MFA M. Flom Associates, Inc. - Global Compliance Center
3356 North San Marcos Place, Suite 107, Chandler, Arizona 85225-7176
www.mflom.com general@mflom.com (480) 926-3100, FAX: 926-3598

121.5MHz AUXILLARY RADIO-LOCATION DEVICE TRANSMITTER TEST

for

Models: MBT-040600 & MBT-040600-GP

pursuant to

FEDERAL COMMUNICATIONS COMMISSION

Rule Part(s) 95K, 95.1402(b)

DATE OF REPORT: July 14th, 2003

ON THE BEHALF OF THE APPLICANT:

Micro-Monolithics Inc.

AT THE REQUEST OF: P.O. 83276

Microwave Monolithics Inc.
2263 Ward Avenue
Simi Valley, CA 93065

Attention of: Daniel Siu – Project Manager
Cathy Nolan - Buyer

SUPERVISED BY: David E. Lee.
Director of Test

PAGE NO. 2 of 17.

Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

a) TEST REPORT

b) Laboratory: M. Flom Associates, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044) Chandler, AZ 85225

c) Report Number:

d) Client: Microwave Monolithics Inc.
2263 Ward Avenue
Simi Valley, CA 93065

e) Identification: MBT-040600 (standard and extended case)
EUT Description: PLB

f) EUT Condition: Not required unless specified in individual tests.

g) Report Date: July 14th, 2003
EUT Received: July 7th, 2003

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with MFA internal quality manual.

m) Supervised by:

David E. Lee
Director of Test

n) Results: The results presented in this report relate only to the item tested.

o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

PAGE NO. 3 of 17.

LIST OF GENERAL INFORMATION REQUIRED FOR CERTIFICATION

IN ACCORDANCE WITH FCC RULES AND REGULATIONS,
VOLUME II, PART 2 AND TO

Part 95K, 95.1402(b)

Sub-part 2.1033
(c)(1): NAME AND ADDRESS OF APPLICANT:

Microwave Monolithics Inc.
2263 Ward Avenue
Simi Valley, CA 93065

MANUFACTURER:

Applicant

(c)(2): FCC ID: RG6-MBT-040600

MODEL NO: MBT-040600 (standard case)
MBT-040600-GP (extended case)

(c)(3): INSTRUCTION MANUAL(S):

PLEASE SEE ATTACHED EXHIBITS

(c)(4): TYPE OF EMISSION: 3K20A3E

(c)(5): FREQUENCY RANGE, MHz: 121.500

(c)(6): POWER RATING, Watts: 0.100 [25mW, -0dB, +6dB)
___ Switchable ___ Variable x N/A

(c)(7): MAXIMUM POWER RATING, Watts: 300

DUT RESULTS: Passes x Fails _____

M. Flom Associates, Inc. is accredited by the American Association for Laboratory Association (A2LA) as shown in the scope below.

THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION

ACCREDITED LABORATORY

A2LA has accredited

M. FLOM ASSOCIATES, INC.
Chandler, AZ

for technical competence in the field of

Electrical (EMC) Testing

The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "General Requirements for the Competence of Testing and Calibration Laboratories" and any additional program requirements in the identified field of testing. Testing and calibration laboratories that comply with this International Standard also operate in accordance with ISO 9001 or ISO 9002.

Presented this 2nd day of March, 2001.

President
For the Accreditation Council
Certificate Number 1008.01
Valid to December 31, 2002

For tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical (EMC) Scope of Accreditation

American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO/IEC 17025:1999

M. FLOM ASSOCIATES, INC.
Electronic Testing Laboratory
3356 North San Marcos Place, Suite 107
Chandler, AZ 85225
Marion Flom Phone: 480 926 3100

ELECTRICAL (EMC)

Valid to: December 31, 2002 Certificate Number: 1008.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following electromagnetic compatibility tests:

Tests	Standard(s)
RF Emissions	FCC Part 15 (Subparts B and C) using ANSI C63.4-2000; CISPR 11; CISPR 13; CISPR 14; CISPR 22; EN 55011; EN 55013; EN 55014; EN 55022; EN 55081-1; EN 55081-2; ICES-003; AS/NZS 1044; AS/NZS 1053; AS/NZS 1548; AS/NZS 4251.1; CNS 13438
Harmonic Current	EN 61000-3-2
Fluctuation and Flicker	EN 61000-3-3
RF Immunity	EN: 50082-1, 50082-2, 55024; AS/NZS 4251.1
Electrostatic Discharge (ESD)	EN 61000-4-2
Radiated Susceptibility	EN 61000-4-3; ENV 50140; ENV 50204; IEC 1000-4-3; IEC 801-3
EFT	EN 61000-4-4; IEC 1000-4-4; IEC 801-4
Surge	EN 61000-4-5; ENV 50142; IEC 1000-4-5; IEC 801-5
Voltage Dips, Short Interruptions, and Line Voltage Variations	EN 61000-4-11
47 CFR (FCC)	Parts 2, 18, 21, 22, 23, 24, 25, 26, 27, 74, 80, 87, 90, 95, 97, 101 (excluding SAR Testing)
Power Frequency Magnetic Field Immunity	EN 61000-4-8
Immunity to Conducted Disturbances	EN 61000-4-6

(A2LA Cert. No. 1008.01) 08/01/02 Page 1 of 1

5301 Buckeystown Pike, Suite 350 • Frederick, MD 21704-8373 • Phone: 301-644-3248 • Fax: 301-662-2974

"This laboratory is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this report have been determined in accordance with the laboratory's terms of accreditation unless stated otherwise in the report."

Should this report contain any data for tests for which we are not accredited, or which have been undertaken by a subcontractor that is not A2LA accredited, such data would not covered by this laboratory's A2LA accreditation.

PAGE NO. 5 of 17.

Sub-part 2.1033(c)(14): TEST AND MEASUREMENT DATA

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts:

____ 21 – Domestic Public Fixed Radio Services
____ 22 – Public Mobile Services
____ 22 Subpart H - Cellular Radiotelephone Service
____ 22.901(d) - Alternative technologies and auxiliary services
____ 23 – International Fixed Public Radiocommunication services
____ 24 – Personal Communications Services
____ 74 Subpart H - Low Power Auxiliary Stations
____ 80 – Stations in the Maritime Services
____ 80 Subpart E - General Technical Standards
____ 80 Subpart F - Equipment Authorization for Compulsory Ships
____ 80 Subpart K - Private Coast Stations and Marine Utility Stations
____ 80 Subpart S - Compulsory Radiotelephone Installations for Small Passenger Boats
____ 80 Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes
____ 80 Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act
____ 80 Subpart V - Emergency Position Indicating Radiobeacons (EPIRB'S)
____ 80 Subpart W - Global Maritime Distress and Safety System (GMDSS)
____ 80 Subpart X - Voluntary Radio Installations
____ 87 – Aviation Services
____ 90 – Private Land Mobile Radio Services
____ 94 – Private Operational-Fixed Microwave Service
____ 95 Subpart A - General Mobile Radio Service (GMRS)
____ 95 Subpart C - Radio Control (R/C) Radio Service
____ 95 Subpart D - Citizens Band (CB) Radio Service
____ 95 Subpart E - Family Radio Service
____ 95 Subpart F - Interactive Video and Data Service (IVDS)
_X_ 95 Subpart K – Personal Locator Beacon
____ 97 - Amateur Radio Service
____ 101 – Fixed Microwave Services

STANDARD TEST CONDITIONS and ENGINEERING PRACTICES

Except as noted herein, the following conditions and procedures were observed during the testing:

In accordance with ANSI C63.4-1992/2000 Draft, section 6.1.9, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104 °F) unless the particular equipment requirements specify testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Measurement results, unless otherwise noted, were worst-case measurements. In all screen room tests both units were tested. Where the results differed the worst case was chosen for the report.

The battery is sealed within the unit and not accessible by the user. Unit ID 00798 was pre-conditioned with 20-hour continuous transmission to discharge the battery for the radiated measurements test.

Reference Documents;

A) RTCM Paper 76-2002/SC-110-STD, A12.0
B) 47CFR Section 95.1402(b)
C) 14CFR Section 91.207

The applicant presented two units for test.

Unit assigned MFA ID 00798 was a MBT-040600 (standard case)
Unit assigned MFA ID 00799 was a MBT-040600-GP (extended case)

During all tests, and during the temperature cycling, the signal was monitored on a communications receiver set to 121.5MHz to ensure uninterrupted operation.

[The radiated tests were limited to short bursts during the 5 minute period at the top of the hour in accordance with Reference C. The local Air Traffic Center (Phoenix Sky Harbor) was informed of the testing schedule.]

PAGE NO. 7 of 17.

NAME OF TEST: Frequency Stability (Temperature Variation)

SPECIFICATION: RTCM Paper 76-2002/SC-110-STD, A12.0 (Cat II)

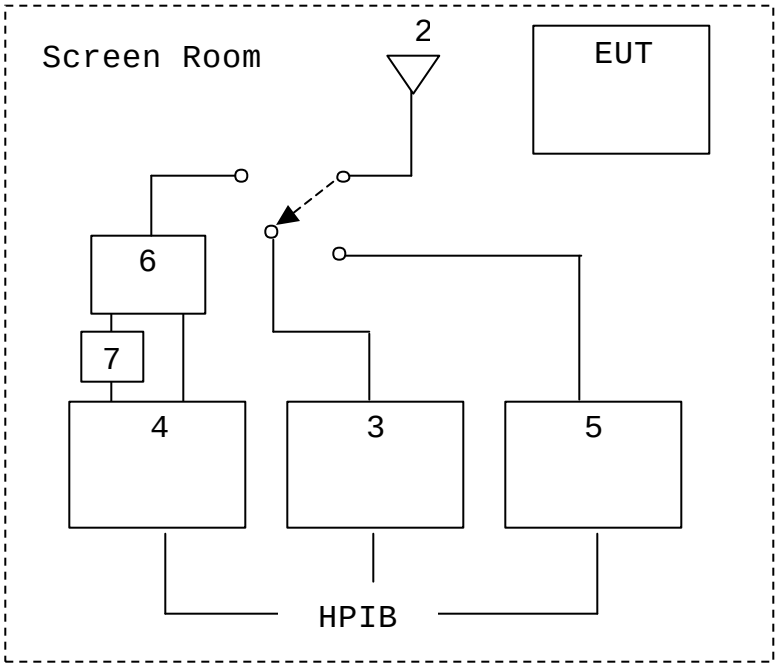
GUIDE: ANSI/TIA/EIA-603-1992, Paragraph 2.2.2

MEASUREMENT PROCEDURE

1. The EUT and test equipment were set up as shown below.

2. All measurements were first taken at ambient temperature (25°C) and data recorded for tests A12.1 and A12.2

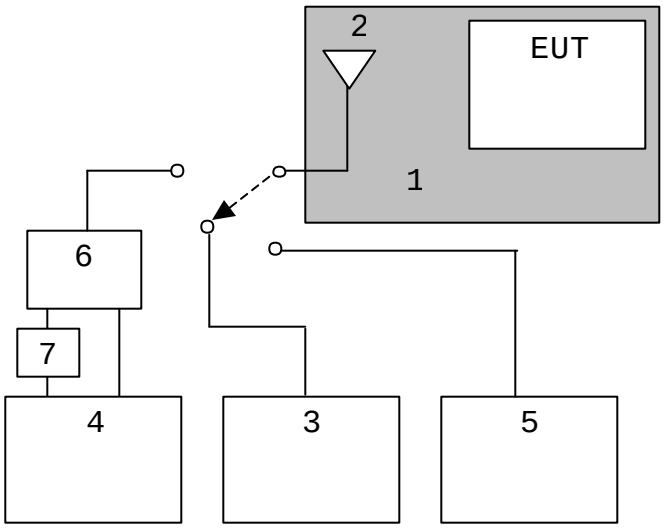
TRANSMITTER TEST SET-UP (AMBIENT)



3. The equipment was moved to the environmental chamber and the tests repeated at the temperature extremes.

4. With all power OFF, the temperature was decreased to -20°C and permitted to stabilize for one hour. Power was applied and the change in frequency was noted within one minute. The modulation parameters were checked for changes from the ambient readings and any variance noted.

TRANSMITTER TEST SET-UP (TEMPERATURE EXTREMES)



5. With power OFF, the temperature was raised to +55°C in one step. The sample was permitted to stabilize at for one hour. Power was applied and the maximum frequency change was noted within one minute. The modulation parameters were checked for changes from the ambient readings and any variance noted.

6. The temperature tests were performed on both units submitted and recorded for the worst case.

Asset	Description (as applicable)	s/n		
(1)	TEMPERATURE			
i00027	Tenney Temp. Chamber	9083-765-234		
(2)	SENSE ANTENNA			
-	Whip Antenna, VHF	NSN		
(3)	SPECTRUM ANALYZER			
i00048	HP 8566B	2511AD1467	12 mo.	May-03
(4)	OSCILLOSCOPE			
i00030	HP 54502A	2927A00209		
(5)	MODULATION ANALYZER			
i00020	HP 8901A	2105A01087		
(6)	COMBINER			
i00154	4 x 25 Ω COMBINER	154		
(7)	CRYSTAL DETECTOR			
i00159	HP 8470B	1822A10054		

Test A12.1

Carrier Frequency:

The carrier frequency of each transmitter was measured on the HP8901A and verified as being in the range 121.5000 +/- 50ppm at minimum and maximum operating temperatures.

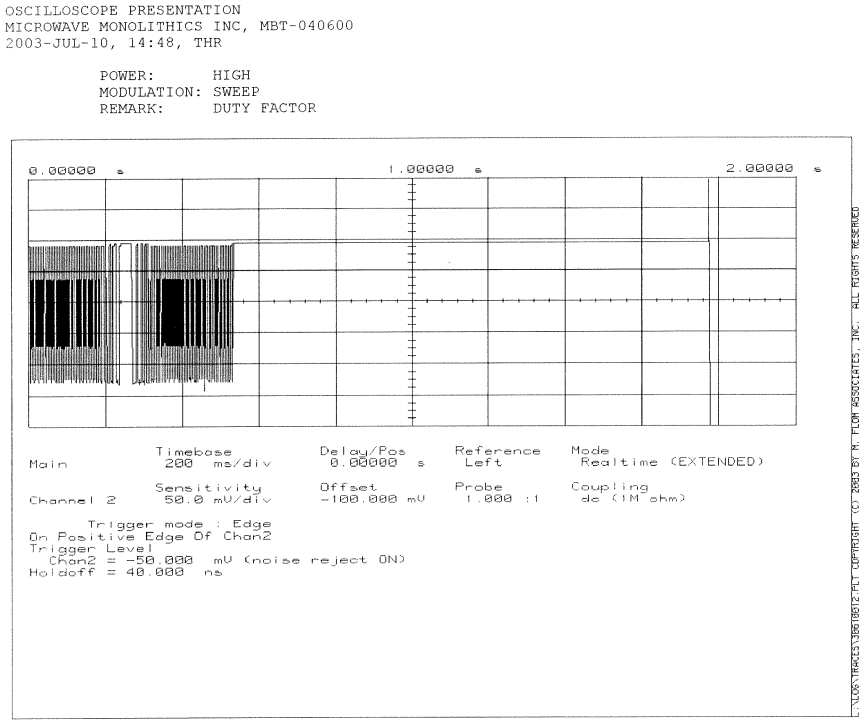
Unit ID 00799 was measured at 121.49989 at -20deg C
Unit ID 00799 was measured at 121.50023 at 25deg C
Unit ID 00799 was measured at 121.50041 at +55deg C

Test A12.2

Modulation Characteristics:

1) Transmitter Duty Cycle

The operation of the unit was monitored on a Spectrum Analyzer. After the initial turn-on self test the transmitter operated continuously except during the transmission of the 406MHz pulse. The interval for this pulse was determined to be approximately 1.5 seconds as shown in plot below.



The 121.5MHz transmission cycle repeated every 50 seconds and was preceded by the Morse code identifier “P”.

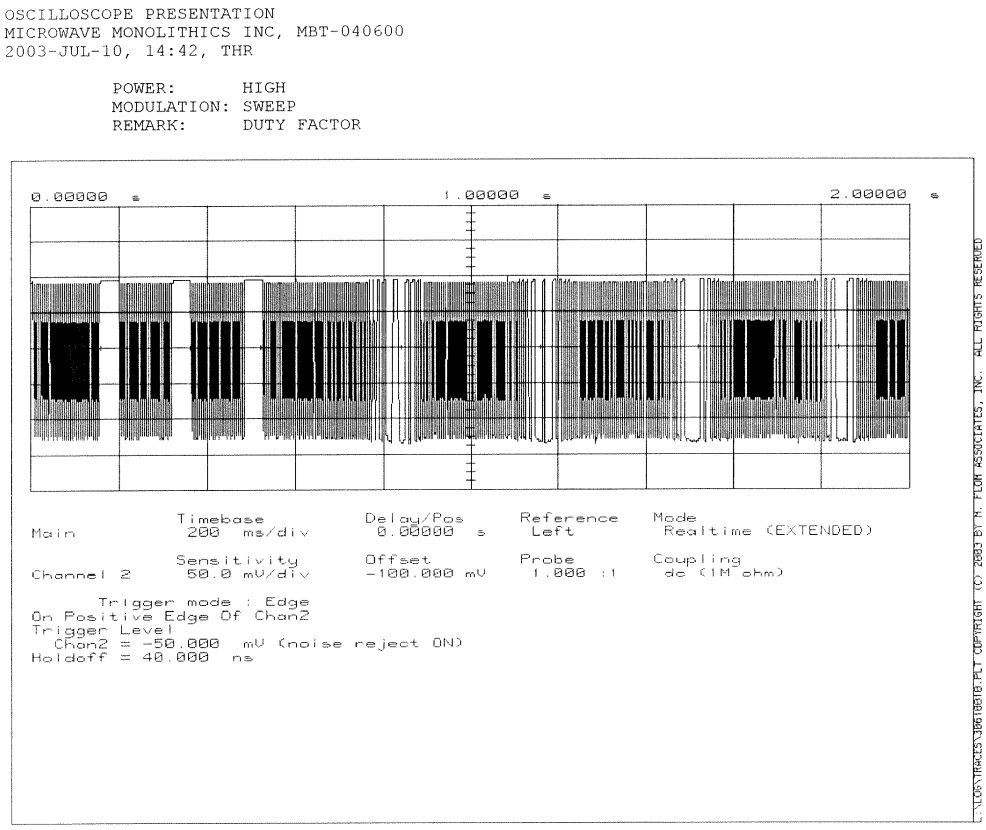
The tests at minimum and maximum operating temperature showed no change in this pattern.

2) Modulation Frequency and Sweep Repetition Rate

Lowest modulation frequency was determined to be 450Hz
Highest modulation frequency was determined to be 1250Hz

The sweep was upwards.

Sweep repetition rate was approximately 3 Hz as shown in the plot below:



The tests at minimum and maximum operating temperature showed no change in this pattern.

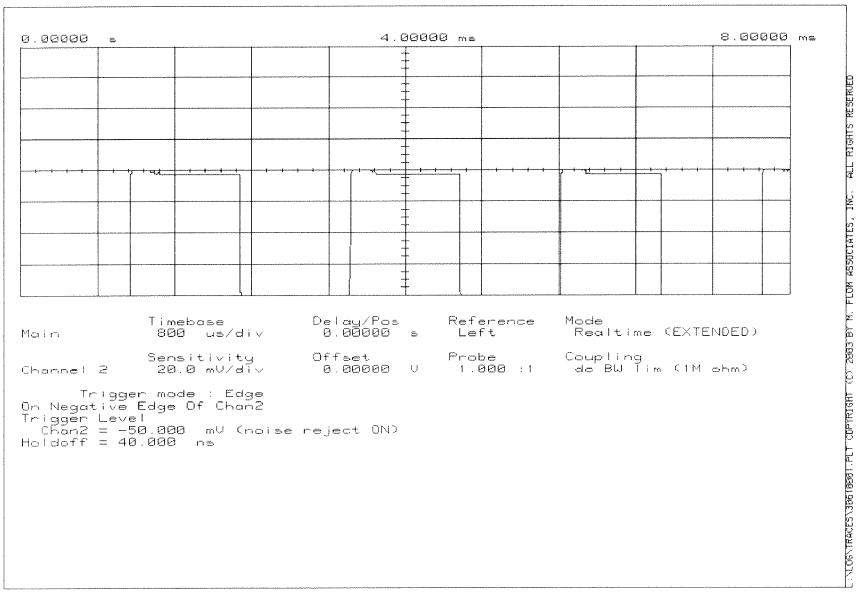
3) Modulation Duty Cycle

The duty cycle of the transmission was recorded over several points of the modulation sweep and the duty cycle remained within the range of 35% - 50%

The following plots show the duty cycle with varying modulation at low, mid and high frequencies.

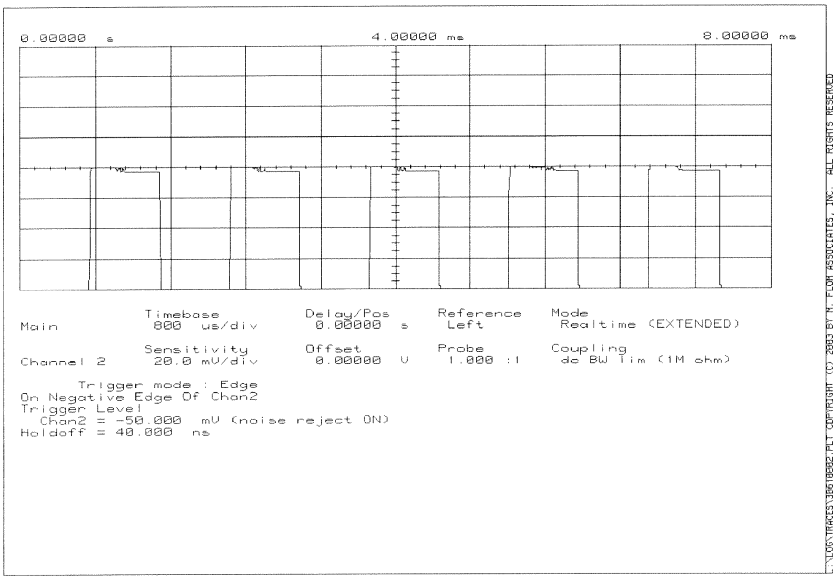
OSCILLOSCOPE PRESENTATION
MICROWAVE MONOLITHICS INC, MBT-040600
2003-JUL-10, 10:53, THR

POWER: HIGH
MODULATION: SWEEP
REMARK: DUTY FACTOR



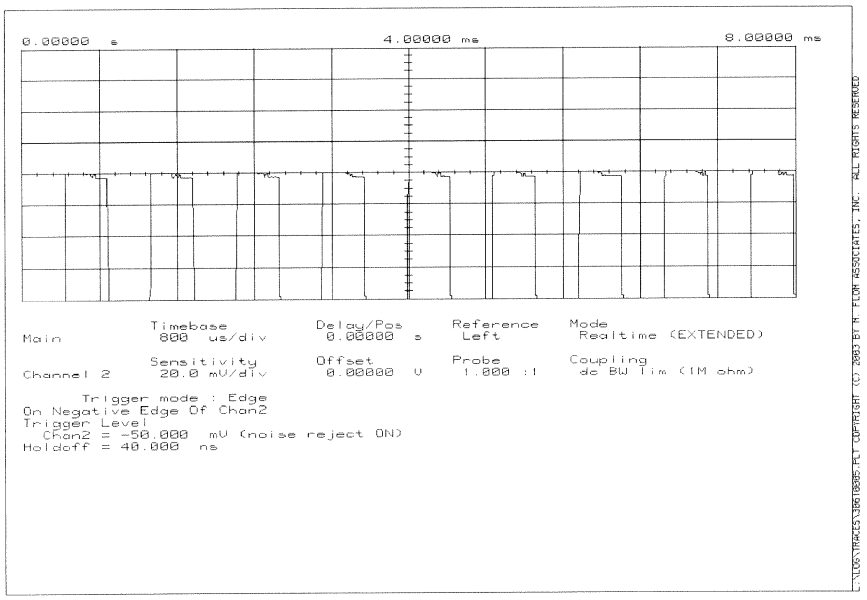
OSCILLOSCOPE PRESENTATION
MICROWAVE MONOLITHICS INC, MBT-040600
2003-JUL-10, 10:53, THR

POWER: HIGH
MODULATION: SWEEP
REMARK: DUTY FACTOR



OSCILLOSCOPE PRESENTATION
MICROWAVE MONOLITHICS INC, MBT-040600
2003-JUL-10, 10:55, THR

POWER: HIGH
MODULATION: SWEEP
REMARK: DUTY FACTOR



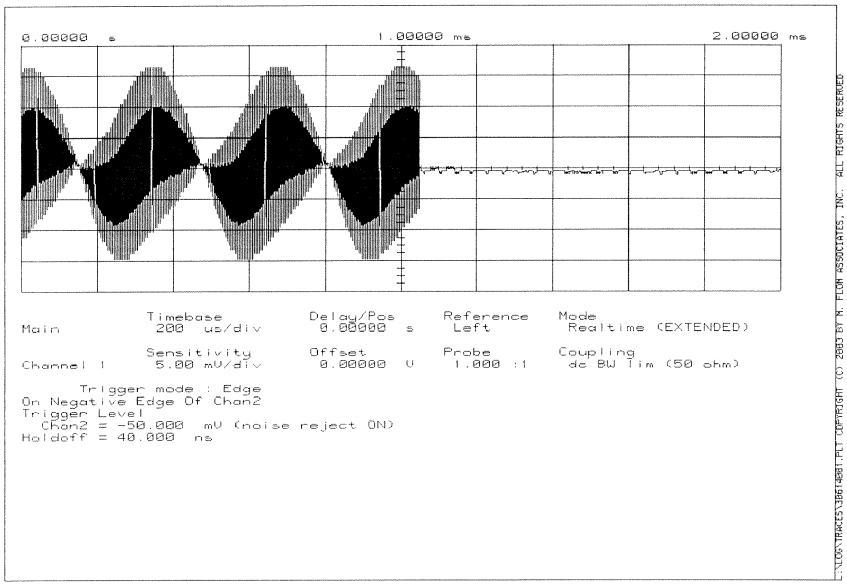
The tests at minimum and maximum operating temperature showed no change in this pattern.

4) Modulation Factor

The modulation depth of the transmission was measured as 100%. Therefore the calculated modulation factor was 1.0

OSCILLOSCOPE PRESENTATION
MICROWAVE MONOLITHICS INC, MBT-040600
2003-JUL-14, 10:11, MON

MODULATION: NONE

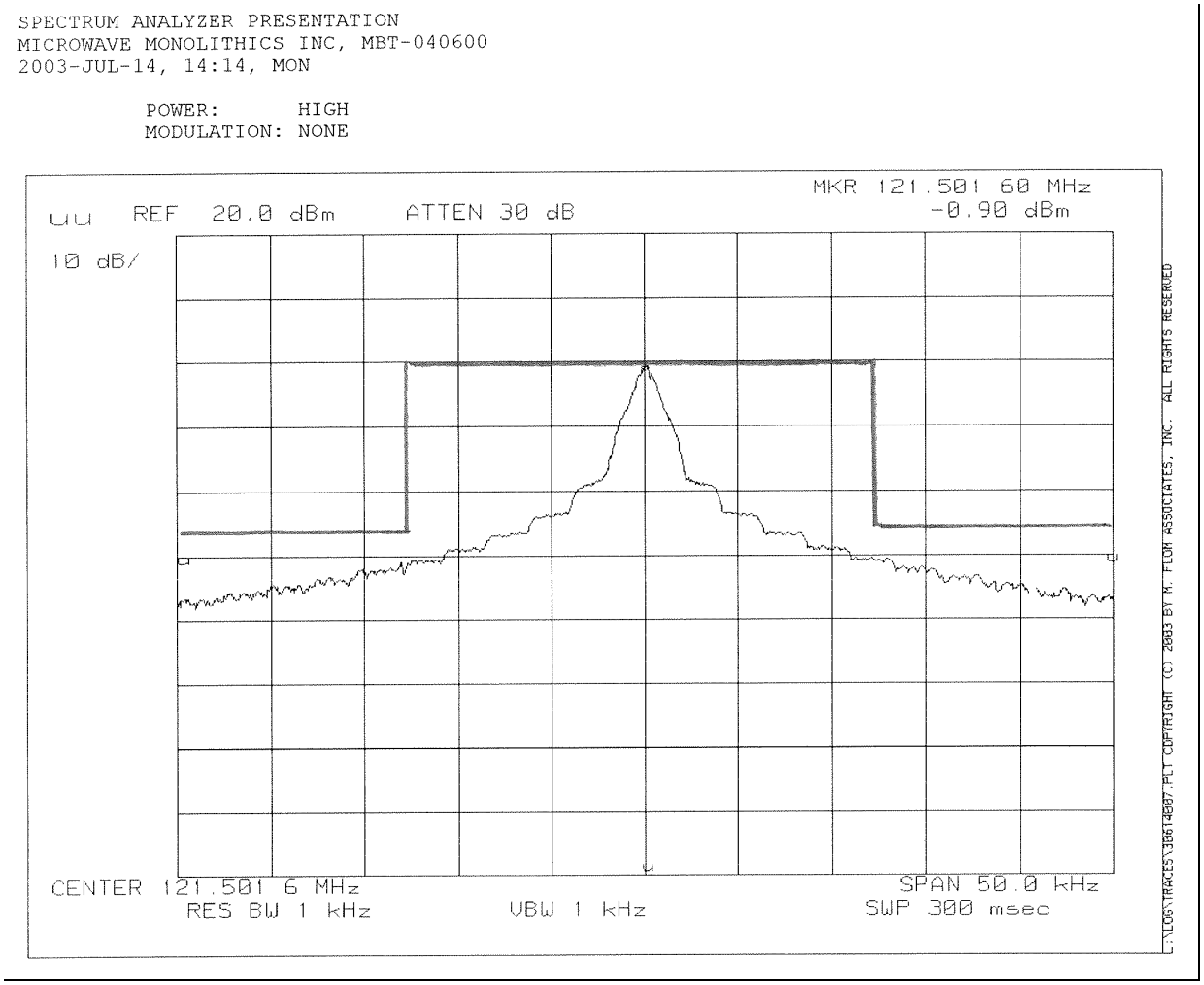


The tests at minimum and maximum operating temperature showed no change in the modulation depth.

5) Frequency Coherence

Measurements were made to determine the bandwidth of the emitted power. More than 30% of the transmitted power was contained within +/-30Hz of the carrier frequency.

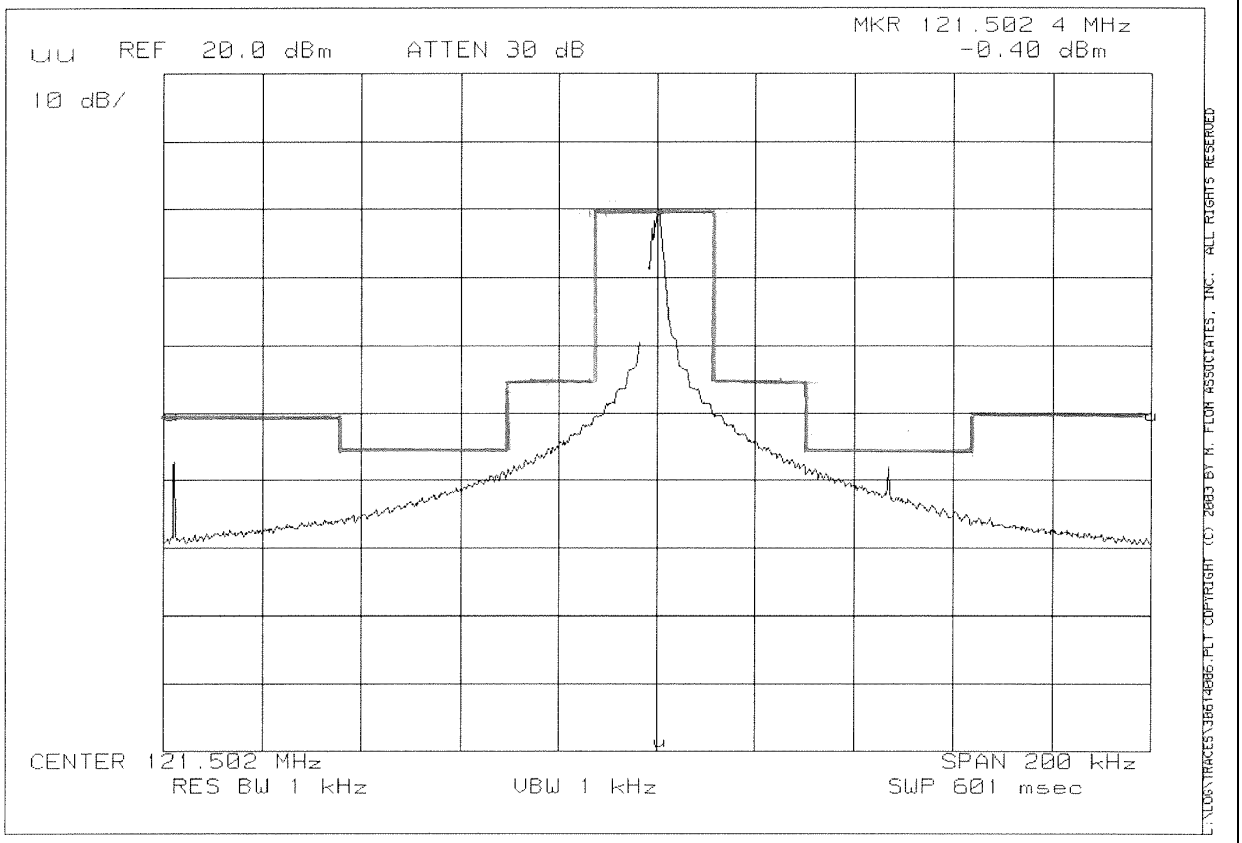
The emission masks and output signature of the device are shown below:



Emission Mask per RTCM76-2002/SC110-STD (A8.0)

SPECTRUM ANALYZER PRESENTATION
MICROWAVE MONOLITHICS INC, MBT-040600
2003-JUL-14, 14:13, MON

POWER: HIGH
MODULATION: NONE



Emission Mask per RTCM76-2002/SC110-STD (A8.0)

After the interruption by the 406MHz pulse the carrier frequency returned to within +/-30Hz of the previous carrier frequency.

The tests at minimum and maximum operating temperature showed no change in this pattern.

Other Related Tests

Other parameters of the 121.5MHz beacon are tested under different sections of Reference A. Specifically:

1) COSPAS-SARSAT Approval Tests [A9.0]
2) Operational Life Tests and Self Test [A10.0]

PAGE NO. 15 of 17.

NAME OF TEST: ERP Carrier Power (Radiated)

SPECIFICATION: TIA/EIA 603A (Substitution Method) – Modified per RTCM Paper 76-2002/SC-110-STD, A12.0

Test A12.3

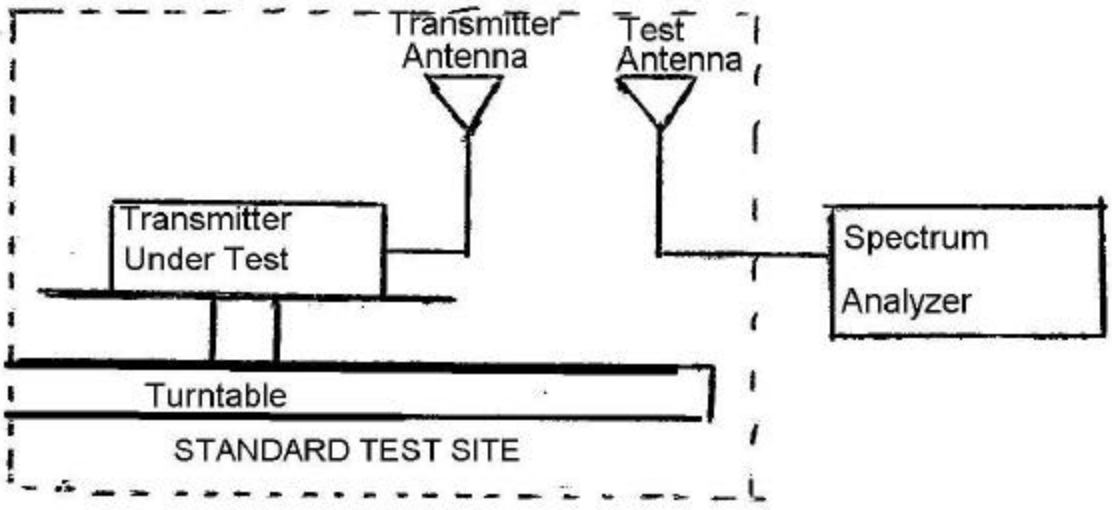
Definition: The average radiated power of a licensed device is the equivalent power required, when delivered to a half-wave dipole or horn antenna, to produce at a distant point the same average received power as produced by the licensed device.

Test Equipment:

Asset	Description (as applicable)	s/n	Cycle (Per ANSI C63.4-1992/2000 Draft, 10.1.4)	Last Cal
TRANSDUCER				
i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Sep-02
SPECTRUM ANALYZER				
i00033	HP 85462A	3625A00357	12 mo.	Jan-03

Method of Measurement:

a) The equipment was connected as illustrated. Tests were performed at 10m with the device on a 75cm radius ground plane instead of the turntable.



b) A bi-conical antenna was used on the mast, which was remotely positioned between 1m and 4m above the ground. The maximum value was achieved with the test antenna to an elevation of 1.21m. This position was maintained for the remained of the test.

PLB on Ground Plane

10m Range View (Antenna to PLB)

c) Step b) was repeated for eleven additional readings at 30° interval positions on the ground plane [RTCM Paper 76-2002/SC-110-STD, A12.0 requirement].

d) The transmitter antenna under test was replaced with a half-wave vertically polarized antenna. The center of the antenna was at the same location as the transmitter under test. The antenna was connected to a signal generator with a known output power and records the path loss made in dB. For this arrangement the loss was measured as 2.9dB at 121.6MHz to avoid interference on the 121.5MHz emergency frequency.

TEST RESULTS

Azimuth (deg)	Level @10m (dB/microV)	Correction Factor (dB)	Calculated (dB/microV)	Calculated EIRP (dBm)	Incl. Path Loss of 2.9dB (dBm)
0	82.0	16.3	98.2	13.5	16.4
30	81.0	16.3	97.2	12.5	15.4
60	82.0	16.3	98.3	13.5	16.4
90	81.9	16.3	98.1	13.4	16.3
120	81.6	16.3	97.9	13.1	16.0
150	81.2	16.3	97.4	12.6	15.5
180	81.1	16.3	97.4	12.6	15.5
210	82.0	16.3	98.3	13.5	16.4
240	81.9	16.3	98.2	13.4	16.3
270	82.1	16.3	98.2	13.6	16.5
300	80.3	16.3	96.6	11.8	14.7
330	81.5	16.3	97.8	13.0	15.9

e) The average radiated output power was calculated from the readings in step c) and d) by the following:

Average radiated power = 10 $\log_{10}$ S 10(LVL – LOSS)/10 (dBm)

Av. Radiated Power: 15.94 dbm

f) For the test the Temperature was 88 deg F, Relative Humidity was 20% and Atmospheric Pressure was 29.72in/hg.

g) The pattern was vertically polarized and omni-directional in the horizontal plane to within +/-3dB [+/-0.7dB measured].

h) No conducted output connector was fitted. No VSWR measurements taken.