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# TEST REPORT

N°: 20570161-795244-A

Version: 02

<b>Subject</b>	<b>Electromagnetic compatibility tests according to the standards: FCC CFR 47 Part 15, Subpart C ANSI C63.4 RSS-210 Issue 10</b>
<b>Issued to</b>	<b>ASTEELFLASH FRANCE 43 Chemin du vieux chene 38240 – MEYLAN France</b>
<b>Apparatus under test</b>	<b>AVALANCHE BEACON ARVA ASTEELFLASH EVO BT RF SIMPLE O9BARVAEVOBT 22008-ARVAEVOBT</b>
<b>Conclusion</b>	See Test Program chapter §1
<b>Test date</b>	November 22, 2023 to November 24, 2023
<b>Test location</b>	MOIRANS
<b>FCC Test site</b>	FR0008 - 918017
<b>ISED Test site</b>	FR0008 - 6500A
<b>Sample receipt date</b>	November 22, 2023
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**Written by :**  
Majid MOURZAGH  
**Tests operator**

**Approved by :**  
Anthony MERLIN  
**Technical manager**



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**LCIE**

Laboratoire Central des Industries Electriques  
Une société de Bureau Veritas

ZI Centr'alp  
170 rue de Chatagnon  
38430 Moirans FRANCE

Tél : +33 4 76 07 36 36  
[contact@lcie.fr](mailto:contact@lcie.fr)  
[www.lcie.fr](http://www.lcie.fr)



## PUBLICATION HISTORY

Version	Date	Author	Modification
01	January 19 , 2024		Creation of the document
02	February 2, 2024	Majid MOURZAGH	Correction FCC Test Site page 1 Add Scan missed on §3.6.5

*Each new edition of this test report replaces and cancels the previous edition. The control of the old editions of report is under responsibility of client.*



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# 1. TEST PROGRAM

**Standard:**

- FCC Part 15, Subpart C
- ANSI C63.10 (2013)
- RSS-210 Issue 10
- RSS-Gen Issue 5

EMISSION TEST	LIMITS			RESULTS (Comments)
<b>Limits for conducted disturbance at mains ports</b> 150kHz-30MHz <i>CFR 47 §15.207</i>	<b>Frequency</b>	<b>Quasi-peak value (dBµV)</b>	<b>Average value (dBµV)</b>	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL <input checked="" type="checkbox"/> NA <input type="checkbox"/> NP
	150-500kHz	66 to 56	56 to 46	
	0.5-5MHz	56	46	
	5-30MHz	60	50	
<b>Radiated emissions</b> 9kHz-30MHz <i>CFR 47 §15.209 (a)</i> <i>CFR 47 §15.225</i> <i>RSS-Gen §4.9</i>	<b>Measure at 300m</b> 9kHz-490kHz : 67.6dBµV/m /F(kHz) <b>Measure at 30m</b> 490kHz-1.705MHz : 87.6dBµV/m /F(kHz) 1.705MHz-30MHz : 29.5 dBµV/m			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
<b>Radiated emissions</b> 30MHz-25GHz* <i>CFR 47 §15.209 (a)</i> <i>CFR 47 §15.225</i> <i>RSS-Gen §4.9</i> <i>Highest frequency :</i> <i>(Declaration of provider)</i>	<b>Measure at 3m</b> 30MHz-88MHz : 40 dBµV/m 88MHz-216MHz : 43.5 dBµV/m 216MHz-960MHz : 46.0 dBµV/m Above 960MHz : 54.0 dBµV/m			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
<b>Fundamental field strength limit</b> <i>CFR 47 §15.225</i> <i>RSS-210</i>	<b>Operation within the band</b> 456.9-457.1kHz			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
<b>Fundamental frequency tolerance</b> <i>CFR 47 §15.225</i> <i>RSS-210</i>	<b>Operation within the band</b> 456.9-457.1kHz			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
<b>Occupied bandwidth</b> <i>RSS-Gen Issue 5 §6.7</i>	<b>No limit</b>			<input type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP
<b>Receiver Spurious Emission**</b> <i>RSS-Gen Issue 5 §7.3</i>	<b>See RSS-Gen §7.3</b> 30MHz-88MHz : 40 dBµV/m 88MHz-216MHz : 43.5 dBµV/m 216MHz-960MHz : 46.0 dBµV/m Above 960MHz : 54.0 dBµV/m			<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP

\*§15.33: The highest internal source of a testing device is defined like more the highest frequency generated or used in the testing device or on which the testing device works or agrees.

- If the highest frequency of the internal sources of the testing device is lower than 108 MHz, measurement must be only performed until 1GHz.

- If the highest frequency of the internal sources of the testing device ranges between 108 MHz and 500 MHz, measurement must be only performed until 2GHz.

- If the highest frequency of the internal sources of the testing device ranges between 500 MHz and 1 GHz, measurement must be only performed until 5GHz.

If the highest frequency of the internal sources of the testing device is above 1 GHz, measurement must be only performed until 5 times the highest frequency or 40 GHz, while taking smallest of both.

\*\*Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

## 2. SYSTEM TEST CONFIGURATION

### 2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

#### Equipment under test (EUT):

**EVO BT**

**Serial Number: RF SIMPLE**



#### Power supply:

During all the tests, EUT is supplied by Vnom: 4.5 VDC

For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	<input type="checkbox"/> AC <input type="checkbox"/> DC <input checked="" type="checkbox"/> Battery	3*1.5 VDC		

#### Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
No input or output						



**Equipment information (declaration of provider):**

EQUIPMENT INFORMATION				
RF module:	Not communicated			
Frequency Carrier:	[457 kHz]			
Sub-band REC7003:	ANNEX 2 – Band a2 [456.9-457.1kHz]			
RF mode:	<input checked="" type="checkbox"/> Transmitter	<input type="checkbox"/> Transceiver	<input checked="" type="checkbox"/> Receiver	<input type="checkbox"/> Standby
Antenna type:	<input type="checkbox"/> External:		<input checked="" type="checkbox"/> Internal:	
Antenna gain:	Not communicated			
Equipment location	<input checked="" type="checkbox"/> Mobile station		<input type="checkbox"/> Fixed station	
Extreme temperature range:	<input type="checkbox"/> Category (General): -20°C to +50°C		<input checked="" type="checkbox"/> other*: From -30 to 55°C	
Extreme test source voltage:	<input type="checkbox"/> ±15%:	<input checked="" type="checkbox"/> other*: From 4.05VDC to 4.95VDC		
Rmq: *ask from provider				

**2.2. EUT CONFIGURATION**

A special configuration of the EUT permits:

- Permanent emission of the carrier frequency with modulation
- Permanent RX mode

Inboard Firmware / Software version of EUT: V. 1.4.0

**2.3. EQUIPMENT MODIFICATIONS**

- None       Modification:

**2.4. FIELD STRENGTH CALCULATION**

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follow:

$$FS = RA + AF + CF - AG$$

Where      FS = Field Strength  
              RA = Receiver Amplitude  
              AF = Antenna Factor  
              CF = Cable Factor  
              AG = Amplifier Gain

Assume a receiver reading of 52.5dBµV is obtained. The antenna factor of 7.4 and a cable factor of 1.1 are added. The amplifier gain of 29dB is subtracted, giving a field strength of 32 dBµV/m.

$$FS = 52.5 + 7.4 + 1.1 - 29 = 32 \text{ dB}\mu\text{V/m}$$

The 32 dBµV/m value can be mathematically converted to its corresponding level in µV/m.

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(32\text{dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m.}$$

**2.5. CALIBRATION DATE**

The calibration intervals are extended at 12+2 months. This extended interval is based on the fact that there is sufficient calibration data to statistically establish a trend or based on experience of use of the test equipment to assure good measurement results for a longer period



### 3. RADIATED EMISSION DATA (15.209)

#### 3.1. ENVIRONMENTAL CONDITIONS

Test performed by : Majid MOURZAGH  
 Date of test : November 22, 2023  
 Ambient temperature : 23 °C  
 Relative humidity : 35 %

#### 3.2. TEST SETUP

The installation of EUT is identical for pre-characterization measures in a 3 meters semi- anechoic chamber and for measures on the 10 meters Open site.

The EUT and auxiliaries are set:

- 80cm above the ground on the non-conducting table (Table-top equipment) - Below 1GHz
- 10cm above the ground on isolating support (Floor standing equipment)

The EUT is powered by  $V_{nom}$ .



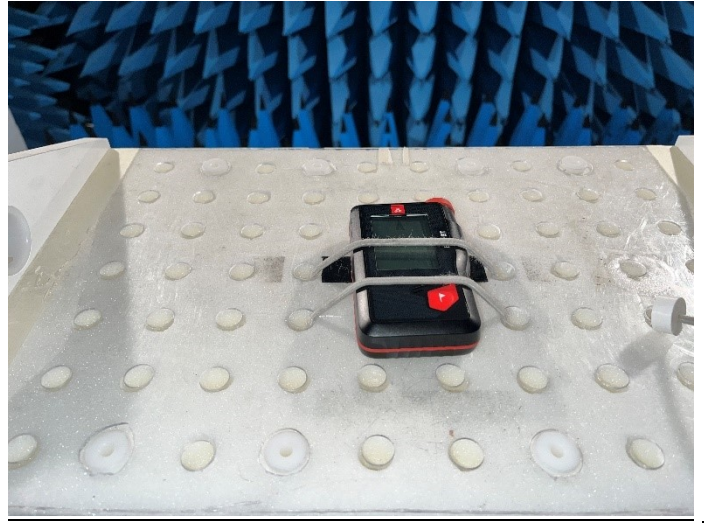
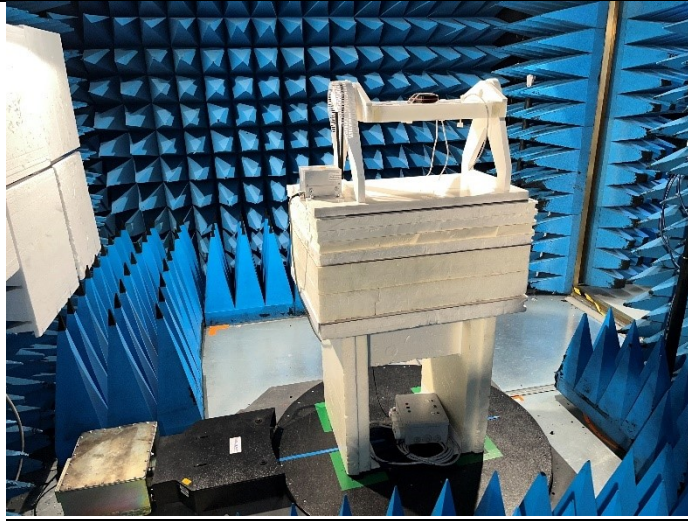
Axis XY on OATS



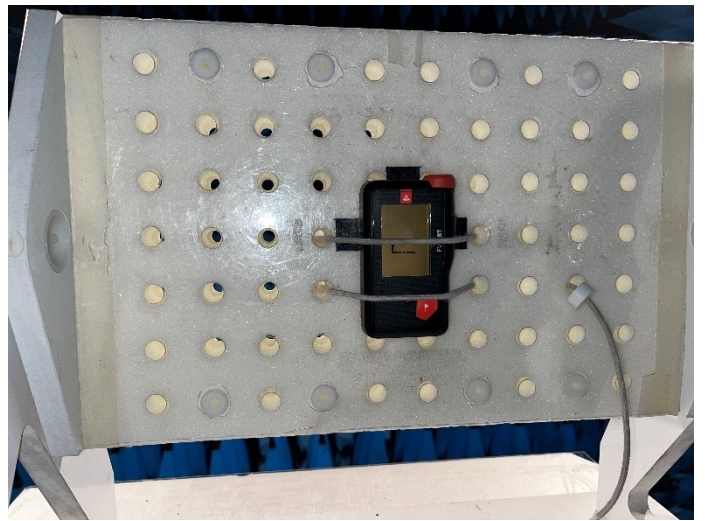
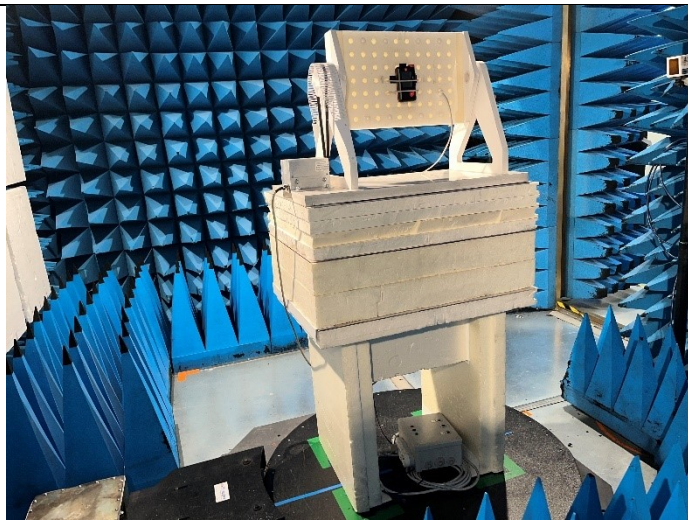
Axis Z on OATS

Test setup on OATS





*Axis XY on FAR*



*Axis Z on FAR*

*Test setup in anechoic chamber*

### **3.3. TEST METHOD**

The product has been tested according to ANSI C63.10, FCC Part 15 Subpart C.

#### Pre-characterisation measurement: (9kHz – 1GHz)

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to 1GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test for maximized the emission measurement. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration.

#### Characterization on 10 meters open site from 9kHz to 1GHz:

Radiated Emissions were measured on an open area test site. A description of the facility is on file with the FCC. The product has been tested at a distance of **10 meters** from the antenna and compared to the FCC Part 15 Subpart C limits. Measurement bandwidth was 9kHz below 30MHz and 120kHz from 30 MHz to 1GHz. Test is performed in horizontal (H)





and vertical (V) polarization, the loop antenna was rotated during the test for maximized the emission measurement. The height antenna is varied from 1m to 4m. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown.

Frequency list has been created with anechoic chamber pre-scan results.

Frequency range:	1GHz to 14GHz	
Test:	Pre-Characterization	Qualification
Antenna Polarization:	Horizontal and Vertical	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	Centered on EUT (§6.6.5 ANSI C63-10)
Antenna Type:	Horn	
RBW Filter:	1MHz	
Maximization:	Turntable rotation of 360 degrees range	
EUT height:	1.5m	1.5m
Test site:	Full Anechoic Chamber	Full Anechoic Chamber
Distance EUT - Antenna:	3m	3m
Detector:	Peak & Average	Peak & Average

Frequency range:	14GHz to 25GHz	
Test:	Pre-Characterization	Qualification
Antenna Polarization:	Horizontal and Vertical	
Antenna Height:	Centered on EUT (§6.6.5 ANSI C63-10)	Centered on EUT (§6.6.5 ANSI C63-10)
Antenna Type:	Horn	
RBW Filter:	1MHz	
Maximization:	Turntable rotation of 360 degrees range	
EUT height:	1.5m	1.5m
Test site:	Full Anechoic Chamber	Full Anechoic Chamber
Distance EUT - Antenna:	1m	1m
Detector:	QPeak & Average	Peak & Average



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### 3.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Amplifier 10MHz - 18GHz	LCIE SUD EST	–	A7102082	05/22	05/24
Antenna Bi-log	AH System	SAS-521-7	C2040180	05/23	05/25
Antenna loop	ELECTRO-METRICS	EM-6879	C2040294	08/22	08/24
BAT EMC	NEXIO	v3.21.0.32	L1000115		
Cable 0.75m	-	18GHz	A5329900	08/22	08/24
Comb EMR HF	YORK	CGE01	A3169114		
CONTROLLER	INNCO	CO3000	D3044034		
Filter Matrice	LCIE SUD EST	Combined filters	A7484078	03/23	03/25
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25
Rehausse Table C3	LCIE	–	F2000511		
Semi-Anechoic chamber #3 (BF)	SIEPEL	–	D3044017_BF	04/22	04/25
Semi-Anechoic chamber #3 (VSWR)	SIEPEL	–	D3044017_VSWR	04/22	04/25
SMA Cable 18GHz 0.5m	TELEDYNE	18GHz	A5330060	02/23	02/24
SMA Cable 18GHz 0.5m	TELEDYNE	18GHz	A5330059	02/23	02/24
Spectrum analyzer	ROHDE & SCHWARZ	FSU 26	A4060058	09/23	09/25
Table C3	LCIE	–	F2000461		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
TILT	INNCO	TILT	D3044033		
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		
Antenna Bi-log	CHASE	CBL6111A	C2040172	04/22	04/24
Antenna Mat (OATS)	ETS Lingren	2071-2	F2000392		
Cable (OATS)	–	1GHz	A5329623	09/23	09/24
CALCUL_FACTEURS	LCIE SUD EST	V4	L2000035		
Emission Cable	RADIALEX		A5329061	08/22	08/24
Emission Cable	MICRO-COAX	1GHz	A5329656	09/23	09/24
OATS	–	–	F2000409	08/23	08/24
Radiated emission comb generator	BARDET	–	A3169050		
Table C1/OATS	LCIE	–	F2000445		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
Turntable (OATS)	ETS Lingren	Model 2187	F2000403		
Turntable / Mast controller (OATS)	ETS Lingren	Model 2066	F2000372		



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TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Biconic Antenna	EATON	94455-1	C2040234	05/23	05/25
Cable (OATS)	–	1GHz	A5329623	09/23	09/24
CALCUL_FACTEURS	LCIE SUD EST	V4	L2000035		
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	03/23	03/25
Table C1/OATS	LCIE	–	F2000445		
Emission Cable 0.5m (Ampl <-> receptor)	INTELLICONNECT	C-KPKP-1503-500MM	A5329988	04/23	04/26
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	11/21	11/23
Emission Cable 0.6m (Ampl <-> receptor)	TELEDYNE	A90-010-0.6MTR	A5330056	04/23	04/24
Antenna horn 40GHz	SCHWARZBECK	BBHA 9170	C2042028	06/22	06/25
Cable 1m 40GHz	INTELLICONNECT	C-KPKP-1503-1M	A5329987	04/21	04/24
PRE-AMPLIFIER	LCIE SUD EST	PRE-AMPLIFIER (40GHz)	A7080078	09/22	09/24

### 3.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None       Divergence:



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### 3.6. TEST RESULTS

#### 3.6.1. Pre-characterization at 3 meters [9kHz-30MHz]

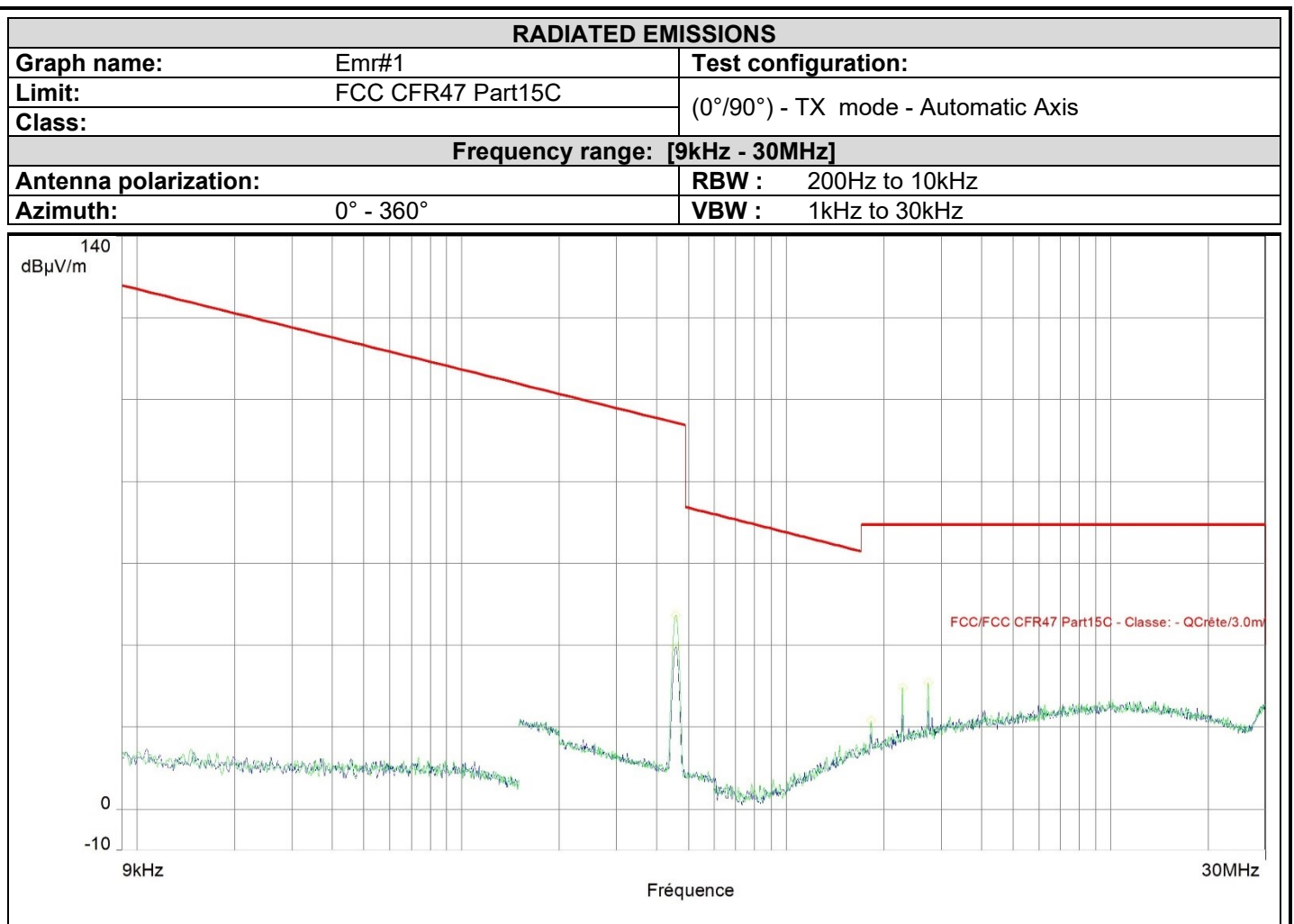
See graph for 9kHz-30MHz band:

Graph identifier	Polarization	EUT position	Mode	Comments
Emr# 1	0°&90°	Axis XYZ	TX	/
Emr# 2	180°	Axis XYZ	TX	/

#### 3.6.2. Pre-characterization at 3 meters [30MHz-1GHz]

See graphs for 30MHz-1GHz:

Graph identifier	Polarization	EUT position	Mode	Comments
Emr# 3	H & V	Axis XYZ	TX	See annex 1



**Spurious emissions**

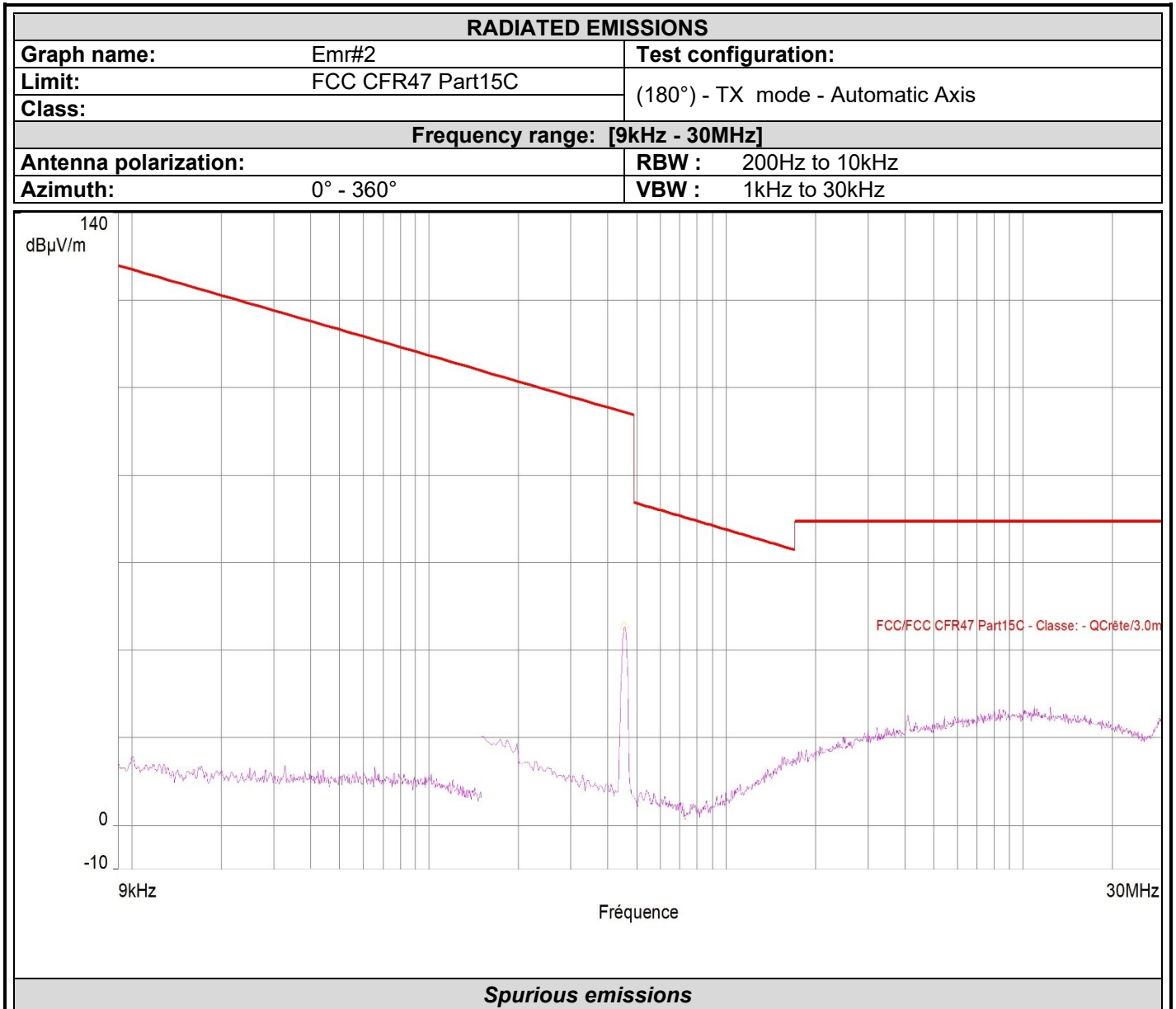
Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
0.457	47.4	94.4	Vertical	15.7
1.826	21.6	69.5	Vertical	9.0
2.285	29.7	69.5	Vertical	8.4
2.740	30.9	69.5	Vertical	8.2
0.457	39.6	94.4	Horizontal	15.7

\*: Carrier frequency





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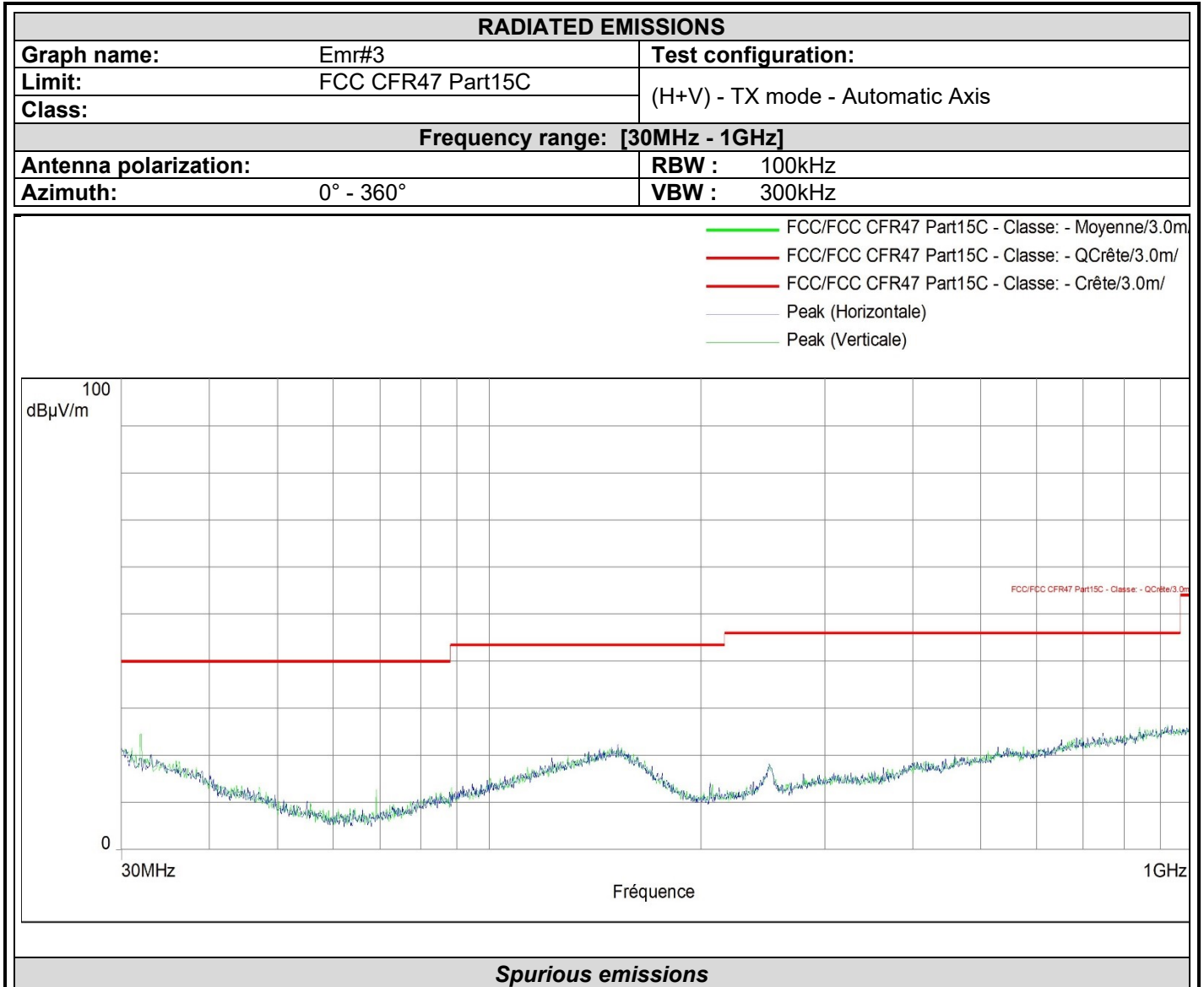


Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
0.454	45.4	94.4	Horizontal	15.7

\*: Carrier frequency



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*No significative frequency observed*

### 3.6.3. Characterization on 10 meters open site below 30 MHz

#### **Worst case final data result:**

Frequency list has been created with semi-anechoic chamber pre-scan results. Measurements are performed using a QUASI-PEAK detection.

No	Frequency (MHz)	QPeak Limit (dBµV/m) @ 10m	Qpeak (dBµV/m)	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	Comments
1	0.457	73.5	35.4	-38.1	0	0°	110	45.6	/

\*: Measure have been done at 10m distance and corrected according to requirements of 15.209.e (M@300m = M@10m-59.1dB)



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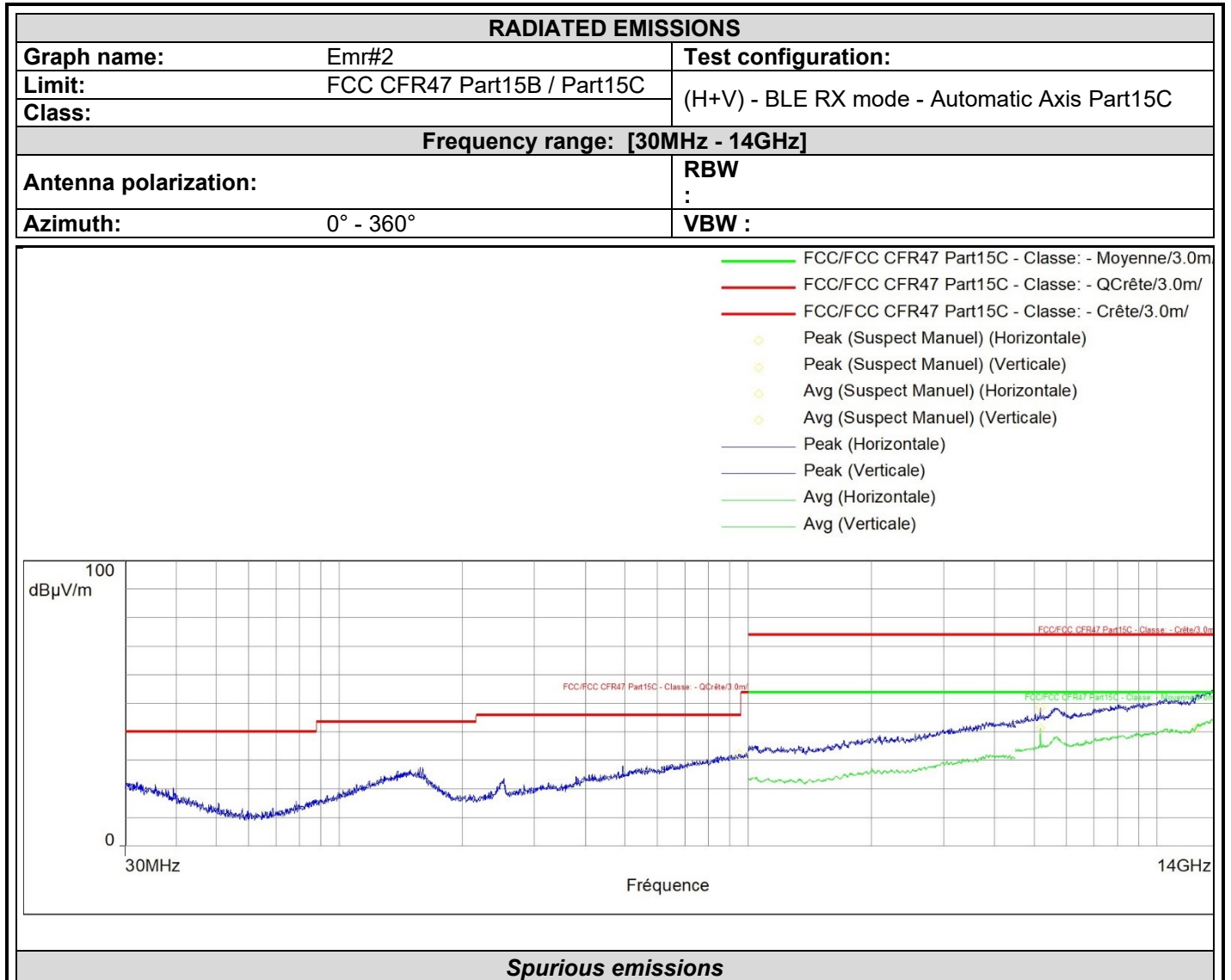
**3.6.4. Characterization on 10 meters open site from 30MHz to 1GHz**

**Worst case final data result:**

Frequency list has been created with semi-anechoic chamber pre-scan results. Measurements are performed using a QUASI-PEAK detection.

Test Frequency (MHz)	Meter Reading dB(μV)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
No frequency observed, margin >15dB in pre-characterization									

**3.6.5. 30MHz to 25GHz (BLE module)**

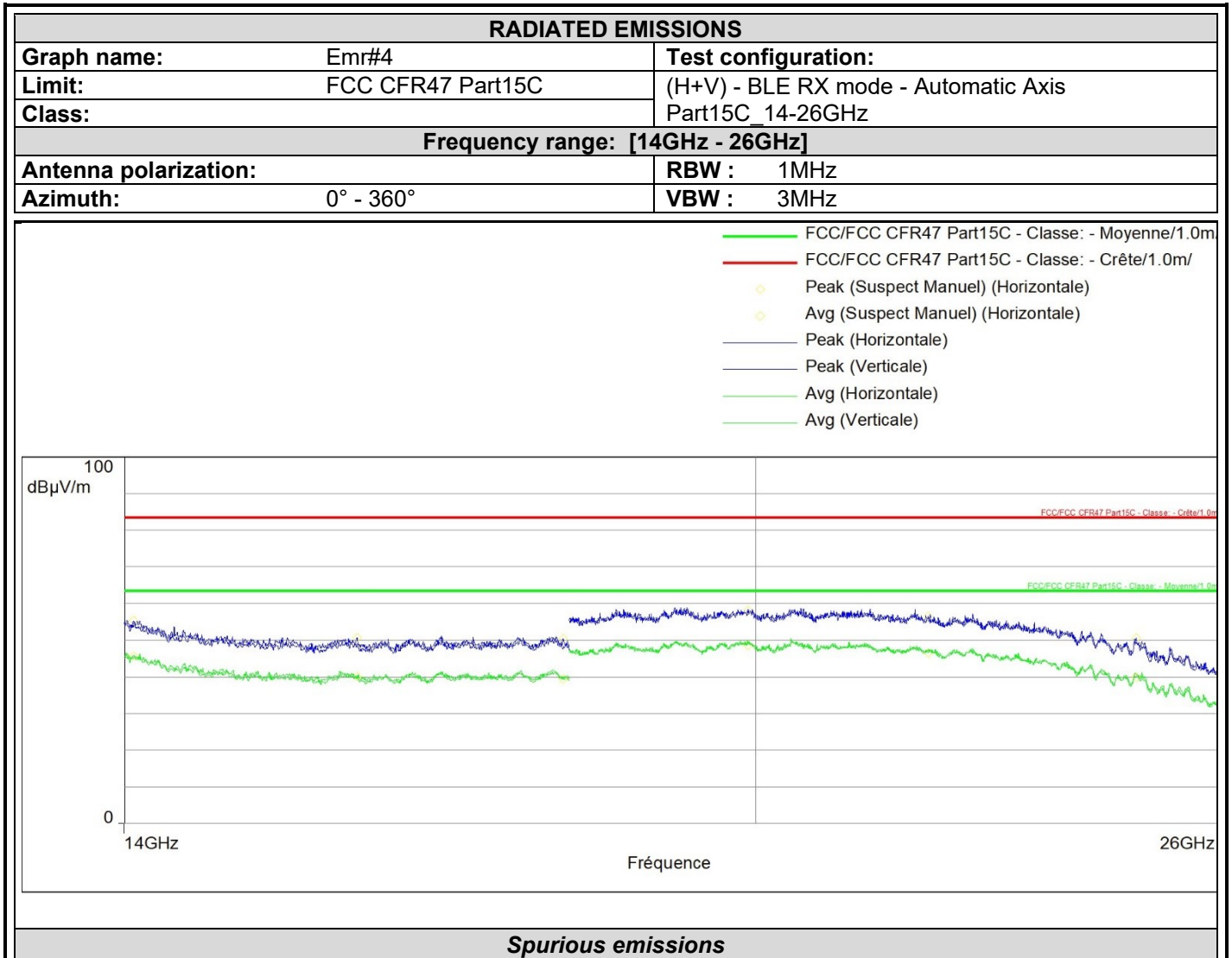


**Spurious emissions**

Frequency (MHz)	Peak (dBμV/m)	Lim.Peak (dBμV/m)	Avg (dBμV/m)	Lim.Avg (dBμV/m)	Polarization	Correction (dB)
12473.350	53.0	74.0	41.4	54.0	Horizontal	-10.5
5184.950	48.6	74.0	41.4	54.0	Vertical	-18.3
13989.550	55.1	74.0	43.4	54.0	Vertical	-5.4



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Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Avg (dBµV/m)	Lim.Avg (dBµV/m)	Polarization	Correction (dB)
14074.000	55.4	83.5	45.7	63.5	Horizontal	3.3
15966.500	50.7	83.5	40.1	63.5	Horizontal	-4.1
17940.500	50.5	83.5	39.5	63.5	Horizontal	-3.3
19910.000	58.3	83.5	48.5	63.5	Horizontal	5.3
22044.000	56.5	83.5	46.5	63.5	Horizontal	4.2
24793.000	50.7	83.5	39.9	63.5	Horizontal	6.0

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
No frequency observed, margin >10dB in pre-characterization									

### 3.7. CONCLUSION

The sample of the equipment EVO BT, Sn: RF SIMPLE, tested in the configuration presented in this test report satisfies to requirements of class B limits of the standard FCC Part 15 Subpart C, for radiated emissions.



## 4. FUNDAMENTAL FREQUENCY TOLERANCE (RSS)

### 4.1. ENVIRONMENTAL CONDITIONS

Test performed by : Majid MOURZAGH  
Date of test : November 24, 2023  
Ambient temperature : 23 °C  
Relative humidity : 38 %

### 4.2. TEST SETUP

Frequency of carrier: 457kHz

The equipment (RF box) is set in a climatic chamber. Measure is performed on one channel of RF module.



Test setup

### 4.3. TEST METHOD

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency when the temperature is varied from  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at the nominal power voltage and the primary power voltage is varied from battery's operating end-point voltage to nominal voltage at  $20^{\circ}\text{C}$ .



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**4.4. TEST EQUIPMENT LIST**

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Antenna Loop (near field)	ELECTRO-METRICS	EM-6993	C2040215	09/22	09/25
Cable SMA 2m	-	6GHz	A5329637	05/22	05/24
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	01/23	01/25
Data Logger (CEM1)	AGILENT	34970A	A6440083	05/23	05/25
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	11/21	11/23
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	10/22	10/24
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25

**4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION**

None       Divergence:

**4.6. TEST RESULTS**

Voltage VDC	Temperature	-30	20	50
4.05	Frequency (kHz)	0.4569852	0.4569897	0.4569888
	Frequency Drift (%)	-0.0032%	-0.0023%	-0.0025%
4.5	Frequency (kHz)	<b>0.4569833</b>	<b>0.4569953</b>	0.456987
	Frequency Drift (%)	-0.0037%	-0.0010%	-0.0028%
4.95	Frequency (kHz)	0.4569833	0.4569897	0.4569852
	Frequency Drift (%)	-0.0037%	-0.0023%	-0.0032%

Frequency drift measured is **12Hz** when the temperature is varied from -30°C to +50°C and voltage is varied.

**4.7. CONCLUSION**

The sample of the equipment EVO BT, Sn: RF SIMPLE, tested in the configuration presented in this test report satisfies to requirements of the standard FCC Part 15 Subpart C, for fundamental frequency tolerance.



## 5. OCCUPIED BANDWIDTH

### 5.1. ENVIRONMENTAL CONDITIONS

Test performed by : Majid MOURZAGH  
 Date of test : November 24, 2023  
 Ambient temperature : 23 °C  
 Relative humidity : 38 %

### 5.2. SETUP

**Conducted measurement:**

The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

**Radiated measurement:**

The EUT is turned ON and connected to measurement instrument; the center frequency of the spectrum analyzer is set to the fundamental frequency. The captured power is measured and recorded; the measurement is repeated until all frequencies required were complete.

**Measurement Procedure:**

1. RBW used in the range of 1% to 5% of the anticipated emission bandwidth
2. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
3. Detector = Peak.
4. Trace mode = Max Hold.
5. Sweep = Auto couple.
6. Allow the trace to stabilize.
7. OBW 99% function of spectrum analyzer used

### 5.3. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Antenna Loop (near field)	ELECTRO-METRICS	EM-6993	C2040215	09/22	09/25
Cable SMA 2m	-	6GHz	A5329637	05/22	05/24
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	01/23	01/25
Data Logger (CEM1)	AGILENT	34970A	A6440083	05/23	05/25
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	11/21	11/23
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	10/22	10/24
Thermo-hygrometer	TESTO	608-H1	B4204120	03/23	03/25
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25

### 5.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

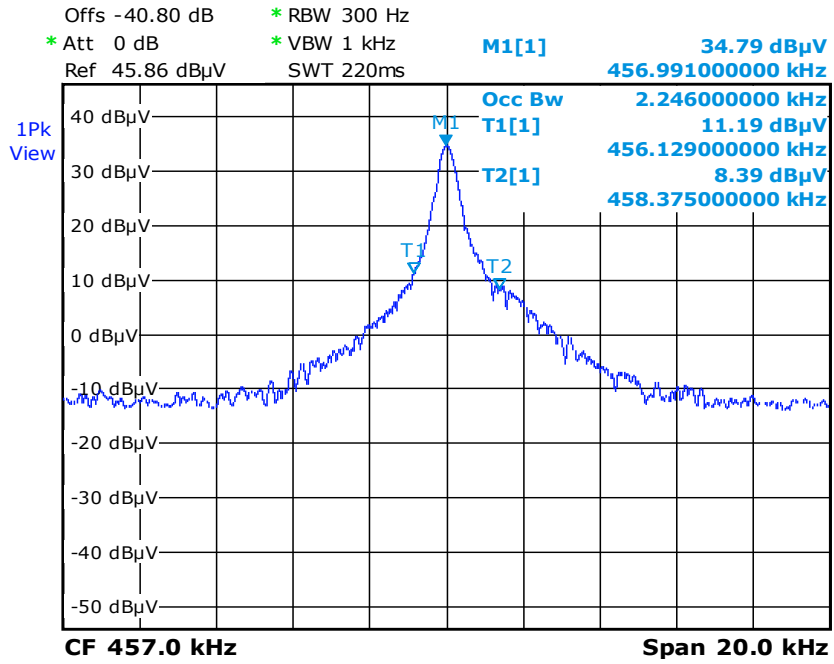
None
                 
  Divergence:



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### 5.5. TEST SEQUENCE AND RESULTS

Channel	Channel Frequency (kHz)	99% Occupied Bandwidth (Hz)
Nom	0.457	2246



Date: 24.NOV.2023 14:06:08



## 6. RECEIVER SPURIOUS EMISSION

Test performed by : Majid MOURZAGH  
 Date of test : November 24, 2023  
 Ambient temperature : 23 °C  
 Relative humidity : 38 %

### 6.1. TEST SETUP

The installation of EUT is identical for pre-characterization measures in a 3 meters semi- anechoic chamber and for measures on the 10 meters Open site.

The EUT and auxiliaries are set:

- 80cm above the ground on the non-conducting table (Table-top equipment) - Below 1GHz
- 10cm above the ground on isolating support (Floor standing equipment)

The EUT is powered by  $V_{nom}$ .



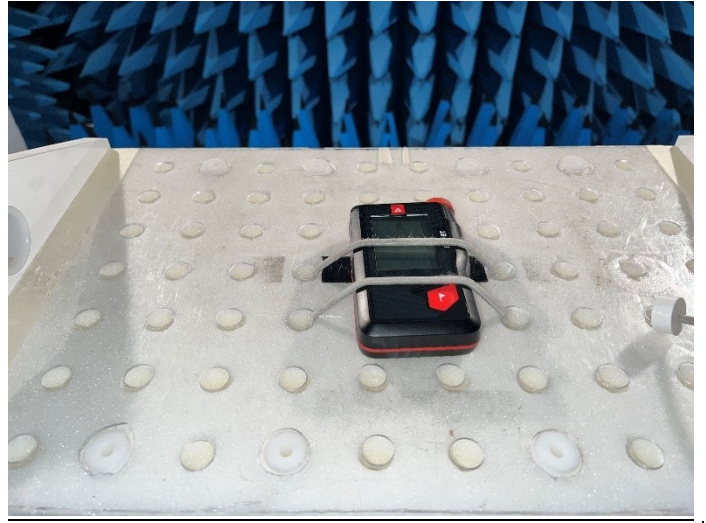
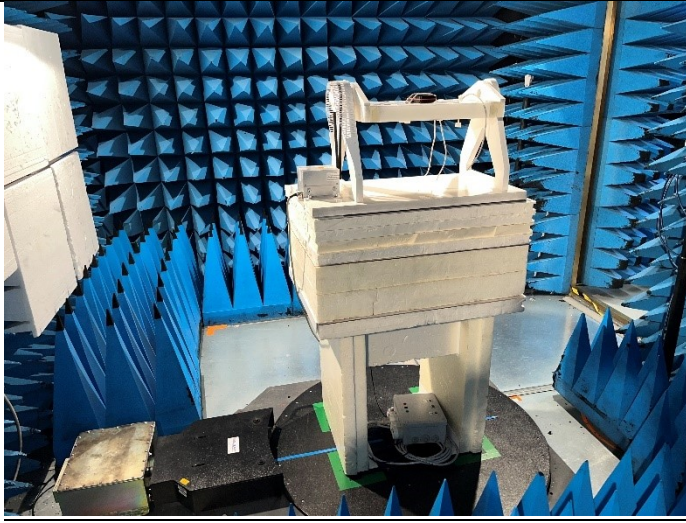
Axis XY on OATS



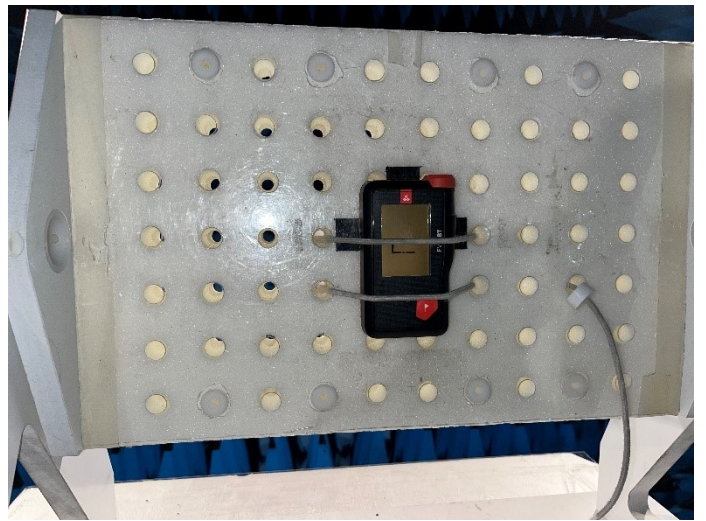
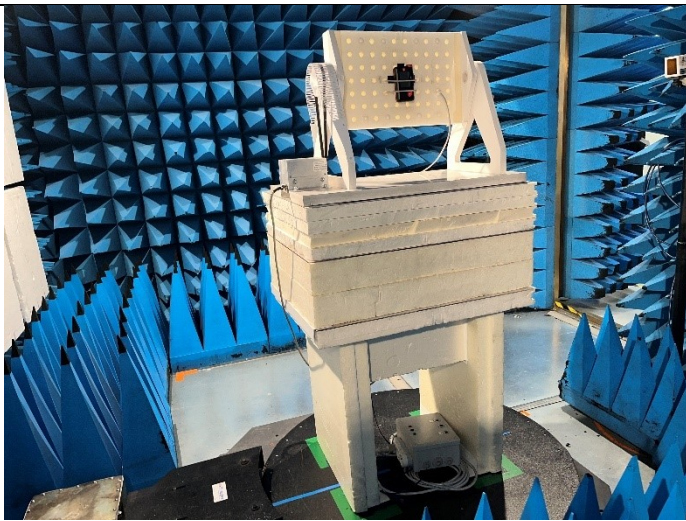
Axis Z on OATS

Test setup on OATS





*Axis XY on FAR*



*Axis Z on FAR*



## 6.2. TEST METHOD

The product has been tested according to RSS GEN.

### Pre-characterisation measurement: (9kHz – 1GHz)

A pre-scan of all the setup has been performed in a 3 meters semi-anechoic chamber for frequency from 30MHz to 1GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test for maximized the emission measurement. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration.

### Characterization on 10 meters open site from 9kHz to 1GHz:

Radiated Emissions were measured on an open area test site. A description of the facility is on file with the RSS GEN. The product has been tested at a distance of **10 meters** from the antenna and compared to the RSS GEN limits. Measurement bandwidth was 9kHz below 30MHz and 120kHz from 30 MHz to 1GHz. Test is performed in horizontal (H) and vertical (V) polarization, the loop antenna was rotated during the test for maximized the emission measurement. The height antenna is varied from 1m to 4m. Continuous linear turntable azimuth search was performed with 360 degrees range. Measurement performed on all axis of EUT used in normal configuration. A summary of the worst case emissions found in all test configurations and modes is shown.

Frequency list has been created with anechoic chamber pre-scan results.



**LCIE**

### 6.3. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Amplifier 10MHz - 18GHz	LCIE SUD EST	_	A7102082	05/22	05/24
Antenna Bi-log	AH System	SAS-521-7	C2040180	05/23	05/25
Antenna loop	ELECTRO-METRICS	EM-6879	C2040294	08/22	08/24
BAT EMC	NEXIO	v3.21.0.32	L1000115		
Cable 0.75m	-	18GHz	A5329900	08/22	08/24
Comb EMR HF	YORK	CGE01	A3169114		
CONTROLLER	INSCO	CO3000	D3044034		
Filter Matrice	LCIE SUD EST	Combined filters	A7484078	03/23	03/25
Multimeter - CEM	FLUKE	87	A1240251	10/23	10/25
Rehausse Table C3	LCIE	_	F2000511		
Semi-Anechoic chamber #3 (BF)	SIEPEL	_	D3044017_BF	04/22	04/25
Semi-Anechoic chamber #3 (VSWR)	SIEPEL	_	D3044017_VSWR	04/22	04/25
SMA Cable 18GHz 0.5m	TELEDYNE	18GHz	A5330060	02/23	02/24
SMA Cable 18GHz 0.5m	TELEDYNE	18GHz	A5330059	02/23	02/24
Spectrum analyzer	ROHDE & SCHWARZ	FSU 26	A4060058	09/23	09/25
Table C3	LCIE	_	F2000461		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
TILT	INSCO	TILT	D3044033		
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		
Antenna Bi-log	CHASE	CBL6111A	C2040172	04/22	04/24
Antenna Mat (OATS)	ETS Lingren	2071-2	F2000392		
Cable (OATS)	_	1GHz	A5329623	09/23	09/24
CALCUL_FACTEURS	LCIE SUD EST	V4	L2000035		
Emission Cable	RADIALEX		A5329061	08/22	08/24
Emission Cable	MICRO-COAX	1GHz	A5329656	09/23	09/24
OATS	_	_	F2000409	08/23	08/24
Radiated emission comb generator	BARDET	_	A3169050		
Table C1/OATS	LCIE	_	F2000445		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	05/23	05/25
Turntable (OATS)	ETS Lingren	Model 2187	F2000403		
Turntable / Mast controller (OATS)	ETS Lingren	Model 2066	F2000372		

### 6.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None       Divergence:





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## 6.5. TEST RESULTS

### 6.5.1. Pre-characterization at 3 meters [9kHz-30MHz]

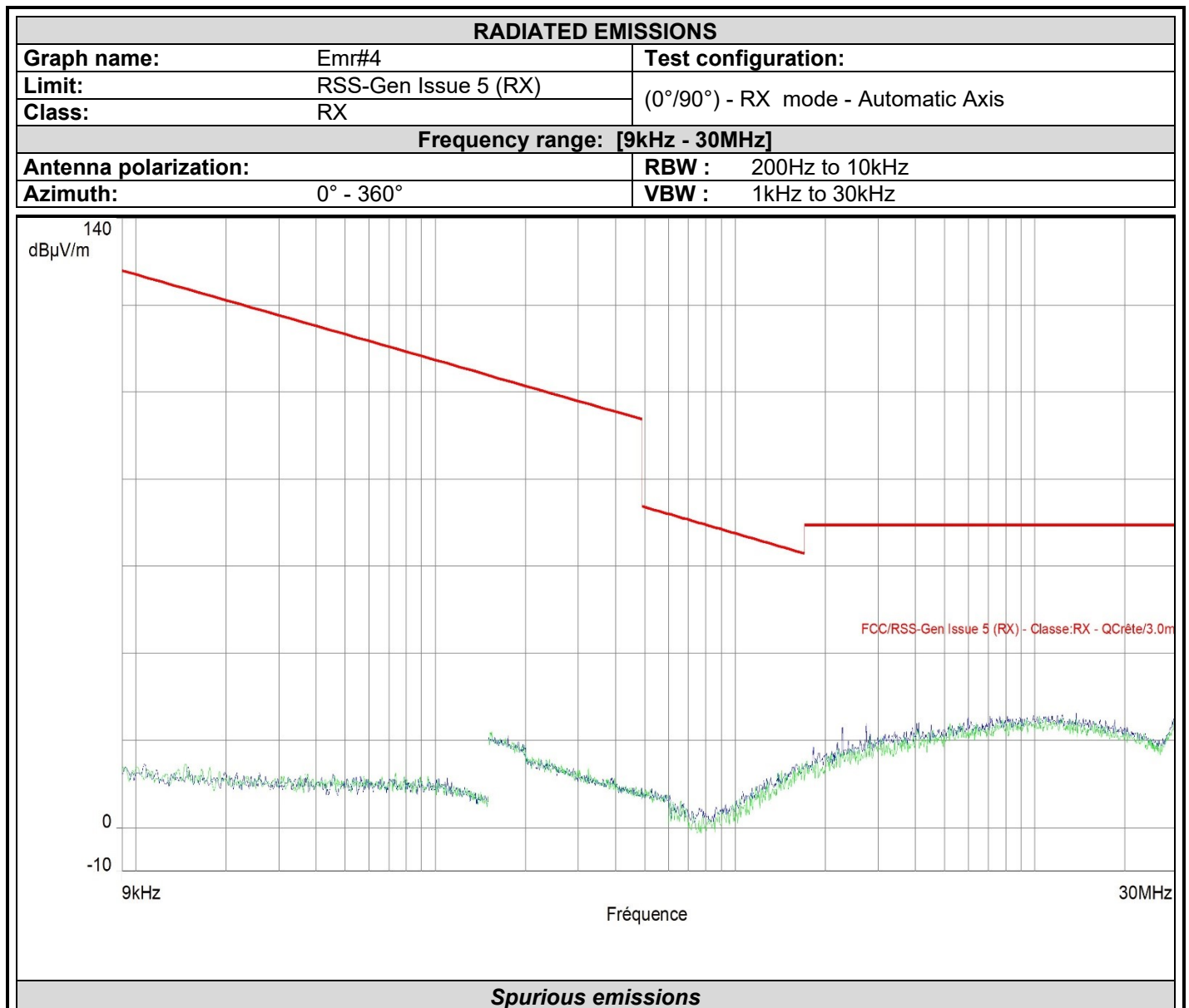
See graph for 9kHz-30MHz band:

Graph identifier	Polarization	EUT position	Mode	Comments
Emr# 4	0°&90°	Axis XYZ	RX	
Emr# 5	180°	Axis XY/Z	RX	

### 6.5.2. Pre-characterization at 3 meters [30MHz-1GHz]

See graphs for 30MHz-1GHz:

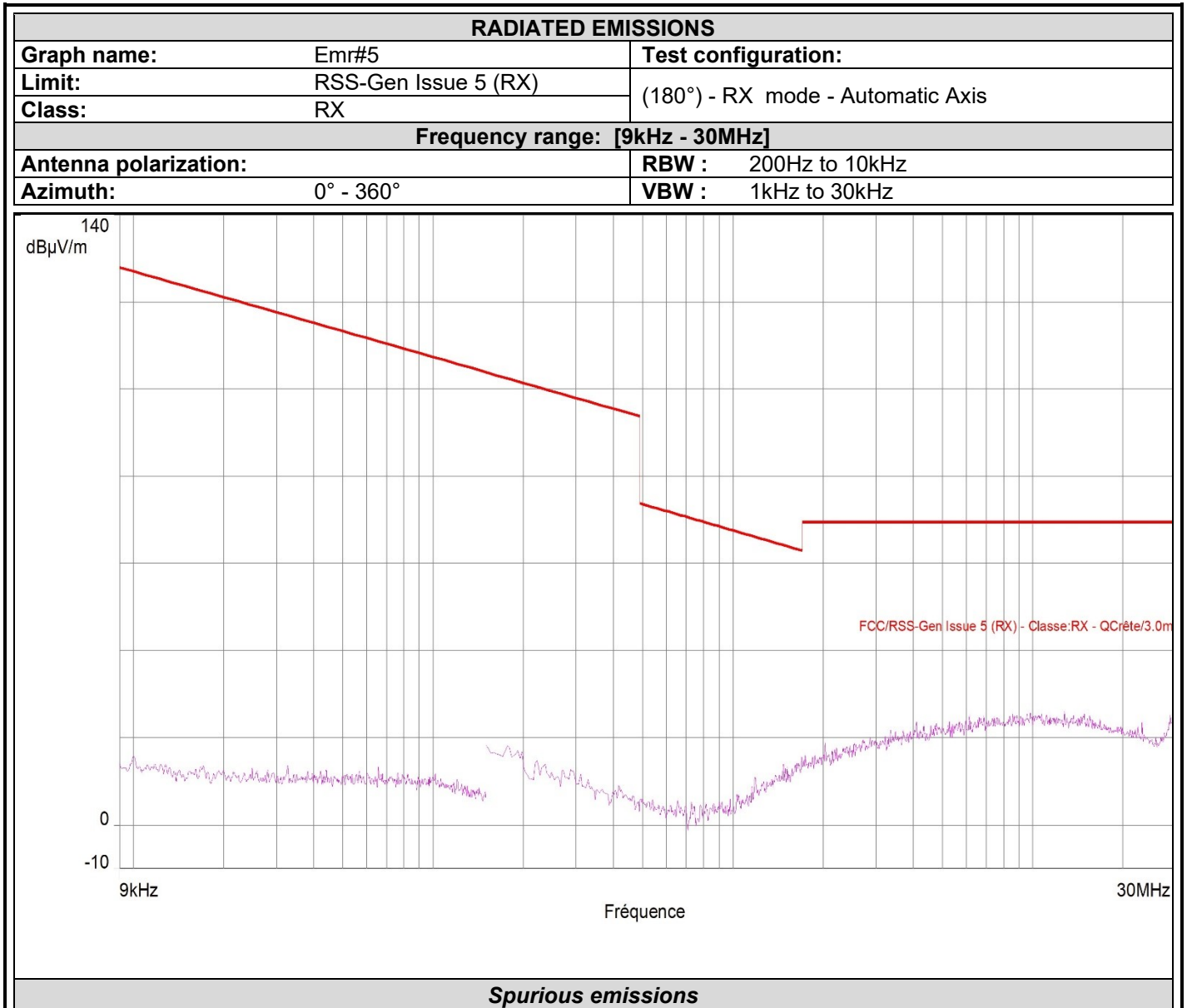
Graph identifier	Polarization	EUT position	Mode	Comments
Emr# 6	H & V	Axis XYZ	RX	See annex 1



No significant frequency observed



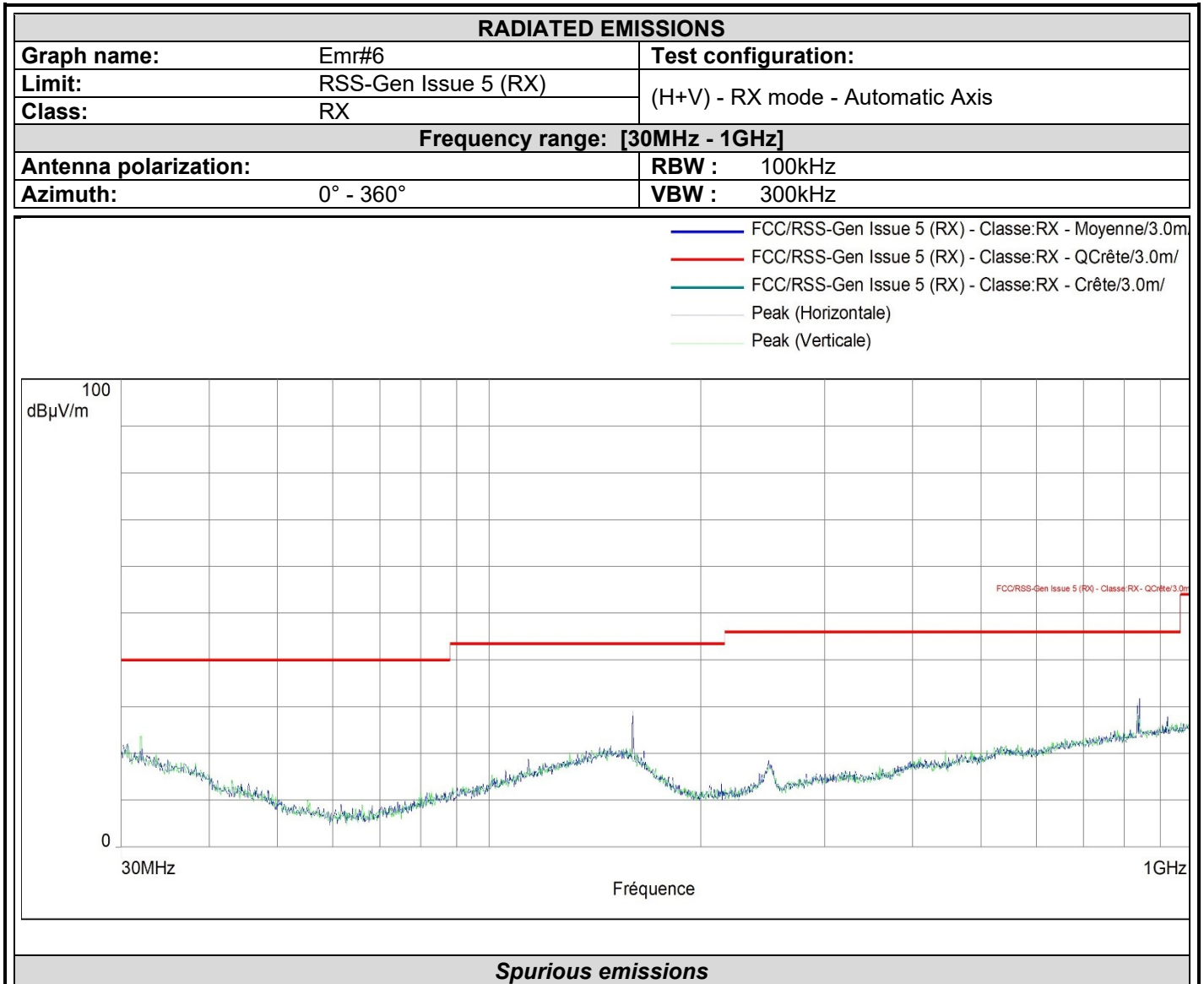
L C I E



No significant frequency observed



L C I E



*No significant frequency observed*

**6.5.1. Characterization on 10 meters open site below 30 MHz**

**Worst case final data result:**

Frequency list has been created with semi-anechoic chamber pre-scan results. Measurements are performed using a QUASI-PEAK detection.

Test Frequency (MHz)	Meter Reading dB(µV)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)
No frequency observed, margin >15dB in pre-characterization									

\*: Measure have been done at 10m distance and corrected according to requirements of 15.209.e (M@300m = M@10m-59.1dB)



### 6.5.2. Characterization on 10 meters open site from 30MHz to 1GHz

#### **Worst case final data result:**

Frequency list has been created with semi-anechoic chamber pre-scan results.  
Measurements are performed using a QUASI-PEAK detection.

Test Frequency (MHz)	Meter Reading dB( $\mu$ V)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
No frequency observed, margin >15dB in pre-characterization									

### 6.6. CONCLUSION

The sample of the equipment EVO BT, Sn: RF SIMPLE, tested in the configuration presented in this test report satisfies to requirements of the standard RSS GEN, for Receiver Spurious Emission.

## 7. UNCERTAINTIES CHART

Type de mesure / Kind of measurement	Incertitude élargie laboratoire / Wide uncertainty laboratory (k=2) ± x	Incertitude limite du CISPR / CISPR uncertainty limit ± y
Measurement of conducted disturbances in voltage on the power port	3.29dB	3.4 dB
Measurement of conducted disturbances in voltage on the telecommunication port.	3.26 dB	5dB
Measurement of discontinuous conducted disturbances in voltage	3.33 dB	3.4 dB
Measurement of conducted disturbances in current	2.67 dB	2.9dB
Spurious emission, radiated (Semi anechoic chamber & open test site)	5.60 dB	6 dB
Spurious emission, radiated (Full anechoic chamber above 1GHz)	±3.8 dB	±6 dB
Occupied Channel Bandwidth	±2.8 %	±5 %
Temperature	±0.75 °C	±3 °C
Supply Voltages	±1.7 %	±3 %

Les valeurs d'incertitudes calculées du laboratoire étant inférieures aux valeurs d'incertitudes limites établies par la norme, la conformité de l'échantillon est établie directement par les niveaux limites applicables. / The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the standard. The conformity of the sample is directly established by the applicable limits values.