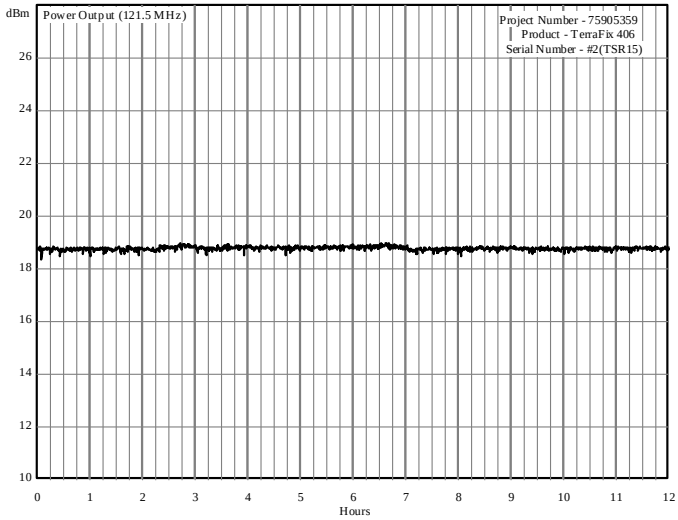
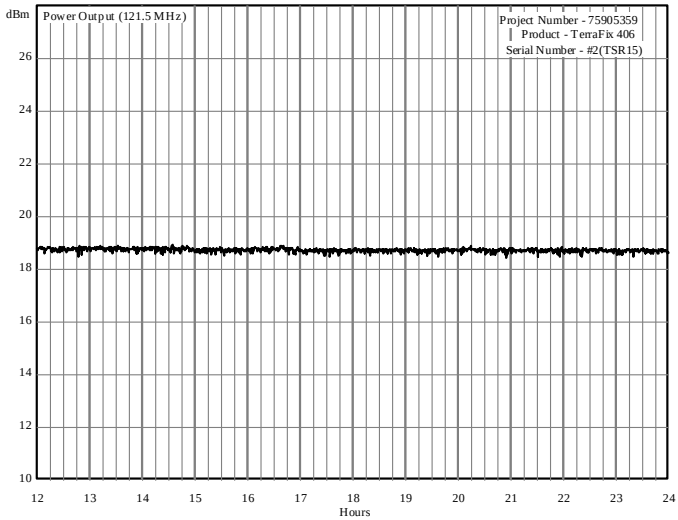
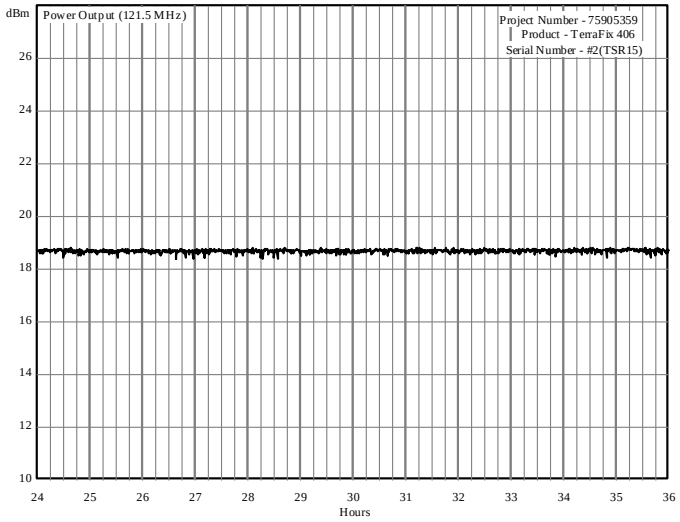
Digital Message

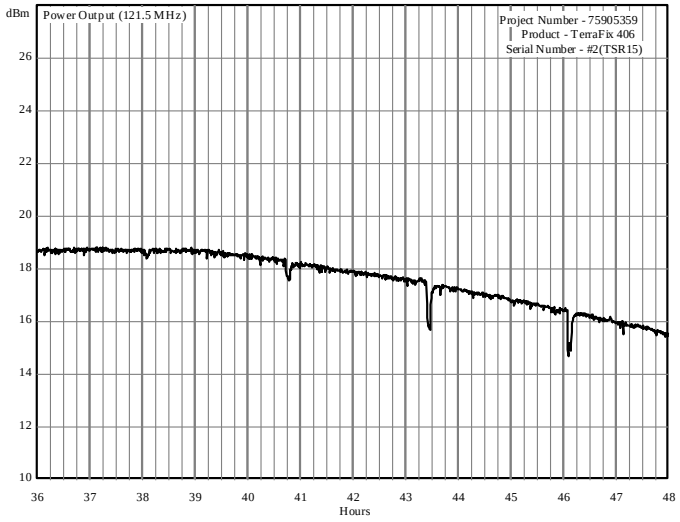
```
================================================================================
 Beacon Id Format......... 22 Hex Id, Short Message, Bits 25-112
 15 Hex (Bits 26- 85) = 993D400004001AD              993D400004001AD Default_Id
 30 Hex (Bits 25-144) = 4C9EA00002000D6A77978000000000

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 0 1001 1001 0011 1101 0100 0000 0000 0000 0000 0100 0000 0000 0001 1010 1101
   0100 1110 1111 0010 1111 0000 0000 0000 0000 0000 0000 0000 0000 0000 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            0 Short Message                              0
Protocol Flag      26            1 User                                       1
MID                27- 36      201 ALBANIA                          0011 0010 01
User Protocol      37- 39        7 Test                                    111
Spare              40- 63                          0101 0000 0000 0000 0000 0001
Spare              64- 83                               0000 0000 0000 0110 1011
Homing             84- 85        1 121.5                                    01
BCH Encoded        86-106          Errors=0           0100 1110 1111 0010 1111 0
BCH Generated      86-106                             0100 1110 1111 0010 1111 0
Emergency Cd Flag 107            0 National Use                               0
Beacon Activation 108            0 Manual only                                0
National Use      109-112                                                  0000

================================================================================
```

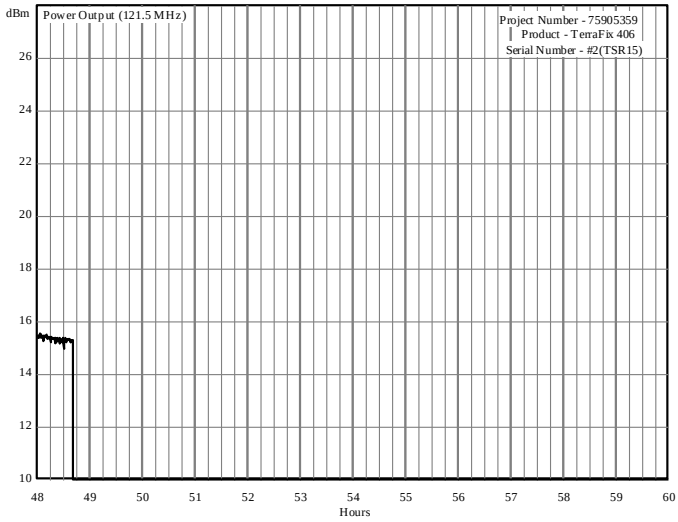
121 MHz Peak Envelope Power Results






dBm
Power Output (121.5 MHz)
Project Number - 75905359
Product - TerraFix 406
Serial Number - #2(TSR15)
26
24
22
20
18
16
14
12
10
24 25 26 27 28 29 30 31 32 33 34 35 36
Hours


dBm
Power Output (121.5 MHz)
Project Number - 75905359
Product - TerraFix 406
Serial Number - #2(TSR15)
26
24
22
20
18
16
14
12
10
36 37 38 39 40 41 42 43 44 45 46 47 48
Hours


dBm
Power Output (121.5 MHz)
Project Number - 75905359
Product - TerraFix 406
Serial Number - #2(TSR15)
26
24
22
20
18
16
14
12
10
48
49
50
51
52
53
54
55
56
57
58
59
60
Hours

Product Service

Battery Current and Measurement Results

Battery Discharge Current

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

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

The individual tests were conducted for the following durations:

Standby Current	:	30 minutes	(1799920 ms)
Self-test Current	:	4.88 seconds	(4880 ms)
GPS Test Current	:	128 seconds	(128000 ms)
GPS Burst Current	:	74.16 seconds	(74160 ms)
Operating Current	:	22.51 minutes	(1350560 ms)

Assumptions / Supplied Data

Battery Replacement Interval	: 10.75 years
Battery Capacity	: 1.4 Ah
Battery Self Drain	: 1.00 % per year
Self-test Interval	: 12 tests per year
GPS Tests	: 2.4 tests per year

Test Results

Mode Current	=	Accumulated Charge	/	Time		
Standby Current	=	50656.47 pC	/	1799920 ms	=	0.03 nA
Self-test Current	=	575703 uC	/	4880 ms	=	117.97 mA
GPS Test Current	=	2678847.2 uC	/	128000 ms	=	20.93 mA
GPS Burst Current	=	2323980 uC	/	74160 ms	=	31.34 mA
Operating Current	=	35243603.05 uC	/	1350560 ms	=	26.10 mA

Battery Preconditioning / Discharge Time Calculations

Battery Self Drain = Capacity - [(100% - Self Drain/Year%)$^{\text{Replacement Interval}}$ x Capacity]
= 1.4- ((1- 0.0100) ^{11} x 1.4) = 0.1434 Ah

Standby Drain = Hours per year x Battery Replacement Interval x Standby Current
= 365 x 24 x # x 0.03 x 10^{-9} = 0.0000 Ah (0.0012 mAh too small
Worst Case = 1.65 x 0.0000 Ah = 0.0000 Ah to be relevant)

Self-test Drain = Self-tests per battery x Self-test Current x Self-test duration (in hours)
= 12 x 11 x 117.97 x 10^{-3} x (4.88 / 3600) = 0.0206 Ah
Worst Case = 1.65 x 0.0206 Ah = 0.0340 Ah

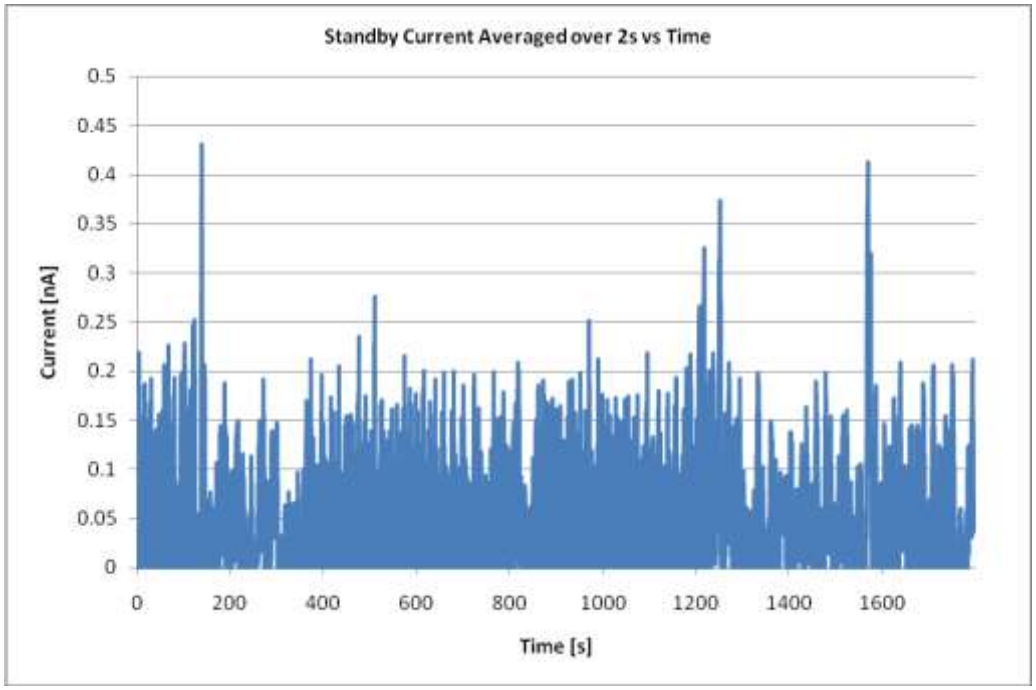
GPS Test Drain = Self-tests per beacon x Self-test Current x Self-test duration (in hours)
= 2.4 x 11 x 20.93 x 10^{-3} x (128 / 3600) = 0.0192 Ah
Worst Case = 1.65 x 0.0192 Ah = 0.0317 Ah

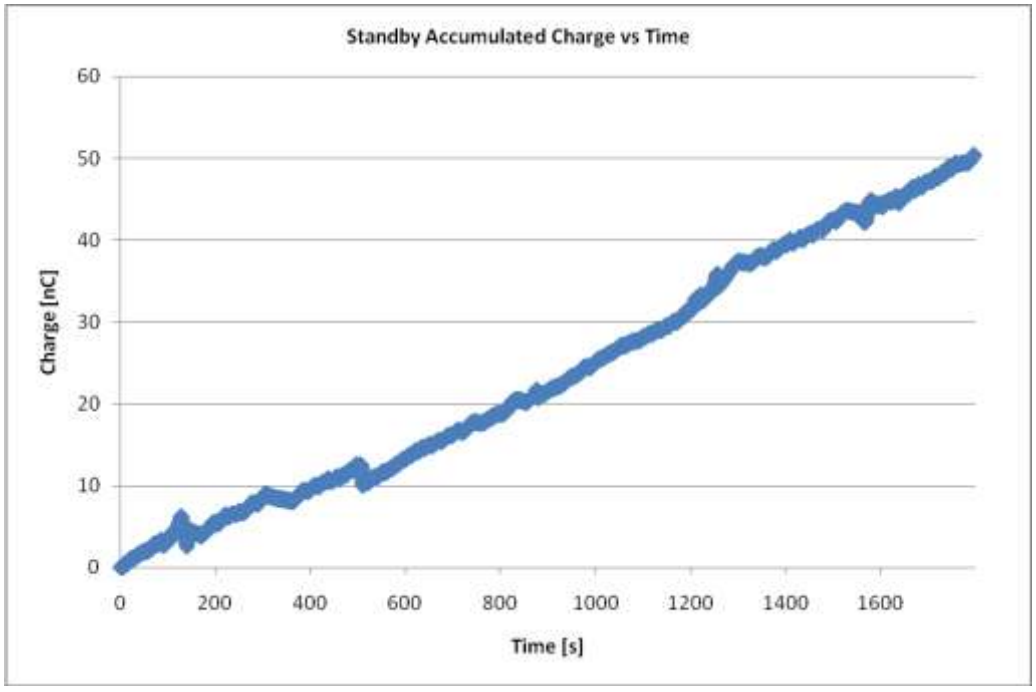
GPS Burst Drain = GPS-tests per beacon x GPS Burst Current x GPS Burst duration (in hours)
= 2.4 x 11 x 31.34 x 10^{-3} x (74.2 / 3600) = 0.0167 Ah
Worst Case = 1.65 x 0.0167 Ah = 0.0275 Ah

Total Drain = Self Drain + Standby Drain (Worst Case) + Self-test Drain (Worst Case)
= 0.1434 + 0.0000 + 0.0340 + 0.0317 + 0.0275 = 0.2366 Ah

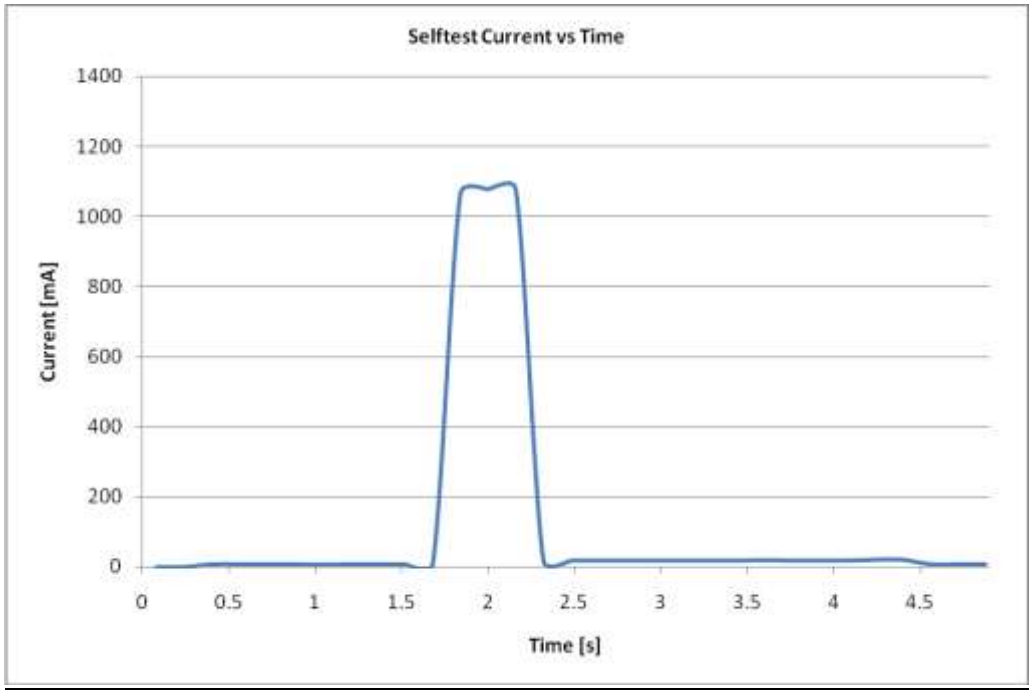
Battery Preconditioning / Discharge Time = Worst Case drain / Operational Current
= 0.2366 / (26.10 x 10^{-3})
= 9.07 hours

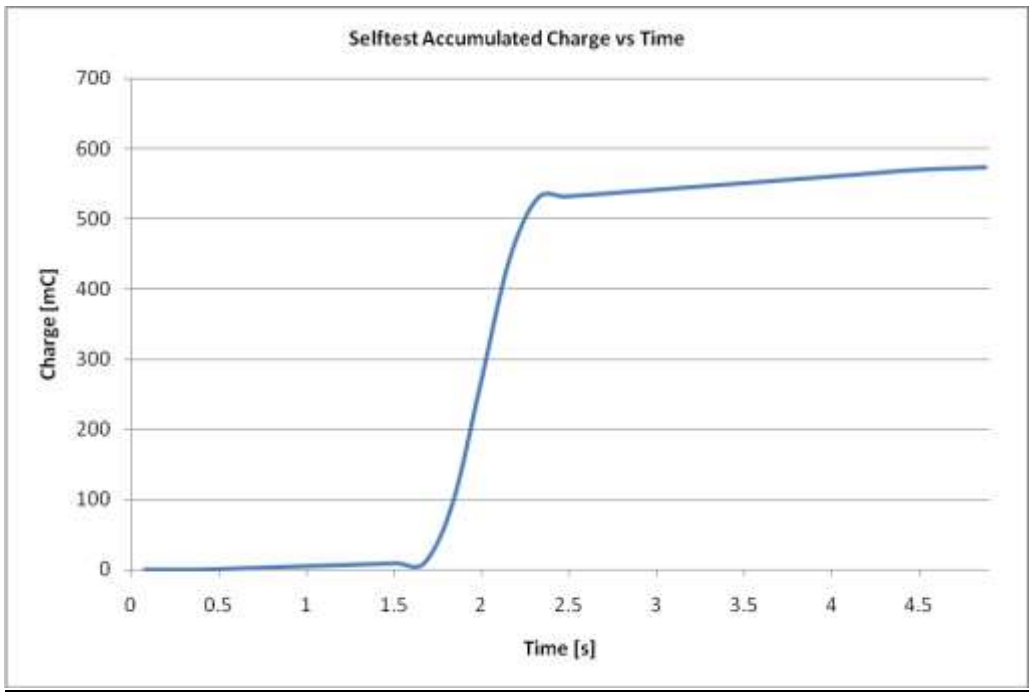
Battery Current and Measurement Results – Standby Mode



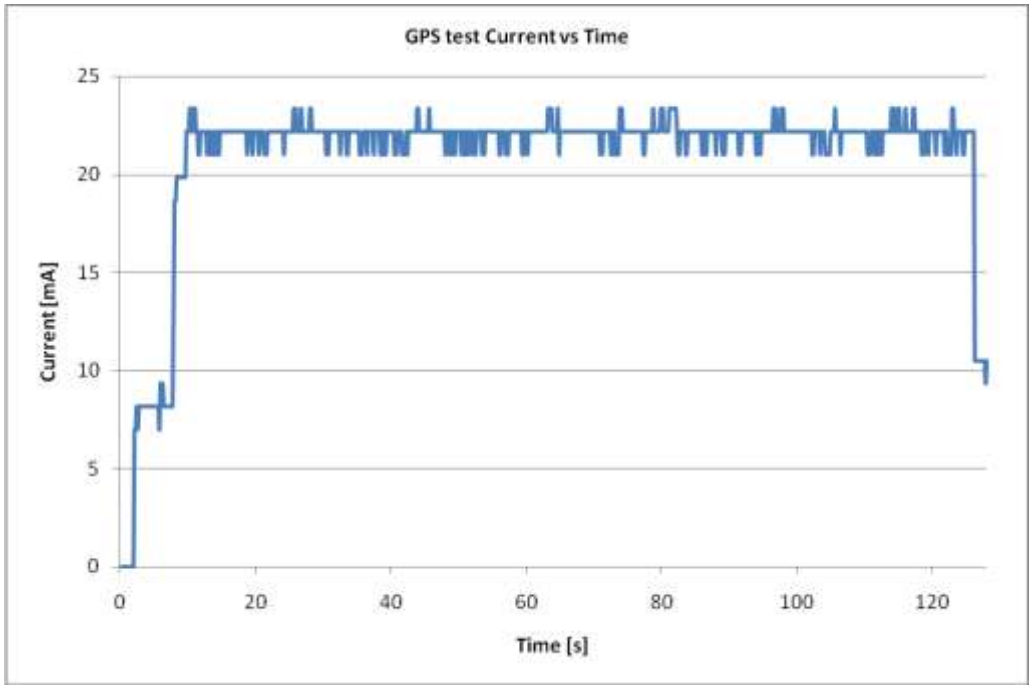


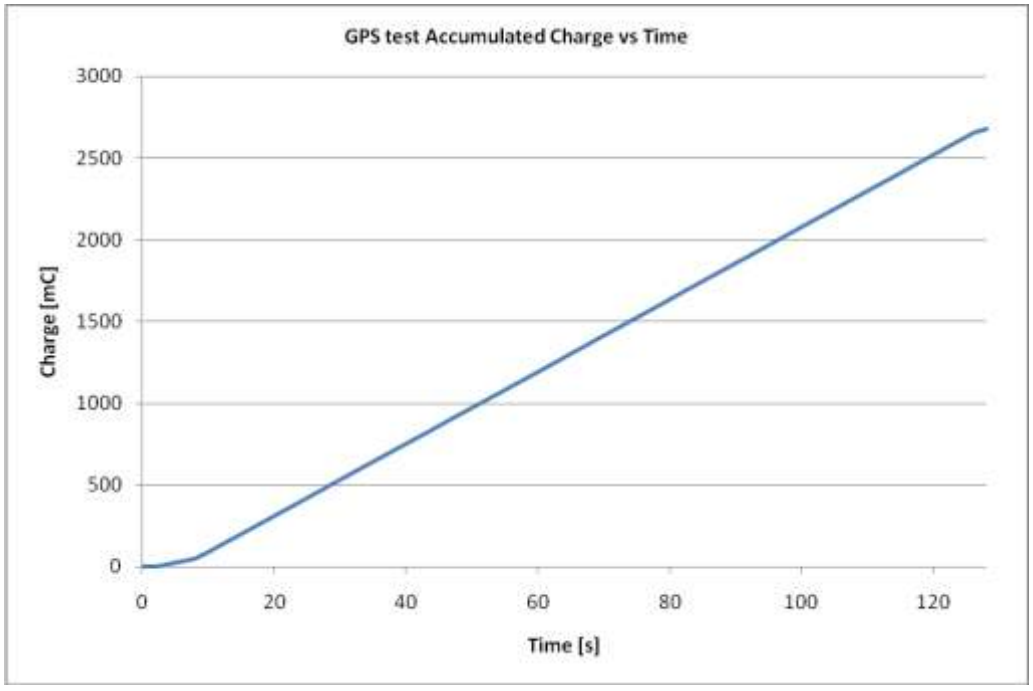
Battery Current and Measurement Results – Self-Test Mode



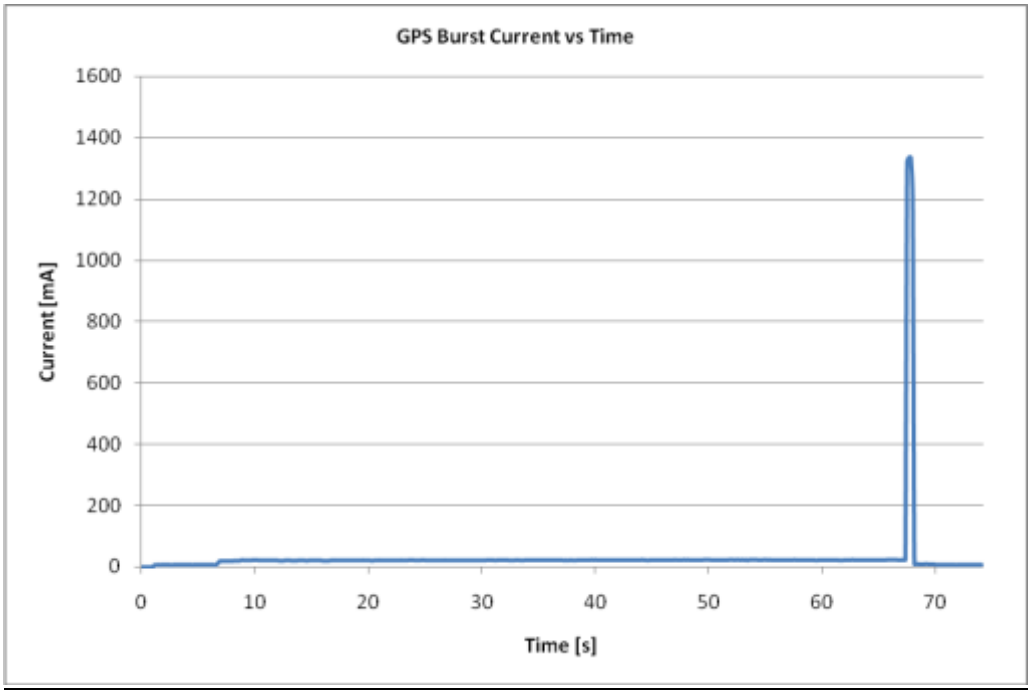


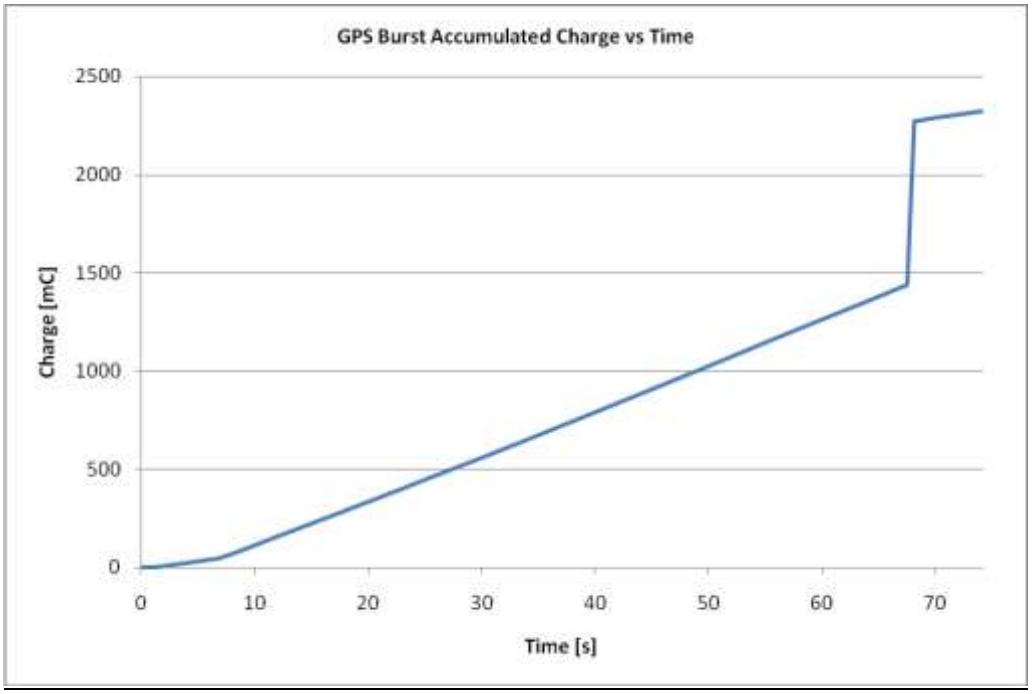
Battery Current and Measurement Results – GPS Test Mode



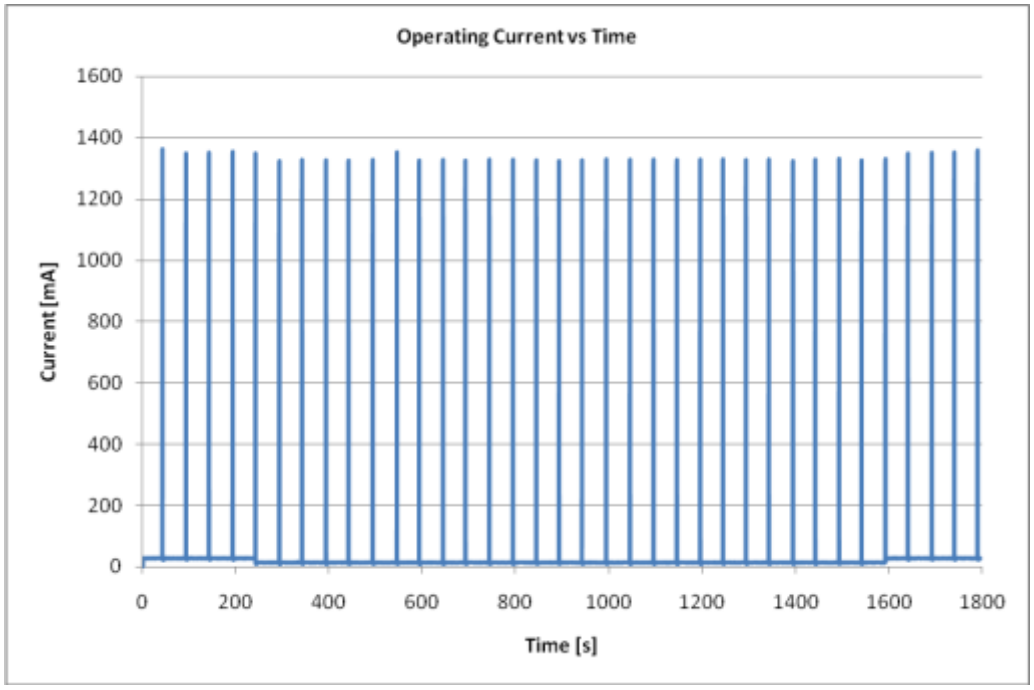


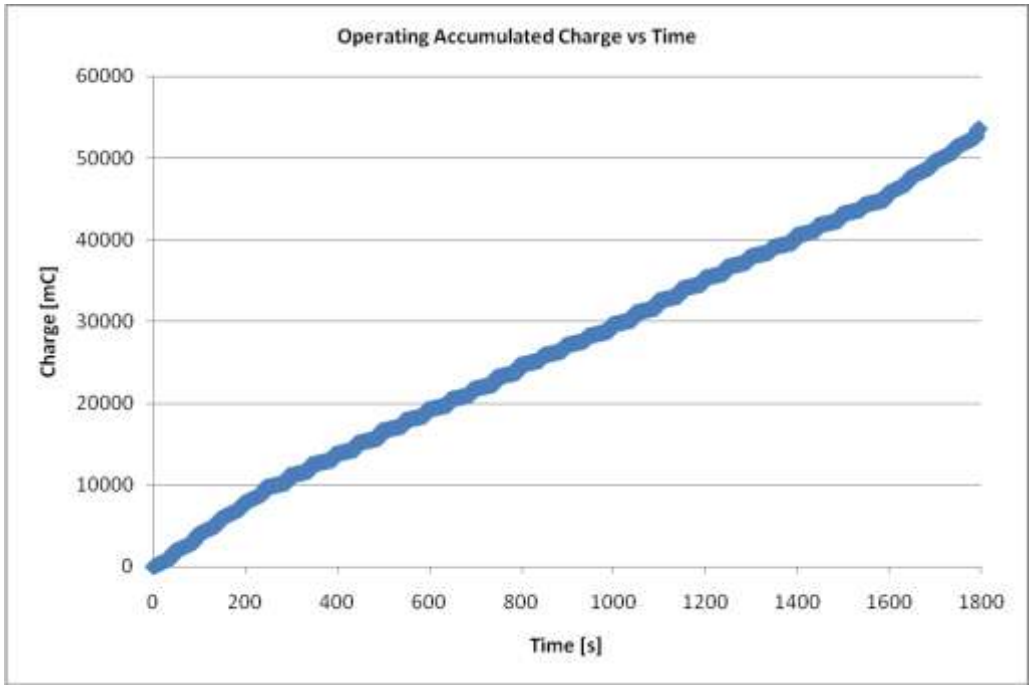
Battery Current and Measurement Results – GPS Burst Mode





Battery Current and Measurement Results – Operational Mode





2.15 SELF TEST

2.15.1 Specification Reference

RTCM 11010.2:2008, Clause A.13.2

2.15.2 Equipment Under Test

PLB-350A (Floatation), S/N #7
PLB-350B (Floatation), S/N #2
PLB-350B (Slim), S/N #3

2.15.3 Date of Test and Modification State

29 January, 03 & 17 February 2009 - Modification State 0

2.15.4 Test Equipment Used

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

2.15.5 Operating Modes

The test was performed with the EUT in the following mode(s): Self-test

2.15.6 Test Results

Summary of Self-test Results

PLB-350A (Floatation), S/N #7 – Non GPS Variant

Parameter	Limit/Units	Test Results		
		(-20°C)	(20°C)	(+55°C)
Self-test Indication	Pass/Fail	Pass		
Post-self-test deactivation	Pass/Fail	Pass		
Pulse duration	≤ 444 Ms	440.2951	440.422	439.9734
Frame sync pattern	011010000	Pass		
Number of bursts	1	1	1	1
15 Hex ID	Pass/Fail	Pass		
Self-test 121 MHz burst duration	< 1 second or 3 sweeps	Pass		

PLB-350B (Floatation), S/N #2 – GPS Variant

Parameter	Limit/Units	Test Results		
		(-20°C)	(20°C)	(+55°C)
Self-test Indication	Pass/Fail	Pass		
Post-self-test deactivation	Pass/Fail	Pass		
Pulse duration	≤ 444 Ms	440.4386	440.4559	440.4665
Frame sync pattern	011010000	Pass		
Number of bursts	1	1	1	1
15 Hex ID	Pass/Fail	Pass		
Self-test 121 MHz burst duration	< 1 second or 3 sweeps	Pass		

Digital Message

PLB-350A (Floatation), S/N #7 – Non GPS Variant

```
================================================================================
 Beacon Id Format......... 22 Hex Id, Short Message, Bits 25-112
 15 Hex (Bits 26- 85) = 993D400004001AD             993D400004001AD Default_Id
 30 Hex (Bits 25-144) = 4C9EA00002000D6A77978000000000

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 0 1001 1001 0011 1101 0100 0000 0000 0000 0000 0100 0000 0000 0001 1010 1101
   0100 1110 1111 0010 1111 0000 0000 0000 0000 0000 0000 0000 0000 0000 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            0 Short Message                              0
Protocol Flag      26            1 User                                       1
MID                27- 36      201 ALBANIA                          0011 0010 01
User Protocol      37- 39        7 Test                                    111
Spare              40- 63                          0101 0000 0000 0000 0000 0001
Spare              64- 83                               0000 0000 0000 0110 1011
Homing             84- 85        1 121.5                                    01
BCH Encoded        86-106          Errors=0             0100 1110 1111 0010 1111 0
BCH Generated      86-106                               0100 1110 1111 0010 1111 0
Emergency Cd Flag 107            0 National Use                               0
Beacon Activation 108            0 Manual only                                0
National Use      109-112                                                  0000

================================================================================
```

The digital message for Self-test was identical at all three test temperatures.

PLB-350B (Floatation), S/N #2 – GPS Variant

```
================================================================================
 Beacon Id Format......... 22 Hex Id, Short Message, Bits 25-112
 15 Hex (Bits 26- 85) = 2DDC5F0002FFBFF             2DDC5F0002FFBFF Default_Id
 30 Hex (Bits 25-144) = 96EE2F80017FDFF8EA71B700000000

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0010 1101 1101 1100 0101 1111 0000 0000 0000 0010 1111 1111 1011 1111 1111
   0001 1101 0100 1110 0011 0110 1110 0000 0000 0000 0000 0000 0000 0000 000
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   86   90   94   98  102  106  110  114  118  122  126  130  134  138  142

Field Name        Bit Pos    Value Decode                                  Bits
----------        -------    ----- ------                                  ----
Format Flag        25            1 Long Message: bcn entered Short Non-Spec   1
Protocol Flag      26            0 Location NEW                               0
MID                27- 36      366 USA                              0101 1011 10
Protocol Code      37- 40       14 Test Serial (Standard)                  1110
Spare              41- 64                          0010 1111 1000 0000 0000 0001
Coarse Position    65- 85          DEFAULT             0111 1111 1101 1111 1111 1
BCH Encoded        86-106          Errors=0            0001 1101 0100 1110 0011 0
BCH Generated      86-106                              0001 1101 0100 1110 0011 0
Fixed Bits        107-109                                                   110
Fixed Bit         110             1                                           1
Encode Pos Device 111             1 Internal                                  1
121.5 Homing      112             1 YES                                       1
Resultant Position               --> Not Defined

================================================================================
```

The digital message for Self-test was identical at all three test temperatures.

PLB-350B (Slim), S/N #3

GNSS Self Test Digital Message (Ambient)

```
Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 2DDE000119AE039              2DDE00013F81FE0 Default_Id
 30 Hex (Bits 25-144) = 96EF00008CD701CC95F23790040CA6

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0010 1101 1101 1110 0000 0000 0000 0001 0001 1001 1010 1110 0000 0011 1001
   1001 0010 1011 1110 0100 0110 1111 0010 0000 0000 1000 0001 1001 0100 110
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      366 USA                            0101 1011 10
Protocol Code      37- 40       15 Test (National)                      1111
Serial Number      41- 58        2                          0000 0000 0000 0000 10
Medium Position    59- 85          Data Present
Latitude Flag      59            0 North:                                    0
Latitude Degrees   60- 66       51  51 deg                          0110 011
Lat. Minutes /2    67- 71       11  22 min                            0101 1
Longitude Flag     72            1 West:                                     1
Long. Degrees      73- 80        1   1 deg                         0000 0001
Long. Minutes /2   81- 85       25  50 min                            1100 1
BCH Encoded        86-106          Errors=0           1001 0010 1011 1110 0100 0
BCH Generated      86-106                             1001 0010 1011 1110 0100 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                 110
More Data Flag    110            1 Position Data in bits 113-132             1
Encode Pos Device 111            1 Internal                                  1
121.5 Homing      112            1 YES                                       1
Position Change   113-126        Data Present
Lat. Change Sign  113            1 Plus:                                     1
Lat. Chg. Minutes 114-115        0  0 min                                   00
Lat. Chg. Secs /4 116-119        8 32 sec                                1000
Long Change Sign  120            0 Minus:                                    0
Long Chg. Minutes 121-122        0  0 min                                  00
Long Chg. Secs /4 123-126        1  4 sec                                0001
Resultant Position             -->  51.37556 LAT,   -1.83222 LONG
                   51 deg 22 min 32 sec N,    1 deg 49 min 56 sec W
National Use      127-132        0 Default                           0000 00
BCH Encoded       133-144          Errors=0                     1100 1010 0110
BCH Generated     133-144                                       1100 1010 0110
```

GNSS Self Test Digital Message (+55°C and -20°C)

Note: The digital message for GNSS Self-test was identical at the two extreme temperatures.

```
Beacon Id Format......... 30 Hex Id, Long Message, Bits 25-144
 15 Hex (Bits 26- 85) = 2DDE000119AE039              2DDE00013F81FE0 Default_Id
 30 Hex (Bits 25-144) = 96EF00008CD701CC95F2379208025B

   26   30   34   38   42   46   50   54   58   62   66   70   74   78   82
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
 1 0010 1101 1101 1110 0000 0000 0000 0001 0001 1001 1010 1110 0000 0011 1001
   1001 0010 1011 1110 0100 0110 1111 0010 0100 0001 0000 0000 0100 1011 011
   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
   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      366 USA                              0101 1011 10
Protocol Code      37- 40       15 Test (National)                        1111
Serial Number      41- 58        2                         0000 0000 0000 0000 10
Medium Position    59- 85          Data Present
Latitude Flag      59            0 North:                                      0
Latitude Degrees   60- 66       51  51 deg                             0110 011
Lat. Minutes /2    67- 71       11  22 min                               0101 1
Longitude Flag     72            1 West:                                       1
Long. Degrees      73- 80        1   1 deg                             0000 0001
Long. Minutes /2   81- 85       25  50 min                               1100 1
BCH Encoded        86-106          Errors=0           1001 0010 1011 1110 0100 0
BCH Generated      86-106                             1001 0010 1011 1110 0100 0
Long Message      107-144          Data Present
Fixed Bits        107-109                                                   110
More Data Flag    110            1 Position Data in bits 113-132               1
Encode Pos Device 111            1 Internal                                    1
121.5 Homing      112            1 YES                                         1
Position Change   113-126          Data Present
Lat. Change Sign  113            1 Plus:                                       1
Lat. Chg. Minutes 114-115        0  0 min                                     00
Lat. Chg. Secs /4 116-119        9 36 sec                                  1001
Long Change Sign  120            0 Minus:                                      0
Long Chg. Minutes 121-122        0  0 min                                     00
Long Chg. Secs /4 123-126        2  8 sec                                  0010
Resultant Position              -->  51.37667 LAT,   -1.83111 LONG
                   51 deg 22 min 36 sec N,    1 deg 49 min 52 sec W
National Use      127-132        0 Default                                0000 00
BCH Encoded       133-144          Errors=0                       0010 0101 1011
BCH Generated     133-144                                         0010 0101 1011
```

Position Error (Ambient)

Position	Latitude	Longitude
Input ①	N 51° 22' 35"	W 001° 49' 50"
Output (as decoded message above)	N 51° 22' 32"	W 001° 49' 56"
Error	148.0 m	

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

① Input from GPS simulator.

Position Error (+55°C and -20°C)

Position	Latitude	Longitude
Input ①	N 51° 22' 35"	W 001° 49' 50"
Output (as decoded message above)	N 51° 22' 36"	W 001° 49' 52"
Error	50.1 m	

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

① Input from GPS simulator.

Actual GNSS Self-test Duration

During the capture of the Digital Messages, above, a stopwatch was used to record the following times.

Parameter	Result		
	Low (-20°C)	Ambient	High (+55°C)
Time from button press to GNSS Self-test mode activation	5.87 s	5.91 s	5.82 s
Time from GNSS Self-test mode activation to Indication of success and Burst transmission	36.28 s	58.74	57.84 s
Difference, i.e. Actual GNSS Self-test duration	30.41 s	52.83 s	52.02 s

Note: Input from GPS simulator as per Digital Message and Position Error, above.

Maximum GNSS Self-test Duration

The EUT was placed in the GNSS Self-test mode and a stopwatch was used to record the following times:

Parameter	Result		
	Low (-20°C)	Ambient	High (+55°C)
Time from button press to GNSS Self-test mode activation	5.78	5.81 s	5.81 s
Time from GNSS Self-test mode activation to Indication of failure	124.42	124.48 s	124.31
Difference, i.e. Maximum GNSS Self-test duration	118.64 s	118.67 s	118.50 s

Note: No navigation Data input was provided for this test.

Maximum Number of GNSS Self-tests

GNSS Self-tests were conducted repeatedly until the EUT indicated that no more were possible. The maximum number of GNSS Self-tests allowed by the EUT was 12.

2.16 COSPAS-SARSAT TYPE APPROVAL

2.16.1 Specification Reference

RTCM 11010.2:2008, Clause A.14

2.16.2 Test Results

EUT Tested in accordance with Cospas-Sarsat T.001 Issue 3 Revision 8 November 2007 and Cospas-Sarsat T.007 Issue 4 Revision 2 November 2007 and submitted to Cospas-Sarsat Secretariat for approval.

Copies of the Cospas-Sarsat Type Approval Certificates (TAC) can be found at Annex B.

This is intended to show compliance with the above Specification References.

2.17 BUOYANCY TEST (CATEGORY 1 ONLY)

2.17.1 Specification Reference

RTCM 11010.2:2008, Clause A.15

2.17.2 Equipment Under Test

PLB-350A (Floatation), Serial Number #20
PLB-350B (Floatation), Serial Number #22

2.17.3 Date of Test and Modification State

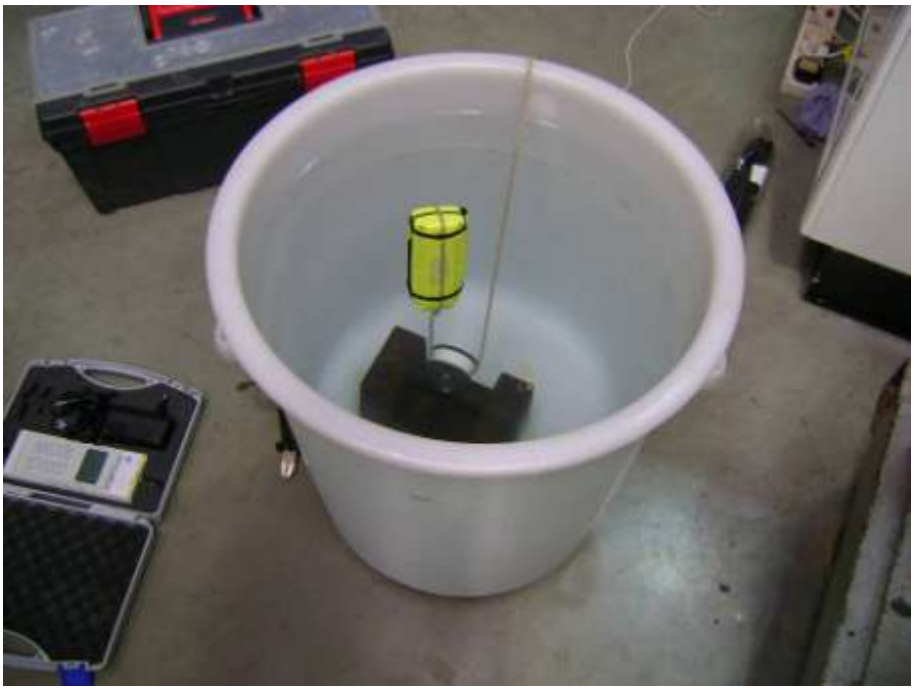
30 April 2009 - Modification State 0

2.17.4 Test Equipment Used

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

2.17.5 Test Set-up and Operating Modes

The test was performed with the EUT in the following mode(s): Idle



Test Set-up

2.17.6 Test Results

A vessel was filled with domestic tap water. A large mass with a pulley attachment was submerged into the tank, the pulley converted an angled force supplied by the test engineer into a downwards force, completely submerging the EUT. The upwards vertical force (buoyant force) supplied to the EUT was measured with a force gauge. It was a positive force and hence the test was complete and the EUT complied. The buoyancy is calculated below for information.

PLB-350A

EUT mass	=	0.245 kg	(measured)
EUT weight	=	2.403 N	(calculated by multiplying weight by g = 9.81)

Buoyant forces measured were 0.441, 0.427 and 0.421 N

Mean = 0.430 N

$$\text{Buoyancy} = \frac{\text{Buoyant Force}}{\text{Weight}} = \frac{0.430}{2.403}$$

Buoyancy = 0.1789

= 17.89 %

PLB-350B

EUT mass	=	0.264 kg	(measured)
EUT weight	=	2.590 N	(calculated by multiplying weight by g = 9.81)

Buoyant forces measured were 0.276, 0.264 and 0.238 N

Mean = 0.259 N

$$\text{Buoyancy} = \frac{\text{Buoyant Force}}{\text{Weight}} = \frac{0.259}{2.590}$$

Buoyancy = 0.1

= 10 %

Note: EUT is not required to operate floating in water; hence the Floating Upright Test is not applicable.

2.18 AUXILIARY RADIO LOCATING DEVICE TRANSMITTER TEST (CARRIER FREQUENCY)

2.18.1 Specification Reference

RTCM 11010.2:2008, Clause A.16.1

2.18.2 Equipment Under Test

PLB-350B (Slim), Serial Number #2
PLB-350A (Floatation), Serial Number #7

2.18.3 Date of Test and Modification State

21, 22, 28, 29 May 2009 and 22 June 2009 - Modification State 0

2.18.4 Test Equipment Used

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

2.18.5 Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.18.6 Test Results

Note: Though not required by the above Specification Reference, Ambient Temperature results are shown for information.

PLB-350B (Slim), Serial Number: #2 (TUV Reference 75905359_015)

Parameter	Limit	Units	Test Results		
			T_{min} (-20°C)	T_{amb}	T_{max} (+55°C)
Carrier Frequency	121.5 ± 0.006	MHz	121.5013840	121.5006798	121.4992158

PLB-350A (Floatation), Serial Number: #7 (TUV Reference 75905359_005)

Parameter	Limit	Units	Test Results		
			T_{min} (-20°C)	T_{amb}	T_{max} (+55°C)
Carrier Frequency	121.5 ± 0.006	MHz	121.5009417	121.5007322	121.4999525

2.19 AUXILIARY RADIO LOCATING DEVICE TRANSMITTER TEST (TRANSMITTER DUTY CYCLE)

2.19.1 Specification Reference

RTCM 11010.2:2008, Clause A.16.2

2.19.2 Equipment Under Test

PLB-350B (Slim), Serial Number #2
PLB-350A (Floatation), Serial Number #7

2.19.3 Date of Test and Modification State

26, 28 & 29 May and 22 June 2009 - Modification State 0

2.19.4 Test Equipment Used

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

2.19.5 Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.19.6 Test Results

Note: Though not required by the above Specification Reference, Ambient Temperature results are shown for information.

Note: Transmitter Duty Cycle = $\frac{\text{interval - duration}}{\text{interval}}$

PLB-350B (Slim), S/N #2

Parameter	Units	Test Results		
		T_{min} (-20°C)	T_{amb} *	T_{max} (+55°C)
121.5 MHz transmission interruption interval	seconds	48.4930	48.8940 *	48.4023
121.5 MHz transmission interruption duration	seconds	1.7132	1.7126 *	1.7140
Transmitter Duty Cycle	%	96.5	96.5	96.4

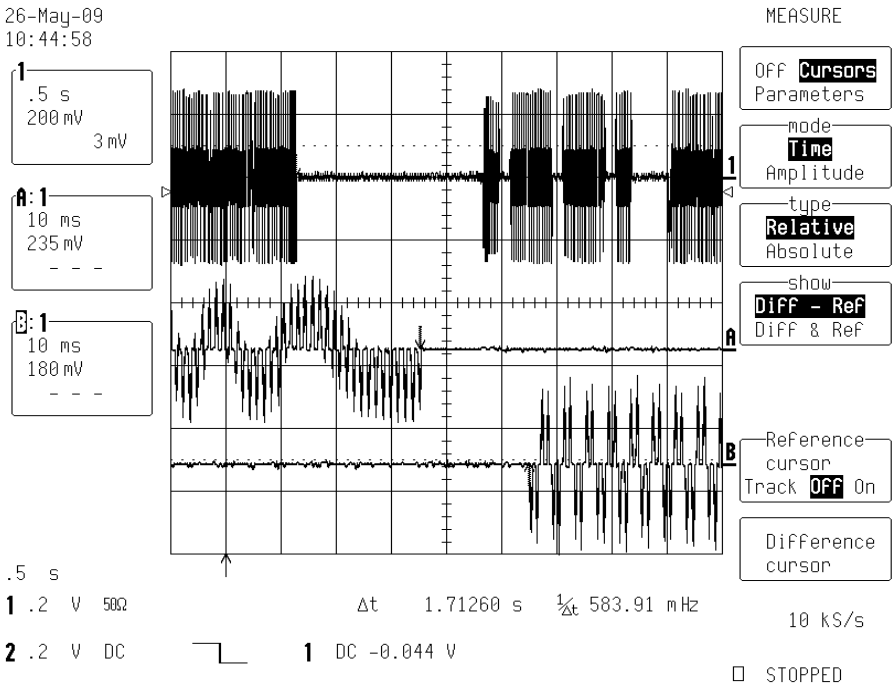
* See 'Plots' below

PLB-350A (Floatation), S/N #7

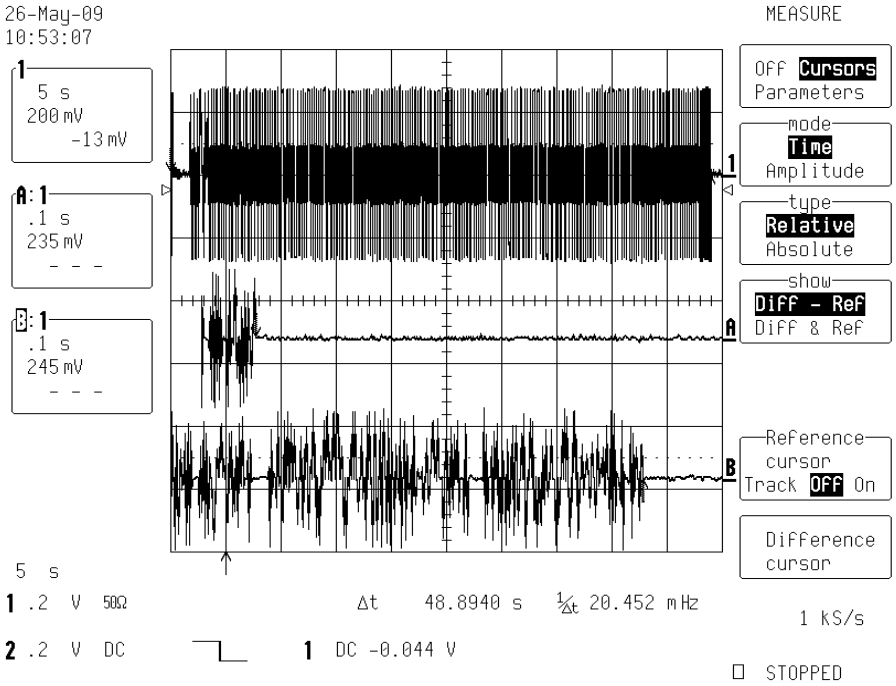
Parameter	Units	Test Results		
		T_{min} (-20°C)	T_{amb}	T_{max} (+55°C)
121.5 MHz transmission interruption interval	Seconds	48.5939	47.7353	49.2457
121.5 MHz transmission interruption duration	Seconds	1.6861	1.9087	1.6539
Transmitter Duty Cycle	%	96.5	96.0	96.6

Plots

The following plots show the measurement of the interval and duration values of the PLB-350B (Slim), Serial Number #2 at Ambient Temperature only as an example. The other parameters and temperatures were measured the same way.



Plot showing 121.5MHz interruption duration (Ambient Temperature)



Plot showing 121.5MHz interruption interval (Ambient Temperature)

2.20 AUXILIARY RADIO LOCATING DEVICE TRANSMITTER TEST (MODULATION FREQUENCY, SWEEP REPETITION RATE AND MODULATION DUTY CYCLE)

2.20.1 Specification Reference

RTCM 11010.2:2008, Clause A.16.2

2.20.2 Equipment Under Test

PLB-350B (Slim), Serial Number #2
PLB-350A (Floatation), Serial Number #7

2.20.3 Date of Test and Modification State

21, 22, 28 & 29 May and 22 June 2009 - Modification State 0

2.20.4 Test Equipment Used

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

2.20.5 Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.20.6 Test Results

Note: Though not required by the above Specification Reference, Ambient Temperature results are shown for information.

The EUT was connected to the automated test rack, the following results were obtained.

PLB-350B (Slim), S/N #2

Parameter	Units	Test Results		
		T_{min} (-20°C)	T_{amb}	T_{max} (+55°C)
Frequency Range	Hz	1035.07	1028.61	1033.40
Minimum Frequency	Hz	536.84	536.48	536.45
Maximum Frequency	Hz	1571.91	1565.09	1569.85
Sweep Direction	Upward / Downward	Downward	Downward	Downward
Modulation Duty Cycle	%	34.63	36.15	36.94
Sweep repetition rate	sweeps per second	2.65	2.65	2.65

PLB-350A (Floatation), S/N #7

Parameter	Units	Test Results		
		T_{min} (-20°C)	T_{amb}	T_{max} (+55°C)
Frequency Range	Hz	1036.18	1032.94	1028.46
Minimum Frequency	Hz	535.92	536.77	536.48
Maximum Frequency	Hz	1572.10	1569.70	1564.94
Sweep Direction	Upward / Downward	Downward	Downward	Downward
Modulation Duty Cycle	%	34.63	36.47	36.94
Sweep repetition rate	sweeps per second	2.65	2.65	2.65

2.21 AUXILIARY RADIO LOCATING DEVICE TRANSMITTER TEST (MODULATION FACTOR)

2.21.1 Specification Reference

RTCM 11010.2:2008, Clause A.16.2

2.21.2 Equipment Under Test

PLB-350B (Slim), Serial Number #2
PLB-350A (Floatation), Serial Number #7

2.21.3 Date of Test and Modification State

26, 28 & 29 May and 22 June 2009 - Modification State 0

2.21.4 Test Equipment Used

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

2.21.5 Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.21.6 Test Results

Note: Though not required by the above Specification Reference, Ambient Temperature results are shown for information.

Note: Modulation Factor = (A - B) / (A + B)

PLB-350B (Slim), S/N #2

Parameter	Units	Test Results		
		T_{min} (-20°C)	T_{amb} *	T_{max} (+55°C)
A	mV	788	267 *	269
B	mV	22	11 *	9
Modulation Factor	(no units)	0.946	0.921	0.935

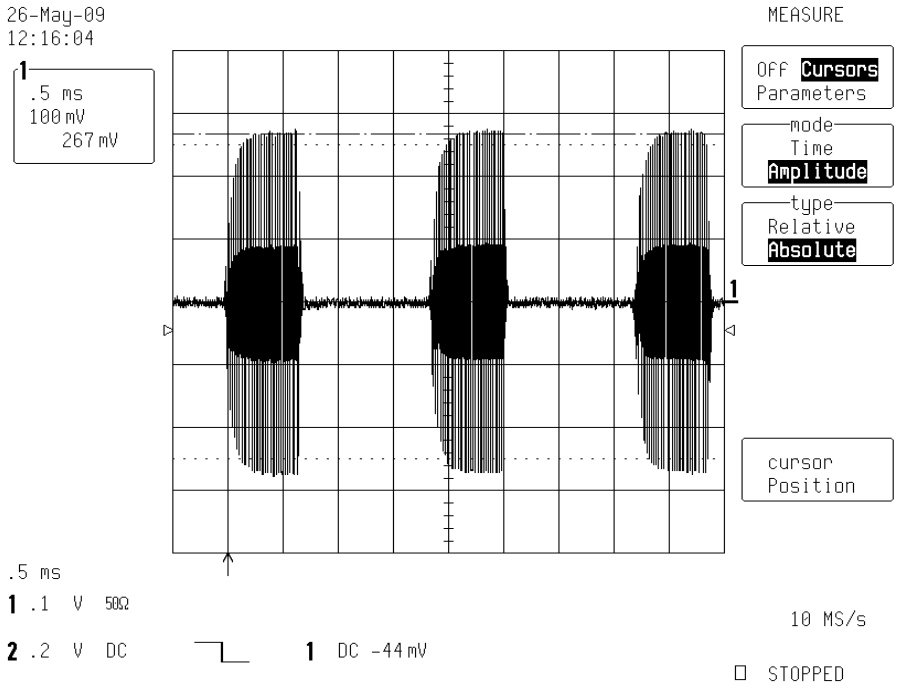
* See 'Plots' below

PLB-350A (Floatation), S/N #7

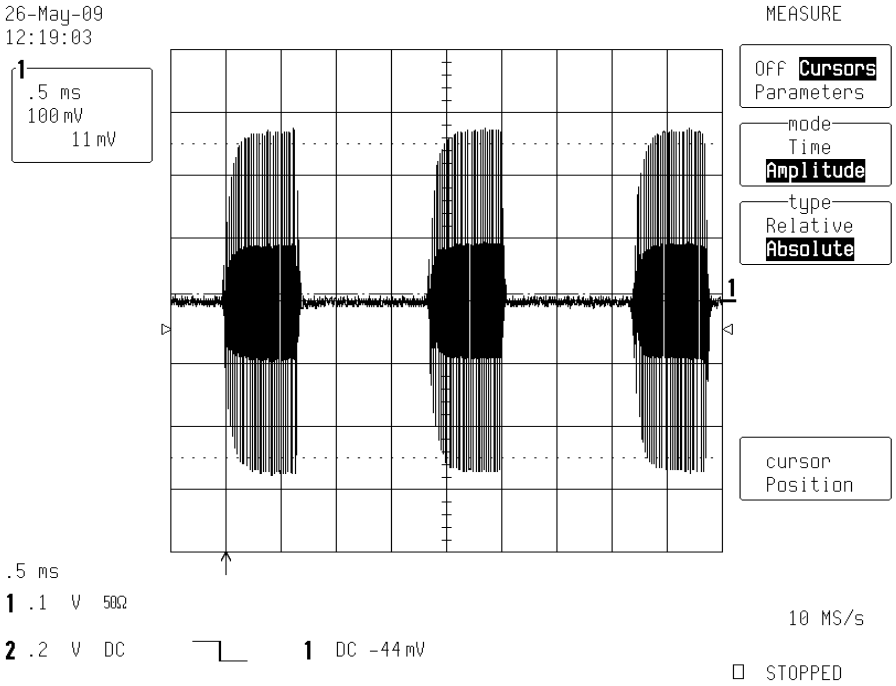
Parameter	Units	Test Results		
		T_{min} (-20°C)	T_{amb}	T_{max} (+55°C)
A	mV	809	850	266
B	mV	16	25	9
Modulation Factor	(no units)	0.961	0.943	0.935

Plots

The following plots show the measurement of the A and B values of the PLB-350B (Slim), Serial Number #2 at Ambient Temperature only as an example. The other parameters and temperatures were measured the same way.



Plot showing “A” (Ambient Temperature)



Plot Showing “B” (Ambient Temperature)

2.22 AUXILIARY RADIO LOCATING DEVICE TRANSMITTER TEST (FREQUENCY COHERENCE)

2.22.1 Specification Reference

RTCM 11010.2:2008, Clause A.16.2

2.22.2 Equipment Under Test

PLB-350B (Slim), Serial Number #2
PLB-350A (Floatation), Serial Number #7

2.22.3 Date of Test and Modification State

27, 28, 29 May and 01 & 22 June 2009 - Modification State 0

2.22.4 Test Equipment Used

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

2.22.5 Operating Modes

The test was performed with the EUT in the following mode(s): Operating

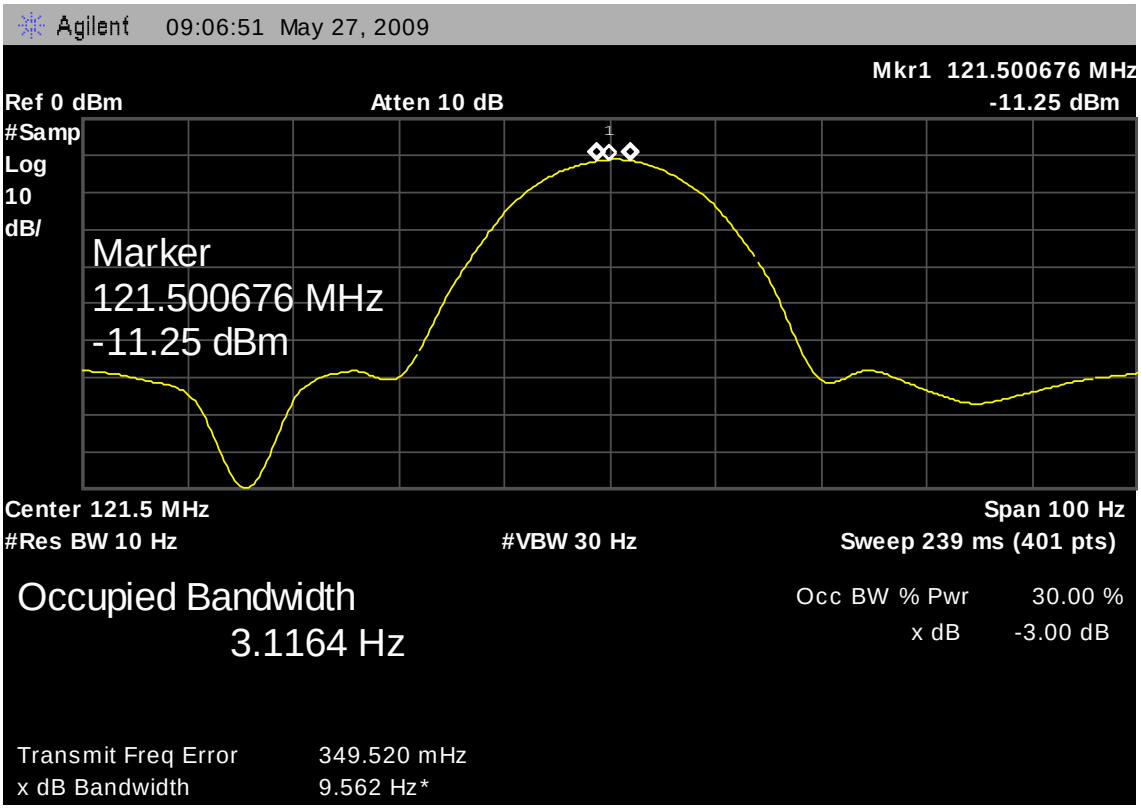
2.22.6 Test Results

Note: Though not required by the above Specification Reference, Ambient Temperature results are shown for information.

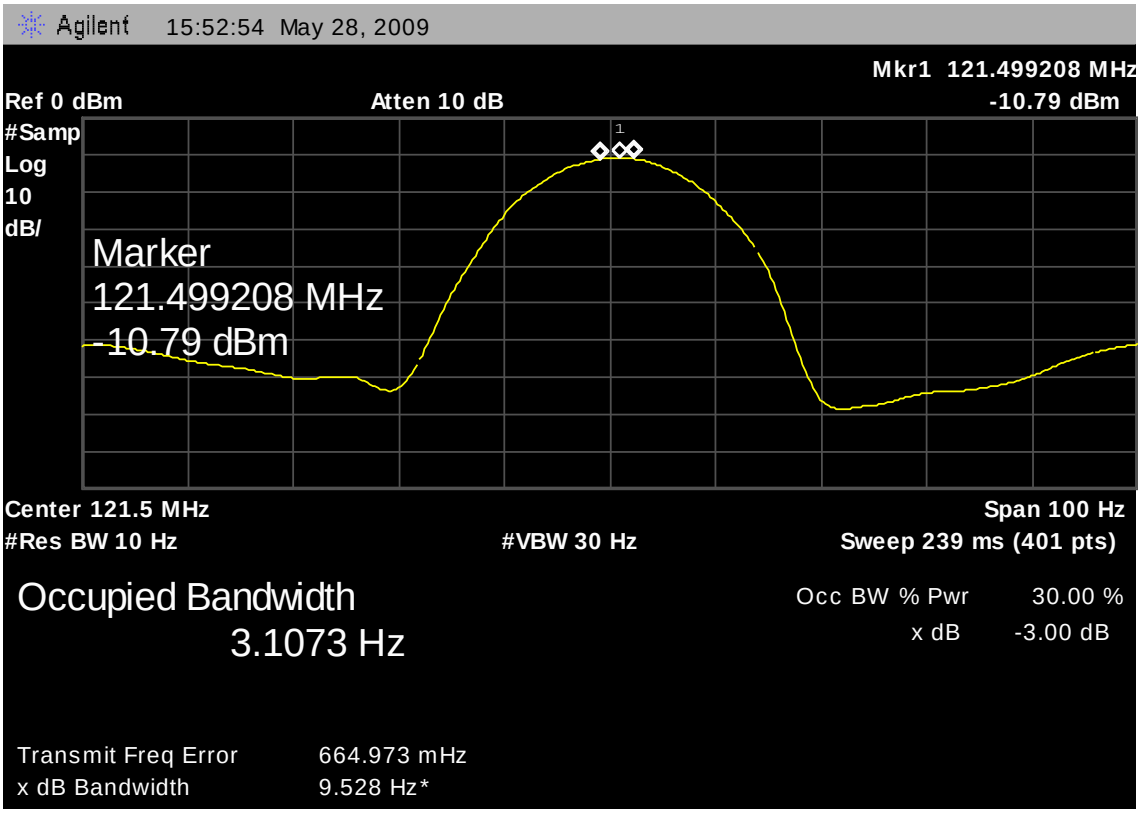
The following Occupied Bandwidth plots show markers encompassing 30% of the total power emitted during a transmission cycle and the corresponding bandwidth. If the occupied bandwidth is <30Hz the test requirements are satisfied.

The following Frequency Shift plots show two traces, the first is the transmitter output envelope for a brief period *before* the 406 MHz burst, the second is the envelope *after* the burst. The two markers are positioned on the peak of each plot. If the markers are within 30 Hz of one another the test requirements are satisfied.

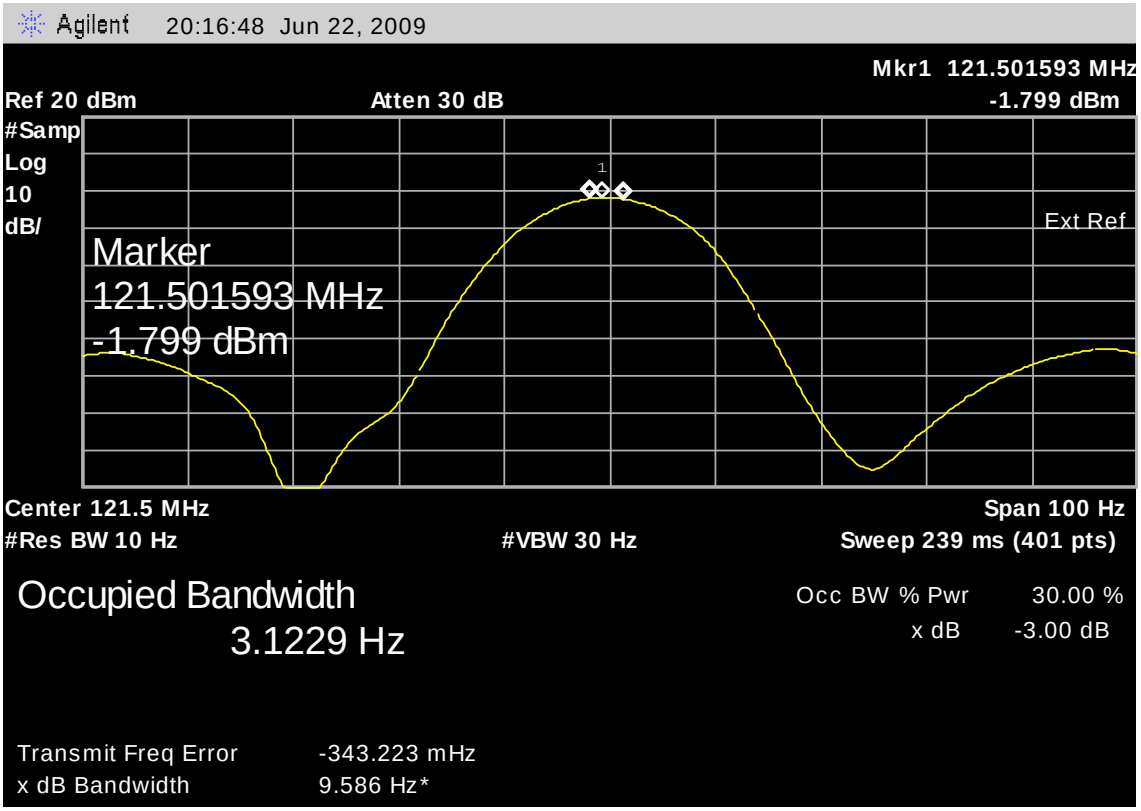
PLB-350B (Slim), S/N #2



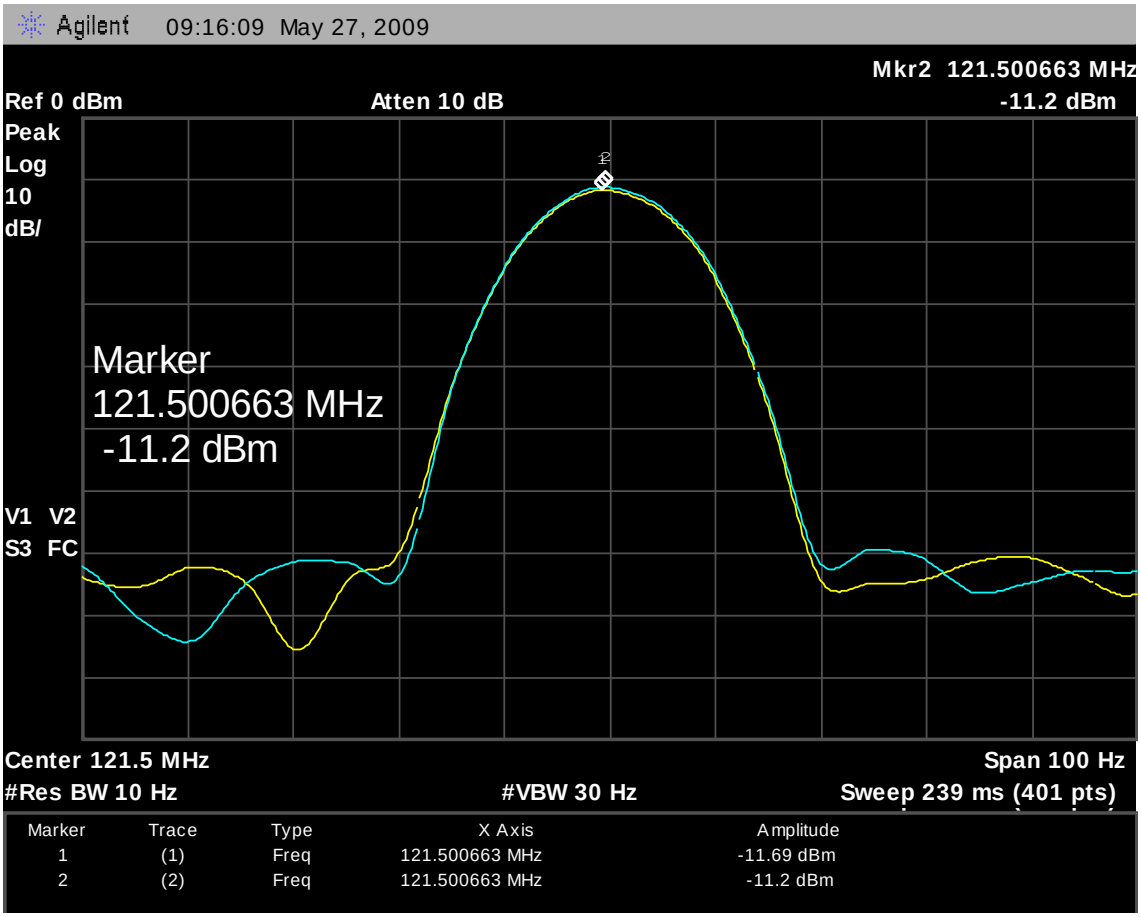
Occupied Bandwidth Plot for Ambient Temperature



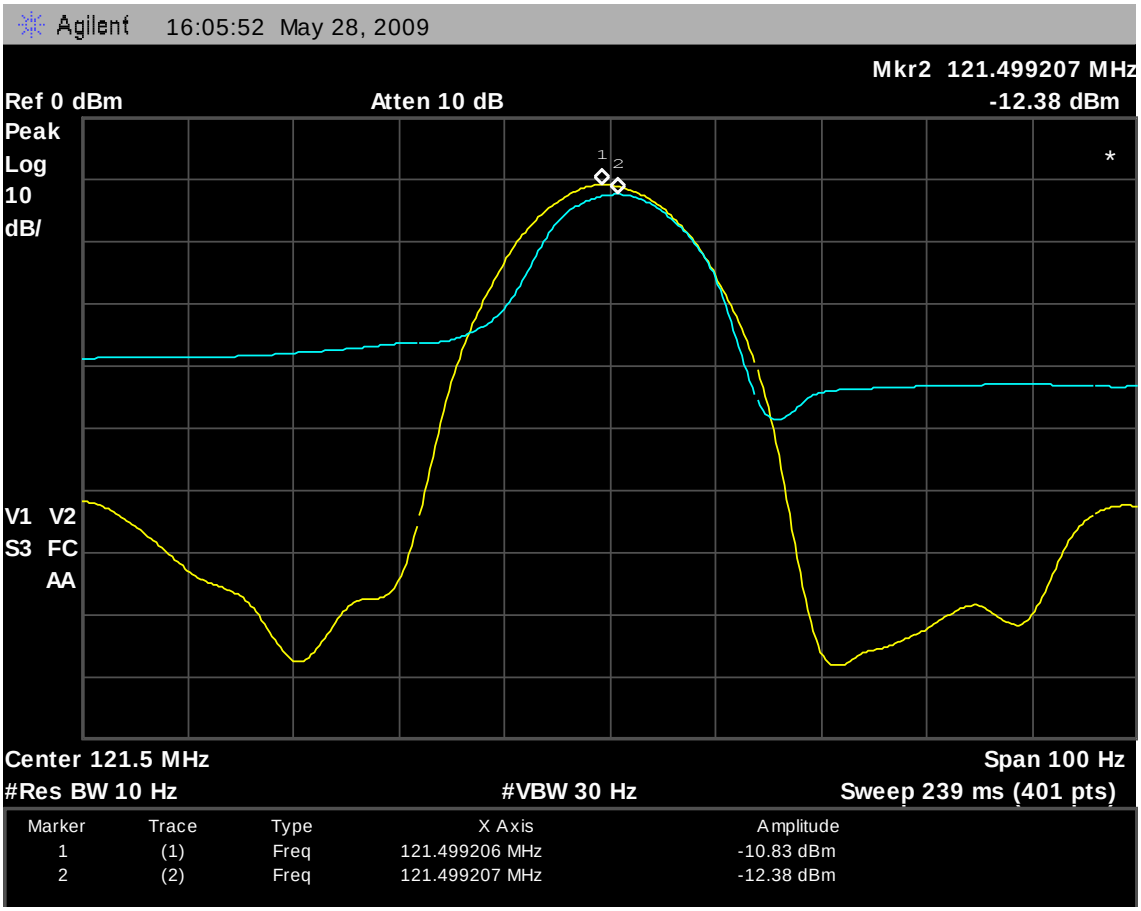
Occupied Bandwidth Plot for Maximum Temperature (+55ºC)



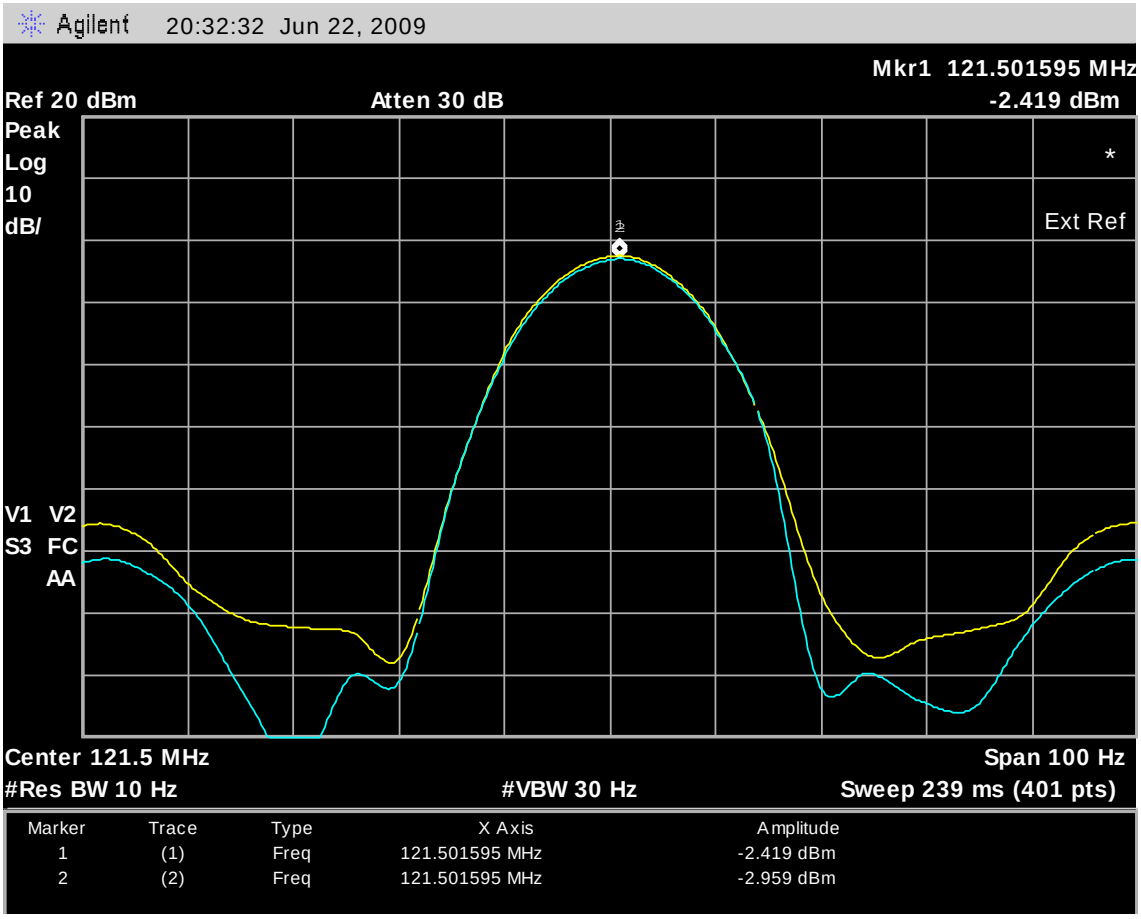
Occupied Bandwidth Plot for Minimum Temperature (-20ºC)



Frequency Shift Plot for Ambient Temperature

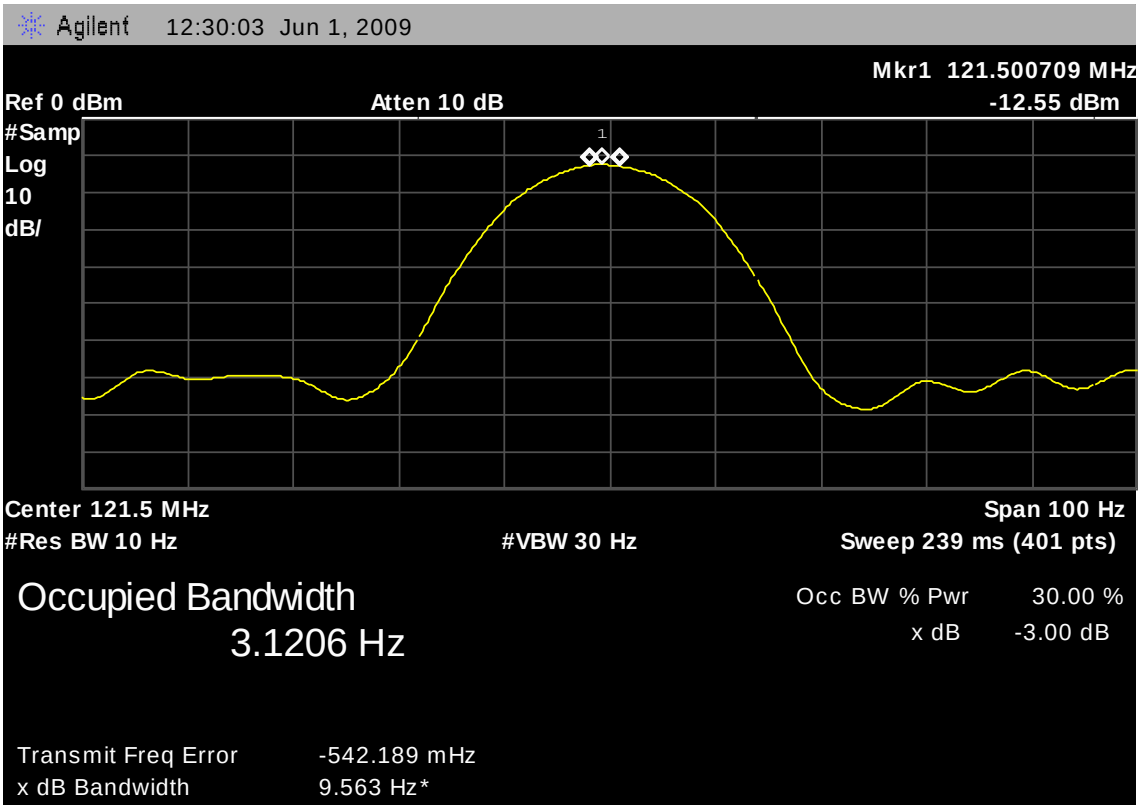


Frequency Shift Plot for Maximum Temperature +55ºC

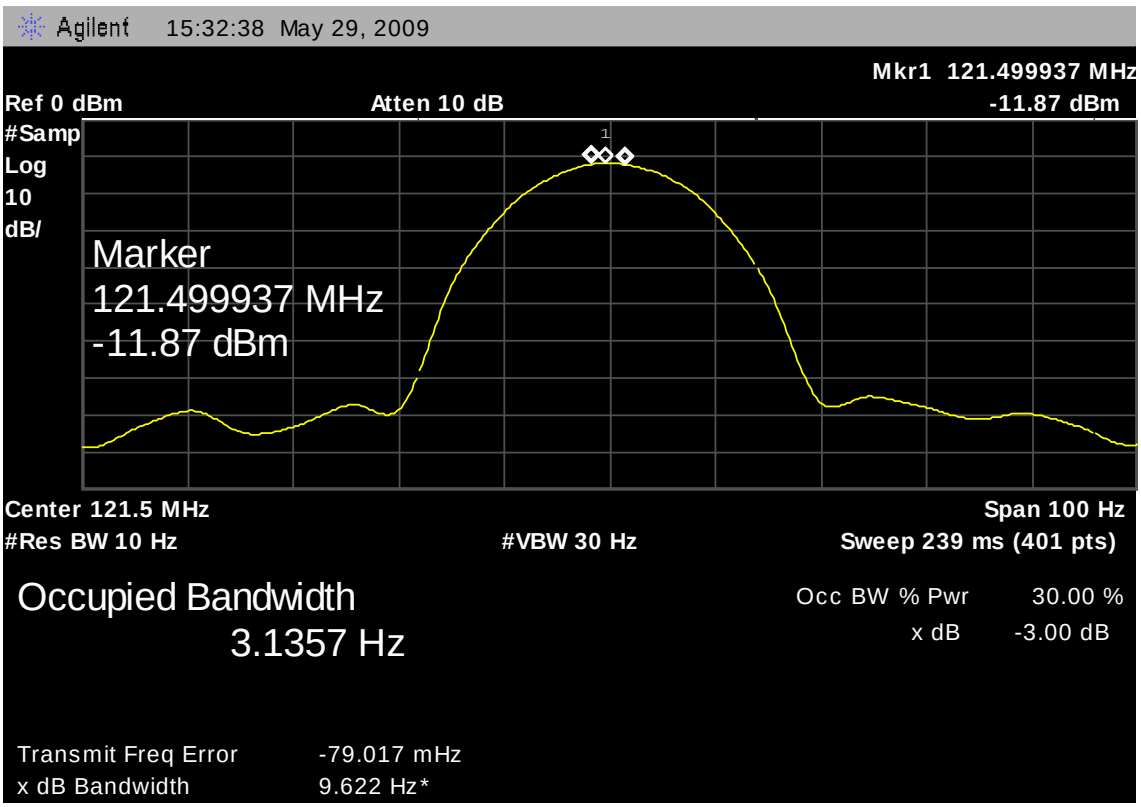


Frequency Shift Plot for Minimum Temperature -20ºC

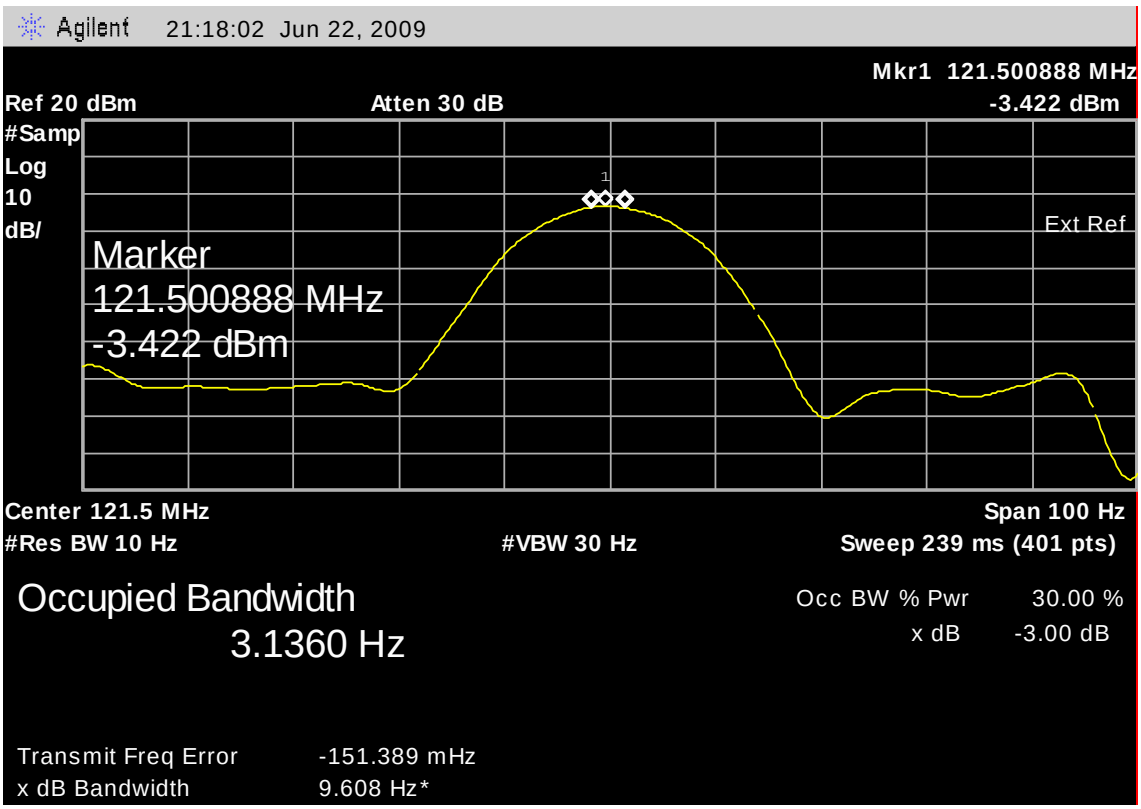
PLB-350A (Floatation), S/N #5



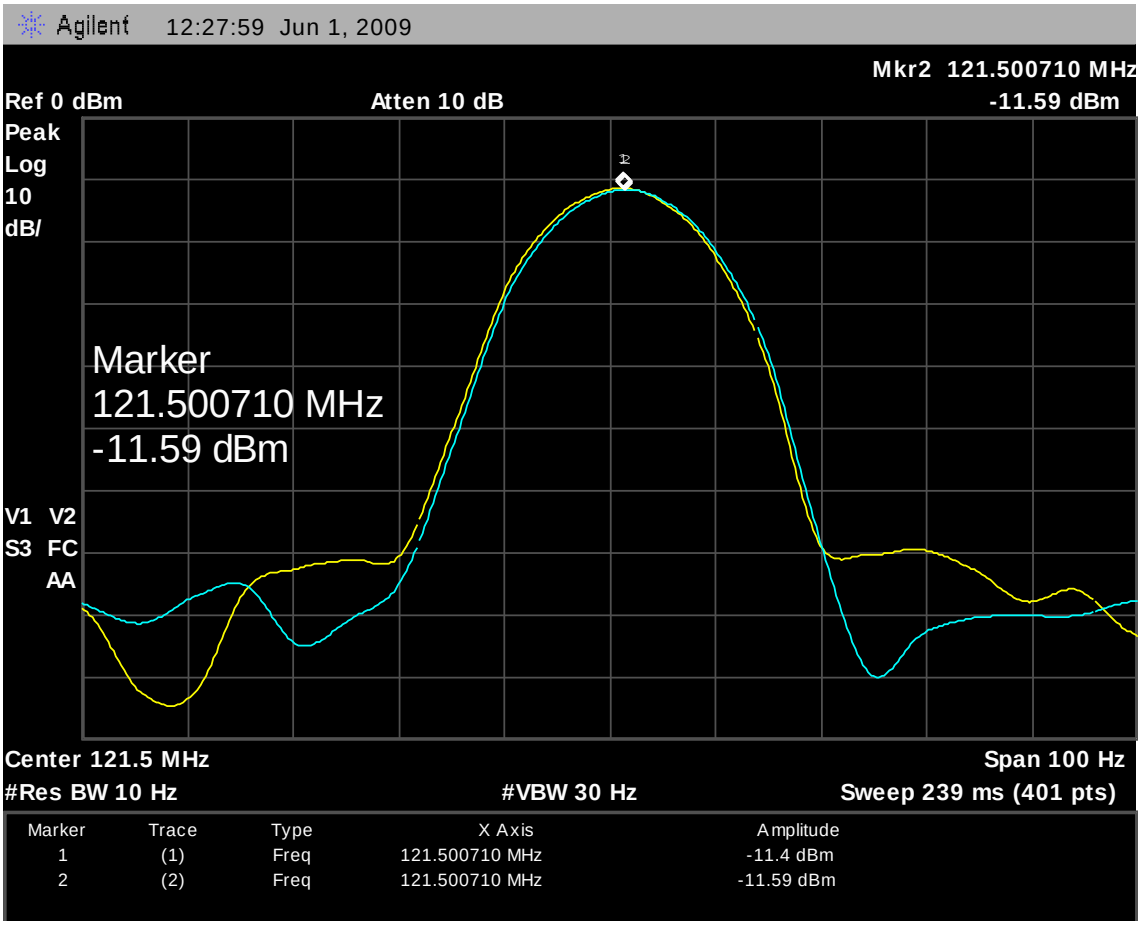
Occupied Bandwidth Plot for Ambient Temperature



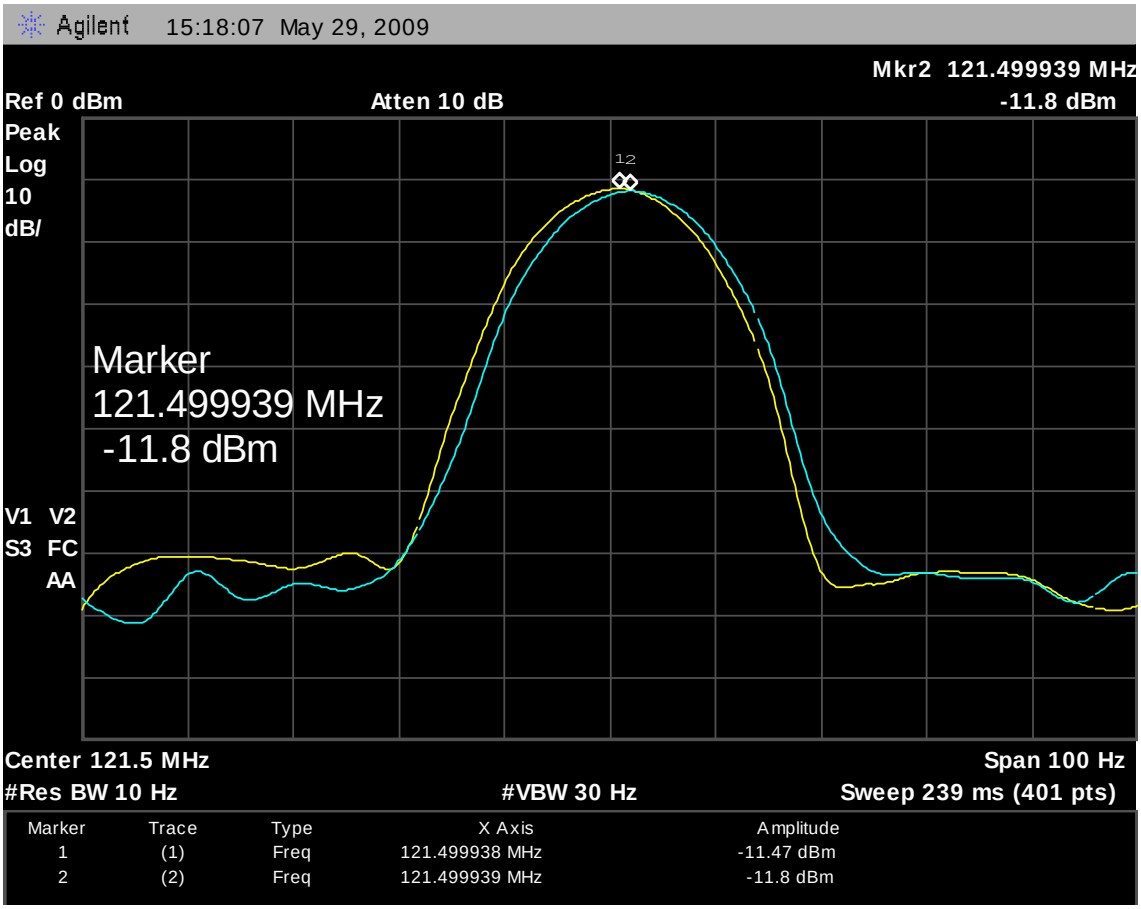
Occupied Bandwidth Plot for Maximum Temperature (+55ºC)



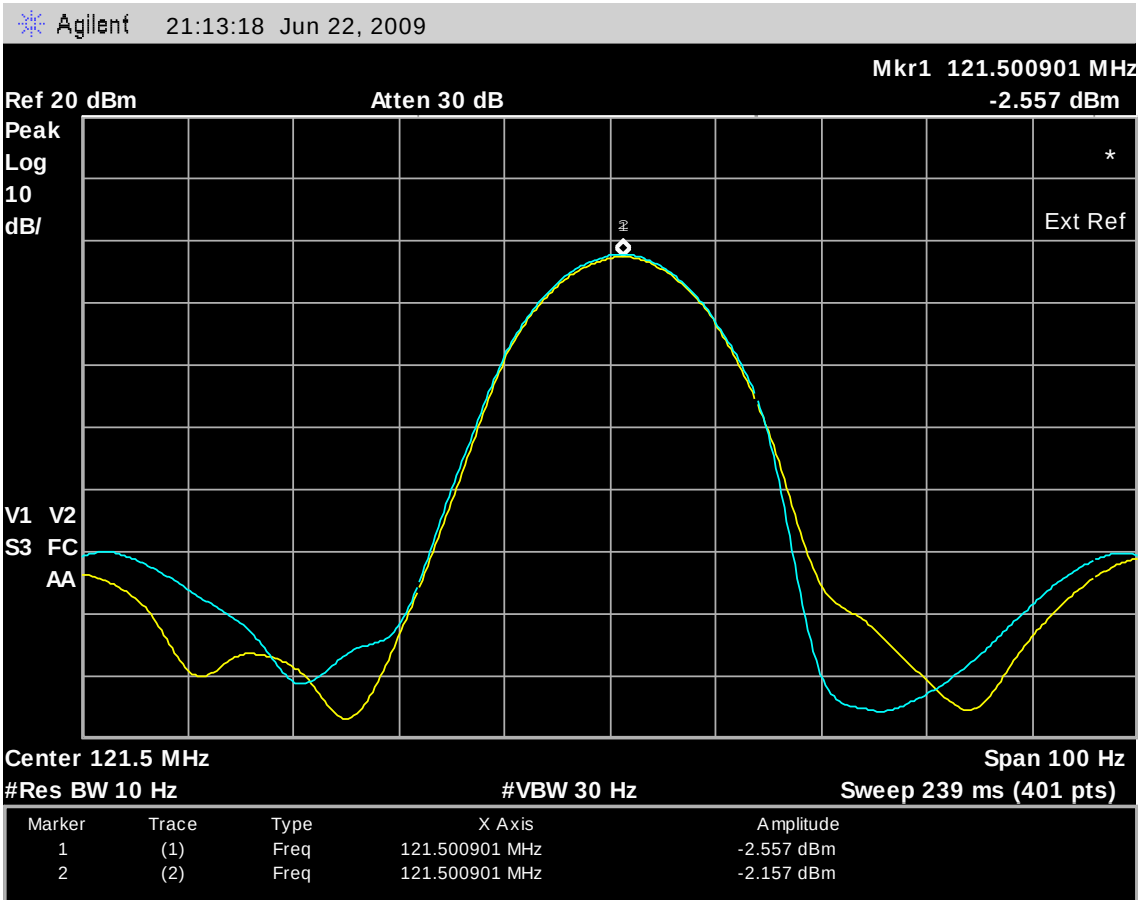
Occupied Bandwidth Plot for Minimum Temperature (-20ºC)



Frequency Shift Plot for Ambient Temperature



Frequency Shift Plot for Maximum Temperature +55ºC



Frequency Shift Plot for Minimum Temperature -20ºC

2.23 AUXILIARY RADIO LOCATING DEVICE TRANSMITTER TEST (MORSE LETTER P)

2.23.1 Specification Reference

RTCM 11010.2:2008, Clause A.16.2

2.23.2 Equipment Under Test

PLB-350B (Slim), Serial Number: Not Serialised (TUV Reference 75905359_055)

2.23.3 Date of Test and Modification State

12 and 15 June 2009 - Modification State 1

2.23.4 Test Equipment Used

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

2.23.5 Operating Modes

The test was performed with the EUT in the following mode(s): Operating

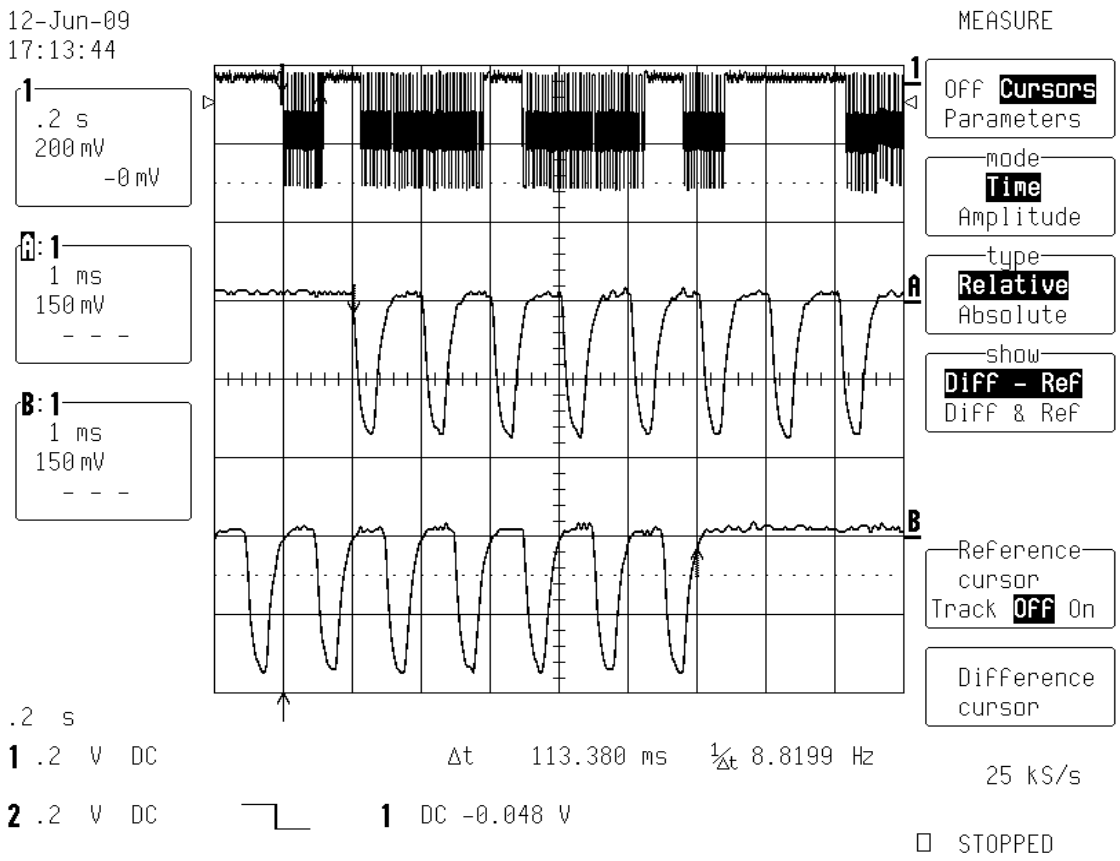
2.23.6 Test Results

Both the PLB-350B (Slim), S/N #2 and the PLB-350A (Floatation), S/N #7 were yielding failures for several (but not all) parameters. The Customer confirmed that a change in software would correct the problem and supplied a new beacon coded with the revised software. Explanation of modification impact can be found at Annex A.

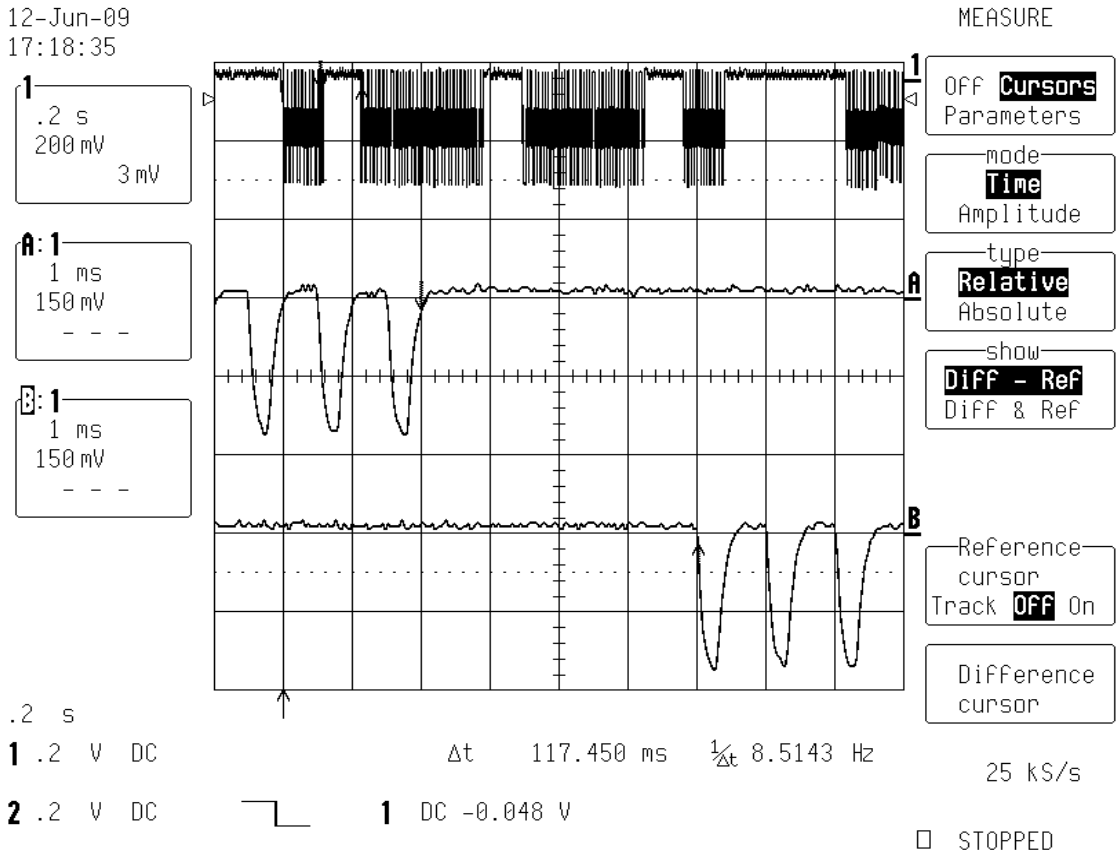
Note: Though not required by the above Specification Reference, Ambient Temperature results are shown for information.

Parameter	Limit /Units	Test Results		
		T_{min} (-20°C) *	T_{amb}	T_{max} (+55°C)
Dot 1 Length *	115 ± 5% ms	113.380 *	116.230	113.220
Gap 1 Length *	115 ± 5% ms	117.450 *	117.615	117.615
Dash 1 Length *	345 ± 5% ms	350.245 *	350.250	350.238
Gap 2 Length	115 ± 5% ms	117.450	117.455	117.473
Dash 2 Length	345 ± 5% ms	350.240	350.250	350.225
Gap 3 Length	115 ± 5% ms	118.470	118.465	118.493
Dot 2 Length	115 ± 5% ms	116.380	116.395	116.413
Gap 4 Length	345 ± 5% ms	353.930	353.920	354.083
Modulation Frequency	1000 Hz ± 50 Hz	989.1 *	998.0	999.4

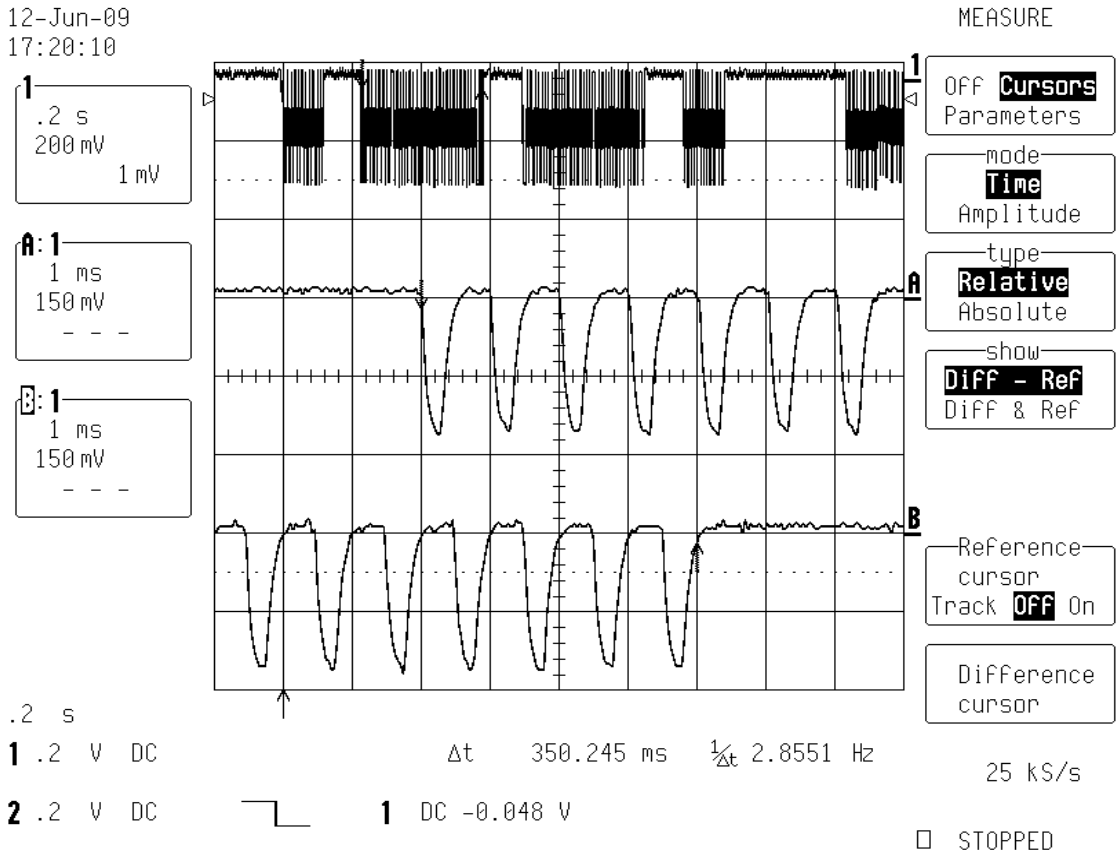
* The following plots show the measurement of the first three parameters and the modulation frequency from the above table as an example. The other parameters and temperatures were measured the same way.



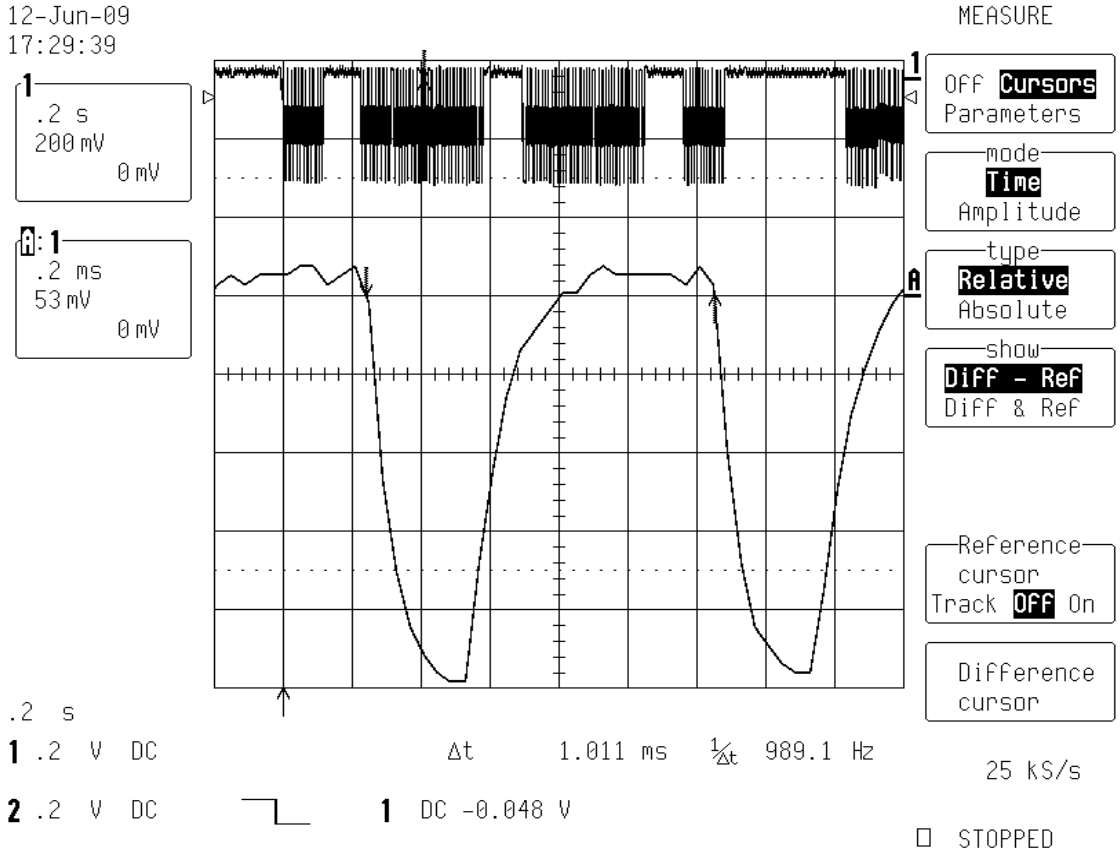
Dot 1 Length Measurement Example Low Temperature (-20°C)



Gap 1 Length Measurement Example Low Temperature (-20°C)



Dash 1 Length Measurement Example Low Temperature (-20°C)



Modulation Frequency Measurement Example Low Temperature (-20°C)

2.24 AUXILIARY RADIO LOCATING DEVICE TRANSMITTER TEST (PEAK EQUIVALENT ISOTROPIC RADIATED POWER)

2.24.1 Specification Reference

RTCM 11010.2:2008, Clause A.16.3

2.24.2 Equipment Under Test

PLB-350A (Floatation), Serial Number #20
PLB-350B (Floatation), Serial Number #22
PLB-350B (Slim), Serial Number #5

2.24.3 Date of Test and Modification State

14 & 19 March 2009 - Modification State 0

2.24.4 Test Equipment Used

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

2.24.5 Operating Modes

The test was performed with the EUT in the following mode(s): Operating

2.24.6 Test Results

Peak Equivalent Isotropic Radiated Power

Measurements were made (in dBm) at an arbitrarily chosen elevation angle across the full range of azimuth. The azimuth providing the maximum value was set as 0°. Measurements were made at said azimuth angle across a range of elevation angles from 5° to 20°. Upon finding the maximum, the elevation was fixed and 12 measurements made at 30° azimuth increments.

These results (from the vertically polarised dipole) were converted to PERP in mW. See the following tables.

PLB-350A (Floatation), S/N #20

Elevation (°)	Azimuth (°)											
	0	30	60	90	120	150	180	210	240	270	300	330
5	23.361	-	-	-	-	-	-	-	-	-	-	-
10	28.085	28.085	26.821	28.085	28.085	28.085	28.085	28.085	28.085	26.821	26.821	28.085
15	24.848	-	-	-	-	-	-	-	-	-	-	-
20	20.855	-	-	-	-	-	-	-	-	-	-	-

The median of the twelve values was 28.085 mW, or 14.49 dBm.

Of the 11 highest values, the max was 28.085 and the minimum was 26.821, the ratio between these is 1.047 to 1 (0.20dB)

PLB-350B (Floatation), S/N #22

Elevation (°)	Azimuth (°)											
	0	30	60	90	120	150	180	210	240	270	300	330
5	23.905	-	-	-	-	-	-	-	-	-	-	-
10	27.446	30.795	30.795	30.795	30.795	30.795	30.795	30.795	30.094	29.409	28.739	29.409
15	25.427	-	-	-	-	-	-	-	-	-	-	-
20	18.164	-	-	-	-	-	-	-	-	-	-	-

The median of the twelve values was 30.79 mW, or 14.88 dBm.

Of the 11 highest values, the max was 30.795 and the minimum was 28.739, the ratio between these is 1.070 to 1 (0.29dB)

PLB-350B (Slim), S/N #5

Elevation (°)	Azimuth (°)											
	0	30	60	90	120	150	180	210	240	270	300	330
5	21.802	-	-	-	-	-	-	-	-	-	-	-
10	32.246	28.739	28.085	29.409	30.094	32.246	32.246	30.094	30.094	29.409	28.085	30.094
15	31.282	-	-	-	-	-	-	-	-	-	-	-
20	24.502	-	-	-	-	-	-	-	-	-	-	-

The median of the twelve values was 30.094 mW, or 14.785 dBm.

Of the 11 highest values, the max was 32.246 and the minimum was 28.085, the ratio between these is to 1.148 (0.06.dB)

Off Ground Plane Radiated Power Test

This test is effectively a repeat of the Peak Equivalent Isotropic Radiated Power test except that the EUT was raised above the ground plane as described in C/S T.007 Issue 4 Revision 2 November 2007, Figure B.5.

PLB-350A (Floatation), S/N #20

Elevation (°)	Azimuth (°)			
	0	90	180	270
5	14.74	14.74	14.74	13.756
10	11.181	-	-	-
15	6.2415	-	-	-
20	2.8132	-	-	-

The minimum of the four values was 13.756 mW, or 11.39 dBm.

PLB-350B (Floatation), S/N #22

Elevation (°)	Azimuth (°)			
	0	90	180	270
5	13.756	14.076	12.838	12.838
10	12.26	-	-	-
15	7.5039	-	-	-
20	2.9458	-	-	-

The minimum of the four values was 12.838 mW, or 11.10 dBm.

PLB-350B (Slim), S/N #5

Elevation (°)	Azimuth (°)			
	0	90	180	270
5	13.756	12.838	12.838	11.981
10	10.197	-	-	-
15	5.5628	-	-	-
20	2.6866	-	-	-

The minimum of the four values was 11.981 mW, or 10.78 dBm.

2.25 SOLAR RADIATION

2.25.1 Specification Reference

RTCM 11010.2:2008, Clause A.17

2.25.2 Test Waiver

Solar Radiation was waivered in accordance with the above specification reference which states: " *The solar radiation test shall be waived where the manufacturer is able to produce evidence that the components, materials and finishes employed in the equipment and its labels would satisfy the test.*"

2.25.3 Justification

Customer supplied information (see Annex A) intends to show that the waiver is justified.

2.26 OIL RESISTANCE

2.26.1 Specification Reference

RTCM 11010.2:2008, Clause A.18

2.26.2 Test Waiver

Solar Radiation was waivered in accordance with the above specification reference which states: " *The oil resistance test shall be waived where the manufacturer is able to produce evidence that the components, materials and finishes employed in the equipment would satisfy the test.*"

2.26.3 Justification

Customer supplied information (see Annex A) intends to show that the waiver is justified.

2.27 COMPASS SAFE DISTANCE

2.27.1 Specification Reference

RTCM 11010.2:2008, Clause A.19

2.27.2 Equipment Under Test

PLB-350A (Floatation), Serial Number #20
PLB-350B (Slim), Serial Number #14

2.27.3 Date of Test and Modification State

06 April 2009 - Modification State 0

2.27.4 Test Equipment Used

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

2.27.5 Test Setup and Operating Modes

The test was performed with the EUT in the following mode: Idle

2.27.6 Environmental Conditions

	06 April 2009
Ambient Temperature	25 ºC
Relative Humidity	32%
Atmospheric Pressure	1007mbar

2.27.7 Test Method

A wooden table aligned E-W was used with the compass set in the centre of the table and aligned to read zero. The table was marked to give a graduated scale of distance. The EUT was gradually moved towards the compass until a standard deviation of 0.2° was obtained. Each orientation of the EUT was tested in this manner with the measurement distance between the compass centre and the EUT being noted.

The test was repeated but with readings being taken when the compass gave a steering deviation of 0.75°

The local area Magnetic Flux density (H) at the site of testing was 20.2uT.

The above testing was performed three times with the EUT as follows:

a. Un-powered Sate.
b. Normalised.
c. Powered Up.

Prior to performing the tests in accordance with part b above, the EUT was normalised by placing it into Helmholtz Coil Assembly and subjecting it to a magnetic field of 79A/m.

2.27.8 Test Results

The EUT was tested to the requirements of IEC 60945 for Compass Safe Distance (Enclosure Port).

The test results are shown below.

PLB -350B (Slim), S/N #14

Orientation of the EUT	Un-powered State		Normalised		Powered Up	
	Distance From Compass (cm) at A° deflection	Distance From Compass (cm) at B° deflection	Distance From Compass (cm) at A° deflection	Distance From Compass (cm) at B° deflection	Distance From Compass (cm) at A° deflection	Distance From Compass (cm) at B° deflection
Front	17cm	17cm	17cm	17cm	17cm	17cm
Top	17cm	17cm	17cm	17cm	17cm	17cm
Left Hand Side	17cm	17cm	17cm	17cm	17cm	17cm
Right Hand Side	17cm	17cm	17cm	17cm	17cm	17cm
Bottom	17cm	28cm	17cm	25cm	17cm	17cm
Rear	17cm	17cm	17cm	17cm	17cm	17cm

Standard Compass safe distance	300mm
Emergency Compass safe distance	200mm

PLB-350A (Floatation), S/N #20

Orientation of the EUT	Un-powered State		Normalised		Powered Up	
	Distance From Compass (cm) at A° deflection	Distance From Compass (cm) at B° deflection	Distance From Compass (cm) at A° deflection	Distance From Compass (cm) at B° deflection	Distance From Compass (cm) at A° deflection	Distance From Compass (cm) at B° deflection
Front	17cm	17cm	17cm	17cm	17cm	17cm
Top	17cm	17cm	17cm	17cm	17cm	17cm
Left Hand Side	17cm	17cm	17cm	17cm	17cm	17cm
Right Hand Side	17cm	17cm	17cm	17cm	17cm	17cm
Bottom	17cm	17cm	17cm	17cm	17cm	17cm
Rear	17cm	17cm	17cm	17cm	17cm	17cm

Standard Compass safe distance	200mm
Emergency Compass safe distance	200mm

2.28 MISCELLANEOUS TESTS

2.28.1 Specification Reference

RTCM 11010.2:2008, Clause A.20

2.28.2 Equipment Under Test

PLB-350A (Floatation), Serial Number #20
PLB-350B (Floatation), Serial Number #22
PLB-350A (Slim), Serial Number #18
PLB-350B (Slim), Serial Number #5

2.28.3 Date of Test and Modification State

18, 19, 22 & 23 June 2009 - Modification State 0

2.28.4 Test Equipment Used

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

2.28.5 Test Setup and Operating Modes

The test was performed with the EUT in the following mode(s): Idle and Operational and Self-test Mode

The following diagrams show key features referenced in the following test results.

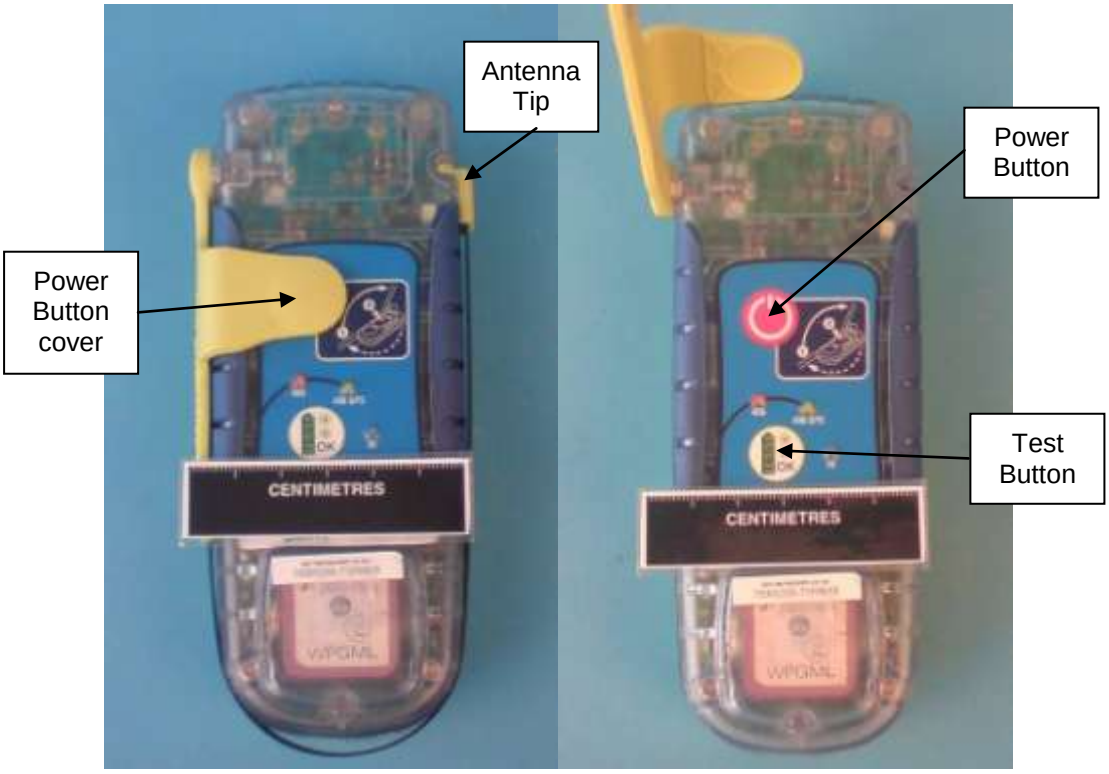


Diagram 1 – Key Features

Diagram 2 – Label/Instructions and Power Button Detail

2.28.6 Test Results

Controls and Indicators

The following actions were undertaken whilst wearing a glove from an immersion suit with the corresponding mitten over the top:

1. The antenna was disengaged at the tip
2. The antenna (complete with power button cover) was lifted by pulling it up and away from the body of the EUT
3. The power button was depressed until audible and visual indications of operation were noted, all EUT provided Audible 'bleep' and LED confirmation of operation.

Three steps were required to activate the EUT in accordance with the manufacturer's instructions (excluding any tamper-proof seals that could have been present). If the instructions were ignored the EUT could be activated in a minimum of two steps (2 and 3), this however left the antenna in an unnatural position, not as per the label instructions.

Notes:

- All four EUT variant samples could be operated with equal ease
- The power button was marked with a slightly raised red circle 12-13 mm in diameter with a white power symbol (similar to the IEC 5009 power symbol, ⏻) 10 mm wide, all in contrast with the background (as pictured)
- The Self-test button was marked “TEST” in letters approximately 2mm high by 1.5 mm wide on a slightly raised circle 12-13mm wide as pictured above
- There was no immediately obvious ‘power off’ button, suggesting that either of the other buttons would perform the function
- All markings resisted firm abrasion with a gloved finger without any visible signs of deterioration
- Until the button guard was raised it was extremely difficult to depress the “ON” button with a finger, gloved or otherwise
- Whilst raising the antenna (lifting the power button cover), the use of two hands was avoided as per Specification Reference above
    - All actions could be accomplished with only one hand on the EUT. With the exception of depressing the power button, all actions required a surface against which to hold the EUT. For the proposes of testing “worst case”, the EUT was held against the body, though a flat stable surface such as the floor (or conceivably, a deck) would have been easier
- The Red and high intensity white LEDs indicated activation along with an audible ‘bleep’
- The controls were few in number (buttons were two in quantity)
- Red and Green LEDs were labelled “406” and “406 GPS” respectively
- After and hour of operation the EUT’s internal “Electronic Witness” caused the Self-test to fail, indicating prior operation

Self-test and GNSS Self-test Function (Activation and Reset)

The following actions were undertaken:

1. The EUT was placed in the Self-test mode by depressing the test button for approximately 3 seconds (until an audible ‘bleep’ and LED confirmations indicated Self-test mode was activated)
2. The green LED indicated a “SELF-TEST OK” result
3. All LED activity ceased and the EUT appeared to enter idle (“OFF”) mode automatically
4. The EUT was placed in the Self-test mode again by the same method, indicating that the Self-test mode reset itself automatically

Product Service

Self-test and GNSS Self-test Function (Description)

The following data is supplied with this report:

Manufacturer's Data

- Self-test Mode Description (see Section 1.2, Application Form)
- Protection Against Repetitive Self-test Mode Transmissions (see Annex A)

Self-test and GNSS Self-test Function (Switch Details)

The Self-test mode is activated by a "TEST" button, it is sprung and returns to the 'off' position when released. It is entirely separate from other controls i.e. the power button.

Self-test and GNSS Self-test Function (Coding)

Self-test functional parameters, coding details and test measurements/results can be found at Section 2.15.

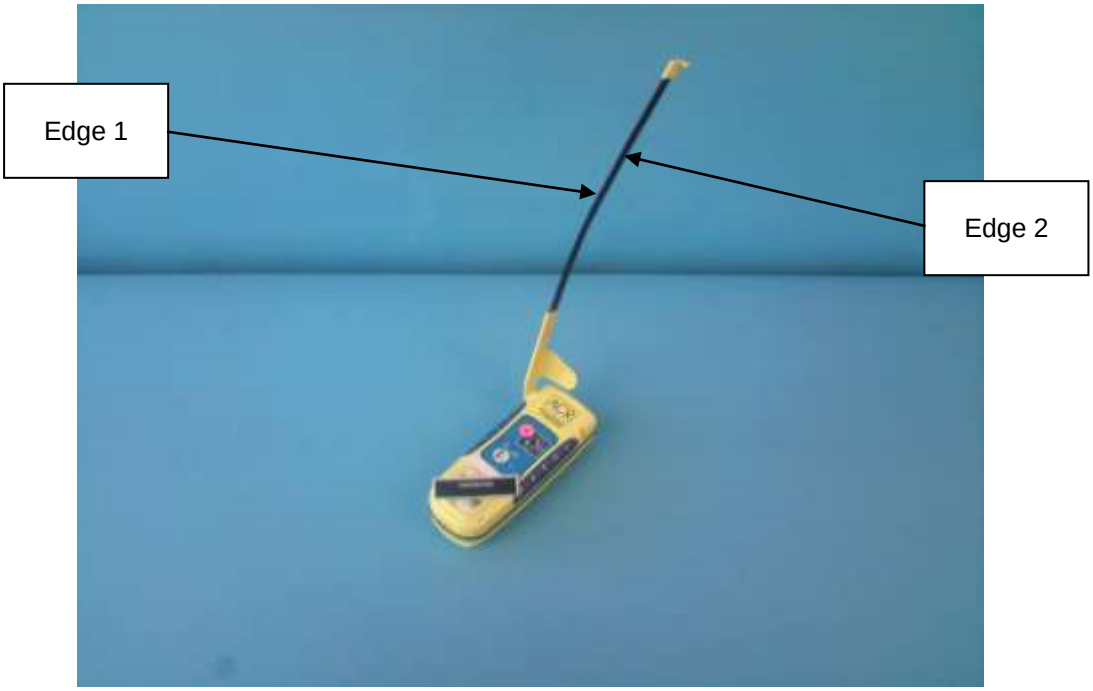
Battery

TÜV Document No. 75905359 Report 03 contains details pertaining to battery safety; a copy of said document should accompany this report in any compliance application.

Annex A contains customer supplied information also relating to battery safety.

General Construction

A Sharp Edge Tester, consisting of a ‘repeatable-force arm’ and a padded ‘finger’ covered with tape, was run along the following edges:



Edges Tested

Upon inspection of the tape covering the ‘finger’ no cuts were found, merely creases.

Exterior Finish

The EUT yellow surface areas were approximately measured using a rule, as was the total surface area of the EUT. The EUT surface ranges from approximately 75% yellow (PLB-350A Floatation) to 65% (PLB-350B Slim).

Labelling (Resistance)

For Sunlight, Seawater and Oil resistance see Customer Supplied Statement on Materials at Annex A.

Labelling abrasion resistance information can be found at Annex A.

Labelling (Legibility)

For legibility test results the customer intends to waive the tests based on historical usage of symbols and instructions without issue. See Annex A for Waiver Request

Labelling (Instructions and Information)

Customer Supplied Information at Annex A details the EUT labelling scheme.

Labelling (Comprehensibility)

For legibility test results the customer intends to waive the tests based on historical usage of symbols and instructions without issue. See Annex A for Waiver Request

Documentation

A copy of the operation manual and a copy of the end user (consumer) packaging are provided at Annex A.

SECTION 3

TEST EQUIPMENT USED

Product Service

3.1 TEST EQUIPMENT USED

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

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.13 & 2.22 Beacons - Spurious Emissions & 121 Frequency Coherence					
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Beacon RF Unit	TUV	N/A	97	-	TU
Attenuator 10dB/10W)	Trilithic	HFP-50N	454	12	22-Jul-2009
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	18-Jun-2009
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	9-Jun-2009
Termination (50ohm, 0.5W)	Hewlett Packard	HP11593A	3086	12	1-Sep-2009
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3098	12	9-Mar-2010
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	2-Jun-2009
Thermocouple Thermometer	Fluke	51	3172	12	3-Jul-2009
Bandpass filter	Trilithic	5BE406/35-1-AA	3206	12	1-Aug-2009
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3351	12	22-Apr-2010
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3356	12	22-Apr-2010
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3357	12	22-Apr-2010
Sections 2.18 & 2.20Beacons - 121 Carrier Frequency & Modulation Characteristics					
Beacon RF Unit	TUV	N/A	97	-	TU
Signal Generator (100kHz to 2.6GHz)	Hewlett Packard	8663A	1063	12	17-Feb-2010
Beacon RF Unit	TUV	N/A	3066	-	TU
Termination (50ohm, 6W)	Microndе	R404613	3074	12	17-Mar-2010
Termination (50ohm, 0.5W)	Hewlett Packard	HP11593A	3086	12	1-Sep-2009
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3098	12	9-Mar-2010
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3158	12	18-Jun-2009
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	2-Jun-2009
Bandpass filter	Trilithic	5BE406/35-1-AA	3206	12	1-Aug-2009
Time Interval Analyser	Yokogawa	TA720 704510	3253	12	4-Nov-2009
ScopeCorder	Yokogawa	DL750 701210	3254	12	5-Nov-2009
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3352	12	22-Apr-2010
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3357	12	22-Apr-2010
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3358	12	22-Apr-2010

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Sections 2.21 & 2.23 Beacons - 121 Modulation Factor & Morse P					
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Attenuator 10dB/10W)	Trilithic	HFP-50N	454	12	22-Jul-2009
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	18-Jun-2009
1GHz Digital Oscilloscope	Lecroy	9370M	612	12	30-Sep-2009
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	9-Jun-2009
Thermocouple Thermometer	Fluke	51	3172	12	3-Jul-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3357	12	22-Apr-2010
Section 2.19 Beacons - 121 Transmitter Duty Cycle					
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Attenuator 10dB/10W)	Trilithic	HFP-50N	454	12	22-Jul-2009
Attenuator (10dB, 10W)	Texscan	HFP-50N	468	12	18-Jun-2009
1GHz Digital Oscilloscope	Lecroy	9370M	612	12	30-Sep-2009
Thermocouple Thermometer	Fluke	51	3172	12	3-Jul-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3357	12	22-Apr-2010
Section 2.24 Beacons - 121 Peak Equivalent Isotropic Radiated Power					
Antenna, (Tuned Dipole Set)	Roberts Antenna	A-100	569	-	TU
Spectrum Analyser	Hewlett Packard	8568B	571	12	11-Feb-2010
Test Receiver	Rohde & Schwarz	ESVP	1669	12	7-Nov-2009
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	36	11-Sep-2011
Floppy Disc Station	Rohde & Schwarz	LAS-Z11	1854	-	TU
Turntable Interface	Various	RH-253.6	1855	-	TU
Antenna Tower 6M	EMCO	1050	1859	-	TU
Roberts Antenna 406MHz	Compliance Design	-	1861	24	7-Sep-2009
Antenna (Bilog, 20MHz-2GHz)	York Electronics	CBL6111B	1868	24	20-Aug-2010
Signal Generator, 9kHz to 6GHz	Rohde & Schwarz	SMB 100A	3501	12	19-May-2009
Section 2.14 Beacons - Battery Current Measurements					
Load (50ohm)	Diamond	DL-30N	392	12	1-Sep-2009
Hygrometer	Rotronic	I-1000	3068	12	26-Jun-2009
8 Channel Datalogger + Terminal Board	Pico Technology Ltd	ADC-16	3287	12	17-Dec-2009
Resistor (Nominal 0.25ohm)	TUV	2x RS Components 188-071 R5/100W Resistors	3343	-	TU

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.15 Beacons - Constant Temperature Tests					
Climatic Chamber	Heraeus Votsch	VMT 04/30	40	-	O/P Mon
Power Meter	Hewlett Packard	436A	83	12	13-Aug-2009
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Rubidium Frequency Standard	Quartzlock	A10-B	92	12	12-Jan-2010
Signal Generator	Hewlett Packard	8644A	96	12	17-Apr-2009
Time Interval Analyser	Yokogawa	TA720	181	12	27-Feb-2009
High Resolution Oscilloscope	Gould	840	182	12	6-Mar-2009
Load (50ohm, 15W)	Diamond Antenna	DL-30N	337	12	1-Sep-2009
Load (50ohm)	Diamond	DL-30N	392	12	1-Sep-2009
Attenuator 10dB 25W	Weinschel	46-10-43	400	12	6-May-2009
Attenuator 10dB/10W)	Trilithic	HFP-50N	454	12	22-Jul-2009
Distress Beacon RF Unit	TUV	-	2445	-	TU
Beacon RF Unit	TUV	N/A	3066	-	TU
Hygrometer	Rotronic	I-1000	3068	12	26-Jun-2009
Termination (50ohm, 2W)	Omni-Spectra	3001-6100	3081	12	15-Mar-2009
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3097	12	15-Mar-2009
Termination (50ohm, 15W)	Diamond Antenna	DL-30N	3098	12	15-Mar-2009
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	2-Jun-2009
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-03-34	3161	12	2-Jun-2009
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-03-34	3163	12	2-Jun-2009
Thermocouple Thermometer	Fluke	51	3172	12	3-Jul-2009
Thermocouple Thermometer	Fluke	51	3173	12	3-Jul-2009
Bandpass filter	Trilithic	5BE406/35-1-AA	3206	12	1-Aug-2009
Bandpass Filter	Trilithic	5BE406/35-1-AA	3207	12	1-Aug-2009
Time Interval Analyser	Yokogawa	TA720 704510	3253	12	4-Nov-2009
ScopeCorder	Yokogawa	DL750 701210	3254	12	5-Nov-2009
Short Circuit	TUV	Short Cicuit	3272	-	TU
Power Sensor	Agilent	8482A	3289	12	1-Dec-2009
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3352	12	22-Apr-2009
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354	12	22-Apr-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3356	12	22-Apr-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3358	12	22-Apr-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3359	12	22-Apr-2009
Cable (3m, N-type)	Rhophase	NPS-1601-3000-NPS	3361	12	22-Apr-2009
Rubidium Frequency Standard	Symmetricom	8040C	3490	12	21-Feb-2009

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.14 Beacons - Operating Lifetime					
Power Meter	Hewlett Packard	436A	47	12	8-Jul-2009
Power Meter	Hewlett Packard	436A	83	12	13-Aug-2009
Climatic Chamber	Heraeus Votsch	VM 04/100	85	-	O/P Mon
Beacon Tester	WS Technologies	BT 100S	87	-	TU
Rubidium Frequency Standard	Quartzlock	A10-B	92	12	12-Jan-2010
Signal Generator	Hewlett Packard	8644A	96	12	17-Apr-2009
Spectrum Analyser	Hewlett Packard	E4407B	1154	12	9-Jun-2009
Beacon RF Unit	TUV	N/A	3066	-	TU
Hygrometer	Rotronic	I-1000	3068	12	26-Jun-2009
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3159	12	2-Jun-2009
Attenuator (20dB, 10W)	Aeroflex / Weinschel	23-20-34	3160	12	2-Jun-2009
Attenuator (3dB, 20W)	Aeroflex / Weinschel	23-03-34	3163	12	2-Jun-2009
Thermocouple Thermometer	Fluke	51	3173	12	3-Jul-2009
Bandpass Filter	Trilithic	5BE406/35-1-AA	3207	12	1-Aug-2009
Time Interval Analyser	Yokogawa	TA720 704510	3253	12	4-Nov-2009
ScopeCorder	Yokogawa	DL750 701210	3254	12	5-Nov-2009
Power Sensor	Agilent	8482A	3289	12	1-Dec-2009
Power Sensor	Agilent	8482A	3290	12	1-Dec-2009
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	21-Apr-2009
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3353	12	22-Apr-2009
Cable (1m, N Type)	Rhophase	NPS-1601-1000-NPS	3354	12	22-Apr-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3357	12	22-Apr-2009
Cable (2m, N Type)	Rhophase	NPS-1601-2000-NPS	3359	12	22-Apr-2009
Bandpass Filter	Trilithic	5BE121.55/35-3-BA	3410	12	4-Aug-2009
Section 2.2 Climatic - High Temperature					
Montford 8F3	Montford	8FT CUBED	2127	12	31-Mar-2009
Chamber	Heraeus	HC 4033	2174	12	5-Sep-2009
Section 2.3 Climatic - Humidity					
Chamber	Heraeus	HC 4033	2174	12	5-Sep-2009
Section 2.4 & 2.5 Climatic - Low Temperature					
Montford 8F3	Montford	8FT CUBED	2127	12	31-Mar-2009
Climatic Chamber	Climatec	WALK-IN	2847	12	2-Apr-2009
5 metre Tape Measure	Stanley	33-719	3549	-	TU
Section 2.10 Climatic - Thermal Shock					
Chamber	Heraeus	HC 4033	2174	12	5-Sep-2009
Balance	Geniweigher	GM-11K	2334	12	1-Apr-2009
Climatic Chamber	Climatec	WALK-IN	2847	12	2-Apr-2009
5 metre Tape Measure	Stanley	33-719	3549	-	TU

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.11 & 2.12 Climatic - Wet Tests					
0 - 20N Force Gauge	Hahn & Kolb	321-20N	892	12	13-Mar-2010
Over Pressure (T)	ASL (TUV)	0 TO 15 PSI	2125	-	TU
Hygrometer	Rotronic	HYGROPALM 1	2338	12	17-Sep-2009
Digital Pressure Indicator	Druck	RPT301	2345	12	26-Jan-2010
Temperature Logger	Digitron	2098T	2479	12	16-Sep-2009
Section 2.27 EMC - Compass Safe Distance					
Sussex Helmholtz Coil	Various	88771	327	-	TU
Magnetometer	Bartington	MAG01	671	36	3-Sep-2011
Multimeter	Iso-tech	IDM101	2423	12	3-Sep-2009
Marine Binacle Compass with Azimuth Circle	Cassens & Plath	Type 11	3331	24	1-Jun-2009
Compass Verification Unit	TUV	CVU	3579	-	TU
Sections 2.6 & 2.7 Vibration – Sine & Bump					
Charge Amplifier	Endevco	133	2504	12	29-Jul-2009
Vibration Controller	Muller & Partner	VIBCO NT VX1	2510	12	29-Oct-2009
Vibration Table	Ling Dynamic Systems	875	3170	6	22-Feb-2009
Isotron Accelerometer	Endevco	256-10	3380	6	2-Apr-2009
Accelerometer	Endevco	256-10	3433	6	25-Mar-2009
Accelerometer	Endevco	256-10	3502	6	2-Apr-2009
Section 2.9 ENV - Drop / Topple					
Hardwood Block	Unknown	ELM	2650	-	TU
ESA-E Series Spectrum Analyser	Agilent	E4402B	3348	12	21-Apr-2009
5 metre Tape Measure	Stanley	33-719	3549	-	TU
Beacon Tester	WS Technologies	BT 100S	87	-	TU
Section 2.17 Climatic – Buoyancy Test					
Force Gauge	TWL	AFG 4	926	12	08-Jul-2009
Tape Measure	Stanley	-	2363	-	TU
Stopwatch	Farnell	SUPER LAB/SPLIT	2465	12	24-Jul-2009

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

Product Service

SECTION 4

PHOTOGRAPHS

4.1 PHOTOGRAPHS OF EQUIPMENT UNDER TEST (EUT)

PLB-350B Floatation, S/N #22 Front View

PLB-350B Floatation, S/N #22 Rear View

PLB-350B Slim (50Ω), S/N #2 Front View

PLB-350B Slim (50Ω), S/N #2 Rear View

PLB-350B Slim, S/N #5 Front View

PLB-350B Slim, S/N #5 Rear View

PLB-350B Slim (50Ω), S/N #3 Front View

PLB-350B Slim (50Ω), S/N #3 Rear View

PLB-350A Floatation, S/N #17 Front View

PLB-350A Floatation, S/N #17 Rear View

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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

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

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

ANNEX A

CUSTOMER SUPPLIED INFORMATION

Product Service

Customer Supplied Statement on Materials

Cobham Life Support
ACR Products
5757 Ravenswood Road
Fort Lauderdale
FL 33312-6645 USA

T: +1 (954) 981-3333
F: +1 (954) 983-5087

PLB-350A & PLB-350B Materials declaration

As required by IEC 61097-2 & RTCM 11010.2 test requirements
the PLB-350A and 350B products are required to be tested and to meet the specific tests –

- Corrosion (Salt Mist) IEC 60945 (8.12) & ETSI 302-152-1 (6.5) & RTCM 11010.2 (A.8)
- Solar Radiation IEC 60945 (8.10) & RTCM 11010.2 (A.17)
- Oil Resistance IEC 60945 (8.11) & RTCM 11010.2 (A.18)

IEC 60945 stipulates that where a manufacturer can produce evidence that the components, materials and finishes employed in the equipment would satisfy the tests then the tests shall be waived.

In this instance ACR Electronics, inc. claim, for one or more of the reasons listed below that these criteria are met and therefore make application that the tests be waived.

1. The materials have a proven history of service in a marine environment. Either from use in ACR Electronics, inc.'s existing approved marine equipment range, or by implication from a long established history of exposure without effect (e.g. stainless steel).

2. The material manufacturer has conducted equivalent testing and has declared the product as being immune to these effects in the relevant data sheet.

3. ACR Electronics, inc. in-house testing has proven the materials to be immune to the cause of degradation (e.g. oil resistance).

ACR Electronics, inc. hereby declares that the materials used in the construction of the PLB-350A and 350B products as here-in listed are not affected by the degrading agents listed above.

Signed on behalf of ACR Electronics, Inc.

Chung Tong

Date:_June 09th 2009

Chung Tong
Project Manager

Product Service

Components and materials listed below are in direct contact with the marine environment

Back case, floatation moulded	EXL-1330
Back case, slim moulded	EXL-1330
Front case, opaque moulded	EXL-1330
Front case, clear moulded	EXL-1434T
Front case, overmold	GLS Versollan RU2205-1
Sealing Gasket	Silicone rubber shore 35
Antenna Wishbone	Ticona vectra A130
Antenna wishbone o-ring	Viton
Antenna sealing o-ring	EPDM 540
Antenna moulding	Polypropylene with UV inhibitor
Antenna bushing	316 grade Stainless Steel
Antenna blade	301 grade Stainless Steel
Screw, 4-40, self-sealing	18-8 grade Stainless Steel
Keypad	AUTOTEX F8XE

Customer Supplied Description of Modification 1 and Impact on Testing

From: Chung Tong [mailto:chung.tong@cobham.com]
Sent: 09 June 2009 15:25
To: Hampton, Robert; Plummer, Julie
Cc: Chung Tong; Kerry Greer
Subject: ACR Statement of the SW Fix for the 121 Morse P Duration in the PLB-350A and PLB-350B

Dear Julie and Rob,

ACR has made a software modification to change the 121 Morse P duration from 120 ms to 117 ms, to allow an additional 3 ms margin. One sample unit with this modification has been submitted to TUV for the fix verification. This modification does not affect any other electrical parameters of the beacon.

Best regards,
Chung Tong
Principal Electrical Engineer
ACR Products
Cobham Life Support

Information on Protection Against Repetitive Self-test Mode Transmissions

PLB-350A
The self-test algorithm is in-line code with no loops that execute consecutive instructions implementing self-test with checks interspersed to monitor the switch positions. It is possible to either complete one self-test, enter the ON mode, or turn off. It is not possible to repeat the instructions. The self-test algorithm causes the software to continuously monitor the hardware during self-test. If the switch is left in self-test for an extended time, the stuck mode is entered for a maximum time of 50 seconds. This mode alternately flashes the red LED, the green LED, and sounds the buzzer, then times out after 50 seconds. Nothing else can be generated when in this mode. Therefore, if the switch is left in the self-test position, it is not possible to generate more than one self-test.

PLB-350B
The self-test algorithm is in-line code with no loops that execute consecutive instructions implementing self-test with checks interspersed to monitor the switch positions. It is possible to either complete one self-test, one GPS test, enter the ON mode, or turn off. It is not possible to repeat the instructions. The self-test algorithm causes the software to continuously monitor the hardware during self-test. If the switch is left in self-test during and after the GPS test is generated, the stuck mode is entered for a maximum time of 50 seconds. This mode alternately flashes the red LED, the green LED, and sounds the buzzer, then times out after 50 seconds. Nothing else can be generated when in this mode. Therefore, if the switch is left in the self-test position, it is not possible to generate more than one self-test.

Product Service

GNSS Self-test Mode Description

03/23/2009

PLB-350B GNSS Self Test Description

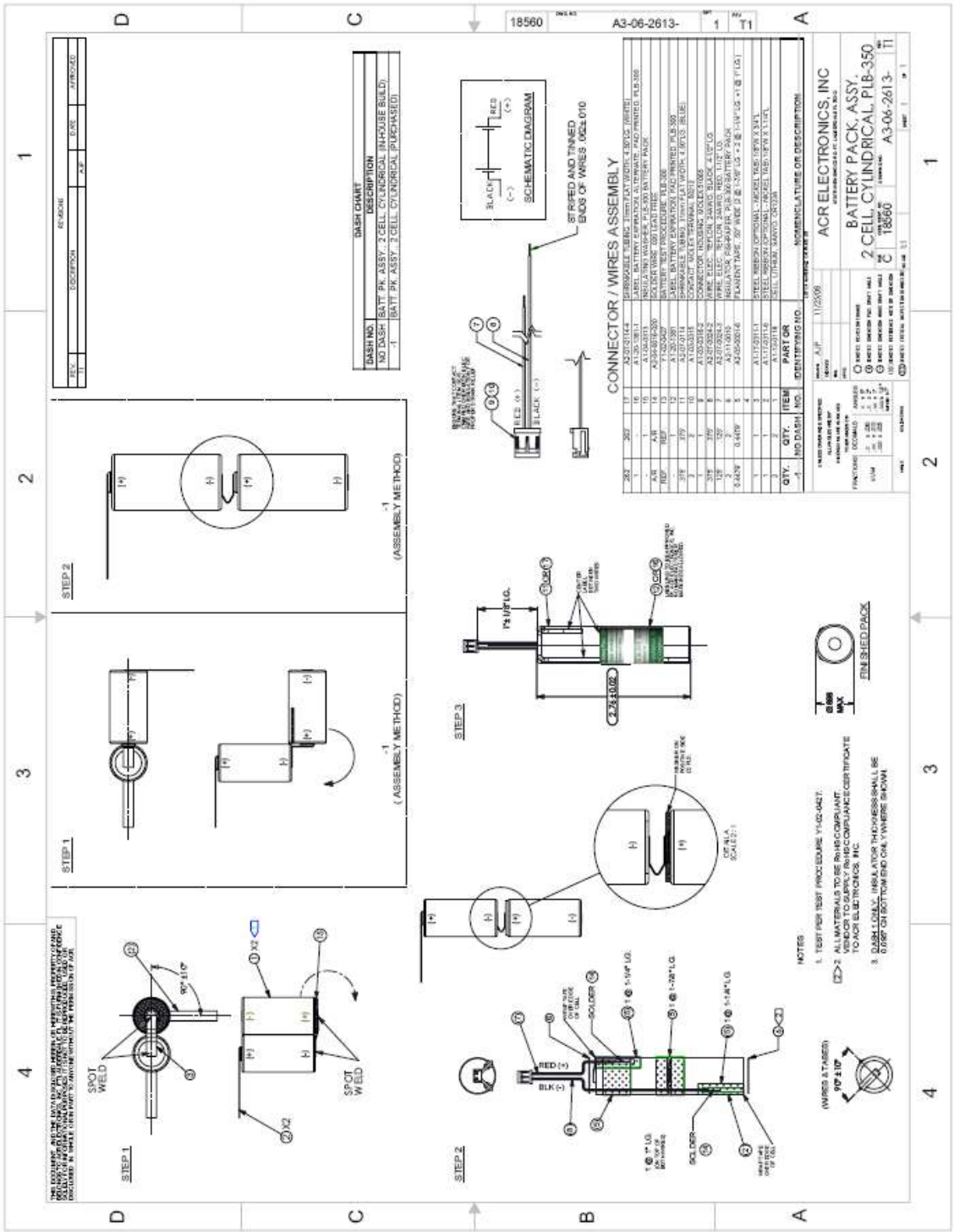
The PLB-350B model which is the GPS-Enabled model, provides the Cospas Sarsat GNSS Self Test feature, and this feature should not be performed more than twelve times during the life of the battery pack. Once this GNSS testing feature reaches 12 times, the feature will be disabled by internal software.

GNSS Self Test Procedure:

Press the self-test button for greater than 5 seconds. Observe the beacon for the entire GPS test. A BEEP and green LED will indicate that the GPS has been turned ON. The beacon will BEEP every 3 seconds and the GPS will remain ON until LAT/LON coordinates have been obtained or until 2 minutes have elapsed. If good LAT/LON data has been obtained, a single 406MHz test burst will be sent out with location data and the GPS will be turned OFF and the green LED will light for at least 3 seconds along with a long beep. This LAT/LON data is not saved for use. The green LED indicates that the GPS is functioning properly and that the beacon is in a location or environment where it can receive the necessary signals from GPS satellites. If the GPS does not acquire good Location data, the GPS will turn OFF after 2 minutes, followed with a RED LED light up for 3 seconds along with a long beep, and no 406MHz burst sent out.

The worst case current consumption scenario for the PLB-350B GNSS self test feature is 12 times of 2 minutes and 12 406 MHz bursts.

Battery Pack Assembly Information



Product Service

Battery Cell Information

Lithium

(Specifications of Primary Lithium Batteries)

■ Coin Type Primary Lithium Batteries

Model	Nominal voltage (V)	Nominal* capacity (mAh)	Standard discharge current (mA)	Max. discharge current (mA)		Max. dimensions (mm)		Weight (g)	Reference Model No.
				continuous※1	pulse※2	diameter (D)	height (H)		IEC type
CR1220	3	36	0.1	2	10	12.5	2.0	0.8	CR1220
CR2016	3	80	0.3	5	50	20.0	1.6	1.7	CR2016
CR2025	3	170	0.3	5	40	20.0	2.5	2.5	CR2025
CR2032	3	230	0.3	4	20	20.0	3.2	3.0	CR2032
CR2430	3	280	0.3	5	50	24.5	3.0	4.0	CR2430
CR2450	3	610	0.2	2	30	24.5	5.0	6.9	CR2450

Operational temperature range: −20℃ to +70℃
Consult Sanyo when using batteries at temperatures exceeding the −20℃ to +60℃ range.

■ High-power Cylindrical Type Primary Lithium Batteries (spiral structure, crimp-sealing)

Model	Nominal voltage (V)	Nominal* capacity (mAh)	Standard discharge current (mA)	Max. discharge current (mA)		Max. dimensions (mm)		Weight (g)	Reference Model No.
				continuous※1	pulse※2	diameter (D)	height (H)		IEC type
CR-1/3N	3	160	2	60	80	11.6	10.8	3.3	CR11108
2CR-1/3N	6	160	2	60	80	13.0	25.2	9.1	2CR11108
CR15270＊	3	850	10	1000	2500	15.5	27.0	11	CR15G270
CR17335＊	3	1400	10	1500	3500	17.0	33.8	16	CR17338
CR14500＊	3	1650	10	1750	3500	14.0	50.0	18	CR14500
CR2	3	850	10	1000	2500	15.6	27.0	11	CR15H270
CR123A	3	1400	10	1500	3500	17.0	34.5	17	CR17345
CR-V3	3	3300	20	3500	7000	29.0 (L)×14.5 (W)×52.0 (H)		38	CP3152
CR-P2	6	1400	10	1500	3500	34.8 (L)×19.5 (W)×35.8 (H)		37	2CP4036
2CR5	6	1400	10	1500	3500	34 (L)× 17 (W)× 45 (H)		40	2CP3845

Operational temperature range: −40℃ to +60℃
Consult Sanyo when using batteries at temperatures exceeding the −20℃ to +60℃ range.
CR15270, CR17335, CR14500, CR2, CR123A, CR-V3, CR-P2 and 2CR5 incorporate a PTC device to prevent overheating and excess discharging current.

■ High-power Cylindrical Type Primary Lithium Batteries (spiral structure, laser-sealing)

Model	Nominal voltage (V)	Nominal* capacity (mAh)	Standard discharge current (mA)	Max. discharge current (mA)		Max. dimensions (mm)		Weight (g)	Reference Model No.
				continuous※1	pulse※2	diameter (D)	height (H)		IEC type
CR17335E-R＊	3	1600	5	700	2500	17.0	33.5	17	CR17335
CR17335HE-R＊	3	1350	5	1000	3000	17.0	33.5	16	CR17335
CR17450E-R＊	3	2400	5	1000	2500	17.0	45.0	23	CR17450
CR17450HE-R＊	3	2000	5	1500	3500	17.0	45.0	22	CR17450

Operational temperature range: −40℃ to +85℃
Consult Sanyo when using batteries at temperatures exceeding the −20℃ to +60℃ range.

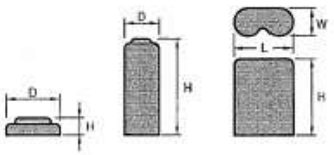
■ High-capacity Cylindrical Type Primary Lithium Batteries (bobbin structure, laser-sealing)

Model	Nominal voltage (V)	Nominal* capacity (mAh)	Standard discharge current (mA)	Max. discharge current (mA)		Max. dimensions (mm)		Weight (g)	Reference Model No.
				continuous※2	pulse※3	diameter (D)	height (H)		IEC type
CR14250SE＊	3	850*	0.5	7	70	14.5	25.0	9	CR14250
CR12600SE＊	3	1500	1.0	15	250	12.0	60.0	15	CR12600
CR17335SE＊	3	1800	1.0	8	100	17.0	33.5	17	CR17335
CR17450SE＊	3	2500	1.0	9	150	17.0	45.0	22	CR17450
CR23500SE＊	3	5000	1.0	10	200	23.0	50.0	42	CR23500

Operational temperature range: −40℃ to +85℃
Consult Sanyo when using batteries at temperatures exceeding the −20℃ to +60℃ range.
All batteries listed above, except for the CR12600SE, are also available in models with safety vents (SE-R).
★CR14250SE (850mAh type) is under development.

＊ Denotes models supplied with extra terminals.
Note: IEC type in the above tables conform to the IEC86-1 notation system.

※1 Nominal capacity is determined at an end voltage of 2.0V (4.0V for 6V models) when the battery is allowed to discharge at a standard current level at 23℃.
※2 Current value is determined to be the level at which 50% of the nominal capacity is obtained with an end voltage of 2.0V (4.0V for 6V models) at 23℃.
※3 Current value for obtaining 2.0V cell voltage (4.0V for 2CR-1/3N) when pulse is applied for 15 seconds at 50% discharge depth (50% of the nominal capacity) at 23℃.
For CR15270, CR17335, CR14500, CR2, CR123A, CR-V3, CR17335E-R, CR17335HE-R, CR17450E-R and CR17450HE-R, however, the current values for obtaining 1.0V are listed.



Product Service

More Than 95% of Initial Capacity Even After 10 Years

A stable electrolyte, Sanyo's superior manufacturing methods and sealing technology combine to ensure that the tendency of lithium batteries to self-discharge is reduced to a very low level. Even after 10 years of storage at room temperature, more than 95% capacity is retained.

Self-discharge rate per year at room temperature:

Coin type primary battery:	under 1%
High-power cylindrical type primary battery:	
Crimp-sealing	under 1%
Laser-sealing	under 0.5%
High-capacity cylindrical type primary battery:	under 0.5%

Product Service

Battery Safety Information

Product name : Manganese Dioxide Primary Lithium Battery

No.LB-CE-001-02
Establishment/Revision : Jan.1 2009

Safety data sheet for chemical products

1.PRODUCT AND COMPANY IDENTIFICATION

- Product name: Manganese Dioxide Lithium Primary Battery
- Sanyo Model: CR123A

- Company name: Sanyo Electric Co.,Ltd. Mobile Energy Company
- Address: 222-1, Kaminaizen , Sumoto City ,Hyogo ,Japan
- Telephone number +81-799-24-4111
- Telefax number: +81-799-24-4129
- Emergency telephone number: [Weekday] +81-799-23-2924
  [Night and holiday] +81-799-24-4131

2.COMPOSITION / INFORMATION ON INGREDIENTS

- Substance or preparation: Preparation
- Information about the chemical nature of product:

Common chemical name / General name	CAS number	Concentration / Concentration range	Classification and Hazard labeling
Manganese Dioxide	1313-13-9	30-40%	Specific hazards
Lithium metal	7439-93-2	3.4% *	Water forbiddance
Mixture solvent of carbonate and ether	—	10-20%	Inflammability
Lithium trifluoro methane sulphonate ($LiCF_3SO_3$)	33454-82-9		—

* Weight of Lithium per cell : 0.57g

3.HAZARDS IDENTIFICATION

- Most important hazard and effects: No information is obtained.
- Specific hazards: Since chemicals are contained in a sealed can, there are no hazards.
  Lithium metal of contents sets off a chemical burn if it touches a skin.
- Emergency overview may also be given: The time when the battery is mechanically or electrically abused when a battery vents, and when short circuit occurs.

4.FIRST-AID MEASURES

- Inhalation: In case content's vapor caused by blowout of a battery is inhaled, move to a place having fresh air immediately
- Skin contact: In case the content adheres to a skin, wash away with water and soap immediately.
- Eye contact: In case the content goes into an eye, wash away with much water for more than 15 minutes.
- Ingestion: A medical examination of a doctor is received quickly.

5.FIRE-FIGHTING MEASURE

- Suitable extinguishing media: Carbonic acid gas, powder, foam, atomized water
- Specific methods of fire fighting: Take batteries to a safe place not to be burnt down in a spreading fire.
  In case batteries packaged in a box burn, since burning material is paper, use a water extinguisher, a CO2 extinguisher, and a powder extinguisher as a normal extinguisher.
- Special equipment for the protection of firefighters:
  Hand protection: a pair of flame-proof groves
  Eye protection: face mask
  Protective wear of skin and/or body: protective clothing

1

6.ACCIDENTAL RELEASE MEASURES

- Personal precautions: In case release is small and continues for short time, health condition does not turn bad.
- Environmental precautions: Extinguish it quickly, or the bad odor will smoke up because the fire gets left for some time.
- Cleaning method: Solid content gets moved into a container. In case of the scatter, wipe it on a dry towel.
- Prevention of secondary hazards: In case of Lithium metal, it causes fever reacted by water in the air, ignition may occur deal with accidental release quickly.

7.HANDLING AND STORAGE

- Handling
  Prevention of user exposure: No problem on regular handling
  Prevention of fire and explosion: No problem on regular handling
  Precaution for prevention of local emission and powder dust:: No problem on regular handling
- Storage
  Technical measures: measures to avoid direct rays, high temperature, and high humidity
  Incompatible products: Combustible things, conductive things (metal: cause of shot circuit)
  Storage conditions (suitable): Low temperature and low humidity (a cool and dark place)
  Storage conditions (to be avoid): High temperature and high humidity, and direct rays
  Packing material (recommended): Excellent flame resisting, incombustible, and insulated material

8.EXPOSURE CONTROLS / PERSONAL PROTECTION

- Engineering measures: regular handling doesn't cause scatters. If it should happen by destruction of batteries and so on, however, operate local emission device, or clear the air well
- Control parameters

Common chemical name / General name	ACGIH	
	TLV-TWA	BEI
Manganese dioxide	Mn: 0.2mg/m^3	—
Lithium metal	—	—
Mixture solvent of carbonate and ether	—	—
Lithium trifluoro methane sulphonate ($LiCF_3SO_3$)	—	—

ACGIH :American Conference of Governmental Industrial Hygienists ,Inc.
TLV-TWA :Threshold Limit Value-time weighted average concentration
BEI :Biological Exposure Indices

- Personal protective equipment
  There in no need on regular handling. Use the protections shown below when contents leaking out of batteries are dealt with.
  Respiratory protection: Mask(with a filter preferably)
  Hand protection: Synthetic rubber grove
  Eye protection: Goggle or glass
- Specific hygiene measures: Wash a dirty place.

9.PHYSICAL AND CHEMICAL PROPERTIES

- Appearance
  Physical state: Solid
  Smell: odorless
- PH: Not applicable because of insolubility in water.
- Specific temperature/humidity at which physical state changes: No information because of mixture.
- Density: not mentioned because this product is a mixture.
- Solubility: insolubility in water

10.STABILITY AND REACTIVITY

- Stability : Stable on regular handling
- Conditions to avoid: External short circuit of battery , deformation by crush, exposure at high temperature of more than 60 degree C (cause heat generation and ignition) direct ray, high humidity
- Materials to avoid: Water, a chain, and a piece of metal that causes short circuit.
- Hazardous decomposition product: Emitted acrid or poisonous gases in fire.

11.TOXICOLOGICAL INFORMATION

- Since chemicals are contained in a sealed can, there are no hazards.
  Components of Chemical substances are shown below.

Manganese Dioxide
Acute toxicity: rabbit *1 : LDL_0(blue pipe)=45mg/kg, mouse*2: LD_{50}(subcutaneous)=422mg/kg
Local effects: Stimulus to an eye, a nose, a throat, and a skin
Chronic toxicity or long-term toxicity: Inhale powder dust or fume for a long time (at least 3 months), and that may cause specific central nerve symptom like Parkinson's disease.
Reproduction toxicity: Mouse*3 inhalation TCL_0=49mg/m^3

Lithium metal
Acute toxicity: No information in a metal state
Local effects: Touching on a skin or an eye causes thermal burn and alkaline's chemical burn.

Carbonate
Acute toxicity: No information at present
Local effects: No information at present

Ether
Acute toxicity: Rat*4 oral LD_{50}=7000mg/kg
Local effects: Light stimulus to a skin

Lithium trifluoro methane sulphonate ($LiCF_3SO_3$)
Acute toxicity: No information at present
Local effects: Slight stimulus to mucous membranes

12.ECOLOGICAL INFORMATION

- Possible environment impact/ ecotoxicity: Chemical substances do not influence on an environment because of being sealed in metal container.

13.DISPOSAL CONSIDERATIONS

- Recommended methods for safe and environmentally preferred disposal
  Product(waste from residues): Pack used batteries into an inner box not to tumble down to be short-circuiting. Pack the inner boxes into an outer box besides, and dispose of it by industrial-waste disposal company consignment-constructed.
  Contaminated packaging: Container and/or package is/are not contaminated on regular usage. In case contents leaking out of batteries adhere, deal with that as industrial waste subject to special control.

14.TRANSPORT INFORMATION

In the case of transportation, confirm no leakage and no overspill from a container. Take in a cargo of them without falling, dropping and breakage. Prevent collapse of cargo piles and wet by rain. The container must be handled carefully. Do not give shocks that result in a mark of hitting on a cell. Please refer to Section 7-HANDLING AND STORAGE also.

- UN classification: However this product's shipping name is "Lithium metal batteries"(or "Lithium metal batteries packed with equipment" or "Lithium metal batteries contained in equipment"), it is not recognized as "DANGEROUS GOODS" when its transport condition accords with "packing instruction 968 part 1 of IATA-DGR" (or "packing instruction 969 part 1" or "packing instruction 970 Part 1") or "special provision 188 of IMO-IMDG Code". *5 *6

15.REGULATORY INFORMATION

- Regulations specifically applicable to the product :
  IATA-DGR (air transportation)
  IMO-IMDG Code(sea transportation)
  US Department of Transportation 49 Code of Federal Regulations [USA]

16.OTHER INFORMATION

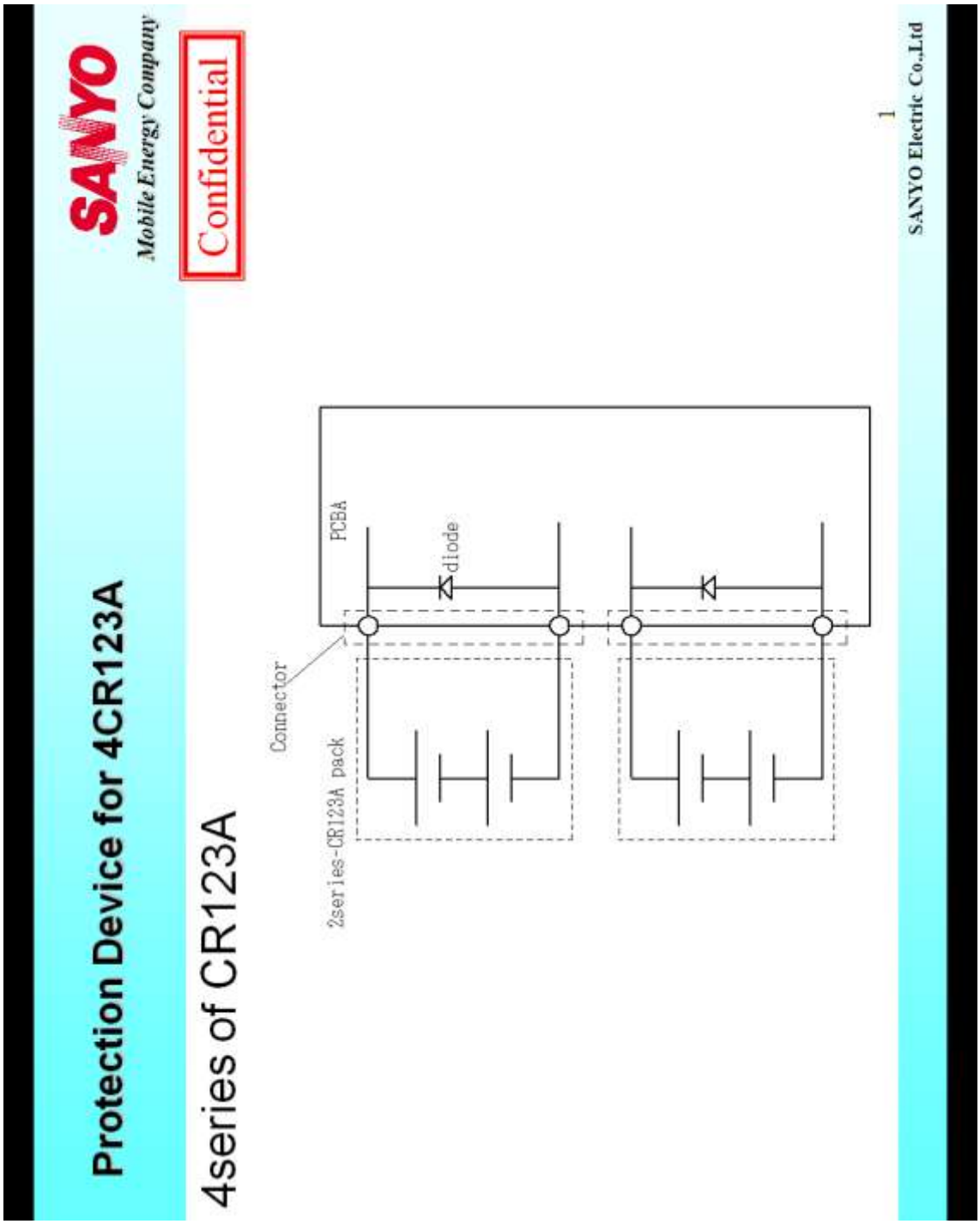
- This material safety data sheet is offered in order to have handling safe about dangerous detrimental chemicals carried out.
- The entrepreneur who deals with it needs to consider this material safety data sheet as reference, and needs to devise suitable disposal in an entrepreneur's responsibility.
- Numerical values, such as a content and the physical-chemistry-characteristic, are not guarantee values among the written contents.

Reference

*1 Journal of the D.I Mendeleeva All-Union Chemical Society.
(V/0 Mezhdunarodnaya knija, 113095 Moscow, USSR) V.5-1960
*2 Merck Index; an Encyclopedia of Chemicals, Drugs, and Biologicals, 11st ed.,
Rahway, NJ 07065, Merck & Co., Inc. 1898
*3 Federation of American Societies for Experimental Biology (Bethesda, MD) V.1-46, 1942-87
*4 Ube Industries, LTD Chemical & plastic Division (internal measured data)
*5 Dangerous Goods Regulations – 50th Edition Effective 1 January 2009 : International Air Transport Association (IATA)
*6 IMDG Code – 2008 Edition : International Maritime Organization(IMO)

Create Date : Feb. 17, 2009
Creation Department : Sanyo Electric Co., Ltd
Mobile Energy Company
Lithium Battery Division
Lithium Engineering Department
Technical Service Section

Battery Protection Device Information



Product Service

Label Abrasion Information

Cobham Life Support
ACR Products
5757 Ravenswood Road
Fort Lauderdale
FL 33312-6645 USA

T: +1 (954) 981-3333
F: +1 (954) 983-5087

June 19th, 2009-06-19

Subject: Pad Print Labelling for PLB-350A and PLB-350B

Please be advised that the Pad print used for labelling on the exterior of the PLB-350A and PLB-350B has been tested for abrasion resistance, per RTCM 11010.2 (A.20.6), by ACR Electronics Inc. and found successful. The same pad print process has been widely used on numerous ACR products for many years and found no degradation.

ACR Electronics, inc. hereby declares that the Pad Print used for labelling the PLB-350A and 350B products fully complies with the requirements of RTCM 11010.2, section A.20.6

Signed on behalf of ACR Electronics, Inc.

Chung Tong

Chung Tong
Project Manager

Date:_June 19th 2009

Customer Waiver Statement for Label Legibility and Label Comprehensibility Tests

From: Chung Tong [chung.tong@cobham.com]
Sent: 23 June 2009 23:31
To: Forsyth, Nic
Cc: Plummer, Julie; Hampton, Robert; Chung Tong
Subject: ACR Statement of Label Legibility and Comprehesibility

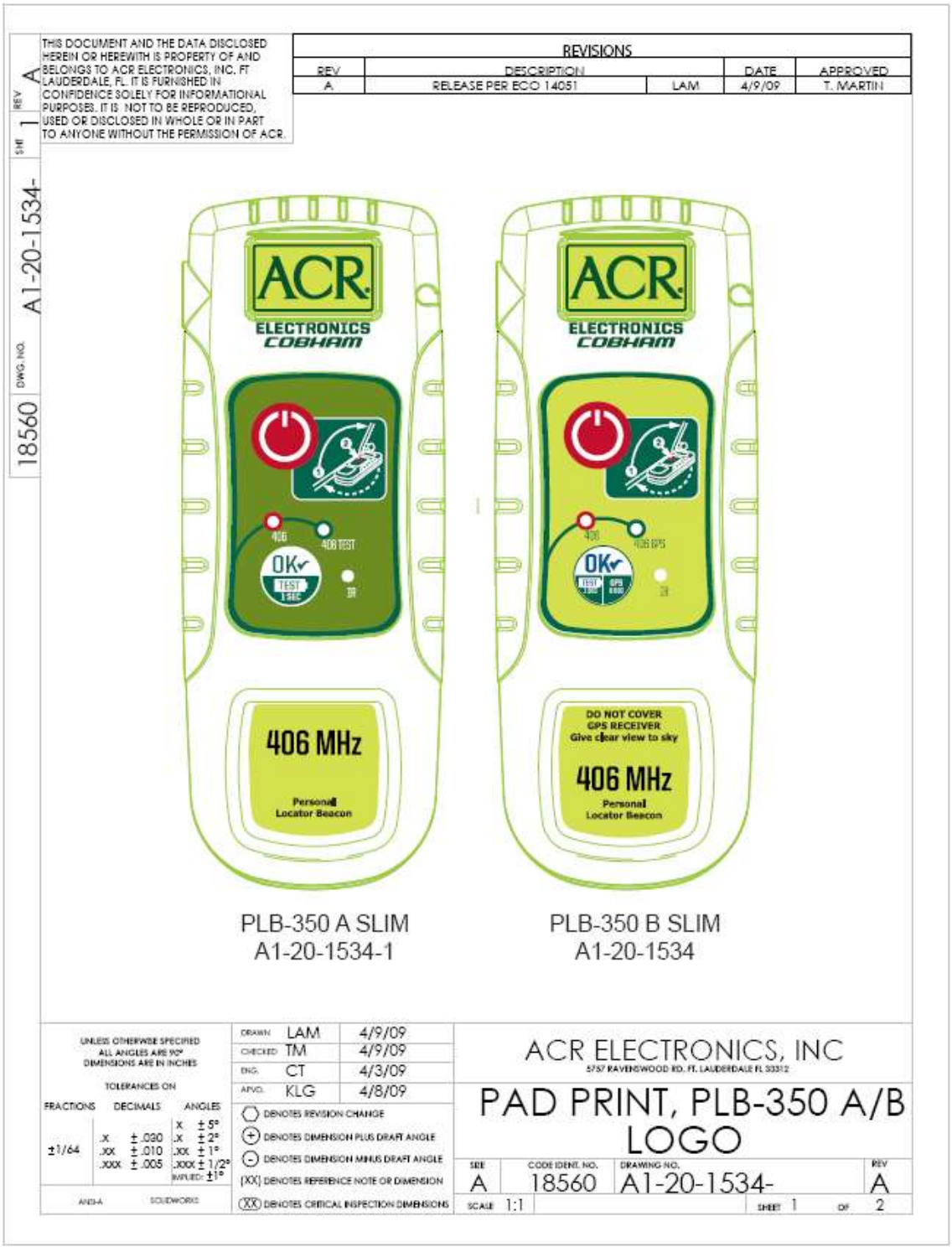
Dear Rob,

ACR Electronics Inc. hereby declares that the Pad print labels used in the PLB-350A/B are identical to the pad print labels of the previously approved PLB-300 beacon, in terms of material, text sizes, and process. There are thousands of these beacons currently in the field without any known label issue. In addition, ACR also used the same pad print labels in many other beacons, like the RLB-35 issued in 2001 and found extremely reliable.

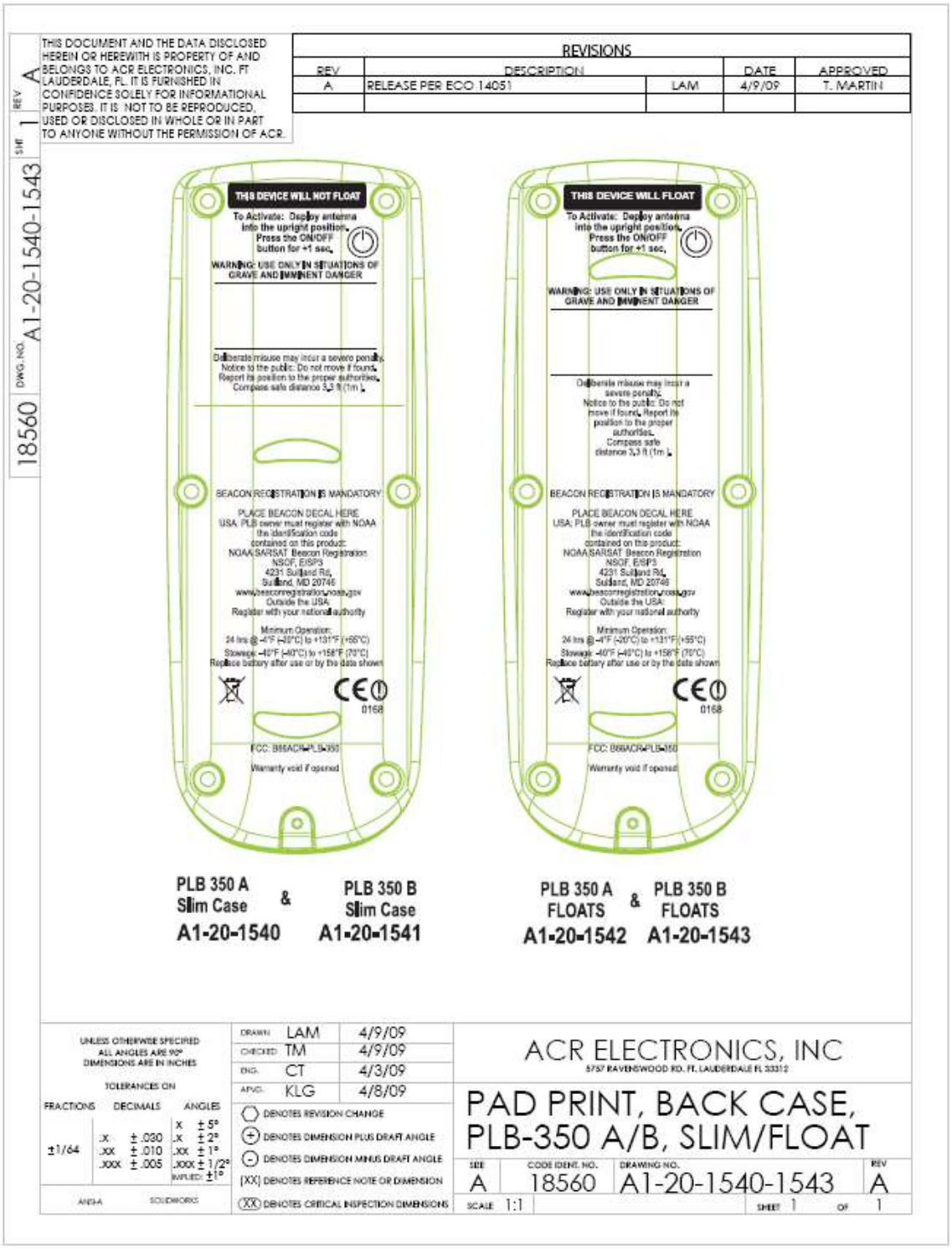
ACR Electronics Inc. has a long standing historical usage of these pad print label process, and being used widely across all ACR products today.

Best regards,
Chung Tong
Principal Engineer
ACR Electronics, Inc.

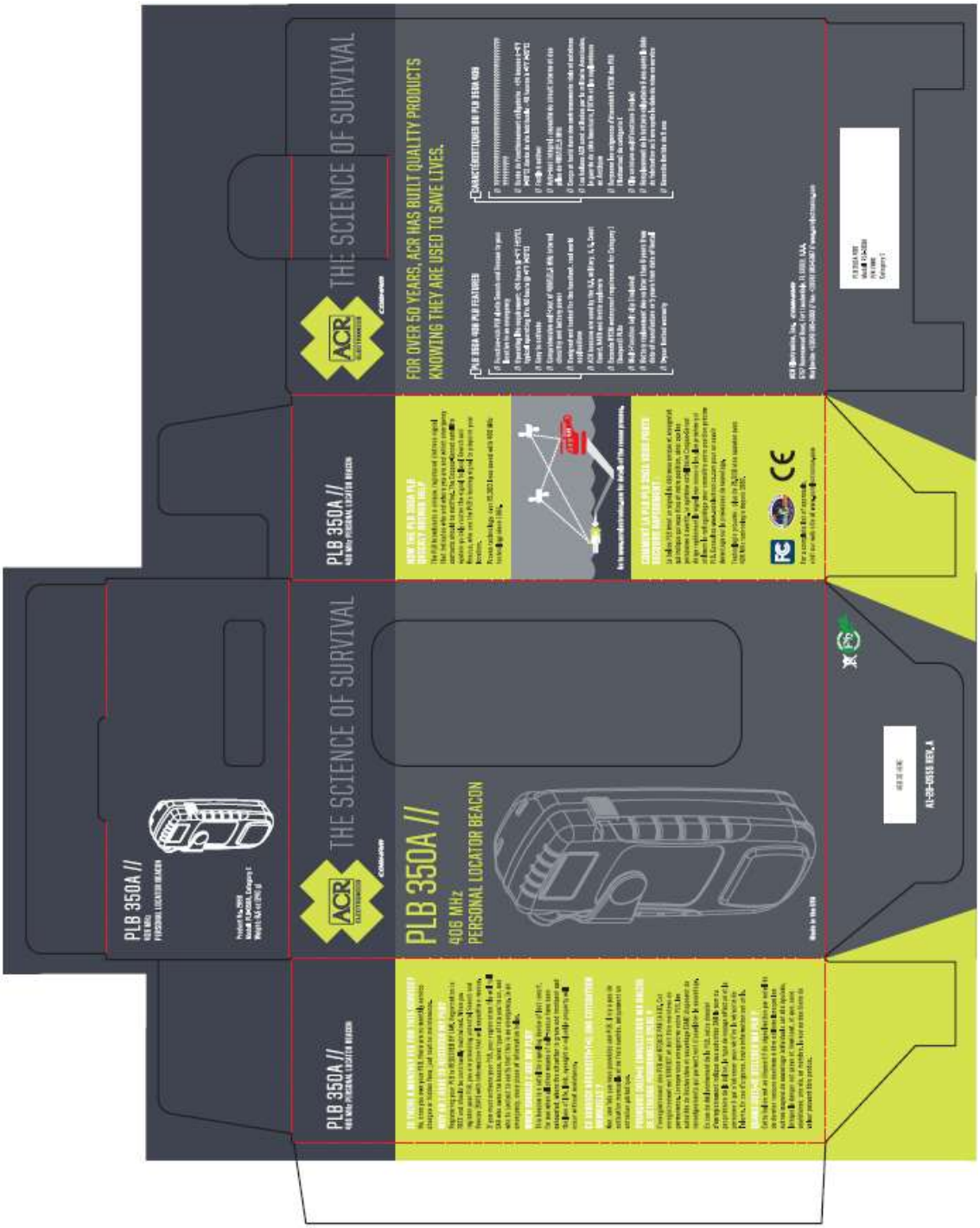
EUT Labelling Diagrams

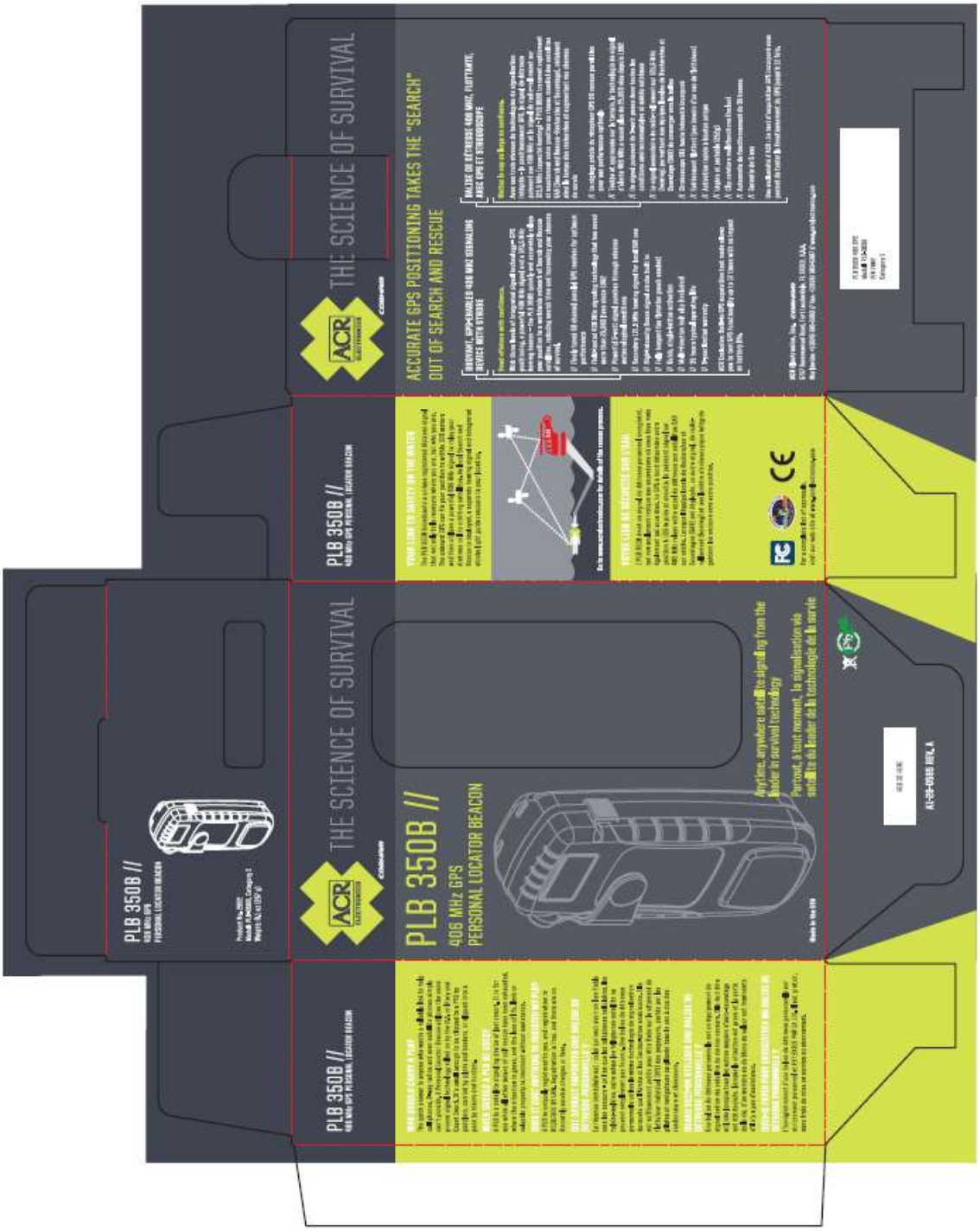


Product Service



EUT Packaging Diagrams




PLB 350B //
406 MHz GPS
PERSONAL LOCATOR BEACON
THE SCIENCE OF SURVIVAL
ACCURATE GPS POSITIONING TAKES THE "SEARCH" OUT OF SEARCH AND RESCUE
Anytime, anywhere satellite signalling from the leader in survival technology
Partout, à tout moment, la signalisation via satellite du leader de la technologie de la survie

Product Service

EUT Product Support Manual

THE SCIENCE ACR ELECTRONICS OF SURVIVAL

COBHAM

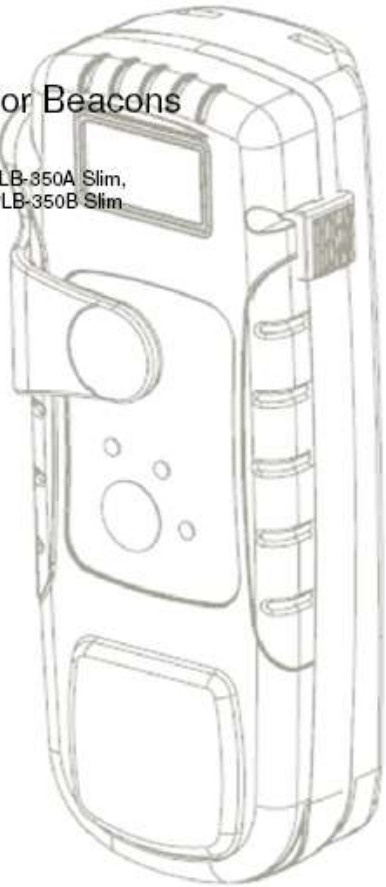
PRODUCT SUPPORT MANUAL

PLB350 series
GPS Personal Locator Beacons

Model No.: PLB-350A, PLB-350B
Product Variants: PLB-350A Float, PLB-350A Slim,
PLB-350B Float, PLB-350B Slim

Y1-03-0241 Rev. T2

Personal Locator Beacon (PLB)



Y1-03-0241 R

ACR Electronics, Inc. // 5757 Ravenswood Road // Fort Lauderdale // FL // 33312-6645
Tel: +1 (954) 981-3333 // Fax: +1 (954) 983-5087 // www.acrelectronics.com

i

Product Service

Table of Contents

Foreword

Thank you for purchasing from ACR Electronics, Inc. We design, manufacture and distribute quality products knowing they are used to save lives. Many of our products are required to be tested and approved by regulatory bodies worldwide. We believe in going beyond those specifications to insure our products work when needed in real world conditions. With proper care and maintenance your ACR product will last for years. It is important that you thoroughly read this product support manual to understand the proper care and use of your ACR product.

ACR is proud to be certified to ISO 9001:2000, the International Standard for Quality.

Summary of products

This manual provides operation and maintenance instructions for Personal Locator Beacons (PLBs), models PLB-350A and PLB-350B. This manual also describes the characteristics and details of the PLB350 series.

Model	PLB-350A	PLB-350A	PLB-350B	PLB-350B
ACR Product Variants	PLB-350A Slim	PLB-350 Float	PLB-350B Slim	PLB-350B FLoat
Category	Category II	Category I*	Category II	Category I*
GPS engine	none	none	Internal	Internal
Top case	Opaque	Opaque	Clear	Clear
*Floatation bottom case	Slim bottom case	Larger bottom case	Slim bottom case	Larger bottom case

Product Service

SECTION 1 – REGISTRATION OF 406 MHZ BEACONS

1.1 Registration Importance (Registration is FREE and can be updated as many times as you want)

It is **mandatory** that the owner of this 406 MHz beacon registers it with the national authority*. All 406 MHz beacons transmit a Unique Identifier Number (UIN) when activated. This UIN is programmed in the PLB based on the country in which the beacon was purchased. Registration provides the Search and Rescue (SAR) forces with emergency contact information, and will speed the launch of a rescue operation. The National Authorities use the information to verify if an actual emergency exists. Valuable Search and Rescue personnel are put at risk and resources are wasted every year responding to false alerts. For beacons that are not registered, SAR authorities will not know who you are, or who to contact regarding additional information about your current situation. This could delay the launch of a rescue operation.

**The national authority is the governmental body that is responsible for Beacon Registration Database administration in the country for which the beacon is programmed.*

1.2 Where to Register

You must register your beacon with the national authority of your resident country. Verify that your beacon's UIN is programmed for your resident country, regardless of where you do your adventuring. To verify the country for which a beacon is programmed, see the label with the UIN on the back of the unit. Units that do not have a country specified on the UIN label are programmed for the United States. If you should move to a new country, you must register your beacon with the national authority of that country and have the UIN reprogrammed for that country (if necessary). For a list of the national authorities in your area, please view them at http://www.cospas-sarsat.com/Management/listOfParticipants.htm

1.3 Registration in the United States

It is your responsibility to register your 406 MHz beacon(s) that are programmed for and purchased in the United States. The national authority that accepts registrations in the United States is the National Oceanic and Atmospheric Administration (NOAA).

There are three options by which the beacon can be registered:

A. The fastest and easiest way to register your beacon with NOAA is to use the online registration database.

For the fastest service, register online!
In the United States:
www.beaconregistration.noaa.gov

B. If the internet is not accessible to you, complete the enclosed registration form. **Do not confuse this with the ACR Electronics warranty card.** Mail with the pre-addressed, postage paid envelope to:

NOAA SARSAT Beacon Registration
NSOF, E/SP3
4231 Suitland Road
Suitland, MD 20746

C. Faxing your registration is also acceptable. Fax the registration form to fax # +1 (301) 817-4565.

Note that the information you provide on the registration form is used only for rescue purposes. Complete and send the registration immediately. All registration forms will be entered in the 406 MHz beacon registration database within 48 hours of receipt.

Product Service

A confirmation letter, a copy of the actual registration and a proof-of-registration decal will be mailed to you within two weeks. When you receive these documents, **please check the information carefully,** then affix the decal to your beacon in the area marked "BEACON DECAL HERE." If you do not receive confirmation back from NOAA in the expected timeframe, call toll free +1 (888)-212-7283 for assistance.

1.4 Registration in Canada

The national authority in Canada is the NSS (National Search & Rescue Secretariat). Canadian residents can register online at http://beacons.nss.gc.ca/. For more information please contact the NSS at +1 (613) 966-1504 or +1 (800) 727-9414.

National Search and Rescue Secretariat
400-275 Slater Street
Ottawa, Ontario K1A 0K2

1.5 Registration in Other Countries

In countries other than the United States and Canada, 406 MHz beacons are registered with that country's national authority at the time of purchase. The sales agent should assist in filling out the forms and sending to that country's national authority. To verify that the unit is properly programmed for that country, view the UIN label on the side of the unit. In the event that the beacon is not programmed for the country it has been purchased in, the sales agent, (if properly equipped) can reprogram the unit for that country.

1.6 Change of Ownership or Contact Information

It is your responsibility to advise the national authority of any change in the information on the registration form. If the current owner of the beacon is transferring the beacon to a new owner, the current owner is required to inform the national authority by using their online database or by letter, fax or telephone, of the name and address of the new owner. The new owner of the beacon is required to provide the national authority with all of the information requested on the registration form. This obligation transfers to all subsequent owners. Registration forms for the United States are available from NOAA by calling 1 (888) 212-7283 or by visiting our website at www.acrelectronics.com.

1.7 Lost or Stolen Beacons

Things you need to do if your beacon is stolen:

- Report to your local authorities that the beacon has been lost or stolen.
- Contact NOAA at 1-888-212-SAVE (7283), or your national authority, with the following information so your beacon registration information can be updated with the appropriate remarks:
  - Police Department Name
  - Police Phone Number
  - Police Case Number

If the beacon were to be activated, the information you provided will be forwarded to the appropriate search and rescue authorities who will ensure that your beacon gets back to you. If someone attempts to register an beacon reported as stolen, NOAA or your national authority will notify the appropriate police department. Visit www.cospas-sarsat.org for more detailed information.

Product Service

SECTION 2 – RESPONSIBLE USE

A Personal Locator Beacon is a distress signaling device of last resort, for use when all other means of self-rescue have been exhausted; where the situation is grave and imminent, and the loss of life, limb, eyesight or valuable property will occur without assistance. *Deliberate misuse may incur a severe penalty.*

2.1 Prevention of False Alerts

A false alert is any activation of the beacon, intentional or otherwise, that does not result from a situation of grave and imminent danger.

Be sure to do the following:

- **Register your beacon.** This does not reduce false alert rates; however, it does have a dramatic effect on the impact of a false alert. When the beacon is properly registered, the situation can be resolved with a phone call.
- **Be careful who you leave your beacon with**. Make sure that they how to use it, and that they understand the ramifications of causing a false alert. A lot of false alerts are generated by curious individuals. If you notice the beacon is flashing the red or green LED and BEEPING periodically on its own, this likely means it has accidentally been activated and needs to be shut off and reported.

The COSPAS- SARSAT satellites detect distress beacon transmissions immediately. These satellites will locate the transmission within a few minutes of the beacon activation. This is good if you are in distress, but if you are not, you just generated a false alert.

NOTE: If you report a false alert and the authorities have not received the signal, don't worry. This may mean the beacon was deactivated before transmitting the signal.

2.2 Reporting of False Alerts

A false alert **must** be reported to the nearest search and rescue authorities. The information reported must include the beacon Unique Identifier Number (UIN), date, time, duration and cause of activation, as well as location of beacon at the time of activation. If the beacon is registered outside of the United States, contact your national authority.

United States Air Force Rescue Coordination Center (AFRCC) Tel: 1-800-851-3051

False alerts that are rectified must be reported to the AFRCC to let them know that the situation has been corrected and everything is fine. Responsibly reporting these events to the AFRCC or your proper authority will not incur a penalty, but deliberate misuse or not notifying the proper authority may incur a severe penalty.

TO REPORT FALSE ALERTS WORLDWIDE, CONTACT THE NATIONAL AUTHORITY WHERE YOUR BEACON IS REGISTERED.

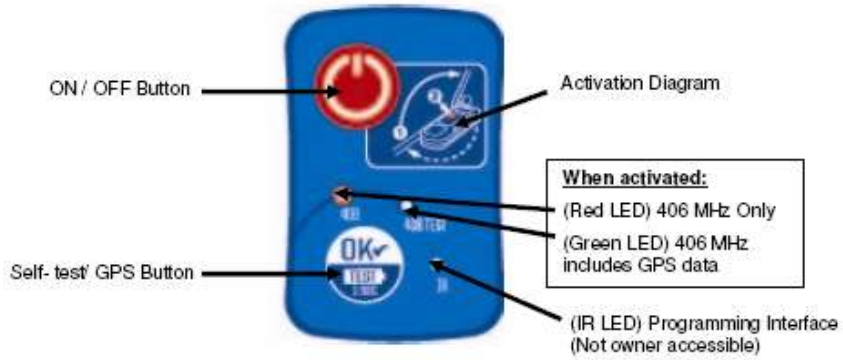
Product Service

SECTION 3 – OPERATION

The PLB350 beacon models are designed to be manually deployed and activated. They are only to be activated when all other means of self-rescue have been exhausted. When properly registered as required, the activation of the beacon tells Search and Rescue who you are, where you are, and that you are facing a life threatening situation.

Note that the keypad functions for all PLB350 models are the same and in the same location. See Figure 2.

Figure 2 - Key Pad Functions



NOTE: Reference to GPS functionality in Figure 2 applies only to those PLB-350B models that are equipped with an internal GPS system.

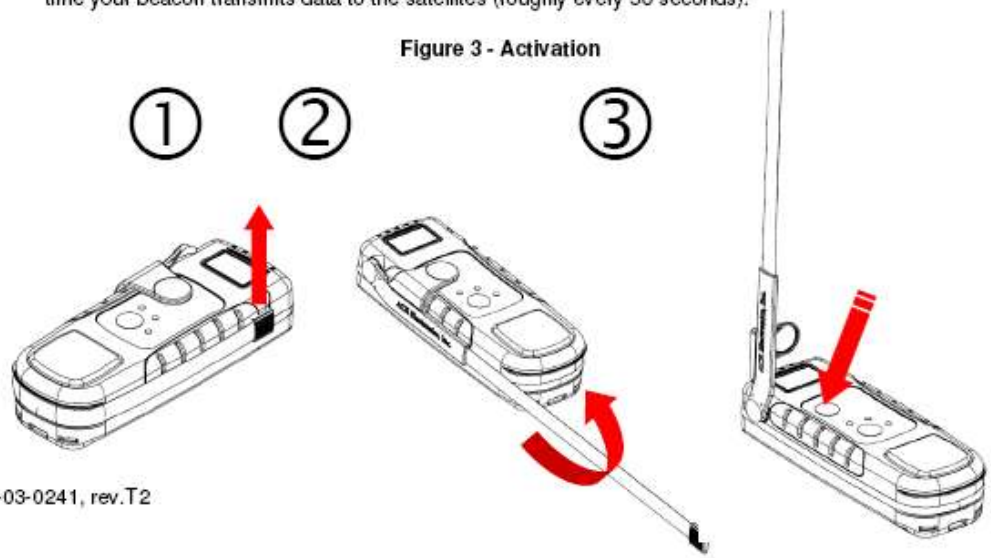
3.1 Activation (406 MHz and 121.5 MHz)

To activate your beacon in a distress situation, follow these steps:

1) Unfasten the antenna from the case.
2) Move it into the upright position (see Figure 3 below).
3) Depress the ON/OFF button for 1 full second.

You will hear a BEEP and your beacon is now activated. While transmitting your distress signal, the red LED will flash once every 2 seconds alerting you that your beacon is active. An additional BEEP will sound every time your beacon transmits data to the satellites (roughly every 50 seconds).

Figure 3 - Activation



Y1-03-0241, rev.T2

Product Service

3.2 406/121.5 Antenna Position

For maximum performance you must deploy the beacon antenna into the proper position (see Figure 3). If at all possible, be sure the antenna is positioned facing the sky and avoid submerging in water. This device is intended to operate on or above the ground only: It is not intended to operate while floating in water.

3.3 Activation with GPS (PLB-350B only)

Your beacon is equipped with an internal GPS receiver if you purchased the PLB-350B model. Once activated, the GPS engine will start up and search to find your LAT/LON and incorporate it into your 406 MHz signal. As soon as the GPS receiver acquires good positioning data the red LED will stop blinking and the green LED will begin flashing once every 2 seconds.

The same GPS data will be sent with each 406 MHz signal for the next twenty minutes. At that time the internal GPS will start up again, search to find your LAT/LON and incorporate it into your next 406 MHz signal. If for any reason the internal GPS cannot update your LAT/LON, your last position will be used for the next four hours. At that time the green LED will stop blinking and the red LED will flash once every 2 seconds until new GPS data is obtained.

3.4 GPS Receiver Orientation

When a model PLB350B with GPS is activated, it is critical that you do not cover the beacon with any body part, water, clothing, etc. The GPS receiver is located under the bottom portion of the case behind the ResQFix™12 or MicrOFix™12 logo. To ensure optimum performance of the GPS receiver, the beacon needs to have an unobstructed view of the sky.

3.5 Deactivation

To deactivate your beacon, depress the ON/OFF button for 1 second. Once the beacon is deactivated, all blinking LED's will stop, signifying that the beacon is no longer sending your distress message.

3.6 Self- test

ACR strongly recommends performing the Self- test once per month, or at least two weeks prior to a trip allowing enough time for service should your beacon require it.

A Self- test is initiated by holding the Self- test button for at least ½ second and **less than 5 seconds**.

Your beacon will sound an initial beep and flash the green LED to signify the test has begun. The green LED will flash a second time to indicate that the self test was successful.

NOTE: The beep is a very high pitch that many people are unable to hear.

Components Tested: Data Integrity and Memory; 406 MHz Synthesizer; RF Power/Battery; GPS header

If a red LED flashes at the completion of the Self- test, your beacon has failed. Repeat the Self- test. If the failure persists, contact ACR Electronics or an authorized Battery Replacement Center for servicing of your beacon.

NOTE: During a Self- test your beacon will send a 406 MHz signal coded as Self-test to the satellite system. The 121.5 MHz homing signal is inhibited during Self- test; this allows you to test your beacon any time during the day without causing false alerts.

Self Test Sequences	Self Test Guide (Green LED Red LED)
Green LED, 4 BEEPS, Green LED	Successful Self- test
Green LED, Less than 4 BEEPS, Red LED	Failed Self- test – Return beacon to ACR
Red LED, 4 BEEPS, Green LED	Successful Self- test – At least 1 hour of battery power has been depleted, have battery replaced.
Red LED, Less than 4 BEEPS, Red LED	Failed Self- test – Return unit to ACR for service.

Product Service

3.7 Battery Witness Seal Life

If your beacon flashes an initial red LED at the beginning of the Self- test, this indicates that your electronic witness has been broken and you have used more than 1 hour of battery life for the PLB-350A models and more than 1 hour 20 minutes for the PLB-350B models. While the beacon will still operate normally in a distress situation, ACR strongly recommends you have your battery replaced and the electronic witness reset to ensure that you will have 24 hours of battery power.

3.8 GPS Testing (GNSS Self-Test)

This test is NOT required as 100% of all GPS receivers that leave ACR have been tested to ensure they perform correctly. However, if you would like to ensure your GPS receiver is working, please follow these instructions very closely.

CAUTION: For PLB-350B models, the following test should not be performed more than twelve times during the life of the battery pack. Once this GPS testing feature reaches 12 times, the feature will be disabled by internal software.

NOTE: The GPS receiver is located under the bottom front portion of the case. It is imperative that the receiver is not obstructed during Self- test or activation to ensure that the GPS receiver is acquiring your latitude (LAT) and longitude (LON) position. This test must be performed outside with a clear view of the sky.

Press the self-test button for greater than 5 seconds. Observe the beacon for the entire GPS test. A BEEP and green LED will indicate that the GPS has been turned ON. The beacon will BEEP every 5 seconds and the GPS will remain ON until LAT/LON coordinates have been obtained or until 2 minutes have elapsed. If good LAT/LON data has been obtained, a single 406MHz test burst will be sent out with location data and the GPS will be turned OFF and the green LED will light for at least 3 seconds along with a long beep. This LAT/LON data is not saved for use. The green LED indicates that the GPS is functioning properly and that the beacon is in a location or environment where it can receive the necessary signals from satellites. If the GPS does not acquire good LAT/LON data, the GPS will turn OFF after 2 minutes, followed with a RED LED light up for 3 seconds along with a long beep, and no 406MHz burst sent out.

GPS Test Sequences (maximum duration 121 seconds)	GPS Test Guide
Green LED and BEEP at start followed by continuous BEEPS every 5 seconds, Green LED & Long BEEP	Successfully acquired GPS data, 406 MHz burst sent out with location data
Green LED and BEEP at start followed by continuous BEEPS every 5 seconds, Red LED & Long BEEP	GPS data was not successfully acquired, no burst sent out.

SECTION 4 – ACCESSORIES

4.1 Multi-Function Belt Clip

The TerraFix™ 406 and MicrOFix™$_{12}$ come standard with a multi-functional belt clip. To install the clip, simply align the bottom tabs on the clip with the insert holes located on the bottom of the beacon. Snap the clip in place by pressing the top of the clip so that the two top tabs engage in the two insert holes on the top of the beacon (see Figure 4). To remove the clip, push up and back on the top tabs one at a time to disengage the clip from the beacon.

The belt clip has been designed to accommodate your extreme adventures. You can secure your beacon directly to backpack webbing straps, life jackets or belts to ensure the beacon is close at hand. ACR recommends that you secure your beacon someplace on your person that is easily accessible in case of an emergency for rapid activation. Ensure the beacon is secured firmly and is protected before heading out to avoid damage or loss.

Figure 4 - Belt Clip

SECTION 5 – CARE AND MAINTENANCE

5.1 Routine Maintenance

Carefully inspect the beacon case for any visible cracks. Cracks may admit moisture, which could falsely activate the beacon or otherwise cause a malfunction. Any cracking observed should be immediately referred to ACR for evaluation by calling 1-800-432-0227 in the US, or +1-954-981-3333 elsewhere. ACR technical support can also be reached by sending an email to service@acrelectronics.com.

After checking the beacon case for cracks, it may be wiped down with a clean, damp cloth. Do not use any type of cleaner on your beacon.

5.2 Battery Replacement

The battery must be replaced by the date indicated on the beacon or every five (5) years. At each inspection, check the time remaining until replacement is required. The battery should be replaced if the beacon has been activated for any use other than the self test. Always refer all long life battery replacement and other beacon service to a factory authorized service center. Battery replacement includes servicing the beacon by replacing all o-rings, testing the water seal and the electrical properties.

NOTE: There are no user serviceable items inside the beacon. DO NOT OPEN THE BEACON.

For the nearest location of a Battery Replacement Center, visit our website at www.acrelectronics.com

The beacon may or may not require special shipping instructions due to the lithium batteries and changes in shipping regulations. Call ACR's customer service department at +1 (954) 981-3333 ext. 2110 for proper shipping instructions.

SECTION 6 – THE SEARCH AND RESCUE SYSTEM

6.1 General Overview

Beacons provide distress alerts via radio transmission on 406 MHz to the LEOSAR satellites of the Cospas-Sarsat network. Some beacons can also transmit a distress alert (acquired by the internal GPS) to the GEOSAR network that includes GPS latitude and longitude coordinates.

The message transmitted is unique for each beacon, which provides identification of the transmitter through computer access of registration files maintained by the National Oceanic and Atmospheric Administration or other national authority*. Remember, SAR forces will know who you are and who to contact that might know of your current situation only if your beacon has been properly registered. This will help expedite the launch of a rescue operation.

NOTE: 406 MHz beacons are required to have their registration updated every two years.

*The national authority is the governmental body responsible for beacon registration database administration for the country for which the beacon is programmed.

Once the 406 MHz signal is relayed through the LEOSAR and/or GEOSAR network, SAR forces determine which SAR group is closest. This group proceeds to the beacon using the 121.5 MHz homing frequency.

6.2 Satellite Detection

Beacons transmit to the satellite portion of the Cospas- Sarsat system. Cospas- Sarsat is an international system that utilizes Russian Federation and United States' low altitude, near-polar orbiting satellites (LEOSAR). These satellites assist in detecting and locating activated 406 MHz satellite beacons.

Cospas and Sarsat satellites receive distress signals from beacons transmitting on the frequency of 406 MHz. The Cospas- Sarsat 406 MHz beacon signal consists of a transmission of non-modulated carriers followed by a digital message format that provides identification data. The 406 MHz system uses Satellite-borne equipment to measure and store the Doppler-shifted frequency along with the beacon's digital data message

and time of measurement. This information is transmitted in real time to an earth station called the Local User Terminal (LUT), which may be within the view of the satellite, as well as being stored for later transmission to other LUTs.

The LUT processes the Doppler-shifted signal from the LEOSAR and determines the location of the beacon, then the LUT relays the position of the distress to a Mission Control Center (MCC) where the distress alert and location information is immediately forwarded to an appropriate Rescue Coordination Center (RCC). The RCC dispatches Search and Rescue (SAR) forces.

The addition of the GEOSAR satellite system greatly improves the reaction time for a SAR event. This satellite system has no Doppler capabilities at 406 MHz, but will relay the distress alert to any of the LUT stations. When there is GPS data included in the distress message, SAR authorities instantly know your location to within 110 yards (100 m). This speeds up the reaction time by not having to wait for one of the LEOSAR satellite to pass overhead. Because most of the search and rescue forces presently are not equipped to home in on the 406 MHz Satellite beacon signal, homing must be accomplished at 121.5 MHz.

Figure 6- Satellite Coverage

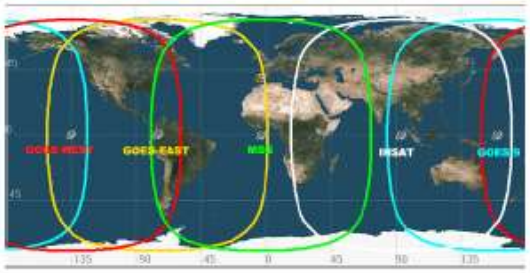


Figure 7- GEOSAR Satellite Orbits

6.3 Global Positioning System (GPS)

The GPS system is a satellite group that enables a GPS receiver to determine its exact position to within 30 m (100 ft.) anywhere on earth. With a minimum of 24 GPS satellites orbiting the earth at an altitude of approximately 11,000 miles they provide users with accurate information on position, velocity, and time anywhere in the world and in all weather conditions. The PLB350 stores this data into its distress transmission allowing search and rescue forces to narrow the search into a very small area and thus minimize the resources required, dramatically increasing the effectiveness of the overall operation.

Figure 8 – GPS Satellite

Product Service

SECTION 7 – TECHNICAL INFORMATION

7.1 Characteristics

The PLB350 series are battery operated Personal Locator Beacons. The beacon case, with its antenna, is waterproof, while semiconductor circuits are mounted within the case assembly which also contains the battery power supply. Keypads with "self test" and "ON" buttons are installed on the case, along with an internal beeper and three LEDs. The beacon contains a GPS receiver that will acquire your LAT/LON located under the bottom of the front case.

The PLB350 series meet the requirements of Federal Communications Commission (FCC) Part 95 Subpart K; and European R&TTE Directive.

NOTE: FCC approval is pending. R&TTE approval is pending. CE mark is pending.

7.2 Applicable Documents

COSPAS- SARSAT C/S T.001	Specification for 406 MHz Distress Beacons
COSPAS- SARSAT C/S T.007	406 MHz Distress Beacon Type Approval Standard
ETSI 302 152-1	Technical Characteristics of 406 MHz Satellite PLBs
RTCM Paper 76-2002/SC110-STD	RTCM Recommended Standards for 406 MHz Satellite PLBs
Industry Canada RSS-287	Radio Standards Specification for EPIRBs, ELTs and PLBs
Australia/New Zealand AS/NZS 4280.2	406 MHz Satellite Distress Beacons; Part 2: PLBs

NOTE: For all other type approval information, please visit our website at www.acrelectronics.com.

7.3 Specifications

406 MHz Transmitter	
Frequency	406 MHz
Output Power	5 watts
Frequency Stability	±2 parts per billion/100ms
Digital Message:	
Format	
Long message	Serialized[1]
Message protocol	Standard Location
Duration	520 ms
Rate	400 bps
Encoding	Biphase L
Modulation	±1.1 radians peak
[1] Beacons are shipped from ACR with a Serialized code but can be reprogrammed at a service center to other coded formats including nationality of registration.	
121.5 MHz Transmitter	
Frequency:	121.5 MHz
Frequency Tolerance	±50 ppm
Output Power	25 mW PEP
Morse Code "P" ID	Every 50 seconds (approximately) (U.S. Protocol)
Modulation	
Type	AM (3K20A3N)
Sweep Range	400 to 1200 Hz
Sweep Rate	3 Hz
Duty Cycle	37.5%
Morse P	AM (2K00A2A) (U.S. Protocol)
STROBE LIGHT	
Light color	Bright White
Flash rate	1 flash per 3 seconds

Antenna	
Frequency	406 & 121.500 MHz
Polarization	Vertical
VSWR	Less than 1.5:1
General/Environmental	
Minimum Battery Operating Life	+24 hours minimum @ -20°C to +55°C (-4°F to +131°F)
Battery Replacement Interval	5 years, after use in an emergency, or expired battery witness seal
***Batteries meet the UN Classification for Non-dangerous goods**	
Size of beacon less Antenna	1.25 x 5.81 x 2.31 in (3.71 x 14.75 x 5.8 cm)
Material	High impact and UV resistant plastic
Color	ACR-treuse™ (High Visibility Yellow)
Weight	9.8 oz (277 grams) w/o holster
Waterproof	Factory Tested to 3.28 ft (1 m) for 1 hour and to 32.8 ft (10 m) for 10 minutes, both at room temperature
Buoyancy	See "Summary of products" table, page 1
Temperature Range	
Operating	-20°C to +55°C (-4°F to +131°F)
Storage:	-40°C to +70°C (-40°F to +158°F)

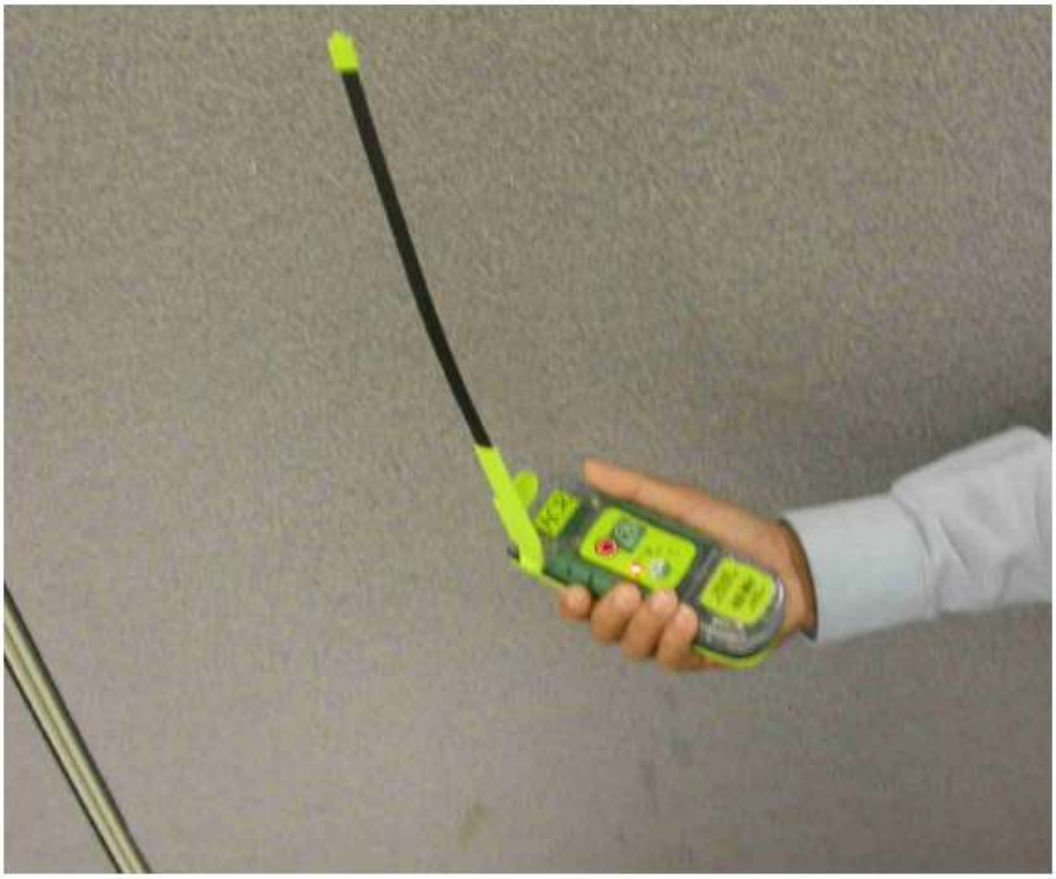
Product Service

APPENDIX

Photo of Beacon in the ON-GROUND Operating Configuration:

Product Service

Photo of Beacon in the Above GROUND Operating Configuration:



ANNEX B

COSPAS-SARSAT TYPE APPROVAL CERTIFICATE(S)

Product Service

Cospas-Sarsat Type Approval Certificate (PLB-350A)

Database ID:	198-2				
TAC Number:	198	**TAC Date:**	15-Jun-09	**TAC Rev Date:**	
Beacon Model Name:	PLB-350A				
Additional Names:	PLB-350A Slim, PLB-350A Float				
Manufacturer:	ACR Electronics Inc.				
Tx Frequencies:	406.037 MHz	**In Production:**	Yes	**Class:**	2
Type: **FF=Float Free**	PLB			**Tested Life:** (24 / 48 hrs)	24
Battery: **Manufacturer (Model, No of Cells)**	SANYO CR123A Lithium Manganese Dioxide (4 cells, 2/3 A size)				
Protocols Tested:	U	*Protocol Notes: U=User; UL=User-Location; SL=Standard Location; NL=National Location*			
Self Test:	Yes				
Self Test RF:	Yes	**Self Test RF (Short/Long):**	Short		
Self Test Format Flag:	Short	**Self Test Consistent with 15 Hex ID:**	Yes		
Homer Freq:	121.5 MHz	**Homer Duty Cycle:**	98%		
Homer Power:	50mW				
Strobe Light:	No	**Strobe Brightness:**			
Strobe Duty Cycle:					
Nav Device:	N/A				
Nav Device Model:	No				
Separable Antenna:	No				
Antenna Model:	Integrated antenna ACR P/N A3-06-2493				
Additional Functions:					
Comments General:	Approved for message encoding with User protocol variants: Maritime with MMSI, Maritime with Radio Call Sign, EPIRB Non Flat Free with Serial Number, Radio Call Sign, Aviation, ELT with Serial Number, ELT with Aircraft 24-bit address, ELT with Aircraft Operator Designator and Serial Number, PLB with Serial Number and National (short message format) protocol . Tested in PLB-like configurations only, i.e. "on the ground" and "above ground".				
TAC Rev History:					
Database ID:	198-2				

Product Service

Cospas-Sarsat Type Approval Certificate (PLB-350B)

Database ID:	198-1
TAC Number:	198
TAC Date:	15-Jun-09
TAC Rev Date:	
Beacon Model Name:	PLB-350B
Additional Names:	PLB-350B Slim, PLB-350B Float
Manufacturer:	ACR Electronics Inc.
Tx Frequencies:	406.037 MHz
In Production:	Yes
Class:	2
Type: **FF=Float Free**	PLB
Tested Life: (24 / 48 hrs)	24
Battery: **Manufacturer (Model, No of Cells)**	SANYO CR123A Lithium Manganese Dioxide (4 cells, 2/3 A size)
Protocols Tested:	NL, SL
	Protocol Notes: U=User; UL=User-Location; SL=Standard Location; NL=National Location
Self Test:	Yes
Self Test RF:	Yes
Self Test RF (Short/Long):	Short
Self Test Format Flag:	Long
Self Test Consistent with 15 Hex ID:	Yes
Homer Freq:	121.5 MHz
Homer Duty Cycle:	98%
Homer Power:	50mW
Strobe Light:	Yes
Strobe Brightness:	Unknown
Strobe Duty Cycle:	21 flashes/min
Nav Device:	Int
Nav Device Model:	Wonde Proud P/N A1-11-0688-1
Separable Antenna:	No
Antenna Model:	Integrated antenna ACR P/N A3-06-2493
Additional Functions:	PLB-350B Float has a larger bottom case and positive floatation (>15%). GNSS Self-Test (1 burst of 520 msec)
Comments General:	Approved for message encoding with Standard Location Protocol variants (EPIRB with MMSI, EPIRB with Serial Number, ELT with 24-bit address, ELT with Aircraft Operator Designator, ELT with Serial Number, PLB with Serial Number) and National Location protocol for EPIRB, ELT and PLB. Tested in PLB-like configurations only, i.e. "on the ground" and "above ground".
TAC Rev History:	
Database ID:	198-1