TEST REPORT

No.I22N02158-BT

for

Guangdong OPPO Mobile Telecommunications Corp., Ltd.

Mobile Phone

Model Name: CPH2437

with

Hardware Version: 11

Software Version: ColorOS 13.0

FCC ID: R9C-CPH2437

Issued Date: 2022-12-02

Designation Number: CN1210

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

Test Laboratory:

SAICT, Shenzhen Academy of Information and Communications Technology

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22N02158-BT	Rev.0	1st edition	2022-12-02

Note: the latest revision of the test report supersedes all previous versions.

CONTENTS

1. Summary of Test Report

1.1. Test Items

Description	Mobile Phone
Model Name	CPH2437
Applicant's name	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Manufacturer's Name	Guangdong OPPO Mobile Telecommunications Corp., Ltd.

1.2. Test Standards

FCC Part15-2021; ANSI C63.10-2013.

1.3. Test Result

Pass

Please refer to "5.2.Test Results"

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 51800

1.5. Project data

Testing Start Date:	2022-10-21
Testing End Date:	2022-11-30

1.6. Signature

Lin Zechuang
(Prepared this test report)

An Ran
(Reviewed this test report)

Zhang Bojun
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address:	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China
Contact Person	Mei XiLi
E-Mail	(86)76986076999
Telephone:	meixili@oppo.com
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2.2. Manufacturer Information

Company Name:	Guangdong OPPO Mobile Telecommunications Corp., Ltd.
Address:	NO.18 Haibin Road, Wusha Village, Chang'an Town, Dongguan City, Guangdong, China
Contact Person	Mei XiLi
E-Mail	(86)76986076999
Telephone:	meixili@oppo.com
Fax:	/

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Mobile Phone
Model Name	CPH2437
Frequency Band	ISM 2400MHz~2483.5MHz
Equipment type	Bluetooth® BR/EDR
Type of Modulation	GFSK/π/4 DQPSK/8DPSK
Number of Channels	79
Antenna Type	Integrated antenna
Antenna Gain	Antenna 0:-1.69dBi; Antenna 12:-0.31dBi.
Power Supply	3.89V DC by Battery
FCC ID	R9C-CPH2437
Condition of EUT as received	No abnormality in appearance

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of Receipt
UT05aa	869315060028091 869315060028083	11	ColorOS 13.0	2022-10-18
UT10aa	869315060020270 869315060020262	11	ColorOS 13.0	2022-10-19
UT11aa	869315060020734 869315060020726	11	ColorOS 13.0	2022-10-19

*EUT ID: is used to identify the test sample in the lab internally.
UT05aa is used for conduction test, UT10aa is used for radiation test, and UT11aa is used for AC Power line Conducted Emission test.

3.3. Internal Identification of AE used during the test

AE No.	Description	AE ID*
AE1	Battery	/
AE2	Charger	/
AE3	USB Cable	/

AE1-1

Model	BLP971
Manufacturer	Dongguan NVT Techonology Co., Ltd.
Capacity	3110mAh
Nominal Voltage	3.89 V

AE1-2

Model	BLP969
Manufacturer	Dongguan NVT Techonology Co., Ltd.
Capacity	1190mAh
Nominal Voltage	3.89 V

AE2

Model	VCB7CAUH
Manufacturer	Jiangsu ChenYang Electronics Co,. Ltd.
Specification	American Standard Charger

AE3

Model	DL152
Manufacturer	/

*AE ID and AE Label: is used to identify the test sample in the lab internally.

3.4. General Description

The Equipment under Test (EUT) is a model of Smart Phone with integrated antenna and battery.
It consists of normal options: Lithium Battery and Charger and USB Cable.
Manual and specifications of the EUT were provided to fulfil the test.
Samples undergoing test were selected by the client.

4. Reference Documents

4.1. Documents supplied by applicant

EUT feature information is supplied by the applicant or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 15	FCC CFR 47, Part 15, Subpart C: 15.205 Restricted bands of operation; 15.209 Radiated emission limits, general requirements; 15.247 Operation within the bands 902–928MHz, 2400–2483.5 MHz, and 5725–5850 MHz	2021
ANSI C63.10	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	2013

5. Test Results

5.1. Testing Environment

Normal Temperature: 15~35℃

Relative Humidity: 20~75%

5.2. Test Results

No	Test cases	Sub-clause of Part 15C	Verdict
0	Antenna Requirement	15.203	**P**
1	Maximum Peak Output Power	15.247 (b)	**P**
2	Band Edges Compliance	15.247 (d)	**P**
3	Conducted Spurious Emission	15.247 (d)	**P**
4	Radiated Spurious Emission	15.247,15.205,15.209	**P**
5	Occupied 20dB bandwidth	15.247(a)	/
6	Time of Occupancy(Dwell Time)	15.247(a)	**P**
7	Number of Hopping Channel	15.247(a)	**P**
8	Carrier Frequency Separation	15.247(a)	**P**
9	AC Power line Conducted Emission	15.107,15.207	**P**

See **ANNEX A** for details.

5.3. Statements

SAICT has evaluated the test cases requested by the applicant/manufacturer as listed in section 5.2 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in section 4.2.

Disclaimer:

A. After confirmation with the customer, the sample information provided by the customer may affect the validity of the measurement results in this report, and the impact and consequences arising therefrom shall be borne by the customer.

B. The samples in this report are provided by the customer, and the test results are only applicable to the samples received.

6. Test Equipments Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Vector Signal Analyzer	FSV40	100903	Rohde & Schwarz	2022-12-29	1 year
2	Power Sensor	U2021XA	MY55430013	Keysight	2022-12-29	1 year
3	Data Acquisition	U2531A	TW55443507	Keysight	/	/
4	RF Control Unit	JS0806-2	21C8060398	Tonscend	2023-05-08	1 year
5	Wireless Connective Tester	CMW270	100540	Rohde & Schwarz	2023-03-13	1 year

Radiated test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	Test Receiver	ESR7	101676	Rohde & Schwarz	2023-11-23	1 year
2	BiLog Antenna	3142E	0224831	ETS-Lindgren	2024-05-27	3 years
3	Horn Antenna	3117	00066577	ETS-Lindgren	2025-04-17	3 years
4	Anechoic Chamber	FACT3-2.0	1285	ETS-Lindgren	2023-05-29	2 years
5	Spectrum Analyzer	FSV40	101192	Rohde & Schwarz	2023-01-12	1 year
6	Loop Antenna	HLA6120	35779	TESEQ	2025-05-10	3 years
7	Horn Antenna	QSH-SL-18-26-S-20	17013	Q-par	2023-01-06	3 years
8	Test Receiver	ESCI	100702	Rohde & Schwarz	2023-01-12	1 year
9	LISN	ENV216	102067	Rohde & Schwarz	2023-07-14	1 year

Test software

No.	Equipment	Manufacturer	Version
1	JS1120-3	Tonscend	3.2
2	EMC32	Rohde & Schwarz	10.50.40

EUT is engineering software provided by the customer to control the transmitting signal.
The EUT was programmed to be in continuously transmitting mode.

7. Laboratory Environment

Shielded room

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

Anechoic chamber

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	<±4 dB, 3 m distance, from 30 to 1000 MHz
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 18 GHz, 3m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

8. Measurement Uncertainty

Test Name	Uncertainty (*k*=2)	
1. Maximum Peak Output Power	1.32dB	
2. Band Edges Compliance	1.92dB	
3. Transmitter Spurious Emission - Conducted	30MHz≤f<1GHz	1.41dB
	1GHz≤f<7GHz	1.92dB
	7GHz≤f<13GHz	2.31dB
	13GHz≤f≤26GHz	2.61dB
4.. Transmitter Spurious Emission - Radiated	9kHz≤f<30MHz	1.79dB
	30MHz≤f<1GHz	4.86dB
	1GHz≤f<18GHz	4.82dB
	18GHz≤f≤40GHz	2.90dB
5. 20dB Bandwidth	4.56kHz	
6. Time of Occupancy (Dwell Time) & Number of Hopping Channels	0.58ms	
7. Carrier Frequency Separation	4.56kHz	
8. AC Power line Conducted Emission	150kHz≤f≤30MHz	2.62dB

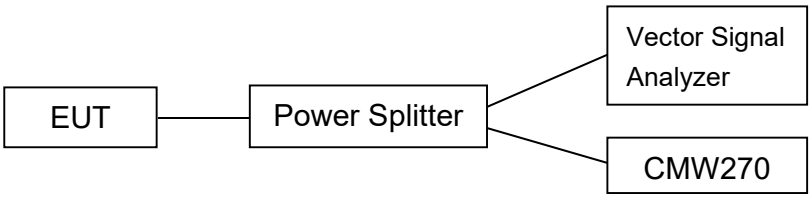
ANNEX A: Detailed Test Results

Test Configuration

The measurement is made according to ANSI C63.10.

1) Conducted Measurements

1. Connect the EUT to the test system correctly.
2. Set the EUT to the required work mode.
3. Set the EUT to the required channel.
4. Set the EUT hopping mode (hopping on or hopping off).
5. Set the spectrum analyzer to start measurement.
6. Record the values.

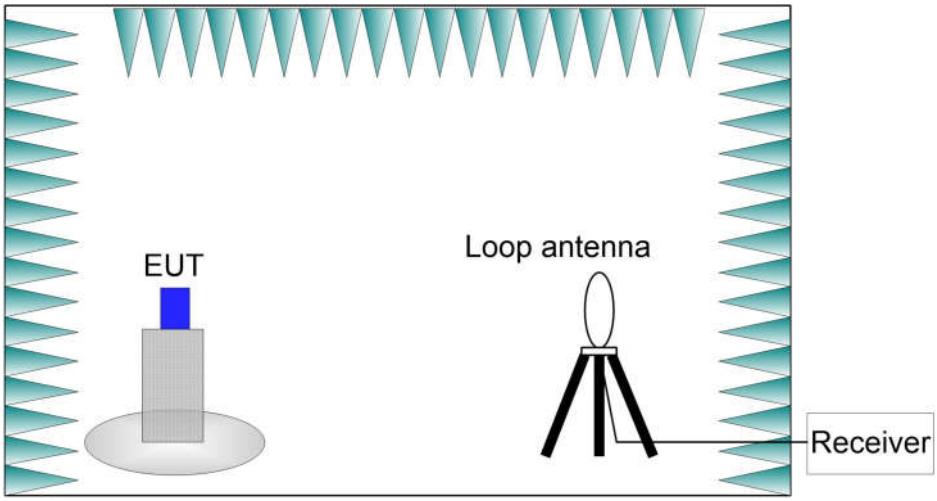


2) Radiated Measurements

Test setup:

9kHz-30MHz：

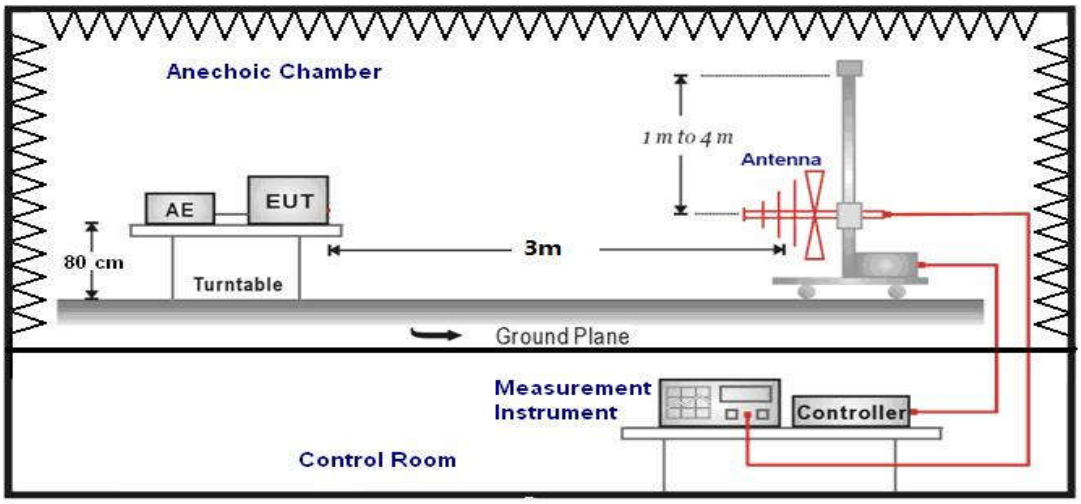
The EUT are measured in a anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The center of the receiving loop antenna is 1.0 meter above the ground. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the receiver antenna polarization.



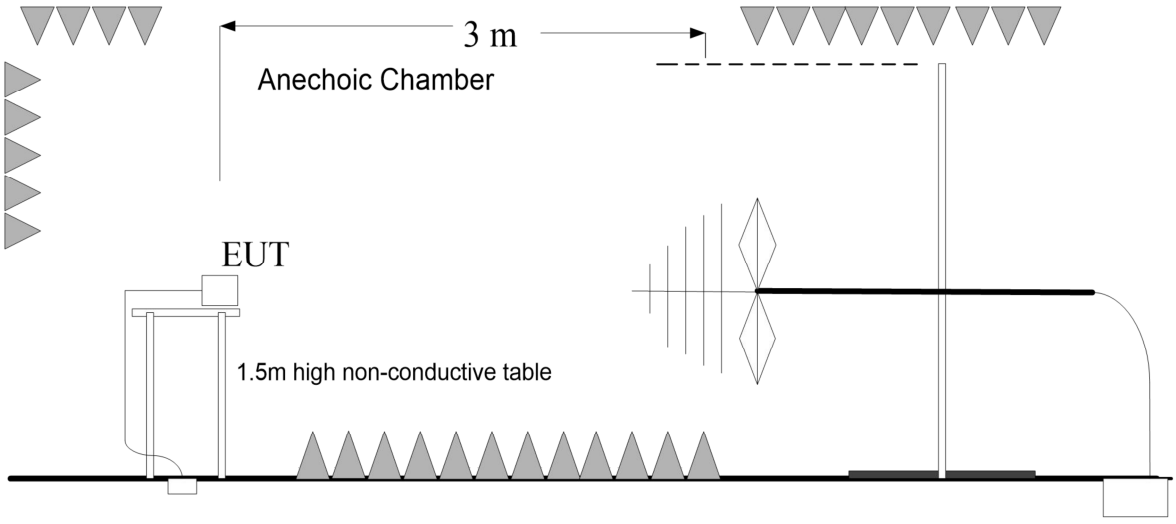
30MHz-26.5GHz:

The EUT are measured in a anechoic chamber. The EUT is placed on a non-conductive stand of 80cm high, and at a measurement distance of 3m from the receiving antenna. The center of the receiving antenna is 1.0 meter to 4.0 meter above the ground. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT and adjusting the receiver antenna polarization.

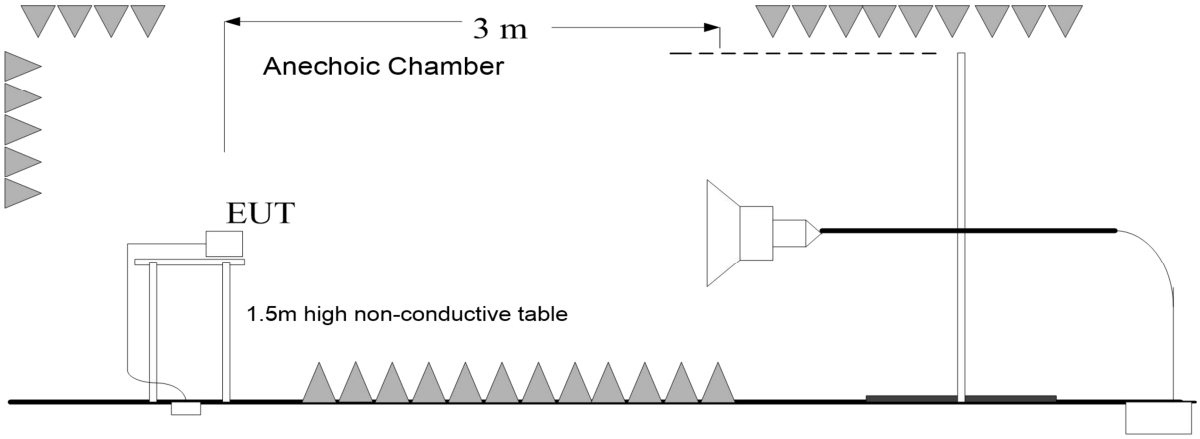
30MHz-1GHz:



1GHz-3GHz:

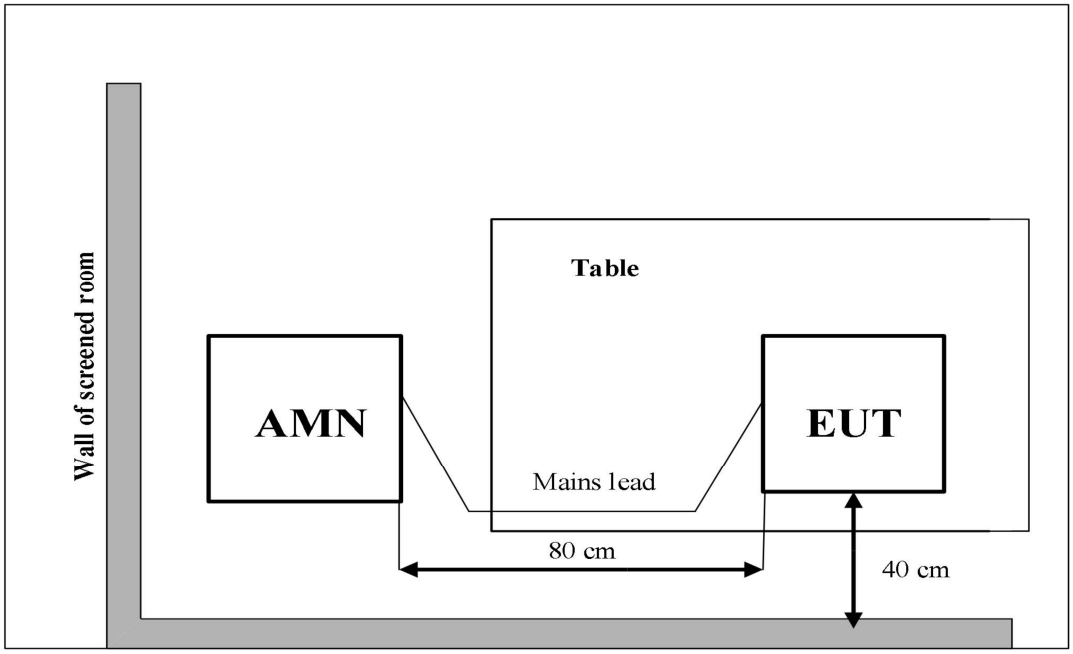


3GHz-26.5GHz:



3) AC Power line Conducted Emission Measurement

The EUT is working as Bluetooth terminal. A communication link of Bluetooth is set up with a System Simulator (SS). The EUT is commanded to operate at maximum transmitting power.



A.0 Antenna requirement

Measurement Limit:

Standard	Requirement
FCC CRF Part 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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Conclusion: The Directional gains of antenna used for transmitting is: Antenna 0:-1.69dBi; Antenna 12:-0.31dBi.

The RF transmitter uses an integrate antenna without connector.

A.1 Maximum Peak Output Power

Method of Measurement: See ANSI C63.10-clause 7.8.5.

A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.

Measurement Limit:

Standard	Limit (dBm)
FCC CRF Part 15.247(b)	< 30

Measurement Results:

Antenna 0:

Mode	Peak Conducted Output Power (dBm)		
	2402MHz (CH0)	2441MHz (CH39)	2480MHz (CH78)
GFSK	9.07	9.39	8.62
π/4 DQPSK	8.51	8.70	7.90
8DPSK	8.67	8.82	8.14

Antenna 12:

Mode	Peak Conducted Output Power (dBm)		
	2402MHz (CH0)	2441MHz (CH39)	2480MHz (CH78)
GFSK	11.89	12.54	11.83
π/4 DQPSK	11.17	11.81	11.34
8DPSK	11.45	11.92	11.56

Note: According to the customer's description, BLE supports switching between the two antennas, but does not support MIMO. Antenna 12 is selected as the antenna with worst condition.

Conclusion: Pass

A.2 Band Edges Compliance

Method of Measurement: See ANSI C63.10-clause 7.8.6.

Measurement Limit:

Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	> 20

Measurement Result:

Mode	Frequency (MHz)	Hopping	Test Results	Conclusion
GFSK	2402(CH0)	OFF	Fig.1	**P**
	2480(CH78)	OFF	Fig.2	**P**
	2402(CH0)	ON	Fig.3	**P**
	2480(CH78)	ON	Fig.4	**P**
π/4 DQPSK	2402(CH0)	OFF	Fig.5	**P**
	2480(CH78)	OFF	Fig.6	**P**
	2402(CH0)	ON	Fig.7	**P**
	2480(CH78)	ON	Fig.8	**P**
8DPSK	2402(CH0)	OFF	Fig.9	**P**
	2480(CH78)	OFF	Fig.10	**P**
	2402(CH0)	ON	Fig.11	**P**
	2480(CH78)	ON	Fig.12	**P**

See below for test graphs.

Conclusion: Pass

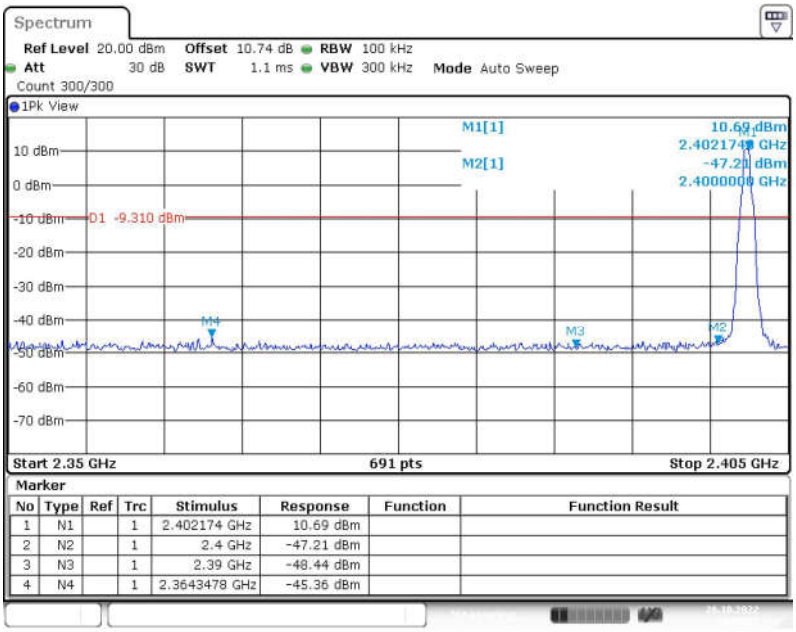


Fig. 1 Band Edges (GFSK, CH0, Hopping OFF)

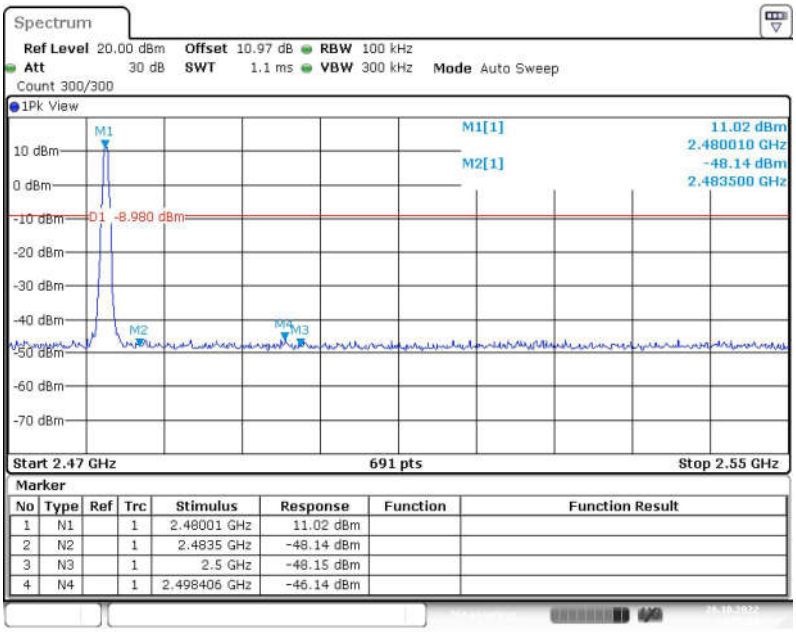


Fig. 2 Band Edges (GFSK, CH78, Hopping OFF)

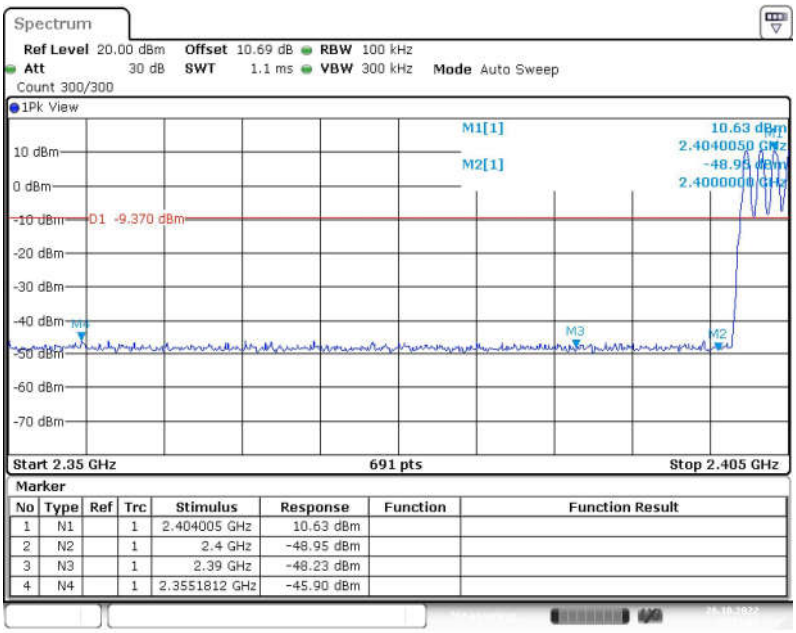


Fig. 3 Band Edges (GFSK, CH0, Hopping ON)

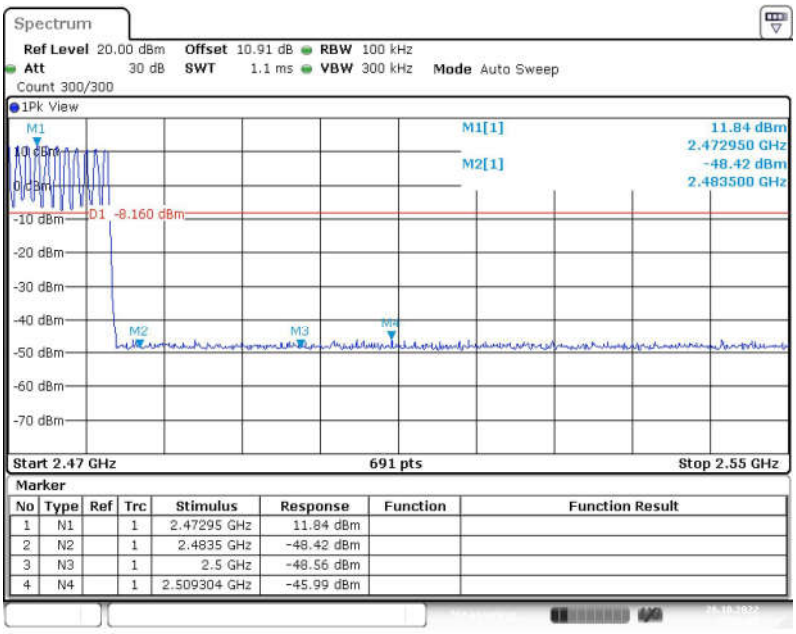


Fig. 4 Band Edges (GFSK, CH78, Hopping ON)

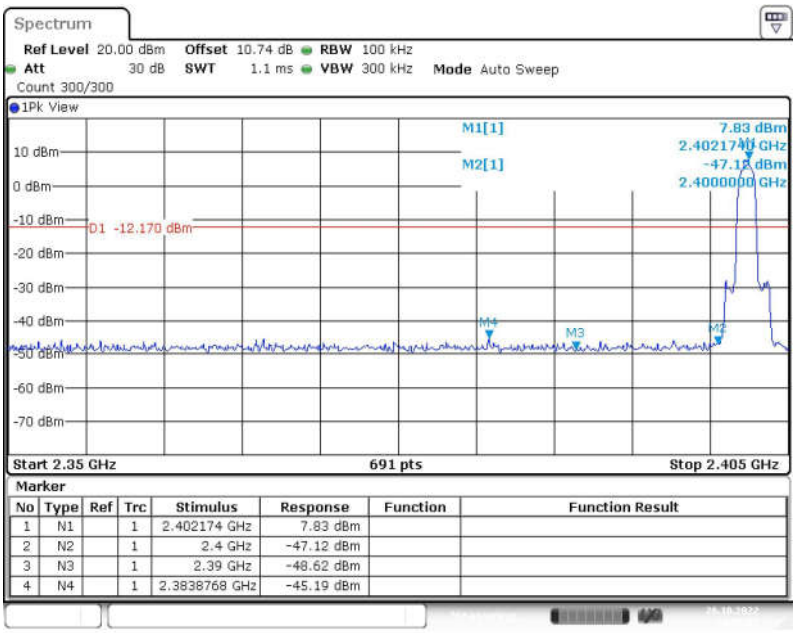


Fig. 5 Band Edges (π/4 DQPSK, CH0, Hopping OFF)

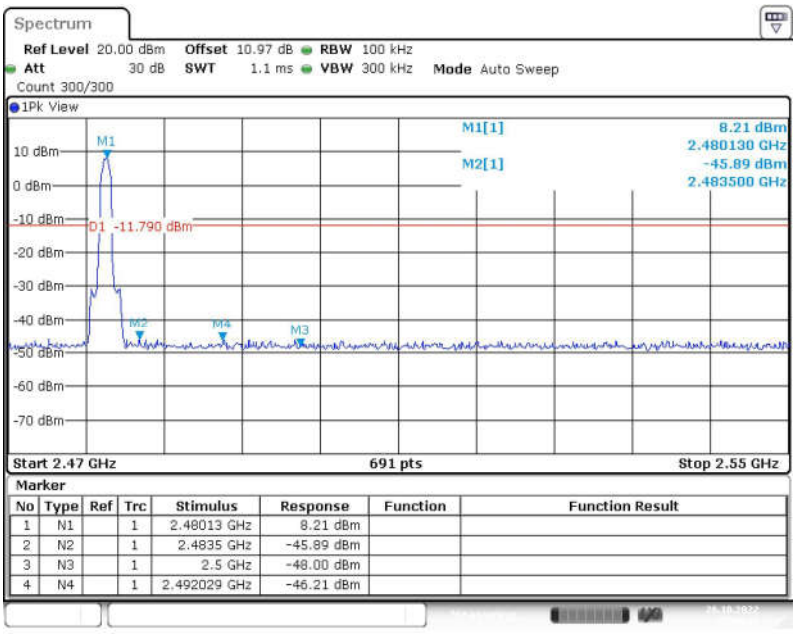


Fig. 6 Band Edges (π/4 DQPSK, CH78, Hopping OFF)

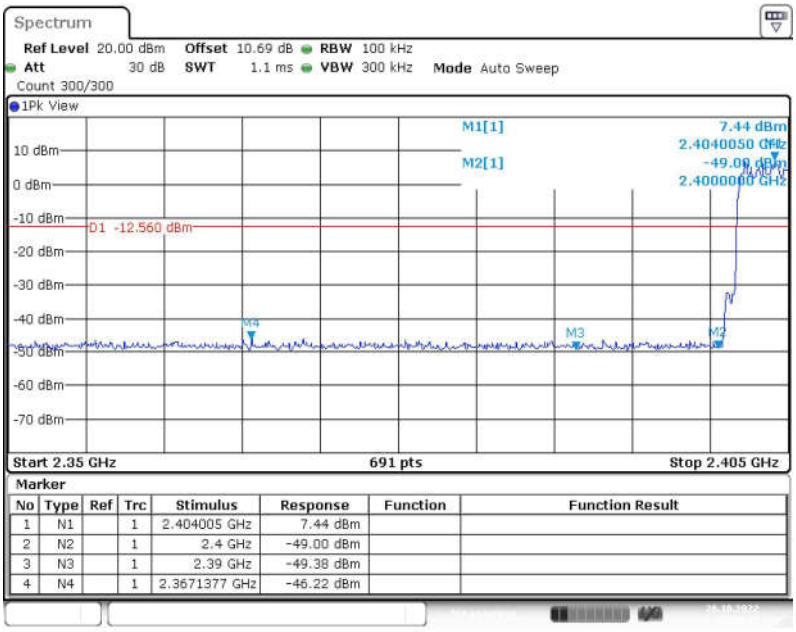


Fig. 7 Band Edges (π/4 DQPSK, CH0, Hopping ON)

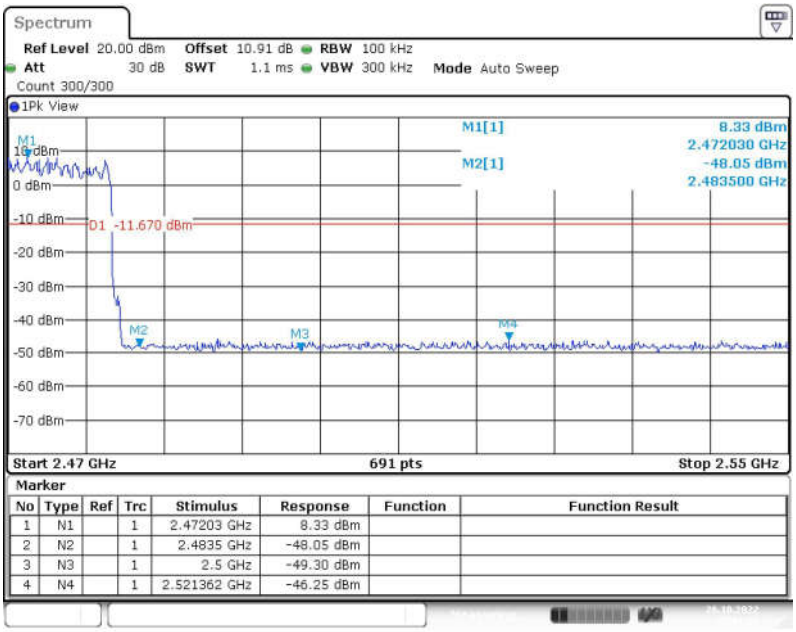


Fig. 8 Band Edges (π/4 DQPSK, CH78, Hopping ON)

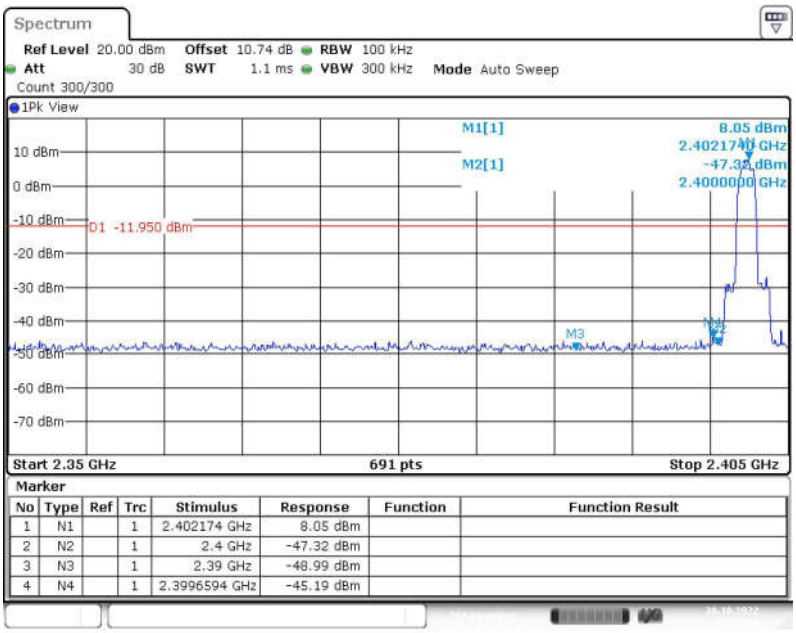


Fig. 9 Band Edges (8DPSK, CH0, Hopping OFF)

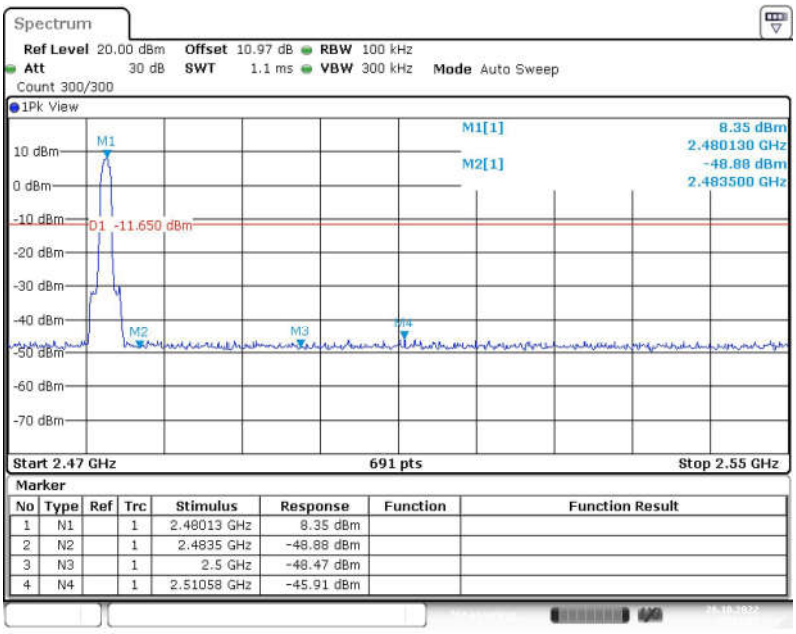


Fig. 10 Band Edges (8DPSK, CH78, Hopping OFF)

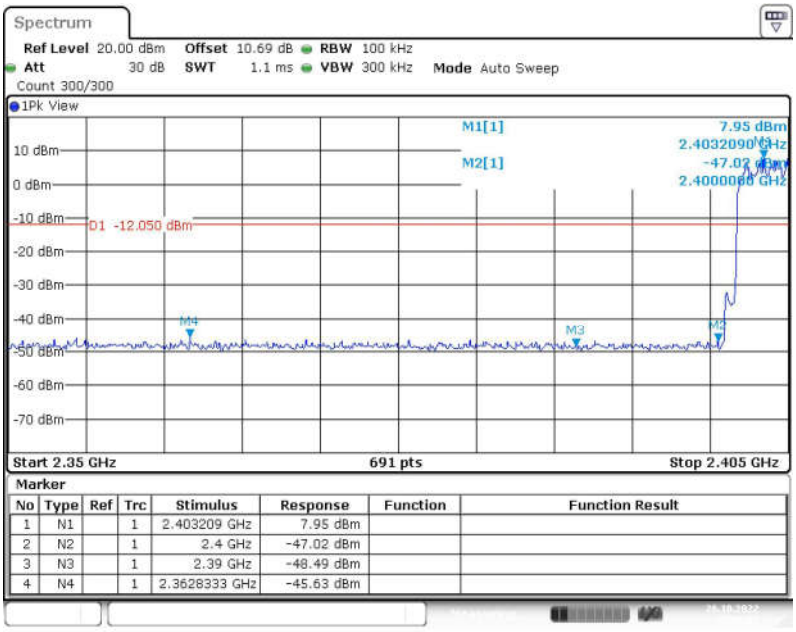


Fig. 11 Band Edges (8DPSK, CH0, Hopping ON)

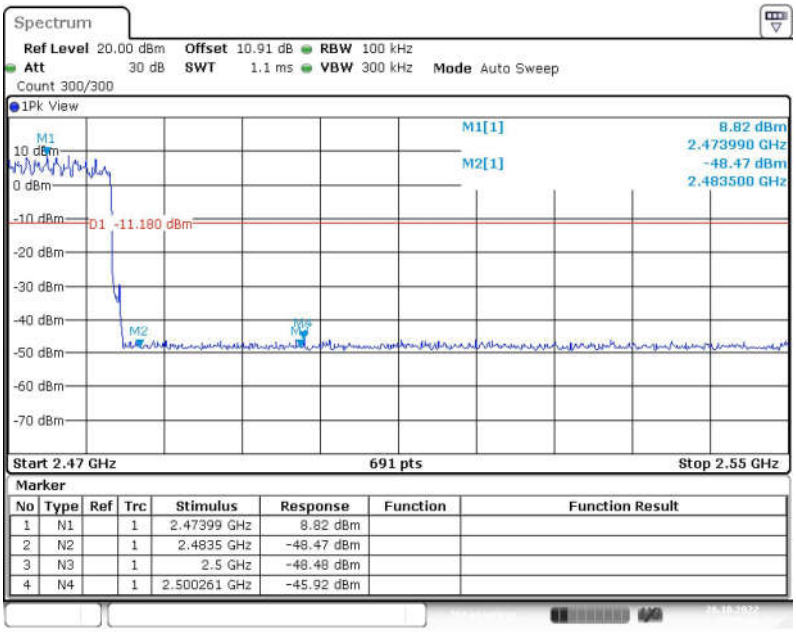


Fig. 12 Band Edges (8DPSK, CH78, Hopping ON)

A.3 Conducted Emission

Method of Measurement: See ANSI C63.10-clause 7.8.8.

Measurement Limit:

Standard	Limit (dBm)
FCC 47 CFR Part 15.247 (d)	20dBm below peak output power in 100kHz bandwidth

Measurement Results:

Mode	Frequency (MHz)	Frequency Range	Test Results	Conclusion
GFSK	2402(CH0)	1GHz-26.5GHz	Fig.13	**P**
	2441(CH39)	1GHz-26.5GHz	Fig.14	**P**
	2480(CH78)	1GHz-26.5GHz	Fig.15	**P**
π/4 DQPSK	2402(CH0)	1GHz-26.5GHz	Fig.16	**P**
	2441(CH39)	1GHz-26.5GHz	Fig.17	**P**
	2480(CH78)	1GHz-26.5GHz	Fig.18	**P**
8DPSK	2402(CH0)	1GHz-26.5GHz	Fig.19	**P**
	2441(CH39)	1GHz-26.5GHz	Fig.20	**P**
	2480(CH78)	1GHz-26.5GHz	Fig.21	**P**
/	All channels	30MHz -1GHz	Fig.22	**P**

See below for test graphs.

Conclusion: Pass

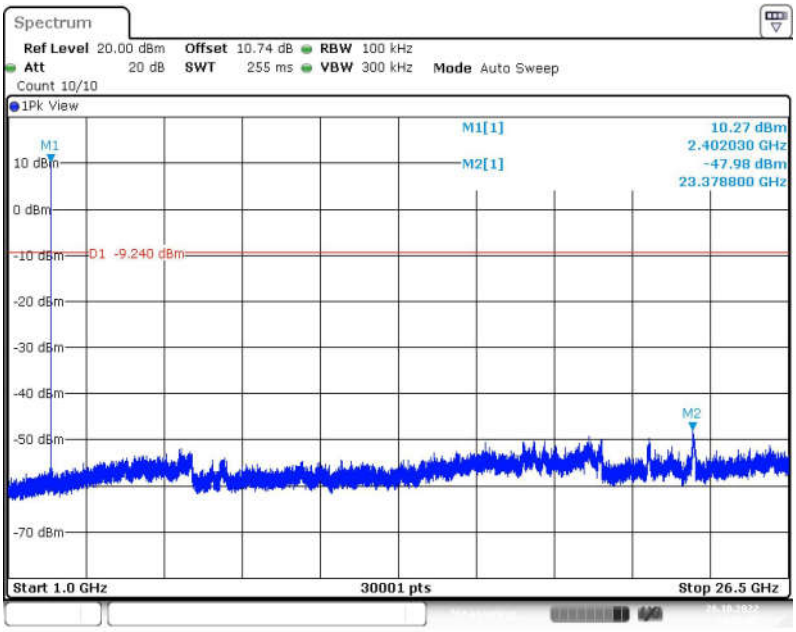


Fig. 13 Conducted Spurious Emission (GFSK, CH0, 1GHz-26.5GHz)

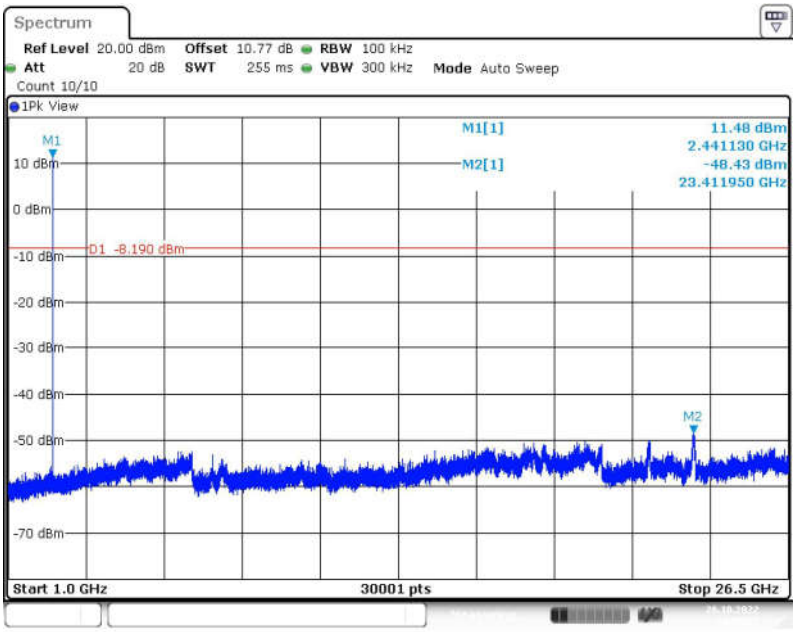


Fig. 14 Conducted Spurious Emission (GFSK, CH39, 1GHz-26.5GHz)

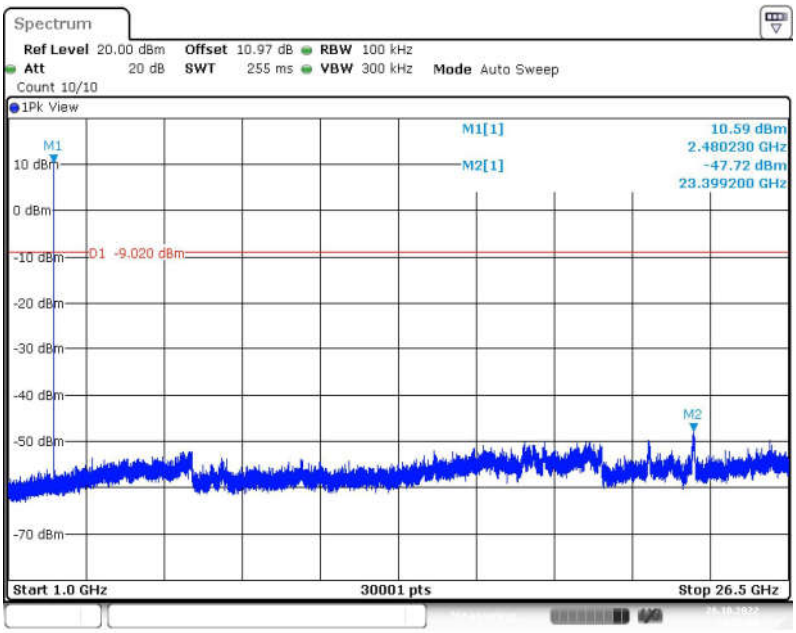


Fig. 15 Conducted Spurious Emission (GFSK, CH78, 1GHz-26.5GHz)

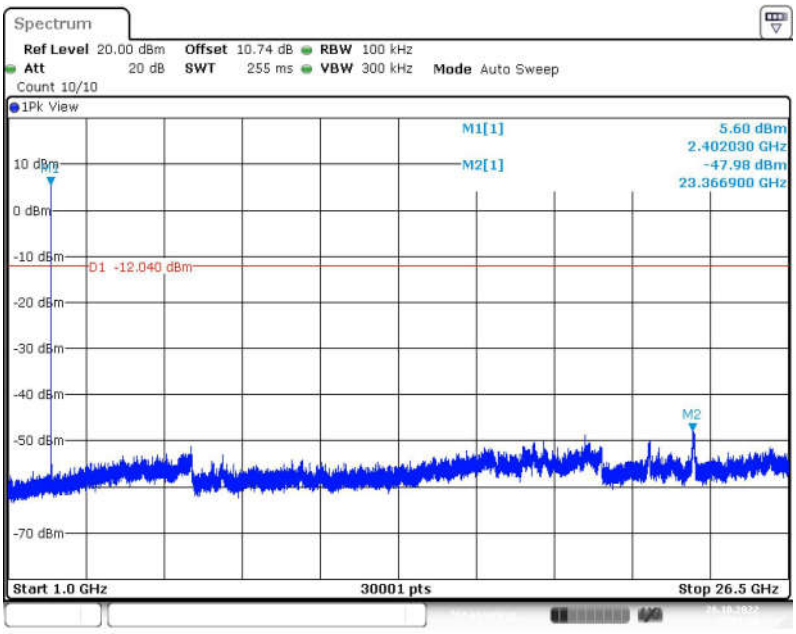


Fig. 16 Conducted Spurious Emission (π/4 DQPSK, CH0, 1GHz-26.5GHz)

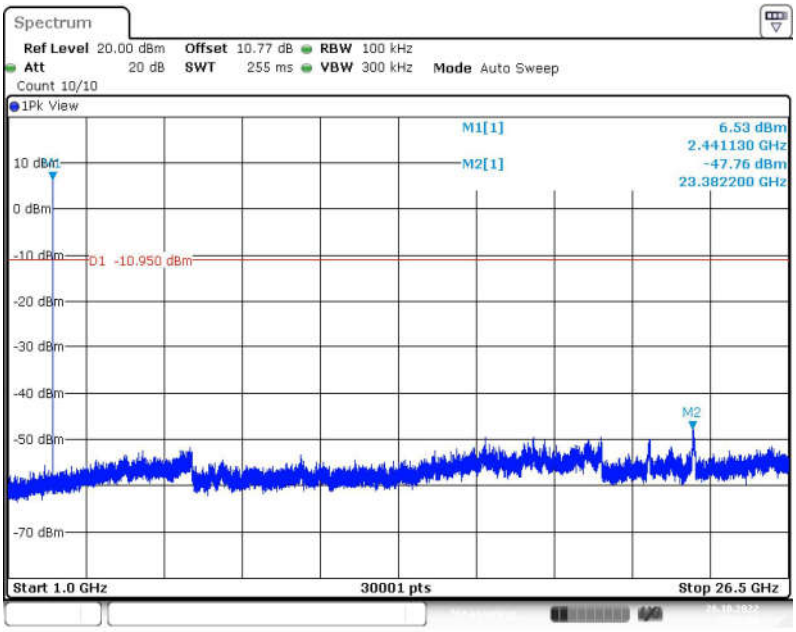


Fig. 17 Conducted Spurious Emission (π/4 DQPSK, CH39, 1GHz-26.5GHz)

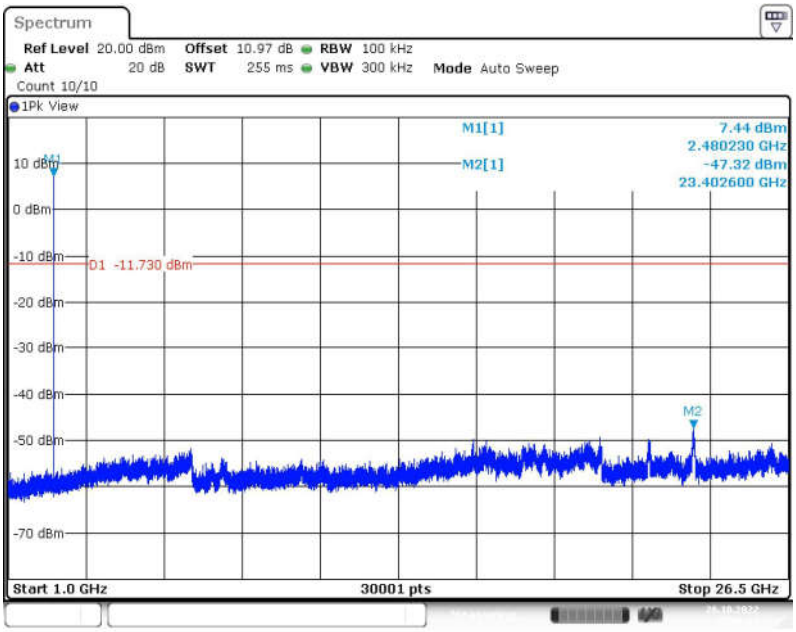


Fig. 18 Conducted Spurious Emission (π/4 DQPSK, CH78, 1GHz-26.5GHz)

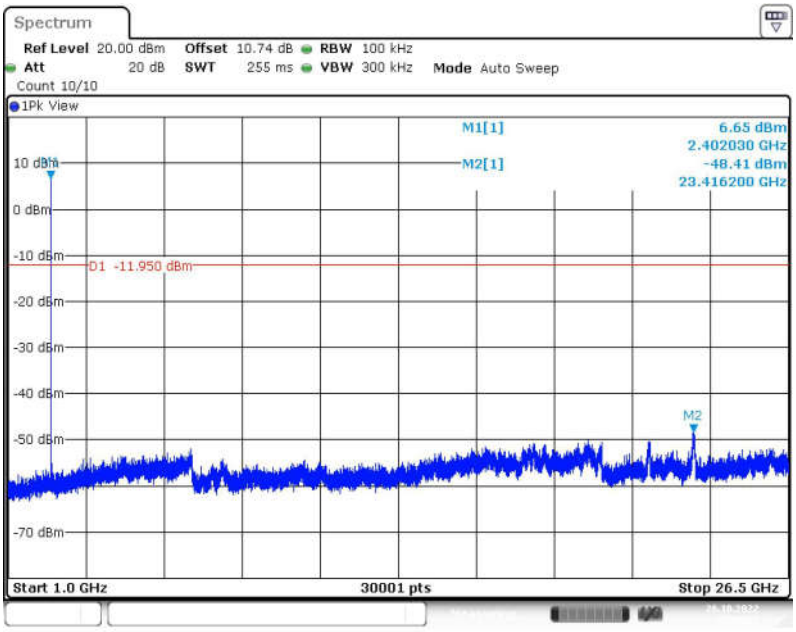


Fig. 19 Conducted Spurious Emission (8DPSK, CH0, 1GHz-26.5GHz)

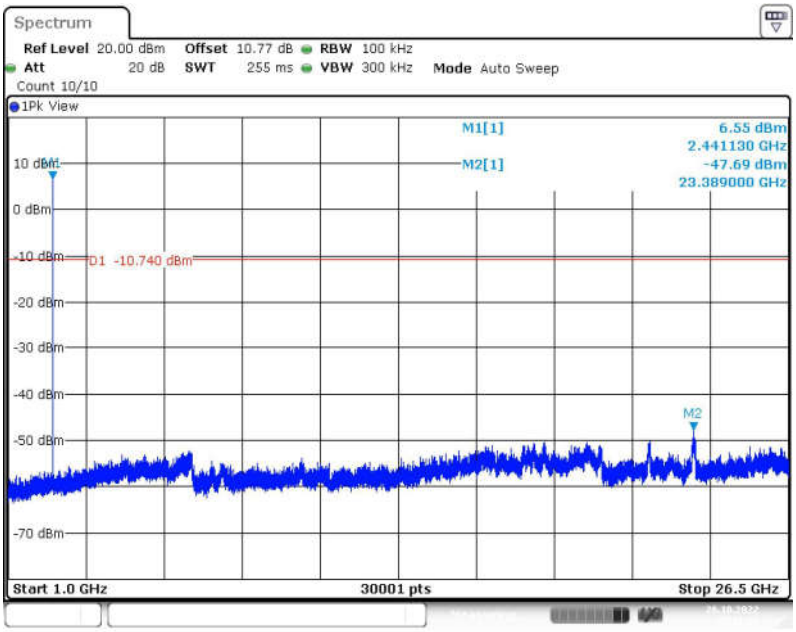


Fig. 20 Conducted Spurious Emission (8DPSK, CH39, 1GHz-26.5GHz)

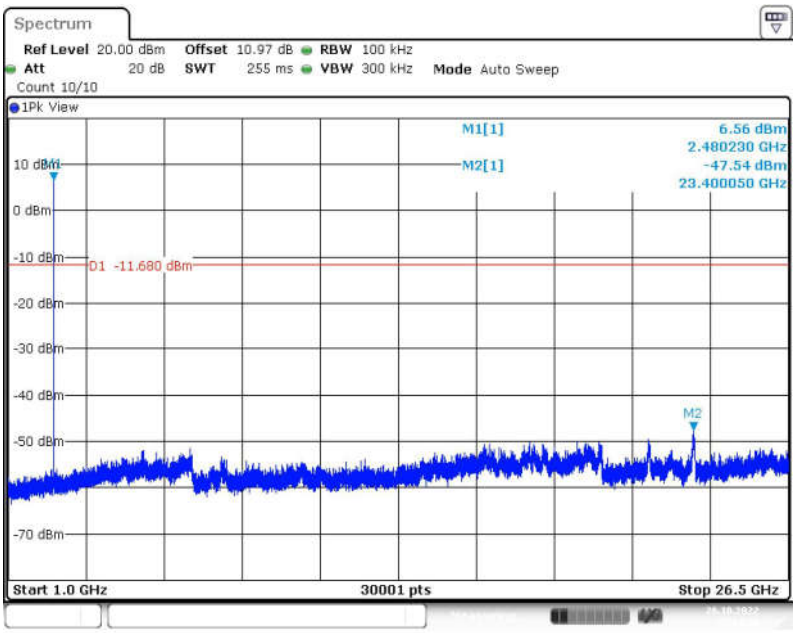


Fig. 21 Conducted Spurious Emission (8DPSK, CH78, 1GHz-26.5GHz)

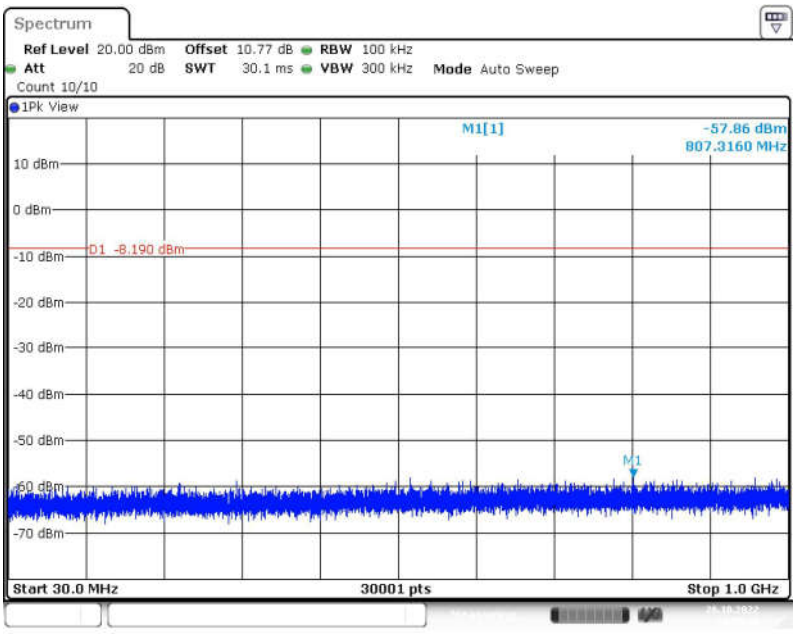


Fig. 22 Conducted Spurious Emission (All Channels, 30MHz -1GHz)

A.4 Radiated Emission

Method of Measurement: See ANSI C63.10-clause 6.3&6.4&6.5&6.6.

Measurement Limit:

Standard	Limit (dBm)
FCC 47 CFR Part 15.247, 15.205, 15.209	20dBm below peak output power

In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

Limit in restricted band:

Frequency of emission (MHz)	Field strength(μV/m)	Measurement distance(meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Condition:

The EUT was placed on a non-conductive table. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz/300kHz	5
1000-4000	1MHz/3MHz	15
4000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Note: According to the performance evaluation, the radiated emission margin of EUT is over 20dB in the band from 9kHz to 30MHz. Therefore, the measurement starts from 30MHz to tenth harmonic. The measurement results include the horizontal polarization and vertical polarization measurements. For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Y plane) were recorded in this report.

Measurement Results:

Mode	Frequency (MHz)	Frequency Range	Test Results	Conclusion
GFSK	2402(CH0)	1 GHz ~18 GHz	Fig.23	P
	2441(CH39)	1 GHz ~18 GHz	Fig.24	P
	2480(CH78)	1 GHz ~18 GHz	Fig.25	P
	Restricted Band(CH0)	2.38 GHz ~ 2.45 GHz	Fig.26	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.27	P
π/4 DQPSK	2402(CH0)	1 GHz ~18 GHz	Fig.28	P
	2441(CH39)	1 GHz ~18 GHz	Fig.29	P
	2480(CH78)	1 GHz ~18 GHz	Fig.30	P
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.31	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.32	P
8DPSK	2402(CH0)	1 GHz ~18 GHz	Fig.33	P
	2441(CH39)	1 GHz ~18 GHz	Fig.34	P
	2480(CH78)	1 GHz ~18 GHz	Fig.35	P
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.36	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.37	P
/	All channels	9 kHz ~30 MHz	Fig.38	P
		30 MHz ~1 GHz	Fig.39	P
		18 GHz ~26.5 GHz	Fig.40	P

Worst Case Result

GFSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
2981.785714	52.11	74.00	20.89	V	6.8
5986.800000	50.37	74.00	24.63	H	5.0
9504.000000	46.79	74.00	28.21	H	7.0
11666.571429	49.87	74.00	25.13	H	9.8
17106.857143	54.56	74.00	19.44	H	18.4
17994.000000	55.63	74.00	19.37	H	19.2

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
2981.785714	39.75	54.00	14.25	V	6.8
5986.800000	36.34	54.00	17.66	H	5.0
9504.000000	34.52	54.00	20.48	H	7.0
11666.571429	37.39	54.00	17.61	H	9.8
17106.857143	43.64	54.00	11.36	H	18.4
17994.000000	43.83	54.00	11.17	H	19.2

π/4 DQPSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4882.200000	46.55	74.00	27.45	V	3.7
8186.571429	45.20	74.00	28.80	V	6.0
10450.714286	46.64	74.00	27.36	V	9.0
13306.714286	49.11	74.00	24.89	V	11.2
14929.714286	50.96	74.00	23.04	V	12.9
17265.857143	53.75	74.00	20.25	V	18.2

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4882.200000	36.83	54.00	17.17	V	3.7
8186.571429	35.12	54.00	18.88	V	6.0
10450.714286	36.49	54.00	17.51	V	9.0
13306.714286	36.37	54.00	17.63	V	11.2
14929.714286	38.74	54.00	15.26	V	12.9
17265.857143	41.82	54.00	12.18	V	18.2

8DPSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4881.900000	46.99	74.00	27.01	H	3.7
8273.142857	45.91	74.00	28.09	V	6.0
10422.000000	47.14	74.00	26.86	H	9.0
12886.285714	49.06	74.00	24.94	V	11.0
14826.000000	49.71	74.00	24.29	H	12.9
16904.571429	54.57	74.00	19.43	H	18.1

Frequency (MHz)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Corr. (dB/m)
4881.900000	38.12	54.00	15.88	H	3.7
8273.142857	35.46	54.00	18.54	V	6.0
10422.000000	37.37	54.00	16.63	H	9.0
12886.285714	36.73	54.00	17.27	V	11.0
14826.000000	38.19	54.00	15.81	H	12.9
16904.571429	43.39	54.00	10.62	H	18.1

Note:

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”, and Antenna Factor, the gain of the preamplifier, the cable loss. P_{Mea} is the field strength recorded from the instrument. The measurement results are obtained as described below:

Result= P_{Mea} +Cable Loss +Antenna Factor-Gain of the preamplifier.

See below for test graphs.

Conclusion: Pass

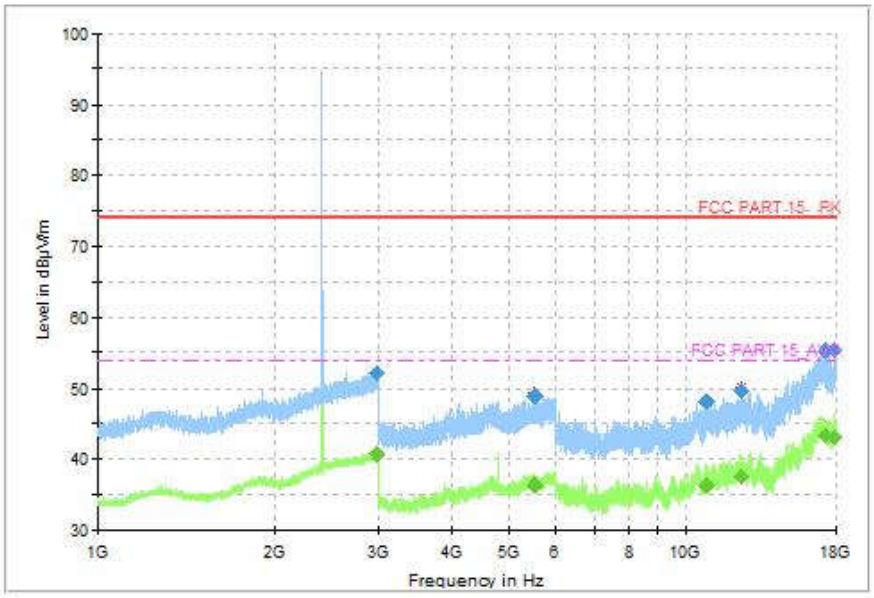


Fig. 23 Radiated Spurious Emission (GFSK, CH0, 1GHz ~18GHz)

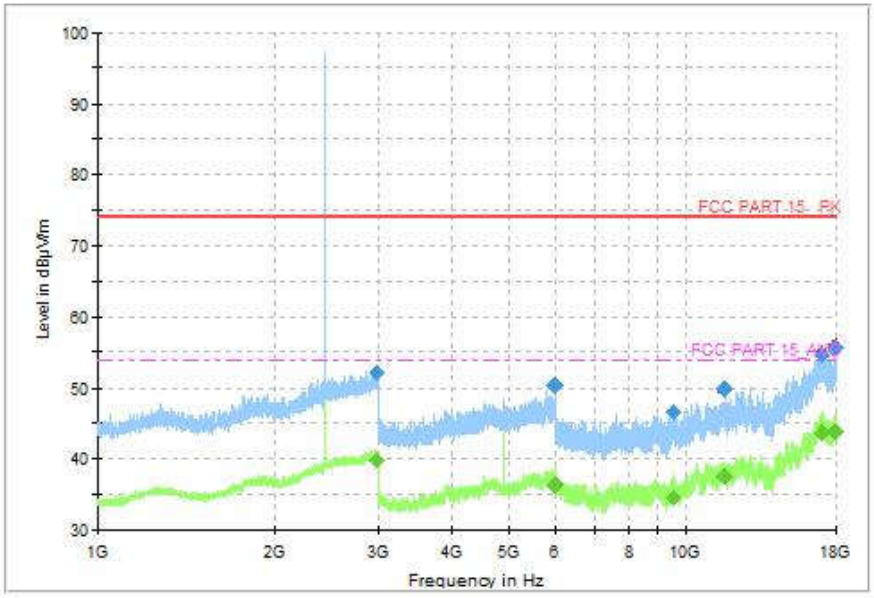


Fig. 24 Radiated Spurious Emission (GFSK, CH39, 1GHz ~18GHz)

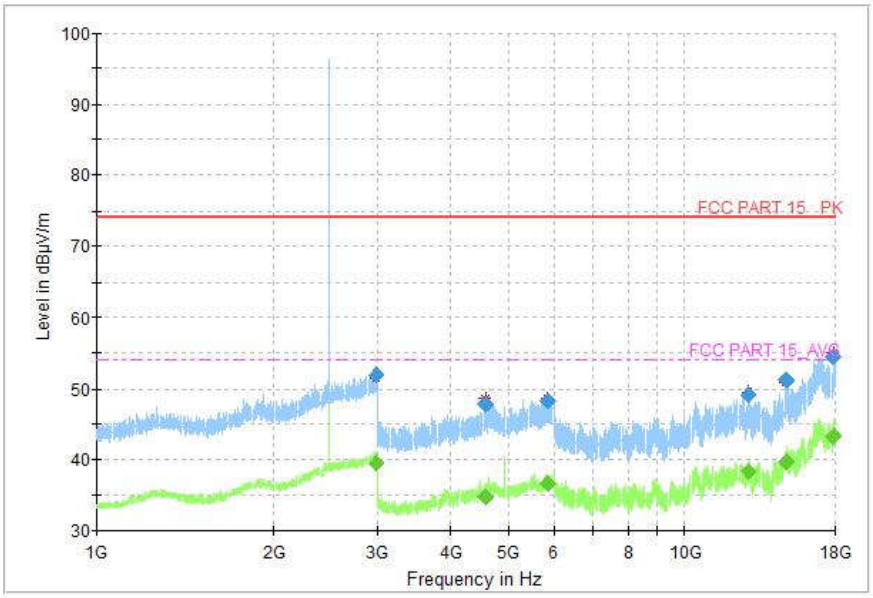


Fig. 25 Radiated Spurious Emission (GFSK, CH78, 1GHz ~18GHz)

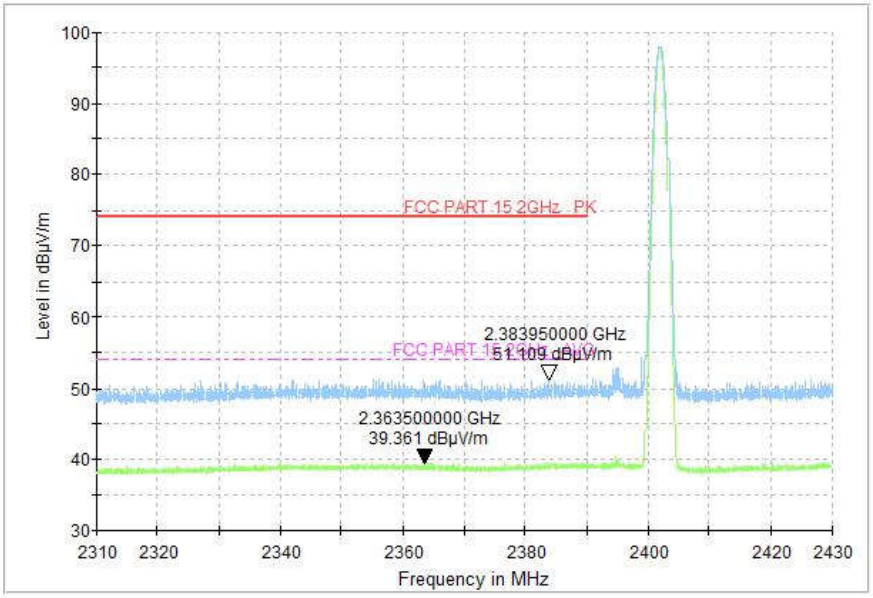


Fig. 26 Radiated Band Edges (GFSK, CH0, 2.38GHz~2.45GHz)

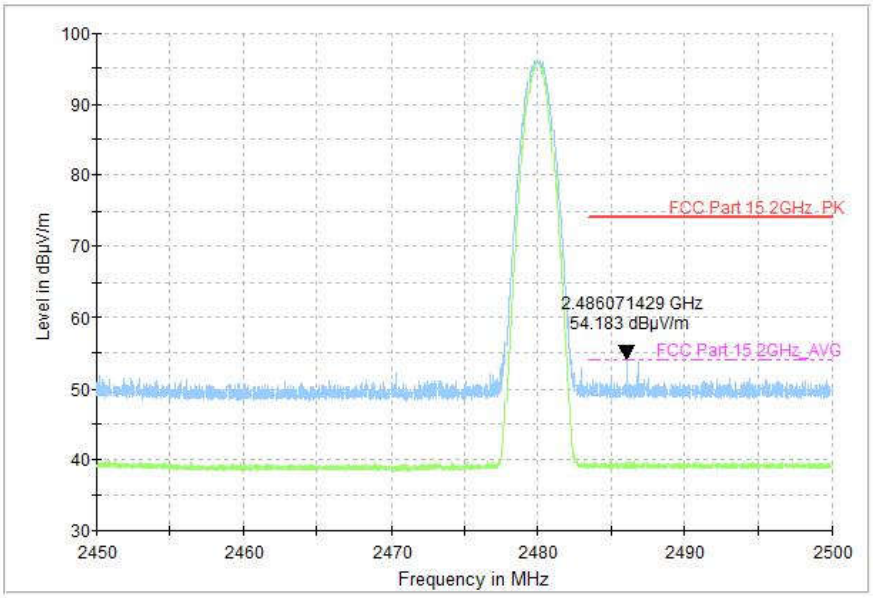


Fig. 27 Radiated Band Edges (GFSK, CH78, 2.45GHz~2.50GHz)

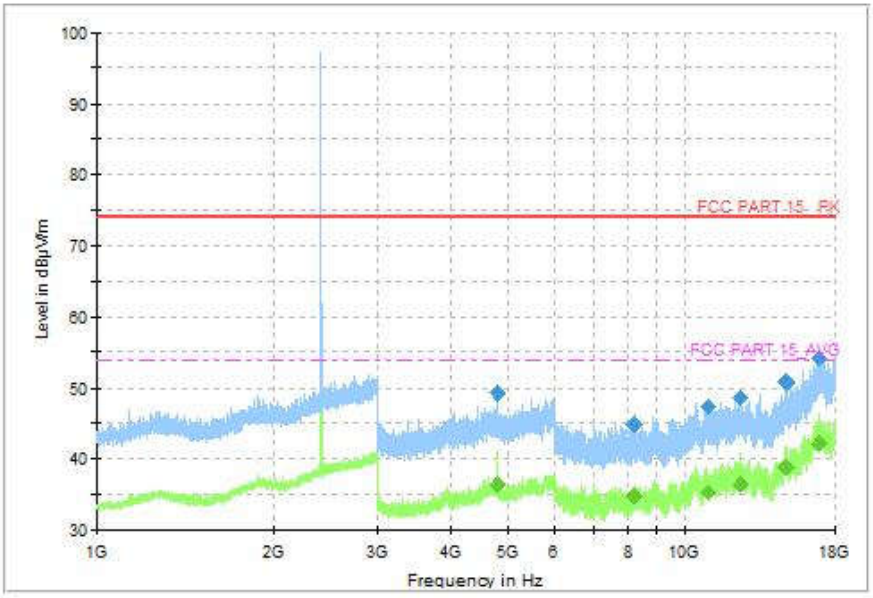


Fig. 28 Radiated Spurious Emission (π/4 DQPSK, CH0, 1GHz ~18GHz)

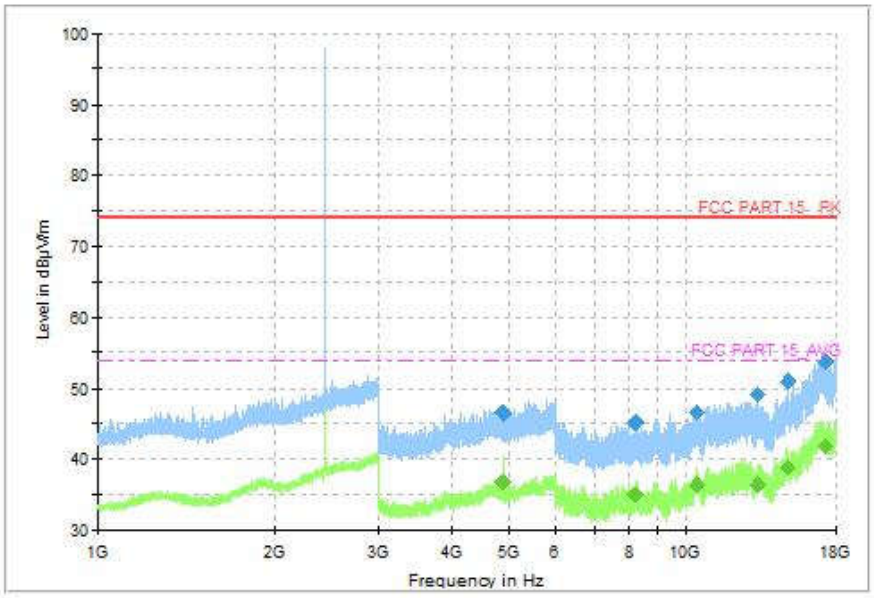


Fig. 29 Radiated Spurious Emission (π/4 DQPSK, CH39, 1GHz ~18GHz)

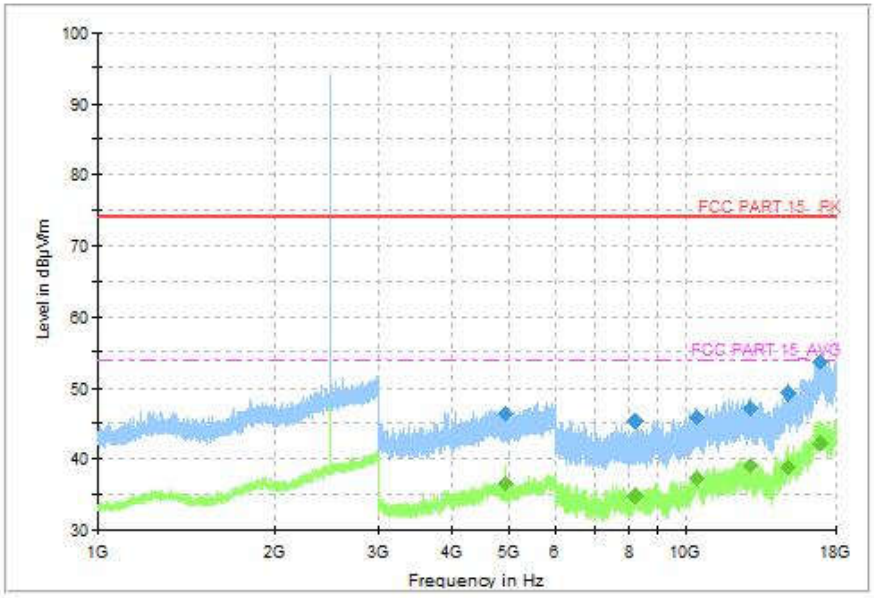


Fig. 30 Radiated Spurious Emission (π/4 DQPSK, CH78, 1GHz ~18GHz)

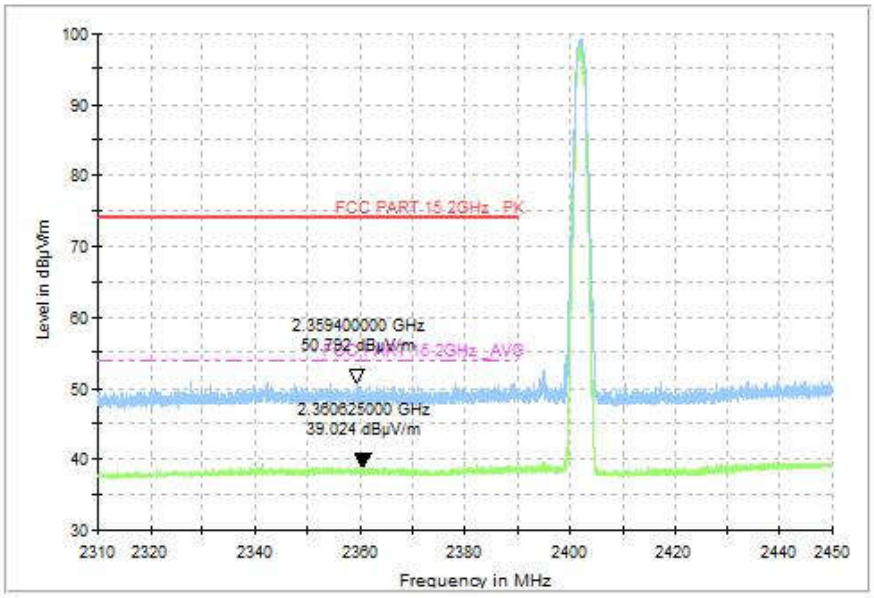


Fig. 31 Radiated Band Edges (π/4 DQPSK, CH0, 2.38GHz~2.45GHz)

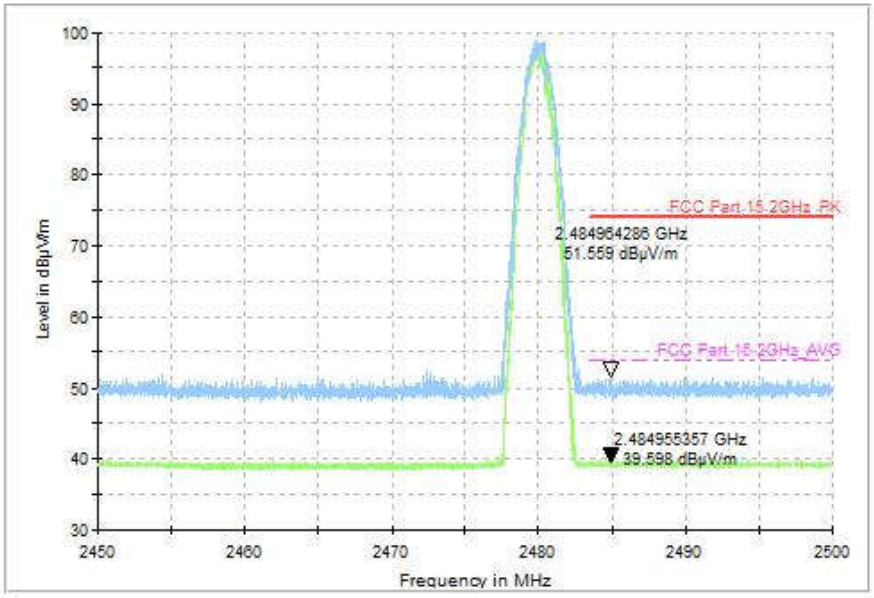


Fig. 32 Radiated Band Edges (π/4 DQPSK, CH78, 2.45GHz~2.50GHz)

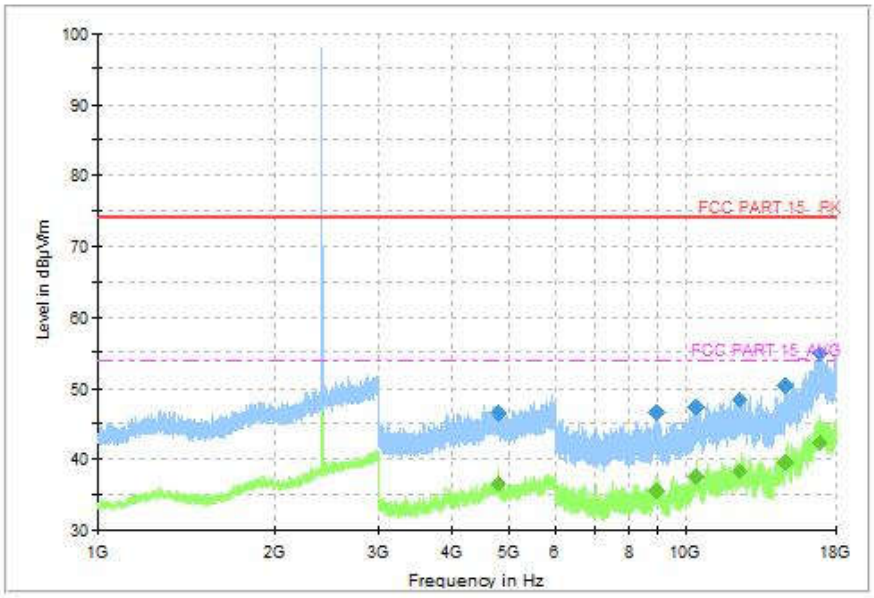


Fig. 33 Radiated Spurious Emission (8DPSK, CH0, 1GHz ~18GHz)

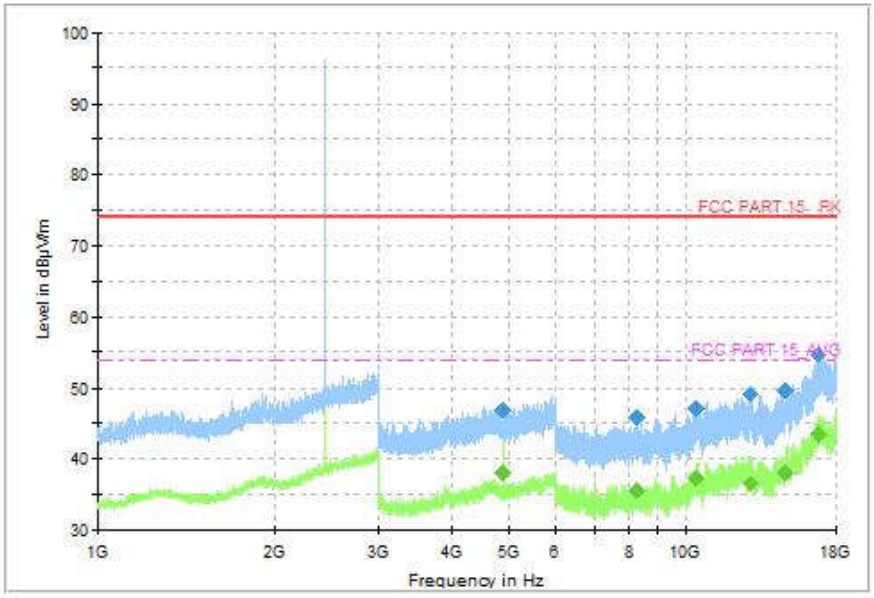


Fig. 34 Radiated Spurious Emission (8DPSK, CH39, 1GHz ~18GHz)

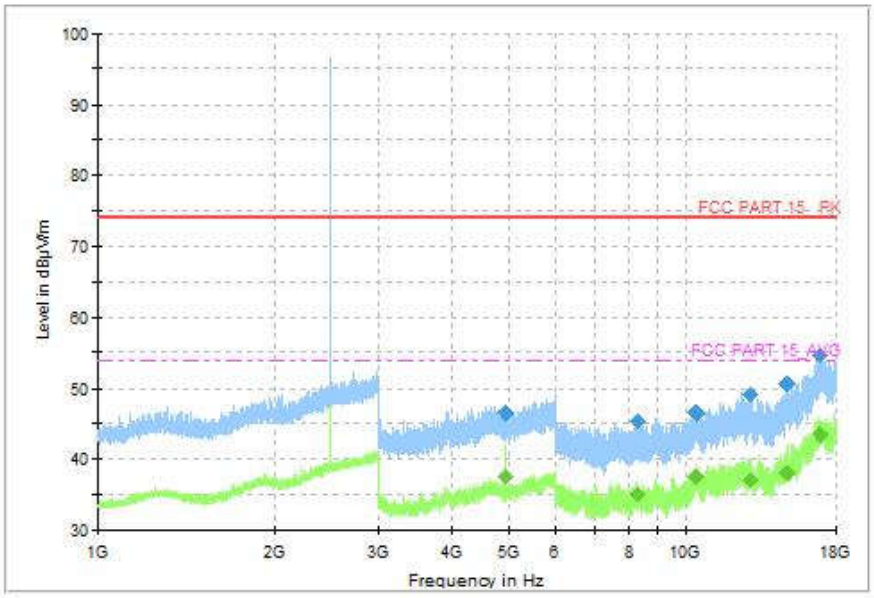


Fig. 35 Radiated Spurious Emission (8DPSK, CH78, 1GHz ~18GHz)

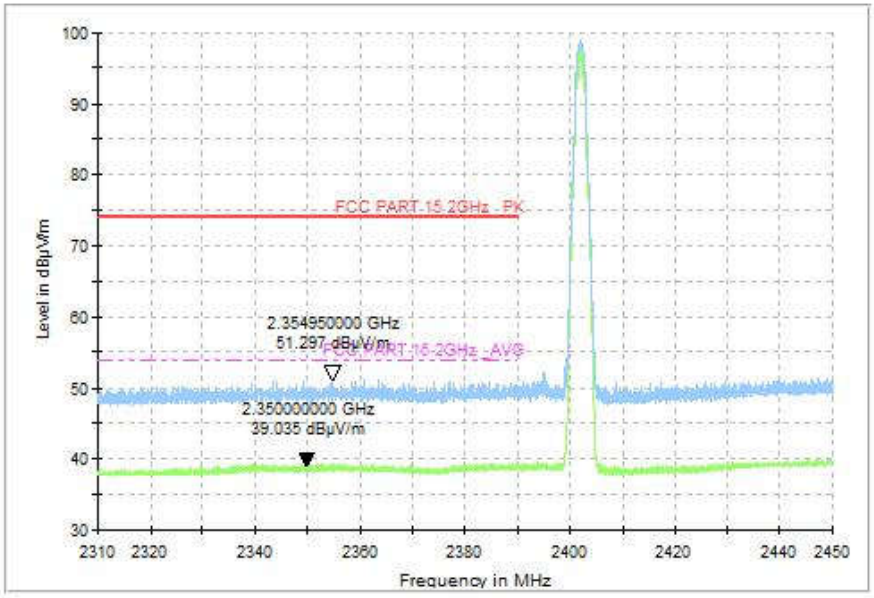


Fig. 36 Radiated Band Edges (8DPSK, CH0, 2.38GHz~2.45GHz)

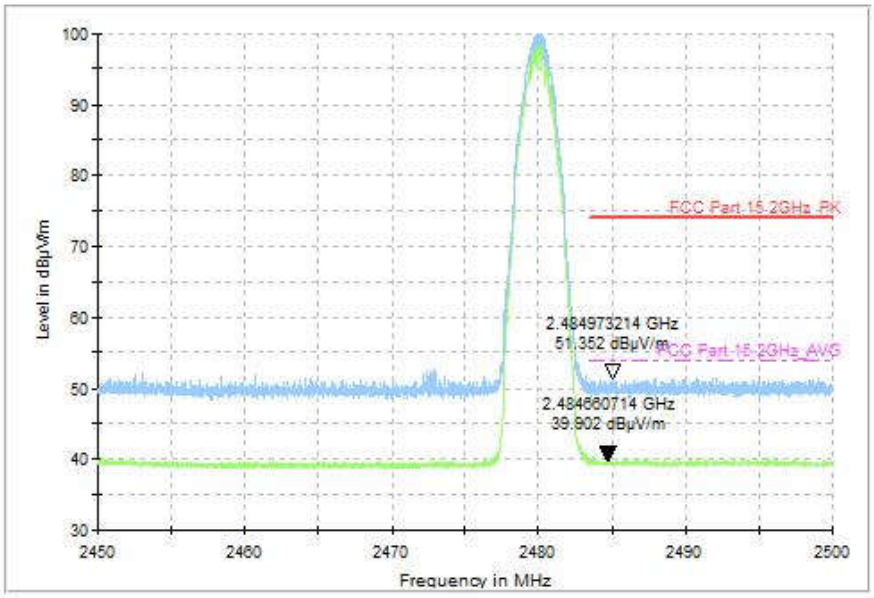


Fig. 37 Radiated Band Edges (8DPSK, CH78, 2.45GHz~2.50GHz)

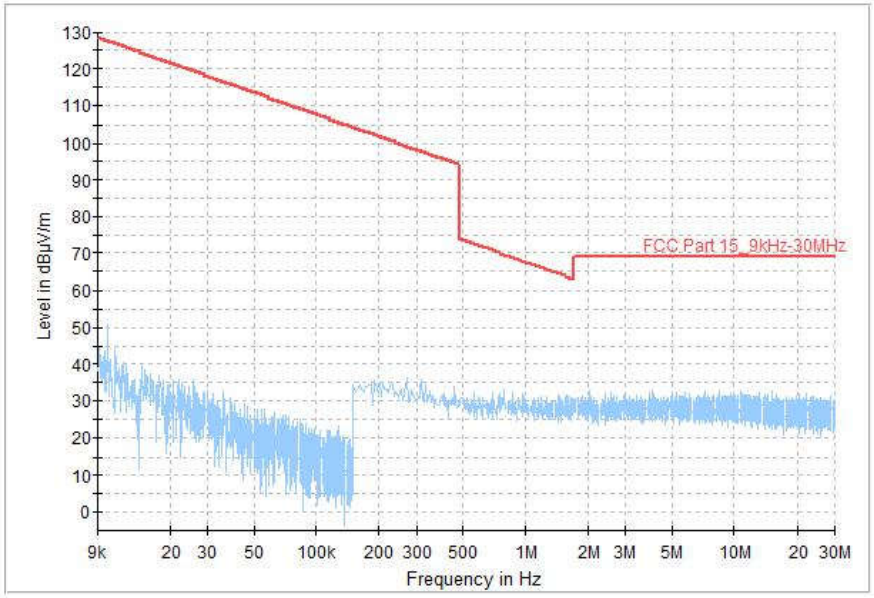


Fig. 38 Radiated Spurious Emission (All Channels, 9kHz ~30MHz)

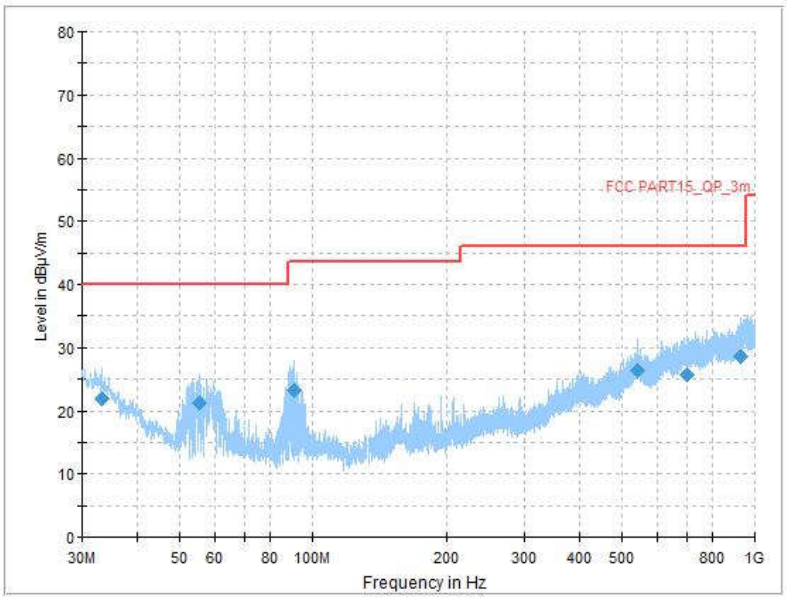


Fig. 39 Radiated Spurious Emission (All Channels, 30MHz ~1GHz)

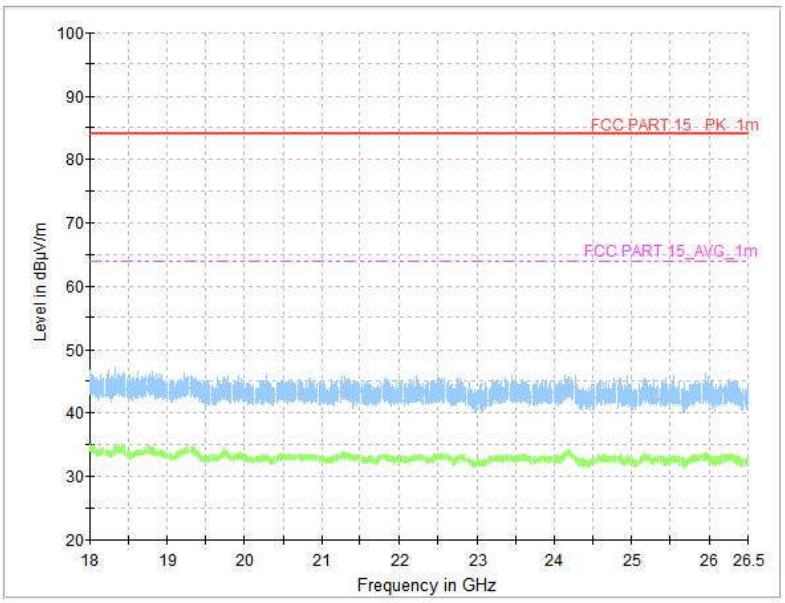


Fig. 40 Radiated Spurious Emission (All Channels, 18GHz ~26.5GHz)

A.5 20dB Bandwidth

Method of Measurement: See ANSI C63.10-clause 7.8.7.

Measurement Limit:

Standard	Limit (MHz)
FCC 47 CFR Part 15.247 (a)	/

Measurement Result:

Mode	Frequency (MHz)	20dB Bandwidth (MHz)		Conclusion
GFSK	2402(CH0)	Fig.41	0.80	/
	2441(CH39)	Fig.42	0.80	
	2480(CH78)	Fig.43	0.80	
π/4 DQPSK	2402(CH0)	Fig.44	1.32	/
	2441(CH39)	Fig.45	1.32	
	2480(CH78)	Fig.46	1.32	
8DPSK	2402(CH0)	Fig.47	1.30	/
	2441(CH39)	Fig.48	1.30	
	2480(CH78)	Fig.49	1.30	

See below for test graphs.

Conclusion: PASS

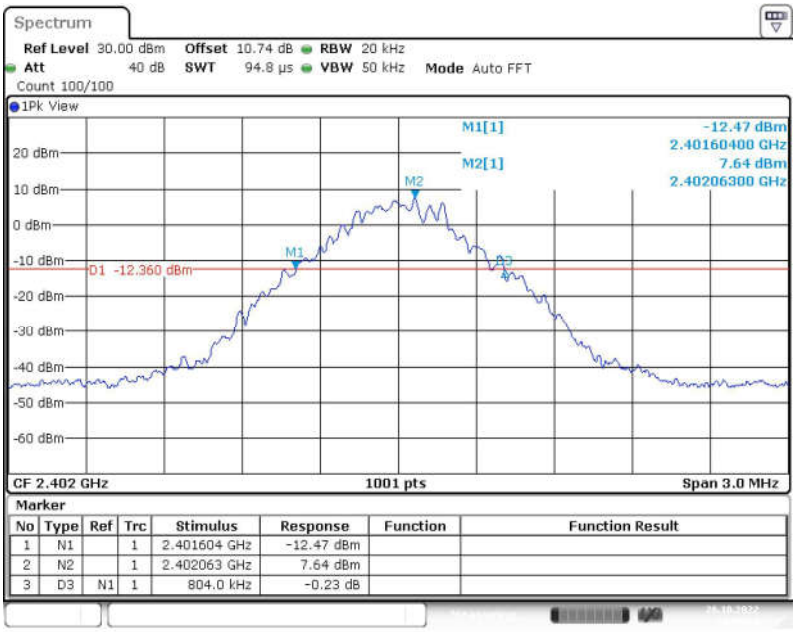


Fig. 41 20dB Bandwidth (GFSK, CH0)

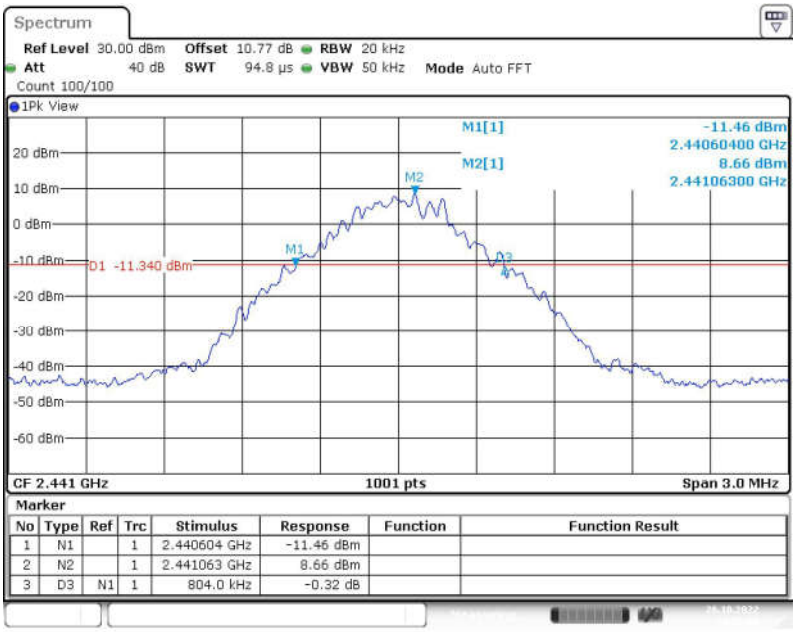


Fig. 42 20dB Bandwidth (GFSK, CH39)

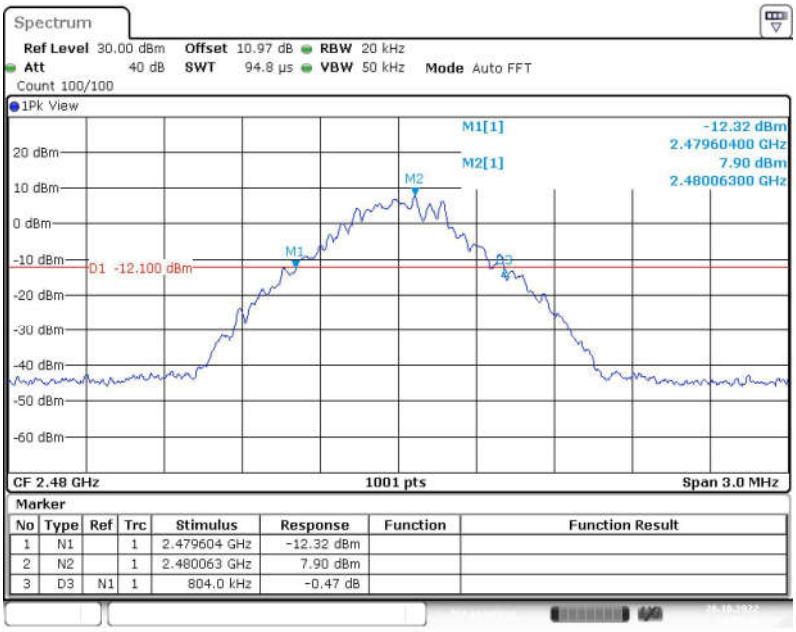


Fig. 43 20dB Bandwidth (GFSK, CH78)

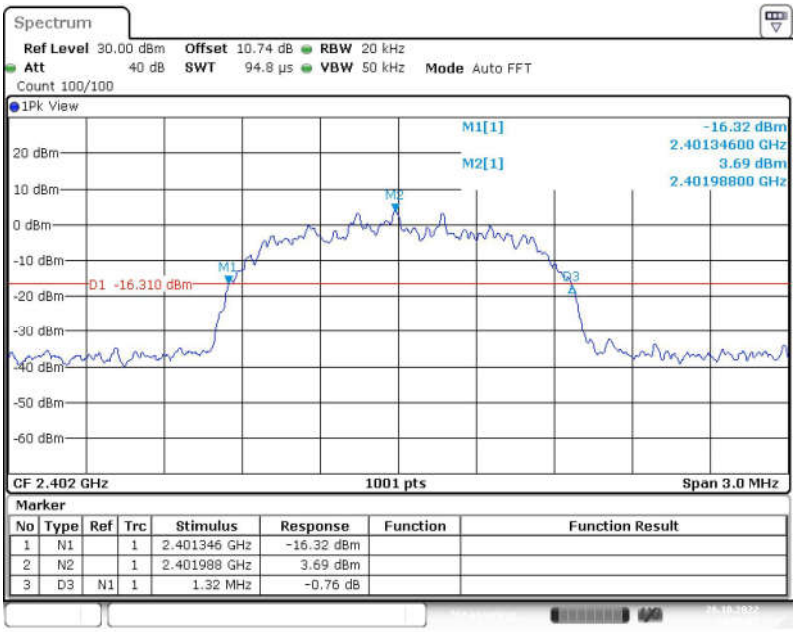


Fig. 44 20dB Bandwidth (π/4 DQPSK, CH0)

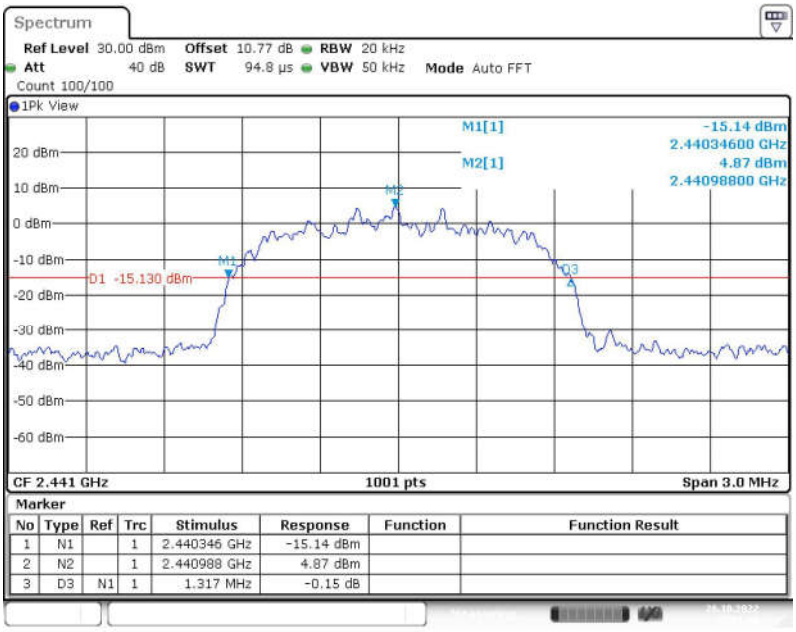


Fig. 45 20dB Bandwidth (π/4 DQPSK, CH39)

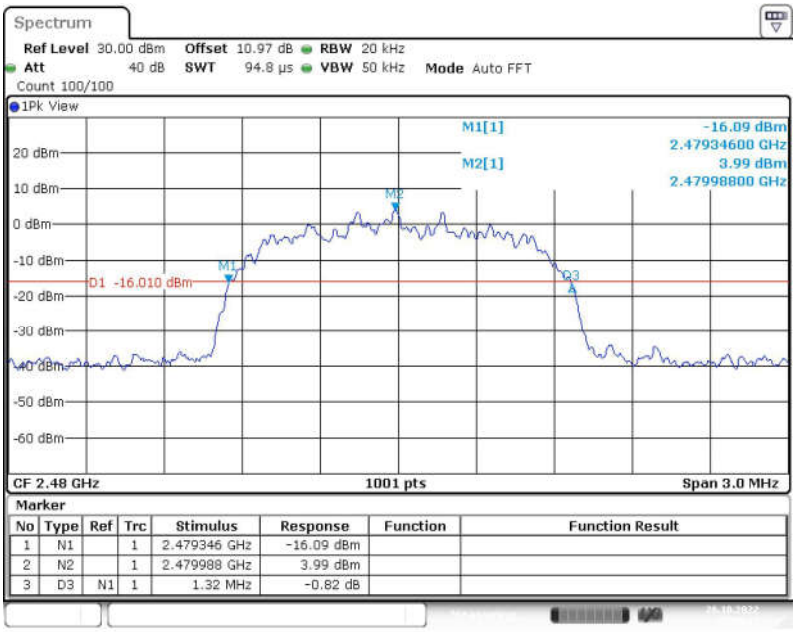


Fig. 46 20dB Bandwidth (π/4 DQPSK, CH78)

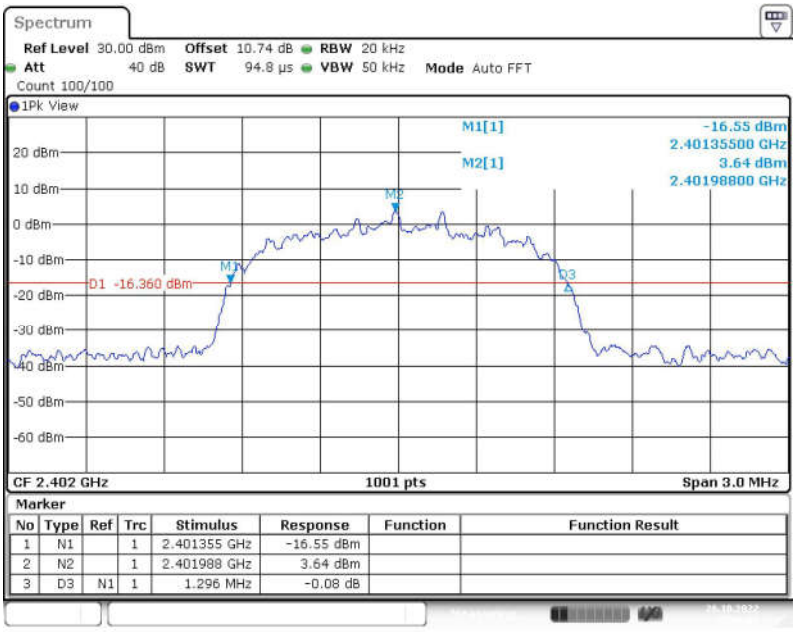


Fig. 47 20dB Bandwidth (8DPSK, CH0)

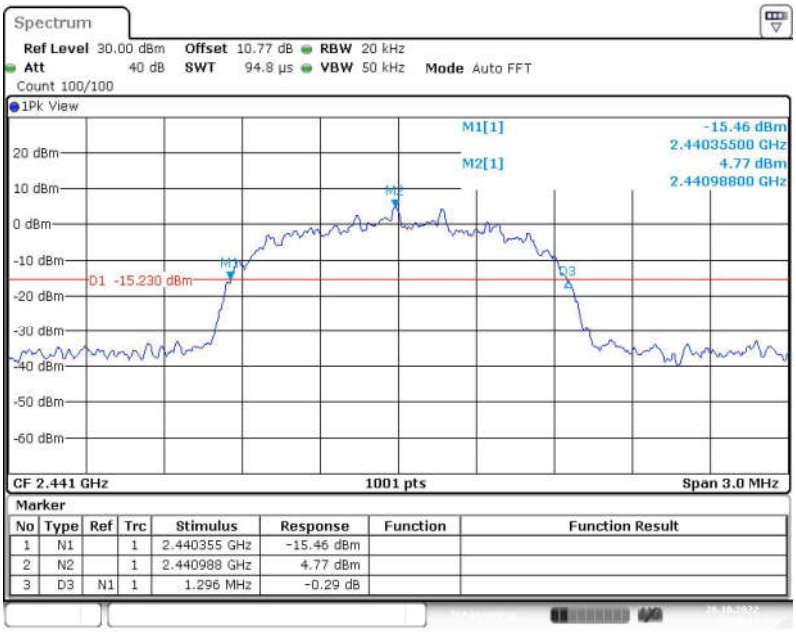


Fig. 48 20dB Bandwidth (8DPSK, CH39)

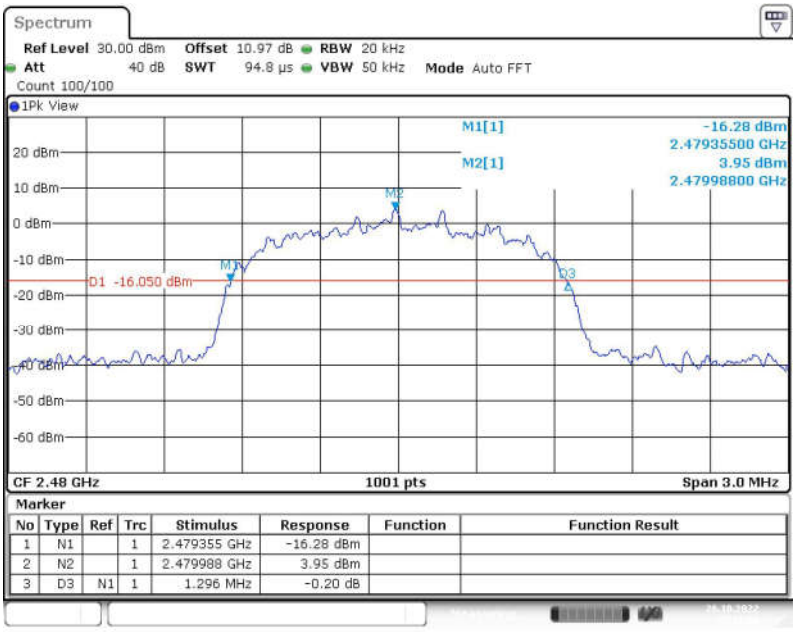


Fig. 49 20dB Bandwidth (8DPSK, CH78)

A.6 Time of Occupancy (Dwell Time)

Method of Measurement: See ANSI C63.10-clause 7.8.4.

Measurement Limit:

Standard	Limit (s)
FCC 47 CFR Part 15.247(a)	< 0.4

Measurement Results:

Mode	Frequency (MHz)	Packet	BurstWidth (ms)		TotalHops (Num)		Result (s)	Conclusion
GFSK	2441(CH39)	DH5	Fig.50	2.86	Fig.51	110	0.315	**P**
π/4 DQPSK	2441(CH39)	2-DH5	Fig.52	2.87	Fig.53	100	0.287	**P**
8DPSK	2441(CH39)	3-DH5	Fig.54	2.87	Fig.55	120	0.345	**P**

See below for test graphs.

Conclusion: Pass

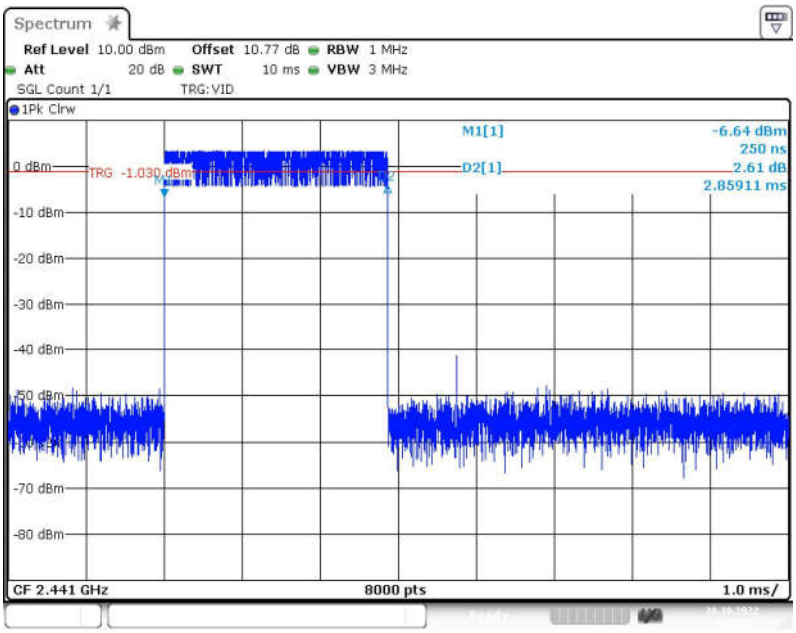


Fig. 50 BurstWidth (Dwell Time) (GFSK, CH39)

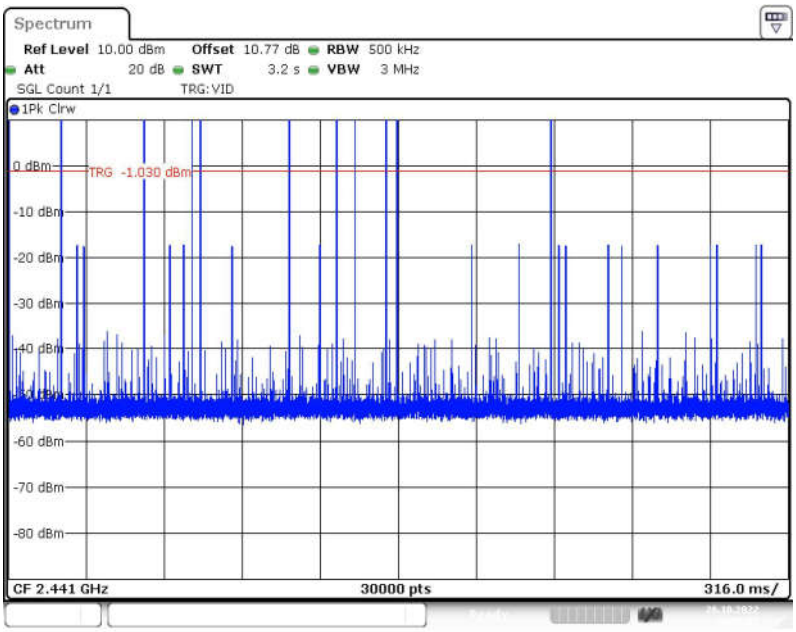


Fig. 51 Number of Burst in Observation Period (Dwell Time) (GFSK, CH39)

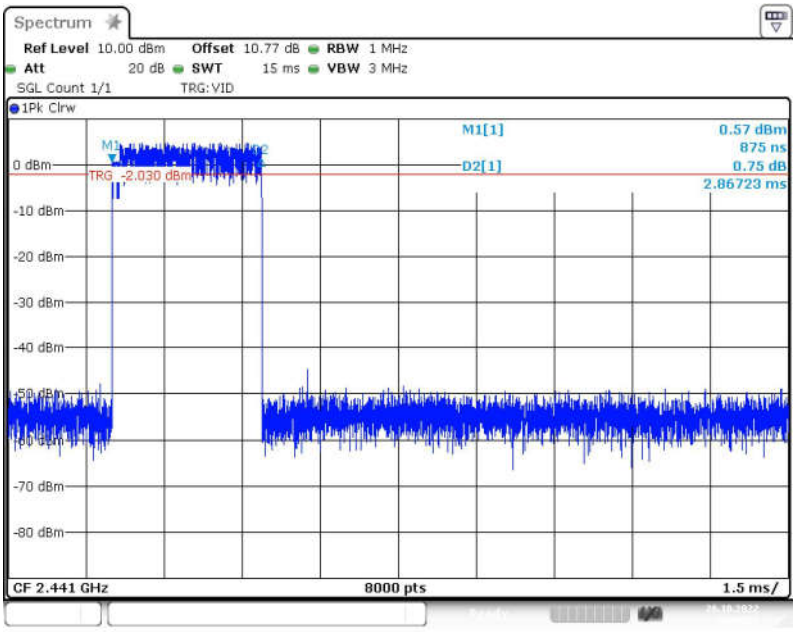


Fig. 52 BurstWidth (Dwell Time) (π/4 DQPSK, CH39)

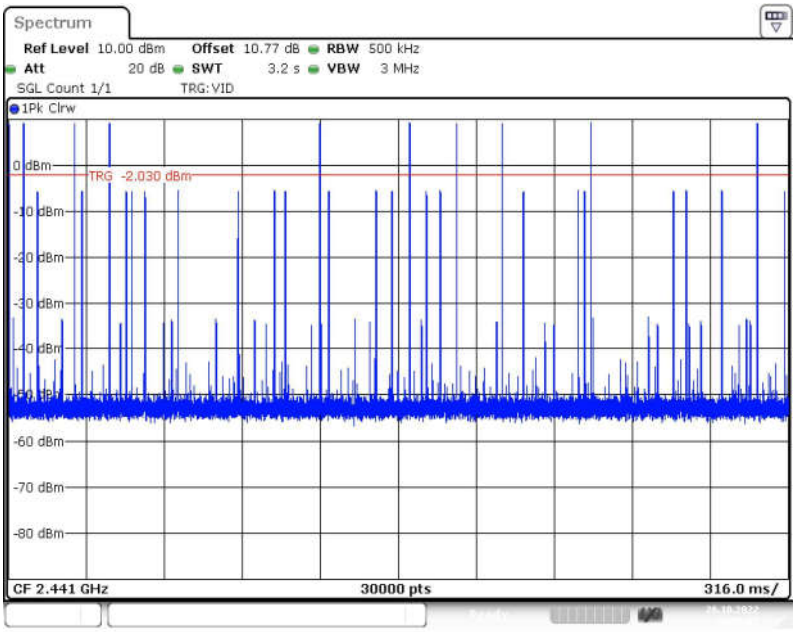


Fig. 53 Number of Burst in Observation Period (Dwell Time) (π/4 DQPSK, CH39)

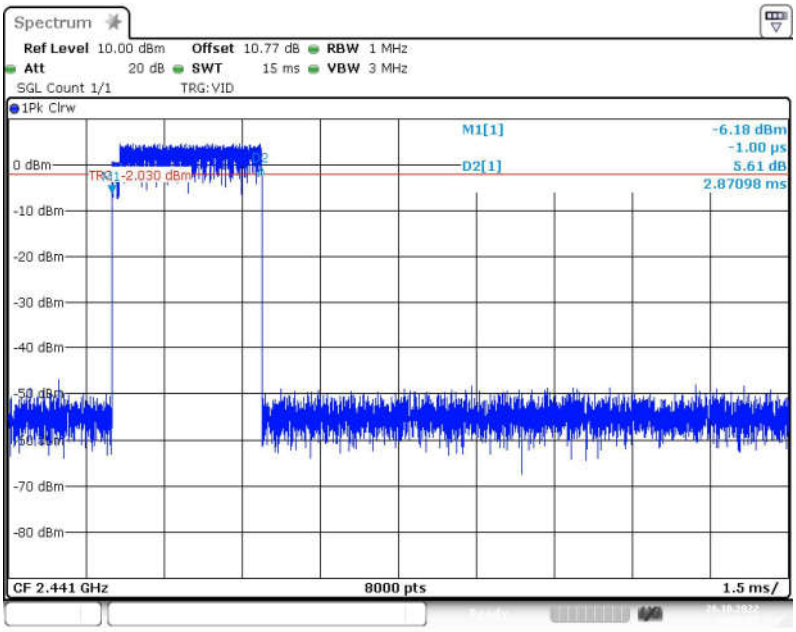


Fig. 54 BurstWidth (Dwell Time) (8DPSK, CH39)

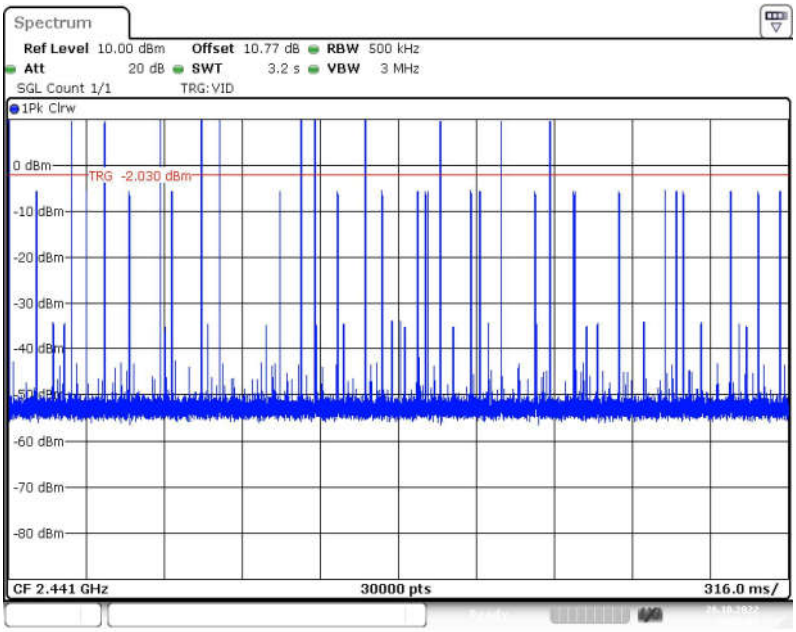


Fig. 55 Number of Burst in Observation Period (Dwell Time) (8DPSK, CH39)

A.7 Number of Hopping Channels

Method of Measurement: See ANSI C63.10-clause 7.8.3.

Measurement Limit:

Standard	Limit (Num)
FCC 47 CFR Part 15.247(a)	At least 15 non-overlapping channels

Measurement Results:

Mode	Packet	Number of Hopping Channels	Test results (Num)	Conclusion
GFSK	DH5	Fig.56	79	**P**
π/4 DQPSK	2-DH5	Fig.57	79	**P**
8DPSK	3-DH5	Fig.58	79	**P**

See below for test graphs.

Conclusion: Pass

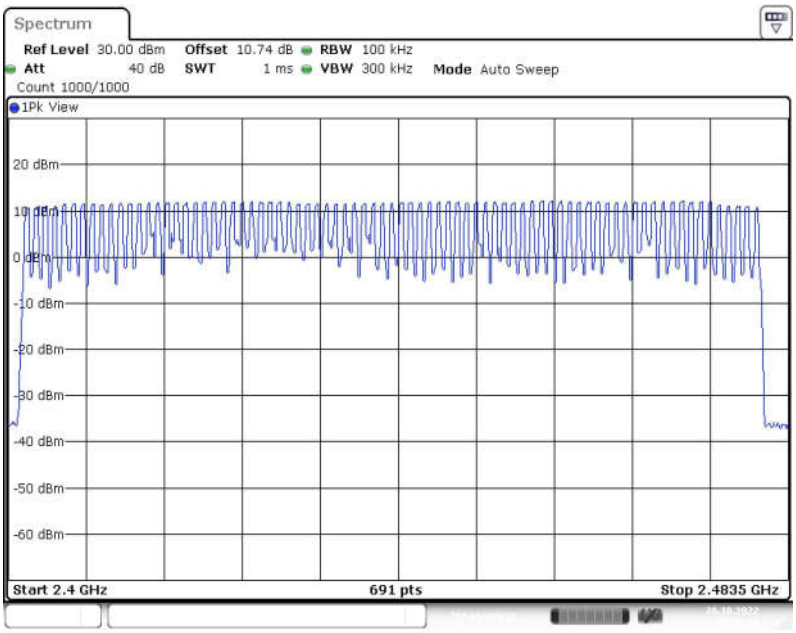


Fig. 56 Number of Hopping Channels (GFSK, Hopping)

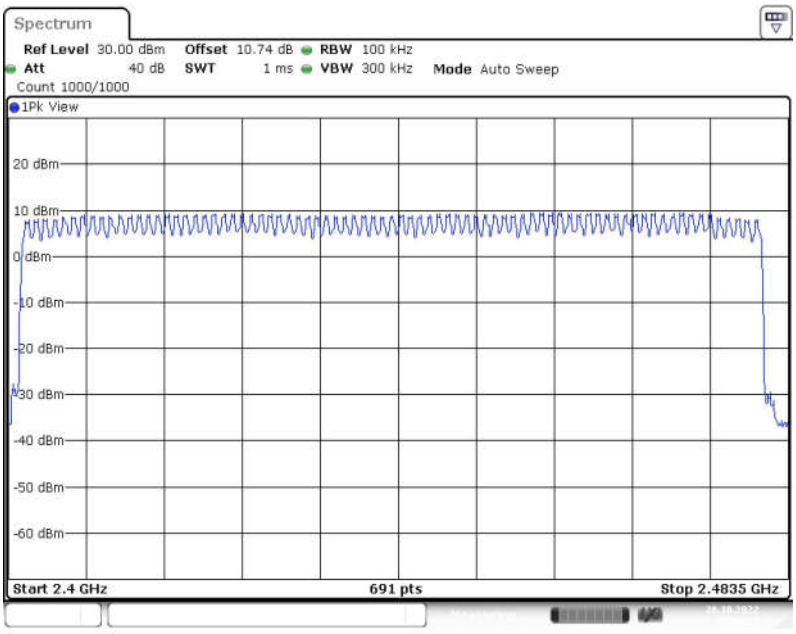


Fig. 57 Number of Hopping Channels (π/4 DQPSK, Hopping)

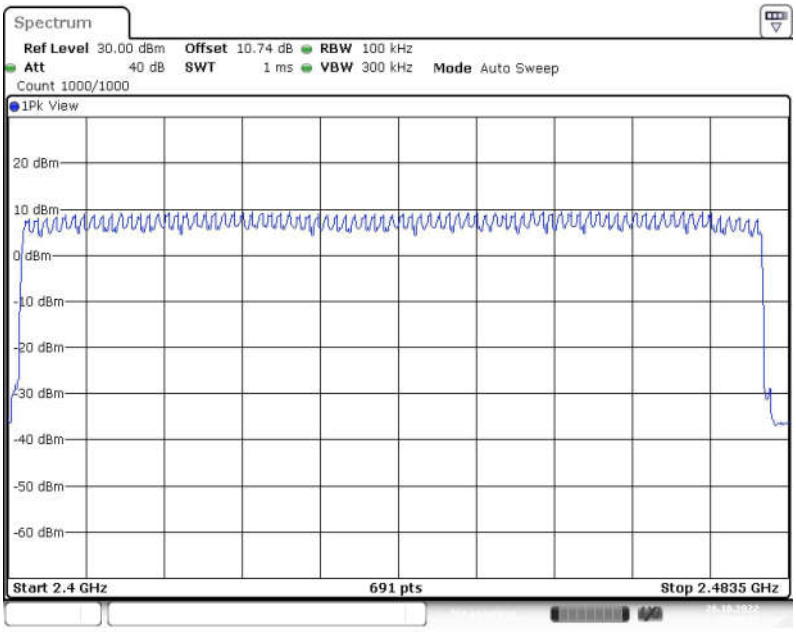


Fig. 58 Number of Hopping Channels (8DPSK, Hopping)

A.8 Carrier Frequency Separation

Method of Measurement: See ANSI C63.10-clause 7.8.2.

Measurement Limit:

Standard	Limit (kHz)
FCC 47 CFR Part 15.247(a)	By a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater

Measurement Results:

Mode	Frequency (MHz)	Packet	Separation of hopping channels	Test result (kHz)	Conclusion
GFSK	2441(CH39)	DH5	Fig.59	1000.00	**P**
π/4 DQPSK	2441(CH39)	2-DH5	Fig.60	1003.00	**P**
8DPSK	2441(CH39)	3-DH5	Fig.61	1003.00	**P**

See below for test graphs.

Conclusion: Pass

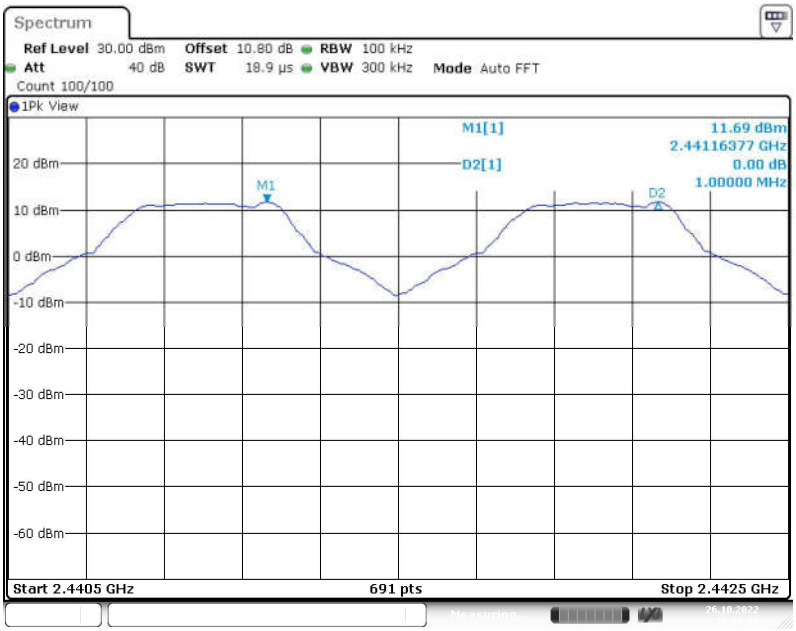


Fig. 59 Carrier Frequency Separation (GFSK, CH39)

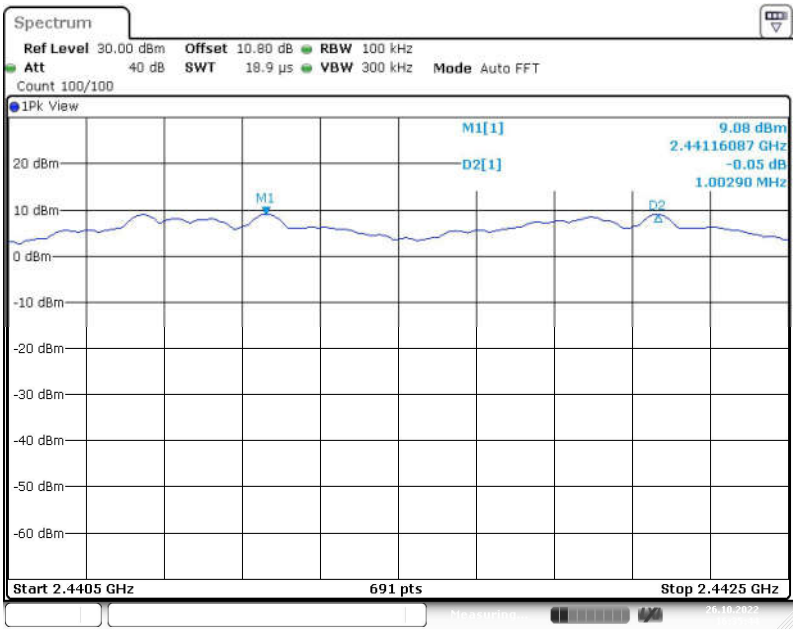


Fig. 60 Carrier Frequency Separation (π/4 DQPSK, CH39)

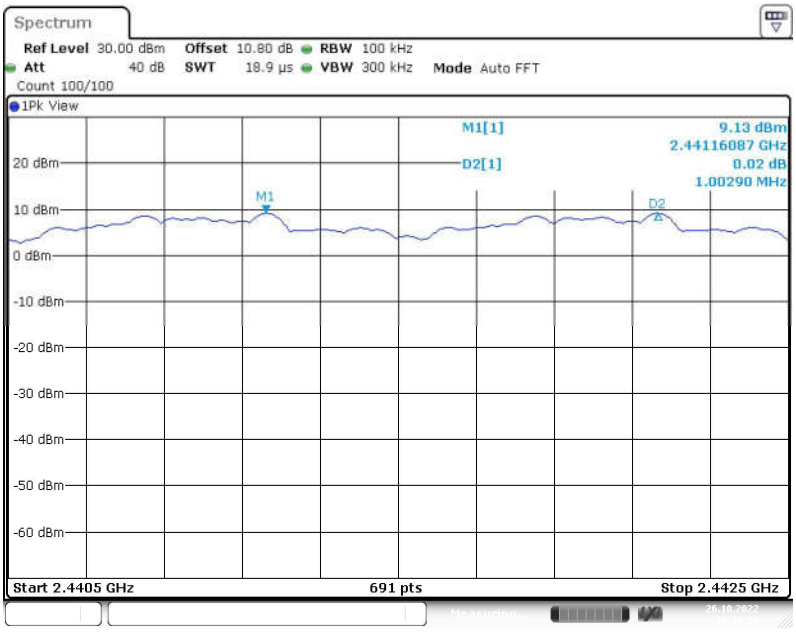


Fig. 61 Carrier Frequency Separation (8DPSK, CH39)

A.9 AC Power line Conducted Emission

Method of Measurement: See ANSI C63.10-clause 6.2.

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average-peak Limit (dBμV)	Result (dBμV)		Conclusion
			Traffic	Idle	
0.15 to 0.5	66 to 56	56 to 46	Fig.62	Fig.63	**P**
0.5 to 5	56	46			
5 to 30	60	50			
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.					

Note: The measurement results include the L1 and N measurements.

See below for test graphs.
Conclusion: Pass

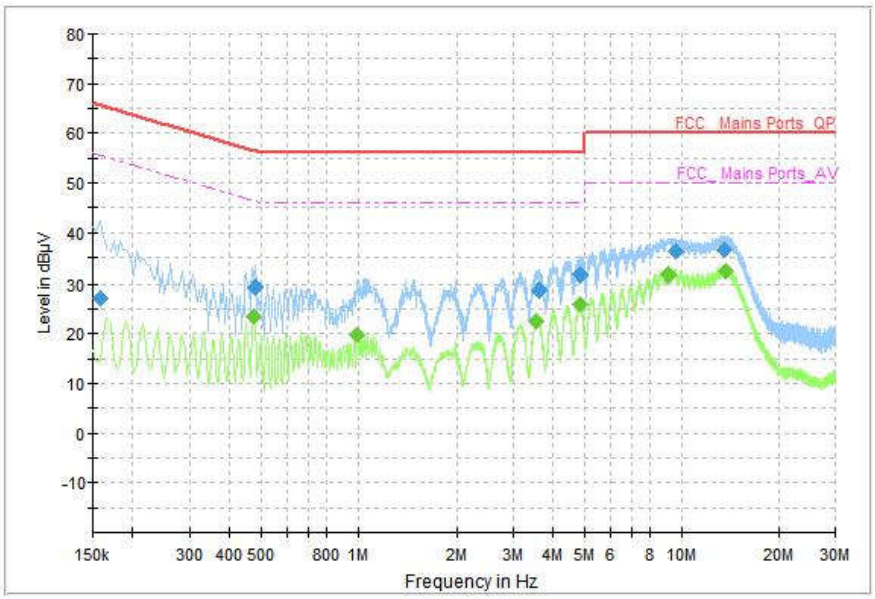


Fig. 62 AC Power line Conducted Emission (Traffic)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.158000	27.20	65.57	38.37	N	ON	10
0.478000	29.36	56.37	27.01	N	ON	10
3.594000	28.76	56.00	27.24	N	ON	10
4.842000	31.56	56.00	24.44	N	ON	10
9.550000	36.19	60.00	23.81	L1	ON	10
13.634000	36.46	60.00	23.54	L1	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.474000	23.30	46.44	23.15	N	ON	10
0.990000	19.73	46.00	26.27	L1	ON	10
3.550000	22.50	46.00	23.50	N	ON	10
4.842000	25.96	46.00	20.04	N	ON	10
9.058000	31.77	50.00	18.23	L1	ON	10
13.782000	32.34	50.00	17.66	L1	ON	11

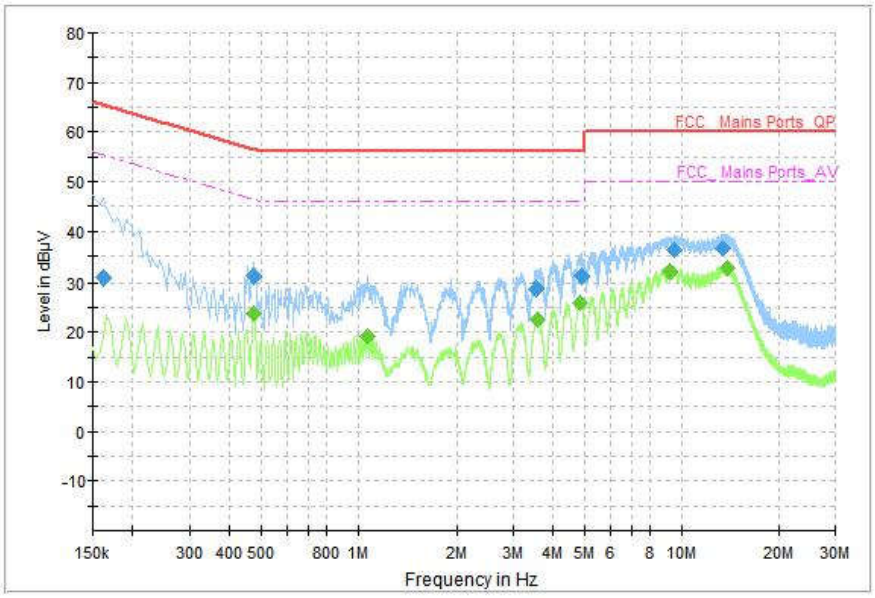


Fig. 63 AC Power line Conducted Emission (Idle)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.162000	30.91	65.36	34.45	N	ON	10
0.474000	31.01	56.44	25.43	N	ON	10
3.534000	28.64	56.00	27.36	N	ON	10
4.882000	31.05	56.00	24.95	N	ON	10
9.498000	36.37	60.00	23.63	L1	ON	10
13.478000	36.50	60.00	23.50	L1	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.474000	23.58	46.44	22.86	N	ON	10
1.070000	19.15	46.00	26.85	L1	ON	10
3.578000	22.51	46.00	23.49	N	ON	10
4.854000	25.97	46.00	20.03	N	ON	10
9.142000	31.90	50.00	18.10	N	ON	10
13.814000	32.46	50.00	17.54	L1	ON	11

*****END OF REPORT*****