



Inter**Lab**[®]

FCC Measurement/Technical Report on

Bluetooth - WLAN transceiver
Parrot by Martin Szekely (MSZ)

Report Reference: MDE_PARRO_0829_FCCb

Test Laboratory:

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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 (Frequency Hopping Spread Spectrum and Digital Device / Spread Spectrum).

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 (10-1-06 Edition).

The following parts and subparts are applicable to the results in this test report.

- Part 2, Subpart J - Equipment Authorization Procedures, Certification
- Part 15, Subpart C – Intentional Radiators

Note:

-

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

§15.35, §15.205, §15.209

Spurious radiated emissions

The measurement was performed according to ANSI C63.4

2003

OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_01	Enclosure	passed
op-mode 2	Setup_01	Enclosure	passed
op-mode 3	Setup_02	Enclosure	passed
op-mode 4	Setup_02	Enclosure	passed
op-mode 5	Setup_02	Enclosure	passed
op-mode 6	Setup_02	Enclosure	passed

FCC Part 15, Subpart C

§15.35, §15.205, §15.209

Band edge compliance

The measurement was performed according to ANSI C63.4

2003

OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_01	Enclosure	passed
op-mode 2	Setup_01	Enclosure	passed
op-mode 3	Setup_01	Enclosure	passed
op-mode 4	Setup_01	Enclosure	passed

The purpose of the test case and operating mode selection is evaluating of co-location effects.



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Responsible for
Accreditation Scope:



Responsible
for Test Report:





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

The test facility is also accredited by the following accreditation organisation:
- Deutscher Akkreditierungs Rat DAR-Registration no. DAT-P-192/99-01

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

Report Template Version: 2008-08-06

1.2 Project Data

Responsible for testing and report: Carsten Steinröder
Date of Test(s): 2008-10-14 to 2008-10-21
Date of Report: 2007-11-05

1.3 Applicant Data

Company Name: Parrot S.A.
Address: 174 Quai de Jemmapes
75010 Paris
France
Contact Person: Mr. Ludovic Legeay

1.4 Manufacturer Data

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



2 Product labelling

2.1 FCC ID label

At the time of the report there was no FCC label available.

2.2 Location of the label on the EUT

see above

3 Test object Data

3.1 General EUT Description

Equipment under Test	Bluetooth and WLAN transceiver
Type Designation:	Parrot by Martin Szekely (MSZ)
Kind of Device:	Digital Picture Frame with Bluetooth and WLAN
(optional)	technology
Voltage Type:	AC/DC converter
Voltage level:	AC (120V) / DC in (12V)

General product description:

Bluetooth is a short-range radio link intended to be a cable replacement between portable and/or fixed electronic devices.

Bluetooth operates in the unlicensed ISM Band at 2.4 GHz. In the US a band of 83.5 MHz width is available. In this band, the Bluetooth technology defines 79 RF channels spaced 1 MHz (2402 - 2480 MHz). The actual RF channel is chosen from a pseudo-random hopping sequence through the 79 channels. A channel is occupied for a defined amount of time slots, with a nominal slot length of 625 μ s. The maximum dwell time on one channel is defined by the packet type and is 0.625 ms for DH1 packets, 1.875 ms for DH3 and 3.125 ms for DH5. The nominal hop rate is 1600 hops/s for DH1, 1600/3 for DH3 and 1600/5 for DH5. All frequencies are equally used. The maximum nominal average time of occupancy is 0.4 s within a period of 79*0.4 seconds.

WLAN Transceiver operating in the 2.4 GHz ISM band using Direct Sequence Spread Spectrum (DSSS) Modulation. The EUT supports the modes 802.11b (maximum data rate 11Mbps), 802.11g (maximum data rate 54Mbps).

The EUT provides the following ports:

Ports

- Enclosure
- AC Port (power line)
- Mini-USB Port
- Memory Card Port

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



3.2 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 (Code: CX310a01)	Bluetooth and WLAN Transceiver	Parrot by Martin Szekely (MSZ)	PI040140DV8H 000085	HW03	1.0RC1	2008-09-18

Remark: the maximum gain of the used antenna is +2.53 dBi (Bluetooth antenna) and +1.05 dBi (WLAN antenna)

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

3.3 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
-	-	-	-	-	-	-

3.4 Auxiliary Equipment

For the purposes of this test report, auxiliary 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	Type Designation	HW Status	SW Status	Serial no.	FCC ID
AE1: WLAN Router	FRITZ!Box SL WLAN	-	-	S442.155.00.021.558	-
AE2: WLAN Router	Netgear Wireless-N Gigabit Router WNR3500	-	-	1U818471003F6	PY307300074

3.5 EUT Setups

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

Setup No.	Combination of EUTs	Description
Setup_01	EUT A + AE1	setup for radiated measurements
Setup_02	EUT A + AE2	setup for radiated measurements



3.6 Operating Modes

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

Op. Mode	Description of Operating Modes	Remarks
op-mode 1	EUT transmits on 2402 MHz (Bluetooth) and on 2412 MHz (WLAN, 802.11b)	Bluetooth: Loopback mode, max output power WLAN: normal connection, max output power
op-mode 2	EUT transmits on 2480 MHz (Bluetooth) and on 2462 MHz (WLAN, 802.11b)	Bluetooth: Loopback mode, max output power WLAN: normal connection, max output power
op-mode 3	EUT transmits on 2402 MHz (Bluetooth) and on 2412 MHz (WLAN, 802.11g)	Bluetooth: Loopback mode, max output power WLAN: normal connection, max output power
op-mode 4	EUT transmits on 2480 MHz (Bluetooth) and on 2462 MHz (WLAN, 802.11g)	Bluetooth: Loopback mode, max output power WLAN: normal connection, max output power
op-mode 5	EUT transmits on 2402 MHz (Bluetooth) and on 2462 MHz (WLAN, 802.11g)	Bluetooth: Loopback mode, max output power WLAN: normal connection, max output power
op-mode 6	EUT transmits on 2480 MHz (Bluetooth) and on 2412 MHz (WLAN, 802.11g)	Bluetooth: Loopback mode, max output power WLAN: normal connection, max output power

4 Test Results

4.1 Spurious radiated emissions

Standard FCC Part 15, 10-1-07
Subpart C

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

4.1.1 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 and 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 – 3 m
- Height variation step size: 2 m
- 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: 100 ms
- Turntable angle range: -180 to 180 °
- Turntable step size: 45 °
- Height variation range: 1 – 4 m
- Height variation step size: 0.5 m
- 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: 0.5 m

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 ± 22.5 ° 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: 100 ms
- Turntable angle range: -22.5 ° to $+22.5$ ° around the determined value
- Height variation range: -0.25 m 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(< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

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. Measurement above 1 GHz

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

The measurement distance was reduced to 1 m. 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, 25–40 GHz) are used, the steps 2–4 are omitted. Step 1 was performed only at one height of the receiving antenna.

EMI receiver settings:

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

4.1.2 Test Requirements / Limits

FCC §15.205 (b)

“Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.”

FCC §15.209 (a)

“Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:”

FCC §15.209, Radiated Emission Limits

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit(dBµV/m @10m)
0.009 – 0.49	2400/F(kHz)	300	Limit (dBµV/m)+30dB
0.49 – 1.705	24000/F(kHz)	30	Limit (dBµV/m)+10dB
1.705 - 30	30	30	Limit (dBµV/m)+10dB

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit (dBµV/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

FCC §15.35(b)

“..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. ...”

Used conversion factor: $\text{Limit (dBµV/m)} = 20 \log (\text{Limit (µV/m)}/1\mu\text{V/m})$

4.1.3 Test Protocol

Temperature: 24-25 °C
 Air Pressure: 1017- 021 hPa
 Humidity: 40-42 %

Op. Mode **Setup** **Port**
 op-mode 1 Setup_01 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 + horizontal	2487	-	51.97	35.01	-	74	54	22.03	18.99
	7391	-	47.22	34.82	-	74	54	26.78	19.18

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

Op. Mode **Setup** **Port**
 op-mode 2 Setup_01 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 + horizontal	2377	-	51.31	34.87	-	74	54	22.69	19.13
	2382	-	55.36	36.39	-	74	54	18.64	17.61
	2385	-	57.46	36.40	-	74	54	16.54	17.60
	2490	-	50.73	35.90	-	74	54	23.27	18.10

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

Op. Mode **Setup** **Port**
 op-mode 3 Setup_02 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 + horizontal									

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



Op. Mode **Setup** **Port**
 op-mode 4 Setup_02 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 + horizontal	2484	-	55.87	35.20	74	54	-	18.13	18.80

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

Op. Mode **Setup** **Port**
 op-mode 5 Setup_02 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 + horizontal									

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

Op. Mode **Setup** **Port**
 op-mode 6 Setup_02 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 + horizontal	2485	-	52.61	35.96	-	74	54	21.39	18.04

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

The measurements were performed in the frequency range 1 to 25 GHz.

4.1.4 Test result: Spurious radiated emissions

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	Passed
	op-mode 2	Passed
	op-mode 3	Passed
	op-mode 4	Passed
	op-mode 5	Passed
	op-mode 6	Passed



4.2 Band edge compliance

Standard FCC Part 15, 10-1-07
Subpart C

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

4.2.1 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 placed inside FAC (fully anechoic chamber) to perform the measurements. The radiated emissions measurements were made in a typical installation configuration.

The measurement was carried out with a spectrum analyser, cable and horn antenna in a distance of 1 m using peak and average detector.

The measurement was performed at the lowest and highest band edges of the used ISM bands:

- 2400.0 MHz
- 2483.5 MHz

4.2.2 Test Requirements / Limits

For the measurement at the band edges the limit is specified in §15.209.

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit(dBµV/m @10m)
0.009 – 0.49	2400/F(kHz)	300	Limit (dBµV/m)+30dB
0.49 – 1.705	24000/F(kHz)	30	Limit (dBµV/m)+10dB
1.705 - 30	30	30	Limit (dBµV/m)+10dB

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit (dBµV/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

“In the emission table above, the tighter limit applies at the band edges.”

FCC §15.35(b)

“..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. ...”

Used conversion factor: $\text{Limit (dBµV/m)} = 20 \log (\text{Limit (µV/m)}/1\mu\text{V/m})$

4.2.3 Test Protocol

4.2.3.1 Lower band edge

Temperature: 23 °C
 Air Pressure: 1013 hPa
 Humidity: 40 %

Op. Mode	Setup	Port
op-mode 1	Setup_01	Enclosure

Frequency MHz	Measured value dBµV/m	Reference value dBµV/m	Limit dBµV/m	Delta to limit dB
2400.00	53.18	100.07	80.07	26.89

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 3	Setup_01	Enclosure

Frequency MHz	Measured value dBµV/m	Reference value dBµV/m	Limit dBµV/m	Delta to limit dB
2400.00	54.82	97.88	77.88	23.06

Remark: Please see annex for the measurement plot.

4.2.3.2 Higher band edge

Temperature: 23 °C
 Air Pressure: 1013 hPa
 Humidity: 40 %

Op. Mode	Setup	Port
op-mode 2	Setup_01	Enclosure

Frequency MHz	Polarisation	Corrected value dBµV/m		Limit Peak dBµV/m	Limit AV dBµV/m	Delta to Peak limit / dB	Delta to AV limit / dB
		Peak	AV				
2483.50	Vertical + horizontal	47.73	36.39	74.0	54.0	26.27	17.61

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 4	Setup_01	Enclosure

Frequency MHz	Polarisation	Corrected value dBµV/m		Limit Peak dBµV/m	Limit AV dBµV/m	Delta to Peak limit / dB	Delta to AV limit / dB
		Peak	AV				
2483.50	Vertical + horizontal	48.79	36.09	74.0	54.0	25.21	17.91

Remark: Please see annex for the measurement plot.



4.2.4 Test result: Band edge compliance

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed
	op-mode 2	passed
	op-mode 3	passed
	op-mode 4	passed

5 Test Equipment

EUT Digital Signalling System

Equipment	Type	Serial No.	Manufacturer	Last Cal	Next cal
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz	07.10.08	07.10.11
Signalling Unit for Bluetooth	PTW60	100004	Rohde & Schwarz	-	-
Universal Radio Communication Tester	CMU200	102366	Rohde & Schwarz	22.09.07	22.09.09
Universal Radio Communication Tester	CMU200	837983/052	Rohde & Schwarz	22.09.07	22.09.09
Signalling Unit for Bluetooth	CBT	100302	Rohde & Schwarz	22.09.06	N/A – only used for signalling

EMI Test System

Equipment	Type	Serial No.	Manufacturer	Last Cal	Next cal
Comparison Noise Emitter	CNE III	99/016	York	-	-
EMI Analyzer	ESI 26	830482/004	Rohde & Schwarz	06.12.07	06.12.09
Signal Generator	SMR 20	846834/008	Rohde & Schwarz	05.12.07	05.12.09
AC Power Source	6404	64040000B04	Croma ATE INC.	01.06.08	01.06.11

EMI Radiated Auxiliary Equipment

Equipment	Type	Serial No.	Manufacturer	Last Cal	Next cal
Antenna mast 4m Biconical dipole	MA 240 VUBA 9117	240/492 9117108	HD GmbH H. Deisel Schwarzbeck	- 27.10.08	- 27.10.13
Broadband Amplifier 18MHz-26GHz	JS4- 18002600 -32	849785	Miteq	26.06.08	26.12.08
Broadband Amplifier 30MHz-18GHz	JS4- 00101800 -35	896037	Miteq	26.06.08	26.12.08
Broadband Amplifier 45MHz-27GHz	JS4- 00102600 -42	619368	Miteq	26.06.08	26.12.08
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2 W38.01-2	Kabel Kusch	26.06.08	26.12.08
Cable "ESI to Horn Antenna"	UFB311A UFB293C	W18.02-2 W38.02-2	Rosenberger- Microcoax	26.06.08	26.12.08
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz	12.05.06	12.05.09
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz	20.01.04	N/A – spare antenna
High Pass Filter	5HC3500/ 12750- 1.2-KK	200035008	Trilithic	26.06.08	26.12.08
High Pass Filter	5HC2700/ 12750- 1.5-KK	9942012	Trilithic	26.06.08	26.12.08
High Pass Filter	4HC1600/ 12750- 1.5-KK	9942011	Trilithic	26.06.08	26.12.08
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz	17.05.06	17.05.09
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz	19.08.02	N/A – only used for pre-testing
Pyramidal Horn Antenna 26.5 GHz	Model 3160-09	00083069	EMCO	28.02.08	N/A (Stand. Gain Horn)
Pyramidal Horn Antenna 40GHz	Model 3160-10	00086675	EMCO	18.12.07	N/A (Stand. Gain Horn)

EMI Conducted Auxiliary Equipment

Equipment	Type	Serial No.	Manufacturer	Last Cal	Next cal
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber+Suhner	26.06.08	26.12.08
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz	13.10.08	13.10.11
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz	-	-

Auxiliary Test Equipment – calibration not applicable; spare equipment

Equipment	Type	Serial No.	Manufacturer	Last Cal	Next cal
Broadband Resist. Power Divider N	1506A / 93459	LM390	Weinschel	-	-
Broadband Resist. Power Divider SMA	1515 / 93459	LN673	Weinschel	-	-
Digital Multimeter 01	Voltcraft M-3860M	IJ096055	Conrad	-	-
Digital Multimeter 02	Voltcraft M-3860M	IJ095955	Conrad	-	-
Digital Oscilloscope	TDS 784C	B021311	Tektronix	-	-
Fibre optic link Satellite	FO RS232 Link	181-018	Pontis	-	-
Fibre optic link Transceiver	FO RS232 Link	182-018	Pontis	-	-
I/Q Modulation Generator	AMIQ-B1	832085/018	Rohde & Schwarz	-	-
Notch Filter ultra stable	WRCA800 /960-6E	24	Wainwright	-	-
Temperature Chamber	VT 4002	58566002150010	Vötsch	-	-
Temperature Chamber	KWP 120/70	59226012190010	Weiss	-	-
ThermoHygro Datalogger 03	Opus10 THI (8152.00)	7482	Lufft Mess- und Regeltechnik GmbH	-	-
Spectrum Analyzer 9 kHz to 3 GHz	FSP3	838164/004	Rohde & Schwarz	06.10.08	06.10.11
Signal Analyzer 20 Hz to 26.5 GHz	FSIQ26	840061/005	Rohde & Schwarz	02.10.08	02.10.11

Anechoic Chamber – calibration not applicable

Equipment	Type	Serial No.	Manufacturer	Last Cal	Next cal
Air Compressor (pneumatic)			Atlas Copco	-	-
Controller	CO 2000	CO2000/328/12470406/L	Innco innovative constructions GmbH	-	-
EMC Camera	CE-CAM/1		CE-SYS	-	-
EMC Camera for observation of EUT	CCD-400E	0005033	Mitsubishi	-	-
Filter ISDN	B84312-C110-E1		Siemens & Matsushita	-	-
Filter telephone systems / modem	B84312-C40-B1		Siemens & Matsushita	-	-
Filter Universal 1A	B84312-C30-H3		Siemens & Matsushita	-	-
Fully/Semi AE Chamber	10.58x6.3 8x6		Frankonia	-	-
Turntable	DS 420S	420/573/99	HD GmbH, H.Deisel	-	-
Valve Control Unit (pneum.)	VE 615P	615/348/99	HD GmbH, H.Deisel	-	-

6 Photo Report

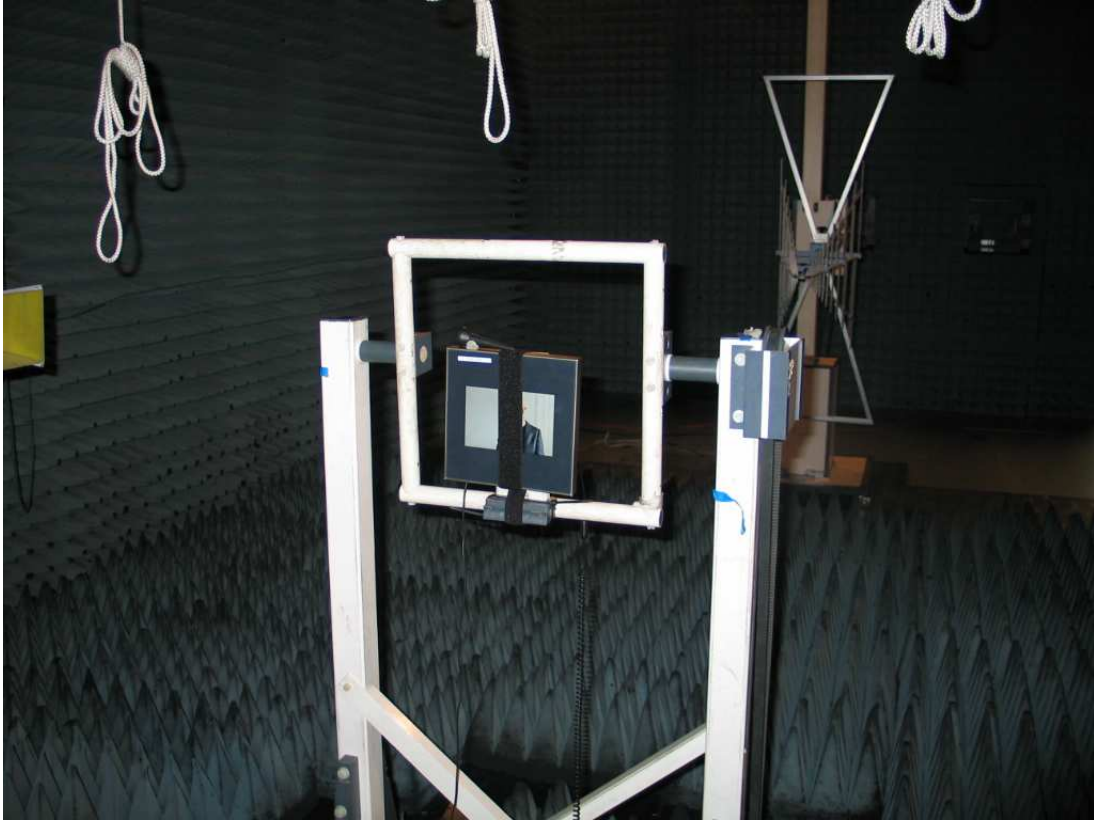
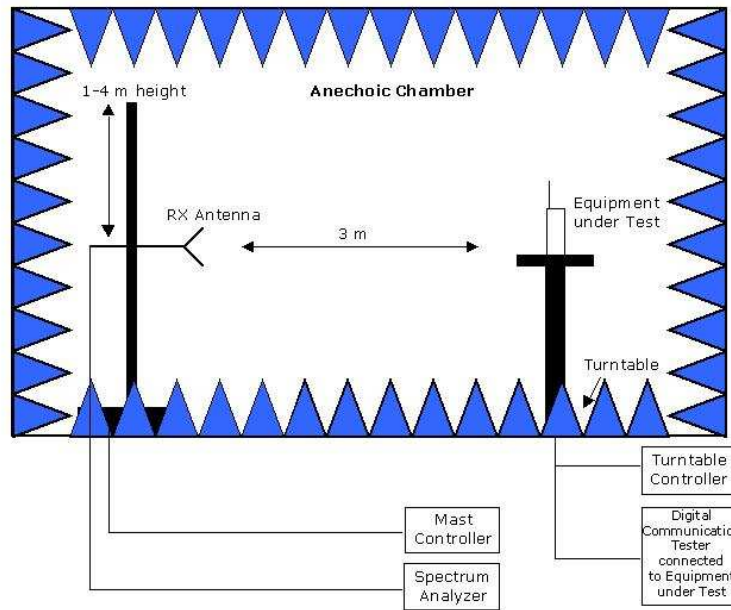


Photo 1: Test setup for radiated measurements

7 Setup Drawings



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

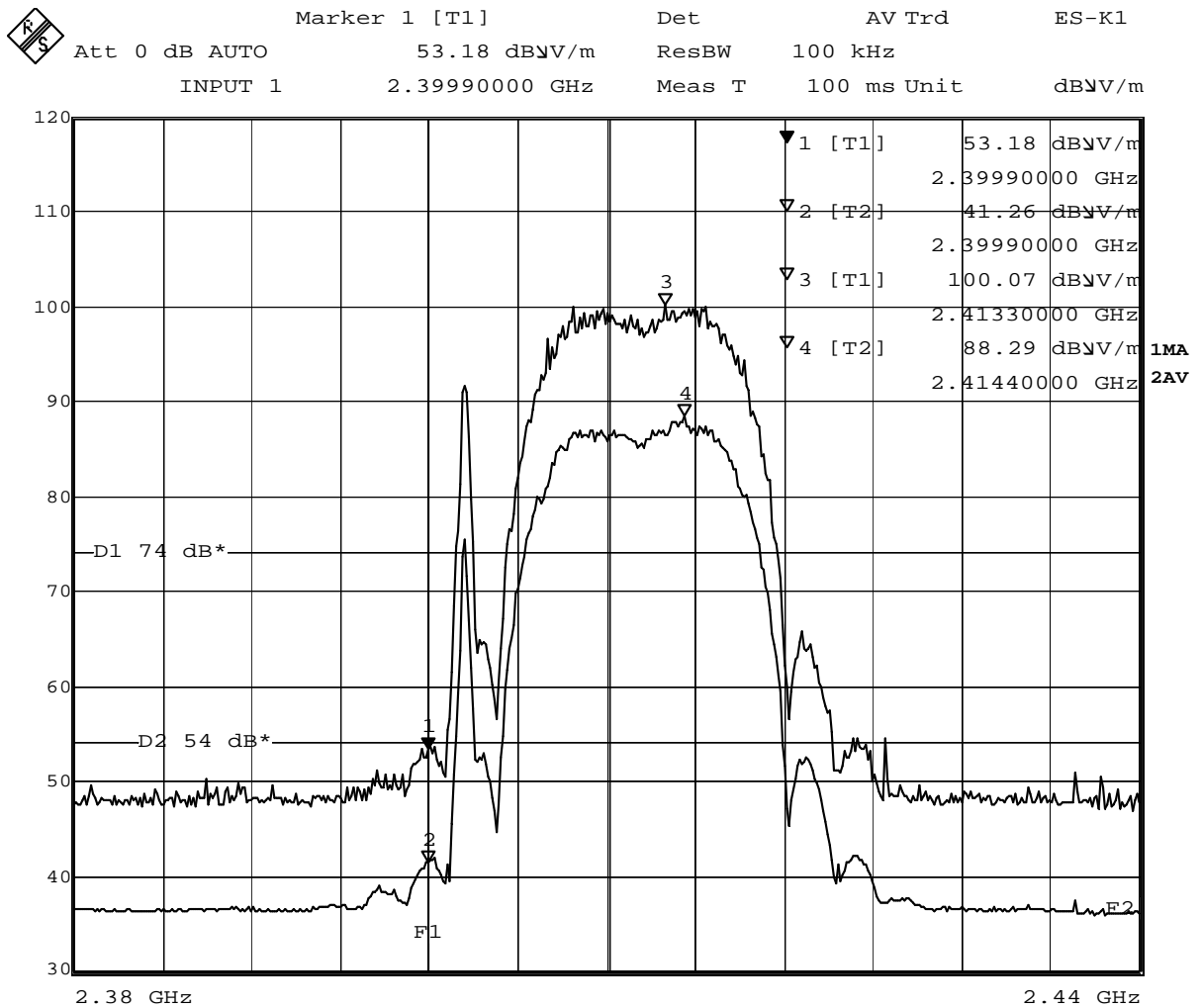
Drawing 1: Setup in the Anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting ground plane.

8 Annex measurement plots

8.1 Band edge compliance

Op. Mode


op-mode 1

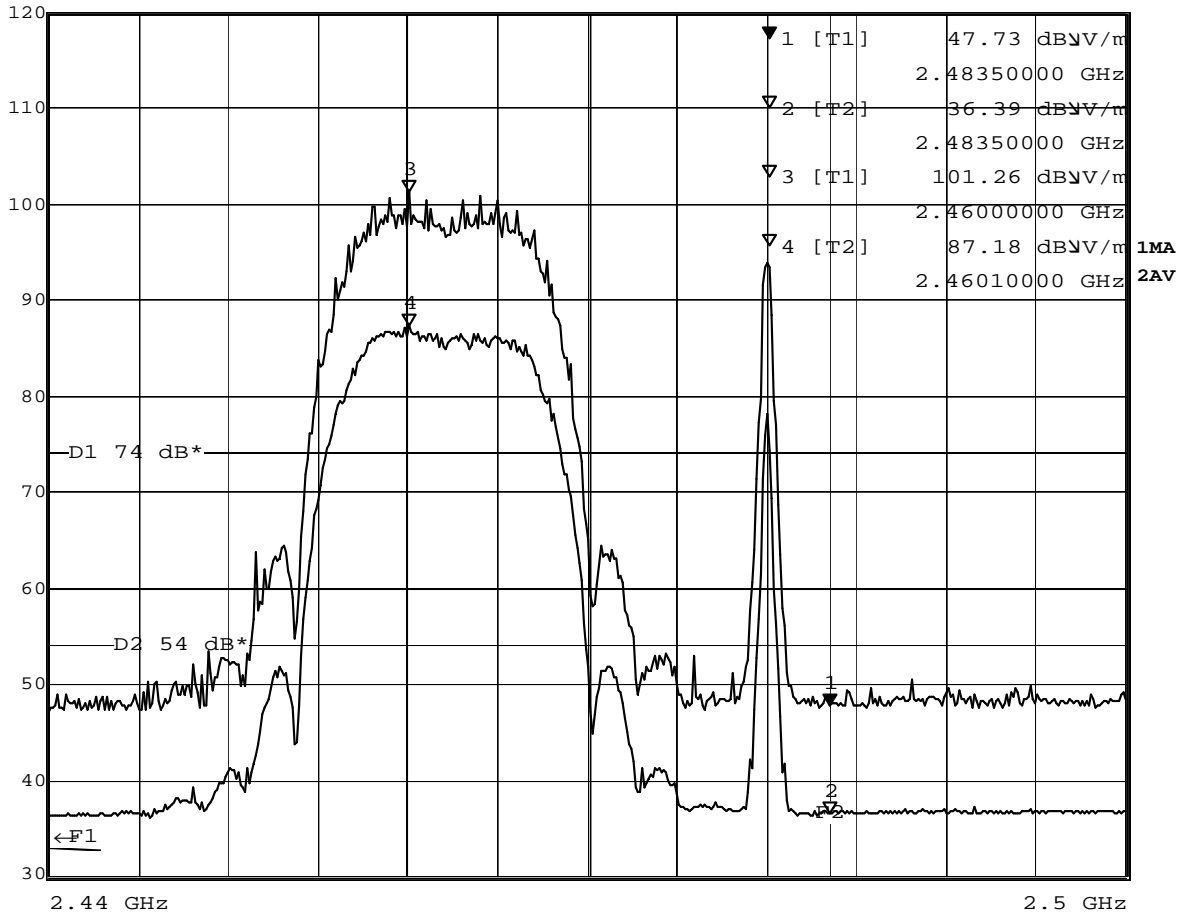


Date: 21.OCT.2008 11:53:53

Op. Mode

op-mode 2


	Att 0 dB AUTO	Marker 1 [T1]	47.73 dBV/m	Det	AV Trd	ES-K1
	INPUT 1	2.48350000 GHz		ResBW	100 kHz	
				Meas T	100 ms Unit	dBV/m

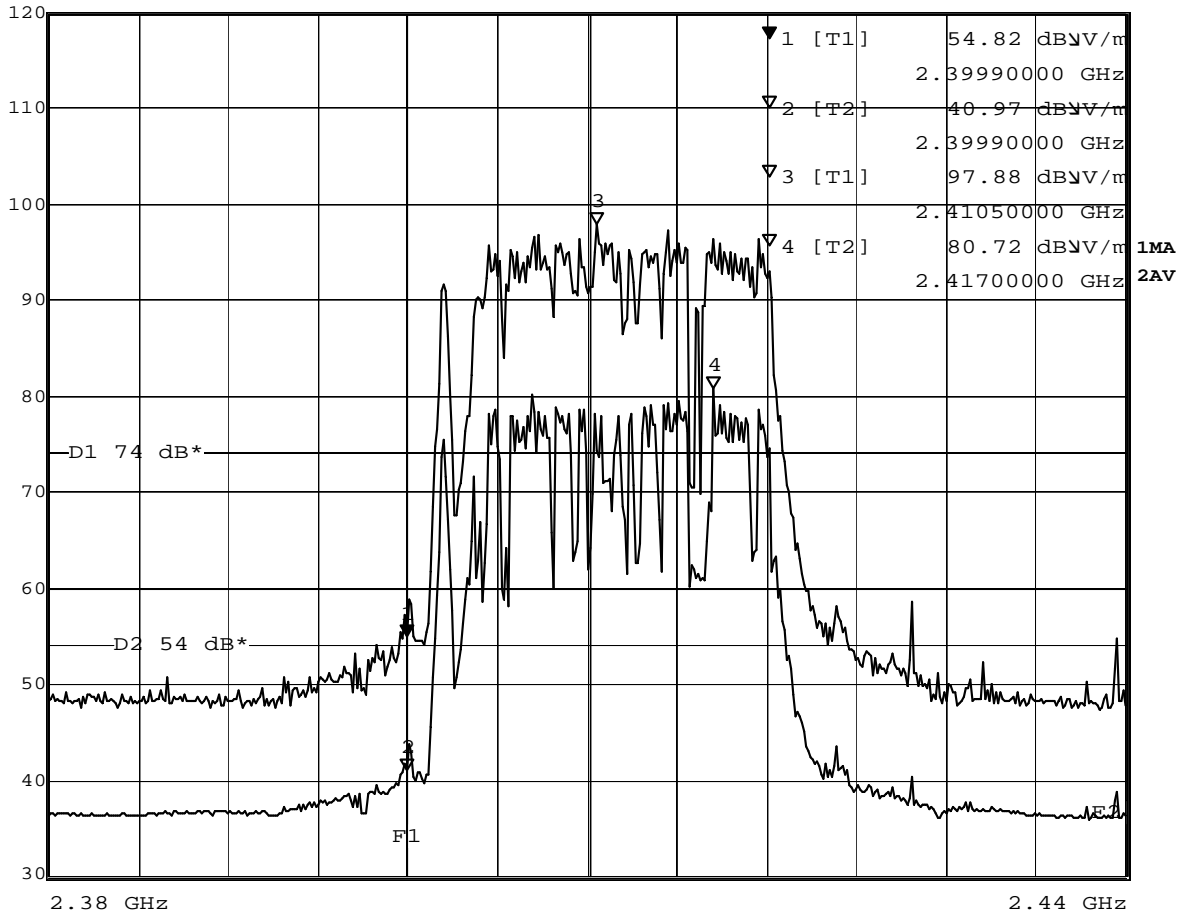


Date: 21.OCT.2008 12:06:09

Op. Mode

op-mode 3


	Marker 1 [T1]	Det	AV Trd	ES-K1
	Att 0 dB AUTO	54.82 dB μ V/m	ResBW 100 kHz	
	INPUT 1	2.39990000 GHz	Meas T 100 ms Unit	dB μ V/m

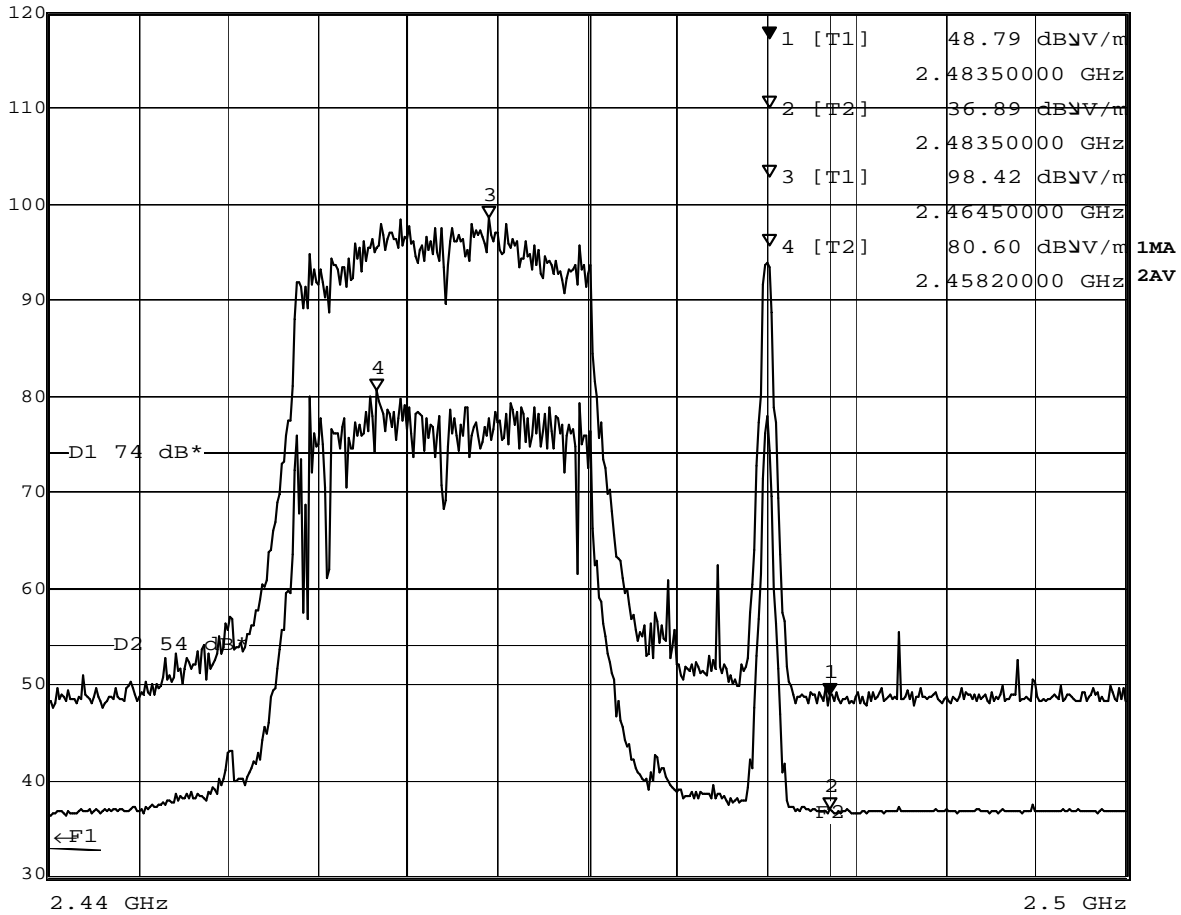


Date: 21.OCT.2008 11:43:42

Op. Mode

op-mode 4

	Att 0 dB AUTO	Marker 1 [T1]	48.79 dBV/m	Det	AV Trd	ES-K1
	INPUT 1	2.48350000 GHz		ResBW	100 kHz	
				Meas T	100 ms Unit	dBV/m



Date: 21.OCT.2008 12:20:40