

TEST REPORT

Test Report Reference: R40495 Edition 2

Equipment under Test: SA4-WM730

Serial Number: 6000000

Article Number: 960 730 016 0

FCC ID: SA4-WM730-0

Applicant: WABCO GmbH & Co. OHG

Manufacturer: WABCO GmbH & Co. OHG

**Test Laboratory
(CAB)
accredited by
DATech e.V.
in compliance with DIN EN ISO/IEC 17025
under the
Reg. No. TTI-P-G071/94-11
and listed by
FCC 31040/SIT1300F2**

Contents:	Page
1 IDENTIFICATION.....	3
1.1 APPLICANT	3
1.2 MANUFACTURER	3
1.3 DATES	3
1.4 TEST LABORATORY	4
1.5 RESERVATION	4
1.6 NORMATIVE REFERENCES	4
1.7 TEST RESULTS	4
2 TECHNICAL DATA OF EQUIPMENT	5
2.1 DEVICE UNDER TEST	5
2.2 PEREPHERY DEVICES	5
3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES	6
4 LIST OF TEST MODULES.....	7
4.1 EMISSION.....	7
5 METHOD OF MEASUREMENT	8
5.1 RADIATED EMISSIONS 30 MHz to 1 GHz	8
5.2 RADIATED EMISSIONS (1 GHz to 5 GHz)	10
5.3 CALCULATION OF THE MEASUREMENT RESULTS.....	12
6 TEST RESULTS EMISSION TEST	17
6.1 PRELIMINARY RADIATED EMISSION TEST (30 MHz to 1 GHz).....	17
6.2 FINAL RADIATED EMISSION TEST (30 MHz to 1 GHz).....	18
6.3 PRELIMINARY RADIATED EMISSION TEST (1 GHz to 5 GHz).....	19
6.4 FINAL RADIATED EMISSION TEST (1 GHz to 5 GHz)	21
6.5 OCCUPIED BANDWIDTH	22
7 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS	23
8 LIST OF ANNEXES	27

1 IDENTIFICATION

1.1 APPLICANT

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Applicant represented during the test by the following person:	Mr. Michael BRAND

1.2 MANUFACTURER

Name:	WABCO GmbH & Co. OHG
Address:	Am Lindener Hafen 21 30453 Hannover
Country:	Germany
Name for contact purposes:	Mr. Lutz DANNE
Phone:	+49 511 922 1990
Fax:	+49 511 922 4990
Mail address:	lutz.danne@wabco-auto.com
Manufacturer represented during the test by the following person:	Mr. Michael BRAND

1.3 DATES

Date of receipt of test sample:	22 June 2004
Start of test:	22 June 2004
End of test:	24 June 2004

1.4 TEST LABORATORY

The tests were carried out at:

PHOENIX TEST-LAB GmbH
Königswinkel 10
D-32825 Blomberg
Germany

Phone: +49 (0) 52 35 / 95 00-0
Fax: +49 (0) 52 35 / 95 00-10

accredited by DATech e.V. in compliance with DIN EN ISO/IEC 17025 under Reg. No. TTI-P-G071/94-11 and listed by FCC 31040/SIT1300F2.

Test engineer:

Bernd STEINER

Name



13 September
2004

Date

Test report checked:

Thomas KÜHN

Name



Signature

13 September
2004

Date

Phoenix TEST-LAB 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 TEST-LAB GmbH is prohibited.

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 C63.4-2001** 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 2004)** 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.

2 TECHNICAL DATA OF EQUIPMENT

2.1 DEVICE UNDER TEST

Type of equipment:	Tire pressure transmitter for truck use
Type designation:	SA4-WM730
Article No.:	960 730 016 0
FCC ID:	SA4-WM730-0
Highest internal frequency	433.92 MHz
Antenna type:	Integral
Software	none

The following external I/O cables were used:

No cables were connectable to the EUT.

2.2 PEREPHERY DEVICES

The following equipment was used as control unit and ancillary equipment:

Permanent magnet

3 OPERATIONAL STATES AND PHYSICAL BOUNDARIES

For all measurements except the measurement of duty cycle the external wheel module SA4-WM730 was tested in configuration mode, because in this mode the module transmits more often than in its normal operation mode. Presenting a permanent magnet in front of the EUT activates this test mode. During this mode a synchronization-word is transmitted for 30 seconds, which is followed by a normal data telegram every minute. With this means the repetition rate of the synchronization-word was higher and the time between two transmissions shorter.

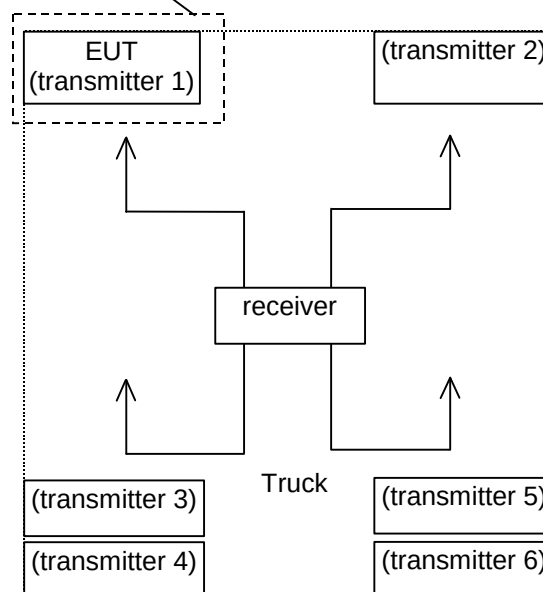
The tested sample was sealed.

During the tests the EUT was supplied by an new internal battery.

For the whole frequency range a preliminary (30 MHz to 1 GHz) and a final (1 GHz to 5 GHz) measurement in a fully anechoic chamber with a measuring distance of 3 m was carried out to determine the frequencies, which were radiated by the EUT. The final measurement for the frequency range of 30 MHz to 1 GHz on the detected frequencies was carried on an open area test site with ground plane.

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

Physical boundary of the external wheel sensor SA4-WM730



4 LIST OF TEST MODULES

4.1 EMISSION

Radiated Emissions fundamental frequency FCC 47 CFR Part 15 section 15.231 (e) [2]						
No.	Application	Fundamental Frequency	Limits	Reference standard	Remark	Status
1	Intentional radiator (fundamental frequency)	433.92 MHz	72.87 dB μ V/m at 3m	ANSI C63.4 (2001);	-	Passed
Spurious Emissions FCC 47 CFR Part 15 section 15.231 (b) [2]						
No.	Application	Fundamental Frequency	Limits	Reference standard	Remark	Status
2	Intentional radiator (spurious emissions)	433.92 MHz	54 dB μ V/m at 3m *	ANSI C63.4 (2001);	-	Passed
* because of higher limit in 15.209						
Radiated emissions in restricted bands FCC 47 CFR Part 15 section 15.209						
No.	Application	Frequency of Emission	Limits	Reference standard	Remark	Status
3	Radiated emissions	30 to 88 MHz 88 to 216 MHz 216 to 960 MHz Above 960 MHz	40 dB μ V/m at 3 m** 43 dB μ V/m at 3 m** 46 dB μ V/m 3 m** 54 dB μ V/m 3m	ANSI C63.4 (2001);	-	Passed
** Except as provided in paragraph (g) (of Part 15.209), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54 – 72 MHz, 76 – 88 MHz, 174 – 216 MHz or 470 – 806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.						

5 METHOD OF MEASUREMENT

5.1 RADIATED EMISSIONS 30 MHz to 1 GHz

The radiated emission measurement is divided into two stages.

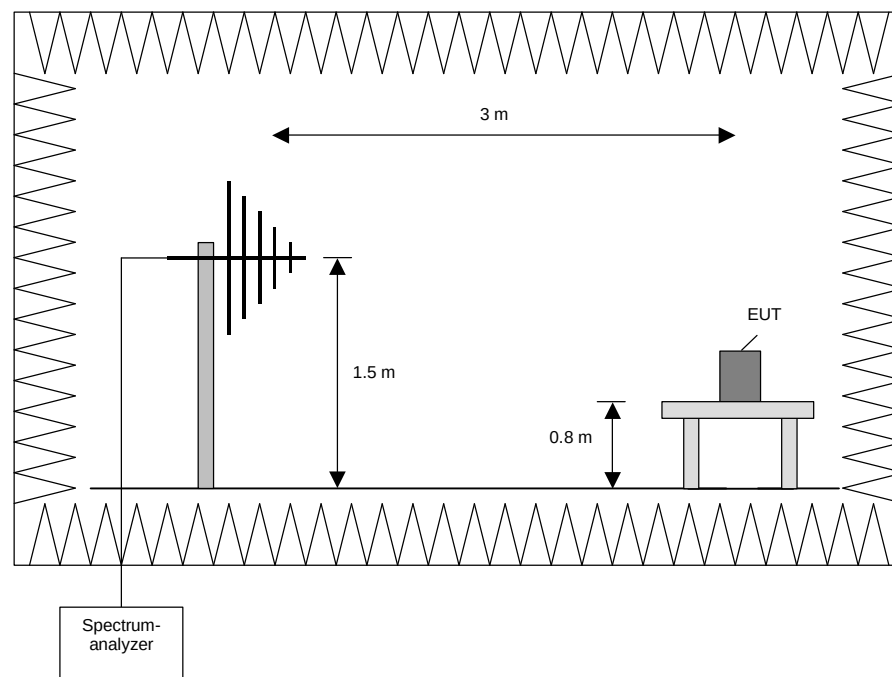
Preliminary measurement:

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 C63.4-2001 [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 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:

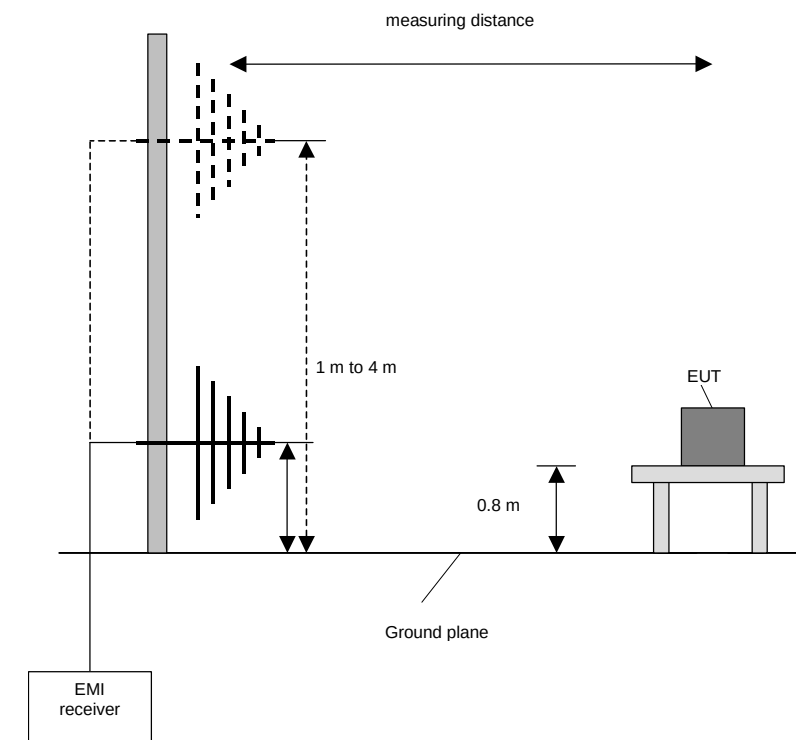
1. Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °
2. Manipulate the system cables within the range to produce the maximum level of emission
3. Rotate the EUT by 360 ° to maximize the detected signals.
4. Make a hardcopy of the spectrum
5. Measure the frequency of 3 highest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

Final Measurement:

In the second stage 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



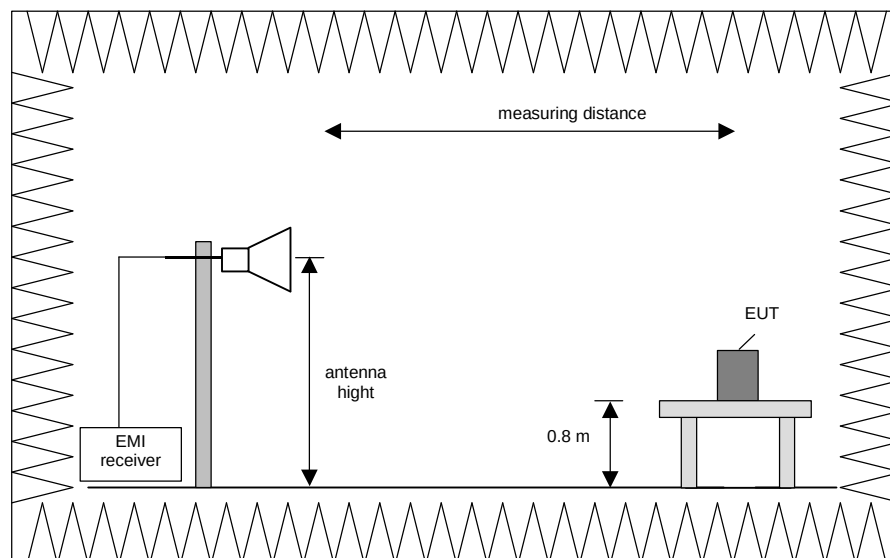
Procedure final measurement:

- 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 (Peak) 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

5.2 RADIATED EMISSIONS (1 GHz to 5 GHz)

This measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter and will be also divided into a preliminary and final measurement. 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 C63.4-2000 [1].

The measurement set-up will be the same for preliminary and final measurement and will be shown schematically below:



Preliminary measurement:

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 5 GHz	100 kHz

Procedure of measurement:

The measurement was performed in the frequency range 1 GHz to 4.4 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 antenna polarisation and azimuth, which causes the maximum emission.
- 8) Repeat steps 1) to 7) with the other orthogonal axes of the EUT.
- 9) Repeat steps 1) to 8) for the next antenna spot if the EUT is larger than the antenna beamwidth.

Final measurement:

During this measurement the frequencies, which are found during the preliminary measurement were measured with the correct resolution bandwidth and detector.

Frequency range	Resolution bandwidth
1 GHz to 5 GHz	1 MHz

The measurement was performed in the frequency range 1 GHz to 5 GHz.

The following procedure will be used:

- 1) The position (orthogonal direction and azimuth) of the EUT and if applicable with the antenna spot, at which the maximum emission was detected.
- 2) Change the antenna polarisation to the one at which the maximum emission was detected.
- 3) Measure the level of the emission correct resolution bandwidth (1MHz) and the peak and average detector
- 4) Repeat steps 1) to 3) for all other frequencies, which were found during the preliminary measurement.

5.3 CALCULATION OF THE MEASUREMENT RESULTS

Because of pulsed transmission all measurements were carried out with a peak detector and the average value is calculated over a pulse train of 100 ms as required in Part 15.35.

To calculate the average value a complete pulse train was measured. A detail view to a pulse period was taken and the transmitter-on-time was recorded. This time was used to calculate the average correction factor.

A pulse train consists of seven sub pulse trains. The minimum time between two sub pulse trains is 88 ms. During a pulse train the transmitter on time for a sub pulse will be the same. To make a worst-case calculation the minimum transmitter off time between two subpulses was taken in account.

Because the complete pulse train exceed 100 ms, the average correction factor was calculated with the length of a sub pulse train divided by 100 ms.

Silent period between two transmissions (pulses) in normal operation mode: At least 15 minutes.

Summary of the complete subpulsetrain:

one subpulsetrain consists of

2 pulses type 1: $2 * 474.549\mu\text{s} = 949.098\mu\text{s}$

46 pulses type 2: $46 * 113.827\mu\text{s} = 5236.042\mu\text{s}$

4 pulses type 3: $4 * 230.460\mu\text{s} = 921.840\mu\text{s}$

total on time of one subpulse = $7106.98\mu\text{s}$

total length of one subpulse = 13.303ms

minimum off time between two pulses = 86.773ms

Duty cycle correction factor according to 15.35c

$F [\text{dB}] = 20 * \log (7106.98\mu\text{s} / 100\text{ms}) = -22.96\text{dB}$

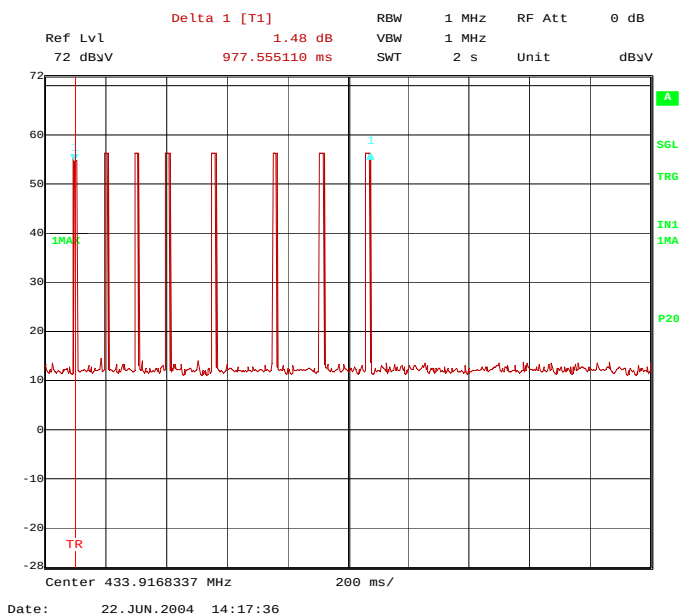
According to 15.35b the maximum relaxation factor between peak and average is 20dB. So the measured peak values were calculated with 20dB down into average values.

Please refer also to the plots in the following.



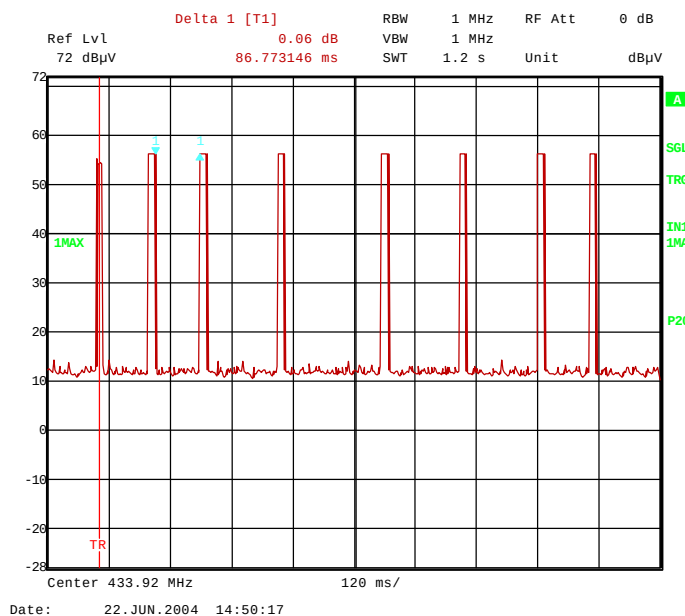
TEST REPORT REFERENCE: R40495 Edition 2

40495_2.wmf (complete pulse train):



Complete pulse trains consists of 8 subpulsetrains with a total length of 977.55ms

40495_14.wmf (minimum off time between two subpulses):

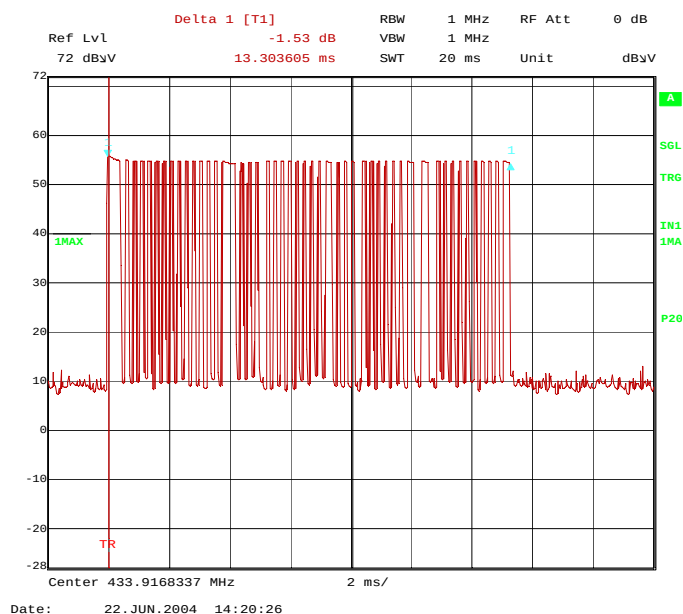


minimum off time between two subpulses: 86.773ms



TEST REPORT REFERENCE: R40495 Edition 2

40495_3.wmf (complete subpulse train)

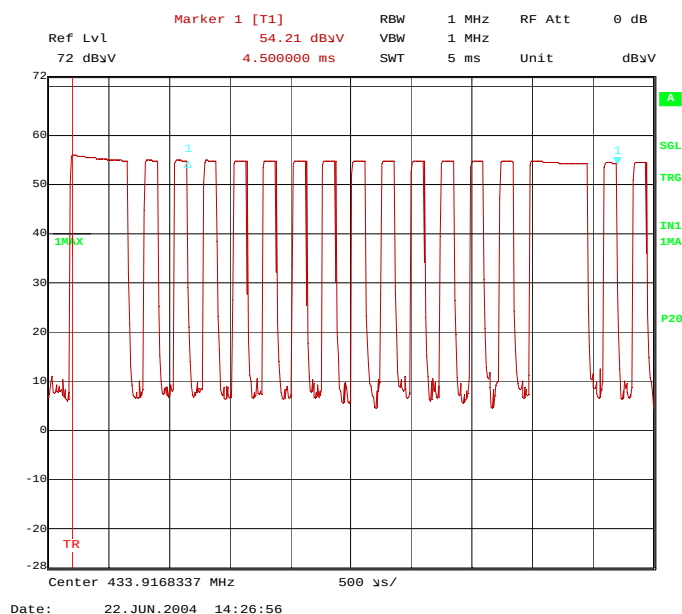


Total length of pulse train 13.303ms

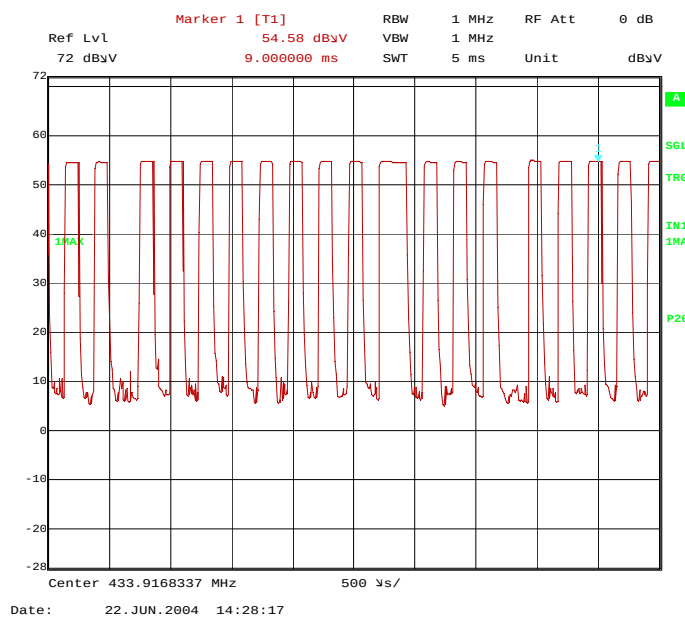


TEST REPORT REFERENCE: R40495 Edition 2

40495 6.wmf (1st detail view to sub pulse train):



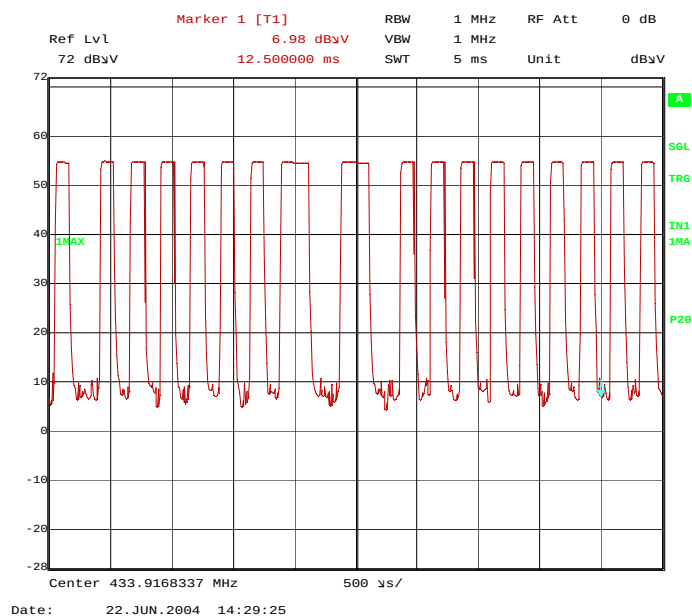
40495 8.wmf (2nd detail view to sub pulse train):



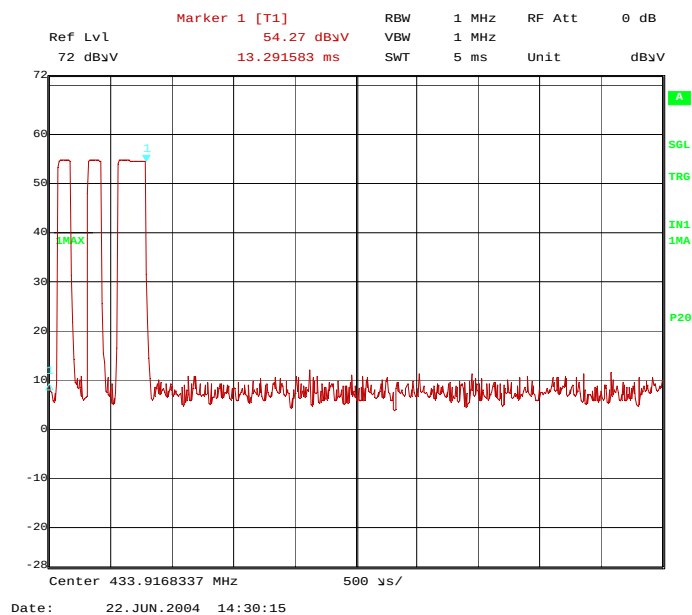


TEST REPORT REFERENCE: R40495 Edition 2

40495_9.wmf (3rd detail view to sub pulse train):



40495_10.wmf (4th detail view to sub pulse train):



6 TEST RESULTS EMISSION TEST

6.1 PRELIMINARY RADIATED EMISSION TEST (30 MHz to 1 GHz)

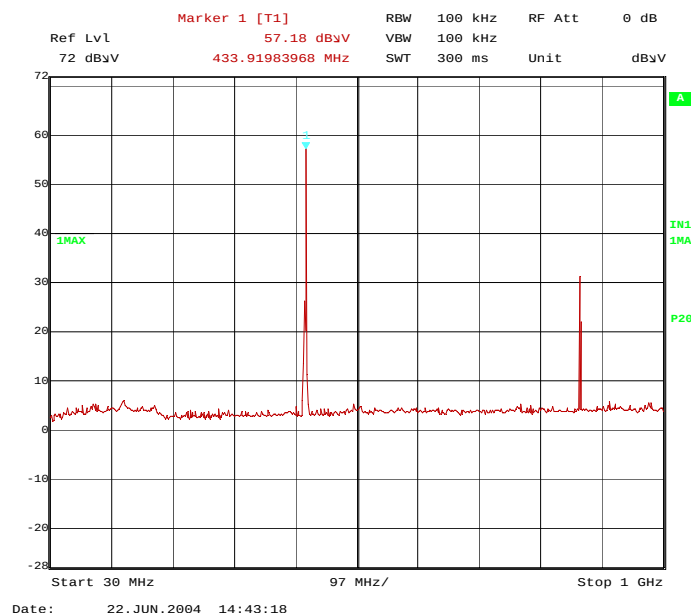
Ambient temperature	20 °C	Relative humidity	25 %
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Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: No cables were connected to the EUT.

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

40495_11.wmf (30 MHz to 1000 MHz):



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

- 433.919 MHz;
- 867.826 MHz.

The following frequencies were found inside the restricted bands according to FCC 47 CFR Part 15 section 15.205 [2].

- No frequencies found inside the restricted bands.

These frequencies have to be measured on the open area test site. The results of this final measurement are shown in subclause 6.2 of this test report.

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 35, 43

6.2 FINAL RADIATED EMISSION TEST (30 MHz to 1 GHz)

Ambient temperature	21 °C	Relative humidity	35 %
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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 to the EUT.

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

Supply voltage: During all measurements the EUT was supplied by the internal power supply.

The results of the standard final measurement on the open area test site are indicated in the table below. The limits as well as the measured results (levels) refer to the above-mentioned standard while taking account of the specified requirements for a 3 m measuring distance.

Results measured with the peak detector (and calculated to average):

Fundamental emission										
Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings Peak dBμV	Antenna factor 1/m	Cable loss dB	Average correction factor [dB]	Height cm	Azimuth deg	Pol.
433.919	58.6	72.9	14.3	58.6	16.4	3.6	-20.0	200	90	Hor.
Highest spurious emissions outside restricted bands										
Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings Peak dBμV	Antenna factor 1/m	Cable loss dB	Average correction factor [dB]	Height cm	Azimuth deg	Pol.
867.826	38.4	54.0	15.6	30.9	22.1	5.4	-20.0	100	226	Hor.
Three highest spurious emissions in restricted bands										
No emissions in restricted bands found										

The test results were calculated with the following formula:

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

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

14 – 20

6.3 PRELIMINARY RADIATED EMISSION TEST (1 GHz to 5 GHz)

Ambient temperature	21 °C	Relative humidity	28 %
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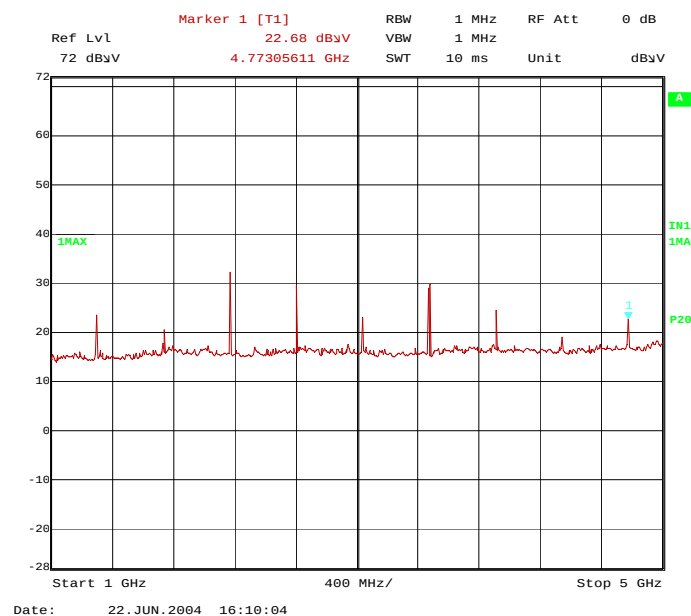
Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: No cables were connected to the EUT.

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

Supply voltage: During all measurements the EUT was supplied by the internal power supply.

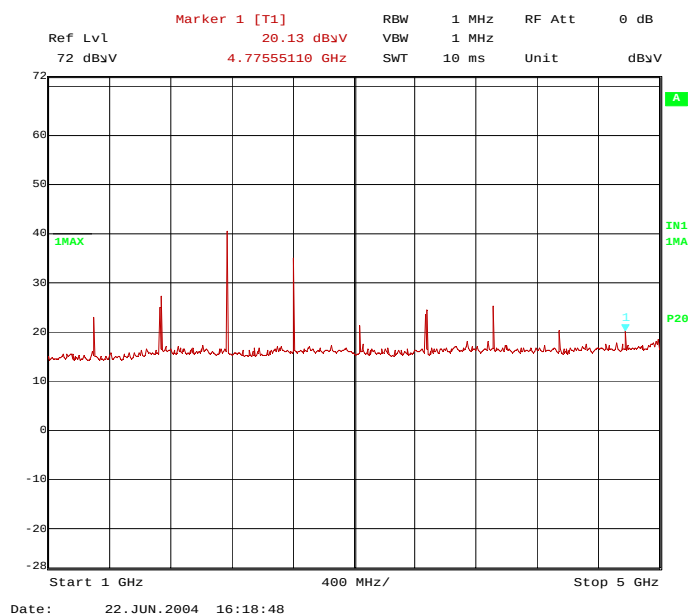
40495a_17.wmf (1 GHz to 5 GHz, horizontal polarisation):





TEST REPORT REFERENCE: R40495 Edition 2

40495a 18.wmf (1 GHz to 5 GHz, vertical polarisation):



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

- 1735.676 MHz;
- 2169.598 MHz;
- 2603.460 MHz;
- 3037.343 MHz;
- 3471.308 MHz.

The following frequencies were found inside the restricted bands according to FFC 47 CFR Part 15 section 15.205 [2].

- 1301.784 MHz;
- 3905.210 MHz;
- 4339.173 MHz;
- 4773.056 MHz

On these frequencies a final measurement have to take place. The results of this final measurement are shown in subclause 6.4 of this test report.

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 43

6.4 FINAL RADIATED EMISSION TEST (1 GHz to 5 GHz)

Ambient temperature	21 °C	Relative humidity	28 %
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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 to the EUT.

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

Supply voltage: During all measurements the EUT was supplied by the internal power supply.

Results measured with the peak detector (and calculated to average):

Three highest spurious emissions outside restricted bands										
Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Cable loss dB	Average correction factor [dB]	Height cm	Azimuth deg	Pol.
2169.598	51.72	54.0	2.28	40.42	27.9	3.4	-20.0	150	40	Vert.
2603.460	47.40	54.0	6.60	34.90	28.8	3.7	-20.0	150	35	Vert.
3471.308	45.36	54.0	8.64	29.56	31.5	4.3	-20.0	150	205	Hor.
Three highest spurious emissions in restricted bands										
Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Cable loss dB	Average correction factor [dB]	Height cm	Azimuth deg	Pol.
3905.210	42.93	54.0	11.07	25.63	32.9	4.4	-20.0	150	30	Vert.
4339.173	40.25	54.0	13.75	23.15	32.4	4.7	-20.0	150	310	Hor.
4773.056	40.88	54.0	13.12	22.68	33.1	5.1	-20.0	150	58	Hor.
Other spurious emissions outside restricted bands										
Frequency MHz	Result dBμV/m	Limit dBμV/m	Margin dB	Readings dBμV	Antenna factor 1/m	Cable loss dB	Average correction factor [dB]	Height cm	Azimuth deg	Pol.
1735.676	37.47	54.0	16.53	27.17	27.3	3.0	-20.0	150	165	Vert.
3037.343	37.26	54.0	16.74	22.76	30.5	4.0	-20.0	150	224	Hor.
Other spurious emissions inside restricted bands										
1301.784	33.42	54.0	20.58	25.62	25.2	2.6	-20.0	150	0	Vert.

The test results were calculated with the following formula:

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

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 34, 36, 43

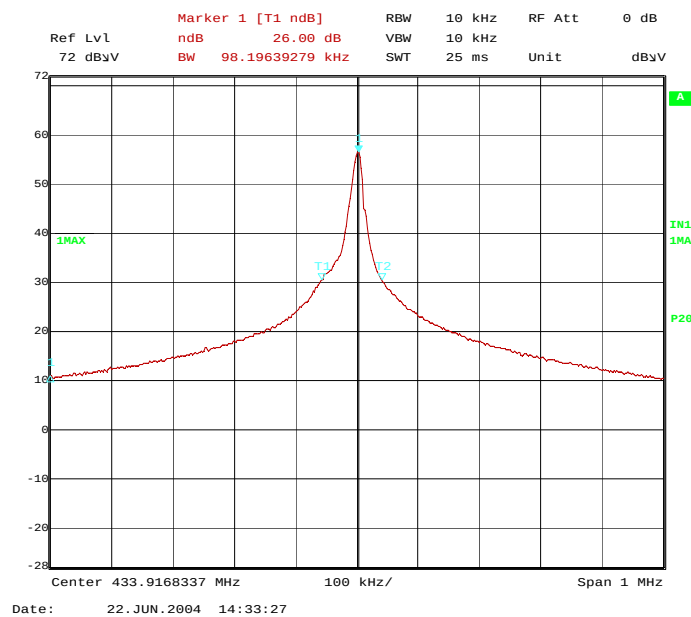
TEST REPORT REFERENCE: R40495 Edition 2

6.5 OCCUPIED BANDWIDTH

Ambient temperature:	20 °C	Relative humidity:	62 %
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Supply voltage: During all measurements the EUT was supplied by the internal power supply.

40495a11.wmf: Occupied bandwidth



Measured Bandwidth	Limit
98.2 kHz	1.08 MHz (0.25% of 433.92MHz)

Test: Passed

TEST EQUIPMENT USED THE TEST:

29, 31, 34, 35, 43

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
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
22	Measuring receiver	ESMI	Rohde & Schwarz	843977/001	480179

				843530/018	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
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
No.	Test equipment	Type	Manufacturer	Serial No.	PM-No
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
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

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	PHOTOGRAPHS OF THE TEST SET-UPS:	4 pages
	SA4-WM730 detail view of table test set-up fully anechoic chamber	40495a.JPG
	SA4-WM730 test set-up fully anechoic chamber	40495d.JPG
	SA4-WM730 detail view of test set-up open area test site	40495j.JPG
	SA4-WM730 test set-up open area test site	40495i.JPG
ANNEX B	EXTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:	4 pages
	SA4-WM730 top view	40495EUT1.JPG
	SA4-WM730 rear view	40495EUT2.JPG
	SA4-WM730 label	40495EUT3.JPG
	SA4-WM730 mounting plate removed	40495EUT12.JPG
ANNEX C	INTERNAL PHOTOGRAPHS OF THE TEST SAMPLE:	3 pages
	SA4-WM730 PCB side view	40495EUT4.JPG
	SA4-WM730 PCB rear view	40495EUT6.JPG
	SA4-WM730 PCB front view	40495EUT8.JPG