TEST REPORT

RADIO

Number	122727-645985A
Composition of document	31 pages
FCC Registration Number	166175 (FAR) & 888863 (Ecuelles)
Industry Canada Number	6230B(FAR) & 6230B-1(Ecuelles)
Standards	47 CFR Part 15.207 47 CFR Part 15.209 RSS-Gen, Issue 3
Issued to	SAFRAN MORPHO 18, chaussée Jules CESAR F-95520 OSNY
Apparatus under test	Control Access Terminal
Trade mark	SAFRAN MORPHO
Manufacturer	SAFRAN MORPHO
Type	MorphoAccess® SIGMA PROX WR
Serial number	1331SMS0000219
IC	11472A-MASIGMA125K
FCC ID	ZBW-MASIGMA125K
Test date	2013/09/13 & 2013/10/10
Tests performed by	Laurent DENEUX & Stéphane PHOUDIAH
Test site	Fontenay aux Roses & Ecuelles
Date of issue	2013/10/18

Written by :
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SUMMARY

1. TEST PROGRAM

- **References**

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

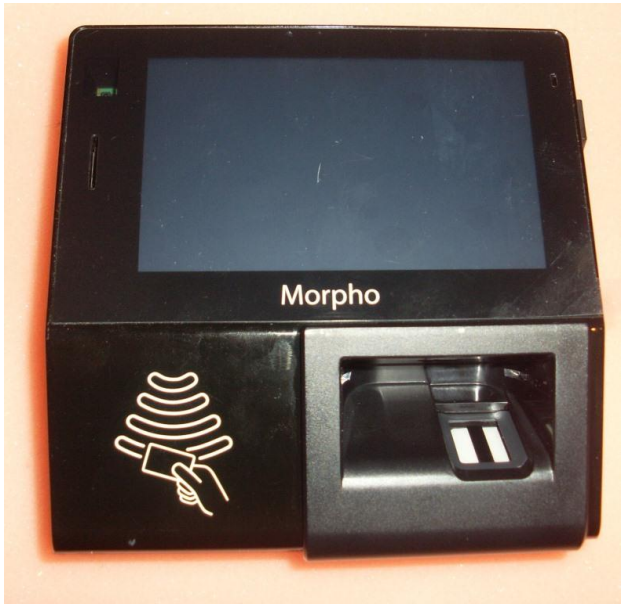
Standard Section	Test Description	TEST RESULT - Comments
CFR 47 § 15.203	Antenna Requirement	PASS (Internal Antenna)
CFR 47 § 15.205	Restricted Band Operation	PASS
RSS-Gen § 4.6.1	99% Occupied Bandwidth	PASS (No Limit applicable)
CFR 47 § 15.207 RSS-210 §2.5.1	AC Power Line Conducted Emissions	PASS
CFR 47 § 15.209 (a) RSS-210 §2.5.1	Radiated emissions	PASS

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):**



Mode 1

Mode 2

Photograph of EUT

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

- Personal computer with Tftp
- Programmable Power Supply
- Shielded Ethernet cable
- RFID Card
- AC/DC Power Supply FW7362/12
- POE TP-LINK TL-POE150S

- **Input/output:**

- 1 Input Power 12-24Vdc
- 1 Input Power 48Vdc POE
- 1 Ethernet
- 2 Usb
- 4 blocks connectors

- **Equipment information:**

- External antenna connector: No
- Frequency band used: 125KHz
- Number of channel: 1
- Antenna type: Integral
- Stand By mode: No
- Type of power source: External power supply (Power Source Equipment POE or Adapter AC/DC)
- Power supply (Mode 1):12v
- Power supply (Mode 2):48v

- **Equipment of the same family:**

-Tests are performed on the most complete product “MorphoAccess® SIGMA PROX WR”. See Table below for difference between products. So, tests results are applicable for all products describe in the following table.

Products	FCC ID & IC ID	Reference	Radio Frequency	PCB architecture				Water Resistant*
				Motherboard Reference: 293 645 695	PROX board 125k HID Ref: 4065BAC07	Biometric sensor Ref: 29362595	POE module: Sivertel AG9712-2BR	
MorphoAccess® SIGMA Prox WR	FCC ID : ZBW-MASIGMA125K IC: 11472A-MASIGMA125K	293638905	125KHz	X	X	X	opt	Yes
MorphoAccess® SIGMA Prox	FCC ID : ZBW-MASIGMA125K IC: 11472A-MASIGMA125K	293645567	125KHz	X	X	X	opt	No

2.2. RUNNING MODE

The EUT is set in the following modes during tests:
-Mode 1: Communication with a tag & powered at 12Vdc
-Mode 2: Communication with a tag & powered at 48Vdc (POE)
-Mode 3: Communication with a tag & powered at 110V/60Hz with a representative AC/DC adapter for conducted emission test
-Mode 4: Communication with a tag & powered at 110V/60Hz with a representative Power Source Equipment POE for conducted emission test

2.3. EQUIPEMENT LABELLING

2.4. EQUIPMENT MODIFICATIONS

No equipment modification has been necessary during testing.

3. 99% OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by : Stéphane PHOUDIAH
Date of test : 2013/10/10
Ambient temperature : 21°C
Relative humidity : 45%

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 § 4.6.1 reference method.

Spectrum Analyzer Setting:
Center frequency= 125kHz
Span= At least 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 99% Occupied Bandwidth

3.3. RESULTS

Mode 1

Temperature	**Tnom**
Voltage	**Vnom**
Frequency	Fnom
99% Occupied Bandwidth (kHz)	31.53

Mode 2

Temperature	**Tnom**
Voltage	**Vnom**
Frequency	Fnom
99% Occupied Bandwidth (kHz)	31.53

See graphics in annex

Result: PASS
Limit: → None

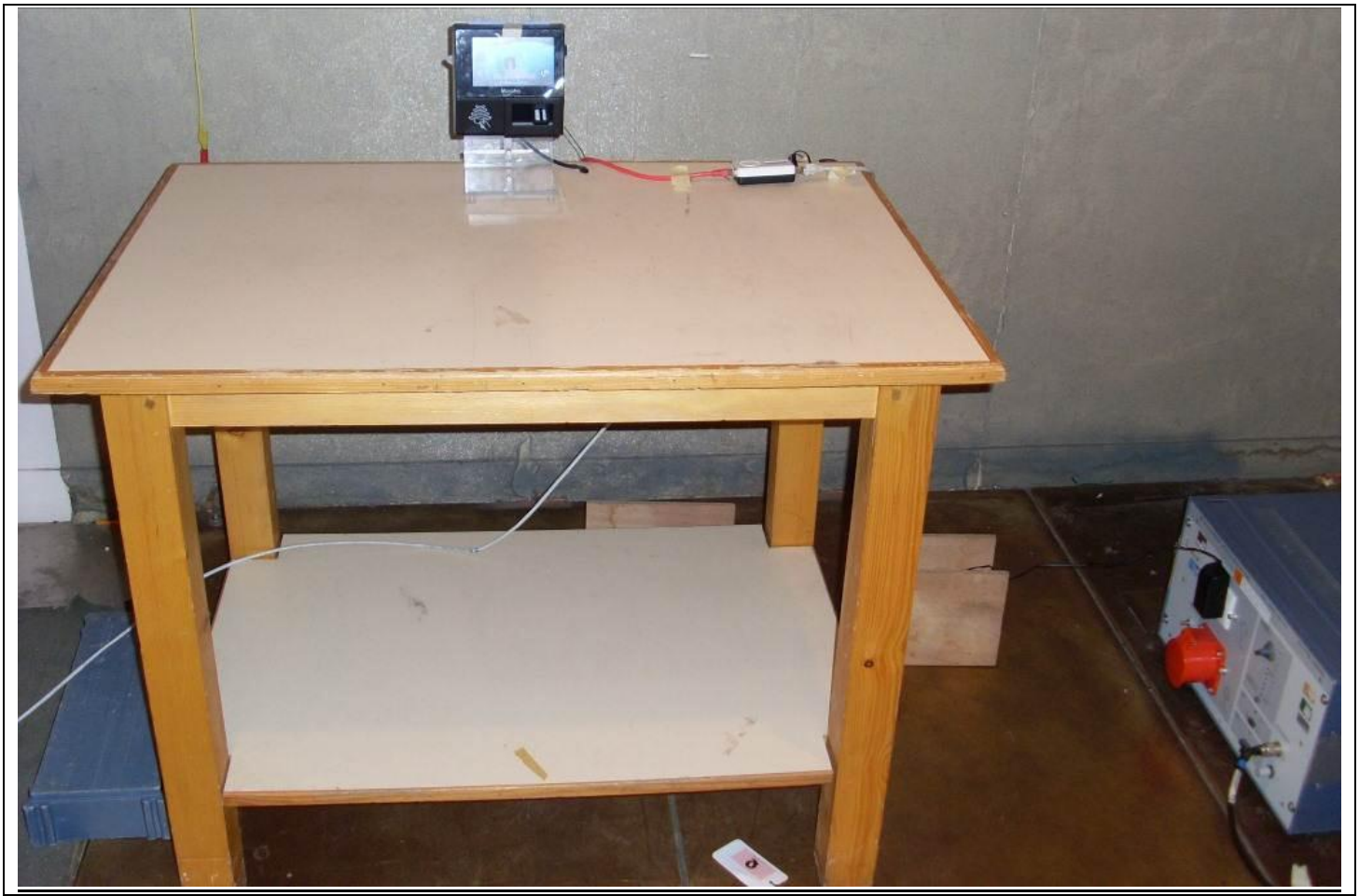
4. AC POWER LINE CONDUCTED EMISSIONS

4.1. TEST CONDITIONS

Test performed by : Laurent DENEUX
Date of test : 2013/09/
Ambient temperature : 22 °c
Relative humidity : 48 %

4.2. TEST SETUP

The product has been tested according to ANSI C63.4-(2003) 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 POE Power Source Line Conducted Emissions (Front view)

Photograph for POE power Source Line Conducted Emissions (Rear view)

Photograph for AC Power Line Conducted Emissions (Front view)

Photograph for AC Power Line Conducted Emissions (Rear view)

4.3. RESULTS

Mode 3

Phase Line

Frequency (MHz)	Peak Level (dBµV/m)	Quasi-Peak Level (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Average Level (dBµV/m)	Average Limit (dBµV/m)
0.166	44.6	-	65.1	25.5	55.1
0.648	29	-	56	21	46
4.28	22.8	-	56	12	46
23.128	40	-	60	-	50

Neutral Line

Frequency (MHz)	Peak Level (dBµV/m)	Quasi-Peak Level (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Average Level (dBµV/m)	Average Limit (dBµV/m)
0.160	44.6	-	65.4	25	55.4
0.672	28.8	-	56	22	46
4.23	24.3	-	56	16	46
23.13	40.7	-	60	-	50

Mode 4

Phase Line

Frequency (MHz)	Peak Level (dBµV/m)	Quasi-Peak Level (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Average Level (dBµV/m)	Average Limit (dBµV/m)
0.161	46.3	-	65.4	31.8	55.4
0.428	36	-	57.2	28	47.2
2.54	25	-	56	26	46
7.12	38.5	-	60	29.5	50

Antenna disconnected

Neutral Line

Frequency (MHz)	Peak Level (dBµV/m)	Quasi-Peak Level (dBµV/m)	Quasi-Peak Limit (dBµV/m)	Average Level (dBµV/m)	Average Limit (dBµV/m)
0.169	43.4	-	65	23.3	55
0.387	33.8	-	58.1	23	48.1
0.977	45.8	-	56	16	46
8.36	36.7	-	60	29	50

See annex for graphics

Result: PASS

Limit: →

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

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

*Decreases with the logarithm of the frequency

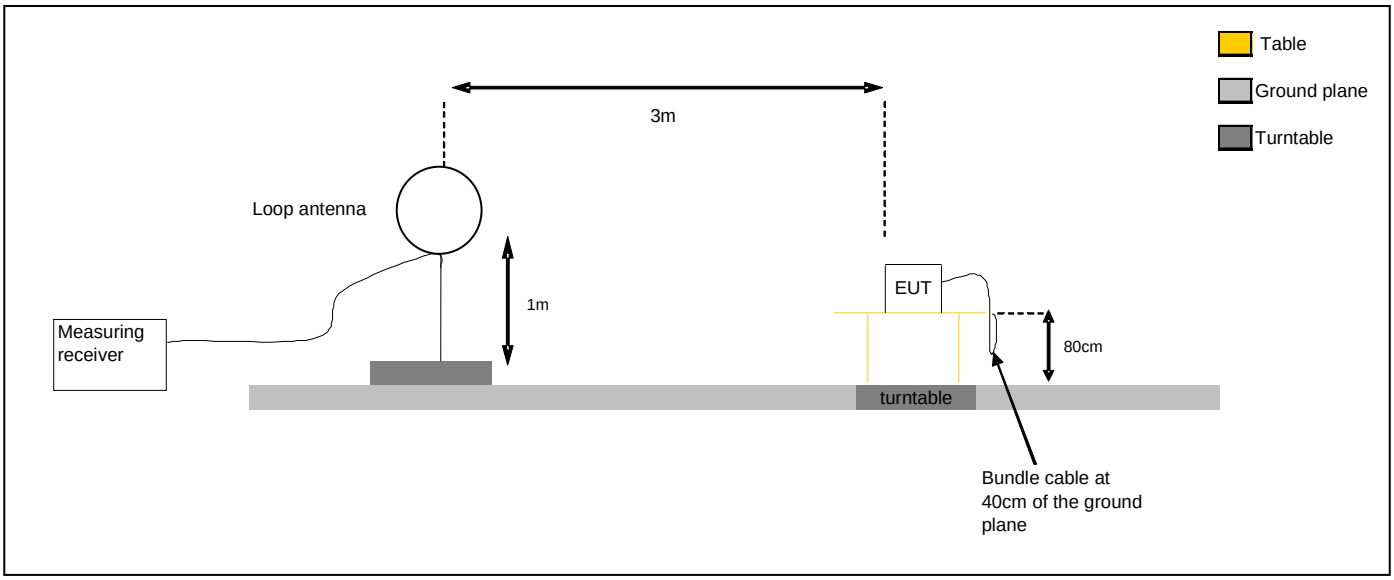
5. RADIATED EMISSIONS

5.1. 1 TEST CONDITIONS

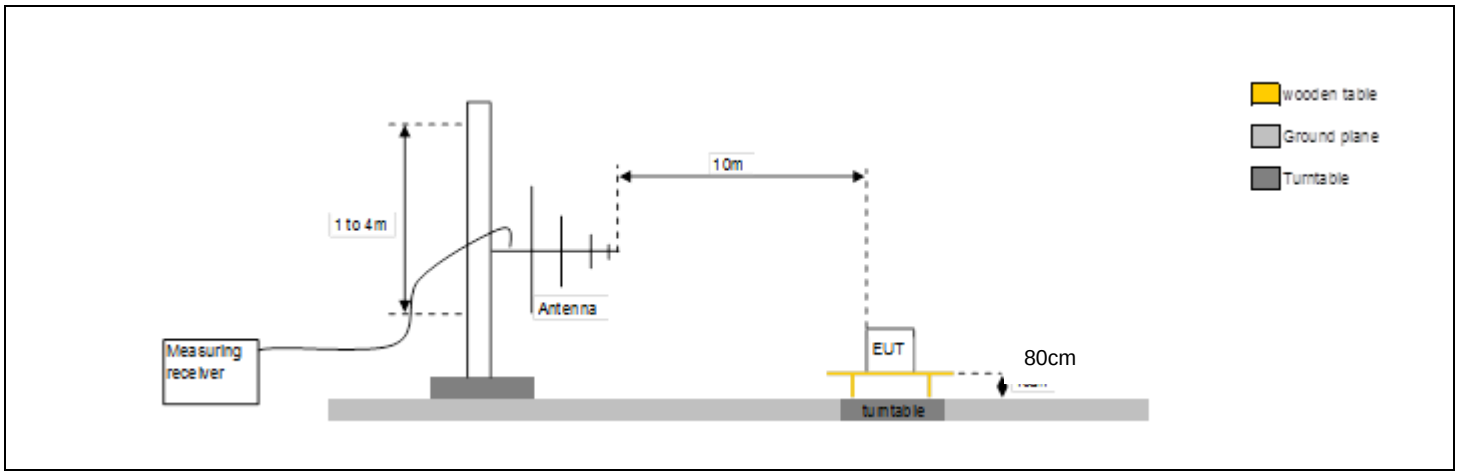
Test performed by : Laurent DENEUX
Date of test : September 10th, 2013
Ambient temperature : 20 °C
Relative humidity : 47 %

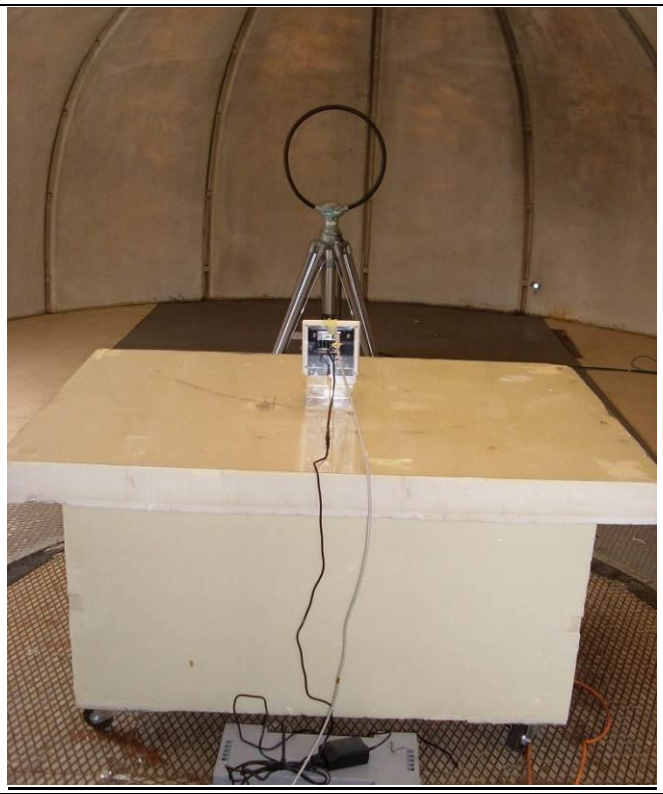
5.2. TEST SETUP

The EUT is placed at 3m distance of the loop antenna (0.009 to 30MHz) on a table 80cm height. The level has been maximised by turning the EUT with the rotating table and with the antenna at 0° and 90° around its vertical and horizontal axes. Antenna height was 1m. Pre scans were performed on the EUT put on its three axes to determine the position with maximum radiation.

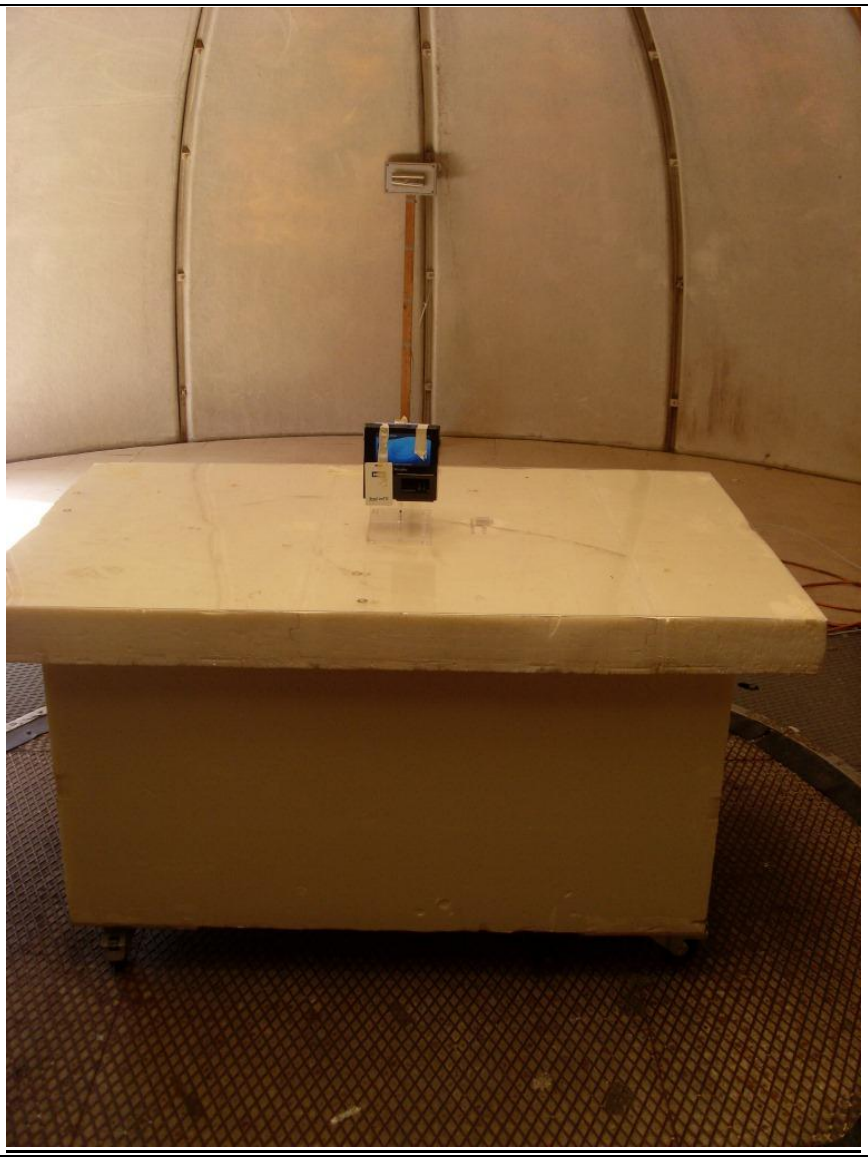


The EUT is placed at 10m distance of the Bilog (30 to 1000MHz) or horn (above 1GHz) antenna on a table 80cm height. The level has been maximised by turning the EUT with the rotating table and with the antenna in horizontal and vertical polarity. Antenna height search was performed from 1 to 4m





Photograph for Field strength below 30MHz



Photograph for Field strength above 30MHz

5.3. RESULTS

- **Characterization on an open test site (9kHz to 30MHz):**

Mode 1

Perpendicular antenna
Below 30Mhz

Frequency (MHz)	QPeak Level (dBµV/m)	Limit (3m) (dBµV/m)
0.125	60	105.6
11.7	40.8	69.5
26.8	42.5	69.5

Paralell antenna
Below 30Mhz

Frequency (MHz)	QPeak Level (dBµV/m)	Limit (3m) (dBµV/m)
0.125	67	105.6
9.6	39.5	69.5
11	39.3	69.5
11.8	38.5	69.5

Mode 2

Perpendicular antenna
Below 30Mhz

Frequency (MHz)	QPeak Level (dBµV/m)	Limit (3m) (dBµV/m)
0.125	68	105.6
0.187	71.5	102.2
0.238	68.7	100
0.300	65.5	98
0.400	59.5	95.5
0.459	55.1	94.3
0.497	57.3	73.7
0.535	55	73
0.572	54.1	72.4
5	46.6	69.5
9.6	43.5	69.5

Paralell antenna
Below 30Mhz

Frequency (MHz)	QPeak Level (dBµV/m)	Limit (3m) (dBµV/m)
0.125	70	105.6
0.200	60.5	101.5
0.238	55.5	100
0.259	54.5	99.3
0.318	54.5	97.5
0.380	53.5	96
11.7	40.5	69.5

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

Characterization on an open test site (30MHz to 1000MHz)

Worst frequencies for mode 1		
Frequency MHz	Measured level (10m distance) dBµV/m	Limit level FCC Part.15 Class B
32.5	26.3	29.5
80	24.2	29.5
200	23	33
573.5	25.5	35.5
776.5	28.9	35.5
792	30	35.5

Worst frequencies for mode 2		
Frequency MHz	Measured level (10m distance) dBµV/m	Limit level FCC Part.15 Class B
37	26.7	29.5
125	28.6	33
372.9	25.7	35.5
511.3	28	35.5
776.5	29	35.5
792	28.6	35.5

See annex for graphics

Characterization on an open test site (1GHz to 18GHz)

No significant spurious has been observed

Result: PASS
Limit: →

30MHz to 88MHz:	100µV/m (3m) or 29.5dBµV/m (10m) QPeak
88MHz to 216MHz:	150µV/m (3m) or 33dBµV/m (10m) QPeak
216MHz to 960MHz:	200µV/m (3m) or 35.5dBµV/m (10m) QPeak
960MHz to 1000MHz:	500µV/m (3m) or 43.5dBµV/m (10m) QPeak
Above 1000MHz:	500µV/m (3m) or 43.5dBµV/m (10m) Average or 63.5dBµV/m (10m) Peak

6. TEST EQUIPMENT LIST

Radiated emissions					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Open test site	LCIE	-	F2000400	-	-
EMI Test Receiver	ROHDE & SCHWARZ	ESU	A2642018	2013-04-17	2014-04
Preamplifier	HEWLETT PACKARD	8449B	A4069002	2012-11-21	2013-11
Bilog antenna	CHASE	CBL 6112A	C2040040	2013-03-28	2014-03
Horn antenna	EMV	3115	C2040023	2013-04-17	2014-04
Loop Antenna	RHODE & SCHWARZ	HFH2-Z2	C2040007	2012-09-04	2013-09
Cable	-	-	A5329449	2013-09-06	2014-09
Cable	-	-	A5329365	2013-03-20	2014-03
cable	-	-	A5329444	2013-09-06	2014-09
AC Power Line Conducted Emissions					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
EMI Test Receiver	ROHDE & SCHWARZ	ESU	A2642018	2013-04-17	2014-04
Pulse limiter	RHODE & SCHWARZ	ESH3-Z2	A2649008	2013-02-28	2014-02
V LISN	ROHDE & SCHWARZ	ESH2-Z5	C2322001	2013-06-10	2014-06
Ground plan	LCIE	-	-	-	-
Cable	-	-	A5329417	2013-09-05	2014-09
Frequency Tolerance & Occupied Bandwidth					
Apparatus	**Trade Mark**	**Type**	**Registration number**	**Calibration date**	**Calibration due**
Multimeter	KEITHLEY	2000 Multimeter	A1241084	2011/10	2013/10
Power Supply	KIKUSUI	PCR500M	A7040079	Verified with multimeter before use	Verified with multimeter before use
Spectrum Analyser	ROHDE & SCHWARZ	FSL	A4060032	2013/11	2014/11
Climatic chamber	SECASI Technologies	SLT34	D1024029	Verify with thermometer before test	Verify with thermometer before test
Thermometer	AOIP	TM 6630	B4041042	2013/07	2014/07

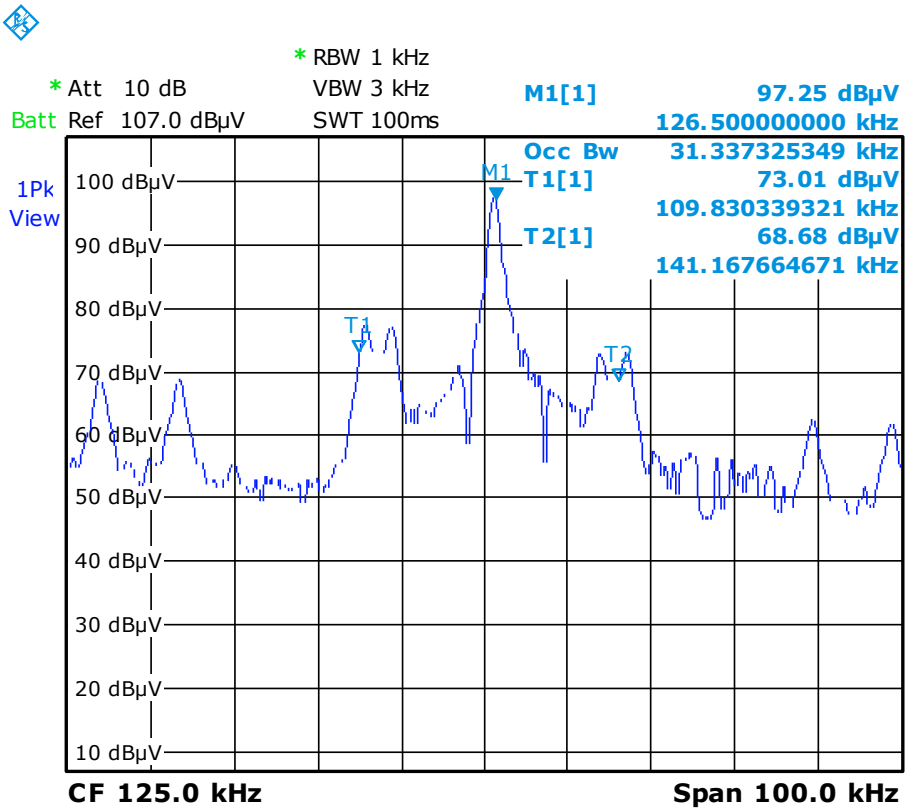
Note: In our Quality System, the calibration due of our equipments is more or less 2 months.

7. 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 %

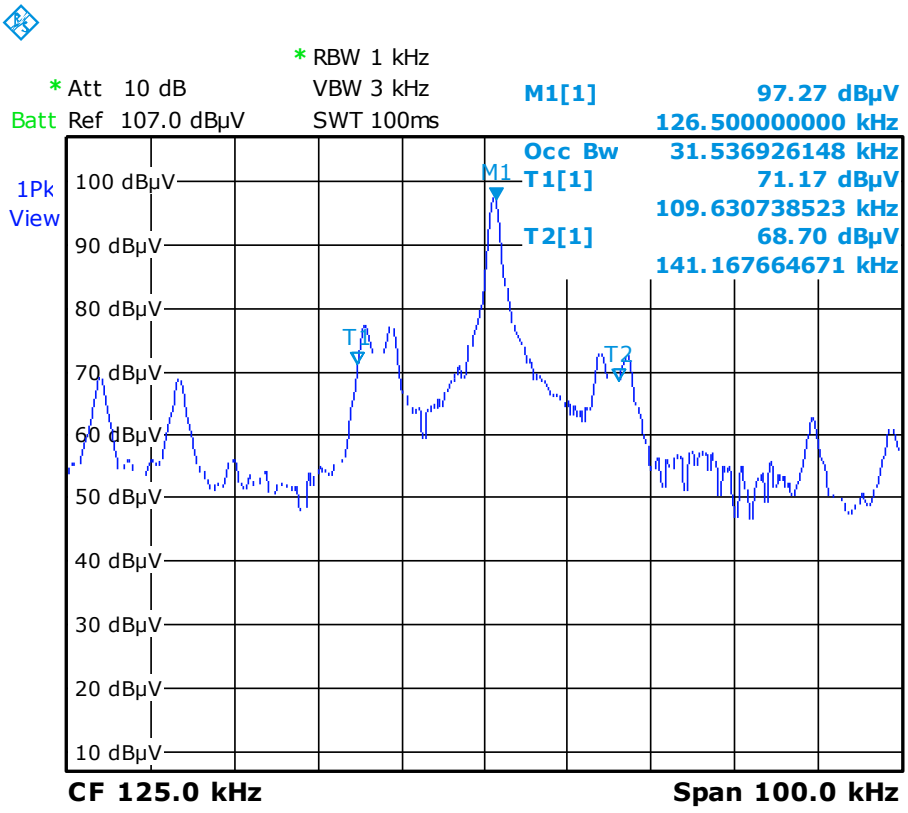
8. ANNEX (GRAPHS)

Mode 1
99% Occupied Bandwidth
Temperature: Tnom
Voltage: Vnom



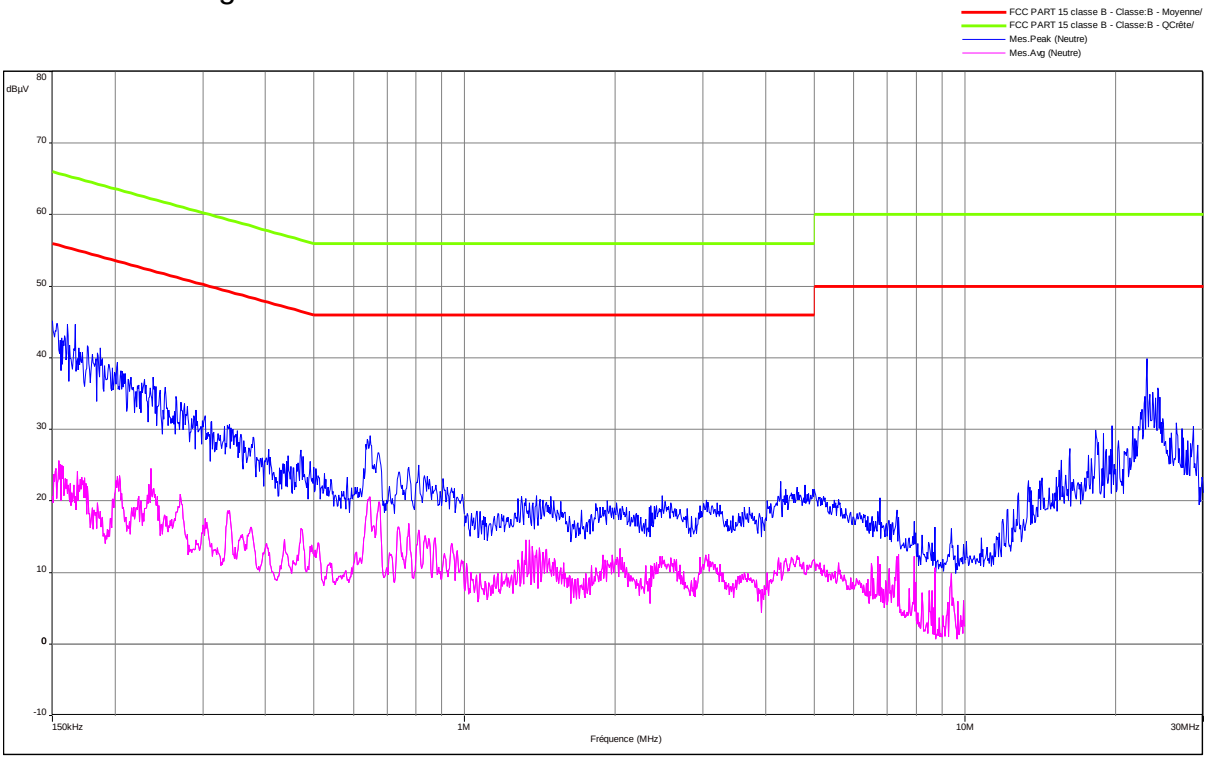
Date: 10.OCT.2013 14:06:09

Mode 2
99% Occupied Bandwidth
Temperature: Tnom
Voltage: Vnom

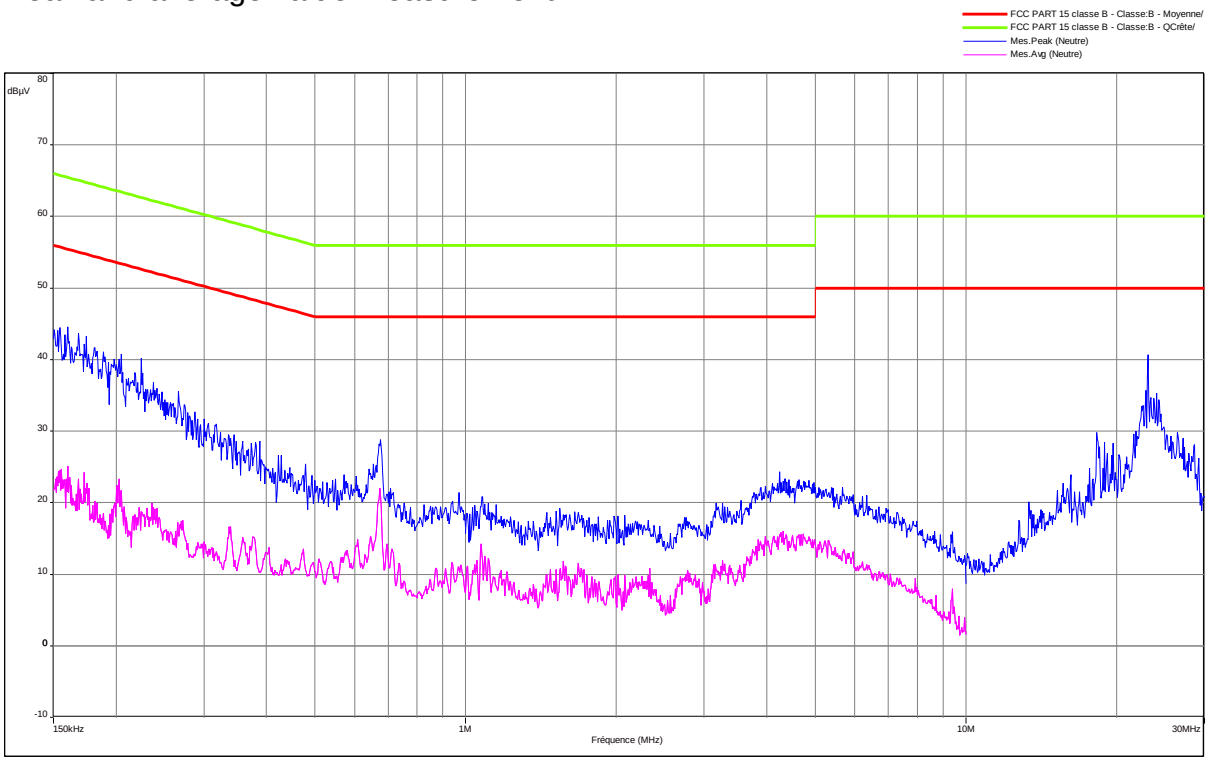


Date: 10.OCT.2013 14:03:47

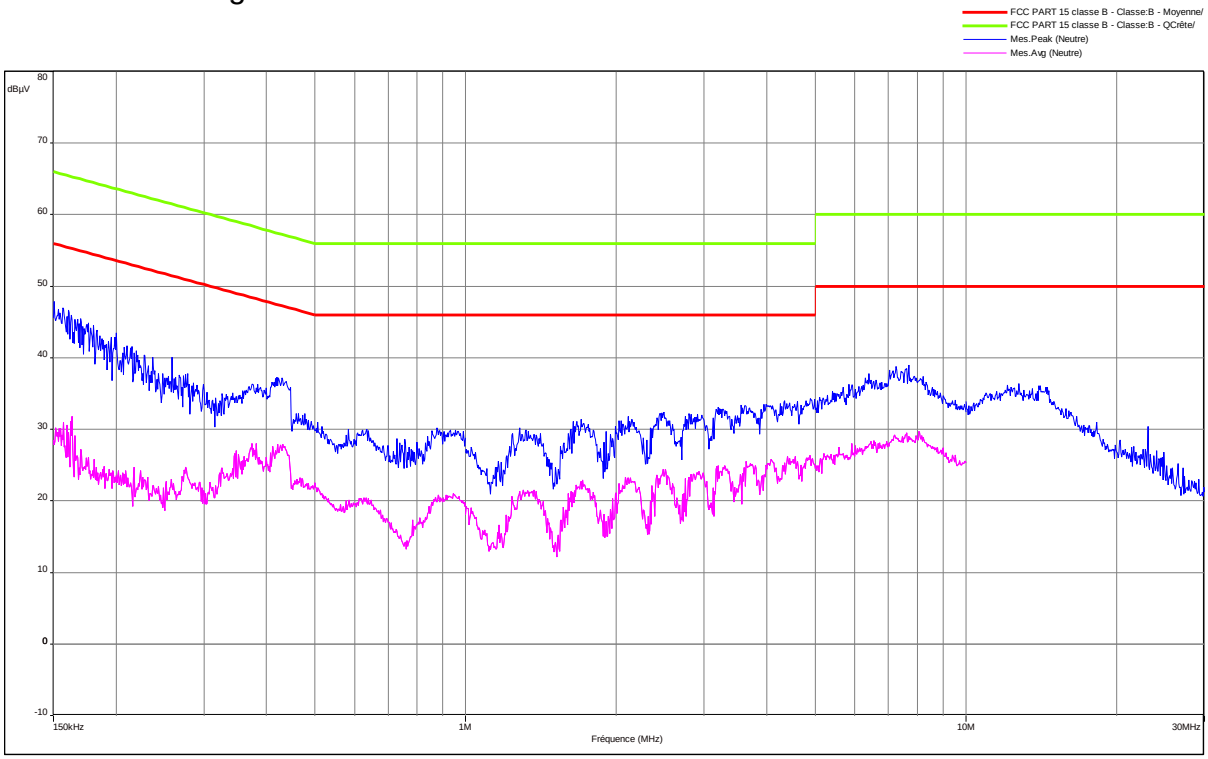
FCC Part 15 class B
Mode 3
CONDUCTOR 1: 120V-60Hz
Peak and average value measurement



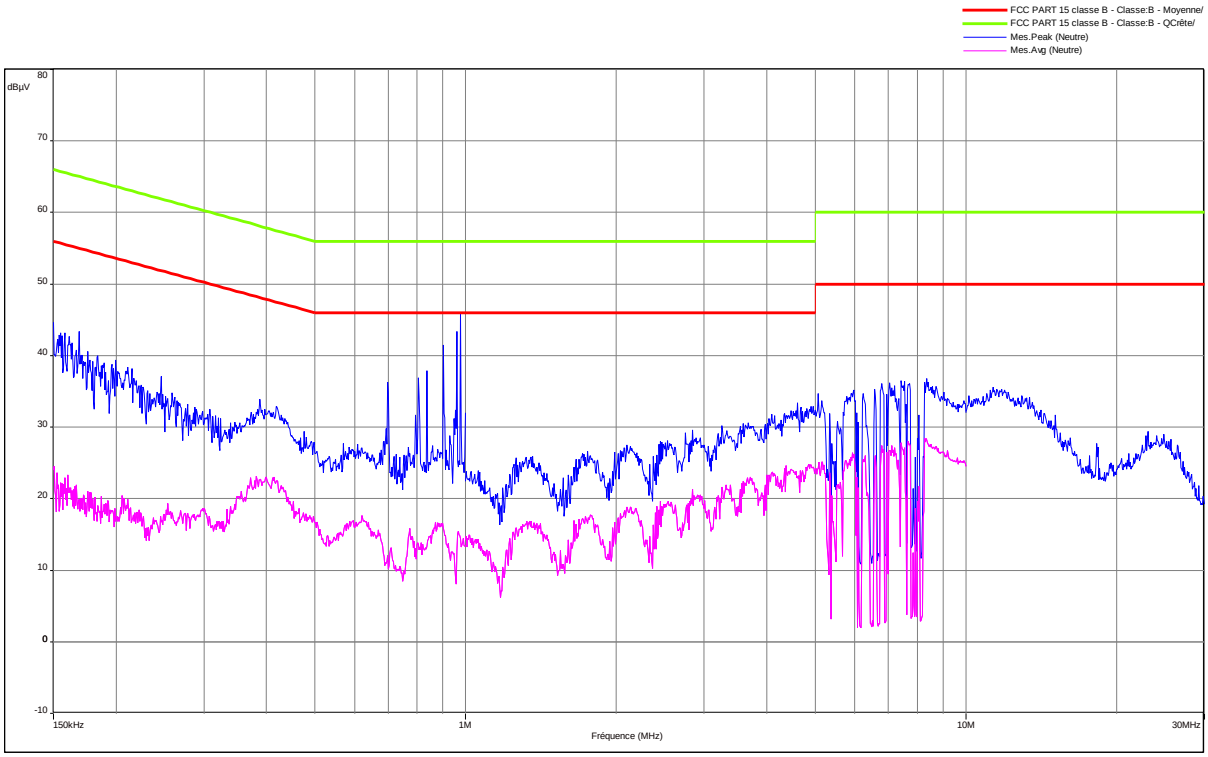
FCC Part 15 class B
Mode 3
CONDUCTOR 2: 120V-60Hz
Peak and average value measurement



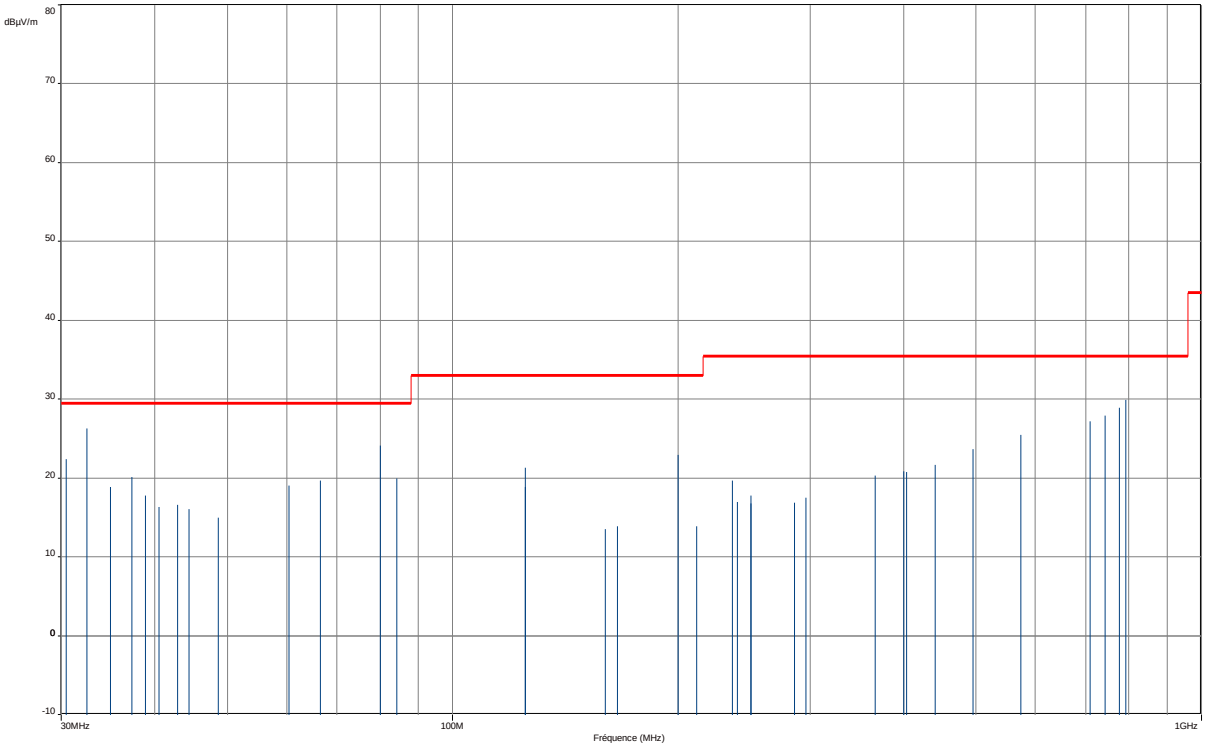
FCC Part.15 class B
Mode 4
CONDUCTOR 1: 120V-60Hz
Peak and average value measurement



FCC Part 15 class B
Mode 4
CONDUCTOR 2: 120V-60Hz
Peak and average value measurement



FCC Part 15 class B
Mode 1
Quasi peak measurement



FCC Part 15 class B
Mode 2
Quasi peak measurement