



FCC - TEST REPORT

Report Number : **68.910.22.0005.01** Date of Issue: 2022-03-10

Model : SensorPod-V

Product Type : SensorPod

Applicant : ACCO Brands, Inc.

Address : 4 Corporate Drive Lake Zurich Illinois United States 60047

Manufacturer : ACCO Brands, Inc.

Address : 4 Corporate Drive Lake Zurich Illinois United States 60047

Test Result : **Positive** **Negative**

Total pages including Appendices : 25

Any use for advertising purposes must be granted in writing. This technical report may only be quoted in full. This report is the result of a single examination of the object in question and is not generally applicable evaluation of the quality of other products in regular production. For further details, please see testing and certification regulation chapter A-3.4.



1 Table of Contents

1 Table of Contents	2
2 Details about the Test Laboratory	3
3 Description of the Equipment Under Test	4
4 Summary of Test Standards	5
5 Summary of Test Results	6
6 General Remarks	7
7 Test setups	8
8 Technical Requirement	9
8.1 Conducted Emission	9
8.2 Field strength of emissions and Restricted bands	12
8.3 Out of Band Emissions	17
8.4 20dB Bandwidth & 99% Occupied Bandwidth	20
9 Test equipment lists	24
10 System Measurement Uncertainty	25



2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13, Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2, Nanshan District,
Shenzhen City, 518052,
P. R. China

FCC Registration Number: 514049

Telephone: 86 755 8828 6998
Fax: 86 755 8828 5299



3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product: SensorPod

Model no: SensorPod-V

FCC ID: GV3-21SP0M2

Options and accessories: NIL

Ratings: 7.5V-12V, 0.5A

Adapter information Model: IVP0900-0500W
 Input: 100-240VAC, 50/60Hz, 0.5A
 Output: 9VDC, 0.5A

RF Transmission Frequency: 2402-2480MHz

Antenna Type: PCB Antenna

Antenna Gain: 2.0dBi

Description of the EUT: The product is a SensorPod that operated at 2.4GHz, The TX and RX range is 2402MHz, 2440MHz, 2480MHz

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	RATINGS	MODEL NO.
---	---	---	---



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2020 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to ANSI C63.10-2013.



5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C 15.249				
Test Condition	Test Site	Test Result		
		Pass	Fail	N/A
15.207 Conducted emission AC power port	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.205(a), §15.209(a), §15.249(a), §15.249(c) & Field strength of emissions and Restricted bands	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.249(d) Out of band emissions	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FCC §15.215(c) 20dB bandwidth & 99% Occupied Bandwidth	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.203 Antenna requirement	See note 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark 1: N/A- Not Applicable;

Note 1: The EUT used an integral PCB antenna, which gain is 2.0dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.



6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: GV3-21SP0M2 complies with Section 15.207, 15.205, 15.209, 15.249 of the FCC Part 15, Subpart C Rules;

SUMMARY:

All tests according to the regulations cited on page 5 were

n - Performed

o - **Not** Performed

The Equipment Under Test

n - **Fulfills** the general approval requirements.

o - **Does not** fulfill the general approval requirements.

Sample Received Date: 2021-12-15

Testing Start Date: 2021-12-15

Testing End Date: 2022-03-08

- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch -

Reviewed by:

Prepared by:

Tested by:

John Zhi
Project Manager

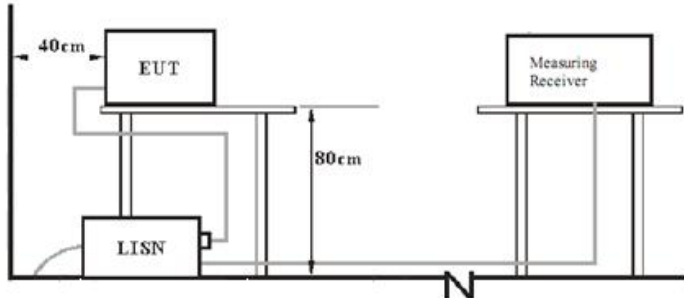
Mark Chen
Project Engineer



Carry Cai
Test Engineer

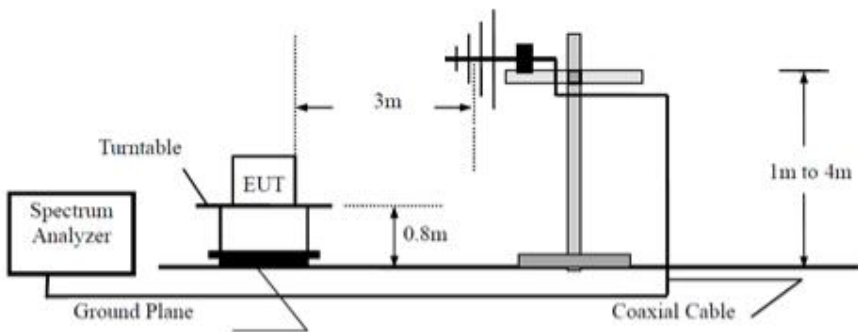
7 Test setups

7.1 AC Power Line Conducted Emission test setups

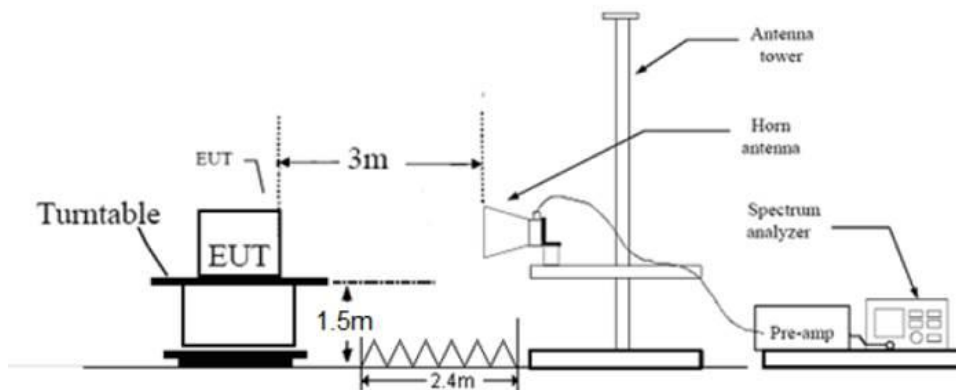


7.2 Radiated test setups

Below 1GHz



Above 1GHz



8 Technical Requirement

8.1 Conducted Emission

Test Method

1. The EUT was placed on a table, which is 0.8m above ground plane
2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3. Maximum procedure was performed to ensure EUT compliance
4. A EMI test receiver is used to test the emissions from both sides of AC line

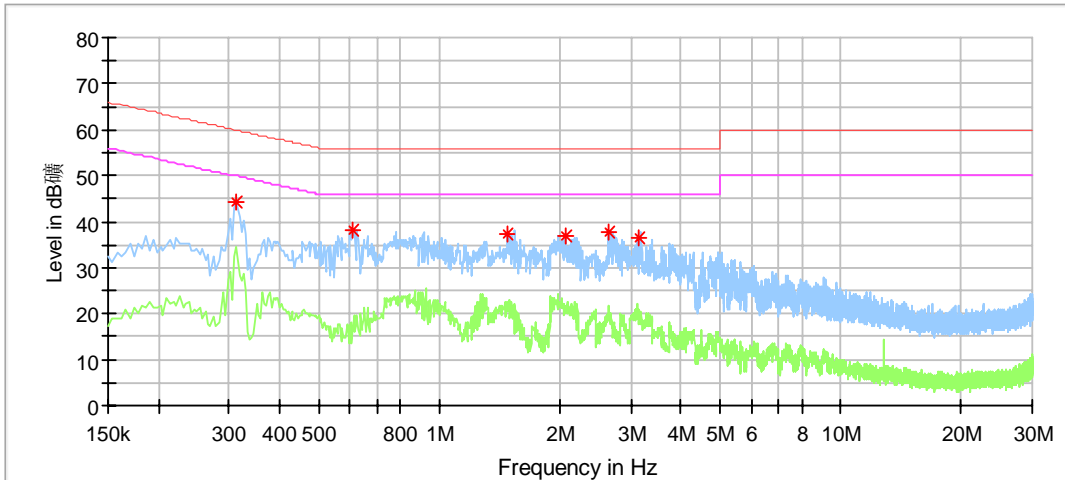
Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreasing linearly with logarithm of the frequency.

Conducted Emission

Product Type : SensorPod
 M/N : SensorPod-V
 Operating Condition : Normal working with transmitting
 Test specification : Live
 Comment : AC 120V/60Hz



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB/m)
0.314000	44.33	---	59.86	15.54	L1	9.22
0.610000	38.30	---	56.00	17.70	L1	9.20
1.478000	37.43	---	56.00	18.57	L1	9.22
2.054000	37.12	---	56.00	18.88	L1	9.23
2.654000	37.92	---	56.00	18.08	L1	9.25
3.158000	36.51	---	56.00	19.49	L1	9.26

Remark:

Level=Reading Level + Correction Factor

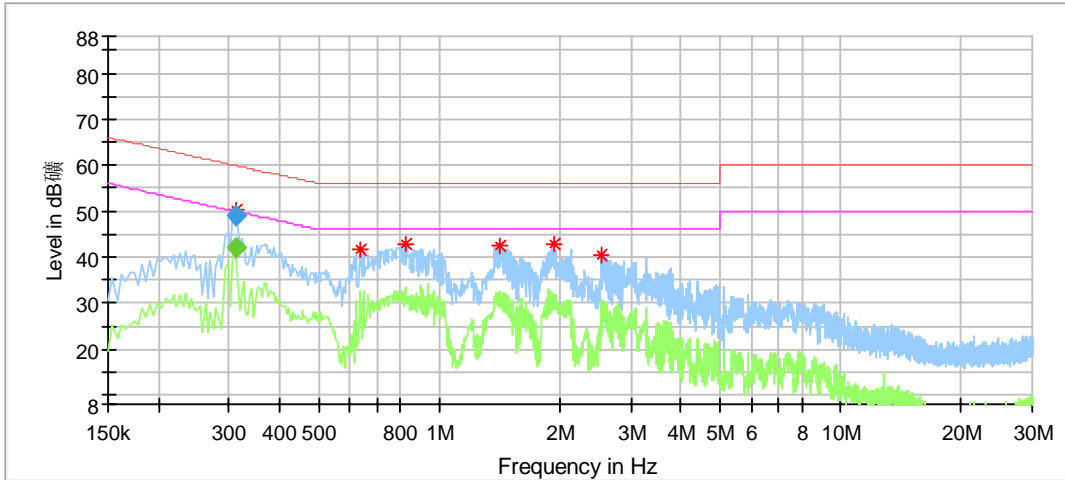
Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)



Conducted Emission

Product Type : SensorPod
 M/N : SensorPod-V
 Operating Condition : Normal working with transmitting
 Test specification : Neutral
 Comment : AC 120V/60Hz



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB/m)
0.313500	50.07	---	59.97	9.90	N	9.39
0.634000	41.69	---	56.00	14.31	N	9.39
0.822000	42.82	---	56.00	13.18	N	9.39
1.418000	42.50	---	56.00	13.50	N	9.41
1.934000	42.67	---	56.00	13.33	N	9.41
2.542000	40.50	---	56.00	15.50	N	9.44

Remark:

Level=Reading Level + Correction Factor

Correction Factor=Cable Loss + LISN Factor

(The Reading Level is recorded by software which is not shown in the sheet)

8.2 Field strength of emissions and Restricted bands

Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3-meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- 5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 1MHz, VBW \geq RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 KHz, VBW \geq RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log (1/duty cycle)).
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.



Field strength of emissions and Restricted bands

Limits

According to §15.249 (a) the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

According to §15.249 (c), Field strength limits are specified at a distance of 3 meters. According to §15.249 (d), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Field strength of emissions and Restricted bands

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Fundamental test result as below:

Low channel 2402MHz Test Result

Radiated Emission							
Value	Emissions Frequency MHz	E-Field Polarity	Reading Level dB μ V/m	Limit dB μ V/m	Margin dBm	Correct factor (dB/m)	Result
PK	2402	H	81.86	114.00	32.14	-3.14	Pass
AV	2402	H	81.86	94.00	12.14	-3.14	Pass
PK	2402	V	79.55	114.00	34.45	-3.14	Pass
AV	2402	V	79.55	94.00	14.45	-3.14	Pass

Middle channel 2440MHz Test Result

Radiated Emission							
Value	Emissions Frequency MHz	E-Field Polarity	Reading Level dB μ V/m	Limit dB μ V/m	Margin dBm	Correct factor (dB/m)	Result
PK	2440	H	80.40	114.00	33.60	-3.01	Pass
AV	2440	H	80.40	94.00	13.60	-3.01	Pass
PK	2440	V	82.09	114.00	31.91	-3.01	Pass
AV	2440	V	82.09	94.00	11.91	-3.01	Pass

High channel 2480MHz Test Result

Radiated Emission							
Value	Emissions Frequency MHz	E-Field Polarity	Reading Level dB μ V/m	Limit dB μ V/m	Margin dBm	Correct factor (dB/m)	Result
PK	2480	H	81.93	114.00	32.07	-2.76	Pass
AV	2480	H	81.93	94.00	12.07	-2.76	Pass
PK	2480	V	82.03	114.00	31.97	-2.76	Pass
AV	2480	V	82.03	94.00	11.97	-2.76	Pass

Transmitting spurious emission test result as below:
Low channel 2402MHz Test Result

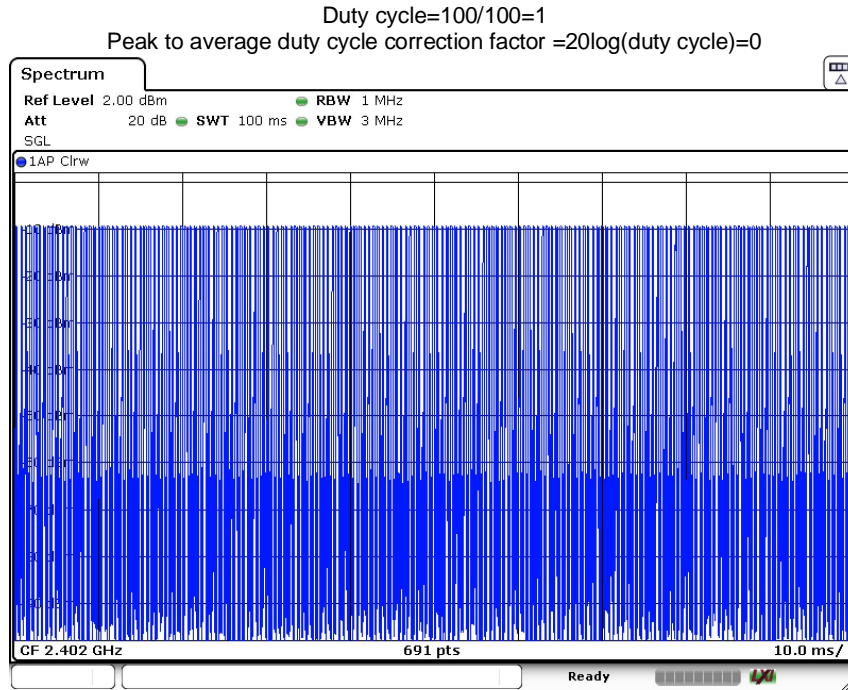
Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor (dB/m)	Result
	MHz	dB μ V/m		dB μ V/m		dB μ V/m		
30-1000MHz	738.53	34.59	H	46	QP	11.41	29.55	Pass
	41.91	31.74	V	40	QP	3.10	20.15	Pass
1000-25000MHz	1817.62	40.74	H	74	PK	33.26	-5.89	Pass
	--	--	H	54	AV	--	--	Pass
	1900	42.09	V	74	PK	31.91	-4.93	Pass
	--	--	V	54	AV	--	--	Pass

Middle channel 2440MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor (dB/m)	Result
	MHz	dB μ V/m		dB μ V/m		dB μ V/m		
30-1000MHz	--	--	H	43.5	QP	--	--	Pass
	--	--	H	46	QP	--	--	Pass
1000-25000MHz	9853	43.49	H	74	PK	30.51	11.69	Pass
	--	--	H	54	AV	--	--	Pass
	9820	43.58	V	74	PK	30.42	11.13	Pass
	--	--	V	54	AV	--	--	Pass

High channel 2480MHz Test Result

Frequency Band	Frequency	Emission Level	Polarization	Limit	Detector	Margin	Correct factor (dB/m)	Result
	MHz	dB μ V/m		dB μ V/m		dB μ V/m		
30-1000MHz	--	--	H	43.5	QP	--	--	Pass
	--	--	H	46	QP	--	--	Pass
1000-25000MHz	2837.62	47.05	H	74	PK	26.95	-2.14	Pass
	--	--	H	54	AV	--	--	Pass
	2837.14	47.45	V	74	PK	26.55	-2.14	Pass
	--	--	V	54	AV	--	--	Pass



Date: 8.MAR.2022 16:13:31

Remark:

- (1) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.
- (2) Corrected Amplitude= Read level + Corrector factor
 Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Pre-amplifier
 Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
 (The Reading Level is recorded by software which is not shown in the sheet)
- (3) AV Emission = Average Reading Level + Correction Factor (for duty cycle≥98%)



8.3 Out of Band Emissions

Test Method

- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold.
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section.

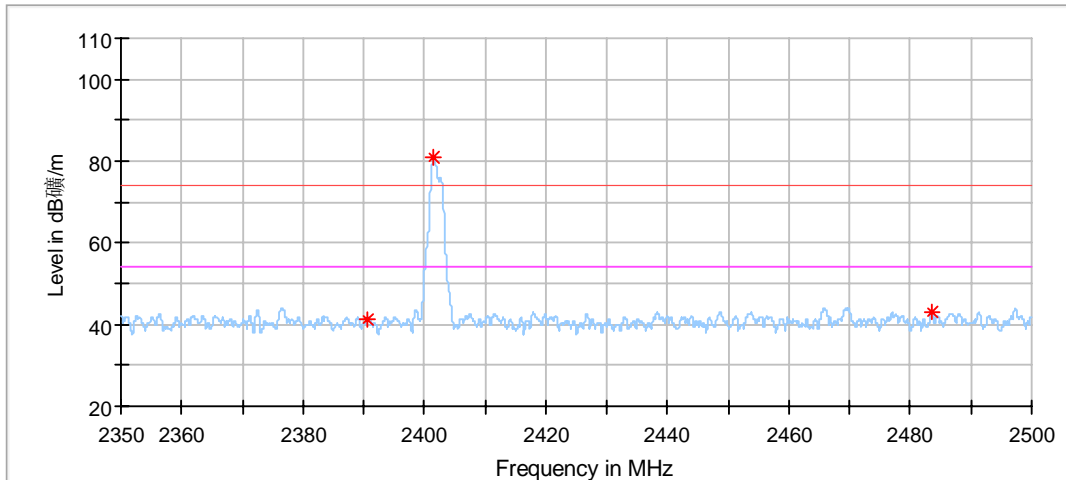
Limits

According to §15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.



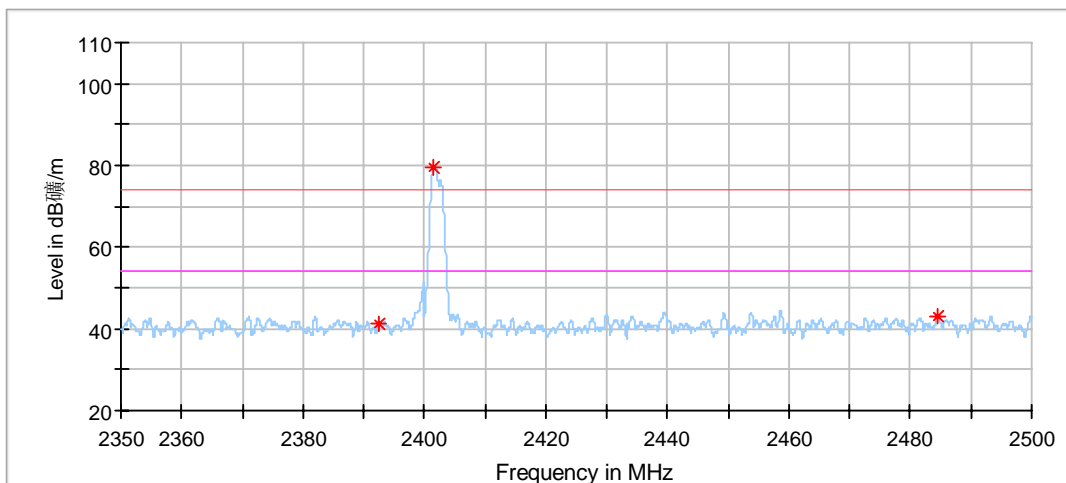
Out of Band Emissions

2402MHz



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2390.571429	41.17	74.00	32.83	150.0	H	189.0	-3.12
2401.571429	81.02	74.00	-7.02	150.0	H	48.0	-3.14
2483.428571	43.28	74.00	30.72	150.0	H	130.0	-2.76

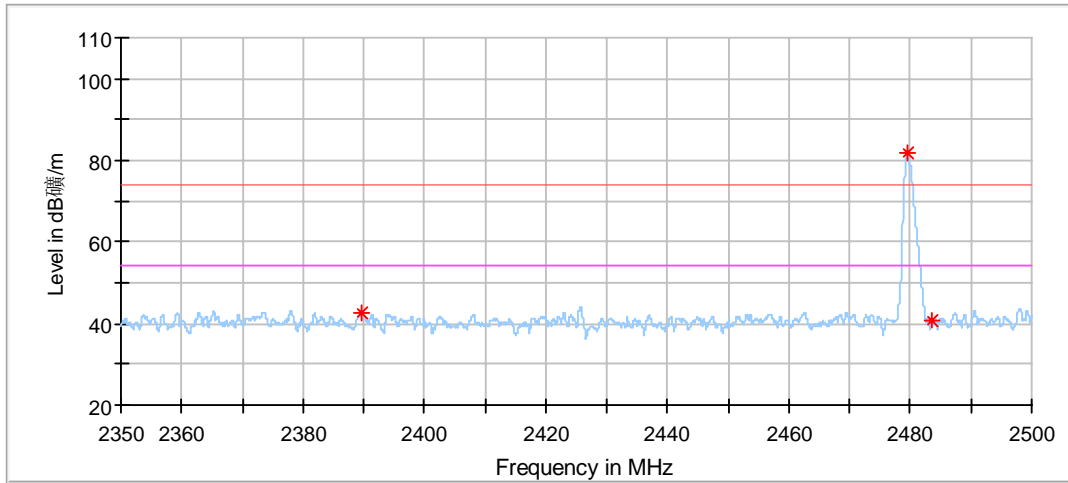


Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2392.571429	41.18	74.00	32.82	150.0	V	75.0	-3.12
2401.571429	79.39	74.00	-5.39	150.0	V	104.0	-3.14
2484.357143	42.96	74.00	31.04	150.0	V	60.0	-2.76

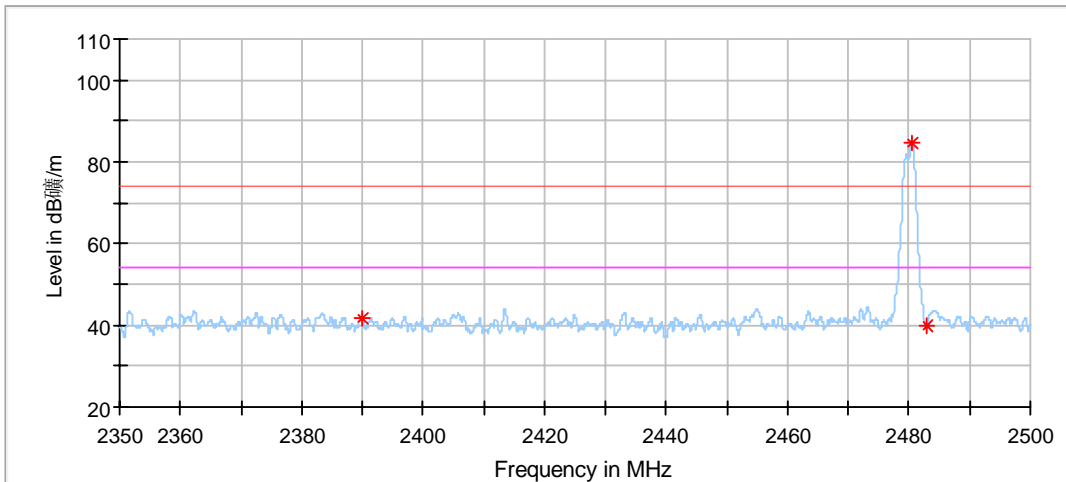


2480MHz



Critical Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2389.750000	42.65	74.00	31.35	150.0	H	340.0	-3.12
2479.571429	81.81	74.00	-7.81	150.0	H	182.0	-2.76
2483.428571	40.97	74.00	33.03	150.0	H	303.0	-2.76



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2390.000000	41.85	74.00	32.15	150.0	V	289.0	-3.12
2480.428571	84.71	74.00	-10.71	150.0	V	281.0	-2.76
2483.000000	39.94	74.00	34.06	150.0	V	151.0	-2.76

8.4 20dB Bandwidth & 99% Occupied Bandwidth

Test Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to spectrum analyser. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.

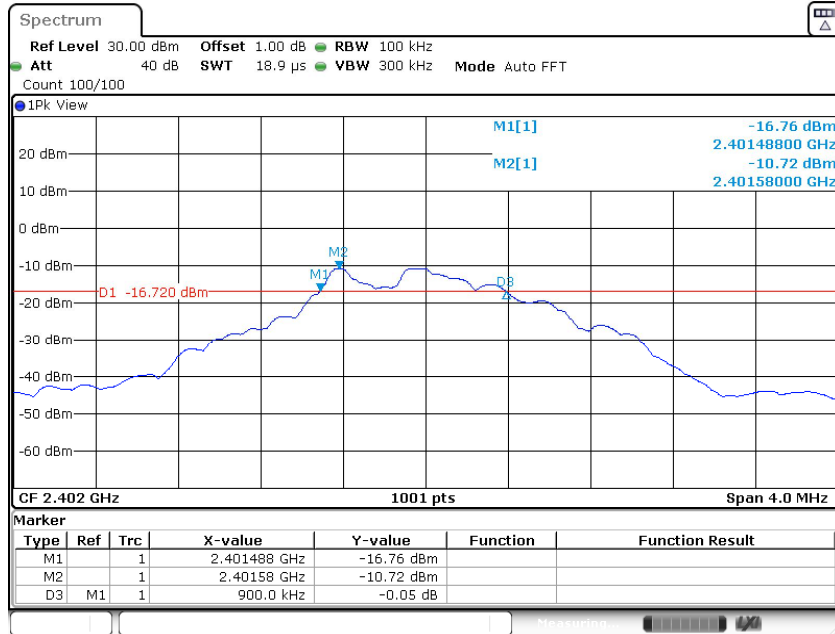
Limits:

According to 15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.



20dB Bandwidth & 99% Occupied Bandwidth

Frequency	20dB Bandwidth	99% Bandwidth	Limit
MHz	MHz	MHz	MHz
2402	0.9	1.734	--



Date: 14.FEB.2022 10:23:56



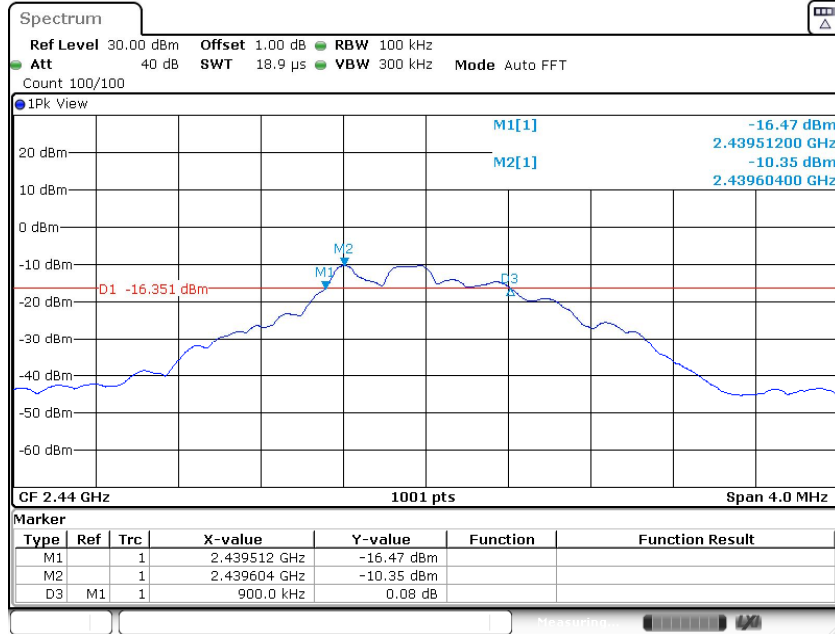
Date: 14.FEB.2022 10:24:07

2405MHz

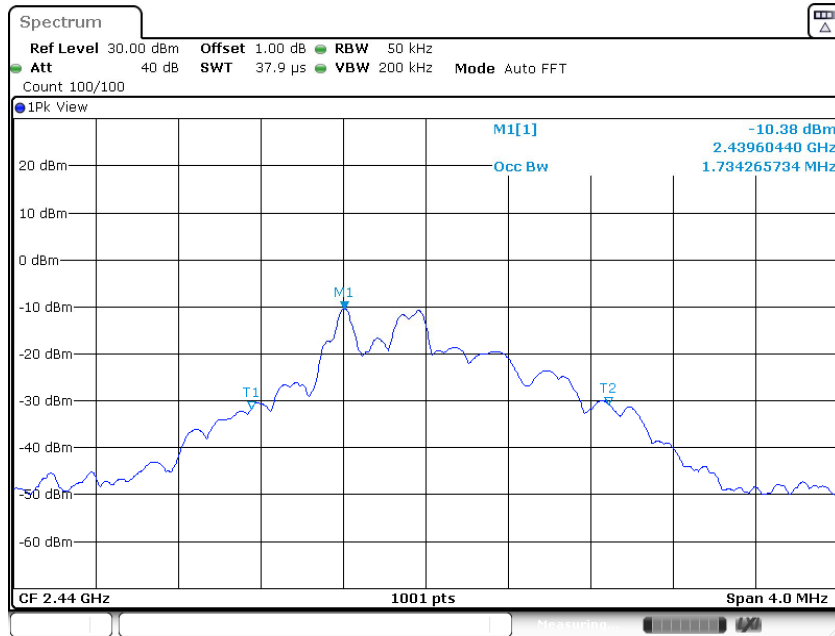


20dB Bandwidth & 99% Occupied Bandwidth

Frequency	20dB Bandwidth	99% Bandwidth	Limit
MHz	MHz	MHz	MHz
2440	0.9	1.734	--



Date: 14.FEB.2022 10:26:35



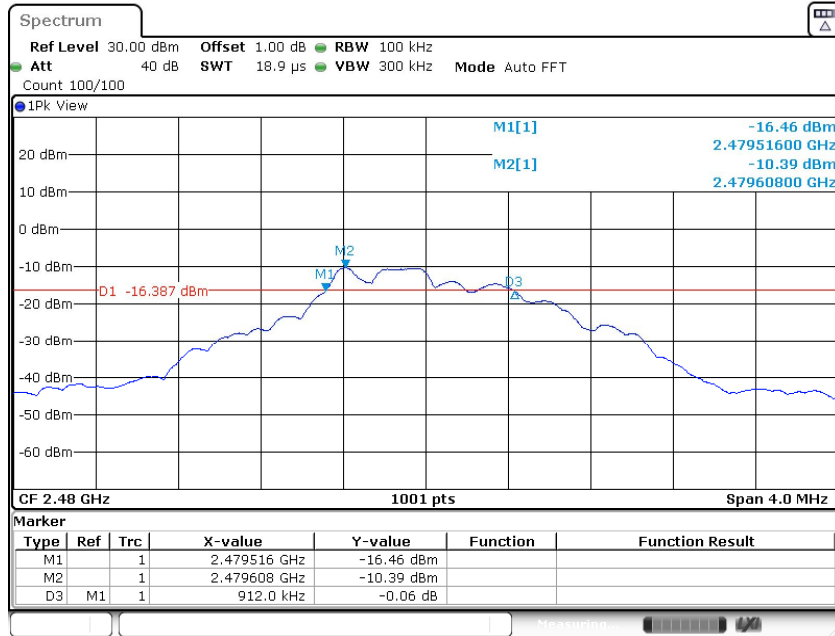
Date: 14.FEB.2022 10:26:46

2440MHz



20dB Bandwidth & 99% Occupied Bandwidth

Frequency	20dB Bandwidth	99% Bandwidth	Limit
MHz	MHz	MHz	MHz
2480	0.9	1.738	--



Date: 14.FEB.2022 10:29:33



Date: 14.FEB.2022 10:29:43

2480MHz



9 Test equipment lists

Conducted Emission 2# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-19-002	102590	1	2022-6-4
LISN	Rohde & Schwarz	ENV216	68-4-87-19-001	102472	1	2022-6-5
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	1	2022-6-3
Test software	Rohde & Schwarz	EMC32	68-4-90-19-005-A01	Version10.35.02	N/A	N/A
Shielding Room	TDK	CSR #2	68-4-90-19-005	----	3	2022-11-07

Radiated Emission Test 1# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 7	68-4-74-19-001	102176	1	2022-6-4
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	68-4-80-14-002	707	1	2022-7-23
Pre-amplifier	Rohde & Schwarz	SCU 18	68-4-29-14-001	102230	1	2022-6-6
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-001	15542	1	2022-8-23
3m Semi-anechoic chamber	TDK	SAC-3 #1	68-4-90-14-001	----	2	2023-5-28
Test software	Rohde & Schwarz	EMC32	68-4-90-14-001-A10	Version10.35.02	N/A	N/A

Radiated Emission 2# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	1	2022-6-4
Wave Guide Antenna	ETS	3117	68-4-80-19-001	00218954	1	2022-5-24
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	100745	1	2022-10-10
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-002	100746	1	2022-10-10
Sideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	1	2022-7-21
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	1	2022-7-27
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-002	15542	1	2022-8-23
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	2	2023-5-28
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.35.02	N/A	N/A



10 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432 or ENV4200)	3.64dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.63dB; Vertical: 4.61dB;
Uncertainty for Radiated Spurious Emission 1000MHz-3000MHz	Horizontal: 4.81dB; Vertical: 4.89dB;
Uncertainty for Radiated Spurious Emission 3000MHz-18000MHz	Horizontal: 4.65dB; Vertical: 4.63dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	Horizontal: 4.51dB; Vertical: 4.50dB;