



FCC ID: E9MPT4500

Registration No. DAT-P-207/05

EMI -- TEST REPORT

Test Report No. : T32267-01-00KJ	26. June 2008 Date of issue
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Type / Model Name : PT 4500

Product Description : Pocket transmitter

Applicant : AKG Acoustics GmbH

Address : Lemböckgasse 21-25
1230 Wien, Austria

Manufacturer : AKG Acoustics GmbH

Address : Lemböckgasse 21-25
1230 Wien, Austria

Licence holder : AKG Acoustics US

Address : 8500 Balboa Blvd
91329 Northridge, CA, US

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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DAT-P-207/05-00

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test results without the written permission of the test laboratory.

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 74

Experimental radio, auxiliary, special broadcast and
other program distributional services (October 01, 2007)

Part 74, Subpart H, Section 74.861

Technical requirements for low power auxiliary stations

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2 SUMMARY

GENERAL REMARKS:

All tests have been performed with full batteries.

FINAL ASSESSMENT:

The equipment under test **fulfills** the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 14. January 2008

Testing concluded on : 26. June 2008

Checked by:

Tested by:

Thomas Weise
Dipl.-Ing.(FH)
Laboratory Manager

Josef Knab

3 EQUIPMENT UNDER TEST

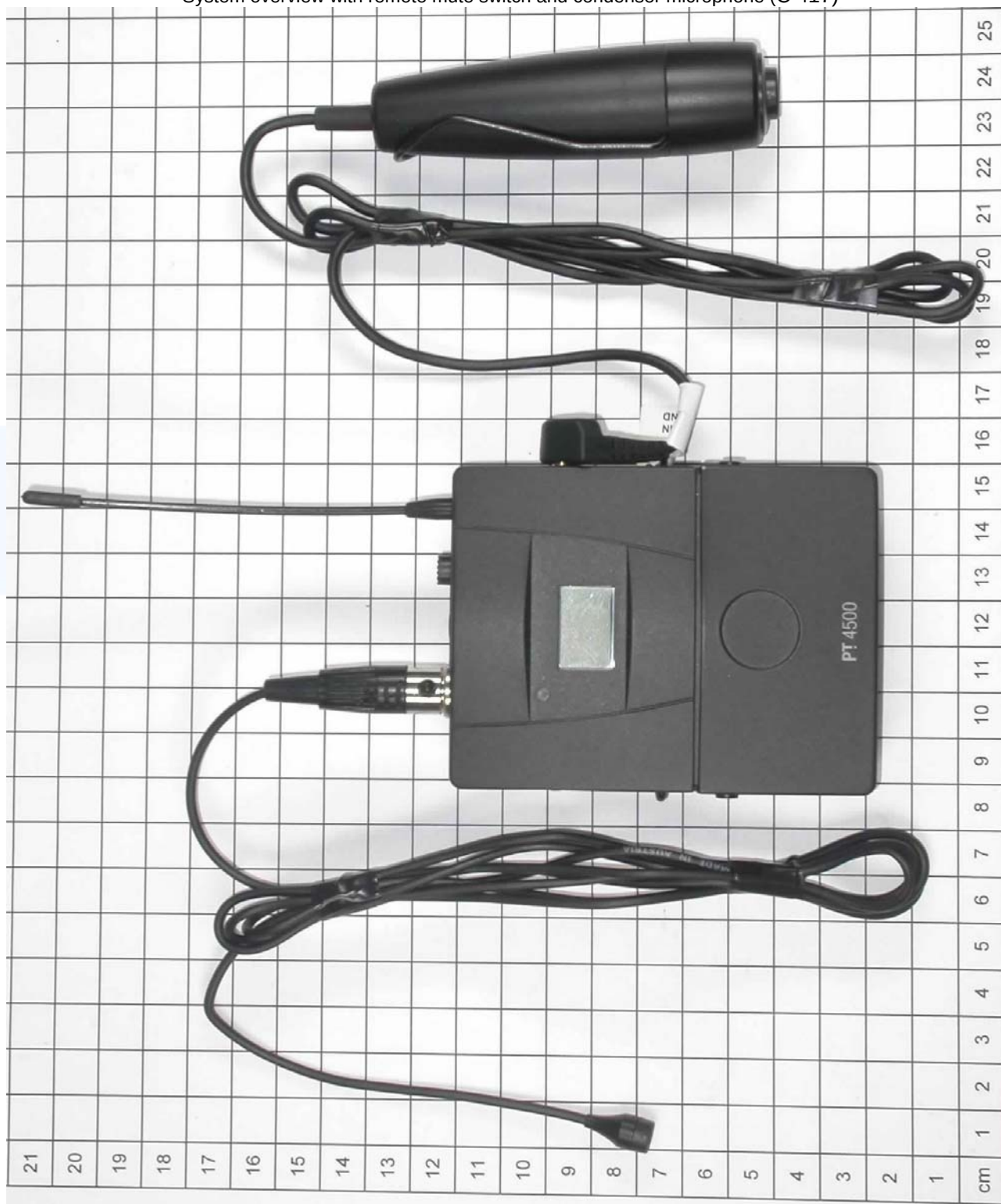
3.1 Photo documentation of the EuT

Pocket transmitter - PT 4500

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External photo

System overview with remote mute switch and condenser microphone (C 417)



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Pocket transmitter - PT 4500

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External photo

Front view



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Pocket transmitter - PT 4500

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External photo

Rear view



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Pocket transmitter - PT 4500

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External photo

Bottom view



Pocket transmitter - PT 4500

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External photo

Top view



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Pocket transmitter - PT 4500

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External photo

Side view (left)



Pocket transmitter - PT 4500

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External photo

Side view (right)



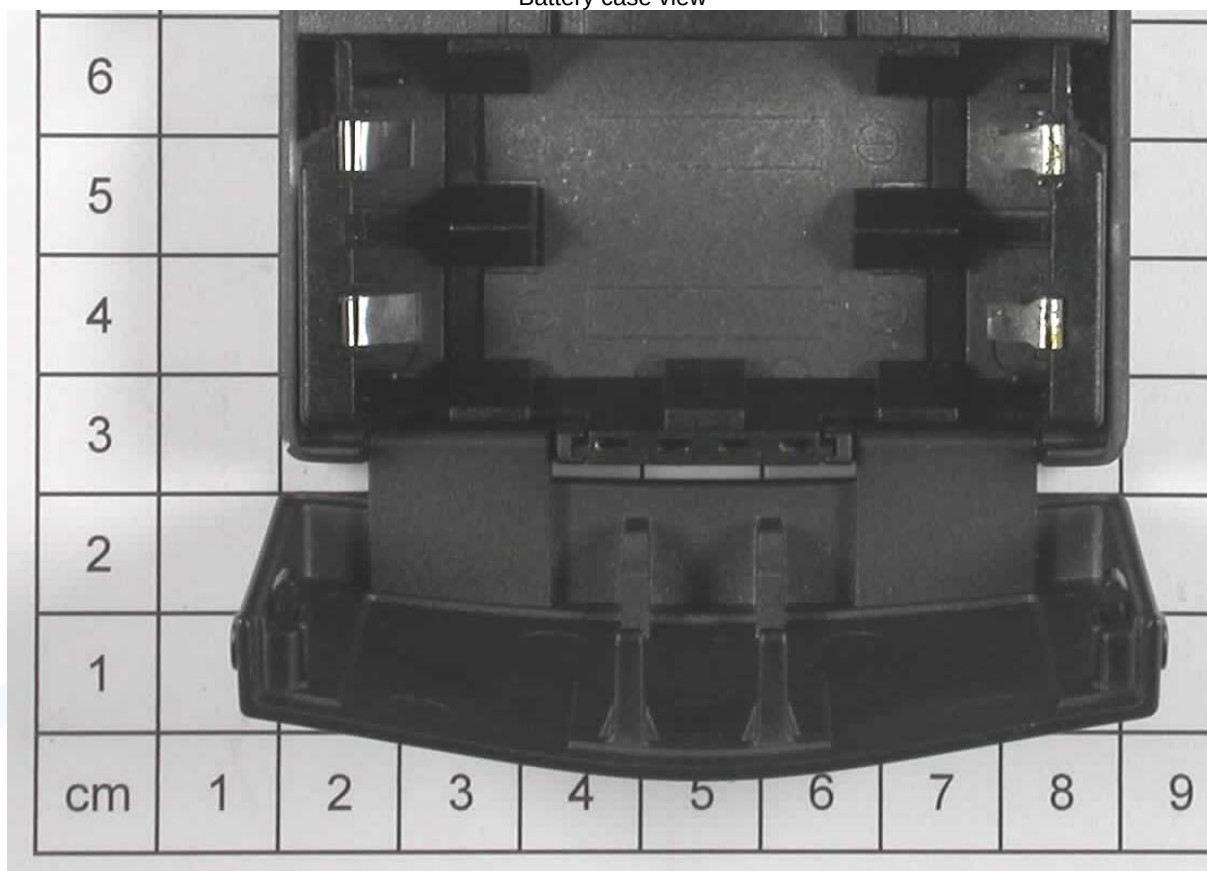
FCC ID: E9MPT4500

Pocket transmitter - PT 4500

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External photo

Battery case view



Pocket transmitter - PT 4500

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External photo

Label view



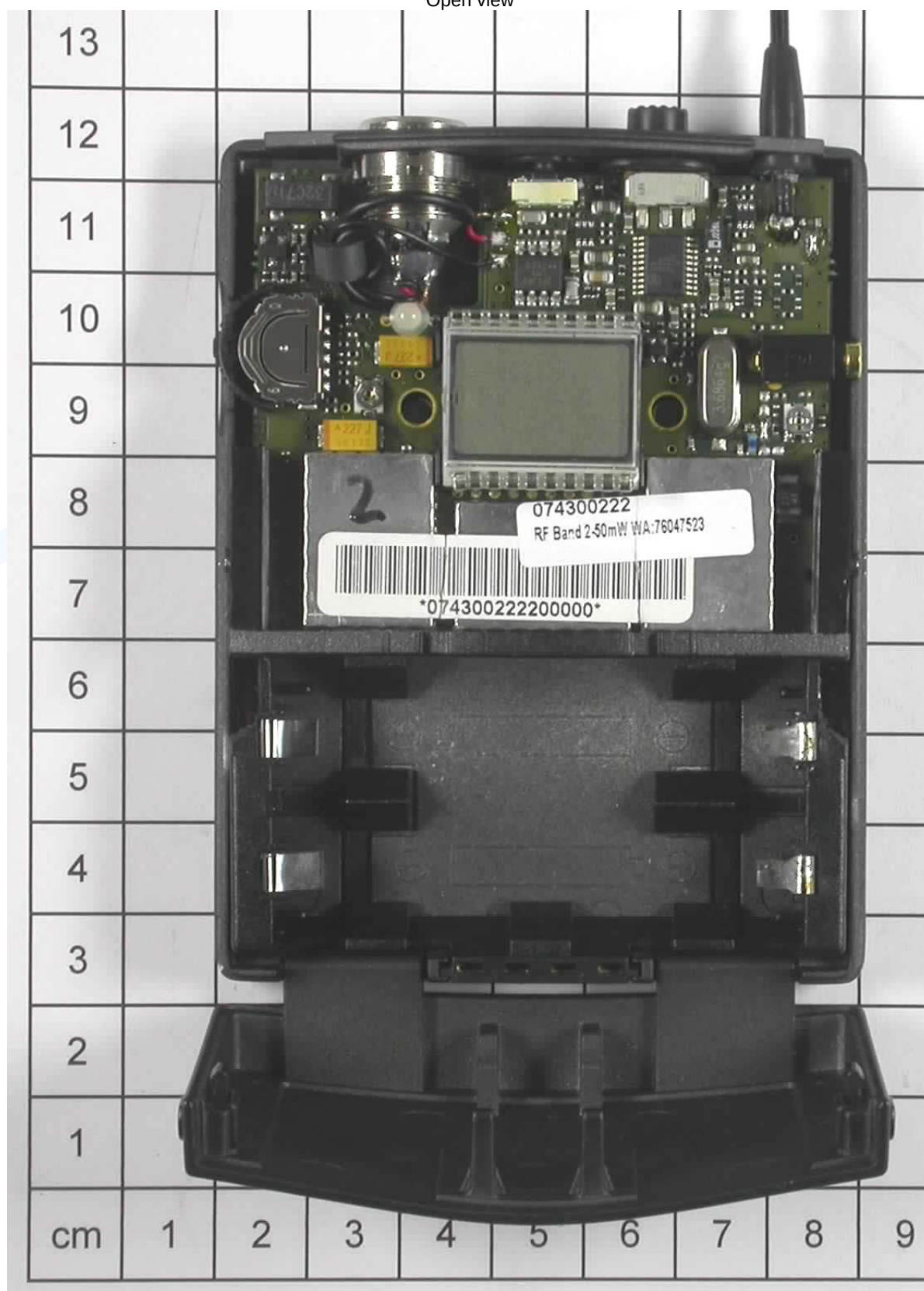
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Pocket transmitter - PT 4500

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Internal photo

Open view



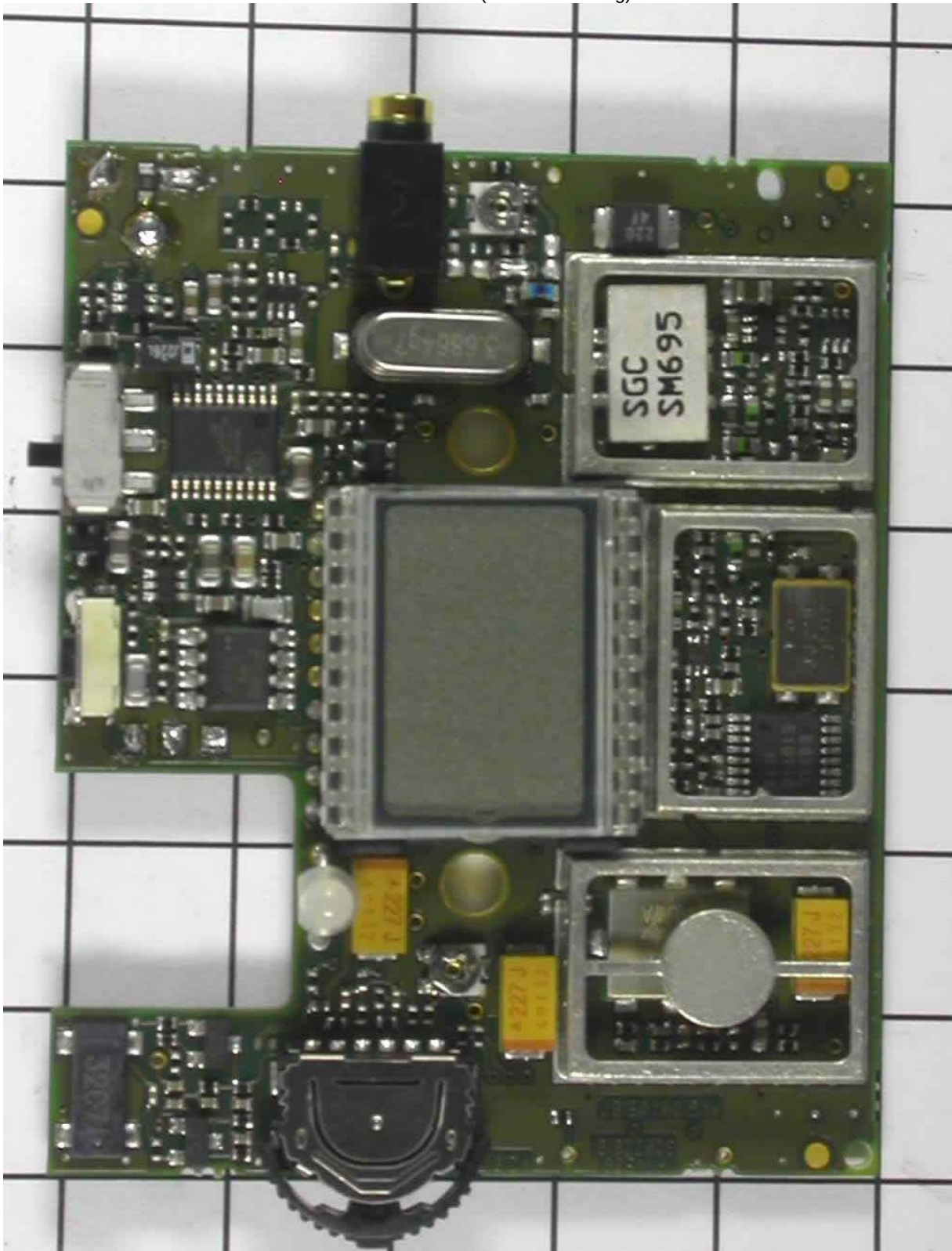
FCC ID: E9MPT4500

Pocket transmitter - PT 4500

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Internal photo

Front view of PCB (without shielding)



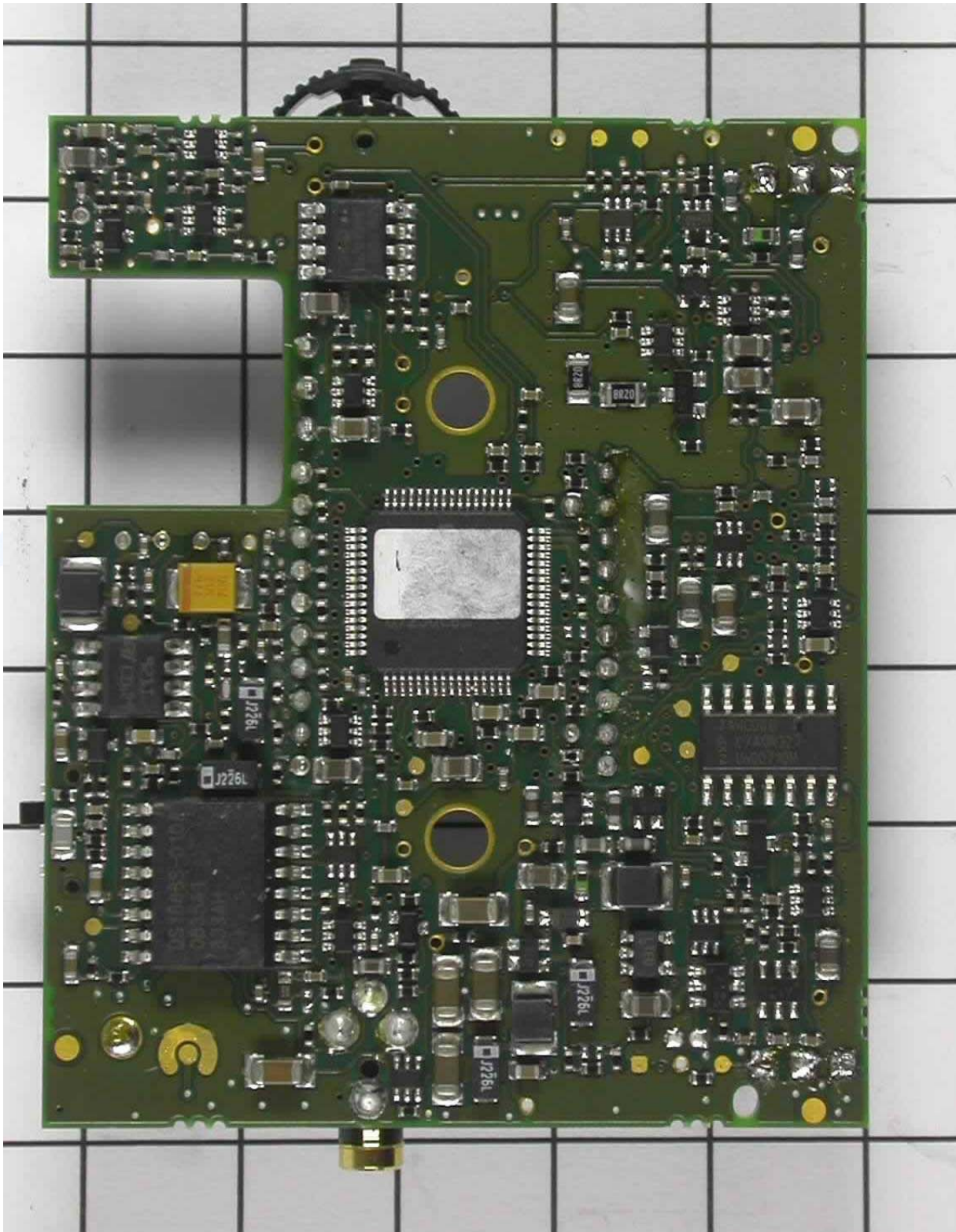
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Pocket transmitter - PT 4500

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Internal photo

Rear view of PCB



3.2 Power supply system utilised

Power supply voltage : 3.2 V / DC

3.3 Short description of the Equipment under Test (EuT)

The EuT is a bodypack transmitter with both dynamic microphones and condenser microphones. The microphone elements available for the PT 4500 have been specifically designed for electric guitar, electric bass, or remote keyboard. The PT 4500 operates in one subband up to 30 MHz wide within the 500.1 MHz to 790.0 MHz UHF carrier frequency band. Within the subband, you can either set the carrier frequency directly in 25 kHz increments or select one of the Channels of the Preset Frequency Groups of the transmitter.

Accessories: C 417: condenser microphone for PT 4500
BP 4000: Battery pack

Number of tested samples: 1
Serial number: 074300222

EuT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- TX mode

-

-

EuT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurements:

- condenser microphone for PT 4500	Model : C 417
-	Model :
-	Model :
-	Model :
-	Model :
-	Model :

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

mikes-testingpartners gmbh
Ohmstrasse 2-4
94342 Strasskirchen
Germany

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2 /11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Measurement Protocol for FCC, VCCI and AUSTEL

4.4.1 GENERAL INFORMATION

4.4.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

In compliance with 47 CFR Part 15 Subpart A Section 15.38 testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

4.4.1.2 Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.2 DETAILS OF TEST PROCEDURES

4.4.2.1 General Standard Information

The test methods used comply with CISPR Publication 22, EN 55022 - "Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4-2003 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

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4.5 Discovery of worst case measurement conditions

The model PT 4500 is a bodypack transmitter and consists of 6 different versions between the frequency band 500.0 MHz to 790.0MHz.

Band1 650.0 MHz to 680.0 MHz

Band3 720.0 MHz to 750.0 MHz

Band7 500.0 MHz to 530.0 MHz

Band2 680.0 MHz to 710.0 MHz

Band4 760.0 MHz to 790.0 MHz

Band8 570.0 MHz to 600.0 MHz

All the versions are technically identical except the following items:

- PCB: The boards are similar with differences only in the output filter. On the PCB, the values of some resistors, coils and capacitors are different. For more detailed information, please see technical documentation set. Due to the different output filter, the PCB's have different names.

To find out the worst case channel for the complete measurement the following tests have been performed at that channel with the highest output power.

The complete measurement was performed at four versions:

- Band1 working at 680.0 MHz (highest channel of the frequency band)
- Band2 working at 695.0 MHz (middle channel of the frequency band)
- Band3 working at 720.0 MHz (lower channel of the frequency band)
- Band4 working at 760.0 MHz (lowest channel of the frequency band)
- Band7 working at 515.0 MHz (middle channel of the frequency band)
- Band8 working at 570.1 MHz (lower channel of the frequency band)

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emissions

For test instruments and accessories used see section 6 Part A 4.

5.1.1 Description of the test location

Test location: None

5.1.2 Photo documentation of the test set-up

5.1.3 Description of Measurement

The final level, expressed in dB μ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EuT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50 Ω /50 μ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.4 Test result

Remarks: Not applicable.

The EuT is battery powered.

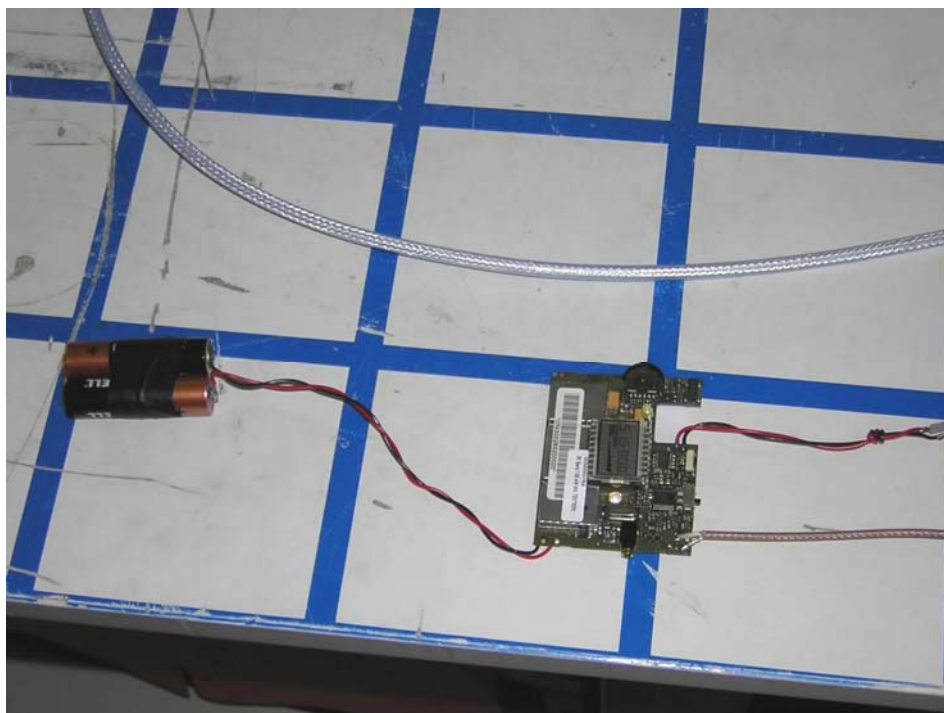
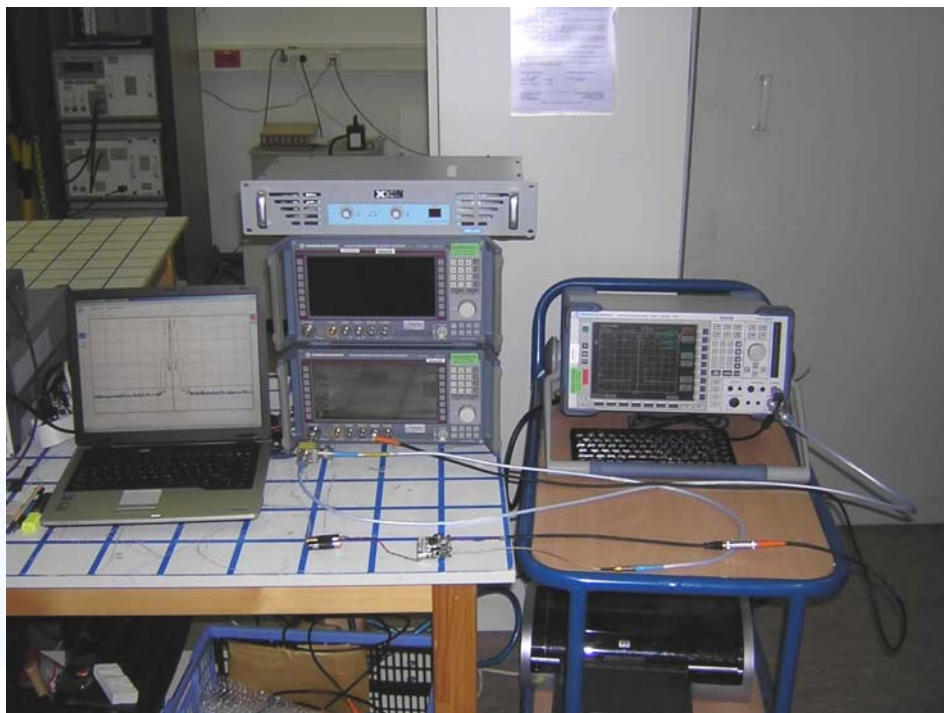
5.2 Effective radiated power (conducted)

For test instruments and accessories used see section 6 Part CPC 2.

5.2.1 Description of the test location

Test location: AREA4

5.2.2 Photo documentation of the test set-up



5.2.3 Description of Measurement

Transmitter power is the power at the transmitter output terminals and delivered to the antenna, antenna transmission line, or any other impedance-matched, radio frequency load.

No unusual transmitting antennas or antenna elevations shall be used as defined in §74.861(f) and the requirements in § 74.801 shall be fulfilled.

5.2.4 Test result

Band1:

Frequency [MHz]	Level [dBm]	Limit [dBm]	DLimit [dB]
680.0	14.7	24.0	9.3

Band2:

Frequency [MHz]	Level [dBm]	Limit [dBm]	DLimit [dB]
695.0	15.0	24.0	9.0

Band3:

Frequency [MHz]	Level [dBm]	Limit [dBm]	DLimit [dB]
720.0	14.5	24.0	9.5

Band4:

Frequency [MHz]	Level [dBm]	Limit [dBm]	DLimit [dB]
760.0	15.4	24.0	8.6

Band7:

Frequency [MHz]	Level [dBm]	Limit [dBm]	DLimit [dB]
515.0	15.9	24.0	8.1

Band8:

Frequency [MHz]	Level [dBm]	Limit [dBm]	DLimit [dB]
570.1	16.2	24.0	7.8

Peak Power Limit according to FCC Subpart 74.861(e)(1)(ii):

Transmitting frequencies of the EuT [MHz]	Limit [mW]	Limit [dBm]
54 – 72	50	17
76 – 88		
174 – 216		
470 – 608	250	24
614 - 806		

The requirements are **FULFILLED**.

Remarks: Unusual transmitting antennas or antenna elevations have not been used as defined
in §74.861(f) and the requirements in § 74.831 are also fulfilled.

5.3 Radiated emissions (electric field) 30 MHz – 40 GHz

For test instruments and accessories used see section 6 Part SER 2, SER 3.

5.3.1 Description of the test location

Test location / distance: OATS1 / 3 meters

Test location / distance: Anechoic Chamber A2 / 3 meters

5.3.2 Photo documentation of the test set-up



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5.3.3 Description of Measurement

Radiated spurious emissions from the EuT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003. The Interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in

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this test) are routed through the center of the table and to a screen room located outside the test area. The antenna was positioned 3, 10 or 30 meters horizontally from the EuT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarization's and the EuT are rotated 360 degrees.

The final level, expressed in dBm, is arrived by taking the reading from the EMI receiver (Level dBm) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored. This result then has the FCC or CISPR limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets at page.

The radiated emissions from the EuT are measured in the frequency range of 1 GHz to maximum frequency as specified in section 15.33, using a tuned receiver (Spectrum Analyser) and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003.

The Interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna was positioned 3 horizontally from the EuT.

Measurement are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak and resolution as well as video bandwidth set to 1 MHz. All tests are performed at a test-distance of 3 meters. Hand-held or body-worn devices are rotated through three orthogonal axes to determine which attitude and configuration procedure the highest emission relative the limit and therefore shall be used for final testing. During the tests the EUT is rotated all around to find the maximum levels of emissions. The cables and equipment were placed and moved within the range of position likely to find their maximum emissions. When the EuT is larger than the beamwidth of the measuring antenna, the measurement antenna will be moved over the surfaces for the four sides or the test distance will be reduced to demonstrate that emissions were at maximum at the limit distance.

The resolution bandwidth during the measurement is as follows:

30 MHz – 1000 MHz:	ResBW: 120 kHz
1000 MHz – 40000 MHz	ResBW: 1 MHz

5.3.4 Test result

Band1 (working at 680.0 MHz):

Frequency [MHz]	Reading Vert. [dBm]	Reading Hor. [dBm]	Correct. Vert. [dB]	Correct. Hor. [dB]	Level Vert. [dBm]	Level Hor. [dBm]	Limit [dBm]	DLimit [dB]
25-1000	-	-	-	-	<-60.0	<-60.0	-40.0	-
1360	-45.3	-43.5	-10.7	-10.8	-56.0	-54.3	-40.0	-14.3
2038	-54.4	-54.6	-12.1	-12.1	-66.5	-66.7	-40.0	-26.5
2722	-47.9	-54.6	-8.8	-9.3	-56.7	-63.9	-40.0	-16.7
4072	-52.4	-59.3	3.5	3.6	-48.9	-55.7	-40.0	-8.9
4756	-58.0	-59.7	3.6	4.0	-54.4	-55.7	-40.0	-14.4
5440	-60.1	-	4.4	-	-55.7	-	-40.0	-15.7
6124	-60.8	-	5.3	-	-55.5	-	-40.0	-15.5

Band2 (working at 695.0 MHz):

Frequency [MHz]	Reading Vert. [dBm]	Reading Hor. [dBm]	Correct. Vert. [dB]	Correct. Hor. [dB]	Level Vert. [dBm]	Level Hor. [dBm]	Limit [dBm]	DLimit [dB]
25-1000	-	-	-	-	<-60.0	<-60.0	-39.8	-
1390	-48.2	-45.5	-11.0	-11.1	-59.2	-56.6	-39.8	-16.8
2086	-54.9	-	-13.1	-	-68.0	-	-39.8	-28.2
2782	-52.2	-54.8	-9.0	-9.6	-61.2	-64.4	-39.8	-21.4
4162	-54.6	-59.5	3.6	3.5	-51.0	-56.0	-39.8	-11.2
4846	-59.6	-61.2	3.7	4.1	-55.9	-57.1	-39.8	-16.1
5548	-61.0	-	4.5	-	-56.5	-	-39.8	-16.7
8050	-	-61.3	-	7.8	-	-53.5	-39.8	-13.7

Band3 (working at 720.0 MHz):

Frequency [MHz]	Reading Vert. [dBm]	Reading Hor. [dBm]	Correct. Vert. [dB]	Correct. Hor. [dB]	Level Vert. [dBm]	Level Hor. [dBm]	Limit [dBm]	DLimit [dB]
25-1000	-	-	-	-	<-60.0	<-60.0	-40.1	-
1438	-53.2	-	-12.4	-	-65.6	-	-40.1	-25.5
2158	-56.2	-	-11.3	-	-67.5	-	-40.1	-27.4
2878	-51.6	-53.2	-8.5	-8.5	-60.1	-61.7	-40.1	-20.0
4318	-57.8	-	5.0	-	-52.8	-	-40.1	-12.7
5038	-57.8	-57.9	5.9	3.6	-51.9	-54.3	-40.1	-11.8

Band4 (working at 760.0 MHz):

Frequency [MHz]	Reading Vert. [dBm]	Reading Hor. [dBm]	Correct. Vert. [dB]	Correct. Hor. [dB]	Level Vert. [dBm]	Level Hor. [dBm]	Limit [dBm]	DLimit [dB]
25-1000	-	-	-	-	<-60.0	<-60.0	-39.5	-
1522	-47.5	-44.0	-12.7	-12.3	-60.2	-56.3	-39.5	-16.8
2278	-43.4	-50.5	-10.3	-11.2	-53.7	-61.7	-39.5	-14.2
3040	-48.0	-50.8	-7.9	-8.7	-55.9	-59.5	-39.5	-16.4
3802	-54.2	-	-5.8	-	-60.0	-	-39.5	-20.5
4558	-55.6	-60.7	3.4	3.6	-52.2	-57.1	-39.5	-12.7

Band7 (working at 515.0 MHz):

Frequency [MHz]	Reading Vert. [dBm]	Reading Hor. [dBm]	Correct. Vert. [dB]	Correct. Hor. [dB]	Level Vert. [dBm]	Level Hor. [dBm]	Limit [dBm]	DLimit [dB]
25-1000	-	-	-	-	<-60.0	<-60.0	-39.1	-
1030	-56.1	-56.4	-13.4	-13.4	-69.5	-69.8	-39.1	-30.4
1546	-44.3	-49.9	-13.1	-12.9	-57.4	-62.8	-39.1	-18.3
2062	-45.2	-50.3	-12.6	-12.6	-57.8	-62.9	-39.1	-18.7
2578	-43.7	-47.6	-8.9	-9.2	-52.6	-56.8	-39.1	-13.5
3094	-48.0	-52.9	-8.6	-8.1	-56.6	-61.0	-39.1	-17.5
3610	-54.0	-	-6.0	-	-60.0	-	-39.1	-20.9
4108	-58.0	-	3.5	-	-54.5	-	-39.1	-15.4
6178	-58.3	-61.4	5.5	5.1	-52.8	-56.3	-39.1	-13.7

Band8 (working at 570.1 MHz):

Frequency [MHz]	Reading Vert. [dBm]	Reading Hor. [dBm]	Correct. Vert. [dB]	Correct. Hor. [dB]	Level Vert. [dBm]	Level Hor. [dBm]	Limit [dBm]	DLimit [dB]
25-1000	-	-	-	-	<-60.0	<-60.0	-38.9	-
1138	-	-54.4	-	-12.7	-	-67.1	-38.9	-28.2
1708	-54.5	-	-12.8	-	-67.3	-	-38.9	-28.4
2284	-51.4	-53.3	-10.4	-10.5	-61.8	-63.8	-38.9	-22.9
4560	-58.4	-62.2	5.6	3.4	-52.8	-58.8	-38.9	-13.9
5120	-58.3	-62.6	5.7	3.8	-52.6	-58.8	-38.9	-13.7

Peak-Limit according to FCC Subpart 74.861(e)(6)(iii)

The mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least $43+10\log_{10}(\text{mean output power in watts})$ dB.

The requirements are **FULFILLED**.

Remarks: During the test, the Eut was set into transmitting mode without modulation.

The measurement was performed up to the 10th harmonic (9000 MHz).

The measurement has been performed in Peak mode. For critical results, the measurements would be repeated in average mode.

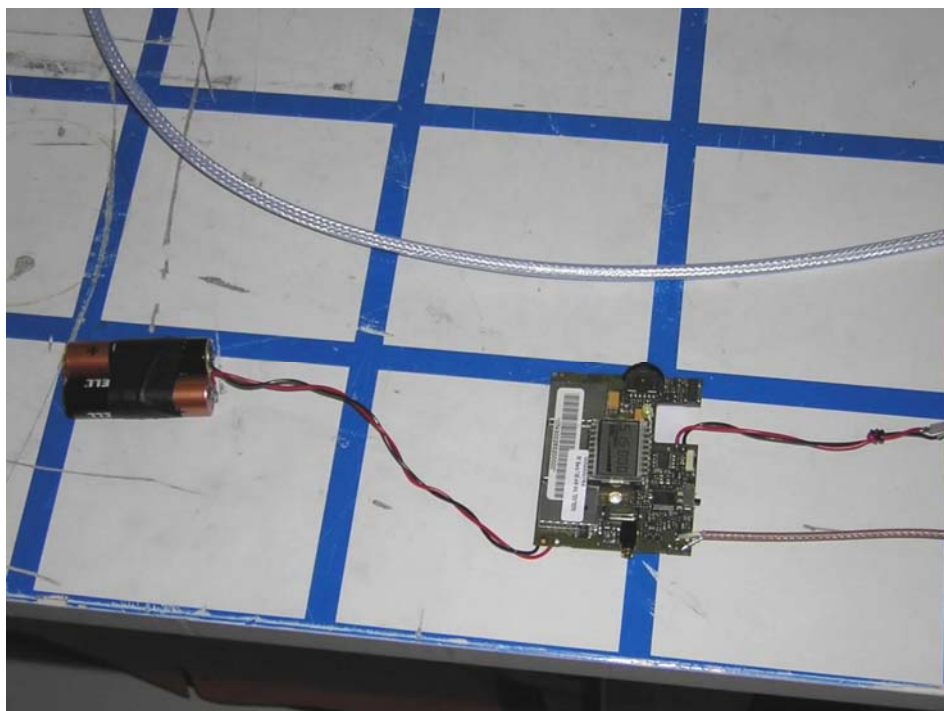
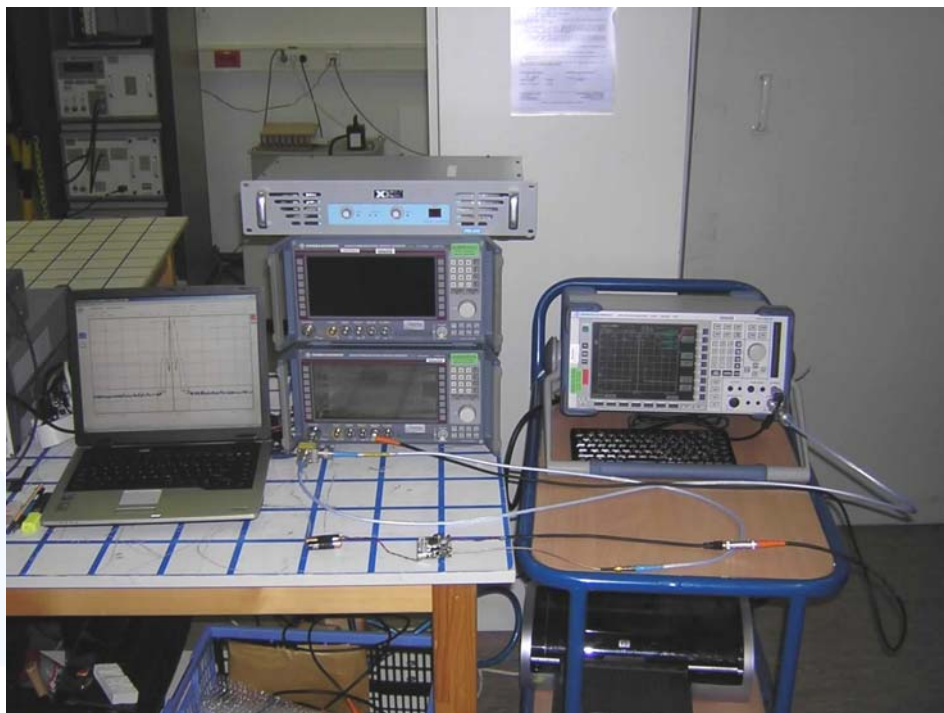
5.4 Modulation Limiting Data

For test instruments and accessories used see section 6 Part MLD.

5.4.1 Description of the test location

Test location: AREA4

5.4.2 Photo documentation of the test set-up



5.4.3 Description of Measurement

The modulation limiting data were measured at the antenna terminals for EuT's with external connector. Other EuT's are tested via an adequate coupling device with antenna jack. The antenna jack was connected to the input of a communication test receiver. The data have been taken by feeding the connectors used for connecting the microphone with different audio frequencies. These frequencies are generated in the communication test receiver.

The level was varied in 10 dB steps from 20 dB μ V to the maximum audio input level specified by the manufacturer. The frequency deviation at these levels has been recorded.

PFD: Positive frequency deviation

NFD: Negative frequency deviation

5.4.4 Test result

Band1 (working at 680.0 MHz):

Input Audio level [dB μ V]	Fmod = 50 Hz		Fmod = 2,5 kHz		Fmod = 15 kHz	
	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]
20	2,7	2,7	2,6	2,7	2,8	2,8
30	2,6	2,8	2,7	2,7	3,1	3,1
40	3,2	3,2	3,0	3,0	4,1	4,0
50	3,7	3,8	3,9	3,9	5,9	5,9
60	5,2	5,2	5,6	5,6	9,3	9,2
70	8,0	7,8	8,9	8,9	15,3	14,9
80	12,9	12,4	14,7	14,5	25,8	25,3
90	21,6	21,5	25,1	24,8	44,2	44,0
100	35,9	37,6	42,3	42,9	55,2	54,7
110	48,7	50,7	51,5	48,7	55,4	54,1
120	48,7	50,5	54,8	47,9	55,4	54,2
123	49,3	50,5	55,3	48,0	55,2	54,2

Band2 (working at 695.0 MHz):

Input Audio level [dB μ V]	Fmod = 50 Hz		Fmod = 2,5 kHz		Fmod = 15 kHz	
	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]
20	2,4	2,3	2,4	2,4	2,6	2,5
30	2,6	2,4	2,5	2,5	2,8	2,8
40	2,8	2,9	2,8	2,8	3,7	3,7
50	3,3	3,4	3,7	3,6	5,5	5,4
60	4,7	4,8	5,3	5,3	8,6	8,6
70	7,5	7,4	8,4	8,4	14,3	13,9
80	12,0	11,8	14,0	13,6	24,2	23,8
90	20,2	20,5	24,0	23,6	41,6	40,8
100	33,6	35,6	41,5	38,2	51,9	50,0
110	45,7	46,1	49,6	43,7	51,8	49,5
120	46,2	45,6	52,6	43,0	51,6	49,7
123	47,5	46,6	53,0	42,8	51,5	50,0

Band3 (working at 720.0 MHz):

Input Audio level [dB μ V]	Fmod = 50 Hz		Fmod = 2,5 kHz		Fmod = 15 kHz	
	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]
20	2,4	2,5	2,4	2,4	2,6	2,5
30	2,7	2,6	2,4	2,5	2,9	2,9
40	3,1	2,9	2,7	2,8	3,8	3,7
50	3,4	3,5	3,5	3,5	5,5	5,5
60	4,6	4,8	5,1	5,1	8,8	8,7
70	7,2	7,3	8,1	8,1	14,6	14,4
80	11,6	11,6	13,3	13,2	24,7	24,3
90	19,3	20,0	22,9	22,6	41,9	41,6
100	32,0	34,1	39,2	37,9	48,5	46,3
110	43,9	45,2	46,6	41,7	47,9	46,3
120	46,0	45,9	48,5	40,6	47,9	46,3
123	46,5	46,6	48,6	40,7	47,8	46,4

Band4 (working at 760.0 MHz):

Input Audio level [dB μ V]	Fmod = 50 Hz		Fmod = 2,5 kHz		Fmod = 15 kHz	
	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]
20	2,7	2,8	2,6	2,7	2,9	2,8
30	2,8	2,9	2,8	2,8	3,2	3,2
40	3,0	3,0	3,1	3,1	4,1	4,1
50	3,7	3,9	4,0	4,0	6,0	5,9
60	5,2	5,3	5,8	5,7	9,3	9,2
70	8,1	8,0	9,1	9,0	15,2	14,9
80	13,0	12,7	14,9	14,5	25,6	25,3
90	21,5	21,9	25,4	25,1	44,1	43,6
100	35,8	38,0	43,9	43,2	55,5	54,2
110	49,0	51,1	52,5	48,0	55,5	53,6
120	49,2	50,7	55,8	47,3	55,5	53,8
123	50,7	51,0	56,1	47,2	55,4	53,9

Band7 (working at 515.0 MHz):

Input Audio level [dB μ V]	Fmod = 50 Hz		Fmod = 2,5 kHz		Fmod = 15 kHz	
	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]
20	2,2	2,2	2,2	2,2	2,2	2,2
30	2,2	2,3	2,3	2,2	2,6	2,5
40	2,6	2,5	2,5	2,5	3,4	3,3
50	3,3	3,1	3,3	3,3	4,9	4,9
60	4,3	4,2	4,8	4,7	7,7	7,7
70	6,7	6,5	7,5	7,5	12,8	12,4
80	10,7	10,7	12,4	12,1	21,7	21,2
90	18,0	18,4	21,3	21,0	37,2	36,6
100	29,8	32,1	36,9	36,6	46,9	45,5
110	40,6	42,8	44,0	40,8	46,9	45,0
120	40,9	42,6	46,7	40,1	46,8	45,1
123	41,6	42,8	46,9	40,1	46,7	45,3

FCC ID: E9MPT4500

Band8 (working at 570.1 MHz):

Input Audio level [dBμV]	Fmod = 50 Hz		Fmod = 2,5 kHz		Fmod = 15 kHz	
	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]	PFD [kHz]	NFD [kHz]
20	2,4	2,5	2,5	2,4	2,6	2,7
30	2,7	2,7	2,5	2,5	2,9	2,9
40	2,8	2,9	2,9	27,0	3,7	3,7
50	3,5	3,3	3,6	3,5	5,5	5,4
60	4,5	4,7	5,1	5,0	8,5	8,5
70	7,1	7,0	7,9	7,8	14,1	13,8
80	11,2	11,1	13,0	12,8	24,0	23,6
90	18,6	19,3	22,2	22,0	41,4	40,8
100	31,0	33,0	38,4	37,3	48,3	46,0
110	43,3	44,5	46,2	41,5	47,9	46,0
120	45,2	44,8	48,3	40,1	47,9	46,0
123	46,0	46,2	48,3	40,1	47,9	46,0

Limit according to FCC Subpart 74.861(e)(3):

Any form of modulation may be used. A maximum deviation of +/- 75 kHz is permitted when frequency modulation is employed.

The requirements are **FULFILLED**.

Remarks:

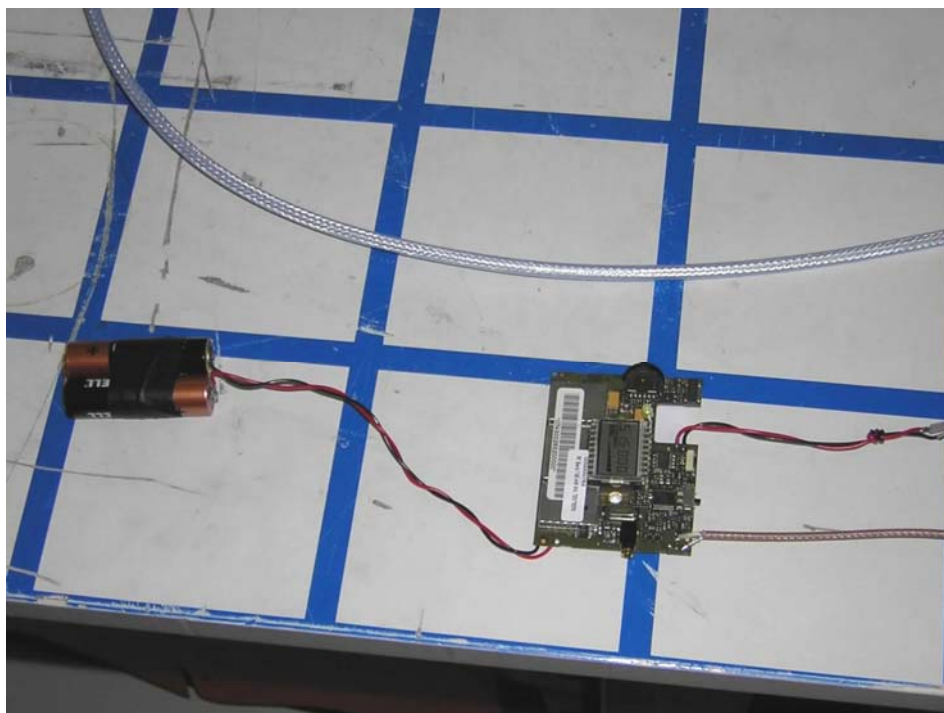
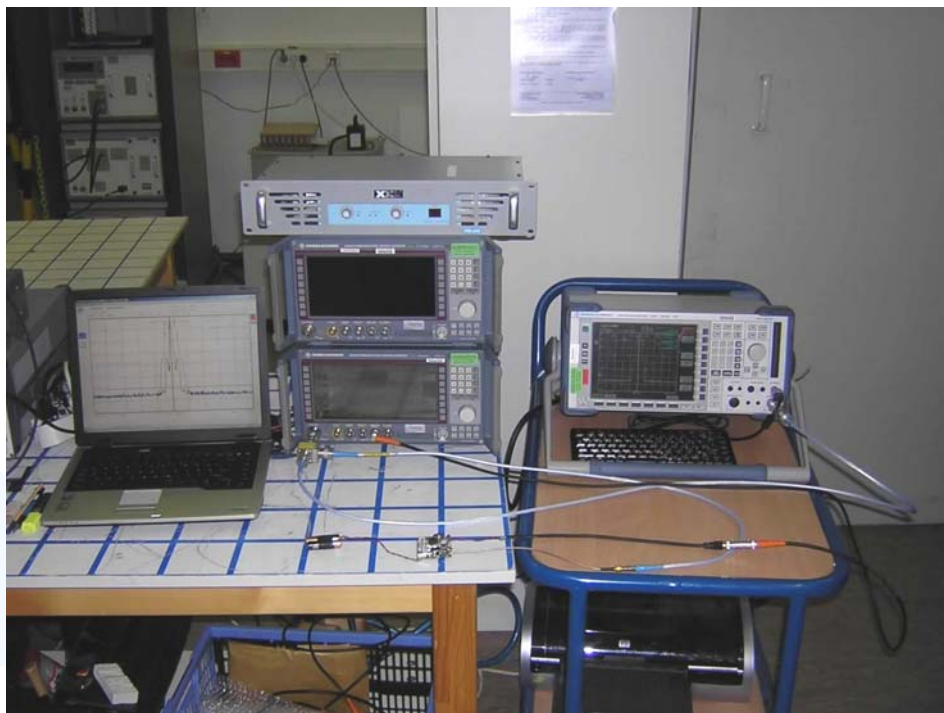
5.5 Occupied Bandwidth

For test instruments and accessories used see section 6 Part MB.

5.5.1 Description of the test location

Test location: AREA4

5.5.2 Photo documentation of the test set-up



5.5.3 Description of Measurement

For the occupied bandwidth protocol the value of 50 % of the maximum frequency deviation was calculated. The level on the audio input was increased until this 50 % frequency deviation was achieved. To this level 16 dB have been added and a plot was made as described in the next chapter under section occupied bandwidth

5.5.4 Test result

Band1 (working at 680.0 MHz):

Max. measured frequency deviation (e.g. 2.5 kHz): ± 55.3 kHz

50% of the maximum deviation: ± 27.7 kHz

Audio input level (ail) to get $\pm$ kHz: $L = 91.8$ dB μ V

$L + 16$ dB μ V = 107.8 dB μ V $\Rightarrow$ Level for testing the occupied bandwidth

Version of EuT	Band1			
Audio test level	L= 107.8 dB μ V 2.5 kHz		L= 97.3 dB μ V 15.0 kHz	
Shape of emission mask	± 50 -100% [dB]	± 100 -250% [dB]	± 50 -100% [dB]	± 100 -250% [dB]
Min.limit margin [dB]	> 15	> 20	> 5	> 20

Band2 (working at 695.0 MHz):

Max. measured frequency deviation (e.g. 2.5 kHz): ± 53.0 kHz

50% of the maximum deviation: ± 26.5 kHz

Audio input level (ail) to get $\pm$ kHz: $L = 91.9$ dB μ V

$L + 16$ dB μ V = 107.9 dB μ V $\Rightarrow$ Level for testing the occupied bandwidth

Version of EuT	Band2			
Audio test level	L= 107.9 dB μ V 2.5 kHz		L= 97.3 dB μ V 15.0 kHz	
Shape of emission mask	± 50 -100% [dB]	± 100 -250% [dB]	± 50 -100% [dB]	± 100 -250% [dB]
Min.limit margin [dB]	> 20	> 20	> 10	> 20

Band3 (working at 720.0 MHz):

Max. measured frequency deviation (e.g. 2.5 kHz): ± 48.6 kHz

50% of the maximum deviation: ± 24.3 kHz

Audio input level (ail) to get $\pm$ kHz: $L = 91.1$ dB μ V

$L + 16$ dB μ V = 107.1 dB μ V $\Rightarrow$ Level for testing the occupied bandwidth

Version of EuT	Band3			
Audio test level	L= 107.1 dB μ V 2.5 kHz		L= 95.8 dB μ V 15.0 kHz	
Shape of emission mask	± 50 -100% [dB]	± 100 -250% [dB]	± 50 -100% [dB]	± 100 -250% [dB]
Min.limit margin [dB]	> 20	> 20	> 10	> 20

Band4 (working at 760.0 MHz):

Max. measured frequency deviation (e.g. 2.5 kHz): ± 56.1 kHz

50% of the maximum deviation: ± 28.1 kHz

Audio input level (ail) to get $\pm$ kHz: $L = 91.8$ dB μ V

$L + 16$ dB μ V = 107.8 dB μ V $\Rightarrow$ Level for testing the occupied bandwidth

Version of EuT	Band4			
Audio test level	L= 107.8 dB μ V 2.5 kHz		L= 97.5 dB μ V 15.0 kHz	
Shape of emission mask	± 50 -100% [dB]	± 100 -250% [dB]	± 50 -100% [dB]	± 100 -250% [dB]
Min.limit margin [dB]	> 20	> 20	> 10	> 20

Band7 (working at 515.0 MHz):

Max. measured frequency deviation (e.g. 2.5 kHz): ± 46.9 kHz

50% of the maximum deviation: ± 23.5 kHz

Audio input level (ail) to get $\pm$ kHz: $L = 91.8$ dB μ V

$L + 16$ dB μ V = 107.8 dB μ V $\Rightarrow$ Level for testing the occupied bandwidth

Version of EuT	Band7			
Audio test level	L= 107.8 dB μ V 2.5 kHz		L= 97.5 dB μ V 15.0 kHz	
Shape of emission mask	± 50 -100% [dB]	± 100 -250% [dB]	± 50 -100% [dB]	± 100 -250% [dB]
Min.limit margin [dB]	> 20	> 20	> 15	> 20

FCC ID: E9MPT4500

Band8 (working at 570.1 MHz):

Max. measured frequency deviation (e.g. 2.5 kHz): ± 48.3 kHz

50% of the maximum deviation: ± 24.2 kHz

Audio input level (ail) to get $\pm$ kHz: $L = 91.5$ dB μ V

$L + 16$ dB μ V = 107.5 dB μ V $\Rightarrow$ Level for testing the occupied bandwidth

Version of EuT	Band8			
Audio test level	L= 107.5 dB μ V 2.5 kHz		L= 96.2 dB μ V 15.0 kHz	
Shape of emission mask	± 50 -100% [dB]	± 100 -250% [dB]	± 50 -100% [dB]	± 100 -250% [dB]
Min.limit margin [dB]	> 20	> 20	> 15	> 20

Limit according to FCC Subpart 15.247(e)(6)(i)(ii)(iii):

Attenuated below the mean output power of the transmitter	± 50 -100% [dB]	± 100 -250% [dB]	> 250%
Limit	25	35	$43 + 10 \log_{10}$ (mean output power in watt)

The requirements are **FULFILLED**.

Remarks: For detailed results, please see the protocol at following page(s).

FCC ID: E9MPT4500

5.5.5 Test protocol

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band1 working at 680.0 MHz
AIL: 107.8 dB μ V **F_{mod}: 2.5 kHz**



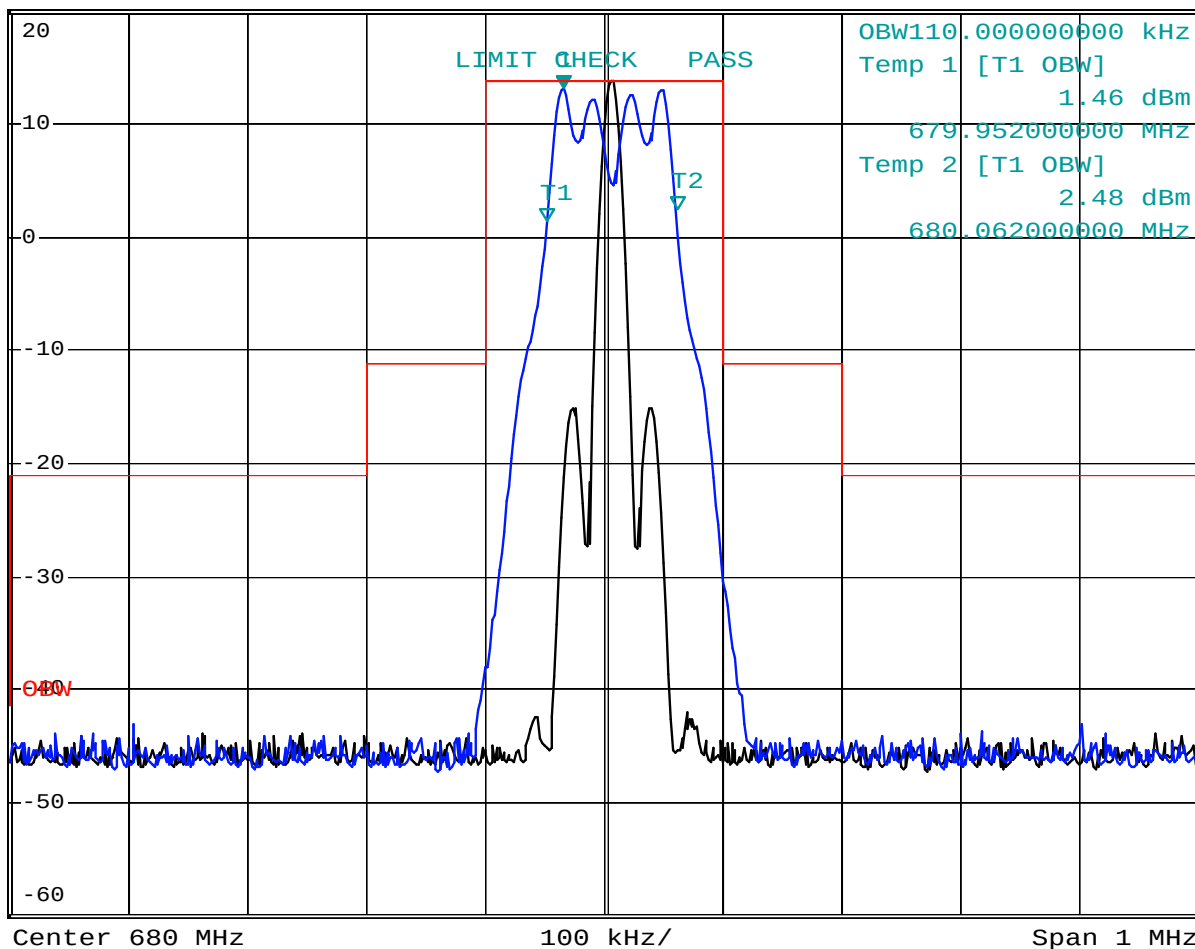
* RBW 10 kHz Marker 1 [T1]
* VBW 10 kHz 13.13 dBm
* SWT 5 s 679.966000000 MHz

Ref 20 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



*
A

TDF

Date: 5.FEB.2008 16:14:40

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band1 working at 680.0 MHz
AIL: 97.3 dBμV F_{mod}: 15.0 kHz



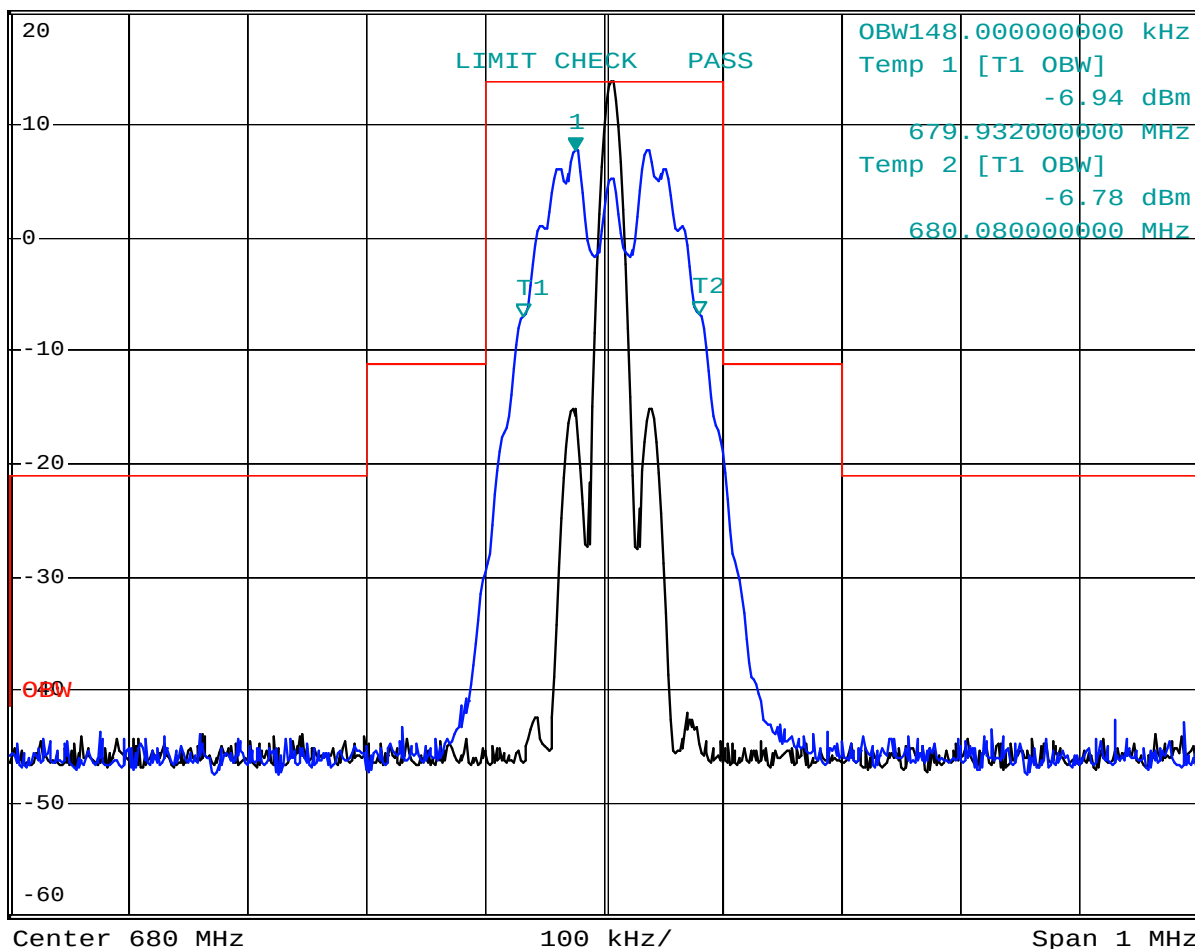
* RBW 10 kHz Marker 1 [T1]
* VBW 10 kHz 7.72 dBm
* SWT 5 s 679.976000000 MHz

Ref 20 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



Date: 5.FEB.2008 16:13:13

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band2 working at 695.0 MHz
AIL: 107.9 dB μ V F_{mod}: 2.5 kHz



* RBW 10 kHz

Marker 1 [T1]

* VBW 10 kHz

13.79 dBm

* SWT 5 s

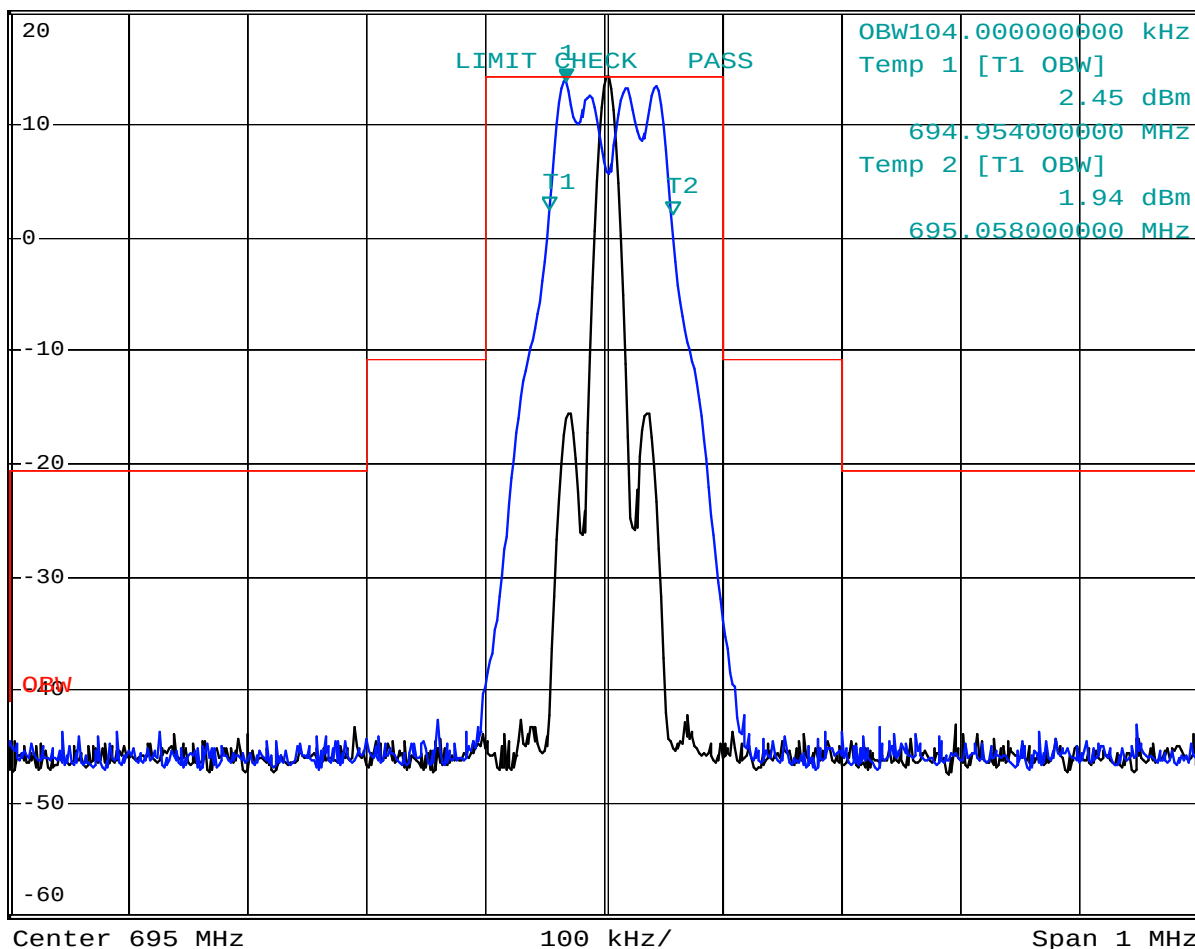
694.968000000 MHz

Ref 20 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



TDF

Date: 5.FEB.2008 15:31:49

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band2 working at 695.0 MHz
AIL: 97.3 dBμV F_{mod}: 15.0 kHz



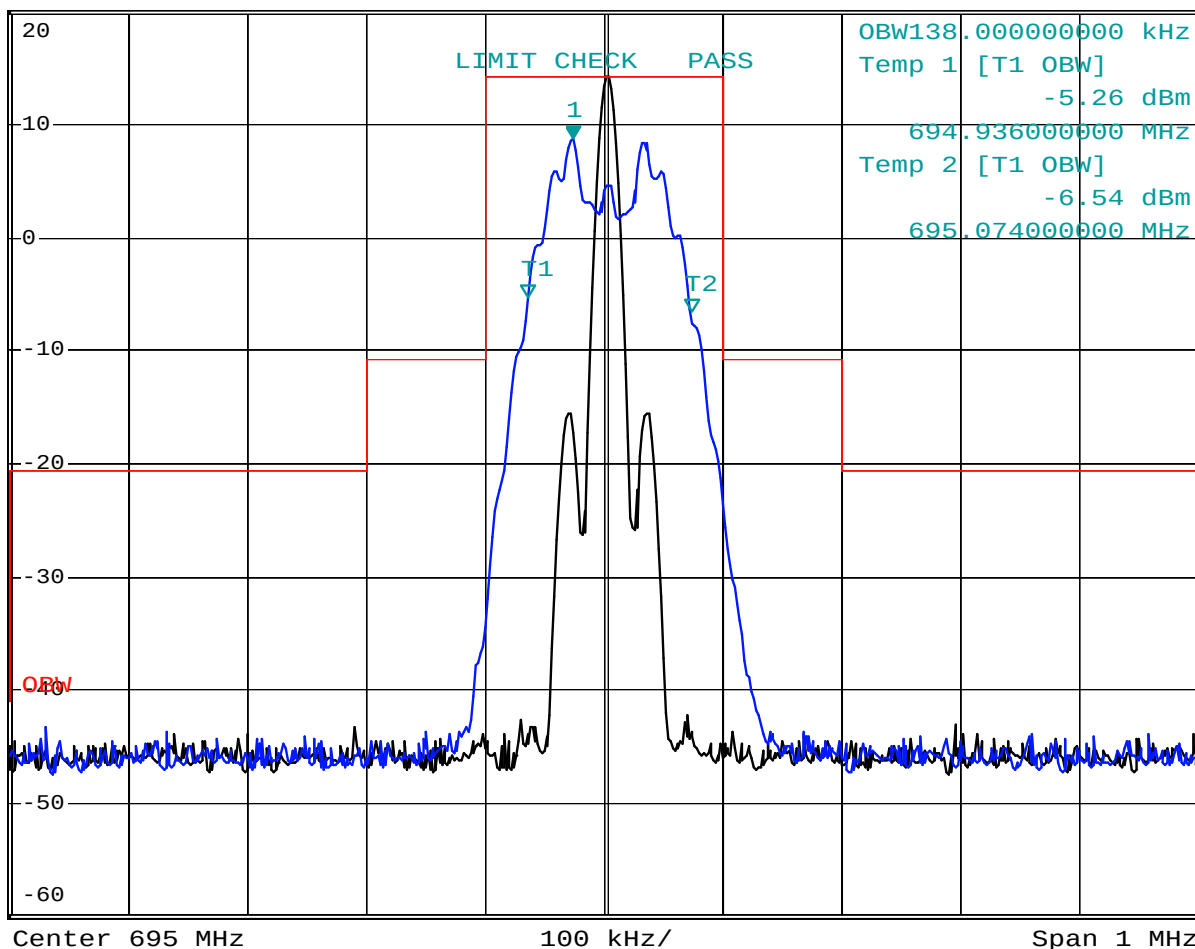
* RBW 10 kHz Marker 1 [T1]
* VBW 10 kHz 8.69 dBm
* SWT 5 s 694.974000000 MHz

Ref 20 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



Date: 5.FEB.2008 15:35:12

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band3 working at 720.0 MHz
AIL: 107.1 dB μ V F_{mod}: 2.5 kHz



MARKER 1

719.972 MHz

Ref 20 dBm

* Att 30 dB

* RBW 10 kHz

* VBW 10 kHz

* SWT 5 s

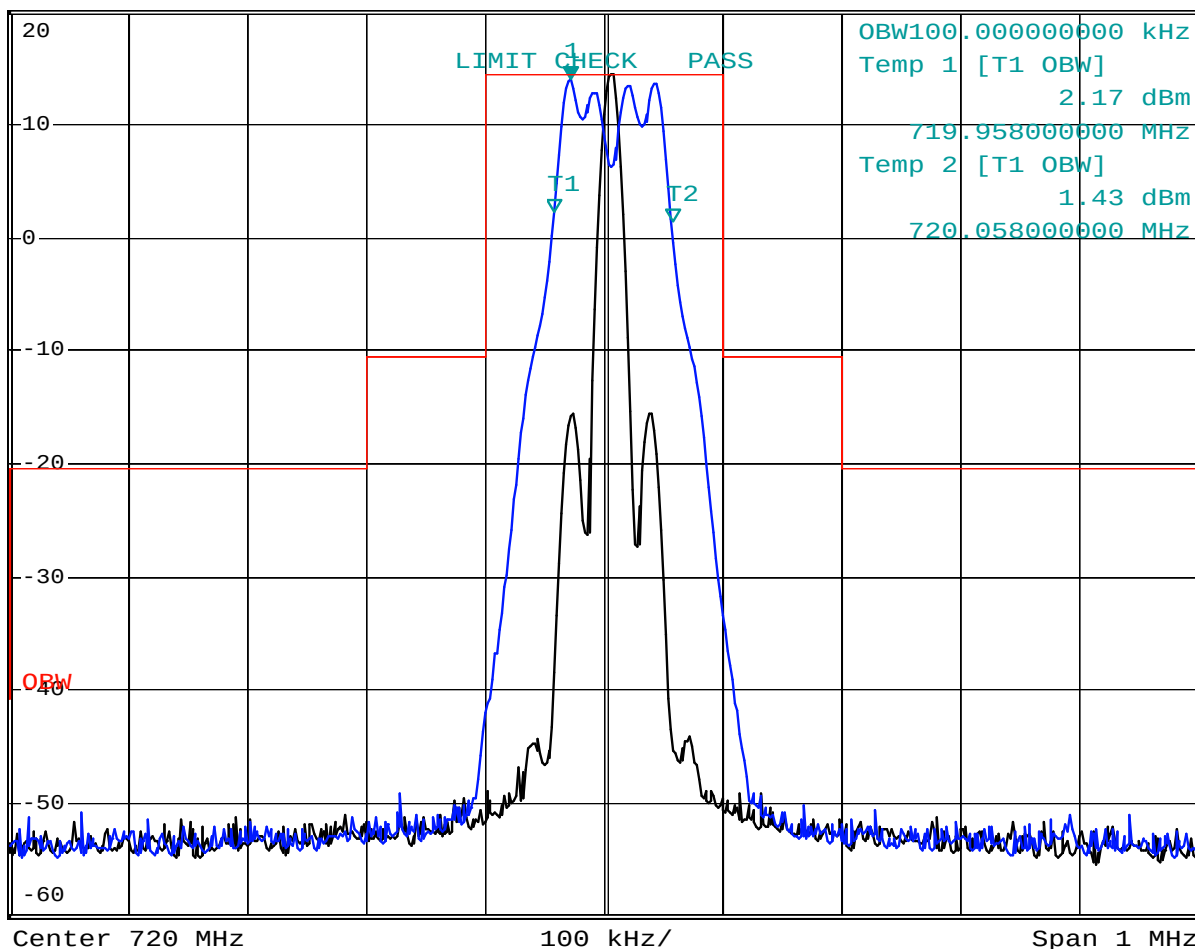
Marker 1 [T1]

13.95 dBm

719.972000000 MHz

1 PK
VIEW

2 PK
VIEW



Date: 24.JUN.2008 16:41:44

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band3 working at 720.0 MHz
AIL: 95.8 dBμV F_{mod}: 15.0 kHz



MARKER 1

719.976 MHz

Ref 20 dBm

* Att 30 dB

* RBW 10 kHz

* VBW 10 kHz

* SWT 5 s

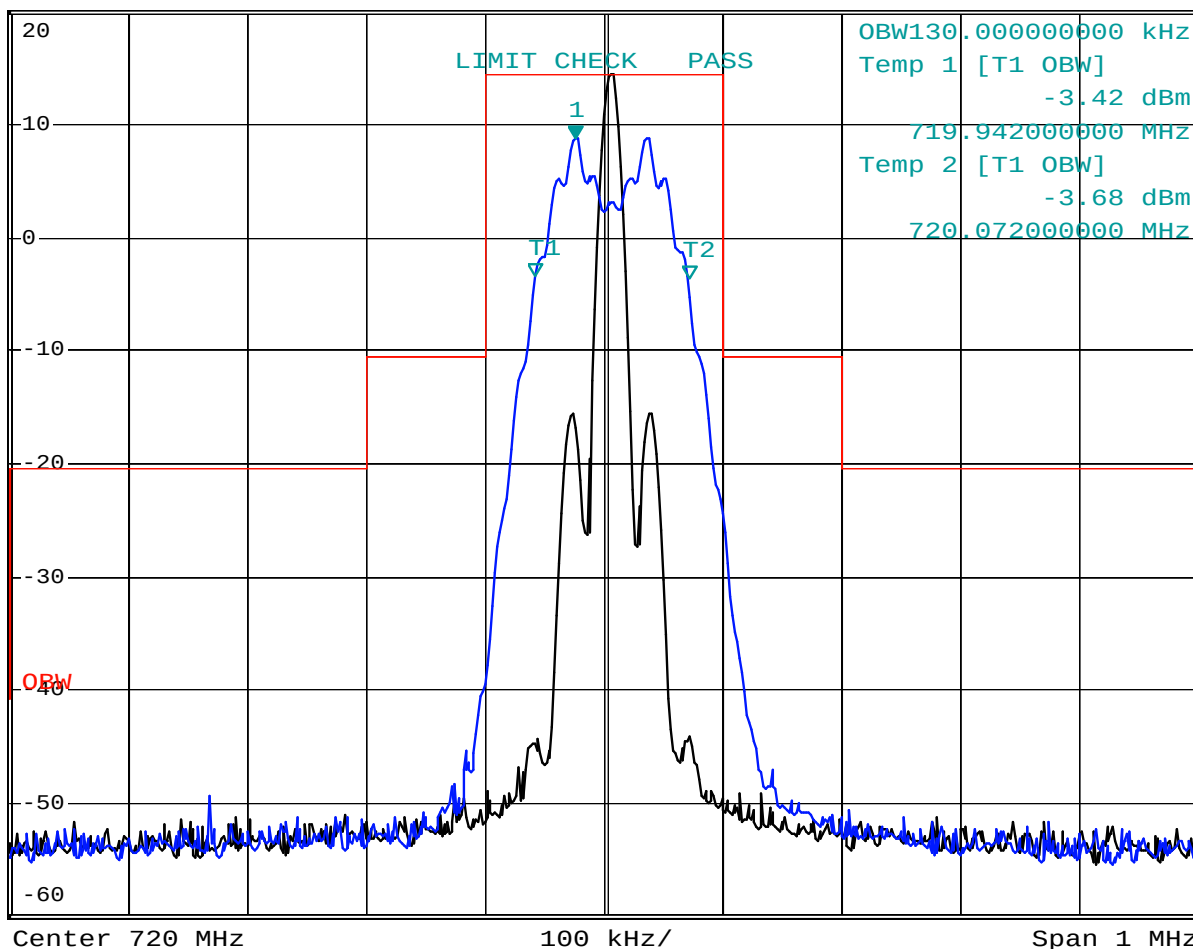
Marker 1 [T1]

8.86 dBm

719.976000000 MHz

1 PK
VIEW

2 PK
VIEW



Date: 24.JUN.2008 16:40:07

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band4 working at 760.0 MHz
AIL: 107.8 dB μ V F_{mod}: 2.5 kHz



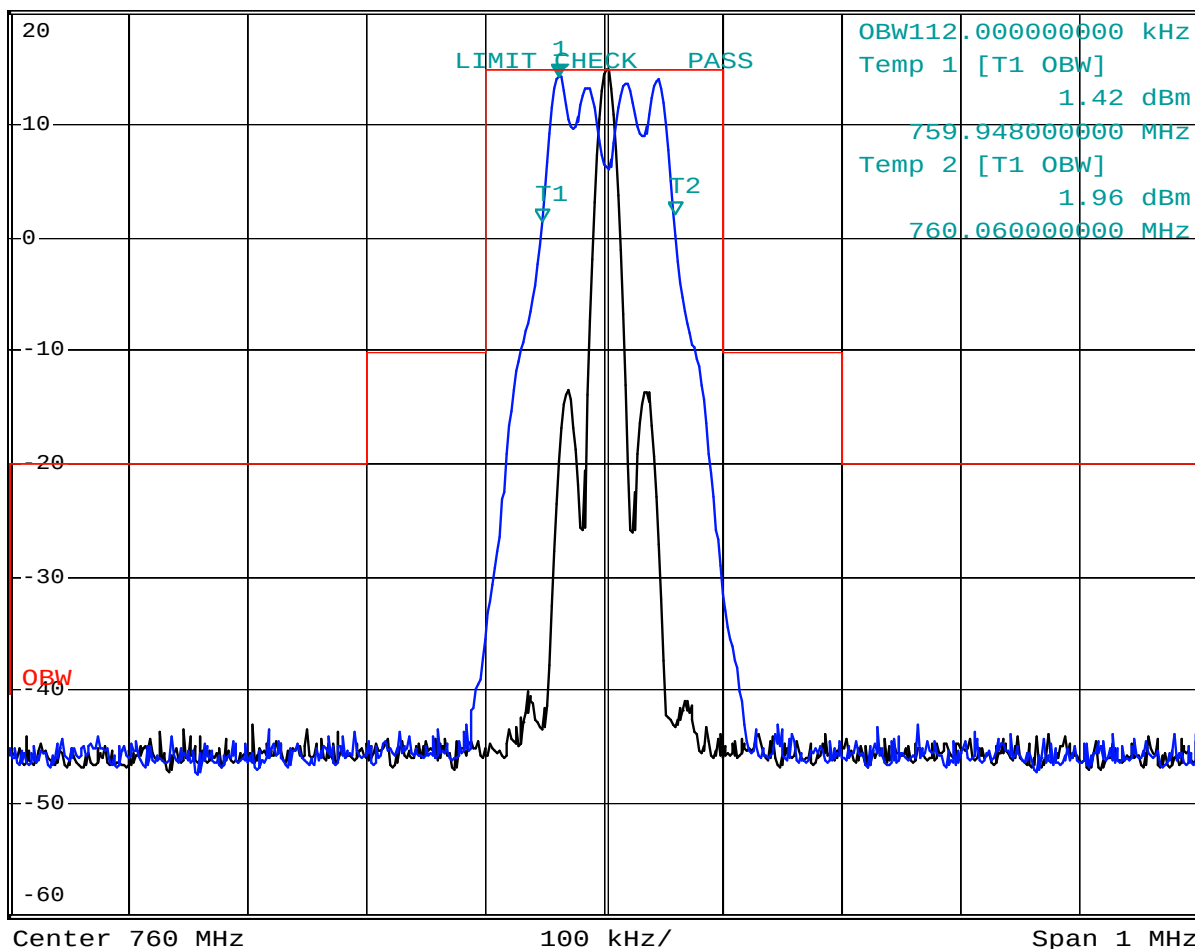
* RBW 10 kHz Marker 1 [T1]
* VBW 10 kHz 14.26 dBm
* SWT 5 s 759.962000000 MHz

Ref 20 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



Date: 5.FEB.2008 16:42:03

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band4 working at 760.0 MHz
AIL: 97.5 dBμV F_{mod}: 15.0 kHz



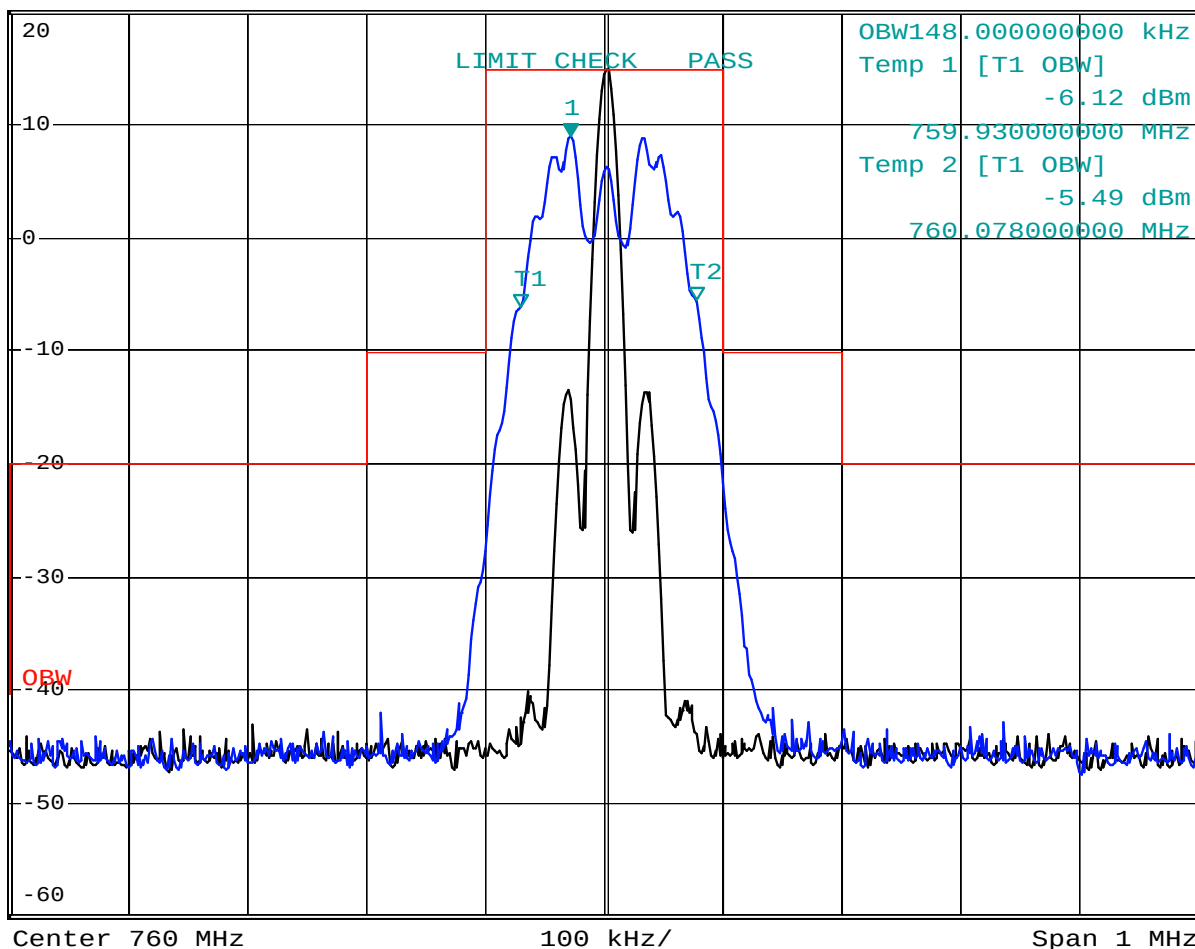
* RBW 10 kHz Marker 1 [T1]
* VBW 10 kHz 8.91 dBm
* SWT 5 s 759.972000000 MHz

Ref 20 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



TDF

Date: 5.FEB.2008 16:43:49

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band7 working at 515.0 MHz
AIL: 107.8 dB μ V F_{mod}: 2.5 kHz



* RBW 10 kHz

Marker 1 [T1]

* VBW 10 kHz

15.32 dBm

* SWT 5 s

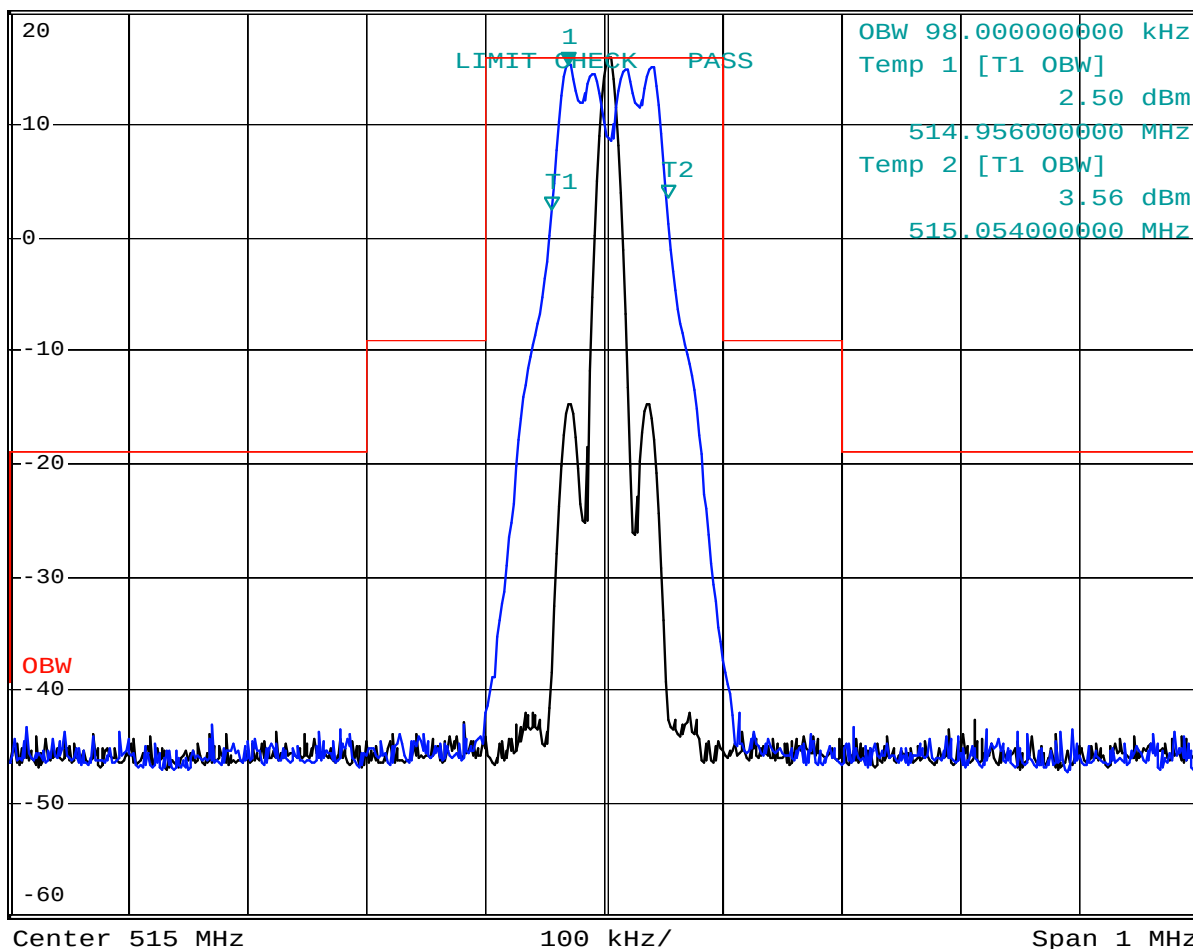
514.970000000 MHz

Ref 20 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



TDF

Date: 5.FEB.2008 17:06:39

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band7 working at 515.0 MHz
AIL: 97.5 dB μ V F_{mod}: 15.0 kHz



* RBW 10 kHz

Marker 1 [T1]

* VBW 10 kHz

10.22 dBm

* SWT 5 s

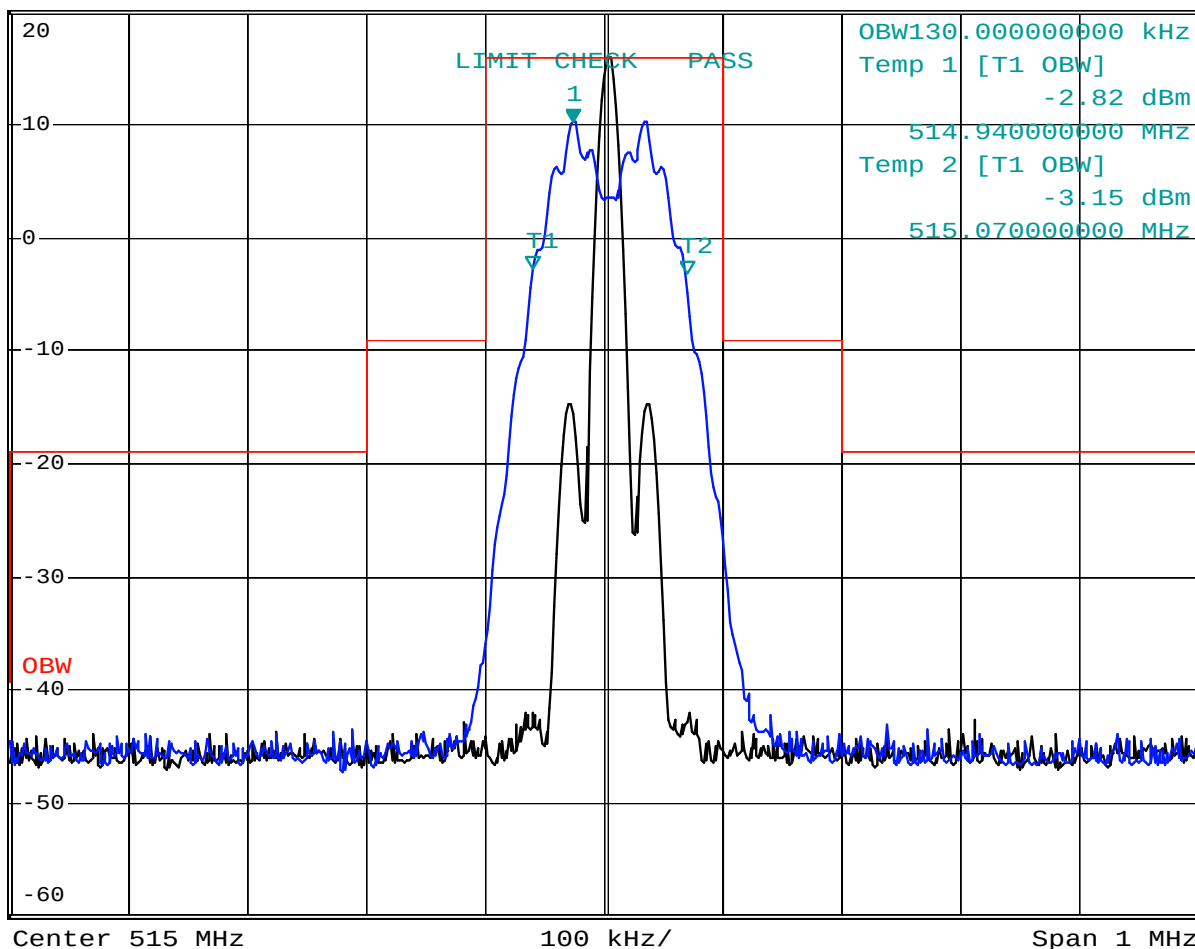
514.974000000 MHz

Ref 20 dBm

* Att 30 dB

1 PK
VIEW

2 PK
VIEW



Date: 5.FEB.2008 17:08:20

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band8 working at 570.1 MHz
AIL: 107.5 dB μ V F_{mod}: 2.5 kHz



MARKER 1

570.068 MHz

Ref 20 dBm

* Att 30 dB

* RBW 10 kHz

* VBW 10 kHz

* SWT 5 s

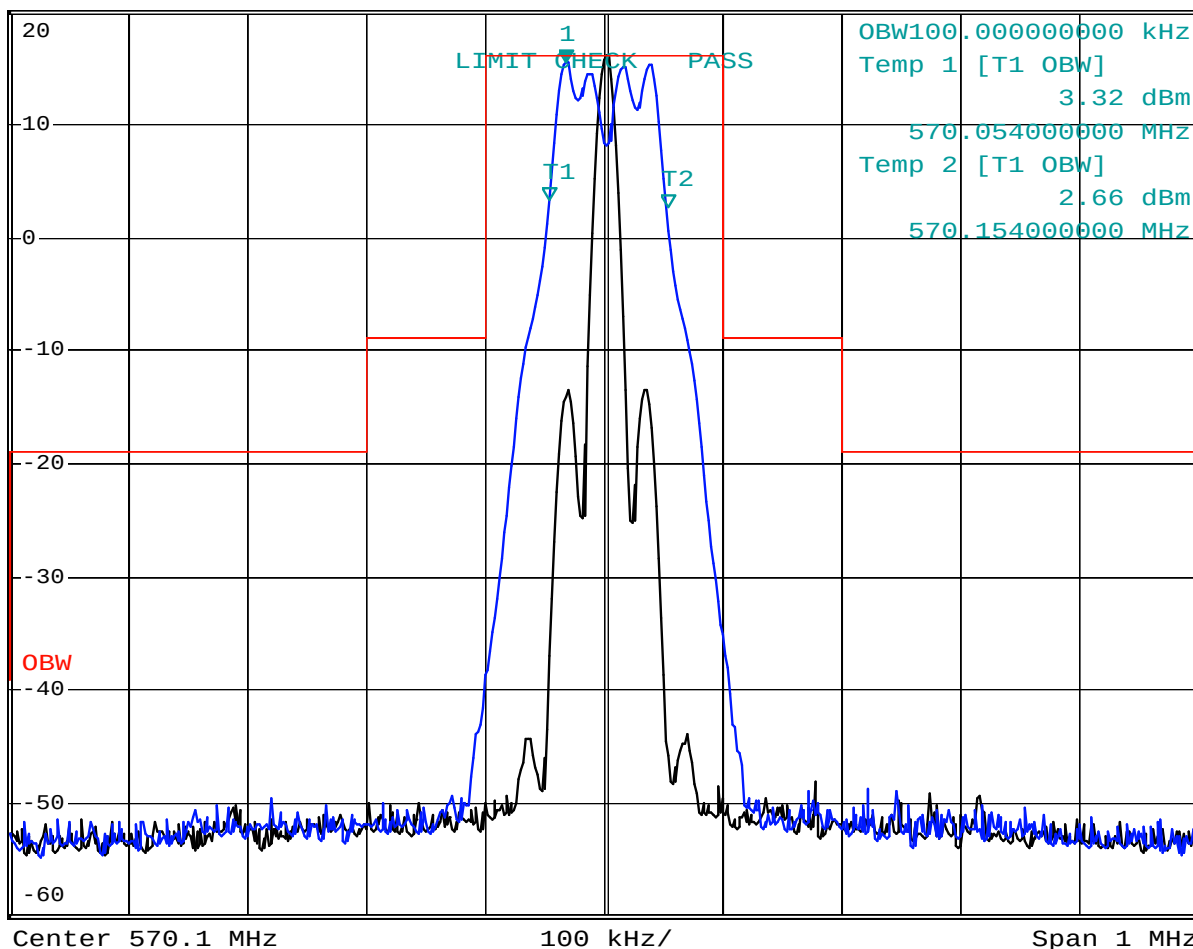
Marker 1 [T1]

15.53 dBm

570.068000000 MHz

1 PK
VIEW

2 PK
VIEW



TDF

Date: 25.JUN.2008 08:35:44

FCC ID: E9MPT4500

Occupied Bandwidth
FCC Part 15 Subpart 74.861(e)(6)

Band8 working at 570.1 MHz
AIL: 96.2 dBμV F_{mod}: 15.0 kHz



MARKER 1

570.072 MHz

Ref 20 dBm

* Att 30 dB

* RBW 10 kHz

* VBW 10 kHz

* SWT 5 s

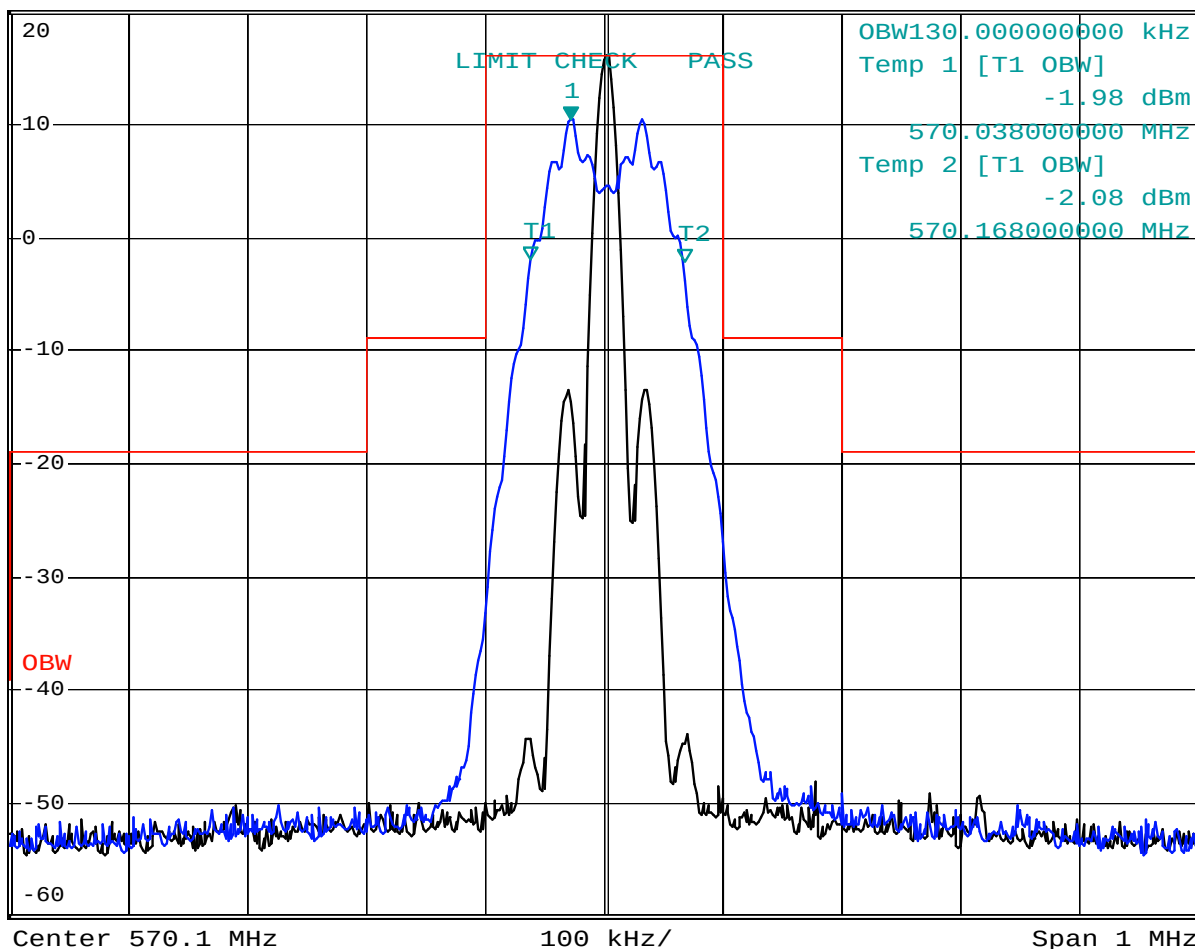
Marker 1 [T1]

10.44 dBm

570.072000000 MHz

1 PK
VIEW

2 PK
VIEW



Date: 25.JUN.2008 08:37:32

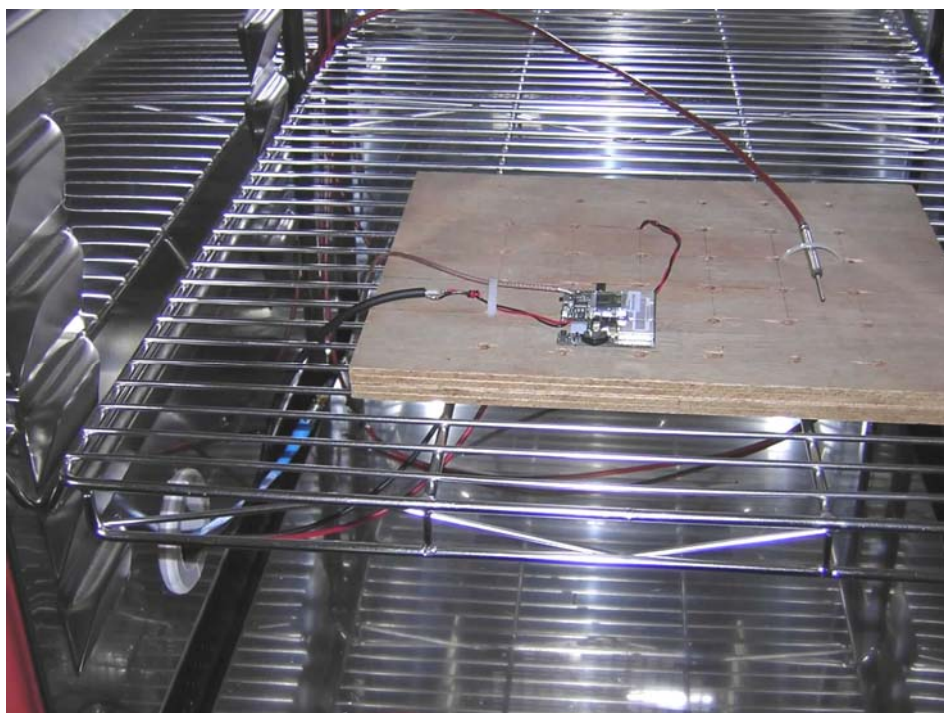
5.6 Frequency error

For test instruments and accessories used see section 6 Part FE.

5.6.1 Description of the test location

Test location: AREA4

5.6.2 Photo documentation of the test set-up



5.6.3 Description of Measurement

The frequency error was measured at the antenna terminals for EuT's with external connector. Other EuT's are tested via an adequate coupling device with antenna jack in a climatic test chamber. The antenna jack was connected to the input of a communication test receiver. The internal batteries have been removed also and a variable DC power supply was used instead. The measurements have been made with the EuT unmodulated. During the test the supply voltage and the temperature were varied and applied simultaneously. The lower supply voltage was given by the manufacturer. In case the equipment was switching off before, the switch off voltage was used instead. The frequency error is defined as the deviation of the transmitting frequency from the nominal frequency.

5.6.4 Test result

Version of Equipment with the fitting transmitting frequency		Band1 680.0 MHz	Band2 695.0 MHz	Band3 720.0 MHz
Temperature [°C]	DC supply voltage [V]	Frequency error [kHz]	Frequency error [kHz]	Frequency error [kHz]
-30	2.1	3.18	1.78	-0.18
	3.2	3.44	2.13	0.88
-20	2.1	6.62	6.04	4.21
	3.2	6.80	6.42	4.43
-10	2.1	8.54	7.98	6.79
	3.2	8.67	8.13	6.94
0	2.1	9.17	8.83	7.88
	3.2	9.25	8.89	7.99
+10	2.1	8.77	8.52	7.92
	3.2	8.75	8.54	8.01
+20	2.1	7.82	8.16	7.34
	3.2	7.81	8.22	7.39
+30	2.1	7.10	7.59	6.48
	3.2	7.15	7.65	6.54
+40	2.1	6.17	6.88	5.82
	3.2	6.21	6.96	5.87
+50	2.1	5.73	6.44	5.76
	3.2	5.77	6.51	5.82
Maximum deviation from nominal frequency: [kHz]		+9.25 / -0.0	+8.89 / -0.0	+8.01 / -0.18

FCC ID: E9MPT4500

Version of Equipment with the fitting transmitting frequency		Band4 760.0 MHz	Band7 515.0 MHz	Band8 570.1 MHz
Temperature [°C]	DC supply voltage [V]	Frequency error [kHz]	Frequency error [kHz]	Frequency error [kHz]
-30	2.1	-6.91	-0.94	-2.29
	3.2	-6.67	-0.76	-2.12
-20	2.1	-2.97	1.81	0.87
	3.2	-2.81	1.94	1.04
-10	2.1	-0.80	4.03	2.74
	3.2	-0.70	3.55	2.85
0	2.1	0.04	4.03	3.48
	3.2	0.12	4.09	3.58
+10	2.1	-0.32	3.79	3.52
	3.2	-0.34	3.81	3.59
+20	2.1	-1.09	3.25	3.19
	3.2	-1.10	3.28	3.22
+30	2.1	-1.72	2.64	2.28
	3.2	-1.66	2.67	2.30
+40	2.1	-2.64	2.07	1.56
	3.2	-2.60	2.09	1.58
+50	2.1	-3.00	1.89	1.14
	3.2	-2.96	1.92	1.18
Maximum deviation from nominal frequency: [kHz]		+0.12 / -6.91	+4.09 / -0.94	+3.59 / -2.29

Limit according to FCC Subpart 74.861(e)(4):

The frequency tolerance of the transmitter shall be not greater than 0.005 percent of the nominal transmit frequency as declared by the manufacturer.

Versions of Eut's with the fitting nominal frequency [MHz]	0.005% of nominal frequency [kHz]	Limit [kHz]
Band1 680.0 MHz	34.0	±17.0
Band2 695.0 MHz	34.8	±17.4
Band3 720.0 MHz	36.0	±18.0
Band4 760.0 MHz	38.0	±19.0
Band7 515.0 MHz	25.8	±12.9
Band8 570.1 MHz	28.5	±14.3

The requirements are **FULFILLED**.

Remarks:

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

The calibration intervals and the calibration history will be given out on request.

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.
CPC 2	CMS-54	Com. Receiver	Rohde & Schwarz München	02-02/05-05-012
	FSP 30	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001
	DR285/N	2-Way Power Divider	PARZICH GMBH	02-02/50-05-169
FE	ZVL6	Network analyzer 9 kHz	Rohde & Schwarz Memmingen	01-02/11-07-002
	THS730A	Handheld Scope	Tektronix GmbH	02-02/13-05-001
	WK-340/40	Climatic Chamber	Weiss Umwelttechnik GmbH	02-02/45-05-001
	6543A	Power Supply	HP Hewlett-Packard	02-02/50-05-157
MB	CMS-54	Com. Receiver	Rohde & Schwarz München	02-02/05-05-012
	FSP 30	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001
	DR285/N	2-Way Power Divider	PARZICH GMBH	02-02/50-05-169
MLD	CMS-54	Com. Receiver	Rohde & Schwarz München	02-02/05-05-012
	FSP 30	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001
	DR285/N	2-Way Power Divider	PARZICH GMBH	02-02/50-05-169
SER 2	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-006
	VULB 9168	Trilog-Broadband Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-005
	S10162-B	RF Cable 33m	Huber + Suhner	02-02/50-05-031
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-033
	NW-2000-NB	RF Cable	Huber + Suhner	02-02/50-05-113
SER 3	FSP 30	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001
	AFS4-01000400-10-10P-4	RF Amplifier 1-4 GHz	PARZICH GMBH	02-02/17-05-003
	AMF-4F-04001200-15-10P	RF Amplifier 4-12 GHz	PARZICH GMBH	02-02/17-05-004
	AFS5-12001800-18-10P-6	RF Amplifier 12-18 GHz	PARZICH GMBH	02-02/17-06-002
	3117	Horn Antenna 1-18 GHz	EMCO Elektronik GmbH	02-02/24-05-009
	WHJS 1000-10EE	High Pass Filter	Wainwright Instruments GmbH	02-02/50-05-070
	Sucoflex N-1600-SMA	RF Cable	novotronik	02-02/50-05-073
	Sucoflex N-2000-SMA	RF Cable	novotronik	02-02/50-05-075

FCC ID: E9MPT4500

Test ID	Model Type	Next Calib.	Last Calib.	Next Verif.	Last Verif.
CPC 2	CMS-54 FSP 30 DR285/N	11/20/2008 12/06/2008	11/20/2007 12/06/2006		
FE	ZVL6 THS730A WK-340/40 6543A	05/25/2009 09/03/2008 09/01/2008	05/25/2007 09/03/2007 09/01/2005	06/07/2008	12/07/2007
MB	CMS-54 FSP 30 DR285/N	11/20/2008 12/06/2008	11/20/2007 12/06/2006		
MLD	CMS-54 FSP 30 DR285/N	11/20/2008 12/06/2008	11/20/2007 12/06/2006		
SER 2	ESVS 30 VULB 9168 S10162-B KK-EF393-21N-16 NW-2000-NB	07/24/2008 04/15/2008	07/24/2007 04/15/2005	09/21/2008	09/21/2007
SER 3	FSP 30 AFS4-01000400-10-10P-4 AMF-4F-04001200-15-10P AFS5-12001800-18-10P-6 3117 WHJS 1000-10EE Sucoflex N-1600-SMA Sucoflex N-2000-SMA	12/06/2008 01/16/2009	12/06/2006 01/16/2008		