



InterLab®

FCC Measurement/Technical Report

on

NXP automotive module OM12000

Report Reference: MDE_NXP_0901_FCCd

Test Laboratory:

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DGA-PL-192/99-02

Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the testing laboratory.

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0 Summary

0.1 Technical Report Summary

Type of Authorization

Certification for an intentional radiator RFID card reader at 13.56 MHz

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 (10-1-09 Edition) and 15 (10-1-09 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart C – Intentional Radiators

§ 15.205 Restricted bands of operation

§ 15.207 Conducted limits

§ 15.209 Radiated emission limits; general requirements

§ 15.215 Additional provisions to the general radiated emission limitations

§ 15.225 Operation within the band 13.110-14.010 MHz

Note:
none

Summary Test Results:

The EUT complied with all performed tests as listed in chapter 0.2 Measurement Summary.

0.2 Measurement Summary

FCC Part 15, Subpart C			§15.209
Radiated Emissions			
The measurement was performed according to ANSI C63.4			2003
OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_a01	enclosure	passed
FCC Part 15, Subpart C			§ 15.207
Conducted Emissions AC Power line			
The measurement was performed according to ANSI C63.4			2003
OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_a02	AC port (power line)	passed
FCC Part 15, Subpart C			§ 15.215
Occupied Bandwidth			
The measurement was performed according to FCC § 2.1049			10-1-09 Edition
OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_a01	enclosure	passed
FCC Part 15, Subpart C			§ 15.225
Spectrum Mask			
The measurement was performed according to §15.225			10-1-09 Edition
OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_a01	enclosure	passed
FCC Part 15, Subpart C			§ 15.225
Frequency Tolerance			
The measurement was performed according to FCC § 2.1055			10-1-09 Edition
OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_a01	enclosure	passed



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Responsible for
Accreditation Scope:

A. P. B.

Responsible
for Test Report:

Radach



1 Administrative Data

1.1 Testing Laboratory

Company Name: 7 Layers AG
Address Borsigstr. 11
40880 Ratingen
Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716.

The test facility is also accredited by the following accreditation organisation:
- Deutscher Akkreditierungs Rat DAR-Registration no. DGA-PL-192/99-02

Responsible for Accreditation Scope: Dipl.-Ing. Bernhard Retka
Dipl.-Ing. Robert Machulec
Dipl.-Ing. Andreas Petz

Report Template Version: 2010-07-20

1.2 Project Data

Responsible for testing and report: Dipl.-Ing. Robert Machulec
Date of Test(s): 2009-11-13 to 2009-11-23
Date of Report: 2010-07-27

1.3 Applicant Data

Company Name: NXP Semiconductors
Address: 2 esplanade Anton Philips, Campus
EffiScience, Colombelles BP2000
14906 Caen Cedex 9
France
Contact Person: Mr. Hugues de Perthuis

1.4 Manufacturer Data

Company Name: please see applicant data
Address:
Contact Person:

2 Test object Data

2.1 General EUT Description

Equipment under Test	NXP automotive module OM12000
Type Designation:	OM12000
Kind of Device: (optional)	RFID transceiver operating at 13.56 MHz
Voltage Type:	DC
Voltage level:	4.8 V

General product description:

The module includes the technologies: GSM, GPS, RFID.

The EUT provides the following ports:

Ports

enclosure
Antenna connectors
Power and control connector

The main components of the EUT are listed and described in Chapter 3.2

2.2 EUT Main components

Type, S/N, Short Descriptions etc. used in this Test Report

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status	Date of Receipt
EUT A (CS100c04)	NXP automotive module OM12000	OM12000	E30B2#034	B2 REV 05 SMX 09/40	version 0.2 RF	2009-11-03

Remark: EUT A is equipped with a loop antenna (NXP PCB2079-1, 52-08).

NOTE: The short description is used to simplify the identification of the EUT in this test report.

2.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	HW Status	SW Status	Serial no.	FCC ID
AE1	AC/DC supply	-	-	-	-	-
AE2	RFID TAG	Mifare® 4K	-	-	-	-

2.4 EUT Setups

This chapter describes the combination of EUTs and ancillary equipment used for testing.

Setup No.	Combination of EUTs	Description
Setup_a01	EUT A + AE 2	setup for EUT reading a tag
Setup_a02	EUT A + AE 1 + AE 2	setup for test on power line

2.5 Operating Modes

This chapter describes the operating modes of the EUTs used for testing.

Op. Mode	Description of Operating Modes	Remarks
op-mode 1	modulated carrier signal	EUT is transmitting a periodically modulated signal and is continuously reading TAG information. GSM 1900 TCH 661 and GPS are also active same time.

2.6 Product labeling

2.6.1 FCC ID label

Please refer to the documentation of the applicant.

2.6.2 Location of the label on the EUT

Please refer to the documentation of the applicant.

3 Test Results

3.1 Spurious radiated emissions

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: ANSI C 63.4, 2003

3.1.1 Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

The radiated emissions measurements were made in a typical installation configuration. The measurement procedure is implemented into the EMI test software ES-K1 from R&S.

1. Measurement up to 30 MHz

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. The Equipment Under Test (EUT) was set up on a non-conductive table in the anechoic chamber.

The radiated emissions measurements were made in a typical installation configuration. The measurement procedure is implemented into the EMI test software ES-K1 from R&S. The Loop antenna HFH2-Z2 is used.

Step 1: pre measurement

- Anechoic chamber
- Antenna distance: 10m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 and 0.15 – 30 MHz
- Frequency steps: 0.1 kHz and 5 kHz
- IF-Bandwidth: 0.2 kHz and 10 kHz
- Measuring time / Frequency step: 100 ms

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: final measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is to find the maximum emission level.

- Open area test side
- Antenna distance: according to the Standard
- Detector: Quasi-Peak
- Frequency range: 0.009 – 30 MHz
- Frequency steps: measurement at frequencies detected in step 1
- IF-Bandwidth: 200 Hz - 10 kHz
- Measuring time / Frequency step: 100 ms

2. Measurement above 30 MHz

Measurement up to 1 GHz

Step 1: Preliminary scan

Preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Detector: Peak-Maxhold
- Frequency range: 30 – 1000 MHz
- Frequency steps: 60 kHz
- IF-Bandwidth: 120 kHz

- Measuring time / Frequency step: 100 μ s
- Turntable angle range: -180 to 180°
- Turntable step size: 90°
- Height variation range: 1 – 3m
- Height variation step size: 2m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: second measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is, to find out the approximate turntable angle and antenna height for each frequency.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100ms
- Turntable angle range: -180 to 180°
- Turntable step size: 45°
- Height variation range: 1 – 4m
- Height variation step size: 0.5m
- Polarisation: horizontal + vertical

After this step the EMI test system has determined the following values for each frequency (of step 1):

- Frequency
- Azimuth value (of turntable)
- Antenna height

The last two values have now the following accuracy:

- Azimuth value (of turntable): 45°
- Antenna height: 0.5m

Step 3: final measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved.

This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will be slowly varied by $\pm 22.5^\circ$ around this value. During this action the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position the antenna height is also slowly varied by ± 25 cm around the antenna height determined. During this action the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100ms
- Turntable angle range: -22.5° to $+ 22.5^\circ$ around the determined value
- Height variation range: -0.25m to $+ 0.25$ m around the determined value

Step 4: final measurement with QP detector

With the settings determined in step 3, the final measurement will be performed:

EMI receiver settings for step 4:

- Detector: Quasi-Peak(< 1GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1s



Measurement above 1GHz

The following modifications apply to the measurement procedure for the frequency range above 1 GHz:

The measurement distance was reduced to 1m. The results were extrapolated by the extrapolation factor of 20 dB/decade (inverse linear distance for field strength measurements, inverse linear-distance squared for the power reference level measurements). Due to the fact that in this frequency range a double ridged wave guided horn antenna (up to 18 GHz) and a horn antenna (18-25 GHz) are used, the steps 2-4 are omitted. Step 1 was performed with one height of the receiving antenna only.

EMI receiver settings:

- Detector: Peak, Average
- RBW = VBW = 100 kHz

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

3.1.2 Test Requirements / Limits

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency in MHz	Limit ($\mu\text{V/m}$)	Measurement distance (m)	Limit(dB $\mu\text{V/m}$ @10m)
0.009 – 0.49	2400/F(kHz)	300	Limit (dB $\mu\text{V/m}$)+30dB
0.49 – 1.705	24000/F(kHz)	30	Limit (dB $\mu\text{V/m}$)+10dB
1.705 - 30	30	30	Limit (dB $\mu\text{V/m}$)+10dB

Frequency in MHz	Limit ($\mu\text{V/m}$)	Measurement distance (m)	Limit (dB $\mu\text{V/m}$)
30 - 88	100	3	40.0
88 - 216	150	3	43.5
216 - 960	200	3	46.0
above 960	500	3	54.0

3.1.3 Test Protocol

Temperature: 24°C
Air Pressure: 1013 hPa
Humidity: 33%

3.1.3.1 Measurement up to 30 MHz

Op. Mode	Setup	Port
op-mode 1	Setup_a01	Enclosure

Frequency kHz	Corrected value dBμV/m			Limit dBμV/ m	Limit dBμV/ m	Limit dBμV/ m	Delta to limit dB	Delta to limit dB
	QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
720.0	-	37.86	-	-	50.45	-	12.59	-
1245.0	-	37.22	-	-	45.65	-	8.43	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found therefore step 2 was not performed. Please refer to the plot in the annex.
The found peak at 99.5kHz is an emission from loop antenna power supply, and the peak found at 13.56MHz is the wanted signal of the EUT.

3.1.3.2 Measurement above 30 MHz

Op. Mode	Setup	Port
op-mode 1	Setup_a01	Enclosure

Polarisation	Frequency MHz	Corrected value dBμV/m			Limit dBμV/ m	Limit dBμV/ m	Limit dBμV/ m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Vertical	54.24	3.80	-	-	40.00	-	-	36.20	-
Vertical	81.36	6.30	-	-	40.00	-	-	33.70	-
Vertical	122.04	8.20	-	-	43.50	-	-	35.30	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.

3.1.4 Test result: Spurious radiated emissions

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed

3.2 Conducted emissions (AC power line)

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: ANSI C 63.4, 2003

3.2.1 Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. The Equipment Under Test (EUT) was setup in a shielded room to perform the conducted emissions measurements in a typical installation configuration. The EUT was powered from 50 μ H || 50 Ohm Line Impedance Stabilization Network (LISN). The LISN's unused connections were terminated with 50 Ohm loads.

The measurement procedure consists of two steps. It is implemented into the EMI test software ES-K1 from R&S.

Step 1: Preliminary scan

Intention of this step is, to determine the conducted EMI-profile of the EUT.

EMI receiver settings:

- Detector: Peak - Maxhold
- Frequency range: 150 kHz – 30 MHz
- Frequency steps: 5 kHz
- IF-Bandwidth: 9 kHz
- Measuring time / Frequency step: 20 ms
- Measurement on phase + neutral lines of the power cords

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

Step 2: Final measurement

Intention of this step is, to determine the highest emissions with the settings defined in the test specification for the frequencies identified in step 1.

EMI receiver settings:

- Detector: Quasi-Peak
- IF - Bandwidth: 9 kHz
- Measuring time: 1 s / frequency

At each frequency determined in step 1, four measurements are performed in the following combinations:

- 1) Neutral lead - reference ground (PE grounded)
- 2) Phase lead - reference ground (PE grounded)
- 3) Neutral lead - reference ground (PE floating)
- 4) Phase lead - reference ground (PE floating)

The highest value is reported.

3.2.2 Test Requirements / Limits

FCC Part 15, Subpart C, §15.207

Frequency Range (MHz)	QP Limit (dBμV)	AV Limit (dBμV)
0.15 – 0.5	66 to 56	56 to 46
0.5 – 5	56	46
5 – 30	60	50

Used conversion factor: Limit (dBμV) = 20 log (Limit (μV)/1μV).

3.2.3 Test Protocol

Temperature: 23°C
Air Pressure: 1037 hPa
Humidity: 37%

Op. Mode	Setup	Port
op-mode 1	Setup_a02	AC Port (power line)

Power line	Frequency MHz	Measured value dBμV	Delta to limit dBμV	Remarks
N	13.500	45.20	14.80	-
L1	13.825	21.70	38.30	-

Remark: No final measurement was performed because no frequencies (peaks) were found within the offset for acceptance analysis during the preliminary scan. Please see annex for the measurement plot.

The operating frequency (wanted signal / carrier) of the EUT is set to 13.56 MHz (RFID) by the manufacturer and cannot be changed.

3.2.4 Test result: Conducted emissions (AC power line)

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed

3.3 Occupied bandwidth

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: FCC §15.31, 10-1-09 Edition

3.3.1 Test Description

The Equipment Under Test (EUT) was setup in a shielded room to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produces the worst-case (widest) occupied bandwidth.

3.3.2 Test Requirements / Limits

FCC Part 15, Subpart C, §15.215 (c)

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. ...

3.3.3 Test Protocol

Temperature: 24°C
Air Pressure: 1028hPa
Humidity: 32%

Op. Mode	Setup	Port
op-mode 1	Setup_a01	Enclosure

20 dB bandwidth kHz	99% bandwidth kHz	Remarks
436.874	593.186	The 20 dB bandwidth from 13.55921250 MHz to 13.55964937 MHz is contained within the designated frequency band 13.110 MHz to 14.010 MHz.

Remark: Please see annex for the measurement plot.

3.3.4 Test result: Occupied bandwidth

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed

3.4 Spectrum mask

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: FCC §15.225, 10-1-09 Edition

3.4.1 Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. The Equipment Under Test (EUT) was set up on a non-conductive table in the anechoic chamber.

The radiated emissions measurements were made in a typical installation configuration. The measurement procedure is implemented into the EMI test software ES-K1 from R&S. The Loop antenna HFH2-Z2 is used.

- Anechoic chamber
- Antenna distance: 10m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 and 0.15 – 30 MHz
- Frequency steps: 0.1 kHz and 5 kHz
- IF-Bandwidth: 0.2 kHz and 10 kHz
- Measuring time / Frequency step: 100 ms

3.4.2 Test Limits

FCC Part 15, Subpart C, §15.225 (a-d), and §15.209, corrected by the means of the extrapolation of §15.31 due to the reduced measuring distance from 30m to 10m.

3.4.3 Test Protocol

Temperature: 24°C
Air Pressure: 1028 hPa
Humidity: 32%

Op. Mode	Setup	Port
op-mode 1	Setup_a01	Enclosure

Maximum value dBµV/m	Limit dBµV/m	Remarks
42.48	93.5	measuring distance 10m

Remark: Please see annex for the measurement plot.

3.4.4 Test result: Spectrum mask

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed



3.5 Frequency tolerance

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: FCC §15.225, 10-1-09 Edition

3.5.1 Test Description

The Equipment Under Test (EUT) was placed in a temperature chamber. The frequency drift during temperature and voltage variation was measured by the means of a spectrum analyzer with frequency counter function. The temperature was varied from -30°C to +50°C. For +20°C the extreme power supply voltages of 85% and 115% were applied. After reaching each target temperature and waiting sufficient time to stabilize the temperature conditions in chamber and EUT one measurement was performed immediately after powering the EUT on, and two further measurements were performed after 5 and 10 minutes continuous operation of EUT.

3.5.2 Test Limits

FCC Part 15, Subpart C, §15.225 (e): The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.



3.5.3 Test Protocol

Temperature: 24°C
Air Pressure: 1028 hPa
Humidity: 32%

Op. Mode	Setup	Port
op-mode 1	Setup_a01	Enclosure

Voltage					
normal	low	high			
4.8	3.3	4.8			
temp/°C	voltage/V	time /min	freq /MHz	limit/MHz	margin/Hz
50	4.8	0	13.55940481	1.356	595.19
50	4.8	5	13.55940982	1.356	590.18
50	4.8	10	13.55941082	1.356	589.18
40	4.8	0	13.55941383	1.356	586.17
40	4.8	5	13.55940481	1.356	595.19
40	4.8	10	13.55940581	1.356	594.19
30	4.8	0	13.55942786	1.356	572.14
30	4.8	5	13.55941683	1.356	583.17
30	4.8	10	13.55941583	1.356	584.17
20	3.3	0	13.55944790	1.356	552.1
20	3.3	5	13.55944289	1.356	557.11
20	3.3	10	13.55943988	1.356	560.12
20	4.8	0	13.55943788	1.356	562.12
20	4.8	5	13.55943788	1.356	562.12
20	4.8	10	13.55943788	1.356	562.12
10	4.8	0	13.55946794	1.356	532.06
10	4.8	5	13.55946293	1.356	537.07
10	4.8	10	13.55945892	1.356	541.08
0	4.8	0	13.55946994	1.356	530.06
0	4.8	5	13.55947295	1.356	527.05
0	4.8	10	13.55947395	1.356	526.05
-10	4.8	0	13.55944188	1.356	558.12
-10	4.8	5	13.55945691	1.356	543.09
-10	4.8	10	13.55945892	1.356	541.08
-20	4.8	0	13.55938778	1.356	612.22
-20	4.8	5	13.55940281	1.356	597.19
-20	4.8	10	13.55940481	1.356	595.19
-30	4.8	0	13.55927756	1.356	722.44
-30	4.8	5	13.55932465	1.356	675.35
-30	4.8	10	13.55932365	1.356	676.35

Remark: The limit is ± 1.356 kHz.
The manufacturer declared that normal voltage is equivalent with high voltage.

3.5.4 Test result: Frequency tolerance

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed

4 Test Equipment

1 Test Equipment Details

1.1 List of Used Test Equipment

The calibration, hardware and software states are shown for the testing period.

Test Equipment Anechoic Chamber

Lab ID:	Lab 2		
Manufacturer:	Frankonia		
Description:	Anechoic Chamber for radiated testing		
Type:	10.58x6.38x6		
	<i>Calibration Details</i>	<i>Last Execution</i>	<i>Next Exec.</i>
	FCC renewal	2006/12/19	2009/12/19
	IC renewal	2009/01/21	2011/01/20
	FCC renewal	2009/01/07	2011/01/06

Single Devices for Anechoic Chamber

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Air compressor	none	-	Atlas Copco
Anechoic Chamber	10.58 x 6.38 x 6	none	Frankonia
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	FCC listing 96716 3m Part15/18		2009/01/07 2011/01/06
	ANSI C64.3 NSA		2009/01/21 2011/01/20
Controller Innco 2000	CO 2000	CO2000/328/12470 406/L	Innco innovative constructions GmbH
EMC camera	CE-CAM/1	-	CE-SYS
EMC camera Nr.2	CCD-400E	0005033	Mitsubishi
Filter ISDN	B84312-C110-E1		Siemens&Matsushita
Filter Universal 1A	BB4312-C30-H3	-	Siemens&Matsushita

Test Equipment Auxiliary Equipment for Conducted emissions

Lab ID:	Lab 1
Manufacturer:	Rohde & Schwarz GmbH & Co.KG
Description:	EMI Conducted Auxiliary Equipment

Single Devices for Auxiliary Equipment for Conducted emissions

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber&Suhner
Coupling-Decoupling-Network	CDN ENY41	100002	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard Calibration		2008/03/06 2011/03/05
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz GmbH & Co. KG
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	DKD calibration		2008/10/13 2011/10/12

Test Equipment Auxiliary Equipment for Radiated emissions

Lab ID: Lab 2
Description: Equipment for emission measurements
Serial Number: see single devices

Single Devices for Auxiliary Equipment for Radiated emissions

Single Device Name	Type	Serial Number	Manufacturer		
Antenna mast	AS 620 P		HD GmbH		
Biconical dipole	VUBA 9117	9117108	Schwarzbeck	Last Execution	Next Exec.
	Calibration Details				
	Standard Calibration			2008/10/27	2013/10/26
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P	849785	Miteq		
	Calibration Details			Last Execution	Next Exec.
	Path Calibration			2009/05/18	2009/11/17
	Path Calibration			2009/11/16	2010/05/15
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4	-	Miteq		
	Calibration Details			Last Execution	Next Exec.
	Path Calibration			2009/05/18	2009/11/17
	Path Calibration			2009/11/16	2010/05/15
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P	896037	Miteq		
	Calibration Details			Last Execution	Next Exec.
	Path Calibration			2009/05/18	2009/11/17
	Path Calibration			2009/11/16	2010/05/15
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2+W38.01-2	Kabel Kusch		
	Calibration Details			Last Execution	Next Exec.
	Path Calibration			2009/05/18	2009/11/17
	Path Calibration			2009/11/16	2010/05/15
Cable "ESI to Horn Antenna"	UFB311A+UFB293C	W18.02-2+W38.02-2	Rosenberger Micro-Coax		
	Calibration Details			Last Execution	Next Exec.
	Path Calibration			2009/05/18	2009/11/17
	Path Calibration			2009/11/16	2010/05/15
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz GmbH & Co. KG		
	Calibration Details			Last Execution	Next Exec.
	Standard Calibration			2009/04/16	2012/04/15
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG		
	Calibration Details			Last Execution	Next Exec.
	Standard Calibration			2009/04/28	2012/04/27
Dreheinheit	DE 325		HD GmbH		
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic		
	Calibration Details			Last Execution	Next Exec.
	Path Calibration			2009/05/18	2009/11/17
	Path Calibration			2009/11/16	2010/05/15
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic		
	Calibration Details			Last Execution	Next Exec.
	Path Calibration			2009/05/18	2009/11/17
	Path Calibration			2009/11/16	2010/05/15
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic		

Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	Type	Serial Number	Manufacturer	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Path Calibration		2009/05/18	2009/11/17
	Path Calibration		2009/11/16	2010/05/15
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard Calibration		2009/05/27	2012/05/26
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	DKD calibration		2008/10/07	2011/10/06
Pyramidal Horn Antenna 3160-09 26,5 GHz		00083069	EMCO Elektronik GmbH	
Pyramidal Horn Antenna 3160-10 40 GHz		00086675	EMCO Elektronik GmbH	

Test Equipment Auxiliary Test Equipment

Lab ID:	Lab 2, Lab 3
Manufacturer:	see single devices
Description:	Single Devices for various Test Equipment
Type:	various
Serial Number:	none

Single Devices for Auxiliary Test Equipment

Single Device Name	Type	Serial Number	Manufacturer	
AC Power Source	Chroma 6404	64040001304	Chroma ATE INC.	
Broadband Power Divider 1506A / 93459 N (Aux)		LM390	Weinschel Associates	
Broadband Power Divider WA1515 SMA		A855	Weinschel Associates	
Digital Multimeter 01 (Multimeter)	Voltcraft M-3860M	IJ096055	Conrad Electronics	
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	Fluke Europe B.V.	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard calibration		2009/10/07	2010/10/06
Digital Oscilloscope [SA2] (Aux)	TDS 784C	B021311	Tektronix GmbH	
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018	Pontis	
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018	Pontis	
Isolating Transformer	LTS 604	1888	Thalheimer Transformatorenwerke GmbH	
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24	Wainwright	
Spectrum Analyser	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	DKD calibration		2008/10/06	2011/10/05

Test Equipment Digital Signalling Devices

Lab ID: Lab 1, Lab 2, Lab 3

Description: Signalling equipment for various wireless technologies.

Single Devices for Digital Signalling Devices

Single Device Name	Type	Serial Number	Manufacturer
Bluetooth Signalling Unit CBT CBT		100589	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		Last Execution Next Exec.
	Standard Calibration		2008/08/14 2011/08/13
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		Last Execution Next Exec.
	Standard calibration		2008/10/07 2010/10/06
Digital Radio Test Set	6103E	2359	Racal Instruments, Ltd.
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		Last Execution Next Exec.
	Standard calibration		2009/02/16 2011/02/15
	HW/SW Status		Date of Start Date of End
	Hardware: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B56V14, B68 3v04, PCMCIA, U65V04 Software: K21 4v21, K22 4v21, K23 4v21, K24 4v21, K42 4v21, K43 4v21, K53 4v21, K56 4v22, K57 4v22, K58 4v22, K59 4v22, K61 4v22, K62 4v22, K63 4v22, K64 4v22, K65 4v22, K66 4v22, K67 4v22, K68 4v22, K69 4v22 Firmware: µP1 8v50 02.05.06 ---		2007/07/16
Universal Radio Communication Tester	CMU 200	837983/052	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		Last Execution Next Exec.
	Standard calibration		2008/12/01 2011/11/30
	HW/SW Status		Date of Start Date of End
	HW options: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B54V14, B56V14, B68 3v04, B95, PCMCIA, U65V02 SW options: K21 4v11, K22 4v11, K23 4v11, K24 4v11, K27 4v10, K28 4v10, K42 4v11, K43 4v11, K53 4v10, K65 4v10, K66 4v10, K68 4v10, Firmware: µP1 8v40 01.12.05 ---		2007/01/02
Vector Signal Generator	SMU200A	100912	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		Last Execution Next Exec.
	Standard calibration		2008/10/28 2011/10/27
	SW: K62, K69		2008/11/03

Test Equipment Emission measurement devices

Lab ID: Lab 1, Lab 2
Description: Equipment for emission measurements
Serial Number: see single devices

Single Devices for Emission measurement devices

Single Device Name	Type	Serial Number	Manufacturer	
Personal Computer	Dell	30304832059	Dell	
Signal Generator	SMR 20	846834/008	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		Last Execution	Next Exec.
	Standard Calibration		2007/12/05	2010/12/04
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		Last Execution	Next Exec.
	Standard Calibration		2007/12/06	2009/12/05

Test Equipment Radio Lab Test Equipment

Lab ID: Lab 3
Description: Radio Lab Test Equipment

Single Devices for Radio Lab Test Equipment

Single Device Name	Type	Serial Number	Manufacturer
Broadband Power Divider SMA	WA1515	A856	Weinschel Associates
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Path Calibration			2009/07/07 2010/01/06
Coax Attenuator 10dB SMA 2W	4T-10	F9401	Weinschel Associates
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Path Calibration			2009/07/07 2010/01/06
Coax Attenuator 10dB SMA 2W	56-10	W3702	Weinschel Associates
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Path Calibration			2009/07/07 2010/01/06
Coax Attenuator 10dB SMA 2W	56-10	W3711	Weinschel Associates
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Path Calibration			2009/07/07 2010/01/06
Coax Cable Huber&Suhner	Sucotest 2,0m		Rosenberger Micro-Coax
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Path Calibration			2009/07/07 2010/01/06
Coax Cable Rosenberger Micro Coax FA210A0010003030 SMA/SMA 1,0m	FA210A0010003030	54491-2	Rosenberger Micro-Coax
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Path Calibration			2009/07/07 2010/01/06
Power Sensor	NRV-Z1	836219/005	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard Calibration			2009/10/20 2011/10/19
Powermeter	NRVS	836333/064	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard calibration			2009/10/15 2011/10/14
RF Step Attenuator RSP	RSP	833695/001	Rohde & Schwarz GmbH & Co.KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard Calibration			2008/06/18 2011/06/17
Rubidium Frequency Standard	Datum, Model: MFL	2689/001	Datum-Beverly
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
Standard calibration			2009/06/23 2010/06/22
Signal Generator	SMY02	829309/018	Rohde & Schwarz GmbH & Co. KG
<i>Calibration Details</i>			<i>Last Execution</i> <i>Next Exec.</i>
standard calibration			2008/10/07 2011/10/06
Signal Generator SMP	SMP02	836402/008	Rohde & Schwarz GmbH & Co. KG

Single Devices for Radio Lab Test Equipment (continued)

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>	
Spectrum Analyser	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard Calibration		2007/02/27	2010/02/26
	FSIQ26	840061/005	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
Temperature Chamber Vötsch 05	calibration		2008/10/02	2010/10/01
	VT 4002	58566080550010	Vötsch	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Specific calibration		2009/03/12	2010/03/11
Vector Signal Generator	SMIQ 03B	837747/020	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		<i>Last Execution</i>	<i>Next Exec.</i>
	Standard/DKD Calibration		2008/10/09	2011/10/08

Test Equipment Shielded Room 02

Lab ID:	Lab 1
Manufacturer:	Frankonia
Description:	Shielded Room for conducted testing
Type:	12 qm
Serial Number:	none

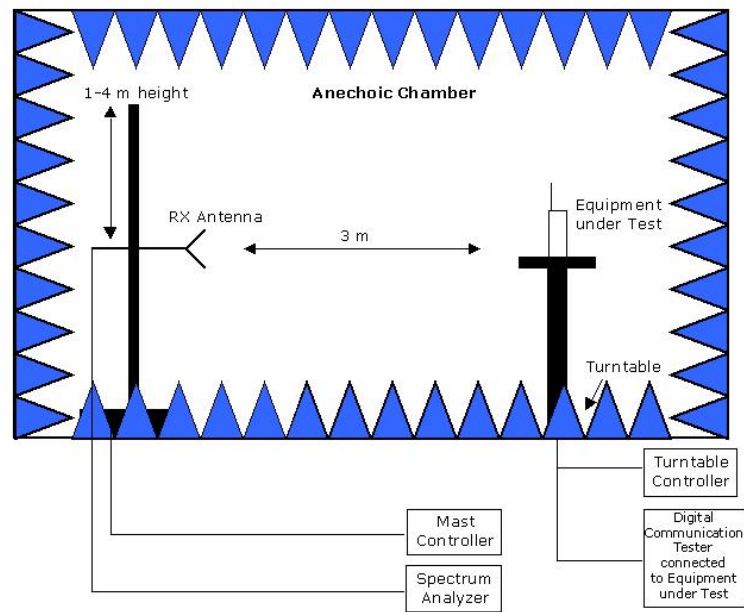


5 Photo Report





6 Setup Drawings



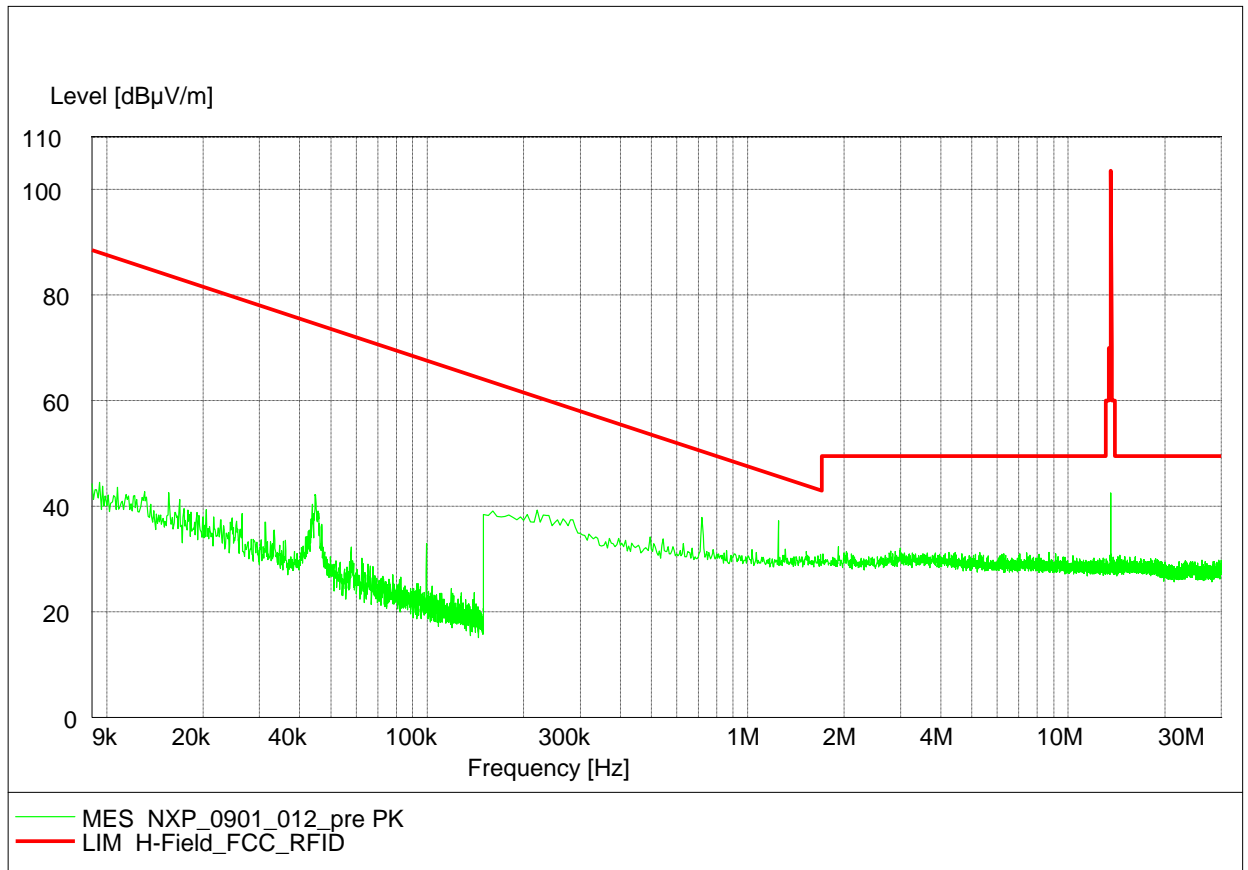
Remark: Depending on the frequency range suitable antenna types, attenuators or preamplifiers are used.

Drawing 1: Setup in the Anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting ground plane.

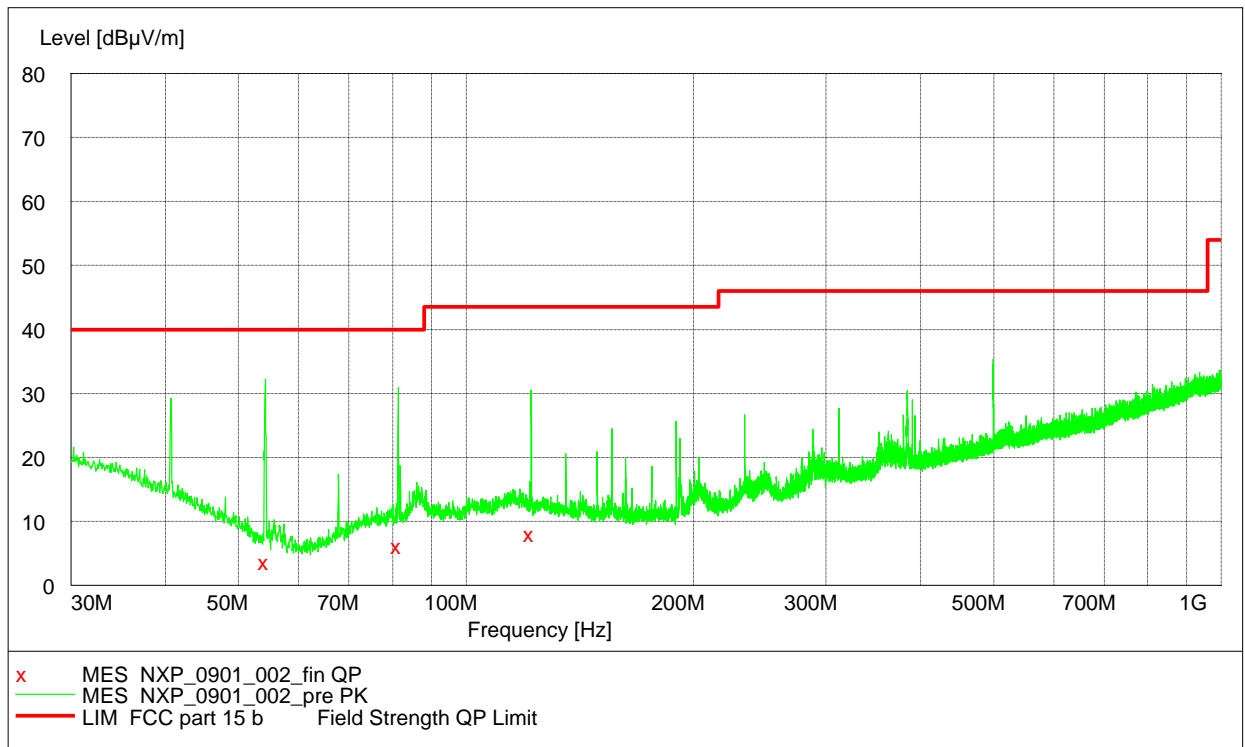
7 Annex measurement plots

7.1 Radiated emissions

7.1.1 Radiated emissions ($f < 30\text{MHz}$)



7.1.2 Radiated emissions (f>30MHz)



MEASUREMENT RESULT: "NXP_0901_002_fin QP"

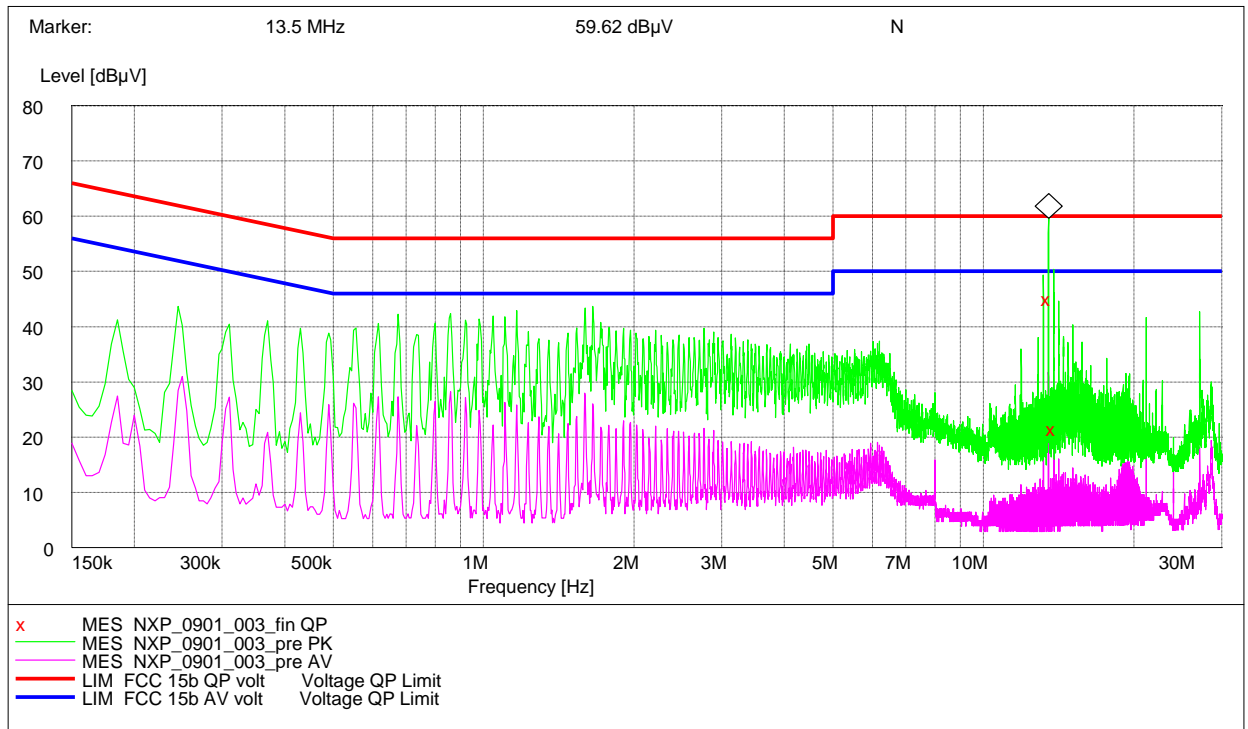
13.11.2009 07:16

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarisation
54.240000	3.80	6.3	40.0	36.2	100.0	307.00	VERTICAL
81.360000	6.30	9.8	40.0	33.7	125.0	292.00	VERTICAL
122.040000	8.20	11.1	43.5	35.3	113.0	153.00	VERTICAL

7.2 AC Mains conducted

Short Description: FCC Voltage

Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width	MaxPeak	20.0 ms	9 kHz	ESH3-Z5
150.0 kHz	30.0 MHz	5.0 kHz	Average			

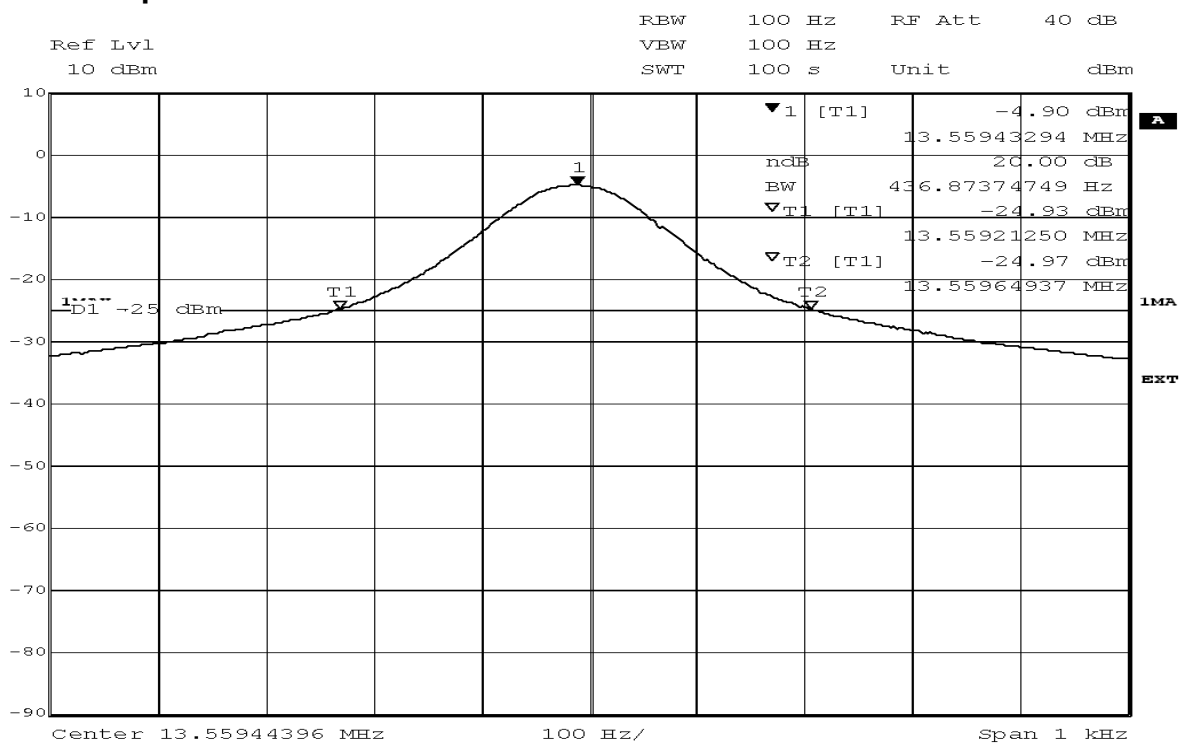


MEASUREMENT RESULT: "NXP_0901_003_fin QP"

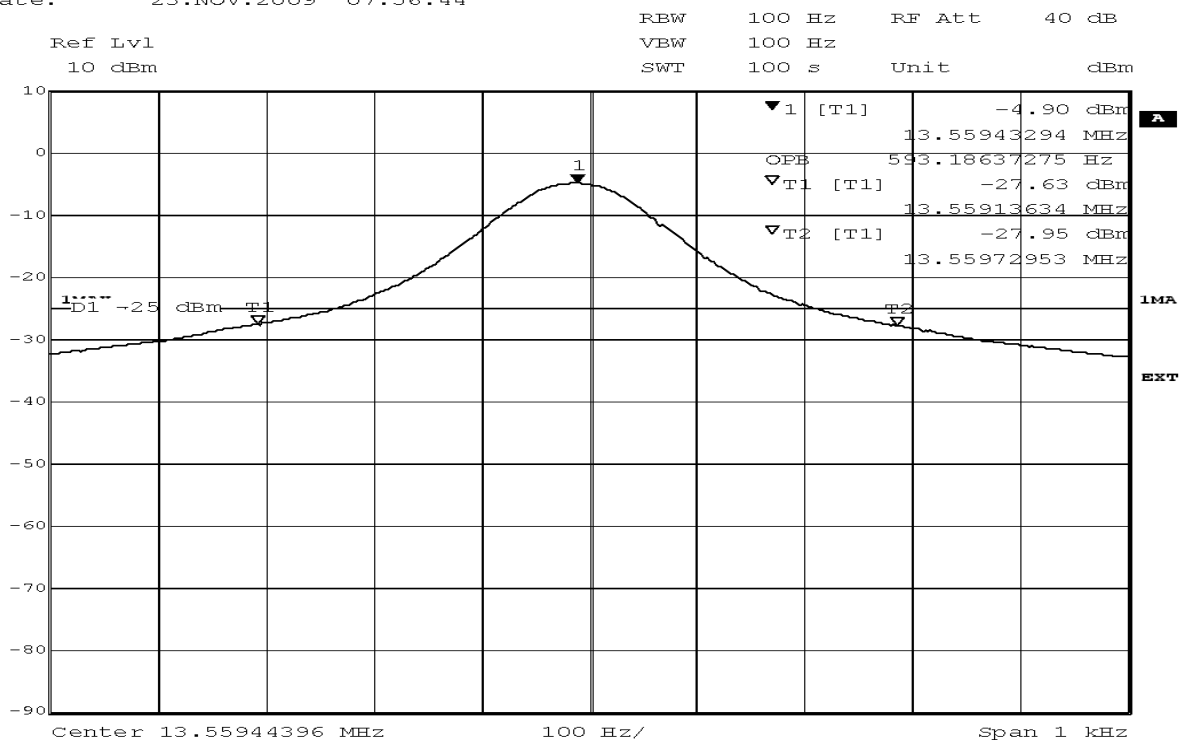
18.11.2009 14:09

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
13.500000	45.20	10.4	60	14.8	N	FLO
13.825000	21.70	10.4	60	38.3	L1	FLO

7.3 Occupied bandwidth



Title: occupied bandwidth
Comment A: CS100c04 occupied bandwidth
Date: 23.NOV.2009 07:56:44



Title: 99% bandwidth
Comment A: CS100c04 99% bandwidth
Date: 23.NOV.2009 07:59:16

7.4 Spectrum mask

