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TEST REPORT

Test Report Reference: R50924_FCC_Edition 1

Equipment under Test: 2.4 GHz Module

OBRF2402

Applicant: Otto Bock HealthCare

Manufacturer: Otto Bock HealthCare

FCC ID: TDMRF

Test Laboratory
(CAB)
accredited by
DATech e.V.
in compliance with DIN EN ISO/IEC 17025
under the
Reg. No. DAT-P-105/99-21,
listed by
FCC 31040/SIT1300F2
and OATS listed by
IC 3469

Contents: **Page**

1 IDENTIFICATION

1.1 APPLICANT

Name:	Otto Bock HealthCare
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Country:	Germany
Name for contact purposes:	Mr. Erik LAATSCH, Mr. Michael NOLTE
Phone:	+49 5527 848 1507
Fax:	+49 5527 848 1484
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1.2 MANUFACTURER

Name:	Otto Bock HealthCare
Address:	Max-Naeder-Str. 15, 37115 Duderstadt
Country:	Germany
Name for contact purposes:	Mr. Erik LAATSCH, Mr. Michael NOLTE
Phone:	+49 5527 848 1507
Fax:	+49 5527 848 1484
Mail address:	----

1.3 DATES

Date of receipt of test sample:	20 May 2005
Start of test:	20 May 2005
Finish of test:	7 June 2005

1.4 TEST LABORATORY

The tests were carried out at: **PHOENIX TEST-LAB GmbH**
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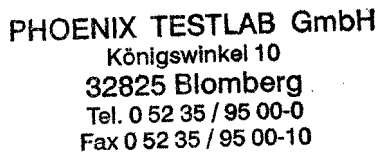
Germany **Fax: +49 (0) 52 35 / 95 00-10**

accredited by DATech e.V. in compliance with DIN EN ISO/IEC 17025 under Reg. No. DAT-P-105/99-21, listed by FCC 31040/SIT1300F2 and OATS listed by IC 3469.

Test engineer:	Michael DINTER Name		04 July 2005
Test report checked by:	Bernd STEINER Name		04 July 2005



Stamp

1.5 RESERVATION

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

1.6 NORMATIVE REFERENCES

[1] **ANSI C63.4-2003** 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 (April 2005)** Radio Frequency Devices

[3] **RSS-210 Issue 5 November 2001** Low power Licence-Exempt Radiocommunication Devices (All Frequency Bands).

[4] **RSS-212 Issue 1 (Provisional) February 27, 1999** Test Facilities and Test Methodes for Radio Equipment

1.7 TEST RESULTS

The requirements of this test document are fulfilled by the equipment under test. The complete test results are presented in the following.

2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Type of equipment:	2.4 GHz Module
Type designation:	OBRF2402
Serial No.:	-
Highest internal frequency:	2402 MHz / Channel 1*
Lowest internal frequency:	1 MHz *

* declared by the applicant

The following external I/O cables were used:

Cable	Length	Shielding	Connector
none	----	----	----
none	----	----	----

2.2 PEREPHERY DEVICES

The ancillary equipment mentioned below was in use:

The EUT is a transceiver module and was powered with two Batteries Type AAAA (3V DC).

2.3 MODIFICATIONS

The Transceiver was programmed in power category II and continuous transmit and receive mode.

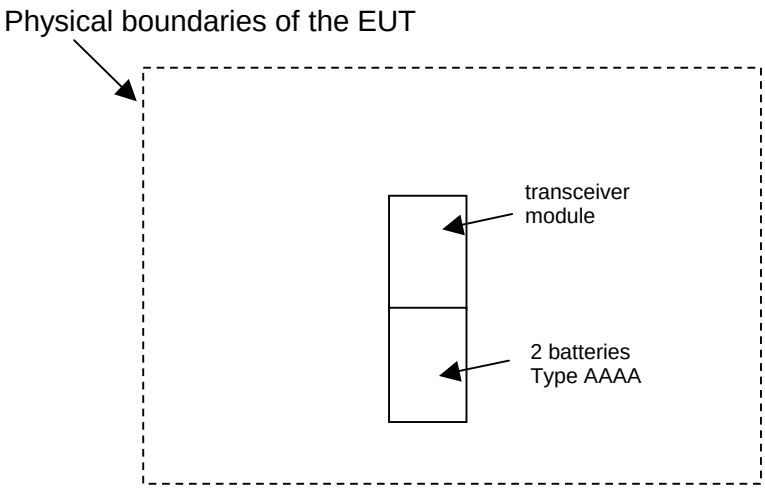
3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

The EUT was measured in a test mode (continuous receive and transmit mode).

The transceiver was operating on the following frequencies:

Channel:	Transmit frequency:
1	2402 MHz

The physical boundaries of the Equipment Under Test are shown below.



4 LIST OF TEST MODULES

Radiated emissions FCC 47 CFR Part 15 section 15.209 [2]						
No.	Application	Frequency range	Limits	Reference standard	Remark	Status
1	Intentional radiator	0.009 to 0.490 MHz 0.490 to 1.705 MHz 1.705 to 30 MHz 30 to 88 MHz 88 to 216 MHz 216 to 960 MHz above 960 MHz	2400/f(kHz) mV/m at 300 m 24000/f(kHz) mV/m at 30 m 30 mV/mat 30 m 40 dBµV/m at 3 m 43.5 dBµV/m at 3 m 46.0 dBµV/m at 3 m 54.0 dBµV/m at 3 m	ANSI C63.4 (2003);	-	Passed
Radiated emissions FCC 47 CFR Part 15 section 15.249 (a)[2] RSS210 subclause 6.2.2 m2						
No.	Application	Frequency range	Limits (microvolts/meter)	Reference standard	Remark	Status
2	Operation with in the band 2400 MHz to 2483.5 MHz	2400 to 2483.5 MHz	50.000 at 3m or 94dBµV/m at 3m	ANSI C63.4 (2003);	-	Passed
		Field strength of harmonics	500 µV/m at 3 m or 54 dBµV/m at 3m	ANSI C63.4 (2003);	-	Passed
Frequency tolerance over temperature and supply voltage FCC 47 CFR Part 15 section 15.249 (b3)[2]						
No.	Application		Limits	Reference standard	Remark	Status
3	Temperature range -20°C to +50°C and supply voltage 85 to 115 % or new battery		± 0.001 %	ANSI C63.4 (2003);	-	not appli-cable
Conducted emissions FCC 47 CFR Part 15 section 15.207 (a)[2]						
No.	Application	Frequency range	Limits (microvolts/meter)	Reference standard	Remark	Status
4	Intentional radiator	0.15 to 0.5 MHz 0.5 to 5 MHz 5 to 30 MHz	66 to 56 dBµV * (QP) 56 to 46 dBµV * (AV) 56 dBµV * (QP) 46 dBµV * (AV) 60 dBµV * (QP) 50 dBµV * (AV)	ANSI C63.4 (2003);	-	not appli-cable*

* Because the module is battery powered only

5 METHOD OF MESUREMENT

5.1 RADIATED EMISSIONS

The radiated emission measurement is subdivided into four stages.

- A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 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 final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 25 GHz.

All measurements will be carried out with the EUT working on the middle and upper and lower edge of the assigned frequency band. For this reason the hopping function of the EUT has to be disenabled.

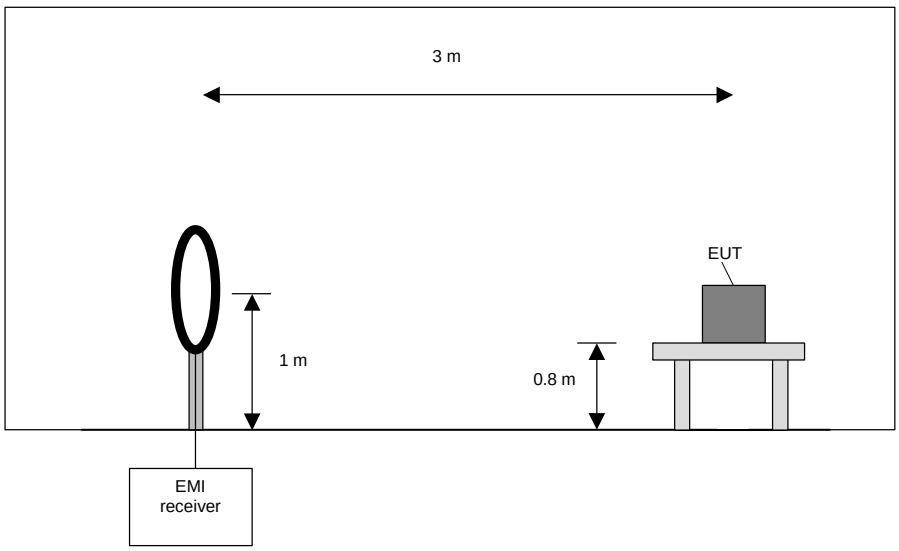
Preliminary measurement (9 kHz to 30 MHz):

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 C63.4-2003 [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 4) with the other orthogonal axes of the EUT.
7) Rotate the measuring antenna and repeat steps 1) to 5).

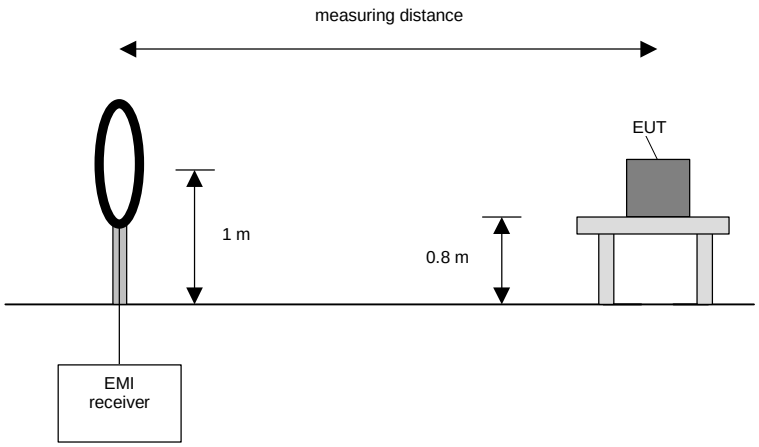
Final measurement (9 kHz to 30 MHz):

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 if applicable (handheld equipment).

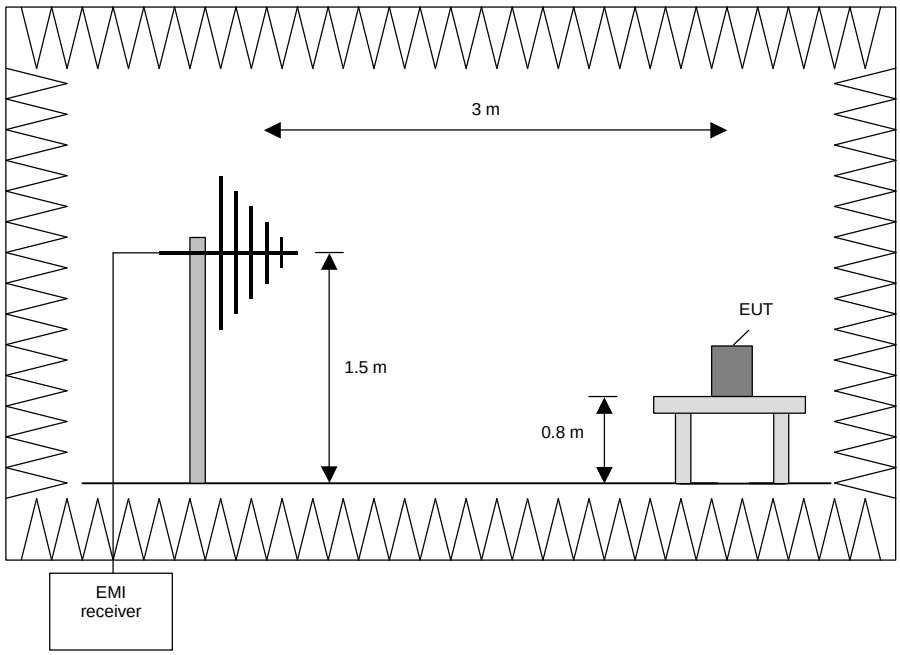
Preliminary measurement (30 MHz to 1 GHz)

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 C63.4-2003 [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:

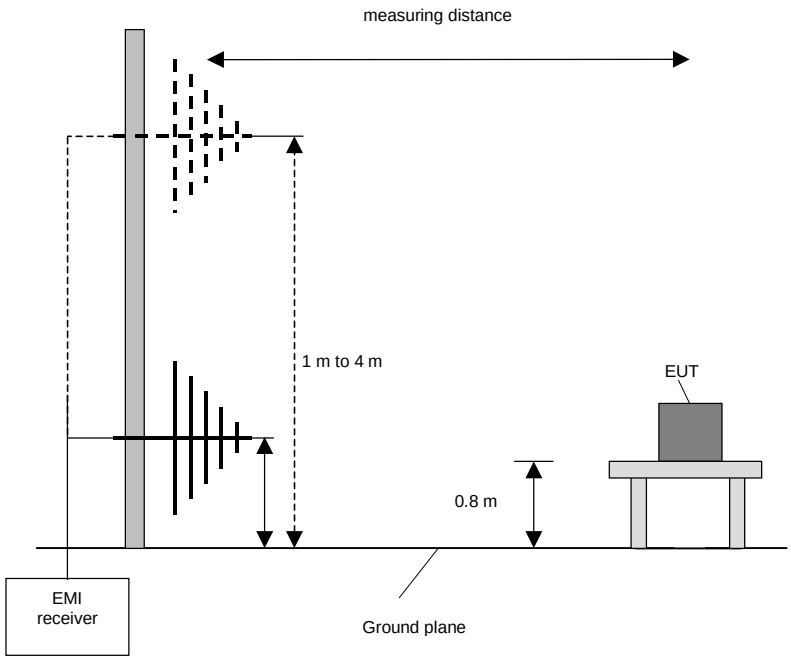
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the 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 if handheld equipment.
7. Repeat 1) to 5) with the vertical polarisation of the measuring antenna.

Final measurement (30 MHz to 1 GHz)

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

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

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

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

Final measurement (1 GHz to 25 GHz)

This 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 C63.4-2003 [1].

Preliminary measurement (1 GHz to 25 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 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 °. If the EUT is larger than the antenna beamwidth, the antenna will be moved to various positions, to cover the whole surface of the EUT. It might be possible to shorter the measuring distance to higher the measurement sensitivity.

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

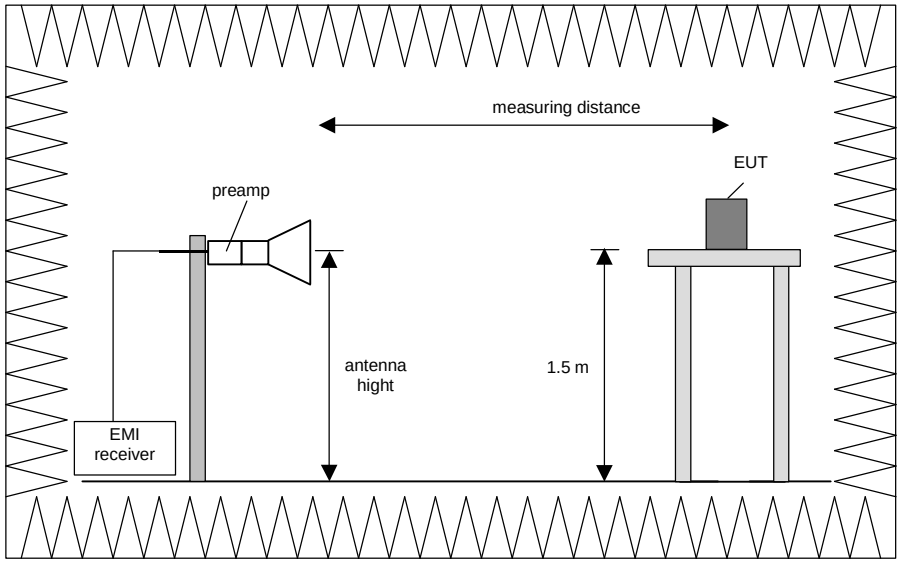
Frequency range	Resolution bandwidth
1 GHz to 4 GHz	100 kHz
4 GHz to 12 GHz	100 kHz
12 GHz to 18 GHz	100 kHz
18 GHz to 25 GHz	100 kHz

Final measurement (1 GHz to 25 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 MAX Hold 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 °. If the EUT is larger than the antenna beamwidth, the antenna will be moved to various positions, to cover the whole surface of the EUT. It might be possible to shorter the measuring distance to higher the measurement sensitivity.

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 25 GHz	1 MHz



Procedure of measurement:

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 and 18 GHz to 25 GHz.
The following procedure will be used:

1) Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2) Rotate the EUT by 360 ° to maximize the detected signals.
3) Change the antenna polarisation.
4) Rotate the EUT by 360 ° to maximize the detected signals.
5) Make a hardcopy of the spectrum.
6) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
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) with the other orthogonal axes of the EUT if handheld equipment.
9) Repeat steps 1) to 8) for the next antenna spot if the EUT is lager than the antenna beamwidth.

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

5.2 BAND-EDGE COMPLIANCE

The calibration of the spectrum analyser has to be checked with the help of a known signal from a signal generator. The EUT has to be connected to the spectrum analyser via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT has to be switched on and the hopping function has to be disenabled.

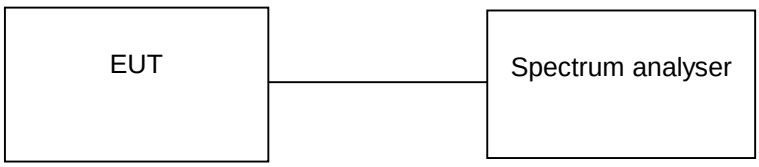
The following spectrum analyser settings shall be used:

- Span: Wide enough to capture the peak level of the emission on the channel closest to the band-edge, as well as any modulation products, which fall outside the assigned frequency band.
- Resolution bandwidth: ≥ 1 % of the span, but not below 30 kHz.
- Video bandwidth: ≥ the resolution bandwidth.
- Sweep: Auto.
- Detector function: Peak.
- Trace mode: Max hold.

After trace stabilisation the marker shall be set on the signal peak. The first display line has to be set on this value. The second display line has to be set 20 dB below the first line (or the peak marker). The frequency line shall be set on the edge of the assigned frequency band. Set the second marker on the emission at the band-edge, or on the highest modulation product outside of the band, if this level is higher than that at the band-edge. After this the difference between this emission level and the signal peak will be calculated. With the value of measured field strength of the signal peak and the calculated difference to the emission level, the level of the field strength of the emission will be calculated.

The measurement will be performed at the upper and lower end of the assigned frequency band.

Test set-up:



6 MEASUREMENT RESULTS

6.1 RADIATED EMISSION TRANSMIT

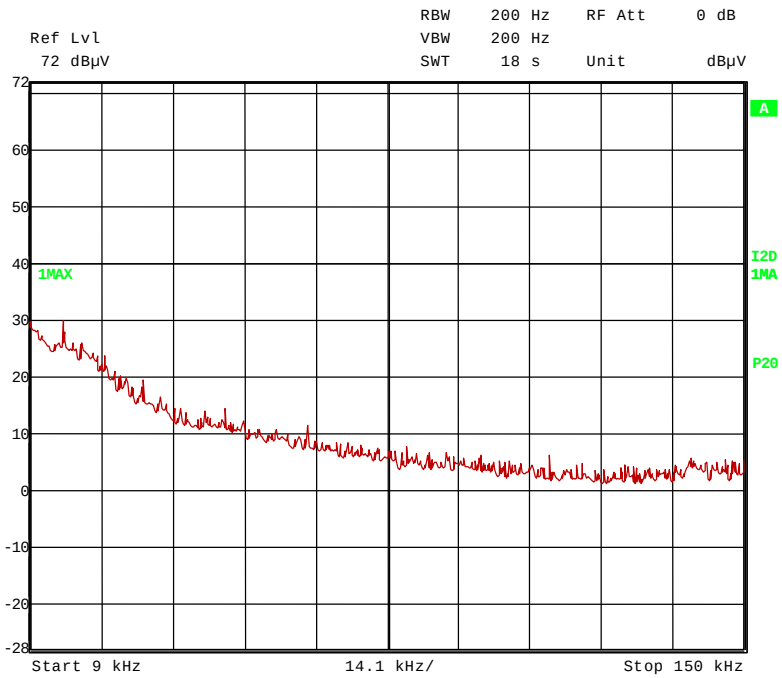
6.1.1 PRELIMINARY MEASURMENT (9 kHz to 30 MHz)

Ambient temperature	20 °C	Relative humidity	45 %

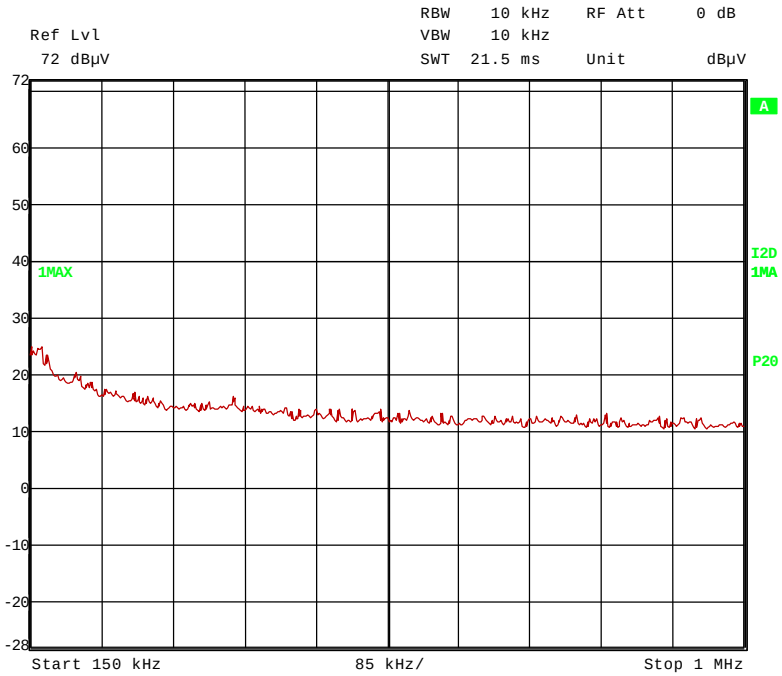
Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: no cables were connected

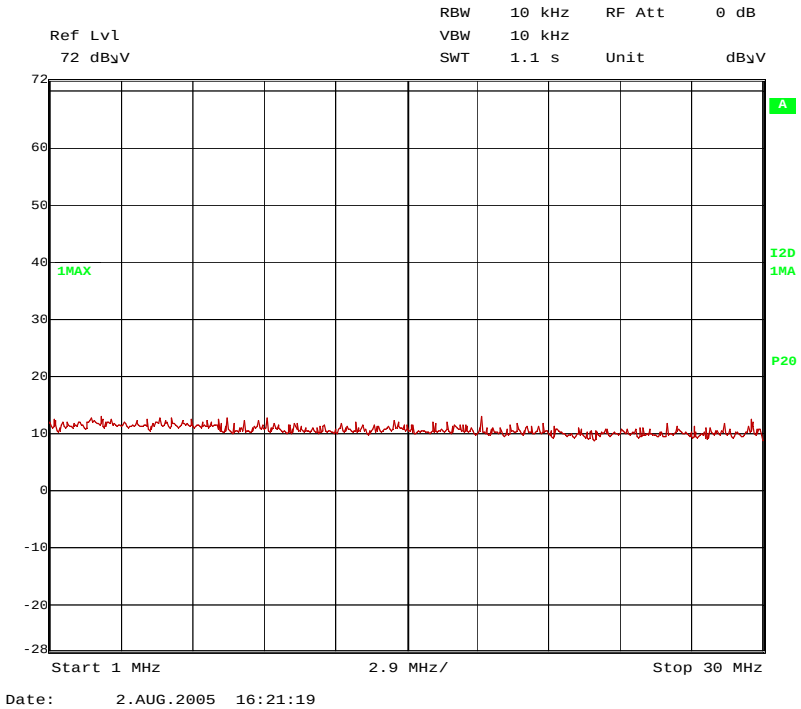
Test record: The test was carried out in transmit mode of the EUT (with modulation). All results are shown in the following.



50924_1.wmf: Spurious emissions from 9 kHz to 150 kHz



50924_2.wmf: Spurious emissions from 150 kHz to 1 MHz



50924_3.wmf: Spurious emissions from 1 MHz to 30 MHz

No significant frequencies were found during the preliminary radiated emission test:
No frequencies were found inside the restricted bands.

TEST EQUIPMENT USED THE TEST:

29, 31 - 33, 55

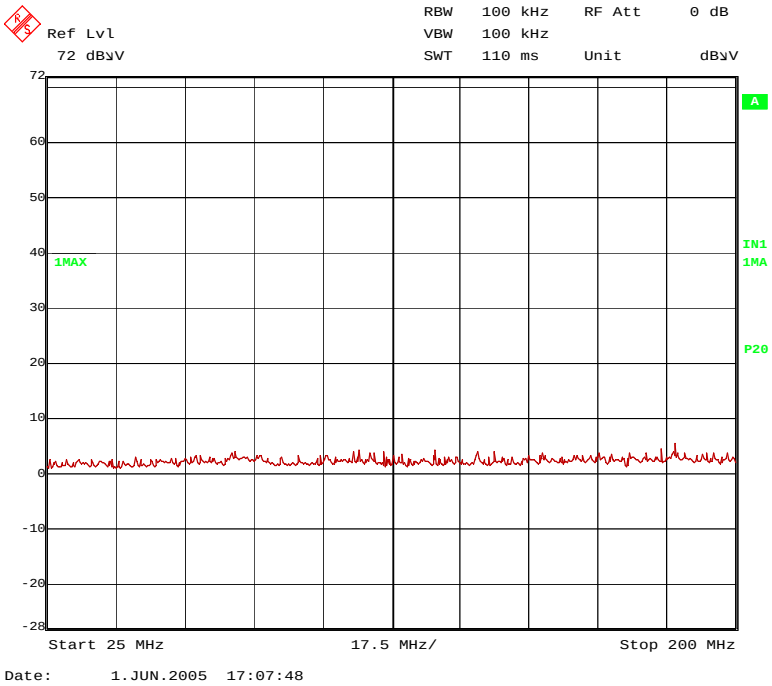
6.1.2 PRELIMINARY MEASUREMENT (30 MHz to 1 GHz)

Ambient temperature	20 °C	Relative humidity	45 %

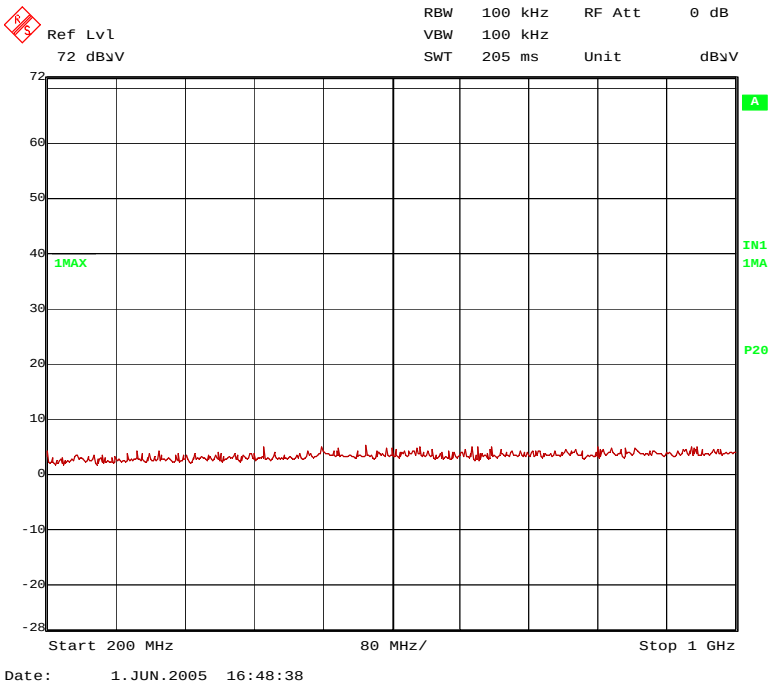
Position of EUT: The EUT was set-up on a table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: no cables were connected

Test record: The test was carried out in transmit mode of the EUT (with modulation). All results are shown in the following.



50924H_TX_1F.wmf: 25 MHz to 200 MHz, transmit mode



50924H_TX_2F.wmf: 200 MHz to 1 GHz, transmit mode

No significant frequencies were found during the preliminary radiated emission test:
No frequencies were found inside the restricted bands.

TEST EQUIPMENT USED THE TEST:

29, 31 - 33, 34, 35, 43

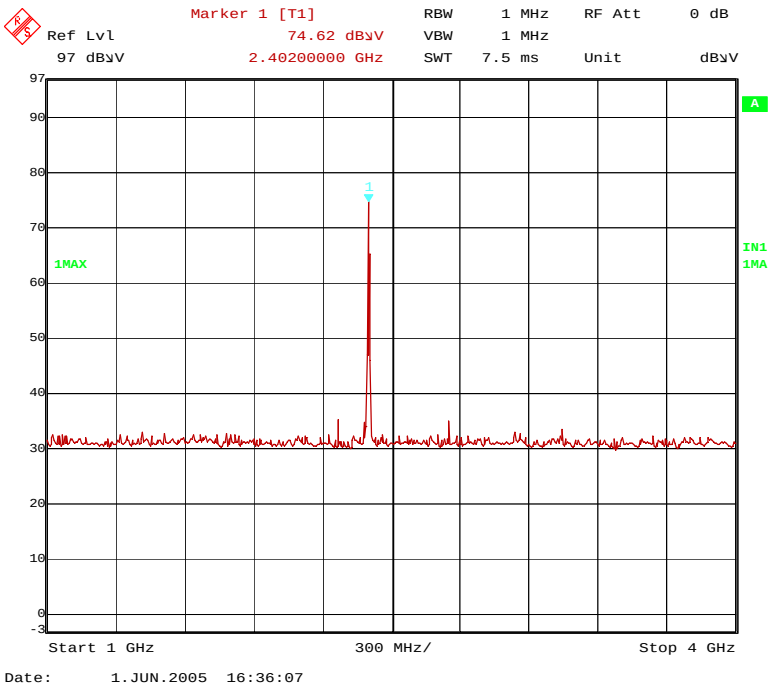
6.1.3 PRELIMINARY MEASUREMENT (1 GHz to 25 GHz)

Ambient temperature	20 °C	Relative humidity	45 %

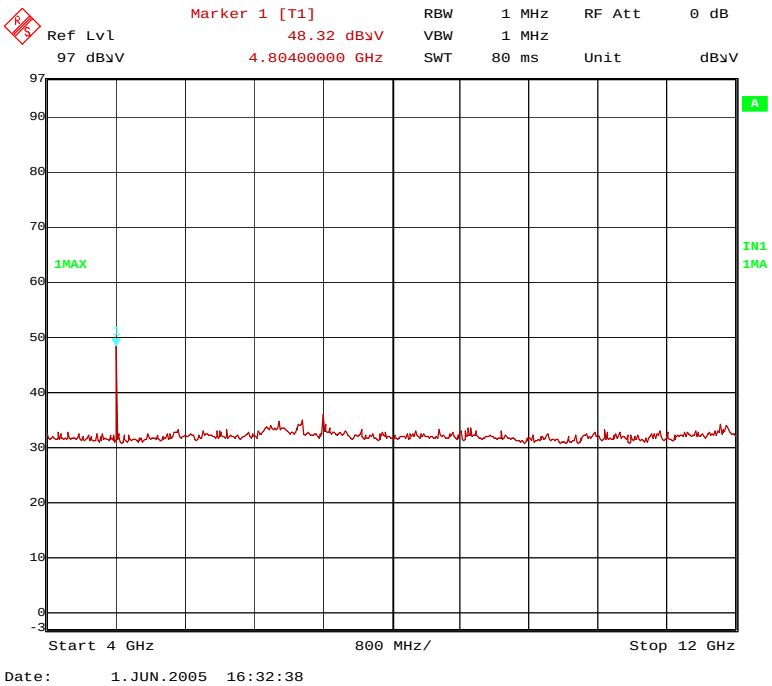
Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: no cables were connected

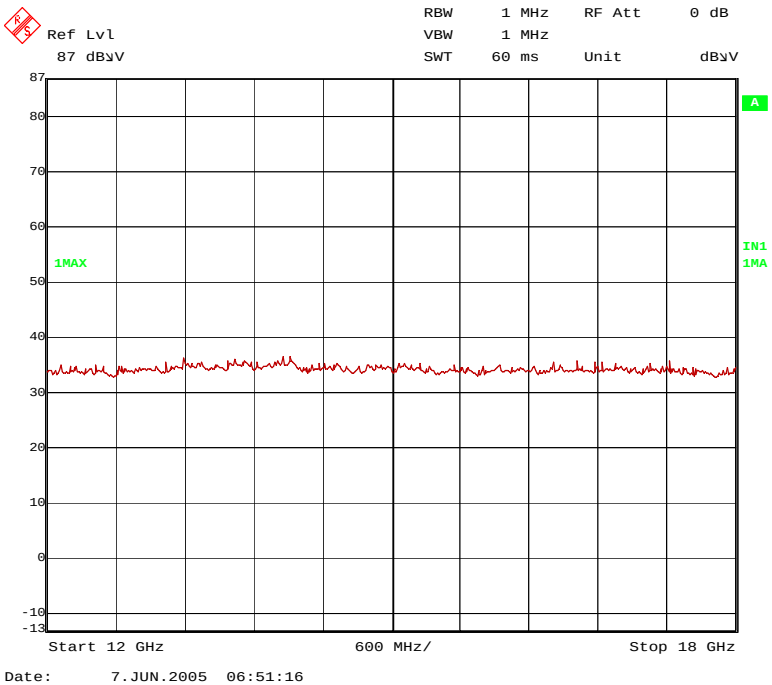
Test record: The test was carried out in transmit mode of the EUT (with modulation). All results are shown in the following.



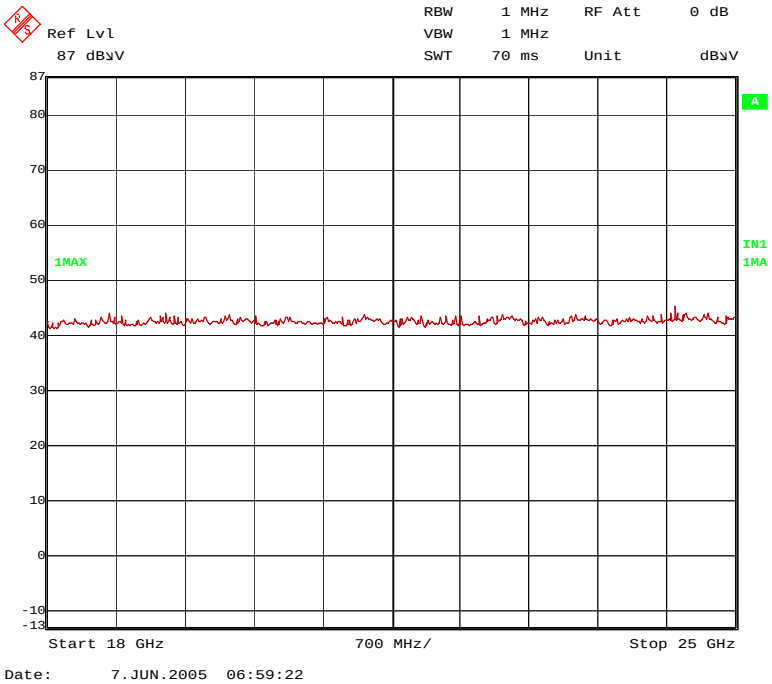
50924H_TX_3F.wmf: 1 GHz to 4 GHz, transmit mode



50924H_TX_4F.wmf: 4 GHz to 12 GHz, transmit mode



50924H_TX_5F.wmf: 12 GHz to 18 GHz, transmit mode



50924H_TX_6F.wmf: 18 GHz to 25 GHz, transmit mode

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

- 2.402 GHz, and 4.804 GHz.

These frequencies have to be measured in a final measurement. The results were presented in the following.

TEST EQUIPMENT USED THE TEST:

29, 31 - 33, 34, 36, 37, 39, 43, 47, 49, 50, 51

6.1.4 FINAL MEASUREMENT

Ambient temperature	20 °C	Relative humidity	45 %

Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: no cables were connected

Test record: The test was carried out in transmit mode of the EUT (with modulation). All results are shown in the following.

Measurement results transmit mode:

Result measured with the peak detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2.402	79.4	114.0	34.7	74.6	28.5	26.5	2.8	150	Vert.	-
4.804	59.5	74.0	14.5	48.3	33.1	25.7	3.8	150	Vert.	Yes

Result measured with the average detector:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
2.402	59.4	94.0	34.7	54.6	28.5	26.5	2.8	150	Vert.	-
4.804	39.5	54.0	14.5	28.3	33.1	25.7	3.8	150	Vert.	Yes

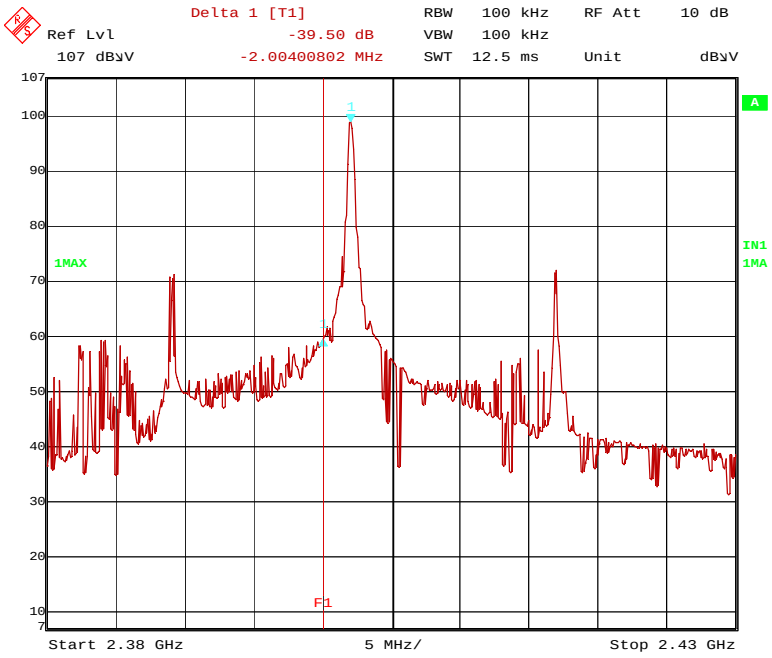
Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

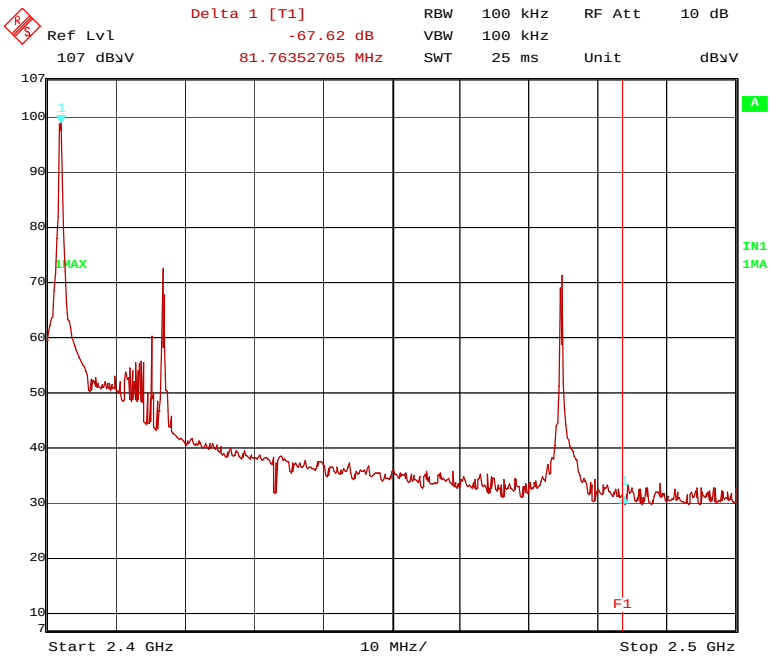
29, 31 - 33, 34, 36, 43, 49

6.2 BAND-EDGE COMPLIANCE

Ambient temperature	20 °C	Relative humidity	45 %



50924_58.wmf (band-edge compliance, lower band edge):



50924_67.wmf (band-edge compliance, upper band edge):

The plots on the two pages before are showing the band-edge compliance for the upper and lower band-edge. The frequency line 1 (F1) shows the edge of the assigned frequency.

Band-edge compliance				
Band-edge	Difference to the signal peak [dB]	Field strength of this signal peak [dBµV/m]	Field strength at the band edge [dBµV/m]	Limit
Upper	67.6	59.3	-8.3	54.0 dBµV/m
Lower	39.5	59.3	19.8	54.0 dBµV/m

Test: Passed

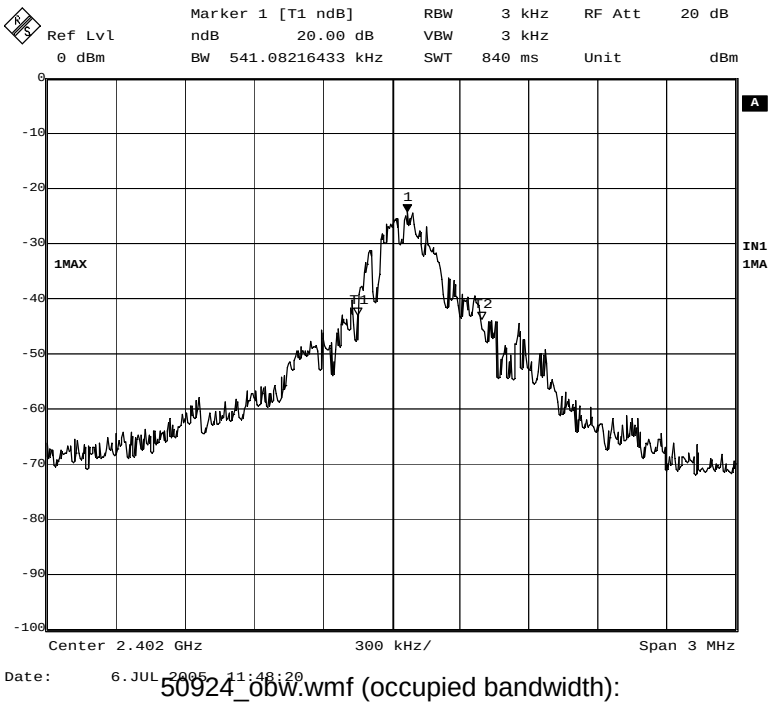
TEST EQUIPMENT USED FOR THE TEST:

31, 45

6.3 OCCUPIED BANDWIDTH

Ambient temperature	20 °C	Relative humidity	45 %

Test record: The test was carried out in transmit mode of the EUT (with modulation). All results are shown in the following.



50924_obw.wmf (occupied bandwidth):

The 20dB Bandwidth of the modulated signal is 541kHz

TEST EQUIPMENT USED FOR THE TEST:

31, 45

6.4 RADIATED EMISSIONS RECEIVE

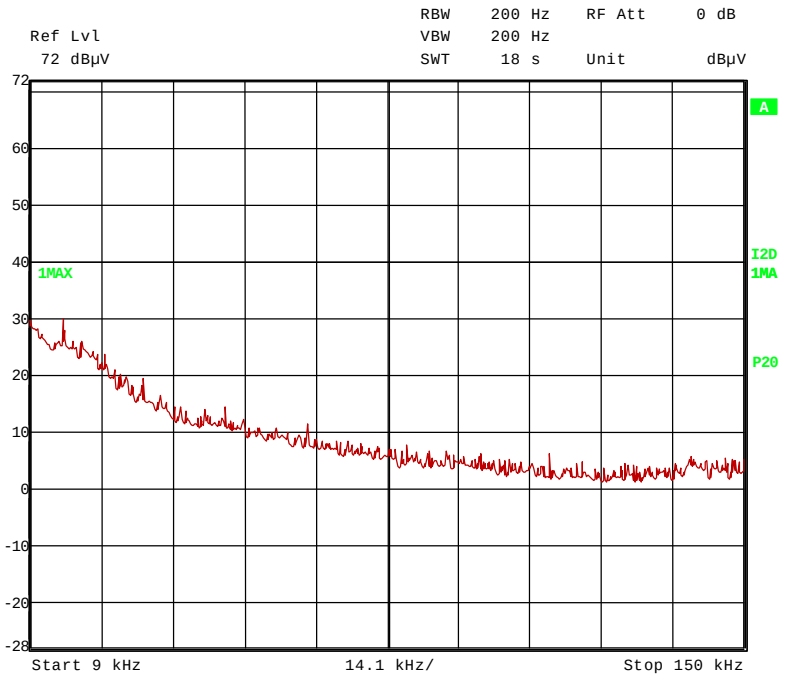
6.4.1 PRELIMINARY MEASUREMENT (9 kHz to 30 MHz)

Ambient temperature	20 °C	Relative humidity	45 %

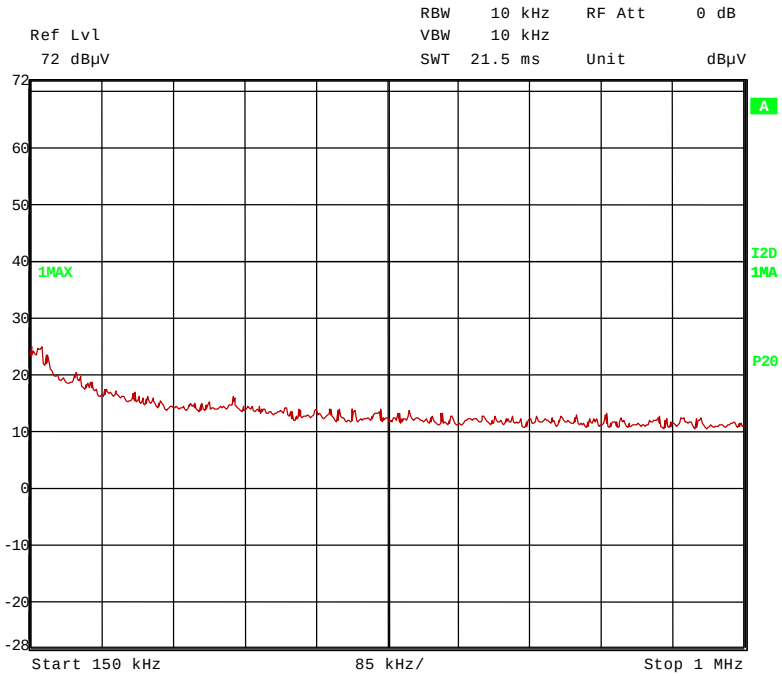
Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: no cables were connected

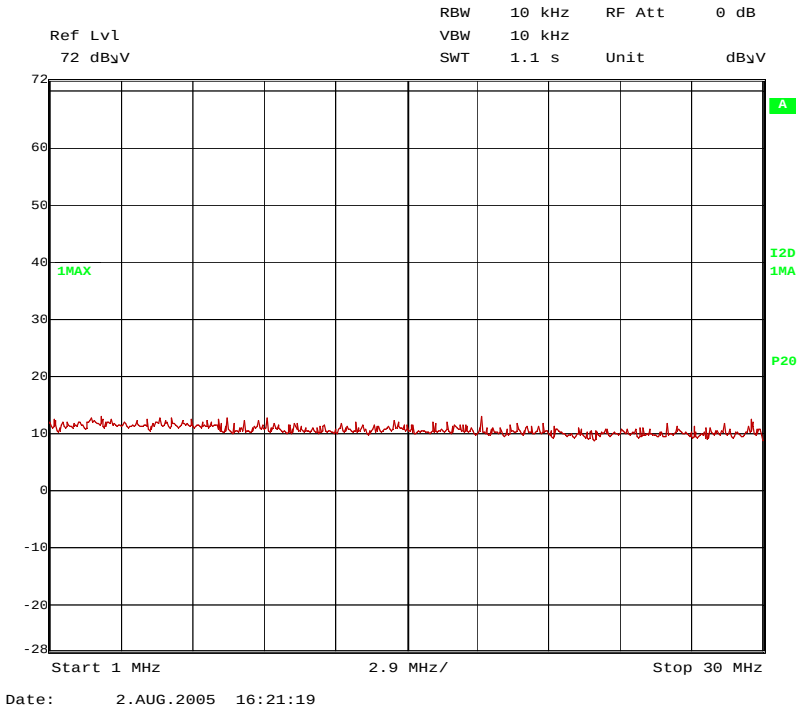
Test record: The test was carried out in receive mode of the EUT. All results are shown in the following.



50924modrx_emi1.wmf: Spurious emissions from 9 kHz to 150 kHz receive mode



50924modrx_emi2.wmf: Spurious emissions from 150 kHz to 1 MHz receive mode



50924modrx_emi3.wmf: Spurious emissions from 1 MHz to 30 MHz receive mode

No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out on the outdoor test site.

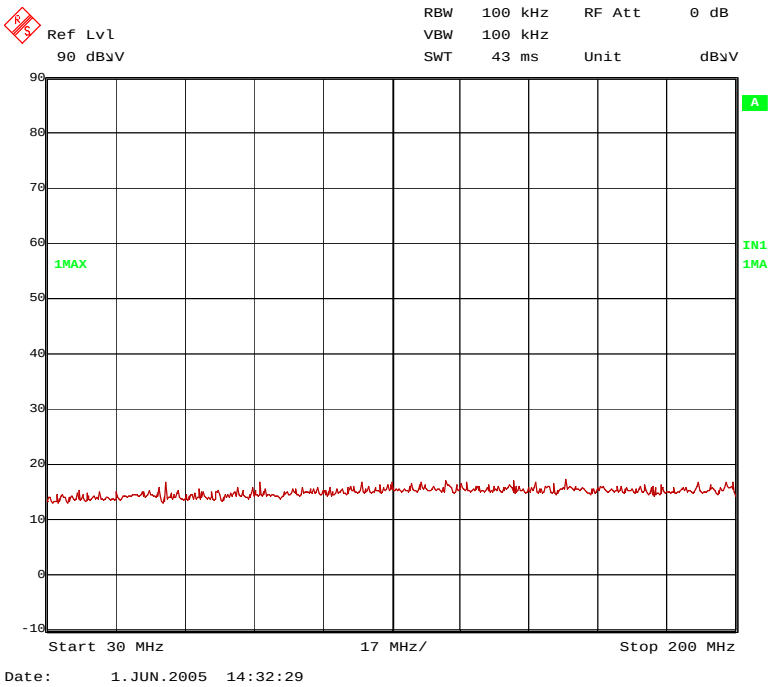
6.4.2 PRELIMINARY MEASUREMENT (30 MHz to 1 GHz)

Ambient temperature	20 °C	Relative humidity	45 %

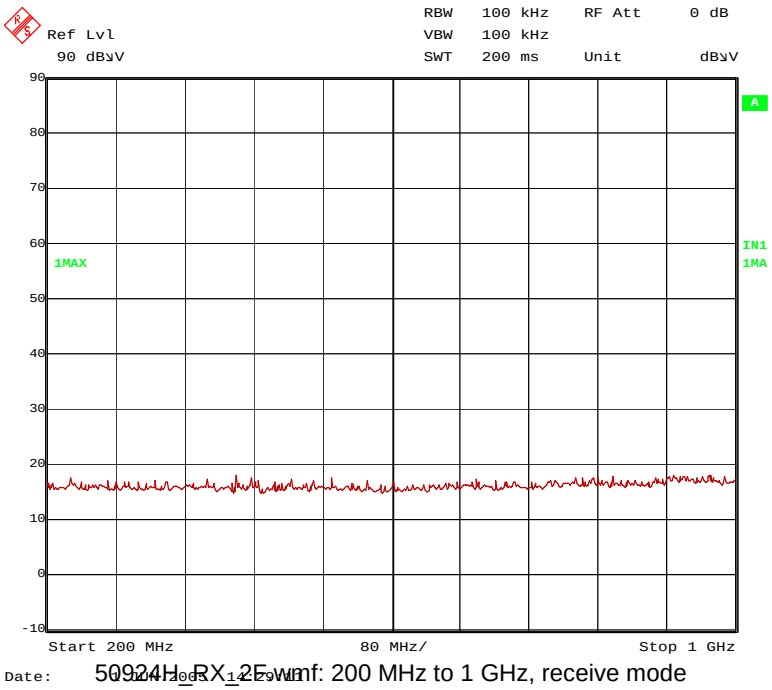
Position of EUT: The EUT was set-up on a table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: no cables were connected

Test record: The test was carried out in receive mode of the EUT. All results are shown in the following.



50924H_RX_1F.wmf: 30 MHz to 200 MHz, receive mode



50924H_RX_2F.wmf: 200 MHz to 1 GHz, receive mode

No significant frequencies above the noise floor of the system were found during the preliminary radiated emission test, so no measurements were carried out the open area test site.

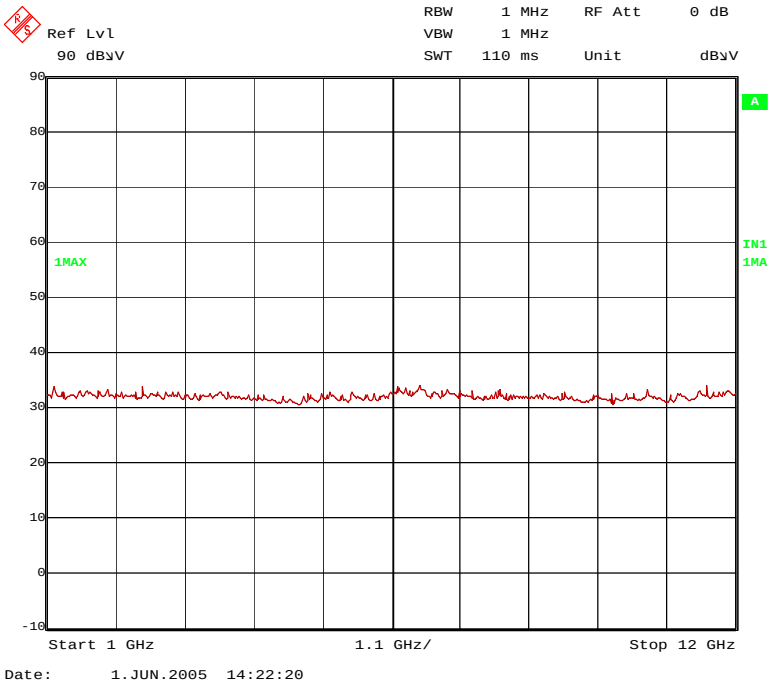
6.4.3 PRELIMINARY MEASUREMENT (1 GHz to 25 GHz)

Ambient temperature	20 °C	Relative humidity	45 %

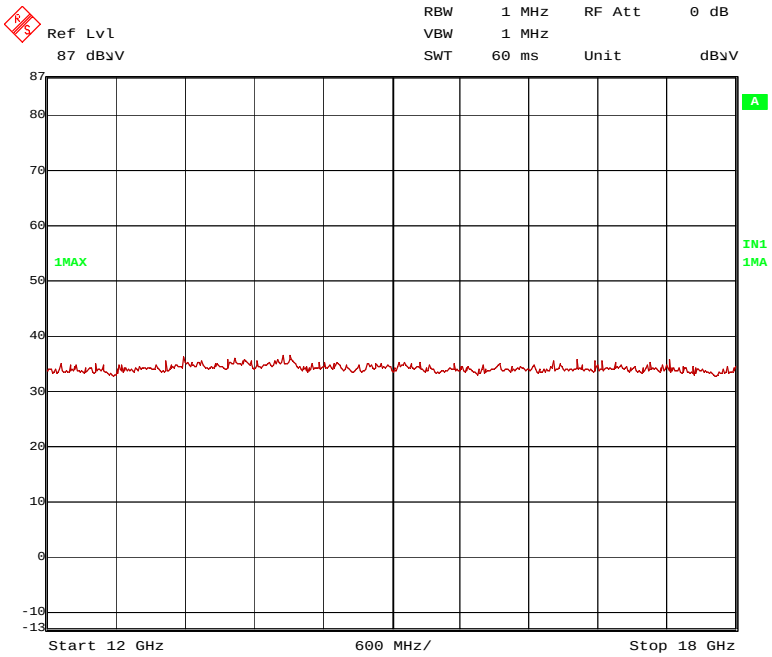
Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: no cables were connected

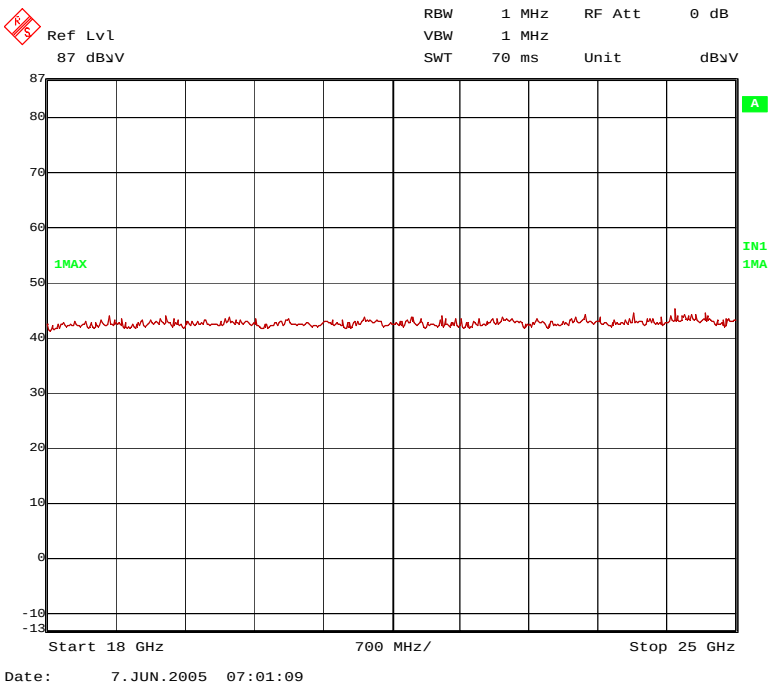
Test record: The test was carried out in receive mode of the EUT. All results are shown in the following.



50924H_RX_3F.wmf: 1 GHz to 12 GHz, receive mode



50924H_RX_5F.wmf: 12 GHz to 18 GHz, receive mode



50924H_RX_F6.wmf: 18 GHz to 25 GHz, receive mode

No significant frequencies were found during the preliminary radiated emission test:

TEST EQUIPMENT USED FOR THE TEST:

29, 31 - 33, 34, 35, 36, 37, 39, 43, 47, 49, 50, 51, 55

6.4.4 FINAL MEASUREMENT

Ambient temperature	20 °C	Relative humidity	45 %

Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: no cables were connected

Test record: The test was carried out in receive mode of the EUT. All results are shown in the following.

Measurement results receive mode:

Frequency GHz	Corr. value dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor 1/m	Preamp dB	Cable loss dB	Height cm	Pol.	Restr. Band
			All frequencies at least 10 dB below 54 dBµV/m. No other spurious frequencies found.							

7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

Emission measurement at AC mains and DC in / out ports at M4					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
1	Shielded chamber M4	-	Siemens	B83117S1-X158	480088
2	Measuring receiver	ESAI	Rohde & Schwarz	831953/001 833181/018	480025 480026
3	LISN	NSLK8128	Schwarzbeck	8128155	480058
4	DC-filter	B84266-A21-E13	Siemens	940164525	480099
5	AC-filter	B84299-D87-E3	Siemens	930262292	480097
6	EMI-Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M5					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
7	Fully anechoic chamber M5	-	Siemens	B83177-S1-X156	480073
8	Measuring receiver	ESVS30	Rohde & Schwarz	829673/012	480024
9	Controller	HD100	Deisel	100/324	480067
10	Antenna support	MA240	Deisel	228/314	480069
11	Turntable	DS412	Deisel	412/317	480070
12	Antenna	CBL6112C	Chase	2689	480327
13	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M6					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
14	Open area test site	-	Phoenix Test-Lab	-	480085
15	Measuring receiver	ESVS30	Rohde & Schwarz	829673/012	480024
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 A	Chase	1643	480147
20	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M8					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
21	Fully anechoic chamber M8	-	Siemens	B83117-E7019-T231	480190
22	Measuring receiver	ESMI	Rohde & Schwarz	843977/001 843530/018	480179 480180
23	Measuring receiver	ESCS 30	Rohde & Schwarz	828985/014	480270
24	Controller	HD100	Deisel	100/427	480181
25	Turntable	DS420	Deisel	420/435/97	480186
26	Antenna support	AS615P	Deisel	615/310	480187
27	Antenna	CBL6112 A	Chase	2034	480185
28	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Radiated emission measurement at M20					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
29	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303
30	Measuring receiver	ESMI	Rohde & Schwarz	843977/001 843530/018	480179 480180
31	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355
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
36	Antenna	3115 A	EMCO	9609-4918	480183
37	Standard Gain Horn 11.9GHz – 18GHZ	18240-20	Flann Microwave	483	480294
38	Standard Gain Horn 11.9GHz – 18GHZ	18240-20	Flann Microwave	482	480295
39	Standard Gain Horn 17.9GHz – 26.7GHZ	20240-20	Flann Microwave	411	480297
40	Standard Gain Horn 17.9GHz – 26.7GHZ	20240-20	Flann Microwave	410	480296
41	Standard Gain Horn 26.4GHz – 40.1GHZ	22240-20	Flann Microwave	469	480299

No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
42	Standard Gain Horn 26.4GHz – 40.1GHZ	22240-20	Flann Microwave	468	480298
43	RF-cable No. 30	RTK 081	Rosenberger	-	410141
44	RF-cable No. 31	RTK 081	Rosenberger	-	410142
45	RF-cable 1m	KPS-1533-400-KPS	Insulated Wire	-	480300
46	RF-cable 1m	KPS-1533-400-KPS	Insulated Wire	-	480301
47	RF-cable 2m	KPS-1533-400-KPS	Insulated Wire	-	480302
48	RF-cable No. 5	RTK 081	Rosenberger		410097
49	Preamplifier	JS3-00101200-23-5A	Miteq	681851	480337
50	Preamplifier	JS3-12001800-16-5A	Miteq	571667	480343
51	Preamplifier	JS3-18002600-20-5A	Miteq	658697	480342
52	Preamplifier	JS3-26004000-25-5A	Miteq	563593	480344
53	EMI Software	ES-K1	Rohde & Schwarz	-	480111

Ancillary equipment used for testing					
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
54	Power supply	TOE 8852	Toellner	51712	480233
55	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

All used measurement equipment was calibrated (if necessary). The calibration intervals and the calibration history will be given out on request.

8 LIST OF ANNEXES

ANNEX A	**INTERNAL PHOTOGRAPHS OF THE TEST SAMPLE**:	**4 page**
	PCB (transceiver) 3D view	50924_eut7.jpg
	PCB (transceiver) top view	50924_eut2.jpg
	PCB (transceiver) bottom view	50924_eut1.jpg
	PCB (transceiver) side view	50924_eut6.jpg
ANNEX B	**EXTERNAL PHOTOGRAPHS OF THE TEST SAMPLE**:	**---- pages**
ANNEX C	**PHOTOGRAPHS OF THE TEST SET-UPS**:	**3 pages**
	Test set-up fully anechoic chamber	50924mod_emi1.JPG
	Test set-up fully anechoic chamber	50924mod_emi4.JPG
	Test set-up fully anechoic chamber	50924mod_emi6.JPG