



LCIE

Bluetooth Low Energy Template: Release September 27, 2019

TEST REPORT

N°: 165981-748012-A(FILE#1038603)

Version : 02

Subject

Radio spectrum matters
tests according to standards:
47 CFR Part 15.247 & RSS-247 Issue 2 & RSS-Gen Issue 5

Issued to

LEGRAND FRANCE ISERE ST-MARCELLIN
Rue Arago
B.P.95
38163 – SAINT-MARCELLIN Cedex
FRANCE

Apparatus under test

- ↪ Product
- ↪ Trade mark
- ↪ Manufacturer
- ↪ Family Range
- ↪ Model under test
- ↪ Serial number
- ↪ FCC ID
- ↪ IC

Switch wireless without battery
LEGRAND
LEGRAND
ZLGP12 / ZLGP14 / ZLGP15 / ZLGP16 / ZLGP17 /
ZLGP18
ZLGP12
None
2ACN8-ZLGP1X
12132A-ZLGP1X

Conclusion

See Test Program chapter

Test date

February 3, 2020 to February 4, 2020

Test location

LCIE, Z.I. Centr'alp 170 Rue de Chatagnon, F-38430
Moirans, France

Test Site

6500A

Sample receipt date

August 28, 2019

Composition of document

45 pages

Document issued on

May 4, 2020

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

33, Av du Général Leclerc
92266 Fontenay Aux Roses
FRANCE

Tél : +33 1 40 95 60 60
contact@lcie.fr
www.lcie.fr



PUBLICATION HISTORY

Version	Date	Author	Modification
01	May 4, 2020	Majid MOURZAGH	Creation of the document
02	May 4, 2020	Majid MOURZAGH	Adding FCC/IC informations

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.



SUMMARY

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1. TEST PROGRAM

References

- 47 CFR Part 15.247
- RSS 247 Issue 2
- RSS Gen Issue 5
- KDB 558074 D01 DTS Meas Guidance v05r02
- ANSI C63.10-2013

Radio requirement:

Clause (47CFR Part 15.247 & RSS-247 Issue 2 & RSS-Gen Issue 5) Test Description	Test result - Comments
Occupied Bandwidth	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP(1)
6dB Bandwidth	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA() <input type="checkbox"/> NP(1)
Duty Cycle	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL <input checked="" type="checkbox"/> NA <input type="checkbox"/> NP(1)
Maximum Conducted Output Power	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP(1)
Power Spectral Density	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP(1)
Conducted Spurious Emission at the Band Edge	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA() <input type="checkbox"/> NP(1)
Unwanted Emissions into Non-Restricted Frequency Bands	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA() <input type="checkbox"/> NP(1)
AC Power Line Conducted Emission	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL <input checked="" type="checkbox"/> NA(2) <input type="checkbox"/> NP(1)
Unwanted Emissions into Restricted Frequency Bands	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL <input type="checkbox"/> NA <input type="checkbox"/> NP(1)
Receiver Radiated emissions	<input type="checkbox"/> PASS <input type="checkbox"/> FAIL <input checked="" type="checkbox"/> NA <input type="checkbox"/> NP(1)
This table is a summary of test report, see conclusion of each clause of this test report for detail.	

(1): Limited program

(2): EUT not directly or indirectly connected to the AC Power Public Network

PASS: EUT complies with standard's requirement

FAIL: EUT does not comply with standard's requirement

NA: Not Applicable

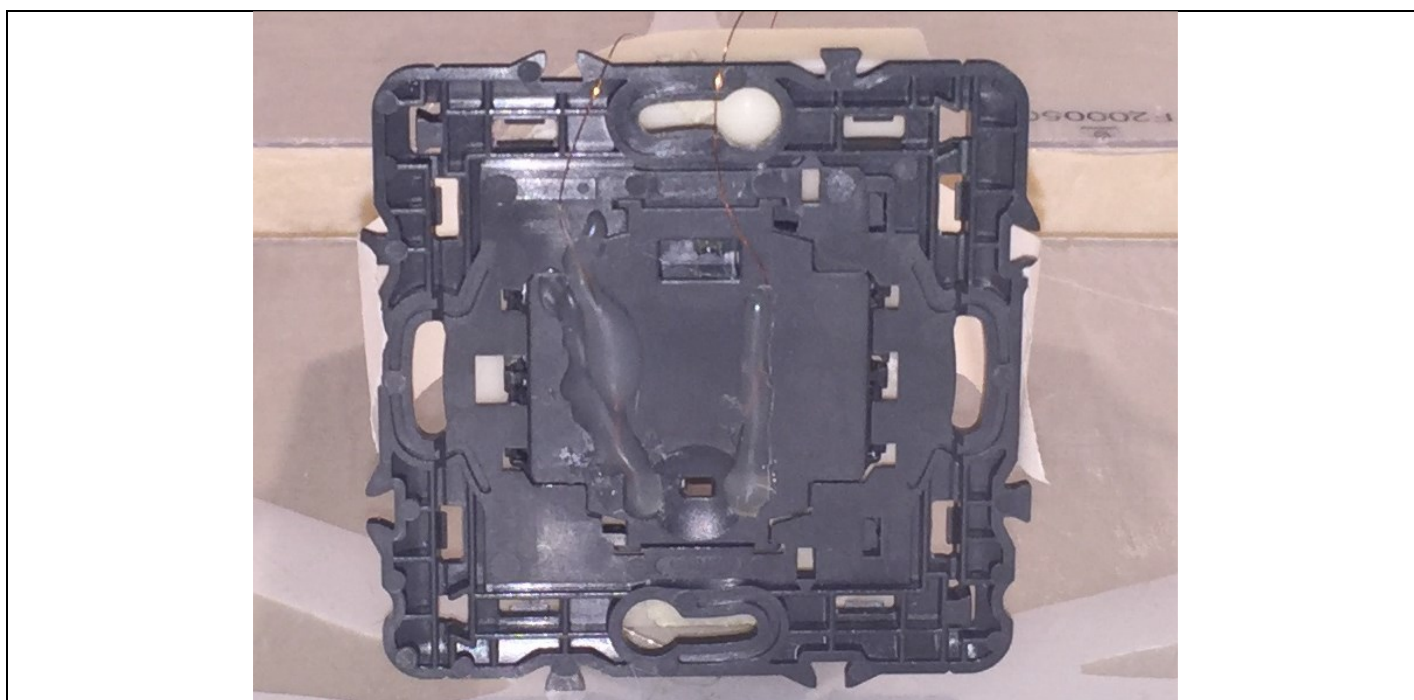
NP: Test Not Performed

2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER)

2.1. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):
LEGRAND ZLGP12

Serial Number: None



Equipment Under Test

Power supply:

During all the tests, EUT is supplied by V_{nom} : .3.3VDC

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"/> Piezzo	3.3Vdc	/	/

Voltage table used (for Power Line Conducted Emissions):

Type	Measurement performed:
<input checked="" type="checkbox"/> Piezzo	<input checked="" type="checkbox"/> +3.3VDC <input type="checkbox"/> -....VDC

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
None						

Auxiliary equipment used during test:

Type	Reference	-	Comments
Power supply DC	METRIX AX503	Power supply DC METRIX AX503 - A7040093	A7040093



Equipment information:

Type:	<input checked="" type="checkbox"/> ZIGBEE		<input type="checkbox"/> RF4CE	
Frequency band:	[2400 – 2483.5] MHz			
Number of Channel:	16			
Spacing channel:	5MHz			
Channel bandwidth:	2MHz			
Antenna Type:	<input checked="" type="checkbox"/> Integral	<input type="checkbox"/> External	<input type="checkbox"/> Dedicated	
Antenna connector:	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> Temporary for test	
Antenna requirements §15.203	<i>The transmitter uses an integral antenna and it permanently connected. Therefore, the transmitter meets the requirements of 15.203.</i>			
Transmit chains:	1			
	Single antenna Gain: 6dBi			
Beam forming gain:	No			
Receiver chains	1			
Type of equipment:	<input checked="" type="checkbox"/> Stand-alone	<input type="checkbox"/> Plug-in	<input type="checkbox"/> Combined	
Ad-Hoc mode:	<input type="checkbox"/> Yes		<input checked="" type="checkbox"/> No	
Adaptivity mode:	<input checked="" type="checkbox"/> Yes (Load Based)	<input type="checkbox"/> Off mode	<input type="checkbox"/> No	
	Clear Channel Assessment Time:			Xµs
Duty cycle:	<input type="checkbox"/> Continuous duty	<input type="checkbox"/> Intermittent duty	<input checked="" type="checkbox"/> 100% duty	
Equipment type:	<input checked="" type="checkbox"/> Production model		<input checked="" type="checkbox"/> Pre-production model	
Tnom:	20°C			
Type of power source:	<input type="checkbox"/> AC power supply	<input type="checkbox"/> DC power supply	<input checked="" type="checkbox"/> Piezzo	
Operating voltage range:	Vnom:	<input type="checkbox"/> 230V/50Hz	<input checked="" type="checkbox"/> 3.3Vdc	



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CHANNEL PLAN	
Channel	Frequency (MHz)
Cmin: 11	2405
12	2410
13	2415
14	2420
15	2425
16	2430
17	2435
Cmid: 18	2440
19	2445
20	2450
21	2455
22	2460
23	2465
24	2470
25	2475
Cmax: 26	2480

DATA RATE		
Data Rate (Mbps)	Modulation Type	Worst Case Modulation
0.25	O-QPSK	<input checked="" type="checkbox"/>

2.2. EQUIPMENT LABELLING

None

2.3. EQUIPMENT MODIFICATION

None Modification:

2.4. RUNNING MODE

Test mode	Description of test mode
Test mode 1	Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
Test mode 2	Permanent reception
Test	Running mode
Occupied Bandwidth	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()
6dB Bandwidth	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()
Maximum Conducted Output Power	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()
Power Spectral Density	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()
Conducted Spurious Emission at the Band Edge	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()
Unwanted Emissions into Non-Restricted Frequency Bands	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()
AC Power Line Conducted Emission	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()
Unwanted Emissions into Restricted Frequency Bands	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()

(1) The EUT is set in the following modes during tests:
 Permanent emission with modulation on a fixed channel in the data rate that produced the highest power
 The power order is set at 0dBm
 The test process provided by the customer:

	Action	Led Color	Power	State
1	Press CPB	NONE	0dBm	TX un-modulated carrier frequency: 2,44GHz (ch 18)
2	Press CPB	NONE	0dBm	TX un-modulated carrier frequency: 2,405GHz (ch 11)
3	Press CPB	NONE	0dBm	TX un-modulated carrier frequency: 2,48GHz (ch 26)
4	Press CPB	NONE	0dBm	TX modulated carrier frequency = 2,44GHz (ch 18)
5	Press CPB	NONE	0dBm	TX modulated carrier frequency = 2,405GHz (ch 11)
6	Press CPB	NONE	0dBm	TX modulated carrier frequency = 2,48GHz (ch 26)

Exit test function
 Power supply OFF

Hardware information		
Software (if applicable):	V. :	V10

3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
Date of test : February 4, 2020
Ambient temperature : 22 °C
Relative humidity : 38 %

3.2. TEST SETUP

- The Equipment under Test is installed:

- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

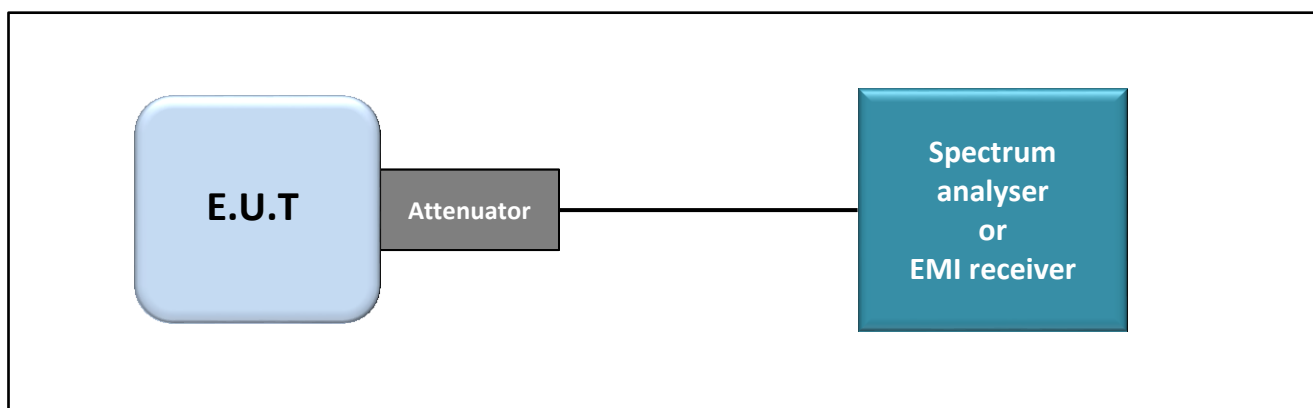
- Conducted Method (welded connection, according to manufacturer's requirements)
- Radiated Method

- Test Procedure:

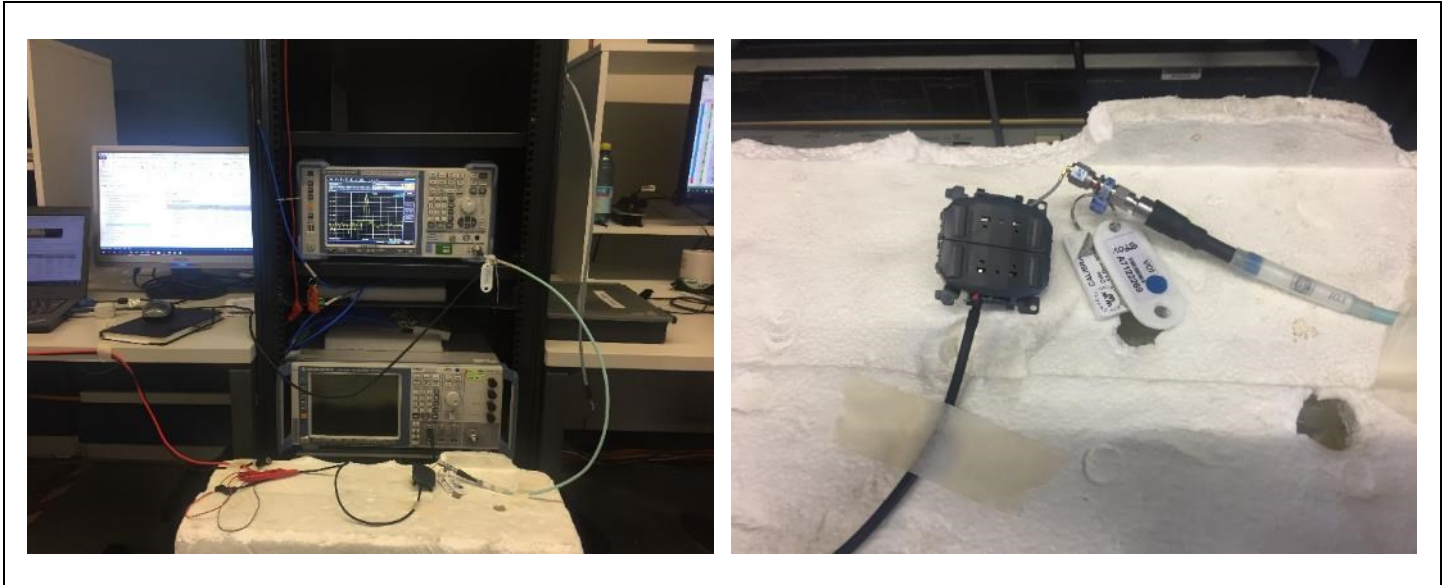
- RSS-Gen Issue 5 § 6.7
- ANSI C63.10 § 6.9.2

Measurement Procedure:

- a) RBW shall be in the range of 1% to 5% of the anticipated occupied bandwidth
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW
- c) SPAN = Capture all products of the modulation process
- d) Detector = Peak.
- e) Trace mode = max hold.
- f) Sweep = auto couple.
- g) Allow the trace to stabilize.
- h) OBW 99% function of spectrum analyzer used



Test set up of Occupied Bandwidth



Photograph for Occupied bandwidth

3.3. LIMIT

None

3.4. TEST EQUIPMENT LIST

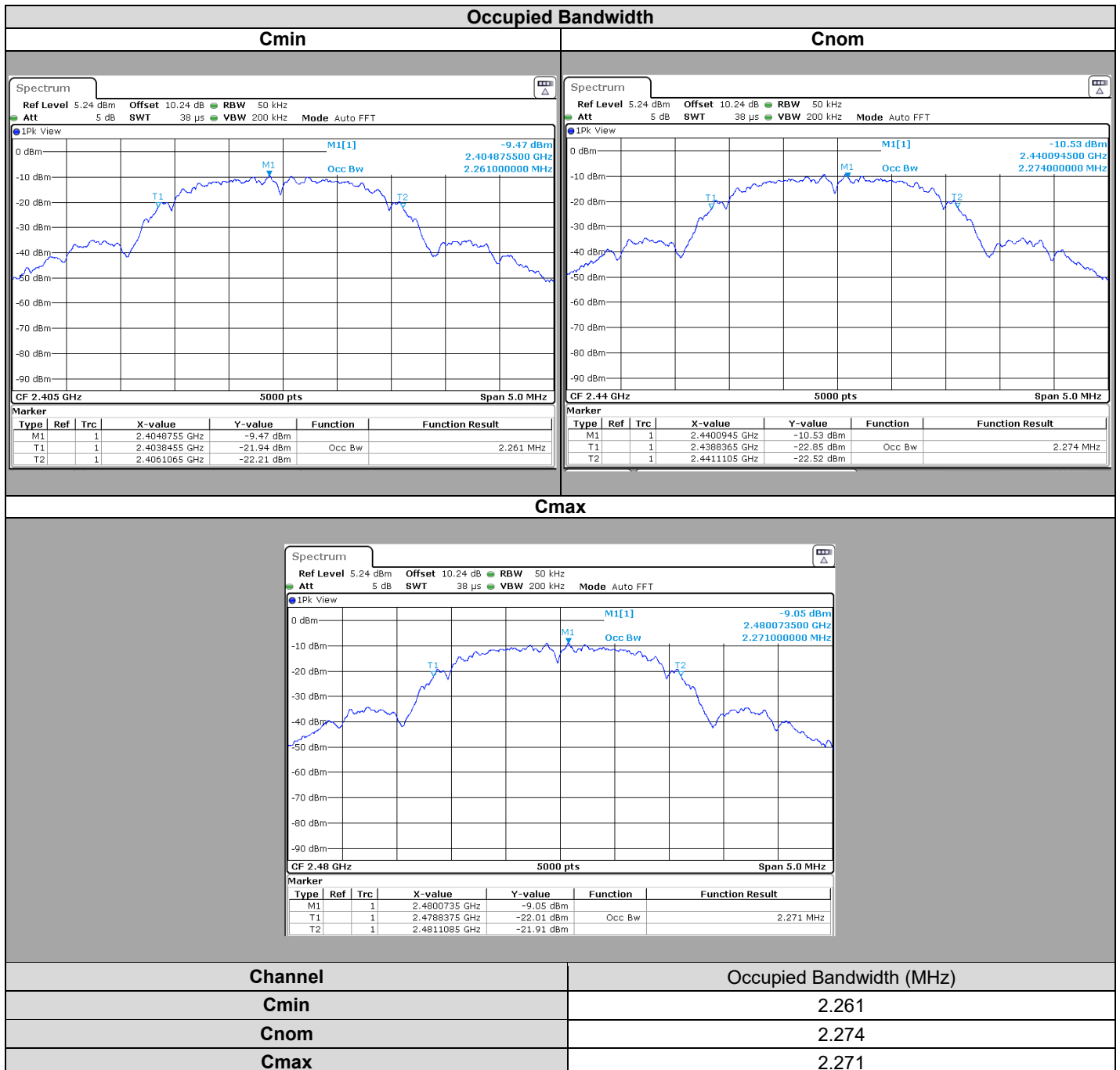
TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	_	A7122269	12/18	02/20
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/21	05/23
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Cable Measure	_	36G	A5329604	02/19	02/20

Note: In our quality system, the test equipment calibration due is more & less 2 months



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3.5. RESULTS



3.6. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **LEGRAND ZLGP12**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS-GEN ISSUE 5** limits.

4. 6dB EMISSION BANDWIDTH

4.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
Date of test : February 4, 2020
Ambient temperature : 22 °C
Relative humidity : 38 %

4.2. TEST SETUP

- The Equipment under Test is installed:

- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

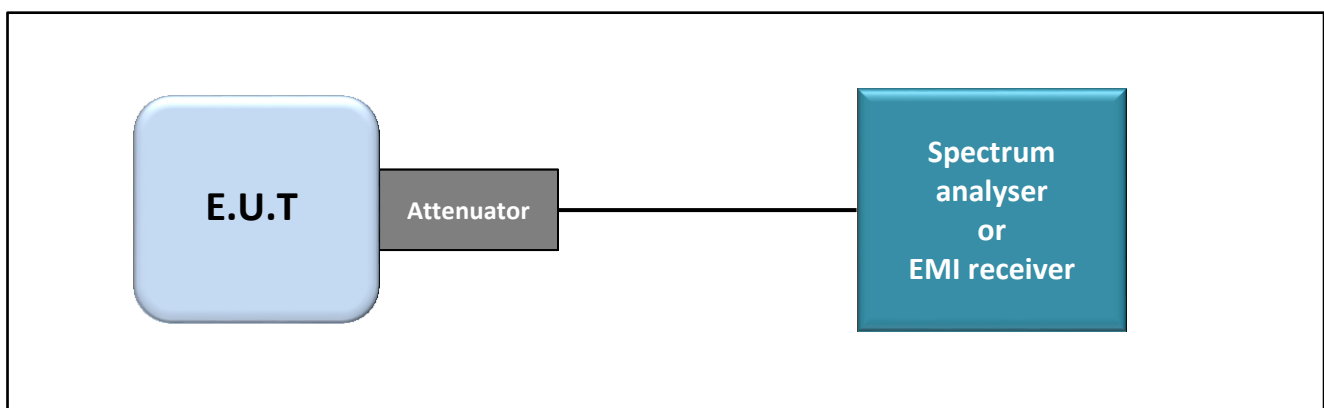
- Conducted Method (welded connection, according to manufacturer's requirements)
- Radiated Method

- Test Procedure:

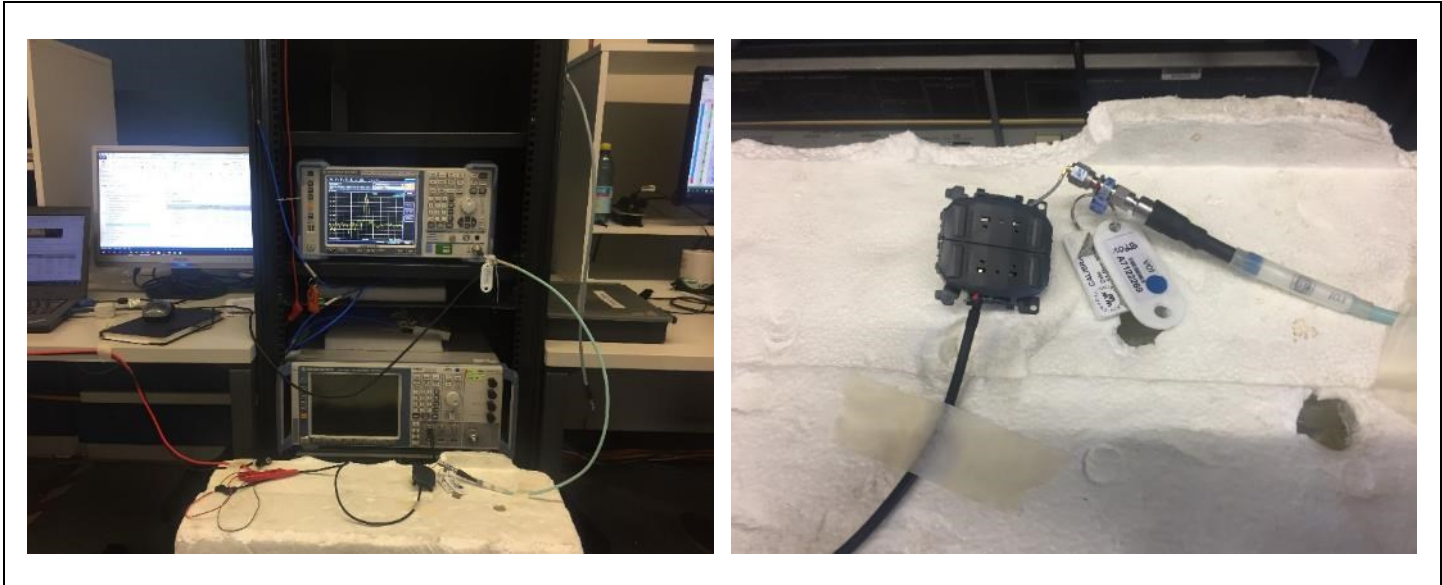
- KDB 558074 D01 DTS Meas Guidance v05r02 § 8.2

Measurement Procedure:

1. Set resolution bandwidth (RBW) = 100kHz.
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. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission. Compare the resultant bandwidth with the RBW setting of the analyzer.



Test set up of 6dB Emission Bandwidth



Photograph for 6dB emission bandwidth

4.3. LIMIT

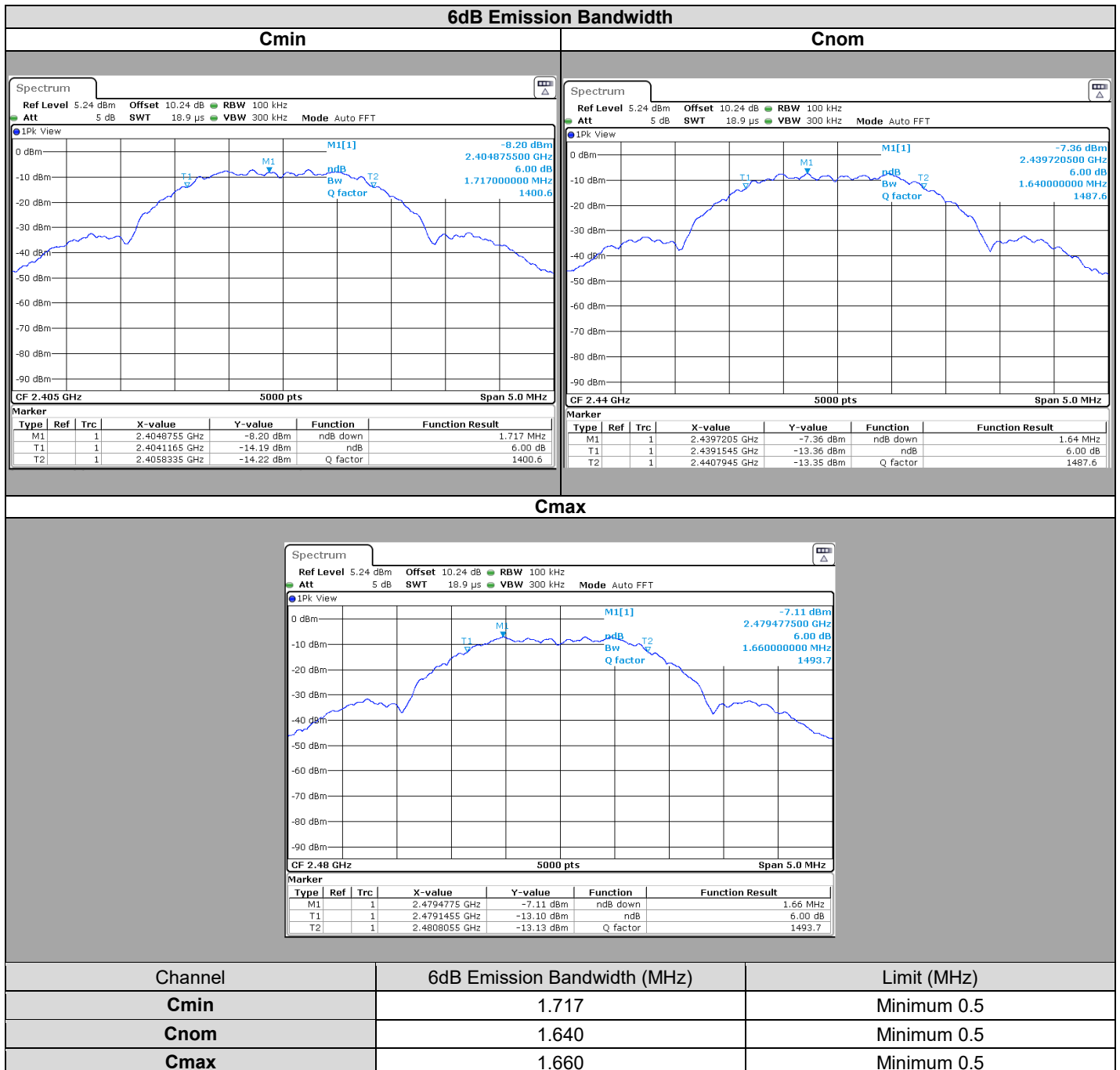
The 6dB bandwidth shall be at least 500kHz

4.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	_	A7122269	12/18	02/20
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/21	05/23
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Cable Measure	_	36G	A5329604	02/19	02/20

Note: In our quality system, the test equipment calibration due is more & less 2 months

4.5. RESULTS



4.6. CONCLUSION

6dB Emission Bandwidth measurement performed on the sample of the product **LEGRAND ZLGP12**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.



5. MAXIMUM CONDUCTED OUTPUT POWER

5.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
Date of test : February 4, 2020
Ambient temperature : 22 °C
Relative humidity : 38 %

5.2. TEST SETUP

- The Equipment under Test is installed:

- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

- Conducted Method (welded connection, according to manufacturer's requirements)
- Radiated Method

- Test Procedure:

- KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.1.1

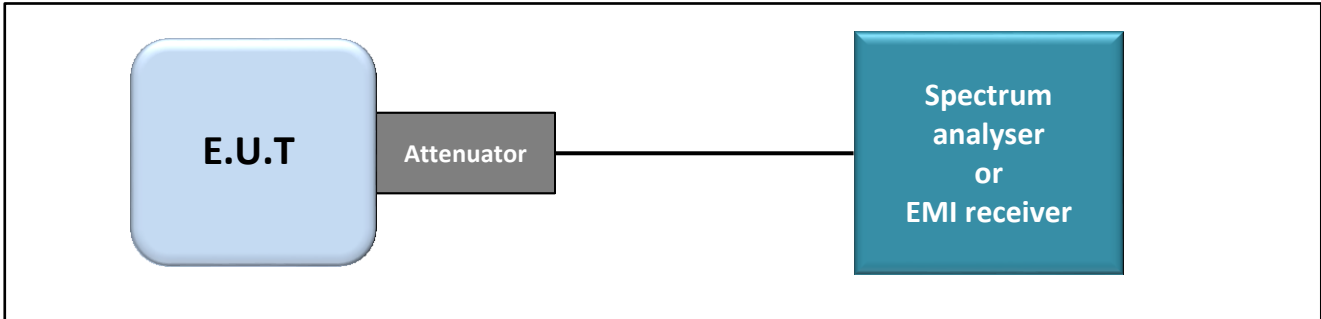
This procedure shall be used when the measurement instrument has available a resolution bandwidth that is greater than the DTS bandwidth.

- a) Set the RBW \geq DTS bandwidth.
- b) Set VBW \geq 3 x RBW.
- c) Set span \geq 3 x RBW
- d) Sweep time = auto couple.
- e) Detector = peak.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use peak marker function to determine the peak amplitude level.

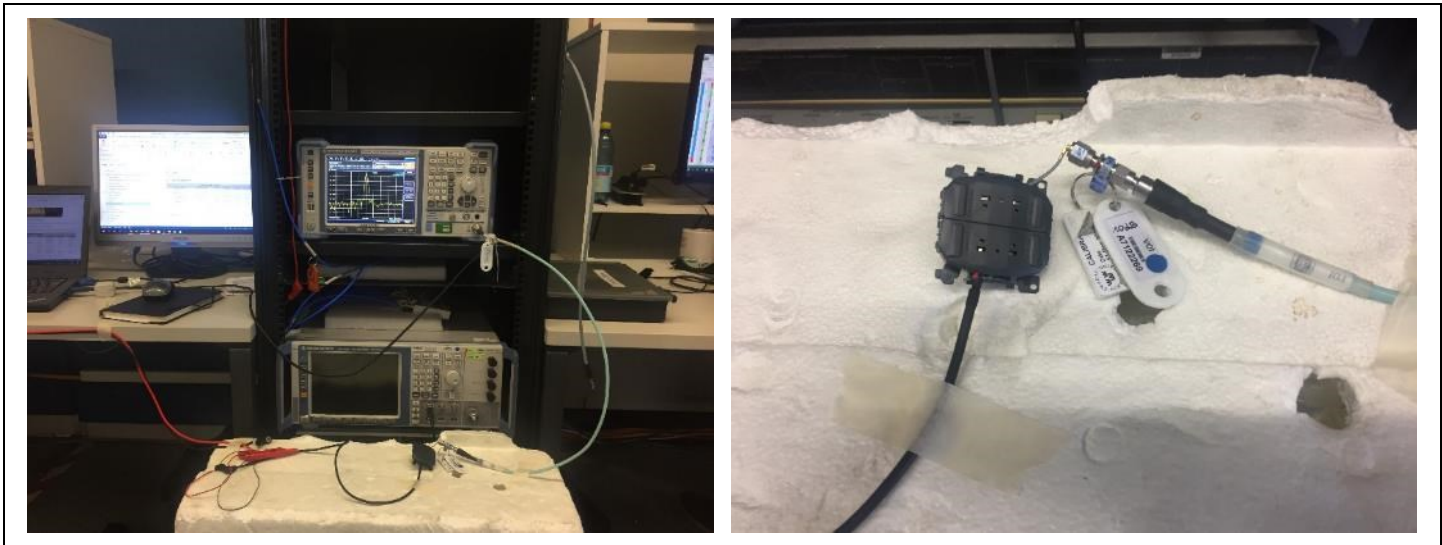
- KDB 558074 D01 DTS Meas Guidance v05r02 § 8.3.1.2

This procedure may be used when the maximum available RBW of the measurement instrument is less than the DTS bandwidth.

- a) Set the RBW = 1 MHz.
- b) Set the VBW \geq 3 x RBW
- c) Set the span \geq 1.5 x DTS bandwidth.
- d) Detector = peak.
- e) Sweep time = auto couple.
- f) Trace mode = max hold.
- g) Allow trace to fully stabilize.
- h) Use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges



Test set up of Maximum Conducted Output Power



Photograph for Maximum Conducted Output Power

5.3. LIMIT

Maximum Conducted Output power:
 2400MHz-2483.5MHz: Shall not exceed 30dBm
 Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi

5.4. TEST EQUIPMENT LIST

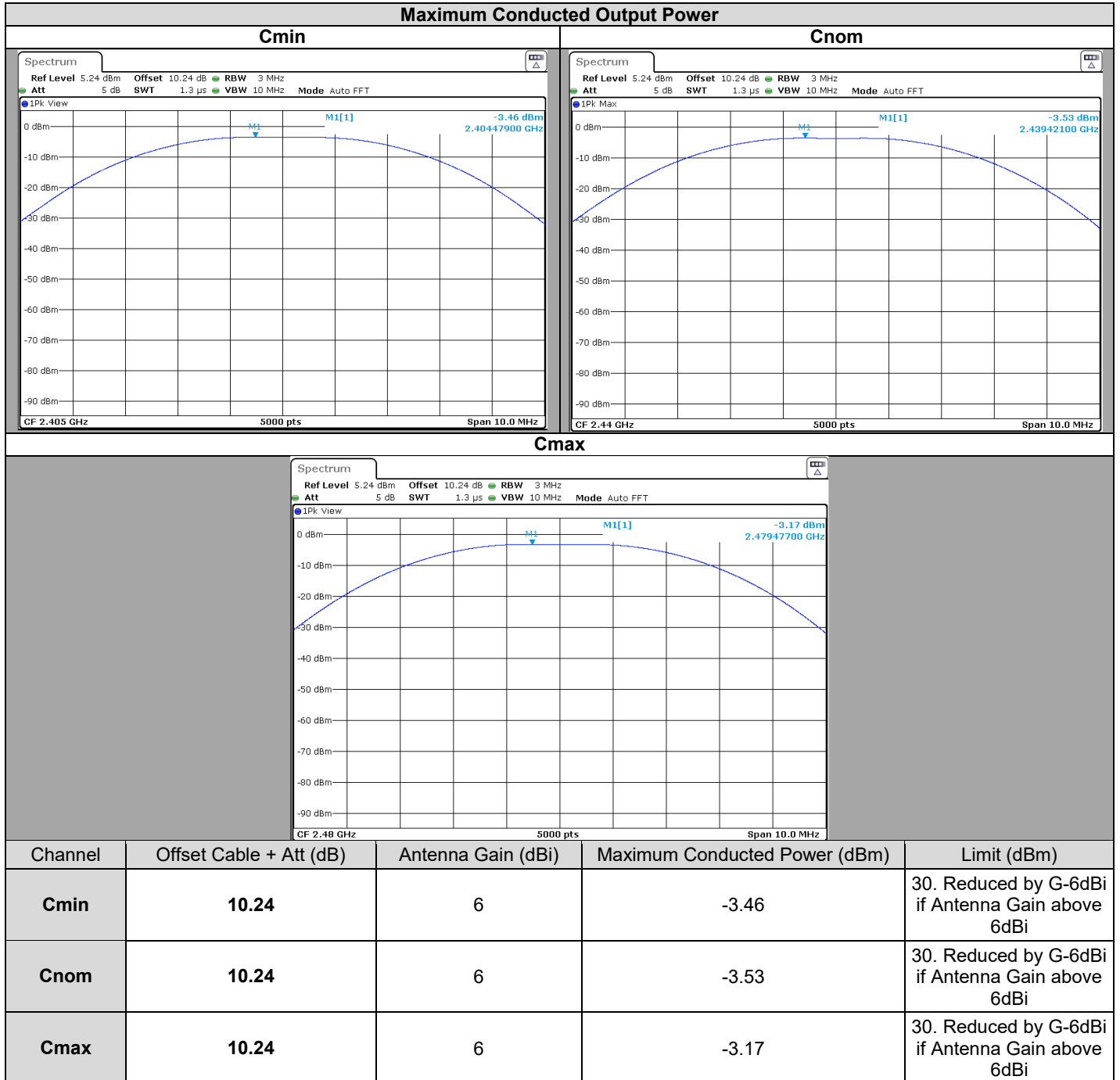
TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	_	A7122269	12/18	02/20
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/21	05/23
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Cable Measure	_	36G	A5329604	02/19	02/20

Note: In our quality system, the test equipment calibration due is more & less 2 months



L C I E

5.5. RESULTS



5.6. CONCLUSION

Maximum Conducted Output Power measurement performed on the sample of the product **LEGRAND ZLGP12**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.

6. POWER SPECTRAL DENSITY

6.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
Date of test : February 4, 2020
Ambient temperature : 22 °C
Relative humidity : 38 %

6.2. TEST SETUP

- The Equipment Under Test is installed:

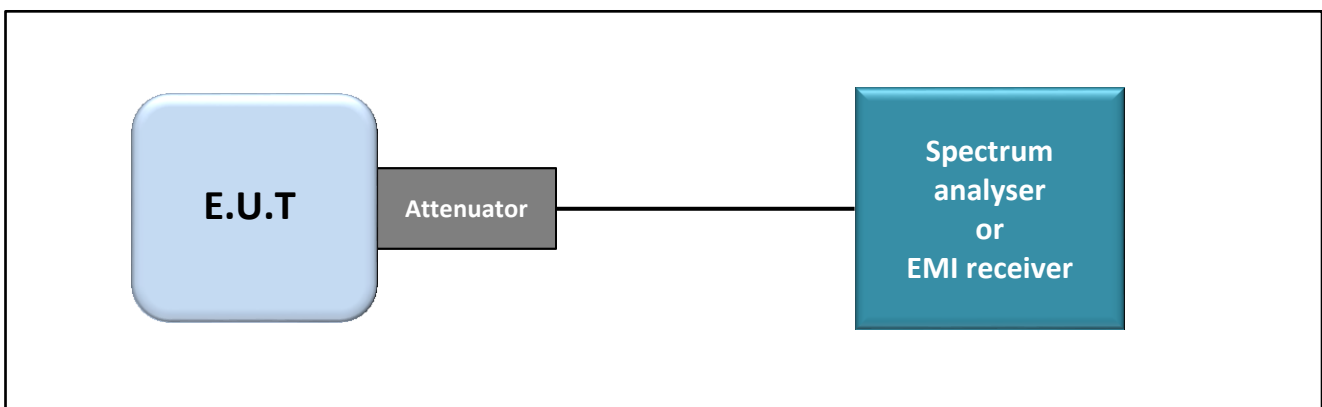
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

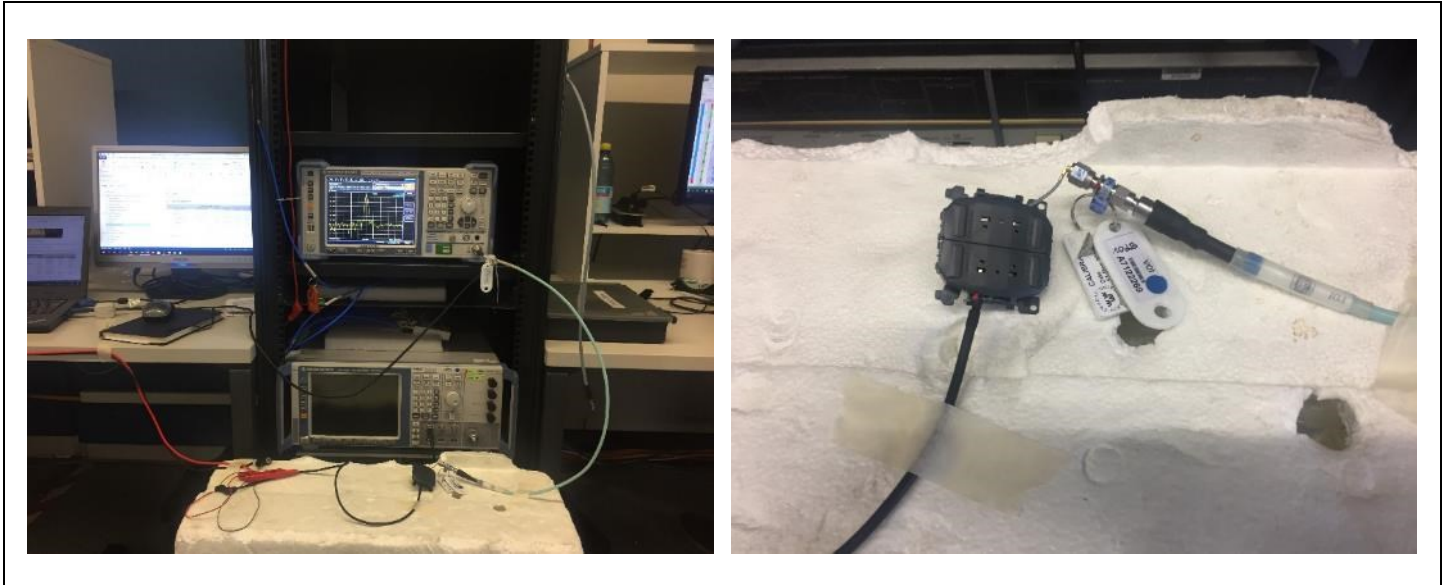
- Conducted Method (welded connection, according to manufacturer's requirements)
- Radiated Method

- Test Procedure:

- KDB 558074 D01 DTS Meas Guidance v05r02 § 8.4 (Method PKPSD)
 - a) Set analyzer center frequency to DTS channel center frequency.
 - b) Set the span to 1.5 times the DTS bandwidth.
 - c) Set the RBW to: 3 kHz.
 - d) Set the VBW $\geq 3 \times$ RBW.
 - e) Detector = peak.
 - f) Sweep time = auto couple.
 - g) Trace mode = max hold.
 - h) Allow trace to fully stabilize.
 - i) Use the peak marker function to determine the maximum amplitude level within the RBW.
 - j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test set up of Power Spectral Density



Photograph for Power Spectral Density

6.3. LIMIT

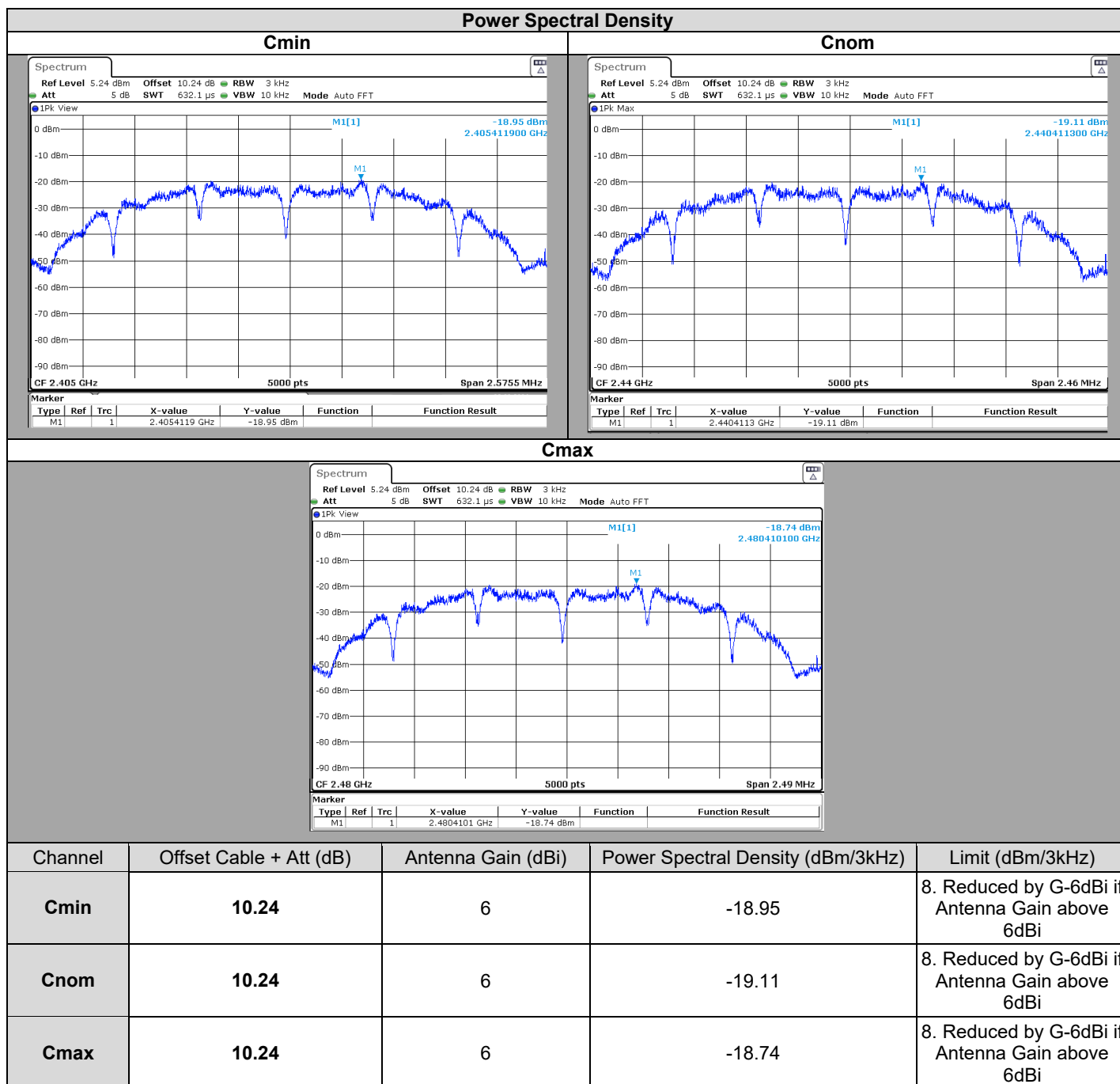
Power Spectral Density:
 2400MHz-2483.5MHz: Shall not exceed 8dBm/3kHz
 Limits are reduced by G-6dBi if Overall Antenna Gain above 6dBi

6.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	—	A7122269	12/18	02/20
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/21	05/23
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Cable Measure	—	36G	A5329604	02/19	02/20

Note: In our quality system, the test equipment calibration due is more & less 2 months

6.5. RESULTS



6.6. CONCLUSION

Power Spectral Density measurement performed on the sample of the product **LEGRAND ZLGP12**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.

7. UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS AT THE BAND EDGE

7.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
Date of test : February 4, 2020
Ambient temperature : 22 °C
Relative humidity : 38 %

7.2. TEST SETUP

- The Equipment Under Test is installed:

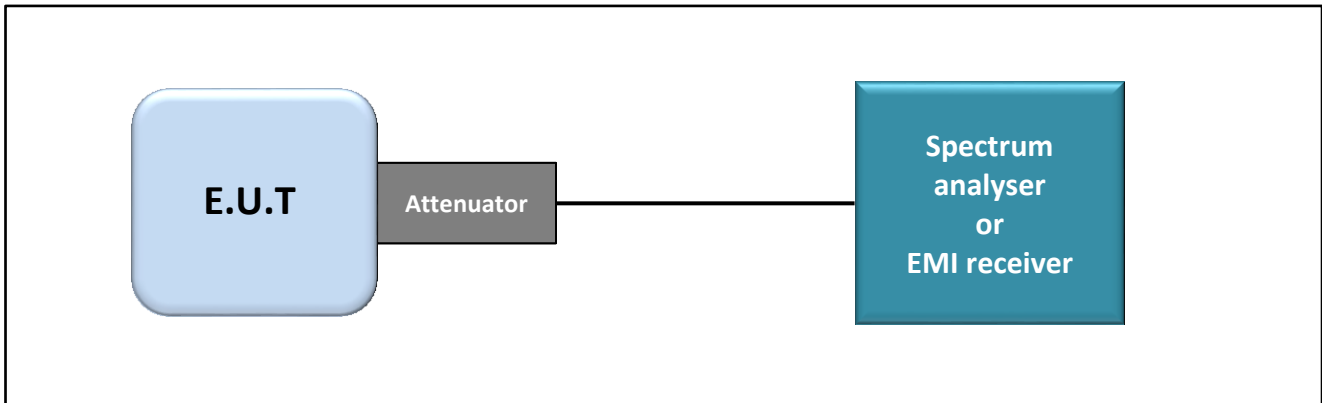
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

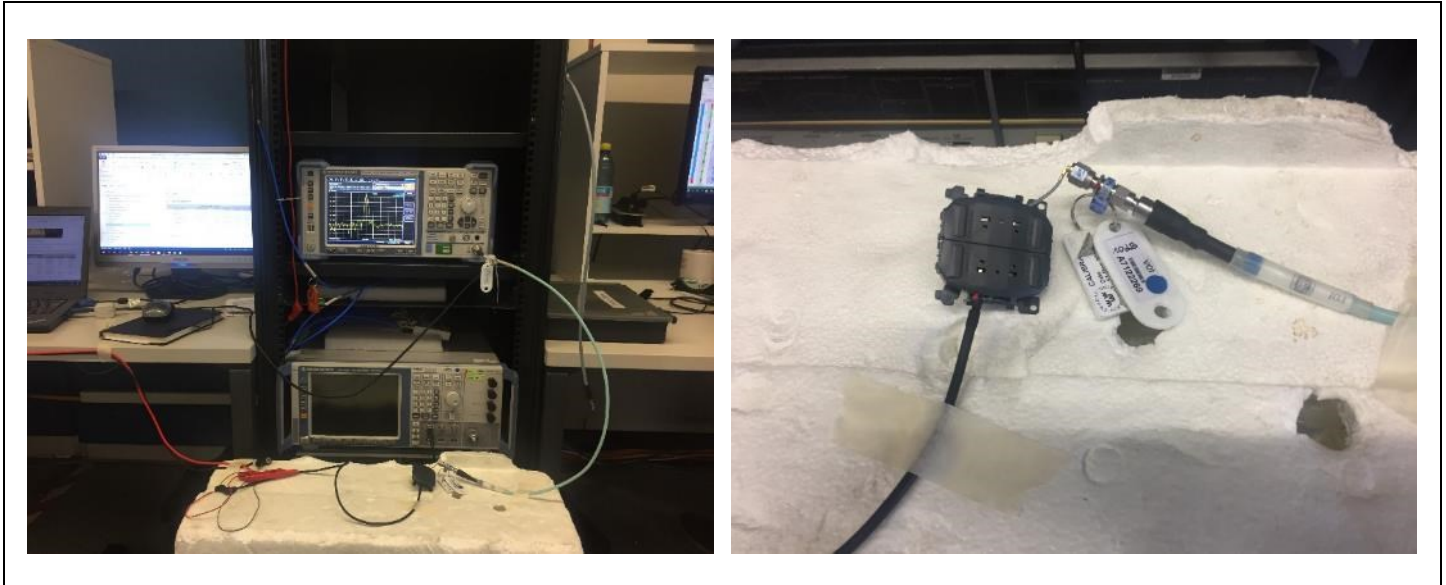
- Conducted Method (welded connection, according to manufacturer's requirements)
- Radiated Method

- Test Procedure:

- KDB 558074 D01 DTS Meas Guidance v05r02 § 8.5



Test set up of Unwanted Emissions into Non-Restricted Frequency Bands at the Band Edge



Photograph for Unwanted Emission into non-restricted frequency bands at the band edge

7.3. LIMIT

All Spurious Emissions must be at least 20dB below the Fundamental Radiator Level at the Band Edge Edge “2400MHz & 2483,5MHz”

7.4. TEST EQUIPMENT LIST

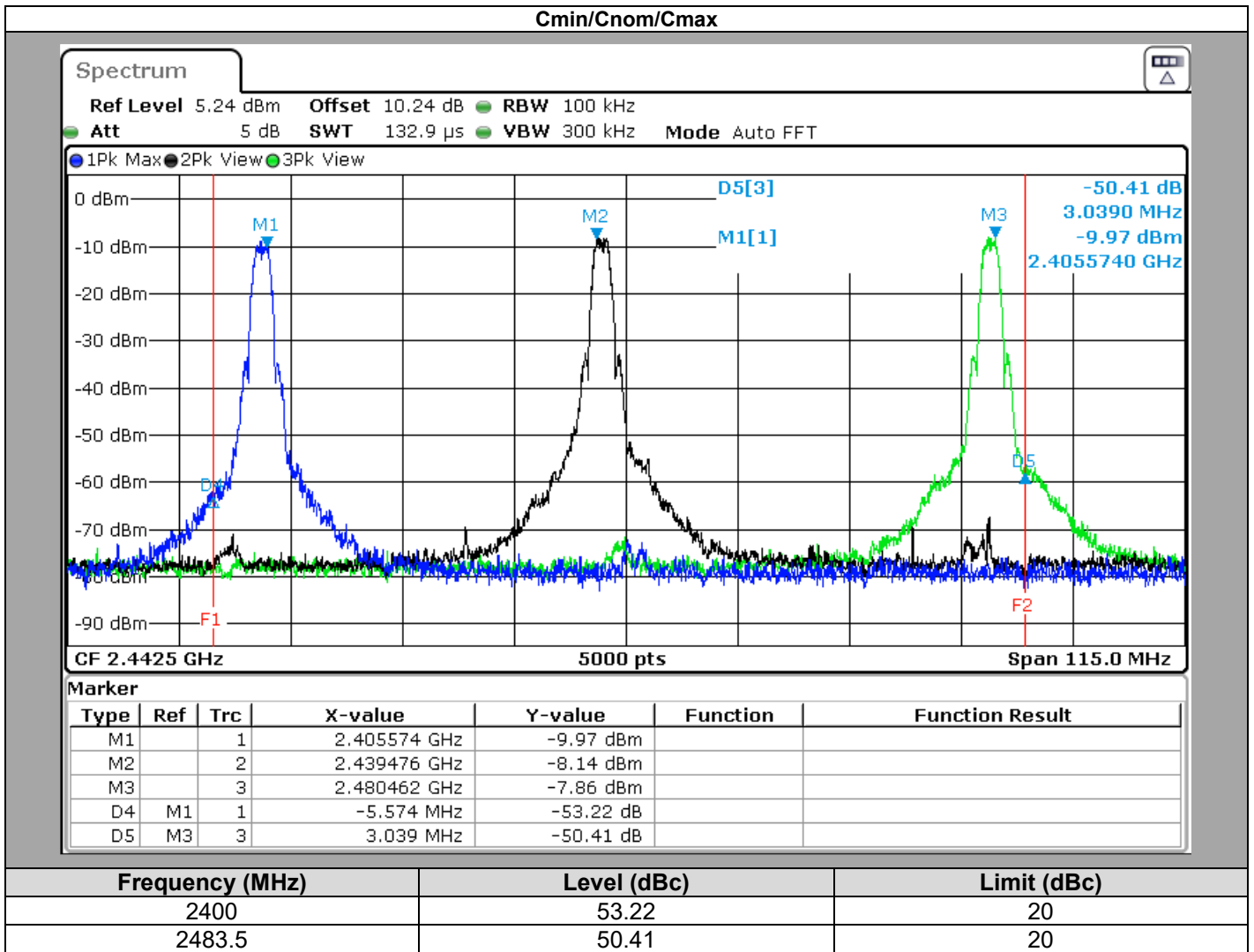
TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	_	A7122269	12/18	02/20
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/21	05/23
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Cable Measure	_	36G	A5329604	02/19	02/20

Note: In our quality system, the test equipment calibration due is more & less 2 months



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7.5. RESULTS



7.6. CONCLUSION

Unwanted Emission into non-restricted frequency bands at the band edge measurement performed on the sample of the product **LEGRAND ZLGP12**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.

8. UNWANTED EMISSIONS INTO NON-RESTRICTED FREQUENCY BANDS

8.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
Date of test : February 4, 2020
Ambient temperature : 22 °C
Relative humidity : 38 %

8.2. TEST SETUP

- The Equipment under Test is installed:

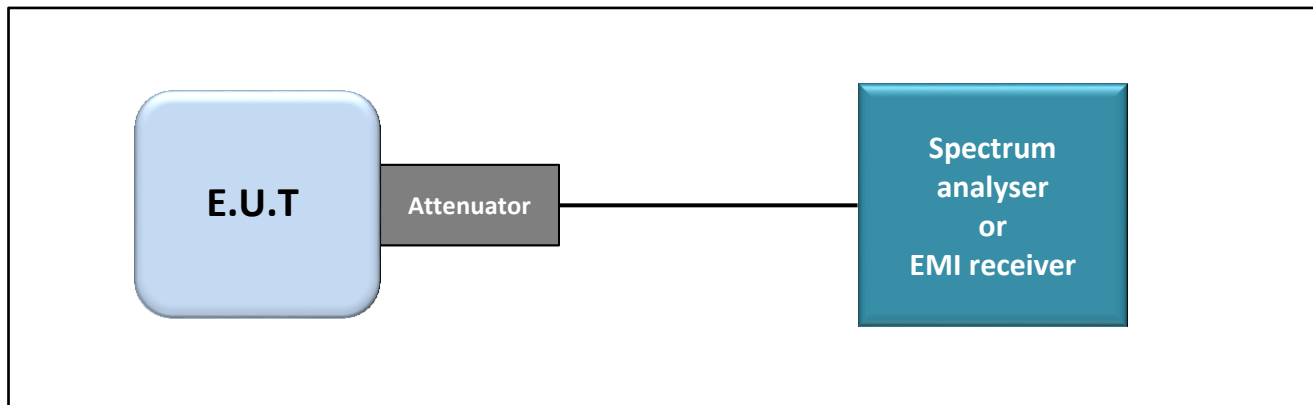
- On a table
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

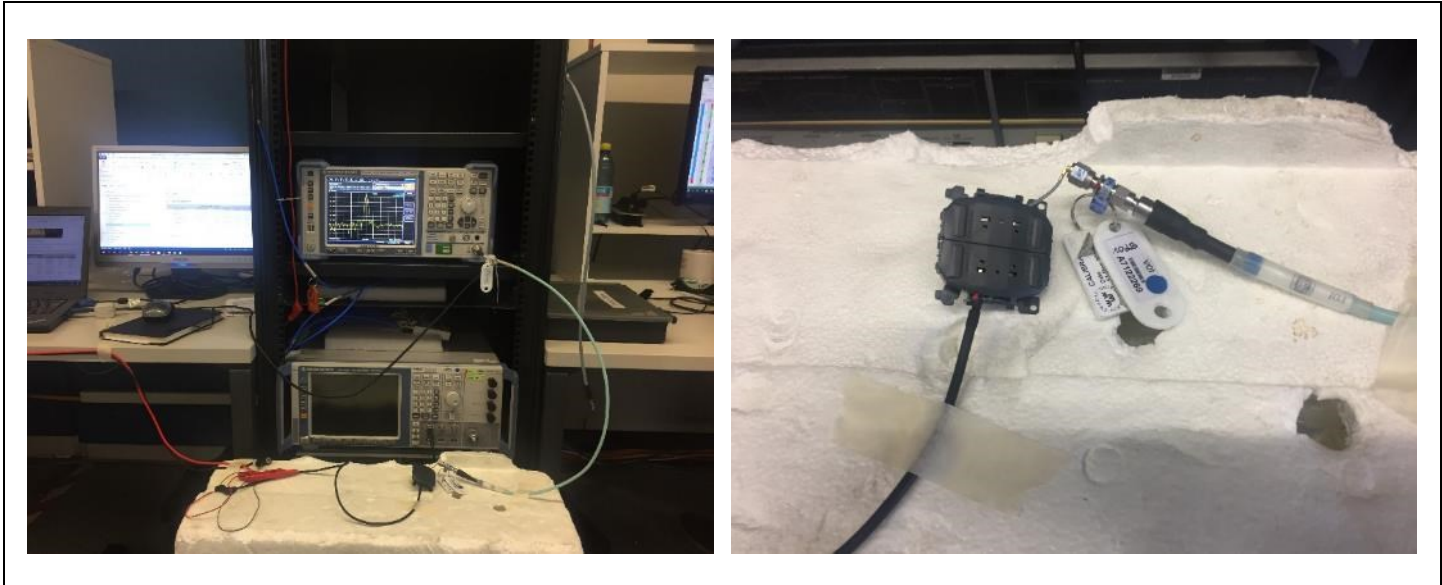
- Conducted Method
- Radiated Method

- Test Procedure:

- KDB 558074 D01 DTS Meas Guidance v05r02 § 8.5



Test set up of Unwanted Emissions into Non-Restricted Frequency Bands



Photograph for Unwanted Emission into non-restricted frequency bands

8.3. LIMIT

All Spurious Emissions must be at least 20 below the Fundamental Radiator Level

8.4. TEST EQUIPMENT LIST

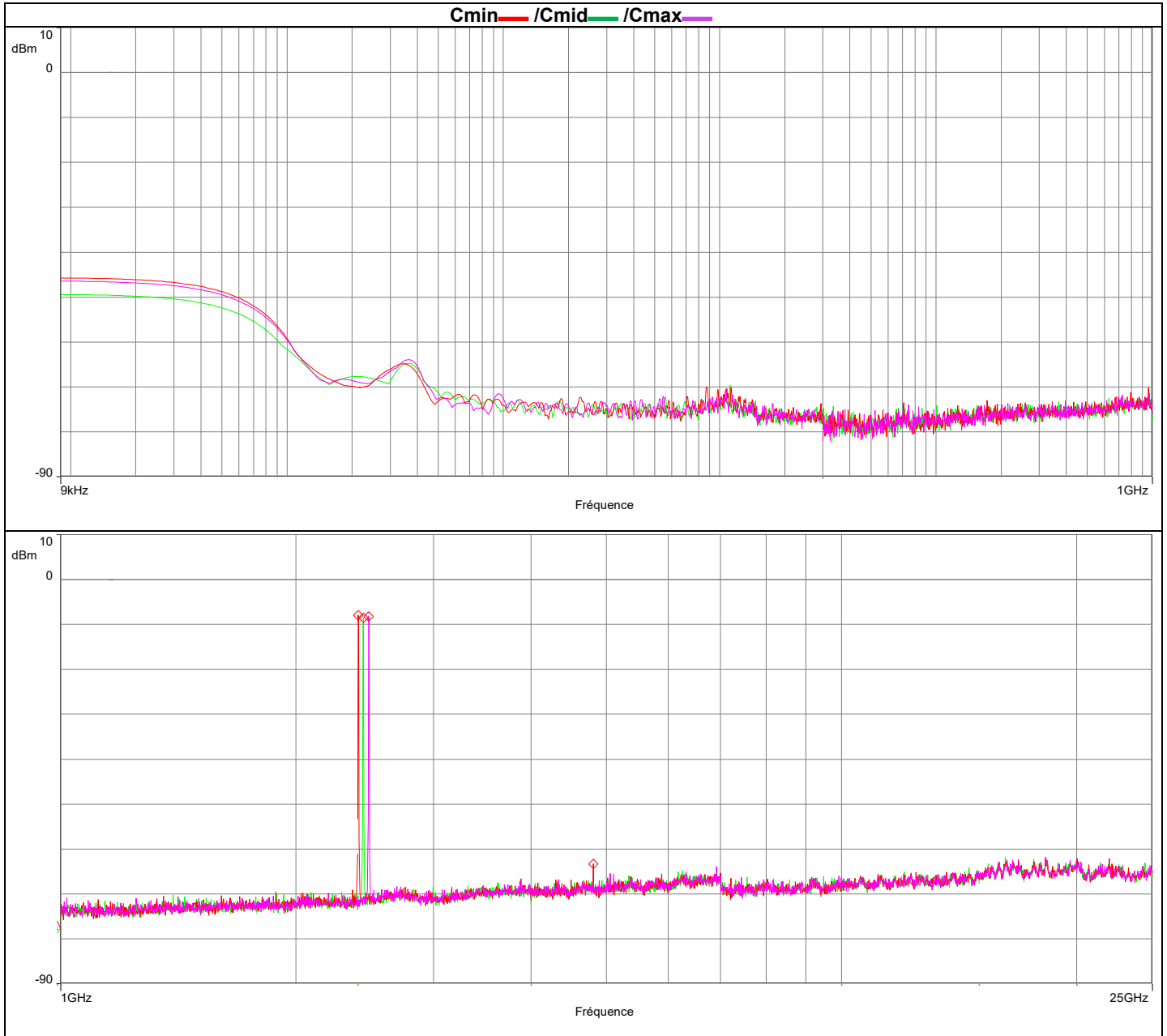
TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Attenuator 10dB	AEROFLEX	_	A7122269	12/18	02/20
Multimeter - CEM	FLUKE	87	A1240251	11/18	11/20
Spectrum analyzer	ROHDE & SCHWARZ	FSV 40	A4060059	05/21	05/23
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Cable Measure	_	36G	A5329604	02/19	02/20

Note: In our quality system, the test equipment calibration due is more & less 2 months



L C I E

8.5. RESULTS





Frequency (MHz)	Level (dBm)	Level (dBc)	Limit (dBc)
2405.00	-7.92		
4810	-63.34	55.42	20
2440.00	-8.51		
2480.00	-8.2		

8.6. CONCLUSION

Unwanted Emission into non-restricted frequency bands measurement performed on the sample of the product **LEGRAND ZLGP12**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the **47 CFR PART 15.247 & RSS 247 ISSUE 2** limits.

9. UNWANTED EMISSIONS IN RESTRICTED FREQUENCY BANDS

9.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH / Mounir BOUAMARA
 Date of test : February 3, 2020
 Ambient temperature : 23 °C
 Relative humidity : 45 %

9.2. TEST SETUP

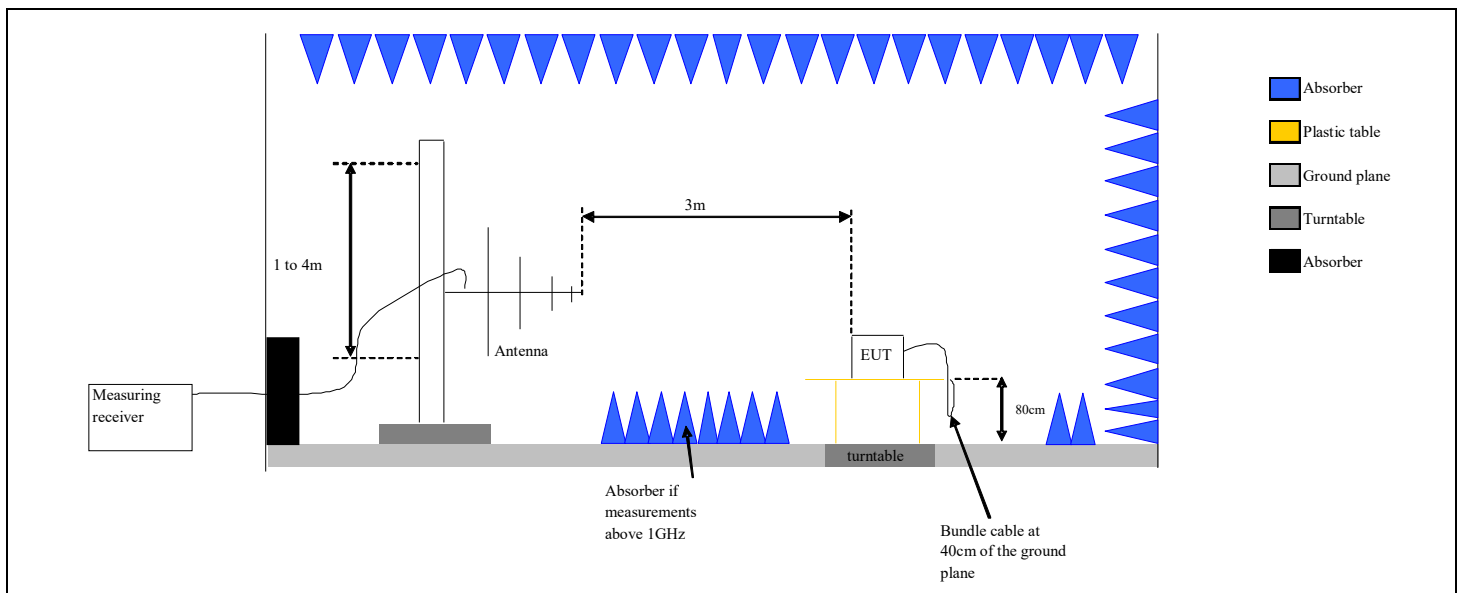
The product has been tested according to ANSI C63.10 (2013) and FCC part15 subpart C. Test is performed in parallel, perpendicular and ground parallel axis with a loop antenna below 30MHz. Measurement bandwidth was 200Hz below 150kHz and 9kHz between 150kHz & 30MHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. Antenna height was 1m. The EUT is placed **on an open area test site**. Distance between measuring antenna and the EUT is **Distance**.

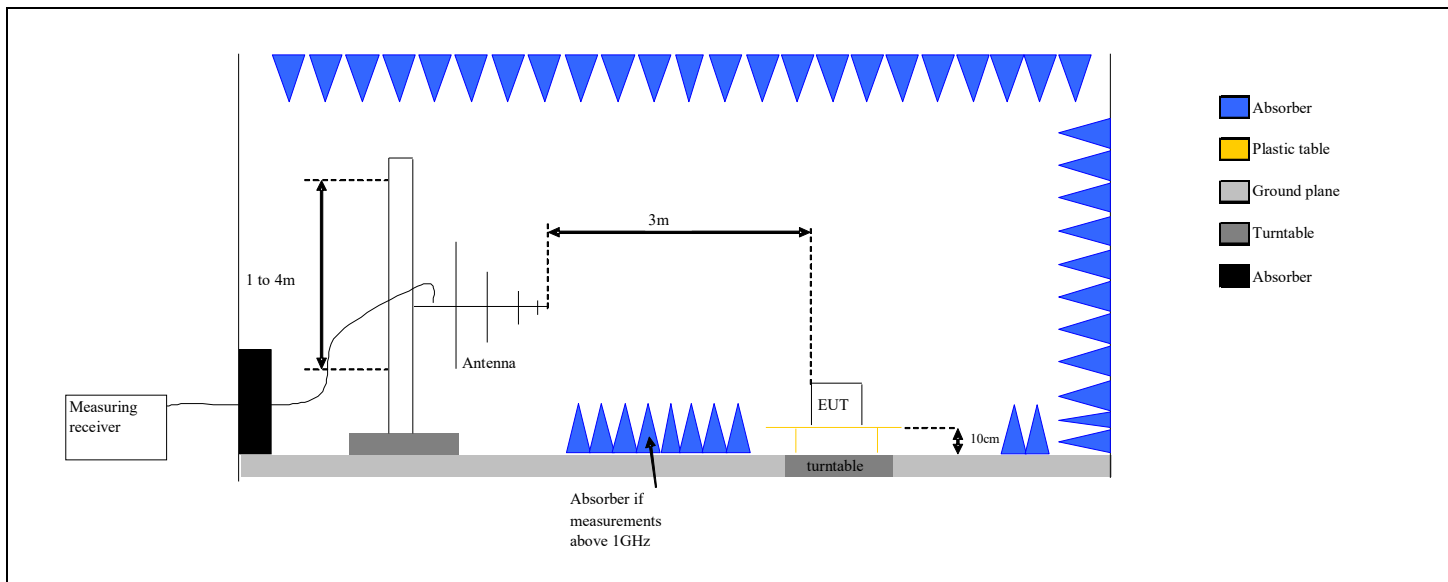
Test is performed in horizontal (H) and vertical (V) polarization with **bilog** between 30MHz & 1GHz and with a horn antenna above 1GHz. Measurement bandwidth was 120kHz below 1GHz and 1MHz above 1GHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. The EUT is placed at 1.5m high above 1GHz and at 0.8m high under 1GHz. The EUT is placed **in a full anechoic chamber** above 1GHz and **on an open area test site** from 30MHz to 1GHz. Distance between measuring antenna and the EUT is **3m**. The height antenna is varied from 1m to 4m from 30MHz to 1GHz and above 1GHz is:

On mast, varied from 1m to 4m

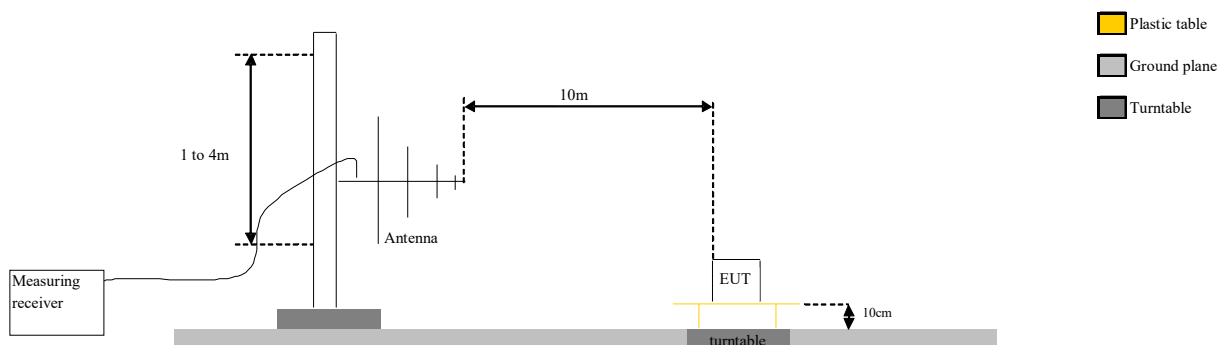
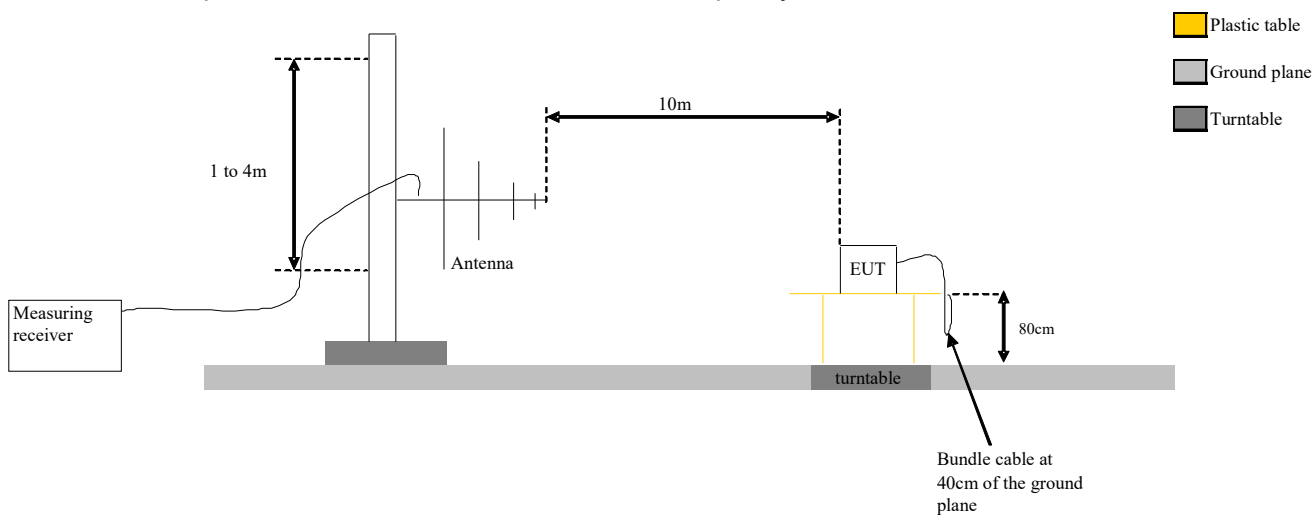
Fixed and centered on the EUT (EUT smaller than the beamwidth of the measurement antenna, ANSI C63.10 §6.6.5)

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

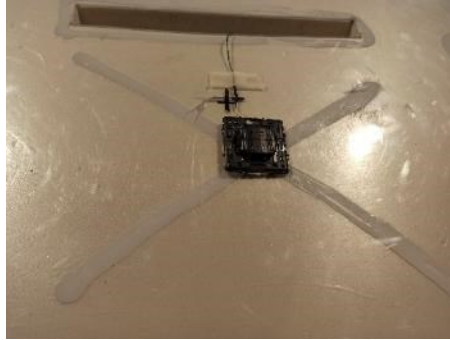




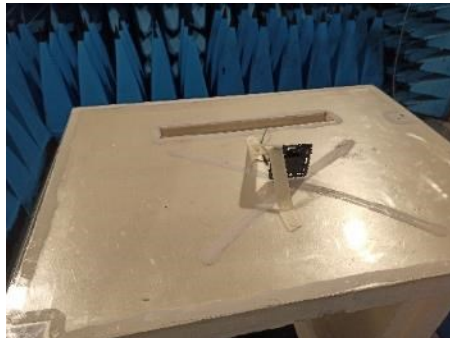
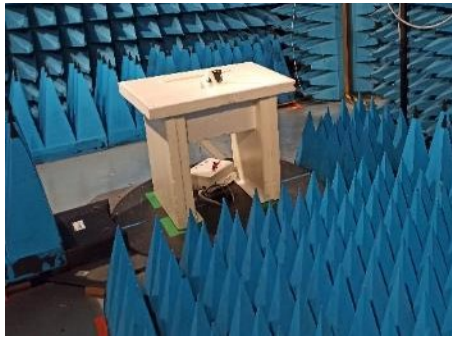
Test set up of Unwanted Emissions in Restricted Frequency Bands in semi anechoic chamber



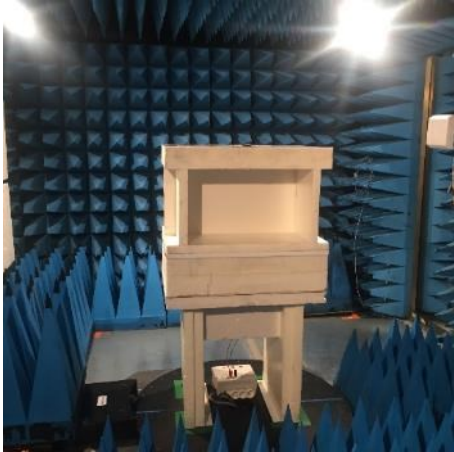
Test Set up for radiated measurement in open area test site



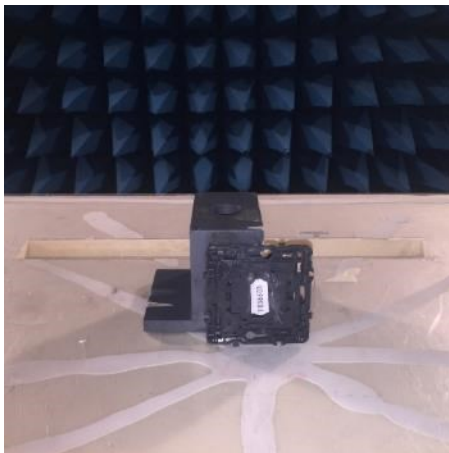
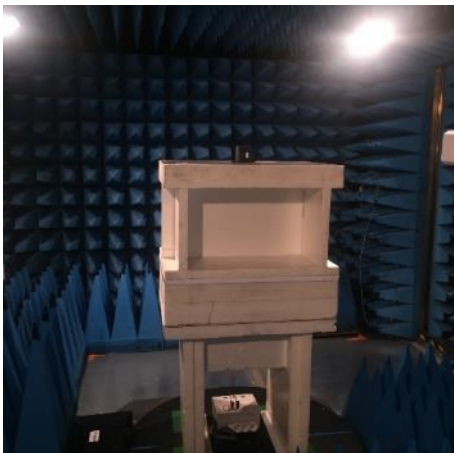
Axis XY on FAR (under 1GHz)



Axis XY on FAR (under 1GHz)



Axis XY on FAR (above 1GHz)



Axis Z on FAR (above 1GHz)



Axis Z on OATS (Worst case)

Photograph for Unwanted Emission in restricted frequency bands



L C I E

9.3. LIMIT

Measure at 300m		
Frequency range	Level	Detector
9kHz-490kHz	67.6dB μ V/m /F(kHz)	QPeak
Measure at 30m		
Frequency range	Level	Detector
490kHz-1.705MHz	87.6dB μ V/m /F(kHz)	QPeak
1.705MHz-30MHz	29.5dB μ V/m	QPeak
Measure at 10m		
Frequency range	Level	Detector
30MHz to 88MHz	29.5dB μ V/m	QPeak
88MHz to 216MHz	33dB μ V/m	QPeak
216MHz to 960MHz	35.5B μ V/m	QPeak
960MHz to 1000MHz	43.5dB μ V/m	QPeak
Above 1000MHz	63.5dB μ V/m	Peak
	43.5dB μ V/m	Average
Measure at 3m		
Frequency range	Level	Detector
30MHz to 88MHz	40dB μ V/m	QPeak
88MHz to 216MHz	43.5dB μ V/m	QPeak
216MHz to 960MHz	46B μ V/m	QPeak
960MHz to 1000MHz	54dB μ V/m	QPeak
Above 1000MHz	74dB μ V/m	Peak
	54dB μ V/m	Average



LCIE

9.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Amplifier 9kHz - 40GHz	LCIE SUD EST	_	A7102082	10/18	03/20
Antenna Bi-Log	CHASE	UPA6192	C2040221	01/18	01/20
Antenna horn 18GHz	EMCO	3115	C2042029	09/17	09/20
BAT EMC	NEXIO	v3.9.0.10	L1000115		
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	01/19	01/20
Emission Cable (SMA 3.3m)	TELEDYNE	26GHz	A5329875	01/19	01/20
Emission Cable (SMA 30cm)	TELEDYNE	26GHz	A5329873	01/19	01/20
Emission Cable <1GHz (Ampl <-> Cage)	-	18GHz	A5329562	08/19	08/20
Emission Cable <1GHz (Ampl <-> Cage)	-	18GHz	A5329907	08/19	08/20
Rehausse Table C3	LCIE	_	F2000507		
Rehausse Table C3	LCIE	_	F2000511		
Semi-Anechoic chamber #3 (BF)	SIEPEL	_	D3044017_BF	03/17	03/20
Semi-Anechoic chamber #3 (VSWR)	SIEPEL	_	D3044017_VSWR	03/17	03/20
Spectrum analyzer	ROHDE & SCHWARZ	FSU 26	A4060058	09/19	09/21
Table C3	LCIE	_	F2000461		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	08/18	08/20
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		
Antenna Bi-log	CHASE	CBL6111A	C2040051	06/19	06/20
Antenna mast (OATS)	ETS Lingren	2071-2	F2000392		
Cable (OATS)	_	1GHz	A5329623	03/19	03/20
Emission Cable	SUCOFLEX	6GHz	A5329061	02/19	02/20
OATS	_	_	F2000409	02/19	02/20
Radiated emission comb generator	BARDET	_	A3169050		
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	12/17	02/20
Table C1/OATS	LCIE	_	F2000445		
Turntable (OATS)	ETS Lingren	Model 2187	F2000403		
Turntable / Mast controller (OATS)	ETS Lingren	Model 2066	F2000372		

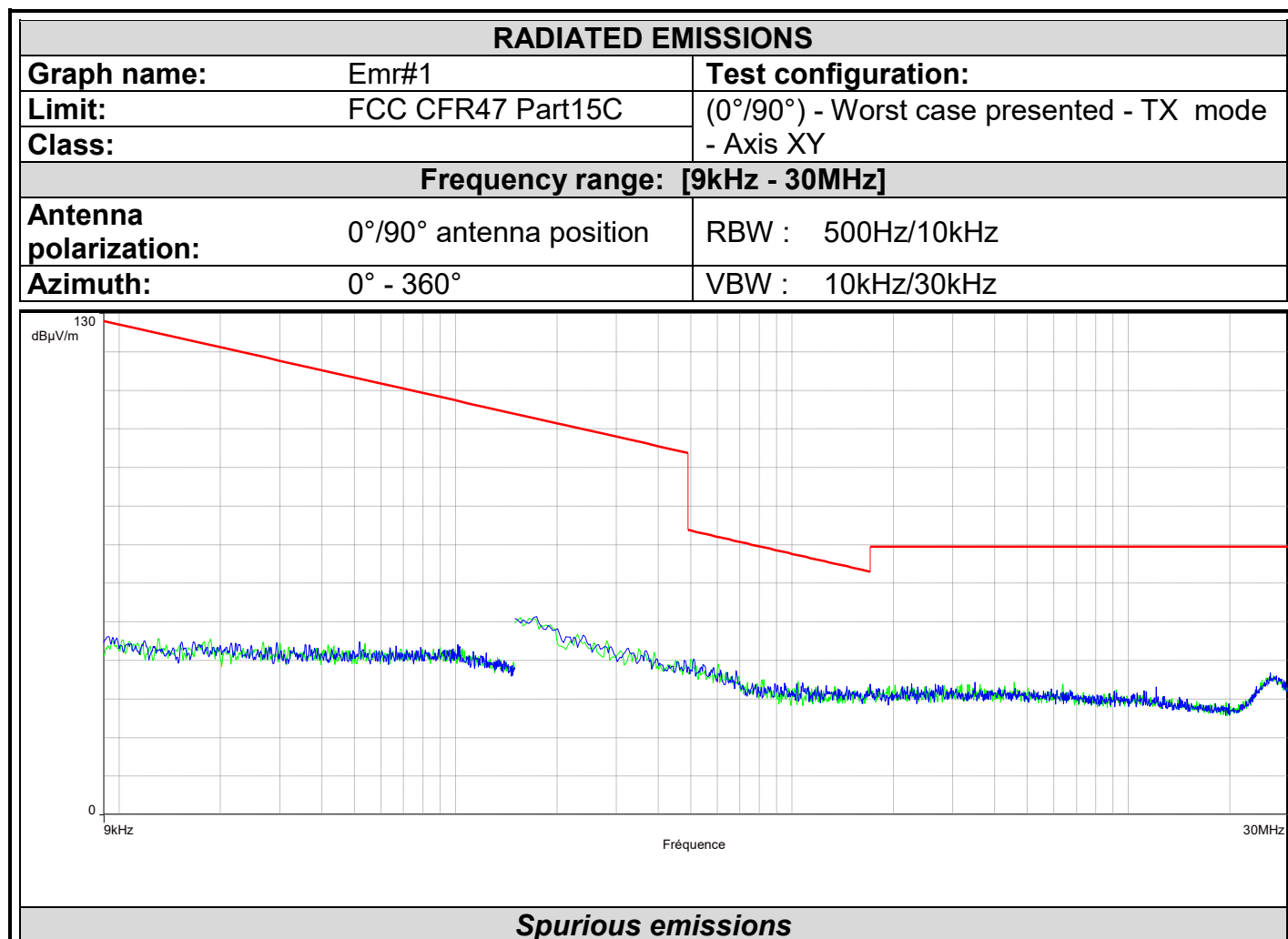
Note: In our quality system, the test equipment calibration due is more & less 2 months

9.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

9.6. RESULTS

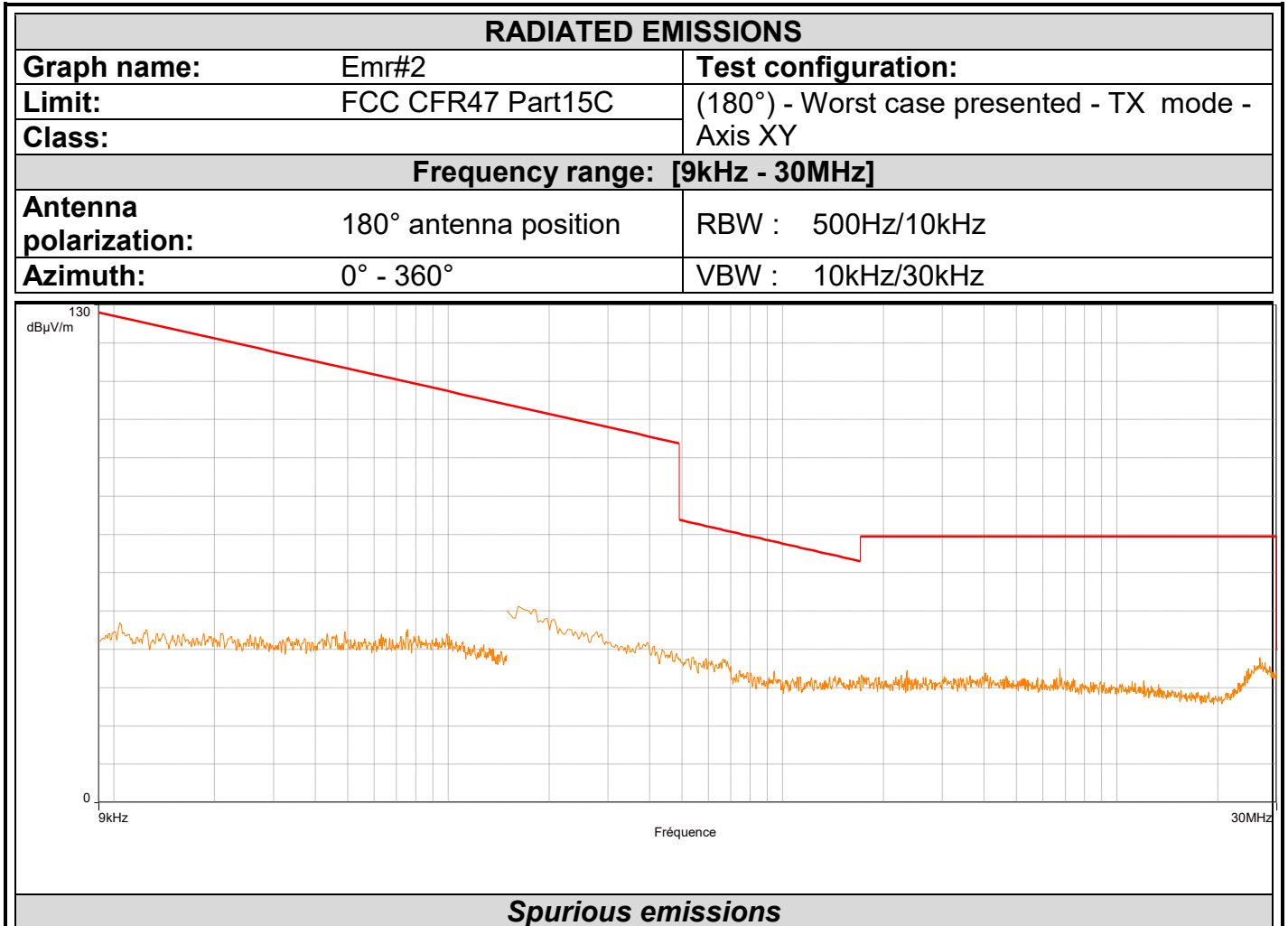
See Test results in §8.5 (Band edge measurement):



No significant frequency observed in 20dB below limit of restricted frequency bands



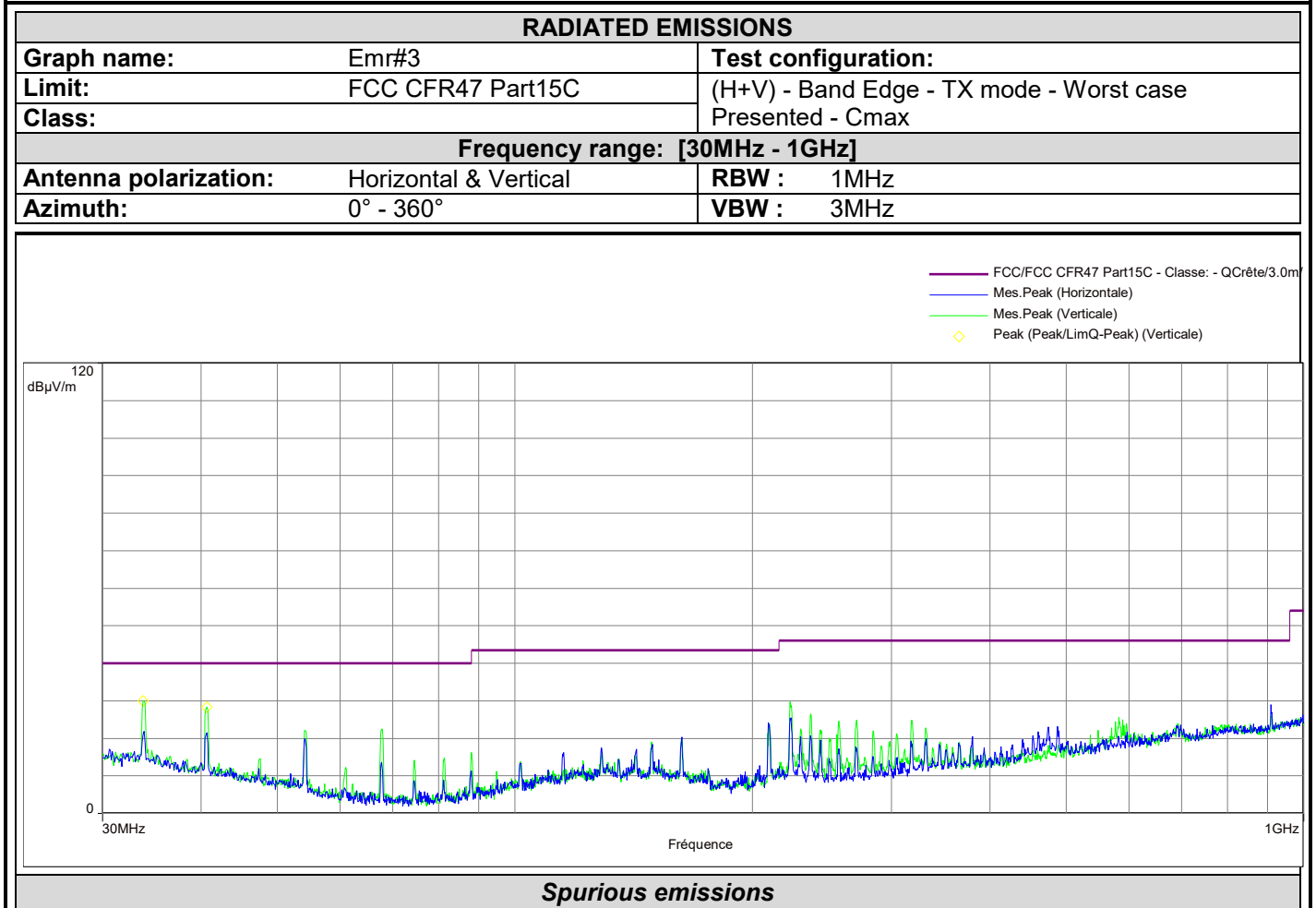
L C I E



No significant frequency observed in 20dB below limit of restricted frequency bands



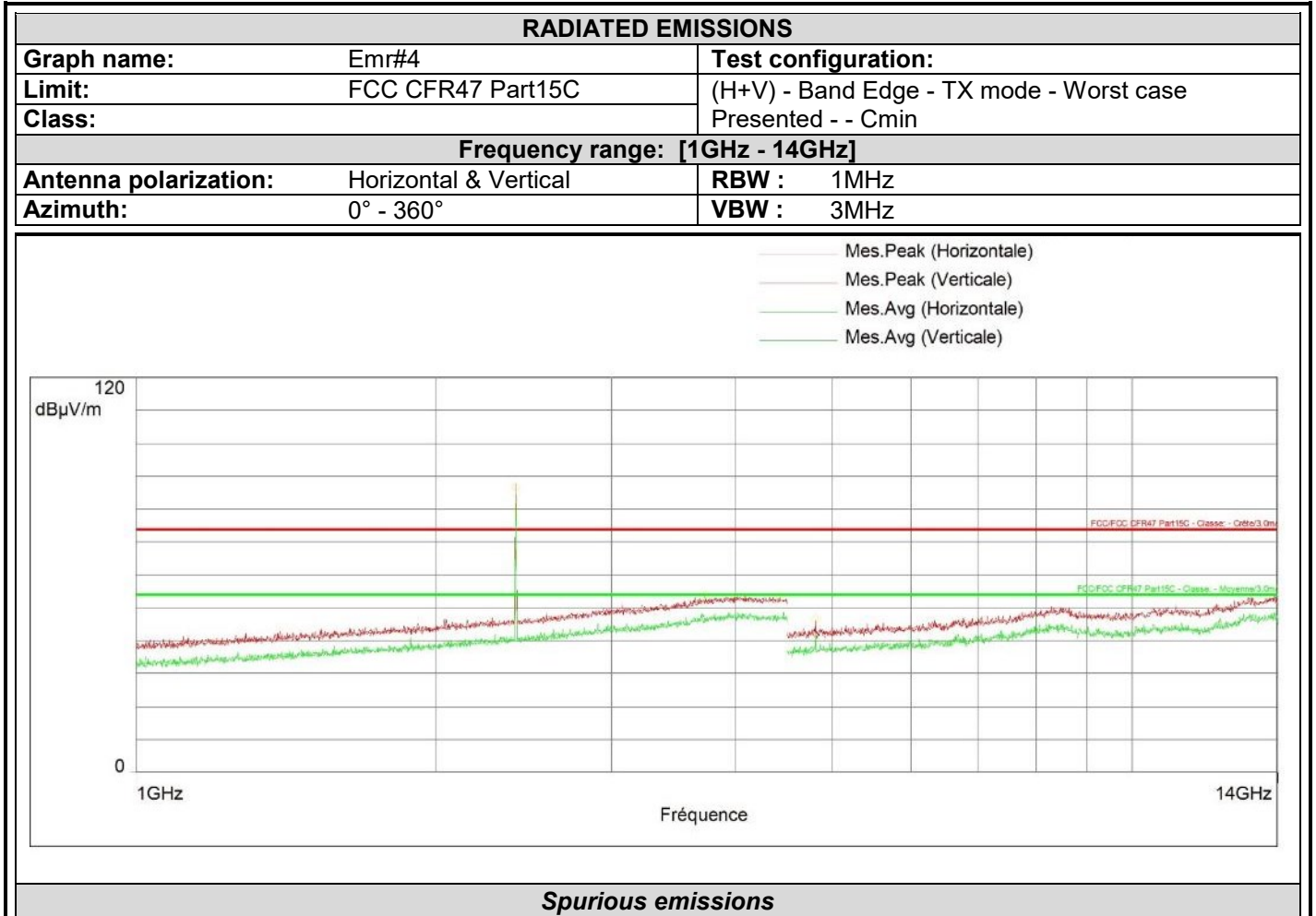
L C I E



Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
33.783	30.0	40.0	-10.0	Vertical	-15.2
40.670	28.2	40.0	-11.8	Vertical	-18.6



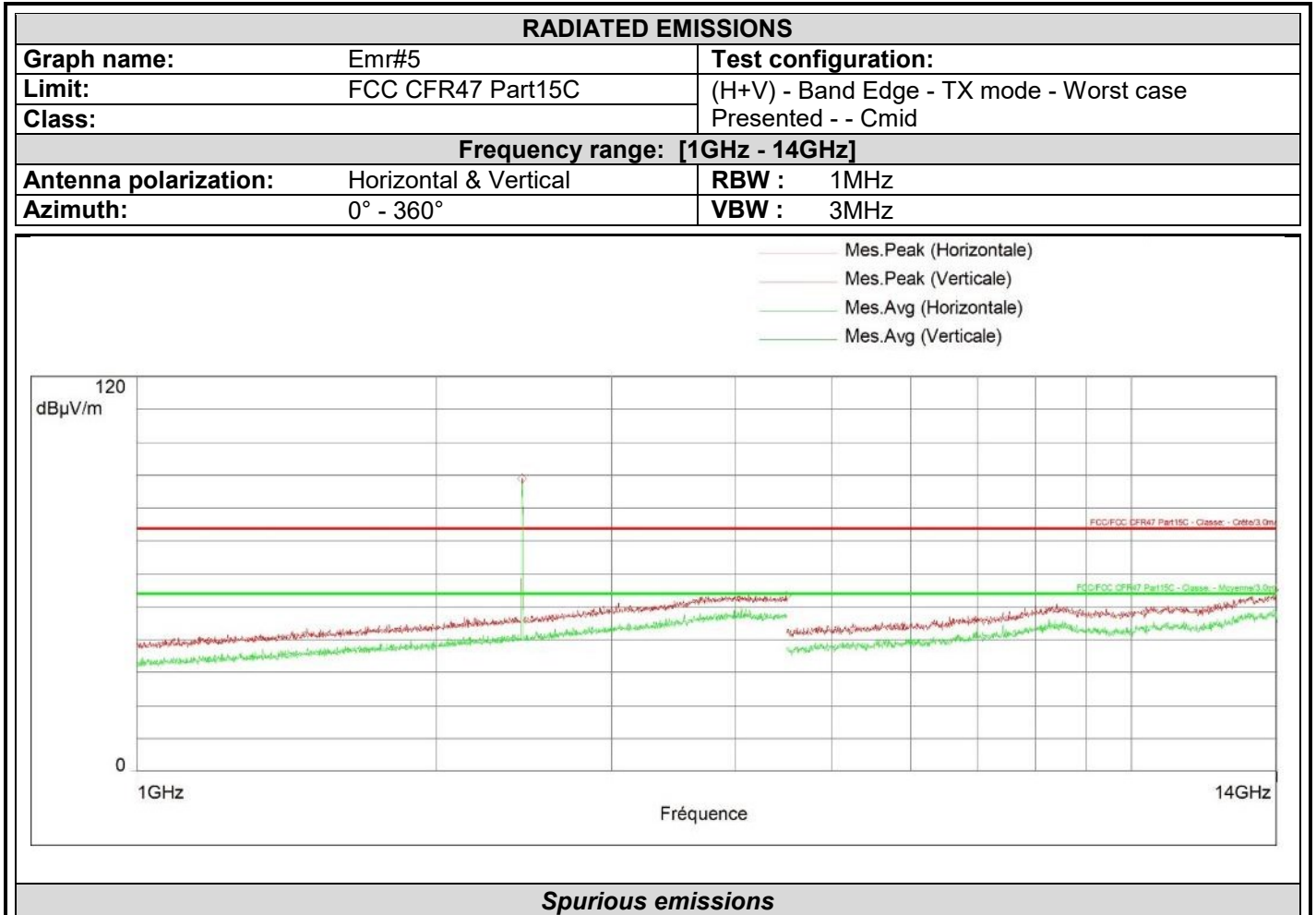
L C I E



Frequency (MHz)	Peak Level (dBµV/m)	Limit Peak (dBµV)	Polarization	Correction (dB)
2404.550	86.7	74	Vertical	33.4
3724.400	53.9	74	Vertical	37.7
4424.750	53.4	74	Vertical	38.2
13919.844	53.5	74	Horizontal	-13.1
4808.750	46.6	74	Vertical	-24.9



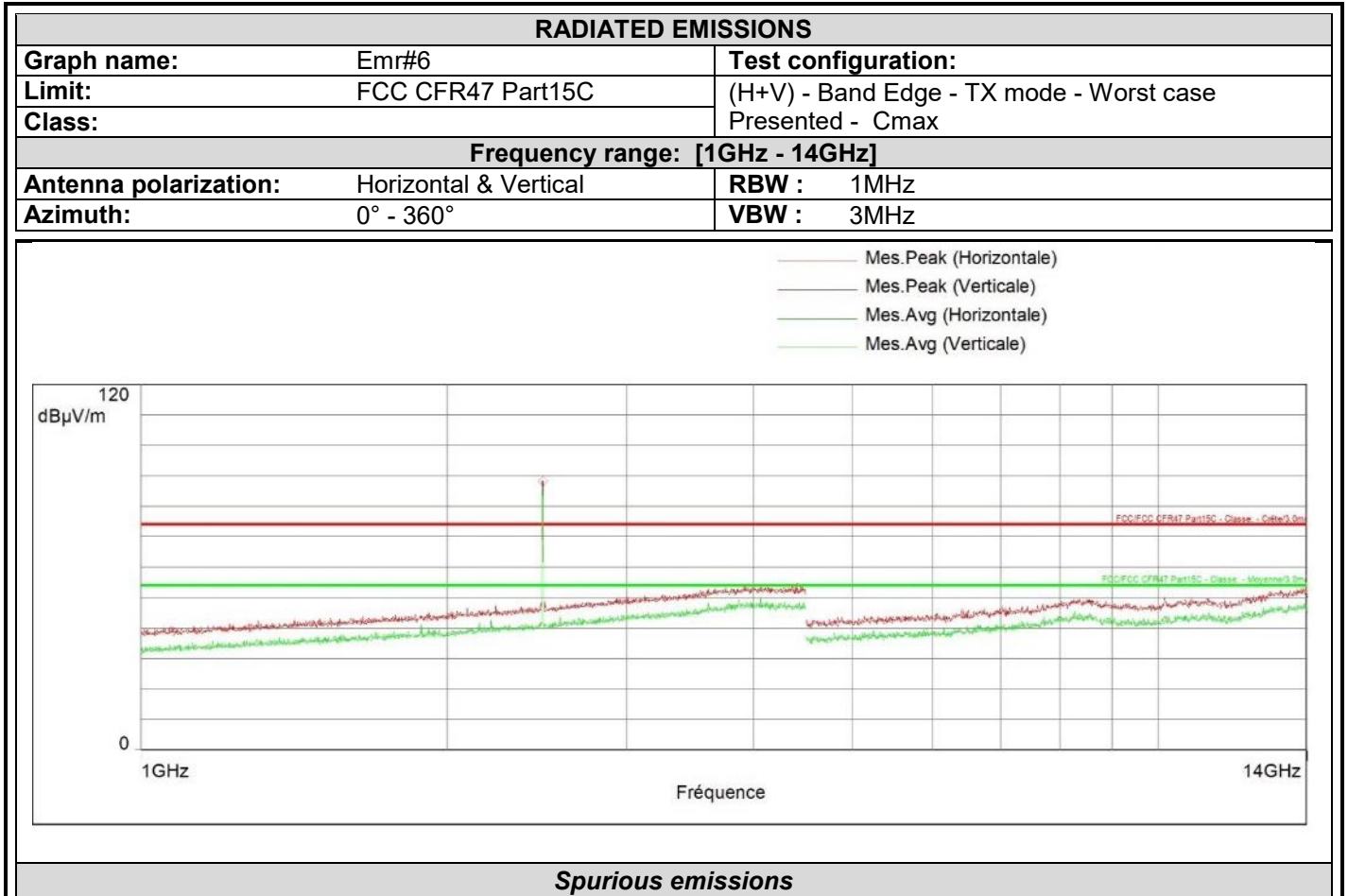
L C I E



Frequency (MHz)	Peak Level (dBµV/m)	Limit Peak (dBµV)	Polarization	Correction (dB)
2439.900	88.9	74	Horizontal	33.5
4493.000	53.5	74	Horizontal	38.2
13891.344	55.0	74	Horizontal	-13.2



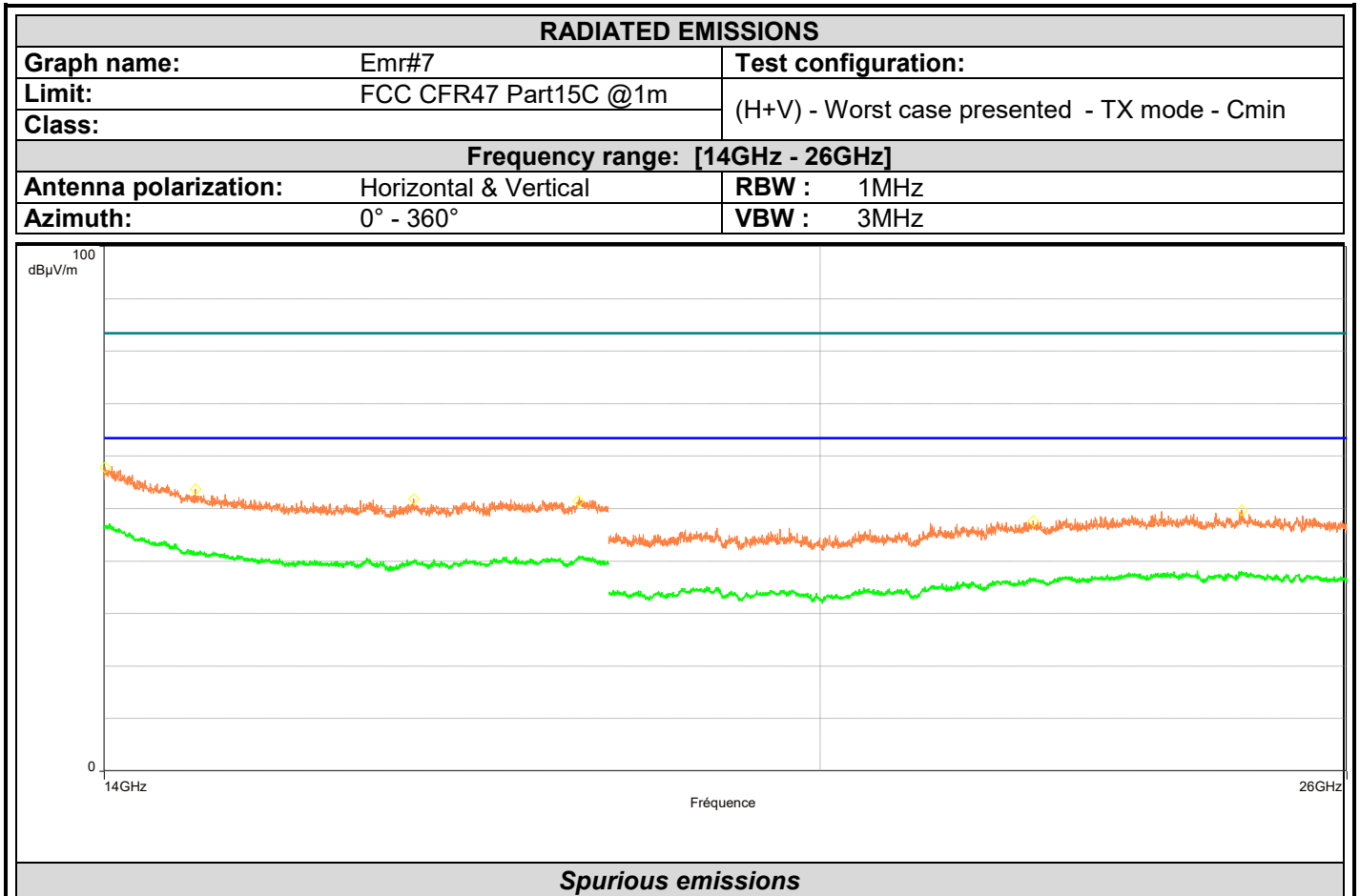
L C I E



Frequency (MHz)	Peak Level (dBµV/m)	Limit Peak (dBµV)	Polarization	Correction (dB)
2480.850	88.2	74	Horizontal	33.7
4411.800	53.3	74	Horizontal	38.2
13983.969	53.2	74	Vertical	-13.0



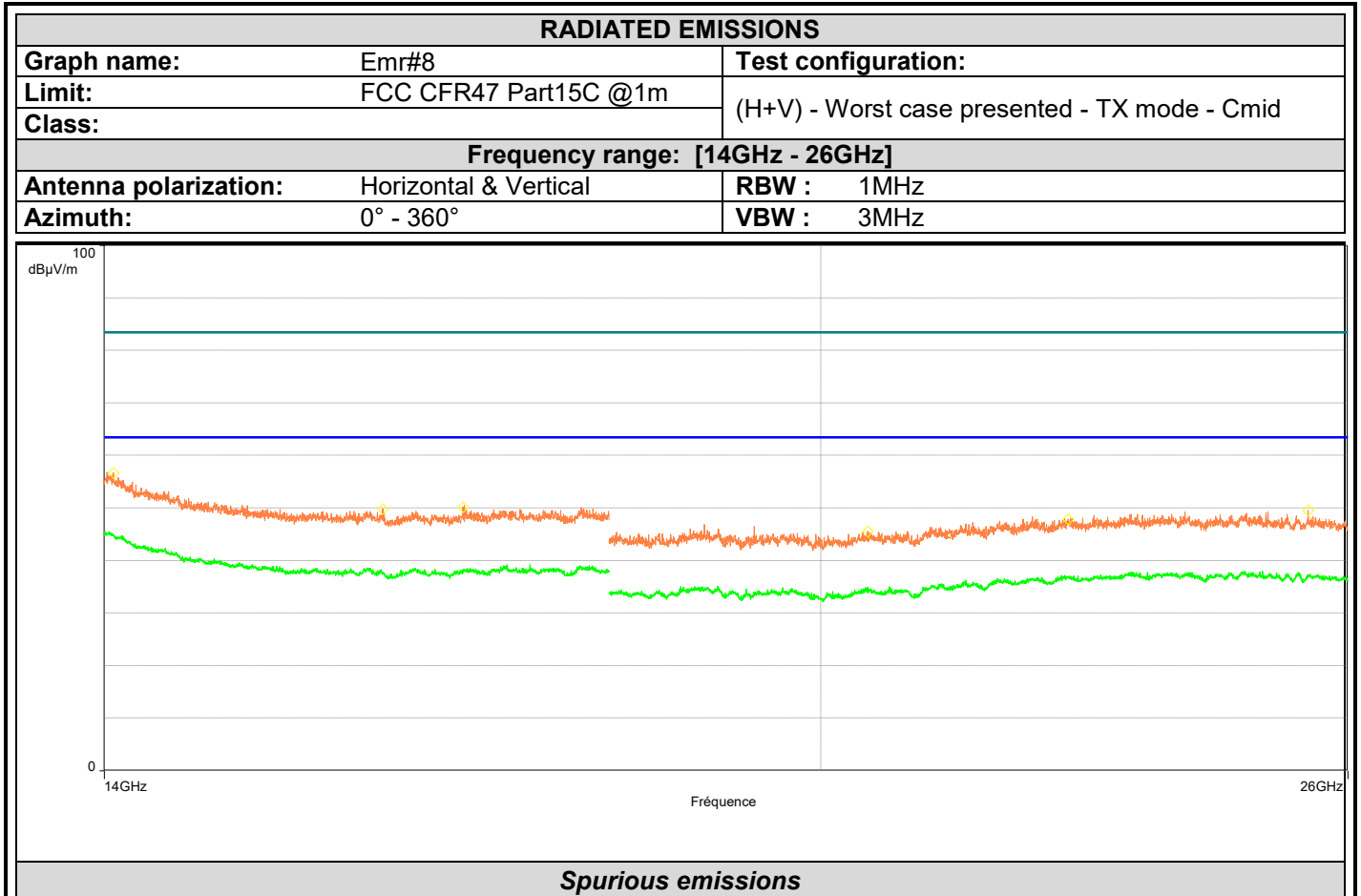
L C I E



Frequency (MHz)	Peak Level (dBµV/m)	Polarization	Correction (dB)
14007.000	57.9	Horizontal	5.6
14652.500	53.8	Horizontal	0.3
16336.000	51.8	Horizontal	-2.2
17731.000	51.5	Horizontal	-1.6
22240.000	47.7	Horizontal	-0.9
24673.000	49.7	Horizontal	0.1



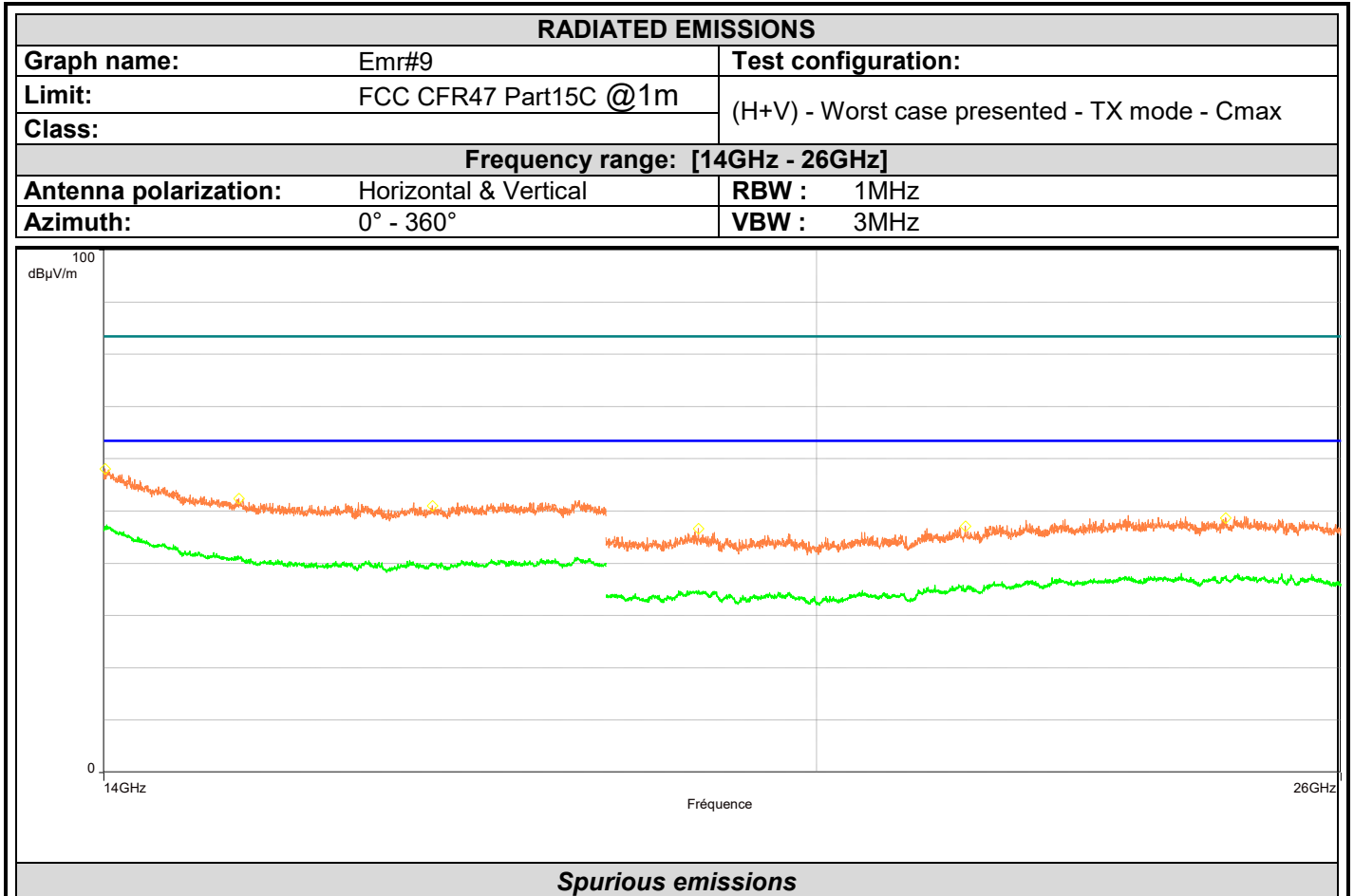
L C I E



Frequency (MHz)	Peak Level (dBµV/m)	Polarization	Correction (dB)
14063.500	56.7	Horizontal	3.6
16082.500	49.8	Horizontal	-4.7
20476.000	45.5	Horizontal	-2.1
22622.000	47.9	Horizontal	-0.6
25491.000	49.5	Horizontal	0.4
16739.500	50.2	Vertical	-4.8



L C I E





QUALIFICATION (30MHz-1GHz): 10 meters measurement on the Open Area Test Site.
 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/A v)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
33.780	9.7	QP	V	300	110	17.6	27.3	40.0	-12.7	Worst case
40.670	9.5	QP	V	180	100	14.0	23.5	40.0	-16.5	Worst case

*Note: Measure have been done at 10m distance and corrected according to requirements of 15.209.e)
 (M@3m = M@10m+10.5dB)*

QUALIFICATION (1GHz- 26GHz): 3 meters measurement in full anechoic chamber. The frequency list is created from the results obtained during the pre-characterization in anechoic chamber.
 Measurements are performed using a PEAK and AVERAGE detection.

Frequency (MHz)	Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Avg Level (dBμV/m)	Avg Limit (dBμV/m)	Margin (dB)	Polarization	Correction (dB)
3724.4	53.9	74	-20.1	45.8	54	-8.2	Vertical	37.7
4424.75	53.4	74	-20.6	45.1	54	-8.9	Vertical	38.2
13919.844	53.5	74	-20.5	44.2	54	-9.8	Horizontal	-13.1
4808.75	46.6	74	-27.4	44.6	54	-9.4	Vertical	-24.9



L C I E

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Avg Level (dB μ V/m)	Avg Limit (dB μ V/m)	Margin (dB)	Polarization	Correction (dB)
4493	44	74	-30	35.4	54	-18.6	Horizontal	38.2
13891.344	45.5	74	-28.5	34.3	54	-19.7	Horizontal	-13.2
14007	48.4	74	-25.6	36.84	54	-17.16	Horizontal	5.6
14652.5	44.3	74	-29.7	32.34	54	-21.66	Horizontal	0.3
16336	42.3	74	-31.7	30.78	54	-23.22	Horizontal	-2.2
17731	42	74	-32	31.35	54	-22.65	Horizontal	-1.6
22240	38.2	74	-35.8	29.35	54	-24.65	Horizontal	-0.9
24673	40.2	74	-33.8	28.58	54	-25.42	Horizontal	0.1
14063.5	47.2	74	-26.8	35.39	54	-18.61	Horizontal	3.6
16082.5	40.3	74	-33.7	28.63	54	-25.37	Horizontal	-4.7
20476	36	74	-38	29.06	54	-24.94	Horizontal	-2.1
22622	38.4	74	-35.6	25.19	54	-28.81	Horizontal	-0.6
25491	40	74	-34	27.65	54	-26.35	Horizontal	0.4
16739.5	40.7	74	-33.3	27.82	54	-26.18	Vertical	-4.8
14009.5	48.6	74	-25.4	37.67	54	-16.33	Horizontal	5.6
14981	42.9	74	-31.1	31.87	54	-22.13	Horizontal	-0.7
16505	41.6	74	-32.4	30.68	54	-23.32	Horizontal	-2.5
18854	37.1	74	-36.9	25.34	54	-28.66	Horizontal	-2
21549	37.6	74	-36.4	26.39	54	-27.61	Horizontal	-1.2
24543	39.2	74	-34.8	28.21	54	-25.79	Horizontal	0

Note: Measure have been done at 1m distance and corrected according to requirements of 15.209.e)
(M@3m = M@1m-9.5dB)

9.7. CONCLUSION

Unwanted Emission in restricted frequency bands measurement performed on the sample of the product **LEGRAND ZLGP12**, SN: **None**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.247 & RSS 247 ISSUE 2 limits.

10. 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
Mesure des perturbations conduites en tension sur le réseau d'énergie <i>Measurement of conducted disturbances in voltage on the power port</i>	3.51 dB	3.6 dB
Mesure des perturbations conduites en tension sur le réseau de télécommunication <i>Measurement of conducted disturbances in voltage on the telecommunication port.</i>	3.26 dB	A l'étude / Under consid.
Mesure des perturbations discontinues conduites en tension <i>Measurement of discontinuous conducted disturbances in voltage</i>	3.45 dB	3.6 dB
Mesure des perturbations conduites en courant <i>Measurement of conducted disturbances in current</i>	3.09 dB	A l'étude / Under consid.
Mesure du champ électrique rayonné sur le site en espace libre de Moirans <i>Measurement of radiated electric field on the Moirans open area test site</i>	5.20 dB	6.3 dB

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.