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Report On

Emergency Beacon Testing of the
Standard Communications Pty Limited
MT403G / MT403FG

Document 75901666 Report 01 Issue 4 January 2008

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REPORT ON

Emergency Beacon Testing of the
Standard Communications Pty Limited
MT403G / MT403FG

Document 75901666 Report 01 Issue 4

January 2008

PREPARED FOR

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APPROVED BY

M J Hardy
Authorised Signatory

DATED

31 January 2008

Product Service

Section **Page No**

Product Service

SECTION 1

REPORT SUMMARY

Emergency Beacon Testing of the
Standard Communications Pty Limited
MT403G / MT403FG

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Standard Communications PTY Limited MT403G / MT403FG to the requirements of T.007 Issue 4 – Rev 1 October 2006.

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	Standard Communications PTY Limited
Model Number(s)	MT403G / MT403FG
Serial Number(s)	33790 (Test Sample number: 75901666_01)
Number of Samples Tested	One
Test Specification/Issue/Date	Cospas-Sarsat T.007 Issue 4 – Rev 1 October 2006
Date of Receipt of Test Samples	21st August 2007
Order Number Date	PO # 52559 20th June 2007
Start of Test	16th October 2007
Finish of Test	30th January 2008
Name of Engineer(s)	R Hampton R Henley I Tebby S Bennett R Bennett

1.2 APPLICATION FORM

1.2.1 Beacon Manufacturer and Beacon Model

Beacon Manufacturer	Standard Communications Pty Ltd
Beacon Model	MT403G / MT403FG

1.2.2 Beacon Type and Operational Configurations

Beacon Type	**Beacon used while:**	**Tick where appropriate**
EPIRB	Floating in water or on deck or in a safety raft	☒
PLB	On ground and above ground	☐
	On ground and above ground and floating in water	☐
ELT Survival	On ground and above ground	☐
	On ground and above ground and floating in water	☐
ELT Auto Fixed	Fixed ELT with aircraft external antenna	☐
ELT Auto Portable	In aircraft with an external antenna	☐
	On ground, above ground, or in a safety raft with an integrated antenna	☐
ELT Auto Deployable	Deployable ELT with attached antenna	☐
Other (specify)		☐

1.2.3 Beacon Characteristics

Characteristic	**Specification**
Operating temperature range	Tmin = -20°C Tmax = +55°C
Operating lifetime	48+ hours
Battery chemistry	LiMnO2 / Organic Electrolyte
Battery cell size and number of cells	5 batteries @ 2 cells CR2/3AH
Battery manufacturer	Varta
Battery pack manufacturer and part number	Standard Communications - 97MT403BAT or VARTA - 080022
Oscillator type (e.g. OCXO, MCXO, TCXO)	MCXO
Oscillator manufacturer	Standard Communications
Oscillator part name and number	na
Oscillator satisfies long-term frequency stability requirements (Yes or No)	Yes

Characteristic	Specification
Antenna type (Integrated or External)	Integrated
Antenna manufacturer	na
Antenna part name and number	na
Navigation device type (Internal, External or None)	Internal
Features in beacon that prevent degradation to 406 MHz signal or beacon lifetime resulting from a failure of navigation device or failure to acquire position data (Yes, No, or N/A)	Yes
Features in beacon that ensures erroneous position data is not encoded into the beacon message (Yes, No or N/A)	Yes
Navigation device capable of supporting global coverage (Yes, No or N/A)	Yes
For Internal Navigation Devices	
- Geodetic reference system (WGS 84 or GTRF)	WGS 84
- GNSS receiver cold start forced at every beacon activation (Yes or No)	Yes
- Navigation device manufacturer	ublox
- Navigation device model name and part Number	TIM-4A
- GNSS system supported (e.g. GPS, GLONASS, Galileo)	GPS
For External Navigation Devices	
- Data protocol for GNSS receiver to beacon interface	na
- Physical interface for beacon to navigation device	na
- Electrical interface for beacon to navigation device	na
- Navigation device model and manufacturer (if beacon designed to use specific devices)	na

Characteristic	Specification
Self-Test Mode Characteristics	
- Self-test has separate switch position (Yes or No)	Yes
- Self-test switch automatically returns to normal position when released (Yes or No)	Yes
- Self-test activation can cause an operational mode transmission (Yes or No)	No
- Self-test causes a single beacon self-test message burst only regardless of how long the self-test activation mechanism applied (Yes or No)	No
- Results of self-test indicated by (e.g. Pass / Fail Indicator Light, Strobe Light, etc.)	Visual & Audible indication
- Self-test can be activated from beacon remote activation points (Yes or No)	No
- Self-test performs an internal check and indicates that RF power emitted at 406 MHz and 121.5 MHz if beacon includes a 121.5 MHz homer (Yes or No)	Yes
- Self-test transmits a signal(s) other than at 406 MHz (Yes & details or No)	Yes, unmodulated 121.5MHz carrier
- Self-test can be activated directly at beacon (Yes or No)	Yes
- List of Items checked by self-test	battery voltage, RF output, PLL lock, firmware checksum, 406 message checksum, GPS alive
- Self-test transmission burst duration (440 or 520 ms)	520 ms
- Self-test format bit (“0” or “1”)	1
Beacon includes a homer transmitter (if yes identify frequency of transmission)	121.5MHz
-Homer Transmit Power	17dBm
-Homer Duty Cycle	>96%
-Duty Cycle of Homer Swept Tone	37%

Characteristic	Specification
Beacon includes a strobe light (Yes or No)	Yes
- Strobe light intensity	>0.75cd
- Strobe light flash rate	20~21/min
Beacon transmission repetition period satisfies C/S T.001 requirement that two beacon's repetition periods are not synchronised closer than a few seconds over 5 minute period, and the time intervals between transmissions are randomly distributed on the interval 47.5 to 52.5 seconds (Yes or No)	Yes
Other ancillary devices (e.g. voice transceiver). List details on a separate sheet if insufficient space to describe.	No
Beacon includes automatic activation mechanism (Yes or No)	Yes

1.2.4 Information Provided by the Cospas-Sarsat Accepted Test Facility

Name and Location of Beacon Test Facility: TUV Product Service Ltd, United Kingdom

Date of Submission for Testing: 21st August 2007

Applicable C/S Standards:

Document	Issue	Revision	Date
C/S T.001	3	7	Nov-05
C/S T.007	4	1	Oct-06

I hereby confirm that the 406 MHz beacon described above has been successfully tested in accordance with the Cospas-Sarsat Type Approval Standard (C/S T.007) and complies with the Specification for Cospas-Sarsat 406 MHz Distress Beacons (C/S T.001) as demonstrated in the attached report.

Signed: M Hardy

Name: M J Hardy

Position Held: Authorised Signatory

Date: 31 January 2008

1.2.5 Applicant Details

Company Name	Standard Communications Pty Ltd		
Address	6 Frank Street Gladesville NSW Australia		
Category of Applicant	☒ Manufacturer	☐ Importer	
	☐ Distributor	☐ Agent	
Contact Name	Craig DUNCAN	Telephone	+ 61 (0)2 9844 6666
Email	cduncan@gme.net.au	Facsimile	+61 (0)2 9844 6600

1.2.6 Manufacturer Details

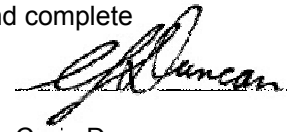
Company Name	Same as above		
Address			
Contact Name		Telephone	
Email		Facsimile	

1.2.7 Declaration of Build Status

Hardware Version	1
- PCB Revision	B
- Battery Model	97MT403BAT (Varta)
Software Version	na
Firmware Version	OS0012.1.03
Other (Specify)	na

1.2.8 Applicant's Declaration

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

Signed: 

Name: Craig Duncan

Position Held: Project Engineering Manager

Date: 09/08/2007

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Standard Communications Pty Limited MT403G / MT403FG as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.

Note: The EUT can be described as either a MT403G or a MT403FG as the only difference between the two models (in their operational mode) is the black plastic adaptor bracket at the foot of the unit (pictured). When fitted, the adaptor converts a MT403G into a MT403FG enabling the unit to be mounted in the float-free cradle in its quiescent state.

Equipment Under Test

1.3.2 Physical Test Configuration

EUT was fitted with a "normal" head piece for radiated testing such as Antenna Characteristics and Satellite Qualitative. For the conducted tests a test head piece was fitted incorporating a 50Ω output. In order to achieve this output a matching device was in line with the output causing a loss of power output. The customer declared that this loss was 1.71dB; hence, all power measurements were subject to an offset of 1.71dB, details are supplied where appropriate.

EUT was tested out of its float-free/non-float-free cradle. No ancillary equipment was attached.

1.3.3 Modes of Operation

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

Standby Mode:

- EUT mounted in cradle (non-float free) in order to utilise the magnetic activation inhibitor contained within cradle

Self-test:

- 121 MHz homer active.
- 243 MHz homer not present
- GPS aliveness checked
- Low duty cycle light active
- Audio sounder active

GPS Acquisition Test:

- GPS active and in search mode (no GPS signals supplied – customer declared “worst case” mode)
- Low duty cycle light active
- Audio sounder active
- Mode initiated by Self-test followed by timed release of Self-test switch (Self-test current draw retained in GPS Acquisition Test mode current calculations, see section 2.6)

Operating:

- 121 MHz homer active.
- 243 MHz homer not present
- GPS active and in search mode (no GPS signals supplied)*
- Physical configuration as above
- Low duty cycle light active
- Audio sounder active

*Unless a location input is specified

1.4 MODIFICATIONS

No modifications were made to the test sample during testing.

1.5 REPORT MODIFICATION RECORD

Issue 1 – First Issue
Issue 2 – Revised as per COSPAS-SARSAT worksheet 2007-44 (12 December 2007).
Issue 3 – Minor formatting and clerical errors corrected, test data unaffected.
Issue 4 – Modifications made in accordance with Worksheet 2 (2007-44: CHN to TAC-139).
Test Results/EUT name and details were changed in the following sections: Application Form, Table Of Test Results (Parameters 10: Operating Lifetime at Minimum Temperature and 17: Navigation System), Satellite Qualitative Tests, Antenna Characteristics, Beacon Coding Software and Navigation System.

SECTION 2

TEST DETAILS

Emergency Beacon Testing of the
Standard Communications Pty Limited
MT403G / MT403FG

TEST RESULTS TABLE

Parameter	Limits	Units	Test Results Tmin (-20°C)	Test Results Tamb (23.7°C)	Test Results Tmax (+55°C)	Comments
1. Power Output						Test Sample: 75901666_01 **Result: Pass**
Transmitter power output	35 - 39	dBm	35.66	35.37	34.98	Path loss through a matching circuit of 1.71 dB should be applied to the result (making the actual power higher)
Power output rise time	< 5	ms	1.428	1.545	1.64	
Power output 1ms before burst	< -10	dBm	-30.31	-30.59	-28.31	
2. Digital Message Coding	Bit Numbers					Test Sample: 75901666_01 **Result: Pass**
Bit Sync 1 - 15	15 bits "1"	P / F	P	P	P	Decoded Message: Page20
Frame sync 16 - 24	"000101111"	P / F	P	P	P	
Format flag 25	1 bit	bit value	1	1	1	
Protocol flag 26	1 bit	bit value	0	0	0	
Identification / position data	59 bits	P / F	P	P	P	
BCH code 86 -106	21 bits	P / F	P	P	P	
Emerg. Code/nat. use/supplem. Data	6 bits	bit value	110111	110111	110111	
Additional data / BCH (if applicable)	32 bits	P / F	P	P	P	
Position Error (if applicable)	< 5	km	N/A	N/A	N/A	
3. Digital Message Generator						Test Sample: 75901666_01 **Result: Pass (MU)**
Repetition rate TR:						
Average TR	48.5 ≤ TRavg ≤ 51.5	seconds	49.912	50.34	50.031	
Minimum TR	47.5 ≤ TRmin ≤ 48.0	seconds	47.859	47.937	47.891	
Maximum TR	52.0 ≤ TRmax ≤ 52.5	seconds	52.187	52.344	52.203	
Standard deviation	0.5 - 2.0	seconds	1.165	1.434	1.313	
Bit rate						
Minimum fb	≥ 396	bits/sec	399.575	399.602	399.587	
Maximum fb	≤ 404	bits/sec	399.606	399.627	399.629	
Total transmission time						
Short message	435.6 - 444.4	ms	N/A	N/A	N/A	
Long message	514.8 - 525.2	ms	518.883	518.611	518.577	
Unmodulated carrier						
Minimum T1	≥ 158.4	ms	158.602	158.333*	158.220*	* The minimum value at Ambient and +55°C are within Measurement Uncertainty limits stated in C/S T.008.
Maximum T1	≤ 161.6	ms	158.745	158.486	158.434	
First burst delay	≥ 47.5	seconds	77.06	75.56	77.52	Self Test after approximately 2 seconds

Parameter	Limits	Units	Test Results			Comments
			T_{min} (-20°C)	T_{amb} (23.7°C)	T_{max} (+55°C)	
4. Modulation						Test Sample: 75901666_01 **Result: Pass**
Biphase-L	P / F	P / F	P	P	P	
Rise time	50 - 250	µs	172.46	174.30	175.01	
Fall time	50 - 250	µs	171.47	175.43	174.57	
Phase deviation: positive	+(1.0 to 1.2)	radians	1.058	1.1	1.089	
Phase deviation: negative	-(1.0 to 1.2)	radians	-1.118	-1.076	-1.087	
Symmetry measurement	≤ 0.05		0.0140	0.0101	0.0123	
5. 406 MHz Transmitted Frequency						Test Sample: 75901666_01 **Result: Pass**
Nominal Value	C/S T.001	MHz	406.0369971	406.036986	406.0369852	
Short-term stability	≤ $2x10^{-9}$	/100ms	$2.955x10^{-10}$	$1.816x10^{-10}$	$3.653x10^{-10}$	
Medium-term stability – Slope	$(-1 \text{ to } +1)x10^{-9}$	/minutes	$1.262x10^{-11}$	$1.688x10^{-10}$	$2.723x10^{-10}$	
Medium-term stability – Residual frequency variation	≤ $3x10^{-9}$		$7.079x10^{-10}$	$6.786x10^{-10}$	$7.557x10^{-10}$	
6. Spurious Emission on 50ohms						Test Sample: 75901666_01 **Result: Pass**
In band (406.0 – 406.1 MHz)	C/S T.001 mask	P / F	P	P	P	Spectrum plot: Page 18
7. 406 MHz VSWR Check						Test Sample: 75901666_01 **Result: Pass**
Nominal transmitted frequency	C/S T.001	MHz	406.0369979	406.036986	406.0369858	
Modulation						
Rise time	50-250	µs	171.44	173.73	171.71	
Fall time	50-250	µs	174.37	178.16	175.53	
Phase deviation: positive	+ (1.0 to 1.2)	radians	1.067	1.080	1.133	
Phase deviation: negative	- (1.0 to 1.2)	radians	-1.106	-1.102	-1.041	
Symmetry measurement	≤ 0.05		0.0130	0.0119	0.0127	
Digital Message	correct	P / F	P	P	P	Decoded Message: Page 24

Parameter	Limits	Units	Test Results			Comments
			T_{min} (-20°C)	T_{amb} (23.7°C)	T_{max} (+55°C)	
8. Self-test Mode						Test Sample: 75901666_01 **Result: Pass**
Frame sync	011010000	P / F	P	P	P	Decoded Message: Page 25
Format flag	1 / 0	bit value	1	1	1	
Single radiated burst	≤440 / 520 (±1%)	ms	520.878	520.8782	520.8238	
Default position data (if applicable)	correct	P / F	P	P	P	
Description of Self-test	provided	Y / N		Y		
Design data on protection against repetitive self-test mode transmissions	provided	Y / N		Y		Applicant's data, see Annex A for details
Single burst verification	one burst	P / F	P	P	P	
Provides for 15 Hex ID	correct	P / F	P	P	P	
121.5 MHz RF power (if applicable)	self-test checks that RF power emitted	P / F	P	P	P	
406 MHz power	self-test checks that RF power emitted	P / F	P	P	P	

Parameter	Limits	Units	Test Results		Comments
9. Thermal Shock					Test Sample: 75901666_01 **Result: Pass**
Soak Temperature	30°C difference	°C	22.6		
Measurement Temperature		°C	-7.4		Test Data: Page 26
Transmitted Frequency			Min	Max	
Nominal value	C/S T.001	MHz	406.036999	406.037003	
Short-term stability	≤ $2x10^{-9}$	/100ms	$1.498x10^{-10}$	$2.552x10^{-10}$	
Medium-term stability – Slope	(-2 to +2)$x10^{-9}$	/min	$-6.188x10^{-11}$	$5.841x10^{-10}$	
Medium-term stability – Residual frequency variation	≤ $3x10^{-9}$		$3.786x10^{-10}$	$8.538x10^{-10}$	
Transmitter power output	35 - 39	dBm	35.64	35.74	Path loss through a matching circuit of 1.71 dB should be applied to the result (making the actual power higher)
Digital message	correct	P/F	P		Decoded Message: Page 31
10 Operating Lifetime at Minimum Temperature					Test Sample: 75901666_01 **Result: Pass**
Pre-test battery discharge duration (operating)		Hours	N/T*		* Pre-test battery discharge was not fully conducted, instead, an equivalent operating lifetime reduction was applied, see Test Data for further details.
Effective operational lifetime duration	>24	hours	49.5		Systems within the beacon cause the cessation of 406MHz transmissions when battery voltage is deemed too low. This cessation occurred after 55.5hours. The figure shown accounts for the equivalent operating lifetime reduction of 6.0 hours, see the battery current measurement results on page 39 for details.
Transmitted Frequency			Min	Max	
Nominal value	C/S T.001	MHz	406037004.8	406037014.2	
Short-term stability	≤ $2x10^{-9}$	/100ms	$1.261X10^{-10}$	$4.475X10^{-10}$	
Medium-term stability – Slope	(-1 to +1)$x10^{-9}$	/min	$-2.674X10^{-10}$	$4.194X10^{-10}$	
Medium-term stability – Residual frequency variation	≤ $3x10^{-9}$		$3.003X10^{-10}$	$1.486X10^{-9}$	Test Data: Page 32
Transmitter power output	35 - 39	dBm	34.60	35.28	Path loss through a matching circuit of 1.71 dB should be applied to the result (making the actual power higher)
Digital message	correct	P/F	P		Decoded Message: Page 37
11. Temperature Gradient (5°C/hr)					Test Sample: 75901666_01 **Result: Pass**
Transmitted Frequency			Min	Max	
Nominal value	C/S T.007	MHz	406.036992	406.037013	Test Data: Page 44
Short-term stability	≤ $2x10^{-9}$	/100ms	$1.011x10^{-10}$	$5.659x10^{-10}$	
Medium-term stability – Slope[1]	(-1 to +1)$x10^{-9}$	/min	$-3.503x10^{-10}$	$3.52x10^{-10}$	Limits between points B to C+15 minutes and D to E+15 minutes as per C/S T.007 are (-2 to +2)$x10^{-9}$
Medium-term stability – Residual frequency variation	≤ $3x10^{-9}$		$2.121x10^{-10}$	$1.278x10^{-9}$	
Transmitter power output	35 – 39	dBm	35.04	35.72	Path loss through a matching circuit of 1.71 dB should be applied to the result (making the actual power higher)
Digital message	correct	P/F	P		Test Data: Page 49

Parameter	Limits	Units	Test Results		Comments
12. Oscillator Aging					
Data	provided	Y / N	Y		Applicant's data, see Annex A for details
13. Protection Against Continuous Transmission					
Description	provided	Y / N	Y		Applicant's data, see Annex A for details
14. Satellite Qualitative Tests					Test Sample:75901666_01 **Result: Pass**
Test Configuration	C/S T.007	Figure	B.4	B.5	
15 Hex ID Decoded by LUT	correct	P / F	P	P	Test Data: Page 50
Doppler Location results with error ≤5km	≥80	%	91.67	94.12	
15. Antenna Characteristics					Test Sample: 75901666_01 **Result: Pass**
Test Configuration	C/S T.007	Figure	B.4	B.5	
Polarisation	linear or RHCP		Linear	N/A	Test Data: Page 52
VSWR	≤1.5		N/A		Detachable Antennas Only
$EIRP_{LOSS}$		dB	2.48		
$EIRP_{maxEOL}$	≤43	dBm	43.0	39.7	
$EIRP_{minEOL}$	≥32 (B.4)/30 (B.5)	dBm	34.0	30.0*	* Limit for B.5 configuration is ≥30dBm
Azimuth gain variation at 40° elevation angle	≤3	dB	0.40	N/A	
$EIRP_{minEOL}$	≥32	dBm	34.0	30.0*	* Limit for B.5 configuration is ≥30dBm
Azimuth gain variation at 40° elevation angle	≤3	dB	0.40	N/A	
16. Beacon Coding Software					Test Sample: 75901666_01 **Result: Pass**
Sample message for each coding option of the applicable coding types	correct	P / F	P		Test Data: Page 54
Sample self-test message for each coding option of the applicable coding types	correct	P / F	P		

Parameter	Limits	Units	Test Results			Comments
17. Navigation System						Test Sample: 75901666_01 **Result: Pass**
Location protocol	C/S T.001		National	Standard	User	
Position data default values	correct	P / F	P	P	P	Test Data: Page 56
Position acquisition time	<10/1	min	2	2	2	
Position accuracy - A3.8.2.1, Floating in water	C/S T.001		130.8	35.3	1587.4	
Position accuracy - A3.8.2.2, Floating in water	C/S T.001		49.5	53.1	3372.8	
Position accuracy - A3.8.2.1, C/S T.007: Figure B.5	C/S T.001		22.9	127	1559.2	
Position accuracy - A3.8.2.2, C/S T.007: Figure B.5	C/S T.001		35.3	53.1	3372.8	
Encoded position data update interval	>20	min	51m 41s	51m 40s	52m 31s	
Position clearance after deactivation	cleared	P / F	P	P	P	
Position data input update interval (as applicable)	20/1	Min	N/A	N/A	N/A	
Position data encoding	correct	P / F	P*	P*	P*	*The response time for the beacon to transmit correctly encoded location must be less than 52.5 seconds, however in all three protocols the EPIRB took greater than this time limit: National: 529, Standard: 544, User: 451.
Retained last valid position after navigation input lost	240(±5)	minutes	240	240	240	
Default position data transmitted after 240(±5) minutes without valid position data	cleared	P / F	P	P	P	
Information on protection against beacon degradation due to navigation device, interface or signal failure or malfunction	provided	Y / N	Y			Applicant's data, see Annex A for details

2.1 DIGITAL MESSAGE CODING

2.1.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

2.1.2 Date of Test

16th October 2007

2.1.3 Test Equipment Used

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

2.1.4 Test Results

Digital Message at Ambient Temperature

```
Beacon Id Format..... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 193E41FF3F81FE0              193E41FF3F81FE0 Default_Id
 36 Hex (Bits 1-144) = FFFE2F8C9F20FF9FC0FF022EF5379F3C0010

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1110 0100 0001 1111 1111 0011 1111 1000 0001 1111 1110 0000
   0100 0101 1101 1110 1010 0110 1111 0011 1110 0111 1000 0000 0000 0010 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            1 Long Message                              1
Protocol Flag      26            0 Location NEW                              0
MID                27- 36      201 ALBANIA                        0011 0010 01
Protocol Code      37- 40       15 Test (National)                       1111
Serial Number      41- 58    33790                          0010 0000 1111 1111 10
Medium Position    59- 85          DEFAULT     0111 1111 0000 0011 1111 1100 000
BCH Encoded        86-106          Errors=0           0100 0101 1101 1110 1010 0
BCH Generated      86-106                             0100 0101 1101 1110 1010 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
More Data Flag    110              1 Position Data in bits 113-132           1
Encode Pos Device 111              1 Internal                                1
121.5 Homing      112              1 YES                                     1
Position Change   113-126            DEFAULT                    1001 1111 0011 11
Resultant Position                --> Not Defined
National Use      127-132          0 Default                           0000 00
BCH Encoded       133-144            Errors=0                   0000 0001 0000
BCH Generated     133-144                                       0000 0001 0000
```

Digital Message at Minimum Temperature

```
Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 193E41FF3F81FE0              193E41FF3F81FE0 Default_Id
 36 Hex (Bits 1-144) = FFFE2F8C9F20FF9FC0FF022EF5379F3C0010

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1110 0100 0001 1111 1111 0011 1111 1000 0001 1111 1110 0000
   0100 0101 1101 1110 1010 0110 1111 0011 1110 0111 1000 0000 0000 0010 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            1 Long Message                                1
Protocol Flag      26            0 Location NEW                                0
MID                27- 36      201 ALBANIA                          0011 0010 01
Protocol Code      37- 40       15 Test (National)                          1111
Serial Number      41- 58    33790                        0010 0000 1111 1111 10
Medium Position    59- 85          DEFAULT     0111 1111 0000 0011 1111 1100 000
BCH Encoded        86-106          Errors=0           0100 0101 1101 1110 1010 0
BCH Generated      86-106                             0100 0101 1101 1110 1010 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                   110
More Data Flag    110              1 Position Data in bits 113-132             1
Encode Pos Device 111              1 Internal                                  1
121.5 Homing      112              1 YES                                       1
Position Change   113-126          DEFAULT                     1001 1111 0011 11
Resultant Position               --> Not Defined
National Use      127-132          0 Default                              0000 00
BCH Encoded       133-144          Errors=0                    0000 0001 0000
BCH Generated     133-144                                      0000 0001 0000
```

Digital Message at Maximum Temperature

```
Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 193E41FF3F81FE0              193E41FF3F81FE0 Default_Id
 36 Hex (Bits 1-144) = FFFE2F8C9F20FF9FC0FF022EF5379F3C0010

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1110 0100 0001 1111 1111 0011 1111 1000 0001 1111 1110 0000
   0100 0101 1101 1110 1010 0110 1111 0011 1110 0111 1000 0000 0000 0010 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            1 Long Message                               1
Protocol Flag      26            0 Location NEW                               0
MID                27- 36      201 ALBANIA                          0011 0010 01
Protocol Code      37- 40       15 Test (National)                         1111
Serial Number      41- 58    33790                        0010 0000 1111 1111 10
Medium Position    59- 85          DEFAULT     0111 1111 0000 0011 1111 1100 000
BCH Encoded        86-106          Errors=0           0100 0101 1101 1110 1010 0
BCH Generated      86-106                             0100 0101 1101 1110 1010 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
More Data Flag    110              1 Position Data in bits 113-132            1
Encode Pos Device 111              1 Internal                                 1
121.5 Homing      112              1 YES                                      1
Position Change   113-126          DEFAULT                     1001 1111 0011 11
Resultant Position               --> Not Defined
National Use      127-132          0 Default                             0000 00
BCH Encoded       133-144          Errors=0                 0000 0001 0000
BCH Generated     133-144                                   0000 0001 0000
```

2.2 SPURIOUS EMISSIONS

2.2.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

2.2.2 Date of Test

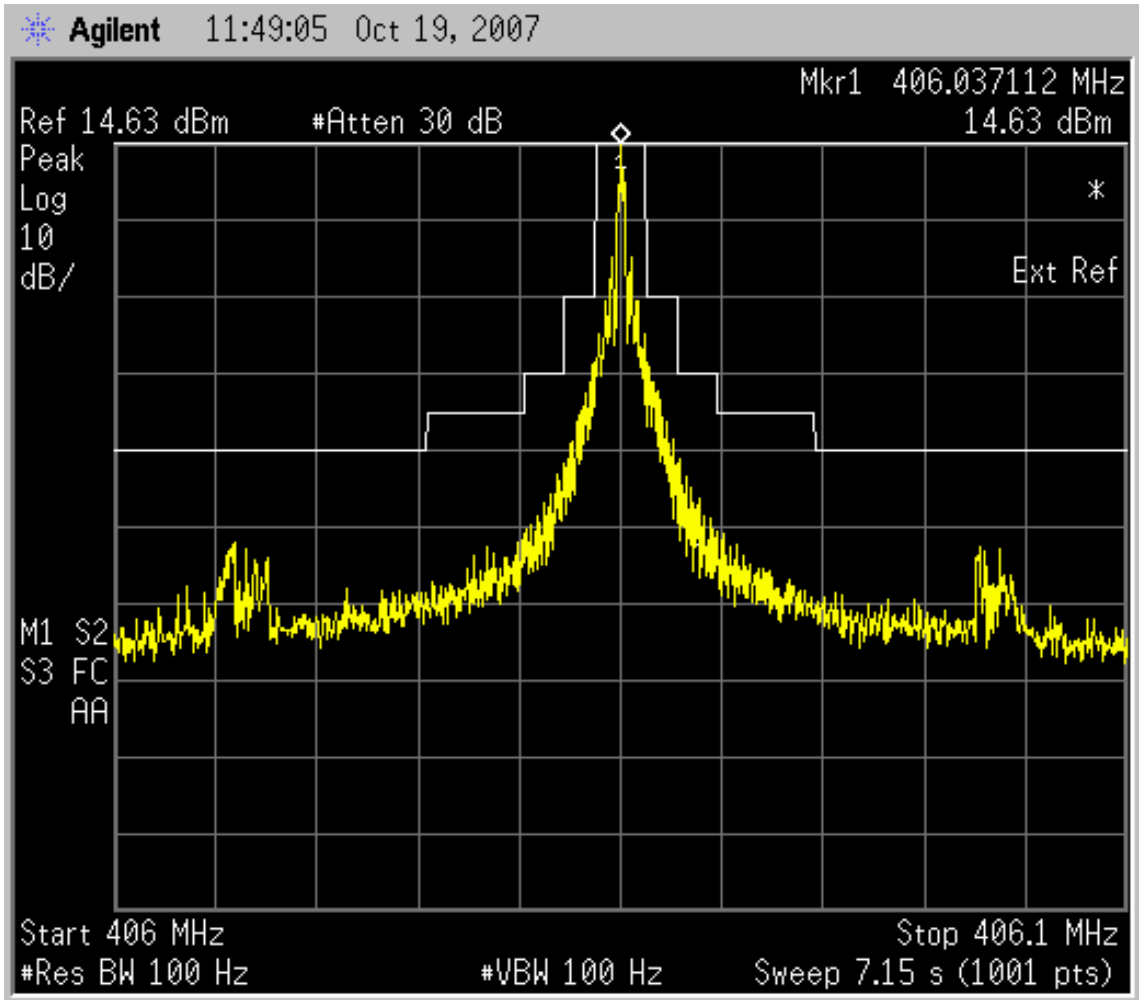
19th October 2007

2.2.3 Test Equipment Used

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

2.2.4 Test Results

Spurious Emissions at Combined Temperatures – Ambient, +55°C and -20°C



2.3 406 MHZ VSWR CHECK – DECODED MESSAGE

2.3.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

2.3.2 Date of Test

16th October 2007

2.3.3 Test Equipment Used

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

2.3.4 Test Results

Digital Message

```
Beacon Id Format..... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 193E41FF3F81FE0              193E41FF3F81FE0 Default_Id
 36 Hex (Bits 1-144) = FFFE2F8C9F20FF9FC0FF022EF5379F3C0010

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1110 0100 0001 1111 1111 0011 1111 1000 0001 1111 1110 0000
   0100 0101 1101 1110 1010 0110 1111 0011 1110 0111 1000 0000 0000 0010 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            1 Long Message                              1
Protocol Flag      26            0 Location NEW                              0
MID                27- 36      201 ALBANIA                        0011 0010 01
Protocol Code      37- 40       15 Test (National)                       1111
Serial Number      41- 58    33790                          0010 0000 1111 1111 10
Medium Position    59- 85          DEFAULT     0111 1111 0000 0011 1111 1100 000
BCH Encoded        86-106          Errors=0           0100 0101 1101 1110 1010 0
BCH Generated      86-106                             0100 0101 1101 1110 1010 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                   110
More Data Flag    110              1 Position Data in bits 113-132            1
Encode Pos Device 111              1 Internal                                 1
121.5 Homing      112              1 YES                                      1
Position Change   113-126            DEFAULT                    1001 1111 0011 11
Resultant Position                --> Not Defined
National Use      127-132          0 Default                            0000 00
BCH Encoded       133-144            Errors=0                    0000 0001 0000
BCH Generated     133-144                                        0000 0001 0000
```

2.4 SELF-TEST MODE – DECODED MESSAGE

2.4.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

2.4.2 Date of Test

16th October 2007

2.4.3 Test Equipment Used

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

2.4.4 Test Results

Digital Message

```
Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 193E41FF3F81FE0              193E41FF3F81FE0 Default_Id
 36 Hex (Bits 1-144) = FFFED0F8C9F20FF9FC0FF022EF5379F3C0010

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1110 0100 0001 1111 1111 0011 1111 1000 0001 1111 1110 0000
   0100 0101 1101 1110 1010 0110 1111 0011 1110 0111 1000 0000 0000 0010 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            1 Long Message                              1
Protocol Flag      26            0 Location NEW                              0
MID                27- 36      201 ALBANIA                          0011 0010 01
Protocol Code      37- 40       15 Test (National)                        1111
Serial Number      41- 58    33790                          0010 0000 1111 1111 10
Medium Position    59- 85          DEFAULT     0111 1111 0000 0011 1111 1100 000
BCH Encoded        86-106          Errors=0           0100 0101 1101 1110 1010 0
BCH Generated      86-106                             0100 0101 1101 1110 1010 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                   110
More Data Flag    110              1 Position Data in bits 113-132            1
Encode Pos Device 111              1 Internal                                 1
121.5 Homing      112              1 YES                                      1
Position Change   113-126            DEFAULT                    1001 1111 0011 11
Resultant Position                --> Not Defined
National Use      127-132          0 Default                             0000 00
BCH Encoded       133-144            Errors=0                      0000 0001 0000
BCH Generated     133-144                                          0000 0001 0000
```

2.5 THERMAL SHOCK

2.5.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

2.5.2 Date of Test

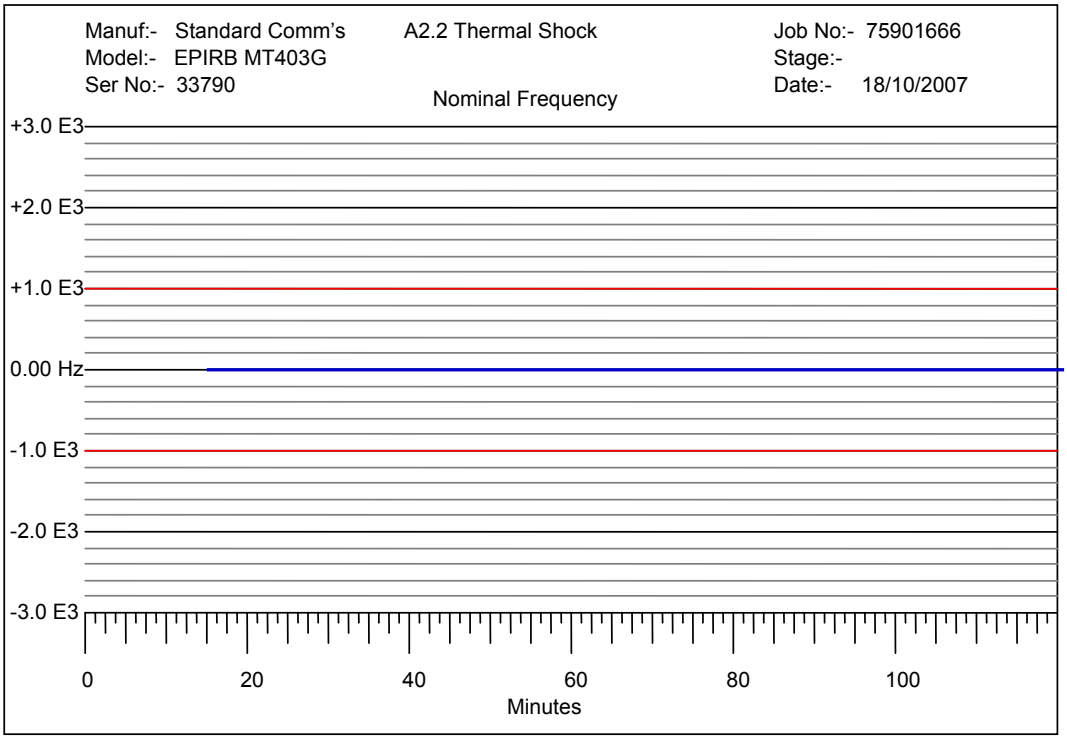
18th October 2007

2.5.3 Test Equipment Used

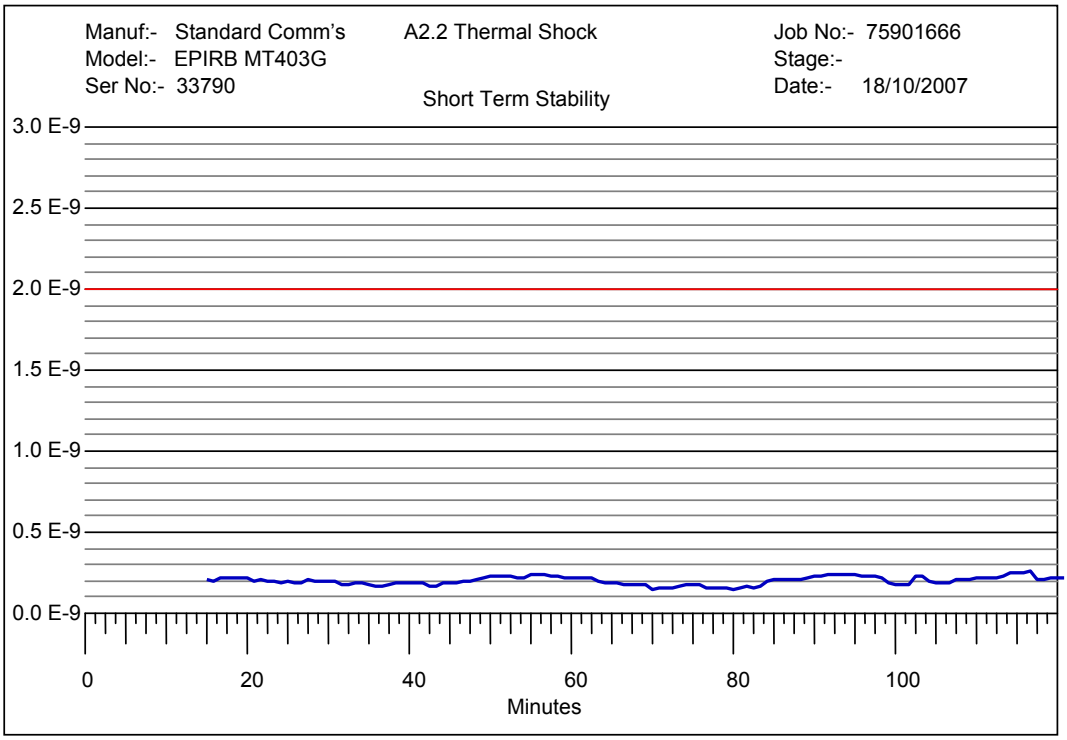
The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.4 Test Results

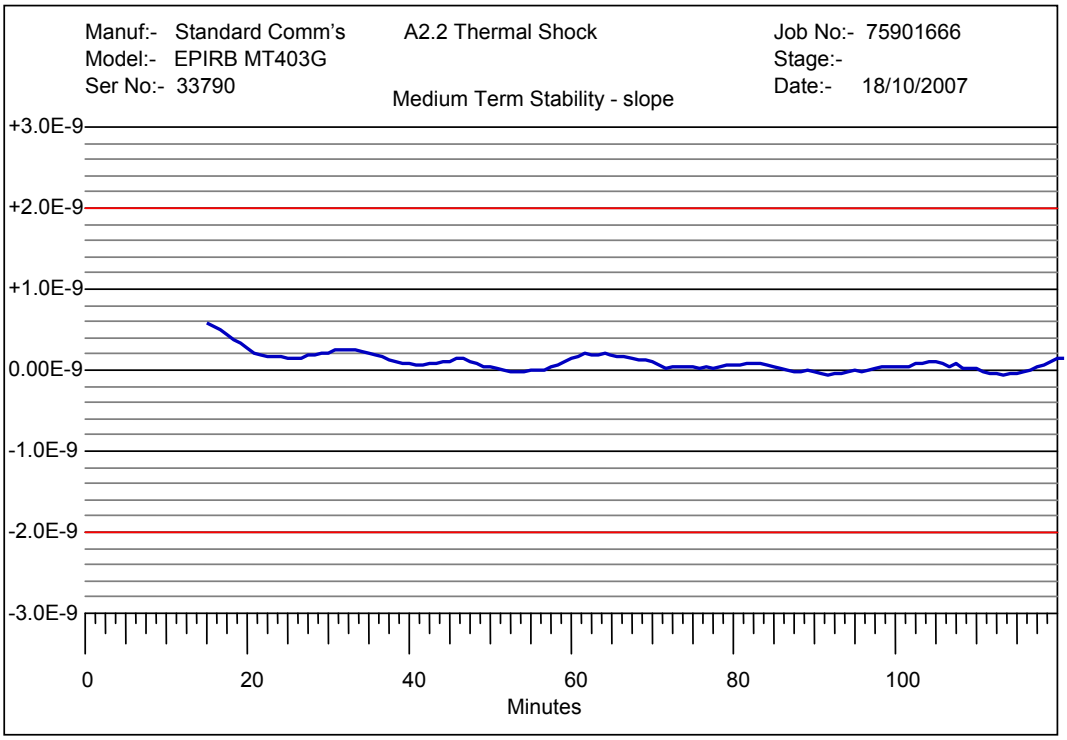
Thermal Shock – Nominal Frequency



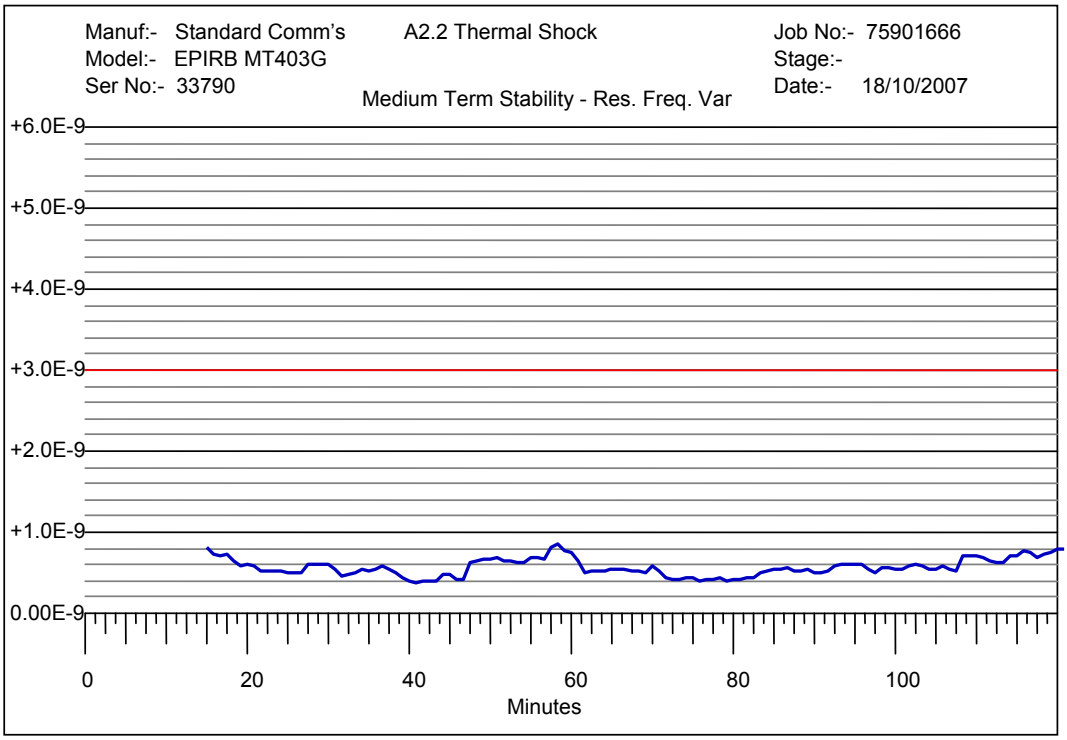
Thermal Shock – Short Term Stability



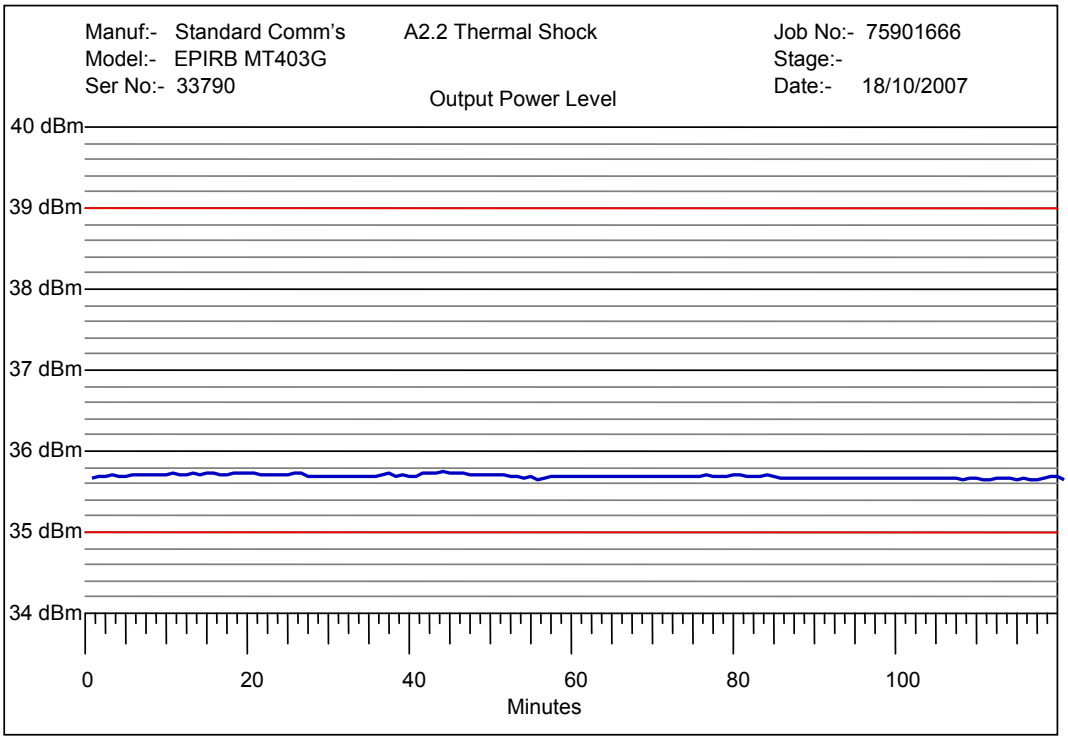
Thermal Shock – Mean Term Stability, Mean Slope



Thermal Shock – Medium Term Stability, Residual Frequency Variation



Thermal Shock – Output Power



Thermal Shock – Digital message

```
Beacon Id Format..... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 193E41FF3F81FE0              193E41FF3F81FE0 Default_Id
 36 Hex (Bits 1-144) = FFFE2F8C9F20FF9FC0FF022EF5379F3C0010

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1110 0100 0001 1111 1111 0011 1111 1000 0001 1111 1110 0000
   0100 0101 1101 1110 1010 0110 1111 0011 1110 0111 1000 0000 0000 0010 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            1 Long Message                               1
Protocol Flag      26            0 Location NEW                               0
MID                27- 36      201 ALBANIA                          0011 0010 01
Protocol Code      37- 40       15 Test (National)                         1111
Serial Number      41- 58    33790                        0010 0000 1111 1111 10
Medium Position    59- 85          DEFAULT     0111 1111 0000 0011 1111 1100 000
BCH Encoded        86-106          Errors=0           0100 0101 1101 1110 1010 0
BCH Generated      86-106                             0100 0101 1101 1110 1010 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
More Data Flag    110              1 Position Data in bits 113-132            1
Encode Pos Device 111              1 Internal                                 1
121.5 Homing      112              1 YES                                      1
Position Change   113-126          DEFAULT                     1001 1111 0011 11
Resultant Position               --> Not Defined
National Use      127-132          0 Default                             0000 00
BCH Encoded       133-144          Errors=0                    0000 0001 0000
BCH Generated     133-144                                      0000 0001 0000
```

2.6 OPERATING LIFETIME AT MINIMUM TEMPERATURE

2.6.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

2.6.2 Date of Test

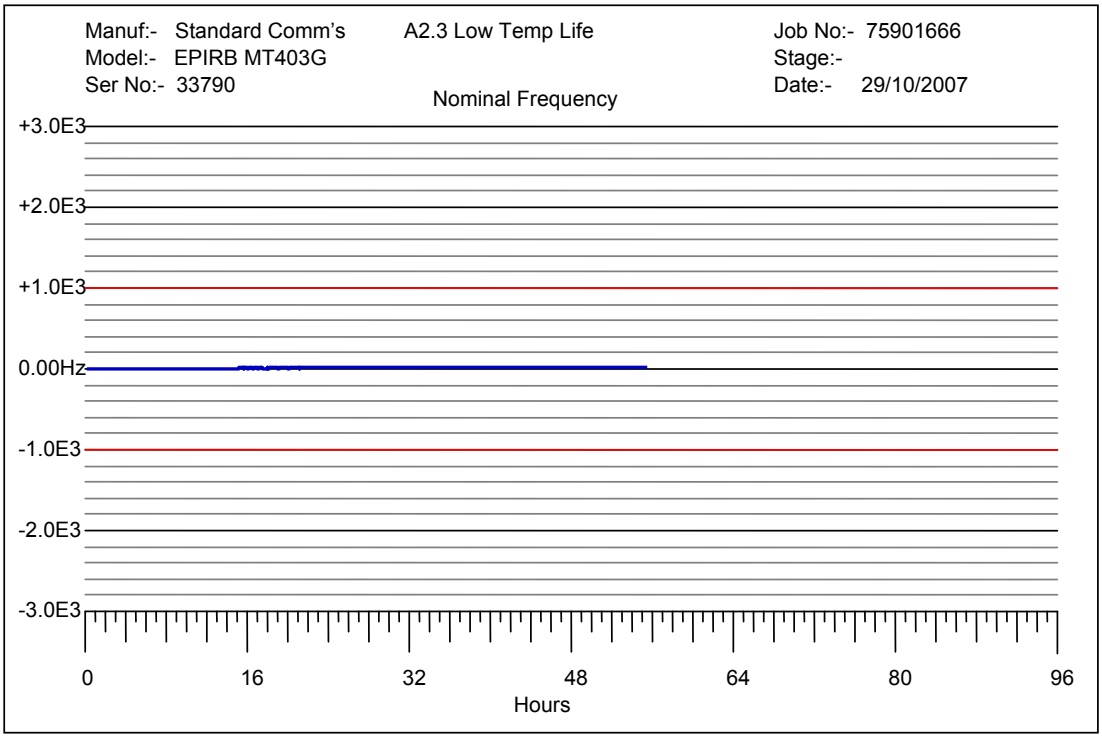
27th to 29th October 2007

2.6.3 Test Equipment Used

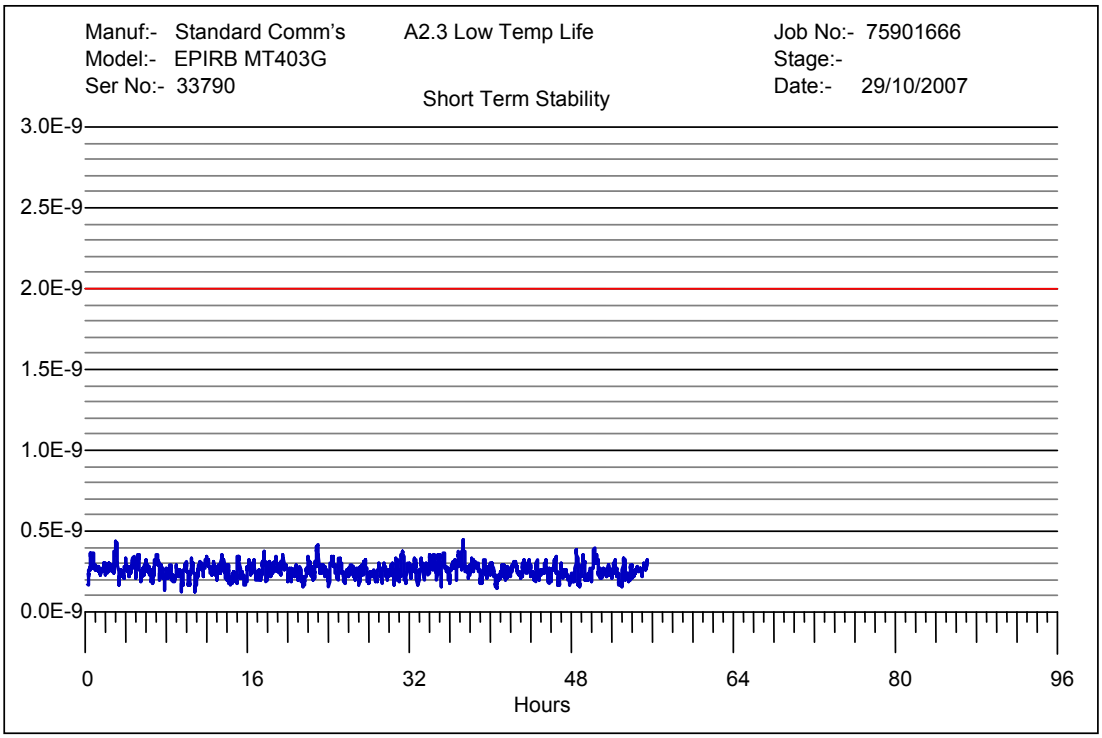
The major items of test equipment used for the above tests are identified in Section 3.1.

2.6.4 Test Results

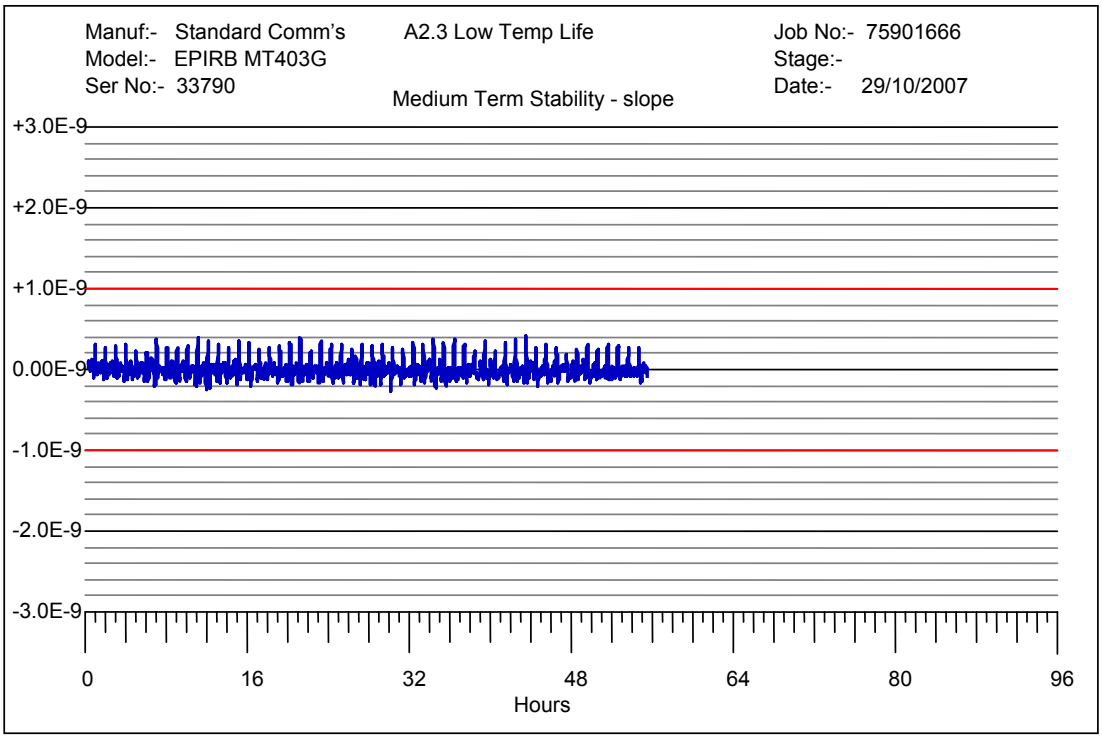
Operating Lifetime at Minimum Temperature – Nominal Frequency



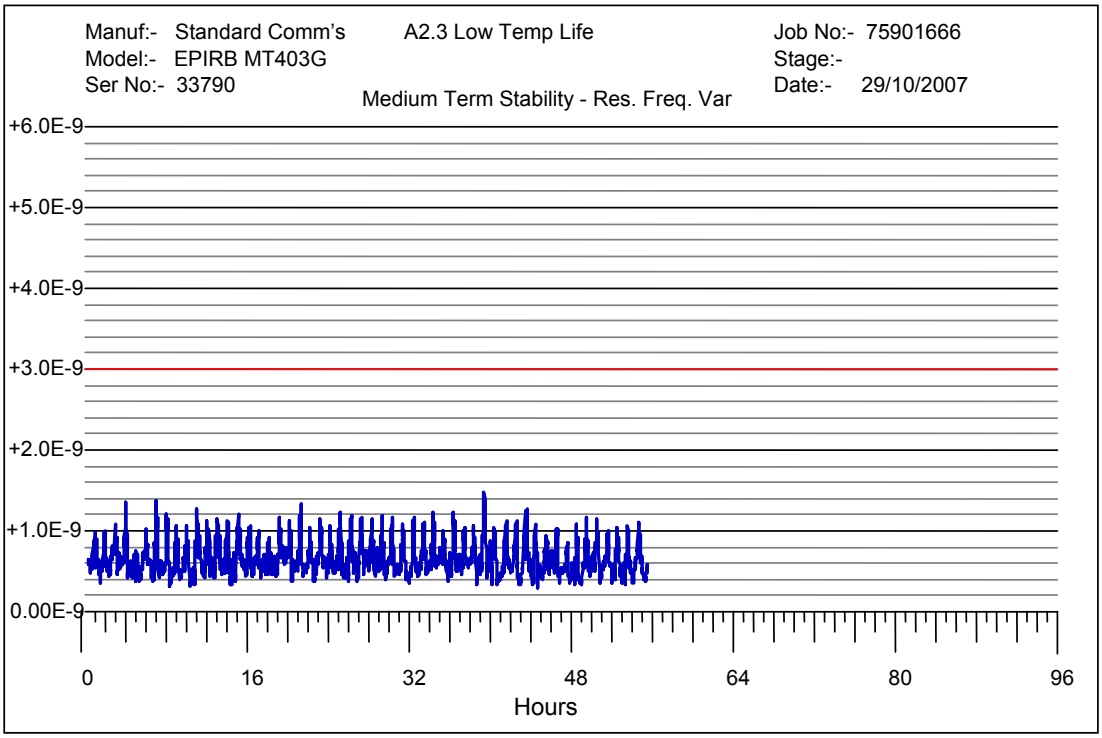
Operating Lifetime at Minimum Temperature – Short Term Stability



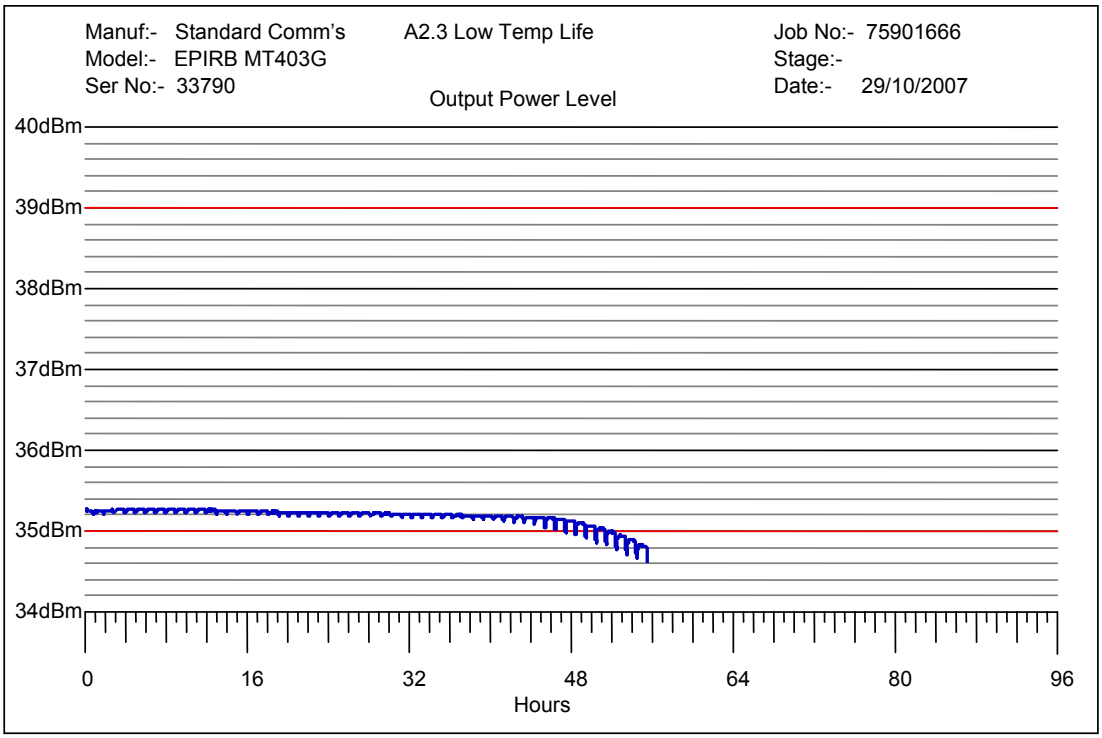
Operating Lifetime at Minimum Temperature – Medium Term Stability, Mean Slope



Operating Lifetime at Minimum Temperature – Medium Term Stability, Residual Frequency Variation



Operating Lifetime at Minimum Temperature – Output Power



Note: Path loss through a matching circuit of 1.71 dB should be applied to the result (making the actual power higher)

Operating Lifetime at Minimum Temperature – Digital Message

```
Message Content
     Expected Message       FFFE2F8C9F20FF9FC0FF022EF5379F3C0010
     Actual Message         FFFE2F8C9F20FF9FC0FF022EF5379F3C0010
     Message Error Count    00

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 193E41FF3F81FE0              193E41FF3F81FE0 Default_Id
 30 Hex (Bits 1-144) = 8C9F20FF9FC0FF022EF5379F3C0010

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1110 0100 0001 1111 1111 0011 1111 1000 0001 1111 1110 0000
   0100 0101 1101 1110 1010 0110 1111 0011 1110 0111 1000 0000 0000 0010 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            1 Long Message                               1
Protocol Flag      26            0 Location NEW                               0
MID                27- 36      201 ALBANIA                          0011 0010 01
Protocol Code      37- 40       15 Test (National)                         1111
Serial Number      41- 58    33790                          0010 0000 1111 1111 10
Medium Position    59- 85          DEFAULT     0111 1111 0000 0011 1111 1100 000
BCH Encoded        86-106          Errors=0           0100 0101 1101 1110 1010 0
BCH Generated      86-106                             0100 0101 1101 1110 1010 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                   110
More Data Flag    110              1 Position Data in bits 113-132            1
Encode Pos Device 111              1 Internal                                 1
121.5 Homing      112              1 YES                                      1
Position Change   113-126            DEFAULT                     1001 1111 0011 11
Resultant Position                --> Not Defined
National Use      127-132          0 Default                              0000 00
BCH Encoded       133-144            Errors=0                  0000 0001 0000
BCH Generated     133-144                                      0000 0001 0000
```

Product Service

Battery Current Measurement Results

Battery Discharge Current

The discharge current for the batteries was measured for each of the following beacon states.

Beacon in the Off or Standby State, "Standby Current"
Beacon performing a Self-test, "Self-test Current"
Beacon activated and transmitting, "Operating Current"

The individual tests were conducted for the following durations:

Standby Current	:	10.5 minutes	(631840 ms)
Self-test Current	:	3.92 seconds	(3920 ms)
GPS-test Current	:	210 seconds	(209920 ms)
Operating Current	:	30 minutes	(1799920 ms)

Assumptions / Supplied Data

Battery Replacement Interval	: 8 years
Battery Capacity	: 7.5 Ah
Battery Self Drain	: 0.75 % per year
Self-test Interval	: 12 tests per year
GPS-test Interval	: 1 tests per year

Test Results

Mode Current	=	Accumulated Charge	/	Time		
Standby Current	=	657109.36 pC	/	631840 ms	=	1.04 nA
Self-test Current	=	2345256.8 uC	/	3920 ms	=	598.28 mA
GPS-test Current	=	13630296 uC	/	209920 ms	=	64.93 mA
Operating Current	=	151804620 uC	/	1799920 ms	=	84.34 mA

Battery Preconditioning / Discharge Time Calculations

Battery Self Drain = Capacity - [(100% - Self Drain/Year%)$^{\text{Replacement Interval}}$ x Capacity]
= 7.5- ((1- 0.0075)^{8} x 7.5) = 0.4384 Ah

Standby Drain = Hours per year x Battery Replacement Interval x Standby Current
= 365 x 24 x 8 x 1.04 x 10^{-9} = 0.0001 Ah
Worst Case = 1.65 x 0.0001 Ah = 0.0001 Ah

Self-test Drain = Self-tests per battery x Self-test Current x Self-test duration (in hours)
= 12 x 8 x 598.28 x 10^{-3} x (3.92 / 3600) = 0.0625 Ah
Worst Case = 1.65 x 0.0625 Ah = 0.1032 Ah

GPS-test Drain = GPS-tests per battery x GPS-test Current x GPS-test duration (in hours)
= 1 x 8 x 64.93 x 10^{-3} x (210 / 3600) = 0.0303 Ah
Worst Case = 1.65 x 0.0303 Ah = 0.0500 Ah

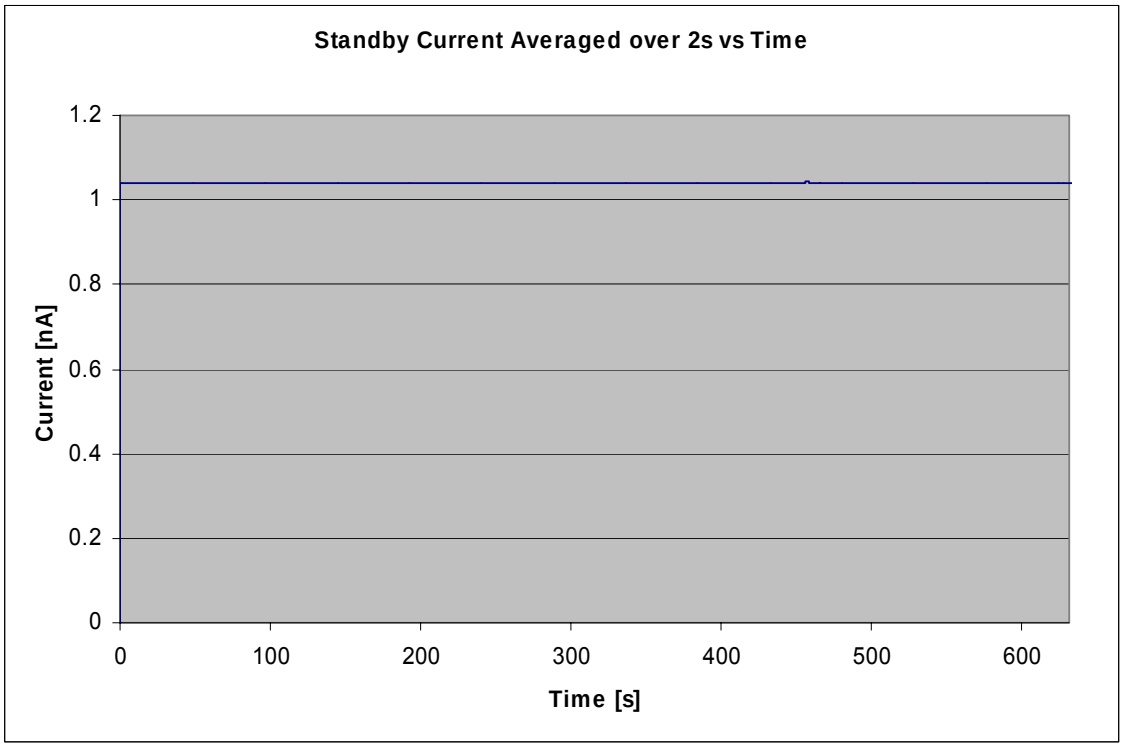
Total Drain = Self Drain + Standby Drain* + Self-test Drain* + GPS-test*
= 0.4384 + 0.0001 + 0.1032 + 0.0303 = 0.5917 Ah

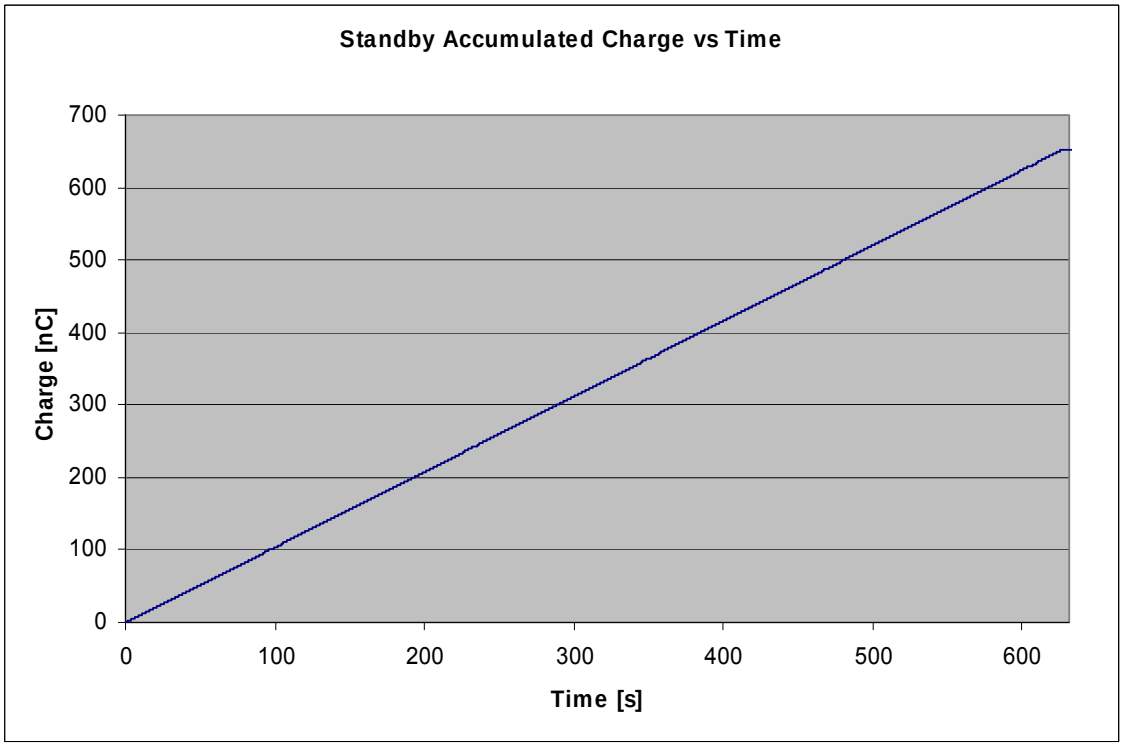
*Worst Case

Battery Preconditioning / Discharge Time = Worst Case drain / Operational Current
= 0.5917 / (84.34 x 10^{-3})
= 7.02 hours

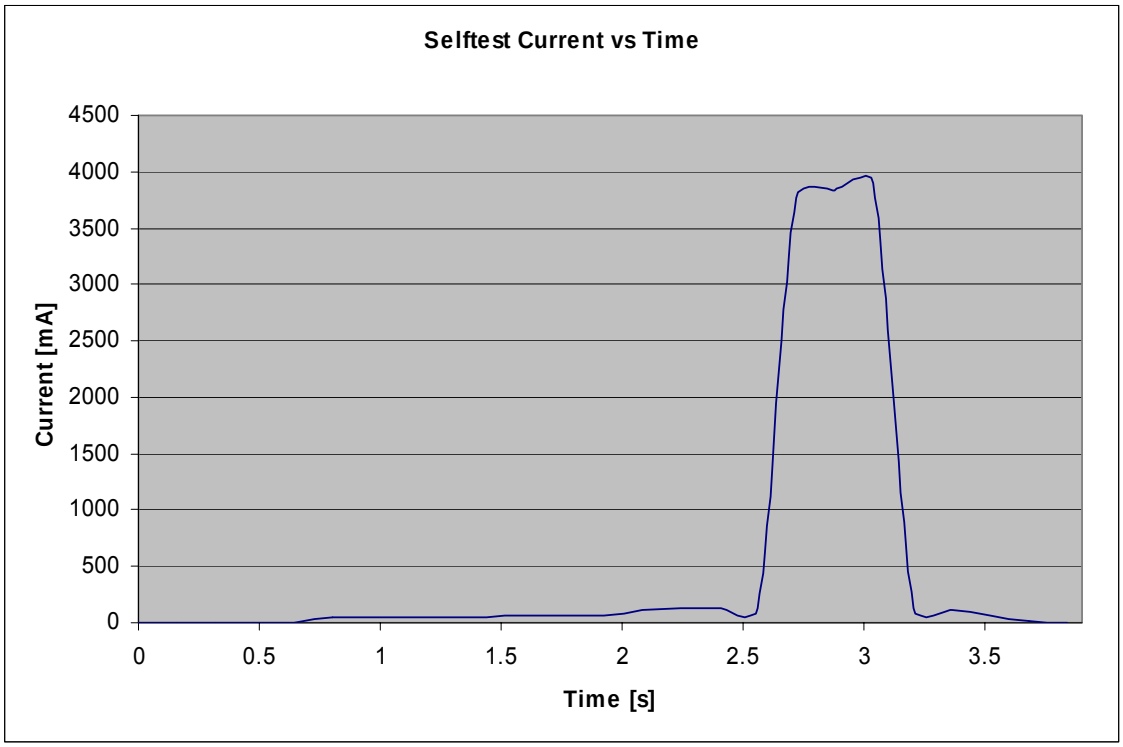
The battery was discharged by operating the beacon for only 1 hour prior to the test; hence, the remaining 6 hours should be removed from the “time to first failure” figure given in the Table Of Test Results to provide an “Effective Operational Lifetime Duration”.

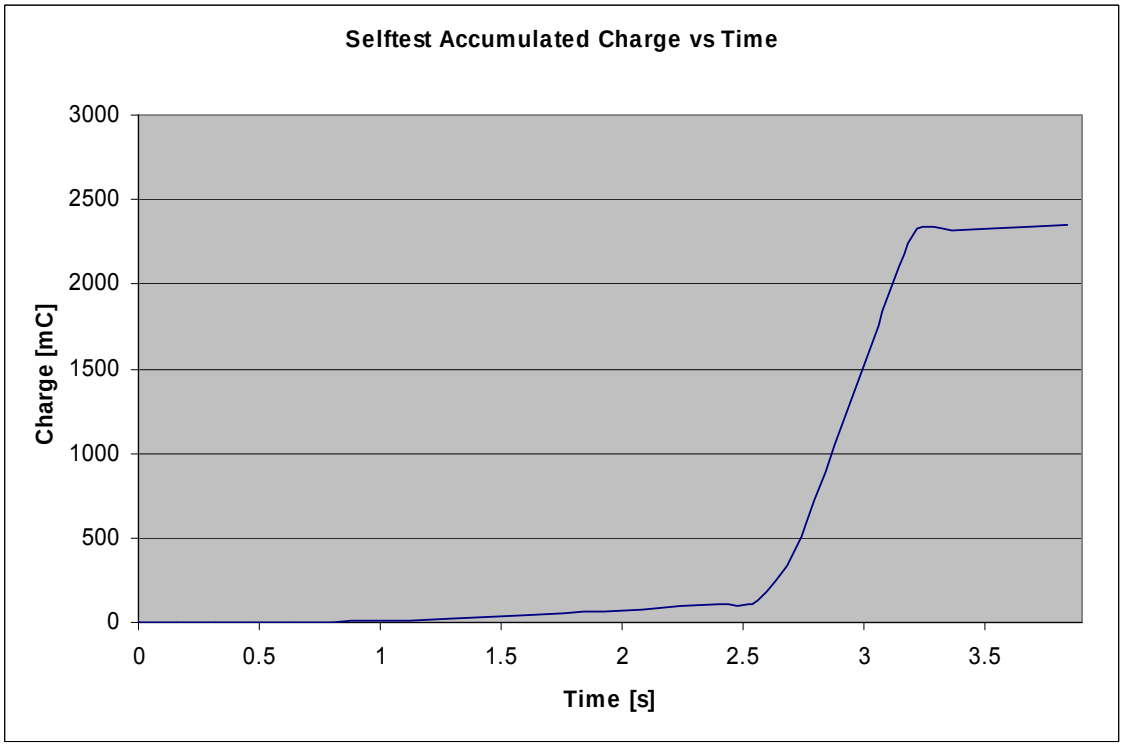
Battery Current Measurement Results (continued) - Standby Mode



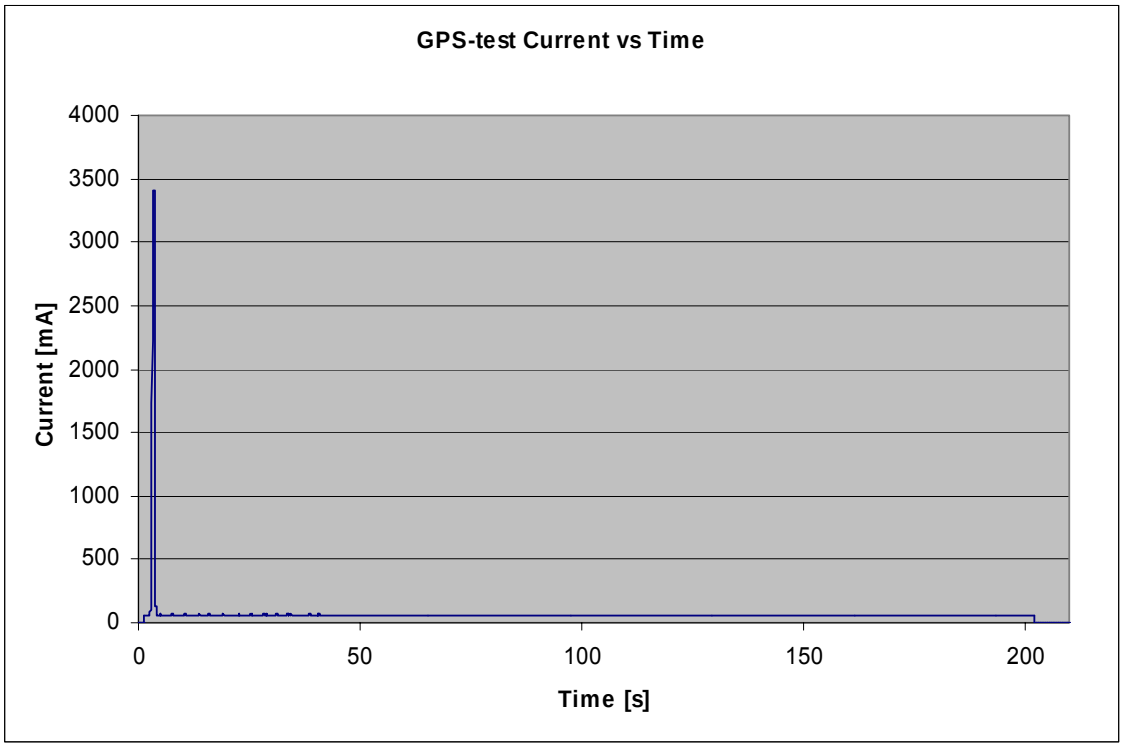


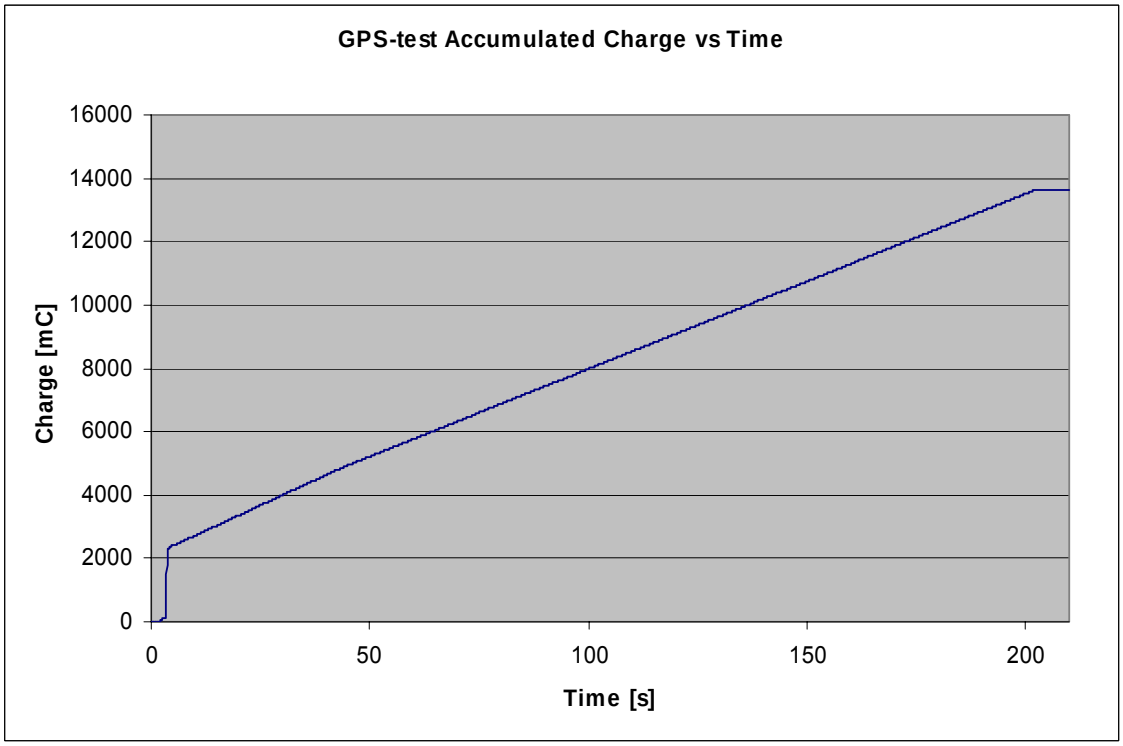
Battery Current Measurement Results (continued) – Self-test Mode



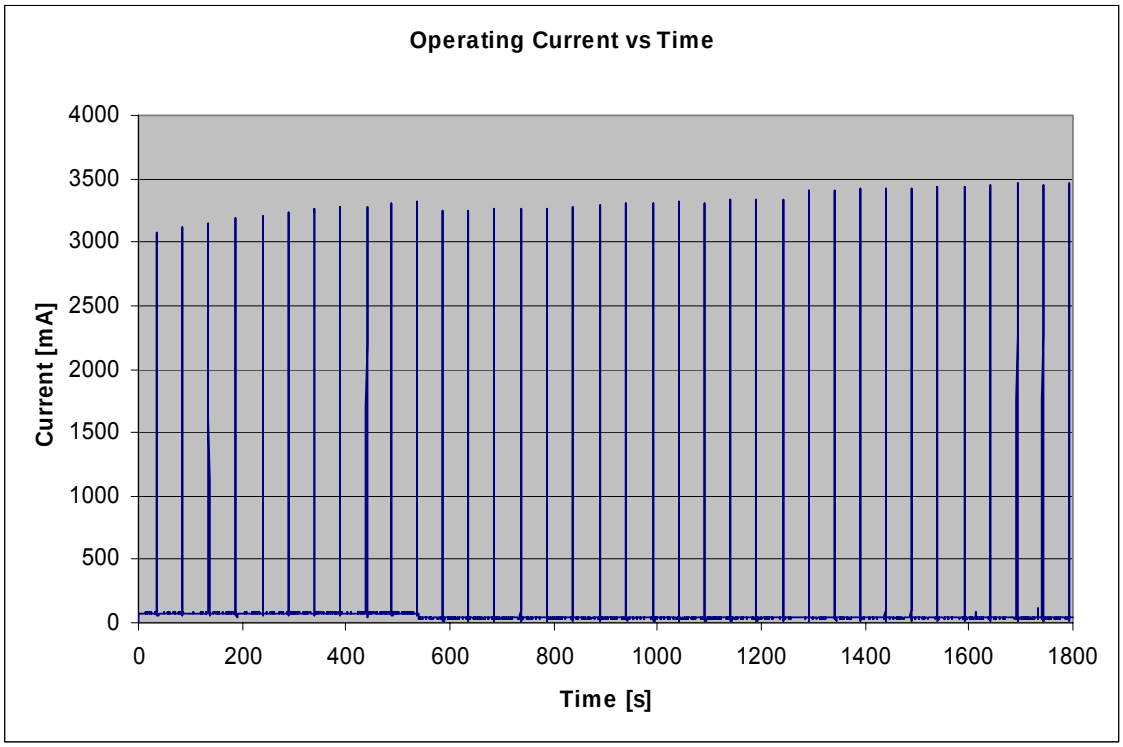


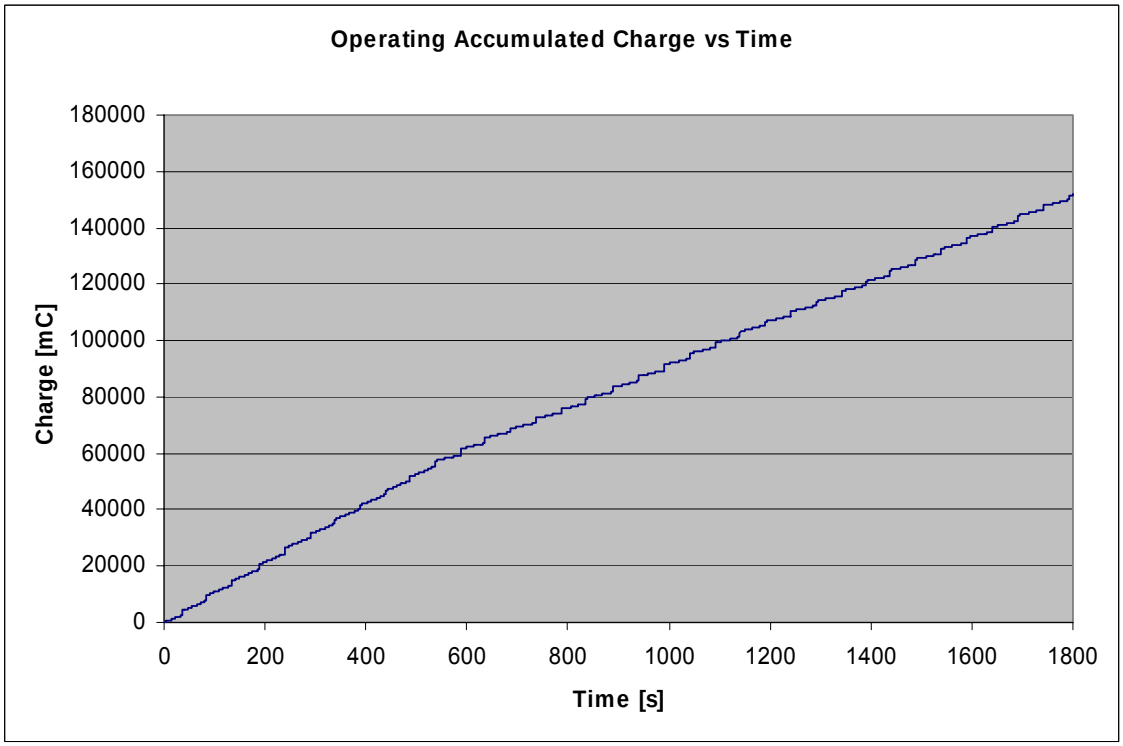
Battery Current Measurement Results (continued) – GPS-test Mode





Battery Current Measurement Results (continued) - Operational Mode





2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT

2.7.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

2.7.2 Date of Test

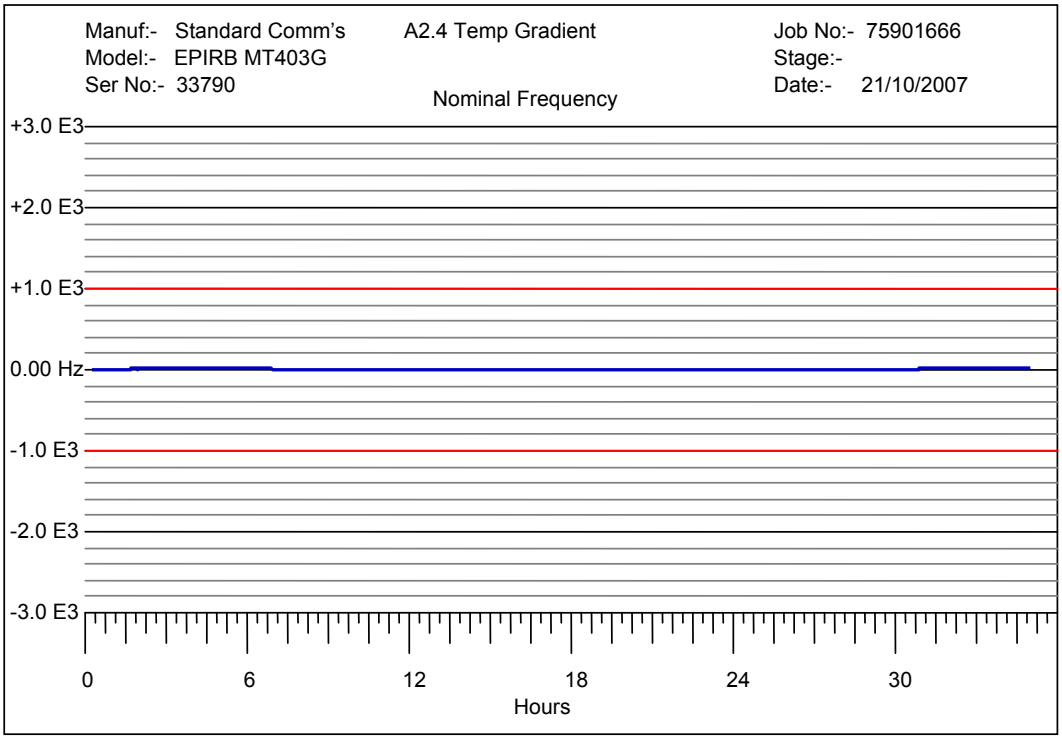
19th to 21st October 2007

2.7.3 Test Equipment Used

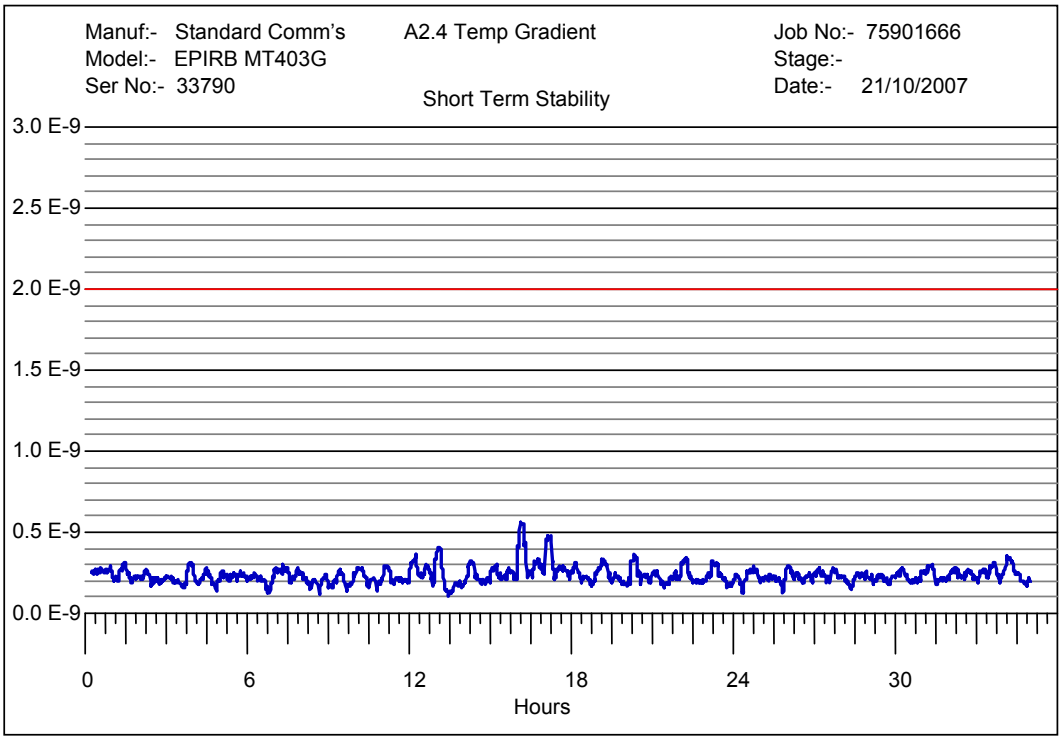
The major items of test equipment used for the above tests are identified in Section 3.1.

2.7.4 Test Results

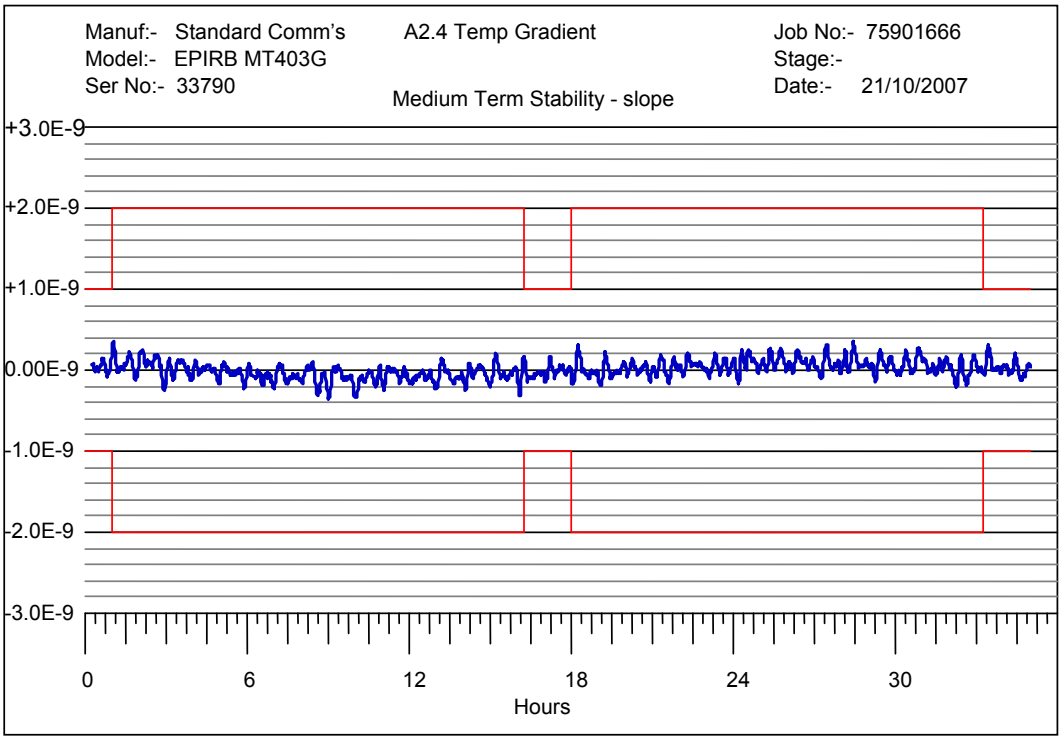
Temperature Gradient – Nominal Frequency



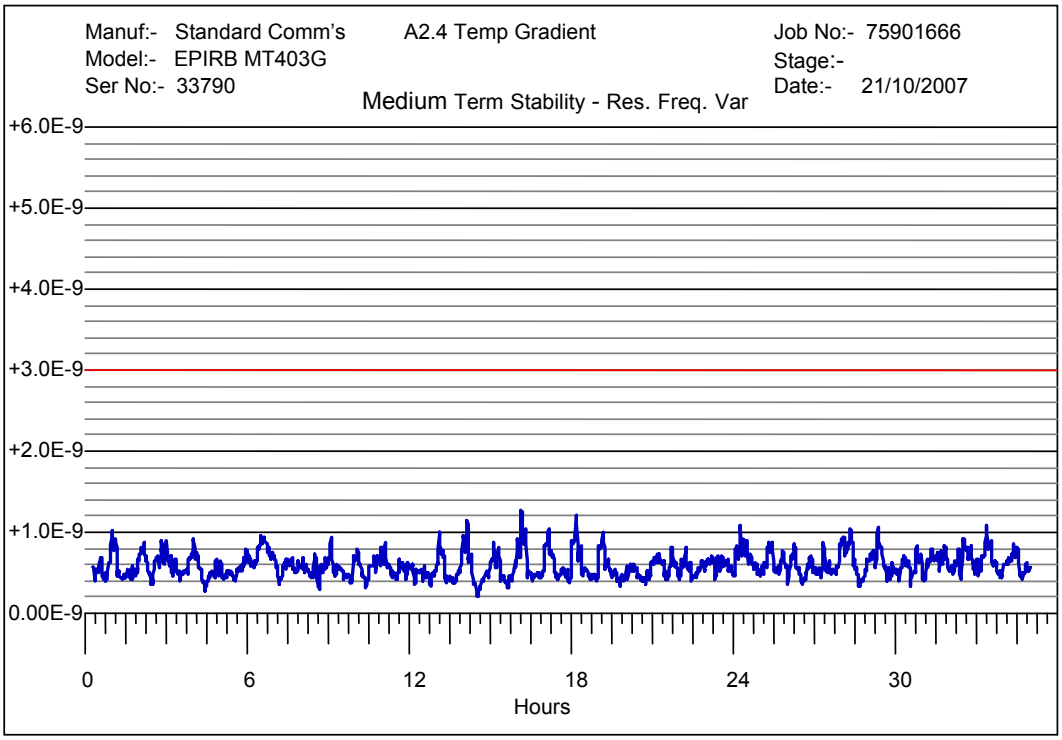
Temperature Gradient – Short Term Stability



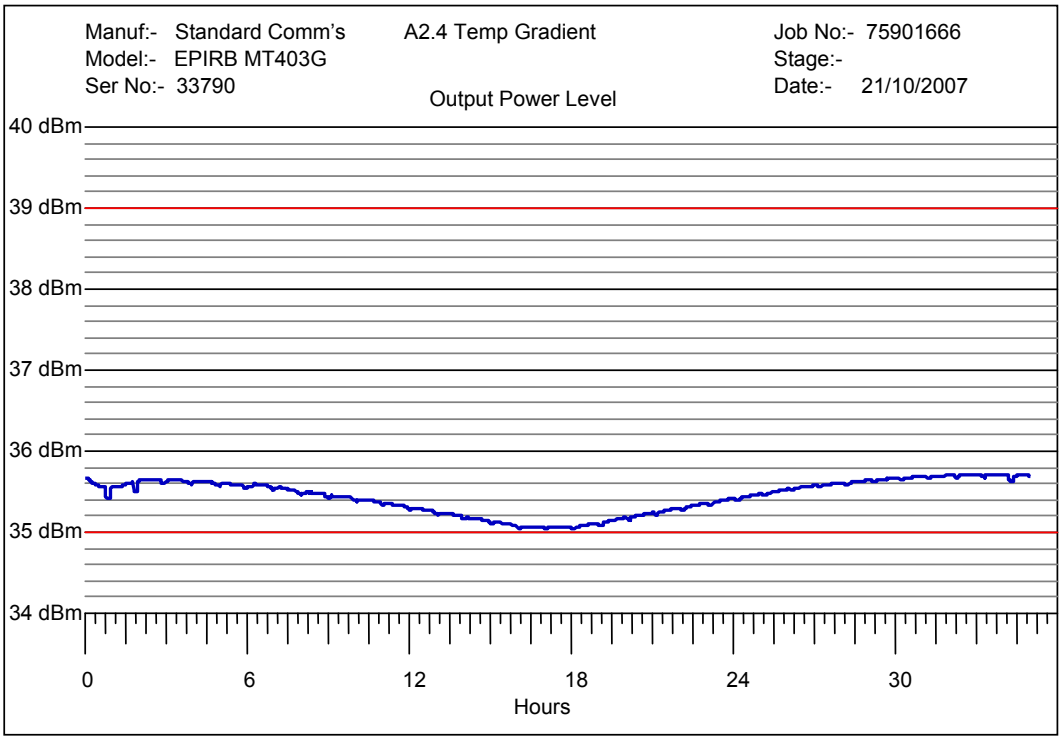
Temperature Gradient – Medium Term Stability, Mean Slope



Temperature Gradient – Medium Term Stability, Residual Frequency Variation



Temperature Gradient – Output Power



Note: Path loss through a matching circuit of 1.71 dB should be applied to the result (making the actual power higher)

Temperature Gradient – Digital Message

```
Message Content
     Expected Message       FFFE2F8C9F20FF9FC0FF022EF5379F3C0010
     Actual Message         FFFE2F8C9F20FF9FC0FF022EF5379F3C0010
     Message Error Count    00

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 193E41FF3F81FE0              193E41FF3F81FE0 Default_Id
 36 Hex (Bits 1-144) = 8C9F20FF9FC0FF022EF5379F3C0010

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1110 0100 0001 1111 1111 0011 1111 1000 0001 1111 1110 0000
   0100 0101 1101 1110 1010 0110 1111 0011 1110 0111 1000 0000 0000 0010 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            1 Long Message                               1
Protocol Flag      26            0 Location NEW                               0
MID                27- 36      201 ALBANIA                          0011 0010 01
Protocol Code      37- 40       15 Test (National)                         1111
Serial Number      41- 58    33790                          0010 0000 1111 1111 10
Medium Position    59- 85          DEFAULT     0111 1111 0000 0011 1111 1100 000
BCH Encoded        86-106          Errors=0           0100 0101 1101 1110 1010 0
BCH Generated      86-106                             0100 0101 1101 1110 1010 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                   110
More Data Flag    110              1 Position Data in bits 113-132            1
Encode Pos Device 111              1 Internal                                 1
121.5 Homing      112              1 YES                                      1
Position Change   113-126            DEFAULT                     1001 1111 0011 11
Resultant Position                --> Not Defined
National Use      127-132          0 Default                              0000 00
BCH Encoded       133-144          Errors=0                     0000 0001 0000
BCH Generated     133-144                                       0000 0001 0000
```

2.8 SATELLITE QUALITATIVE TESTS

2.8.1 Equipment Under Test

MT403G, Serial Number: 33790, Antenna Part/Model Number: N/A (Integrated)

2.8.2 Date of Test

Table 1: 11th – 12th October 2007
Table 2: 1st – 2nd November 2007

2.8.3 Test Equipment Used

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

2.8.4 Test Results

Table 1

Beacon 15 Hex ID: 1D1E4 1FF3F 81FE0
Actual location of the test beacon: Latitude: 050° 49.091'N
Longitude: 001° 11.870'W

Beacon test configuration
(e.g. on dry ground floating in water etc) : Floating in Water

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	Mean Rx Power (dBm)	TCA	CTA (deg)	Location Error (km)
S11	5082	1D1E4 1FF3F 81FE0	50.81626	-1.19407	-118.51	11:43:52	12.438	0.340
S9	27540	1D1E4 1FF3F 81FE0	50.81672	-1.19285	-120.29	11:19:33	4.178	0.386
S9	27539	1D1E4 1FF3F 81FE0	50.81626	-1.19589	-118.93	09:39:16	-11.447	0.254
S11	5081	1D1E4 1FF3F 81FE0	50.81715	-1.20800	-117.83	10:04:15	-2.270	0.723
S11	5080	1D1E4 1FF3F 81FE0	50.81741	-1.19584	-115.12	08:23:11	-18.208	0.164
S7	48937	1D1E4 1FF3F 81FE0	50.80775	-1.09773	-121.66	08:12:29	18.614	7.124
S8	36363	1D1E4 1FF3F 81FE0	50.82091	-1.19482	-124.45	07:24:22	19.139	0.370
S7	48936	1D1E4 1FF3F 81FE0	50.81938	-1.19359	-120.80	06:33:44	5.120	0.326
S8	36362	1D1E4 1FF3F 81FE0	50.81646	-1.19186	-120.98	05:44:56	5.933	0.461
S8	36361	1D1E4 1FF3F 81FE0	50.81661	-1.19727	-116.63	04:04:05	-9.613	0.179
S7	48935	1D1E4 1FF3F 81FE0	50.83284	-1.19208	-120.83	04:53:35	-10.424	1.678
S10	12334	1D1E4 1FF3F 81FE0	50.81815	-1.18720	-120.66	03:10:53	6.867	0.747
S10	12333	1D1E4 1FF3F 81FE0	50.81829	-1.19819	-116.17	01:30:00	-8.644	0.028
S9	27533	1D1E4 1FF3F 81FE0	50.81861	-1.19424	-120.68	23:09:33	-16.081	0.257
S11	5074	1D1E4 1FF3F 81FE0	50.82297	-1.19131	-117.43	21:52:25	-9.331	0.702
S11	5073	1D1E4 1FF3F 81FE0	50.82519	-1.20360	-118.01	20:12:10	6.149	0.878
S9	27531	1D1E4 1FF3F 81FE0	50.82417	-1.20406	-124.48	19:49:33	14.184	0.796
S11	5072	1D1E4 1FF3F 81FE0	50.82439	-1.19899	-119.67	18:33:19	19.352	0.695
S7	48929	1D1E4 1FF3F 81FE0	50.84087	-1.20795	-122.07	18:24:14	-17.096	2.619
S8	36355	1D1E4 1FF3F 81FE0	50.82024	-1.19183	-122.27	17:29:12	-17.968	0.479
S7	48928	1D1E4 1FF3F 81FE0	50.82338	-1.26247	-119.47	16:43:29	-1.178	4.574
S8	36354	1D1E4 1FF3F 81FE0	50.82661	-1.18794	-121.15	15:47:35	-1.951	1.166
S7	48927	1D1E4 1FF3F 81FE0	50.85655	-1.15179	-122.37	15:04:09	13.288	5.350
S10	12327	1D1E4 1FF3F 81FE0	50.82021	-1.19362	-123.86	14:54:32	-18.378	0.372

$$\text{Ratio of successful solutions} = \frac{\text{number of Doppler solution within 5km with } 1° < CTA < 21°}{\text{number of satellite passes over test duration with } 1° < CTA < 21°}$$

$$= \frac{22}{24} = 91.67\%$$

Table 2

Beacon 15 Hex ID: 193E41FF3F81FE0
Actual location of the test beacon: Latitude: 052° 14.447´ N
Longitude: 001° 43.970´ W

Beacon test configuration
(e.g. on dry ground floating in water etc): C/S T.007, Figure B.5

Satellite ID	Satellite Pass Number	15 Hex ID Provided by LUT	Doppler Latitude	Doppler Longitude	Mean Rx Power (dBm)	TCA	CTA (deg)	Location Error (km)
S8	36651	193E4 1FF3F 81FE0	52.24381	-1.71539	-121.43	16:43:32	-10.025	1.234
S9	27832	193E4 1FF3F 81FE0	52.24205	-1.71708	-134.37	23:24:52	-18.080	1.081
S11	5373	193E4 1FF3F 81FE0	52.24508	-1.71593	-129.21	22:59:14	-19.302	1.245
S9	27831	193E4 1FF3F 81FE0	52.24782	-1.71469	-124.74	21:43:55	-2.643	1.461
S9	27830	193E4 1FF3F 81FE0	52.24582	-1.73110	-121.56	20:04:23	11.623	0.572
S11	5372	193E4 1FF3F 81FE0	52.24869	-1.71436	-122.07	21:18:01	-3.824	1.534
S9	27830	193E4 1FF3F 81FE0	52.24727	-1.73752	-126.40	20:04:23	11.625	0.788
S11	5371	193E4 1FF3F 81FE0	52.25176	-1.73461	-123.38	19:38:13	10.599	1.226
S7	49228	193E4 1FF3F 81FE0	52.24346	-1.74750	-131.19	18:23:34	-16.646	1.041
S7	49236	193E4 1FF3F 81FE0	52.27815	-1.61436	-131.05	08:11:12	17.379	9.065
S7	49235	193E4 1FF3F 81FE0	52.23810	-1.74301	-127.04	06:32:22	4.270	0.754
S8	36658	193E4 1FF3F 81FE0	52.24114	-1.72949	-122.19	04:59:11	-2.043	0.231
S7	49234	193E4 1FF3F 81FE0	52.25382	-1.71758	-126.15	04:52:09	-10.820	1.782
S10	12631	193E4 1FF3F 81FE0	52.23963	-1.72050	-130.44	04:33:38	16.827	0.849
S8	36657	193E4 1FF3F 81FE0	52.23705	-1.71760	-129.05	03:17:33	-17.567	1.117
S10	12630	193E4 1FF3F 81FE0	52.23970	-1.71998	-125.95	02:53:50	3.571	0.883
S10	12629	193E4 1FF3F 81FE0	52.23803	-1.72226	-127.52	01:12:38	-11.706	0.782

$$\text{Ratio of successful solutions} = \frac{\text{number of Doppler solution within 5km with } 1° < \text{CTA} < 21°}{\text{number of satellite passes over test duration with } 1° < \text{CTA} < 21°}$$

$$= \frac{16}{17} = 94.12\%$$

2.9 ANTENNA CHARACTERISTICS

2.9.1 Equipment Under Test

MT403G, Serial Number: 33790

2.9.2 Date of Test

1st November 2007

2.9.3 Test Equipment Used

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

2.9.4 Test Results

Configuration B.5

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (degrees)	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi
0	38.7	1.63	39.4	2.37	36.7	-0.34	32.8	-4.26	30.8	-6.26
90	38.6	1.55	39.4	2.28	36.4	-0.63	32.5	-4.62	~~30.4~~	-6.64
180	38.5	1.43	39.5	2.46	36.2	-0.84	32.3	-4.76	~~30.2~~	-6.85
270	38.5	1.43	39.7	2.65	36.4	-0.64	32.4	-4.68	~~30.7~~	-6.35

$EIRP_{LOSS}$ = Pt_{amb} - Pt_{EOL} = (35.37 – 34.60) = 0.77 dB

$EIRP_{maxEOL}$ = MAX [$EIRP_{max}$, $EIRP_{max}$ - $EIRP_{LOSS}$] = MAX (39.7, 38.9) = 39.7dBm

$EIRP_{minEOL}$ = MIN [$EIRP_{min}$, $EIRP_{min}$ - $EIRP_{LOSS}$] = MIN (30.8, 30.0) = 30.0dBm

Pt_{amb} is the power at ambient from the Summary Table
Pt_{EOL} is the power at the end of Operating Life at Minimum Temperature
$EIRP_{max}$ is the maximum EIRP from the antenna characteristics spreadsheet
$EIRP_{min}$ is the minimum EIRP from the antenna characteristics spreadsheet

Configuration B.4

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (degrees)	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi	EIRP dBm	Ant dBi
0	38.7	1.59	41.3	4.25	43.0	5.89	38.7	1.63	35.1	-1.96
30	38.8	1.68	41.2	4.16	42.9	5.79	38.7	1.62	34.8	-2.23
60	38.9	1.86	41.1	4.05	42.8	5.69	38.7	1.63	34.9	-2.18
90	39.1	2.00	41.1	3.97	42.8	5.69	38.8	1.73	34.9	-2.22
120	39.3	2.17	41.4	4.36	42.8	5.70	38.7	1.65	34.9	-2.13
150	39.1	2.00	41.4	4.36	42.9	5.79	38.9	1.84	35.1	-1.94
180	39.0	1.90	41.5	4.46	43.0	5.89	38.8	1.74	35.2	-1.85
210	39.0	1.88	41.3	4.25	42.9	5.79	38.7	1.64	35.2	-1.93
240	38.7	1.58	41.5	4.46	~~43.1~~	5.99	38.6	1.53	34.9	-2.15
270	38.8	1.70	41.3	4.25	43.0	5.89	38.5	1.44	35.1	-2.01
300	38.8	1.68	41.3	4.25	~~43.1~~	5.98	38.8	1.73	34.9	-2.20
330	39.0	1.88	41.0	3.96	42.8	5.69	38.7	1.63	35.0	-2.08
Gain Variation	0.59		0.50		0.31		0.40		0.39	

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (degrees)	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh
0	110.10	92.10	112.40	89.20	113.30	94.00	108.00	85.00	102.70	89.70
30	110.20	91.10	112.30	90.60	113.20	94.20	108.00	82.10	102.50	87.60
60	110.40	89.40	112.20	89.50	113.10	93.90	108.00	85.00	102.50	89.10
90	110.50	92.70	112.10	91.60	113.10	93.70	108.10	84.50	102.50	88.00
120	110.70	91.30	112.50	90.50	113.10	94.30	108.00	87.70	102.60	87.70
150	110.50	92.70	112.50	90.70	113.20	93.70	108.20	86.70	102.80	87.60
180	110.40	93.00	112.60	90.50	113.30	94.10	108.10	86.70	102.90	87.50
210	110.40	91.60	112.40	88.60	113.20	94.10	108.00	87.10	102.80	88.10
240	110.10	91.30	112.60	90.40	113.40	94.20	107.90	84.30	102.60	86.90
270	110.20	92.60	112.40	89.20	113.30	93.50	107.80	86.80	102.70	88.40
300	110.20	91.30	112.40	89.30	113.40	93.40	108.10	85.40	102.50	88.60
330	110.40	91.30	112.10	89.80	113.10	93.30	108.00	85.50	102.60	89.10
Min (Vv-Vh)	17.40		20.50		18.80		20.30		13.00	

$EIRP_{LOSS}$ = Pt_{amb} - Pt_{EOL} = (35.37 – 34.60) = 0.77 dB

$EIRP_{maxEOL}$ = MAX [$EIRP_{max}$, $EIRP_{max}$ - $EIRP_{LOSS}$] = MAX (43.0, 42.2) = 43.0dBm

$EIRP_{minEOL}$ = MIN [$EIRP_{min}$, $EIRP_{min}$ - $EIRP_{LOSS}$] = MIN (34.8, 34.0) = 34.0dBm

Pt_{amb} is the power at ambient from the Summary Table
Pt_{EOL} is the power at the end of Operating Life at Minimum Temperature
$EIRP_{max}$ is the maximum EIRP from the antenna characteristics spreadsheet
$EIRP_{min}$ is the minimum EIRP from the antenna characteristics spreadsheet

2.10 BEACON CODING SOFTWARE

2.10.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

2.10.2 Date of Test

7th November 2007 and 30th January 2008

2.10.3 Test Equipment Used

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

Note: For the purposes of encoding the beacon with the various protocols the "GME Message Encoder", TÜV Product Service Ltd designation 75901666_18, was utilised. This is customer supplied equipment and does not appear in Section 3.1.

2.10.4 Test Results

Examples of User (Location) Protocol Beacon Messages

Protocol	Operational Message (in hexadecimal including bit and frame synchronisation bits)	Self-Test Message (in hexadecimal including bit and frame synchronisation bits)
Maritime User (Location) Protocol with MMSI	FFFE2F CC94186186186E8 8D48FEFE0FF0146	FFFED0 CC94186186186E8 8D48FEFE0FF0146
Maritime User (Location) Protocol with Radio Call Sign	FFFE2F CC95BDBC1ACC8E8 AFF5F6FE0FF0146	FFFED0 CC95BDBC1ACC8E8 AFF5F6FE0FF0146
Radio Call Sign User (Location) Protocol	FFFE2F CC9DBDBC1A554E8 FD32B6FE0FF0146	FFFED0 CC9DBDBC1A554E8 FD32B6FE0FF0146
Serial User (Location): Float Free EPIRB with Serial Number	FFFE2F CC96A107FC007CE 90B972FE0FF0146	FFFED0 CC96A107FC007CE 90B972FE0FF0146
Serial User (Location): No Float Free EPIRB with Serial Number	FFFE2F CC972107FC007CE CC964AFE0FF0146	FFFED0 CC972107FC007CE CC964AFE0FF0146
Aviation User Protocol	N/A	N/A
Serial User: ELT with Serial Number	N/A	N/A
Serial User: ELT with Aircraft Operator Designator & Serial Number	N/A	N/A
Serial User: ELT with Aircraft 24-bit address	N/A	N/A
Serial User: PLB with Serial Number	N/A	N/A
National User (Short)	N/A	N/A
National User (Location) (Long)	FFFE2F CC9800000000000 3AAC24FE0FF0F61	FFFED0 CC9800000000000 3AAC24000000000

Examples of Location Protocol Beacon Messages

Protocol	Operational Message (in hexadecimal including bit and bit/frame synchronisation bits)		Self-Test Message (in hexadecimal including bit and bit/frame synchronisation bits)
	Location A[1]	Location B[1]	
Standard Location: EPIRB with MMSI	FFFE2F 8C92F423F133A03 FFACBF71DA4C1E9[3]	FFFE2F 8C92F423F132E03 02E6AF78EA76951	FFFED0 8C92F423F17FDFF 90DB83783E0F66C
Standard Location: EPIRB with Serial Number	FFFE2F 8C96F9E70F33A03 DA486371DA4C1E9	FFFE2F 8C96F9E70F32E03 27027378EA76951	FFFED0 8C96F9E70F7FDFF B53F5F783E0F66C
Standard Location: ELT with 24-bit Address	N/A	N/A	N/A
Standard Location: ELT with Serial Number	N/A	N/A	N/A
Standard Location: ELT with Aircraft Operator Designator	N/A	N/A	N/A
Standard Location: PLB with Serial Number	N/A	N/A	N/A
National Location: EPIRB	FFFE2F 8C9A00000CD701C EB8A3B7920C0AB2	FFFE2F 8C9A00000CB1019 B7DFC7794240FCD	FFFED0 8C9A00001FC0FF0 21F5DB79F3C0010
National Location: ELT	N/A	N/A	N/A
National Location: PLB	N/A	N/A	N/A
User-Location[2]	FFFE2F CC94186186186E8 8D48FE66D01C026	FFFE2F CC94186186186E8 8D48FE65901967F	FFFED0 CC94186186186E8 8D48FEFE0FF0146

[1] Location “A” and location “B” are separated by approximately 64.4km. Locations are as follows:

Location A: N 51° 22.583’
W 1° 49.833’
Location B: N 50° 48.683’
W 1° 37.417’

[2] Conformance of User-Location protocol demonstrated by a single example of “A”, “B”, and self-test messages provided in table above and by Examples of User Protocol Beacon Messages Table (see page 54) completed with the specific User protocol variations requested.

[3] This message retested 30 January 2008 due to apparent test set up error, “Location B” for the same protocol was also retested for confirmation of test set up repeatability, result was as per original result stated in the above table.

2.11 NAVIGATION SYSTEM – NATIONAL LOCATION PROTOCOL

2.11.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

Note: For the Position Acquisition Time and Position Accuracy test the official designation of the EUT was MT403G as the float-free adaptor bracket was not present.

2.11.2 Date of Test

22nd October and 9th November 2007

2.11.3 Test Equipment Used

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

2.11.4 Test Results

Position Data Default Values

The beacon was activated without providing data and operated for 30 minutes. Message content was checked for all bursts during this period.

Hex 30 Message	Message Count
8C9F20FF9FC0FF022EF5379F3C0010	38

Position Acquisition Time and Position Accuracy

A3.8.2.1: 50° 52.135' N 1° 14.701' W ①
A3.8.2.2: 51° 22.583' N 1° 49.833' W ②

Operation Configuration	C/S T.007 Section A3.8.2.1		C/S T.007 Section A3.8.2.2	
	Time to Acquire Position (sec)	Location Error in metres	Time to Acquire Position (sec)	Location Error in metres
Floating in Water	123	130.8	123	49.5
Resting on Dry Ground	N/A	N/A	N/A	N/A
C/S T.007, Figure B.5	126	22.9	126	49.5

Positional accuracy was estimated using the Haversine Formula, Earth's radius taken as 6367km.

① Input: navigation simulator.
② Input: 'Live' GPS Signals

Encoded Position Data Update Interval

Location 51° 22.583'N, 1° 49.833'W①		
Time from activation to 1st message	75s	
First Message Acquired at	12:18:04	8C9F20FF9FC0FF022EF5379F3C0010
Data Acquired at	12:18:54	8C9F20FF8CD701CE890B37920C0AB2
Location 50° 48.683'N, 1° 37.417'W①		
First Message Acquired at	12:59:48	8C9F20FF8CD701CE890B37920C0AB2
Data Updated at	13:10:35	8C9F20FF8CB1019B4C54F794240FCD
Data Update Interval	51m 41s	

① Input navigation simulator.

Position Clearance After Deactivation

The beacon was activated and a position acquired, moved and a new position acquired, deactivated and reactivated without providing navigation data.

Location 51° 22.583'N, 1° 49.833'W①		
Time from activation to 1st message	75s	
First Message Acquired at	12:18:04	8C9F20FF9FC0FF022EF5379F3C0010
Data Acquired at	12:18:54	8C9F20FF8CD701CE890B37920C0AB2
Location 50° 48.617'N, 1° 38.217'W①		
First Message at	12:59:48	8C9F20FF8CD701CE890B37920C0AB2
Data Updated at	13:10:35	8C9F20FF8CB1019B4C54F794240FCD
Deactivated at	13:10:42	
Time from re-activation to 1st message	75s	
Default data present	13:11:57	8C9F20FF9FC0FF022EF5379F3C0010

Last Valid Position

Location 50° 48.617'N, 1° 38.217'W①		
Time from activation to 1st message	75s	
First Message Acquired at	11:36:54	8C9F20FF9FC0FF022EF5379F3C0010
Data Acquired at	11:41:54	8C9F20FF8CB1019B4C54F794240FCD
GPS Signal Navigation Data Removed	11:42:03	
Last Message with Positional Data	15:41:09	8C9F20FF8CB1019B4C54F794240FCD
First Message with Default Data	15:41:57	8C9F20FF9FC0FF022EF5379F3C0010
Last Valid Position Held	240m	

① Input navigation simulator.

Coarse Position and Delta Offset

Script Reference (See table D.3 of C/S T.007 – Issue 4 November 2005)	Value of Encoded Location Bits Transmitted by Beacon (Hexadecimal)	Confirmation that BCH Correct (✓)
1	Bits 59-85 = 3F81FE0 Bits 113-126 = 27CF	✓
2	Bits 59-85 = A8A0C2 Bits 113-126 = 2489 Number of seconds after providing navigation data that beacon transmitted the above encoded location information: <52.5	✓
3	Bits 59-85 = A8A0C2 Bits 113-126 = 3F09	✓
4	Bits 59-85 = D8A0C2 Bits 113-126 = 2189	✓
5	Bits 59-85 = D8A0C2 Bits 113-126 = B09	✓
6	Bits 59-85 = C8B67D Bits 113-126 = 749	✓
7	Bits 59-85 = C8B67D Bits 113-126 = 77E	✓
8	Bits 59-85 = C8967C Bits 113-126 = 702	✓
9	Bits 59-85 = C8967C Bits 113-126 = 77E	✓
10	Bits 59-85 = C8B67D Bits 113-126 = 749	✓

2.12 NAVIGATION SYSTEM – STANDARD LOCATION PROTOCOL

2.12.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

Note: For the Position Acquisition Time and Position Accuracy test the official designation of the EUT was MT403G as the float-free adaptor bracket was not present.

2.12.2 Date of Test

30th October, 6th and 14th November 2007

2.12.3 Test Equipment Used

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

2.12.4 Test Results

Position Data Default Values

The beacon was activated without providing data and operated for 30 minutes. Message content was checked for all bursts during this period.

Hex 30 Message	Message Count
8C9E0000007FDFFA79ED3783E0F66C	38

Position Acquisition Time and Position Accuracy

A3.8.2.1: 50° 52.135' N 1° 14.701' W ①
A3.8.2.2: 51° 22.583' N 1° 49.833' W ②

Operation Configuration	C/S T.007 Section A3.8.2.1		C/S T.007 Section A3.8.2.2	
	Time to Acquire Position (sec)	Location Error in metres	Time to Acquire Position (sec)	Location Error in metres
Floating in Water	124	35.3	123	53.1
Resting on Dry Ground	N/A	N/A	N/A	N/A
C/S T.007 , Figure B.5	127	35.3	127	53.1

Positional accuracy was estimated using the Haversine Formula, Earth's radius taken as 6367km.

Encoded Position Data Update Interval

Location 51° 22.583'N, 1° 49.833'W①		
Time from activation to 1st message	75s	
First Message Acquired at	12:43:39	8C9E0000007FDFFA79ED3783E0F66C
Data Acquired at	12:44:30	8C9E00000033A03C8E9EF71DA4C1E9
Location 50° 48.617'N, 1° 38.217'W①		
First Message Acquired at	13:06:12	8C9E00000033A03C8E9EF71DA4C1E9
Data Updated at	13:36:10	8C9E00000032E03AEC47378E8792E8
Data Update Interval	51m 40s	

① Input navigation simulator.

Position Clearance After Deactivation

The beacon was activated and a position acquired, moved and a new position acquired, deactivated and reactivated without providing navigation data.

Location 51° 22.583'N, 1° 49.833'W①		
Time from activation to 1st message	75s	
First Message Acquired at	12:43:39	8C9E0000007FDFFA79ED3783E0F66C
Data Acquired at	12:44:30	8C9E00000033A03C8E9EF71DA4C1E9
Location 50° 48.617'N, 1° 38.217'W①		
First Message Acquired at	13:06:12	8C9E00000033A03C8E9EF71DA4C1E9
Data Updated at	13:36:10	8C9E00000032E03AEC47378E8792E8
Deactivated at	13:36:31	
Time from re-activation to 1st message	75s	
Default data present	13:37:51	8C9E0000007FDFFA79ED3783E0F66C

Last Valid Position

Location 50° 48.617'N, 1° 38.217'W①		
Time from activation to 1st message	75s	
First Message Acquired at	13:46:32	8C9E0000007FDFFA79ED3783E0F66C
Data Acquired at	13:47:23	8C9E00000032E0335A3FF78EA76951
GPS Signal Navigation Data Removed	13:47:40	
Last Message with Positional Data	17:46:37	8C9E00000032E0335A3FF78EA76951
First Message with Default Data	17:47:29	8C9E0000007FDFFA79ED3783E0F66C
Last Valid Position Held	240m	

① Input: navigation simulator.

Coarse Position and Delta Offset

Script Reference (See table D.3 of C/S T.007 – Issue 4 November 2005)	Value of Encoded Location Bits Transmitted by Beacon (Hexadecimal)	Confirmation that BCH Correct (✓)
1	Bits 65-85 = FFBFF Bits 113-132 = 83E0F	✓
2	Bits 65-85 = 2404 Bits 113-132 = 8E227 Number of seconds after providing navigation data that beacon transmitted the above encoded location information: 16	✓
3	Bits 65-85 = 2404 Bits 113-132 = F8227	✓
4	Bits 65-85 = 3404 Bits 113-132 = 88227	✓
5	Bits 65-85 = 3404 Bits 113-132 = 74627	✓
6	Bits 65-85 = 2404 Bits 113-132 = 8227	✓
7	Bits 65-85 = 2404 Bits 113-132 = 83D7	✓
8	Bits 65-85 = 2406 Bits 113-132 = 8227	✓
9	Bits 65-85 = 2406 Bits 113-132 = 81B8	✓
10	Bits 65-85 = 2402 Bits 113-132 = 8206	✓

Input: navigation simulator.

2.13 NAVIGATION SYSTEM – USER LOCATION PROTOCOL

2.13.1 Equipment Under Test

MT403G / MT403FG, Serial Number: 33790

Note: For the Position Acquisition Time and Position Accuracy test the official designation of the EUT was MT403G as the float-free adaptor bracket was not present.

2.13.2 Date of Test

7th, 8th and 9th November 2007

2.13.3 Test Equipment Used

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

2.13.4 Test Results

Position Data Default Values

The beacon was activated without providing data and operated for 30 minutes. Message content was checked for all bursts during this period.

Hex 30 Message	Message Count
FFFE2FCC96A107FC007CE90B972FE0FF0146	38

Position Acquisition Time and Position Accuracy

A3.8.2.1 (water): 50° 52.163' N 1° 14.605' W ①
A3.8.2.1 (B.5): 50° 52.135' N 1° 14.701' W ①
A3.8.2.2 : 51° 22.583' N 1° 49.833' W ②

Operation Configuration	C/S T.007 Section A3.8.2.1		C/S T.007 Section A3.8.2.2	
	Time to Acquire Position (sec)	Location Error in metres	Time to Acquire Position (sec)	Location Error in metres
Floating in Water	124	1587.4	126	3372.8
Resting on Dry Ground	N/A	N/A	N/A	N/A
C/S T.007 , Figure B.5	126	1559.2	127	3372.8

Positional accuracy was estimated using the Haversine Formula, Earth's radius taken as 6367km.

① Input: navigation simulator.
② Input: 'Live' GPS Signals

Product Service

Encoded Position Data Update Interval

Location: 51° 22.583' N, 1° 49.833' W ①		
Time from activation to 1st message	77s	
First Message Acquired at	10:31:21	CC94186186186E88D48FEFE0FF0146
Data Acquired at	10:32:12	CC94186186186E88D48FE66D01C026
Location: 50° 48.683' N, 1° 37.417' W ① (Started at 10:32:44)		
First Message Acquired at	10:32:59	CC94186186186E88D48FE66D01C026
Data Updated at	11:24:43	CC94186186186E88D48FE65901967F
Data Update Interval	52min 31s	

① Input: navigation simulator.

Position Clearance After Deactivation

Following the Encoded Position Data Update Interval test, the beacon was deactivated and reactivated without providing navigation data.

Deactivated at	11:24:53	
Time from re-activation to 1st message	75s	
Default data present	11:44:06	CC94186186186E88D48FEFE0FF0146

Last Valid Position

Location: 51° 22.583' N, 1° 49.833' W ①		
Time from activation to 1st message	76s	
First Message Acquired at	11:41:05	CC94186186186E88D48FEFE0FF0146
Data Acquired at	11:41:56	CC94186186186E88D48FE66D01C026
GPS Signal Navigation Data Removed	11:41:59	
Last Message with Positional Data	15:41:10	CC94186186186E88D48FE66D01C026
First Message with Default Data	15:42:02	CC94186186186E88D48FEFE0FF0146
Last Valid Position Held	240min	

Coarse Position and Delta Offset

Script Reference (See table D.3 of C/S T.007 – Issue 4 November 2005)	Value of Encoded Location Bits Transmitted by Beacon (Hexadecimal)	Confirmation that BCH Correct (✓)
1	Bits 108-132 = FE0FF0	✓
2	Bits 108-132 = 23011 Number of seconds after providing navigation data that beacon transmitted the above encoded location information: <51	✓
10	Bits 108-132 = 6D052	✓

① Input navigation simulator.

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 Number	Calibration Due
Section 2.9 Beacons - Antenna Characteristics				
Spectrum Analyser	Hewlett Packard	8568B	571	4-Jan-2008
Signal Generator	Rohde & Schwarz	SMS-2/28	1431	2-May-2008
Antenna Mast	EMCO	1050	1707	TU
Turntable Controller	Various	RH253	1708	TU
Open Area Site 2	TUV	OATS2	1850	3-Oct-2008
Turntable Interface	Various	RH-253.6	1855	TBD
Antenna Tower 6M	EMCO	1050	1859	TU
Roberts Antenna 406MHz	Compliance Design	-	1860	29-Jun-2009
Section 2.10 Beacons - Beacon Coding Software				
Beacon Tester	WS Technologies	BT 100S	87	TU

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Sections 2.1, 2.3 and 2.4 Beacons - Constant Temperature Tests				
Power Meter	Hewlett Packard	436A	47	9-Jul-2008
Power Meter	Hewlett Packard	436A	83	11-Aug-2008
Climatic Chamber	Heraeus Votsch	VM 04/100	85	O/P Mon
Rubidium Frequency Standard	Quartzlock	A10-B	92	22-Dec-2007
Signal Generator	Hewlett Packard	8644A	96	11-Jan-2008
Load (50ohm)	Diamond	DL-30N	341	5-Sep-2008
Load (50ohm)	Diamond	DL-30N	392	28-Aug-2008
Beacon RF Unit	TUV	N/A	3066	TU
Hygrometer	Rotronic	I-1000	3068	25-Apr-2008
Termination (50ohm, 6W)	Micronde	R404613	3074	24-Feb-2008
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	30-May-2008
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3161	30-May-2008
Thermocouple Thermometer	Fluke	51	3172	18-Jun-2008
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	28-Jul-2008
Time Interval Analyser	Yokogawa	TA720 704510	3253	4-Nov-2007
Scope Corder	Yokogawa	DL750 701210	3254	9-Nov-2007
RF Short Circuit	TUV	Short Circuit	3268	TU
Power Sensor	Agilent	8482A	3289	15-Nov-2007
Power Sensor	Agilent	8482A	3290	14-Nov-2007
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	16-Apr-2008
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3356	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3359	18-Apr-2008
Section 2.11, 2.12 & 2.13 Beacons - Navigation System				
Beacon Tester	WS Technologies	BT 100S	87	TU
Termination (50ohm, 15W)	Radio Spares	612-192	2425	5-Sep-2008
Stop Clock	R.S Components	RS328 061	2674	TU
GPS/SBAS Simulator	Spirent	STR4500	3056	1-Feb-2008
Hygrometer	Rotronic	I-1000	3068	25-Apr-2008
EPIRB Tester	Arg Electro Design	5412	3270	TU
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3352	18-Apr-2008

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.6 Beacons - Operating Lifetime				
Climatic Chamber	Heraeus Votsch	VMT 04/30	40	O/P Mon
Power Meter	Hewlett Packard	436A	47	9-Jul-2008
Power Meter	Hewlett Packard	436A	83	11-Aug-2008
Climatic Chamber	Heraeus Votsch	VM 04/100	85	O/P Mon
Rubidium Frequency Standard	Quartzlock	A10-B	92	22-Dec-2007
Signal Generator	Hewlett Packard	8644A	96	11-Jan-2008
Time Interval Analyser	Yokogawa	TA720	181	21-Feb-2008
High Resolution Oscilloscope	Gould	840	182	31-Jan-2008
Load (50ohm, 15W)	Diamond Antenna	DL-30N	337	28-Aug-2008
Attenuator 10dB 25W	Weinschel	46-10-43	400	13-Apr-2008
Attenuator (10dB, 10W)	Weinschel	23-10-34	470	19-Jun-2008
Attenuator (10dB)	Weinschel	47-10-34	481	26-Feb-2008
Load (50ohm, 15W)	Diamond Antenna	DL-30N	822	5-Sep-2008
Signal Generator	Hewlett Packard	8663A	1063	6-Feb-2008
Termination (50ohm, 15W)	Radio Spares	612-192	2425	5-Sep-2008
Distress Beacon RF Unit	TUV		2445	TU
Stop Clock	R.S Components	RS328 061	2674	TU
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	24-Jul-2008
Beacon RF Unit	TUV	N/A	3066	TU
Termination (50ohm, 6W)	Micronde	R404613	3074	24-Feb-2008
Attenuator (20dB, 75W)	Bird	8308-200	3076	26-Feb-2008
Termination (50ohm, 1W)	Suhner		3080	24-Feb-2008
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3096	16-Mar-2008
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	30-May-2008
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3161	30-May-2008
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3163	30-May-2008
Thermocouple Thermometer	Fluke	51	3172	18-Jun-2008
Thermocouple Thermometer	Fluke	51	3174	18-Jun-2008
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	28-Jul-2008
Bandpass filter	Trilithic	5BE406/35-1-AA	3206	28-Jul-2008
Time Interval Analyser	Yokogawa	TA720 704510	3253	4-Nov-2007
Scope Corder	Yokogawa	DL750 701210	3254	9-Nov-2007
Timer	Radio Spares	427-590	3281	TU
Timer	Radio Spares	427-590	3282	TU
8 Channel Datalogger + Terminal Board	Pico Technology Ltd	ADC-16	3287	13-Nov-2007
Power Sensor	Agilent	8482A	3289	15-Nov-2007
Power Sensor	Agilent	8482A	3290	14-Nov-2007

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.6 Beacons - Operating Lifetime (Continued)				
Resistor (Nominal 0.25ohm)	TUV	2x RS Components 188-071, R5/100W Resistors	3343	TU
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3355	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3356	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3357	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3359	18-Apr-2008
Cable (3m, N-type)	Rhophase	NPS-1601-3000-NPS	3360	18-Apr-2008
Section 2.2 Beacons - Spurious Emissions				
Climatic Chamber	Heraeus Votsch	VM 04/100	85	O/P Mon
Rubidium Frequency Standard	Quartzlock	A10-B	92	22-Dec-2007
Hygrometer	Rotronic	I-1000	3068	25-Apr-2008
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	30-May-2008
Thermocouple Thermometer	Fluke	51	3172	18-Jun-2008
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	16-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3356	18-Apr-2008

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.7 Beacons - Temperature Gradient				
Power Meter	Hewlett Packard	436A	47	9-Jul-2008
Climatic Chamber	Heraeus Votsch	VM 04/100	85	O/P Mon
Rubidium Frequency Standard	Quartzlock	A10-B	92	22-Dec-2007
Signal Generator	Hewlett Packard	8644A	96	11-Jan-2008
Beacon RF Unit	TUV	N/A	3066	TU
Hygrometer	Rotronic	I-1000	3068	25-Apr-2008
Termination (50ohm, 6W)	Micronde	R404613	3074	24-Feb-2008
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	30-May-2008
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3161	30-May-2008
Thermocouple Thermometer	Fluke	51	3172	18-Jun-2008
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	28-Jul-2008
Time Interval Analyser	Yokogawa	TA720 704510	3253	4-Nov-2007
Scope Corder	Yokogawa	DL750 701210	3254	9-Nov-2007
Power Sensor	Agilent	8482A	3289	15-Nov-2007
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3356	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3359	18-Apr-2008

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.5 Beacons - Thermal Shock				
Power Meter	Hewlett Packard	436A	47	9-Jul-2008
Climatic Chamber	Heraeus Votsch	VM 04/100	85	O/P Mon
Rubidium Frequency Standard	Quartzlock	A10-B	92	22-Dec-2007
Signal Generator	Hewlett Packard	8644A	96	11-Jan-2008
Beacon RF Unit	TUV	N/A	3066	TU
Hygrometer	Rotronic	I-1000	3068	25-Apr-2008
Termination (50ohm, 6W)	Micronde	R404613	3074	24-Feb-2008
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	30-May-2008
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-3-34	3161	30-May-2008
Thermocouple Thermometer	Fluke	51	3172	18-Jun-2008
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	28-Jul-2008
Time Interval Analyser	Yokogawa	TA720 704510	3253	4-Nov-2007
Scope Corder	Yokogawa	DL750 701210	3254	9-Nov-2007
Power Sensor	Agilent	8482A	3289	15-Nov-2007
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3356	18-Apr-2008
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3359	18-Apr-2008

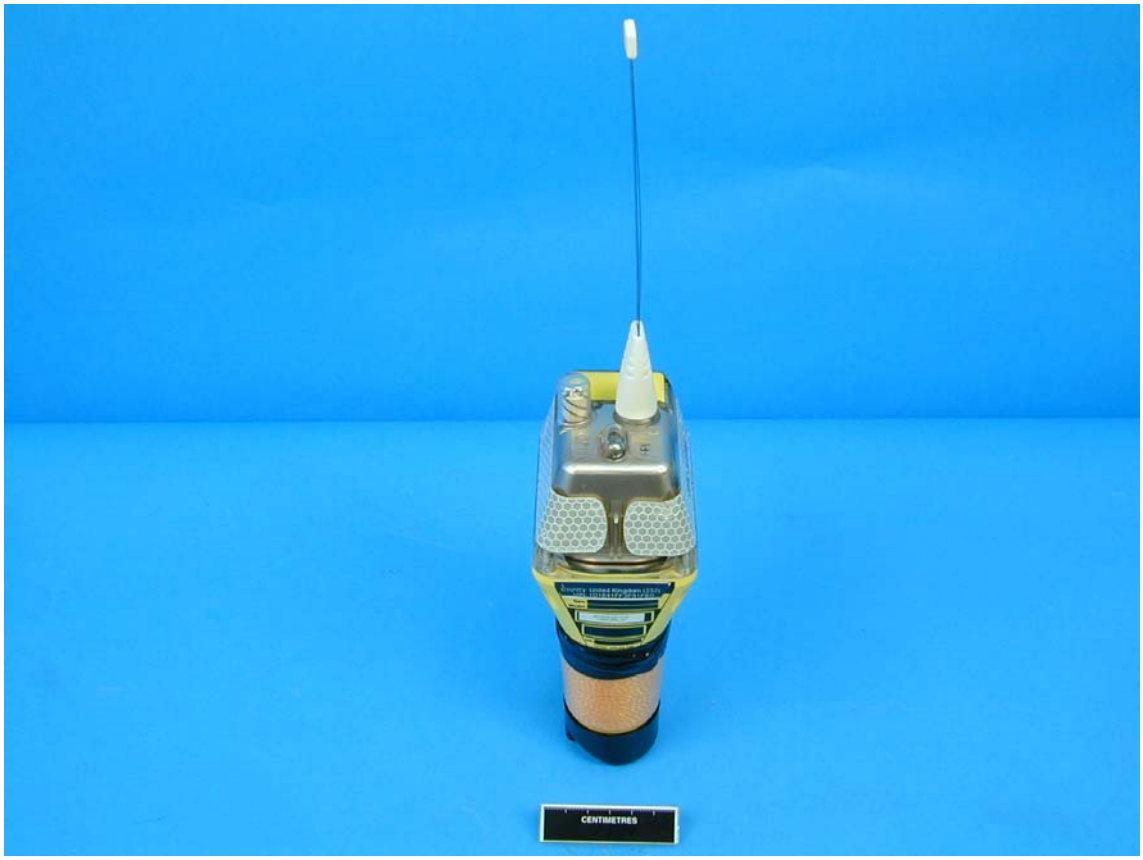
TU – Traceability Unscheduled
OP MON – Output Monitored with Calibrated Equipment

SECTION 4

PHOTOGRAPHS

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Front view of MT403G



Side view of MT403G

Satellite Qualitative – Floating in Water

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

ANNEX A

CUSTOMER SUPPLIED INFORMATION

Customer Supplied Information Summary

Detailed documents were supplied to TÜV Product Service Ltd for inspection against various requirements of T.007 – a summary of the document reference numbers and issues can be found in Table A.1

Table A.1

Test/Requirement Description	Customer Reference Number & Issue	Status
EUT 50Ω output adapter details	ED071120-021, Revision: 1 Issue Date: 20-11-07	Supplied, Inspected and details of loss incorporated into report
Description of Self-test	Application Form (as per this report, Section 1.2)	Supplied, Inspected and incorporated into report
Design data on protection against repetitive self-test mode transmissions	ED071119-03, Revision: 1 Issue Date: 19-11-07 and ED071119-03_Annex A (Neither Revision nor Date Specified)	Supplied and Inspected
Oscillator Aging Data	ED071119-02, Revision: 1 Issue Date: 19-11-07	Supplied and Inspected
Description of Protection Against Continuous Transmission	ED071119-01, Revision: 1 Issue Date: 19-11-07	Supplied and Inspected
Information on protection against beacon degradation due to navigation device, interface or signal failure or malfunction	ED071121-02, Revision: 1 Issue Date: 21-11-07	Supplied and Inspected