TEST REPORT

RADIO

Number	138293-679000
Composition of document	33 pages
FCC Registration Number	166175 (FAR)
Industry Canada Number	6230B
Standards	47 CFR Part 15.225 RSS-210, Issue 8 RSS-Gen, Issue 4
Issued to	INGENICO 28/32 Boulevard de Grenelle 75015 PARIS FRANCE
Apparatus under test	Payment terminal
Trade mark	INGENICO
Manufacturer	INGENICO
Type	Lane/5000 CL/Eth (with capacitive screen)
Serial number	151407313031009301003609
IC	2586D-LANE5000CL
FCC ID	XKB-LANE5000CL
Test date	2015/10/28 to 2015/10/30 & 2015/11/19
Tests performed by	Armand MAHOUNGOU & Arnaud FAYETTE
Test site	Fontenay aux Roses
Date of issue	2016/03/29

Written by :
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S.A.S au capital de 15.745.984 €
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SUMMARY

1. TEST PROGRAM

- **References**

Standards:
- 47 CFR Part 15C
- RSS-210
- RSS-Gen
- CISPR 16-4-2
- ANSI C63.10 (2013)

Standard Section	Test Description	TEST RESULT - Comments
RSS-Gen § 6.6	Occupied Bandwidth	PASS (No Limit applicable)
CFR 47 § 15.225 (e) RSS-210 § A2.6	Frequency tolerance	PASS
CFR 47 § 15.207 RSS-Gen § 8.8	AC Power Line Conducted Emissions	PASS
CFR 47 § 15.225 (a) (b) (c) RSS-210 § A2.6 (a) (b) (c)	Field strength within the band 13.110-14.010 MHz	PASS
CFR 47 § 15.209 (a) CFR 47 § 15.225 (d) RSS-210 § A2.6 (d)	Field strength outside of the bands 13.110-14.010 MHz	PASS
RSS-Gen § 7	Receiver Radiated emissions	NA (Transceiver equipment. Include in Field strength test)

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 DESCRIPTION

2.1. HARDWARE & SOFTWARE IDENTIFICATION

- **Equipment under test (EUT):**

Front face

Back face

Equipment Under Test

The equipment was equipped with capacitive screen.

The equipment has been tested with the following AC/DC power supply:

- PHIHONG, reference: PSC16A-080L6IN-R

RFID card

Bank card

Equipment Under Test

- **Auxiliary equipment (AE) used for testing:**

No auxiliary equipment

Photograph of AE

- **Input/output:**

- Input Power

- **Software identification:**

-Software version: Unknown

- **Equipment information:**

- External antenna connector: No
- Frequency band allocated: 13.553MHz to 13.567MHz
- Frequency band used: 13.56MHz
- Modulation: ASK 100%
- Number of channel: 1
- Antenna type: Integral
- Stand By mode: No
- Type of power source: External power supply
- Power supply: Vmin : 108 V
  Vnom: 120 V
  Vmax :132 V
- Temperature range: Tmin: -30°C (IC) -20°C (FCC)
  Tnom: 20°C
  Tmax: +50°C

2.2. RUNNING MODE

The EUT is set in the following modes during tests:
-Permanent emission-reception with modulation

2.3. EQUIPEMENT LABELLING

2.4. EQUIPMENT MODIFICATIONS

No equipment modification has been necessary during testing.

3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Arnaud FAYETTE
Date of test : 2015/11/19
Ambient temperature : 22°C
Relative humidity : 43%

3.2. TEST SETUP

The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT with a test fixture. The product has been tested according to the RSS-GEN § 6.6 reference method.

Spectrum Analyzer Setting:
Center frequency= 13.56MHz
Span= At least twice the emission spectrum
Amplitude= Sufficient to observe the signal amplitude
RBW= 1% of span
VBW= 3*RBW
Sweep= Auto
Trace= Max Hold
Detector= Peak
Occupied Bandwidth 99% activated

Photograph for Occupied Bandwidth

3.3. RESULTS

Temperature	Tnom
Voltage	**Vnom**
Frequency	Fnom
Occupied Bandwidth (kHz)	1000kHz

See graphics in annex

Result: PASS
Limit: → None

4. FREQUENCY TOLERANCE

4.1. TEST CONDITIONS

Test performed by : Arnaud FAYETTE
Date of test : 2015/11/19
Ambient temperature : 23°C
Relative humidity : 43%

4.2. TEST SETUP

The Equipment Under Test is installed on a table and set in permanent emission with modulation. Measurement is performed with a spectrum analyzer on the EUT with a test fixture.

Spectrum Analyzer Setting:
Center frequency= 13.56MHz
Span= At least twice the emission spectrum
Amplitude= Sufficient to observe the signal amplitude
RBW= 1% of span
VBW= 3*RBW
Sweep= Auto
Trace= Max Hold
Detector= Peak

Photograph for Frequency tolerance

4.3. RESULTS

Temperature	Tmin (IC)	Tmin (FCC)	Tnom	Tmax
Voltage:	**Vmin**			
Frequency (MHz)	13,560	13,560	13,560	13,560
Frequency Drift (%)	0	0	0	0
Voltage:	**Vnom**			
Frequency (MHz)	13,560	13,560	13,560	13,560
Frequency Drift (%)	0	0	0	0
Voltage:	**Vmax**			
Frequency (MHz)	13,560	13,560	13,560	13,560
Frequency Drift (%)	0	0	0	0

See graphics in annex

Result: PASS
Limit: → +/- 0.01%

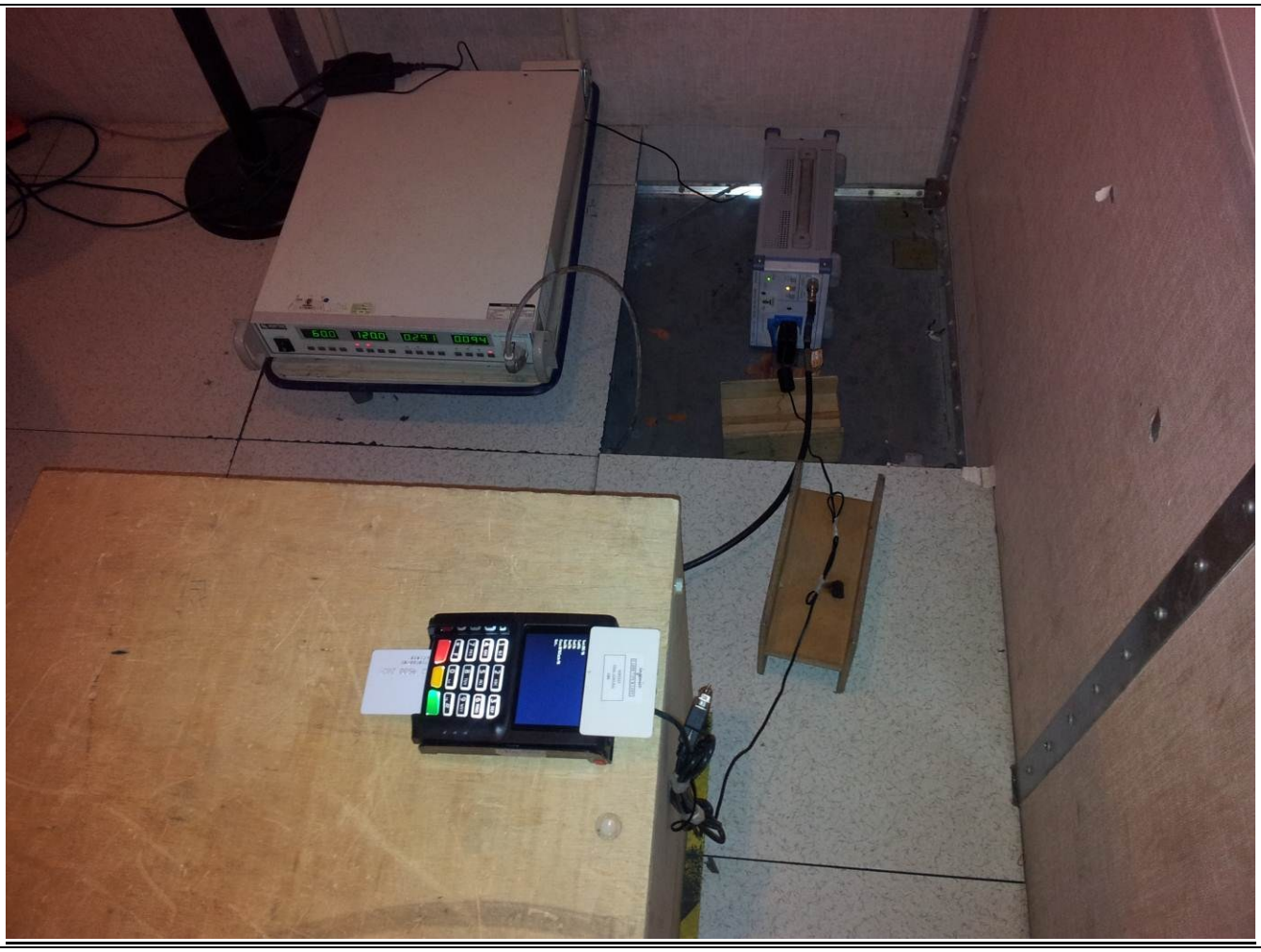
5. AC POWER LINE CONDUCTED EMISSIONS

5.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : 2015/10/30
Ambient temperature : 23°C
Relative humidity : 41%

5.2. TEST SETUP

The product has been tested according to ANSI C63.10-(2013) 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.



Photograph for AC Power Line Conducted Emissions (Global view)

5.3. RESULTS

Phase Line

Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.32	45.68	-	59.72	42.22	49.820
0.635	37.12	-	56	31.79	46
6.825	37.26	-	60	24.82	50
9.265	39.51	-	60	29.26	50

Neutral Line

Frequency (MHz)	Peak Level (dBµV)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.32	47.35	-	59.72	43.74	49.820
0.635	36.93	-	56	29.21	46
7.23	36.45	-	50	24.86	60

See annex for graphics

Result: PASS

Limit: →

Quasi-Peak
0,15kHz to 0,5MHz: 66dBµV to 56dBµV*
0,5MHz to 5MHz: 56dBµV
5MHz to 30MHz: 60dBµV

Average
0,15kHz to 0,5MHz: 56dBµV to 46dBµV*
0,5MHz to 5MHz: 46dBµV
5MHz to 30MHz: 50dBµV

*Decreases with the logarithm of the frequency

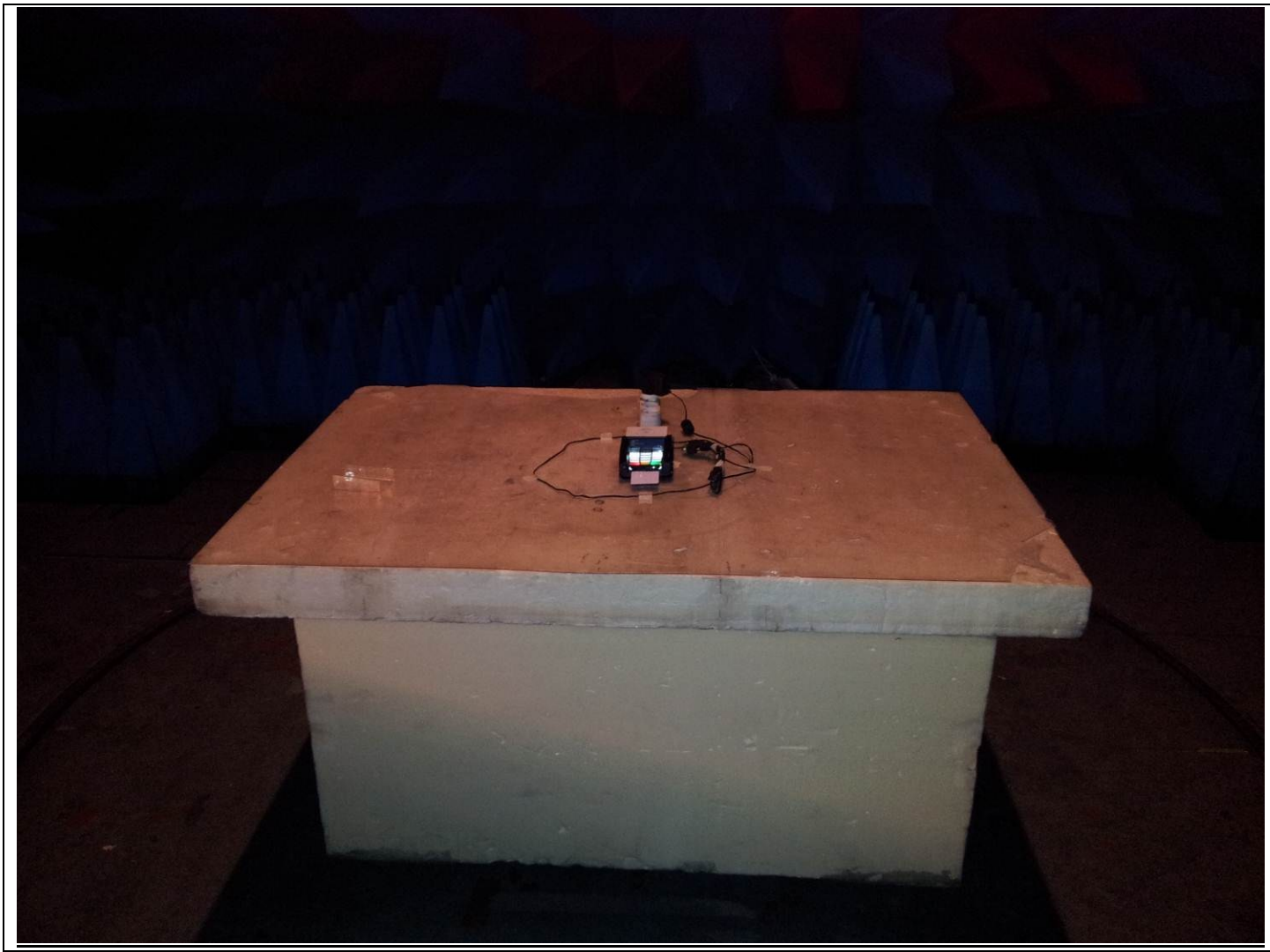
6. FIELD STRENGTH WITHIN THE BAND 13.110-14.010MHZ

6.1. TEST CONDITIONS

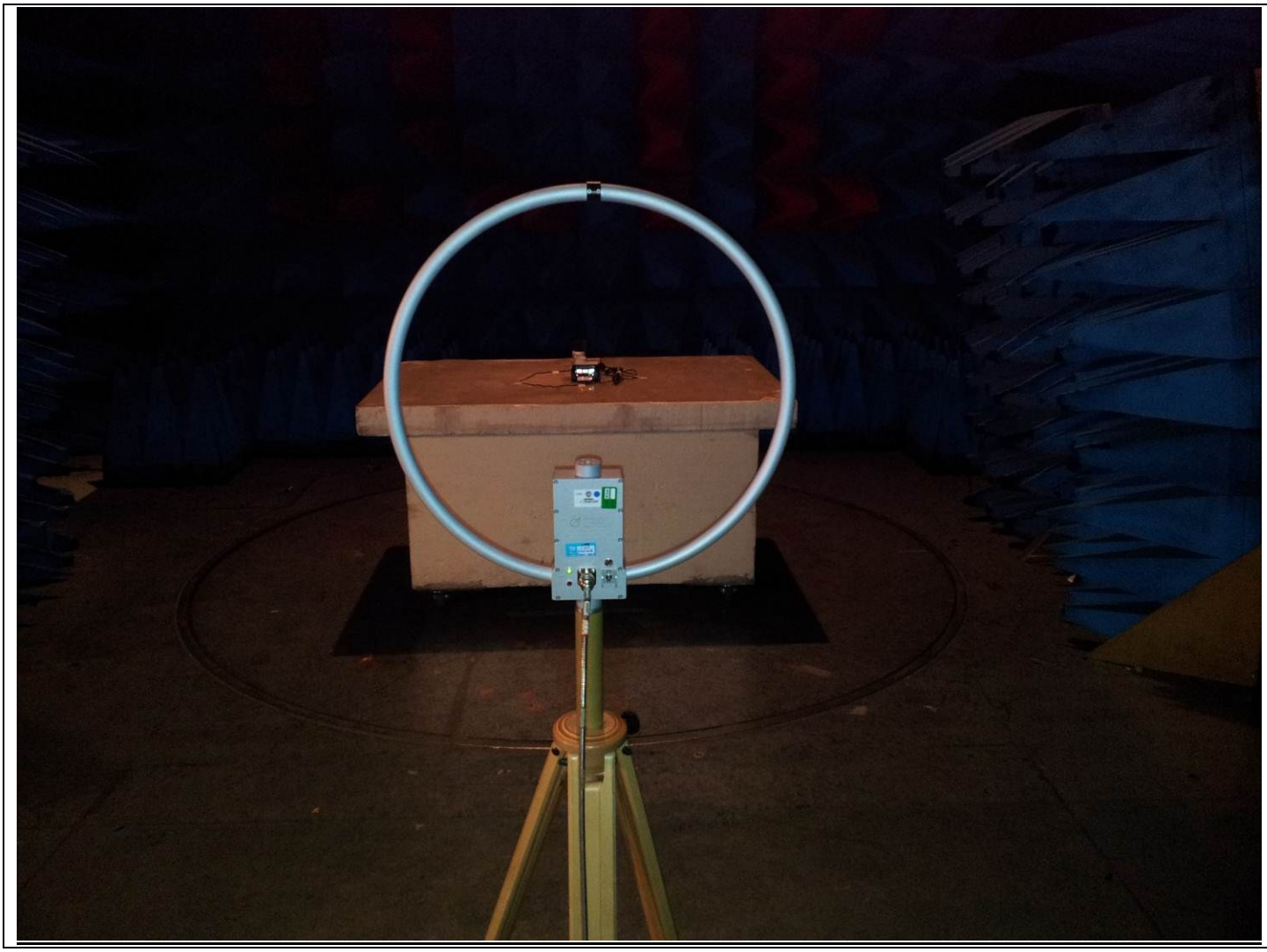
Test performed by : Armand MAHOUNGOU
Date of test : 2015/10/29
Ambient temperature : 21°C
Relative humidity : 44%

6.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2013). The EUT is placed in a semi-anechoic chamber. Distance between measuring antenna and the EUT is 3m. Test is performed in parrallel and perpendicular axis with a loop antenna. Measurement bandwidth was 9kHz. The level has been maximised by the turntable rotation of 360 degrees range on the 3 axis of EUT. Antenna height was 1m.



Photograph for Field strength within the band 13.110-14.010MHz



Photograph for Field strength within the band 13.110-14.010MHz

6.3. *RESULTS*

- **Characterization in a semi anechoic chamber:**

Parallel Axis

Frequency (MHz)	Peak Level (dBµV/m) (3m)	QPeak Level (dBµV/m) (3m)	Limit (dBµV/m) (3m)
Below 13.110	25.65	-	69.5
13.110 to 13.410	25.91	-	80.5
13.410 to 13.553	27.22	-	90.5
13.553 to 13.567	42.86	-	124
13.567 to 13.710	33.48	-	90.5
13.710 to 14.010	30.54	-	80.5
Above 14.010	25.99	-	69.5

Perpendicular Axis

Frequency (MHz)	Peak Level (dBµV/m) (3m)	QPeak Level (dBµV/m) (3m)	Limit (dBµV/m) (3m)
Below 13.110	26.91	-	69.5
13.110 to 13.410	28.39	-	80.5
13.410 to 13.553	38.05	-	90.5
13.553 to 13.567	51.54	-	124
13.567 to 13.710	27.06	-	90.5
13.710 to 14.010	27.20	-	80.5
Above 14.010	29.09	-	69.5

See annex for graphics

Result: PASS

Limit: →

Below 13.110MHz:	69.5dBµV/m (3m) or 29.5dBµV/m (30m)
13.110MHz to 13.410MHz:	106µV/m (30m) or 80.5dBµV/m (3m)
13.410MHz to 13.553MHz:	334µV/m (30m) or 90.5dBµV/m (3m)
13.553MHz to 13.567MHz:	15848µV/m (30m) or 124dBµV/m (3m)
13.567MHz to 13.710MHz:	334µV/m (30m) or 90.5dBµV/m (3m)
13.710MHz to 14.010MHz:	106µV/m (30m) or 80.5dBµV/m (3m)
Above 14.010MHz:	69.5dBµV/m (3m) or 29.5dBµV/m (30m)

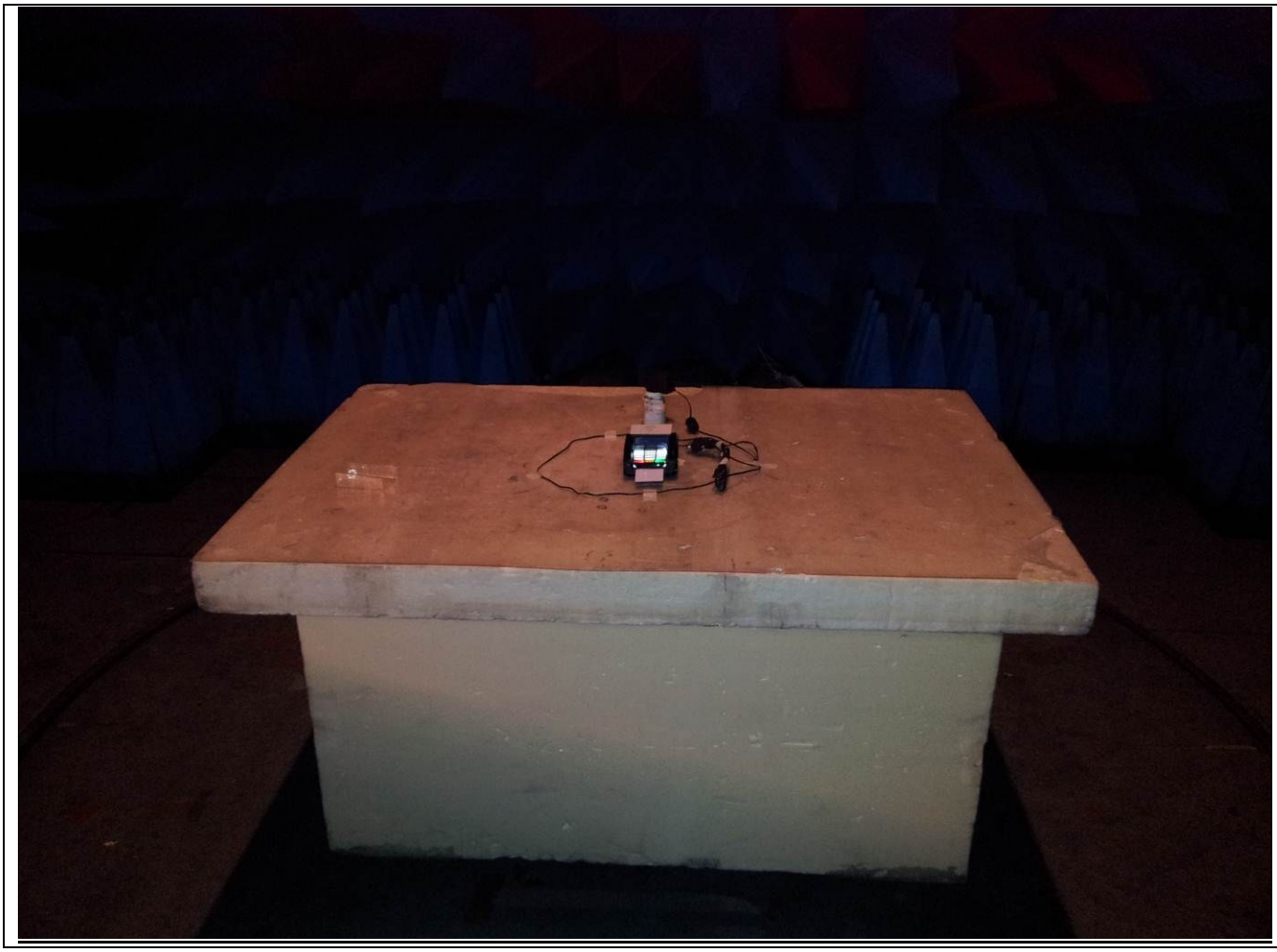
7. FIELD STRENGTH OUTSIDE OF THE BANDS 13.110-14.010 MHZ

7.1. TEST CONDITIONS

Test performed by : Armand MAHOUNGOU
Date of test : 2015/10/29
Ambient temperature : 22°C
Relative humidity : 44%

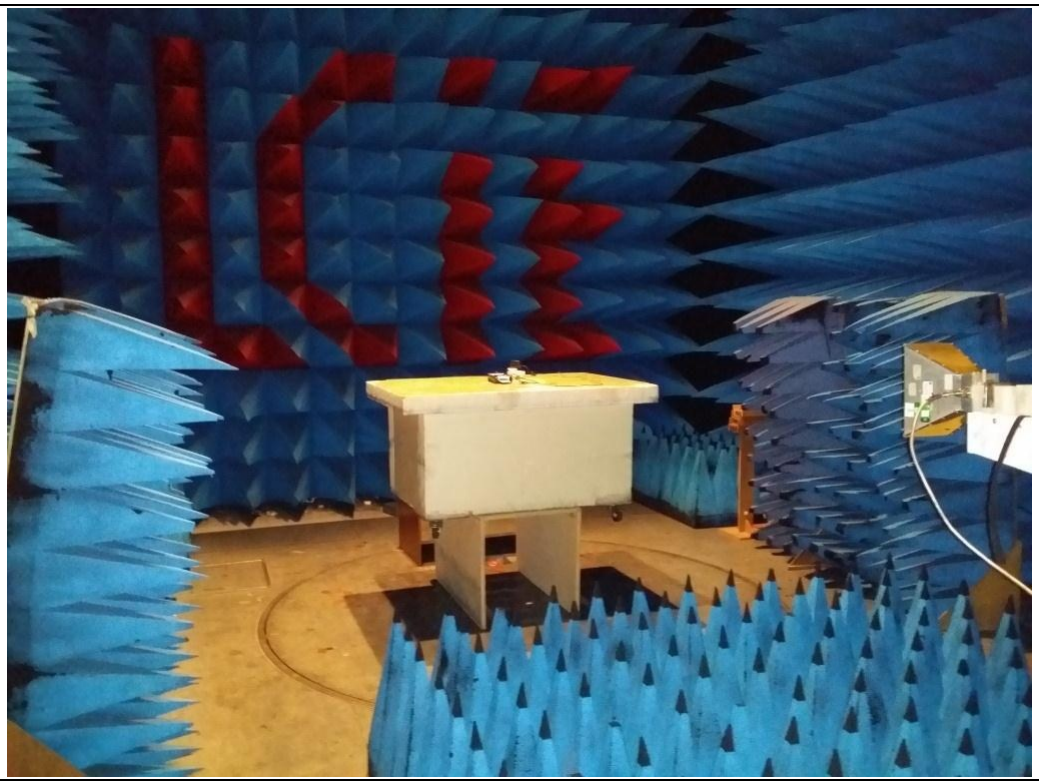
7.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2013). The EUT is placed in a semi-anechoic chamber. Distance between measuring antenna and the EUT is 3m.
Test is performed in parrallel and perpendicular 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 the 3 axis of EUT. Antenna height was 1m.
Test is performed in horizontal (H) and vertical (V) polarization with bilog antenna 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 the 3 axis of EUT. Antenna height search was performed from 1 to 4m.



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

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



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

7.3. *RESULTS*

- **Characterization in a semi anechoic chamber (9kHz to 10GHz):**

Vertical Polarization

Below 1Ghz

Frequency (MHz)	Peak Level (dBµV/m)	QPeak Level (dBµV/m)	Limit (dBµV/m)
0.486	41.95	-	113.85
0.671	40.42	-	111.07
13.54	50.54	-	69.5
22.15	28.49	-	69.5
29.53	32.04	-	69.5
31.65	32.96	27.26	40
81.20	23.83	-	40
108.3	29.20	-	43.5
204.26	26.87	-	43.5
231.38	29.05	-	46
510.02	29.35	-	46
604.46	31.37	-	46

Above 1GHz

Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
1229.56	27.62	54	39.65	74
1883.8	31.36	54	46.75	74

Horizontal Polarization

Below 1GHz

Frequency (MHz)	Peak Level (dBµV/m)	QPeak Level (dBµV/m)	Limit (dBµV/m)
0.449	44.22	-	114.60
0.674	41.58	-	111.03
13.45	42.85	-	69.5
80	20.29	-	40
172.65	25.85	-	43.5
195.30	26.22	-	43.5
245	25.82	-	46
960.02	33.51	-	53.9

Above 1GHz

Frequency (MHz)	Average Level (dBµV/m)	Average Limit (dBµV/m)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)
1439.98	30.28	54	40.37	74
1883.26	31.46	54	46.63	74

See annex for graphics

Result: PASS

Limit: →

9kHz to 0,490MHz:	2400/F(kHz)µV/m (300m) or 20log(2400/F(kHz))dBµV/m (3m) QPeak
0,490MHz to 1.705MHz:	240000/F(kHz)µV/m (30m) or 20log(240000/F(kHz))dBµV/m (3m) QPeak
1.705MHz to 30MHz:	30µV/m (30m) or dBµV/m (3m) QPeak
30MHz to 88MHz:	100µV/m (3m) or 40dBµV/m (3m) QPeak
88MHz to 216MHz:	150µV/m (3m) or 43,5dBµV/m (3m) QPeak
216MHz to 960MHz:	200µV/m (3m) or 46dBµV/m (3m) QPeak
960MHz to 1000MHz:	500µV/m (3m) or 54dBµV/m (3m) QPeak
Above 1000MHz:	5012µV/m (3m) or 74dBµV/m Peak
	500µV/m (3m) or 54dBµV/m (3m) Average

8. TEST EQUIPMENT LIST

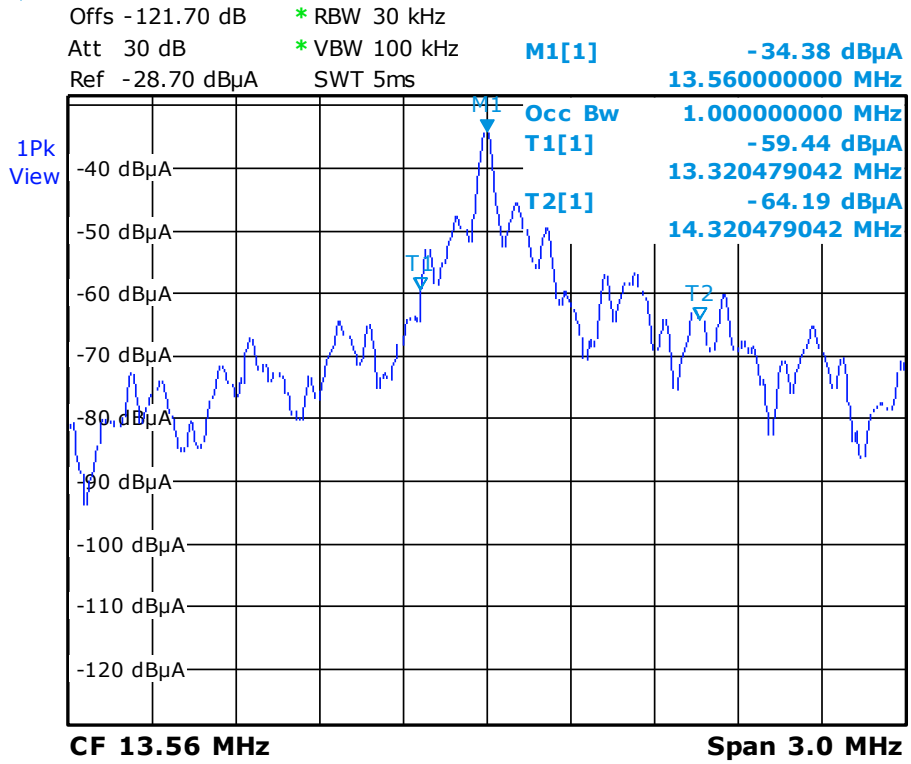
Frequency Tolerance & Occupied Bandwidth					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Apparatus**	**Trade Mark**
Climatic Chamber	SECASI Technologies	SLT-34	D1024029	-	-
Thermometer	AOIP	TM 6630	B4041042	2014/12	2016/06
Cable	CABLES & CONNECTIQUES	-	A5329422	-	-
Spectrum analyzer	ROHDE & SCHWARZ	FSL6	A4060032	2015/04	2017/04
Multimeter	KEITLEY	2000 Multimeter	A1241084	2014/02	2016/02
AC/DC power supply	KIKUSUI	PCR500M	A7040079	2014/05	2016/05
Field strength outside of the bands 13.110-14.010 MHz					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Semi anechoic chamber	SIEPEL	-	D3044008	2015/09	2016/09
EMI receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2015/01	2016/01
Bilog antenna	CHASE	CBL6111C	C2040124	2015/09	2016/09
Cable	CABLES & CONNECTIQUES	3.5MD/CSU528AA/3.5MD/4000	A5329374	2015/06	2016/06
Cable	CABLES & CONNECTIQUES	2.9MD/CSU440AA-TDINOX/2.9MD/12000	A5329426	2015/07	2016/07
Horn antenna	EMCO	3115	C2042018	2015/05	2016/05
Cable	CABLES & CONNECTIQUES	2.9MD/CSU440AA/2.9MD/2000	A5329358	2014/12	2015/12
Preamplifier	BONN Elektronik	BLNA 3018-8F305	A7080053	2015/03	2016/03
Field strength within the band 13.110-14.010MHz					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Semi anechoic chamber	SIEPEL	-	D3044008	2015/09	2016/09
EMI receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2015/01	2016/01
Loop antenna	SCHWARZBECK	FMZB 1513	C2040209	2015/09	2016/09
Cable	CABLES & CONNECTIQUES	3.5MD/CSU528AA/3.5MD/4000	A5329374	2015/06	2016/06
Cable	CABLES & CONNECTIQUES	2.9MD/CSU440AA-TDINOX/2.9MD/12000	A5329426	2015/07	2016/07
AC Power Line Conducted Emissions					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Semi anechoic chamber	SIEPEL	-	D3044008	2015/09	2016/09
EMI receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2015/01	2016/01
Cable	CABLES & CONNECTIQUES	-	A5329411	2015/06	2016/06
Cable	CABLES & CONNECTIQUES	-	A5329413	2015/06	2016/06
V LISN	ROHDE & SCHWARZ	ENV216	C2320163	2015/02	2016/02

9. UNCERTAINTIES CHART

Kind of test	Measurement uncertainties (k=2) ±x(dB) / (Hz)	Limit for uncertainties ±y(dB)
TRANSMITTER REQUIREMENTS		
Radio frequency	$\pm 2.10^{-8}$ Hz	$\pm 1.10^{-7}$ Hz
RF Conducted power	±0.6 dB	±1.5 dB
Spurious emissions • Frequency < 1000 MHz • Frequency > 1000 MHz	 ±3.9 dB ±3.1 dB	±6 dB
Spurious in conduction	±1.6 dB	±3 dB
Temperature	±0.5°C	±1°C
Humidity	±2.5 %	±10 %

10. ANNEX (GRAPHS)

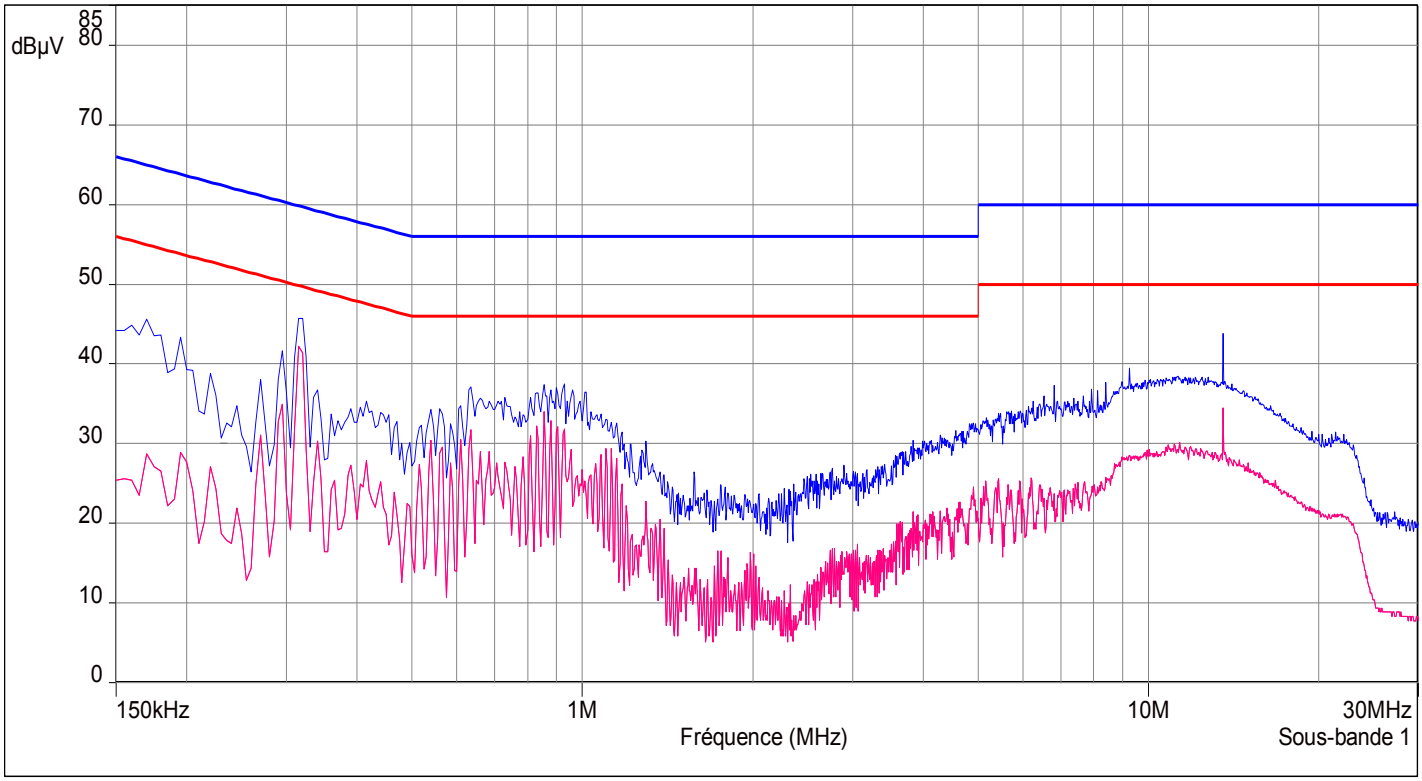
Occupied Bandwidth
Temperature: Tnom
Voltage: Vnom



Date: 19.NOV.2015 11:12:47

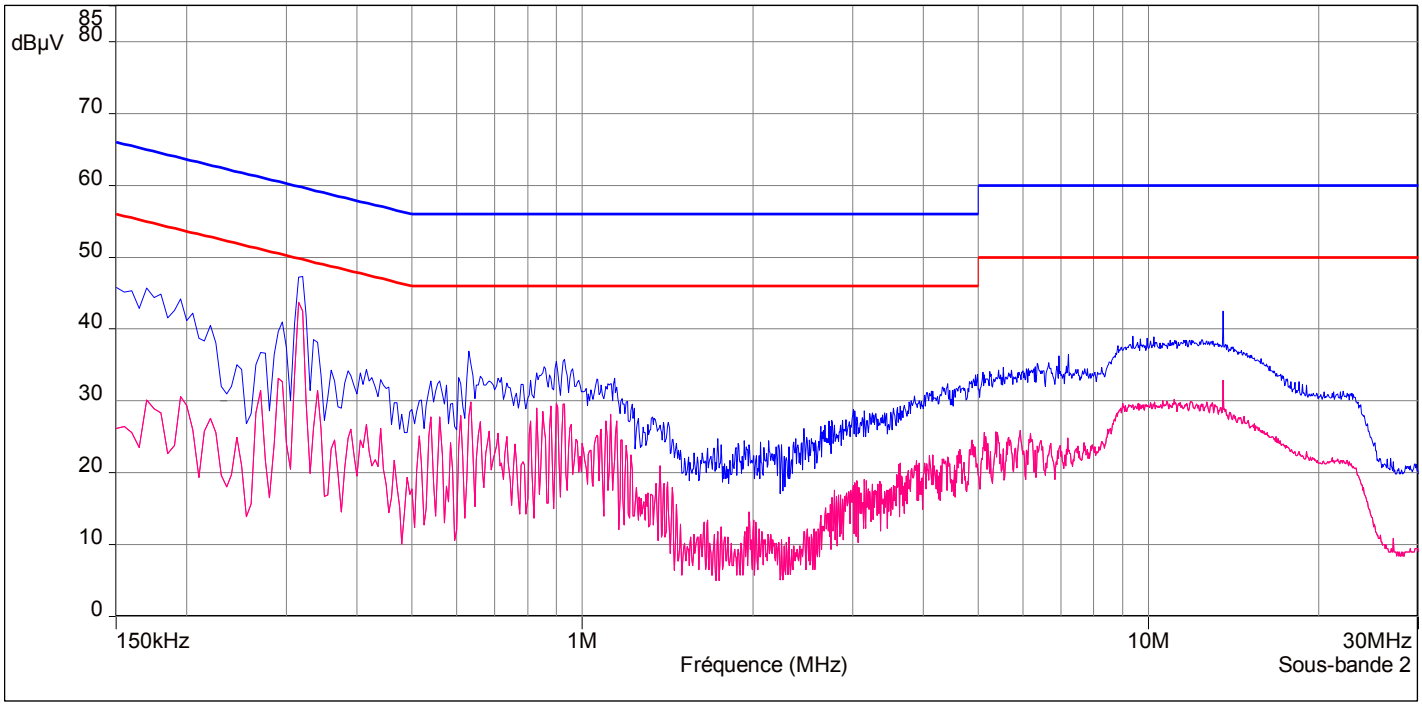
AC power line conduted emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Phase Line

Description Sous-bande 1
Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)
Réglages: RBW: 9 kHz, VBW: Auto, Temps de mesure : 50 ms/Pts, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Preselecteur: On
Ligne:Phase 1

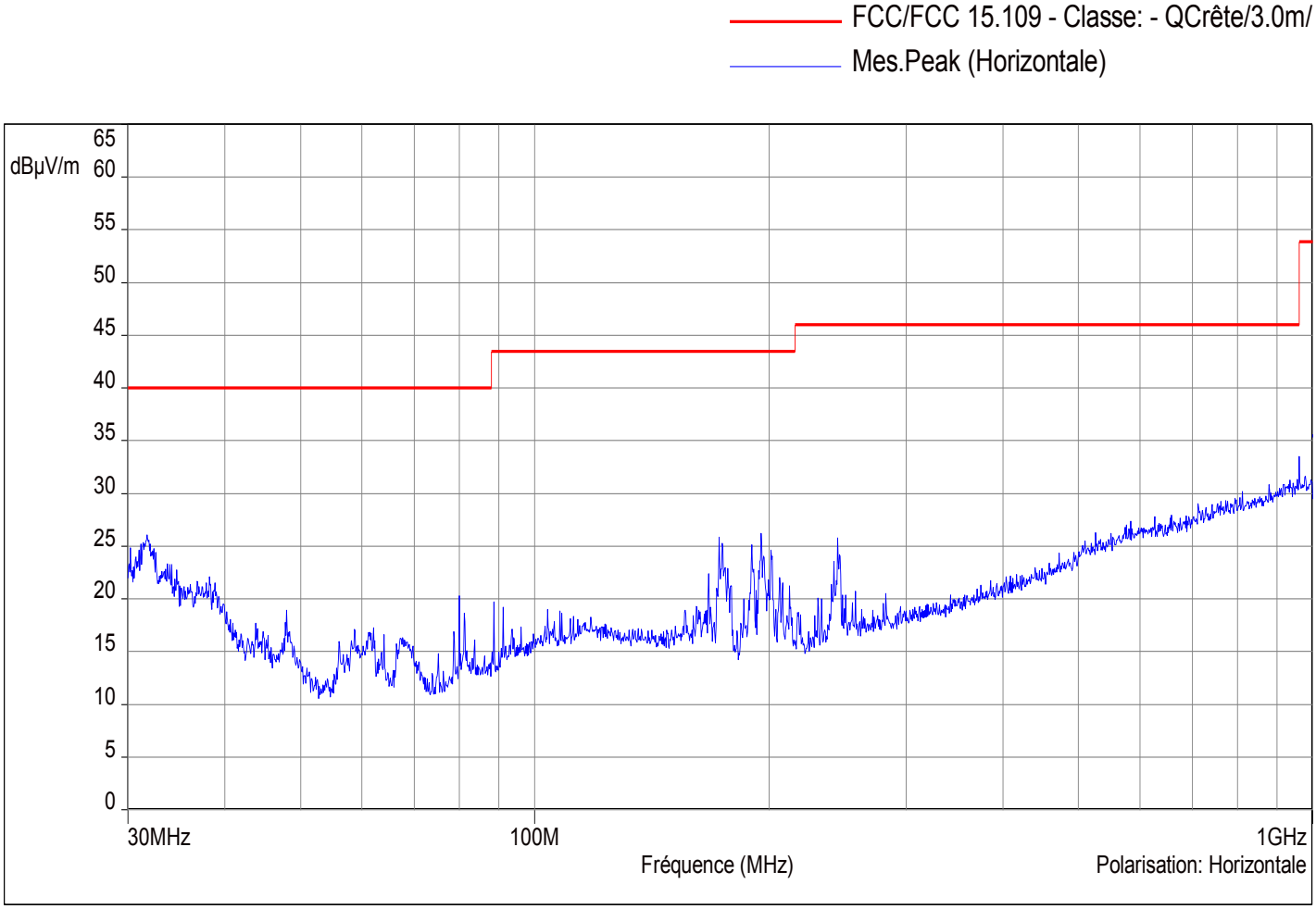


AC power line conduted emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Neutral Line

Description Sous-bande 2
Fréquences: 150 kHz - 30 MHz (Mode: Lin, Pas: 5 kHz)
Réglages: RBW: 9 kHz, VBW: Auto, Temps de mesure : 50 ms/Pts, Nombre de Balayages : 1, Preamp : Off, LN Preamp : Off, Presélecteur: On
Ligne:Neutre

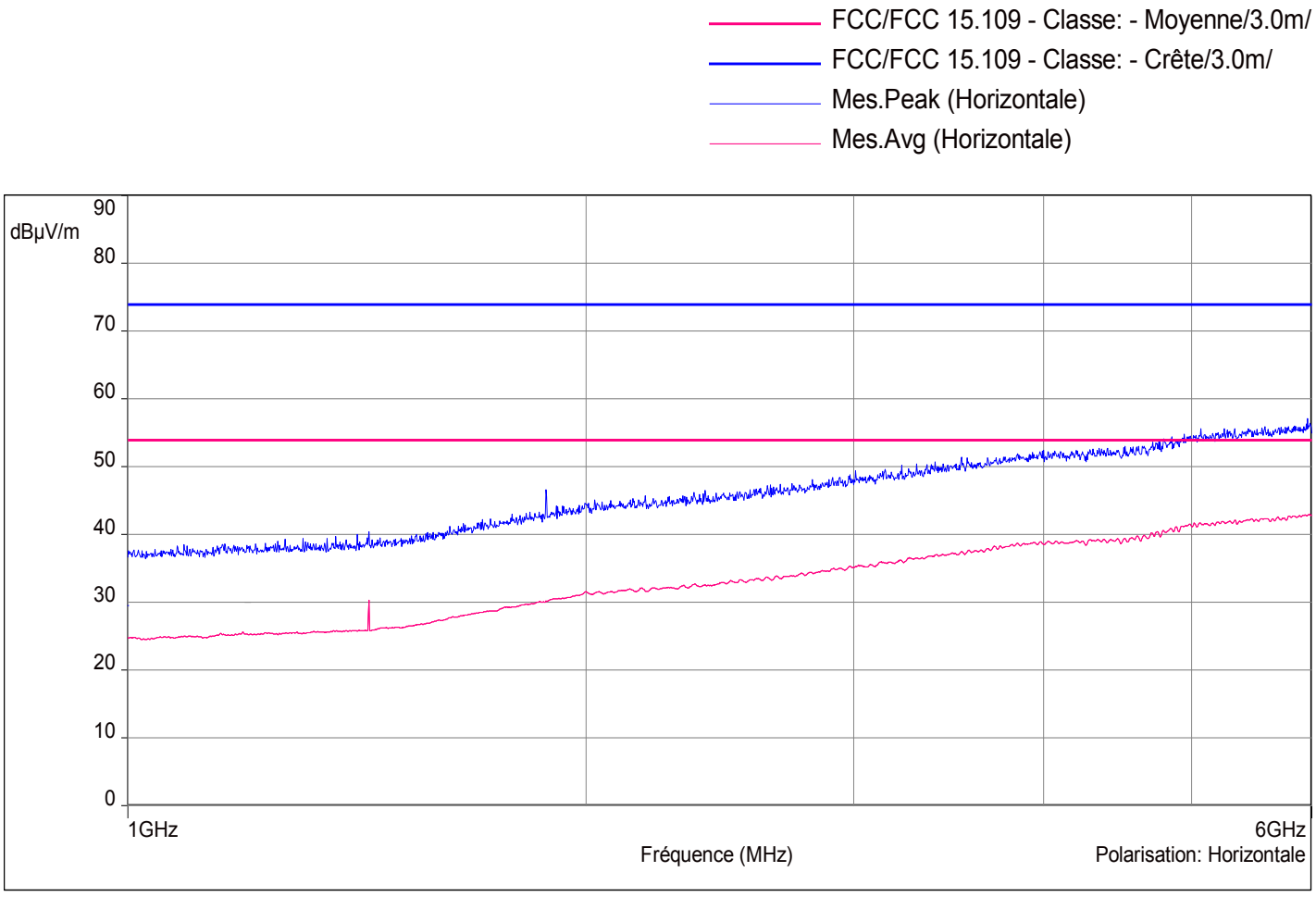


Transmitter Radiated Emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Horizontal polarisation



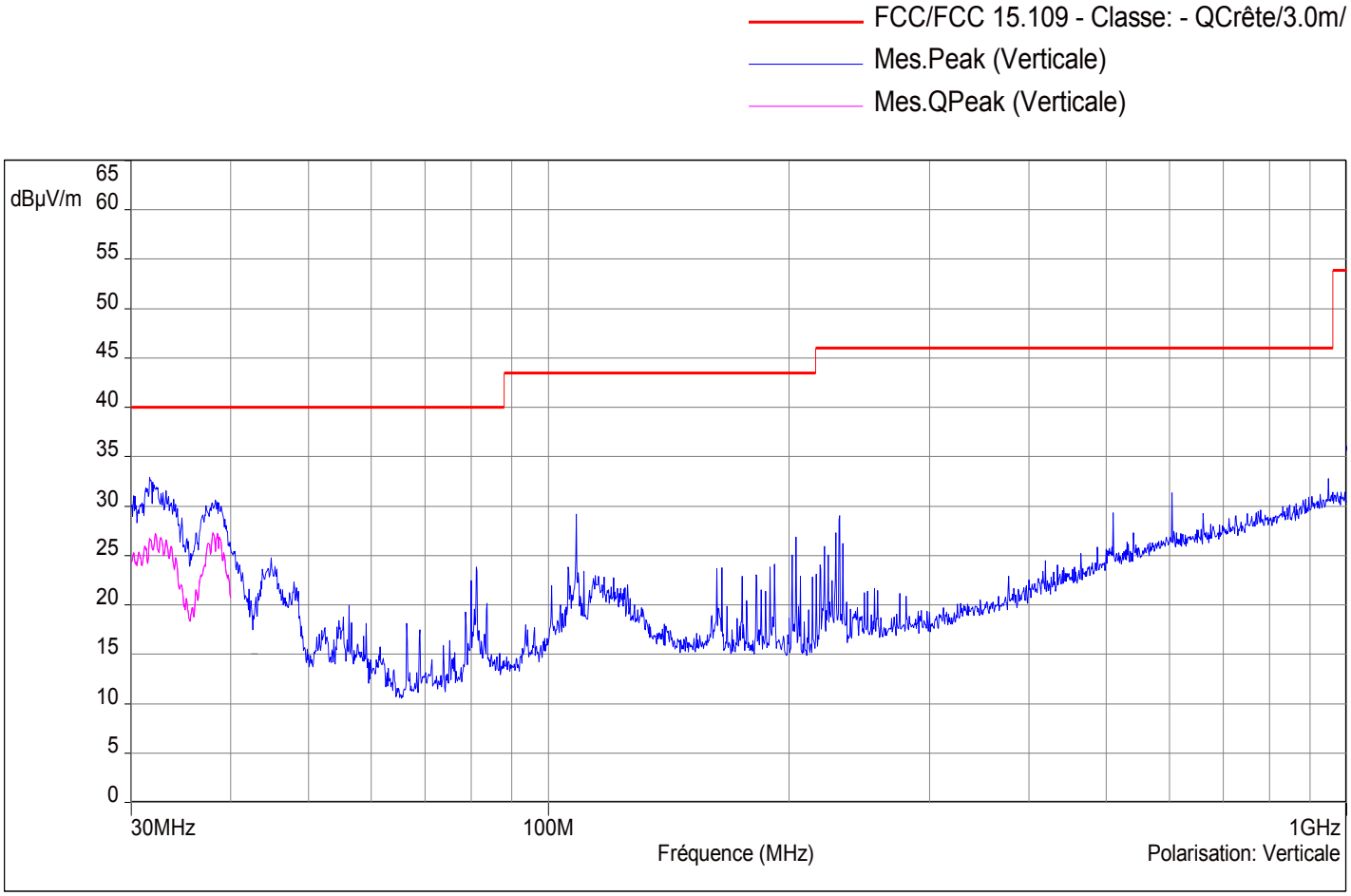
Horizontal Polarization (30-1000MHz)

Transmitter Radiated Emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Horizontal polarisation



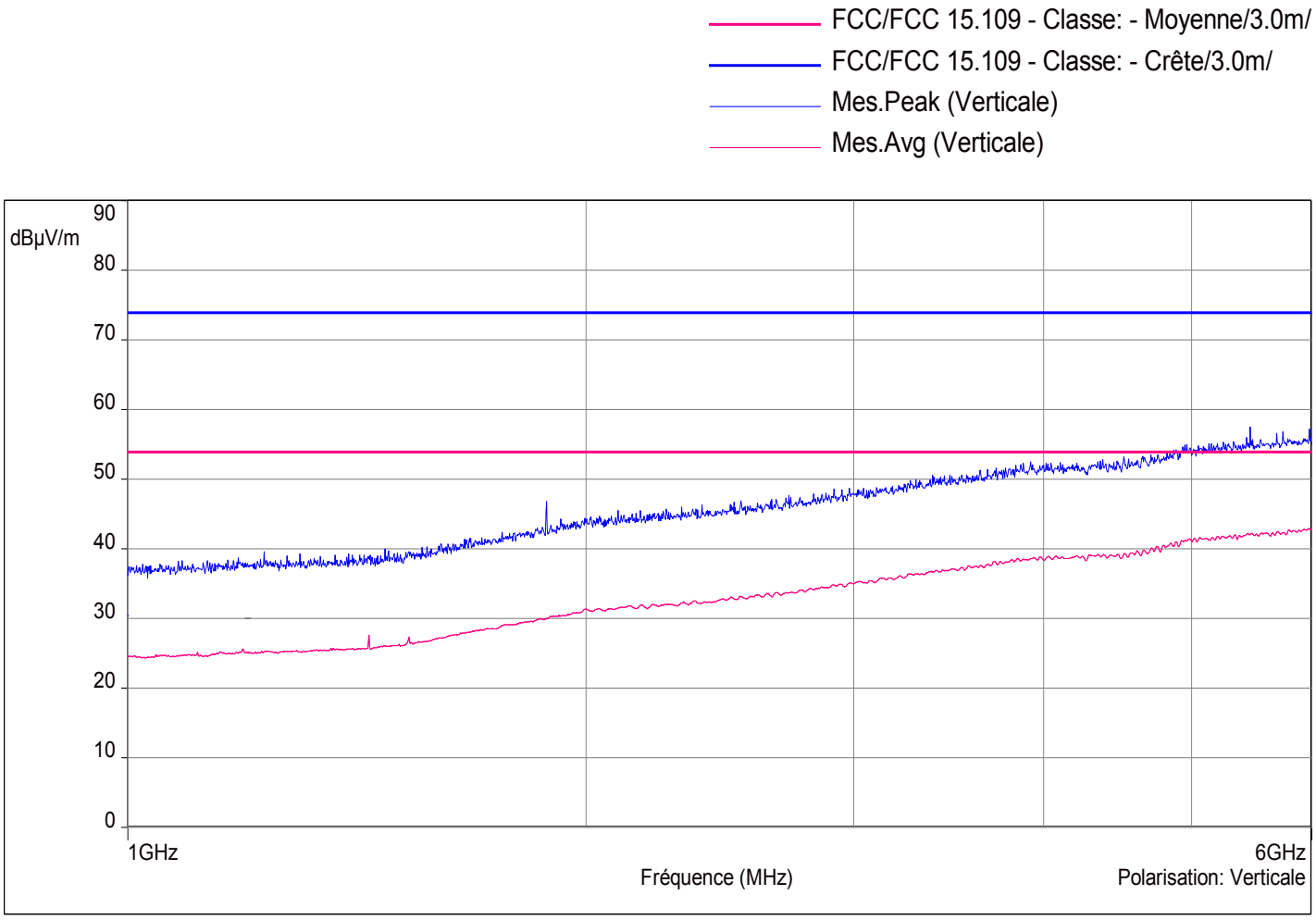
Horizontal Polarization (1-6GHz)

Transmitter Radiated Emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Vertical polarisation



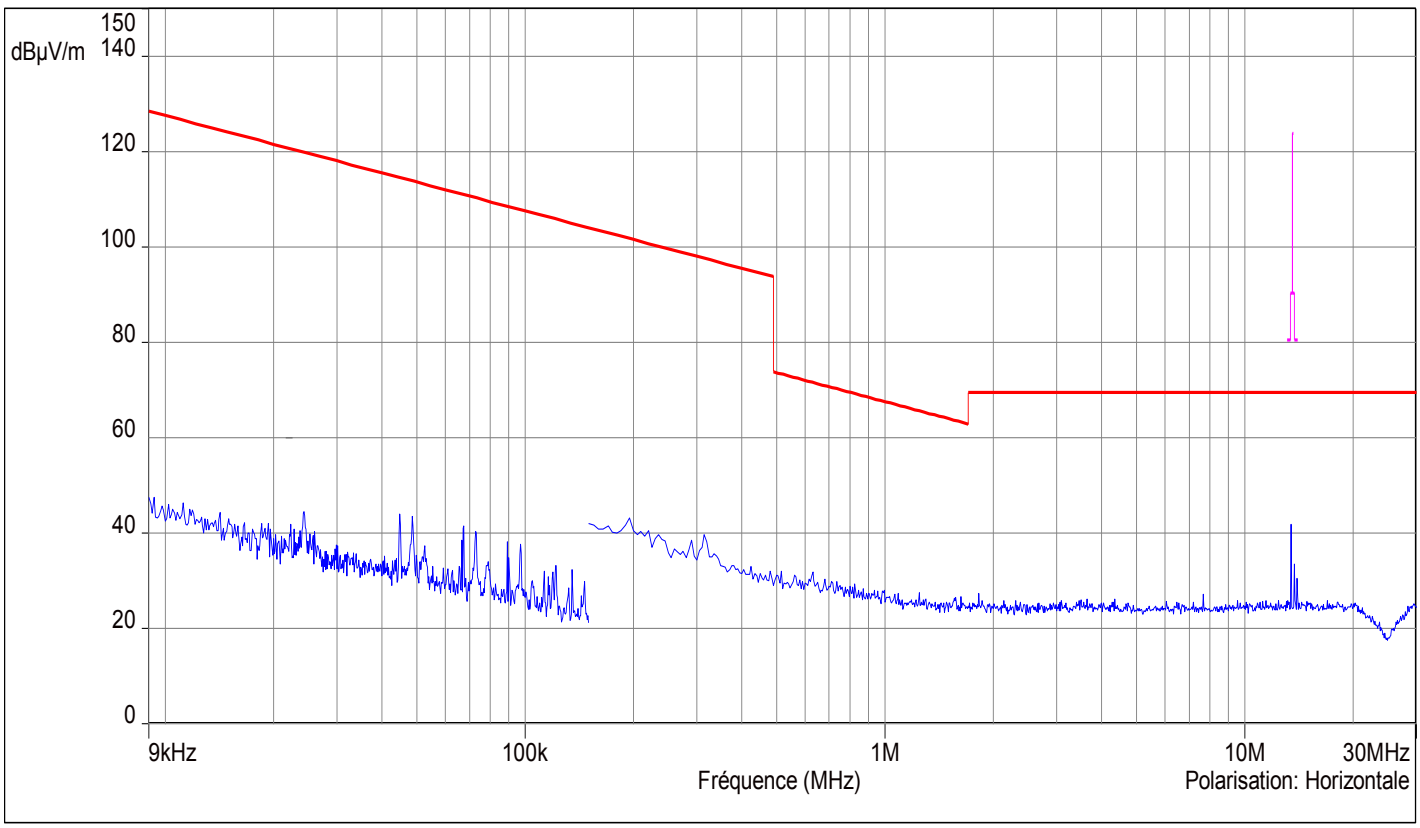
Vertical Polarization (30-1000MHz)

Transmitter Radiated Emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Vertical polarisation

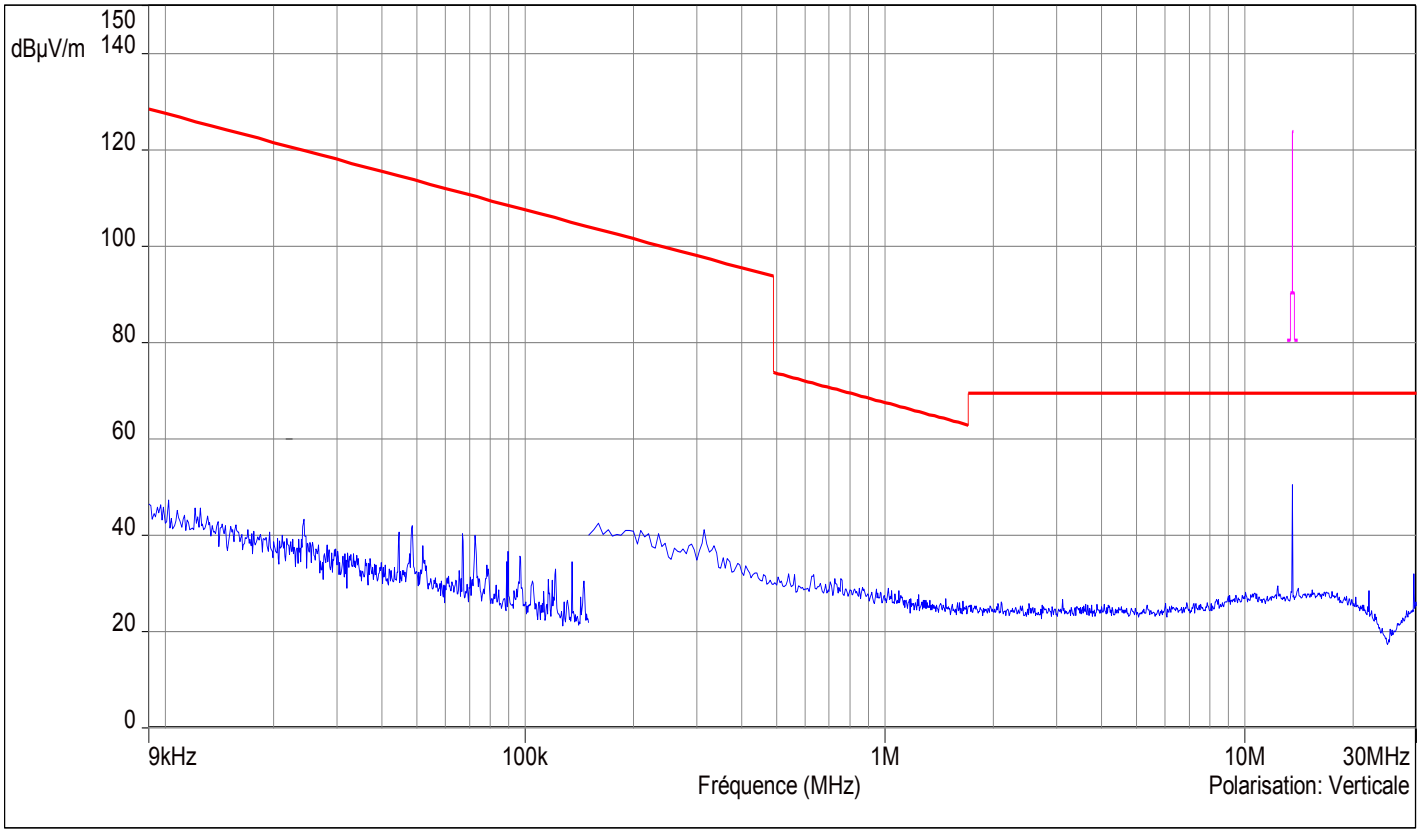


Vertical Polarization (1-6GHz)

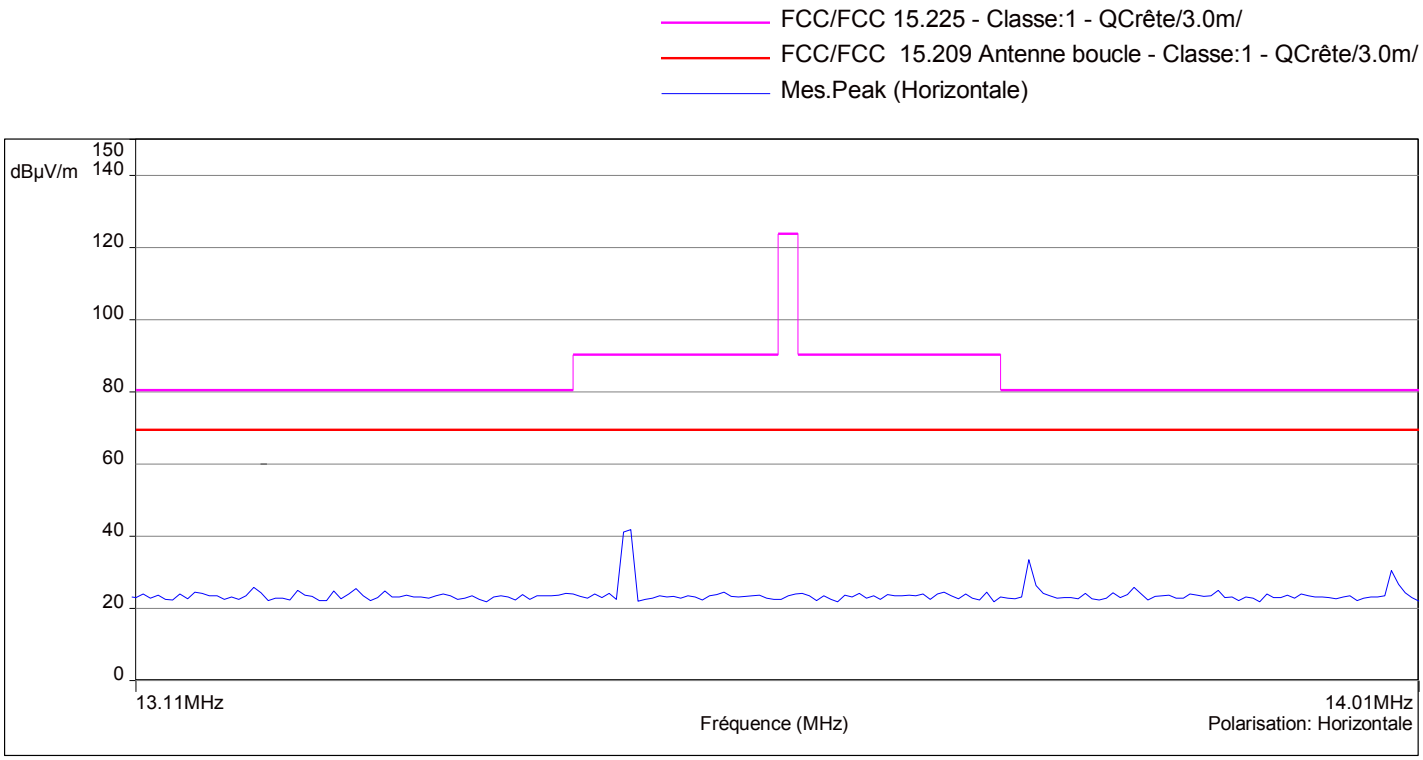
Transmitter Radiated Emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Parallel polarisation



Transmitter Radiated Emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Perpendicular polarisation



Transmitter Radiated Emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Parallel polarisation



Transmitter Radiated Emissions
Frequency: Fnom
Temperature: Tnom
Voltage: Vnom
Parallel polarisation