FCC PART 74
EMI MEASUREMENT AND TEST REPORT

For

Nady Systems, Inc.

6701 Shellmond Street
Emeryville, CA 94608 USA

FCC ID: BEK9E3UH16

April 11, 2002

This Report Concerns:	**Equipment Type:**
☒ Original Report	Transmitter

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Note: This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	Nady Systems, Inc.
Product:	UHF Wireless Transmitter
Model Name:	UH-16
Serial Number:	N/A
FCC ID:	BEK9E3UH16
Transmitter Frequency:	725.998-745.903MHz
Maximum Output Power:	12.17dBm
Dimension:	9.0” L x 2.0” W
DC Voltage and Current:	3Vdc/120mA
Applicable Standard:	FCC Part 74 Subpart H

** The test data was good for test sample only. It may have deviation for other product samples.*

1.2 Objective

This report is prepared on behalf of *Nady Systems, Inc.* in accordance with Part 74 Subpart H of the Federal Communication Commissions rules.

The objective of the manufacturer is to demonstrate compliance with FCC rules for peak output power, modulation characteristics, occupied bandwidth of emission, spurious emission, field strength of spurious radiation, frequency stability and line conduction.

1.3 Test Methodology

Measurements contained in this report were also conducted with TIA/EIA Standard 603, Telecommunications Industry Association Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.4 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.5 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8566B	2610A02165	12/6/02
HP	Spectrum Analyzer	8593B	2919A00242	12/20/02
HP	Amplifier	8349B	2644A02662	12/20/02
HP	Quasi-Peak Adapter	85650A	917059	12/6/02
HP	Amplifier	8447E	1937A01046	12/6/02
A.H. System	Horn Antenna	SAS0200/571	261	12/27/02
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/02
Com-Power	Biconical Antenna	AB-100	14012	11/2/02
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/02
Com-Power	LISN	LI-200	12208	12/20/02
Com-Power	LISN	LI-200	12005	12/20/02
BACL	Data Entry Software	DES1	0001	12/20/02
Rohde & Schwarz	Signal Generator	SMIQ03B	1125.5555.03	7/10/02
Rohde & Schwarz	I/Q Modulation Generator	AMIQ	1110.2003.02	8/10/02

*** Statement of Traceability:** Bay Area Compliance Laboratory Corp. certifies that all calibration has been performed using standards traceable to National Institute of Standard and Technology (NIST).

2 - REQUIREMENTS OF PROVISIONS

2.1 Definition

Low Power Auxiliary Stations: Devices authorized as low power auxiliary stations are intended to transmit over distances of approximately 100 meters for uses such as wireless microphones, cue and control communications, and synchronization of TV camera signals.

Intentional radiator: a device that intentionally generates and emits radio frequency energy by radiation or induction.

Transmitter Power: the power at the transmitter output terminals and delivered to the antenna, antenna transmission line, or any other impedance-matched, radio frequency load. For the purpose of this subpart, the transmitter power is the carrier power.

2.2 Frequencies Available

According to Sec. 74.802 of Part 74, the following frequencies are available for low power auxiliary station:

Frequencies (MHz)

26.100-26.480
54.00-72.0
76.00-88.0
161.625-161.775 (except in Puerto Rico or the virgin Islands)
450.000-451.000
455.000-456.000
47.000-488.000
488.000-494.000 (except Hawaii)
614.000-806.000
944.000-952.000

2.3 Requirements and Test Summary

FCC Rules	Rules Description	Test Result
§74.861(e)	Low power auxiliary transmitters not required to operate on specific carrier frequencies shall operate sufficiently within the authorized frequency band edges to insure the emission bandwidth falls entirely within the authorized band.	Compliant
§74.861(e)(1)(ii)	Maximum Output Power For low power auxiliary station operating in the 614-806MHz band, the power of the measured unmodulated carrier power ant the output of the transmitter power amplifier (antenna input power) may not exceed 250mW	Compliant
§74.861(e)(3) & §2.1047(a)	Modulation Characteristics Any form of modulation may be used. A maximum deviation of ±75 kHz is permitted when frequency modulation is employed.	Compliant
§74.831(e)(4) & §2.1055(a)(1)	Frequencies Tolerance The frequency tolerance of the transmitter shall be 0.005 percent	Compliant
§74.861(e)(5) & §2.1049(c)(1)	Occupied Bandwidth The operating bandwidth shall not exceed 200 kHz	Compliant
§74.861(e)(6) & §2.1051	Spurious Emissions at Antenna Terminals	Compliant
§74.861(e)(6) & §2.1053	Field Strength of Spurious Emissions	Compliant

2.4 Labeling Requirement

Each equipment for which a type acceptance applications is filed on or after May 1, 1981, shall bear an identification plate or label pursuant to §2.295 (Identification of Equipment) and §2.926 (FCC identifier)

3 - OUTPUT POWER MEASUREMENT

3.1 Provision Applicable

According to §74.861(e)(1)(ii), for low power auxiliary station operating in the 614-806MHz band, the power of the measured unmodulated carrier power ant the output of the transmitter power amplifier (antenna input power) may not exceed 250mW

3.2 Test Procedure

The maximum peak output power was measured with a spectrum analyzer connected to the antenna terminal (conducted measurement) while EUT was operating in normal situation. Set RBW of spectrum analyzer to 100 kHz and VBW to 100 kHz.

3.3 Test equipment

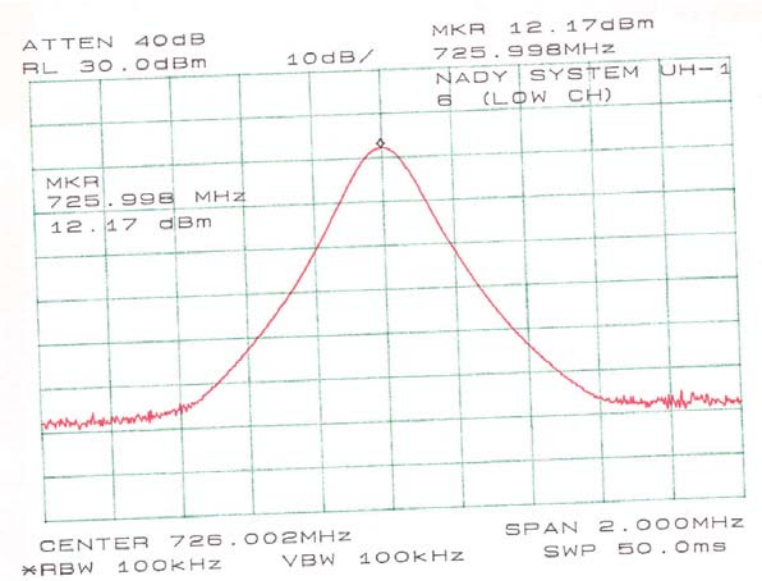
Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

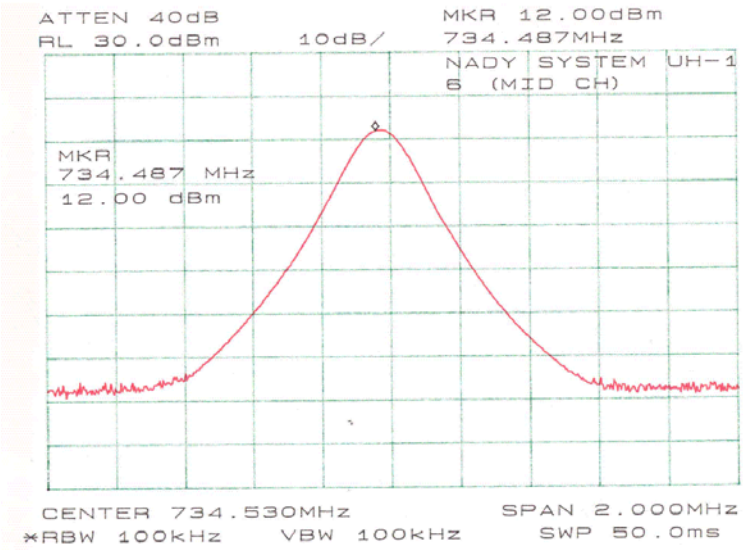
3.4 Test Results

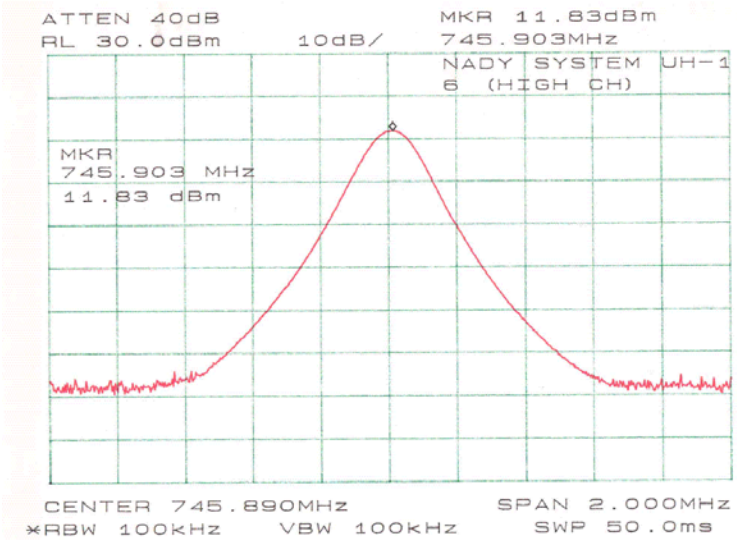
The measured result showed as follows:

Low Channel: 12.17dBm (16.48mW) at 725.998MHz
Middle Channel: 12.00dBm (15.85mW) at 734.487MHz
High Channel: 11.83dBm (15.24mW) at 745.903MHz

The plot (s) of Maximum Output Peak Power was presented hereinafter as reference.


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 12.17dBm
725.998MHz
NADY SYSTEM UH-1
6 (LOW CH)
MKR
725.998 MHz
12.17 dBm
CENTER 726.002MHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 12.00dBm
734.487MHz
NADY SYSTEM UH-1
6 (MID CH)
MKR
734.487 MHz
12.00 dBm
CENTER 734.530MHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR 11.83dBm
745.903MHz
NADY SYSTEM UH-1
6 (HIGH CH)
MKR
745.903 MHz
11.83 dBm
CENTER 745.890MHz
SPAN 2.000MHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

4 - MODULATION CHARACTERISTICS

4.1 Provision Applicable

According to FCC 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100Hz to 5000Hz shall be measured. For equipment required to have an audio low-pass filter, the frequency response of the filter, or of all circuitry installed between the modulation limiter and the modulated stage shall be measured.

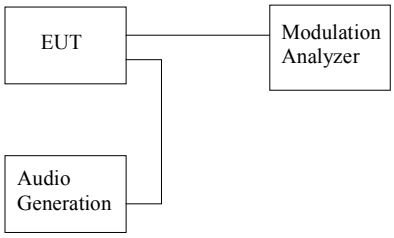
According to §74.861(e)(3), any form of modulation may be used. A maximum deviation of ±75 kHz is permitted when frequency modulation is employed.

4.2 Test Procedure

4.2.1 Frequency response of audio circuits

1) Position the EUT as shown in figure 1

Figure 1
Modulation Characteristic
Measurement Configuration



2) Adjust the audio input frequency for 100, 200, 500, 1000, 3000 and 5000Hz in sequence and the input level from 0V to maximum permitted input voltage with recording the change in output responding to respective input level

4.2.2 Modulation Limit

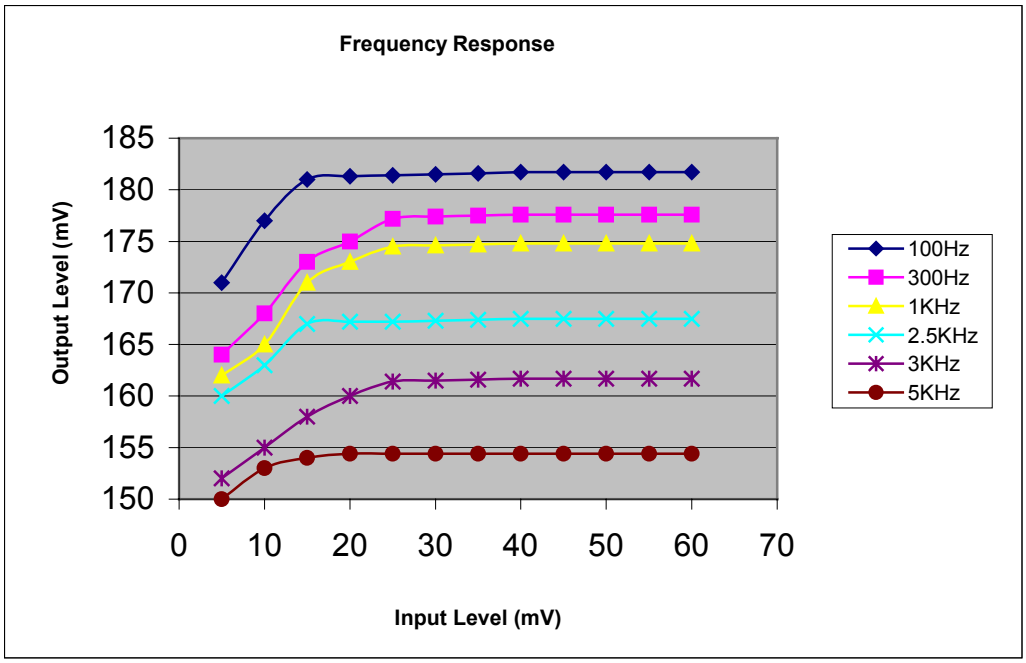
1) Position the EUT as shown in figure 1, adjust the audio input frequency to 100 Hz and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective input level.
2) Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000 and 5000 Hz in sequence.

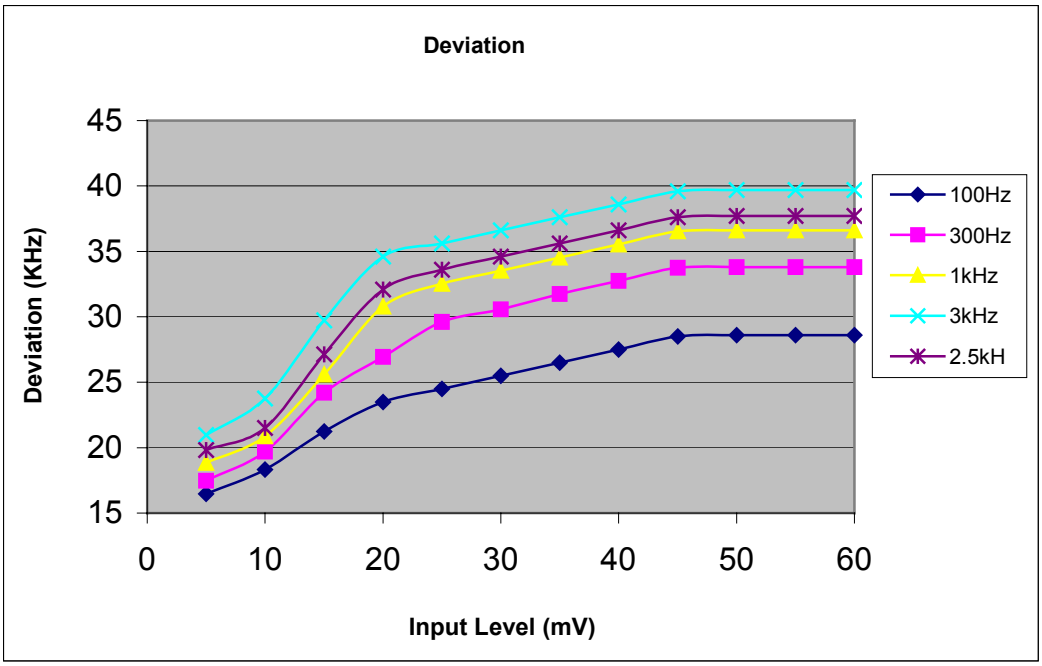
4.3 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter
Hewlett Packard HP8901A Modulation Analyzer
Lecroy 9350A Oscillscope

4.4 Test Results

The plot(s) of modulation characteristic is presented hereinafter as reference.


Frequency Response
Output Level (mV)
185
180
175
170
165
160
155
150
0
10
20
30
40
50
60
70
Input Level (mV)
100Hz
300Hz
1KHz
2.5KHz
3KHz
5KHz


Deviation
Deviation (KHz)
45
40
35
30
25
20
15
0
10
20
30
40
50
60
Input Level (mV)
100Hz
300Hz
1kHz
3kHz
2.5kH

5 - OCCUPIED BANDWIDTH OF EMISSION

5.1 Provision Applicable

According to FCC 2.1049 (c) (1), for radiotelephone transmitter, other than single sideband or independent sideband transmitter, when modulated by a 2.5 kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

According to §74.861(e)(5), the operating bandwidth shall not exceed 200 kHz

5.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Install new batteries in the EUT. Turn on the EUT and set it to any one convenient frequency within its operating range.

5.3 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

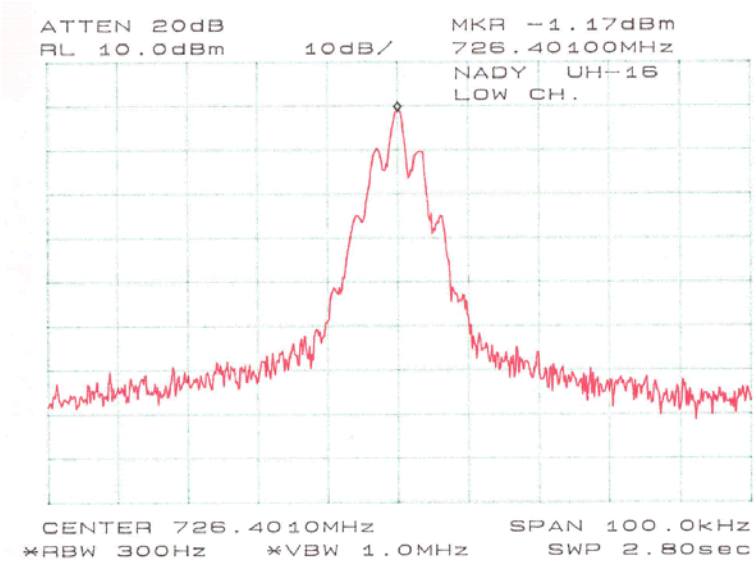
5.4 Test Results

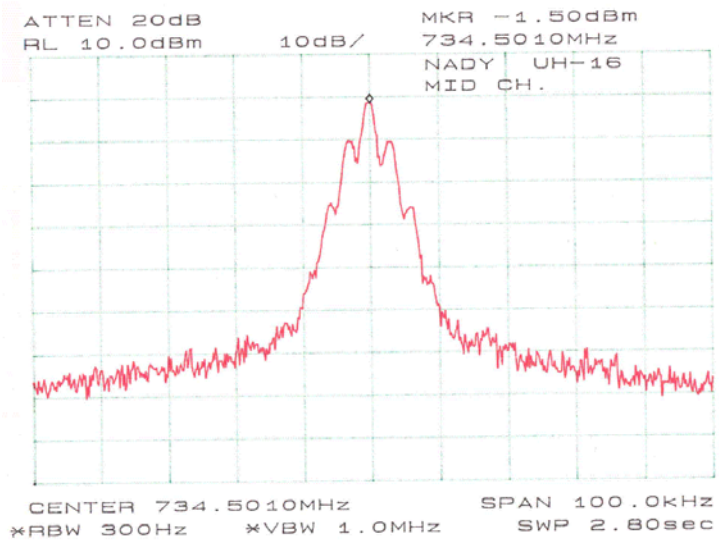
Please refer the following curve and plots.

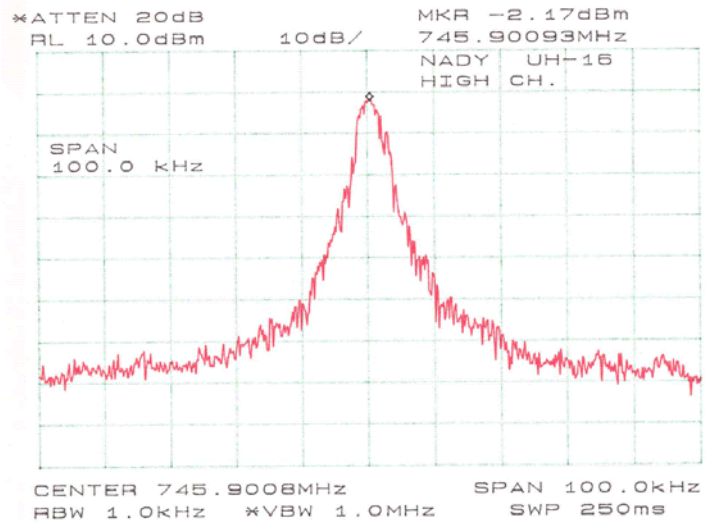
5.5 Emission Designator

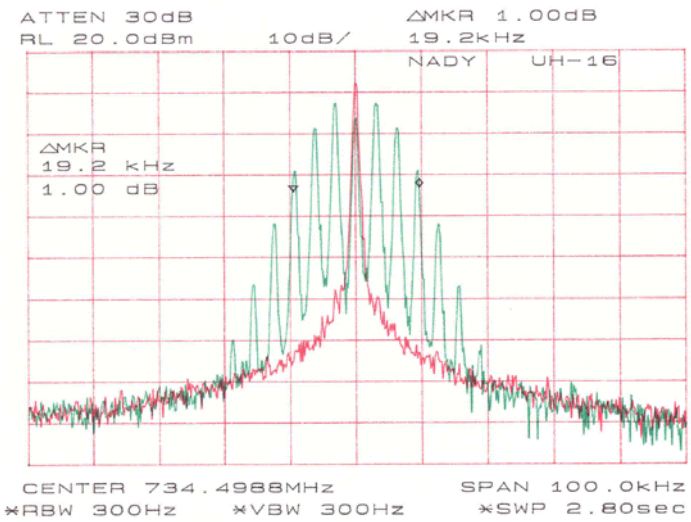
2M + 2D = (2x3kHz) + (2x38.5kHz) = 83K0F3E

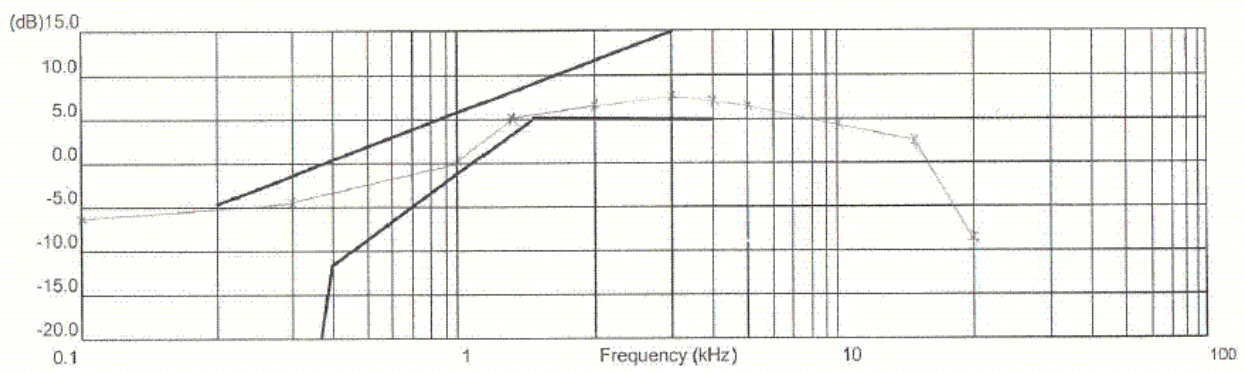
Please refer to the attached plots.

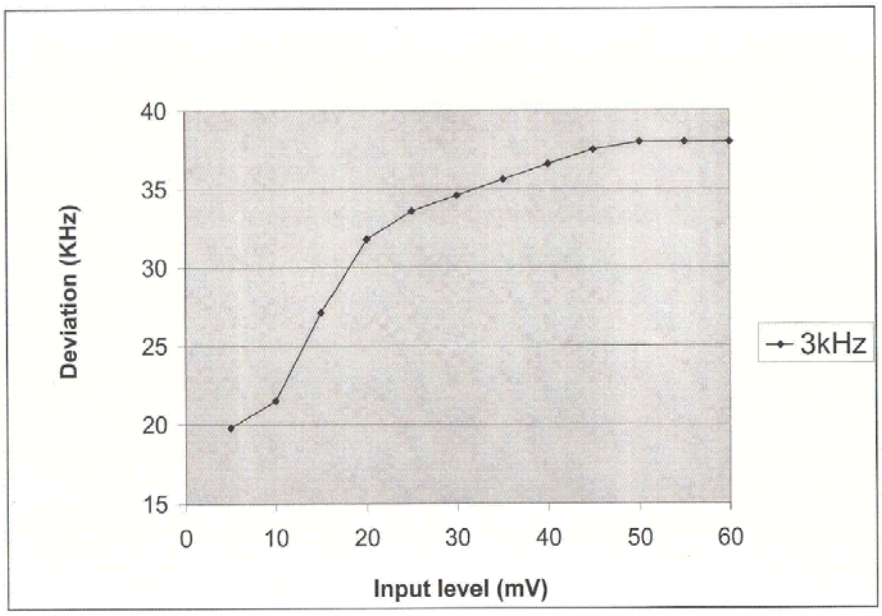

ATTEN 20dB
RL 10.0dBm
10dB/
MKR -1.17dBm
726.40100MHz
NADY UH-16
LOW CH.
CENTER 726.4010MHz
SPAN 100.0kHz
*RBW 300Hz
*VBW 1.0MHz
SWP 2.80sec


ATTEN 20dB
RL 10.0dBm
10dB/
MKR -1.50dBm
734.5010MHz
NADY UH-16
MID CH.
CENTER 734.5010MHz
SPAN 100.0kHz
*RBW 300Hz
*VBW 1.0MHz
SWP 2.80sec


*ATTEN 20dB
RL 10.0dBm
10dB/
MKR -2.17dBm
745.90093MHz
NADY UH-16
HIGH CH.
SPAN
100.0 kHz
CENTER 745.9008MHz
SPAN 100.0kHz
RBW 1.0kHz
*VBW 1.0MHz
SWP 250ms


ATTEN 30dB
RL 20.0dBm
10dB/
ΔMKR 1.00dB
19.2kHz
NADY UH-16
ΔMKR
19.2 kHz
1.00 dB
CENTER 734.4988MHz
SPAN 100.0kHz
*RBW 300Hz
*VBW 300Hz
*SWP 2.80sec


(dB)15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
-20.0
0.1
1
Frequency (kHz)
10
100


Deviation (KHz)
40
35
30
25
20
15
0
10
20
30
40
50
60
Input level (mV)
3kHz

6 - FIELD STRENGTH OF EMISSION

6.1 Provision Applicable

According to FCC2.1053, measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediated circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a halfwave dipole antenna.

According to FCC74.861 (e)(6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

1. on any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.

2. on any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.

3. on any frequency removed from the operating frequency by more than 250 percent up to and the authorized bandwidth shall be attenuated below the un-modulated carrier by at least 43 plus 10 Log (output power in watts)dB.

6.2 Test Procedure

1. Setup the configuration per figure 5 and 6 for frequencies measured below and above 1GHz respectively, adjusting the input voltage to produce the maximum power as measured in chapter 3.

2. Adjust the analyzer for each frequency measured in chapter 6 on a 1MHz frequency span and 100kHz resolution bandwidth.

3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the height when the highest value is indicated on spectrum analyzer, the change the orientation of EUT on test table over a range for 0º to 360º, and record the highest value indicated on spectrum analyzer as reference value.

4. Repeat step 3 until all frequencies need to be measured were completed.

5. Repeat step 4 with search antenna in vertical polarized orientations.

6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at an appreciated output level. Rise and lower the search antenna to get the highest value on spectrum analyzer, and then hold this position. Adjust the SG output to get an identical value derived from step 3 on spectrum analyzer. Record this value for result calculated.

7. repeat step 6 until all frequencies need to be measured were completed.

8. repeat step 7 in vertical polarized orientations.

6.3 Test Equipment

A.H. System Horn Antenna

High Pass Filter

Preamplifier

Hewlett Packard HP8566B Spectrum Analyzer

Hewlett Packard HP 7470A Plotter

6.4 Test Results

-23.7dB at 2904.00MHz
-19.5dB at 2203.43MHz
-19.3dB at 2237.68MHz

A plot with emission mask shows the compliance with the applicable requirements.

020204B2.Nady

R0201188

30-7500MHz. , Low Frequency

EUT					GENERATOR										FCC	
Indicated		Table	st Antenna		Substituted	Substitution Antenna			Test Antenna		Correction Factor		Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Antenna dB	Cable dB	Leval dBm	Emissions dB	dB	dB
725.99	79.6	270	1.5	v	725.99	19.93	30	v	1.5	v	7.2	0.5	12.23			
725.99	79.3	270	1.6	h	725.99	19.89	30	h	1.5	h	7.2	0.5	12.19			
2904.00	49.8	90	1.8	v	2904	-16.2	5	v	1.6	v	19.8	0.7	-36.67	48.9	25.2	-23.7
2904.00	50.7	180	1.5	h	2904	-16.7	5	h	1.5	h	19.8	0.7	-37.17	49.4	25.2	-24.2
3629.87	48.6	90	1.5	v	3629.87	-13.37	4	v	1.5	v	23.7	1.0	-38.07	50.3	25.2	-25.1
2177.99	51.6	135	2.1	v	2177.99	-21.7	6	v	2	v	16.5	0.5	-38.7	50.9	25.2	-25.7
3629.87	49.1	270	1.5	h	3629.87	-14.67	4	h	1.5	h	23.7	1.0	-39.37	51.6	25.2	-26.4
2177.99	49.6	330	1.0	h	2177.99	-23.47	6	h	1.2	h	16.5	0.5	-40.47	52.5	25.2	-27.3
4355.98	45.2	0	1.5	v	4355.98	-14.1	3.5	v	1.5	v	26.4	1.0	-41.47	53.7	25.2	-28.5
4355.98	38.7	45	2.0	h	4355.98	-15.8	3.5	h	1.8	h	26.4	1.0	-43.17	55.4	25.2	-30.2

30-7500MHz., Mid. Frequency

EUT					GENERATOR										FCC	
Indicated		Table	Test Antenna		Substituted		Substitution Antenna		Test Antenna		Correction Factor		Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Antenna dB	Cable dB	Leval dBm	Emissions dB	dB	dB
734.48	83.9	210	1.5	h	734.48	19.73	30	h	1.5	h	7.2	0.5	12.03			
734.48	76.6	270	1.0	v	734.48	19.57	30	v	1.2	v	7.2	0.5	11.87			
2203.48	53.2	270	1.0	v	2203.48	-15.47	6	v	1.2	v	16.5	0.5	-32.47	44.5	25	-19.5
2203.48	52.2	330	1.5	h	2203.48	-19.7	6	h	1.6	h	16.5	0.5	-36.67	48.7	25	-23.7
2938.03	54.2	45	1.5	v	2938.03	-12.77	5	v	1.5	v	19.8	0.7	-33.27	45.3	25	-20.3
2938.03	50.6	130	1.5	h	2938.03	-16.87	5	h	1.5	h	19.8	0.7	-37.37	49.4	25	-24.4
3672.46	57.3	300	2.0	h	3672.46	-7.2	4	h	1.8	h	23.7	1	-31.87	43.9	25	-18.9
3672.46	56.2	130	1.5	v	3672.46	-10.87	4	v	1.5	v	23.7	1	-35.57	47.6	25	-22.6

30-7500MHz. ,High Frequency

EUT					GENERATOR										FCC	
Indicated		Table	st Antenna		Substituted	Substitution Antenna			Test Antenna		Correction Factor		Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Antenna dB	Cable dB	Leval dBm	Emissions dB	dB	dB
745.90	79.50	150	1.5	v	745.9	19.15	30	v	1.2	v	7.2	0.5	11.45			
745.90	83.70	270	1.5	h	745.9	19.62	30	h	1.5	h	7.2	0.5	11.92			
2237.68	54.80	270	1.0	v	2237.7	-15.28	6	v	1.5	v	16.5	0.5	-32.28	44.2	24.9	-19.3
3729.48	55.80	0	2.0	v	3729.5	-7.68	4	v	1.8	v	23.7	1.0	-32.39	44.3	24.9	-19.4
3729.48	55.80	270	2.5	h	3729.5	-7.78	4	h	2	h	23.7	1.0	-32.58	44.5	24.9	-19.6
2983.58	51.30	45	2.5	v	2983.6	-16.18	5	v	2	v	19.8	0.7	-36.68	48.6	24.9	-23.7
2983.58	51.30	130	1.6	h	2983.6	-16.18	5	h	1.5	h	19.8	0.7	-36.68	48.6	24.9	-23.7
2237.68	51.30	330	1.5	h	2237.7	-20.18	6	h	1.2	h	16.5	0.5	-32.17	49.1	24.9	-24.2
4475.40	39.60	230	1.5	v	4475.4	-13.3	3.5	v	1.2	v	26.4	1.0	-40.68	52.6	24.9	-27.7
4475.40	41.17	330	1.5	h	4475.4	-13.98	3.5	h	1.5	h	26.4	1.0	-41.48	53.4	24.9	-28.5

Unwanted emissions 30-1000MHz

EUT					GENERATOR										FCC	
Indicated		Table	st Antenna		Substituted	Substitution Antenna			Test Antenna		Correction Factor		Absolute	Spurious	Limit	Margin
Frequency MHz	Ampl. dBuV/m	Angle Degree	Height Meter	Polar H/V	Frequency MHz	Level dBm	Half-wavel. cm	Polar H/V	Height Meter	Polar H/V	Antenna dB	Cable dB	Leval dBm	Emissions dB	dB	dB
550.76	38.6	360	1.2	h	550.76	-38.5	60	h	1.5	h	6.1	0.5	-45.1	57.3	46	-11.3
642.79	34.0	180	1.8	h	642.79	-39.7	60	h	1.5	h	6.1	0.5	-46.3	58.5	46	-12.5
668.23	35.8	225	1.5	h	444.21	-40.8	70	h	1.2	h	6.1	0.5	-47.4	59.6	46	-13.6
444.21	32.0	225	1.5	h	668.23	-42.0	60	h	1.2	h	6.1	0.5	-48.6	60.8	46	-14.8
367.14	31.2	250	1.5	h	367.14	-46.4	70	h	1.5	h	5.3	0.5	-52.2	64.4	46	-18.4
330.1	32.1	270	1.5	h	330.1	-53.5	70	h	1.8	h	5.3	0.5	-59.3	66.1	46	-20.1
275.01	30.1	230	1.5	h	275.01	-48.9	75	h	1.5	h	5.3	0.3	-54.5	66.7	46	-20.7
245.76	29.6	160	1.0	h	245.76	-51.6	75	h	1.2	h	5.3	0.3	-57.2	69.4	46	-23.4
119.9	25.3	130	1.0	v	119.9	-53.1	80	v	1.5	v	3.7	0.3	-57.1	69.3	43.5	-25.8
67.47	21.3	270	1.5	v	67.47	-54.5	80	v	1.2	v	3.7	0.3	-58.5	70.7	40	-30.7
126.95	19.8	180	1.5	v	88.5	-59.4	80	v	1.5	v	3.7	0.3	-63.4	75.6	43.5	-32.1
88.50	18.3	180	1.5	v	126.95	-59.7	80	v	1.0	v	3.7	0.3	-63.7	75.9	43.5	-32.4

7 - SPURIOUS EMISSION

7.1 Standard Applicable

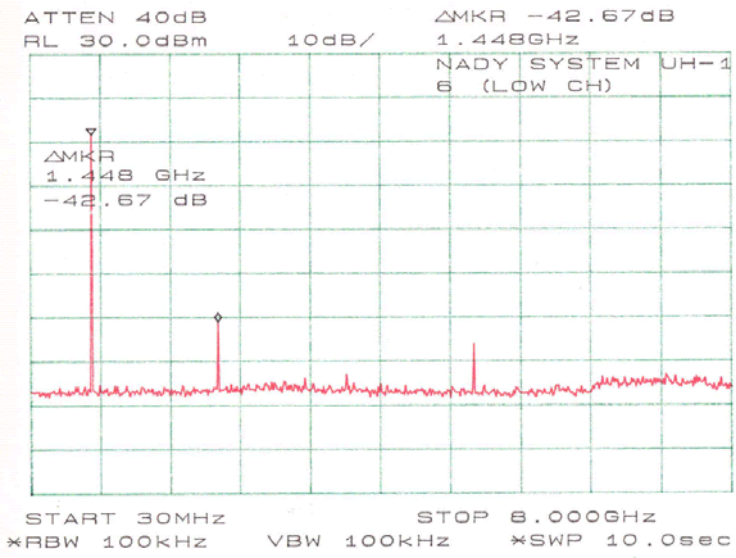
According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation f a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

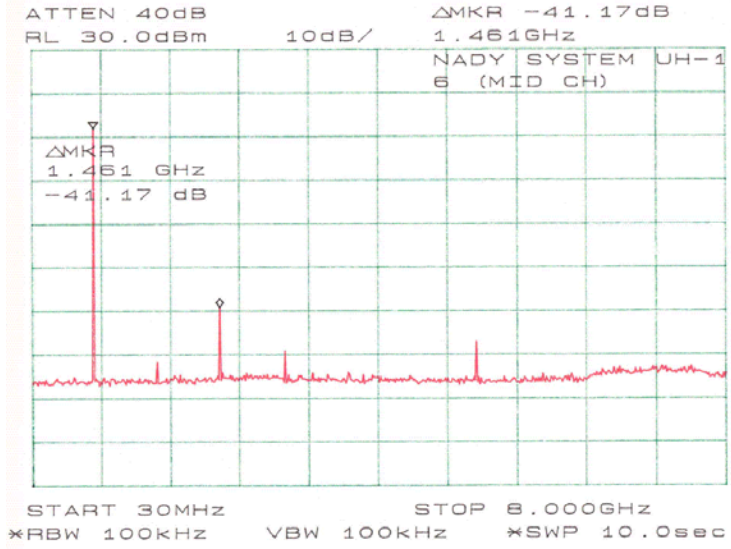
7.2 Measurement Procedure

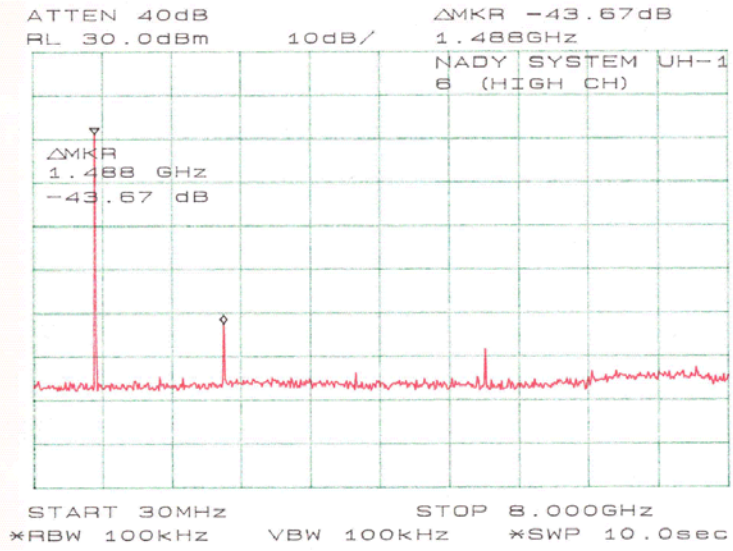
1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

7.3 Measurement Data

Please refer to the following plots.


ATTEN 40dB
RL 30.0dBm 10dB/
ΔMKR -42.67dB
1.448GHz
NADY SYSTEM UH-1
6 (LOW CH)
ΔMKR
1.448 GHz
-42.67 dB
START 30MHz STOP 8.000GHz
*RBW 100kHz VBW 100kHz *SWP 10.0sec


ATTEN 40dB
RL 30.0dBm 10dB/
ΔMKR -41.17dB
1.461GHz
NADY SYSTEM UH-1
6 (MID CH)
ΔMKR
1.461 GHz
-41.17 dB
START 30MHz STOP 8.000GHz
*RBW 100kHz VBW 100kHz *SWP 10.0sec


ATTEN 40dB
RL 30.0dBm 10dB/
ΔMKR -43.67dB
1.488GHz
NADY SYSTEM UH-1
6 (HIGH CH)
ΔMKR
1.488 GHz
-43.67 dB
START 30MHz STOP 8.000GHz
*RBW 100kHz VBW 100kHz *SWP 10.0sec

8 - FREQUENCY STABILITY MEASUREMENT

8.1 Provision Applicable

According to FCC 2.1055(a)(1), the frequency stability shall be measure with variation of ambient temperature from –30ºC to +50ºC, and according to FCC 2.1055(d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC 74.86(e)(4), the frequency tolerance of the transmitter shall be 0.005 percent.

8.2 Test Procedure

A) Frequency stability versus environmental temperature

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is with 15ºC to 25ºC. otherwise, an environmental chamber set for a temperature of 20ºC shall be used. Install new batteries in the EUT.

2. Turn on EUT and set SA center frequency to the right frequency needs to be measured, then set SA RBW to 30kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. Set the temperature of chamber to 50ºC. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

4. Repeat step 2 with a 10ºC decreased per stage until the lowest temperature -30ºC is measured, record all measurement frequencies.

B) Frequency stability versus input voltage

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is within 15ºC to 25ºC. otherwise, an environmental chamber set for a temperature of 20ºC shall be used. Install new batteries in the EUT.

2. Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.

3. For battery operated only device, supply the EUT primary voltage at the battery operating end point which is specified by the manufactured and record the frequency.

8.3 Test Equipment

Hewlett Packard HP8566B Spectrum Analyzer
Hewlett Packard HP 7470A Plotter

8.4 Test Results

Reference Frequency: 726.00 MHz, Limit: 0.005%							
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed					
		2 Minutes		5 Minutes		10 Minutes	
		MHz	%	MHz	%	MHz	%
50	New Batt.	726.002	0.001	726.002	0.001	726.002	0.001
40	New Batt.	726.005	0.003	726.003	0.002	726.005	0.003
30	New Batt.	726.003	0.002	726.005	0.003	726.003	0.002
20	New Batt.	726.002	0.001	726.002	0.001	726.002	0.001
10	New Batt.	726.003	0.002	726.002	0.001	726.002	0.001
0	New Batt.	726.003	0.002	726.003	0.002	726.002	0.001
-10	New Batt.	726.002	0.001	726.002	0.001	726.003	0.002
-20	New Batt.	726.002	0.001	726.002	0.001	726.002	0.001
-30	New Batt.	726.003	0.002	726.005	0.003	726.000	0.000

Reference Frequency: 734.48 MHz, Limit: 0.005%							
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed					
		2 Minutes		5 Minutes		10 Minutes	
		MHz	%	MHz	%	MHz	%
50	New Batt.	734.486	0.003	734.486	0.003	734.486	0.003
40	New Batt.	734.482	0.001	734.482	0.001	734.482	0.001
30	New Batt.	734.484	0.002	734.484	0.002	734.484	0.002
20	New Batt.	734.484	0.002	734.482	0.001	734.482	0.001
10	New Batt.	734.484	0.002	734.482	0.001	734.484	0.002
0	New Batt.	734.482	0.001	734.484	0.002	734.482	0.001
-10	New Batt.	734.484	0.001	734.482	0.001	734.482	0.001
-20	New Batt.	734.482	0.001	734.482	0.001	734.482	0.001
-30	New Batt.	734.483	0.002	734.484	0.002	734.486	0.003

Reference Frequency: 745.90 MHz, Limit: 0.005%							
Environment Temperature (°C)	**Power Supplied (Vdc)**	**Frequency Measure with Time Elapsed**					
		2 Minutes		**5 Minutes**		**10 Minutes**	
		MHz	**%**	**MHz**	**%**	**MHz**	**%**
50	New Batt.	745.904	0.002	745.902	0.001	745.905	0.003
40	New Batt.	745.902	0.001	745.906	0.003	745.904	0.002
30	New Batt.	745.906	0.003	745.902	0.001	745.904	0.002
20	New Batt.	745.902	0.001	745.904	0.002	745.902	0.001
10	New Batt.	745.904	0.002	745.902	0.001	745.904	0.002
0	New Batt.	745.902	0.001	745.902	0.001	745.902	0.001
-10	New Batt.	745.904	0.002	745.902	0.001	745.902	0.001
-20	New Batt.	745.902	0.001	745.902	0.001	745.902	0.001
-30	New Batt.	745.906	0.003	745.902	0.001	745.900	0.000

Test Result: The frequency tolerance rating is 0.003% < 0.005%. Passed.

Frequency Stability Versus Input Voltage

Reference Frequency: 726.00 MHz, Limit: 0.005%						
Power Supplied (Vdc)	Frequency Measure with Time Elapsed					
	2 Minutes		5 Minutes		10 Minutes	
	MHz	%	MHz	%	MHz	%
115% of 3Vdc	726.002	0.001	726.002	0.001	726.002	0.001
115% of 3Vdc	726.005	0.003	726.003	0.002	726.005	0.003
100% of 3Vdc	726.003	0.002	726.005	0.003	726.003	0.002
100% of 3Vdc	726.002	0.001	726.002	0.001	726.002	0.001
85% of 3Vdc	726.003	0.002	726.002	0.001	726.002	0.001
85% of 3Vdc	726.003	0.002	726.003	0.002	726.002	0.001

Test Result: The frequency tolerance rating is 0.003% < 0.005%. Passed.