FCC Test Report

Report No.:	2405W66906EE
Applicant:	Shenzhen Neutop Optoelectronics Co., Ltd
Address:	502, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community,Taoyuan Street, Nanshan District, Shenzhen, Guangdong, China
Product Name:	Projector
Product Model:	D002
Multiple Models:	D001P, D001, D002P, D003, D004, D005
Trade Mark:	N/A
FCC ID:	2BEGB-YX03
Standards:	FCC CFR Title 47 Part 15C (§15.247)
Test Date:	2024-08-27 to 2024-12-20
Test Result:	Complied
Report Date:	2024-12-20

Reviewed by: Abel Chen — Abel Chen, Project Engineer

Approved by: Jacob Kong — Jacob Kong, Manager

Prepared by:

World Alliance Testing & Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China

NVLAP TESTING NVLAP LAB CODE 600335-0

ilac-MRA

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Announcement

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3. This sample tested is in compliance with the limits of the above regulation.

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5. The information marked "#" is provided by the applicant, the laboratory is not responsible for its authenticity and this information can affect the validity of the result in the test report. Customer model name, addresses, names, trademarks etc. are included.

Revision History

Version No.	Issued Date	Description
00	*2024-12-20*	*Original*

Contents

1 General Information

1.1 Client Information

Applicant:	Shenzhen Neutop Optoelectronics Co., Ltd
Address:	502, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community,Taoyuan Street, Nanshan District, Shenzhen, Guangdong, China
Manufacturer:	Shenzhen Neutop Optoelectronics Co., Ltd
Address:	502, BLDG 4, Pingshan minQi Technology Park, No. 65 Lishan Road, Pingshan Community,Taoyuan Street, Nanshan District, Shenzhen, Guangdong, China

1.2 Product Description of EUT

The EUT is Projector that contains Classic Bluetooth, BLE, 2.4G and 5G WLAN radios, this report covers the full testing of the Classic Bluetooth radio.

Sample Serial Number	2QJT-2 for CE test, 2QJT-1 for RE test, 2QJT-6 for RF conducted test (assigned by WATC)
Sample Received Date	2024-08-23
Sample Status	Good Condition
Frequency Range	2402MHz - 2480MHz
Maximum Conducted Peak Output Power	6.82dBm
Modulation Technology	GFSK, π/4-DQPSK, 8DPSK
Spatial Streams	SISO (1TX, 1RX)
Antenna Gain#	2.82dBi
Power Supply	DC 29V from adapter
Adapter Information	Model: SOY-2900380-410-B Input: AC100-240V, 50/60Hz, 2.5A Output: DC 29.0V/3.8A 110.2W
Modification	Sample No Modification by the test lab

1.3 Antenna information

15.203 requirement:

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, 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.

Device Antenna information:	

The BT antenna is an internal antenna which cannot replace by end-user, please see product internal photos for details.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15, Subpart C, Equipment Class: DTS, FCC ID: 2BEGB-YX03

FCC Part 15, Subpart E, Equipment Class: NII, FCC ID: 2BEGB-YX03

1.5 Measurement Uncertainty

Parameter		Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
AC Power Lines Conducted Emissions		±3.14dB
Emissions, Radiated	Below 30MHz	±2.78dB
	Below 1GHz	±4.84dB
	Above 1GHz	±5.44dB
Emissions, Conducted		1.75dB
Conducted Power		0.74dB
Frequency Error		150Hz
Bandwidth		0.34%
Power Spectral Density		0.74dB

Note: *The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.*

1.6 Laboratory Location

World Alliance Testing & Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China

Tel: +86-755-29691511, Email: qa@watc.com.cn

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 463912, the FCC Designation No. : CN5040.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0160.

1.7 Test Methodology

FCC CFR 47 Part 2

FCC CFR 47 Part 15

KDB 558074 D01 15.247 Meas Guidance v05r02

ANSI C63.10-2013

2 Description of Measurement

2.1 Test Configuration

Operating channels:					
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	39	2441	76	2478
1	2403	40	2442	77	2479
…	…	…	…	78	2480
38	2440	…	…	/	/
According to ANSI C63.10-2013 chapter 5.6.1 Table 11 requirement, select lowest channel, middle channel, and highest channel in the frequency range in which device operates for testing. The detailed frequency points are as follows:					
Lowest channel		Middle channel		Highest channel	
Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	39	2441	78	2480

Test Mode:				
Transmitting mode:	Keep the EUT in continuous transmitting with modulation			
Exercise software#:	SecureCRT			
Mode	**Data rate**	**Power Level Setting#**		
		Low Channel	**Middle Channel**	**High Channel**
GFSK	1Mbps	5	5	5
π/4-DQPSK	2Mbps	5	5	5
8DPSK	3Mbps	5	5	5
The exercise software and the maximum power setting that provided by manufacturer.				

Worst-Case Configuration:
For AC power line conducted emission and radiated emission 9kHz-1GHz and above 18GHz were performed with the EUT transmits at the channel with highest output power as worst-case scenario. For radiated emissions below 30MHz, three antenna orientations (parallel, perpendicular, gound-parallel) were tested, only record the worse case test data in report.

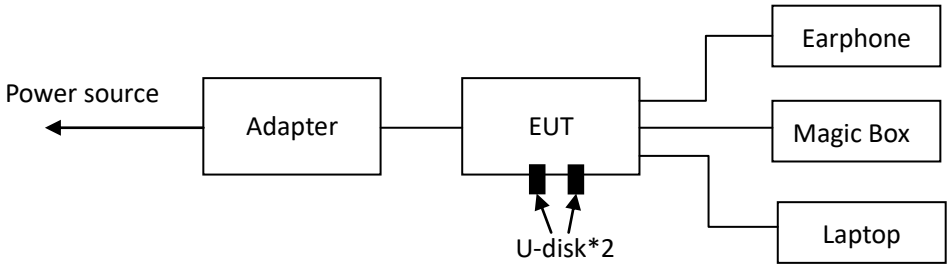
2.2 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
aigo	USB flash disk*2	unknown	unknown
Tmall	Magic Box	M20_C	20081648
unknown	Earphone	unknown	unknown
DELL	Laptop	E5570	52KW7

2.3 Interconnecting Cables

Manufacturer	Description	Length(m)	From	To
SOY	AC Power Cable	0.2	Power source	Adapter
SOY	DC Power Cable	1.5	Adapter	EUT
Unknown	HDMI Cable(Shielding)	1.5	Laptop	EUT
Unknown	AV Cable	1.5	EUT	Magic Box

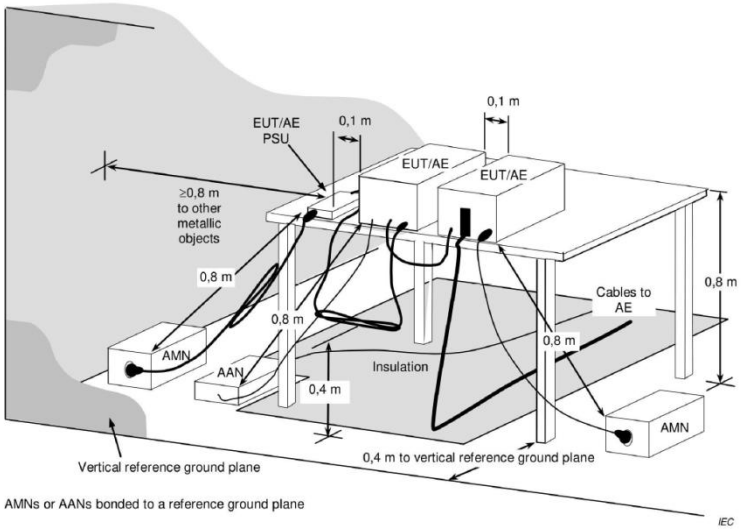
2.4 Block Diagram of Connection between EUT and AE



Note: for reference only, the actual connection setup used for testing please refer to the test photos.

2.5 Test Setup

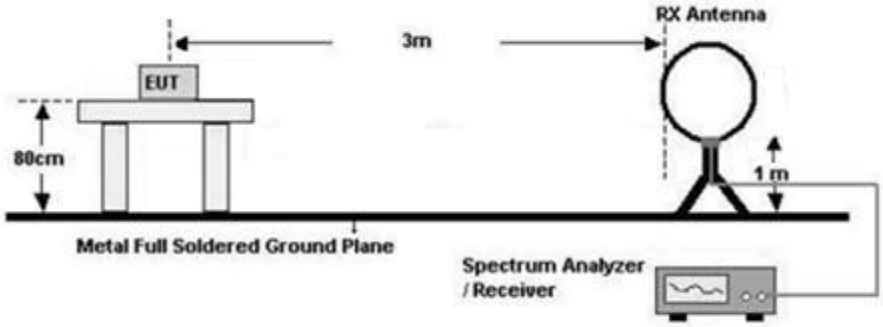
1) Conducted emission measurement:



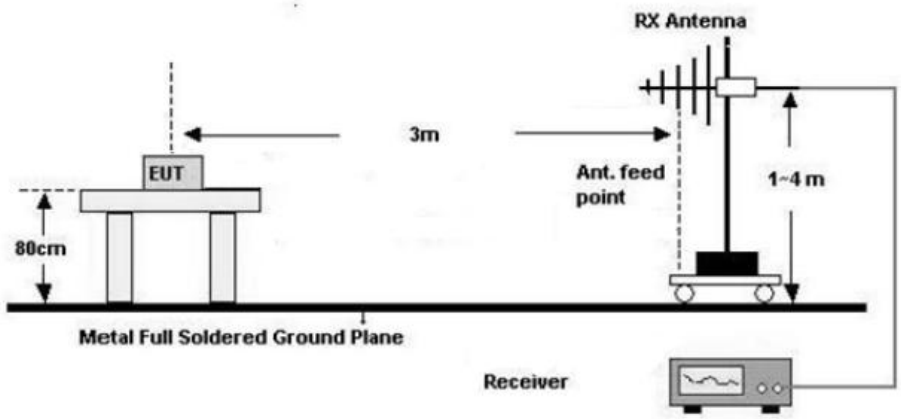
Note: The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

2) Radiated emission measurement:

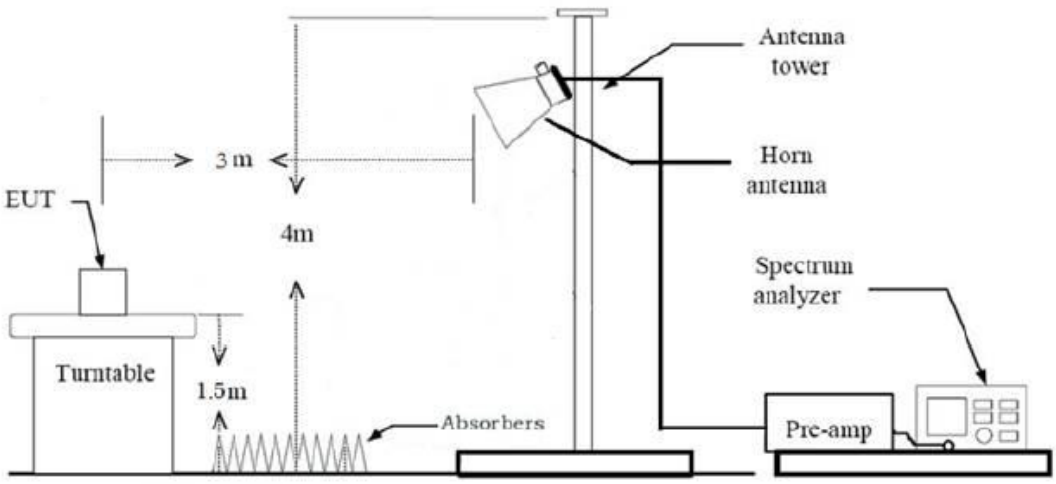
Below 30MHz (3m SAC)



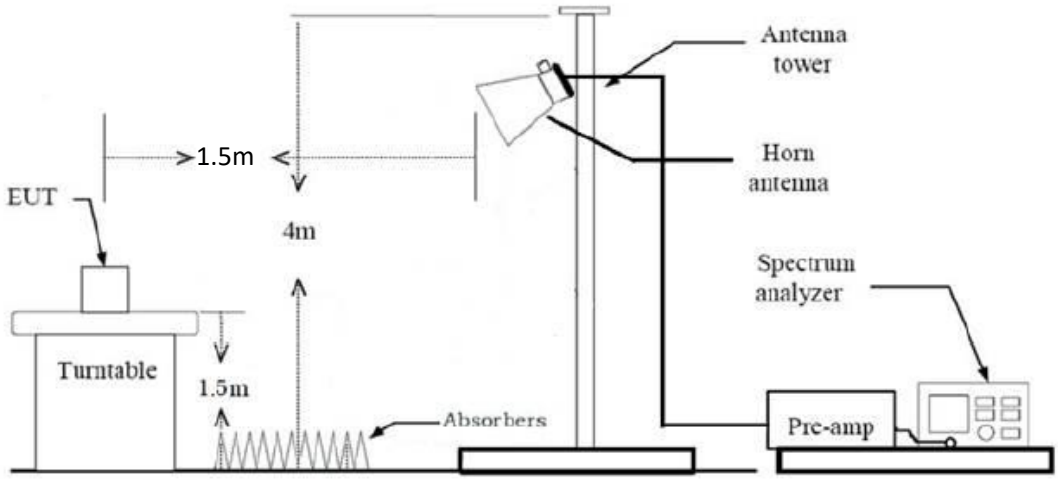
30MHz-1GHz (3m SAC)



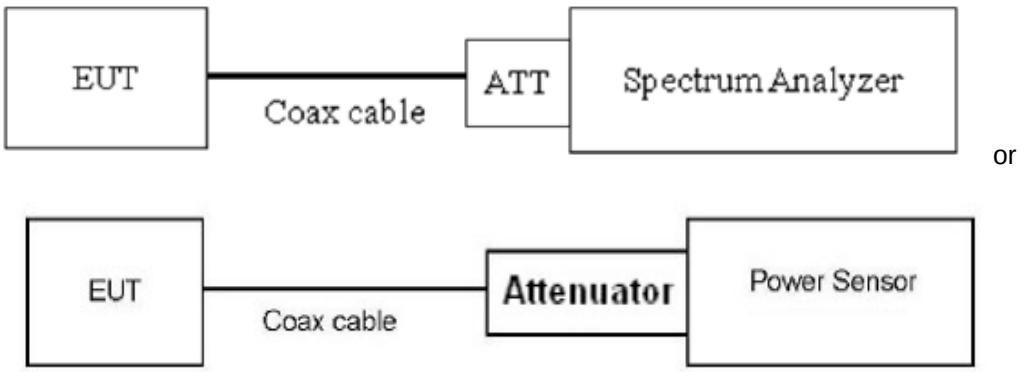
1GHz-18GHz(3m FAC)



Above 18GHz (3m FAC)



3) RF Conducted Test



2.6 Test Procedure

Conducted emission:

1. The E.U.T is placed on a non-conducting table 40cm from the vertical ground plane and 80cm above the horizontal ground plane (Please refer to the block diagram of the test setup and photographs).
2. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.
3. Line conducted data is recorded for both Line and Neutral

Radiated Emission Procedure:

a) For below 30MHz

1. All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz- 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the

intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance).

2. Loop antenna use, investigation was done on the three antenna orientations (parallel, perpendicular, gound-parallel)

b) For 30MHz-1GHz:

1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m.
2. EUT works in each mode of operation that needs to be tested. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.

c) For above 1GHz:

1. The EUT was placed on the tabletop of a rotating table 1.5 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m (1-18GHz) and 1.5 m (above 18GHz).
2. EUT works in each mode of operation that needs to be tested，and having the EUT continuously working. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.
3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.
4. Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

RF Conducted Test:

1. The antenna port of EUT was connected to the RF port of the test equipment (Power Meter or Spectrum analyzer) through Attenuator and RF cable.
2. The cable assembly insertion loss of 6.5dB (including 6.0 dB Attenuator and 0.5dB cable) was entered as an offset in the power meter. Note: Actual cable loss was unavailable at the time of testing, therefore a loss of 0.5dB was assumed as worst case. This was later verified to be true by laboratory. (if the RF cable provided by client, the cable loss declared by client)
3. The EUT is keeping in continuous transmission mode and tested in all modulation modes.

2.7 Measurement Method

Description of Test	Measurement Method
AC Line Conducted Emissions	ANSI C63.10-2013 Section 6.2
Maximum Conducted Output Power	ANSI C63.10-2013 Section 7.8.5
20 dB Emission Bandwidth	ANSI C63.10-2013 Section 6.9.2
99% Occupied Bandwidth	ANSI C63.10-2013 Section 6.9.3
Channel separation	ANSI C63.10-2013 Section 7.8.2
Number of hopping Frequency	ANSI C63.10-2013 Section 7.8.3
Time of occupancy (dwell time)	ANSI C63.10-2013 Section 7.8.4
100kHz Bandwidth of Frequency Band Edge	ANSI C63.10-2013 Section 7.8.7.2&6.10
Conducted emission at Antenna Terminals	ANSI C63.10-2013 Section 7.8.8
Radiated emission	ANSI C63.10-2013 Section 7.8&6.3&6.4&6.5&6.6

2.8 Measurement Equipment

Manufacturer	Description	Model	Management No.	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
ROHDE& SCHWARZ	EMI TEST RECEIVER	ESR	101817	2024/6/4	2025/6/3
R&S	LISN	ENV216	101748	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.12	N/A	2024/6/6	2025/6/5
Farad	Test Software	EZ-EMC	Ver. EMEC-3A1	/	/
Radiated Emission Test					
R&S	EMI test receiver	ESR3	102758	2024/6/4	2025/6/3
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40-N	101608	2024/6/4	2025/6/3
SONOMA INSTRUMENT	Low frequency amplifier	310	186014	2024/6/4	2025/6/3
A.H. Systems	PREAMPLIFIER	PAM-0118P	531	2024/6/4	2025/6/3
COM-POWER	Amplifier	PAM-840A	461306	2024/8/7	2025/8/6
BACL	Loop Antenna	1313-1A	4010611	2024/2/7	2027/2/6
SCHWARZBECK	Log - periodic wideband antenna	VULB 9163	9163-872	2023/7/7	2026/7/6

Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2026/7/5
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2023/7/10	2026/7/9
Oulitong	Band Reject Filter	OBSF-2400-2483.5-50N	OE02103119	2024/6/4	2025/6/3
Unknown	6.7G High Pass Filter	Unknown	6.7G	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.9	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.13	N/A	2024/8/7	2025/8/6
N/A	Coaxial Cable	NO.15	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.16	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.17	N/A	2024/6/4	2025/6/3
Audix	Test Software	E3	191218 V9	/	/
RF Conducted Test					
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40	101419	2024/6/4	2025/6/3
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSU-26	200680/026	2024/6/4	2025/6/3
ANRITSU	USB Power Sensor	MA24418A	12620	2024/6/4	2025/6/3
MEEA	6dB attenuator	603-06-1	N/A	2024/6/4	2025/6/3

Note: All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or International standards.

3 Test Results

3.1 Test Summary

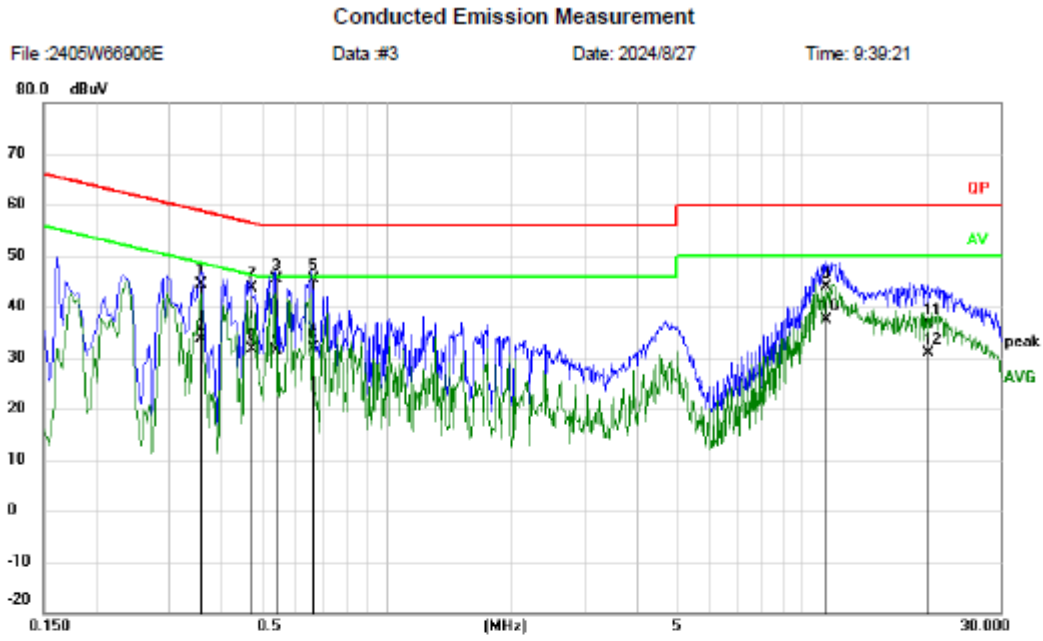
FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207 (a)	AC Line Conducted Emissions	Compliance
§15.247 (a)(1)	20dB Emission Bandwidth	Report only
-	99% Occupied Bandwidth	Report only
§15.247 (a)(1)	Channel separation	Compliance
§15.247 (a)(1)(iii)	Number of hopping Frequency	Compliance
§15.247 (a)(1)(iii)	Time of occupancy (dwell time)	Compliance
§15.247(b)(1)	Maximum Conducted Output Power	Compliance
§15.247(d)	100kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(d)	Conducted emission at Antenna Terminals	Compliance
§15.205, §15.209, §15.247(d)	Radiated emission	Compliance

3.2 Limit

Test items	Limit
AC Line Conducted Emissions	See details §15.207 (a)
Conducted Output Power	For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.
Channel separation	Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
Number of hopping Frequency	Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels.
Time of occupancy (dwell time)	The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
Spurious Emissions, 100kHz Bandwidth of Frequency Band Edge	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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)).

3.3 AC Line Conducted Emissions Test Data

Test Date:	2024-08-27	Test By:	Lirou Li
Environment condition:	Temperature: 23.6°C; Relative Humidity:66%; ATM Pressure: 101.4kPa		



Limit: QP
Mode:transmitting
Note: BT

Phase: L1
Power: AC 120V/60Hz

Temperature: 23.6 ℃
Humidity: 66 %
Air Pressure: 1014 hpa

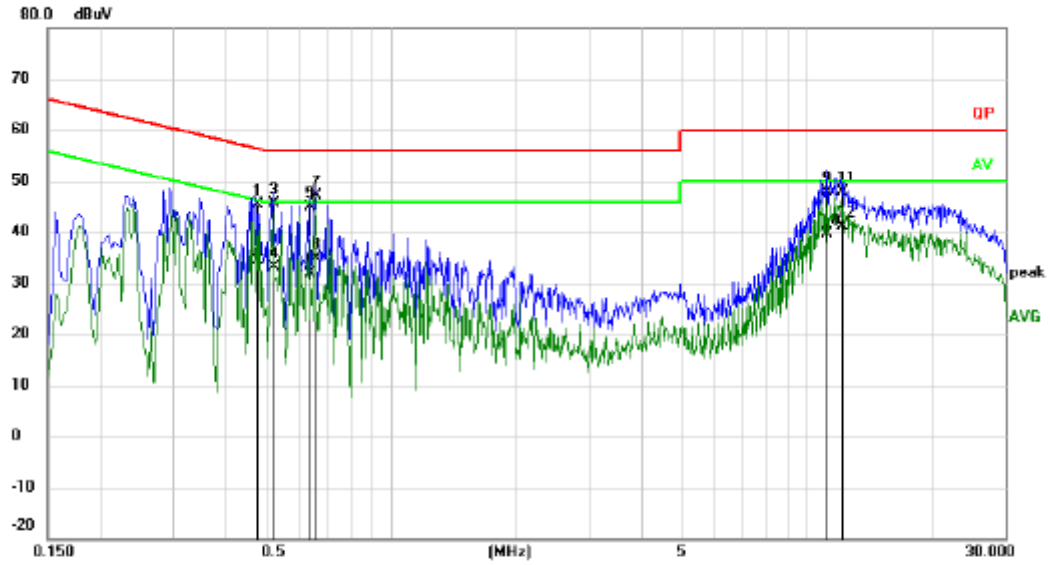
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over Limit		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.3580	33.61	10.76	44.37	58.77	-14.40	QP	
2		0.3580	22.92	10.76	33.68	48.77	-15.09	AVG	
3		0.5420	34.50	10.82	45.32	56.00	-10.68	QP	
4		0.5420	20.67	10.82	31.49	46.00	-14.51	AVG	
5	*	0.6660	34.52	10.85	45.37	56.00	-10.63	QP	
6		0.6660	21.09	10.85	31.94	46.00	-14.06	AVG	
7		0.4740	32.88	10.80	43.68	56.44	-12.76	QP	
8		0.4740	20.73	10.80	31.53	46.44	-14.91	AVG	
9		11.4300	33.42	10.46	43.88	60.00	-16.12	QP	
10		11.4300	26.83	10.46	37.29	50.00	-12.71	AVG	
11		20.1020	25.99	10.55	36.54	60.00	-23.46	QP	
12		20.1020	20.30	10.55	30.85	50.00	-19.15	AVG	

*:Maximum data x:Over limit !:over margin

Engineer Signature: Lirou

Conducted Emission Measurement

File :2405W66906E Data :#4 Date: 2024/8/27 Time: 9:48:43



Limit: QP
Mode:transmitting
Note: BT

Phase: N
Power: AC 120V/60Hz

Temperature: 23.6 ℃
Humidity: 66 %
Air Pressure: 1014 hpa

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over Limit		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4780	34.73	10.70	45.43	56.37	-10.94	QP	
2		0.4780	23.56	10.70	34.26	46.37	-12.11	AVG	
3		0.5220	34.97	10.70	45.67	56.00	-10.33	QP	
4		0.5220	22.37	10.70	33.07	46.00	-12.93	AVG	
5		0.6380	34.28	10.61	44.89	56.00	-11.11	QP	
6		0.6380	21.15	10.61	31.76	46.00	-14.24	AVG	
7		0.6620	36.51	10.59	47.10	56.00	-8.90	QP	
8		0.6620	24.39	10.59	34.98	46.00	-11.02	AVG	
9		11.1580	37.08	10.75	47.83	60.00	-12.17	QP	
10		11.1580	28.96	10.75	39.71	50.00	-10.29	AVG	
11		12.1580	36.97	10.80	47.77	60.00	-12.23	QP	
12	*	12.1580	30.31	10.80	41.11	50.00	-8.89	AVG	

*:Maximum data x:Over limit !:over margin

Engineer Signature: Lirou

Remark:

Measurement (dBuV)= Reading Level (dBuV) + Correct Factor(dB)

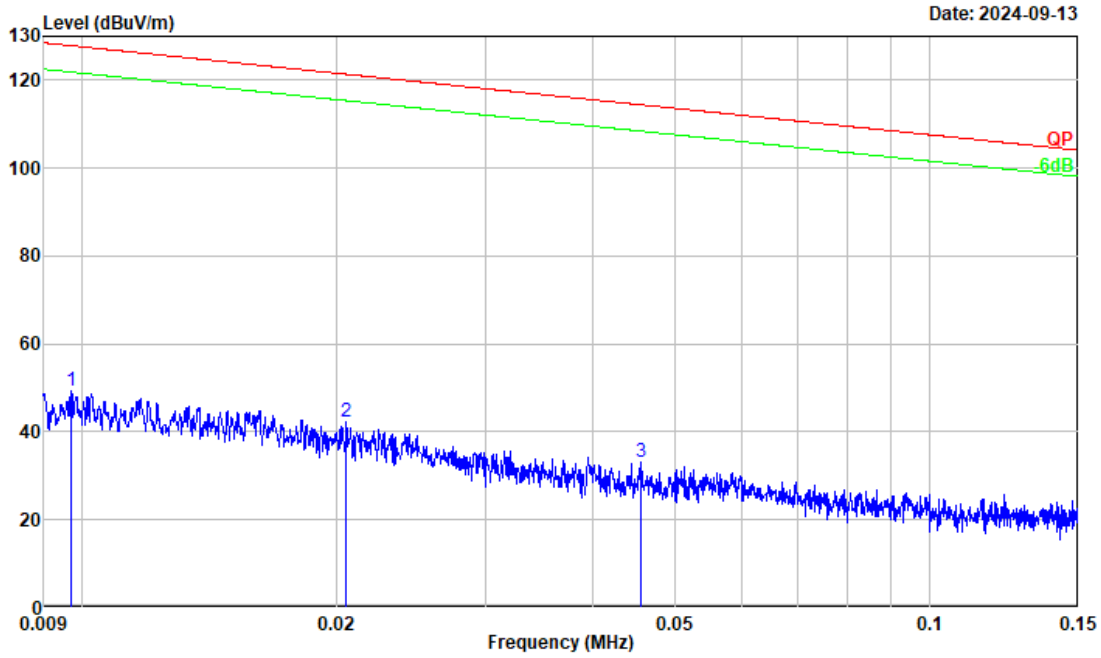
Correct Factor(dB)= LISN Voltage Division Factor (dB)+ Cable loss(dB)

Over Limit = Measurement – Limit

3.4 Radiated emission Test Data

9 kHz-30MHz:

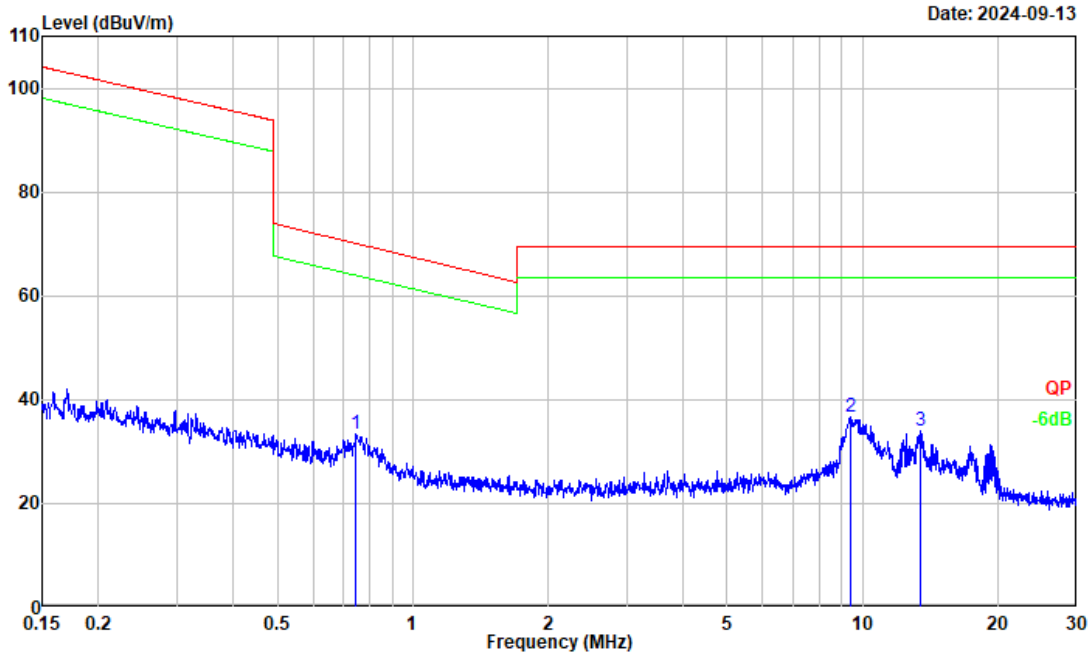
Test Date:	2024-09-13	Test By:	Luke Li
Environment condition:	Temperature: 22.2°C; Relative Humidity:66%; ATM Pressure: 100kPa		



Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 22.2℃/66%R.H./100.0kPa
Tested by : Luke Li
Polarization : PARALLEL
Remark : 8DPSK high channel

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	0.010	11.77	37.44	49.21	127.86	-78.65	Peak
2	0.021	11.67	30.54	42.21	121.37	-79.16	Peak
3	0.046	11.76	21.30	33.06	114.41	-81.35	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit



Project No. : 2405W66906E
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Environment : 22.2℃/66%R.H./100.0kPa
Tested by : Luke Li
Polarization : PARALLEL
Remark : 8DPSK high channel

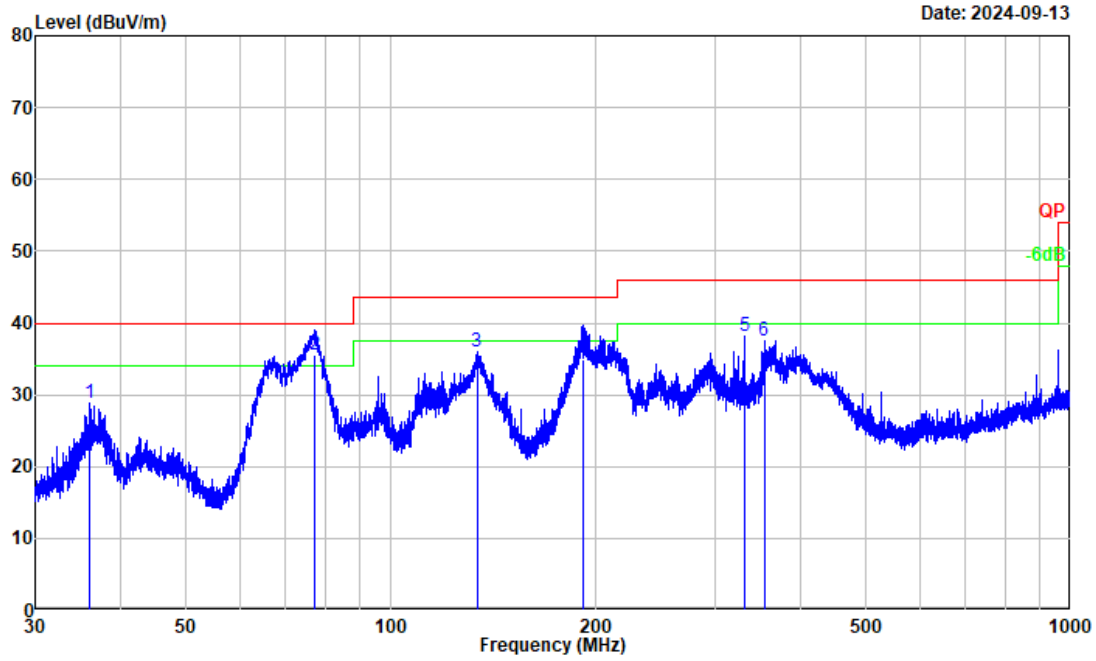
--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	0.748	30.35	2.91	33.26	70.05	-36.79	Peak
2	9.421	40.38	-3.65	36.73	69.54	-32.81	Peak
3	13.438	37.66	-3.58	34.08	69.54	-35.46	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

.

30MHz-1GHz:

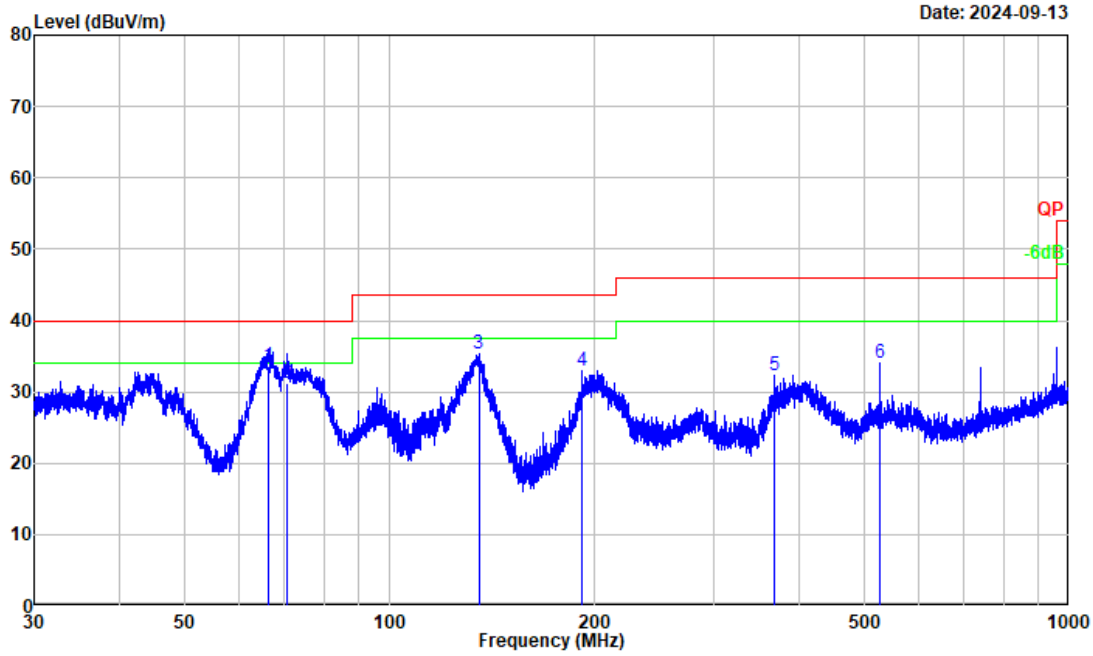
Test Date:	2024-09-13	Test By:	Bard Huang
Environment condition:	Temperature: 22.2°C; Relative Humidity:66%; ATM Pressure: 100kPa		



Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 22.2℃/66%R.H./100.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 8DPSK high channel

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	36.081	43.63	-14.72	28.91	40.00	-11.09	Peak
2	77.432	53.50	-17.88	35.62	40.00	-4.38	QP
3	133.878	52.97	-17.07	35.90	43.50	-7.60	Peak
4	192.042	48.70	-13.81	34.89	43.50	-8.61	QP
5	331.164	47.39	-9.33	38.06	46.00	-7.94	Peak
6	354.137	46.02	-8.54	37.48	46.00	-8.52	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit



Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 22.2℃/66%R.H./100.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 8DPSK high channel

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	66.389	48.06	-14.52	33.54	40.00	-6.46	QP
2	70.684	47.47	-16.21	31.26	40.00	-8.74	QP
3	135.294	52.52	-17.08	35.44	43.50	-8.06	Peak
4	192.042	46.68	-13.81	32.87	43.50	-10.63	Peak
5	368.066	40.50	-8.27	32.23	46.00	-13.77	Peak
6	526.585	39.36	-5.28	34.08	46.00	-11.92	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Above 1GHz:

Test Date:	2024-12-04	Test By:	Bard Huang
Environment condition:	Temperature: 24.1°C; Relative Humidity:36%; ATM Pressure: 101kPa		

Frequency (MHz)	Reading level (dBμV)	Polar (H/V)	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
GFSK							
Low Channel							
4804.000	47.60	horizontal	-2.87	44.73	74.00	-29.27	Peak
4804.000	47.93	vertical	-2.87	45.06	74.00	-28.94	Peak
1057.000	58.77	horizontal	-8.04	50.73	74.00	-23.27	Peak
1060.000	42.81	vertical	-8.03	34.78	54.00	-19.22	Average
1060.000	62.87	vertical	-8.03	54.84	74.00	-19.16	Peak
Middle Channel							
4882.000	47.46	horizontal	-2.32	45.14	74.00	-28.86	Peak
4882.000	47.87	vertical	-2.32	45.55	74.00	-28.45	Peak
1064.000	59.00	horizontal	-8.01	50.99	74.00	-23.01	Peak
1052.000	61.89	vertical	-8.05	53.84	74.00	-20.16	Peak
High Channel							
4960.000	47.72	horizontal	-2.18	45.54	74.00	-28.46	Peak
4960.000	47.87	vertical	-2.18	45.69	74.00	-28.31	Peak
1062.000	59.16	horizontal	-8.02	51.14	74.00	-22.86	Peak
1064.000	43.17	vertical	-8.01	35.16	54.00	-18.84	Average
1064.000	62.81	vertical	-8.01	54.80	74.00	-19.20	Peak
π/4-DQPSK							
Low Channel							
4804.000	48.13	horizontal	-2.87	45.26	74.00	-28.74	Peak
4804.000	47.94	vertical	-2.87	45.07	74.00	-28.93	Peak
1057.000	61.46	horizontal	-8.04	53.42	74.00	-20.58	Peak
1058.000	43.40	vertical	-8.03	35.37	54.00	-18.63	Average
1058.000	63.26	vertical	-8.03	55.23	74.00	-18.77	Peak
Middle Channel							
4882.000	47.49	horizontal	-2.32	45.17	74.00	-28.83	Peak
4882.000	46.67	vertical	-2.32	44.35	74.00	-29.65	Peak
1052.000	59.13	horizontal	-8.05	51.08	74.00	-22.92	Peak
1062.000	43.10	vertical	-8.02	35.08	54.00	-18.92	Average

1062.000	62.20	vertical	-8.02	54.18	74.00	-19.82	Peak
High Channel							
4960.000	47.82	horizontal	-2.18	45.64	74.00	-28.36	Peak
4960.000	47.81	vertical	-2.18	45.63	74.00	-28.37	Peak
1053.000	59.68	horizontal	-8.04	51.64	74.00	-22.36	Peak
1063.000	45.39	vertical	-8.01	37.38	54.00	-16.62	Average
1063.000	63.41	vertical	-8.01	55.40	74.00	-18.60	Peak
8DPSK							
Low Channel							
4804.000	48.25	horizontal	-2.87	45.48	74.00	-28.62	Peak
4804.000	47.77	vertical	-2.87	44.90	74.00	-29.10	Peak
1062.000	59.74	horizontal	-8.02	51.72	74.00	-22.28	Peak
1053.000	45.14	vertical	-8.04	37.10	54.00	-16.90	Average
1053.000	63.58	vertical	-8.04	55.54	74.00	-18.46	Peak
Middle Channel							
4882.000	47.62	horizontal	-2.32	45.30	74.00	-28.70	Peak
4882.000	47.06	vertical	-2.32	44.74	74.00	-29.26	Peak
1059.000	59.94	horizontal	-8.03	51.91	74.00	-22.09	Peak
1048.000	45.82	vertical	-8.06	37.76	54.00	-16.24	Average
1048.000	65.75	vertical	-8.06	57.69	74.00	-16.31	Peak
High Channel							
4960.000	47.59	horizontal	-2.18	45.41	74.00	-28.59	Peak
4960.000	47.59	vertical	-2.18	45.41	74.00	-28.59	Peak
1049.000	61.52	horizontal	-8.06	53.46	74.00	-20.54	Peak
1050.000	43.27	vertical	-8.05	35.22	54.00	-18.78	Average
1050.000	64.39	vertical	-8.05	56.34	74.00	-17.66	Peak

Remark:

Corrected Amplitude= Reading level + corrected Factor

Corrected Factor = Antenna factor + Cable loss – Amplifier gain

Margin = Corrected Amplitude – Limit

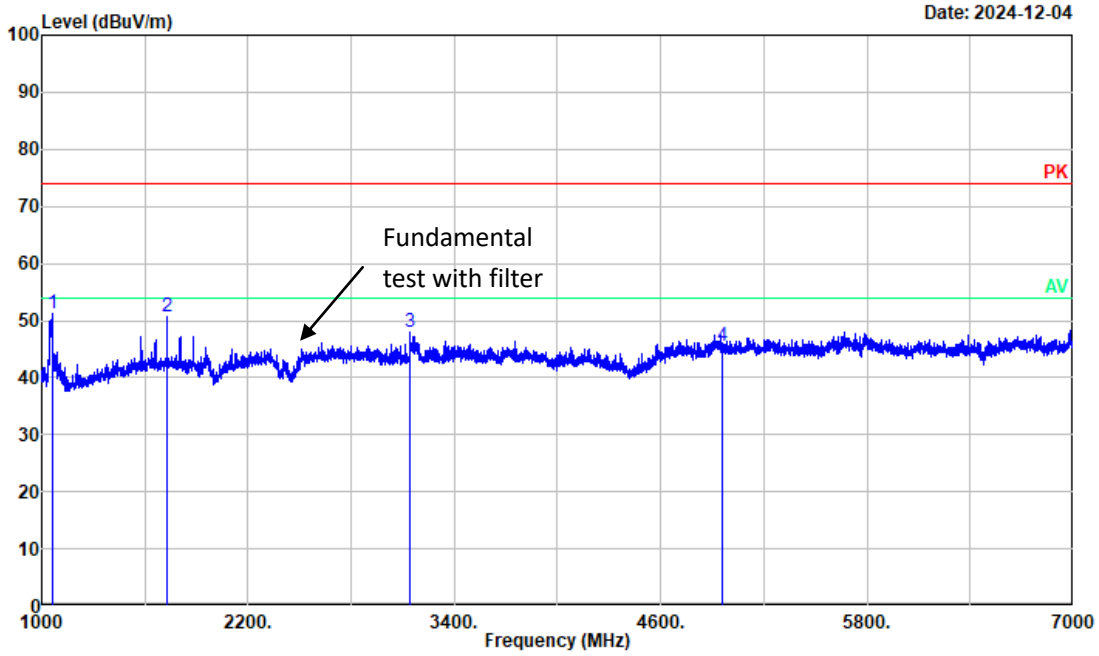
For the test result of Peak below the Peak limit more than 20dB, which can compliance with the average limit, just the Peak level was recorded.

The emission levels of other frequencies that were lower than the limit 20dB, not show in test report.

For emissions in 18GHz-25GHz range, all emissions were investigated and in the noise floor level.

Test plot for example as below:

Mode:	GFSK	Channel:	2480MHz

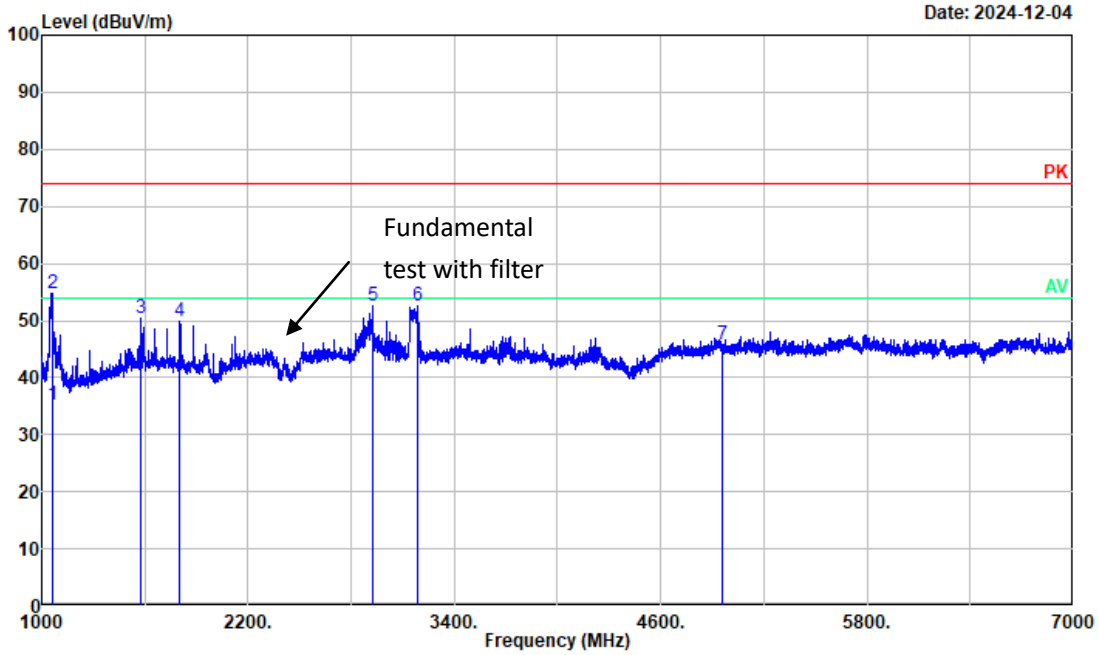


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : DH5 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	1062.000	59.16	-8.02	51.14	74.00	-22.86	Peak
2	1730.000	54.60	-3.89	50.71	74.00	-23.29	Peak
3	3141.000	51.26	-3.18	48.08	74.00	-25.92	Peak
4	4960.000	47.72	-2.18	45.54	74.00	-28.46	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	GFSK	Channel:	2480MHz

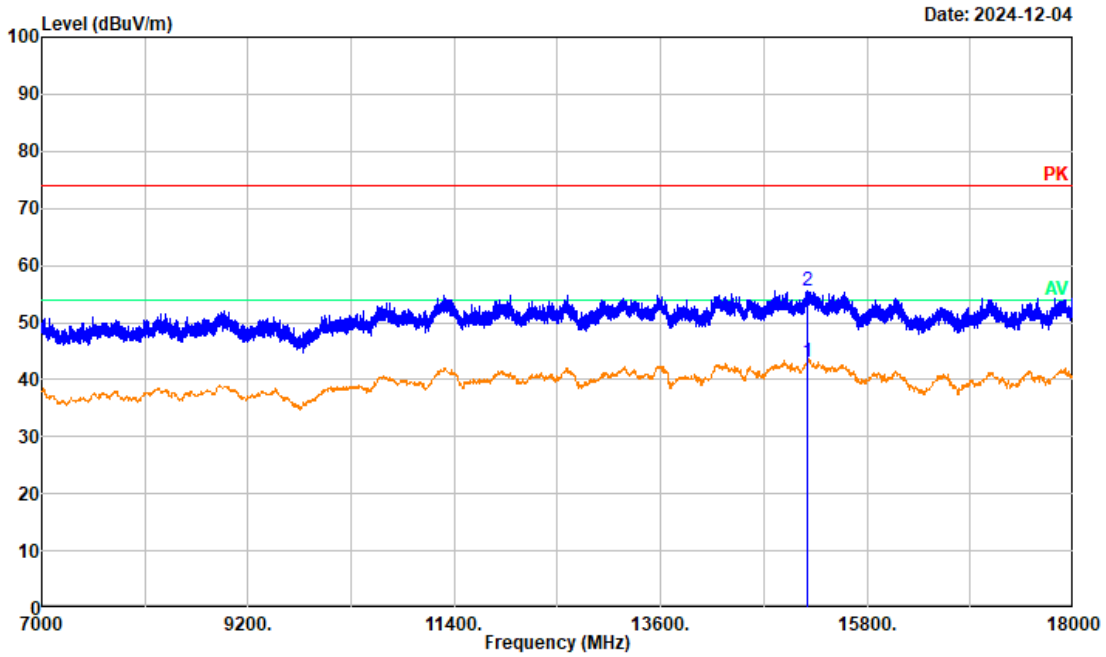


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : DH5 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	1064.000	43.17	-8.01	35.16	54.00	-18.84	Average
2	1064.000	62.81	-8.01	54.80	74.00	-19.20	Peak
3	1580.000	55.01	-4.62	50.39	74.00	-23.61	Peak
4	1805.000	53.77	-3.99	49.78	74.00	-24.22	Peak
5	2921.000	55.58	-2.88	52.70	74.00	-21.30	Peak
6	3184.000	55.78	-3.17	52.61	74.00	-21.39	Peak
7	4960.000	47.87	-2.18	45.69	74.00	-28.31	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	GFSK	Channel:	2480MHz

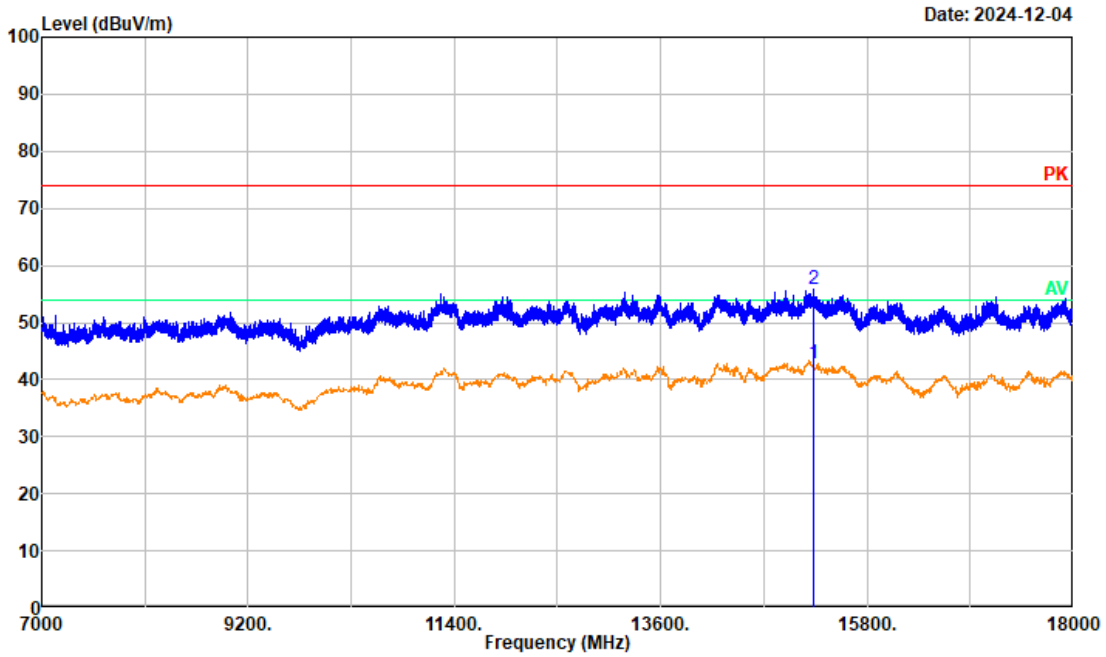


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : DH5 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	15170.000	37.93	5.23	43.16	54.00	-10.84	Average
2	15170.000	50.19	5.23	55.42	74.00	-18.58	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	GFSK	Channel:	2480MHz

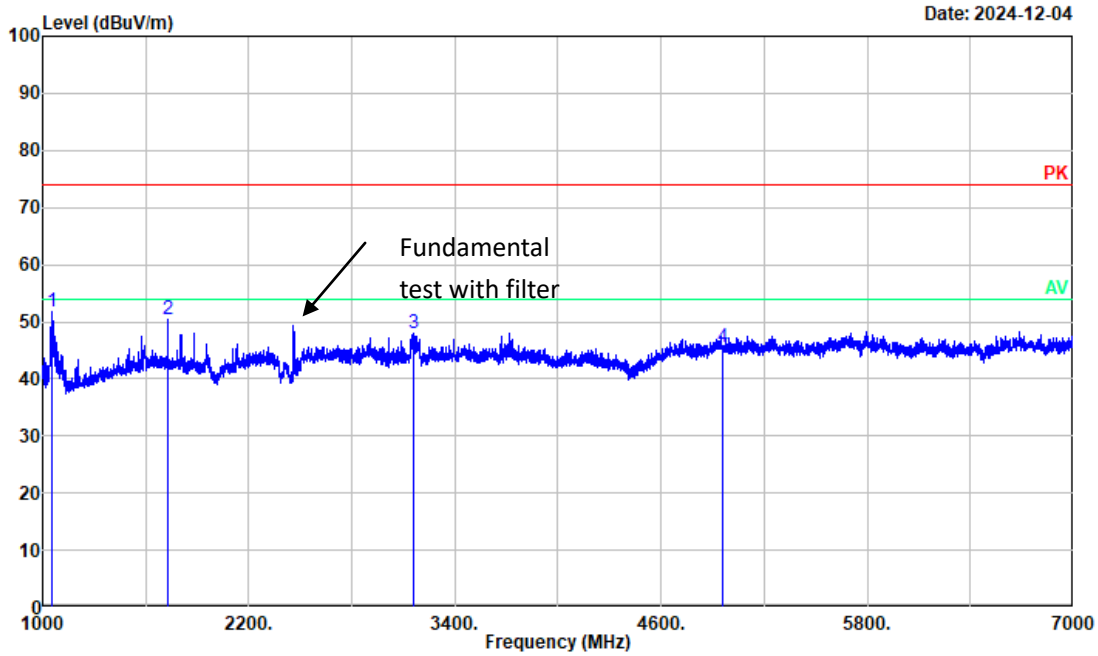


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : DH5 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	15223.000	37.61	5.24	42.85	54.00	-11.15	Average
2	15223.000	50.60	5.24	55.84	74.00	-18.16	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	π/4-DQPSK	Channel:	2480MHz

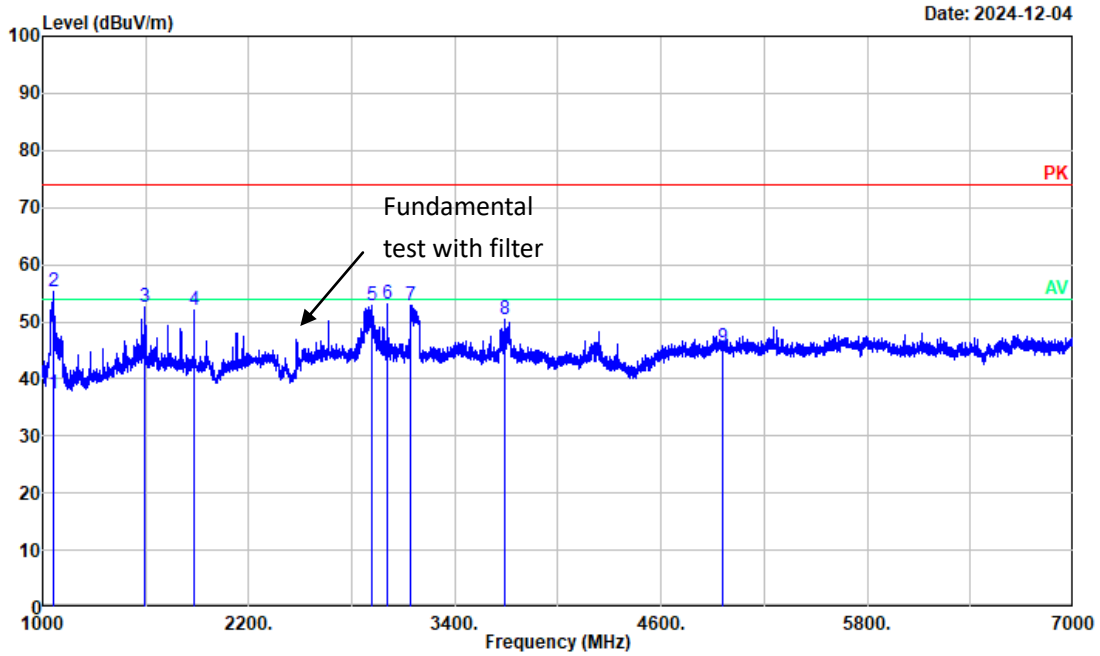


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 2DH5 2480

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	1053.000	59.68	-8.04	51.64	74.00	-22.36	Peak
2	1730.000	54.17	-3.89	50.28	74.00	-23.72	Peak
3	3160.000	51.18	-3.18	48.00	74.00	-26.00	Peak
4	4960.000	47.82	-2.18	45.64	74.00	-28.36	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	π/4-DQPSK	Channel:	2480MHz

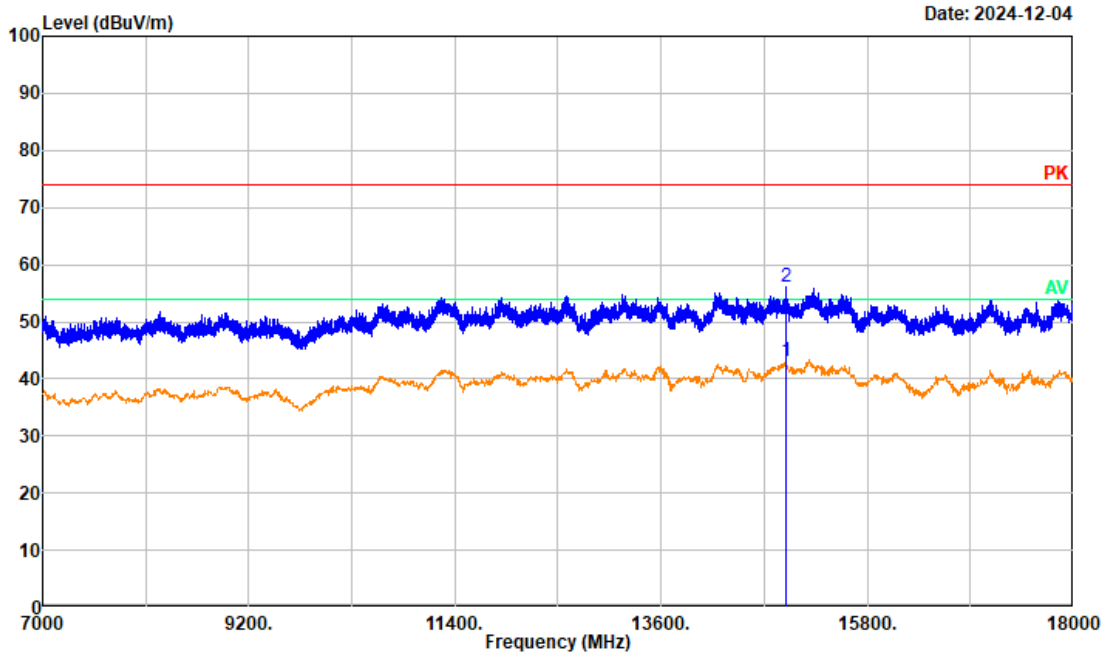


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 2DH5 2480

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	1063.000	45.39	-8.01	37.38	54.00	-16.62	Average
2	1063.000	63.41	-8.01	55.40	74.00	-18.60	Peak
3	1597.000	57.00	-4.47	52.53	74.00	-21.47	Peak
4	1881.000	56.21	-4.29	51.92	74.00	-22.08	Peak
5	2917.000	55.66	-2.87	52.79	74.00	-21.21	Peak
6	3007.000	56.24	-3.04	53.20	74.00	-20.80	Peak
7	3139.000	56.08	-3.19	52.89	74.00	-21.11	Peak
8	3691.000	53.19	-2.91	50.28	74.00	-23.72	Peak
9	4960.000	47.81	-2.18	45.63	74.00	-28.37	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	π/4-DQPSK	Channel:	2480MHz

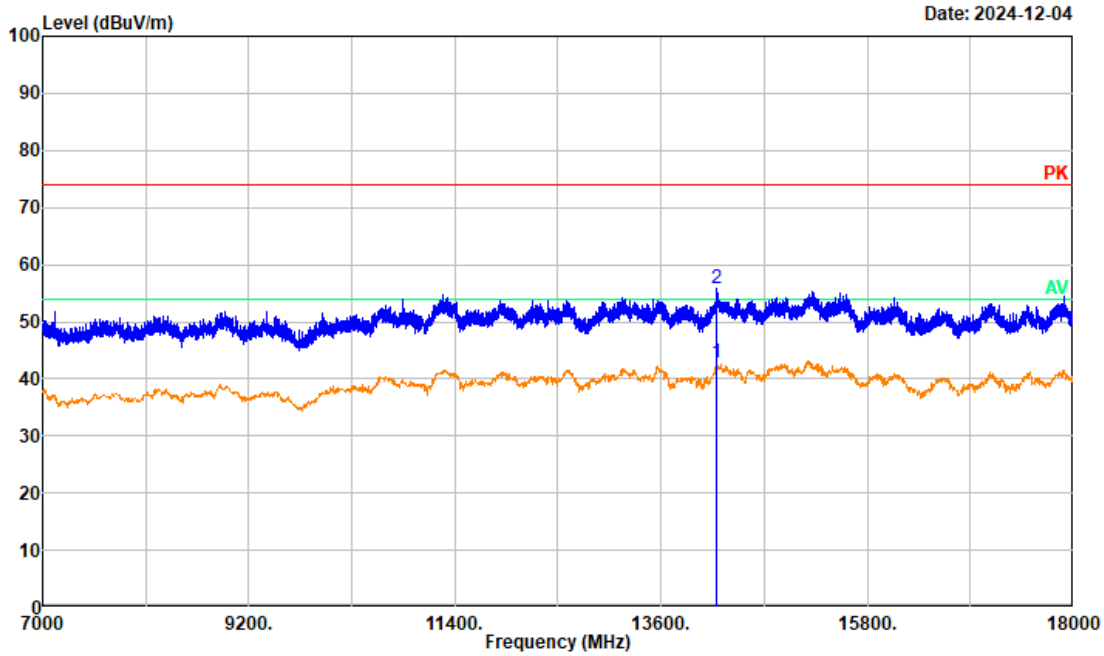


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 2DH5 2480

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	14934.000	37.47	5.57	43.04	54.00	-10.96	Average
2	14934.000	50.43	5.57	56.00	74.00	-18.00	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	π/4-DQPSK	Channel:	2480MHz

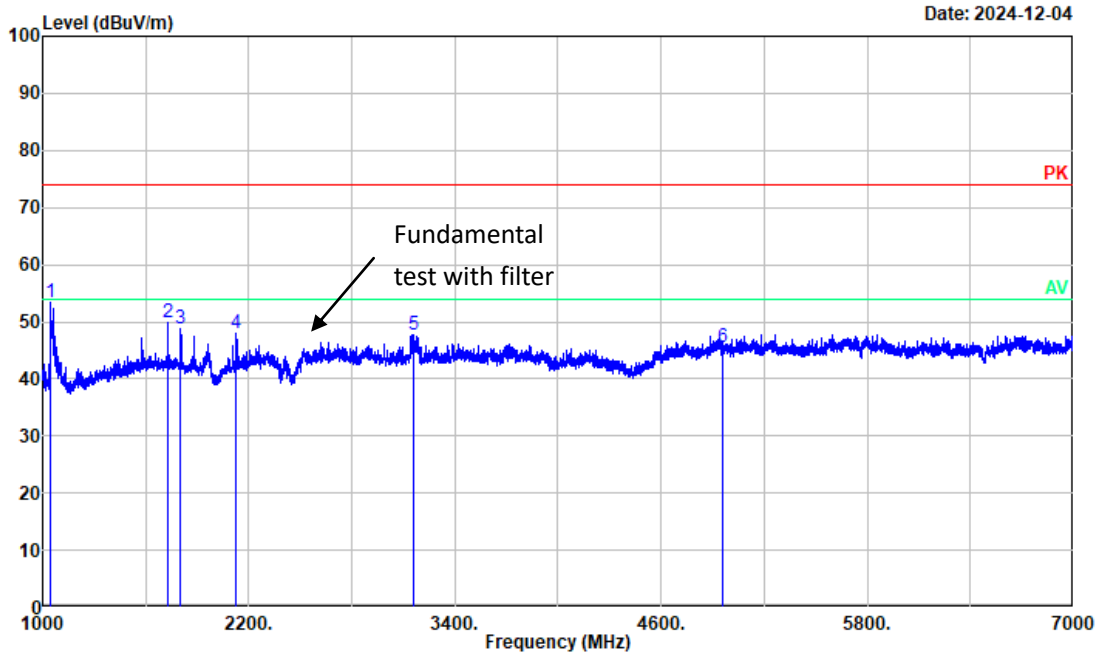


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 2DH5 2480

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	14194.000	37.23	5.48	42.71	54.00	-11.29	Average
2	14194.000	50.25	5.48	55.73	74.00	-18.27	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2480MHz

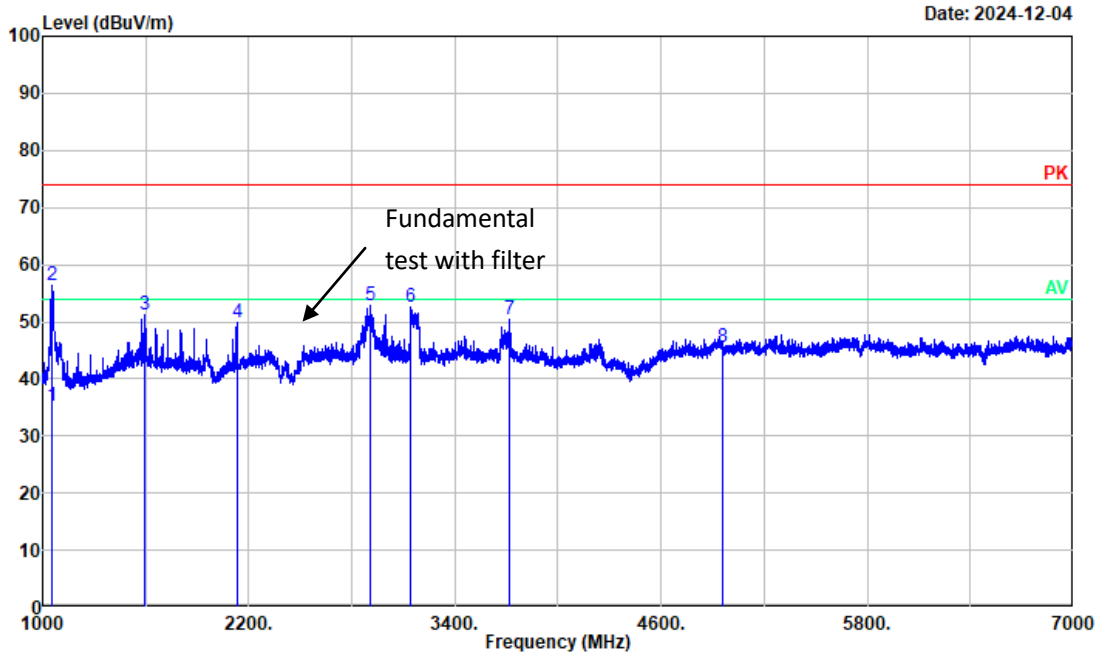


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 3DH5 2480

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	1049.000	61.52	-8.06	53.46	74.00	-20.54	Peak
2	1730.000	53.72	-3.89	49.83	74.00	-24.17	Peak
3	1805.000	52.84	-3.99	48.85	74.00	-25.15	Peak
4	2123.000	52.16	-4.27	47.89	74.00	-26.11	Peak
5	3160.000	50.80	-3.18	47.62	74.00	-26.38	Peak
6	4960.000	47.59	-2.18	45.41	74.00	-28.59	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2480MHz

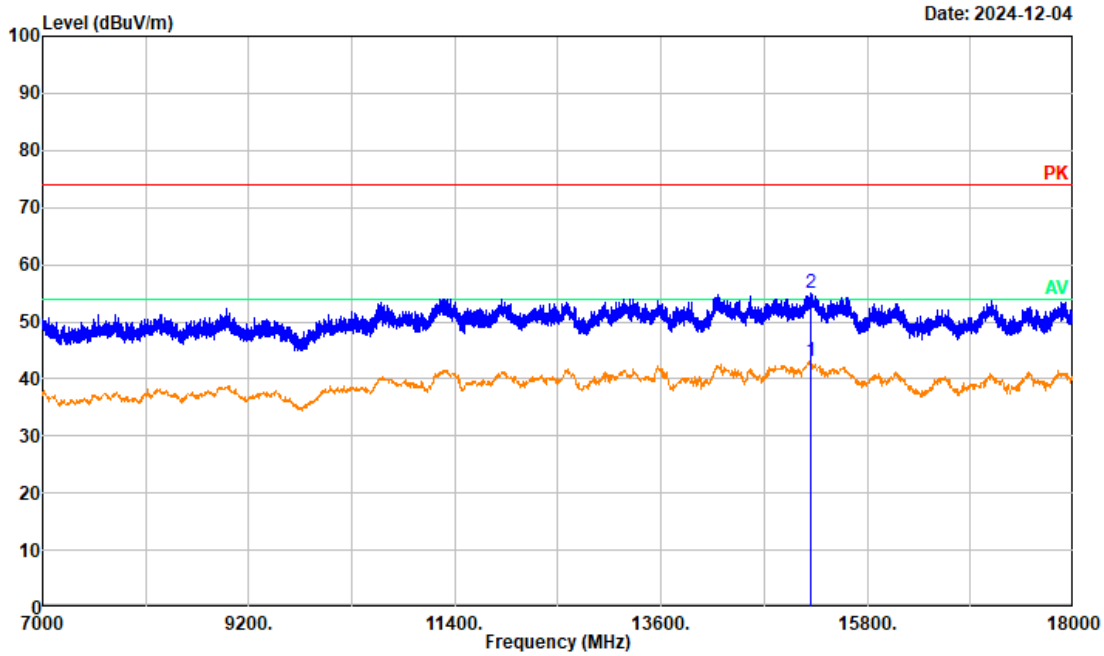


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 3DH5 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	1050.000	43.27	-8.05	35.22	54.00	-18.78	Average
2	1050.000	64.39	-8.05	56.34	74.00	-17.66	Peak
3	1592.000	55.73	-4.52	51.21	74.00	-22.79	Peak
4	2132.000	54.05	-4.22	49.83	74.00	-24.17	Peak
5	2909.000	55.65	-2.85	52.80	74.00	-21.20	Peak
6	3139.000	55.76	-3.19	52.57	74.00	-21.43	Peak
7	3717.000	53.44	-2.91	50.53	74.00	-23.47	Peak
8	4960.000	47.59	-2.18	45.41	74.00	-28.59	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2480MHz

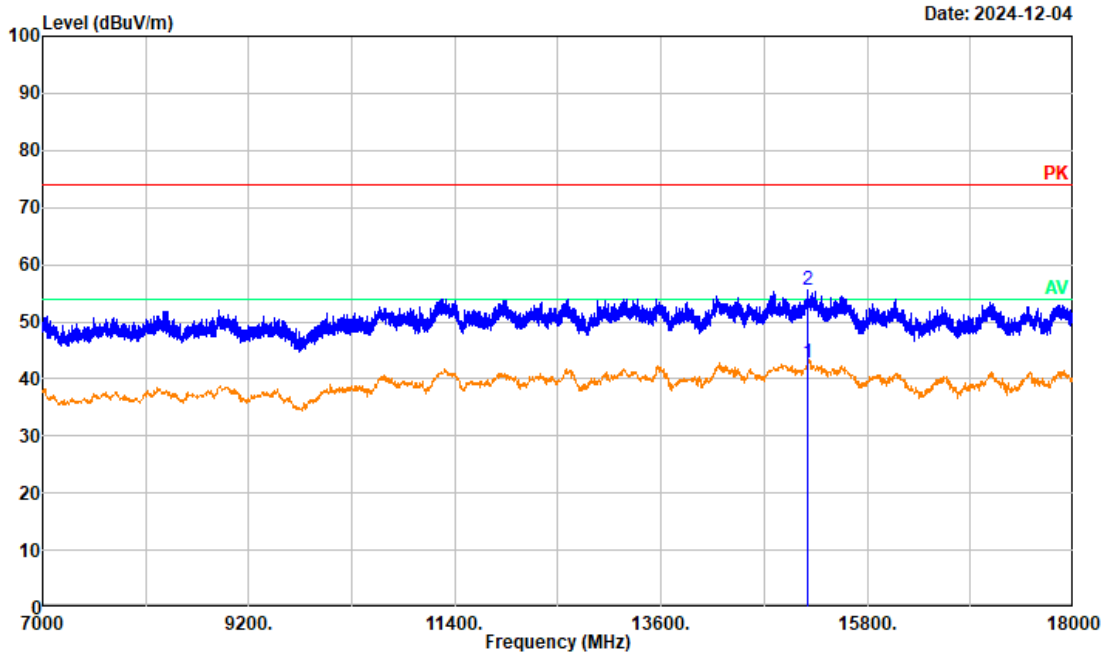


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 3DH5 2480

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	15193.000	37.90	5.27	43.17	54.00	-10.83	Average
2	15193.000	49.76	5.27	55.03	74.00	-18.97	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2480MHz

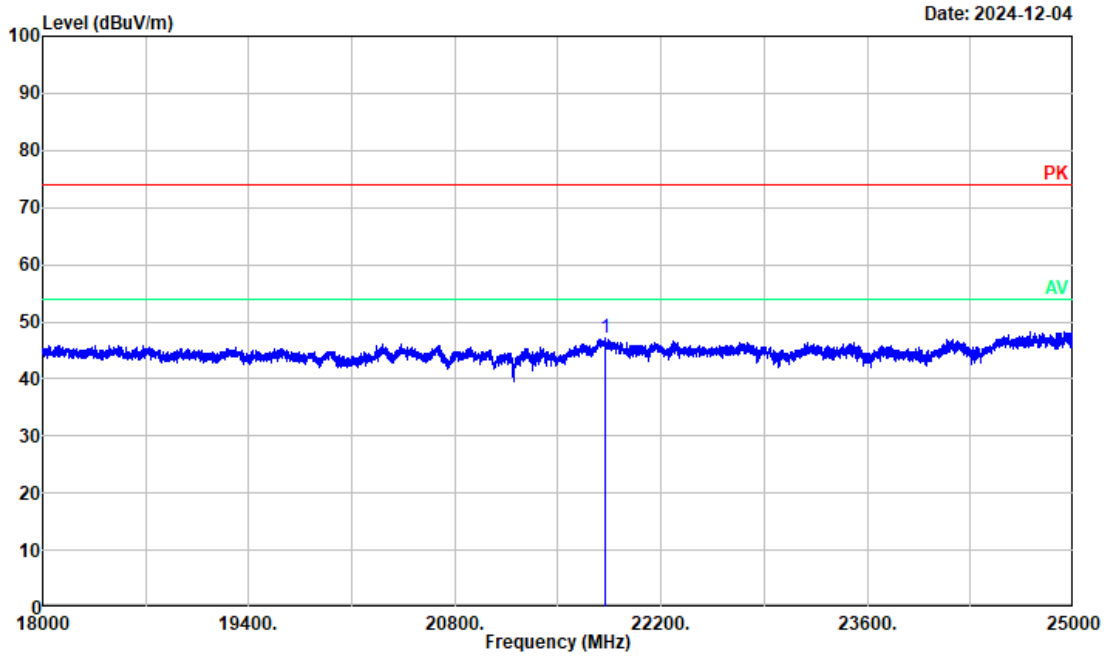


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 3DH5 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	15163.000	37.71	5.22	42.93	54.00	-11.07	Average
2	15163.000	50.37	5.22	55.59	74.00	-18.41	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2480MHz

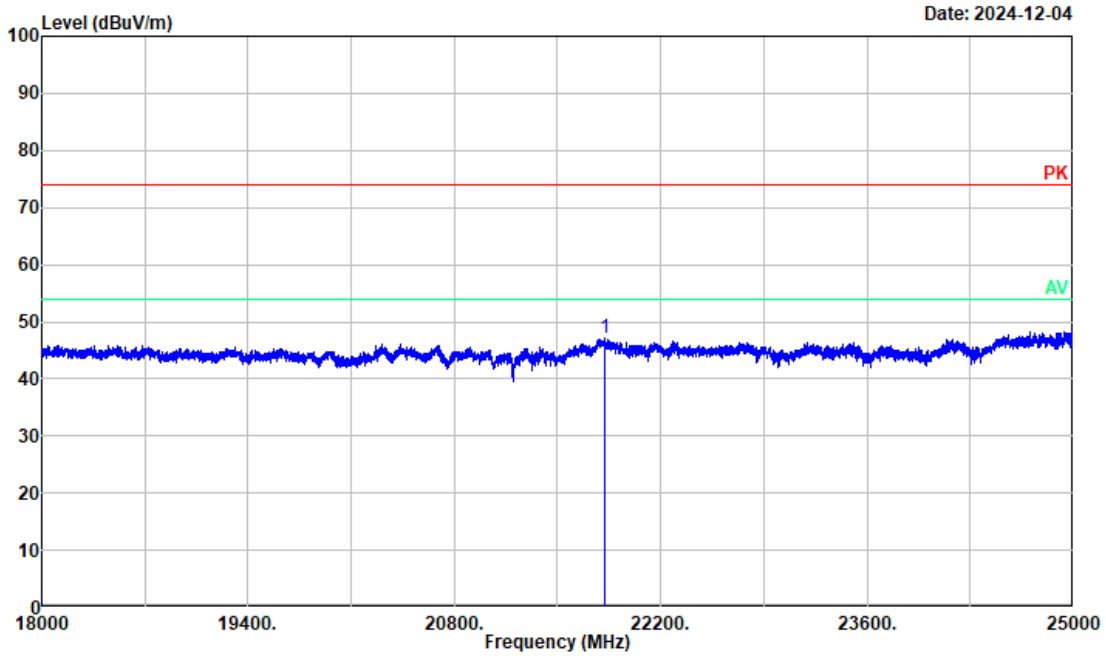


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : Vertical
Remark : 8DPSK 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	21816.520	54.03	-6.96	47.07	74.00	-26.93	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain - Distance extrapolate factor
Distance extrapolate factor = 20*log(specified distance/measured distance)
Specified distance = 3 meters, measured distance = 1.5 meters
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2480MHz



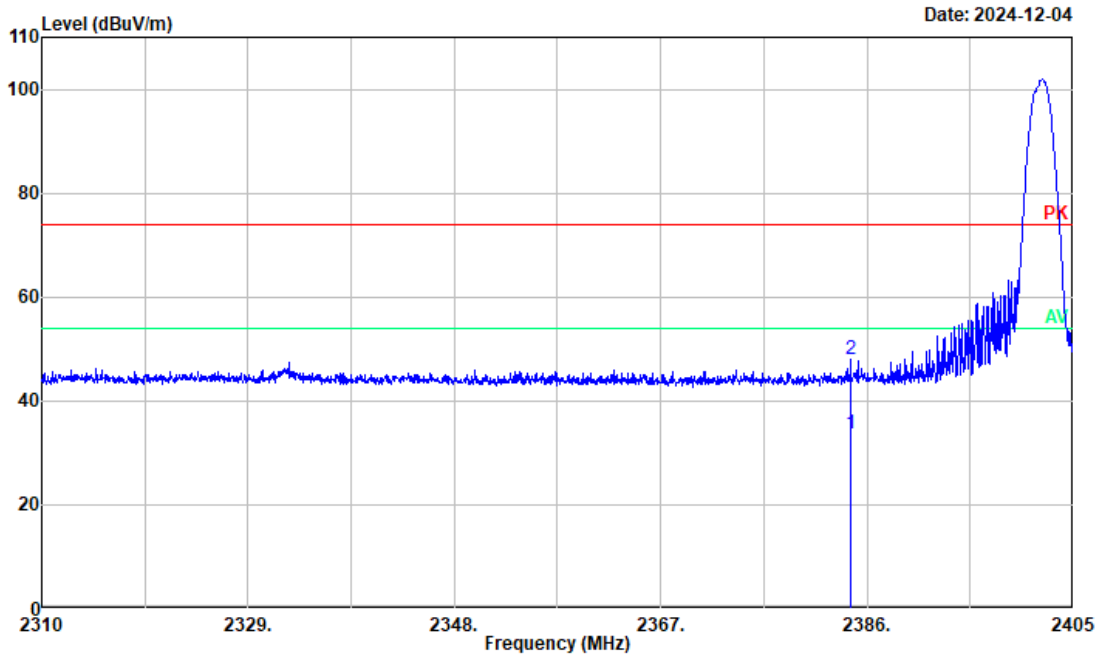
Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : Vertical
Remark : 8DPSK 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	21816.520	54.03	-6.96	47.07	74.00	-26.93	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain - Distance extrapolate factor
Distance extrapolate factor = 20*log(specified distance/measured distance)
Specified distance = 3 meters, measured distance = 1.5 meters
Result = Reading + Factor
Over Limit = Result - Limit

Radiated Band edge:

Mode:	GFSK	Channel:	2402MHz

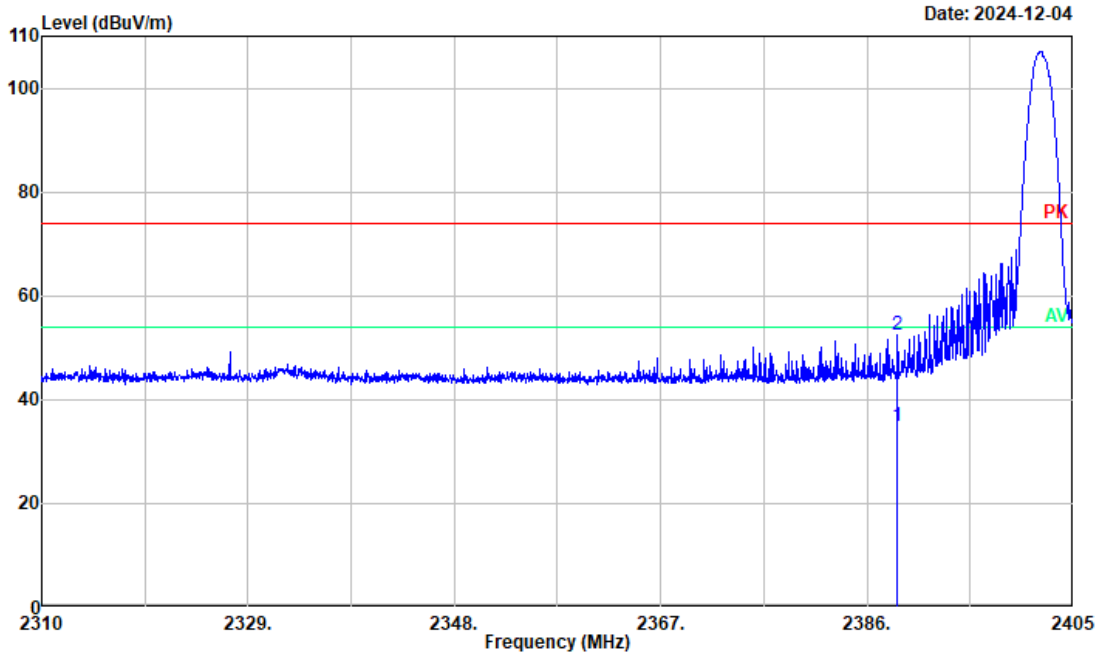


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : DH5 2402

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	2384.470	36.84	-3.18	33.66	54.00	-20.34	Average
2	2384.470	51.32	-3.18	48.14	74.00	-25.86	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	GFSK	Channel:	2402MHz

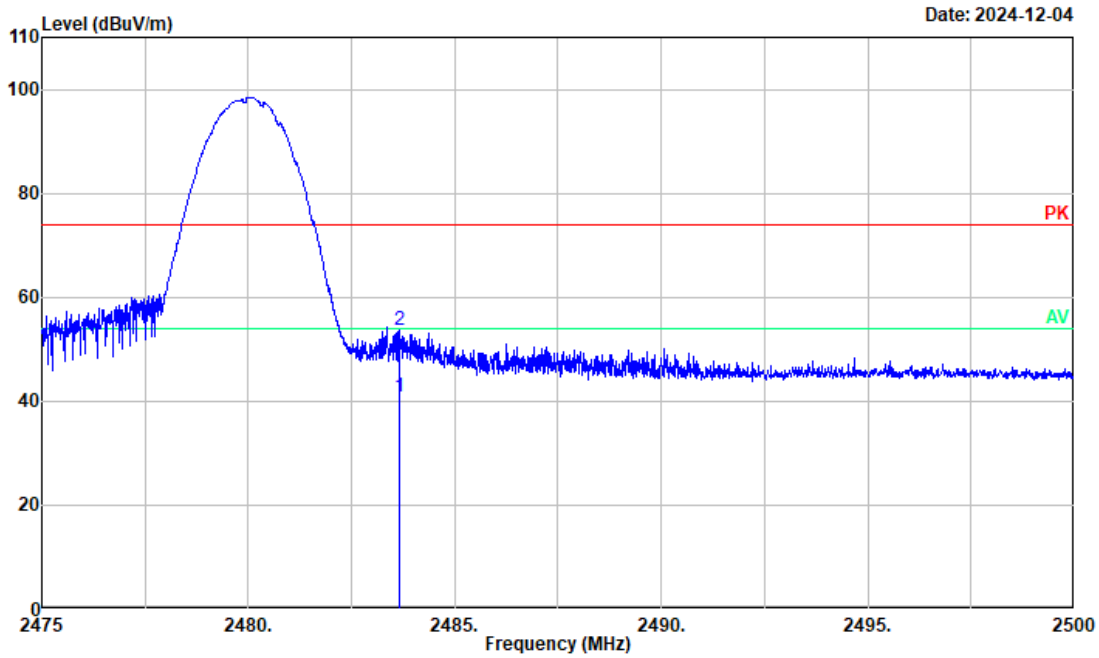


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : DH5 2402

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	2388.794	37.94	-3.18	34.76	54.00	-19.24	Average
2	2388.794	55.77	-3.18	52.59	74.00	-21.41	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	GFSK	Channel:	2480MHz

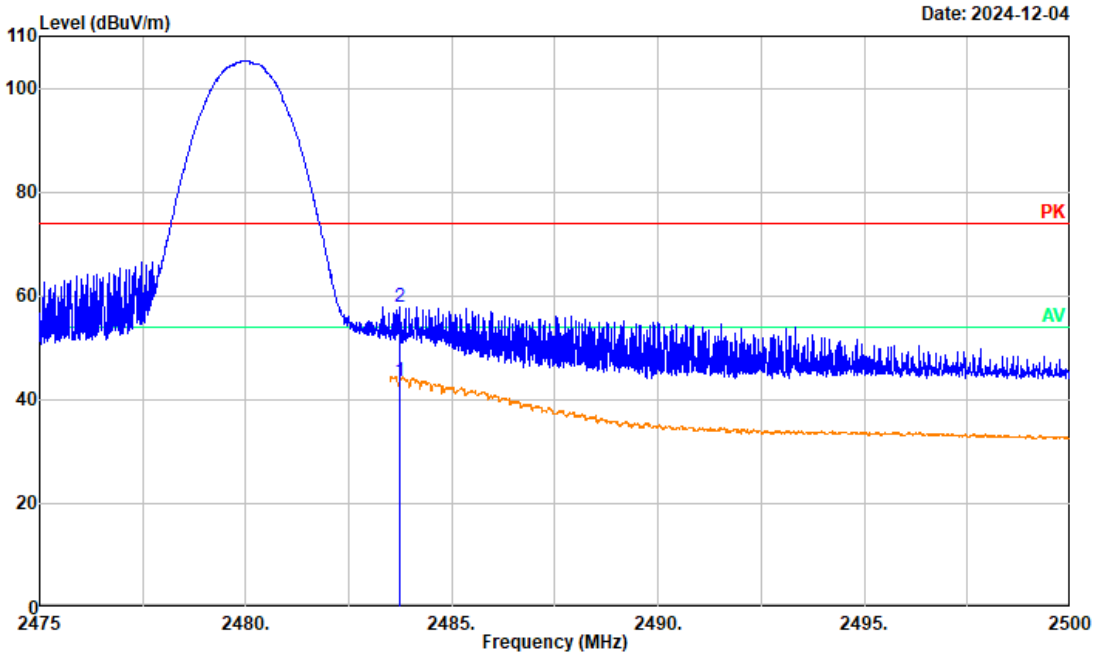


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : DH5 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	2483.642	43.96	-2.98	40.98	54.00	-13.02	Average
2	2483.642	56.56	-2.98	53.58	74.00	-20.42	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	GFSK	Channel:	2480MHz

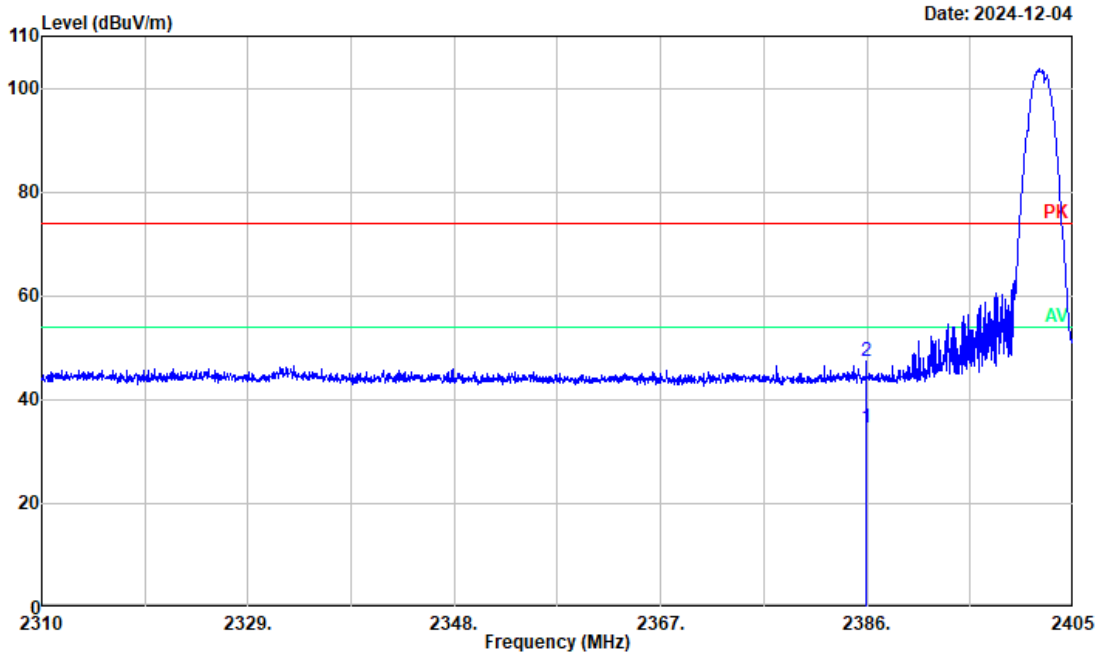


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : DH5 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	2483.729	46.52	-2.98	43.54	54.00	-10.46	Average
2	2483.729	60.87	-2.98	57.89	74.00	-16.11	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	π/4-DQPSK	Channel:	2402MHz

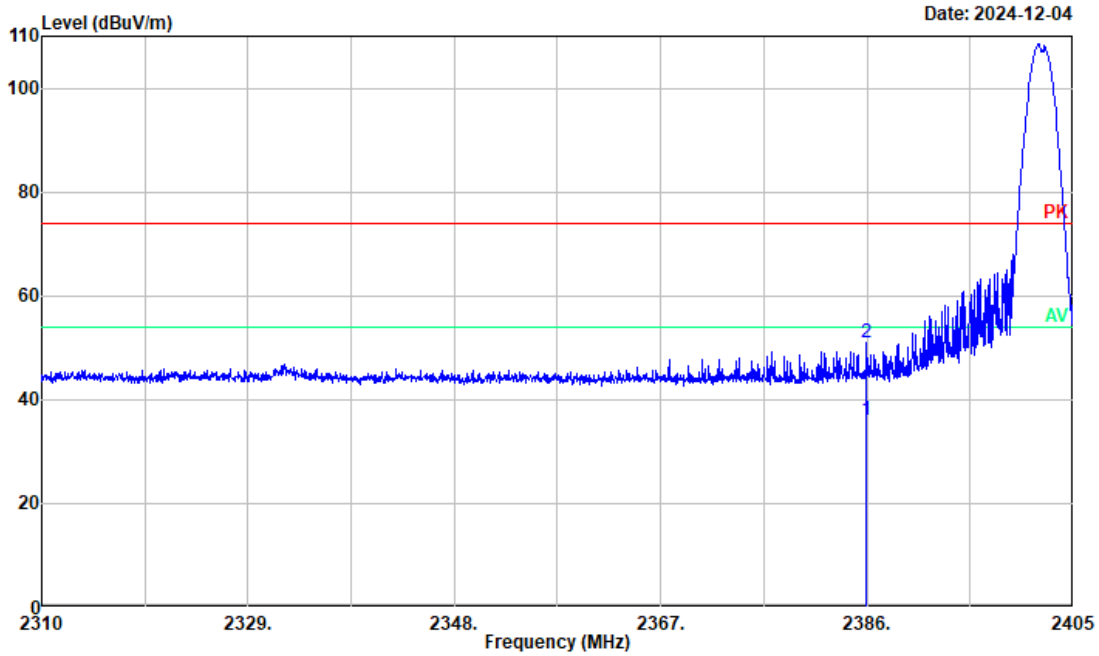


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 2DH5 2402

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	2385.896	37.73	-3.18	34.55	54.00	-19.45	Average
2	2385.896	50.50	-3.18	47.32	74.00	-26.68	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	π/4-DQPSK	Channel:	2402MHz

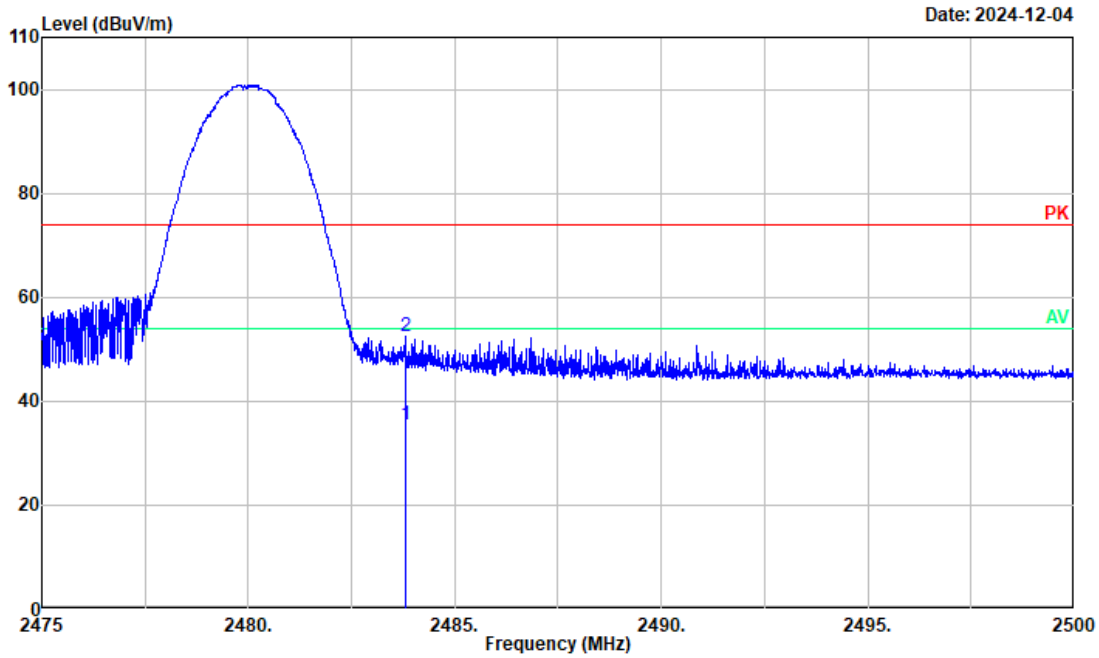


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 2DH5 2402

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	2385.943	39.28	-3.18	36.10	54.00	-17.90	Average
2	2385.943	54.28	-3.18	51.10	74.00	-22.90	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	π/4-DQPSK	Channel:	2480MHz

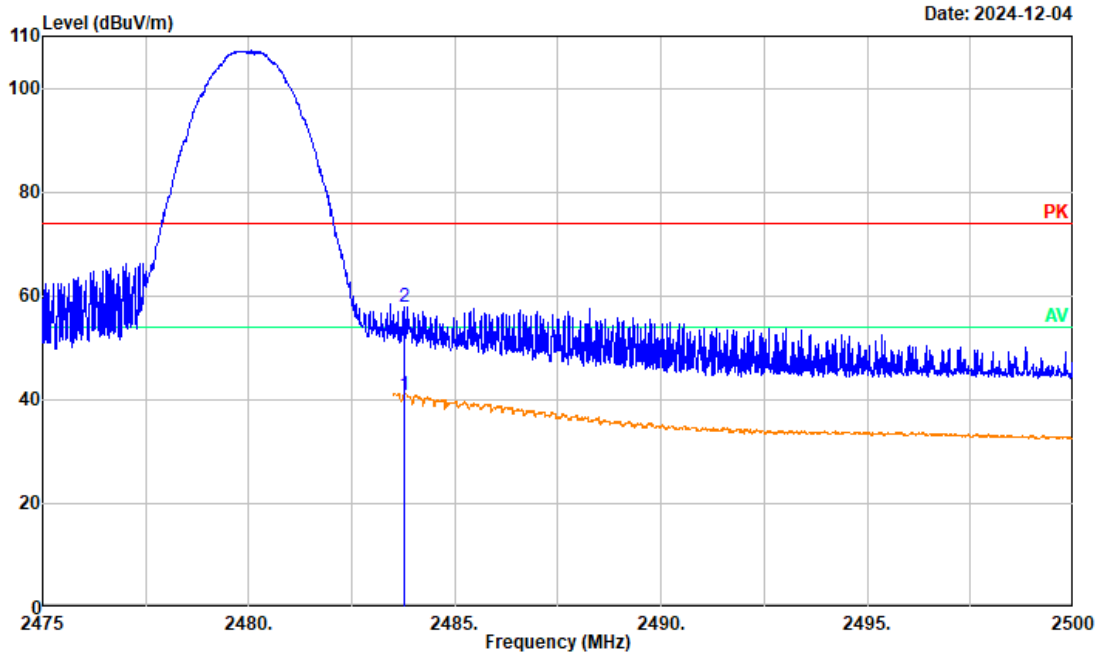


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 2DH5 2480

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	2483.804	38.44	-2.98	35.46	54.00	-18.54	Average
2	2483.804	55.34	-2.98	52.36	74.00	-21.64	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	π/4-DQPSK	Channel:	2480MHz

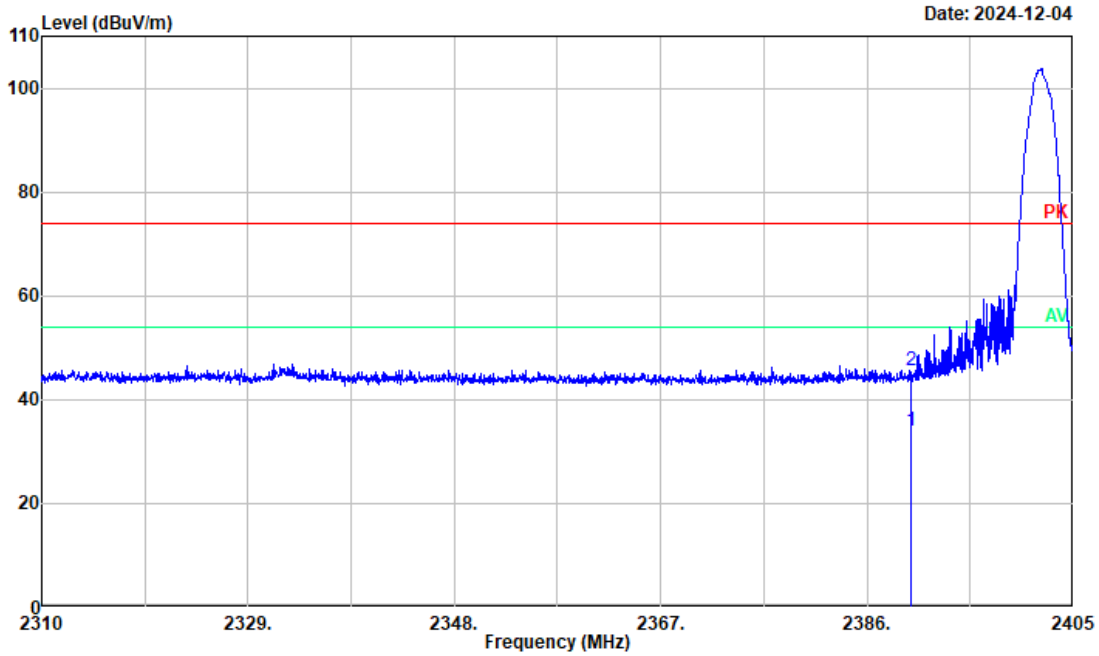


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 2DH5 2480

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	2483.754	43.94	-2.98	40.96	54.00	-13.04	Average
2	2483.754	60.70	-2.98	57.72	74.00	-16.28	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2402MHz

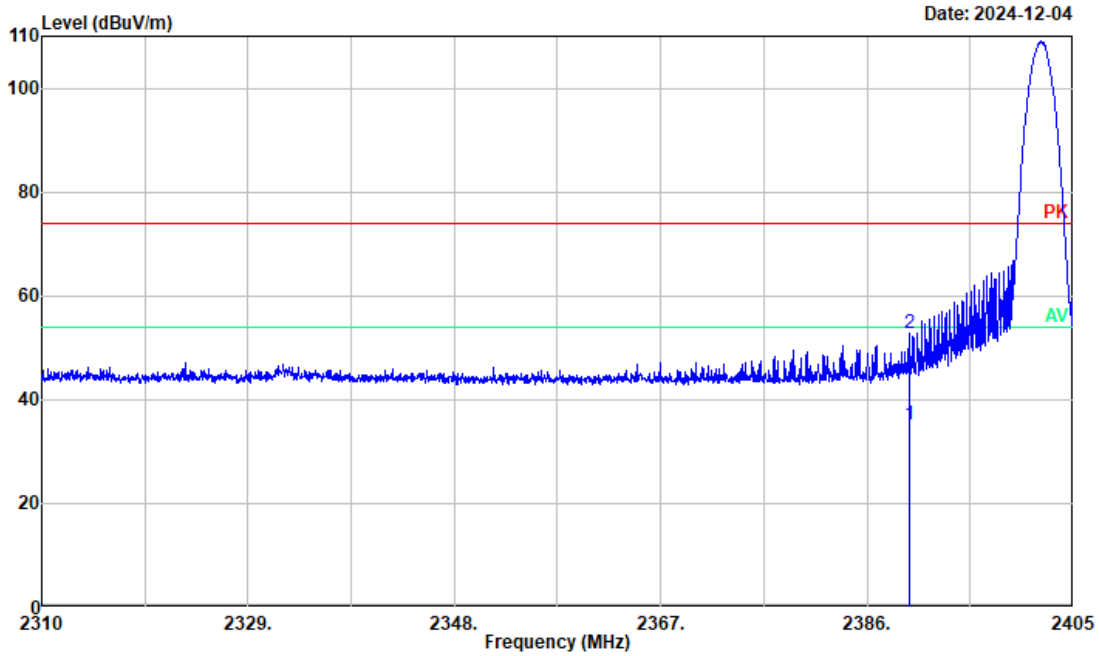


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 3DH5 2402

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	2390.000	37.18	-3.18	34.00	54.00	-20.00	Average
2	2390.000	48.67	-3.18	45.49	74.00	-28.51	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2402MHz

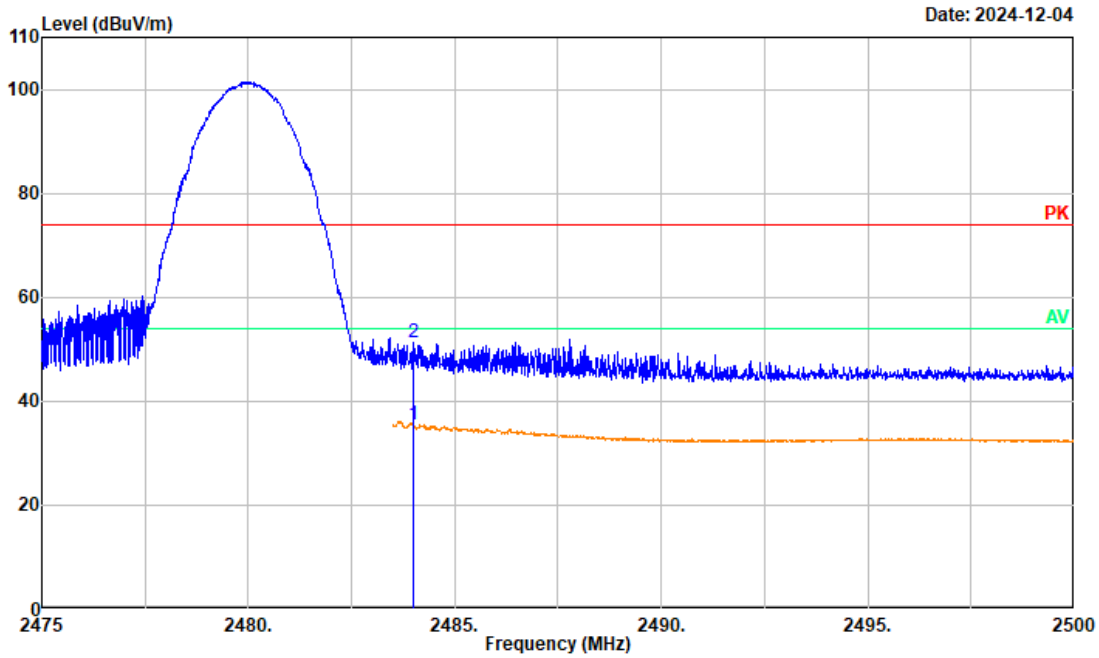


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 3DH5 2402

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	2389.840	38.50	-3.18	35.32	54.00	-18.68	Average
2	2389.840	55.99	-3.18	52.81	74.00	-21.19	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2480MHz

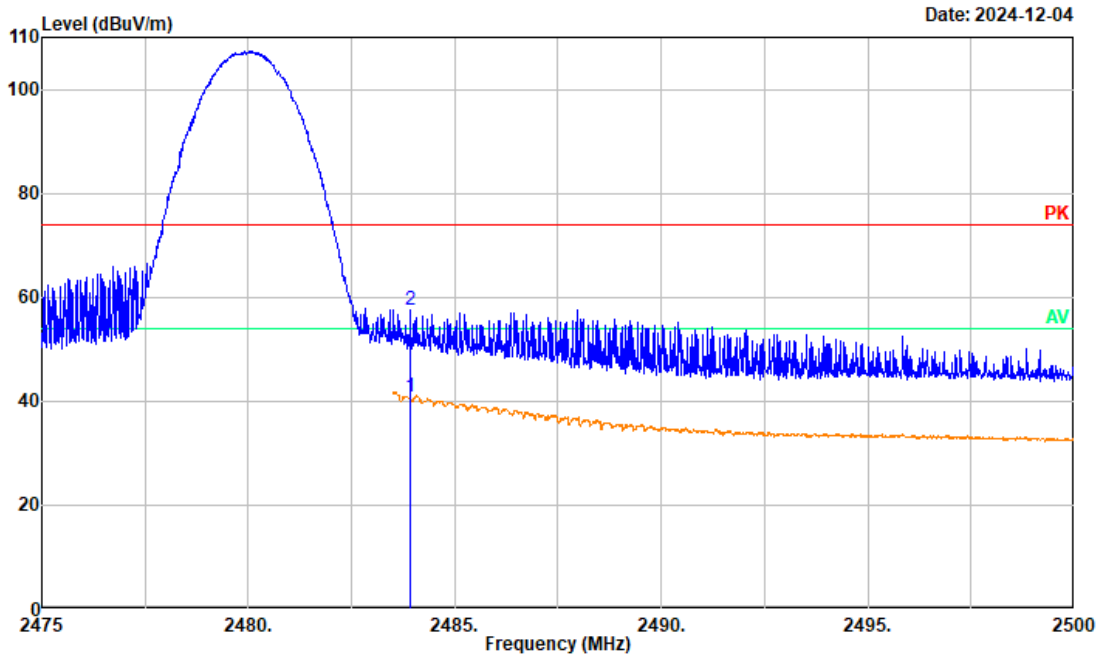


Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : horizontal
Remark : 3DH5 2480

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	2484.004	38.44	-2.98	35.46	54.00	-18.54	Average
2	2484.004	54.25	-2.98	51.27	74.00	-22.73	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

Mode:	8DPSK	Channel:	2480MHz



Project No. : 2405W66906E
Test Mode : Transmitting
Test Voltage : AC 120V/60Hz
Environment : 24.1℃/36%R.H./101.0kPa
Tested by : Bard Huang
Polarization : vertical
Remark : 3DH5 2480

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	2483.917	43.94	-2.98	40.96	54.00	-13.04	Average
2	2483.917	60.53	-2.98	57.55	74.00	-16.45	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain
Result = Reading + Factor
Over Limit = Result - Limit

3.5 RF Conducted Test Data

Test Date:	2024-09-02~2024-12-20	Test By:	Ryan Zhang
Environment condition:	Temperature: 24.1~25.5°C; Relative Humidity:55~60%; ATM Pressure: 100~101.1kPa		

3.5.1 20 dB Emission Bandwidth

BDR

Mode	Value (MHz)
GFSK_Low	0.811
GFSK_Middle	0.814
GFSK_High	0.808

EDR

Mode	Value (MHz)
π/4-DQPSK_Low	1.270
π/4-DQPSK_Middle	1.267
π/4-DQPSK_High	1.264
8DPSK_Low	1.276
8DPSK_Middle	1.276
8DPSK_High	1.273

3.5.2 99% Occupied Bandwidth

BDR

Mode	99% OBW (MHz)
GFSK_Low	0.720
GFSK_Middle	0.720
GFSK_High	0.720

EDR

Mode	99% OBW (MHz)
π/4-DQPSK_Low	1.164
π/4-DQPSK_Middle	1.164
π/4-DQPSK_High	1.164
8DPSK_Low	1.161
8DPSK_Middle	1.161
8DPSK_High	1.161

3.5.3 Maximum Conducted Peak Output Power

BDR

Mode	Value (dBm)	Limit (dBm)	Result
GFSK_Low	3.76	21.00	Pass
GFSK_Middle	3.74	21.00	Pass
GFSK_High	4.11	21.00	Pass

EDR

Mode	Value (dBm)	Limit (dBm)	Result
π/4-DQPSK_Low	6.02	21.00	Pass
π/4-DQPSK_Middle	6.45	21.00	Pass
π/4-DQPSK_High	6.45	21.00	Pass
8DPSK_Low	6.46	21.00	Pass
8DPSK_Middle	6.63	21.00	Pass
8DPSK_High	6.82	21.00	Pass

3.5.4 Channel separation

BDR

Mode	Value (MHz)	Limit (MHz)	Result
GFSK_Low	1.000	0.851	Pass
GFSK_Middle	1.000	0.851	Pass
GFSK_High	1.003	0.849	Pass

Note: only BDR(GFSK) mode was test, as EDR(π/4-DQPSK, 8DPSK) mode has same channel plan.

3.5.5 Number of hopping Frequency

BDR

Mode	Value	Limit	Result
GFSK_Hopping	79	15	Pass

EDR

Mode	Value	Limit	Result
π/4-DQPSK_Hopping	79	15	Pass
8DPSK_Hopping	79	15	Pass

3.5.6 Time of occupancy (dwell time)

BDR

Mode	Pulse width (ms)	Dwell time (s)	Limit (s)	Result
GFSK_Hopping_DH1	0.383	0.123	0.400	Pass
GFSK_Hopping_DH3	1.649	0.264	0.400	Pass
GFSK_Hopping_DH5	2.908	0.310	0.400	Pass

EDR

Mode	Pulse width (ms)	Dwell time (s)	Limit (s)	Result
π/4-DQPSK_Hopping_2DH1	0.394	0.126	0.400	Pass
π/4-DQPSK_Hopping_2DH3	1.652	0.264	0.400	Pass
π/4-DQPSK_Hopping_2DH5	2.913	0.311	0.400	Pass
8DPSK_Hopping_3DH1	0.396	0.127	0.400	Pass
8DPSK_Hopping_3DH3	1.658	0.265	0.400	Pass
8DPSK_Hopping_3DH5	2.918	0.311	0.400	Pass

Note:

DH1:Dwell time=Pulse width (ms) × (1600/2/79) ×31.6 s

DH3:Dwell time=Pulse width (ms) × (1600/4/79) ×31.6 s

DH5:Dwell time=Pulse width (ms) × (1600/6/79) ×31.6 s

2DH1: Dwell time=Pulse width (ms) × (1600/2/79) ×31.6 s

2DH3: Dwell time=Pulse width (ms) × (1600/4/79) ×31.6 s

2DH5: Dwell time=Pulse width (ms) × (1600/6/79) ×31.6 s

3DH1: Dwell time=Pulse width (ms) × (1600/2/79) ×31.6 s

3DH3: Dwell time=Pulse width (ms) × (1600/4/79) ×31.6 s

3DH5: Dwell time=Pulse width (ms) × (1600/6/79) ×31.6 s

3.5.7 100 kHz Bandwidth of Frequency Band Edge

BDR

Mode	Value (dB)	Limit (dB)	Result
GFSK_Low	52.61	20.00	Pass
GFSK_High	53.54	20.00	Pass
GFSK_Hopping_Lower	54.46	20.00	Pass
GFSK_Hopping_Upper	53.56	20.00	Pass

EDR

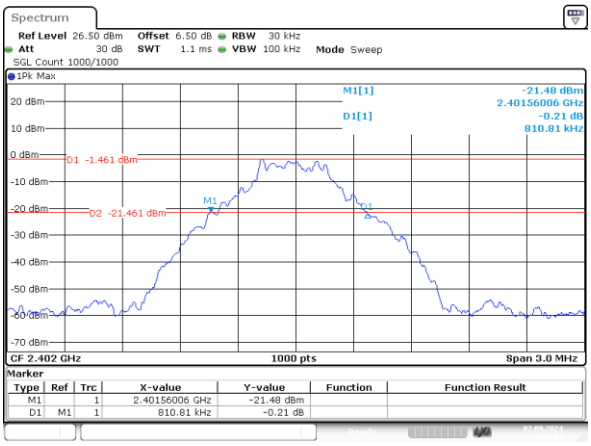
Mode	Value (dB)	Limit (dB)	Result
π/4-DQPSK_Low	52.35	20.00	Pass
π/4-DQPSK_High	53.58	20.00	Pass
π/4-DQPSK_Hopping_Lower	54.16	20.00	Pass
π/4-DQPSK_Hopping_Upper	52.42	20.00	Pass
8DPSK_Low	51.68	20.00	Pass
8DPSK_High	53.48	20.00	Pass
8DPSK_Hopping_Lower	52.96	20.00	Pass
8DPSK_Hopping_Upper	53.07	20.00	Pass

Test Plots:

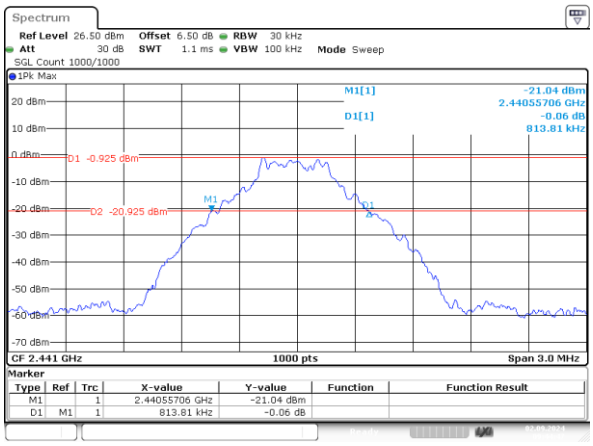
20 dB Emission Bandwidth:

BDR

GFSK_Low 0.811MHz

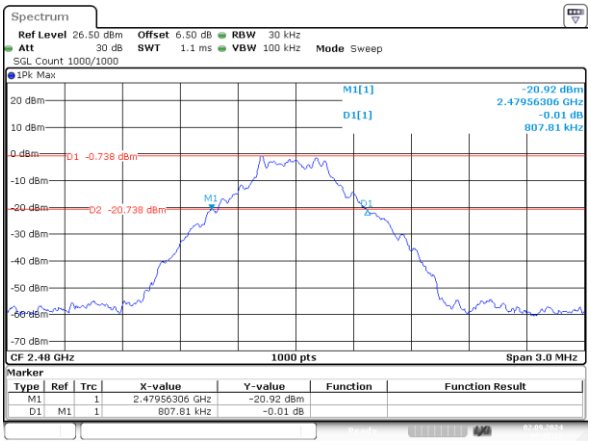


GFSK_Middle 0.814MHz

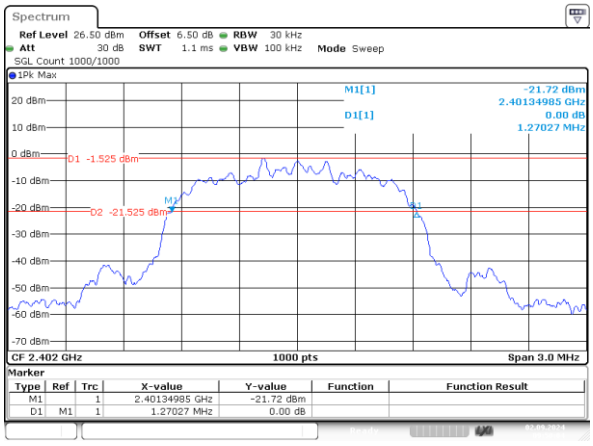


EDR

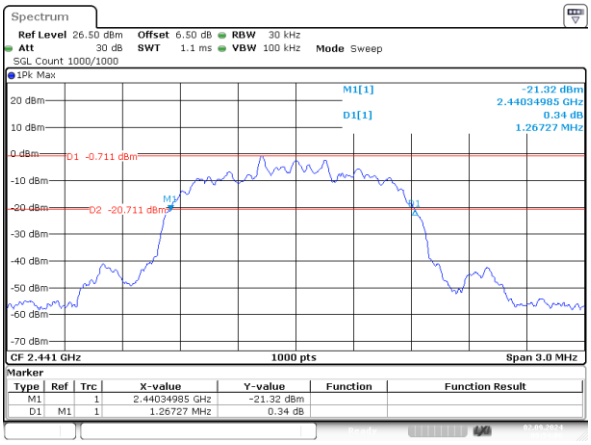
GFSK_High 0.808MHz



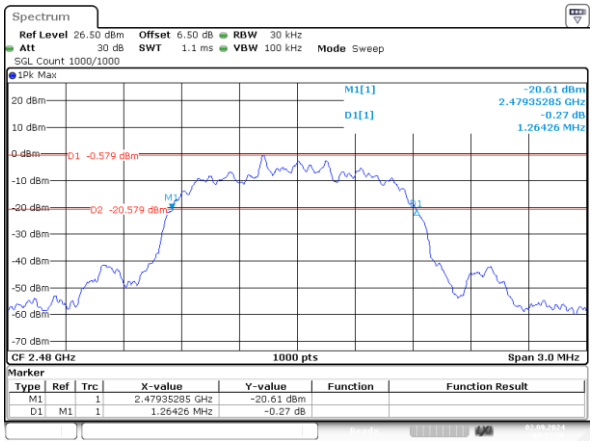
π/4-DQPSK_Low 1.270MHz



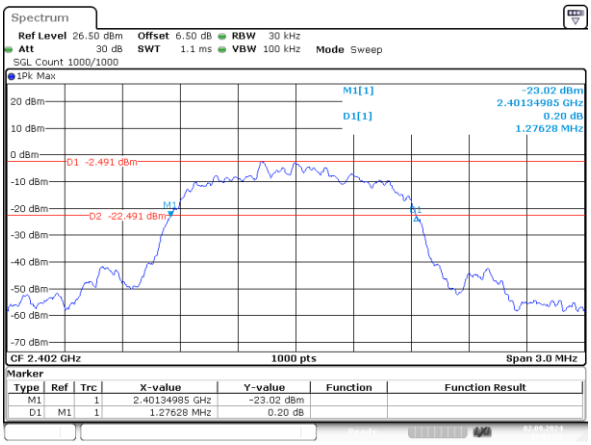
π/4-DQPSK_Middle 1.267MHz



π/4-DQPSK_High 1.264MHz

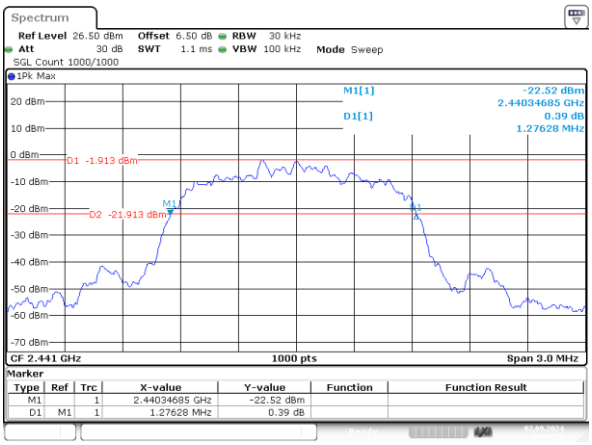


8DPSK_Low 1.276MHz



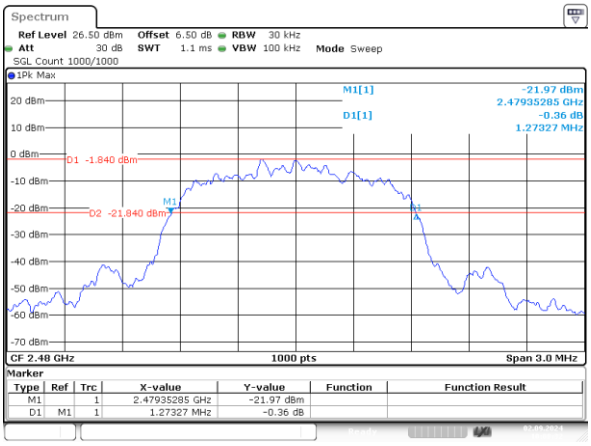
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 10:03:20

8DPSK_Middle 1.276MHz



ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 10:06:57

8DPSK_High 1.273MHz

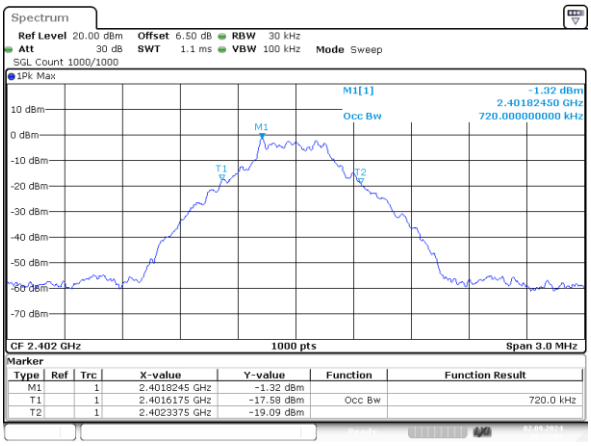


ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 10:08:32

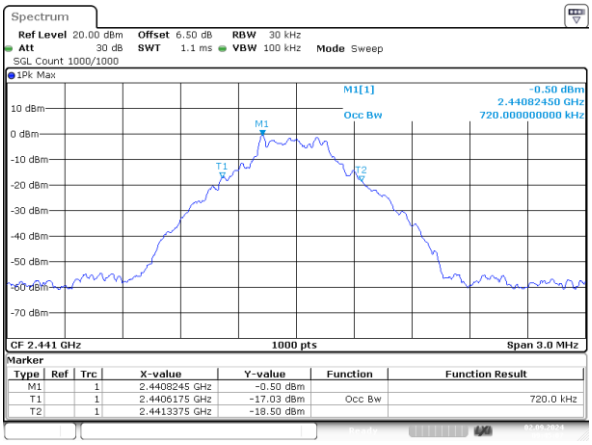
99% Occupied Bandwidth:

BDR

GFSK_Low 0.720MHz

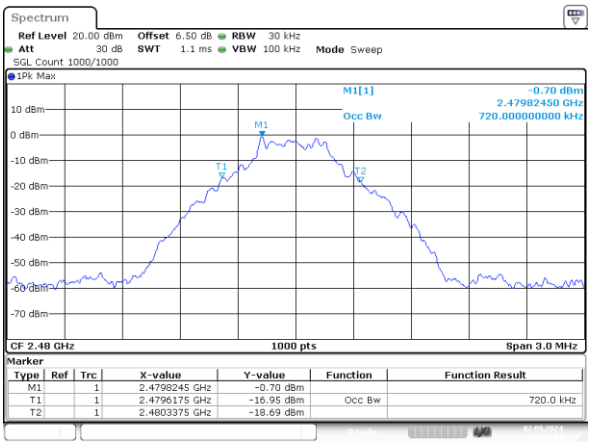


GFSK_Middle 0.720MHz

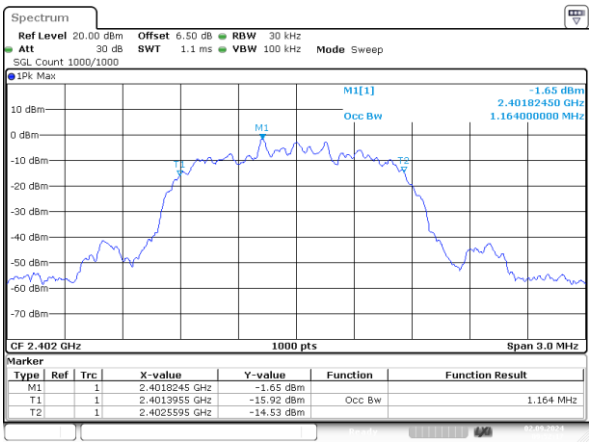


EDR

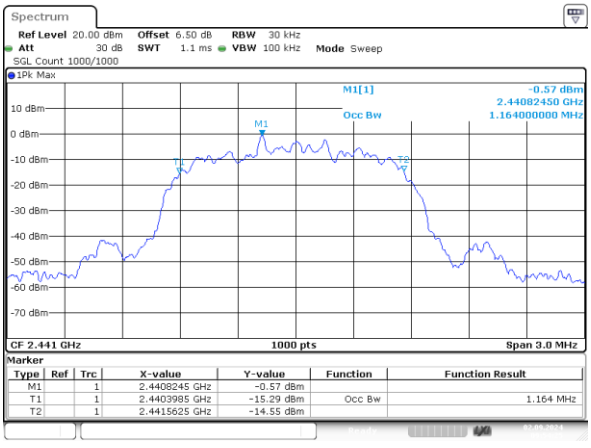
GFSK_High 0.720MHz



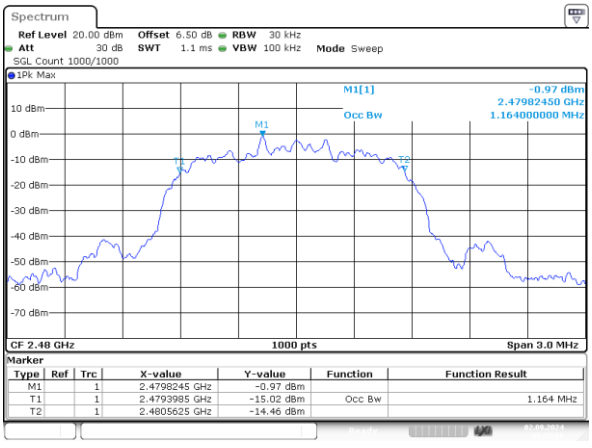
π/4-DQPSK_Low 1.164MHz



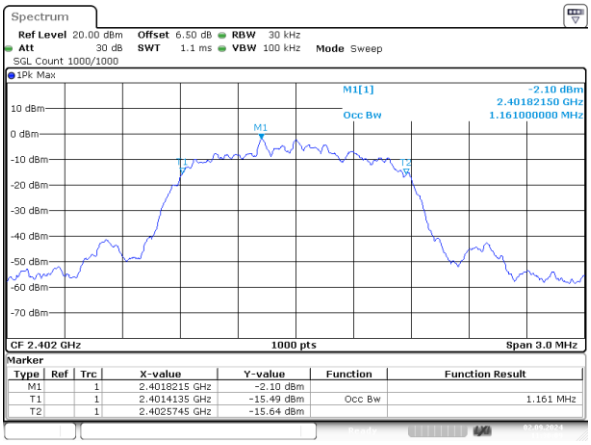
π/4-DQPSK_Middle 1.164MHz



π/4-DQPSK_High 1.164MHz

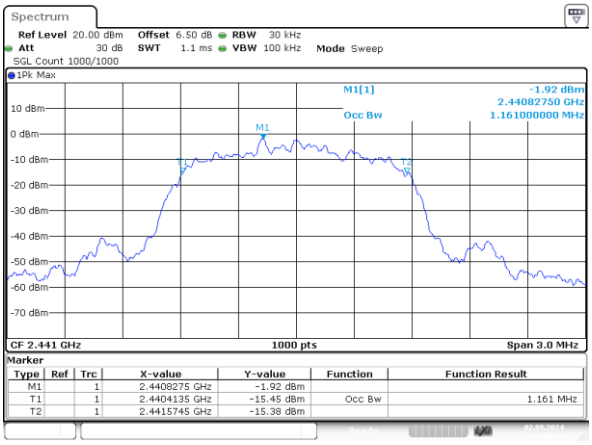


8DPSK_Low 1.161MHz



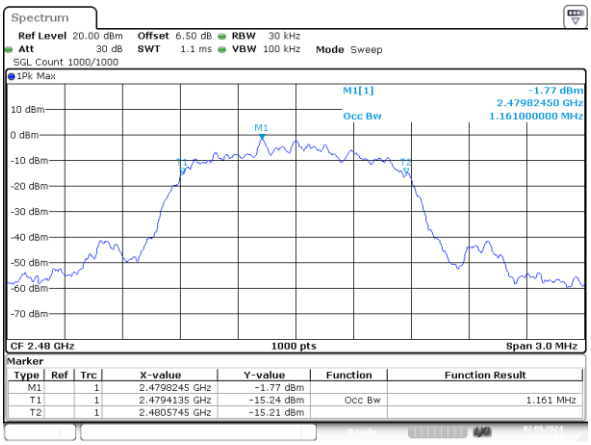
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:30:09

8DPSK_Middle 1.161MHz



ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:30:41

8DPSK_High 1.161MHz

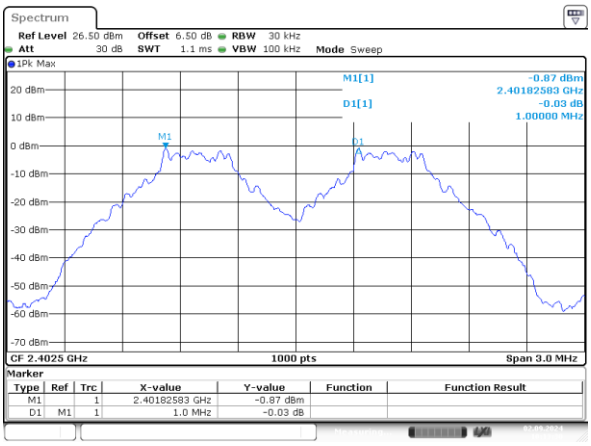


ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:31:04

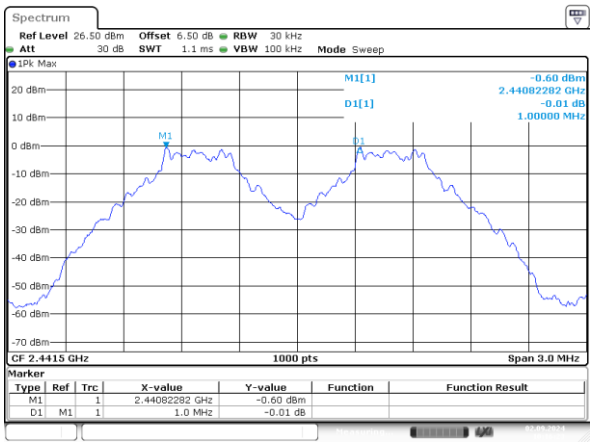
Channel separation:

BDR

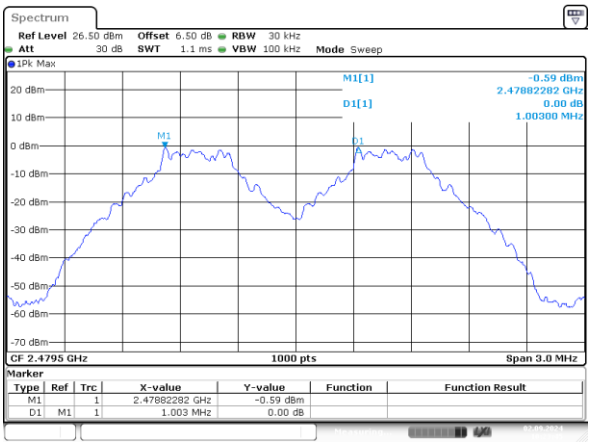
GFSK_Low 1MHz



GFSK_Middle 1MHz



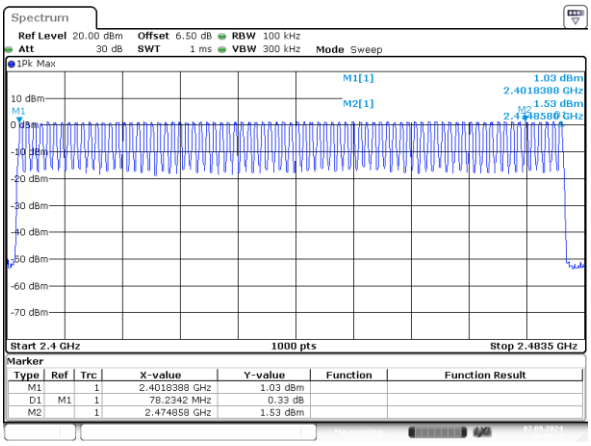
GFSK_High 1.003MHz



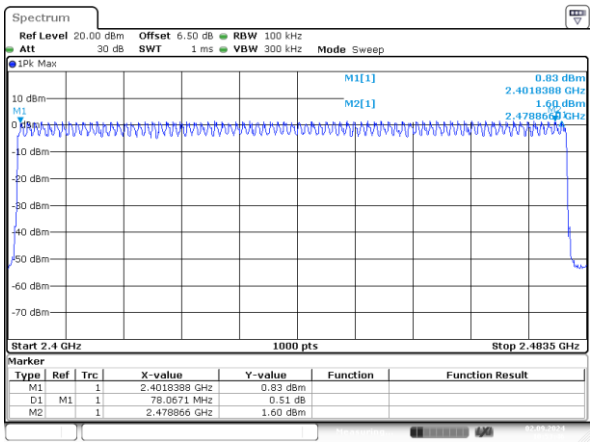
Number of hopping Frequency

BDR

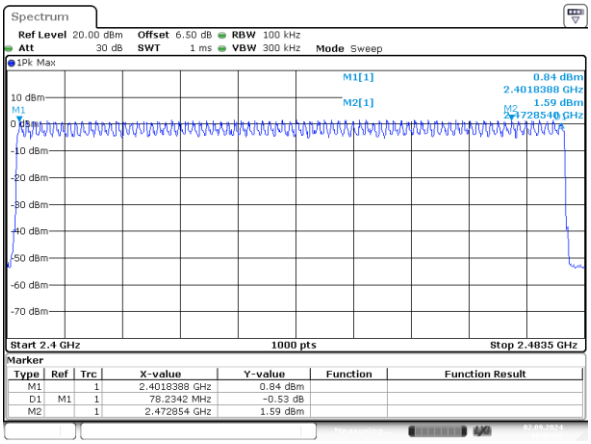
GFSK_Hopping 79



π/4-DQPSK_Hopping 79



8DPSK_Hopping 79

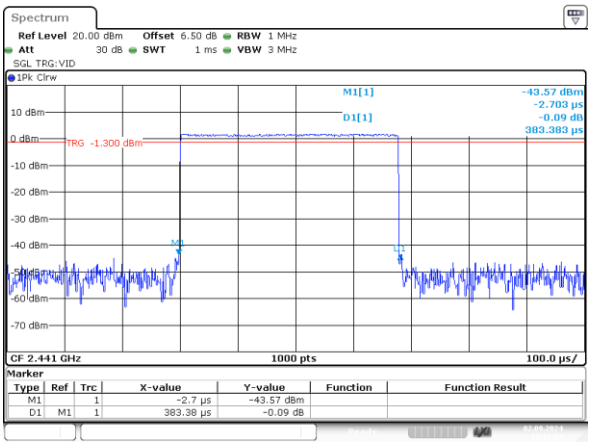


EDR

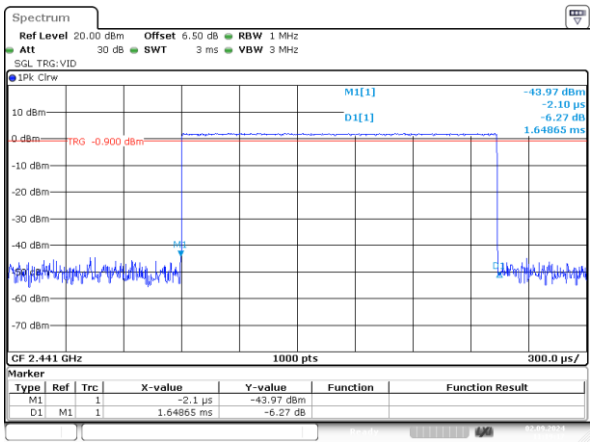
Time of occupancy (dwell time)

BDR

GFSK_Hopping_DH1 0.383ms

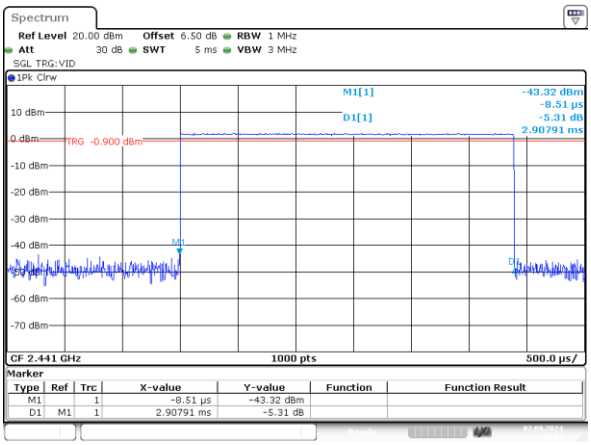


GFSK_Hopping_DH3 1.649ms

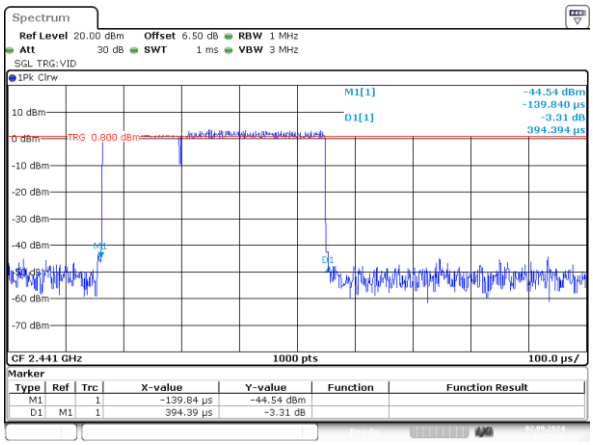


EDR

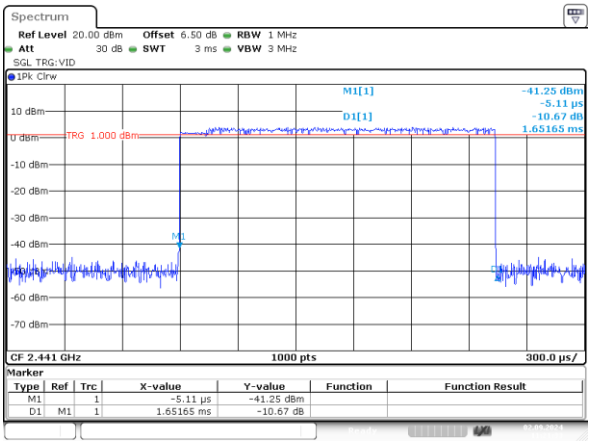
GFSK_Hopping_DH5 2.908ms



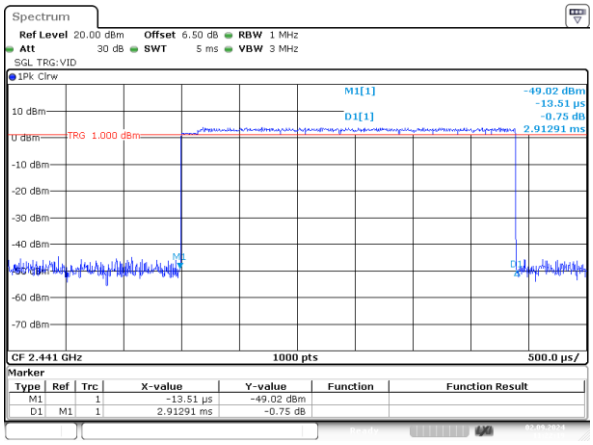
π/4-DQPSK_Hopping_2DH1 0.394ms



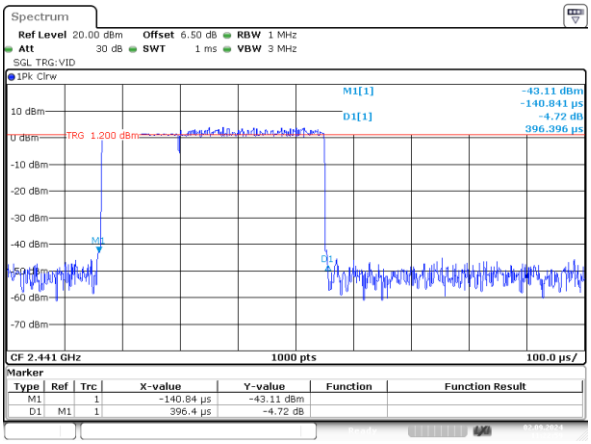
π/4-DQPSK_Hopping_2DH3 1.652ms



π/4-DQPSK_Hopping_2DH5 2.913ms

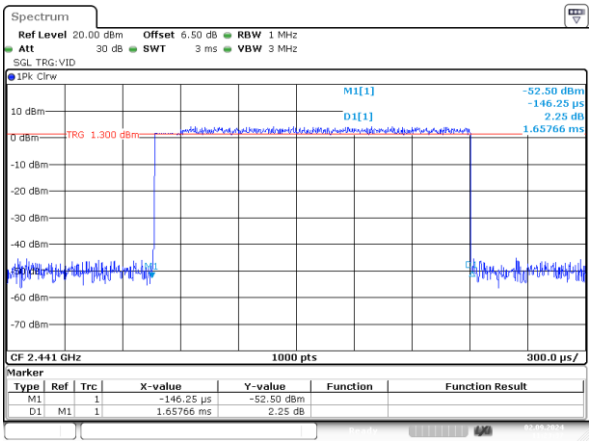


8DPSK_Hopping_3DH1 0.396ms



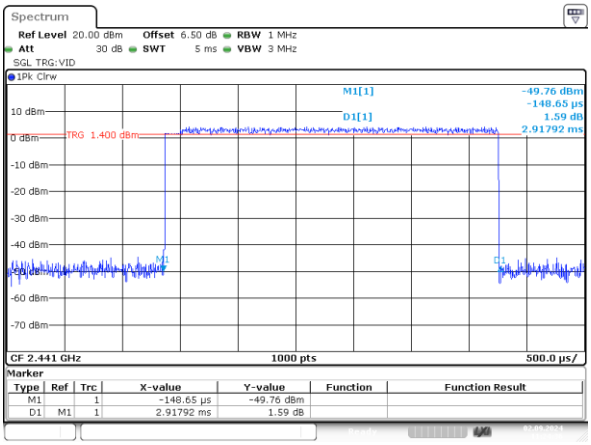
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:22:59

8DPSK_Hopping_3DH3 1.658ms



ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:23:37

8DPSK_Hopping_3DH5 2.918ms

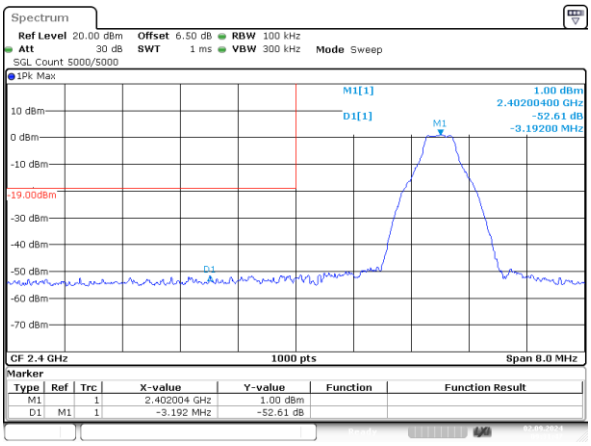


ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:24:36

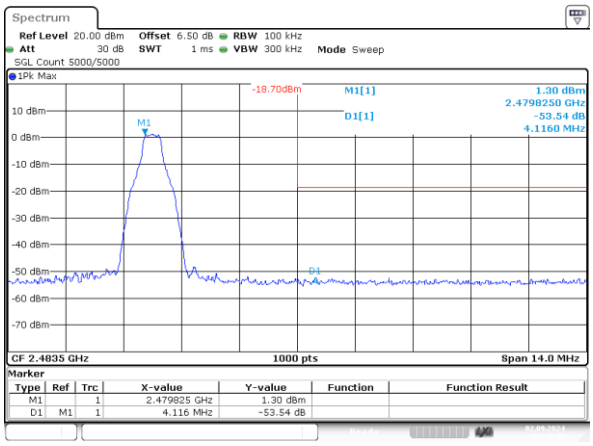
100kHz Bandwidth of Frequency Band Edge:

BDR

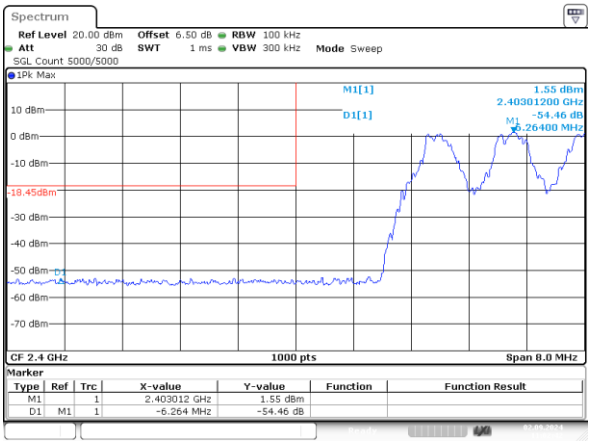
GFSK_Low 52.61dB



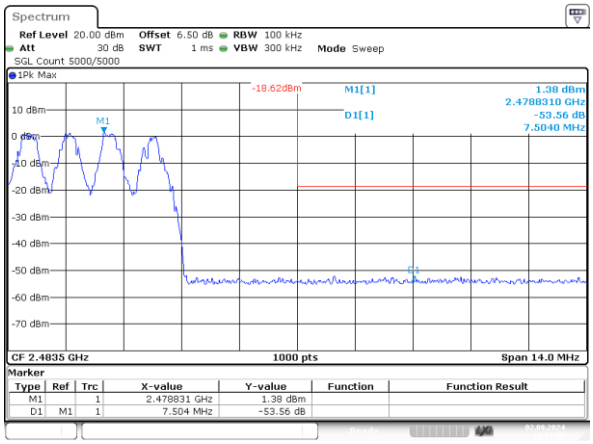
GFSK_High 53.54dB



GFSK_Hopping_Lower 54.46dB

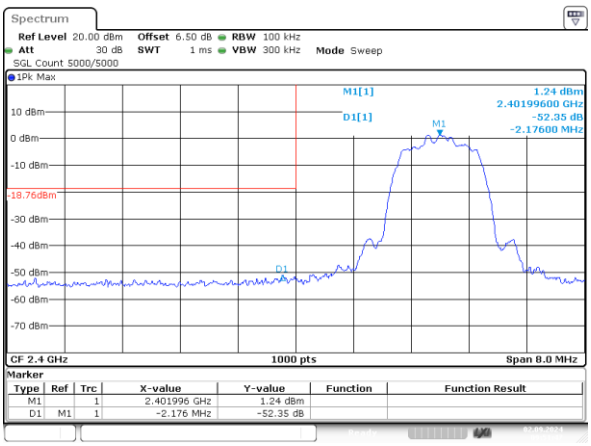


GFSK_Hopping_Upper 53.56dB

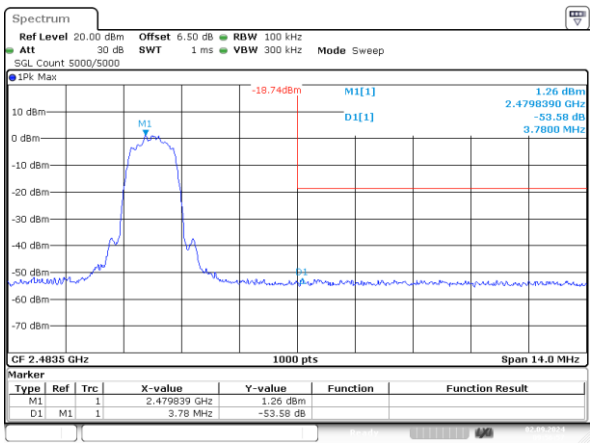


EDR

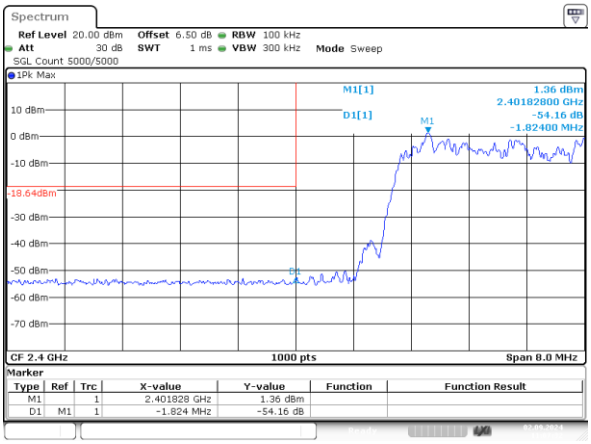
π/4-DQPSK_Low 52.35dB



π/4-DQPSK_High 53.58dB

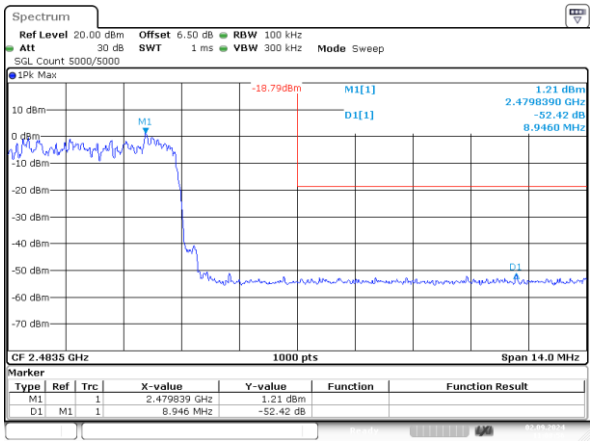


π/4-DQPSK_Hopping_Lower 54.16dB



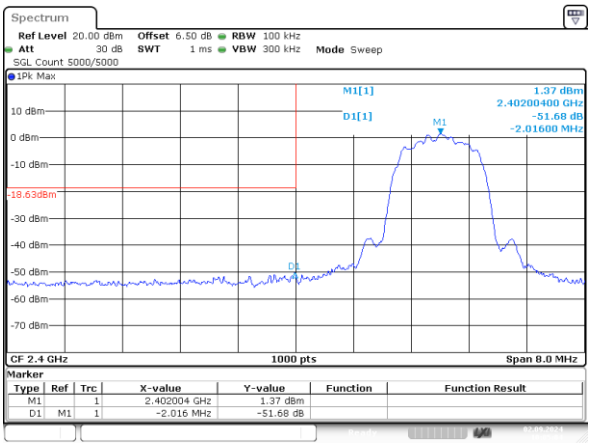
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:07:32

π/4-DQPSK_Hopping_Upper 52.42dB



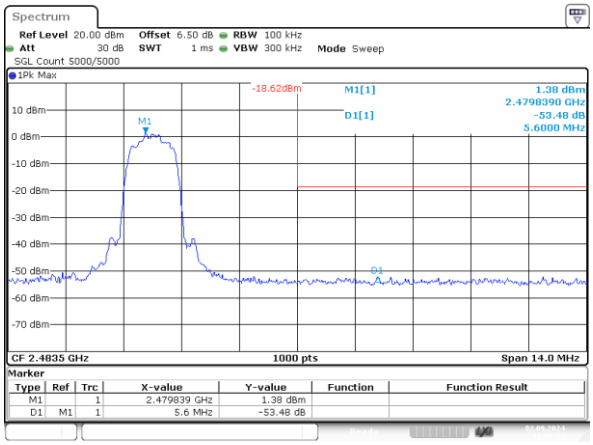
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:08:56

8DPSK_Low 51.68dB



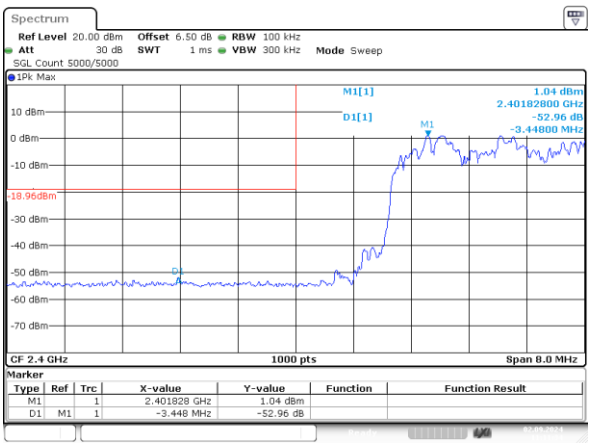
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 10:05:04

8DPSK_High 53.48dB



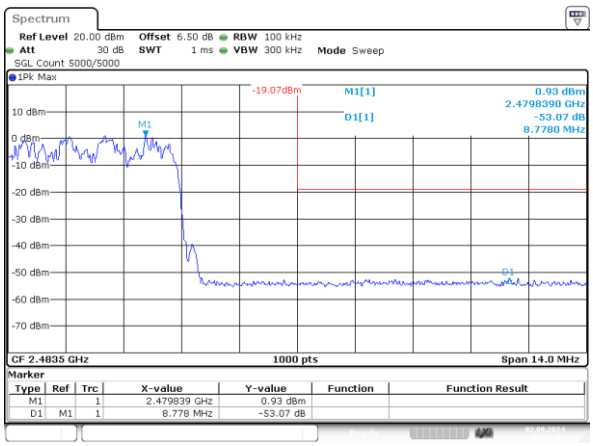
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 10:09:53

8DPSK_Hopping_Lower 52.96dB



ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:11:34

8DPSK_Hopping_Upper 53.07dB

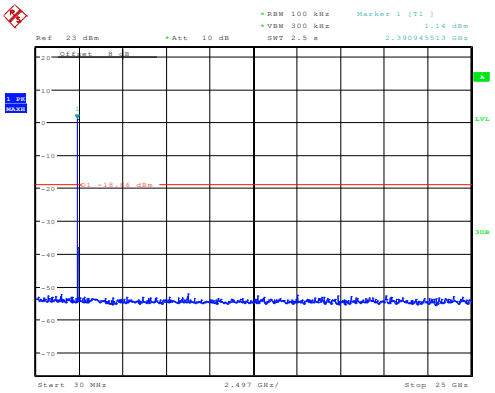


ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 2.SEP.2024 11:15:01

Conducted emission at Antenna Terminals:

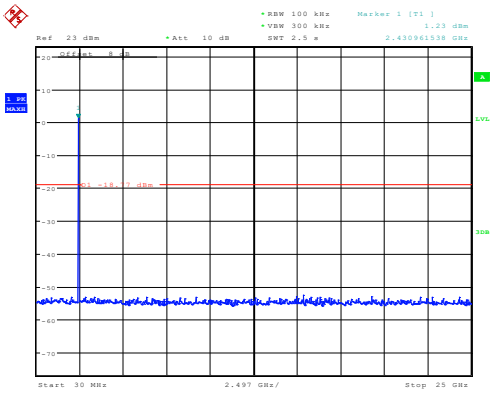
BDR

GFSK_Low



ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 20.DEC.2024 13:32:48

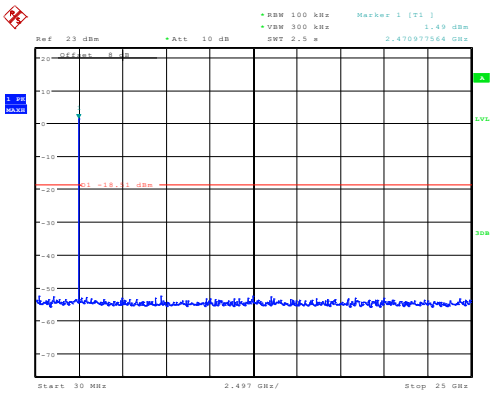
GFSK_Middle



ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 20.DEC.2024 13:34:16

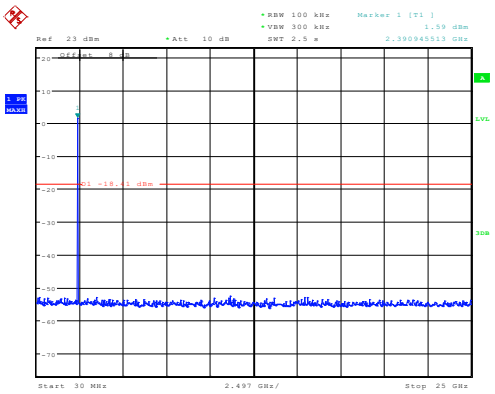
EDR

GFSK_High



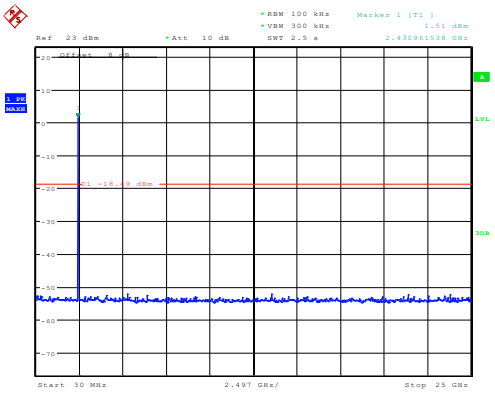
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 20.DEC.2024 13:35:49

π/4-DQPSK_Low



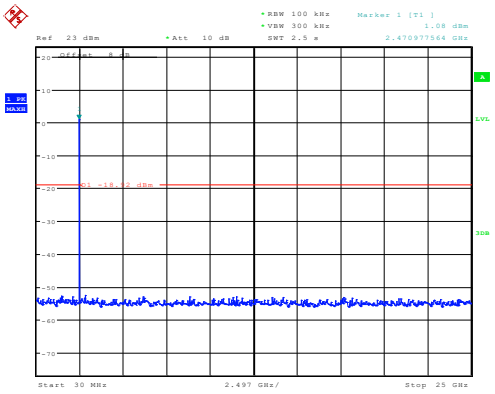
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 20.DEC.2024 13:48:04

π/4-DQPSK_Middle



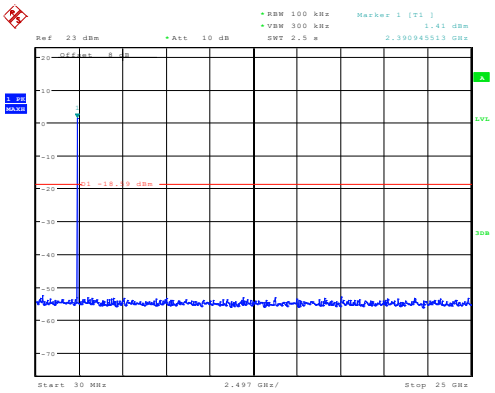
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 20.DEC.2024 13:45:44

π/4-DQPSK_High



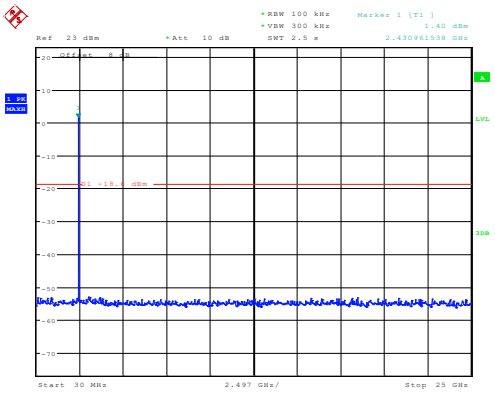
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 20.DEC.2024 13:47:12

8DPSK_Low



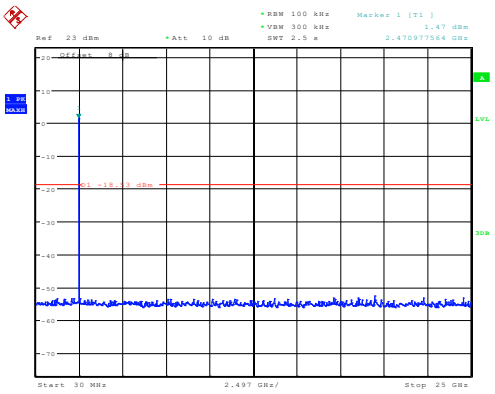
ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 20.DEC.2024 13:49:20

8DPSK_Middle



ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 20.DEC.2024 13:51:57

8DPSK_High



ProjectNo.:2405W66906E-RF Tester:Ryan Zhang
Date: 20.DEC.2024 13:53:09

4 Test Setup Photo

Please refer to the attachment 2405W66906E Test Setup photo.

5 E.U.T Photo

Please refer to the attachment 2405W66906E External photo and 2405W66906E Internal photo.

---End of Report---