

Test Report

Product	ZigBee transmitter and receiver
Name and address of the applicant	ASSA ABLOY Global Solutions Norway AS Anolitveien 1-3, 1400 Ski P.O 424, 1402 Ski Norway
Name and address of the manufacturer	ASSA ABLOY Global Solutions Norway AS Anolitveien 1-3, 1400 Ski P.O 424, 1402 Ski Norway
Model	PCBA 1731
Rating	4.5 VDC
Trademark	ASSA ABLOY
Additional information	This report covers ZigBee 2.4 GHz, End node
Tested according to	ARIB STD T66: V3.7:2014 Second Generation Low Power Data Communication System / Wireless LAN System
Order number	PRJ0012784
Tested in period	2023-04-11 to 2023-05-25
Issue date	2023-06-27
Name and address of the testing laboratory	Nemko Scandinavia AS Instituttveien 6, 2007 Kjeller, Norway
An accredited technical test executed under the Norwegian accreditation scheme	
  Prepared by [Thomas Dangle] Approved by [Frode Sveinsen]	

Nemko Group

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1 INFORMATION

1.1 Tested Item

Name	ASSA ABLOY
Model name	PCBA 1731
Serial number	Conducted sample: Marked as # 3 Radiated sample: Marked as # 1
Hardware identity and/or version	7
Software identity and/or version	/
Frequency Range	2405 – 2480 MHz
Number of Channels	16
Channel Spacing	5 MHz
Operating Mode	ZigBee
Type of Modulation	GFSK
Rated Output Power	3.19 mW
Antenna Connector	Integral Antenna
Antenna Type	PCB antenna
Number of Antennas	1
Antenna Diversity Supported	No
Smart Antenna System	No

Description of Tested Device(s)

The EUT uses ZigBee and GFSK modulation.

All tests the EUT controlled by test software, RF Network Radio Test V1.0 delivered by the manufacturer.

1.2 Test conditions

Temperature:	23 °C
Relative humidity:	50 %
Lower voltage -10%	4.05 VDC
Normal voltage:	4.50 VDC
Upper voltage +10%	4.95 VDC

Channel no	Frequency (MHz)	Power setting dBm	Power setting mW	Modulation
11	2405	8	6.31	GFSK
18	2440	8	6.31	GFSK
26	2480	8	6.31	GFSK

The values are the limit registered during the test period.
All tests have been performed with a regulated power supply.

1.3 Test Engineer

Thomas Dangle.

1.4 Test Equipment

See list of test equipment in clause 7

1.5 Other Comments

The test mode is provided by the manufacturer during the tests. All tests were performed at 50Ω SMA connector (conducted)

2 TEST REPORT SUMMARY

2.1 General

All measurements are traceable to national standards.

The tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with

ARIB STD –T66 VERSION 3.7:2014

Second generation low power data communication system/wireless lan system.

-Radio Law (Law No. 131, 2 May 1950) and its amendments/updates.

-Radio Law Enforcement Regulations (Radio Regulatory Commission Regulations No. 14, November 30, 1950) and its amendments/updates.

-Ordinance Regulating Radio Equipment (Radio Regulatory Commission Regulations No. 18, November 30, 1950), Section 4.17, Article 49.20, 1): "Radio Equipment of Radio Stations of a Low-Power Data Communication System" and its amendments/updates.

-Test methods and appendix 43 to Post of the Ministerial Ordinance No. 37, November 21, 1981 (MIC Notice 88, January 26, 2004) and its amendments/updates.

☒ Production Unit

☐ Pre-production Unit



THIS TEST REPORT APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

It is the manufacturer's responsibility to assure the additional production units of this product are manufactured with identical electrical and mechanical components. The manufacturer is responsible to the authorities for any modifications made to the product, which result in non-compliance to the relevant regulations.

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Opinions expressed within this report regarding general assessments and qualifications for PASS or FAIL to the standards limits and requirements, are not part of the current accreditation. Neither is opinions expressed regarding model variants covered by the testing performed in this report.

Deviations from, additions to, or exclusions from the test specifications are described in "Test Report Summary".

This report was originally distributed electronically with digital signatures. For more information contact Nemko.

2.2 Abbreviations

The following abbreviations are used in the test summary:

- N/A** Not applicable. The testcase is not applicable for the tested equipment.
- N/T** Not tested. The testcase is not covered by this test report.
- U** Unconditional (test is mandatory)
- C** Conditional (test is mandatory if certain conditions are met)

2.3 Test Summary

Test name	OT and RL reference	ARIB T66 reference	Verdict
Antenna power	Article 49-20	3.2 (2)	Pass
Antenna gain	Article 49-20	3.6 (2) a	Pass
Antenna power tolerance	Article 14 7	3.2 (3)	Pass
Frequency Tolerance	Article 5 Annex 1 table 7-8	3.2 (4)	Pass
Spurious emission intensity	Article 7 Annex 3 26	3.2 (6)	Pass
Permissible value for occupied bandwidth	Article 6 Annex 2 30	3.2 (7)	Pass
Spread bandwidth	Article 49-20	3.2 (8)	N/A ¹
Process gain	Article 49-20	3.3 (9)	N/A ¹
Receiver Limit on secondary radiated Emissions	Article 24 2	3.3 (1)	Pass
Interference prevention function	Article 9-4 8 Article 6-2-3	3.5	Pass???

OT: The ordinance regulating radio equipment

RL: Regulations for Enforcement of the Radio Law

Notes:

¹ other digital system

3 Test Results

3.1 Transmitter antenna power and antenna gain

ARIB T66 3.2 (1) & 3.6 (2a)

Conducted RF output power							
Frquency (MHz)	V _{normal}		V _{-10%}		V _{+10%}		Requirement (mW // dBm)
	Measured power (dBm)	Measured power (mW)	Measured power (dBm)	Measured power (mW)	Measured power (dBm)	Mesaured power (mW)	
2405	4.51	2.82	4.51	2.82	4.50	2.82	< 10 // 10
2440	3.30	2.14	3.31	2.14	3.29	2.13	
2480	2.44	1.75	2.44	1.75	2.44	1.75	

Measured with power meter.

The cable loss and attenuator loss are taken into considerations for measured power. The EUT was in test mode with continuous modulated signal.

Test Equipment Used: 1, 3, 5, 7, 9

3.2 Maximum antenna gain

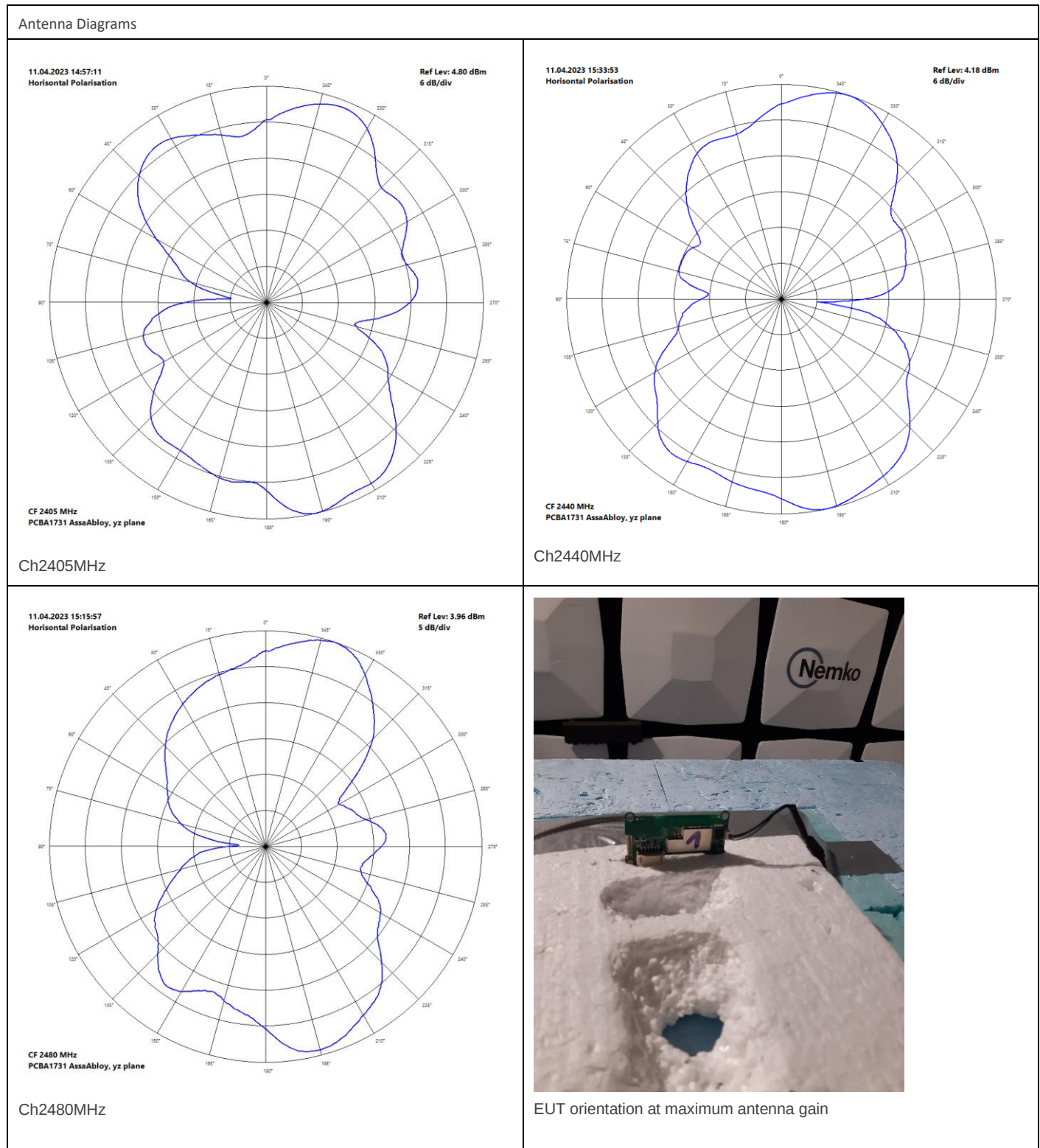
	Transmit Frequency		
	2405 MHz	2440 MHz	2480 MHz
Measured Conducted Peak Power (dBm)	4.51	3.30	2.44
Measured Radiated Peak Power, EIRP (dBm)	4.8	4.18	3.96
Calculated Antenna Gain (dBi)	0.29	0.88	1.52

Modulated carrier is used for antenna gain measurements.

Spectrum analyser settings	
Detector	Peak
Resolution BW	1 MHz
Video BW	1 MHz
Sweep Time	Auto
Trace Mode	Free Run
Span	5 MHz

Test Equipment Used: 2, 4, 6, 8, 10, 12

Antenna Diagrams



3.3 Tolerances for antenna power

ARIB T66 3.2 (3)

Tolerance for antenna power								
Ch no	Frequency (MHz)	Power voltage (Vdc)	Power value (mW)	Rated output (mW)	Deviation (%)	Deviation average value (%)	Limit	Note
11	2405	V _{+10%}	2.82	3.19	-11.70	-30.00	10mW or lower +20 to -80%	Optimal value -30%
		V _{normal}	2.82		-11.70			
		V _{-10%}	2.82		-11.70			
18	2440	V _{+10%}	2.13		-33.31			
		V _{normal}	2.14		-32.99			
		V _{-10%}	2.14		-32.99			
26	2480	V _{+10%}	1.75		-45.20			
		V _{normal}	1.75		-45.20			
		V _{-10%}	1.75		-45.20			

e.g : Deviation: $((2.82 - 3.19)/3.19) \times 100 \sim -11.7\%$

The measured conducted power in cl.3.1 of this test report is used for calculation.

Test Equipment Used: 1, 3, 5, 7, 8, 9

3.4 Frequency tolerance

ARIB T66 3.2 (4)

Frequency Tolerance						
Frquency (MHz)	V _{normal}		V _{-10%}		V _{+10%}	
	Measured Frequency (MHz)	Tolerance (ppm)	Measured Frequency (MHz)	Tolerance (ppm)	Measured Frequency (MHz)	Tolerance (ppm)
2405	2405.012 279	5.11	2405.013 411	5.58	2405.013 454	5.59
2440	2440.013 799	5.66	2440.013 608	5.58	2440.013 598	5.57
2480	2480.013 918	5.61	2480.013 829	5.58	2480.013 811	5.57

e.g. Frequency tolerance: $((2405.012\ 279/2405)-1) \times 10^6 = 5.11\ \text{ppm}$

Requirement: $\pm 50 \times 10^{-6}$

Test Equipment Used: 1, 3, 5, 7, 9

3.5 Spurious emission intensity

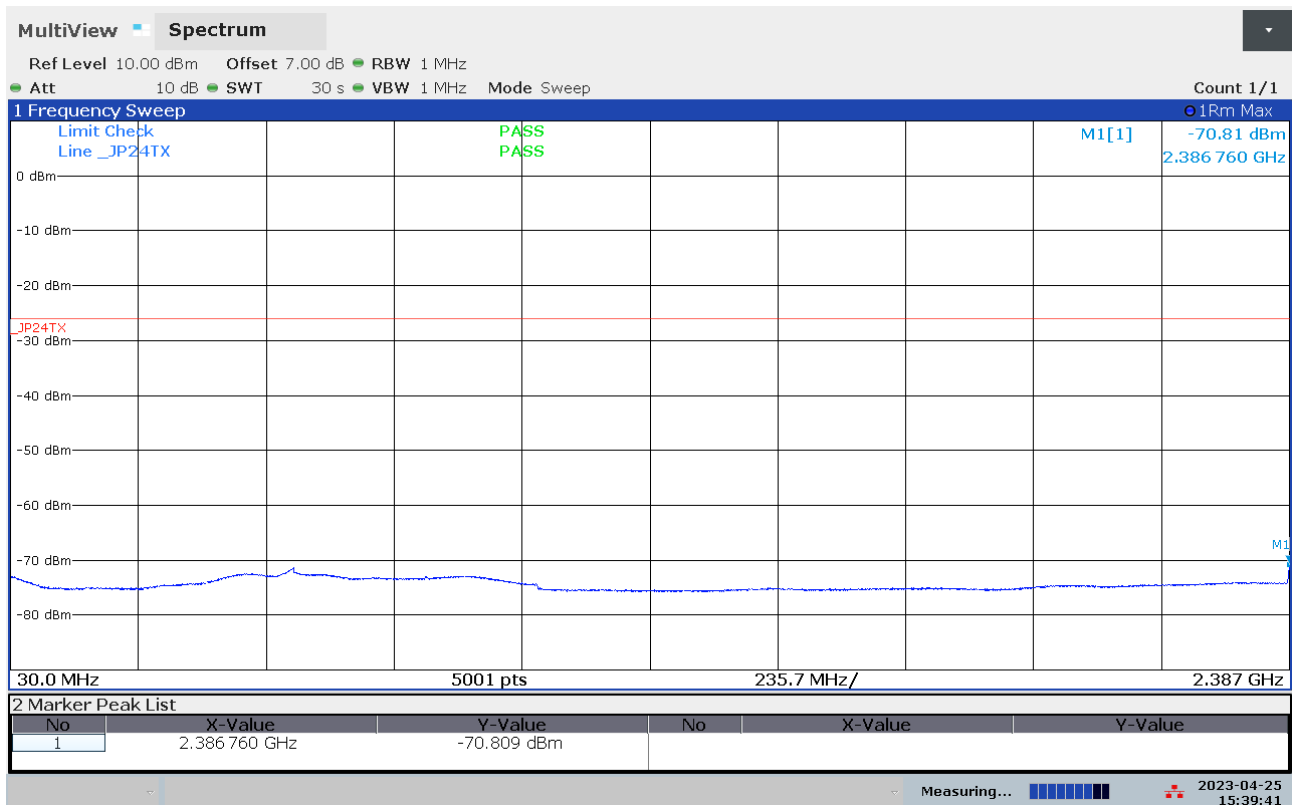
ARIB T66 3.2 (6)

Voltage (dc)	Emission frequency range (MHz)	Ch2405MHz			Requirement (μW // dBm) /MHz
		Highest Emission frequency (MHz)	Emission level (dBm/MHz)	Emission level (μW/MHz)	
V _{normal}	30MHz – 2387MHz	2386.76	-70.81	0.000	2.5 // -26
	2387MHz - 2400MHz	2399.99	-47.79	0.017	25 // -16
	2483.5MHz – 2496.5MHz	2485.69	-68.97	0.000	25 // -16
	2496.5MHz - 12500MHz	7990.30	-71.85	0.000	2.5 // -26
V _{-10%}	30MHz – 2387MHz	2386.76	-70.75	0.000	2.5 // -26
	2387MHz - 2400MHz	2400.00	-47.76	0.017	25 // -16
	2483.5MHz – 2496.5MHz	2485.78	-68.97	0.000	25 // -16
	2496.5MHz - 12500MHz	7988.30	-71.84	0.000	2.5 // -26
V _{+10%}	30MHz – 2387MHz	2386.76	-70.72	0.000	2.5 // -26
	2387MHz - 2400MHz	2400.00	-47.76	0.017	25 // -16
	2483.5MHz – 2496.5MHz	2485.79	-69.02	0.000	25 // -16
	2496.5MHz - 12500MHz	7810.30	-71.86	0.000	2.5 // -26

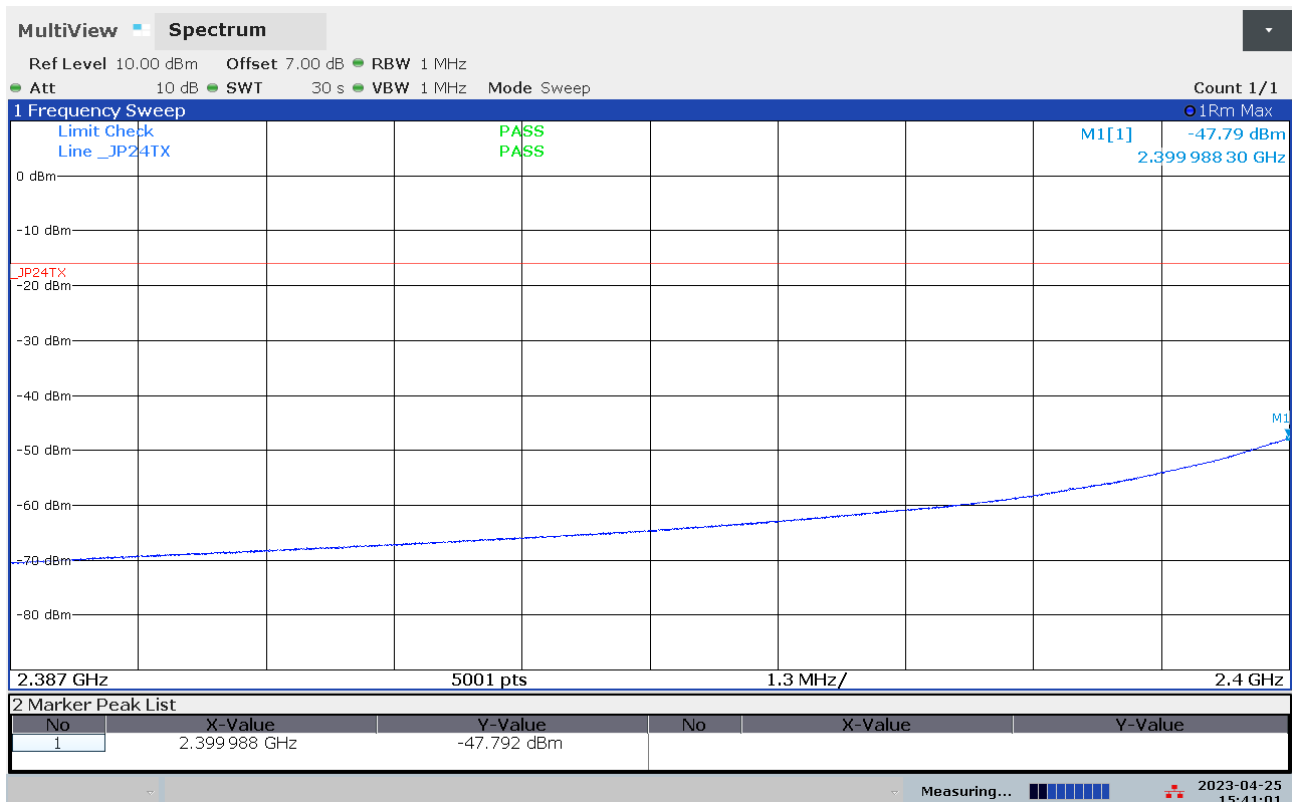
Spectrum analyser settings	
Detector	RMS Max peak
Resolution BW	1 MHz
Video BW	1 MHz
Sweep Time	See plots
Sweep Points	See plots
Trace Mode	Max Hold

The cable loss and attenuator loss are taken into considerations for measured power.
The EUT was in test mode with continuous modulated signal.

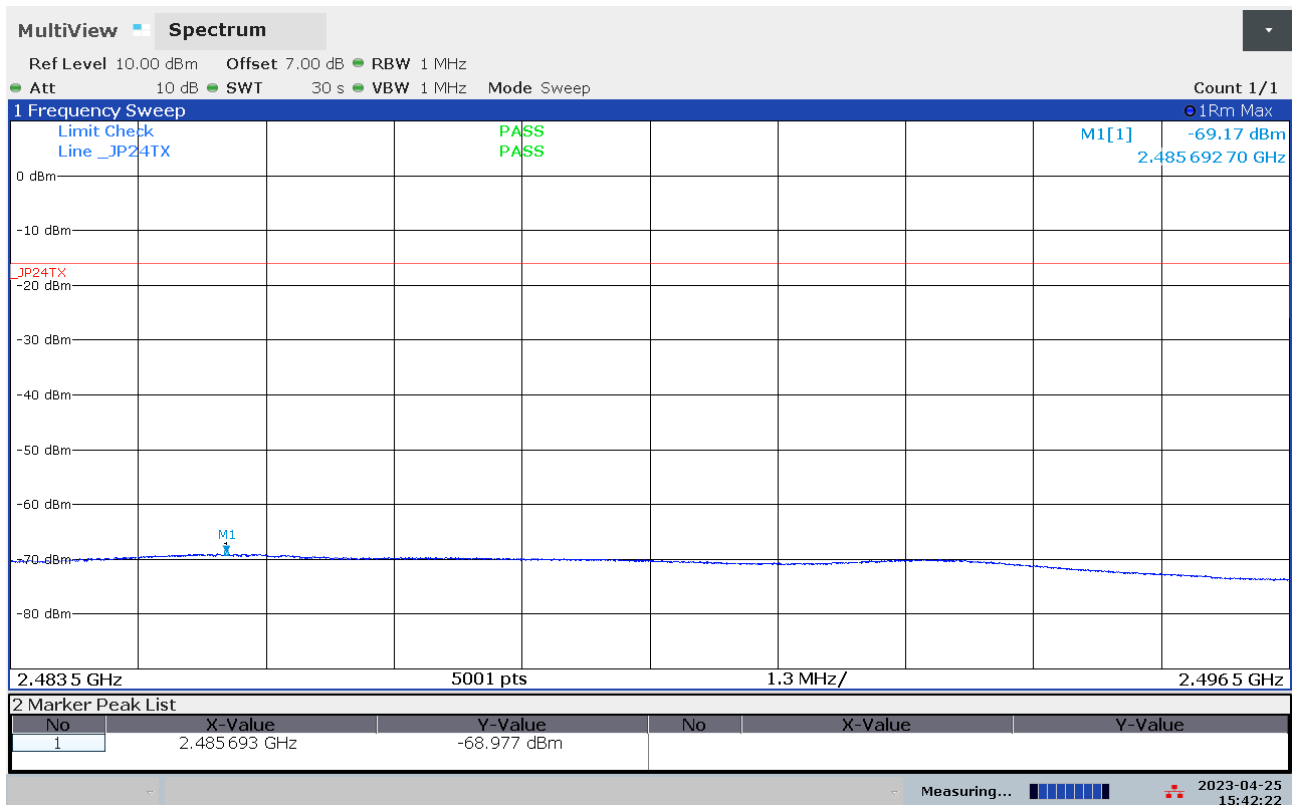
Test Equipment Used: 1, 3, 5, 7, 9



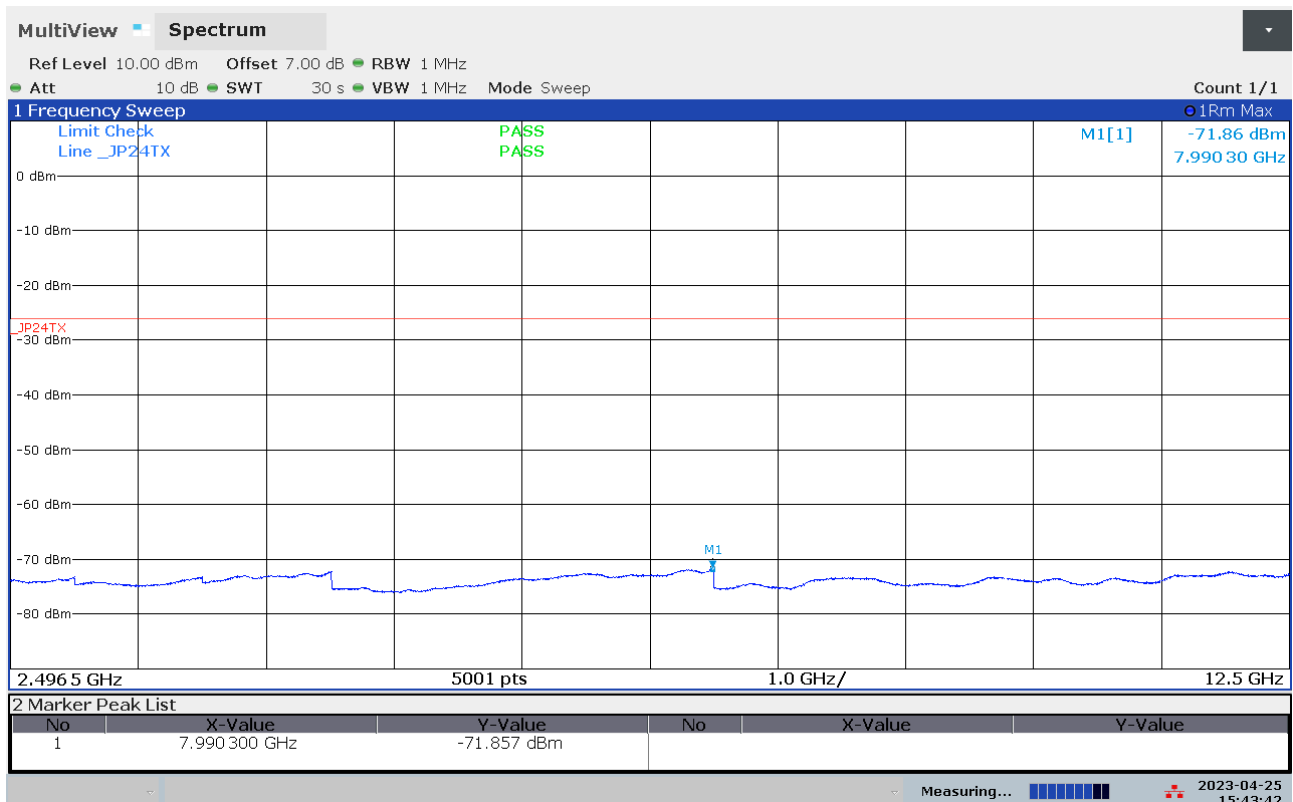
V_{normal} , Ch2405MHz, Spurious emission 30MHz – 2387MHz



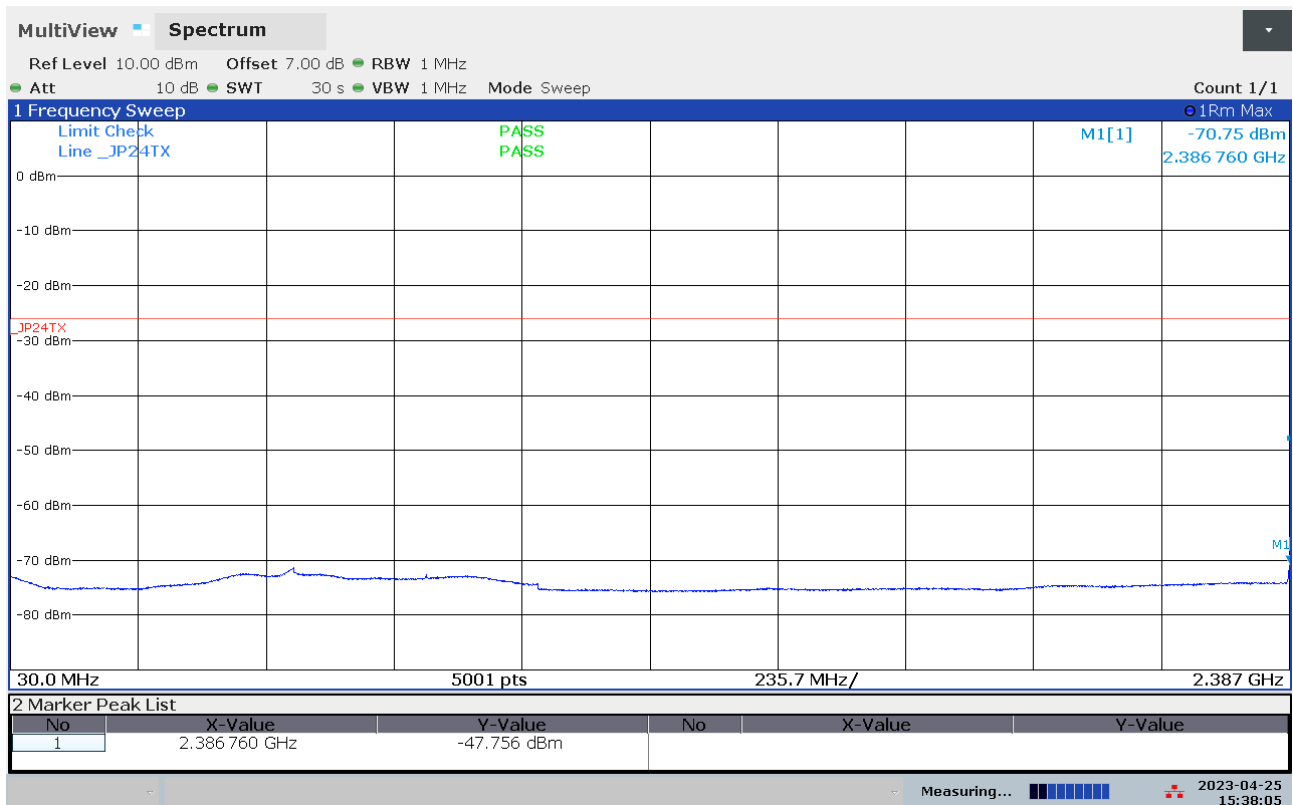
V_{normal} , Ch2405MHz, Spurious emission 2387MHz – 2400MHz



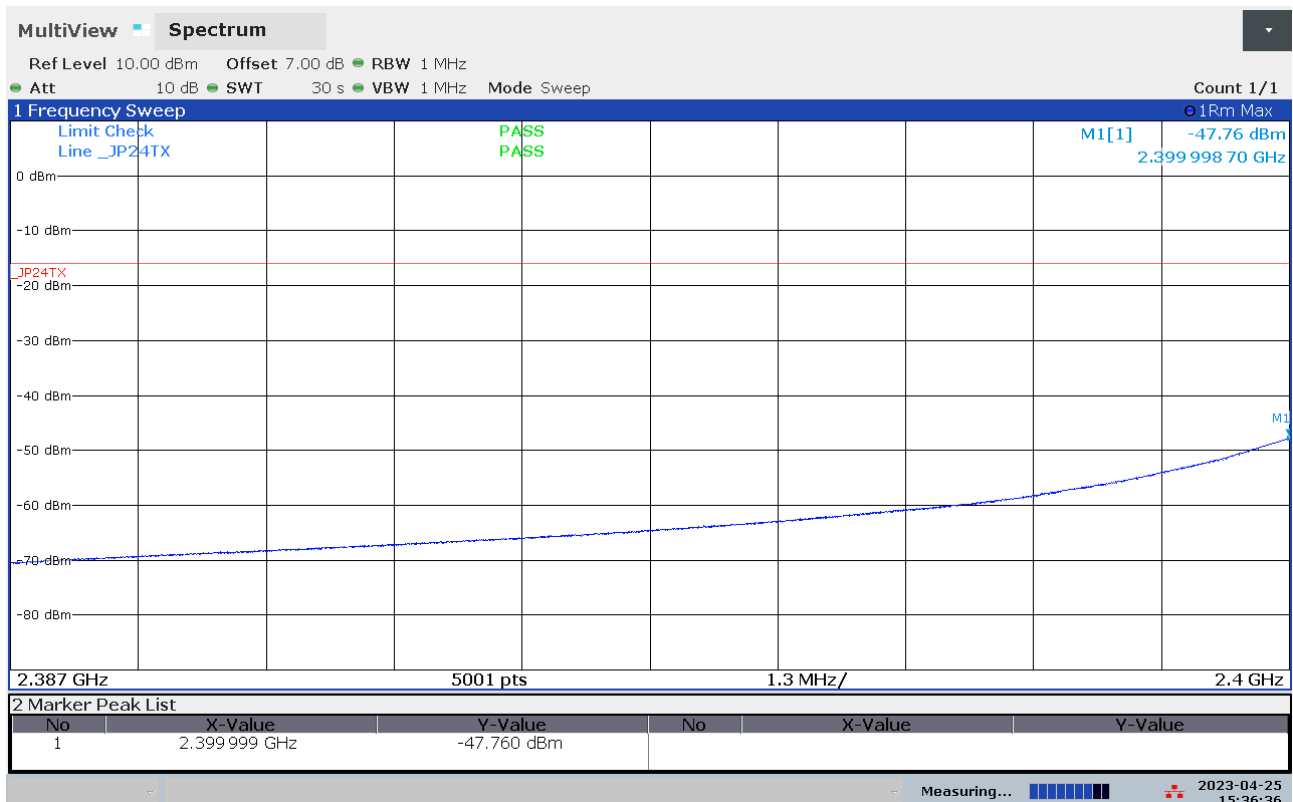
V_{normal} , Ch2405MHz, Spurious emission 2483.5 – 2496.5 MHz



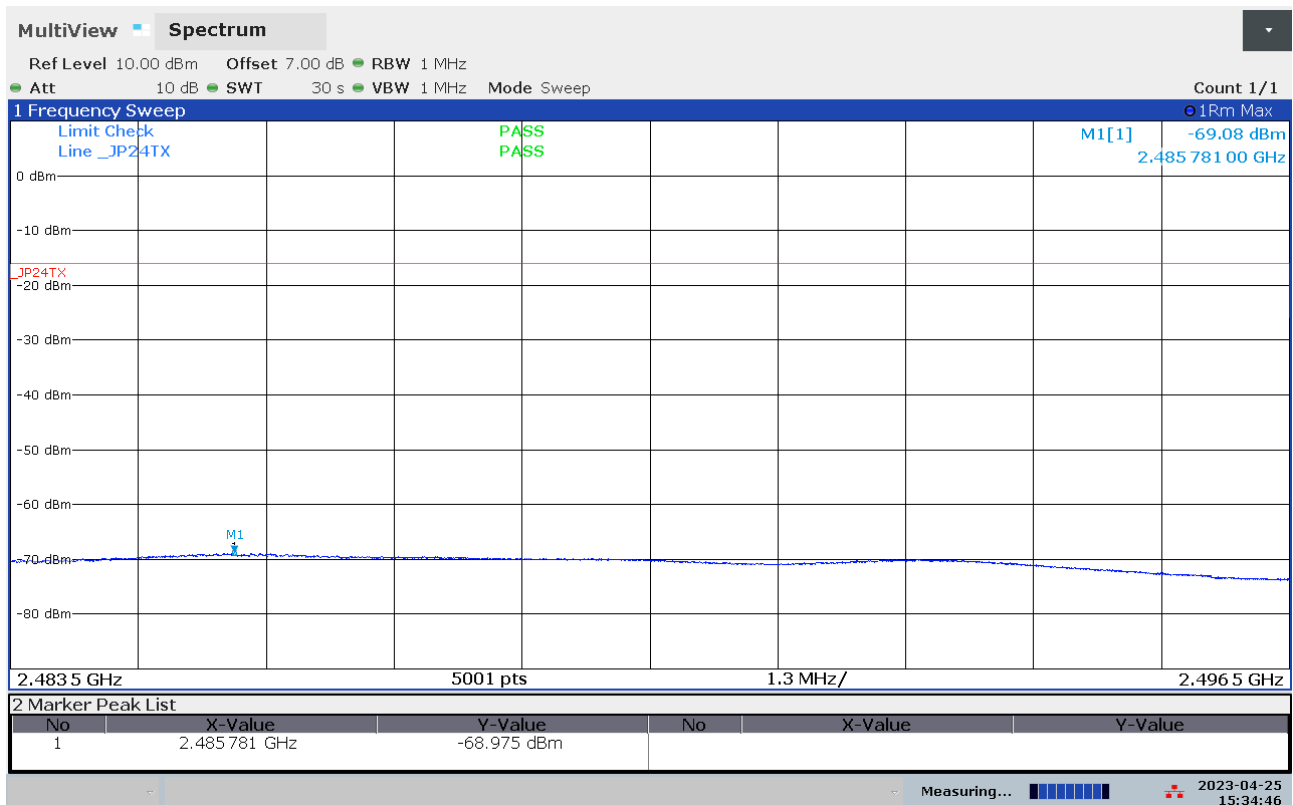
V_{normal} , Ch2405MHz, Spurious emission 2496.5 - 12500 MHz



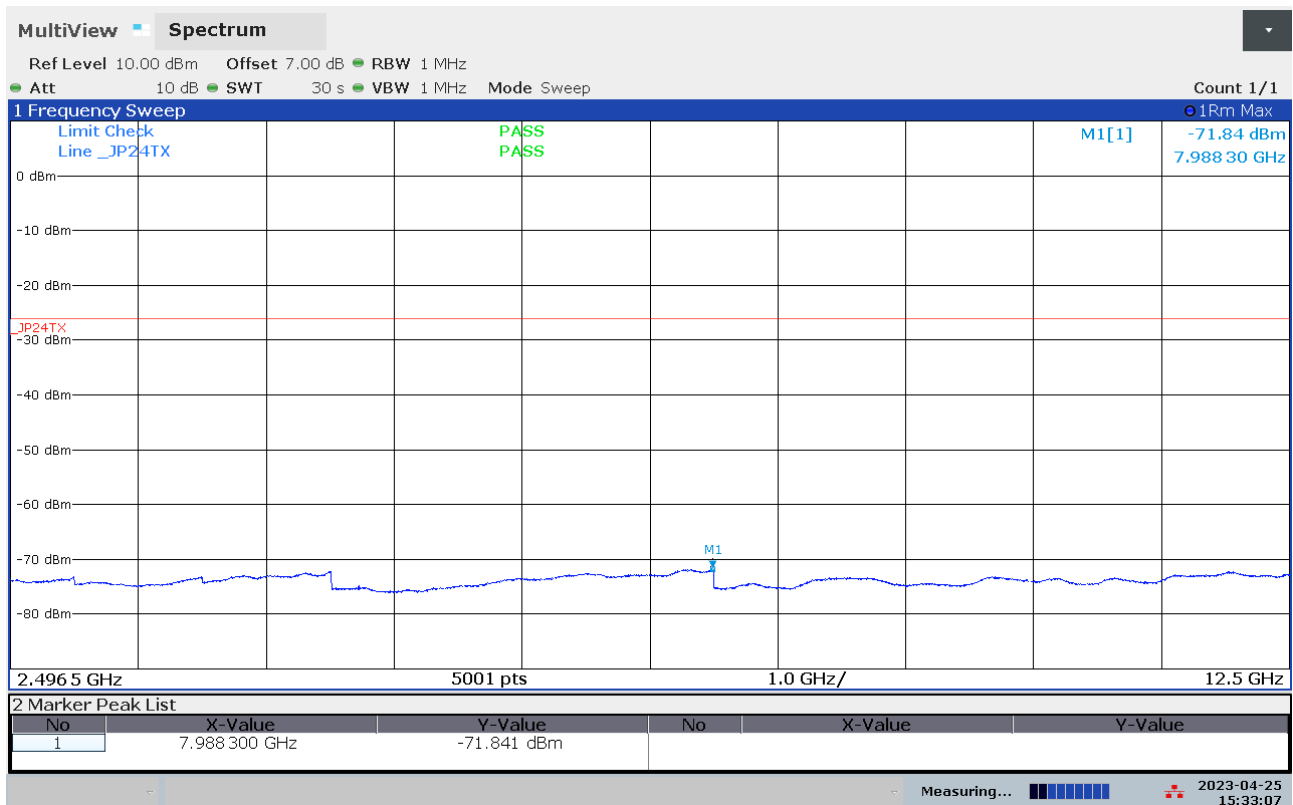
V-10% , Ch2405MHz, Spurious emission 30MHz – 2387MHz



V-10% , Ch2405MHz, Spurious emission 2387MHz – 2400MHz



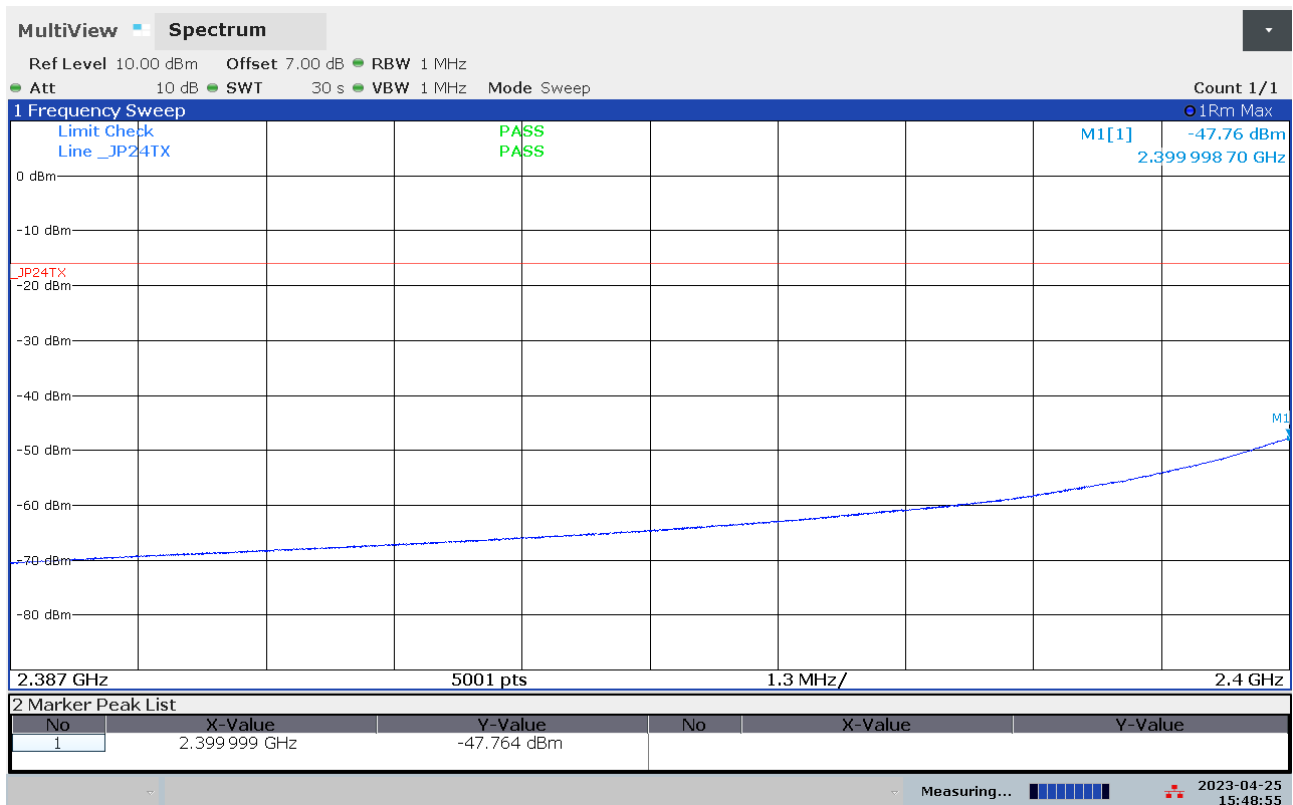
V-10% , Ch2405MHz, Spurious emission 2483.5 – 2496.5 MHz



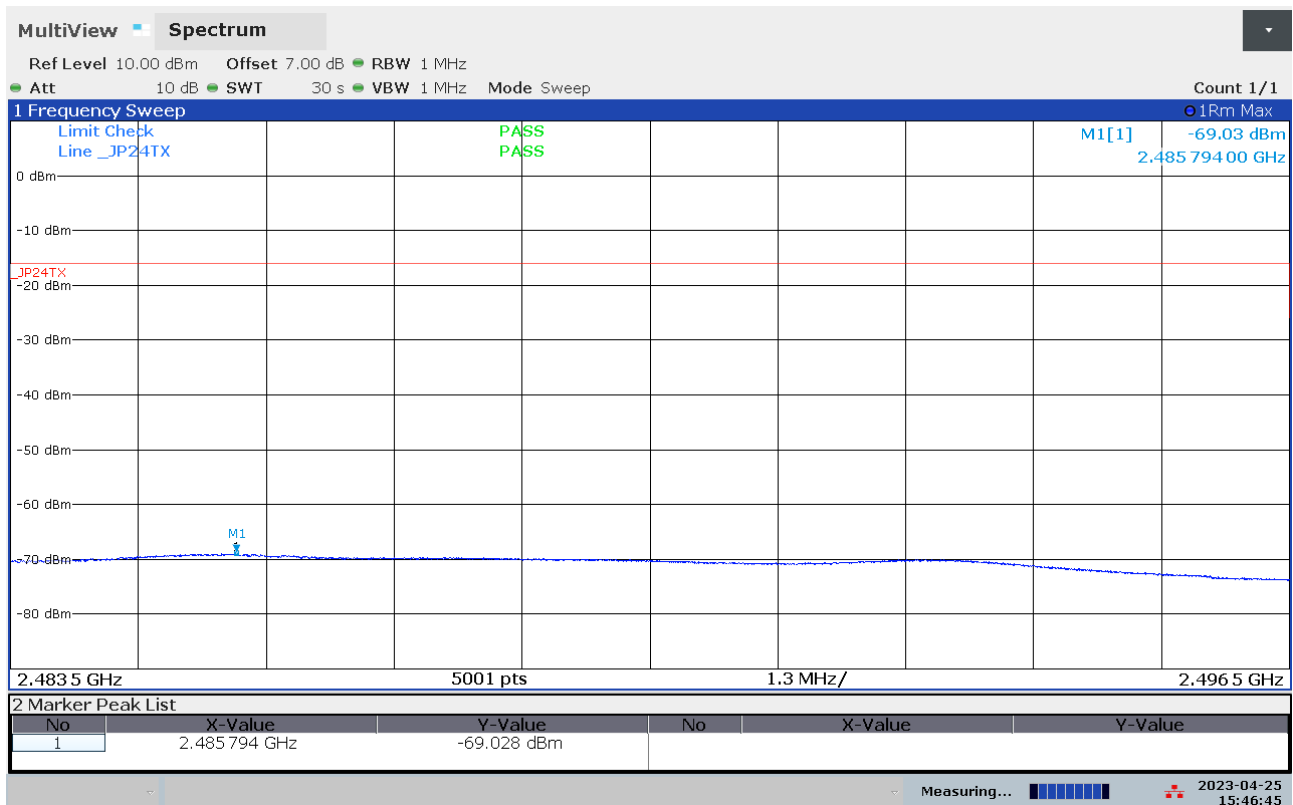
V-10% , Ch2405MHz, Spurious emission 2496.5 - 12500 MHz



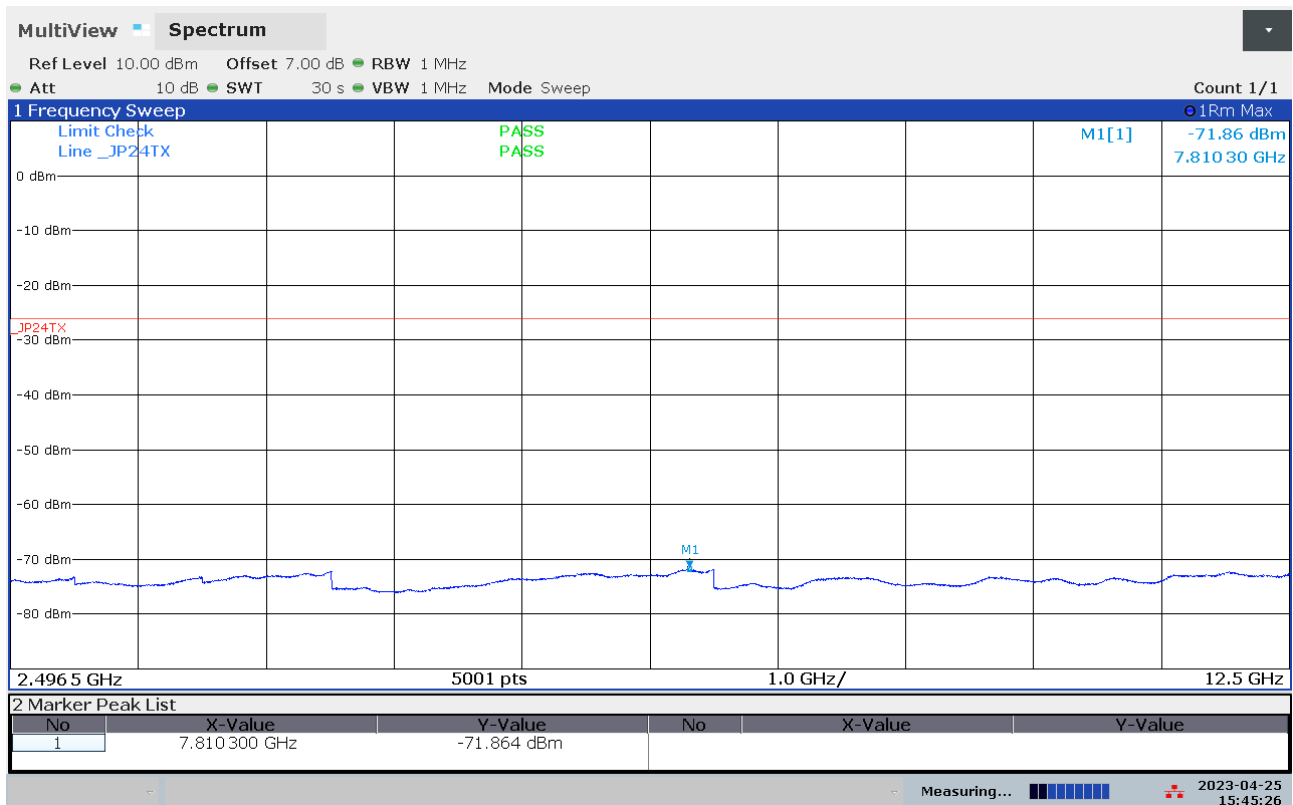
V+10% , Ch2405MHz, Spurious emission 30MHz – 2387MHz



V+10% , Ch2405MHz, Spurious emission 2387MHz – 2400MHz



V+10% , Ch2405MHz, Spurious emission 2483.5 – 2496.5 MHz



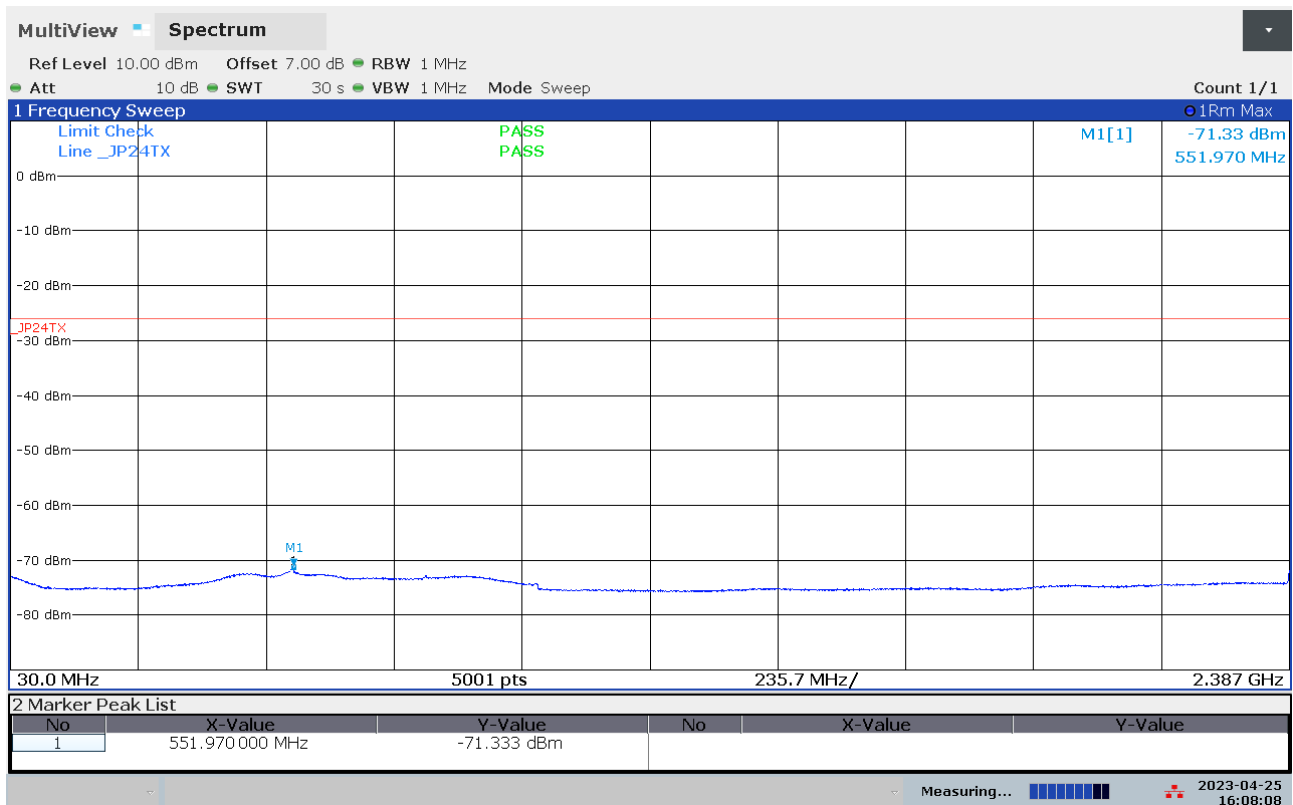
V+10% , Ch2405MHz, Spurious emission 2496.5 - 12500 MHz

Voltage (dc)	Emission frequency range (MHz)	Ch2440MHz			Requirement (μW // dBm) /MHz
		Highest Emission frequency (MHz)	Emission level (dBm/MHz)	Emission level (μW/MHz)	
V _{normal}	30MHz – 2387MHz	551.97	-71.33	0.000	2.5 // -26
	2387MHz - 2400MHz	2399.97	-69.70	0.000	25 // -16
	2483.5MHz – 2496.5MHz	2484.24	-70.41	0.000	25 // -16
	2496.5MHz - 12500MHz	7998.30	-71.85	0.000	2.5 // -26
V _{-10%}	30MHz – 2387MHz	551.50	-71.38	0.000	2.5 // -26
	2387MHz - 2400MHz	2399.94	-69.68	0.000	25 // -16
	2483.5MHz – 2496.5MHz	2484.62	-70.41	0.000	25 // -16
	2496.5MHz - 12500MHz	7998.30	-71.86	0.000	2.5 // -26
V _{+10%}	30MHz – 2387MHz	551.97	-71.40	0.000	2.5 // -26
	2387MHz - 2400MHz	2399.82	-69.74	0.000	25 // -16
	2483.5MHz – 2496.5MHz	2485.04	-70.43	0.000	25 // -16
	2496.5MHz - 12500MHz	7994.30	-71.88	0.000	2.5 // -26

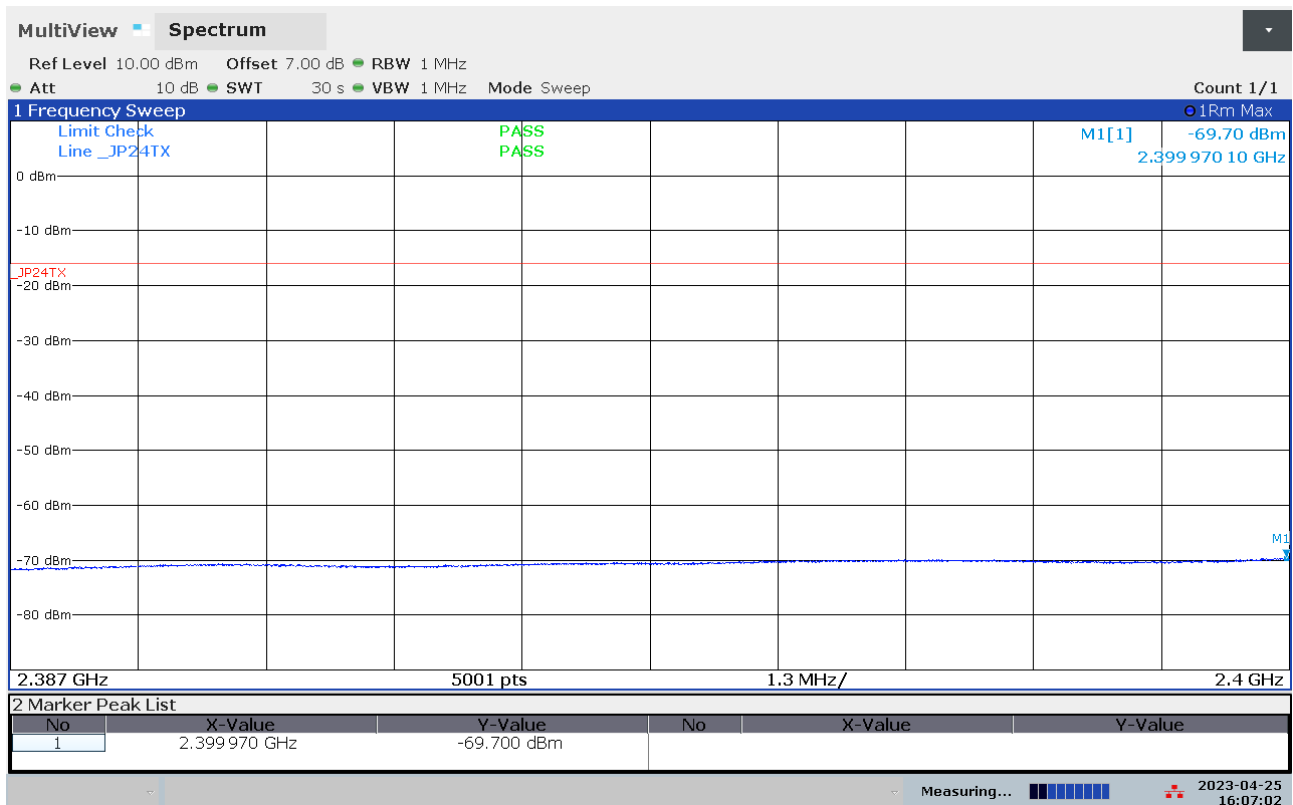
Spectrum analyser settings	
Detector	RMS Max peak
Resolution BW	1 MHz
Video BW	1 MHz
Sweep Time	See plots
Sweep Points	See plots
Trace Mode	Max Hold

The cable loss and attenuator loss are taken into considerations for measured power.
The EUT was in test mode with continuous modulated signal.

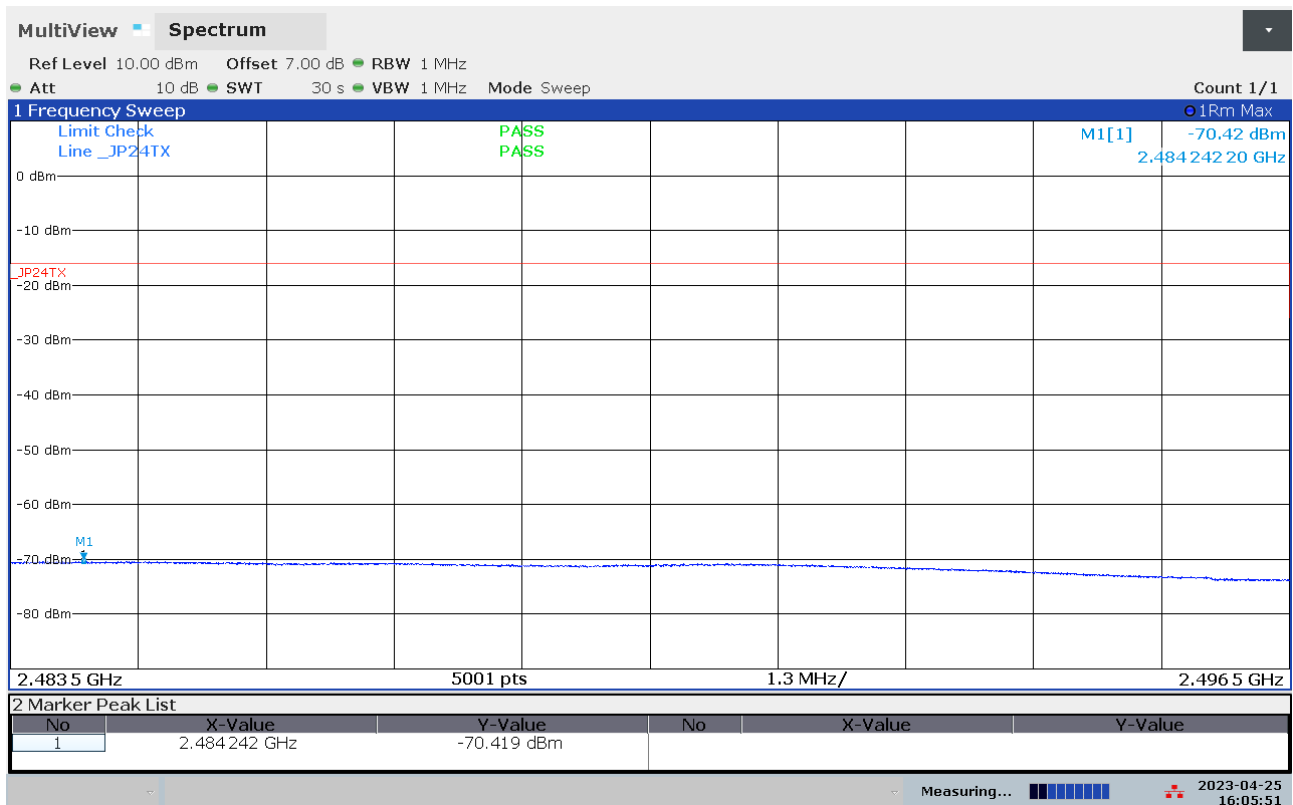
Test Equipment Used: 1, 3, 5, 7, 9



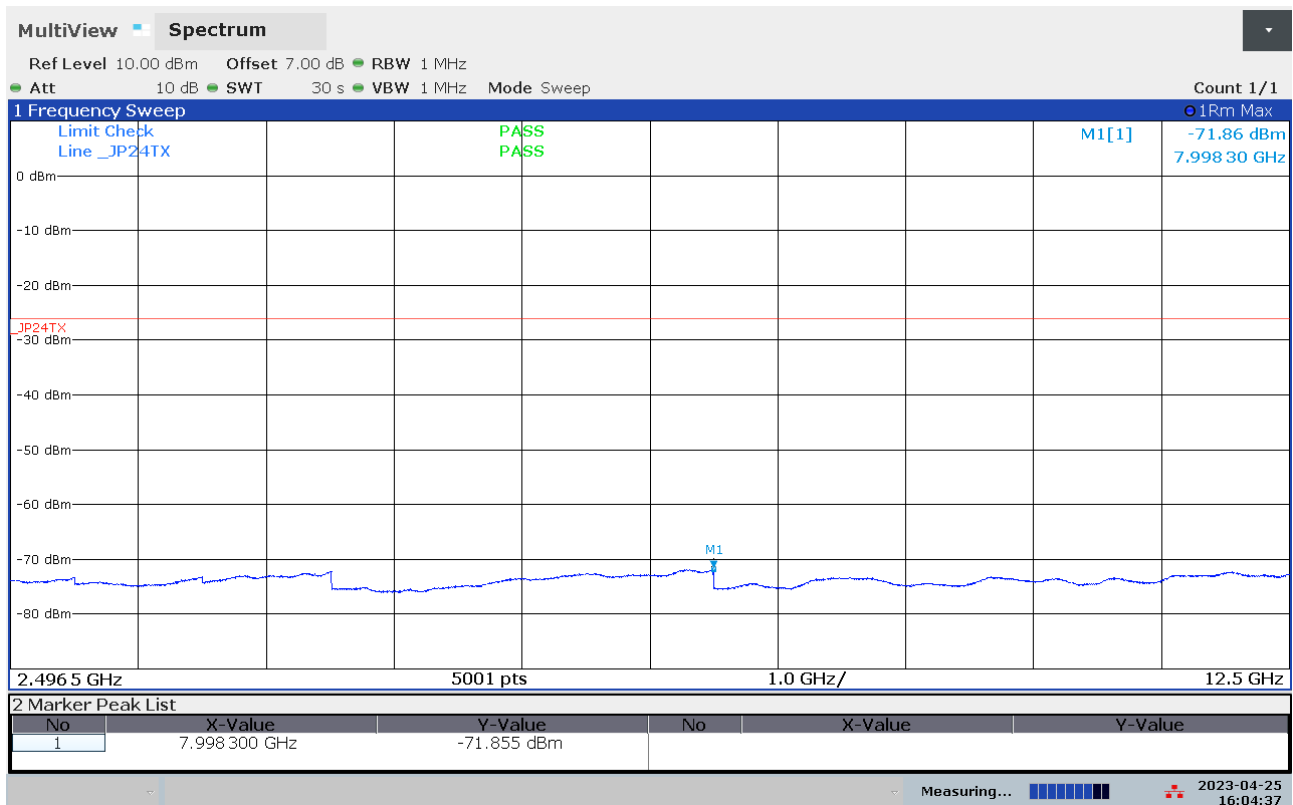
V_{normal} , Ch2440MHz, Spurious emission 30MHz – 2387MHz



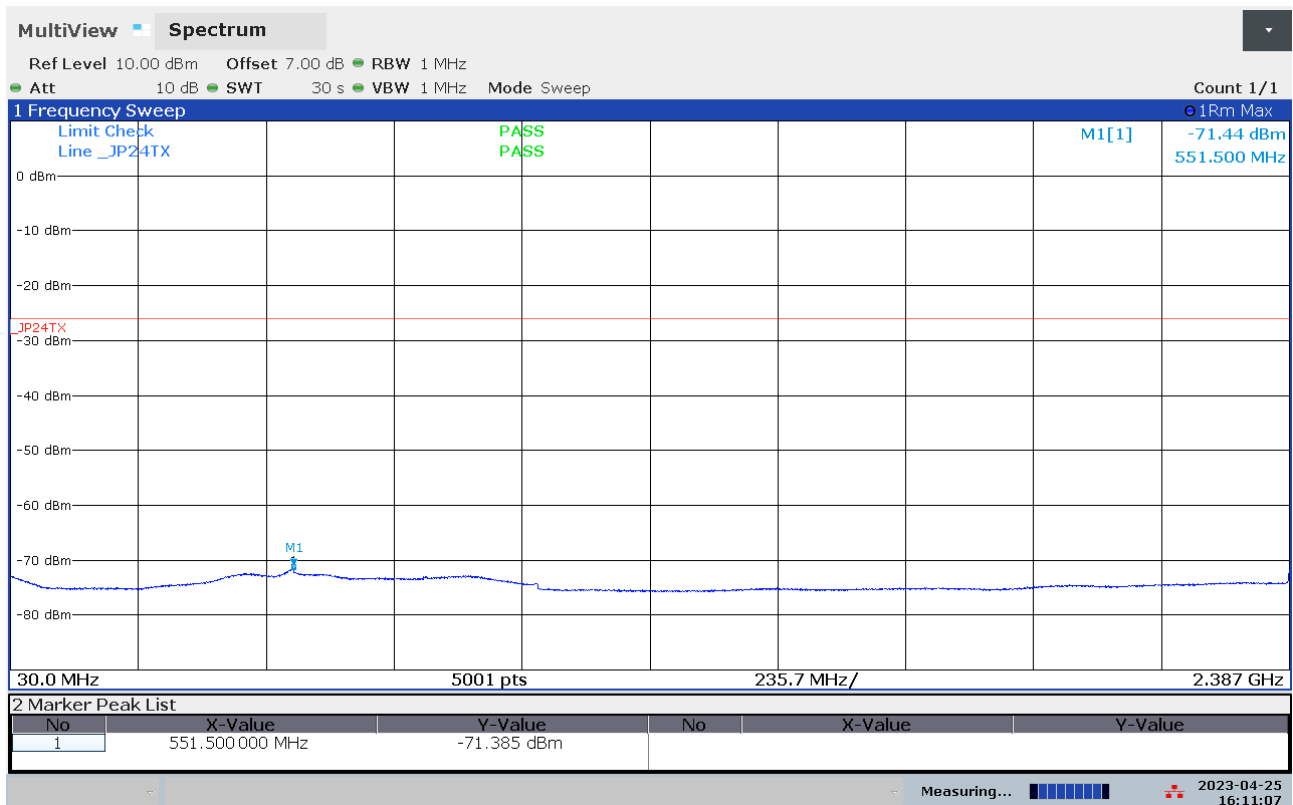
V_{normal} , Ch2440MHz, Spurious emission 2387MHz – 2400MHz



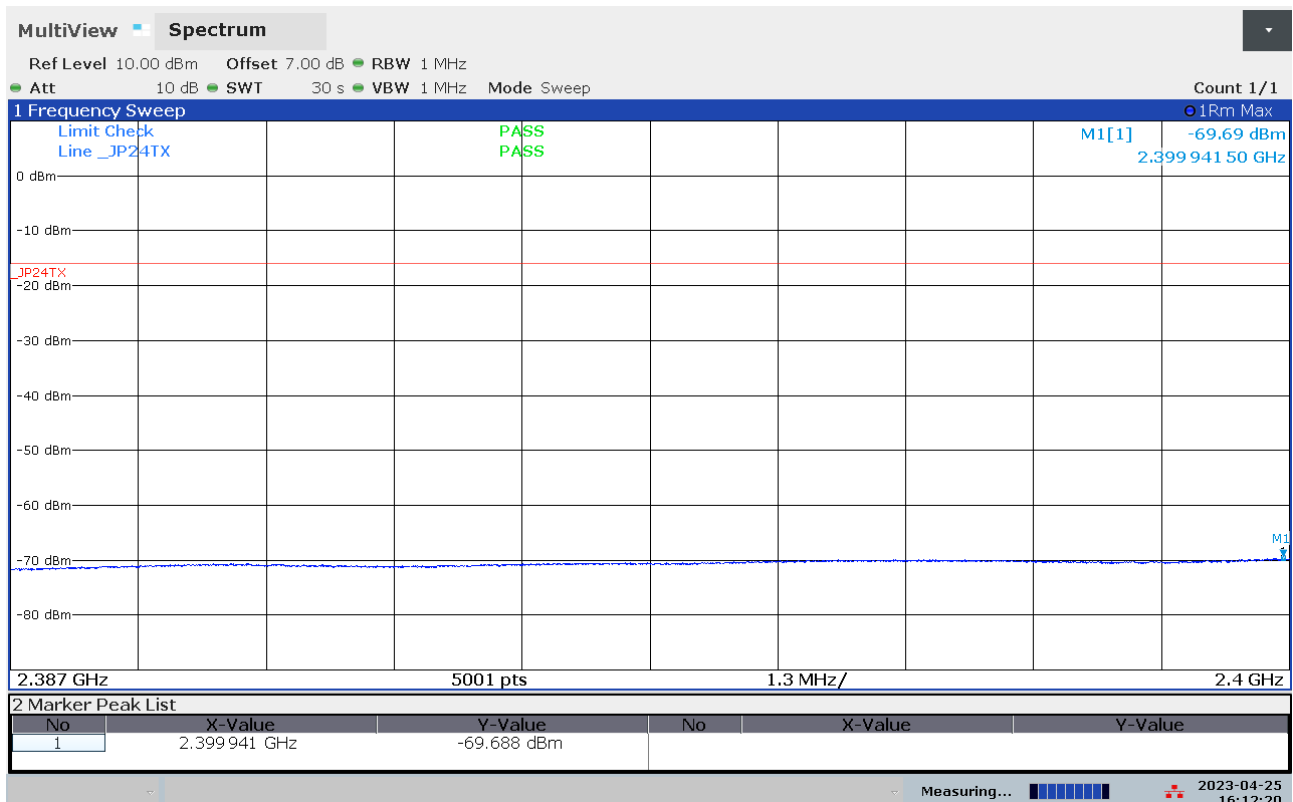
V_{normal} , Ch2440MHz, Spurious emission 2483.5 – 2496.5 MHz



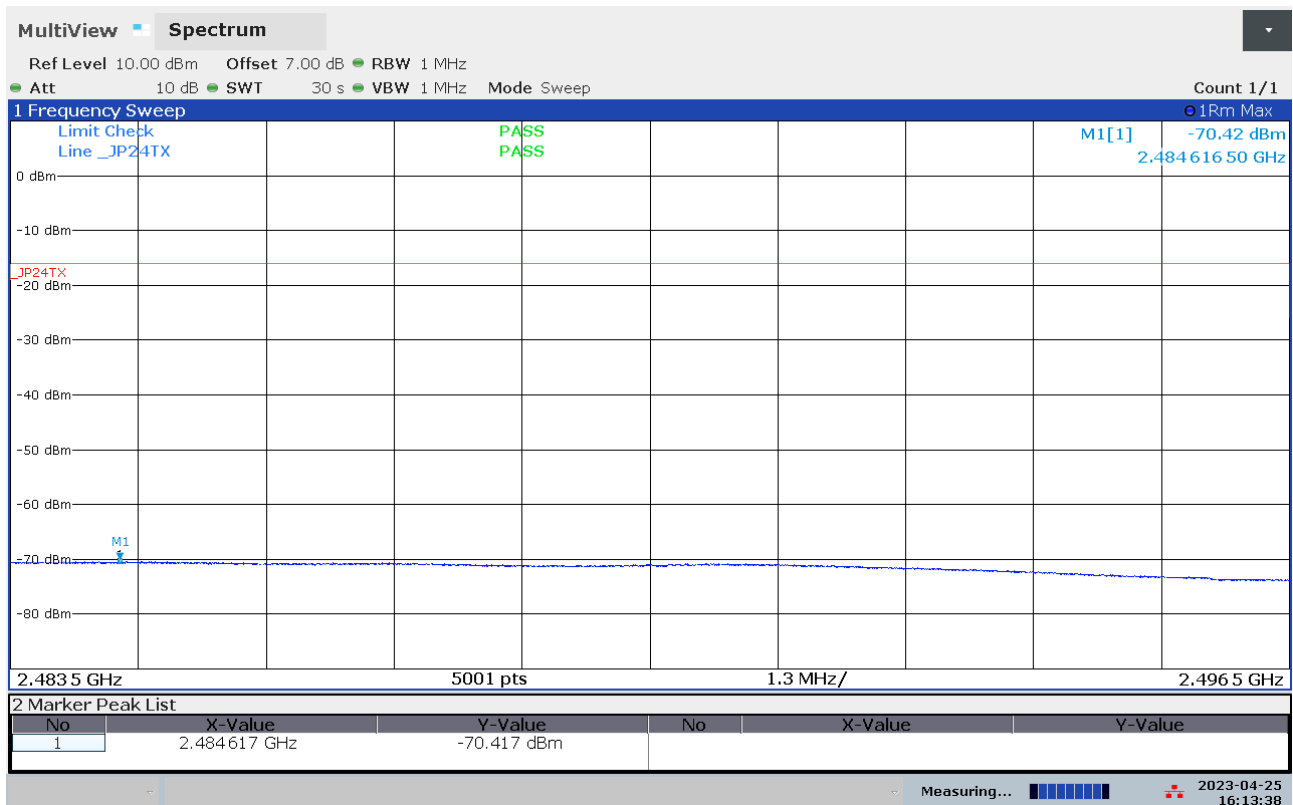
V_{normal} , Ch2440MHz, Spurious emission 2496.5 - 12500 MHz



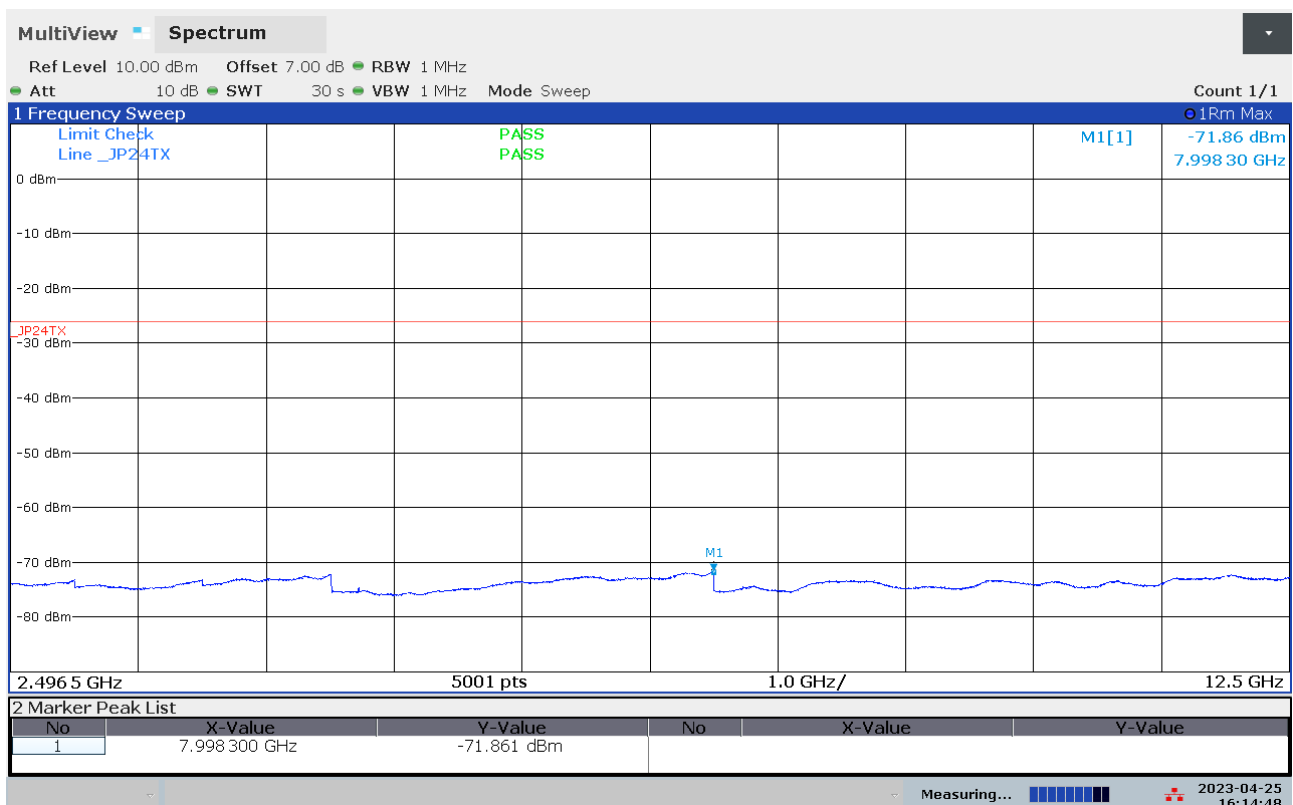
V-10% , Ch2440MHz, Spurious emission 30MHz – 2387MHz



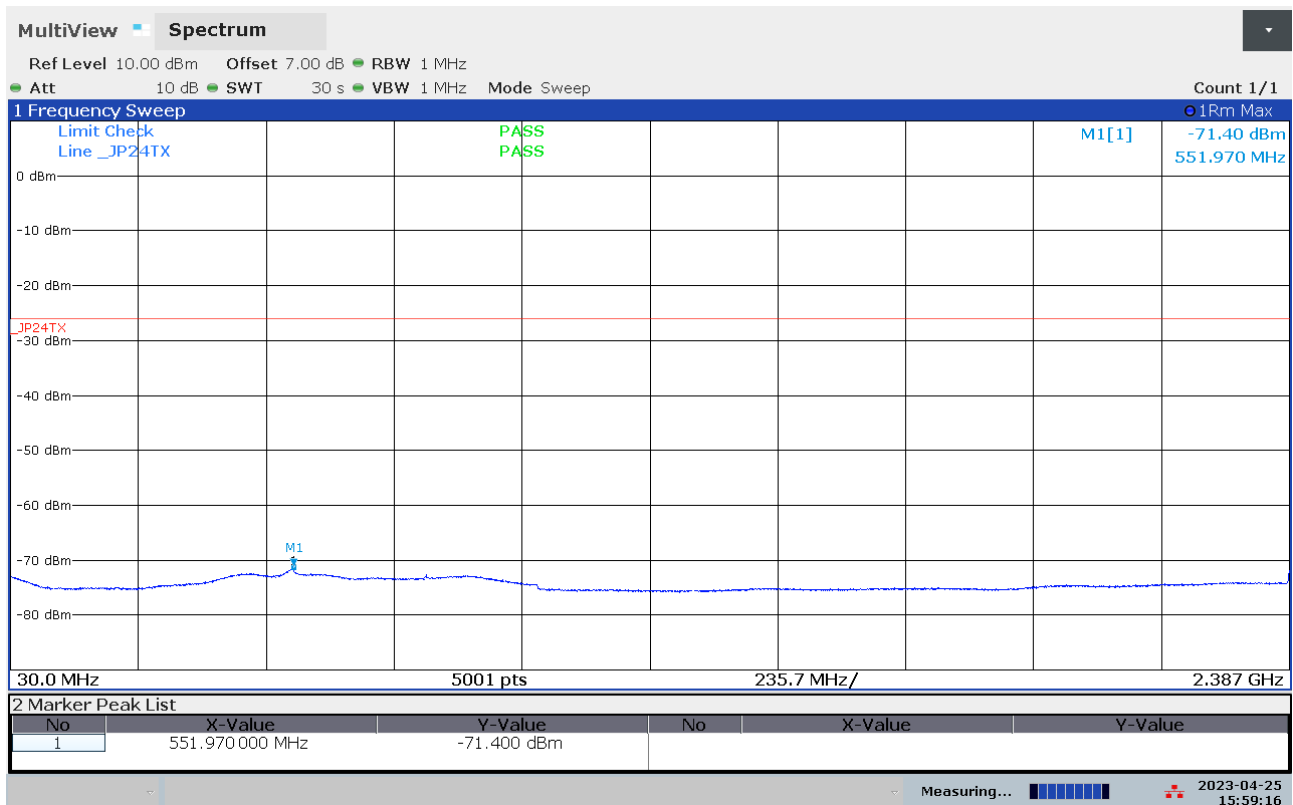
V-10% , Ch2440MHz, Spurious emission 2387MHz – 2400MHz



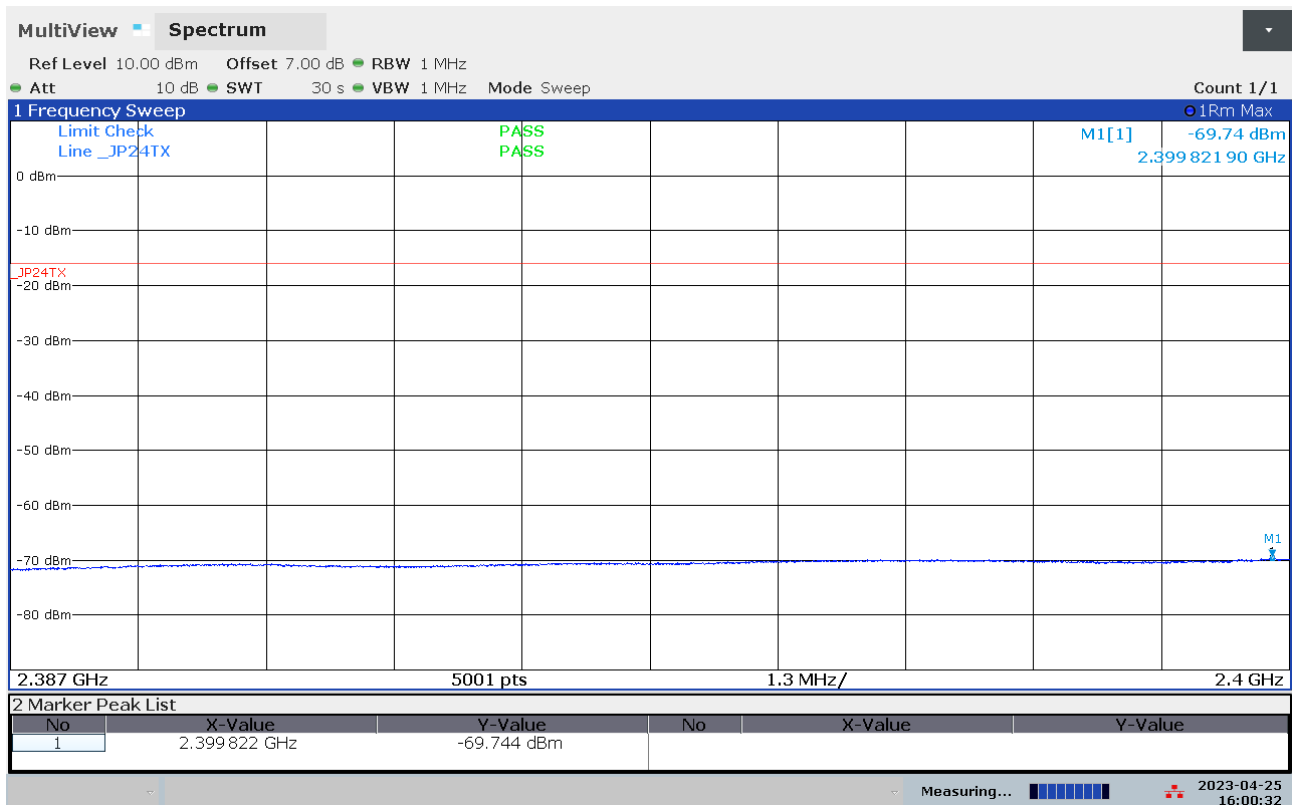
V-10% , Ch2440MHz, Spurious emission 2483.5 – 2496.5 MHz



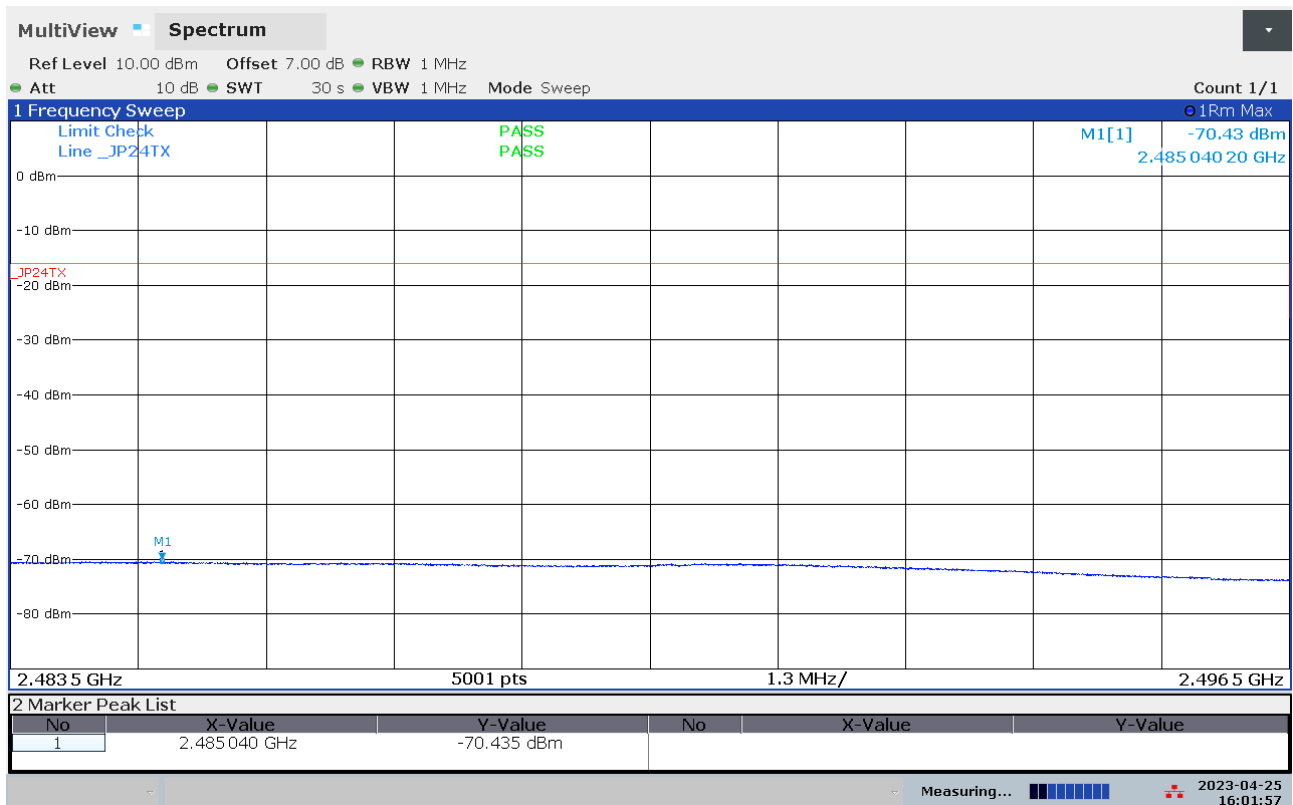
V-10% , Ch2440MHz, Spurious emission 2496.5 - 12500 MHz



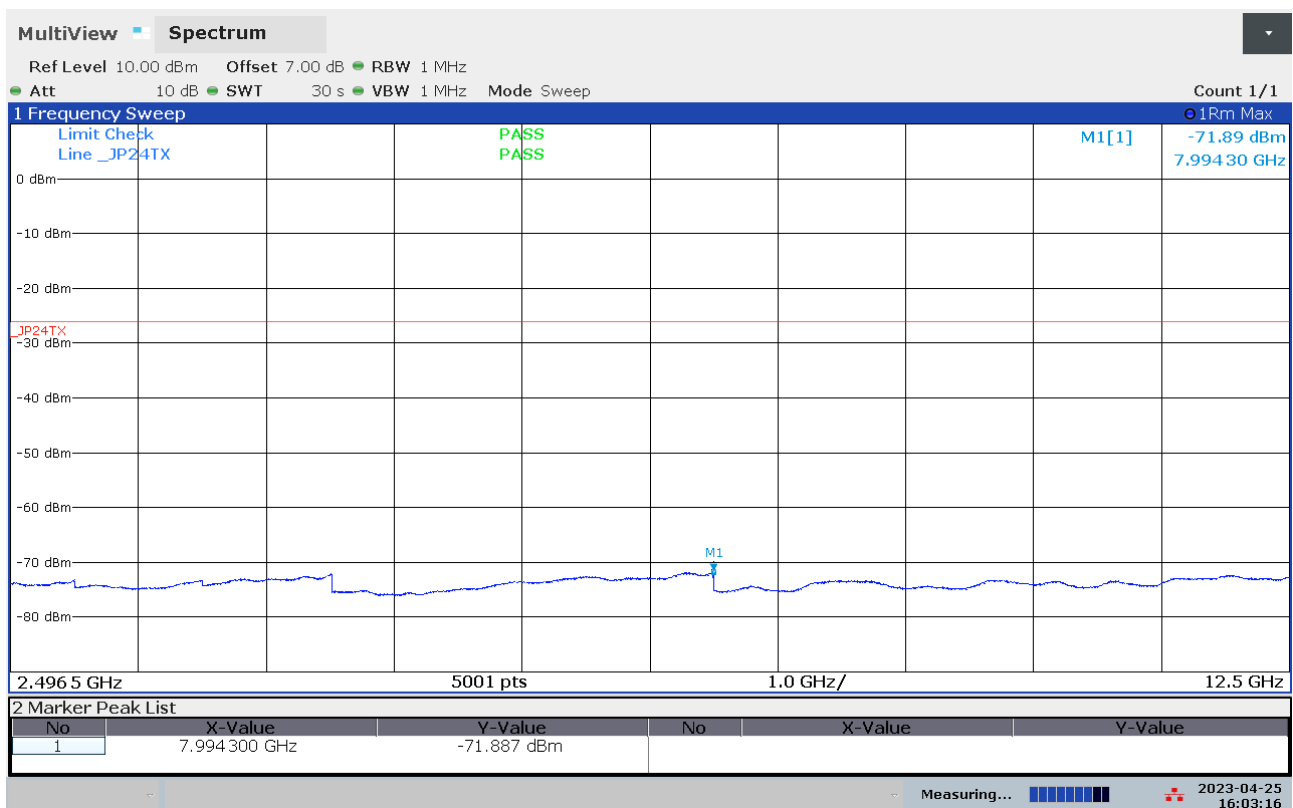
V+10% , Ch2440MHz, Spurious emission 30MHz – 2387MHz



V+10% , Ch2440MHz, Spurious emission 2387MHz – 2400MHz



V+10% , Ch2440MHz, Spurious emission 2483.5 – 2496.5 MHz



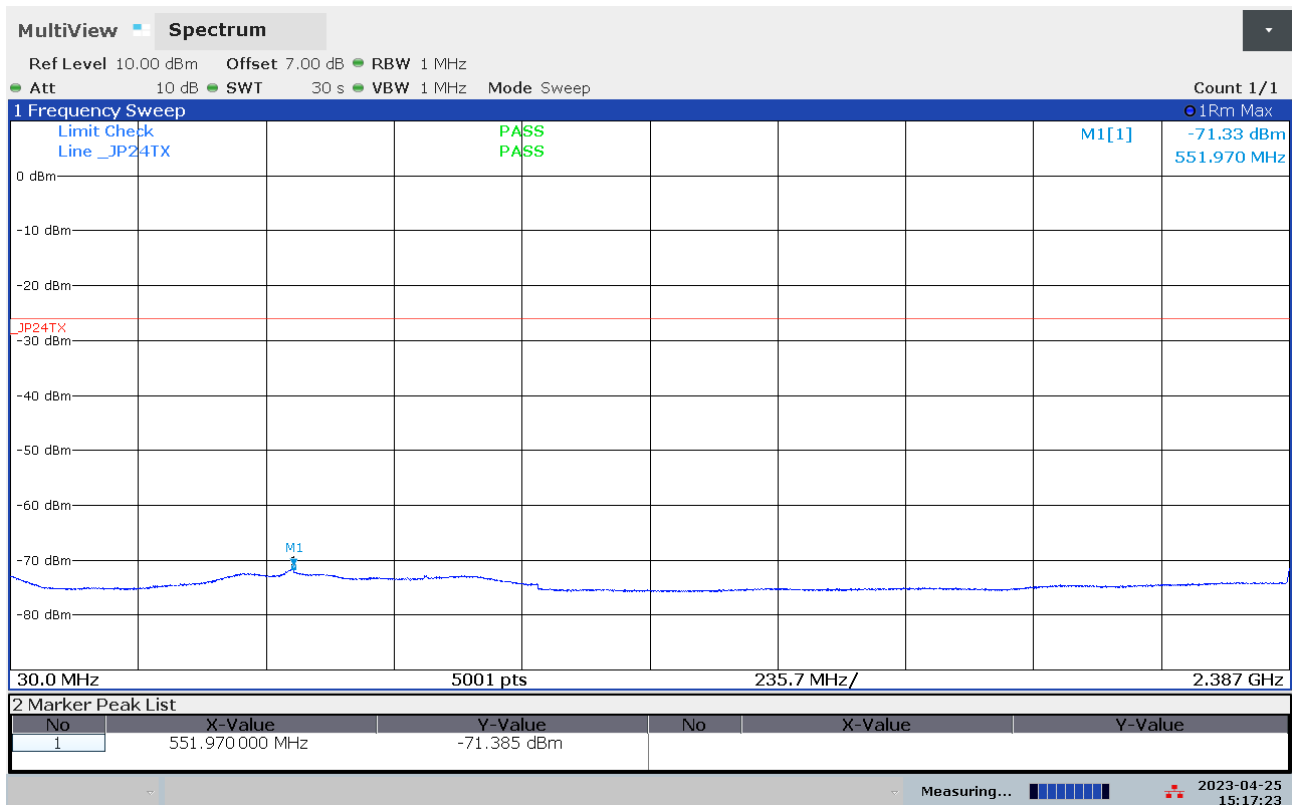
V+10% , Ch2440MHz, Spurious emission 2496.5 - 12500 MHz

Voltage (dc)	Emission frequency range (MHz)	Ch2480MHz			Requirement (μW // dBm) /MHz
		Highest Emission frequency (MHz)	Emission level (dBm/MHz)	Emission level (μW/MHz)	
V _{normal}	30MHz – 2387MHz	551.97	-71.38	0.000	2.5 // -26
	2374MHz - 2400MHz	2391.83	-67.74	0.000	25 // -16
	2483.5MHz – 2496.5MHz	2483.50	-38.68	0.136	25 // -16
	2496.5MHz - 12500MHz	7990.30	-71.87	0.000	2.5 // -26
V _{-10%}	30MHz – 2387MHz	551.97	-71.30	0.000	2.5 // -26
	2374MHz - 2400MHz	2391.83	-67.73	0.000	25 // -16
	2483.5MHz – 2496.5MHz	2483.50	-38.66	0.136	25 // -16
	2496.5MHz - 12500MHz	7992.30	-71.85	0.000	2.5 // -26
V _{+10%}	30MHz – 2387MHz	2386.76	-71.31	0.000	2.5 // -26
	2374MHz - 2400MHz	2.391.81	-67.75	0.000	25 // -16
	2483.5MHz – 2496.5MHz	2483.50	-38.70	0.135	25 // -16
	2496.5MHz - 12500MHz	7998.30	-71.84	0.000	2.5 // -26

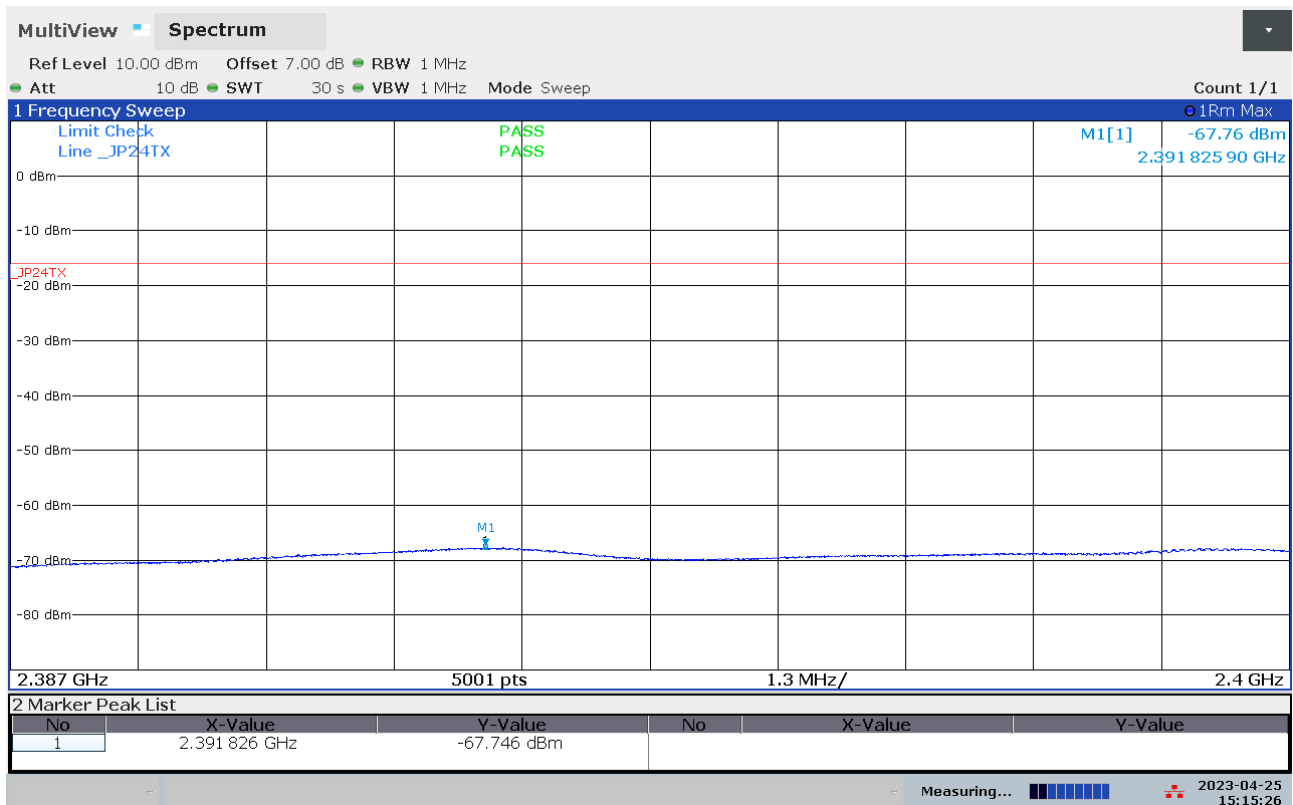
Spectrum analyser settings	
Detector	RMS Max peak
Resolution BW	1 MHz
Video BW	1 MHz
Sweep Time	See plots
Sweep Points	See plots
Trace Mode	Max Hold

The cable loss and attenuator loss are taken into considerations for measured power.
The EUT was in test mode with continuous modulated signal.

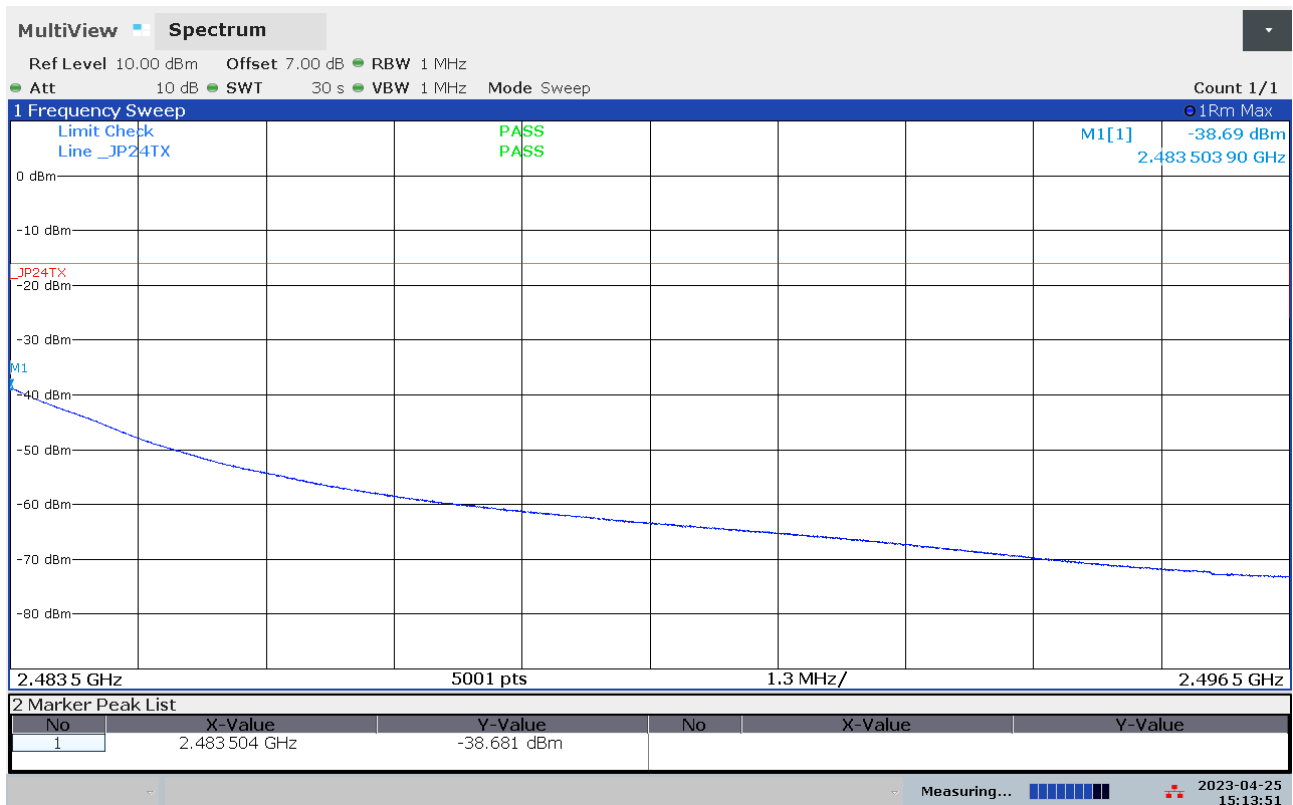
Test Equipment Used: 1, 3, 5, 7, 9



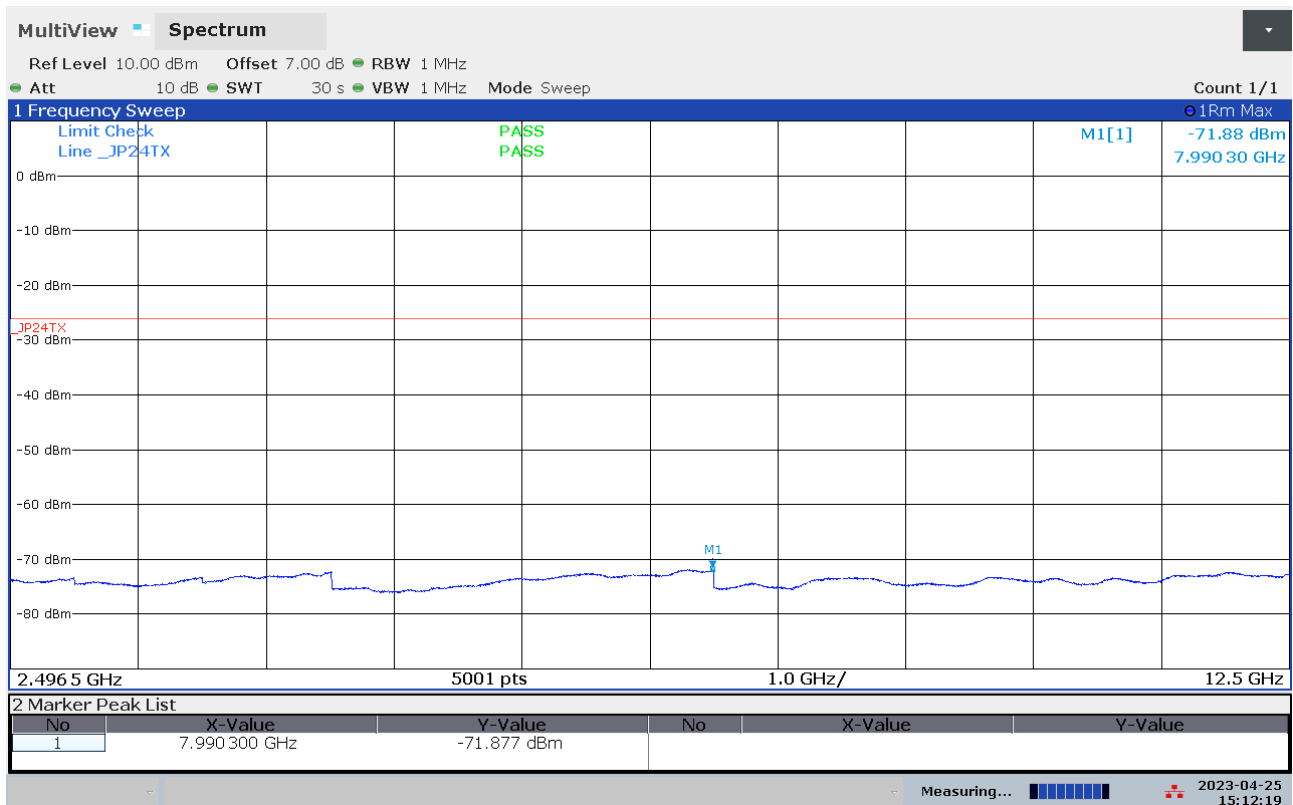
V_{normal} , Ch2480MHz, Spurious emission 30MHz – 2387MHz



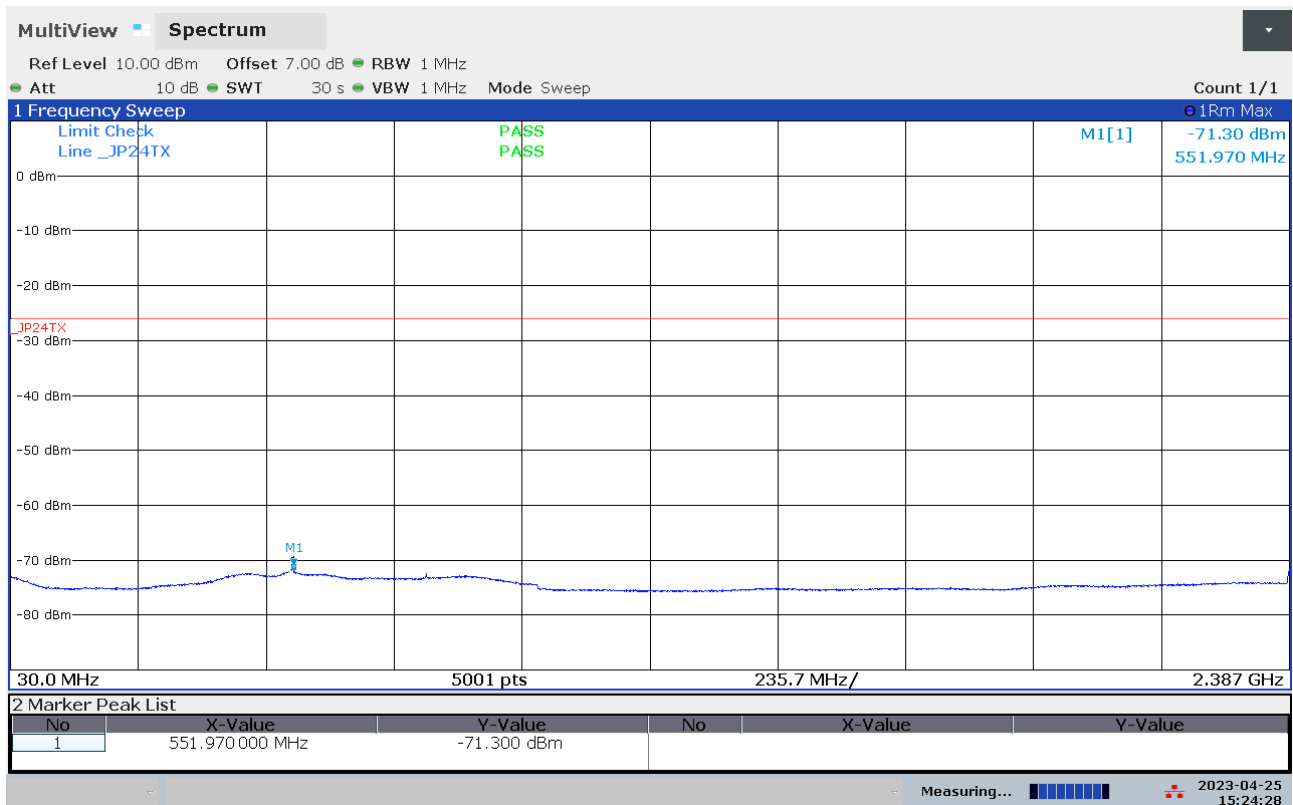
V_{normal} , Ch2480MHz, Spurious emission 2387MHz – 2400MHz



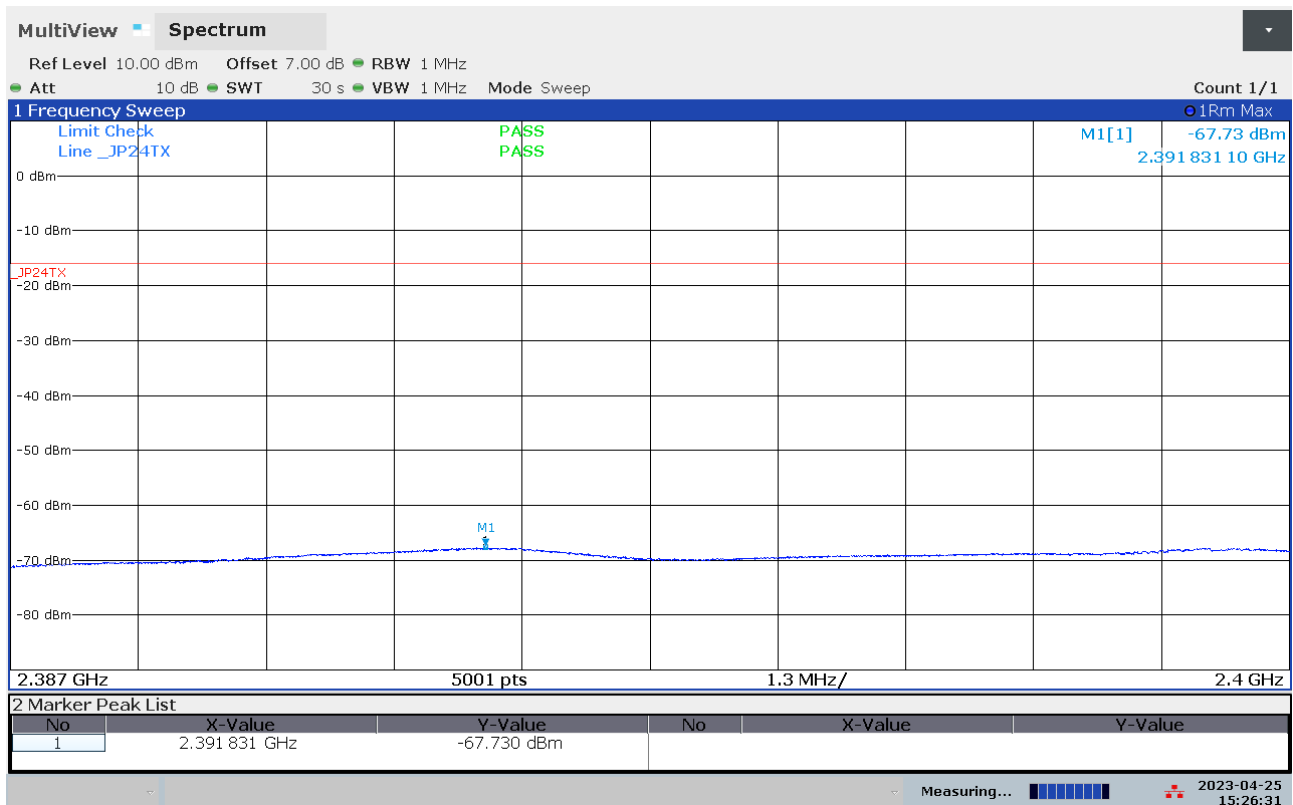
V_{normal} , Ch2480MHz, Spurious emission 2483.5 – 2496.5 MHz



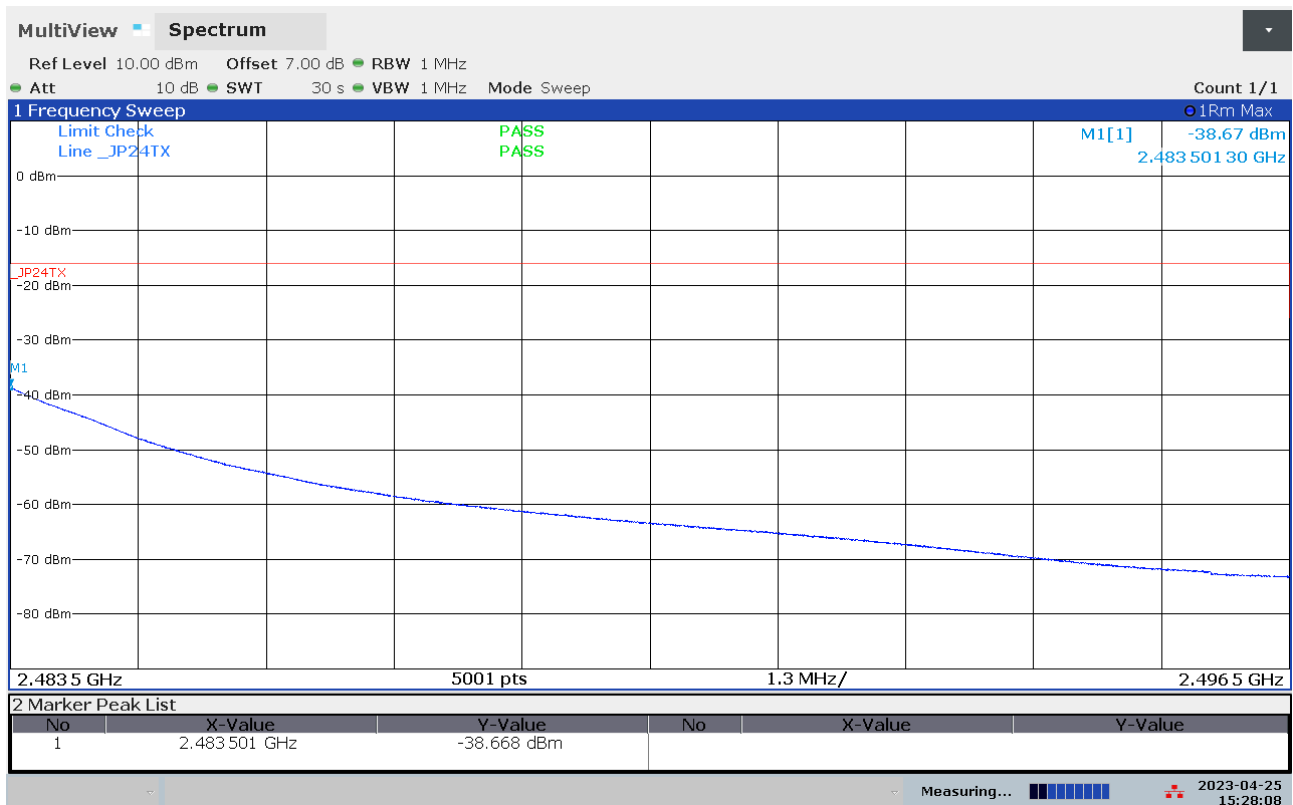
V_{normal} , Ch2480MHz, Spurious emission 2496.5 - 12500 MHz



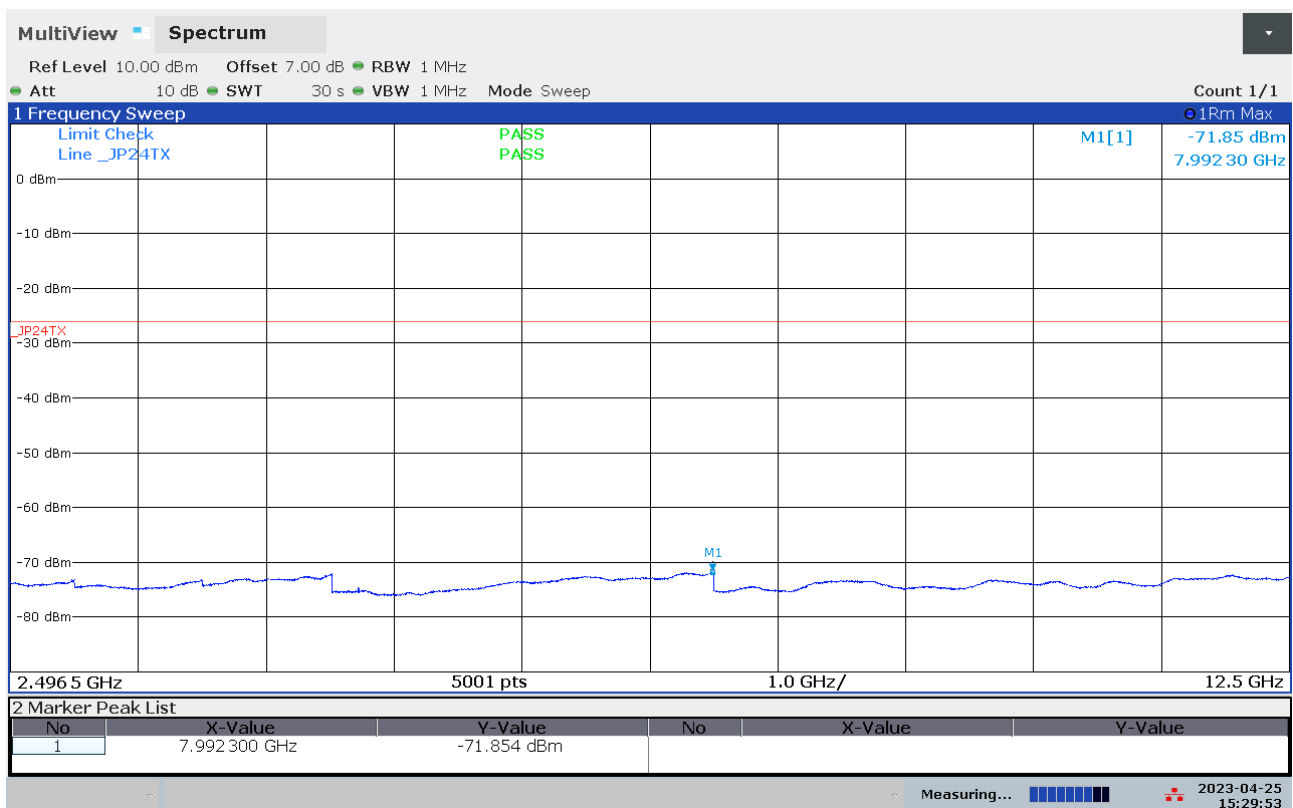
V-10% , Ch2480MHz, Spurious emission 30MHz – 2387MHz



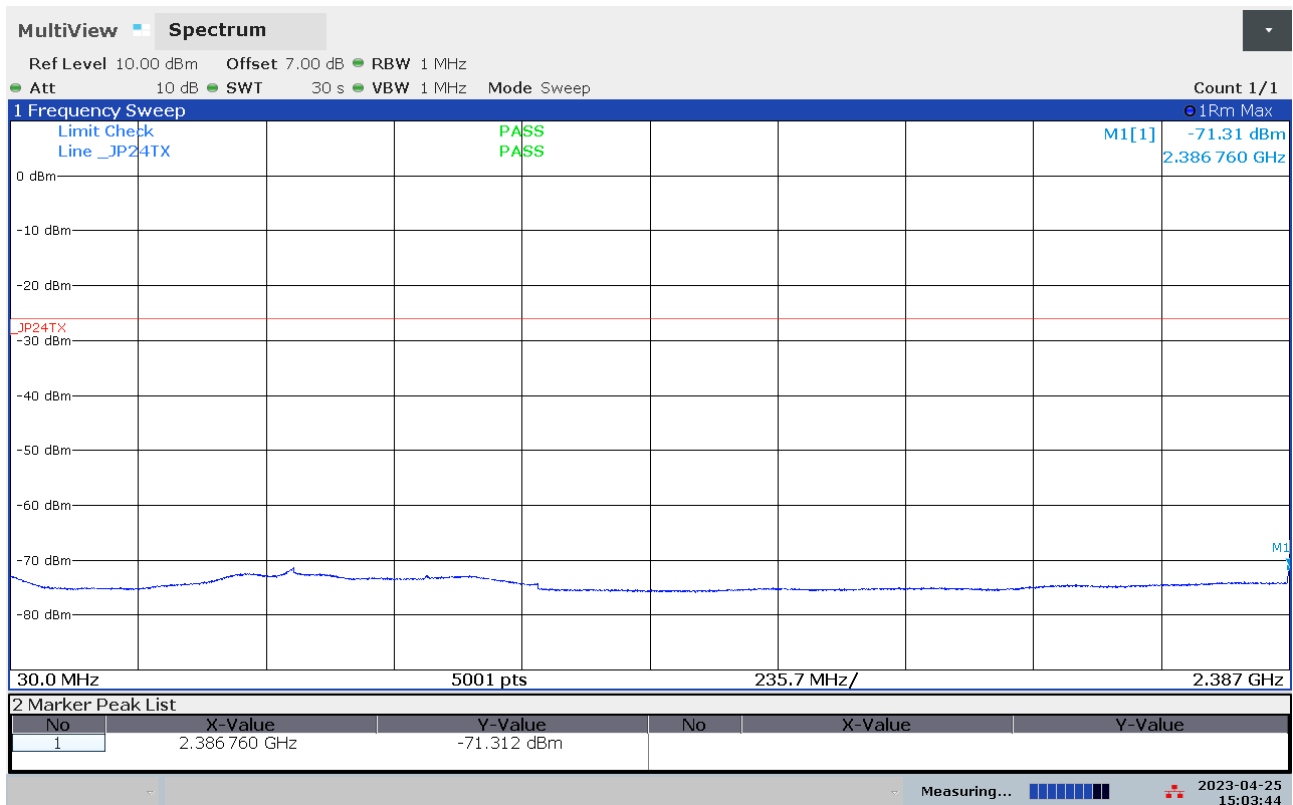
V-10% , Ch2480MHz, Spurious emission 2387MHz – 2400MHz



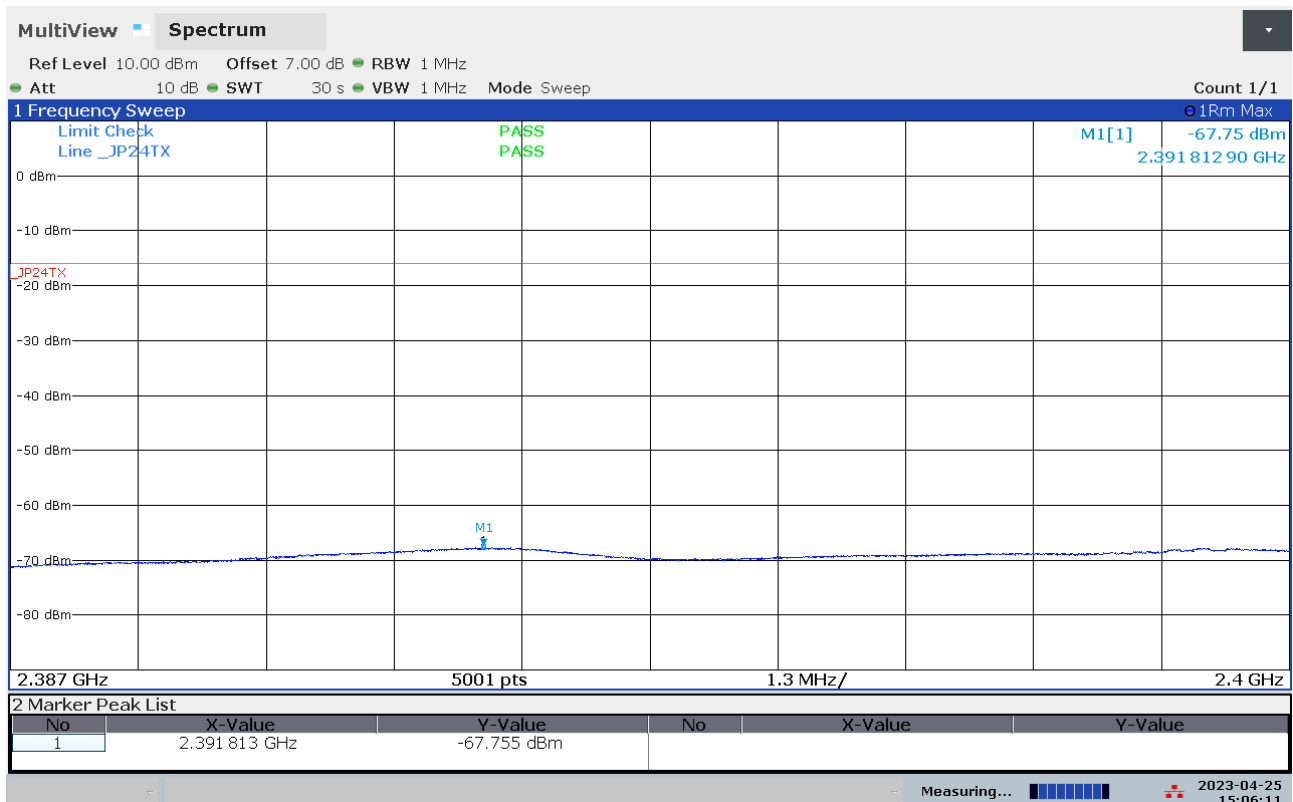
V-10% , Ch2480MHz, Spurious emission 2483.5 – 2496.5 MHz



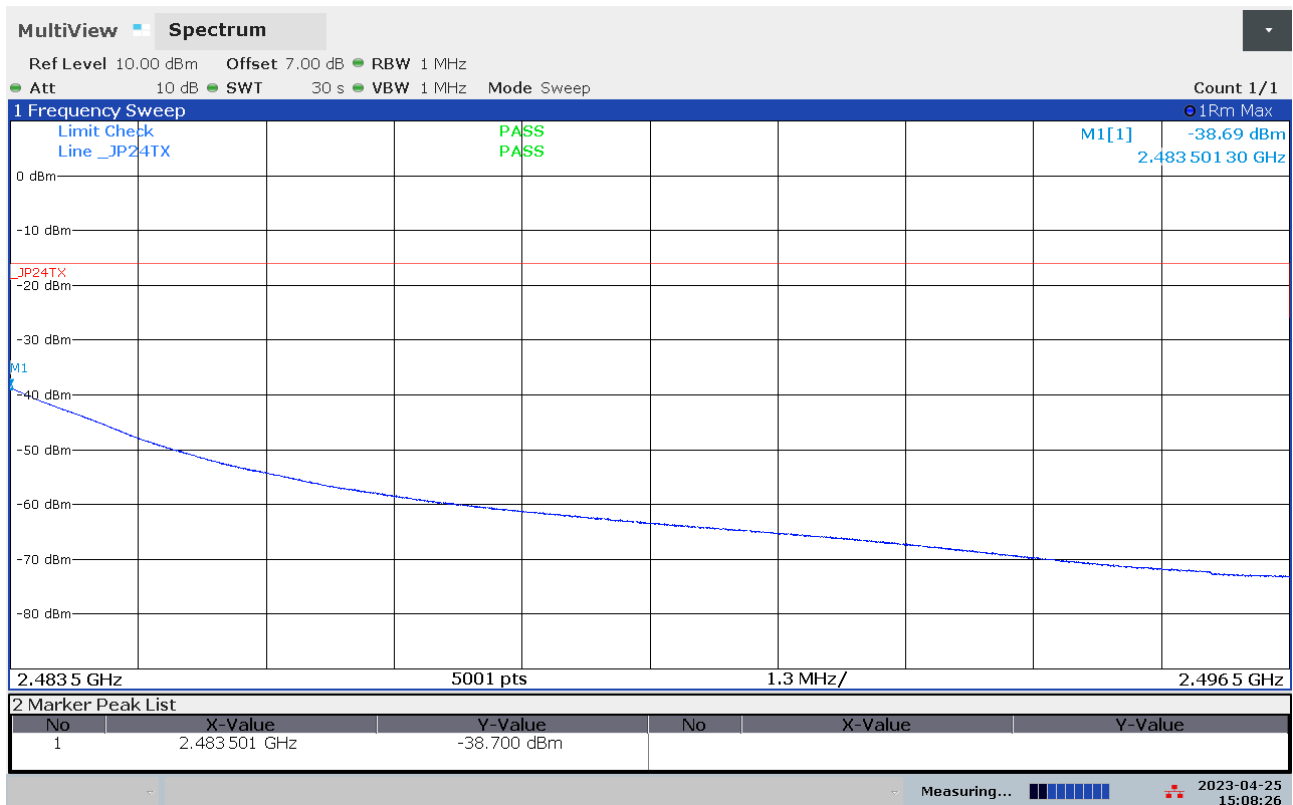
V-10% , Ch2480MHz, Spurious emission 2496.5 - 12500 MHz



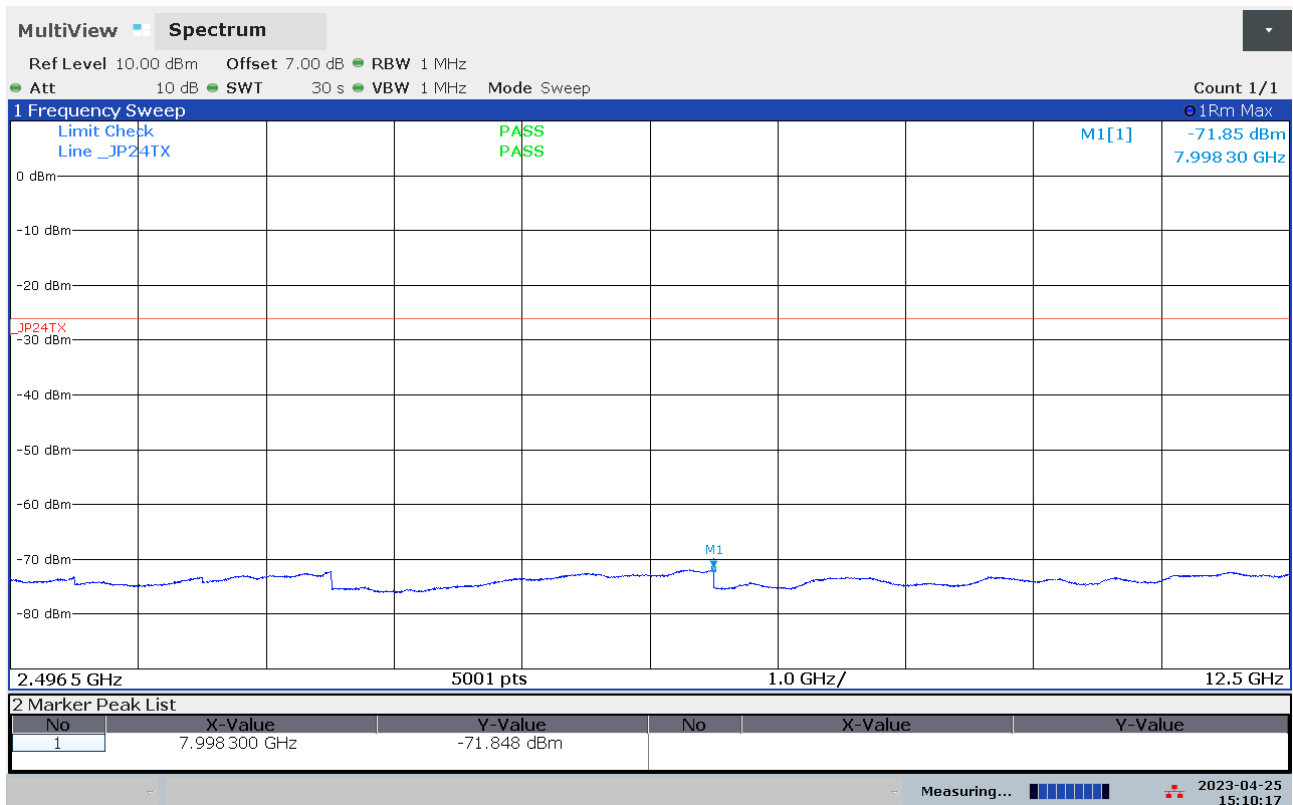
V+10% , Ch2480MHz, Spurious emission 30MHz – 2387MHz



V+10% , Ch2480MHz, Spurious emission 2387MHz – 2400MHz



V+10% , Ch2480MHz, Spurious emission 2483.5 – 2496.5 MHz



V+10% , Ch2480MHz, Spurious emission 2496.5 - 12500 MHz

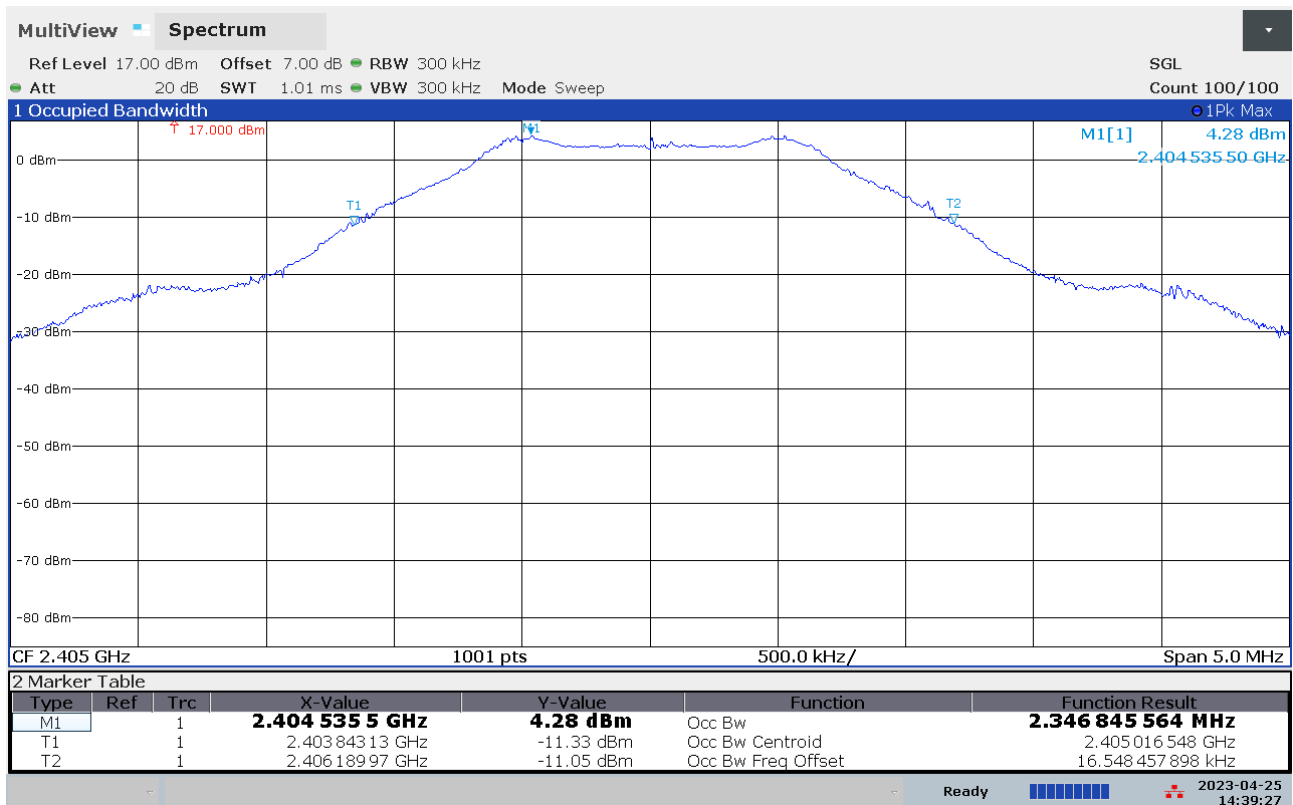
3.6 Permissible value for Occupied Bandwidth

ARIB T66 3.2 (7)

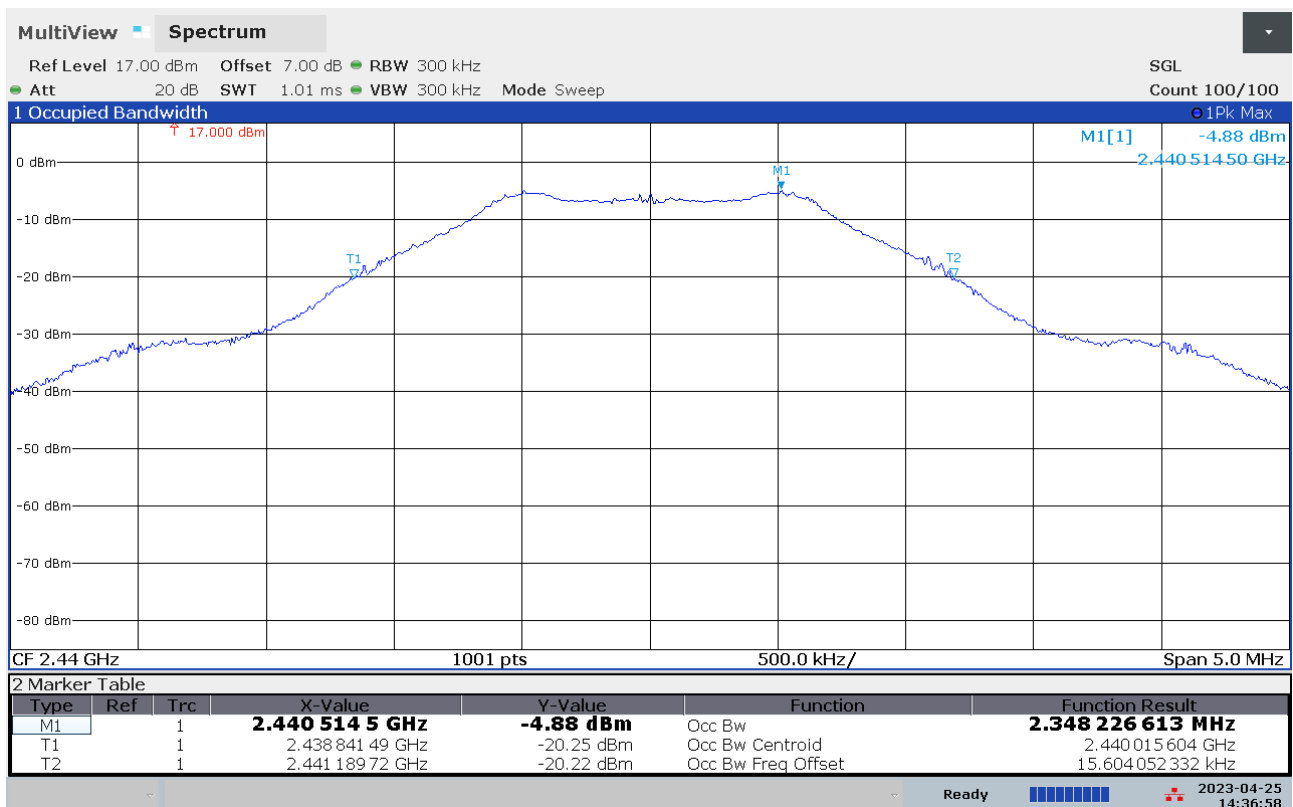
Occupied bandwidth 99% (OBW)				
Frquency (MHz)	V _{normal} Meaured OBW (MHz)	V _{-10%} Meaured OBW (MHz)	V _{+10%} Meaured OBW (MHz))	Requirement (MHz)
2405	2.35	2.34	2.35	< 26
2440	2.35	2.33	2.34	
2480	2.35	2.35	2.35	

The EUT was in test mode with continuous modulated signal.

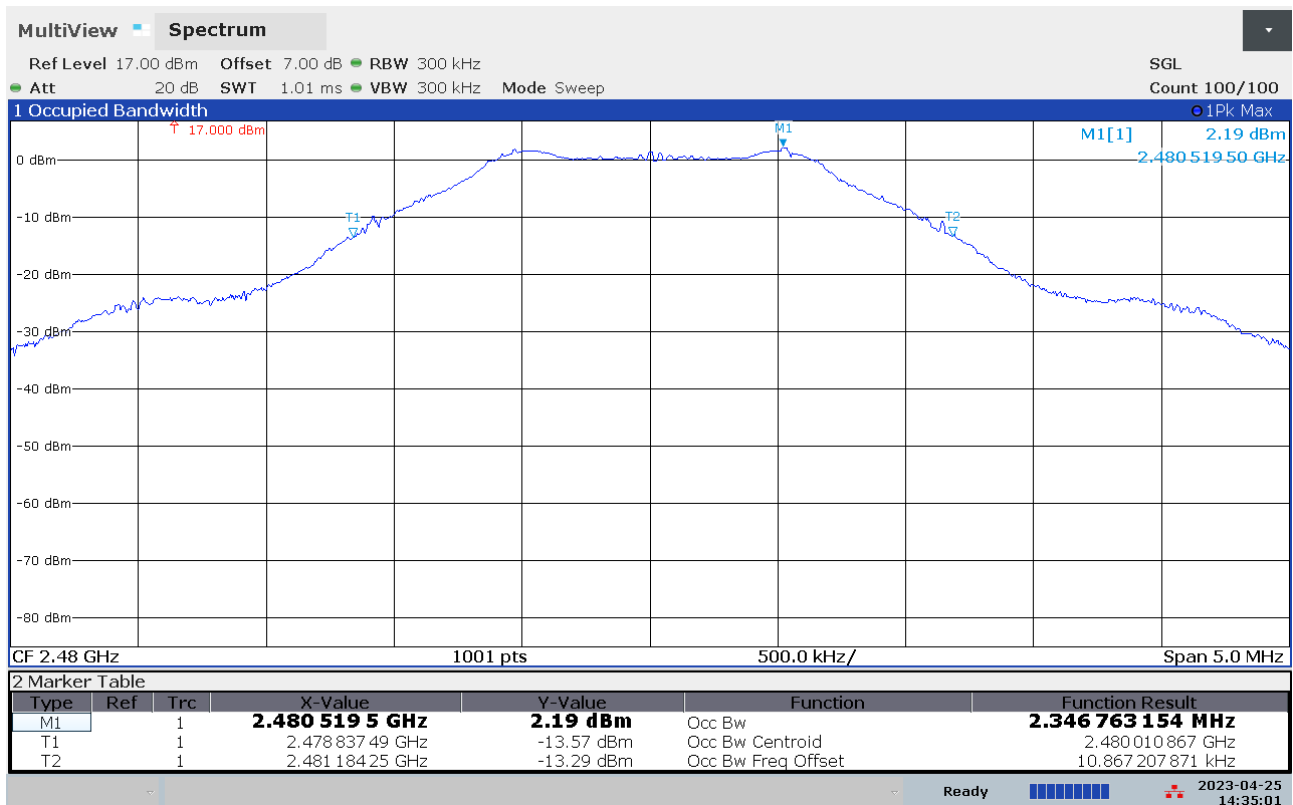
Test Equipment Used: 1, 3, 5, 7, 9



V normal - Ch2405MHz, 99% Occupied bandwidth



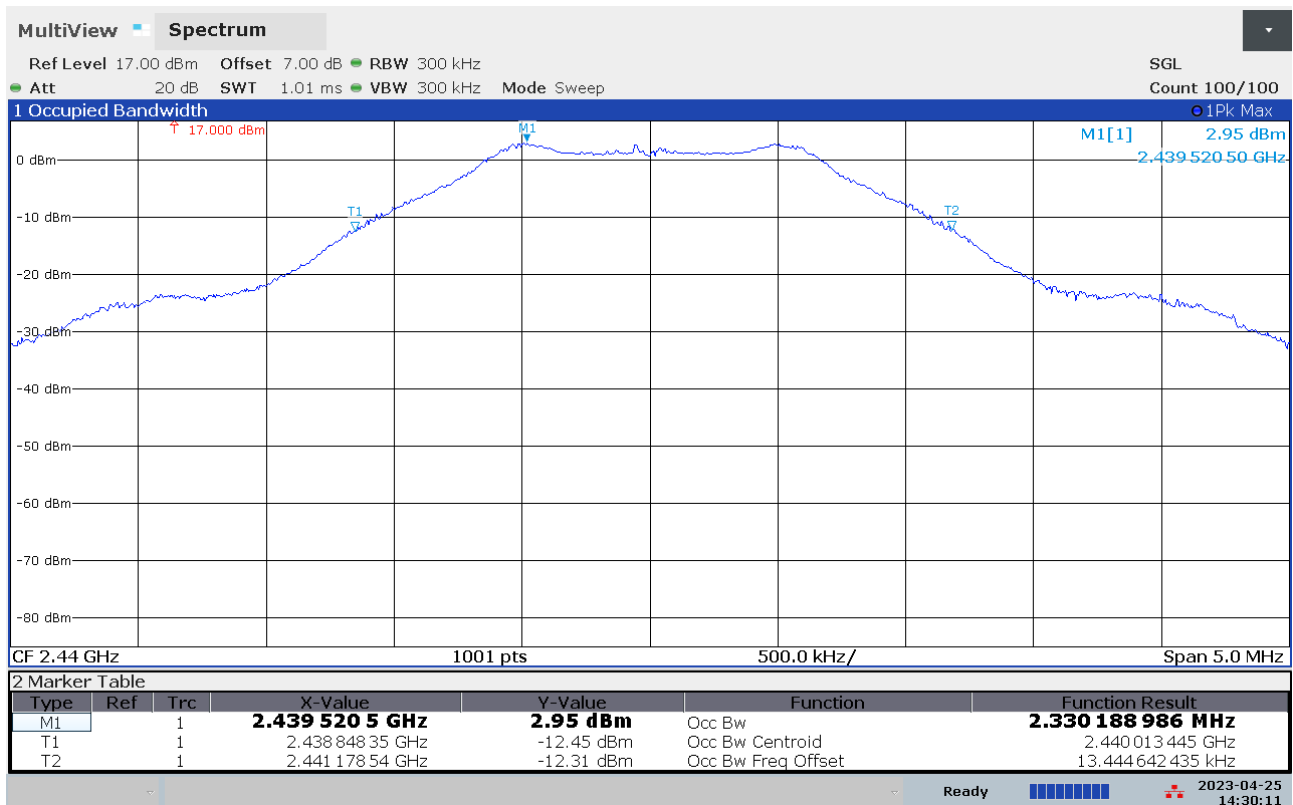
V normal - Ch2440MHz, 99% Occupied bandwidth



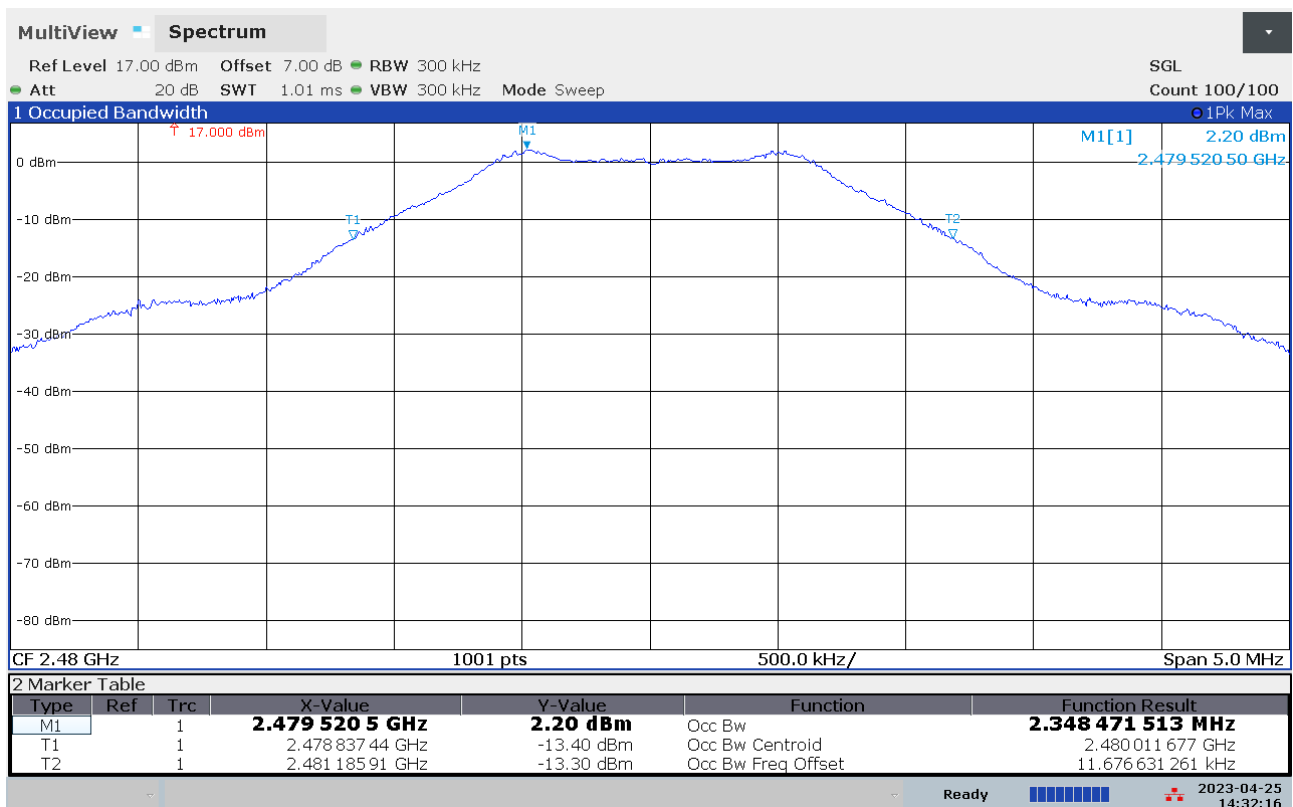
V normal - Ch2480MHz, 99% Occupied bandwidth



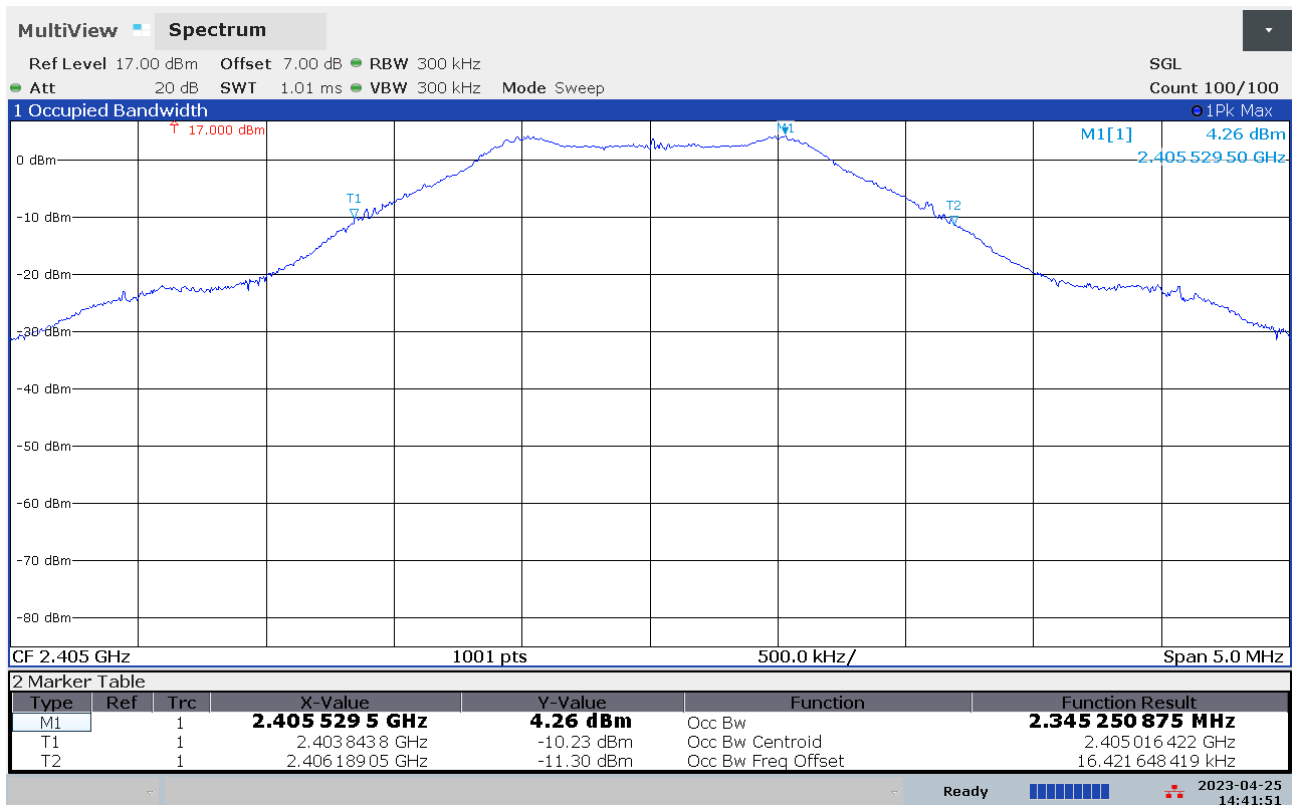
V -10% - Ch2405MHz, 99% Occupied bandwidth



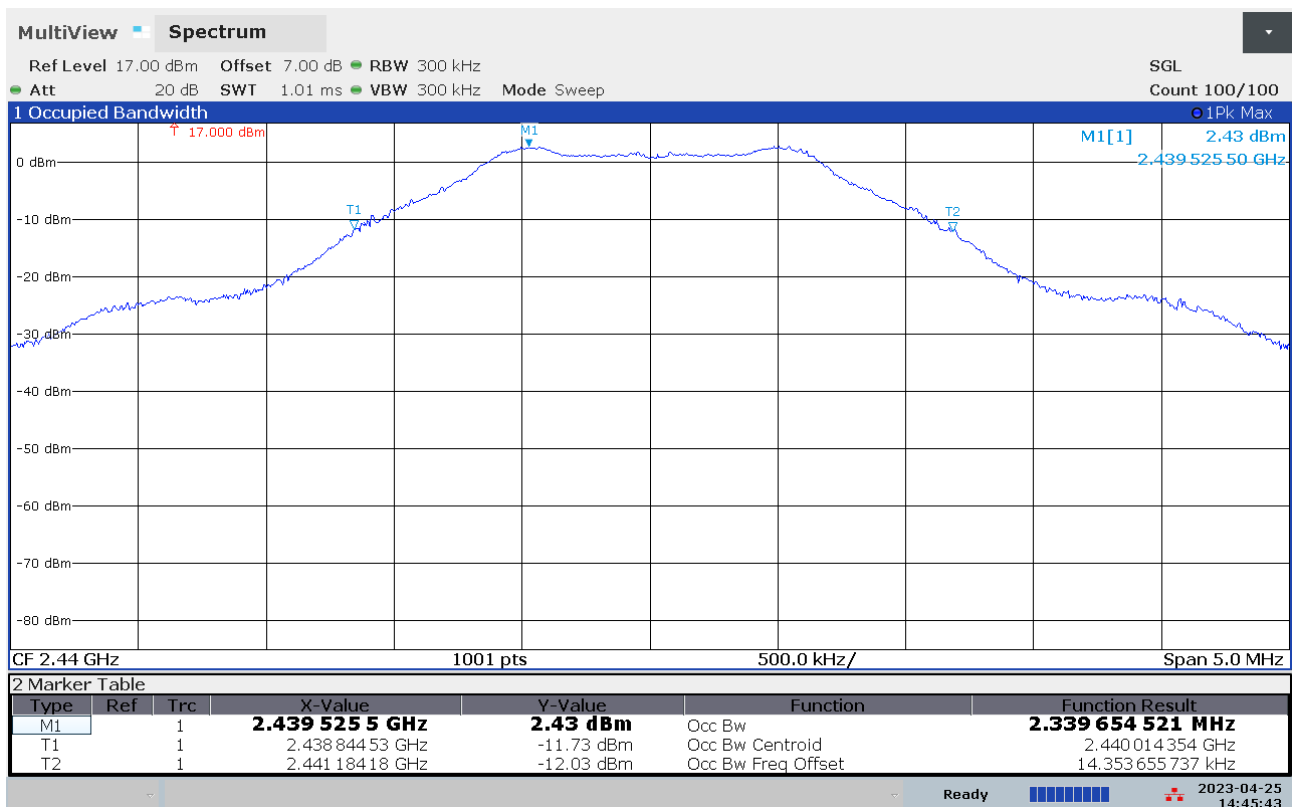
V -10% - Ch2440MHz, 99% Occupied bandwidth



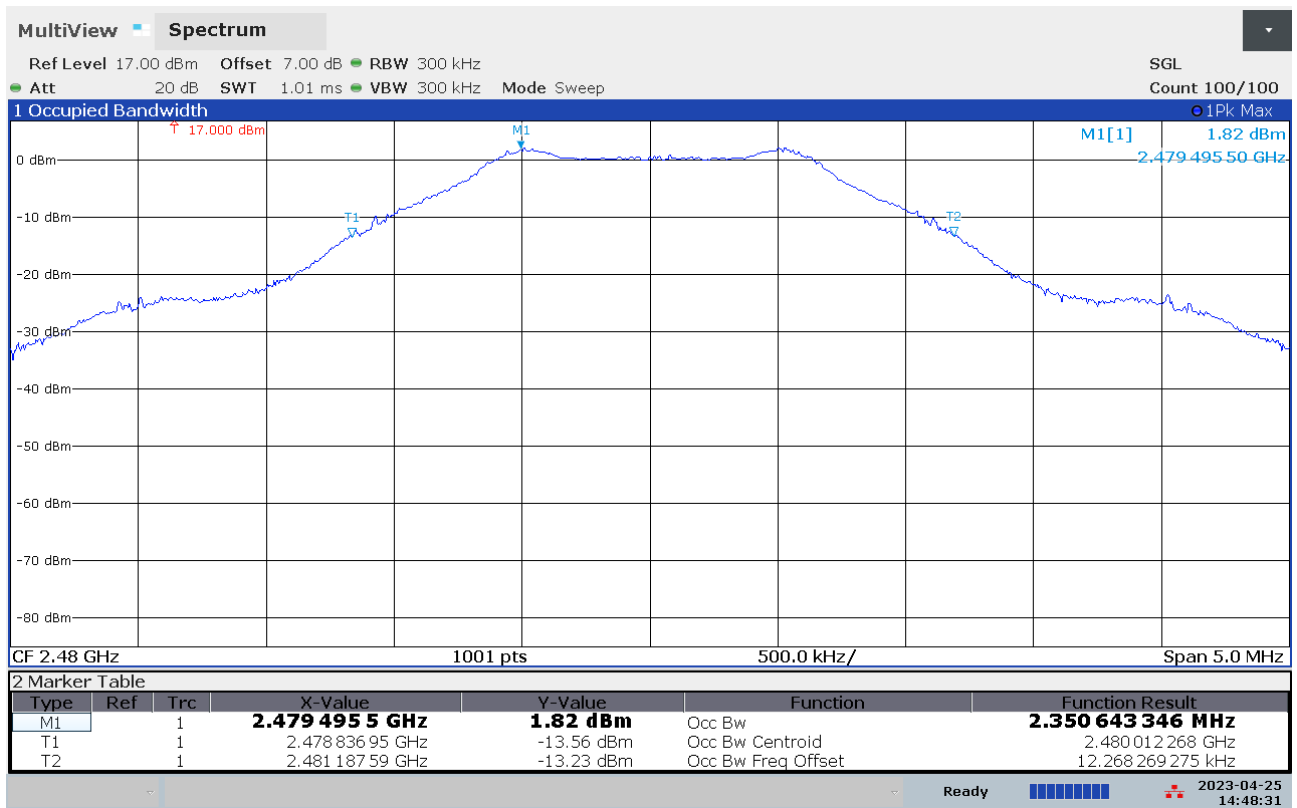
V -10% - Ch2480MHz, 99% Occupied bandwidth



V +10% - Ch2405MHz, 99% Occupied bandwidth



V +10% - Ch2440MHz, 99% Occupied bandwidth



V +10% - Ch2480MHz, 99% Occupied bandwidth

3.7 Spread bandwidth & Process gain

ARIB T66 3.2 (8) & 3.2 (9)

Not applicable for this EUT.

Spread bandwidth 90%				
Frquency (MHz)	V _{normal} Meaured Value (MHz)	V _{-10%} Meaured Value (MHz)	V _{+10%} Meaured Value (MHz))	Requirement (kHz)
2405	/	/	/	≥ 500
2440	/	/	/	
2480	/	/	/	

Process gain requirement: ≥

Test Equipment Used:

3.8 Receiver, Limit on secondary radiated emission

ARIB T66 3.3 (1)

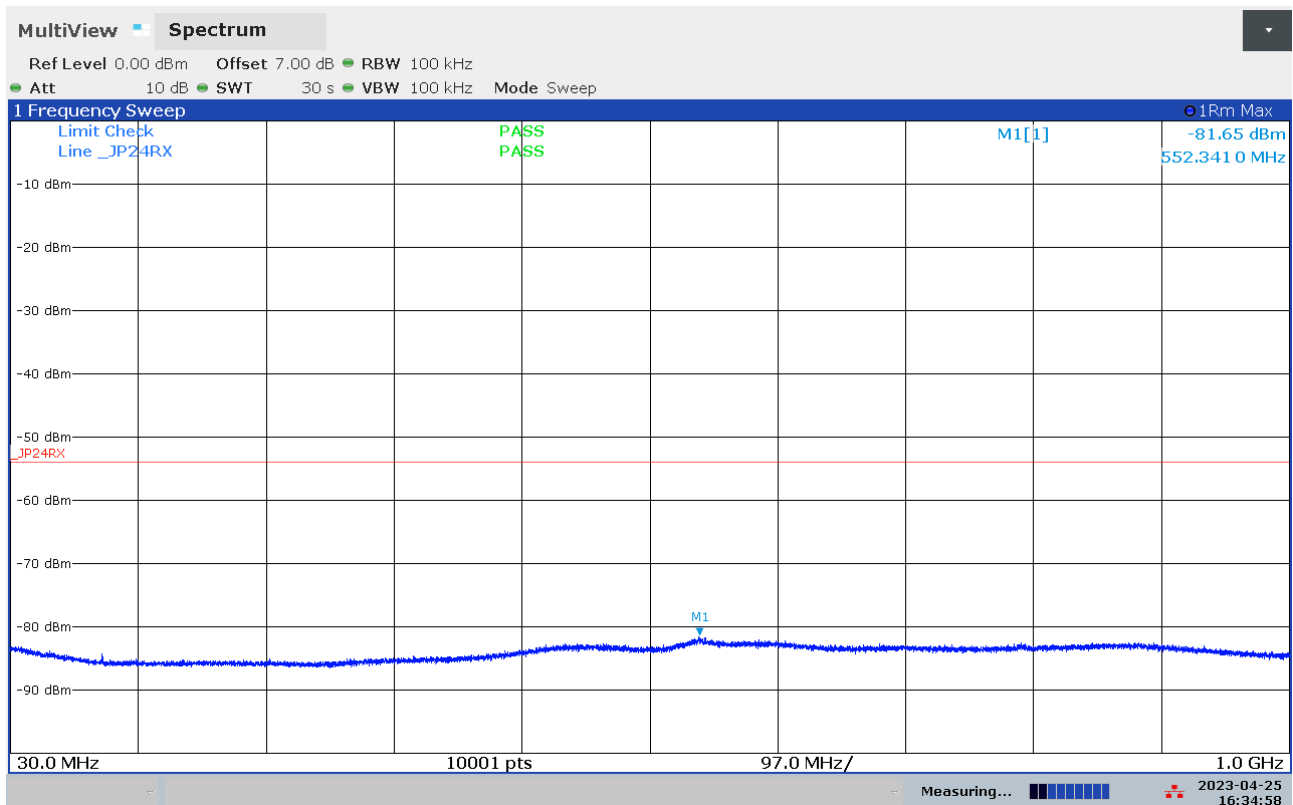
Voltage (dc)	Emission frequency range (MHz)	Ch2405MHz			Requirement (nW // dBm)
		Highest Emission frequency (MHz)	Emission level (dBm)	Emission level (nW)	
V _{normal}	30 - 1000	552.34	-81.65	0.000	4 // -54
	1000 - 12500	5007.90	-73.19	0.000	20 // -47
V _{-10%}	30 - 1000	550.01	-81.74	0.000	4 // -54
	1000 - 12500	5002.20	-73.19	0.000	20 // -47
V _{+10%}	30 - 1000	796.66	-81.42	0.000	4 // -54
	1000 - 12500	4998.70	-73.22	0.000	20 // -47

No spurious detected below 1 GHz.

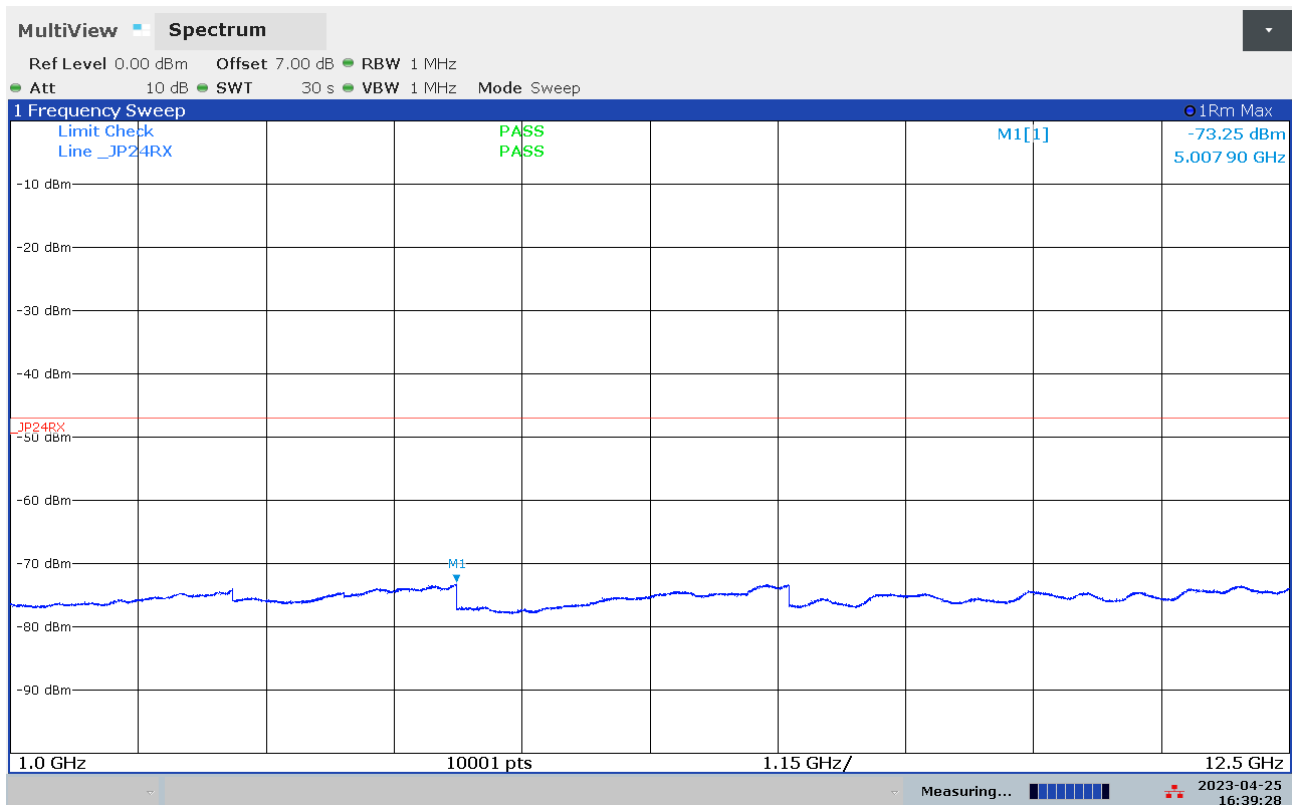
Spectrum analyser settings	
Detector	RMS Max peak
Resolution BW	100 kHz/ 1 MHz
Video BW	100 kHz/ 1 MHz
Sweep Time	See plots
Sweep Points	10001
Trace Mode	Max Hold

The cable loss and attenuator loss are taken into considerations for measured power.
The EUT was in RX mode.

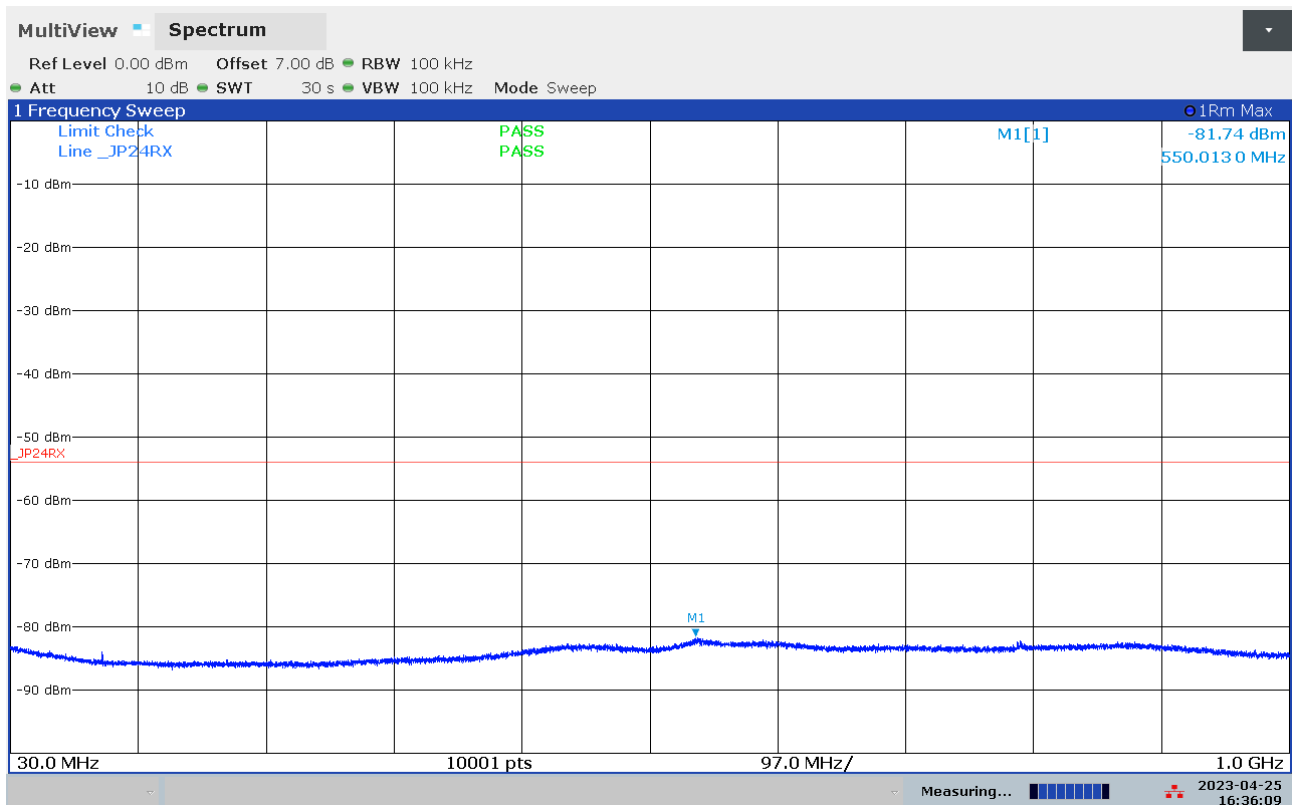
Test Equipment Used: 1, 3, 5, 7, 9



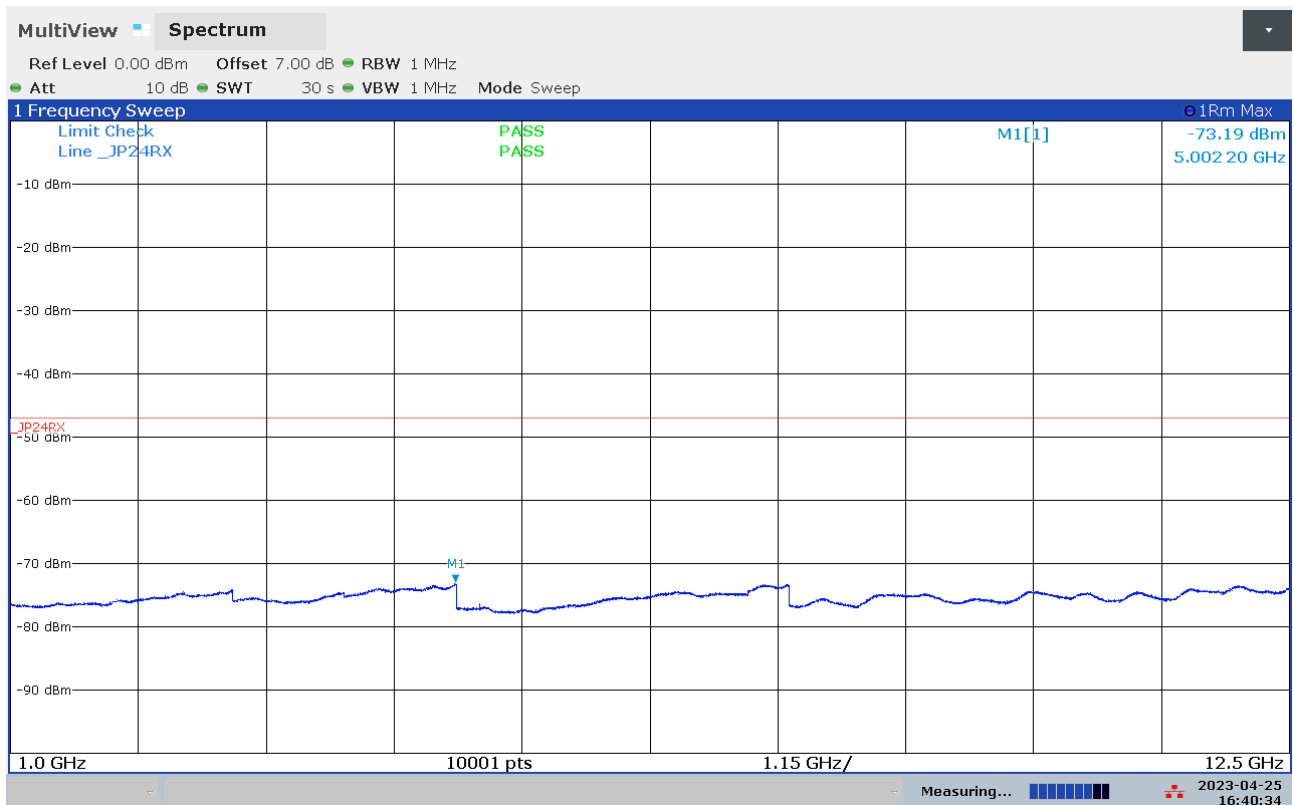
V normal, Ch2405MHz, Receiver spurious radiation, 30MHz - 1000MHz



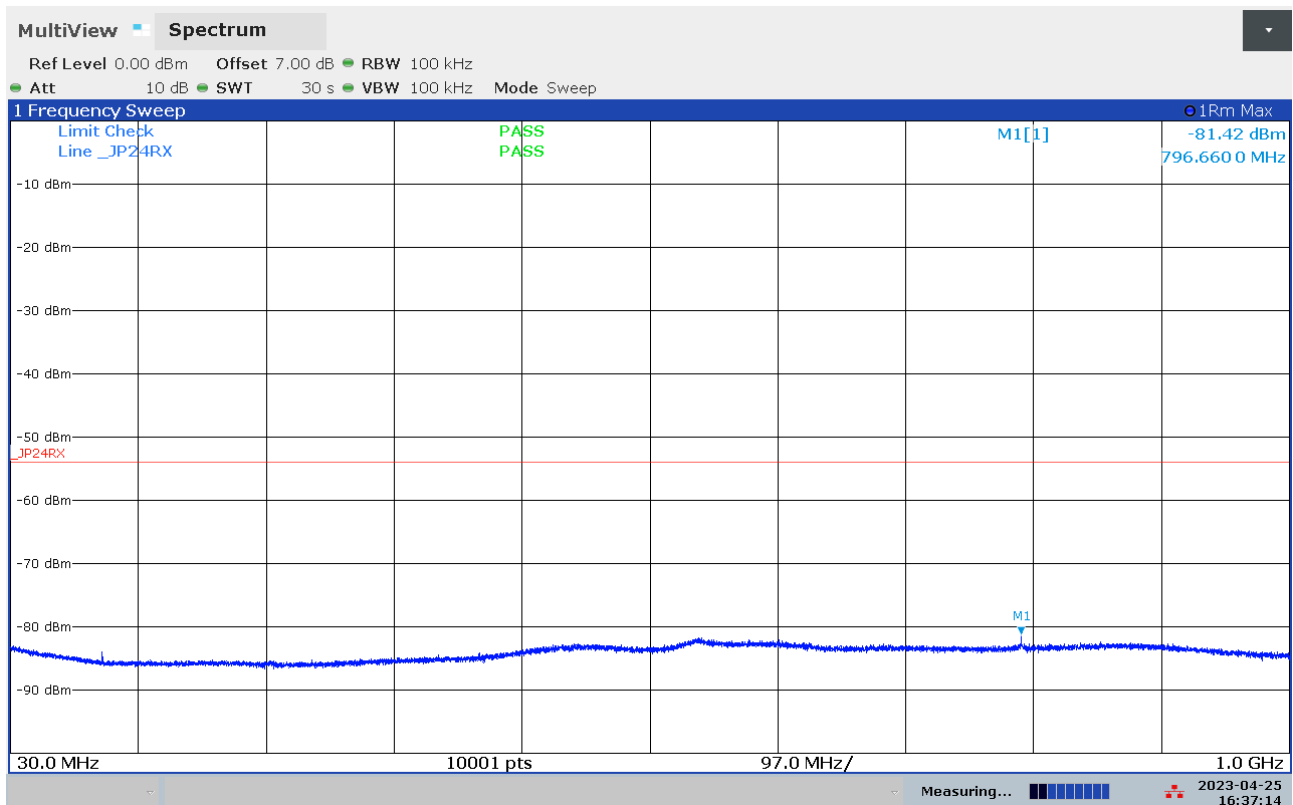
V normal, Ch2405MHz, Receiver spurious radiation, 1000 - 12500MHz



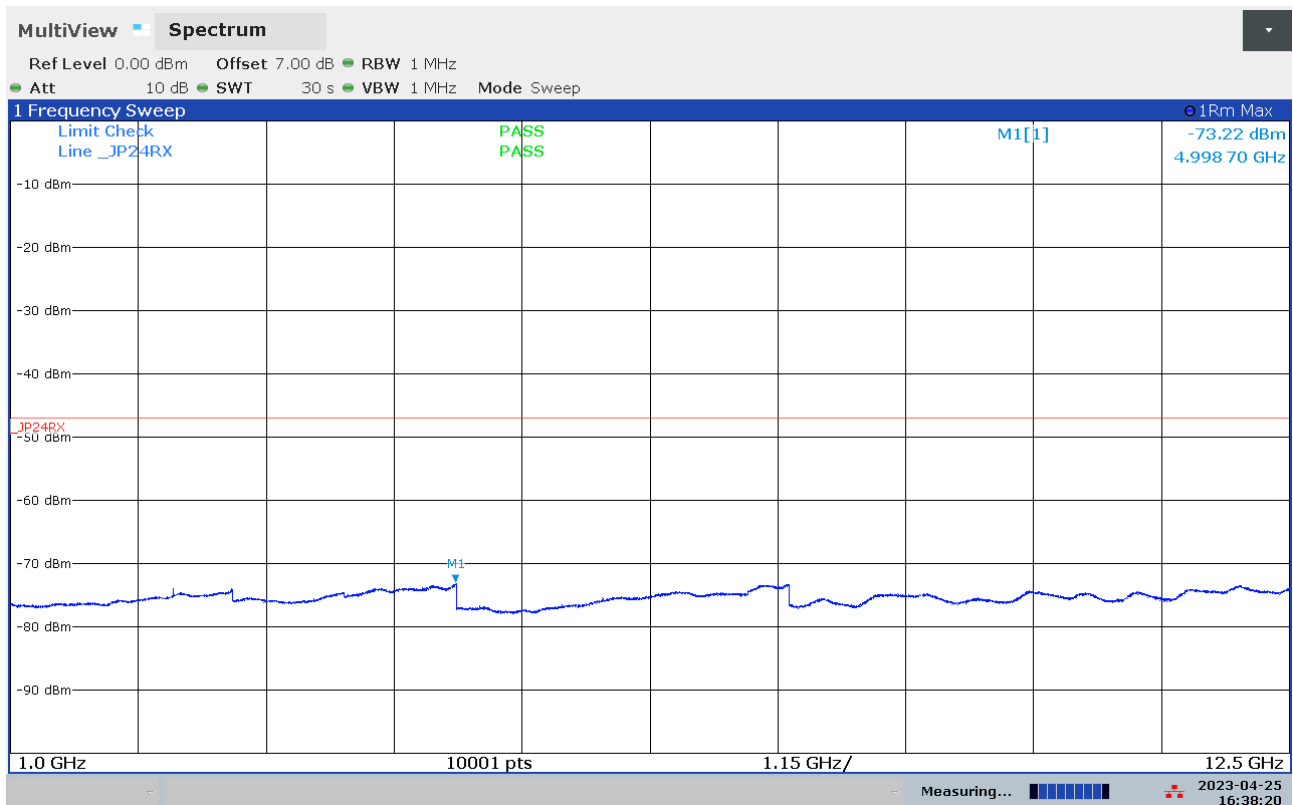
V -10%, Ch2405MHz, Receiver spurious radiation , 30MHz - 1000MHz



V -10%, Ch2405MHz, Receiver spurious radiation , 1000 - 12500MHz



V +10%, Ch2405MHz, Receiver spurious radiation , 30MHz - 1000MHz



V +10%, Ch2405MHz, Receiver spurious radiation , 1000 - 12500MHz

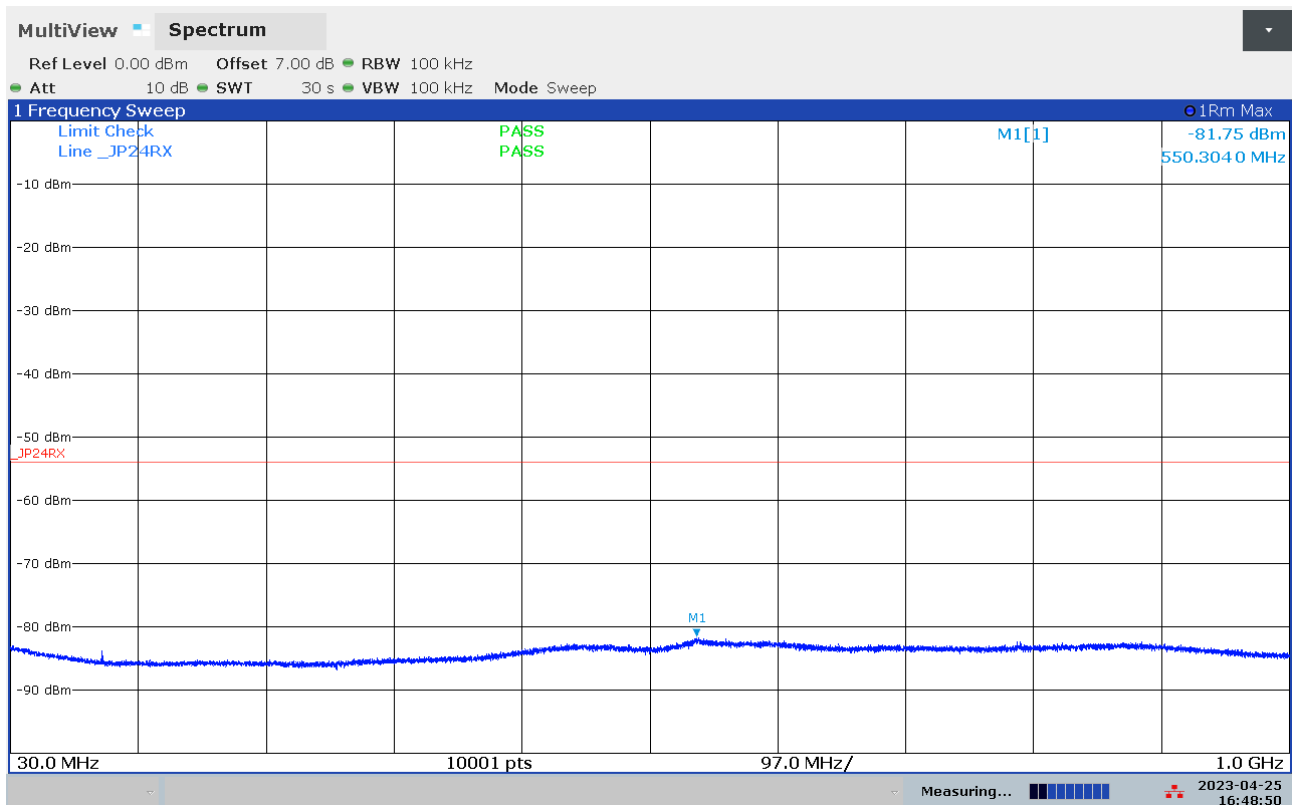
Voltage (dc)	Emission frequency range (MHz)	Ch2440MHz			Requirement (nW // dBm)
		Highest Emission frequency (MHz)	Emission level (dBm)	Emission level (nW)	
V _{normal}	30 - 1000	550.30	-81.75	0.000	4 // -54
	1000 – 12500	5009.10	-73.20	0.000	20 // -47
V _{-10%}	30 - 1000	550.98	-81.77	0.000	4 // -54
	1000 – 12500	5007.90	-73.17	0.000	20 // -47
V _{+10%}	30 - 1000	550.30	-81.79	0.000	4 // -54
	1000 – 12500	5001.00	-73.19	0.000	20 // -47

No spurious detected below 1 GHz.

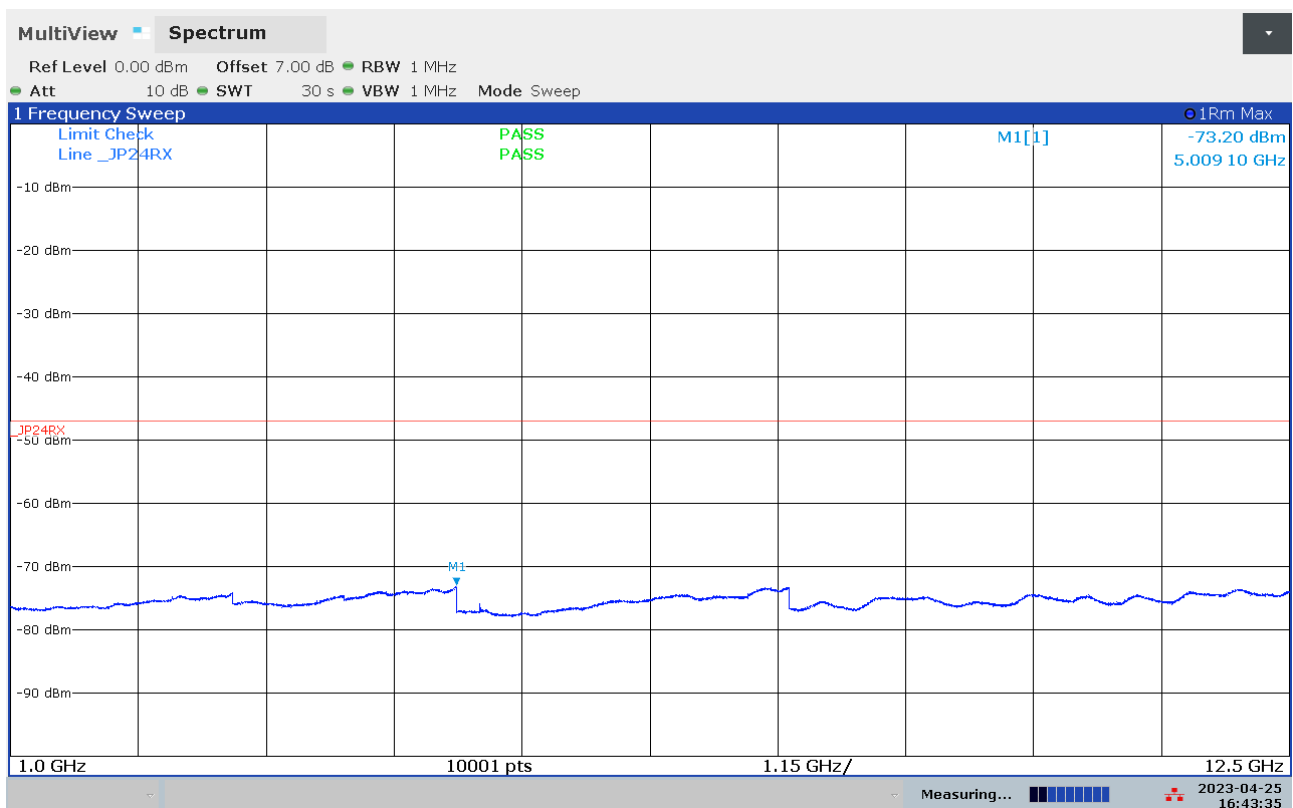
Spectrum analyser settings	
Detector	RMS Max peak
Resolution BW	100 kHz/ 1 MHz
Video BW	100 kHz/ 1 MHz
Sweep Time	See plots
Sweep Points	See plots
Trace Mode	Max Hold

The cable loss and attenuator loss are taken into considerations for measured power.
The EUT was in RX mode.

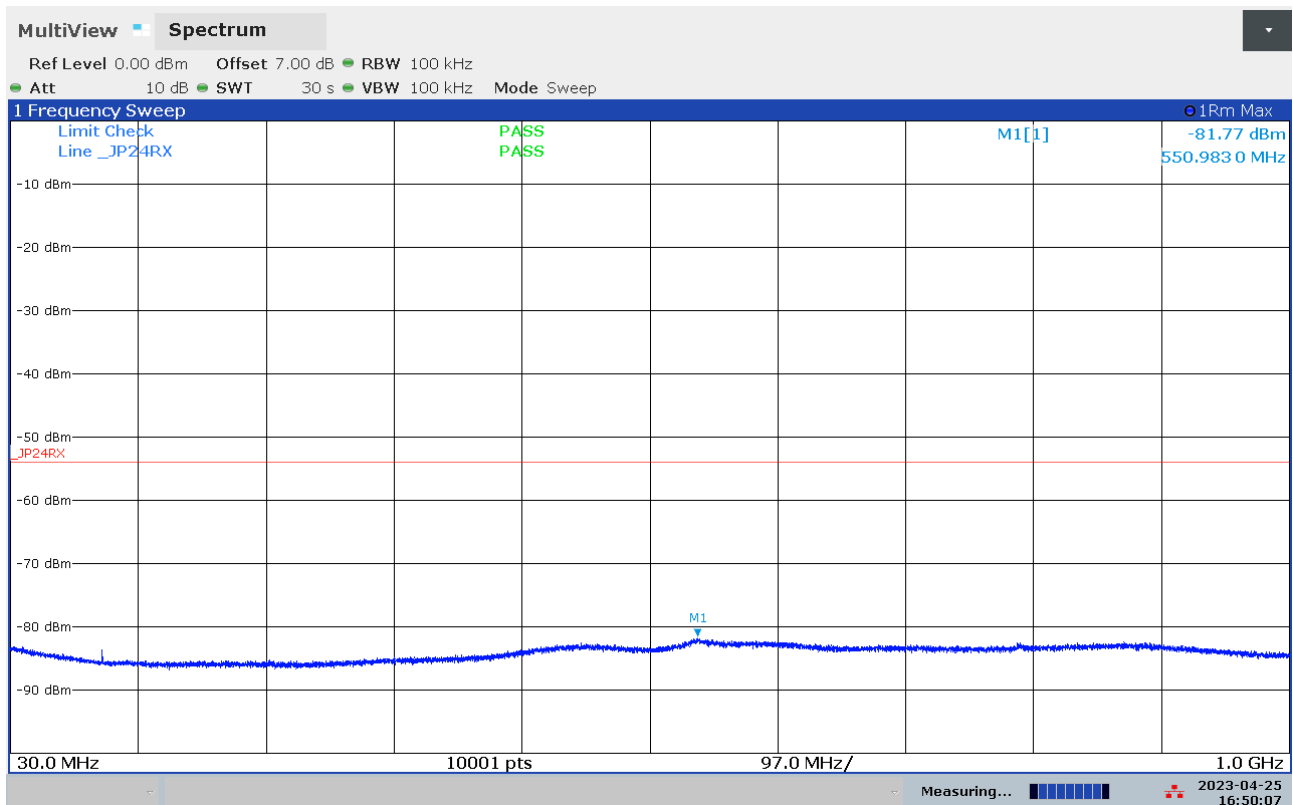
Test Equipment Used: 1, 3, 5, 7, 9



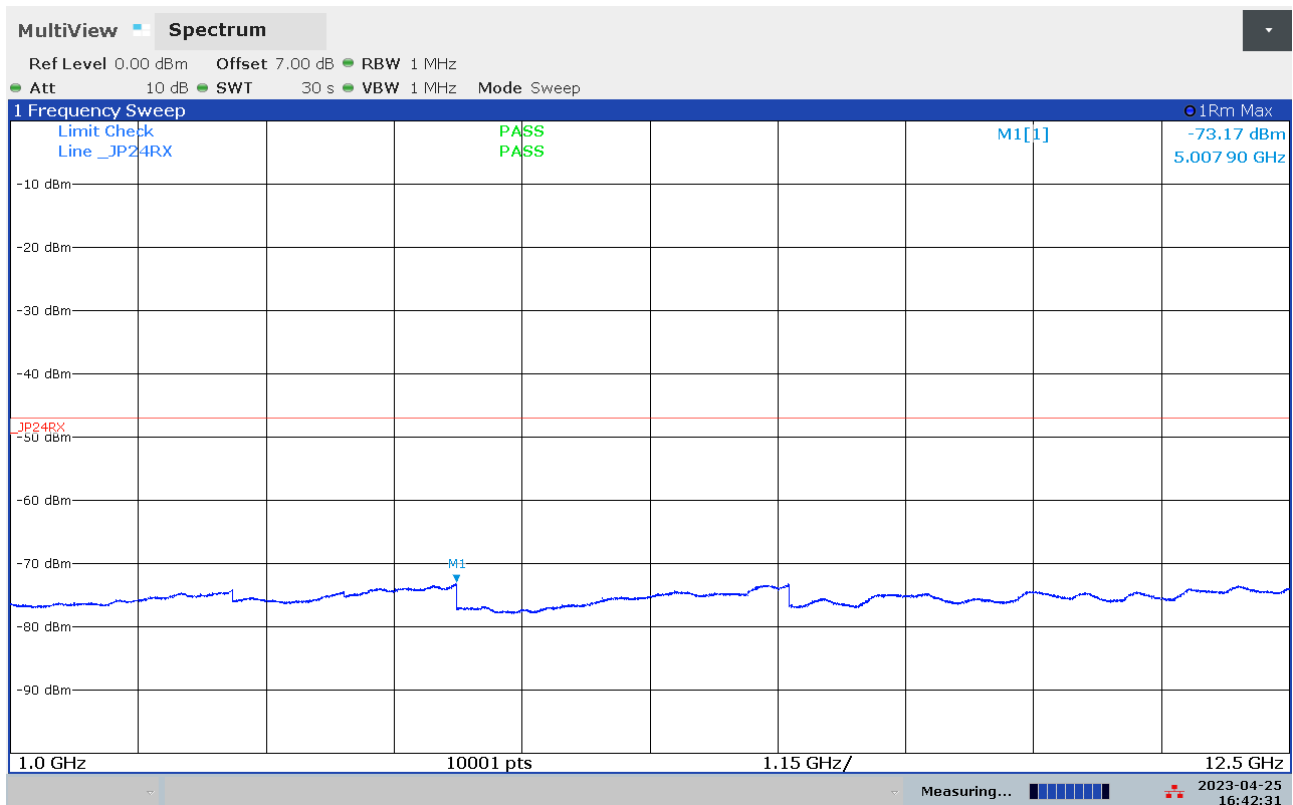
V normal, Ch2440MHz, Receiver spurious radiation, 30MHz - 1000MHz



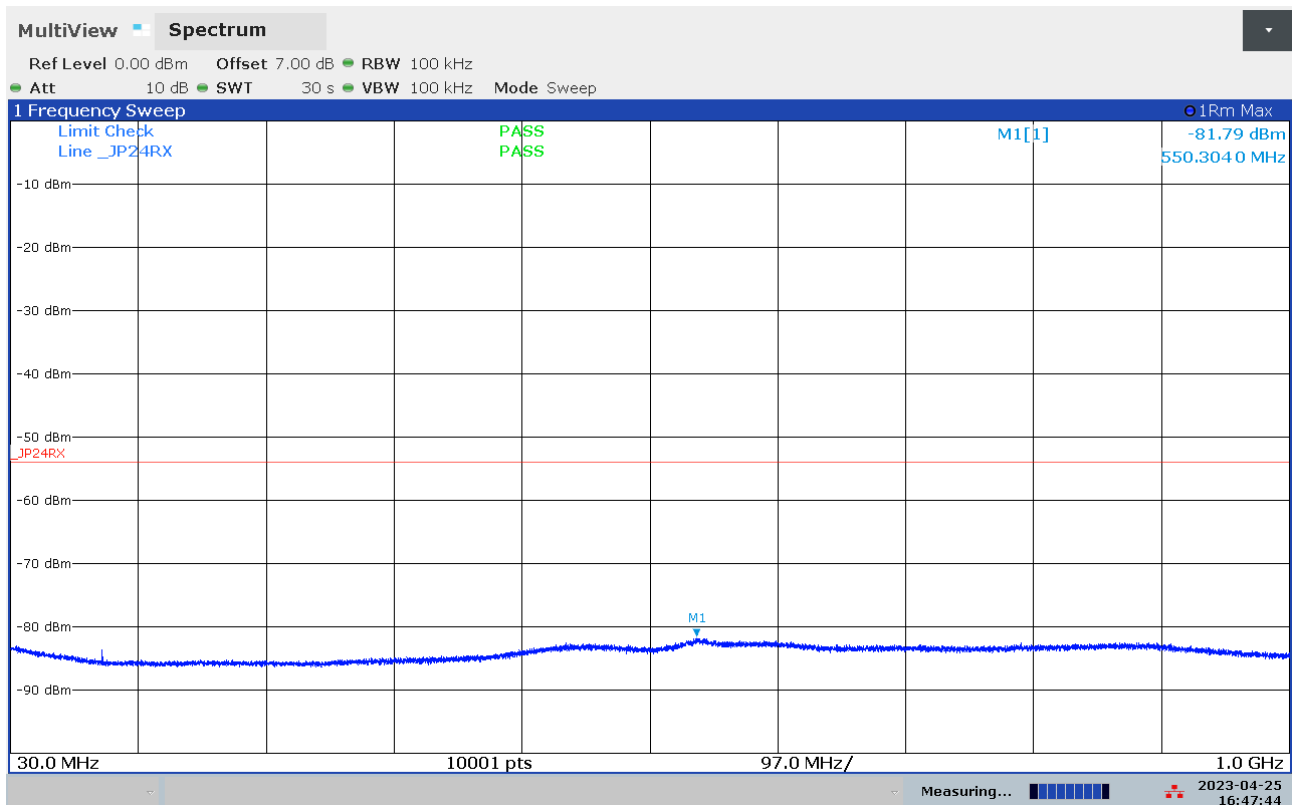
V normal, Ch2440MHz, Receiver spurious radiation, 1000 - 12500MHz



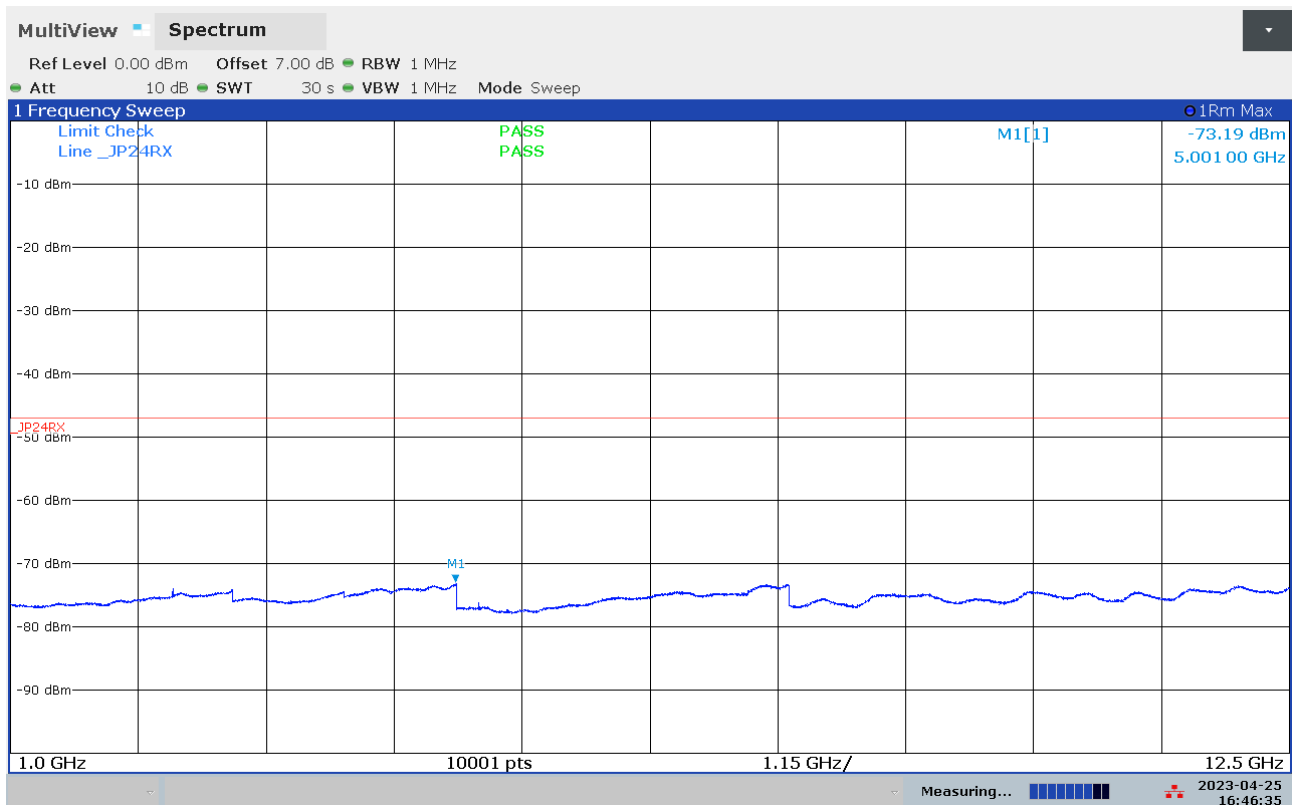
V -10%, Ch2440MHz, Receiver spurious radiation , 30MHz - 1000MHz



V -10%, Ch2440MHz, Receiver spurious radiation , 1000 - 12500MHz



V +10%, Ch2440MHz, Receiver spurious radiation , 30MHz - 1000MHz



V +10%, Ch2440MHz, Receiver spurious radiation , 1000 - 12500MHz

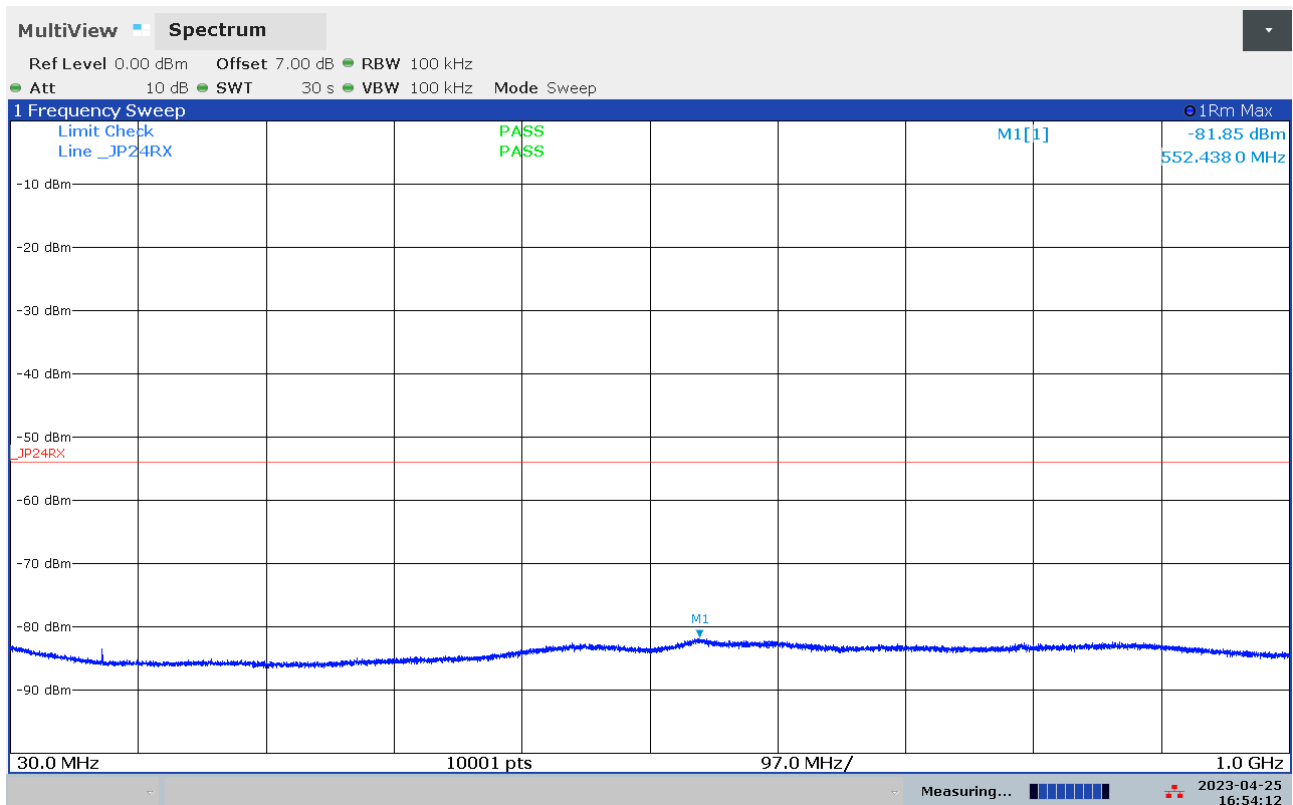
Voltage (dc)	Emission frequency range (MHz)	Ch2480MHz			Requirement (nW // dBm)
		Highest Emission frequency (MHz)	Emission level (dBm)	Emission level (nW)	
V _{normal}	30 - 1000	552.44	-81.85	0.000	4 // -54
	1000 – 12500	5007.90	-73.20	0.000	20 // -47
V _{-10%}	30 - 1000	551.27	-81.82	0.000	4 // -54
	1000 – 12500	5007.90	-73.32	0.000	20 // -47
V _{+10%}	30 - 1000	796.47	-81.27	0.000	4 // -54
	1000 – 12500	5006.80	-73.26	0.000	20 // -47

No spurious detected below 1 GHz.

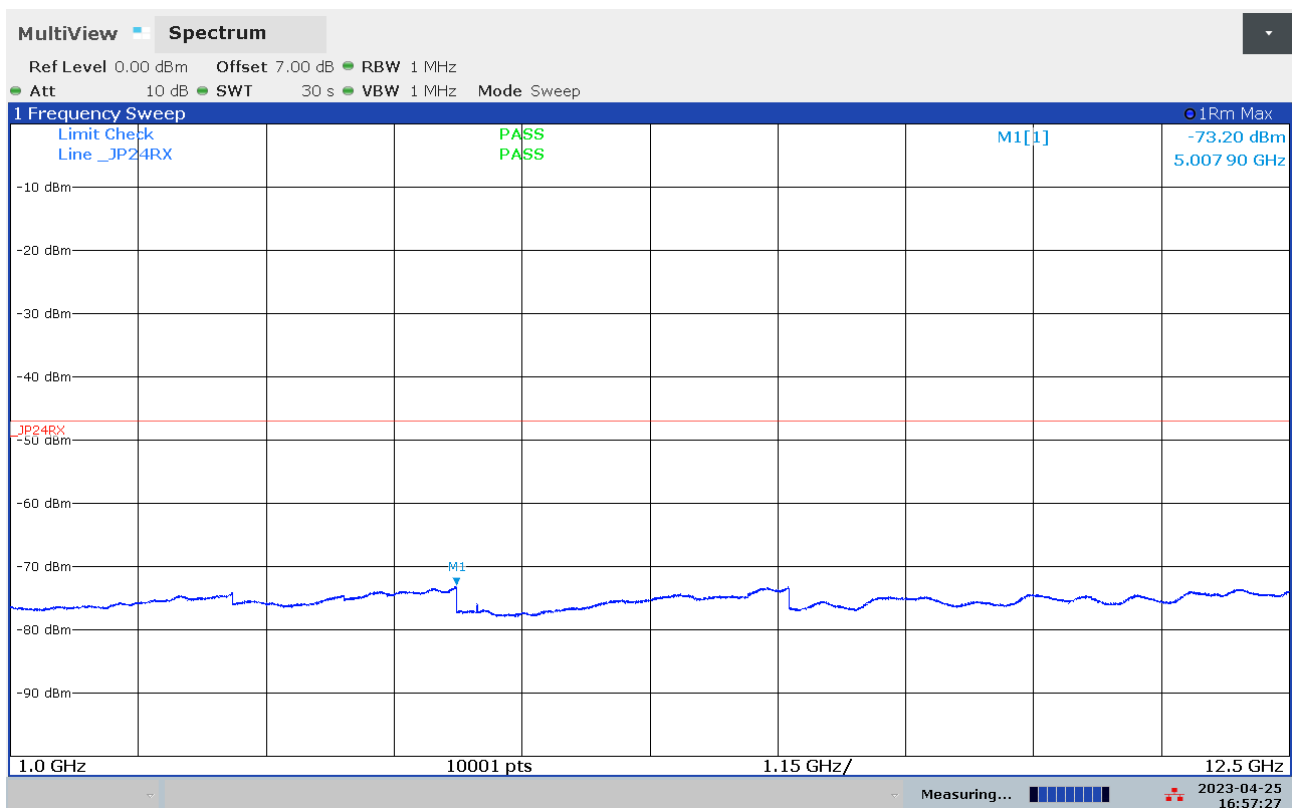
Spectrum analyser settings	
Detector	RMS Max Peak
Resolution BW	100 kHz/ 1 MHz
Video BW	100 kHz/ 1 MHz
Sweep Time	See plots
Sweep Points	See plots
Trace Mode	Max Hold

The cable loss and attenuator loss are taken into considerations for measured power.
The EUT was in RX mode.

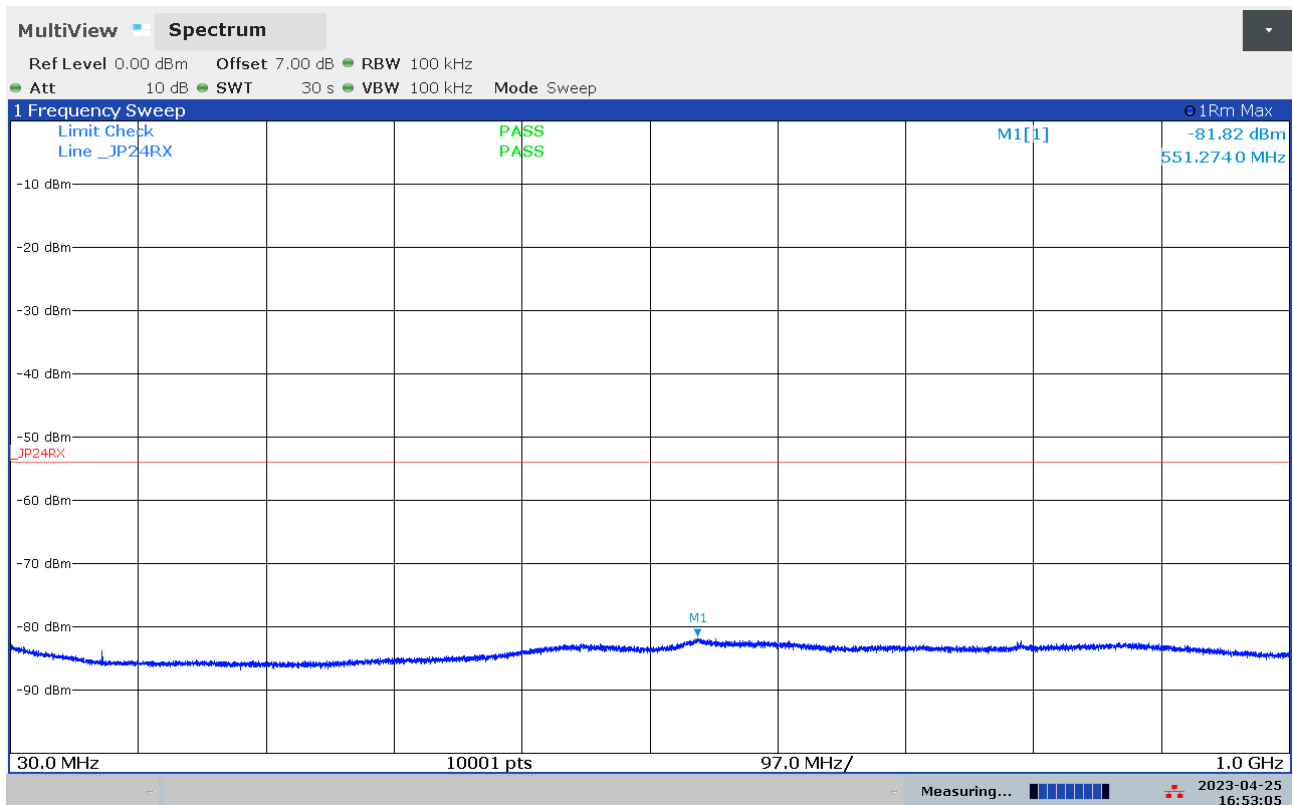
Test Equipment Used: 1, 3, 5, 7, 9



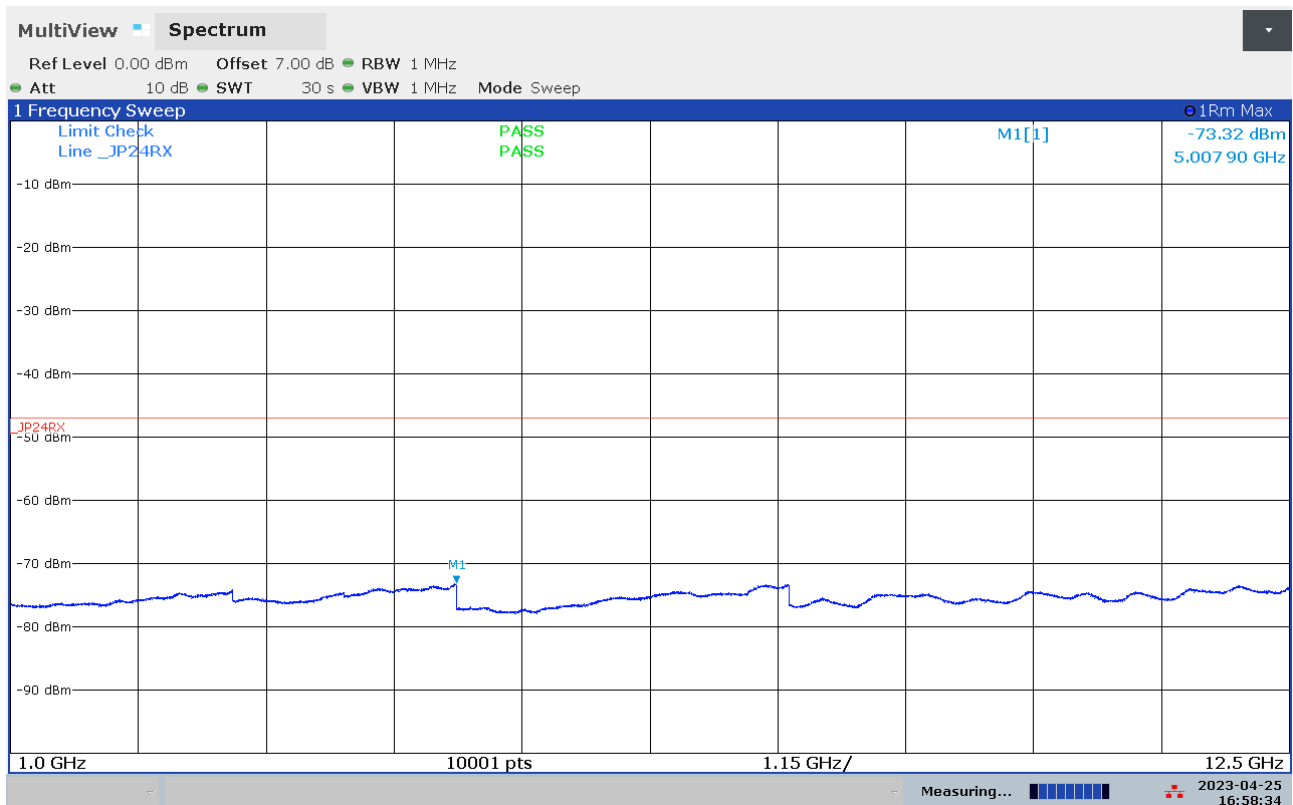
V normal , Ch2480MHz, Receiver spurious radiation , 30MHz - 1000MHz



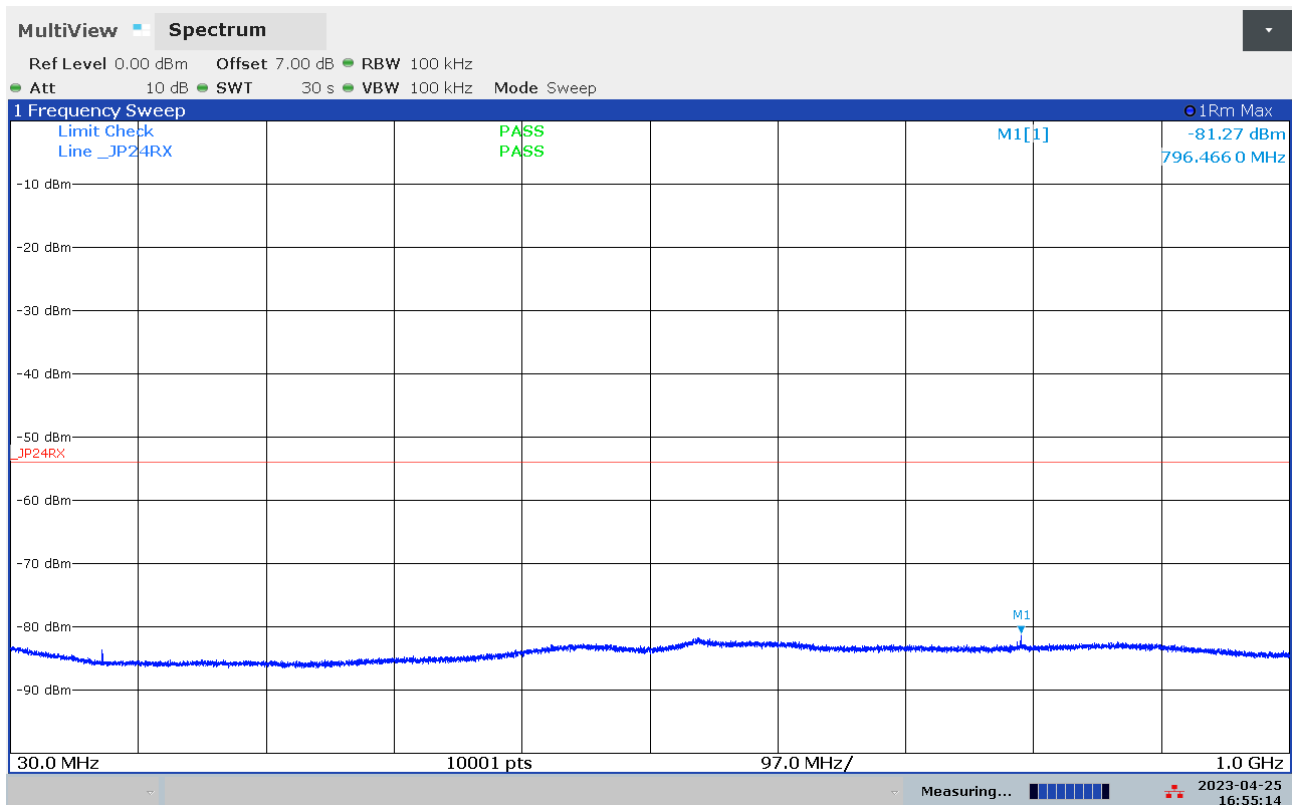
V normal , Ch2480MHz, Receiver spurious radiation , 1000 - 12500MHz



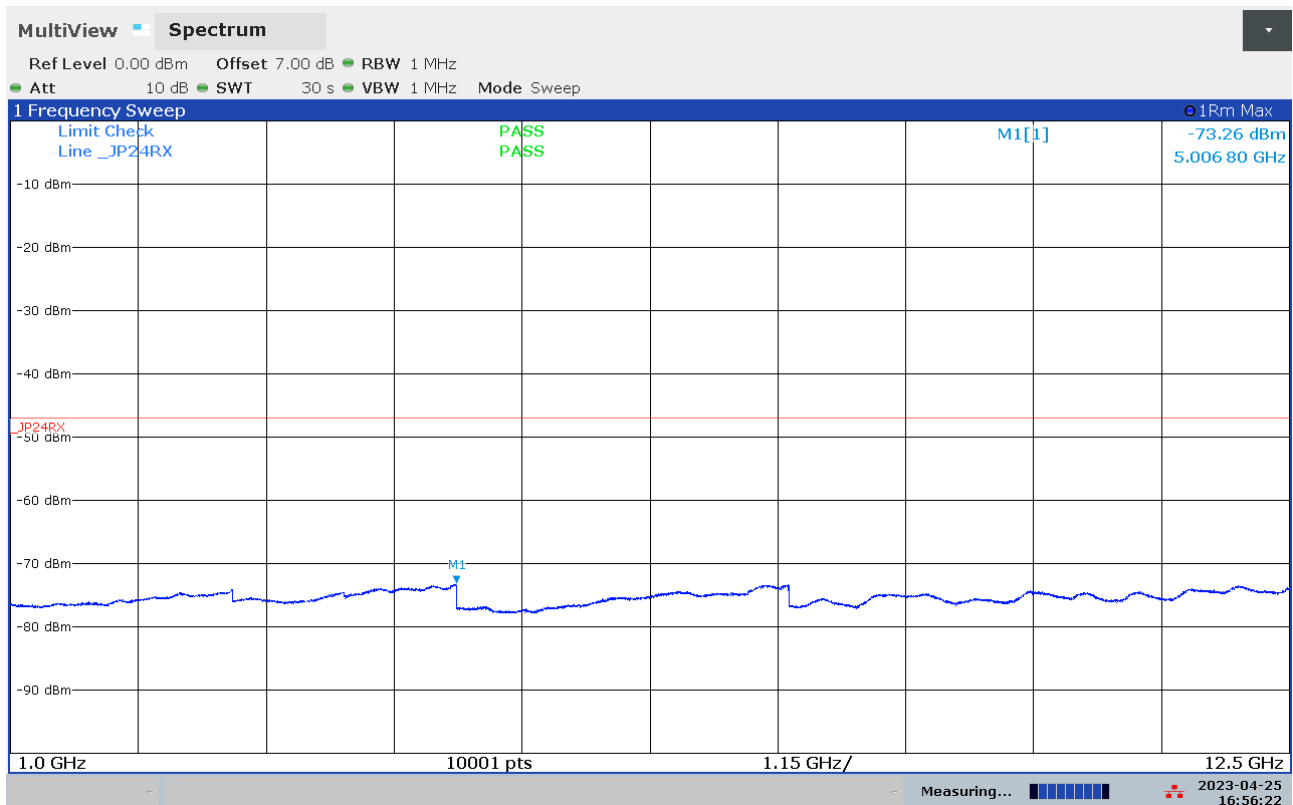
V -10%, Ch2480MHz, Receiver spurious radiation , 30MHz - 1000MHz



V -10%, Ch2480MHz, Receiver spurious radiation , 1000 - 12500MHz



V +10%, Ch2480MHz, Receiver spurious radiation , 30MHz - 1000MHz



V +10%, Ch2480MHz, Receiver spurious radiation , 1000 - 12500MHz

3.9 Interference prevention function

ARIB T66 3.5

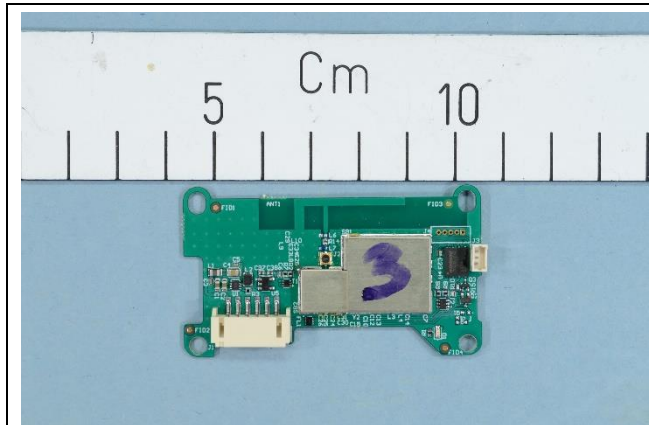
Test results	Test mode	MAC address	Requirement
PASS	ZigBee	F4:CE:36:DC:65:E3:A4:CC	Identification code 64 bits long

1. Set EUT in a door lock under operating mode and link up with a ZigBee Base unit
2. Checked communication status between EUT and Base unit - normal
3. Confirmed the MAC address of the EUT

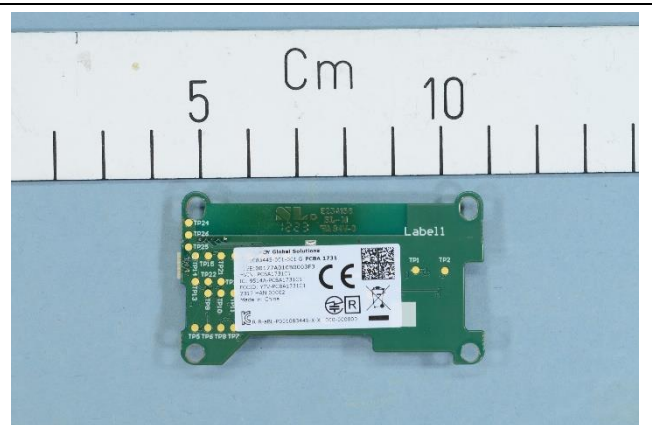
Interference prevention test-setup

Online	☒
Connected to parent (according to LCU)	No
Connected to parent (according to ZED)	No
Device state	END_NODE_IDLE
Time to next parent search	N/A s
LQI	0
RSSI	127 dBm
PAN ID	FF FF
Short address	FF FF
Mac address	F4 CE 36 DC 65 E3 A4 CC
Connected channel	255
TX output power	ETSI (+8dBm) ▼

4 Photos of EUT

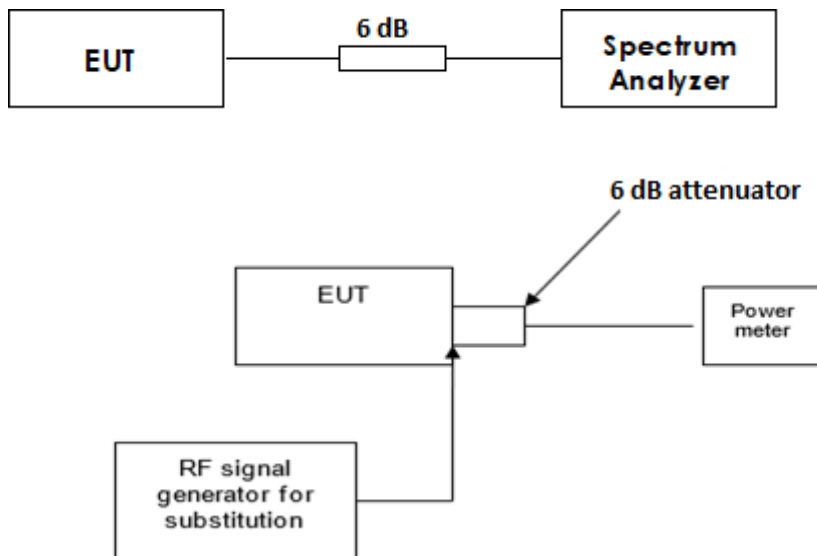


EUT Components side



EUT Label side

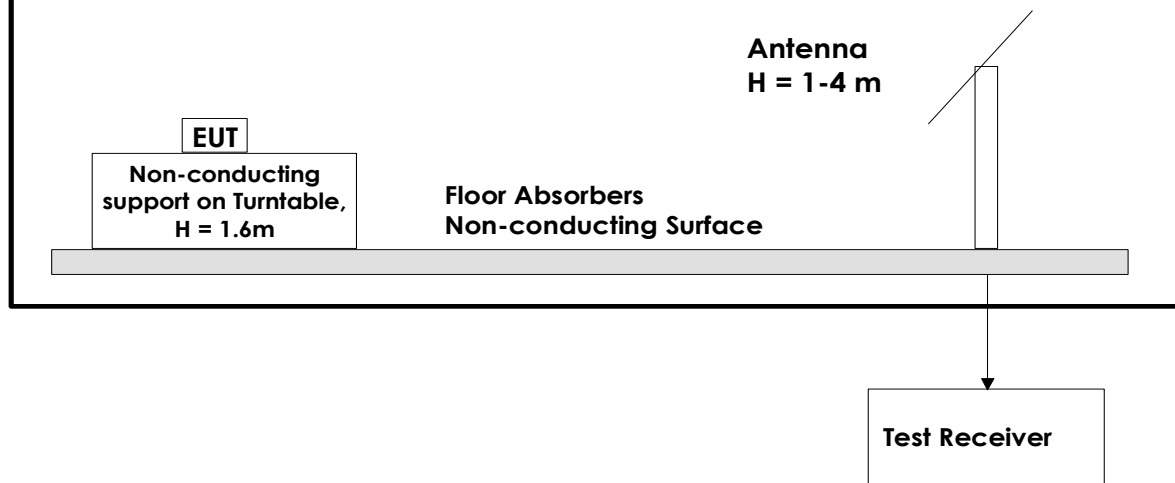
5 Test Set-ups



Test set-up for all conducted emission tests with Spectrum Analyzer

Test set-up was identical for Power Density Measurement, except the Spectrum analyzer was replaced by a Power Sensor

Fully Anechoic Chamber



This test set-up was used for all radiated test.

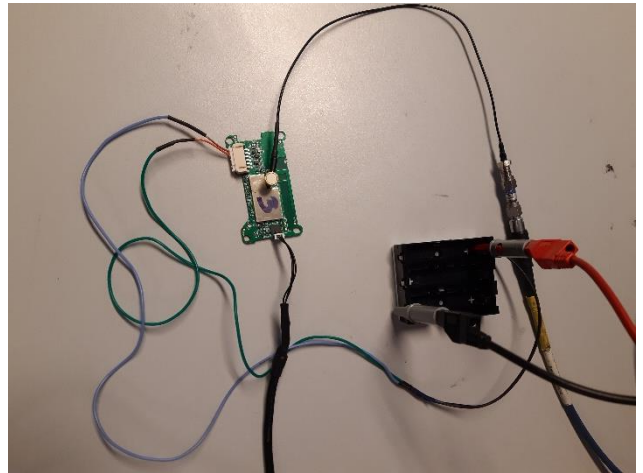
The test receiver was located outside the test chamber. A preamplifier was used after the antenna, with a 10dB attenuator before the preamplifier.

The antenna height was fixed at the same height as the EUT. The EUT was rotated 360 degrees and was also rotated in 3-planes to find the maximum and the antenna characteristics.

6 Photos of Test Set-up



Radiated for antenna characteristics measurements



Conducted measurements

7 Test Equipment Used

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the testhouse.

No.	Model	Type of instrument	Manufacturer	Serial no.	Calibration Date	Next Calibration Date	Calibration Body	Ref. no.
1	FSW43	Spectrum analyzer	Rohde & Schwarz	100616	2023.01	2024.01	R&S	LR 1690
2	FSW26	Spectrum analyzer	Rohde & Schwarz	101454	2023.01	2024.01	R&S	LR 1640
3	Fluke 45 DMM	Multimeter	Fluke	5525163	2023.04	2024.04	Nemko Norway	LT 5218
4	Model 87 V	Multimeter	Fluke	14510368	2023.04	2024.04	Nemko Norway	LR 1598
5	CPX400S	DC Power supply	Aim TTi	/	Service Instrument		N/A	LR 1710
6	9205B	DC Power supply	BK Precision	653C22119	Service Instrument		N/A	LR 1844
7	6 dB	Attenuator	SUHNER	/	Cal b4 use		/	/
8	4768-10	Attenuator	Narda	/	Cal b4 use		/	LR 1673
9	ST18/SMAM/nm/36	Cable Microwave	Rosenberger	N/A	Service Instrument		N/A	LR 1737
10	LNA-40-00101800	Pre-amplifier	NardaMiteq	/	2022.08	2023.08	Nemko Norway	LR 1747
11	3115	Measuring Antenna	EMCO	9311-4164	/	/	/	LR 1326
12	3115	Substitution Antenna	EMCO	9710-5306	2022.10	2026.10	NPL	LR 1330
13	SMB100A	Signal generator	Rohde & Schwarz	107599	2023.01	2024.01	R&S	LR 1656

8 Revision history

Revision	Date	Comment	Sign
A	2023-06-27	First issued	TD