RFID 125kHz Template: Release October 10th, 2016

TEST REPORT

N°: 146947-699381G **Version : 01**

Subject	**Radio spectrum matters tests according to standards: 47 CFR Part 15.209 & Part 15.207 & RSS-Gen Issue 4**
Issued to	**Safran Identity and Security 11 Boulevard Gallieni 92130- ISSY-LES-MOULINEAUX FRANCE**
Apparatus under test	
Product	**MorphoAccess® SIGMA EXTREME Series**
Trade mark	**Safran Identity and Security**
Manufacturer	**Safran Identity and Security**
Model under test	**MPH-AC002A**
Serial number	**1651OMX0000001**
FCC ID	**ZBW-MPHAC002A**
IC ID	**11472A-MPHAC002A**
Test date	: March 9, 2017 to March 13, 2017
Test location	Fontenay Aux Roses & Ecuelles
Composition of document	28 pages
Document issued on	March 30, 2017

Written by :
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Tests operator

Approved by :
Arnaud FAYETTE
Technical manager

PUBLICATION HISTORY

Version	Date	Author	Modification
01	March 15, 2017	Armand MAHOUNGOU	Creation of the document

SUMMARY

1. TEST PROGRAM

References

- **47 CFR Part 15.209 & 15.207**
- **RSS Gen Issue 4**
- **ANSI C63.10-2013**

Radio requirement:

Clause (47CFR Part 15.209 & 15.207 & RSS-Gen Issue 4) Test Description	Test result - Comments			
Occupied Bandwidth	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
AC Power Line Conducted Emission	☑ PASS	☐ FAIL	☐ NA(2)	☐ NP(1)
Transmitter Radiated Emission	☑ PASS	☐ FAIL	☐ NA	☐ NP(1)
Receiver Radiated Emissions	☑ PASS (3)	☐ FAIL	☐ NA	☐ 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

Morpho Access SIGMA Extreme — MA SIGMA Extreme is a biometric access controller terminal.

MorphoAccess® Sigma Extreme device family standard models:

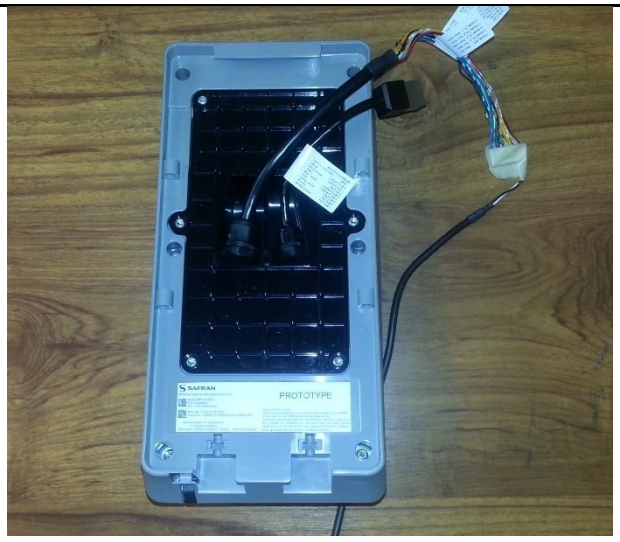
			RFID			Fake Finger Detection (FFD)
Model	**Name**	**Part#**	**iClass**	**Mifare/ Desfire**	**Prox**	
MPH-AC002A	MorphoAccess® SIGMA Extreme Prox	293696171			✓	
	MorphoAccess® SIGMA Extreme FFD Prox	293696204			✓	✓

MPH-AC002A: Tests are performed on the most complete Product.
MorphoAccess® SIGMA Extreme Prox FFD
The product tested is the most representative product with radio 125kHz and the FFD function.

2.2. HARDWARE IDENTIFICATION (EUT AND AUXILIARIES):

Equipment under test (EUT):
Safran Identity and Security **Serial Number: 11472A-MPHAC002A**

Front face



Back face

Equipment Under Test

Power supply:
During all the tests, EUT is supplied by V_{nom}: VAC
For measurement with different voltage, it will be presented in test method.

Name	Type	Rating	Reference / Sn	Comments
Supply1	☑ AC ☐ DC ☐ Battery	100 – 240V ~ / 50 - 60Hz / 700mA	-	-

Inputs/outputs - Cable:

Access	Type	Length used (m)	Declared <3m	Shielded	Under test	Comments
1	Ethernet	10	☐	☑	☑	Cable > 30m telecommunication port
2	USB Mini B	na	☑	☑	☐	Cable < 3m
3	USB micro AB	na	☑	☑	☐	Cable < 3m Service Only
4	RS422/ RS484	na	☐	☐	☐	Cable > 30m not a telecommunication port
5	Wiegand	na	☐	☐	☐	Cable > 30m not a telecommunication port
6	GPI/GPO	na	☐	☐	☐	Cable > 30m static signals

Auxiliary equipment used during test:

Type	Reference	Sn	Comments
Power supply – FRIWO 	FW7362/12	-	Not sold with the product

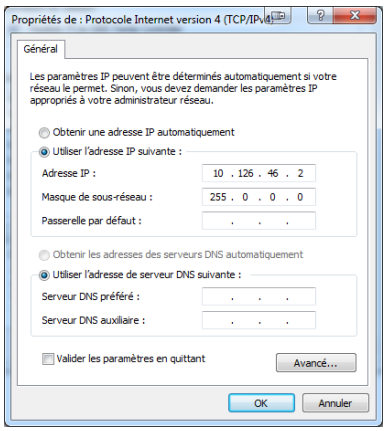
Equipment information:

Type:	☑ **RFID**			
Frequency band:	[125] kHz			
Number of Channel:	1			
Antenna Type:	☑ Integral	☐ External	☐ Dedicated	
Transmit chains:	1			
Receiver chains	1			
Type of equipment:	☑ Stand-alone	☐ Plug-in	☐ Combined	
Equipment type:	☑ Production model		☐ Pre-production model	
Operating temperature range:	Tmin:	☑ -20°C	☐ 0°C	☐ X°C
	Tnom:	20°C		
	Tmax:	☐ 35°C	☐ 55°C	☑ 60°C
Type of power source:	☑ AC power supply	☐ DC power supply	☐ Battery	
Operating voltage range:	Vnom:	☑ 120V/60Hz	☐ XVdc	

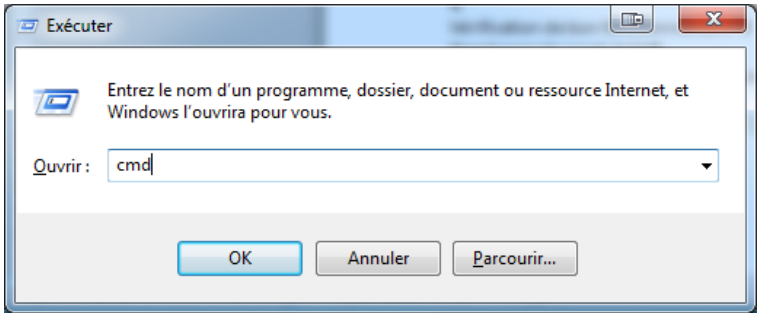
2.3. RUNNING MODE

During the test, products must be ON and communication with a PC through ***ping*** command.
To send the ping command, the laptop must be configured previously as below:

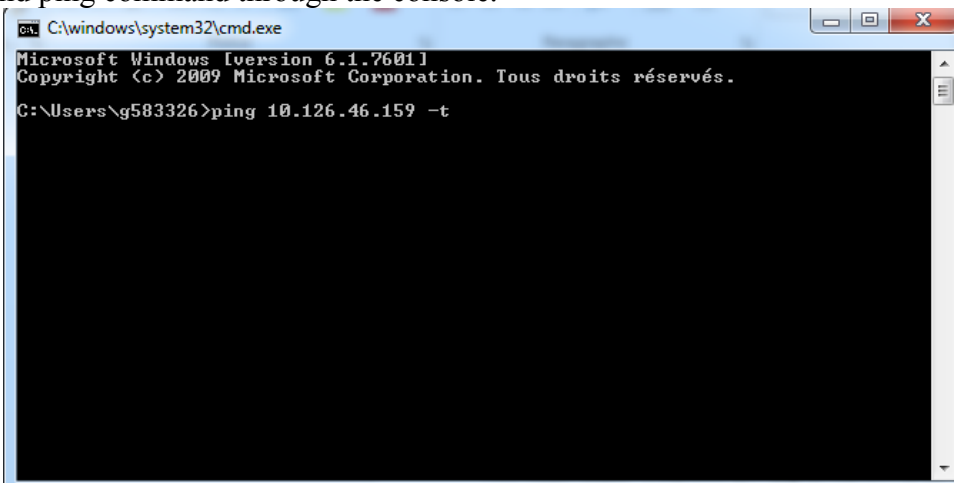
1. Modify IP adress of the laptop (Windows 7 procedure) :
   - Click on« *Demarrer* » menu
   - Click on *Panneau de configuration* → *Centre Réseau et partage*
   - Click on « *Modifier les paramètres de la carte* »
   - Double click on « Connexion au réseau local »
   - Double click on « *Protocol Internet version 4 (TCP/IPv4)* »
   - Enter fields as below and click on "*OK"* button :



2. Open a windows console by clicking simultaneously on Windows button on the keyboard and "R" button.
3. The window below will open. Enter cmd in the field as below and click OK



4. Finally, send ping command through the console.



There are two different IP addresses according to the product under test.

- MPH-AC002A - MA-Extreme Prox FFD: IP address = 10.126.46.**159**
- MPH-AC002B - MA-Extreme iClass FFD: IP address = 10.126.46.**159**

So one of the two commands below must be sent to the good product:

- **MPH-AC002A : *ping 10.126.46.159 –t***
- **MPH-AC002B : *ping 10.126.46.159 –t***

To validate that the product works properly, procedure here under must be followed:

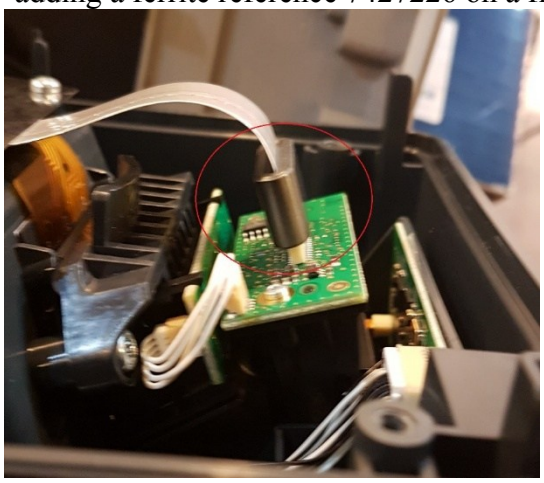
- Check Ping command response on the laptop. Command response must be successful.
  Response awaited for MPH-AC002x product:
  Réponse de 10.126.46.159 : octets=32 temps<1ms TTL=64
- Place your finger on the biometric sensor and after several seconds a closed door must appear on the screen or a second try window then a closed door must appear.
- Place a RFID card below biometric sensor and after several seconds a closed door or a Hold Card pop up must appear on the screen.

2.4. EQUIPMENT LABELLING

2.5. EQUIPMENT MODIFICATION

☐ None ☑ Modification:

-adding a ferrite reference 7427226 on a flat cable.



3. OCCUPIED BANDWIDTH

3.1. TEST CONDITIONS

Test performed by	: Mathieu CERISIER
Date of test	: March 13, 2017
Ambient temperature	: 25 °C
Relative humidity	: 41 %

3.2. TEST SETUP

- The Equipment Under Test is installed:
☑ On a table
☐ In an anechoic chamber

- Measurement is performed with a spectrum analyzer in:
☑ Conducted Method
☐ Radiated Method (test Fixture)

- Test Procedure:
☑ RSS-Gen Issue 4 § 6.6

Photograph for Occupied bandwidth

3.1. LIMIT

None

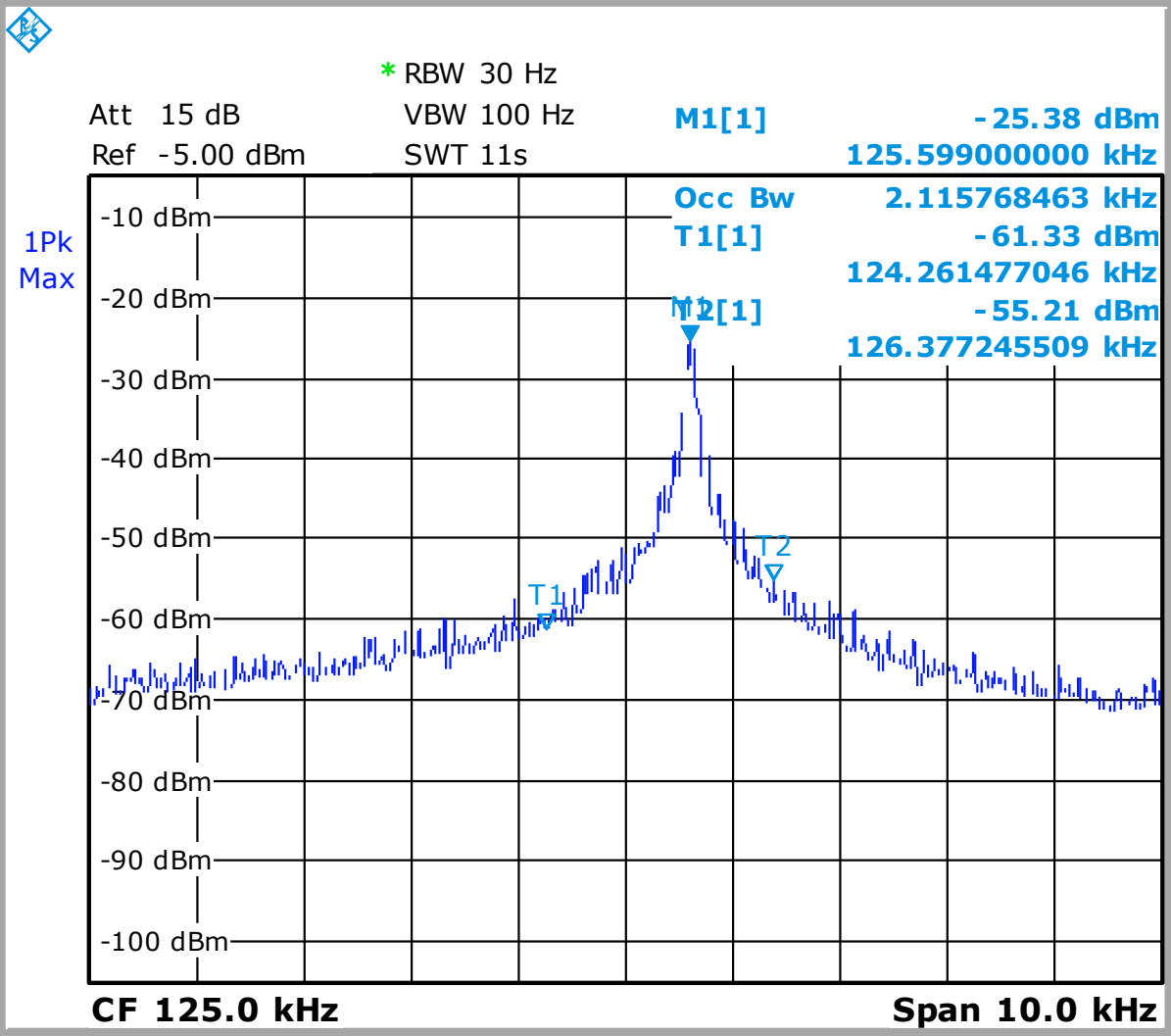
3.2. TEST EQUIPMENT LIST

DESCRIPTION	MANUFACTURER	MODEL	N° LCIE	Cal_Date	Cal_Due
Spectrum analyzer	ROHDE & SCHWARZ	FSL6	A4060032	2015/04	2017/04
Cable	CABLES & CONNECTIQUES	-	A5329422	-	-
Programmable AC/DC power supply	-; KIKUSUI	PCR500M	A7040079	2016/06	2018/06
Multi-meter	KEITHLEY	2000	A1242090	2015/06	2017/06

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

3.3. RESULTS

Occupied Bandwidth
125kHz



Frequency(MHz)	Occupied Bandwidth (kHz)
0,125	2,116

3.1. CONCLUSION

Occupied Channel Bandwidth measurement performed on the sample of the product **MPH-AC002A** SN: **1651OMX0000001**, in configuration and description presented in this test report, show levels **compliant** to the **RSS-GEN ISSUE 4** limits.

4. AC POWER LINE CONDUCTED EMISSIONS

4.1. TEST CONDITIONS

Test performed by	: Laurent DENEUX
Date of test	: March 9, 2017 to March 10, 2017
Ambient temperature	: 21 °C
Relative humidity	: 53 %

4.2. 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 (Front view)

Photograph for AC Power Line Conducted Emissions (Rear view)

4.3. 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

4.4. TEST EQUIPMENT LIST

Test Equipment Used					
Description	**Manufacturer**	**Model**	**Identifier**	**Cal. Date**	**Cal. Due**
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2015-12	2017-12
V ISLN	ROHDE & SCHWARZ	ESH2-Z5	C2322001	2016-05	2017-05
Pulse limiter	ROHDE & SCHWARZ	ESH3-Z2	A2649008	2016-03	2017-03
Cable	-	-	A5329417	2016-10	2017-10
Cable	-	-	A5329589	2016-10	2017-10
Ground plane	LCIE	-	-	-	-

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

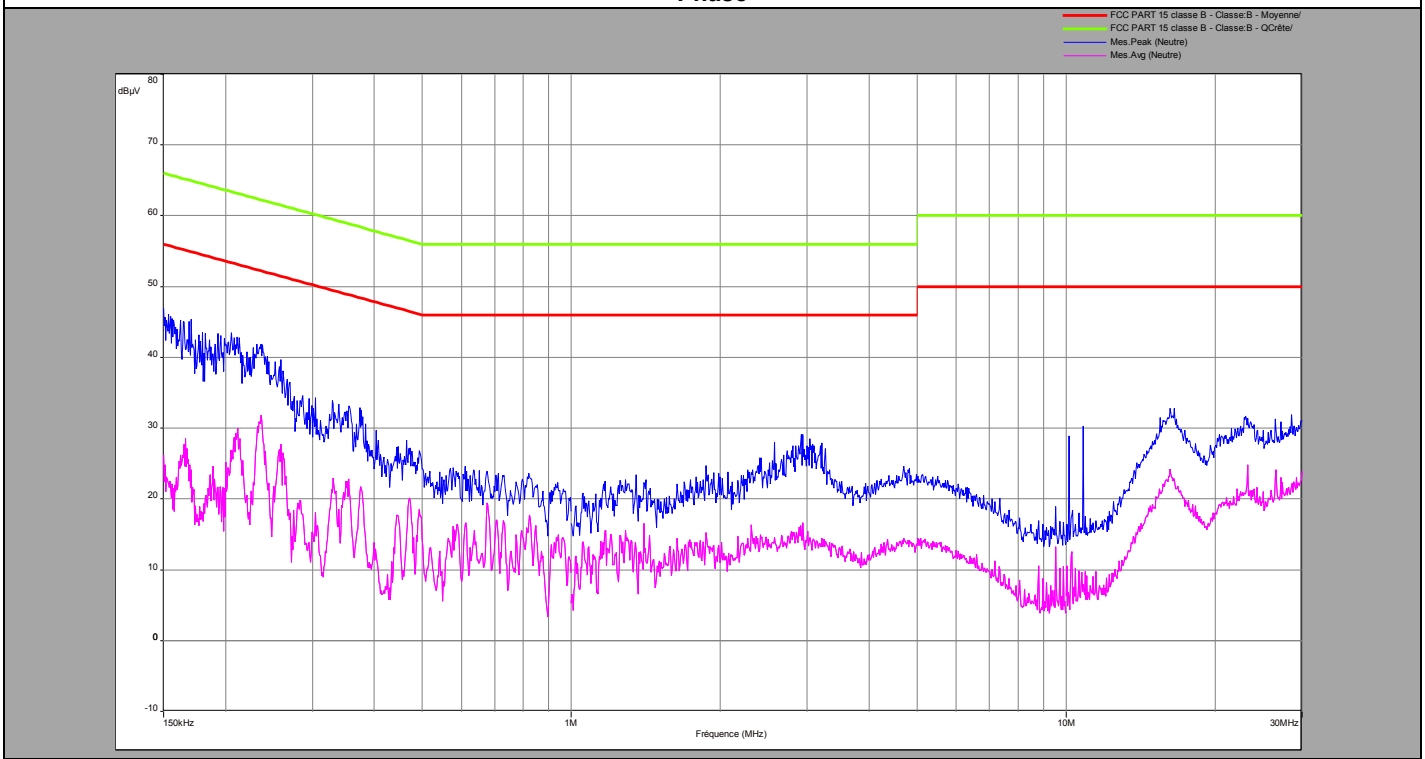
4.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

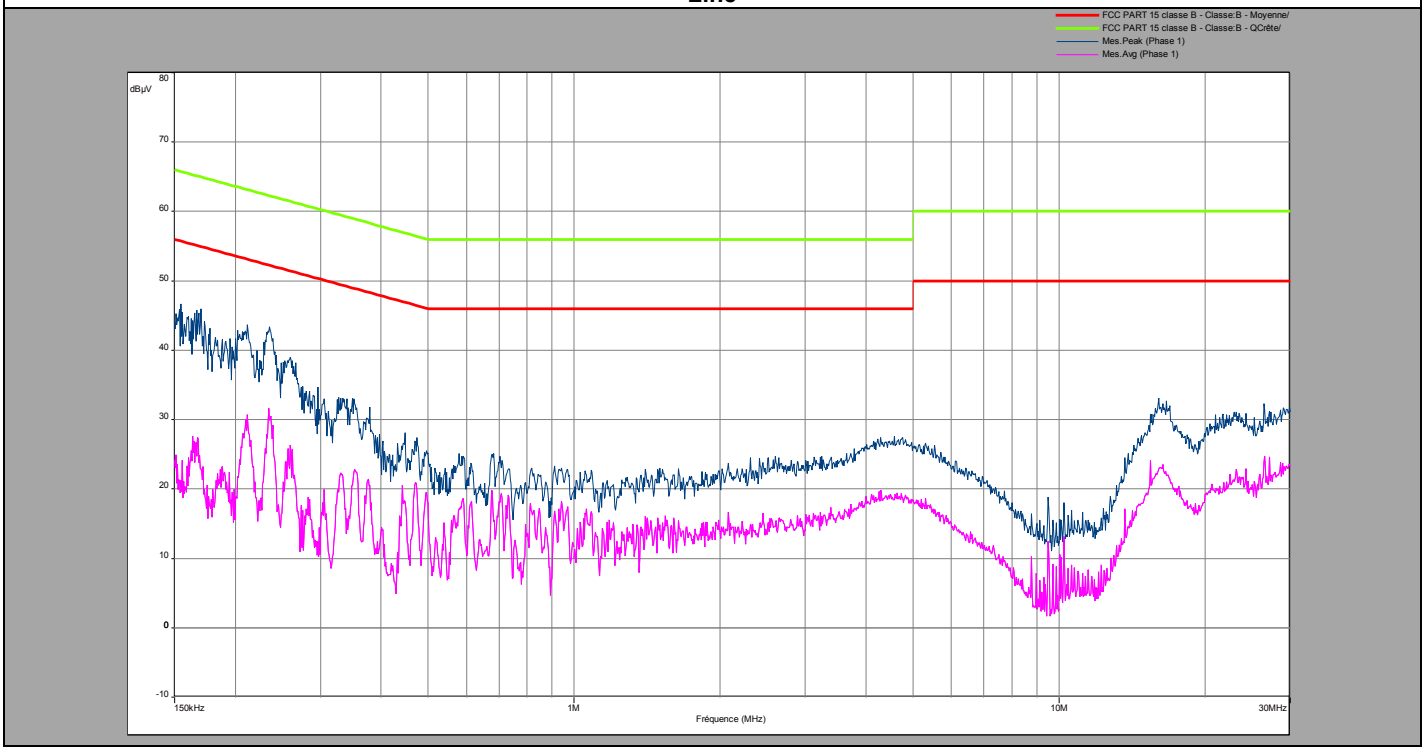
4.6. RESULTS

AC Power Line Conducted Emission

Phase



Line



Phase Line					
Frequency (kHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**
150	47	-	66	26.2	56
676	24	-	56	19.5	46
2949	29.2	-	56	16.6	46
16240	31.7	-	60	24.2	50
26486	31.3	-	60	23	50

Neutral Line					
Frequency (kHz)	**Peak Level (dBµV)**	**Quasi-Peak Level (dBµV)**	**Quasi-Peak Limit (dBµV)**	**Average Level (dBµV)**	**Average Limit (dBµV)**
154.5	46.8	-	65.7	24	55.7
678	25	-	56	19.6	46
4284	27.5	-	56	20	46
16056	33	-	60	22	50
26490	32.3	-	60	24.5	50

4.7. CONCLUSION

Ac Power Line Conducted Emission measurement performed on the sample of the product **MPH-AC002A** SN: **1651OMX0000001**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.207 & RSS Gen ISSUE 4 limits.

5. TRANSMITTER RADIATED EMISSION

5.1. TEST CONDITIONS

Test performed by	: Laurent DENEUX
Date of test	: March 9, 2017 to March 10, 2017
Ambient temperature	: 18 °C
Relative humidity	: 47 %

5.2. TEST SETUP

The product has been tested according to ANSI C63.10 (2013). The EUT is placed **on an open area test site**. 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** 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. The EUT is place at 1.5m high above 1GHz and at 0.8m high under 1GHz.
. Distance between measuring antenna and the EUT is **10m**.

Photograph for Transmitter Radiated Emission

Photograph for Transmitter Radiated Emission

Photograph for Transmitter Radiated Emission

5.3. LIMIT

Limit at 3m:
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: 40dBµV/m QPeak
88MHz to 216MHz: 43,5dBµV/m QPeak
216MHz to 960MHz: 46dBµV/m QPeak
960MHz to 1000MHz: 54dBµV/m QPeak
Above 1000MHz: 74dBµV/m Peak
54dBµV/m Average

Limit at 10m:
30MHz to 88MHz: 29.5dBµV/m QPeak
88MHz to 216MHz: 33dBµV/m QPeak
216MHz to 960MHz: 35.5dBµV/m QPeak
960MHz to 1000MHz: 43.5dBµV/m QPeak
Above 1000MHz: 63.5BµV/m Peak
43.5BµV/m Average

5.4. TEST EQUIPMENT LIST

Apparatus	Trade Mark	Type	Registration number	Cal. Date	Cal. Due
Open test site	LCIE	-	F2000400	2016-05	2017-05
EMI Test Receiver	ROHDE & SCHWARZ	ESIB26	A2642021	2015-12	2017-12
Preamplifier	HELWETT PACKARD	8449B	A7080071	2016-02	2017-02
Bilog antenna	CHASE	CBL 6112A	C2040040	2016-02	2017-02
Loop antenna	RHODE & SCHWARZ	HFH2-Z2	C2040007	2015-11	2017-11
Horn	ETS	3115	C2042023	2016-01	2017-01
Cable	-	-	A5329542	2016-03	2017-03
Cable	-	-	A5329449	2016-10	2017-10
Cable	-	-	A5329368	2016-05	2017-05
Cable	-	-	A5329444	2016-10	2017-10

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

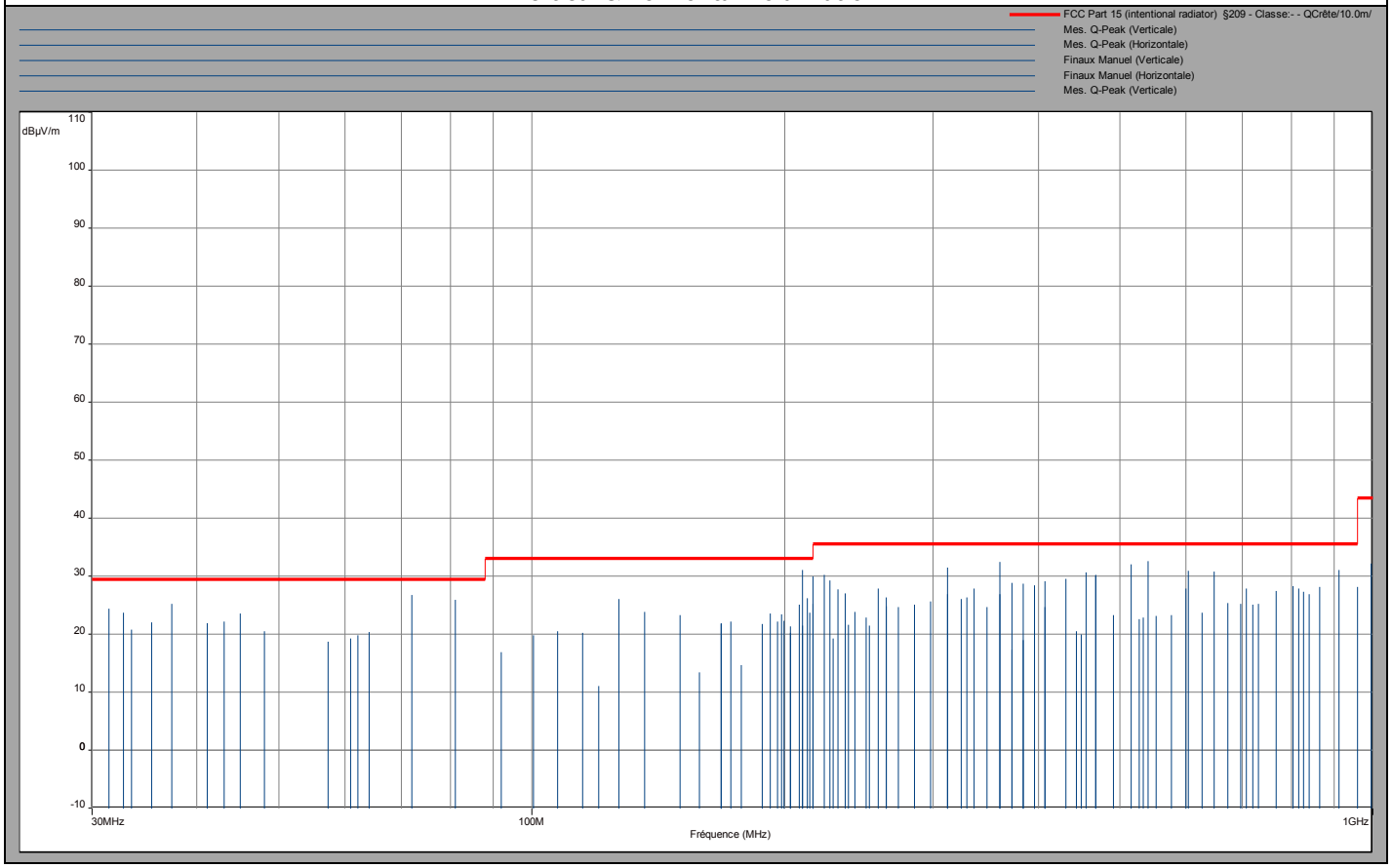
5.5. DIVERGENCE, ADDITION OR SUPPRESSION ON THE TEST SPECIFICATION

☑ None ☐ Divergence:

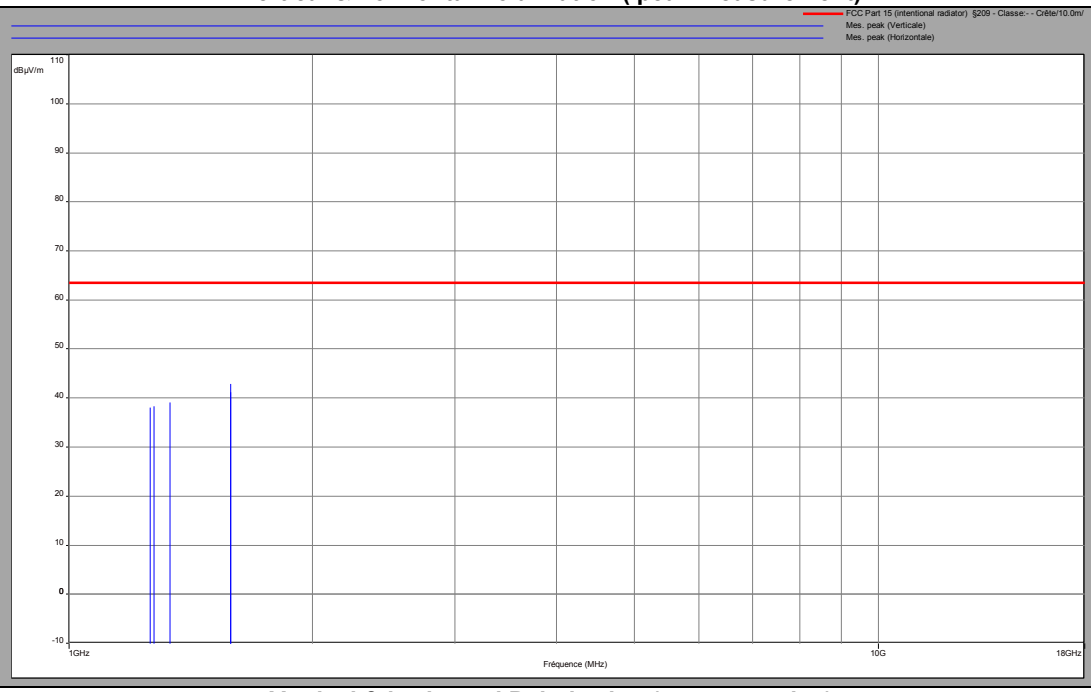
5.6. RESULTS

30MHz to 1GHz

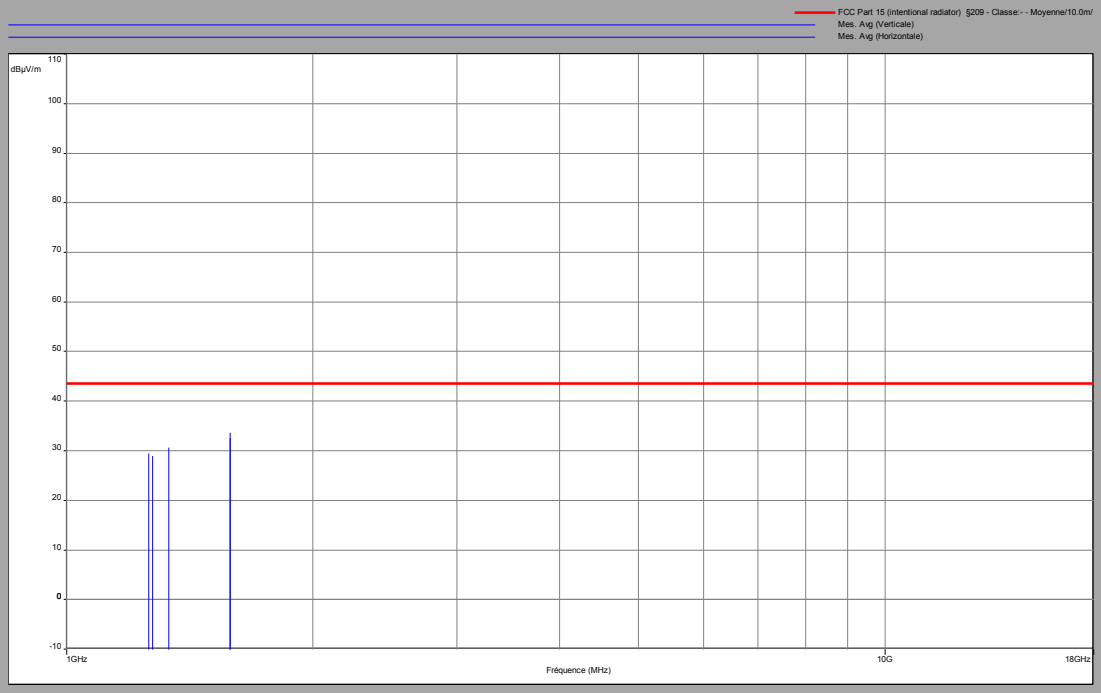
Vertical & horizontal Polarization



Above 1GHz
Vertical & horizontal Polarization (peak measurement)



Vertical & horizontal Polarization (average value)



Below 30MHz

Perpendicular antenna

Frequency (MHz)	QPeak Level (dBµV/m)	Limit (3m) (dBµV/m)
0.125	70.4	105.6

Paralell antenna

Frequency (MHz)	QPeak Level (dBµV/m)	Limit (3m) (dBµV/m)
0.125	62.4	105.6

30MHz to 1GHz			
Polarization	**Frequency (MHz)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**
Vertical	31.4	24.5	29.5
Vertical	32.7	23.8	29.5
Vertical	33.4	20.9	29.5
Vertical	35.3	22.0	29.5
Vertical	37.3	25.2	29.5
Vertical	41.1	21.9	29.5
Vertical	43.1	22.2	29.5
Vertical	45.0	23.6	29.5
Vertical	48.1	20.6	29.5
Vertical	57.2	18.7	29.5
Vertical	60.9	19.3	29.5
Vertical	62.1	19.9	29.5
Vertical	64.0	20.4	29.5
Vertical	72.0	26.8	29.5
Vertical	81.2	26.0	29.5
Vertical	91.9	16.9	33
Vertical	100.5	19.9	33
Vertical	107.3	20.6	33
Vertical	115.0	20.3	33
Vertical	120.0	11.2	33
Vertical	126.8	26.2	33
Vertical	136.3	23.9	33
Vertical	150.0	23.3	33
Vertical	158.4	13.5	33
Vertical	168.0	22.0	33
Vertical	172.4	22.2	33
Vertical	177.4	14.7	33
Vertical	188.0	21.8	33
Vertical	192.0	23.6	33
Vertical	198.0	23.5	33
Vertical	202.8	20.3	33
Vertical	208.0	25.1	33
Vertical	210.0	31.1	33
Vertical	212.8	26.3	33
Vertical	216.0	30.1	33
Vertical	222.6	30.2	35.5
Vertical	226.2	29.2	35.5
Vertical	231.1	27.8	35.5
Vertical	236.0	27.1	35.5
Vertical	242.1	23.8	35.5
Vertical	251.8	21.5	35.5
Vertical	258.2	27.9	35.5
Vertical	264.0	26.4	35.5
Vertical	273.0	24.7	35.5
Vertical	284.9	25.1	35.5

30MHz to 1GHz			
Polarization	**Frequency (MHz)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**
Vertical	312.0	31.6	35.5
Vertical	336.0	27.9	35.5
Vertical	348.0	24.7	35.5
Vertical	360.0	32.5	35.5
Vertical	372.0	28.9	35.5
Vertical	384.0	28.7	35.5
Vertical	396.0	28.4	35.5
Vertical	408.0	29.2	35.5
Vertical	432.0	29.6	35.5
Vertical	444.0	20.6	35.5
Vertical	450.0	20.0	35.5
Vertical	456.0	30.7	35.5
Vertical	468.0	30.3	35.5
Vertical	492.0	23.3	35.5
Vertical	516.0	32.1	35.5
Vertical	528.0	22.7	35.5
Vertical	540.0	32.6	35.5
Vertical	552.0	23.2	35.5
Vertical	600.0	28.0	35.5
Vertical	626.0	23.8	35.5
Vertical	648.0	30.9	35.5
Vertical	672.0	25.4	35.5
Vertical	696.0	25.3	35.5
Vertical	708.0	27.9	35.5
Vertical	720.0	25.2	35.5
Vertical	768.0	27.6	35.5
Vertical	816.0	28.0	35.5
Vertical	828.0	27.3	35.5
Vertical	840.0	27.0	35.5
Vertical	864.0	28.1	35.5
Vertical	960.0	28.3	35.5
Vertical	996.0	32.2	43.5

30MHz to 1GHz			
Polarization	**Frequency (MHz)**	**QPeak Level (dBµV/m)**	**Limit (dBµV/m)**
Horizontal	168.0	21.9	33
Horizontal	196.2	22.2	33
Horizontal	199.4	22.4	33
Horizontal	202.8	21.4	33
Horizontal	210.0	21.5	33
Horizontal	214.0	23.7	33
Horizontal	216.0	25.2	33
Horizontal	228.2	19.3	35.5
Horizontal	238.2	21.7	35.5
Horizontal	249.9	23.0	35.5
Horizontal	264.0	24.9	35.5
Horizontal	298.0	25.6	35.5
Horizontal	312.0	27.0	35.5
Horizontal	324.0	26.1	35.5
Horizontal	328.8	26.5	35.5
Horizontal	360.0	27.0	35.5
Horizontal	372.0	17.4	35.5
Horizontal	384.0	19.0	35.5
Horizontal	396.0	27.8	35.5
Horizontal	408.0	24.8	35.5
Horizontal	468.0	30.1	35.5
Horizontal	533.8	22.9	35.5
Horizontal	576.0	23.4	35.5
Horizontal	604.0	30.9	35.5
Horizontal	732.0	25.3	35.5
Horizontal	804.0	28.3	35.5
Horizontal	912.0	31.1	35.5

Above 1GHz						
Polarization	**Frequency (MHz)**	**Duty cycle correction (dB)**	**Average Level (dBµV/m)**	**Average Limit (dBµV/m)**	**Peak Level (dBµV/m)**	**Peak Limit (dBµV/m)**
Vertical	1272.8	0	30.0	43.5	38.4	63.5
Vertical	1584	0	32.7	43.5	41.3	63.5
Horizontal	1260	0	29.4	43.5	38.0	63.5
Horizontal	1332	0	30.6	43.5	39.1	63.5
Horizontal	1584	0	33.6	43.5	42.9	63.5

5.7. CONCLUSION

Unwanted Emission in restricted frequency bands measurement performed on the sample of the **MPH-AC002A** , SN: **1651OMX0000001**, in configuration and description presented in this test report, show levels **compliant** to the 47 CFR PART 15.209 & RSS-Gen ISSUE 4 limits.

6. 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