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# Test Report

No.: E50292 Edition 2

Designation of equipment under test:

AIS Transponder: UAIS DEBEG 3400

Test Laboratory  
accredited by  
DATEch e.V. in compliance with  
DIN EN ISO/IEC 17025  
under Reg. No. DAT-P-105/99-21.

The copying of excerpts from this report is not permitted without written the consent of the testing body. The test results indicated in this report refer exclusively to the equipment under test specified below. It is not permitted to transfer the results to other systems or configurations.

Testing body: PHOENIX TESTLAB  
Königswinkel 10  
D-32825 Blomberg  
Germany

Client: SAM Electronics GmbH  
System Navigation / Communication  
Behringstrasse 120  
D-22763 Hamburg

Order number: 50292

Type of test: Testing of the electromagnetic disturbances characteristics

Tested on the basis of: IEC 60945 Maritime navigation and radio communication equipment and systems – General requirements – Methods of testing and required test results.

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Disturbance emission: Chapter 9.3: Radiated emissions from enclosure port.  
The limits and requirements according to IEC 60945.

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Equipment under test, EUT: AIS-Transponder

Type identification: UAIS DEBEG 3400

Seriesnumber:

Manufacturer: SAM Electronics GmbH  
Navigation and Communication

Date the EUT was received: 09 February 2005

Annex: Photos of the test set-ups and the test subject

Client represented during the test by the following person(s): Mr. Torsten Galaske

Place of test: PHOENIX TESTLAB Blomberg

Date of test: 09 February 2005

Test result: The requirements made in the test documents were fulfilled by the equipment under test.  
The complete test results are presented in the following.

Blomberg, 24 February 2005



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Test Engineer: Raimund Blask



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approved by authorized Engineer

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## 1 Operational states and test set-up

All tests, documented in this test-report were carried out, because the EUT (see test-report E20273) was modified by the applicant / manufacturer as follows:

1. The enclosure was modified (additional spacer), see page 4 and 5 of the "Annex A" of this test-report.
2. The rf-module from the transmitter output stage was changed from M67748H (old version, no longer available) to RA08H1317M (new version).

Therefore two different EUT's were measured:

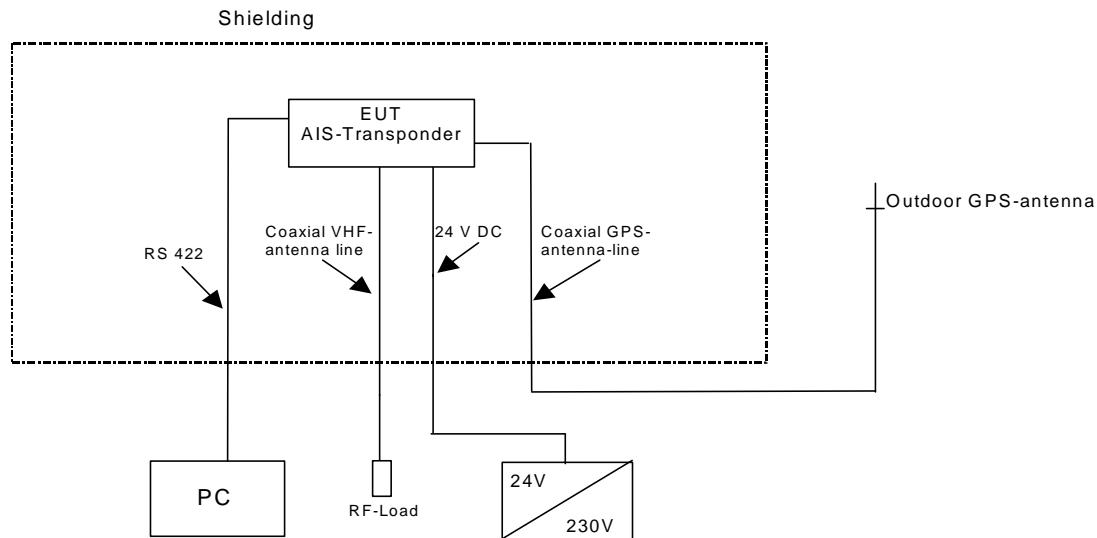
1. "Old version": Transponder with an additional spacer and old rf-module M67748H.
2. "New version": Transponder with an additional spacer and new rf-module RA08H1317M.

Only the radiated emission measurement (H-field 150 kHz to 30 MHz and E-field 30 MHz to 2 GHz) were carried out and documented in this test-report (ordered by the applicant).

Additional information:

As requested by the applicant, the EUT was operating in receive-mode because no emission components (caused by the transmitter) should be measured (spurious emission limits for the transmitter are based on IEC 61993).

### Test set-up:



# 1 List of test modules and results

## 1.1 Disturbance emission

Radiated emission – Enclosure port				
Frequency range	Limit	Basic standard	Remark	Status
150kHz – 300kHz	80 – 52 dB $\mu$ V/m in 3m	IEC 60945	H-field	fulfilled
300kHz – 30MHz	52 – 34 dB $\mu$ V/m in 3m	Chapter 9.3		
30MHz – 156MHz	54 dB $\mu$ V/m in 3m	IEC 60945	E-field	fulfilled
156MHz – 165MHz	24 dB $\mu$ V/m in 3m	Chapter 9.3		
165MHz – 1GHz	54 dB $\mu$ V/m in 3m			
Remark: For frequencies from 150 kHz to 30 MHz measurements shall be made of the magnetic H-field. The receiver bandwidth in the frequency ranges 150 kHz to 30 MHz and 156 MHz to 165 MHz shall be 9 kHz, and in the frequency ranges 30 MHz to 156 MHz and 165 MHz to 1 GHz shall be 120 kHz.				

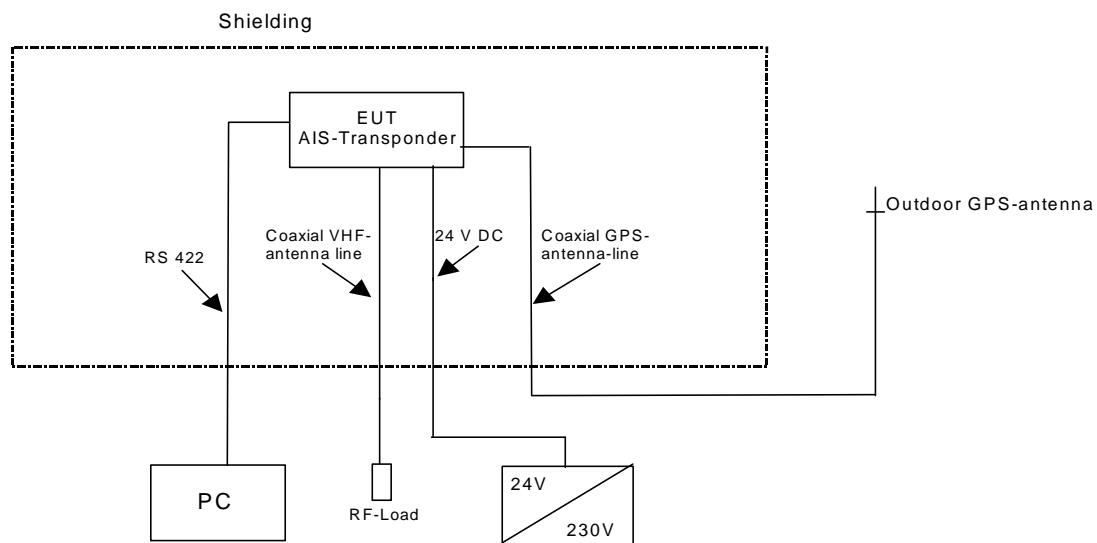
Conducted emission – Power supply ports				
Frequency range	Limit	Basic standard	Remark	Status
10kHz – 150kHz	96 – 50 dB $\mu$ V	IEC 60945	-	-
150kHz – 350kHz	60 – 50 dB $\mu$ V	Chapter 9.2		
350kHz – 30MHz	50 dB $\mu$ V			
Remark: The measuring bandwidth in the frequency range 10 kHz to 150 kHz shall be 200 Hz, and in the frequency range 150 kHz to 30 MHz shall be 9 kHz.				

## 2 Test sequence and test results electromagnetic disturbances characteristics

### 2.1 Radiated radio disturbance according to IEC 60945 chapter 9.3 (E-field)

Test set-up:

- Table set-up
- The drawing below schematically shows the test set-up.
- Photos of the test set-up can also be referred to in the annex.



Test: The interfering field strength is measured in two stages. In the first non-standard stage, preliminary measurements are made in a fully anechoic chamber. Here the equipment under test is measured from various sides in normal fitted position. This procedure makes it possible to ascertain without the effect of external interference sources and without adjusting the antenna in height whether the test object is emitting interference at certain frequencies. In the second stage, the frequencies determined in the preliminary measurements are measured in compliance with the standard on a standard open area test site with a quasi-peak detector.

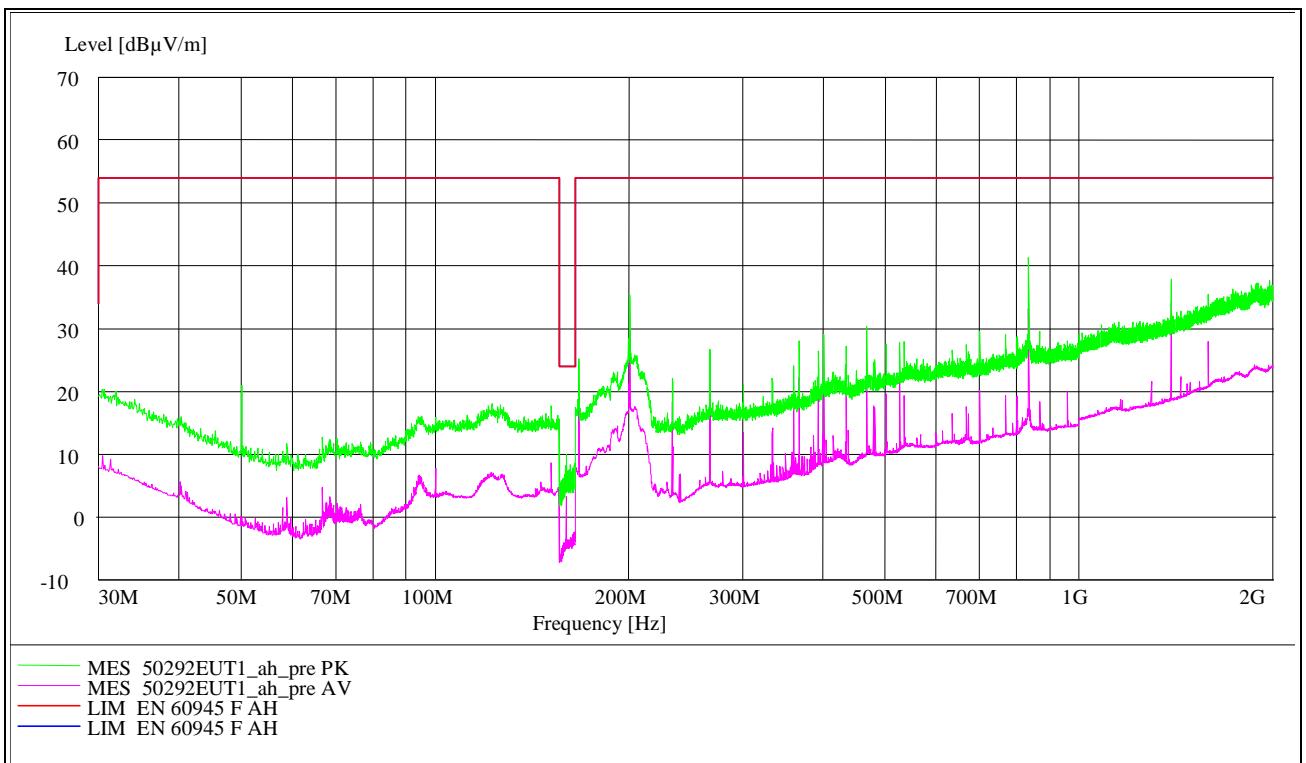
Measuring devices: AH-controller HD100 (PM-No. 480181)  
AH-antenna mast (PM-No. 480187/480188)  
AH-turtable (PM-No. 480186)  
Fully anechoic chamber (PM-No. 480190)  
Receiver ESI (PM-Nr. 480355)  
EMI softwarepackage ES-K1 (PM-No. 480111)  
Antenna Chase CBL 6112 (PM-No. 480185)  
DC filter 4\*60A (PM-No. 480209)  
Filter (X11) 0-4MHz; 100R; 2\*symm. Typ C110-E1 (PM-No. 480213)

Measuring records: The measuring records are presented on the following pages.

Test result: The requirements of the test documents were fulfilled.

### 1. "Old version" (with spacer and old rf-power amplifier):

Title: Preliminary spurious emission measurement according IEC60945  
 EUT: AIS-Transponder UAIS DEBEG 3400  
 Manufacturer: SAM Electronics GmbH  
 Operating Condition: Transmitter off  
 Test site: Fully anechoic chamber M20; PHOENIX TEST LAB GmbH  
 Operator: R. Blask

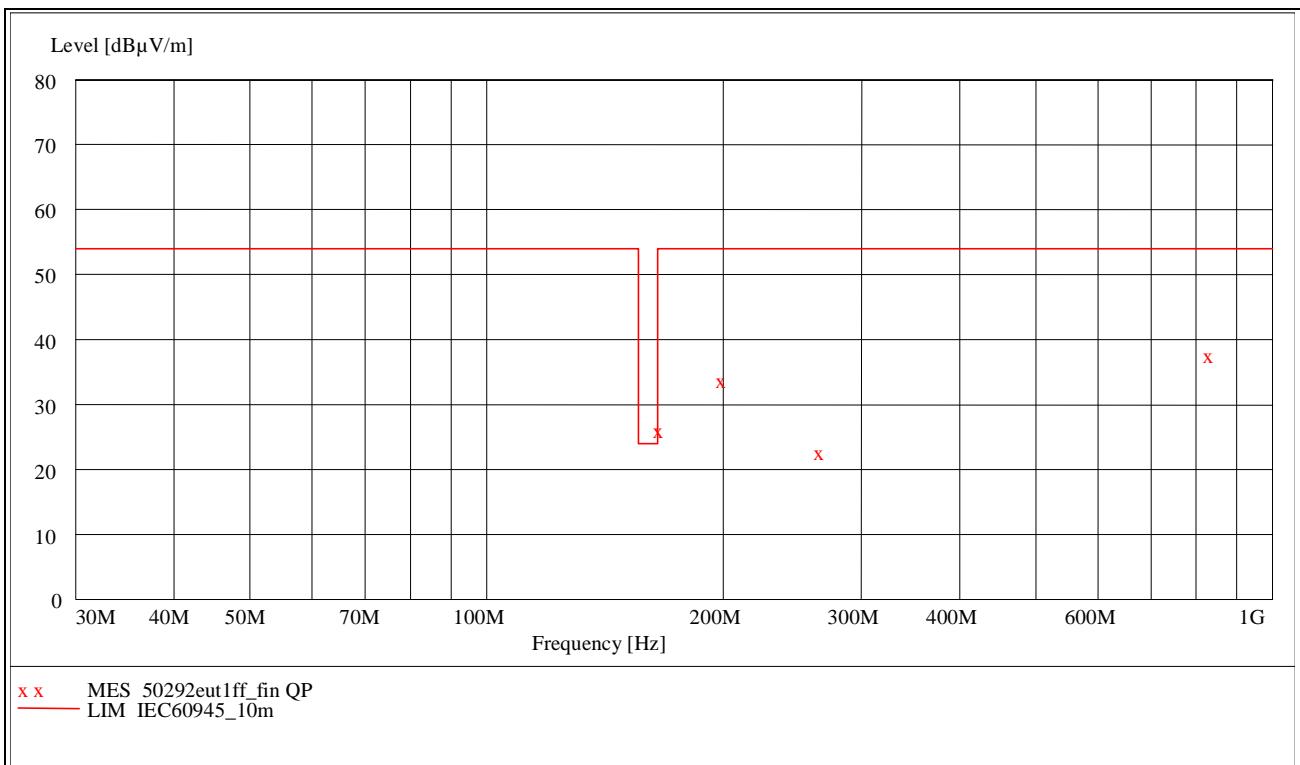


Data record name: 50292EUT1\_ah

of 11 February 2005

In this case it was necessary to carry out subsequent measurements because at some frequency points a value was above the Qualify limit curve during the preliminary measurements. The results from the standard subsequent measurements on the open area test site are presented in the following.

Title: Subsequent emission measurement according IEC60945  
 EUT: AIS-Transponder UAIS DEBEG 3400  
 Manufacturer: SAM Electronics GmbH  
 Operating Condition: Transmitter off  
 Test site: Open area test site M6; PHOENIX TEST LAB GmbH  
 Operator: R. Blask



Data record name: 50292eut1ff

of 10 February 2005

The results of the standard subsequent 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 10 m measuring distance.

**Result measured with the quasi-peak detector:**  
 (These values are marked in the above diagram by x)

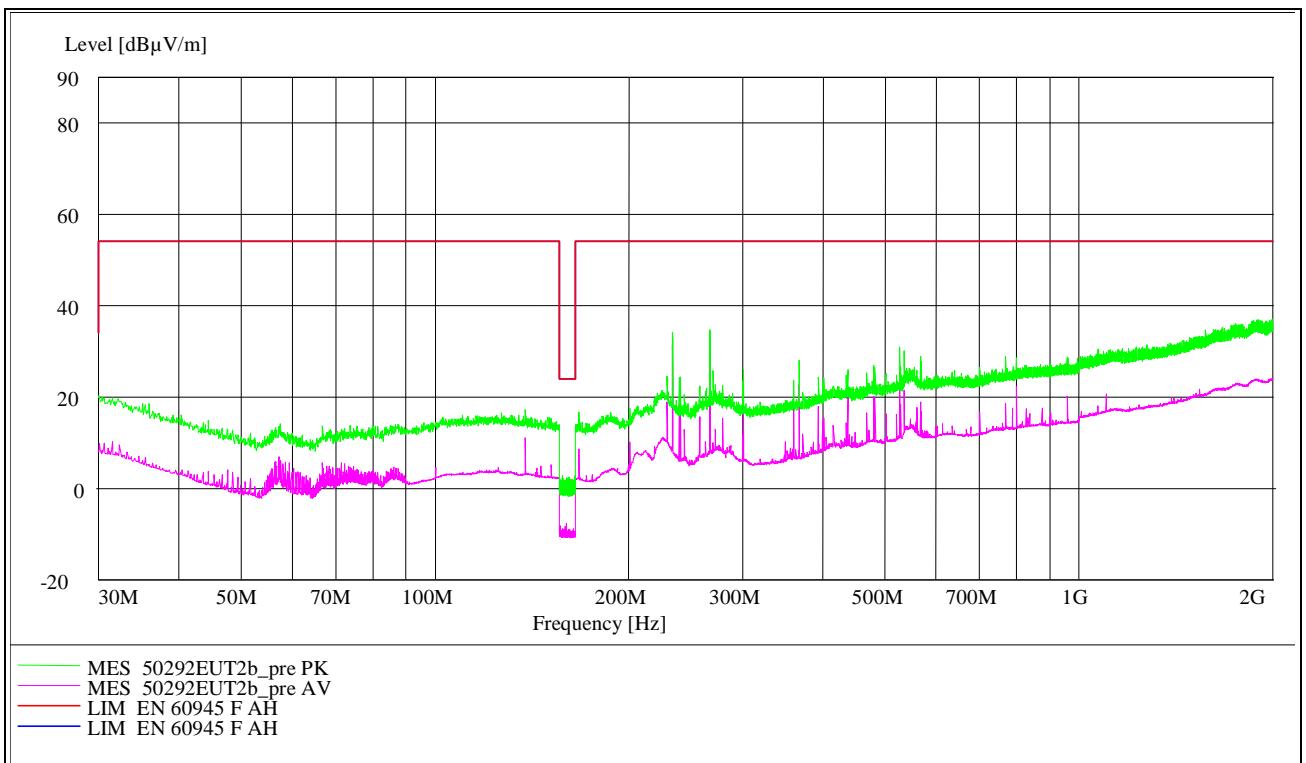
Frequency MHz	Level dB $\mu$ V/m	Transducer dB	Limit dB $\mu$ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
167.080000	26.30	11.1	54.0	27.7	100.0	209.00	VERTICAL
200.440000	33.90	10.4	54.0	20.1	100.0	91.00	VERTICAL
267.250000	22.80	15.0	54.0	31.2	100.0	350.00	VERTICAL
835.100000	37.70	26.0	54.0	16.3	400.0	91.00	VERTICAL

Data record name: 50292eut1ff\_fin QP

of 10 February 2005

## 2. "New version" (with spacer and new rf-power amplifier):

Title: Preliminary spurious emission measurement according IEC60945  
 EUT: AIS-Transponder UAIS DEBEG 3400  
 Manufacturer: SAM Electronics GmbH  
 Operating Condition: Transmitter off  
 Test site: Fully anechoic chamber M20; PHOENIX TEST LAB GmbH  
 Operator: R. Blask

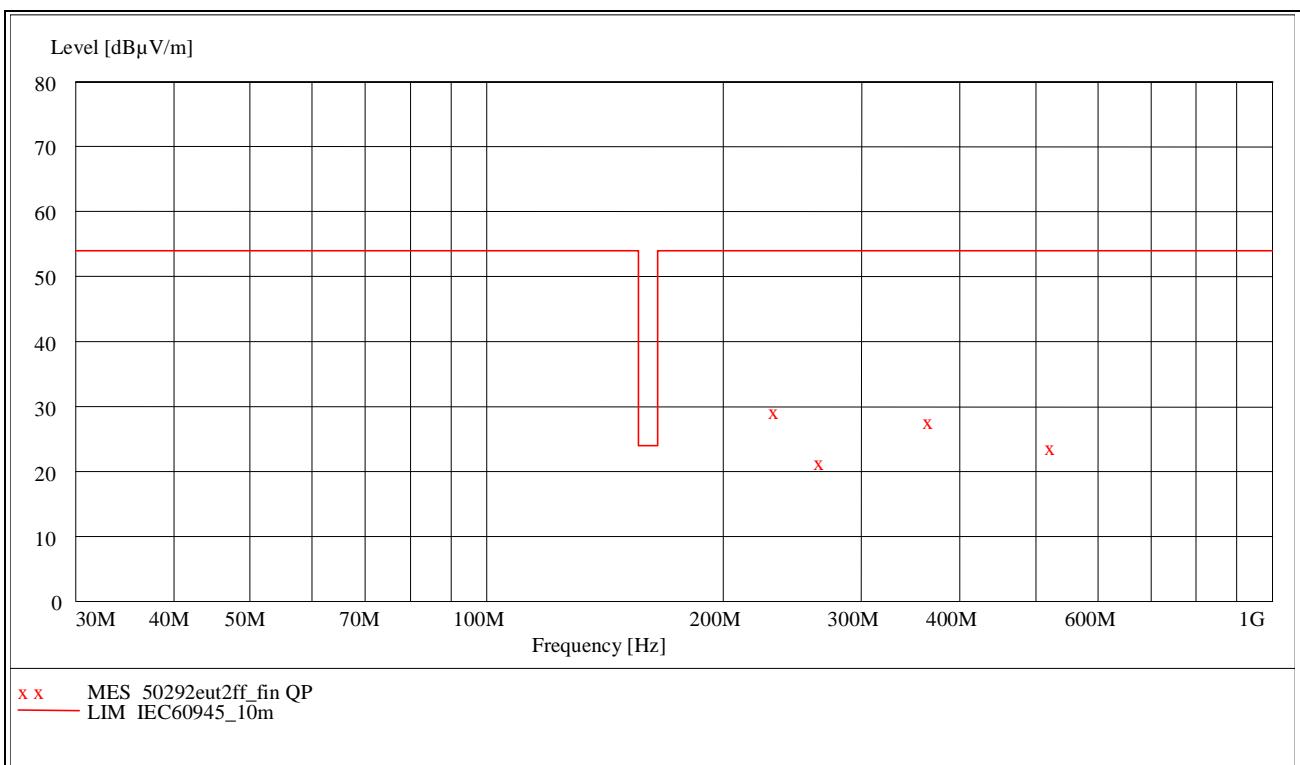


Data record name: 50292EUT2\_ah

of 11 February 2005

In this case it was necessary to carry out subsequent measurements because at some frequency points a value was above the Qualify limit curve during the preliminary measurements. The results from the standard subsequent measurements on the open area test site are presented in the following.

Title: Subsequent emission measurement according IEC60945  
 EUT: AIS-Transponder UAIS DEBEG 3400  
 Manufacturer: SAM Electronics GmbH  
 Operating Condition: Transmitter off  
 Test site: Open area test site M6; PHOENIX TEST LAB GmbH  
 Operator: R. Blask



Data record name: 50292eut2ff

of 10 February 2005

The results of the standard subsequent 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 10 m measuring distance.

**Result measured with the quasi-peak detector:**  
 (These values are marked in the above diagram by x)

Frequency MHz	Level dB $\mu$ V/m	Transducer dB	Limit dB $\mu$ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
233.900000	29.40	12.5	54.0	24.6	100.0	270.00	VERTICAL
267.250000	21.50	15.0	54.0	32.5	100.0	181.00	VERTICAL
367.500000	27.90	17.4	54.0	26.1	100.0	170.00	VERTICAL
525.555000	23.90	21.0	54.0	30.1	286.0	107.00	VERTICAL

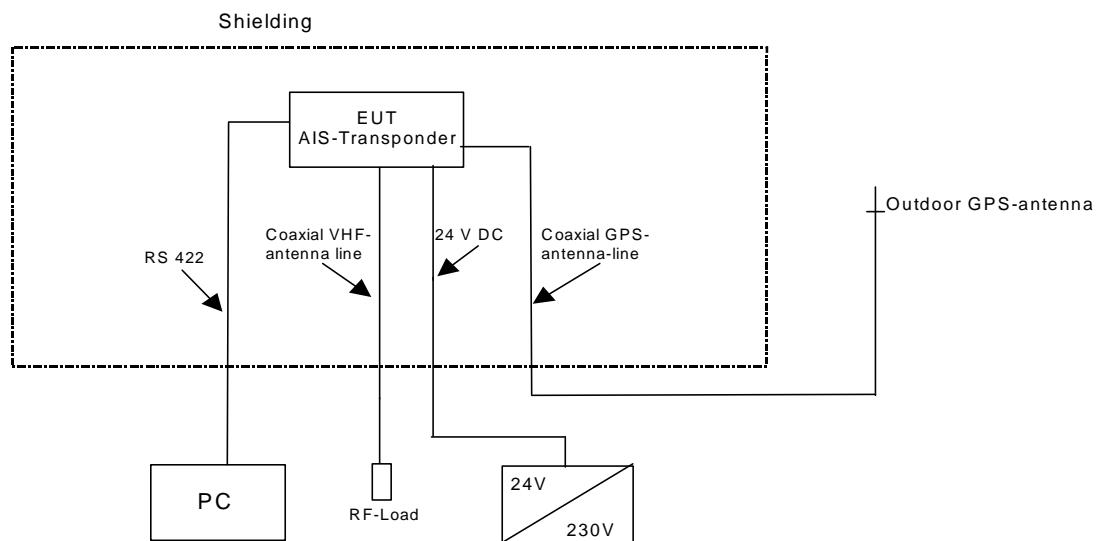
Data record name: 50292eut2ff\_fin QP

of 10 February 2005

## 2.2 Radiated radio disturbance according to IEC 60945 chapter 9.3 (magnetic. field)

Test set-up:

- Table set-up
- The drawing below schematically shows the test set-up.
- Photos of the test set-up can also be referred to in the annex.



Test: The interfering field strength is measured in two stages. In the first non-standard stage, preliminary measurements are made in a fully anechoic chamber. Here the equipment under test is measured from various sides in normal fitted position. This procedure makes it possible to ascertain without the effect of external interference sources and without adjusting the antenna in height whether the test object is emitting interference at certain frequencies. In the second stage, the frequencies determined in the preliminary measurements are measured in compliance with the standard on a standard open area test site with a quasi-peak detector.

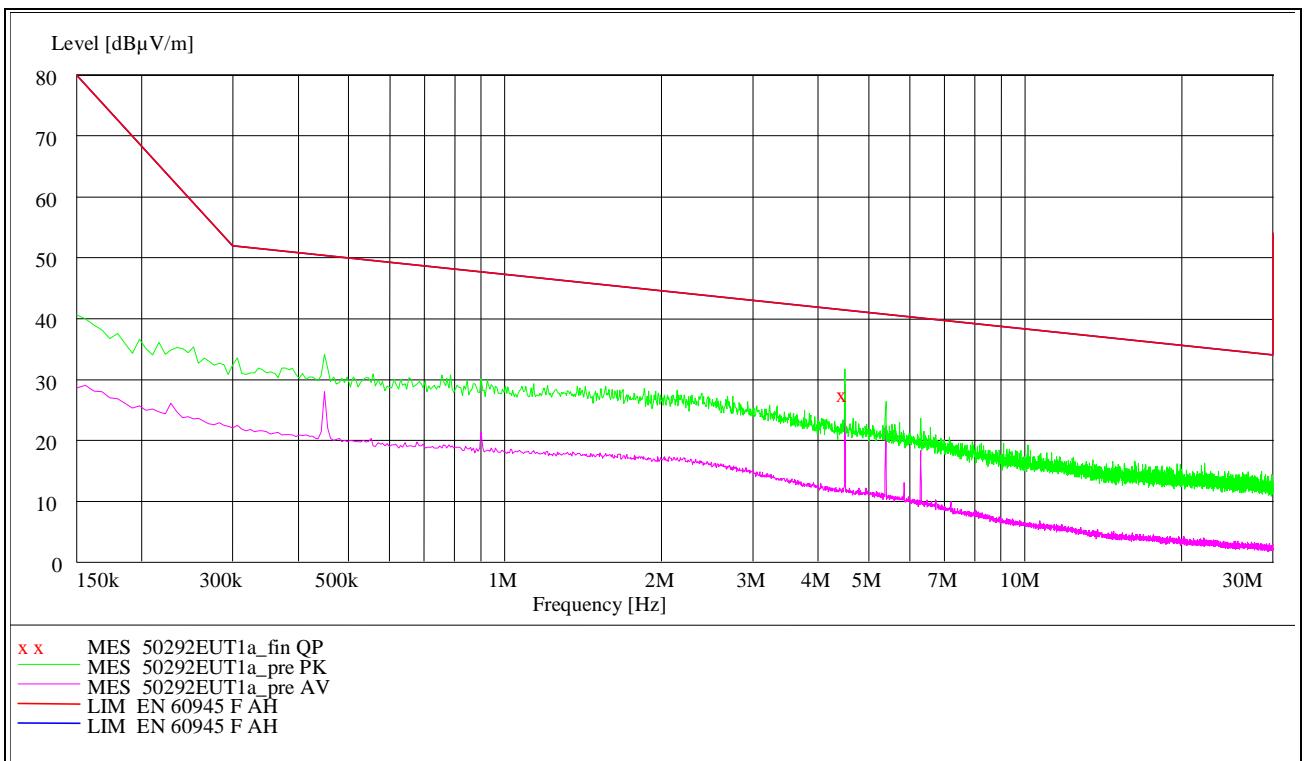
Measuring devices: AH-controller HD100 (PM-No. 480181)  
AH-antenna mast (PM-No. 480187/480188)  
AH-turntable (PM-No. 480186)  
fully anechoic chamber (PM-No. 480190)  
receiver ESI (PM-Nr. 480355)  
EMI softwarepackage ES-K1 (PM-No. 480111)  
FF-controller HD 100 (PM-No. 480139)  
FF-antenna mast (PM-No. 480086)  
FF-turntable (PM-No. 480087)  
open area test site (PM-No. 480085)  
relays switch unit RSU (PM-No. 480077)  
receiver ESAI + Display (PM-Nr. 480025, PM-Nr. 480026)  
Antenna R+S Loop antenna HFH2-Z2 (PM-Nr. 480059)  
DC filter 4\*60A (PM-No. 480209)  
filter (X11) 0-4MHz; 100R; 2\*symm. Type C110-E1 (PM-No. 480213)

Measuring records: The measuring records are presented on the following pages.

Test result: The requirements of the test documents were fulfilled.

### 1. "Old version" (with spacer and old rf-power amplifier):

Title: Spurious emission measurement according IEC60945  
 EUT: AIS-Transponder UAIS DEBEG 3400  
 Manufacturer: SAM Electronics  
 Operating Condition: Transmitter off  
 Test site: fully anechoic chamber M20; PHOENIX TEST LAB GmbH  
 Operator: R. Blask



Data record name: 50292EUT1a

of 09 February 2005

**Result measured with the quasi-peak detector:**  
 (These values are marked in the above diagram by x)

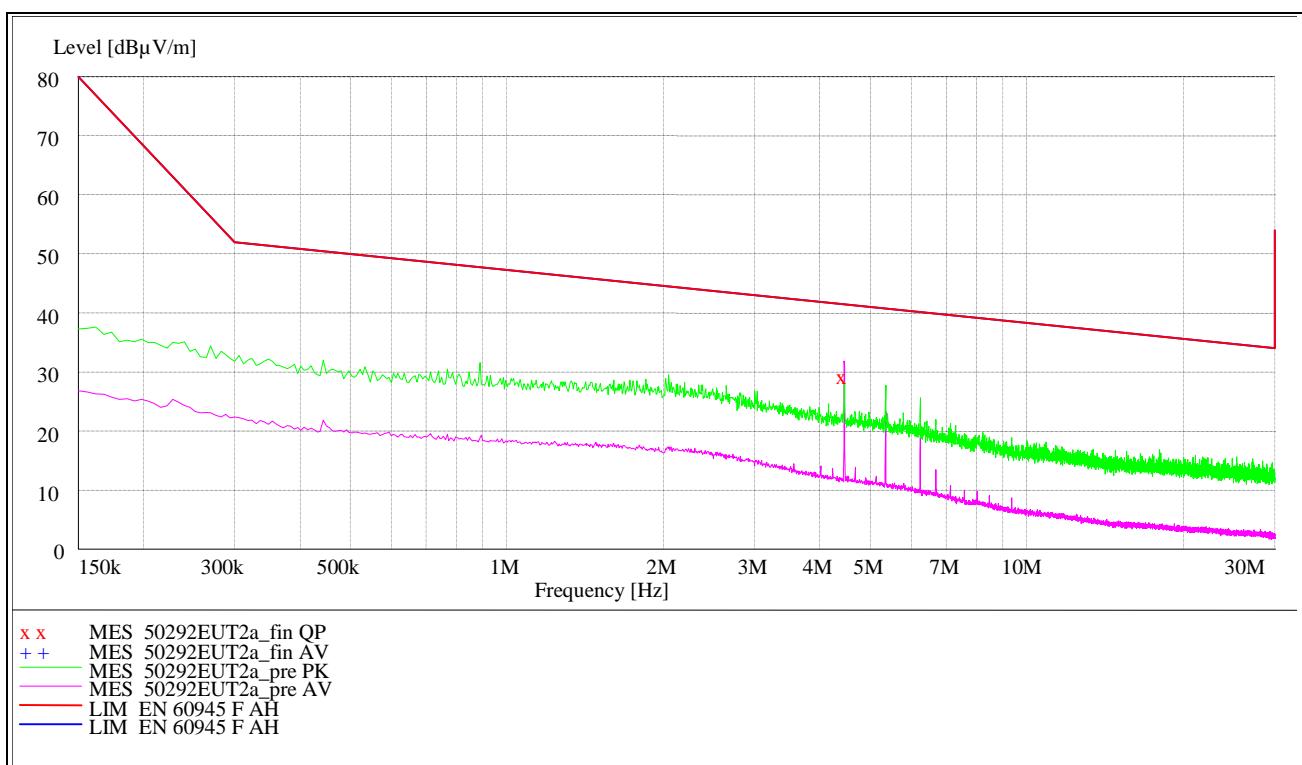
Frequency MHz	Level dB $\mu$ V/m	Transducer dB	Limit dB $\mu$ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
4.500000	27.90	19.9	41.4	13.5	150.0	45.00	HORIZONTAL

Data record name: 50292EUT1a\_fin QP

of 09 February 2005

## 2. "New version" (with spacer and new rf-power amplifier):

Title: Spurious emission measurement according IEC60945  
 EUT: AIS-Transponder UAIS DEBEG 3400  
 Manufacturer: SAM Electronics  
 Operating Condition: Transmitter off  
 Test site: fully anechoic chamber M20; PHOENIX TEST LAB GmbH  
 Operator: R. Blask



Data record name: 50292EUT2a

of 09 February 2005

**Result measured with the quasi-peak detector:**  
 (These values are marked in the above diagram by x)

Frequency MHz	Level dB $\mu$ V/m	Transducer dB	Limit dB $\mu$ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
4.458000	29.80	19.9	41.5	11.7	150.0	50.00	VERTICAL

Data record name: 50292EUT2a\_fin QP

of 09 February 2005

### **3 Annex**

The annex A consists of

4 pages:

Test set-up radiated emission, H-field:

50292emi1.jpg

Test set-up preliminary radiated emission, E-field:

50292emi5.jpg

Test set-up final radiated emission, E-field:

50292emi10.jpg

EUT with “new”-enclosure

50292eut2.jpg