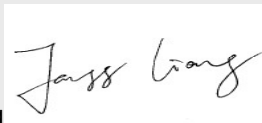
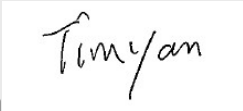


Test report No: 4909379.58

TEST REPORT

Radio Spectrum Matters (RF)

Identification of item tested	Miko Mini Robot
Trademark	
Model and /or type reference	EMK401
FCC ID	2AS3S-EMK401
Features	Input rating: 5,0 V $\overline{=}$; 3,0 A or 9,0 V $\overline{=}$; 2,0 A or 12,0 V $\overline{=}$; 1,5 A. Internal Li-ion battery (18650): 2400 mAh; 3,7 V $\overline{=}$; 8,88 Wh.
Applicant's name / address	RN Chidakashi Technologies Private Limited Flat No - 4, StambhTirth Building, Plot No 82, R.A. Kidwai Road Wadala, Mumbai, 400031, India
Test method requested, standard	FCC CFR Title 47 Part15 Subpart C Section 15.247; KDB558074 D01v05r02;
Verdict Summary	COMPLIANCE
Tested by (name & signature)	 Jazz Liang
Approved by (name & signature)	 Tim Yan
Date of issue	2023-11-13
Report template No	TRF_EMC 2017-06- FCC_Part15C_247

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GENERAL CONDITIONS

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.
5. This report will not be used for social proof function in China market.

UNCERTAINTY

For all measurements where guidance for the calculation of the instrumentation uncertainty of a measurement is specified in EN 55016-4-2 (CISPR 16-4-2), EN/IEC 61000-4 series or a product standard, the measurement instrumentation uncertainty has been calculated and applied in accordance with these standards.

Uncertainties have been calculated according to the DEKRA internal document. The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	-40 °C – 105 °C
Relative Humidity air	30% - 60%
Atmospheric pressure	86 kPa – 106 kPa

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not tested	N/T

DEFINITION OF SYMBOLS USED IN THIS TEST REPORT

☒ Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT.			
☐ Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.			
Decimal separator used in this report	☒	Comma (,)	☐ Point (.)

ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	: Equipment Under Test
QP	: Quasi-Peak
CAV	: CISPR Average
AV	: Average
CDN	: Coupling Decoupling Network
SAC	: Semi-Anechoic Chamber
OATS	: Open Area Test Site
BW	: Bandwidth
AM	: Amplitude Modulation
PM	: Pulse Modulation
HCP	: Horizontal Coupling Plane
VCP	: Vertical Coupling Plane
U_N	: Nominal voltage
Tx	: Transmitter
Rx	: Receiver
N/A	: Not Applicable
N/M	: Not Measured

DOCUMENT HISTORY

Report nr.	Date	Description
4909379.58	2023-11-13	First release.

REMARKS AND COMMENTS

The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).

1 GENERAL INFORMATION

1.1 General Description of the Item(s)

Description of the item	Miko Mini Robot
Trademark.....	MIKO
Model / Type number.....	EMK401
FCC ID	2AS3S-EMK401
Hardware	N/A
Software	N/A
Firmware	N/A
Ratings	Input ratings: 5,0 V $\overline{=}$; 3,0 A or 9,0 V $\overline{=}$; 2,0 A or 12,0 V $\overline{=}$; 1,5 A. Internal Li-ion battery (18650): 2400 mAh; 3,7 V $\overline{=}$; 8,88 Wh.
Manufacturer	Same as applicant
Factory 1	Pacific Industries Zhongshan Limited Xincun Factory Area, Baishawan Industrial Park, Eastern District, 528400, Zhongshan, Guangdong, China.
Factory 2	Kaynes Electronics Manufacturing Private Limited 26-27. Bandanguppe-kellamballi Industrial Area, State Code: 29 ,571313,Chamarajanagara,India

Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☒	AC: 100-240 V, 50/60 Hz	☒	☐	☐	☒	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: 5 V					
	☐	Battery:					
Mounting position.....	☒	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☒	Hand-held equipment					
	☐	Other:					

Wireless module Characteristic

Wireless module No.....	SKI.WB800DS2.1_800M
Operating frequency range(s) – Tx.:	2412 – 2462 MHz for 2.4G WIFI WLAN 5GHz Band: 5180 MHz ~ 5320 MHz, 5500 MHz ~ 5700 MHz, 5745 MHz ~ 5825 MHz; 2402 – 2480 MHz for Bluetooth
Operating frequency range(s) – Rx :	2412 – 2462 MHz for 2.4G WIFI WLAN 5GHz Band: 5180 MHz ~ 5320 MHz, 5500 MHz ~ 5700 MHz, 5745 MHz ~ 5825 MHz;

	2402 – 2480 MHz for Bluetooth
Type of Modulation	WLAN 2.4GHz : IEEE 802.11b: DSSS (CCK, QPSK, BPSK); IEEE 802.11g: OFDM (BPSK, QPSK, 16QAM, 64QAM); IEEE 802.11n HT20/40: OFDM (BPSK, QPSK, 16QAM, 64QAM) IEEE 802.11ax (HE20/40): OFDMA (1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK) WLAN 5GHz : IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20, HT40: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac (VHT20/40): OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ax (HE20/40): OFDMA (256QAM, 64QAM, 16QAM, QPSK, BPSK); Bluetooth LE:GFSK
Antenna type.....	FPC antenna
Antenna gain.....	2,3 dBi for 2.4GHz 2,48 dBi for 5GHz
Operation temperature range	-20 – 70 °C

Antenna List

Antenna Model No.			LJF02-23062508-R0A								
Antenna Manufacturer			Shenzhen Lejin radio frequency technology Co., LTD								
Antenna Delivery			☒	1*TX+1*RX		☐	2*TX+2*RX		☐	3*TX+3*RX	
Antenna Technology			☒	SISO							
			☐	MIMO	☐	Basic methodology					
					☐	Sectorized antenna systems					
					☐	Cross-polarized antennas					
					☐	Unequal antenna gains, with equal transmit powers					
					☐	Spatial Multiplexing					
					☐	Cyclic Delay Diversity (CDD)					
Antenna Type			FPC antenna								
Antenna Gain											
Antenna Technology			Ant Gain(eth1) (dBi)								
☒	SISO		☒	Ant1	2,3 dBi for 2.4GHz 2,48 dBi for 5GHz						
☐			Ant2	-							

The WIFI mode operating channels are:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2412	7	2447
1	2417	8	2452
2	2422	9	2457
3	2427	10	2462
4	2432	-	-
5	2437	-	-
6	2442	-	-

802.11a/n/ac/ax(20MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
36	5180 MHz	40	5200 MHz	44	5220 MHz	48	5240 MHz
52	5260 MHz	56	5280 MHz	60	5300 MHz	64	5320 MHz
100	5500 MHz	104	5520 MHz	108	5540 MHz	112	5560 MHz
116	5580 MHz	120	5600 MHz	124	5620 MHz	128	5640 MHz
132	5660 MHz	136	5680 MHz	140	5700 MHz	149	5745 MHz
153	5765 MHz	157	5785 MHz	161	5805 MHz	165	5825 MHz
802.11n/ac/ax(40MHz) Working Frequency of Each Channel:							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz	54	5270 MHz	62	5310 MHz
102	5510 MHz	110	5550 MHz	118	5590 MHz	126	5630 MHz
134	5670 MHz	151	5755 MHz	159	5795 MHz	N/A	N/A

The radio module (Bluetooth) operating channels are:

BLE:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	14	2430	28	2458
1	2404	15	2432	29	2460
2	2406	16	2434	30	2462
3	2408	17	2436	31	2464
4	2410	18	2438	32	2466
5	2412	19	2440	33	2468
6	2414	20	2442	34	2470
7	2416	21	2444	35	2472
8	2418	22	2446	36	2474
9	2420	23	2448	37	2476

10	2422	24	2450	38	2478
11	2424	25	2452	39	2480
12	2426	26	2454	-	-
13	2428	27	2456	-	-

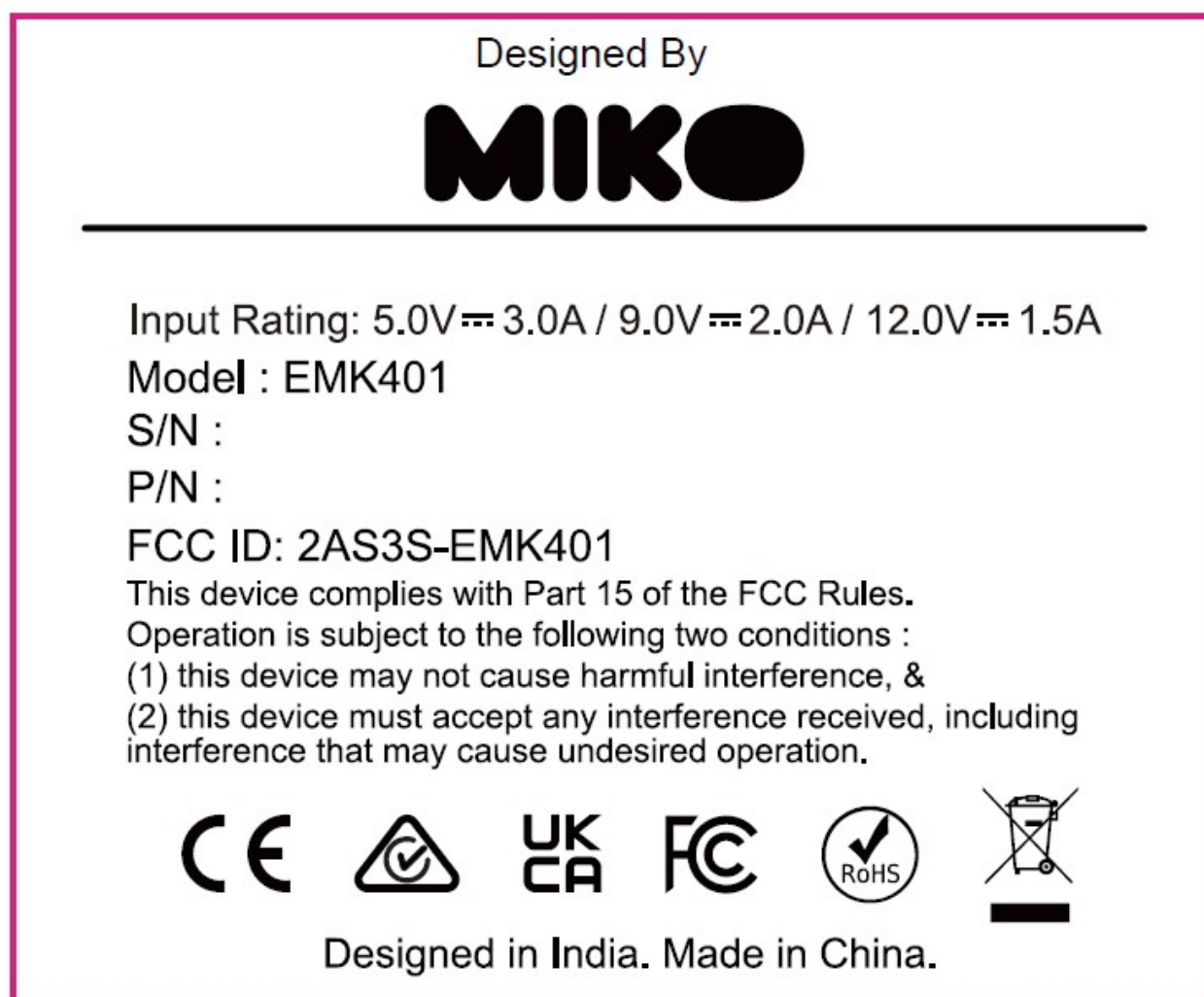
Intended use of the Equipment Under Test (EUT)

The apparatus as supplied for the test is Miko Mini Robot which intended for residential use, the product contains electronic circuitry and with earth connection. It contains a Wireless module, so it would be controlled by other Wi-Fi devices through APPs.

Hence, model EMK401 which contains this certified module SKI.WB800DS2.1_800M was chosen for full test.

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Remark:

- 1.The CE marking must have substantially the same vertical dimension, which shall not be less than 5 mm.
- 2.The symbol combination of WEEE logo shall have a minimum height of 7 mm.
- 3.The EU/EFTA importer (and manufacture, if it is different)'s ①company name, ②registered trade name or registered trademark and③the postal address will be marked on the products before being place on the market. The contact details shall be in a language easily understood by end-users and market surveillance authorities.

1.2 Test data

Test Location	DEKRA Testing and Certification (Shanghai) Ltd. Guangzhou Branch Block 5, No.3, Qiyun Road, Huangpu District, Guangzhou, Guangdong, China FCC Designation Number: CN1324;
Date of receipt of test item	2023-09-12
Date (s) of performance of tests	2023-09-12 to 2023-11-13
Test sample	Normal sample: EMK401 (lab no.4909379-1) RF conducted sample: EMK401 (lab no.4909379-1) RF radiated sample: EMK401 (lab no.4909379-1)

1.3 The environment(s) in which the EUT is intended to be used

The equipment under test (EUT) is intended to be used in the following environment(s):

☒	Residential (domestic) environment.
☐	Commercial and light-industrial environment.
☐	Industrial environment.

2 DESCRIPTION OF TEST SETUP

2.1 Operating mode(s) used for tests

During the tests the following operating mode(s) has(have) been used.

Operating mode	Operating mode description	Used for methods	
		Conducted	Radiated
1	Transmitting at 1 Mbit/s,	☒	☒
2	Transmitting at 2 Mbit/s,	☒	☒
3	Charging mode; Supply power by AC/DC adaptor	☒	☒
4			
Supplemental information: ---			

2.2 Support / Auxiliary equipment / unit / software for the EUT

The EUT has been tested with the following auxiliary equipment / unit / software:

Auxiliary equipment / unit / software	Type / Version	Manufacturer	Supplied by
Laptop	Latitude 5488	DELL	DEKRA
SecureCRT (software)	-	-	Client
Adaptor	-	HUAWEI	DEKRA
Supplemental information: ---			

2.3 Test Configuration / Block diagram used for tests

Refer to Annex 3.

2.4 Measurement procedure

The EUT was controlled by a serial PCB(TELINK BDT) which provided by test lab which connected to laptop through the com port. After connected, run the software "SecureCRT" supplied by manufacturer to control the EUT work in required test mode as below table.

RF Mode	Set_channel(MHz)
BLE_1M	2402
	2440
	2480
BLE_2M	2402
	2440
	2480

3 VERDICT SUMMARY SECTION

This chapter presents an overview of standards and results. Refer to the next chapters for details of measured test results and applied test levels.

3.1 Standards

Standard	Year	Description
FCC CFR Title 47 Part 15 Subpart C Section 15.247	2022	Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.
KDB 558074 D01 v05r02	2019	Guidance for performing compliance measurements on Digital Transmission System (DTS) operating under section 15.247
ANSI C63.10	2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

3.2 Deviation(s) from the Standard(s) / Test Specification(s)

The following deviation(s) was / were made from the published requirements of the listed standards: N/A.

3.3 Overview of results

FCC measurement			
Requirement – Test case	Basic standard(s)	Verdict	Remark
AC Power Line Conducted Emission	FCC 15.207	PASS	---
Emissions in non-restricted frequency bands	FCC 15.247(d), FCC 15.209	PASS	---
Emissions in restricted frequency bands	FCC 15.247(b)(3)	PASS	---
Duty cycle	ANSI C63.10:2013	PASS	---
Band Edge	FCC 15.247(d)	PASS	---
Fundamental emission output power	FCC 15.247(d), FCC 15.209	PASS	---
DTS Bandwidth	FCC 15.247(a)(2)	PASS	---
Power Spectral Density	FCC 15.247(e)	PASS	---
Antenna Requirement	FCC 15.203	PASS	---
Supplementary information: ---			

The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to calculate the uncertainty associated with the measurement result.

4 TRANSMITTER TEST RESULTS

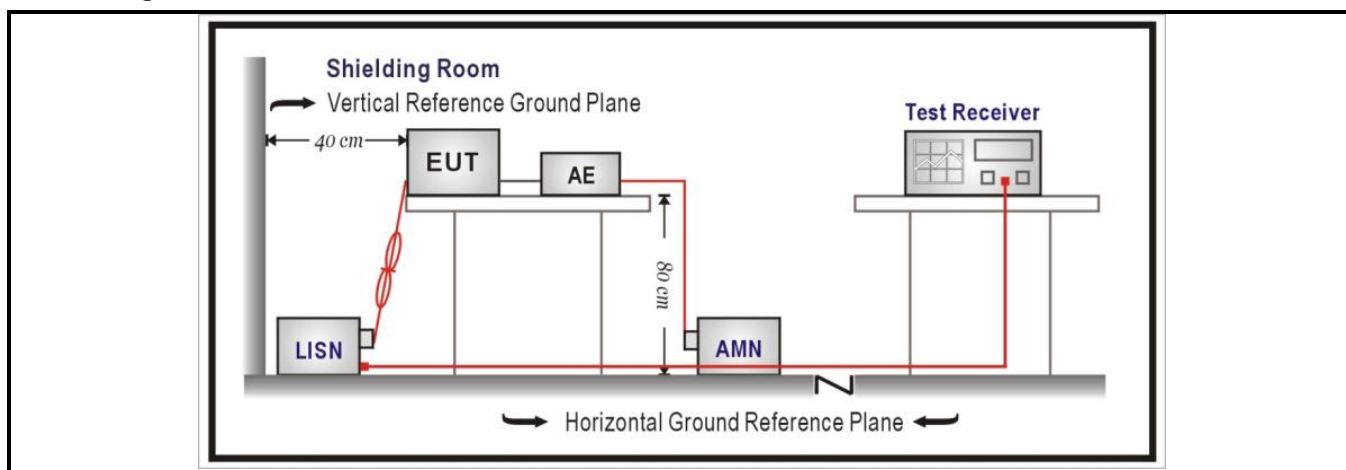
4.1 AC Power Line Conducted Emission	VERDICT: PASS
---	----------------------

Limits

FCC Part 15 Subpart C Paragraph 15.207				
Frequency range [MHz]	Limit: QP [dB(μV) ¹⁾]	Limit: AV [dB(μV) ¹⁾]	IF BW	Detector(s)
0,15 - 0,50	66 - 56 ²⁾	56 - 46 ²⁾	9 KHz	QP, AV
0,50 - 5,0	56	46	9 KHz	QP, AV
5,0 - 30	60	50	9 KHz	QP, AV

¹⁾ At the transition frequency, the lower limit applies.
²⁾ The limit decreases linearly with the logarithm of the frequency.

Test Configuration



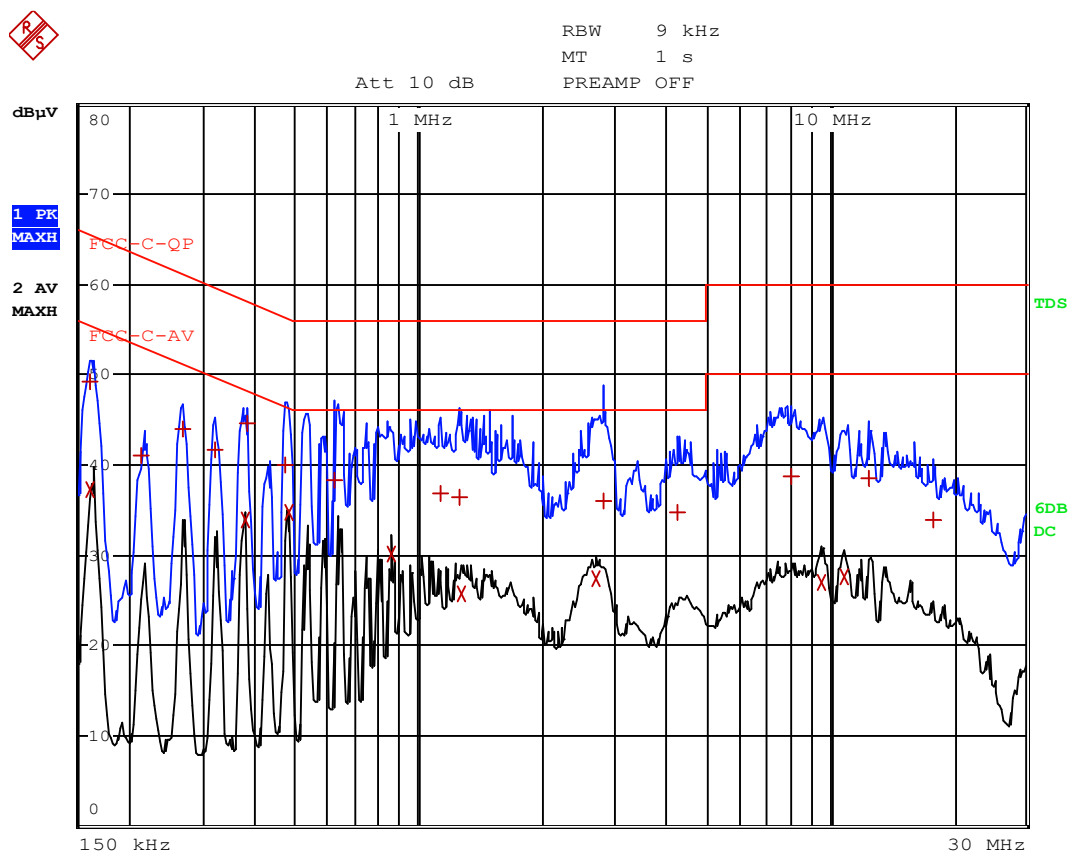
Performed measurements

Port under test			Terminal							
☒	AC mains input power		☒	N	☒	L1	☐	L2	☐	L3
☐	DC input power		☐	Positive (+)			☐	Negative (-)		
Test method applied			☒	Artificial mains network						
			☐	Voltage probe						
Test setup			☒	Table top	☐	Artificial hand applied				
			☐	Floor standing	☐	Other:				
			Refer to the Annex 2 for test setup photo(s).							
Operating mode(s) used			Mode 3							
Envirment condition (temperature; humidiry)			23,0 °C; 45,0 %							
Remark			When the EUT is charging mode, the Bluetooth and WIFI mode remain “off”.							

Model	EMK401
Operation Mode (worst case)	Mode 3
Test voltage	120 Vac, 60 Hz

Results

Live



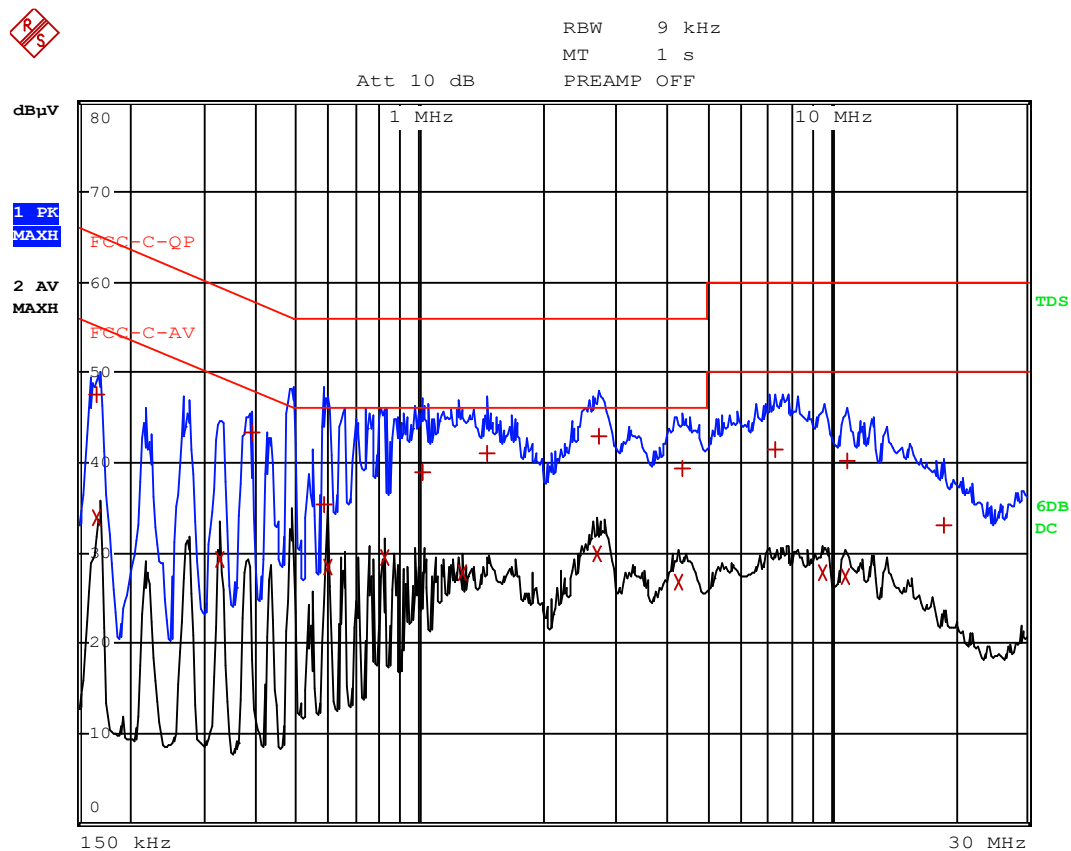
EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCC-C-QP		
Trace2:	FCC-C-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
2 Average	482 kHz	34.67	-11.63
1 Quasi Peak	382 kHz	44.66	-13.57
2 Average	378 kHz	33.99	-14.32
2 Average	858 kHz	30.18	-15.81
1 Quasi Peak	162 kHz	49.23	-16.12
1 Quasi Peak	470 kHz	40.10	-16.41
1 Quasi Peak	266 kHz	44.04	-17.20
1 Quasi Peak	626 kHz	38.21	-17.78

Remarks:

- 1) Level (final measurement) = received value + transducer (Lisn+cable)
- 2) Delta = Level – Limit

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

Neutral



EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCC-C-QP		
Trace2:	FCC-C-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Quasi Peak	2.738 MHz	42.94	-13.05
1 Quasi Peak	390 kHz	43.29	-14.76
1 Quasi Peak	1.454 MHz	41.00	-14.99
2 Average	2.694 MHz	29.97	-16.02
2 Average	818 kHz	29.44	-16.55
1 Quasi Peak	4.342 MHz	39.36	-16.63
1 Quasi Peak	1.022 MHz	38.88	-17.11
2 Average	594 kHz	28.52	-17.47
1 Quasi Peak	166 kHz	47.66	-17.49
2 Average	1.266 MHz	27.78	-18.21

Remarks:

- 1) Level (final measurement) = received value + transducer (Lisn+cable)
- 2) Delta = Level – Limit

No other significant emissions were measured at the frequency range of interest employing both the QP and AV detectors.

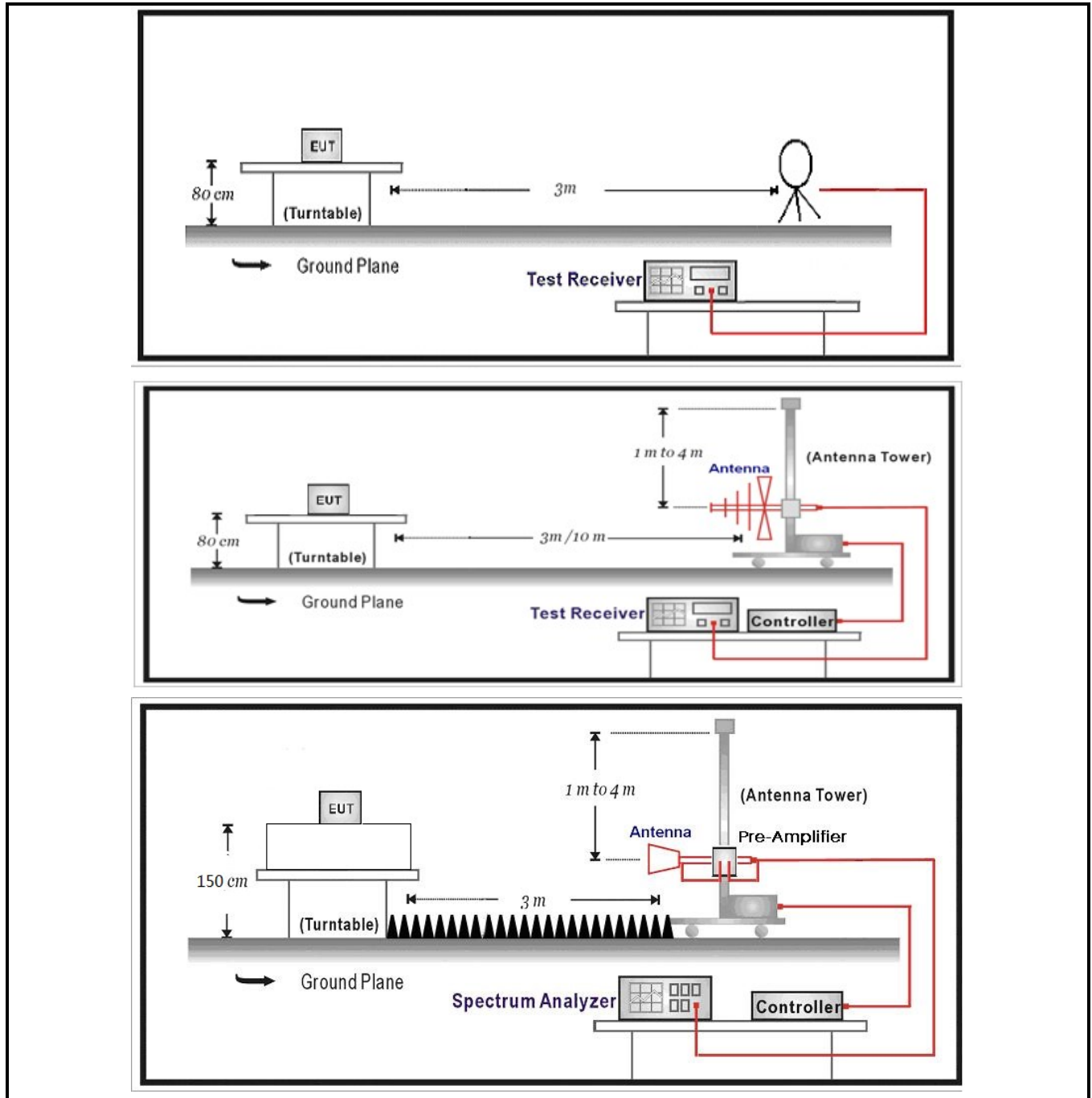
4.2	Emissions in non-restricted frequency bands	VERDICT: PASS
------------	--	----------------------

Emissions Limit 15.209(a)			
Frequency (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009 - 0.49	2400/F(kHz)	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

Note 1: At frequencies below 30 MHz, 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. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

Test Configuration



Performed measurements

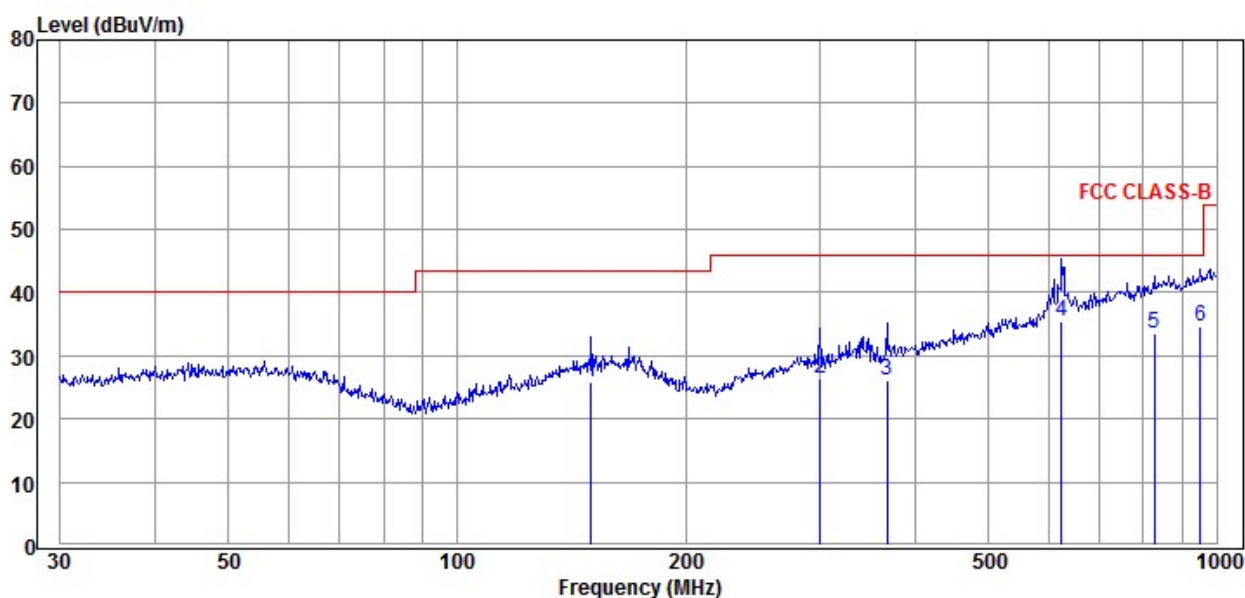
Port under test	Enclosure port	
Test method applied	☐	Conducted measurement
	☒	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1-2	
Remark	1)The test frequency range, 9kHz~30MHz, 18GHz~26GHz, both of the worst case are at least 20dB below the limits, therefore no data appear in the report. 2)The EUT are tested in three orientations. The record is the worst orientation which refer to the Annex 3 for test setup photo(s).	

Results of 30 – 1000 MHz

Model	EMK401
Operation Mode	Mode 3 (worst case)
Test voltage	120Vac

Results

Horizontal



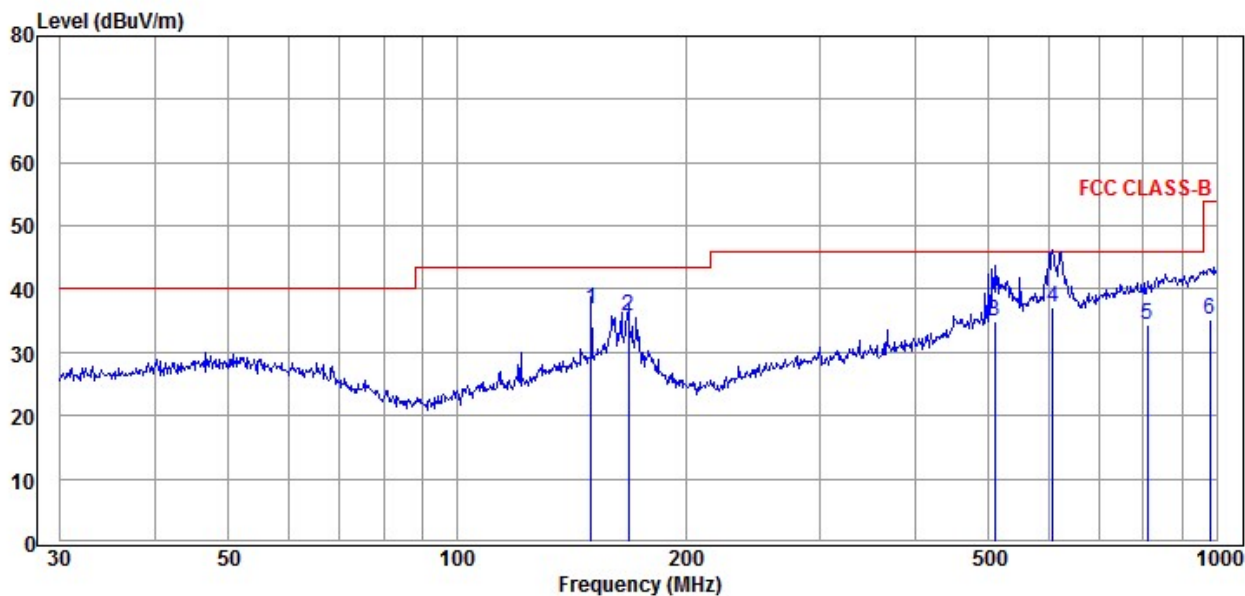
Freq (MHz)	Reading (dBuV)	C.F (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin=limit-result (dB)
150.01	11.22	14.65	25.87	43.50	17.63
300.37	11.06	15.33	26.39	46.00	19.61
368.11	9.03	17.13	26.16	46.00	19.84
625.08	11.95	23.40	35.35	46.00	10.65
827.49	6.78	26.74	33.52	46.00	12.48
952.09	6.92	27.78	34.70	46.00	11.30

Remarks:

- 1) C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
- 2) Result = Reading + C.F (Correction Factor)

No other significant emissions were measured at the frequency range of interest employing the QP detectors.

Vertical



Freq (MHz)	Reading (dBuV)	C.F (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin=limit-result (dB)
150.01	22.22	14.65	36.87	43.50	6.63
167.82	21.15	14.59	35.74	43.50	7.76
510.04	14.19	20.65	34.84	46.00	11.16
607.79	13.51	23.55	37.06	46.00	8.94
810.27	8.37	25.97	34.34	46.00	11.66
979.18	7.01	28.19	35.20	54.00	18.80

Remarks:

- 1) C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
- 2) Result = Reading + C.F (Correction Factor)

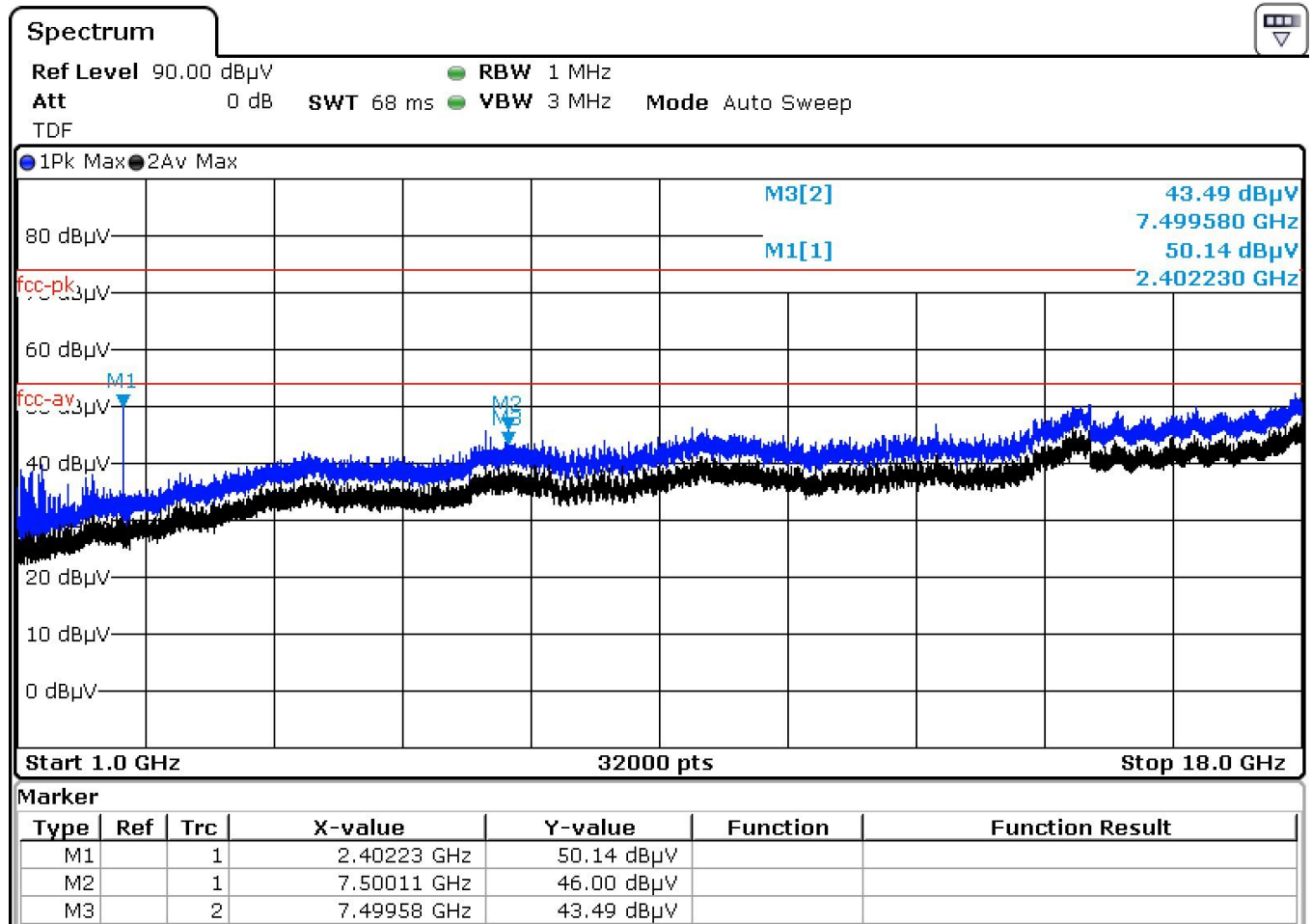
No other significant emissions were measured at the frequency range of interest employing the QP detectors.

Results of 1 – 18 GHz

Model	EMK401
Operation Mode (worst case)	Mode 1 @2402 MHz
Test voltage	5Vdc

Results

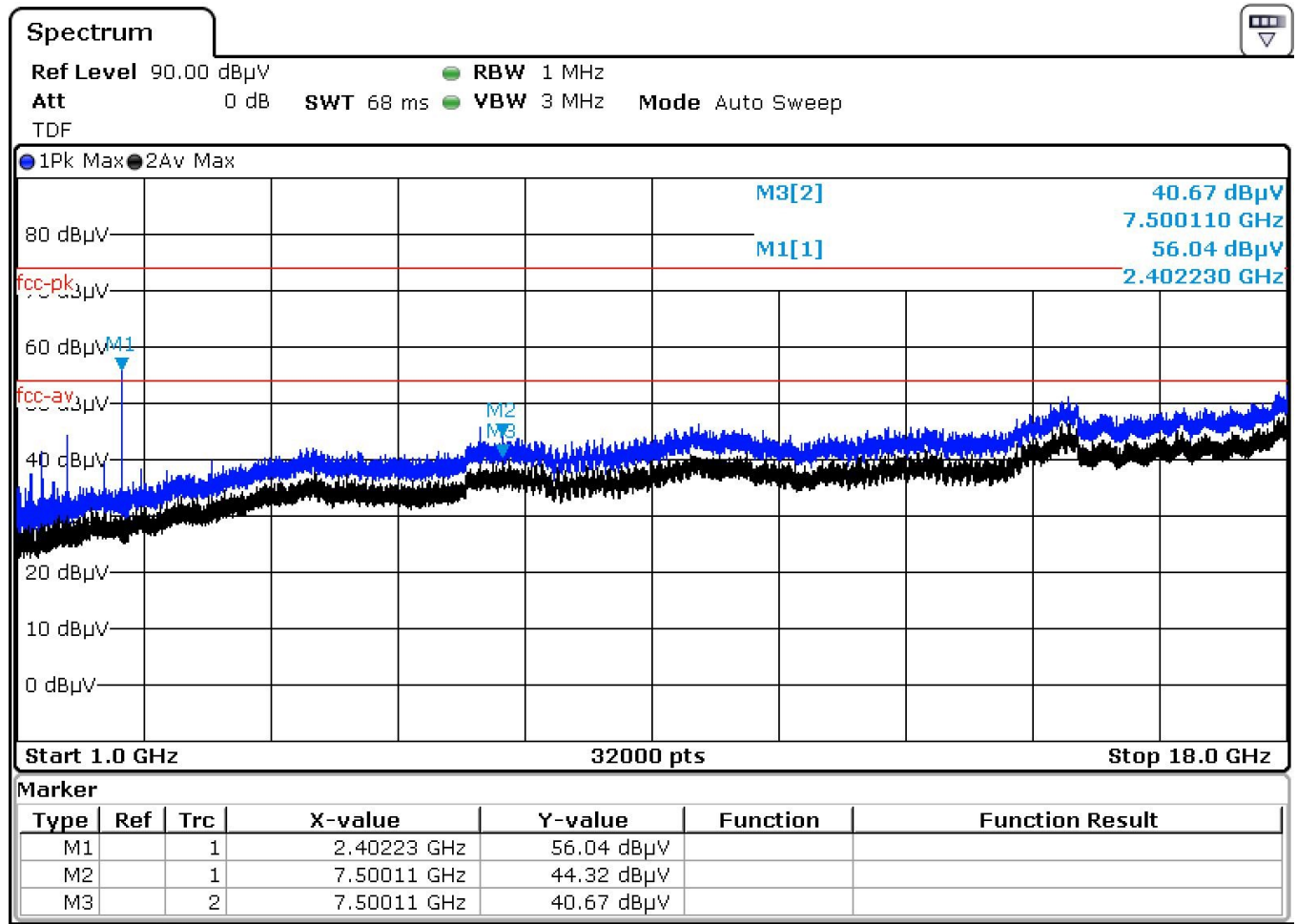
Horizontal



Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Vertical



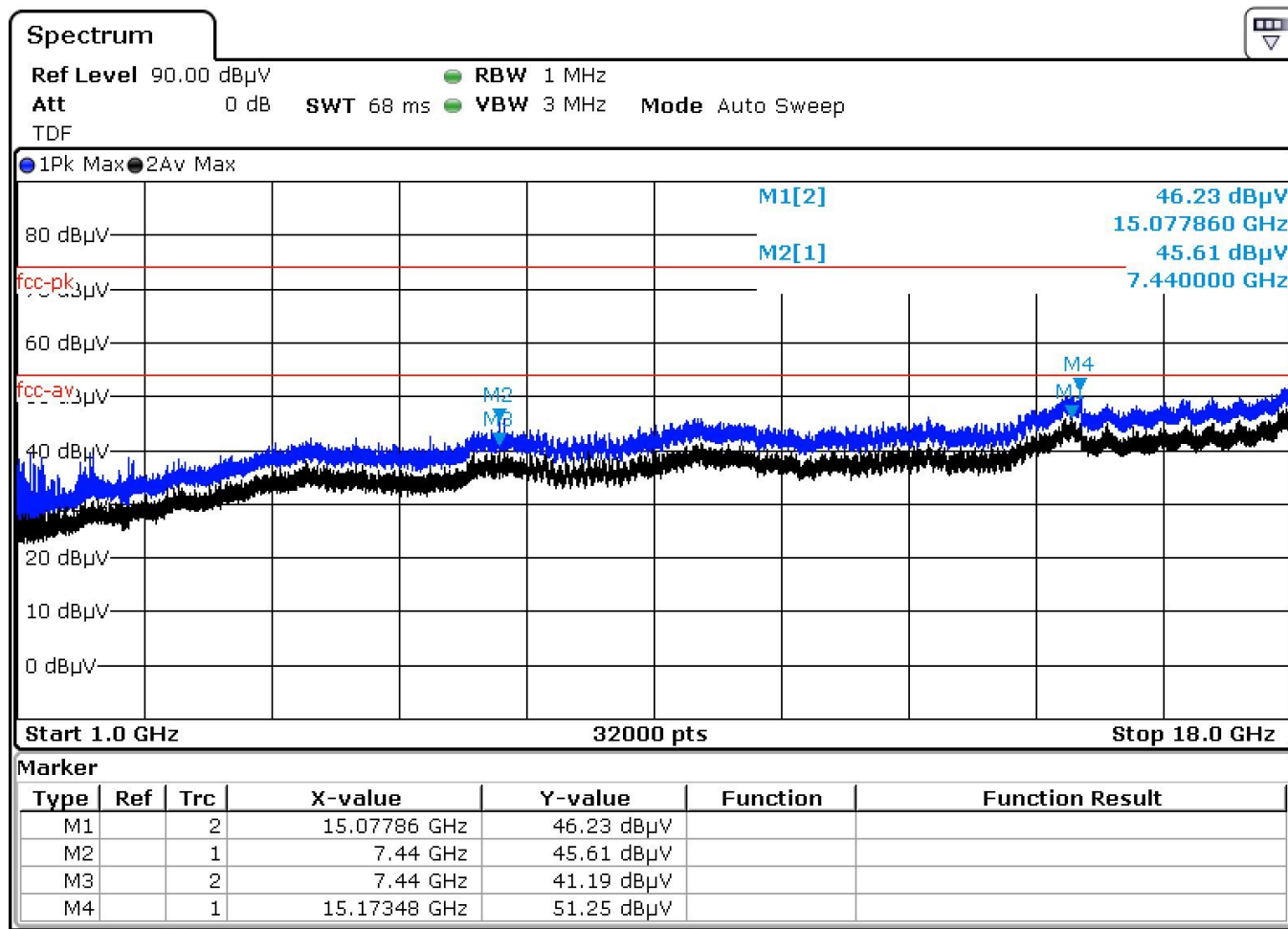
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Model	EMK401
Operation Mode (worst case)	Mode 1 @2480 MHz
Test voltage	5Vdc

Results

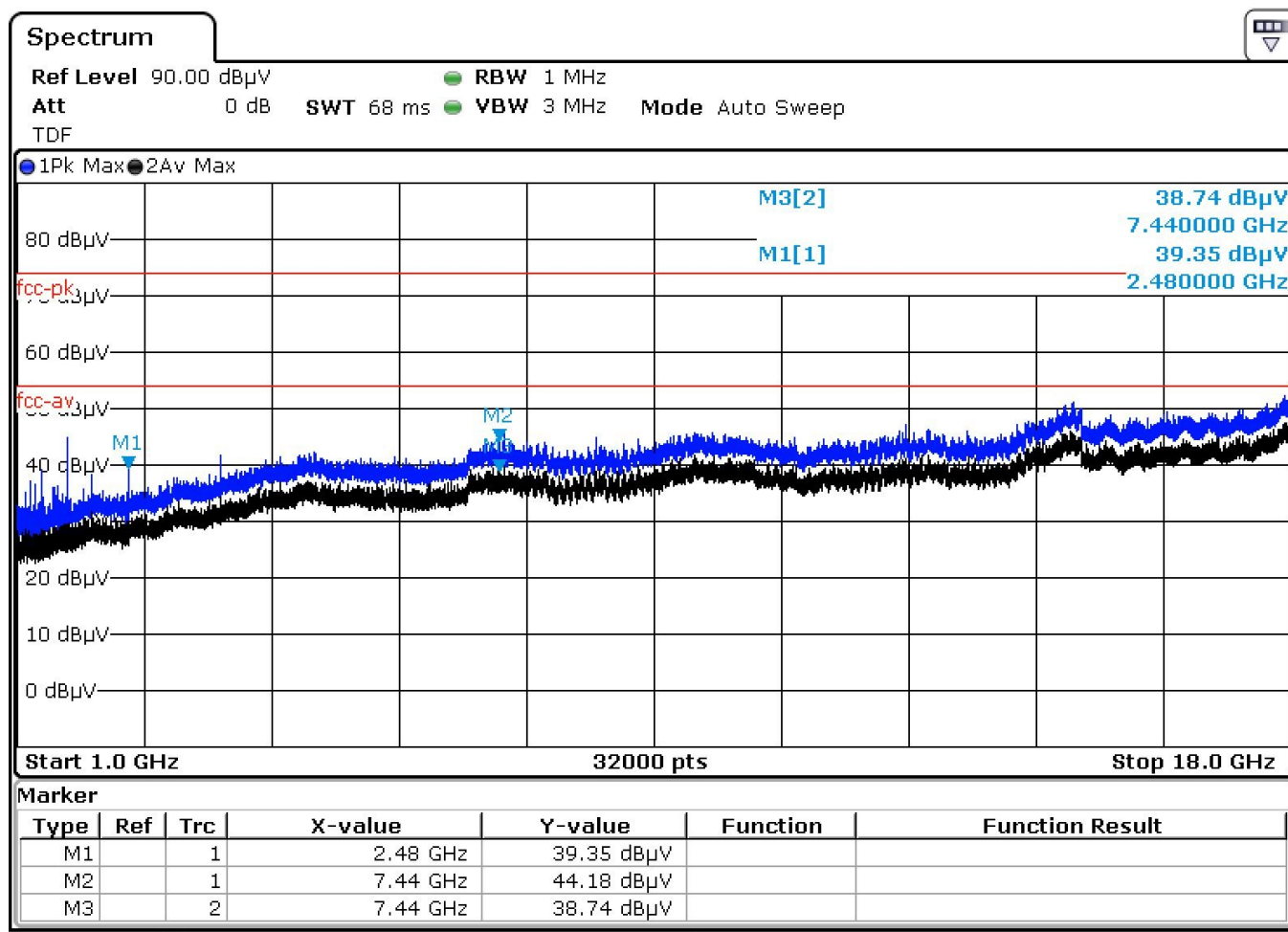
Horizontal



Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Vertical



Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

4.3	Emissions in restricted frequency bands	VERDICT: PASS
------------	--	----------------------

Restricted Bands of operation of FCC			
Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
0.495 – 0.505	16.69475 – 16.69525	608 – 614	5.35 – 5.46
2.1735 – 2.1905	16.80425 – 16.80475	960 – 1240	7.25 – 7.75
4.125 – 4.128	25.5 – 25.67	1300 – 1427	8.025 – 8.5
4.17725 – 4.17775	37.5 – 38.25	1435 – 1626.5	9.0 – 9.2
4.20725 – 4.20775	73 – 74.6	1645.5 – 1646.5	9.3 – 9.5
6.215 – 6.218	74.8 – 75.2	1660 – 1710	10.6 – 12.7
6.26775 – 6.26825	108 – 121.94	1718.8 – 1722.2	13.25 – 13.4
6.31175 – 6.31225	123 – 138	2200 – 2300	14.47 – 14.5
8.291 – 8.294	149.9 – 150.05	2310 – 2390	15.35 – 16.2
8.362 – 8.366	156.52475 – 156.52525	2483.5 – 2500	17.7 – 21.4
8.37625 – 8.38675	156.7 – 156.9	2690 – 2900	22.01 – 23.12
8.81425 – 8.81475	162.0125 – 167.17	3260 – 3267	23.6 – 24.0
12.29 – 12.293	167.72 – 173.2	3332 – 3339	31.2 – 31.8
12.51975–12.52025	240 – 285	3345.8 – 3358	36.43 – 36.5
12.57675–12.57725	322 – 335.4	3600 – 4400	
13.36 – 13.41			
Restricted Bands of operation for IC			
0.090 - 0.110	13.36 - 13.41	960 - 1427	9.0 - 9.2
0.495 - 0.505	16.42 - 16.423	1435 - 1626.5	9.3 - 9.5
2.1735 - 2.1905	16.69475 - 16.69525	1645.5 - 1646.5	10.6 - 12.7
3.020 - 3.026	16.80425 - 16.80475	1660 - 1710	13.25 - 13.4
4.125 - 4.128	25.5 - 25.67	1718.8 - 1722.2	14.47 - 14.5
4.17725 - 4.17775	37.5 - 38.25	2200 - 2300	15.35 - 16.2
4.20725 - 4.20775	73 - 74.6	2310 - 2390	17.7 - 21.4
5.677 - 5.683	74.8 - 75.2	2483.5 - 2500	22.01 - 23.12
6.215 - 6.218	108 - 138	2655 - 2900	23.6 - 24.0
6.26775 - 6.26825	149.9 - 150.05	3260 - 3267	31.2 - 31.8
6.31175 - 6.31225	156.52475 - 156.52525	3332 - 3339	36.43 - 36.5
8.291 - 8.294	156.7 - 156.9	3345.8 - 3358	Above 38.6
8.362 - 8.366	162.0125 - 167.17	3500 - 4400	
8.37625 - 8.38675	167.72 - 173.2	4500 - 5150	
8.41425 - 8.41475	240 - 285	5350 - 5460	
12.29 - 12.293	322 - 335.4	7250 - 7750	
12.51975 - 12.52025	399.9 - 410	8025 - 8500	
12.57675 - 12.57725	608 - 614	--	

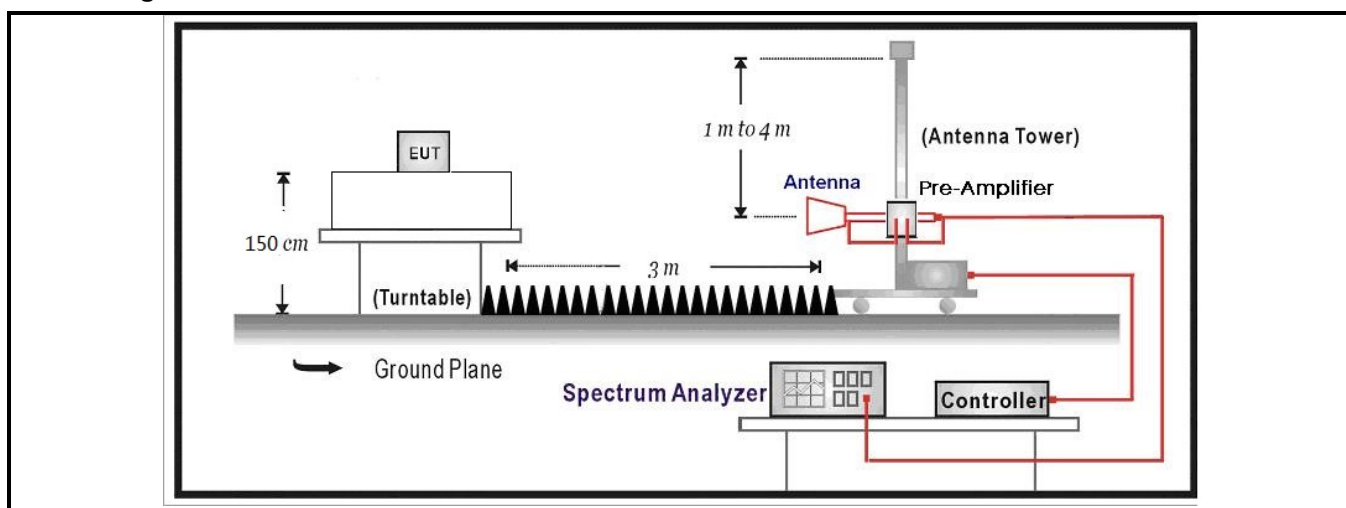
Restricted Band Emissions Limit

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Field strength ($\text{dB}\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.49	$2400/F(\text{kHz})$	48.5 – 13.8	300 _(Note 1)
0.49 - 1.705	$24000/F(\text{kHz})$	33.8 - 23	30 _(Note 1)
1.705 - 30	30	29.5	30 _(Note 1)
30 - 88	100	40	3 _(Note 2)
88 - 216	150	43.5	3 _(Note 2)
216 - 960	200	46	3 _(Note 2)
Above 960	500	54	3 _(Note 2)

Note 1: At frequencies below 30 MHz, 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. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade).

Note 2: At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

Test Configuration



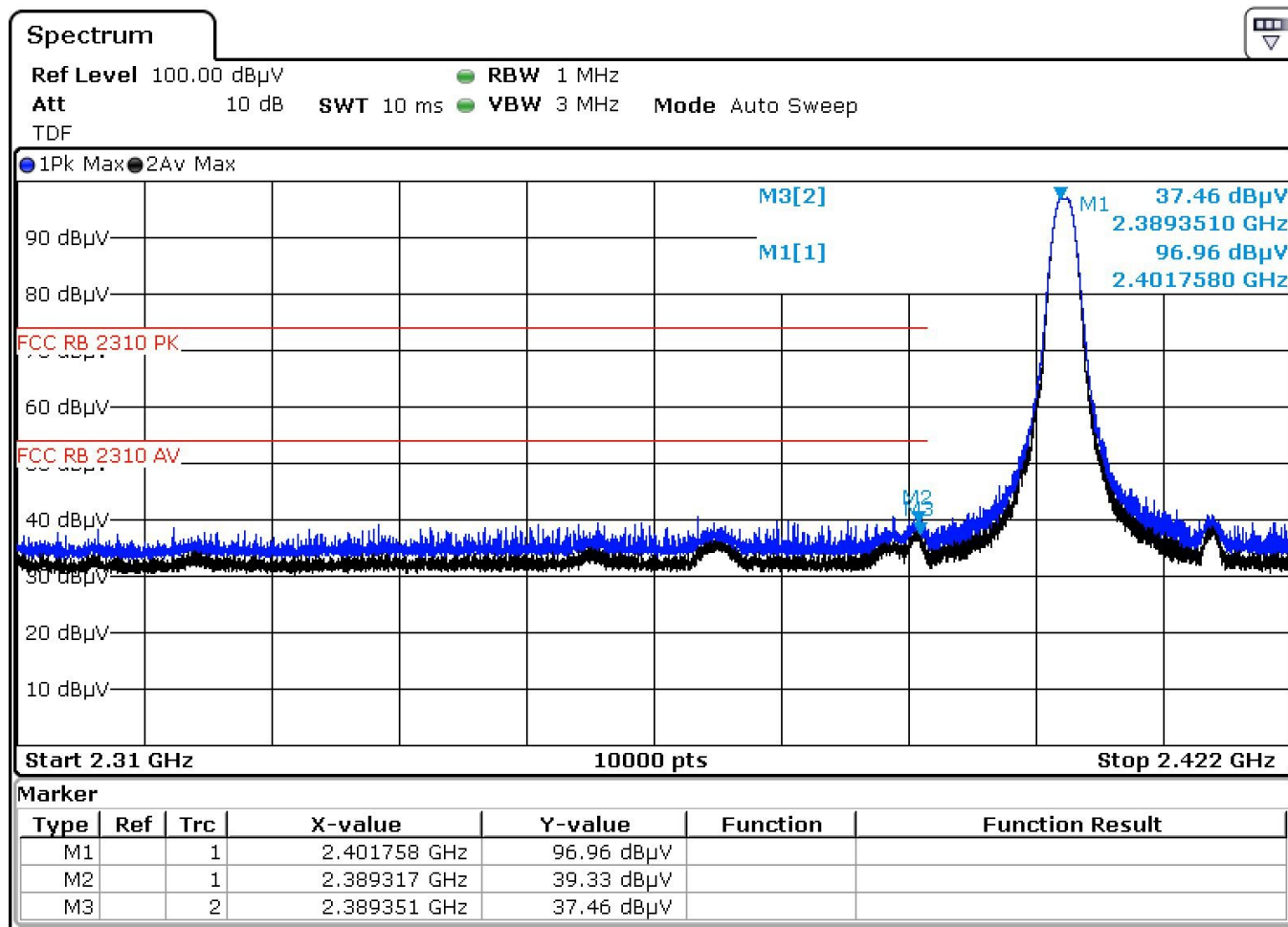
Performed measurements

Port under test	Enclosure port	
Test method applied	☐	Conducted measurement
	☒	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1-2	
Remark	---	

Model	EMK401
Operation Mode (worst case)	Mode 2 @2402 MHz
Test voltage	5Vdc

Results

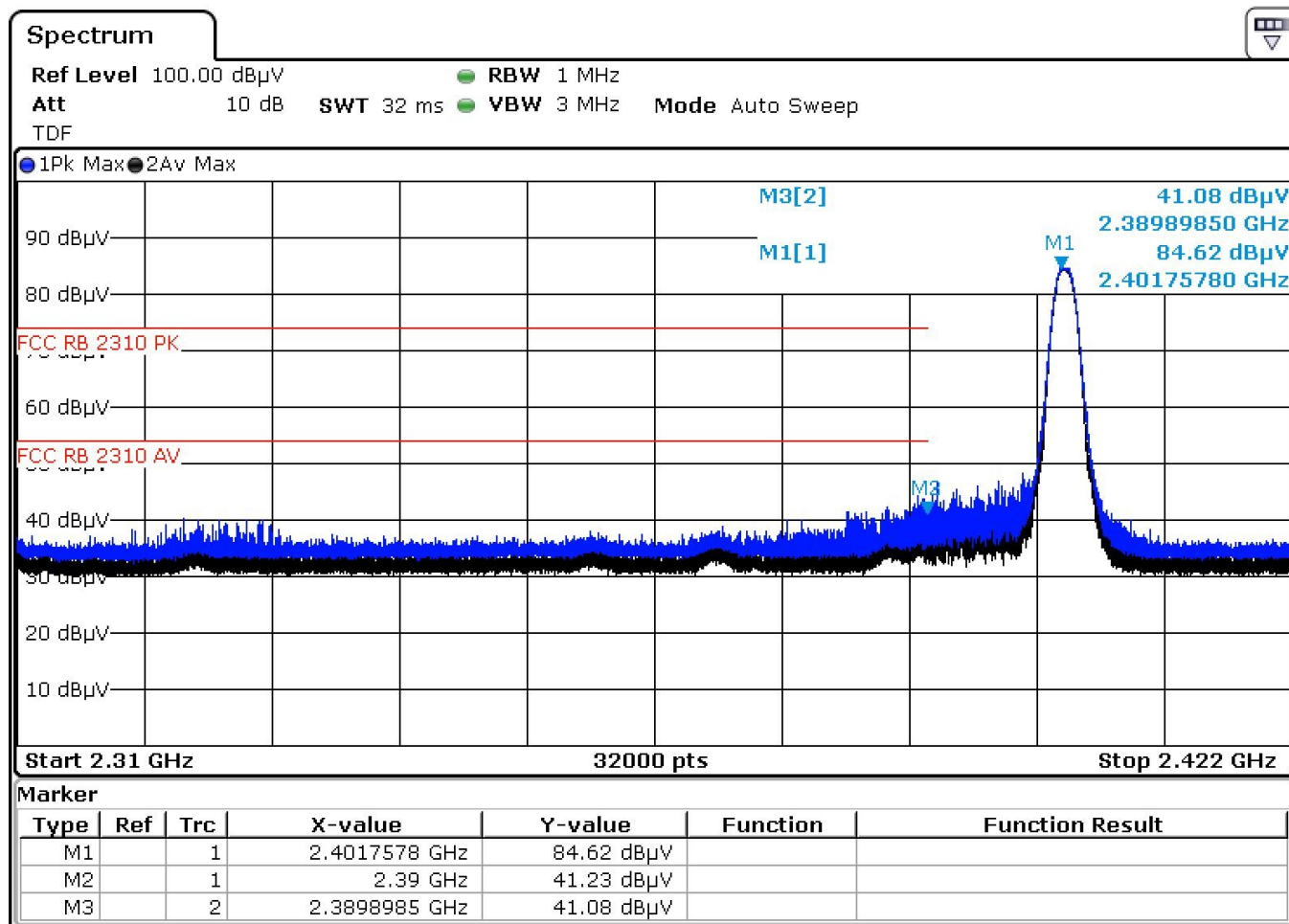
Horizontal



Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Vertical



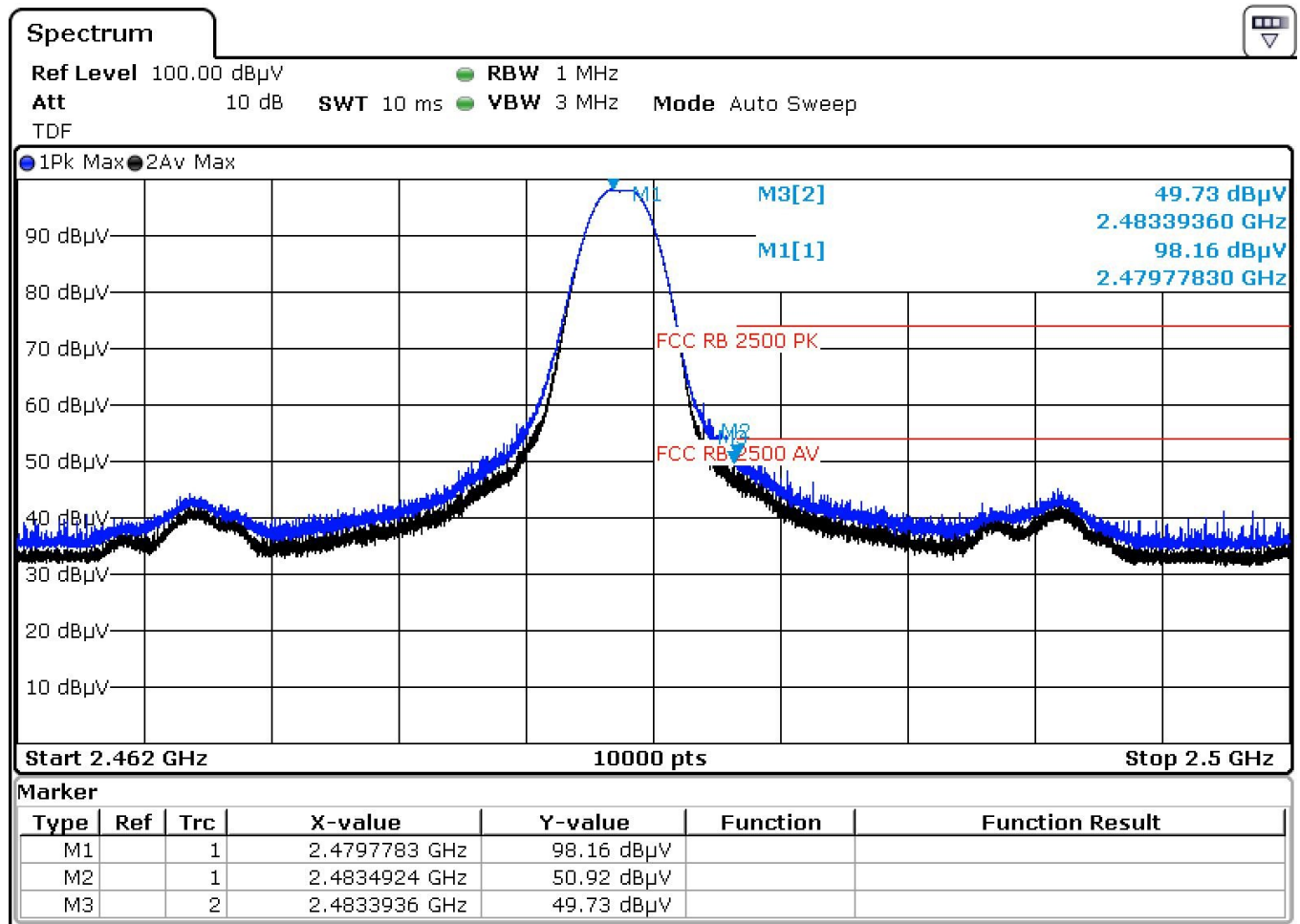
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Model	EMK401
Operation Mode (worst case)	Mode 2 @2480 MHz
Test voltage	5Vdc

Results

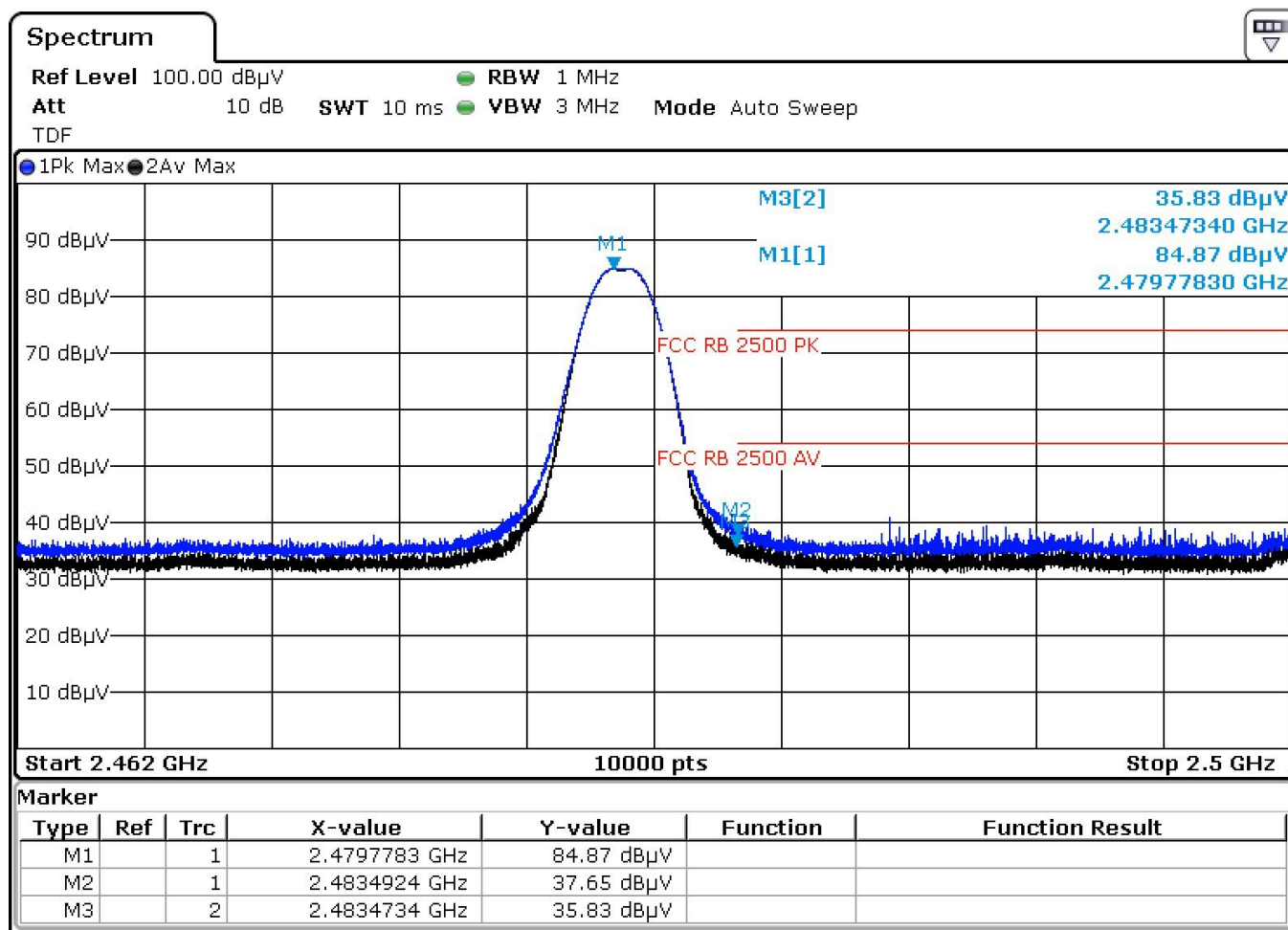
Horizontal



Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Vertical



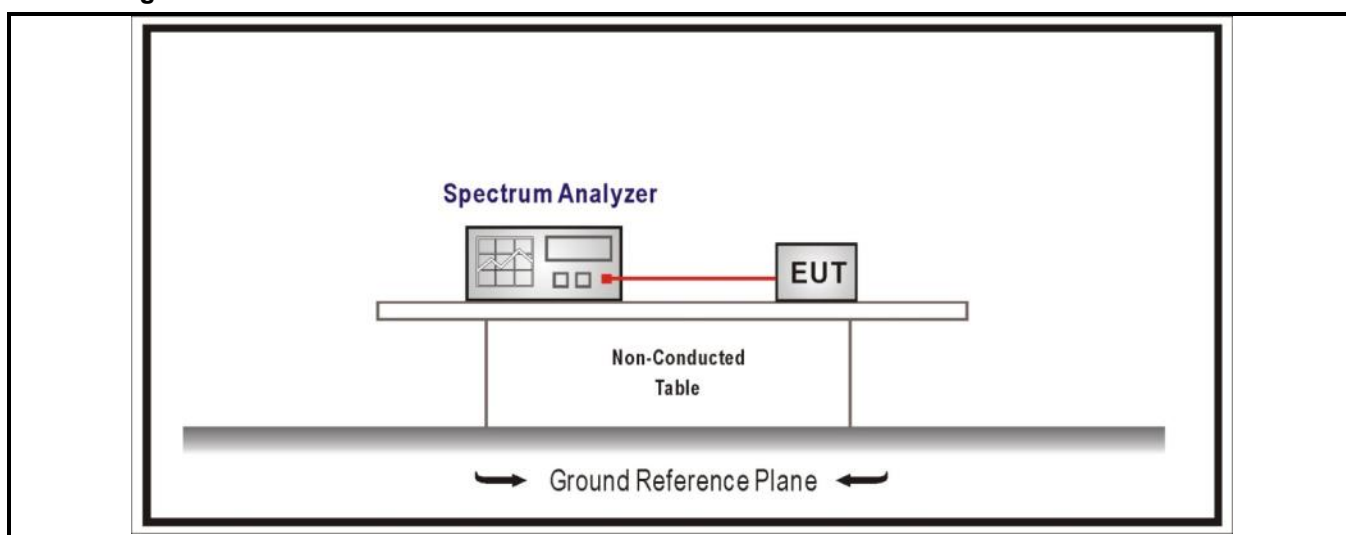
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

4.4 Band Edge	VERDICT: PASS
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Standard	FCC Part 15 Subpart C Paragraph 15.247(d)	
RF Output power (Detection methods)	Limit(dB)	
RF Output power(Average detector)	30dBc(Note1)	
RF Output power(PK detector)	20dBc(Note2)	
Note 1: If maximum conducted (average) output power was used to demonstrate compliance as described in 9.2, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD by level in 100 kHz (i.e., 30 dBc).		
Note 2: If the maximum peak conducted output power procedure was used, then the peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD by level in 100 kHz (i.e., 20 dBc).		

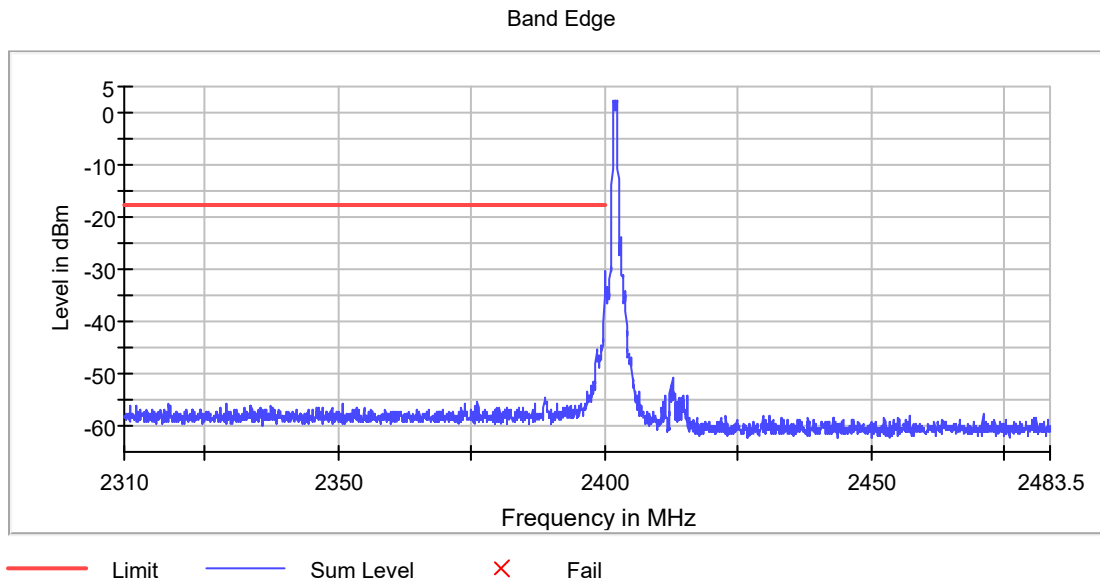
Test Configuration



Performed measurements

Port under test	Antenna port	
Test method applied	☒	Conducted measurement
	☐	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1-2	
Remark	---	

Result of mode1 @2402 MHz



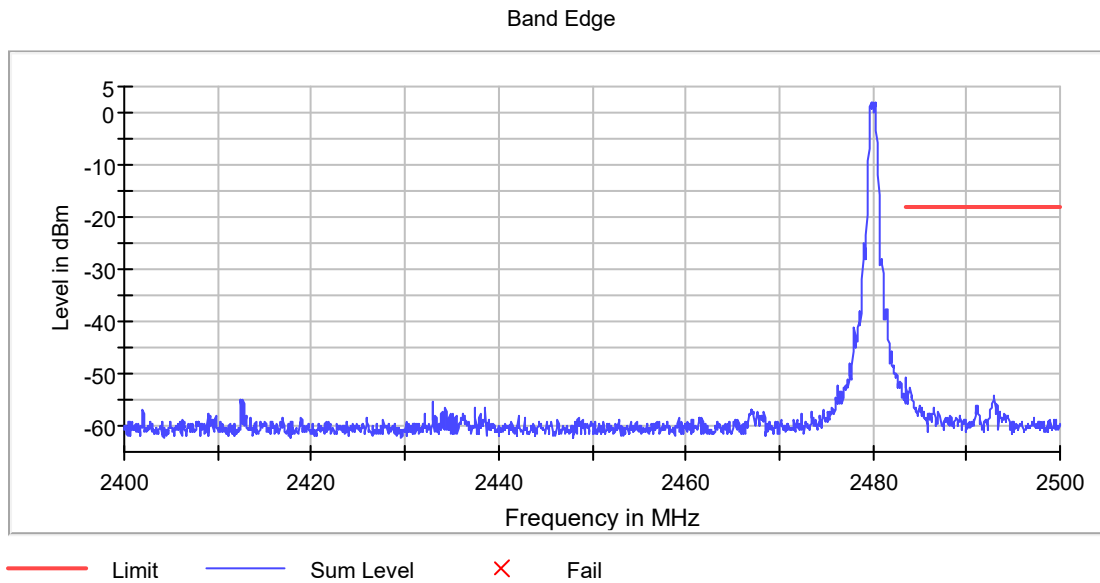
Inband Peak

Frequency (MHz)	Level (dBm)
2402.0000	2.3

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-34.7	17.0	-17.7	PASS
2399.925000	-40.3	22.7	-17.7	PASS
2399.875000	-41.3	23.6	-17.7	PASS
2399.725000	-43.3	25.6	-17.7	PASS
2399.825000	-43.5	25.8	-17.7	PASS
2399.775000	-43.7	26.1	-17.7	PASS
2399.675000	-43.8	26.2	-17.7	PASS
2399.625000	-44.4	26.8	-17.7	PASS
2399.575000	-44.6	26.9	-17.7	PASS
2399.475000	-44.7	27.0	-17.7	PASS
2398.525000	-45.3	27.7	-17.7	PASS
2399.525000	-45.7	28.0	-17.7	PASS
2398.475000	-45.7	28.1	-17.7	PASS
2399.425000	-45.9	28.2	-17.7	PASS
2398.575000	-45.9	28.2	-17.7	PASS

Result mode1 @2480 MHz



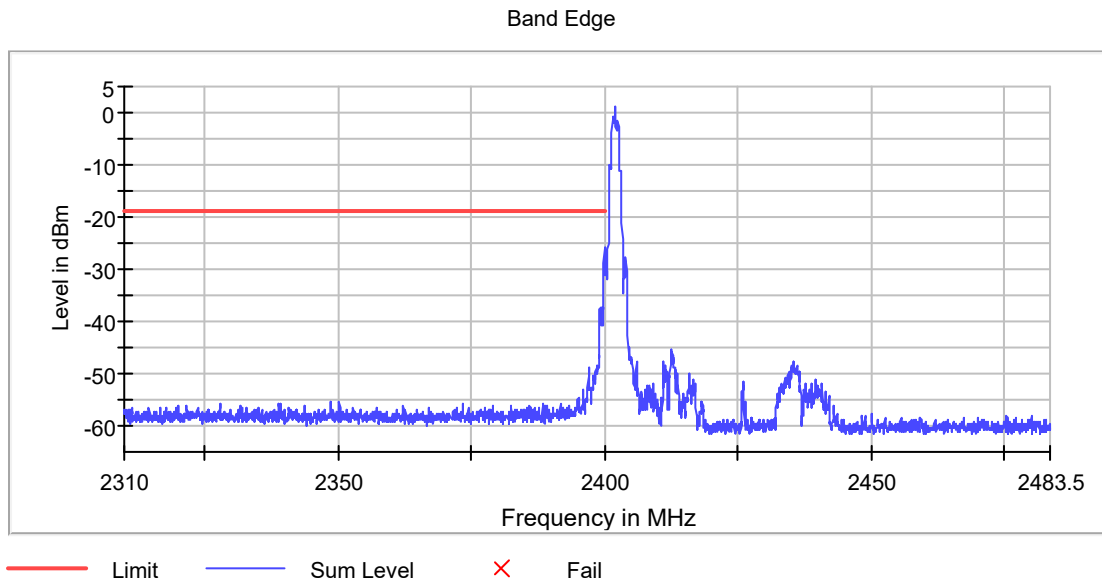
Inband Peak

Frequency (MHz)	Level (dBm)
2480.0000	2.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-50.7	32.7	-18.0	PASS
2483.575000	-52.7	34.7	-18.0	PASS
2483.975000	-52.8	34.8	-18.0	PASS
2484.025000	-52.8	34.9	-18.0	PASS
2483.925000	-52.9	34.9	-18.0	PASS
2483.875000	-53.1	35.1	-18.0	PASS
2483.625000	-53.8	35.8	-18.0	PASS
2483.675000	-54.2	36.3	-18.0	PASS
2484.075000	-54.3	36.3	-18.0	PASS
2492.975000	-54.4	36.4	-18.0	PASS
2484.175000	-54.4	36.4	-18.0	PASS
2483.825000	-54.4	36.4	-18.0	PASS
2484.125000	-54.5	36.5	-18.0	PASS
2483.775000	-54.5	36.5	-18.0	PASS
2493.025000	-54.6	36.6	-18.0	PASS

Result of mode2 @2402 MHz



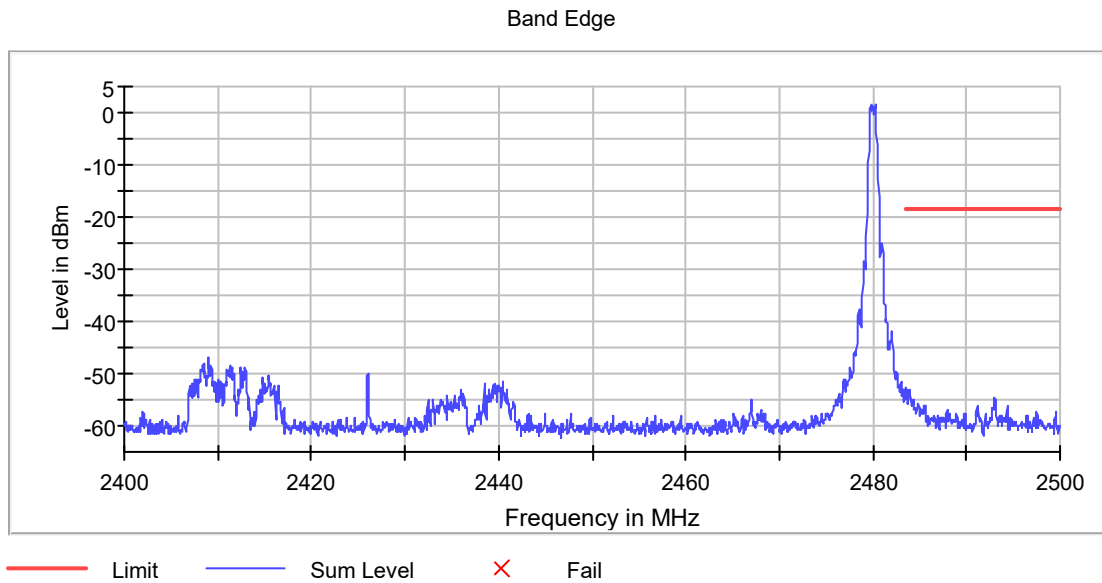
Inband Peak

Frequency (MHz)	Level (dBm)
2402.0000	1.3

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-25.8	7.1	-18.7	PASS
2399.925000	-29.0	10.3	-18.7	PASS
2399.875000	-32.2	13.5	-18.7	PASS
2399.825000	-35.1	16.4	-18.7	PASS
2399.775000	-36.1	17.3	-18.7	PASS
2399.675000	-37.3	18.6	-18.7	PASS
2399.225000	-37.4	18.7	-18.7	PASS
2399.725000	-37.6	18.9	-18.7	PASS
2399.175000	-37.6	18.9	-18.7	PASS
2399.325000	-38.1	19.4	-18.7	PASS
2399.625000	-38.1	19.4	-18.7	PASS
2399.275000	-38.5	19.7	-18.7	PASS
2399.375000	-39.0	20.3	-18.7	PASS
2399.425000	-40.1	21.4	-18.7	PASS
2399.125000	-40.6	21.9	-18.7	PASS

Result mode2 @2480 MHz



Inband Peak

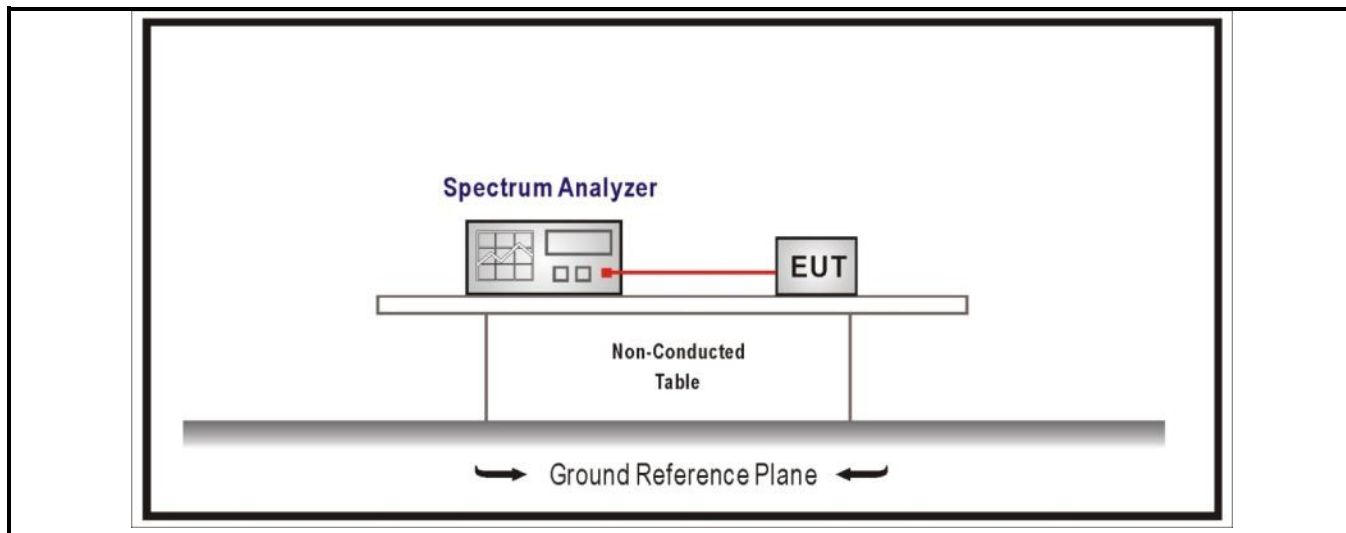
Frequency (MHz)	Level (dBm)
2480.0000	1.5

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.575000	-53.0	34.5	-18.5	PASS
2483.925000	-53.0	34.5	-18.5	PASS
2483.625000	-53.1	34.6	-18.5	PASS
2483.875000	-53.2	34.7	-18.5	PASS
2483.975000	-53.8	35.3	-18.5	PASS
2484.025000	-53.9	35.4	-18.5	PASS
2483.525000	-54.6	36.1	-18.5	PASS
2493.025000	-54.7	36.2	-18.5	PASS
2493.075000	-54.8	36.3	-18.5	PASS
2484.375000	-54.9	36.4	-18.5	PASS
2484.225000	-55.0	36.5	-18.5	PASS
2484.325000	-55.2	36.7	-18.5	PASS
2484.175000	-55.2	36.7	-18.5	PASS
2483.775000	-55.3	36.8	-18.5	PASS
2483.825000	-55.6	37.1	-18.5	PASS

4.5	Duty cycle	VERDICT: PASS
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Test Configuration



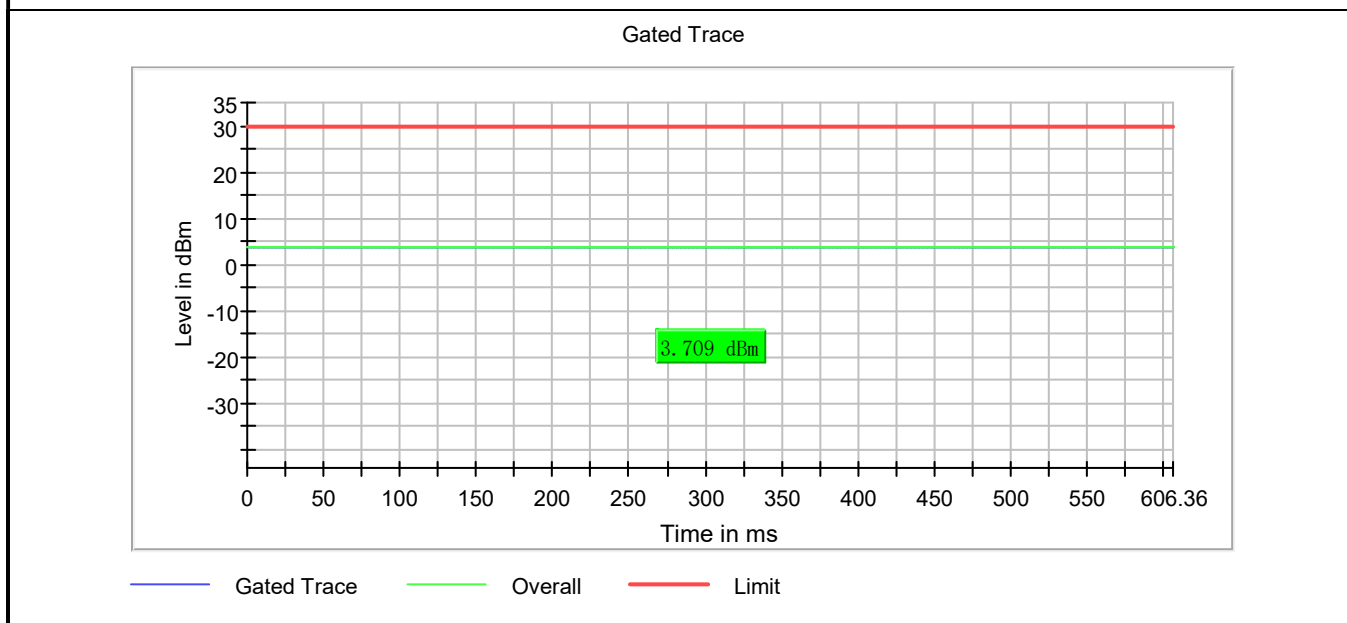
Performed measurements

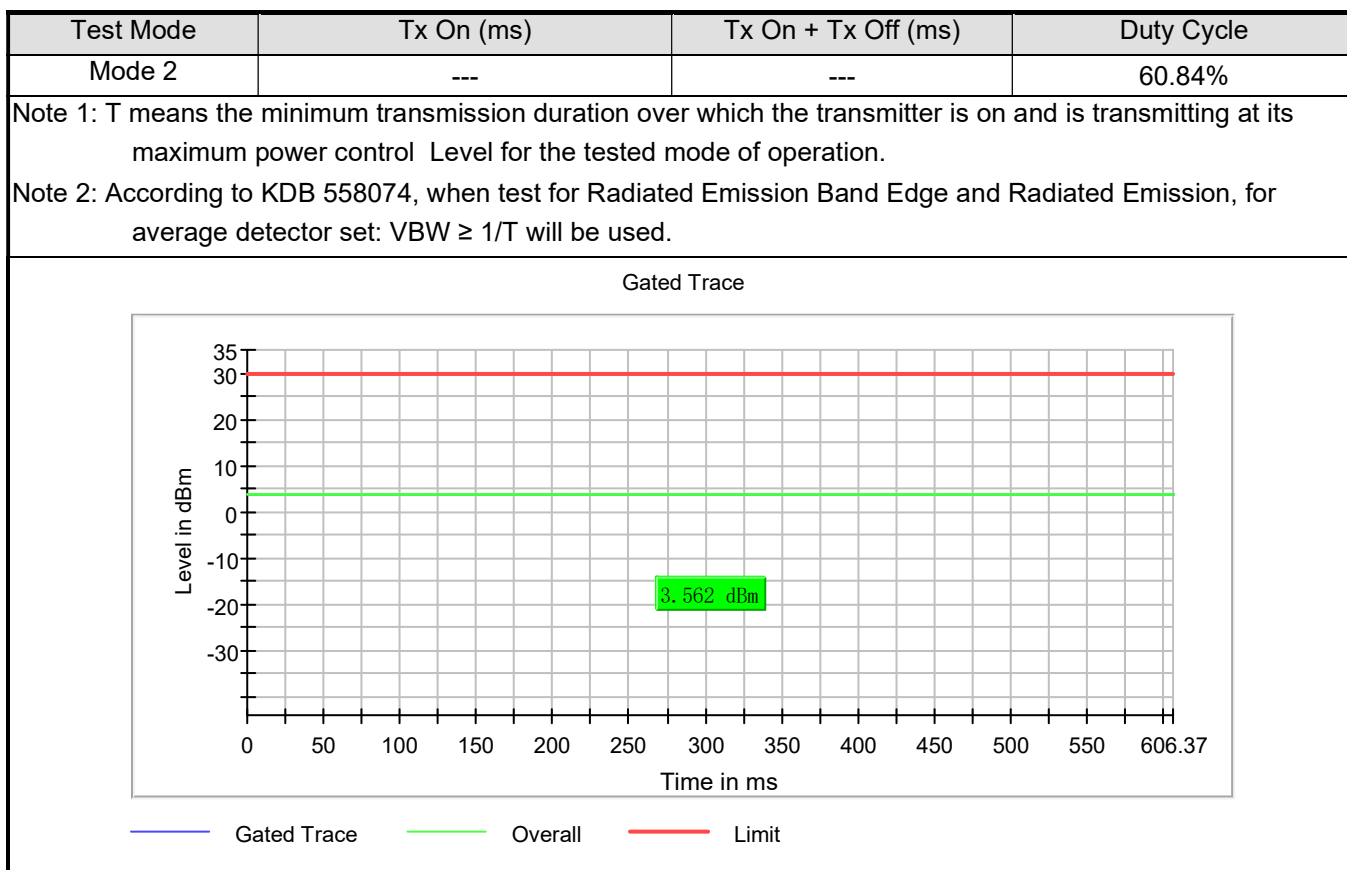
Port under test	Antenna port	
Test method applied	☒	Conducted measurement
	☐	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1-2	
Remark	---	

Test Mode	Tx On (ms)	Tx On + Tx Off (ms)	Duty Cycle
Mode 1	---	---	60.835%

Note 1: T means the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control Level for the tested mode of operation.

Note 2: According to KDB 558074, when test for Radiated Emission Band Edge and Radiated Emission, for average detector set: VBW $\geq 1/T$ will be used.

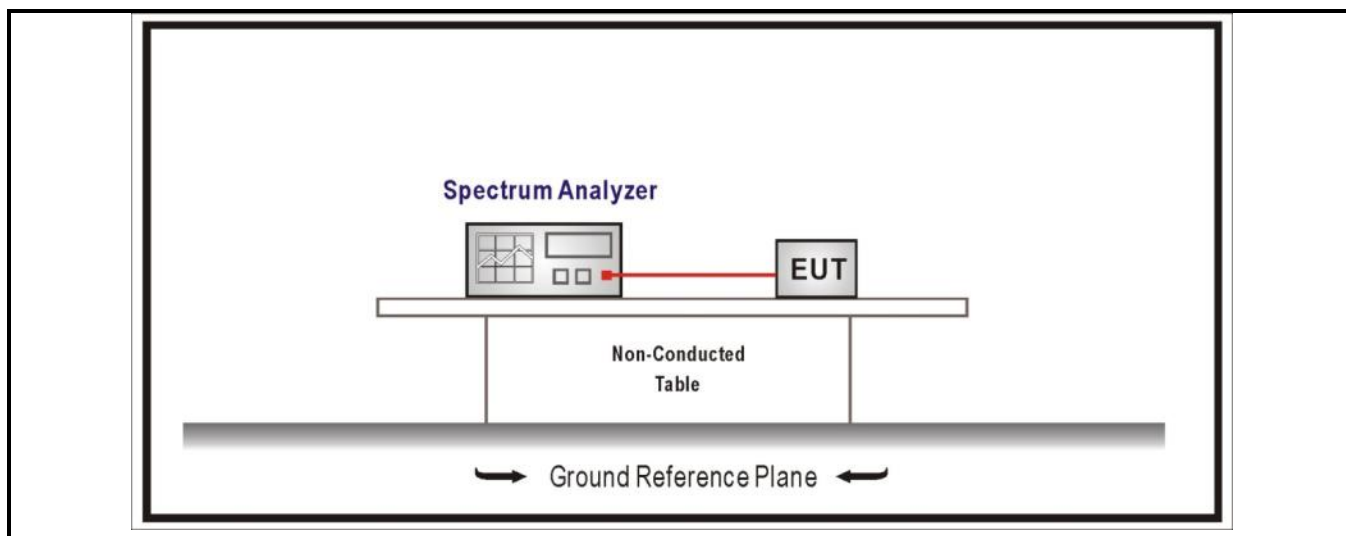




4.6 DTS Bandwidth	VERDICT: PASS
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Standard	FCC Part 15 Subpart C Paragraph 15.247 (a)(2)
Systems using digital modulation techniques operate in the 2400-2483.5 MHz .The minimum 6 dB bandwidth shall be at by least 500 kHz	

Test Configuration



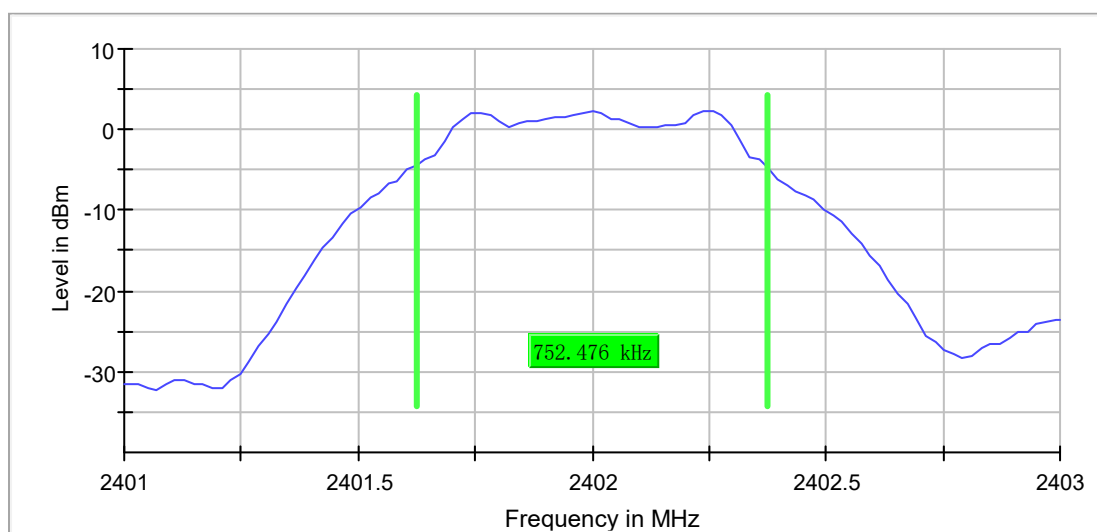
Performed measurements

Port under test	Antenna port	
Test method applied	☒	Conducted measurement
	☐	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1-2	
Remark	---	

Mode	CH.	Test Freq. (MHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
1	0	2402	752.476	>500	Pass
	19	2440	712.872	>500	Pass
	39	2480	732.674	>500	Pass

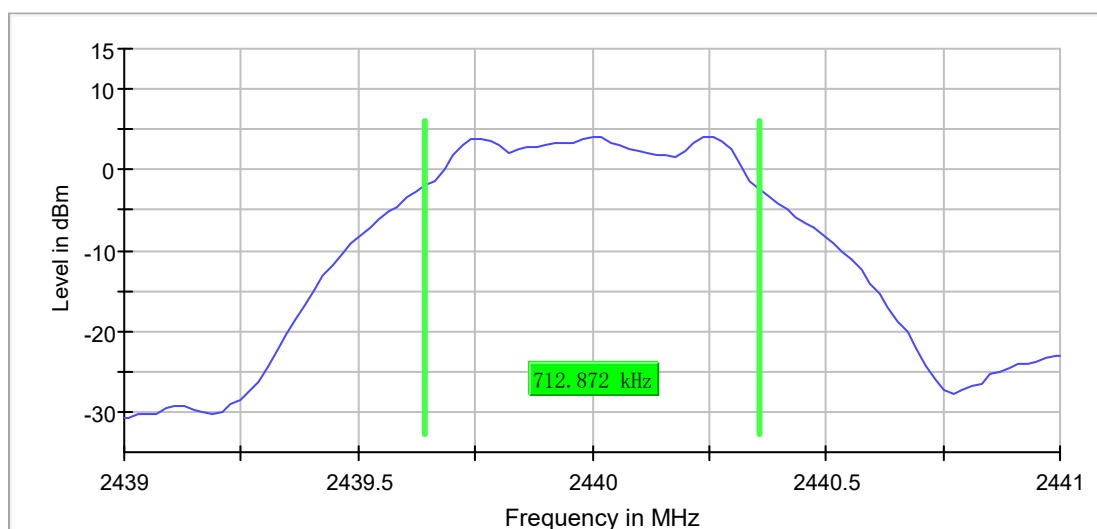
6dB Occupied Bandwidth
 Mode 1 / CH0 (2402MHz)

6 dB Bandwidth



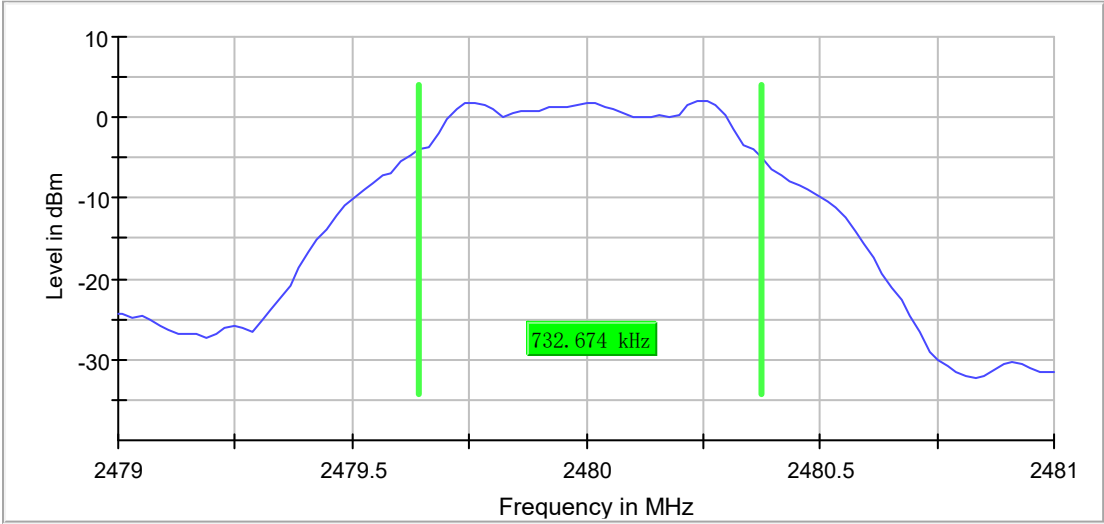
Mode 1 / CH19 (2440MHz)

6 dB Bandwidth



Mode 1 / CH39 (2480MHz)

6 dB Bandwidth

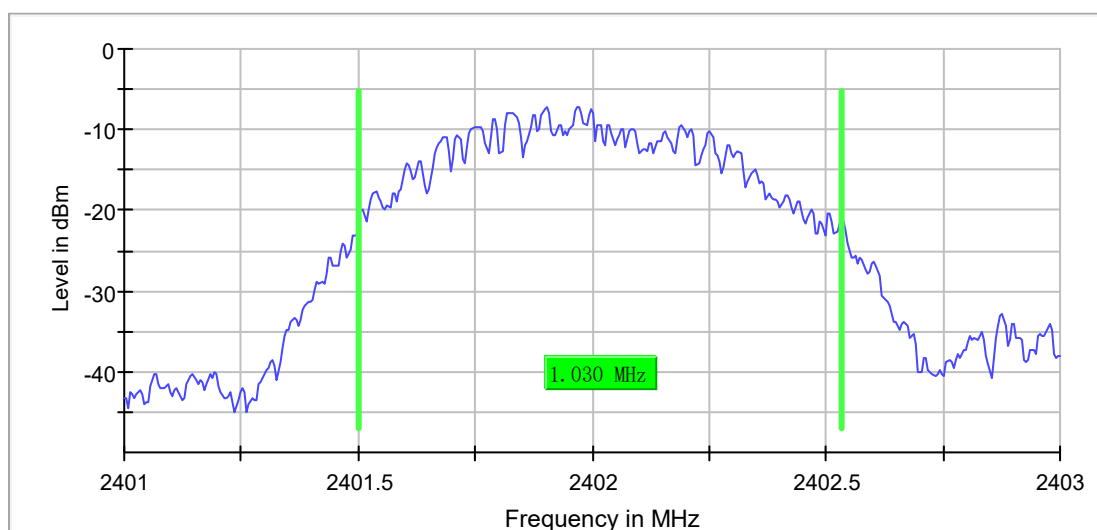


Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)	Limit	Result
1	0	2402	1.030	Within frequency range	Pass
	19	2440	1.030	Within frequency range	Pass
	39	2480	1.050	Within frequency range	Pass

99% Occupied Bandwidth

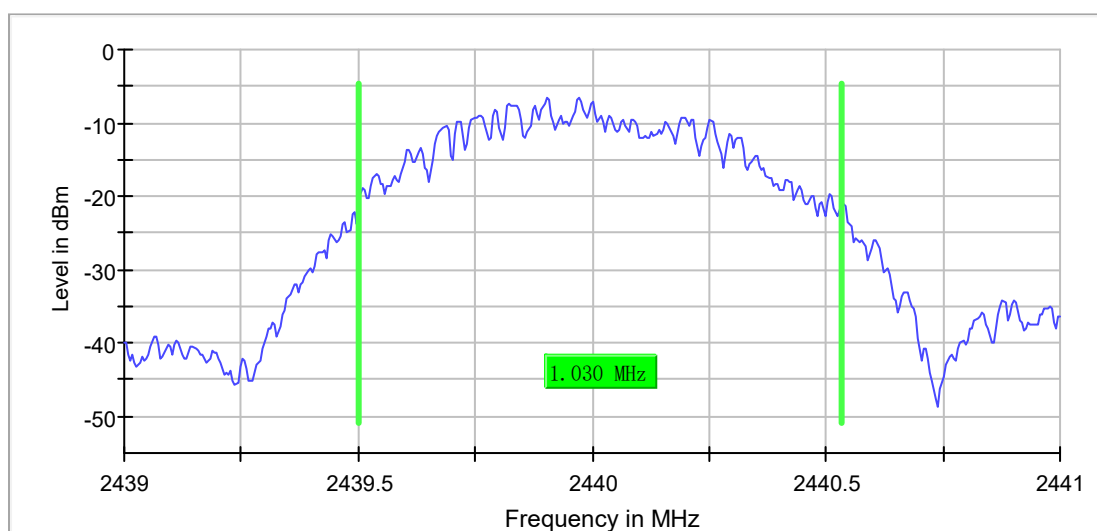
Mode 1 / CH0 (2402 MHz)

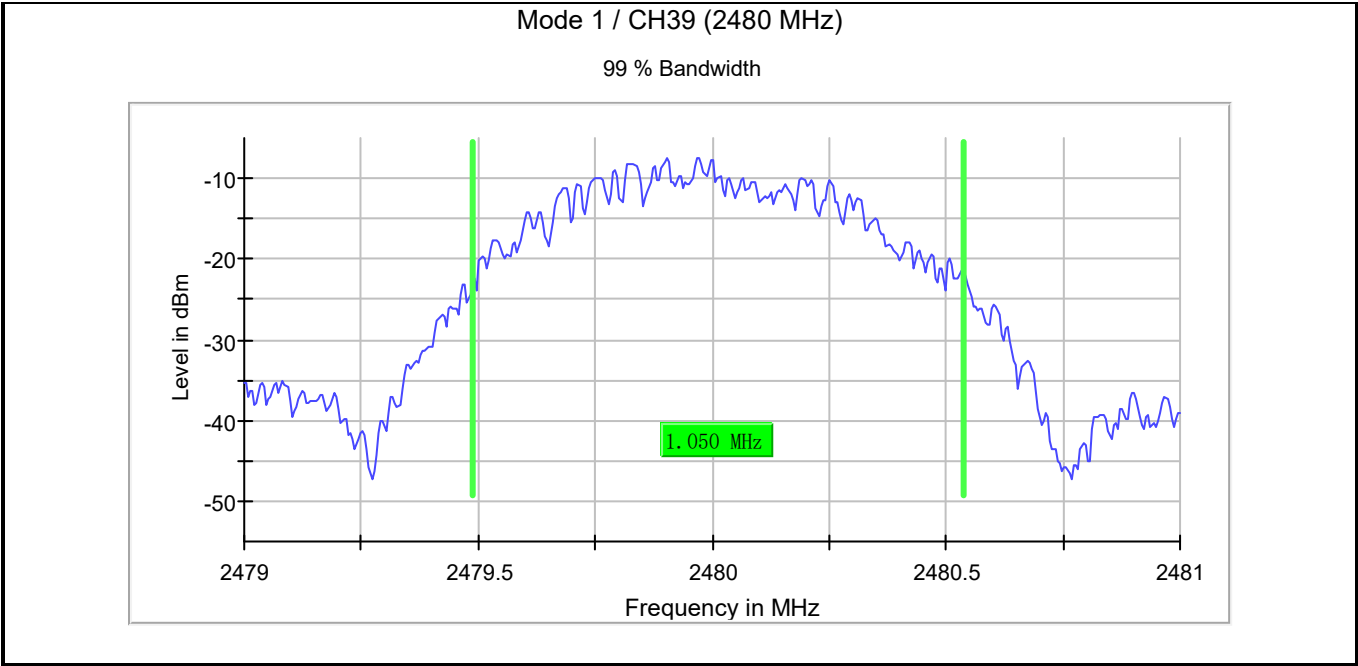
99 % Bandwidth



Mode 1 / CH19 (2440 MHz)

99 % Bandwidth

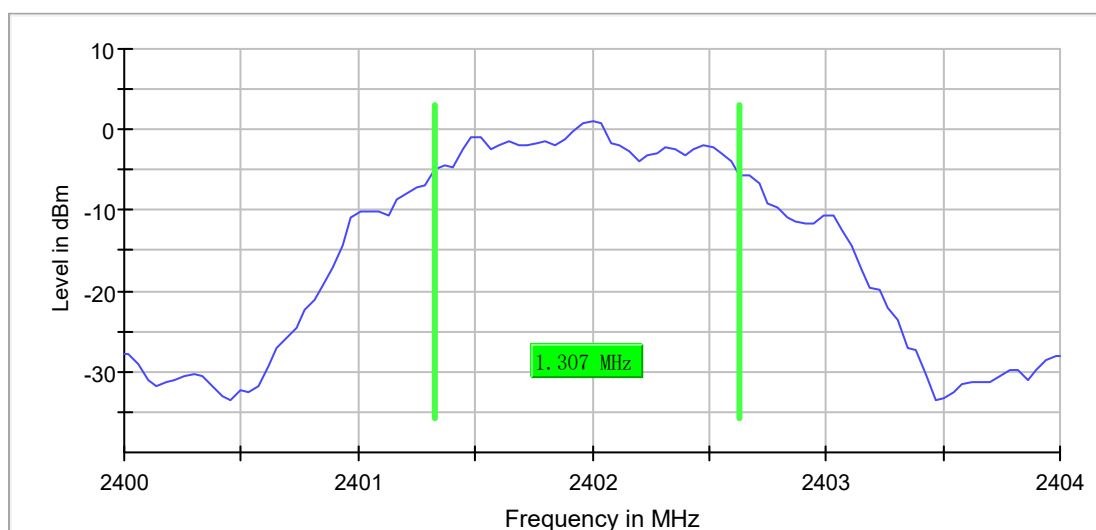




Mode	CH.	Test Freq. (MHz)	6dB Occupied Bandwidth (MHz)	Limit	Result
2	0	2402	1.307	>500	Pass
	19	2440	1.307	>500	Pass
	39	2480	1.307	>500	Pass

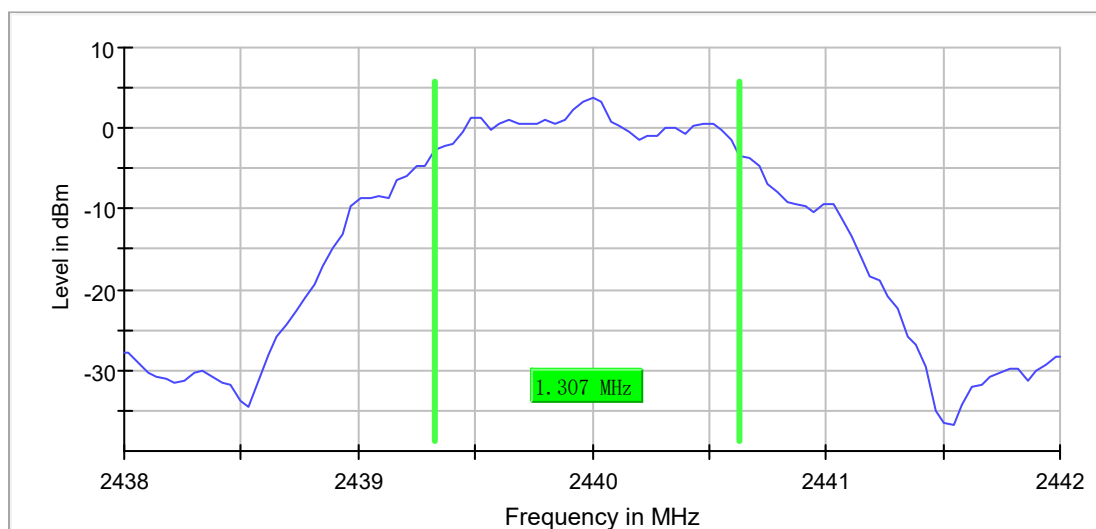
6dB Occupied Bandwidth
 Mode 2 / CH0 (2402 MHz)

6 dB Bandwidth



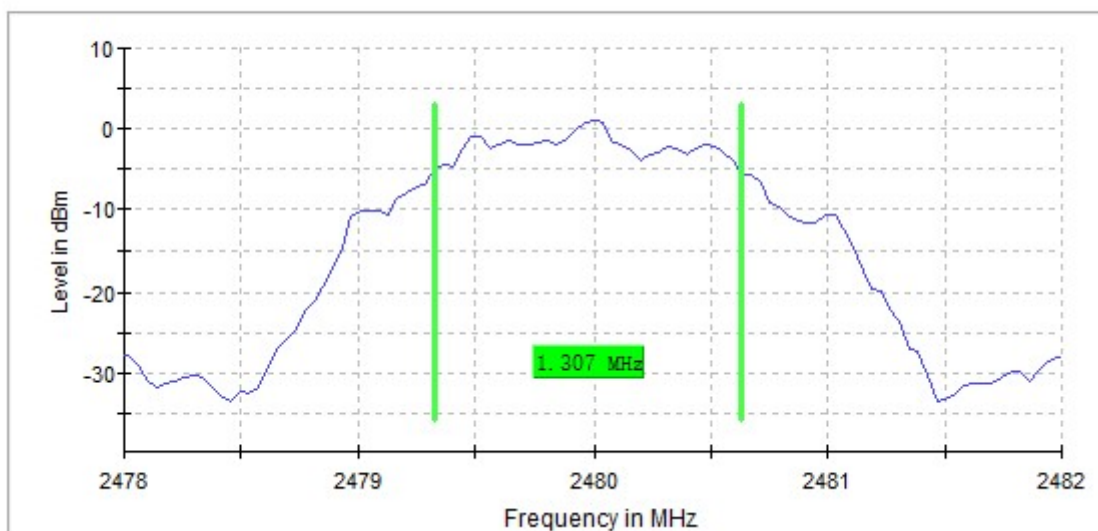
Mode 2 / CH19 (2440 MHz)

6 dB Bandwidth



Mode 2 / CH39 (2480 MHz)

6 dB Bandwidth

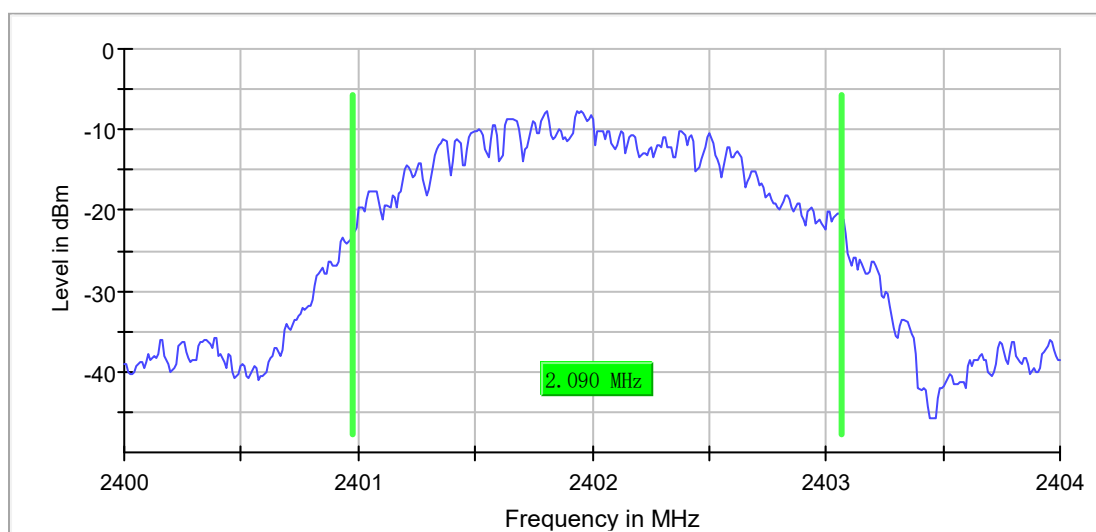


Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)	Limit	Result
2	0	2402	2.090	Within frequency range	Pass
	19	2440	2.040	Within frequency range	Pass
	39	2480	2.090	Within frequency range	Pass

99% Occupied Bandwidth

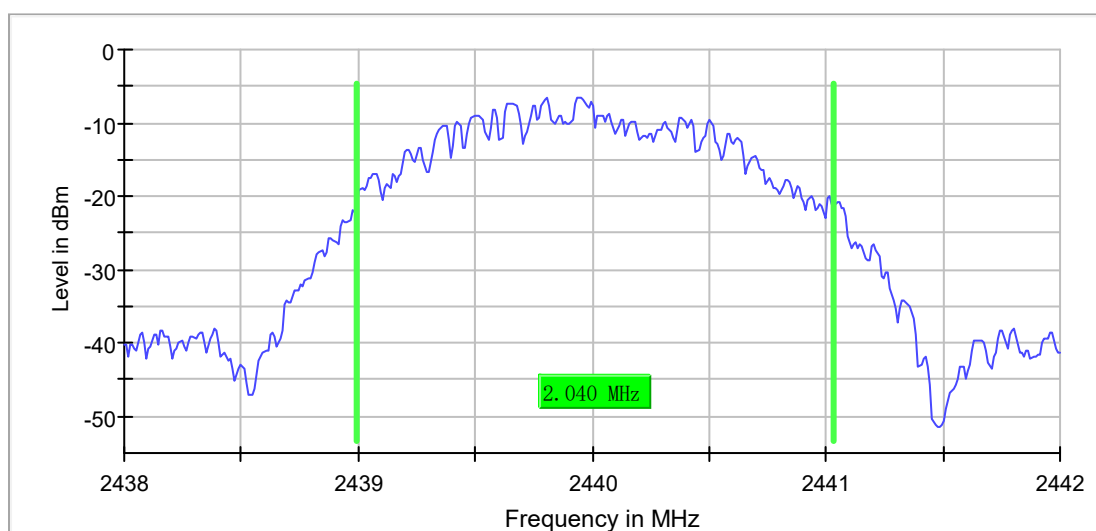
Mode 2 / CH0 (2402 MHz)

99 % Bandwidth



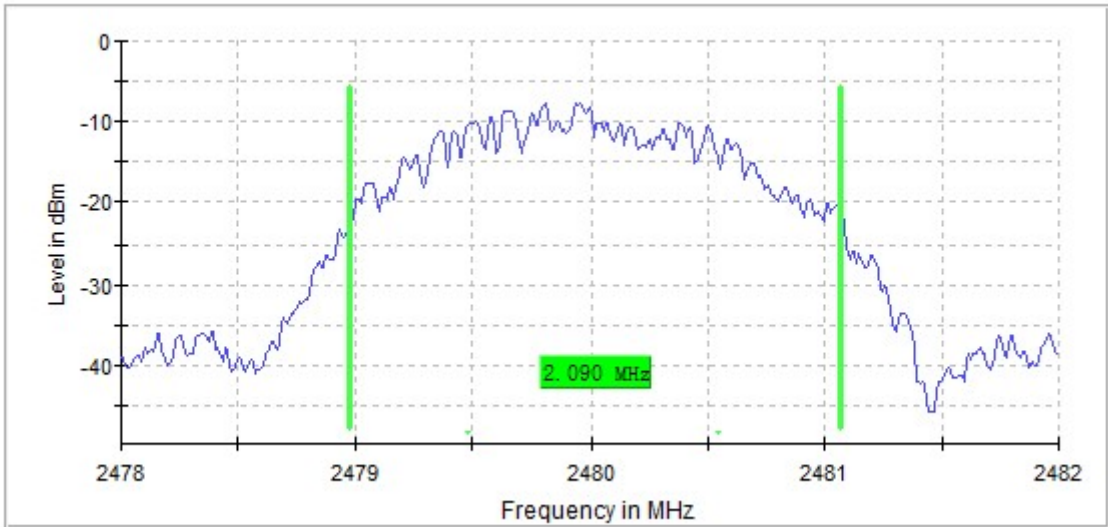
Mode 2 / CH19 (2440 MHz)

99 % Bandwidth



Mode 2 / CH39 (2480 MHz)

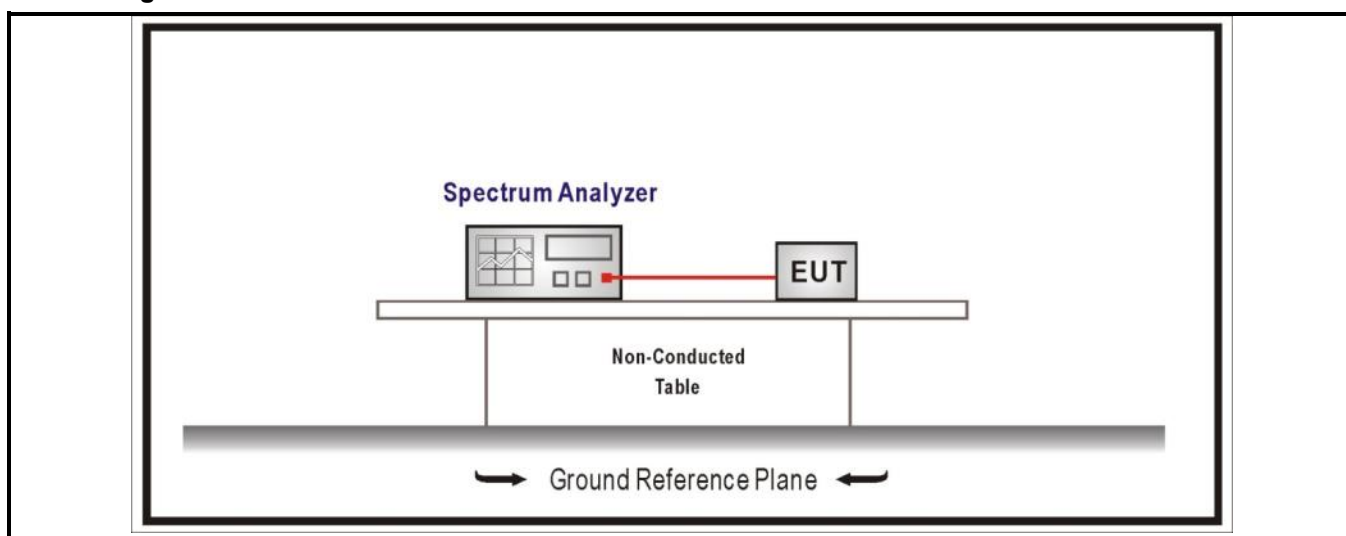
99 % Bandwidth



4.7	Fundamental emission output power	VERDICT: PASS
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Standard		FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
☒	GTX < 6dBi	Pout≤30dBm
☐	GTX > 6dBi	
☐	Non-Fix point-point	Pout≤30-(GTX -6)
☐	Fix point-point	Pout≤30-[(GTX-6)]/3
☐	Point-to-multipoint	Pout≤30-(GTX-6)
☐	Overlap Beams	Pout≤30-[(GTX-6)]/3
☐	Aggregate power transmitted simultaneously on all beams	Pout≤30-[(GTX-6)]/3
☐	single LE directional beam	Pout≤30-[(GTX-6)]/3+8dB
Note 1 : GTX directional gain of transmitting antennas. Note 2 : Pout is maximum peak conducted output power .		

Test Configuration



Performed measurements

Port under test	Antenna port	
Test method applied	☒	Conducted measurement
	☐	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1-2	
Remark	---	

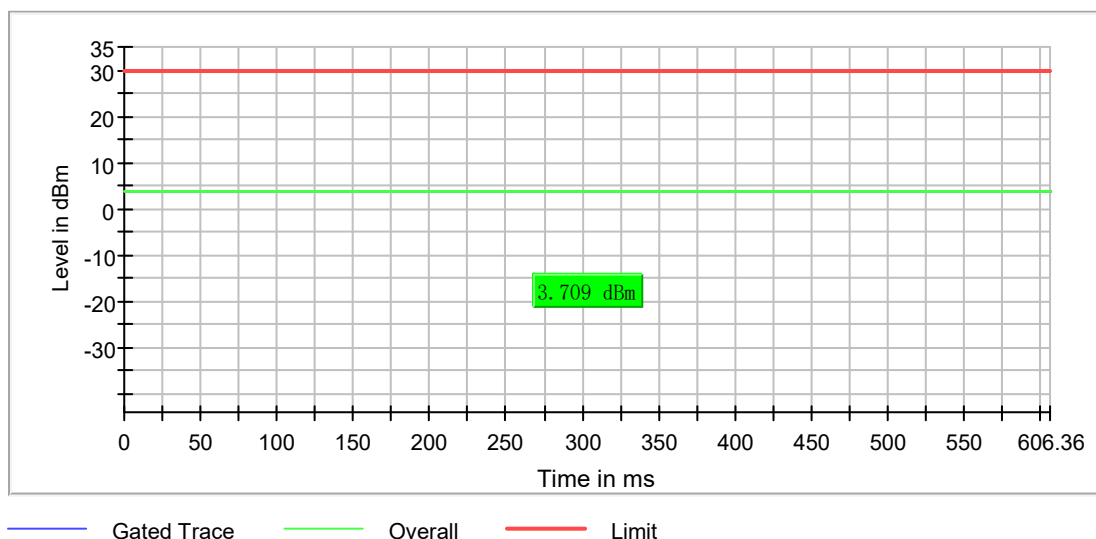
Results

Mode	Channel	Test Frequency (MHz)	Power Output (dBm)	Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
Mode 1	0	2402	3,7	≤30	6,0	≤36	Pass
	19	2440	3,7	≤30	6,0	≤36	Pass
	39	2480	3,4	≤30	5,7	≤36	Pass
Mode 2	0	2402	3,5	≤30	5,8	≤36	Pass
	19	2440	3,6	≤30	5,9	≤36	Pass
	39	2480	3,3	≤30	5,6	≤36	Pass

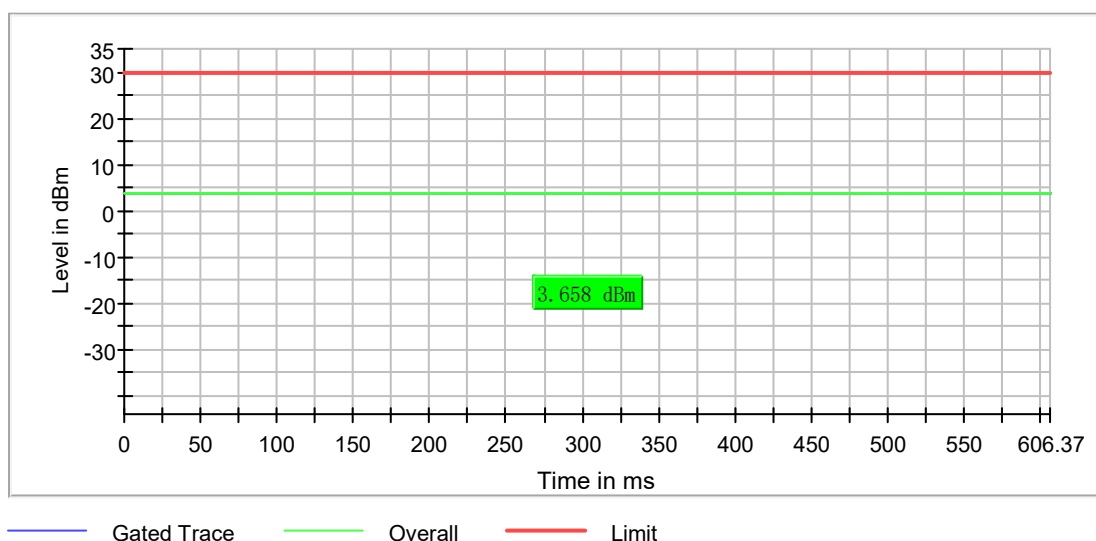
Antenna gain is 2,3 dBi for 2.4GHz

Data of Mode 1

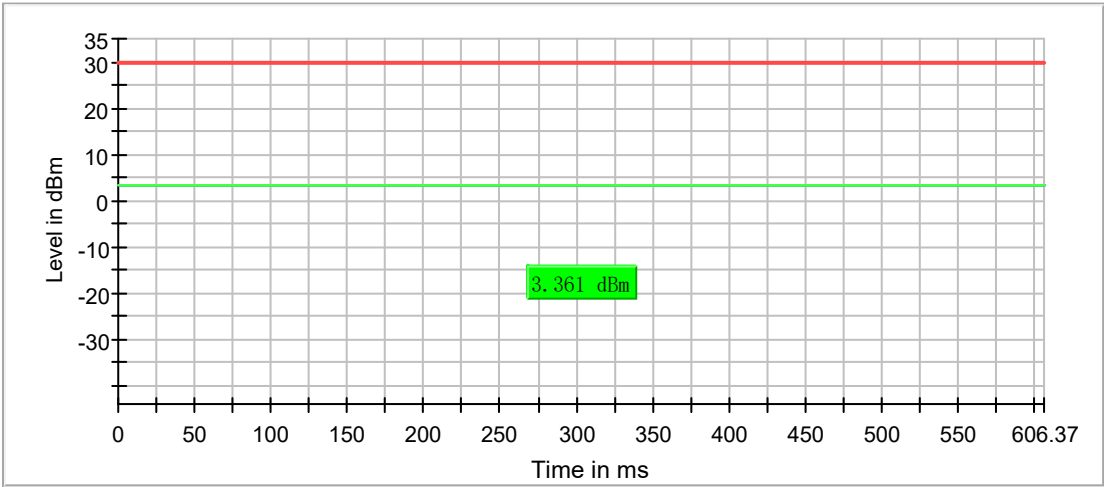
Gated Trace



Gated Trace



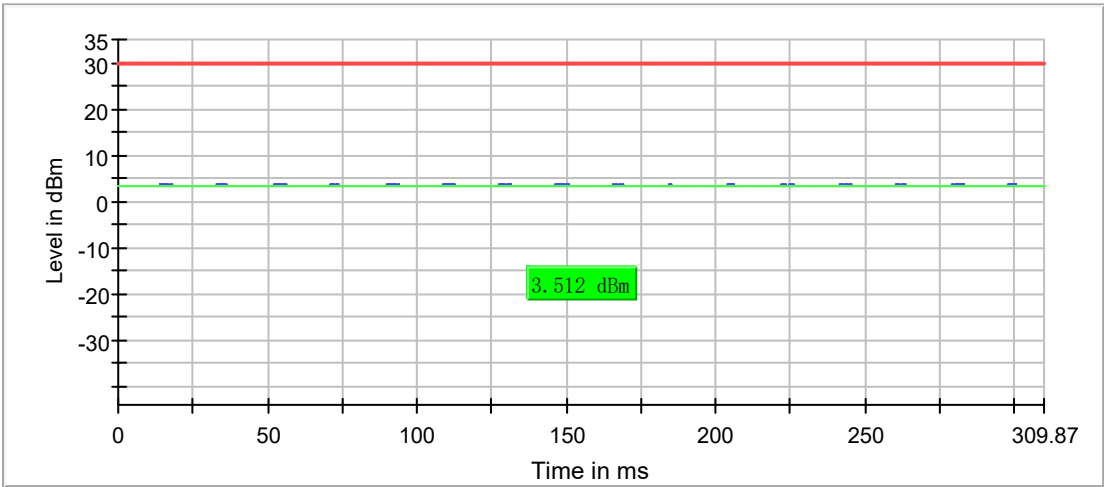
Gated Trace



— Gated Trace — Overall — Limit

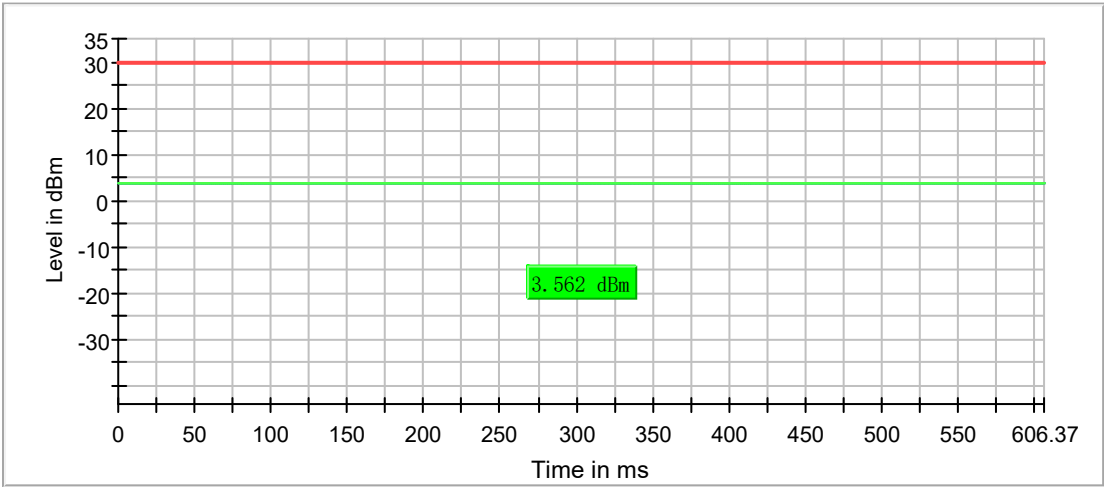
Data of Mode 2

Gated Trace



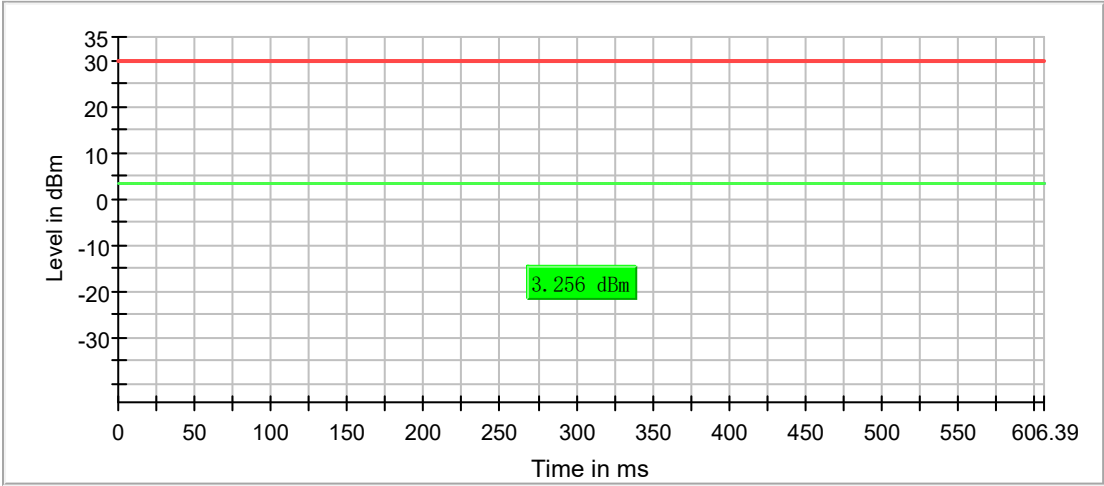
— Gated Trace — Overall — Limit

Gated Trace



— Gated Trace — Overall — Limit

Gated Trace

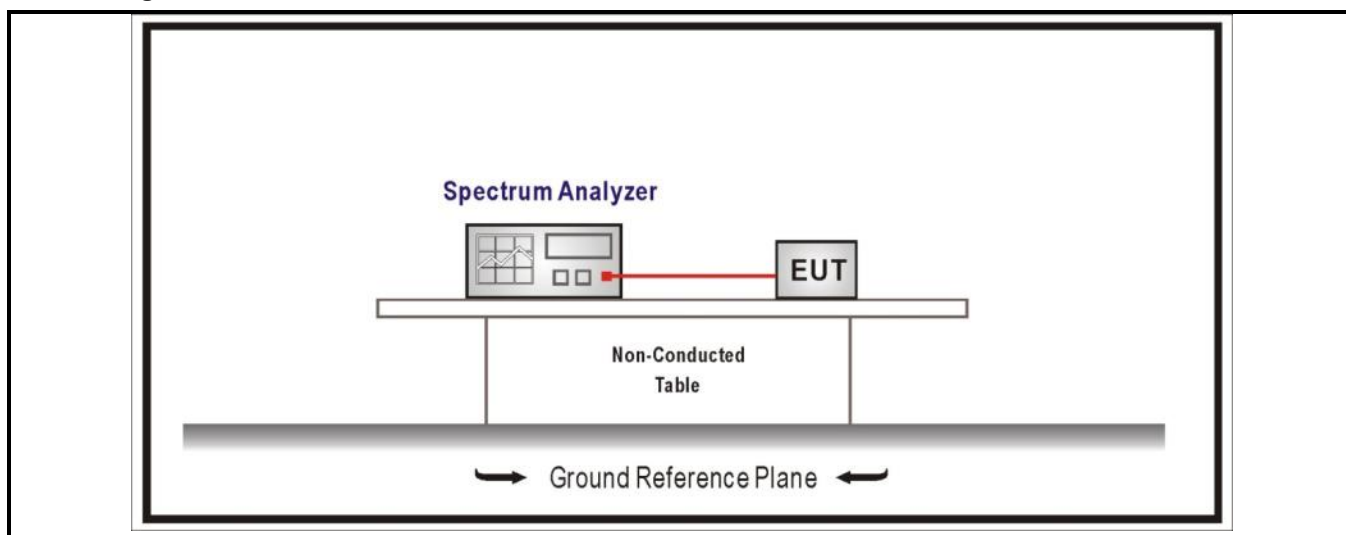


— Gated Trace — Overall — Limit

4.8 Power Density	VERDICT: PASS
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Standard	FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
Power Spectral Density $\leq 8 \text{ dBm/3kHz}$	

Test Configuration



Performed measurements

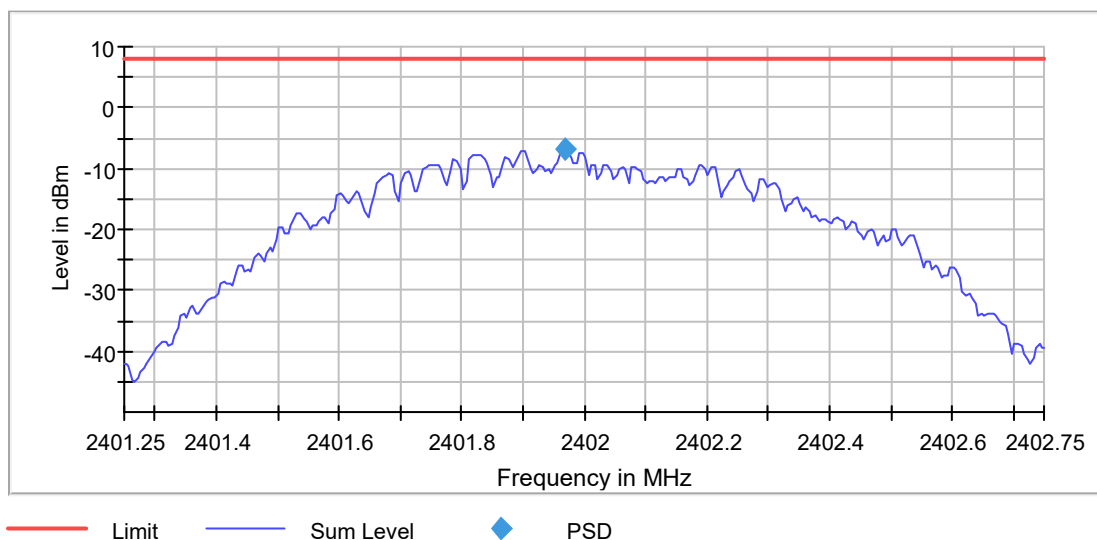
Port under test	Antenna port	
Test method applied	☒	Conducted measurement
	☐	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1-2	
Remark	---	

Results

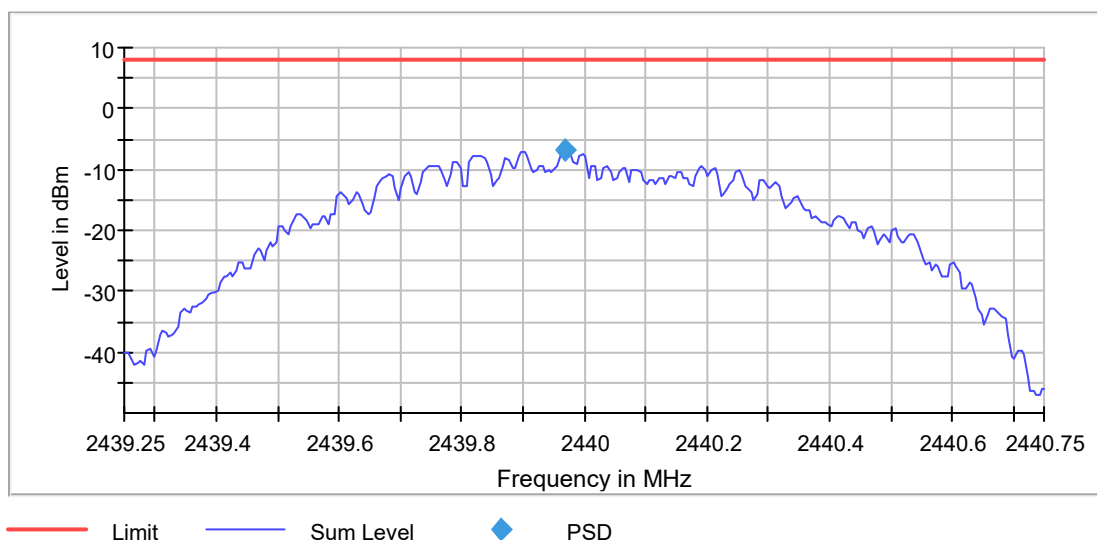
Mode	Channel	Test Frequency (MHz)	Power Output (dBm)	Limit (dBm/3kHz)	Result
Mode 1	0	2402	-6,92	≤ 8	Pass
	19	2440	-6,92	≤ 8	Pass
	39	2480	-7,20	≤ 8	Pass
Mode 2	0	2402	-10,53	≤ 8	Pass
	19	2440	-7,24	≤ 8	Pass
	39	2480	-7,59	≤ 8	Pass

Data of mode 1

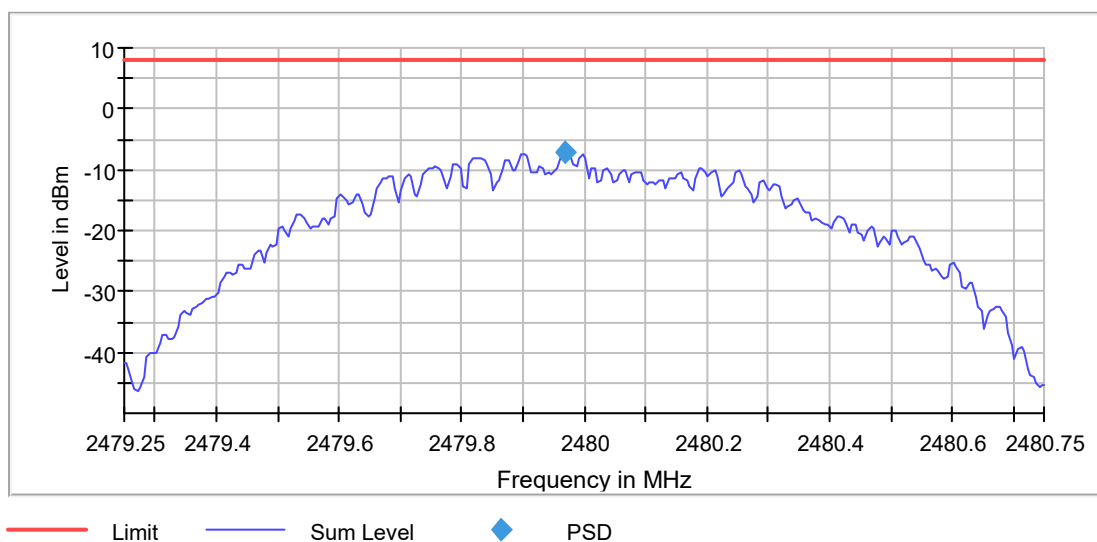
Peak Power Spectral Density



Peak Power Spectral Density

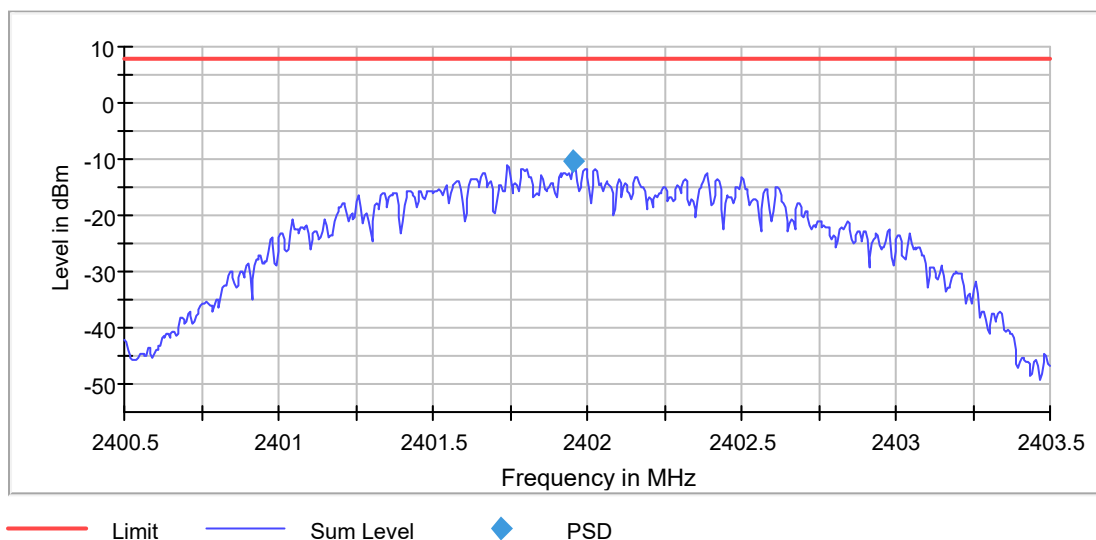


Peak Power Spectral Density

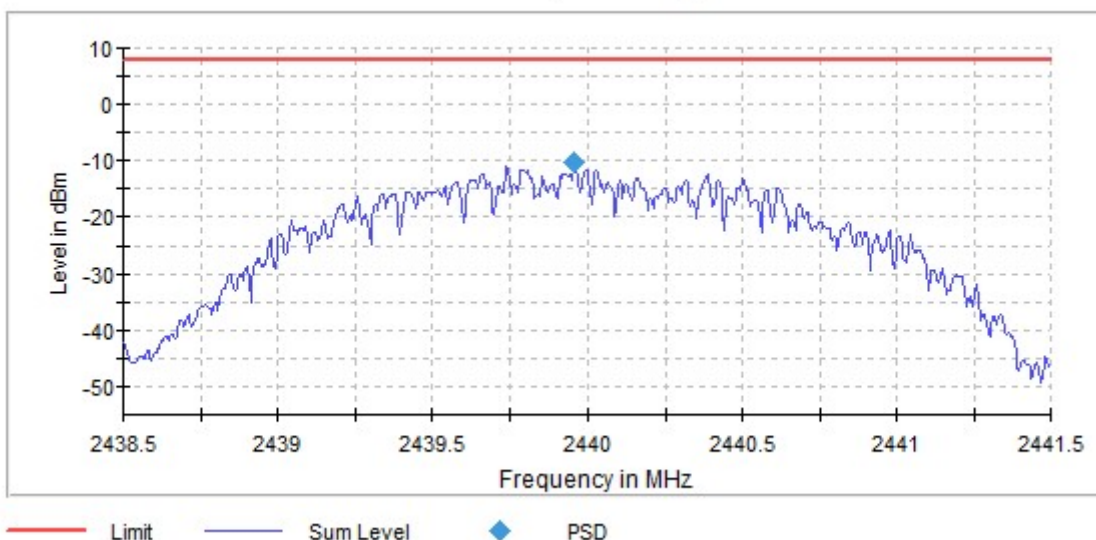


Data of mode 2

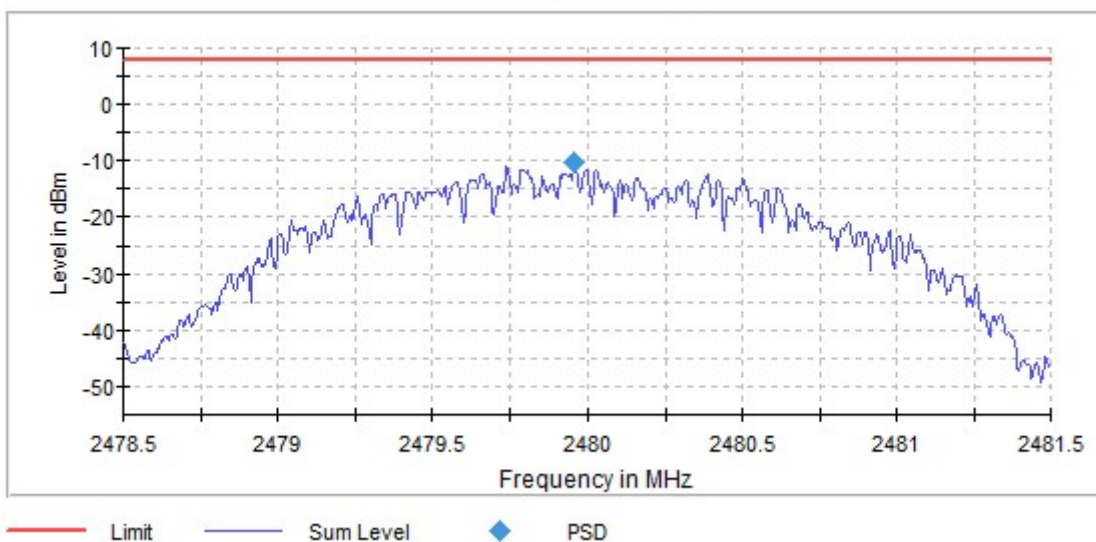
Peak Power Spectral Density



Peak Power Spectral Density



Peak Power Spectral Density



5 IDENTIFICATION OF THE EQUIPMENT UNDER TEST

The photographs show the tested device.

Refer to documents External photo and Internal photo.

ANNEX 1 – MEASUREMENT UNCERTAINTY

Test Item	Uncertainty
Occupied Channel Bandwidth	$\pm 0,7\%$
RF Output power, conducted	$\pm 0,6\text{dB}$
Power Spectral Density, Conducted	$\pm 0,6\text{dB}$
Unwanted Emissions, Conducted	$\pm 0.7\text{dB}$
Spurious (30-1000MHz)	$\pm 4,4\text{dB}$
Spurious (1-12,75GHz)	$\pm 4,4\text{dB}$

ANNEX 2 - USED EQUIPMENT

For Continuous disturbances conducted (150 kHz to 30 MHz)

Instrumentation	Manufacturer	Model No.	Serial No.	DEKRA No.	Cal. Due date
Shielding Room	Changzhou Feite	/	/	G/L861	2024/05/31
EMI Receiver	R&S	ESCI	101206	G/L857	2024/07/02
LISN	R&S	ENV216	101337	G/L859	2024/07/02

For Radiated Emission (30MHz-1000MHz)

Instrumentation	Manufacturer	Model No.	Serial No.	DEKRA No.	Cal. Due date
3m Chamber	ETS	FACT3-2.0	CT000344-1100	G/L856	2024/06/04
EMI receiver	R&S	ESCI	101205	G/L858	2024/07/02
Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	506	G/L864	2023/12/05
Antenna (30MHz-2GHz)	SCHWARZBECK	VULB9168	01229	GZ2018	2024/03/12
CMAD	TESEQ	CMAD 20B	49023	GZ1756	2024/09/08
CMAD	TESEQ	CMAD 20B	49024	GZ1757	2024/09/08
CMAD	TESEQ	CMAD 20B	49026	GZ1758	2024/09/08
CDNE	TESEQ	M310	48706	GZ1759	2024/09/07
CDNE	TESEQ	M210	540133	GZ1906	2024/05/07
Test software	AUDIX	e3	Version 6.130520	---	---

For Radiated Emission (1GHz-18GHz)

Instrumentation	Manufacturer	Model No.	Serial No.	DEKRA No.	Cal. Due date
3m Chamber	ETS	FACT3-2.0	CT000344-1100	G/L856	2024/06/04
Antenna (1GHz-18GHz)	R&S	HF907	102306	G/L1236	2024/04/10
Horn antenna preamplifier	Schwarzbeek	SCU-18	102234	G/L1236-1	2024/02/21
Antenna (1GHz-18GHz)	SCHWARZBECK	BBHA 9120D	02408	GZ2019	2024/01/16
Horn antenna preamplifier	EMC Instruments corporation	EMC051845 SE	980778	GZ2009	2023/12/04
Spectrum analyzer	R&S	FSV	SN101012	G/L1235	2024/01/09

FOR RF

Instrumentation	Manufacturer	Model	Serial no.	DEKRA No.	Cal Due date
Spectrum analyzer	R&S	FSV	SN101012	G/L1235	2024/01/09
Chamber	ETS	/	/	G/L856	2024/06/04
Horn antenna (1GHz-18GHz)	R&S	HF907	102306	G/L1236	2024/04/10
Horn antenna preamplifier	Schwarzbeek	SCU-18	102234	G/L1236-1	2024/02/21
Horn antenna (18GHz-26.5GHz)	ETS	3160-09	00164643	G/L1237	2024/01/09
Horn antenna preamplifier	/	SCU-26D	1879064	G/L1237-1	2024/01/08
EMI receiver	R&S	ESCI	101205	G/L857	2024/07/02
Antenna (30MHz-2GHz)	SCHWARZBECK	VULB9168	01229	GZ2018	2024/03/12
Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	506	G/L864	2023/12/05
OSP	R&S	OSP 150	101907	GZ1894	2024/02/23
Signal generator	R&S	SMB 100A	181317	GZ1895	2024/02/23
Vector signal generator	R&S	SMBV100A	263671	GZ1896	2024/02/23
Wireless connectivity tester	R&S	CMW 270	100990	GZ1893	2024/02/23
Manual step attenuator (11dB)	Keysight	8494B	TH60074118	GZ2086	2024/07/07
Manual step attenuator (70dB)	Keysight	8495D	TH60074471	GZ2087	2024/07/07
Programmable Temperature & Humidity Chamber	ASTUOD	TT-5166	52689	GZ2209	2024/05/08
Test software	R&S	EMC32	---	---	Version 11.30.00

ANNEX 3 - TEST PHOTOS

Refer to document Test setup.

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