

Test report No: 4390024.56

TEST REPORT

Radio Spectrum Matters (RF)

Identification of item tested	Lay on vibrator
Trademark	Moxie for 12000-01 Melt for 12000-02
Model and /or type reference	12000-01, 12000-02
FCC ID	ZUE1200I
Features	Charging input: 5 Vdc Li-ion Battery: 3.7 Vdc
Applicant's name / address	WOW Tech Canada Ltd. 1545 Carling Avenue, Suite 401, Ottawa Ontario, K1Z 8P9, Canada
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 Jazz Liang
Approved by (name & signature)	Tim Yan Tim Yan
Date of issue	2022-07-06
Report template No	TRF_EMС 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	15 °C – 35 °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

<input checked="" type="checkbox"/> Indicates that the listed condition, standard or equipment is applicable for this report/test/EUT.			
<input type="checkbox"/> Indicates that the listed condition, standard or equipment is not applicable for this report/test/EUT.			
Decimal separator used in this report	<input checked="" type="checkbox"/>	Comma (,)	<input type="checkbox"/> 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
T_x	:	Transmitter
R_x	:	Receiver
N/A	:	Not Applicable
N/M	:	Not Measured

DOCUMENT HISTORY

Report nr.	Date	Description
4390024.56	2022-07-06	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	Lay on vibrator
Trademark.....	Moxie for 12000-01 Melt for 12000-02
Model / Type number.....	12000-01, 12000-02
FCC ID	ZUE1200I
Hardware	12000-01, 12000-02
Software.....	510-00074, 510-00073
Firmware	N/A
Ratings.....	Charging input: 5 Vdc Li-ion Battery: 3.7 Vdc
Manufacturer.....	WOW Tech Europe GmbH. Hermann-Blankenstein-Str. 5, 10249 Berlin, Germany.
Factory	Seaco Technology(Dongguan)Co., Ltd. No.6, the 3rd Jin He Industrial Zone, Zhang Mutou Town Dongguan City Guangdong China

the characteristics of wireless module for BLE mode:

Operating frequency range(s).....	2402 MHz – 2480 MHz				
Type of Modulation	GFSK				
Maximum RF output power(conducted)	-1.6 dBm				
EIRP(equivalent isotropically radiated power).....	3.4 dBm				
Antenna type.....	Integral Antenna				
Operating Temperature Range.....	-40 – 85 °C				
BT version.....	Bluetooth 5.1BLE				
Antenna gain.....	5 dBi				
Adaptive/ non-adaptive equipment	Adaptive				

Rated power supply	Voltage and Frequency	Reference poles				
		L1	L2	L3	N	PE
	<input type="checkbox"/> AC:	<input type="checkbox"/>				
	<input checked="" type="checkbox"/> DC: 5V					
	<input checked="" type="checkbox"/> Battery: 3.7V					
Mounting position.....	<input type="checkbox"/> Table top equipment					
	<input type="checkbox"/> Wall/Ceiling mounted equipment					
	<input type="checkbox"/> Floor standing equipment					
	<input checked="" type="checkbox"/> Hand-held equipment					
	<input type="checkbox"/> Other:					

Intended use of the Equipment Under Test (EUT)

The apparatus as supplied for the test is Lay on vibrator intended for residential use and the product contains electronic control circuitry, it is powered by battery.

According to customer description, models 12000-01, 12000-02 are identical except for the trade mark and the appearance of size. Both products share the same PCB, slightly different in PCBA, but there will be no change in radio parameters occurred.

After technical reviewed, model 12000-01 was chosen for full test, model 12000-02 was chosen to repeat Conducted Emission and radiated emissions for compliance verification.

Copy of marking plate:

No provide.

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	2022-05-23
Date (s) of performance of tests	2022-05-23 to 2022-06-28
Test sample	Normal sample: 12000-01(Lab no.4390024-1), 12000-02(Lab no.4390024-4) RF conducted sample: 12000-01(Lab no.4390024-2), 12000-02(Lab no.4390024-5) RF radiated sample: 12000-01(Lab no.4390024-3), 12000-02(Lab no.4390024-6)

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):

<input checked="" type="checkbox"/>	Residential (domestic) environment.
<input checked="" type="checkbox"/>	Commercial and light-industrial environment.
<input type="checkbox"/>	Industrial environment.

1.4 Channel List

The radio module (Bluetooth) operating channels are:

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	-	-

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 methos	
		Conducted	Radiated
1	Transmitting at 1 Mbit/s,	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	Transmitting at 2 Mbit/s,	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
3	Charging mode	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
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
Adaptor	-	-	DEKRA
EMI_TEST(soft ware)	V2.0	-	Client
TELINK BDT(Burning and Debugging tool)	-	-	Client
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 manufacturer which connected to laptop through the com port. After connected, run the software “EMI_TESTV2.0” supplied by manufacturer to control the EUT work in required test mode as below table.

RF Mode	Set_channel(MHz)	Set_power in software
BLE_1M	2402	3.5
	2440	3.5
	2480	3.5
BLE_2M	2402	3.5
	2440	3.5
	2480	3.5

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	---
<u>Supplementary information:</u> ---			

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

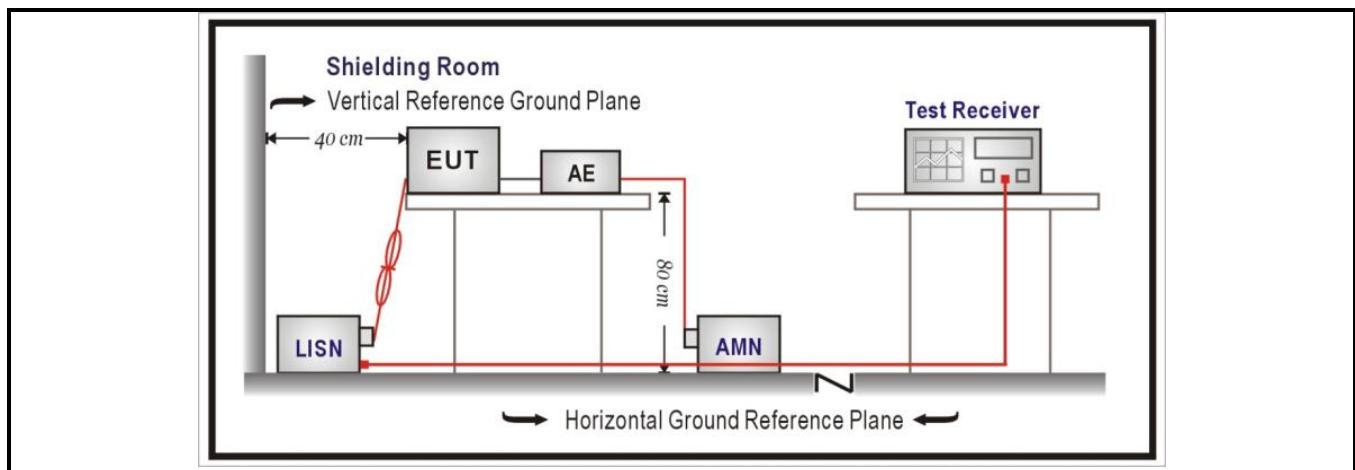
4.1 AC Power Line Conducted Emission	VERDICT: PASS
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Limits

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



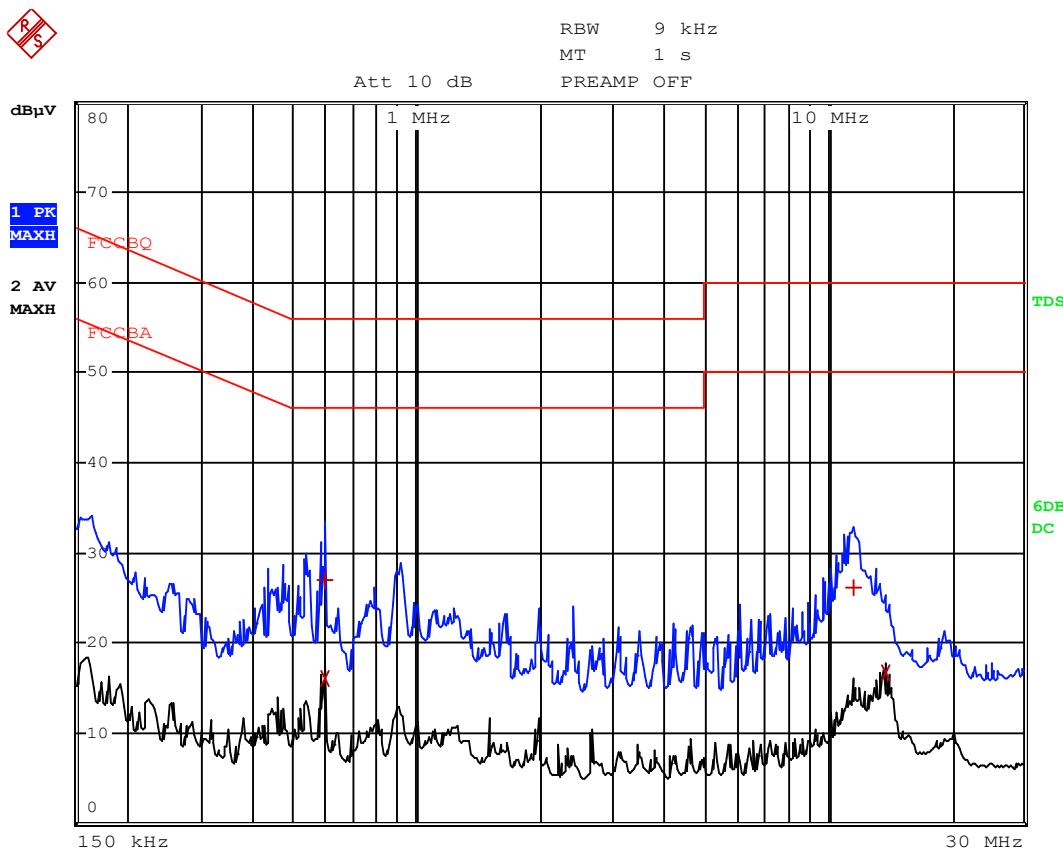
Performed measurements

Port under test	Terminal														
<input checked="" type="checkbox"/> AC mains input power	<input checked="" type="checkbox"/>	N	<input checked="" type="checkbox"/>	L1	<input type="checkbox"/>	L2	<input type="checkbox"/>	L3							
<input type="checkbox"/> DC input power	<input type="checkbox"/>	Positive (+)			<input type="checkbox"/>	Negative (-)									
Test method applied		<input checked="" type="checkbox"/>	Artificial mains network												
		<input type="checkbox"/>	Voltage probe												
Test setup		<input checked="" type="checkbox"/>	Table top	<input type="checkbox"/>	Artificial hand applied										
		<input type="checkbox"/>	Floor standing	<input type="checkbox"/>	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	---														

Model	12000-01
Operation Mode (worst case)	Mode 3
Test voltage	120 Vac, 60 Hz

Results

Live



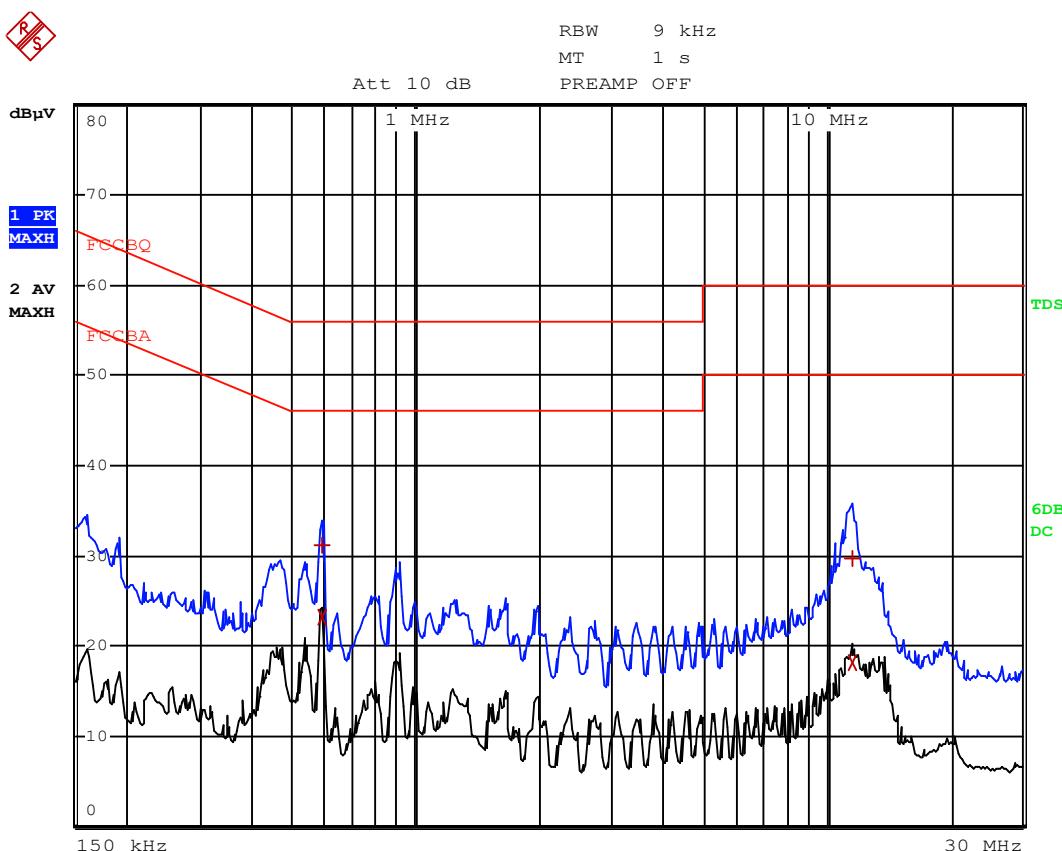
EDIT PEAK LIST (Final Measurement Results)				
Trace1:	FCCBQ			
Trace2:	FCCBA			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBµV	DELTA	LIMIT dB
1 Quasi Peak	594 kHz	27.02	-28.97	
2 Average	594 kHz	16.08	-29.92	
2 Average	13.81 MHz	16.69	-33.30	
1 Quasi Peak	11.538 MHz	26.23	-33.76	

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:	FCCBQ			
Trace2:	FCCBA			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dB μ V	DELTA	LIMIT dB
2 Average	590 kHz	23.28	-22.71	
1 Quasi Peak	590 kHz	31.24	-24.75	
1 Quasi Peak	11.55 MHz	29.65	-30.34	
2 Average	11.55 MHz	18.14	-31.86	

Remarks:

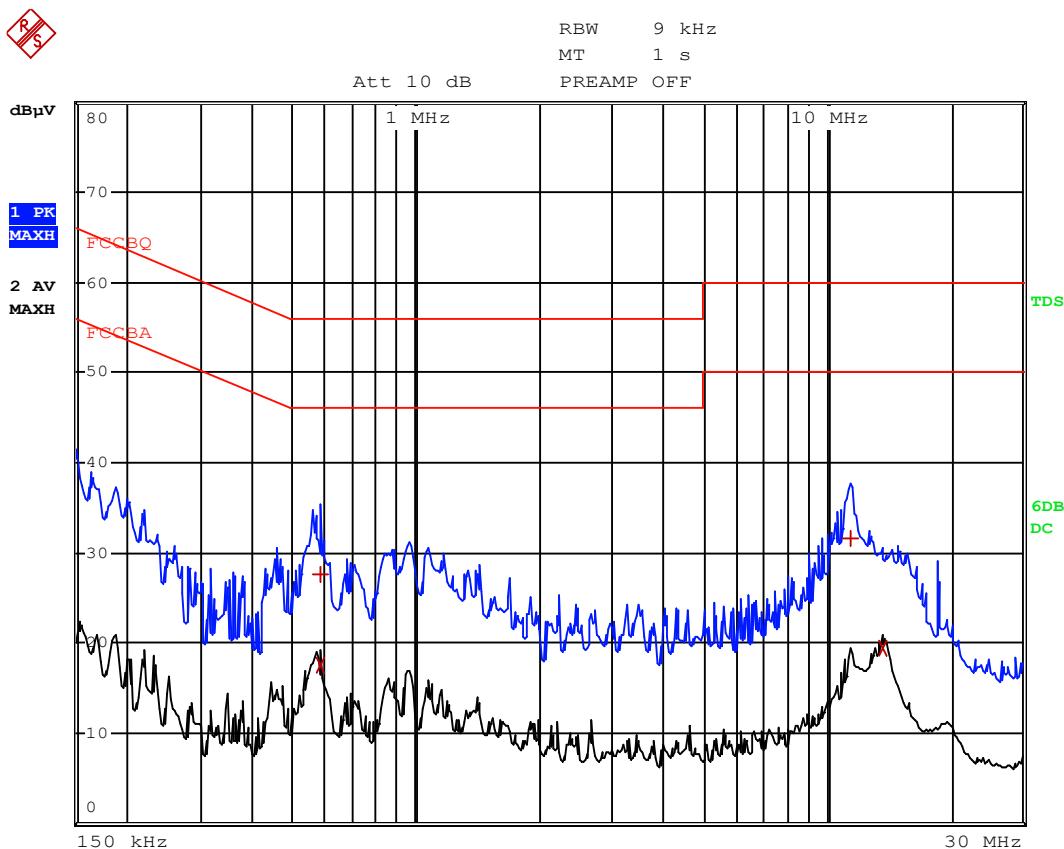
- 1) Level (final measurement) = received value + transducer (Lisn+cable)
- 2) Delta = Level – Limit

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

Model	12000-02
Operation Mode (worst case)	Mode 3
Test voltage	120 Vac, 60 Hz

Results

Live



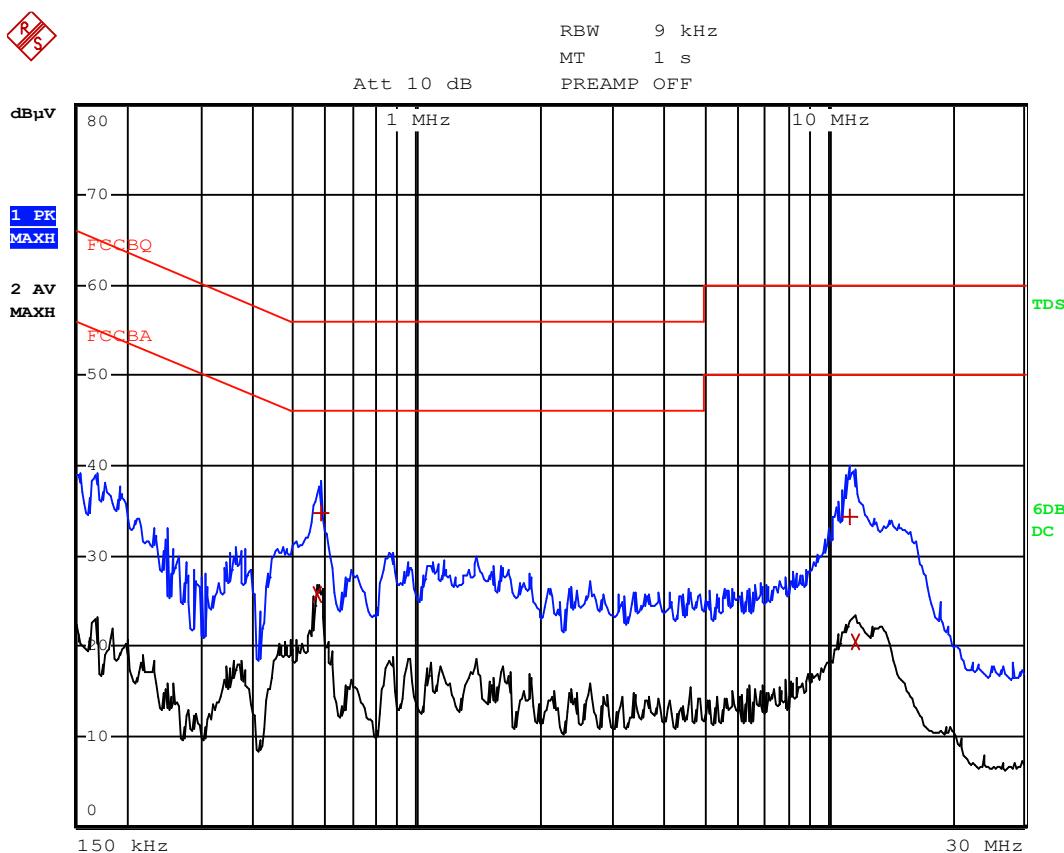
EDIT PEAK LIST (Final Measurement Results)			
Trace1:	FCCBQ		
Trace2:	FCCBA		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dB μ V	DELTA LIMIT dB
1 Quasi Peak	11.402 MHz	31.68	-28.31
1 Quasi Peak	586 kHz	27.64	-28.35
2 Average	586 kHz	17.52	-28.47
2 Average	13.622 MHz	19.35	-30.65

Remarks:

- 3) Level (final measurement) = received value + transducer (Lisn+cable)
- 4) 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:	FCCBQ			
Trace2:	FCCBA			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dB μ V	DELTA	LIMIT dB
2 Average	574 kHz	25.64	-20.35	
1 Quasi Peak	582 kHz	34.84	-21.15	
1 Quasi Peak	11.342 MHz	34.22	-25.77	
2 Average	11.674 MHz	20.56	-29.44	

Remarks:

- 3) Level (final measurement) = received value + transducer (Lisn+cable)
- 4) 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

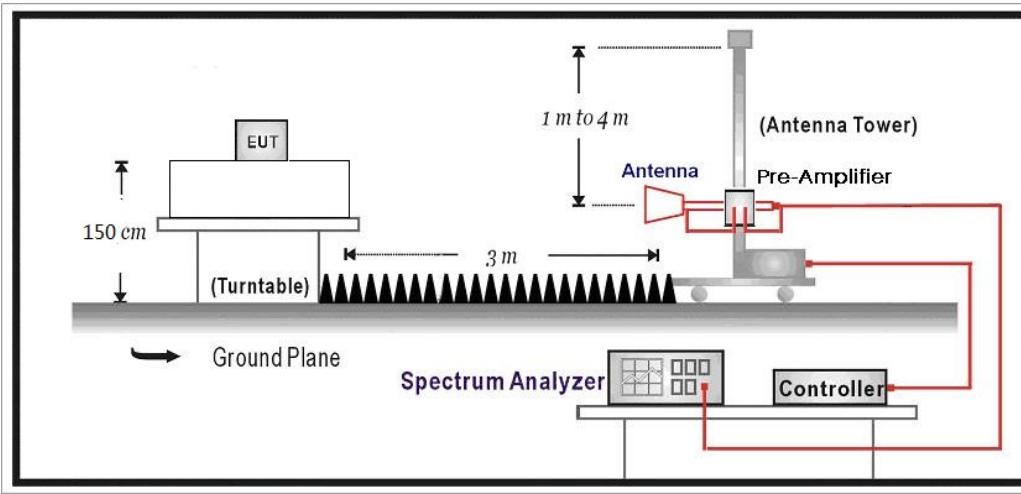
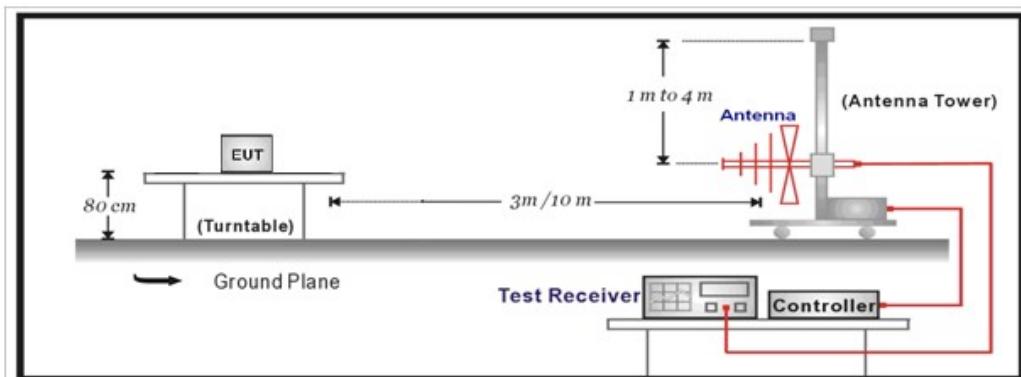
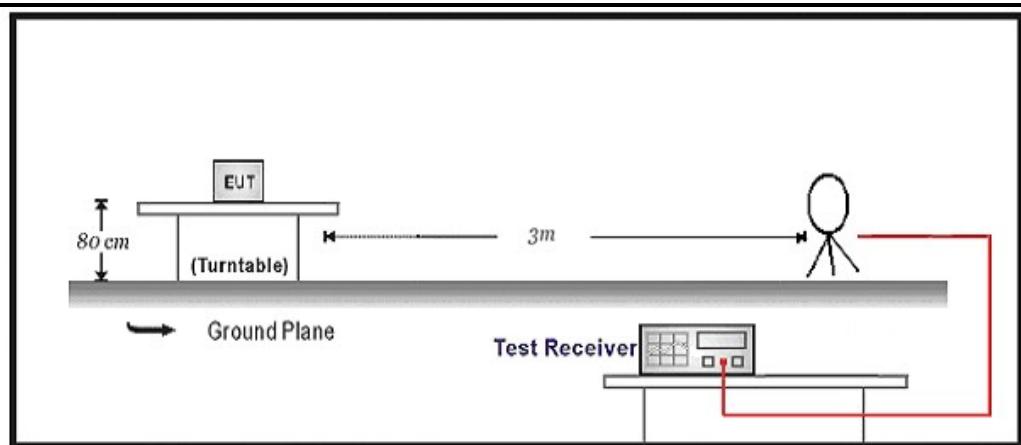
Emissions Limit 15.209(a)

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 <small>(Note 1)</small>
0.49 - 1.705	24000/F(kHz)	33.8 - 23	30 <small>(Note 1)</small>
1.705 - 30	30	29.5	30 <small>(Note 1)</small>
30 - 88	100	40	3 <small>(Note 2)</small>
88 - 216	150	43.5	3 <small>(Note 2)</small>
216 - 960	200	46	3 <small>(Note 2)</small>
Above 960	500	54	3 <small>(Note 2)</small>

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

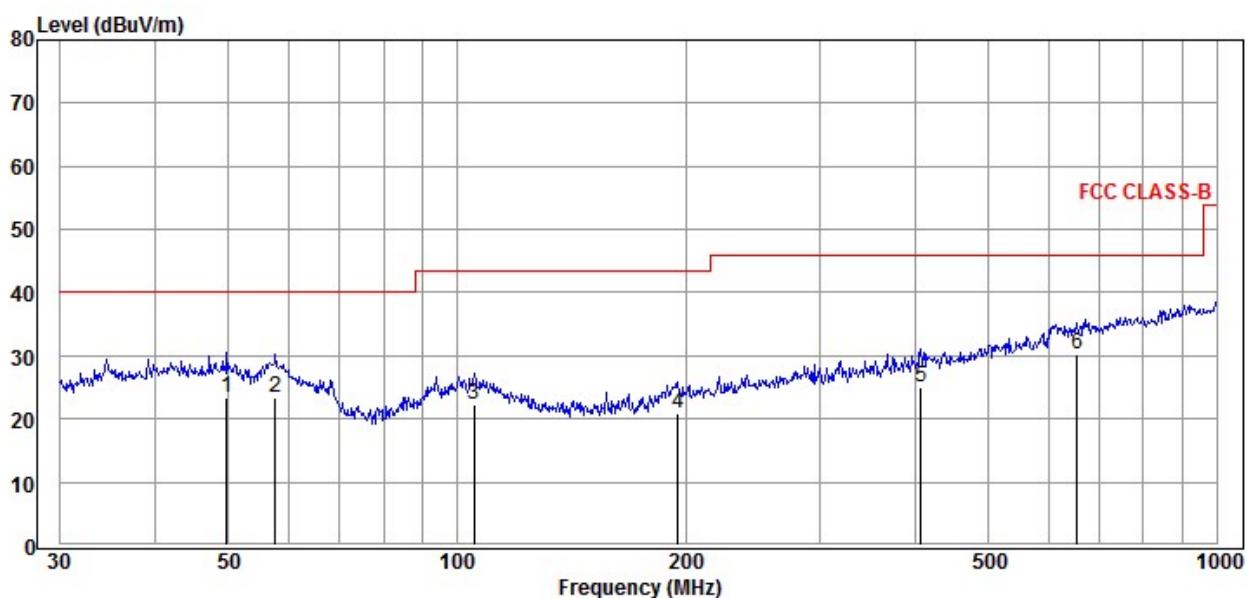
Port under test	Enclosure port
Test method applied	<input type="checkbox"/> Conducted measurement
	<input checked="" type="checkbox"/> Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).
Operating mode(s) used	Mode 1-3
Remark	1)The test frequency range, 9kHz~30MHz, 18GHz~26GHz, 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	12000-01
Operation Mode	Mode 1 @2402MHz (worst case)
Test voltage	3.7 Vdc

Results

Horizontal



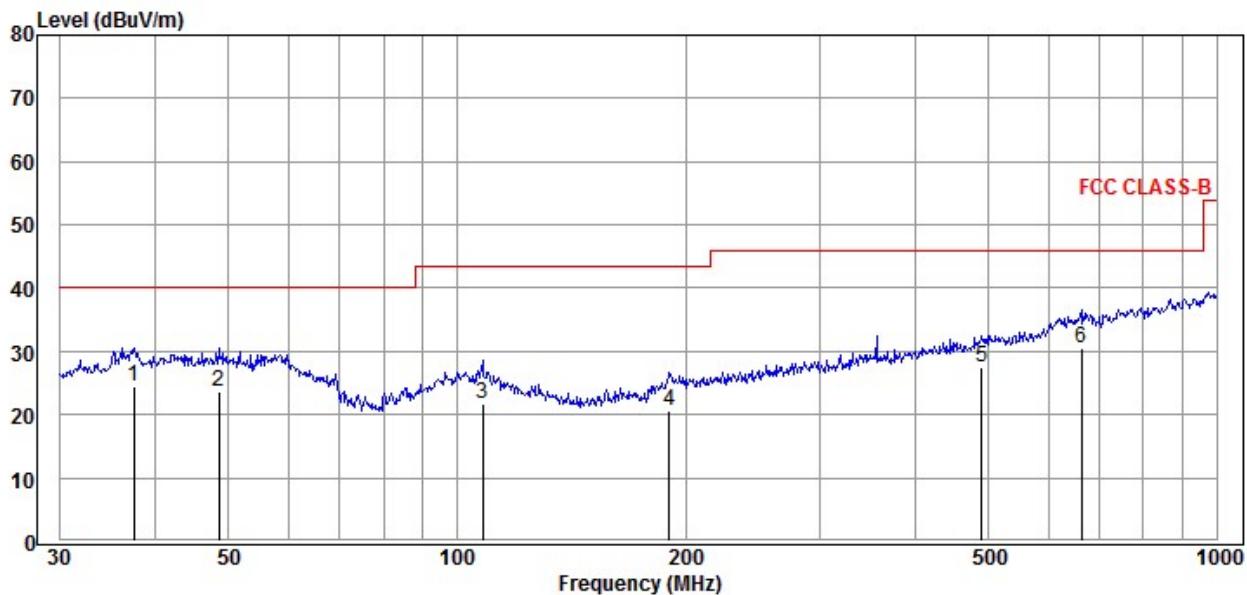
Freq (MHz)	Reading (dBuV)	C.F (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin=limit-result (dB)
49.71	8.25	15.20	23.45	40.00	16.55
57.59	7.88	15.40	23.28	40.00	16.72
105.27	9.58	12.60	22.18	43.50	21.32
195.14	9.07	11.77	20.84	43.50	22.66
407.51	8.54	16.50	25.04	46.00	20.96
654.23	10.15	20.00	30.15	46.00	15.85

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)
37.55	10.52	13.98	24.50	40.00	15.50
48.50	8.39	15.20	23.59	40.00	16.41
107.89	8.91	12.70	21.61	43.50	21.89
190.41	9.02	11.57	20.59	43.50	22.91
490.75	9.61	17.90	27.51	46.00	18.49
663.47	10.39	20.10	30.49	46.00	15.51

Remarks:

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

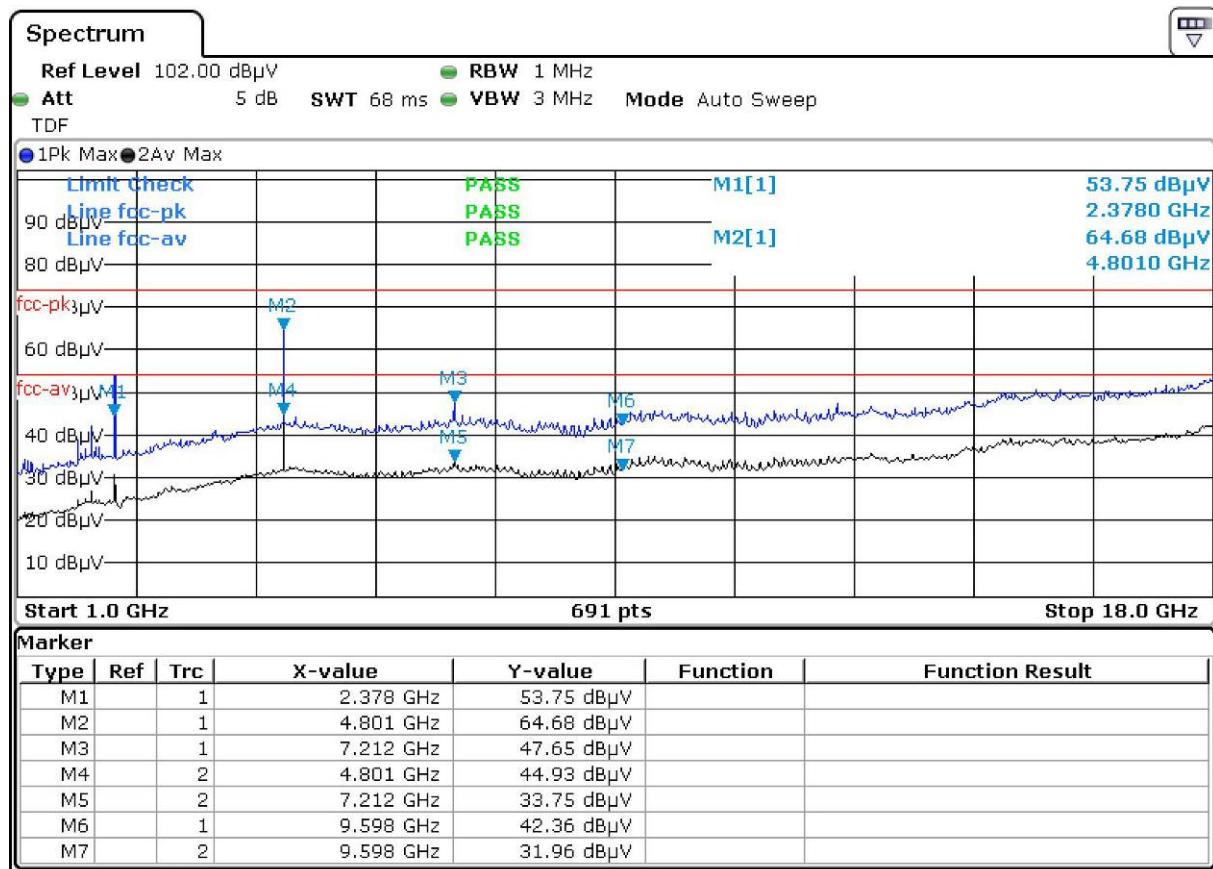
No other significant emissions were measured at the frequency range of interest employing the QP detectors.

Results of 1 – 18 GHz

Model	12000-01
Operation Mode (worst case)	Mode 1 @2402 MHz
Test voltage	3.7 Vdc

Results

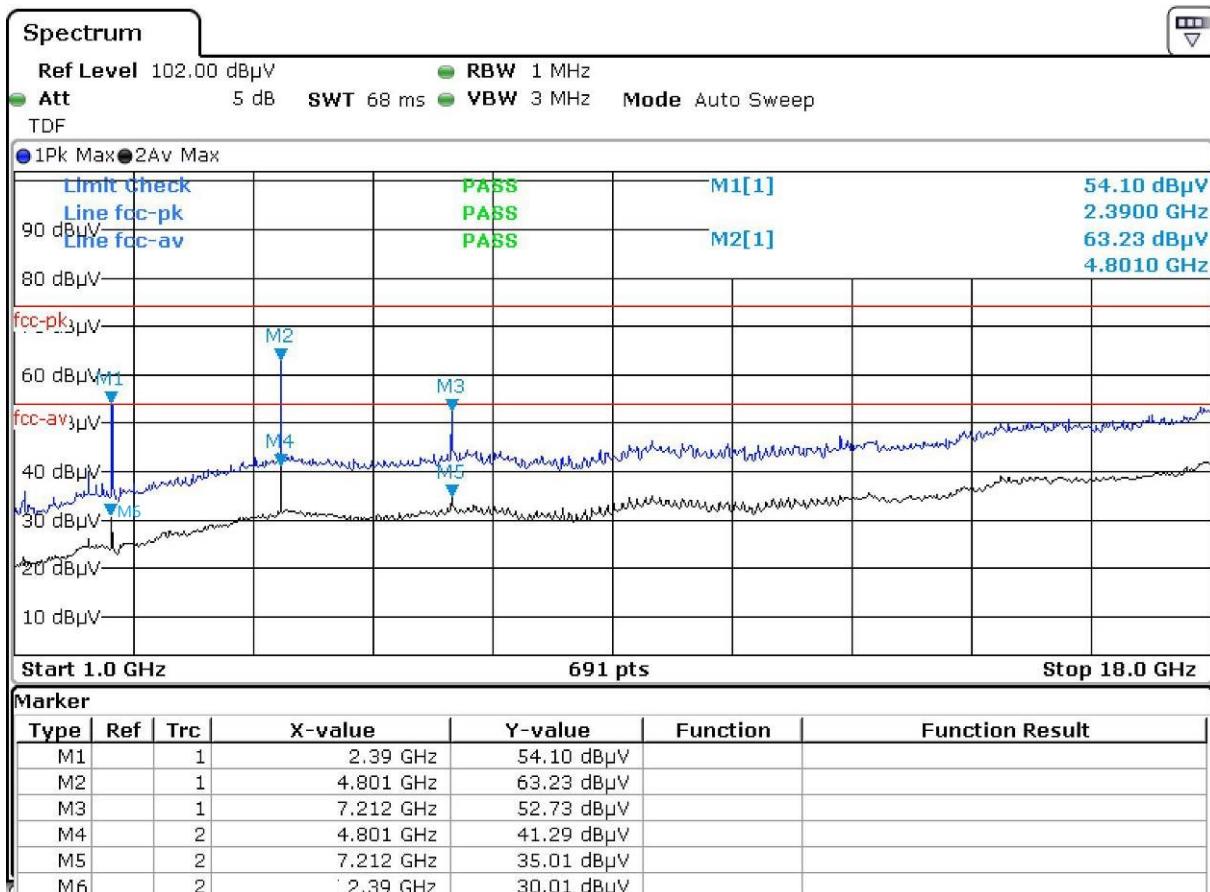
Horizontal



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



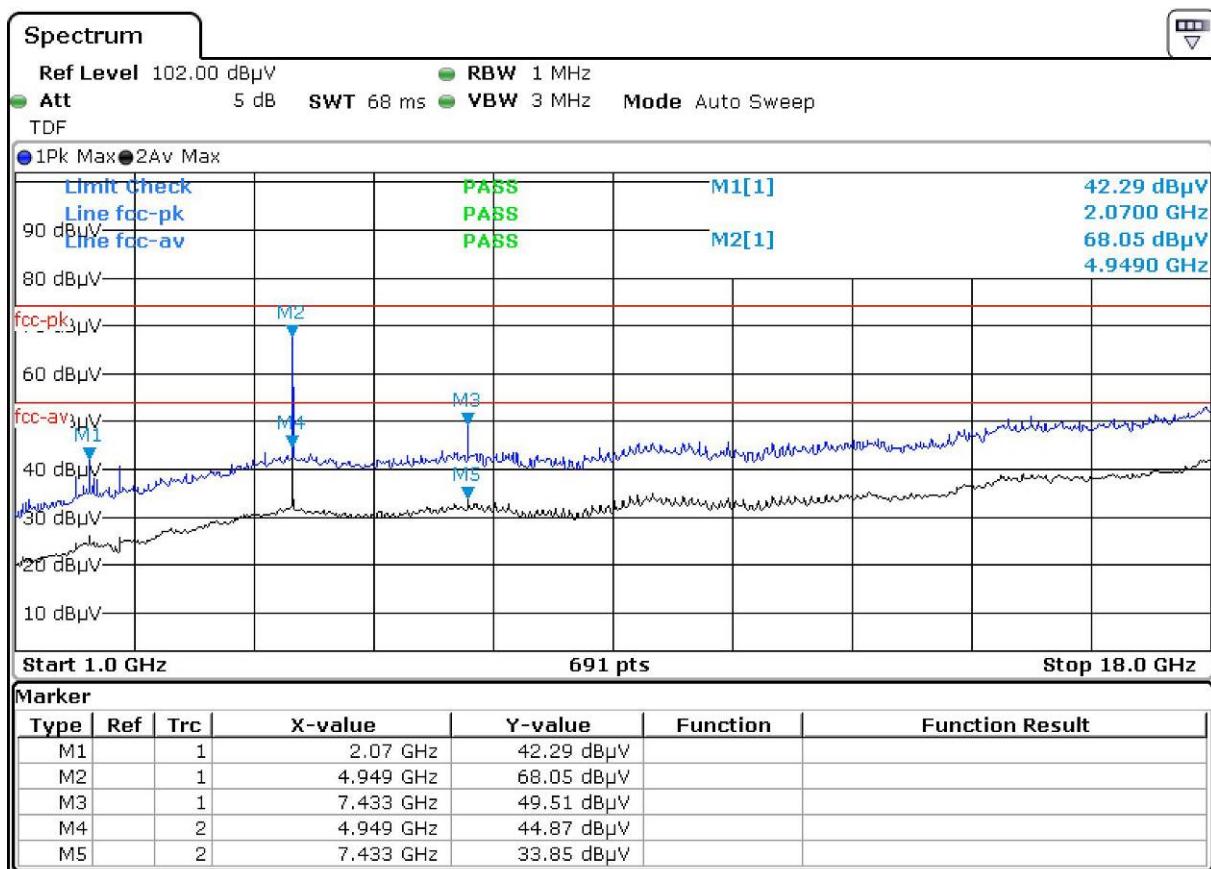
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

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

Model	12000-01
Operation Mode (worst case)	Mode 1 @2480 MHz
Test voltage	3.7 Vdc

Results

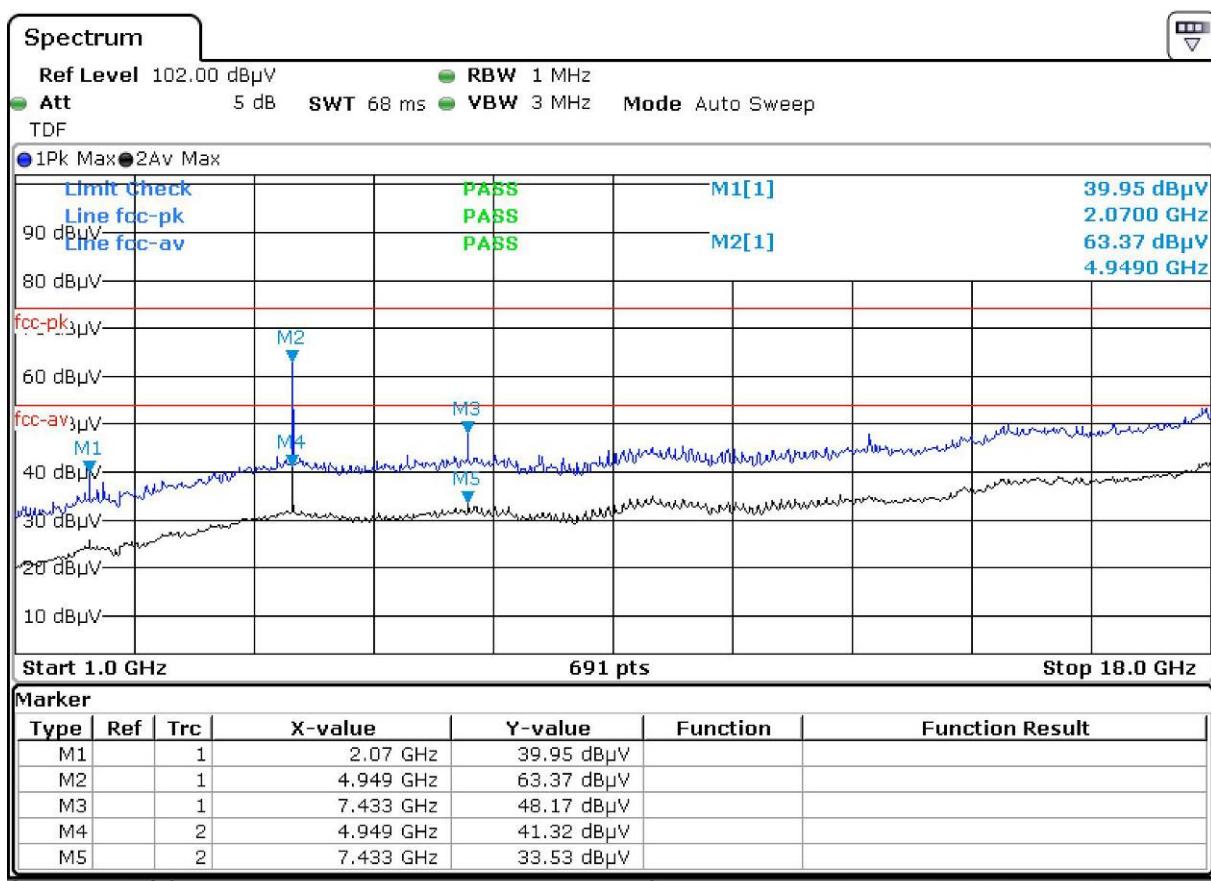
Horizontal



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)

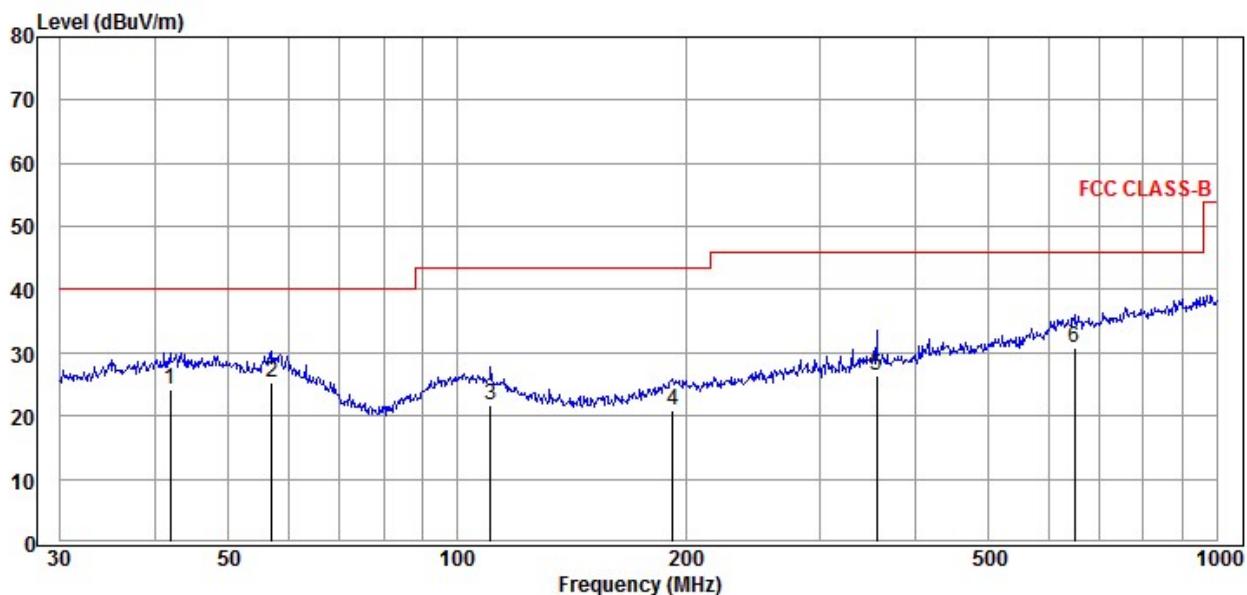
No other significant emissions were measured at the frequency range of interest employing the PK and AV detectors.

Results of 30 – 1000 MHz

Model	12000-02
Operation Mode	Mode 1 @2402MHz (worst case)
Test voltage	3.7 Vdc

Results

Horizontal



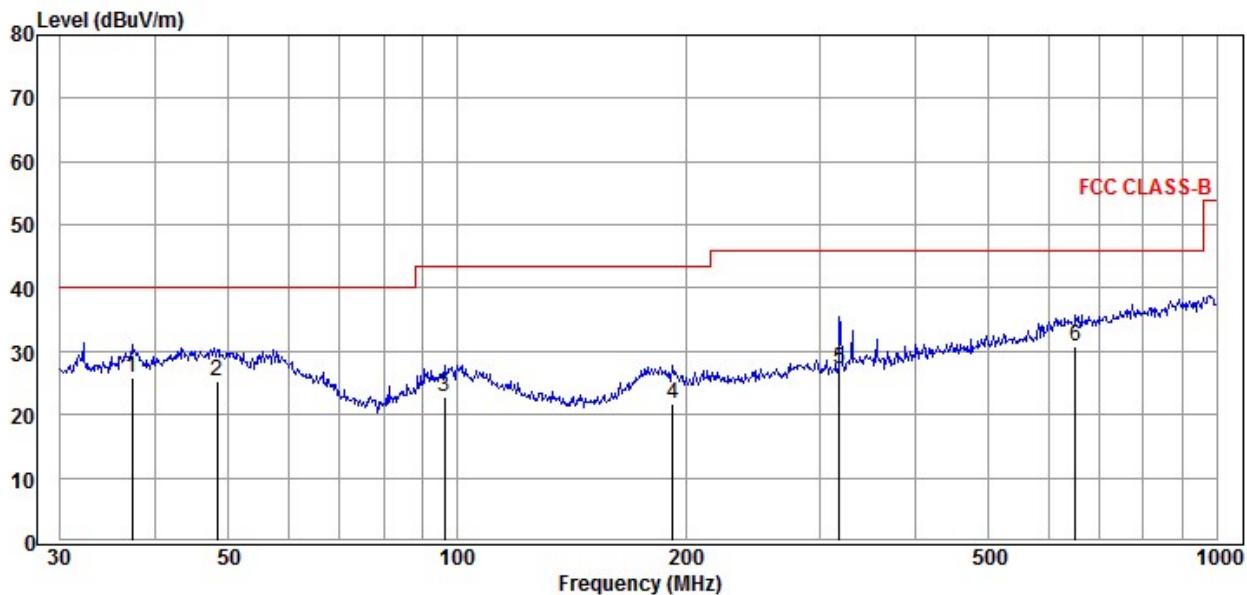
Freq (MHz)	Reading (dBuV)	C.F (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin=limit-result (dB)
41.86	8.52	15.55	24.07	40.00	15.93
56.99	9.94	15.25	25.19	40.00	14.81
110.57	9.47	12.30	21.77	43.50	21.73
192.42	9.04	11.90	20.94	43.50	22.56
356.68	11.06	15.45	26.51	46.00	19.49
649.66	10.99	19.90	30.89	46.00	15.11

Remarks:

- 3) C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain
- 4) 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)
37.29	11.96	13.97	25.93	40.00	14.07
48.33	9.99	15.20	25.19	40.00	14.81
96.10	10.76	12.10	22.86	43.50	20.64
192.42	9.89	11.90	21.79	43.50	21.71
318.82	13.15	14.20	27.35	46.00	18.65
651.94	10.80	19.95	30.75	46.00	15.25

Remarks:

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

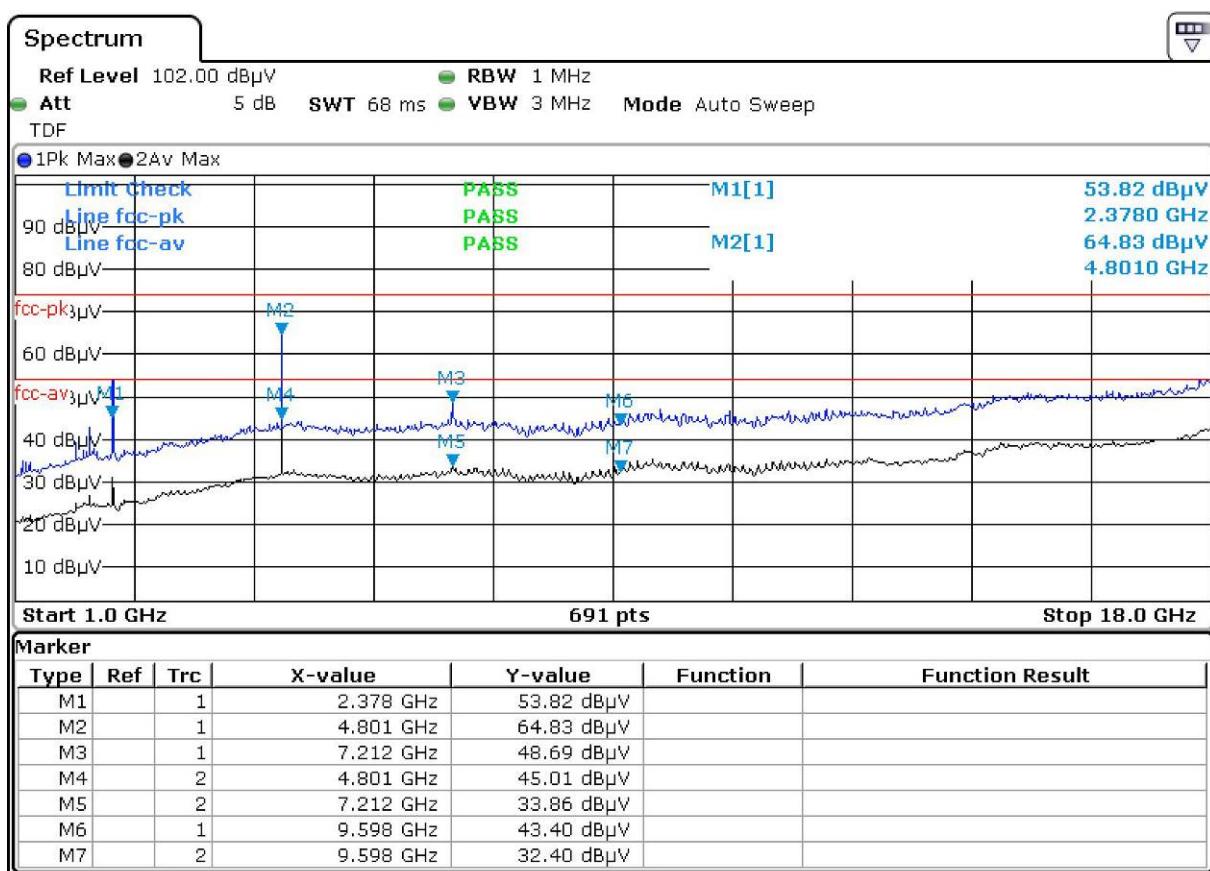
No other significant emissions were measured at the frequency range of interest employing the QP detectors.

Results of 1 – 18 GHz

Model	12000-02
Operation Mode (worst case)	Mode 1 @2402 MHz
Test voltage	3.7 Vdc

Results

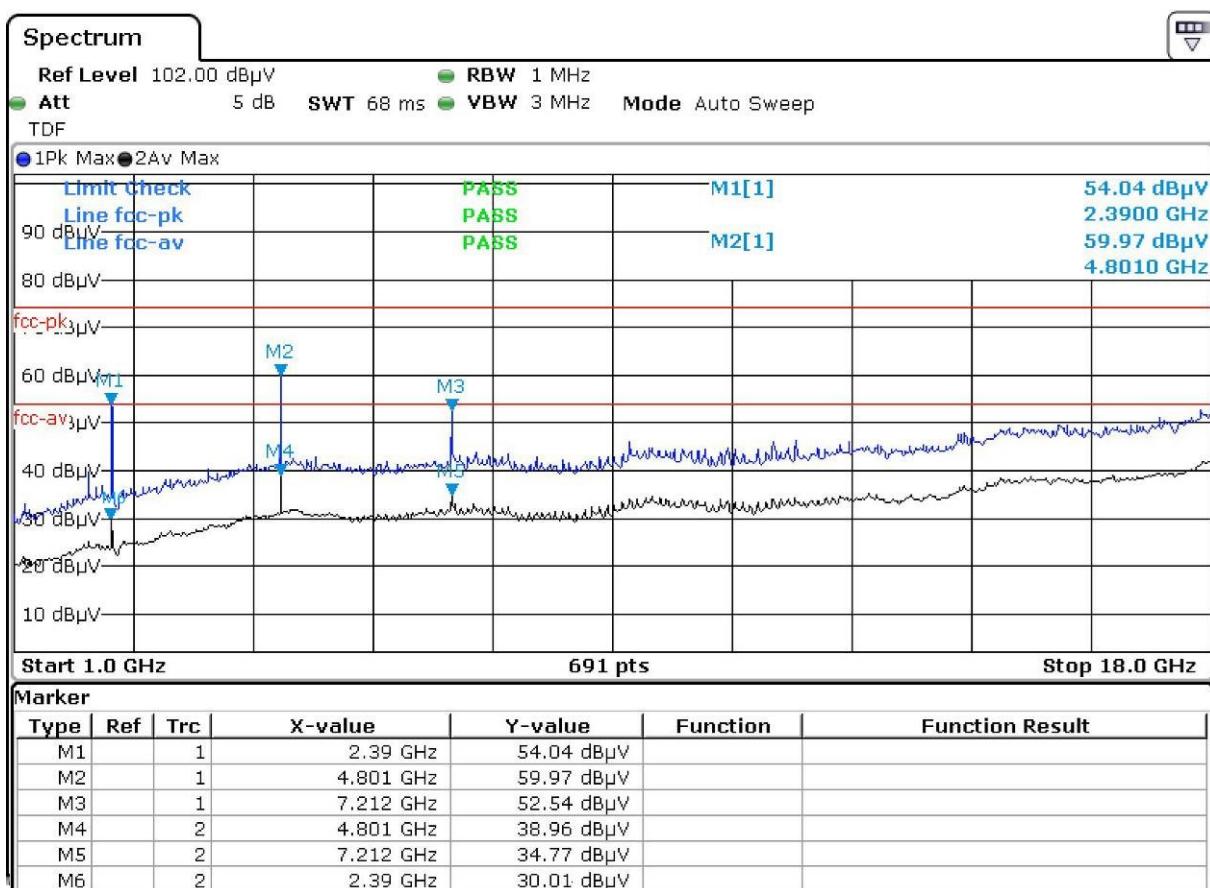
Horizontal



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



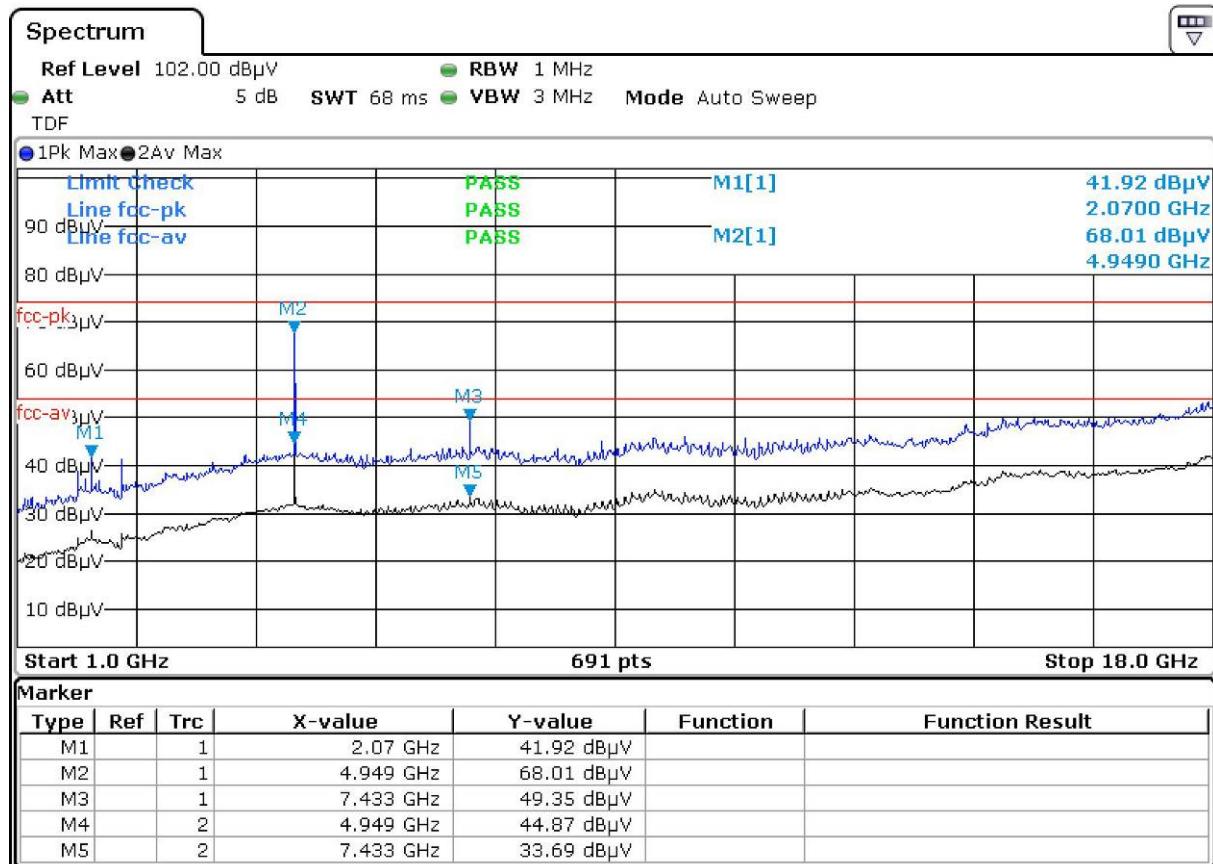
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

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

Model	12000-02
Operation Mode (worst case)	Mode 1 @2480 MHz
Test voltage	3.7 Vdc

Results

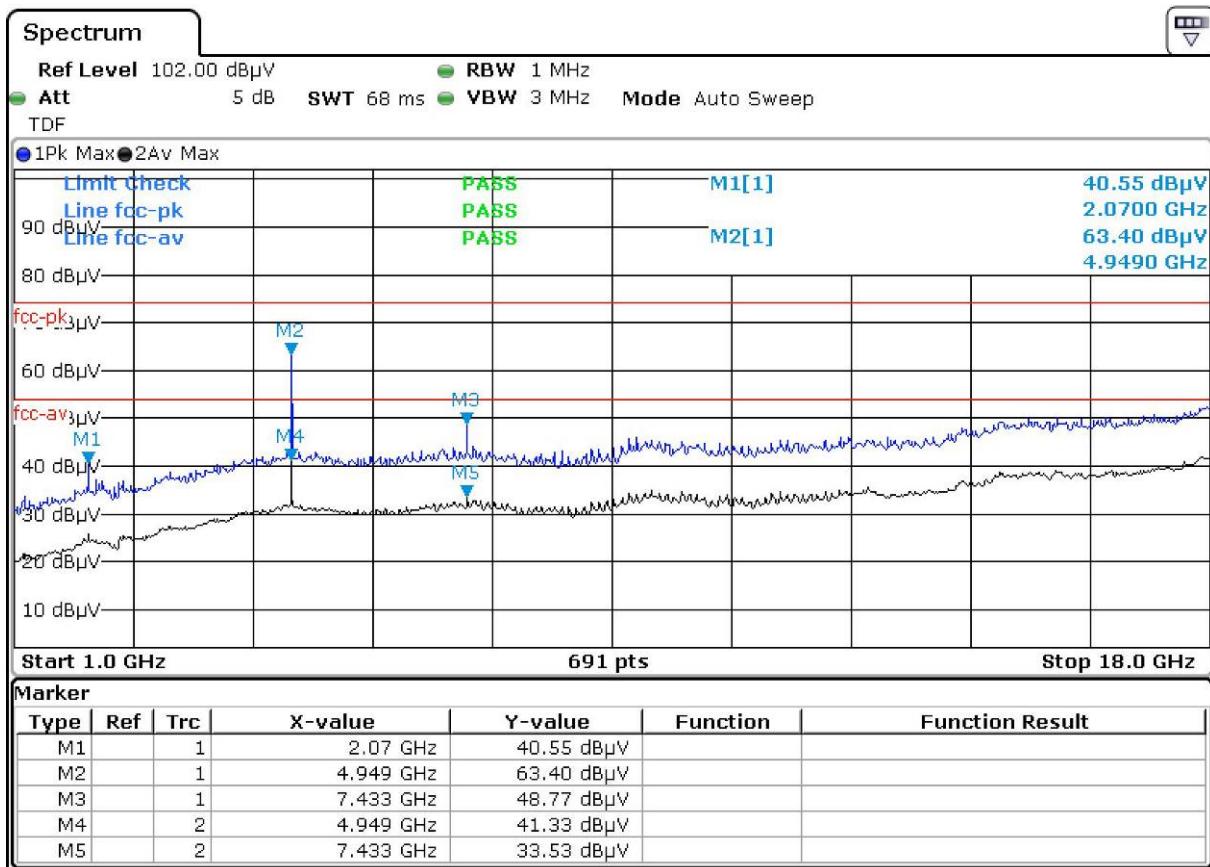
Horizontal



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	--	

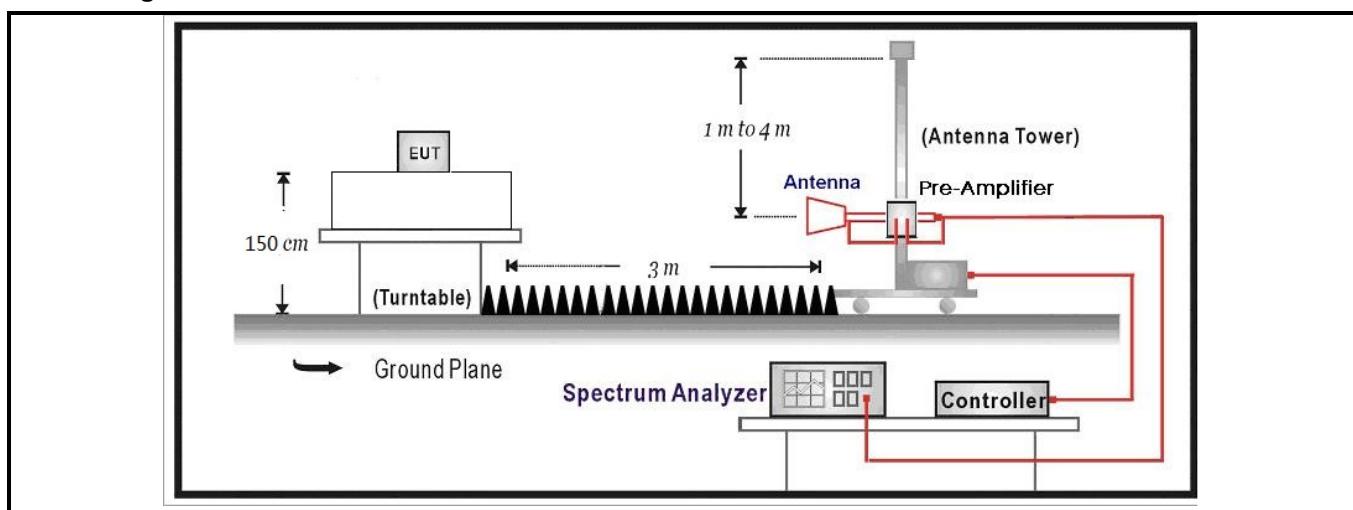
Restricted Band Emissions Limit

Frequency (MHz)	Field strength (μ V/m)	Field strength ($\text{dB}\mu\text{V}/\text{m}$)	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



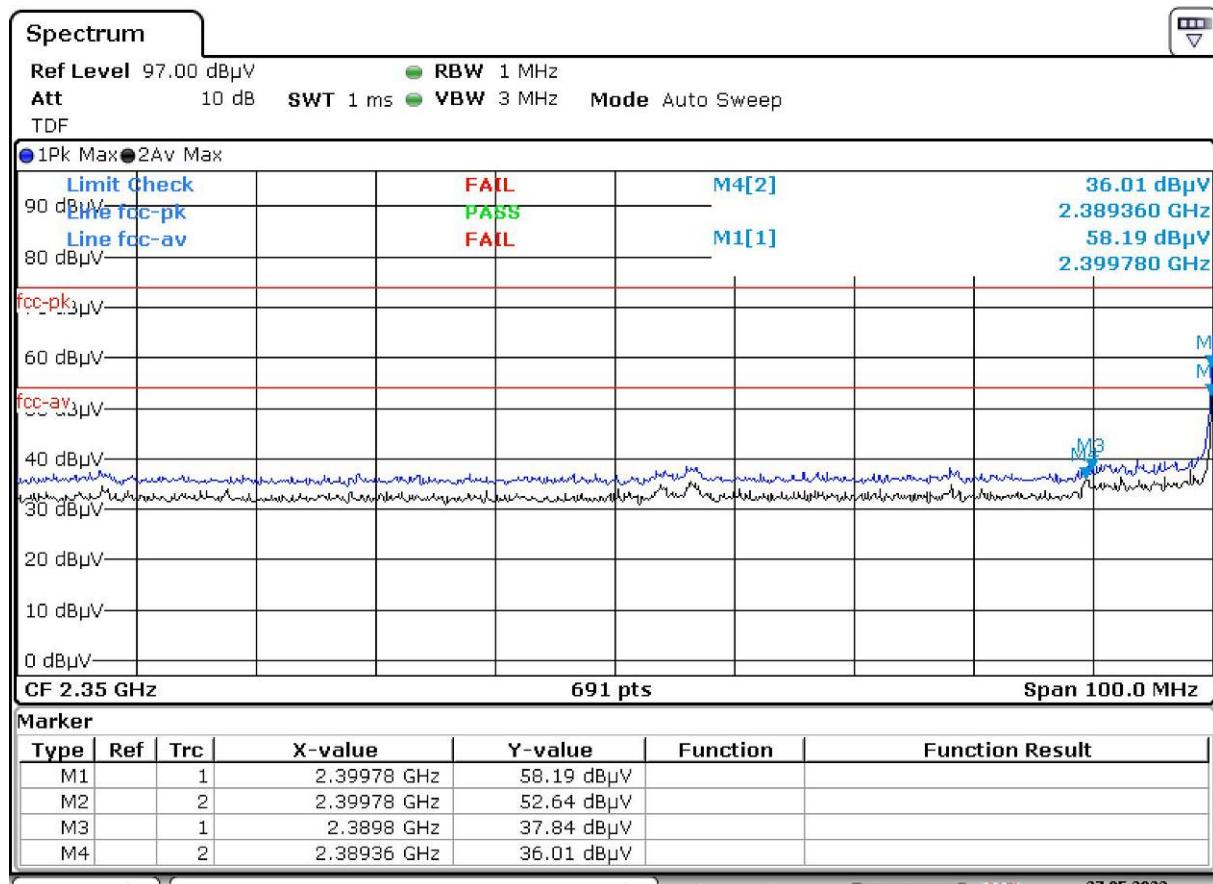
Performed measurements

Port under test	Enclosure port	
Test method applied	<input type="checkbox"/>	Conducted measurement
	<input checked="" type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1-2	
Remark	---	

Model	12000-01
Operation Mode (worst case)	Mode 2 @2402 MHz
Test voltage	3.7 Vdc

Results

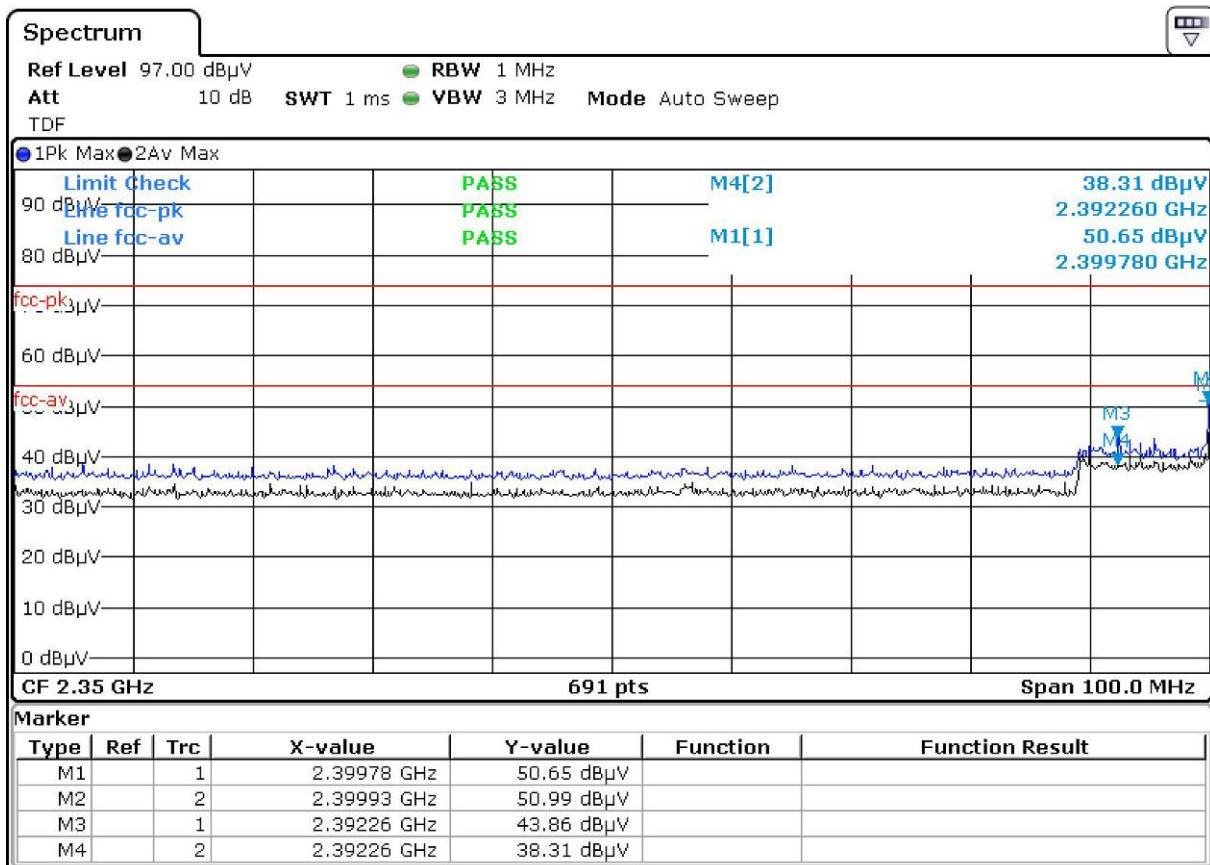
Horizontal



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



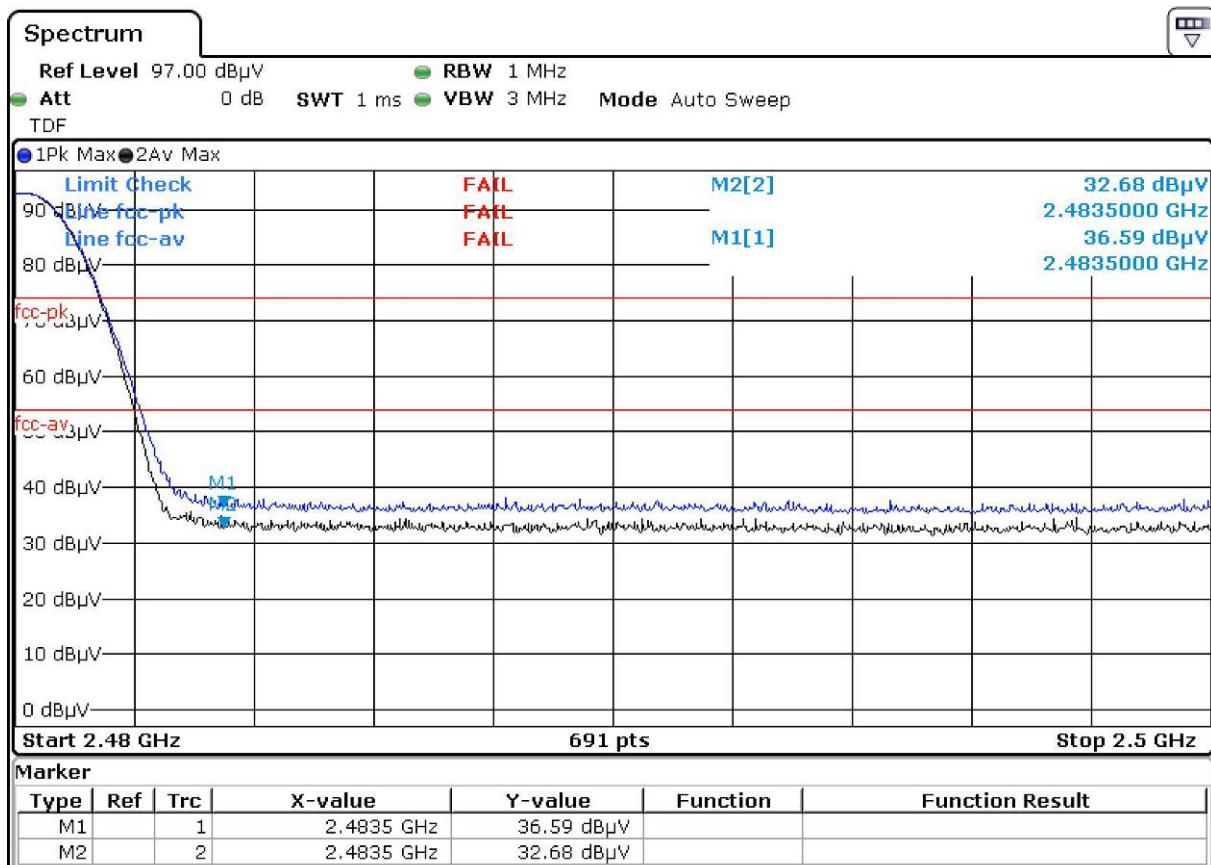
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

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

Model	12000-01
Operation Mode (worst case)	Mode 2 @2480 MHz
Test voltage	3.7 Vdc

Results

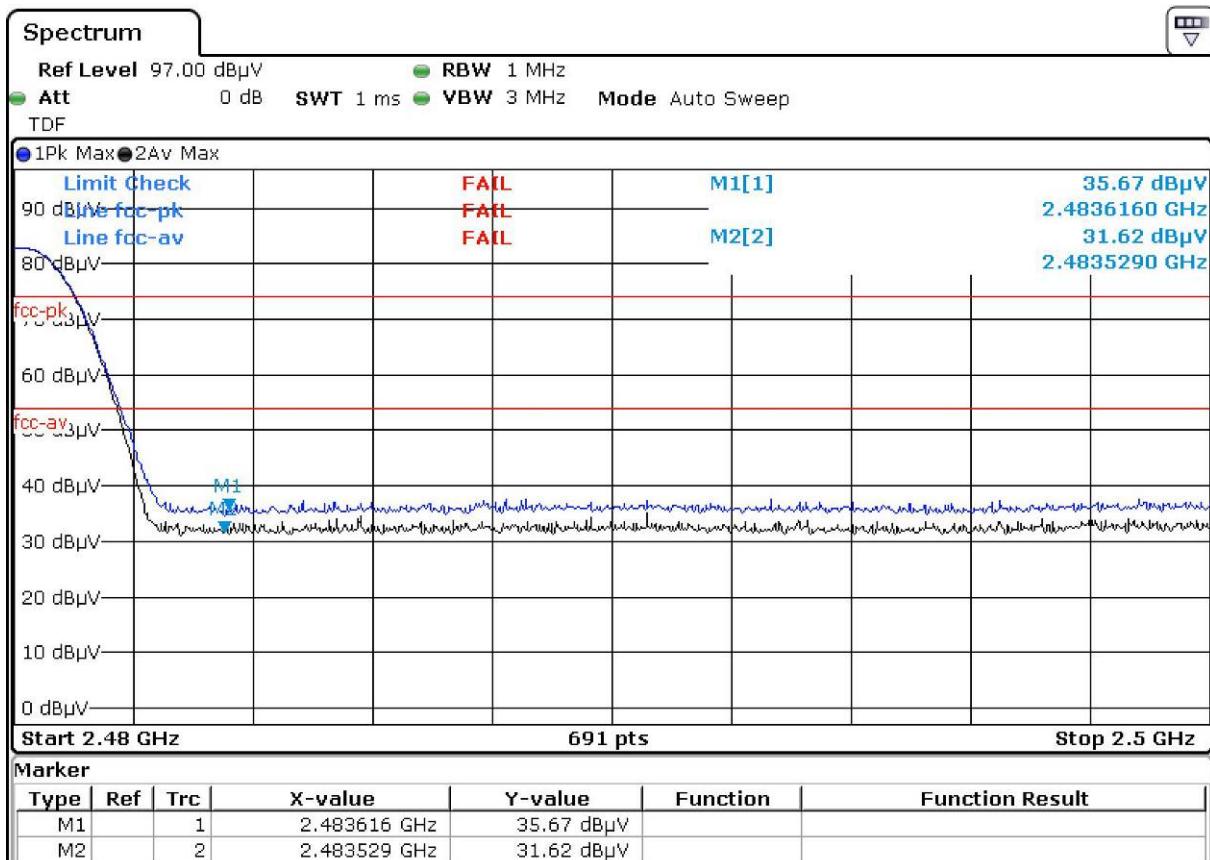
Horizontal



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



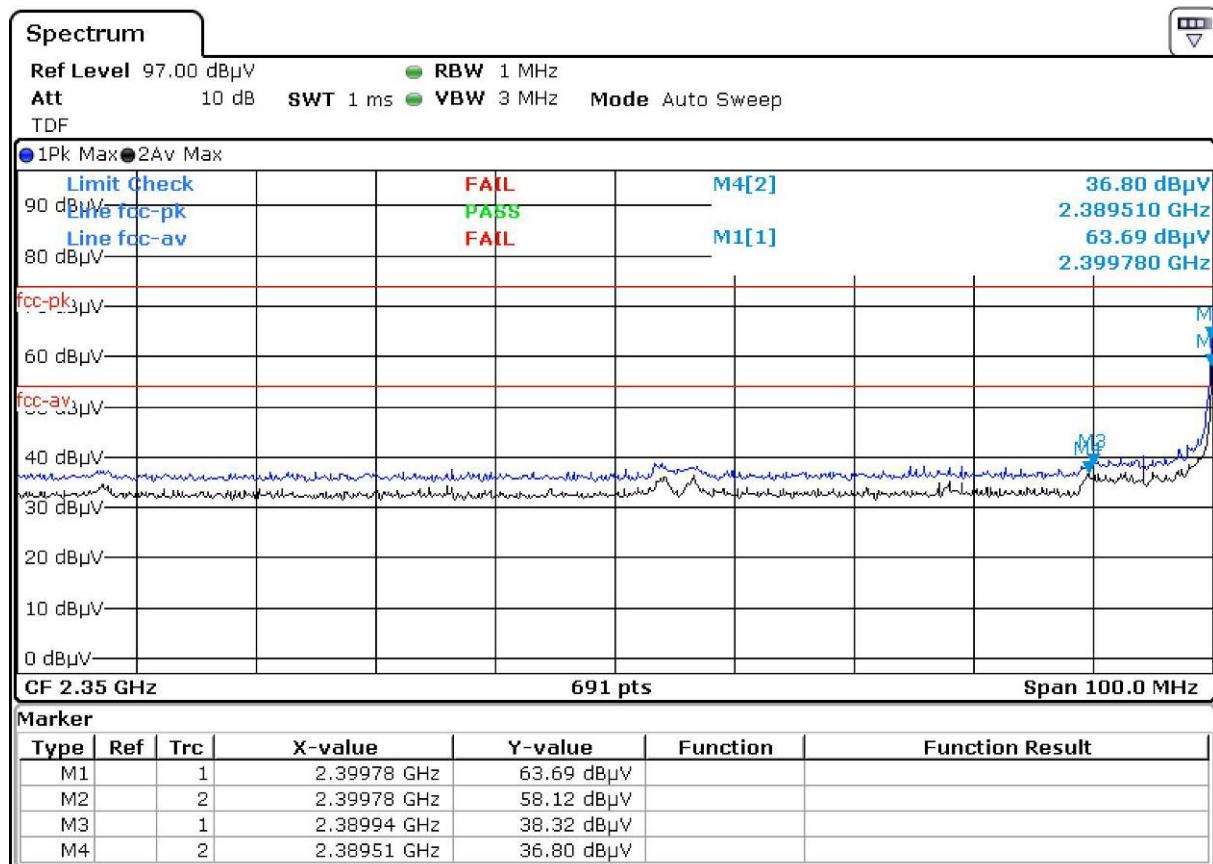
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

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

Model	12000-02
Operation Mode	Mode 2 @2402 MHz
Test voltage	3.7 Vdc

Results

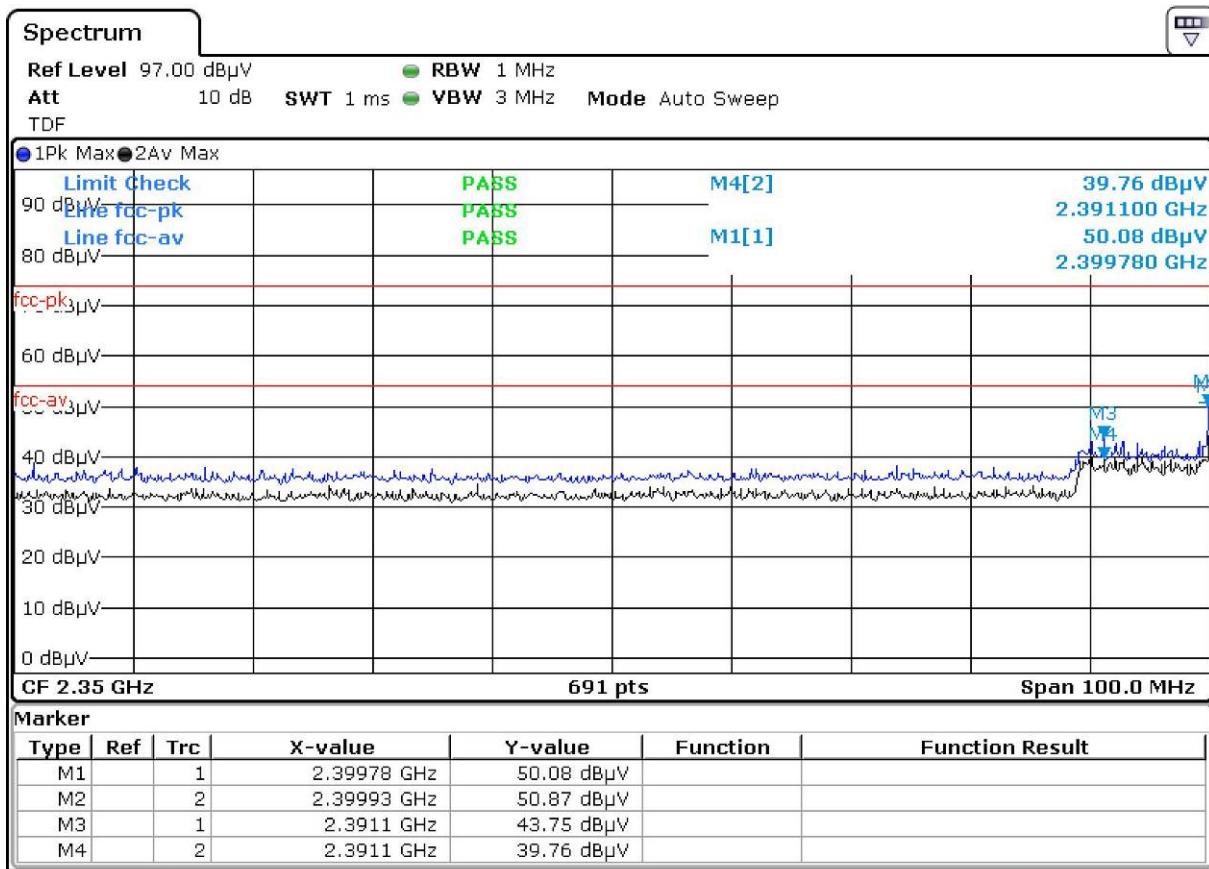
Horizontal



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



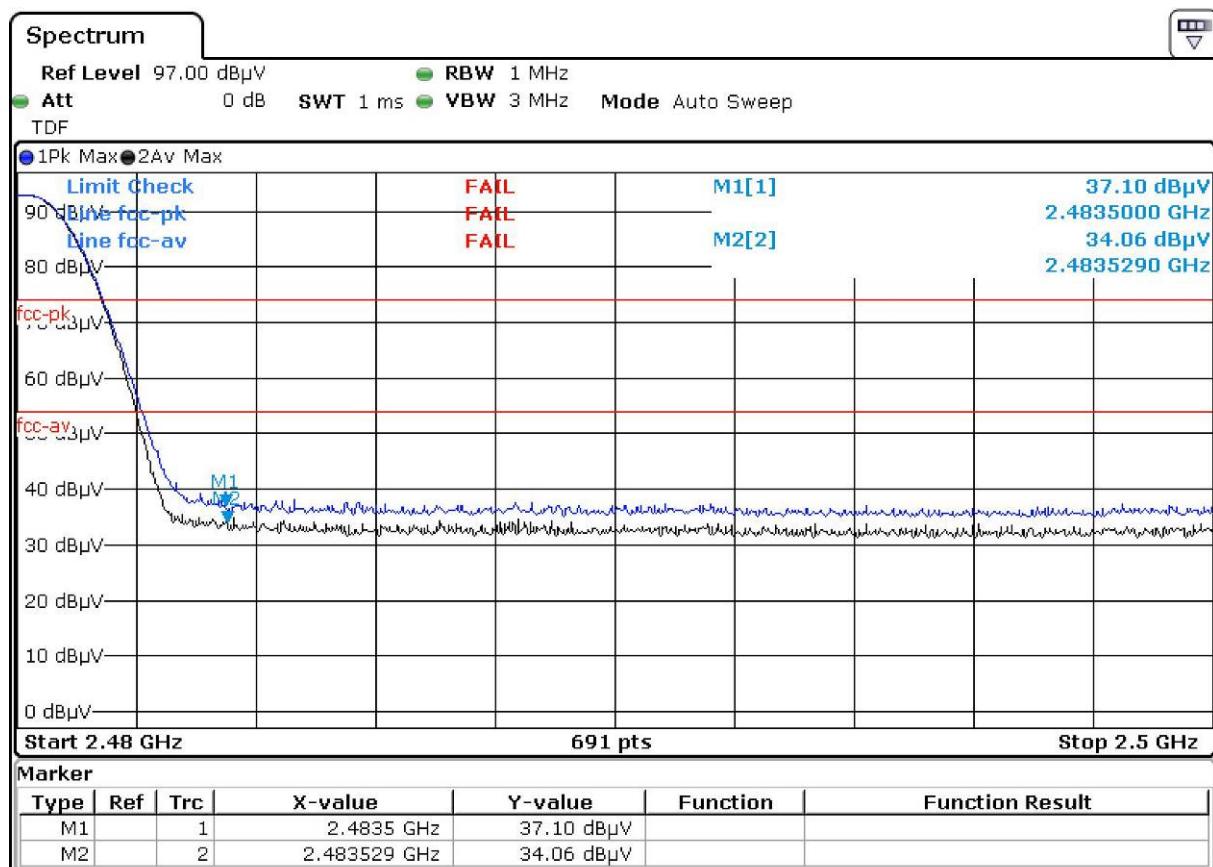
Remarks: Y-Value = received value + Correction Factor (Antenna factor + Cable loss - Preamp gain)

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

Model	12000-02
Operation Mode	Mode 2 @2480 MHz
Test voltage	3.7 Vdc

Results

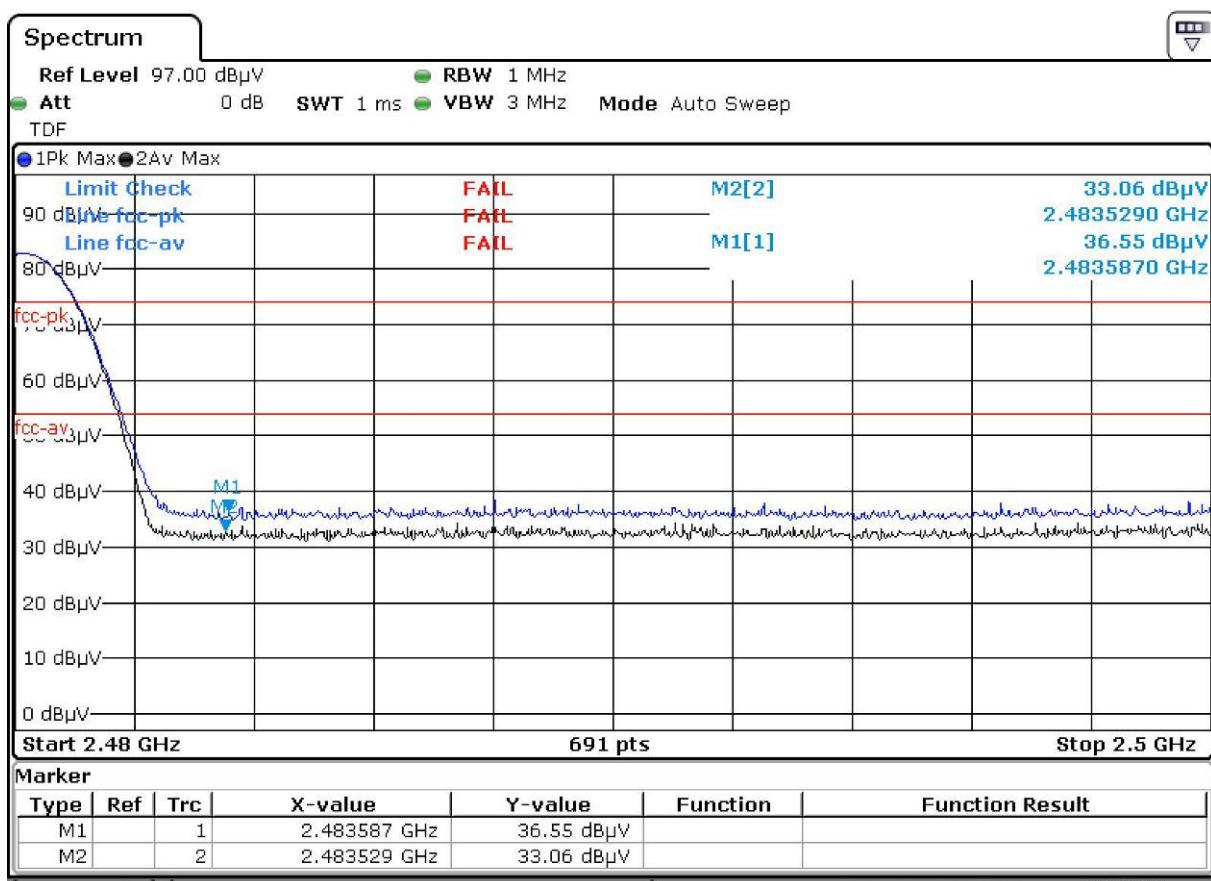
Horizontal



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

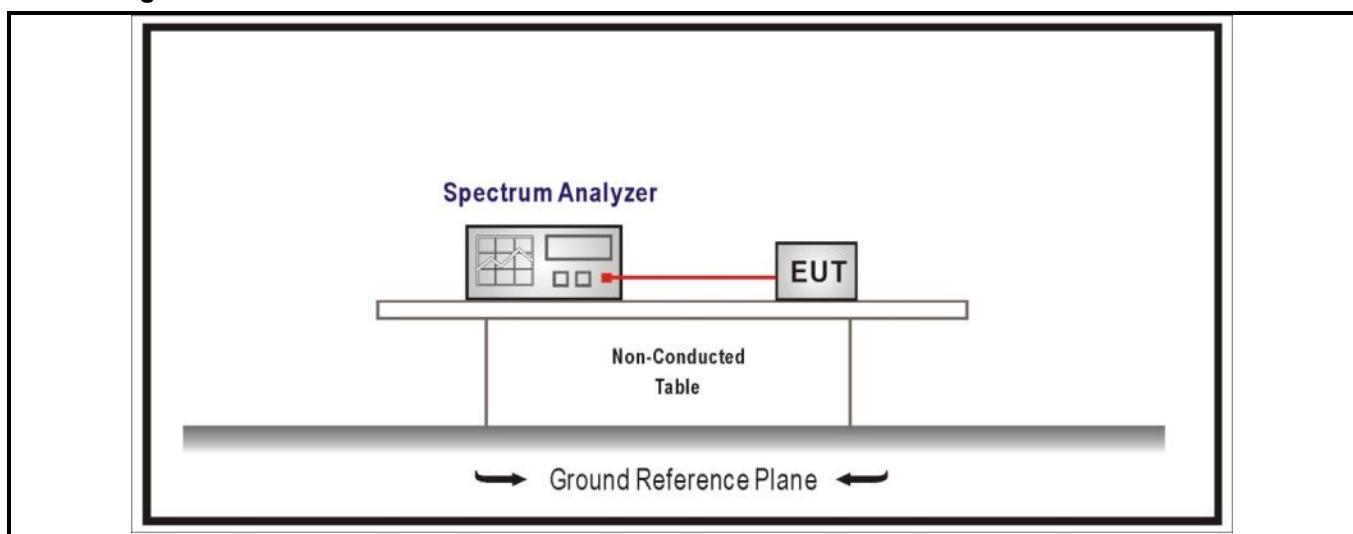
VERDICT: PASS

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).

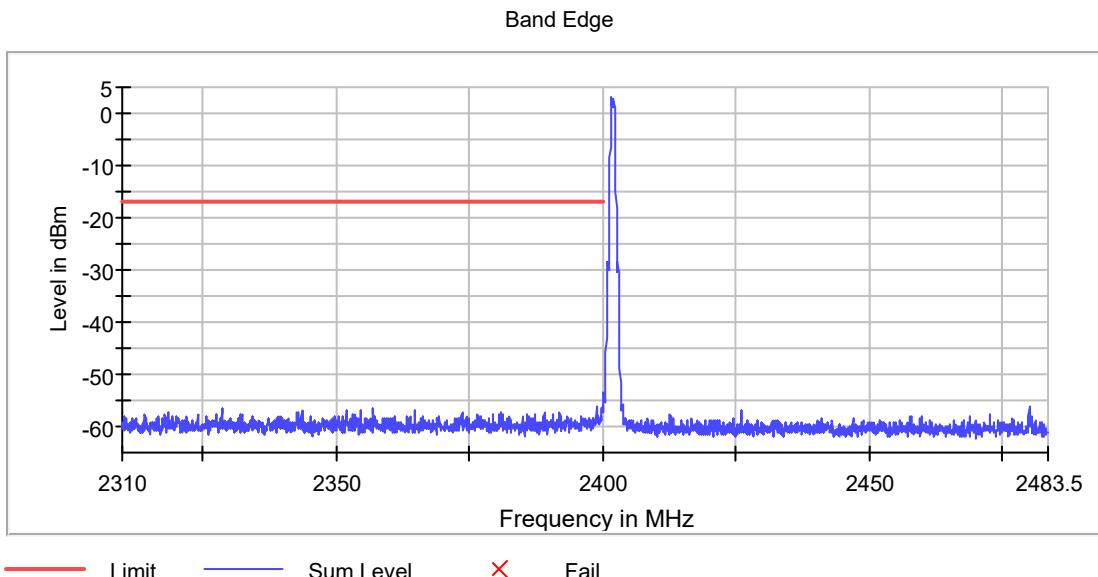
Test Configuration



Performed measurements

Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1, Mode 2	
Remark	---	

Results of mode 1 @2402 MHz



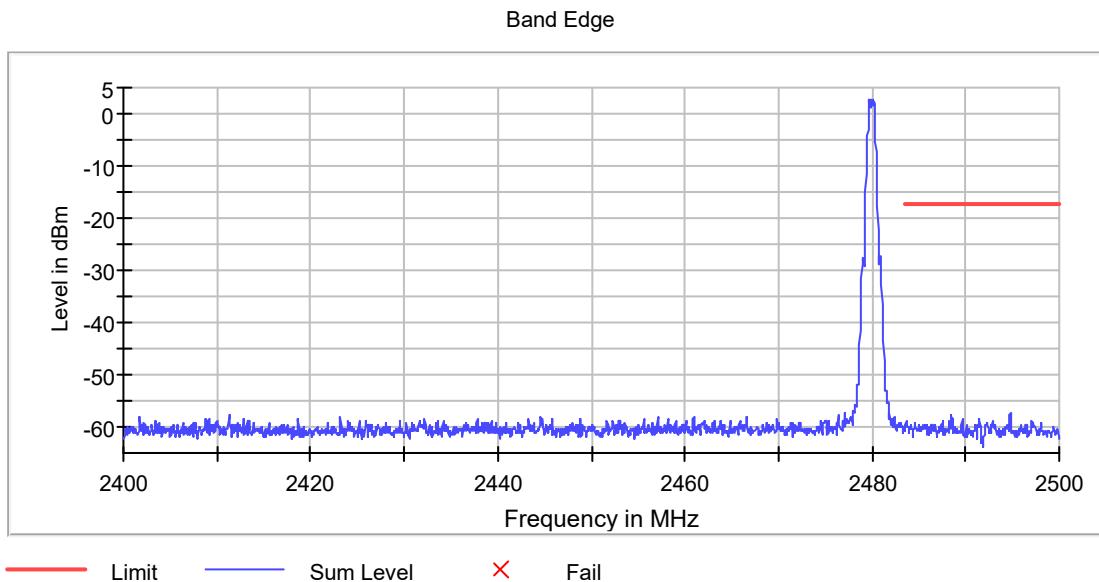
Inband Peak

Frequency (MHz)	Level (dBm)
2402.0000	3.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-56.1	39.1	-17.0	PASS
2398.825000	-56.2	39.3	-17.0	PASS
2398.875000	-56.3	39.3	-17.0	PASS
2357.075000	-56.5	39.5	-17.0	PASS
2399.925000	-56.5	39.5	-17.0	PASS
2328.675000	-56.6	39.6	-17.0	PASS
2399.875000	-56.7	39.7	-17.0	PASS
2364.775000	-57.0	40.0	-17.0	PASS
2352.175000	-57.0	40.0	-17.0	PASS
2343.625000	-57.0	40.0	-17.0	PASS
2354.675000	-57.1	40.1	-17.0	PASS
2373.675000	-57.1	40.2	-17.0	PASS
2342.825000	-57.2	40.2	-17.0	PASS
2364.725000	-57.2	40.2	-17.0	PASS
2343.875000	-57.2	40.3	-17.0	PASS

Results of mode 1 @2480 MHz



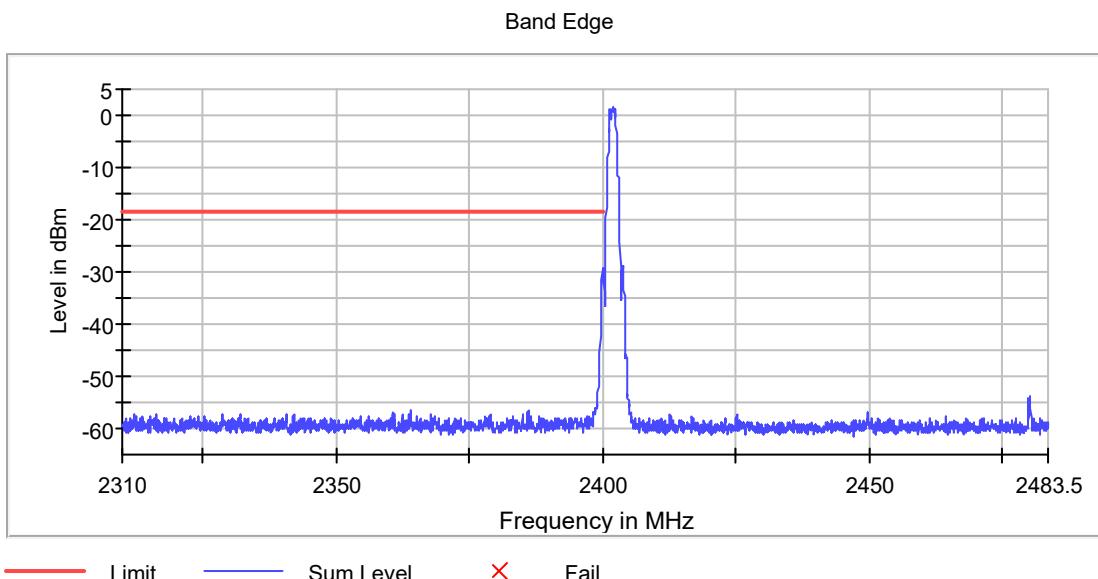
Inband Peak

Frequency (MHz)	Level (dBm)
2480.0000	2.8

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2494.775000	-57.3	40.1	-17.2	PASS
2494.825000	-57.6	40.4	-17.2	PASS
2494.725000	-57.9	40.6	-17.2	PASS
2488.475000	-57.9	40.6	-17.2	PASS
2488.525000	-58.0	40.7	-17.2	PASS
2489.625000	-58.3	41.1	-17.2	PASS
2491.475000	-58.4	41.1	-17.2	PASS
2489.675000	-58.4	41.2	-17.2	PASS
2488.575000	-58.6	41.4	-17.2	PASS
2491.525000	-58.7	41.4	-17.2	PASS
2483.625000	-58.7	41.4	-17.2	PASS
2488.275000	-58.7	41.5	-17.2	PASS
2488.325000	-58.7	41.5	-17.2	PASS
2492.925000	-58.8	41.5	-17.2	PASS
2497.075000	-58.8	41.6	-17.2	PASS

Results of mode 2 @2402 MHz



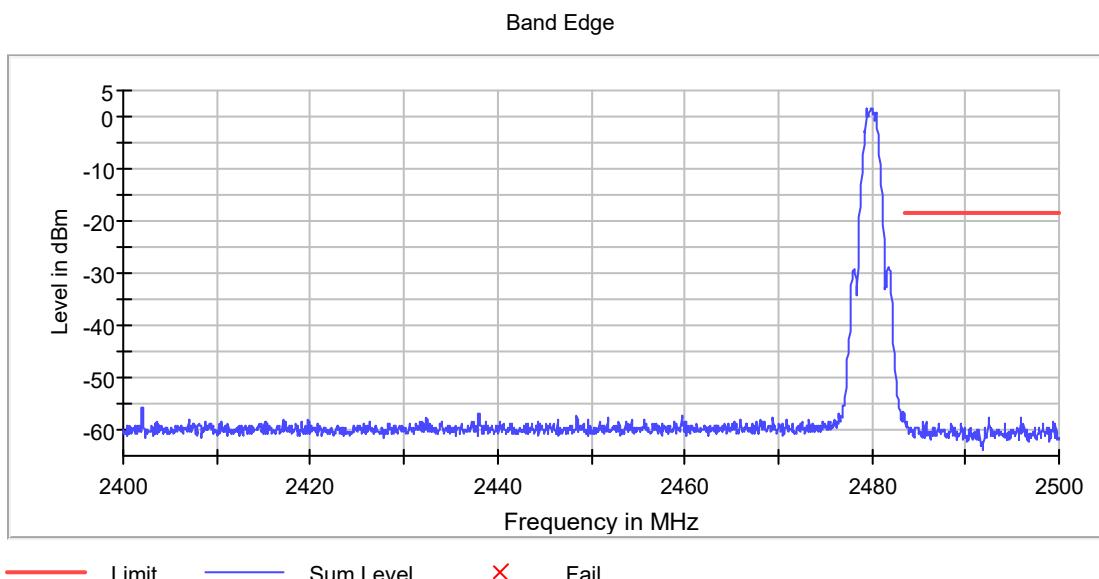
Inband Peak

Frequency (MHz)	Level (dBm)
2402.0000	1.6

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-29.1	10.7	-18.4	PASS
2399.925000	-31.4	12.9	-18.4	PASS
2399.875000	-31.7	13.3	-18.4	PASS
2399.825000	-32.5	14.1	-18.4	PASS
2399.775000	-33.9	15.4	-18.4	PASS
2399.725000	-35.9	17.5	-18.4	PASS
2399.675000	-39.3	20.9	-18.4	PASS
2399.625000	-40.8	22.4	-18.4	PASS
2399.575000	-42.4	24.0	-18.4	PASS
2399.525000	-45.4	27.0	-18.4	PASS
2399.475000	-46.1	27.7	-18.4	PASS
2399.425000	-46.6	28.2	-18.4	PASS
2399.375000	-49.3	30.9	-18.4	PASS
2399.325000	-51.3	32.9	-18.4	PASS
2399.275000	-51.4	33.0	-18.4	PASS

Results of mode 2 @2480 MHz



Inband Peak

Frequency (MHz)	Level (dBm)
2480.0000	1.7

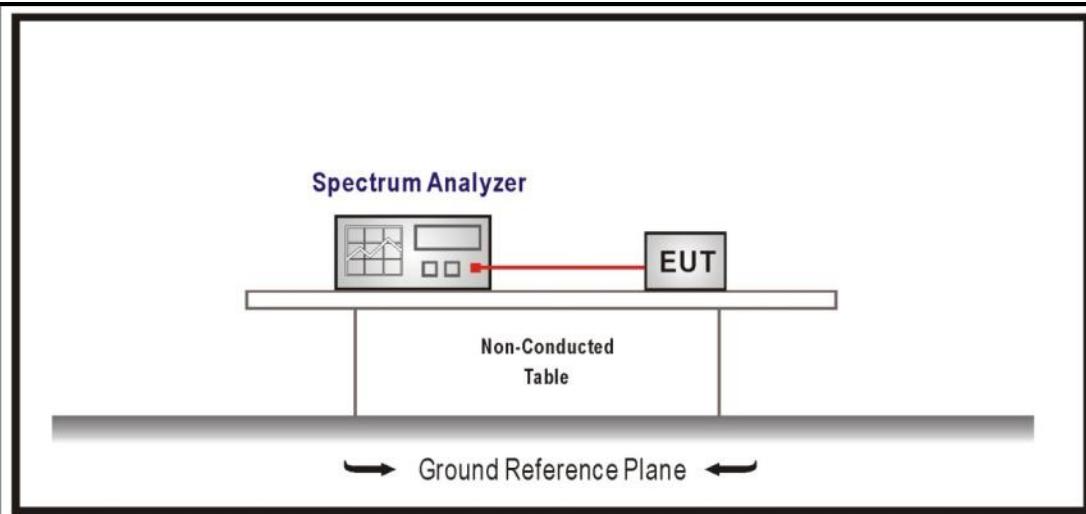
Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2495.875000	-57.8	39.5	-18.3	PASS
2492.525000	-57.8	39.6	-18.3	PASS
2492.475000	-57.9	39.6	-18.3	PASS
2495.925000	-58.0	39.7	-18.3	PASS
2483.525000	-58.1	39.8	-18.3	PASS
2499.375000	-58.3	40.0	-18.3	PASS
2485.775000	-58.5	40.2	-18.3	PASS
2499.425000	-58.5	40.2	-18.3	PASS
2485.475000	-58.5	40.2	-18.3	PASS
2483.725000	-58.5	40.2	-18.3	PASS
2485.525000	-58.6	40.3	-18.3	PASS
2483.575000	-58.6	40.3	-18.3	PASS
2496.175000	-58.7	40.4	-18.3	PASS
2487.175000	-58.7	40.4	-18.3	PASS
2483.675000	-58.7	40.4	-18.3	PASS

4.5 Duty cycle

VERDICT: PASS

Test Configuration



Performed measurements

Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1, Mode 2	
Remark	---	

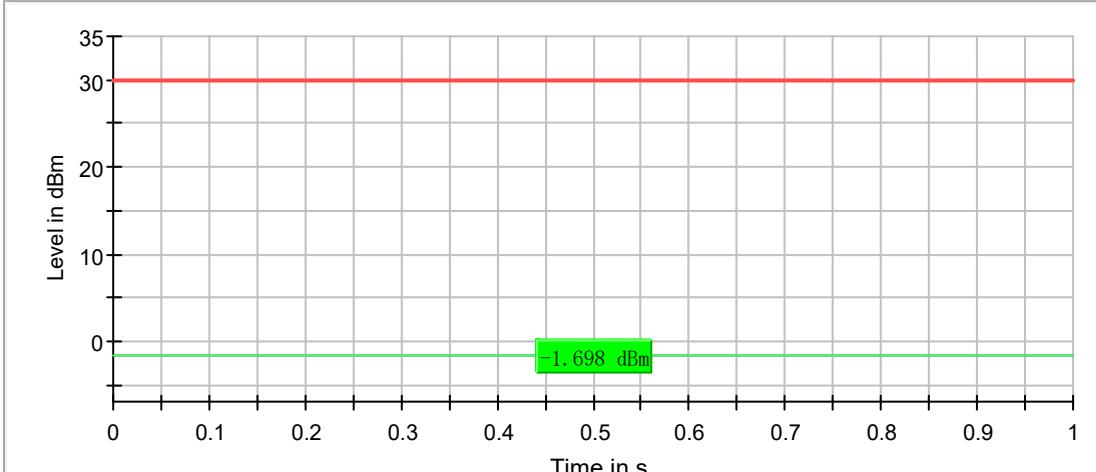
Results

Test Mode	Tx On (ms)	Tx On + Tx Off (ms)	Duty Cycle
Mode 1	---	---	100%

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.

Gated Trace



Level in dBm

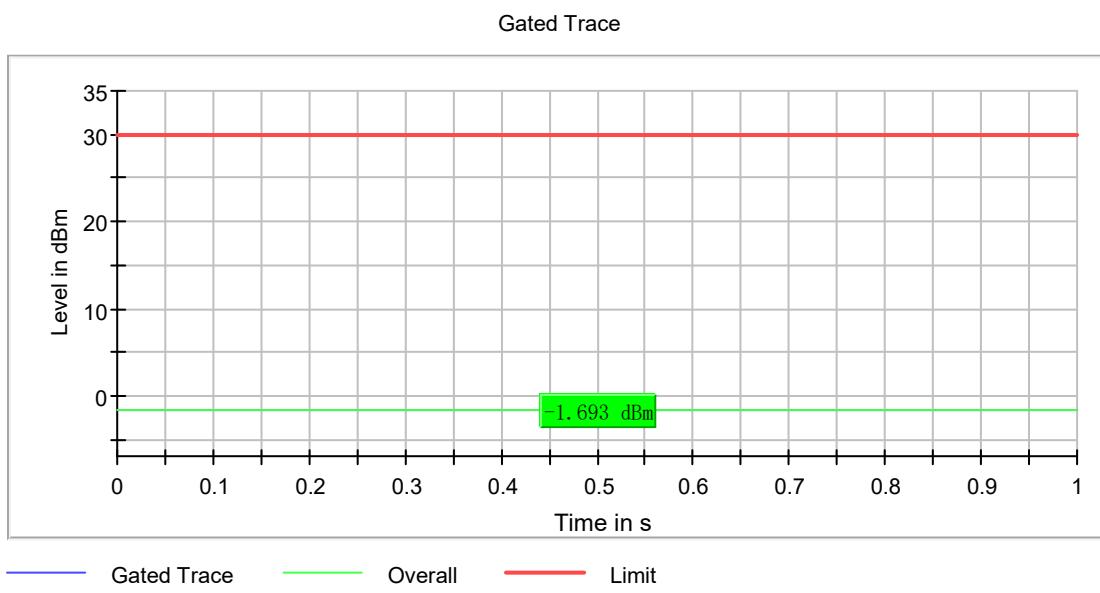
Time in s

Legend: Gated Trace (blue), Overall (green), Limit (red)

Test Mode	Tx On (ms)	Tx On + Tx Off (ms)	Duty Cycle
Mode 2	---	---	100%

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

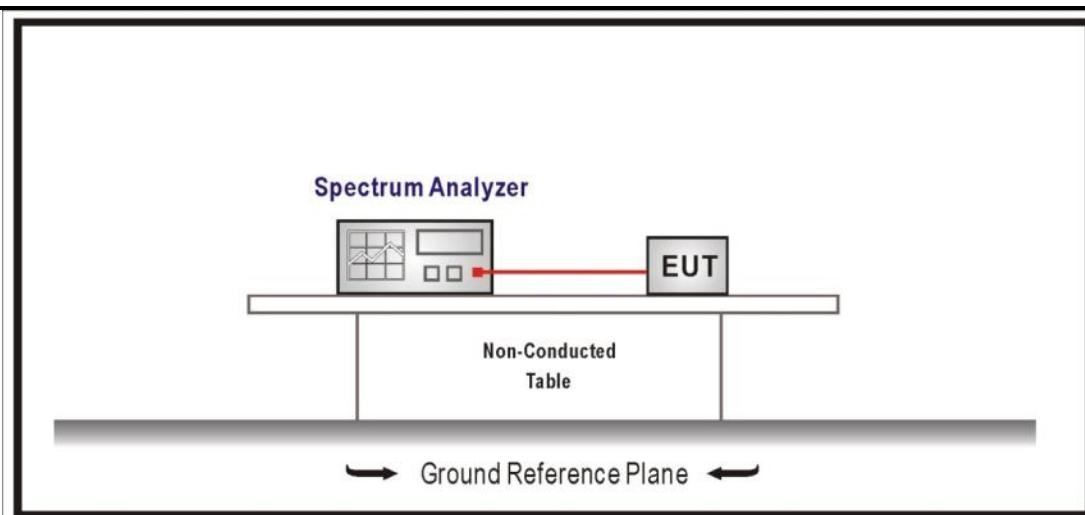
VERDICT: PASS

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 least 500 kHz

Test Configuration



Performed measurements

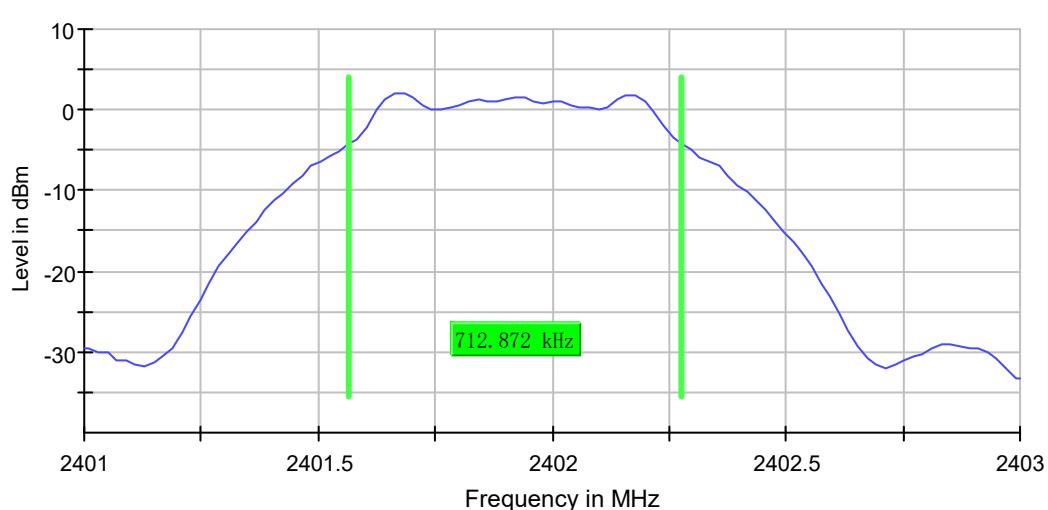
Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1, Mode 2	
Remark	---	

Results

Mode	CH.	Test Freq. (MHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
1	1	2402	712,87	>500	Pass
	39	2480	732,67	>500	Pass

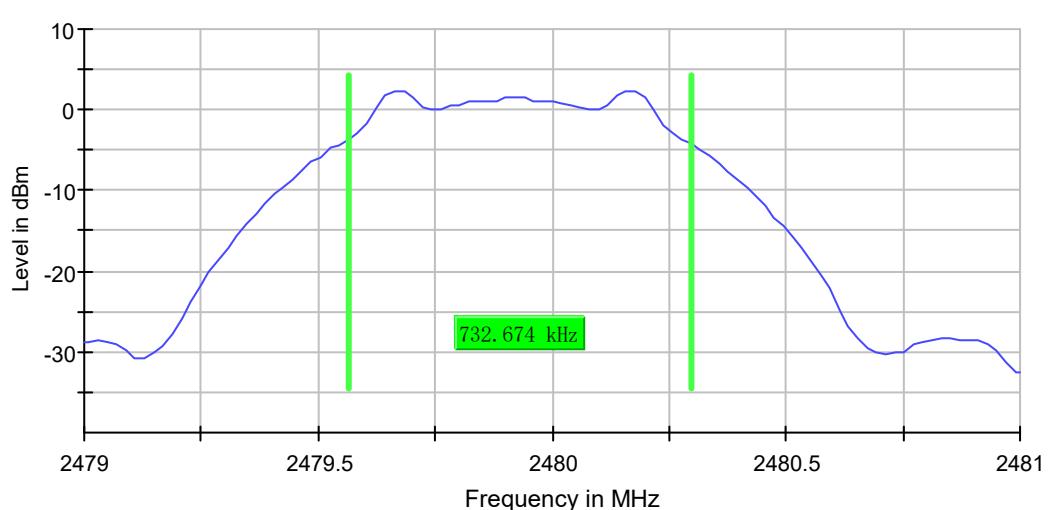
6dB Occupied Bandwidth
Mode 1 / CH1 (2402MHz)

6 dB Bandwidth



Mode 1 / CH39 (2480MHz)

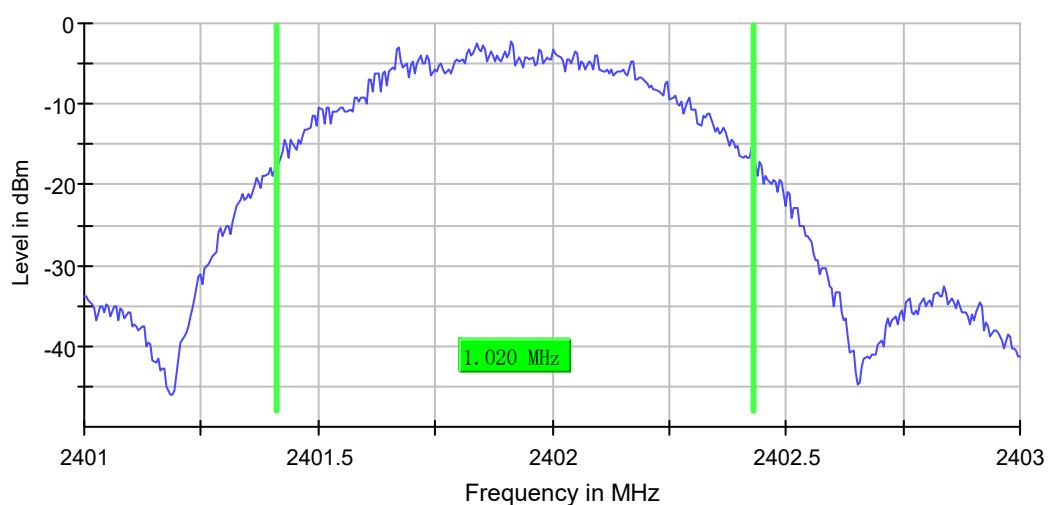
6 dB Bandwidth



Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)	Limit	Result
1	1	2402	1.02	Within frequency range	Pass
	39	2480	1.04	Within frequency range	Pass

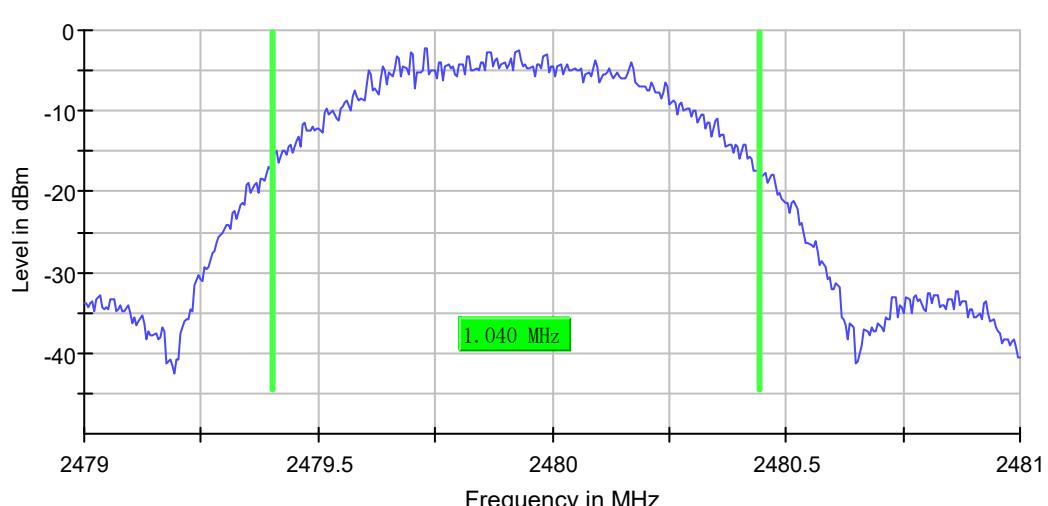
99% Occupied Bandwidth
Mode 1 / CH1 (2402 MHz)

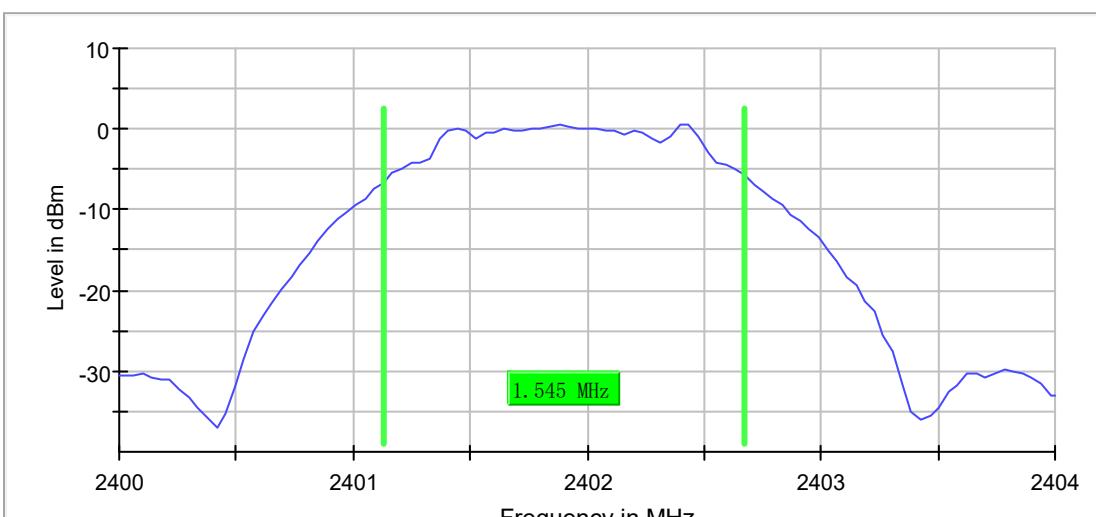
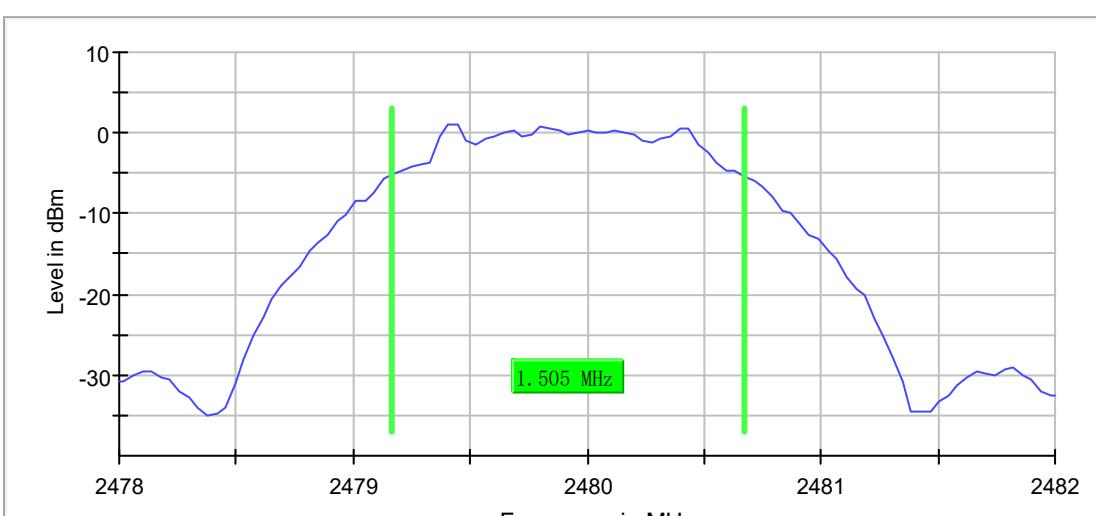
99 % Bandwidth

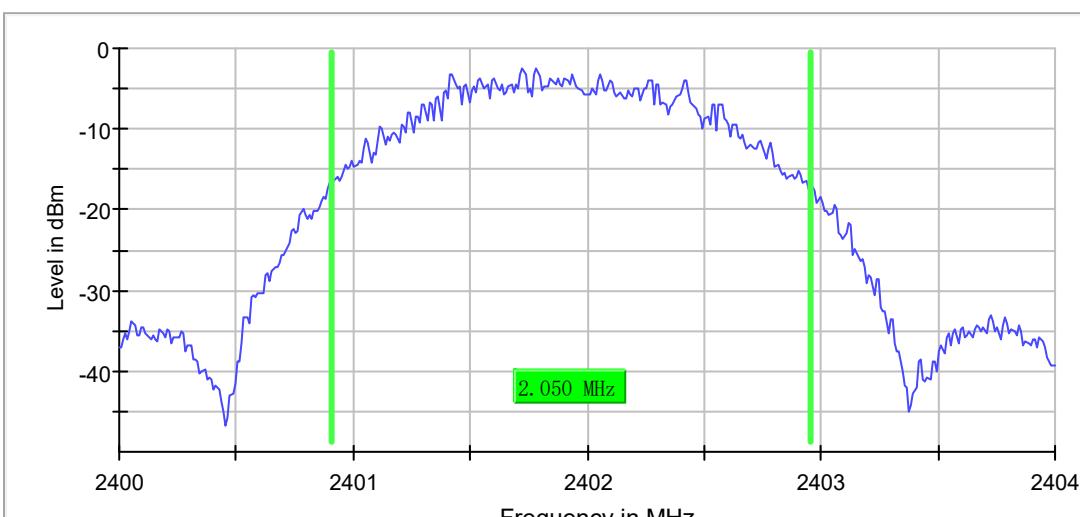
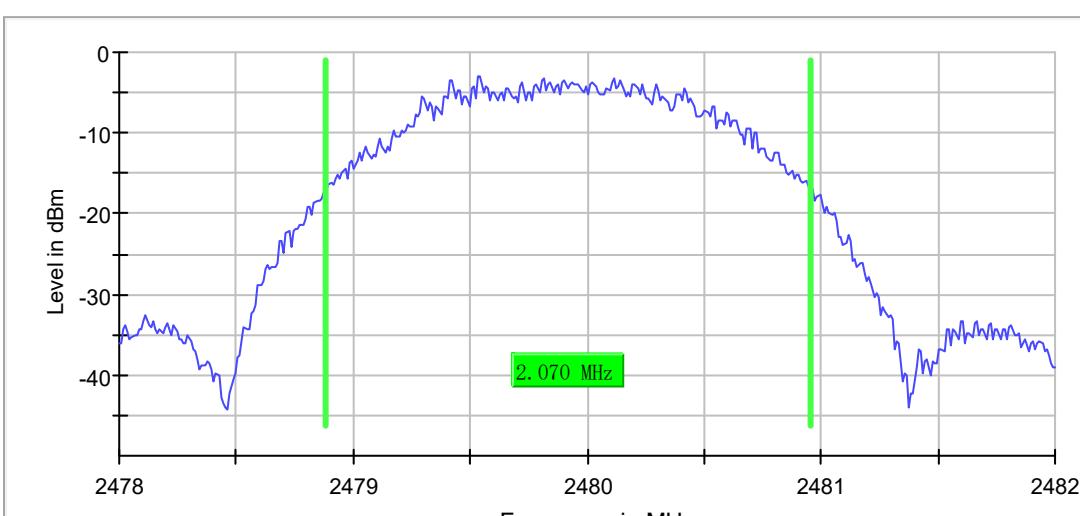


Mode 1 / CH39 (2480 MHz)

99 % Bandwidth



Mode	CH.	Test Freq. (MHz)	6dB Occupied Bandwidth (kHz)	Limit (kHz)	Result
2	1	2402	1545	>500	Pass
	39	2480	1505	>500	Pass
6dB Occupied Bandwidth Mode 2 / CH1 (2402MHz)					
6 dB Bandwidth					
					
Mode 2 / CH39 (2480MHz)					
6 dB Bandwidth					
					

Mode	CH.	Test Freq. (MHz)	99% Occupied Bandwidth (MHz)	Limit	Result
2	1	2402	2,05	Within frequency range	Pass
	39	2480	2,07	Within frequency range	Pass
99% Occupied Bandwidth Mode 2 / CH1 (2402 MHz)					
99 % Bandwidth					
					
Mode 2 / CH39 (2480 MHz)					
99 % Bandwidth					
					

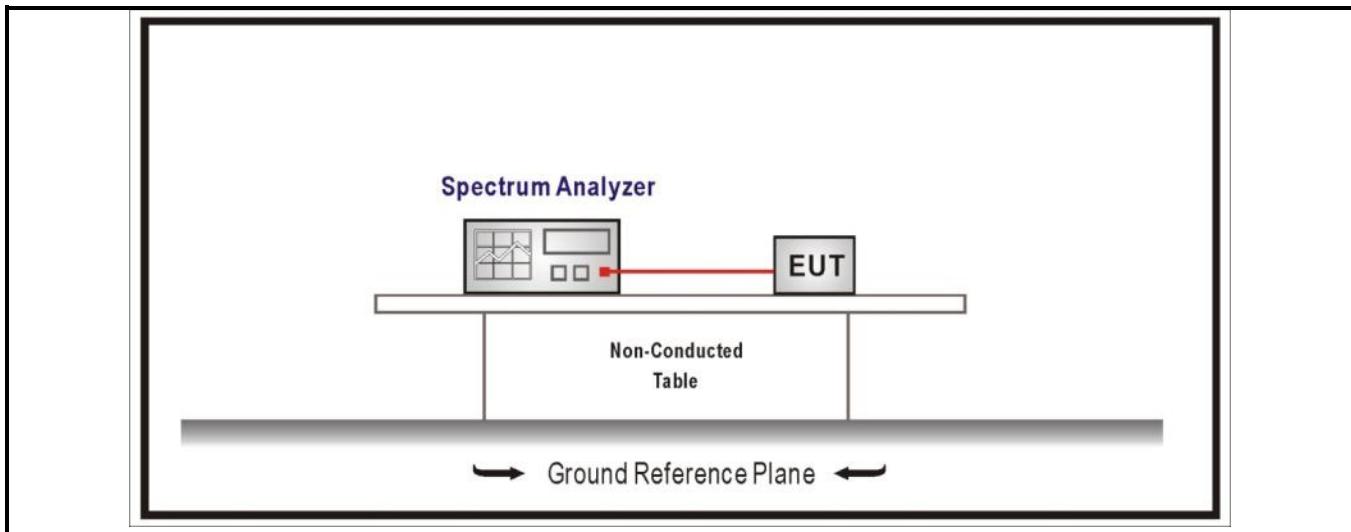
4.7 Fundamental emission output power

VERDICT: PASS

Standard		FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
<input checked="" type="checkbox"/>	GTX <6dBi	Pout≤30dBm
<input type="checkbox"/>	GTX >6dBi	
<input type="checkbox"/>	Non-Fix point-point	Pout≤30-(GTX -6)
<input type="checkbox"/>	Fix point-point	Pout≤30-[(GTX-6)]/3
<input type="checkbox"/>	Point-to-multipoint	Pout≤30-(GTX-6)
<input type="checkbox"/>	Overlap Beams	Pout≤30-[(GTX-6)]/3
<input type="checkbox"/>	Aggregate power transmitted simultaneously on all beams	Pout≤30-[(GTX-6)]/3
<input type="checkbox"/>	singby 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

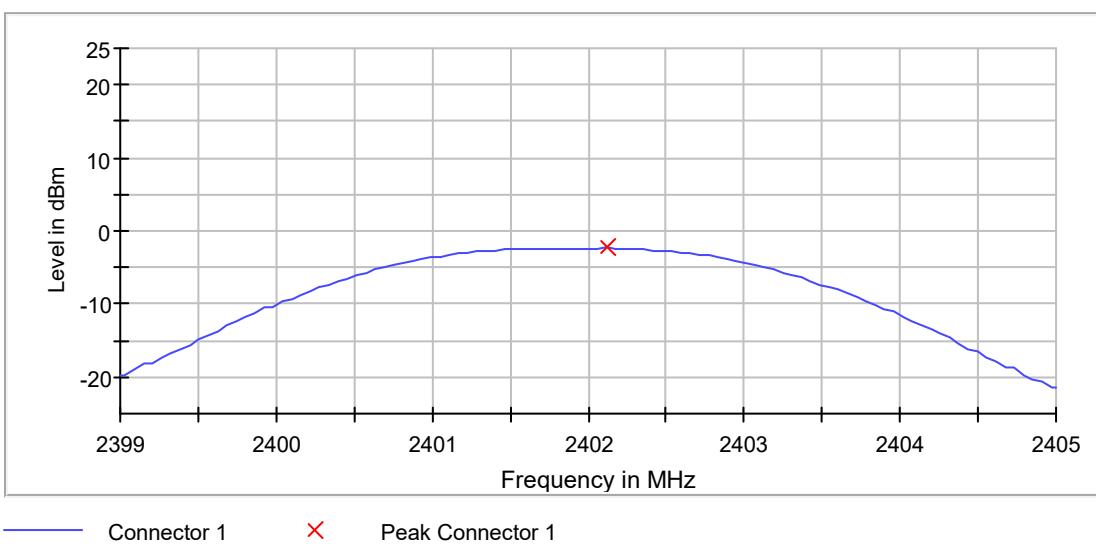
Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1, Mode 2	
Remark	---	

Results

Mode	Channel	Test Frequency (MHz)	Power Output (dBm)	Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)	Result
Mode 1	1	2402	-2,3	≤30	2,7	≤36	Pass
	17	2440	-1,9	≤30	3,1	≤36	Pass
	39	2480	-1,6	≤30	3,4	≤36	Pass
Mode 2	1	2402	-1,7	≤30	3,3	≤36	Pass
	17	2440	-1,9	≤30	3,1	≤36	Pass
	39	2480	-1,6	≤30	3,4	≤36	Pass

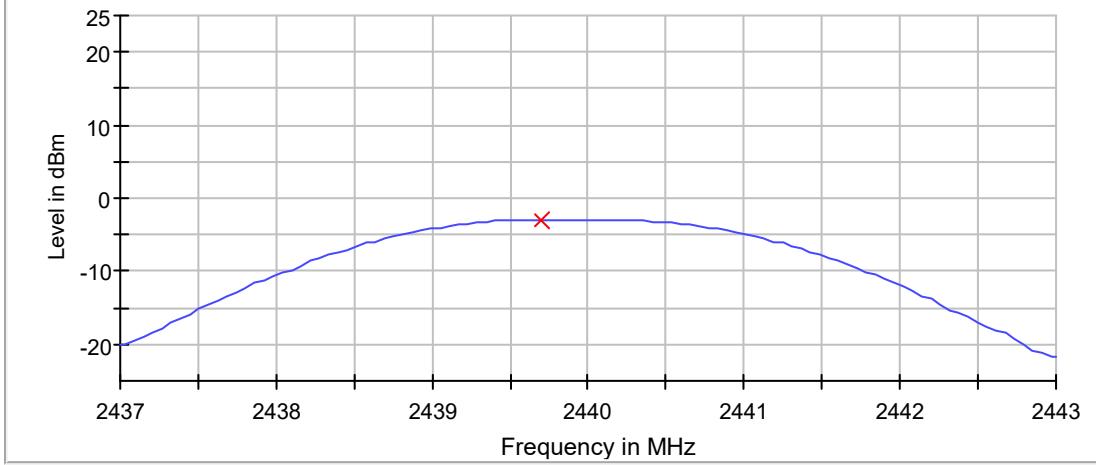
Data of Mode 1

Peak Power



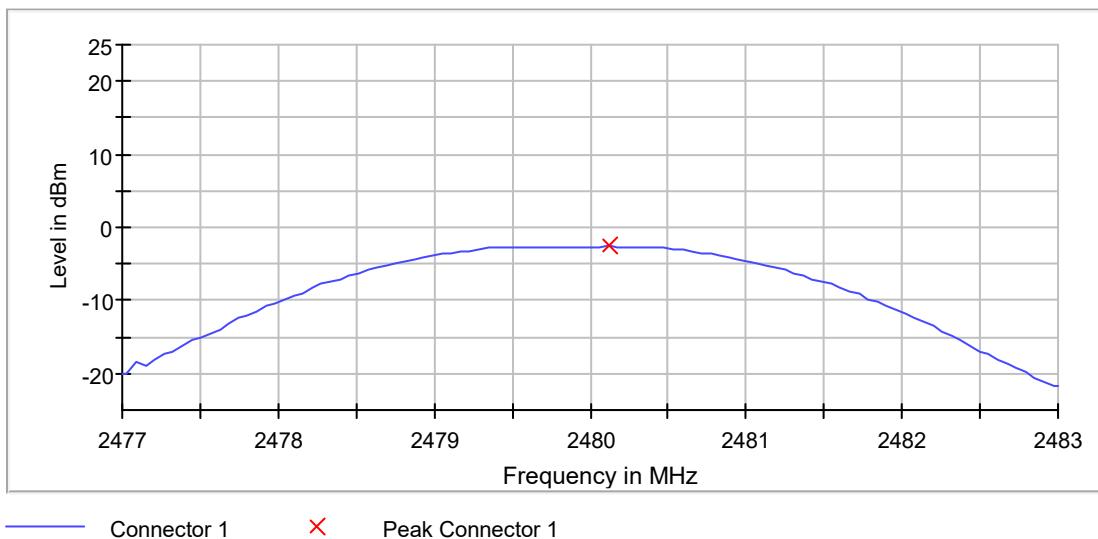
— Connector 1 ✕ Peak Connector 1

Peak Power



— Connector 1 ✕ Peak Connector 1

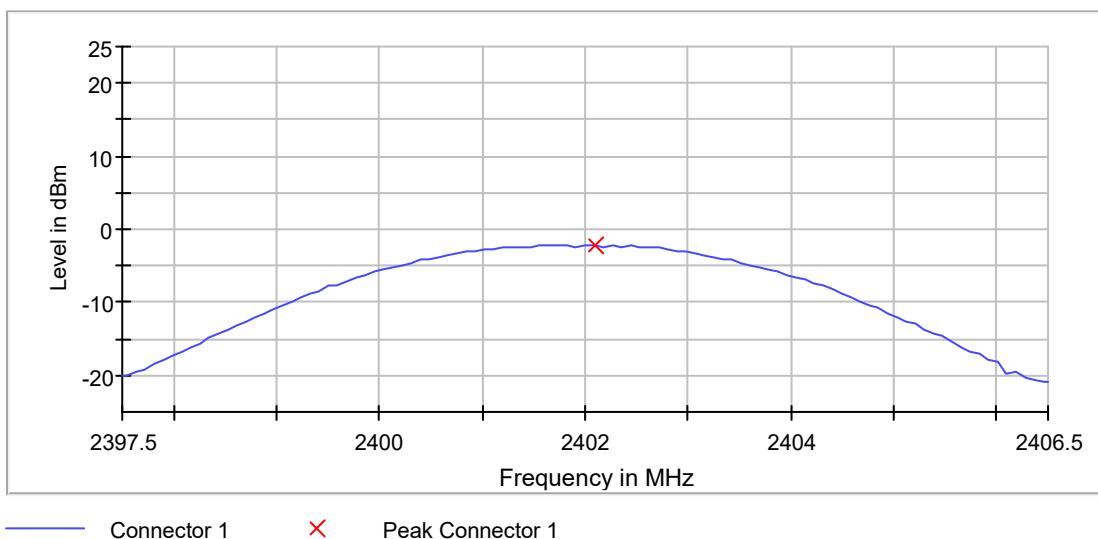
Peak Power



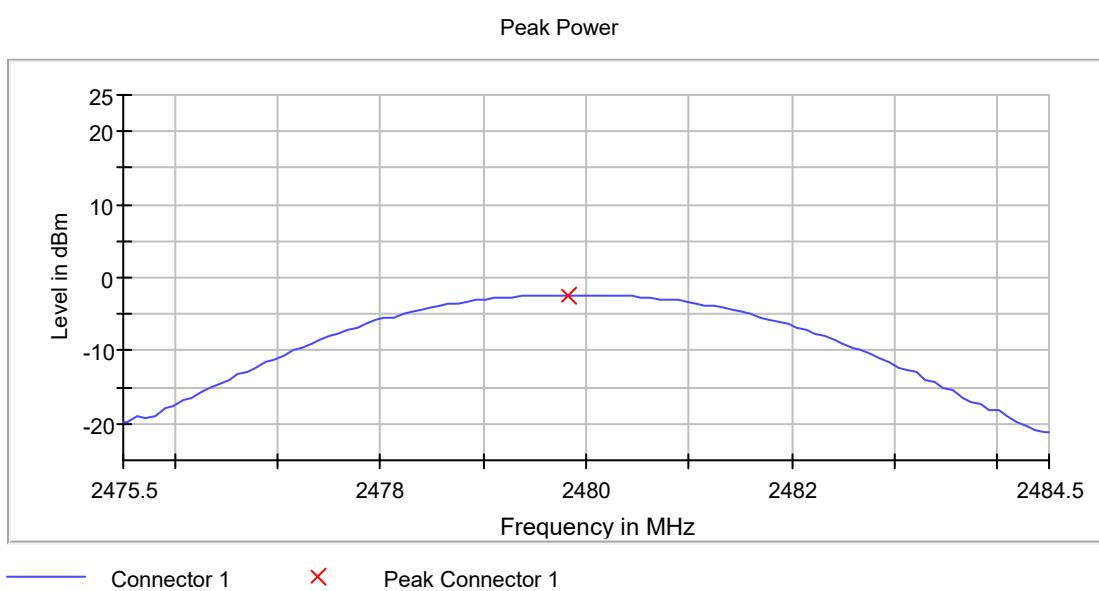
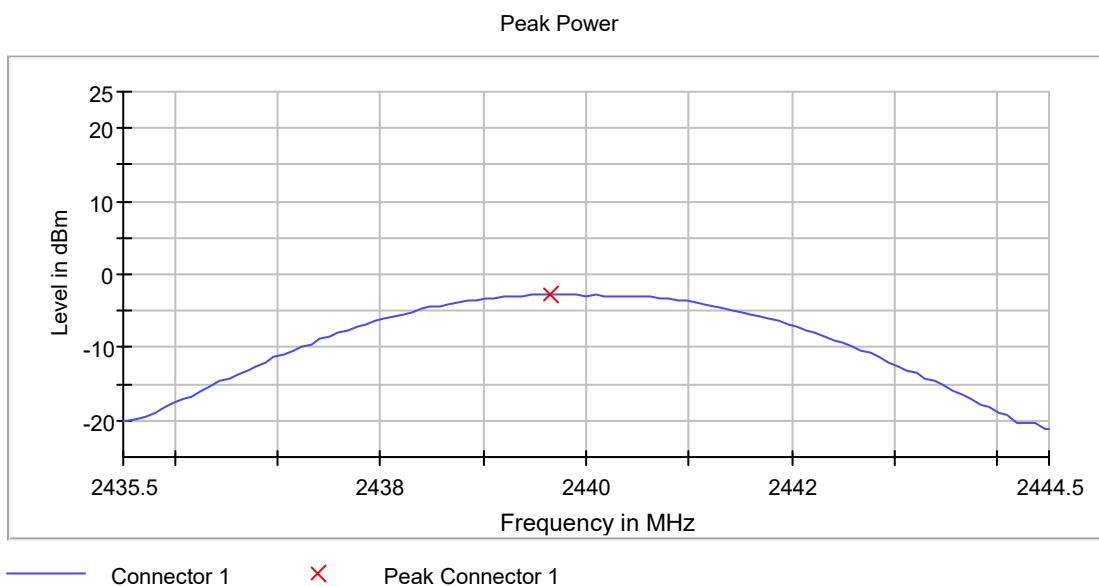
— Connector 1 ✕ Peak Connector 1

Data of Mode 2

Peak Power



— Connector 1 ✕ Peak Connector 1

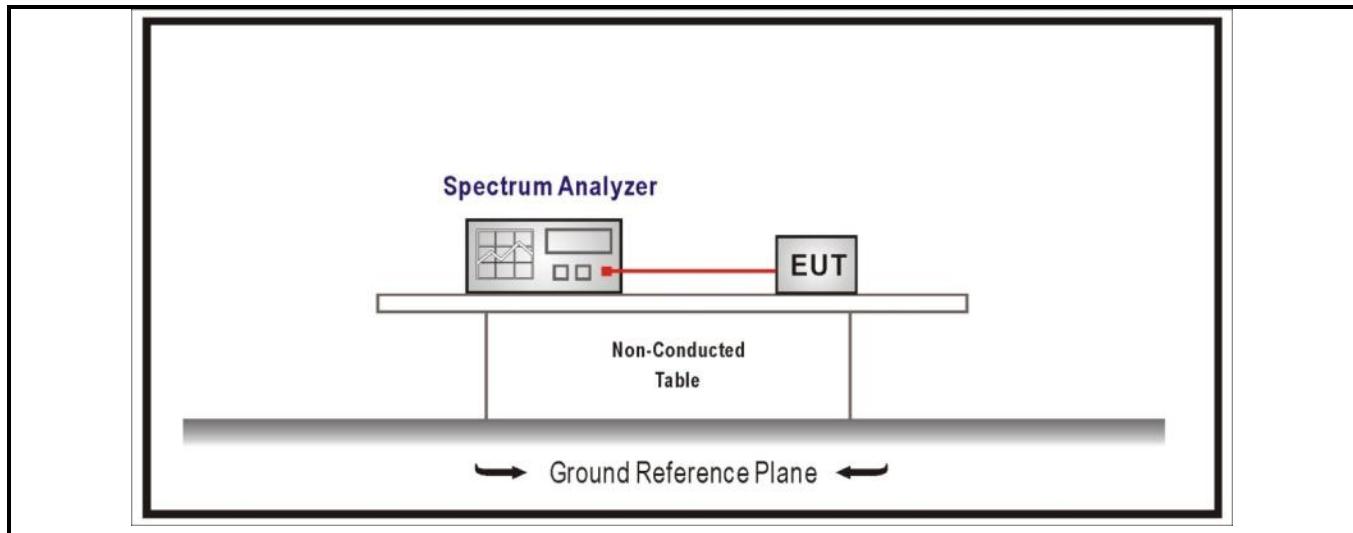


4.8 Power Density

VERDICT: PASS

Standard	FCC Part 15 Subpart C Paragraph 15.247 (b)(3)
Power Spectral Density \leq 8dBm/3kHz	

Test Configuration



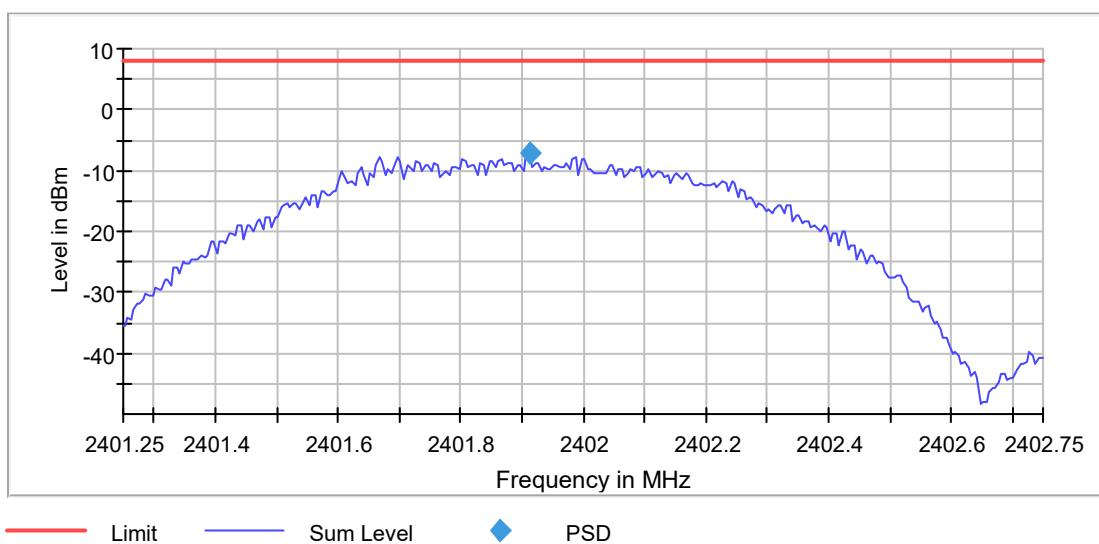
Performed measurements

Port under test	Antenna port	
Test method applied	<input checked="" type="checkbox"/>	Conducted measurement
	<input type="checkbox"/>	Radiated measurement
Test setup	Refer to the Annex 3 for test setup photo(s).	
Operating mode(s) used	Mode 1, Mode 2	
Remark	---	

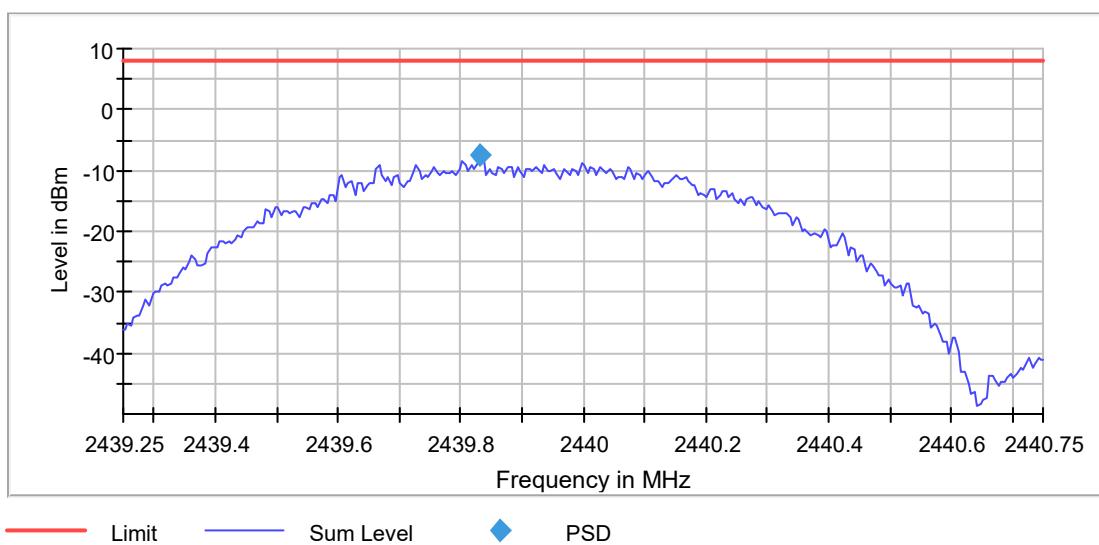
Results

Mode	Channel	Test Frequency (MHz)	Power Output (dBm)	Limit (dBm/3kHz)	Result
Mode 1	1	2402	-7,26	\leq 8	Pass
	17	2440	-7,63	\leq 8	Pass
	39	2480	-7,92	\leq 8	Pass
Mode 2	1	2402	-7,26	\leq 8	Pass
	17	2440	-7,94	\leq 8	Pass
	39	2480	-7,31	\leq 8	Pass

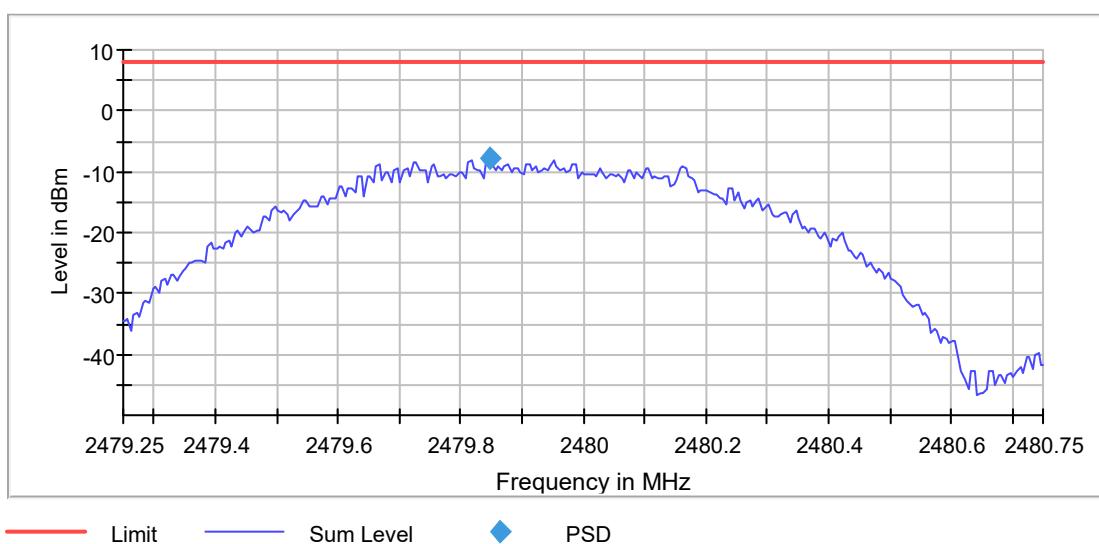
Data of Mode 1
Peak Power Spectral Density



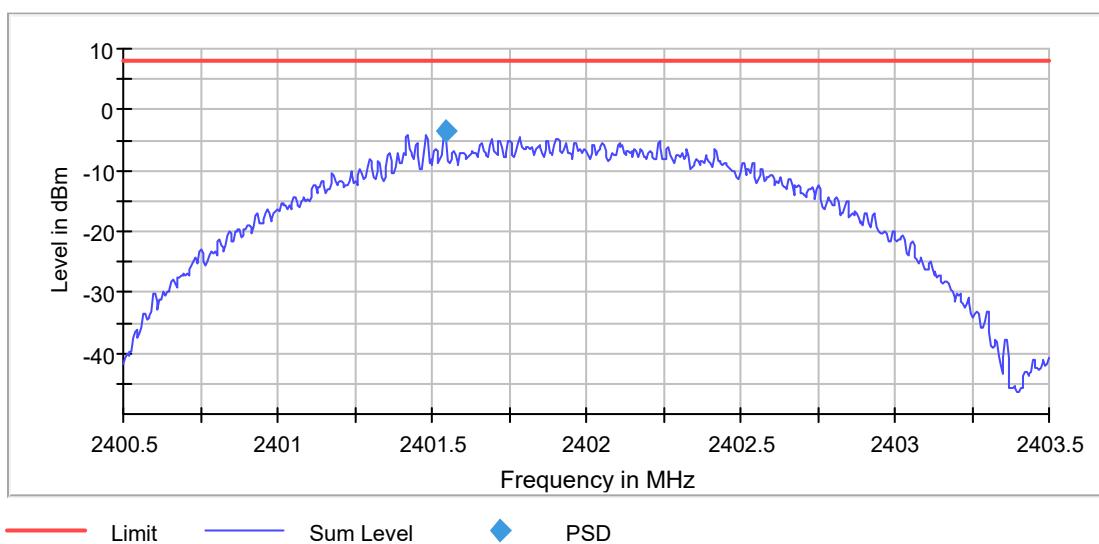
Peak Power Spectral Density



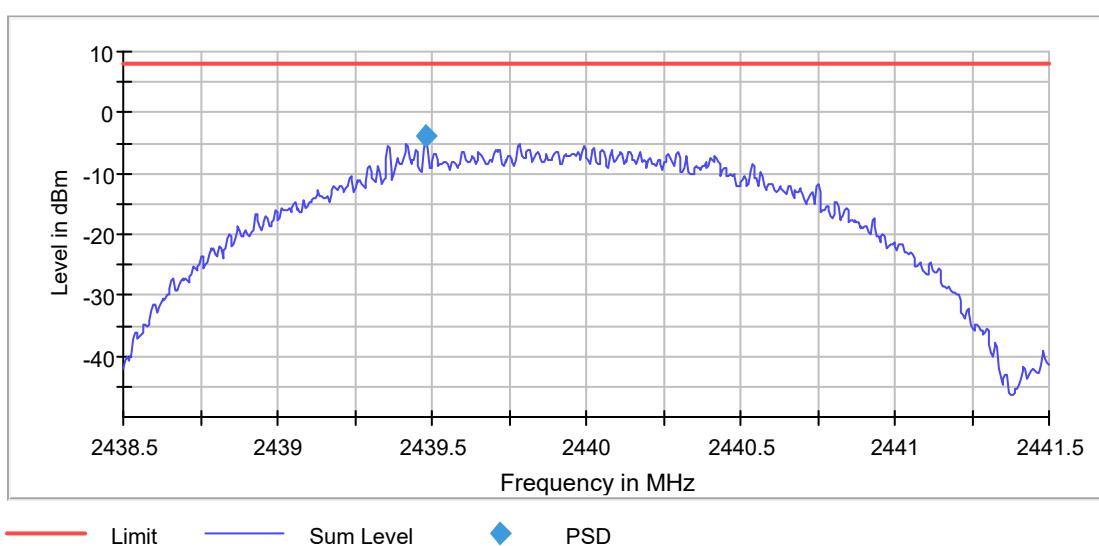
Peak Power Spectral Density



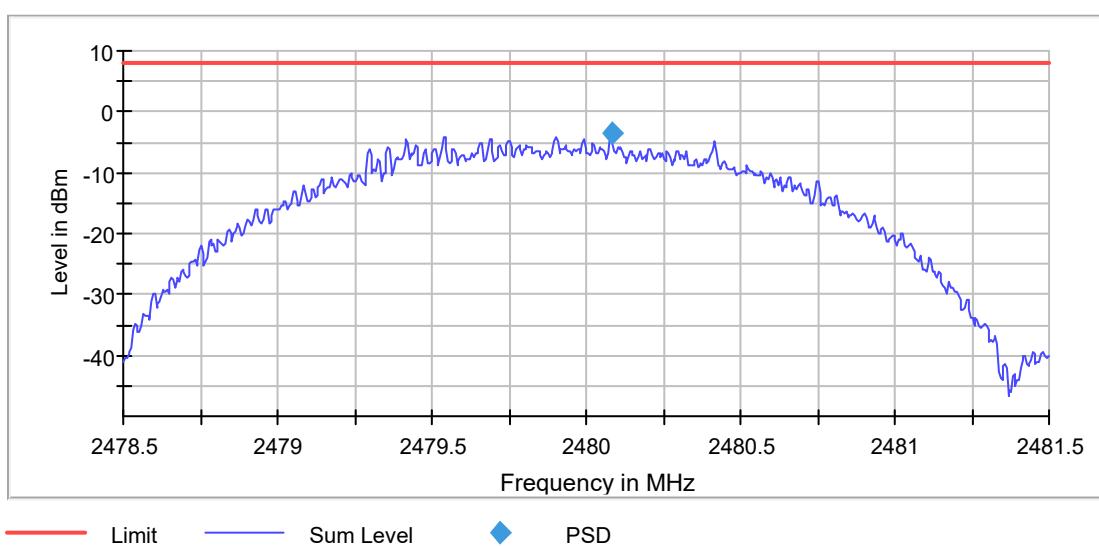
Data of Mode 2
Peak Power Spectral Density



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	±0,7%
RF Output power, conducted	±0,6dB
Power Spectral Density, Conducted	±0,6dB
Unwanted Emissions, Conducted	±0.7dB
Spurious (30-1000MHz)	±4,4dB
Spurious (1-12,75GHz)	±4,4dB

ANNEX 2 - USED EQUIPMENT

Continuous disturbances conducted (150 kHz to 30 MHz)

Item	Instrumentation	Manufacturer	Model No.	Serial No.	DEKRA No.	Cal. Due date
1	EMI Receiver	R&S	ESCI	101206	G/L858	2023/07/21
2	LISN	R&S	ENV216	101336	G/L859	2023/07/21
3	Shielding Room	Changzhou Feite	/	/	G/L861	2023/06/17

Emissions in non-restricted frequency bands/ Emissions in restricted frequency bands

Item	Instrumentation	Manufacturer	Model No.	Serial No.	DEKRA No.	Cal. Due date
1	EMI receiver	R&S	ESCI	101205	G/L857	2023/07/21
2	Antenna (30MHz-3GHz)	SCHWARZBECK	VULB9163	506	G/L864	2022/10/26
3	Chamber	ETS	/	/	G/L856	2024/06/10
4	Antenna (1GHz-18GHz)	R&S	HF907	102306	G/L1236	2023/02/23
5	Horn antenna preamplifier	Schwarzbeek	SCU-18	102234	G/L1236-1	2023/02/21
6	Spectrum analyzer	R&S	FSV	SN101012	G/L1235	2023/01/17
7	HF antenna (18 – 26.5 GHz)	ETS	3160-09	00164643	G/L1237	2023/01/16
8	High frequency antenna preamplifier (18 – 26.5 GHz)	Schwarzbeck	SCU-26	1879064	G/L1237-1	2023/01/10
9	Broadband horn antenna (15 – 40 GHz)	Schwarzbeck	BBHA9170	00908	GZ1901	2023/05/06
10	High frequency antenna preamplifier (18 – 26.5 GHz)	Schwarzbeck	SCU-26	1879064	G/L1237-1	2023/01/10
11	Annular magnetic field antenna	TESEQ	HLA6121	540045	GZ1905	2023/05/12

Duty cycle/Band Edge/Fundamental emission output power/DTS Bandwidth/Power Spectral Density

Item	Instrumentation	Manufacturer	Model	Serial no.	DEKRA No.	Cal Due date
1	Spectrum analyzer	R&S	FSV	SN101012	G/L1235	2023/01/17
2	Chamber	ETS	/	/	G/L856	2024/06/10
3	OSP	R&S	OSP 150	101907	GZ1894	2023/04/27

ANNEX 3 - TEST PHOTOS

Refer to document Test setup.

--- END ---