Transmitter Tests
for
Six (6) Wireless Microphones

For : Shure Inc.
Niles, IL

P.O. No. : 4500082918
Date Received : January 19 2005
Dates Tested : January 19 through March 11, 2005
Test Personnel : Richard E. King, EMC Engineer
Specification : FCC "Code of Federal Regulations" Title 47 Part 74 and Industry Canada RSS-123

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Registered Professional Engineer of Illinois - 44894

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Transmitter Tests for Six Wireless Microphones

1.0 INTRODUCTION:

1.1 DESCRIPTION OF TEST ITEM: This report presents the results of a series of transmitter tests were performed on six Shure Inc. wireless microphones, (hereinafter referred to as the test items). No serial numbers were assigned to the test items. The tests were performed for Shure Incorporated of Niles, IL.

The test items are wireless microphones that operate in low power auxiliary station bands 518 to 806MHz.

Six transmitters were submitted for testing. Each transmitter has a high and a low power setting

Model No.	Rated Power (Watts)	Frequency (MHz)
UR1 H4	.100 or .010	518.0
UR1 L3	.100 or .010	662.0
UR1 Q9	.050 or .010	806.0
UR2 H4	.050 or .010	518.0
UR2 L3	.050 or .010	662.0
UR2 Q9	.050 or .010	806.0

1.2 PURPOSE: The test series was performed to determine if the test item meets the technical requirements of FCC Part 74 for low power auxiliary station bands 518MHz to 806MHz and Industry Canada RSS-123 Low Power Licensed Radiocommunication Devices.

1.3 DEVIATIONS, ADDITIONS AND EXCLUSIONS: There were no deviations, additions to, or exclusions from the test specification during this test series.

1.4 APPLICABLE DOCUMENTS: The following documents of the exact issue designated form part of this document to the extent specified herein:

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 74, dated 1 October 2003

- Federal Communications Commission "Code of Federal Regulations", Title 47, Part 2, dated 1 October 2003

- RSS-123, "Radio Standards Specification Low Power Licensed Radiocommunication Devices" Issue 1, Rev. 2 November 6, 1999

- ANSI C63.4-2003, "American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz

to 40 GHz"

1.5 SUBCONTRACTOR IDENTIFICATION: This series of tests was performed by Elite Electronic Engineering Incorporated, of Downers Grove, Illinois. The laboratory is accredited by the National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP Lab Code: 100278-0.

1.6 LABORATORY CONDITIONS: The temperature at the time of the test was 22°C and the relative humidity was 11%.

2.0 TEST ITEM SETUP AND OPERATION:

2.1 POWER INPUT: The test item obtained 3.0VDC from two 1.5VDC batteries.

2.2 GROUNDING: The test item was ungrounded during the tests.

2.3 PERIPHERAL EQUIPMENT: No peripheral equipment was submitted with the test item.

3.0 TEST EQUIPMENT:

3.1 TEST EQUIPMENT LIST: A list of the test equipment used can be found on Table I. All equipment was calibrated per the instruction manuals supplied by the manufacturer.

3.2 CALIBRATION TRACEABILITY: Test equipment is maintained and calibrated on a regular basis. All calibrations are traceable to the National Institute of Standards and Technology (NIST).

4.0 REQUIREMENTS, PROCEDURES AND RESULTS:

4.1 RF POWER OUTPUT MEASUREMENTS:

4.1.1 REQUIREMENTS: In accordance with paragraph 74.861(e)(1)(ii), for low power auxiliary stations operating in the bands allocated for TV broadcasting, the power of the measured unmodulated carrier power at the output of the transmitter power amplifier (antenna input power) may not exceed 250 milliwatts in the 470-608 and 614-806MHz bands. For certification to paragraph 6.2 of Industry Canada's RSS-123 requirement the RF power output must not exceed 1 watt average power as listed in Table 1.

4.1.2 PROCEDURES: The output from the antenna port of the test item was connected to spectrum analyzer through 40 dB of attenuation. The output of the each test item was then measured.

4.1.3 RESULTS: The output power measurements are presented on page 16. As can be seen from the data, the power output of each transmitter is within the 250 milliwatt requirement of Part 74.861(e)(1)(ii) and the 1 watt requirement of RSS-123.

4.2 MODULATION CHARACTERISTICS:

4.2.1 REQUIREMENTS: In accordance with paragraph 74.861(e)(3) and paragraph 5.5 of RSS-123, for low power auxiliary stations operating in the bands allocated for TV broadcasting, any form of modulation may be used. A maximum deviation of ±75kHz is permitted when frequency modulation is employed.

4.2.2 PROCEDURES: The output of the antenna port of the test item was connected to modulation analyzer. An audio generator was connected to an audio input of the test item.

(a) The test item was modulated with a 1000 Hz modulating signal at 60% of the test items rated frequency deviation.
(b) The level of the audio generator was increased by 20 dB in one step.
(c) The instantaneous and steady state positive peak deviations were recorded.
(d) Using the audio generator level obtained in step (b) the frequency range from 20Hz to 20000 Hz was slowly swept and the maximum frequency deviation recorded at several frequencies.
(e) Steps (a) through (d) were repeated for the negative peak deviations.

4.2.3 RESULTS: The plots of the modulation characteristics are presented on pages 17 through 28.

4.3 FREQUENCY STABILITY:

4.3.1 REQUIREMENTS: In accordance with paragraph 74.861(e)(4) and paragraph 7 of RSS-123 Table 1, for low power auxiliary stations operating in the bands allocated for TV broadcasting, the frequency tolerance of the transmitter shall be 0.005 percent.

4.3.2 PROCEDURES: The test item was connected to a frequency counter through the antenna output of each transmitter. The test item was then placed in a humidity temperature chamber.

(a) The nominal frequency of each transmitter was measured and recorded.
(b) The temperature chamber was then set to -30ºC.
(c) Once the temperature had reached -30ºC the test item was allowed to soak for 30 minutes.
(d) After soaking at -30ºC for thirty minutes the test item was turned on and the transmit frequency was measured and recorded.
(e) Steps (b) through (d) were repeated for each temperature in 10ºC steps from -20ºC to +50ºC.
(f) Steps (b) and (e) were repeated for each transmitter.
(g) The test item was then removed from the temperature chamber and allowed to adjust to nominal room temperature (20ºC).
(h) The battery voltage was checked and adjusted to the nominal level. The frequency was measured and recorded.
(i) The battery voltage was then varied to 85% of its nominal level. The frequency was

measured and recorded.

(j) The battery voltage was then varied to 115% of its nominal level. The frequency was measured and recorded.

(k) Steps (h) through (j) were repeated for each transmitter.

4.3.3 RESULTS: The frequency stability measurements are presented on pages 29 through 32. As can be seen from the data the test frequency deviation was within the 0.005 percent limit.

4.4 OCCUPIED BANDWIDTH MEASUREMENTS:

4.4.1 REQUIREMENTS: In accordance with paragraph 74.861(d)(3), for low power auxiliary stations operating in the bands allocated for TV broadcasting, the occupied bandwidth shall not be greater than that necessary for satisfactory transmission and, in any event, an emissions appearing on any discrete frequency outside the authorized band shall be attenuated, at least, 43 + 10 log(P) dB below the mean output power of the transmitting unit. In addition to paragraph 74.861(d)(3) the test item must also meet the requirements of paragraph 74.861(e)(5), the operating bandwidth shall not exceed 200kHz.

For certification to the RSS-123 paragraph 6.3.1, the power of unwanted emissions shall be attenuated below the mean transmitter power in accordance with the following schedule:

(1) On any frequency removed from the carrier frequency by more than 50% up to and including 100% of the authorized bandwidth: at least 25 dB.

(2) On any frequency removed from the carrier frequency by more than 100% up to and including 250% of the authorized bandwidth: at least 35 dB.

(3) On any frequency removed from the carrier frequency by more than 250% of the authorized bandwidth: at least 55 + 10 Log (P) dB.

4.4.2 PROCEDURES:

(a) The test item was connected to a spectrum analyzer through 40 dB of attenuation. The unmodulated carrier signal level was measured and recorded.

(b) The test item was modulated with a 15 kHz sine wave at an input level necessary to produce 85% of the rated system deviation.

(c) The test item was modulated with a 2500 Hz sine wave at an input level 16 dB greater than that necessary to produce 50% of the rated system deviation.

(d) Steps (a) through (c) were repeated separately for each of the remaining 11 transmitters. The bandwidth of the spectrum analyzer was set to 2kHz (1% of Authorized BW).

4.4.3 RESULTS: The plots of the occupied bandwidth measured are presented on pages 33 through 68. The limits, shown on the plots, are referenced to the power measured from the

unmodulated carrier, the power when modulated with the 15 kHz sine wave at 85% of the maximum deviation and when modulated with a 2500 Hz sine wave at an input 16dB greater than that necessary to produce 50% of the rated deviation. The operating bandwidth was determined using Carson's rule:

Bn = 2M + 2DK where Bn = bandwidth, M= Maximum modulating frequency and D = Peak Deviation. With K = 1, M = 10kHz and D = 56kHz resulting in an operating bandwidth of 132kHz.

As can be seen from the data, the test items met all occupied bandwidth requirements.

4.5 SPURIOUS EMISSIONS AT ANTENNA TERMINAL:

4.5.1 REQUIREMENTS: This test determines whether the test item produces excessive spurious emissions.

In accordance with paragraph 74.861(e)(6)(iii), on any frequency remove from the operating frequency by more than 250 percent of the authorized bandwidth shall attenuated by at least 43 + 10 log (P) dB which is equivalent to -13 dBm. The emissions shall be measured from 30MHz up to the 10th harmonic of the fundamental frequency.

In accordance with RSS – 123 paragraph 6.3.1(3) on any frequency remove from the operating frequency by more than 250 percent of the authorized bandwidth: at least 55 + 10 log (P) dB which is equivalent to -25 dBm. The emissions shall be measured from the fundamental minus 500 kHz up to the 5th harmonic of the fundamental frequency.

4.5.2 PROCEDURES: In general, this test will measure spurious emissions at the antenna terminals.

(a) A spectrum analyzer was connected to the output of the test item. The out of band emissions were measured.

(b) The spectrum analyzer was adjusted accordingly.

(1) For the FCC measurements, the resolution bandwidth was set to 100kHz for spurious emissions below 1GHz and 1MHz for spurious emissions above 1GHz.

(2) For the RSS-123 measurements, the resolution bandwidth was set to 30 kHz.

(c) The plots of the spectrum analyzer screens were recorded.

4.5.3 RESULTS: The plots of the antenna conducted output measurements are presented on pages 69 through 118. As can be seen from the data, the test item did not produce spurious emissions in excess of the limit.

4.6 FIELD STRENGTH OF SPURIOUS EMISSIONS:

4.6.1 PRELIMINARY RADIATED MEASUREMENTS:

4.6.1.1 REQUIREMENTS: Because emission levels in the open field may

be masked by interference from sources other than the test item, preliminary radiated measurements are first performed in the low ambient environment of a shielded enclosure. The radiated emissions from the test item were first measured using peak detection. This data was then automatically plotted

4.6.1.2 PROCEDURES: All preliminary tests were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4 2003 for site attenuation.

The shielded enclosure prevents emissions from other sources, such as radio and TV stations from interfering with the measurements. All power lines and signal lines entering the enclosure pass through filters on the enclosure wall. The power line filters prevent extraneous signals from entering the enclosure on these leads.

The test was performed on each transmitter separately.

The preliminary measurements were performed with each test item operating with the input signal unmodulated. The broadband measuring antennas were positioned at a 3 meter distance from the test item. The frequency range from 30MHz to 10th harmonic was investigated. The readings were taken with a peak detector function and recorded.

4.6.1.3 RESULTS: The preliminary plots are presented on pages 119 through 141. Factors for the antennas and cables were added to the data before it was plotted.

This data is only presented for a reference, and is not used as official data. All significant radiated emissions were subsequently measured at an open field test site.

4.6.2 FINAL RADIATED EMISSIONS:

4.6.2.1 REQUIREMENTS: The field strength of any emission on any frequency remove from the operating frequency by more than 250 percent of the authorized bandwidth: shall be attenuated by at least 43 + 10 log (P) dB for the FCC and at least 55 + 10 log (P) dB for RS-123.

4.6.2.2 PROCEDURES: Final open field measurements were performed in a 32ft. x 20ft. x 18ft. hybrid ferrite-tile/anechoic absorber lined test chamber. The walls and ceiling of the shielded chamber are lined with ferrite tiles. Anechoic absorber material is installed over the ferrite tile. The floor of the chamber is used as the ground plane. The chamber complies with ANSI C63.4 2003 for site attenuation.

The final open field emission test procedure is as follows:

a) The test item was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna.
b) The antenna output of the test item was terminated in 50 ohms for the tests.
c) A double ridged waveguide antenna was placed on an adjustable height antenna mast 3 meters from the test item for emission measurements.
d) Detected emissions were maximized at each frequency by rotating the test item and adjusting the receive antenna height and polarization.
e) The maximum meter reading was recorded.
f) Measurements were performed with the input signal unmodulated.
g) Measurements were performed separately at each frequency used during the preliminary measurements.

The equivalent power into a dipole antenna was determined from the field intensity levels measured at 3 meters using the substitution method. To determine the emission power another tuned dipole antenna or double ridged waveguide antenna was set in place of the test item and connected to a calibrated signal generator. The output of the signal generator was adjusted to match the received level at the spectrum analyzer. The signal level was recorded. The reading was corrected to compensate for cable loss, as required, and when the ridged waveguide antenna was used increased by the difference in gain between the dipole and the waveguide antenna.

4.6.2.3 RESULTS OF OPEN FIELD RADIATED TEST: The final open field radiated levels are presented on pages 142 through 165. The radiated emissions were measured through the 10th harmonic. All emissions measured from the test item were within the specification limits.

5.0 CONCLUSION:

It was found that all six Shure Incorporated, models UR1 and UR2 wireless microphones, did comply with the RF Power Output, the Occupied Bandwidth, the frequency stability, the Spurious Emissions at Antenna Terminal, and the Field Strength of Spurious Emissions requirements of FCC Part 74 for low power auxiliary station bands 518MHz to 806MHz and Industry Canada RSS-123 Low Power Licensed Radiocommunication Devices.

6.0 CERTIFICATION:

Elite Electronic Engineering Incorporated certifies that the information contained in this report was obtained under conditions which meet or exceed those specified in the test specification.

The data presented in this test report pertains only to the test item at the test date as operated by Shure Incorporated personnel. Any electrical or mechanical modification made to the test item subsequent to the specified test date will serve to invalidate the data and void this certification.

7.0 ENDORSEMENT DISCLAIMER:

This report must not be used to claim product endorsement by NVLAP or any agency of the US Government.

TABLE I: TEST EQUIPMENT LIST

ELITE ELECTRONIC ENG. INC. Page: 1

Eq ID	Equipment Description	Manufacturer	Model No.	Serial No.	Frequency Range	Cal Date	Cal Inv	Due Date
	Equipment Type: ACCESSORIES, MISCELLANEOUS							
XZG3	ATTENUATOR/SWITCH DRIVER	HEWLETT PACKARD	11713A	2421A03059	---		N/A	
	Equipment Type: AMPLIFIERS							
APK3	PREAMPLIFIER	AGILENT TECHNOL	8449B	3008A01593	1-26.5GHZ	05/10/04	12	05/10/05
	Equipment Type: ANTENNAS							
NTA0	BILOG ANTENNA	CHASE EMC LTD.	BILOG CBL611	2057	0.03-2GHZ	07/12/04	12	07/12/05
NWH0	RIDGED WAVE GUIDE	TENSOR	4105	2081	1-12.4GHZ	09/05/04	12	09/05/05
NWP0	DOUBLE RIDGED WAVEGUIDE AN	EATON	3115	2099	1GHZ-18GHZ	09/05/04	12	09/05/05
	Equipment Type: ATTENUATORS							
T1EA	10DB, 25W ATTENUATOR	WEINSCHEL	46-10-34	BN2316	DC-18GHZ	03/11/04	12	03/11/05
T2D5	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-43	AY9244	DC-18GHZ	01/20/05	12	01/20/06
T2D7	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-43	AY9246	DC-18GHZ	10/01/04	12	10/01/05
T2DC	20DB, 25W ATTENUATOR	WEINSCHEL	46-20-34	BH5448	DC-18GHZ	11/22/04	12	11/22/05
T2DP	25W 20DB ATTENUATOR	WEINSCHEL	46-20-34	BS0921	DC-18GHZ		12	
	Equipment Type: CONTROLLERS							
CDS2	COMPUTER	GATEWAY	MFATXPNT NMZ	0028483108	1.8GHZ		N/A	
CMA0	MULTI-DEVICE CONTROLLER	EMCO	2090	9701-1213	---		N/A	
	Equipment Type: METERS							
MFC0	MICROWAVE FREQ. COUNTER	HEWLETT PACKARD	5343A	2133A00591	10HZ-26GHZ	05/28/04	12	05/28/05
	Equipment Type: POWER SUPPLIES							
SBA4	DC POWER SUPPLY	APLAB	ZS3205	99071028	0-32V;0-5A		NOTE 1	
	Equipment Type: PRINTERS AND PLOTTERS							
HRE1	LASER JET 5P	HEWLETT PACKARD	C3150A	USHB061052	---		N/A	
	Equipment Type: RECEIVERS							
RAC2	SPECTRUM ANALYZER	HEWLETT PACKARD	85660B	3638A08770	100HZ-22GHZ	02/09/05	12	02/09/06
RACD	RF PRESELECTOR	HEWLETT PACKARD	85685A	3010A01205	20HZ-2GHZ	02/09/05	12	02/09/06
RAE0	SPECTRUM ANALYZER	HEWLETT PACKARD	85660A	1904A00175	100HZ-22GHZ	02/01/05	12	02/01/06
RAF0	QUASIPEAK ADAPTER W/ RECI	HEWLETT PACKARD	85650A	2043A00115	0.01-1000MHZ	02/01/05	12	02/01/06
RAF4	QUASIPEAK ADAPTER	HEWLETT PACKARD	85650A	2043A00320	0.01-1000MHZ	02/09/05	12	02/09/06
RAKG	RF SECTION	HEWLETT PACKARD	85462A	3549A00284	0.009-6500MHZ	03/22/04	12	03/22/05
RAKH	RF FILTER SECTION	HEWLETT PACKARD	85460A	3448A00324	---	03/22/04	12	03/22/05
RBA0	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB26	100145	20HZ-26.5GHZ	09/20/04	12	09/20/05
RYE0	MODULATION ANALYZER	HEWLETT PACKARD	8901B	3104A03410	0.15-1300MHZ	12/09/04	12	12/09/05
	Equipment Type: SIGNAL GENERATORS							
GBX1	SYNTHESIZED SWEEPER	HEWLETT PACKARD	83630A	3420A00857	10MHZ-26.5GHZ	02/08/05	12	02/08/06
GWH2	DDS FUNCTION GENERATOR	WAVETEK	29	079190	0.0001HZ-10MHZ	08/05/04	12	08/05/05

Cal. Interval: Listed in Months I/O: Initial Only N/A: Not Applicable

Note 1: For the purpose of this test, the equipment was calibrated over the specified frequency range, pulse rate, or modulation prior to the test or monitored by a calibrated instrument.

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Output Power Test Setup

Frequency Stability vs. Temperature

Modulation Characteristics Test Setup

Occupied Bandwidth Test Setup

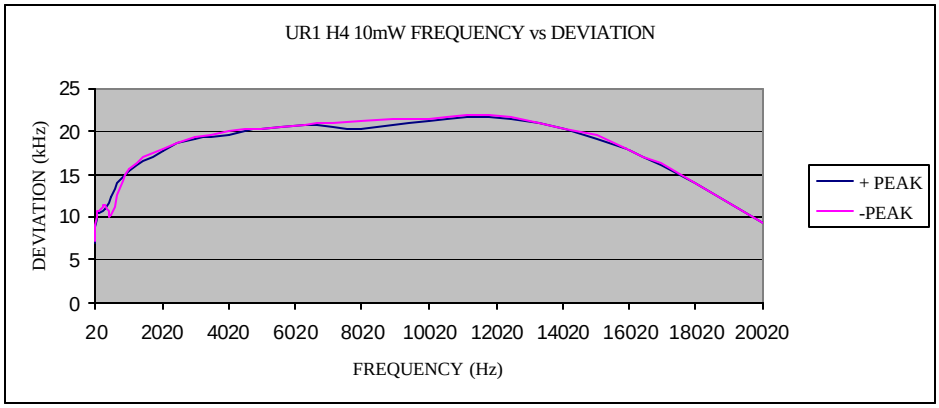
Antenna Conducted Emissions Test Setup

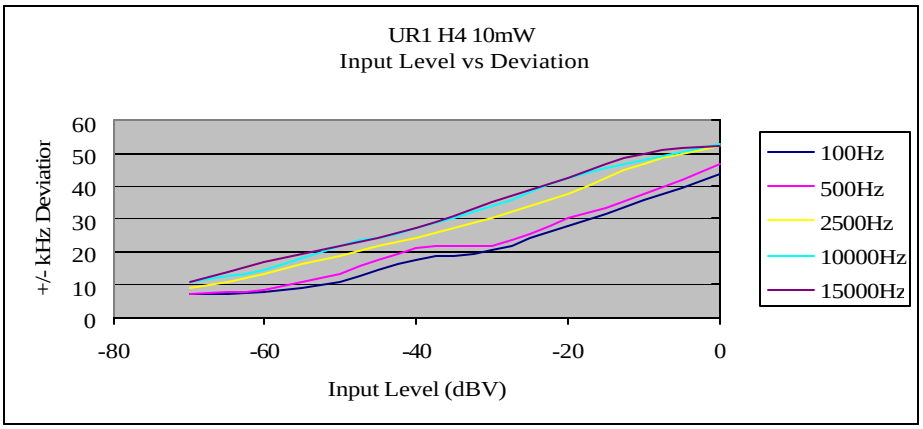
MANUFACTURER : Shure Inc.
MODEL NO. : All Transmitters
SERIAL NO. : None assigned
SPECIFICATION : FCC-74 and RSS-123
TEST PERFORMED : RF Output Power
DATE : January 18, 2005
NOTES : Test Distance is 3 Meters

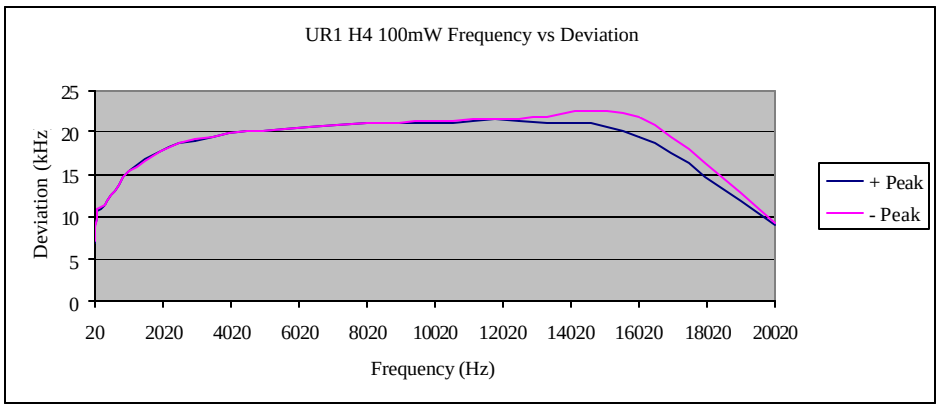
UNIT	Rated Power (Watts)	Frequency (MHz)	Meter Reading (dBm)	Attenuation (dB)	Total (dBm)	Limit (dBm)	Total (Watts)	Limit (Watts)
UR2 H4	.050	518.0	-23.9	40.0	16.1	24.0	0.041	0.250
UR2 L3	.050	662.0	-22.6	40.0	17.4	24.0	0.055	0.250
UR2 Q9	.050	806.0	-24.5	40.0	15.5	24.0	0.035	0.250
UR2 H4	.010	518.0	-29.4	40.0	10.6	24.0	0.012	0.250
UR2 L3	.010	662.0	-28.6	40.0	11.4	24.0	0.014	0.250
UR2 Q9	.010	806.0	-30.0	40.0	10.6	24.0	0.012	0.250
UR1 H4	.100	518.0	-19.2	40.0	20.8	24.0	0.120	0.250
UR1 L3	.100	662.0	-19.4	40.0	20.6	24.0	0.115	0.250
UR1 Q9	.050	806.0	-23.6	40.0	16.4	24.0	0.044	0.250
UR1 H4	.010	518.0	-29.5	40.0	10.5	24.0	0.011	0.250
UR1 L3	.010	662.0	-29.2	40.0	10.8	24.0	0.012	0.250
UR1 Q9	.010	806.0	-30.7	40.0	9.4	24.0	0.009	0.250

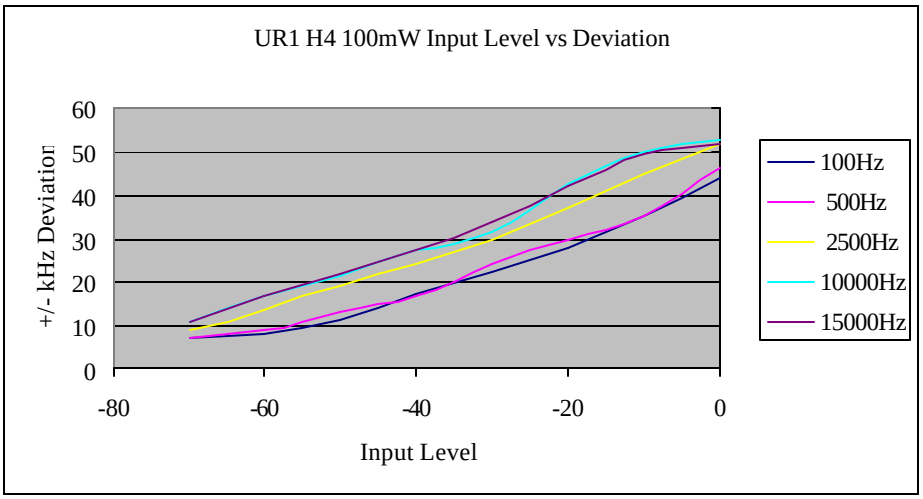
Checked BY : Richard E. King

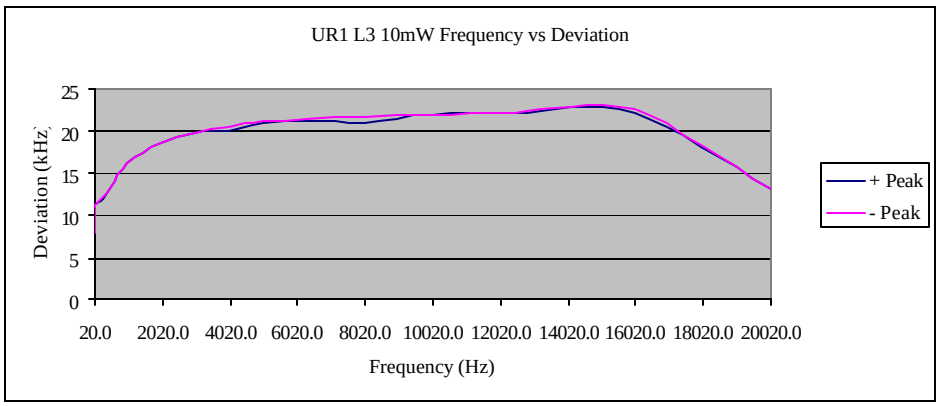
Richard E. King

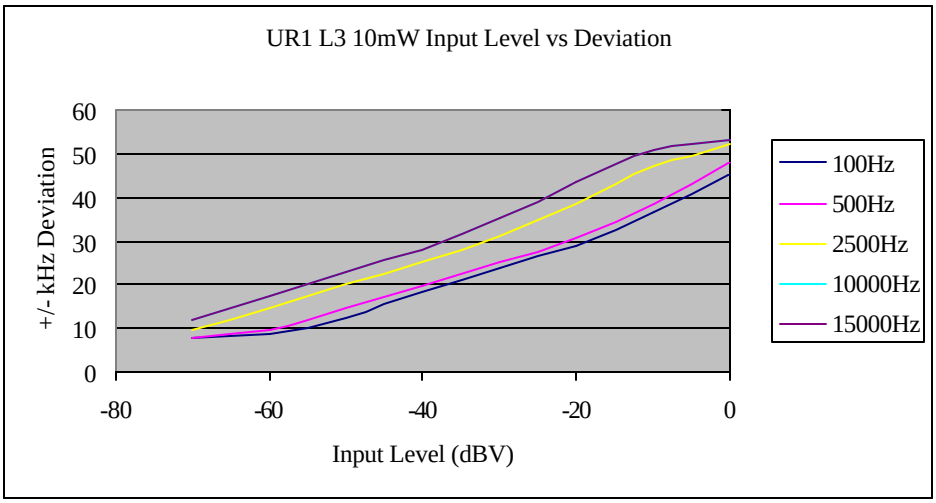

UR1 H4 10mW FREQUENCY vs DEVIATION
DEVIATION (kHz)
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
FREQUENCY (Hz)
+ PEAK
-PEAK

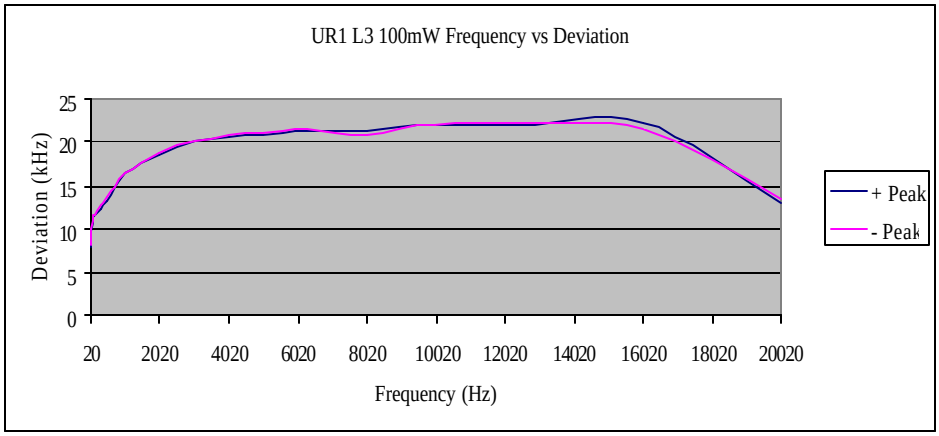

UR1 H4 10mW
Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100Hz
500Hz
2500Hz
10000Hz
15000Hz

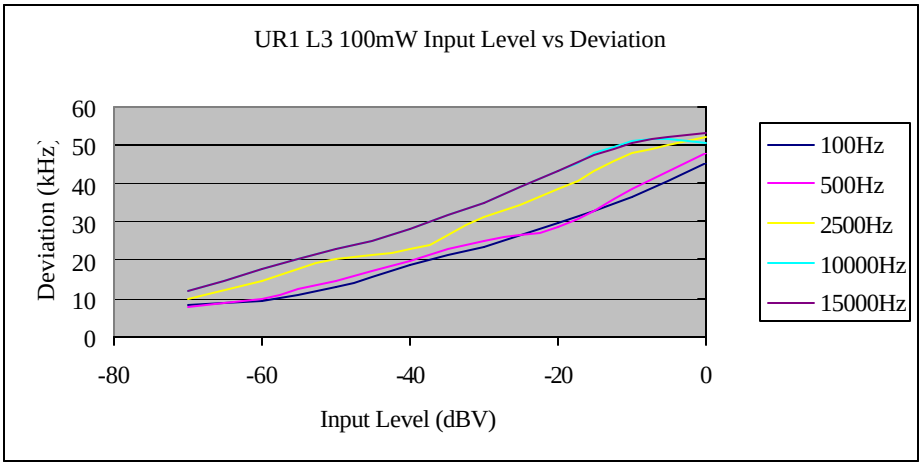

UR1 H4 100mW Frequency vs Deviation
Deviation (kHz
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak

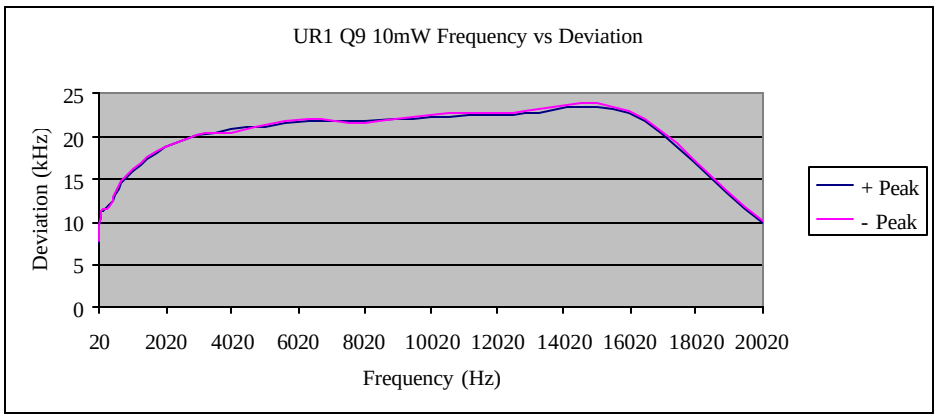

UR1 H4 100mW Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level
100Hz
500Hz
2500Hz
10000Hz
15000Hz

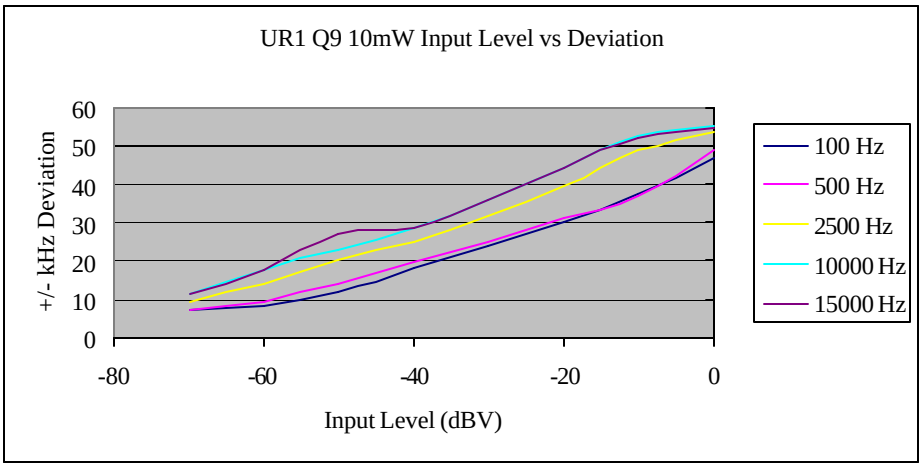

UR1 L3 10mW Frequency vs Deviation
Deviation (kHz)
25
20
15
10
5
0
20.0
2020.0
4020.0
6020.0
8020.0
10020.0
12020.0
14020.0
16020.0
18020.0
20020.0
Frequency (Hz)
+ Peak
- Peak

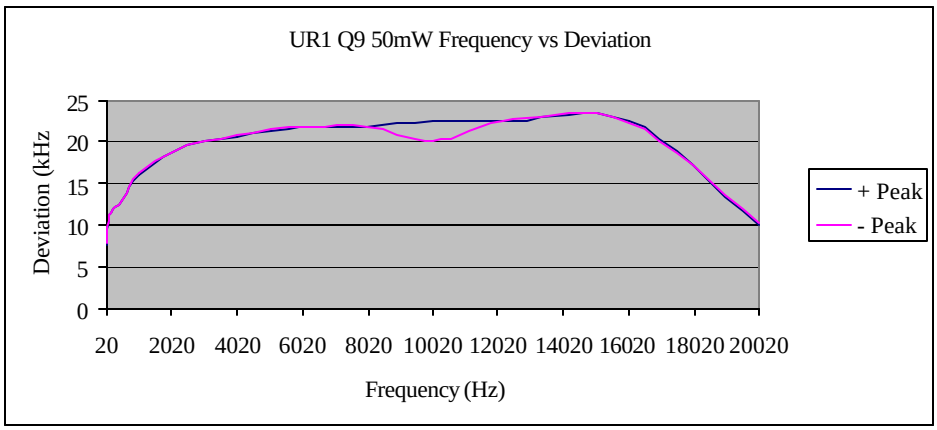

UR1 L3 10mW Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100Hz
500Hz
2500Hz
10000Hz
15000Hz

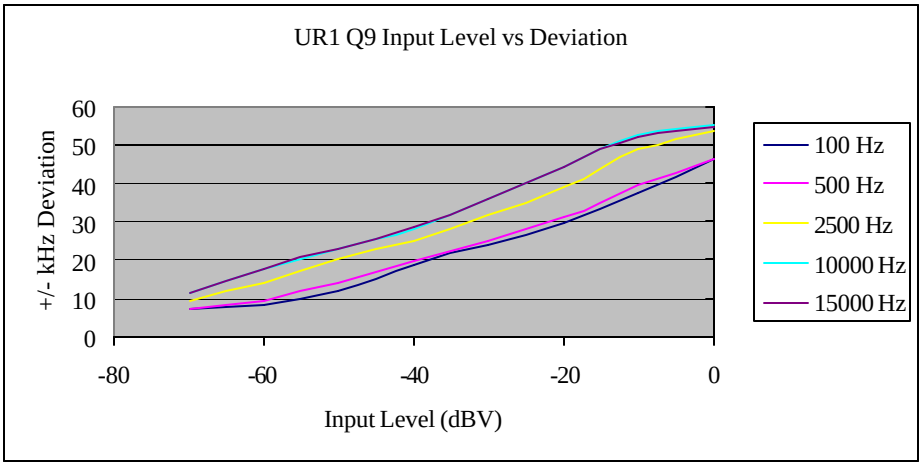

UR1 L3 100mW Frequency vs Deviation
Deviation (kHz)
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak

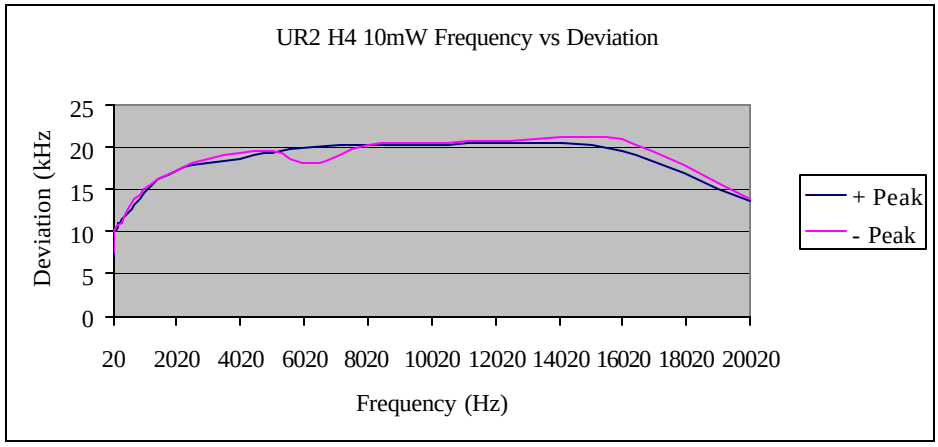

UR1 L3 100mW Input Level vs Deviation
Deviation (kHz)
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100Hz
500Hz
2500Hz
10000Hz
15000Hz

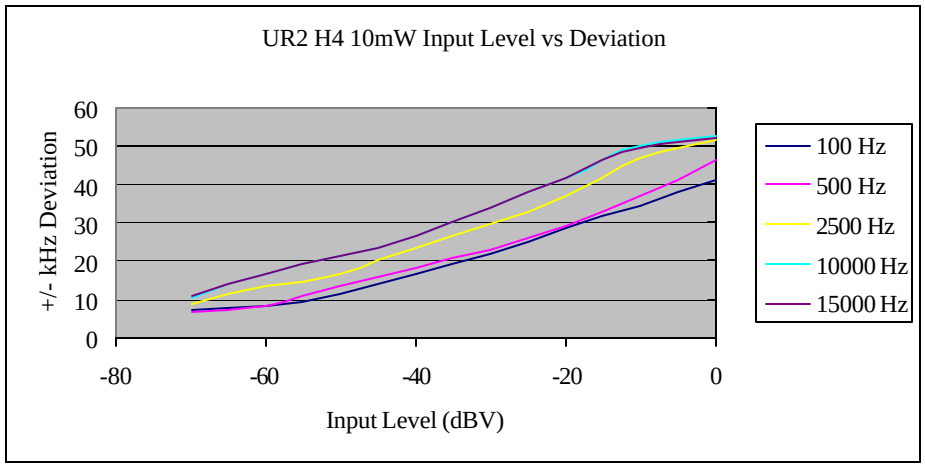

UR1 Q9 10mW Frequency vs Deviation
Deviation (kHz)
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak

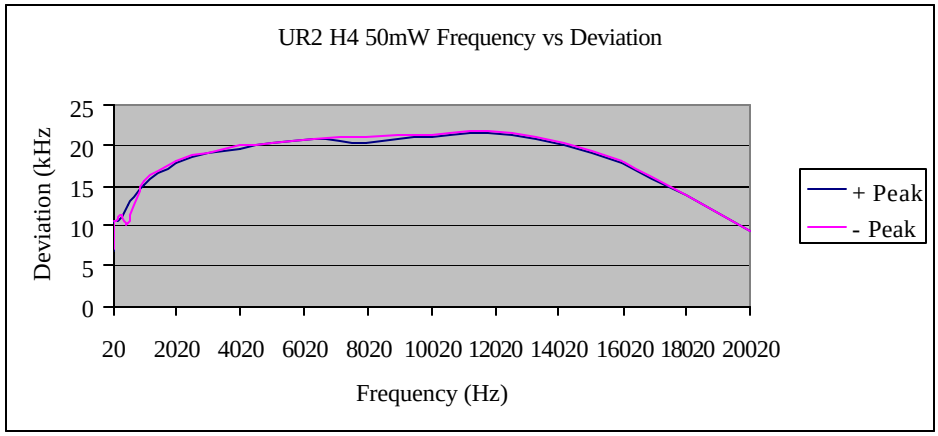

UR1 Q9 10mW Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100 Hz
500 Hz
2500 Hz
10000 Hz
15000 Hz

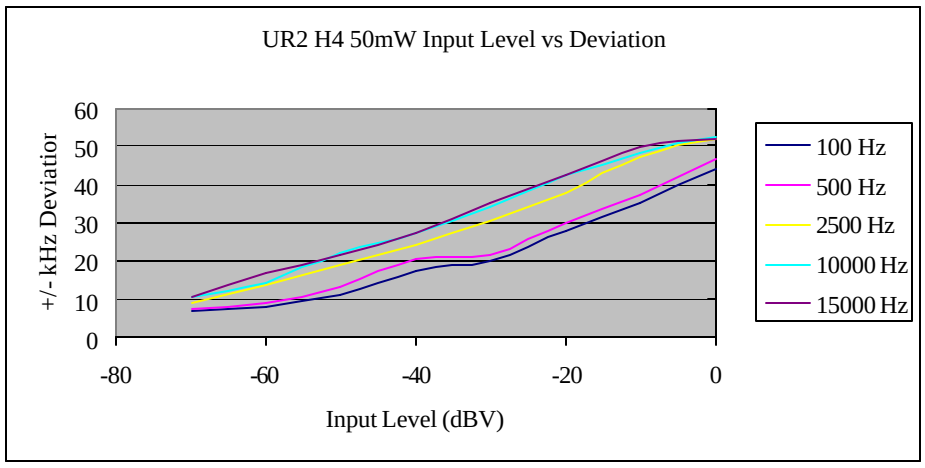

UR1 Q9 50mW Frequency vs Deviation
Deviation (kHz
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak

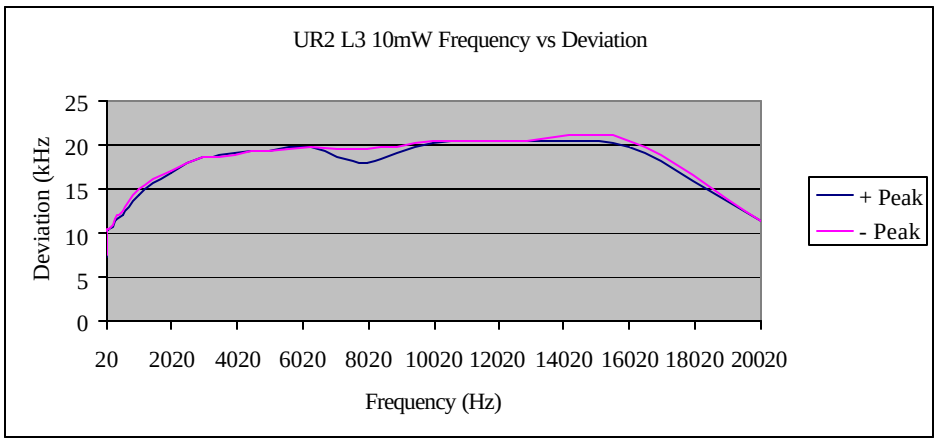

UR1 Q9 Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100 Hz
500 Hz
2500 Hz
10000 Hz
15000 Hz

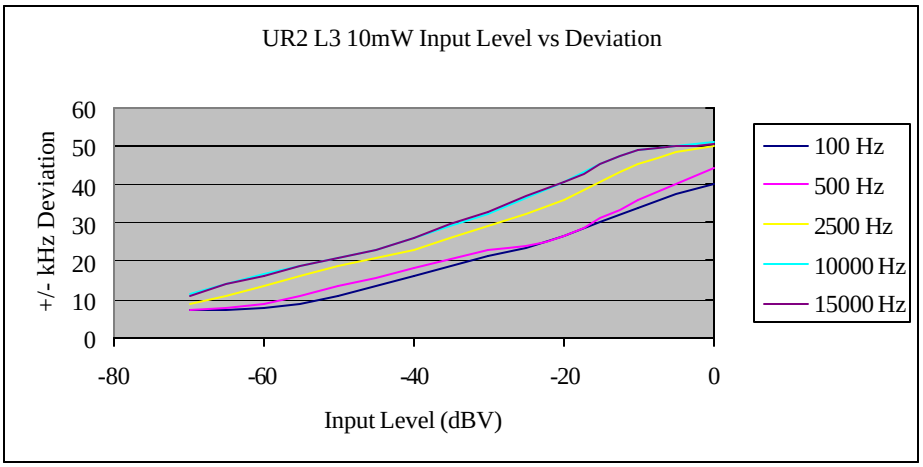

UR2 H4 10mW Frequency vs Deviation
Deviation (kHz
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak

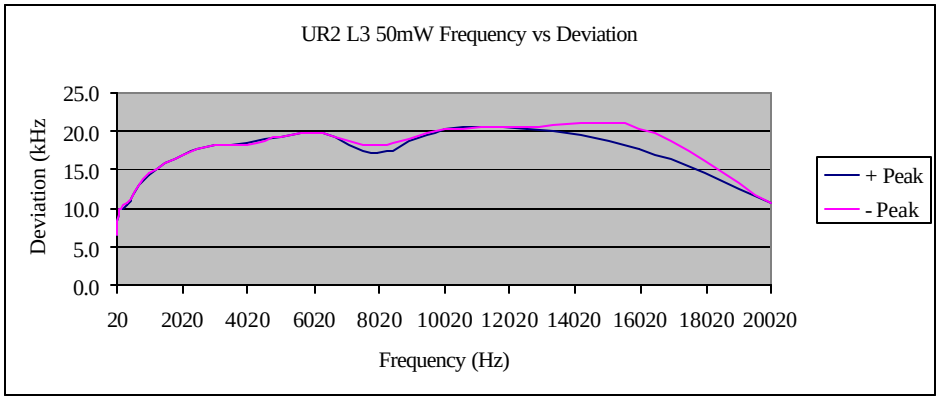

UR2 H4 10mW Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100 Hz
500 Hz
2500 Hz
10000 Hz
15000 Hz

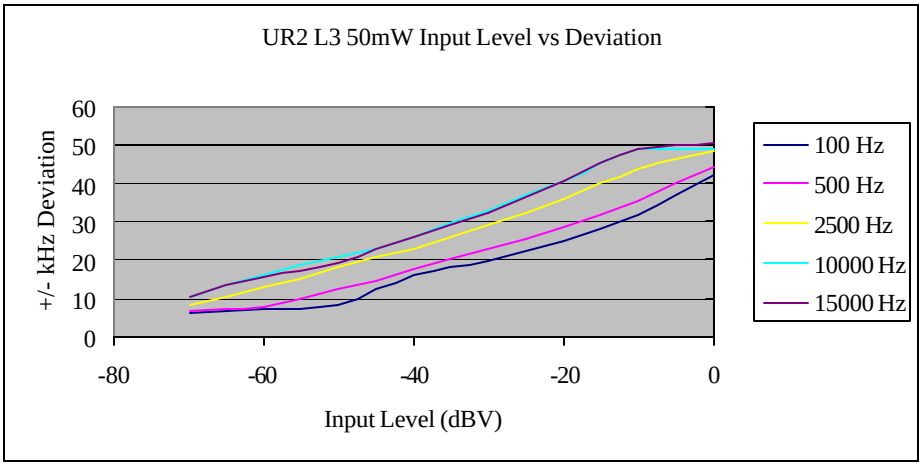

UR2 H4 50mW Frequency vs Deviation
Deviation (kHz
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak

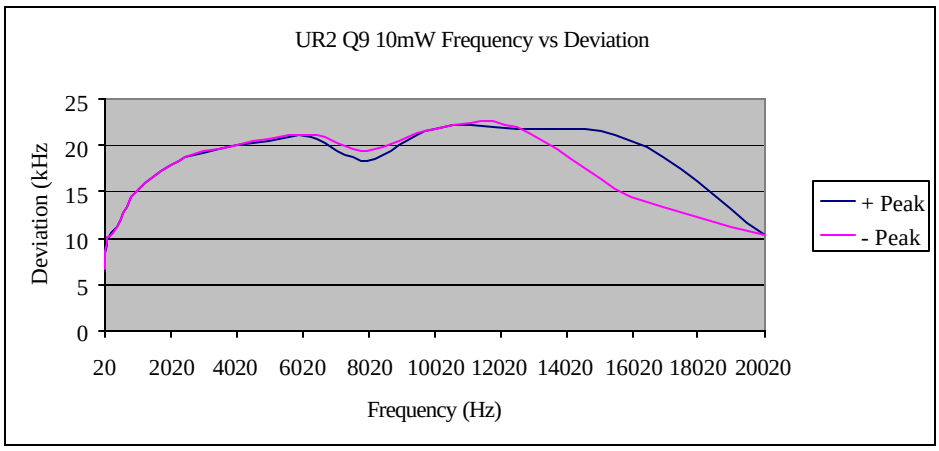

UR2 H4 50mW Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100 Hz
500 Hz
2500 Hz
10000 Hz
15000 Hz

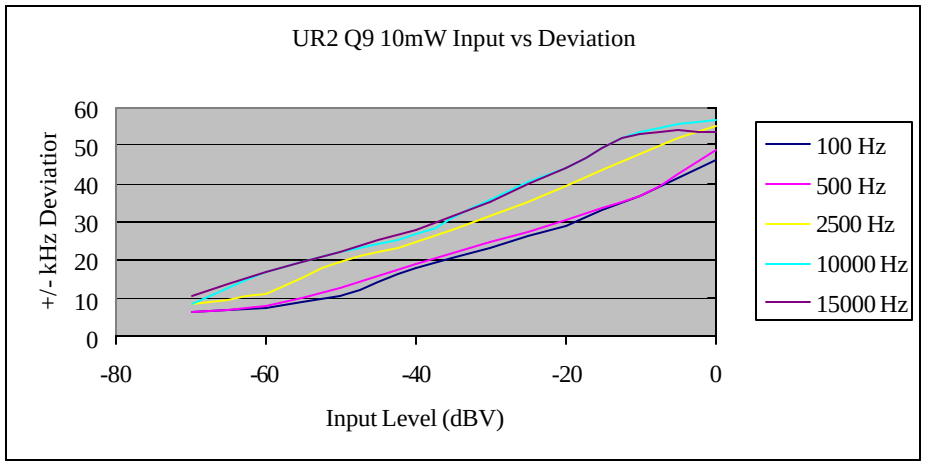

UR2 L3 10mW Frequency vs Deviation
Deviation (kHz
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak

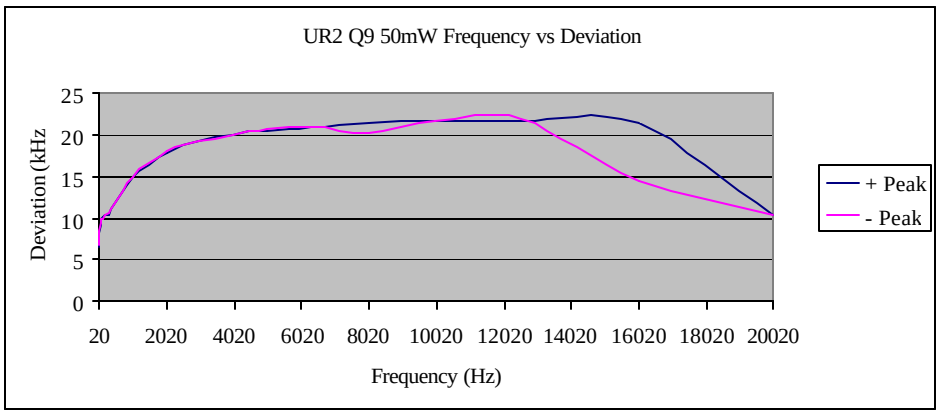

UR2 L3 10mW Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100 Hz
500 Hz
2500 Hz
10000 Hz
15000 Hz

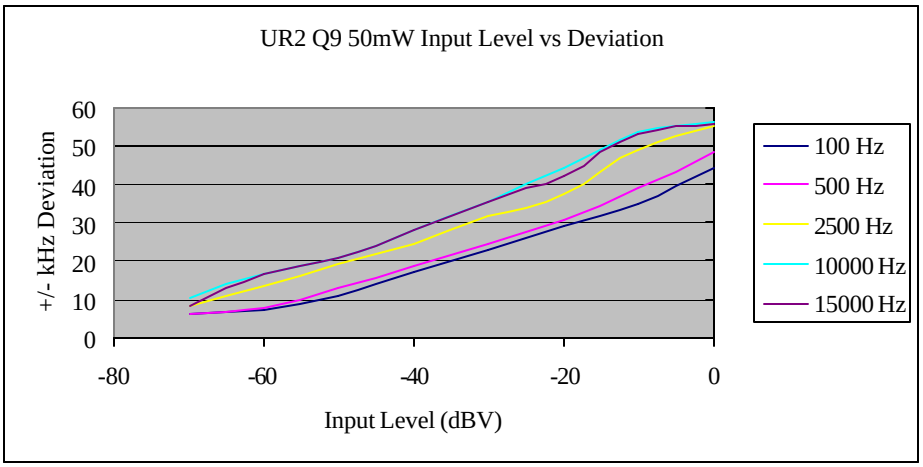

UR2 L3 50mW Frequency vs Deviation
Deviation (kHz
25.0
20.0
15.0
10.0
5.0
0.0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak


UR2 L3 50mW Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100 Hz
500 Hz
2500 Hz
10000 Hz
15000 Hz


UR2 Q9 10mW Frequency vs Deviation
Deviation (kHz
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak


UR2 Q9 10mW Input vs Deviation
+/- kHz Deviatior
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100 Hz
500 Hz
2500 Hz
10000 Hz
15000 Hz


UR2 Q9 50mW Frequency vs Deviation
Deviation (kHz
25
20
15
10
5
0
20
2020
4020
6020
8020
10020
12020
14020
16020
18020
20020
Frequency (Hz)
+ Peak
- Peak


UR2 Q9 50mW Input Level vs Deviation
+/- kHz Deviation
60
50
40
30
20
10
0
-80
-60
-40
-20
0
Input Level (dBV)
100 Hz
500 Hz
2500 Hz
10000 Hz
15000 Hz

MANUFACTURER : **Shure Inc.**
MODEL NO. : **UR1 H4 10mW 518MHz and UR1 L3 10mW 662MHz**
SERIAL NO. : **None assigned**
SPECIFICATION : **FCC-74 and RSS-123**
TEST PERFORMED : **Frequency Stability vs. Temperature**
DATE : **January 21, 2005**
NOTES :

UR1 H4 10mW 518MHz

Temperature	Measured Frequency (MHz)	Nominal Frequency (MHz)	Deviation (%)	Limit (%)	Deviation (Hz)	Limit (Hz)
+50ºC	517999575	517999689	0.00002	0.005	-114	25899
+40ºC	517999163	517999689	0.00010	0.005	-526	25899
+30ºC	517999477	517999689	0.00004	0.005	-212	25899
+20ºC	517999951	517999689	-0.00005	0.005	262	25899
+10ºC	518000261	517999689	-0.00011	0.005	572	25899
+0ºC	518000260	517999689	-0.00011	0.005	571	25899
-10ºC	517999408	517999689	0.00005	0.005	-281	25899
-20ºC	517998137	517999689	0.00030	0.005	-1553	25899
-30ºC	517995773	517999689	0.00076	0.005	-3916	25899

UR1 L3 10mW 662MHz

Temperature	Measured Frequency (Hz)	Nominal Frequency (Hz)	Deviation (%)	Limit (%)	Deviation (Hz)	Limit (Hz)
+50ºC	662000469	661999526	-0.00014	0.005	943	33099
+40ºC	661999622	661999526	-0.00001	0.005	96	33099
+30ºC	661999523	661999526	0.00000	0.005	-3	33099
+20ºC	661999705	661999526	-0.00003	0.005	179	33099
+10ºC	661999698	661999526	-0.00003	0.005	172	33099
+0ºC	661999351	661999526	0.00003	0.005	-175	33099
-10ºC	661997499	661999526	0.00031	0.005	-2027	33099
-20ºC	661993979	661999526	0.00084	0.005	-5547	33099
-30ºC	661990921	661999526	0.00130	0.005	-8605	33099

Checked BY : Richard E. King

Richard E. King

MANUFACTURER : **Shure Inc.**
MODEL NO. : **UR1 Q9 10mW 806MHz and UR2 H4 10mW 518MHz**
SERIAL NO. : **None assigned**
SPECIFICATION : **FCC-74 and RSS-123**
TEST PERFORMED : **Frequency Stability vs. Temperature**
DATE : **January 21, 2005**
NOTES :

UR1 Q9 10mW 806MHz

Temperature	Measured Frequency (Hz)	Nominal Frequency (Hz)	Deviation (%)	Limit (%)	Deviation (Hz)	Limit (Hz)
+50ºC	805976439	805975066	-0.00017	0.005	1373	40298
+40ºC	805975397	805975066	-0.00004	0.005	331	40298
+30ºC	805975139	805975066	-0.00001	0.005	73	40298
+20ºC	805975230	805975066	-0.00002	0.005	164	40298
+10ºC	805974870	805975066	0.00002	0.005	-196	40298
+0ºC	805973926	805975066	0.00014	0.005	-1140	40298
-10ºC	805972323	805975066	0.00034	0.005	-2743	40298
-20ºC	805969123	805975066	0.00074	0.005	-5943	40298
-30ºC	805964406	805975066	0.00132	0.005	-10660	40298

UR2 H4 10mW 518MHz

Temperature	Measured Frequency (Hz)	Nominal Frequency (Hz)	Deviation (%)	Limit (%)	Deviation (Hz)	Limit (Hz)
+50ºC	518000180	518000121	-0.00001	0.005	59	25900
+40ºC	517999928	518000121	0.00004	0.005	-193	25900
+30ºC	518000069	518000121	0.00001	0.005	-52	25900
+20ºC	518000386	518000121	-0.00005	0.005	265	25900
+10ºC	518000548	518000121	-0.00008	0.005	427	25900
+0ºC	518000383	518000121	-0.00005	0.005	262	25900
-10ºC	517999602	518000121	0.00010	0.005	-519	25900
-20ºC	517998249	518000121	0.00036	0.005	-1872	25900
-30ºC	517995819	518000121	0.00083	0.005	-4302	25900

Checked BY : Richard E. King

Richard E. King

MANUFACTURER : **Shure Inc.**
MODEL NO. : **UR2 L3 10mW 662MHz and UR2 Q9 10mW 806MHz**
SERIAL NO. : **None assigned**
SPECIFICATION : **FCC-74 and RSS-123**
TEST PERFORMED : **Frequency Stability vs. Temperature**
DATE : **January 22, 2005**
NOTES : **N/A indicates that the transmitter did not work.**

UR2 L3 10mW 662MHz

Temperature	Measured Frequency (Hz)	Nominal Frequency (Hz)	Deviation (%)	Limit (%)	Deviation (Hz)	Limit (Hz)
+50ºC	661999349	661999549	0.00003	0.005	-200	33100
+40ºC	661999209	661999549	0.00005	0.005	-340	33100
+30ºC	661999483	661999549	0.00001	0.005	-66	33100
+20ºC	661999981	661999549	-0.00007	0.005	432	33100
+10ºC	662000351	661999549	-0.00012	0.005	802	33100
+0ºC	662000409	661999549	-0.00013	0.005	860	33100
-10ºC	661999405	661999549	0.00002	0.005	-144	33100
-20ºC	661997877	661999549	0.00025	0.005	-1672	33100
-30ºC	N/A	661999549	N/A	0.005	N/A	33100

UR2 Q9 10mW 806MHz

Temperature	Measured Frequency (Hz)	Nominal Frequency (Hz)	Deviation (%)	Limit (%)	Deviation (Hz)	Limit (Hz)
+50ºC	805973949	805974778	0.00010	0.005	-829	40298
+40ºC	805974068	805974778	0.00009	0.005	-710	40298
+30ºC	805974801	805974778	0.00000	0.005	23	40298
+20ºC	805975583	805974778	-0.00010	0.005	805	40298
+10ºC	805976089	805974778	-0.00016	0.005	1311	40298
+0ºC	805976251	805974778	-0.00018	0.005	1473	40298
-10ºC	805975435	805974778	-0.00008	0.005	657	40298
-20ºC	805969791	805974778	0.00062	0.005	-4987	40298
-30ºC	N/A	805974778	N/A	0.005	N/A	40298

Checked BY : Richard E. King

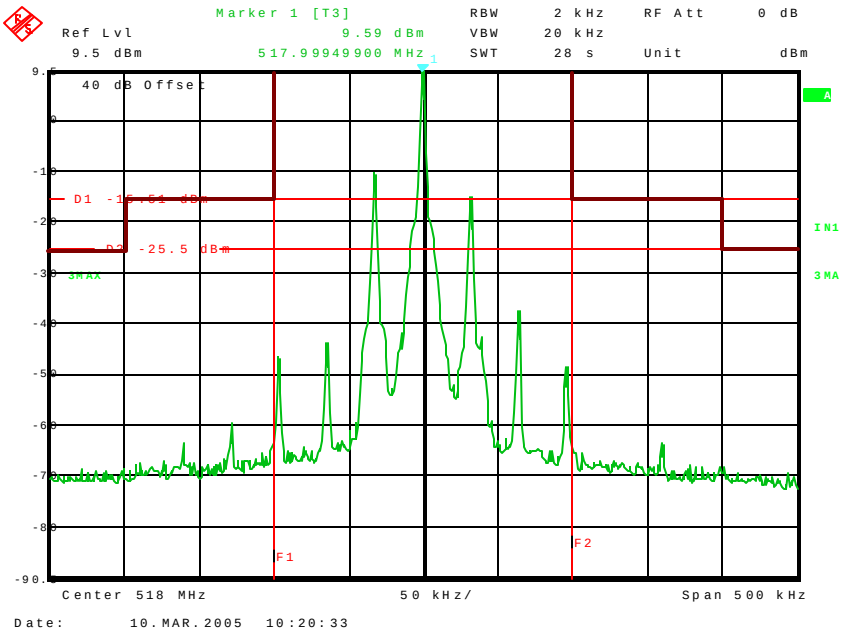
Richard E. King

MANUFACTURER : **Shure Inc.**
SERIAL NOs. : **None assigned**
SPECIFICATION : **FCC-74 and RSS-123**
TEST PERFORMED : **Frequency Stability vs. Voltage**
DATE : **January 21, 2005**
NOTES : **N/A indicates test item did not operate**

Test Item	Nominal Frequency (Hz)	3.4VDC Measured Frequency (Hz)	2.55VDC Measured Frequency (Hz)	3.4VDC Deviation (%)	2.55VDC Deviation (%)	Limit (Hz)
UR1 H4	517.999689	518.000050	518.000086	-0.00007	-0.00008	0.005
UR1 L3	661.999526	661.999515	661.999571	0.00000	-0.00001	0.005
UR1 Q9	805.975066	805.974950	805.974882	0.00001	0.00002	0.005
UR2 H4	518.000121	518.000397	518.000401	-0.00005	-0.00005	0.005
UR2 L3	661.999549	661.999785	661.999772	N/A	-0.00003	0.005
UR2 Q9	805.974778	805.975620	805.975673	N/A	-0.00011	0.005

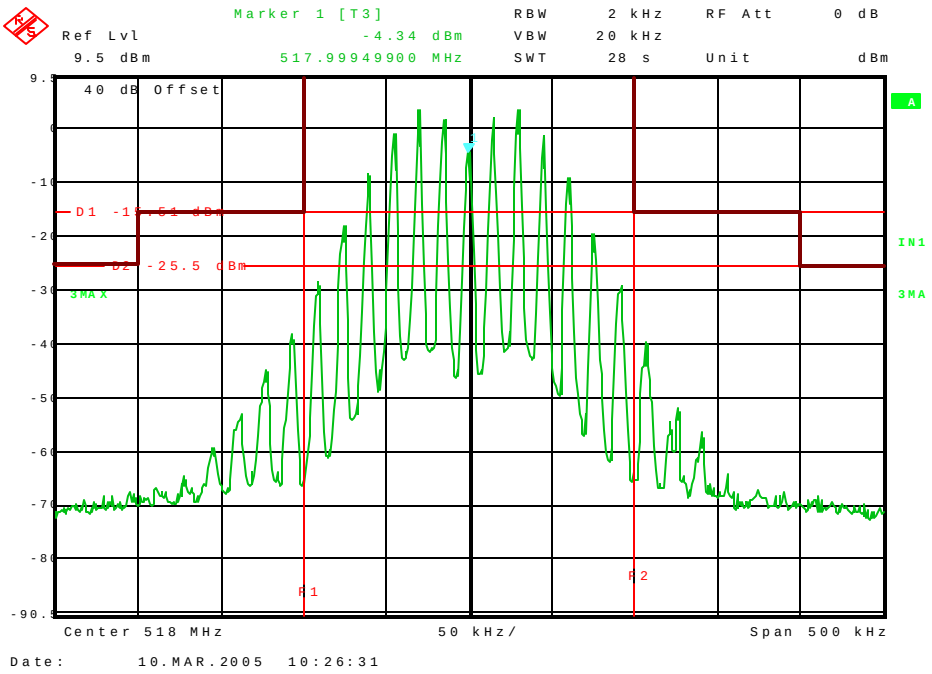
Checked BY : Richard E. King

Richard E. King



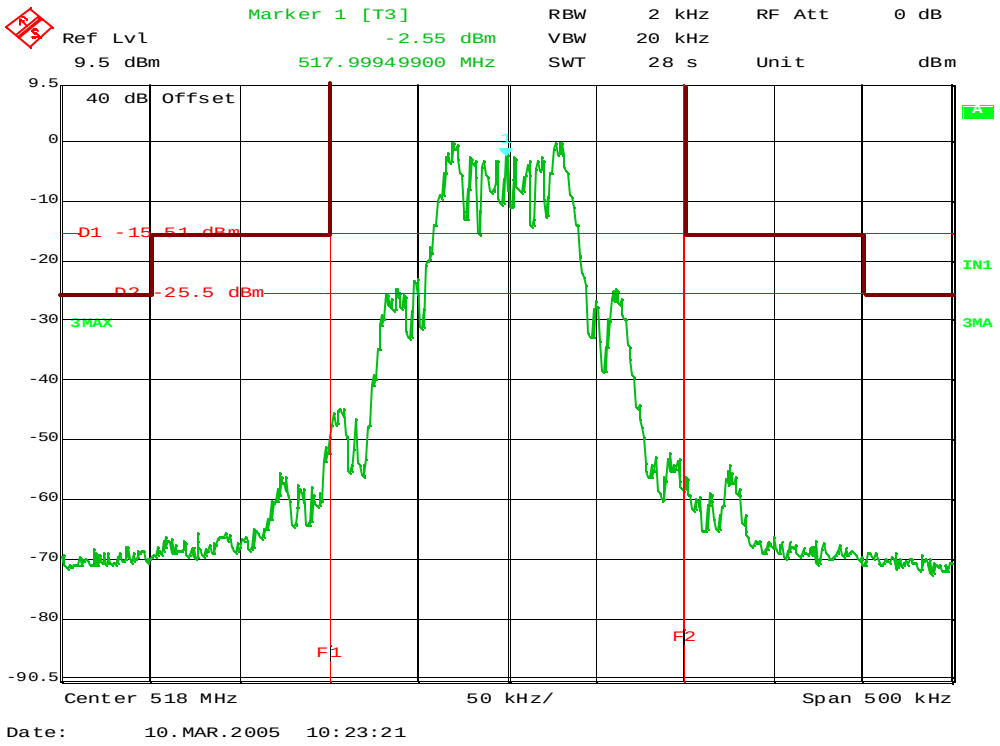
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 518MHz
TEST PARAMETERS : Unmodulated Carrier



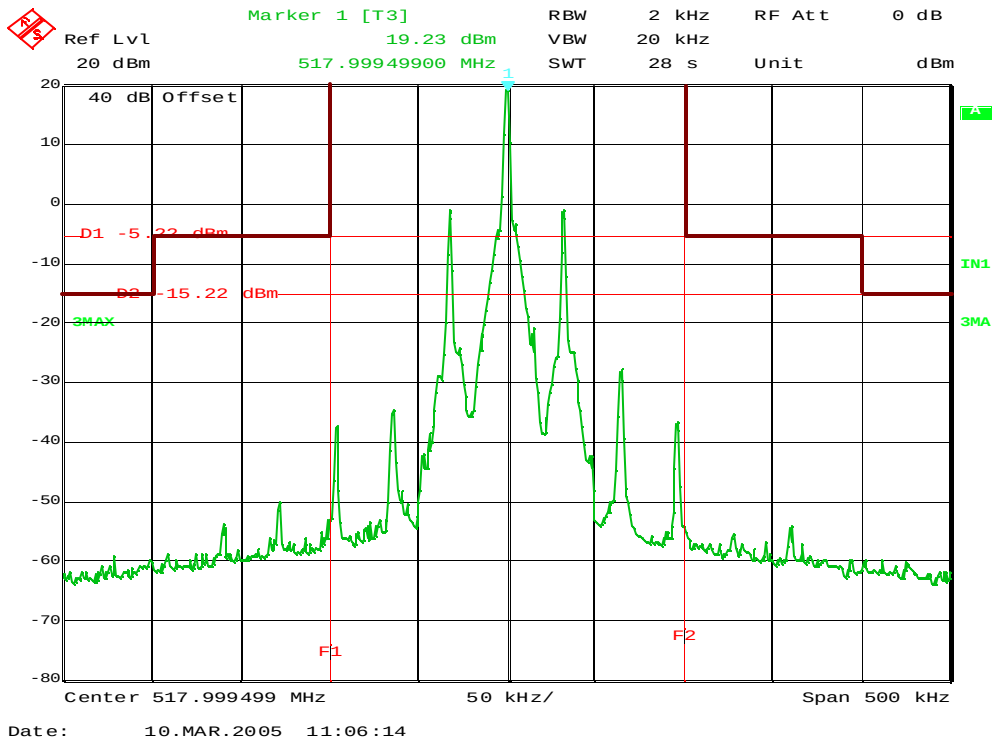
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 518MHz
TEST PARAMETERS : 15kHz @ 85% Modulation



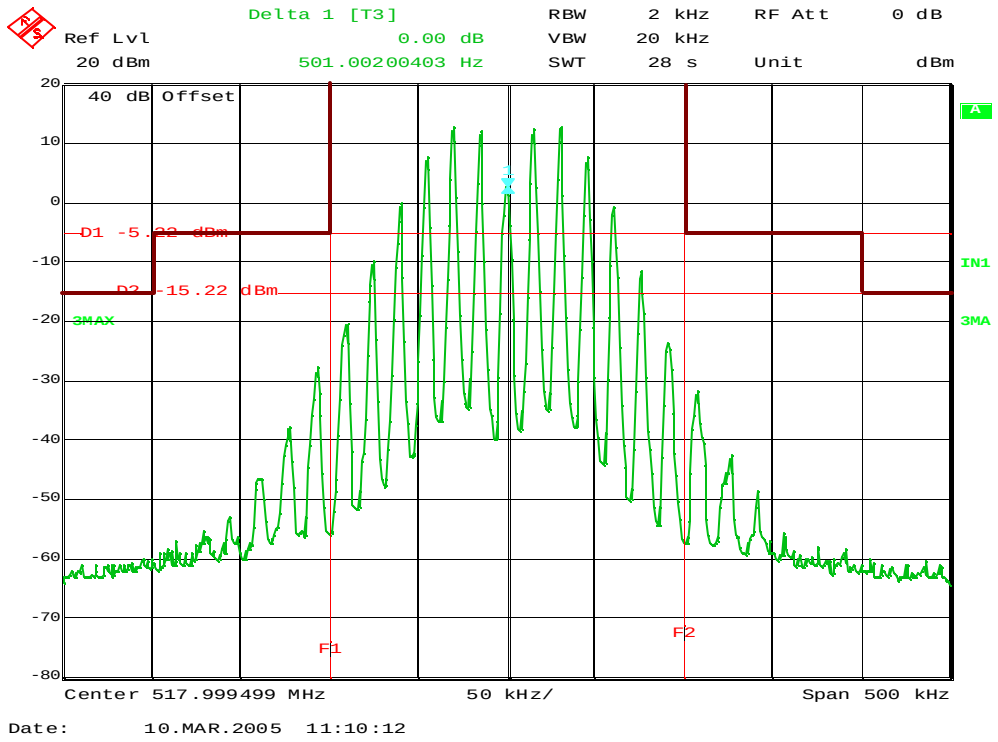
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 518MHz
TEST PARAMETERS : 16dB > 50% Modulation



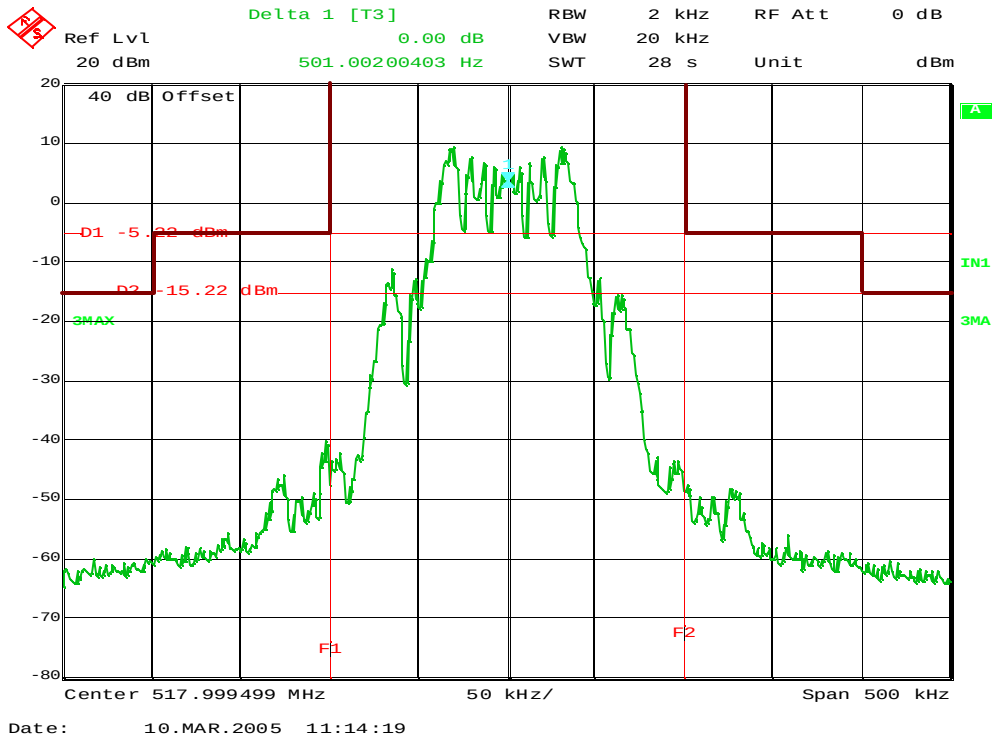
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 100mW @ 518MHz
TEST PARAMETERS : Unmodulated Carrier



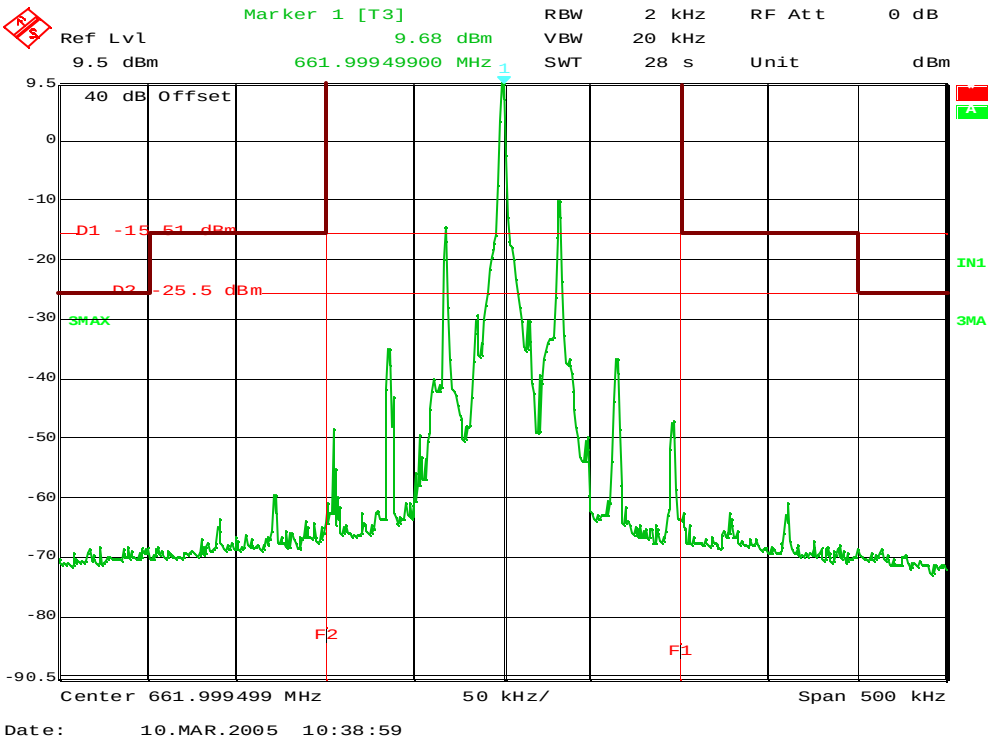
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 100mW @ 518MHz
TEST PARAMETERS : 15kHz @ 85% Modulation



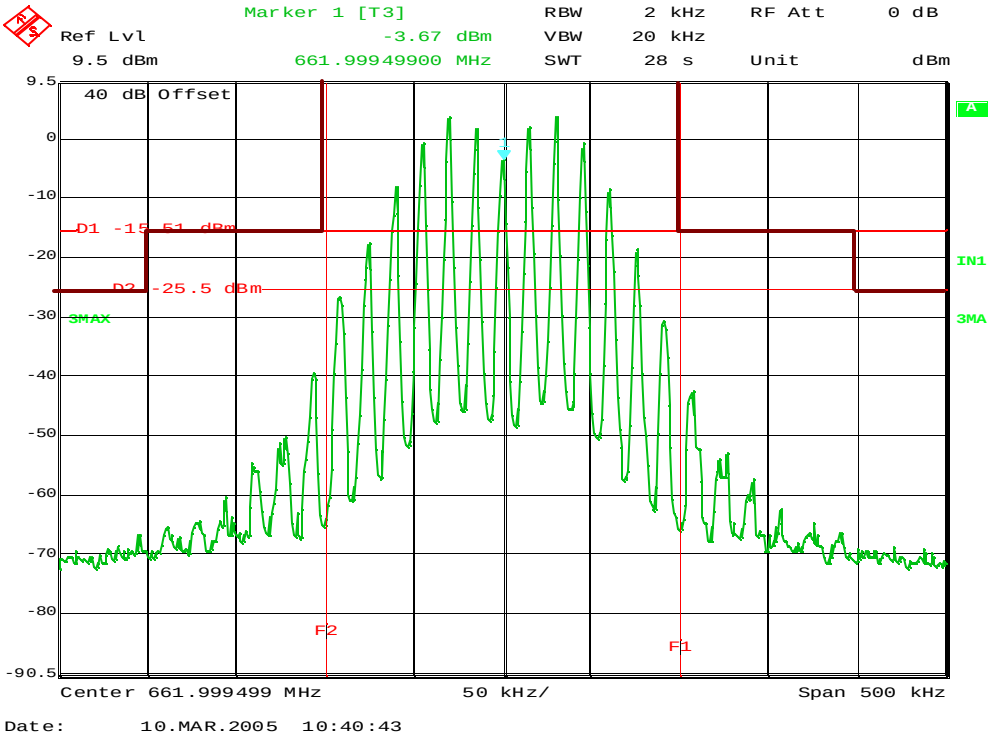
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 100mW @ 518MHz
TEST PARAMETERS : 16dB > 50% Modulation



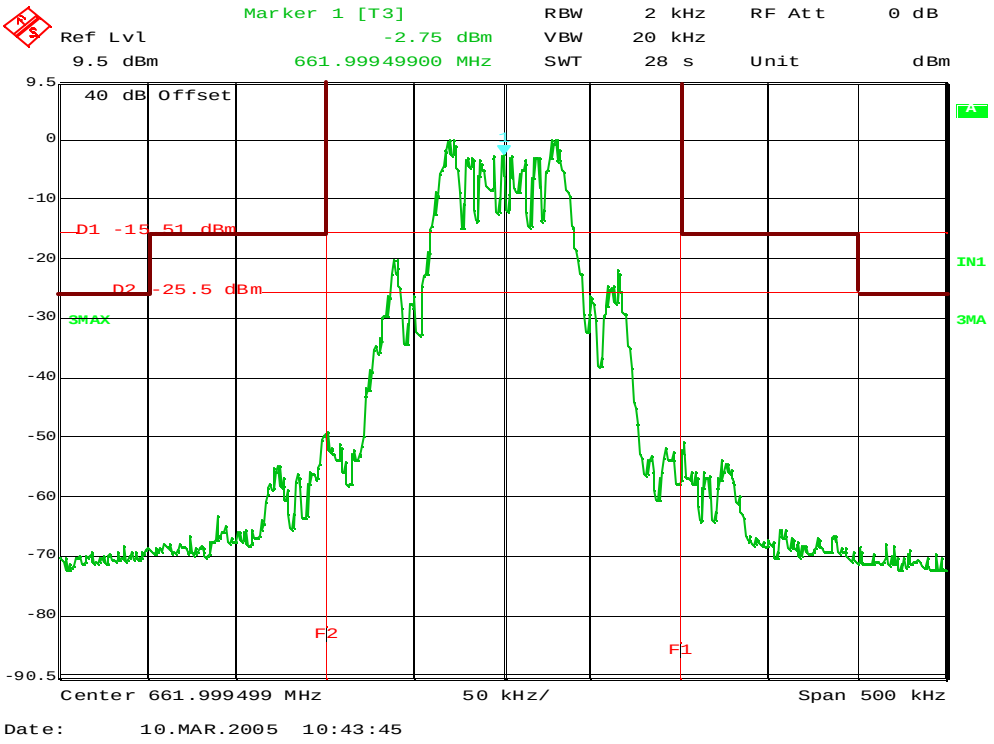
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 L3
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 662MHz
TEST PARAMETERS : Unmodulated Carrier



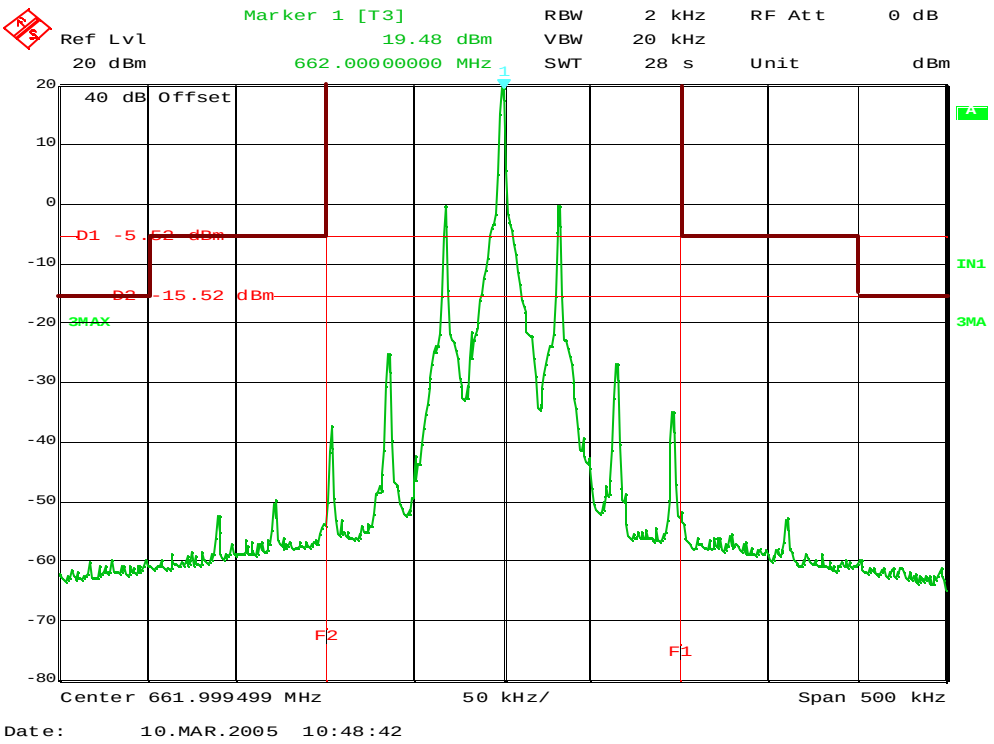
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 L3
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 662MHz
TEST PARAMETERS : 15kHz @ 85% Modulation



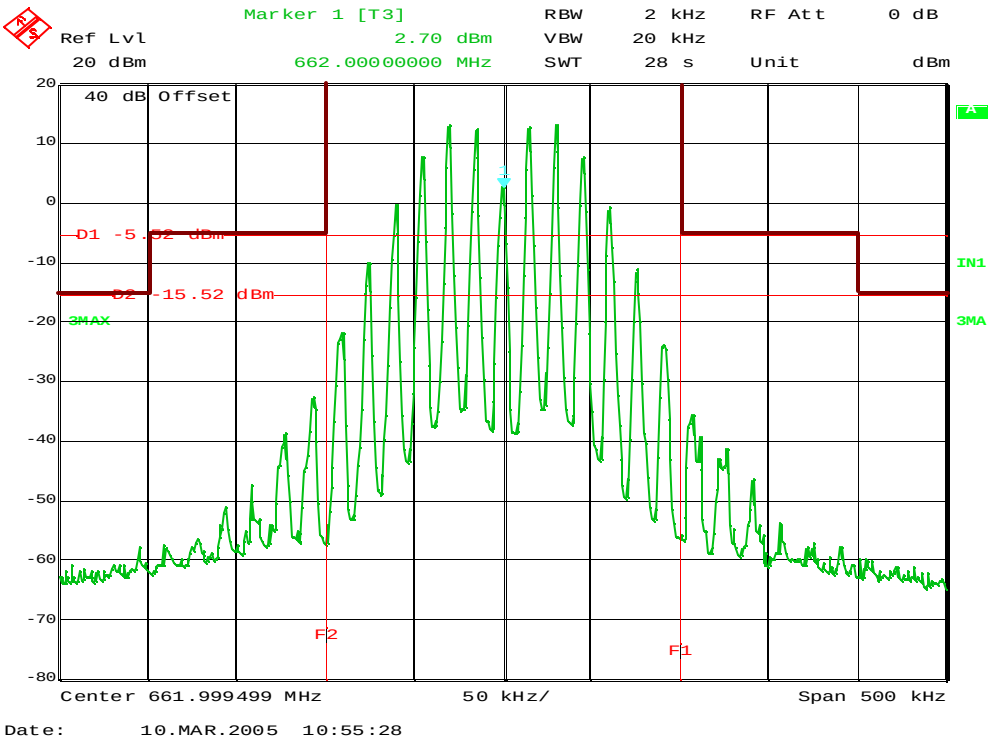
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 L3
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 662MHz
TEST PARAMETERS : 16dB > 50% Modulation



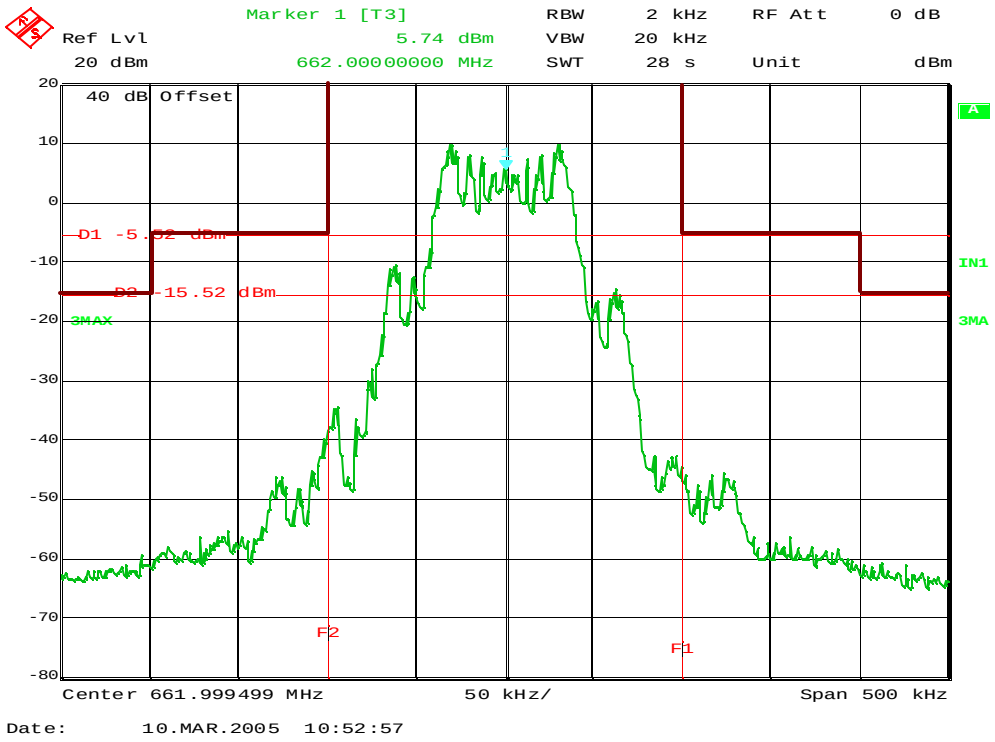
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 L3
SERIAL NUMBER : None assigned
TEST MODE : Tx 100mW @ 662MHz
TEST PARAMETERS : Unmodulated Carrier



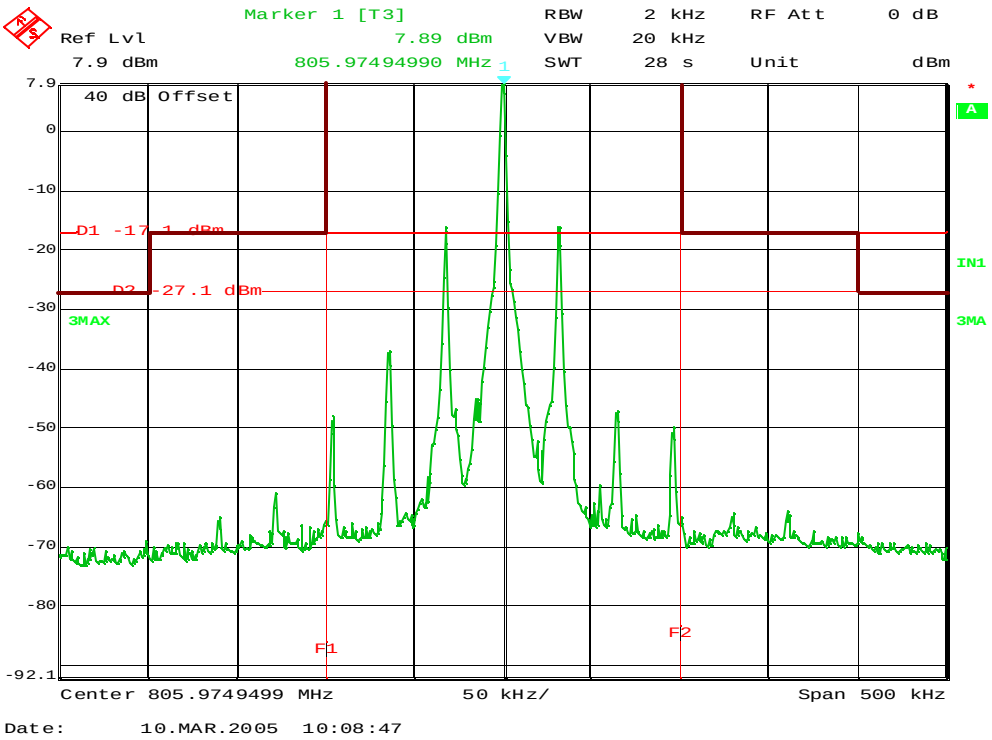
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 L3
SERIAL NUMBER : None assigned
TEST MODE : Tx 100mW @ 662MHz
TEST PARAMETERS : 15kHz @ 85% Modulation



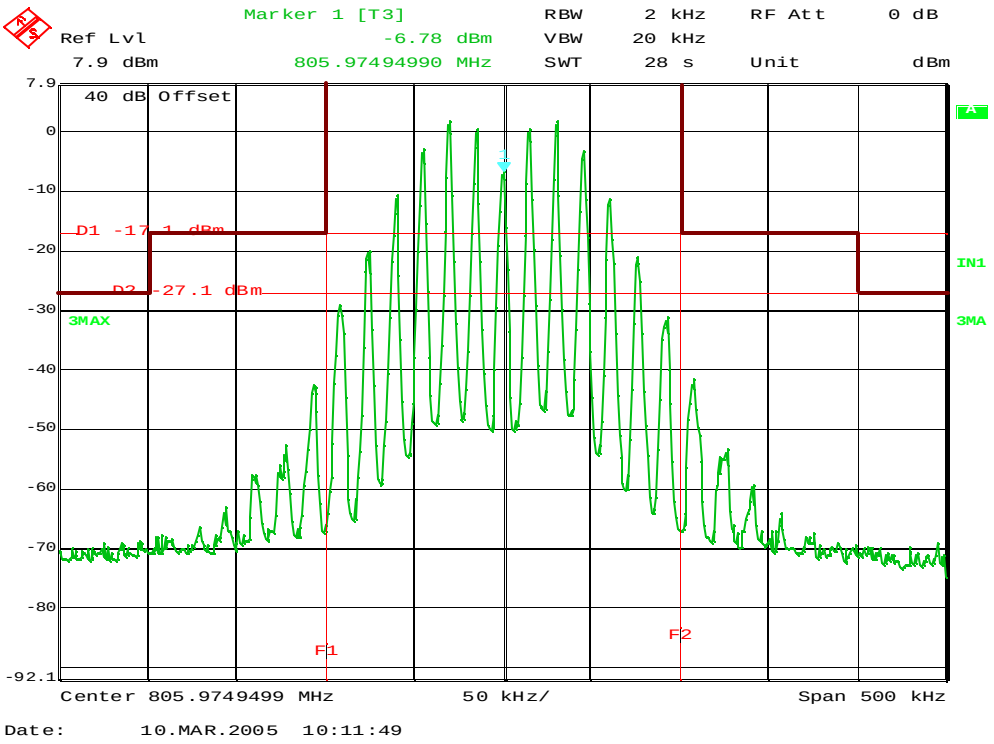
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 L3
SERIAL NUMBER : None assigned
TEST MODE : Tx 100mW @ 662MHz
TEST PARAMETERS : 16dB > 50% Modulation



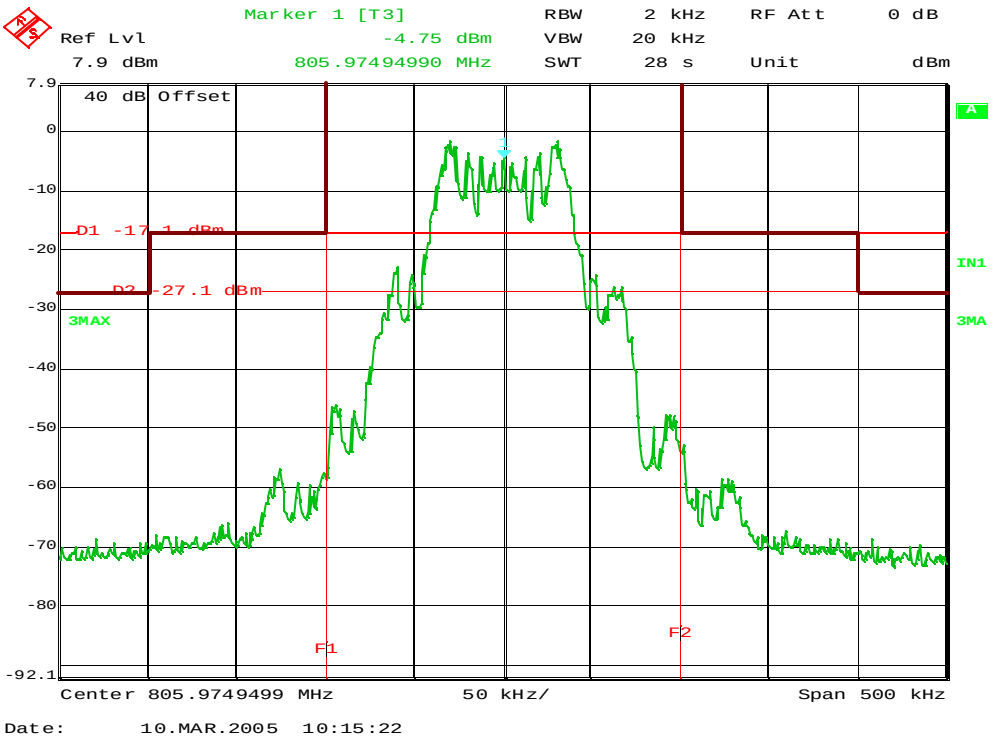
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 Q9
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 806MHz
TEST PARAMETERS : Unmodulated Carrier



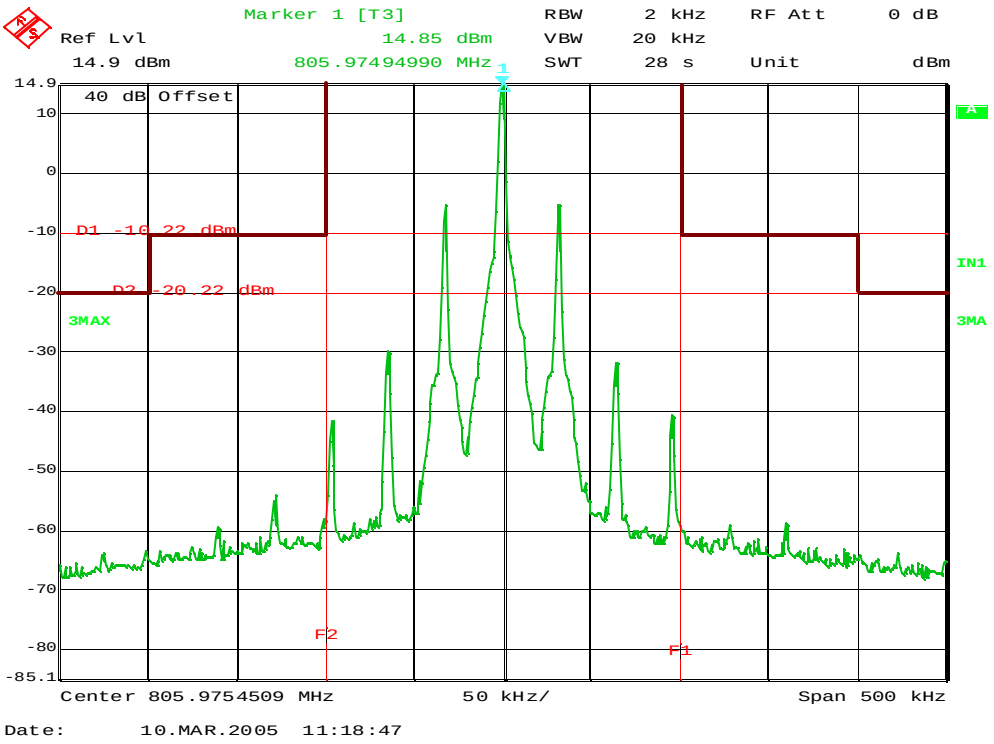
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 Q9
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 806MHz
TEST PARAMETERS : 15kHz @ 85% Modulation



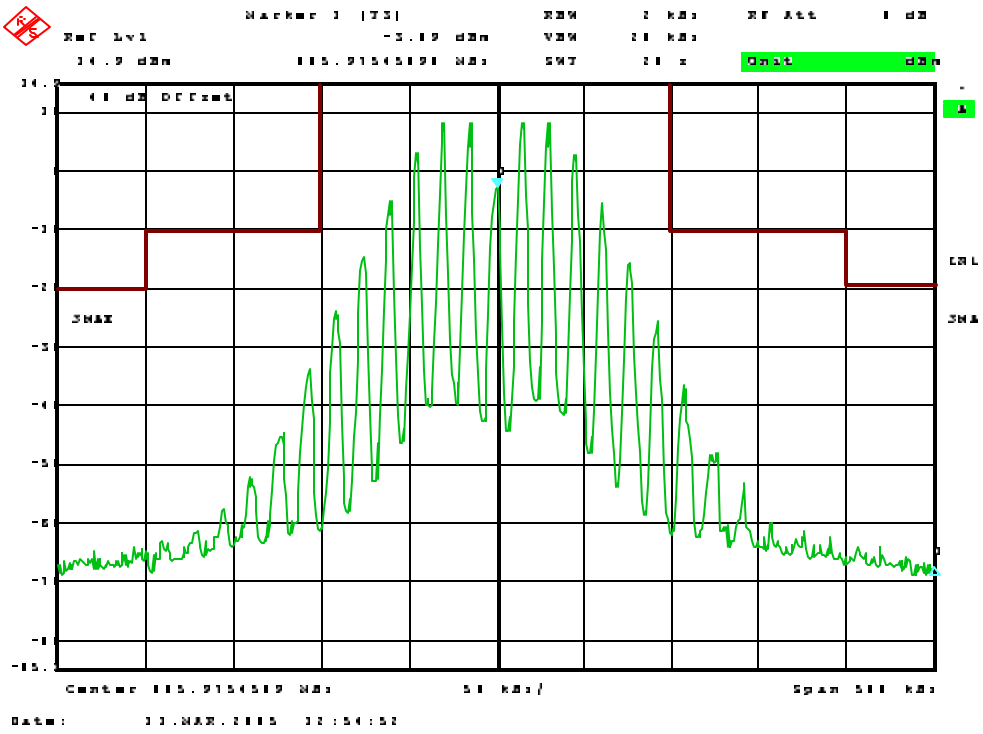
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 Q9
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 806MHz
TEST PARAMETERS : 16dB > 50% Modulation



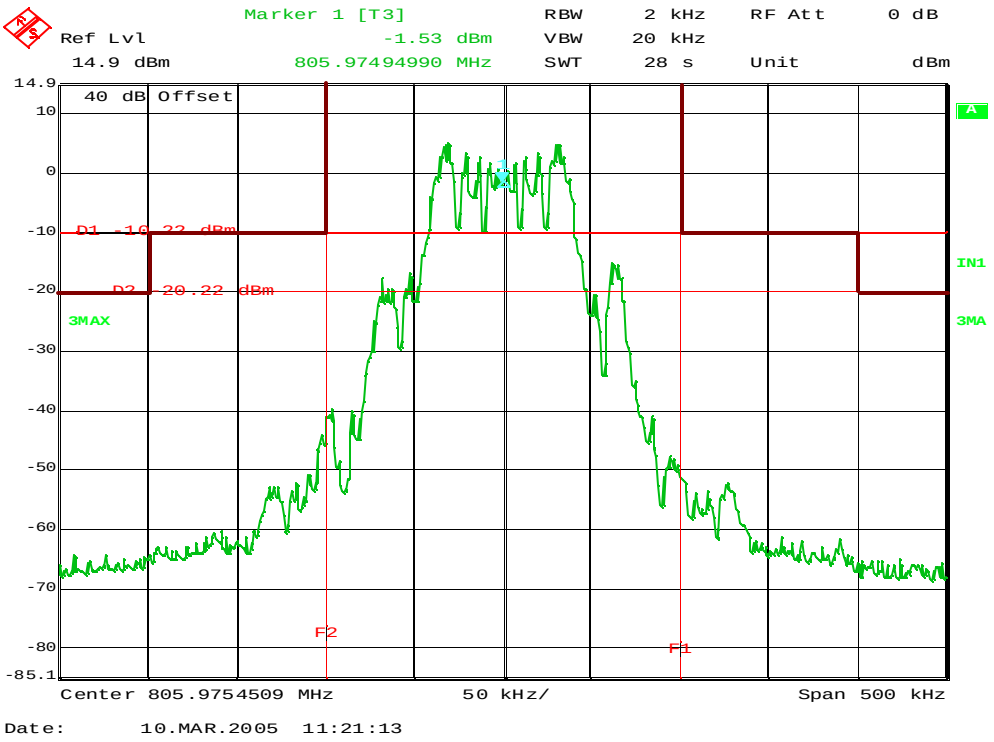
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 Q9
SERIAL NUMBER : None assigned
TEST MODE : Tx 50mW @ 806MHz
TEST PARAMETERS : Unmodulated Carrier



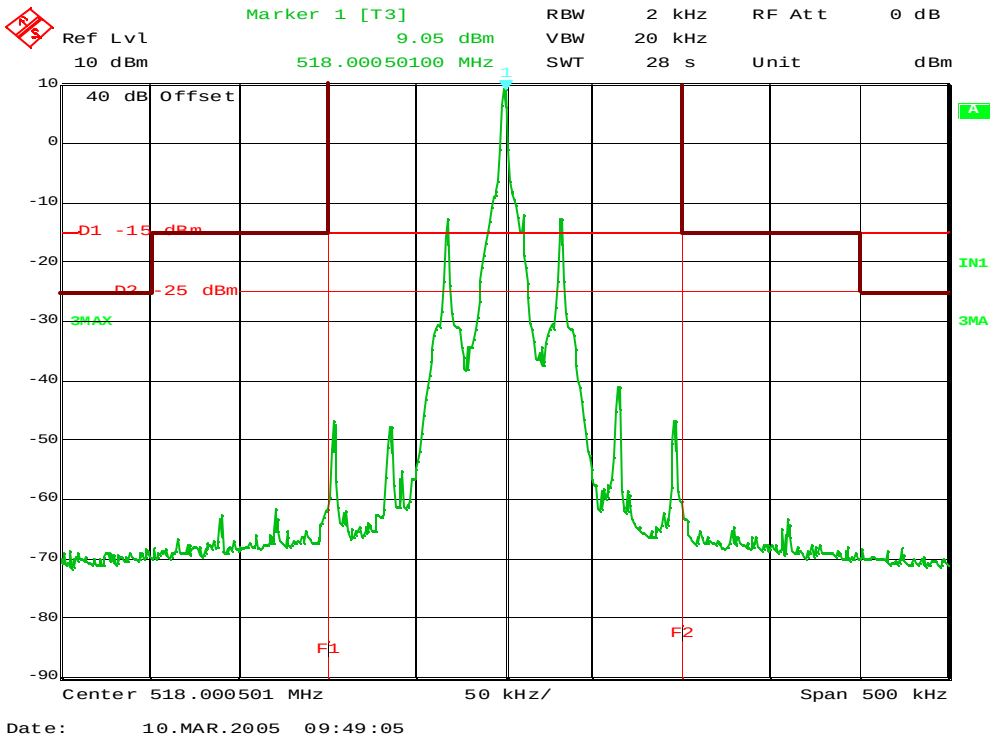
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 Q9
SERIAL NUMBER : None assigned
TEST MODE : Tx 50mW @ 806MHz
TEST PARAMETERS : 15kHz @ 85% Modulation



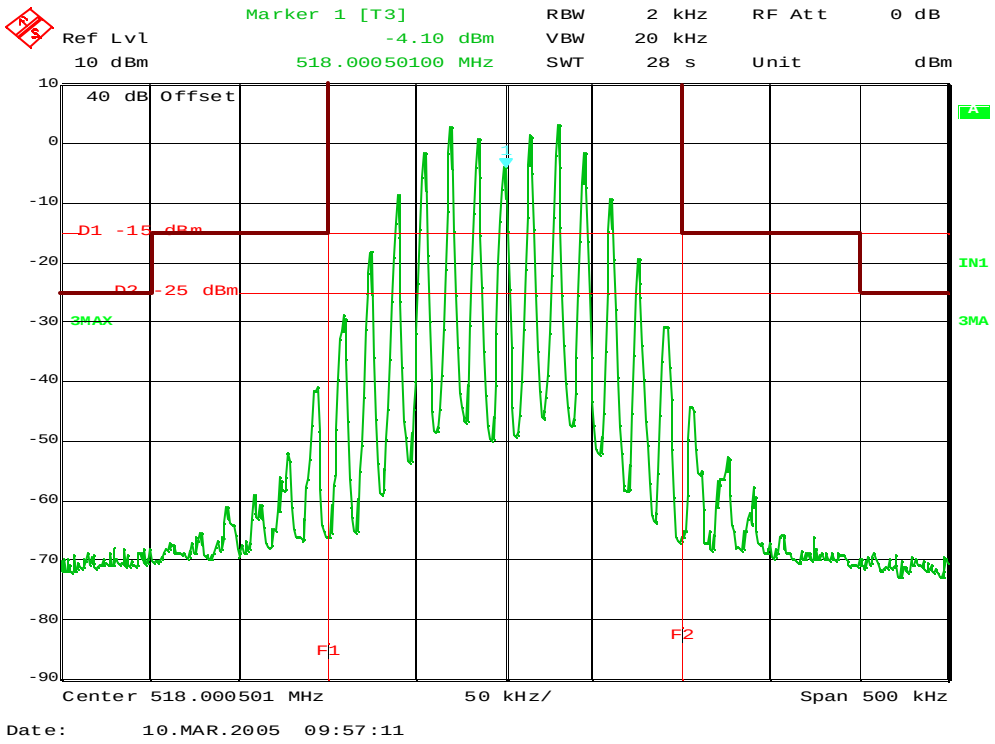
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR1 Q9
SERIAL NUMBER : None assigned
TEST MODE : Tx 50mW @ 806MHz
TEST PARAMETERS : 16dB > 50% Modulation



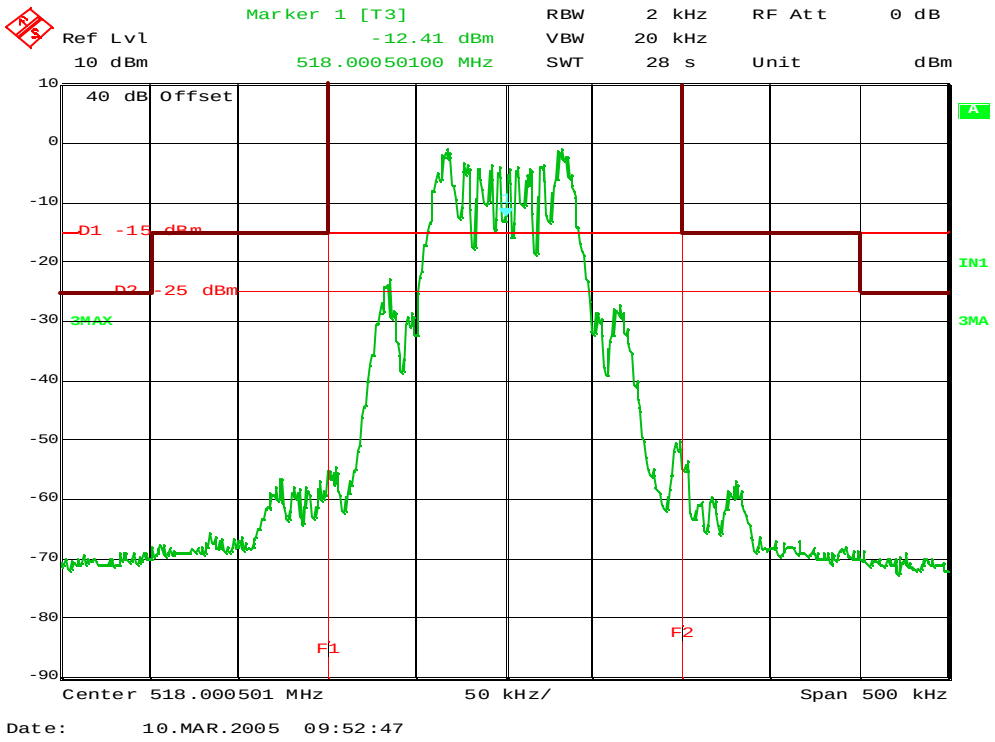
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR2 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 518MHz
TEST PARAMETERS : Unmodulated Carrier



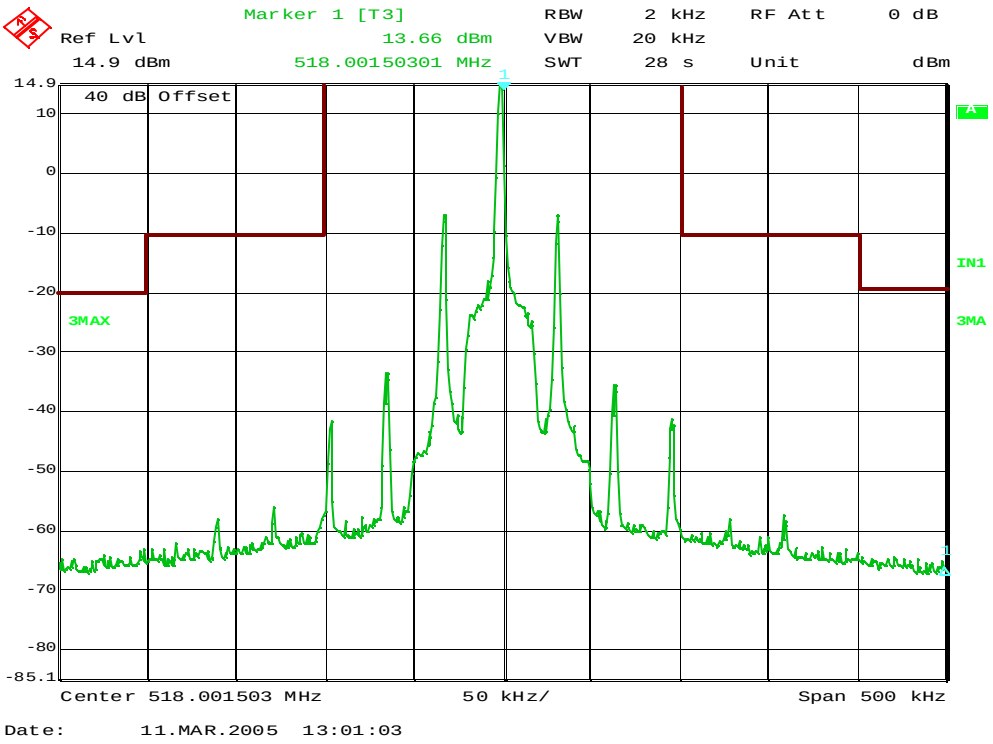
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR2 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 518MHz
TEST PARAMETERS : 15kHz @ 85% Modulation



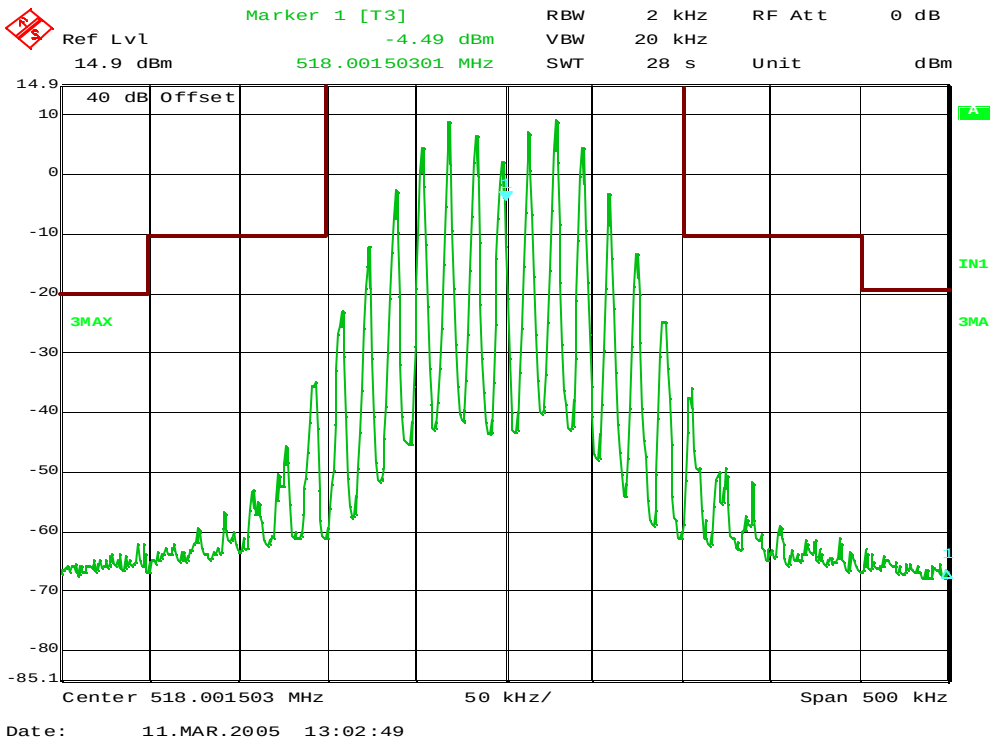
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR2 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 10mW @ 518MHz
TEST PARAMETERS : 16dB > 50% Modulation



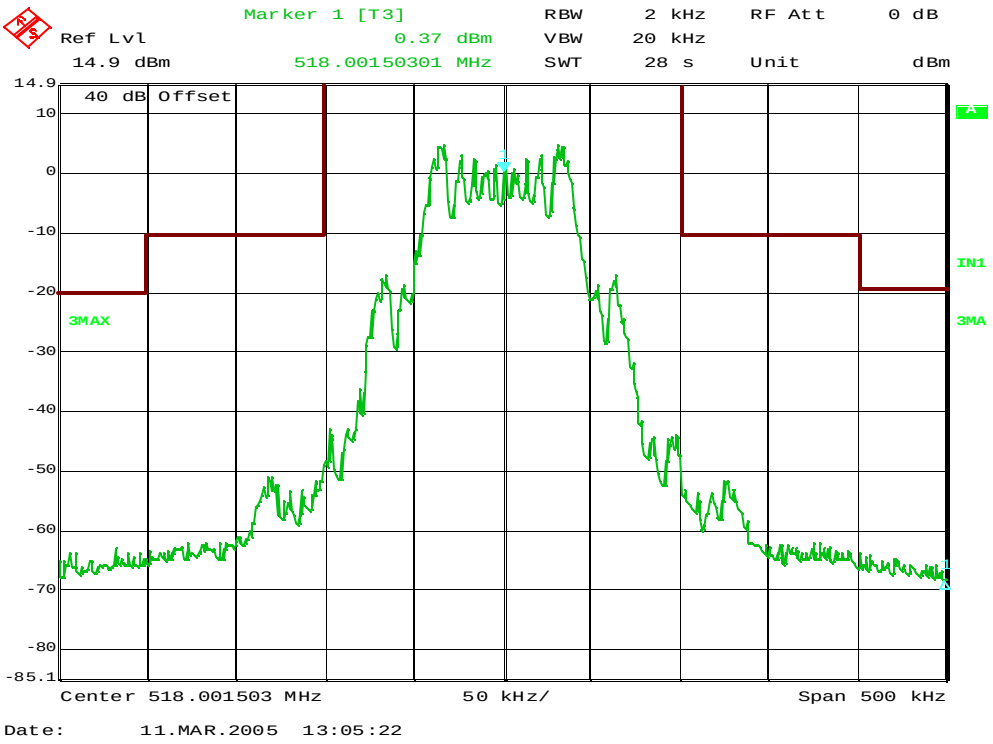
CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR2 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 50mW @ 518MHz
TEST PARAMETERS : Unmodulated Carrier



CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR2 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 50mW @ 518MHz
TEST PARAMETERS : 15kHz @ 85% Modulation



CFR 47 Part 74 RSS - 123 Occupied Bandwidth

MANUFACTURER : Shure Inc.
MODEL NUMBER : UR2 H4
SERIAL NUMBER : None assigned
TEST MODE : Tx 50mW @ 518MHz
TEST PARAMETERS : 16dB > 50% Modulation