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**REPORT ON**

Testing of the Standard Communications Pty Ltd MT410/MT410G  
in accordance with RTCM Paper 76 – 2002 / SC110-STD

**COMMERCIAL-IN-CONFIDENCE**

**Report No RM615377/03 Issue 2**

**June 2007**

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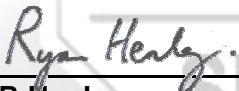
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Fareham, Hampshire, United Kingdom, PO15 5RL  
Tel: +44 (0) 1489 558100. Website: [www.tuvps.co.uk](http://www.tuvps.co.uk); [www.babt.com](http://www.babt.com)


**REPORT ON** Testing of the Standard Communications Pty Ltd MT410/MT410G  
in accordance with RTCM Paper 76 – 2002 / SC110-STD

Report No RM615377/03 Issue 2

June 2007

**PREPARED FOR** Standard Communications  
6 Frank Street  
Gladesville  
NSW  
Australia

**PREPARED BY**   
R Henley  
Principle Engineer

**APPROVED BY**   
M Jenkins  
Authorised Signatory

**DATED** 18<sup>th</sup> June 2007



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## **SECTION 1**

### **REPORT SUMMARY**

Testing of the Standard Communications Pty Ltd MT410/MT410G  
In accordance with RTCM Paper 76 – 2002 / SC110-STD



Product Service

**1.1 STATUS**

<b>Name and Address of Client</b>	Standard Communications Pty Ltd 6 Frank Street Gladesville NSW Australia
<b>Model Number</b>	MT410/MT410G
<b>Serial Number</b>	TUV Ref OS615377_01
<b>Test Specification/Issue/Date</b>	RTCM Paper 76 – 2002 / SC110-STD
<b>Number of Items Tested</b>	One
<b>Security Classification of EUT</b>	Unclassified
<b>Incoming Release Date</b>	Application Form 28 <sup>th</sup> August 2006
<b>Order Number Date</b>	84638 21 <sup>st</sup> June 2006
<b>Start of Test</b>	30 <sup>th</sup> August 2006
<b>Finish of Test</b>	3 <sup>rd</sup> May 2007



## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out to RTCM Paper 76 is shown below.

Section	RTCM Clause	Details	Result
2.1	-	Initial Aliveness Test	Pass
2.2	A3.0	Vibration Test	Pass
2.3	A4.0	Ruggedness Test (Bumps)	Pass
2.4	A5.0	Salt Fog Test	Pass
2.5	A6.0	Drop Test (onto hard surface)	Pass
2.6	A7.0	Leakage and Immersion Tests	Pass
2.7	A8.0	Spurious Emissions Test	Pass
2.8	A9.0	Cospas-Sarsat Type Approval to T.007	See C/S Test Report
2.9	A10.1	Operational Life and Strobe Light	Pass
2.10	A10.2	Self Test	Pass
2.11	A11.0	Buoyancy (Category 1 only)	Pass
2.12	A12.0	Auxiliary Radio-Locating Device Transmitter Test	Pass



### 1.3 APPLICATION FORM – MT410

#### 1.3.1 Beacon Manufacturer and Beacon Model

<b>Beacon Manufacturer</b>	Standard Communications Pty Ltd
<b>Beacon Model</b>	MT410

#### 1.3.2 Beacon Type and Operational Configurations

Beacon Type	Beacon used while:	Tick where appropriate
<b>EPIRB</b>	Floating in water or on deck or in a safety raft	<input type="checkbox"/>
<b>PLB</b>	On ground and above ground	<input checked="" type="checkbox"/>
	On ground and above ground and floating in water	<input type="checkbox"/>
<b>ELT Survival</b>	On ground and above ground	<input type="checkbox"/>
	On ground and above ground and floating in water	<input type="checkbox"/>
<b>ELT Auto Fixed</b>	Fixed ELT with aircraft external antenna	<input type="checkbox"/>
<b>ELT Auto Portable</b>	In aircraft with an external antenna	<input type="checkbox"/>
	On ground, above ground, or in a safety raft with an integrated antenna	<input type="checkbox"/>
<b>ELT Auto Deployable</b>	Deployable ELT with attached antenna	<input type="checkbox"/>

#### 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
<b>Self-Test Mode Characteristics</b>	
- 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
<b>Beacon includes a homer transmitter (if yes identify frequency of transmission)</b>	
-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 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
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: \_\_\_\_\_

18<sup>th</sup> June 2007



Product Service

### 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	<input checked="" type="checkbox"/> Manufacturer	<input type="checkbox"/> Importer	
	<input type="checkbox"/> Distributor	<input type="checkbox"/> Agent	
Contact Name	Craig DUNCAN	Telephone	+61 (0) 2 9844 6666
Email	<a href="mailto:cduncan@gme.net.au">cduncan@gme.net.au</a>	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

<b>Beacon Manufacturer</b>	Standard Communications Pty Ltd
<b>Beacon Model</b>	MT410G

##### 1.4.2 Beacon Type and Operational Configurations

Beacon Type	Beacon used while:	Tick where appropriate
<b>EPIRB</b>	Floating in water or on deck or in a safety raft	<input type="checkbox"/>
<b>PLB</b>	On ground and above ground	<input checked="" type="checkbox"/>
	On ground and above ground and floating in water	<input type="checkbox"/>
<b>ELT Survival</b>	On ground and above ground	<input type="checkbox"/>
	On ground and above ground and floating in water	<input type="checkbox"/>
<b>ELT Auto Fixed</b>	Fixed ELT with aircraft external antenna	<input type="checkbox"/>
<b>ELT Auto Portable</b>	In aircraft with an external antenna	<input type="checkbox"/>
	On ground, above ground, or in a safety raft with an integrated antenna	<input type="checkbox"/>
<b>ELT Auto Deployable</b>	Deployable ELT with attached antenna	<input type="checkbox"/>

##### 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
<b>Self-Test Mode Characteristics</b>	
- 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
<b>Beacon includes a homer transmitter (if yes identify frequency of transmission)</b>	
-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 mechanism (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
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: \_\_\_\_\_

18<sup>th</sup> June 2007



Product Service

## 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	<input checked="" type="checkbox"/> Manufacturer	<input type="checkbox"/> Importer	
	<input type="checkbox"/> Distributor	<input type="checkbox"/> Agent	
Contact Name	Craig DUNCAN	Telephone	+61 (0) 2 9844 6666
Email	<a href="mailto:cduncan@gme.net.au">cduncan@gme.net.au</a>	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

No modifications were made to the test sample during testing.

### 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 and;

TUV Reference RM615377\_31

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

## 1.6 DEVIATIONS FROM THE STANDARD

Section 2.2: Vibration Test

In order to combine the Vibration Tests of RTCM Paper 76-2002 and ETSI EN 302 152-1 the test was performed in accordance with the following test plan (agreed by RTCM – R L Markle)

*EUT mounted in its normal orientation*

*Subject to the following sinusoidal vibration*

*Vertical Axis*

<i>4Hz to 10Hz</i>	<i>2.5mm Peak Amplitude</i>	<i>(5mm p-p)</i>
<i>10Hz to 15Hz</i>	<i>0.8 mm Peak Amplitude</i>	<i>(1.6mm p-p)</i>
<i>15Hz to 25Hz</i>	<i>0.4mm Peak Amplitude</i>	<i>(0.8mm p-p)</i>
<i>25Hz to 33Hz</i>	<i>0.2mm Peak Amplitude</i>	<i>(0.4mm p-p)</i>
<i>33Hz to 50Hz</i>	<i>0.1mm Peak Amplitude</i>	<i>(0.2mm p-p)</i>

*Sweep 4Hz – 50Hz at 15 minute/octave (~50 min in total)*

*During the above test, perform resonance search*

*If resonances detected perform a 2 hour endurance test at the frequency giving the highest magnification.*

*Repeat the above for each axis (3 axes in total)*

## 1.6 REPORT MODIFICATION RECORD

Issue 1 – First Issue

Issue 2 – To correct a typographical error



Product Service

## **SECTION 2**

### **TEST DETAILS**

Testing of the Standard Communications Pty Ltd MT410/MT410G  
in accordance with RTCM Paper 76 – 2002 / SC110-STD



**TABLE OF TEST RESULTS**

PARAMETER TO BE MEASURED	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T <sub>min</sub> (-20°C)	T <sub>amb</sub> (+23°C)	T <sub>max</sub> (+55°C)	
<b>1. INITIAL ALIVENESS TEST (A1.0)</b>						Section 2.1
• Carrier Frequency	406.028±0.001	MHz		406.02820		
• Power Output	35 – 39	dBm		31.01*		*See special conditions for Output Power
<b>2. VIBRATION TEST (A3.0)</b>						Section 2.2
• Exterior Mechanical Inspection	No damage	✓		✓		
• Aliveness Test	Successful self-test	✓		✓		
• Activation	No activation during test	✓		✓		
<b>3 BUMP TEST (A4.0)</b>						Section 2.3
• Exterior Mechanical Inspection	No damage	✓		✓		
• Aliveness Test	Successful self-test	✓		✓		
• Activation	No activation during test	✓		✓		
<b>4. SALT FOG TEST (A5.0)</b>						Section 2.4
• Exterior Mechanical Inspection	No damage	✓		✓		
• Aliveness Test	Successful self-test	✓		✓		



**TABLE OF TEST RESULTS**

PARAMETER TO BE MEASURED	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T <sub>min</sub> (-20°C)	T <sub>amb</sub> (+23°C)	T <sub>max</sub> (+55°C)	
<b>5. DROP TEST (A6.0)</b>						Section 2.5
• Exterior Mechanical Inspection	No damage	✓	✓			Pre-condition as per Clause A6.0
• Aliveness Test	Successful self-test	✓	✓			-40°C
• Activation	No Activation during test	✓	✓			
<b>6. LEAKAGE AND IMMERSION TEST (A7.0)</b>						Section 2.6
• Leakage & Immersion						
- Interior Inspection	No water	✓		✓		
- Aliveness Test	Successful self-test	✓		✓		
<b>7. SPURIOUS EMISSIONS TEST (A8.0)</b>						Section 2.7
• 406 MHz	Figure 2-1	✓	✓	✓	✓	
• 121.5 MHz	Figure 2-5	✓	✓	✓	✓	
<b>8. COSPAS-SARSAT TYPE APPROVAL (A9.0)</b>	C-S Certificate					Section 2.8



**TABLE OF TEST RESULTS**

PARAMETER TO BE MEASURED	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T <sub>min</sub> (-20°C)	T <sub>amb</sub> (+23°C)	T <sub>max</sub> (+55°C)	
<b>9. OPERATIONAL LIFE AND STROBE LIGHT (A 10.1)</b>						Section 2.9
Operational Life	Time to first Failure	Hours	30.12			Details: Page 95
<b>Frequency</b>						
• Nominal Carrier	406.028±0.001	MHz	Min: 406.027990 Max: 406.02800			
• Short-term stability	0.002	Parts/million in 100ms	Min: 2.509x10 <sup>-10</sup> Max: 1.907x10 <sup>-9</sup>			
<b>Medium-term stability</b>						
• Mean slope	0.001	Parts/million/min	Min: -1.962x10 <sup>-10</sup> Max: 2.167x10 <sup>-10</sup>			
• Residual variation	0.003	Parts/million	Min: 3.698x10 <sup>-10</sup> Max: 1.353x10 <sup>-9</sup>			
RF output power	35 – 39	dBm	Min: 29.53* Max: 31.29*			*See special conditions for Output Power
Strobe flash rate	20 – 30	/min	-			Not applicable
Auxiliary PEIRP	14 - 20	dBm	Max: 14.38 Min: 14.05			
<b>10. SELF-TEST (A 10.2)</b>						Section 2.10
• RF pulse duration	0.444 sec or 0.525 sec	✓	✓	✓	✓	
• Frame synchronisation pattern	0 1101 0000	✓	✓	✓	✓	
• Number of RF bursts	1 – burst	✓	✓	✓	✓	
- Beacon 15 Hex ID	Must be provided by self-test burst	✓	✓	✓	✓	
- 121.5 MHz transmission	1 sec / 3 sweeps	✓	✓	✓	✓	
<b>11. BUOYANCY TEST (Category 1 only) (A11.0)</b>						Section 2.11
• Buoyancy	Floats	✓		✓		
• Reserve Buoyancy	>5%	%		16.11		



**TABLE OF TEST RESULTS**

PARAMETER TO BE MEASURED	RANGE OF SPECIFICATION	UNITS	TEST RESULTS			COMMENTS
			T <sub>min</sub> (-20°C)	T <sub>amb</sub> (+23°C)	T <sub>max</sub> (+55°C)	
<b>12. AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST (A12.0)</b>						Section 2.12
• Carrier frequency	121.5 ± 0.006	MHz	121.398198	121.400361	121.400746	Homing frequency offset to 121.4 MHz
• Transmission Duty Cycle	Continuous	%	96.20	95.90	95.88	
Modulation						
• Frequency	700Hz within range of 300 – 1600 Hz	Hz	952.92	950.88	947.54	
• Duty cycle	33 – 55	%	42.40	42.98	43.13	
• Factor	0.85 – 1.0	✓	0.96	0.96	0.96	
• Sweep repetition rate	2 – 4	Hz	3.46	3.43	3.22	
• Frequency Coherence		✓	✓	✓	✓	
PEIRP (Radiated)						Section 2.12
• Antenna (Radiated) Pattern						Passes within Measurement Uncertainty
- Pattern	Omnidirectional	✓		✓		
-Polarization	Vertical	✓		✓		
-VSWR	1.5 : 1	✓		✓		



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**2.1 INITIAL ALIVENESS TEST**

**2.1.1 Specification Reference**

RTCM Paper 76 (A 1.0)

**2.1.2 Test Results**

	Result
Nominal Frequency	406.02820 MHz
Output Power	31.01* dBm

\* See special conditions for Output Power

**Beacon Test Report**

3EFC0001D6FFBFF

**Organization:** TUV Product Service Ltd  
**Tested By:** Emergency Beacons Dept.  
**Date:** 30-Aug-06 12:44:24 PM  
**Tester Model/Serial No./File Name:** BT100S/1025/mt410-1  
**Tester Cal Due Date:** Nov 10, 2006  
**Tester Temperature:** 26°C

**PASS**       **FAIL**      **INITIALS:** \_\_\_\_\_

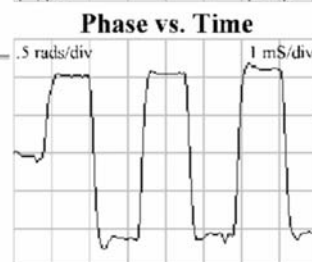
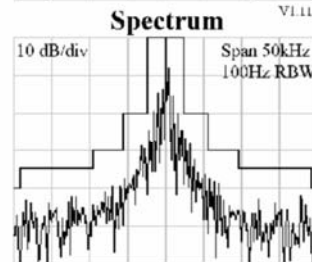
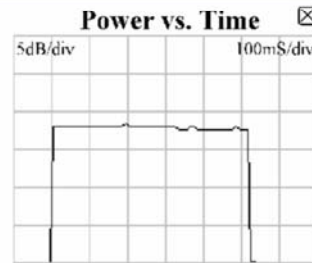
Notes: Add text comments here.

**15 Hex ID:** 3EFC0001D6FFBFF  
**Full Hex:** FFFE2F9F7E0000EB7FDFFA0334F783E0F66C  
**Burst Mode:** Normal Mode (Long)  
**Protocol:** Standard Test Protocol  
**Country 503:** Australia  
**Bits 41 - 64:** 235

**Position Source:** Internal GPS  
**Auxiliary Radio:** 121.5 MHz  
**Bits 107-110:** Default  
**Latitude:** \* \* \* \* \*  
**Longitude:** \* \* \* \* \*

**406 MHz Measurements**  
**406 Frequency (INT REF):** 406.0282 MHz  
**406 Power (INT ANT):** 48%  
**Power Rise Time:** : < 5 ms  
**Phase Deviation:** -1.13 +1.04 radians  
**Modulation Rise Time:** 209 uS  
**Modulation Fall Time:** 188 uS  
**Modulation Symmetry:** 1.2%  
**Modulation Bit Rate:** 399.7 bps  
**CW Preamble:** 159.8 ms

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Beacon Test Report - Initial Functional Test



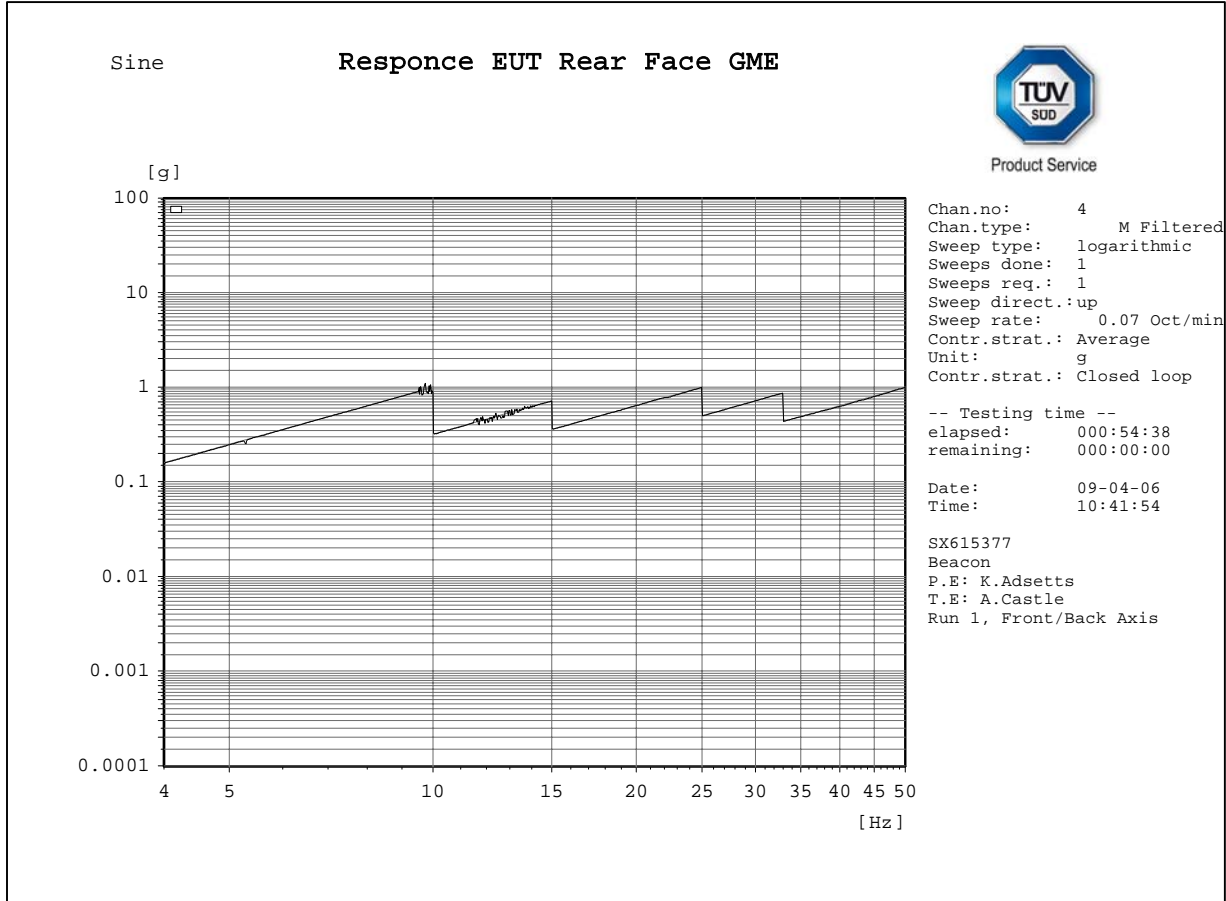
Product Service

2.2 VIBRATION TEST

2.2.1 Specification Reference

RTCM Paper 76 (A 3.0)

2.2.2 Vibration Plots



Plot showing responses – Front / Back Axis

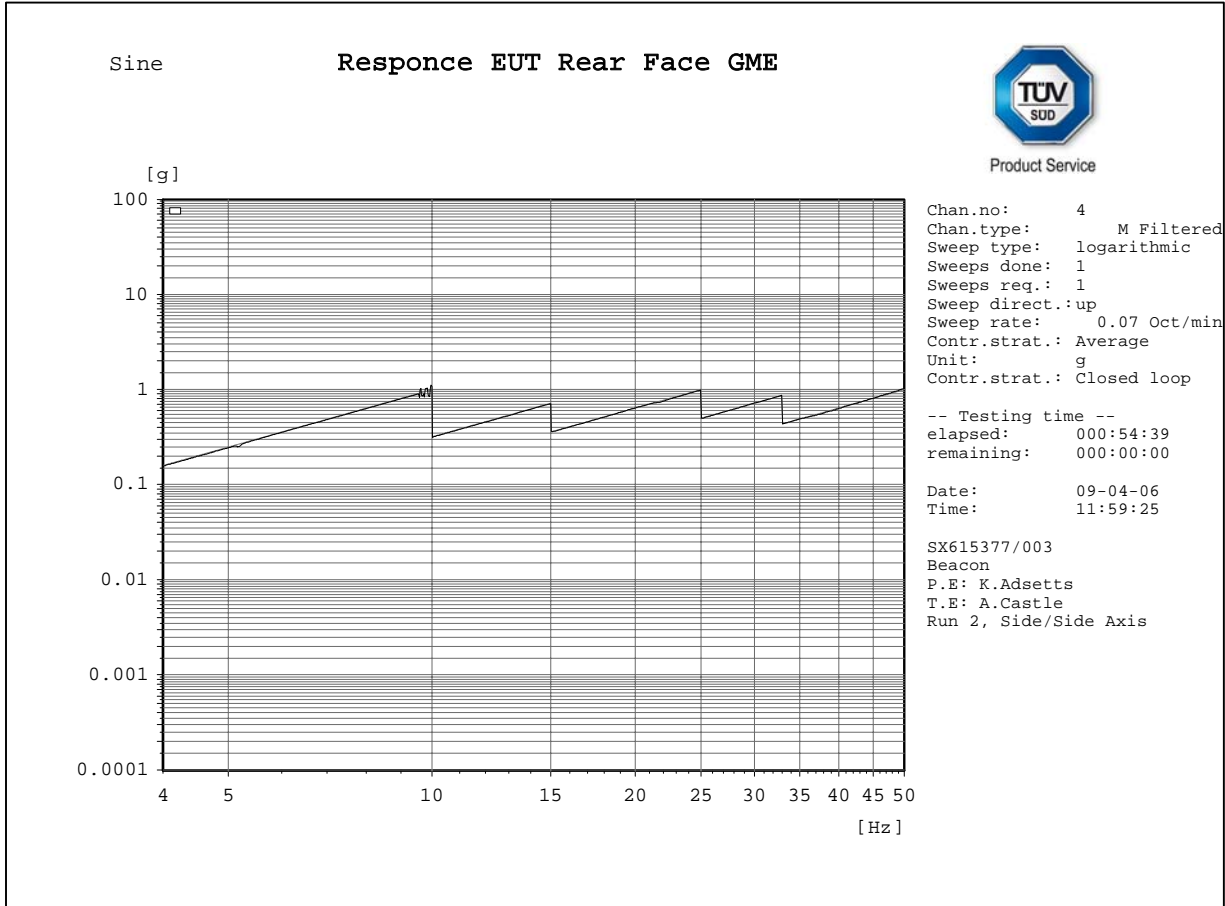




Product Service

## 2.2 VIBRATION TEST

### 2.2.2 Vibration Plots



C:\VcpNT\Daten\m+p\GPS Antennas\Resonance Search 15 min per octave 004.rsn

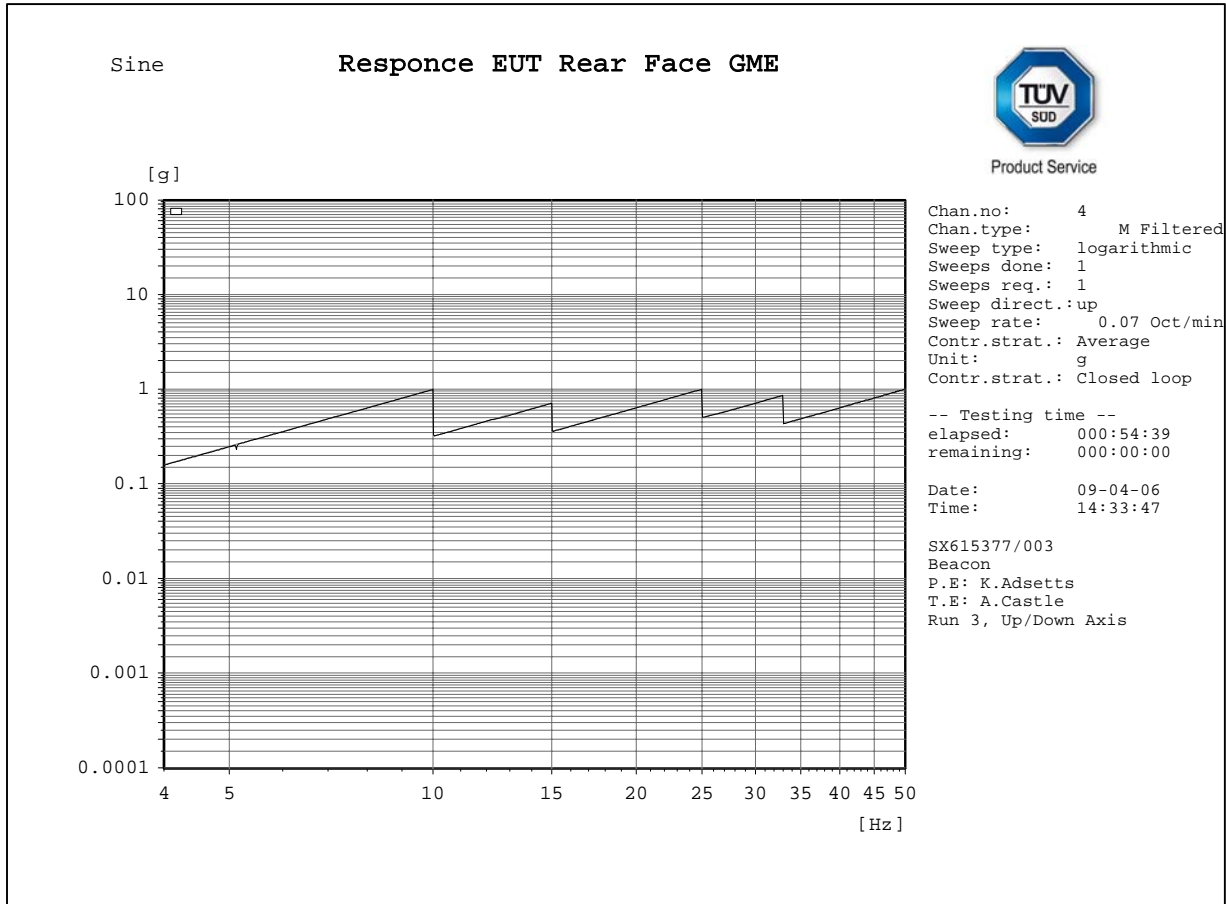
Plot showing responses – Side / Side Axis



Product Service

2.2 VIBRATION TEST

2.2.2 Vibration Plots



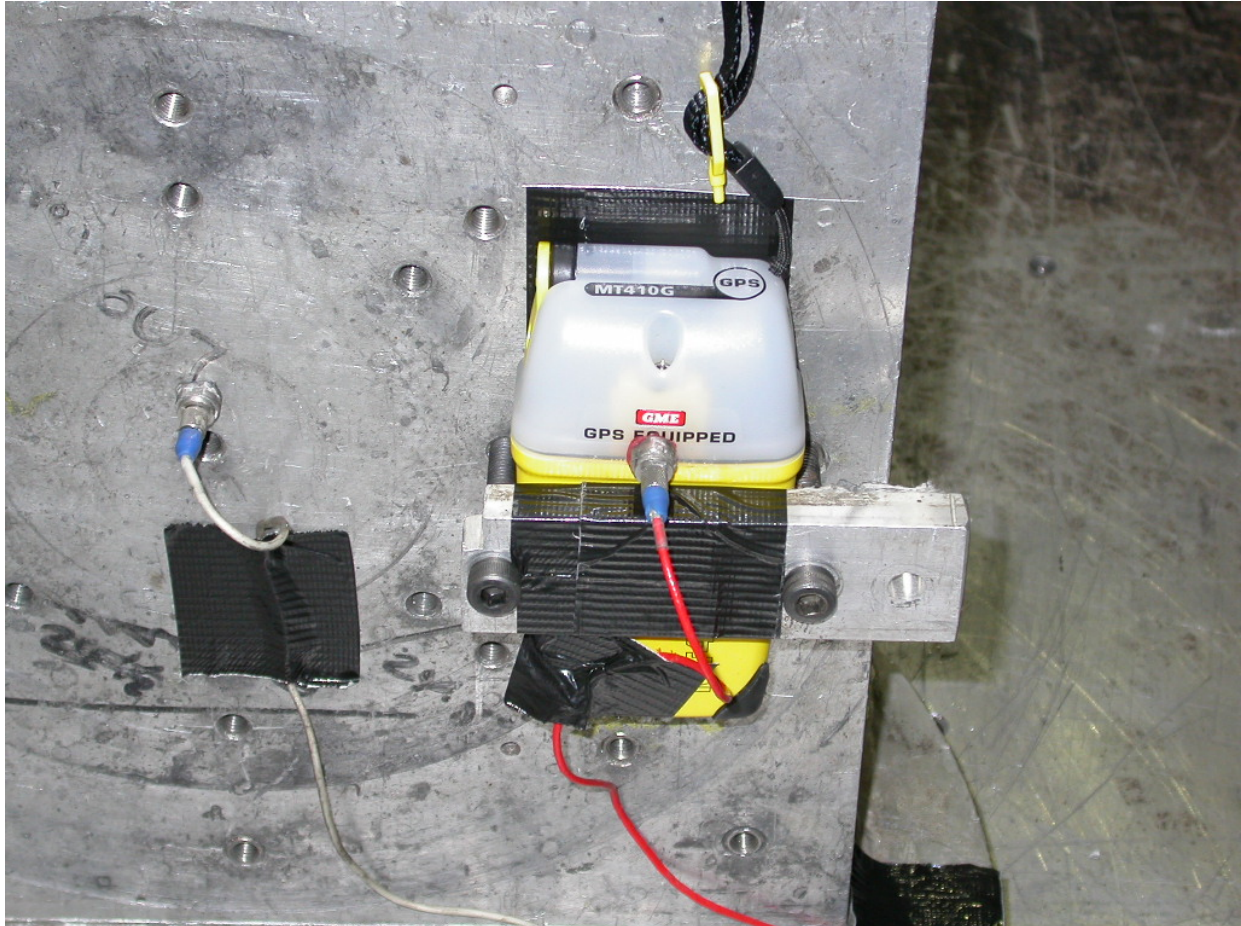
C:\VcpNT\Daten\m+p\GPS Antennas\Resonance Search 15 min per octave 006.rsn

Plot showing responses – Vertical Axis



## 2.2 VIBRATION TEST

### 2.2.3 Set-up Photographs



Photographs showing EUT mounted on Vibration machine



Product Service

2.2 VIBRATION TEST

2.2.4 Test Results

**Beacon Test Report**

3EFC0001D6FFBFF

Organization: TUV Product Service Ltd  
 Tested By: Emergency Beacons Dept.  
 Date: 04-Sep-06 10:49:35 AM  
 Tester Model/Serial No./File Name: BT100S/1025/std com-10  
 Tester Cal Due Date: Nov 10, 2006  
 Tester Temperature: 25°C

PASS       FAIL      INITIALS: \_\_\_\_\_

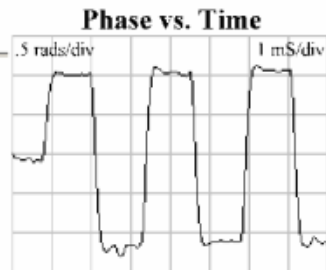
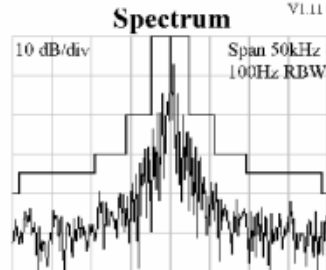
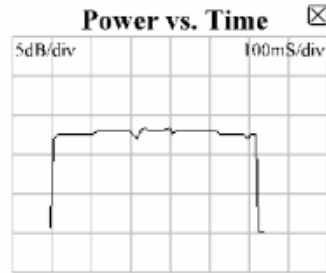
Notes: Add text comments here.

15 Hex ID: 3EFC0001D6FFBFF  
 Full Hex: FFFE2F9F7E0000EB7FDFFA0334F783E0F66C  
 Burst Mode: Normal Mode (Long)  
 Protocol: Standard Test Protocol  
 Country 503: Australia  
 Bits 41 - 64: 235

Position Source: Internal GPS  
 Auxiliary Radio: 121.5 MHz  
 Bits 107-110: Default  
 Latitude: \* \* \* \* \*  
 Longitude: \* \* \* \* \*

406 MHz Measurements  
 406 Frequency (INT REF): 406.0282 MHz  
 406 Power (INT ANT): 28%  
 Power Rise Time: < 5 ms  
 Phase Deviation: -1.2 +1.03 radians  
 Modulation Rise Time: 209 uS  
 Modulation Fall Time: 198 uS  
 Modulation Symmetry: 0.8%  
 Modulation Bit Rate: 399.5 bps  
 CW Preamble: 157.4 ms

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Beacon Test Report following Vibration Test (Back/Front Axis)



Product Service

2.2 VIBRATION TEST

2.2.4 Test Results

**Beacon Test Report**

3EFC0001D6FFBFF

**Organization:** TUV Product Service Ltd  
**Tested By:** Emergency Beacons Dept.  
**Date:** 04-Sep-06 12:02:17 PM  
**Tester Model/Serial No./File Name:** BT100S/1025/sat com-4  
**Tester Cal Due Date:** Nov 10, 2006  
**Tester Temperature:** 28°C

**PASS**       **FAIL**      **INITIALS:** \_\_\_\_\_

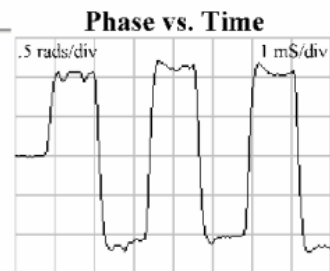
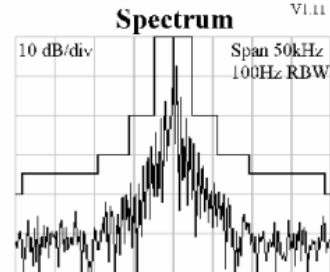
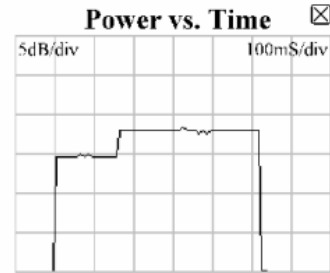
Notes: Add text comments here.

**15 Hex ID:** 3EFC0001D6FFBFF  
**Full Hex:** FFFE2F9F7E0000EB7FDFFA0334F783E0F66C  
**Burst Mode:** Normal Mode (Long)  
**Protocol:** Standard Test Protocol  
**Country 503:** Australia  
**Bits 41 - 64:** 235

**Position Source:** Internal GPS  
**Auxiliary Radio:** 121.5 MHz  
**Bits 107-110:** Default  
**Latitude:** \* \*\*\*\* \* \*\*  
**Longitude:** \* \*\*\*\* \* \*\*

**406 MHz Measurements**  
**406 Frequency (INT REF):** 406.0282 MHz  
**406 Power (INT ANT):** 73%  
**Power Rise Time:** : > 5 ms  
**Phase Deviation:** -1.13 +1.12 radians  
**Modulation Rise Time:** 209 uS  
**Modulation Fall Time:** 198 uS  
**Modulation Symmetry:** 1.1%  
**Modulation Bit Rate:** 399.5 bps

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Beacon Test Report following Vibration Test (Side/side Axis)



Product Service

2.2 VIBRATION TEST

2.2.4 Test Results

**Beacon Test Report**

3EFC0001D6FFBFF

**Organization:** TUV Product Service Ltd  
**Tested By:** Emergency Beacons Dept.  
**Date:** 04-Sep-06 2:40:22 PM  
**Tester Model/Serial No./File Name:** BT100S/1025/std com-10  
**Tester Cal Due Date:** Nov 10, 2006  
**Tester Temperature:** 27°C

**PASS**       **FAIL**      **INITIALS:** \_\_\_\_\_

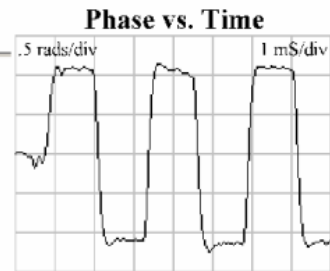
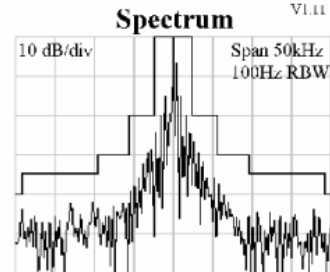
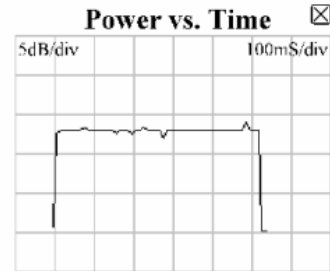
Notes: Add text comments here.

**15 Hex ID:** 3EFC0001D6FFBFF  
**Full Hex:** FFFE2F9F7E0000EB7FDFFA0334F783E0F66C  
**Burst Mode:** Normal Mode (Long)  
**Protocol:** Standard Test Protocol  
**Country 503:** Australia  
**Bits 41 - 64:** 235

**Position Source:** Internal GPS  
**Auxiliary Radio:** 121.5 MHz  
**Bits 107-110:** Default  
**Latitude:** \* \*\*\*\* \*  
**Longitude:** \* \*\*\*\* \*

**406 MHz Measurements**  
**406 Frequency (INT REF):** 406.0282 MHz  
**406 Power (INT ANT):** 29%  
**Power Rise Time:** : < 5 ms  
**Phase Deviation:** -1.09 +1.06 radians  
**Modulation Rise Time:** 188 uS  
**Modulation Fall Time:** 209 uS  
**Modulation Symmetry:** 1.2%  
**Modulation Bit Rate:** 399.7 bps  
**CW Preamble:** 159.2 ms

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Beacon Test Report following Vibration Test (Vertical Axis)

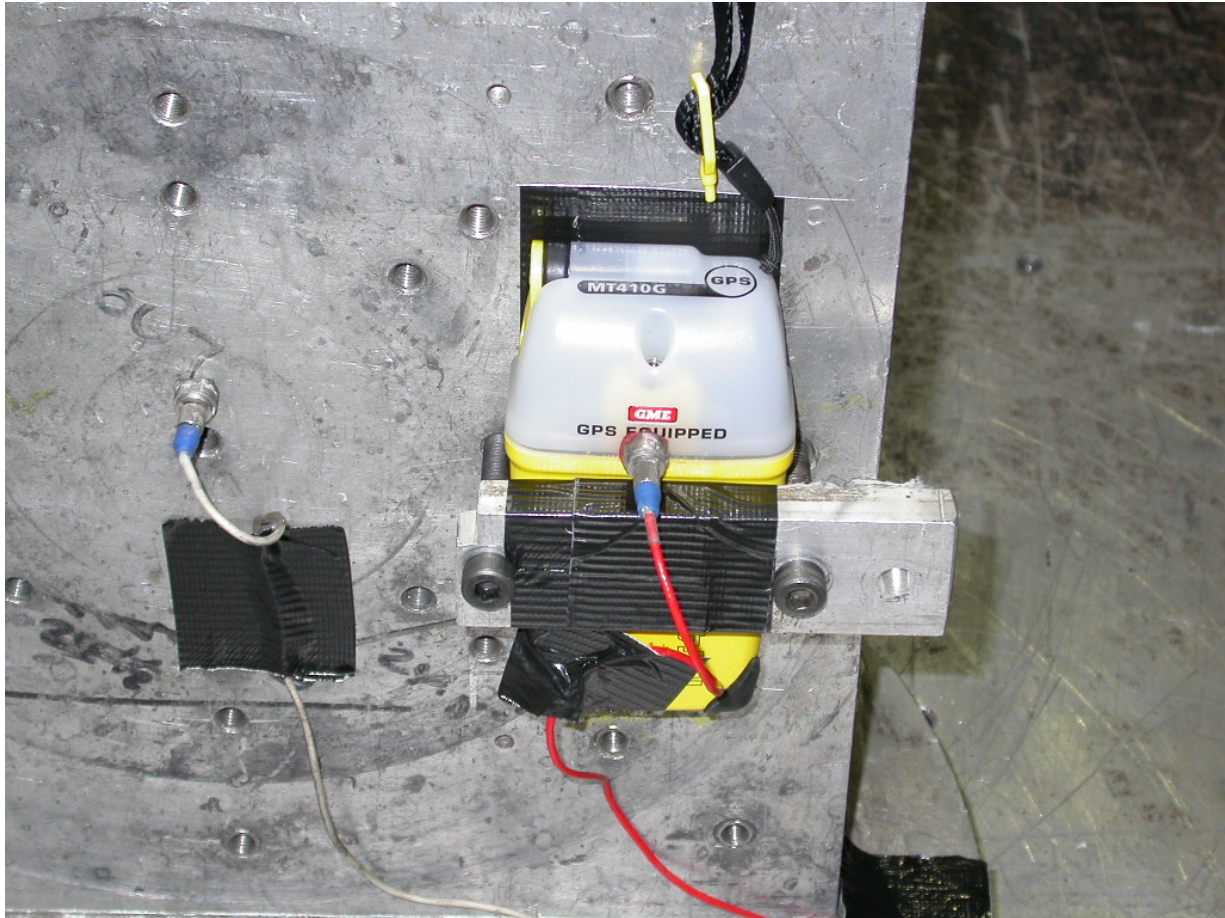


**2.3 RUGGEDNESS TEST (BUMPS)**

**2.3.1 Specification Reference**

RTCM Paper 76 (A 6.0)

**2.3.2 Set-up Photographs**



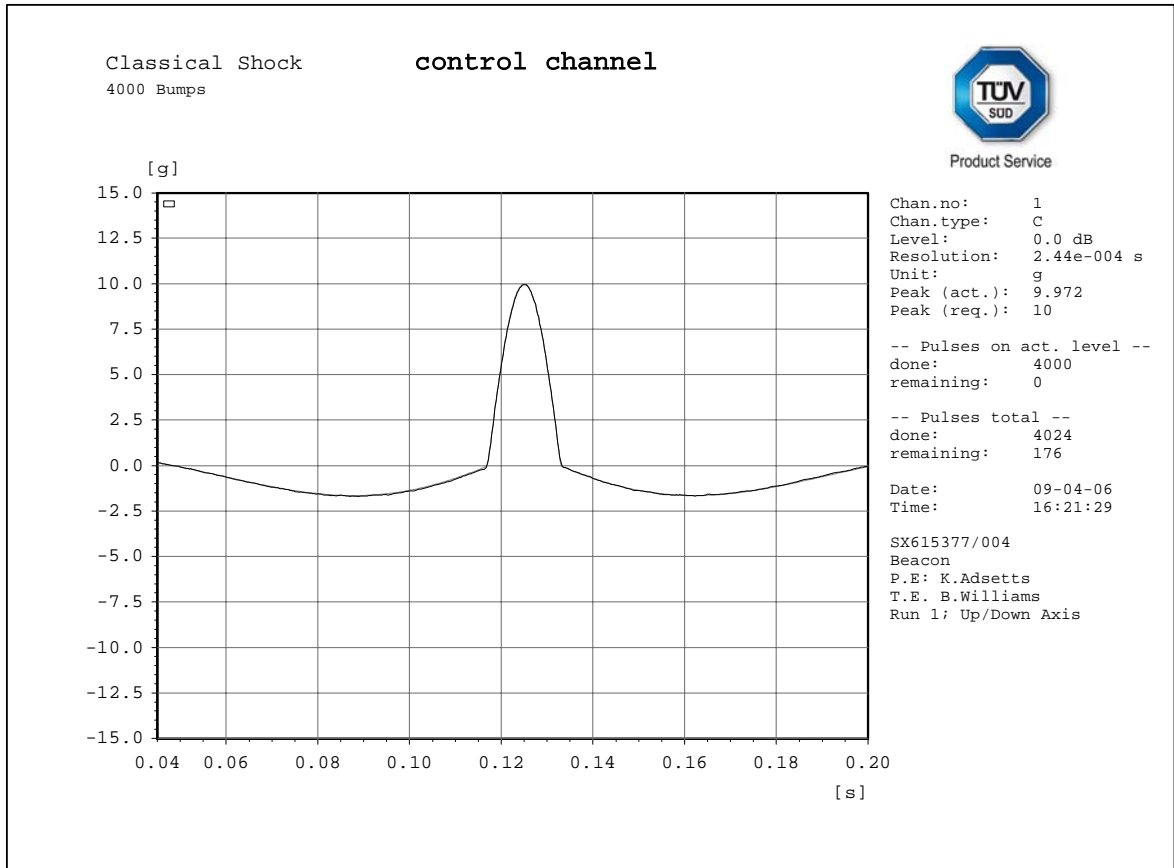
Photograph showing Ruggedness Test Set-up



Product Service

### 2.3 RUGGEDNESS TEST (BUMPS)

#### 2.3.3 Test Results



C:\VcpNT\Daten\m+p\GPS Antennas\10q16ms HS 003.rcs

Plot showing Control Channel for the Ruggedness Test





Product Service

2.3 RUGGEDNESS TEST (BUMPS)

2.3.3 Test Results

**Beacon Test Report**

3EFC0001D6FFBFF

**Organization:** TUV Product Service Ltd  
**Tested By:** Emergency Beacons Dept.  
**Date:** 04-Sep-06 4:46:38 PM  
**Tester Model/Serial No./File Name:** BT100S/1025/std com-1  
**Tester Cal Due Date:** Nov 10, 2006  
**Tester Temperature:** 29°C

**PASS**       **FAIL**      **INITIALS:** \_\_\_\_\_

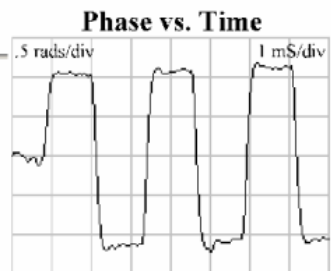
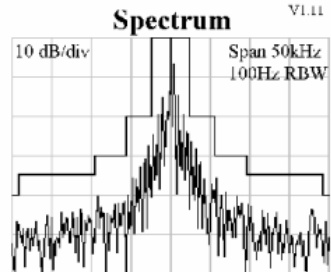
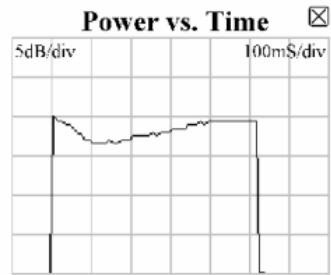
Notes: Add text comments here.

**15 Hex ID:** 3EFC0001D6FFBFF  
**Full Hex:** FFFE2F9F7E0000EB7FDFFA0334F783E0F66C  
**Burst Mode:** Normal Mode (Long)  
**Protocol:** Standard Test Protocol  
**Country 503:** Australia  
**Bits 41 - 64:** 235

**Position Source:** Internal GPS  
**Auxiliary Radio:** 121.5 MHz  
**Bits 107-110:** Default  
**Latitude:** \* \* \* \* \*  
**Longitude:** \* \* \* \* \*

**406 MHz Measurements**  
**406 Frequency (INT REF):** 406.0282 MHz  
**406 Power (INT ANT):** 48%  
**Power Rise Time:** < 5 ms  
**Phase Deviation:** -1.13 +1.06 radians  
**Modulation Rise Time:** 209 uS  
**Modulation Fall Time:** 198 uS  
**Modulation Symmetry:** 1.2%  
**Modulation Bit Rate:** 399.7 bps  
**CW Preamble:** 160.6 ms

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Beacon Test Report following Ruggedness Test



**2.4 SALT FOG TEST**

**2.4.1 Specification Reference**

RTCM Paper 76 (A 5.0)

**2.4.2 Test Photographs**



Photograph of EUT in the Salt Spray Chamber



2.4 SALT FOG TEST

2.4.2 Test Photographs



Photographs of EUT prior to the test



2.4 SALT FOG TEST

2.4.2 Test Photographs



Photographs of EUT following the test



Product Service

2.4 SALT FOG TEST

2.4.2 Test Results

**Beacon Test Report**

3EFC0001D6FFBFF

Organization: TUV Product Service Ltd  
 Tested By: Emergency Beacons Dept.  
 Date: 12-Sep-06 9:53:20 AM  
 Tester Model/Serial No./File Name: BT100S/1025/std coms salt-4  
 Tester Cal Due Date: Nov 10, 2006  
 Tester Temperature: 25°C

PASS       FAIL      INITIALS: \_\_\_\_\_

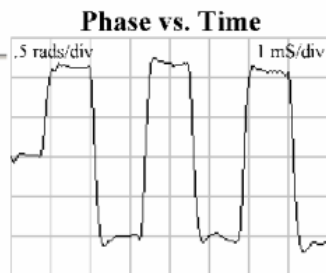
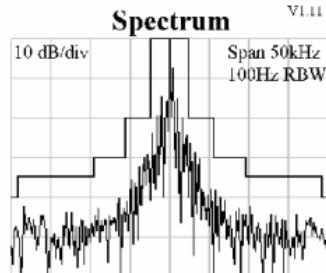
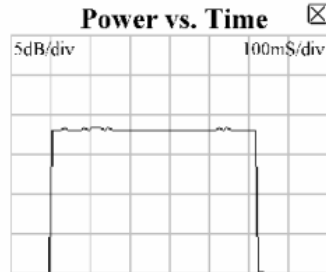
Notes: Add text comments here.

15 Hex ID: 3EFC0001D6FFBFF  
 Full Hex: FFFE2F9F7E0000EB7FDFFA0334F783E0F66C  
 Burst Mode: Normal Mode (Long)  
 Protocol: Standard Test Protocol  
 Country 503: Australia  
 Bits 41 - 64: 235

Position Source: Internal GPS  
 Auxiliary Radio: 121.5 MHz  
 Bits 107-110: Default  
 Latitude: \* \* \* \* \*  
 Longitude: \* \* \* \* \*

406 MHz Measurements  
 406 Frequency (INT REF): 406.0282 MHz  
 406 Power (INT ANT): 63%  
 Power Rise Time: < 5 ms  
 Phase Deviation: -1.01 +1.17 radians  
 Modulation Rise Time: 198 uS  
 Modulation Fall Time: 188 uS  
 Modulation Symmetry: 1.2%  
 Modulation Bit Rate: 399.7 bps  
 CW Preamble: 159.9 ms

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Beacon Test Report following the Salt Fog Test



Product Service

**2.5 DROP TEST (On Hard Surface)**

**2.5.1 Specification Reference**

RTCM Paper 76 (A 6.0)

**2.5.2 Test Results**

The EUT showed no sign of damage or deterioration following the test and did not activate during the test.

**Beacon Test Report**

3EFC0001D6FFBFF

**Organization:** TUV Product Service Ltd  
**Tested By:** Emergency Beacons Dept.  
**Date:** 13-Sep-06 9:57:05 AM  
**Tester Model/Serial No./File Name:** BT100S/1025/std com drop-11  
**Tester Cal Due Date:** Nov 10, 2006  
**Tester Temperature:** 25°C

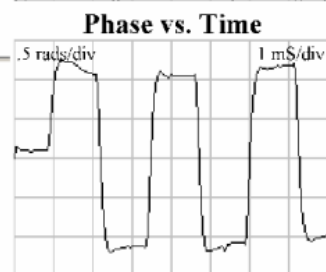
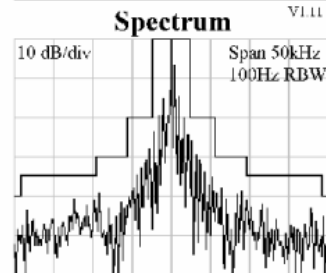
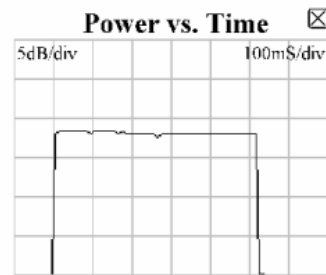
**PASS**       **FAIL**      **INITIALS:** \_\_\_\_\_

Notes: Add text comments here.

**15 Hex ID:** 3EFC0001D6FFBFF  
**Full Hex:** FFFE2F9F7E0000EB7FDFFA0334F783E0F66C  
**Burst Mode:** Normal Mode (Long)  
**Protocol:** Standard Test Protocol  
**Country 503:** Australia  
**Bits 41 - 64:** 235  
  
**Position Source:** Internal GPS  
**Auxiliary Radio:** 121.5 MHz  
**Bits 107-110:** Default  
**Latitude:** \* \* \* \* \*  
**Longitude:** \* \* \* \* \*

**406 MHz Measurements**  
**406 Frequency (INT REF):** 406.0282 MHz  
**406 Power (INT ANT):** 87%  
**Power Rise Time:** : < 5 ms  
**Phase Deviation:** -1.14 +1.04 radians  
**Modulation Rise Time:** 198 uS  
**Modulation Fall Time:** 395 uS  
**Modulation Symmetry:** 1.2%  
**Modulation Bit Rate:** 399.3 bps  
**CW Preamble:** 159.9 ms

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.



Beacon Test Report following Drop test on to hard surface



Product Service

**2.6 LEAKAGE AND IMMERSION TEST**

**2.6.1 Specification Reference**

RTCM Paper 76: A7.0

**2.6.2 Test Results**

The EUT showed no sign of damage or deterioration following the test. There was no evidence of water ingress and the EUT did not activate during the test.

**Beacon Test Report**

3EFC0001D6FFBFF

**Organization:** TUV Product Service Ltd  
**Tested By:** Emergency Beacons Dept.  
**Date:** 15-Sep-06 2:44:55 PM  
**Tester Model/Serial No./File Name:** BT100S/1025/std com leakage-6  
**Tester Cal Due Date:** Nov 10, 2006  
**Tester Temperature:** 26°C

**PASS**       **FAIL**      **INITIALS:** \_\_\_\_\_

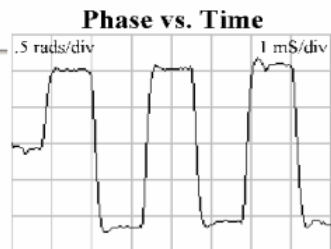
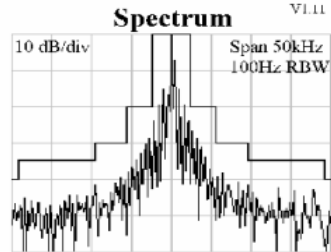
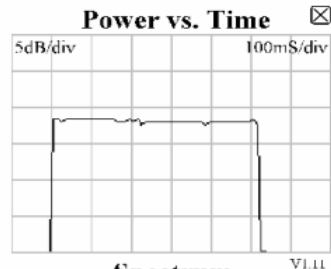
Notes: Add text comments here.

**15 Hex ID:** 3EFC0001D6FFBFF  
**Full Hex:** FFFE2F9F7E0000EB7FDFFA0334F783E0F66C  
**Burst Mode:** Normal Mode (Long)  
**Protocol:** Standard Test Protocol  
**Country 503:** Australia  
**Bits 41 - 64:** 235

**Position Source:** Internal GPS  
**Auxiliary Radio:** 121.5 MHz  
**Bits 107-110:** Default  
**Latitude:** \* \* \* \* \*  
**Longitude:** \* \* \* \* \*

**406 MHz Measurements**  
**406 Frequency (INT REF):** 406.0282 MHz  
**406 Power (INT ANT):** 65%  
**Power Rise Time:** < 5 ms  
**Phase Deviation:** -1.15 +1.02 radians  
**Modulation Rise Time:** 198 uS  
**Modulation Fall Time:** 198 uS  
**Modulation Symmetry:** 1.2%  
**Modulation Bit Rate:** 399.7 bps  
**CW Preamble:** 160.3 ms

DISCLAIMER: IN NO EVENT SHALL WS TECHNOLOGIES INC. OR ITS DISTRIBUTORS OR AGENTS BE LIABLE FOR ANY DAMAGES OR LOSSES INCURRED AS A RESULT OF THE USE OR FAILURE OF THIS MEASUREMENT EQUIPMENT.



Beacon Test Report following the Leakage and Immersion tests



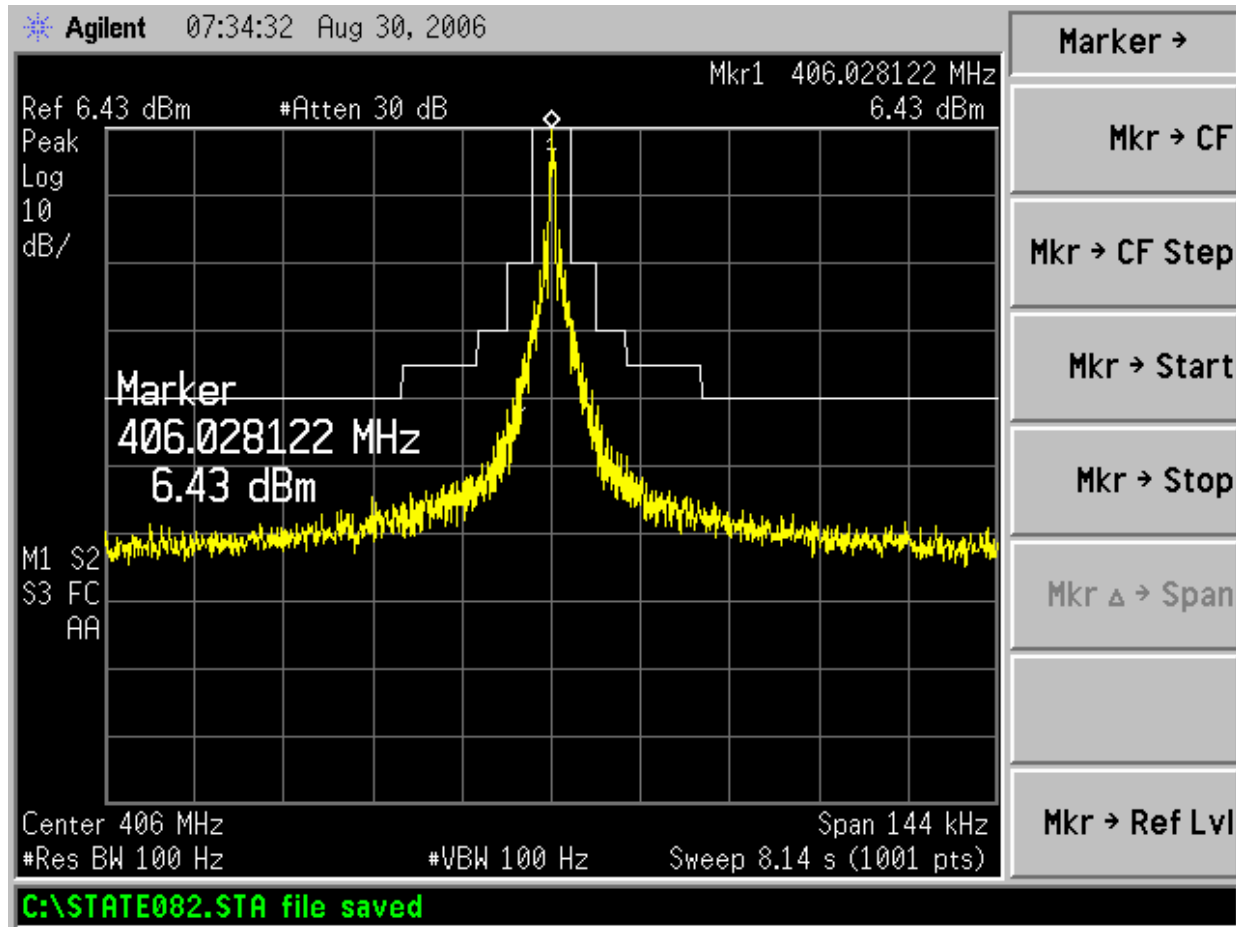
Product Service

**2.7 SPURIOUS EMISSIONS TEST**

**2.7.1 Specification Reference**

RTCM Paper 76 (A 8.0)

**2.7.2 Test Results (406MHz)**



Spurious Emissions Plot at Ambient Temperature

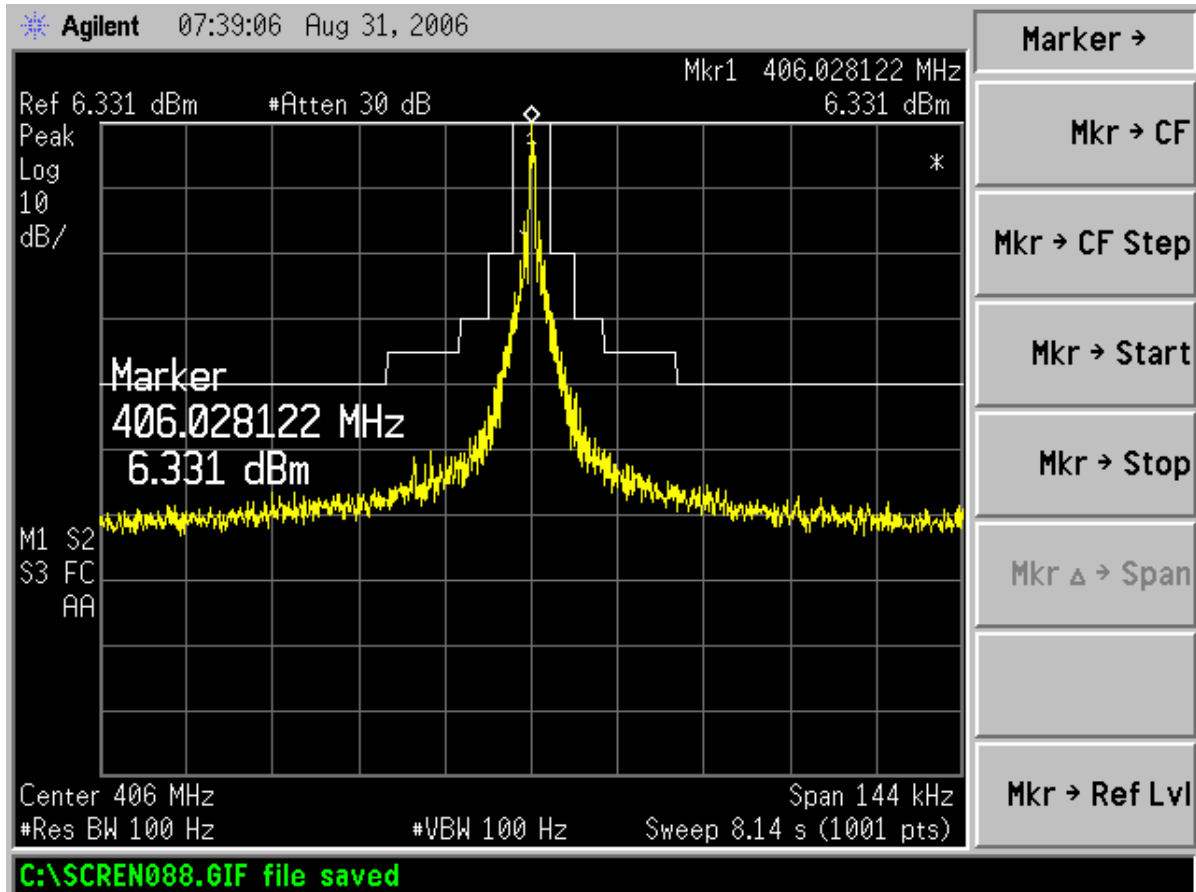




Product Service

2.7 SPURIOUS EMISSIONS TEST

2.7.2 Test Results (406MHz)



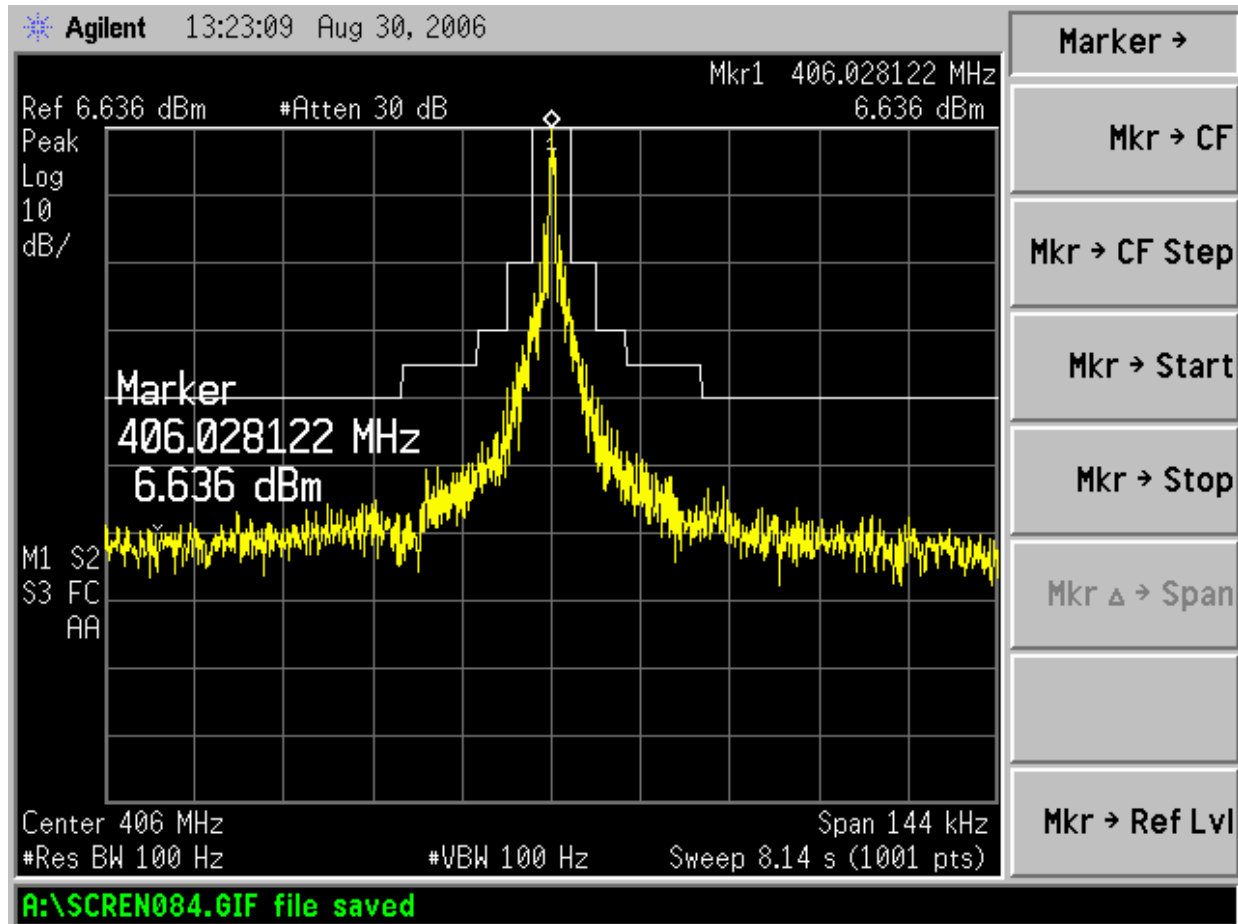
Spurious Emissions Plot at Maximum Temperature (+55°C)



Product Service

2.7 SPURIOUS EMISSIONS TEST

2.7.2 Test Results (406MHz)



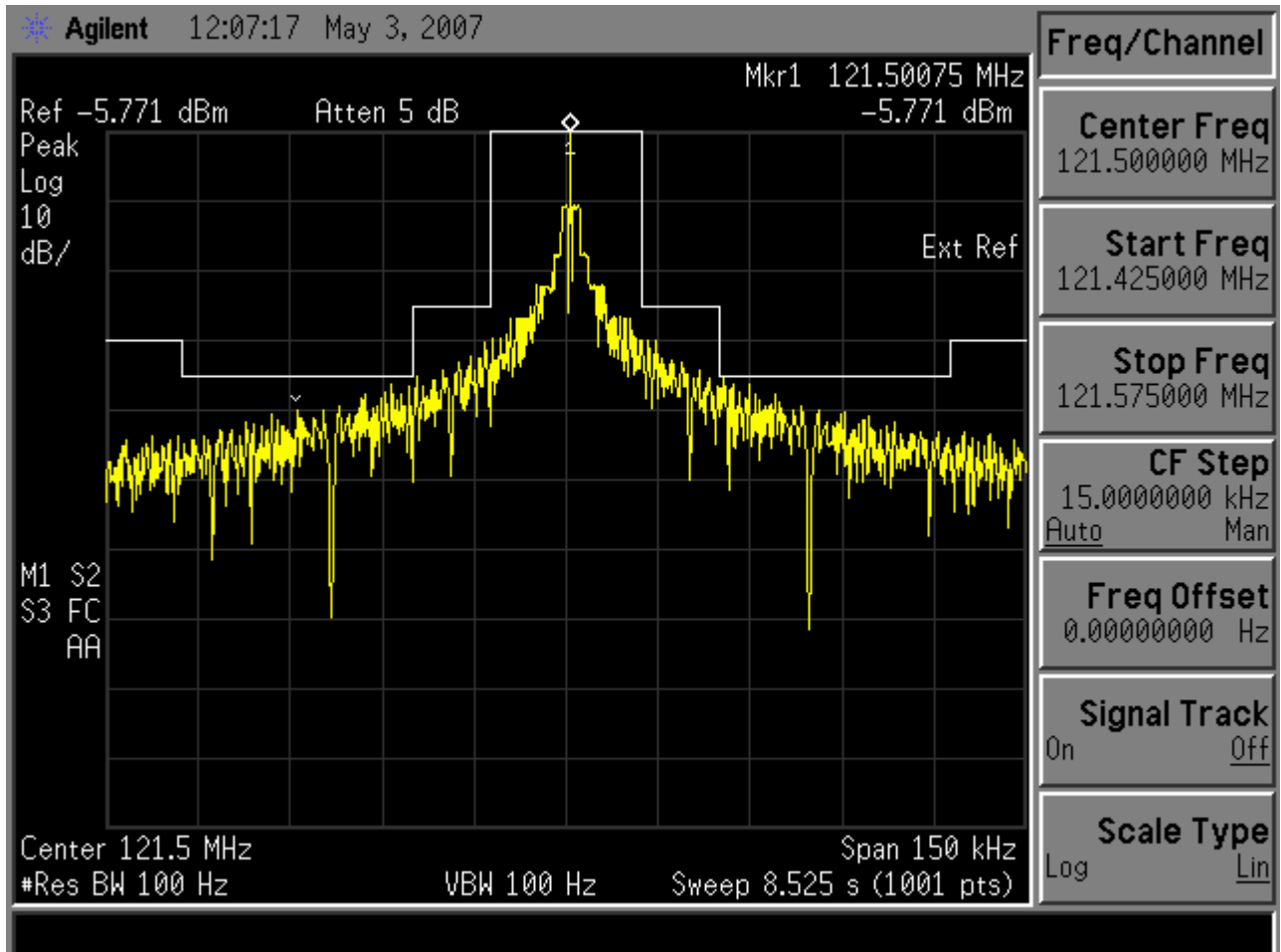
Spurious Emissions Plot at Minimum Temperature (-20°C)



Product Service

2.7 SPURIOUS EMISSIONS TEST

2.7.2 Test Results (121.5MHz)



Plot showing 121.5MHz Spurious Emissions at Ambient Temperature

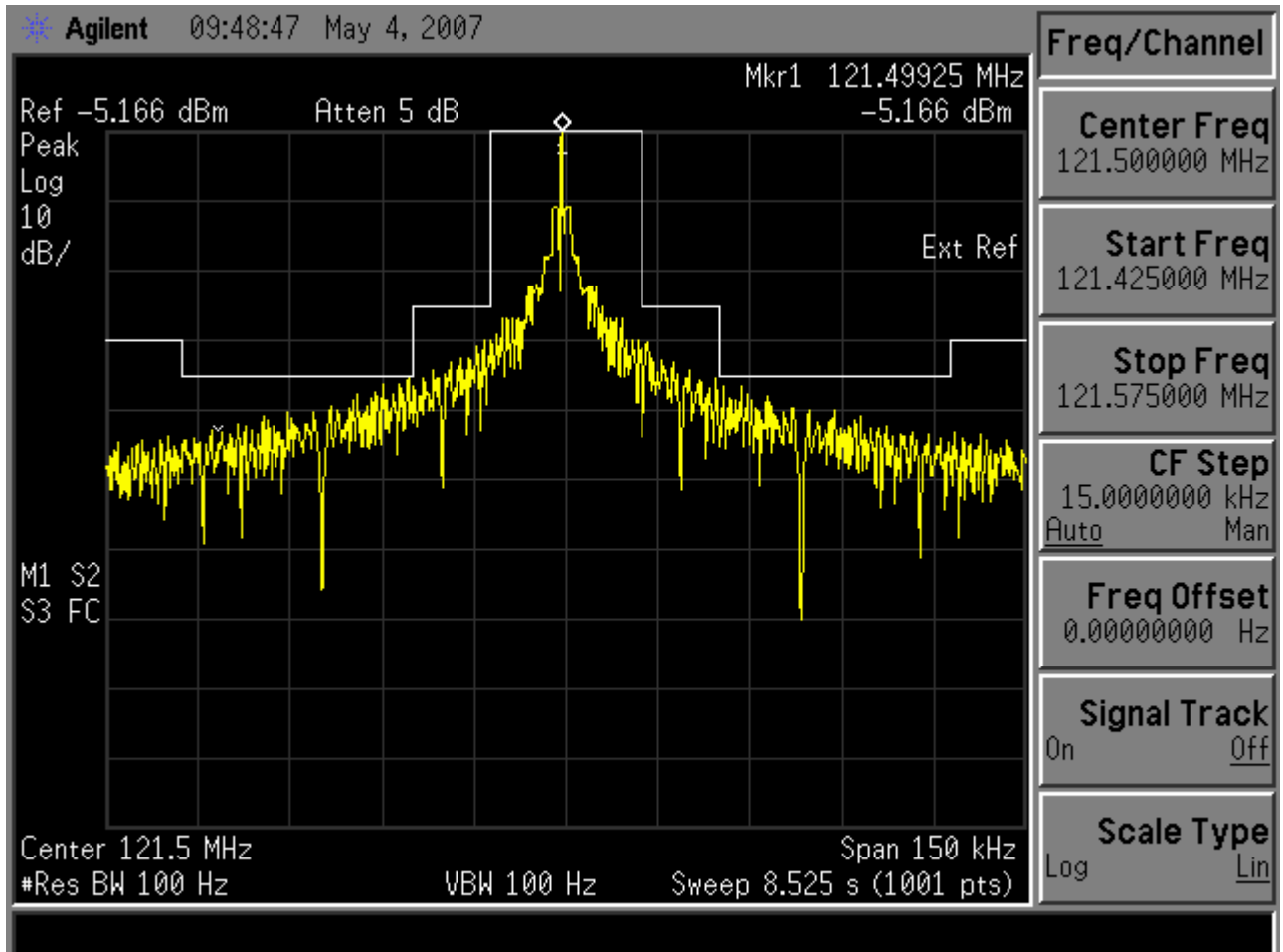
NB: Minimum clearance of 0.32dB found at +25.05 kHz (relative to carrier).



Product Service

2.7 SPURIOUS EMISSIONS TEST

2.7.2 Test Results (121.5MHz)



Plot showing 121.5MHz Spurious Emissions at High Temperature (+55°C)

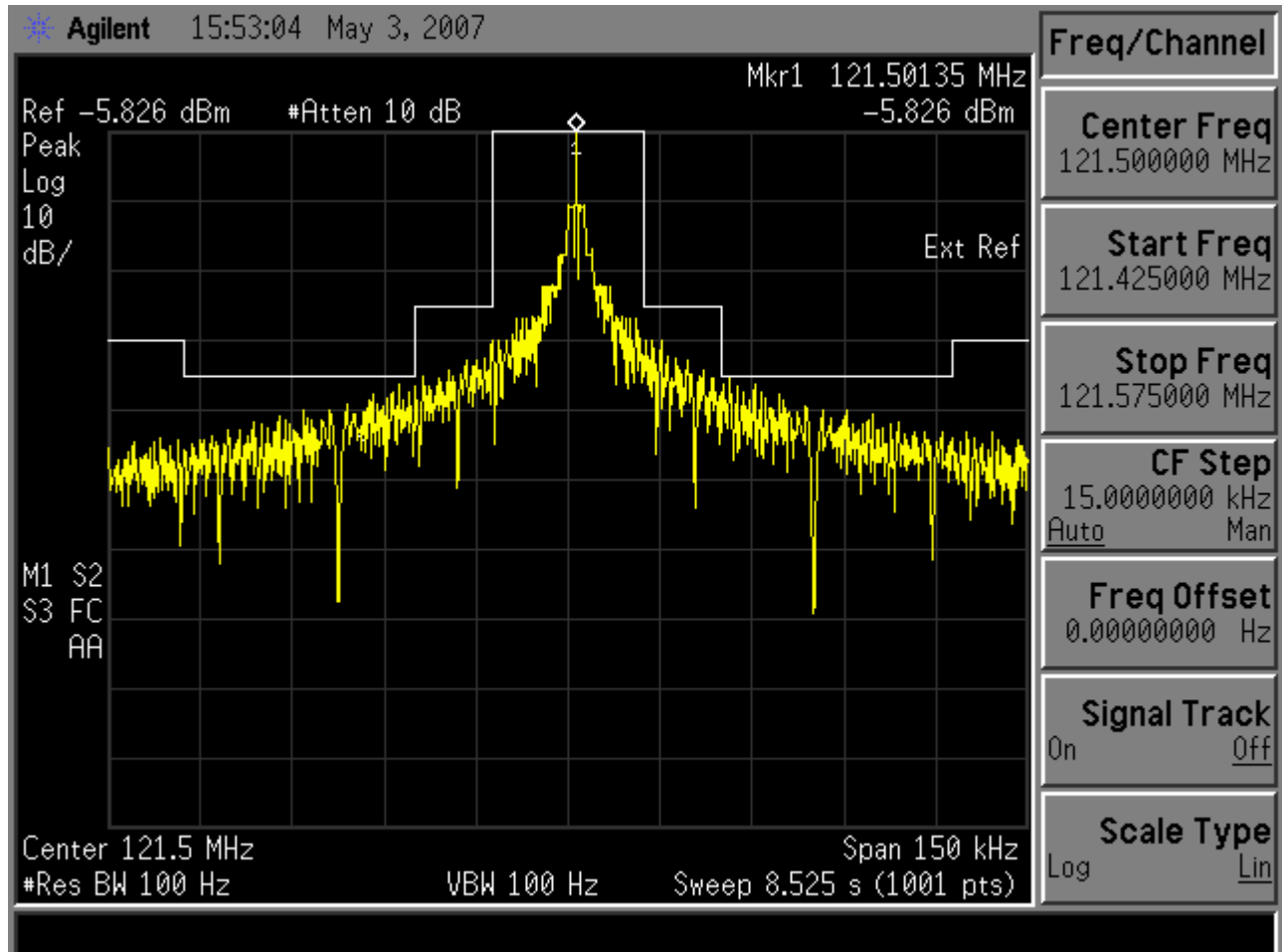
NB: Minimum clearance of 0.21dB found at -25.05 kHz (relative to carrier).



Product Service

2.7 SPURIOUS EMISSIONS TEST

2.7.2 Test Results (121.5MHz)



Plot showing 121.5MHz Spurious Emissions at Low Temperature (-20°C)

NB: Minimum clearance of 0.00dB found at +25.05 kHz (relative to carrier).



Product Service

**2.8 COSPAS-SARSAT TYPE APPROVAL**

**2.8.1 Specification Reference**

RTCM Paper 76 (A 9.0)

**2.8.2 Refer to C/S Certificate/report**



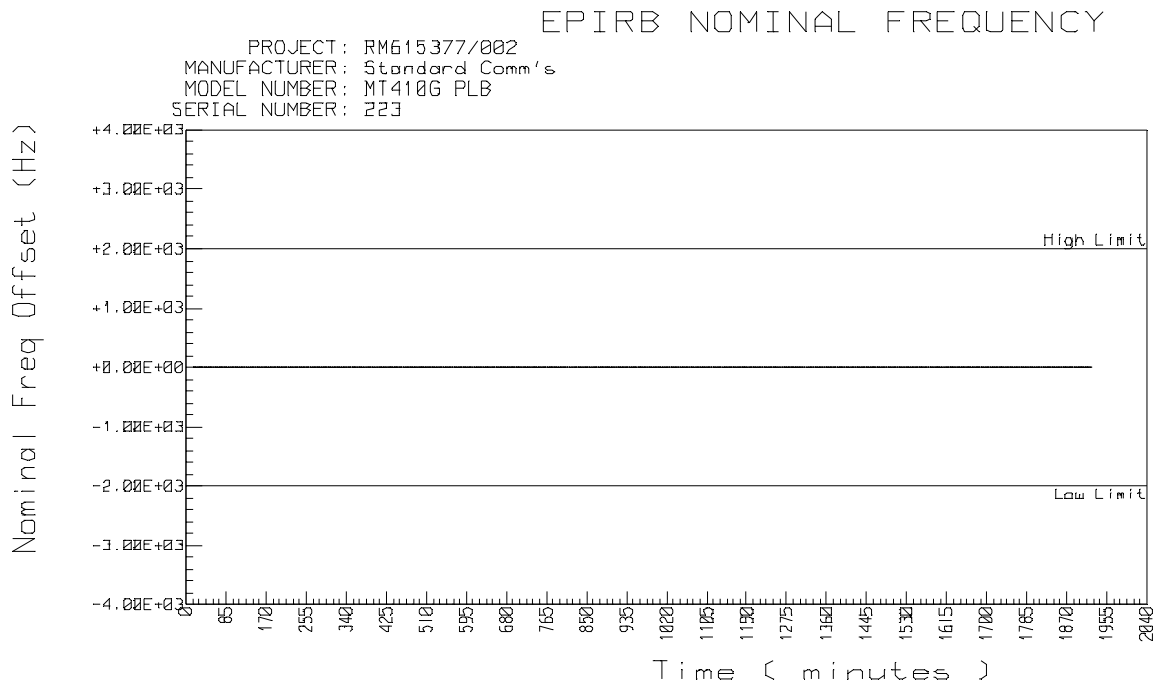
Product Service

**2.9 OPERATIONAL LIFE AND STROBE LIGHT**

**2.9.1 Specification Reference**

RTCM Paper 76: A 10.0

**2.9.2 Test Results**

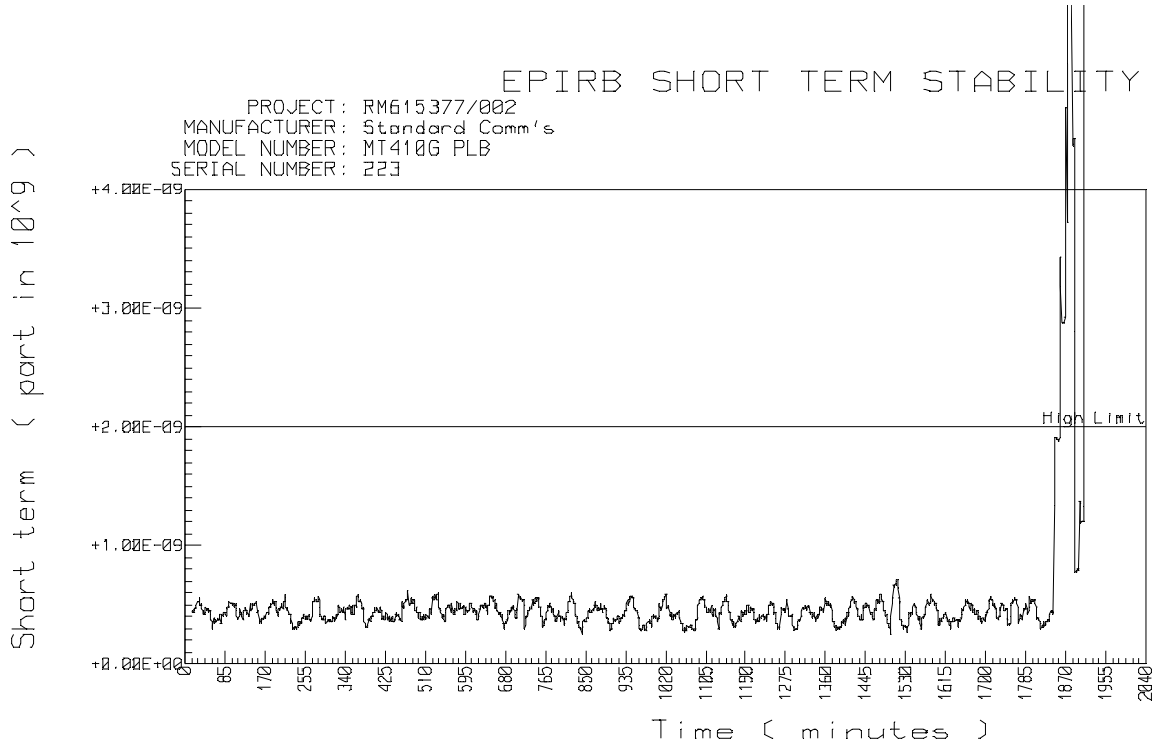


Operating Lifetime at Minimum Temperature - Nominal Frequency



2.9 OPERATIONAL LIFE AND STROBE LIGHT

2.9.2 Test Results



Operating Lifetime at Minimum Temperature - Short Term Stability

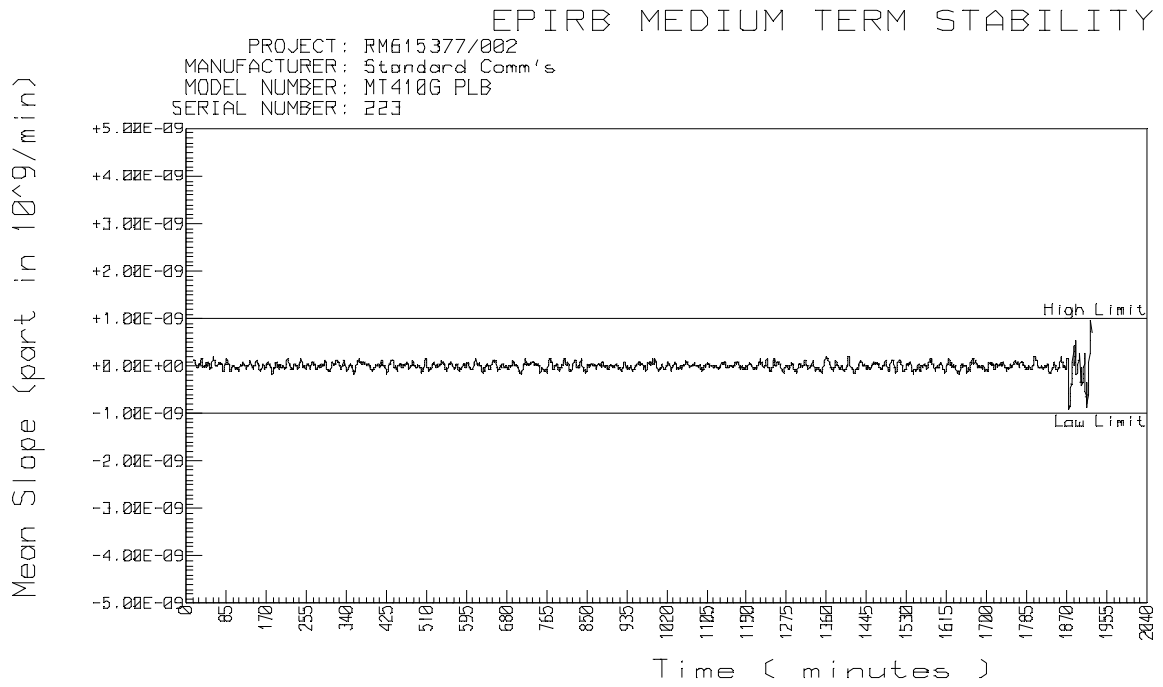




Product Service

## 2.9 OPERATIONAL LIFE AND STROBE LIGHT

### 2.9.2 Test Results

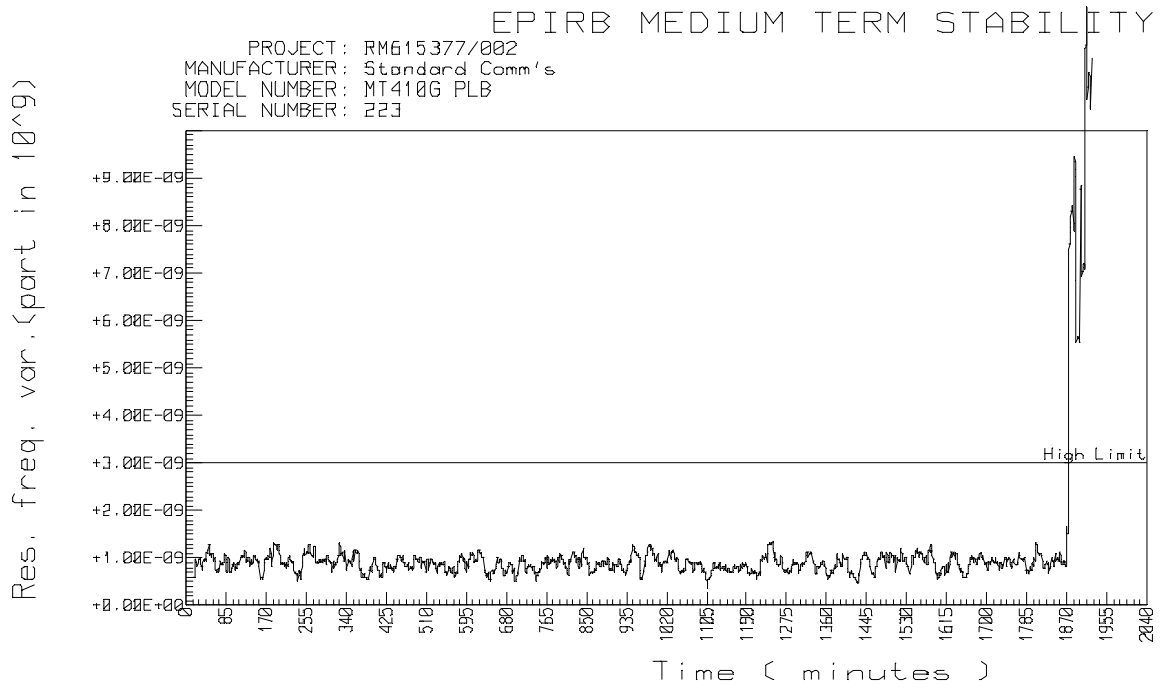


Operating Lifetime at Minimum Temperature - Medium Term Stability, Mean Slope



2.9 OPERATIONAL LIFE AND STROBE LIGHT

2.9.2 Test Results



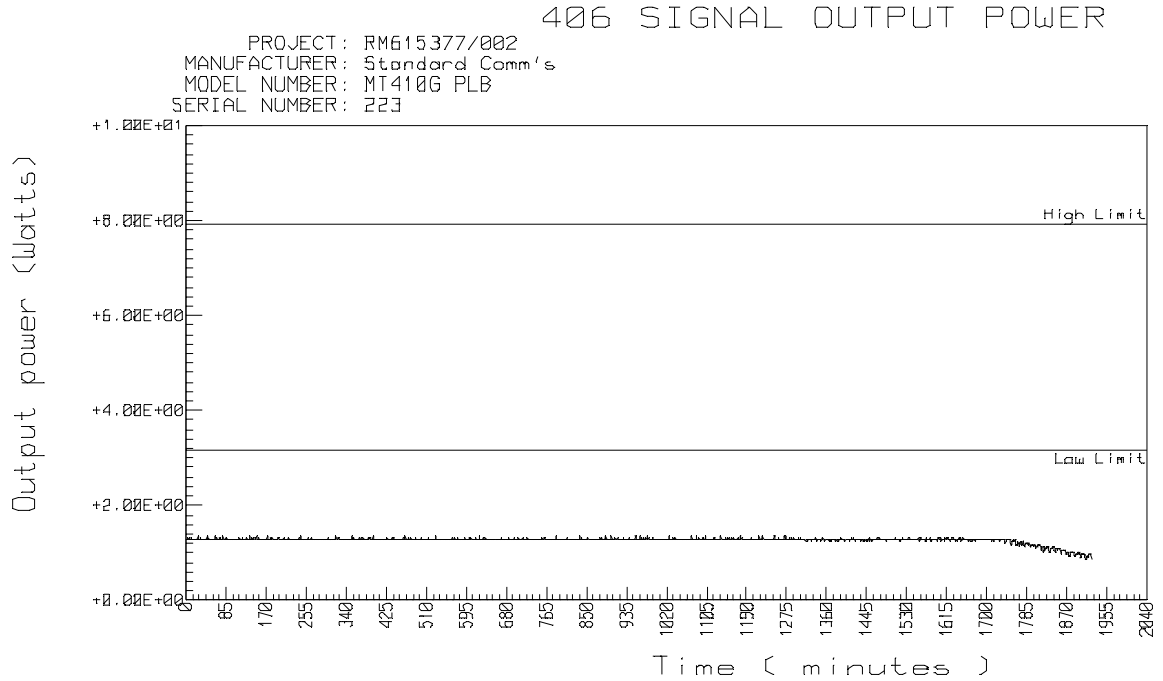
Operating Lifetime at Minimum Temperature - Medium Term Stability, Residual Frequency Variation



Product Service

2.9 OPERATIONAL LIFE AND STROBE LIGHT

2.9.2 Test Results



Operating Lifetime at Minimum Temperature - Output Power



**2.9 OPERATIONAL LIFE AND STROBE LIGHT**

**2.9.3 Battery Current Measurement Results**

Battery Discharge Current

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

- Beacon in the Off or Standby State, "Standby Current"
- Beacon performing a Self-test, "Self-test Current" 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%)<sup>Replacement Interval</sup> x Capacity]  
 = 1.50 - ((1 - 0.0075)<sup>8</sup> 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<sup>-9</sup> = 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<sup>-3</sup> 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<sup>-3</sup> 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

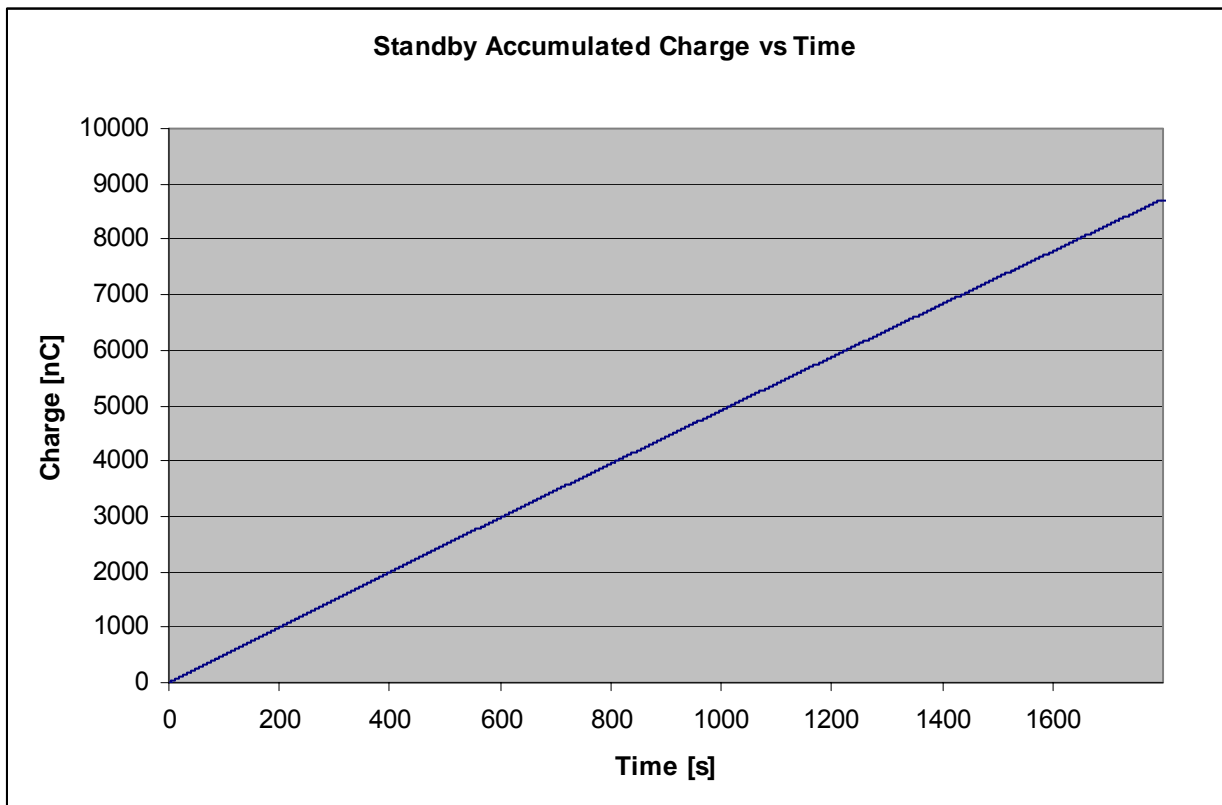
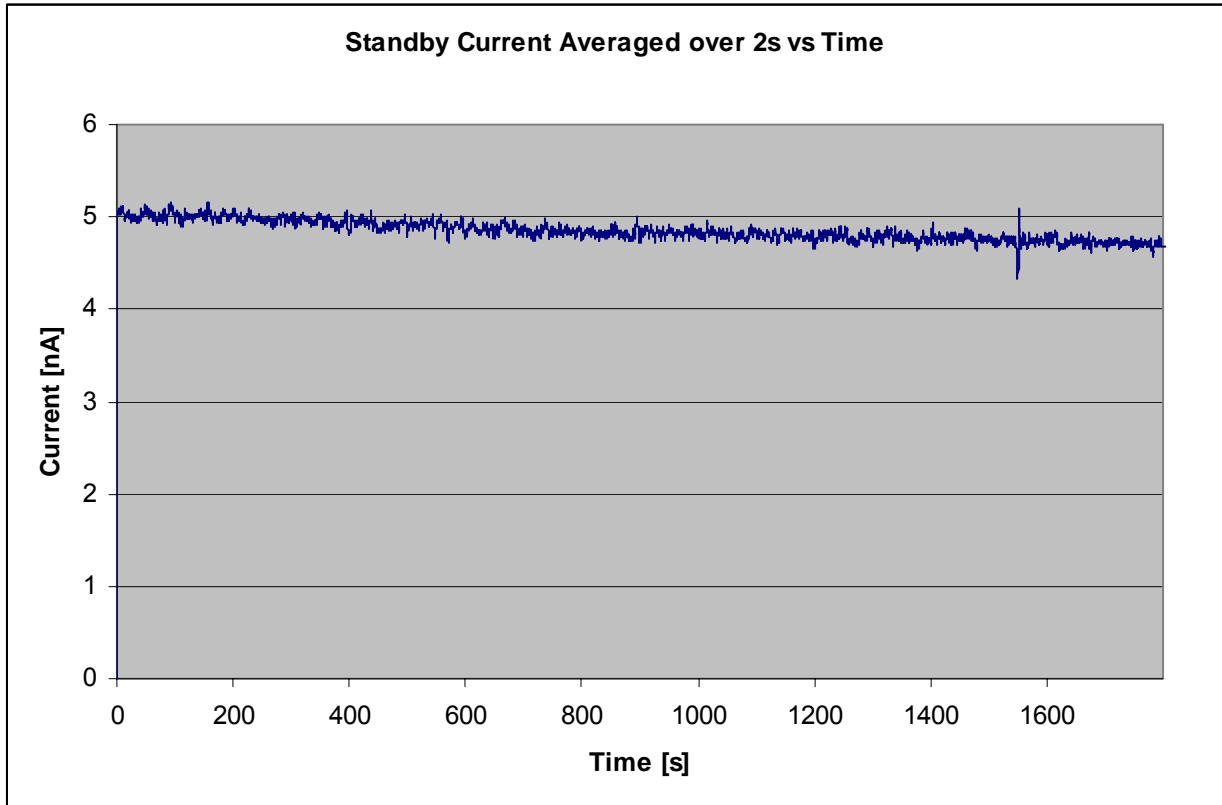
(\* = Worst Case)

Battery Preconditioning / Discharge Time = Worst Case drain / Operational Current  
 = 0.1391 / (31.83 x 10<sup>-3</sup>)  
 = 4.37 hours

This pre-discharge was not performed before the test, however, a previous calculation gave a result of 3.55 hours, this preconditioning was completed. Hence, the Time to First Failure must be reduced to an "Effective Operational Lifetime Duration" of 30.12 hours [30.943 - (4.37 - 3.55)].

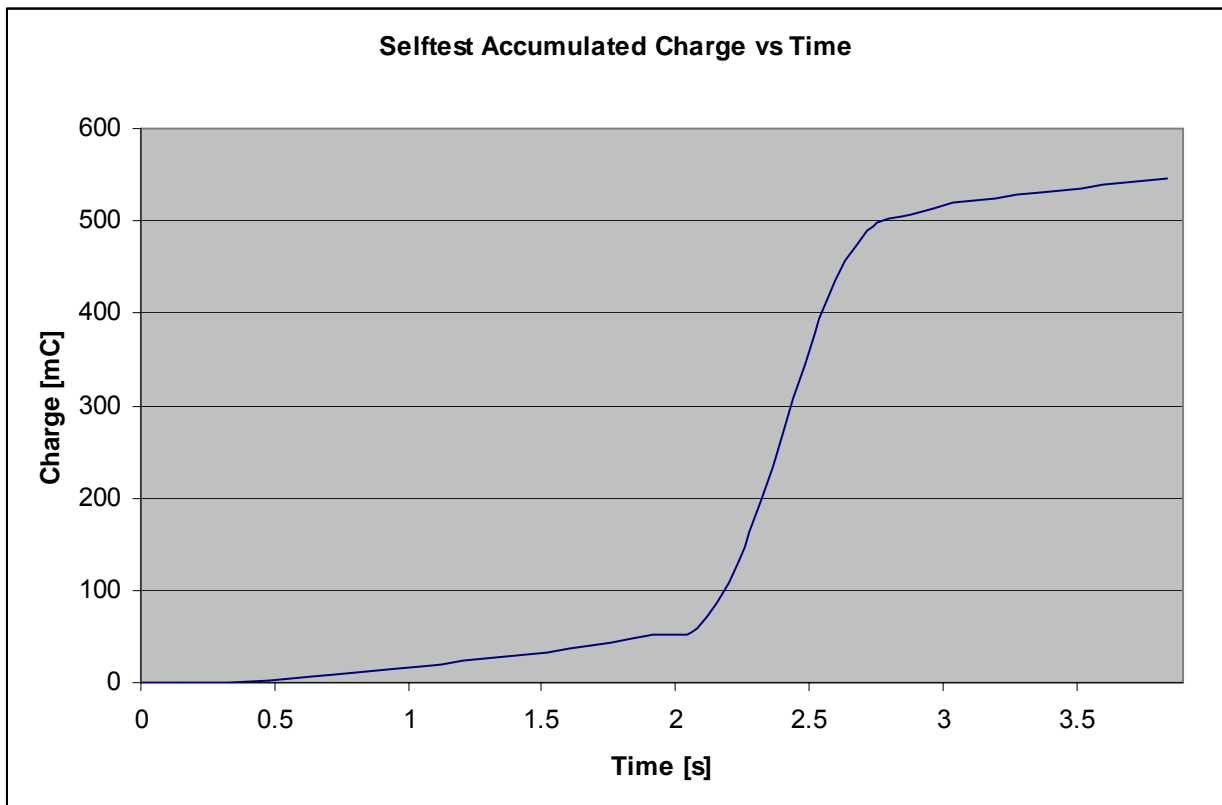
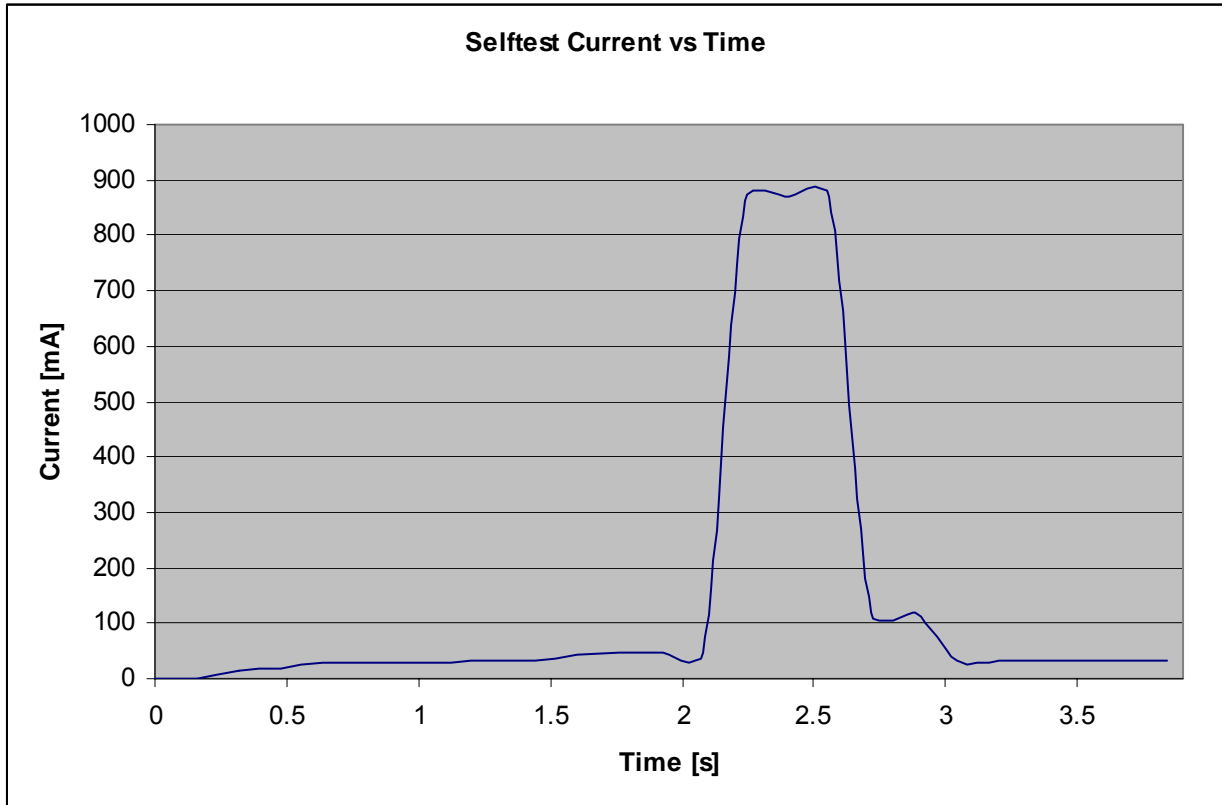


Battery Current Measurement Results (continued) - Standby Mode



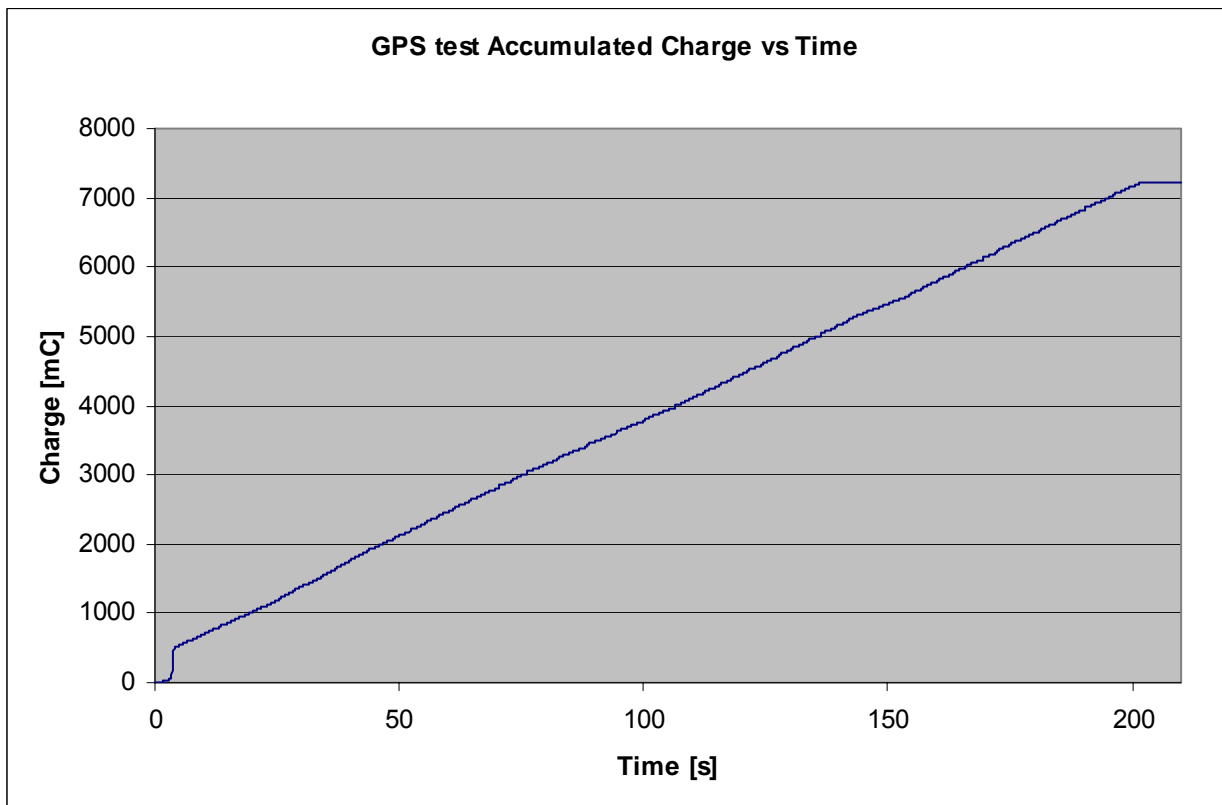
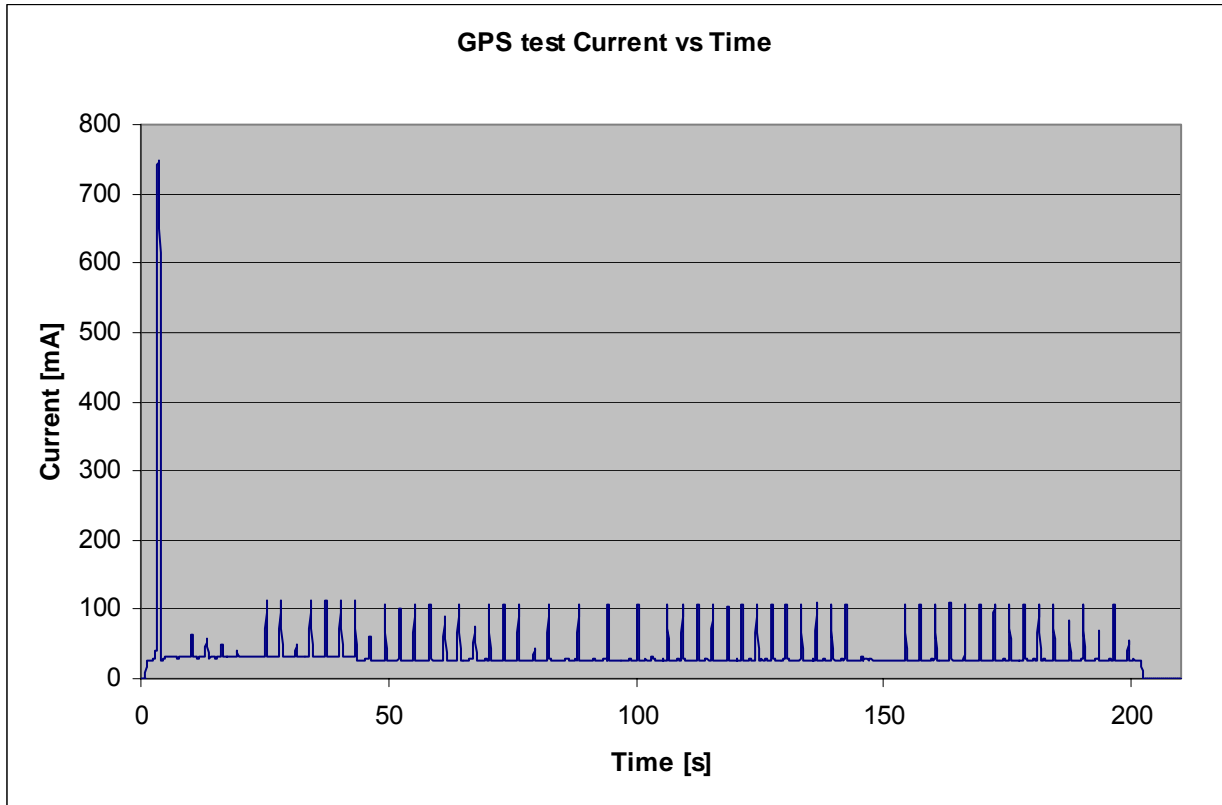


Battery Current Measurement Results (continued) - Selftest Mode



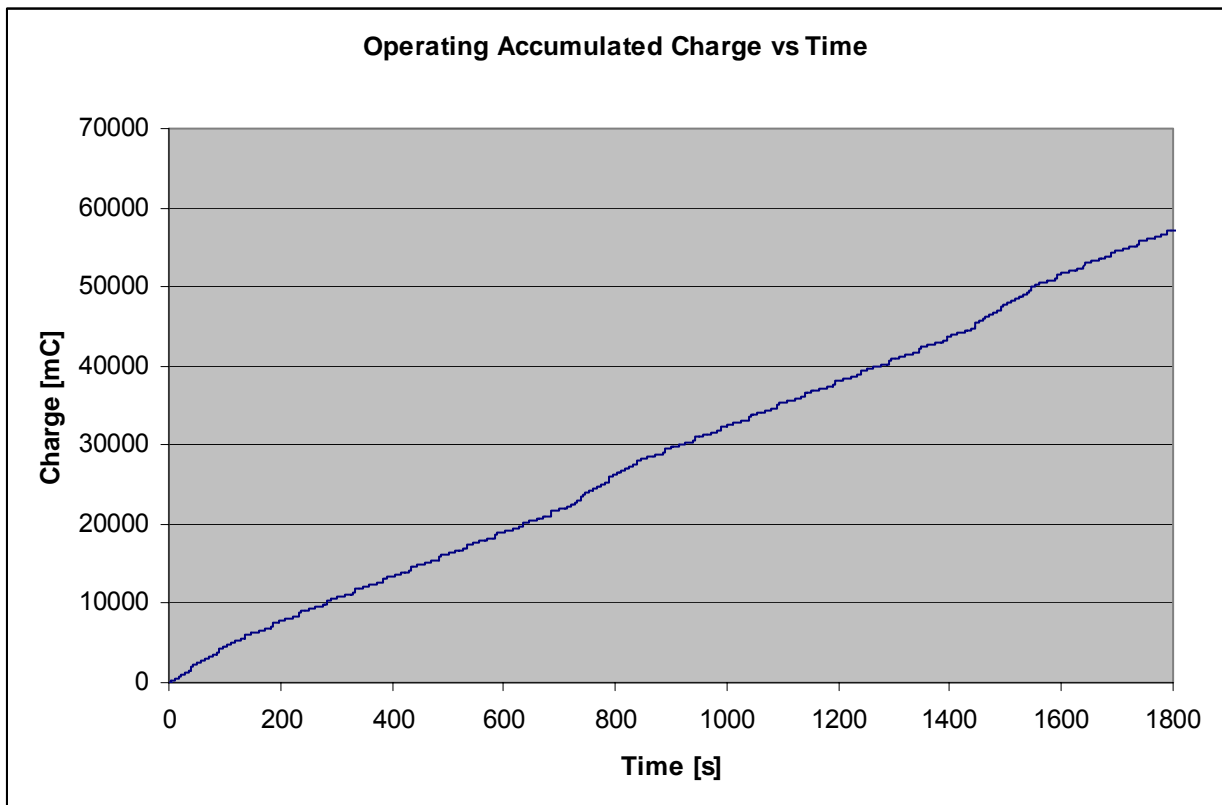
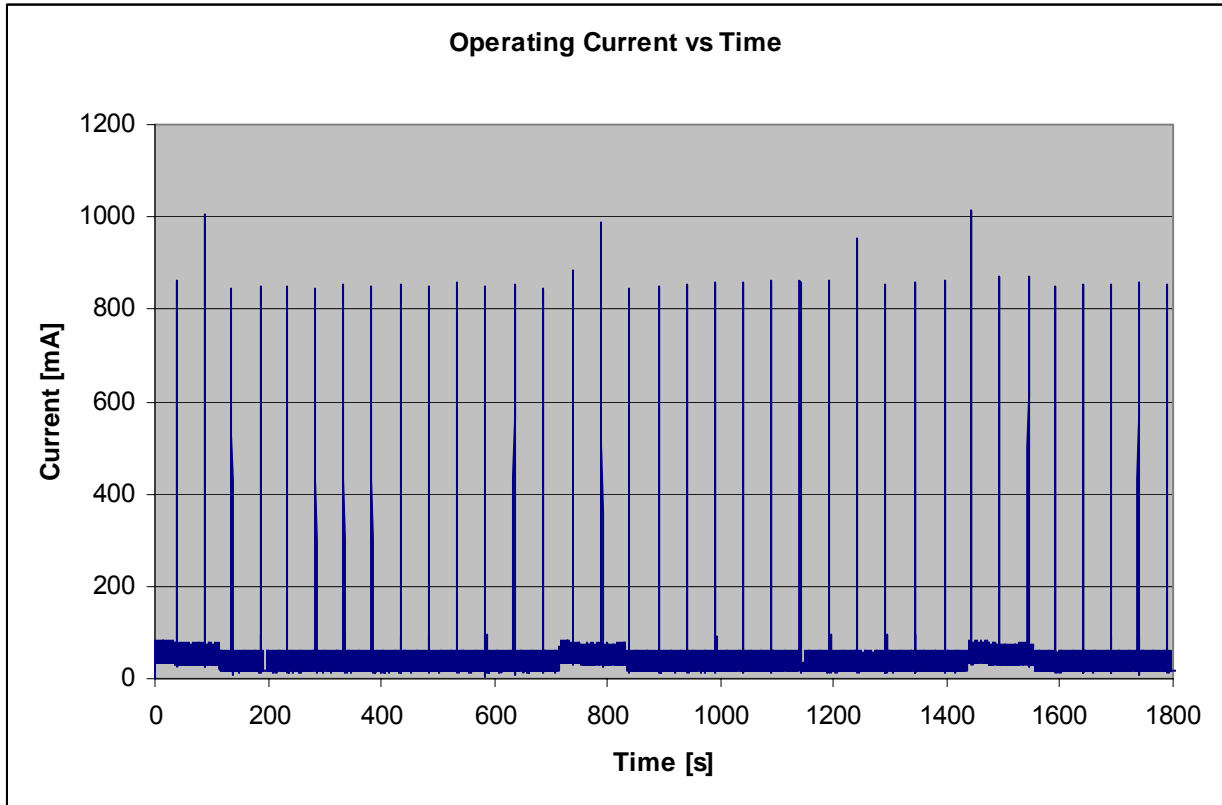


Battery Current Measurement Results (continued) - GPS test Mode





Battery Current Measurement Results (continued) - Operational Mode







**2.10 SELF TEST**

**2.10.1 Specification Reference**

RTCM Paper 76 (A 10.2)

**2.10.2 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

Decoded Message at Ambient Temperature



2.10 SELF TEST

2.10.2 Decoded Message

FFFED09F7E0000EB7FDFFFA0334F783E0F66C

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) = 9F7E0000EB7FDFFFA0334F783E0F66C

```

    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

Decoded Message at -20°C



2.10 SELF TEST

2.10.2 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

Decoded Message at +55°C



**2.11 BUOYANCY TEST (Category 1 only)**

**2.11.1 Specification Reference**

RTCM Paper 76 (A 11.0)

**2.11.2 Test Results**

Following release the MT410 floated in fresh water.

The reserve buoyancy of the MT410 was determined by dividing the buoyant force by the weight of the unit:

Weight of Unit = 0.248kg (2.43288N)

Buoyant force of submerged unit = 0.040kg (0.392N)

Buoyant Force/ Weight of Unit = Reserve Buoyancy

$$0.392N / 2.43288N = 16.11\%$$



Photograph showing EUT floating in fresh water

Limit	The Satellite PLB Should float in calm fresh water.
-------	-----------------------------------------------------



## 2.12 AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST

### 2.12.1 Specification Reference

RTCM Paper 76 (A 12.0)

### 2.12.2 CARRIER FREQUENCY (Clause A12.1)

Test Date: 5<sup>th</sup> December 2006

Ambient Temperature 21°C      Relative Humidity 40%

TEST CONDITIONS	FREQUENCY ERROR (Hz)		
		121.500 MHz*	
T <sub>nom</sub> (+21°C)		+361	
T <sub>min</sub> (-20°C)		-1802	
T <sub>max</sub> (55°C)		+746	
Maximum freq. Error (ppm)		14.84	
Measurement uncertainty (Hz)	± 46 Hz		
Limit	121.500 MHz ± 50ppm		

#### Remarks

\*The homing device operating frequency was offset to prevent false emergency alert.

### 2.12.3 TRANSMITTER DUTY CYCLE (Clause A12.2.1)

Test Date: 2nd May 2007

Ambient Temperature 21°C      Relative Humidity 40%

TRANSMITTER DUTY CYCLE	RESULT (%)		
		121.500 MHz	
T <sub>nom</sub> (+20°C)		95.9	
T <sub>min</sub> (-20°C)		96.2	
T <sub>max</sub> (+55°C)		95.9	
Measurement Uncertainty	± 5 %		
Limit (%)	95.8 to 96.2		

Does the carrier transmit continuously except for a period of up to 2 seconds during the 406MHz transmission?

Yes    [  ]      No    [  ]



**2.12 AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST**

**2.12.4 MODULATION FREQUENCY AND SWEEP REPETITION RATE (Clause A12.2.2)**

Test Date: 5<sup>th</sup> December 2006

Ambient Temperature 22°C      Relative Humidity 42%

TEST CONDITIONS	MODULATION PARAMETERS	
T <sub>nom</sub> (+22°C)	Sweep Direction	Downward
	Minimum Audio Frequency	348.06Hz
	Maximum Audio Frequency	1300.08Hz
	Audio Frequency Range	952.12Hz
	Sweep Repetition Rate	3.31Hz
T <sub>min</sub> (-20°C)	Sweep Direction	Downward
	Minimum Audio Frequency	349.08Hz
	Maximum Audio Frequency	1301.99Hz
	Audio Frequency Range	952.92Hz
	Sweep Repetition Rate	3.46Hz
T <sub>max</sub> (+55°C)	Sweep Direction	Downward
	Minimum Audio Frequency	346.63Hz
	Maximum Audio Frequency	1294.17Hz
	Audio Frequency Range	947.54Hz
	Sweep Repetition Rate	3.22Hz
Measurement uncertainty	Minimum Audio Frequency	± 22.4 Hz
	Maximum Audio Frequency	± 121.56 Hz
	Audio Frequency Range	± 123.6 Hz
	Sweep Repetition Rate	± 5 %

Minimum Audio Frequency	≥ 300 Hz
Maximum Audio Frequency	≤ 1600 Hz
Audio Frequency Range	≥ 700 Hz

Sweep Repetition Rate	2 to 4 Hz
-----------------------	-----------

Test Equipment Used

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



## 2.12 AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST

### 2.12.5 MODULATION DUTY CYCLE (Clause A12.2.3)

Test Date: 5<sup>th</sup> December 2006

Ambient Temperature 22°C      Relative Humidity 42%

PARAMETER	RESULT (%)		
	121.500 MHz		
	-20°C	Ambient	+55°C
Modulation Duty Cycle	42.40	43.04	43.13
Measurement Uncertainty	± 5 %		
Limit (%)	33 to 55		

### 2.12.6 MODULATION FACTOR (Clause A12.2.4)

Test Date: 7<sup>th</sup> December 2006

Ambient Temperature 22°C      Relative Humidity 42%

PARAMETER	RESULT (%)		
	121.500 MHz		
	-20°C	Ambient	+55°C
Modulation Factor	0.96	0.96	0.96
Measurement Uncertainty	± 5 %		
Limit (%)	0.85 to 1.0		



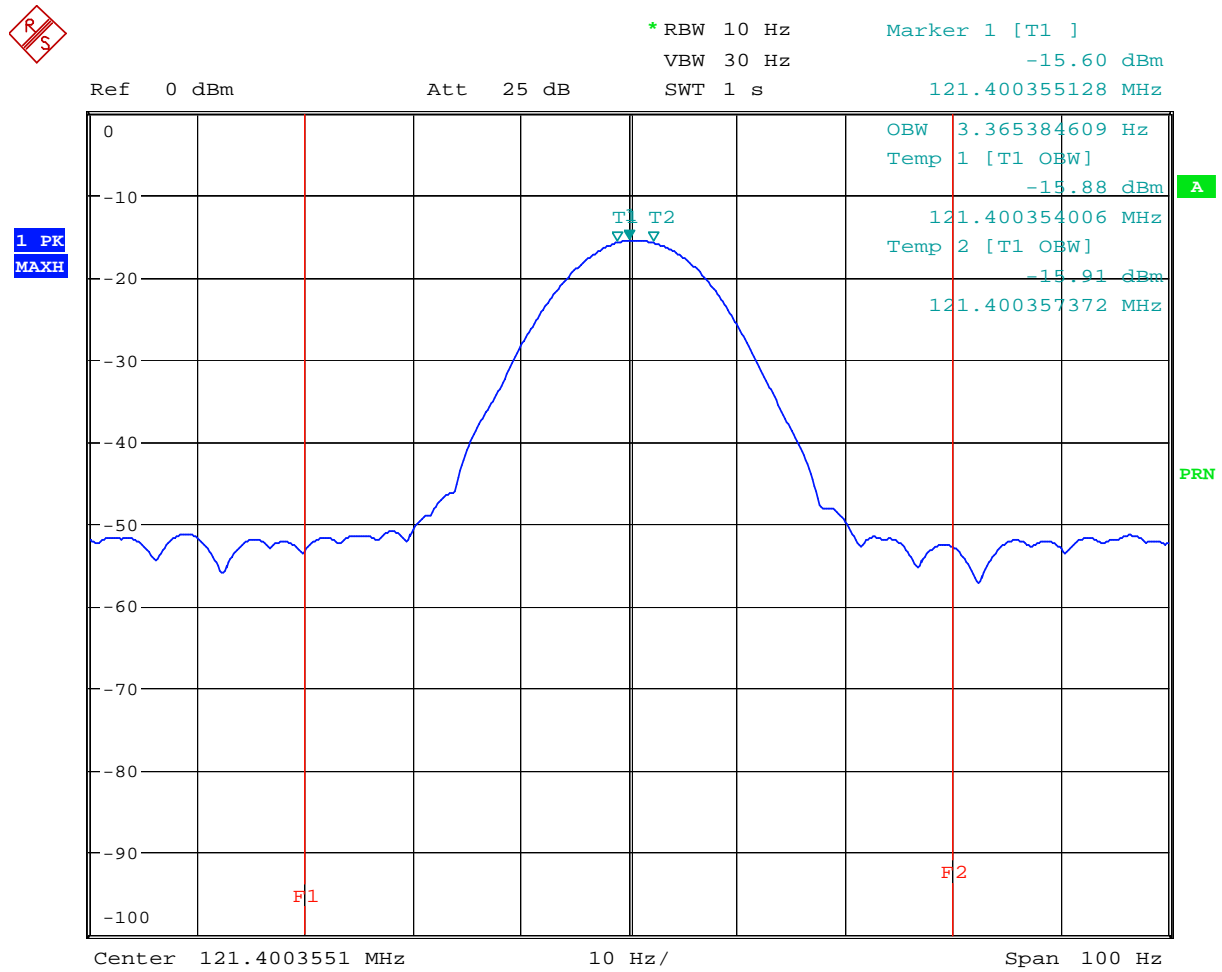
**2.12 AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST**

**2.12.7 FREQUENCY COHERENCE (Clause A12.2.5)**

The following plot is a measurement showing 30% of the total power emitted during a transmission cycle.

Frequency Lines (F1 & F2) are at  $\pm 30$ Hz to the centre frequency (carrier)

Temperature: Ambient



Date: 7.DEC.2006 10:57:50

Is the transmission interrupted by the 406MHz burst?	Yes
If yes:- Frequency Shift (Hz)	+0.7Hz

Limit	The carrier frequency must not shift by more than $\pm 30$ Hz.
-------	----------------------------------------------------------------





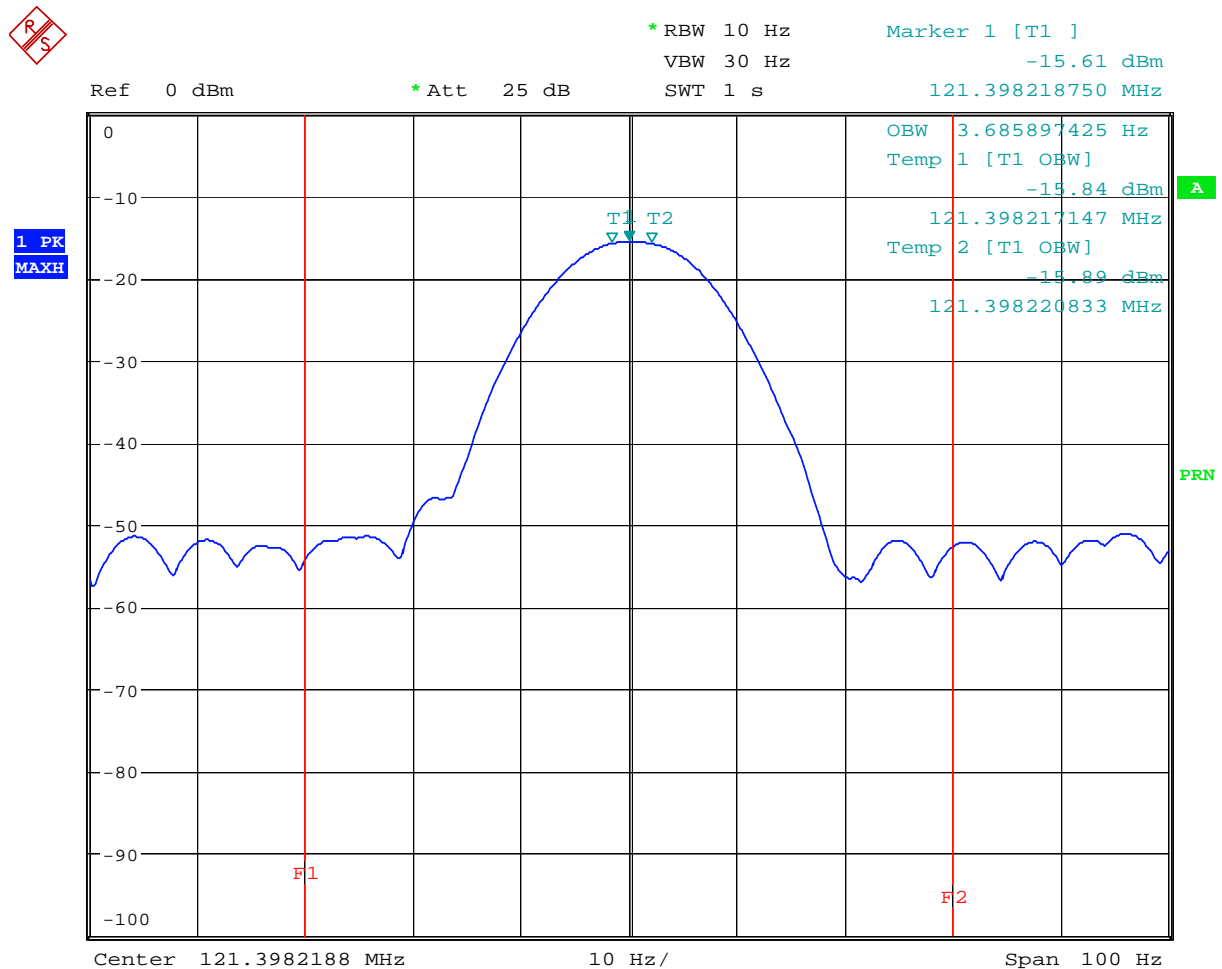
**2.12 AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST**

**2.12.7 FREQUENCY COHERENCE (Clause A12.2.5)**

The following plot is a measurement showing 30% of the total power emitted during a transmission cycle.

Frequency Lines (F1 & F2) are at  $\pm 30\text{Hz}$  to the centre frequency (carrier)

Temperature:  $-20^{\circ}\text{C}$



Date: 8.DEC.2006 10:48:58

Is the transmission interrupted by the 406MHz burst?	Yes
If yes:- Frequency Shift (Hz)	-0.9Hz

Limit	The carrier frequency must not shift by more than $\pm 30$ Hz.
-------	----------------------------------------------------------------



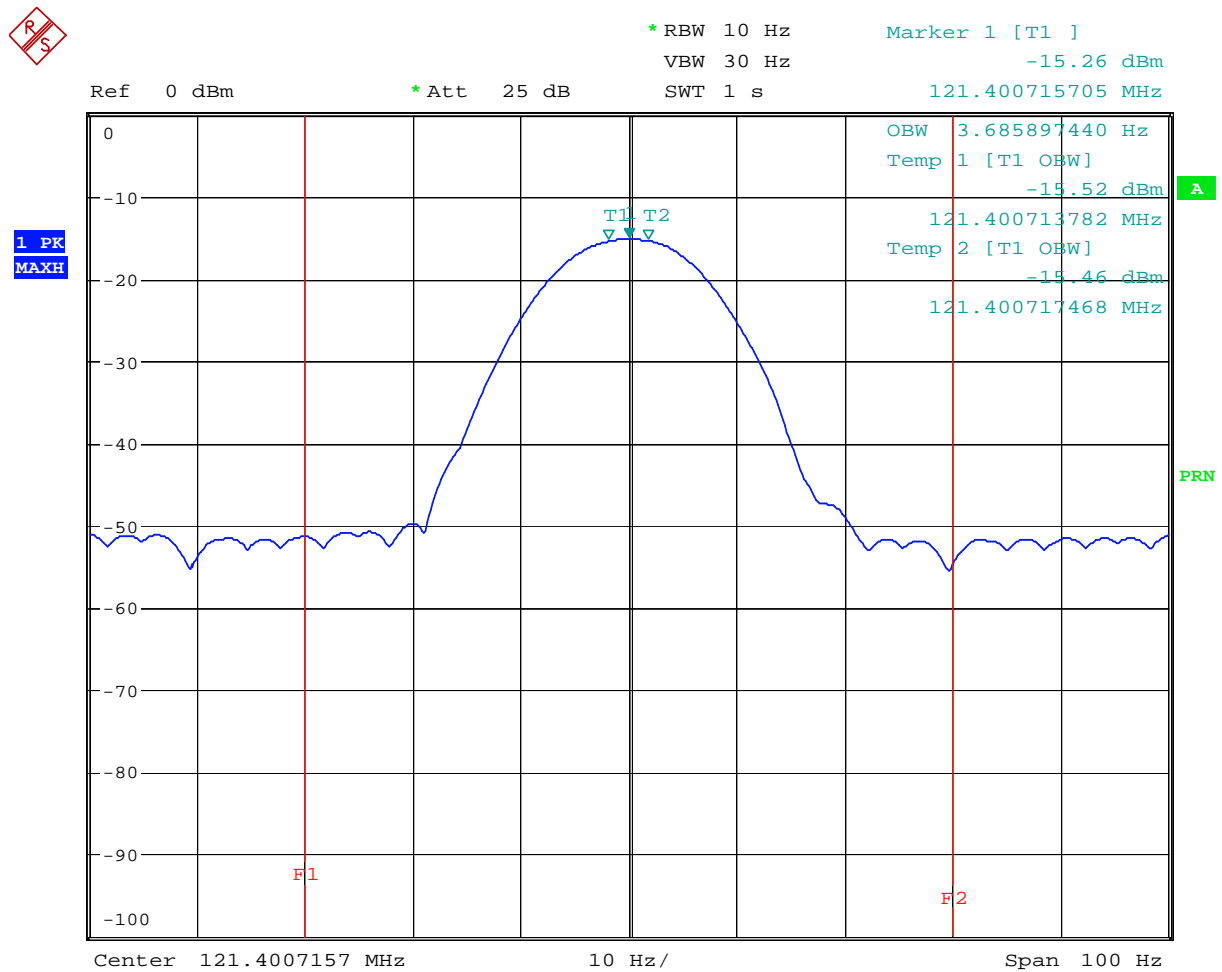
**2.12 AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST**

**2.12.7 FREQUENCY COHERENCE (Clause A12.2.5)**

The following plot is a measurement showing 30% of the total power emitted during a transmission cycle.

Frequency Lines (F1 & F2) are at  $\pm 30$ Hz to the centre frequency (carrier)

Temperature: +55°C



Date: 7.DEC.2006 17:29:15

Is the transmission interrupted by the 406MHz burst?	Yes
If yes:- Frequency Shift (Hz)	0Hz

Limit	The carrier frequency must not shift by more than $\pm 30$ Hz.
-------	----------------------------------------------------------------



## 2.12 AUXILIARY RADIO-LOCATING DEVICE TRANSMITTER TEST

### 2.12.8 PEAK EQUIVALENT ISOTROPIC RADIATED POWER (PEIRP) (Clause A12.3)

Test Date: 20<sup>th</sup> October 2006

Angle of Rotation (°)	PEIRP (dBm)
0	14.0
30	13.9
60	13.8
90	13.8
120	13.9
150	13.9
180	13.9
210	13.9
240	14.0
270	13.9
300	13.9
330	14.5
Measurement Uncertainty	± 5.1dB

LIMIT CLAUSE D.4.2.a)

PEIRP	+17dBm ± 3dB
Maximum to minimum ratio	≤ 6 dB

#### Remarks

The elevation angle producing the maximum gain was 5°



Product Service

### **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
<b>Section 2.7 Radio (Tx) - Conducted Spurious Emissions</b>				
Oscilloscope	Lecroy	LC534AL	79	11/01/2007
Climatic Chamber	Heraeus Votsch	VM 04/100	85	TU
Load (50ohm, 50W)	Radio Spares	613-690	353	22/11/2006
Attenuator 10dB/250W	Weinschel	45-10-43	383	29/08/2007
Directional Coupler	Narda	3020A	419	OP MON
Crystal Detector	Hewlett Packard	8470B	484	OP MON
Power Divider	Weinschel	1506A	601	07/08/2007
Digital Temperature Indicator	Fluke	51	1385	03/08/2007
High Pass Filter	Mini-Circuits	NHP-300	1640	12/08/2007
Spectrum Analyser	Hewlett Packard	8562A	2044	17/02/2007
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	03/02/2007
Hygrometer	Rotronic	I-1000	3068	06/04/2007
2m N(m)-N(m) RF Cable	Reynolds	269-0088-2000	3224	05/08/2007
<b>Section 2.12 Radio (Tx) - Frequency Characteristics</b>				
Climatic Chamber	Heraeus Votsch	VM 04/100	85	TU
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
Digital Temperature Indicator	Fluke	51	1385	03/08/2007
SMA-SMA Cable (1m)	Reynolds	262-0248-1000	2407	27/07/2007
20dB/20W Attenuator	JFW	50FHC-020-20	2774	18/02/2007
Beacon RF Unit	TUV	N/A	3066	TU
Hygrometer	Rotronic	I-1000	3068	06/04/2007
20dB/75W Attenuator	Bird	8308-200	3076	18/02/2007
1m RF Cable SMA	Reynolds	262-0248-1000	3221	27/07/2007



### 3.1 TEST EQUIPMENT

<b>Section 2.12 Radio (Tx) - Modulation Characteristics</b>				
Oscilloscope	Lecroy	LC534AL	79	11/01/2007
Climatic Chamber	Heraeus Votsch	VM 04/100	85	TU
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
Load (50ohm, 50W)	Radio Spares	613-690	353	22/11/2006
Attenuator 10dB/250W	Weinschel	45-10-43	383	29/08/2007
Directional Coupler	Narda	3020A	419	OP MON
Crystal Detector	Hewlett Packard	8470B	484	OP MON
Power Divider	Weinschel	1506A	601	07/08/2007
Digital Temperature Indicator	Fluke	51	1385	03/08/2007
High Pass Filter	Mini-Circuits	NHP-300	1640	12/08/2007
Spectrum Analyser	Hewlett Packard	8562A	2044	17/02/2007
SMA-SMA Cable (1m)	Reynolds	262-0248-1000	2407	27/07/2007
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	03/02/2007
20dB/20W Attenuator	JFW	50FHC-020-20	2774	18/02/2007
Beacon RF Unit	TUV	N/A	3066	TU
Hygrometer	Rotronic	I-1000	3068	06/04/2007
20dB/75W Attenuator	Bird	8308-200	3076	18/02/2007
1m RF Cable sma-sma	Reynolds	262-0248-1000	3221	27/07/2007
2m N(m)-N(m) RF Cable	Reynolds	269-0088-2000	3224	05/08/2007



## 3.1 TEST EQUIPMENT

<b>Section 2.12 Radio (Tx) - Power Characteristics</b>				
Oscilloscope	Lecroy	LC534AL	79	11/01/2007
Climatic Chamber	Heraeus Votsch	VM 04/100	85	TU
Load (50ohm, 50W)	Radio Spares	613-690	353	22/11/2006
Attenuator 10dB/250W	Weinschel	45-10-43	383	29/08/2007
Directional Coupler	Narda	3020A	419	OP MON
Crystal Detector	Hewlett Packard	8470B	484	OP MON
Power Divider	Weinschel	1506A	601	07/08/2007
Digital Temperature Indicator	Fluke	51	1385	03/08/2007
High Pass Filter	Mini-Circuits	NHP-300	1640	12/08/2007
Spectrum Analyser	Hewlett Packard	8562A	2044	17/02/2007
Spectrum Analyser	Rohde & Schwarz	FSU26	2747	03/02/2007
Hygrometer	Rotronic	I-1000	3068	06/04/2007
2m N(m)-N(m) RF Cable	Reynolds	269-0088-2000	3224	05/08/2007
<b>Section 2.4 Climatic - Corrosion</b>				
Thermocouple	Global	T-Type	1504	18/03/2007
WEISS TECHNIK (T)	Weiss Technik	SALT MIST	2121	OP MON
Balance	Geniweigher	GM-11K	2334	15/03/2007
PM METER	Unknown		2335	TU
Thermometer	Digitron	2098T	2347	27/09/2007
Balance	Sartorius	HK160	2678	15/03/2007
Measuring cylinder	Unknown	50mL	3136	TU
<b>Section 2.5 Climatic - Corrosion</b>				
Tape Measure	Stanley		2276	TU
HARDWOOD BLOCK	Unknown	ELM	2650	TU
CHAMBER	Climatec	CLIMATEC 2	2845	07/08/2007



### 3.1 TEST EQUIPMENT

Instrument	Manufacturer	Type No	TE Number	Calibration Due
<b>Section 2.9 Beacons - Operating Lifetime</b>				
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
Frequency -Time Analyser	Hewlett Packard	5372A	93	27/07/2007
Digital Temperature Indicator	Fluke	51	412	21/09/2006 *
Signal Generator	Hewlett Packard	8663A	1172	01/08/2007
Power Sensor	Hewlett Packard	8482A	1341	19/09/2006 *
Data Logger	Pico Technology Ltd	ADC-42	2395	21/09/2006*
50ohm/15W Termination	Radio Spares	612-192	2416	02/08/2007
TERMINATION: 50ohm/15W	Radio Spares	612-192	2425	02/08/2007
Distress Beacon RF Unit	TUV	-	2445	TU
Logic Analyser	Hewlett Packard	1631D	2757	28/07/2007
Multimeter	Hewlett Packard	3478A	2758	21/07/2007
Hygrometer	Rotronic	I-1000	3068	06/04/2007
20dB/10W Attenuator	Aeroflex / Weinschel	23-20-34	3160	01/06/2007
3dB/20W Attenuator	Aeroflex / Weinschel	23-3-34	3161	01/06/2007
Bandpass Filter	Trilithic	5BE406/35-1-AA	3205	TU

\* Equipment Used on 05/09/2006.





### 3.1 TEST EQUIPMENT

Instrument	Manufacturer	Type No	TE Number	Calibration Due
<b>Section 2.6 Climatic - High Temperature</b>				
Temperature Chamber	Instron	906	2128	26/12/2006
<b>Section 2.6, 2.11 Climatic - Wet Tests</b>				
0 - 20N Force Gauge	Hahn & Kolb	321-20N	892	15/08/2007
Thermocouple	Global	T-Type	1504	18/03/2007
Digital Pressure Indicator	Druck	RPT301	2345	07/10/2006*
Data Logging Thermometer	Digitron	2098T	2348	TU
<b>Section 2.2/2.3 - Vibration/Ruggedness</b>				
Charge Amplifier	Endevco	133	2504	04/07/2007
Vibration Controller	Hewlett Packard	E1434A	2507	02/03/2007
Accelerometer	Endevco	256-10	2559	07/12/2006
Charge Amplifier	Endevco	133	2725	06/07/2007
Isotron Accelerometer	Endevco	256-10	3114	13/10/2006
Isotron Accelerometer	Endevco	256-10	3119	13/10/2006
Vibration Table	Ling Dynamic Systems	875	3170	06/12/2006

\* Equipment Used on 15/09/2006

TU - Traceability Unscheduled

OP Mon - Output Monitored

All equipment checked at the time of use and found to be within Calibration Due date, except where OP Mon (where the output was monitored with calibrated equipment) or were the equipment was TU (calibration not required).



Product Service

## **SECTION 4**

### **DISCLAIMERS AND COPYRIGHT**



Product Service

#### 4.1 DISCLAIMERS AND COPYRIGHT

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