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Report On

Emergency Beacons Testing of the
McMurdo Limited
S5 AIS-SART (Fastrax IT310 GPS Receiver Module)

Document 75908379 Report 01 Issue 3 March 2010

Product Service

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REPORT ON

Emergency Beacons Testing of the
McMurdo Limited
S5 AIS-SART (Fastrax IT310 GPS Receiver Module)

Document 75908379 Report 01 Issue 3

March 2010

PREPARED FOR

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APPROVED BY

M Jenkins
Authorised Signatory

DATED 01 March 2010

Product Service

Section **Page No**

SECTION 1

REPORT SUMMARY

Emergency Beacons Testing of the
McMurdo Limited
S5 AIS-SART (Fastrax IT310 GPS Receiver Module)

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Emergency Beacon Testing of the McMurdo Limited S5 AIS-SART (Fastrax IT310 GPS Receiver Module) to the requirements of IEC 61108-1.

Objective	To perform Emergency Beacon Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	McMurdo Limited
Model Number(s)	S5 AIS-SART (Fastrax IT310 GPS Receiver Module)
Serial Number(s)	75907213_TSR0001
Number of Samples Tested	1
Test Specification/Issue/Date	IEC 61108-1:2003
Order Number Date	PC0004035 11 December 2009
Start of Test	13 January 2010
Finish of Test	26 February 2010
Name of Engineer(s)	R Hampton M Hardy
Related Documents	EN 61162-1:2008

1.2 APPLICATION FORM

APPLICANT'S DETAILS
COMPANY NAME:…McMurdo ADDRESS: Silver Point, Airport Service Road Hilsea, Portsmouth, PO3 5PB NAME FOR CONTACT PURPOSES: Neil Jordan TELEPHONE NO: 02392 62393 FAX NO:02392 623997 E-MAIL:neiljordan@mcmurdo.co.uk

EQUIPMENT INFORMATION

Equipment designator:
Model name/number SmartFind S5 AIS SART Identification number

Supply Voltage:

[ ]	AC mains	State AC voltage	and AC frequency
[ ]	DC (external)	State DC voltage	and DC current 7mA average
[X]	DC (internal)	State DC voltage 6.0 V	and Battery type LiMnO2

Frequency characteristics:
Frequency range 161.975. MHz to 162.025 MHz Channel spacing N/A.
Designated test frequencies:
Bottom: 161.975 MHz Middle: Top: 162.025 MHz

Power characteristics:
Maximum transmitter power 1.8 W Minimum transmitter power (if variable)

[ ]	Continuous transmission	
[X]	Intermittent transmission	State duty cycle 0.32%

If intermittent, can transmitter be set to continuous transmit test mode? No

Antenna characteristics:

[ ]	Antenna connector	State impedance …… ohm
[ ]	Temporary antenna connector	State impedance …… ohm
[X]	Integral antenna	State gain 0 dBi

Modulation characteristics:

[ ]	Amplitude	[X] Other
[ ]	Frequency	Details: GMSK
[ ]	Phase	

Can the transmitter operate un-modulated? Yes
ITU Class of emission: 16K0GXW

Extreme conditions: McMurdo has assumed this with the AIS SART running. The stowage temperature for the device is -30C to +70C

Maximum temperature +55 ºC Minimum temperature -20ºC
Maximum supply voltage 6.0 V Minimum supply voltage 5.5V

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature:	Held on file at TÜV Product Service Ltd
Name:	Neil Jordon
Position held:	Engineering Manager
Date:	01 October 2009

TÜV Product Service Ltd formally certifies that the manufacturer's declaration as typed out in this report is a true and accurate record of the original received from the applicant.

1.3 PRODUCT INFORMATION

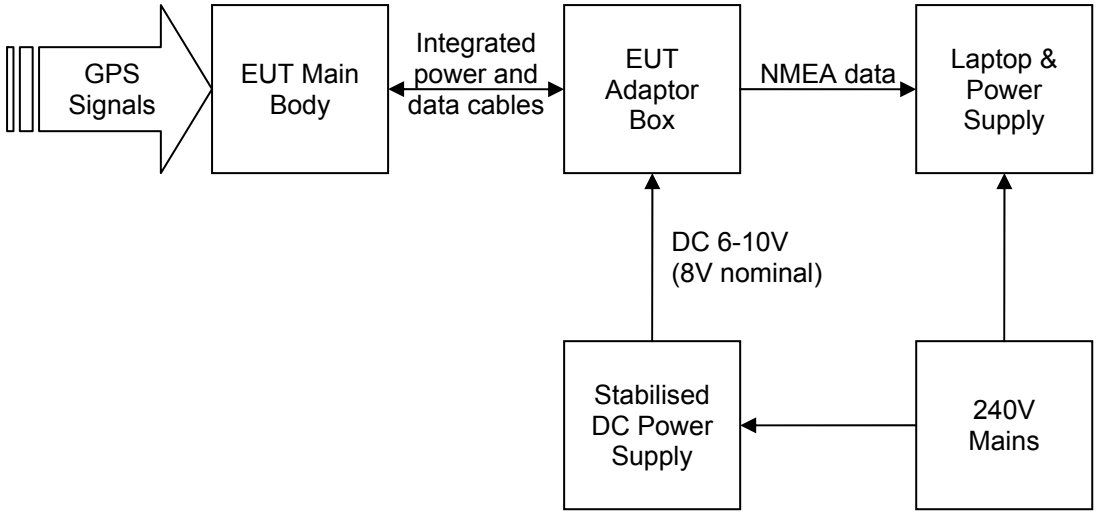
1.3.1 Technical Description

The Equipment Under Test (EUT) was a McMurdo Limited S5 AIS-SART (Fastrax IT310 GPS Receiver Module) as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.

Equipment Under Test

1.3.2 Physical Test Configuration

The EUT was configured so that the internal antenna was disabled (RF power was diverted into a 50Ω load) and NMEA output/power input (normally to/from EUT internal systems). The Equipment Under Test (EUT) was operated using an external power supply (Test Equipment) and the NMEA serial output connected to an external laptop running logging/monitoring software "VisualGPS".



1.3.3 Modes of Operation

Modes of operation of the EUT during testing were as follows:

Operating:

- 8V DC (nominal) applied to power connection (only 3.3V applied to EUT – LDO in adaptor box)
- Physical configuration as above

Off:

- No power applied to power connection

1.4 MODIFICATIONS

For another test programme on the same physical unit the EUT was temporarily converted back to its normal operating state. The EUT was then functionally tested for said other test programme. The modification was then reversed and the EUT put back into its original state (as per the beginning of testing for this report).

The date and details of the modification are stated here for information and completeness only.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
0	As supplied by the customer	Not Applicable	Not Applicable
1	50Ω load removed and normal antenna re-connected, power and NMEA unit disconnected and normal internal connections renewed	Paul Thomas, McMurdo Limited	29 January 2010
0	Above modification reversed, i.e. as supplied by the customer	Paul Thomas, McMurdo Limited	29 January 2010

1.5 REPORT MODIFICATION RECORD

Issue 1 – First Issue
Issue 2 – This report has been revised to Issue 2 to correct a typographical error and the removal of comment from section 2.9.5.
Issue 3 – This report has been revised to correct a typographical error.

SECTION 2

TEST DETAILS

Emergency Beacons Testing of the
McMurdo Limited
S5 AIS-SART (Fastrax IT310 GPS Receiver Module)

2.1 PERFORMANCE MONITORING

2.1.1 Performance Checks

IEC 61108-1, Clause 5.3 Standard test signals:

“A "performance check" is defined as a shortened version of the static accuracy test described in 5.6.4.1, i.e. a minimum of 100 position measurements shall be taken over a period of not <5 min and not >10 min, discarding any measurements with HDOP ≥4. The position of the antenna of the EUT shall not be in error compared with the known position by >100 m 95 % using WGS 84 as the reference datum.”

Clause 4.3.3.1 Static Accuracy:

“(M.112/A3.4*) The GPS receiver equipment* shall have *static accuracy such that the horizontal position of the antenna is determined to within 100 m (95 %) with horizontal dilution of precision (HDOP) ≤4 (or PDOP ≤ 6)*. Since Selective Availability has been set to zero, the static accuracy has been determined to be within 13 m (95 %) as specified by the GPS SPS Performance Standards of October 2001.”

Performance Check Procedure:

For every Performance Check, the following actions were completed:

Action	Reported
EUT provided with GPS signals	Signal Type (Live or Simulated)
EUT powered ‘ON’	N/A
EUT allowed to acquire valid position	Time to acquire valid position
>100 position measurements recorded (NMEA output)	Number of measurements
Measurement duration noted	Measurement duration
Measurements with HDOP≥4 discarded	N/A
Haversine position error calculated for each measurement	N/A
Proportion within tolerance calculated	Percentage of results within <tolerance>

2.2 STATIC ACCURACY (GPS)

2.2.1 Specification Reference

IEC 61108-1, Clause 5.6.4.1.1

2.2.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

2.2.3 Date of Test and Modification State

21 to 22 January 2010 - Modification State 0

2.2.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.5 Test Setup

Test Set-up

2.2.6 Environmental Conditions

Ambient Temperature:	1.2°C
Relative Humidity:	72%

2.2.7 Test Results

EUT was placed on the static test site on a non-conductive platform. It was operated and monitored continuously for the period of measurement as below. Results were as follows:

Test Parameter	Result	Limit
Period of Measurement	26.56 h	>24 h
Total Number of Measurements with HDOP ≥ 4 and PDOP ≥6	95601	-
Number of Measurements with positional error <13m	95266	-
Total Within Specification	99.65%	> 95%

2.3 ANGULAR MOVEMENT OF THE ANTENNA

2.3.1 Specification Reference

IEC 61108-1, Clause 5.6.4.2

2.3.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

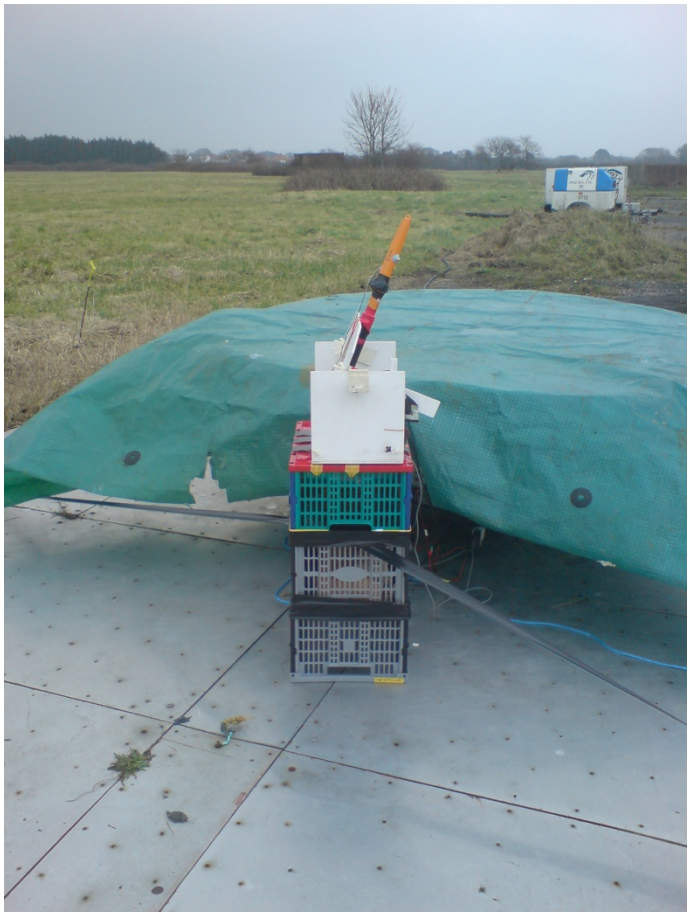
2.3.3 Date of Test and Modification State

25 to 26 January 2010 - Modification State 0

2.3.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.5 Test Setup



Test Set-up

2.3.6 Environmental Conditions

Ambient Temperature: 1.2°C
Relative Humidity: 72%

2.3.7 Test Results

EUT was placed on the static test site on a non-conductive platform oscillating ±22° from the vertical with a period of approximately 8 seconds. It was operated and monitored continuously for the period of measurement as below. Results were as follows:

Test Parameter	Result	Limit
Period of Measurement	26.16 h	>24 h
Total Number of Measurements with HDOP ≥ 4 and PDOP ≥6	94168	-
Number of Measurements with positional error <13m	94067	-
Total Within Specification	99.89%	> 95%

2.4 DYNAMIC ACCURACY (GPS)

2.4.1 Specification Reference

IEC 61108-1, Clause 5.6.4.3.1

2.4.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

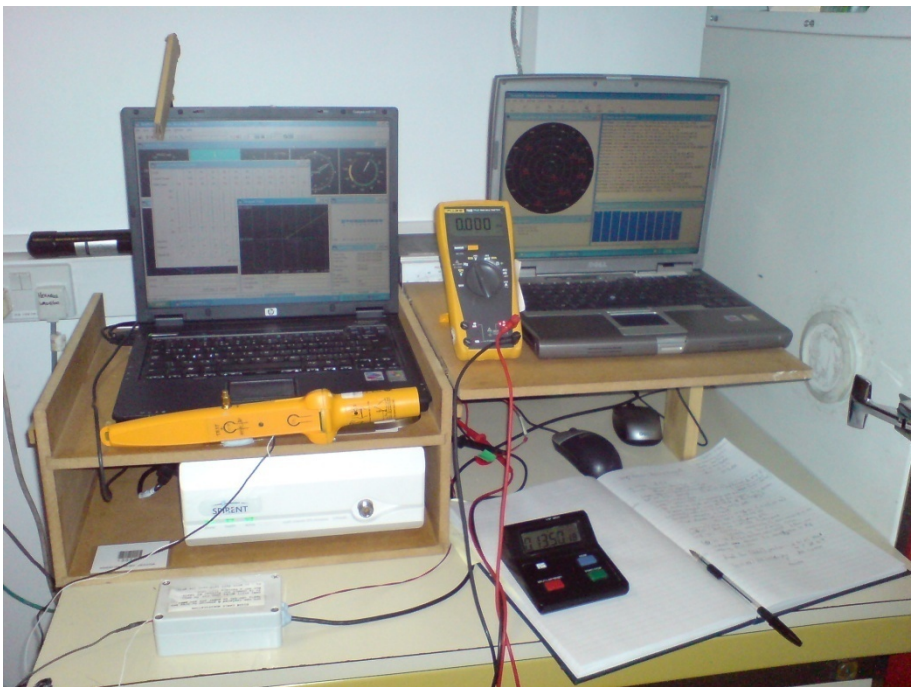
2.4.3 Date of Test and Modification State

22 and 26 February 2010 – Modification State 0

2.4.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.5 Test Setup



Test Set-up

2.4.6 Environmental Conditions

	22 February 2010	26 February 2010
Ambient Temperature:	21.8°C	20.8°C
Relative Humidity:	39%	34%RH

2.4.7 Test Results

Dynamic Accuracy A:

EUT and GPS simulator were started simultaneously and the EUT acquired a position lock after 48 seconds; the simulator ran a dynamic position travelling at 48 knots in a straight line for 10 minutes before decelerating to 0 knots in 5 seconds (in the same straight line). The time from the simulation coming to rest and the EUT stopping the position update, also the position output error were determined from the NMEA output. A Performance Check was then performed.

Parameter	Result	Limit
Time for EUT to stop updating position	8 seconds	<10 seconds
Position Error 10s after coming to rest	7.39 m	<13 m
Performance Check		
Signal Type (Live or Simulated)	Simulated	-
Time to acquire valid position	N/A	-
Number of Measurements	307	>100
Measurement duration	5.12 minutes	>5 minutes and <10minutes
Percentage of results within 13m (excluding HDOP≥4)	100%	-

Dynamic Accuracy B:

EUT and GPS simulator were started simultaneously and the EUT acquired a position lock after 23 seconds; the simulator ran a dynamic position travelling at 24 knots in a straight line for 10 minutes before starting to oscillate smoothly ±2 m either side of the original path for a further 20 minutes.

EUT position output error compared to the simulated dynamic position was determined from the EUT NMEA output.

A Performance Check was conducted during the 20-minute oscillation period in order to determine that the position error was not outside of the ±30 m 'lane' of tolerance.

Parameter	Result	Limit
Performance Check		
Signal Type (Live or Simulated)	Simulated	-
Time to acquire valid position	N/A	-
Number of Measurements	1201	>100
Measurement duration	20.0 min	> 2 min
Percentage of results within **30m** (not excluding any values)	100 %	-

2.5 ACQUISITION - CONDITION A - INITIALIZATION

2.5.1 Specification Reference

IEC 61108-1, Clause 5.6.5.1

2.5.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

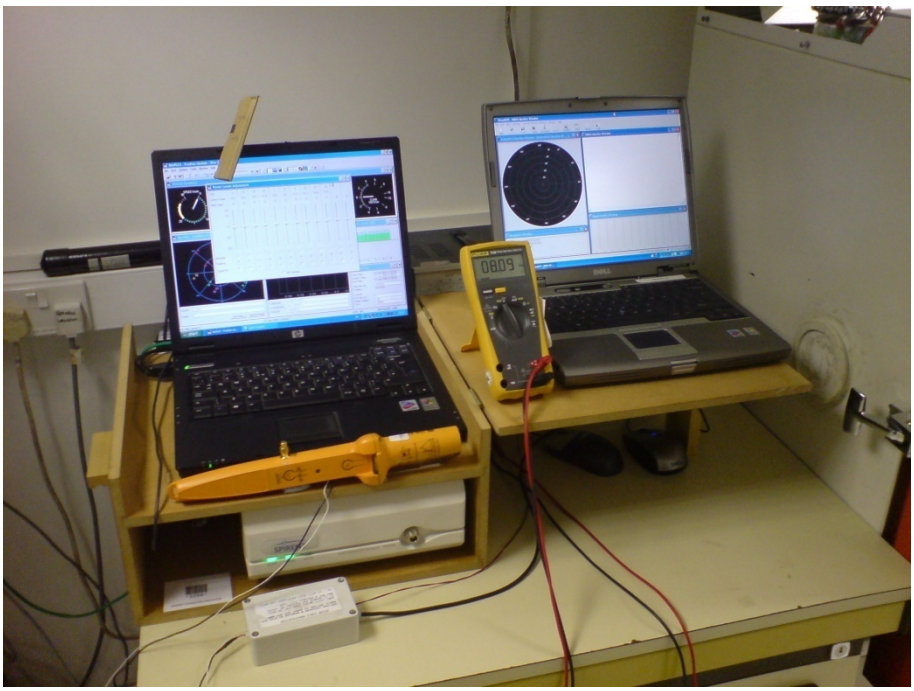
2.5.3 Date of Test and Modification State

01 February 2010 - Modification State 0

2.5.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.5 Test Setup



Test Set-up

2.5.6 Environmental Conditions

Ambient Temperature:	21.8°C
Relative Humidity:	24%

2.5.7 Test Results

EUT was previously initialised to a 'Live' position for another test and subsequently powered off.

Position scenario >1,000km and <10,000km away from previous position was started on a GPS simulator with transmitting antenna. Power was applied to the EUT. Time to position lock was timed and a Performance Check was started once position lock was obtained.

Parameter	Result	Limit
Performance Check		
Signal Type (Live or Simulated)	Simulated	-
Time to acquire valid position	0.58 minutes	30 minutes
Number of Measurements	339	>100
Measurement duration	5.65 minutes	>5 minutes and not <10minutes
Percentage of results within 13m (excluding HDOP≥4)	100%	>95%

2.6 ACQUISITION - CONDITION B - POWER OUTAGE

2.6.1 Specification Reference

IEC 61108-1, Clause 5.6.5.2

2.6.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

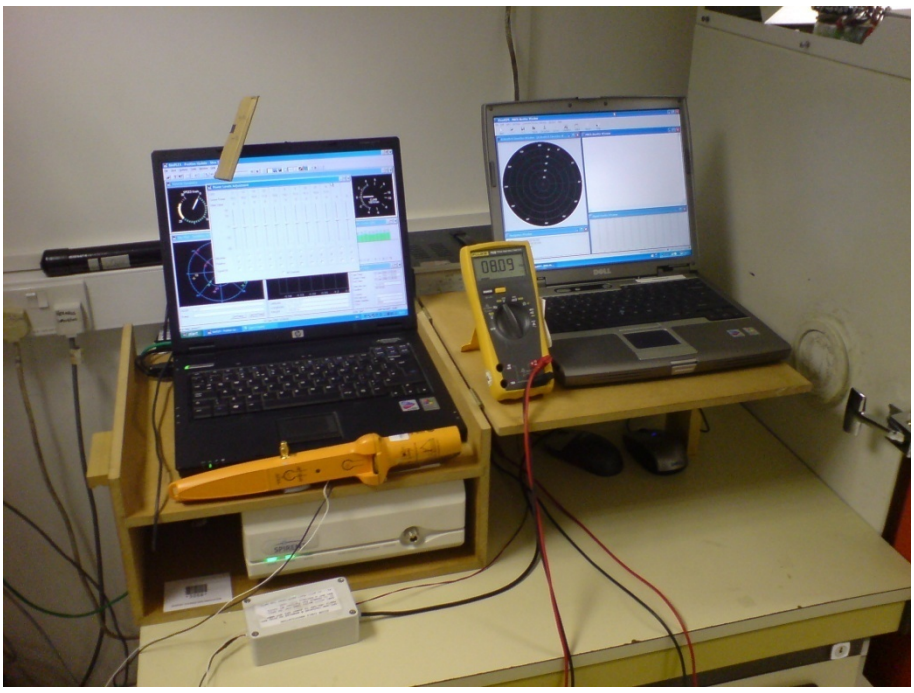
2.6.3 Date of Test and Modification State

01 to 02 February 2010 - Modification State 0

2.6.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.5 Test Setup



Test Set-up

2.6.6 Environmental Conditions

Ambient Temperature:	21.8 – 20.6°C
Relative Humidity:	24 – 37%

2.6.7 Test Results

The EUT was locked and stable following the Condition D test and the power was removed for 24 hours 23 minutes then re-applied. A performance check was then completed.

Parameter	Result	Limit
Performance Check		
Signal Type (Live or Simulated)	Simulated	-
Time to acquire valid position	1.3 minutes	5 minutes
Number of Measurements	332	>100
Measurement duration	5.55 minutes	>5 minutes and <10minutes
Percentage of results within 13m (excluding HDOP≥4)	100%	>95%

2.7 ACQUISITION - CONDITION C - INTERRUPTION OF GPS SIGNALS

2.7.1 Specification Reference

IEC 61108-1, Clause 5.6.5.3

2.7.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

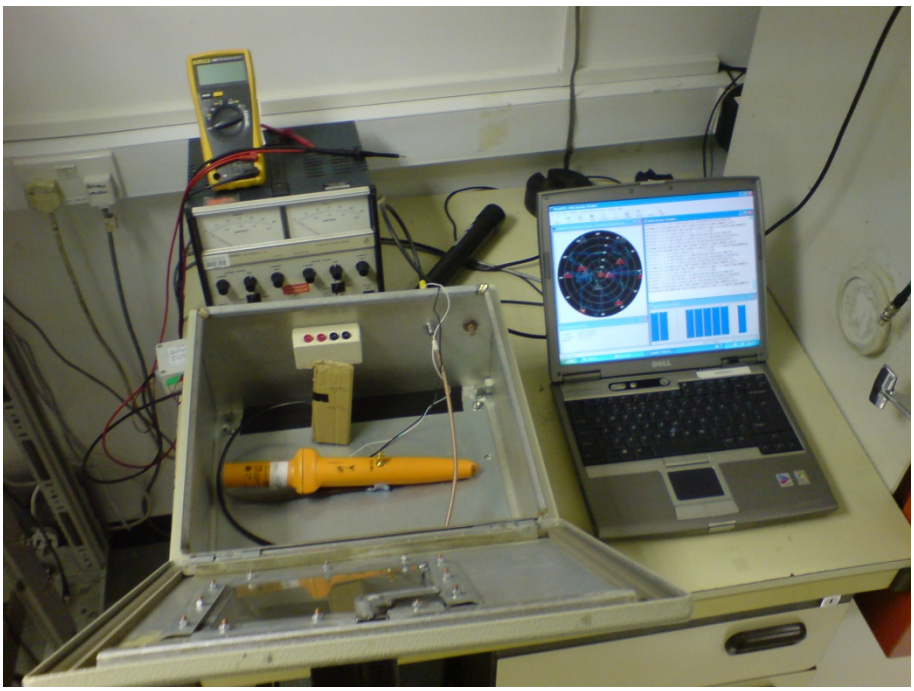
2.7.3 Date of Test and Modification State

09 to 10 February 2010 - Modification State 0

2.7.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.5 Test Setup



Test Set-up

2.7.6 Environmental Conditions

Ambient Temperature:	20.6 – 20.2 °C
Relative Humidity:	37 – 40%

2.7.7 Test Results

EUT was powered on, allowed to acquire a position lock and settle for at least 5 minutes. The GPS Signals were the removed for 24hours 28minutes then re-applied. A performance check was then completed.

Parameter	Result	Limit
Performance Check		
Signal Type (Live or Simulated)	Simulated	-
Time to acquire valid position	0.60 minutes	5 minutes
Number of Measurements	341	>100
Measurement duration	5.70 minutes	>5 minutes and <10minutes
Percentage of results within 13m (excluding HDOP≥4)	98.83%	>95%

2.8 ACQUISITION - CONDITION D - BRIEF INTERRUPTION OF POWER

2.8.1 Specification Reference

IEC 61108-1, Clause 5.6.5.4

2.8.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

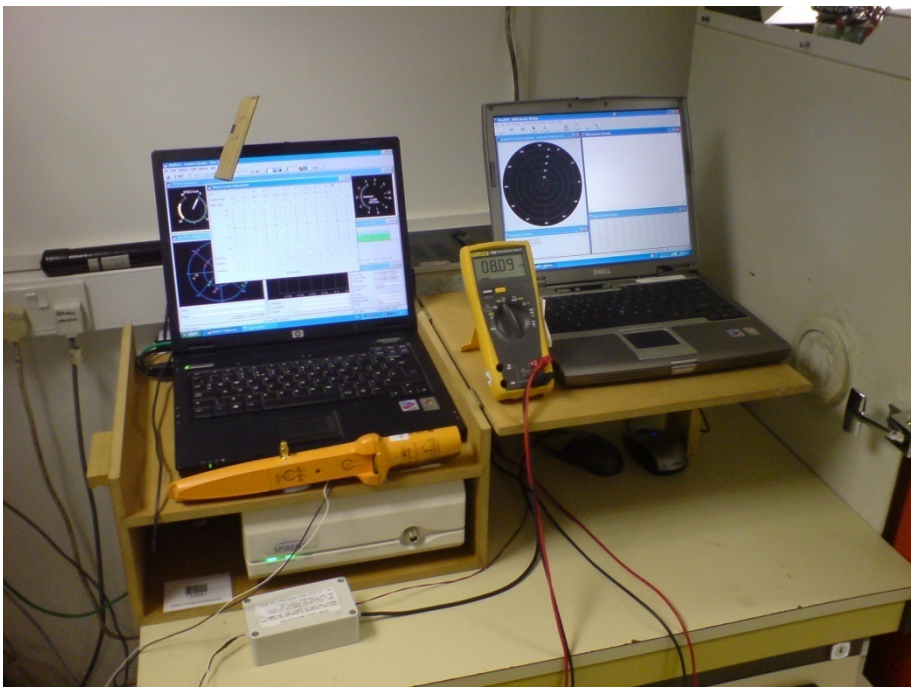
2.8.3 Date of Test and Modification State

01 February 2010 - Modification State 0

2.8.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.8.5 Test Setup



Test Set-up

2.8.6 Environmental Conditions

Ambient Temperature: 21.8°C
Relative Humidity: 24%

2.8.7 Test Results

EUT remained operational after the Condition A test in “Normal Operation”; locked and settled having just passed a performance check (See Section 2.5). Power was then removed for 1.00 minutes; upon reapplication of power a Performance Check was performed:

Parameter	Result	Limit
Performance Check		
Signal Type (Live or Simulated)	Simulated	-
Time to acquire valid position	0.57 minutes	30 minutes
Number of Measurements	317	>100
Measurement duration	5.30 minutes	>5 minutes and <10minutes
Percentage of results within 13m (excluding HDOP≥4)	100%	>95%

2.9 SENSITIVITY AND DYNAMIC RANGE – ACQUISITION

2.9.1 Specification Reference

IEC 61108-1, Clause 5.6.8.1

2.9.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

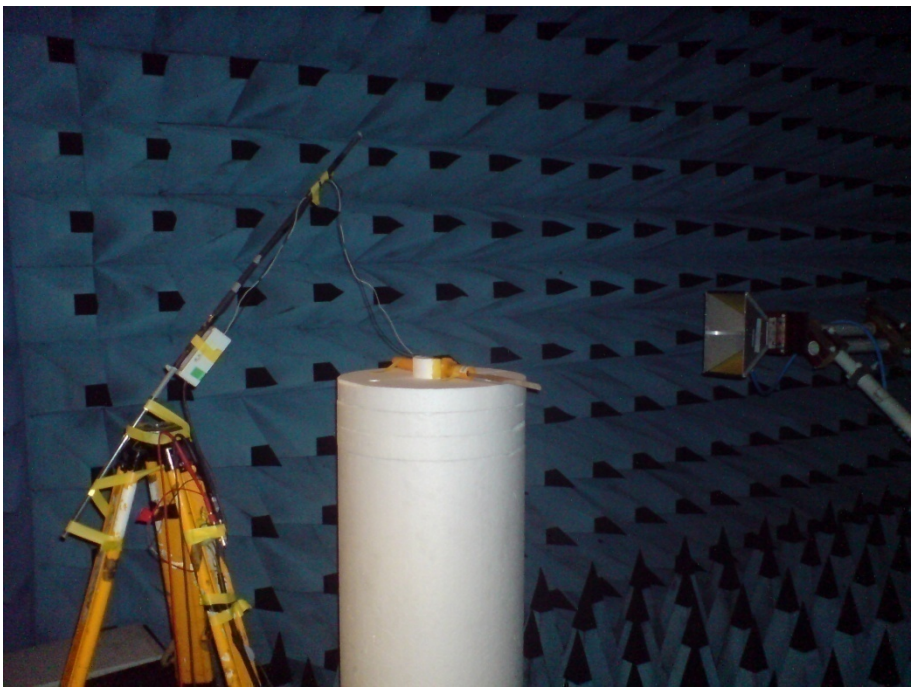
2.9.3 Date of Test and Modification State

13, 14, 19 and 20 January 2010 - Modification State 0

2.9.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.9.5 Test Setup



Tripod holding power and signal cables/box, EUT with internal GPS patch antenna facing GPS transmitting antenna (far right)

Note: Antenna used is a linearly polarised Double Ridged wave-Guide (DRG). McMurdo Limited declared that the EUT antenna is a Right-Hand Circularly Polarised (RHCP) antenna. For this reason the applied field strength was increased by 3dB to account for the polarity mismatch.

Field Calibration

Field strength was ascertained by the following process.

1) “System Loss” taken from calibrated chamber ‘Transducer Factor’. The system is calibrated at 1.5 and 1.6GHz and the value for 1.575GHz was interpolated as 30.39dB

2) Additional Attenuation was calibrated using a Power Meter zeroed (i.e. Relative Measurement) on the output of a Signal Generator at 1.575GHz. This Additional Attenuation was required to drop the GPS Simulator output from the measurable range into the required range. This was measured as 42.76dB.

3) GPS Simulator output (10 satellites) measured on a spectrum analyser using the following settings:

Parameter	Setting	Comments
Centre Frequency	1.575 GHz	GPS L1 Band
Span	50MHz	
Reference Level	-40dBm	
Reference Attenuation	10dB	Automatic
Resolution Bandwidth	10MHz	
Video Bandwidth	10MHz	Automatic
Sweep Time	5ms	Automatic
Trace Type	Average (200)	Average over 200 samples
Sweep Count	200	

4) Final Calculation:

Component	Actual	Effective (when received with RHCP)
GPS Simulator output, P_{GPS}	-48.99dBm	-48.99 - 3 = -51.99dBm
Additional Attenuation, L_A	42.76dB	42.76dB
System Loss, L_S	30.39dB	30.39dB
Signal Power, $P_S = P_{GPS} – L_A – L_S$	-122.14dBm	-125.14dBm

2.9.6 Environmental Conditions

Ambient Temperature: 23.6°C
Relative Humidity: 25%

2.9.7 Test Results

Test Parameter	Result	Limit
Field Strength (Effective)	-125.14dBm	-125dBm ±5dBm
Performance Check		
Signal Type (Live or Simulated)	Simulated	-
Time to acquire valid position	1.89 minutes	-
Number of Measurements	326	>100
Measurement duration	05min 27seconds	>5 min and not <10 min
Percentage of results within 13m (excluding HDOP≥4)	100%	>95%

2.10 SENSITIVITY AND DYNAMIC RANGE – TRACKING

2.10.1 Specification Reference

IEC 61108-1, Clause 5.6.8.2

2.10.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

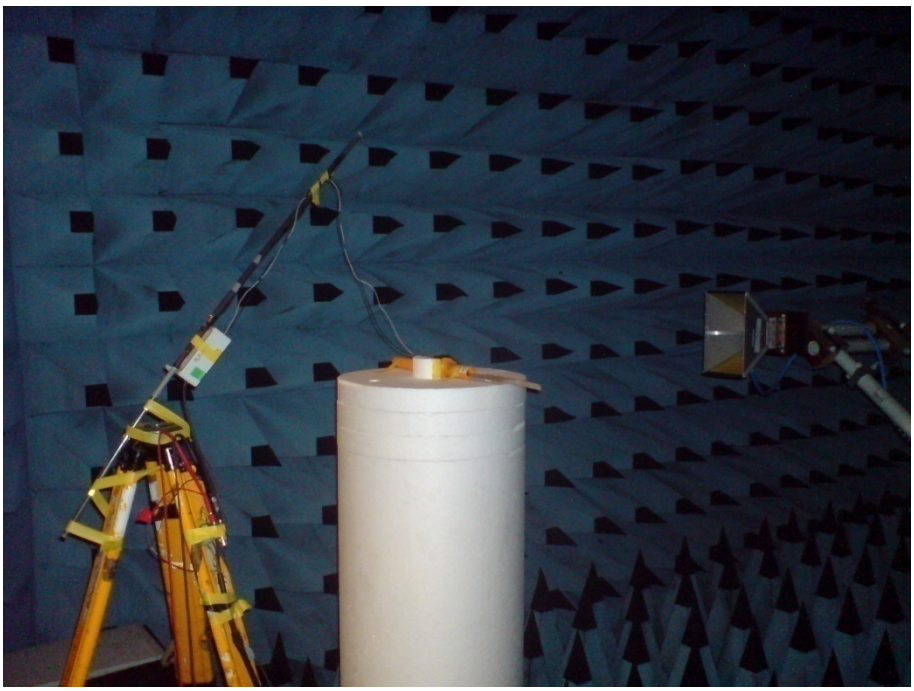
2.10.3 Date of Test and Modification State

20 January 2010 – Modification State 0

2.10.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.10.5 Test Setup



Tripod holding power and signal cables/box, EUT with internal GPS patch antenna facing GPS transmitting antenna (far right)

2.10.6 Environmental Conditions

Ambient Temperature: 23.6°C
Relative Humidity: 25%

2.10.7 Test Results

EUT remained operational after the Sensitivity and Dynamic Range – Acquisition test in “Normal Operation”; locked and settled having just passed a performance check (See Section 2.9). GPS Signal power was then reduced gradually in 0.5dB steps over 5.83 minutes to -133dBm.

The EUT continued to track at least 6 satellites whilst also maintaining a position fix.

2.11 SLOW SPEED UPDATE RATE

2.11.1 Specification Reference

IEC 61108-1, Clause 5.6.10.1

2.11.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

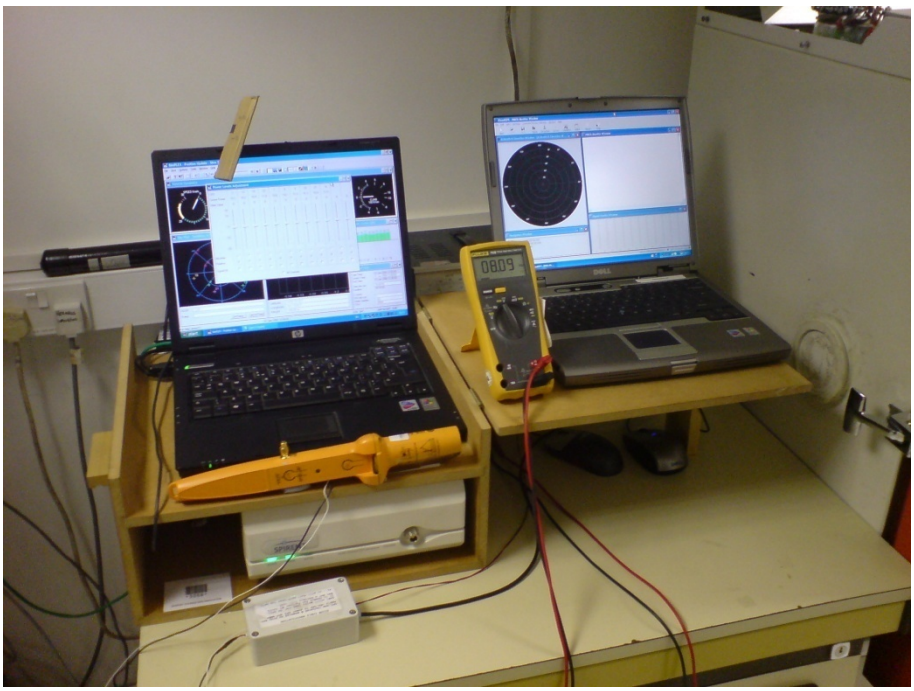
2.11.3 Date of Test and Modification State

18 February 2010 – Modification State 0

2.11.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.11.5 Test Setup



Test Set-up

2.11.6 Environmental Conditions

Ambient Temperature: 19.0°C
Relative Humidity: 36%

2.11.7 Test Results

EUT was locked and settled on a static position for 3 minutes 15 seconds when the GPS simulator scenario started a 25-minute period of motion at 5 knots ±1 knots.

The EUT position output was monitored (position output frequency = 1 Hz) and began to update approximately 30 seconds into the 25-minute period of motion. Once 'tracking' the changing position the EUT updated its position every second.

A performance check was carried out during the observation period to confirm that the received positions were in compliance with the simulated position.

Test Parameter	Result	Limit
Sample Latitude field value	5051.0169	Minimum resolution is 0.001 min
Sample Longitude field value	00108.6166	Minimum resolution is 0.001 min
Position solution update rate	1 s^{-1}	≥ 1 s^{-1}
Performance Check		
Signal Type (Live or Simulated)	Simulated	-
Time to acquire valid position	1.80 minutes[1]	-
Number of Measurements	598[2]	>100
Measurement duration	10.00 minutes	>5 minutes and <10 minutes
Percentage of results within 13m[3] (excluding HDOP≥4)	99.13%	95 %

[1] Static position
[2] From start of 25-minute period of motion
[3] Within 13m of the instantaneous position

2.12 HIGH SPEED UPDATE RATE

2.12.1 Specification Reference

IEC 61108-1, Clause 5.6.10.2

2.12.2 Equipment Under Test

S5 AIS-SART (Fastrax IT310 GPS Receiver Module), S/N: 75907213_TSR0001

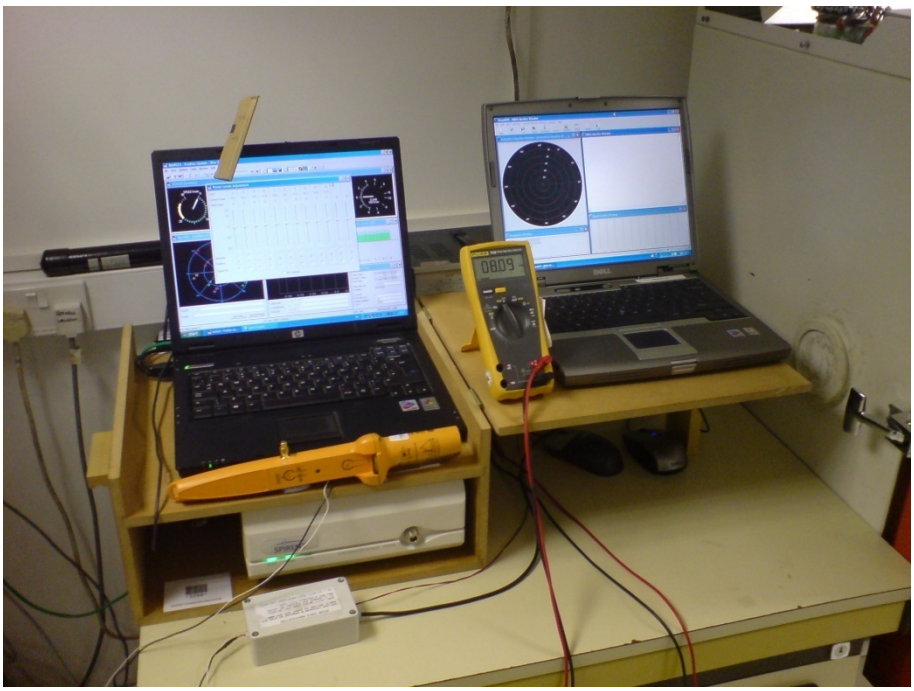
2.12.3 Date of Test and Modification State

24 February 2010 - Modification State 0

2.12.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.12.5 Test Setup



Test Set-up

2.12.6 Environmental Conditions

Ambient Temperature:	21.8°C
Relative Humidity:	39%RH

2.12.7 Test Results

Deviation from the Test Method Clause: A simulator was used to perform this test; however, EUT output remained at 1-second intervals, rather than 0.5 s as recommended.

EUT and GPS simulator were started simultaneously and the EUT acquired a position lock after 48 s; the simulator was running a dynamic position travelling at 70 knots in a straight line for the test duration. Once the EUT acquired a valid position the 10-minute observation period was started.

The EUT position output was observed (position output frequency was 1 s^{-1}) and began to update immediately after position lock. Once tracking the dynamic position the EUT continued to update its position output every second.

A performance check was carried out during the observation period to confirm that the received positions were in compliance with the simulated position.

Parameter	Result	Limit
Sample Latitude field value	5052.9963	Minimum resolution is 0.001 min
Sample Longitude field value	00121.0235	Minimum resolution is 0.001 min
Position solution update rate	1 s^{-1}	≥ 1 s^{-1}
Performance Check		
Signal Type (Live or Simulated)	Simulated	-
Time to acquire valid position	N/A	-
Number of Measurements	601	>100
Measurement duration	10.00 minutes	>5 minutes and <10minutes
Percentage of results within 13m (excluding HDOP≥4)	99.67%	95 %

SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.2 and 2.3 Beacons – Static Accuracy & Angular Movement Of The Antenna					
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
Multimeter	Fluke	79 Series III	611	12	24-Jun-2010
Stop Clock	R.S Components	RS328 061	2674	-	TU
Thermohygrometer	Rotronic	A1	2749	12	8-Dec-2010
Inclinometer	FISCO	EN 17	3223	12	9-Dec-2010
Section 2.5, 2.6, 2.7 and 2.8 Beacons - GPS Acquisition (Power Conditions)					
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
RF Shielded Enclosure	Rittal	AE1380	162	-	TU
Multimeter	Fluke	79 Series III	611	12	24-Jun-2010
Stop Clock	R.S Components	RS328 061	2674	-	TU
GPS/SBAS Simulator	Spirent	STR4500	3056	-	TU
Hygrometer	Rotronic	I-1000	3068	12	3-Jul-2010
Section 2.4 Beacons - GPS Dynamic Accuracy					
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
Multimeter	Fluke	79 Series III	611	12	24-Jun-2010
Stop Clock	R.S Components	RS328 061	2674	-	TU
GPS/SBAS Simulator	Spirent	STR4500	3056	-	TU
Hygrometer	Rotronic	I-1000	3068	12	3-Jul-2010
Section 2.11 and 2.12 Beacons - GPS Position Update					
Power Supply Unit	Farnell	LT-30-2	41	-	O/P Mon
Multimeter	Fluke	79 Series III	611	12	24-Jun-2010
Stop Clock	R.S Components	RS328 061	2674	-	TU
GPS/SBAS Simulator	Spirent	STR4500	3056	-	TU
Hygrometer	Rotronic	I-1000	3068	12	3-Jul-2010

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.9 and 2.10 Beacons - GPS Sensitivity and Dynamic Range (Acquisition and Tracking)					
Power Supply Unit	Hewlett Packard	6267B	21	-	TU
Antenna (Double Ridge Guide)	EMCO	3115	34	12	18-Jul-2010
Spectrum Analyser	Rohde & Schwarz	FSEM	37	12	16-Apr-2010
Power Meter	Hewlett Packard	436A	94	12	12-Oct-2010
Attenuator (Software Driver)	Hewlett Packard	11713A	116	-	TU
Attenuator (Step, 11dB, 1W)	Hewlett Packard	8494H	425	-	TU
AF Load (4ohm)	ASL (TUV)	4ohm	430	12	09-Sep-2010
Multimeter	Fluke	79 Series III	611	12	24-Jun-2010
Power Sensor	Hewlett Packard	8481A	1338	12	18-Dec-2010
Screened Room (8)	Rainford	Rainford	1548	-	TU
Stop Clock	R.S Components	RS328 061	2674	-	TU
Attenuator (11dB, 1W)	Hewlett Packard	8496H	2786	-	TU
Hygrometer	Rotronic	I-1000	2882	12	6-Jul-2010
GPS/SBAS Simulator	Spirent	STR4500	3056	-	TU
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3158	12	24-Jun-2010
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3356	12	22-Apr-2010
Cable (3m, N-type)	Rhophase	NPS-1601-3000-NPS	3361	12	22-Apr-2010
Signal Generator: 10MHz to 20GHz	Rohde & Schwarz	SMR20	3475	12	4-Dec-2010

TU – Traceability Unscheduled
OP MON – Output Monitored with Calibrated Equipment

SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

ANNEX A

CUSTOMER SUPPLIED INFORMATION

GPS Module Information

Fastrax IT310

OEM GPS Receiver Module

- **Ultra High Sensitivity with SiRFstarIII**
- **75mW power with SiRF GSC3f/LPx chip**
- **Improved cold start sensitivity**

IT310 Key Features:

- SiRFstarIII chip GSC3f/LPx
- Tiny size – 13.1mm x 15.9mm x 2.3mm
- Low power consumption: 75mW @ 3.0V
- Ultra High Sensitivity –159 dBm (Tracking)
- Cold start sensitivity -146dBm (GSW3.5 firmware)
- NMEA & SiRF binary protocols
- Two serial ports
- 1PPS output

OEM receiver for many Applications

Fastrax IT310 OEM GPS receiver module enables high performance navigation in the most stringent applications and solid fix even in harsh GPS visibility environments.

The IT310 receiver is ideally suited for both industrial tracking and navigation systems and battery operated consumer products like sports accessories, handheld computers, asset tracking devices, vehicle navigation devices and mobile phones.

Market Leading Performance

State-of-the-art cold start sensitivity enables fast TTFF and rapid re-acquisitions in harsh urban canyon or blocking environments. Upgraded -3LPx chip also enables lower power consumption and supports also TricklePower and Push-to-Fix low power management operating modes.

User configurable power management makes IT310 one of the lowest power consuming, complete 20-channel OEM GPS receivers on the market. E.g. the SiRF Adaptive TricklePower™ mode enables low power consumption but which adapts itself to weak signal conditions with full power acquisition and tracking.

The SiRF Push-to-Fix™ mode keeps the GPS time and satellite data valid allowing fast navigation fix on demand.

Cutting component costs

Space and costs are reduced due to the cutting-edge technology in the IT310 receivers. The surface mount SMD design eliminates need for expensive and labor intensive system and RF connectors. Very few additional components are required.

Quick Start with Easy-To-Deploy Solution

The addition of an antenna and power supply is all that is required to make the IT310 operational. The module supports also dedicated control inputs for optional host control for the operating state.

www.fastraxgps.com

Fastrax

IT310

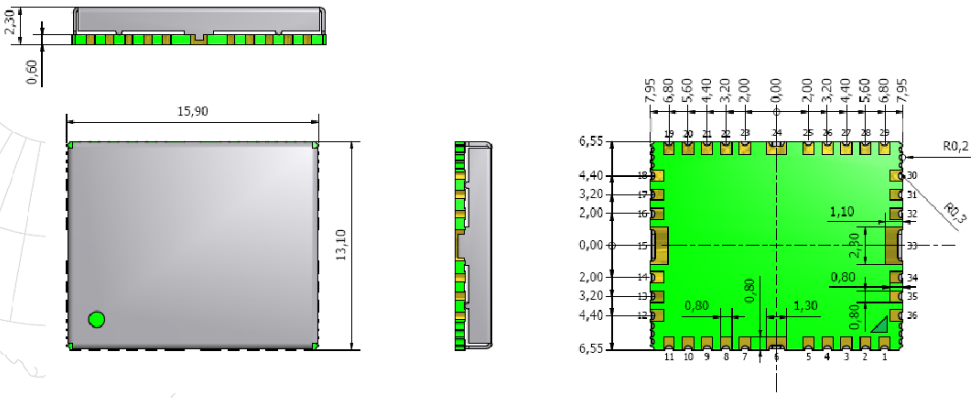
IT310 OEM GPS Receiver Module					
Specifications					
General:	L1 frecuency, C/A code (SPS)		I/O ports:	36 contact LGA	
	20 independent tracking channels			Two asynchronous serial ports	
	Separate search and acquisition engine			1PPS output	
Update rate:	1 fix/s (user configurable)			2x GPIO	
Accuracy:	Position:	1.8m (CEP95)		External clock input	
	Velocity:	<0.1m/s		Timesync input	
	Time:	+/-1us		Wakeup interrupt input	
TTFF:	Cold Start (out of the box):	33s typ.	Protocol:	NMEA 0183, default	
	Hot start:	1s typ.		SiRF Binary Protocol	
Sensitivity:	Acquisition (cold):	-146dBm (1)	Dimensions:	13.1mm x 15.9mm x 2.3mm (2.6 max)	
	Tracking:	-159dBm (1)	Weight:	3g	
Power Drain (3.0V):	Navigating 1 fix/s:	75mW typ.	Antenna Input:	LGA pad, 50ohm (1)	
	Back up state:	18uW typ.	Antenna bias:	same as Main Supply VCC	
Operating voltage:	Main Supply VCC:	+3.0V... 3.6V	Chip set:	SiRFstar III (GSC3f/LPx)	
	Back up Supply:	+1.5V... 3.6V			
Operating temperature:		-30C..+85C (2)	SW Features:	Adaptive TricklePower(TM)	
Storage temperature:		-40C..+85C		Push-to-Fix(TM)	
				Extremely fast TTFF	

Notes:

1) GPS simulator usage: external LNA usage is suggested

2) Operation accepted also -40°C... -30°C but TTFF may increased

Dimensions and pin out:



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