



LCIE

RFID 13,56MHz Template: Release January 26th, 2022

TEST REPORT

N°: 14531571-777343-A (FILE#3761246)

Version : 01

Subject

**Radio spectrum matters
tests according to standards:
47 CFR Part 15.225 & RSS 210 Issue 10 & RSS-Gen Issue 5**

Issued to

INGENICO
9 avenue de la gare – Rovaltain TGV
26958 – VALENCE Cedex 9
France

Apparatus under test

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

NFC card reader module
INGENICO
INGENICO
OPEN
OPEN2500 CL/POE/BT / OPEN2500 CL/Eth/BT
220647313471260623948272 and
220617313161260223902168
XKB-OPE15CLBTV2
2586D-OPE15CLBTV2

Conclusion

See Test Program chapter

Test date

May 5, 2022 to May 24, 2022

Test location

Moirans

FCC Test site

FR0008 - 197516

ISED Test site

FR0008 - 6500A

Sample receipt date

May 4, 2022

Composition of document

51 pages

Document issued on

June 30, 2022

Written by :
Majid MOURZAGH
Tests operator

Approved by :
Gaetan DESCHAMPS
Technical manager



This document shall not be reproduced, except in full, without the written approval of the LCIE. This document contains results related only to the items tested. It does not imply the conformity of the whole production to the items tested. Unless otherwise specified or rule defined by the test method, the decision of conformity doesn't take into account the uncertainty of measures. This document doesn't anticipate any certification decision.

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
www.lcie.fr



PUBLICATION HISTORY

Version	Date	Author	Modification
01	June 30, 2022	Majid MOURZAGH	Creation of the document

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

1. TEST PROGRAM 4

2. EQUIPMENT UNDER TEST: CONFIGURATION (DECLARED BY PROVIDER) 5

3. OCCUPIED BANDWIDTH..... 10

4. 20DB EMISSION BANDWIDTH 13

5. FREQUENCY TOLERANCE 16

6. AC POWER LINE CONDUCTED EMISSIONS..... 20

7. FIELD STRENGTH OUTSIDE OF THE BANDS 13.110-14.010 MHZ 32

8. FIELD STRENGTH WITHIN THE BAND 13.110-14.010MHZ..... 46

9. UNCERTAINTIES CHART 51



1. TEST PROGRAM

References

- 47 CFR Part 15.225 (2020)
- RSS 210 Issue 10
- RSS Gen Issue 5
- ANSI C63.10 (2013)

Radio requirement:

Clause (47CFR Part 15.225 & RSS-210 Issue 9 & 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)
20dB Bandwidth	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
AC Power Line Conducted Emission	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA(2)	<input type="checkbox"/> NP(1)
Frequency Tolerance	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Field strength within the band 13.110-14.010MHz	<input checked="" type="checkbox"/> PASS	<input type="checkbox"/> FAIL	<input type="checkbox"/> NA	<input type="checkbox"/> NP(1)
Field strength outside of the bands 13.110-14.010 MHz	<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 (3)	<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

(3) Testing covered the receive mode, and receiver spurious emissions are considered to be the same as transmitter.

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. INFORMATIONS

All test are performed with 48VDC PoE (worst case).
 AC power Line conducted Emissions and Field strength outside of the bands 13.110-14.010 MHz are also performed with 24VDC on DC connector

Open1500 and OPEN 2500 are same electronics, difference is plastic casing.

2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):

INGENICO OPEN2500 CL/POE/BT / OPEN2500 CL/Eth/BT

Serial Number: 220647313471260623948272 and 220617313161260223902168



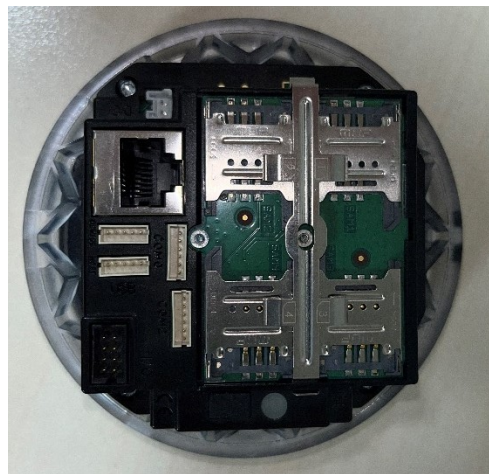
Open2500



Open1500



Powered by : 12-24Vdc



Powered by : POE 48VDC or 12-24Vdc

Equipment Under Test



L C I E

Power supply:

Name	Type	Rating	Reference / Sn	Configuration	Comments
Supply1	<input checked="" type="checkbox"/> DC	12-24VDC	/	Configuration n°1	Power supply 24Vdc on DC connector
Supply2	<input checked="" type="checkbox"/> DC	48VDC	/	Configuration n°2	Power supply 48Vdc on POE (Power Over Eternet)

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	2wires	1.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
Ethernet cable	RJ45 (Ethernet)	1.8	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
COM0 cable	RS232	1	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
USB Device cable	USB	0.9	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	/
Access4	microSD (MMC)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	/
Access5	SAM1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	/
Access6	SAM2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	/

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Contactless card	Type B	296116026	INGENICO
POE adapter	TP-LINK / TL-POE200A	2168528003068	48VDC
AC/DC power source	KEYSIGHT	AC6802A -	A7042305
Laptop	DELL	/	INGENICO

Equipment information (declaration of provider):

Type:	<input checked="" type="checkbox"/> RFID		
Frequency band:	[13.553 to 13.567] MHz		
Number of Channel:	1		
Antenna Type:	<input checked="" type="checkbox"/> Integral	<input type="checkbox"/> External	<input type="checkbox"/> Dedicated
Transmit chains:	1		
Receiver chains:	1		
Type of equipment:	<input checked="" type="checkbox"/> Stand-alone	<input type="checkbox"/> Plug-in	<input type="checkbox"/> Combined
Equipment arrangement:	<input checked="" type="checkbox"/> Tabletop	<input type="checkbox"/> Floor-standing	<input type="checkbox"/> Multiple orientations
Equipment type:	<input checked="" type="checkbox"/> Production model		<input type="checkbox"/> Pre-production model
Operating temperature range:	Tmin:	<input checked="" type="checkbox"/> -30°C	<input type="checkbox"/> X°C*
	Tnom:	20°C	
	Tmax:	<input type="checkbox"/> 50°C	<input checked="" type="checkbox"/> +70°C*
Operating voltage:	Vmin	<input checked="" type="checkbox"/> 10.2Vdc	<input checked="" type="checkbox"/> 40.8Vdc
	Vnom:	<input checked="" type="checkbox"/> 24 Vdc	<input checked="" type="checkbox"/> 48Vdc
	Vmax	<input checked="" type="checkbox"/> 27.6Vdc	<input checked="" type="checkbox"/> 55.2Vdc

Hardware information

Software (if applicable):	V. :	-0000- => 1 OS VERSION: 050501 -c101- 2 OS CRC: 0xc417 -0001- -c102- 3 APPLI VERSION: 030400 -0002- -c103- 4 APPLI CRC: 0xCC85 -0003-
---------------------------	------	---

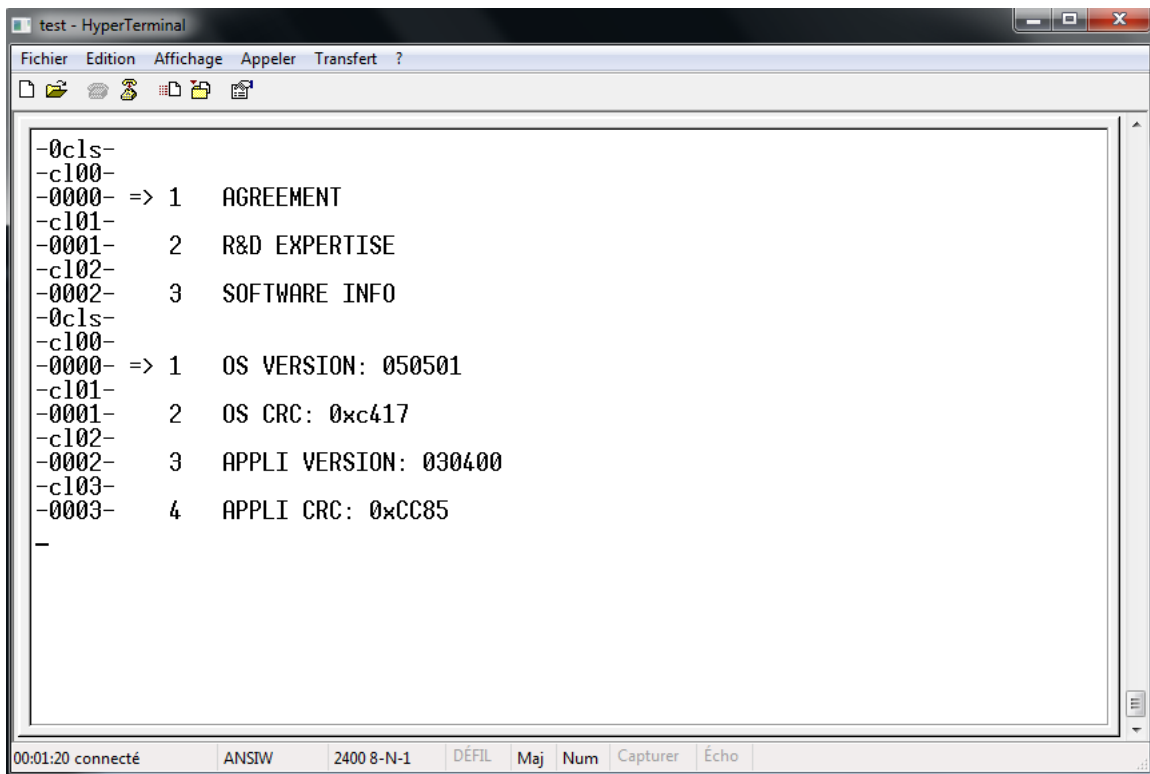
2.3. RUNNING MODE

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()
Frequency Tolerance	<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()
Field strength within the band 13.110-14.010MHz	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()
Field strength outside of the bands 13.110-14.010 MHz	<input checked="" type="checkbox"/> Test mode 1 (1) <input type="checkbox"/> Alternative test mode()
Receiver Radiated Emissions	<input checked="" type="checkbox"/> Test mode 2 (2) <input type="checkbox"/> Alternative test mode()

(1) Following commands with the specific test software are used to set the product:

(2) Note: The test can't be performed because the transmitter and receiver are operating at the same frequency and the transmitter cannot be switched off as the carrier is used as receiver injection signal



```

-0cls-
-c100-
-0000- => 1  AGREEMENT
-c101-
-0001-  2  R&D EXPERTISE
-c102-
-0002-  3  SOFTWARE INFO
-0cls-
-c100-
-0000- => 1  OS VERSION: 050501
-c101-
-0001-  2  OS CRC: 0xc417
-c102-
-0002-  3  APPLI VERSION: 030400
-c103-
-0003-  4  APPLI CRC: 0xCC85
-

```



L C I E

```
test - HyperTerminal
Fichier Edition Affichage Appeler Transfert ?
- c103-
- 0003- 4 APPLI CRC: 0xCC85
- 0cls-
- c100-
- 0000- => 1 AGREEMENT
- c101-
- 0001- 2 R&D EXPERTISE
- c102-
- 0002- 3 SOFTWARE INFO
- 0cls-
- c100-
- 0000- => 1 BLUETOOTH AGREEMENT
- c101-
- 0001- 2 SAFETY/EMC AGREEMENT
- c102-
- 0002- 3 RFID AGREEMENT
- 0cls-
- c100-
- 0000- => 1 MIFARE
- c101-
- 0001- 2 ISO 14443 TYPE A
- c102-
- 0002- 3 ISO 14443 TYPE B
-
00:02:26 connecté ANSIW 2400 8-N-1 DÉFIL Maj Num Capturer Écho
```

2.4. EQUIPMENT LABELLING

None

2.5. EQUIPMENT MODIFICATION

None Modification:



2.6. 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 52.5dB μ V 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 dB μ V/m.

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

The 32 dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

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

2.7. 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. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
Date of test : May 6, 2022
Ambient temperature : 22 °C
Relative humidity : 39 %

3.2. TEST SETUP

- The Equipment Under Test is installed:

- On a table
- In a climatic chamber
- In an anechoic chamber

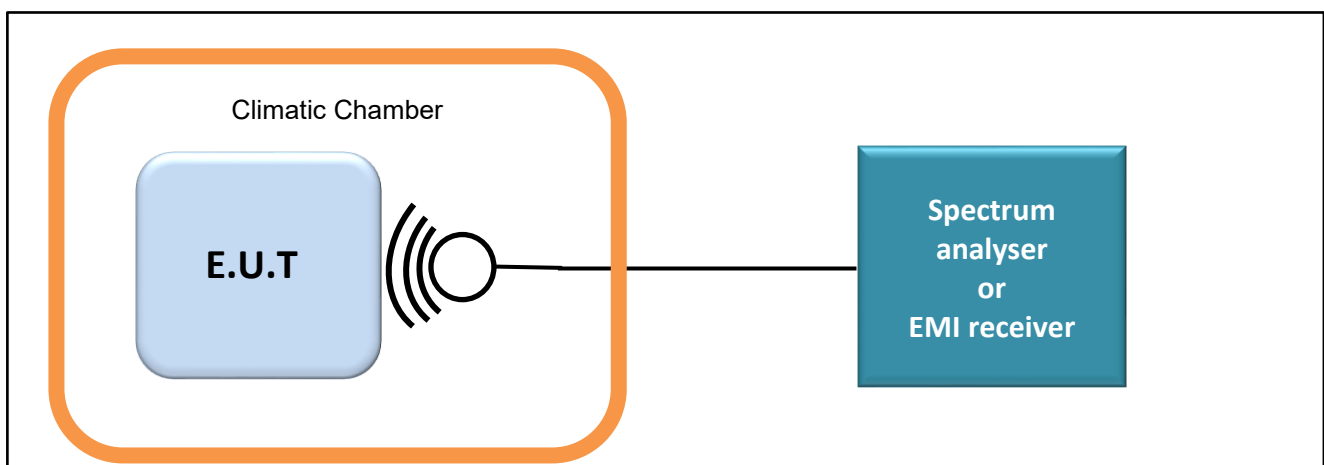
- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

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.

- Test Procedure:

- RSS-Gen Issue 5 § 6.7
 - RBW used in the range of 1% to 5% of the anticipated emission bandwidth
 - Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
 - Detector = Peak.
 - Trace mode = Max Hold.
 - Sweep = Auto couple.
 - Allow the trace to stabilize.
 - OBW 99% function of spectrum analyzer used



Test set up of Occupied Bandwidth



Photograph for Occupied bandwidth

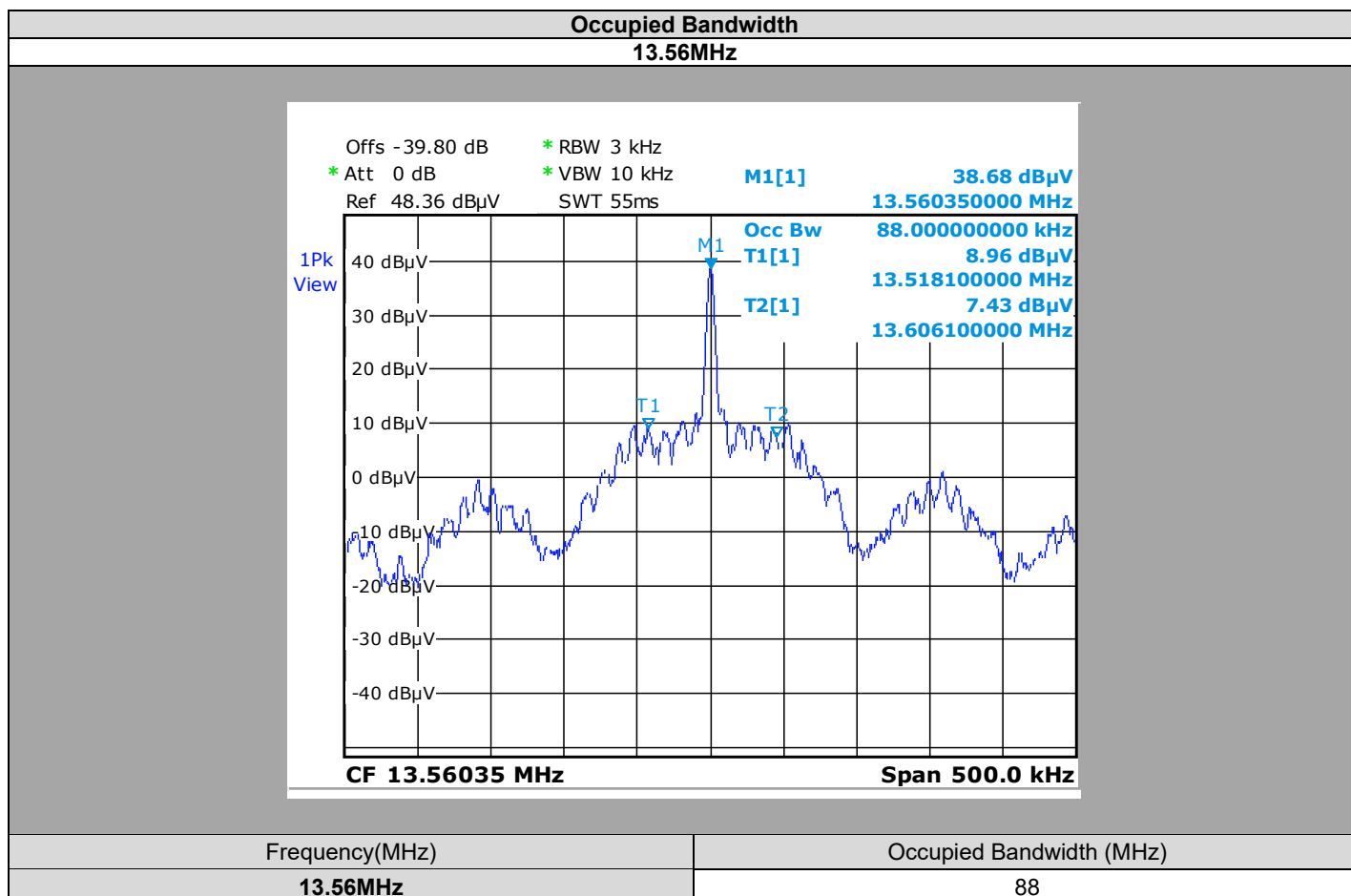
3.3. LIMIT

None

3.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Antenna Loop (near field)	ELECTRO-METRICS	EM-6993	C2040215	06/19	06/22
Attenuator 10dB	AEROFLEX	_	A7122267	08/21	08/23
Cable SMA 2m	_	6GHz	A5329637	06/20	06/22
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	12/20	12/22
Data Logger (CEM1)	AGILENT	34970A	A6440083	11/20	11/22
Multimeter - CEM	FLUKE	87	A1240251	03/21	03/23
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	08/20	08/22
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23

3.5. RESULTS



3.6. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **INGENICO OPEN2500 CL/POE/BT**, SN: **220647313471260623948272**, in configuration and description presented in this test report, show levels **compliant** to the **RSS-GEN** limits.

4. 20dB EMISSION BANDWIDTH

4.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
Date of test : May 6, 2022
Ambient temperature : 22 °C
Relative humidity : 39 %

4.2. TEST SETUP

- The Equipment Under Test is installed:

- On a table
- In a climatic chamber
- In an anechoic chamber

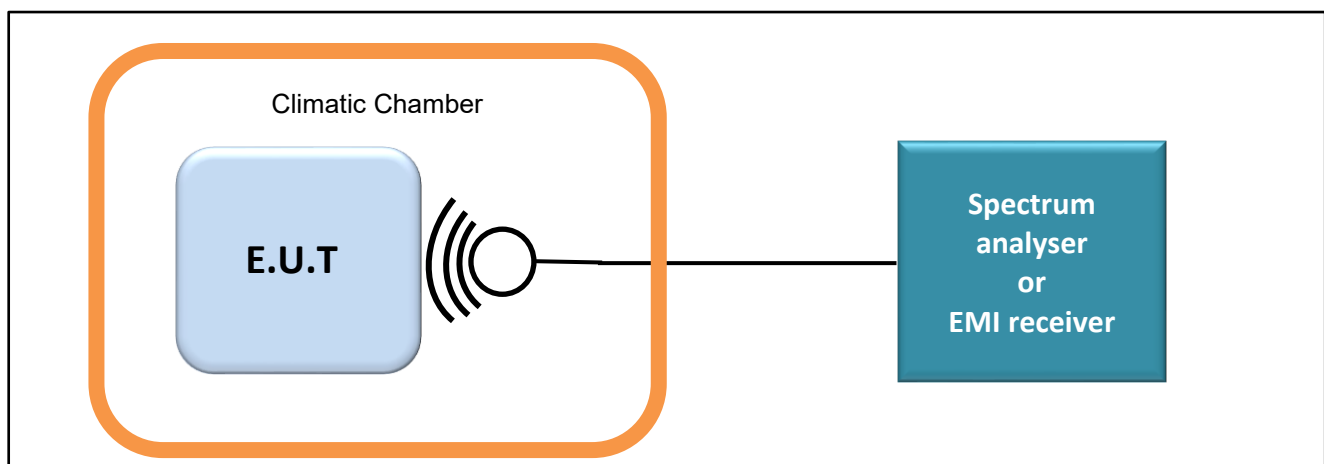
- Measurement is performed with a spectrum analyzer in:

- Conducted Method
- Radiated Method

- Test Procedure:

- ANSI C63.10 § 6.9.2:

The EUT is placed in an anechoic chamber; levels have been corrected to be in compliant with the Peak Output Power measured. The EUT is turn ON and using the MaxHold function, the frequency separation of two frequencies that were attenuated 20dB from the Peak Output Power level. A delta marker is used to measure the frequency difference as the emission bandwidth.



Test set up of 20dB Emission Bandwidth



Photograph for 20dB emission bandwidth

4.3. LIMIT

No Limit

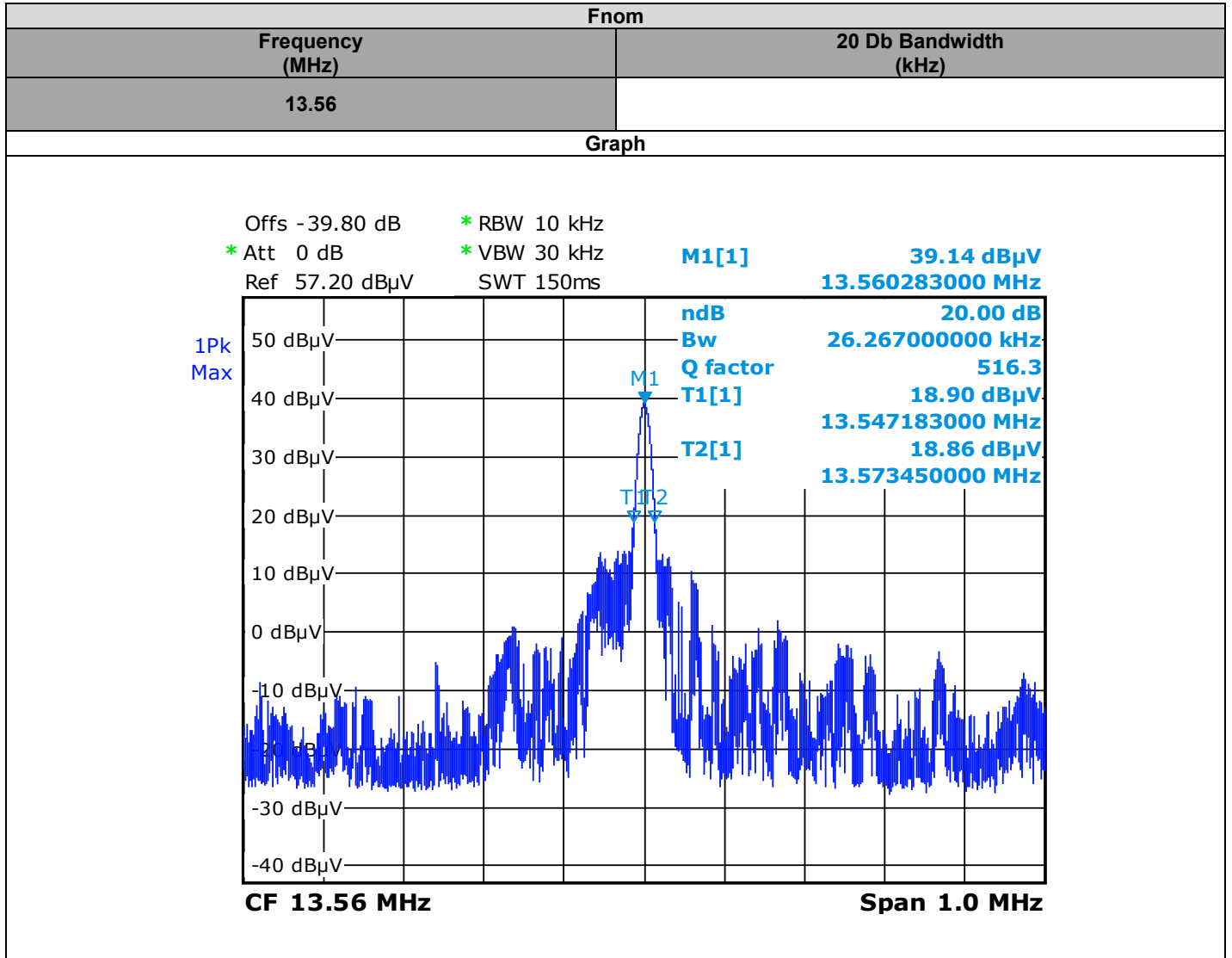
4.4. TEST EQUIPMENT LIST

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	06/19	06/22
Attenuator 10dB	AEROFLEX	_	A7122267	08/21	08/23
Cable SMA 2m	_	6GHz	A5329637	06/20	06/22
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	12/20	12/22
Data Logger (CEM1)	AGILENT	34970A	A6440083	11/20	11/22
Multimeter - CEM	FLUKE	87	A1240251	03/21	03/23
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	08/20	08/22
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23



L C I E

4.5. RESULTS



4.6. CONCLUSION

20dB Emission Bandwidth measurement performed on the sample of the product **INGENICO OPEN2500 CL/POE/BT**, SN: **220647313471260623948272**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS 210 limits.

5. FREQUENCY TOLERANCE

5.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
Date of test : May 6, 2022
Ambient temperature : 22 °C
Relative humidity : 39 %

5.2. TEST SETUP

- The Equipment Under Test is installed:

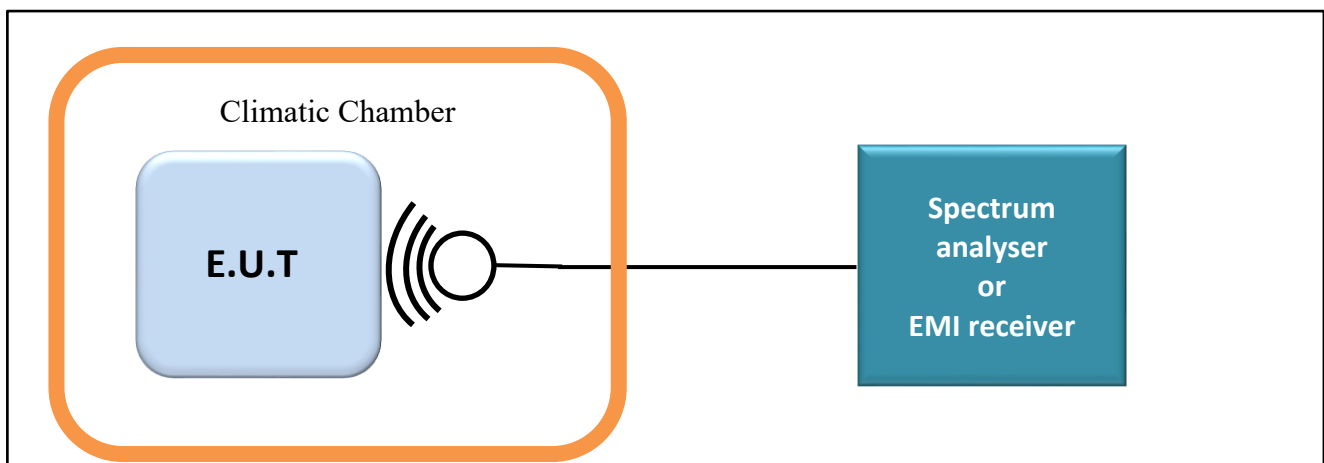
- On a table
- In a climatic chamber
- In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:

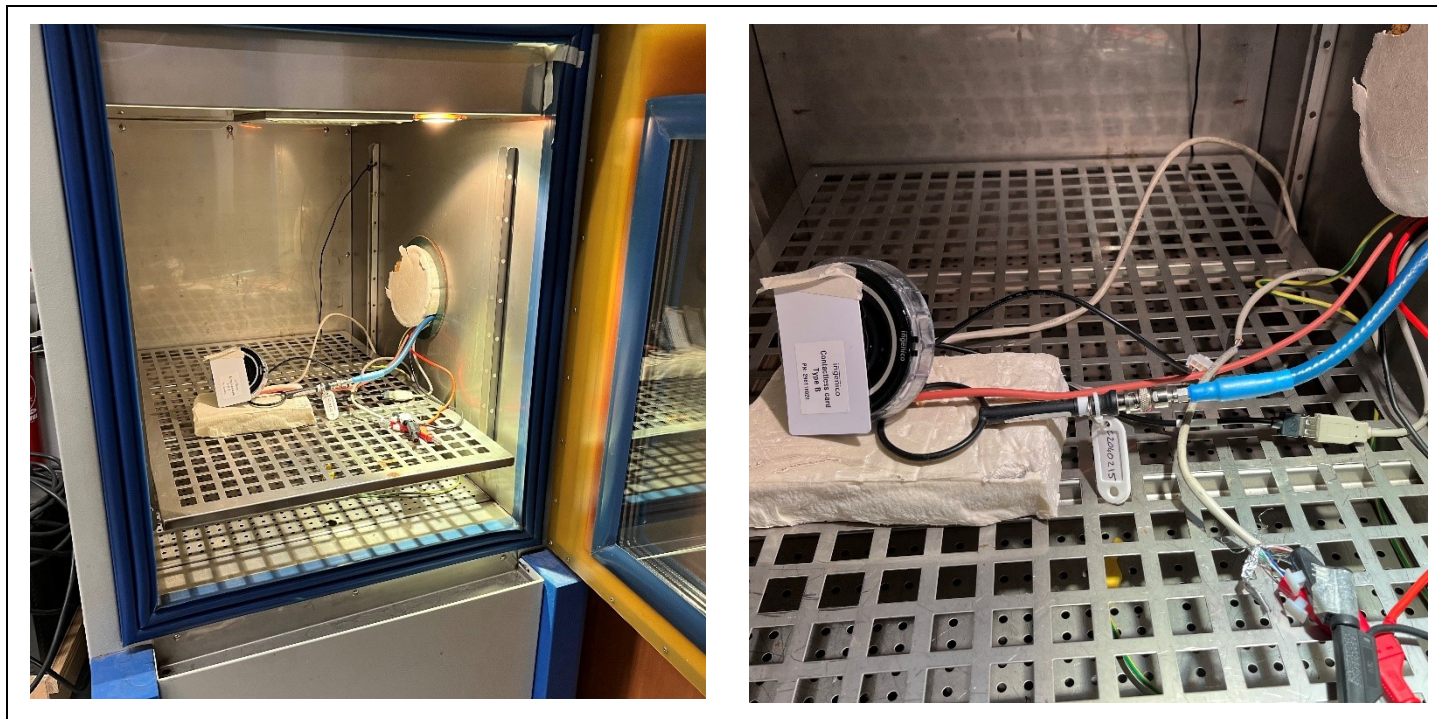
- Conducted Method
- Radiated Method

- Test Procedure:

- ANSI C63.10 § 6.8



Test set up of Occupied Bandwidth



Photograph for Frequency Tolerance

5.3. LIMIT

$\pm 0.01\%$ ($\pm 100\text{ppm}$)

5.4. 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	06/19	06/22
Attenuator 10dB	AEROFLEX	_	A7122267	08/21	08/23
Cable SMA 2m	_	6GHz	A5329637	06/20	06/22
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	12/20	12/22
Data Logger (CEM1)	AGILENT	34970A	A6440083	11/20	11/22
Multimeter - CEM	FLUKE	87	A1240251	03/21	03/23
Spectrum Analyzer 9kHz - 6GHz	ROHDE & SCHWARZ	FSL6	A2642020	08/20	08/22
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23

5.5. RESULTS

EUT activation:	Startup										
Voltage:	Vnom										
Temperature:	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C	60°C	70°C
Frequency (MHz)	13.56057	13.56057	13.56054	13.56048	13.56038	13.56008	13.55958	13.56126	13.55984	13.56043	13.55866
Frequency Drift (%)	0.00004	0.00004	0.00004	0.00004	0.00003	0.00001	-0.00003	0.00009	-0.00001	0.00003	-0.00010
EUT activation:	2min										
Voltage:	Vnom										
Temperature:	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C	60°C	70°C
Frequency (MHz)	13.56056	13.56056	13.56055	13.56051	13.56047	13.56104	13.55994	13.55950	13.55949	13.55881	13.55897
Frequency Drift (%)	0.00004	0.00004	0.00004	0.00004	0.00003	0.00008	0.00000	-0.00004	-0.00004	-0.00009	-0.00008
EUT activation:	5min										
Voltage:	Vnom										
Temperature:	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C			50°C
Frequency (MHz)	13.56059	13.56059	13.56057	13.56051	13.56046	13.56066	13.56013	13.56096	13.55997	13.55987	13.55957
Frequency Drift (%)	0.00004	0.00004	0.00004	0.00004	0.00003	0.00005	0.00001	0.00007	0.00000	-0.00001	-0.00003
EUT activation:	10min										
Voltage:	Vnom										
Temperature:	-30°C	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C	60°C	70°C
Frequency (MHz)	13.56054	13.56054	13.56056	13.56050	13.56047	13.56042	13.56087	13.55921	13.55907	13.56002	13.55885
Frequency Drift (%)	0.00004	0.00004	0.00004	0.00004	0.00003	0.00003	0.00006	-0.00006	-0.00007	0.00000	-0.00009

Temperature	Tnom		
Voltage:	Vmin	Vnom	Vmax
Frequency (MHz)	13.56104	13.56104	13.56104
Frequency Drift (%)	0.00008	0.00008	0.00008



5.6. CONCLUSION

Frequency tolerance measurement performed on the sample of the product **INGENICO OPEN2500 CL/POE/BT**, SN: **220647313471260623948272**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS 210 limits.

6. AC POWER LINE CONDUCTED EMISSIONS

6.1. TEST CONDITIONS

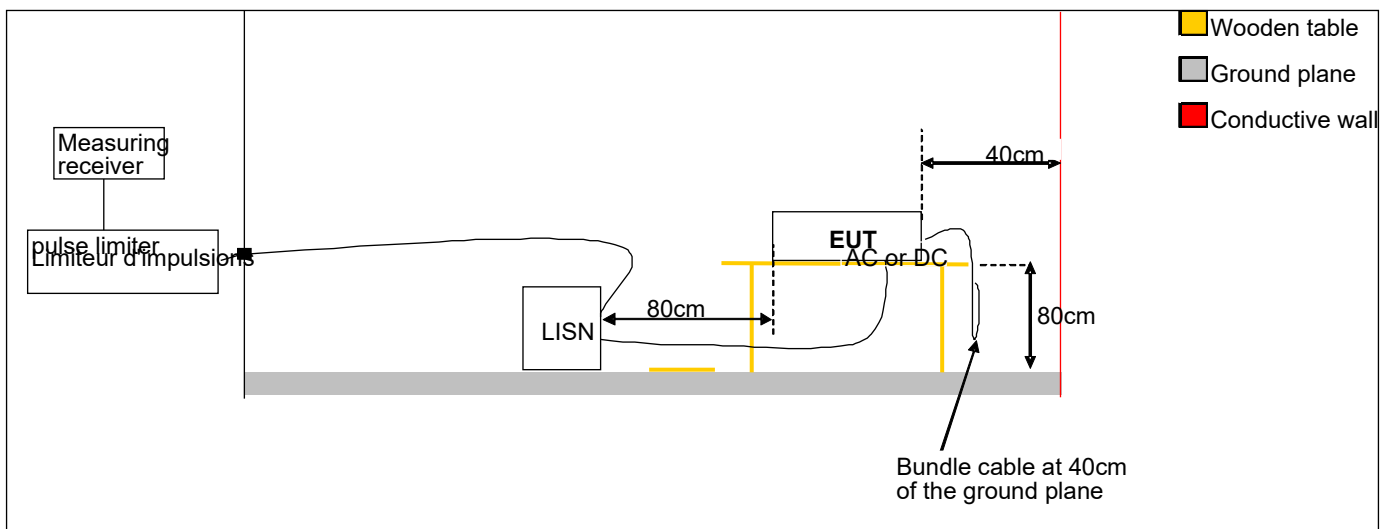
Test performed by : Majid MOURZAGH
 Date of test : May 24, 2022
 Ambient temperature : 22 °C
 Relative humidity : 40 %

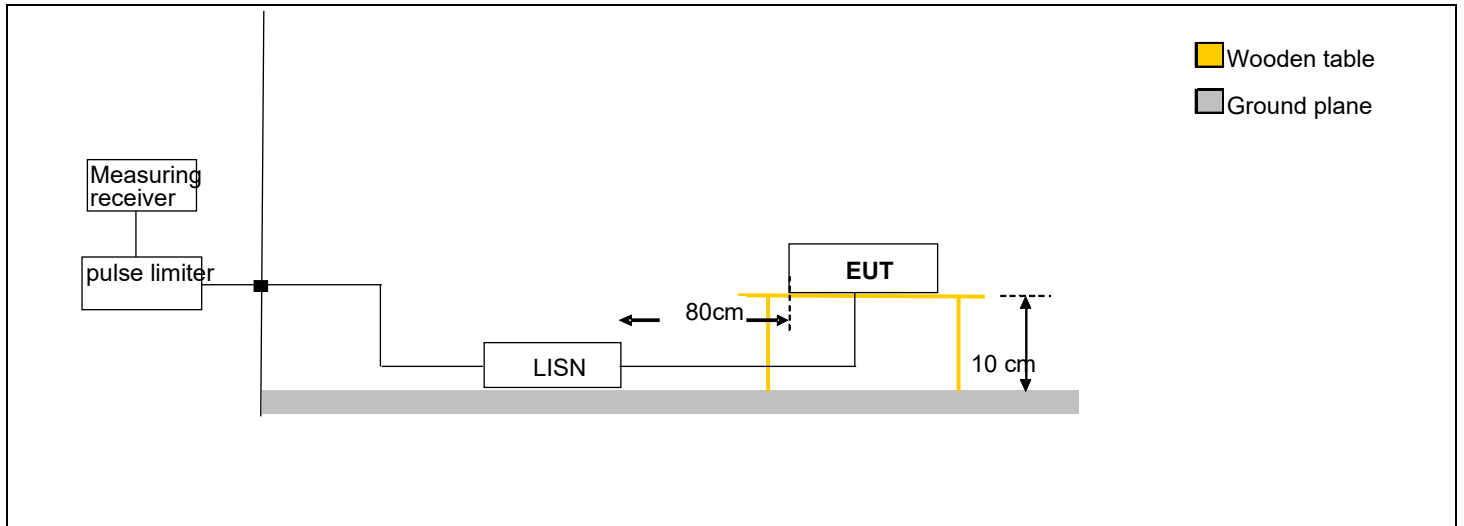
6.2. TEST SETUP

The product has been tested according to ANSI C63.10 method. The EUT is placed on the ground reference plane, at 80cm from the LISN. The distance between the EUT and the vertical ground plane is 40cm. Auxiliaries are powered by another LISN. The cable has been shorted to 1meter length. The EUT is powered through the LISN. Measurement is made with a receiver in peak mode. This was followed by a Quasi-Peak, i.e. CISPR measurement for any strong signal. If the average limit is met when using a Quasi-Peak detector, the EUT shall be deemed to meet both limits and measurement with the average detector is unnecessary. The LISN (measure) is 50Ω / 50μH. Interconnecting cables and equipment's were moved to position that maximized emission.

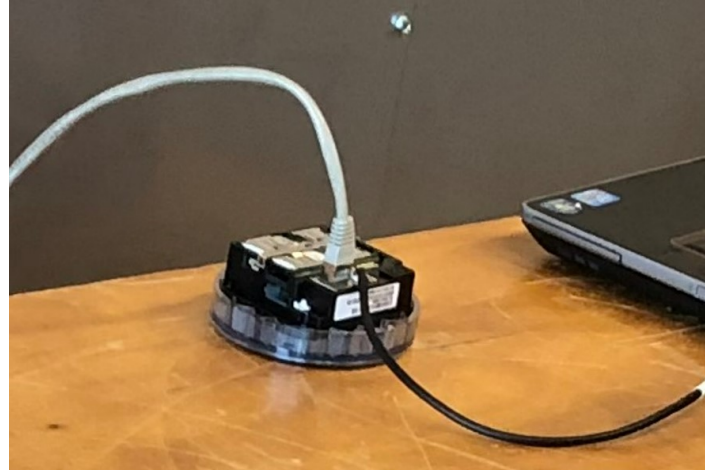
Voltage table used (for Power Line Conducted Emissions):

Type	Measurement performed:	
<input checked="" type="checkbox"/> AC / <input type="checkbox"/> DC (Auxiliary used)	<input checked="" type="checkbox"/> 120VAC/60Hz	<input checked="" type="checkbox"/> 240VAC/50Hz
<input type="checkbox"/> USB (Laptop auxiliary)	<input type="checkbox"/> 120VAC/60Hz (Laptop auxiliary)	<input type="checkbox"/> 240VAC/50Hz(Laptop auxiliary)





Test set up of AC Power Line Conducted Emissions



Photograph for AC Power Line Conducted Emissions



6.3. LIMIT

Frequency range	Level	Detector
0,15kHz to 0,5MHz	66dB μ V to 56 μ V*	QPeak
	56dB μ V to 46 μ V*	Average
0,5MHz to 5MHz	56dB μ V	QPeak
	46dB μ V	Average
5MHz to 30MHz	60B μ V	QPeak
	50dB μ V	Average

*Decreases with the logarithm of the frequency

6.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
BAT EMC	NEXIO	v3.21.0.27	L1000115		
Cable + self	–	–	A5329578	05/22	05/23
EMC comb generator	LCIE SUD EST	–	A3169098		
LISN	ROHDE & SCHWARZ	ENV216	C2320291	08/21	08/22
Spectrum Analyzer 9kHz - 30MHz	ROHDE & SCHWARZ	ESHS10	A2642028	01/20	05/22
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23
Transient limiter	ROHDE & SCHWARZ	ESH3-Z2	A7122204	08/20	08/22
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	10/20	10/22

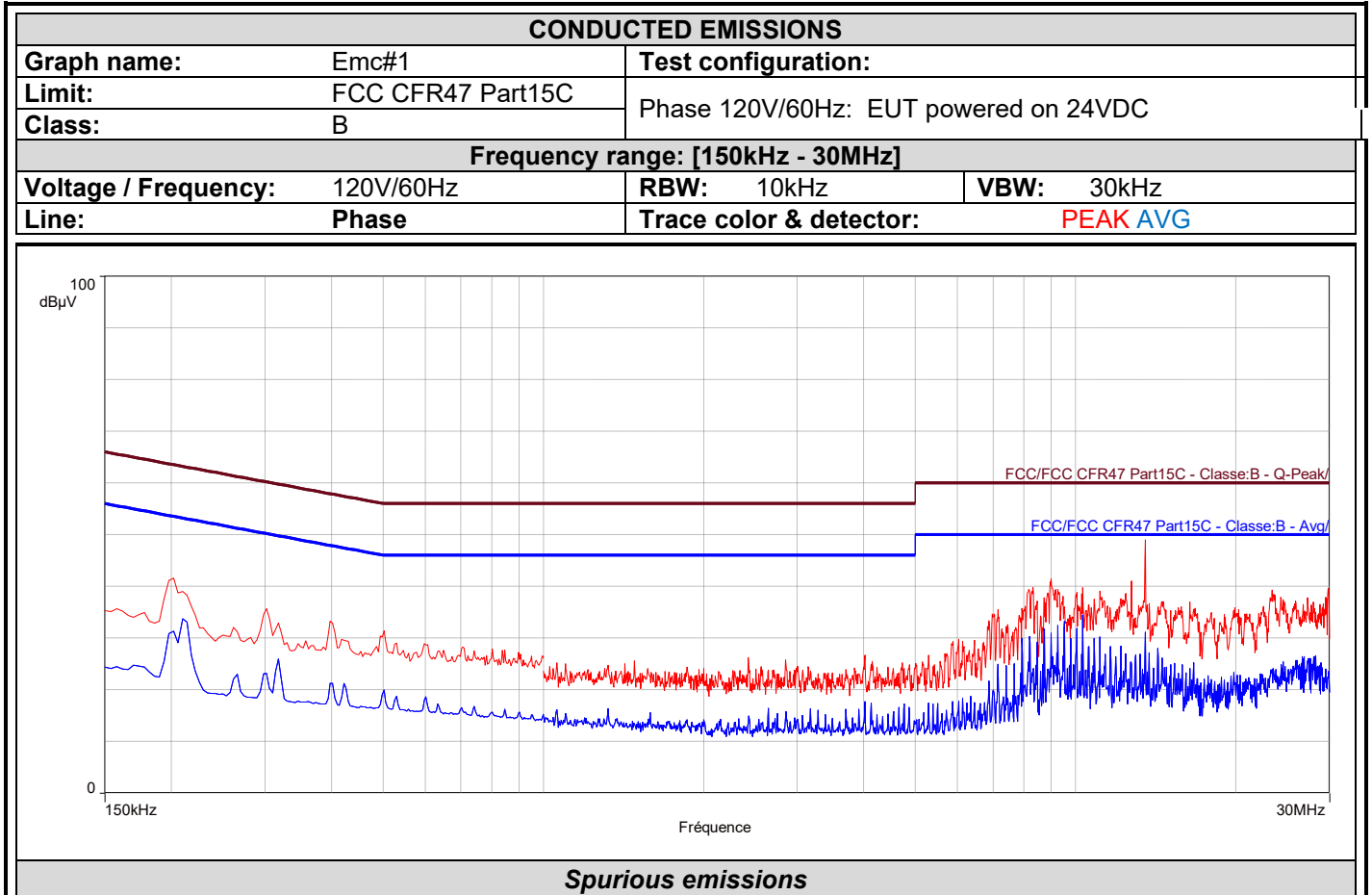
6.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:



L C I E

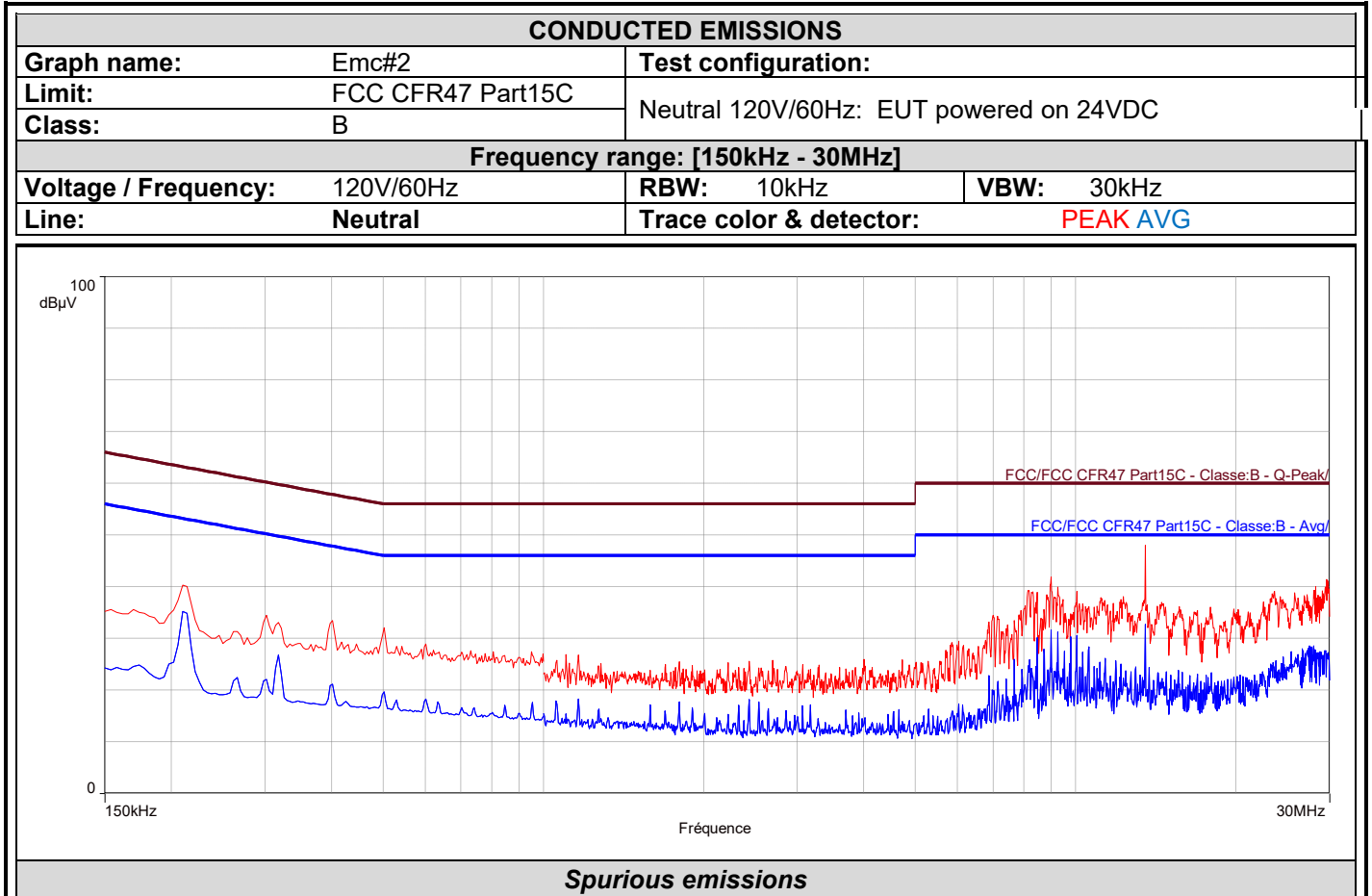
6.6. RESULTS



Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.202	40.4	37.0	63.5	-26.5	27.8	53.5	-25.8	25.6
0.302	35.0	30.5	60.2	-29.7	22.0	50.2	-28.2	25.6
8.160	40.0	36.4	60.0	-23.6	22.8	50.0	-27.2	26.2
8.996	40.0	34.8	60.0	-25.2	26.2	50.0	-23.8	26.3
13.516	49.0	47.0	60.0	-13.0	31.1	50.0	-18.9	26.6
23.388	38.7	29.8	60.0	-30.2	20.0	50.0	-30.0	27.3
29.836	32.8	24.8	60.0	-35.2	17.8	50.0	-32.2	27.6



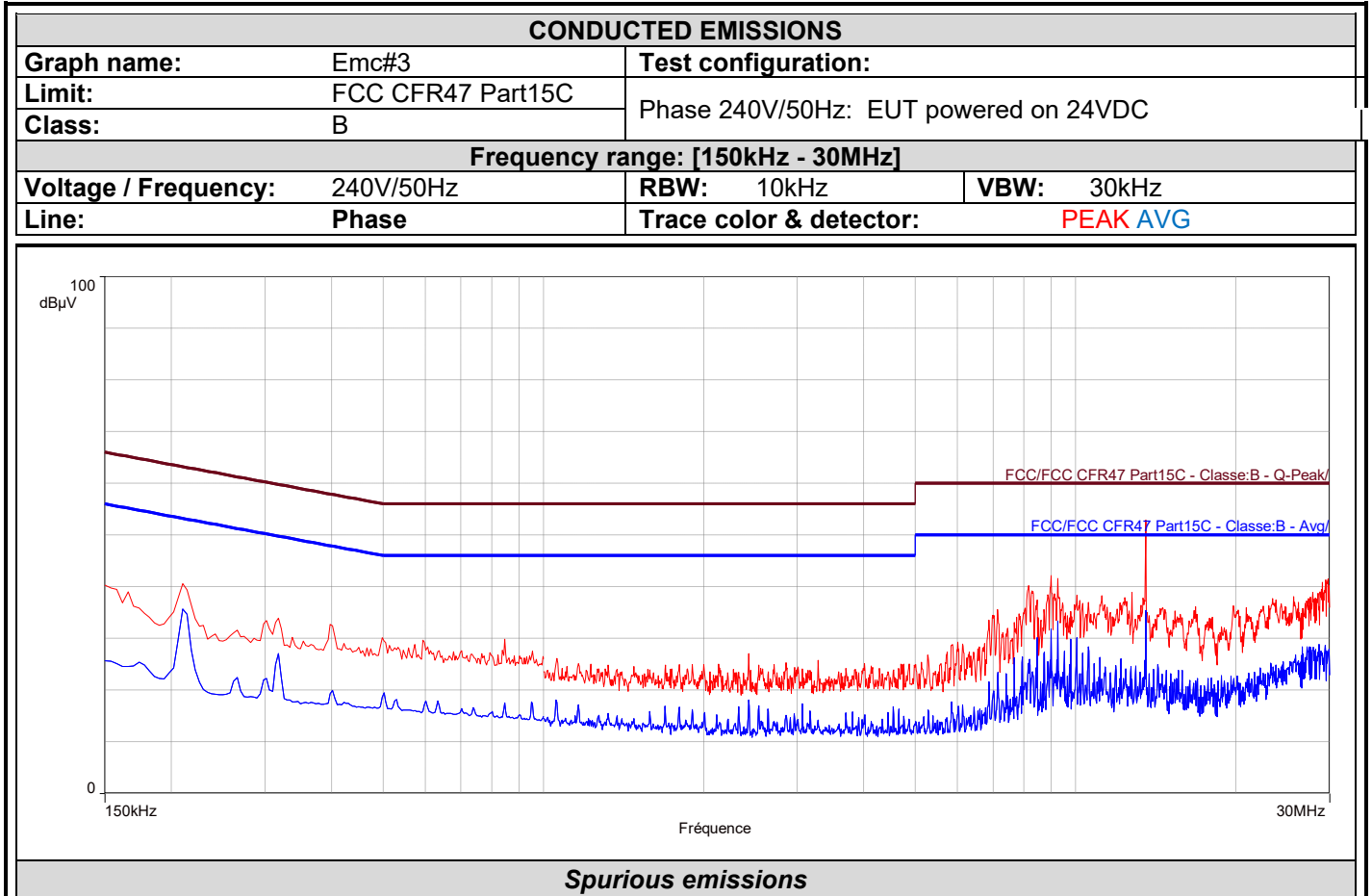
L C I E



Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.210	40.3	37.3	63.2	-25.9	35.2	53.2	-18.0	25.6
0.502	31.4	26.4	56.0	-29.6	18.9	46.0	-27.1	25.6
8.992	42.8	37.4	60.0	-22.6	29.6	50.0	-20.4	26.3
13.508	48.6	44.8	60.0	-15.2	30.7	50.0	-19.3	26.6
23.632	39.9	32.4	60.0	-27.6	21.7	50.0	-28.3	27.3
29.632	41.7	35.6	60.0	-24.4	27.1	50.0	-22.9	27.6



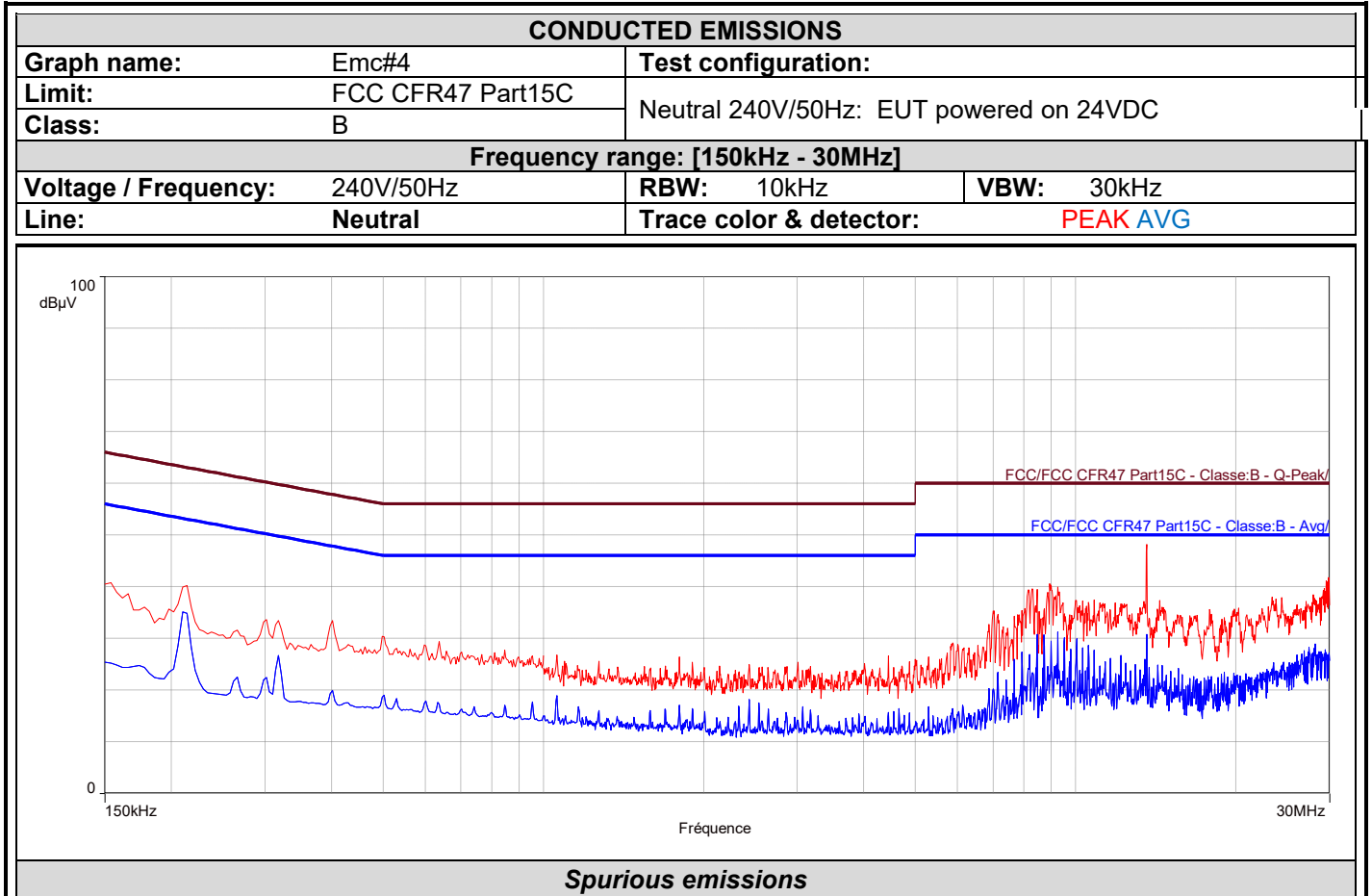
L C I E



Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.214	39.6	36.8	63.0	-26.3	34.5	53.0	-18.6	25.6
8.156	40.6	36.5	60.0	-23.5	25.3	50.0	-24.7	26.2
8.984	40.9	36.6	60.0	-23.4	21.7	50.0	-28.3	26.3
13.532	48.0	44.8	60.0	-15.2	28.9	50.0	-21.1	26.6
19.844	35.9	28.7	60.0	-31.3	19.4	50.0	-30.6	27.1
25.740	37.2	31.6	60.0	-28.4	24.4	50.0	-25.6	27.4
29.860	42.4	36.4	60.0	-23.6	25.4	50.0	-24.6	27.6



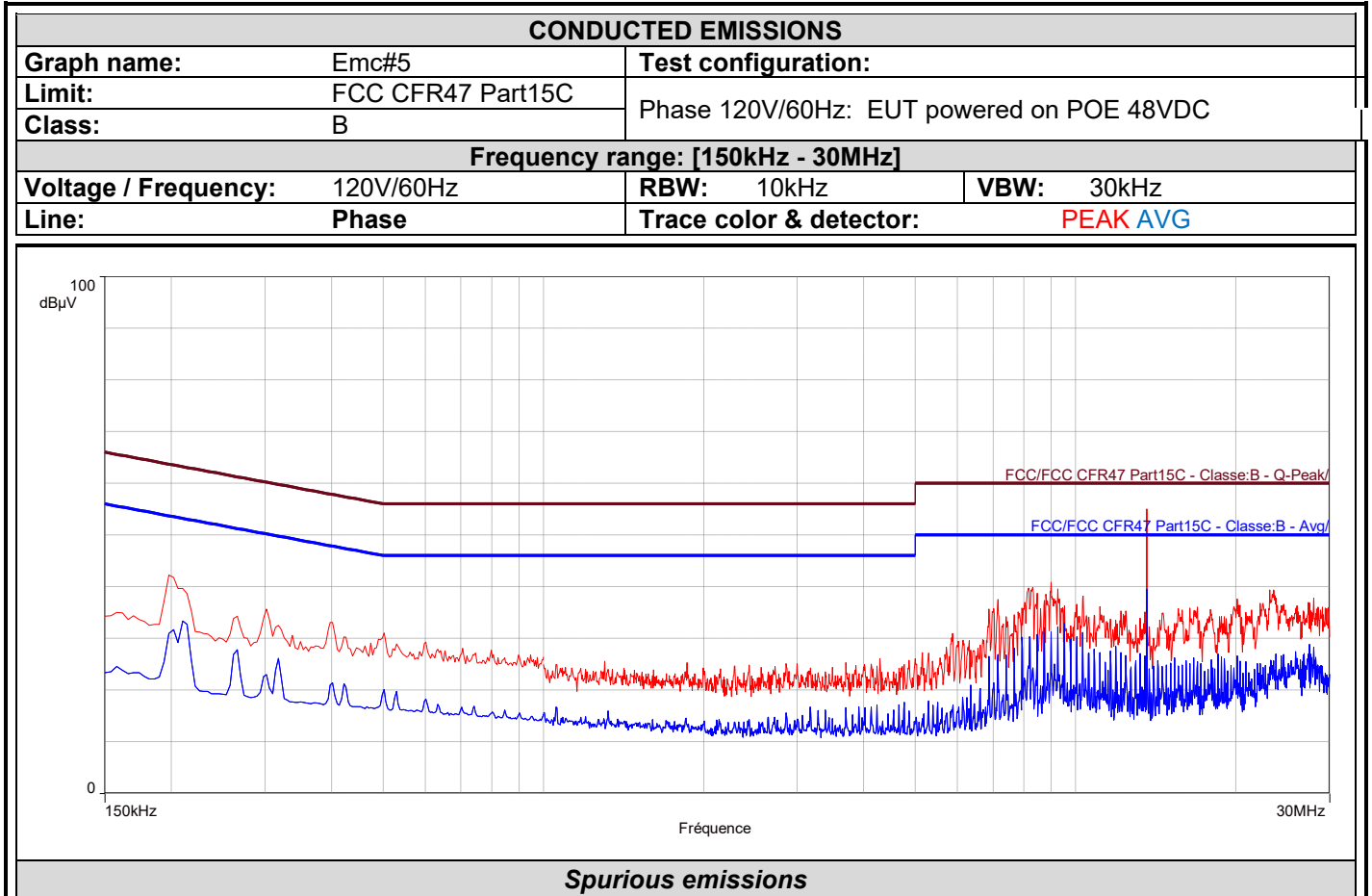
L C I E



Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.214	40.2	36.6	63.0	-26.4	34.3	53.0	-18.8	25.6
0.402	33.2	28.2	57.8	-29.6	19.1	47.8	-28.7	25.6
8.148	40.2	36.3	60.0	-23.7	22.8	50.0	-27.2	26.2
8.944	41.5	32.1	60.0	-27.9	22.0	50.0	-28.0	26.3
13.600	47.9	44.7	60.0	-15.3	28.5	50.0	-21.5	26.6
27.956	38.6	33.3	60.0	-26.7	26.5	50.0	-23.5	27.5



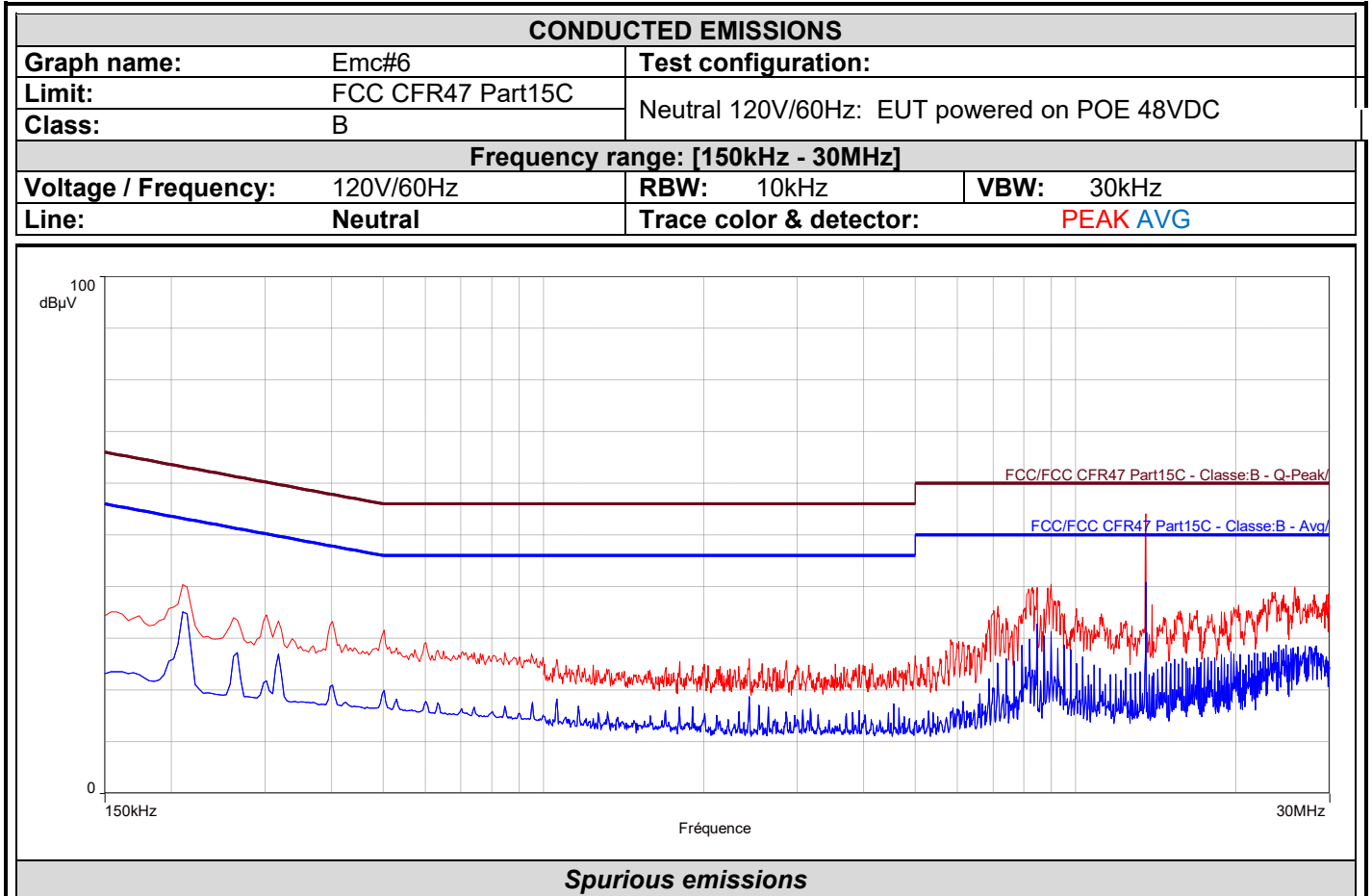
L C I E



Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.202	42.1	38.8	63.5	-24.8	31.2	53.5	-22.3	25.6
0.302	35.7	31.2	60.2	-29.0	22.6	50.2	-27.6	25.6
8.308	40.0	37.3	60.0	-22.7	22.9	50.0	-27.1	26.2
8.996	43.3	37.9	60.0	-22.1	31.9	50.0	-18.1	26.3
13.612	54.7	49.4	60.0	-10.6	26.7	50.0	-23.3	26.6
23.184	37.0	29.9	60.0	-30.1	22.4	50.0	-27.6	27.3



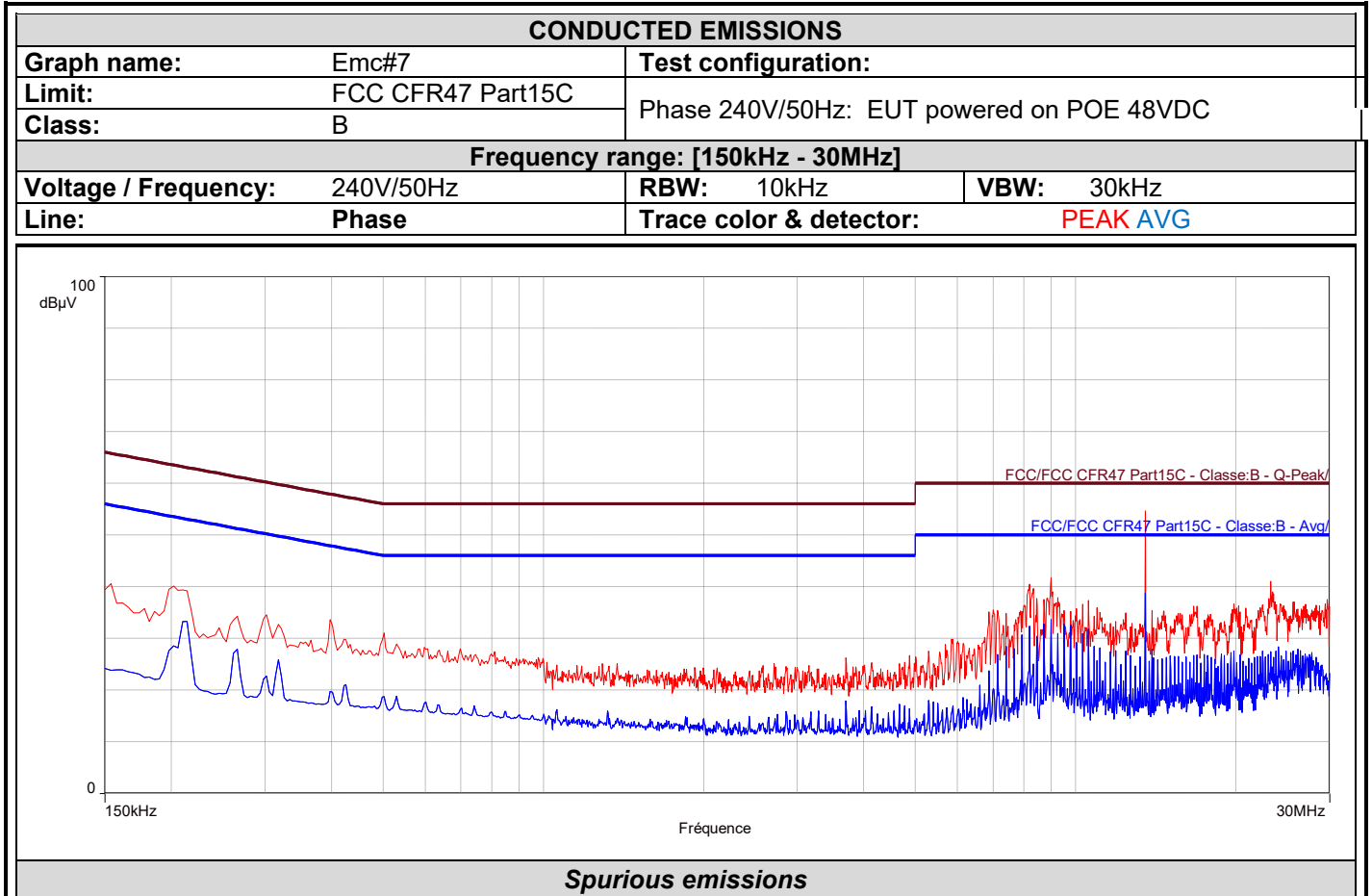
L C I E



Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.210	40.3	37.4	63.2	-25.8	34.9	53.2	-18.3	25.6
0.502	31.5	26.9	56.0	-29.1	19.2	46.0	-26.8	25.6
8.300	39.7	36.2	60.0	-23.8	21.9	50.0	-28.1	26.2
8.992	42.0	37.2	60.0	-22.8	30.6	50.0	-19.4	26.3
13.540	53.6	49.7	60.0	-10.3	26.7	50.0	-23.3	26.6
25.820	34.9	28.2	60.0	-31.8	19.9	50.0	-30.1	27.4



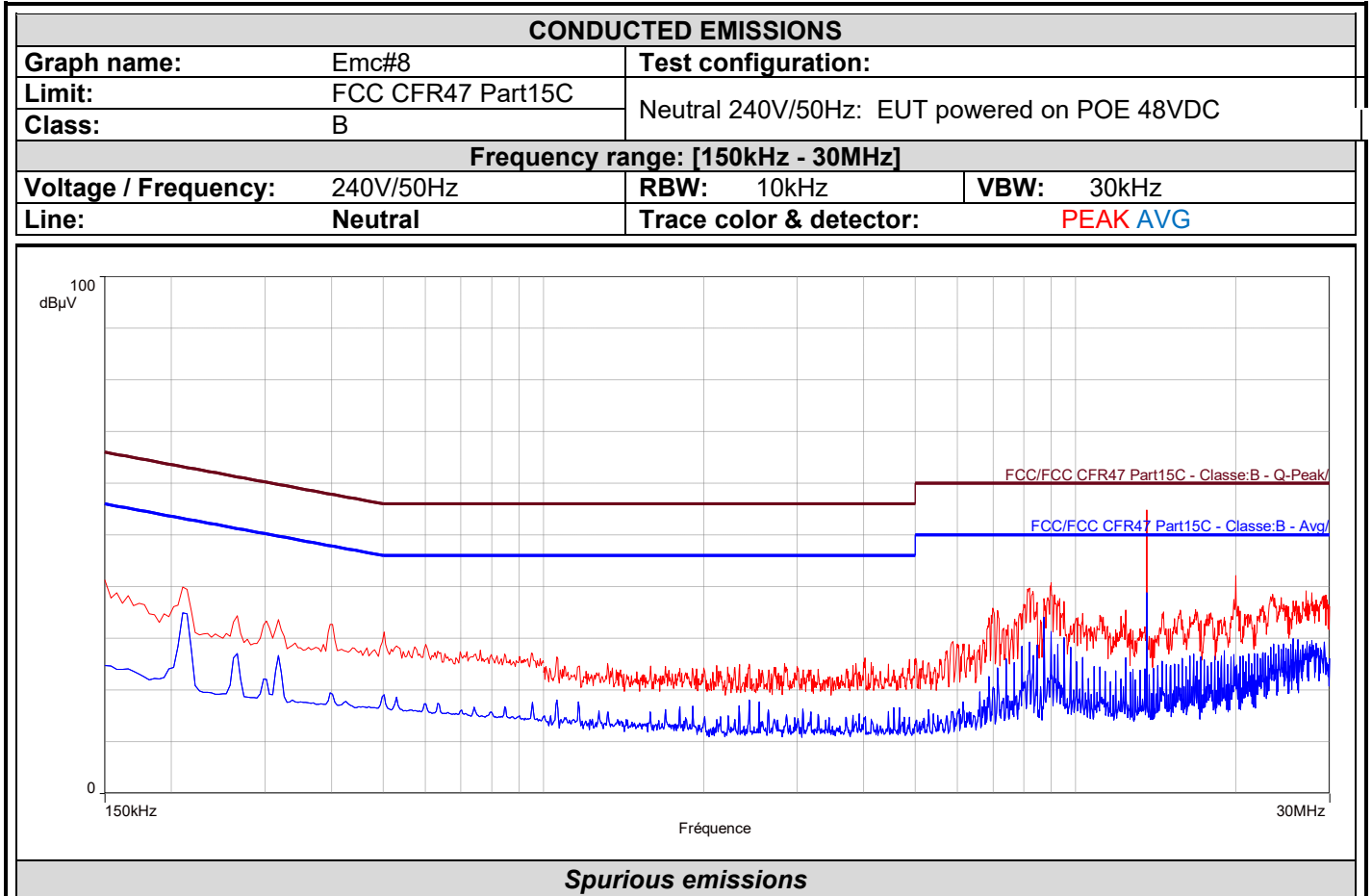
L C I E



Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.214	38.9	35.8	63.0	-27.2	32.9	53.0	-20.2	25.6
0.502	30.6	25.2	56.0	-30.8	18.4	46.0	-27.6	25.6
8.192	40.6	33.4	60.0	-26.6	25.2	50.0	-24.8	26.2
8.988	43.0	37.5	60.0	-22.5	31.4	50.0	-18.6	26.3
13.532	54.1	48.9	60.0	-11.1	25.8	50.0	-24.2	26.6
23.272	38.4	32.0	60.0	-28.0	26.1	50.0	-23.9	27.3
29.684	38.1	32.3	60.0	-27.7	21.9	50.0	-28.1	27.6



L C I E



Frequency (MHz)	Peak (dBµV)	Q-Peak (dBµV)	Lim.Q-Peak (dBµV)	Q-Peak-Lim.Q-Peak (dB)	Avg (dBµV)	Lim.Avg (dBµV)	Avg-Lim.Avg (dB)	Correction (dB)
0.210	40.4	37.0	63.2	-26.2	34.5	53.2	-18.7	25.6
0.502	31.0	25.5	56.0	-30.5	18.4	46.0	-27.6	25.6
8.188	39.8	34.0	60.0	-26.0	20.0	50.0	-30.0	26.2
8.988	42.0	36.5	60.0	-23.5	28.7	50.0	-21.3	26.3
13.604	54.8	49.5	60.0	-10.5	26.6	50.0	-23.4	26.6
20.000	36.0	28.8	60.0	-31.2	17.2	50.0	-32.8	27.1
27.120	43.6	34.4	60.0	-25.6	23.6	50.0	-26.4	27.5

6.7. CONCLUSION

Ac Power Line Conducted Emission measurement performed on the sample of the product **INGENICO OPEN2500 CL/POE/BT, / OPEN2500 CL/Eth/BT**, SN: **220647313471260623948272, 220617313161260223902168** in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS Gen limits.

7. FIELD STRENGTH OUTSIDE OF THE BANDS 13.110-14.010 MHz

7.1. TEST CONDITIONS

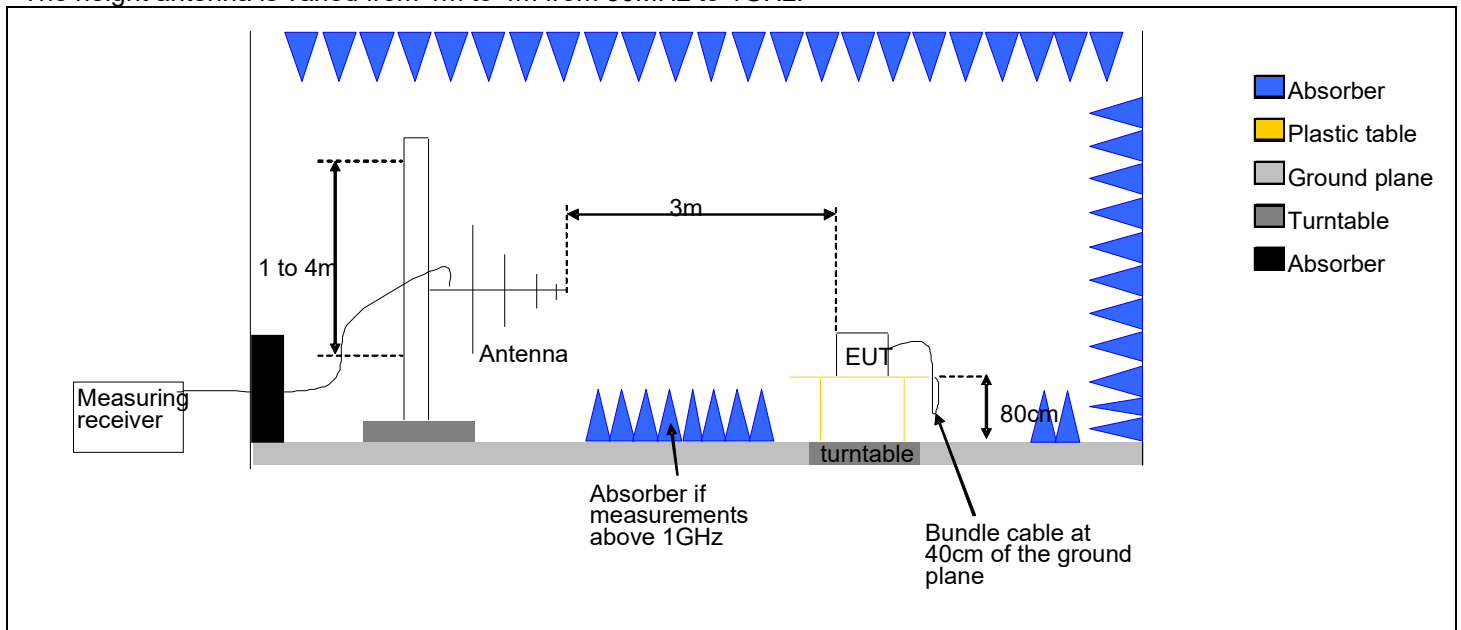
Test performed by : Majid MOURZAGH
 Date of test : May 6, 2022
 Ambient temperature : 22 °C
 Relative humidity : 39 %

7.2. TEST SETUP

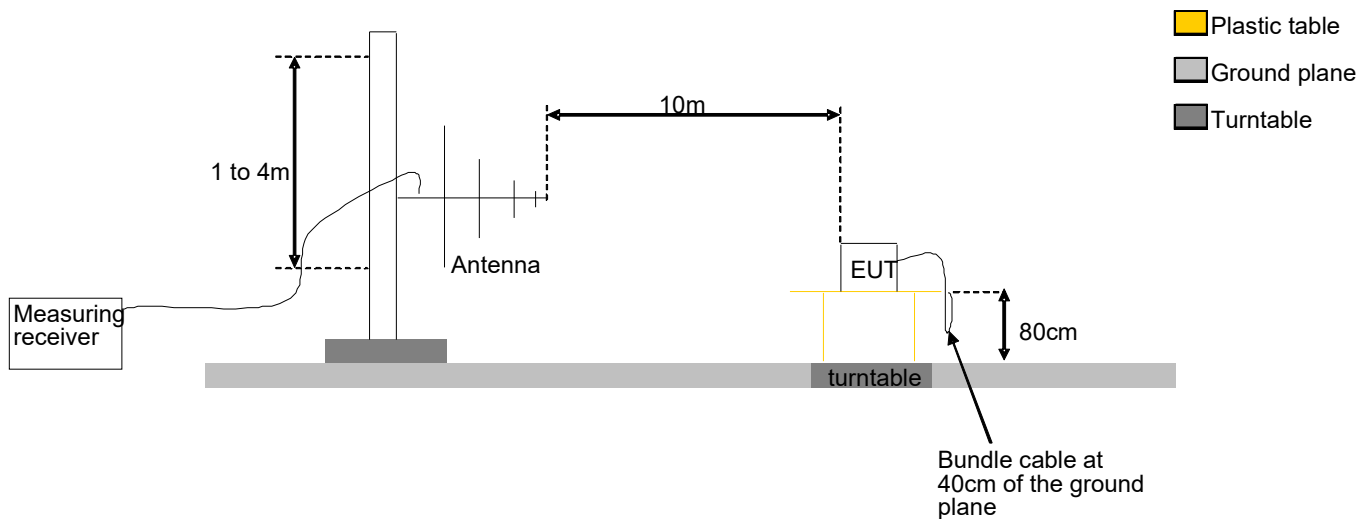
The product has been tested according to ANSI C63.10 and FCC part 15 subpart C.

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 **in a semi-anechoic chamber**. Distance between measuring antenna and the EUT is **3m**.

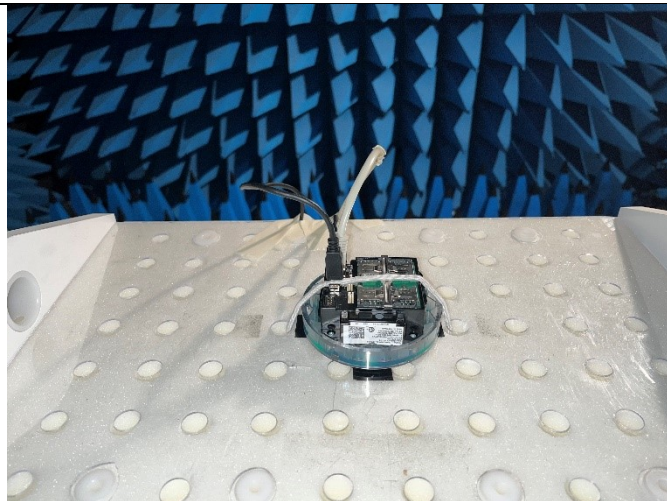
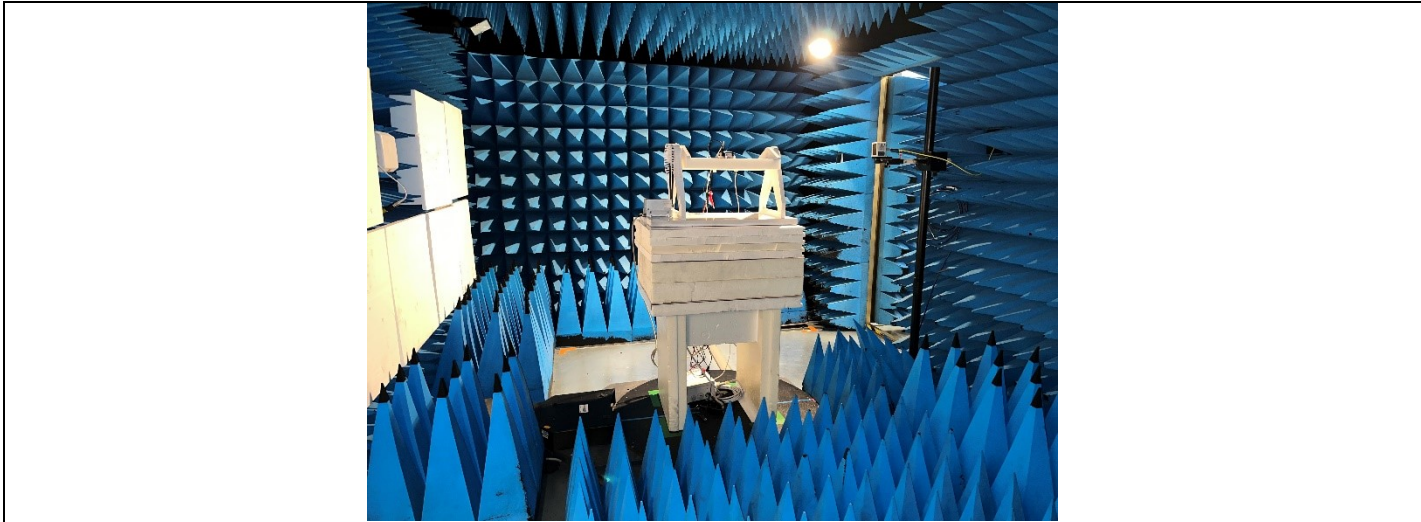
Test is performed in horizontal (H) and vertical (V) polarization with **logperiodic** between 30MHz & 1GHz. Measurement bandwidth was 120kHz below 1GHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. The EUT is placed at 0.8m high under 1GHz. The EUT is placed **on an open area test site** from 30MHz to 1GHz. Distance between measuring antenna and the EUT is **10m**. The height antenna is varied from 1m to 4m from 30MHz to 1GHz.



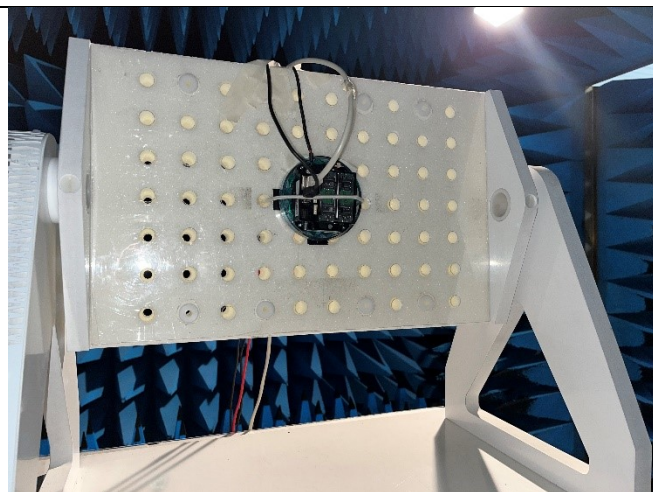
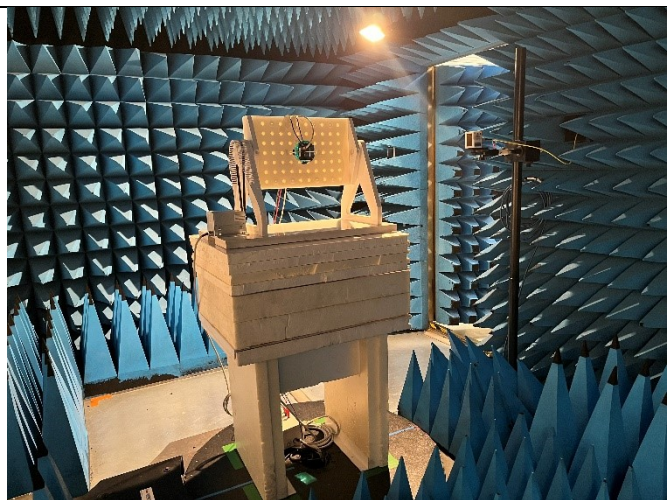
Test set up of Unwanted Emissions in Restricted Frequency Bands in semi anechoic chamber



Test Set up for radiated measurement in open area test site



AXIS XY on FAR



Axis Z on FAR



OATS Setup



Axis XY on OATS



Axis Z on OATS

Photograph for Field strength outside of the bands 13.110-14.010 MHz



L C I E

7.3. 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



7.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED on FAR					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Amplifier 9kHz - 40GHz	LCIE SUD EST	-	A7102082	05/22	05/24
Antenna Bi-log	AH System	SAS-521-7	C2040180	02/21	02/23
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052	06/19	06/22
BAT EMC	NEXIO	v3.21.0.27	L1000115		
Cable SMA 40GHz 40cm	WITHWAVE	W101-SM1-0.4M	A5329979	04/21	08/22
Comb EMR HF	YORK	CGE01	A3169114		
CONTROLLER	INNCO	CO3000	D3044034		
Emission Cable <1GHz (Ampl <-> Cage)	INTELLICONNECT	C-KPKP-1503-500MM	A5329988	04/21	08/22
Filter Matrice	LCIE SUD EST	Combined filters	A7484078	09/20	09/22
Multimeter - CEM	FLUKE	189	A1240171	09/21	09/23
Power supply DC	METRIX	AX503	A7042308		
Rehausse Table C3	LCIE	-	F2000511		
Semi-Anechoic chamber #3 (BF)	SIEPEL	-	D3044017_BF	12/19	12/22
Semi-Anechoic chamber #3 (VSWR)	SIEPEL	-	D3044017_VSWR	12/19	12/22
Spare C3 Cable Measure	TELEDYNE	26GHz	A5329681	09/20	09/22
Spectrum analyzer	ROHDE & SCHWARZ	FSU 26	A4060058	09/21	09/23
Table C3	LCIE	-	F2000461		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23
TILT	INNCO	TILT	D3044033		
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		



LCIE

TEST EQUIPMENT USED on OATS					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Antenna Bi-log	CHASE	CBL6111A	C2040172	04/22	04/24
Biconic Antenna	EATON	94455-1	C2040234	03/21	03/23
Multimeter - CEM	FLUKE	87	A1240251	03/21	03/23
Power supply DC	METRIX	AX503	A7042308		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23
Antenna Mat (OATS)	ETS Lingren	2071-2	F2000392		
Cable (OATS)	—	1GHz	A5329623	08/21	08/22
CALCUL_FACTEURS	LCIE SUD EST	V4	L2000035		
Emission Cable	SUCOFLEX	6GHz	A5329061	08/21	08/22
Emission Cable	MICRO-COAX	1GHz	A5329656	08/21	08/22
OATS	—	—	F2000409	04/21	08/22
Rehausse Table C1/OATS	LCIE	—	F2000512		
Table C1/OATS	LCIE	—	F2000445		
Turntable (OATS)	ETS Lingren	Model 2187	F2000403		
Turntable / Mast controller (OATS)	ETS Lingren	Model 2066	F2000372		

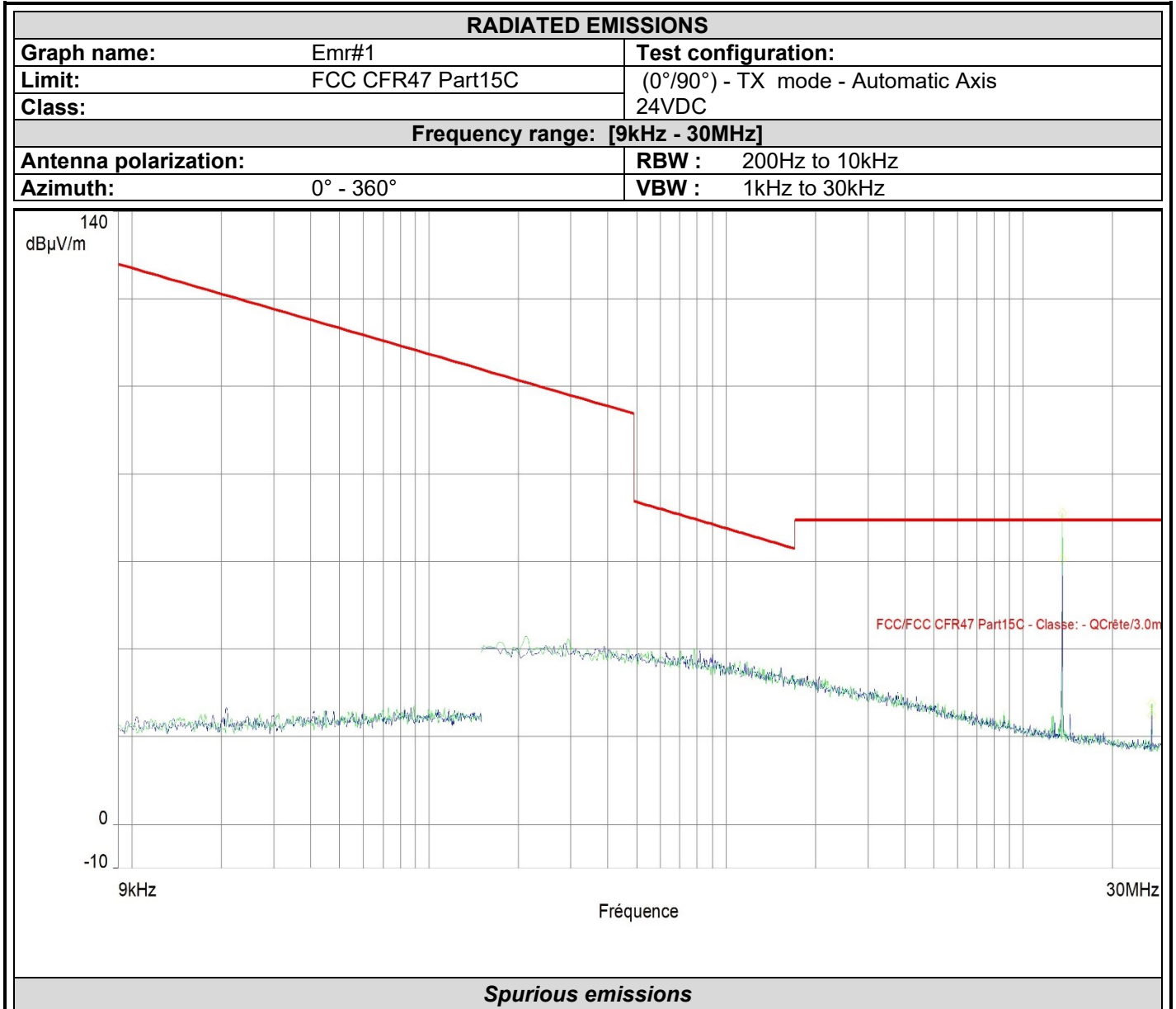
7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:



L C I E

7.6. RESULTS

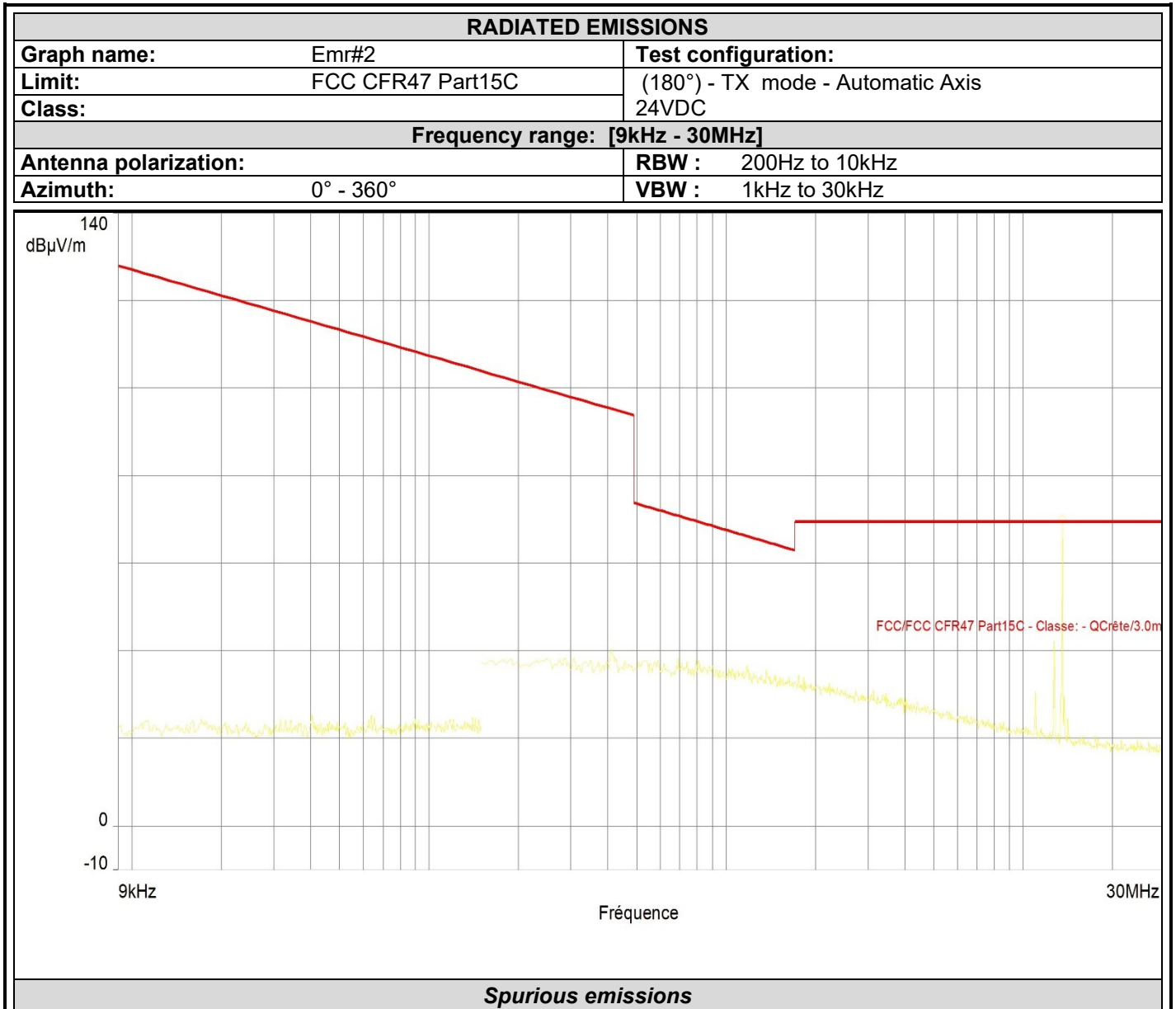


Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
13.562*	60.6	69.5	Horizontal	12.4
27.119	24.8	69.5	Horizontal	10.3
13.562*	71.0	69.5	Vertical	12.4
27.122	27.6	69.5	Vertical	10.2

*Carrier frequency



L C I E

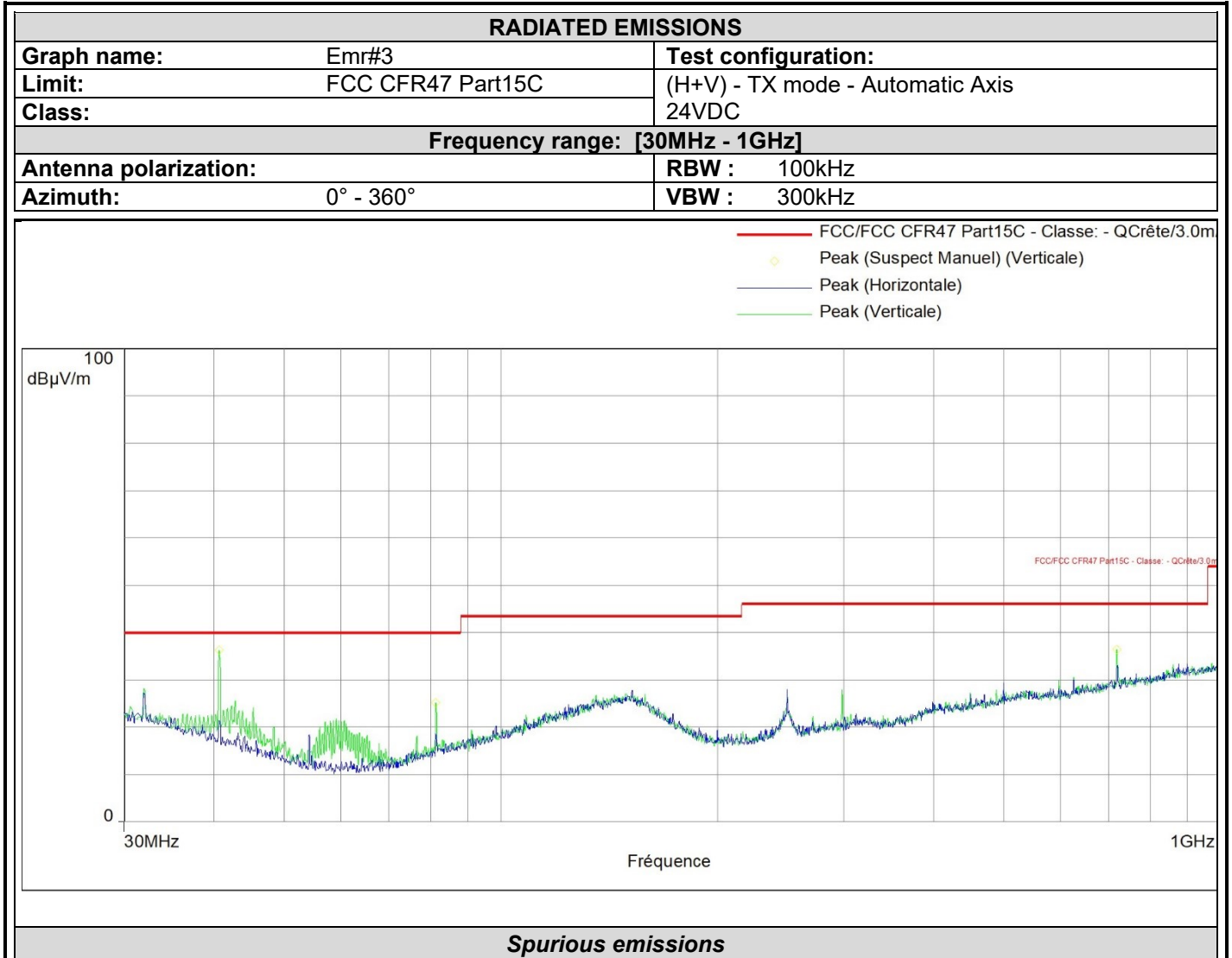


Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
13.562*	69.9	69.5	Horizontal	12.4

*Carrier frequency

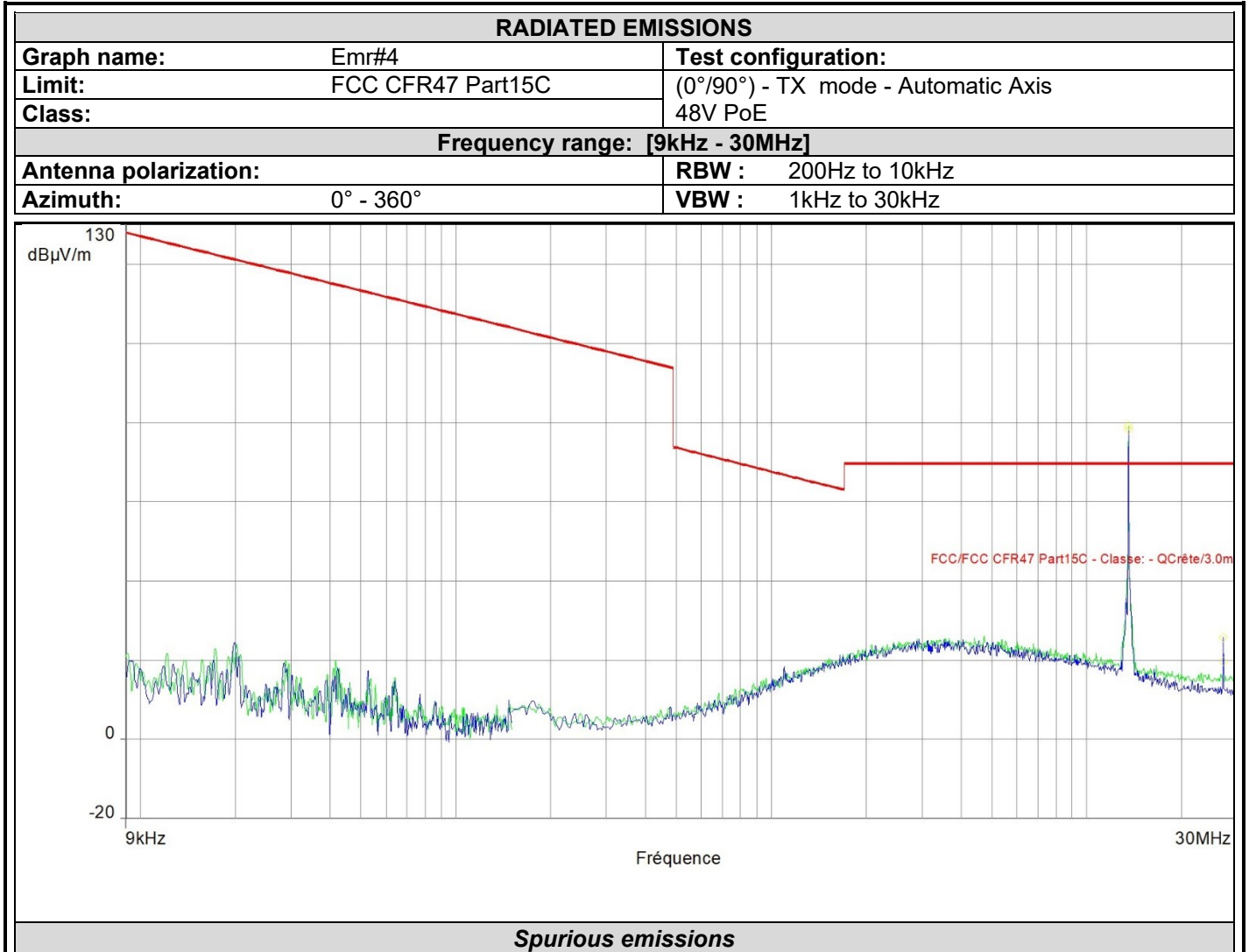


L C I E





L C I E

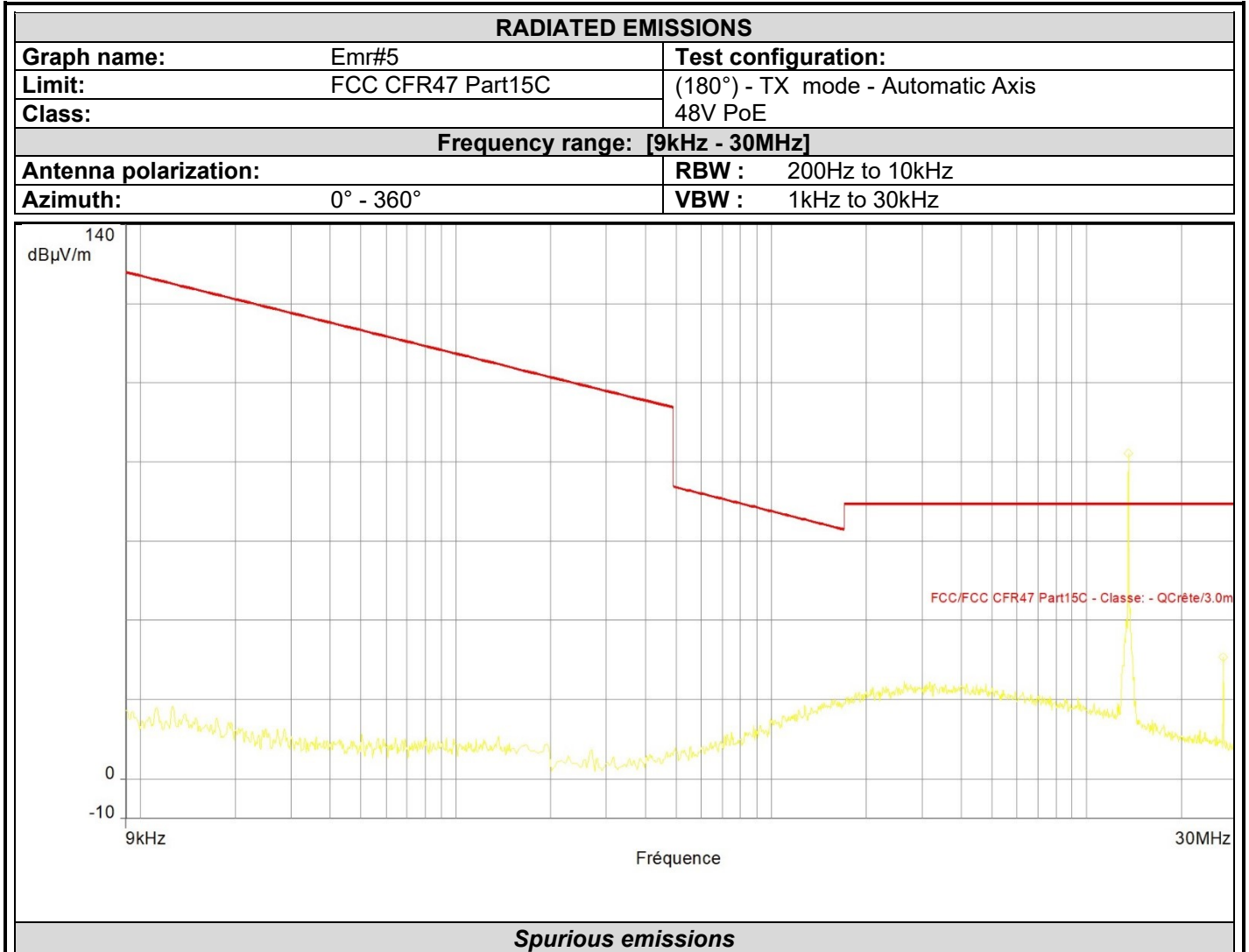


Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
13.562*	78.3	69.5	Horizontal	12.4
27.122	25.8	69.5	Horizontal	10.2
13.562*	79.2	69.5	Vertical	12.4
27.122	19.6	69.5	Vertical	10.2

*Carrier frequency



L C I E

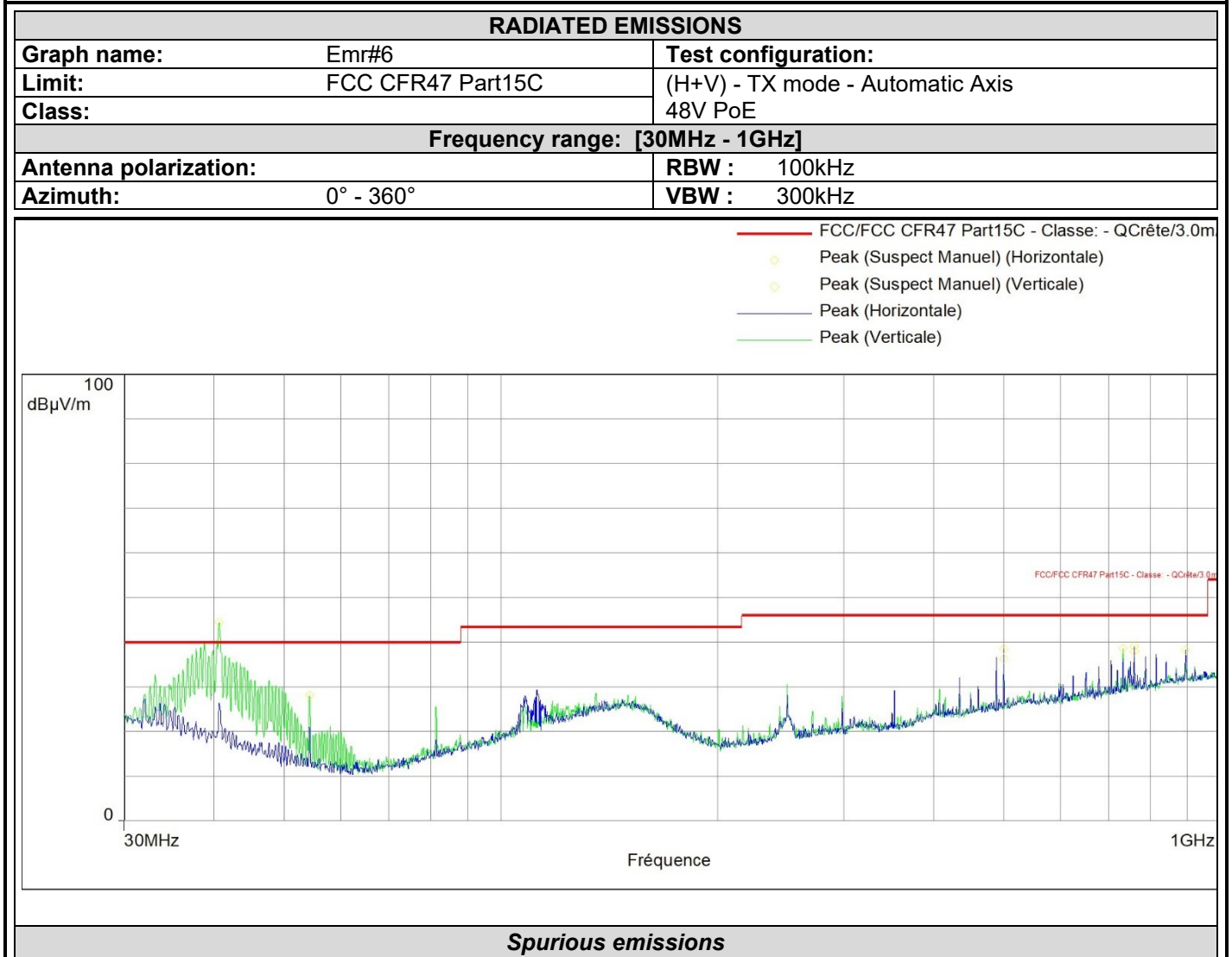


Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
13.562*	82.2	69.5	Horizontal	12.4
27.122	30.7	69.5	Horizontal	10.2

*Carrier frequency



L C I E



Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Polarization	Correction (dB)
499.965	38.5	46.0	Horizontal	22.4
759.440	39.0	46.0	Horizontal	26.2
40.670	44.5	40.0	Vertical	16.3
54.250	28.0	40.0	Vertical	10.7
499.965	36.3	46.0	Vertical	22.4
732.280	38.6	46.0	Vertical	25.9
759.440	37.9	46.0	Vertical	26.2



Final measurement:

9kHz to 30MHz					
Polarization	Frequency (MHz)	Peak Level (dB μ V/m)	QPeak Level (dB μ V/m)	Limit (dB μ V/m)	Margin QPeak (dB μ V/m)
all emissions were greater than 20 dB below the limit					

Final measurement:

Test Frequency (MHz)	Meter Reading dB(μ V)	Detector (Pk/QP/Av)	Polarity (V/H)	Azimuth (Degrees)	Antenna Height (cm)	Transducer Factor (dB)	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
40.68	23.0	QP	V	0	110	14.4	37.4	40.0	-2.6
54.24	19.1	QP	V	45	100	11.4	30.5	40.0	-9.5
488.16	14.3	QP	V	270	100	23.2	37.5	46.0	-8.5
500	16.0	QP	V	0	125	23.7	39.7	46.0	-6.3
732.24	13.1	QP	V	30	130	29.2	42.3	46.0	-3.7
759.36	12.3	QP	V	0	130	29.3	41.6	46.0	-4.4

7.7. CONCLUSION

Field strength outside of the bands 13.110-14.010 MHz measurement performed on the sample of the product **INGENICO OPEN2500 CL/POE/BT, OPEN2500 CL/Eth/BT** SN: **220647313471260623948272, 220617313161260223902168** in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS-Gen limits.

8. FIELD STRENGTH WITHIN THE BAND 13.110-14.010MHZ

8.1. TEST CONDITIONS

Test performed by : Majid MOURZAGH
 Date of test : May 6, 2022
 Ambient temperature : 22 °C
 Relative humidity : 39 %

8.2. TEST SETUP

Measurement procedure:

- Open Area Test Site
- Open Area Test Site + Test fixture in climatic chamber (for normal condition measurement)

Ambient temperature: 20 °C
 Relative humidity: 36 %

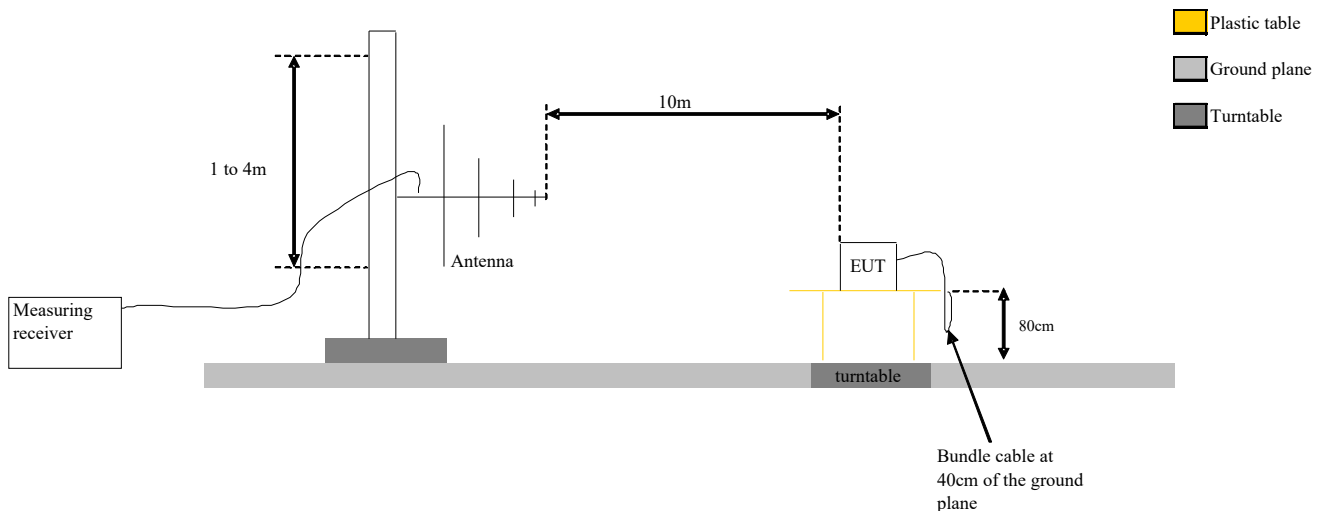
Note: It is impracticable to carry out tests under normal condition as specified in standard.

The product has been tested according to ANSI C63.10.

The EUT is placed **on an open area test site**. Distance between measuring antenna and the EUT is **10m**.

Test is performed in parallel, perpendicular and ground parallel axis with a loop antenna below 30MHz.

Measurement bandwidth was 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 search was performed from 1 to 4m. The EUT is placed at 0.8m.



Test Set up for radiated measurement in open area test site

For measurement with test fixture is used, the power level calibration of the spectrum analyzer shall then be related to the power level or field strength measured with temperature during OATS measure taking in consideration in climatic chamber. The calculation will be used to calculate the absolute level of the sideband power.

Frequency band 13.110-14.010MHz

Following plots show radiated emission level in the frequency band 13.110-14.010MHz with a RBW of 9kHz and a quasi-peak detector. The graphs are obtained with a measuring receiver.



OATS Setup



Axis XY



Axis Z

Photograph for Field strength within the band 13.110-14.010MHz in OATS



Photograph for Field strength within the band 13.110-14.010MHz in Climatic Chamber (normal condition)

8.3. LIMIT

Frequency (MHz)	Field strength ($\mu\text{V/m}$) @30m	Field strength ($\text{dB}\mu\text{V/m}$) @30m	Field strength ($\text{dB}\mu\text{V/m}$) @3m
13.553-13.567	15 848	84.0	124.0
13.410-13.553 13.567-13.710	334.0	50.5	90.5
13.110-13.410 13.710-14.010	106.0	40.5	80.5
Below 13.110MHz Above 14.010MHz	30.0	29.5	69.5



8.4. TEST EQUIPMENT LIST

TEST EQUIPMENT USED on OATS					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052	06/19	06/22
Multimeter - CEM	FLUKE	87	A1240251	03/21	03/23
Power supply DC	METRIX	AX503	A7042308		
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23
Antenna Mat (OATS)	ETS Lingren	2071-2	F2000392		
Cable (OATS)	—	1GHz	A5329623	08/21	08/22
CALCUL_FACTEURS	LCIE SUD EST	V4	L2000035		
Emission Cable	SUCOFLEX	6GHz	A5329061	08/21	08/22
Emission Cable	MICRO-COAX	1GHz	A5329656	08/21	08/22
OATS	—	—	F2000409	04/21	08/22
Rehausse Table C1/OATS	LCIE	—	F2000512		
Table C1/OATS	LCIE	—	F2000445		
Turntable (OATS)	ETS Lingren	Model 2187	F2000403		
Turntable / Mast controller (OATS)	ETS Lingren	Model 2066	F2000372		

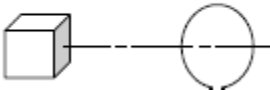
8.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:

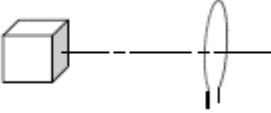
8.6. RESULTS

Results on OATS test conditions:

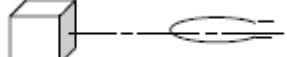
Frequency (MHz)	QPeak Limit (dB μ V/m) @ 30m	Qpeak (dB μ V/m) @ 30m	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	Comments
13.56	84	38.2	-45.8	0	V	150	35.6	Axis 0°



Parallel Axis (0°)



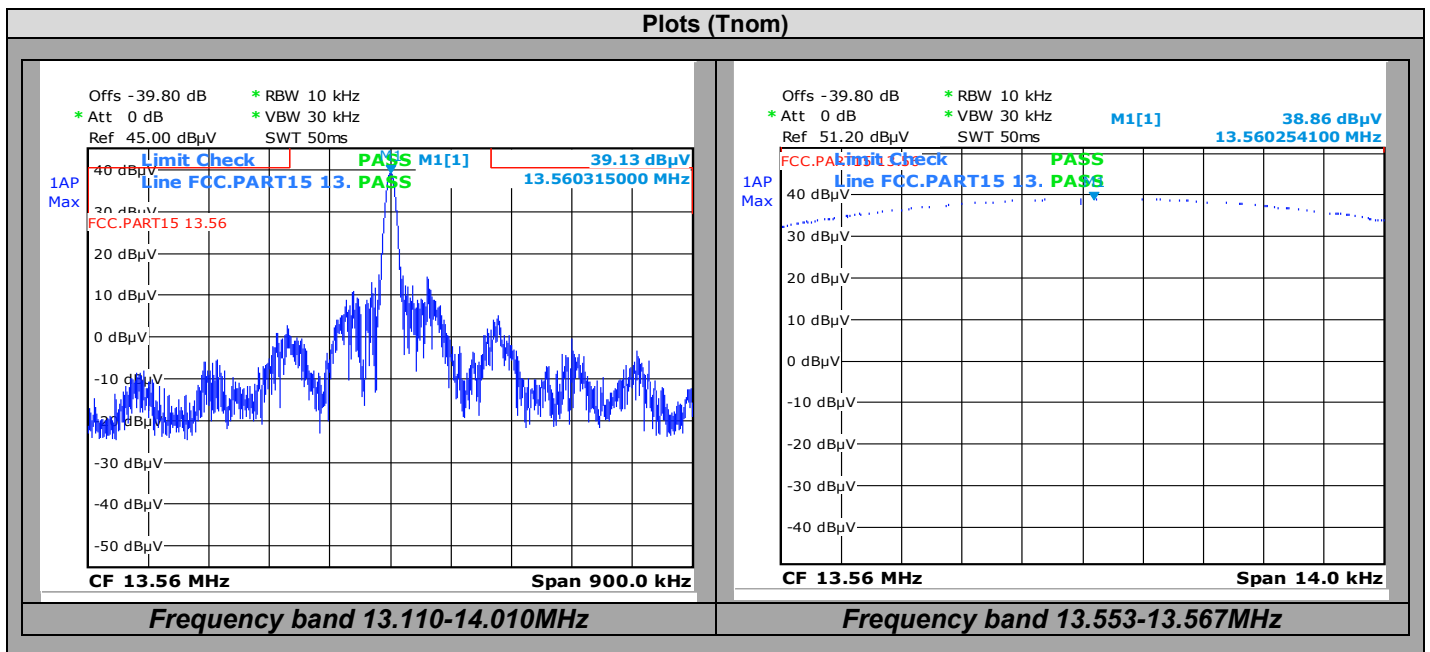
Perpendicular Axis (90°)



Ground Parallel Axis (180°)

Note: Measure have been done at 10m distance and corrected according to requirements of 15.209.e) ($M@30m = M@10m-19.1dB$)

Results under Normal condition



8.7. CONCLUSION

Field strength within the band 13.110-14.010MHz measurement performed on the sample of the product **INGENICO OPEN2500 CL/POE/BT**, SN: **220647313471260623948272**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS 210 limits.

9. UNCERTAINTIES CHART

47 CFR Part 15.209 & 15.207 Kind of test	Wide uncertainty laboratory (k=2) ±x(dB) / (Hz)/ ms	Uncertainty limit
Measurement of conducted disturbances in voltage on the AC power port (9 kHz – 150 kHz)	2,67	3.8
Measurement of conducted disturbances in voltage on the AC power port (150 kHz – 30 MHz)	2,67	3.4
Measurement of conducted disturbances in voltage on the telecommunication port. (AAN)	3,67	5.0
Measurement of conducted disturbances in current (current clamp)	2,73	2.9
Measurement of disturbance power	2,67	4.5
Measurement of radiated magnetic field from 10kHz to 30MHz in SAC V01	4,48	/
Measurement of radiated magnetic field from 10kHz to 30MHz in SAC C01	4,48	/
Measurement of radiated electric field from 30 to 1000MHz in horizontal position on the OATS (Ecuellas)	4,88	6.3
Measurement of radiated electric field from 1 to 18GHz on the Ecuellas site	5.16	/
Measurement of radiated electric field from 30 to 1000MHz in vertical position on the OATS (Ecuellas)	4,99	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC C01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC C01	5,16	6.3
Measurement of radiated electric field from 30 to 1000MHz in horizontal position in SAC V01	5,08	6.3
Measurement of radiated electric field from 30 to 1000MHz in vertical position in SAC V01	5,15	6.3
Measurement of radiated electric field from 1 to 6 GHz C01	5,1	5.2
Measurement of radiated electric field from 1 to 6 GHz V01	4,85	5.2
Measurement of radiated magnetic field from 10kHz to 30MHz on the OATS (Ecuellas)	4,48	/

The uncertainty values calculated by the laboratory are lower than limit uncertainty values defined by the CISPR. The conformity of the sample is directly established by the applicable limits values. This table includes all uncertainties maximum feasible for testing in the laboratory, whether or not made in this report