



LCIE

RFID 13,56MHz Template: Release March 25th, 2021

TEST REPORT

N°: 173715-769143-A (File#2923296)

Version : 02

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
FRANCE

Apparatus under test

↻ Product Payment terminal
↻ Trade mark **INGENICO**
↻ Manufacturer **INGENICO**
↻ Family range **Desk/5000**
↻ Model under test **Desk/5000 CL**
↻ Serial number **211907303001249821476359**
↻ FCC ID **XKB-D5000M02**
↻ IC **2586D-D5000M02**

Conclusion

See Test Program chapter

Test date

August 9, 2021 to August 13, 2021

Test location

Moirans

Test Site

ISED:6500A-1 & 6500A-3 / FCC:197516

Sample receipt date

July 28, 2021

Composition of document

45 pages

Document issued on

September 21, 2021

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PUBLICATION HISTORY

Version	Date	Author	Modification
01	September 21, 2021	Mounir BOUAMARA	Creation of the document
02	September 27, 2021	Mounir BOUAMARA	Completing the following informations page 40. Emr#7 page 35

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 15.225 (2020) / Part15B / Part15C
- 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. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):
INGENICO Desk/5000 CL

Serial Number: 211907303001249821476359



Equipment Under Test

Power supply:

During all the tests, EUT is supplied by V_{nom} : **230VAC**

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

Name	Type	Rating	Reference / Sn	Comments
Supply1	AC	100-240 Vac 50-60Hz	AM32W-0.80A	-

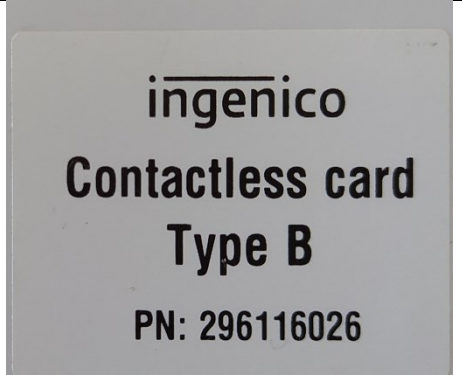


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Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
Supply1	Input AC, 2 wires	1,8	Yes	No	Yes	-
	Output DC, Jack	1,8	Yes	No	Yes	-
Twist cable to Magicbox	Power supply Jack	2	Yes	No	Yes	-
	RJ11	2	Yes	No	No	-
	RJ45	2	Yes	No	No	-
	RJ11	2	Yes	No	No	-

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
ContactLess card	/	/	



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 type="checkbox"/> Tabletop	<input type="checkbox"/> Floor-standing	<input checked="" 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"/> -20°C	<input type="checkbox"/> X°C*
	Tnom:	20°C	
	Tmax:	<input checked="" type="checkbox"/> 50°C	<input type="checkbox"/> X°C*
Operating voltage:	Vmin (90% Vnom):	<input checked="" type="checkbox"/> 90/60Hz	<input type="checkbox"/> XVdc*
	Vnom:	<input checked="" type="checkbox"/> 100V/60Hz	<input type="checkbox"/> XVdc*
	Vmax:	<input checked="" type="checkbox"/> 240V/60Hz	<input type="checkbox"/> XVdc*

*Ask from provider

Antenna Characteristic			
Antenna assembly	Gain (dBi)	Frequency Band (MHz)	Impedance(Ω)
1	0	[13.553 to 13.567] MHz	50

Hardware information		
Software (if applicable):	V. :	Not communicated



2.2. 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) 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

2.3. EQUIPMENT MODIFICATION

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 52.5dB 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.

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

2.5. 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. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Mounir BOUAMARA
Date of test : August 9, 2021 to August 13, 2021
Ambient temperature : 24 °C
Relative humidity : 42 %

3.2. TEST SETUP

- The Equipment Under Test is installed:

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

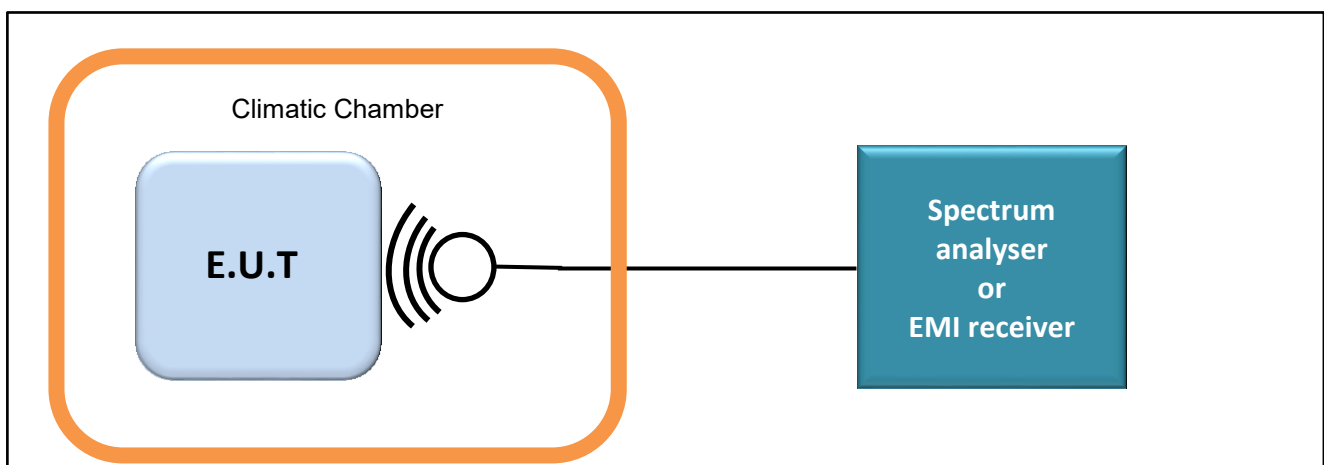
- Measurement is performed with a spectrum analyzer in:

- 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



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Photograph for Occupied bandwidth

3.3. LIMIT

None

3.4. TEST EQUIPMENT LIST

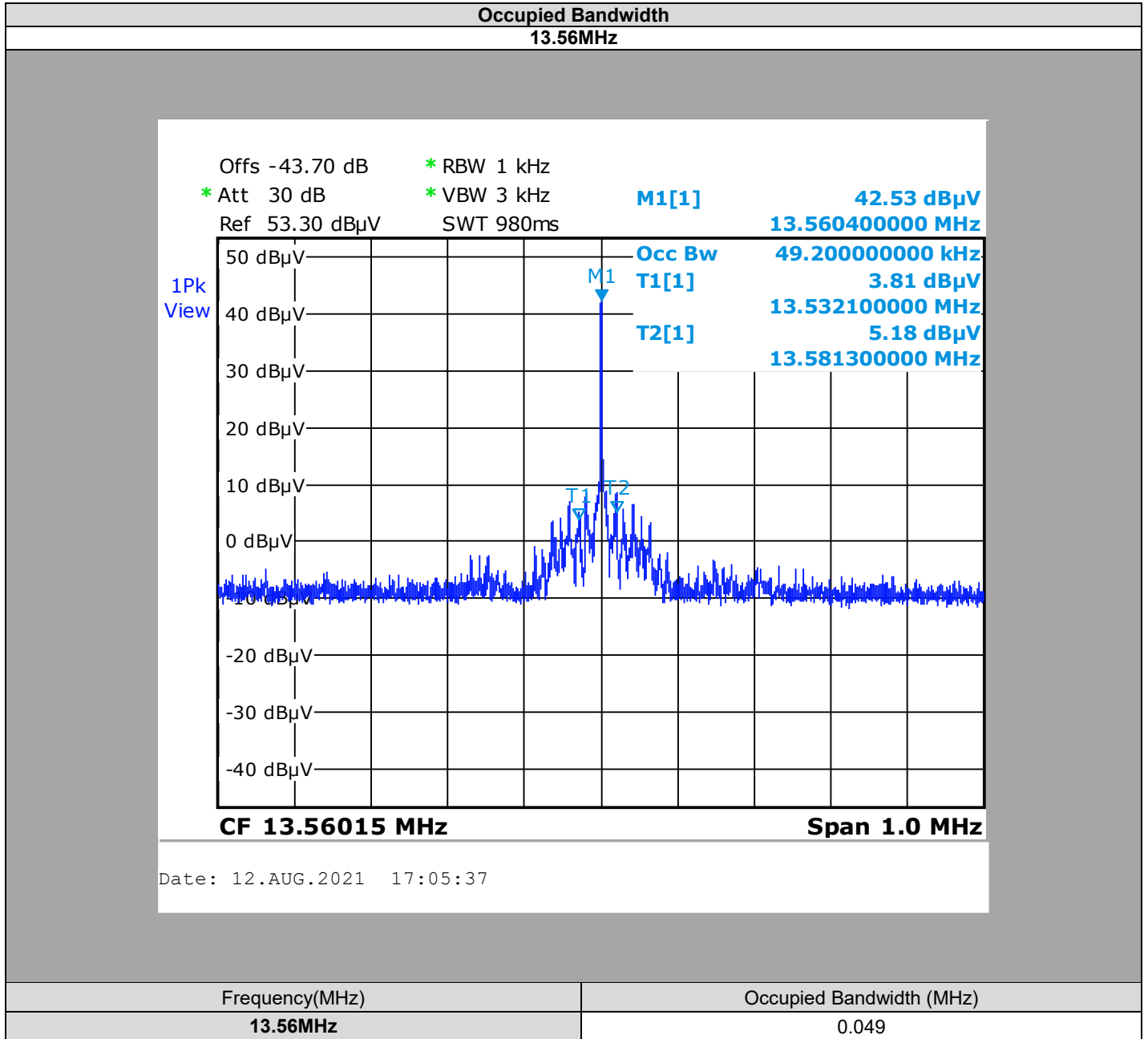
TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
AC source 1kW	KEYSIGHT	AC6802A	A7042305		
Antenna Loop (near field)	ELECTRO-METRICS	EM-6993	C2040215	06/19	06/22
Attenuator 10dB	AEROFLEX	-	A7122267	05/19	09/21*
Cable SMA 2m	-	6GHz	A5329635	02/20	02/22
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	12/20	12/21
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	TESTO	608-H1	B4204120	12/20	12/22
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23

*Under derogation



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3.5. RESULTS



3.6. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **INGENICO Desk/5000 CL**, SN: **211907303001249821476359**, 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 : Mounir BOUAMARA
Date of test : August 9, 2021 to August 13, 2021
Ambient temperature : 24 °C
Relative humidity : 42 %

4.2. TEST SETUP

- The Equipment Under Test is installed:

- In an anechoic chamber
- In an anechoic chamber
- In an climatic chamber

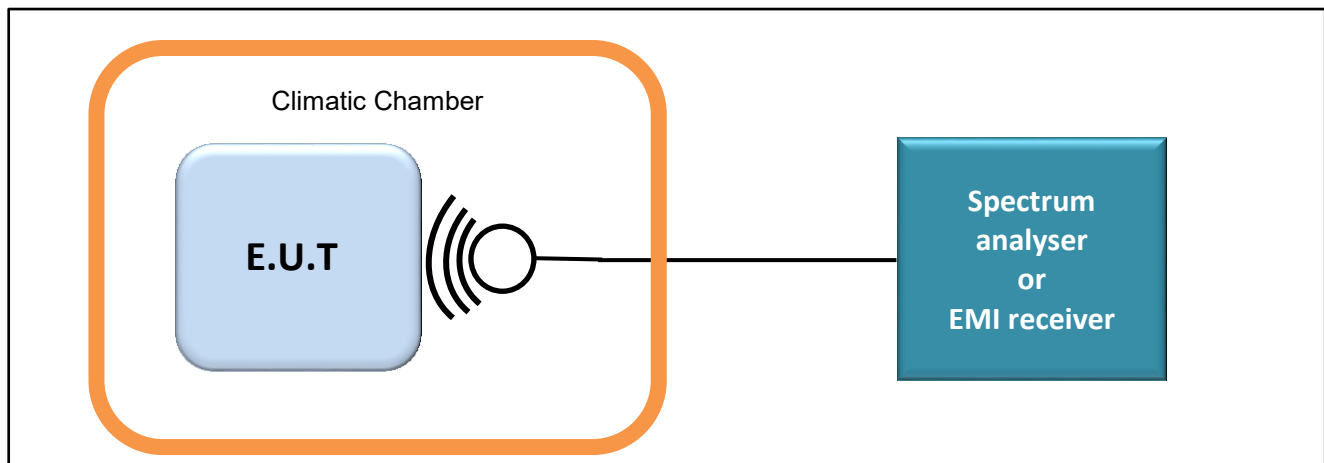
- Measurement is performed with a spectrum analyzer in:

- 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	05/19	09/21*
Cable SMA 2m	-	6GHz	A5329635	02/20	02/22
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	12/20	12/21
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	TESTO	608-H1	B4204120	12/20	12/22
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23

*Under derogation

5. FREQUENCY TOLERANCE

5.1. TEST CONDITIONS

Test performed by : Mounir BOUAMARA
Date of test : August 9, 2021 to August 13, 2021
Ambient temperature : 24 °C
Relative humidity : 42 %

5.2. TEST SETUP

- The Equipment Under Test is installed:

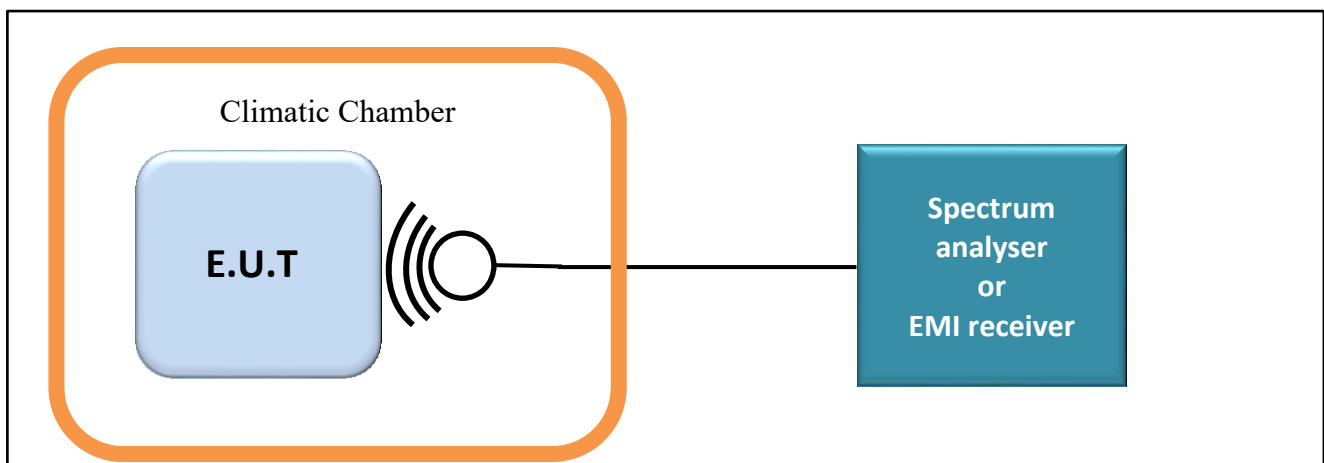
- On a table
- In a climatic chamber
- In an anechoic chamber

- 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



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Photograph for Frequency Tolerance

5.3. LIMIT

±0.01% (± 100ppm)

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	05/19	09/21*
Cable SMA 2m	_	6GHz	A5329635	02/20	02/22
Climatic chamber	BIA CLIMATIC	CL 6-25	D1022117	12/20	12/21
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	TESTO	608-H1	B4204120	12/20	12/22
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23

*Under derogation



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5.5. RESULTS

EUT activation:	Startup							
Voltage:	Vnom							
Temperature:	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
Frequency (MHz)	13.56041427	13.56039774	13.56039966	13.56039608	13.56038175	13.56039443	13.56039801	13.5605381
Frequency Drift (%)	0.0031%	0.0029%	0.0029%	0.0029%	0.0028%	0.0029%	0.0029%	0.0040%
EUT activation:	2min							
Voltage:	Vnom							
Temperature:	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
Frequency (MHz)	13.56041427	13.56039774	13.56039966	13.56039608	13.56038175	13.56039443	13.56039801	13.5605381
Frequency Drift (%)	0.0031%	0.0029%	0.0029%	0.0029%	0.0028%	0.0029%	0.0029%	0.0040%
EUT activation:	5min							
Voltage:	Vnom							
Temperature:	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
Frequency (MHz)	13.56041427	13.56039774	13.56039966	13.56039608	13.56038175	13.56039443	13.56039801	13.5605381
Frequency Drift (%)	0.0031%	0.0029%	0.0029%	0.0029%	0.0028%	0.0029%	0.0029%	0.0040%
EUT activation:	10min							
Voltage:	Vnom							
Temperature:	-20°C	-10°C	0°C	10°C	20°C	30°C	40°C	50°C
Frequency (MHz)	13.56041427	13.56039774	13.56039966	13.56039608	13.56038175	13.56039443	13.56039801	13.5605381
Frequency Drift (%)	0.0031%	0.0029%	0.0029%	0.0029%	0.0028%	0.0029%	0.0029%	0.0040%

Temperature	Tnom		
Voltage:	Vmin	Vnom	Vmax
Frequency (MHz)	13.56037431	13.56037977	13.56037982
Frequency Drift (%)	0.0028%	0.0028%	0.0028%

5.6. CONCLUSION

Frequency tolerance measurement performed on the sample of the product **INGENICO Desk/5000 CL**, SN: **211907303001249821476359**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.225 & RSS 210 limits.

6. MEASUREMENT OF CONDUCTED EMISSION

6.1. ENVIRONMENTAL CONDITIONS

Date of test : August 4, 2021
 Test performed by : Loïc BOURET
 Atmospheric pressure (hPa) : 990
 Relative humidity (%) : 60
 Ambient temperature (°C) : 24

6.2. TEST SETUP

Mains terminals

The EUT and auxiliaries are set 80cm above the ground on the non-conducting table (Table-top equipment).

The EUT is powered by V_{nom} .

The EUT is powered through a LISN (measure). Auxiliaries are powered by another LISN.



Test setup

6.3. TEST EQUIPMENT LIST

TEST EQUIPMENT USED					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
BAT EMC	NEXIO	v3.19.1.23	L1000115		
Cable + self	–	–	A5329578	04/21	04/22
EMC comb generator	LCIE SUD EST	–	A3169098		
LISN	ROHDE & SCHWARZ	ENV216	C2320123	09/20	09/21
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23
Transient limiter	ROHDE & SCHWARZ	ESH3-Z2	A7122204	08/20	08/21
Receiver 20Hz – 8GHz	ROHDE & SCHWARZ	ESU8	A2642019	11/20	11/22



6.4. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None

6.5. TEST RESULTS – RUNNING MODE N°1

Mains terminals:

Supply1

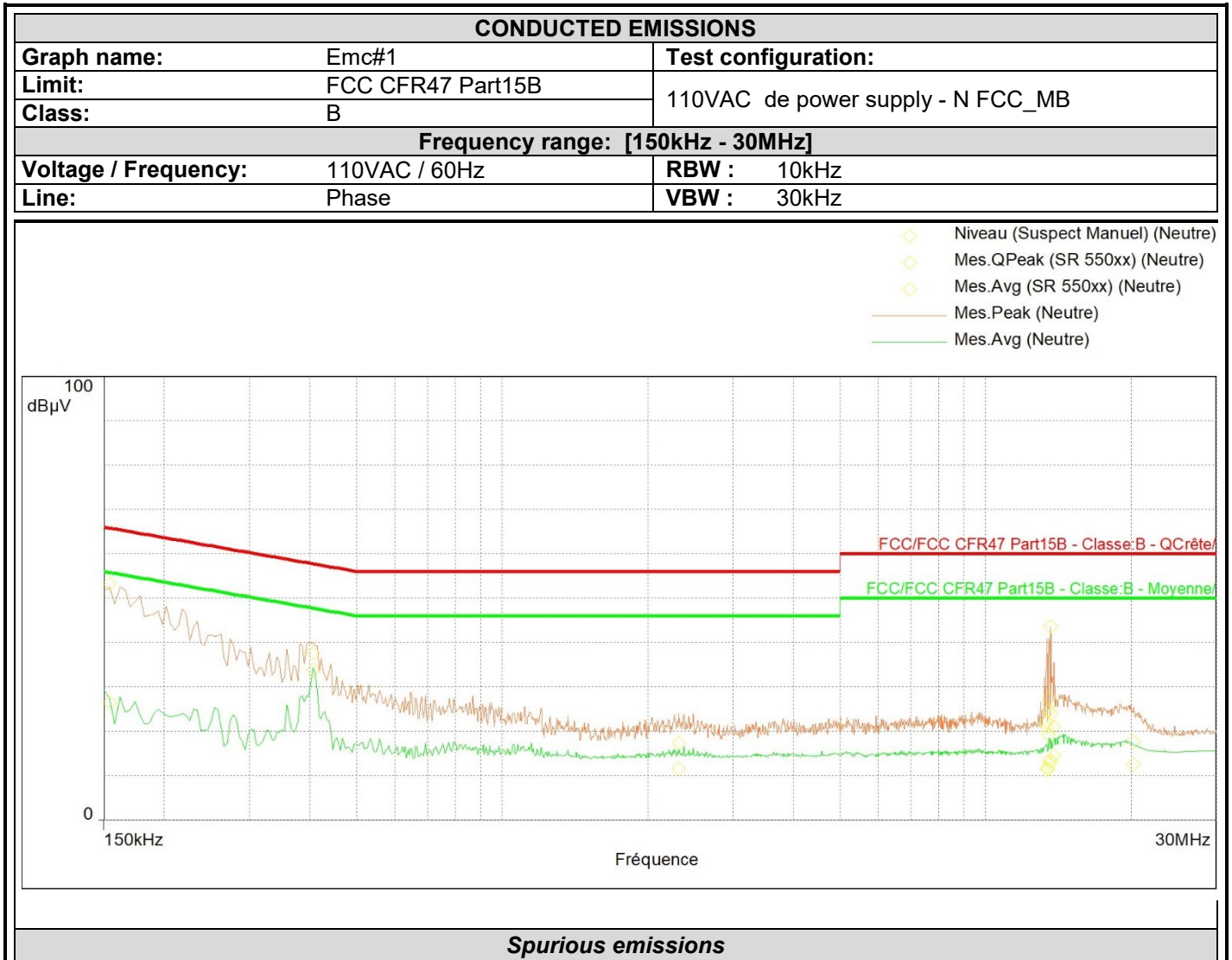
Measurements are performed on the power line.

Results: (PEAK detection)

Graph identifier	Line	Comments	
Emc# 1	Phase	110VAC/60Hz	See below
Emc# 2	Neutral	110VAC/60Hz	See below
Emc# 3	Phase	230VAC/50Hz	See below
Emc# 4	Neutral	230VAC/50Hz	See below



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Spurious emissions

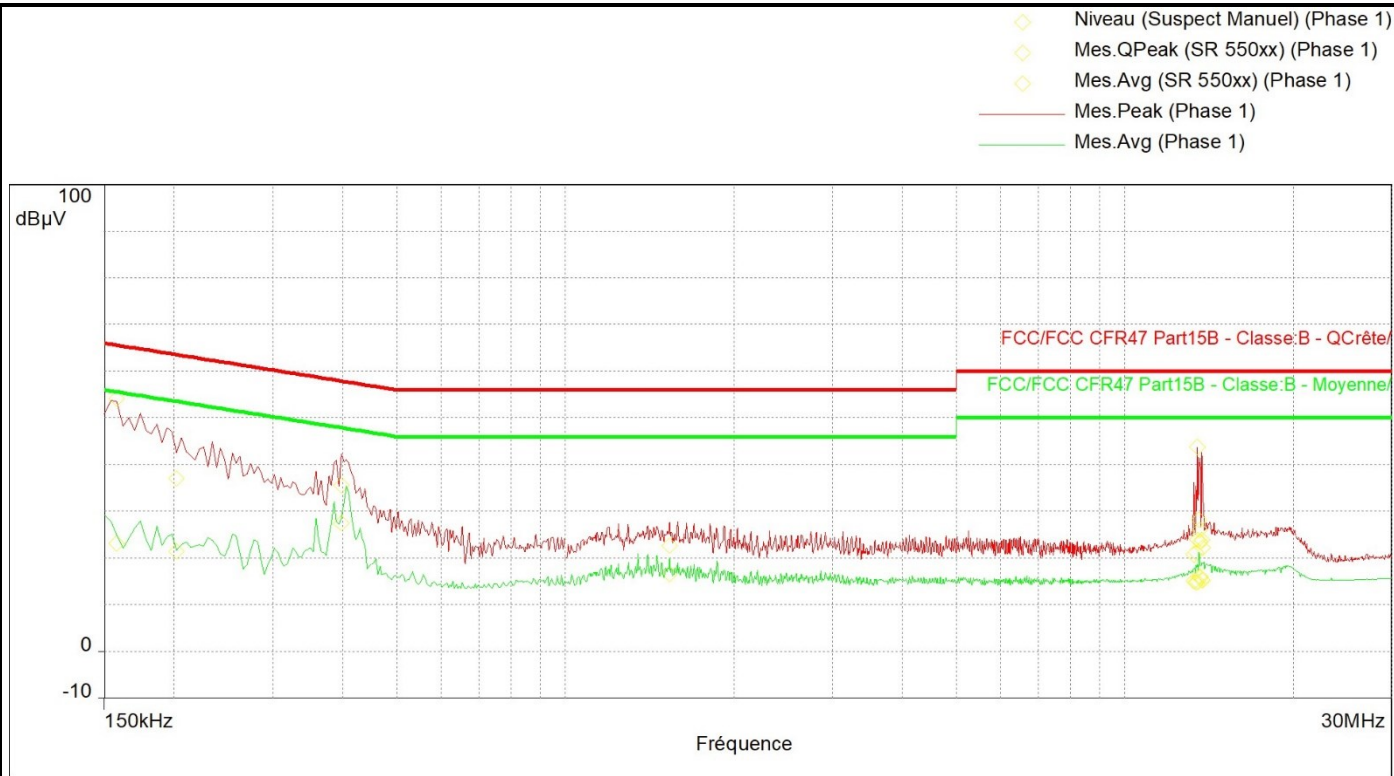
Frequency (MHz)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.154	53.4	65.8	-12.4	26.6	55.8	-29.2	Neutre	19.4
0.406	37.6	57.7	-20.1	33.8	47.7	-14.0	Neutre	19.5
2.320	17.4	56.0	-38.6	11.6	46.0	-34.4	Neutre	19.6
13.356	22.1	60.0	-37.9	11.6	50.0	-38.4	Neutre	20.5
13.408	20.8	60.0	-39.2	11.4	50.0	-38.6	Neutre	20.5
13.468	19.4	60.0	-40.6	11.7	50.0	-38.3	Neutre	20.5
13.524	24.9	60.0	-35.1	12.8	50.0	-37.2	Neutre	20.5
13.576	27.7	60.0	-32.3	13.6	50.0	-36.4	Neutre	20.5
13.632	24.0	60.0	-36.0	13.2	50.0	-36.8	Neutre	20.5
13.840	21.0	60.0	-39.0	14.5	50.0	-35.5	Neutre	20.5
20.200	17.6	60.0	-42.4	12.6	50.0	-37.4	Neutre	21.0



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CONDUCTED EMISSIONS

Graph name:	Emc#2	Test configuration:	
Limit:	FCC CFR47 Part15B	110 VAC de power supply - P FCC_MB	
Class:	B		
Frequency range: [150kHz - 30MHz]			
Voltage / Frequency:	110VAC / 60Hz	RBW :	10kHz
Line:	Phase	VBW :	30kHz

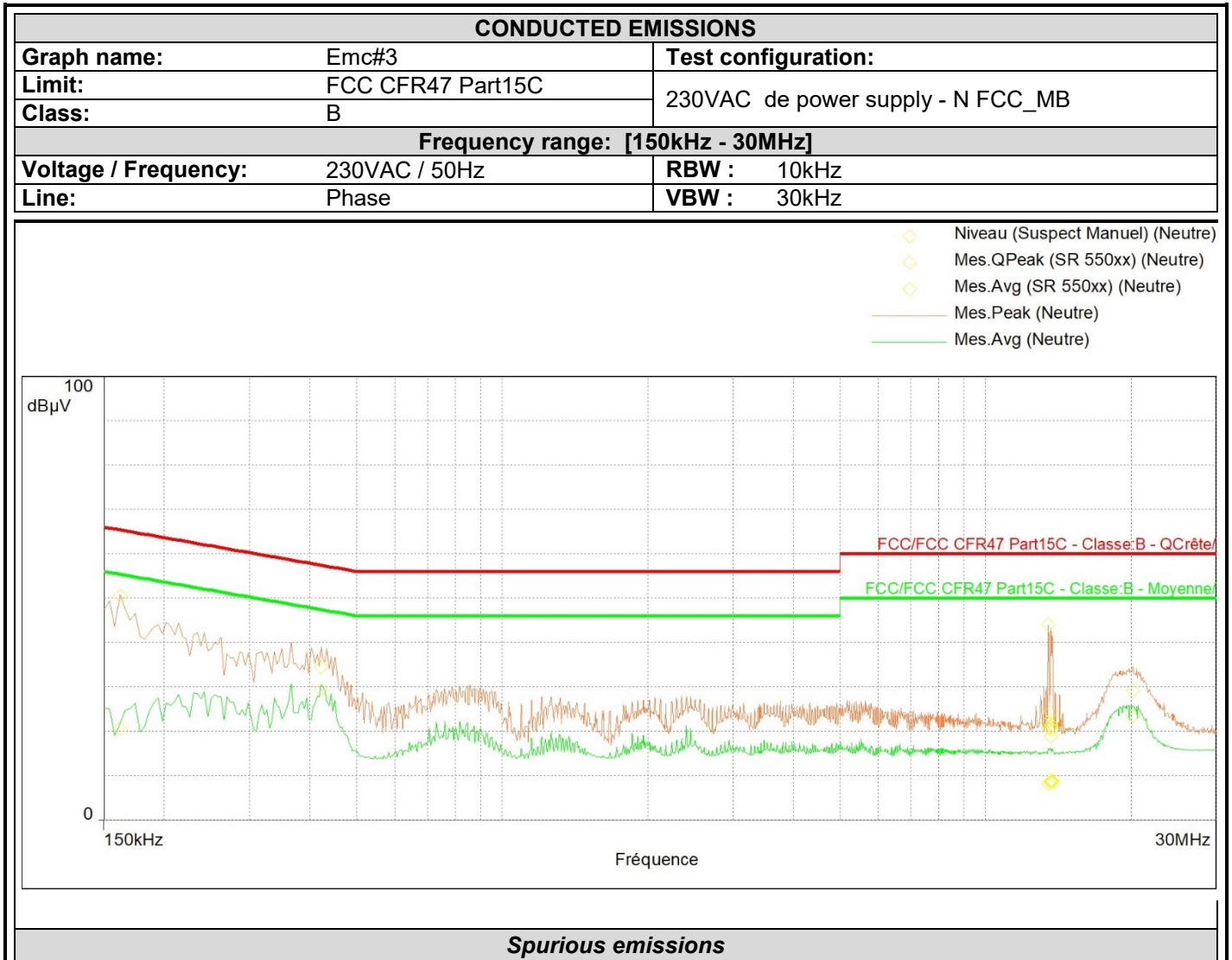


Spurious emissions

Frequency (MHz)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.158	54.2	65.6	-11.4	23.2	55.6	-32.4	Phase 1	19.4
0.202	37.1	63.5	-26.4	21.4	53.5	-32.1	Phase 1	19.5
0.398	35.6	57.9	-22.3	27.4	47.9	-20.5	Phase 1	19.5
1.536	22.6	56.0	-33.4	16.6	46.0	-29.4	Phase 1	19.6
13.276	20.7	60.0	-39.3	15.0	50.0	-35.0	Phase 1	20.5
13.392	21.2	60.0	-38.8	14.8	50.0	-35.2	Phase 1	20.5
13.484	23.9	60.0	-36.1	14.9	50.0	-35.1	Phase 1	20.5
13.544	28.2	60.0	-31.8	16.1	50.0	-33.9	Phase 1	20.5
13.596	26.0	60.0	-34.0	16.2	50.0	-33.8	Phase 1	20.5
13.644	23.5	60.0	-36.5	15.9	50.0	-34.1	Phase 1	20.5
13.704	23.9	60.0	-36.1	15.4	50.0	-34.6	Phase 1	20.5
13.760	22.3	60.0	-37.7	15.2	50.0	-34.8	Phase 1	20.5



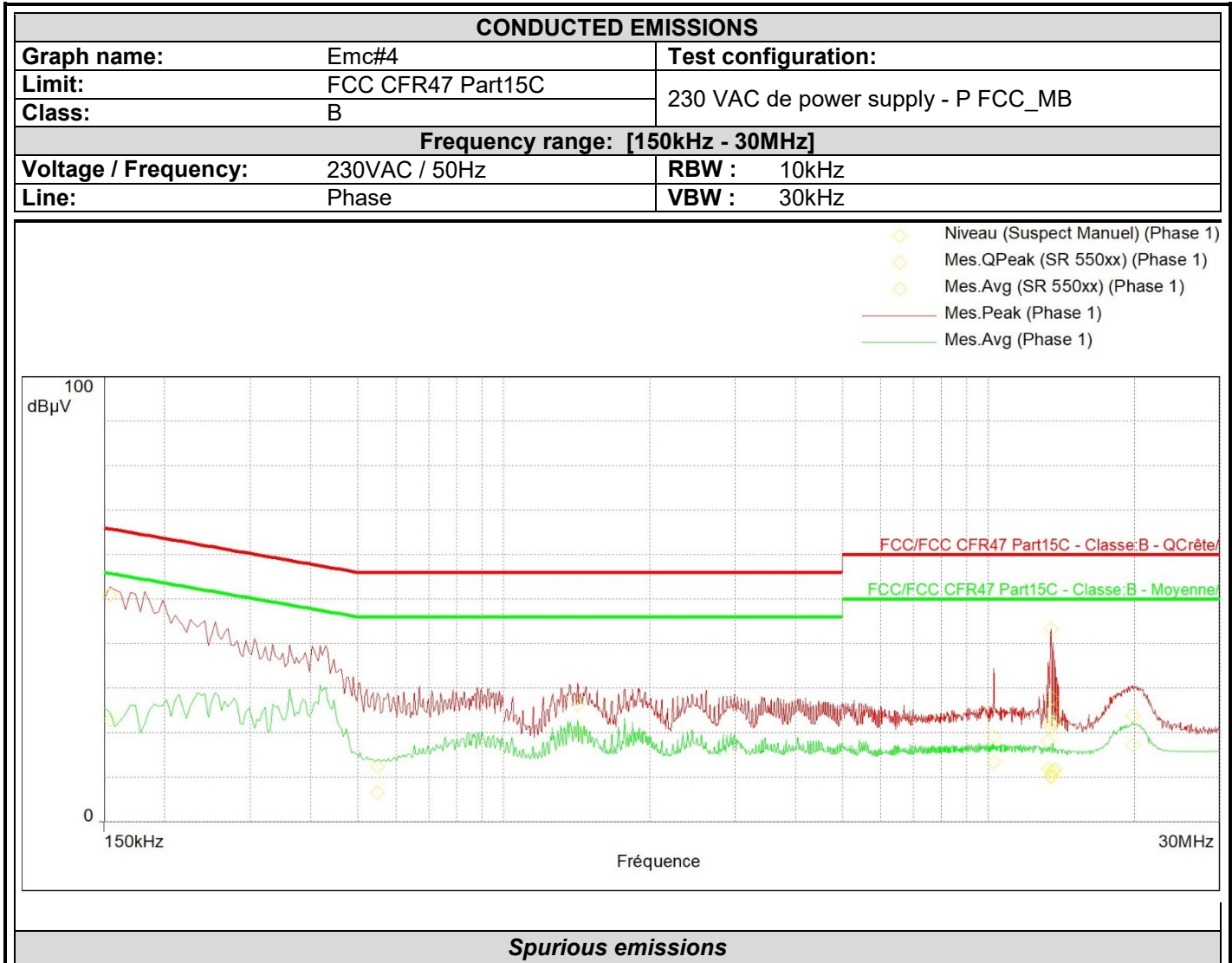
L C I E



Frequency (MHz)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.162	50.6	65.4	-14.8	20.7	55.4	-34.7	Neutre	19.4
0.422	34.4	57.4	-23.0	29.3	47.4	-18.1	Neutre	19.5
13.476	20.7	60.0	-39.3	8.3	50.0	-41.7	Neutre	20.5
13.484	22.3	60.0	-37.7	8.2	50.0	-41.8	Neutre	20.5
13.596	24.4	60.0	-35.6	8.6	50.0	-41.4	Neutre	20.5
13.640	21.0	60.0	-39.0	8.6	50.0	-41.4	Neutre	20.5
13.648	19.0	60.0	-41.0	8.9	50.0	-41.1	Neutre	20.5
13.700	21.4	60.0	-38.6	8.7	50.0	-41.3	Neutre	20.5
13.708	20.4	60.0	-39.6	8.7	50.0	-41.3	Neutre	20.5
13.764	22.5	60.0	-37.5	8.8	50.0	-41.2	Neutre	20.5
20.156	29.2	60.0	-30.8	23.5	50.0	-26.5	Neutre	21.0



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Frequency (MHz)	Mes.QPeak (dBµV)	LimQP (dBµV)	Mes.QPeak-LimQP (dB)	Mes.Avg (dBµV)	LimAvg (dBµV)	Mes.Avg-LimAvg (dB)	Line	Correction (dB)
0.154	51.0	65.8	-14.7	23.0	55.8	-32.8	Phase 1	19.4
0.550	12.4	56.0	-43.6	6.6	46.0	-39.4	Phase 1	19.5
1.424	26.5	56.0	-29.5	20.2	46.0	-25.8	Phase 1	19.6
10.272	19.2	60.0	-40.8	13.6	50.0	-36.4	Phase 1	20.3
13.272	18.1	60.0	-41.9	11.8	50.0	-38.2	Phase 1	20.5
13.428	21.2	60.0	-38.8	10.2	50.0	-39.8	Phase 1	20.5
13.480	22.1	60.0	-37.9	10.4	50.0	-39.6	Phase 1	20.5
13.544	27.8	60.0	-32.2	11.6	50.0	-38.4	Phase 1	20.5
13.596	25.1	60.0	-34.9	11.4	50.0	-38.6	Phase 1	20.5
13.704	22.2	60.0	-37.8	11.8	50.0	-38.2	Phase 1	20.5
19.884	23.9	60.0	-36.1	17.3	50.0	-32.7	Phase 1	21.0



6.6. CONCLUSION

The sample of the equipment **INGENICO Desk/5000 CL**, Sn: **211907303001249821476359**, tested in the configuration presented in this test report **satisfies** to requirements of the product family standard applied (See §Test Program) for conducted emissions.

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

7.1. TEST CONDITIONS

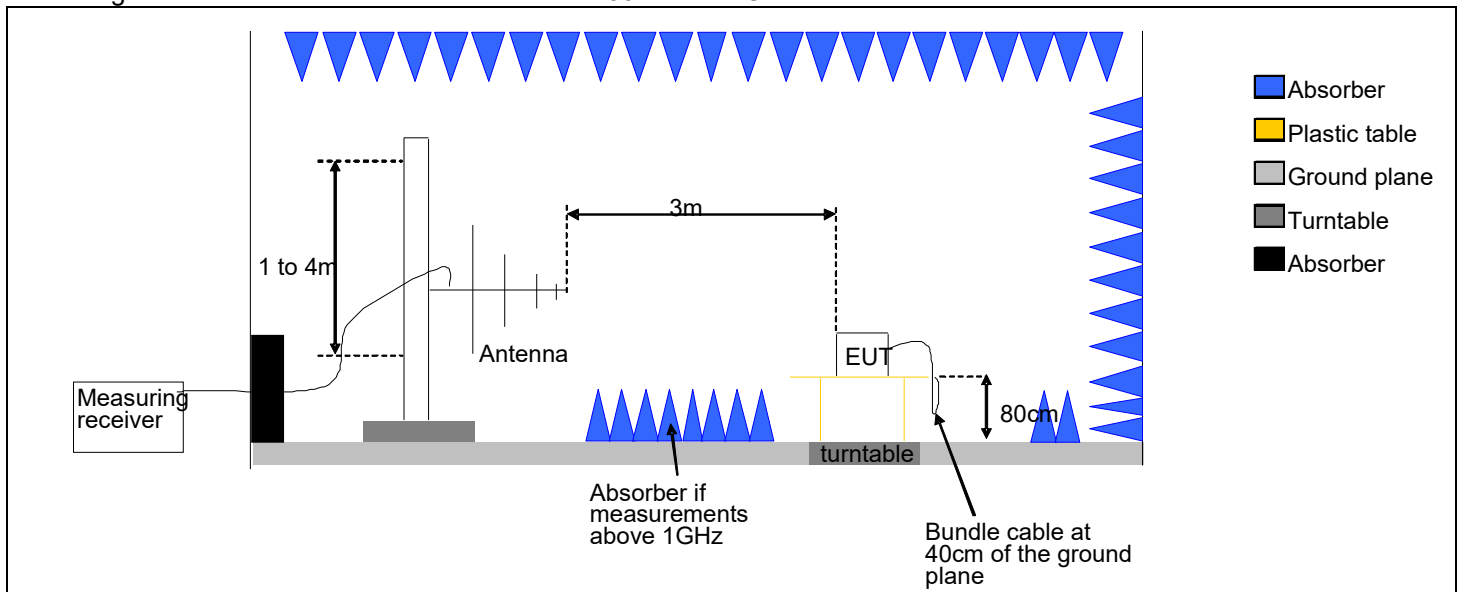
Test performed by : Mounir BOUAMARA
 Date of test : August 9, 2021 to August 13, 2021
 Ambient temperature : 24 °C
 Relative humidity : 42 %

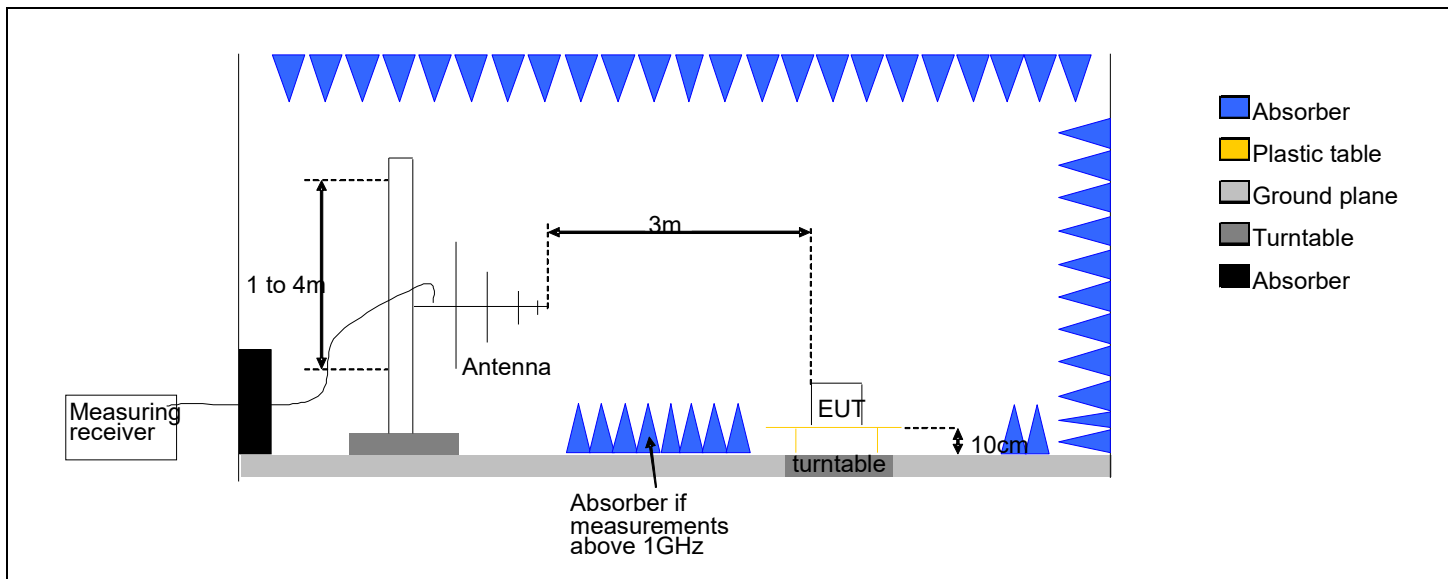
7.2. TEST SETUP

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

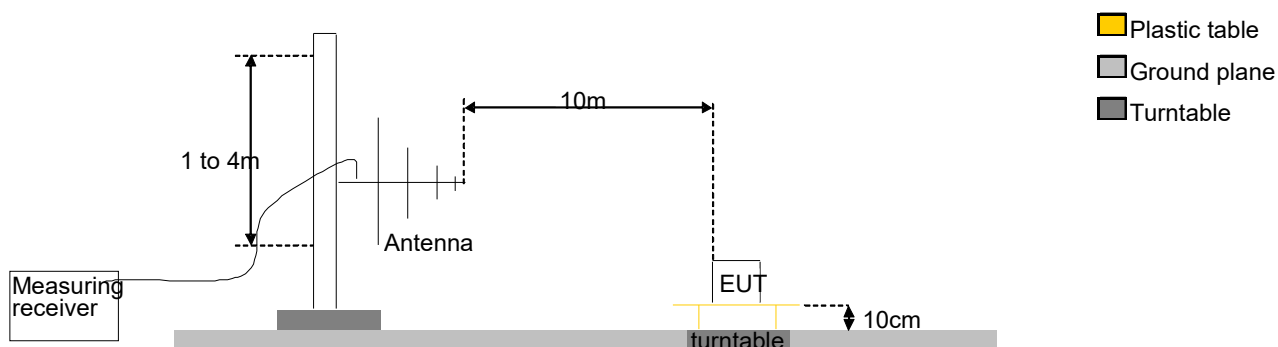
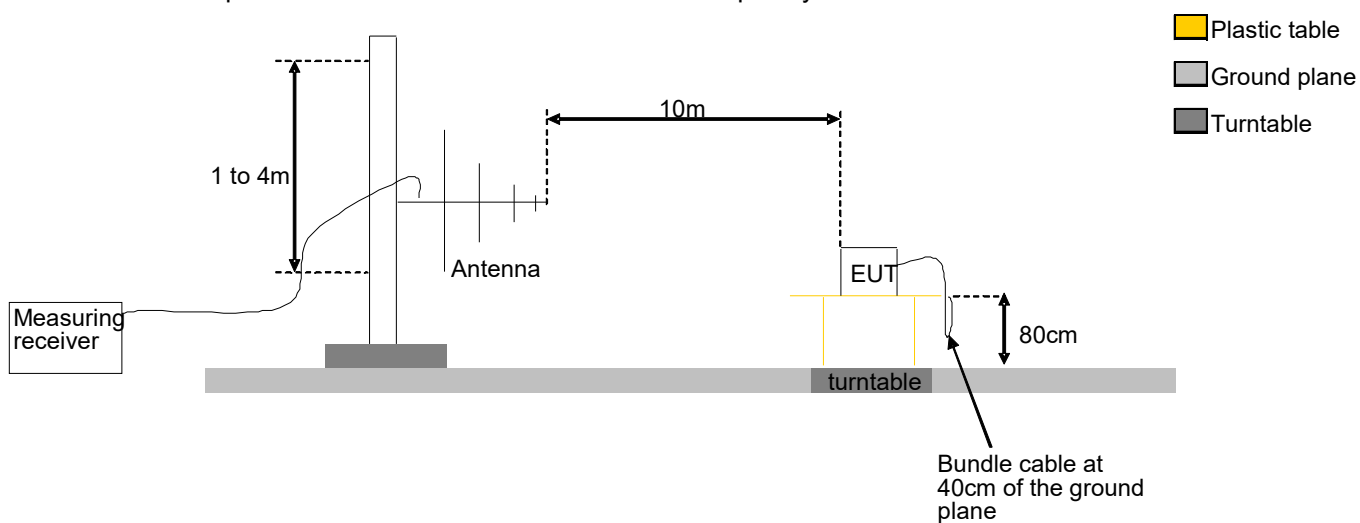
Test is performed in parallel, perpendicular and ground parallel axis with a loop antenna below 30MHz. Measurement bandwidth was 200Hz below 150kHz and 9kHz between 150kHz & 30MHz. The level has been maximised by the turntable rotation of 360 degrees range on all axis of EUT used in normal configuration. Antenna height was 1.5m. The EUT is placed **in a full-anechoic chamber**. Distance between measuring antenna and the EUT is **3m**.

Test is performed in horizontal (H) and vertical (V) polarization with **bilog & biconic** 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 place 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.

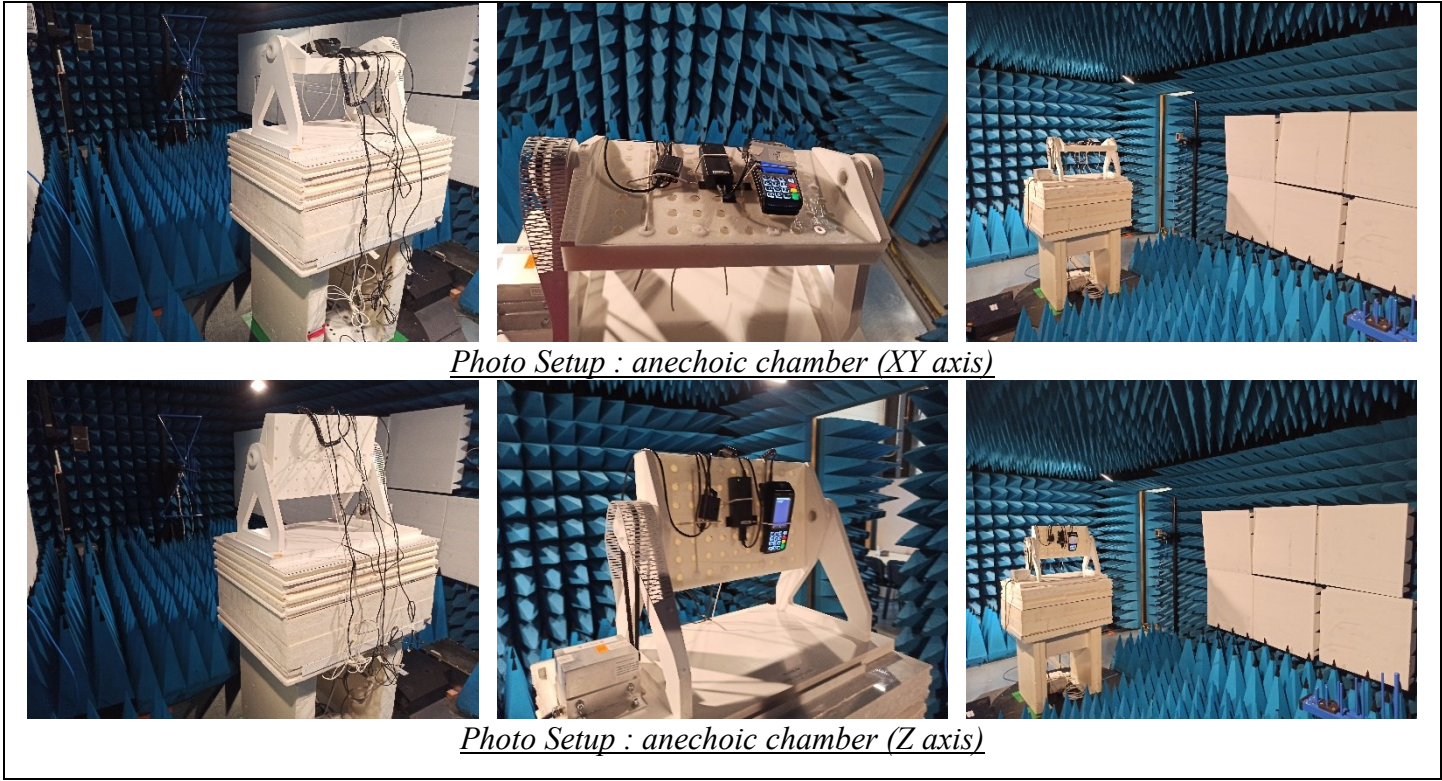




Test set up of Unwanted Emissions in Restricted Frequency Bands in semi anechoic chamber



Test Set up for radiated measurement in open area test site



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

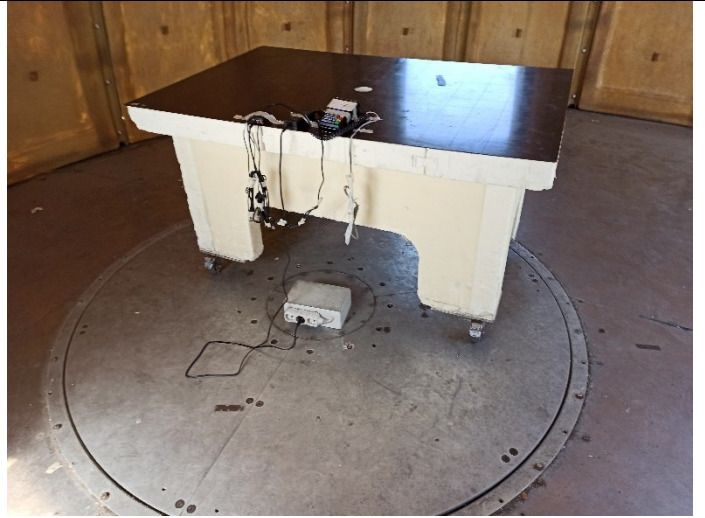


Photo Setup – OATS



Photo Setup – OATS (Biconic antenna)



Photo Setup – OATS (Bilog antenna)

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



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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					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Amplifier 9kHz - 40GHz	LCIE SUD EST	-	A7102082	06/20	10/21*
Antenna Bi-log	CHASE	CBL6111A	C2040172	09/18	08/21*
Antenna horn 18GHz	EMCO	3115	C2042029	09/18	09/21
BAT EMC	NEXIO	v3.19.1.23	L1000115		
CABLE N 3m	-	-	A5329206	07/20	07/22
Cable SMA 40GHz 40cm	WITHWAVE	W101-SM1-0.4M	A5329979	04/21	04/22
Comb EMR HF	YORK	CGE01	A3169114		
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	10/20	10/21
Emission Cable (SMA 3.3m)	TELEDYNE	26GHz	A5329875	10/20	10/21
Emission Cable <1GHz (Ampl <-> Cage)	-	18GHz	A5329907	08/20	08/21
Filter Matrice	LCIE SUD EST	Combined filters	A7484078	09/20	09/21
Multimeter - CEM	FLUKE	87	A1240251	03/21	03/23
Power supply DC	METRIX	AX503	A7042308		
Rehausse Table C3	LCIE	-	F2000511		
Rehausse Table C3	LCIE	-	F2000507		
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	09/19	09/21
Table C3	LCIE	-	F2000461		
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	02/21	02/23
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052	06/19	06/22
Biconic Antenna	EATON	94455-1	C2040234	03/21	03/23

*Under derogation

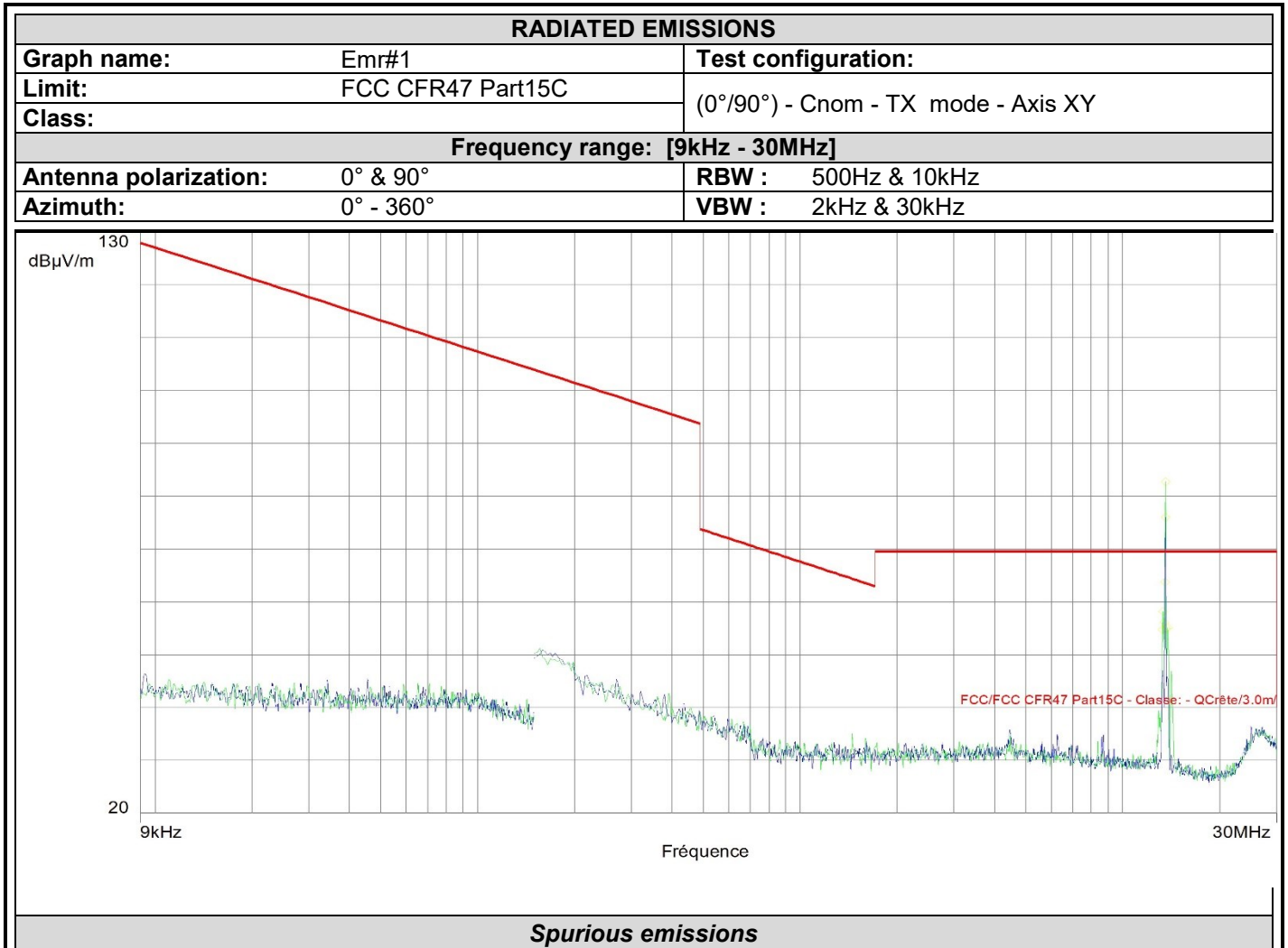
7.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:



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7.6. RESULTS

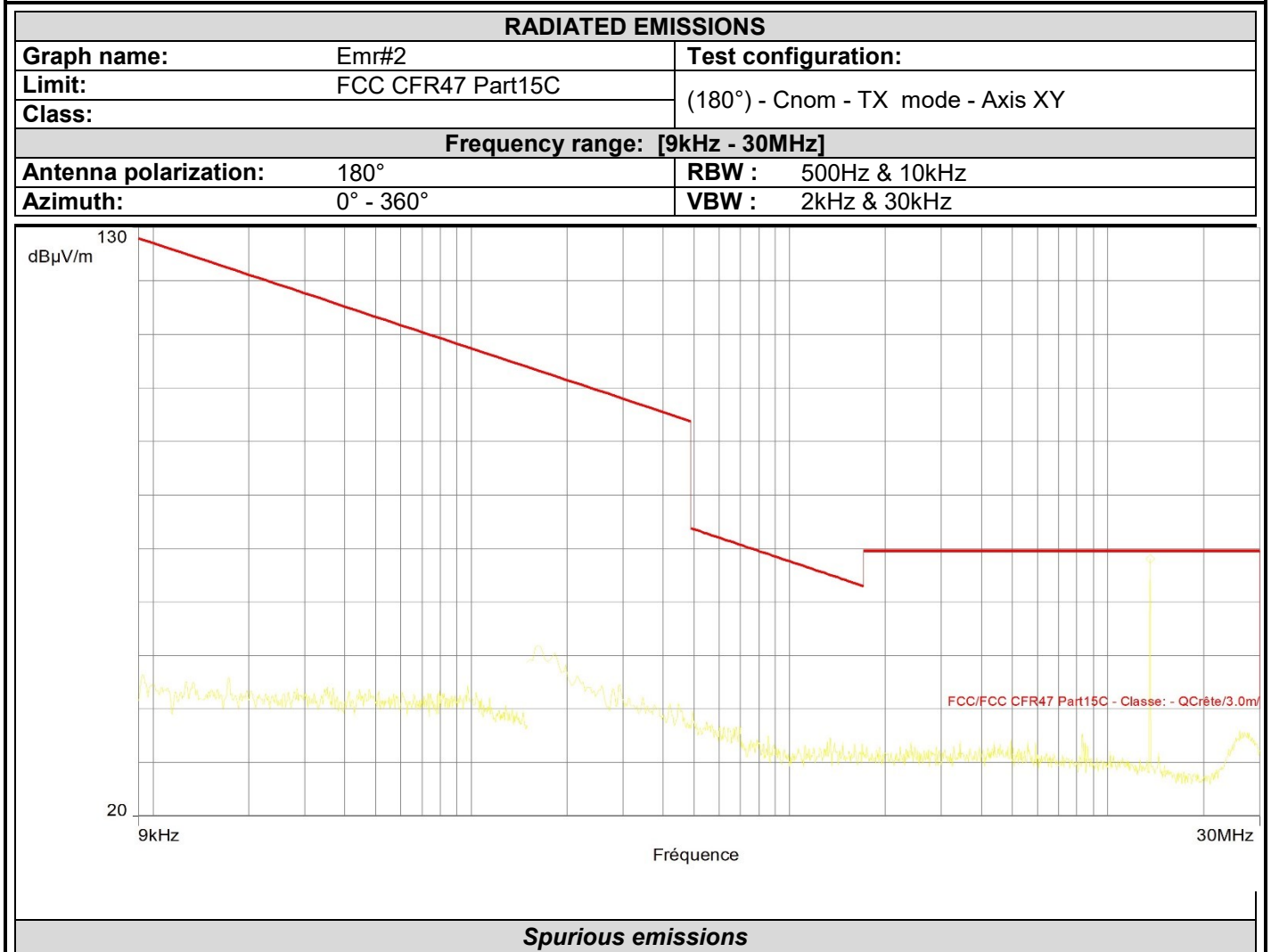


Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
13.562*	76.1	69.5	6.6	Horizontal	37.5
13.272	54.8	69.5	-14.7	Vertical	37.6
13.353	58.2	69.5	-11.3	Vertical	37.6
13.448	56.2	69.5	-13.3	Vertical	37.6
13.490	63.7	69.5	-5.8	Vertical	37.6
13.562*	82.8	69.5	13.3	Vertical	37.5
13.612	55.0	69.5	-14.5	Vertical	37.5
13.663	54.9	69.5	-14.6	Vertical	37.5

*Carrier frequency



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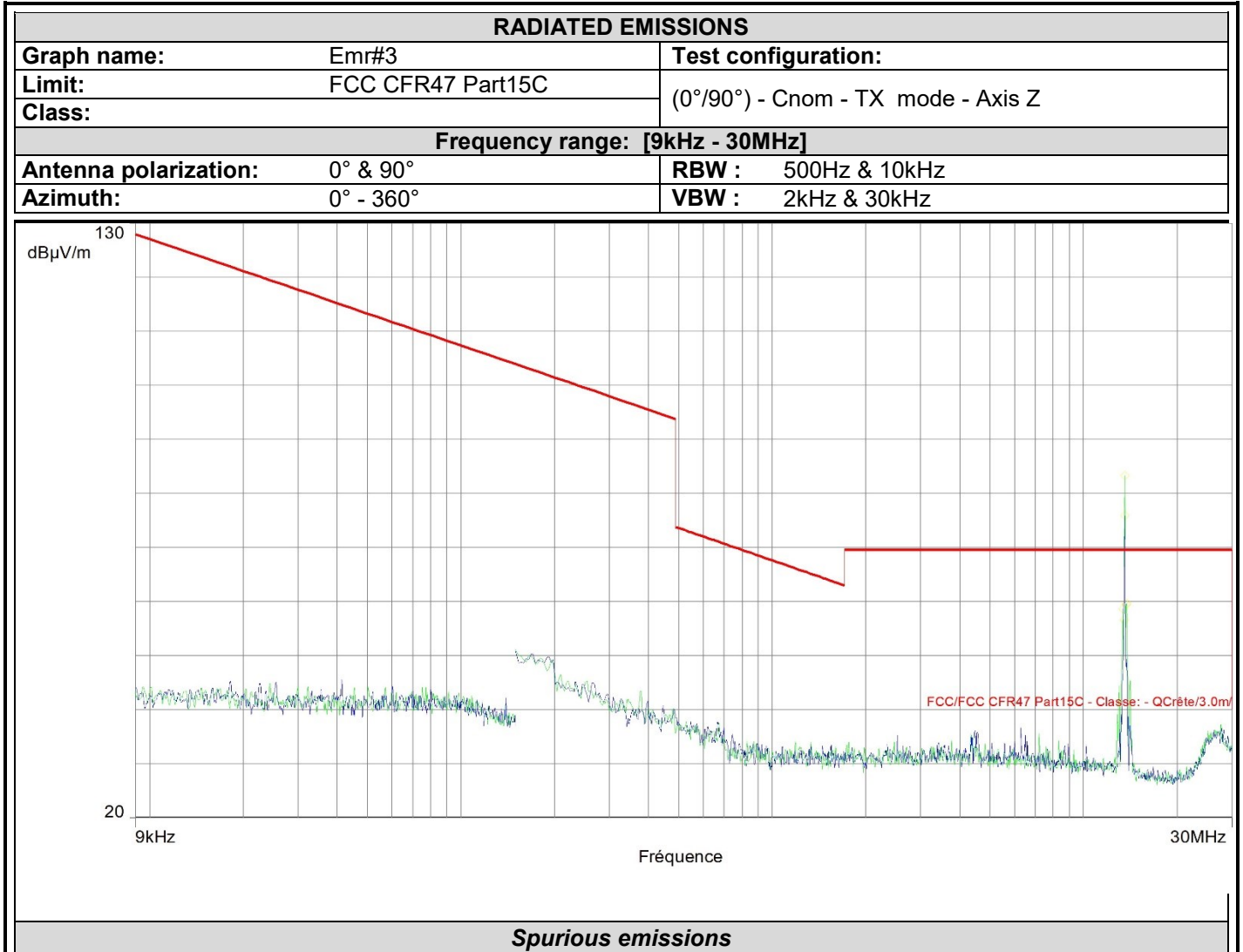


Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
13.562*	68.0	69.5	-1.5	Horizontal	37.5

*Carrier frequency



L C I E

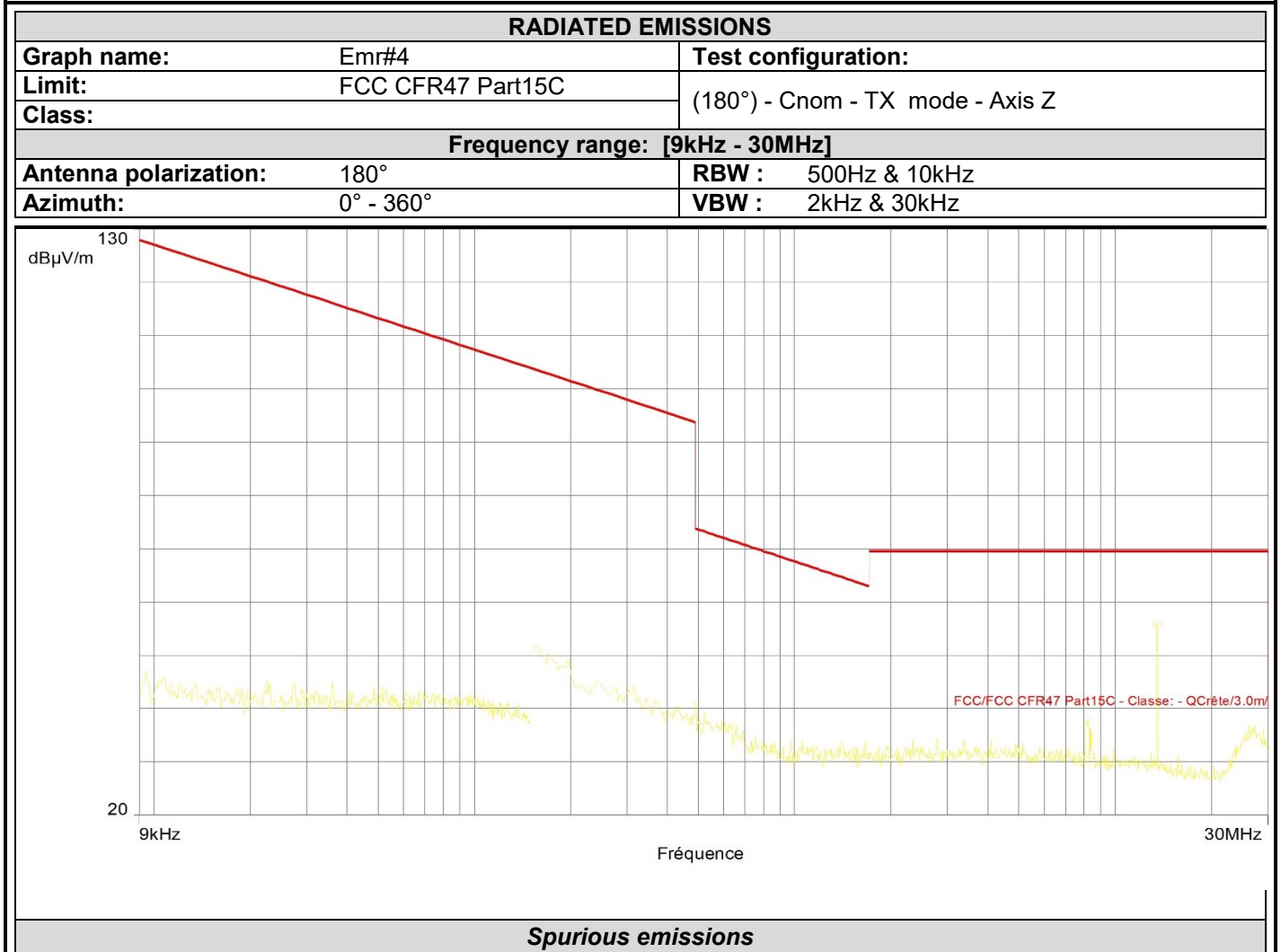


Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
13.487	56.6	69.5	-12.9	Horizontal	37.6
13.562*	75.9	69.5	6.4	Horizontal	37.5
13.418	58.7	69.5	-10.8	Vertical	37.6
13.562	83.3	69.5	13.8	Vertical	37.5
13.714	59.4	69.5	-10.1	Vertical	37.5
13.777	59.6	69.5	-9.9	Vertical	37.5

*Carrier frequency



L C I E

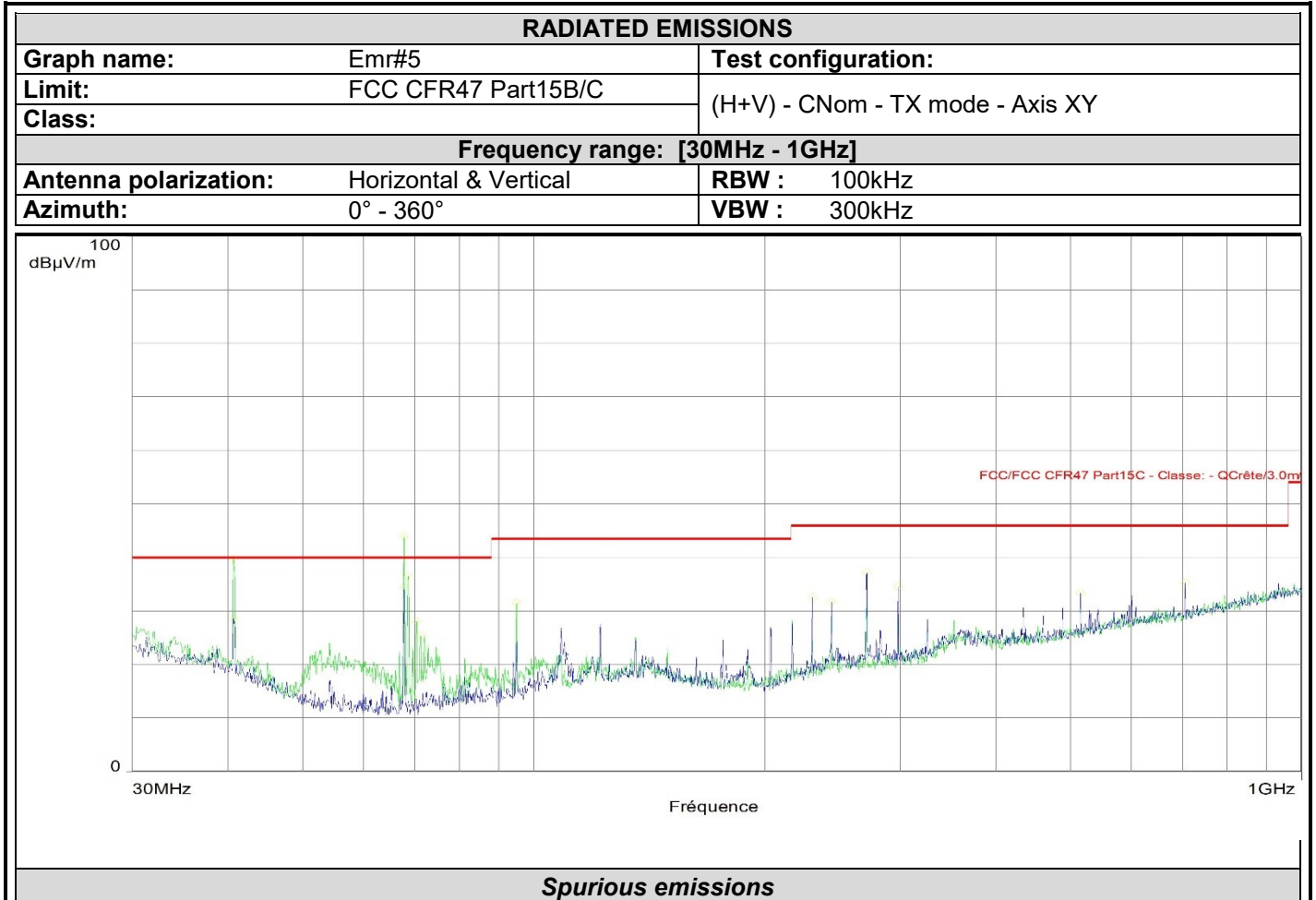


Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
13.550*	55.8	69.5	-13.7	Horizontal	37.5

*Carrier frequency



L C I E

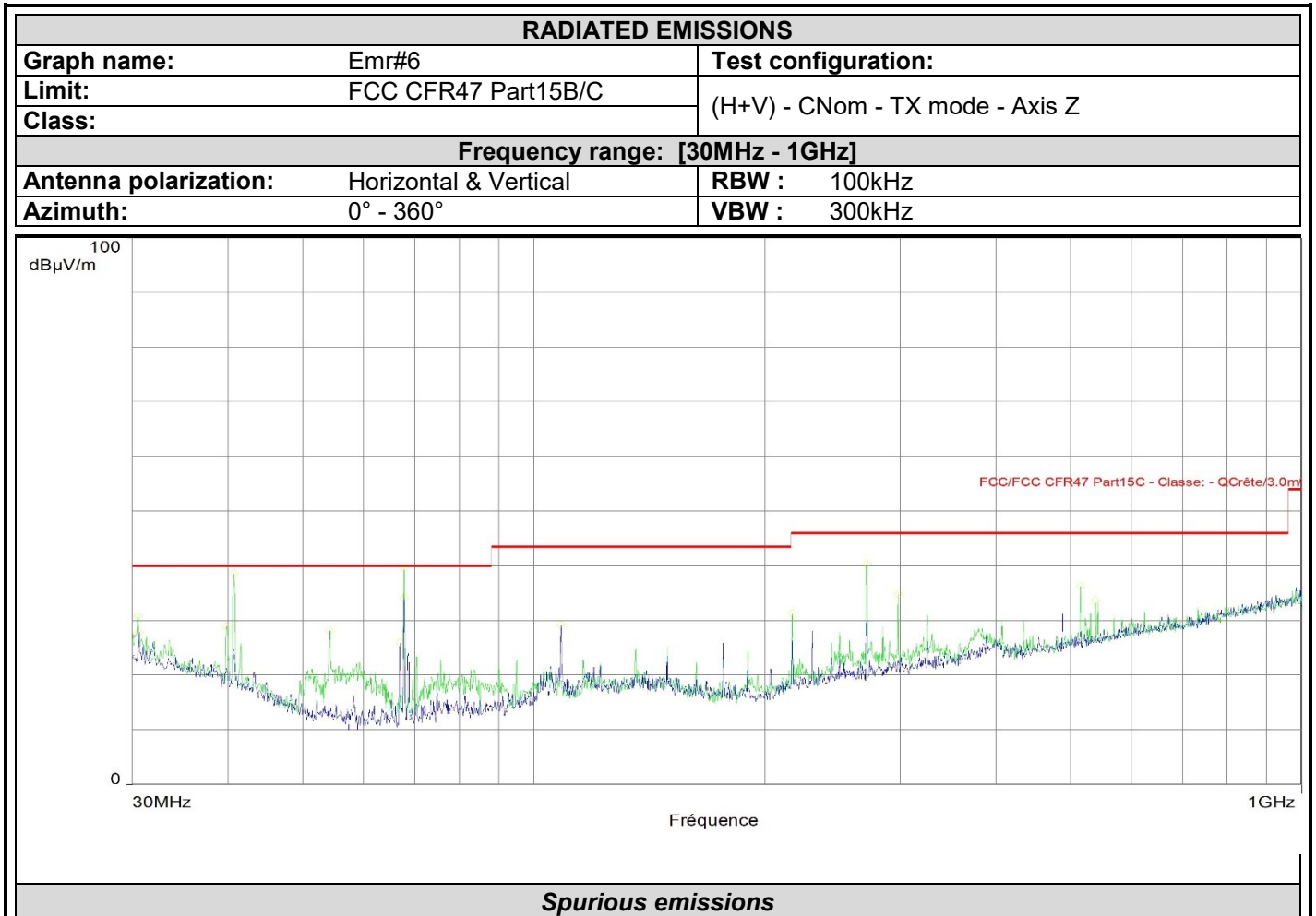


Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
40.670	28.6	40.0	-11.4	Horizontal	18.4
67.733	34.4	40.0	-5.6	Horizontal	10.7
230.499	32.5	46.0	-13.5	Horizontal	16.1
244.079	31.6	46.0	-14.4	Horizontal	17.0
271.239	37.2	46.0	-8.8	Horizontal	17.7
298.302	34.7	46.0	-11.3	Horizontal	18.0
515.291	33.4	46.0	-12.6	Horizontal	23.3
705.217	35.2	46.0	-10.8	Horizontal	26.2
40.670	39.8	40.0	-0.2	Vertical	18.4
67.733	44.0	40.0	4.0	Vertical	10.7
68.606	36.6	40.0	-3.4	Vertical	10.8
70.352	28.1	40.0	-11.9	Vertical	10.8
71.225	25.4	40.0	-14.6	Vertical	10.9
94.893	31.6	43.5	-11.9	Vertical	13.1

*See Final measurement:results in OATS



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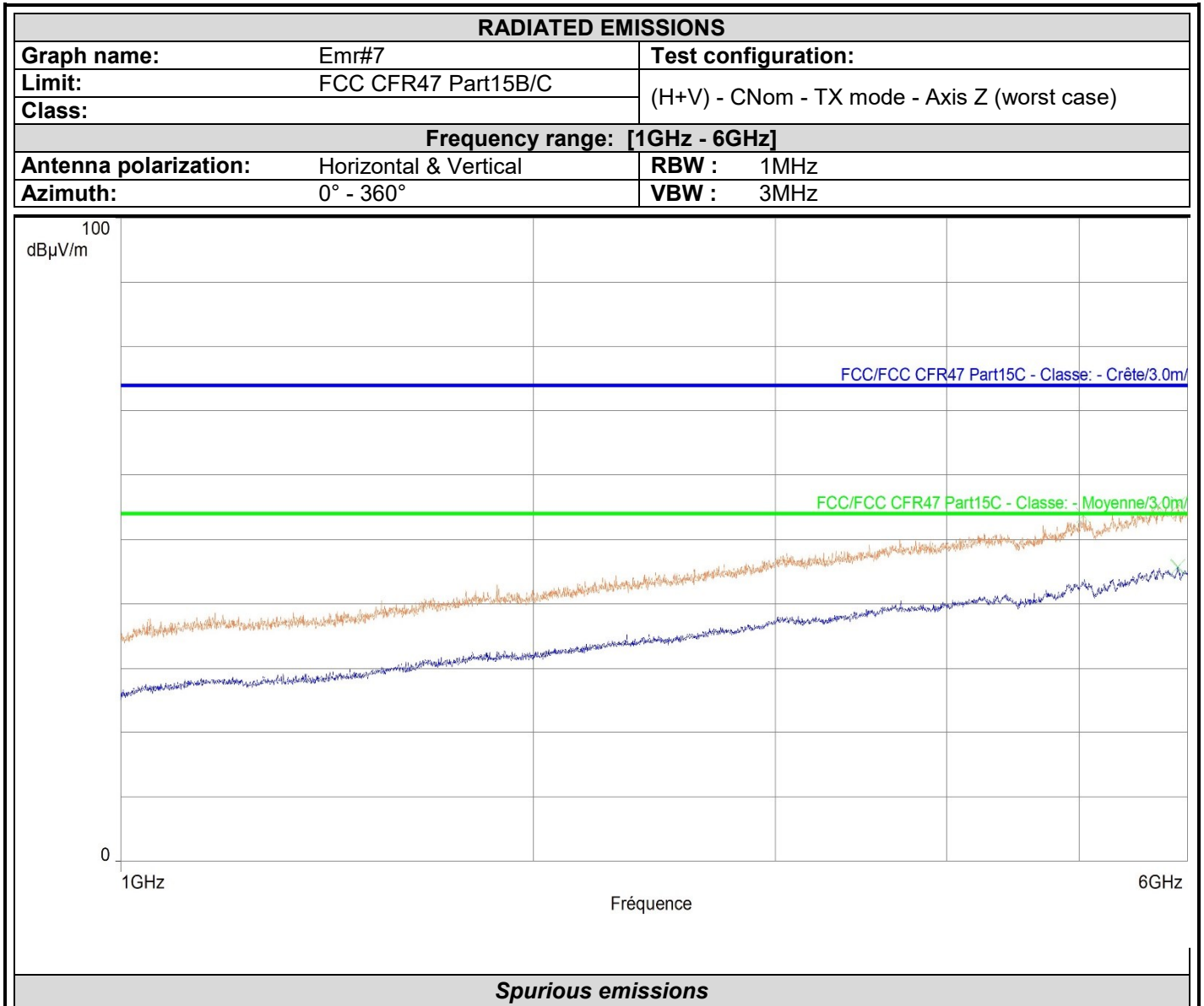


Frequency (MHz)	Peak (dBµV/m)	LimQP (dBµV/m)	Peak-LimQP (dB)	Polarization	Correction (dB)
30.582	27.8	40.0	-12.2	Horizontal	22.5
66.957	25.9	40.0	-14.1	Horizontal	10.7
67.733	34.1	40.0	-5.9	Horizontal	10.7
108.473	29.1	43.5	-14.4	Horizontal	14.6
30.485	30.8	40.0	-9.2	Vertical	22.6
39.797	28.9	40.0	-11.1	Vertical	18.8
40.670	38.6	40.0	-1.4	Vertical	18.4
54.153	28.1	40.0	-11.9	Vertical	11.6
67.733	39.7	40.0	-0.3	Vertical	10.7
216.919	31.3	46.0	-14.7	Vertical	15.2
271.239	40.4	46.0	-5.6	Vertical	17.7
298.302	34.8	46.0	-11.2	Vertical	18.0
515.291	36.3	46.0	-9.7	Vertical	23.3
538.571	33.6	46.0	-12.4	Vertical	23.8

*See Final measurement:results in OATS



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Frequency (MHz)	Average (dBµV/m)	Lim.Average (dBµV/m)	Average-Lim.Average (dB)	Hauteur (m)	Commentaire	Polarization	Correction (dB)
5897.188	45.7	54.0	-8.3	1.0	Horizontal	Horizontal	20.2
5904.688	45.8	54.0	-8.2	1.0	Vertical	Vertical	20.2

Frequency (MHz)	Peak (dBµV/m)	Lim.Peak (dBµV/m)	Peak-Lim.Peak (dB)	Hauteur (m)	Commentaire	Polarization	Correction (dB)
5707.031	55.2	74.0	-18.8	1.0	Horizontal	Horizontal	20.2
5034.688	53.8	74.0	-20.2	1.0	Vertical	Vertical	19.5
5903.594	55.5	74.0	-18.5	1.0	Vertical	Vertical	20.2



Final measurement:

30MHz to 1GHz				
Polarization	Frequency (MHz)	QPeak Level (dBµV/m)	Limit (dBµV/m)	Margin QPeak (dBµV/m)
Vertical	40.68	29.2	40.0	-10.8
Vertical	67.8	30.5	40.0	-9.5
Vertical	271.2	38.3	46.0	-7.7
all emissions were greater than 20 dB below the limit				

7.7. CONCLUSION

Field strength outside of the bands 13.110-14.010 MHz measurement performed on the sample of the product **INGENICO Desk/5000 CL**, SN: **211907303001249821476359**, 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 : Mounir BOUAMARA
 Date of test : August 9, 2021 to August 13, 2021
 Ambient temperature : 24 °C
 Relative humidity : 42 %

8.2. TEST SETUP

Measurement procedure:

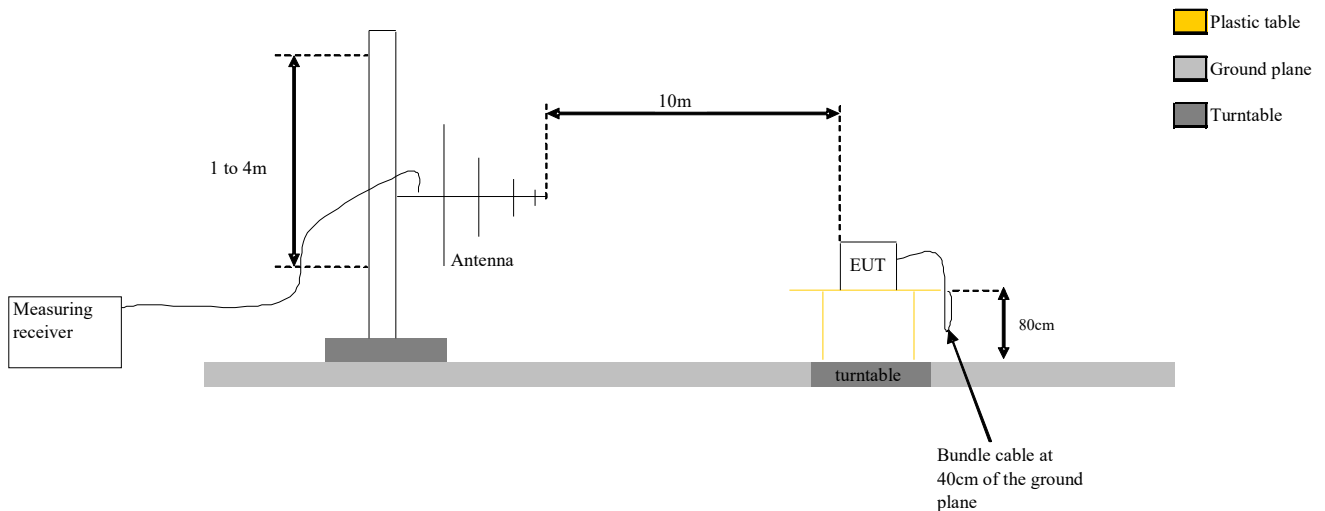
- Open Area Test Site
- Open Area Test Site + Test fixture in climatic chamber

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 place 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.

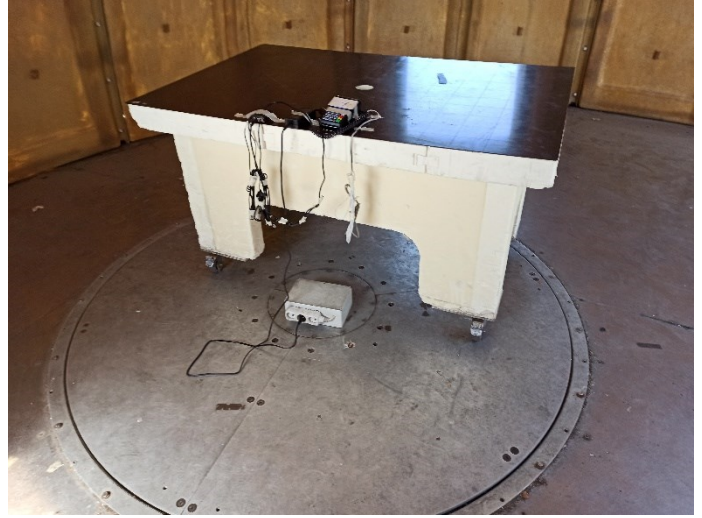


Photo Setup – OATS



Photo Setup – OATS (Biconic antenna)



Photo Setup – OATS (Bilog antenna)

Photograph for Field strength within the band 13.110-14.010MHz



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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					
Description	Manufacturer	Model	Identifier	Cal_Date	Cal_Due
Amplifier 9kHz - 40GHz	LCIE SUD EST	-	A7102082	06/20	10/21*
Antenna Bi-log	CHASE	CBL6111A	C2040172	09/18	08/21*
Antenna horn 18GHz	EMCO	3115	C2042029	09/18	09/21
BAT EMC	NEXIO	v3.19.1.23	L1000115		
CABLE N 3m	-	-	A5329206	07/20	07/22
Cable SMA 40GHz 40cm	WITHWAVE	W101-SM1-0.4M	A5329979	04/21	04/22
Comb EMR HF	YORK	CGE01	A3169114		
Emission Cable (SMA 1m)	TELEDYNE	26GHz	A5329874	10/20	10/21
Emission Cable (SMA 3.3m)	TELEDYNE	26GHz	A5329875	10/20	10/21
Emission Cable <1GHz (Ampl <-> Cage)	-	18GHz	A5329907	08/20	08/21
Filter Matrice	LCIE SUD EST	Combined filters	A7484078	09/20	09/21
Multimeter - CEM	FLUKE	87	A1240251	03/21	03/23
Power supply DC	METRIX	AX503	A7042308		
Rehausse Table C3	LCIE	-	F2000511		
Rehausse Table C3	LCIE	-	F2000507		
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	09/19	09/21
Table C3	LCIE	-	F2000461		
Thermo-hygrometer (C3)	OREGON	BAR206	B4204078	02/21	02/23
Thermo-hygrometer (PM1/2/3)	KIMO	HQ 210	B4206022	01/21	01/23
Turntable chamber (Cage#3)	ETS Lingren	Model 2165	F2000371		
Turntable controller (Cage#3)	ETS Lingren	Model 2090	F2000444		
Antenna Loop	ELECTRO-METRICS	EM-6879	C2040052	06/19	06/22
Biconic Antenna	EATON	94455-1	C2040234	03/21	03/23

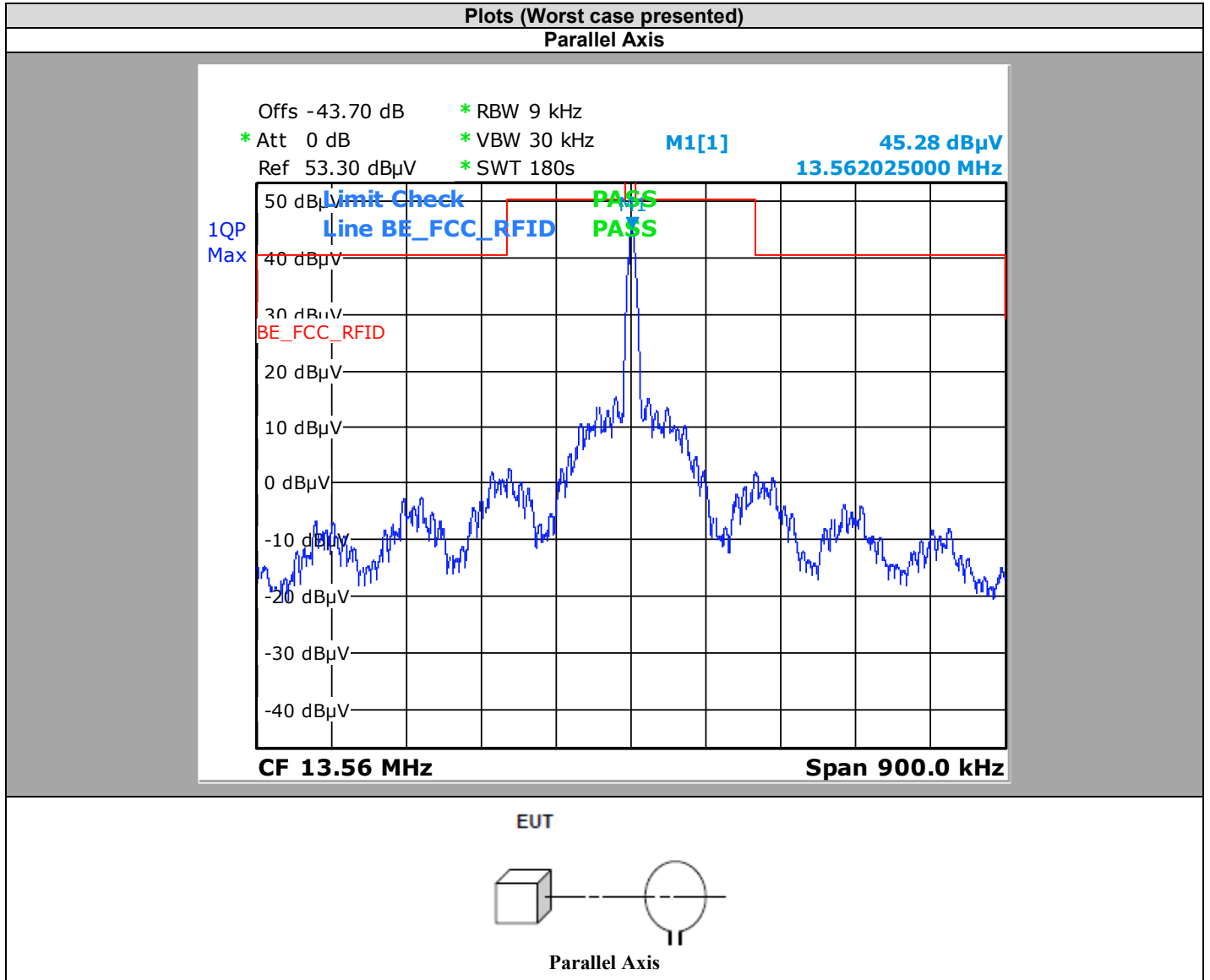
8.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

None Divergence:



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8.6. RESULTS



Frequency (MHz)	QPeak Limit (dBµV/m) @ 30m	Qpeak (dBµV/m) @ 30m	Margin (Mes-Lim) (dB)	Angle Table (deg)	Pol Ant.	Ht Ant. (cm)	Correc. Factor (dB)	Comments
13.56	84	25	59	0	90°	150	35.6	

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

8.7. CONCLUSION

Field strength within the band 13.110-14.010MHz measurement performed on the sample of the product **INGENICO Desk/5000 CL**, SN: **211907303001249821476359**, 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 (Ecuelles)	4,88	6.3
Measurement of radiated electric field from 1 to 18GHz on the Ecuelles site	5.16	/
Measurement of radiated electric field from 30 to 1000MHz in vertical position on the OATS (Ecuelles)	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 (Ecuelles)	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