

TEST REPORT

Test Report Reference: R70306_A Edition 1

Equipment under Test: Sender mit Verkleidung

FCC ID: U3L0007982-090

Spare Part Number: 94317199

Serial Number: none

Applicant: Heinz Kettler GmbH & Co. KG

Manufacturer: Siemens AG

**Test Laboratory
(CAB)
accredited by
DATech GmbH
in compliance with DIN EN ISO/IEC 17025
under the
Reg. No. DAT-P-105/99-21,
and
FCC Test site registration number 90877**

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1 IDENTIFICATION

1.1 APPLICANT

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1.2 MANUFACTURER

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	30519 Hannover
Country:	Germany
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Tel:	+49 511-877-1572
Fax:	+49 511-877-741572
e-mail address:	christian.peyerl@siemens.com

1.3 DATES

Date of receipt of test sample:	21 February 2007
Start of test:	12 March 2007
End of test:	20 March 2007

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1.4 TEST LABORATORY

The tests were carried out at: **PHOENIX TESTLAB GmbH**
Königswinkel 10
D-32825 Blomberg Phone: **+49 (0) 52 35 / 95 00-0**
Germany Fax: **+49 (0) 52 35 / 95 00-10**


accredited by DATech GmbH in compliance with DIN EN ISO/IEC 17025 under Reg. No. DAT-P-105/99-21 and FCC Test site registration number 90877

Test engineer: Bernd STEINER
Name



24 April 2007
Date

Test report checked: Thomas KÜHN
Name



24 April 2007
Date

Signature

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Tel. 0 52 35 / 95 00-0
Fax 0 52 35 / 95 00-10

Stamp

1.5 RESERVATION

This test report is only valid in its original form.

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

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalizations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT 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 CFR 47 Part 15 (October 2006)** Radio Frequency Devices

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.

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2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Type of equipment: *	Short range device transmitter for rowing machine					
Type designation: *	Sender mit Verkleidung					
FCC ID:	U3L0007982-90					
Spare Part Number:	94317199					
Serial number: *	none					
Antenna type: *	PCB antenna					
Antenna gain: *	Not available					
Antenna connector: *	Fixed antenna (integral)					
Power supply: *	3.0 V internal battery					
Supply Voltage:	U _{nom} =	3.0 V DC *	U _{min} =	2.5 V DC *	U _{max} =	3.0 V DC *
Type of modulation: *	FSK					
Operating frequency range:*	2450 MHz					
Number of channels: *	None channelised equipment					
Highest/lowest internal Frequency: *	2450 MHz / 16 MHz					
Temperature range: *	0 °C to 55 °C					

The following external I/O cables were used:

none

2.2 PERIPHERY DEVICES

none

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3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

The EUT is a transmitter, which is intended to be used for transmission of data from a control panel to a display unit of a rower machine

The tests were carried out with an unmodified sample which allows a communication between the transmitter and the receiver of a rower machine. To reach a repetitive transmission mode the up and down buttons were pressed simultaneously.

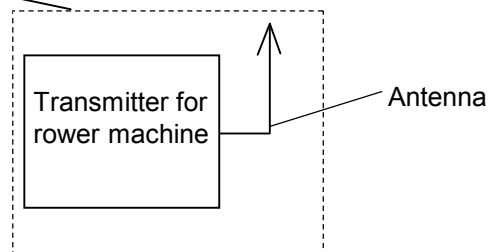
During the tests the test sample was powered by the internal batteries with 3.0 V DC.

During the tests, the EUT was not labeled with a FCC-label.

The following operation modes were used during the tests:

Operation mode	Description of the operation mode
1	Continuous transmitting on 2450 MHz

Physical boundary of the EUT



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4 REQUIREMENT OVERVIEW

Conducted emissions FCC 47 CFR Part 15 section 15.207 (a)[2]					
Application	Frequency range	Limits	Reference standard	Remark	Status
On AC supply line	0.15 to 0.5 MHz 0.5 to 5 MHz 5 to 30 MHz	66 to 56 dB μ V (QP) * 56 to 46 dB μ V (AV) * 56 dB μ V (QP) 46 dB μ V (AV) 60 dB μ V (QP) 50 dB μ V (AV)	ANSI C63.4 (2003)	-	Not applicable because of battery powered equipment
*: Decreases with the logarithm of the frequency					
Radiated emissions FCC 47 CFR Part 15 section 15.209 [2]					
Application	Frequency range	Limits (microvolt/meter)	Reference standard	Remark	Status
Intentional radiator	0.009 to 0.49 MHz 0.490 to 1.705 MHz 1.705 to 30.0 MHz 30 to 88 MHz 88 to 216 MHz 216 to 960 MHz 960 to 26000 MHz	2400/f(kHz) at 300 m 24000/f(kHz) at 30 m 30.0 dB μ V/m at 30 m 40.0 dB μ V/m at 3 m 43.5 dB μ V/m at 3 m 46.0 dB μ V/m at 3 m 54.0 dB μ V/m at 3 m	ANSI C63.4 (2003);	-	Passed
Radiated emissions FCC 47 CFR Part 15 section 15.249 [2]					
	Frequency range	Limits (microvolt/meter)	Reference standard	Remark	Status
Operation with in the band 2400 - 2483.5 MHz	2400 - 2483.5 MHz	50,000 (fundamental) 500 (harmonics)	ANSI C63.4 (2003);	-	Passed
Antenna requirement FCC 47 CFR Part 15 section 15.203 [2]					
					Status
The antenna is fixed (soldered to the PCB and glued to the housing).					Passed

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5 TEST RESULTS

5.1 RADIATED EMISSIONS

5.1.1 METHOD OF MEASUREMENT (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 26 GHz.
- A final measurement carried out on an outdoor test side without reflecting ground plane and a fixed antenna height in the frequency range 30 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 26 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 disabled.

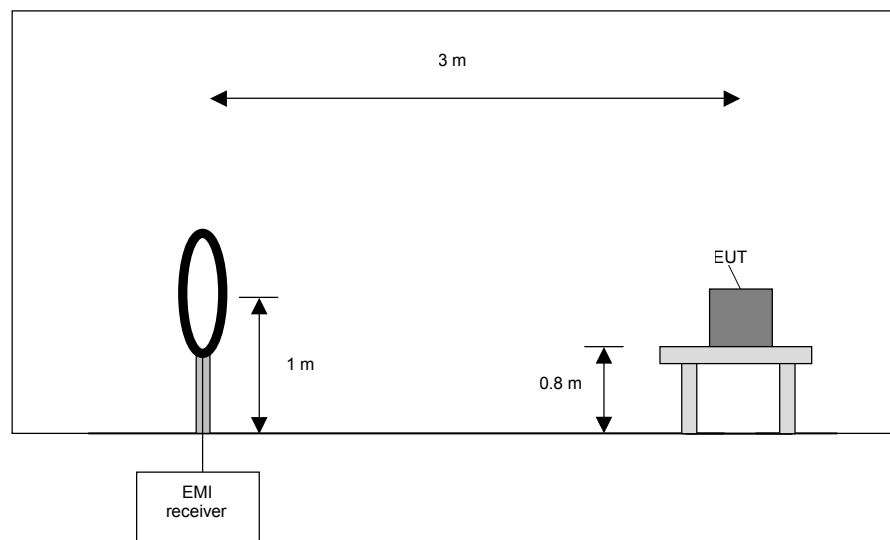
Preliminary measurement (9 kHz to 30 MHz):

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



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Preliminary measurement procedure:

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

The following procedure will be used:

- 1) Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
- 2) Manipulate the system cables within the range to produce the maximum level of emission.
- 3) Rotate the EUT by 360 ° to maximize the detected signals.
- 4) Make a hardcopy of the spectrum.
- 5) Measure the frequencies of highest detected emission with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
- 6) Repeat steps 1) to 5) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
- 7) Rotate the measuring antenna and repeat steps 1) to 5).

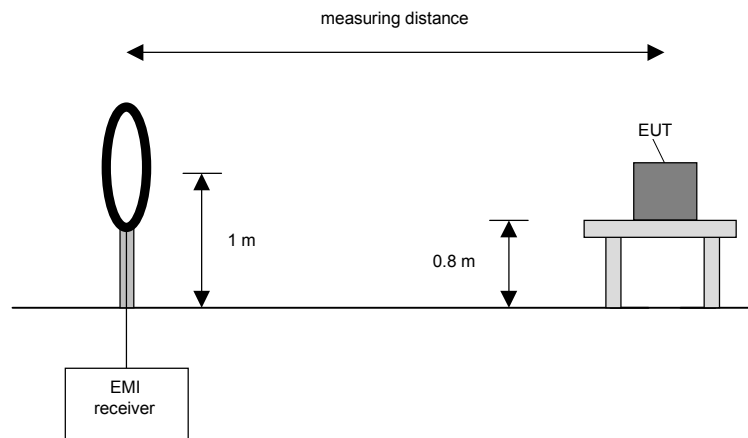
Final measurement (9 kHz to 30 MHz):

In the second stage a final measurement will be performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m and 30 m if possible. 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 30 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



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Final measurement procedure:

The following procedure will be used:

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

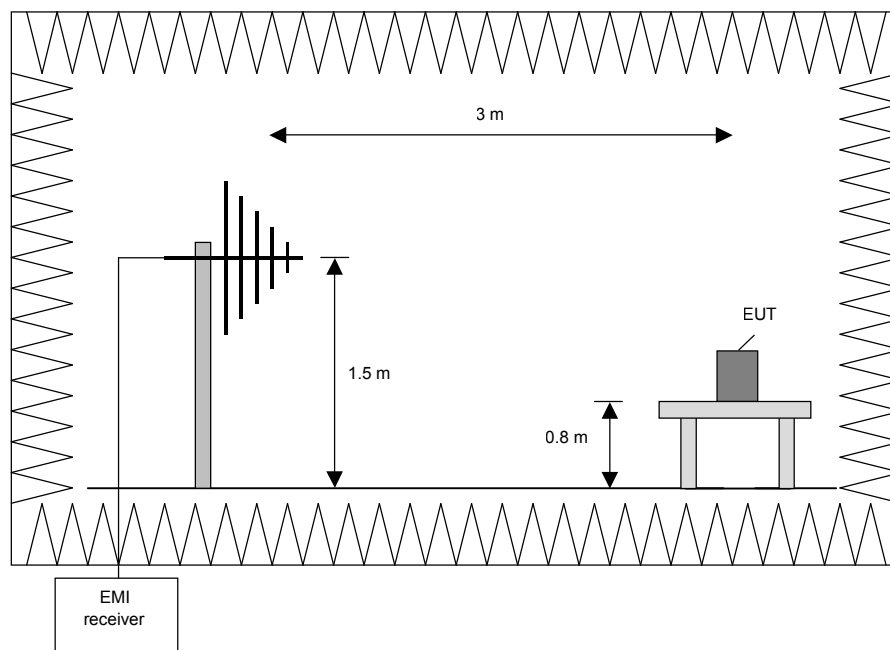
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [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



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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:

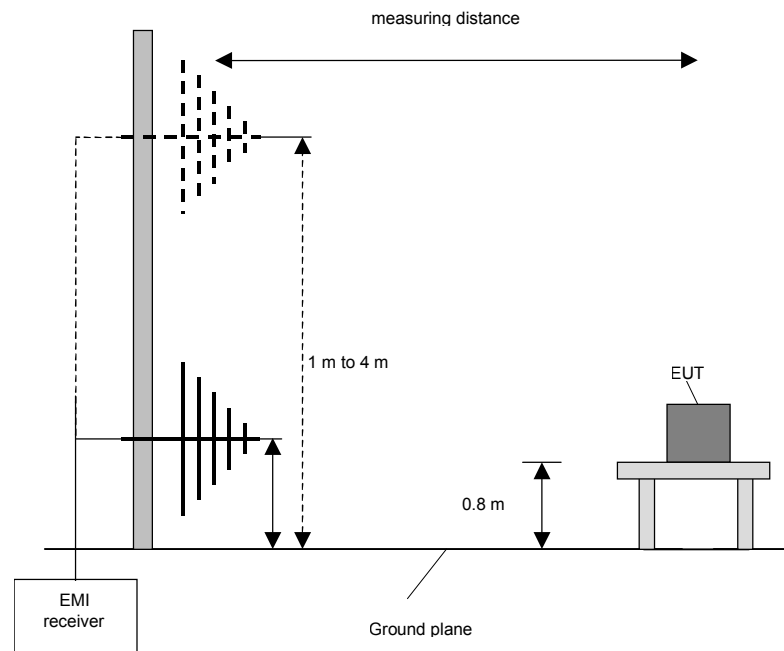
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
2. Manipulate the system cables within the range to produce the maximum level of emission.
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum.
5. Measure the frequency of the 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



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Procedure final measurement:

The following procedure will be used:

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

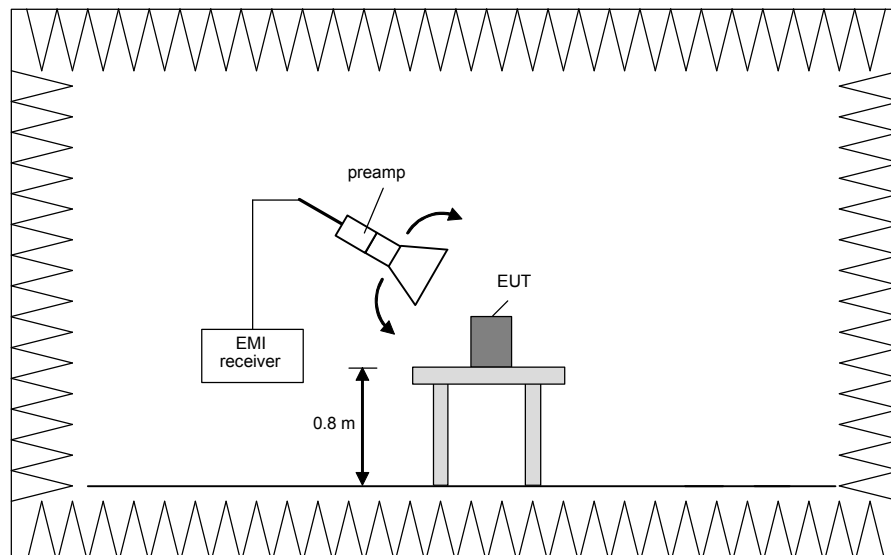
Preliminary and final measurement (1 GHz to 26 GHz)

This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003 [1]. The resolution bandwidth of the EMI Receiver will be set to the following values:

Frequency range	Resolution bandwidth (preliminary)	Resolution bandwidth (final)
1 GHz to 4 GHz	100 kHz	1 MHz
4 GHz to 12 GHz	100 kHz	1 MHz
12 GHz to 18 GHz	100 kHz	1 MHz
18 GHz to 26 GHz	100 kHz	1 MHz

Preliminary measurement (1 GHz to 26 GHz)

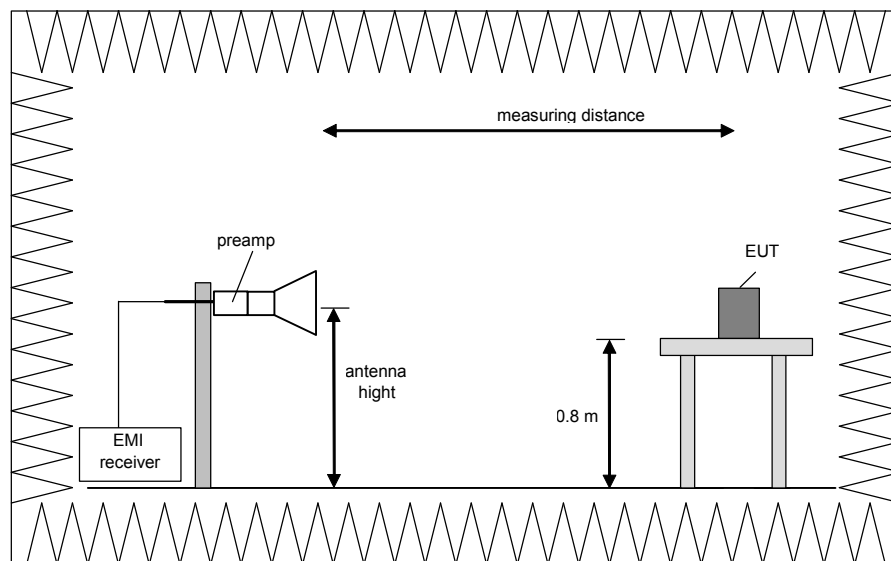
The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna,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



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Final measurement (1 GHz to 26 GHz)

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



Procedure of measurement:

The measurements were performed in the frequency range 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz and 18 GHz to 26 GHz.

The following procedure will be used:

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

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

Because the equipment under test is transmitting in short intervals only a final measurement was performed additionally on each harmonic frequency. Where an emission was detected the value is shown in the table of the final measurement.

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5.1.2 RADIATED EMISSIONS (TRANSMITTER)

5.1.2.1 PRELIMINARY MEASUREMENT (9 kHz to 26 GHz)

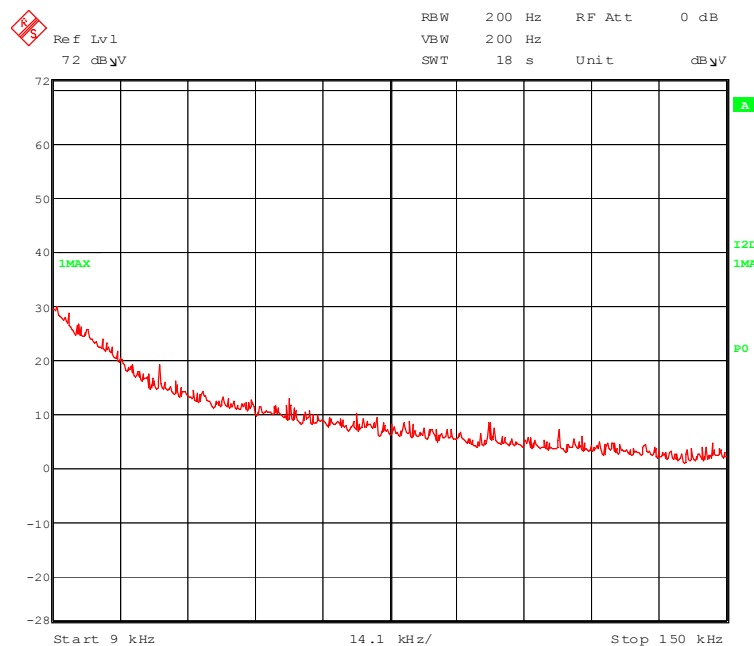
Ambient temperature	20 °C	Relative humidity	43 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: There were no cables connected.

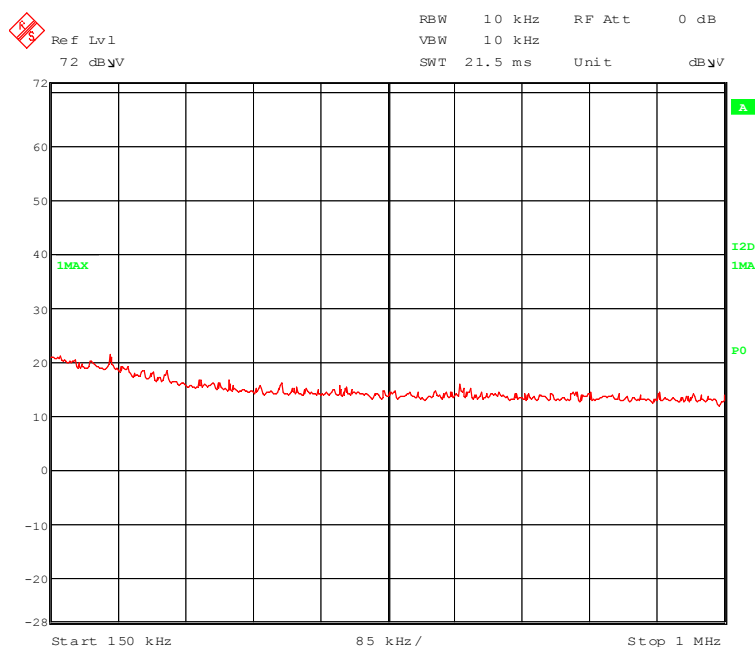
Test record: Where not otherwise stated the test was carried out in test mode 1 of the EUT. All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 3.0 V from the internal batteries.

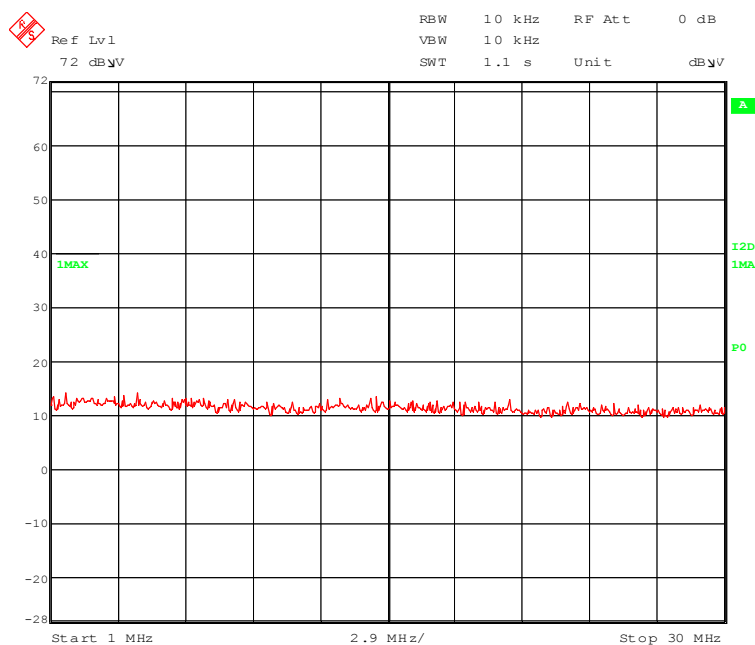


70306_10.wmf: Transmitter spurious emissions from 9 kHz to 150 kHz

TEST REPORT REFERENCE: R70306_A Edition 1



70306_9.wmf: Transmitter spurious emissions from 150 kHz to 1 MHz



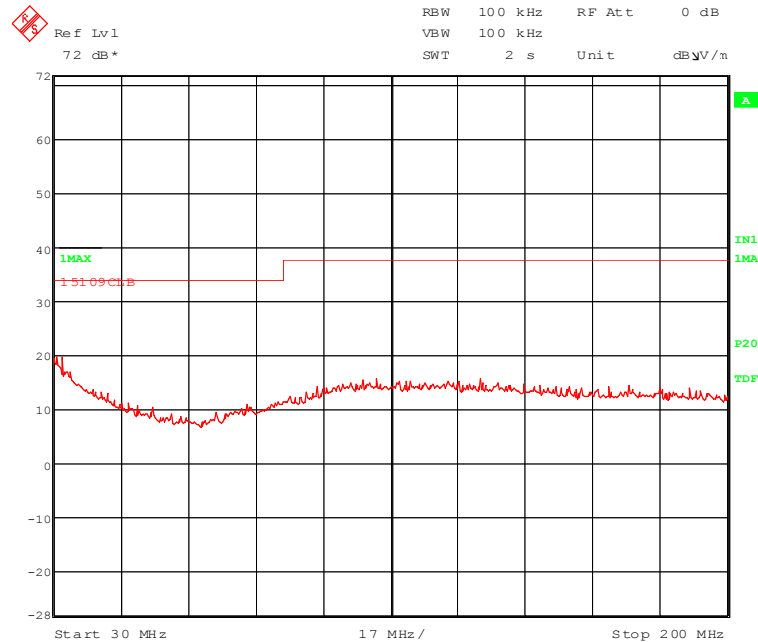
70306_8.wmf: Transmitter spurious emissions from 1 MHz to 30 MHz

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.

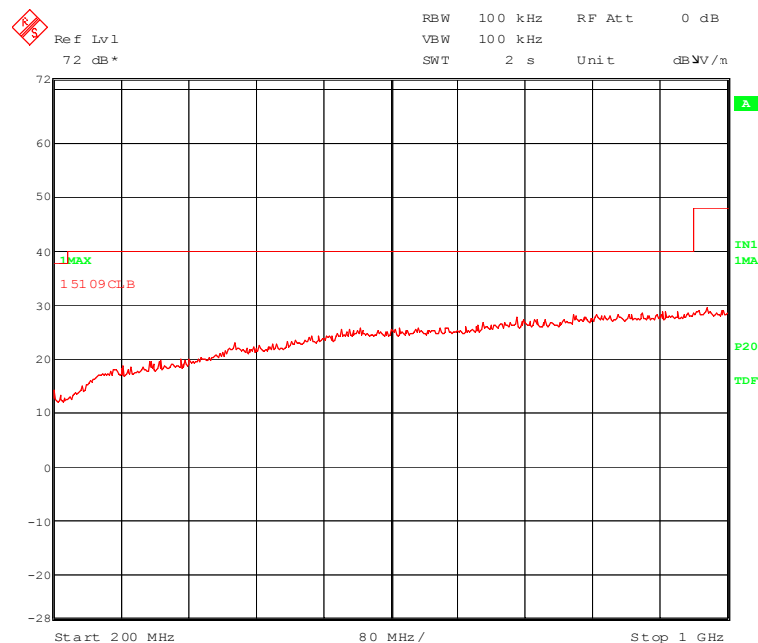
TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 33, 57

TEST REPORT REFERENCE: R70306_A Edition 1



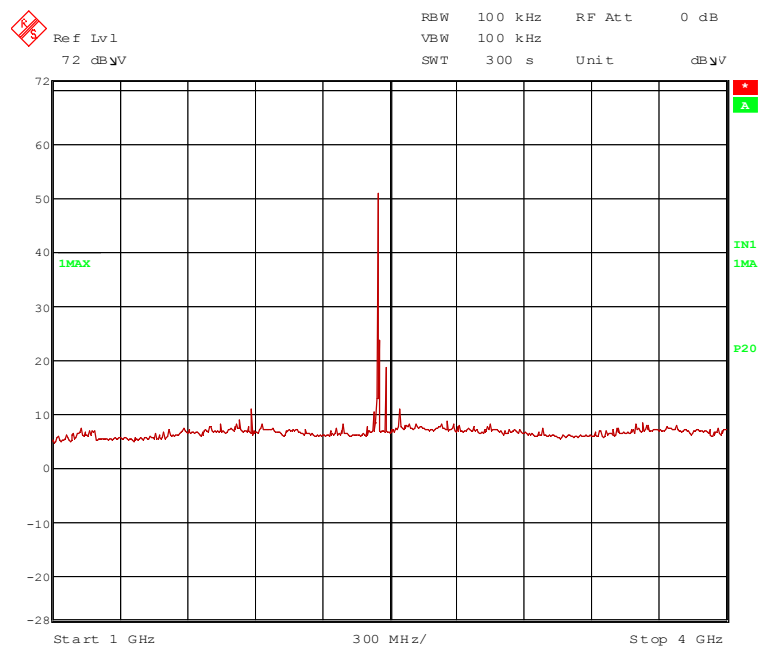
70306_6.wmf: Transmitter spurious emissions from 30 MHz to 200 MHz



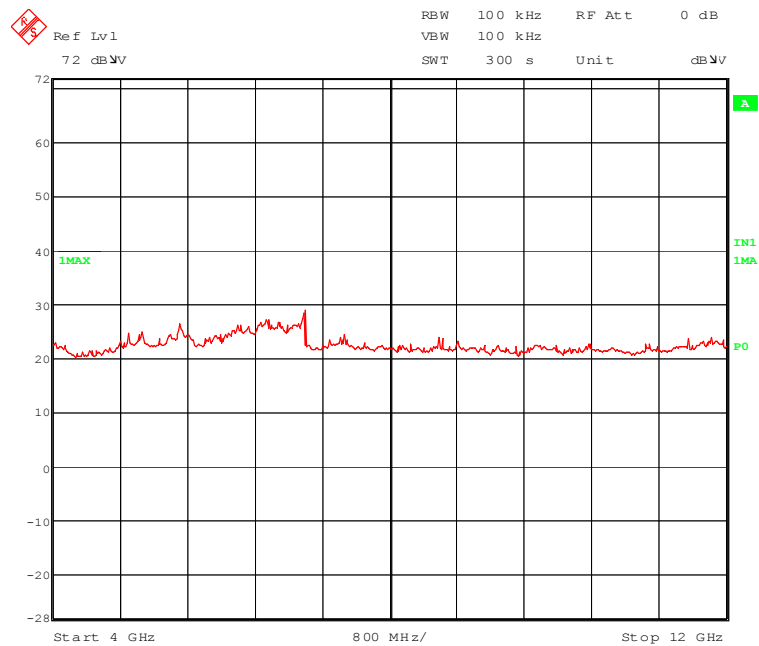
70306_7.wmf: Transmitter spurious emissions from 200 MHz to 1 GHz

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 open area test site.

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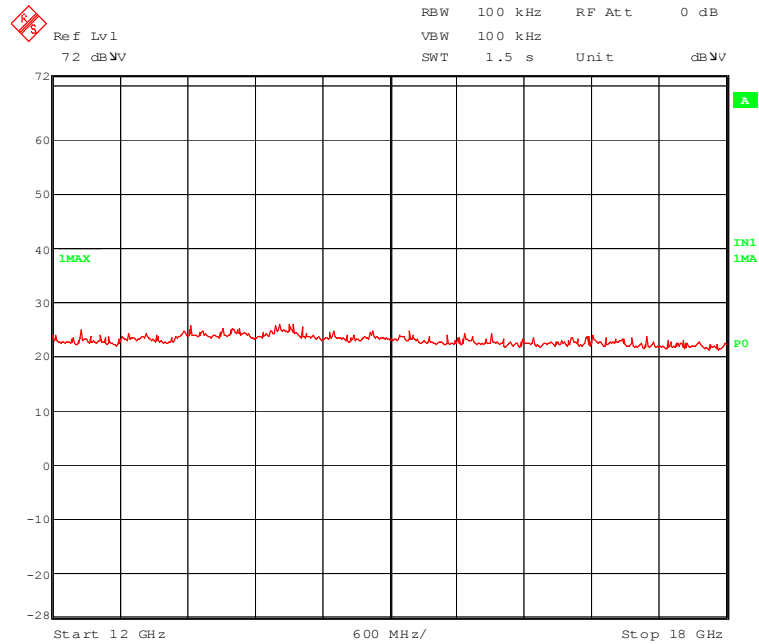


70306_2.wmf: Transmitter spurious emissions from 1 GHz to 4 GHz

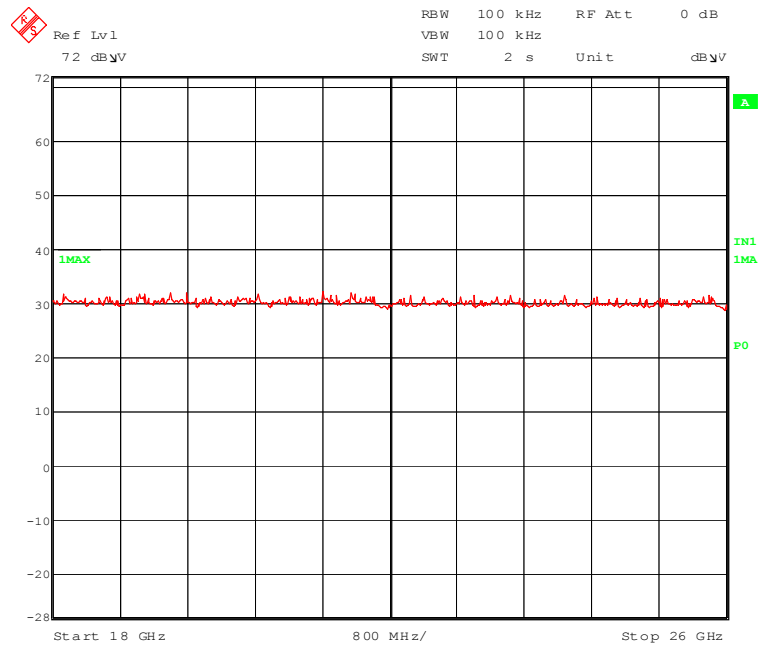


70306_.wmf: Transmitter spurious emissions from 4 GHz to 12 GHz

TEST REPORT REFERENCE: R70306_A Edition 1



70306_4.wmf: Transmitter spurious emissions from 12 GHz to 18 GHz



70306_5.wmf: Transmitter spurious emissions from 18 GHz to 26 GHz

TEST REPORT REFERENCE: R70306_A Edition 1

The following frequency was found inside the restricted bands during the preliminary radiated emission test:

- 2.4835 GHz
- 4.9000 GHz

The following frequency was found outside the restricted bands during the preliminary radiated emission test:

- 2.4284 GHz
- 2.4500 GHz
- 9.8000 GHz

These frequencies have to be measured in a final measurement. The result of this final measurement is shown in subclause 6.1.2 of this test report.

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 37, 39, 43, 44, 47, 49 – 51, 55
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TEST REPORT REFERENCE: R70306_A Edition 1

5.1.2.2 FINAL MEASUREMENT (1 GHz to 26 GHz)

Ambient temperature	20 °C	Relative humidity	43 %
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Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: There were no cables connected

Test record: Where not otherwise stated the test was carried out in test mode 1 of the EUT. All results are shown in the following.

Supply voltage: During all measurements the EUT was supplied with 3.0 V from the internal batteries.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

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
2.4284	64.7	74.0	9.3	33.2	28.7	0.0	2.8	150	Vert.	No
2.4500	90.9	114.0	23.1	59.4	28.7	0.0	2.8	150	Vert.	-
2.4835	61.6	74.0	12.4	30.1	28.7	0.0	2.8	150	Vert.	Yes
4.9000	55.3	74.0	18.7	43.8	33.4	25.7	3.8	150	Vert.	Yes
9.8000	56.0	74.0	18.0	36.3	37.9	23.9	5.7	150	Vert.	No

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
2.4284	44.0	54.0	10.0	12.5	28.7	0.0	2.8	150	Vert.	No
2.4500	49.0	94.0	45.0	17.5	28.7	0.0	2.8	150	Vert.	-
2.4835	43.7	54.0	10.3	12.2	28.7	0.0	2.8	150	Vert.	Yes
4.9000	29.6	54.0	24.9	18.1	33.4	25.7	3.8	150	Vert.	Yes
9.8000	37.5	54.0	16.5	17.8	37.9	23.9	5.7	150	Vert.	No

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36 – 37, 44, 47, 49, 55

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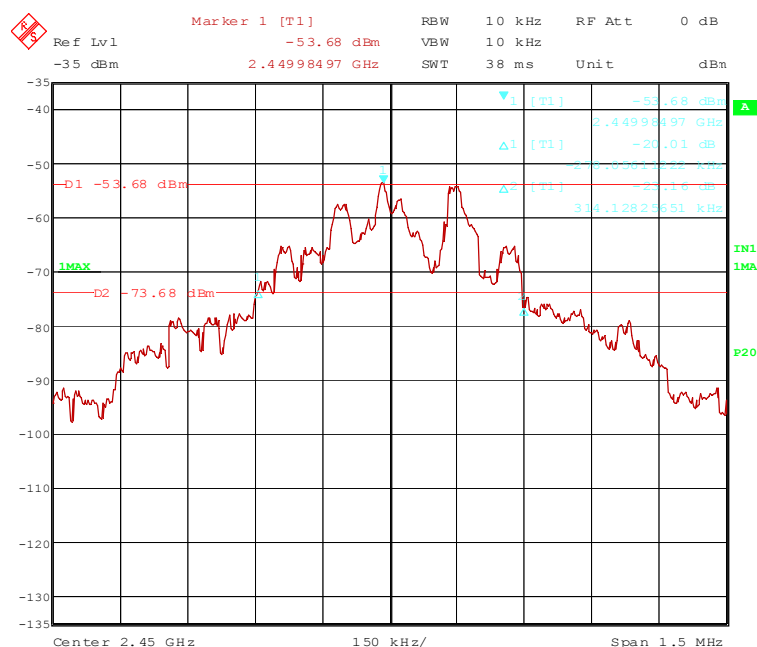
5.1.3 OCCUPIED BANDWIDTH

Ambient temperature	20 °C	Relative humidity	43 %
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Test set-up: This test was done in the radiated setup as described in clause 5.1.1

Supply voltage: During all measurements the EUT was supplied with 3.0 V from the internal batteries.

Test record: Where not otherwise stated the test was carried out in test mode 1 of the EUT. All results are shown in the following.



70306ob2.wmf: Occupied Bandwidth 20dB

Channel frequency [MHz]	20 dB bandwidth [kHz]
2445	584.184

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44

TEST REPORT REFERENCE: R70306_A Edition 1

5.1.4 BAND-EDGE COMPLIANCE

5.1.4.1 METHOD OF MEASUREMENT (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 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: $\geq 1\%$ of the span, but not below 100 kHz.
- Video bandwidth: \geq the resolution bandwidth.
- Sweep: Auto.
- Detector function: Peak.
- Trace mode: Max hold.

The same test set-up as used for the final radiated emission measurement shall be used (refer also subclause 5.1.1 of this test report). The measurements shall be carried out with using a resolution bandwidth of 100 kHz.

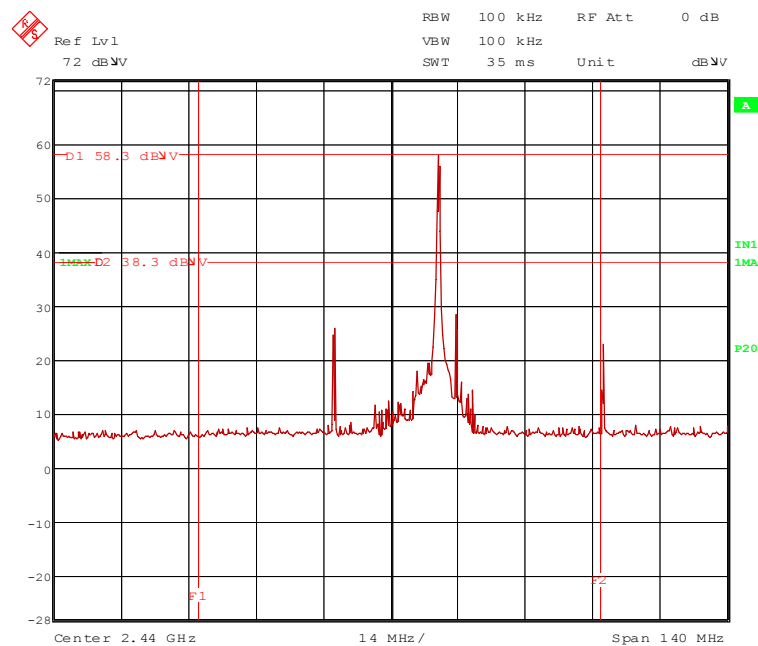
After trace stabilisation the marker shall be set on the signal peak. The first display line has to be set on this value. The second display line has to be set 20 dB below the first line (or the peak marker). The frequency line shall be set on the edge of the assigned frequency band. Set the second marker 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. This frequency shall be measured with the EMI receiver as described in subclause 5.1.1 of this test report, but 100 kHz resolution bandwidth shall be used.

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

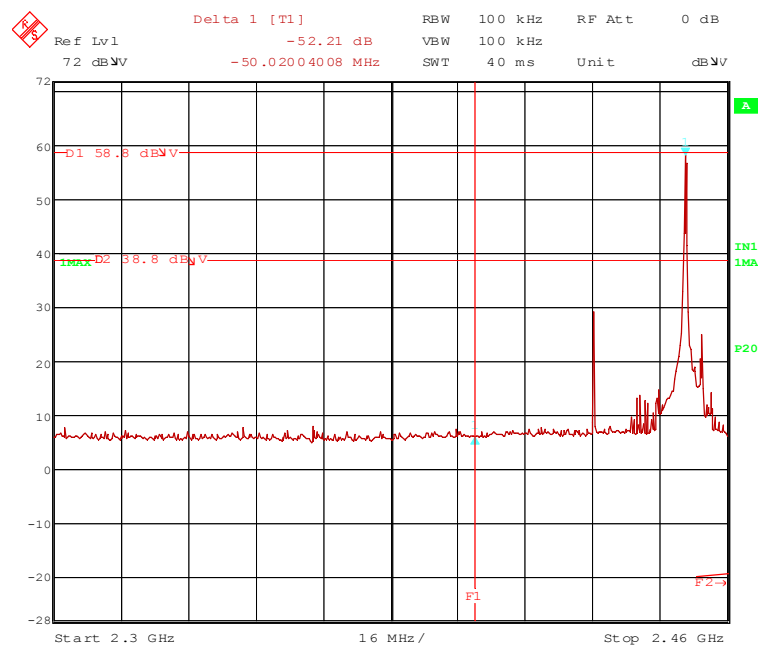
TEST REPORT REFERENCE: R70306_A Edition 1

5.1.4.2 TEST RESULT (BAND-EDGE COMPLIANCE (RADIATED))

Ambient temperature	20 °C	Relative humidity	35 %
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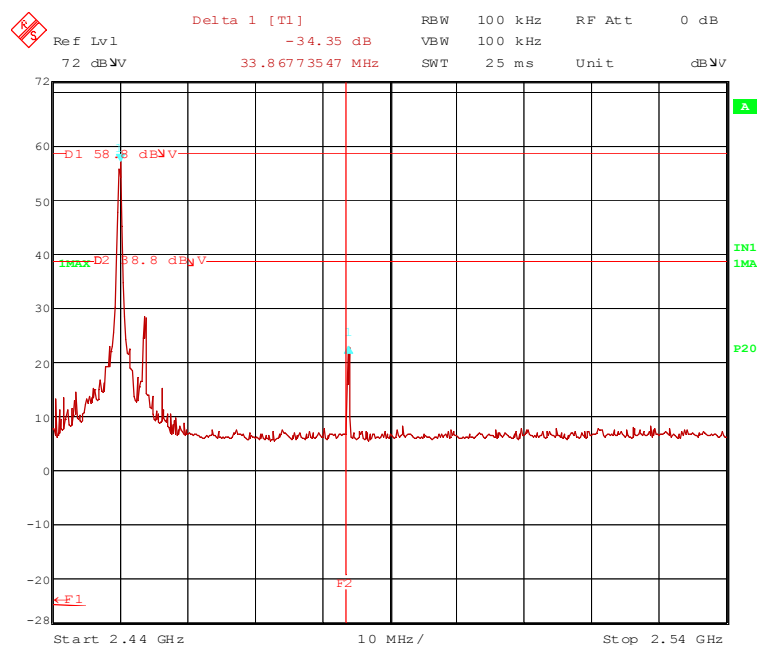


70306be1.wmf: Total view



70306be2.wmf: Lower Bandedge

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70306be3.wmf: Upper Bandedge

The plots on the page before are showing the radiated band-edge compliance for the upper band-edge, with and without hopping. The display line 1 (D1) in these plots represents the highest level within the assigned frequency band. The display line 2 (D2) represents the 20 dB offset to this highest level and shows the compliance with FCC 47 CFR Part 15.247 (d). The frequency line 1 (F1) shows the edge of the assigned frequency.

Band-edge compliance (upper band edge)										
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
2.4500	90.9	-	-	59.4	28.7	0.0	2.8	150	Vert.	-
2.4835	61.6	74.0	12.4	30.1	28.7	0.0	2.8	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
2.4500	49.0	-	-	17.5	28.7	0.0	2.8	150	Vert.	-
2.4835	43.7	54.0	10.3	12.2	28.7	0.0	2.8	150	Vert.	Yes
Measurement uncertainty							+2.2 dB / -3.6 dB			

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Band-edge compliance (lower band edge)										
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
2.4500	90.9	-	-	59.4	28.7	0.0	2.8	150	Vert.	-
2.4000	38.7	70.9	32.2	7.2	28.7	0.0	2.8	150	Vert.	No
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
2.4500	49.0	-	-	17.5	28.7	0.0	2.8	150	Vert.	-
2.4000	28.4	50.9	22.5	-3.1	28.7	0.0	2.8	150	Vert.	No
Measurement uncertainty							+2.2 dB / -3.6 dB			

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 44

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6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

TEST REPORT REFERENCE: R70306_A Edition 1

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

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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

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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	High Pass Filter	HP4000	Dirk Fischer Elektronik	-	480445
56	High Pass Filter	WHJS1000C 11/60EF	Wainwright Instruments GmbH	1	480413
57	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.

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7 LIST OF ANNEXES

Annex A	Photographs of the test set-ups:	4 pages
	Test setup, equipment under test	70306_emi.jpg
	Test setup Emission measurement below 30 MHz	70306_emi1.jpg
	Test setup Emission measurement 30 MHz to 1 GHz	70306_emi2.jpg
	Test setup Emission measurement above 1 GHz	70306_emi3.jpg
ANNEX B	INTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:	5 pages
	Sender mit Verkleidung internal view	70306_2.jpg
	Sender mit Verkleidung radio board top view	70306_3.jpg
	Sender mit Verkleidung radio board bottom view	70306_4.jpg
	Sender mit Verkleidung button board top view	70306_5.jpg
	Sender mit Verkleidung button board bottom view	70306_6.jpg
ANNEX C	EXTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:	3 pages
	Sender mit Verkleidung 3D view	70306_a.jpg
	Sender mit Verkleidung top view	70306_b.jpg
	Sender mit Verkleidung bottom view	70306_c.jpg