REPORT ON

Testing of the Standard Communications PTY. LTD. MT410G PLB and MT410 PLB
in accordance with
Cospas-Sarsat 406 MHz Distress Beacon Type Approval Standard
T.007 Issue 4 November 2005

Report No RM615377/01 Issue 9 **May 2007**

Product Service

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TUV Product Service Ltd, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuvps.co.uk; www.babt.com

REPORT ON

Testing of the Standard Communications PTY. Ltd MT410G PLB and MT410 PLB in accordance with Cospas-Sarsat 406 MHz Distress Beacon Type Approval Standard T.007 Issue 4 November 2005

Report No RM615377/01 Issue 9

May 2007

PREPARED FOR

Standard Communications PTY. Ltd
6 Frank Street
Gladesville
NSW2111
Australia

PREPARED BY

N Bennett
Administrator

APPROVED BY

M Jenkins
Authorised Signatory

DATED

3rd May 2007

UKAS TESTING
0141
Group

CONTENTS

SECTION 1

REPORT SUMMARY

Testing of the Standard Communications PTY. LTD.
MT410G PLB and MT410 PLB
in accordance with
Cospas-Sarsat 406 MHz Distress Beacon Type Approval Standard
T.007 Issue 4 November 2005

1.1 STATUS

Manufacturer	Standard Communications PTY. LTD.
Type Designation	MT410G PLB and MT410 PLB
TUV Reference	RM615377_01 MT410G PLB, Serial Number 223 RM615377_03 MT410G PLB, Serial Number 224 RM615377_04 MT410 PLB, Serial Number 229 RM615377_27 MT410 PLB, Serial Number 228 RM615377_33 MT410 PLB, Serial Number 22551
Number of Samples Tested	Five
Test Specification/Issue/Date	Cospas-Sarsat T.007 Issue 5 – November 2005
Date of Receipt of Test Sample	29th August 2006
Start of Test	30th August 2006
Finish of Test	1st May 2007
Test Engineer(s)	R Henley J Holding R Hampton

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out is shown below.

Section	Spec Clause	Test Description	Result	Levels/Comments
	-	Table of Test Results	N/A	
	A3.2.2	Transmitted Power Output	Pass	
2.1	A3.1.4	Digital Message Coding	Pass	
-	A3.1	Digital Message Generator	Pass	
-	A3.2.3	Data Encoding and Modulation	Pass	
-	A3.2.1	406MHz Transmitted Frequency	Pass	
2.2	A3.2.2.4	Spurious Emissions	Pass	
2.3	A3.3	406MHz VSWR Check – Decoded Message	Pass	
2.4	A3.6	Self Test Mode – Decoded Message	Pass	
2.5	A2.2	Thermal Shock	Pass	
2.6	A2.3	Operating Lifetime at Minimum Temperature	Pass	
2.7	A2.4	Frequency Stability with Temperature Gradient	Pass	
-	A3.5	Long Term Frequency Stability	-	Customer Supplied Data
-	A3.4	Protection Against Continuous Transmission	-	Customer Supplied Data
2.8	A2.5	Satellite Qualitative Test	Pass	
2.9	A2.6	Antenna Characteristics	Pass	Issue 9
2.10	-	Beacon Coding Software	Pass	
2.11	A3.8	Navigation System	Pass	
2.11.1	A3.8	National Location Protocol 1	Pass	
2.11.2	A3.8	Standard Location Protocol 1	Pass	
2.11.3	A3.8	User Location Protocol 1	Pass	

1.3 APPLICATION FORM – MT410

1.3.1 Beacon Manufacturer and Beacon Model

Beacon Manufacturer	Standard Communications Pty Ltd
Beacon Model	MT410

1.3.2 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)		☐

1.3.3 Beacon Characteristics

Characteristic	**Specification**
Operating temperature range	Tmin = -20°C Tmax= 55°C
Operating lifetime	24+ hours
Battery chemistry	LiMnO2 / Organic Electrolyte
Battery cell size and number of cells	2 batteries @ 2 cells CR17345
Battery manufacturer	Varta
Battery pack manufacturer and part number	Standard Communications – 97MT410BAT or VARTA – 080019
Oscillator type (e.g. OCXO, MCXO, TCXO)	MCXO
Oscillator manufacturer	Standard Communications
Oscillator part name and number	N/A
Oscillator satisfies long-term frequency stability requirements (Yes or No)	Yes

1.3 APPLICATION FORM – MT410

1.3.3 Beacon Characteristics (Continued…)

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

1.3 APPLICATION FORM – MT410

1.3.3 Beacon Characteristics (Continued…)

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
- Self-test transmission burst duration (440 or 520 ms)	440 ms
- Self-test format bit (“0” or “1”)	0
Beacon includes a homer transmitter (if yes identify frequency of transmission)	121.5 MHz
-Homer Transmit Power	17 dBm
-Homer Duty Cycle	>96 %
-Duty Cycle of Homer Swept Tone	37 %

1.3 APPLICATION FORM – MT410

1.3.3 Beacon Characteristics (Continued…)

Characteristic	Specification
Beacon includes a strobe light (Yes or No)	Yes
- Strobe light intensity	Not specified
- Strobe light flash rate	20 +/minute
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.	N/A
Beacon includes automatic activation mechanism (Yes or No)	No

1.3.4 InformationProvided 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: August 2006

Applicable C/S Standards:

Document	Issue	Revision
C/S T.001	**3 (Revision 7)**	**Nov-05**
C/S T.007	**4**	**Nov-05**

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: 

Name: M Jenkins

Position Held: Authorised Signatory

Date: 3rd May 2007

1.3 APPLICATION FORM – MT410

1.3.5 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

1.3.6 Manufacturer Details

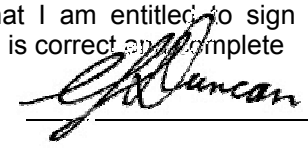
Company Name	Same as above		
Address			
Contact Name		Telephone	
Email		Facsimile	

1.3.7 Declaration of Build Status

Hardware Version	2
- PCB Revision	D
- Battery Model	97MT410BAT (Varta)
Software Version	N/A
Firmware Version	OS0012.1.01
Other (Specify)	N/A

1.3.8 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: 01/12/2006

1.4 APPLICATION FORM - MT410G

1.4.1 Beacon Manufacturer and Beacon Model

Beacon Manufacturer	Standard Communications Pty Ltd
Beacon Model	MT410G

1.4.2 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)		☐

1.4.3 Beacon Characteristics

Characteristic	Specification
Operating temperature range	Tmin = -20°C Tmax= 55°C
Operating lifetime	24+ hours
Battery chemistry	LiMnO2 / Organic Electrolyte
Battery cell size and number of cells	2 batteries @ 2 cells CR17345
Battery manufacturer	Varta
Battery pack manufacturer and part number	Standard Communications – 97MT410BAT or VARTA – 080019
Oscillator type (e.g. OCXO, MCXO, TCXO)	MCXO
Oscillator manufacturer	Standard Communications
Oscillator part name and number	N/A
Oscillator satisfies long-term frequency stability requirements (Yes or No)	Yes

1.4 APPLICATION FORM - MT410G

1.4.3 Beacon Characteristics (Continued…)

Characteristic	Specification
Antenna type (Integrated or External)	Integrated
Antenna manufacturer	N/A
Antenna part name and number	N/A
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-4P
- GNSS system supported (e.g. GPS, GLONASS, Galileo)	GPS
For External Navigation Devices	
- Data protocol for GNSS receiver to beacon interface	N/A
- Physical interface for beacon to navigation device	N/A
- Electrical interface for beacon to navigation device	N/A
- Navigation device model and manufacturer (if beacon designed to use specific devices)	N/A

1.4 APPLICATION FORM - MT410G

1.4.3 Beacon Characteristics (Continued…)

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)	121.5 MHz
-Homer Transmit Power	17 dBm
-Homer Duty Cycle	>96 %
-Duty Cycle of Homer Swept Tone	37 %

1.4 APPLICATION FORM - MT410G

1.4.3 Beacon Characteristics (Continued…)

Characteristic	Specification
Beacon includes a strobe light (Yes or No)	Yes
- Strobe light intensity	Not specified
- Strobe light flash rate	20 +/minute
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.	N/A
Beacon includes automatic activation Yes or No)	No

1.4.4 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: August 2006

Applicable C/S Standards:

Document	Issue	Revision
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Signed: 

Name: M Jenkins

Position Held: Authorised Signatory

Date: 3rd May 2007

1.4 APPLICATION FORM

1.4.5 Applicant Details

Company Name	Standard Communication Pty Ltd		
Address	9 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

1.4.6 Manufacturer Details

Company Name	Same as above		
Address			
Contact Name		Telephone	
Email		Facsimile	

1.4.7 Declaration of Build Status

Hardware Version	2
- PCB Revision	D
- Battery Model	97MT410BAT (Varta)
Software Version	N/A
Firmware Version	OS0012.1.01
Other (Specify)	N/A

1.4.8 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: 01/12/2006

1.5 MODIFICATIONS

Build State 0: No modifications were made to the test sample during testing.

Build State 1: in order to pass the Antenna Characteristics Test a physical modification was made to the antenna assembly/components. Details can be found on page A.65. No electrical modifications were made. The Antenna characteristics test was retested and the results included in Issue 9 of this report.

1.5.1 SPECIAL CONDITIONS FOR OUTPUT POWER

In order to conduct the test programme, a modification was made to the following samples:

TUV Reference RM615377_01 and;

TUV Reference RM615377_04

This modification provided a 50Ω BNC output onto which the test system was connected. The modification affected the Transmitter Output Power. Details can be found at Annex A. Power measurements made were effectively 6.4dB lower than actual power from the "Real Life" beacon.

Note on Temperature Gradient Test Results: Due to software result plotting restrictions, the power "offset" was accounted for in the calculation of the results, so that the power trace could be seen on the plot. For actual measured values, subtract 6.4dB from the reported result.

1.6 REPORT MODIFICATION RECORD

Issue 1 – First Issue.

Issue 2 – Report has been re-issued to correct errors in the application form and to amend pages in the Annex.

Issue 3 – MT410 PLB Satellite Qualitative Test (Configuration B.2) Results replaced with "On the ground" configuration results.

Issue 4 – Two application forms included for each beacon model. Battery current discharge test repeated and new results included. "Special conditions for output power" comment included. Results included for EIRP measurements per B.9.4 of C/S T.007. Explanation and typographical errors corrected for beacon coding software. Typographical error corrected in navigation system results.

Issue 5 – MT410GPLB Changed to MT410G PLB and MT410PLB changed to MT410G PLB. Brief Summary of results corrected to correspond with Table of Test Results.

Issue 6 – Additional GPS test mode current measurements performed and factored into "Effective Operational Lifetime Duration". Subsequent effects on Antenna characteristics also calculated with respect to new Pt_{EOL}. Clerical errors corrected on RHCP Antenna Characteristics.

Issue 7 – Re-test of Antenna Characteristics. The manufacturer declared that the excessive bending exhibited by the antenna during the original testing, was not typical of normal antenna deployment. The antenna was therefore manually straightened by a representative of the manufacturer, prior to the commencement of the re-test.

Issue 8 – To correct typographical errors and the table of test results.

Issue 9 – Further typographical errors corrected plus Retest of Antenna Characteristics and Satellite Qualitative due to Modification of beacon antenna assembly.

SECTION 2

TEST DETAILS

Testing of the Standard Communications PTY. LTD.
MT410G PLB and MT410 PLB
in accordance with
Cospas-Sarsat 406 MHz Distress Beacon Type Approval Standard
T.007 Issue 4 November 2005

TABLE OF TEST RESULTS

Parameter		Limits	Units	Test Results			Comments
				T_{min} (ºC)	T_{amb}	T_{max} (ºC)	
				-20	23.7	+55	
1. Power Output							Test sample: RM615377_01 Build state: 0 **Result: Pass**
Transmitter power output		35 to 39	dBm	30.45*	30.53*	30.36*	*See Special Conditions for Output Power: Page 16
Power output rise time		< 5	ms	1.33	1.33	1.404	
Power output 1ms before burst		< -10	dBm	-32.29	-32.75	-30.54	
2. Digital Message Coding							Test sample: RM615377_01 Build state: 0 **Result: Pass**
Bit sync	Bits 1 – 15	111111111111111	P / F	P	P	P	Decoded messages: Page 24
Frame Sync	16 – 24	000101111	P / F	P	P	P	
Format Flag	25	1 bit	data	1	1	1	
Protocol Flag	26	1 bit	data	0	0	0	
Identification / position data	27 – 85	59 bits	P / F	P	P	P	
BCH code	86 – 106	21 bits	P / F	P	P	P	
Emerg. code/nat. use/supplem. data	107 – 112	6 bits	data	110111	110111	110111	
Additional Data / BCH (if applicable)	112 – 144	32 bits	P / F	P	P	P	
Position Error Iif applicable)		< 5	km	N/A	N/A	N/A	
3. Digital Message Generator							Test sample: RM615377_01 Build state: 0 **Result: Pass**
Repetition rate T_R							
Average T_R		48.5 to 51.5	seconds	50.059	50.111	50.056	
Minimum T_R		$47.5 \leq T_R \leq 48$	seconds	47.78	47.73	47.79	
Maximum T_R		$52 \leq T_R \leq 52.5$	seconds	52.40	52.35	52.40	
Standard deviation		0.5 to 2.0		1.420	1.355	1.467	
Bit rate							
Minimum f_b		≥ 396	bits/sec	399.518	399.521	399.518	
Maximum f_b		≤ 404	bits/sec	399.625	399.623	399.726	
Total transmission time							
Short message		435.6 - 444.4	ms	N/T*	N/T*	N/T*	*Not Tested
Long message		514.8 - 525.2	ms	520.934	520.922	521.103	
Unmodulated carrier							
Minimum T_1		≥ 158.4	ms	159.210	159.24	159.09	
Maximum T_1		≤ 161.6	ms	159.311	159.34	159.19	
First burst delay		>47.5	seconds	62	62	63	Self test after 3 seconds of switch on.

TABLE OF TEST RESULTS

Parameter	Limits	Units	Test Results			Comments
			T_{min} (ºC)	T_{amb}	T_{max} (ºC)	
			-20	23.7	+55	
4. Modulation						Test sample: RM615377_01 Build state: 0 **Result: Pass**
Biphase L	P / F	P / F	P	P	P	
Rise time	50 - 250	µs	188.22	200.21	221.3	
Fall Time	50 - 250	µs	173.79	187.79	222.7	
Phase deviation: positive	+ (1.0 to 1.2)	radians	1.13	1.07	1.1334	
Phase deviation: negative	- (1.0 to 1.2)	radians	-1.02	-1.10	-1.0501	
Symmetry measurement	≤ 0.05	radians	0.0016	0.0154	0.0385	
5. 406 MHz Transmitted Frequency						Test sample: RM615377_01 Build state: 0 **Result: Pass**
Nominal value	IAW T.001 / T.007	MHz	406.027995	406.027990	406.027981	
Short term stability	≤ $2x10^{-9}$	/100 ms	$4.77x10^{-10}$	$2.311x10^{-10}$	$2.812x10^{-10}$	
Medium term stability						
Slope	(-1 to +1)$x10^{-9}$	/minute	$1.263x10^{-10}$	$-4.02x10^{-11}$	$-1.608x10^{-11}$	
Residual frequency variation	≤ $3x10^{-9}$		$8.84x10^{-10}$	$6.944x10^{-10}$	$6.623x10^{-10}$	
6. Spurious Emissions						Test sample: RM615377_01 Build state: 0 **Result: Pass**
In band (406.0 – 406.1 MHz)	IAW mask	P / F	P	P	P	Spectrum plots: Page 27
7. 406MHz VSWR Check						Test sample: RM615377_01 Build state: 0 **Result: Pass**
Nominal transmitted frequency	IAW T.001 / T.007	MHz	406.027994	406.027990	406.027981	
Modulation						
Rise time	50 - 250	µs	178.21	190.21	221.4	
Fall Time	50 - 250	µs	181.79	201.79	217.6	
Phase deviation: positive	+ (1.0 to 1.2)	radians	1.08	1.08	1.0547	
Phase deviation: negative	- (1.0 to 1.2)	radians	-1.09	-1.09	-1.1265	
Symmetry measurement	≤ 0.05	radians	0.0163	0.0162	0.0251	
Digital Message	Must be correct	P / F	P	P	P	Decoded message: Page 31
8. Self Test Mode						Test sample: RM615377_01 Build state: 0 **Result: Pass**
Frame sync	011010000	P / F	P	P	P	Decoded message: Page 32
Format flag	0 or 1	1 / 0	1	1	1	
Single radiated burst	440 / 520 +/- 1%	ms	520.580	520.899	519.9762	
Default position data (if applicable)	Must be correct	P / F	P	P	P	
Description provided	Y / N					Applicant's data: See Annex A
Data on protections against repetitive transmission	Y / N					
Single burst verification	1 burst	P / F	P	P	P	
Provides for beacon 15 Hex ID	Must be correct	P / F	P	P	P	

TABLE OF TEST RESULTS

Parameter	Limits	Units	Test Results	Comments
9. Thermal Shock				Test sample: RM615377_01 Build state: 0 **Result: Pass**
Soak Temperature		ºC	23.2	
Measurement Temperature		ºC	-6.8	
Meet within 15 minutes, maintained for 2 hours:				
Transmitted frequency				Test data: Page 33
Nominal value	IAW T.007 / T.012	MHz	Max 406.027998 Min 406.027994	
Short term stability	≤ $2x10^{-9}$	/100ms	Max $4.824x10^{-10}$ Min $2.808x10^{-10}$	
Medium term stability				
Slope	(-1 to +1)$x10^{-9}$	/minute	Max $3.856x10^{-10}$ Min $-8.185x10^{-11}$	
Residual frequency variation	≤ $3x10^{-9}$		Max $1.023x10^{-9}$ Min $4.962x10^{-10}$	
Transmitter output power	35 – 39	dBm	Max 30.87* Min 30.65*	*See Special Conditions for Output Power: Page 16
Digital Message	Must be correct	P / F	P	Decoded message: Page 38
10. Operating Lifetime at Minimum Temperature				Test sample: RM615377_01 Build state: 0 **Result: Pass**
Duration	>24		>24	Quiescent battery current: Page 45
Transmitted frequency				Test data: Page 39
Nominal value	IAW T.007 / T.012	MHz	Max 406.027998 Min 406.027994	Values shown are to 28.37 hours. (24hours + Effective
Short term stability	≤ $2x10^{-9}$	/100ms	Max $9.378x10^{-10}$ Min $2.437x10^{-10}$	Operational Lifetime test extension of 4.37 hours)
Medium term stability				EUT battery was not discharged before the test.
Slope	(-1 to +1)$x10^{-9}$	/minute	Max $2.537x10^{-10}$ Min $-2.142x10^{-10}$	Equivalent Operational Lifetime Duration was calculated
Residual frequency variation	≤ $3x10^{-9}$		Max $1.446x10^{-9}$ Min $3.088x10^{-10}$	to be 29.49 hours. Details: Page 45
Transmitter output power	35 – 39	dBm	Max 31.01* Min 29.43*	*See Special Conditions for Output Power: Page 16
Digital Message	Must be correct	P / F	P	Decoded message: Page 44
11. Frequency Stability with Temperature Gradient – Down Ramp				Test sample: RM615377_01 Build state: 0 **Result: Pass**
Transmitted frequency				Test data: Page 51
Nominal value	IAW T.007 / T.012	MHz	Max 406.028010 Min 406.027981	
Short term stability	≤ $2x10^{-9}$	/100ms	Max $6.362x10^{-10}$ Min $1.934x10^{-10}$	
Medium term stability				
Slope (C+15 to D, E+15 to F)	(-1 to +1)$x10^{-9}$	/minute	Max $3.451x10^{-10}$ Min $-1.713x10^{-10}$	
Slope (C+15, D to E+15)	(-2 to +2)$x10^{-9}$	/minute	Max $3.451x10^{-10}$ Min $-1.713x10^{-10}$	
Residual frequency variation	≤ $3x10^{-9}$		Max $1.321x10^{-9}$ Min $3.216x10^{-10}$	
Transmitter output power	35 – 39	dBm	Max 38.450* Min 37.837*	*See Special Conditions for Output Power: Page 16
Digital Message	Must be correct	P / F	P	Decoded message: Page 55

TABLE OF TEST RESULTS

Parameter	Limits	Units	Test Results	Comments
11. Frequency Stability with Temperature Gradient – Up Ramp				
Transmitted frequency				
Nominal value	IAW T.007 / T.012	MHz	Max 406.028000 Min 406.027979	
Short term stability	≤ $2x10^{-9}$	/100ms	Max $6.710x10^{-10}$ Min $1.643x10^{-10}$	
Medium term stability				
Slope (A to B, C+15 to D)	(-1 to +1)$x10^{-9}$	/minute	Max $9.970x10^{-11}$ Min $4.087x10^{-10}$	
Slope (B to C+15)	(-2 to +2)$x10^{-9}$	/minute	Max $9.970x10^{-11}$ Min $4.087x10^{-10}$	
Residual frequency variation	≤$3x10^{-9}$		Max $1.248x10^{-9}$ Min $3.495x10^{-10}$	
Transmitter output power	35 – 39	dBm	Max 37.581* Min 36.645*	*See Special Conditions for Output Power: Page 16
Digital Message	Must be correct	P / F	P	
12. Long Term Frequency Stability				
Data on long term stability	Y / N		Y	Applicant's data: Annex A

TABLE OF TEST RESULTS

Parameter	Limits	Units	Test Results		Comments
13. Protection Against Continuous Transmission					
Description provided	Y / N		Y		Applicant's data: See Annex A
14. Satellite Qualitative Tests – MT410G PLB					Test sample: RM615377_03 Build state: 0 **Result: Pass**
Configuration	C/S T.007		Figure B.5	On the Ground	
Successfully located by satellites / LUT	Must be correct	P / F	P	P	Test data: Page 64 to 68
% of results <=5 km Position error	≥80	%	100	100	
14. Satellite Qualitative Tests – MT410 PLB					* Test sample: RM615377_04 Build state: 0 **Result: Pass**
Configuration	C/S T.007		Figure B.5*	On the Ground**	** Test Sample RM615377_27 Build state: 0
Successfully located by satellites / LUT	Must be correct	P / F	P	P	Test data: Page 64 to 68
% of results <=5 km Position error	≥80	%	93.3	100	
14. Satellite Qualitative Tests – Build State 1					Test sample: RM615377_33 Build state: 1 **Result: Pass**
Configuration	C/S T.007		Figure B.5	On the Ground	
Successfully located by Satellites / LUT	Must be correct	P / F	P	P	Test data: Page 64 to 68
% of results <=5 km Position error	≥80	%	83.3	93.3	
15 Antenna Characteristics					Test sample: RM615377_03 Build state: 0 **Result: Fail**
Configuration	C/S T.007	Figure	B.2	B.5	
Polarisation	Linear / RHCP		LHCP①	N/A	Test data: Page 69
VSWR	≤1.5		N/A	N/A	Detachable antennas only
$EIRP_{maxEOL}$	≤43	dBm	36.9	36.8	① Results Fail. NB: If Antenna polarity were deemed to be linear, the other two values would be 32.3dBm (Pass) and 4.64dB (Pass within MU) respectively.
$EIRP_{minEOL}$	≥32	dBm	24.9①	31.4②	
Azimuth gain variation at 40° elevation angle	≤3	dB	11.20①	N/A	② The Limit for B.5 Configuration is 30 dBm
15 Antenna Characteristics Additional testing					Test sample: RM615377_03 Build state: 0 **Result: Pass**
Configuration	C/S T.007	Figure	B.2	B.5	Refer to report modification Issue 7 on Page 16.
Polarisation	Linear / RHCP		Linear	N/A	Test data: Page 73
VSWR	≤1.5		N/A	N/A	Detachable antennas only
$EIRP_{maxEOL}$	≤43	dBm	39.4	38.7	
$EIRP_{minEOL}$	≥32	dBm	32.2	33.1	
Azimuth gain variation at 40° elevation angle	≤3	dB	1.66	N/A	
15 Antenna Characteristics: Build State 1					Test sample: RM615377_33 Build state: 1 **Result: Pass**
Configuration	C/S T.007	Figure	B.2	B.5	Build State 1 – Refer to page 16
Polarisation	Linear / RHCP		Linear	N/A	Test data: Page 75
VSWR	≤1.5		N/A	N/A	Detachable antennas only
$EIRP_{maxEOL}$	≤43	dBm	42.8	42.5	
$EIRP_{minEOL}$	≥32	dBm	35.0	36.6	
Azimuth gain variation at 40° elevation angle	≤3	dB	0.63	N/A	

TABLE OF TEST RESULTS

Parameter	Limits	Units	Test Results			Comments
16. Beacon Coding Software – MT410G PLB						Test sample: RM615377_01 Build state: 0 **Result: Pass**
Sample message for each coding option	Must be correct		P			Decoded Messages: Page 77 to 78
Sample self-test message for each coding option	Must be correct		P			
16. Beacon Coding Software – MT410 PLB						Test sample: RM615377_04 Build state: 0 **Result: Pass**
Sample message for each coding option	Must be correct		P			Decoded Messages: Page 79 to 80
Sample self-test message for each coding option	Must be correct		P			
17. Navigation System						Test sample: RM615377_01 Build state: 0 **Result: Pass**
Clause A3.8			National	Standard	User	Test data: Page 81 to 89
Position data default values	Must be correct	P/ F	P	P	P	
Position acquisition time – B.2 Configuration	<10/1 minutes	P / F	P	P	P	
Position accuracy – B.2 Configuration	C/S T.001	P / F	P	P	P	
Position acquisition time – B.5 Configuration	<10/1 minutes	P / F	P	P	P	
Position accuracy – B.5 Configuration	C/S T.001	P / F	P	P	P	
Encoded position data update interval	>20	minutes	50m 59s	51m	51m	
Position clearance after deactivation	Cleared	P / F	P	P	P	
Position data update interval (as applicable)	20/1	minutes	N/A	N/A	N/A	
Position data encoding	Must be correct	P/F	P	P	P	
Retained last valid position after navigation input lost	240(±5)	Minutes	239	236	239	
Default position data transmitted after 240(±) minutes without valid position data	Cleared	P/F	P	P	P	
Information provided on protection against beacon degradation due to navigation device, interference or signal failure or malfunction	No degradation	P/F	P			Applicant's data: See Annex A

2.1 DIGITAL MESSAGE CODING

```
FFFE2F9F7E0000EB7FDFFA0334F783E0F66C

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
15 Hex (Bits 26- 85) = 3EFC0001D6FFBFF             3EFC0001D6FFBFF Default_Id
30 Hex (Bits 25-144) = 9F7E0000EB7FDFFA0334F783E0F66C

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0011 1110 1111 1100 0000 0000 0000 0001 1101 0110 1111 1111 1011 1111 1111
   0100 0000 0110 0110 1001 1110 1111 0000 0111 1100 0001 1110 1100 1101 100
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      503 AUSTRALIA                    0111 1101 11
Protocol Code      37- 40       14 Test Serial (Standard)                1110
Spare              41- 64                          0000 0000 0000 0000 1110 1011
Coarse Position    65- 85          DEFAULT            0111 1111 1101 1111 1111 1
BCH Encoded        86-106          Errors=0           0100 0000 0110 0110 1001 1
BCH Generated      86-106                             0100 0000 0110 0110 1001 1
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
Fixed Bit         110            1                                           1
Encode Pos Device 111            1 Internal                                  1
121.5 Homing      112            1 YES                                       1
Position Change   113-132          DEFAULT              1000 0011 1110 0000 1111
Resultant Position              --> Not Defined
BCH Encoded       133-144          Errors=0                      0110 0110 1100
BCH Generated     133-144                                        0110 0110 1100
```

Digital Message at Minimum Temperature

2.1 DIGITAL MESSAGE CODING

```
FFFE2F9F7E0000EB7FDFFA0334F783E0F66C

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
15 Hex (Bits 26- 85) = 3EFC0001D6FFBFF             3EFC0001D6FFBFF Default_Id
30 Hex (Bits 25-144) = 9F7E0000EB7FDFFA0334F783E0F66C

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0011 1110 1111 1100 0000 0000 0000 0001 1101 0110 1111 1111 1011 1111 1111
   0100 0000 0110 0110 1001 1110 1111 0000 0111 1100 0001 1110 1100 1101 100
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      503 AUSTRALIA                    0111 1101 11
Protocol Code      37- 40       14 Test Serial (Standard)                1110
Spare              41- 64                          0000 0000 0000 0000 1110 1011
Coarse Position    65- 85          DEFAULT            0111 1111 1101 1111 1111 1
BCH Encoded        86-106          Errors=0           0100 0000 0110 0110 1001 1
BCH Generated      86-106                             0100 0000 0110 0110 1001 1
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
Fixed Bit         110            1                                           1
Encode Pos Device 111            1 Internal                                  1
121.5 Homing      112            1 YES                                       1
Position Change   113-132          DEFAULT              1000 0011 1110 0000 1111
Resultant Position              --> Not Defined
BCH Encoded       133-144          Errors=0                      0110 0110 1100
BCH Generated     133-144                                        0110 0110 1100
```

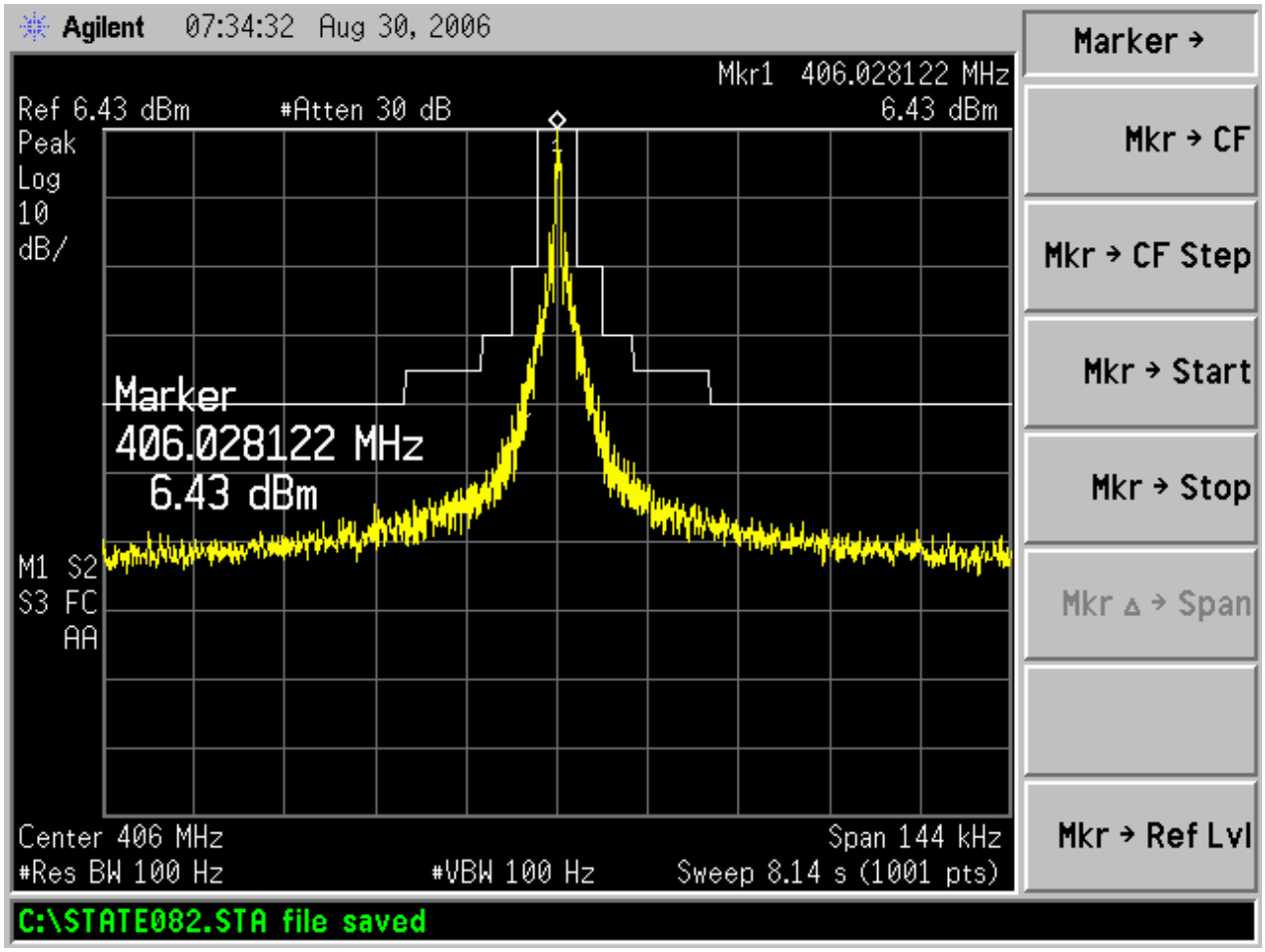
Digital Message at Ambient Temperature

2.1 DIGITAL MESSAGE CODING

```
FFFE2F9F7E0000EB7FDFFA0334F783E0F66C

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
15 Hex (Bits 26- 85) = 3EFC0001D6FFBFF             3EFC0001D6FFBFF Default_Id
30 Hex (Bits 25-144) = 9F7E0000EB7FDFFA0334F783E0F66C

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0011 1110 1111 1100 0000 0000 0000 0001 1101 0110 1111 1111 1011 1111 1111
   0100 0000 0110 0110 1001 1110 1111 0000 0111 1100 0001 1110 1100 1101 100
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      503 AUSTRALIA                    0111 1101 11
Protocol Code      37- 40       14 Test Serial (Standard)                1110
Spare              41- 64                          0000 0000 0000 0000 1110 1011
Coarse Position    65- 85          DEFAULT            0111 1111 1101 1111 1111 1
BCH Encoded        86-106          Errors=0           0100 0000 0110 0110 1001 1
BCH Generated      86-106                             0100 0000 0110 0110 1001 1
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
Fixed Bit         110            1                                           1
Encode Pos Device 111            1 Internal                                  1
121.5 Homing      112            1 YES                                       1
Position Change   113-132          DEFAULT              1000 0011 1110 0000 1111
Resultant Position              --> Not Defined
BCH Encoded       133-144          Errors=0                      0110 0110 1100
BCH Generated     133-144                                        0110 0110 1100
```

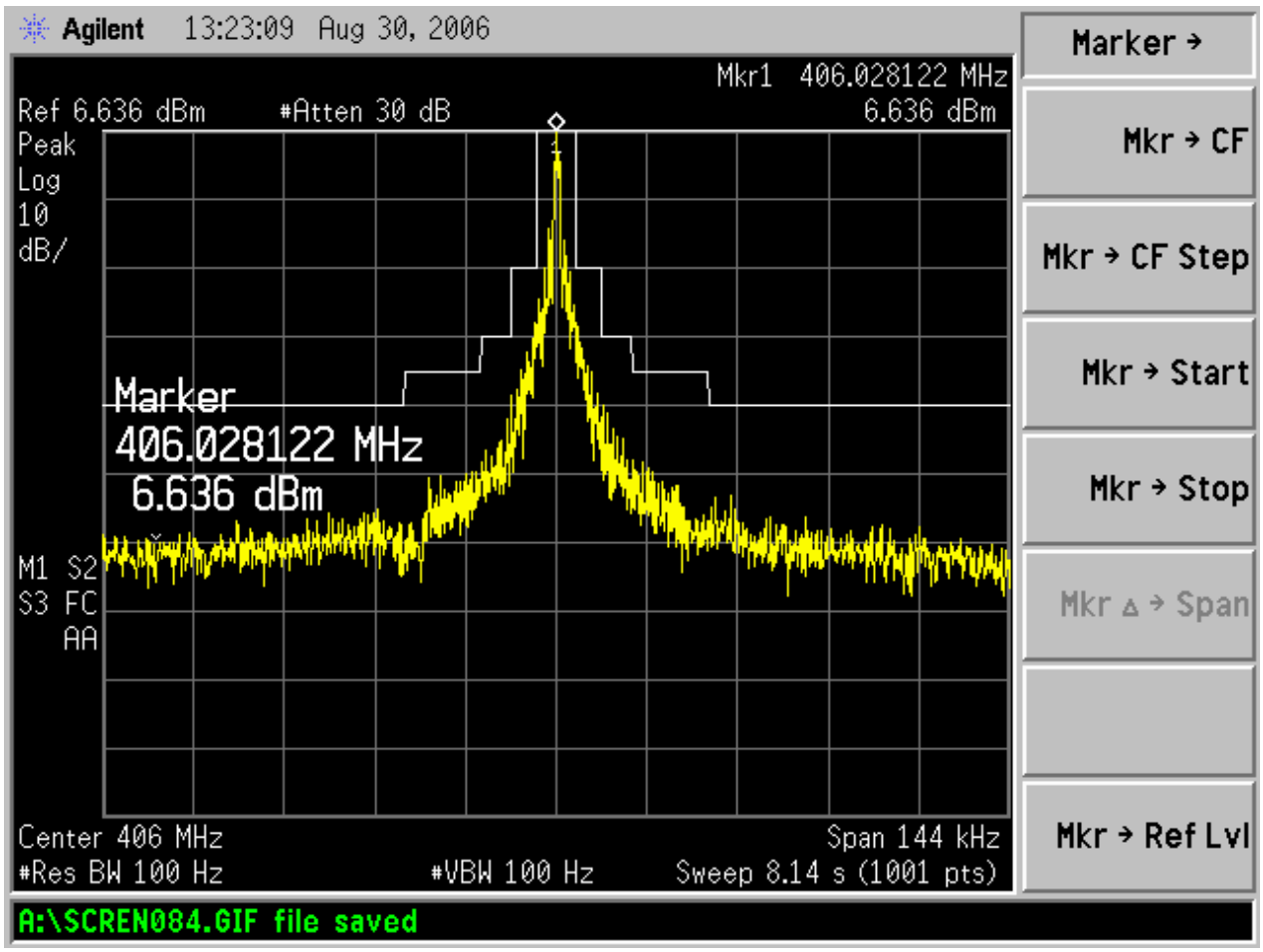
Digital Message at Maximum Temperature

2.2 SPURIOUS EMISSIONS – MT410G PLB



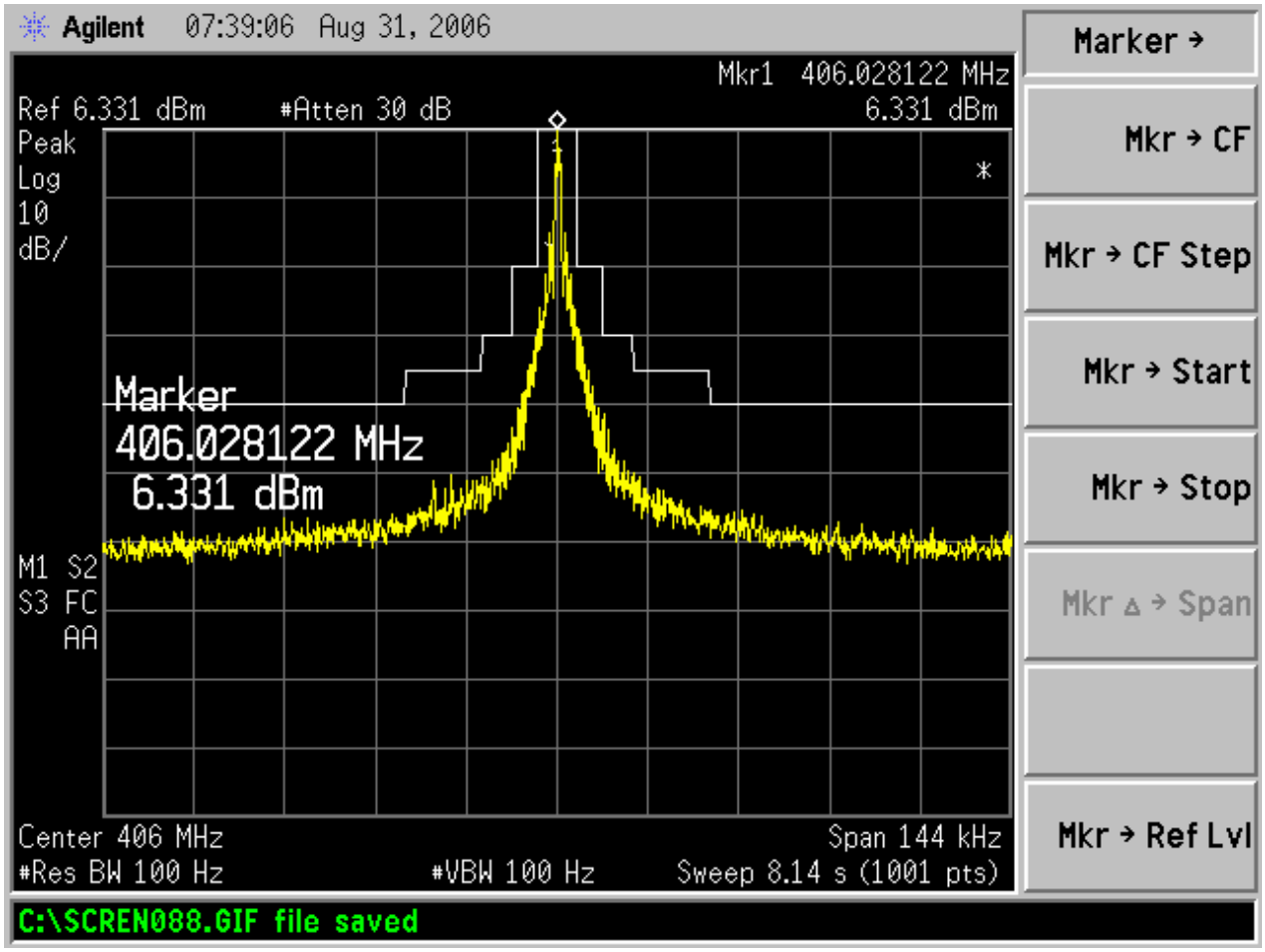
Spurious Emissions at Ambient Temperature

2.2 SPURIOUS EMISSIONS – MT410G PLB



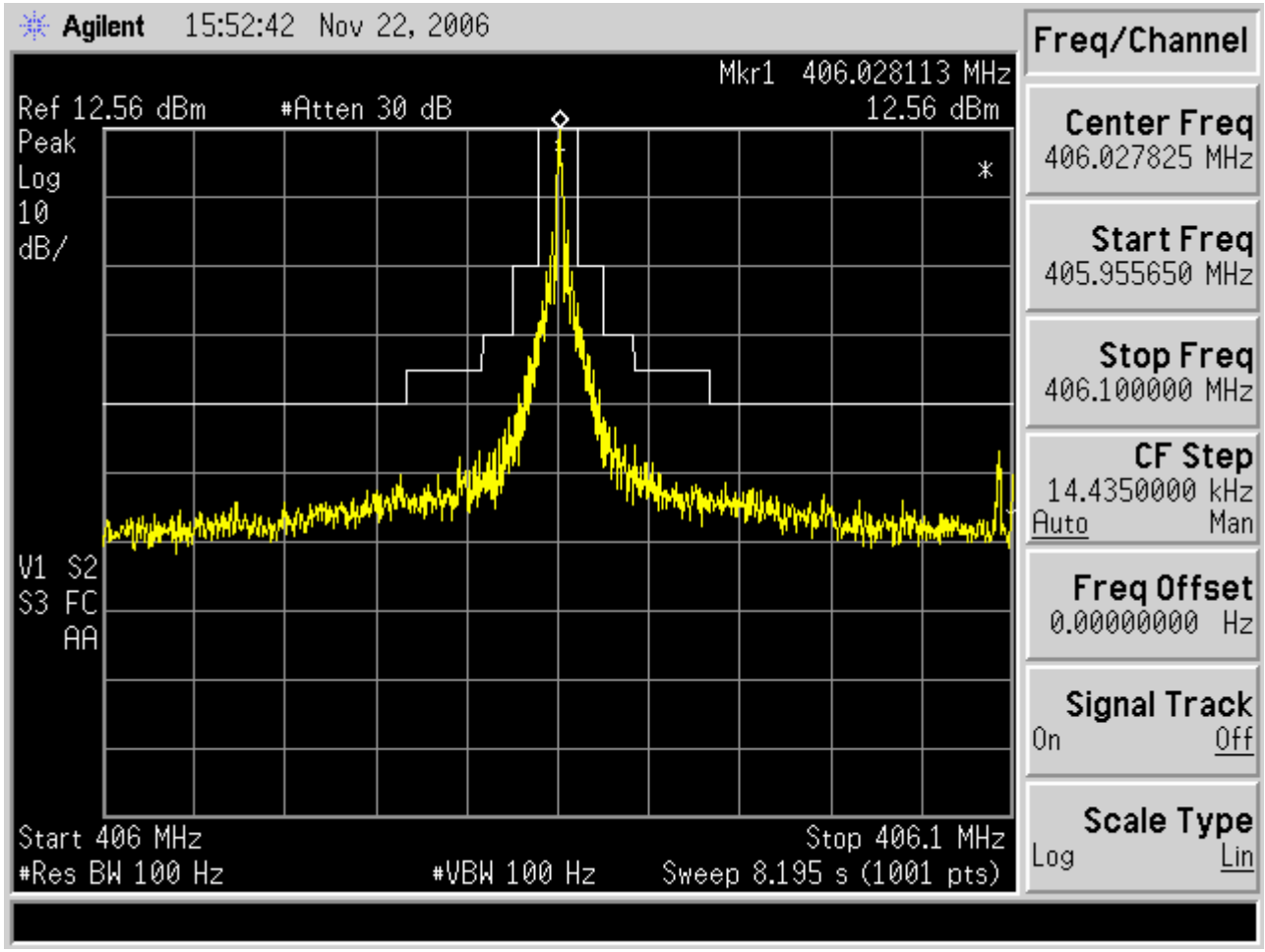
Spurious Emissions at Minimum Temperature

2.2 SPURIOUS EMISSIONS – MT410G PLB



Spurious Emissions at Maximum Temperature

2.2 SPURIOUS EMISSIONS – MT410 PLB



Spurious Emissions combined plot at Ambient, +5°C and -20°C

2.3 406 MHZ VSWR CHECK – DECODED MESSAGE

```
FFFE2F9F7E0000EB7FDFFA0334F783E0F66C

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
15 Hex (Bits 26- 85) = 3EFC0001D6FFBFF             3EFC0001D6FFBFF Default_Id
30 Hex (Bits 25-144) = 9F7E0000EB7FDFFA0334F783E0F66C

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0011 1110 1111 1100 0000 0000 0000 0001 1101 0110 1111 1111 1011 1111 1111
   0100 0000 0110 0110 1001 1110 1111 0000 0111 1100 0001 1110 1100 1101 100
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      503 AUSTRALIA                    0111 1101 11
Protocol Code      37- 40       14 Test Serial (Standard)                1110
Spare              41- 64                          0000 0000 0000 0000 1110 1011
Coarse Position    65- 85          DEFAULT            0111 1111 1101 1111 1111 1
BCH Encoded        86-106          Errors=0           0100 0000 0110 0110 1001 1
BCH Generated      86-106                             0100 0000 0110 0110 1001 1
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
Fixed Bit         110            1                                           1
Encode Pos Device 111            1 Internal                                  1
121.5 Homing      112            1 YES                                       1
Position Change   113-132          DEFAULT              1000 0011 1110 0000 1111
Resultant Position              --> Not Defined
BCH Encoded       133-144          Errors=0                      0110 0110 1100
BCH Generated     133-144                                        0110 0110 1100
```

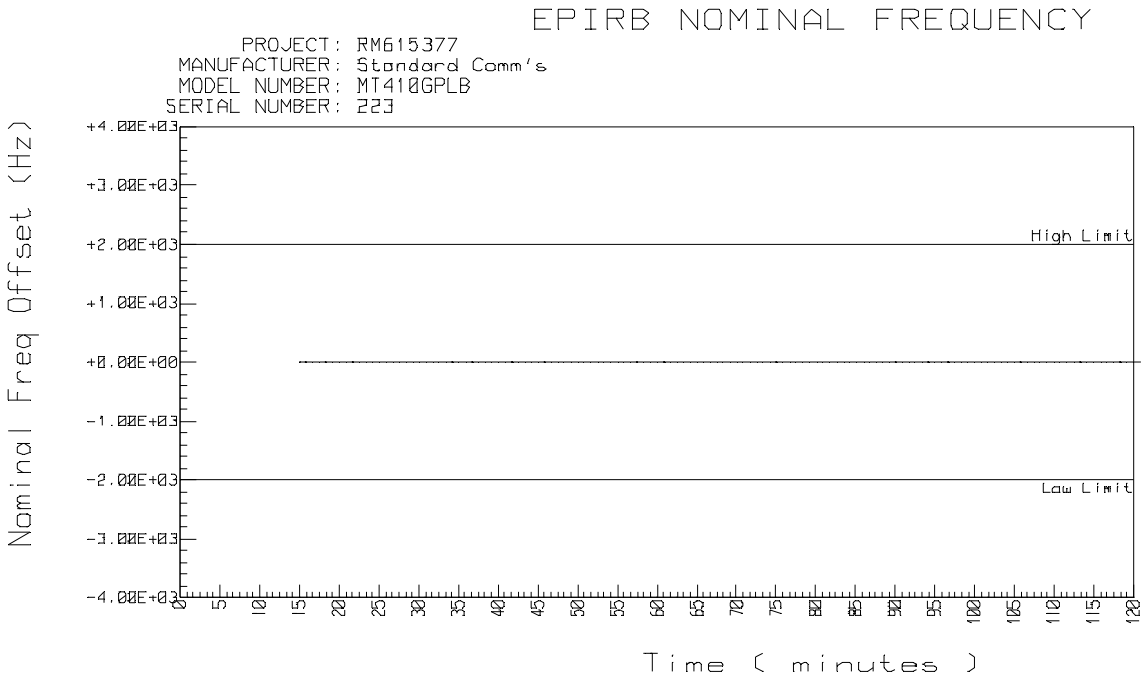
Results as reported on page 19.

2.4 SELF TEST MODE – DECODED MESSAGE

```
FFFED09F7E0000EB7FDFFA0334F783E0F66C

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
15 Hex (Bits 26- 85) = 3EFC0001D6FFBFF             3EFC0001D6FFBFF Default_Id
30 Hex (Bits 25-144) = 9F7E0000EB7FDFFA0334F783E0F66C

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0011 1110 1111 1100 0000 0000 0000 0001 1101 0110 1111 1111 1011 1111 1111
   0100 0000 0110 0110 1001 1110 1111 0000 0111 1100 0001 1110 1100 1101 100
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      503 AUSTRALIA                       0111 1101 11
Protocol Code      37- 40       14 Test Serial (Standard)                  1110
Spare              41- 64                          0000 0000 0000 0000 1110 1011
Coarse Position    65- 85          DEFAULT            0111 1111 1101 1111 1111 1
BCH Encoded        86-106          Errors=0           0100 0000 0110 0110 1001 1
BCH Generated      86-106                             0100 0000 0110 0110 1001 1
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
Fixed Bit         110            1                                           1
Encode Pos Device 111            1 Internal                                  1
121.5 Homing      112            1 YES                                       1
Position Change   113-132          DEFAULT              1000 0011 1110 0000 1111
Resultant Position              --> Not Defined
BCH Encoded       133-144          Errors=0                       0110 0110 1100
BCH Generated     133-144           -                             0110 0110 1100
```

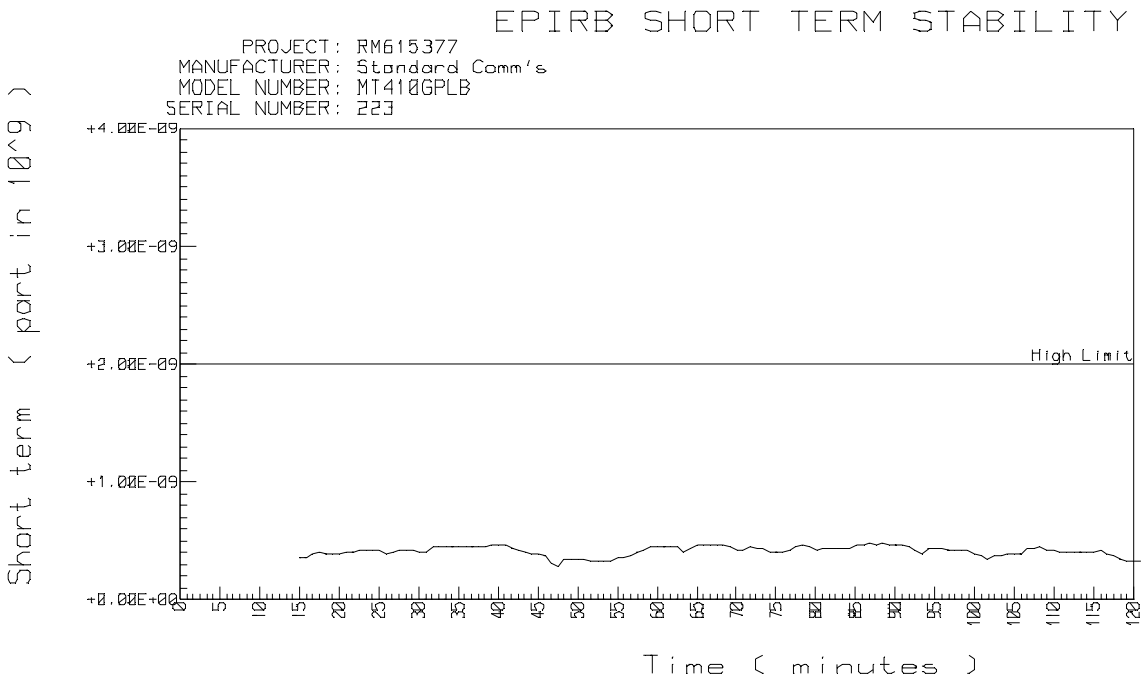
Results as reported on page 19.

2.5 THERMAL SHOCK



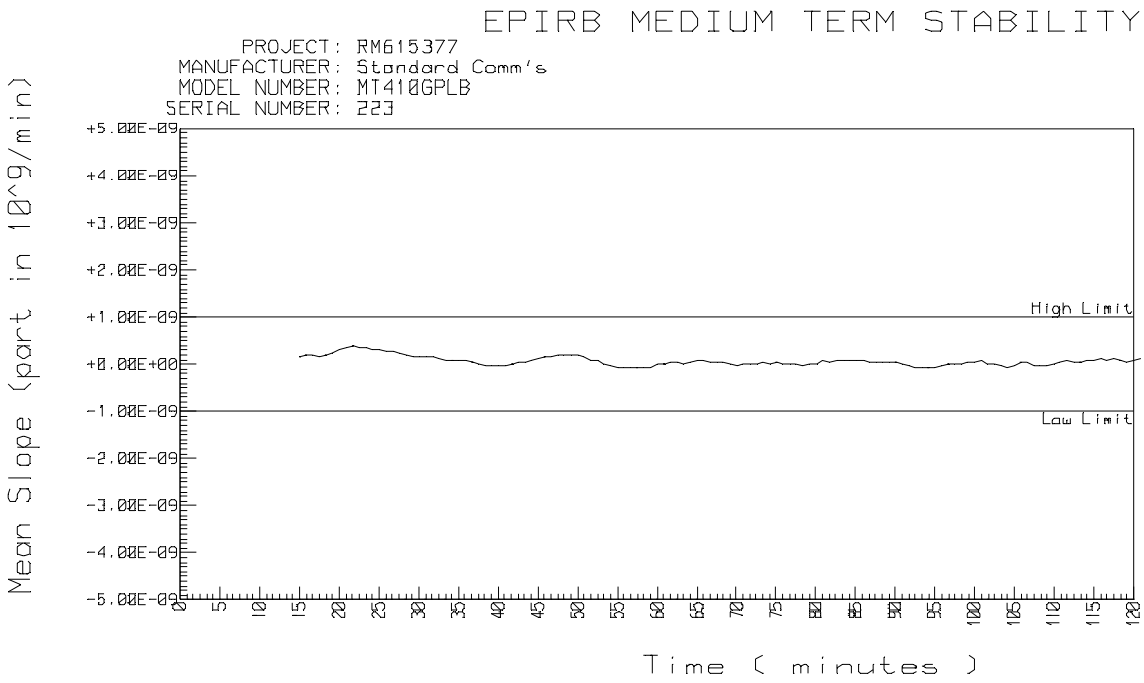
Thermal Shock - Nominal Frequency

2.5 THERMAL SHOCK



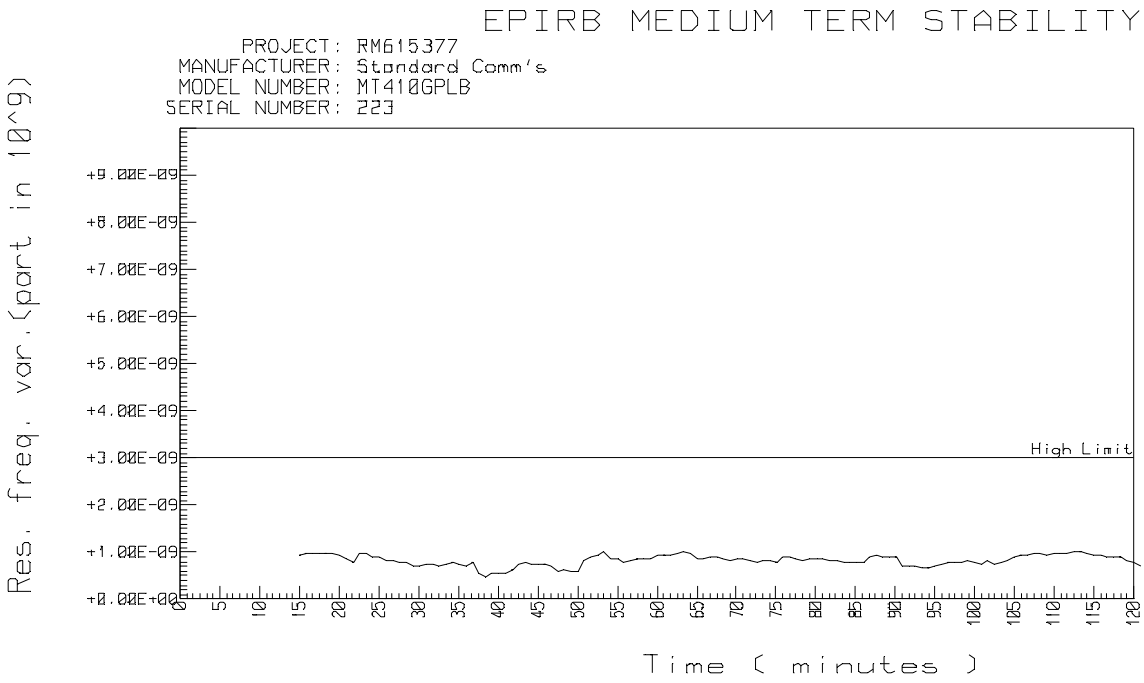
Thermal Shock - Short Term Stability

2.5 THERMAL SHOCK



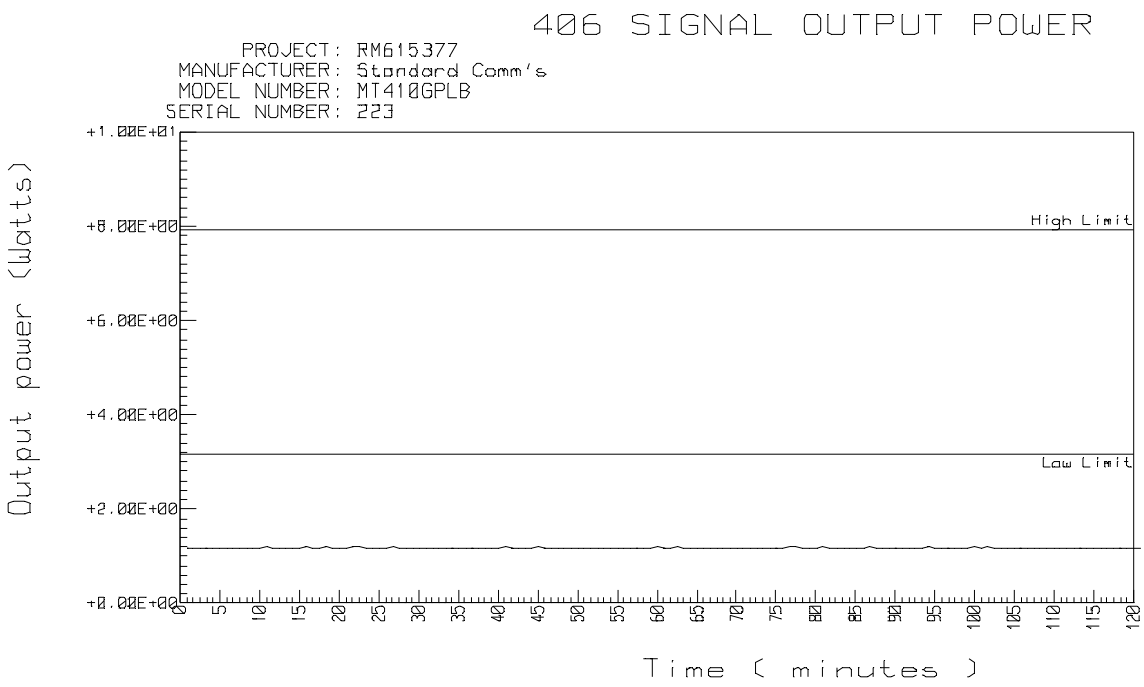
Thermal Shock - Medium Term Stability, Mean Slope

2.5 THERMAL SHOCK



Thermal Shock - Medium Term Stability, Residual Frequency Variation

2.5 THERMAL SHOCK



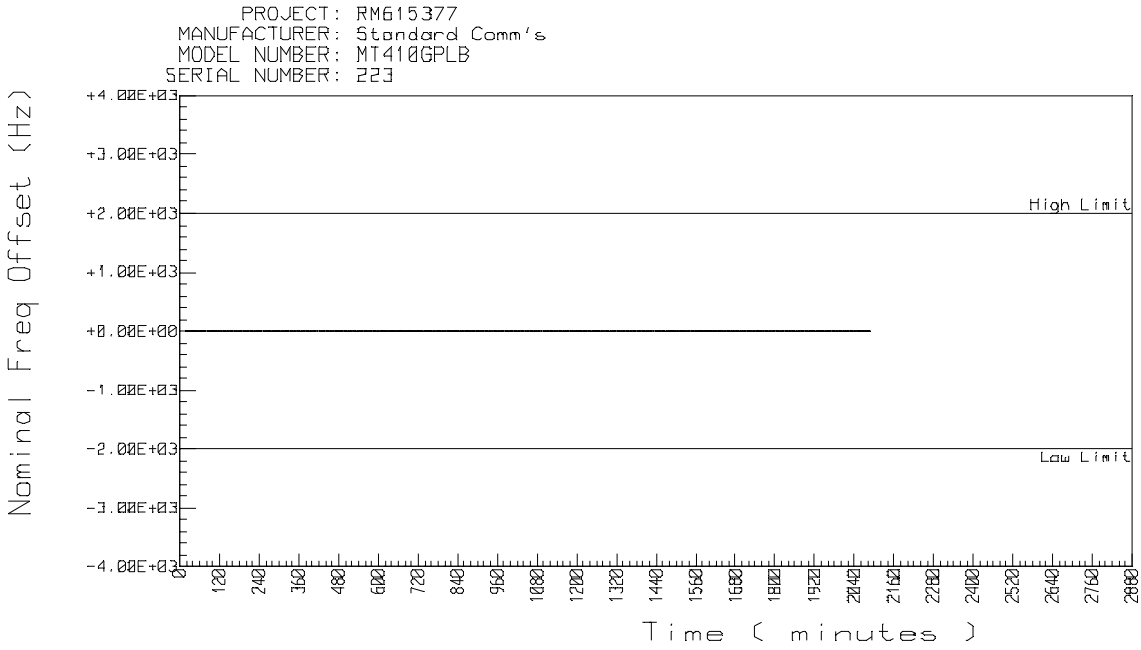
Thermal Shock - Output Power

2.5 THERMAL SHOCK

```
FFFE2F9F7E0000EB7FDFFA0334F783E0F66C

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
15 Hex (Bits 26- 85) = 3EFC0001D6FFBFF              3EFC0001D6FFBFF Default_Id
30 Hex (Bits 25-144) = 9F7E0000EB7FDFFA0334F783E0F66C

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0011 1110 1111 1100 0000 0000 0000 0001 1101 0110 1111 1111 1011 1111 1111
   0100 0000 0110 0110 1001 1110 1111 0000 0111 1100 0001 1110 1100 1101 100
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      503 AUSTRALIA                    0111 1101 11
Protocol Code      37- 40       14 Test Serial (Standard)                 1110
Spare              41- 64                        0000 0000 0000 0000 1110 1011
Coarse Position    65- 85          DEFAULT          0111 1111 1101 1111 1111 1
BCH Encoded        86-106          Errors=0         0100 0000 0110 0110 1001 1
BCH Generated      86-106                           0100 0000 0110 0110 1001 1
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
Fixed Bit         110            1                                          1
Encode Pos Device 111            1 Internal                                 1
121.5 Homing      112            1 YES                                      1
Position Change   113-132          DEFAULT            1000 0011 1110 0000 1111
Resultant Position              --> Not Defined
BCH Encoded       133-144          Errors=0                    0110 0110 1100
BCH Generated     133-144                                      0110 0110 1100
```

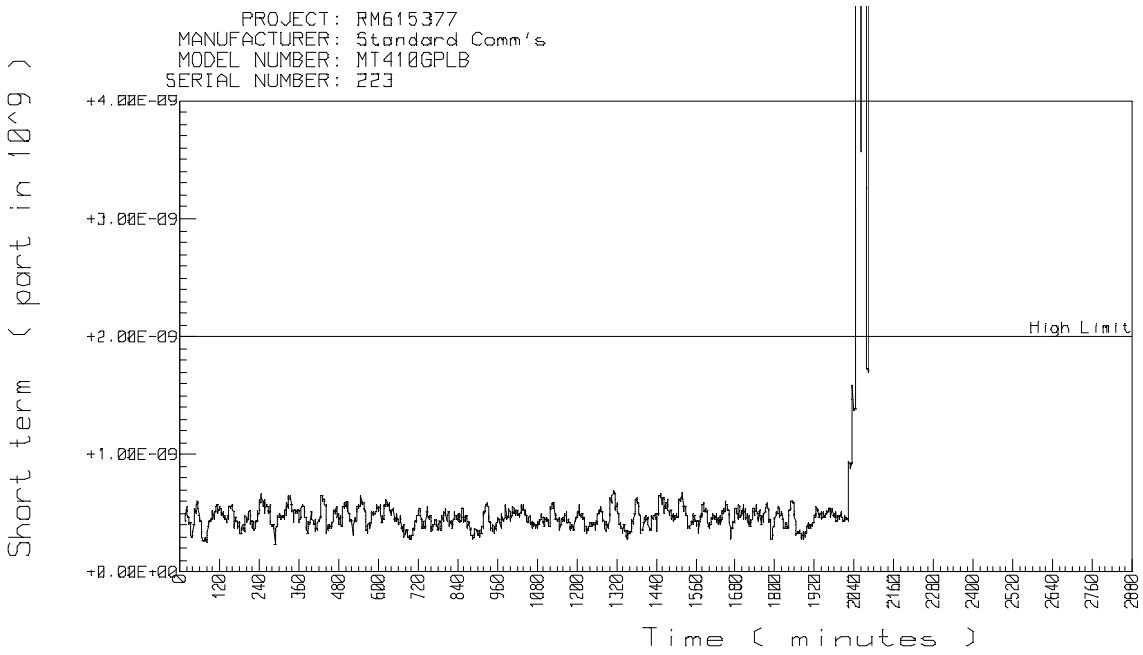
Thermal Shock - Digital Message

2.6 OPERATING LIFETIME AT MINIMUM TEMPERATURE



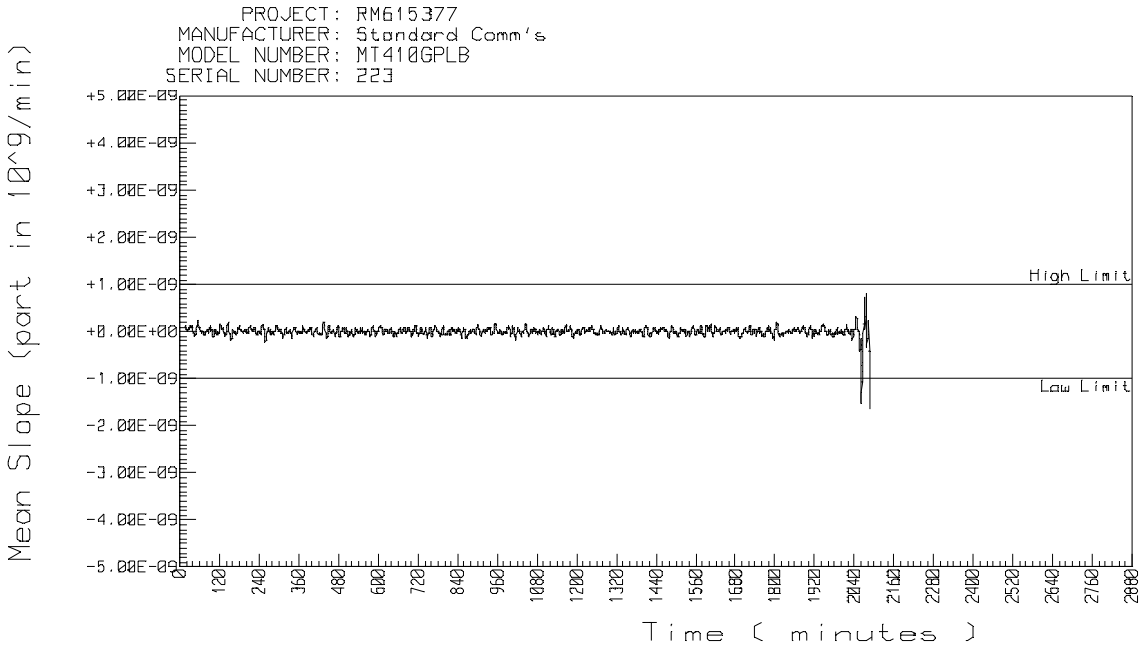
Operating Lifetime at Minimum Temperature - Nominal Frequency

2.6 OPERATING LIFETIME AT MINIMUM TEMPERATURE



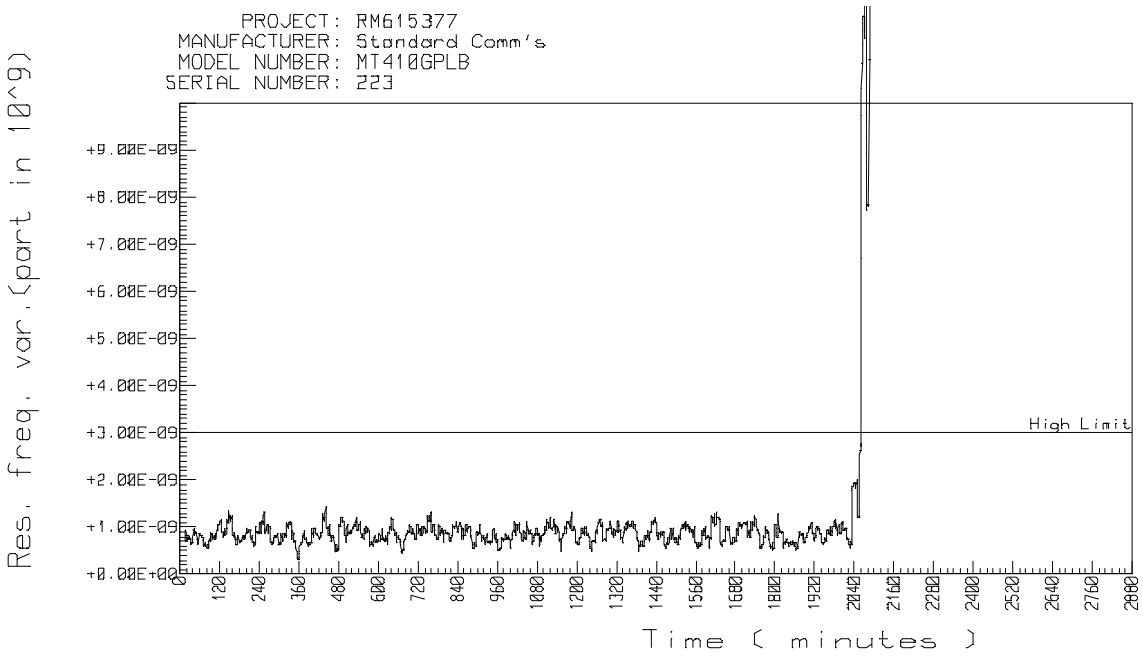
Operating Lifetime at Minimum Temperature - Short Term Stability

2.6 OPERATING LIFETIME AT MINIMUM TEMPERATURE



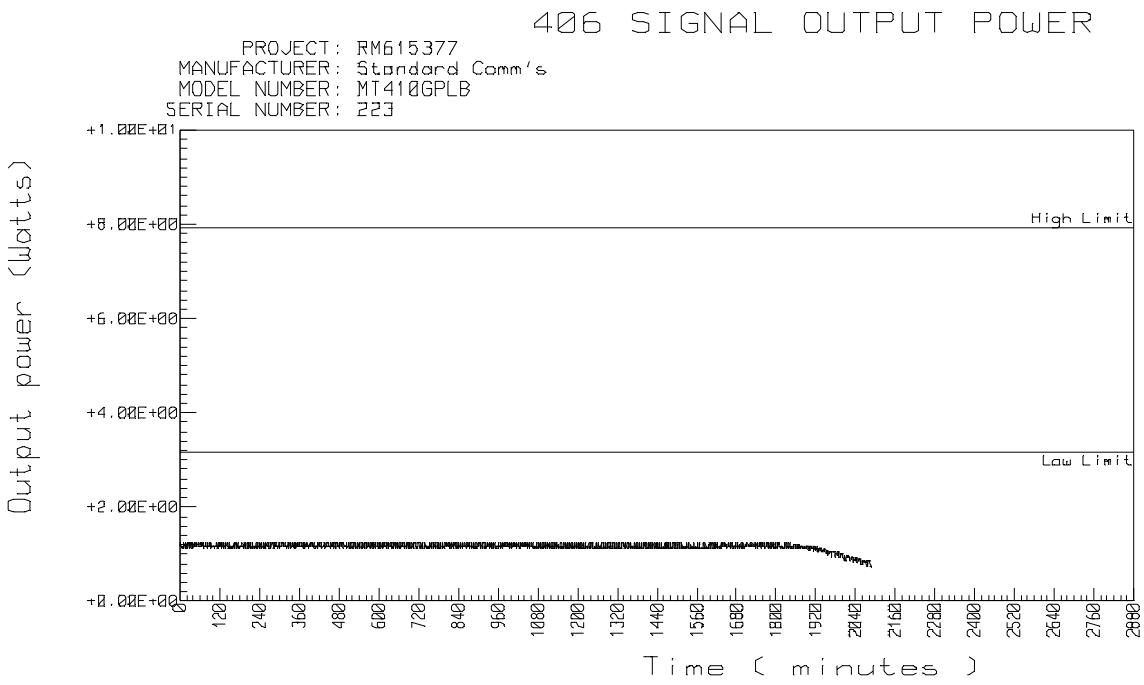
Operating Lifetime at Minimum Temperature - Medium Term Stability, Mean Slope

2.6 OPERATING LIFETIME AT MINIMUM TEMPERATURE



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

2.6 OPERATING LIFETIME AT MINIMUM TEMPERATURE



Operating Lifetime at Minimum Temperature - Output Power

2.6 OPERATING LIFETIME AT MINIMUM TEMPERATURE

```
FFFE2F9F7E0000EB7FDFFA0334F783E0F66C

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
15 Hex (Bits 26- 85) = 3EFC0001D6FFBFF             3EFC0001D6FFBFF Default_Id
30 Hex (Bits 25-144) = 9F7E0000EB7FDFFA0334F783E0F66C

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0011 1110 1111 1100 0000 0000 0000 0001 1101 0110 1111 1111 1011 1111 1111
   0100 0000 0110 0110 1001 1110 1111 0000 0111 1100 0001 1110 1100 1101 100
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      503 AUSTRALIA                    0111 1101 11
Protocol Code      37- 40       14 Test Serial (Standard)                1110
Spare              41- 64                          0000 0000 0000 0000 1110 1011
Coarse Position    65- 85          DEFAULT            0111 1111 1101 1111 1111 1
BCH Encoded        86-106          Errors=0           0100 0000 0110 0110 1001 1
BCH Generated      86-106                             0100 0000 0110 0110 1001 1
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
Fixed Bit         110            1                                           1
Encode Pos Device 111            1 Internal                                  1
121.5 Homing      112            1 YES                                       1
Position Change   113-132          DEFAULT              1000 0011 1110 0000 1111
Resultant Position               --> Not Defined
BCH Encoded       133-144          Errors=0                      0110 0110 1100
BCH Generated     133-144                                        0110 0110 1100
```

Operating Lifetime at Minimum Temperature - Digital Message

2.6 OPERATING LIFETIME AT MINIMUM TEMPERATURE

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" and a GPS self-test, "GPS test Current"
Beacon activated and transmitting, "Operating Current"

The individual tests were conducted for the following durations:

Standby Current	:	30 minutes	(1799920 ms)
Self-test Current	:	3.92 seconds	(3920 ms)
GPS test Current	:	210 seconds	(210000 ms)
Operating Current	:	30 minutes	(1799920 ms)

Assumptions / Supplied Data

Battery Replacement Interval	: 8 years
Battery Capacity	: 1.5 Ah
Battery Self Drain	: 0.75 % per year
Self-test Interval	: 12 tests per year
GPS Tests limited to	: 8 tests per battery

Test Results

Mode Current	=	Accumulated Charge / Time			
Standby Current	=	8728380.1 pC / 1799920 ms	=	4.85	nA
Self-test Current	=	553520.8 uC / 3920 ms	=	141.20	mA
GPS test Current	=	7219221.2 uC / 210000 ms	=	34.38	mA
Operating Current	=	57284546 uC / 1799920 ms	=	31.83	mA

Battery Preconditioning / Discharge Time Calculations

Battery Self Drain = Capacity - [(100% - Self Drain/Year%)$^{\text{Replacement Interval}}$ x Capacity]
= 1.50- ((1- 0.0075) ^{8} x 1.5) = 0.0877 Ah

Standby Drain = Hours per year x Battery Replacement Interval x Standby Current
= 365 x 24 x 8 x 4.85 x 10^{-9} = 0.0003 Ah
Worst Case = 1.65 x 0.0003 Ah = 0.0006 Ah

Self-test Drain = Self-tests per battery x Self-test Current x Self-test duration (in hours)
= 12 x 8 x 141.20 x 10^{-3} x (3.92 / 3600) = 0.0148 Ah
Worst Case = 1.65 x 0.0148 Ah = 0.0244 Ah

GPS Test Drain = GPS Tests per battery x GPS test Current x GPS test duration (in hours)
= 8 x 34.38 x 10^{-3} x (210 / 60) = 0.0160 Ah
Worst Case = 1.65 x 0.0160 Ah = 0.0265 Ah

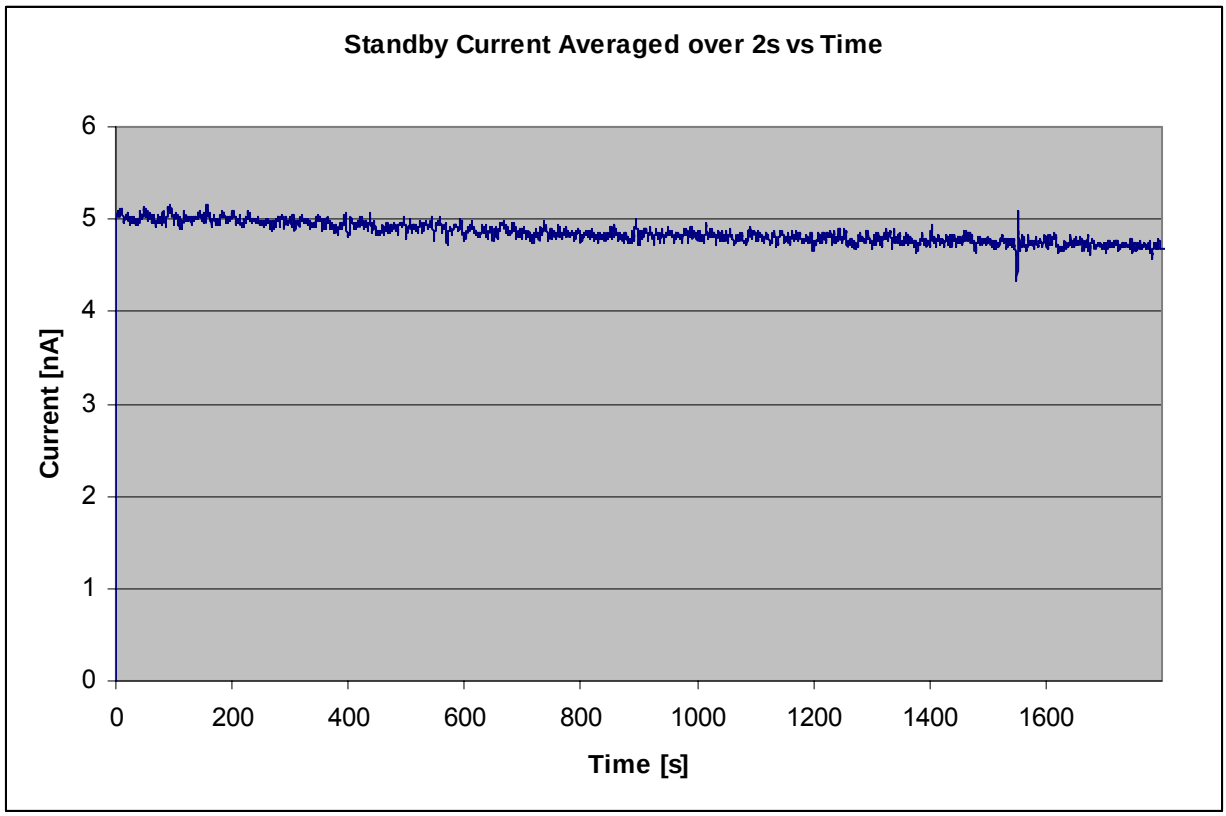
Total Drain = Self Drain + Standby Drain* + Self-test Drain* + GPS Test Drain*
= 0.0877 + 0.0006 + 0.0244 + 0.0265 = 0.1391 Ah

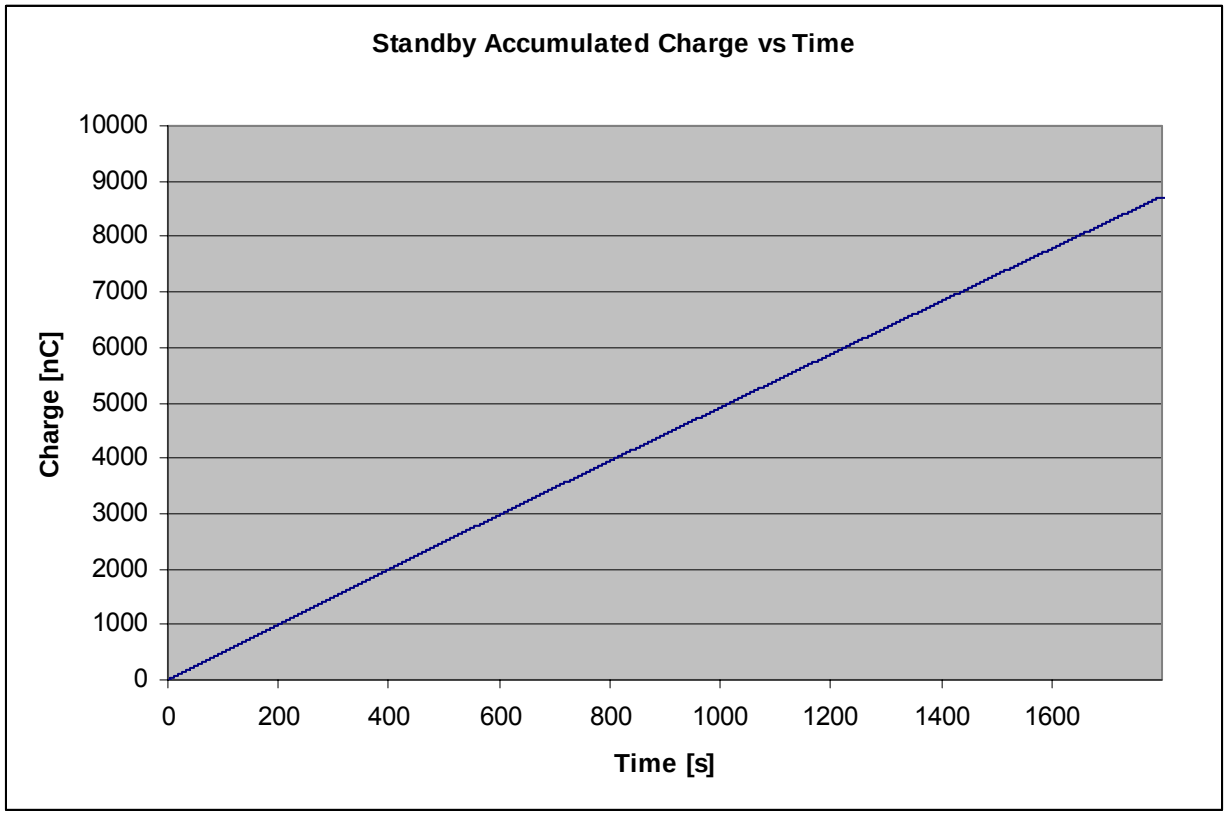
(* = Worst Case)

Battery Preconditioning / Discharge Time = Worst Case drain / Operational Current
= 0.1391 / (31.83 x 10^{-3})
= 4.37 hours

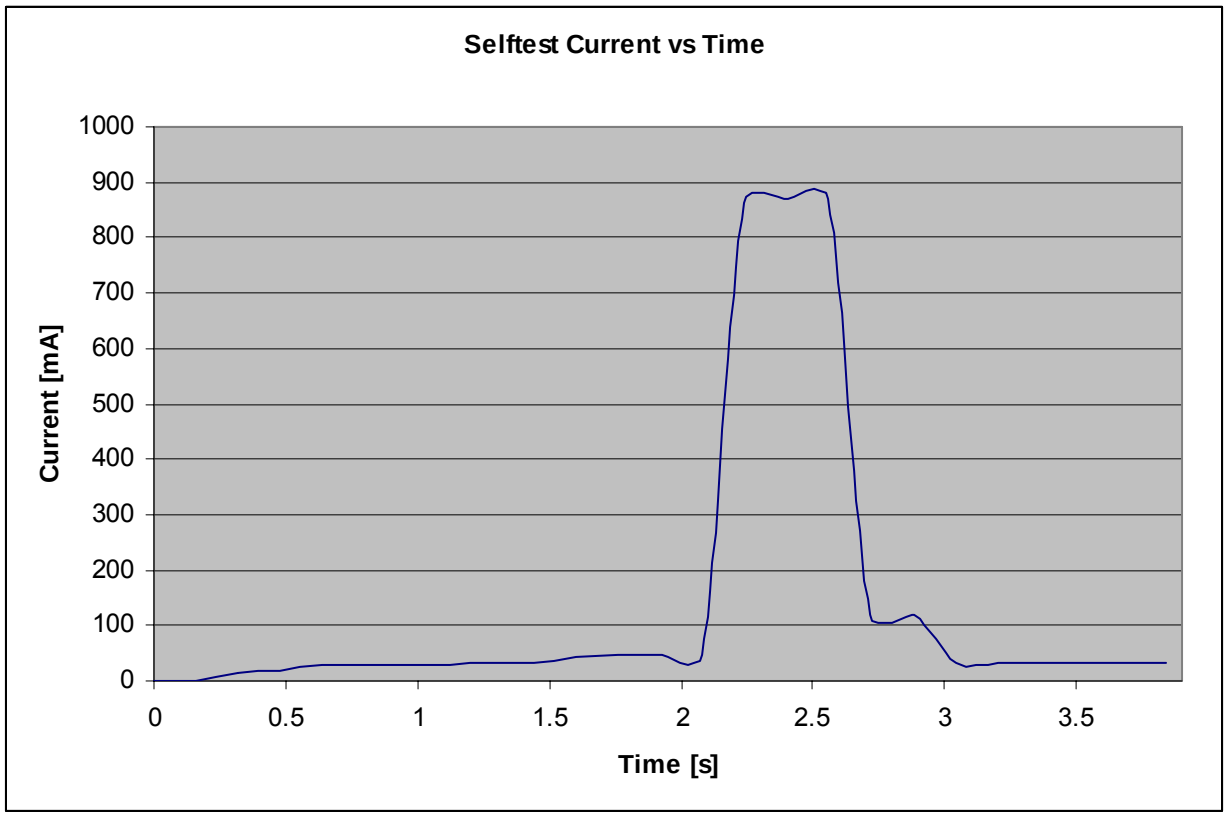
This pre-discharge was not performed before the test, hence, the Time to First Failure must be reduced to an “Effective Operational Lifetime Duration” of 29.49 hours (33.86 – 4.37).

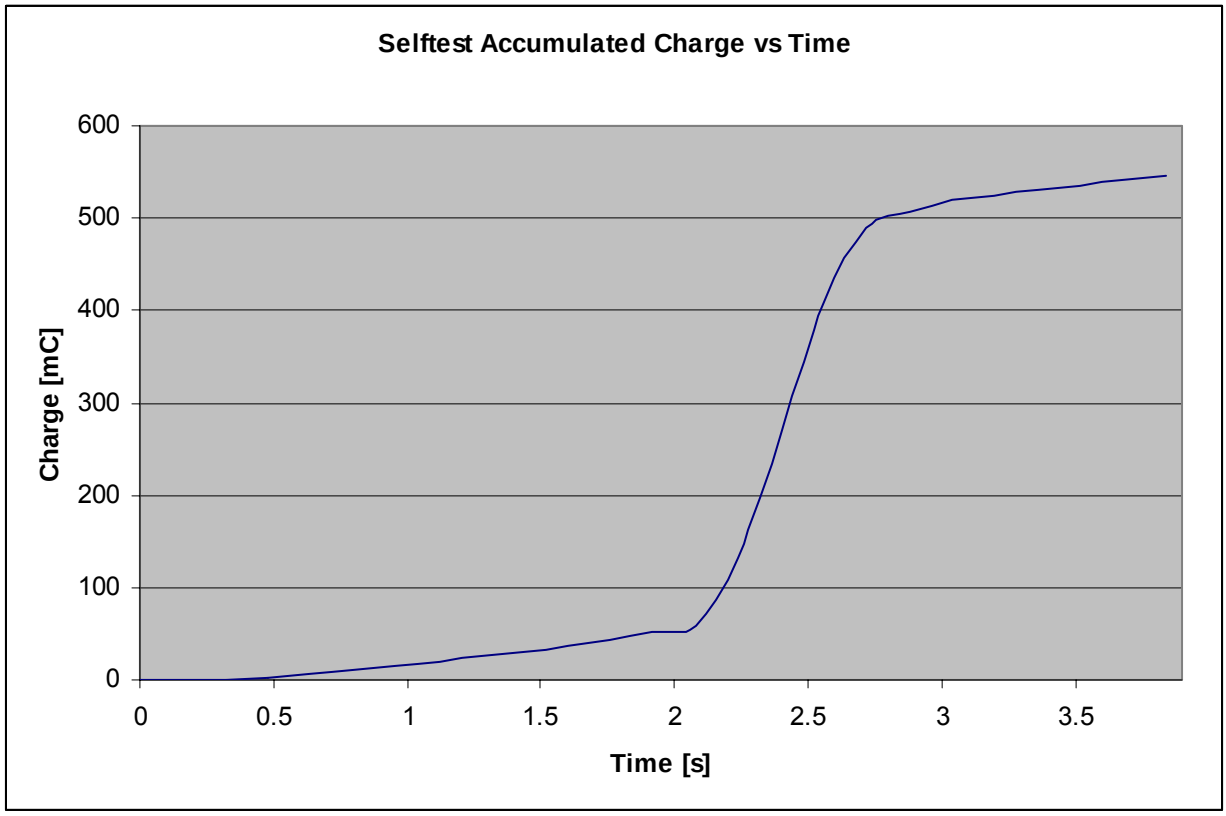
Battery Current Measurement Results (continued) - Standby Mode



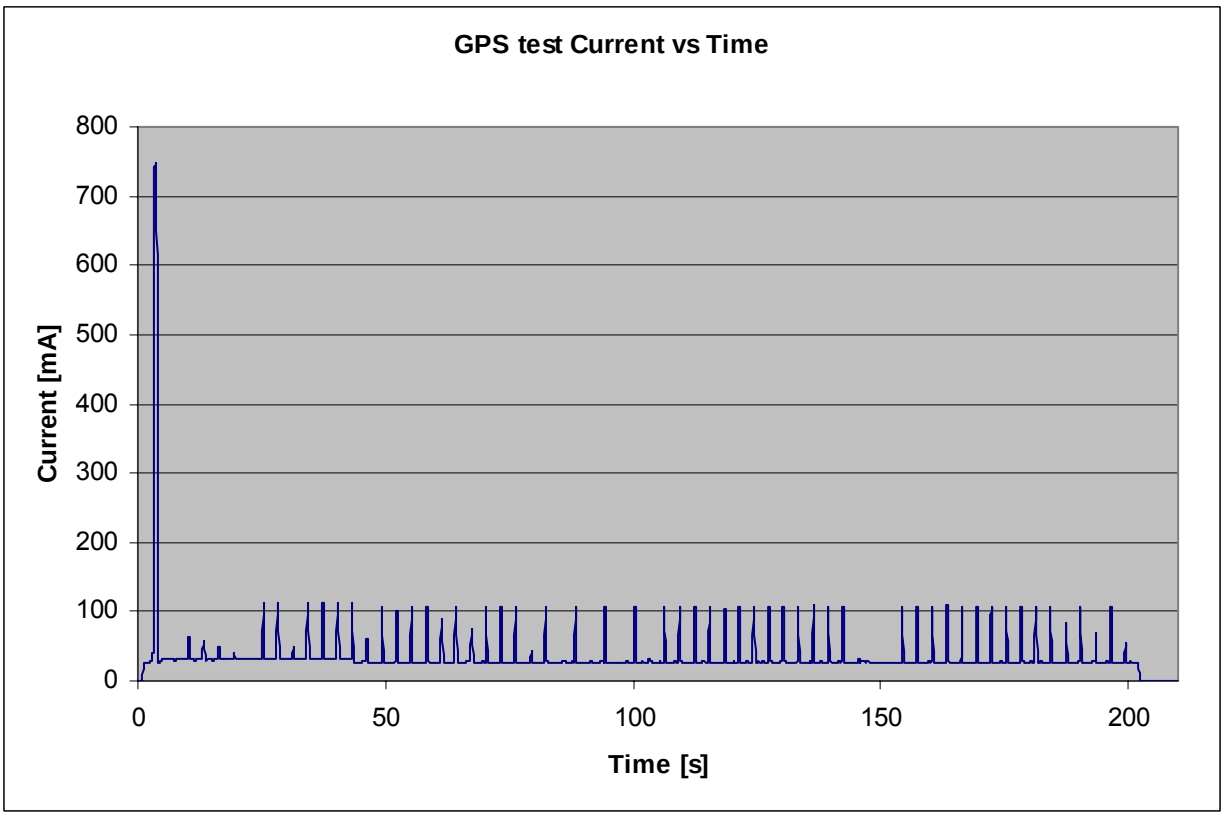


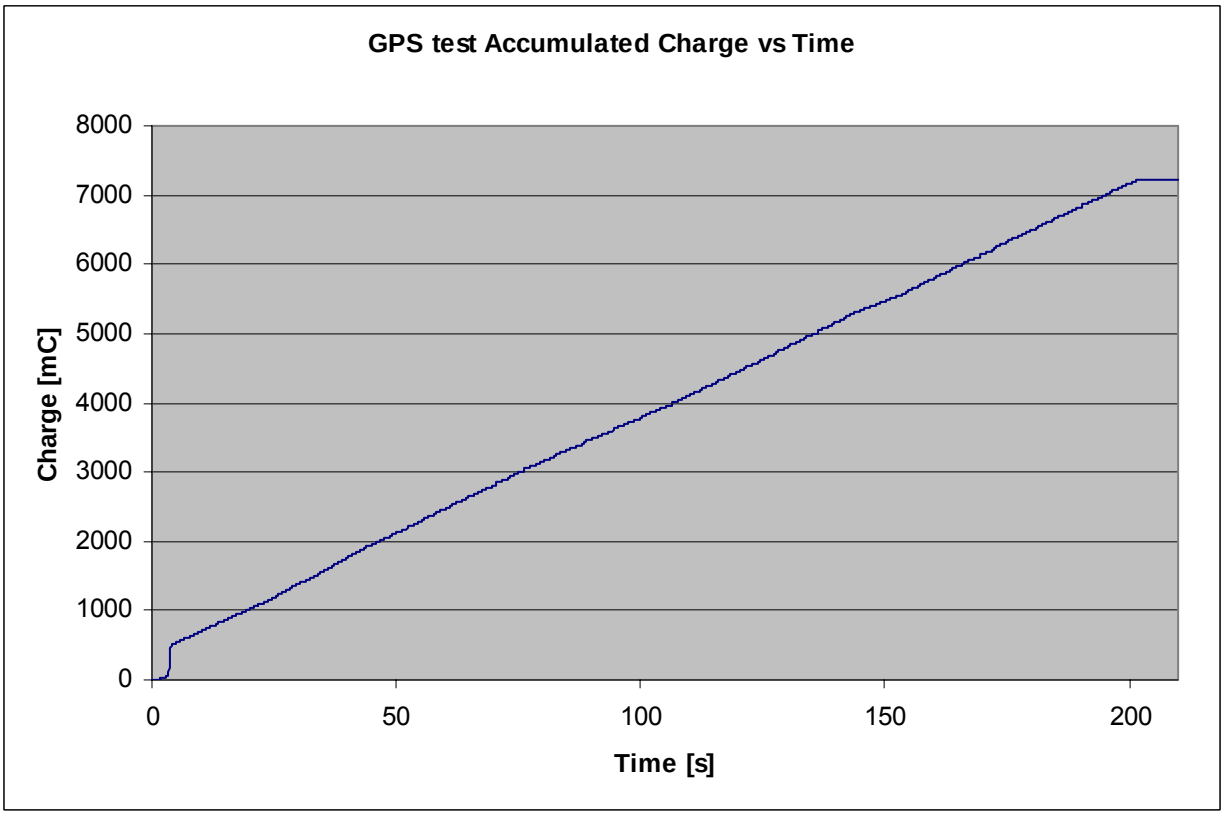
Battery Current Measurement Results (continued) - Selftest Mode



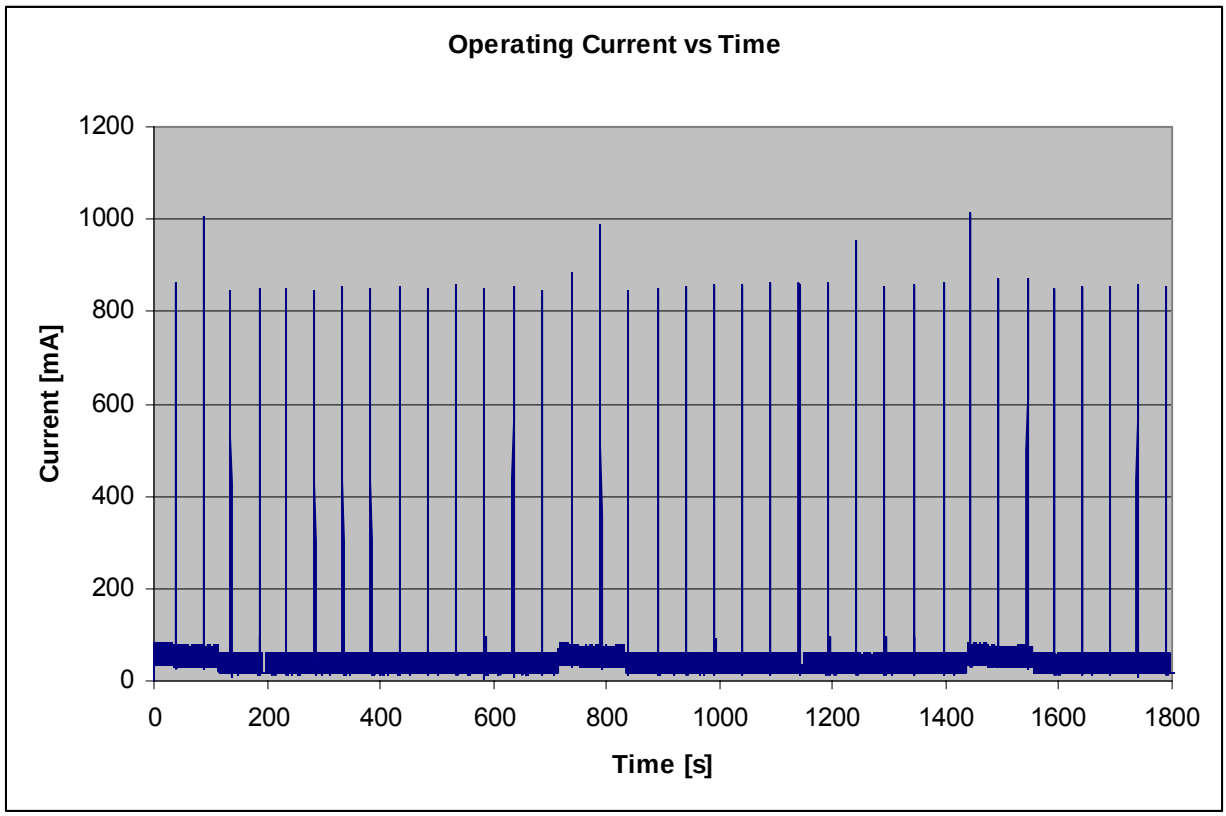


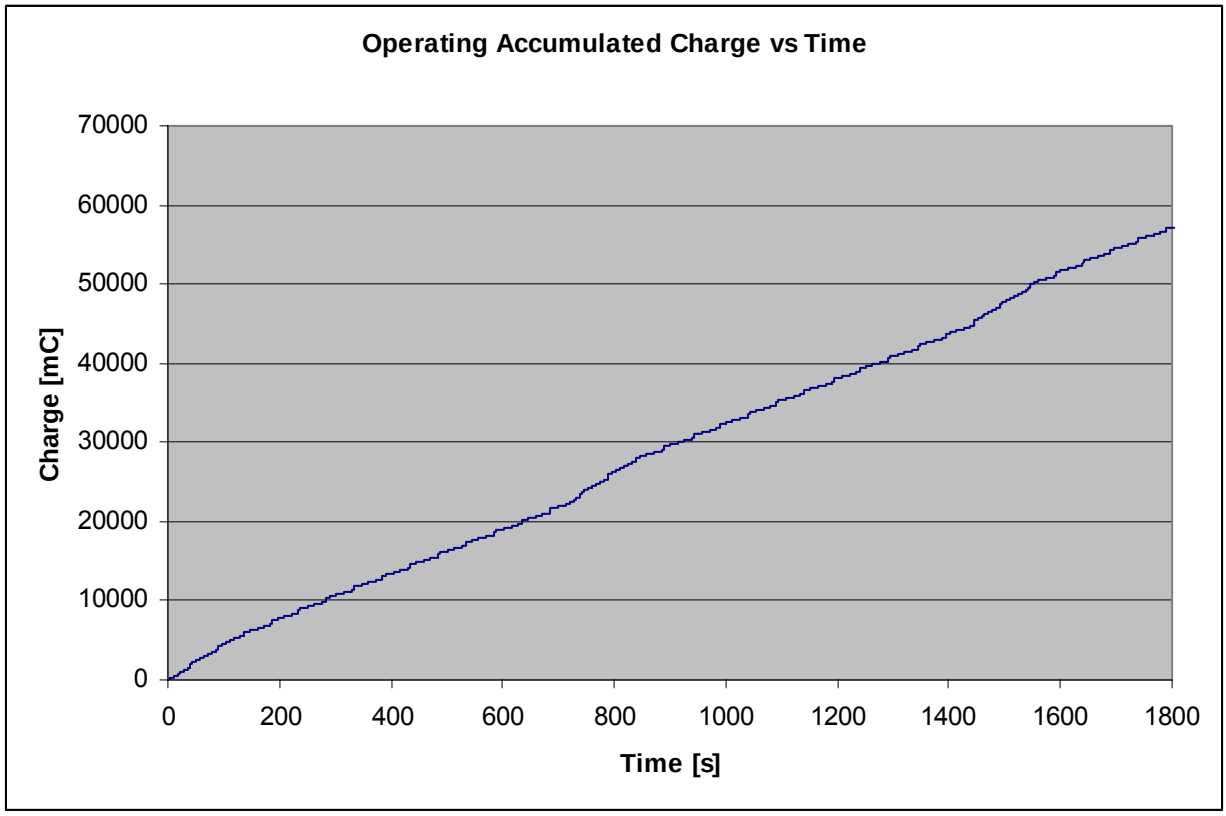
Battery Current Measurement Results (continued) - GPS test Mode



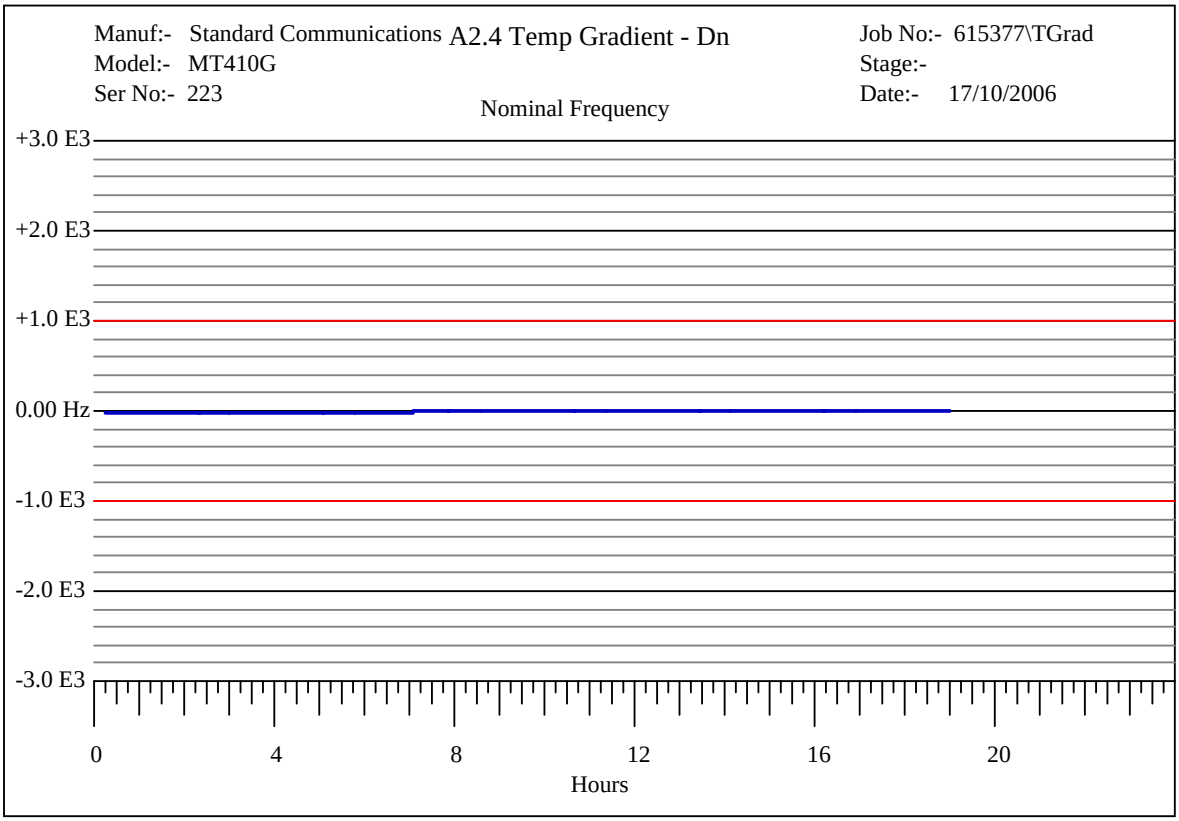


Battery Current Measurement Results (continued) - Operational Mode



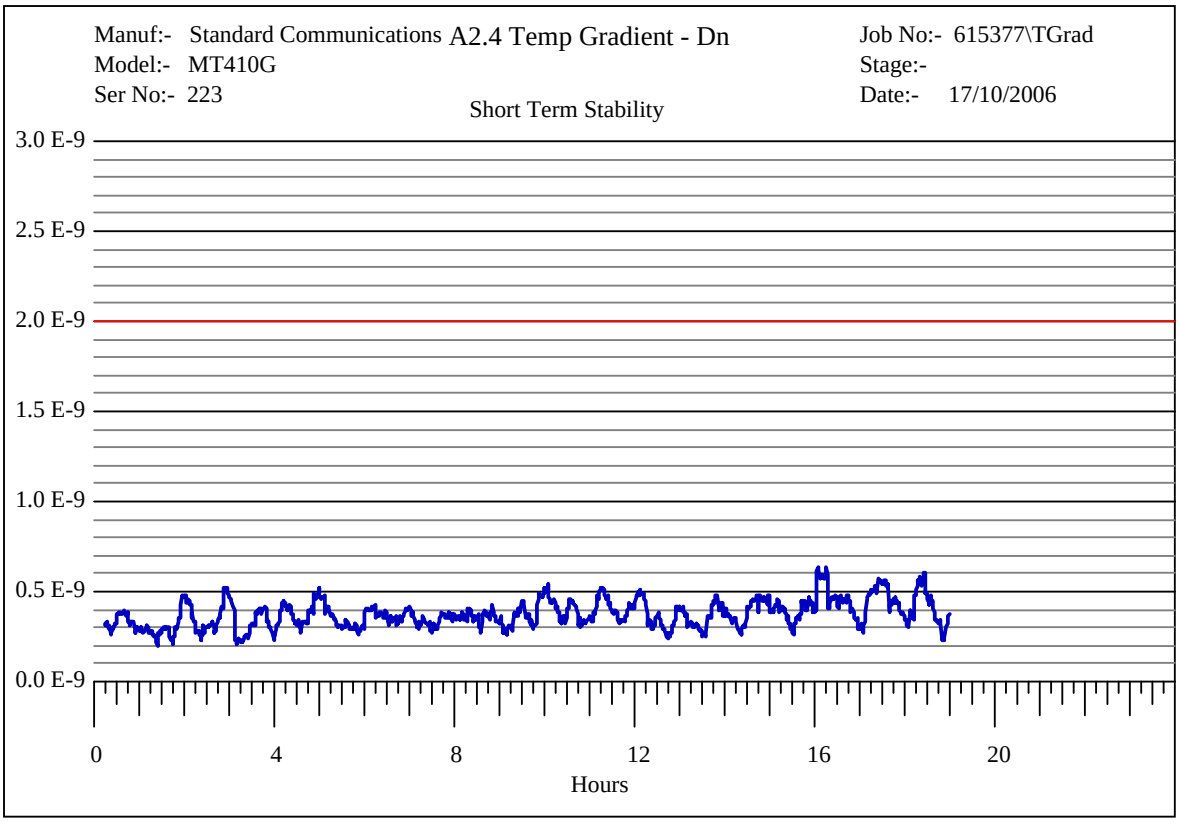


2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – DOWN-RAMP



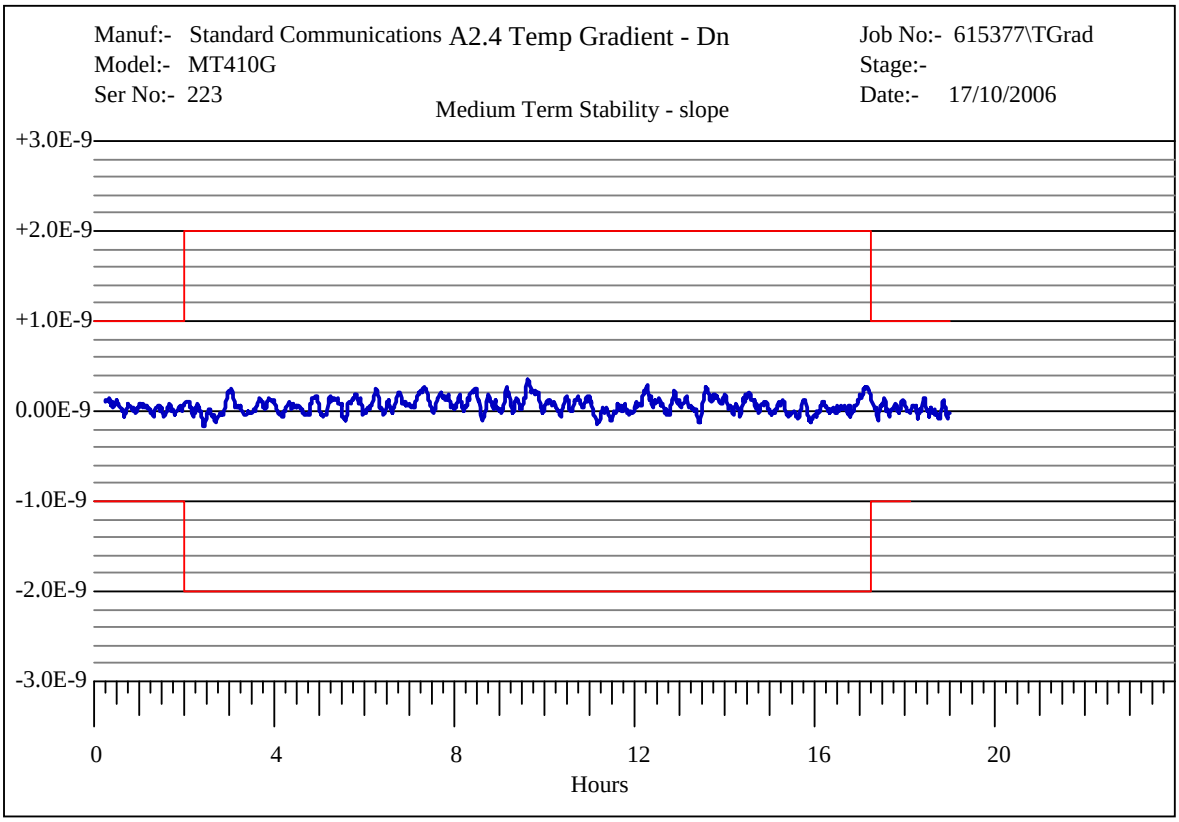
Temperature Gradient - Nominal Frequency

2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – DOWN-RAMP



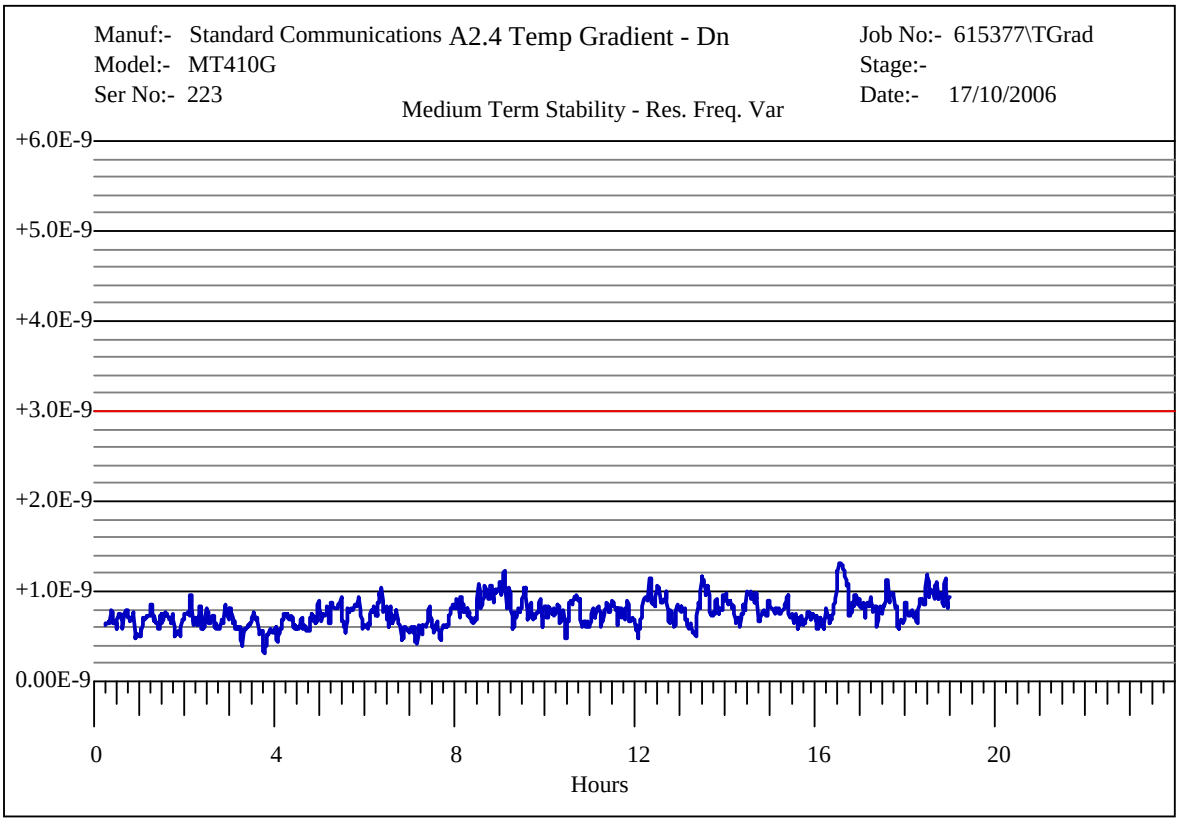
Temperature Gradient - Short Term Stability

2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – DOWN-RAMP



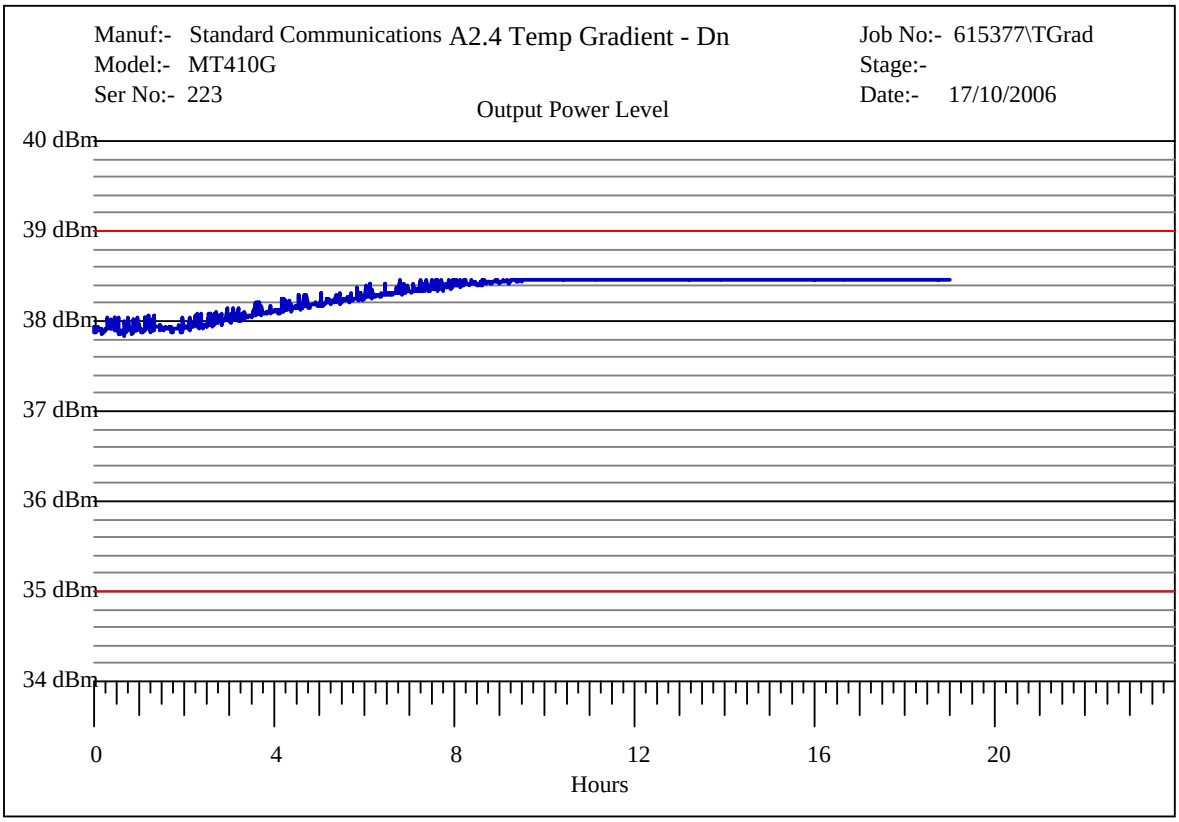
Temperature Gradient - Medium Terms Stability, Mean Slope

2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – DOWN-RAMP



Temperature Gradient – Medium Term Stability, Residual Frequency Variation

2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – DOWN-RAMP



Temperature Gradient – Output Power

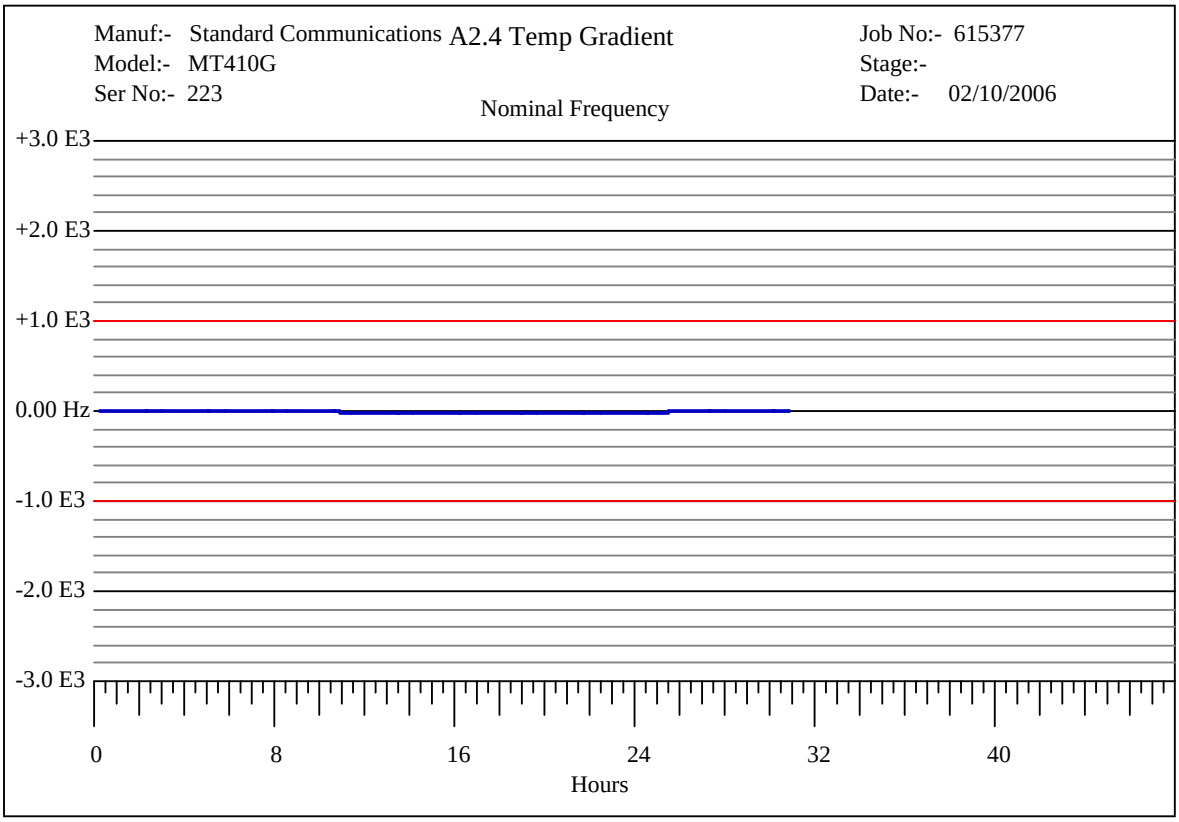
2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – DOWN-RAMP

```
FFFE2F8C9E0000007FDFFA79ED3783E0F66C

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
15 Hex (Bits 26- 85) = 193C000000FFBFF              193C000000FFBFF Default_Id
30 Hex (Bits 25-144) = 8C9E0000007FDFFA79ED3783E0F66C

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1100 0000 0000 0000 0000 0000 0000 1111 1111 1011 1111 1111
   0100 1111 0011 1101 1010 0110 1111 0000 0111 1100 0001 1110 1100 1101 100
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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	14	Test Serial (Standard)	1110
Spare	41- 64		0000 0000 0000 0000 0000 0000	
Coarse Position	65- 85		DEFAULT	0111 1111 1101 1111 1111 1
BCH Encoded	86-106		Errors=0	0100 1111 0011 1101 1010 0
BCH Generated	86-106			0100 1111 0011 1101 1010 0
Long Message	107-144		Data Present	
Fixed Bits	107-109			110
Fixed Bit	110	1		1
Encode Pos Device	111	1	Internal	1
121.5 Homing	112	1	YES	1
Position Change	113-132		DEFAULT	1000 0011 1110 0000 1111
Resultant Position		-->	Not Defined	
BCH Encoded	133-144		Errors=0	0110 0110 1100
BCH Generated	133-144			0110 0110 1100

Temperature Gradient – Digital Message Check

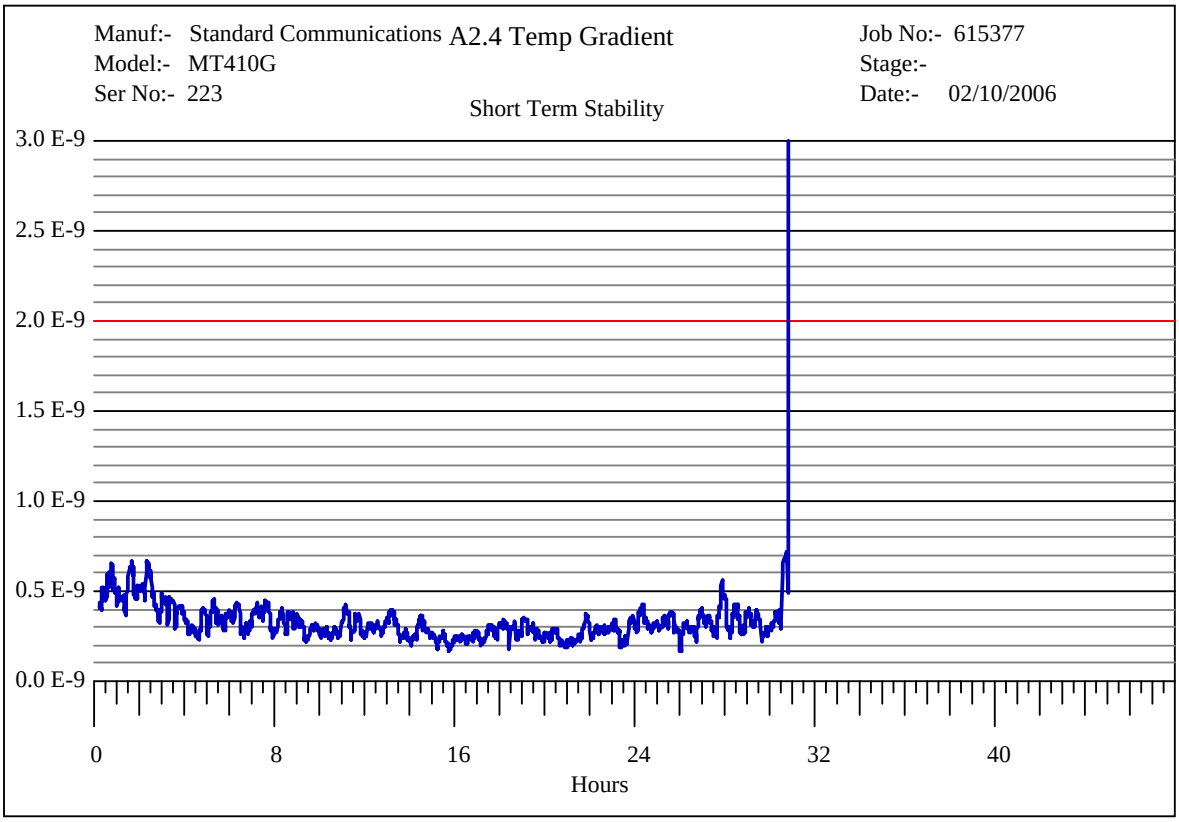
2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – UP-RAMP



Temperature Gradient - Nominal Frequency

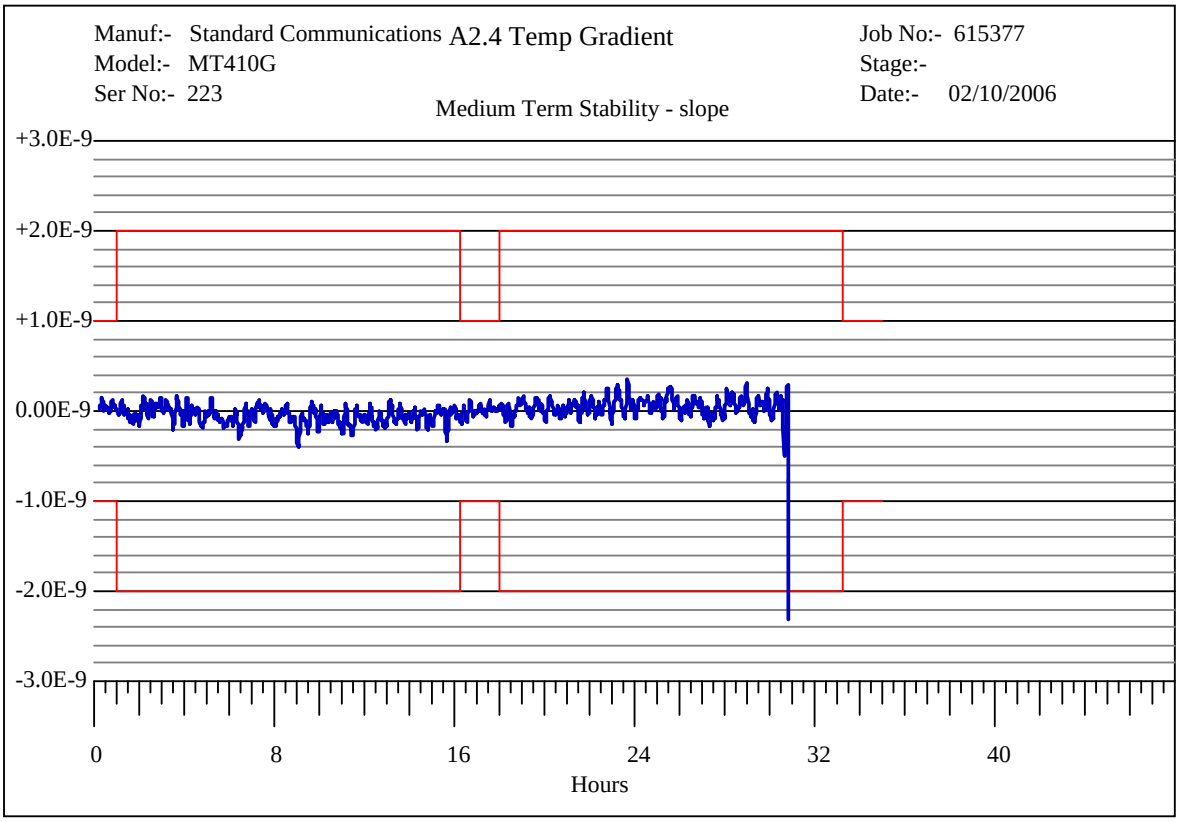
N.B The plot shown above and the following 4 plots show 31 hours of a Temperature Gradient test. The first 18 hours are identified as the up-ramp. The maximum and minimum measurements for this duration are shown in the table of test results on page 11 and 12. Down ramp test was completed separately, see appropriate test results.

2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – UP-RAMP



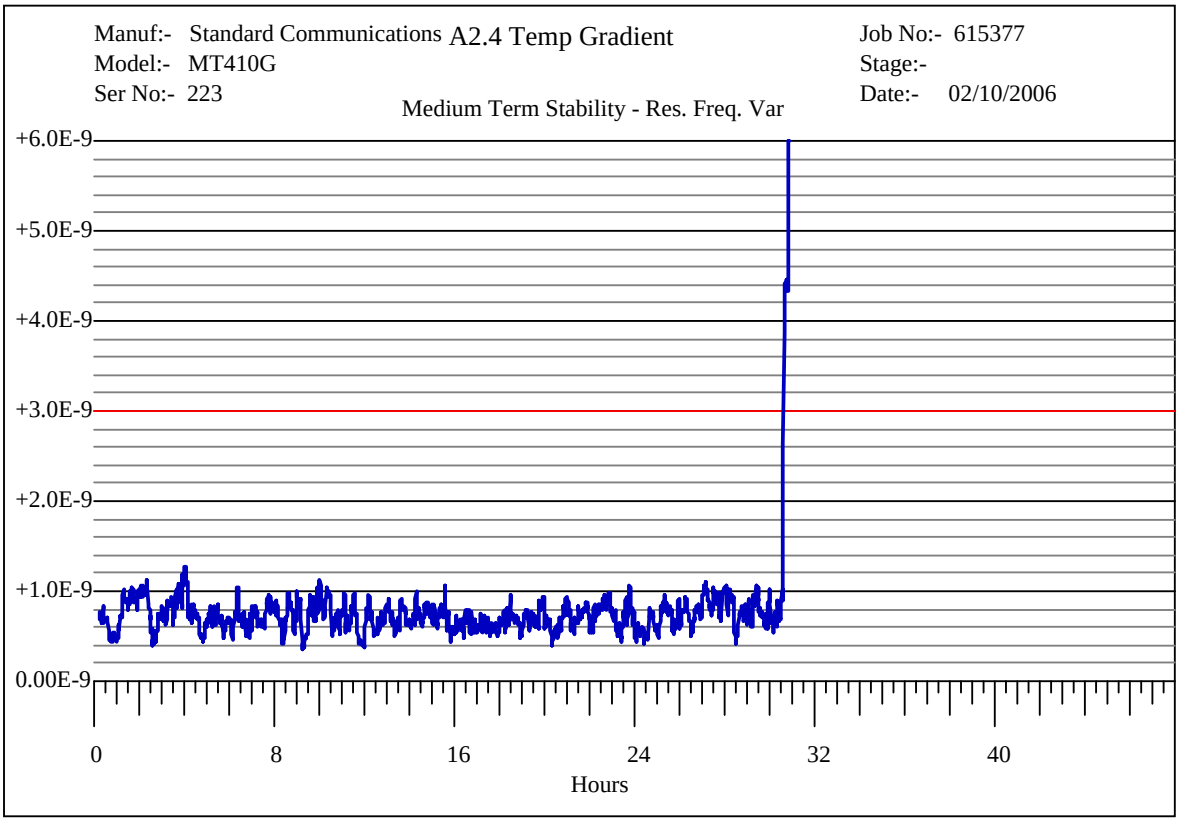
Temperature Gradient - Short Term Stability

2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – UP-RAMP



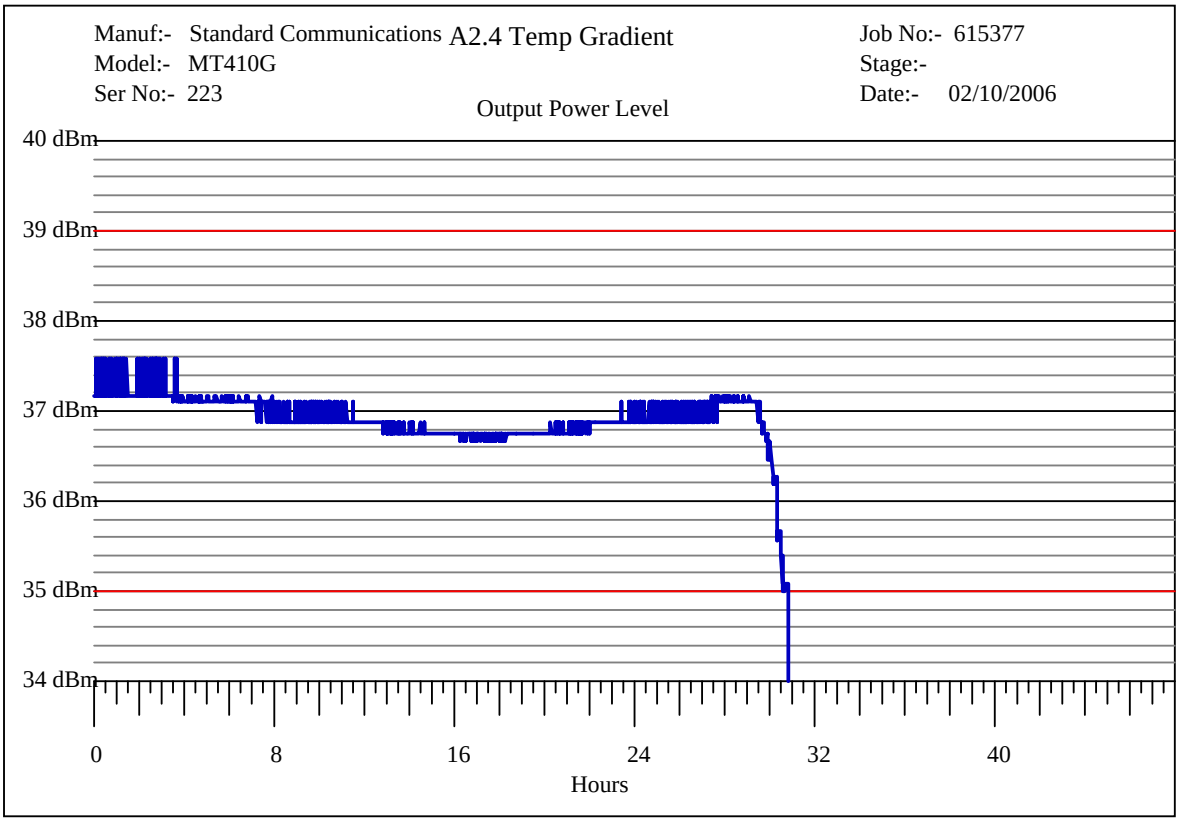
Temperature Gradient - Medium Terms Stability, Mean Slope

2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – UP-RAMP



Temperature Gradient – Medium Term Stability, Residual Frequency Variation

2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – UP-RAMP



Temperature Gradient – Output Power

2.7 FREQUENCY STABILITY WITH TEMPERATURE GRADIENT – UP-RAMP

```
FFFE2F9F7E0000EB7FDFFA0334F783E0F66C

Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
15 Hex (Bits 26- 85) = 3EFC0001D6FFBFF              3EFC0001D6FFBFF Default_Id
30 Hex (Bits 25-144) = 9F7E0000EB7FDFFA0334F783E0F66C

26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0001 1001 0011 1100 0000 0000 0000 0000 0000 0000 1111 1111 1011 1111 1111
   0100 1111 0011 1101 1010 0110 1111 0000 0111 1100 0001 1110 1100 1101 100
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      503 AUSTRALIA                    0111 1101 11
Protocol Code      37- 40       14 Test Serial (Standard)                 1110
Spare              41- 64                          0000 0000 0000 0000 1110 1011
Coarse Position    65- 85          DEFAULT            0111 1111 1101 1111 1111 1
BCH Encoded        86-106          Errors=0           0100 0000 0110 0110 1001 1
BCH Generated      86-106                             0100 0000 0110 0110 1001 1
Long Message      107-144          Data Present
Fixed Bits        107-109                                                  110
Fixed Bit         110            1                                           1
Encode Pos Device 111            1 Internal                                  1
121.5 Homing      112            1 YES                                       1
Position Change   113-132          DEFAULT              1000 0011 1110 0000 1111
Resultant Position              --> Not Defined
BCH Encoded       133-144          Errors=0                       0110 0110 1100
BCH Generated     133-144                                       0110 0111100
```

Temperature Gradient – Digital Message Check

2.8 SATELLITE QUALITATIVE TESTS

Date of the Test:	26th and 27th September 2006
Time of the Test:	15:02 to 09:21
Beacon Model:	MT410GPLB
Beacon Reference:	RM615377_03
Beacon 15 Hex ID:	3EFC0 001D6 FFBFF
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)
S6	60550	3EFC0 001D6 FFBFF	52.24014	-1.71859	-135.71	09:14:12	-11.312	0.972
S9	22131	3EFC0 001D6 FFBFF	52.25352	-1.72150	-129.49	09:00:24	-19.736	1.612
S7	43526	3EFC0 001D6 FFBFF	52.23880	-1.72364	-127.07	07:26:59	8.821	0.663
S8	30998	3EFC0 001D6 FFBFF	52.23946	-1.71893	-130.80	06:04:51	14.067	0.957
S7	43525	3EFC0 001D6 FFBFF	52.23832	-1.72365	-124.10	05:47:12	-5.833	0.682
S10	6976	3EFC0 001D6 FFBFF	52.24109	-1.72714	-135.17	04:50:43	18.211	0.389
S10	6975	3EFC0 001D6 FFBFF	52.24169	-1.71581	-126.87	03:11:05	5.325	1.163
S8	30996	3EFC0 001D6 FFBFF	52.23628	-1.71936	-130.05	02:43:26	-15.196	1.045
S10	6974	3EFC0 001D6 FFBFF	52.23549	-1.72727	-128.90	01:30:02	-9.817	0.699
S10	6968	3EFC0 001D6 FFBFF	52.24247	-1.71787	-128.89	14:55:18	-17.126	1.035
S6	60544	3EFC0 001D6 FFBFF	52.23434	-1.78148	-139.04	22:40:41	-16.156	3.387
S9	22125	3EFC0 001D6 FFBFF	52.24670	-1.71804	-127.73	22:31:39	-7.795	1.202
S9	22124	3EFC0 001D6 FFBFF	52.24895	-1.72662	-129.19	20:51:40	7.057	1.001
S9	22123	3EFC0 001D6 FFBFF	52.23569	-1.72152	-125.05	19:13:02	19.501	0.956
S7	43518	3EFC0 001D6 FFBFF	52.24426	-1.71704	-126.48	17:37:44	-6.150	1.142
S7	43516	3EFC0 001D6 FFBFF	52.24555	-1.72755	-126.18	14:19:29	20.625	0.640

Ratio of Successful Solutions = $\frac{\text{number of Doppler solutions within 5km with } 1^{\circ}<\text{CTA}<21^{\circ}}{\text{number of satellite passes over test duration with } 1^{\circ}<\text{CTA}<21^{\circ}}$

$= \frac{16}{16} = 100\ \%$

2.8 SATELLITE QUALITATIVE TESTS

Date of the Test:	6th and 7th December 2006
Time of the Test:	15:15 to 10:15
Beacon Model:	MT410GPLB
Beacon Reference:	RM615377_03
Beacon 15 Hex ID:	3EFC0 001D6 FFBFF
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):	On the Ground

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	32000	3EFC0 001D6 FFBFF	50.82129	-1.19332	-128.34	05:41:54	11.026	0.469
S9	23142	3EFC0 001D6 FFBFF	50.81612	-1.19823	-121.72	10:07:37	-8.778	0.231
S7	44537	3EFC0 001D6 FFBFF	50.81382	-1.19659	-130.18	07:37:26	11.810	0.493
S7	44536	3EFC0 001D6 FFBFF	50.81618	-1.19864	-128.86	05:57:57	-2.988	0.230
S10	7977	3EFC0 001D6 FFBFF	50.81500	-1.19838	-131.83	04:25:35	16.579	0.356
S8	31999	3EFC0 001D6 FFBFF	50.81750	-1.20257	-129.30	04:01:33	-3.914	0.341
S10	7976	3EFC0 001D6 FFBFF	50.81616	-1.19013	-128.41	02:45:42	2.592	0.586
S9	23136	3EFC0 001D6 FFBFF	50.82249	-1.19130	-129.89	23:37:53	-18.783	0.663
S6	61547	3EFC0 001D6 FFBFF	50.83262	-1.19878	-126.54	22:24:40	-13.093	1.606
S9	23135	3EFC0 001D6 FFBFF	50.82415	-1.18870	-123.13	21:56:55	-2.854	0.922
S6	61546	3EFC0 001D6 FFBFF	50.83412	-1.20731	-129.97	20:43:35	2.701	1.892
S9	23134	3EFC0 001D6 FFBFF	50.82698	-1.20798	-124.86	20:17:24	11.924	1.210
S6	61545	3EFC0 001D6 FFBFF	50.82863	-1.22373	-131.36	19:03:55	16.604	2.157
S7	44529	3EFC0 001D6 FFBFF	50.82926	-1.18897	-121.05	17:47:39	-8.577	1.379
S7	44528	3EFC0 001D6 FFBFF	50.83180	-1.21214	-124.09	16:07:40	6.831	1.816
S8	31992	3EFC0 001D6 FFBFF	50.82232	-1.18478	-121.59	15:44:58	-7.548	1.025

Ratio of Successful Solutions = $\frac{\text{number of Doppler solutions within 5km with } 1^\circ<\text{CTA}<21^\circ}{\text{number of satellite passes over test duration with } 1^\circ<\text{CTA}<21^\circ}$

$$= \frac{16}{16} = 100\ \%$$

2.8 SATELLITE QUALITATIVE TESTS

Date of the Test: 4th and 5th January 2007
Time of the Test: 11:28 to 15:36 GMT
Beacon Model: MT410 PLB
Beacon 15 Hex ID: BEFC0 00000 00000
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): On the ground

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)
S10	8392	BEFC0 00000 00000	50.82446	-1.18909	-124.30	14:21:36	-12.666	0.929
S8	32410	BEFC0 00000 00000	50.82344	-1.19368	-123.85	06:44:49	18.661	0.653
S8	32414	BEFC0 00000 00000	50.82687	-1.21117	-126.24	13:16:15	14.870	1.345
S10	8391	BEFC0 00000 00000	50.82621	-1.19032	-123.74	12:40:20	3.148	1.036
S9	23556	BEFC0 00000 00000	50.81265	-1.19619	-124.00	12:19:30	11.312	0.626
S11	1104	BEFC0 00000 00000	50.81342	-1.19535	-121.26	11:36:08	11.482	0.557
S11	1103	BEFC0 00000 00000	50.81342	-1.20276	-112.24	09:56:25	-3.363	0.632
S6	61964	BEFC0 00000 00000	50.84517	-1.15582	-128.30	11:06:18	5.007	4.206
S10	8390	BEFC0 00000 00000	50.82661	-1.21140	-125.78	11:00:30	17.038	1.336
S10	8386	BEFC0 00000 00000	50.82037	-1.19375	-121.09	04:28:42	17.029	0.376
S9	23555	BEFC0 00000 00000	50.81587	-1.19950	-122.00	10:39:55	-3.554	0.282
S11	1102	BEFC0 00000 00000	50.81541	-1.19417	-113.19	08:15:15	-19.324	0.401
S6	61963	BEFC0 00000 00000	50.82045	-1.16846	-130.67	09:25:26	-10.614	2.077
S9	23554	BEFC0 00000 00000	50.81418	-1.19752	-125.01	08:58:53	-19.497	0.445
S7	44950	BEFC0 00000 00000	50.81562	-1.19737	-123.28	07:46:50	13.328	0.287
S7	44949	BEFC0 00000 00000	50.82134	-1.21351	-122.06	06:07:30	-1.239	1.155
S7	44948	BEFC0 00000 00000	50.81797	-1.19725	-115.44	04:26:44	-17.118	0.047
S8	32409	BEFC0 00000 00000	50.81862	-1.19337	-122.56	05:05:19	5.306	0.317
S8	32408	BEFC0 00000 00000	50.81528	-1.19625	-124.26	03:24:24	-10.299	0.341
S10	8384	BEFC0 00000 00000	50.81672	-1.19488	-117.97	01:07:37	-12.669	0.263
S10	8385	BEFC0 00000 00000	50.81913	-1.19344	-121.37	02:48:53	3.147	0.326
S11	1096	BEFC0 00000 00000	50.82290	-1.19045	-112.90	21:44:33	-8.271	0.737
S6	61957	BEFC0 00000 00000	50.83795	-1.19658	-125.94	22:51:04	-16.855	2.198
S9	23548	BEFC0 00000 00000	50.82565	-1.18928	-121.46	22:29:13	-8.064	1.024
S11	1095	BEFC0 00000 00000	50.82418	-1.20274	-113.54	20:04:24	7.112	0.750
S9	23547	BEFC0 00000 00000	50.82849	-1.21118	-123.44	20:49:14	7.295	1.480
S11	1094	BEFC0 00000 00000	50.82456	-1.20875	-114.92	18:25:38	20.089	1.044
S6	61955	BEFC0 00000 00000	50.83252	-1.23276	-130.78	19:29:39	13.644	2.924
S9	23542	BEFC0 00000 00000	50.82153	-1.19698	-121.12	12:42:14	14.382	0.377
S9	23546	BEFC0 00000 00000	50.82580	-1.21723	-125.91	19:10:39	20.247	1.603
S11	1090	BEFC0 00000 00000	50.81885	-1.19431	-114.73	11:56:35	14.240	0.258
S7	44942	BEFC0 00000 00000	50.82551	-1.18892	-122.04	17:57:21	-10.390	1.027
S8	32402	BEFC0 00000 00000	50.82492	-1.19145	-124.02	16:49:26	-17.218	0.873
S7	44940	BEFC0 00000 00000	50.82303	-1.20282	-118.96	14:38:27	18.598	0.642
S7	44941	BEFC0 00000 00000	50.82358	-1.19867	-122.94	16:17:12	5.159	0.603
S8	32401	BEFC0 00000 00000	50.82504	-1.18812	-123.61	15:07:52	-1.221	1.023
S10	8378	BEFC0 00000 00000	50.82453	-1.19002	-122.95	14:32:03	-14.319	0.893
S8	32400	BEFC0 00000 00000	50.82706	-1.21054	-124.74	13:27:46	13.345	1.330
S10	8377	BEFC0 00000 00000	50.82173	-1.20943	-123.52	12:50:38	1.601	0.905

Continued on next page…

2.8 SATELLITE QUALITATIVE TESTS

Ratio of Successful Solutions = $\frac{\text{number of Doppler solutions within 5km with } 1^\circ<\text{CTA}<21^\circ}{\text{number of satellite passes over test duration with } 1^\circ<\text{CTA}<21^\circ}$

$= \frac{39}{39} = 100\%$

2.8 SATELLITE QUALITATIVE TESTS

Date of the Test:	29th and 30th September 2006
Time of the Test:	16:45 to 09:08
Beacon Model:	MT410PLB
Beacon Reference:	RM615377_04
Beacon 15 Hex ID:	BEFC0 00000 00000
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)
S6	60592	BEFC0 00000 00000	52.24286	-1.71014	-139.85	08:34:44	-17.399	1.561
S7	43569	BEFC0 00000 00000	52.23710	-1.72404	-129.74	07:55:17	12.638	0.725
S7	43568	BEFC0 00000 00000	52.24015	-1.72492	-122.30	06:15:54	-1.455	0.543
S7	43567	BEFC0 00000 00000	52.23813	-1.72396	-122.15	04:35:06	-16.861	0.672
S10	7018	BEFC0 00000 00000	52.23996	-1.73091	-129.37	04:20:21	14.630	0.160
S8	31039	BEFC0 00000 00000	52.23962	-1.72250	-126.65	03:49:46	-5.080	0.715
S8	31038	BEFC0 00000 00000	52.24121	-1.71948	-125.19	02:07:48	-20.662	0.910
S10	7016	BEFC0 00000 00000	52.23205	-1.72364	-127.26	00:58:48	-14.601	1.155
S7	43561	BEFC0 00000 00000	52.24367	-1.71782	-121.11	18:06:33	-10.599	1.071
S9	22168	BEFC0 00000 00000	52.24707	-1.71716	-131.24	23:02:56	-12.611	1.275
S6	60586	BEFC0 00000 00000	52.26630	-1.73317	-129.95	22:01:17	-10.094	2.836
S9	22167	BEFC0 00000 00000	52.24675	-1.72968	-125.74	21:22:30	2.619	0.697
S6	60585	BEFC0 00000 00000	52.27804	-1.73707	-134.17	20:20:25	5.002	4.150
S9	22166	BEFC0 00000 00000	52.25021	-1.73533	-130.97	19:43:27	16.012	1.061
S6	60584	BEFC0 00000 00000	52.28273	-1.77143	-137.38	18:40:56	17.884	5.350

Ratio of Successful Solutions = $\frac{\text{number of Doppler solutions within 5km with } 1^{\circ}<\text{CTA}<21^{\circ}}{\text{number of satellite passes over test duration with } 1^{\circ}<\text{CTA}<21^{\circ}}$

$= \frac{14}{15} = 93.3\ \%$

2.8 SATELLITE QUALITATIVE TESTS

Date of the Test:	30th April 2007
Time of the Test:	09:00 to 19:00
Beacon Model:	MT410PLB
Beacon Reference:	RM615377_33
Build State	1
Beacon 15 Hex ID:	BEFC0 00000 00001
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):	On The Ground

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)
S7	46594	BEFC0 00000 00001	50.82281	-1.18715	-120.29	18:34:50	-17.373	0.909
S7	46593	BEFC0 00000 00001	50.82263	-1.18996	-112.76	16:54:03	-1.477	0.741
S8	34040	BEFC0 00000 00001	60.45298	-41.48937	-124.35	17:44:52	-1.174	2691.369
S7	46593	BEFC0 00000 00001	50.82618	-1.18660	-119.37	16:54:03	-1.481	1.188
S8	34039	BEFC0 00000 00001	50.82928	-1.18751	-121.25	15:59:40	-7.137	1.430
S7	46592	BEFC0 00000 00001	50.82764	-1.20641	-121.32	15:14:42	13.115	1.211
S10	10014	BEFC0 00000 00001	50.82400	-1.19228	-120.76	14:42:36	-16.265	0.755
S8	34038	BEFC0 00000 00001	50.82530	-1.20473	-120.13	14:19:03	8.180	0.927
S8	34037	BEFC0 00000 00001	50.82311	-1.20414	-118.31	12:39:49	20.851	0.704
S11	2738	BEFC0 00000 00001	50.81938	-1.19632	-111.92	11:57:34	14.267	0.170
S10	10012	BEFC0 00000 00001	50.82395	-1.20133	-114.69	11:20:52	14.209	0.686
S9	25192	BEFC0 00000 00001	50.81932	-1.18611	-120.34	11:29:01	4.600	0.833
S6	63589	BEFC0 00000 00001	50.82889	-1.21079	-125.20	11:20:57	5.754	1.498
S9	25191	BEFC0 00000 00001	50.81582	-1.19576	-120.49	09:48:47	-10.996	0.300
S6	63588	BEFC0 00000 00001	50.83150	-1.20105	-125.26	09:40:10	-9.798	1.497

Ratio of Successful Solutions = $\frac{\text{number of Doppler solutions within 5km with } 1^{\circ}<\text{CTA}<21^{\circ}}{\text{number of satellite passes over test duration with } 1^{\circ}<\text{CTA}<21^{\circ}}$

$$= \frac{14}{15} = 93.3\ \%$$

2.8 SATELLITE QUALITATIVE TESTS

Date of the Test:	1st May 2007
Time of the Test:	08:45 to 17:00
Beacon Model:	MT410PLB
Beacon Reference:	RM615377_33
Build State	1
Beacon 15 Hex ID:	BEFC0 00000 00001
Actual location of the test beacon:	Latitude: 050° 52.121´ N Longitude: 001° 14.685´ 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	34053	BEFC0 00000 00001	50.87392	-1.23763	-121.87	15:47:54	-5.239	0.767
S7	46606	BEFC0 00000 00001	50.87819	-1.25833	-122.87	14:51:15	16.180	1.422
S10	10028	BEFC0 00000 00001	50.87591	-1.23746	-125.10	14:32:07	-14.576	0.952
S8	34052	BEFC0 00000 00001	50.87743	-1.25423	-121.96	14:07:27	9.847	1.178
S11	2753	BEFC0 00000 00001	61.84393	-46.03655	-131.60	13:16:54	-2.778	2940.313
S10	10027	BEFC0 00000 00001	50.87223	-1.28254	-121.78	12:50:40	1.355	2.679
S10	10026	BEFC0 00000 00001	50.87426	-1.24899	-116.10	11:10:40	15.525	0.687
S10	10025	BEFC0 00000 00001	55.60085	26.51563	-125.90	09:29:23	11.575	1905.401
S11	2752	BEFC0 00000 00001	50.86740	-1.24245	-118.51	11:37:07	11.455	0.215
S6	63603	BEFC0 00000 00001	50.86534	-1.25446	-127.47	11:08:00	3.768	0.776
S11	2751	BEFC0 00000 00001	50.86719	-1.24259	-115.87	09:57:24	-3.373	0.225
S9	25205	BEFC0 00000 00001	50.86565	-1.24208	-124.50	09:25:26	-14.714	0.386

Ratio of Successful Solutions = $\frac{\text{number of Doppler solutions within 5km with } 1^{\circ}<\text{CTA}<21^{\circ}}{\text{number of satellite passes over test duration with } 1^{\circ}<\text{CTA}<21^{\circ}}$

$= \frac{10}{12} = 83.3\ \%$

2.9 ANTENNA CHARACTERISTICS

Configuration: T.007 Figure B.2

	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	35.2	4.95	37.4	7.08	34.0	3.73	33.9	3.58	35.2	4.91
30	36.2	5.94	36.7	6.44	33.5	3.18	32.7	2.46	34.5	4.18
60	36.0	5.66	37.1	6.76	33.2	2.89	~~31.5~~	1.16	34.3	4.02
90	35.6	5.34	35.6	5.35	32.3	2.04	~~30.1~~	-0.23	34.2	3.94
120	35.9	5.66	36.1	5.80	~~31.7~~	1.44	~~29.4~~	-0.86	33.9	3.62
150	36.2	5.91	36.9	6.57	32.5	2.25	~~30.6~~	0.27	34.2	3.96
180	36.0	5.73	36.9	6.63	33.3	3.02	~~32.2~~	1.90	33.8	3.54
210	35.7	5.44	37.8	7.50	34.4	4.16	32.8	2.48	34.2	3.95
240	35.4	5.16	37.5	7.24	34.0	3.71	33.4	3.11	34.6	4.36
270	35.5	5.23	37.5	7.18	34.2	3.94	33.8	3.50	35.5	5.24
300	35.1	4.85	37.6	7.33	34.3	4.04	33.4	3.14	35.7	5.43
330	35.3	5.00	37.4	7.13	34.1	3.82	34.1	3.77	35.3	5.01
Gain Variation	1.09		2.15		2.10		4.64①		1.89	

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh
0	106.40	93.90	108.10	96.00	102.50	99.60	100.80	99.20	102.50	92.20
30	107.40	94.60	107.40	96.20	101.30	100.10	99.10	98.80	101.60	93.00
60	107.20	92.60	107.90	93.10	102.00	98.00	98.80	96.10	101.70	90.30
90	107.00	84.10	106.60	85.50	102.20	92.20	99.00	87.20	101.90	79.20
120	107.30	87.60	107.00	89.70	102.00	73.40	98.30	87.40	101.50	85.30
150	107.50	90.90	107.60	95.40	102.60	89.70	97.10	96.40	101.30	93.30
180	107.30	91.80	107.50	97.50	103.00	94.60	97.40	99.20	100.40	95.10
210	107.00	91.80	108.40	98.00	104.40	93.30	99.40	98.50	100.90	95.20
240	106.80	87.10	108.30	95.40	104.20	87.10	101.60	95.80	101.70	93.70
270	106.90	82.20	108.40	89.50	104.50	78.50	102.90	86.90	103.10	87.70
300	106.50	85.20	108.60	81.40	104.20	94.20	102.30	91.40	103.40	76.70
330	106.50	92.90	108.30	92.50	103.40	97.50	102.20	96.70	102.80	89.40
Min (Vv-Vh)	12.50		10.00		1.20②		-1.80②		5.30②	

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL} = (30.53 – 30.55) = -0.02dB$

$EIRP_{maxEOL} = MAX [EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})] = MAX (37.8, 37.8) = 37.8dBm$

$EIRP_{minEOL} = MIN [EIRP_{min} , (EIRP_{min} - EIRP_{LOSS})] = MIN (32.3 , 32.3) = 32.3dBm$

①This is a Pass within Measurement Uncertainty
② As per T.007, section B.9.3, due to 30% of Vv-Vh values being less than 10dB, polarisation measurements are required.

Pt_{amb} is the power at ambient from the summary table
Pt_{EOL} is the power at the end of the 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

2.9 ANTENNA CHARACTERISTICS

Polarisation Measurements — Configuration: T.007 Figure B.2

Azimuth Angle (Degrees)	Elevation Angle (degrees) 40		Antenna Receiving Highest Level
	RHCP Antenna	LHCP Antenna	
0	94.7	106.7	LHCP
30	93.3	106.0	LHCP
60	97.2	104.9	LHCP
90	101.6	101.6	Draw
120	103.9	97.6	RHCP
150	104.1	85.9	RHCP
180	104.5	93.6	RHCP
210	103.9	99.3	RHCP
240	103.1	102.6	RHCP
270	101.9	104.7	LHCP
300	98.7	106.0	LHCP
330	97.8	106.9	LHCP

Total RHCP 5
Total LHCP 6
Total Draw 1

In accordance with T.007 B.9.3 the antenna is deemed to be Left Hand Circularly Polarised (LHCP), where it must be Right Hand Circularly Polarised (RHCP).

Note: From the distribution of the results (RHCP or 'Draw' for Azimuth angles 90° through 240° and LHCP for the remainder), and the physical properties of the antenna (see Section 4, Photographs) the antenna would appear to be in fact linearly polarised. Furthermore, it would be deemed to be inclined as shown by the results of the original testing.

Therefore, assuming that the antenna is an inclined linear antenna, EIRP measurements were repeated using a RHCP antenna. The results are shown on page 68.

2.9 ANTENNA CHARACTERISTICS

Configuration: T.007 Figure 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	36.8	6.49	35.9	5.61	32.7	2.45	~~30.4~~	0.14	~~30.2~~	-0.04
90	36.2	5.88	35.6	5.36	31.4	1.07	~~27.8~~	-2.44	~~30.0~~	-0.31
180	35.6	5.29	36.3	6.03	34.0	3.72	32.5	2.23	32.8	2.50
270	36.0	5.71	36.2	5.92	34.5	4.23	33.3	2.98	32.7	2.43

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL} = (30.53 – 30.55) = -0.02dB$

$EIRP_{maxEOL} = MAX [EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})] = MAX (36.8, 36.8) = 36.8dBm$

$EIRP_{minEOL} = MIN [EIRP_{min} , (EIRP_{min} - EIRP_{LOSS})] = MIN (31.4 , 31.4) = 31.4dBm$

2.9 ANTENNA CHARACTERISTICS

Configuration: T.007 Figure B.2 – RHCP Measuring Antenna

	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	35.6	5.07	36.9	6.38	34.5	3.99	~~20.9~~	-9.64	28.2	-2.32
30	35.5	4.97	36.5	5.98	33.0	2.49	~~19.5~~	-11.04	28.6	-1.92
60	34.8	4.27	35.0	4.48	31.6	1.09	~~23.4~~	-7.14	30.5	-0.02
90	33.4	2.87	33.6	3.08	29.2	-1.31	27.8	-2.74	33.0	2.48
120	32.7	2.17	32.1	1.58	~~24.0~~	-6.51	30.1	-0.44	34.4	3.88
150	32.4	1.87	32.6	2.08	~~24.3~~	-6.21	30.3	-0.24	35.2	4.68
180	32.5	1.97	33.3	2.78	26.4	-4.11	30.7	0.16	36.0	5.48
210	32.7	2.17	34.2	3.68	29.8	-0.71	30.1	-0.44	35.5	4.98
240	33.4	2.87	35.0	4.48	31.0	0.49	29.3	-1.24	34.7	4.18
270	34.6	4.07	35.6	5.08	32.3	1.79	28.1	-2.44	33.9	3.38
300	35.0	4.47	36.6	6.08	33.6	3.09	24.9	-5.64	32.3	1.78
330	35.3	4.77	36.5	5.98	33.9	3.39	~~24.0~~	-6.54	30.0	-0.52
Gain Variation	3.20		4.80		10.50		11.20		7.80	

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL}$ = (30.53 – 30.55) = -0.02dB

$EIRP_{maxEOL}$ = MAX [$EIRP_{max}$, ($EIRP_{max}$ - $EIRP_{LOSS}$)] = MAX (36.9, 36.9) = 36.9dBm

$EIRP_{minEOL}$ = MIN [$EIRP_{min}$, ($EIRP_{min}$ - $EIRP_{LOSS}$)] = MIN (24.9 , 24.9) = 24.9dBm①

① Lower Limit is 32dBm
② As per T.007, section B.9.3, due to 30% of Vv-Vh values being less than 10dB, polarisation measurements are required.

Pt_{amb} is the power at ambient from the summary table
Pt_{EOL} is the power at the end of the 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

2.9 ANTENNA CHARACTERISTICS

Additional Testing

Configuration: T.007 Figure B.2

	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	37.8	0.82	39.4	2.49	33.6	-3.37	32.5	-4.39	35.8	-1.12
30	37.4	0.43	38.8	1.88	33.1	-3.80	33.0	-3.92	35.9	-1.02
60	37.2	0.24	39.0	2.09	33.4	-3.48	32.9	-4.02	35.9	-0.99
90	37.1	0.18	38.3	1.41	33.6	-3.37	32.4	-4.50	36.0	-0.89
120	37.6	0.71	38.2	1.29	32.9	-4.02	32.2	-4.75	35.6	-1.33
150	37.2	0.28	38.8	1.91	33.6	-3.33	~~31.3~~	-5.58	35.4	-1.48
180	37.5	0.57	38.6	1.63	33.3	-3.66	~~31.4~~	-5.51	35.2	-1.77
210	37.0	0.08	39.1	2.21	34.2	-2.72	~~31.4~~	-5.48	35.5	-1.43
240	37.2	0.28	39.0	2.11	34.1	-2.88	~~31.6~~	-5.32	35.6	-1.30
270	37.2	0.29	39.1	2.20	34.1	-2.87	32.2	-4.78	35.8	-1.17
300	37.4	0.49	39.1	2.19	34.0	-2.89	32.5	-4.45	35.9	-1.00
330	37.2	0.23	39.0	2.09	33.7	-3.27	32.8	-4.11	35.9	-1.02
Gain Variation	0.74		1.20		1.30		1.66		0.88	

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh
0	109.40	89.90	110.70	82.20	103.60	94.80	101.80	89.60	103.80	66.00
30	109.00	90.00	110.10	64.10	103.00	95.50	102.30	89.50	103.90	68.40
60	108.80	90.90	110.30	83.90	103.50	94.60	102.30	86.90	103.90	81.90
90	108.80	82.50	109.60	88.10	103.70	94.00	101.80	87.10	104.00	82.20
120	109.30	88.50	109.50	83.10	103.30	89.70	101.60	85.00	103.50	86.70
150	108.90	80.70	110.10	88.50	104.00	90.20	100.70	86.50	103.30	88.40
180	109.20	71.70	109.80	90.60	103.70	89.10	100.70	88.20	102.90	90.60
210	108.70	81.60	110.40	89.20	104.70	87.70	100.70	88.60	103.30	89.80
240	108.90	73.80	110.30	88.00	104.50	89.40	100.90	88.10	103.50	87.90
270	108.90	85.50	110.40	86.10	104.50	89.60	101.60	83.60	103.70	84.00
300	109.10	84.40	110.40	83.50	104.30	93.10	101.80	88.50	103.90	81.30
330	108.80	89.80	110.30	82.50	103.80	94.10	102.20	87.30	103.90	65.00
Min (Vv-Vh)	17.90		19.20		7.50		12.10		12.30	

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL} = (30.53 – 30.55) = -0.02dB$

$EIRP_{maxEOL} = MAX [EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})] = MAX (39.4, 39.4) = 39.4dBm$

$EIRP_{minEOL} = MIN [EIRP_{min} , (EIRP_{min} - EIRP_{LOSS})] = MIN (32.2, 32.2) = 32.2dBm$

Pt_{amb} is the power at ambient from the summary table
Pt_{EOL} is the power at the end of the 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

2.9 ANTENNA CHARACTERISTICS

Additional Testing

Configuration: T.007 Figure 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	38.1	1.22	38.4	1.51	35.1	-1.79	34.2	-2.70	33.9	-3.07
90	38.1	1.20	38.2	1.29	34.6	-2.35	33.1	-3.85	33.6	-3.32
180	38.7	1.79	38.4	1.49	34.9	-2.08	34.0	-2.91	33.5	-3.39
270	38.2	1.29	38.7	1.79	35.6	-1.38	34.3	-2.63	34.2	-2.72

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL}$ = (30.53 – 30.55) = -0.02dB

$EIRP_{maxEOL}$ = MAX [$EIRP_{max}$, ($EIRP_{max}$ - $EIRP_{LOSS}$)] = MAX (33.1, 33.1) = 33.1dBm

$EIRP_{minEOL}$ = MIN [$EIRP_{min}$, ($EIRP_{min}$ - $EIRP_{LOSS}$)] = MIN (38.7, 38.7) = 38.7dBm

2.9 ANTENNA CHARACTERISTICS

Build State 01

Configuration: T.007 Figure B.2

	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	40.9	4.00	42.3	5.41	39.0	2.03	35.6	-1.32	40.7	3.76
30	41.4	4.52	41.6	4.71	37.9	1.02	35.5	-1.41	40.7	3.80
60	41.5	4.61	41.7	4.73	36.9	-0.02	35.5	-1.42	40.2	3.28
90	41.7	4.74	41.6	4.67	37.5	0.52	35.2	-1.71	40.3	3.33
120	41.9	4.92	41.7	4.77	37.0	0.09	35.4	-1.49	40.1	3.14
150	41.9	4.93	41.9	4.92	38.0	1.10	35.0	-1.88	40.0	3.07
180	41.8	4.85	42.2	5.24	38.5	1.57	35.4	-1.55	40.1	3.20
210	41.6	4.70	42.4	5.48	39.6	2.70	35.2	-1.75	40.3	3.36
240	41.6	4.65	42.6	5.67	39.7	2.73	35.2	-1.70	40.3	3.36
270	41.7	4.79	42.7	5.74	39.3	2.36	35.2	-1.75	40.2	3.29
300	41.7	4.81	42.7	5.82	39.5	2.58	35.5	-1.45	40.4	3.51
330	41.3	4.39	42.3	5.33	39.1	2.17	35.7	-1.25	40.5	3.57
Gain Variation	0.93		1.14		2.74		0.63		0.73	

	Elevation Angle (degrees)									
	10		20		30		40		50	
Azimuth Angle (Degrees)	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh	Vv	Vh
0	112.40	89.50	113.40	91.70	109.10	96.60	104.60	93.50	108.40	91.20
30	112.90	92.70	112.70	91.40	108.10	95.40	104.50	93.50	108.40	92.70
60	113.00	92.30	112.70	92.80	107.00	95.40	104.70	89.40	107.90	91.50
90	113.10	95.10	112.60	95.90	107.60	95.00	104.30	91.70	107.90	93.30
120	113.30	94.00	112.70	95.90	107.20	93.90	104.50	92.30	107.70	93.40
150	113.30	94.20	112.80	98.00	108.20	95.10	104.00	93.40	107.60	94.00
180	113.20	95.60	113.10	98.70	108.70	94.90	104.30	94.10	107.70	94.80
210	113.10	90.70	113.40	96.90	109.90	94.00	104.10	93.90	107.90	94.20
240	113.00	95.40	113.60	96.80	109.90	94.90	104.20	93.40	107.90	94.20
270	113.20	89.30	113.70	95.00	109.50	95.60	104.30	90.80	107.90	91.80
300	113.20	92.10	113.80	93.10	109.70	96.30	104.40	94.20	108.10	92.80
330	112.80	87.80	113.30	93.50	109.20	97.50	104.60	94.40	108.20	91.40
Min (Vv-Vh)	17.60		14.40		11.60		10.20		12.90	

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL}$ = (30.53 – 30.55) = -0.02dB

$EIRP_{maxEOL}$ = MAX [$EIRP_{max}$, ($EIRP_{max}$ - $EIRP_{LOSS}$)] = MAX (42.7, 42.8) = 42.8dBm

$EIRP_{minEOL}$ = MIN [$EIRP_{min}$, ($EIRP_{min}$ - $EIRP_{LOSS}$)] = MIN (35.0, 35.1) = 35.0dBm

Pt_{amb} is the power at ambient from the summary table
Pt_{EOL} is the power at the end of the 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

2.9 ANTENNA CHARACTERISTICS

Build State 01

Configuration: T.007 Figure 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	42.5	5.59	41.6	4.71	38.9	1.99	36.9	-0.04	38.4	1.43
90	42.3	5.42	41.4	4.47	38.6	1.64	36.6	-0.36	38.7	1.79
180	42.4	5.46	41.8	4.90	39.6	2.67	37.9	0.93	38.9	1.97
270	42.5	5.58	42.0	5.02	39.9	3.00	38.2	1.29	38.6	1.71

$EIRP_{LOSS} = Pt_{ambient} - Pt_{EOL} = (30.53 – 30.55) = -0.02dB$

$EIRP_{maxEOL} = MAX [EIRP_{max}, (EIRP_{max} - EIRP_{LOSS})] = MAX (42.5, 42.5) = 42.5dBm$

$EIRP_{minEOL} = MIN [EIRP_{min} , (EIRP_{min} - EIRP_{LOSS})] = MIN (36.6, 36.6) = 36.6dBm$

2.10 BEACON CODING SOFTWARE – MT410G PLB

Examples of User Protocol Beacon Messages

Protocol	Operational Message (in hexadecimal including bit and frame synchronization bits)	Self-Test Message (in hexadecimal including bit and frame synchronization bits)
Maritime User Protocol with MMSI	N/A	N/A
Maritime User Protocol with Radio Call Sign	N/A	N/A
Radio Call Sign User Protocol	N/A	N/A
Serial User: Float-Free EPIRB with Serial Number	N/A	N/A
Serial User: Non Float-Free EPIRB with Serial Number	N/A	N/A
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 (Long)	N/A	N/A

2.10 BEACON CODING SOFTWARE – MT410G PLB

Examples of Location Protocol Beacon Messages

Protocol	Operational Message (in hexadecimal including bit and frame synchronization bits)		Self-Test Message (in hexadecimal including bit and frame synchronization bits)
	Location "A"	Location "B"	
Standard Location: EPIRB with MMSI	N/A	N/A	N/A
Standard Location: EPIRB with Serial Number	N/A	N/A	N/A
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	FFFE2F8C9722C0633360 3BA185F79DE47303	FFFE2F8C9722C06332E0 365493B78EA76951	FFFED08C9722C0637FDF FF77417783E0F66C
National Location: EPIRB	N/A	N/A	N/A
National Location: ELT	N/A	N/A	N/A
National Location: PLB	FFFE2F8C9B0018CCD701 C889E777920C0AB2	FFFE2F8C9B0018CCB10 1 9D4CB8B794240FCD	FFFED08C9B0018DFC0FF 042E19779F3C0010
User-Location	FFFE2FCC97A001BE0011 6BB59FA0230110F4	FFFE2FCC97A001BE0011 6BB59FA06D0520AF	FFFED0CC97A001BE0011 6BB59FAFE0FF0146

Note: For Standard Location protocol, beacon was programmed with CSTA number 139. This option was not possible to change in programming software. Although the value is different according to table C.1 in Annex C of T.007, the message decode was correct.

For User Location protocol, beacon was programmed with CSTA number 139 and serial number 223. These options were not possible to change in programming software. Although the value is different according to table C.1 in Annex C of T.007, the message decode was correct.

2.10 BEACON CODING SOFTWARE – MT410 PLB

Examples of User Protocol Beacon Messages

Protocol	Operational Message (in hexadecimal including bit and frame synchronization bits)	Self-Test Message (in hexadecimal including bit and frame synchronization bits)
Maritime User Protocol with MMSI	N/A	N/A
Maritime User Protocol with Radio Call Sign	N/A	N/A
Radio Call Sign User Protocol	N/A	N/A
Serial User: Float-Free EPIRB with Serial Number	N/A	N/A
Serial User: Non Float-Free EPIRB with Serial Number	N/A	N/A
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	FFFE2F4C978000C60011 6D958C80	FFFED04C978000C60011 6D958C80
National User (Short)	FFFE2F4C980000000000 00526140	FFFED04C980000000000 00526140
National User (Long)	N/A	N/A

2.10 BEACON CODING SOFTWARE – MT410 PLB

Examples of Location Protocol Beacon Messages

Protocol	Operational Message (in hexadecimal including bit and frame synchronization bits)		Self-Test Message (in hexadecimal including bit and frame synchronization bits)
	Location "A"	Location "B"	
Standard Location: EPIRB with MMSI	N/A	N/A	N/A
Standard Location: EPIRB with Serial Number	N/A	N/A	N/A
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	N/A	N/A	N/A
National Location: ELT	N/A	N/A	N/A
National Location: PLB	N/A	N/A	N/A
User-Location	N/A	N/A	N/A

2.11 NAVIGATION SYSTEM

2.11.1 NATIONAL LOCATION PROTOCOL 1

Position Data Default Values

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

Hex 30 Message	Message Count
8C9F00001FC0FF044BFDF79F3C0010	36

Position Acquisition Time and Position Accuracy

A3.8.2.1: Location: 50^0 52.163' N 1^0 14.605' W①

A3.8.2.2: Location: 51^0 22.583' N 1^0 49.833' W②

① GPS Location (Site Surveyed)
② Input from navigation simulator

Operation Configuration	C/S T.007 Section A3.8.2.1		C/S T.007 Section A.3.8.2.2	
	Time to Acquire Position (sec)	Location Error in metres	Time to Acquire Position (sec)	Location Error in metres
Above Dry Ground	111	40.1	111	49.8
Resting on Dry Ground	110	55.3	159	49.8

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

Encoded Position Data Update Interval

Location: 51^0 22.583' N 1^0 49.833' W②		
Time from activation to 1st message	63s	
First Message Acquired at	4:00:14	8C9F00001FC0FF044BFDF79F3C0010
Data Acquired at	4:01:50	8C9F00000CD701C8EC03F7920C0AB2
Location: 50^0 48.683' N 1^0 37.417' W②		
Data Updated at	4:52:49	8C9F00000CB1019D295C3794240FCD
Data Update Interval	50m 59s	

② Input from navigation simulator

2.11 NAVIGATION SYSTEM

2.11.1 NATIONAL LOCATION PROTOCOL 1

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: 51^0 22.583' N 1^0 49.833' W②		
Time from activation to 1st message	63s	
First Message Acquired at	4:00:14	8C9F00001FC0FF044BFDF79F3C0010
Data Acquired at	4:01:50	8C9F00000CD701C8EC03F7920C0AB2
Location: 50^0 48.683' N 1^0 37.417' W②		
Data Updated at	4:52:49	8C9F00000CB1019D295C3794240FCD
Deactivated at	4:54:30	
Time from re-activation to 1st message	63s	
Default data present	4:55:31	8C9F00001FC0FF044BFDF79F3C0010

② Input from navigation simulator

Last Valid Position

Location: 51^0 22.583' N 1^0 49.833' W②		
Time from activation to 1st message	63s	
First Message Acquired at	10:47:05	8C9F00001FC0FF044BFDF79F3C0010
Data Present at	10:47:53	8C9F00000CD701C8EC03F79208025B
Navigation Data Removed	10:48:20	
Last Message with Positional Data	14:46:37	8C9F00000CD701C8EC03F79208025B
First Message with Default Data	14:47:29	8C9F00001FC0FF044BFDF79F3C0010
Last Valid Position Held	239m 36s	

② Input from navigation simulator

2.11 NAVIGATION SYSTEM

2.11.1 NATIONAL LOCATION PROTOCOL 1

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: 105	✓ ✓
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	✓ ✓

Input from navigation simulator

2.11 NAVIGATION SYSTEM

2.11.2 STANDARD LOCATION PROTOCOL 1

Position Data Default Values

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

Hex 30 Message	Message Count
8C9E0000007FDFFA79ED3783E0F66C	36

Position Acquisition Time and Position Accuracy

A3.8.2.1: Location: 50^0 52.163' N 1^0 14.605' W①

A3.8.2.2: Location: 51^0 22.583' N 1^0 49.833' W②

① GPS Location (Site Surveyed)
② Input from navigation simulator

Operation Configuration	C/S T.007 Section A3.8.2.1		C/S T.007 Section A.3.8.2.2	
	Time to Acquire Position (sec)	Location Error in metres	Time to Acquire Position (sec)	Location Error in metres
Above Dry Ground	110	38.1	110	49.2
Resting on Dry Ground	110	90.7	63	280.5

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

Encoded Position Data Update Interval

Location: 51^0 22.583' N 1^0 49.833' W②		
Time from activation to 1st message	63s	
First Message Acquired at	13:35:17	8C9E0000007FDFFA79ED3783E0F66C
Data Acquired at	13:36:05	8C9E00000033A03C8E9EF71DA4D4D0
Location: 50^0 48.683' N 1^0 37.417' W②		
Data Updated at	14:27:05	8C9E00000032E03AEC47378E8792E8
Data Update Interval	51m	

② Input from navigation simulator

2.11 NAVIGATION SYSTEM

2.11.2 STANDARD LOCATION PROTOCOL 1

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: 51^0 22.583' N 1^0 49.833' W②		
Time from activation to 1st message	63s	
First Message Acquired at	13:35:17	8C9E0000007FDFFA79ED3783E0F66C
Data Acquired at	13:36:05	8C9E00000033A03C8E9EF71DA4D4D0
Location: 50^0 48.683' N 1^0 37.417' W②		
Data Updated at	14:27:05	8C9E00000032E03AEC47378E8792E8
Deactivated at	14:36:11	
Time from re-activation to 1st message	63s	
Default data present	14:38:07	8C9E0000007FDFFA79ED3783E0F66C

② Input from navigation simulator

Last Valid Position

Location: 51^0 22.583' N 1^0 49.833' W②		
Time from activation to 1st message	63s	
First Message Acquired at	10:41:34	8C9E0000007FDFFA79ED3783E0F66C
Data Present at	10:43:10	8C9E00000033A03C8E9EF71DA4D4D0
Navigation Data Removed	10:46:26	
Last Message with Positional Data	14:41:06	8C9E00000033A03C8E9EF71DA4D4D0
First Message with Default Data	14:41:58	8C9E0000007FDFFA79ED3783E0F66C
Last Valid Position Held	238m 48s	

② Input from navigation simulator

2.11 NAVIGATION SYSTEM

2.11.2 STANDARD LOCATION PROTOCOL 1

Coarse Position and Delta Offset

Script Reference (See Table D.2 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: 131	✓ ✓
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 from navigation simulator

2.11 NAVIGATION SYSTEM

2.11.3 USER LOCATION PROTOCOL 1

Position Data Default Values

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

Hex 30 Message	Message Count
CC97A001BE00116BB59FAFE0FF0146	36

Position Acquisition Time and Position Accuracy

A3.8.2.1: Location: 50^0 52.163' N 1^0 14.605' W①

A3.8.2.2: Location: 51^0 22.583' N 1^0 49.833' W②

① GPS Location (Site Surveyed)
② Input from navigation simulator

Operation Configuration	C/S T.007 Section A3.8.2.1		C/S T.007 Section A.3.8.2.2	
	Time to Acquire Position (sec)	Location Error in metres	Time to Acquire Position (sec)	Location Error in metres
Above Dry Ground	111	1.5390	110	3.3727
Resting on Dry Ground	63	1.6583	63	3.3727

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

Encoded Position Data Update Interval

Location: 1^0 3.500' N 1^0 2.500' W②		
Time from activation to 1st message	63s	
First Message Acquired at	11:41:41	CC97A001BE00116BB59FAFE0FF0146
Data Acquired at	11:42:29	CC97A001BE00116BB59FA0230110F4
Location: 3^0 23.500' N 5^0 6.250' W②		
Data Updated at	12:33:29	CC97A001BE00116BB59FA06D0520AF
Data Update Interval	51m	

Input from navigation simulator

2.11 NAVIGATION SYSTEM

2.11.3 USER LOCATION PROTOCOL 1

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: 1^0 3.500' N 1^0 2.500' W②		
Time from activation to 1st message	63s	
First Message Acquired at	11:41:41	CC97A001BE00116BB59FAFE0FF0146
Data Acquired at	11:42:29	CC97A001BE00116BB59FA0230110F4
Location: 3^0 23.500' N 5^0 6.250' W②		
Data Updated at	12:33:29	CC97A001BE00116BB59FA06D0520AF
Deactivated at	12:34:10	
Time from re-activation to 1st message	63s	
Default data present	12:35:35	CC97A001BE00116BB59FAFE0FF0146

② Input from navigation simulator

Last Valid Position

Location: 51^0 22.583' N 1^0 49.833' W②		
Time from activation to 1st message	63s	
First Message Acquired at	09:55:49	CC97A001BE00116BB59FAFE0FF0146
Data Present at	09:56:37	CC97A001BE00116BB59FA66D01C026
Navigation Data Removed	09:59:52	
Last Message with Positional Data	13:54:40	CC97A001BE00116BB59FA66D01C026
First Message with Default Data	13:55:32	CC97A001BE00116BB59FAFE0FF0146
Last Valid Position Held	238m 55s	

② Input from navigation simulator

2.11 NAVIGATION SYSTEM

2.11.3 USER LOCATION PROTOCOL 1

Coarse Position

Script Reference (See Table D.1 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: 125	✓
3	Bits 108-132= 6D052	✓

Input from navigation simulator

SECTION 3

TEST EQUIPMENT

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				
Antenna, (Tuned Dipole Set)	Roberts Antenna	A-100	569	TU
Signal Generator	Rohde & Schwarz	SMS-2/28	1431	19/04/2007
Spectrum Analyser	Hewlett Packard	8568B	1666	08/06/2007
RF Preselector	Hewlett Packard	85685A	1668	08/06/2007
Antenna Mast	EMCO	1050	1707	TU
Turntable Controller	Various	RH253	1708	TU
Spectrum Analyser	Rohde & Schwarz	EZM	1823	TU
Open Area Site 2	TUV	OATS2	1850	03/10/2008
Spectrum Analyser	Hewlett Packard	8568B	571	04/01/2008
Antenna Tower 6M	EMCO	1050	1859	TU
Roberts Antenna 406MHz	Compliance Design	-	1861	12/09/2007

3–1 TEST EQUIPMENT

Sections 1 – 8 of Table of Test Results: Beacons - Constant Temperature Tests				
Climatic Chamber	Heraeus Votsch	VMT 04/30	40	TU
Power Meter	Hewlett Packard	436A	47	21/06/2007
Signal Generator	Rohde & Schwarz	SMY01	49	19/06/2007
Rubidium Frequency Standard	Quartzlock	A10-B	92	12/12/2006
Signal Generator	Hewlett Packard	8644A	96	17/12/2006
Beacon RF Unit	TUV	N/A	97	TU
Logic Analyser	Hewlett Packard	1631D	155	06/09/2007
Time Interval Analyser	Yokogawa	TA720	181	17/11/2006
Oscilloscope	Gould	840	182	31/01/2007
Signal Generator	Hewlett Packard	8644A	199	17/12/2006
Digital Temperature Indicator + T/C	Fluke	51	412	21/09/2006
Attenuator: 10dB/20W	Narda	766-10	480	13/07/2007
Oscilloscope	Tektronix	2445A	761	01/08/2007
Oscilloscope	Tektronix	TDS 784A	1117	21/03/2007
Spectrum Analyser	Hewlett Packard	E4407B	1154	31/05/2007
Power Sensor	Hewlett Packard	8482A	1341	19/09/2006
50ohm/15W Termination	Radio Spares	612-192	2416	02/08/2007

3.1 TEST EQUIPMENT

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 1 – 8 of Table of Test Results: Beacons - Constant Temperature Tests				
TERMINATION: 50ohm/15W	Radio Spares	612-192	2425	02/08/2007
Stop Clock	R.S Components	RS328 061	2674	TU
Frequency and Time Interval Analyser	Hewlett Packard	5372A	2756	16/06/2007
Beacon RF Unit	TUV	N/A	3066	TU
50ohm / 6W Termination	Micronde	R404613	3074	18/02/2007
50ohm/ 1W Termination	Suhner		3080	18/02/2007
50ohm/2W Termination	Omni-Spectra	3001-6100	3081	18/02/2007
50ohm/15W Termination	Diamond Antenna	DL-30N	3097	09/03/2007
50ohm/15W Termination	Diamond Antenna	DL-30N	3098	09/03/2007
20dB/10W Attenuator	Aeroflex / Weinschel	23-20-34	3159	01/06/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3161	01/06/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3163	01/06/2007
Thermocouple Thermometer	Fluke	51	3173	22/06/2007
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	TU
Bandpass filter	Trilithic	5BE406/35-1-AA	3206	TU
Section 2.11 Beacons - Navigation System				
GPS/SBAS Simulator	Spirent	STR4500	3056	19/01/2007
Hygrometer	Rotronic	I-1000	3068	06/04/2007
EPIRB Tester	Arg Electro Design	5412	3270	TU
Section 2.6 Beacons - Operating Lifetime				
Power Meter	Hewlett Packard	436A	47	21/06/2007
Signal Generator	Rohde & Schwarz	SMY01	49	19/06/2007
Beacon RF Unit	TUV	N/A	97	TU
Logic Analyser	Hewlett Packard	1631D	155	06/09/2007
Signal Generator	Hewlett Packard	8644A	199	17/12/2006
Attenuator: 10dB/20W	Narda	766-10	480	13/07/2007
Power Sensor	Hewlett Packard	8482A	1341	19/09/2006

3.1 TEST EQUIPMENT

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.6 Beacons - Operating Lifetime				
TERMINATION: 50ohm/15W	Radio Spares	612-192	2425	02/08/2007
Frequency and Time Interval Analyser	Hewlett Packard	5372A	2756	16/06/2007
50ohm/ 1W Termination	Suhner		3080	18/02/2007
50ohm/2W Termination	Omni-Spectra	3001-6100	3081	18/02/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3161	01/06/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3162	01/06/2007
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	TU
Climatic Chamber	Heraeus Votsch	VM 04/100	85	TU
Digital Temperature Indicator	Fluke	51	1385	03/08/2007
1m N(m) - N(m) Cable	Reynolds	269-0088-1000	2397	02/08/2007
Section 2.2 Beacons - Spurious Emissions				
Climatic Chamber	Heraeus Votsch	VM 04/100	85	OP MON
Spectrum Analyser	Hewlett Packard	E4407B	1154	31/05/2007
20dB/10W Attenuator	Aeroflex / Weinschel	23-20-34	3159	01/06/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3163	01/06/2007
Thermocouple Thermometer	Fluke	51	3173	22/06/2007
Bandpass filter	Trilithic	5BE406/35-1-AA	3206	TU
Section 2.7 Beacons - Temperature Gradient				
Power Meter	Hewlett Packard	436A	83	10/08/2007
Climatic Chamber	Heraeus Votsch	VM 04/100	85	TU
Rubidium Frequency Standard	Quartzlock	A10-B	92	12/12/2006
Signal Generator	Hewlett Packard	8644A	96	17/12/2006
Time Interval Analyser	Yokogawa	TA720	181	17/11/2006
Oscilloscope	Gould	840	182	31/01/2007
Attenuator (10dB)	Weinschel	47-10-34	481	21/12/2006
Power Sensor	Hewlett Packard	8481A	1342	31/08/2007
Digital Temperature Indicator	Fluke	51	1385	03/08/2007
1m N(m) - N(m) Cable	Reynolds	269-0088-1000	2397	02/08/2007

3.1 TEST EQUIPMENT

Instrument	Manufacturer	Type No	TE Number	Calibration Due
Section 2.7 Beacons - Temperature Gradient				
Stop Clock	R.S Components	RS328 061	2674	TU
20dB/20W Attenuator	JFW	50FHC-020-20	2774	18/02/2007
Beacon RF Unit	TUV	N/A	3066	TU
50ohm / 6W Termination	Micronde	R404613	3074	18/02/2007
50ohm/15W Termination	Diamond Antenna	DL-30N	3097	09/03/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3161	01/06/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3163	01/06/2007
Thermocouple Thermometer	Fluke	51	3173	22/06/2007
Bandpass filter	Trilithic	5BE406/35-1-AA	3206	TU
Section 2.5 Beacons – Thermal Shock				
Power Meter	Hewlett Packard	436A	47	21/06/2007
Signal Generator	Rohde & Schwarz	SMY01	49	19/06/2007
Beacon RF Unit	TUV	N/A	97	TU
Logic Analyser	Hewlett Packard	1631D	155	06/09/2007
Signal Generator	Hewlett Packard	8644A	199	17/12/2006
Attenuator: 10dB/20W	Narda	766-10	480	13/07/2007
Power Sensor	Hewlett Packard	8482A	1341	19/09/2006
TERMINATION: 50ohm/15W	Radio Spares	612-192	2425	02/08/2007
Frequency and Time Interval Analyser	Hewlett Packard	5372A	2756	16/06/2007
50ohm/ 1W Termination	Suhner		3080	18/02/2007
50ohm/2W Termination	Omni-Spectra	3001-6100	3081	18/02/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3161	01/06/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3162	01/06/2007
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	TU
Climatic Chamber	Heraeus Votsch	VM 04/100	85	TU
Digital Temperature Indicator	Fluke	51	1385	03/08/2007
1m N(m) - N(m) Cable	Reynolds	269-0088-1000	2397	02/08/2007

SECTION 4

PHOTOGRAPHS

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Front View (Antenna Deployed)

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Side View (Antenna in 'idle' position)

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Antenna Characteristics Testing (EUT on ground plane (2.5m dia. 0.75m height) – Antenna Deployed)

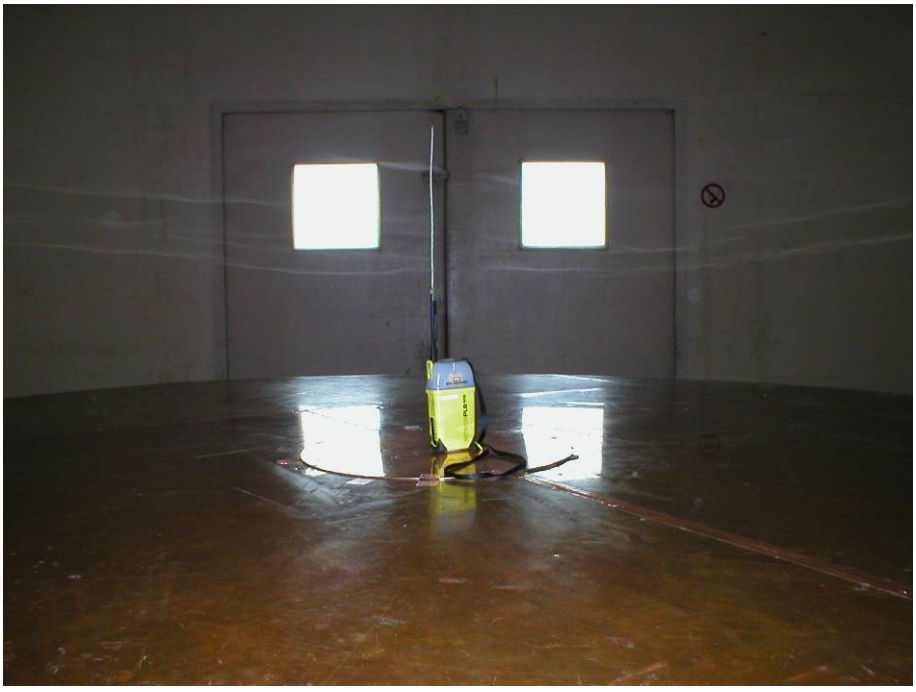
4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Antenna Characteristics Testing (EUT simulated above dry ground) – Antenna Deployed

Antenna Characteristics Testing (EUT simulated above dry ground) – Antenna Deployed

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Antenna Characteristics Testing (EUT on ground plane (2.5m dia. 0.75m height) – Antenna Deployed



Antenna Characteristics Testing (EUT on ground plane (2.5m dia. 0.75m height) – Antenna Deployed

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Antenna Characteristics Testing (EUT on ground plane (2.5m dia. 0.75m height) – Antenna Deployed

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Antenna Characteristics Testing (EUT simulated above dry ground) – Antenna Deployed
Build State 1

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

Antenna Characteristics Testing (EUT on ground plane (2.5m dia. 0.75m height) – Antenna Deployed Build State 1

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMER 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

PLB Model(s): MT410/MT410G
TYPE APPROVAL SUBMISSION
PREPARED FOR COSPAS/SARSAT

Prepared: Craig DUNCAN
Position: Project Engineering Manager
Date: 5th December, 2006
Endorsement:

BATTERY ANALYSIS AND CALCULATIONS

Background and PURPOSE

C-S T.007 Specifies:

'The operational lifetime test is intended to establish, with reasonable confidence, that the beacon will function at its minimum operating temperature for its rated life using a battery that has reached its expiration date…..take into account:

i. the depletion in battery power resulting from normal battery loss of energy due to battery ageing over the rated life of the battery pack;

ii. the average current drain resulting from constant operation of the circuits powered from the beacon battery prior to beacon activation over the rated life of the battery pack;

iii. the number of self-tests, as recommended by the beacon manufacturer over the rated life of the battery pack (the beacon manufacturer shall substantiate the method used to determine the corresponding current drain); and

iv. correction coefficient of 1.65 (applied to item (ii) and item (iii)) to account for differences between battery to battery, beacon to beacon and the possibility of exceeding the battery replacement time. '

Further this test may involve a pre-test discharge conditioning of the battery pack or:

'Discharge of the battery may be replaced by the equivalent extension of the operating lifetime test.'

Data and Supporting Information

Rated Battery Pack Life

The MT410 and MT410G are to achieve a 8 year battery pack replacement interval. This period is to commence from the date of cell manufacture.

Battery Aging, Self Discharge (i)

The following have been extracted from the VARTA Microbattery SALES PROGRAM AND TECHNICAL HANDBOOK, Primary Lithium Cells $LiMnO_2$, Document 9832_U/S:

SYSTEM PROPERTIES OF VARTA Microbattery LITHIUM

Series	CR Series Cylindrical Cells	CR Series Button Cells
System	Li/MnO_2	Li/MnO_2
Gravimetric energy density	250–300 Wh/kg	250–300 Wh/kg
Nominal voltage	3.0 V	3.0 V
Open circuit voltage	3.2 V	3.2 V
Available capacity range	950–2000 mAh	25–560 mAh
Storage life	≥10 years[1)]	≥5 years[1)]
Self discharge δ=20°C	<1% p.a.	<1% p.a.
Operating temperature	–30 ... +75°C[2)]	–20 ... +65°C
Maximum temperature range (short term)[3)]	–40 ... +80°C[4)]	–40 ... +80°C[4)]
Storage temperature[5)]	–55 ... +75°C[2)]	–55...+70°C

TABLE - 'TAB 1 Page 05 VARTA Technical Handbook'

FIG. 8
Capacity Retention

Capacity retention characteristics of **VARTA** Microbattery Lithium Cells Cylindrical Cells CR ... AA, CR ... A and CR 2 NP

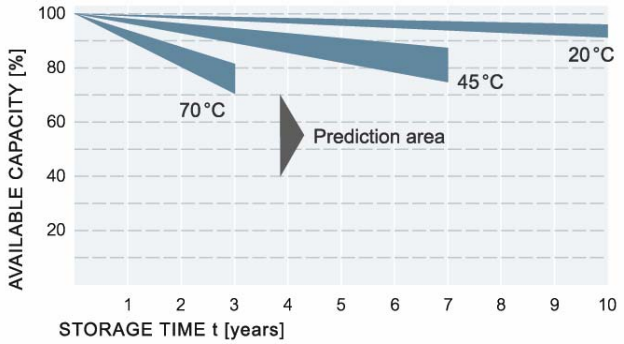


FIGURE - 'FIG. 8 Page 05 VARTA Technical Handbook'

The table identifies self discharge as less than 1% pa. Further the figure which is applicable to type CR123A (IEC CR17345) shows maximum self-discharge at 8 years as approximately 7.0%. For the purposes of this submission worst case figures shall be used , ie 7.0% loss / 93% retention.

Standby Energy Consumption (ii)

The MT410 and MT410G circuitry does not draw current unless activated.

Self-Test Consumption (iii)

The following applies to model MT410G:

Time (s)	Duration (s)	Current (ma) 12V	Energy (J)	Description
0	0.34	13	0.0530	Power on/Initialise
0.34	0.7	26	0.2184	uC + GPS
1.04	0.4	27	0.1296	uC + GPS +TX driver
1.44	0.4	42	0.2016	uC + GPS + TX driver + 121.5 out (unmodulated)
1.84	0.52	740	4.6176	uC + GPS + TX driver + 406 out (long message)
2.36				Self-test end
		TOTAL :	5.2202	Energy per self-test cycle

The MT410 and MT410G Instruction Manual states that a self-test should not be conducted any more regularly than once per month. Over 7.5yrs (cells are 6 months old prior to reaching retail) the consumption is:

Description	Value	Units
No. of Years	7.5	
Max Test per year	12	
Total No. of Tests	90	
Energy per test	5.2202	J
Total Energy:	469.8216	J

Further, it is possible to do a GPS acquisition self test by following a special operator sequence. The MT410 and MT410G Instruction Manual states this should be carried out no more regularly than once yearly:

Description	Value	Units
Maximum Duration	180	s
Current at 12V	31	mA
Energy per test	66.96	J
Max Quantity	8	
Total Energy:	535.68	J

Description	Value	Units	Value	Units
Battery Pack Capacity	1500	mA hours		
Nominal Voltage	12	V		
Battery Pack Capacity		J	64800	J
Self-test Energy Loss				
Normal	469.8216	J		
GPS (special)	535.6800	J		
TOTAL Self-test Loss			1006	
Self-Test Loss as % of Pack Capacity:			1.55%	

C-S Calculations

T.007 Item	Description	Loss (%)	Factor	Adj Loss (%)
i.	Battery Aging	7.00	1	7.00
ii.	Standby	0	1.65	0
iii.	Self-Test	1.55	1.65	2.56
			TOTAL:	10.56

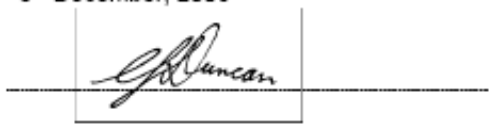
Conclusion

When subjected to the COSPAS-SARSAT operational duration test per C-S T.007 the MT410G beacon is required to operate in excess of the minimum permit duration of 24 hours by 10.56%, ie the PLB must operate for a least 26.53 hours.

As the MT410 current draw is significantly reduced due to the omission of the GPS receiver function, the achieved operational duration for this model type shall be greater. A successful result for the MT410G therefore also confirms compliance for the MT410.

PLB Model(s): MT410/MT410G
TYPE APPROVAL SUBMISSION
PREPARED FOR COSPAS/SARSAT

Prepared: Craig DUNCAN
Position: Project Engineering Manager
Date: 3rd December, 2006
Endorsement:



OPERATING MODE & ENERGY USAGE

1. BACKGROUND AND PURPOSE

Section 5d, 'Technical Data' of C/S T.007 requires information used to identify operational states and modes that result in increased energy and power demands respectively.

2. DATA AND SUPPORTING INFORMATION

2.1 MT410

There is only one single constant operational mode for this model type.

2.2 MT410G

There is only one single operational mode for this model type, however its operation is dynamically adjusted.

The GPS receiver is usually placed in a low energy consumption (sleep) mode and only woken for short periods of time, commencing from activation, and at regular intervals thereafter (approximately every 50 minutes), in order to attempt a position update.

The activation period is terminated early when a suitable accurate position fix has been resolved. Maximum energy consumption therefore occurs in the absence of suitable GPS signals.

3. CONCLUSION

The MT410G operational life test should be done in the absence of GPS signals in order to maximise energy consumption.

TECHNICAL DATA SHEET MT410 & MT410G

MODES OF OPERATION

Activated: UHF (406) and VHF (homer) complete with high intensity strobe and audible alert.

Self Test: Comprehensive internal diagnostics with visual and audible operator feed-back. UHF test message (inverted synchronisation compatible with portable beacon testers). GPS satellite acquisition test (MT410G only).

OPERATION

Activation: Automatically when antenna deployed.

Duration: In excess of 24 hours at -20°C Longer at higher ambient temperatures.

Transmission: 121.5 MHz and 406 MHz

Delay: 60 seconds to de-activate prior to distress transmission.

Warm Up: None required (due to patented digital frequency generation).

VHF: 121.5 MHz, 50 mW ±3 dB, swept tone AM (analogue).

UHF: 406.028 MHz, 5 W ± 2 dB, PSK (digital).

Strobe: > 20 flashes/minute 2 x high intensity white LED.

COSPAS-SARSAT: Certified to C/S T.001 (Class 2) requirements.

Approvals: AS/NZS 4280.2, ETSI EN 302 152-1

UHF-Protocol/Data: Supports all short (MT410) and long (MT410G) operation protocols (re-programmable by Distributor).

Repetition Period: 50 s mean, digitally generated randomization.

VHF: Satellite compatible phase coherent

BATTERY

Replacement Period: Prior to expiry date marked on case - (7 yrs), or after use.

Replacement Method: Service centre or factory only (non-user replaceable).

Battery Chemistry: $LiMnO_2$ (0.49 g Lithium per cell)

Battery Configuration: 2 electronically isolated batteries, each consisting of 2 cell types CR17345.

PHYSICAL

Operating: -20 to +55°C

Storage: -30 to +70°C

Weight: MT410 - 235 g, MT410G - 250 g

Compass Safe Distance: 0.1 m (for minimal deflection)

Dimensions (mm): 135 (h) x 71 (w) x 38 (d)

Buoyant: Will float in fresh/salt water

Waterproof: Submersion to 1 m, exceeds IP67.

Materials: High visibility yellow chassis with translucent cap. UV stabilised high impact plastic chassis with energy absorption over-moulded bumpers.

GPS RECEIVER (FITTED TO MT410G ONLY)

Type: Ultra-high sensitivity L1 frequency C/A.

Channels: 16 Channel, 8192 time/frequency search windows.

Antenna: Dielectrically loaded quadrifilar helix

Acquisition: Cold start 34 seconds typical Hot start <3.5 seconds typical.

Position: Located to within 45 m typical

OTHER FEATURES

Transport: Meets UN requirements for transport as non-hazardous cargo on board passenger aircraft.

Antenna: Flexible, self straightening and robust wire rope design. Marine grade 316 Stainless Steel.

Included Accessories: Wrist/Neck strap. Protective carry pouch with multidirectional belt loops.

All specifications are typical and subject to change without notice or obligation.

406 MHZ PLB


GME
ACCUSAT
POCKET SERIES
406 MHZ PLB
EMERGENCY
PERSONAL LOCATOR BEACON
MT410 & MT410G
AUSTRALIAN DESIGN
AND MANUFACTURE
GPS EQUIPPED
INSTRUCTION MANUAL

CONTENTS

WARNING

EMERGENCY BEACONS SHOULD ONLY BE USED IN SITUATIONS OF GRAVE AND IMMINENT DANGER.

It is important that you read this manual thoroughly.

FEATURES

- Suitable for marine, aviation and land applications.
- GPS model available - Accusat Pocket Pro+ (MT410G).
- 7 year Battery life, 7 year Warranty.
- Typical accuracy - MT410G: <45 m MT410: <5 km.
- High visibility strobe light.
- Unique patented technology - no warm up period.
- Featherweight, compact and robust construction.
- Digital 406 MHz, 5 Watt transmission plus 121.5 MHz homing signal.
- COSPAS-SARSAT worldwide operation.
- National and International Approvals.
- Buoyant and waterproof design (exceeds IP67).
- Simple 2-step activation.
- Complete with retention strap and protective carry pouch.

Compliance Statement and Application Certificates: please visit: www.gme.net.au/epirb

INTRODUCTION

Congratulations on purchasing your new Accusat Pocket Series Personal Locator Beacon (PLB). The GME Accusat Pocket MT410 and GPS equipped Accusat Pocket Pro+ MT410G are the most advanced 406 MHz digital satellite beacons available today. Using new digital frequency generation technology, GME have developed and approved world wide, a new family of affordable high performance 406 MHz Personal Locator Beacons

GENERAL

The GME MT410 and MT410G PLBs are designed for use when the safety of life is endangered and you have no other means of communication. The PLB can save your life and the lives of others by leading an air, land or sea rescue to your precise location.

PLBs are an excellent choice to provide added safety while participating in just about any outdoor or remote area activity. The MT410/410G beacons are fully sealed units and will not sink if dropped into water, making them equally suitable for use on board a boat, or in many other diverse water sport adventures.

Note: PLBs are not a satisfactory substitute for situations which require the specifically designed GME Marine EPIRBs. An EPIRB is designed to float unassisted with the antenna above the water surface to meet Maritime Authority requirements.

In the past, using the analogue system, (which will become obsolete in February 2009) extensive and lengthy searches have been carried out for missing persons, sometimes to no avail. Your GME PLB is a self contained 406 MHz digital radio transmitter that emits an internationally-recognized distress signal on a frequency monitored by the COSPAS-SARSAT satellite system. The MT410 and MT410G contain a unique identity code which can be cross referenced to a database of registered 406 MHz beacons, allowing the beacon's owner to be immediately identified in the event of an emergency. Both PLB models include a high performance solid state strobe and 121.5 MHz VHF homing signal to assist in leading rescuers to your precise location.

The MT410G also features an integrated 16 Channel GPS Receiver which when activated, will automatically acquire a position and relay the latitude and longitude of the beacon along with the personal identifier and emergency signal.

ABOUT THE COSPAS-SARSAT SYSTEM

The COSPAS-SARSAT system is a complete global search and rescue service using geostationary and polar orbiting satellites. Many countries provide ground facilities known as Local User Terminals (LUTs). Polar orbiting satellites provide complete, although non-continuous, coverage of the earth (due to fact that these satellites can only view a portion of the earth at any given time) and can accurately resolve an active beacons' location. Additionally, geostationary satellites can give an immediate alerting function in many regions of the world.

The basic COSPAS-SARSAT concept is illustrated in the following diagram

ABOUT 406 MHZ BEACONS

406 MHz beacons provide more accurate and reliable alert data to search and rescue agencies than the older 121.5/243 MHz systems presently being phased out. The older 121.5 MHz analogue system required that the satellite be within view of both the beacon and the LUT before it could transmit the beacons' position. This limited the coverage to an area immediately surrounding the LUT. However, the digital nature of the 406 MHz system means that the satellites are able to store the beacons' position and digital message, no matter where in the world it is received. These details are then relayed to the next LUT that comes into range, giving the 406 MHz system true global coverage.

REGISTRATION & TRANSFER OF OWNERSHIP

Registration of your 406 MHz satellite PLB with the Registration Section of your National Authority is important and now mandatory in most countries because of the global alerting nature of the COSPAS-SARSAT system.

Owner Registration Forms for registering your beacon may be supplied within the packaging, otherwise, your National Authority will be able to provide the correct forms. Up to date forms are often available online.

The information provided in the registration is used only for search and rescue purposes. Promptly fill in the owner registration form upon completion of the sales transaction, then mail, fax or email it to your National Authority. If the PLB is to enter service immediately, complete the registration form and fax or email the information.

Should the PLB be transferred to a new owner, as the previous owner you are obligated to inform your National Authority by email, fax, letter or telephone of the name and address of the new owner. The new owner of the beacon is also required to provide their National Authority with the information as shown on the registration form. This obligation transfers to all subsequent owners.

Note: Your MT410/MT410G has been programmed with a unique identifying code which will be transmitted by the beacon in an emergency. Registering your beacon provides the authorities with immediate access to your details when the beacon is detected. This means they will know who you are and who your emergency contacts are. In situations of accidental activation they can also immediately eliminate your beacon as an emergency situation by contacting you when activation is detected.

REGISTRATION CONTACTS

Australian users - Address all correspondence to:

Beacon Registration Section, AusSAR
Australian Maritime Safety Authority
GPO Box 2181, Canberra City, ACT 2601.
Phone: 1800 406 406 or International: +61 2 6279 5041.
Fax: 1800 622 153 or International: +61 2 6230 6868.
Email: ausbeacon@amsa.gov.au.

New Zealand users - Address all correspondence to:

Rescue Co-ordination Centre New Zealand
PO Box 30050, Lower Hutt 6009.

Phone: +64 4 914 8383. Fax: +64 4 914 8388
Email: 406registry@maritimenz.govt.nz

Ensure information is current. Notify the appropriate authority if ownership of the beacon is transferred.

Other areas - Please contact your Country Distributor as shown on page 8 of this manual. If you have a beacon coded with a foreign country code, or if you do not know what country code has been used, then you will need advice, please contact the relevant authority on one of the numbers shown above or visit:
www.cospas-sarsat.org/BeaconsCodingGuideGeneral/poc.htm

PREVENTING ACCIDENTAL ACTIVATION

The signal from a PLB is regarded by authorities as an indication of distress and is given an appropriate response. It is the responsibility of every owner of a PLB to ensure that it is not activated unintentionally or in situations that do not justify its use.

Most cases of accidental transmission result from poor or inappropriate storage or failure to totally disable an old model beacon before disposal.

The need to treat emergency beacons responsibly cannot be too highly emphasised.

The MT410/410G will not commence transmitting until approximately 60 seconds after activation, providing a period of audible and visual warning. If you hear the beacon beeping while it is being carried or stowed, you may still be able to deactivate it during this time period without actually transmitting a distress signal. If in doubt, report the incident to your local authorities just in case.

To minimise the possibility of accidental activation, PLB owners are urged to pay careful attention to the following points:

1. Follow the self-testing procedures
2. Educate your travelling companions on how and when to correctly operate your PLB
3. Avoid stowing the PLB where it will be subjected to continuous direct sunlight. This could cause the beacon's internal temperature to exceed the maximum storage temperature of +70°C. Long term stowage under these conditions could result in reduced battery life, poor performance or degradation of the plastics due to excessive U.V. light.
4. Do not allow children to interfere with the PLB.

CONTACTS FOR REPORTING ACTIVATIONS

If you suspect that a PLB has been activated inadvertently, you MUST turn it off and report it immediately to your National Authority's Rescue Co-ordination Centre to prevent an unnecessary search.

When reporting you should include the following:

1. Your PLB's 15 character Unique Identifier Number (UIN), which is marked on the unit body.
2. Date, time and duration of activation.
3. Cause of activation.
4. Location at time of activation.

Search and Rescue authorities will not penalize an EPIRB owner or operator in cases of genuine accidental activation.

Contact numbers:

Australia: 1800 641 792
New Zealand: 0508 472 269
United States of America: (800) 323 7233
United Kingdom: 01326 317 575

BATTERIES & MAINTENANCE

The MT410 and MT410G PLBs are fitted with the very latest in high capacity battery technology. These batteries are able to operate within a temperature range of -20°C to +55°C.

The full operational capability of your beacon may not be available if the batteries fitted have exceeded their replacement date, as shown on the body of the unit. Prior to reaching this date, make arrangements to have your MT410/MT410G returned for service.

Note: PLB maintenance operations, including battery replacement, require that the beacon be returned to a manufacturer approved service facility. A list of authorised Service Centres can be found on: www.gme.net.au. The replacement of batteries due to expiry or usage is not covered by the product's Warranty.

MT410/MT410G batteries are not user replaceable.

Although the MT410/410G are otherwise maintenance free, routinely following these few simple steps will help ensure that your beacon will be operationally ready if called upon:

1. Test the PLB at the recommended interval.
2. Confirm the SAFETY SEAL has not been broken.
3. Check that the batteries have not passed their replacement date.
4. Inspect the MT410/410G for physical damage or deterioration.
5. Keep the unit clean by wiping over with a damp cloth (warm water and mild detergent are suitable), then dry.

If there is any doubt as to the products' serviceability, immediately contact your authorised Dealer or Service Centre for advice.

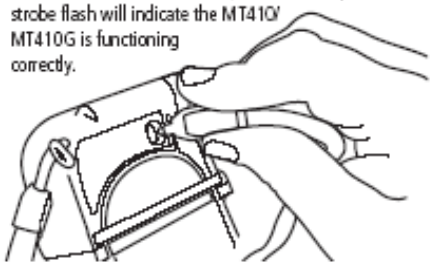
TESTING THE PLB

It is recommended that you test the MT410/410G at regular intervals to ensure it is fully functional. You should also test the beacon prior to an extended journey.

WARNING
- **DO NOT over test** – testing consumes some battery power, no more than once per month.
- **DO NOT deploy the antenna** as this will break the seal and activate the beacon to transmit a distress signal after 60 seconds.

You may test the PLB using the following procedure:

1. Remove the beacon from the carry pouch.
2. Use the key (attached to the lanyard) to slide self test switch down and then release, a 'double beep' and a strobe flash will indicate the MT410/ MT410G is functioning correctly.



GPS SATELLITE ACQUISITION TEST

The standard self test procedure is more than sufficient to perform a comprehensive check of your beacon without consuming too much battery capacity. On occasions, and no more regularly than on average once a year, you may wish to perform a GPS satellite acquisition check (MT410G only).

Whereas the routine self test verifies the GPS receiver's circuitry, the full test will include the operation of the special GPS antenna as well.

1. This test consumes much more power than a standard self test so choose a test location with good visibility of the open sky above. A quick satellite acquisition means a short test, and less wasted power consumption.
2. Carry out a self test in the usual way but rather than releasing the key, continue to hold it in position. After the self test pass confirmation, both the strobe flash and the internal beeper will start. Count four flashes/beeps then immediately release the key.
3. The MT410G will continue to flash and beep whilst it searches for available satellites. This may continue for a number of minutes depending on the number and location of satellites present. It is not possible to abort the test once started, and note that distress signals are not radiated as part of this test.
4. If no satellites are found after a predetermined time the repetitive flash and beep will stop. This may indicate a fault with the GPS receiver system within the PLB and you should contact your local service centre for advice.

If the test terminates with a rapid sequence of flashes and beeps then GPS satellite acquisition and correct operation has been confirmed.

SAFETY SEAL

The safety seal which covers the antenna on the rear side of the beacon is designed to tear if the unit is switched on. A safety seal that is not broken serves to indicate that the beacon has never been manually activated.

NEVER remove or break the seal unless deploying the PLB in an emergency. If the beacon has been activated for any length of time, the batteries can no longer be guaranteed to have the capacity to operate for the minimum 24 hour period and therefore must be replaced.

TRANSPORTATION

GME PLBs use batteries with a low level of lithium content. Consequently GME PLBs are classed as 'non-hazardous products' by IATA and maybe shipped without DG declaration and carried without problem (accompanied or unaccompanied) on passenger aircraft. However, it is advisable that you check with your carrier that they do not have specific restrictions which may apply to you.

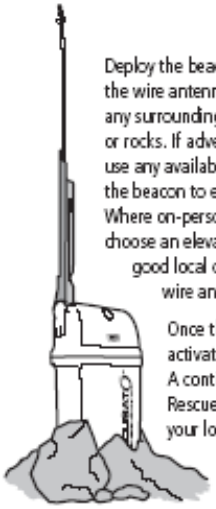
ACTIVATION IN AN EMERGENCY

PLBs should only be activated in situations of grave and imminent danger. Deliberate misuse may well result in the unnecessary deployment of valuable Search and Rescue resources and could incur a severe penalty.

Should there be an inadvertent activation it is the responsibility of the user to immediately switch the beacon off and notify the nearest RCC (Rescue Coordination Centre).

LOCATION FOR DEPLOYMENT

The MT410/410G will deliver best performance where there is a clear view of the sky. Deploying the beacon within an enclosure, particularly one which is electrically conductive such as under a car roof, will reduce the signal strength and may mean that it cannot be detected by rescue satellites or overflying aircraft. If you find yourself in a narrow valley or ravine, you can greatly increase the chances of your beacon signal being detected by placing it on higher ground.

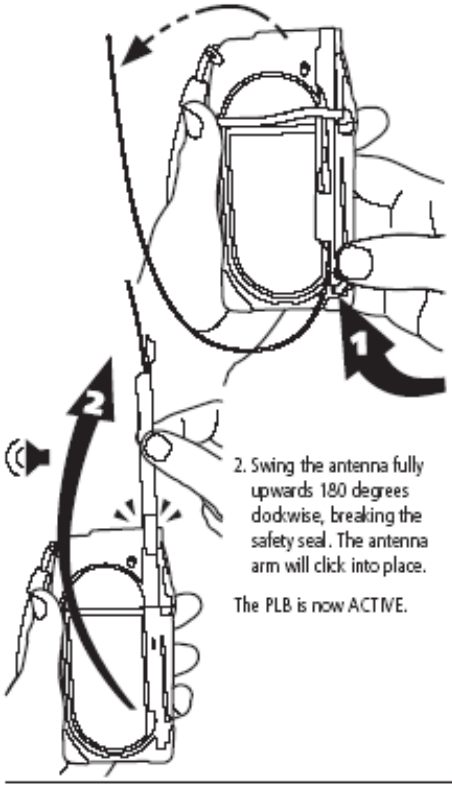


Deploy the beacon in an upright position with the wire antenna vertical and well clear of any surrounding obstructions such as trees or rocks. If adverse weather conditions exist, use any available props around the base of the beacon to ensure it will not topple over. Where on-person operation is unavoidable, choose an elevated position that also achieves good local clearance around the vertical wire antenna.

Once the beacon has been activated, leave it switched on. A continuous signal is needed for Rescue Authorities to determine your location.

ACTIVATING THE MT410/410G

1. Hold firmly and release the antenna by pushing the black arm (where marked by a yellow triangle) inwards then upwards The antenna will quickly uncoil and extend.



2. Swing the antenna fully upwards 180 degrees clockwise, breaking the safety seal. The antenna arm will click into place.

The PLB is now ACTIVE.

The MT410 will 'beep' and pulse the inbuilt strobe 20-21 times per minute.

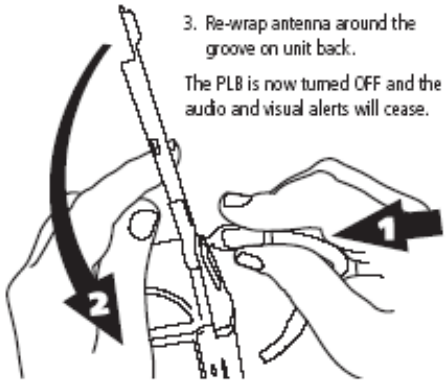
The MT410G will emit a rapid series of 'beeps' and strobe flashes for a period of 6 seconds, indicating to the user that it has acquired a GPS position fix and is relaying this position along with the distress signal and the unique personal identifier to the COSPAS-SARSAT satellite system.

After 6 seconds the MT410G will continue to 'beep' and pulse the strobe 20-21 times per minute.

DE-ACTIVATING THE MT410/410G

1. Using the key (attached to the lanyard) depress the antenna latch.
2. Swing the antenna fully down 180 degrees anti-clockwise and latch.
3. Re-wrap antenna around the groove on unit back.

The PLB is now turned OFF and the audio and visual alerts will cease.



DISPOSAL

Special precautions must be taken when finally disposing of your beacon at the end of it's useful life. Legislation may determine the specific requirements which apply to you. In the first instance, contact your National Authority for advice. The following information may also be helpful:

To permanently disable the beacon:

1. At the rear of the beacon remove the two retaining screws located just under the safety seal. Turn the unit over and remove a third screw from the middle of the cap.
2. Release the antenna just sufficiently to allow the cap to be partially withdrawn, remove the yellow plastic insert from the front centre to allow the unit to slide apart.
3. Unplug the battery leads at the base of the circuit board.

- Lithium batteries are generally not considered as hazardous waste when fully discharged. Qualified personnel may be able to slowly and safely discharge the cells for you.
- The MT410 and MT410G contain many recydable parts.

SPECIFICATIONS*

MODES OF OPERATION

Activated:	UHF (406) and VHF (homer) complete with high intensity strobe and audible alert.
Self Test:	Comprehensive internal diagnostics with visual and audible operator feed-back. UHF test message (inverted synchronisation compatible with portable beacon testers). GPS satellite acquisition test (MT410G only).

OPERATION

Activation:	Automatically when antenna deployed.
Duration:	In excess of 24 hours at -20°C Longer at higher ambient temperatures.
Transmission:	121.5 MHz and 406 MHz
Delay:	60 seconds to de-activate prior to distress transmission.
Warm Up:	None required (due to patented digital frequency generation).
VHF:	121.5 MHz, 50 mW ±3 dB, swept tone AM (analogue).
UHF:	406.028 MHz, 5 W ± 2 dB, PSK (digital).
Strobe:	> 20 flashes/minute 2 x high intensity white LED.
COSPAS-SARSAT:	Certified to C/S T.001 (Class 2) requirements.
Approvals:	AS/NZS 4280.2, ETSI EN 302 152-1
UHF-Protocol/Data:	Supports all short (MT410) and long (MT410G) operation protocols (re-programmable by Distributor).
Repetition Period:	50 s mean, digitally generated randomization.
VHF:	Satellite compatible phase coherent

BATTERY

Replacement Period:	Prior to expiry date marked on case - (7 yrs), or after use.
Replacement Method:	Service centre or factory only (non-user replaceable).
Battery Chemistry:	$LiMnO_2$ (0.49 g Lithium per cell)
Battery Configuration:	2 electronically isolated batteries, each consisting of 2 cell types CR17345.

PHYSICAL

Operating:	-20 to +55°C
Storage:	-30 to +70°C
Weight:	MT410 - 235 g, MT410G - 250 g
Compass Safe Distance:	0.1 m (for minimal deflection)
Dimensions (mm):	135 (h) x 71 (w) x 38 (d)
Buoyant:	Will float in fresh/salt water (RTCM Cat2).
Waterproof:	Submersion to 1 m, exceeds IP67.
Materials:	High visibility yellow chassis with translucent cap. UV stabilised high impact plastic chassis with energy absorption over-moulded bumpers.

GPS RECEIVER (FITTED TO MT410G ONLY)

Type:	Ultra-high sensitivity L1 frequency C/A.
Channels:	16 Channel, 8192 time/frequency search windows.
Antenna:	Dielectrically loaded quadrifilar helix
Acquisition:	Cold start 34 seconds typical Hot start <3.5 seconds typical.
Position:	Located to within 45 m typical

OTHER FEATURES

Transport:	Meets UN requirements for transport as non-hazardous cargo on board passenger aircraft.
Antenna:	Flexible, self straightening and robust wire rope design. Marine grade 316 Stainless Steel.
Included Accessories:	Wrist/Neck strap. Protective carry pouch with multidirectional belt loops.

*All specifications are typical and subject to change without notice or obligation.

WARRANTY

GME limit this warranty to the original Purchaser of the equipment. GME warrant this product to be free from defects in material and workmanship for a period of 7 years from the date of purchase from the authorised Dealer.

Replacement of batteries due to expiry or usage is exduded from this Warranty. Should the product require servicing during this period, all labour and parts used to effect repairs will be supplied free of charge. GME reserve the right to determine whether damage has been occasioned by accident, misuse or improper installation, whereby the Warranty could be void. In the event of a defect occurring during the Warranty period, the original Purchaser may return the defective unit along with suitable proof of purchase (i.e. receipt, credit card slip etc.) and a full description of the defect to the Dealer from whom the unit was purchased.

The Dealer will forward the unit to an authorised GME Service Depot in your State.

All freight charges incurred for transportation by the Dealer or GME are the Purchasers' responsibility.

International customers should contact their in-country distributor or contact GME directly at: info@gme.net.au

NATIONAL AUTHORITY INFORMATION

Australia 24 Hour Emergency Contact
Phone: 1800 641 792 or
International: +612 6230 6811

New Zealand: 24 Hour Emergency Contact
Phone: 0508 472 269 or
International: +64 4914 8389

Owner Details : Name: .....

Address: .....

.....

Tel: .....

ID Code #: .....

Distributed by:

GME A Division of: **Standard Communications PTY LTD**

ISO 9001 SGS

Head Office: SYDNEY- Locked Bag 2086, North Ryde N.S.W. 1670, Australia. Tel: (02) 9844 6666, Fax: (02) 9844 6600.

MELBOURNE	ADELAIDE	PERTH	BRISBANE	SYDNEY	AUCKLAND
7 Mircro Circuit	14 Phillips St.	Unit 1	Unit 1	Unit B	Unit F
Dandenong South	Thebarton	10-12 Harvard Way	89-101 Factory Rd.	22-24 College St.	35 Neilpark Dr.
Vic. 3165	S.A. 5031	Canning Vale	Oxley	Gladesville	East Tamaki
Tel: (03) 9798 0988	Tel: (08) 8234 2633	W.A. 6155	Qld. 4075	N.S.W. 2111	N.Z.
Fax: (03) 9798 0177	Fax: (08) 8234 5138	Tel: (08) 9455 5744	Tel: (07) 3278 6444	Tel: (02) 9879 8888	Tel: (09) 274 0955
		Fax: (08) 9455 3110	Fax: (07) 3278 6555	Fax: (02) 9816 4722	Fax: (09) 274 0959

For customers outside Australia and New Zealand, please contact your local GME Distributor or email to: export@gme.net.au

Part Number: 310361 Drawing Number: 43003-1


GME
ACCUSAT
POCKET SERIES 406 MHz PLB
MT410 / MT410G 406 MHz EMERGENCY PERSONAL LOCATOR BEACONS
Fitted with NON-HAZMAT Long Life Batteries
RESCUE
GPS OPTION AVAILABLE (MT410G POCKET PRO+)
7 year Battery life, 7 year Warranty.
Typical accuracy - MT410G: <45m MT410: <5km.
High visibility strobe light.
Unique patented technology - no warm up period.
Featherweight, compact and robust construction.
Digital 406 MHz, 5 Watt transmission plus 121.5 MHz homing signal.
COSPAS-SARSAT worldwide operation.
National & International Approvals.
Sealed waterproof design (exceeds IP67).
Retention strap and fully buoyant design reduces risk of loss.
Complete with protective carry pouch.
PLB
GME
GPS EQUIPPED
ACCUSAT
POCKET SERIES 406 MHz PLB
AUSTRALIAN OWNED
ESTABLISHED 1959
www.gme.net.au

GME

ACCUSAT™ POCKET SERIES 406 MHz PLB

MT410 / MT410G SPECIFICATIONS

GME's **AccuSat Series**, available with or without an integrated GPS option, are leading the world with feature innovation and user benefits.

Not only is the **AccuSat Series** the smallest and lightest PLB on the market, both models offer a massive 7 year battery replacement life, an 'industry first' 7 year warranty, a high intensity LED strobe and a 'Non Hazmat' battery pack for simple and cost effective transportation, all contributing to the unique **AccuSat** advantage.

The current 121.5/243 MHz analogue COSPAS SARSAT service will be terminated in February 2009 and only the 406 MHz digital beacon signals will be processed thereafter. Consumers have for some time recognised the major benefits of a 406 MHz over a 121.5 MHz device in faster, more accurate detection, personal identification of each beacon, reduced search area resulting in a faster more targeted response in a life threatening situation. However the prohibitive cost of 406 MHz beacons has always been an issue.

Today with cutting edge microprocessor technology, GME's engineers are able to provide the outdoor adventurer with a 406 MHz PLB solution that is not only affordable, but provides enhanced peace of mind for boaters, bush walkers, 4 x 4 enthusiasts and aviators should they ever require emergency assistance.

GME has been designing and manufacturing emergency beacons in Australia for over 30 years. In that time literally hundreds of lives have been saved in Australia and around the world.

For information on the GX600D or any GME product please visit our website:

www.gme.net.au

MODES OF OPERATION

Activated:	UHF (406) and VHF (homer) complete with high intensity strobe and audible alert.
Self Test:	Comprehensive internal diagnostics with visual and audible operator feed-back. UHF test message (inverted synchronisation compatible with portable beacon testers). GPS satellite acquisition test (MT410G only)

OPERATION

Activation:	Automatically when antenna deployed
Duration:	In excess of 24 hours at -20 °C Longer at higher ambient temperatures.
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VHF:	121.5 MHz, 50 mW ±3 dB, swept tone AM (analogue)
UHF:	406.028 MHz, 5 W ± 2 dB, PSK (digital)
Strobe:	> 20 flashes/minute 2 x high intensity white LED
COSPAS-SARSAT:	Certified to C/S T.001 (Class 2) requirements
Approvals:	AS/NZS 4280.2 ETSI EN 302 152-1
UHF-Protocol/Data:	Supports all short (MT410) and long (MT410G) operation protocols (reprogrammable by Distributor)
Repetition Period:	50 s. mean, digitally generated randomization
VHF:	Satellite compatible phase coherent

BATTERY

Replacement Period:	Prior to expiry date marked on case - (7 yrs)
Replacement Method:	Service centre or factory only (non-user replaceable)
Battery Chemistry:	$LiMnO_2$ (0.49 g Lithium per cell)
Battery Configuration:	2 electronically isolated batteries, each consisting of 2 cell types CR17345

PHYSICAL

Operating:	-20 to +55 °C
Storage:	-30 to +70 °C
Weight:	MT410 - 235 g MT410G - 250 g
Compass Safe Distance:	0.1 m (for minimal deflection)
Dimensions (mm):	135 (h) x 71 (w) x 38 (d)
Buoyant:	Will float in fresh/salt water
Waterproof:	Submersion to 1 m
Materials:	High visibility yellow chassis with translucent cap. UV stabilised high impact plastic chassis with energy absorbtion overmouled bumpers.

GPS RECEIVER *(FITTED TO MT410G ONLY)*

Type:	Ultra-high sensitivity L1 frequency C/A
Channels:	16 Channel, 8192 time/ frequency search windows
Antenna:	Dielectrically loaded quadrifilar helix
Acquisition:	Cold start 34 seconds typical Hot start <3.5 seconds typical
Position:	Located to within 45 m typical

OTHER FEATURES

Transport:	Meets UN requirements for transport as Non-hazardous cargo on board passenger aircraft
Antenna:	Flexible and robust wire rope design. Marine grade 316 stainless steel.
Included Accessories:	Wrist/Neck strap. Protective carry pouch with multidirectional belt loops.
Antenna:	Flexible self straightening stainless steel design

Specifications are subject to change without notice or obligation.

Dealer:

A Division of **Standard Communications** PTY. LTD.

HEAD OFFICE: Locked Bag 2086 NORTH RYDE N.S.W. 1670 Australia.
Phone: +61 (0)2 9844 6666 Fax: +61 (0)2 9844 6600 Email: export@gme.net.au
MELBOURNE: (03) 9798 0988 BRISBANE: (07) 3278 6444 PERTH: (08) 9455 5744
SYDNEY: (02) 9879 8888 ADELAIDE: (08) 8234 2633 AUCKLAND: (09) 274 0955

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