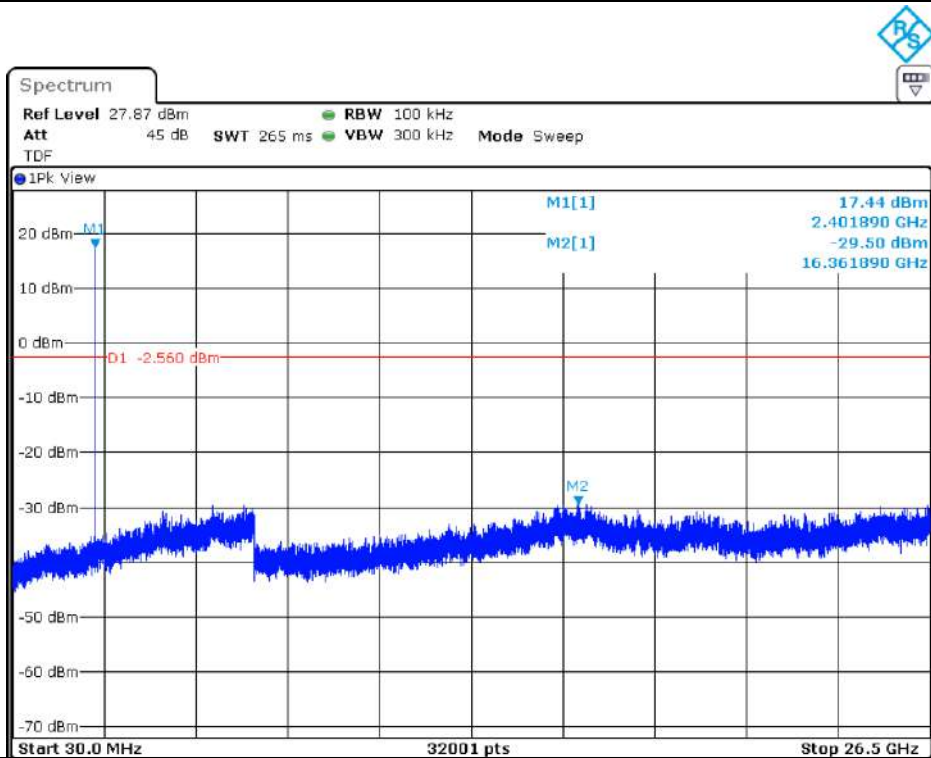
3-DH5_High CH



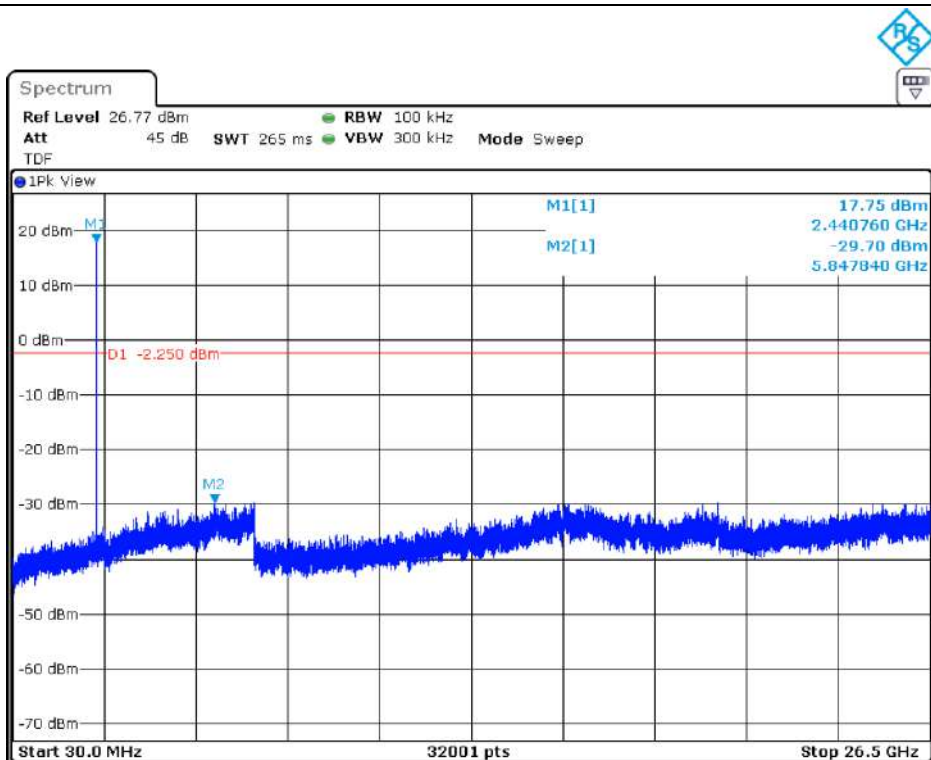
3-DH5_Hopping



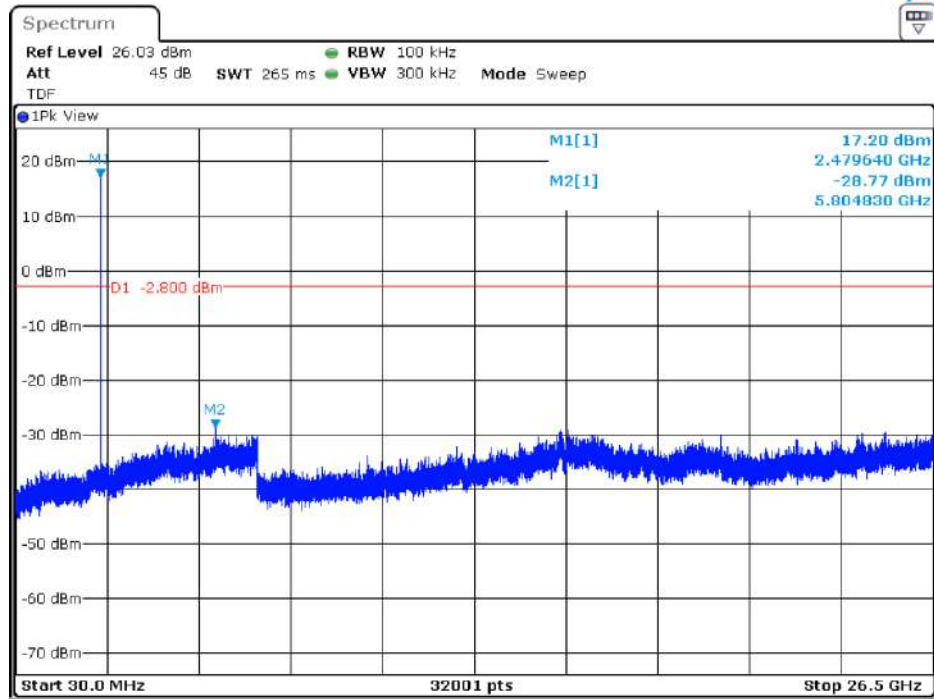
10.4.1.3 Unwanted Emissions In Non-Restricted Frequency Bands_DC 24 V



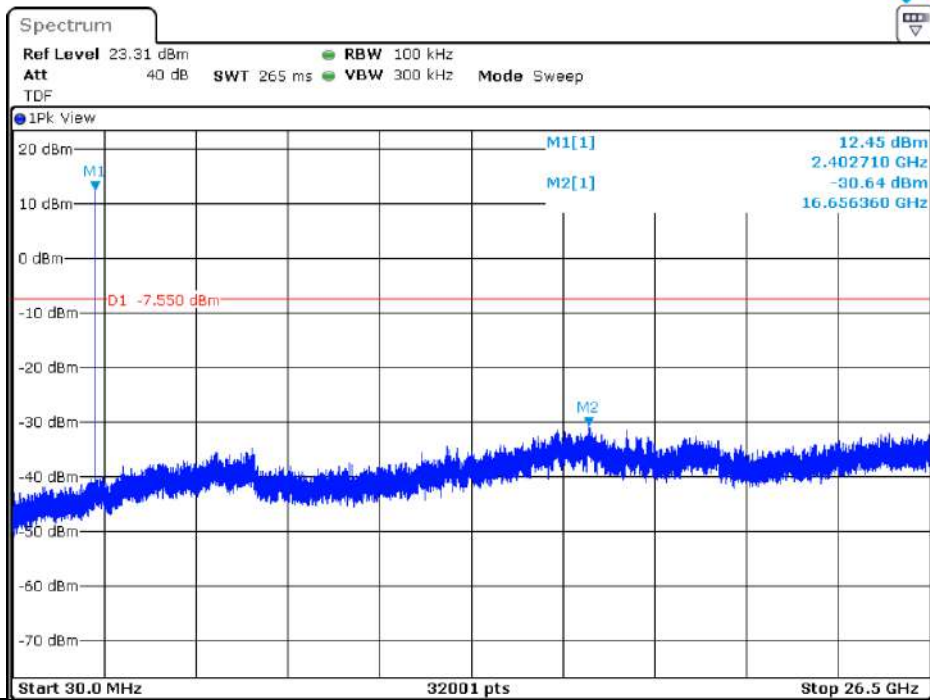
DH5_Low CH



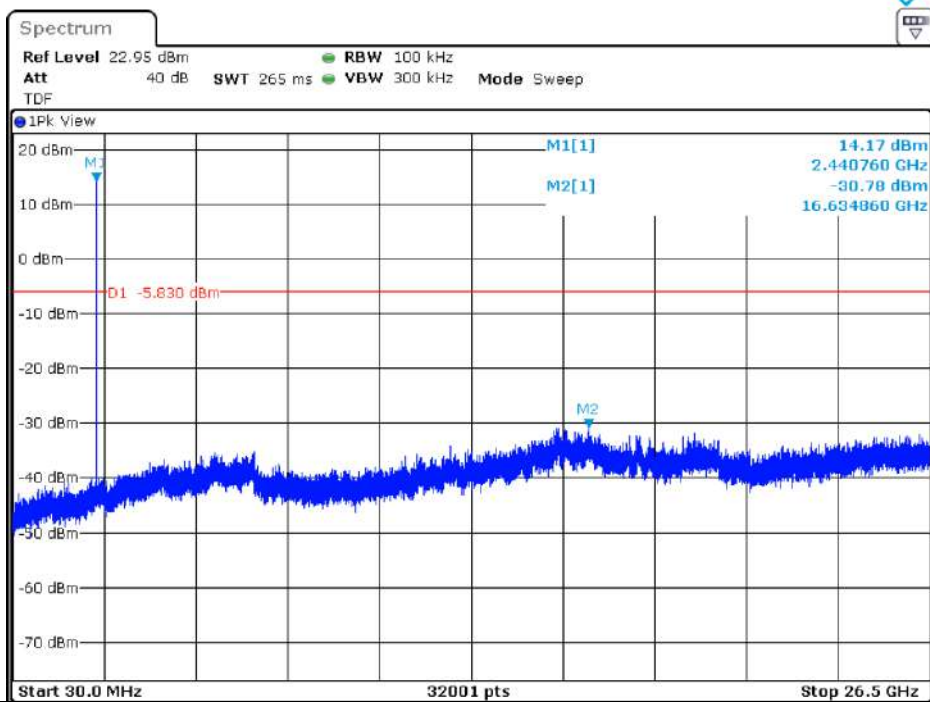
DH5_Mid CH



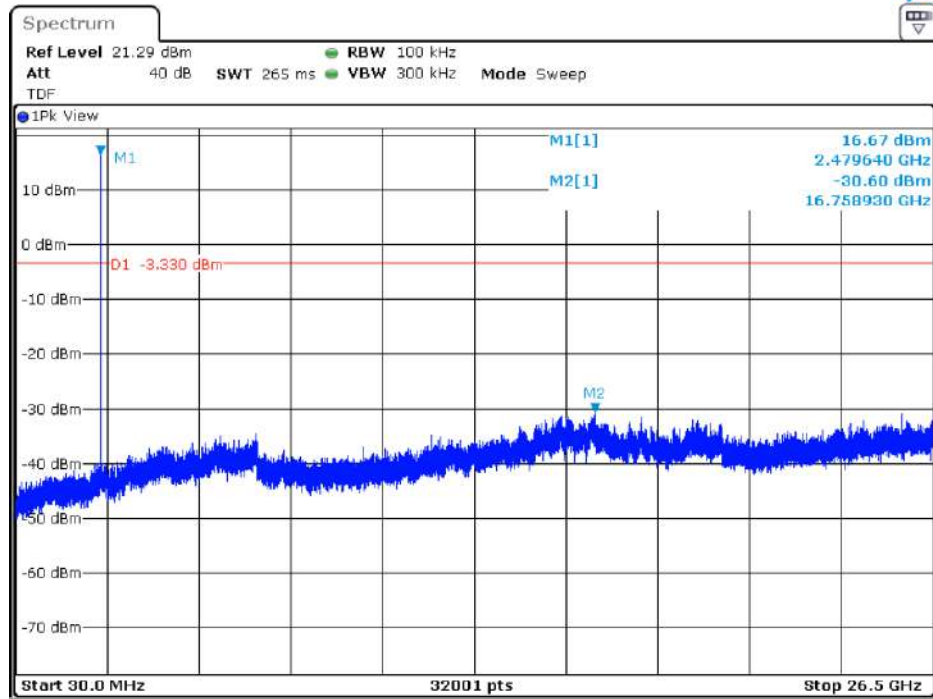
DH5_High CH



3-DH5_Low CH



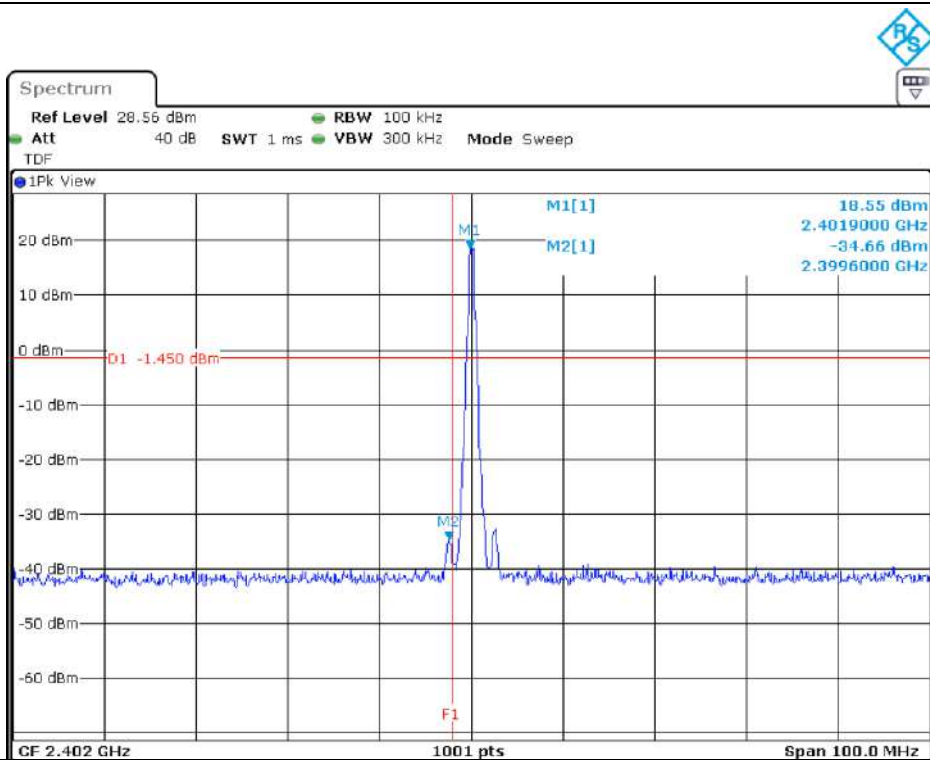
3-DH5_Mid CH



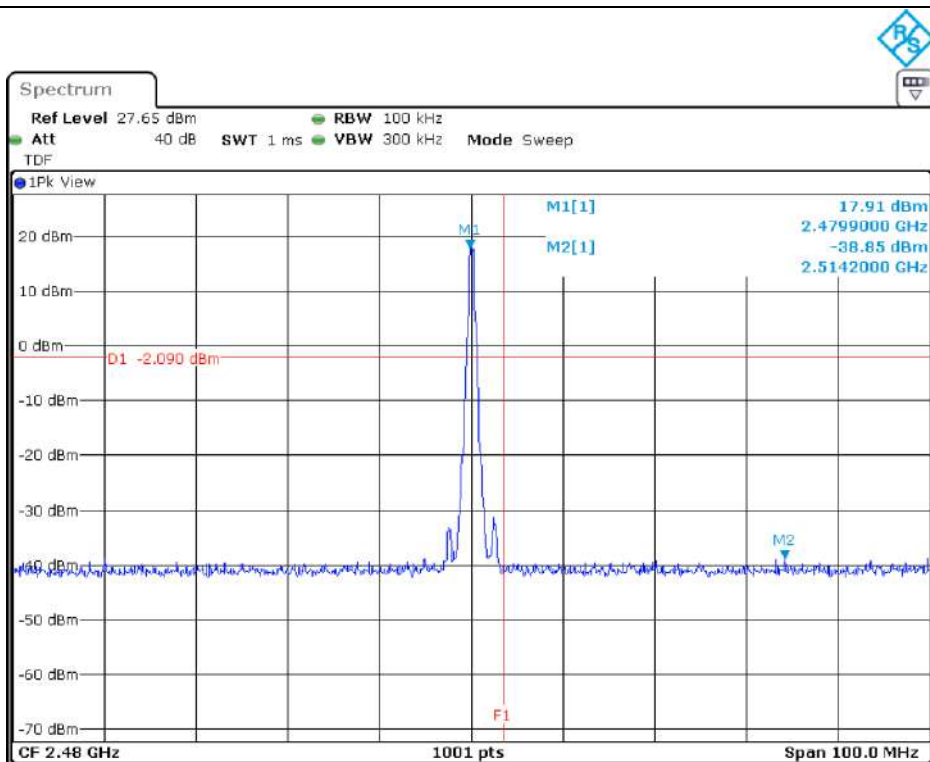
3-DH5_High CH



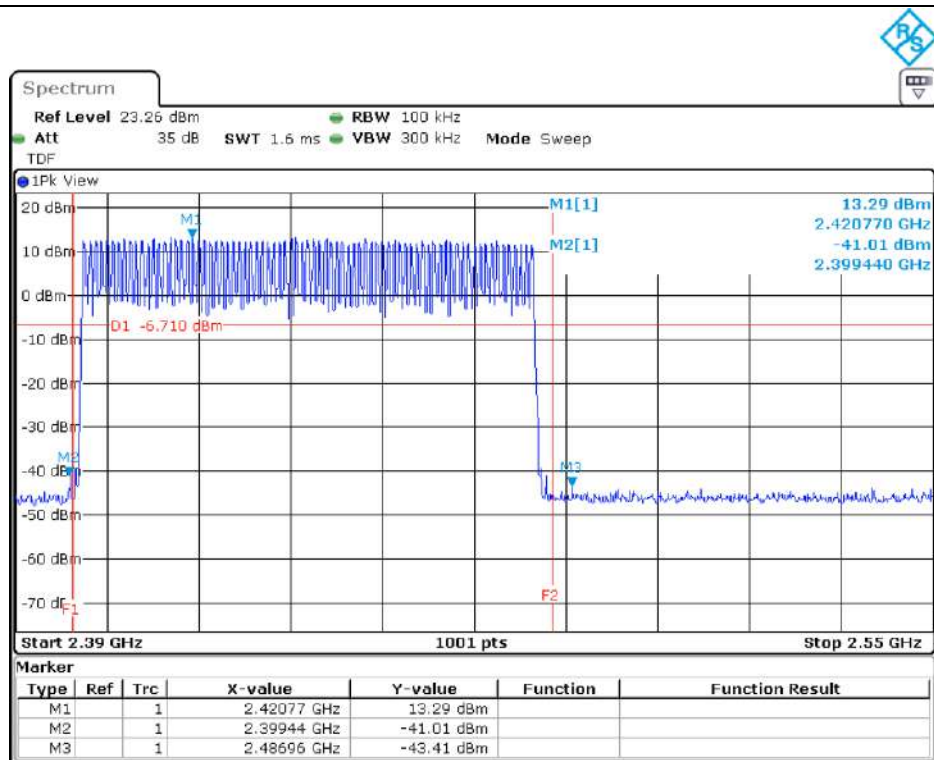
10.4.1.4 Band Edge_DC 24 V



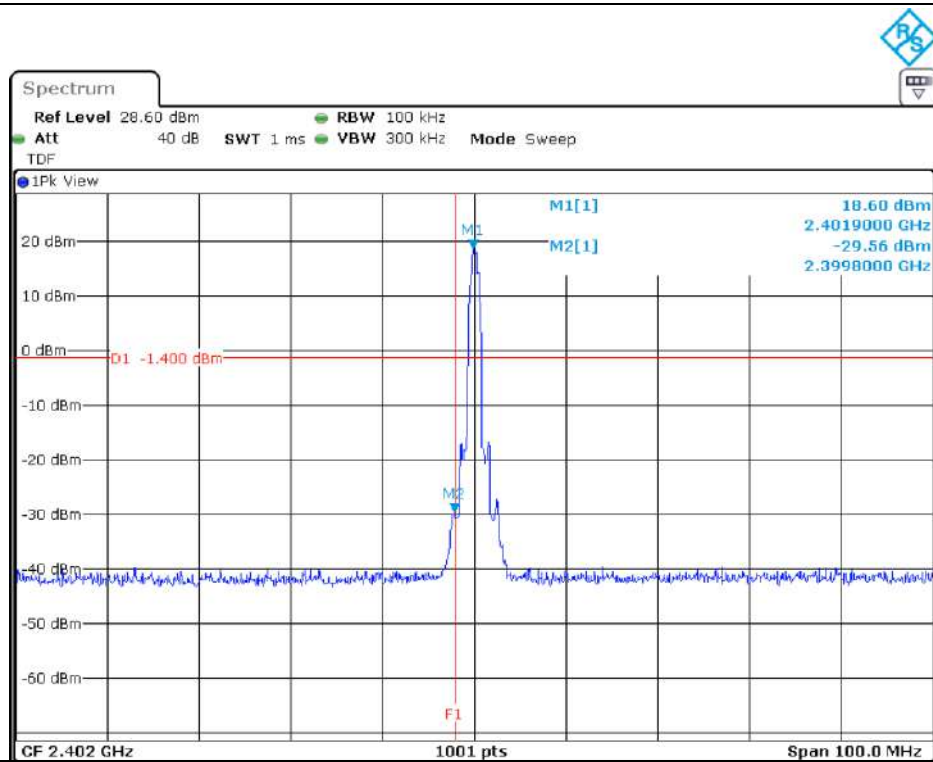
DH5_Low CH



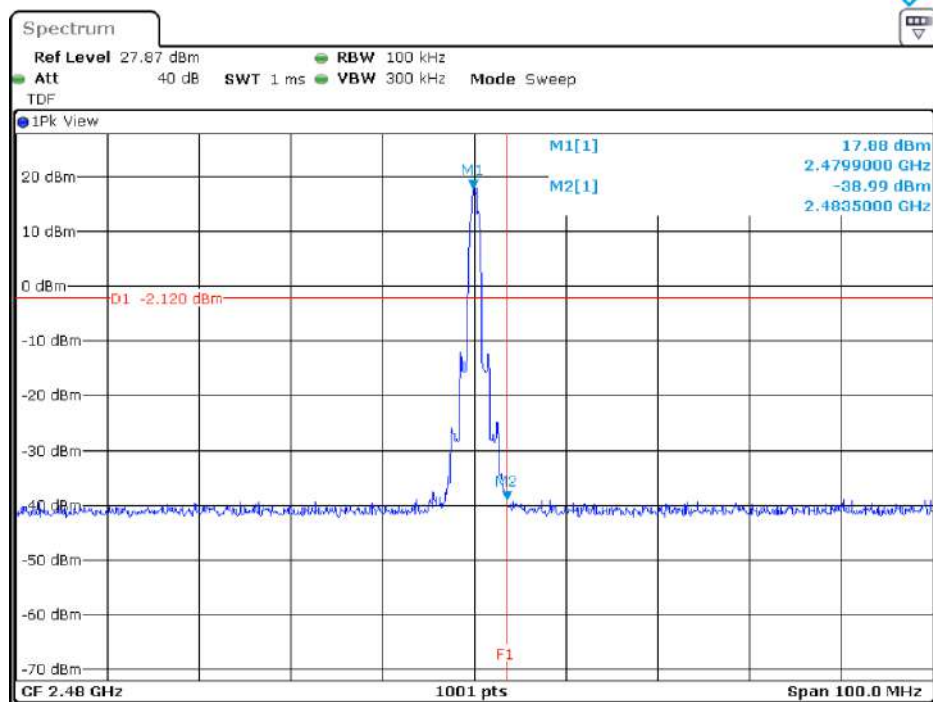
DH5_High CH



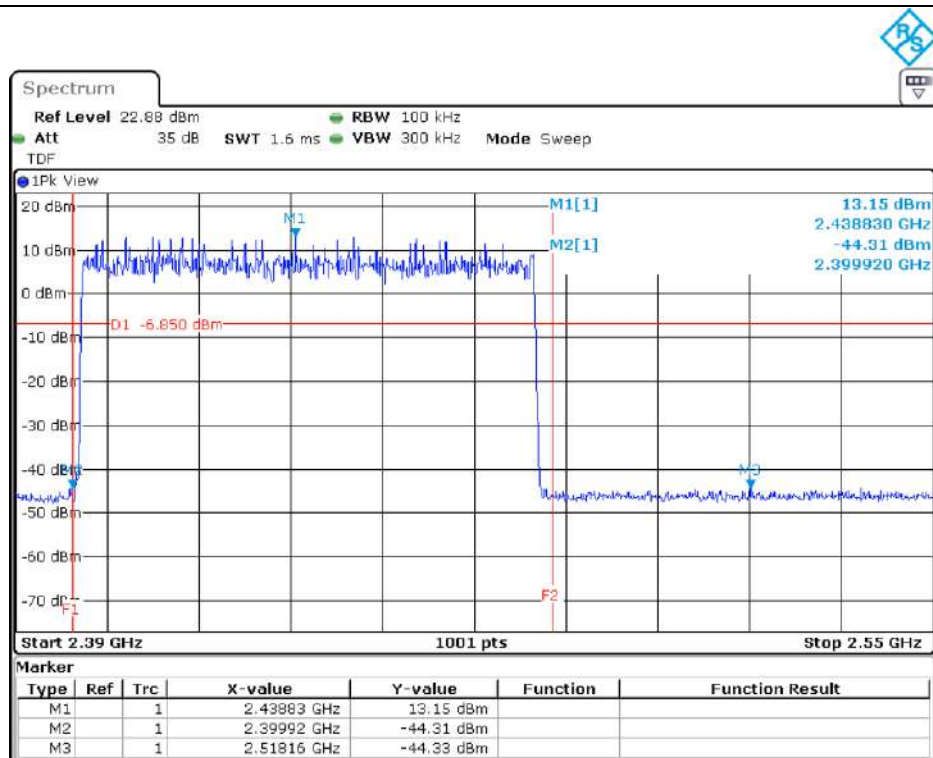
DH5_Hopping



3-DH5_Low CH



3-DH5_High CH



3-DH5_Hopping



11. Radiated Spurious Emission(Restricted band)

11.1 Operating environment

Temperature : (22 ~ 24) °C

Relative humidity : (47 ~ 49) %

11.2 Measurement method

Standard : ANSI 63.10 (6.4/6.5/6.6)

11.3 Limit

Standard : §15.205, §15.209

11.4 Test data

Operating mode : Transmit mode

Test Result : Pass



11.4.1 Test data for Restricted band for DC 12 V

11.4.1.1 Measured Results for DH5

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
2 389.15	Peak	V	30.00	-14.70	44.70	73.98	29.28
	Average	V	5.63		20.33	53.98	33.65
High CH							
2 484.14	Peak	H	29.13	-14.50	43.63	73.98	30.35
	Average	H	4.59		19.09	53.98	34.89

※ Ant. Pol. : Antenna Polarization

※ Corr Factor. : Antenna Factor + Cable Loss - Amplifier Gain

※ Result = Reading + Corr Factor

※ Margin = Limit - Result

11.4.1.2 Measured Results for 3-DH5

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
2 383.08	Peak	V	27.28	-14.70	41.98	73.98	32.00
	Average	V	7.13		21.83	53.98	32.15
High CH							
2 489.17	Peak	H	28.05	-14.40	42.45	73.98	31.53
	Average	H	4.63		19.03	53.98	34.95

※ Ant. Pol. : Antenna Polarization

※ Corr Factor. : Antenna Factor + Cable Loss - Amplifier Gain

※ Result = Reading + Corr Factor

※ Margin = Limit - Result



11.4.2 Test data for Restricted band for DC 24 V

11.4.2.1 Measured Results for DH5

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
2 372.70	Peak	V	23.86	-14.70	38.56	73.98	35.42
	Average	V	6.58		21.28	53.98	32.70
High CH							
2 484.05	Peak	H	28.14	-14.50	42.64	73.98	31.34
	Average	H	5.06		19.56	53.98	34.42

- ※ Ant. Pol. : Antenna Polarization
- ※ Corr Factor. : Antenna Factor + Cable Loss - Amplifier Gain
- ※ Result = Reading + Corr Factor
- ※ Margin = Limit - Result

11.4.2.2 Measured Results for 3-DH5

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
2 377.74	Peak	V	23.54	-14.70	38.24	73.98	35.74
	Average	V	5.74		20.44	53.98	33.54
High CH							
2 492.47	Peak	H	23.88	-14.40	38.28	73.98	35.70
	Average	H	4.60		19.00	53.98	34.98

- ※ Ant. Pol. : Antenna Polarization
- ※ Corr Factor. : Antenna Factor + Cable Loss - Amplifier Gain
- ※ Result = Reading + Corr Factor
- ※ Margin = Limit - Result



11.4.3 Test data for Spurious & Harmonic for DC 12 V

11.4.3.1 Measurement Results for Below 30 MHz_DH5

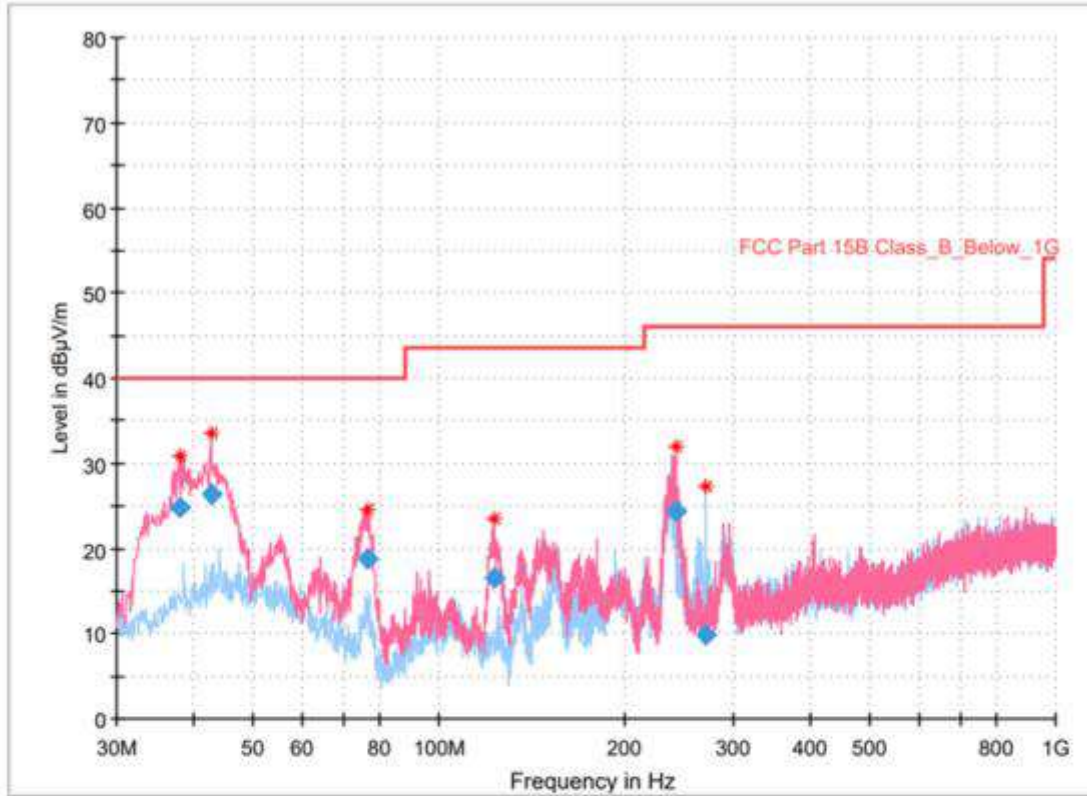
Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
It was not found any emissions peaks found from the EUT.							
Mid CH							
It was not found any emissions peaks found from the EUT.							
High CH							
It was not found any emissions peaks found from the EUT.							

11.4.3.2 Measurement Results for Below 30 MHz_3-DH5

Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
It was not found any emissions peaks found from the EUT.							
Mid CH							
It was not found any emissions peaks found from the EUT.							
High CH							
It was not found any emissions peaks found from the EUT.							



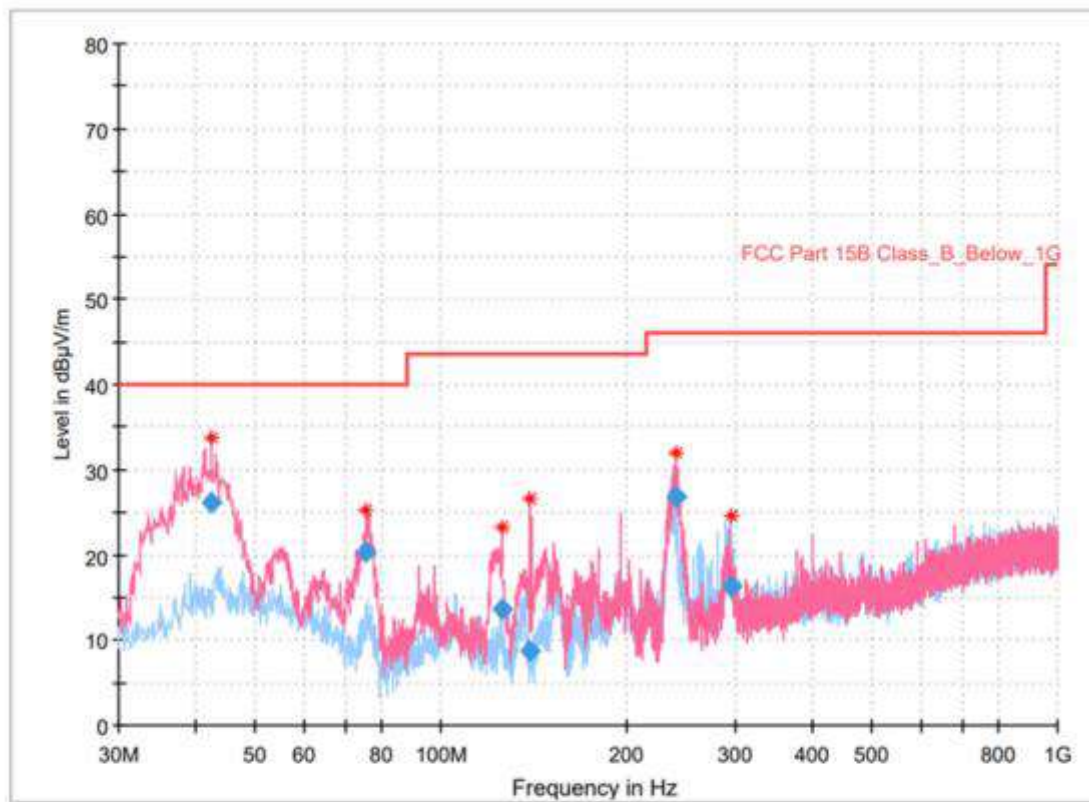
11.4.3.3 Measurement Results for Below 1 GHz_DH5



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
37.857	24.84	40.00	15.16	1000.0	120.000	100.1	V	0.0	-22.8
42.707	26.46	40.00	13.54	1000.0	120.000	100.1	V	336.0	-21.3
76.851	18.75	40.00	21.25	1000.0	120.000	100.1	V	309.0	-27.3
122.441	16.47	43.50	27.03	1000.0	120.000	100.1	V	268.0	-25.1
242.139	24.42	46.00	21.58	1000.0	120.000	100.1	V	254.0	-22.2
271.433	9.85	46.00	36.15	1000.0	120.000	100.1	H	273.0	-21.5

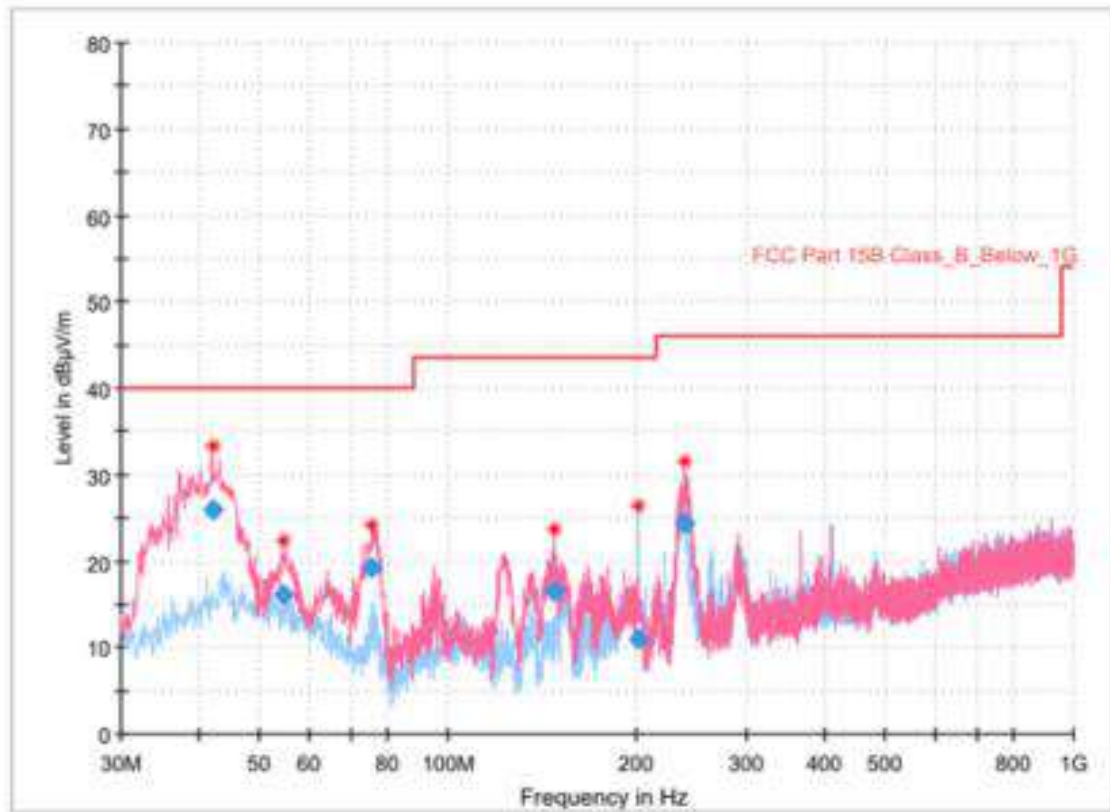
Low CH



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.416000	26.04	40.00	13.96	1000.0	120.000	100.1	V	0.0	-21.4
75.687000	20.36	40.00	19.64	1000.0	120.000	100.1	V	330.0	-26.9
125.351000	13.67	43.50	29.83	1000.0	120.000	100.1	V	13.0	-25.5
139.610000	8.77	43.50	34.73	1000.0	120.000	100.1	V	13.0	-26.5
240.005000	26.71	46.00	19.29	1000.0	120.000	100.1	V	272.0	-22.3
294.810000	16.28	46.00	29.72	1000.0	120.000	100.1	H	268.0	-21.0

Mid CH



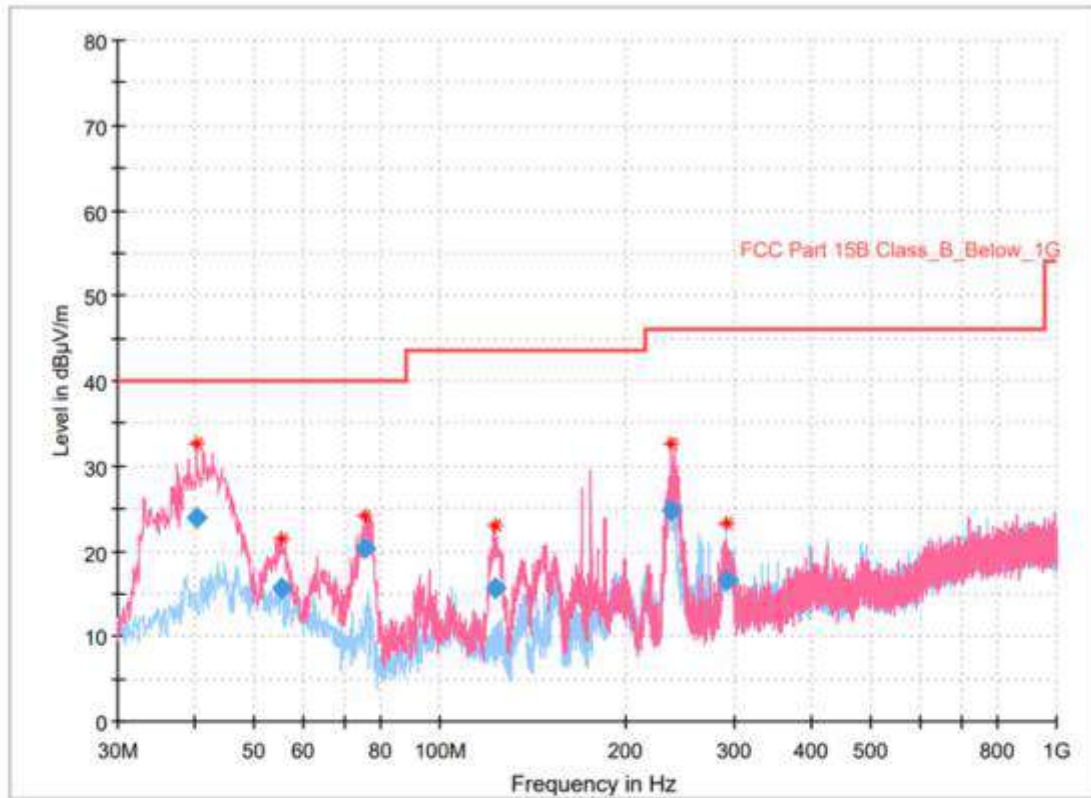
Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.028000	25.84	40.00	14.16	1000.0	120.000	100.1	V	162.0	-21.5
54.735000	16.05	40.00	23.95	1000.0	120.000	100.1	V	329.0	-20.5
75.493000	19.30	40.00	20.70	1000.0	120.000	100.1	V	298.0	-26.9
147.952000	16.51	43.50	26.99	1000.0	120.000	100.1	V	34.0	-26.5
201.011000	11.04	43.50	32.46	1000.0	120.000	100.1	H	0.0	-23.2
239.423000	24.30	46.00	21.70	1000.0	120.000	100.1	V	34.0	-22.4

High CH



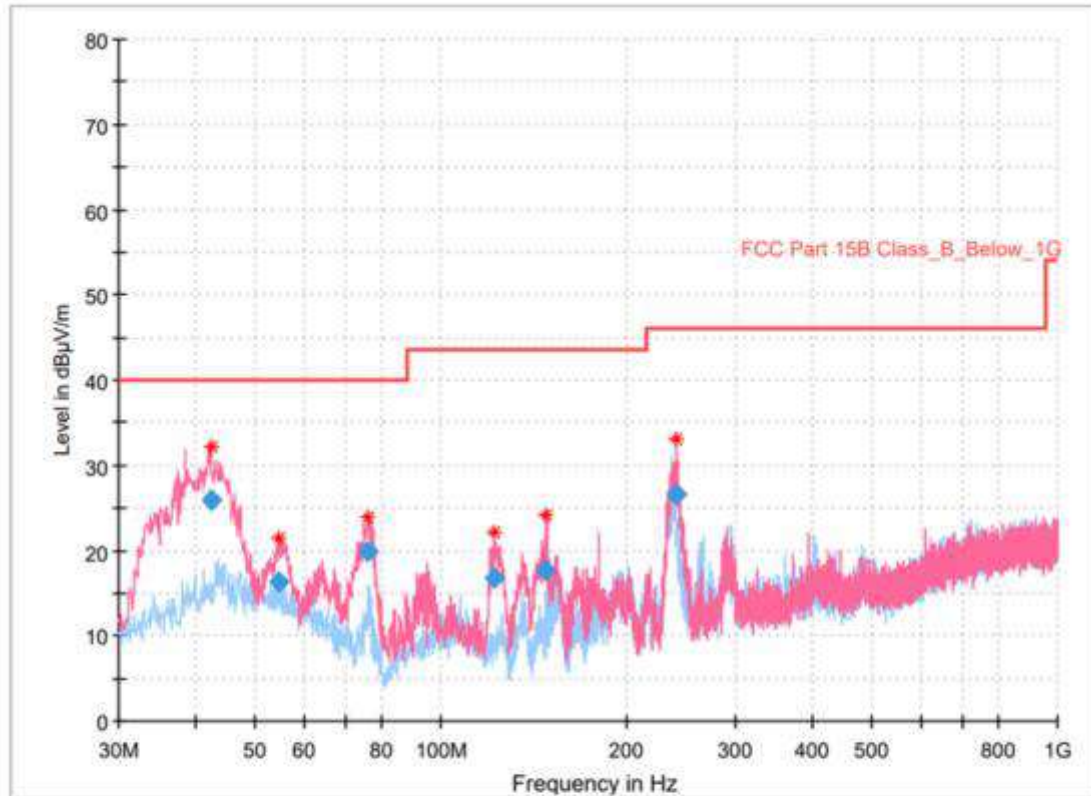
11.4.3.4 Measurement Results for Below 1 GHz_3-DH5



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
40.282000	23.89	40.00	16.11	1000.0	120.000	100.1	V	200.0	-22.3
55.414000	15.74	40.00	24.26	1000.0	120.000	100.1	V	200.0	-20.6
75.687000	20.28	40.00	19.72	1000.0	120.000	100.1	V	0.0	-26.9
122.538000	15.57	43.50	27.93	1000.0	120.000	100.1	V	0.0	-25.1
237.871000	24.76	46.00	21.24	1000.0	120.000	100.1	V	200.0	-22.4
291.706000	16.64	46.00	29.36	1000.0	120.000	100.1	H	261.0	-21.0

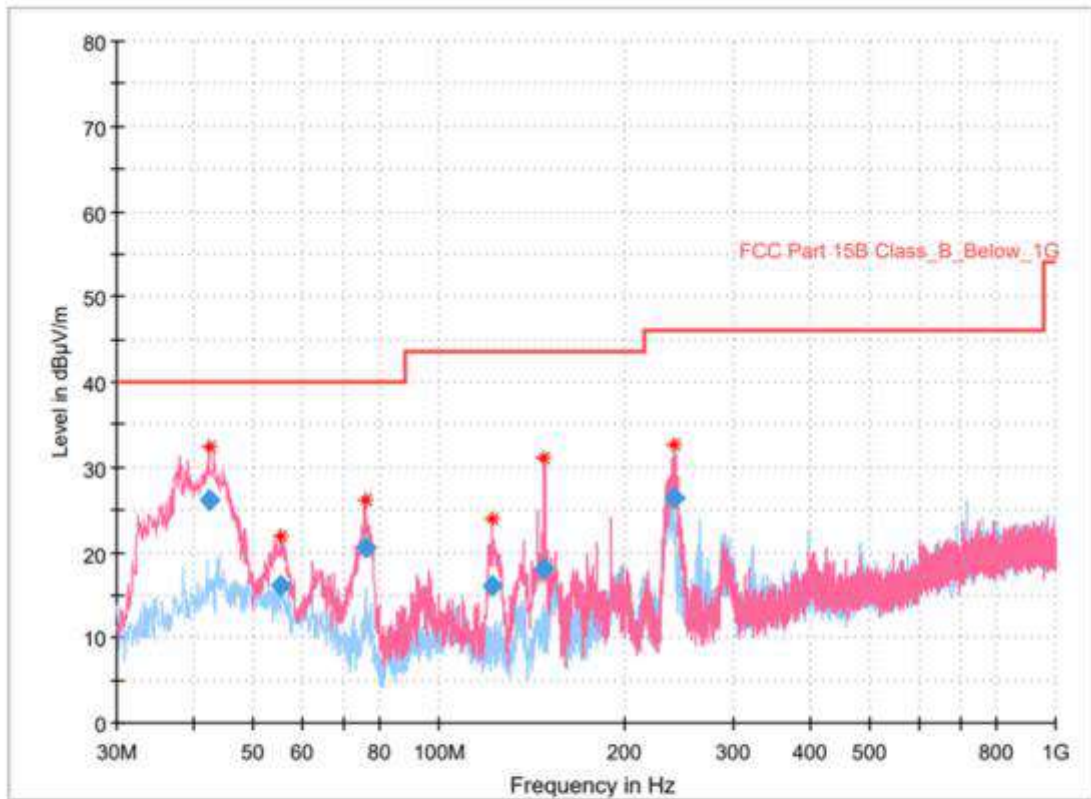
Low CH



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.319000	25.86	40.00	14.14	1000.0	120.000	100.1	V	0.0	-21.4
54.735000	16.21	40.00	23.79	1000.0	120.000	100.1	V	36.0	-20.5
75.784000	19.82	40.00	20.18	1000.0	120.000	100.1	V	185.0	-27.0
121.956000	16.71	43.50	26.79	1000.0	120.000	100.1	V	115.0	-25.0
148.243000	17.57	43.50	25.93	1000.0	120.000	100.1	V	22.0	-26.4
240.102000	26.57	46.00	19.43	1000.0	120.000	100.1	V	254.0	-22.3

Mid CH



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.319000	26.22	40.00	13.78	1000.0	120.000	100.1	V	124.0	-21.4
55.414000	15.99	40.00	24.01	1000.0	120.000	100.1	V	71.0	-20.6
75.784000	20.57	40.00	19.43	1000.0	120.000	100.1	V	301.0	-27.0
121.956000	16.19	43.50	27.31	1000.0	120.000	100.1	V	192.0	-25.0
148.243000	18.17	43.50	25.33	1000.0	120.000	100.1	V	314.0	-26.4
239.811000	26.27	46.00	19.73	1000.0	120.000	100.1	V	260.0	-22.3

High CH



11.4.3.5 Measurement Results for Above 1 GHz_DH5

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
4 804.60	Peak	V	33.81	-4.30	38.11	73.98	35.87
	Average	V	20.44		24.74	53.98	29.24
Mid CH							
4 881.10	Peak	V	36.34	-3.80	40.14	73.98	33.84
	Average	V	22.65		26.45	53.98	27.53
High CH							
4 961.00	Peak	V	36.77	-3.60	40.37	73.98	33.61
	Average	V	23.37		26.97	53.98	27.01

11.4.3.6 Measurement Results for Above 1 GHz_3-DH5

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
4 804.60	Peak	V	33.92	-4.30	38.22	73.98	35.76
	Average	V	20.36		24.66	53.98	29.32
5 323.10	Peak	V	47.86	-3.40	51.26	73.98	22.72
	Average	V	24.33		27.73	53.98	26.25
6 375.40	Peak	V	45.28	-1.20	46.48	73.98	27.50
	Average	V	25.39		26.59	53.98	27.39
Mid CH							
4 882.80	Peak	V	34.66	-3.80	38.46	73.98	35.52
	Average	V	21.53		25.33	53.98	28.65
High CH							
4 961.00	Peak	V	35.24	-3.60	38.84	73.98	35.14
	Average	V	21.85		25.45	53.98	28.53

- ※ Ant. Pol. : Antenna Polarization
- ※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain
- ※ Result = Reading + Corr. Factor+ DCCF
- ※ Margin = Limit – Result



11.4.4 Test data for Spurious & Harmonic for DC 24 V

11.4.4.1 Measurement Results for Below 30 MHz_DH5

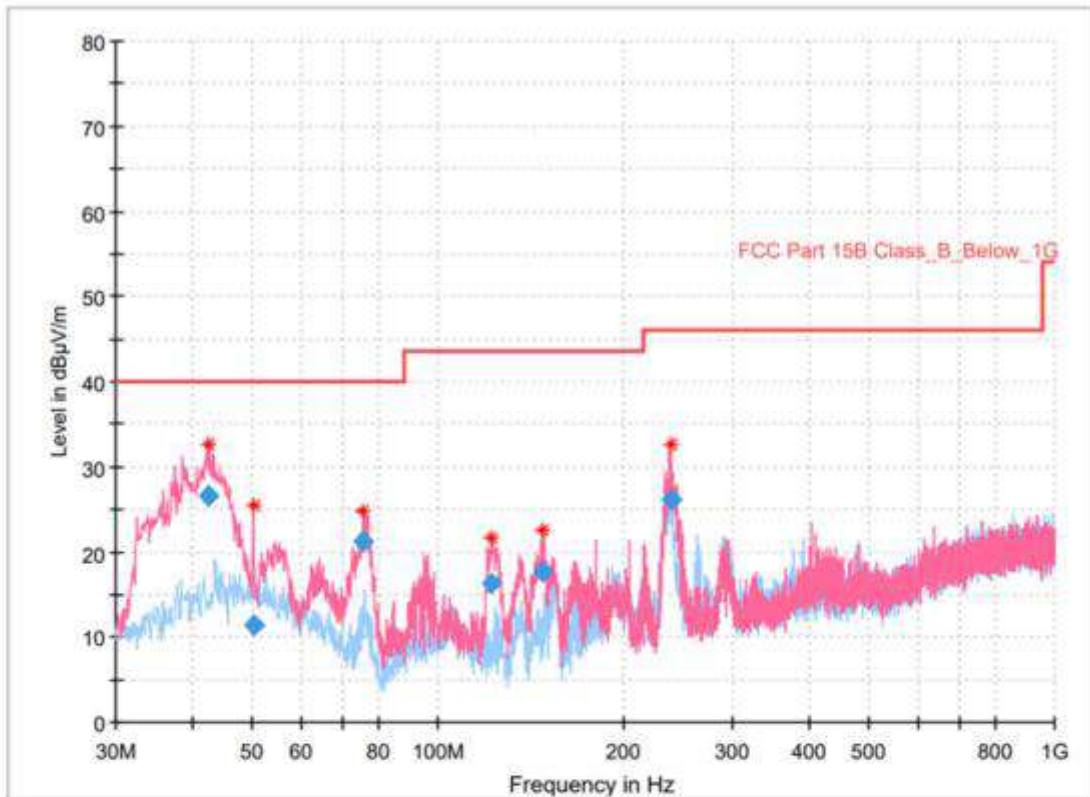
Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
It was not found any emissions peaks found from the EUT.							
Mid CH							
It was not found any emissions peaks found from the EUT.							
High CH							
It was not found any emissions peaks found from the EUT.							

11.4.4.2 Measurement Results for Below 30 MHz_3-DH5

Frequency (MHz)	Reading (dBμV)	Detector	Ant. Pol. (H/V)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
It was not found any emissions peaks found from the EUT.							
Mid CH							
It was not found any emissions peaks found from the EUT.							
High CH							
It was not found any emissions peaks found from the EUT.							



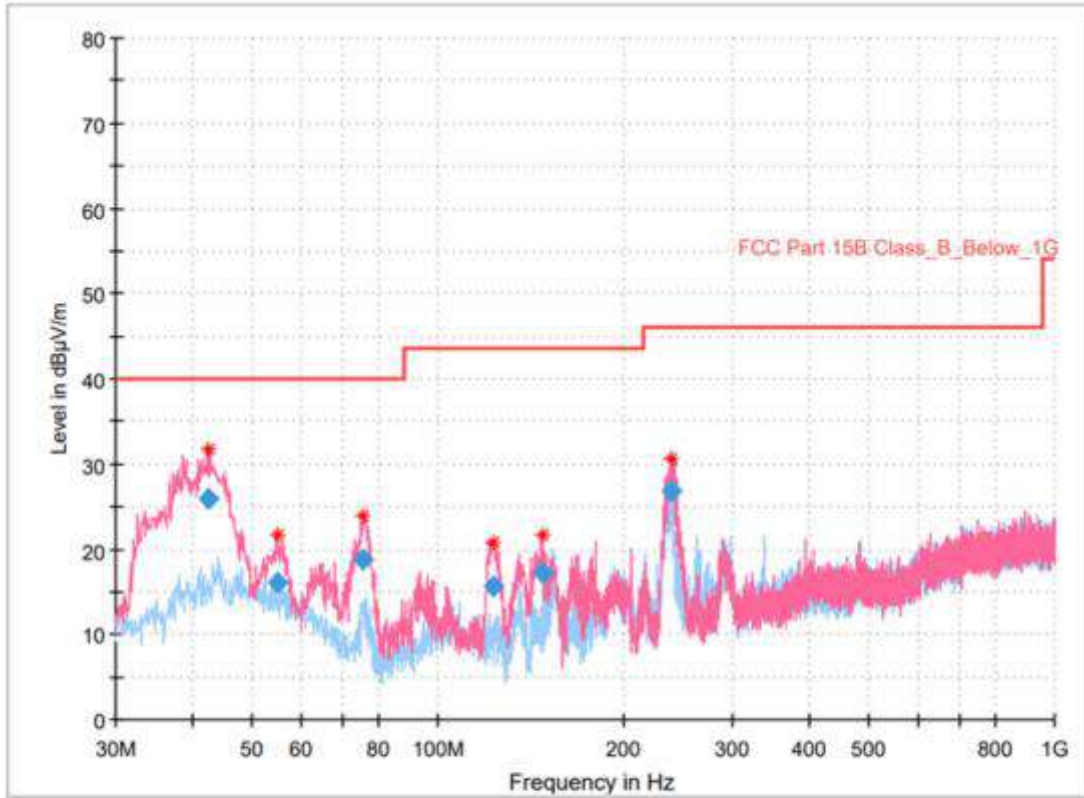
11.4.4.3 Measurement Results for Below 1 GHz_DH5



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Poi	Azimuth (deg)	Corr. (dB)
42.513000	26.59	40.00	13.41	1000.0	120.000	100.1	V	139.0	-21.3
50.176000	11.29	40.00	28.71	1000.0	120.000	100.1	V	31.0	-20.1
75.687000	21.21	40.00	18.79	1000.0	120.000	100.1	V	270.0	-26.9
122.344000	16.32	43.50	27.18	1000.0	120.000	100.1	V	153.0	-25.1
147.661000	17.55	43.50	25.95	1000.0	120.000	100.1	V	44.0	-26.5
239.423000	26.09	46.00	19.91	1000.0	120.000	100.1	V	270.0	-22.4

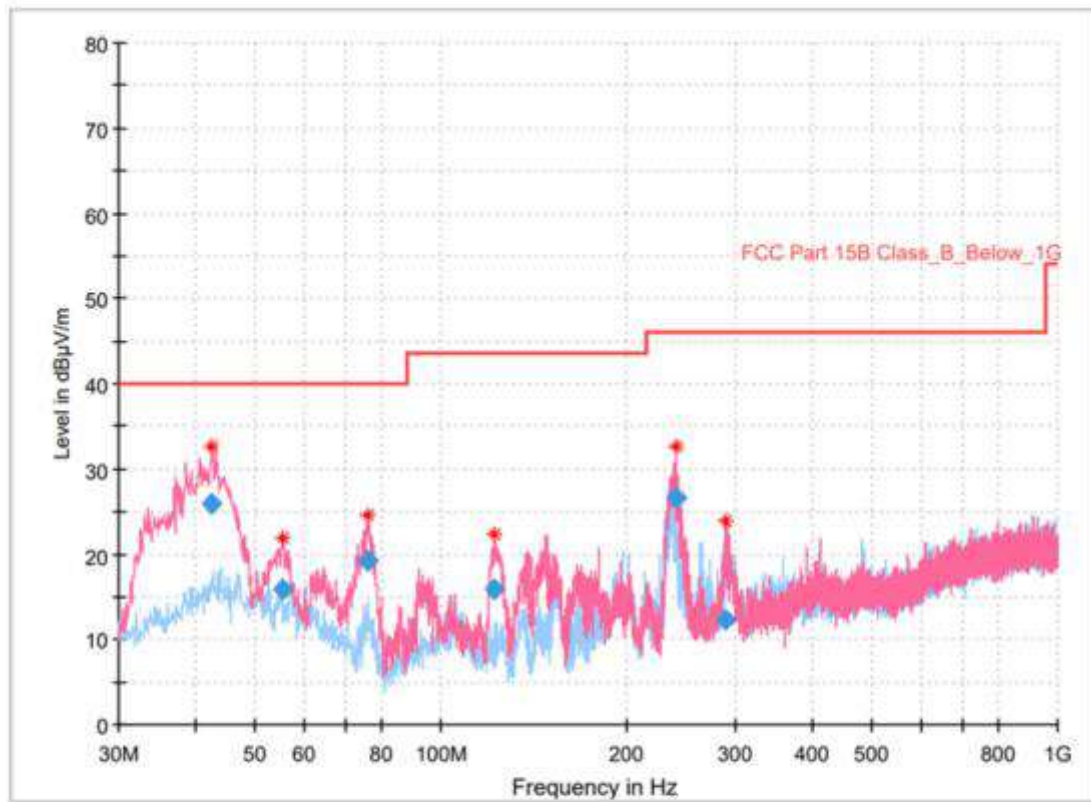
Low CH



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.416000	25.99	40.00	14.01	1000.0	120.000	100.1	V	175.0	-21.4
55.026000	16.20	40.00	23.80	1000.0	120.000	100.1	V	37.0	-20.6
75.590000	18.85	40.00	21.15	1000.0	120.000	100.1	V	3.0	-26.9
123.217000	15.71	43.50	27.79	1000.0	120.000	100.1	V	92.0	-25.2
147.564000	17.25	43.50	26.25	1000.0	120.000	100.1	V	277.0	-26.5
239.423000	26.71	46.00	19.29	1000.0	120.000	100.1	V	230.0	-22.4

Mid CH



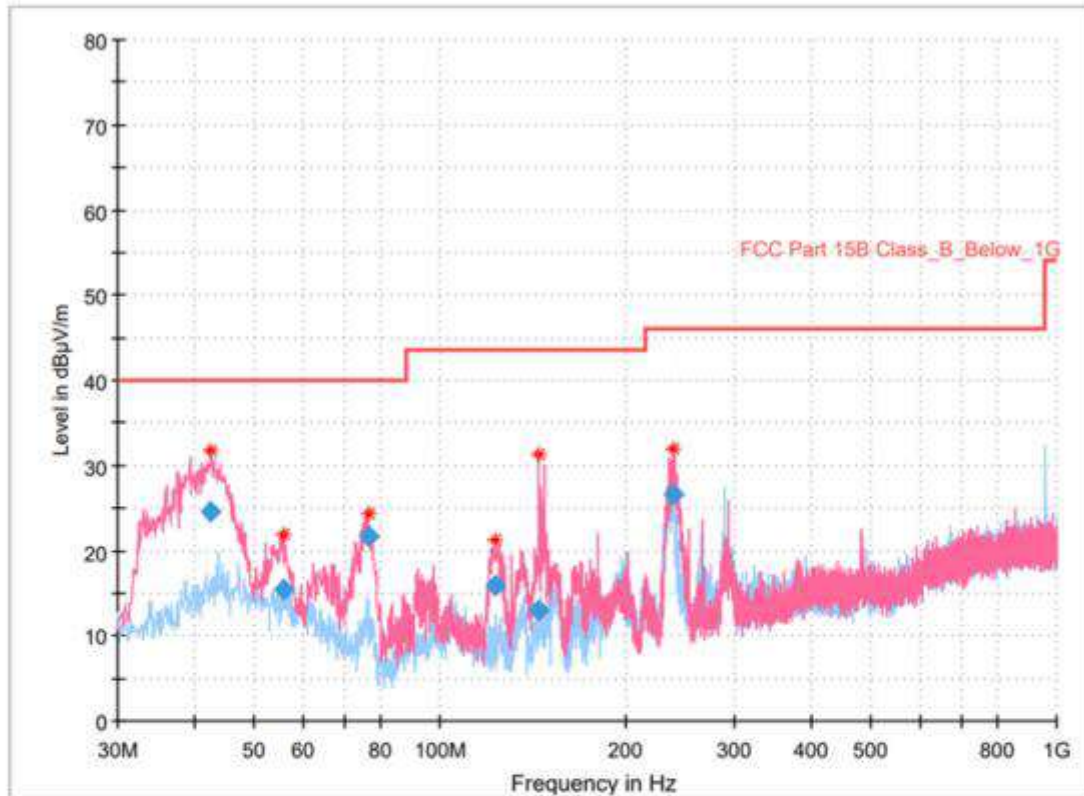
Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.416000	25.81	40.00	14.19	1000.0	120.000	100.1	V	226.0	-21.4
55.511000	15.95	40.00	24.05	1000.0	120.000	100.1	V	35.0	-20.7
75.881000	19.21	40.00	20.79	1000.0	120.000	100.1	V	241.0	-27.0
121.762000	15.87	43.50	27.63	1000.0	120.000	100.1	V	241.0	-25.0
240.102000	26.63	46.00	19.37	1000.0	120.000	100.1	V	255.0	-22.3
288.408000	12.27	46.00	33.73	1000.0	120.000	100.1	V	0.0	-21.1

High CH



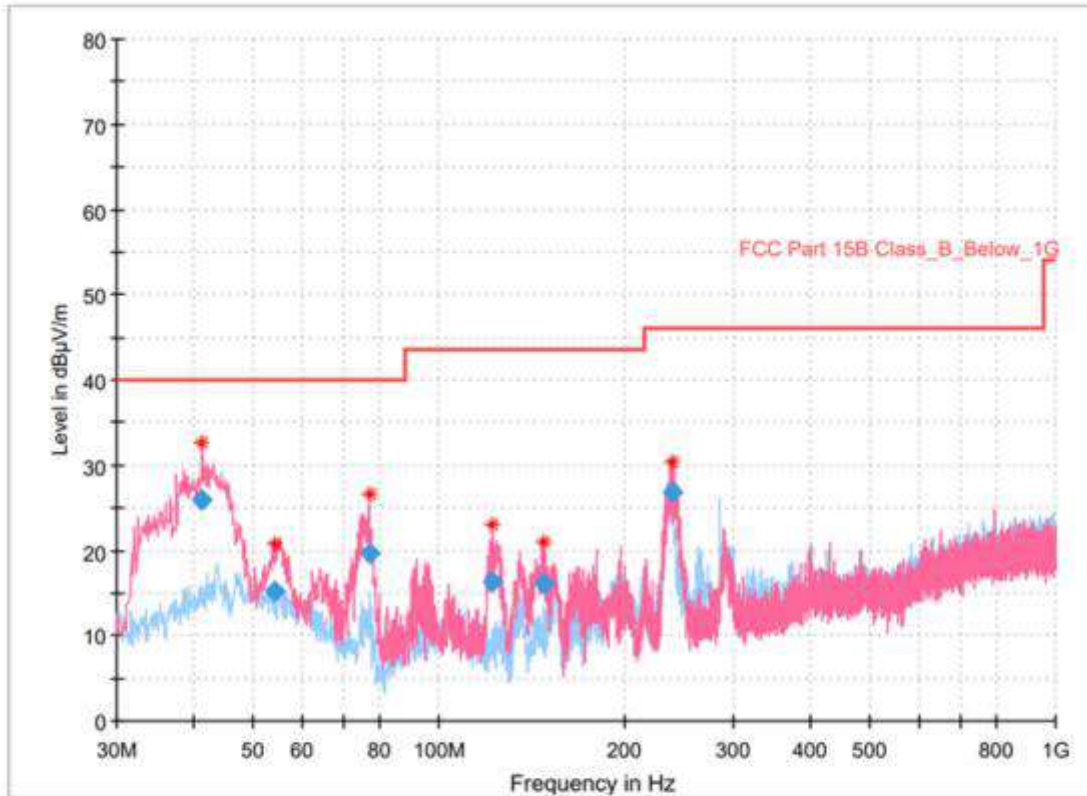
11.4.4.4 Measurement Results for Below 1 GHz_3-DH5



Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.513000	24.48	40.00	15.52	1000.0	120.000	100.1	V	292.0	-21.3
55.802000	15.45	40.00	24.55	1000.0	120.000	100.1	V	156.0	-20.7
76.366000	21.57	40.00	18.43	1000.0	120.000	100.1	V	266.0	-27.2
123.120000	15.83	43.50	27.67	1000.0	120.000	100.1	V	170.0	-25.2
144.848000	12.94	43.50	30.56	1000.0	120.000	100.1	V	0.0	-26.5
239.423000	26.68	46.00	19.32	1000.0	120.000	100.1	V	225.0	-22.4

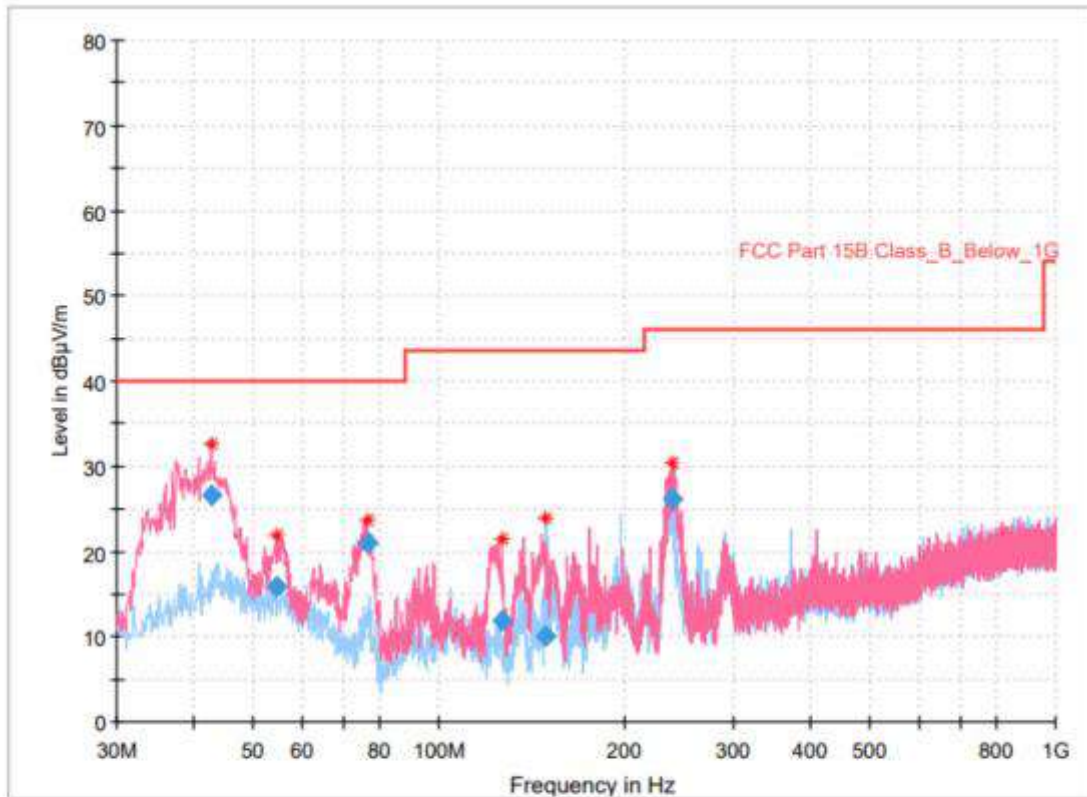
Low CH



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
41.349000	25.91	40.00	14.09	1000.0	120.000	100.1	V	226.0	-21.7
54.153000	15.12	40.00	24.88	1000.0	120.000	100.1	V	210.0	-20.5
77.045000	19.56	40.00	20.44	1000.0	120.000	100.1	V	316.0	-27.4
122.344000	16.37	43.50	27.13	1000.0	120.000	100.1	V	210.0	-25.1
147.564000	16.12	43.50	27.38	1000.0	120.000	100.1	V	210.0	-26.5
239.423000	26.90	46.00	19.10	1000.0	120.000	100.1	V	246.0	-22.4

Low CH



Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
42.707000	26.66	40.00	13.34	1000.0	120.000	100.1	V	159.0	-21.3
54.735000	15.81	40.00	24.19	1000.0	120.000	100.1	V	227.0	-20.5
76.366000	20.93	40.00	19.07	1000.0	120.000	100.1	V	0.0	-27.2
126.806000	11.77	43.50	31.73	1000.0	120.000	100.1	V	214.0	-25.7
148.922000	10.04	43.50	33.46	1000.0	120.000	100.1	H	0.0	-26.5
239.132000	26.25	46.00	19.75	1000.0	120.000	100.1	V	255.0	-22.4

Low CH



11.4.4.5 Measurement Results for Above 1 GHz_DH5

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
4 804.60	Peak	V	34.71	-4.30	39.01	73.98	34.97
	Average	V	20.91		25.21	53.98	28.77
5 318.00	Peak	V	40.01	-3.40	43.41	73.98	30.57
	Average	V	22.82		26.22	53.98	27.76
Mid CH							
4 882.80	Peak	V	35.74	-3.80	39.54	73.98	34.44
	Average	V	21.61		25.41	53.98	28.57
5 324.80	Peak	V	45.39	-3.40	48.79	73.98	25.19
	Average	V	23.32		26.72	53.98	27.26
High CH							
4 961.00	Peak	V	35.48	-3.60	39.08	73.98	34.90
	Average	V	21.84		25.44	53.98	28.54

- ※ Ant. Pol. : Antenna Polarization
- ※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain
- ※ Result = Reading + Corr. Factor
- ※ Margin = Limit - Result



11.4.4.6 Measurement Results for Above 1 GHz_3-DH5

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Corr. Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low CH							
4 802.90	Peak	V	34.21	-4.40	38.61	73.98	35.37
	Average	V	20.38		24.78	53.98	29.20
5 314.60	Peak	V	39.90	-3.50	43.40	73.98	30.58
	Average	V	22.47		25.97	53.98	28.01
Mid CH							
4 881.10	Peak	V	34.41	-3.80	38.21	73.98	35.77
	Average	V	21.43		25.23	53.98	28.75
High CH							
4 967.80	Peak	V	35.35	-3.60	38.95	73.98	35.03
	Average	V	21.73		25.33	53.98	28.65

- ※ Ant. Pol. : Antenna Polarization
- ※ Corr. Factor. : Antenna Factor + Cable Loss - Amplifier Gain
- ※ Result = Reading + Corr. Factor
- ※ Margin = Limit - Result



12. Power Line Conducted Emission

12.1 Operating environment

Temperature : 24 °C

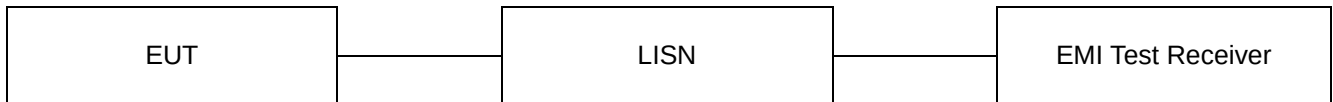
Relative humidity : 44 %

12.2 Measurement method

Standard : §15.207

12.3 Test setup

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

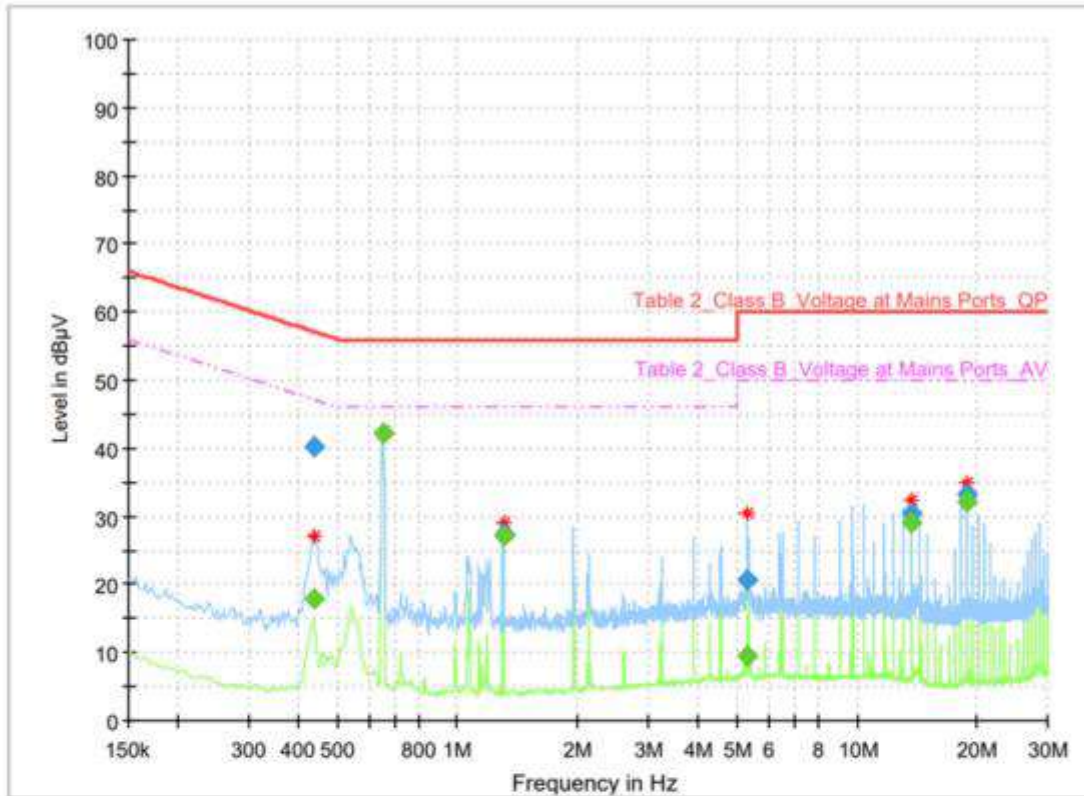


12.4 Test data

Operating mode : Transmit mode

Test Result : Pass

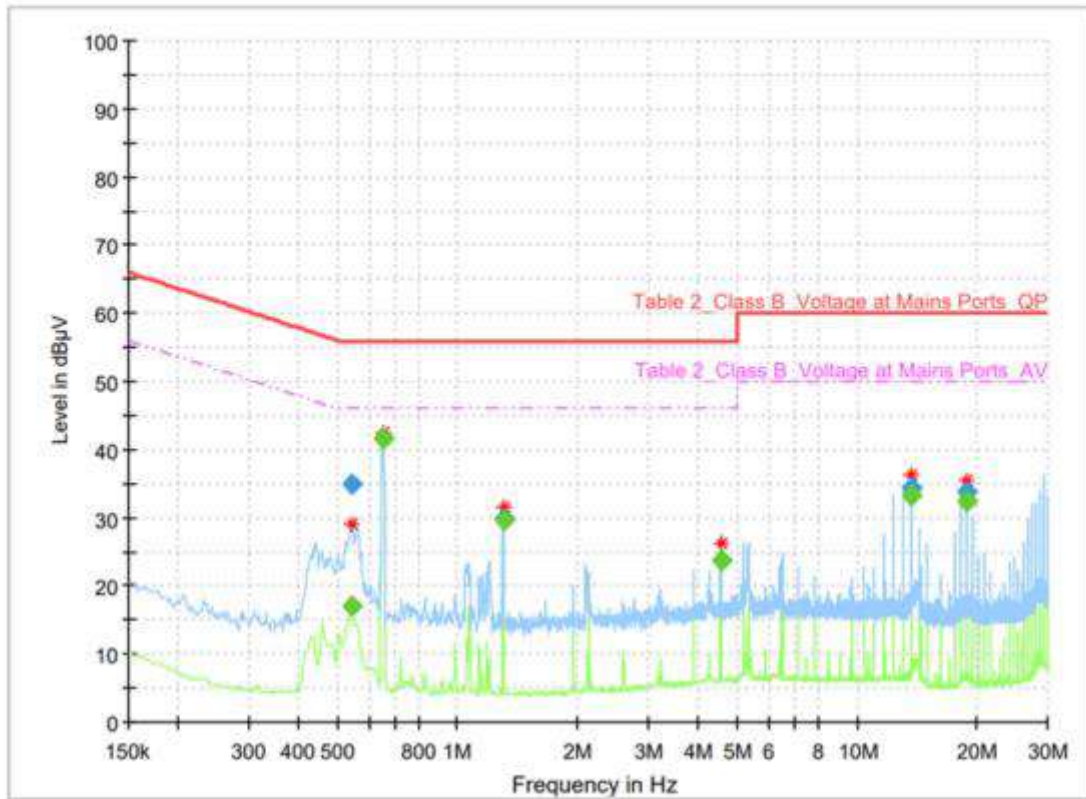
12.4.1 Measured Results & Graph



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.440	---	17.92	47.06	29.13	1000.0	9.000	L1	GND	10.61
0.440	40.20	---	57.06	16.86	1000.0	9.000	L1	GND	10.61
0.650	---	42.05	46.00	3.95	1000.0	9.000	L1	GND	10.60
0.650	42.20	---	56.00	13.80	1000.0	9.000	L1	GND	10.60
1.300	---	27.11	46.00	18.89	1000.0	9.000	L1	GND	10.59
1.300	27.51	---	56.00	28.49	1000.0	9.000	L1	GND	10.59
5.332	---	9.60	50.00	40.40	1000.0	9.000	L1	GND	10.64
5.332	20.75	---	60.00	39.25	1000.0	9.000	L1	GND	10.64
13.661	---	29.18	50.00	20.82	1000.0	9.000	L1	GND	10.71
13.661	30.50	---	60.00	29.50	1000.0	9.000	L1	GND	10.71
18.866	---	32.24	50.00	17.76	1000.0	9.000	L1	GND	10.76
18.866	33.37	---	60.00	26.63	1000.0	9.000	L1	GND	10.76

Live line



Final Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.546	---	16.97	46.00	29.03	1000.0	9.000	N	FLO	10.56
0.546	34.92	---	56.00	21.08	1000.0	9.000	N	FLO	10.56
0.650	---	41.74	46.00	4.26	1000.0	9.000	N	FLO	10.55
0.650	41.74	---	56.00	14.26	1000.0	9.000	N	FLO	10.55
1.300	---	29.51	46.00	16.49	1000.0	9.000	N	FLO	10.56
1.300	29.91	---	56.00	26.09	1000.0	9.000	N	FLO	10.56
4.556	---	23.74	46.00	22.26	1000.0	9.000	N	FLO	10.59
4.556	23.77	---	56.00	32.23	1000.0	9.000	N	FLO	10.59
13.659	---	33.14	50.00	16.86	1000.0	9.000	N	FLO	10.67
13.659	34.38	---	60.00	25.62	1000.0	9.000	N	FLO	10.67
18.863	---	32.51	50.00	17.50	1000.0	9.000	N	FLO	10.73
18.863	33.88	---	60.00	26.12	1000.0	9.000	N	FLO	10.73

Neutral line

- END -