



FCC PART 15C TEST REPORT

No.25T04Z100699-014

for

TCL Communication Ltd.

Tablet PC

8189S

FCC ID: 2ACCJB233

with

Hardware Version: 03

Software Version: 4PA5

Issued Date: 2025-06-16

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 CTTL.

Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

No.52, HuayuanNorth Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0)10-62304633-2512,Fax:+86(0)10-62304633-2504

Email:cttl_terminals@caict.ac.cn, website: www.chinattl.com

REPORT HISTORY

Report Number	Revision	Description	Issue Date
25T04Z100699-014	Rev.0	1st edition	2025-06-16

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

CONTENTS

1. TEST LABORATORY	5
1.1. INTRODUCTION & ACCREDITATION	5
1.2. TESTING LOCATION	5
1.3. TESTING ENVIRONMENT	6
1.4. PROJECT DATA	6
1.5. SIGNATURE	6
2. CLIENT INFORMATION	7
2.1. APPLICANT INFORMATION	7
2.2. MANUFACTURER INFORMATION	7
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)	8
3.1. ABOUT EUT	8
3.2. INTERNAL IDENTIFICATION OF EUT	8
3.3. INTERNAL IDENTIFICATION OF AE	8
3.4. NORMAL ACCESSORY SETTING	8
3.5. GENERAL DESCRIPTION	8
4. REFERENCE DOCUMENTS	9
4.1. DOCUMENTS SUPPLIED BY APPLICANT	9
4.2. REFERENCE DOCUMENTS FOR TESTING	9
5. TEST RESULTS	10
5.1. SUMMARY OF TEST RESULTS	10
5.2. STATEMENTS	10
6. TEST FACILITIES UTILIZED	11
7. MEASUREMENT UNCERTAINTY	12
7.1. PEAK OUTPUT POWER - CONDUCTED	12
7.2. FREQUENCY BAND EDGES - CONDUCTED	12
7.3. TRANSMITTER SPURIOUS EMISSION - CONDUCTED	12
7.4. TRANSMITTER SPURIOUS EMISSION - RADIATED	12
7.5. TIME OF OCCUPANCY (DWELL TIME)	12
7.6. 20DB BANDWIDTH	12
7.7. CARRIER FREQUENCY SEPARATION	13
7.8. AC POWERLINE CONDUCTED EMISSION	13
ANNEX A: EUT PARAMETERS	14
ANNEX B: DETAILED TEST RESULTS	15
B.1. MEASUREMENT METHOD	15
B.2. PEAK OUTPUT POWER	16
B.3. FREQUENCY BAND EDGES – CONDUCTED	18



B.4. TRANSMITTER SPURIOUS EMISSION - CONDUCTED	24
B.5. RADIATED UNWANTED EMISSION	37
B.6. TIME OF OCCUPANCY (DWEIL TIME)	48
B.7. 20dB BANDWIDTH	53
B.8. CARRIER FREQUENCY SEPARATION	58
B.9. NUMBER OF HOPPING CHANNELS	61
B.10. AC POWERLINE CONDUCTED EMISSION	63
B.11. ANTENNA REQUIREMENT	66
ANNEX C: ACCREDITATION CERTIFICATE	67

1. Test Laboratory

1.1. Introduction &Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website

1.2. Testing Location

Conducted testing Location:CTTL(Gaolizhang Road)

Address: Cuihu Cloud Center, No.1, Gaolizhang Road, Wenquan,
Haidian District, Beijing, China

Radiated testing Location: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China100191

1.3. Testing Environment

Normal Temperature: 20-27℃
Relative Humidity: 20-50%

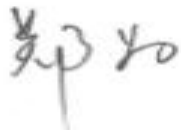
1.4. Project data

Testing Start Date: 2025-04-08
Testing End Date: 2025-06-16

1.5. Signature



Yao Xingyu
(Prepared this test report)



Zheng Wei
(Reviewed this test report)



Pang Shuai
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
Address/Post: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science
Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Contact Person: Ting Wang
Contact Email: ting.wang.hz@tcl.com
Telephone: +86 752 2639091
Fax: 0086-755-36612000-81722

2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address/Post: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science
Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Contact Person: Ting Wang
Contact Email: ting.wang.hz@tcl.com
Telephone: +86 752 2639091
Fax: 0086-755-36612000-81722

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

3.1. About EUT

Description	Tablet PC
Model Name	8189S
FCC ID	2ACCJB233
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	GFSK/ $\pi/4$ DQPSK/8DPSK
Number of Channels	79
Power Supply	3.85V DC by Battery
Antenna gain	-2.80dBi

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
EUT2	357684210038089/ 357684210038162	03	4PA5	2025-04-08
EUT1	357684210038279/ 357684210038360	03	4PA5	2025-04-27

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

3.3. Internal Identification of AE

AE ID*	Description	Model	Manufacturer
AE1	Cable	CDA0000307C1	JUWEI

*AE ID: is used to identify the test sample in the lab internally. The model and manufacturer information were provided by the client.

3.4. Normal Accessory setting

Fully charged battery is used during the test.

3.5. General Description

The Equipment Under Test (EUT) is a model of Tablet PC with integrated antenna. It consists of normal options: lithium battery and USB cable. Manual and specifications of the EUT were provided to fulfill the test. Samples undergoing test were selected by the Client.

4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters, referring to Annex A for detailed information, is supplied by the client 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 Part15	FCC CFR 47, Part 15, Subpart C:	2024
	15.205 Restricted bands of operation;	
	15.209 Radiated emission limits, general requirements;	
ANSI C63.10	15.247 Operation within the bands 902–928MHz, 2400–2483.5 MHz, and 5725–5850 MHz.	June,2013
	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices	

5. Test Results

5.1. Summary of Test Results

Abbreviations used in this clause:

P Pass, The EUT complies with the essential requirements in the standard.

F Fail, The EUT does not comply with the essential requirements in the standard

NA Not Applicable, The test was not applicable

NP Not Performed, The test was not performed by CTTL

SUMMARY OF MEASUREMENT RESULTS	Sub-clause	Verdict
Peak Output Power	15.247 (b)(1)	P
Frequency Band Edges- Conducted	15.247 (d)	P
Transmitter Spurious Emission - Conducted	15.247 (d)	P
Radiated Unwanted Emission	15.247, 15.205, 15.209	P
Time of Occupancy (Dwell Time)	15.247 (a) (1)(iii)	P
20dB Bandwidth	15.247 (a)(1)	NA
Carrier Frequency Separation	15.247 (a)(1)	P
Number of hopping channels	15.247 (a)(iii)	P
AC Powerline Conducted Emission	15.107, 15.207	P
Antenna Requirement	15.203	P

Please refer to **ANNEX A** for detail.

The measurement is made according to ANSI C63.10.

5.2. Statements

CTTL has evaluated the test cases requested by the applicant /manufacturer as listed in section 5.1 of this report for the EUT specified in section 3 according to the standards or reference documents listed in section 4.2

6. Test Facilities Utilized

Conducted test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Vector Signal Analyzer	FSW67	104051	Rohde & Schwarz	1 year	2026-06-09
2	Base Station Simulator	CMW500	159384	Rohde & Schwarz	1 year	2025-11-10
3	Bluetooth Tester	CBT	101042	R&S	1 year	2026-01-20
4	LISN	ENV216	101200	R&S	1 year	2025-05-16
5	Test Receiver	ESCI	100344	R&S	1 year	2026-04-01
6	Shielding Room	S81	/	ETS-Lindgren	/	/

Note: The No.4 equipment was in calibration due date when used for testing.

Radiated emission test system

No.	Equipment	Model	Serial Number	Manufacturer	Calibration Period	Calibration Due date
1	Test Receiver	ESW44	103023	R&S	1 year	2025-06-06
2	EMI Antenna	VULB 9163	01222	SCHWARZBECK	1 year	2025-09-11
3	EMI Antenna	3115	00146404	ETS-Lindgren	1 year	2025-06-16
4	EMI Antenna	3116	2663	ETS-Lindgren	1 year	2026-03-03

Note: The No.1 equipment was in calibration due date when used for testing.

7. Measurement Uncertainty

7.1. Peak Output Power - Conducted

Measurement Uncertainty:

Measurement Uncertainty (k=2)	0.66dB
-------------------------------	--------

7.2. Frequency Band Edges - Conducted

Measurement Uncertainty:

Measurement Uncertainty (k=2)	0.66dB
-------------------------------	--------

7.3. Transmitter Spurious Emission - Conducted

Measurement Uncertainty:

Frequency Range	Uncertainty (k=2)
30 MHz ~ 8 GHz	1.22dB
8 GHz ~ 12.75 GHz	1.51dB
12.7GHz ~ 26 GHz	1.51dB

7.4. Transmitter Spurious Emission - Radiated

Measurement Uncertainty:

Frequency Range	Uncertainty(dBm) (k=2)
9kHz-30MHz	/
$30\text{MHz} \leq f \leq 1\text{GHz}$	4.72
$1\text{GHz} \leq f \leq 18\text{GHz}$	4.84
$18\text{GHz} \leq f \leq 40\text{GHz}$	5.12

7.5. Time of Occupancy (Dwell Time)

Measurement Uncertainty:

Measurement Uncertainty (k=2)	0.88ms
-------------------------------	--------

7.6. 20dB Bandwidth

Measurement Uncertainty:

Measurement Uncertainty (k=2)	61.936Hz
-------------------------------	----------

7.7. Carrier Frequency Separation

Measurement Uncertainty:

Measurement Uncertainty (k=2)	61.936Hz
-------------------------------	----------

7.8. AC Powerline Conducted Emission

Measurement Uncertainty:

Measurement Uncertainty (k=2)	3.08dB
-------------------------------	--------

ANNEX A: EUT parameters

Disclaimer: The antenna gain provided by the client may affect the validity of the measurement results in this report, and the client shall bear the impact and consequences arising therefrom.

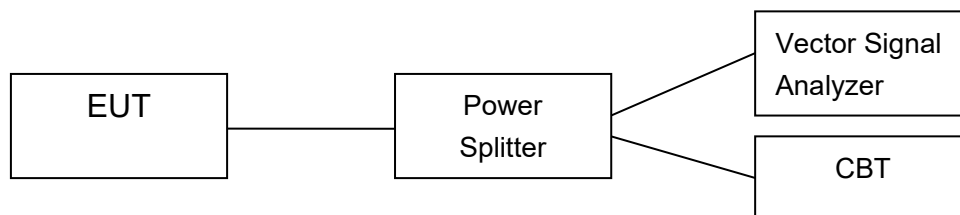
ANNEX B: Detailed Test Results

B.1. Measurement Method

B.1.1. Conducted Measurements

The measurement is made according to ANSI C63.10.

- 1). Connect the EUT to the test system correctly.
- 2). Set the EUT to the required work mode (Transmitter, receiver or transmitter & receiver).
- 3). Set the EUT to the required channel.
- 4). Set the EUT hopping mode (hopping or hopping off).
- 5). Set the spectrum analyzer to start measurement.
- 6). Record the values. Vector Signal Analyzer



B.1.2. Radiated Emission Measurements

The measurement is made according to ANSI C63.10

The radiated emission test is performed in semi-anechoic chamber. The EUT was placed on a non-conductive table with 80cm above the ground plane for measurement below 1GHz and 1.5m above the ground plane for measurement above 1GHz. The measurement antenna was placed at a distance of 3 meters from the EUT. The test is carried out on both vertical and horizontal polarization and only maximization result of both polarizations is kept. During the test, the turntable is rotated from 0° to 360° and the measurement antenna is moved from 1m to 4m to get the maximization result. The maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

B.2. Peak Output Power

B.2.1. Peak Output Power – Conducted

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

a) Use the following spectrum analyzer settings:

- Span: 6MHz
- RBW: 3MHz
- VBW: 3MHz
- Sweep time: 2.5ms
- Detector function: peak
- Trace: max hold

b) Allow trace to stabilize.

c) Use the marker-to-peak function to set the marker to the peak of the emission.

d) The indicated level is the peak output power.

Measurement Limit:

Standard	Limits	
FCC Part 15.247 (b)(1)	Bandwidth $\leq$ 1MHz	30dBm (1W)
	Bandwidth $>$ 1MHz	21dBm (125mW)

Measurement Results:

For GFSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	10.27	9.57	10.03	P

For $\pi/4$ DQPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	9.44	8.64	9.27	P

For 8DPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
Peak Conducted Output Power (dBm)	9.29	8.55	9.11	P

Conclusion: PASS

B.2.2. E.I.R.P.

The radiated E.I.R.P. is listed below:

Antenna gain = -2.80dBi

For GFSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
E.I.R.P (dBm)	7.47	6.77	7.23	P

For $\pi/4$ DQPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
E.I.R.P (dBm)	6.64	5.84	6.47	P

For 8DPSK

Channel	Ch 0 2402 MHz	Ch 39 2441 MHz	Ch 78 2480 MHz	Conclusion
E.I.R.P (dBm)	6.49	5.75	6.31	P

Note: E.I.R.P. are calculated with the antenna gain.

Conclusion: PASS

B.3. Frequency Band Edges – Conducted

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

Connect the spectrum analyzer to the EUT using an appropriate RF cable connected to the EUT output. Configure the spectrum analyzer settings as described below (be sure to enter all losses between the unlicensed wireless device output and the spectrum analyzer).

- Span: 10 MHz
- Resolution Bandwidth: 100 kHz
- Video Bandwidth: 300 kHz
- Sweep Time:Auto
- Detector: Peak
- Trace: max hold

Place a marker at the end of the restricted band closest to the transmit frequency to show compliance. Also measure any emissions in the restricted bands. Save the spectrum analyzer plot. Repeat for each power and modulation for lowest and highest channel.

Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not an absolute field strength measurement; it is only a relative measurement to determine the amount by which the emission drops at the band edge relative to the highest fundamental emission level.

Measurement Limit:

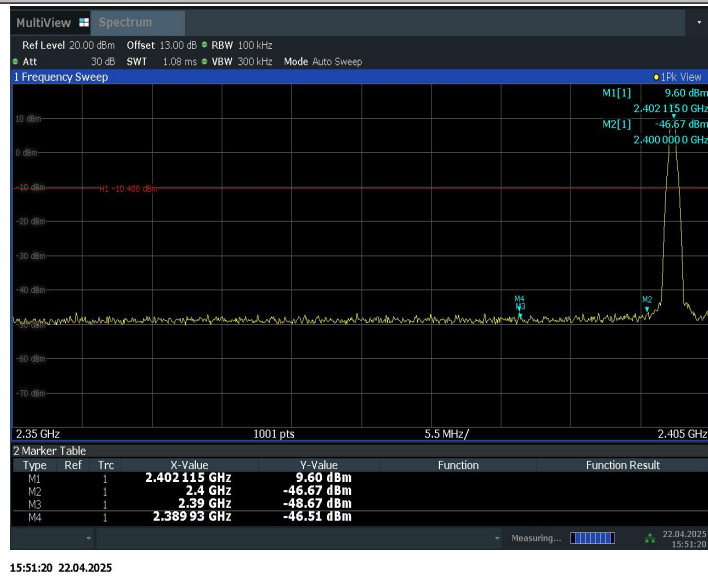
Standard	Limit (dBc)
FCC 47 CFR Part 15.247 (d)	< -20

Measurement Result:

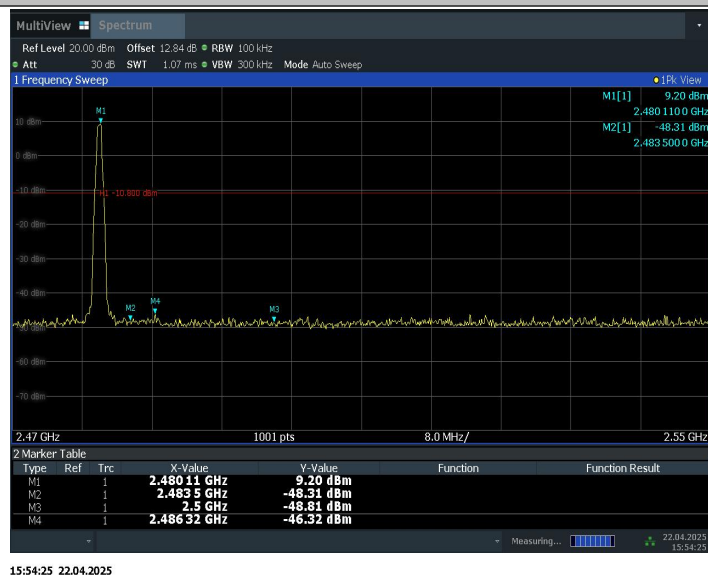
TestMode	ChName	Frequency[MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	Low	2402	9.60	-46.51	≤-10.4	PASS
	High	2480	9.20	-46.32	≤-10.8	PASS
	Low	Hop_2402	9.77	-46.69	≤-10.23	PASS
	High	Hop_2480	8.45	-45.35	≤-11.55	PASS
2DH5	Low	2402	9.33	-46.39	≤-10.67	PASS
	High	2480	8.69	-46.56	≤-11.31	PASS
	Low	Hop_2402	8.06	-46.37	≤-11.94	PASS
	High	Hop_2480	7.54	-46.25	≤-12.46	PASS
3DH5	Low	2402	9.36	-46.32	≤-10.64	PASS
	High	2480	8.78	-45.93	≤-11.22	PASS
	Low	Hop_2402	8.35	-46.21	≤-11.65	PASS
	High	Hop_2480	6.26	-43.79	≤-13.74	PASS

Test graphs as below

DH5_Low_2402



DH5_High_2480

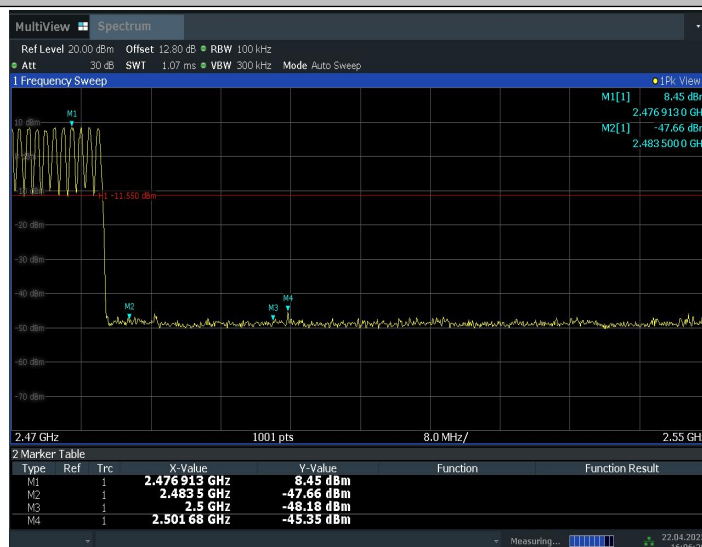


DH5_Low_Hop_2402



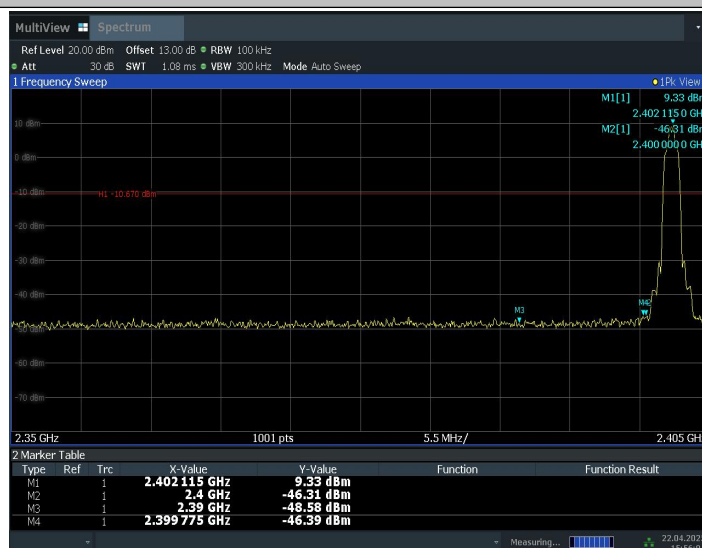
16:04:58 22.04.2025

DH5_High_Hop_2480



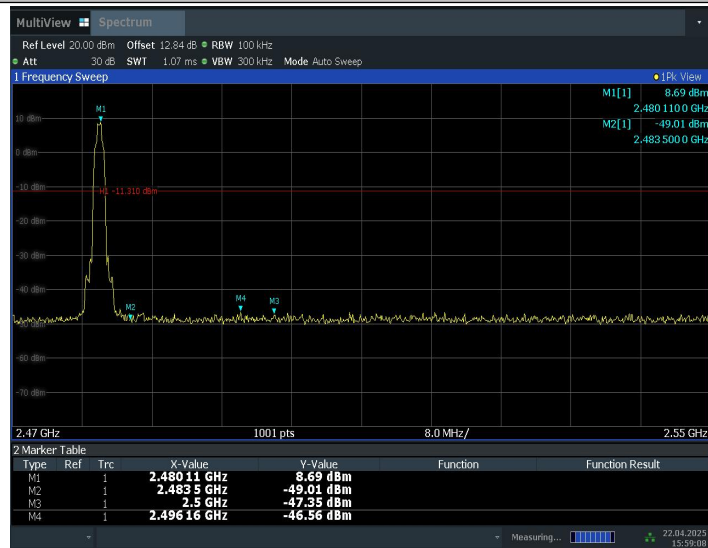
16:06:28 22.04.2025

2DH5_Low_2402



15:56:04 22.04.2025

2DH5_High_2480



15:59:09 22.04.2025

2DH5_Low_Hop_2402



16:06:39 22.04.2025

2DH5_High_Hop_2480



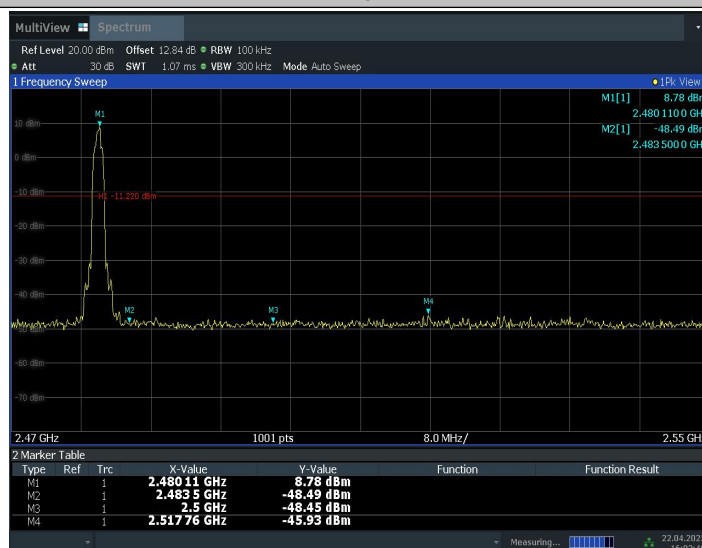
16:08:09 22.04.2025

3DH5_Low_2402



16:00:46 22.04.2025

3DH5_High_2480



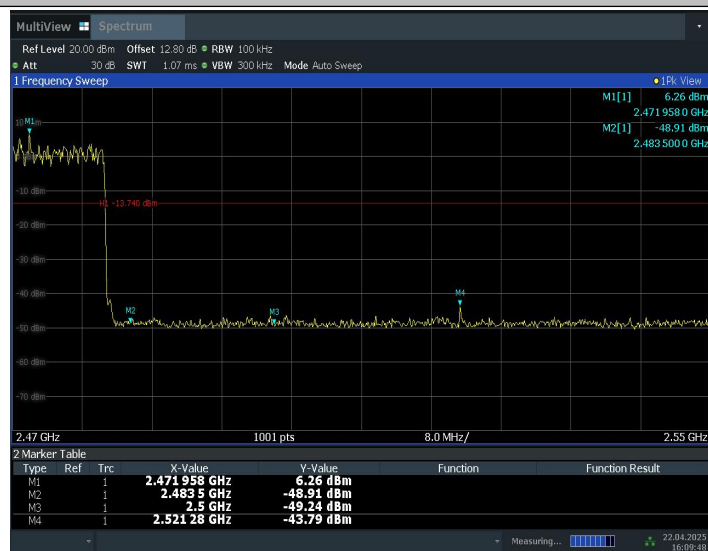
16:03:50 22.04.2025

3DH5_Low_Hop_2402



16:08:19 22.04.2025

3DH5_High_Hop_2480



16:09:49 22.04.2025

Conclusion: PASS

B.4. Transmitter Spurious Emission - Conducted

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

Measurement Procedure – Reference Level

1. Set the RBW = 100 kHz.
2. Set the VBW = 300 kHz.
3. Set the span to 5-30 % greater than the EBW.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW. Next, determine the power in 100 kHz band segments outside of the authorized frequency band using the following measurement:

Measurement Procedure - Unwanted Emissions

1. Set RBW = 100 kHz.
2. Set VBW = 300 kHz.
3. Set span to encompass the spectrum to be examined.
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize (this may take some time, depending on the extent of the span).

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified above.

Measurement Limit:

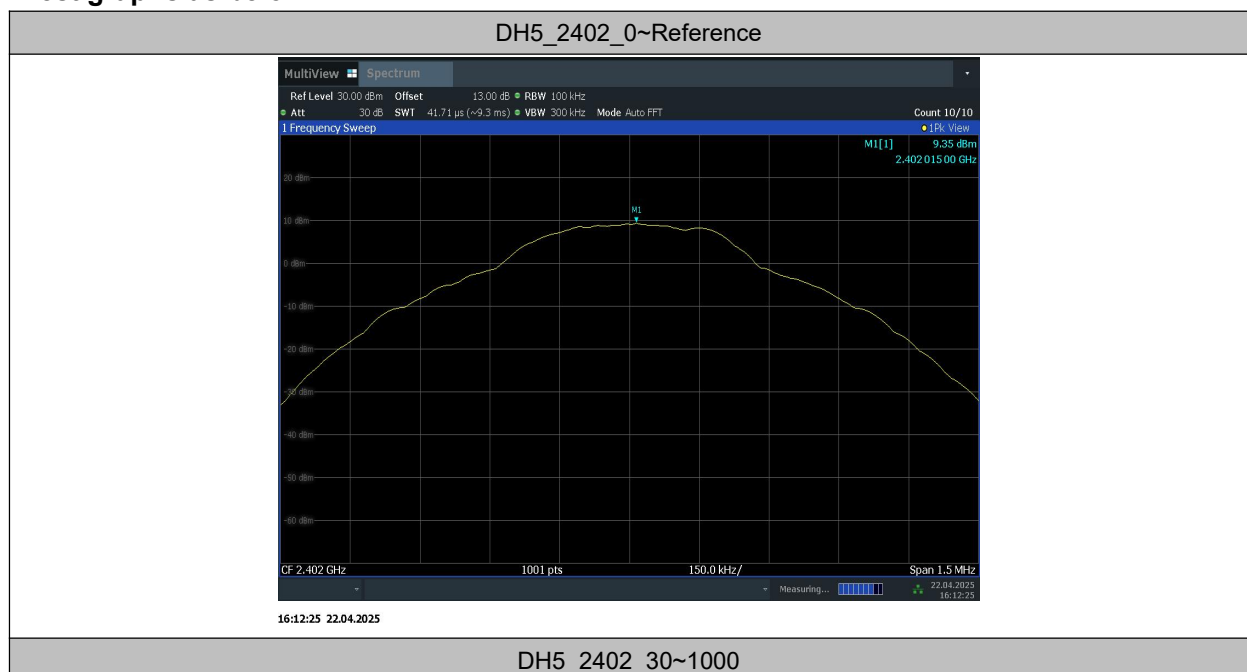
Standard	Limit
FCC 47 CFR Part 15.247 (d)	20dB below peak output power in 100 kHz bandwidth

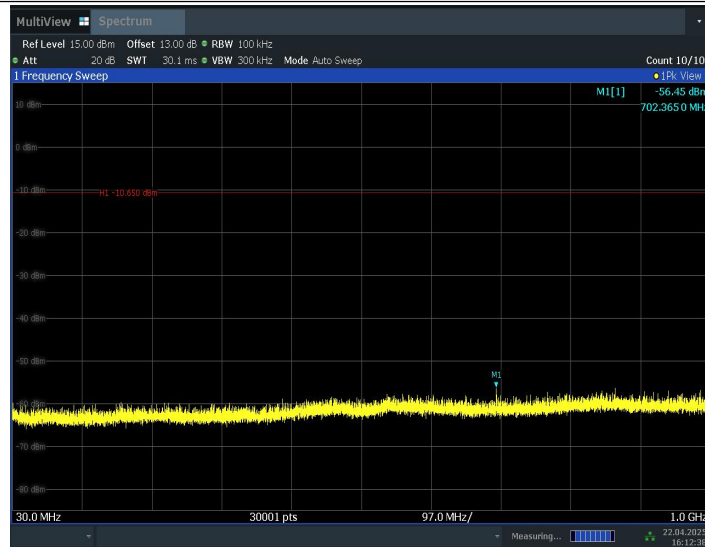
Measurement Results:

TestMode	Frequency[MHz]	FreqRange [MHz]	RefLevel [dBm]	Result [dBm]	Limit [dBm]	Verdict
DH5	2402	Reference	9.35	9.35	---	PASS

		30~1000	9.35	-56.45	≤ -10.65	PASS
		1000~26500	9.35	-44.24	≤ -10.65	PASS
	2441	Reference	7.97	7.97	---	PASS
		30~1000	7.97	-57.18	≤ -12.03	PASS
		1000~26500	7.97	-44.07	≤ -12.03	PASS
	2480	Reference	8.64	8.64	---	PASS
		30~1000	8.64	-57.24	≤ -11.36	PASS
		1000~26500	8.64	-44.52	≤ -11.36	PASS
2DH5	2402	Reference	8.24	8.24	---	PASS
		30~1000	8.24	-56.01	≤ -11.76	PASS
		1000~26500	8.24	-44.54	≤ -11.76	PASS
	2441	Reference	7.10	7.10	---	PASS
		30~1000	7.10	-56.95	≤ -12.9	PASS
		1000~26500	7.10	-44.12	≤ -12.9	PASS
	2480	Reference	7.29	7.29	---	PASS
		30~1000	7.29	-56.78	≤ -12.71	PASS
		1000~26500	7.29	-44.44	≤ -12.71	PASS
3DH5	2402	Reference	8.09	8.09	---	PASS
		30~1000	8.09	-56.94	≤ -11.91	PASS
		1000~26500	8.09	-44.04	≤ -11.91	PASS
	2441	Reference	6.97	6.97	---	PASS
		30~1000	6.97	-56.79	≤ -13.03	PASS
		1000~26500	6.97	-44.52	≤ -13.03	PASS
	2480	Reference	7.59	7.59	---	PASS
		30~1000	7.59	-57.22	≤ -12.41	PASS
		1000~26500	7.59	-44.33	≤ -12.41	PASS

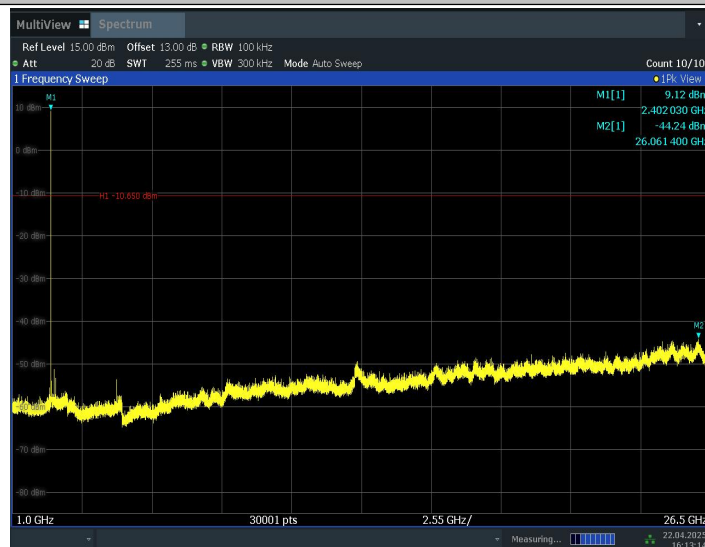
Test graphs as below





16:12:39 22.04.2025

DH5_2402_1000~26500



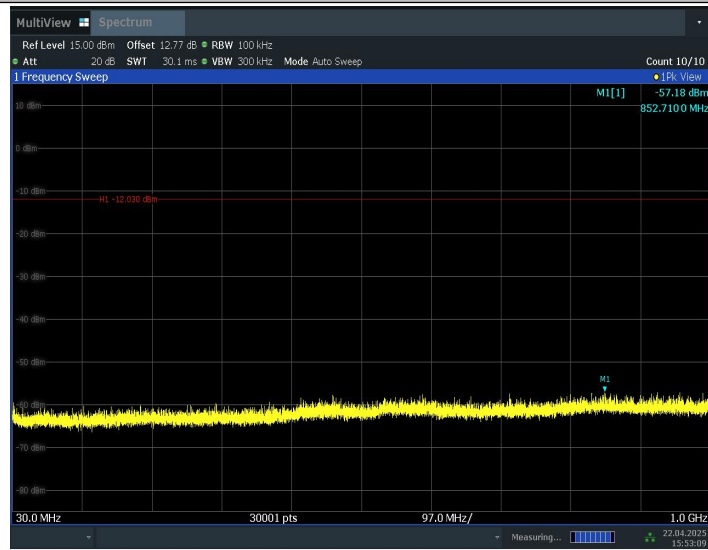
16:13:15 22.04.2025

DH5_2441_0~Reference



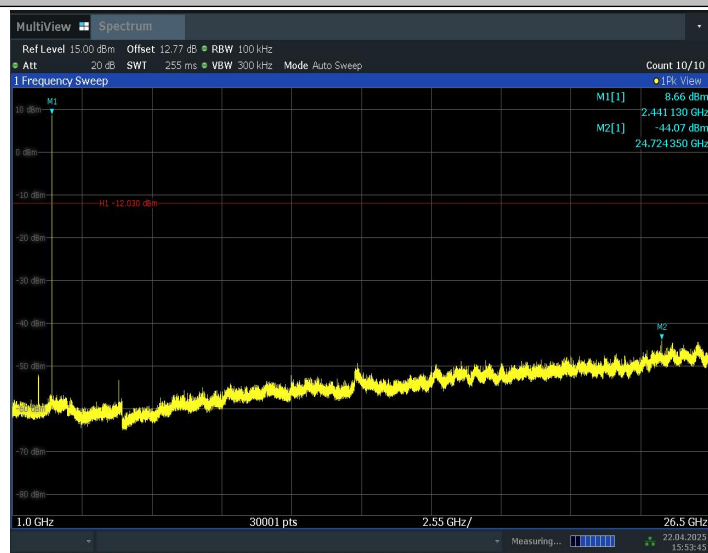
15:52:56 22.04.2025

DH5_2441_30~1000



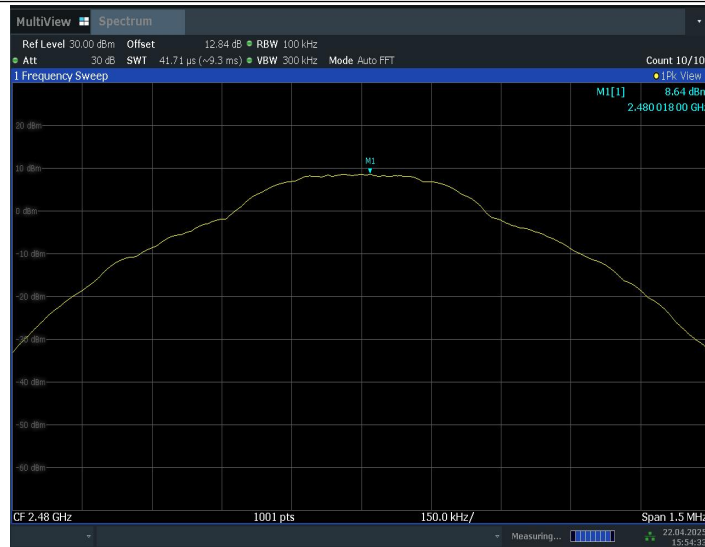
15:53:09 22.04.2025

DH5_2441_1000~26500



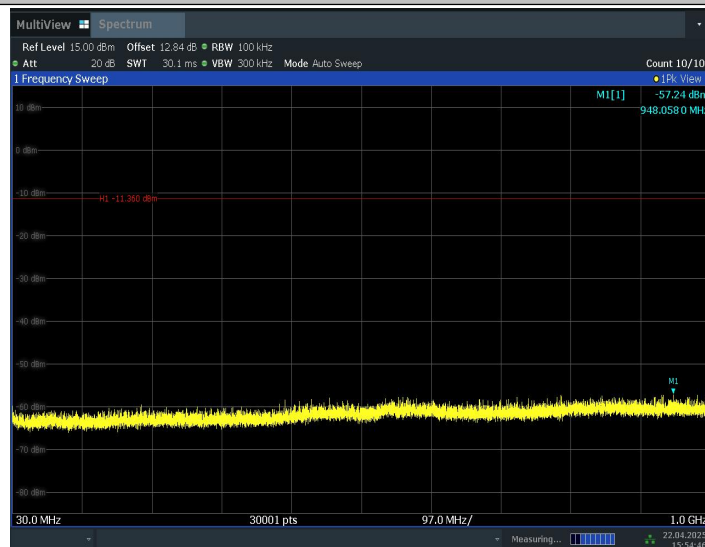
15:53:46 22.04.2025

DH5_2480_0~Reference



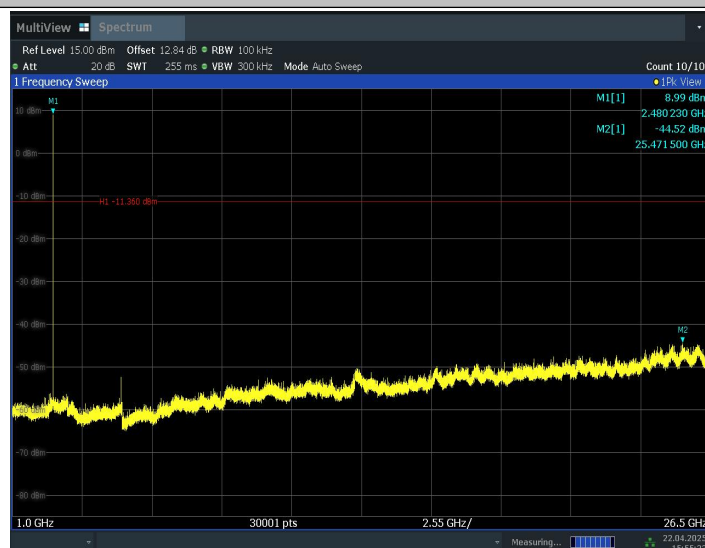
15:54:34 22.04.2025

DH5_2480_30~1000



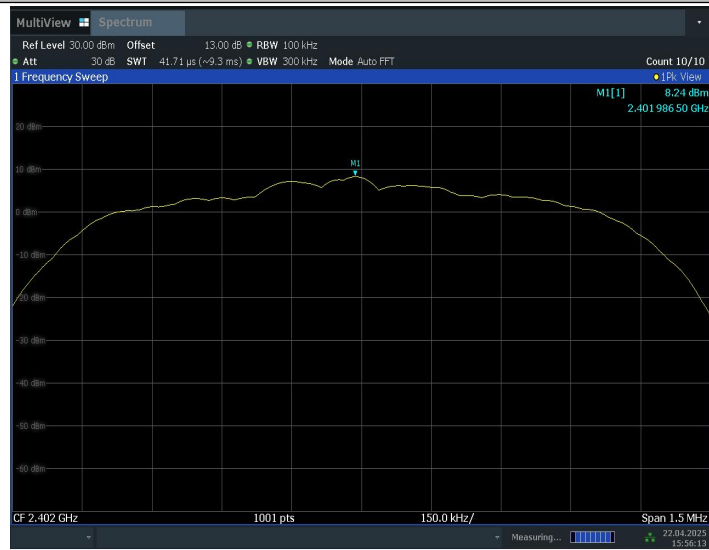
15:54:47 22.04.2025

DH5_2480_1000~26500



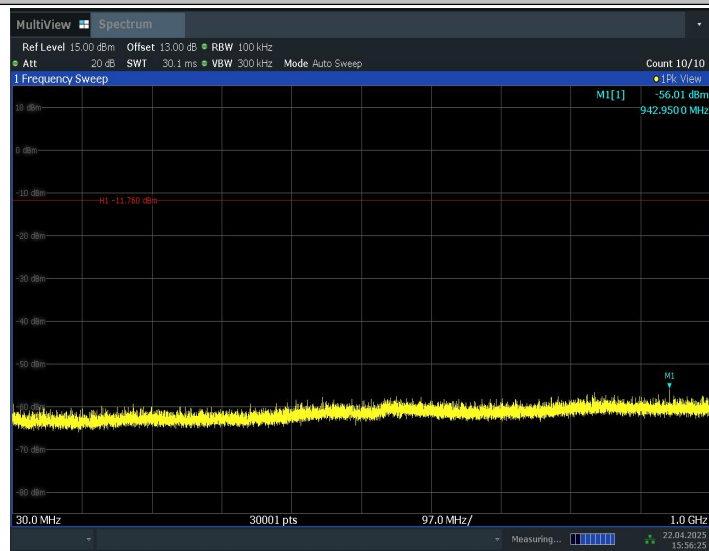
15:55:23 22.04.2025

2DH5_2402_0~Reference



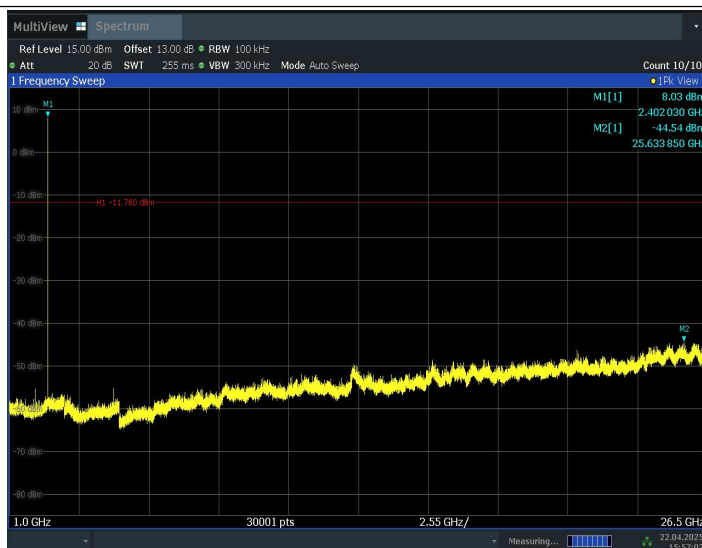
15:56:13 22.04.2025

2DH5_2402_30~1000



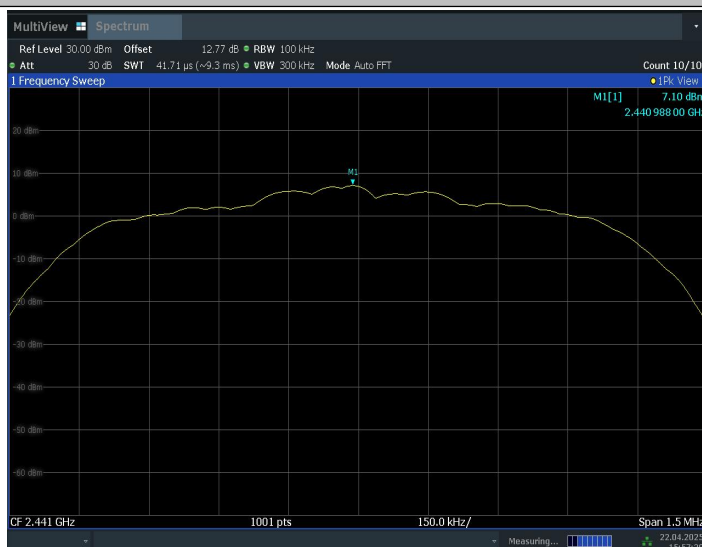
15:56:26 22.04.2025

2DH5_2402_1000~26500



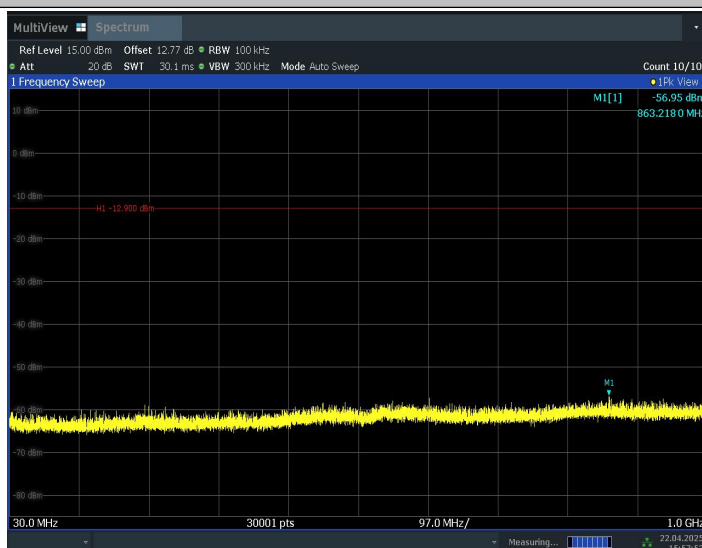
15:57:03 22.04.2025

2DH5_2441_0~Reference



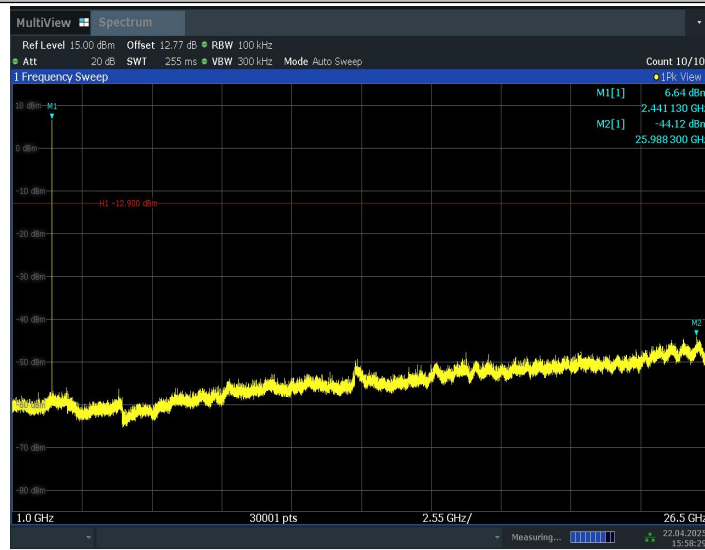
15:57:40 22.04.2025

2DH5_2441_30~1000



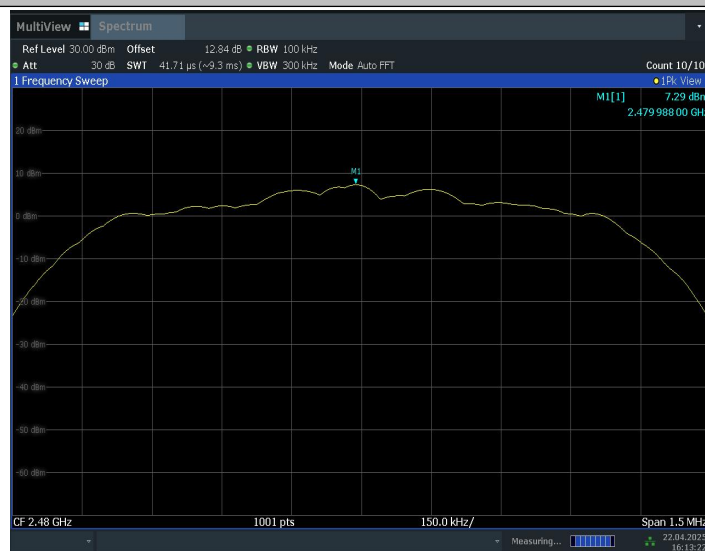
15:57:53 22.04.2025

2DH5_2441_1000~26500



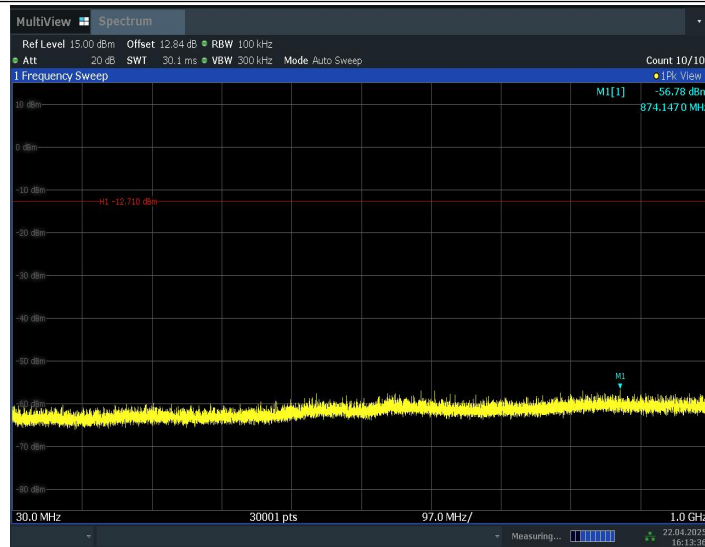
15:58:29 22.04.2025

2DH5_2480_0~Reference



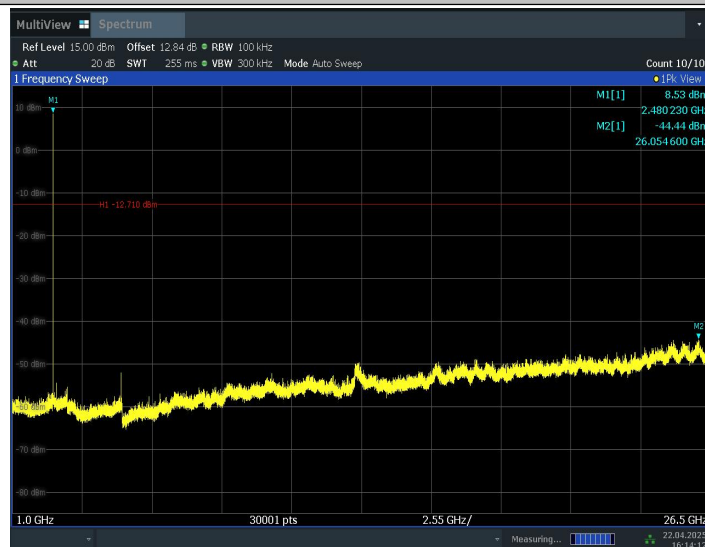
16:13:22 22.04.2025

2DH5_2480_30~1000



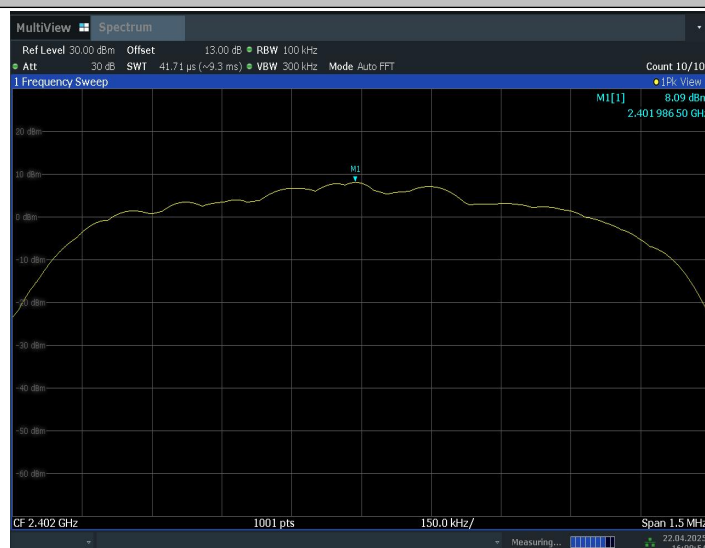
16:13:36 22.04.2025

2DH5_2480_1000~26500



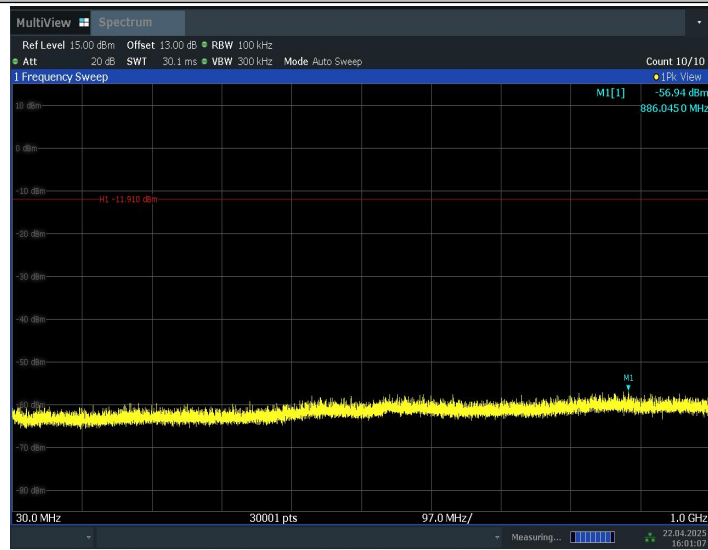
16:14:12 22.04.2025

3DH5_2402_0~Reference



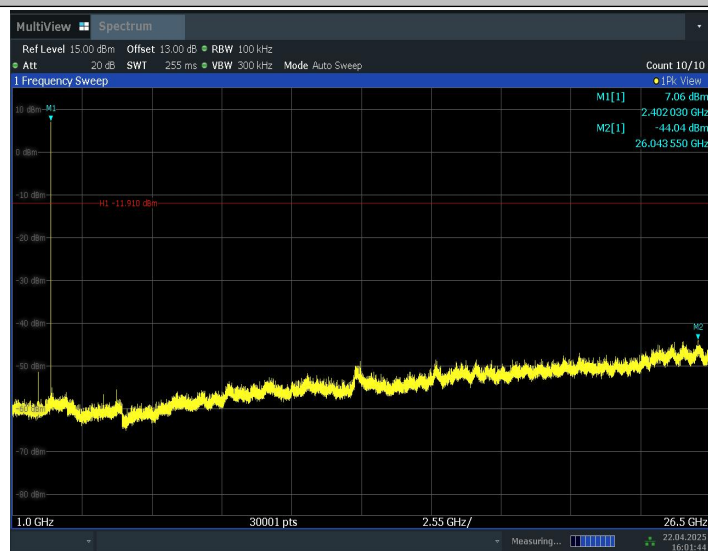
16:00:55 22.04.2025

3DH5_2402_30~1000



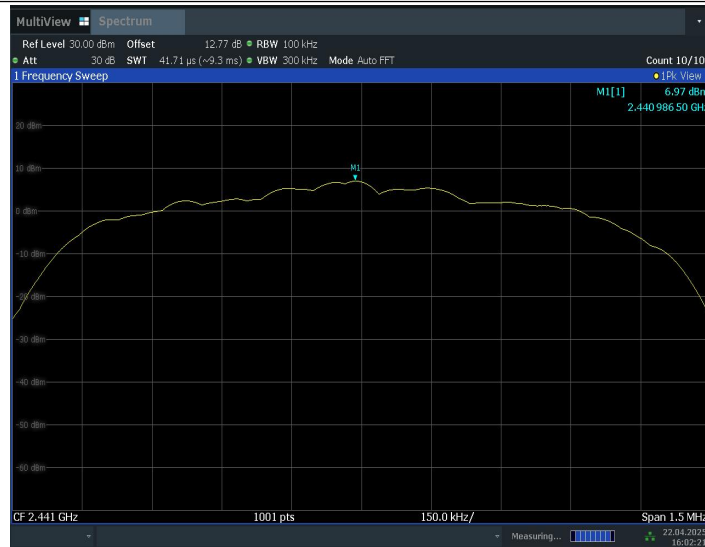
16:01:08 22.04.2025

3DH5_2402_1000~26500



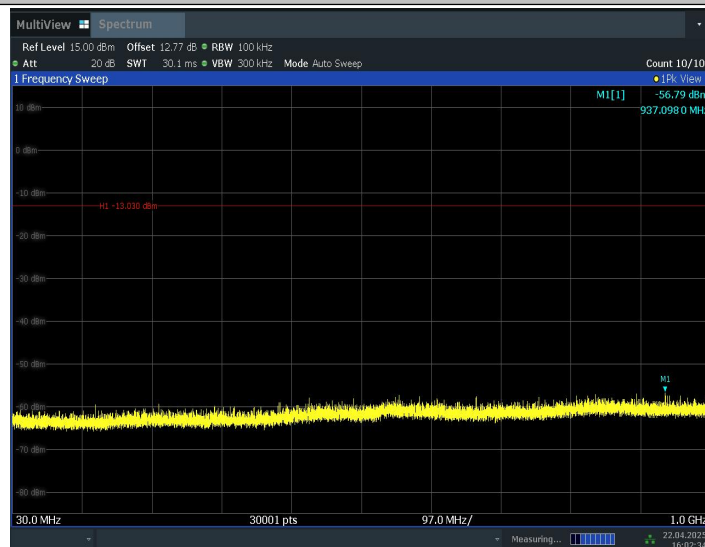
16:01:44 22.04.2025

3DH5_2441_0~Reference



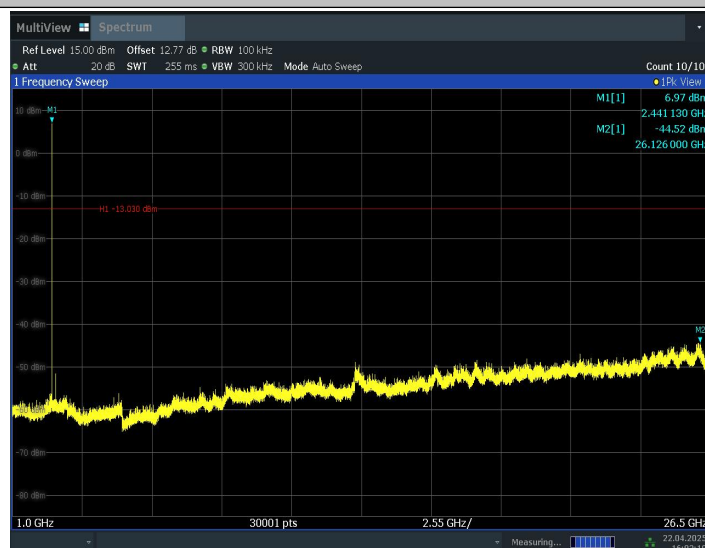
16:02:21 22.04.2025

3DH5_2441_30~1000



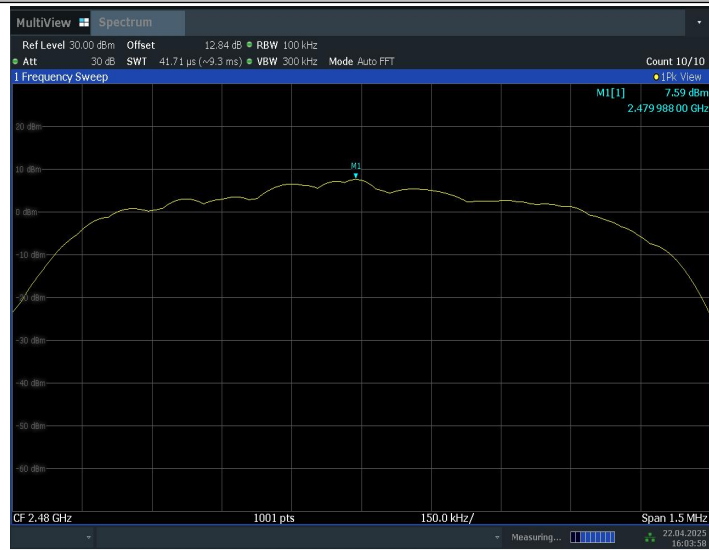
16:02:35 22.04.2025

3DH5_2441_1000~26500



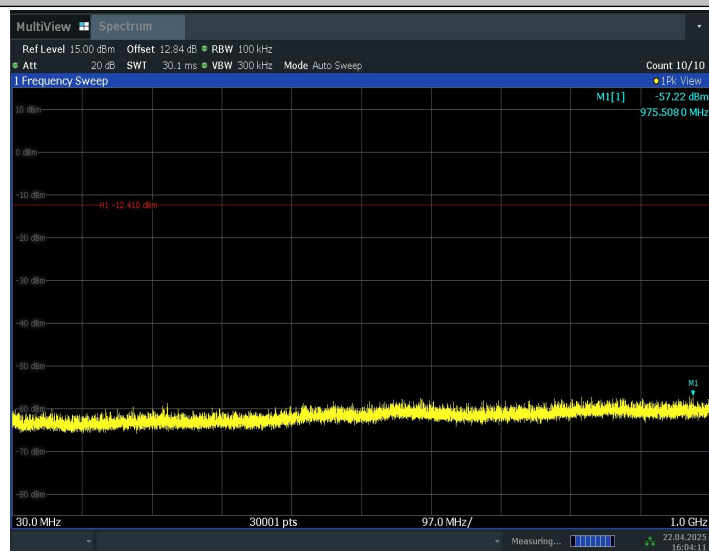
16:03:11 22.04.2025

3DH5_2480_0~Reference



16:03:59 22.04.2025

3DH5_2480_30~1000



16:04:12 22.04.2025

3DH5_2480_1000~26500



Conclusion: PASS

B.5. Radiated Unwanted Emission

Limits

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 (MHz)	Field strength($\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	30
1.705 – 30.0	30	30

Frequency of emission (MHz)	Field strength ($\mu\text{V/m}$)	Field strength (dB $\mu\text{V/m}$)	Measurement distance (m)
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Note: When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor.

Test setup

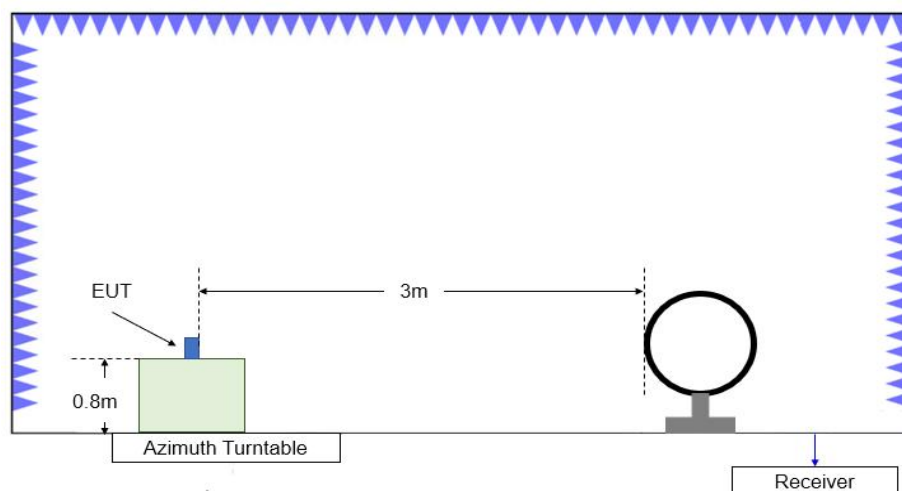


Figure B.5.1. Test Site Diagram (9kHz-30MHz)

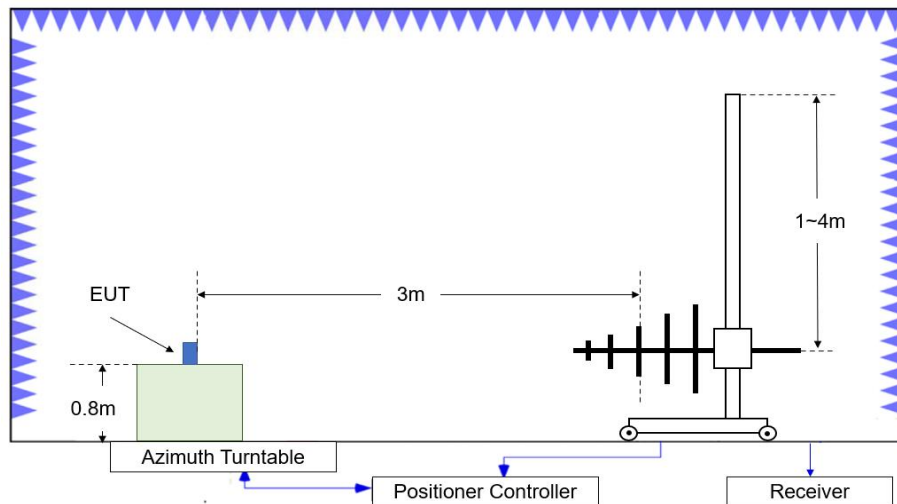


Figure B.5.2. Test Site Diagram (30MHz-1GHz)

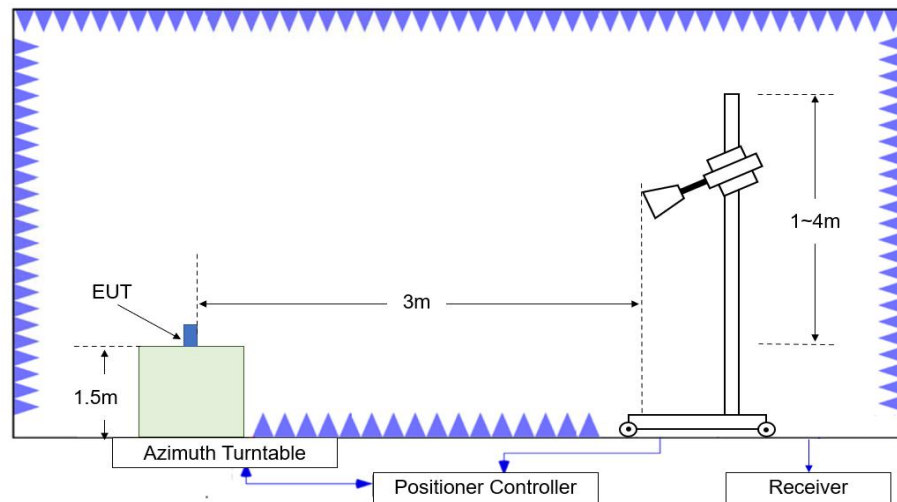


Figure B.5.3. Test Site Diagram (1GHz-40GHz)

Test Procedures

Radiated unwanted emissions from the EUT were measured according to ANSI C63.10-2013 (ANSI C63.10-2020).

Test setting

Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	100kHz/300kHz	5
1000-3000	1MHz/3MHz	15
3000-18000	1MHz/3MHz	40
18000-26500	1MHz/3MHz	20

Sample Calculation

A "reference path loss" is established and the A_{Rpl} is the attenuation of "reference path loss", and including the gain of receive antenna, 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= $P_{Mea}+A_{Rpl}= P_{Mea}+Cable\ Loss+Antenna\ Factor$

Test note

1. Investigation has been done on all modes and modulations/data rates. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.
2. Spurious emissions for all channels were investigated and almost the same below 1GHz. According to FCC 47 CFR §15.31, emission levels are not report much lower than the limit by over 20dB
3. Measurement frequencies were performed from 9 kHz to the 10th harmonic of highest fundamental frequency or 40GHz, whichever is lower.

Test Result

EUT ID: EUT1

Radiated Spurious Emission

GFSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17902.500	56.23	-25.40	42.30	39.33	74.00	17.77	H
13725.000	52.18	-29.10	40.70	40.58	74.00	21.82	H
11780.000	49.62	-31.30	38.90	42.02	74.00	24.38	H
9346.500	47.27	-34.10	38.10	43.27	74.00	26.73	V
7535.500	45.65	-34.60	37.40	42.85	74.00	28.35	V
2338.920	55.70	-19.24	27.30	47.64	74.00	18.30	H

GFSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17943.000	56.02	-25.40	42.30	39.12	74.00	17.98	H
14197.500	51.50	-29.40	40.40	40.50	74.00	22.50	H
12374.000	49.70	-30.10	38.80	41.00	74.00	24.30	V
8933.500	47.14	-33.60	37.70	43.04	74.00	26.86	V
7228.000	45.97	-34.50	37.40	43.07	74.00	28.03	H
4881.500	43.76	-36.90	32.80	47.86	74.00	30.24	H

GFSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17928.500	56.35	-25.40	42.30	39.45	74.00	17.65	V
13759.500	52.07	-29.10	40.70	40.47	74.00	21.93	H
12987.000	49.20	-29.80	39.80	39.20	74.00	24.80	V

9636.500	47.20	-33.00	37.90	42.30	74.00	26.80	H
4959.500	46.77	-36.70	32.90	50.57	74.00	27.23	H
2483.519	58.20	-19.23	27.70	49.73	74.00	15.80	H

$\pi/4$ DQPSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17930.000	56.13	-25.40	42.30	39.23	74.00	17.87	H
13717.000	51.82	-29.10	40.70	40.22	74.00	22.18	H
12410.000	49.36	-30.10	38.80	40.66	74.00	24.64	H
9559.500	47.44	-33.20	37.90	42.74	74.00	26.56	H
7539.000	46.33	-34.60	37.40	43.53	74.00	27.67	H
2342.580	56.40	-19.24	27.30	48.34	74.00	17.60	H

$\pi/4$ DQPSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17885.000	56.11	-25.40	42.30	39.21	74.00	17.89	V
14078.500	51.44	-28.70	40.50	39.64	74.00	22.56	V
12834.000	49.28	-30.60	39.60	40.28	74.00	24.72	V
9624.500	47.06	-33.00	37.90	42.16	74.00	26.94	H
7232.000	46.25	-34.50	37.40	43.35	74.00	27.75	H
4881.500	44.27	-36.90	32.80	48.37	74.00	29.73	H

$\pi/4$ DQPSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17944.000	56.10	-25.40	42.30	39.20	74.00	17.90	V
14062.000	51.87	-28.70	40.50	40.07	74.00	22.13	V
12986.000	49.20	-29.80	39.80	39.20	74.00	24.80	V
9359.500	47.21	-34.10	38.10	43.21	74.00	26.79	H
7442.000	46.11	-34.30	37.50	42.91	74.00	27.89	H
2483.675	56.30	-19.23	27.70	47.83	74.00	17.70	H

8DPSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17932.500	56.47	-25.40	42.30	39.57	74.00	17.53	H
13738.500	51.63	-29.10	40.70	40.03	74.00	22.37	V
11791.500	49.58	-31.30	38.90	41.98	74.00	24.42	H
9137.500	47.19	-33.70	37.80	43.09	74.00	26.81	H
6663.500	46.41	-35.40	36.20	45.61	74.00	27.59	V
2323.485	55.70	-19.23	27.30	47.63	74.00	18.30	H

8DPSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17943.000	56.90	-25.40	42.30	40.00	74.00	17.10	V
14106.500	51.46	-28.70	40.50	39.66	74.00	22.54	H
12351.000	49.21	-30.10	38.80	40.51	74.00	24.79	H
9665.500	46.92	-33.00	37.80	42.12	74.00	27.08	V
7235.500	45.98	-34.50	37.40	43.08	74.00	28.02	H
4881.500	42.98	-36.90	32.80	47.08	74.00	31.02	H

8DPSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17915.500	56.47	-25.40	42.30	39.57	74.00	17.53	V
14005.000	52.31	-28.90	40.70	40.51	74.00	21.69	H
12359.000	49.38	-30.10	38.80	40.68	74.00	24.62	H
9045.500	47.10	-33.60	37.60	43.10	74.00	26.90	H
7501.500	45.95	-34.60	37.50	43.05	74.00	28.05	H
2491.994	56.80	-19.23	27.70	48.33	74.00	17.20	H

Average Measurement results

GFSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17947.500	46.70	-25.40	42.30	29.80	54.00	7.30	V
14108.500	42.39	-28.70	40.50	30.59	54.00	11.61	V
12732.500	40.03	-30.40	39.40	31.03	54.00	13.97	H
4803.500	38.91	-37.10	32.60	43.41	54.00	15.09	H
9579.000	37.44	-33.20	37.90	32.74	54.00	16.56	V
2350.020	44.30	-19.24	27.30	36.24	54.00	9.70	V

GFSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17943.000	46.73	-25.40	42.30	29.83	54.00	7.27	H
14107.500	42.22	-28.70	40.50	30.42	54.00	11.78	H
4881.500	40.78	-36.90	32.80	44.88	54.00	13.22	H
12772.500	39.53	-30.40	39.60	30.33	54.00	14.47	V
9196.000	37.08	-33.70	37.90	32.88	54.00	16.92	V
7726.000	36.27	-34.60	37.10	33.77	54.00	17.73	H

GFSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17955.000	46.77	-25.40	42.30	29.87	54.00	7.23	V
4959.500	43.23	-36.70	32.90	47.03	54.00	10.77	H
14080.500	41.88	-28.70	40.50	30.08	54.00	12.12	H
12756.500	39.89	-30.40	39.40	30.89	54.00	14.11	V
9642.000	37.54	-33.00	37.90	32.64	54.00	16.46	V
2499.769	44.60	-19.05	27.70	35.95	54.00	9.40	H

$\pi/4$ DQPSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17957.000	46.71	-25.40	42.30	29.81	54.00	7.29	H
14129.500	42.15	-29.40	40.50	31.05	54.00	11.85	V
12976.000	39.74	-29.80	39.80	29.74	54.00	14.26	H
4803.500	38.38	-37.10	32.60	42.88	54.00	15.62	H
9534.000	37.18	-33.20	38.00	32.38	54.00	16.82	H
2389.860	44.10	-19.22	27.30	36.02	54.00	9.90	H

$\pi/4$ DQPSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17916.500	46.65	-25.40	42.30	29.75	54.00	7.35	V
14088.000	42.09	-28.70	40.50	30.29	54.00	11.91	V
4881.500	40.47	-36.90	32.80	44.57	54.00	13.53	H
12776.000	39.71	-30.40	39.60	30.51	54.00	14.29	V
9532.000	37.42	-33.20	38.00	32.62	54.00	16.58	H
7527.000	36.09	-34.60	37.40	33.29	54.00	17.91	H

$\pi/4$ DQPSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17932.500	46.86	-25.40	42.30	29.96	54.00	7.14	V
4959.500	42.44	-36.70	32.90	46.24	54.00	11.56	H
14088.500	42.38	-28.70	40.50	30.58	54.00	11.62	H
12776.500	39.86	-30.40	39.60	30.66	54.00	14.14	H
8577.500	37.28	-33.60	37.60	33.28	54.00	16.72	V
2496.100	44.50	-19.23	27.70	36.03	54.00	9.50	H

8DPSK Ch 0

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17936.000	47.05	-25.40	42.30	30.15	54.00	6.95	V
14150.000	41.99	-29.40	40.50	30.89	54.00	12.01	H
12895.000	39.62	-30.60	39.70	30.52	54.00	14.38	H
4803.500	39.00	-37.10	32.60	43.50	54.00	15.00	H
9127.500	37.53	-33.70	37.80	33.43	54.00	16.47	V
2323.620	43.80	-19.23	27.30	35.73	54.00	10.20	H

8DPSK Ch 39

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17933.500	46.69	-25.40	42.30	29.79	54.00	7.31	H
13776.500	42.49	-29.10	40.90	30.69	54.00	11.51	V
11903.500	39.72	-31.00	38.80	31.92	54.00	14.28	V
4881.500	39.50	-36.90	32.80	43.60	54.00	14.50	H
9137.000	37.03	-33.70	37.80	32.93	54.00	16.97	H
7226.500	36.24	-34.50	37.40	33.34	54.00	17.76	H

8DPSK Ch 78

Frequency (MHz)	Measurement Result (dBuV/m)	Cable Loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Pol. (H/V)
17936.500	46.85	-25.40	42.30	29.95	54.00	7.15	V
4959.500	43.02	-36.70	32.90	46.82	54.00	10.98	H
14118.000	42.13	-29.40	40.50	31.03	54.00	11.87	H
12769.000	39.42	-30.40	39.40	30.42	54.00	14.58	V
9229.500	37.30	-33.90	38.00	33.20	54.00	16.70	V
2493.250	44.60	-19.23	27.70	36.13	54.00	9.40	H

Conclusion: Pass

Note: the spurious emission above 18G is noise only and did not show on the report.

Band edge compliance

Mode	Channel	Frequency Range	Test Results	Conclusion
GFSK	0	2.31GHz ~2.43GHz	Fig.1	P
	78	2.45GHz ~2.5GHz	Fig.2	P

Mode	Channel	Frequency Range	Test Results	Conclusion
$\pi/4$ DQPSK	0	2.31GHz ~2.43GHz	Fig.3	P
	78	2.45GHz ~2.5GHz	Fig.4	P

Mode	Channel	Frequency Range	Test Results	Conclusion
8DPSK	0	2.31GHz ~2.43GHz	Fig.5	P
	78	2.45GHz ~2.5GHz	Fig.6	P

Conclusion: PASS

Test graphs as below

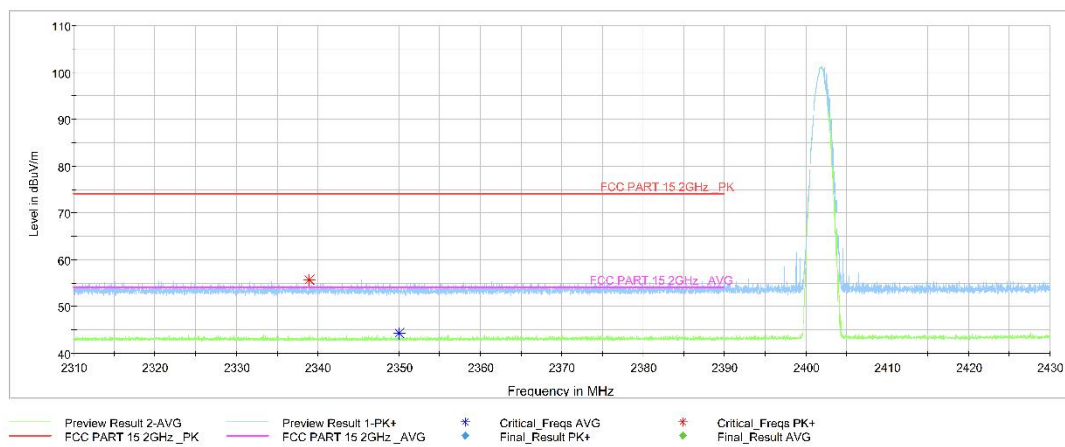


Fig.1. Frequency Band Edges: GFSK, Channel 0, Hopping Off, 2.31 GHz – 2.45GHz

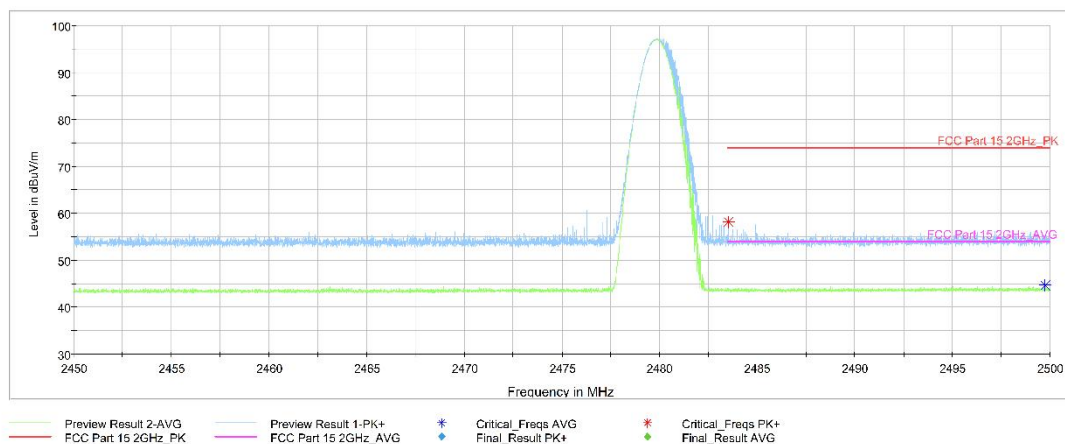


Fig.2. Frequency Band Edges: GFSK, Channel 78, Hopping Off, ch11, 2.45 GHz - 2.50GHz

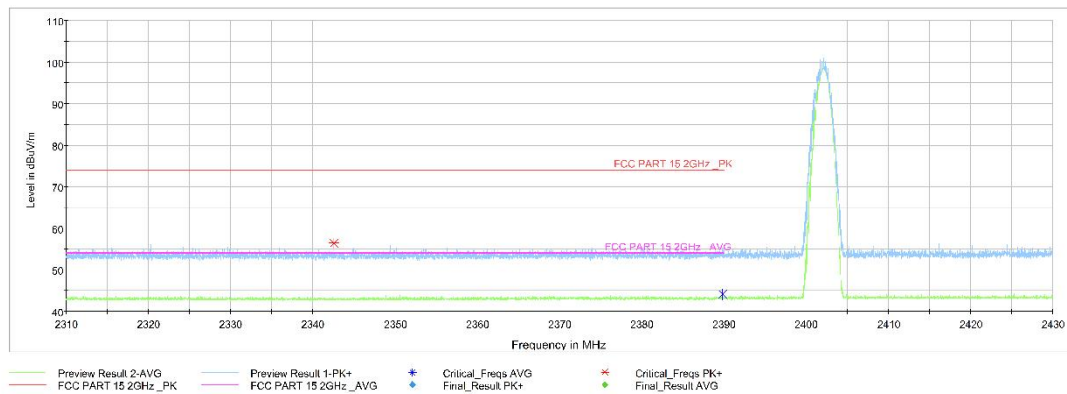


Fig.3. Frequency Band Edges: $\pi/4$ DQPSK, Channel 0, Hopping Off, 2.31 GHz - 2.45GHz

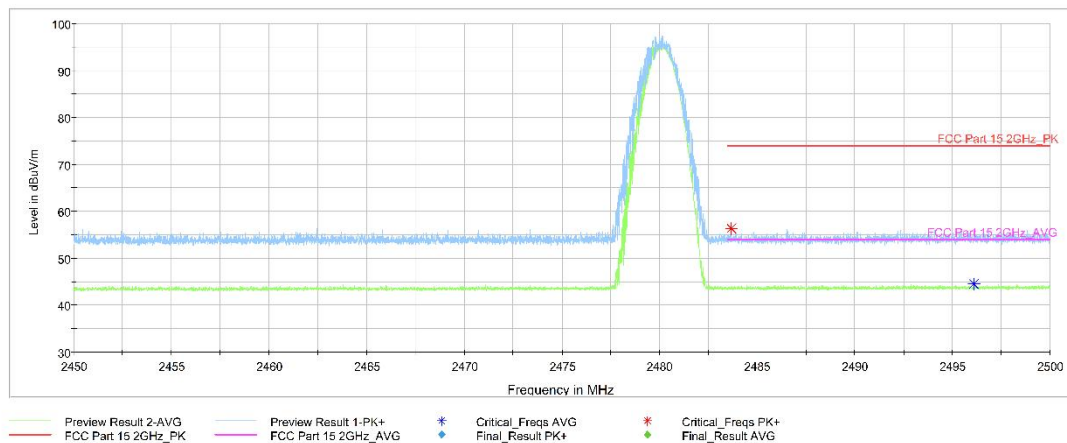


Fig.4. Frequency Band Edges: $\pi/4$ DQPSK, Channel 78, Hopping Off, 2.45 GHz - 2.50GHz

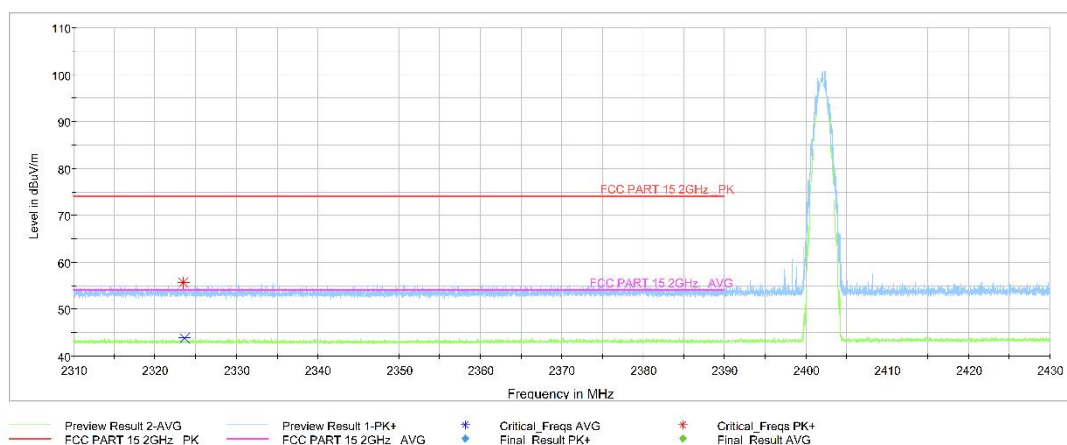


Fig.5. Frequency Band Edges: 8DPSK, Channel 0, 2.31 GHz - 2.45GHz

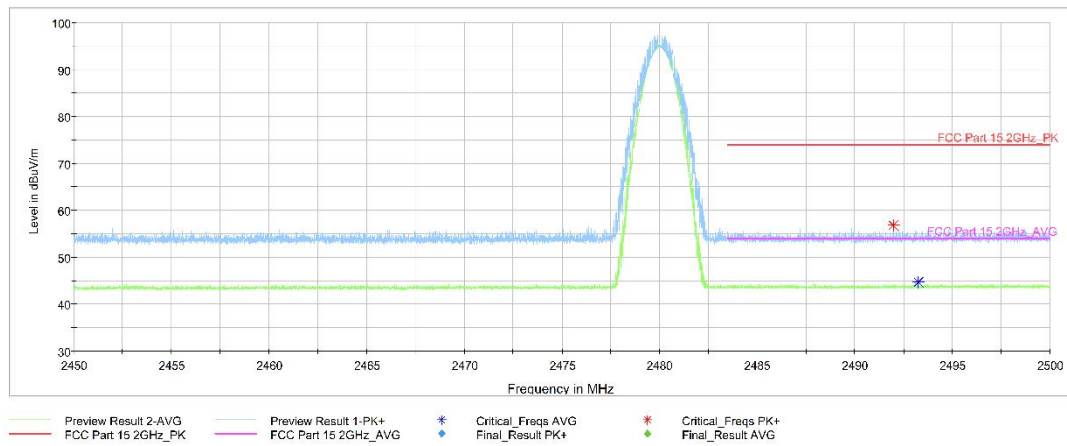


Fig.6. Frequency Band Edges: 8DPSK, Channel 78, 2.45 GHz - 2.50GHz