

Königswinkel 10  
32825 Blomberg  
Germany  
Phone +49 5235 9500-0  
Fax +49 5235 9500-10

# TEST REPORT

Report Number:

**F140344E1**

Equipment under Test (EUT):

**RFID Reader  
CSMS-M-A-L-KA**

Applicant:

**Bernstein AG**

Manufacturer:

**Bernstein AG**



Laboratory (CAB) accredited by  
Deutsche Akkreditierungsstelle GmbH (DAkkS)  
in compliance with DIN EN ISO/IEC 17025  
under the Reg. No. D-PL-17186-01-02,  
FCC Test site registration number 90877 and  
Industry Canada Test site registration IC3469A-1

## 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 15** Radio Frequency Devices
- [3] **RSS-210 Issue 8 (December 2010)** Low-power Licence-exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment
- [4] **RSS-Gen Issue 4 (November 2014)** General Requirements and Information for the Certification of Radiocommunication Equipment

## 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.

Test engineer:	Michael DINTER		3 November 2014
	<small>Name</small>	<small>Signature</small>	<small>Date</small>
Authorized reviewer:	Bernd STEINER		3 November 2014
	<small>Name</small>	<small>Signature</small>	<small>Date</small>

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## 1 Identification

### 1.1 Applicant

Name:	Bernstein AG
Address:	Tieloser Weg 6 32457 Porta Westfalica
Country:	Germany
Name for contact purposes:	Viktor KELLER
Tel:	+49 (0) 571 / 793 - 504
Fax:	+49 (0) 571 / 793 - 555
e-mail address:	v.keller@de.bernstein.eu

### 1.2 Manufacturer

Name:	Bernstein AG
Address:	Tieloser Weg 6 32457 Porta Westfalica
Country:	Germany
Name for contact purposes:	Viktor KELLER
Tel:	+49 (0) 571 / 793 - 504
Fax:	+49 (0) 571 / 793 - 555
e-mail address:	v.keller@de.bernstein.eu

### 1.3 Test laboratory

The tests were carried out at: **PHOENIX TESTLAB GmbH**  
**Königswinkel 10**  
**32825 Blomberg**  
**Germany**

Test Laboratory (CAB) accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under the Reg. No. D-PL-17186-01-02,  
 recognized by Bundesnetzagentur under the Reg.-No. BNetzA-CAB-02/21-104.  
 CAB Designation Number DE0004, listed by FCC 31040/SIT1300F2, IC OATS Listing 3469A-1.

The tests were performed at: **PHOENIX TESTLAB GmbH**  
**Königswinkel 10**  
**32825 Blomberg**  
**Germany**

## 1.4 EUT (Equipment Under Test)

Type of equipment:	RFID transceiver
Type designation / model name:	CSMS-M-A-L-KA
Serial No.:	14030503
FCC ID:	2ABA6CSMSA
IC:	11535A-CSMSA

## 1.5 Technical data of equipment

Power supply: *	24 V DC					
Supply voltage: *	Unom=	24.0 V	Umin=	20.4 V	Umax=	26.4 V
Type of modulation: *	Amplitude-modulated					
Operating frequency range: *	6.78 MHz					
Number of channels: *	1					
Antenna type: *	Internal loop antenna					
Antenna area: *	-					
Duty cycle: *	-					
Rated RF power: *	-					
Data rate: *	62.5 kBit/s					
Lowest internal frequency: *	58 kHz					
Highest internal frequency: *	13.56 MHz					
Temperature range: *	-25 °C to +70 °C					

\* declared by the applicant.

The following external I/O cables were used:

Identification	Connector		Length
	EUT	Ancillary	
Data-/ Power-Line	fixed	customized	2 m
-	-	-	-
-	-	-	-

\*: Length during the test if no other specified.

### Ancillary equipment

Type of equipment	Power Supply
Type designation	Quint PS 100-240 AC / 24 DC / 5 A
Manufacturer	Phoenix Contact
Part No	2938581
Power supply	AC Mains AC Adapter
Supply voltage:	120 VAC 60 Hz
Highest internal Frequency:	Below 108 MHz

Type of equipment	TAG
Type designation	CSMS-S-L S/N 6075980065

### 1.6 Dates

Date of receipt of test sample:	11 March 2014
Start of test:	11 March 2014
End of test:	25 March 2014

## 2 Operational states and physical boundaries

The EUT is a RFID System used as a code switch.

The tests were carried out with an unmodified sample, which operates in normal mode continuous reading TAG.

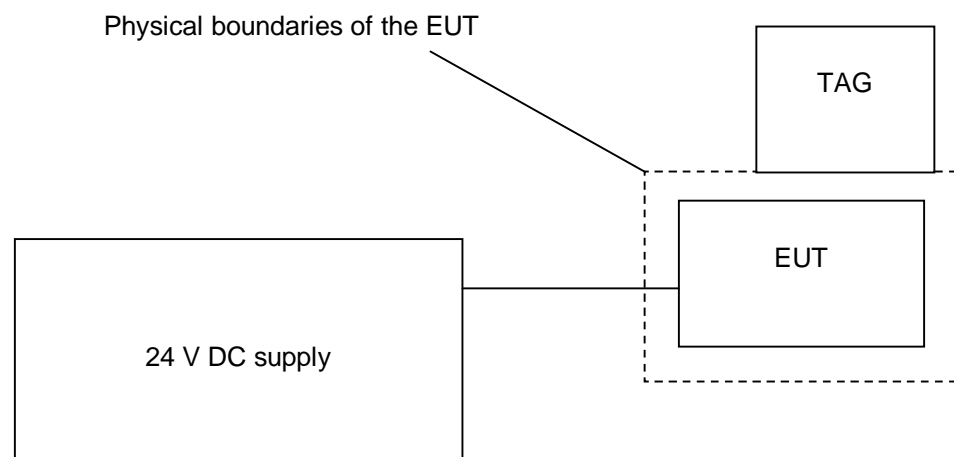
During the tests the EUT was supplied with 24 V DC.

The relay contact was left open during the tests.

No spurious emission measurement of the receiver was carried out, because the co located transmitter transmits continuously.

During the tests, the EUT was not labelled with a FCC or IC-label.

The physical boundaries of the EUT are shown below.



### 3 Additional information

The following ancillary equipment was used for the tests:

AC Adapter: Phoenix Contact PC MINI PS 100-240 AC / 24 DC / 1.3 A Order-No.:2866446

TAG: CSMS-S-L

During the tests the EUT was not labelled as required by FCC / IC

### 4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS-210 Issue 8 [3] and RSS-Gen, Issue 4 [4]	Status	Refer page
Conducted emissions on supply line	0.15 - 30	15.207 (a)	8.8 [4]	Passed	11 et seq.
Radiated emissions	0.009 - 1,000	15.205 (a) 15.209 (a)	8.9 [4] 2.5 [3]	Passed	13 et seq.
99 % bandwidth	6.780	-	6.6 [4]	Passed	Annex D



## 5 Test results

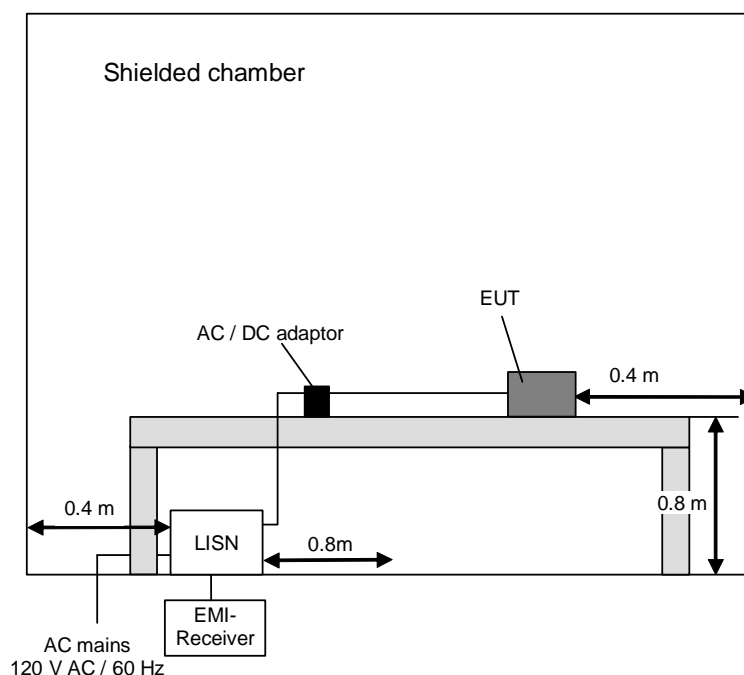
### 5.1 Conducted emission measurement on ac mains (150 kHz to 30 MHz)

#### 5.1.1 Method of measurement (conducted emission measurement on ac mains)

This test will be carried out in a shielded chamber. Table top 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 appropriate 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 Test results (conducted emission measurement on ac mains)

Ambient temperature:	20 °C	Relative humidity:	45 %
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Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m.

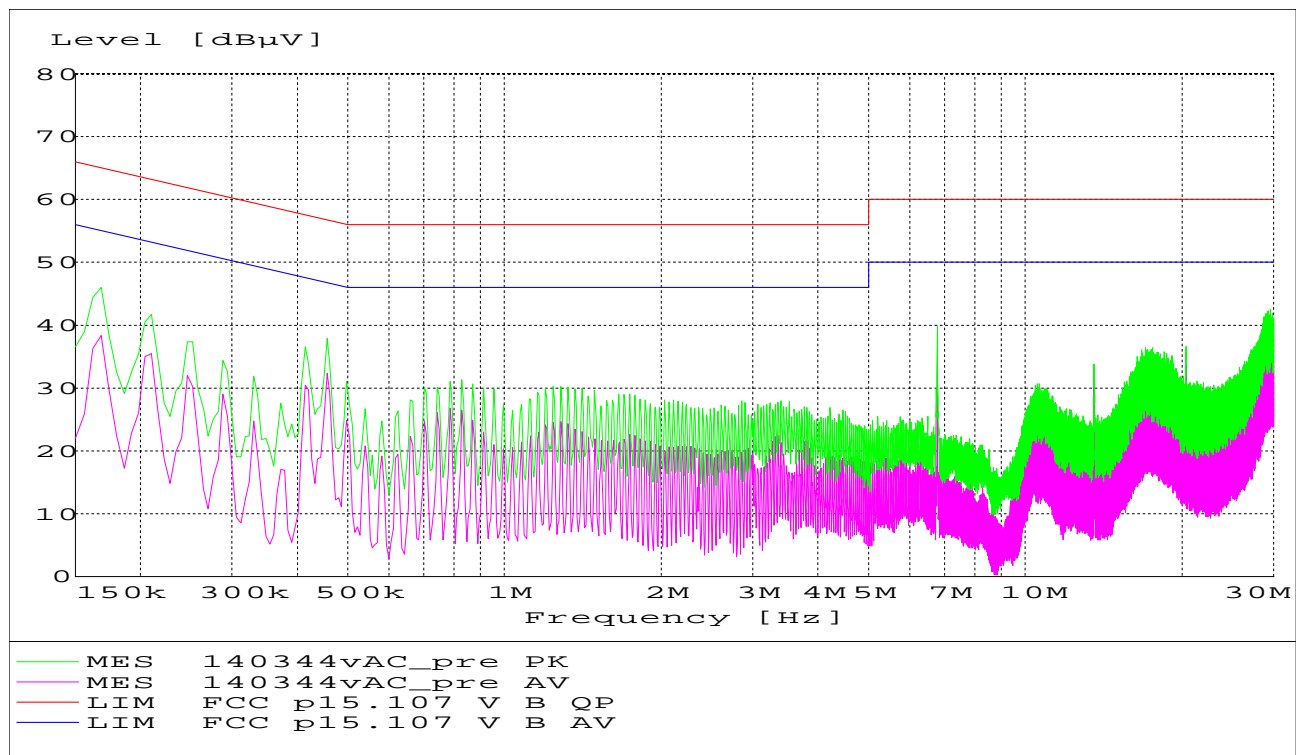
Cable guide: The cable of the EUT was fixed on the wooden table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

Power supply: During this test the EUT was powered via AC DC adapter from an AC-mains network with 120 V AC / 60 Hz.

Operation states: As described in chapter 2.

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 "+".



Data record name: 140344vAC

Test: Passed

Test equipment used for the test:

1 - 3, 5, 6

## 5.2 Radiated emissions

### 5.2.1 Method of measurement (radiated emissions)

The radiated emission measurement is subdivided into five stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 9 kHz to 1 GHz.
- A final measurement carried out on an outdoor test side without reflecting ground plane and a fixed antenna height in the frequency range 9 kHz to 30 MHz.
- A final measurement carried out on an open area test side with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
- A preliminary measurement carried out in a fully anechoic chamber with a variable antenna distance and height in the frequency range 1 GHz to 110 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 110 GHz.

All measurements will be carried out with the EUT working on the middle and upper and lower edge of the assigned frequency band.

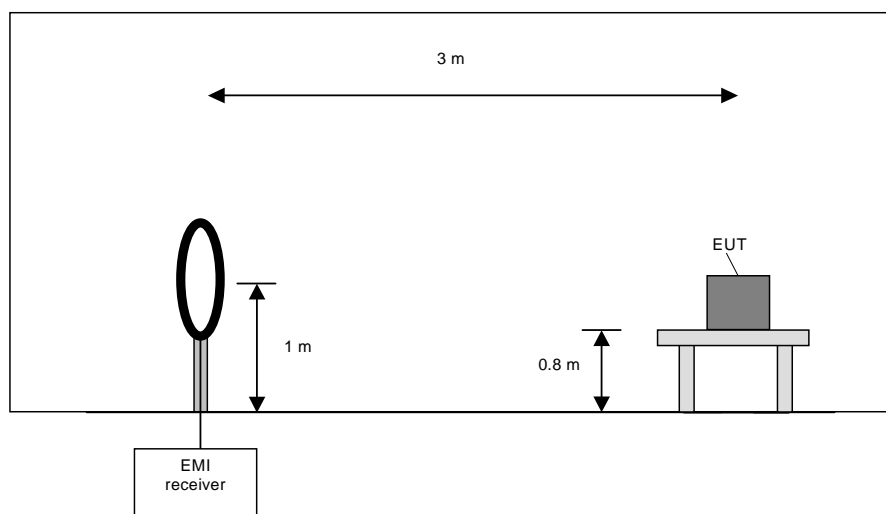
#### **Preliminary measurement (9 kHz to 30 MHz):**

In the first stage a preliminary measurement will be performed in a shielded room with a measuring distance of 3 meters. 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 9 kHz to 30 MHz will be monitored with a spectrum analyser while the system and its cables will be manipulated to find out the configuration with the maximum emission levels if applicable. The EMI Receiver will be set to MAX Hold mode. The EUT and the measuring antenna will be rotated around their vertical axis to found the maximum emissions.

The resolution bandwidth of the spectrum analyser will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	10 kHz



#### Preliminary measurement procedure:

Prescans were performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

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 frequencies of highest detected emission with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
- 6) Repeat steps 1) to 5) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
- 7) Rotate the measuring antenna and repeat steps 1) to 5).

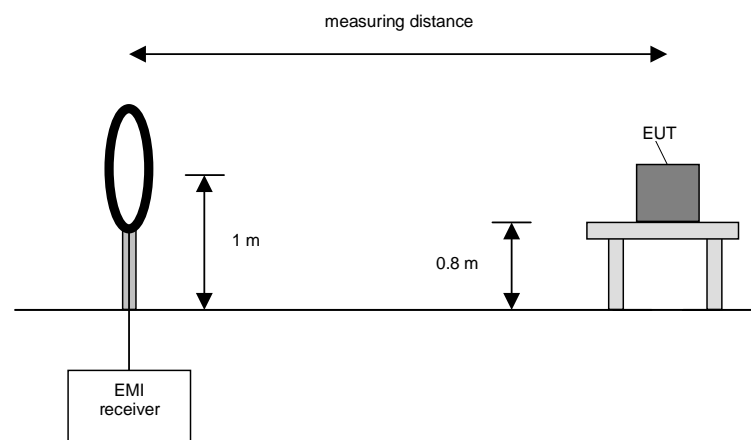
#### **Final measurement (9 kHz to 30 MHz):**

In the second stage a final measurement will be performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m and 30 m. In the case where larger measuring distances are required the results will be extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with a EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an average detector will be used according Section 15.209 (d) [2].

On the during the preliminary measurement detected frequencies the final measurement will be performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum value is found.

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

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



### Final measurement procedure:

The following procedure will be used:

- 1) Monitor the frequency range with the measuring antenna at vertical orientation parallel to the EUT at an azimuth of 0 °.
- 2) Rotate the EUT by 360 ° to maximize the detected signals and note the azimuth and orientation.
- 3) Rotate the measuring antenna to find the maximum and note the value.
- 4) Rotate the measuring antenna and repeat steps 1) to 3) until the maximum value is found.
- 5) Repeat steps 1) to 4) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

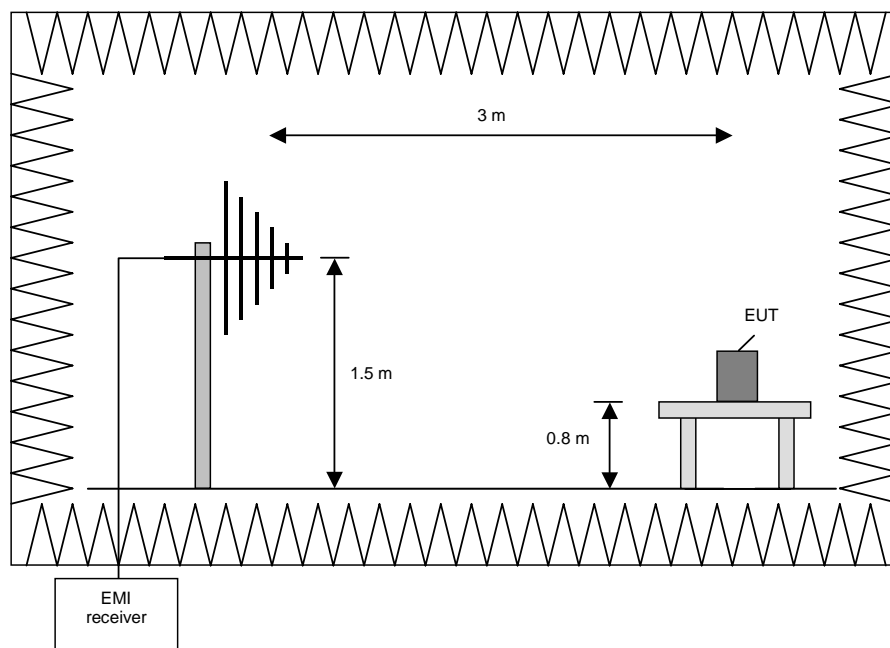
### **Preliminary measurement (30 MHz to 1 GHz)**

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 100 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 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



### Procedure preliminary measurement:

Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.

The following procedure will be used:

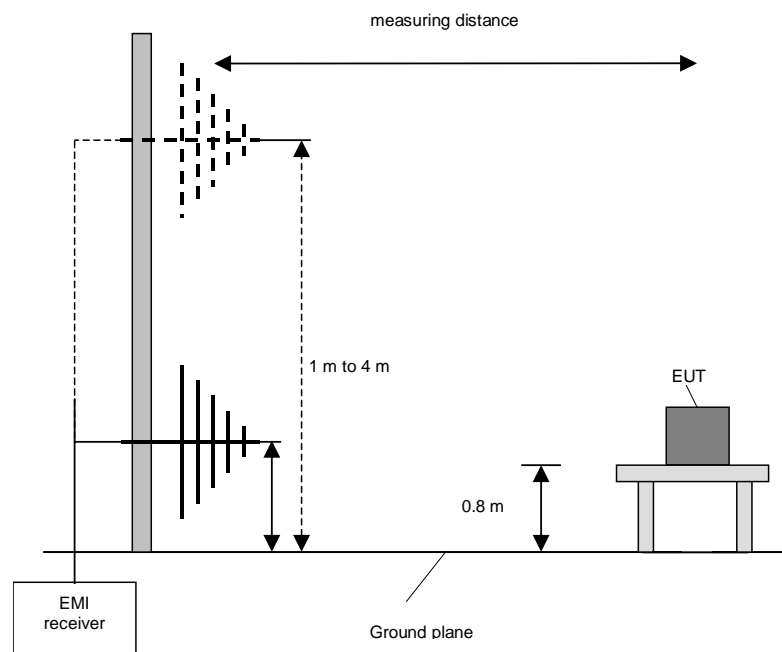
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the 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 (because of EUT is a module and might be used in a handheld equipment application).
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 (because of EUT is a module and might be used in a handheld equipment application).

#### **Preliminary and final measurement (1 GHz to 110 GHz)**

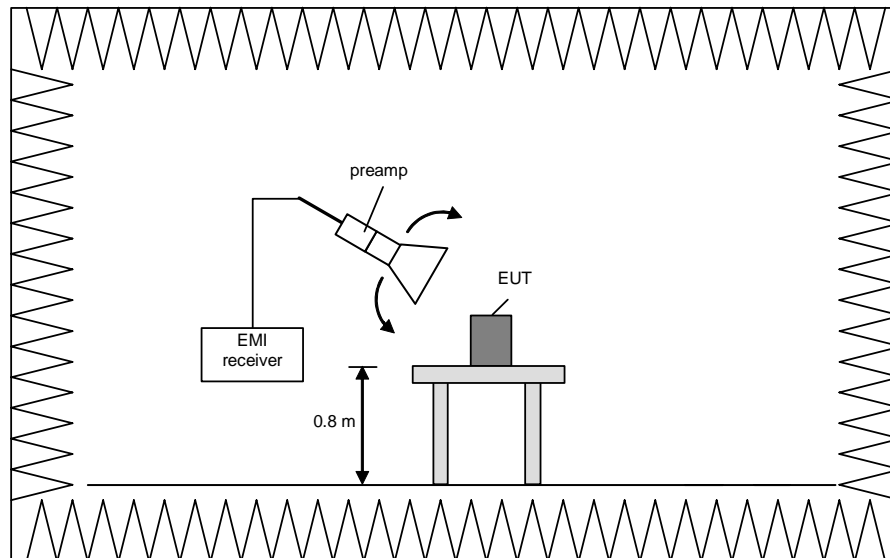
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance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

#### **Preliminary measurement (1 GHz to 110 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 then 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.

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

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	100 kHz
4 GHz to 12 GHz	100 kHz
12 GHz to 18 GHz	100 kHz
18 GHz to 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz
40 GHz to 60 GHz	100 kHz
50 GHz to 75 GHz	100 kHz
75 GHz to 110 GHz	100 kHz



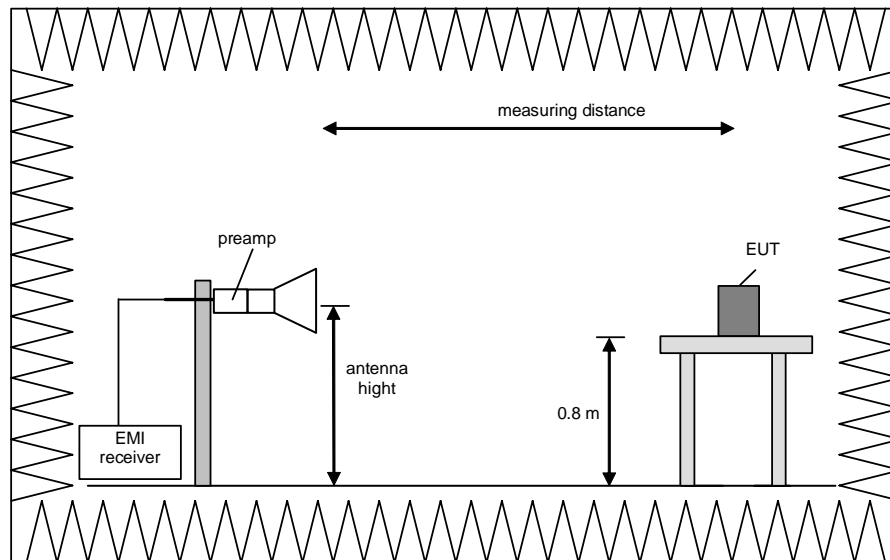
### **Final measurement (1 GHz to 110 GHz)**

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.

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

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz
40 GHz to 60 GHz	1 MHz
50 GHz to 75 GHz	1 MHz
75 GHz to 110 GHz	1 MHz





#### Procedure of measurement:

The measurements were performed in the frequency range 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 26.5 GHz, 26.5 GHz to 40 GHz, 40 GHz to 60 GHz, 60 GHz to 75 GHz and 75 GHz to 110 GHz. The following procedure will be used:

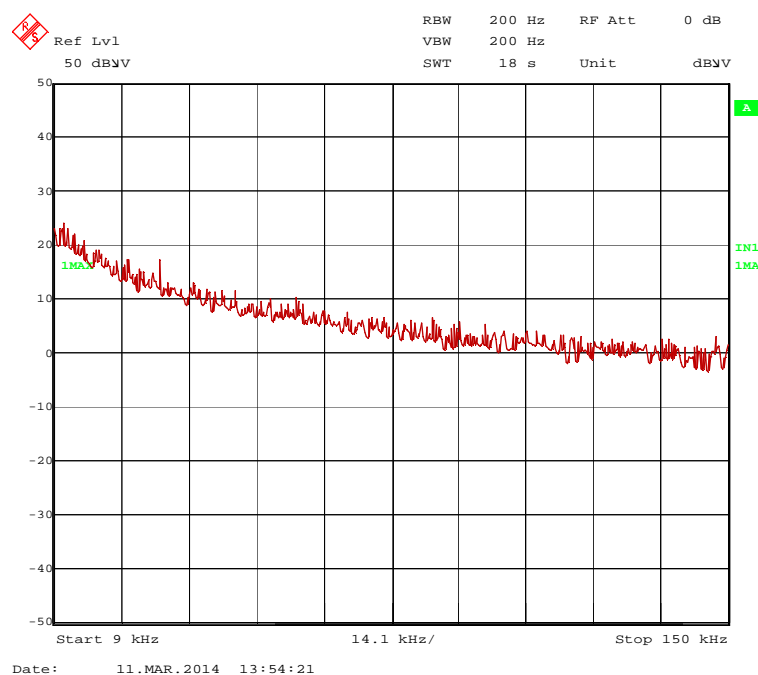
- 1) Monitor the frequency range at horizontal polarisation and move the antenna over all sides of the EUT (if necessary move the EUT to another orthogonal axis).
- 2) Change the antenna polarisation and repeat 1) with vertical polarisation.
- 3) Make a hardcopy of the spectrum.
- 4) Measure the frequency 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 larger than the antenna beamwidth.

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

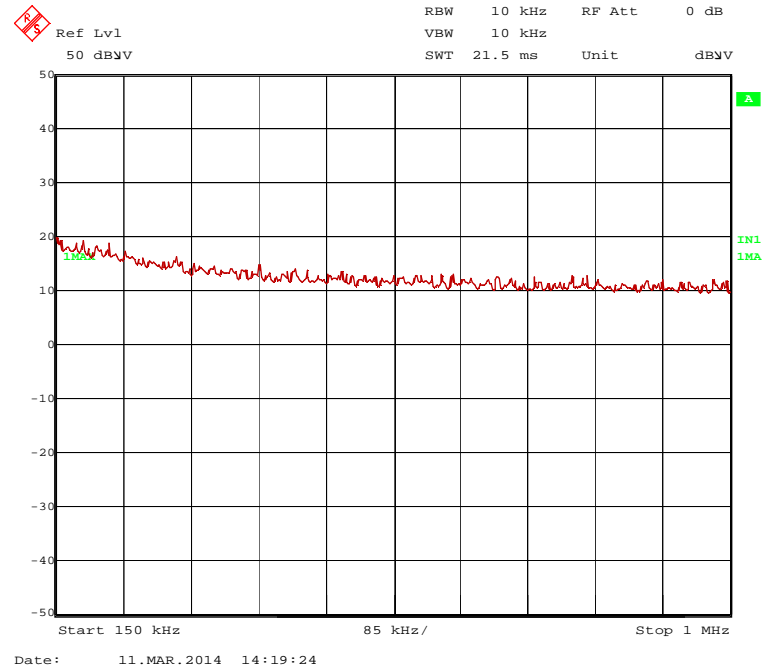
## 5.2.2 Preliminary radiated emission tests (9 kHz to 1 GHz)

Ambient temperature:	20 °C	Relative humidity:	45 %
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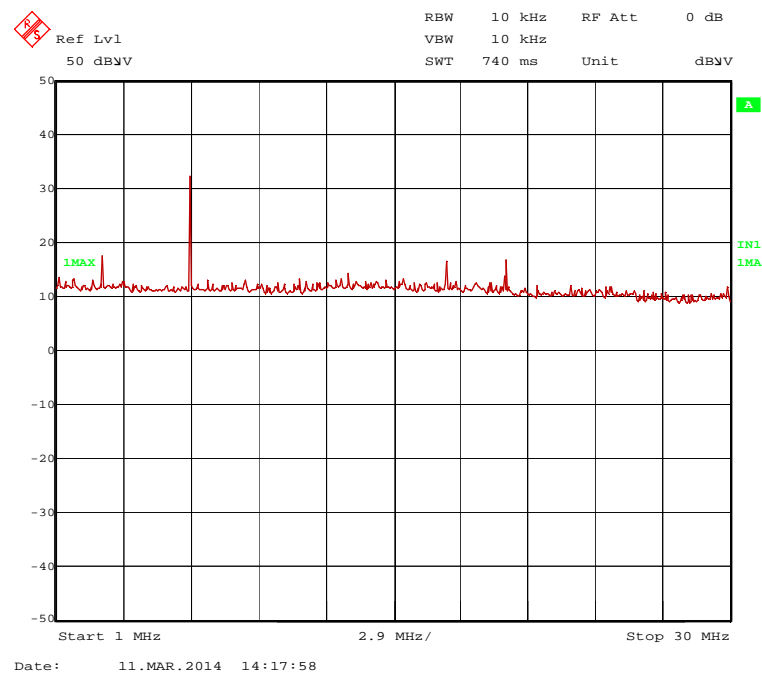
Position of EUT:	The EUT was set-up on a wooden table of a height of 0.8 m.
Cable guide:	The cable of the EUT was fixed on the wooden table. For further information of the cable guide refer to the pictures in annex A of this test report.
Test record:	The test was carried out in normal operation mode of the EUT (reading a TAG). All results are shown in the following.
Power supply:	During this test the EUT was powered with 24 V DC.



140344\_4.wmf: Spurious emissions from 9 kHz to 150 kHz



140344\_10.wmf: Spurious emissions from 150 kHz to 1 MHz



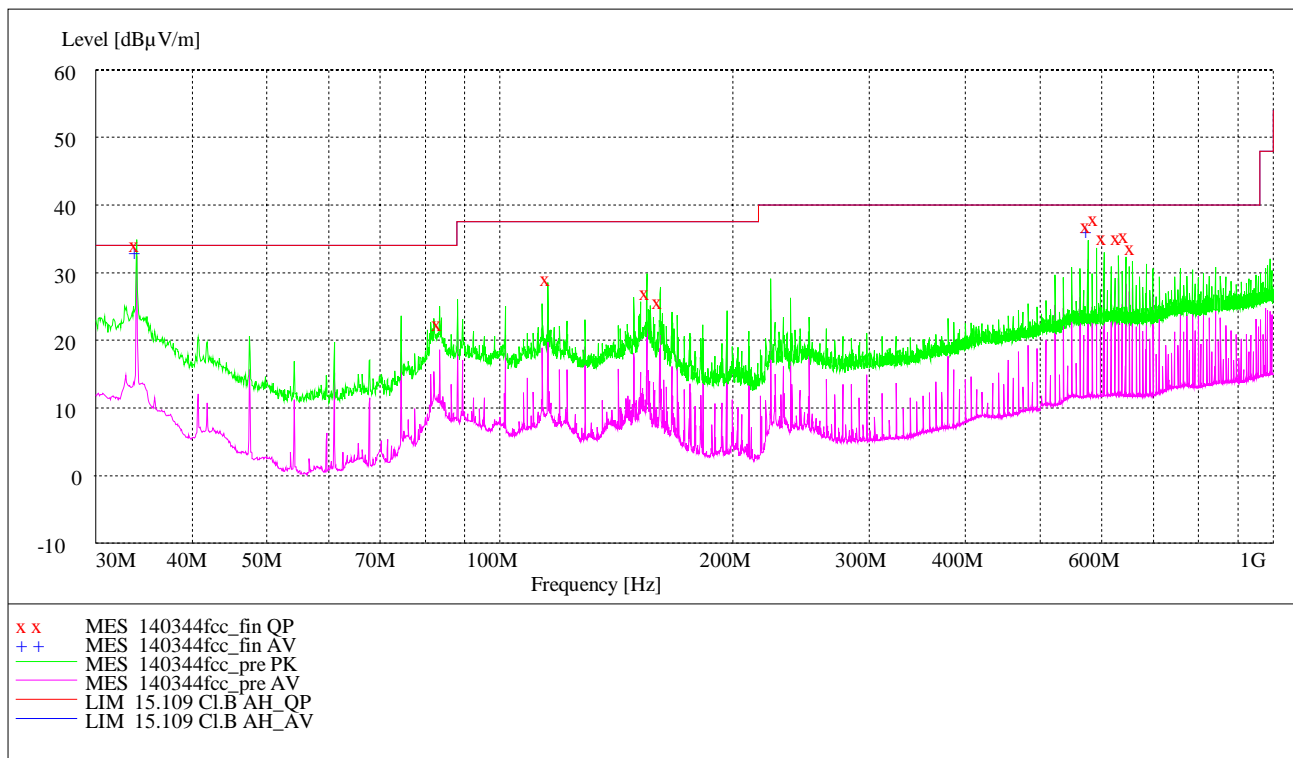
140344\_8.wmf: Spurious emissions from 1MHz to 30 MHz

The following emissions below 30 MHz were found according to FCC 47 CFR Part 15 section 15.209 (a).

2.976 MHz, 17.362 MHz and 20.34 MHz.

The 6.78 MHz is the wanted signal.

This frequency has to be measured on the outdoor test site. The results were presented in the following.



Data record name: 140344fcc

The following frequencies were found during the preliminary radiated emission test:

33.900 MHz, 83.496 MHz, 155.040 MHz, 161.016 MHz, 223.740 MHz, 576.316 MHz, 589.864 MHz, 603.436 MHz, 630.544 MHz, 644.104 MHz and 657.676 MHz

The following frequencies were found inside the restricted bands:

115.260 MHz

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

Test equipment used the test:

29, 31 – 35, 43, 56

### 5.2.3 Final radiated emission test (9 kHz to 30 MHz)

Ambient temperature:	15 °C	Relative humidity:	56 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m, 10 m and 30 m.

Cable guide: The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.

Test record: The test was carried out in normal operation mode of the EUT (reading a TAG). All results are shown in the following.

Power supply: During this test the EUT was powered with 24 V DC.

Test results: The test results were calculated with the following formula:

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{antenna factor [dB/m]}$$

Results with measuring distance of 3 m (fundamental)						
Frequency MHz	Result dB $\mu$ V/m	Limit(* dB $\mu$ V/m	Margin dB	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
6.78	60.4	69.5	9.1	QP	40.4	20.0
Results with measuring distance of 10 m (fundamental)						
Frequency MHz	Result dB $\mu$ V/m	Limit(* dB $\mu$ V/m	Margin dB	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
6.78	46.9	49.5	2.6	QP	26.9	20.0
Results with measuring distance of 30 m (fundamental)						
Frequency MHz	Result dB $\mu$ V/m	Limit(* dB $\mu$ V/m	Margin dB	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
6.78	26.9*)	29.5	2.6	QP	-	20.0
Signal was below the noise floor of the measuring system						
Measurement uncertainty			+2.2 dB / -3.6 dB			

\*: Cable loss included

(\*:Limits according to 15.209

\*) :Level extrapolated with a factor (40dB/decade) from the result at 10m according to Part 15.31 (f)(2)

Results with measuring distance of 3 m						
Frequency MHz	Result dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB	Detector	Readings dB $\mu$ V	Antenna factor * dB/m
2.976	46.6	69.5	22.9	QP	26.6	20.0
17.362	42.1	69.5	27.4	QP	22.1	20.0
20.340	45.5	69.5	24.0	QP	25.5	20.0
Signal was below the noise floor of the measuring system						
Measurement uncertainty			+2.2 dB / -3.6 dB			

Test: Passed

Test equipment used for the test:

56 – 57

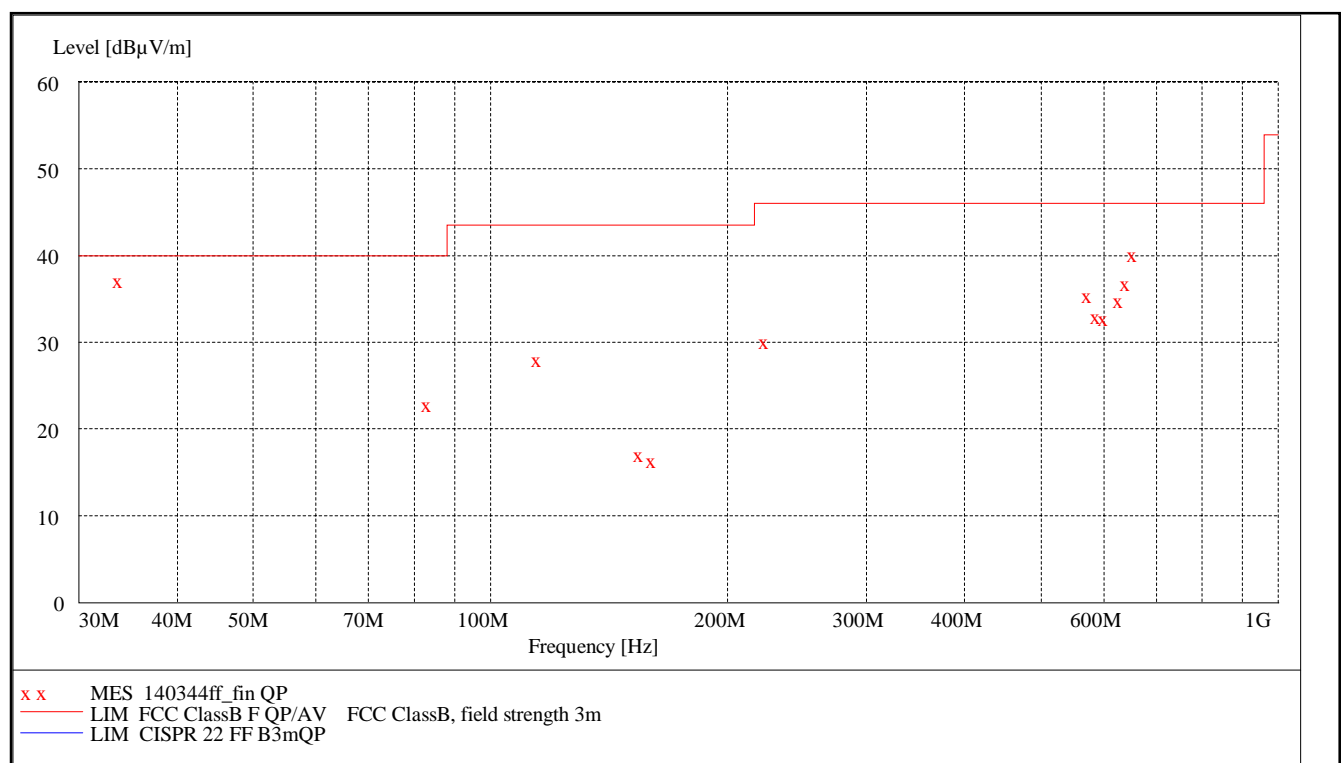
#### 5.2.4 Final radiated emission test (30 MHz to 1 GHz)

Ambient temperature:	20 °C	Relative humidity:	47 %
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Position of EUT:	The EUT was set-up on a wooden table of a height of 0.8 m.
Cable guide:	The cable of the EUT was fixed on the wooden table. For further information of the cable guide refer to the pictures in annex A of this test report.
Test record:	The test was carried out in normal operation mode of the EUT (reading a TAG). All results are shown in the following.
Power supply:	During this test the EUT was powered with 24 V DC.
Test results:	The test results were calculated with the following formula:

$$\text{Result [dB}\mu\text{V/m]} = \text{reading [dB}\mu\text{V]} + \text{cable loss [dB]} + \text{antenna factor [dB/m]}$$

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above mentioned standard. The measured points marked with x are the measured results of the standard subsequent measurement on the open area test site.



Data record name: 140344ff

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:

(These values are marked in the above diagram by an x)

Spurious emissions in restricted bands									
Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
115.260	28.1	43.5	15.4	14.8	12.1	1.2	100	6	vert
Spurious emissions outside restricted bands									
Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.
33.900	37.2	40.0	2.8	18.7	17.9	0.6	100	90	vert
83.496	23.0	40.0	17.0	13.4	8.6	1.0	143	5	vert
155.040	17.2	43.5	26.3	4.2	11.6	1.4	100	0	vert
161.016	16.5	43.5	27.0	4.0	11.0	1.5	100	344	vert
223.740	30.3	46.0	15.7	18.7	10.0	1.6	135	254	hor
576.316	35.6	46.0	10.4	13.7	19.1	2.8	100	22	vert
589.864	33.1	46.0	12.9	11.2	19.1	2.8	100	23	vert
603.436	32.9	46.0	13.1	10.8	19.3	2.8	100	23	vert
630.544	34.9	46.0	11.1	12.2	19.8	2.9	100	25	vert
644.104	36.9	46.0	9.1	14.3	19.7	2.9	100	205	vert
657.676	40.3	46.0	5.7	17.8	19.6	2.9	123	215	hor
Measurement uncertainty				+2.2 dB / -3.6 dB					

The test results were calculated with the following formula:

Result [dBμV/m] = reading [dBμV] + cable loss [dB] + antenna factor [dB/m]

Test: Passed

Test equipment used for the test:

14 – 20

## 6 Report history

Report Number	Date	Comment
F140344E1	3 November 2014	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	21/03/2014	03/2016
3	LISN	NSLK8128	Schwarzbeck	8128155	480058	04/05/2012	05/2014
5	AC-filter	B84299-D87-E3	Siemens	930262292	480097	Weekly verification (system cal.)	
6	EMI-Software	ES-K1	Rohde & Schwarz	-	480111	-	-
14	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
15	Measuring receiver	ESIB7	Rohde & Schwarz	100304	480521	6/02/2013	02/2015
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	-	-
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	26/02/2014	02/2016
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	CBL6112 B	Chase	2688	480328	21/04/2011	04/2014
43	RF-cable No. 30	RTK 081	Rosenberger	-	410141	Weekly verification (system cal.)	
56	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	18/02/2014	02/2016
57	EMI test receiver	ESPC	Rohde & Schwarz	843756/006	480150	24/02/2014	02/2016
58	Loop Antenna Ø = 225 mm	-	Phoenix Test-Lab	-	410085	Weekly verification	
59	RF-cable No. 10	RG223	Phoenix-Test-Lab	-	410102	Weekly verification	
60	Outdoor test site	-	Phoenix-Test-Lab	-	480293	-	
61	Climatic Chamber	MK 240	WTB Binder Labortechnik GmbH	05-79022	480462	25/04/2012	04/2014
62	Spectrum analyser	FSW43	Rohde & Schwarz	100586	481720	10/09/2013	09/2015
63	Loop Antenna Ø = 225 mm	-	Phoenix Test-Lab	-	410085	Weekly verification	
64	Spectrum analyser	FSU	Rohde & Schwarz	100586	480956	24/02/2014	02/2016



## 8 List of annexes

<b>ANNEX A</b>	<b>Photographs of the test set-ups:</b>	<b>5 pages</b>
	Test set-up preliminary radiated emissions (E-Field)	140344_1.jpg
	Test set-up final radiated emissions (E-Field)	140344_2.jpg
	Test set-up final radiated emissions (E-Field)	140344_3.jpg
	Test set-up outdoor test site (H-Field)	140344_4.jpg
	Test set-up outdoor test site (H-Field)	140344_5.jpg
	Test set-up conducted emissions	140344_6.jpg
<b>ANNEX B</b>	<b>External photographs of the test sample:</b>	<b>5 pages</b>
	EUT, 3D view 1	140344_eut1.jpg
	EUT, 3D view 2	140344_eut2.jpg
	EUT, TAG	140344_eut3.jpg
	EUT, set up	140344_eut4.jpg
	EUT, TAG	140344_eut5.jpg
<b>ANNEX C</b>	<b>Internal photographs of the test sample:</b>	<b>2 pages</b>
	PCB top view	134118pcb1.jpg
	PCB bottom view	134118pcb2.jpg
<b>ANNEX D</b>	<b>Additional measurement results for industry Canada:</b>	<b>2 pages</b>