

EMC Test Report
for the
SRT Marine Technology Ltd
Cobalt II Class B AIS Transceiver



Project Engineer: D. Tiroke



Approval Signatory

Approved signatories: R. P. St John James J. A. Jones A. V. Jones

The above named are authorised Hursley EMC Services signatories.

Contents

1.0	OVERVIEW	3
1.1	INTRODUCTION	3
1.2	OBJECTIVE	3
1.3	PRODUCT MODIFICATIONS	3
1.4	CONCLUSION	3
2.0	TEST SUMMARY	4
2.1	SUMMARY	4
2.2	TEST DEVIATIONS	4
2.3	EMC TEST LAB REFERENCE	4
3.0	EQUIPMENT & TEST DETAILS	5
3.1	GENERAL	5
3.2	EUT DESCRIPTION	6
3.3	EUT SUPPORT	6
3.4	EUT TEST EXERCISER & CONFIGURATIONS	6
3.5	ENVIRONMENTAL TEST CONDITIONS	10
3.6	EMC TEST EQUIPMENT	10
4.0	EMISSION RESULTS	11
4.1	RADIATED EMISSIONS; 30 TO 1000 MHz	11
4.2	RADIATED EMISSIONS; 1.0 TO 2.0 GHz	13
4.3	RADIATED H-FIELD, 150 kHz TO 30 MHz	15
4.4	CONDUCTED EMISSIONS	18
5.0	IMMUNITY RESULTS	22
5.1	PERFORMANCE CRITERIA	22
5.2	ELECTROSTATIC DISCHARGE	23
5.3	RADIATED RF IMMUNITY	27
5.4	FAST TRANSIENT BURSTS	28
5.5	CONDUCTED IMMUNITY	29
5.6	POWER LINE DISTURBANCE	30
6.0	PHOTO LOG (TYPICAL)	31
7.0	ANNEX	38
7.1	COMPASS SAFE DISTANCE	38
7.2	EN 60945 COMPASS SAFE DISTANCE TEST SET-UPS	39

1.0 OVERVIEW

1.1 Introduction

The Equipment Under Test (EUT), as described within this document, was submitted for EMC testing as agreed with the customer.

1.2 Objective

The purpose of the test was to measure and report the EUT against limits and methods of the emissions and immunity standards, as requested for and listed in section **2.0 Test Summary**.

1.3 Product Modifications

None to sample submitted:

1.4 Conclusion

The EUT met the emission limits and immunity requirements of the tests defined in section **2.0 Test Summary**.

This report relates to the sample tested and may not represent the entire population. It is valid only for the product identified, either in part or in full, to the relevant electromagnetic requirements necessary for compliance with the EMC Directive 2014/30/EU.

2.0 TEST SUMMARY

2.1 Summary

The EUT was tested to the EN 60945 test standard for maritime navigation and radio communication equipment.

The EUT met the **emission** test requirements of the following standards:

Description	General Standard	Referenced Standard
Radiated disturbance	EN 60945:2002	CISPR 16-1-1:2006
Radiated H-Field	IEC 60945 (Fourth edition – 2002)	CISPR 16-1-1:2006
Conducted disturbance	& EN 301 843-1 v2.1.1*	CISPR 16-1-1:2006

The EUT met the **immunity** test requirements of the following standards:

Description	General Standard	Referenced Standard
Electrostatic discharge	EN 60945:2002 IEC 60945 (Fourth edition – 2002) & EN 301 843-1 v2.1.1*	EN / IEC 61000-4-2:2009
Radiated RF immunity		EN / IEC 61000-4-3:2006 inc A1: 2008 & A2:2010
Fast transient bursts		EN / IEC 61000-4-4:2012
Conducted immunity		EN / IEC 61000-4-6:2014
Power line disturbance		EN / IEC 61000-4-11:2004

Compass Safe Distance:

EN 60945:2002 / IEC 60945 Section 11.2 - 0.3 Deg of deflection = 200mm (powered)

The uncertainty of measurement for each test has been included to support a level of confidence of approximately 95%.

Note: Standard marked * are not with the UKAS schedule of this laboratory.

2.2 Test Deviations

None.

2.3 EMC Test Lab Reference

Hursley EMC Services file: 17R196.

3.0 EQUIPMENT & TEST DETAILS

3.1 General

EUT:	Cobalt II Class B AIS Transceiver Make: SRT Marine Technology Ltd Model: Cobalt II Serial number: UNIT1
EUT power rating:	12 to 24V DC
EUT manufacturer:	SRT Marine Technology Ltd
EUT build level:	Production sample
Customer:	SRT Marine Technology Ltd Wireless House Westfield Industrial Estate Midsomer Norton Bath BA3 4BS United Kingdom Tel: +44 (0) 1761 409 500
Test commissioned by:	Mr Shaun Horan
Date EUT received:	2 nd May 2017
Test date(s):	2 nd to the 5 th May 2017
EMC measurement site:	Hursley EMC Services Limited Hursley Park, Winchester, Hampshire

3.2 EUT Description

The em-trak B100 with Cobalt II". Part number 411-0012 applies to this product. The description is "AIS Class B Transceiver".

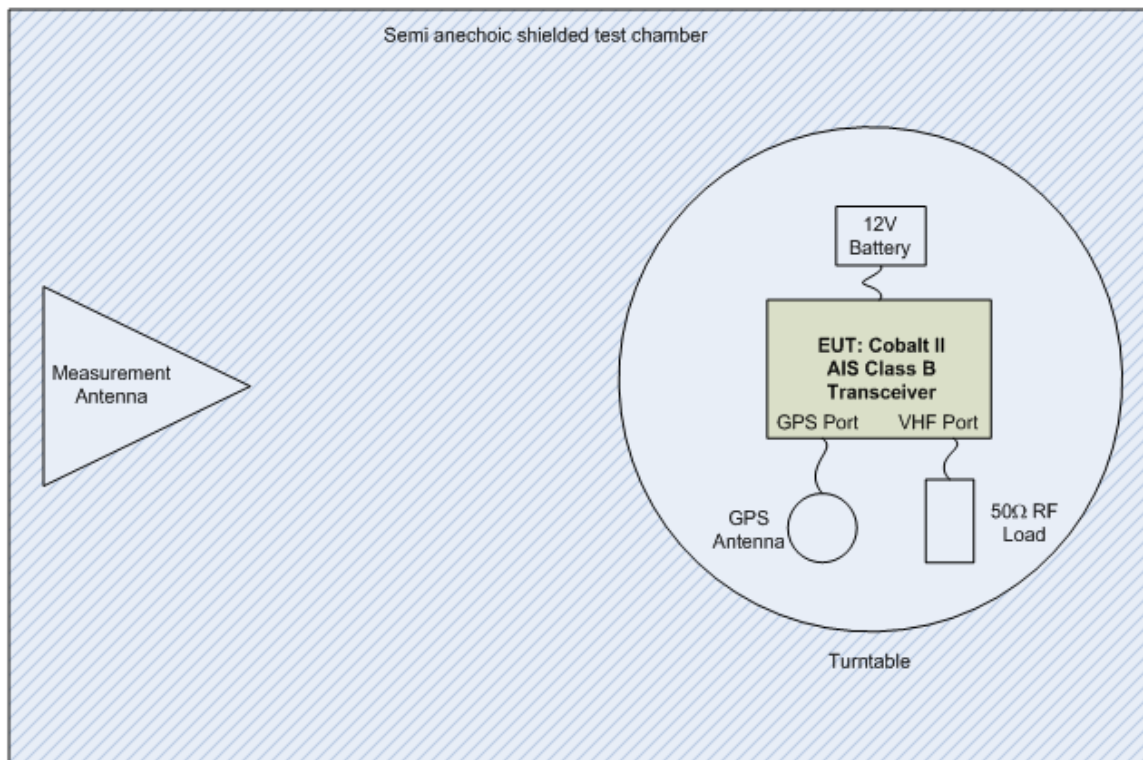
3.3 EUT Support

- GPS antenna (x2) Model MA-700 s/n 304-0015 and 0018908
- Apollo AIS class A transceiver s/n 42500021660006
- Actisense USB to RSS 422 converter model USG-1-422 s/n 136602
- Laptop HP Probook 4530 s/n 000209 with hp PSU p/n 384020 s/n 7y18423905

3.4 EUT Test Exerciser & Configurations

Radiated Emissions Pre-Scan Set-up

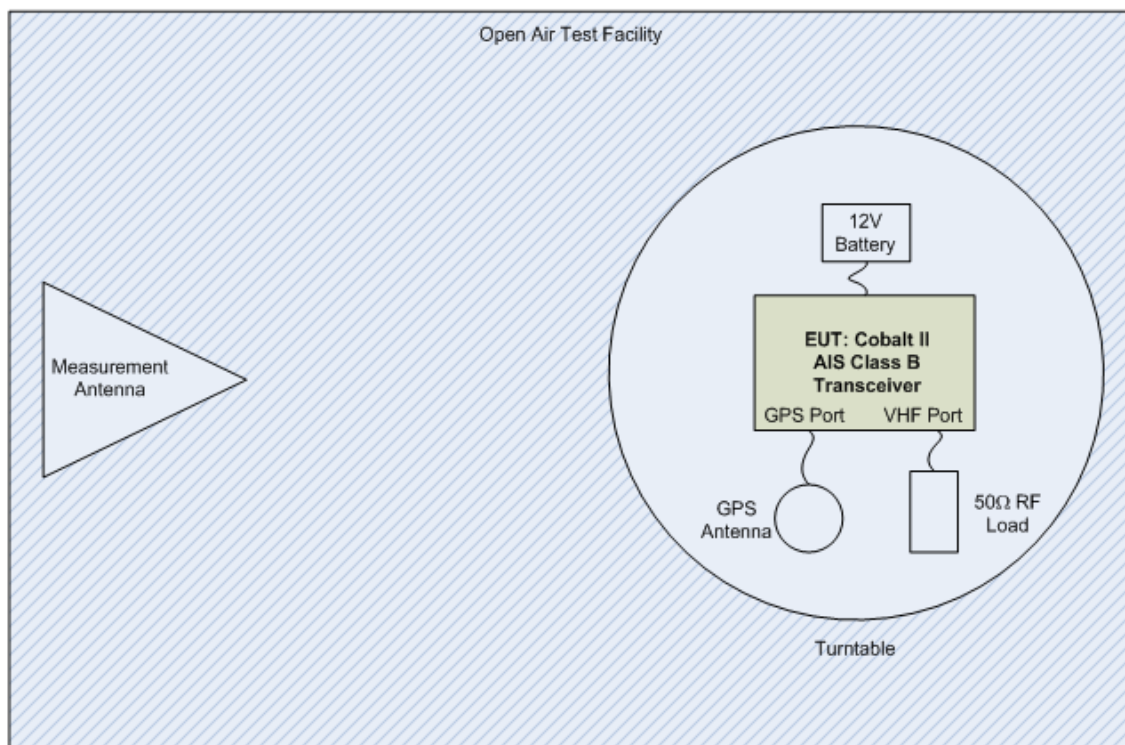
During the pre-scan stage of the radiated emissions testing, the EUT was setup inside an anechoic shielded test chamber. The VHF Port of the Cobalt II EUT was terminated by a 50Ω RF Load, and the GPS port was connected to a GPS Antenna positioned next to the EUT with the co-axial cable coiled up. VHF Transmissions from the EUT were suppressed as there was no GPS signal present within the test chamber.



EUT Test Exerciser and Configurations (continued)

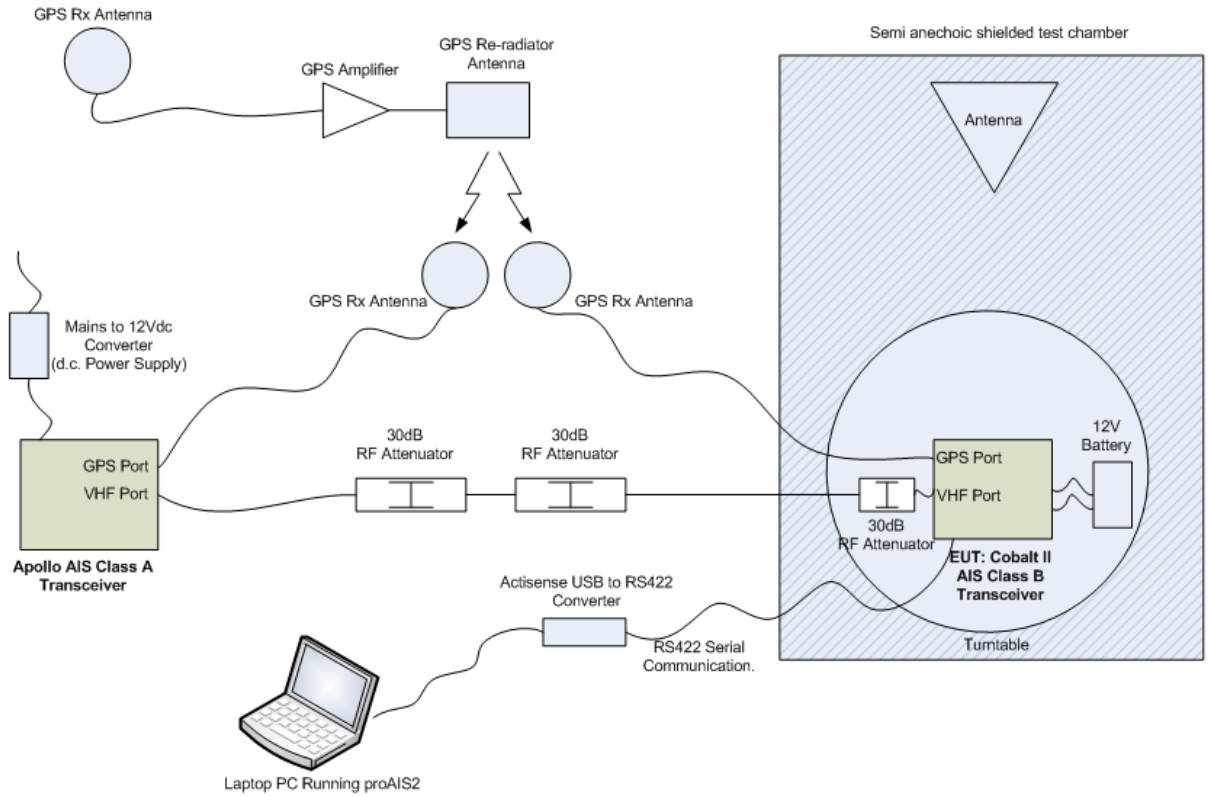
Radiated Emissions Final Measurement Set-up

During the final measurement of radiated emission testing, the open-air test site was used where GPS signal would be present. To suppress VHF transmissions from the EUT, silent mode function of the Cobalt II EUT was enabled using proAIS2 interface software prior to commencing the test.



EUT Test Exerciser and Configurations (continued)

Radiated Immunity Set-up



EUT Test Exerciser and Configurations (continued)

Radiated immunity set-up (continued)

During radiated immunity testing, an Apollo AIS Class A Transceiver was used as a monitoring station to receive transmissions from the EUT checking Tx function of EUT, at the same time transmissions from the Apollo were being monitored by the EUT checking Rx function of EUT. The Apollo AIS Class A Transceiver reporting rate was 10 seconds, the Cobalt II EUT reporting rate was 5 seconds.

Communication with the Cobalt II EUT was via RS422 where an Actisense USG-1-422 USB to RS422 converter located outside the chamber was used.

The operational status of the Cobalt II EUT including transmitter and receiver function was monitored by viewing the Diagnostics window of proAIS2 interface software.

Power Supply: A 12V battery was used to power the EUT.

GPS Antenna: A GPS signal feed was used, which was then amplified and re-radiated to illuminate two GPS receiving antennas located indoors but outside the EMC Test chamber. The distance between GPS radiating antenna and the two GPS receiving antennas feeding the EUT and monitoring equipment was approximately two meters.

3.5 Environmental Test Conditions

Temperature	18 to 20° Celsius
Relative Humidity	42 to 48%
Atmospheric Pressure	1003 to 1014 millibars

3.6 EMC Test Equipment

#ID	CP	Manufacturer	Type	Serial Nø	Description	Calibration due date
008	1	HP	8568B	2517A01791	Spectrum analyser	Internal
013	1	Schaffner	CBL6140A	1235	Antenna X-wing (chamber)	Internal
030a	2	KeyTek	MZ-15/EC	0406216	ESD Minizap /pink	06/03/2019
040	1	HP	8593EM	3536A00137	Spectrum analyser (9kHz-26.5GHz)	12/01/2018
047	3	Rohde & Schwarz	HFH2-Z2	879021/22	Loop antenna (9kHz-30MHz)	01/06/2019
053	1	HP	8449B	3008A01394	Pre-amplifier (1.0-26.5GHz)	25/08/2017
068	1	EM	CWS500C	1001-07	Conducted immunity simulator	23/03/2017
073	3	Schwarzbeck	BBHA9120B	237	Horn antenna (1-10GHz)	22/07/2019
158	1	Rohde & Schwarz	ESH3-Z2	357881052	Pulse limiter	20/09/2017
162	1	Rohde & Schwarz	ESH3 Z5	829996/003	Single phase LISN / AMN	31/08/2017
173	1	Rohde & Schwarz		942451	Absorbing clamp	03/10/2017
190	0	Milmega	AS0104-55/55	1010023	RF amplifier (1-4GHz)	Internal
200	1	Fischer	F-2031-32MM	09849	EM Injection clamp (10k-1GHz)	11/06/2017
218	1	Boonton	4230	26603	Power meter/probe(a) (18GHz)	22/09/2017
289	1	Rohde & Schwarz	ESC1 7	100765	CISPR 7GHz Receiver	17/07/2017
403	1	Fischer	CDN M2	9925	CDN M2	22/11/2017
550	1	AR	200W1000N7A	0	80 to 1000MHz RF Amplifier	Internal
581	1	MEB	S2	11262	CDN	Internal
600	1	HP	8447D	2944A07419	Amplifier	26/05/2017
668	1	EMC Partner	IMU 4000	0	IMU 4000+E698+A698:G698	03/10/2017
679	1	Gauss	TDEIM30M	1510003	30MHz TD Receiver	18/10/2017
718	1	Rohde & Schwarz	SMT06	831654/005	6GHz sig gen with pulse	08/06/2017

CP = Interval period [year] prescribed for external calibrations

Note: 'Calibration due date' means that the instrument is certified with a UKAS or traceable calibration certificate.
'Internal' means internally calibrated using HEMCS procedures

4.0 EMISSION RESULTS

4.1 Radiated Emissions; 30 to 1000 MHz

Radiated emissions pre-scan profile measurements were taken at a distance of three metres on eight azimuths of the EUT in both horizontal and vertical antenna polarities in a semi-anechoic chamber.

The EUT was scanned in a chamber with the supply set to 12V DC.

Using the pre-scan results as a guide, each emission from the EUT was maximised. Measurements were carried out a distance of three metres in a CISPR 16-1-4 compliant semi-anechoic chamber. Cable positions were then finally adjusted to produce the maximum emission levels. The worst-case CISPR results are recorded below.

4.1.1 Data

Emission frequency (MHz)	Measured quasi-peak value (dB μ V/m)	Measured quasi-peak value including uncertainty budget	Specified quasi-peak limit (dB μ V/m)	Status
30.974	31.60	35.80	54.0	Pass
32.588	32.94	37.14	54.0	Pass
62.328	31.40	35.60	54.0	Pass
142.320	48.12	52.32	54.0	Pass
159.621	18.26	22.46	24.0	Pass
159.994	14.54	18.74	24.0	Pass
191.275	48.25	52.45	54.0	Pass
284.641	39.26	43.46	54.0	Pass
382.560	39.04	43.24	54.0	Pass
426.961	38.32	42.52	54.0	Pass

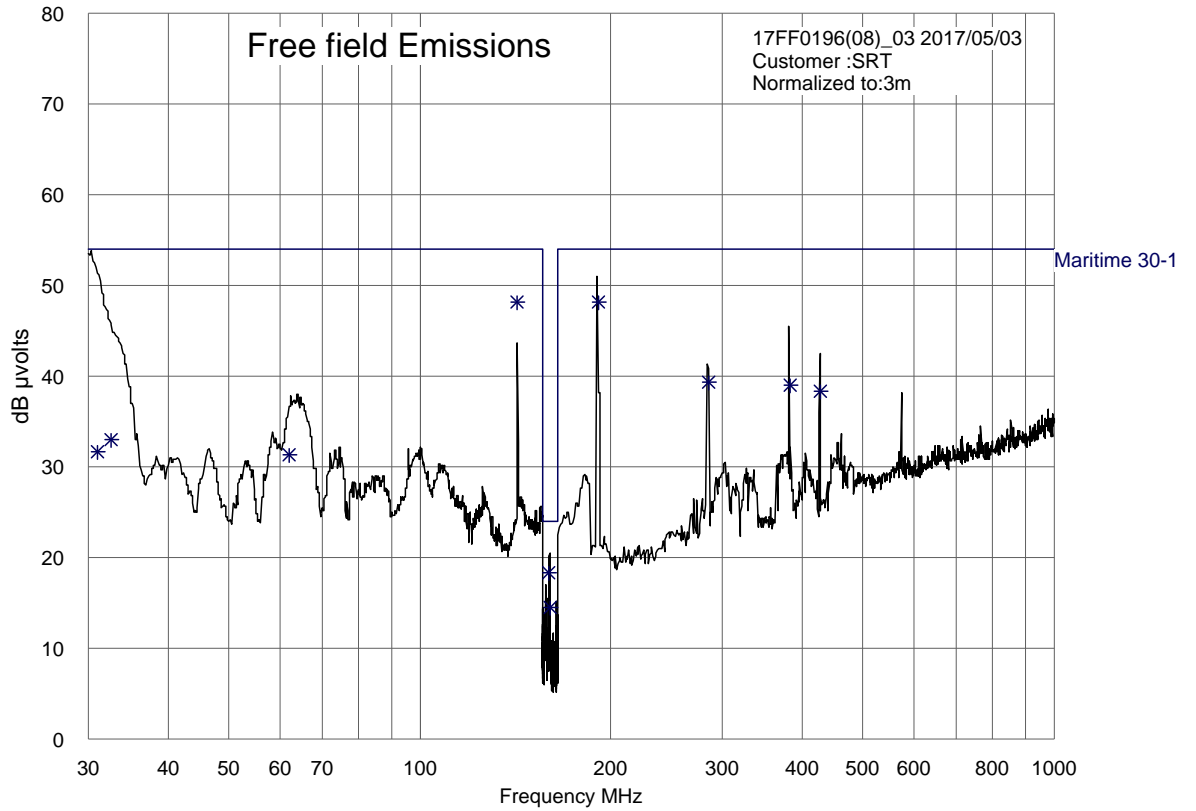
The uncertainty of measurement: $\pm 4.2\text{dB}\mu\text{V}$ for a 95% confidence level has been added to the measured result.

The measurements reported are the highest emissions relative to the EN / IEC 60945 limit and take into account the antenna and cable loss factors. Measurements were made with a 9 kHz quasi-peak detector between 156 and 165 MHz; at all other frequencies a 120 kHz quasi-peak detector was used. Measurements made according to the EN/IEC 60945 test standard and Hursley EMC Services test procedure RAD-01

TEST ENGINEER: Andy Jones

4.1.2 Profile

Maximum peak hold trace with quasi-peak values (*)



4.2 Radiated Emissions; 1.0 to 2.0 GHz

Radiated emissions pre-scan profile measurements were taken at a distance of three metres with the EUT turned through 360°, with both horizontal and vertical antennae polarities in an anechoic chamber. This pre-scan profile was made from 1.0 to 2.0 GHz and evaluated against the EN 60945 limit.

The sample was then re-measured in an anechoic chamber; the pre-scan results were used as a guide at three metre. Each emission from the EUT was maximised. Cable positions were then finally adjusted to produce the maximum emission levels. There were no frequencies found within the laboratory's ≤ 12 dB criterion and so no further measurements were necessary.

4.2.1 Data

Emission frequency (GHz)	Measured quasi-peak value (dB μ V/m)	Measured quasi-peak value including uncertainty budget	Specified quasi-peak limit (dB μ V/m)	Status
No significant peaks found within the specified limit.				Pass

Uncertainty of measurements: ± 5.1 dB μ V for a 95% confidence level for >1.0 GHz.

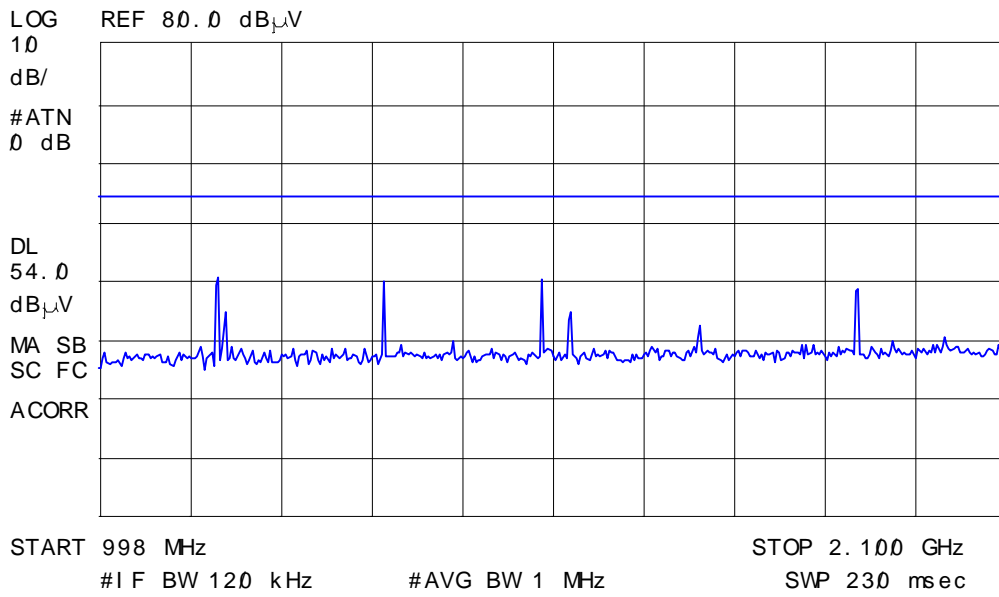
The measurements reported are the highest emissions relative to the EN 60945 limit and take into account the antenna, cable loss factors and uncertainty cable. Measurements made according to the EN 60945 test standard and Hursley EMC Services test procedures RAD-01 and MAR-01.

TEST ENGINEER: Daniel Tiroke

4.2.2 Profile

10:37:35 MAY 02, 2017

ACTV DET: PEAK
MEAS DET: PEAK QP AVG



4.3 Radiated H-Field, 150 kHz to 30 MHz

A profile scan was taken at a distance of three metres with a 360° azimuth scan of the EUT in a semi-anechoic chamber. The tests were repeated for three orientations of the loop antenna.

4.3.1 Data; 90 degrees and 180 degrees

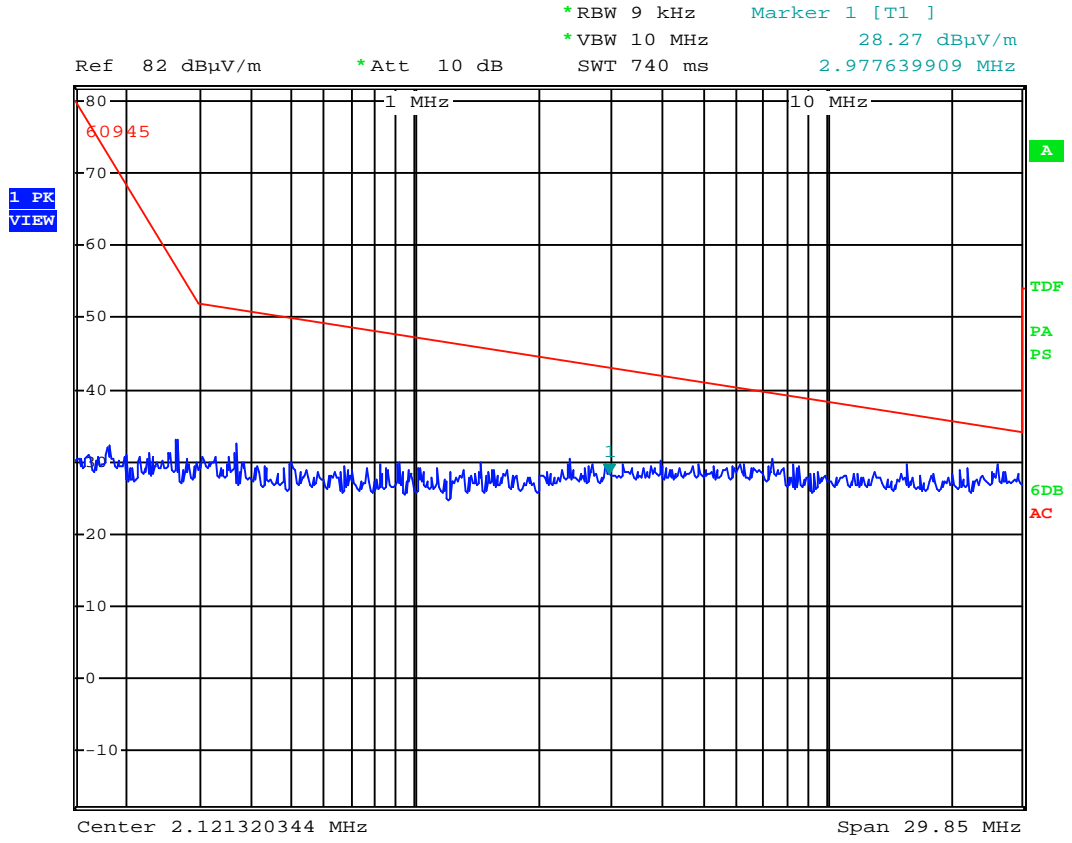
Frequency	Quasi-peak value (dB μ V)			Status
	Measured	Measured quasi-peak value including uncertainty budget	Limit	
No significant peaks found within the specified limit.				Pass

The uncertainty of measurement: ± 3.22 dB μ V for a 95% confidence level has been added to the measured result.

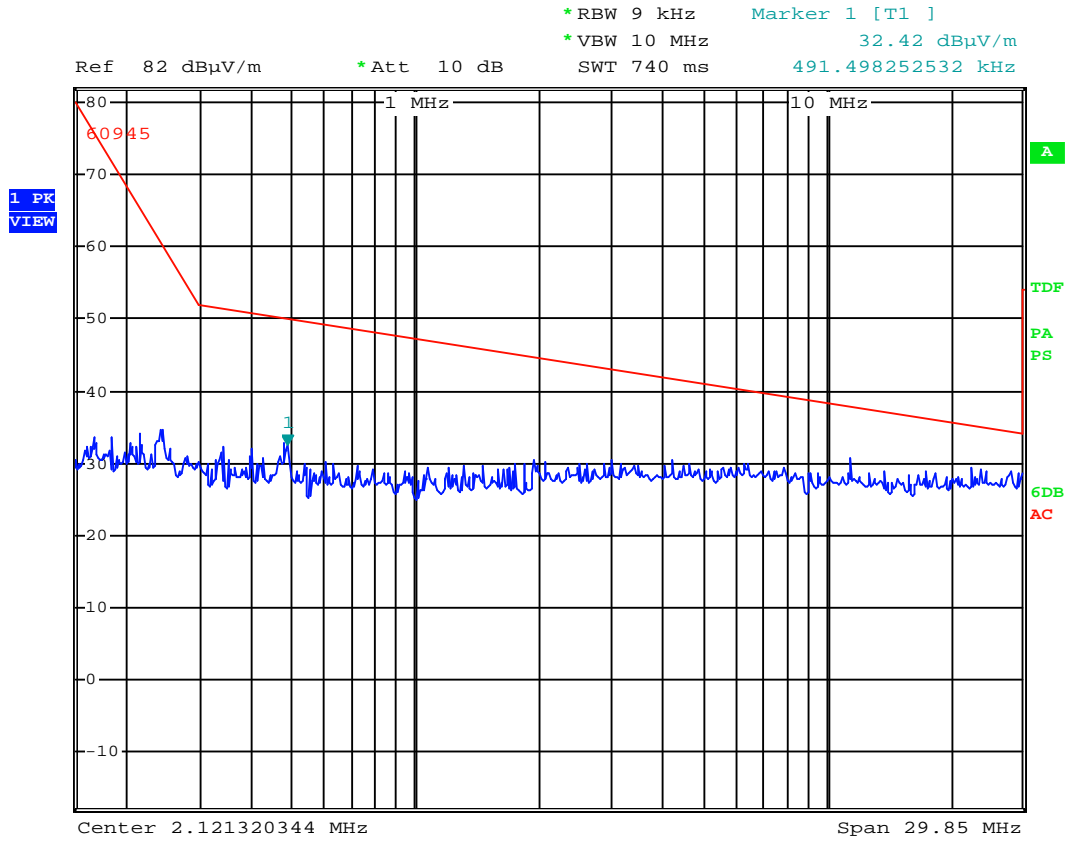
The measurements reported are the highest emissions relative to the EN 60945 limit and take into account the antenna, cable loss factors and uncertainty budget. Measurements made according to the EN 60945 test standard and Hursley EMC Services test procedure MAR-01.

TEST ENGINEER: Daniel Tiroke

4.3.2 Profile; 90 degrees



4.3.3 Profile; 180 degrees



4.4 Conducted Emissions

A filtered power supply from 12V DC battery was fed to the EUT via a 50Ω/50μH Artificial Mains Network (AMN). The AMN was bonded to a conductive ground plane. Line and neutral phases were measured separately.

A spectrum analyser was set to scan between 10 kHz and 30 MHz to record the peak emission profiles. The worst-case peaks were then measured using a quasi-peak receiver and compared to the EN 60945 limit. Measurements made according the EN 60945 test standard and Hursley EMC Services test procedure CON-02. The worst-case results are shown here.

4.4.1 Data

0V

Frequency	Quasi-peak value (dBμV)			
	Measured	Measured quasi-peak value including uncertainty budget	Limit	Status
4.206 MHz	28.96	78.96	50.00	Pass
10.080 MHz	34.73	84.73	50.00	Pass
12.541 MHz	37.26	87.26	50.00	Pass
15.306 MHz	34.20	84.20	50.00	Pass
20.952 MHz	31.67	81.67	50.00	Pass
25.063 MHz	28.60	78.60	50.00	Pass
19.272 kHz	37.72	122.58	84.86	Pass
38.544 kHz	24.49	97.57	73.08	Pass
66.956 kHz	23.92	87.62	63.70	Pass
101.030 kHz	14.11	70.82	56.71	Pass
121.792 kHz	12.80	66.34	53.54	Pass
140.270 kHz	14.91	66.05	51.14	Pass

Uncertainty of measurement: ± 3.22 dBμV for a 95% confidence level has been added to the measured result.

Conducted emissions (continued)

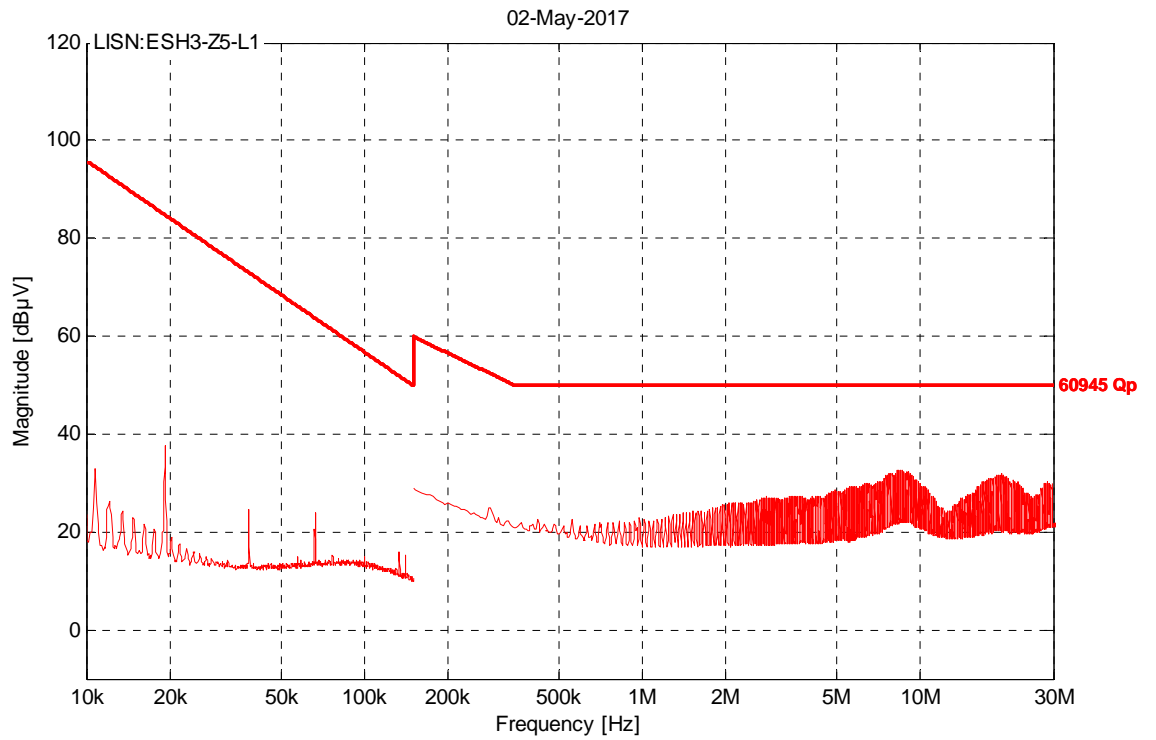
12V

Frequency	Quasi-peak value (dB μ V)			Status
	Measured	Measured quasi-peak value including uncertainty budget	Limit	
4.935 MHz	28.45	78.45	50.00	Pass
8.469 MHz	32.72	82.72	50.00	Pass
10.314 MHz	29.40	79.40	50.00	Pass
19.569 MHz	31.90	81.90	50.00	Pass
20.299 MHz	31.30	81.30	50.00	Pass
28.672 MHz	30.18	80.18	50.00	Pass
19.272 kHz	37.72	122.58	84.86	Pass
38.544 kHz	24.46	97.54	73.08	Pass
66.956 kHz	23.79	87.49	63.70	Pass
99.937 kHz	14.80	71.70	56.90	Pass
123.481 kHz	12.58	65.88	53.30	Pass
134.011 kHz	15.90	67.81	51.91	Pass

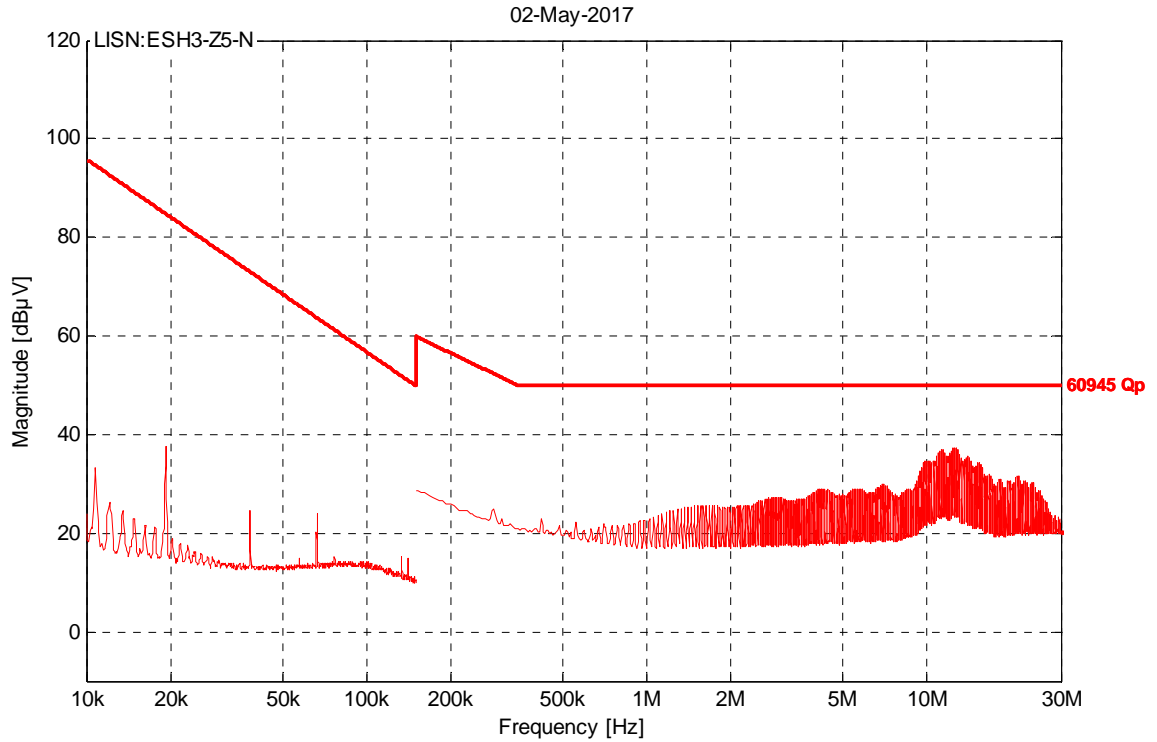
Uncertainty of measurement: ± 3.22 dB μ V for a 95% confidence level has been added to the measured result.

TEST ENGINEER: Daniel Tiroke

4.4.2 Profile; 0V



4.4.3 Profile; 12V



5.0 IMMUNITY RESULTS

5.1 Performance Criteria

General performance criteria for immunity testing are defined below:-

Criterion A:	The apparatus shall continue to operate as intended. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. If the performance level or the permissible level is not specified by the manufacturer then either of these may be derived from the EUT description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Criterion B:	The apparatus shall continue to operate as intended after the test. No degradation of performance or loss of function is allowed below a performance level specified by the manufacturer, when the apparatus is used as intended. In some cases the performance level may be replaced by a permissible loss of performance. During the test degradation of performance is however allowed. No change of actual operating state or stored data is allowed. If the minimum performance level or the permissible level is not specified by the manufacturer then either of these may be derived from the EUT description and documentation and what the user may reasonably expect from the apparatus if used as intended.
Criterion C:	Temporary loss of function is allowed provided the loss of function is self-recoverable or can be restored by the operation of the controls, or by any operation specified in the instructions for use.

Note: All immunity tests were applied above the specification level to include the uncertainty attributed to each test.

5.2 Electrostatic Discharge

TEST METHOD	IEC 61000-4-2 REFERENCING PROCEDURE: ESD-03
--------------------	--------------------------------------------------------

TEST DETAILS

Test severity, <u>contact discharge</u>	± 6.0 kV, 50 strikes per point. Total of 200 strikes (minimum).
Test severity, <u>air discharge</u>	± 8.0 kV, 10 strikes for each selected point
Exerciser program during test	Referencing section 3.4
Specified test criterion	Criterion 'B'
EUT performance criterion	Criterion 'A'

RESULTS

Contact, Indirect

SPECIFIED VOLTS	REFERENCE PLANE @ 10cm	STATUS
± 4.0 kV	Horizontal and vertical; front, rear and sides	PASS
± 6.0 kV	Horizontal and vertical; front, rear and sides	PASS

Contact, Direct To EUT

SPECIFIED VOLTS	TEST POINTS	STATUS
± 2.0 kV	Case and connector shells; see illustration on next page	PASS
± 4.0 kV		PASS
± 6.0 kV		PASS

Air Discharge (Insulating, Slots & Apertures)

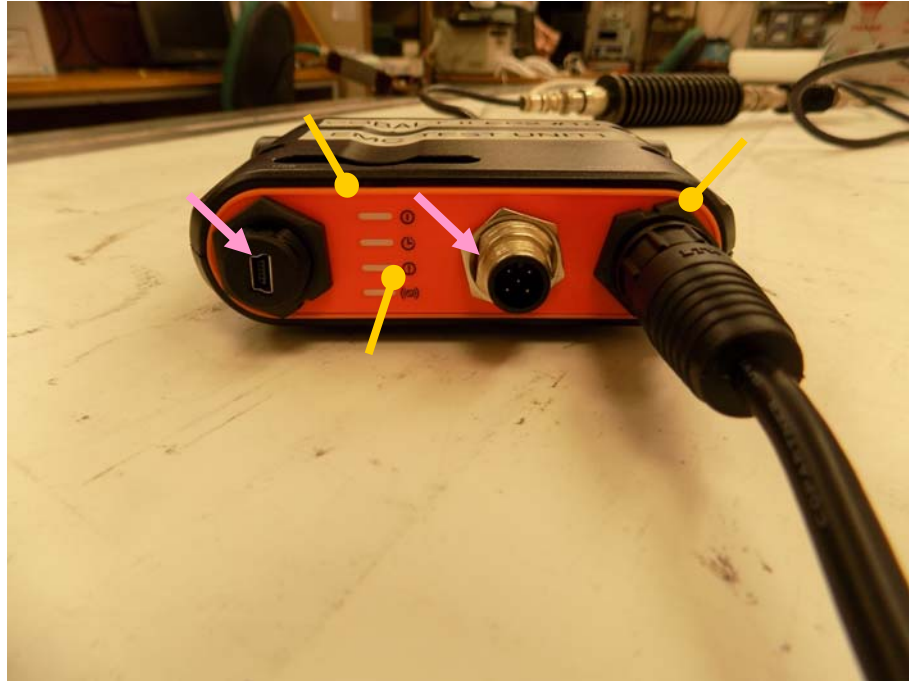
SPECIFIED VOLTS	TEST POINTS	STATUS
± 2.0 kV	See illustration on next page	PASS
± 4.0 kV		PASS
± 8.0 kV		PASS

UNCERTAINTY: Specified as less than 5%. The level applied was 5% higher than the upper levels stated above to take into account the uncertainty for this test.

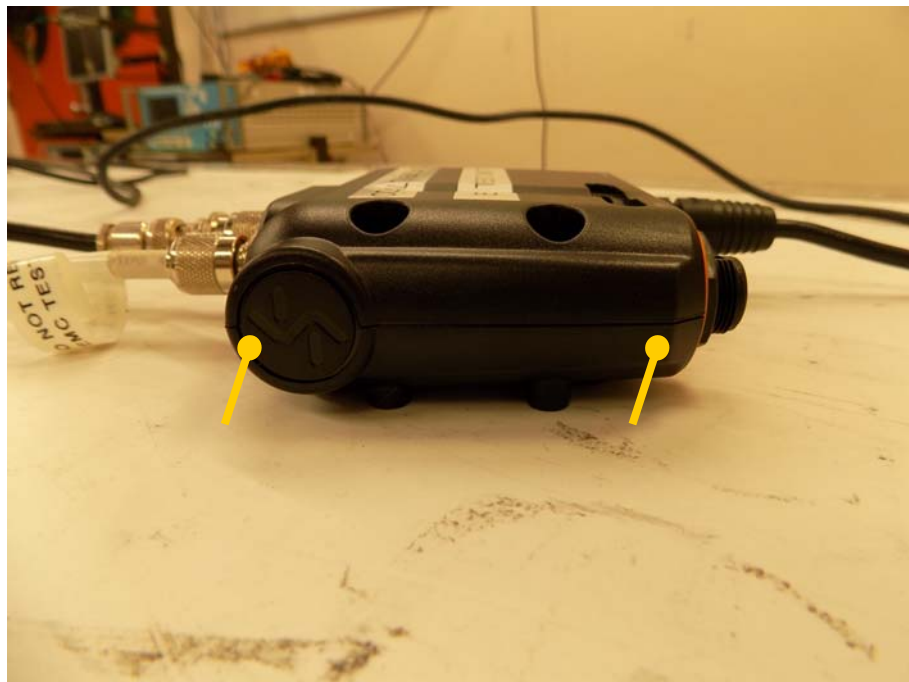
COMMENT: The EUT met the specified test criterion.

TEST ENGINEER: Daniel Tiroke

5.2.1 Electrostatic Discharge Test Points




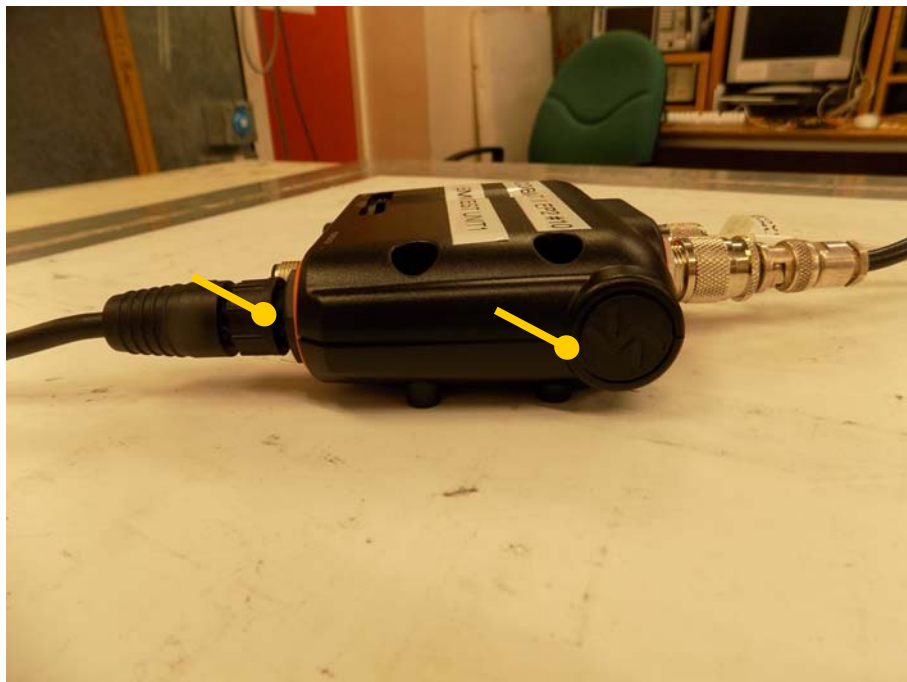
Arrow indicates Contact Discharge  /  Air discharge



Electrostatic discharge set-up (continued)



Arrow indicates Contact Discharge  /  Air discharge



Electrostatic discharge set-up (continued)



Arrow indicates Contact Discharge  /  Air discharge



5.3 Radiated RF Immunity

TEST METHOD	IEC 61000-4-3 REFERENCING PROCEDURE: RES-02
--------------------	--------------------------------------------------------

TEST DETAILS

Test severity levels,	<ul style="list-style-type: none"> • 10.0 V/m; 80 to 2700 MHz swept frequency • 80% amplitude modulation 400 Hz • 1% increment, 3 seconds dwell time and 9 seconds dwell time from 1.0 GHz
Exerciser program during test	Referencing section 3.4
Specified test criterion	Criterion 'A'
EUT performance criterion	Criterion 'A'

RESULTS

TEST POINTS	ANTENNA POLARITIES	FIELD LEVEL SPOT FREQUENCY	STATUS
Front	Horizontal & vertical	10.0 V/m	PASS
Side, left	Horizontal & vertical	10.0 V/m	PASS
Side, right	Horizontal & vertical	10.0 V/m	PASS
Rear	Horizontal & vertical	10.0 V/m	PASS

UNCERTAINTY: Estimated uncertainty is 20%. The field level has been applied at level higher of 12 V/m to take into account uncertainties.

COMMENT: The exclusion band was $\pm 5\%$ of the GPS frequency (1570 MHz). In test no exclusion bands were used. The EUT met the specified test criterion.

TEST ENGINEER: Daniel Tiroke

5.4 Fast Transient Bursts

TEST METHOD	IEC 61000-4-4 REFERENCING PROCEDURE: FTB-01
--------------------	--------------------------------------------------------

TEST DETAILS

Test severity	<ul style="list-style-type: none"> • ± 1.0 kV All Ports 5/50ns Tr/Td 5kHz Repetition Rate
Exerciser program during test	Referencing section 3.4
Specified test criterion	Criterion 'B'
EUT performance criterion	Criterion 'A'

RESULTS

Injection Via Clamp

PORT	TEST VOLTAGE	STATUS
All ports	± 1.0 kV	PASS

UNCERTAINTY: Specified as less than 10% but estimated as less than 5%. The level applied was 5% higher than the levels stated above to take into account the uncertainty for this test.

COMMENT: The EUT met the specified test criterion.

TEST ENGINEER: Daniel Tiroke

5.5 Conducted Immunity

TEST METHOD	IEC 61000-4-6 REFERENCING PROCEDURE: CES-02
--------------------	--------------------------------------------------------------

TEST DETAILS

Test severity level	<ul style="list-style-type: none"> • 3.0V rms, 80% amplitude modulation 400 Hz 0.15 to 80 MHz • 10V rms spot frequencies at: 2, 3, 4, 6.2, 8.2, 12.2, 12.6, 16.5, 18.8, 22, 25 MHz, the dwell at each frequency was 60 seconds.
Exerciser program during test	Referencing section 3.4
Specified test criterion	Criterion 'A'
EUT performance criterion	Criterion 'A'

RESULTS

TEST VOLTAGE	TEST POINTS	COUPLING METHOD	STATUS
3.0V & 10.0V	DC Input	CDN	PASS

RESULTS – Signal Port

TEST VOLTAGE	TEST POINTS	COUPLING METHOD	STATUS
3.0V & 10.0V	AIS & GPS	150-50 ohm Adapter	PASS
3.0V & 10.0V	All other signal ports	EM-Clamp	PASS

UNCERTAINTY: Estimated uncertainty is < 5%. The applied voltage has been applied at higher level of 4 or 12V to take into account uncertainties.

COMMENT: The EUT met the performance criterion.

TEST ENGINEER: Daniel Tiroke

5.6 Power Line Disturbance

TEST METHOD	IEC 61000-4-11 REFERENCING PROCEDURE: PLD-01
--------------------	---------------------------------------------------------------

TEST DETAILS	Specified test types & levels (voltage shift @ zero phase crossing)	Specified criteria
	Interrupt: 100% reduction for 60s	C
Exerciser program during test	Referencing section 3.4	

RESULTS

Applied test types & levels	Test point	Nominal operation frequency / voltage	Performed criteria	Status
-100% x 60s	DC Input	12V DC	C	PASS

UNCERTAINTY: Specification level is 5% but estimated as less than 1%.

COMMENT: The EUT reset and continued after the test. The EUT met the performance criteria.

TEST ENGINEER: Daniel Tiroke

6.0 PHOTO LOG (TYPICAL)

Emissions:

Radiated emissions



Photo Log (continued)

Emissions:

Conducted emissions

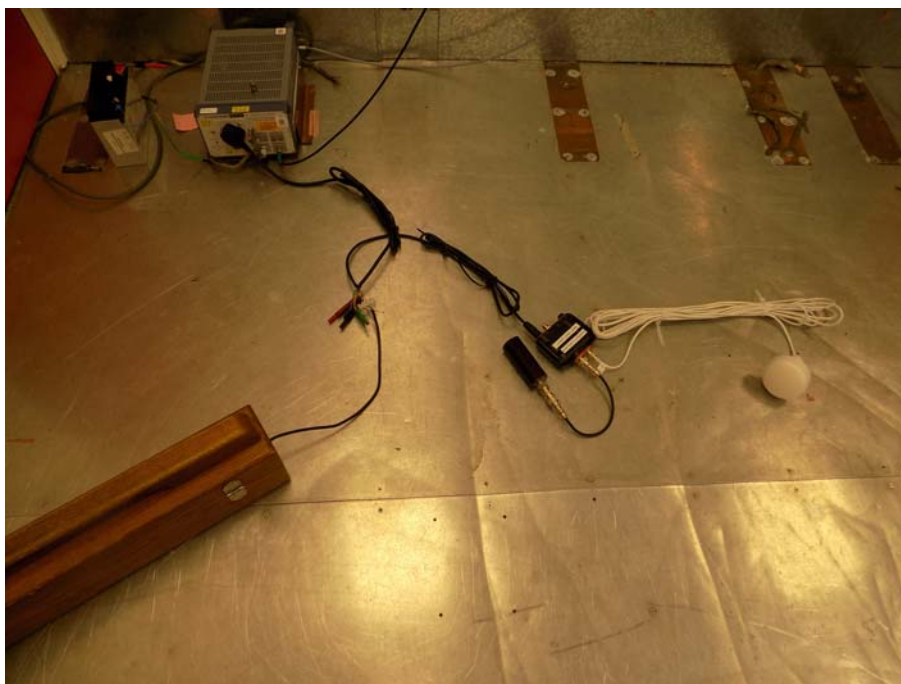


Photo Log (continued)

Immunity:

Electrostatic discharge (set-up)

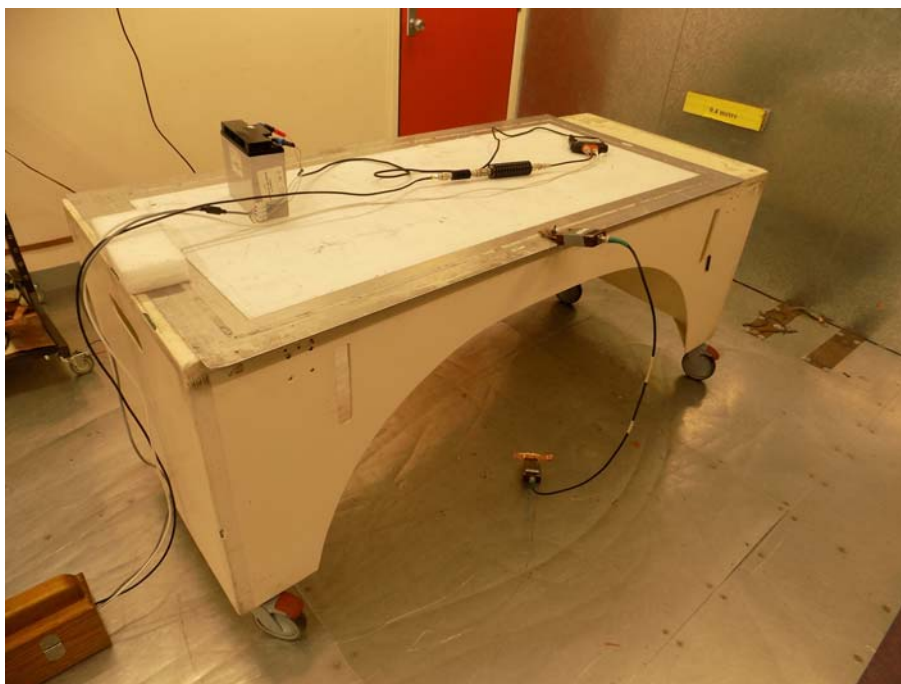


Photo Log (continued)

Immunity:

Radiated RF immunity

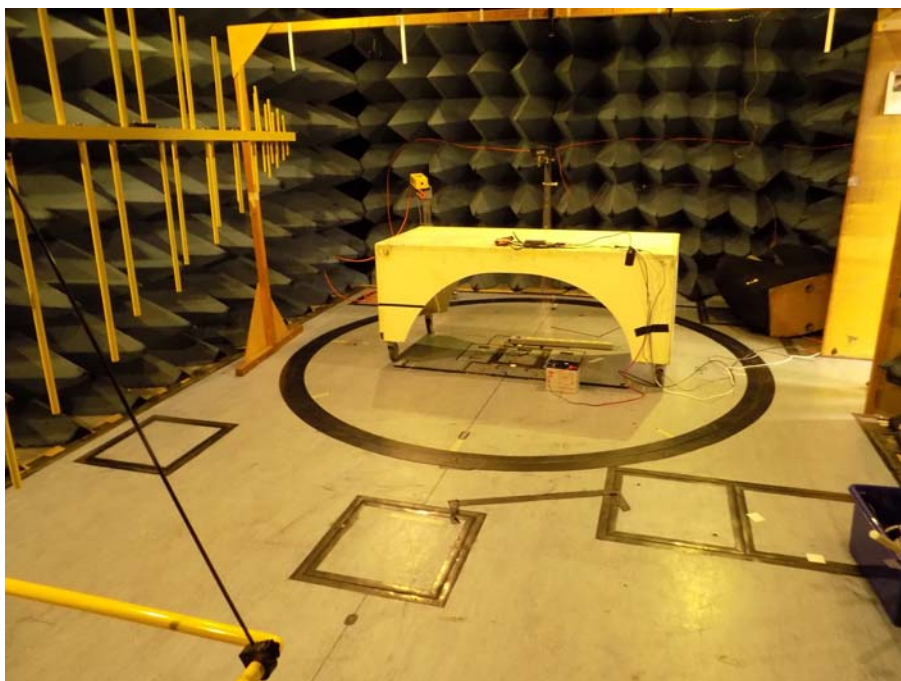
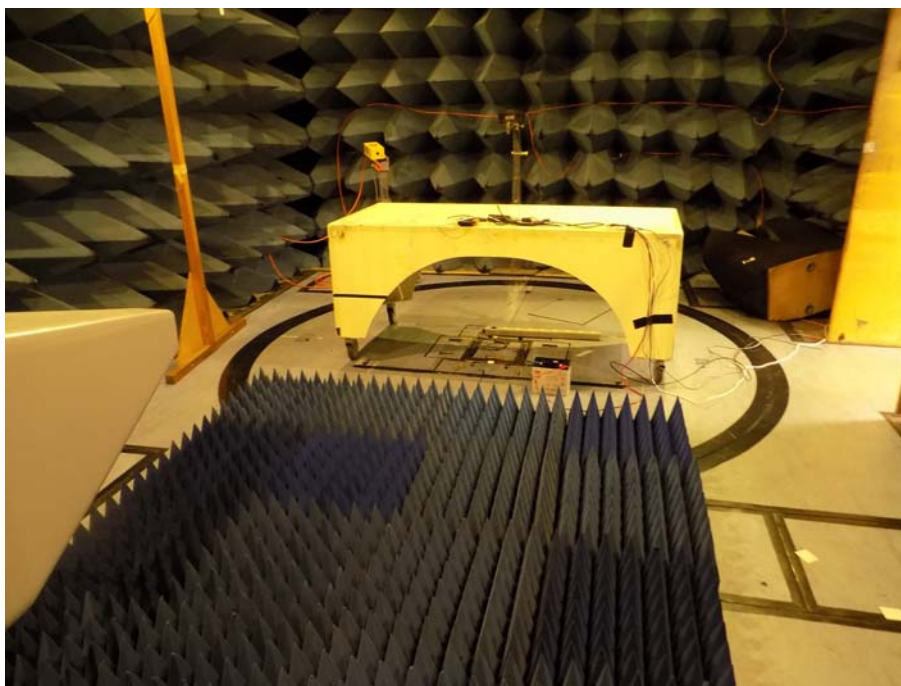


Photo Log (continued)

Immunity:

Fast burst transients

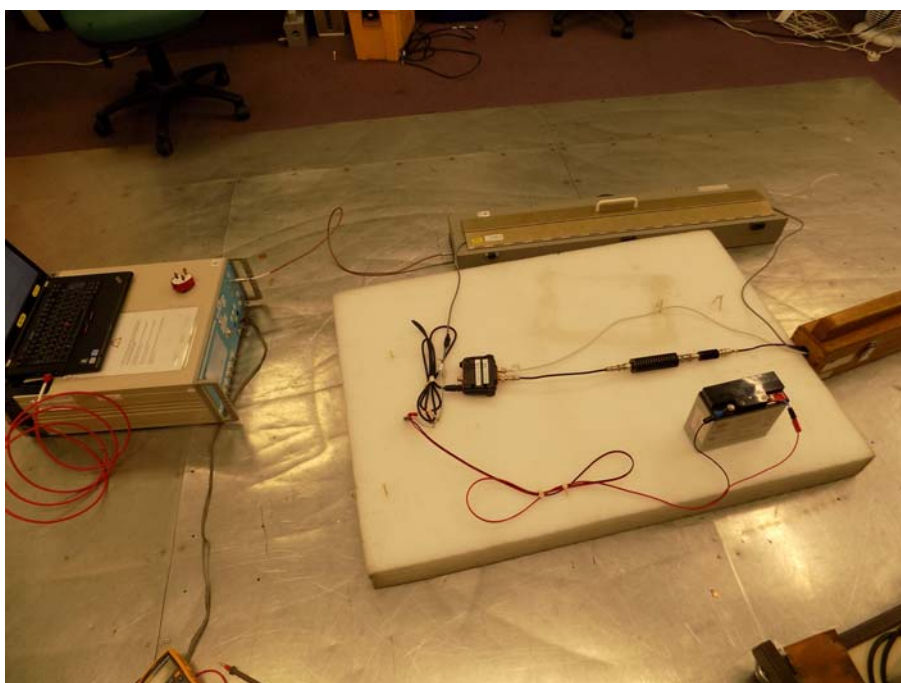
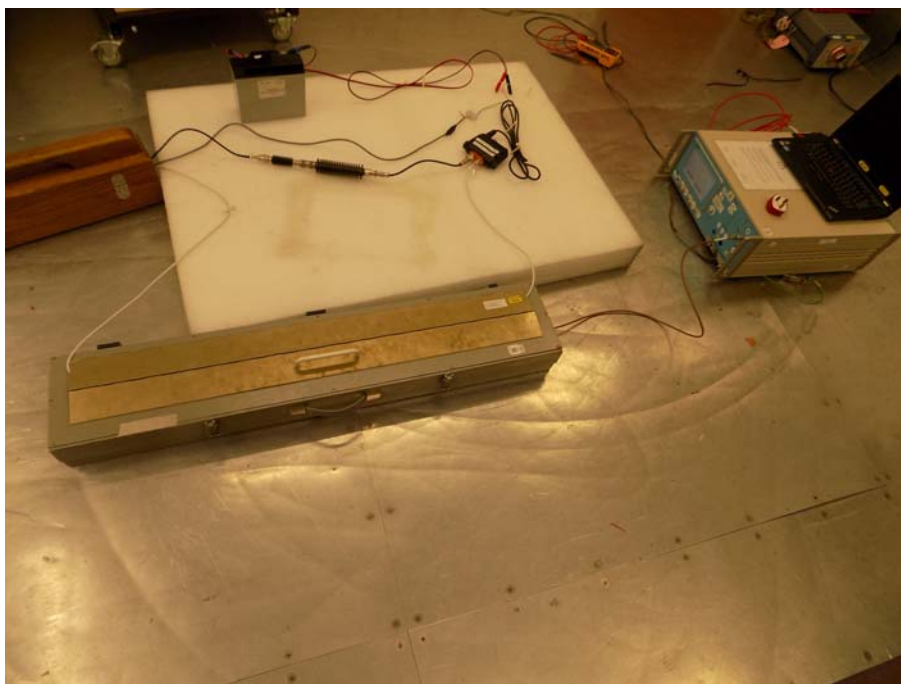


Photo Log (continued)

Immunity:

Conducted immunity

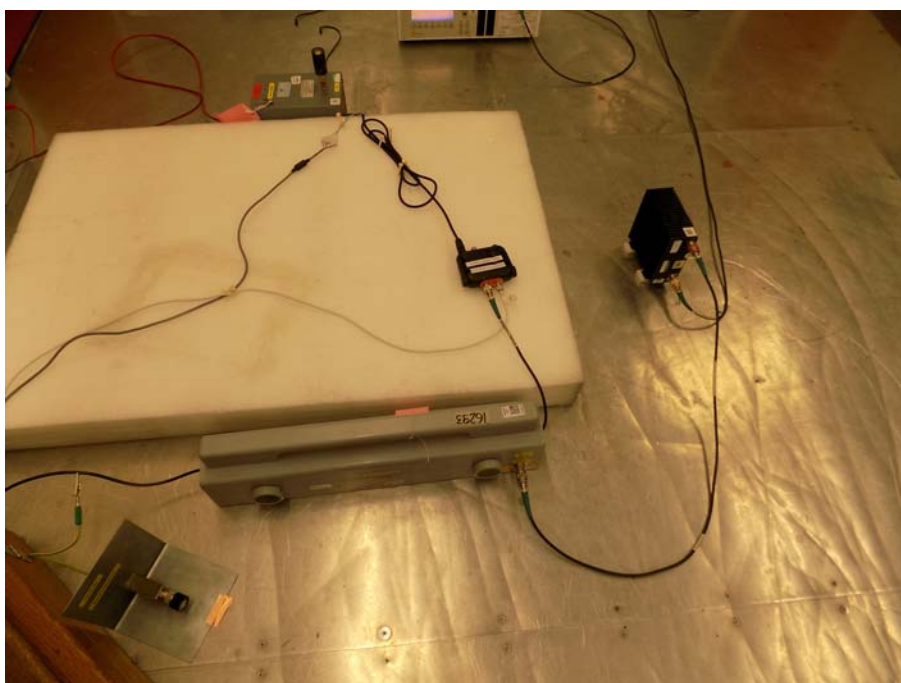
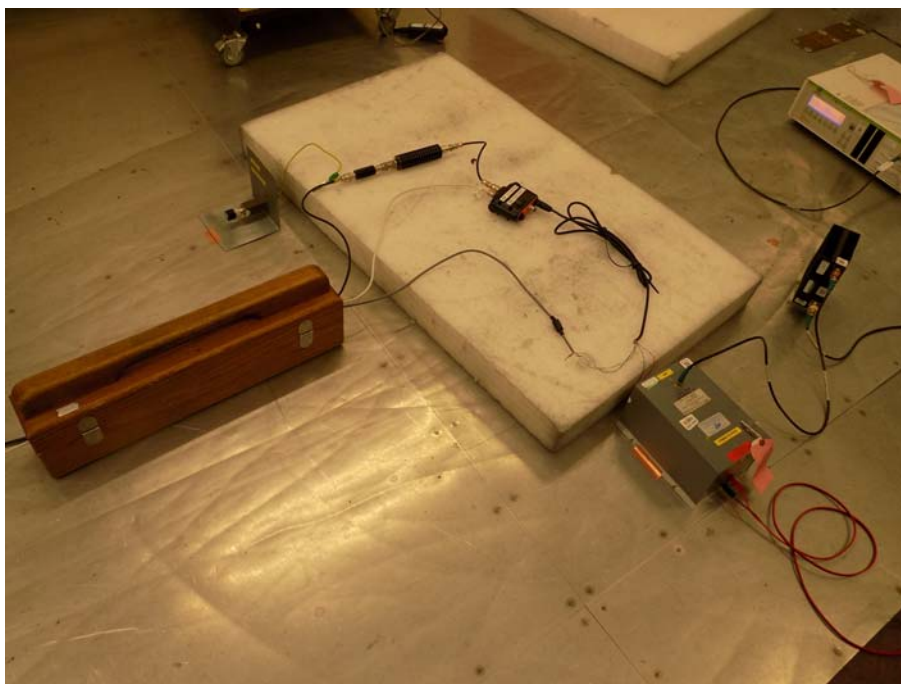
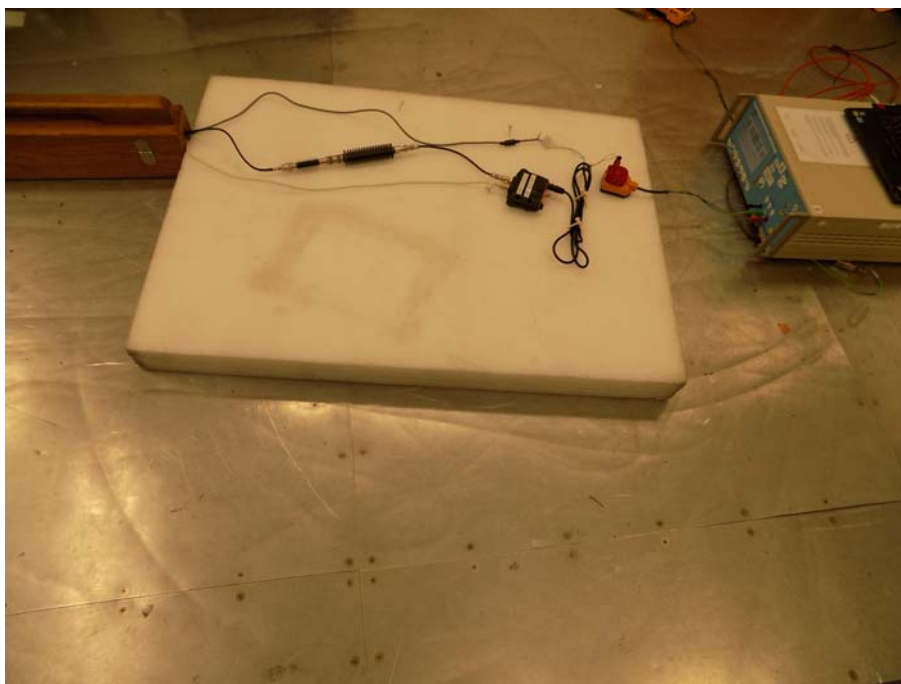


Photo Log (continued)

Immunity:

Power line disturbance




7.0 ANNEX

7.1 Compass Safe Distance

TEST METHOD EN60945: 2002	REFERENCING PROCEDURE: CSD-01A
-------------------------------------	------------------------------------------

TEST DETAILS

CUSTOMER	COBOLT II		
TEST LIMIT	STANDARD COMPASS		
MAX COMPASS DEFLECTION			
MAX DEVIATION (μT)	0.33°(0.09 μT)		
MODE OF OPERATION	EUT UNPOWERED EUT POWERED EUT NORMALISED		
EUT	AIS		
EUT COMPASS SAFE DISTANCE	10CM		
DATE OF TEST	08 MAY 2017		
TEMPERATURE °C	20	% RH	48
ENGINEER(S)	NJC		

RESULTS

EUT MODE	FRONT	REAR	LEFT	RIGHT	TOP	BOTTOM
OFF	5CM	5CM	5CM	5CM	10CM	5CM
ON	5CM	5CM	5CM	5CM	10CM	5CM
NORMALISED	5CM	5CM	5CM	5CM	10CM	5CM

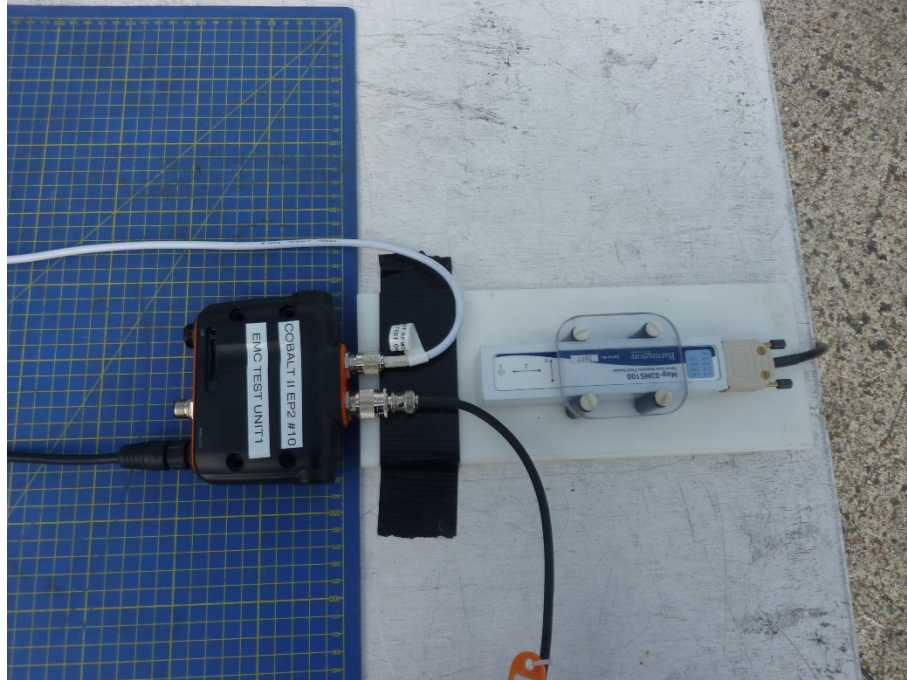
Notes;

All distances rounded up to the nearest 5cm or 10cm.

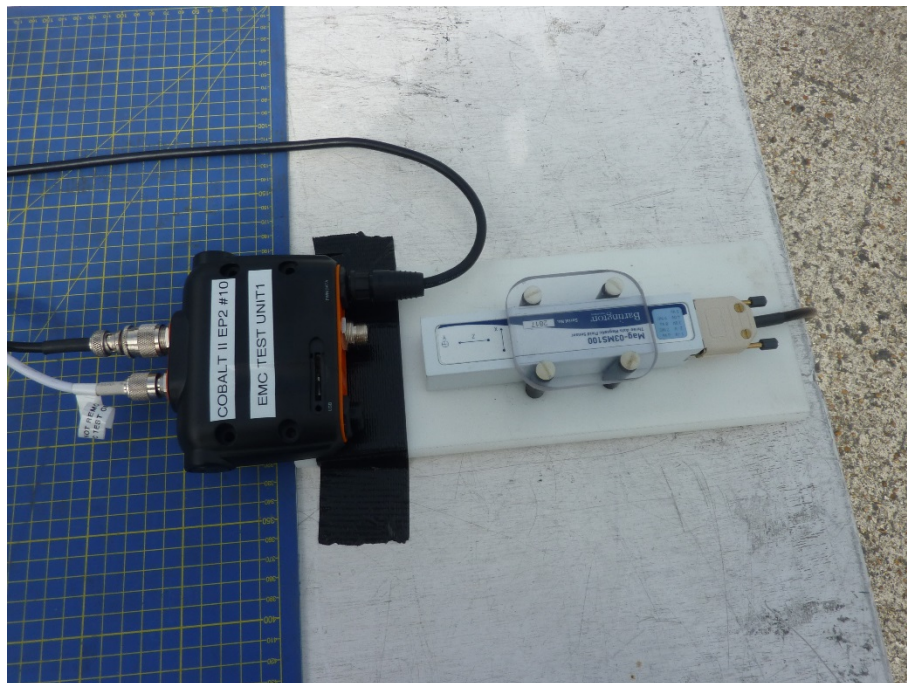
The EUT was measured before after being normalized, it was normalised by placing it in a Helmholtz coil and applying a d.c. field of $1 \times 1000/4\pi$ A/m with a superimposed stabilizing a.c. field of 50 Hz of $18 \times 1000/4\pi$ A/m r.m.s.

TEST ENGINEER: Neil Constance

7.2 EN 60945 Compass Safe Distance Test Set-ups

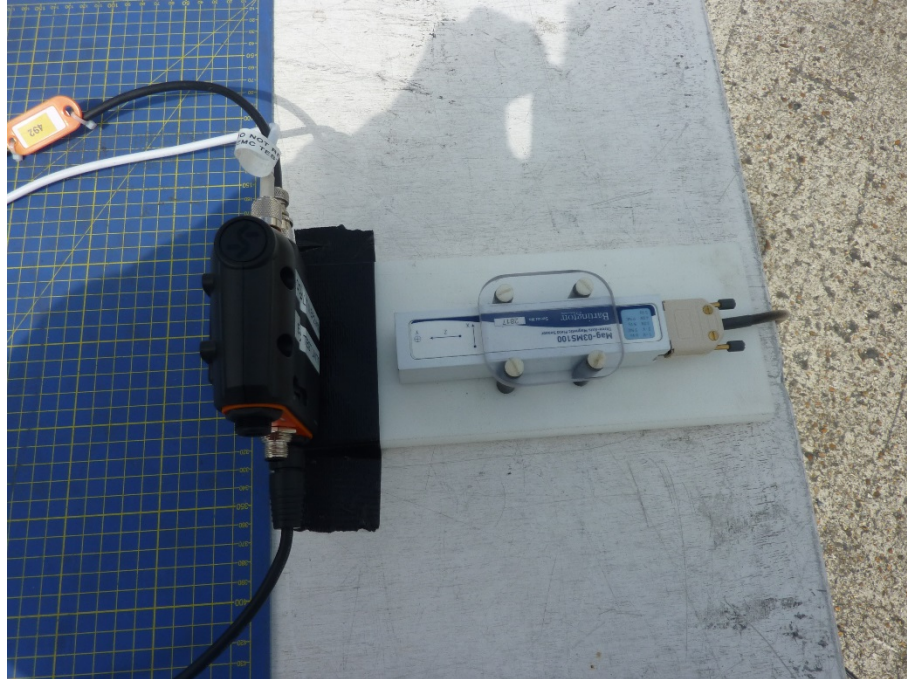


Top Face at 10cm

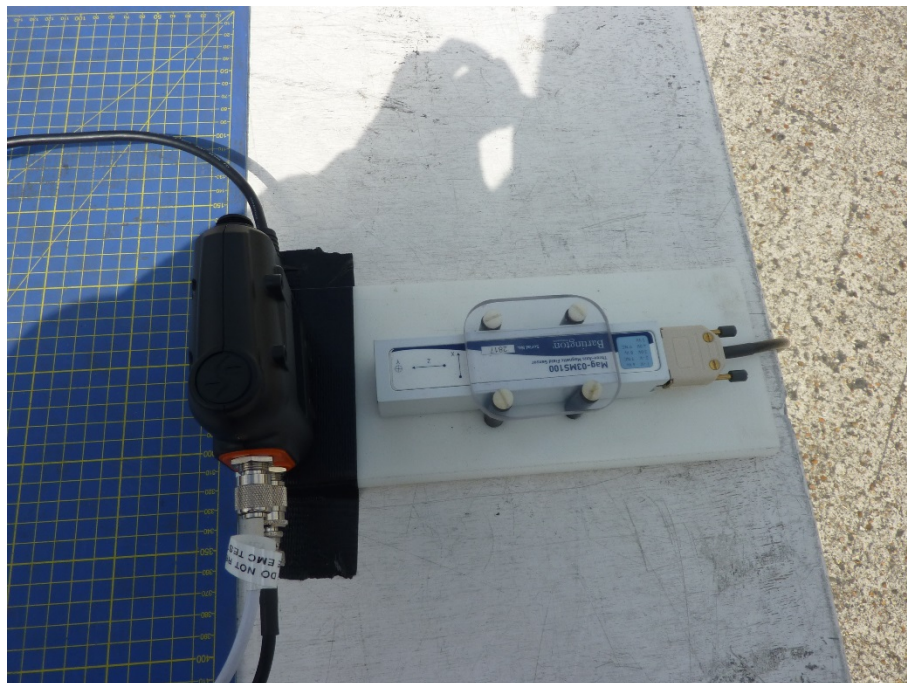


Bottom Face at 5cm

EN 60945 Compass Safe Distance Test Set-ups (continued)

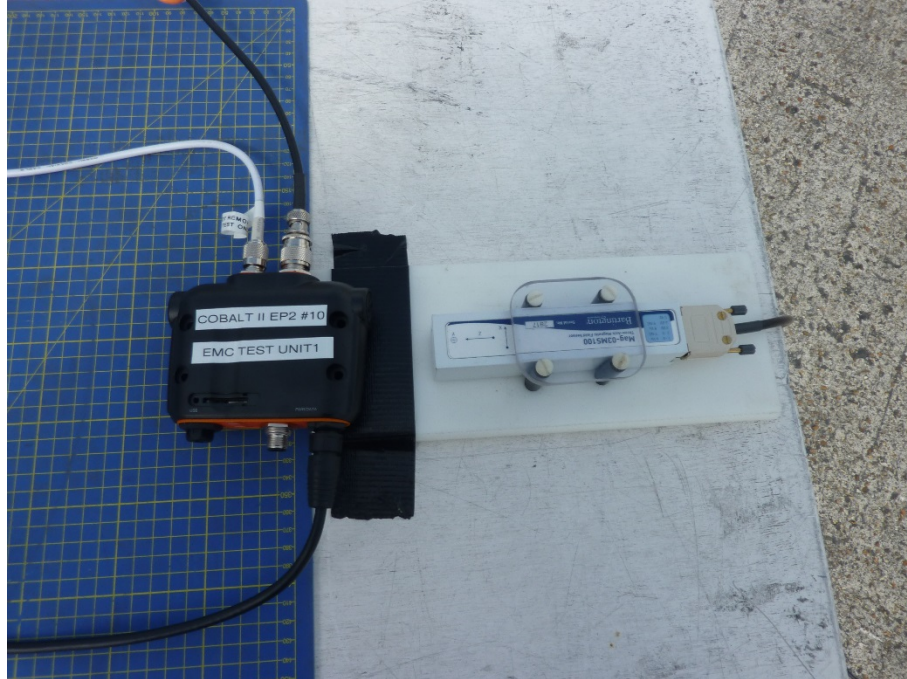


Front Face at 5cm

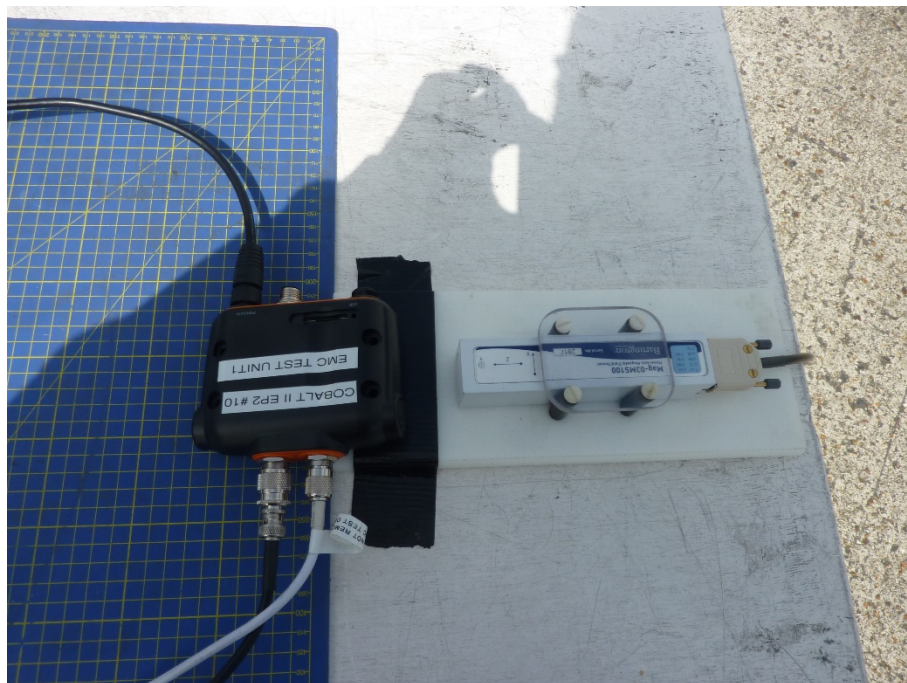


Rear Face at 40cm

EN 60945 Compass Safe Distance Test Set-ups (continued)

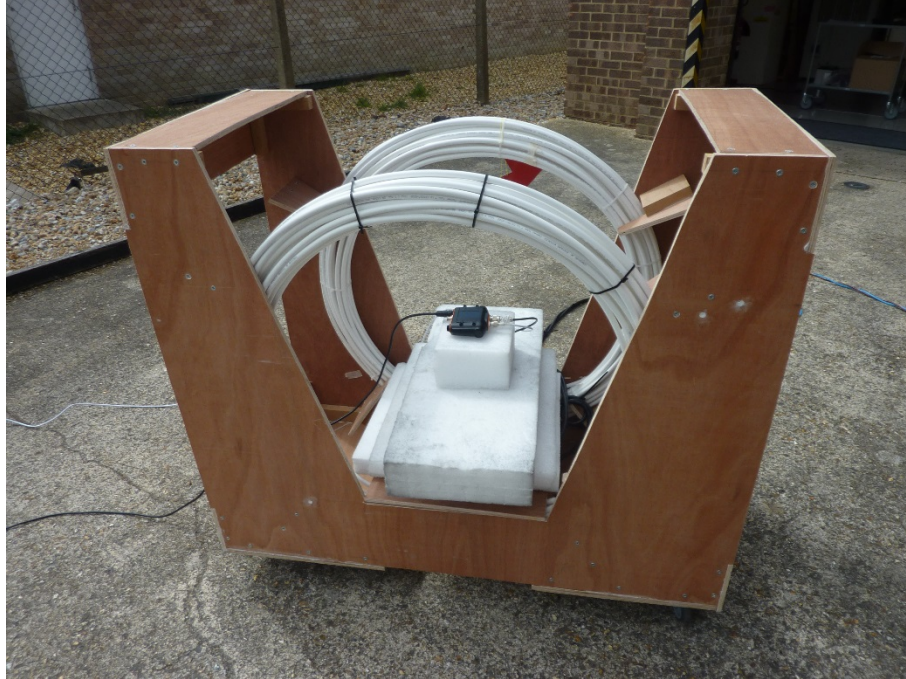


Right Hand Face at 5cm



Left Hand Face at 5cm

EN 60945 Compass Safe Distance Test Set-ups (continued)



Magnetising Loops



General Set Up

End of document