Test Report

T-0329-4296-00 JP

Type / Model Name:	**STU**
FCC ID	**W5ISTU**
Product Description:	**Symeo Telemetry Unit**
Applicant:	**Symeo GmbH**

EMC -- TEST REPORT

Test Report No. : T-0329-4296-00 JP	2012-03-26 Date of issue

Type / Model Name : STU

FCC ID W5ISTU

Product Description : Symeo Telemetry Unit

Applicant : Symeo GmbH

Address : Professor-Messerschmitt-Str. 3

85579 Neubiberg / München

Germany

Manufacturer : Symeo GmbH

Address : Professor-Messerschmitt-Str. 3

85579 Neubiberg / München

Germany

Test Result according to the standards listed in clause 1 test standards:	**POSITIVE**

DAkkS Deutsche Akkreditierungsstelle D-PL-12141-01-01

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Part 15 Subpart A October 2010	Code of Regulations Part 15 (Radio Frequency Devices), Subpart A (General) of the Federal Communications Commision (FCC)
FCC Part 15 Subpart B October 2010	Code of Regulations Part 15 (Radio Frequency Devices), Subpart B (Unintentional Radiators) of the Federal Communications Commision (FCC) Applied Paragraphs: §15.107, §15.109
ANSI C63.4-2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz – 40 GHz

2 OVERVIEW TEST RESULT

Performed test(s)	Result		
	Passed	Failed	Not performed
Conducted disturbance FCC Rule Part 15.107a	X		
Radiated disturbance (electric field) FCC Rule Part 15.109a	X		
Radiated disturbance (electric field) 1GHz to 8GHz FCC Rule Part 15.109a	X		

3 SUMMARY

GENERAL REMARKS:

The EUT has a TX mode and a RX mode but RX is without TX beacons not possible therefore the measurements were performed in TX mode only.
The EuT contains radio modules with FCC ID: IHDT56KL1 and FCC ID MCQ-50M1746. These modules are not part of this testreport.

FINAL ASSESSMENT:

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

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

Testing commenced on : 2012-02-06

Testing concluded on : 2012-03-19

Checked by:

Wolfgang Straubinger 2012.03.26 10:25:44 +02'00'

Wolfgang Straubinger

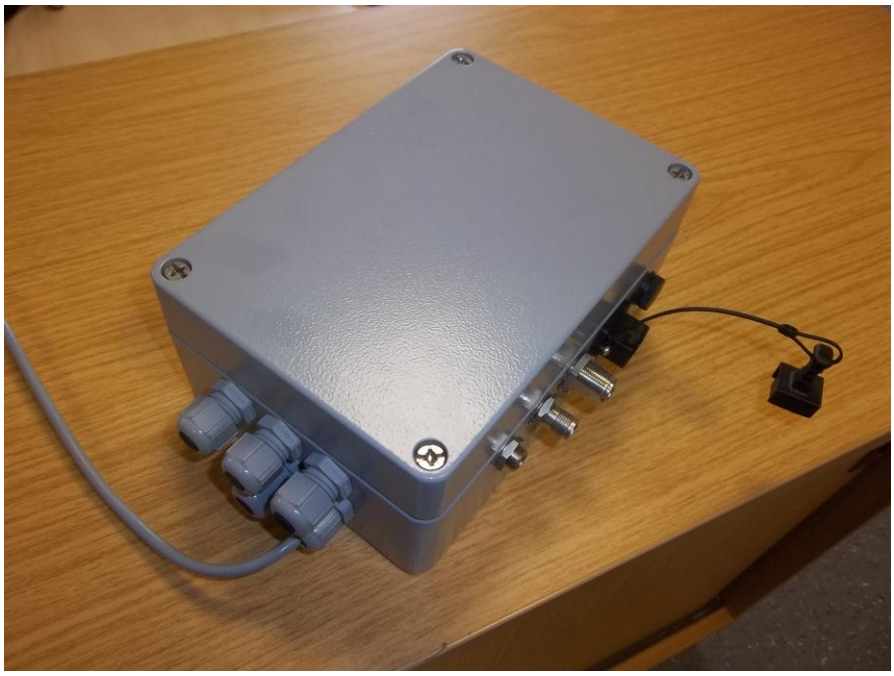
Tested by:

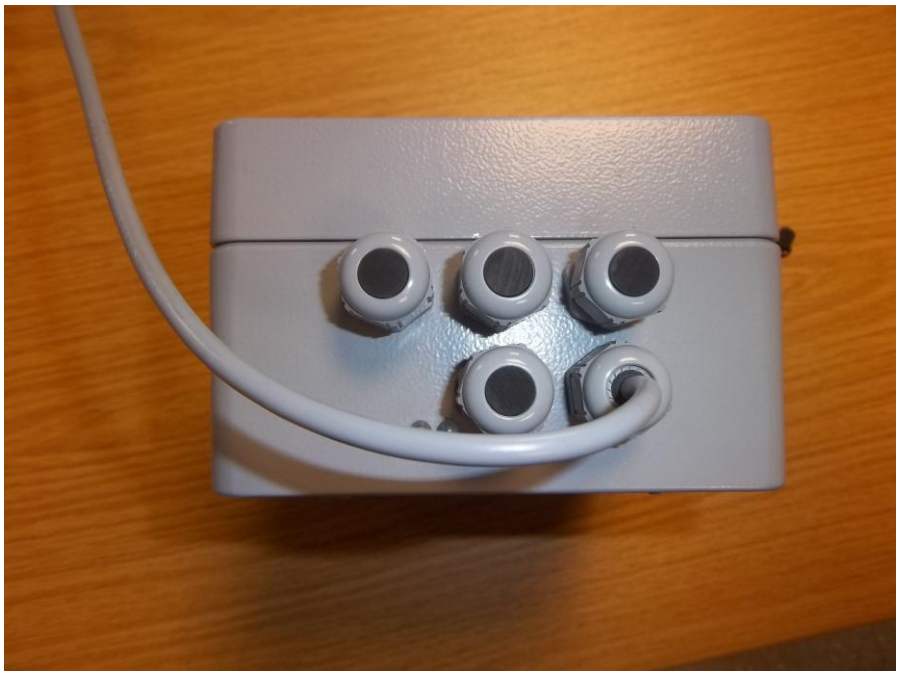
Jürgen Pessinger 2012.03.26 10:22:42 +02'00'

Jürgen Pessinger

4 EQUIPMENT UNDER TEST

4.1 Photo documentation of the EuT






Hemisphere
MD A20
PN 804-3032-000#
SN 1020-7956-0705
Made in China

4.2 Power supply system

Power supply voltage: 10-36V DC

4.3 Short description of the Equipment under Test (EuT)

The EuT gathers information from positioning sensors like GPS, inertial sensors and vehicle interface to calculate a stable position and interact with a host system for logistic matters.

Number of tested samples: 1
Serial number: none

Dimensions: L: 22cm W: 16cm H: 9cm

EuT operation mode:

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

- Test programm supplied by client active, ping connection established between EuT and Laptop

EuT configuration:

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

Interface cables:

Interface cable	Length [m]	Type	Line		Line termination
			shielded	unshielded	
DC power line	2,0	2-wires	☐	☒	DC power supply or 12V battery
LAN cable	3,0	8-wires	☒	☐	Laptop
UMTS/GSM antenna cable	5,0	2-wires	☒	☐	UMTS antenna
WLAN antenna	0,0	2-wires	☒	☐	WLAN antenna
GPS antenna cable	4,0	2-wires	☒	☐	GPS antenna

Peripheral devices:

Kind of equipment		Model and/or Manufacturer
DC power supply		EA-PS 3032-10B, emitel ID: 01-05/50-11-014
Laptop		Tecra A2, Toshiba, emitel ID: 01-01/01-05-005
UMTS/GSM antenna		ANQ001114, Symeo
WLAN antenna		ANZ000473, Symeo
GPS antenna		ANC000442, Symeo

5 TEST ENVIRONMENT

5.1 Address of the test laboratory

emitel AG
Ohmstrasse 1
94342 STRASSKIRCHEN
DEUTSCHLAND

Laboratory registration numbers:

DAkkS Registration number:	D-PL-12141-01-01
KBA Registration number:	KBA-P 00057-01
SNCH Registration number:	SNCH 001/2005
FCC Registration number:	765810
IC Registration number:	IC 5066A-1

5.2 Statement regarding the usage of logos at test reports

The logos of accreditation- and notification bodies displayed at this test reports are only valid for standards listed at the accreditation- or notification scope of emitel AG.

5.3 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

All atmospheric pressure values refer to our Laboratory altitude of 324m.

5.4 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 does have the sole responsibility for the continued compliance of the device.

5.5 Measurement Protocol for FCC and AUSTEL

5.5.1 GENERAL INFORMATION

5.5.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22 (2008), European Standard EN 55022 (2010)and Australian Standard AS 3548 (which are based on CISPR 22).

In compliance with FCC Docket 92-152, "Harmonization of Rules for Digital Devices Incorporate International Standards", testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

5.5.1.2 Measurement Error

The data and results referenced in this document are true and accurate. The reader is cautioned that there is some measurement variability due to the tolerances of the test equipment that can contribute to a nominal product measurement uncertainty. The measurement uncertainty was calculated for all measurements listed in this test report according to CISPR 16-4-2 and is documented in the emitel AG quality system according to DIN EN ISO/IEC 17025. Furthermore, component differences and manufacturing process variability of production units similar to that tested may result in additional product uncertainty. If necessary, refer to the test lab for the actual measurement uncertainty for specific tests. The manufacturer has the sole responsibility of continued compliance of the device.

5.5.1.3 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 into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum disturbances from the unit.

5.5.2 CONDUCTED DISTURBANCE

The final level, expressed in dBµV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the CISPR limit, which is equivalent to the Australian AS 3548 limit.

To convert between dBµV and µV, the following conversions apply:
dBµV = 20(log µV)
µV = Inverse log(dBµV/20)

6 TEST CONDITIONS AND RESULTS

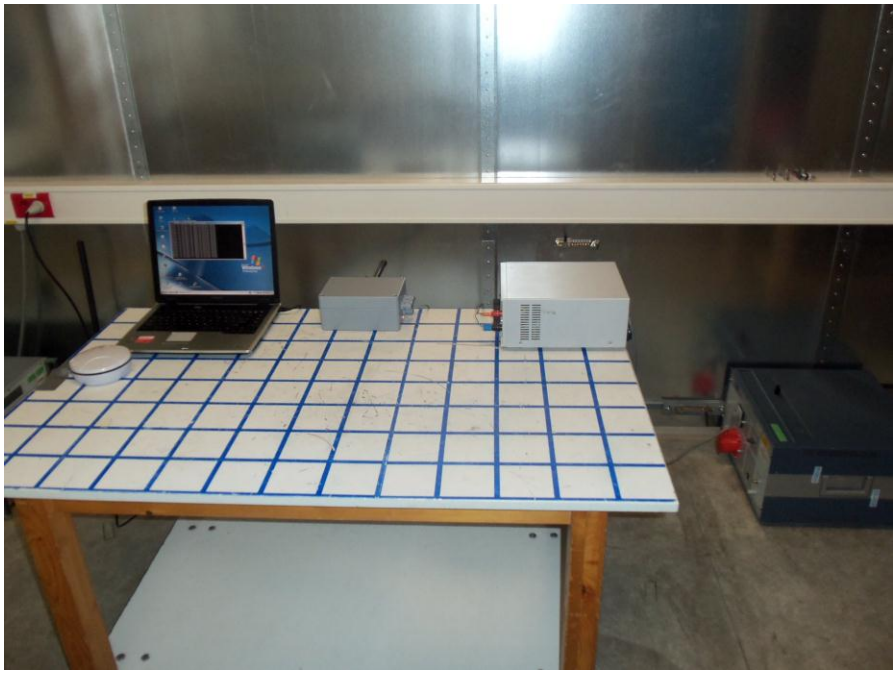
6.1 Conducted disturbance

For test instruments and accessories used see section 7 Part **A 4**.

6.1.1 Description of the test location

Test location: Shielded Room SK4

6.1.2 Photo documentation of the test set-up



6.1.3 Test specification

Environmental conditions: Temperature: 22° C Humidity: 32% Atmospheric pressure: 99kPa

Frequency range: 0.15 MHz - 30 MHz

The test was carried out in the following operation mode(s):
- Test programm supplied by client active, ping connection established between EuT and Laptop

6.1.4 Test result

Minimal margin to limit -3.5 dB at 0.160 MHz

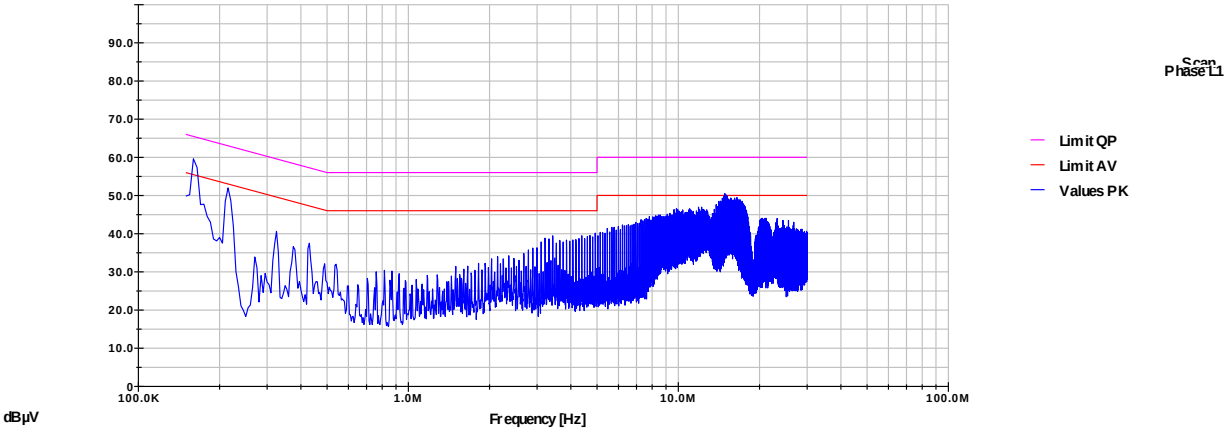
The requirements are **FULFILLED.**

Remarks: The measurements were made at AC input port of the DC Power supply

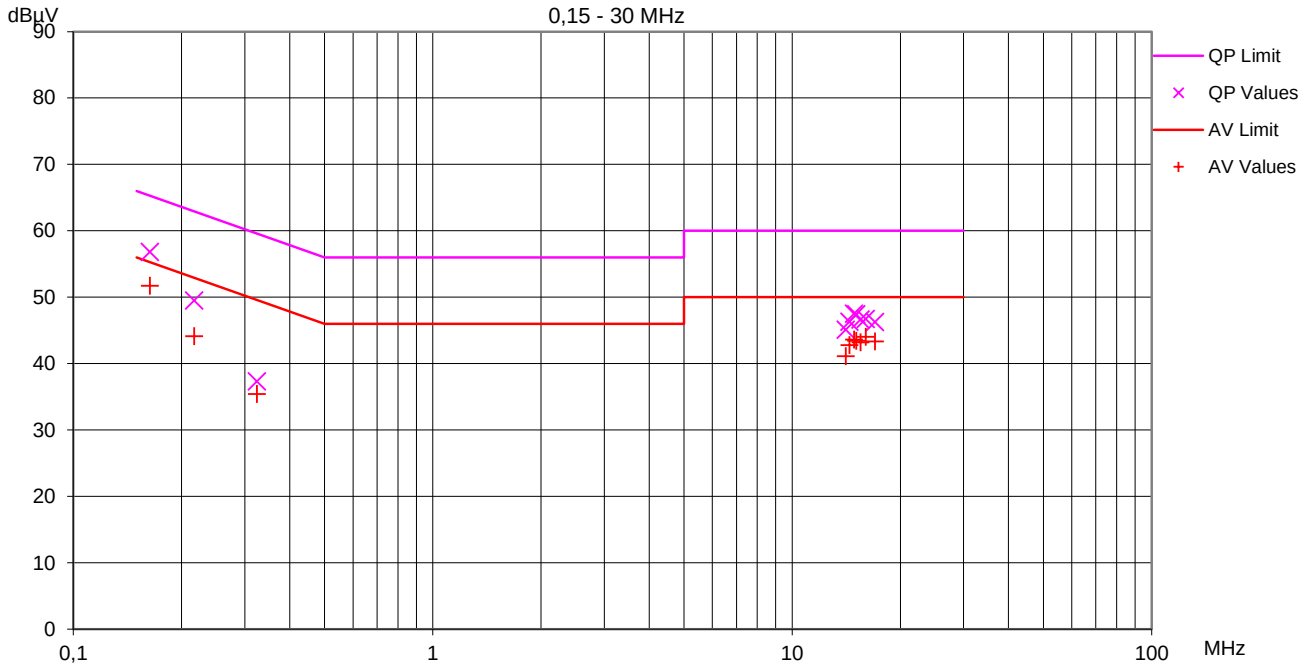
6.1.5 Test protocol

Test point	L1	Result: SCAN
Operation mode:	Test programm supplied by client active, ping connection established between EuT and Laptop	
Remarks:	The measurement was made at AC input port of the DC Power supply	
Date:	2012-02-06	
Tested by:	Pessinger Jürgen	

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak



Test point	L1	Result: passed
Operation mode:	Test programm supplied by client active, ping connection established between EuT and Laptop	
Remarks:	The measurement was made at AC input port of the DC Power supply	
Date:	2012-02-06	
Tested by:	Pessinger Jürgen	

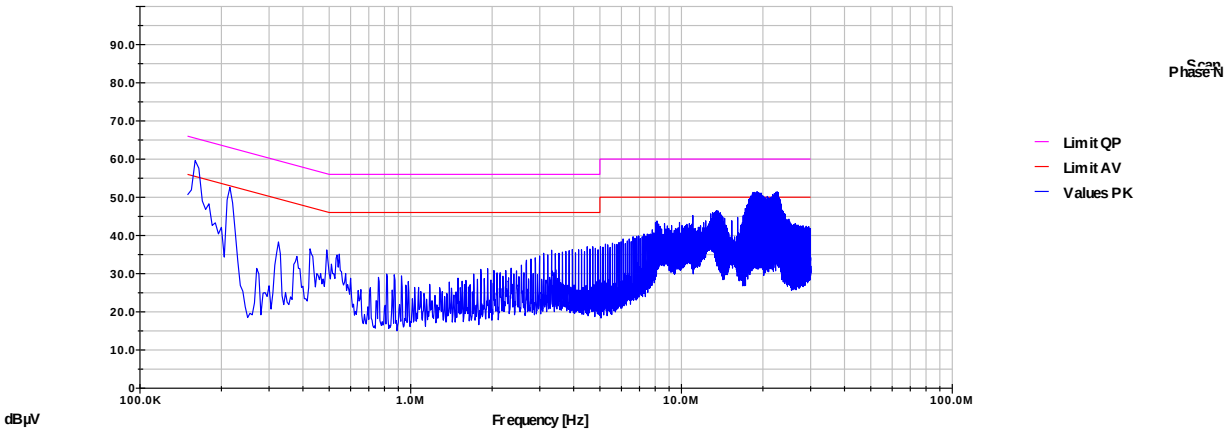


Minimum margin to limit: -3,6 dB

Frequency	Reading [dBµV]		Correction	Values [dBµV]		Limit [dBµV]		Margin [dB]	
[MHz]	QP	AV	[dB]	QP	AV	QP	AV	QP	AV
0,163	56,6	51,5	0,2	56,8	51,7	65,3	55,3	-8,5	-3,6
0,217	49,3	43,9	0,2	49,5	44,1	62,9	52,9	-13,4	-8,8
0,324	37,1	35,2	0,2	37,3	35,4	59,6	49,6	-22,3	-14,2
14,123	44,7	40,7	0,4	45,1	41,1	60,0	50,0	-14,9	-8,9
14,442	45,9	42,4	0,4	46,3	42,8	60,0	50,0	-13,7	-7,2
14,870	47,1	43,2	0,4	47,5	43,6	60,0	50,0	-12,5	-6,4
15,082	47,0	43,0	0,4	47,4	43,4	60,0	50,0	-12,6	-6,6
15,512	46,2	42,8	0,4	46,6	43,2	60,0	50,0	-13,4	-6,8
16,045	46,3	43,6	0,4	46,7	44,0	60,0	50,0	-13,3	-6,0
17,010	45,8	42,9	0,4	46,2	43,3	60,0	50,0	-13,8	-6,7

Test point:	N	Result: SCAN
Operation mode:	Test programm supplied by client active, ping connection established between EuT and Laptop	
Remarks:	The measurement was made at AC input port of the DC Power supply	
Date:	2012-02-06	
Tested by:	Pessinger Jürgen	

Start frequency [MHZ]	Stop frequency [MHZ]	Resolution bandwidth	step size	Measurement time	Detector
0.15	30	9 kHz	4.5 kHz	10 ms	Peak



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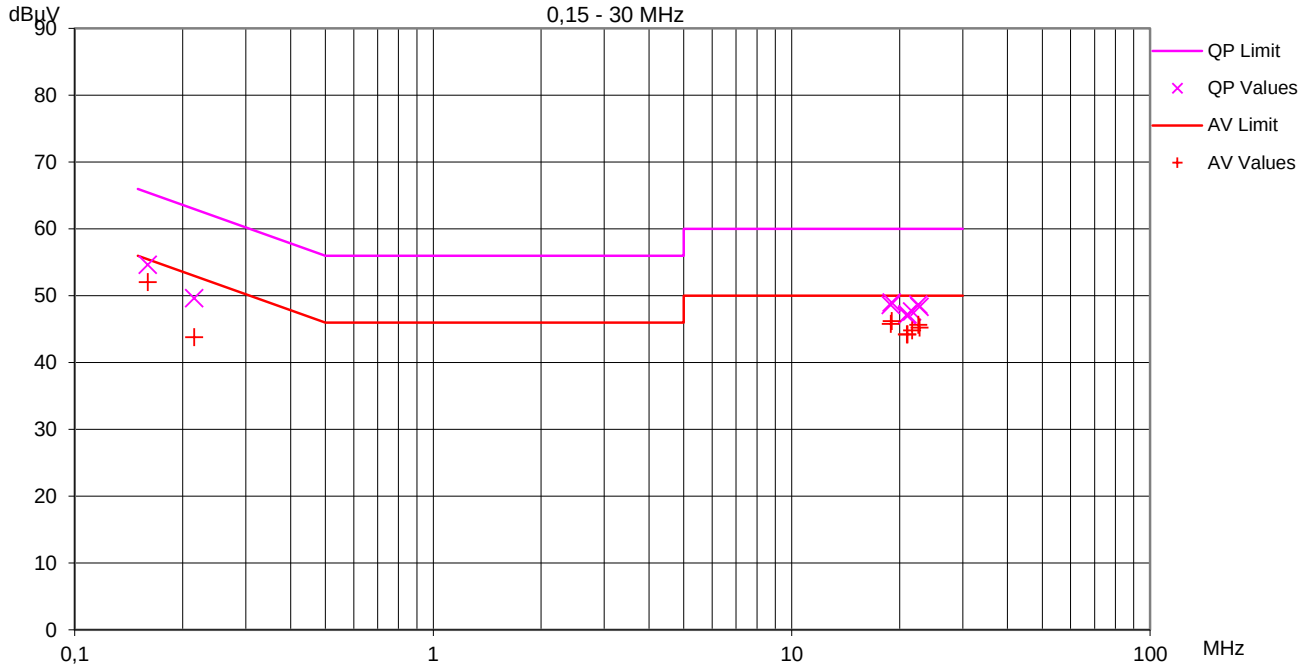
Test point:	N	Result: passed
Operation mode:	Test programm supplied by client active, ping connection established between EuT and Laptop	
Remarks:	The measurement was made at AC input port of the DC Power supply	
Date:	2012-02-06	
Tested by:	Pessinger Jürgen	



Minimum margin to limit: -3,5 dB

Frequency	Reading [dBµV]		Correction	Values [dBµV]		Limit [dBµV]		Margin [dB]	
[MHz]	QP	AV	[dB]	QP	AV	QP	AV	QP	AV
0,160	54,4	51,8	0,2	54,6	52,0	65,5	55,5	-10,9	-3,5
0,215	49,4	43,6	0,2	49,6	43,8	63,0	53,0	-13,4	-9,2
18,924	48,1	45,3	0,5	48,6	45,8	60,0	50,0	-11,4	-4,2
19,030	48,5	45,7	0,5	49,0	46,2	60,0	50,0	-11,0	-3,8
20,956	46,5	43,7	0,5	47,0	44,2	60,0	50,0	-13,0	-5,8
21,061	46,7	43,7	0,5	47,2	44,2	60,0	50,0	-12,8	-5,8
21,703	47,1	44,3	0,5	47,6	44,8	60,0	50,0	-12,4	-5,2
22,555	48,1	45,1	0,5	48,6	45,6	60,0	50,0	-11,4	-4,4
22,772	47,8	44,7	0,5	48,3	45,2	60,0	50,0	-11,7	-4,8

6.2 Radiated disturbance (electric field)

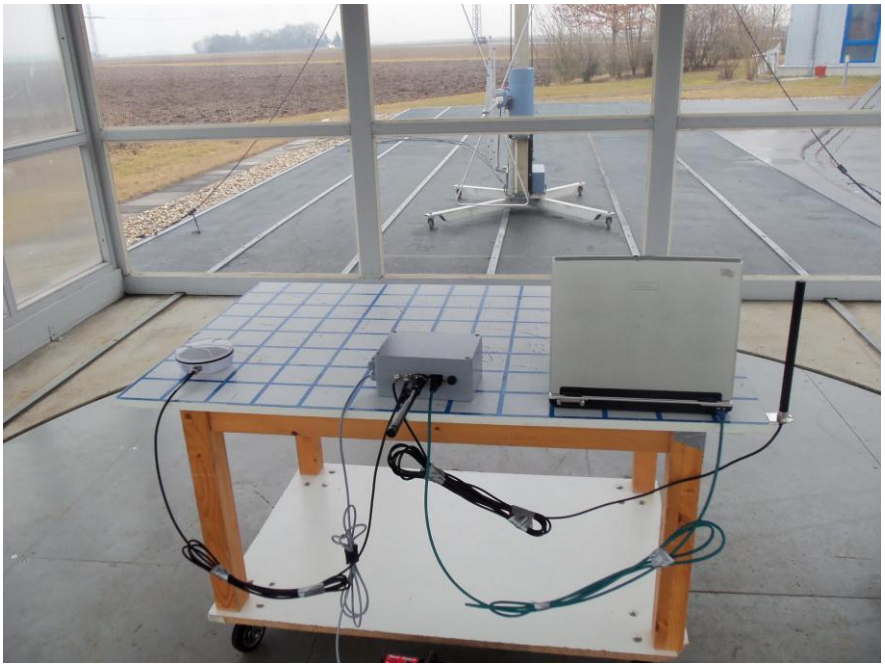
For test instruments and accessories used see section 7 Part **A 5**.

6.2.1 Description of the test location

Test location: OATS 3

Test distance: 3 metres

6.2.2 Photo documentation of the test set-up



6.2.3 Test specification

Environmental conditions: Temperature: 18° C Humidity: 34% Atmospheric pressure: 97kPa

Frequency range: 30 MHz - 1000 MHz

The test was carried out in the following operation mode(s):
- Test programm supplied by client active, ping connection established between EuT and Laptop

6.2.4 Test result

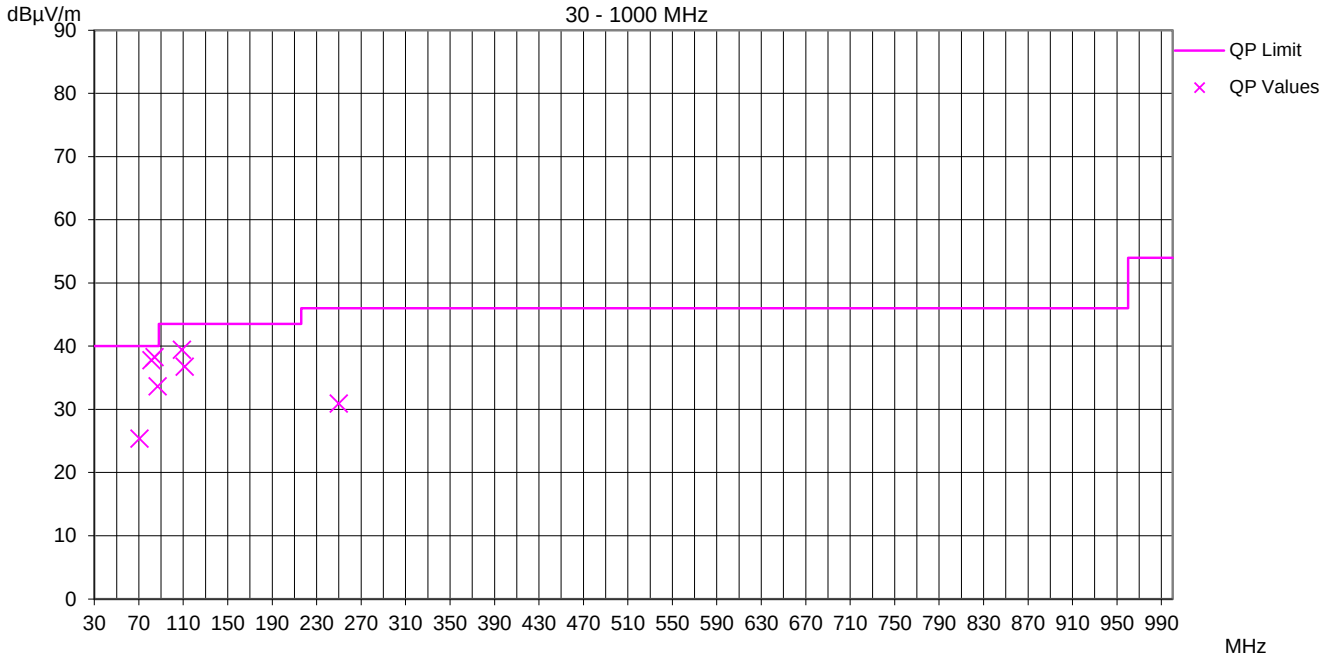
Minimal margin to limit -1.7 dB at 84 MHz

The requirements are **FULFILLED.**

Remarks: none

6.2.5 Test protocol

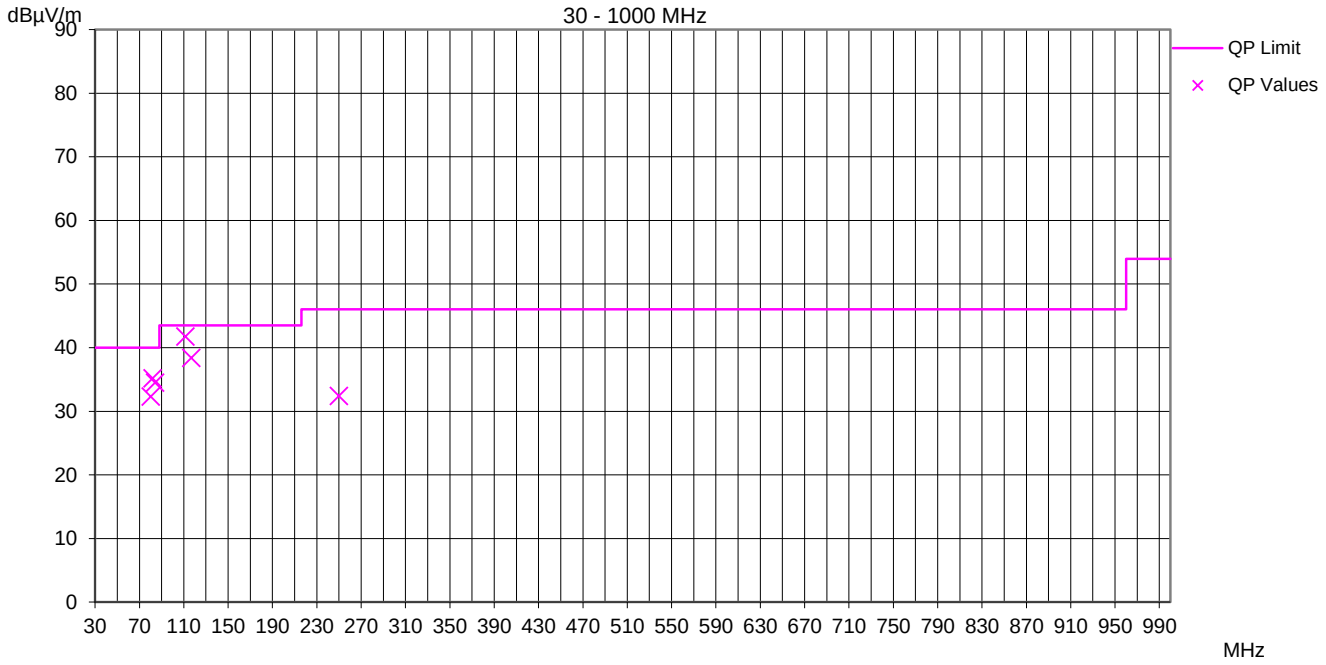
Test point:	Horizontal	Result: passed
Operation mode:	Test programm supplied by client active, ping connection established between EuT and Laptop	
Remarks:	none	
Date:	2012-02-28	
Tested by:	Pessinger Jürgen	



Minimum margin to limit: -1,7 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Values [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
70,709	14,2	11,2	25,4	40,0	-14,6
81,603	26,7	11,1	37,8	40,0	-2,2
84,313	27,0	11,3	38,3	40,0	-1,7
87,021	22,0	11,6	33,6	40,0	-6,4
108,791	25,6	13,8	39,4	43,5	-4,1
111,525	23,2	13,5	36,7	43,5	-6,8
250,052	15,8	15,1	30,9	46,0	-15,1

Test point:	Vertical	Result: passed
Operation mode:	Test programm supplied by client active, ping connection established between EuT and Laptop	
Remarks:	none	
Date:	2012-02-28	
Tested by:	Pessinger Jürgen	



Minimum margin to limit: -1,8 dB

Frequency [MHz]	Reading [dBµV] QP	Correction [dB]	Values [dBµV/m] QP	Limit [dBµV/m] QP	Margin [dB] QP
80,255	21,3	11,0	32,3	40,0	-7,7
81,860	24,1	11,1	35,2	40,0	-4,8
84,339	23,2	11,3	34,5	40,0	-5,5
111,536	28,2	13,5	41,7	43,5	-1,8
116,966	25,7	12,7	38,4	43,5	-5,1
250,076	17,3	15,1	32,4	46,0	-13,6

6.3 Radiated disturbance (electric field) 1GHz to 8GHz

For test instruments and accessories used see section 7 Part **SER 3**.

6.3.1 Description of the test location

Test location: Anechoic Chamber A4

Test distance: 3 metres

6.3.2 Photo documentation of the test set-up

6.3.3 Test specification

Environmental conditions: Temperature: 18° C Humidity: 34% Atmospheric pressure: 97kPa

Frequency range: 1000 MHz - 8000 MHz

The test was carried out in the following operation mode(s):
- Test programm supplied by client active, ping connection established between EuT and Laptop

6.3.4 Test result

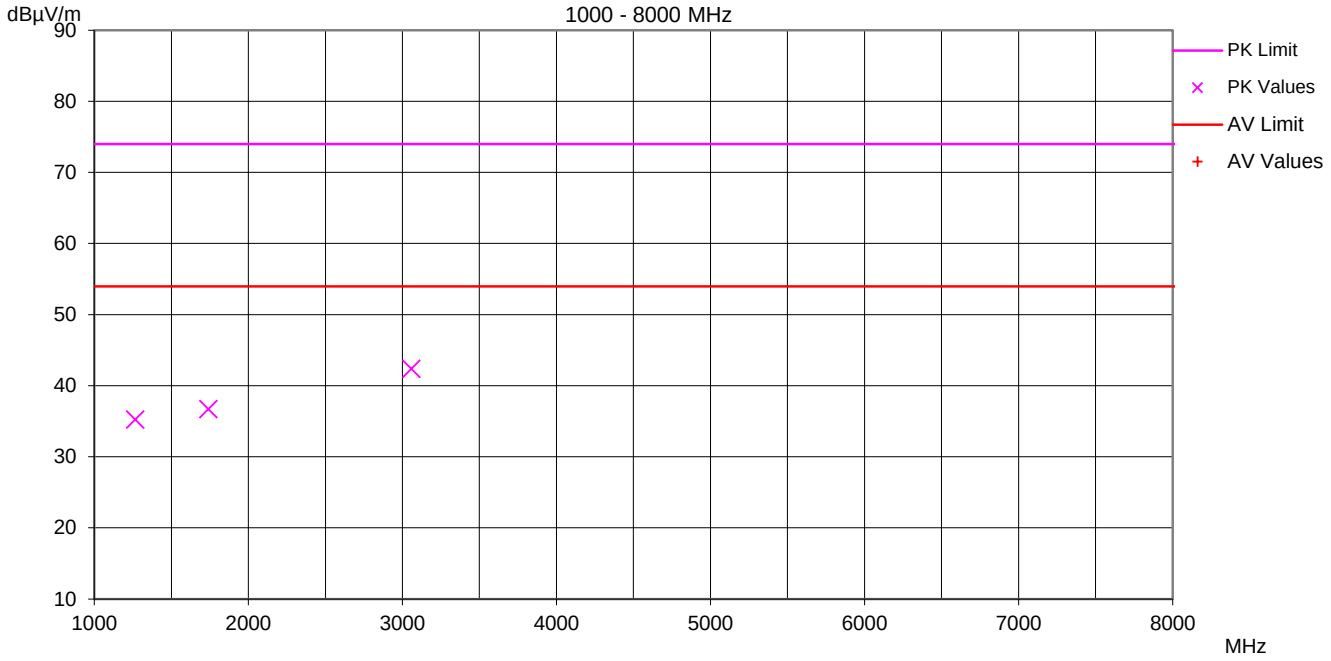
Minimal margin to limit -30.2 dB at 3867 MHz

The requirements are **FULFILLED.**

Remarks: No average measurement was carried out because peak results were belwo average limit.

6.3.5 Test protocol

Test point:	Horizontal	Result: passed
Operation mode:	Test programm supplied by client active, ping connection established between EuT and Laptop	
Remarks:	none	
Date:	2012-03-19	
Tested by:	Pessinger Jürgen	



Minimum margin to limit: -31,6 dB

Frequency	Reading [dBµV]		Correction	Values [dBµV/m]		Limit [dBµV/m]		Margin [dB]	
[MHz]	PK	AV	[dB]	PK	AV	PK	AV	PK	AV
1266,000	45,9	*	-10,7	35,2		74,0	54,0	-38,8	
1742,000	44,5	*	-7,8	36,7		74,0	54,0	-37,3	
3058,000	46,0	*	-3,7	42,3		74,0	54,0	-31,6	

*No average measurement was carried out because peak results were below average limit.

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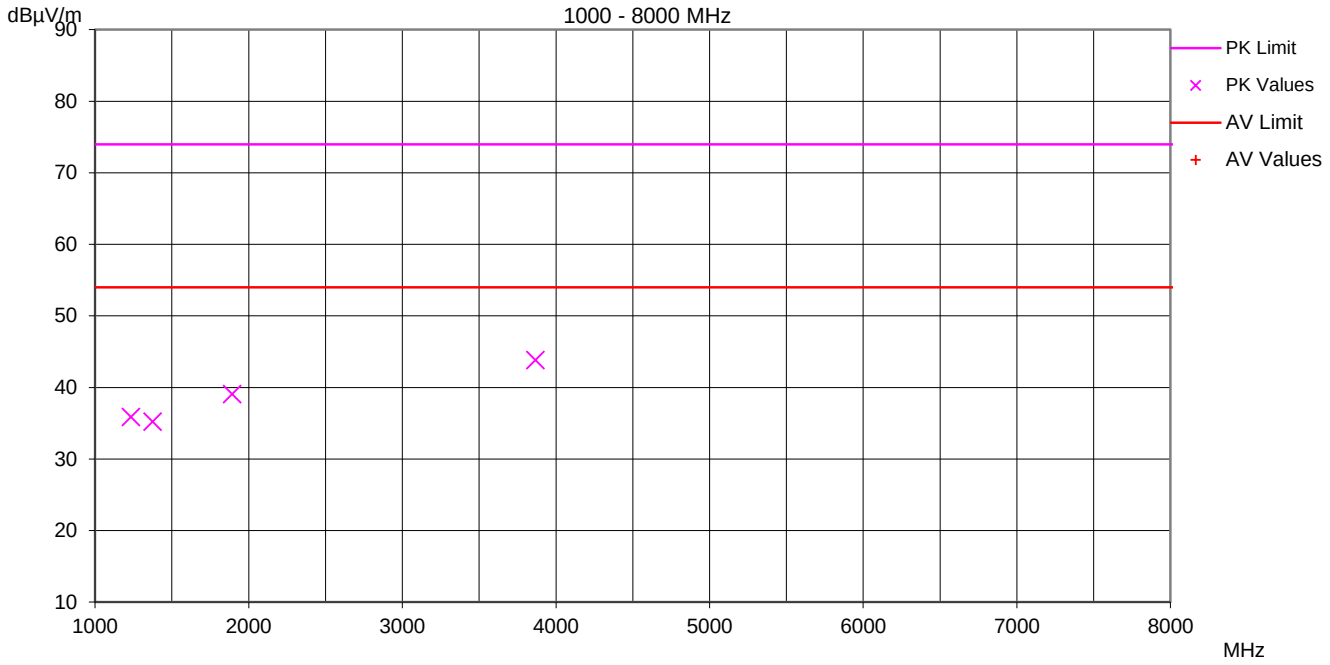
Test point:	Vertical	Result: passed
Operation mode:	Test programm supplied by client active, ping connection established between EuT and Laptop	
Remarks:	none	
Date:	2012-03-19	
Tested by:	Pessinger Jürgen	



Minimum margin to limit: -30,2 dB

Frequency [MHz]	Reading [dBµV] PK	Reading [dBµV] AV	Correction [dB]	Values [dBµV/m] PK	Values [dBµV/m] AV	Limit [dBµV/m] PK	Limit [dBµV/m] AV	Margin [dB] PK	Margin [dB] AV
1235,000	46,7	*	-10,8	35,9		74,0	54,0	-38,1	
1376,000	45,6	*	-10,4	35,2		74,0	54,0	-38,8	
1893,000	46,2	*	-7,2	39,0		74,0	54,0	-34,9	
3867,000	45,2	*	-1,4	43,8		74,0	54,0	-30,2	

*No average measurement was carried out because peak results were below average limit.

7 USED TEST EQUIPMENT AND ACCESSORIES

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

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESH 3	01-02/03-01-005	02/01/2013	02/01/2012		
	ESH 2 - Z 5	01-02/20-01-001	26/01/2014	26/01/2011	02/02/2013	02/02/2012
	ESH 3 - Z 2	01-02/50-02-020	29/12/2012	29/12/2011		
	BNC-3000-N	01-02/50-07-008				
	N-5000-N	01-02/50-07-009				
	Tile Version 3.4K20	01-02/68-09-001				
	emitel ESW V31	01-02/68-09-002				
A 5	ESVP	01-02/03-01-002	27/02/2013	27/02/2012		
	HM 5012	01-02/11-01-001				
	VULB 9163	01-02/24-01-006	09/11/2014	09/11/2011		
	N-40000-N	01-02/50-05-043				
	N-30000-N	01-02/50-05-044				
	Tile Version 3.4K20	01-02/68-09-001				
	emitel ESW V31	01-02/68-09-002				
SER 3	AMF-40-005-180-24-10P	01-02/17-02-009			12/12/2012	12/12/2011
	3117	02-02/24-05-009	16/02/2013	16/02/2012		
	HCC	01-02/50-01-021				
	FA210A0020000000	01-02/50-06-065				
	FA210A0050000000	01-02/50-10-005				
	Tile Version 3.4K20	01-02/68-09-001				
	emitel ESW V31	01-02/68-09-002				
	RST 070	01-05/60-02-003				
	FSP 30	02-02/11-05-001	05/10/2012	05/10/2011		