ENVIRONMENTAL TEST REPORT

FOR THE

PERSONAL LOCATOR BEACON

MODEL MBT-040600
AND
MODEL MBT-040600 TYPE GP

MANUFACTURED BY

MICROWAVE MONOLITHICS
2263 WARD AVENUE
SIMI VALLEY, CALIFORNIA 93065

PREPARED BY

ENVIRONMENT ASSOCIATES, INC.
9604 VARIEL AVENUE
CHATSWORTH, CALIFORNIA 91311

Maintains Laboratory Accreditation to ISO/IEC 17025 and ISO 9001

APPROVAL SHEET

Environment Associates hereby certifies that the information presented in this report is, to the best of our knowledge, true and correct in all respects.

ENVIRONMENT ASSOCIATES, INC.
Robert Coiteux, Laboratory Manager

8/6/03
Date

Report Written by Gerald Flippen on August 4, 2003

REVISION SHEET

REVISION LETTER	DESCRIPTION OF REVISION	DATE	APPROVAL
None	Original Issue	08/04/2003	

ADMINISTRATIVE DATA

PURPOSE OF TEST:	To demonstrate compliance to the applicable requirements of the specifications cited below.
ITEM SUBJECTED TO TEST:	Personal Locator Beacon Model MBT-040600 & MBT-040600 Type GP
TEST SPECIFICATIONS:	RTCM Paper 76-2002/SC110-STD
SUBMITTED BY:	Microwave Monolithics 2263 Ward Avenue Simi Valley, California 93065
TESTING AGENCY:	Environment Associates, Inc. 9604 Variel Avenue Chatsworth, California 91311
DATES TESTING CONDUCTED:	July 10 through July 30, 2003
AUTHORIZATION TO TEST:	Microwave Monolithics Purchase Order Number 83277

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SUMMARY OF TEST RESULTS

	TEST	MODEL NO.	SAMPLE NO.	PASS/FAIL	
2.0	Vibration	040600	263	X	
		040600 Type GP	264	X	
3.0	Bump (Shock)	040600	263	X	
		040600 Type GP	264	X	
4.0	Salt Fog	040600	263	X	
		040600 Type GP	264	X	
5.0	Drop	040600	263	X	
		040600 Type GP	264	X	
6.0	Leakage & Immersion	040600	263	X	
		040600 Type GP	264		X[1]
7.0	Leakage & Immersion (Retest)	040600 Type GP	264	X	

[1]Refer to Notice of Test Deviation number 1

Note:

"Pass" in the column above indicates completion of the test.

GENERAL INFORMATION

1.0 GENERAL

1.1 TEST ITEM DESCRIPTION

Personal Locator Beacon
Model MBT-040600, Sample Number 263
Model MBT-040600 Type GP, Sample Number 264

1.2 REFERENCE DOCUMENTS

Military

MIL-STD-831	Preparation of Test Reports

Commercial

RTCM Paper 76-2002/SC110-STD	Environmental and Operational Performance Test Procedures for Approval of 406 MHz Satellite PLBs

1.3 TOLERANCES

Test Equipment

Test equipment utilized was calibrated to International Organization for Standards (ISO) 10012-1, "Quality Assurance Requirements for Measuring Equipment", Part 1: "Meteorological (sic) Confirmation System for Measuring Equipment"; American National Standards Institute (ANSI)/National conference of Standards Laboratories (NCSL) Z540-1, "General Requirements for Calibration Laboratories and Measuring and Test Equipment, latest revision and traceable to the National Institute for Standards and Technology.

1.3 TOLERANCES (Continued)

Unless otherwise described in this report, the environmental test equipment was capable of controlling the test equipment within the following tolerances:

Vibration Frequency:	**1% or ±1/2 Hz below 25 Hz**
Sine Vibration Amplitude:	**±10%**
Shock Amplitude:	**±15%**
Shock Duration:	**±10%**
Temperature at the control sensor:	**±2.0 degrees C**
Sensor response time:	**<20 seconds**
Time:	**±5%**

Laboratory Ambient Conditions

All laboratory ambient conditions was maintained as follows:

Temperature:	**25 ±10 degrees C**
Pressure:	**30 ±2 inches Hg**
Relative Humidity:	**90% maximum**

2.0 VIBRATION

2.1 REFERENCE

RTCM Paper 76-2002/SC110-STD, Paragraph A3.0

2.2 PROCEDURE

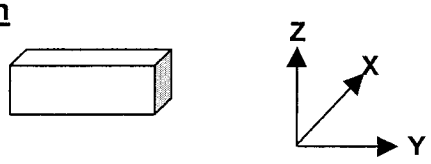
2.2.1 Test Parameters

The vibration control system was programmed for the following sinusoidal conditions:

Frequency	Level
5 - 33 Hz	1.0 g (maximum)

(logarithmic sweep 5 – 33 Hz, 2.5 minutes/sweep)

2.2.2 Axis Designation



2.2.3

The test samples listed below were mounted on the vibration exciter in the Z axis. The test samples were instrumented with one (1) control accelerometer. The test samples were non-operating during the vibration test.

1. Personal Locator Beacon, Model 040600, Sample Number 263
2. Personal Locator Beacon, Model 040600 Type GP, Sample Number 264

2.2.4

The test samples were subjected to twelve (12) sweeps of sinusoidal vibration at the conditions specified in paragraph 2.2.1. Plot #1 shows the input vibration level. No anomalies were noted.

2.2.5

The test samples were reoriented on the vibration exciter in the X axis. The test samples were instrumented with one (1) control accelerometer. The test samples were non-operating during the vibration test.

2.2.6

The test samples were subjected to twelve (12) sweeps of sinusoidal vibration at the conditions specified in paragraph 2.2.1. Plot #2 shows the input vibration level. No anomalies were noted.

2.2.7

The test samples were reoriented on the vibration exciter in the Y axis. The test samples were instrumented with one (1) control accelerometer. The test samples were non-operating during the vibration test.

2.2.8

The test samples were subjected to twelve (12) sweeps of sinusoidal vibration at the conditions specified in paragraph 2.2.1. Plot #3 shows the input vibration level. No anomalies were noted.

2.2.9

The test samples were removed from the vibration exciter and visually examined. There was no visible evidence of physical damage noted.

2.2.10

The test samples were subjected to an operational check. No functional anomalies were noted.

2.3 RESULTS

2.3.1

The vibration test was performed at the facility of Environment Associates, Inc., Chatsworth, California on July 10, 2003.

2.3.2

The test samples did not actuate during the vibration test.

2.3.3

All inspection and operation of the test samples were by Environment Associates personnel at the direction of Microwave Monolithics personnel who retained all data recorded.

2.3.4

The test log may be found in Appendix I. The list of equipment used during the test and test photographs may be found in Appendix II.

3.0 BUMP (SHOCK)

3.1 REFERENCE

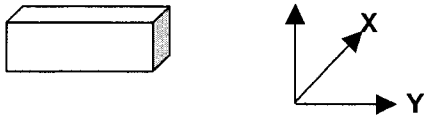
RTCM Paper 76-2002/SC110-STD, Paragraph A4.0

3.2 PROCEDURE

3.2.1 Test Parameters

The shock control system was programmed for a 98 m/s^2, 16 millisecond duration, halfsine shaped shock pulse.

3.2.2 Axis Designation



3.2.3

The test samples listed below were mounted on the vibration exciter in the Y axis. The test samples were instrumented with one (1) control accelerometer. The test samples were non-operating during the bump test.

1. Personal Locator Beacon, Model 040600, Sample Number 263
2. Personal Locator Beacon, Model 040600 Type GP, Sample Number 264

3.2.4

The test samples were subjected to four thousand (4000) pulses at the conditions specified in paragraph 3.2.1. No anomalies were noted.

3.2.5

The test samples were reoriented on the vibration exciter in the X axis. The test samples were instrumented with one (1) control accelerometer. The test samples were non-operating during the shock test.

3.2.6

The test samples were subjected to four thousand (4000) pulses at the conditions specified in paragraph 3.2.1. No anomalies were noted.

3.2.7

The test samples were reoriented on the vibration exciter in the Z axis. The test samples were instrumented with one (1) control accelerometer. The test samples were non-operating during the shock test.

3.2.8

The test samples were subjected to four thousand (4000) pulses at the conditions specified in paragraph 3.2.1. No anomalies were noted.

3.2.9

The test samples were removed from the vibration exciter and visually examined. There was no visible evidence of physical damage noted.

3.2.10

The test samples were subjected to an operational check. No functional anomalies were noted.

3.3 RESULTS

3.3.1

The bump (shock) test was performed at the facility of Environment Associates, Inc., Chatsworth, California on July 10, 2003.

3.3.2

The test samples did not actuate during the bump test.

3.3.3

All inspection and operation of the test samples were by Environment Associates personnel at the direction of Microwave Monolithics personnel who retained all data recorded.

3.3.4

The test log may be found in Appendix I. The list of equipment used during the test and test photographs may be found in Appendix II.

4.0 SALT FOG

4.1 REFERENCE

RTCM Paper 76-2002/SC110-STD, Paragraph A5.0

4.2 PROCEDURE

4.2.1

The test chamber ambient temperature was stabilized at +35°C.

4.2.2

The test samples listed below were placed in the center of the chamber on a fiberglass bar.

1. Personal Locator Beacon, Model 040600, Sample Number 263
2. Personal Locator Beacon, Model 040600 Type GP, Sample Number 264

4.2.3

The atomizers were turned on and the test samples were subjected to a salt fog atmosphere consisting of 5% sodium chloride and 95% deionized water (by weight) for a total period of forty eight (48) hours.

4.2.4

The volume, pH and specific gravity of the collected fallout solution were measured on a daily basis during the exposure period.

4.2.5

The test samples were removed from the chamber and allowed to dry at site ambient conditions for a period of twenty four (24) hours.

4.2.6

The test samples were re-installed in the chamber as described in paragraph 4.2.2.

4.2.7

The atomizers were turned on and the test samples were subjected to a salt fog atmosphere consisting of 5% sodium chloride and 95% deionized water (by weight) for an additional period of twelve (12) hours.

4.2.8

The volume, pH and specific gravity of the collected fallout solution were measured during the exposure period.

4.2.9

The test samples were removed from the chamber and allowed to dry at site ambient conditions for a period of twelve (12) hours.

4.2.10

The test samples were visually examined. There was no visible evidence of physical damage noted..

4.3 RESULTS

4.3.1

The salt fog test was performed at the facility of Environment Associates, Inc. Chatsworth, California during the period of July 10 through July 15, 2003.

4.3.2

All inspection and operation of the test samples were by Environment Associates personnel at the direction of Microwave Monolithics personnel who retained all data recorded.

4.3.3

The test log may be found in Appendix I. The list of equipment used during the test and test photographs may be found in Appendix II

5.0 DROP

5.1 REFERENCE

RTCM Paper 76-2002/SC110-STD, Paragraph A6.0

5.2 PROCEDURES

5.2.1

The test samples listed below were placed in a temperature chamber.

1. Personal Locator Beacon, Model 040600, Sample Number 263
2. Personal Locator Beacon, Model 040600 Type GP, Sample Number 264

5.2.2

The chamber temperature was decreased to -30°C.

5.2.3

The test samples were subjected to a two (2) hour dwell at -30°C.

5.2.4

Upon completion of the dwell at -30°C, the chamber temperature was decreased to -40°C.

5.2.5

The test samples were subjected to a two (2) hour dwell at -40°C.

5.2.6

Sample number 263 was removed from the chamber and subjected to one (1) drop on each surface of the test sample for a total of six (6) drops. The drop height was thirty nine (39) inches.

5.2.7

Sample number 264 was removed from the chamber and subjected to one (1) drop on each surface of the test sample for a total of six (6) drops. The drop height was thirty nine (39) inches.

5.2.8

The test samples were visually examined. It was noted that the paint was chipping on both caps. No other visual damage was noted.

5.2.9

The test samples were subjected to a self test. There was a green light observed on both test samples.

5.3 RESULTS

5.3.1

The drop test was performed at the facility of Environment Associates, Inc., Chatsworth, California on July 21, 2003.

5.3.2

All inspection and operation of the test samples were by Environment Associates personnel at the direction of Microwave Monolithics personnel who retained all data recorded.

5.3.3

The test log may be found in Appendix I. The list of equipment used during the test and test photographs may be found in Appendix II.

6.0 LEAKAGE AND IMMERSION

6.1 REFERENCE

RTCM Paper 76-2002/SC110-STD, Paragraph A7.0

6.2 PROCEDURES

6.2.1

The test chamber temperature was increased to +65°C and stabilized.

6.2.2

The test samples listed below were placed in the temperature chamber, which was stabilized at +65°C.

1. Personal Locator Beacon, Model 040600, Sample Number 263
2. Personal Locator Beacon, Model 040600 Type GP, Sample Number 264

6.2.3

The test samples were subjected to a one (1) hour dwell at +65°C.

6.2.4

Upon completion of the dwell, the test samples were removed from the chamber and immediately immersed in water to a depth off one hundred (100) millimeters (measured from the highest point of the test samples to the surface of the water). The water vessel was in a temperature chamber and was stabilized at +20°C.

6.2.5

The test samples were subjected to a forty eight (48) hour dwell at the conditions specified in paragraph 6.2.4.

6.2.6

Upon completion of the forty eight (48) hour dwell, the test samples were submerged in water to a depth of one (1) meter for a period of one (1) hour.

6.2.7

Upon completion of the one (1) hour dwell, the test samples were removed from the water and allowed to dry.

6.2.8

The test samples were subjected to a functional test. There was a green light observed on sample number 263. There was no green light observed on sample number 264. Refer to Notice of Test Deviation number 1.

6.2.9

The test samples were visually examined. No visible anomalies were noted on sample number 263. A crack was observed in the antenna cover on sample number 264. Refer to Notice of Test Deviation number 1.

6.2.10

Test sample number 263 was returned to Microwave Monolithics personnel for visual examination and functional evaluation.

6.3 RESULTS

6.3.1

The leakage and immersion test was performed at the facility of Environment Associates, Inc., Chatsworth, California during the period of July 22 through July 24, 2003.

6.3.2

All inspection and operation of the test samples were by Environment Associates personnel at the direction of Microwave Monolithics personnel who retained all data recorded.

6.3.3

The test log may be found in Appendix I. The list of equipment used during the test and test photographs may be found in Appendix II. Notice of Test Deviation may be found in Appendix III.

7.0 LEAKAGE AND IMMERSION (Retest)

7.1 REFERENCE

RTCM Paper 76-2002/SC110-STD, Paragraph A7.0

7.2 PROCEDURES

7.2.1

The test chamber temperature was increased to +65°C and stabilized.

7.2.2

The test sample listed below was placed in the temperature chamber, which was stabilized at +65°C.

Personal Locator Beacon, Model 040600 Type GP, Sample Number 264

7.2.3

The test sample was subjected to a one (1) hour dwell at +65°C.

7.2.4

Upon completion of the dwell, the test sample was removed from the chamber and immediately immersed in water to a depth off one hundred (100) millimeters (measured from the highest point of the test sample to the surface of the water). The water vessel was in a temperature chamber and was stabilized at +20°C.

7.2.5

The test sample was subjected to a forty eight (48) hour dwell at the conditions specified in paragraph 7.2.4.

7.2.6

Upon completion of the forty eight (48) hour dwell, the test sample was submerged in water to a depth of one (1) meter for a period of one (1) hour.

7.2.7

Upon completion of the one (1) hour dwell, the test sample was removed from the water and allowed to dry.

7.2.8

The test sample was subjected to a functional test. No functional anomalies were noted.

7.2.9

The test sample was returned to Microwave Monolithics personnel for visual examination and functional evaluation.

7.3 RESULTS

7.3.1

The leakage and immersion test was performed at the facility of Environment Associates, Inc., Chatsworth, California during the period of July 28 through July 30, 2003.

7.3.2

All inspection and operation of the test sample were by Environment Associates personnel at the direction of Microwave Monolithics personnel who retained all data recorded.

7.3.3

The test log may be found in Appendix I. The list of equipment used during the test and test photographs may be found in Appendix II.