



TEST REPORT

No. I22N00113-BT

TCL Communication Ltd.

Tablet PC

Model Name: 9132G

with

Hardware Version: PIO

Software Version: CS53

FCC ID: 2ACCJB177

Issued Date: 2022-03-15

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:

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1. Summary of Test Report

1.1. Test Items

Description	Tablet PC
Model Name	9132G
Applicant's name	TCL Communication Ltd.
Manufacturer's Name	TCL Communication Ltd.

1.2. Test Standards

FCC Part15-2019; 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

1.5. Project data

Testing Start Date:	2022-02-10
Testing End Date:	2022-03-10

1.6. Signature

Lin Kanfeng
(Prepared this test report)

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(Reviewed this test report)

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(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact Person: Peter yang
E-Mail: peter.yang@tcl.com
Telephone: +86 755 3664 5759
FAX: 0086-755-36612000-81722

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

3.1. About EUT

Description	Tablet PC
Model Name	9132G
Frequency Band	2400MHz~2483.5MHz
Type of Modulation	GFSK/π /4 DQPSK/8DPSK
Number of Channels	79
Antenna Type	Integrated
Antenna Gain	1.9 dBi
Power Supply	3.85V DC by Battery
FCC ID	2ACCJB177
Condition of EUT as received	No abnormality in appearance

3.2. Internal Identification of EUT

EUT ID*	IMEI	HW Version	SW Version	Receive Date
UT04aa	/	PIO	CS53	2022-02-10
UT01aa	/	PIO	CS53	2022-02-23

*EUT ID: is used to identify the test sample in the lab internally.

*UT04aa is used for Conduction test; UT01aa is used for Radiation test.

3.3. Internal Identification of AE

AE ID*	Description	SN
AE1	Battery	CAC4000018C7
AE2	Adapter	CBA0058AATC5
AE3	Adapter	CBA0058ABTC5
AE4	Adapter	CBA0058AGTC5
AE5	USB Cable	CDA0000162C2
AE6	USB Cable	CDA0000162C1

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

3.4. General Description

The Equipment under Test (EUT) is a model of Tablet PC with integrated antenna and battery. It consists of normal options: Lithium Battery and Charger. 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	2019
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°C

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	Bluetooth Tester	CBT32	100584	Rohde & Schwarz	2022-12-29	1 year
3	Power Sensor	U2021XA	MY55430013	Keysight	2022-12-29	1 year
4	Data Acquisition	U2531A	TW55443507	Keysight	/	/

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1	LISN	ENV216	102067	R&S	2022-07-15	1 year
2	Test Receiver	ESCI	100702	R&S	2023-01-12	1 year
3	Loop Antenna	HLA6120	35779	TESEQ	2022-04-25	3 year
4	BiLog Antenna	3142E	0224831	ETS-Lindgren	2024-05-27	3 year
5	Horn Antenna	3117	00066577	ETS-Lindgren	2022-04-02	3 year
6	Test Receiver	ESR7	101676	R&S	2022-11-24	1 year
7	Spectrum Analyzer	FSV40	101192	R&S	2023-01-12	1 year
8	Chamber	FACT3-2.0	1285	ETS-Lindgren	2023-05-29	2 year
9	Antenna	QSH-SL-1 8-26-S-20	17013	Q-par	2023-01-06	3 year
10	Antenna	QSH-SL-1 8-40-K-SG	15979	Q-par	2023-01-06	3 year

Test software

No.	Equipment	Manufacturer	Version
1	TechMgr Software	CAICT	2.1.1
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.

Anechoic chamber

Fully anechoic chamber by ETS-Lindgren

7. Laboratory Environment

Semi-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

Shielded room

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-1000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

Fully-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
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 18 GHz, 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

8. Measurement Uncertainty

Test Name	Uncertainty ($k=2$)	
1. RF Output Power - Conducted	1.32dB	
2. Time of Occupancy - Conducted	0.58ms	
3. Occupied channel bandwidth - Conducted	66Hz	
4. Transmitter Spurious Emission - Conducted	$30\text{MHz} \leq f < 1\text{GHz}$	1.41dB
	$1\text{GHz} \leq f < 7\text{GHz}$	1.92dB
	$7\text{GHz} \leq f < 13\text{GHz}$	2.31dB
	$13\text{GHz} \leq f \leq 26\text{GHz}$	2.61dB
5. Transmitter Spurious Emission - Radiated	$9\text{kHz} \leq f < 30\text{MHz}$	1.70dB
	$30\text{MHz} \leq f < 1\text{GHz}$	4.90dB
	$1\text{GHz} \leq f < 18\text{GHz}$	4.60dB
	$18\text{GHz} \leq f \leq 40\text{GHz}$	4.10dB
6. AC Power line Conducted Emission	$150\text{kHz} \leq f \leq 30\text{MHz}$	3.00dB



ANNEX A: Detailed Test Results

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 1.9 dBi. 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)	E.I.R.P Limit (dBm)
FCC CRF Part 15.247 (b)	< 30	< 36

Measurement Results:

Conducted transmitter power

Mode	Peak Conducted Output Power (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	4.05	5.58	4.53
π /4 DQPSK	3.13	4.69	3.63
8DPSK	3.13	4.69	3.64

E.I.R.P

Mode	Peak Conducted Output Power (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	5.95	7.48	6.43
π /4 DQPSK	5.03	6.59	5.53
8DPSK	5.03	6.59	5.54

Note: E.I.R.P value = Conducted values (with conducted samples) + Antenna Gain.

Conclusion: Pass



A.2 Band Edges Compliance

Measurement Limit:

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

Measurement Result:

Mode	Channel	Hopping	Test Results	Conclusion
GFSK	0	ON	Fig.1	P
	78	ON	Fig.2	P
$\pi/4$ DQPSK	0	ON	Fig.3	P
	78	ON	Fig.4	P
8DPSK	0	ON	Fig.5	P
	78	ON	Fig.6	P

Mode	Channel	Hopping	Test Results	Conclusion
GFSK	0	OFF	Fig.7	P
	78	OFF	Fig.8	P
$\pi/4$ DQPSK	0	OFF	Fig.9	P
	78	OFF	Fig.10	P
8DPSK	0	OFF	Fig.11	P
	78	OFF	Fig.12	P

See below for test graphs.

Conclusion: Pass

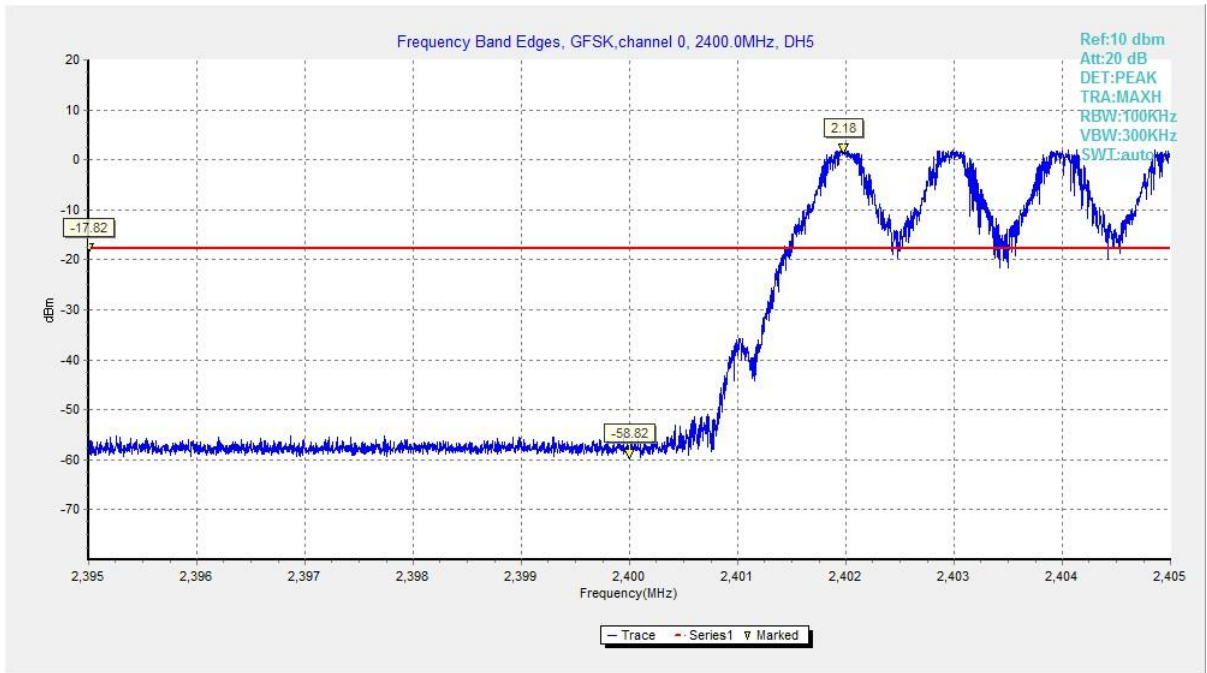


Fig. 1 Band Edges (GFSK, Ch 0, Hopping ON)

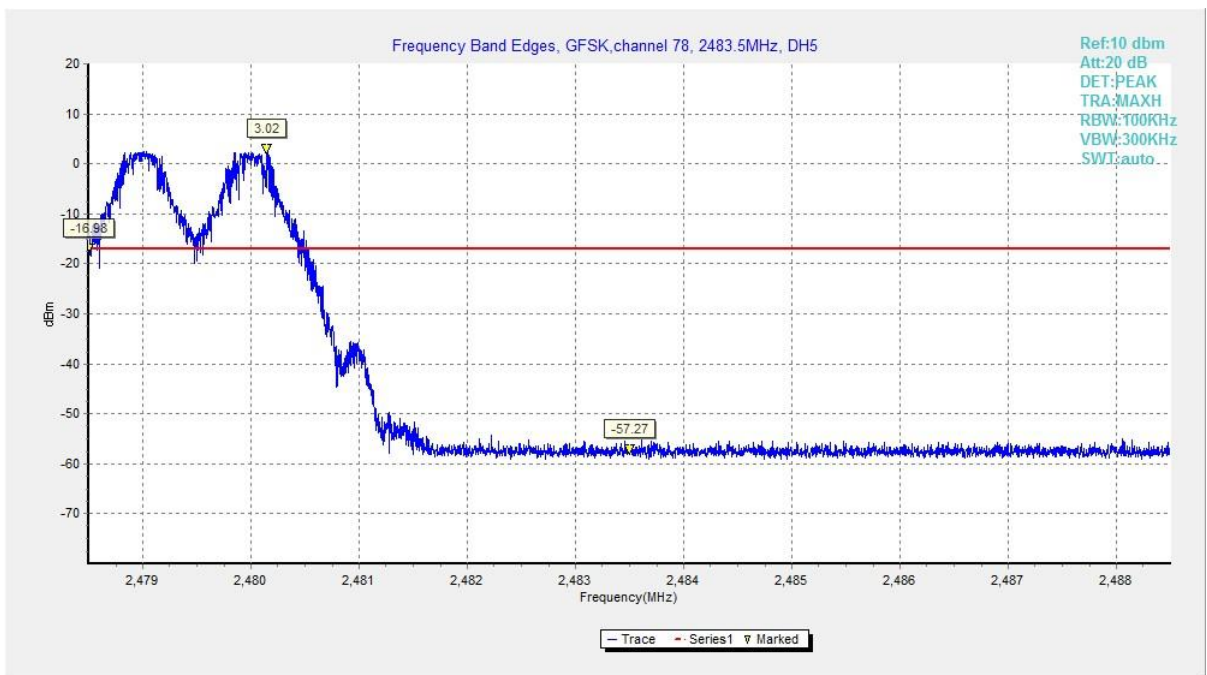


Fig. 2 Band Edges (GFSK, Ch 78, Hopping ON)

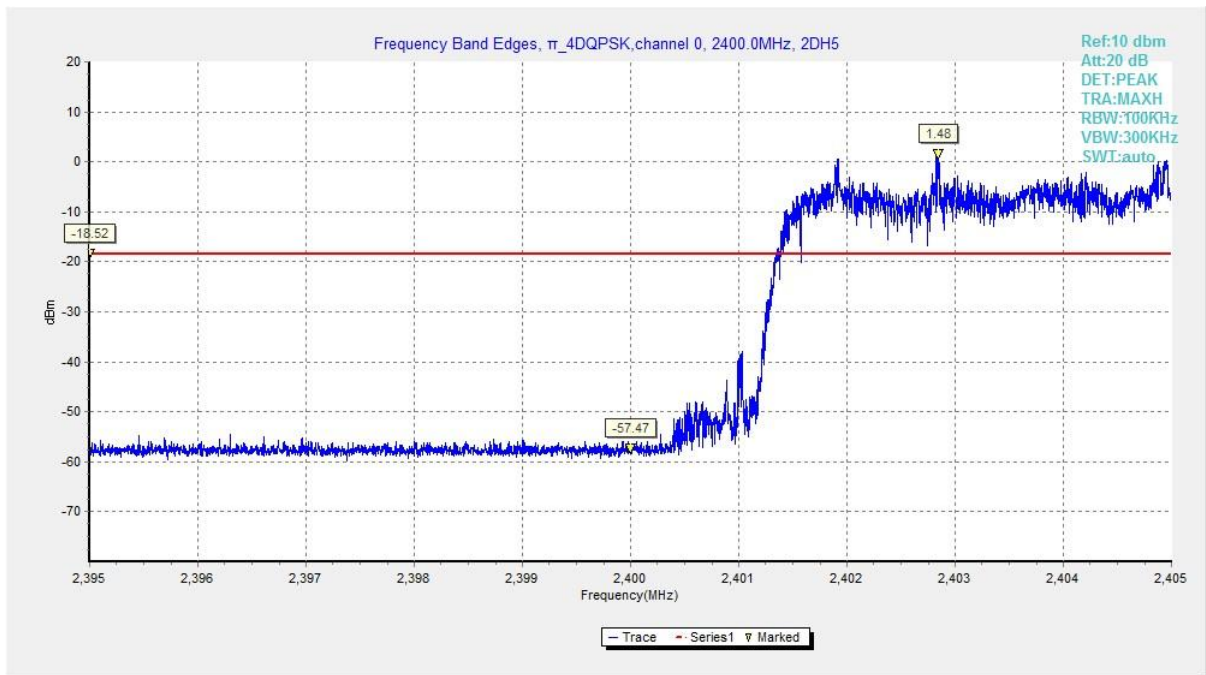


Fig. 3 Band Edges ($\pi/4$ DQPSK, Ch 0, Hopping ON)

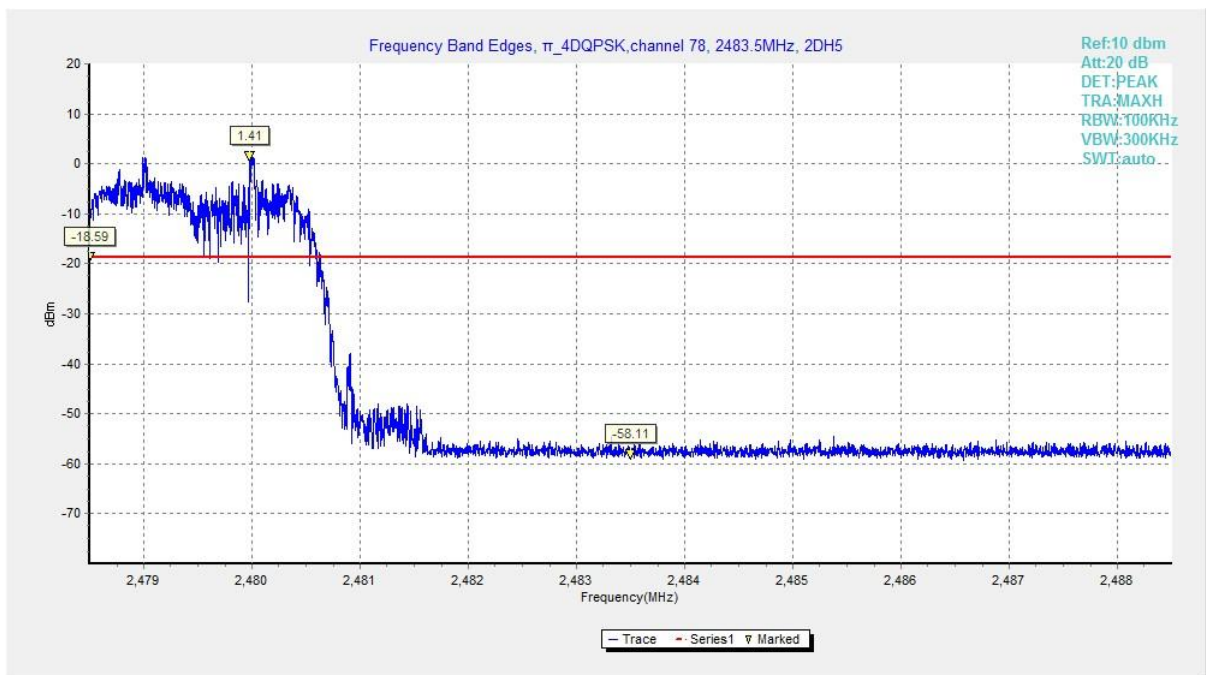


Fig. 4 Band Edges ($\pi/4$ DQPSK, Ch 78, Hopping ON)

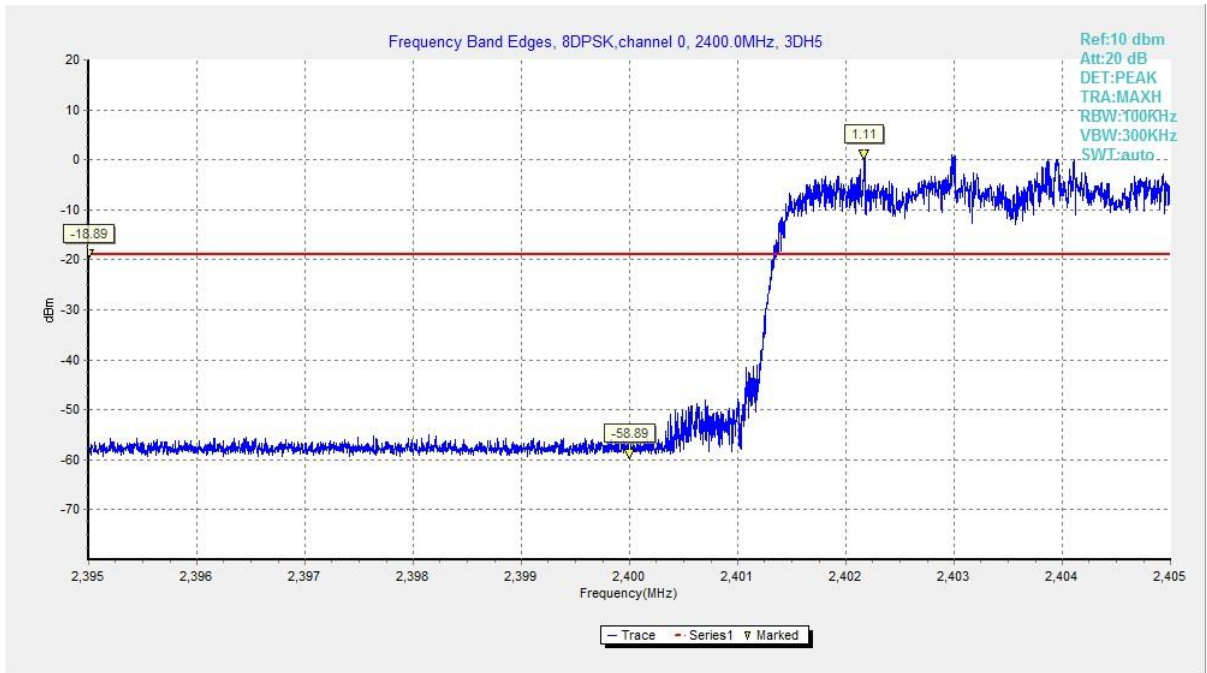


Fig. 5 Band Edges (8DPSK, Ch 0, Hopping ON)

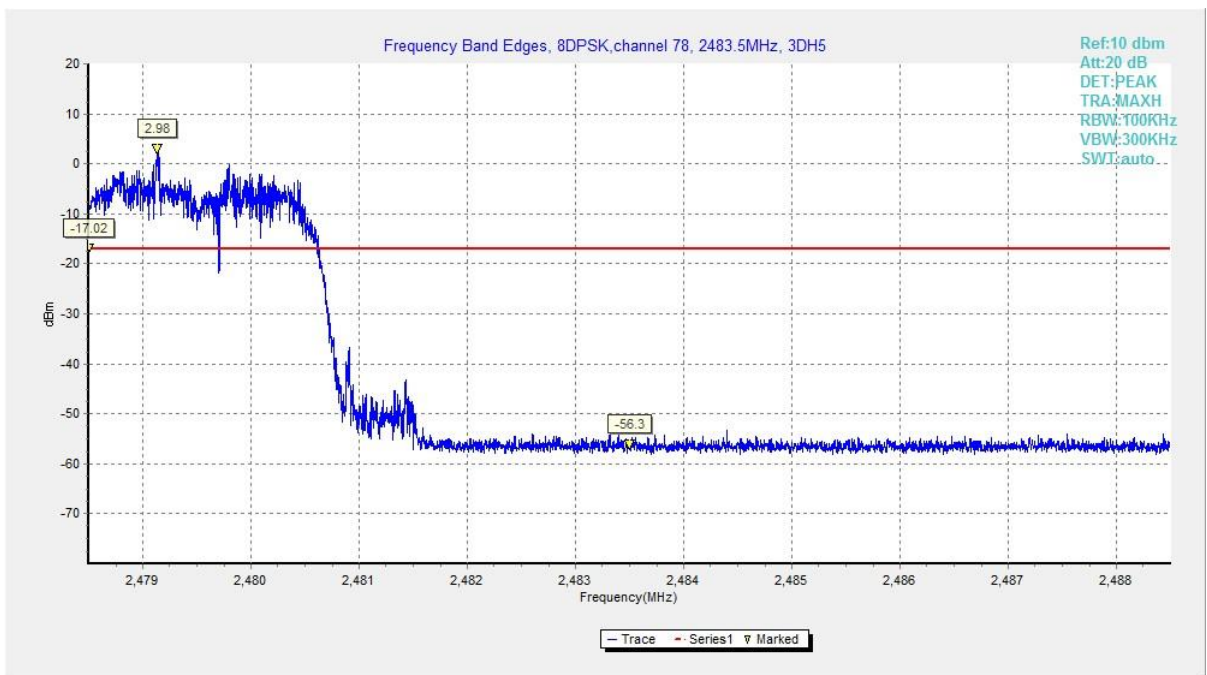


Fig. 6 Band Edges (8DPSK, Ch 78, Hopping ON)

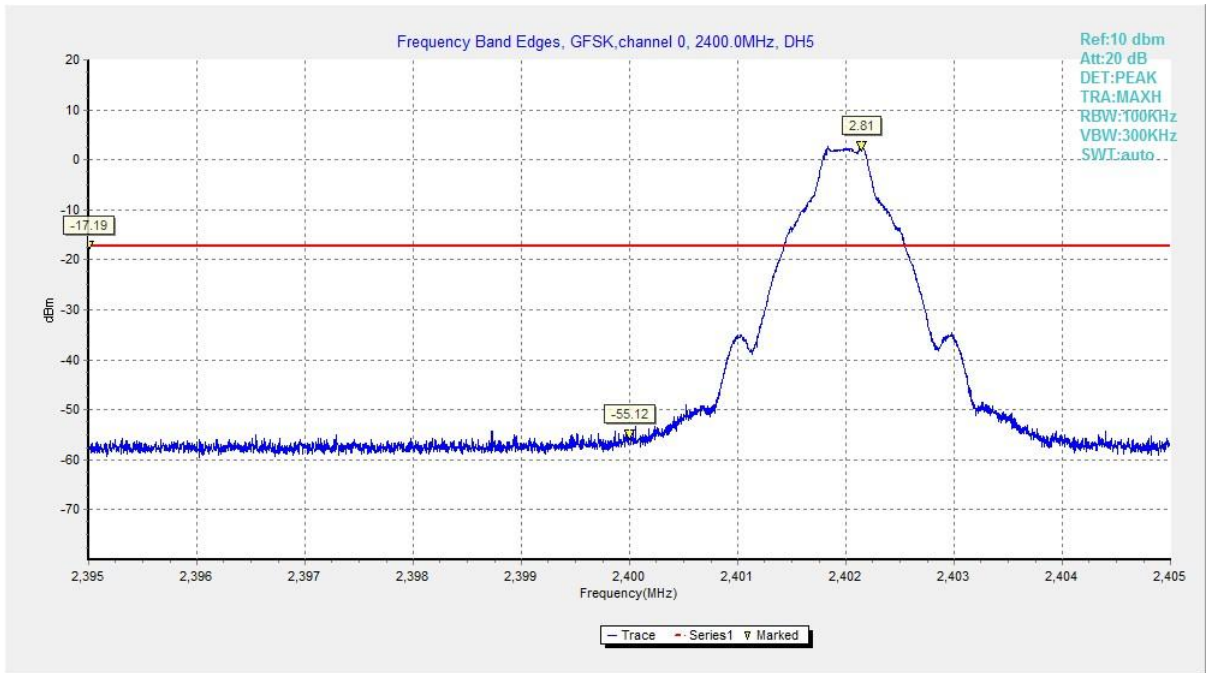


Fig. 7 Band Edges (GFSK, Ch 0, Hopping OFF)

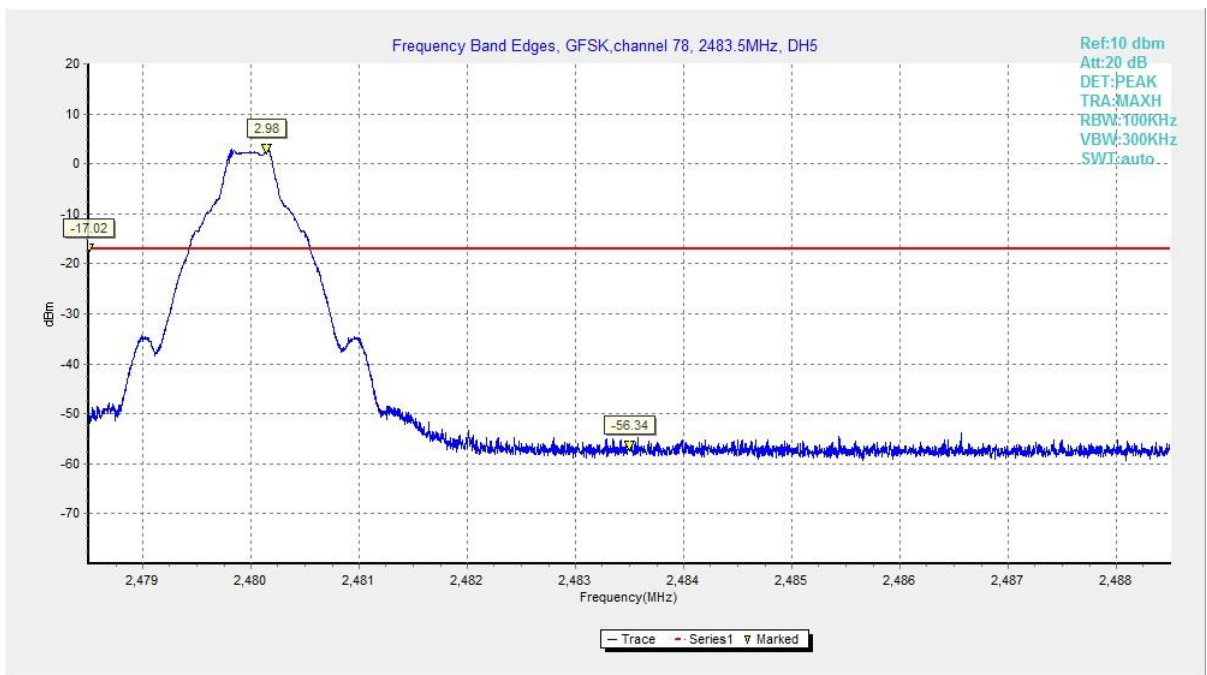


Fig. 8 Band Edges (GFSK, Ch 78, Hopping OFF)

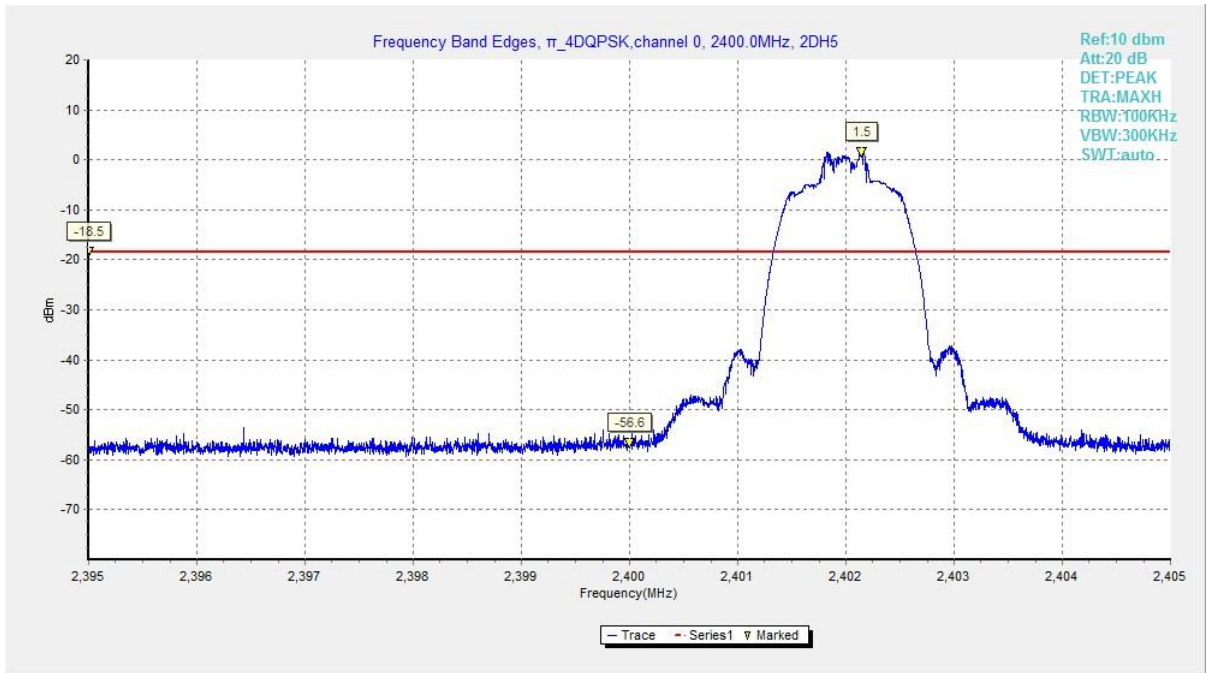


Fig. 9 Band Edges ($\pi/4$ DQPSK, Ch 0, Hopping OFF)

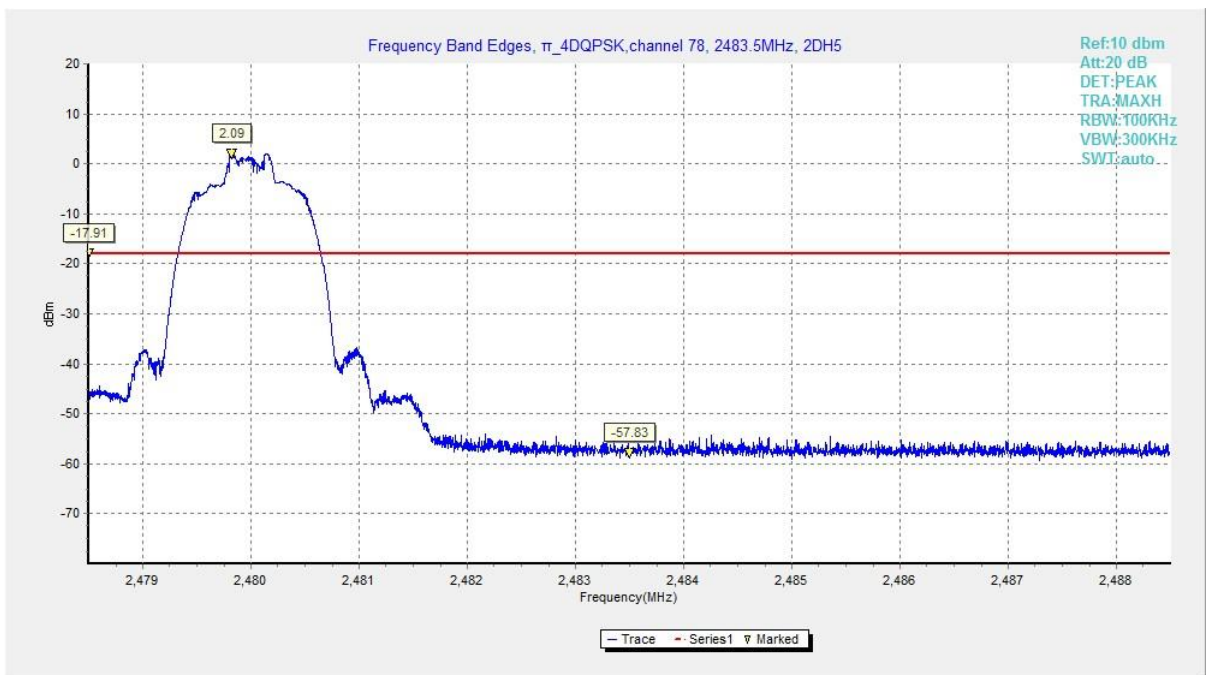


Fig. 10 Band Edges ($\pi/4$ DQPSK, Ch 78, Hopping OFF)

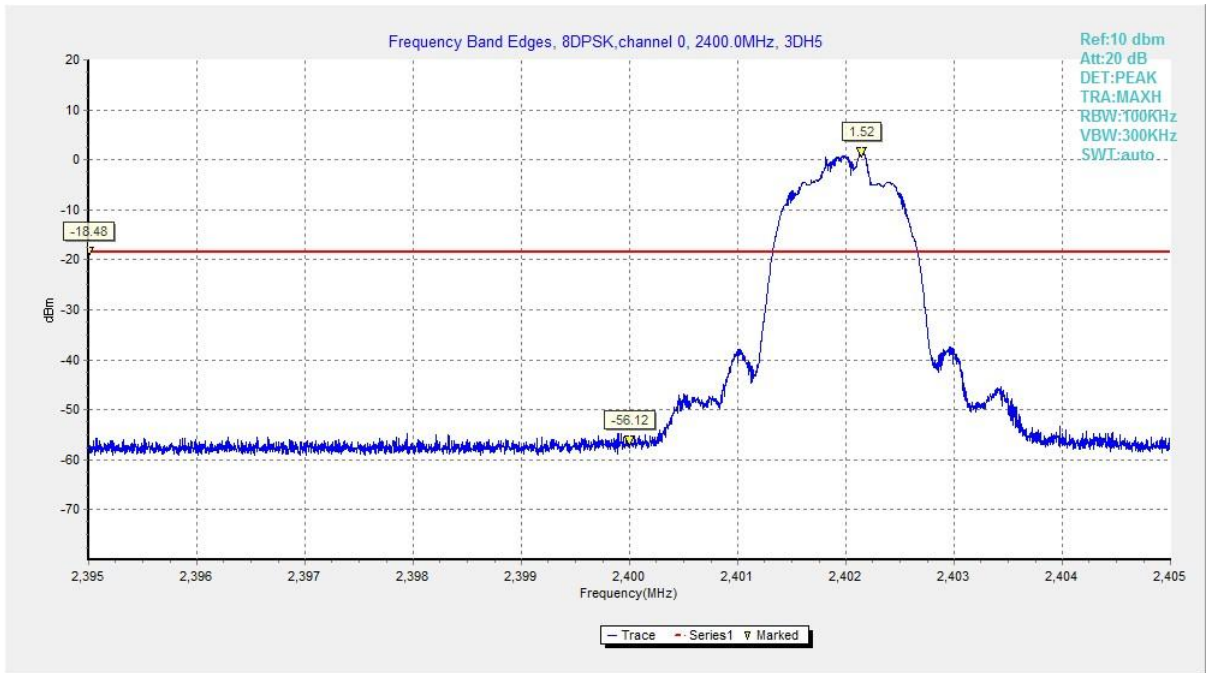


Fig. 11 Band Edges (8DPSK, Ch 0, Hopping OFF)

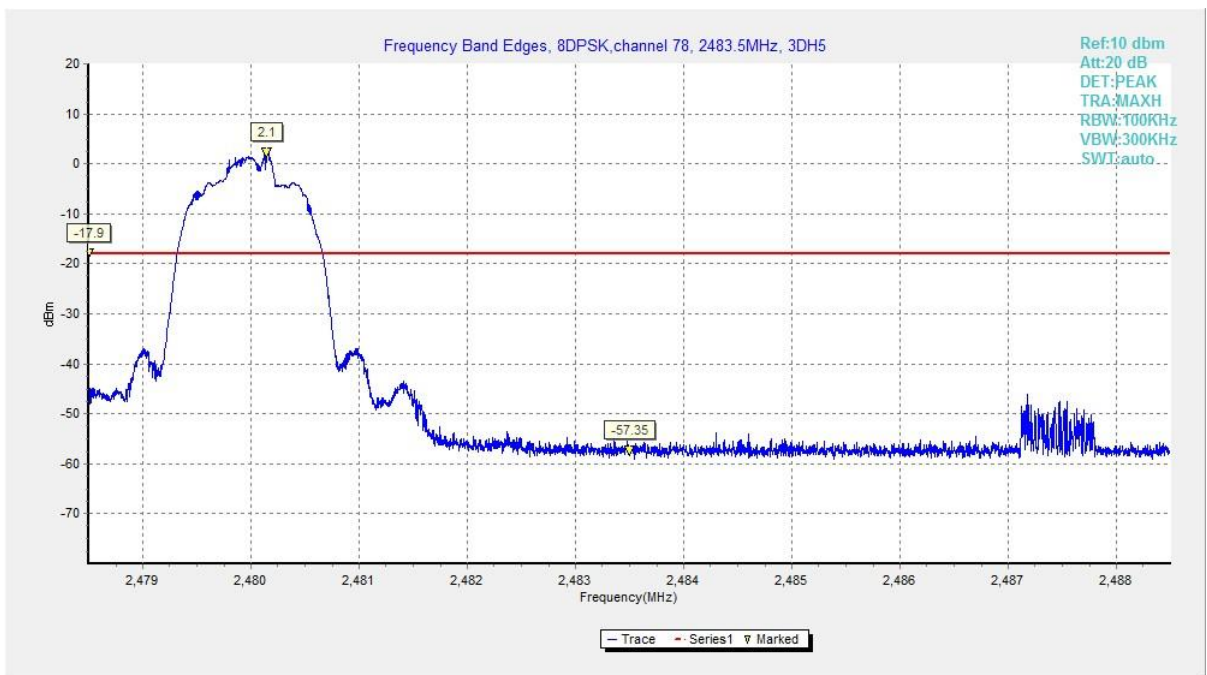


Fig. 12 Band Edges (8DPSK, Ch 78, Hopping OFF)



A.3 Conducted Emission

Measurement Limit:

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

Measurement Results:

MODE	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	1GHz-3GHz	Fig.13	P
		3GHz-10GHz	Fig.14	P
	39	1GHz-3GHz	Fig.15	P
		3GHz-10GHz	Fig.16	P
	78	1GHz-3GHz	Fig.17	P
		3GHz-10GHz	Fig.18	P
$\pi/4$ DQPSK	0	1GHz-3GHz	Fig.19	P
		3GHz-10GHz	Fig.20	P
	39	1GHz-3GHz	Fig.21	P
		3GHz-10GHz	Fig.22	P
	78	1GHz-3GHz	Fig.23	P
		3GHz-10GHz	Fig.24	P
8DPSK	0	1GHz-3GHz	Fig.25	P
		3GHz-10GHz	Fig.26	P
	39	1GHz-3GHz	Fig.27	P
		3GHz-10GHz	Fig.28	P
	78	1GHz-3GHz	Fig.29	P
		3GHz-10GHz	Fig.30	P
/	All channels	30 MHz-1GHz	Fig.31	P
		10GHz-26GHz	Fig.32	P

See below for test graphs.

Conclusion: Pass

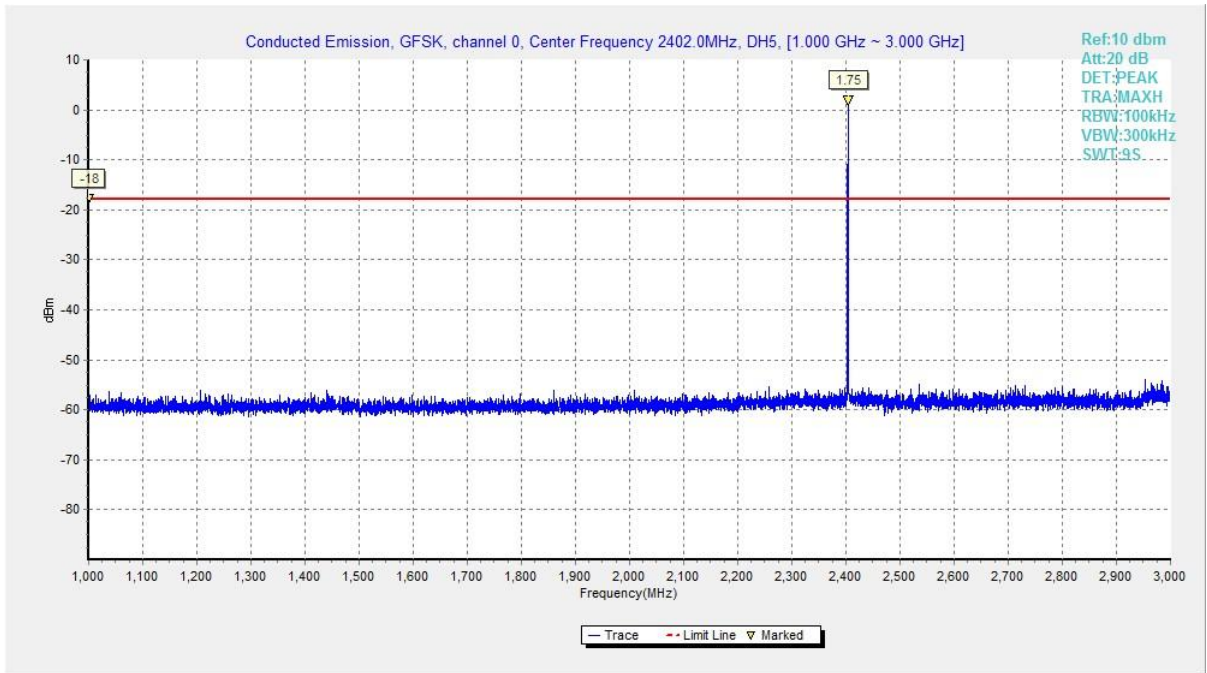


Fig. 13 Conducted Spurious Emission (GFSK, Ch0, 1GHz-3GHz)

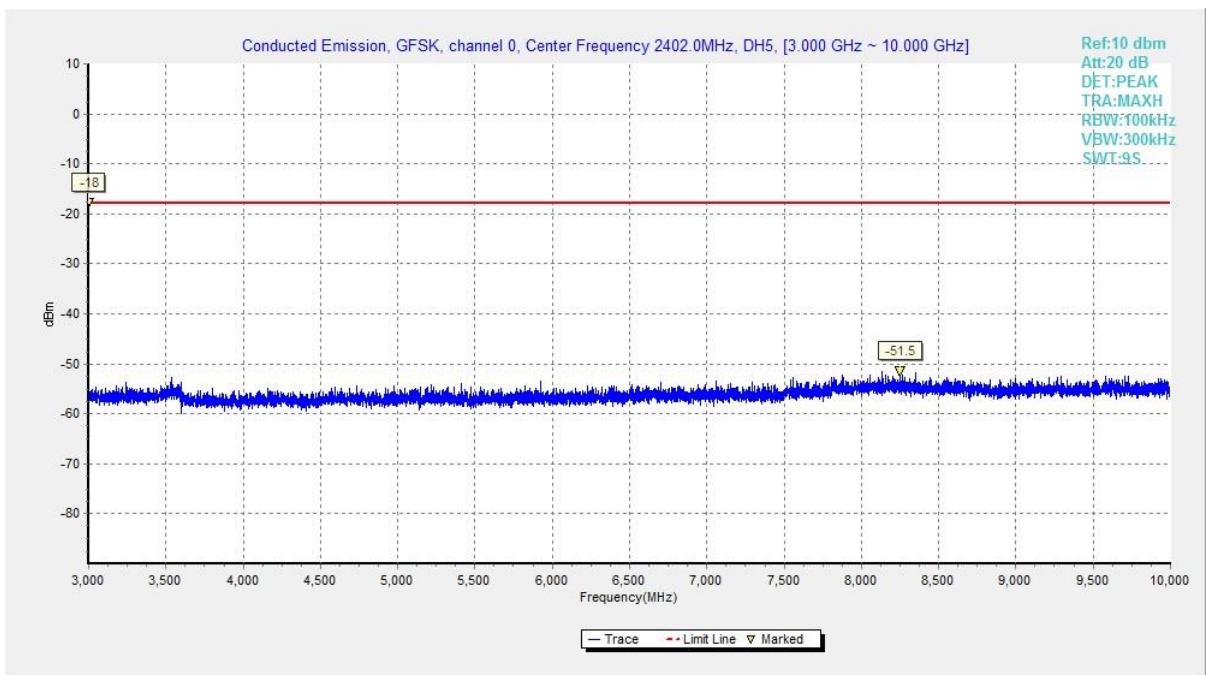


Fig. 14 Conducted Spurious Emission (GFSK, Ch0, 3GHz-10GHz)

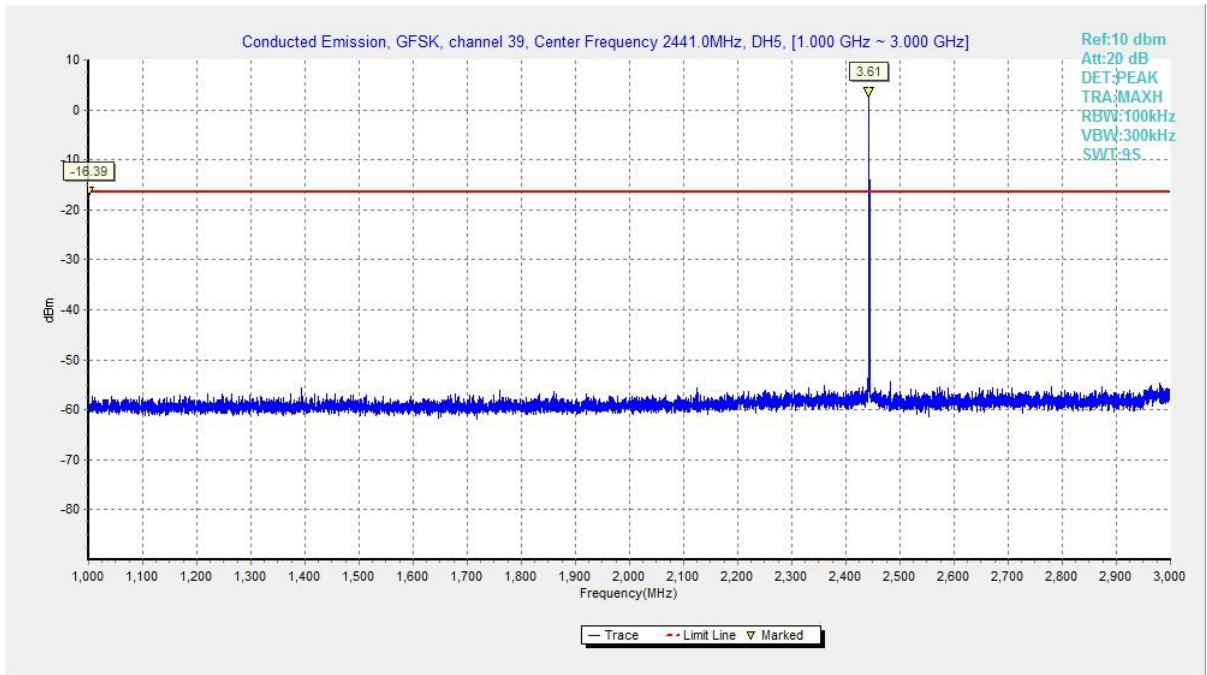


Fig. 15 Conducted Spurious Emission (GFSK, Ch39, 1GHz-3GHz)

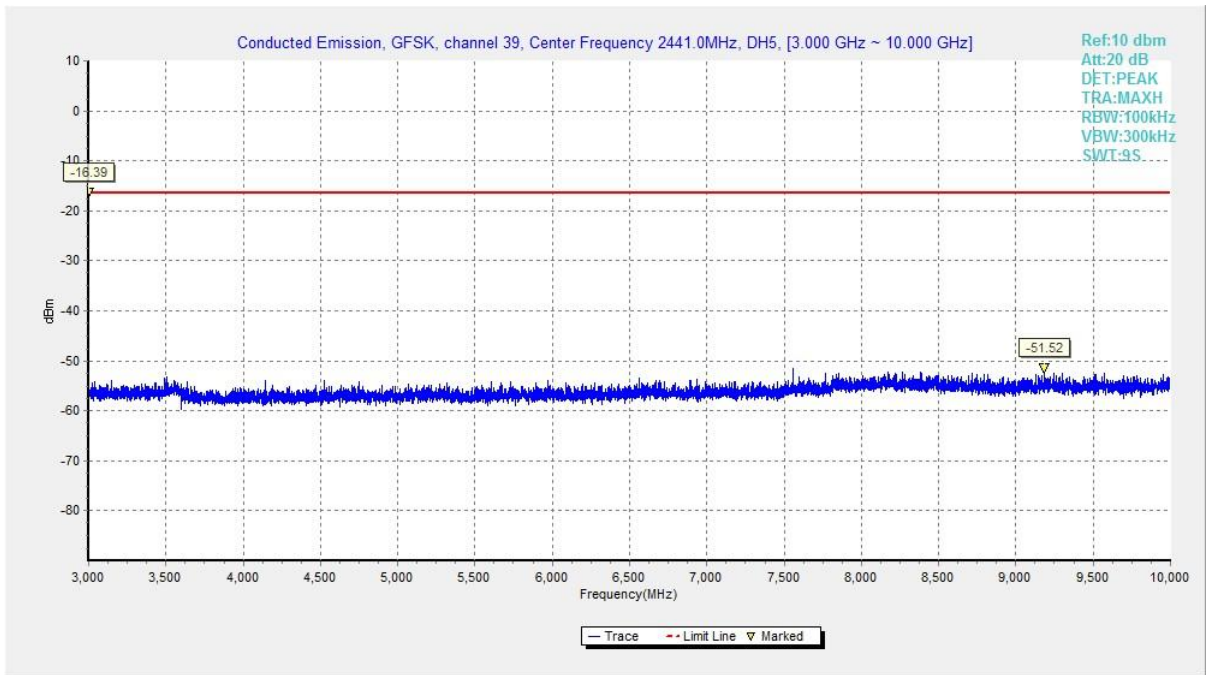


Fig. 16 Conducted Spurious Emission (GFSK, Ch39, 3GHz-10GHz)

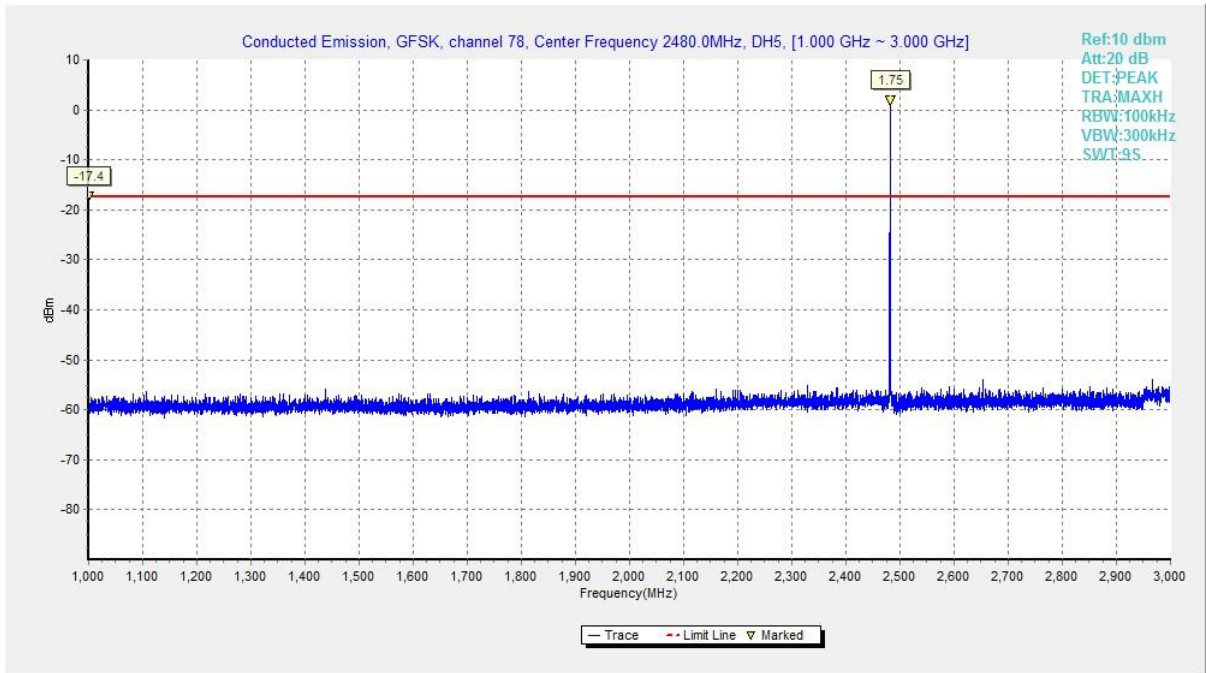


Fig. 17 Conducted Spurious Emission (GFSK, Ch78, 1GHz-3GHz)

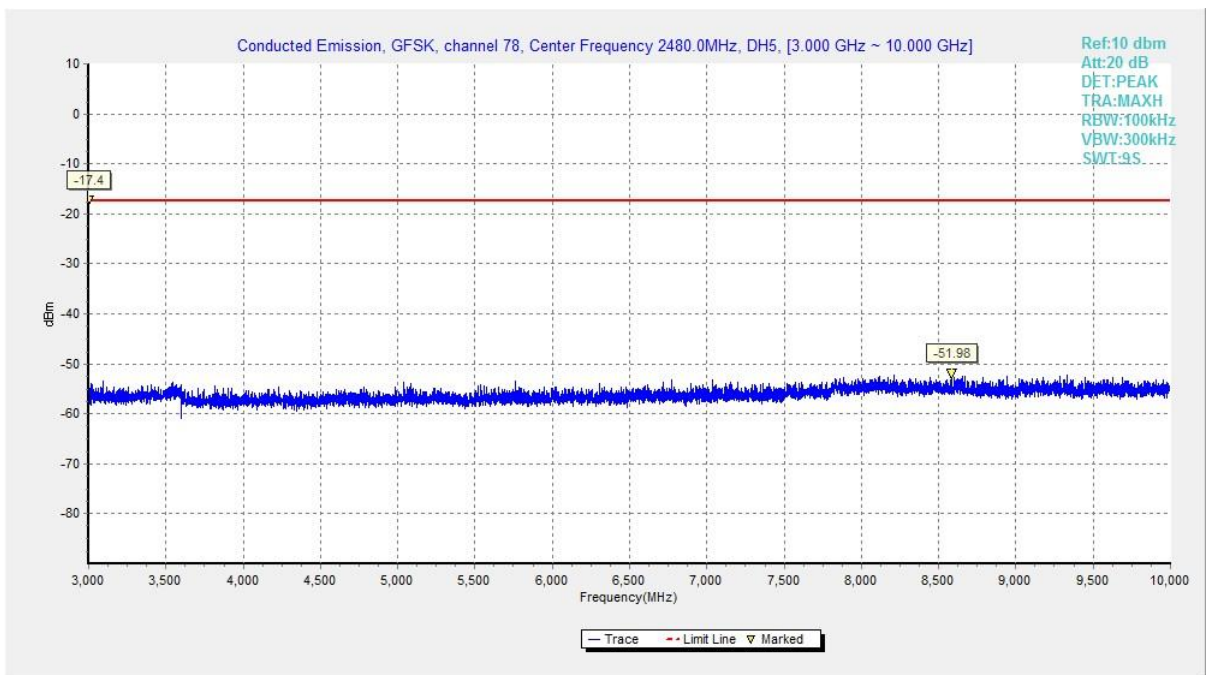


Fig. 18 Conducted Spurious Emission (GFSK, Ch78, 3GHz-10GHz)

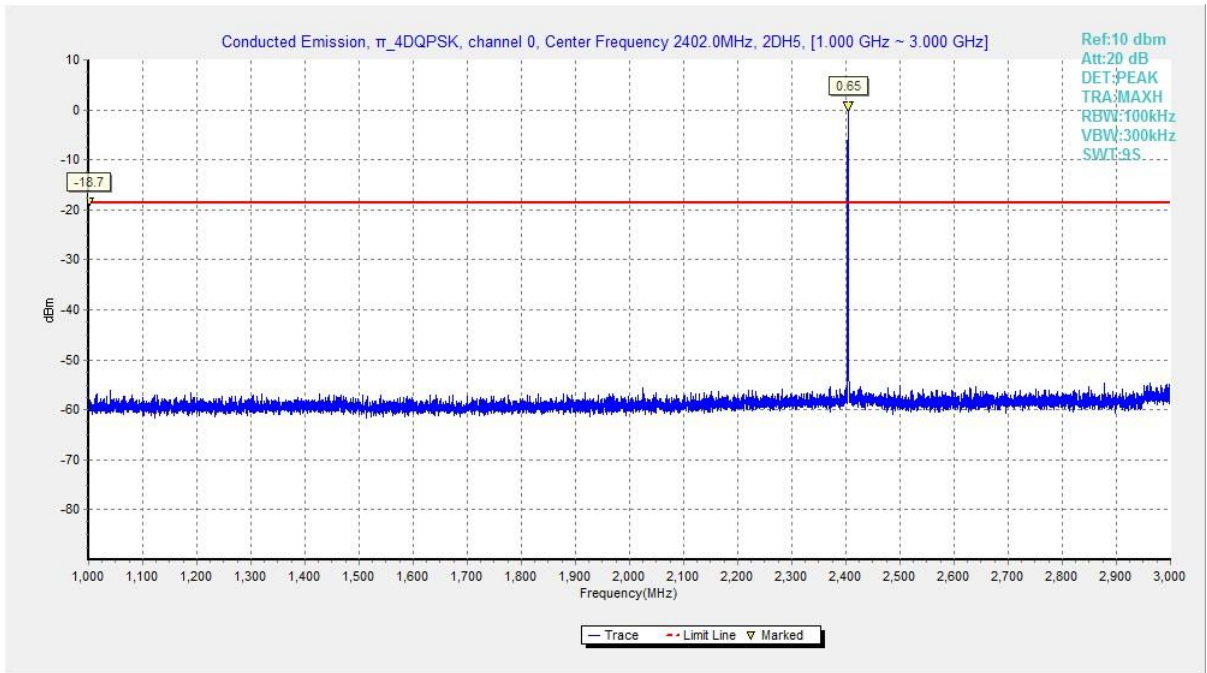


Fig. 19 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch0, 1GHz-3GHz)

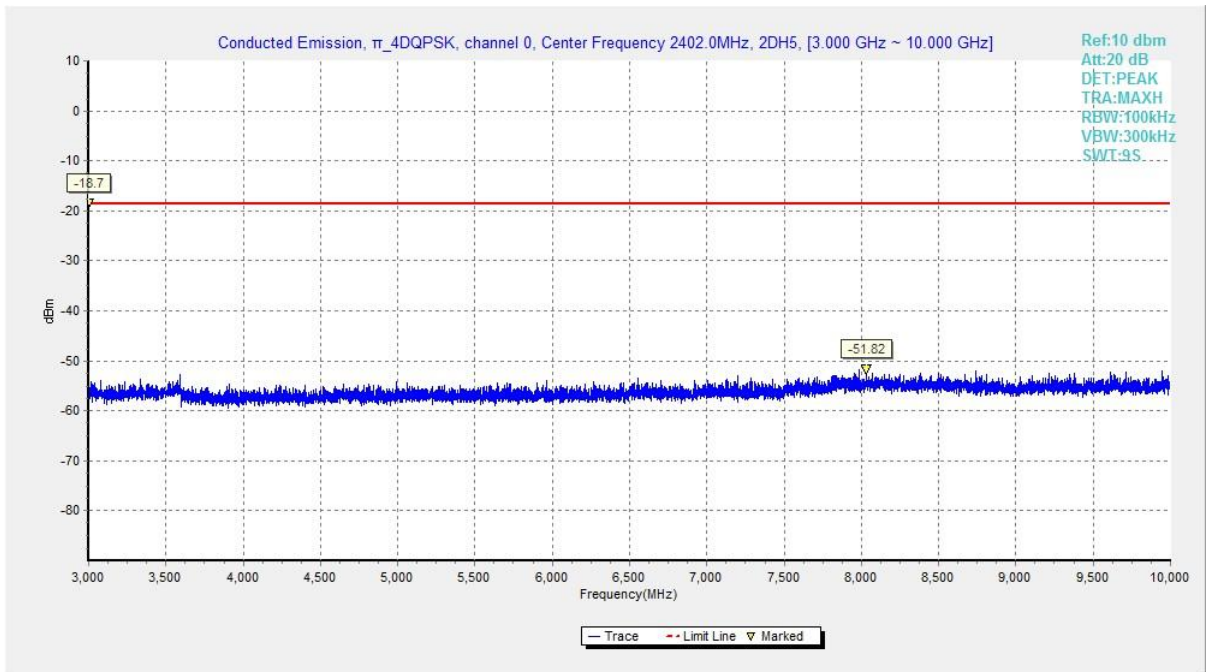


Fig. 20 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch0, 3GHz-10GHz)

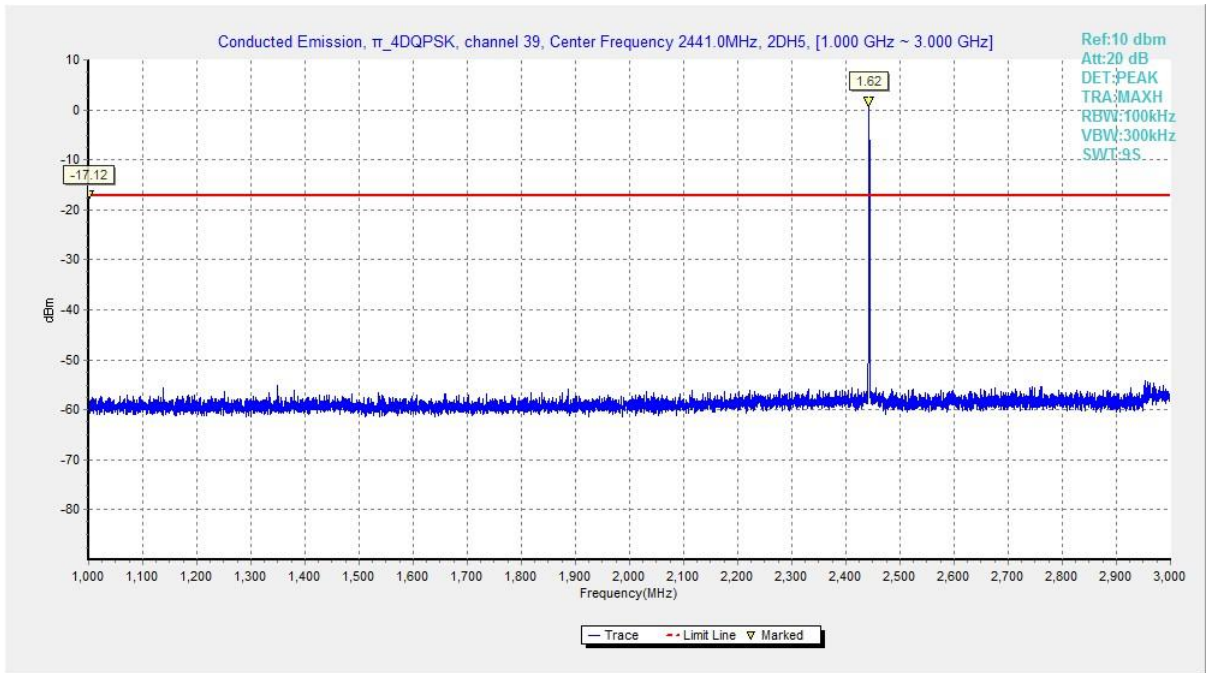


Fig. 21 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch39, 1GHz-3GHz)

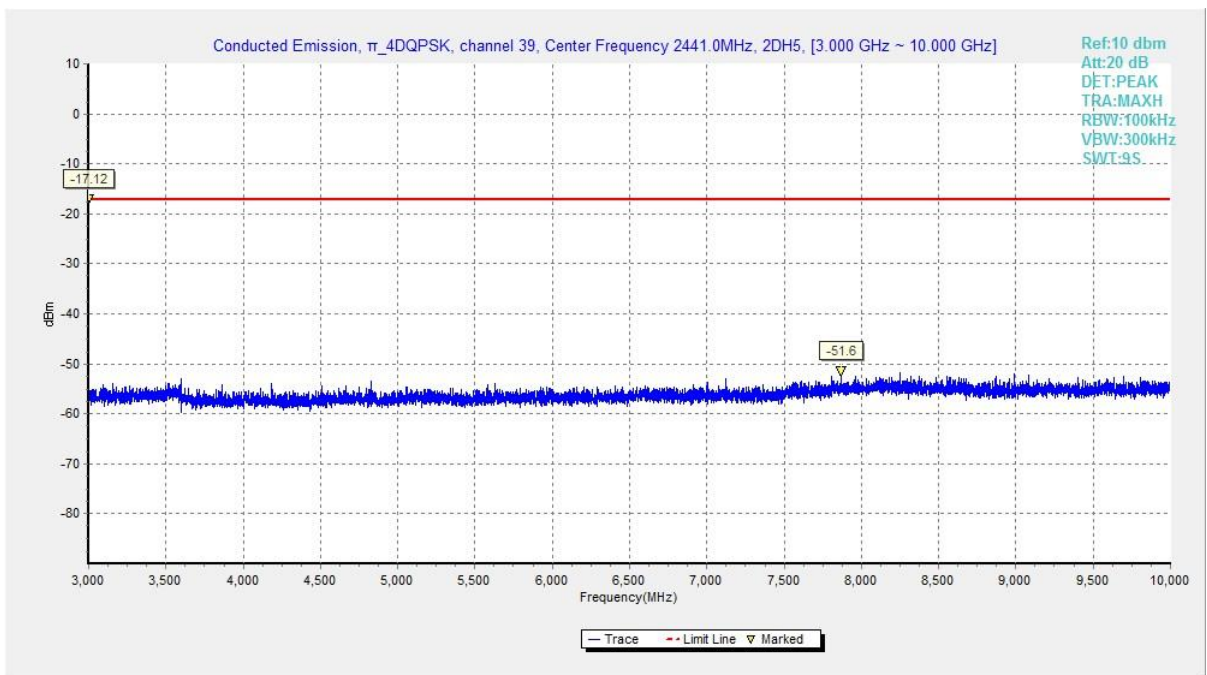


Fig. 22 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch39, 3GHz-10GHz)

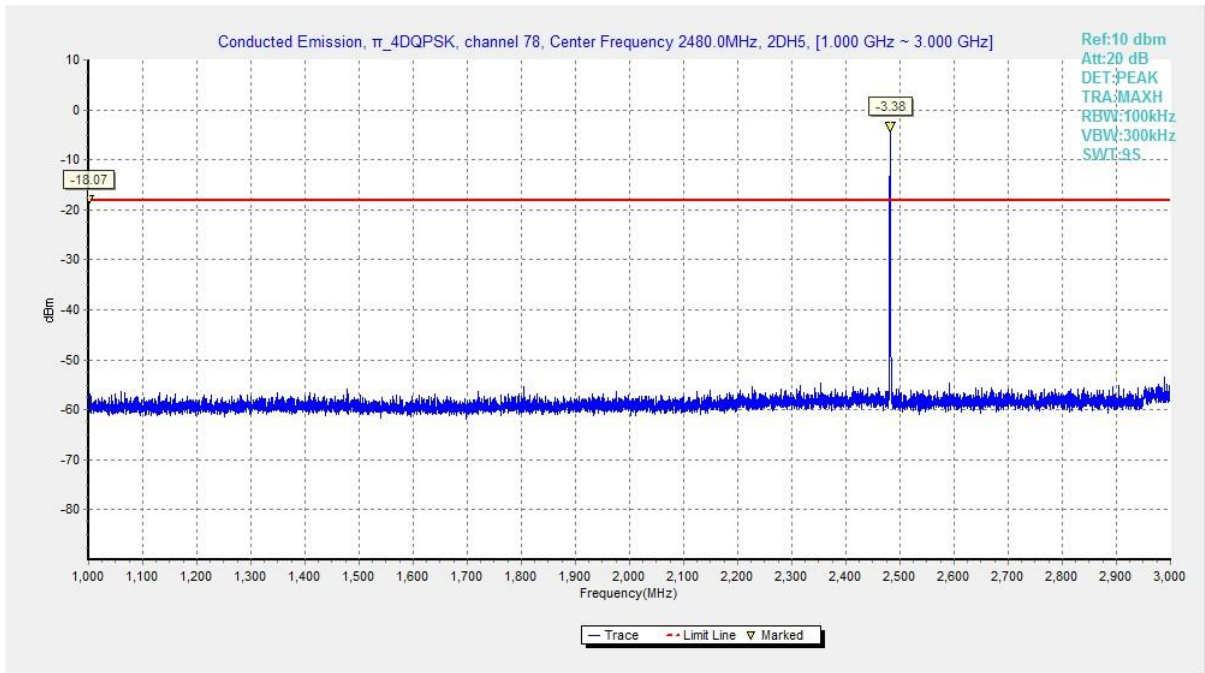


Fig. 23 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch78, 1GHz-3GHz)

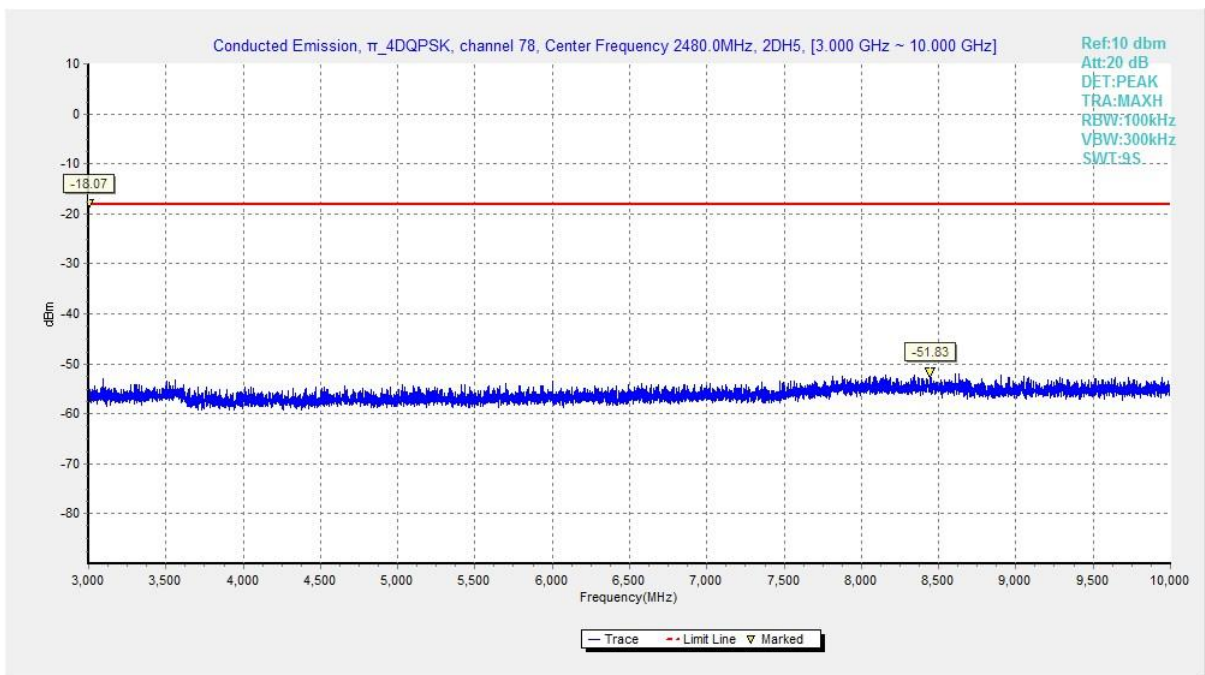


Fig. 24 Conducted Spurious Emission ($\pi/4$ DQPSK, Ch78, 3GHz-10GHz)

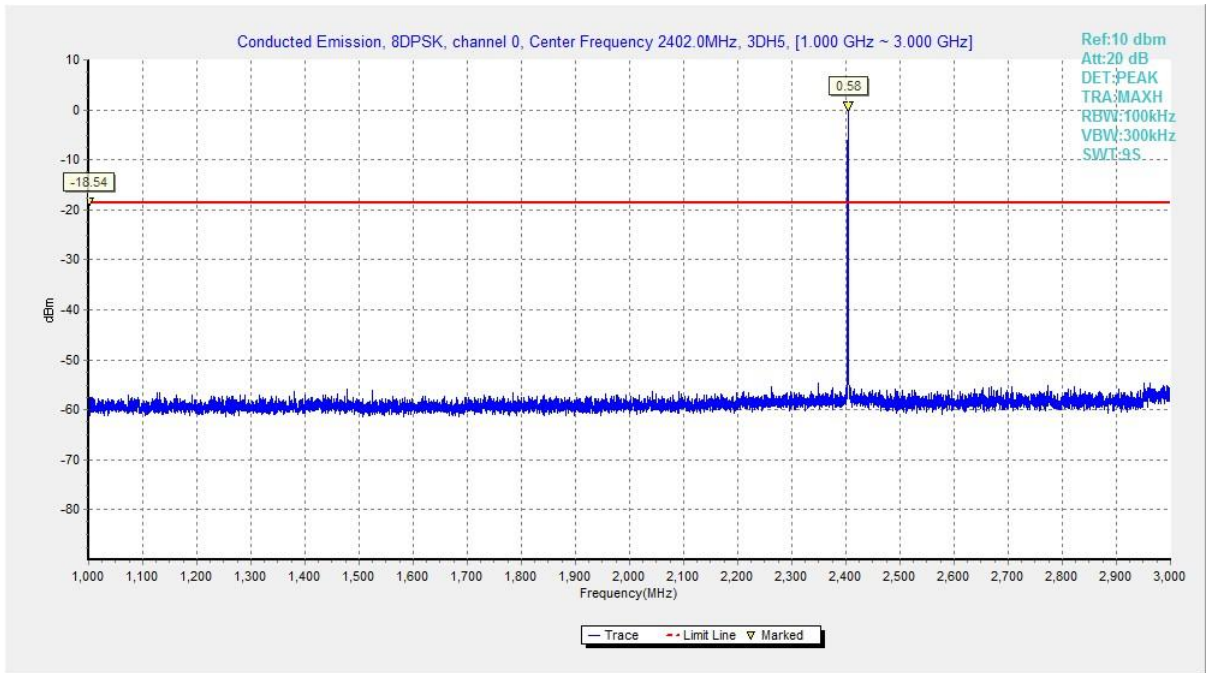


Fig. 25 Conducted Spurious Emission (8DPSK, Ch0, 1GHz-3GHz)

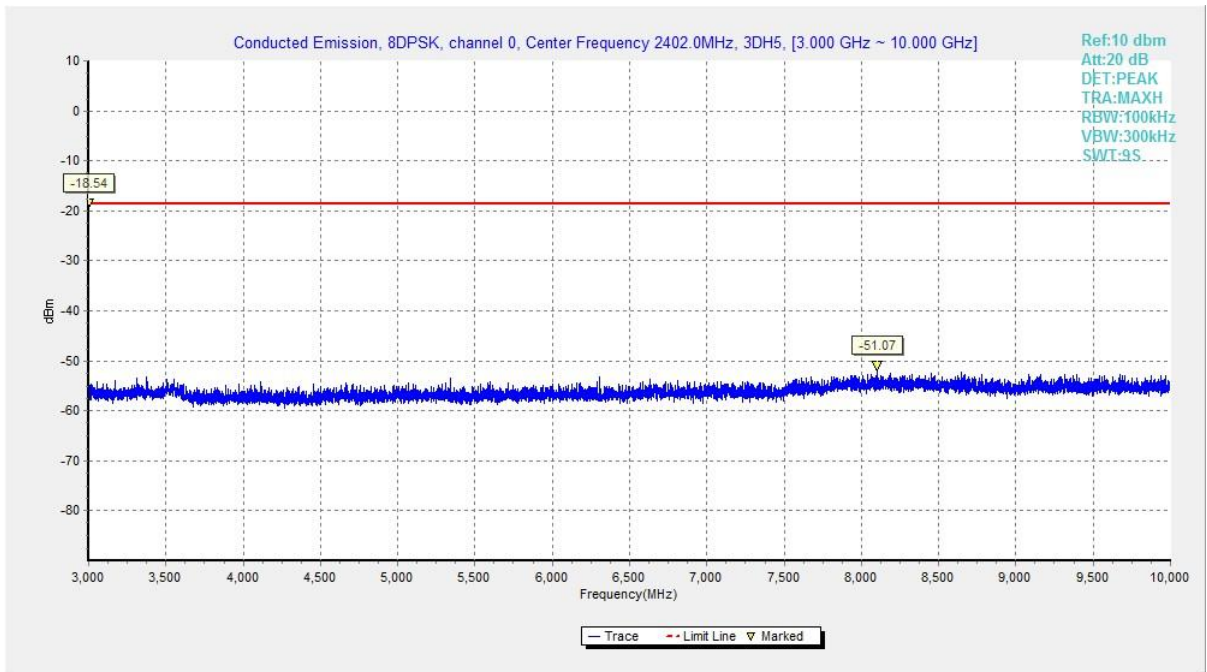


Fig. 26 Conducted Spurious Emission (8DPSK, Ch0, 3GHz-10GHz)

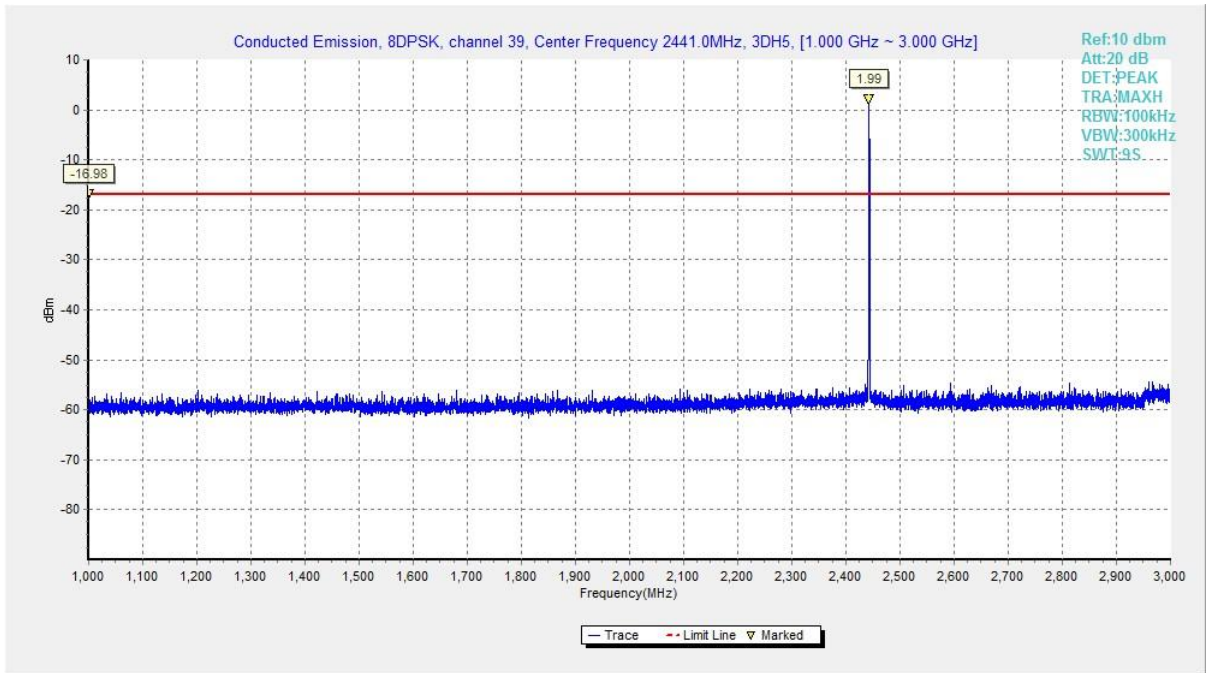


Fig. 27 Conducted Spurious Emission (8DPSK, Ch39, 1GHz-3GHz)

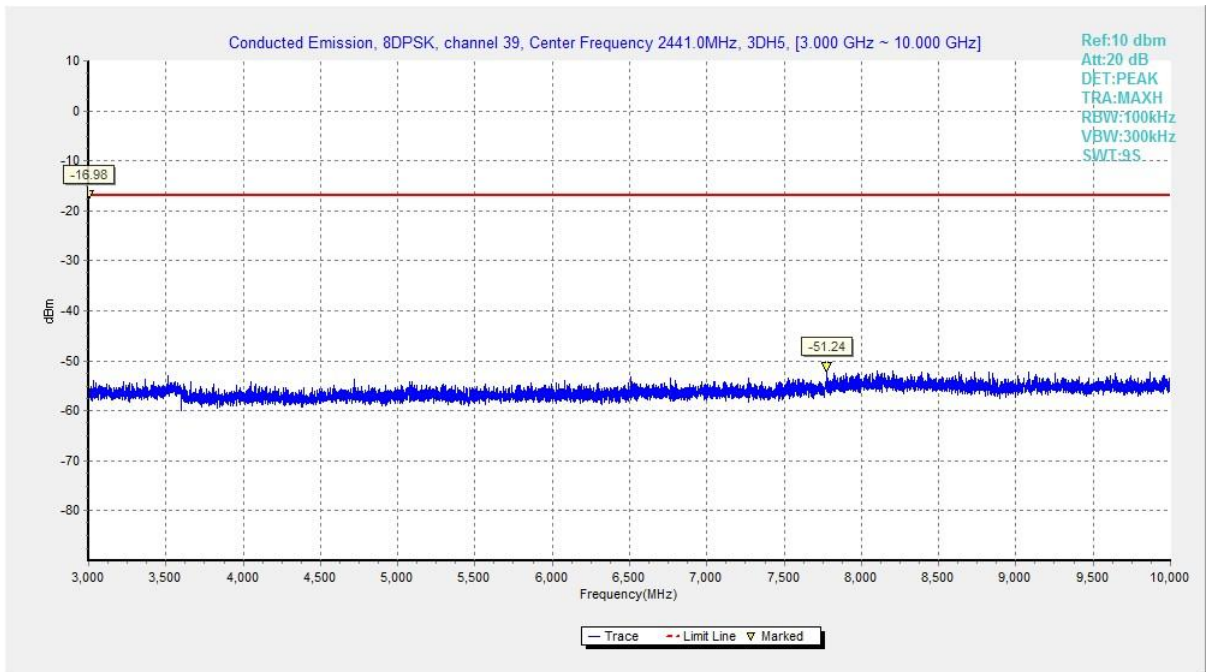


Fig. 28 Conducted Spurious Emission (8DPSK, Ch39, 3GHz-10GHz)

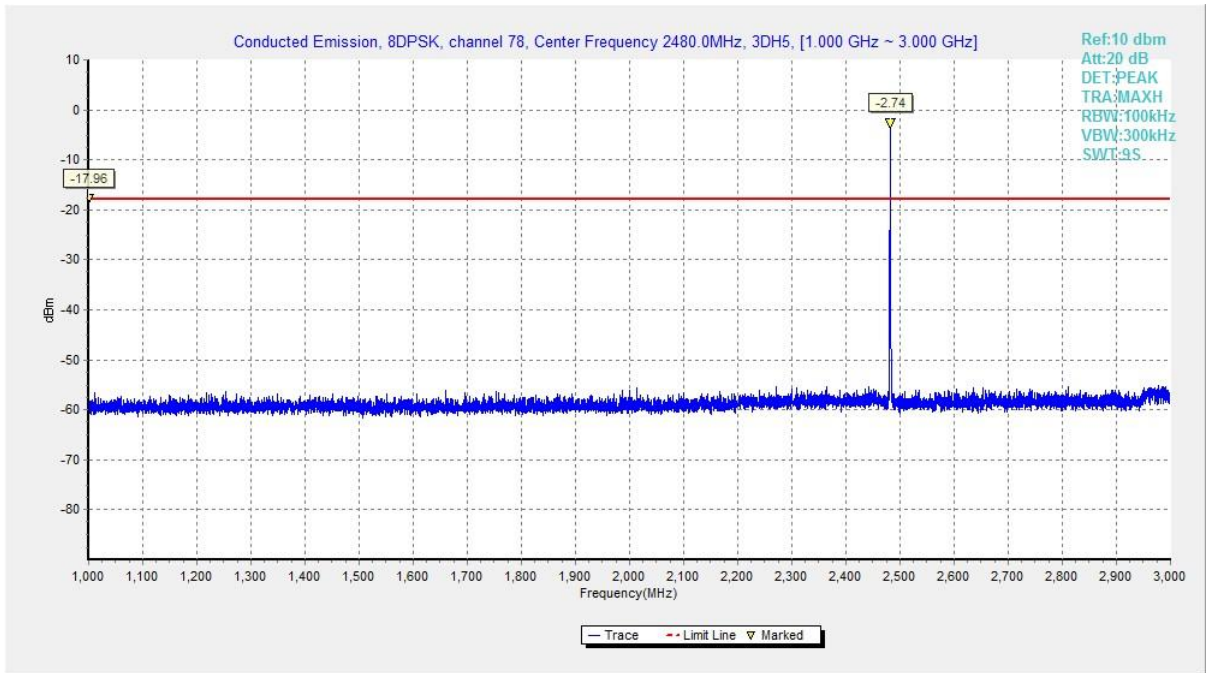


Fig. 29 Conducted Spurious Emission (8DPSK, Ch78, 1GHz-3GHz)

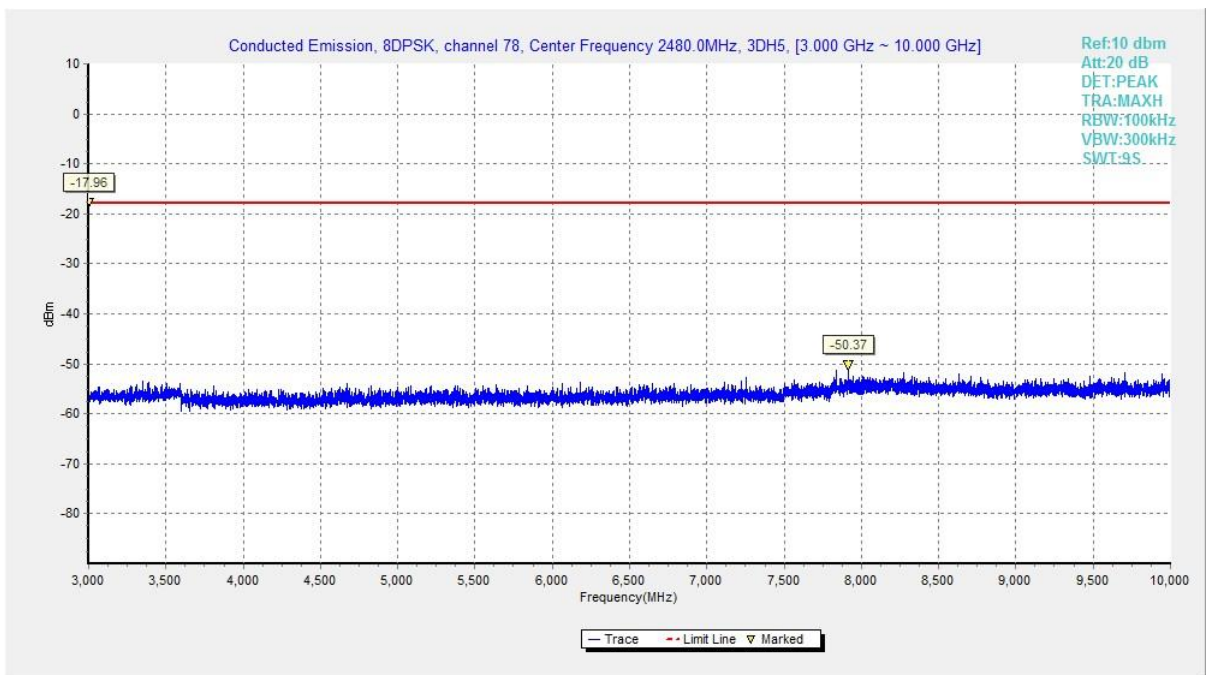


Fig. 30 Conducted Spurious Emission (8DPSK, Ch78, 3GHz-10GHz)

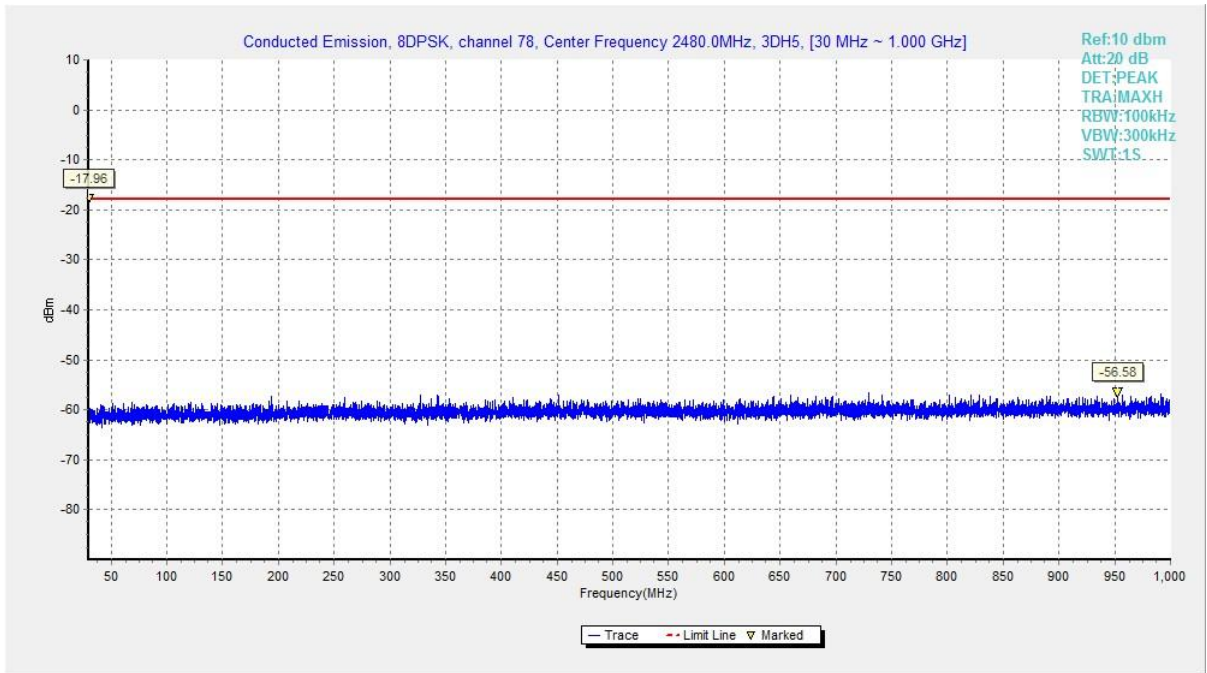


Fig. 31 Conducted Spurious Emission (All channel, 30MHz-1GHz)

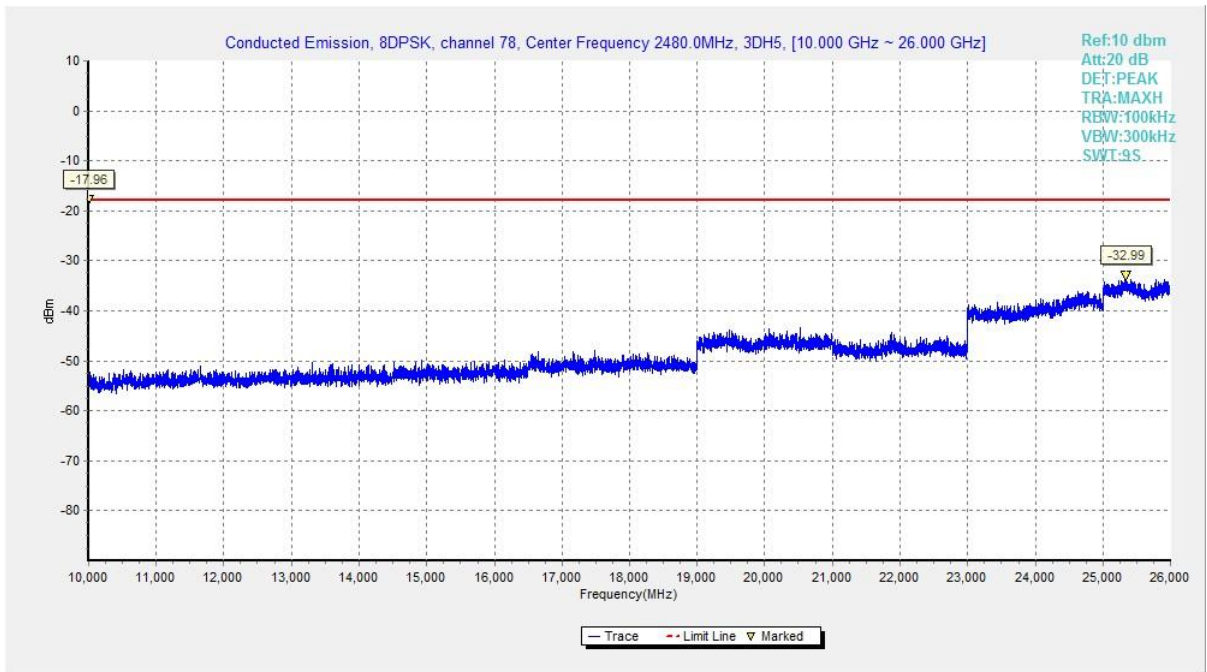


Fig. 32 Conducted Spurious Emission (All channel, 10GHz-26GHz)

A.4 Radiated Emission

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247, 15.205, 15.209	20dB 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.

Measurement Results:

Mode	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	1 GHz ~ 18 GHz	Fig.33	P
	39	1 GHz ~ 18 GHz	Fig.34	P
	78	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
$\pi/4$ DQPSK	0	1 GHz ~ 18 GHz	Fig.38	P
	39	1 GHz ~ 18 GHz	Fig.39	P
	78	1 GHz ~ 18 GHz	Fig.40	P
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.41	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.42	P
8DPSK	0	1 GHz ~ 18 GHz	Fig.43	P
	39	1 GHz ~ 18 GHz	Fig.44	P
	78	1 GHz ~ 18 GHz	Fig.45	P
	Restricted Band (CH0)	2.38 GHz ~ 2.45 GHz	Fig.46	P
	Restricted Band (CH78)	2.45 GHz ~ 2.5 GHz	Fig.47	P
/	All channels	9 kHz ~ 30 MHz	Fig.48	P
		30 MHz ~ 1 GHz	Fig.49	P
		18 GHz ~ 26.5 GHz	Fig.50	P



Worst Case Result
GFSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
2937.200000	47.17	74.00	26.83	V	10.80
3529.500000	35.10	74.00	38.90	H	-13.29
4881.600000	36.76	74.00	37.24	H	-9.43
7312.800000	44.53	74.00	29.47	H	-1.67
14230.800000	50.11	74.00	23.89	H	6.60
17996.400000	55.71	74.00	18.29	H	13.90

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
2937.200000	34.93	54.00	19.07	V	10.80
3529.500000	22.93	54.00	31.07	H	-13.29
4881.600000	30.19	54.00	23.81	H	-9.43
7312.800000	31.55	54.00	22.45	H	-1.67
14230.800000	38.35	54.00	15.65	H	6.60
17996.400000	43.52	54.00	10.48	H	13.90

π /4 DQPSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
2798.800000	48.30	74.00	25.70	V	10.70
3802.800000	36.13	74.00	37.87	V	-12.40
4843.800000	38.52	74.00	35.48	V	-9.59
7286.800000	44.55	74.00	29.45	H	-1.73
14598.400000	50.68	74.00	23.32	V	6.54
17993.200000	57.07	74.00	16.93	H	13.96

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
2798.800000	35.50	54.00	18.50	V	10.70
3802.800000	22.00	54.00	32.00	V	-12.40
4843.800000	24.96	54.00	29.04	V	-9.59
7286.800000	31.04	54.00	22.96	H	-1.73
14598.400000	38.90	54.00	15.10	V	6.54
17993.200000	44.80	54.00	9.20	H	13.96

8DPSK CH39 (1-18GHz)

Frequency (MHz)	MaxPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
2961.200000	47.56	74.00	26.44	V	10.87
3544.500000	35.44	74.00	38.56	V	-13.07
4964.100000	38.67	74.00	35.33	H	-8.94
8002.400000	43.58	74.00	30.42	V	-2.05
14271.600000	51.55	74.00	22.45	V	6.65
17995.600000	56.34	74.00	17.66	H	13.92

Frequency (MHz)	Average (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Pol	Corr. (dB)
2961.200000	35.16	54.00	18.84	V	10.87
3544.500000	22.53	54.00	31.47	V	-13.07
4964.100000	26.27	54.00	27.73	H	-8.94
8002.400000	31.60	54.00	22.40	V	-2.05
14271.600000	38.81	54.00	15.19	V	6.65
17995.600000	44.57	54.00	9.43	H	13.92

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

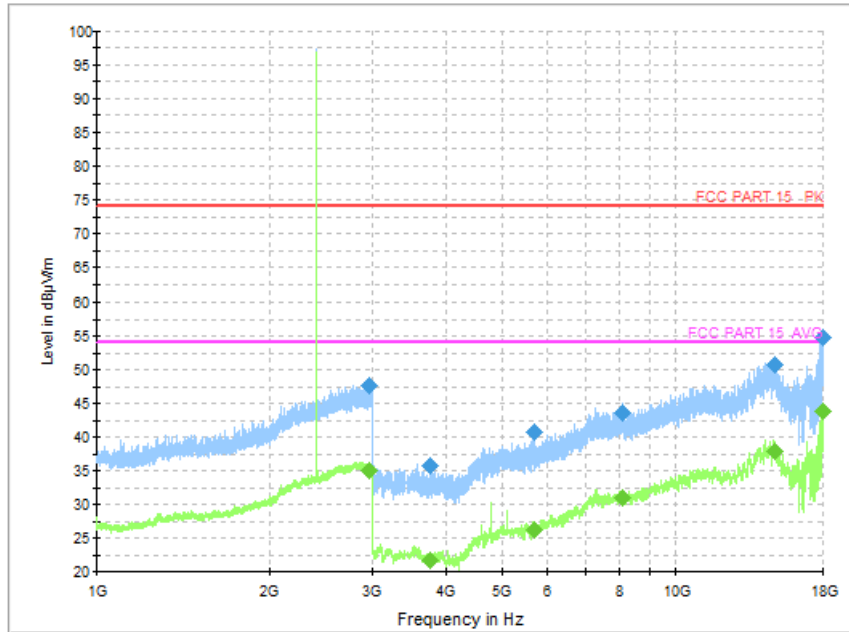


Fig. 33 Radiated Spurious Emission (GFSK, Ch0, 1GHz ~ 18GHz)

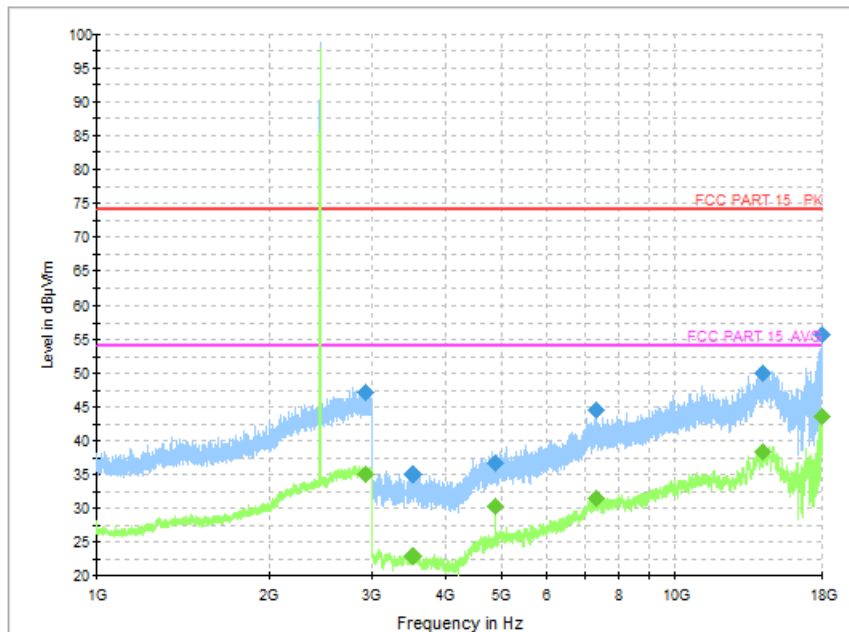


Fig. 34 Radiated Spurious Emission (GFSK, Ch39, 1GHz ~ 18GHz)

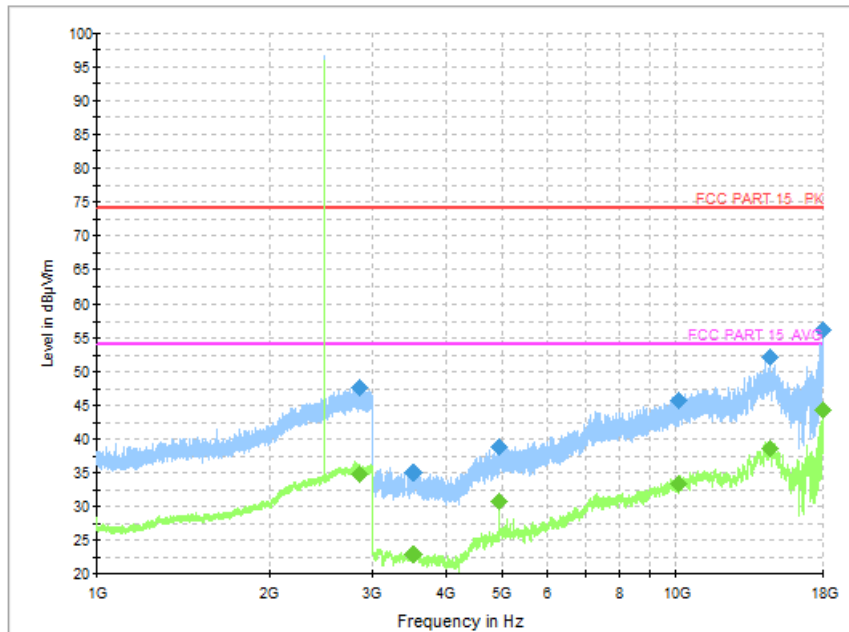


Fig. 35 Radiated Spurious Emission (GFSK, Ch78, 1GHz ~ 18GHz)

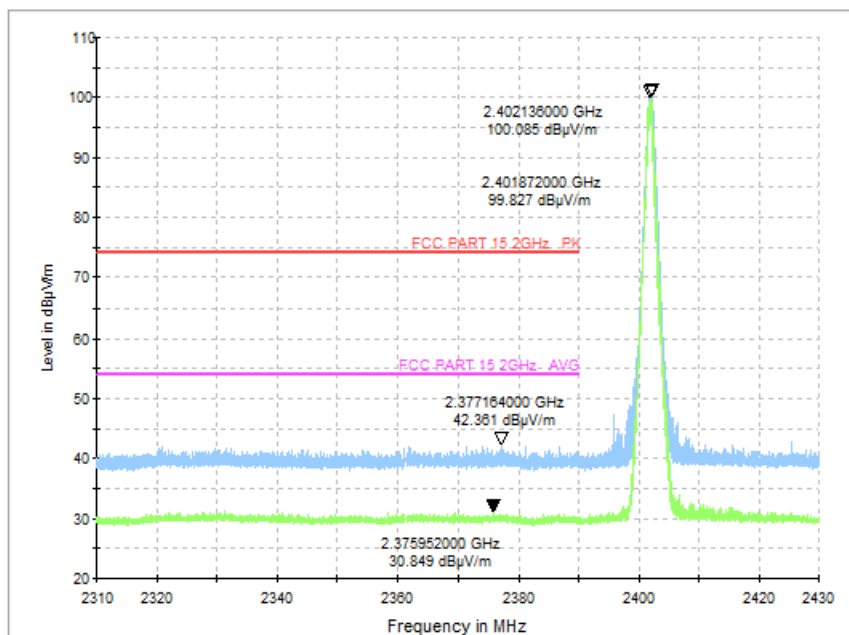


Fig. 36 Radiated Band Edges (GFSK, Ch0, 2380GHz ~ 2450GHz)

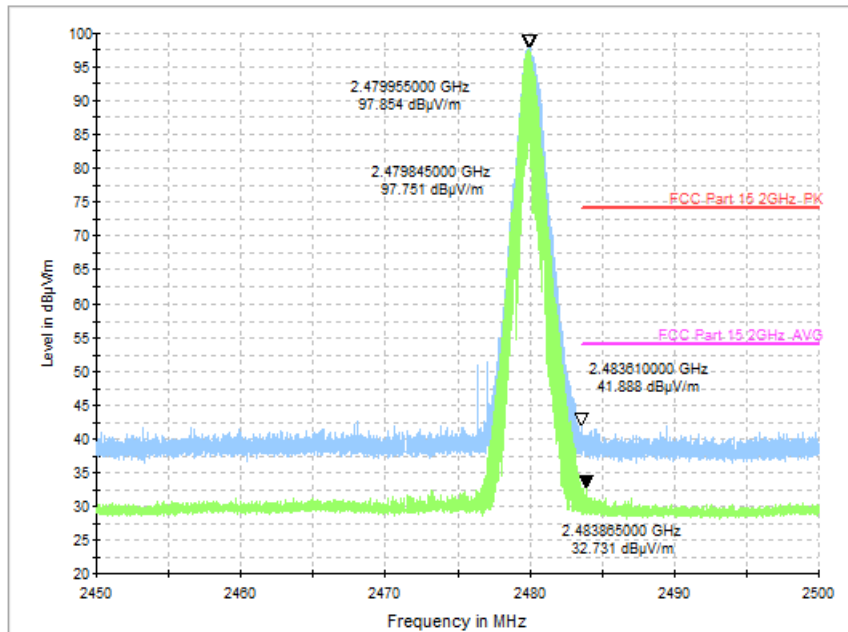


Fig. 37 Radiated Band Edges (GFSK, Ch78, 2450GHz ~ 2500GHz)

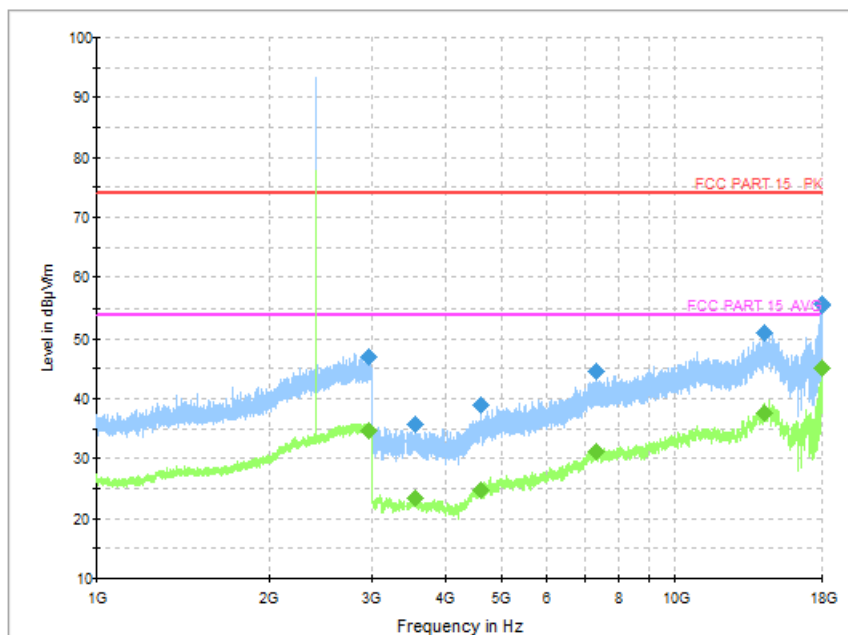


Fig. 38 Radiated Spurious Emission ($\pi/4$ DQPSK, Ch0, 1GHz ~ 18GHz)

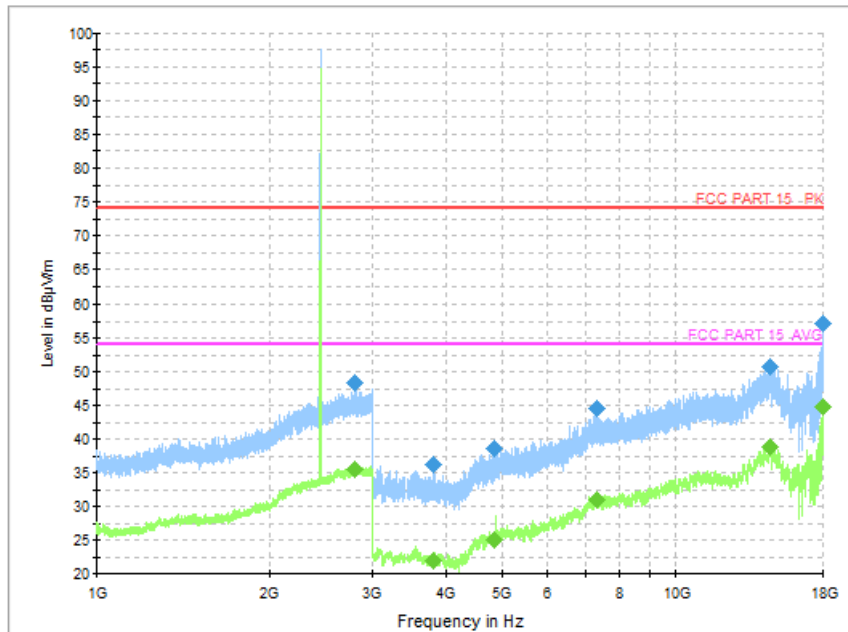


Fig. 39 Radiated Spurious Emission ($\pi/4$ DQPSK, Ch39, 1GHz ~ 18GHz)

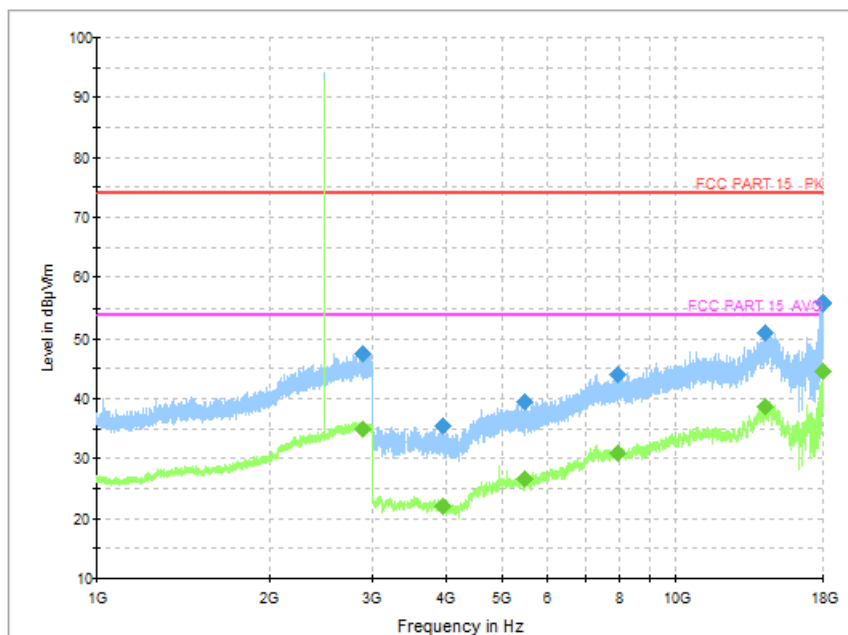


Fig. 40 Radiated Spurious Emission ($\pi/4$ DQPSK, Ch78, 1GHz ~ 18GHz)

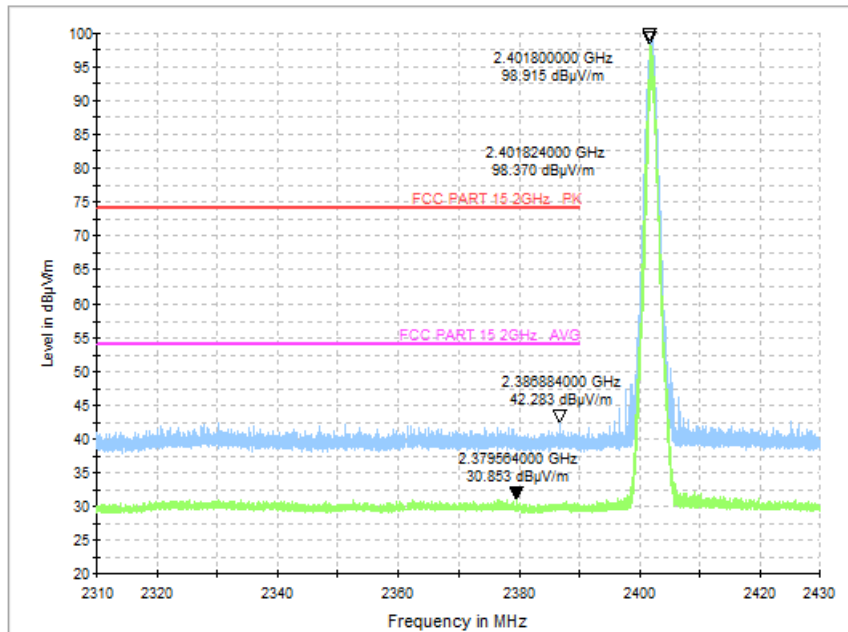


Fig. 41 Radiated Band Edges ($\pi/4$ DQPSK, Ch0, 2380GHz ~ 2450GHz)

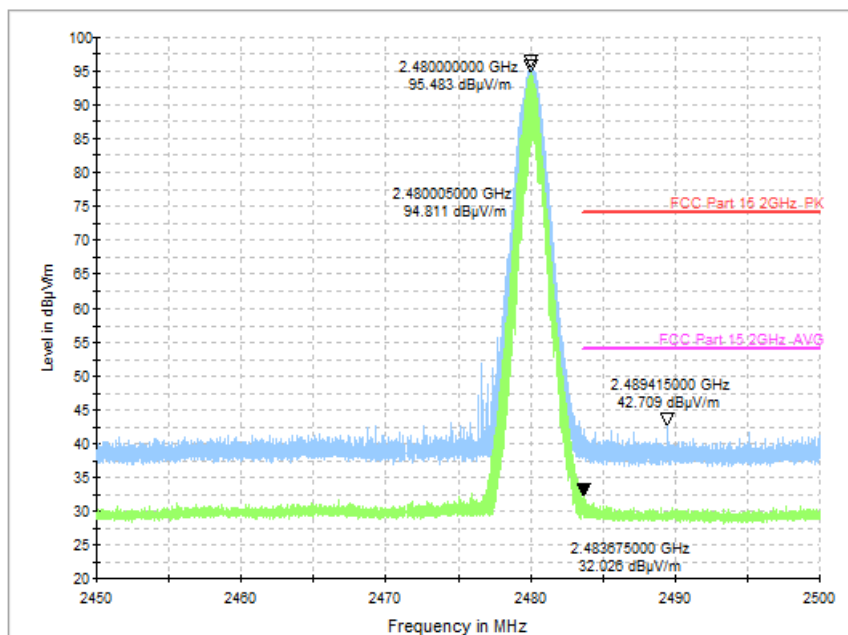


Fig. 42 Radiated Band Edges ($\pi/4$ DQPSK, Ch78, 2450GHz ~ 2500GHz)

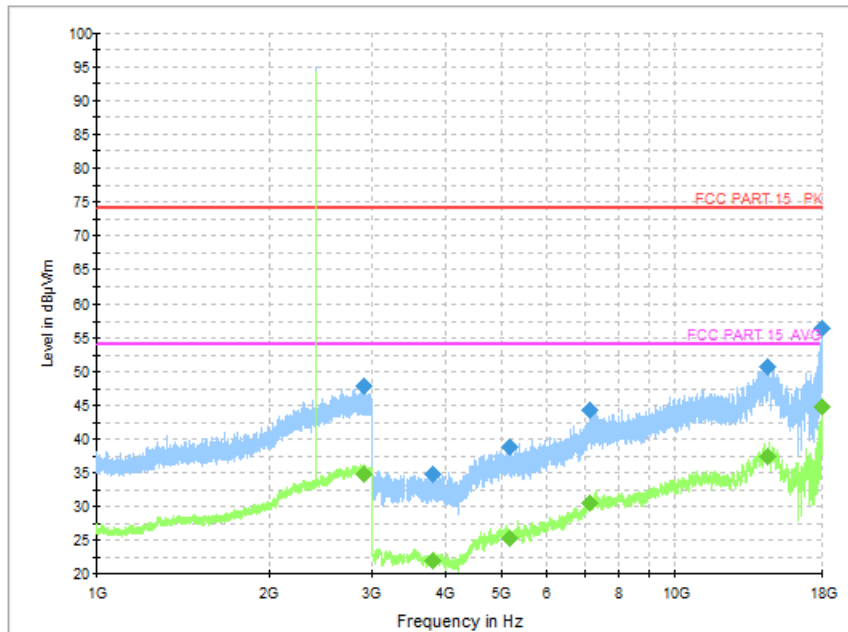


Fig. 43 Radiated Spurious Emission (8DPSK, Ch0, 1GHz ~ 18GHz)

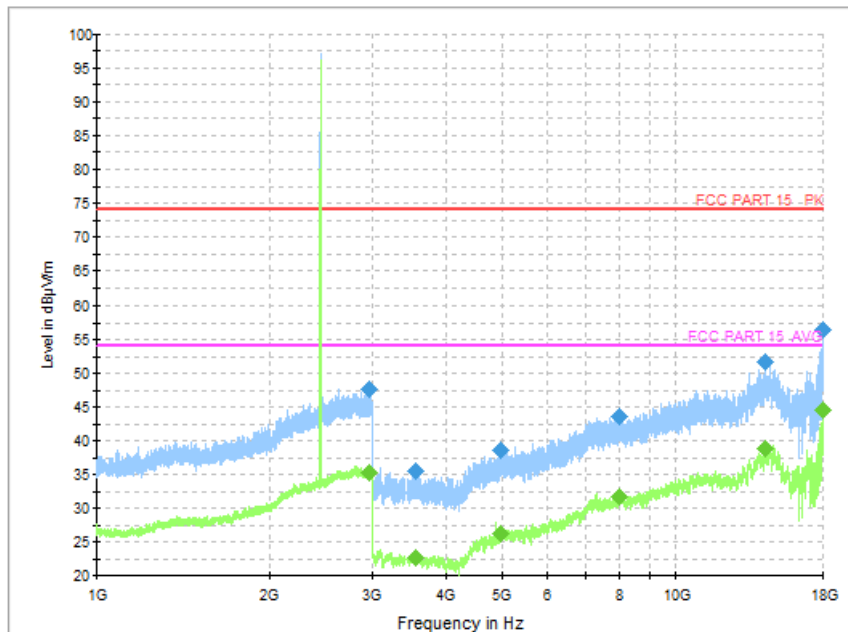


Fig. 44 Radiated Spurious Emission (8DPSK, Ch39, 1GHz ~ 18GHz)

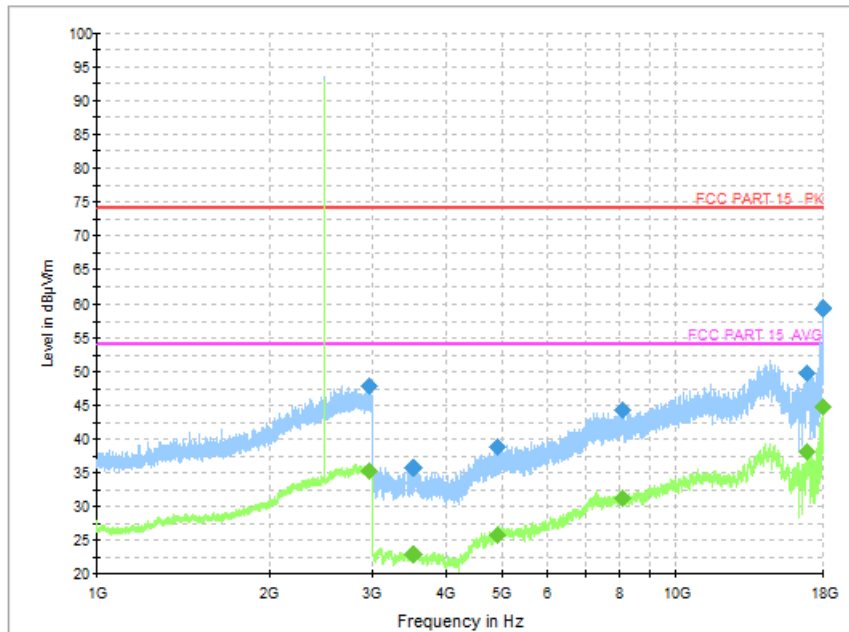


Fig. 45 Radiated Spurious Emission (8DPSK, Ch78, 1GHz ~ 18GHz)

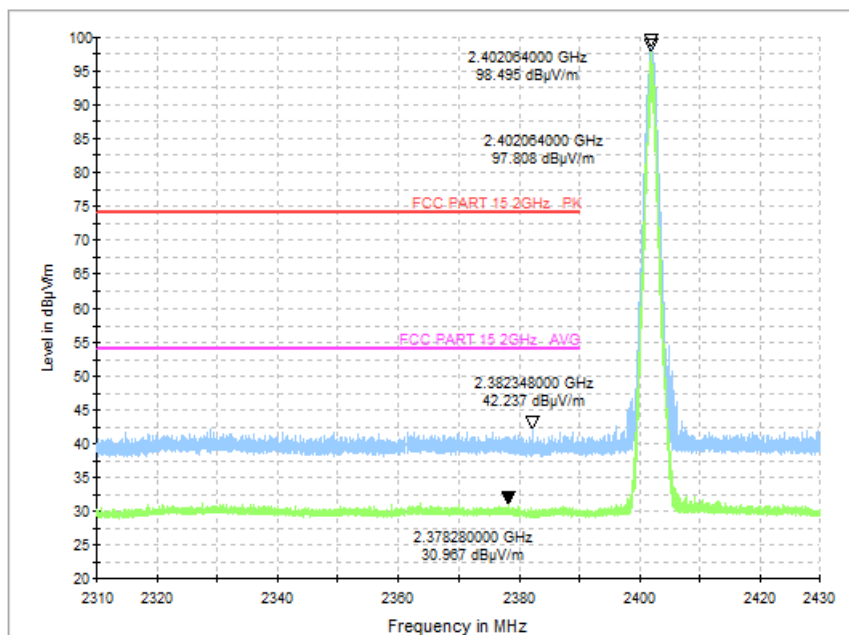


Fig. 46 Radiated Band Edges (8DPSK, Ch0, 2380GHz ~ 2450GHz)

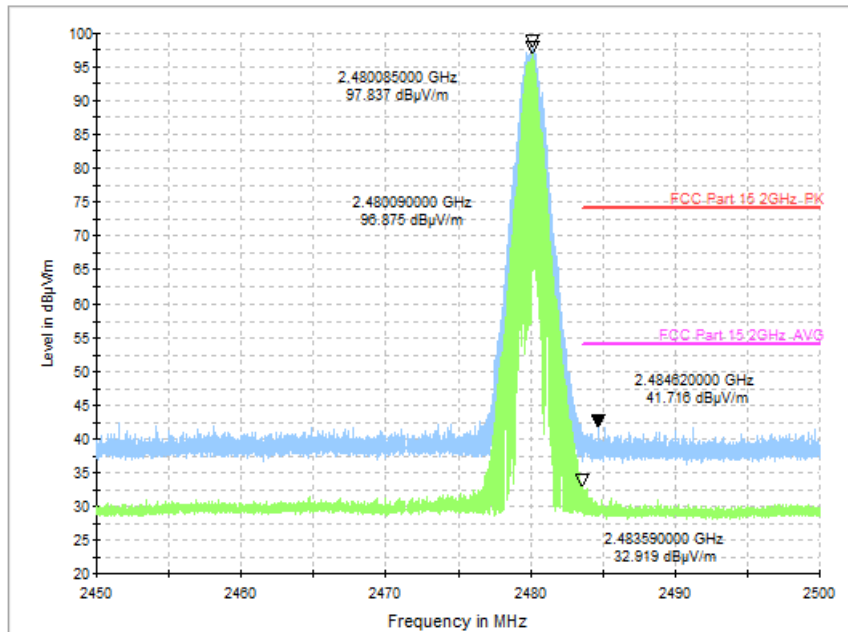


Fig. 47 Radiated Band Edges (8DPSK, Ch78, 2450GHz ~ 2500GHz)

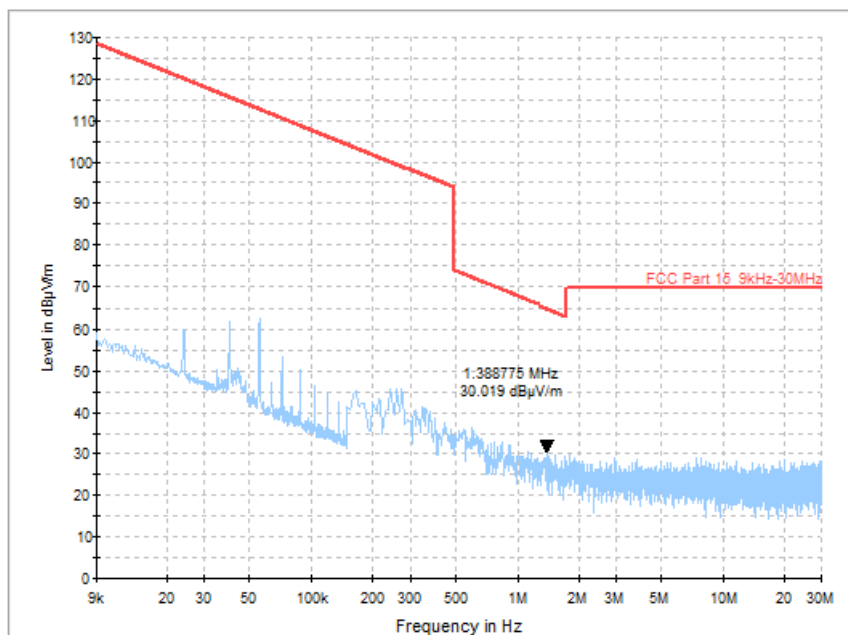


Fig. 48 Radiated Spurious Emission (All Channels, 9kHz ~ 30MHz)

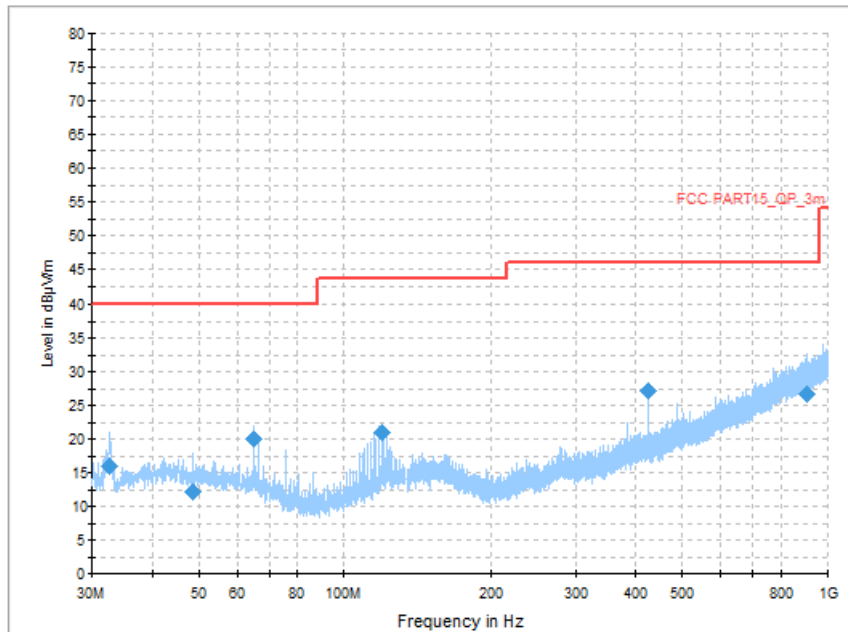


Fig. 49 Radiated Spurious Emission (All Channels, 30MHz ~ 1GHz)

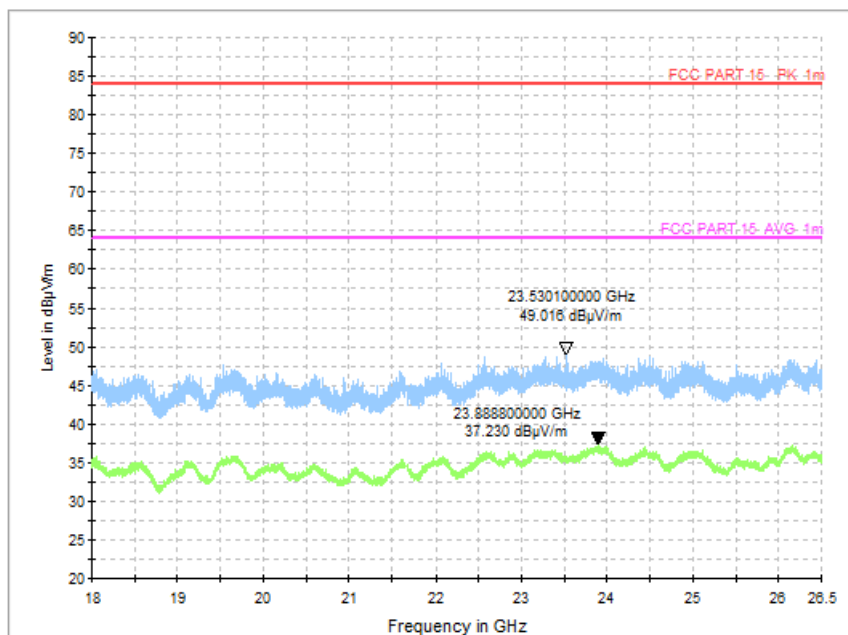


Fig. 50 Radiated Spurious Emission (All Channels, 18GHz ~ 26.5GHz)

A.5 20dB Bandwidth

Measurement Limit:

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

Measurement Result:

Mode	Channel	20dB Bandwidth (kHz)		conclusion
GFSK	0	Fig.51	966.00	/
	39	Fig.52	943.50	
	78	Fig.53	941.25	
$\pi/4$ DQPSK	0	Fig.54	1257.00	/
	39	Fig.55	1221.00	
	78	Fig.56	1259.25	
8DPSK	0	Fig.57	1203.75	/
	39	Fig.58	1262.25	
	78	Fig.59	1260.00	

See below for test graphs.

Conclusion: PASS

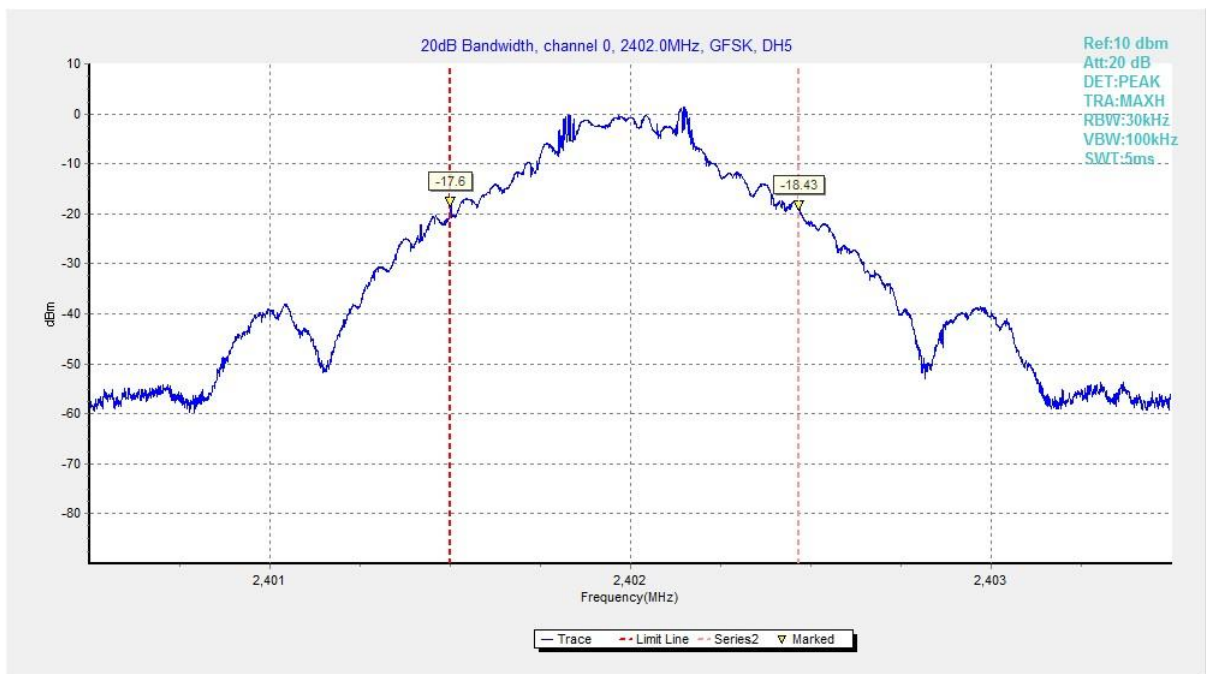


Fig. 51 20dB Bandwidth (GFSK, Ch 0)

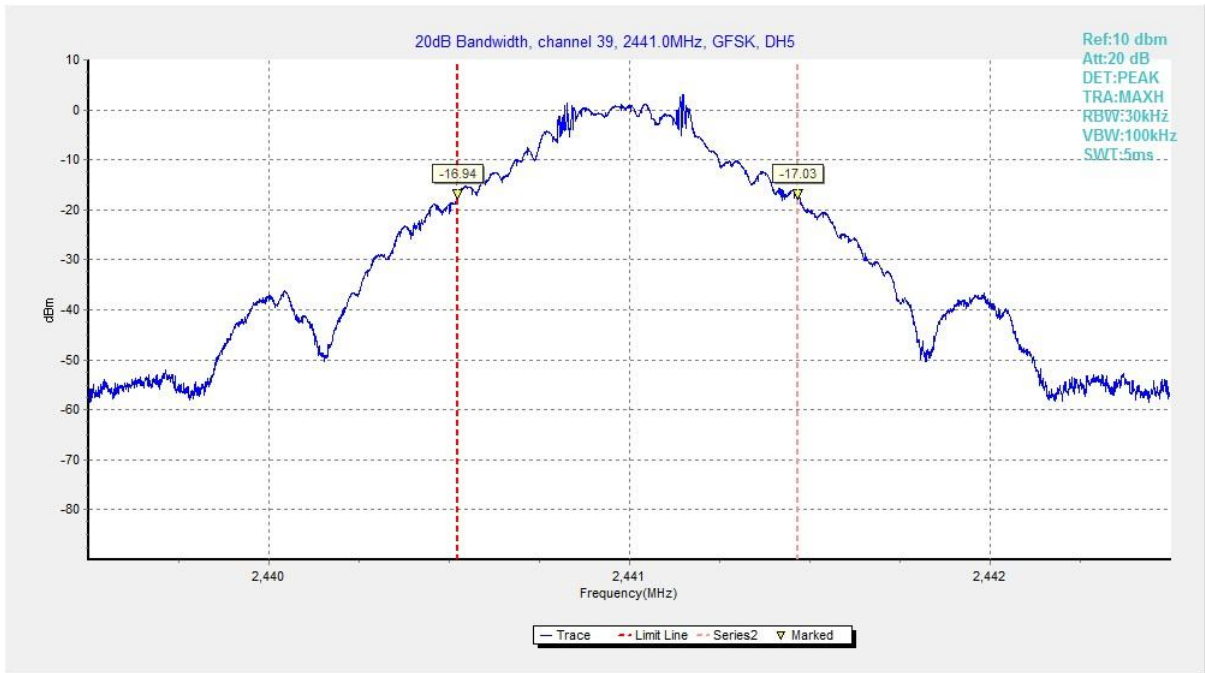


Fig. 52 20dB Bandwidth (GFSK, Ch 39)

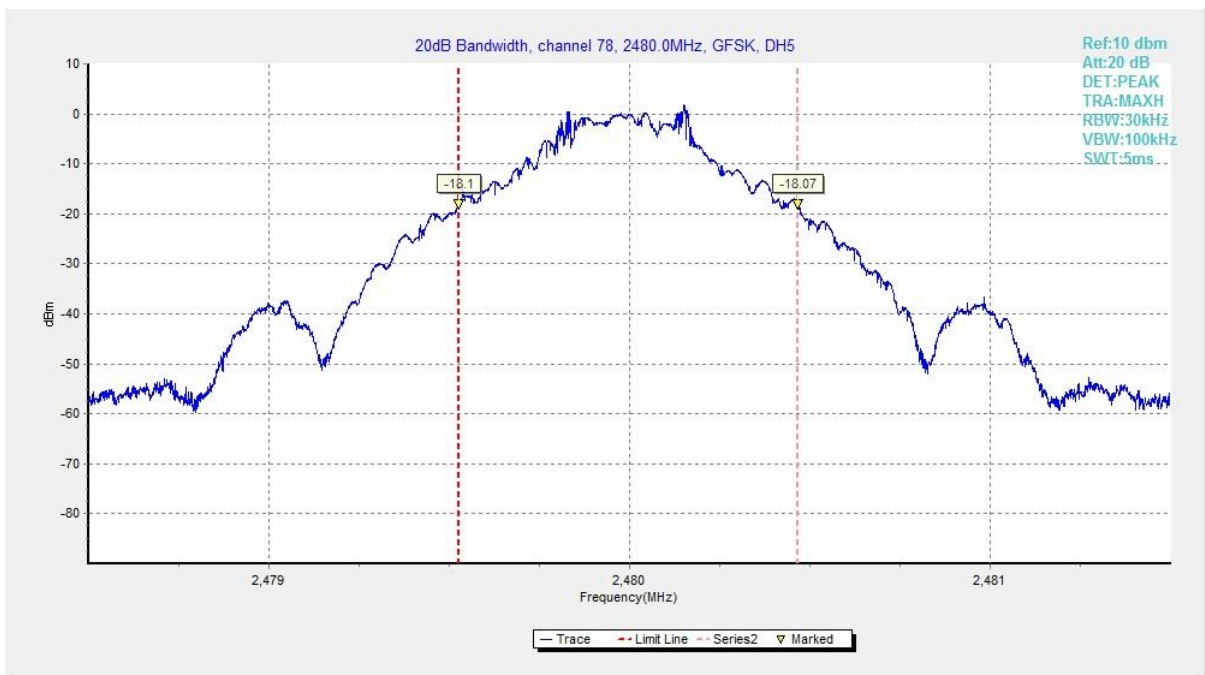


Fig. 53 20dB Bandwidth (GFSK, Ch 78)

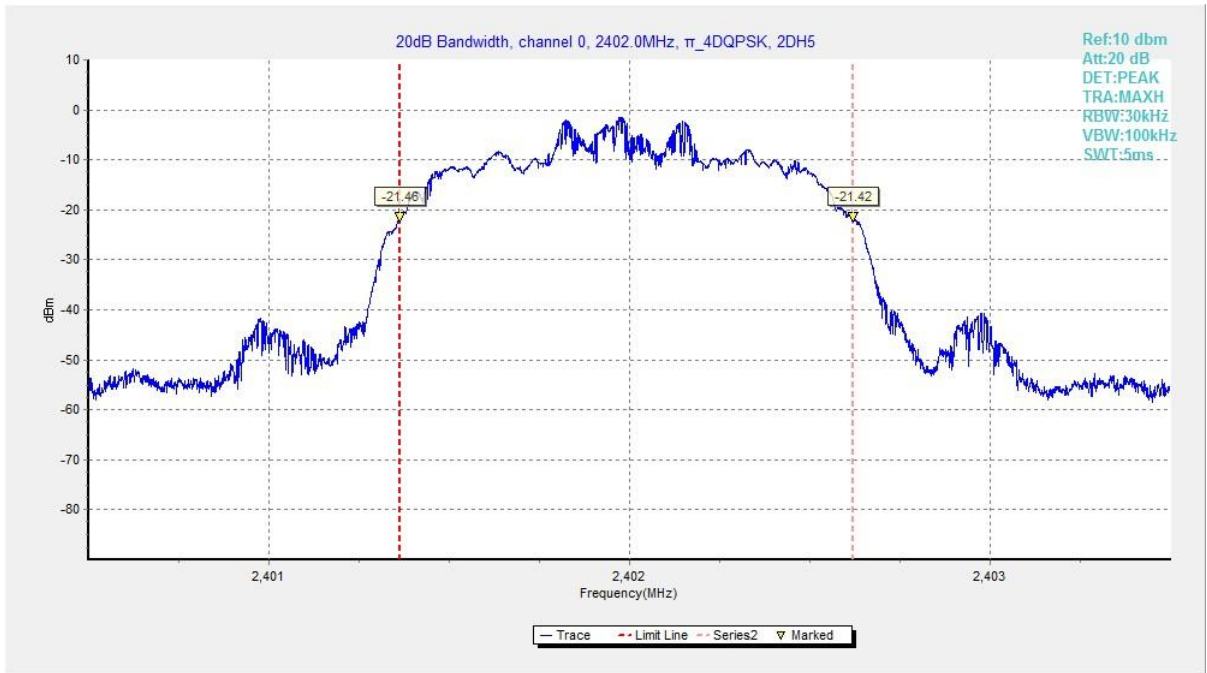


Fig. 54 20dB Bandwidth (π /4 DQPSK, Ch 0)

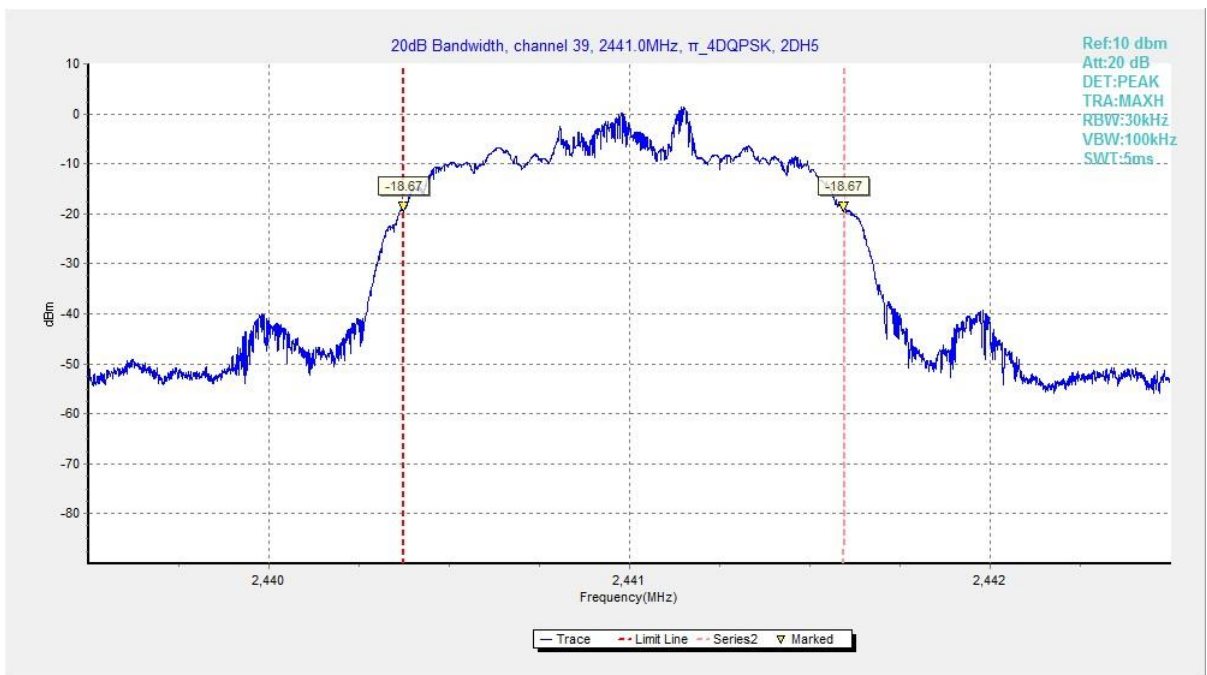


Fig. 55 20dB Bandwidth (π /4 DQPSK, Ch 39)

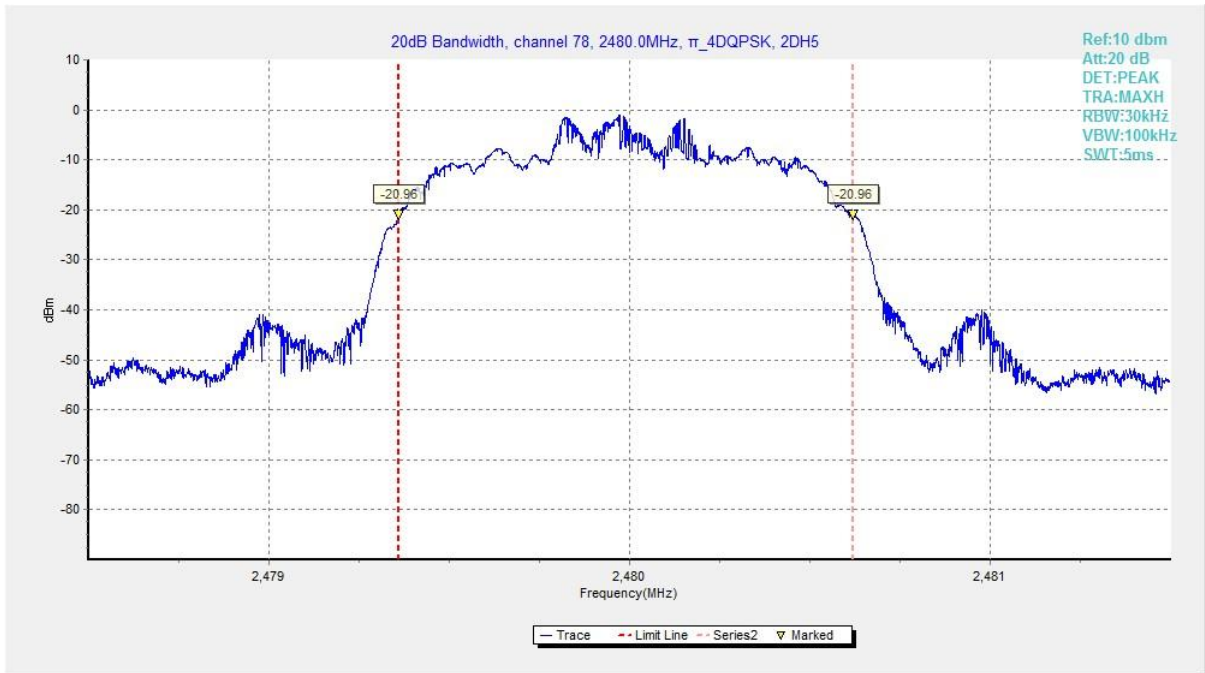


Fig. 56 20dB Bandwidth ($\pi/4$ DQPSK, Ch 78)

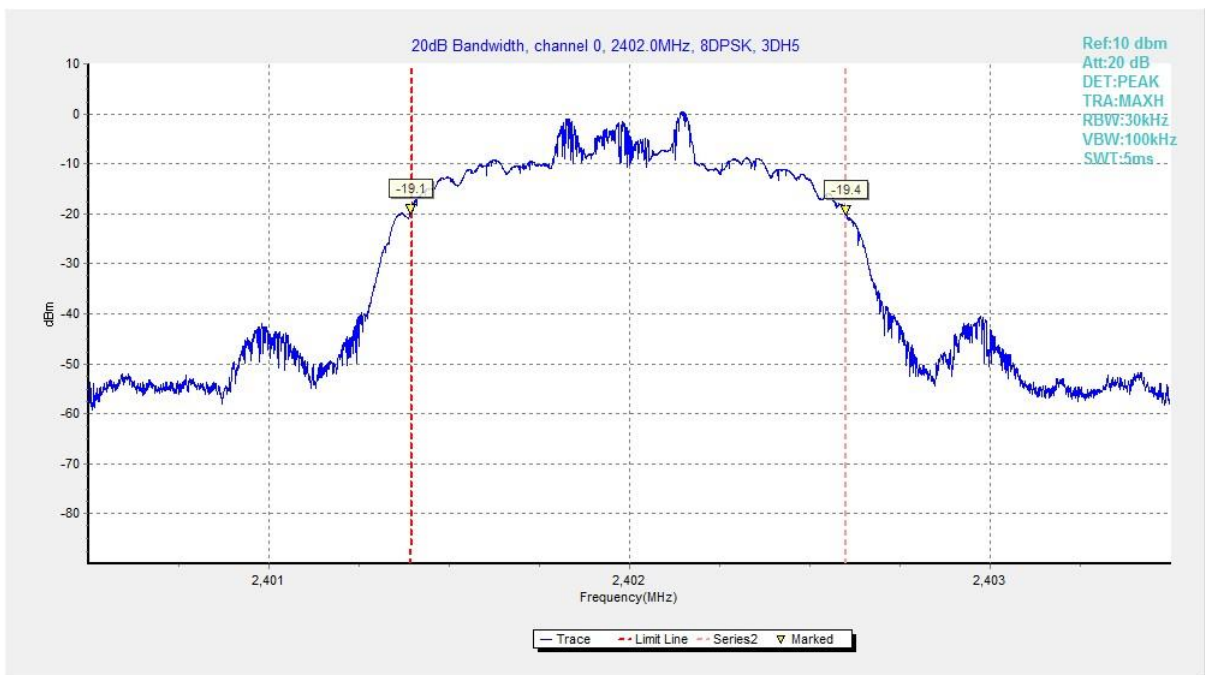


Fig. 57 20dB Bandwidth (8DPSK, Ch 0)

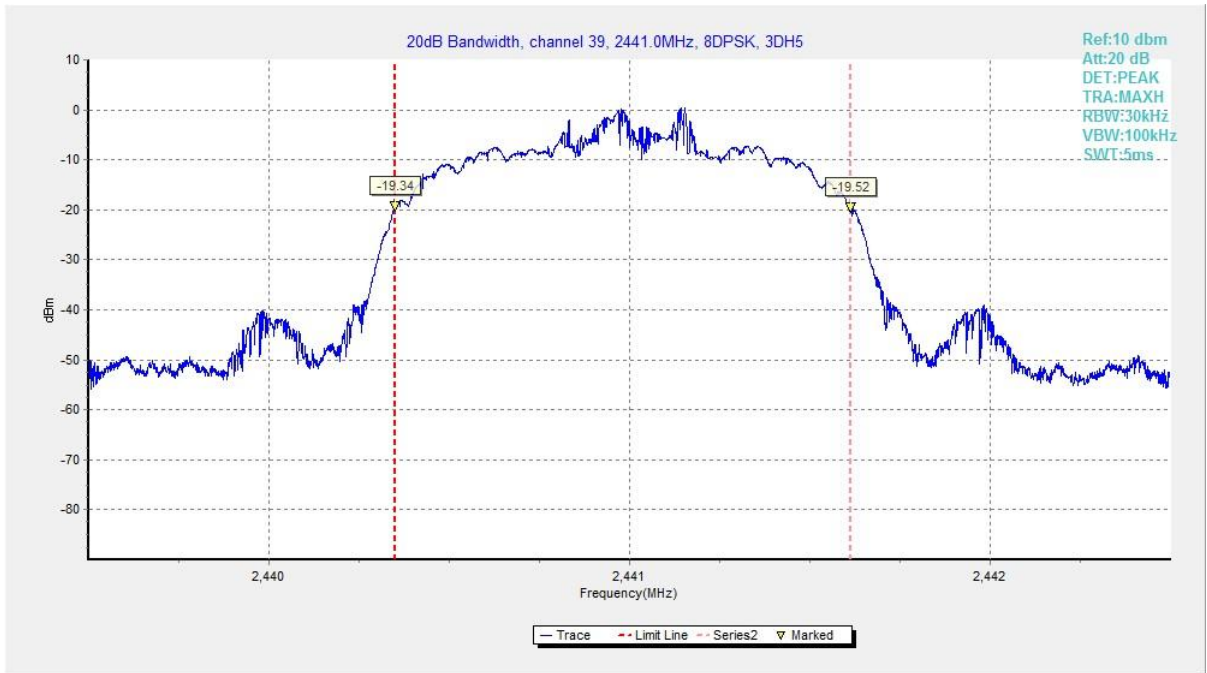


Fig. 58 20dB Bandwidth (8DPSK, Ch 39)

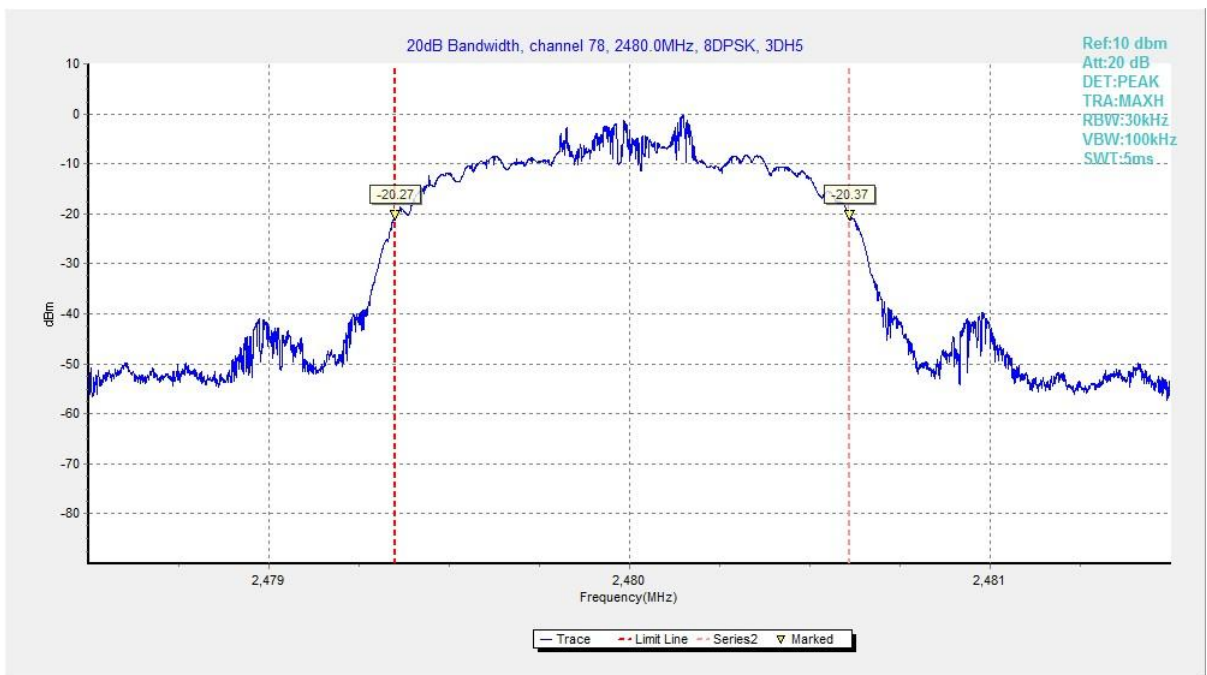


Fig. 59 20dB Bandwidth (8DPSK, Ch 78)

A.6 Time of Occupancy (Dwell Time)

Measurement Limit:

Standard	Limit
FCC 47 CFR Part 15.247 (a)	< 400 ms

Measurement Results:

Mode	Channel	Packet	Dwell Time(ms)	Conclusion	
GFSK	39	DH5	Fig.60	219.01	P
			Fig.61		
$\pi/4$ DQPSK	39	2-DH5	Fig.62	201.96	P
			Fig.63		
8DPSK	39	3-DH5	Fig.64	178.93	P
			Fig.65		

See below for test graphs.

Conclusion: Pass

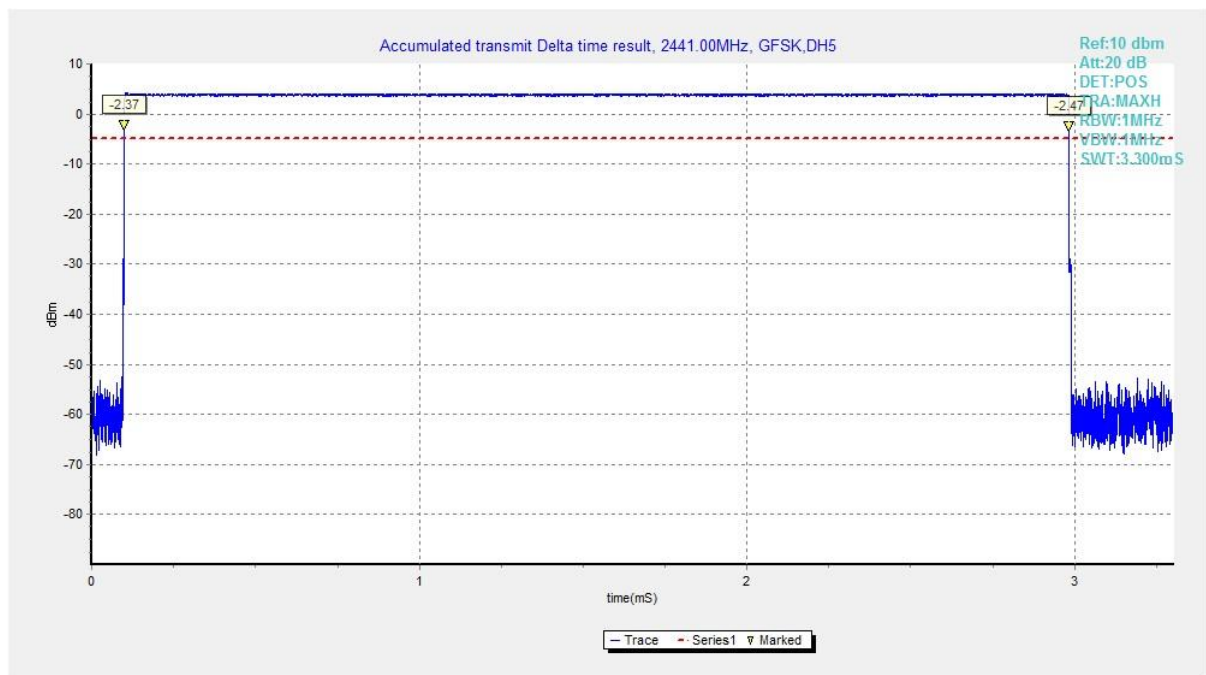


Fig. 60 Time of Occupancy (Dwell Time) (GFSK, Ch39)

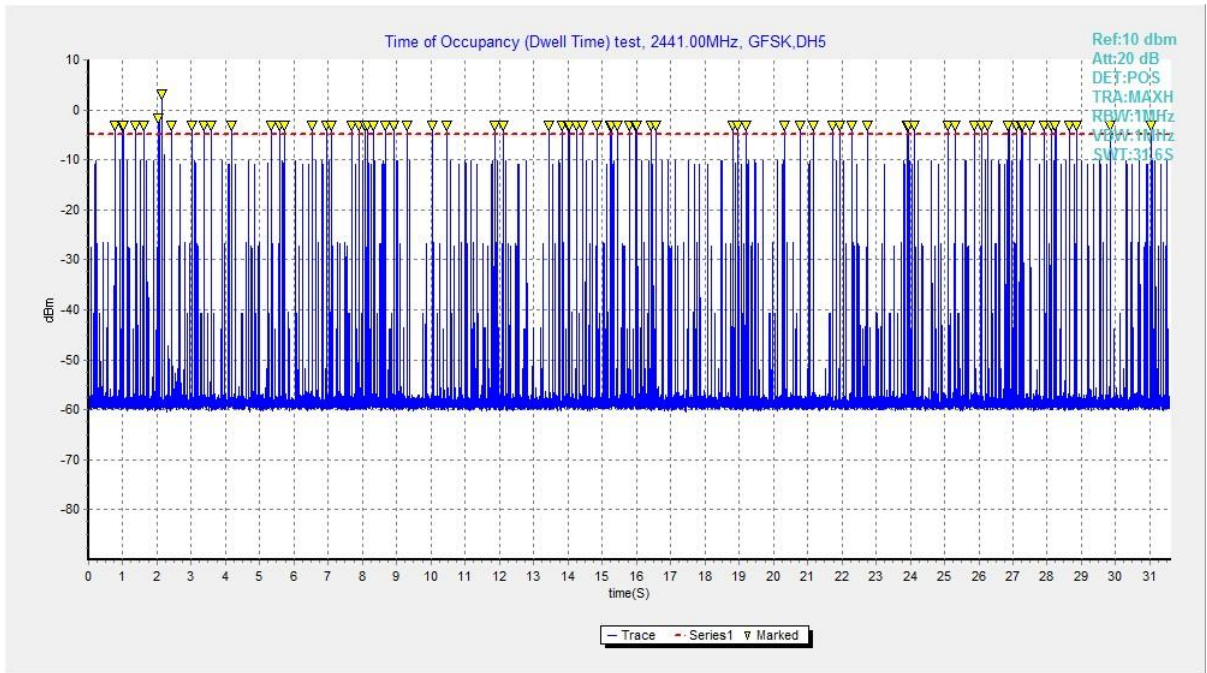


Fig. 61 Time of Occupancy (Dwell Time) (GFSK, Ch39)

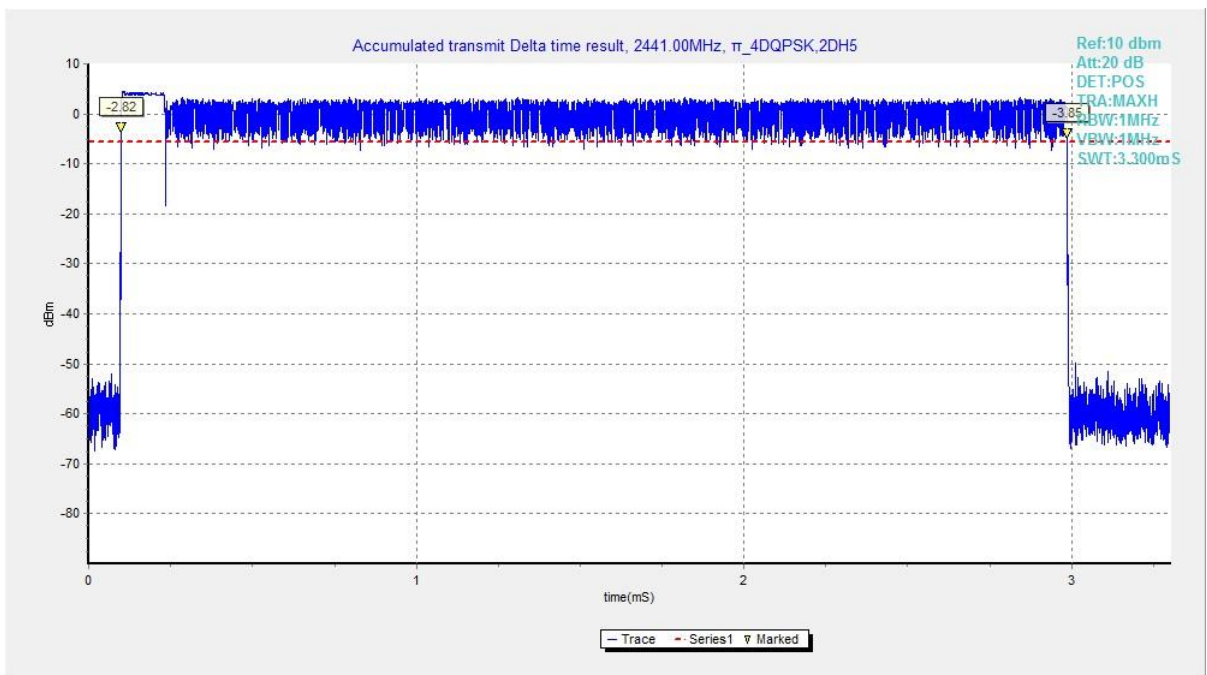


Fig. 62 Time of Occupancy (Dwell Time) ($\pi/4$ DQPSK, Ch39)

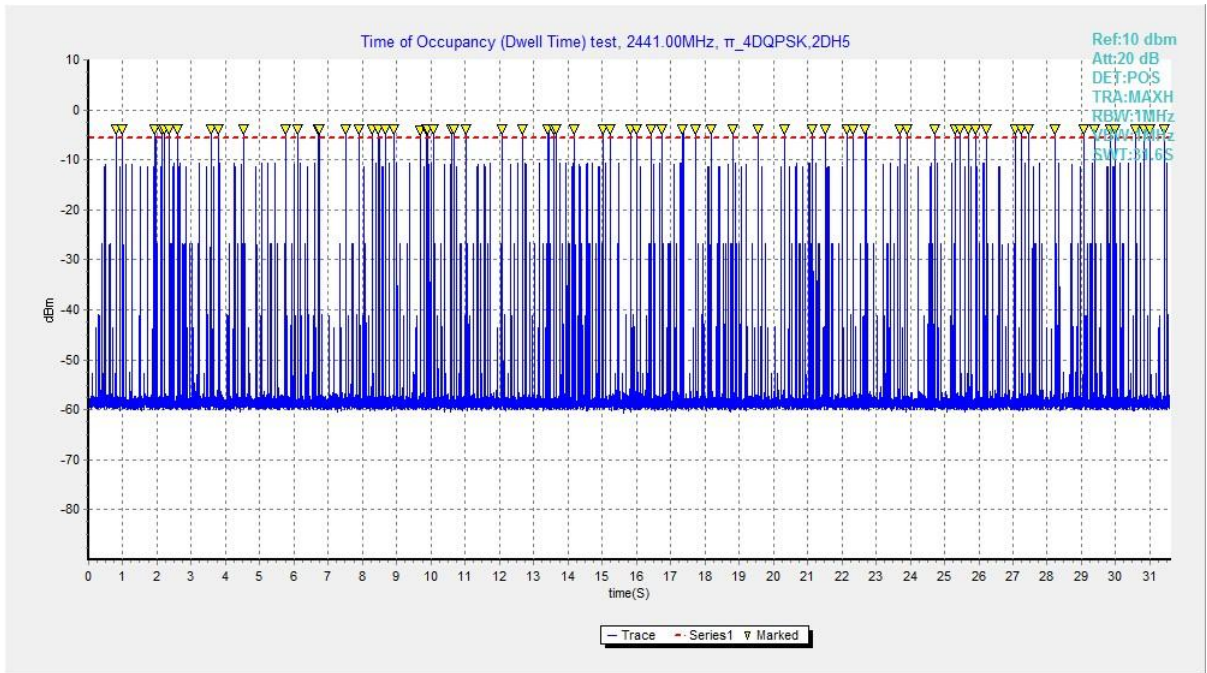


Fig. 63 Time of Occupancy (Dwell Time) ($\pi/4$ DQPSK, Ch39)

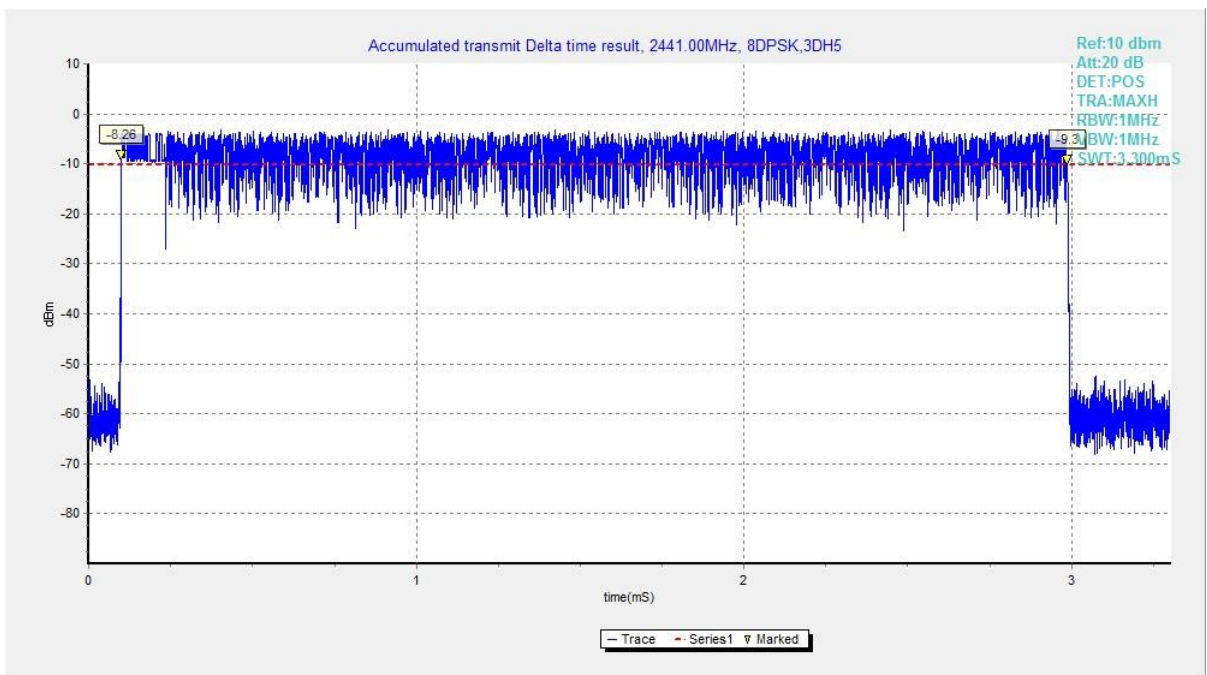


Fig. 64 Time of Occupancy (Dwell Time) (8DPSK, Ch39)

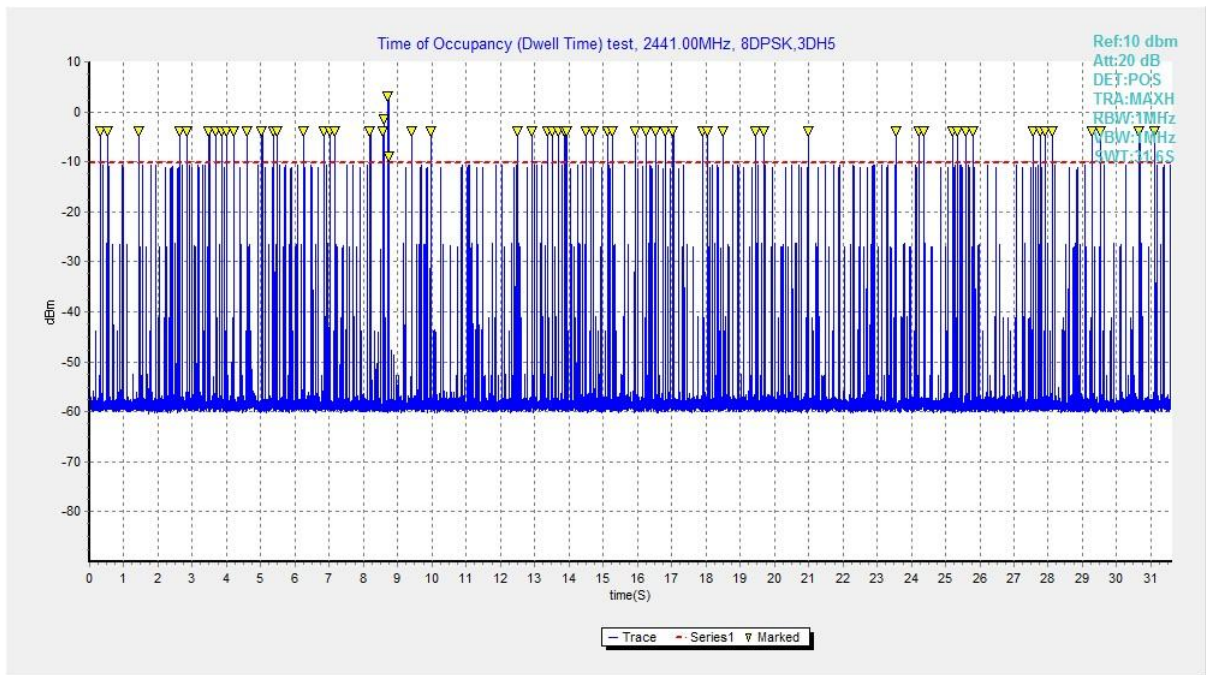


Fig. 65 Time of Occupancy (Dwell Time) (8DPSK, Ch39)

A.7 Number of Hopping Channels

Measurement Limit:

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

Measurement Results:

Mode	Packet	Number of hopping channels		Test result	Conclusion
GFSK	DH5	Fig.66	Fig.67	79	P
$\pi/4$ DQPSK	2-DH5	Fig.68	Fig.69	79	P
8DPSK	3-DH5	Fig.70	Fig.71	79	P

See below for test graphs.

Conclusion: Pass

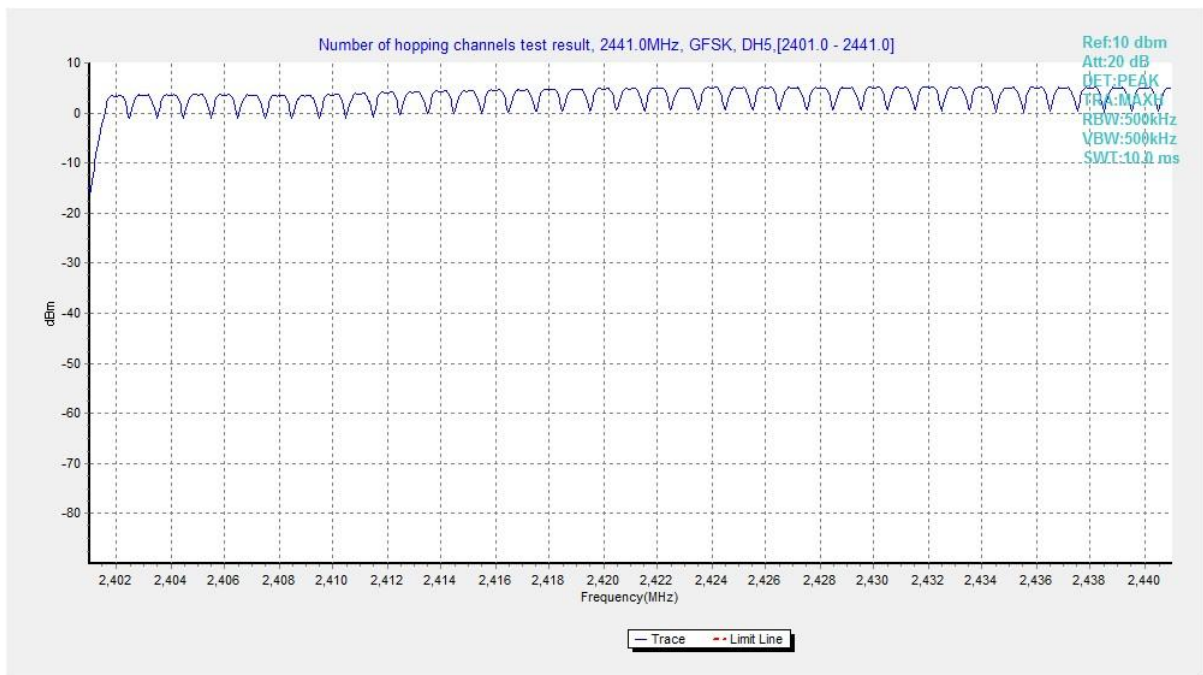


Fig. 66 Hopping channel ch0~39 (GFSK, Ch39)

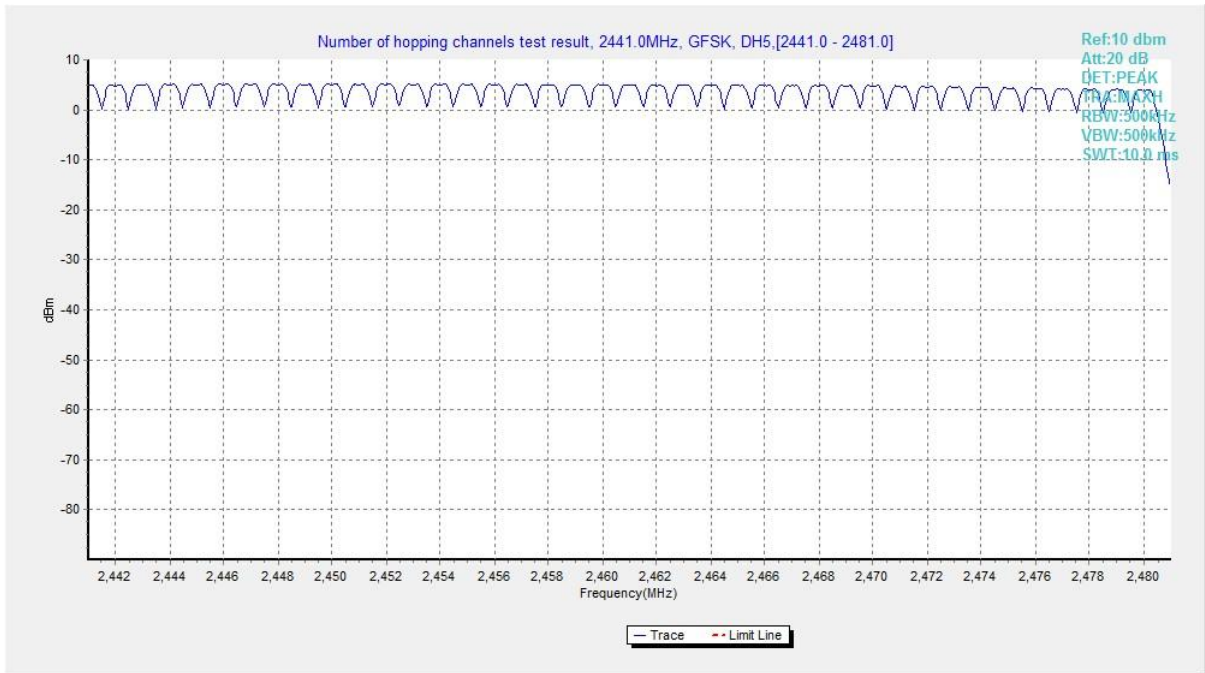


Fig. 67 Hopping channel ch40~78 (GFSK, Ch39)

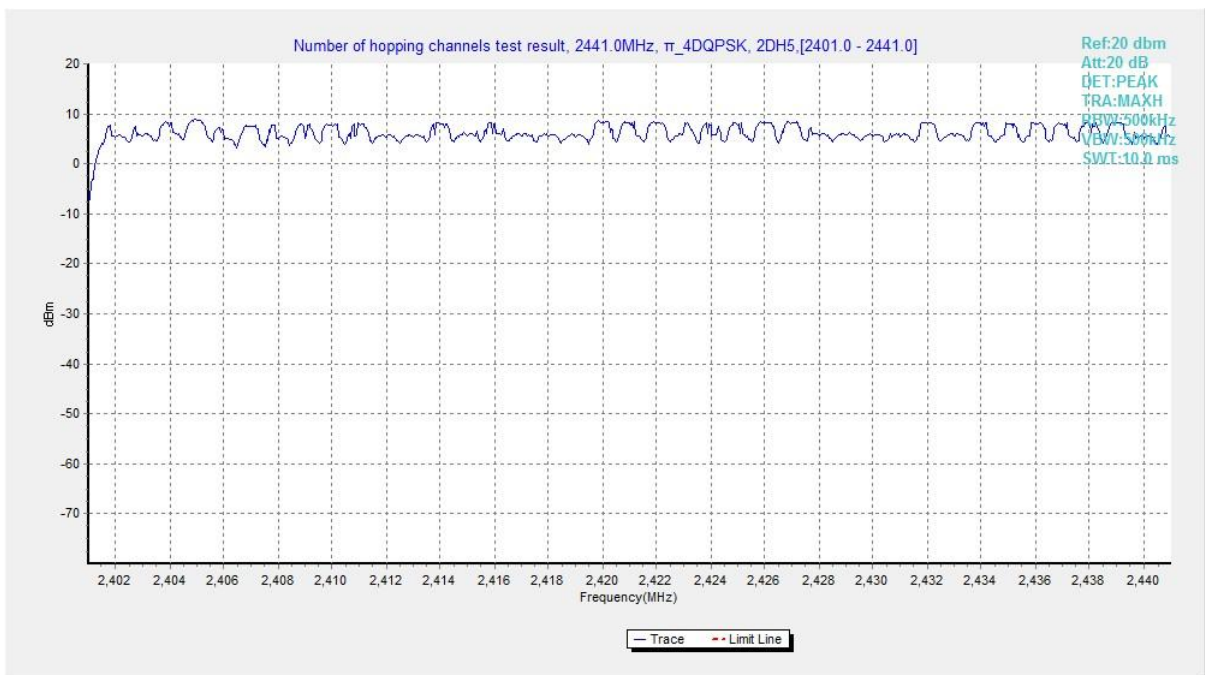


Fig. 68 Hopping channel ch0~39 ($\pi/4$ DQPSK, Ch39)

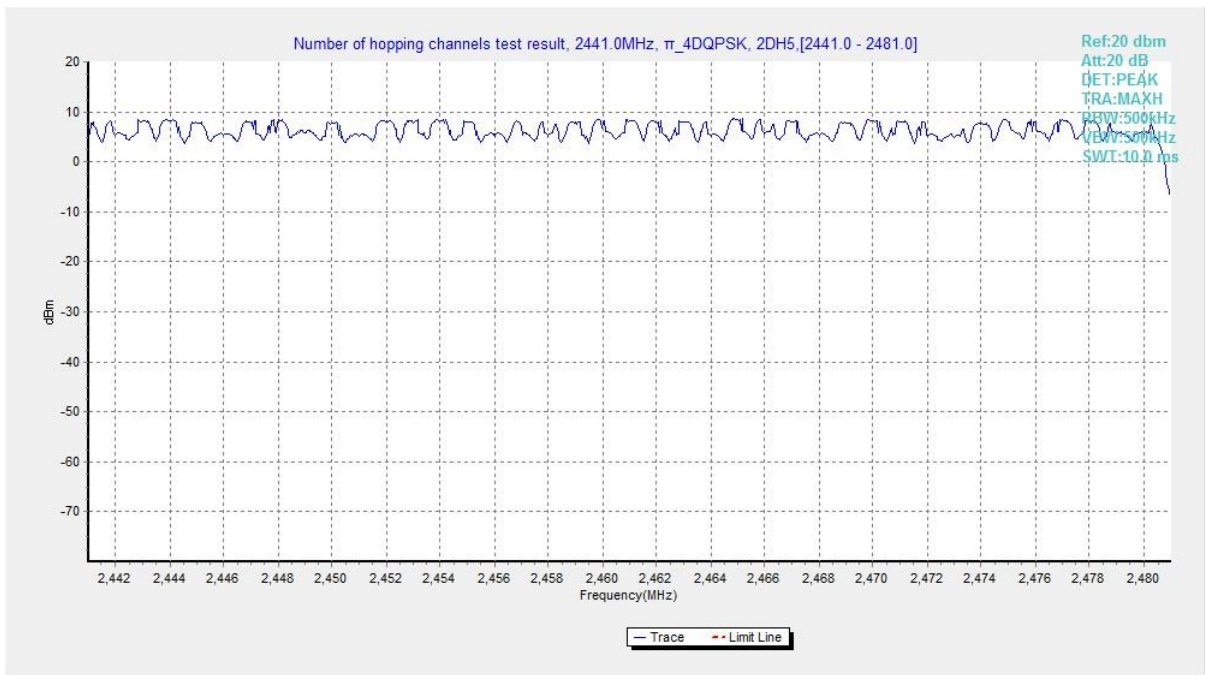


Fig. 69 Hopping channel ch40~78 (π /4 DQPSK, Ch39)

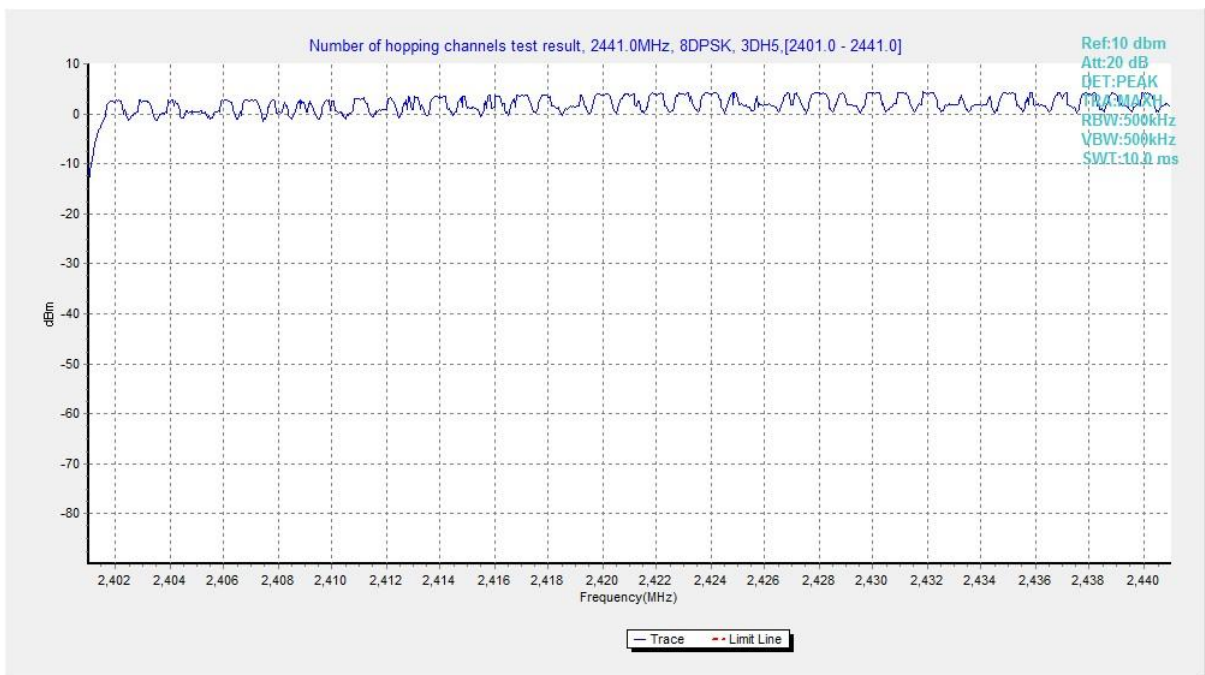


Fig. 70 Hopping channel ch0~39 (8DPSK, Ch39)

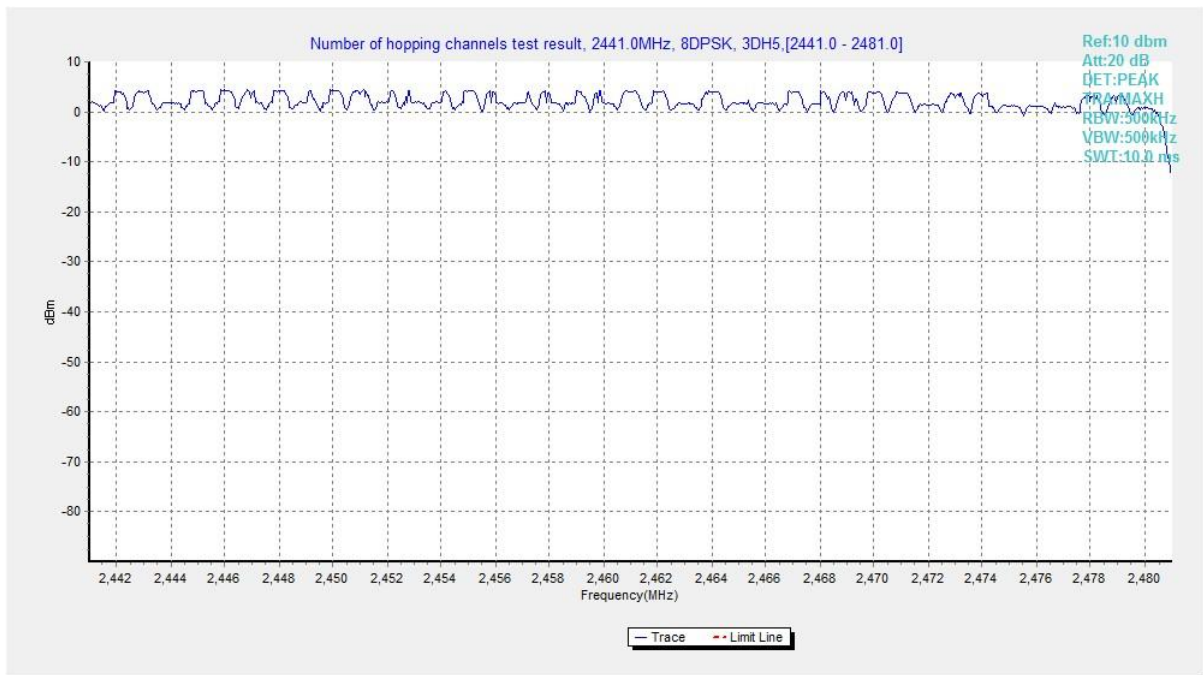


Fig. 71 Hopping channel ch40~78 (8DPSK, Ch39)

A.8 Carrier Frequency Separation

Measurement Limit:

Standard	Limit
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	Channel	Packet	Separation of hopping channels	Test result (MHz)	Conclusion
GFSK	39	DH5	Fig.72	1.00	P
$\pi/4$ DQPSK	39	2-DH5	Fig.73	1.02	P
8DPSK	39	3-DH5	Fig.74	1.00	P

See below for test graphs.

Conclusion: Pass

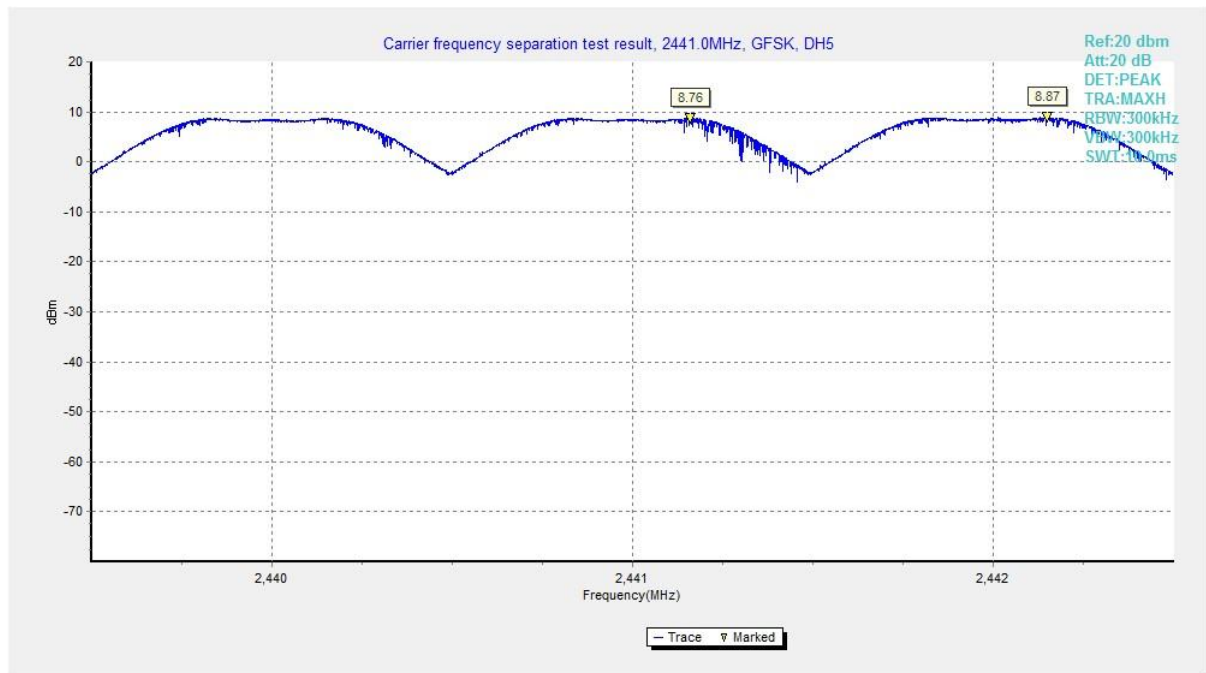


Fig. 72 Carrier Frequency Separation (GFSK, Ch39)

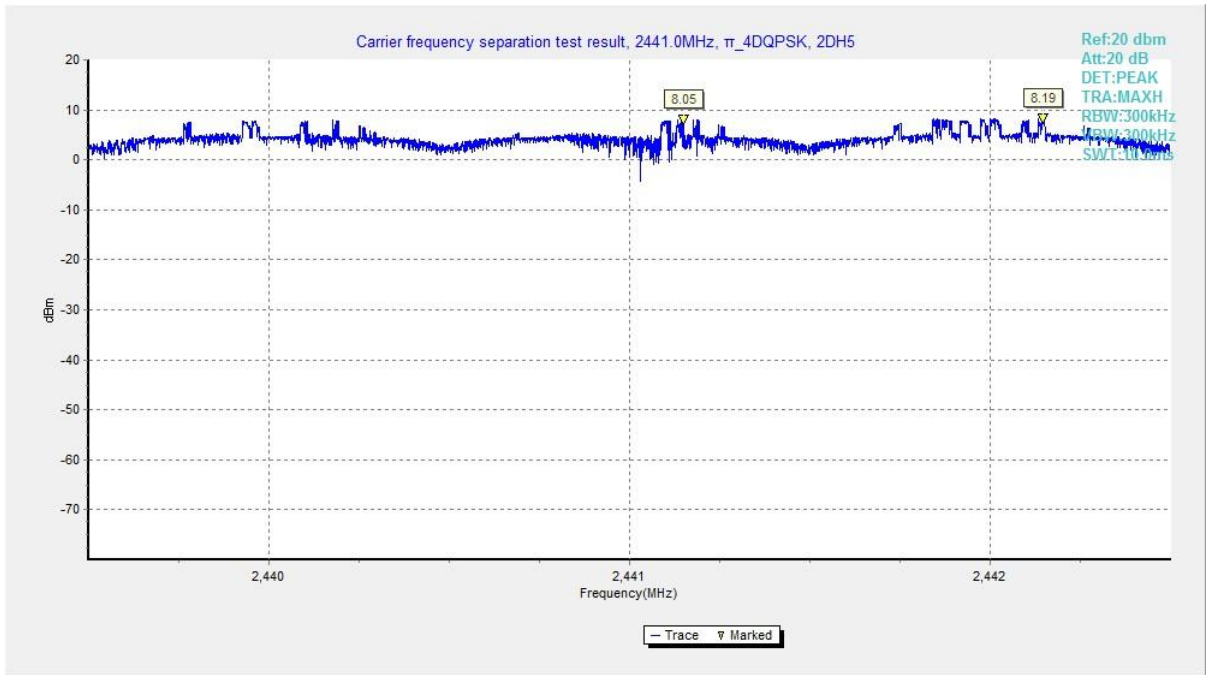


Fig. 73 Carrier Frequency Separation (π /4 DQPSK, Ch39)

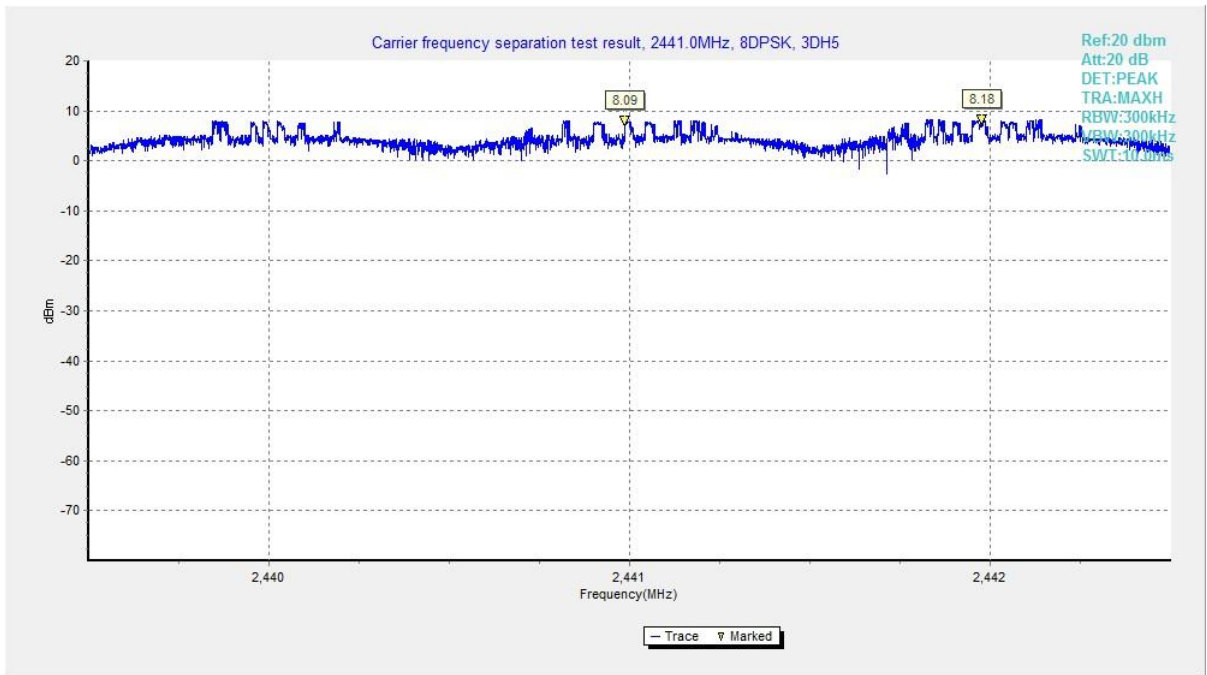


Fig. 74 Carrier Frequency Separation (8DPSK, Ch39)

A.9 AC Power line Conducted Emission

Test Condition:

Voltage (V)	Frequency (Hz)
120	60

Measurement Result and limit:

BT (Quasi-peak Limit) - AE2

Frequency range (MHz)	Quasi-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	66 to 56	Fig.75	Fig.76	P
0.5 to 5	56			
5 to 30	60			

Note: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

BT (Average Limit) - AE2

Frequency range (MHz)	Average-peak Limit (dB μ V)	Result (dB μ V)		Conclusion
		Traffic	Idle	
0.15 to 0.5	56 to 46	Fig.76	Fig.77	P
0.5 to 5	46			
5 to 30	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

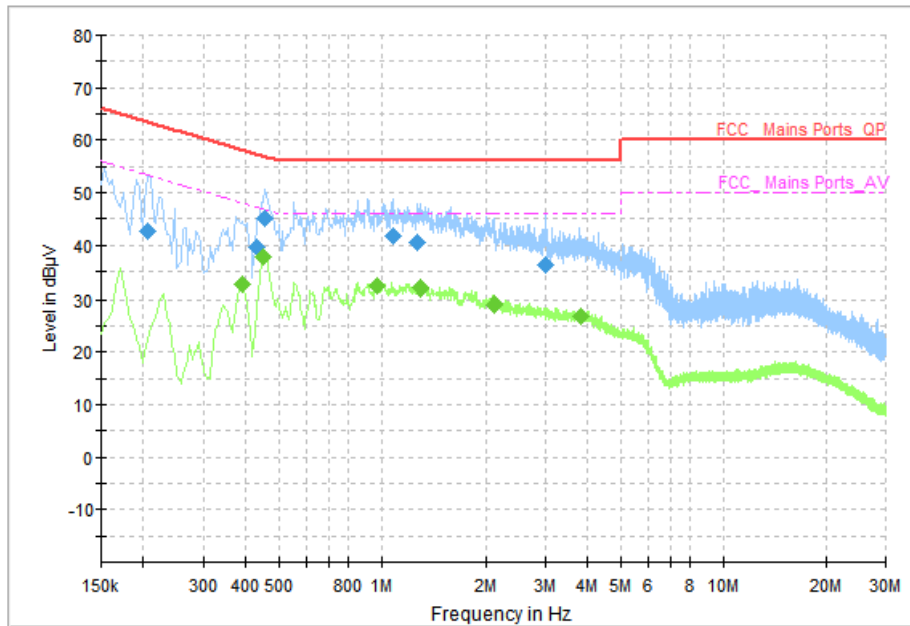


Fig. 75 AC Powerline Conducted Emission (Traffic, AE2, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.206000	42.65	63.37	20.71	N	ON	10
0.430000	39.70	57.25	17.55	N	ON	10
0.454000	45.22	56.80	11.58	N	ON	10
1.078000	41.80	56.00	14.20	N	ON	10
1.270000	40.59	56.00	15.41	N	ON	10
2.998000	36.14	56.00	19.86	N	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.390000	32.66	48.06	15.41	N	ON	10
0.450000	37.83	46.88	9.05	N	ON	10
0.970000	32.36	46.00	13.64	N	ON	10
1.306000	32.13	46.00	13.87	N	ON	10
2.126000	28.98	46.00	17.02	N	ON	10
3.822000	26.78	46.00	19.22	N	ON	10

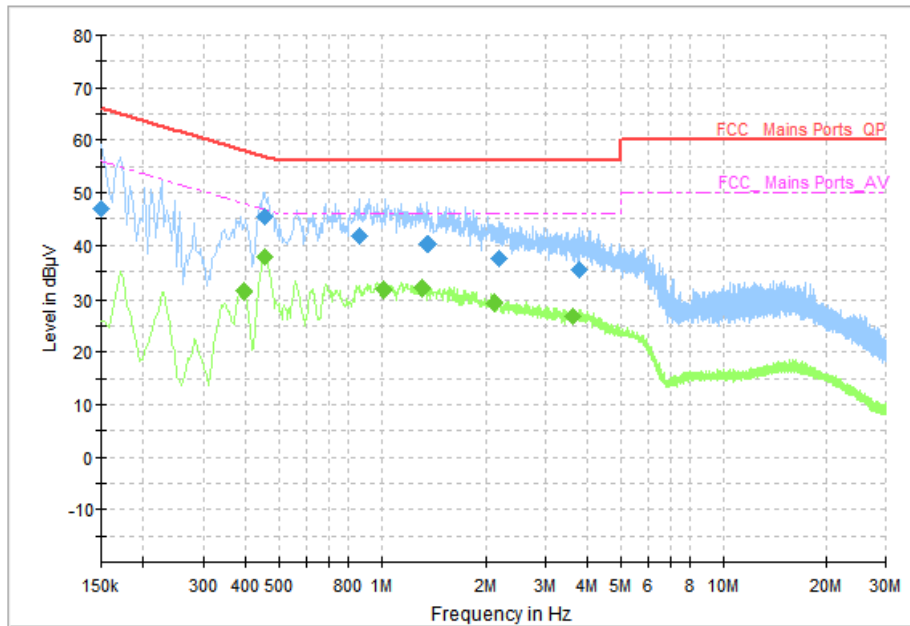


Fig. 76 AC Power line Conducted Emission (Idle, AE2, 120V)

Measurement Results: Quasi Peak

Frequency (MHz)	Quasi Peak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.150000	46.87	66.00	19.13	N	ON	10
0.454000	45.57	56.80	11.23	N	ON	10
0.858000	41.87	56.00	14.13	N	ON	10
1.362000	40.38	56.00	15.62	N	ON	10
2.186000	37.44	56.00	18.56	N	ON	10
3.754000	35.34	56.00	20.66	N	ON	10

Measurement Results: Average

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.394000	31.49	47.98	16.49	N	ON	10
0.454000	37.81	46.80	8.99	N	ON	10
1.018000	31.81	46.00	14.19	N	ON	10
1.310000	32.07	46.00	13.93	N	ON	10
2.122000	29.15	46.00	16.85	N	ON	10
3.606000	26.67	46.00	19.33	N	ON	10

END OF REPORT