PHOENIX TESTLAB
Königswinkel 10
32825 Blomberg
Germany
Phone: +49 (0) 52 35 95 00-0
Fax: +49 (0) 52 35 95 00-10

Test Report

Report Number:

F123379E1

Applicant:

Pieps GmbH

Manufacturer:

Pieps GmbH

Equipment under Test (EUT):

Wireless Satellite Beacon “Globalfinder”

Laboratory accredited by
DGA Deutsche Gesellschaft für Akkreditierung mbH
in compliance with DIN EN ISO/IEC 17025

REFERENCES

[1] **ANSI C63.4:2009** American National Standard for Methods of Measuring of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

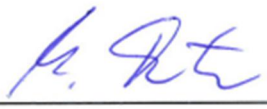
[2] **FCC 47 CFR Part 2** General Rules and Regulations

[3] **FCC 47 CFR Part 15** Radio Frequency Devices (Subpart B)

[4] **ICES-003 Issue 5** Spectrum Management and Telecommunications Policy. Interference-Causing Equipment Standard. Digital Apparatus

TEST RESULT

The requirements of the tests performed as shown in the overview (chapter 4 of this test report) were fulfilled by the equipment under test.
The complete test results are presented in the following.

	Name	Signature	Date
Test engineer:	Raimund BLASK		10 Sept. 2012
Authorized reviewer:	Michael DINTER		10 Sept. 2012

RESERVATION

This test report is only valid in its original form.

Any reproduction of its contents in extracts without written permission of the accredited test laboratory PHOENIX TESTLAB GmbH is prohibited.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalisations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

Contents: **Page**

1 IDENTIFICATION 4
1.1 APPLICANT 4
1.2 MANUFACTURER 4
1.3 TEST LABORATORY 4
1.4 EUT (EQUIPMENT UNDER TEST) 5
1.5 TECHNICAL DATA OF EQUIPMENT 5
1.6 DATES 5
2 OPERATIONAL STATES 6
3 ADDITIONAL INFORMATION 6
4 OVERVIEW 7
5 RESULTS 8
5.1 CONDUCTED EMISSIONS ON POWER SUPPLY LINES 8
5.1.1 TESTMETHOD 8
5.1.2 RESULTS CONDUCTED EMISSION MEASUREMENT ON AC MAINS 9
5.2 RADIATED EMISSIONS 11
5.2.1 TESTMETHOD 11
5.2.2 RESULT PRELIMINARY MEASUREMENT 16
5.2.3 RESULT FINAL MEASUREMENT 18
6 REPORT HISTORY 18
7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS 19
8 LIST OF ANNEXES 20

1 IDENTIFICATION

1.1 APPLICANT

Name:	PIEPS GmbH
Address:	Parkring 4
	8403 Lebring
Country:	Austria
Name for contact purposes:	Mr. DI Wolfgang Platzer
Tel:	+43-3182-52556-12
Fax:	+43-3182-52556-19
e-mail address:	platzer.wolfgang@pieps.com

1.2 MANUFACTURER

Name:	PIEPS GmbH
Address:	Parkring 4
	8403 Lebring
Country:	Austria
Name for contact purposes:	Mr. DI Wolfgang Platzer
Tel:	+43-3182-52556-12
Fax:	+43-3182-52556-19
e-mail address:	platzer.wolfgang@pieps.com

1.3 TEST LABORATORY

The tests were carried out at:

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Germany

accredited by DGA Deutsche Gesellschaft für Akkreditierung mbH in compliance with DIN EN ISO/IEC 17025 under Reg. No. DGA-PL-105/99-22
Industry Canada Test site registration 3469A-1 recognized by Bundesnetzagentur under the Reg.-No. BNetzA-CAB-02/21-104/3, CAB Designation Number DE0004,
listed by FCC 31040/SIT1300F2 FCC Test site registration number 90877

1.4 EUT (EQUIPMENT UNDER TEST)

Test object: *	Wireless Satellite Beacon
Type: *	GLOBALFINDER
Antenna type: *	Integral Quadra Helical Antenna
Serial-No.:	8977750260
Hardware version: *	Rev. 4
Software version: *	Rev. 015.9
FCC-ID:	REMGLOBF01

Ports/Connectors of the EUT:

Identification	Connector		Length during test
	EUT	Ancillary	
USB-Connector	USB	USB	1m

1.5 TECHNICAL DATA OF EQUIPMENT

	GPS		Iridium	
Duty cycle class: *	-		-	
Rated transmitter field strength: *	-		1.5 W*	
Channel spacing: *	-		-	
ITU classification: *	-		-	
Alignment range: *	1575.42 MHz		1616.0 to 1626.5 MHz	
Switching range: *	1575.42 MHz		1616.0 to 1626.5 MHz	
Modulation: *	-		-	
Bit rate of transmitter: *	-		-	
Supply Voltage: *	U_{Nom} =	3.7 V	U_{Min}=	2.9 V
Power Supply: *	3.7 V Lithium-Ion-Battery (1350mAh)			
Temperature range: *	-20°C to 55°C			

*: Declared by the applicant.

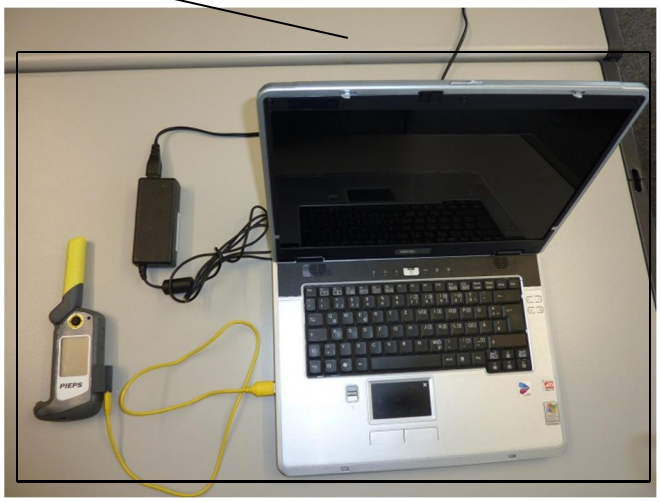
1.6 DATES

Date of receipt of test sample:	27 August 2012
Start of test:	27 August 2012
End of test:	31 August 2012

2 OPERATIONAL STATES

The tests were carried out with an unmodified test sample.
The EUT is a Wireless Satellite Beacon with an integrated GPS-Receiver and can be used as rescue Transmitter and Receiver in a Frequency Range from 1616.000 MHz to 1626.500 MHz (Iridium-Satellite).
The Iridium-Satellite-Module was switched off during the tests and is not part of this Test-Report.
During the tests the EUT was connected via USB to an external PC-Laptop. A communication-link via USB was established to exchange stored data (e.g. GPS-Track) to the PC during the measurement.

The physical boundaries are shown below:



3 ADDITIONAL INFORMATION

Ancillary (necessary for testing):

- Laptop MEDION MD96500 with 120V/60Hz-AC-Power-Supply.

Special EMC measures:

- none

4 OVERVIEW

Conducted emissions FCC 47 CFR Part 15 section 15.107 (b) [3] / ICES-003 Issue 5 section 7.1 [4]					
Application	Frequency range	Limits	Reference standard	Remark	Status
AC supply line	0.15 to 0.5 MHz 0.5 to 5 MHz 5 to 30 MHz	66 to 56 dBµV (QP)* 56 to 46 dBµV (AV)* 56 dBµV (QP) 46 dBµV (AV) 60 dBµV (QP) 50 dBµV (AV)	ANSI C63.4 (2009) CISPR 22	class B	Passed
*: Decreases with the logarithm of the frequency					
Radiated emissions FCC 47 CFR Part 15 section 15.109 (b) [3] / ICES-003 Issue 5 section 7.1 [4]					
Application	Frequency range	Limits	Reference standard	Remark	Status
Radiated Emission	30 to 88 MHz 88 to 216 MHz 216 to 960 MHz 960 to 1000 MHz above 1000 MHz	40.0 dBµV/m QP at 3 m 43.5 dBµV/m QP at 3 m 46.0 dBµV/m QP at 3 m 54.0 dBµV/m QP at 3 m 54.0 dBµV/m AV at 3 m	ANSI C63.4 (2009);	class B	Passed
Radiated Emission	30 to 230 MHz 230 to 1000 MHz 1 to 3 GHz 3 to 6 GHz	40 dBµV/m QP at 3 m 47 dBµV/m QP at 3 m 50/70 dBµV/m AV/PK at 3 m 54/74 dBµV/m AV/PK at 3 m	CISPR 22	-	Passed

Remark: The highest internal frequency of the EUT was below 500 MHz as declared by the applicant. Therefore the radiated emission test was carried out up to 2 GHz.

5 RESULTS

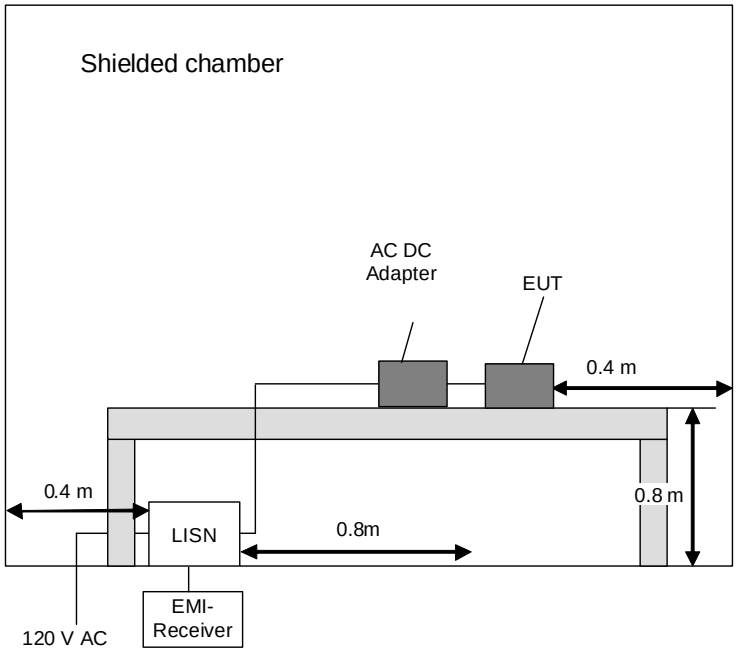
5.1 CONDUCTED EMISSIONS ON POWER SUPPLY LINES

5.1.1 TESTMETHOD

This test will be carried out in a shielded chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm above the ground plane. Floor-standing devices will be placed directly on the ground plane. The setup of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriable limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz

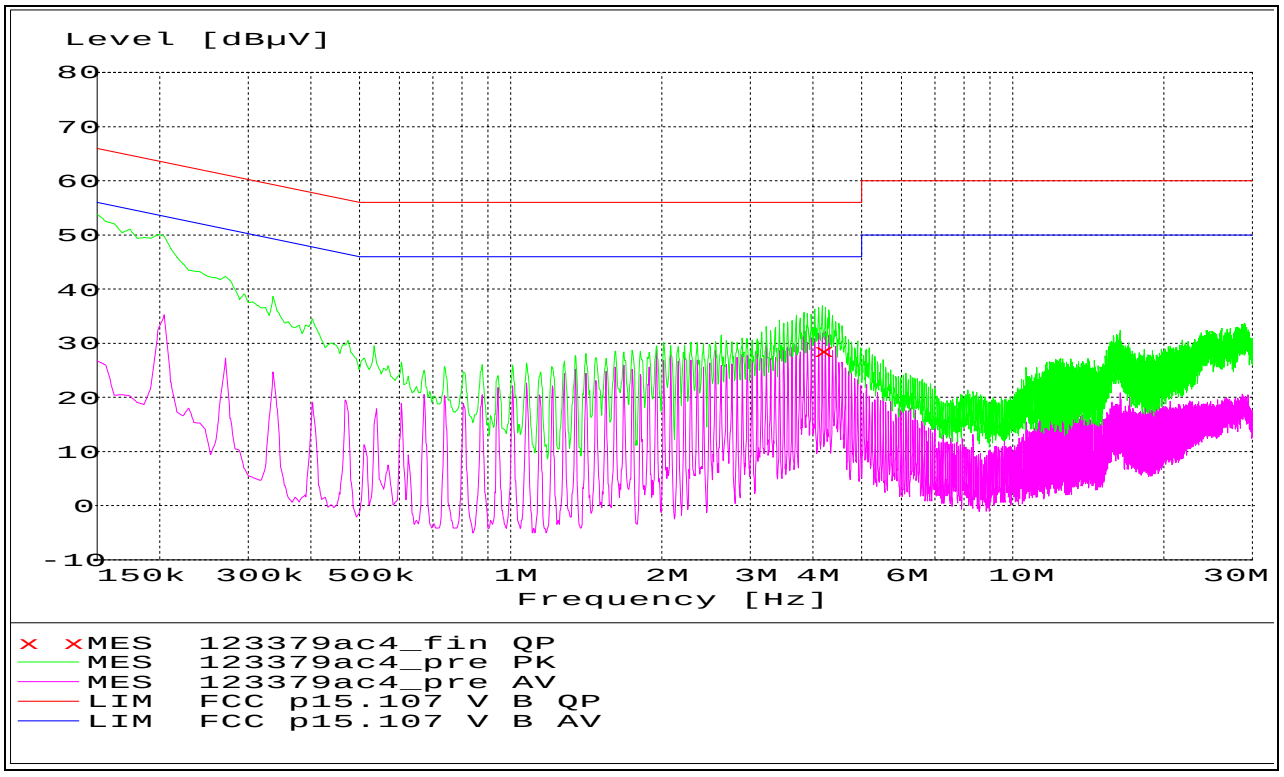


5.1.2 RESULTS CONDUCTED EMISSION MEASUREMENT ON AC MAINS

Ambient temperature:	20 °C	Relative humidity:	36 %

Position of EUT:	The EUT was set-up on a wooden table of a height of 0.8 m.
Cable guide:	The cables of the EUT were fixed on the wooden table. For further information of the cable guide refer to the pictures in annex C of this test report.
Power supply:	During the measurement the EUT was supplied with 120 V_{AC} 60 Hz via a AC adapter.
Operation states:	As described in chapter 2.
Title:	Mains terminal disturbance voltage measurement with protective ground conductor simulation
EUT:	Globalfinder
Manufacturer:	Pieps GmbH
Operating Condition:	Connected via USB to Medion-Laptop
Test site:	PHOENIX TESTLAB GmbH, Blomberg M4
Operator:	R. Blask
Test Specification:	Laptop powered with 120 V / 60 Hz

The curves in the diagram only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by “x” and the average measured points by “+”.



Result measured with the quasipeak detector (marked by x):

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
4.167600	28.60	1.0	56.0	27.4	L1	GND

Test: Passed

TEST EQUIPMENT USED:

1-3, 5, 6

5.2 RADIATED EMISSIONS

5.2.1 TESTMETHOD

The radiated emission measurement is subdivided into four stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 30 MHz to 1 GHz.
- A final measurement carried out on an open area test side with reflecting ground plane and various antenna heights in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 12.75 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 12.75 GHz.

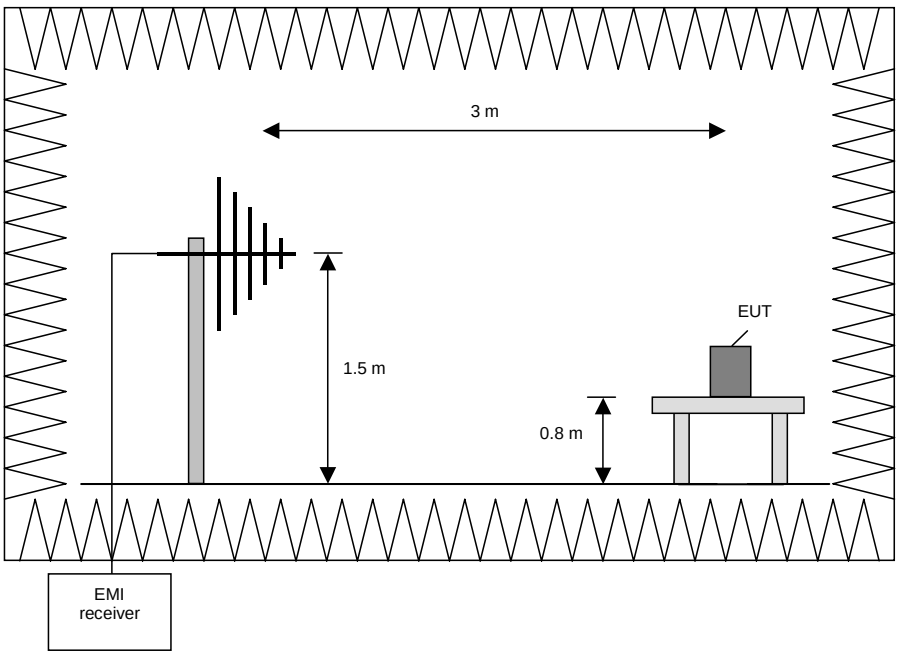
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver set to MAX Hold mode and a resolution bandwidth of 120 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 1 GHz.
The following procedure will be used:

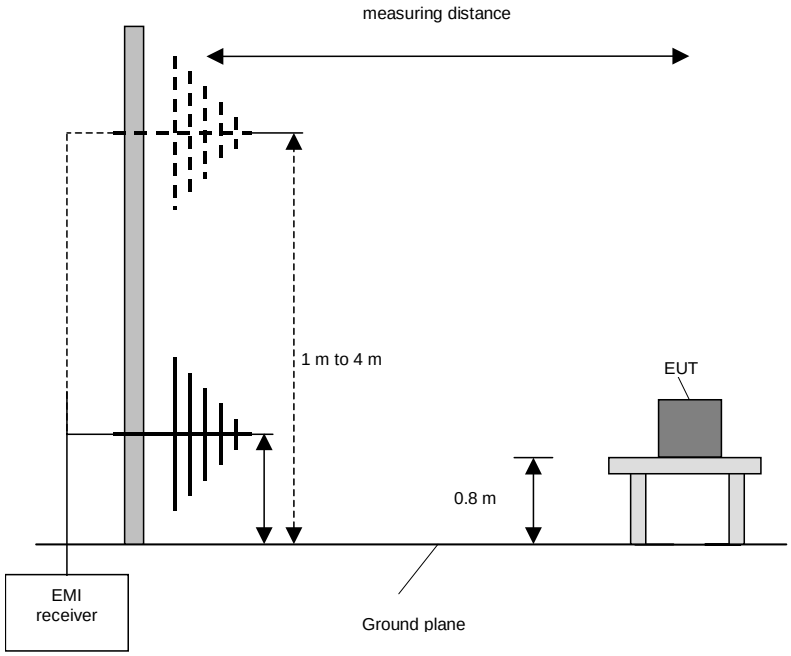
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
6. Repeat 1) to 4) with the other orthogonal axes of the EUT if handheld equipment.
7. Repeat 1) to 5) with the vertical polarisation of the measuring antenna.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of 0 ° to 360 °, the measuring antenna will be set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

1) Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23 °.
2) Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
3) Rotate the EUT by 45 ° and repeat 2) until an azimuth of 337 ° is reached.
4) Repeat 1) to 3) for the other orthogonal antenna polarization.
5) Move the antenna and the turntable to the position where the maximum value is detected.
6) Measure while moving the antenna slowly +/- 1 m.
7) Set the antenna to the position where the maximum value is found.
8) Measure while moving the turntable +/- 45 °.
9) Set the turntable to the azimuth where the maximum value is found.
10) Measure with Final detector (QP and AV) and note the value.
11) Repeat 5) to 10) for each frequency.
12) Repeat 1) to 11) for each orthogonal axes of the EUT if handheld equipment.

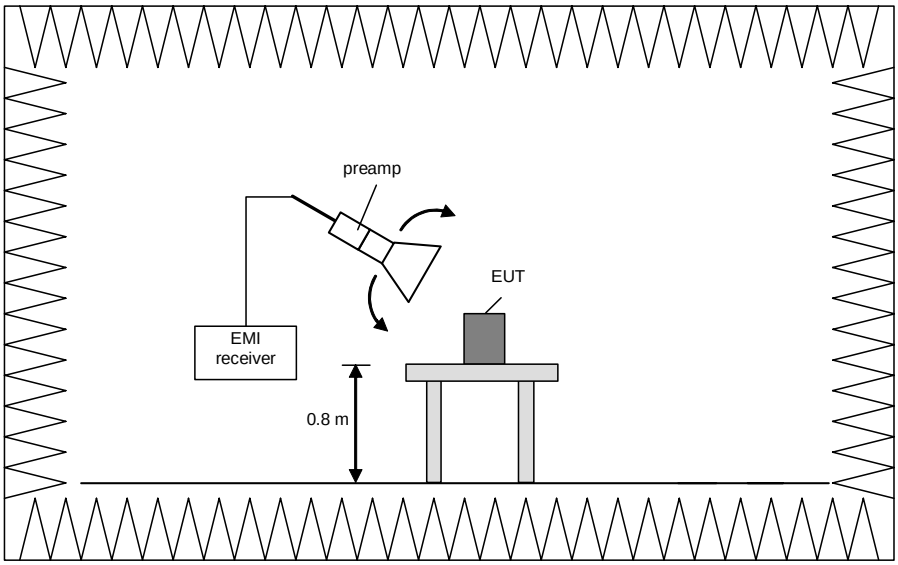
Preliminary and final measurement (1 GHz to 12.75 GHz)

This measurement will be performed in a fully anechoic chamber. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].
The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth (preliminary)	Resolution bandwidth (final)
1 GHz to 12.75 GHz	100 kHz	1 MHz

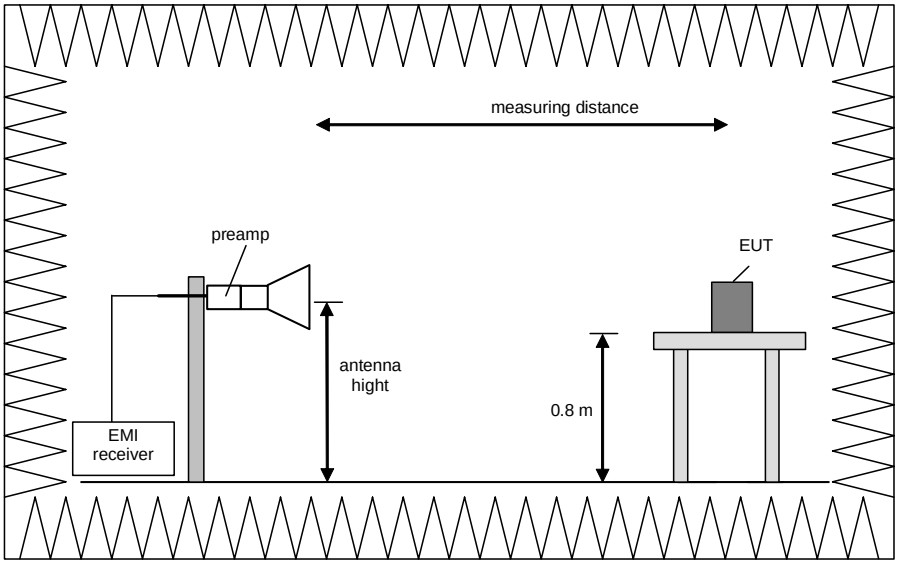
Preliminary measurement (1 GHz to 12.75 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna, the antenna close to the EUT and while moving the antenna over all sides of the EUT. With the spectrum analyser in CLEAR / WRITE mode the cone of the emission should be found and than the measuring distance will be set to 3 m with the receiving antenna moving in this cone of emission. At this position the final measurement will be carried out.



Final measurement (1 GHz to 12.75 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 ° in order to have the antenna inside the cone of radiation.



Procedure of measurement:

The measurements were performed in the frequency range 1 to 12.75 GHz.
The following procedure will be used:

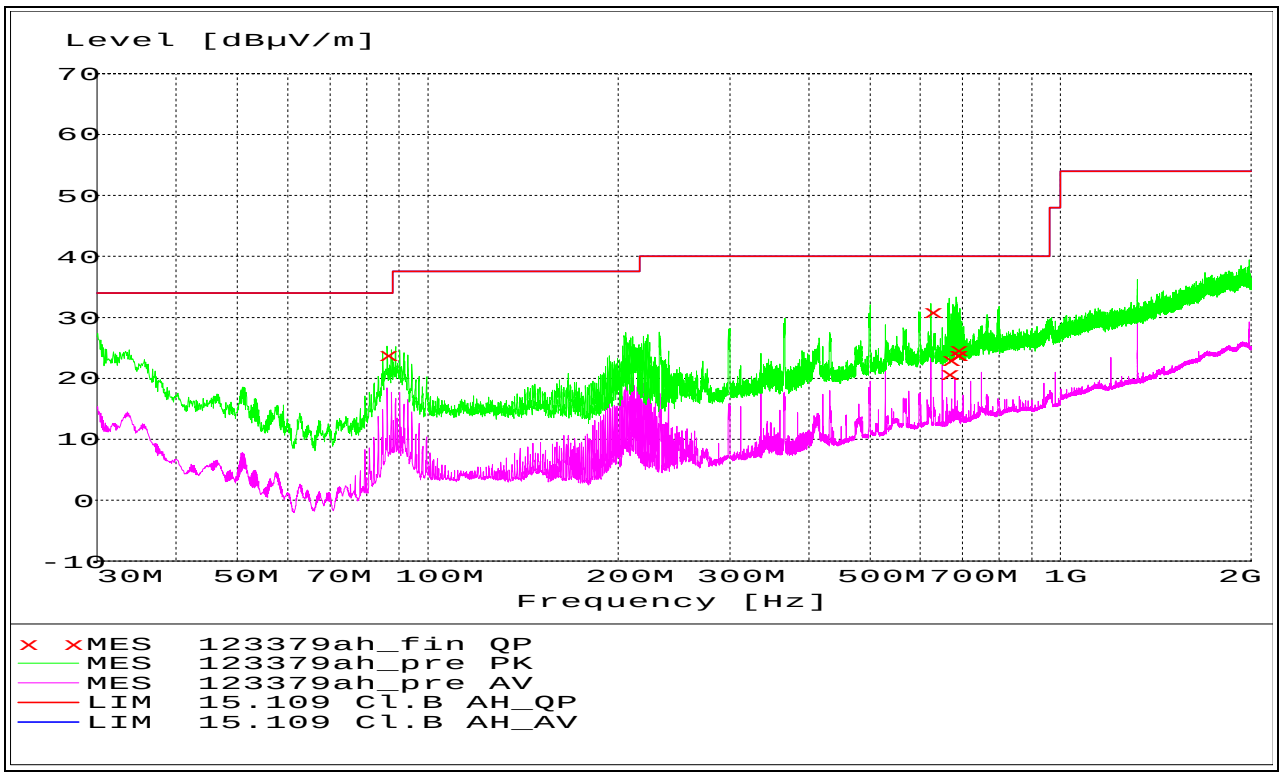
1) Monitor the frequency range at horizontal polarisation and move the antenna over all sides of the EUT (if necessary move the EUT to another orthogonal axis).
2) Change the antenna polarisation and repeat 1) with vertical polarisation.
3) Make a hardcopy of the spectrum.
4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
5) Change the analyser mode to Clear / Write and found the cone of emission.
6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3 m and the antenna will be still inside the cone of emission.
7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarisation and azimuth and the peak and average detector, which causes the maximum emission.
8) Repeat steps 1) to 7) for the next antenna spot if the EUT is lager than the antenna beam width.

Step 1) to 6) are defined as preliminary measurement.

5.2.2 RESULT PRELIMINARY MEASUREMENT

Title:	preliminary emission measurement according CFR 47 Part15.109
EUT:	Globalfinder
Manufacturer:	Pieps GmbH
Operating Condition:	Connected via USB to Medion-Laptop
Test site:	fully anechoic chamber M20; PHOENIX TEST LAB GmbH
Operator:	R. Blask
Test Specification:	Laptop powered with 120 V / 60 Hz

The limit line and measurement curve shown in the diagram below refer to the preliminary measurements. Here, it must be noted that because of the reduced measuring distance and because of the floor absorbers, the measured values do not comply with the values of the above mentioned standard; they only serve as orientation in determining which frequencies must be measured on the open area test site.
The limit line is achieved with the applied standard by converting to a 3 m measurement distance (+ 10 dB) and the correction for the free space in which in the "worst case" the reflected floor wave is missing entirely (– 6 dB). Therefore 4 dB is added to the limit line of the standard concerned.
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with the EUT in various positions.
The top measured curve represents the peak measurement. The measured points marked with “x” are frequency points for which later measurements with a quasi-peak detector were carried out. These values are indicated in the following table. The bottom measured curve represents average values (marked with “+”), which are only required for control purposes.



The following frequencies were found during the preliminary emission test:

Frequency MHz
86.215
205.360
232.240
300.000
366.640
500.000
624.000
683.680
799.680

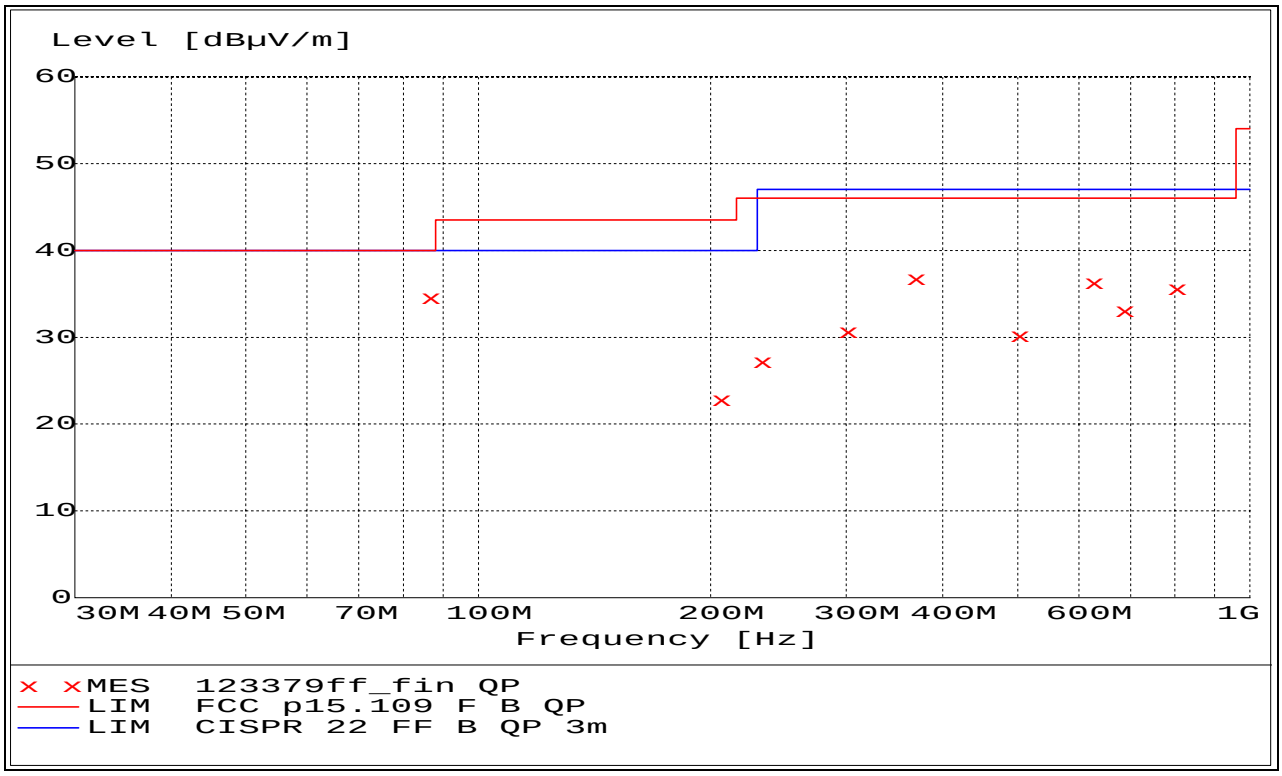
These frequencies had to be measured on the open area test site. The results are presented in the following.

TEST EQUIPMENT USED FOR THE TEST:

29 - 36

5.2.3 RESULT FINAL MEASUREMENT

Title:	Final emission measurement according CFR 47 Part15.109
EUT:	Globalfinder
Manufacturer:	Pieps GmbH
Operating Condition:	Connected via USB to Medion-Laptop
Test site:	fully anechoic chamber M20; PHOENIX TEST LAB GmbH
Operator:	R. Blask
Test Specification:	Laptop powered with 120 V / 60 Hz



The results of the standard subsequent measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Result measured with the quasipeak detector (marked by x):

Frequency MHz	Level dBµV/m	Transducer dB	Limit dBµV/m FCC/ICES	Margin dB	Height cm	Azimuth deg	Polarisation
86.215	34.40	10.9	40.0 / 40.0	5.6 / 5.6	398.0	214.00	VERTICAL
205.360	22.70	11.7	43.5 / 40.0	20.8 / 17.3	400.0	180.00	HORIZONTAL
232.240	27.00	13.4	46.0 / 47.0	19.0 / 20.0	331.0	134.00	HORIZONTAL
300.000	30.60	16.4	46.0 / 47.0	15.4 / 16.4	256.0	308.00	VERTICAL
366.640	36.60	18.1	46.0 / 47.0	9.4 / 10.4	208.0	161.00	HORIZONTAL
500.000	30.10	21.9	46.0 / 47.0	15.9 / 16.9	225.0	270.00	HORIZONTAL
624.000	36.20	24.6	46.0 / 47.0	9.8 / 10.8	145.0	201.00	HORIZONTAL
683.680	33.00	25.0	46.0 / 47.0	13.0 / 14.0	206.0	41.00	VERTICAL
799.680	35.50	26.9	46.0 / 47.0	10.5 / 11.5	100.0	243.00	HORIZONTAL

6 REPORT HISTORY

Report Number	Date	Comment
F123379E1	10 September 2012	Document created
-	-	-
-	-	-

7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
1	Shielded chamber M4	-	Siemens	B83117S1-X158	480088	Weekly verification (system cal.)	
2	Measuring receiver	ESIB 26	Rohde & Schwarz	100292	481182	09/03/2012	03/2014
3	LISN	NSLK8128	Schwarzbeck	8128155	480058	12/2011	12/2012
5	AC-filter	B84299-D87-E3	Siemens	930262292	480097		
6	EMI-Software	ES-K1	Rohde & Schwarz	-	480111	-	
14	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
15	Measuring receiver	ESIB 7	Rohde & Schwarz	100304	480521	03/2012	03/2014
16	Controller	HD100	Deisel	100/670	480139	-	-
17	Turntable	DS420HE	Deisel	420/620/80	480087	-	-
18	Antenna support	AS615P	Deisel	615/310	480086	-	-
19	Antenna	CBL6111 D	Chase	25761	480894	28/09/2011	09/2014
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	
30	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	13/02/2012	02/2014
32	Controller	HD100	Deisel	100/670	480326	-	
33	Turntable	DS420HE	Deisel	420/620/80	480315	-	
34	Antenna support	AS615P	Deisel	615/310	480187	-	
35	Antenna	CBL6112B	Chase	2917	480447	28/09/2010	09/2012
36	Antenna	3115 A	EMCO	9609-4918	480183	09/11/2011	11/2014
37	Preamplifier	JS3-00101200-23-5A	Miteq	681851	480337	Six month verification (system cal.)	
40	Fully anechoic chamber M5	-	Siemens	B83177-S1-X156	480073	Weekly verification (system cal.)	
42	Measuring receiver	ESIB 7	Rohde & Schwarz	100304	480521	15/02/2012	02/2014
43	Controller	MCU	Maturo	MCU/040/971107	480924	-	-
44	Antenna support	MA240	Deisel	228/314	480069	-	-
45	Turntable	DS412	Deisel	412/317	480070	-	-
46	Antenna	CBL6112B	Chase	2917	480447	28/09/2010	09/2012
47	EMI Software	ES-K1	Rohde & Schwarz	-	480111	-	

8 LIST OF ANNEXES

Annex A	**Photographs of the test set-ups:**	**3 pages**
	Test setup anechoic chamber	123379emi1.jpg
	Test setup open-area-test-site OATS	123379emi2.jpg
	Test setup conducted emission	123379emi3.jpg
Annex B	**External photographs of the EUT:**	**2 pages**
	EUT, front view	123379eut1.jpg
	EUT, rear view	123379eut2.jpg
Annex C	**Internal photographs of the EUT:**	**3 pages**
	EUT, inside view	123379eut3.jpg
	PCB, front view	123379eut4.jpg
	PCB, rear view	123379eut5.jpg