Lab Code: 200167-0

FCC PARTS 22, 74 AND 90

MEASUREMENT AND TEST REPORT

For

Headline Systems, INC

Misung Bldg., Guro-Dong 612-6, Guro-Gu, Seoul, Korea, 152-865

FCC ID: U5IHL-1511
Model: HL-1511

Report Type: ☒ Original Report	**Product type:** VHF Data Radio Transciever
Test Engineer:	Victor Zhang
Report Number:	R0803119-90
Report Date:	2008-04-23
Reviewed By:	Boni Baniqued
Prepared By: (J8)	Bay Area Compliance Laboratories Corp. (**BACL**) 1274 Anvilwood Ave Sunnyvale, CA 94085, U.S.A. Tel: (408) 732-9162 Fax: (408) 732 9164 www.baclcorp.com

Note: This test report is for the customer shown above and their specific product only. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The report has been prepared on behalf of Headline Systems, INC and their product FCC ID: U5IHL-1511, model: HL-1511 or the EUT as referred to in the rest of this report. The EUT is a UHF Radio Transceiver that operates under FCC Parts 22, 74, and 90.

EUT Specifications	
Frequency Band	136 – 174 MHz
Modulation Type	F3E
RF Output Power	1.0 -4.0 Watts
Channel Spacing	25 kHz / 12.5 kHz
Number of Channels	22
Power Supply	7.4 VDC
Frequency Deviation	Peak ±5 kHz (25 kHz Channel Spacing) Peak ±2.5 kHz (12.5 kHz Channel Spacing)
Antenna Type	External Omnidirectional Antenna with reverse polarity connection type, 0 dBi Gain

1.2 Mechanical Description

The Headline Systems INC's product, model: HL-1511 or the "EUT" as referred to in this report is a UHF Radio Transceiver of plastic construction, which measures approximately 121.4 mm (L) x 54.0 mm (W) x 45.1 mm (H) and weighs 112 g.

** The test data gathered are from production sample, serial number: H0802000001 Revision: Rev 1 provided by the manufacturer.*

1.3 EUT Photo

Additional Photo in Exhibit C

1.4 Objective

This Type approval report is prepared on behalf of *Headline Systems, INC* in accordance with Part 22, Part 74 and Part 90 of the Federal Communication Commissions rules.

1.5 Related Submittal(s)/Grant(s)

No related submittal(s).

1.6 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 22 – Public Mobile Services, Part 74 – Experimental Radio, Auxillary, Special Broadcast and other Program Distributional Services, Part 90 – Private Land Mobile Radio Service

Applicable Standards:TIA603-C and ANSI 63.4-2003, American National Standard for Method of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed by Bay Area Compliance Laboratories Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have 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 C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to TIA/EIA-603-C.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

2.2 Equipment Modifications

No modifications were made to the EUT.

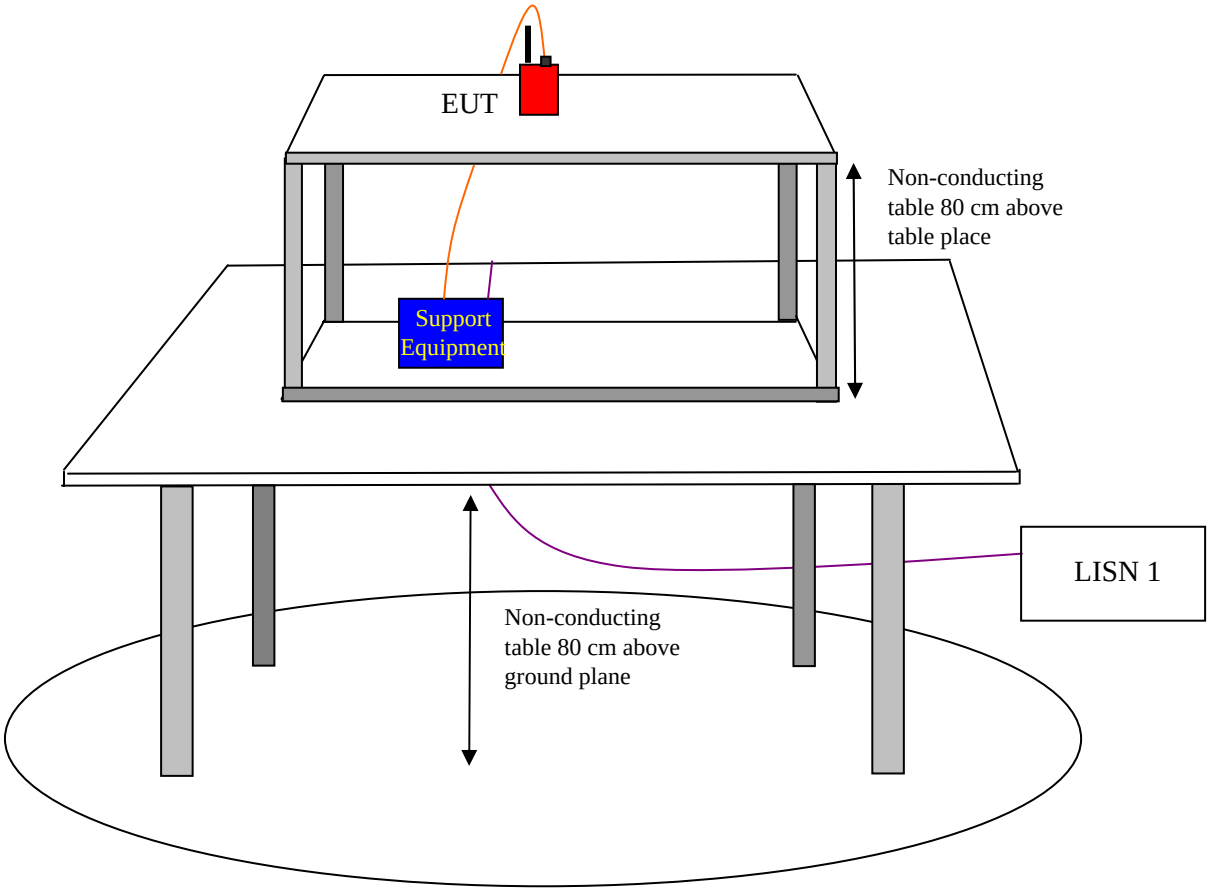
2.3 Local Support Equipment Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
BK PRECISION	DC power supply	1612A	0553WSC12

2.4 Interface Ports and Cabling

Cable Description	Length (M)	From	To
PT5 Data test cable	1.0	PC Serial Port / Function Generator BNC output port	EUT Serial connector / BNC
PT5 Audio test cable	1.0	PC Serial Port / Function Generator BNC output port	EUT Serial connector / BNC

2.5 Test Setup Block Diagram



3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1093	RF Exposure	Compliant
§2.1046, §90.205	RF Output Power	Compliant
§2.1047, §90.207	Modulation Characteristics, Audio Frequency Response and Audio Filter Response	Compliant
§2.1049, §22.359, §74.1236, §90.209/90.210	Occupied Bandwidth and Emission Mask	Compliant
§2.1051, §90.210	Spurious Emissions AT Antenna Terminals	Compliant
§2.1055, §22.355, §74.1261, § 90.213	Frequency stability	Compliant
§2.1053, § 90.210	Field strength of spurious radiation	Compliant
§ 90.214	Transient Frequency Behavior	Compliant

4 §2.1093 - RF EXPOSURE

4.1 Applicable Standard

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

According to FCC Exclusion list, In the following table, fGHz is mid-band frequency in GHz, and d is the distance to a person'sbody, excluding hands, wrists, feet, and ankles.

Exposure category	low threshold	high threshold
general population	$(60/f_{GHz})$ mW, $d < 2.5$ cm $(120/f_{GHz})$ mW, $d \geq 2.5$ cm	$(900/f_{GHz})$ mW, $d < 20$ cm
occupational	$(375/f_{GHz})$ mW, $d < 2.5$ cm $(900/f_{GHz})$ mW, $d \geq 2.5$ cm	$(2250/f_{GHz})$ mW, $d < 20$ cm

Routine SAR evaluation refers to that specifically required by § 2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

4.2 Result:

This is a portable device and the Maximum peak output power are 4121 mW (25kHz Channel separation) and 4335 mW (12.5 kHz Channel Separation), which are below the low threshold level of 4838.7mW = [(375/0.155GHz)X 2] mW. The SAR measurement is not applicable for this device.

5 §2.1046, and §90.205 - Conducted Output Power

5.1 Applicable Standard

According to FCC §2.1046, and §90.205, maximum ERP is dependent upon the station's antenna HAAT and required service area.

5.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

RBW	Video BW
100 kHz	300 kHz

5.3 Environmental Conditions

Temperature:	26 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by Victor Zhang on 2007-04-21.*

5.4 Test Equipment List and Details

Manufacturer	Equipment Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	Receiver, EMI Test	ESCS-30	100176	2007-11-29

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

5.5 Test Result

Test Mode: Transmitting

High Power

Frequency Spacing (kHz)	Frequency (MHz)	Output Power (dBm)	Output Power (Watt)
VHF (25kHz)	136.025	36.11	4.083
VHF (25kHz)	155.025	36.15	4.121
VHF (25kHz)	173.975	36.07	4.046
VHF (12.5kHz)	136.025	36.12	4.093
VHF (12.5kHz)	155.025	36.37	4.335
VHF (12.5kHz)	173.975	36.07	4.046

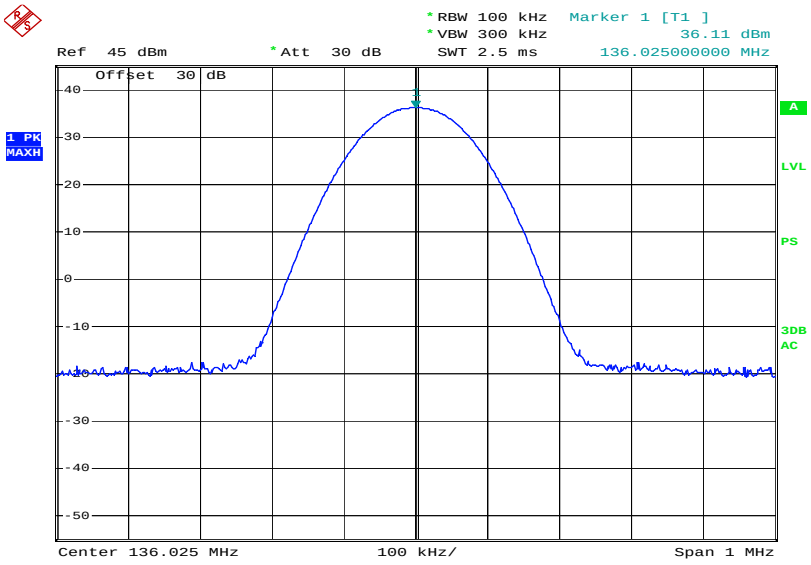
Low Power

Frequency Spacing (kHz)	Frequency (MHz)	Output Power (dBm)	Output Power (Watt)
VHF (25kHz)	136.025	29.04	0.802
VHF (25kHz)	155.025	29.15	0.822
VHF (25kHz)	173.975	29.14	0.820
VHF (12.5kHz)	136.025	29.01	0.800
VHF (12.5kHz)	155.025	29.19	0.830
VHF (12.5kHz)	173.975	29.20	0.832

5.6 Plots of conducted output power:

UHF (25 kHz) High Power

Low Channel



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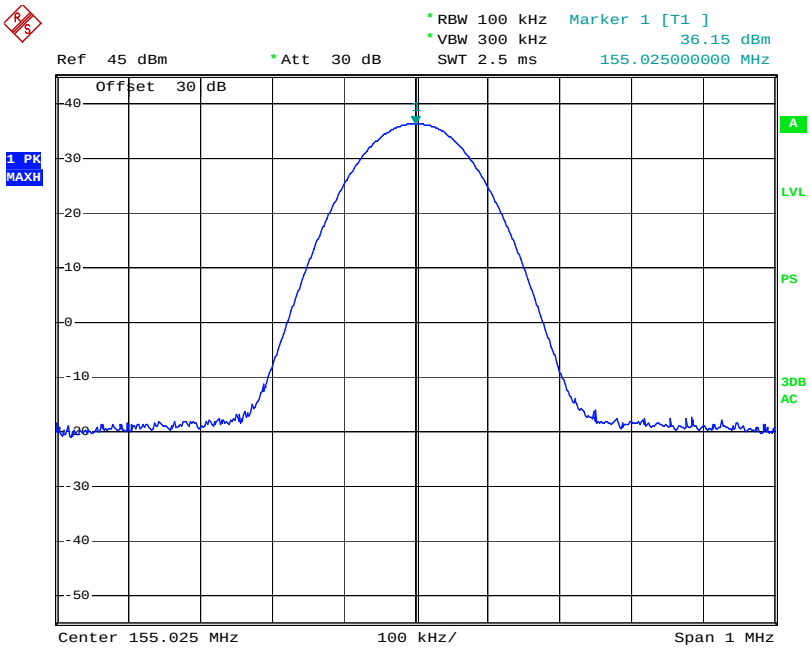
Middle Channel



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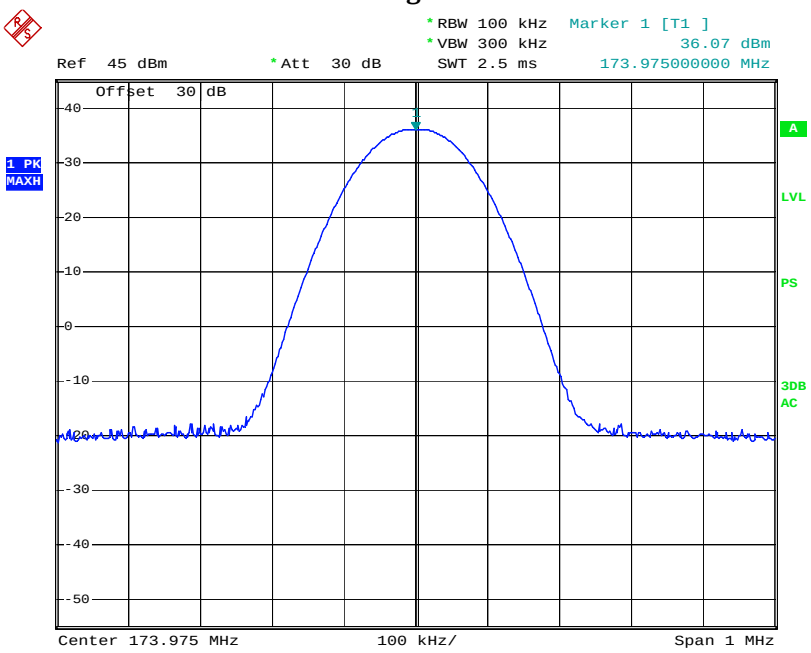
High Channel



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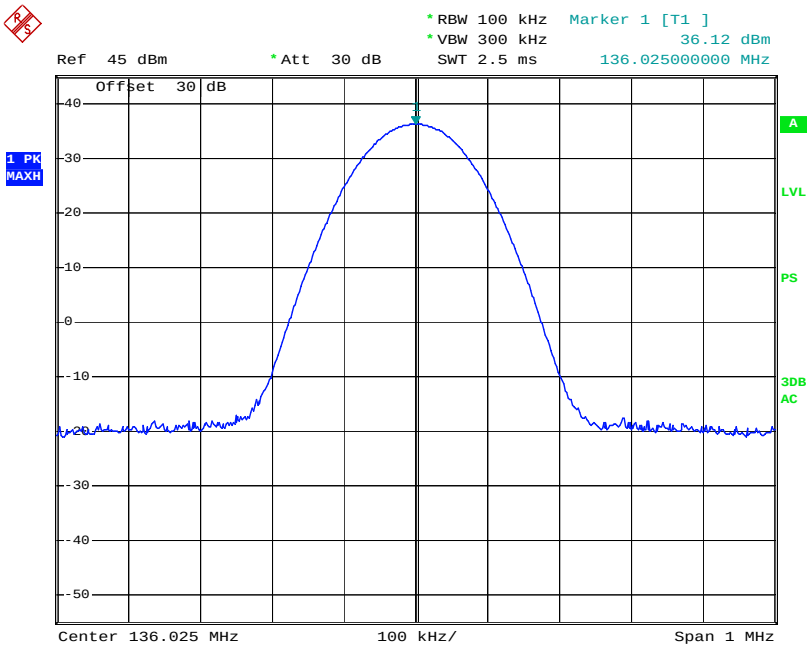
UHF (12.5 kHz) High Power

Low Channel



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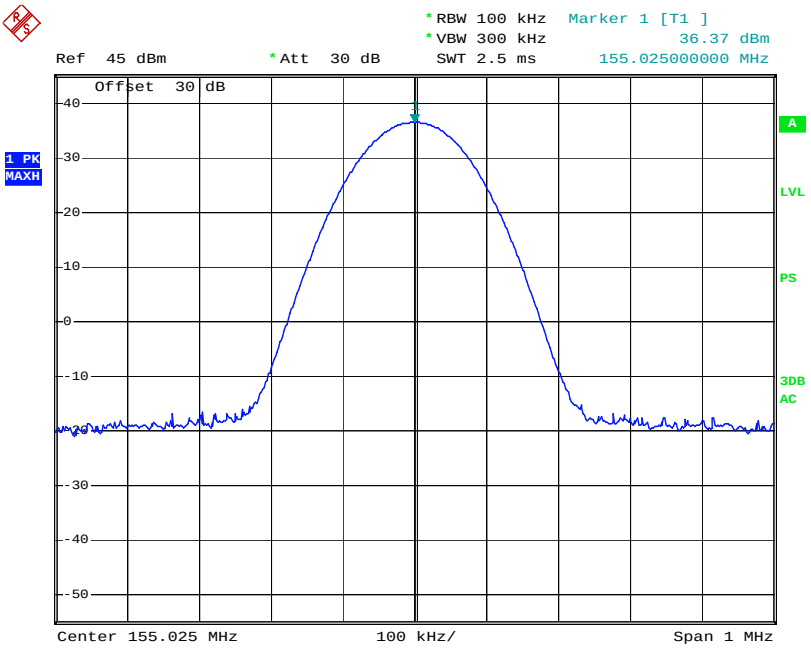

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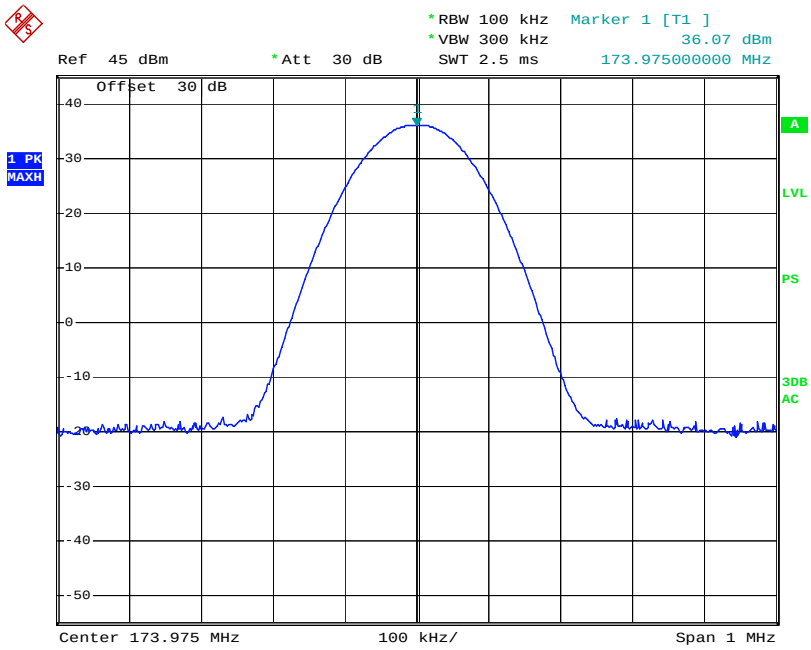
High Channel



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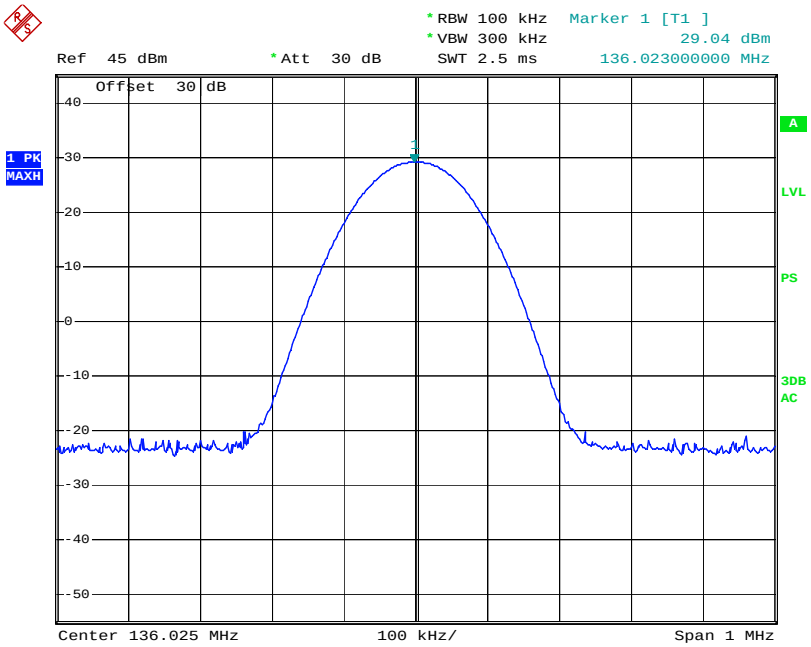
VHF (25 kHz) Low Power

Low Channel



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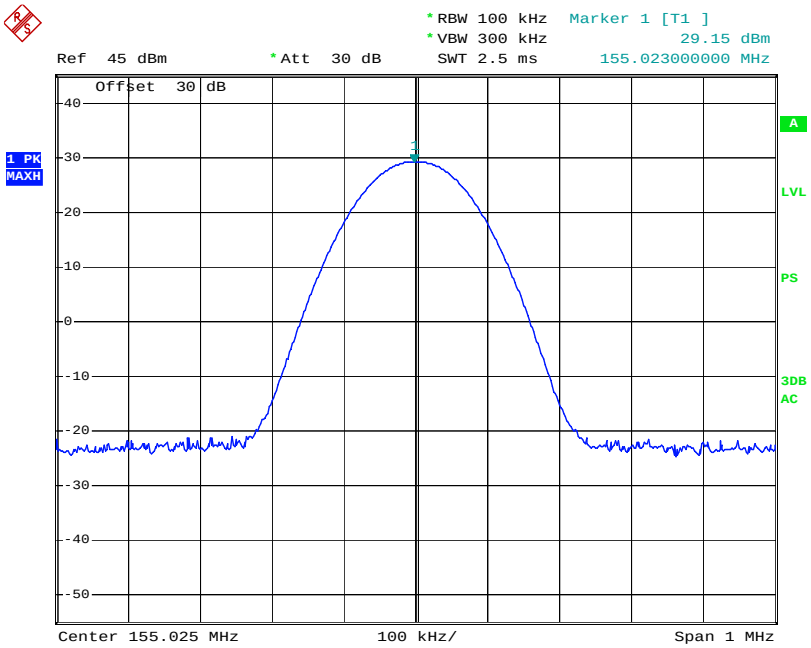

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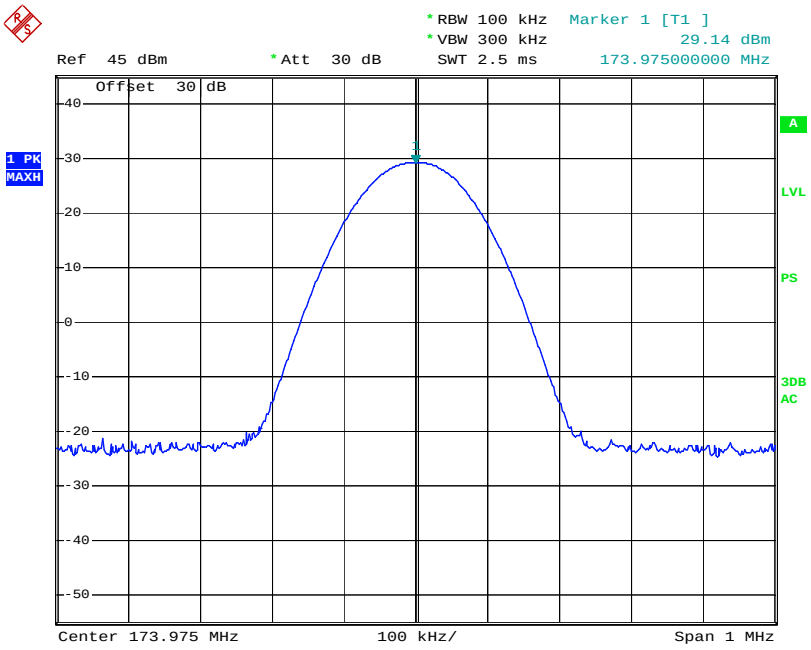
High Channel



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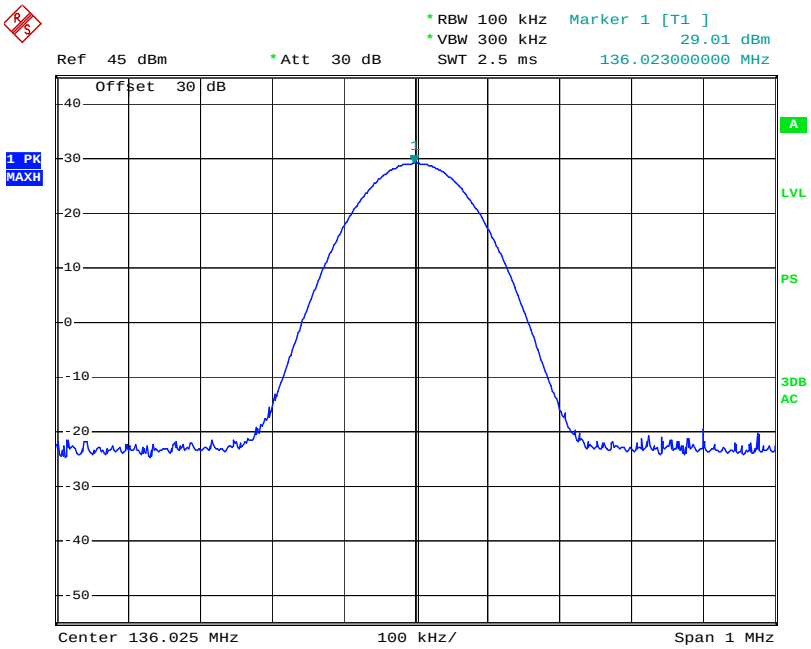
VHF (12.5 kHz) Low Power

Low Channel



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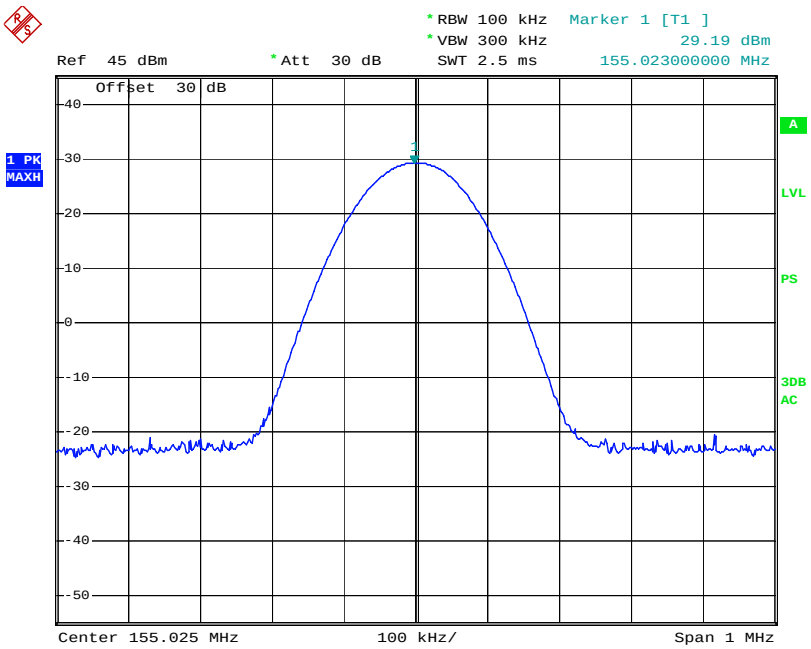
Middle Channel



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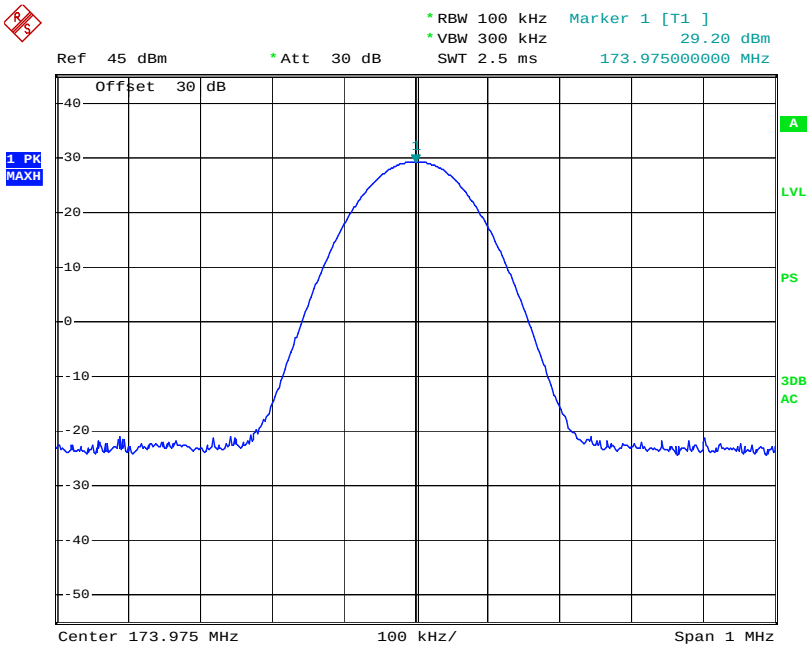
High Channel



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6 §2.1047, and §90.207 - MODULATION CHARACTERISTIC

6.1 Applicable Standard

§2.1047 & §90.207:

(a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.
(b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

6.2 Test Procedure

Test Method: TIA/EIA-603-C 2.2.3

6.3 Environmental Conditions

Temperature:	26 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by Victor Zhang on 2008-04-17.*

6.4 Test Equipment List and Details

Manufacturer	Equipment Description	Model	Serial Number	Calibration Date
Agilent	Function Arbitrary Waveform Generator	33220A	MY43004878	2007-06-04
RF Communication test set	8920A	HP	3438A05338	2008-03-20

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

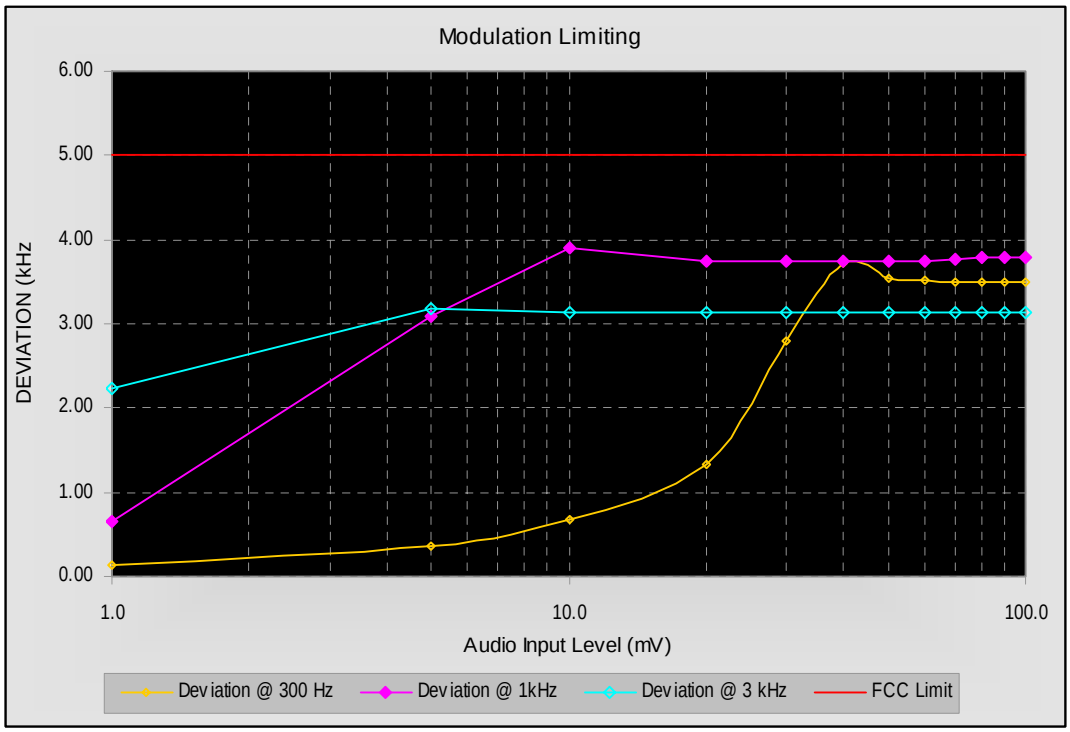
6.5 Test Result

Test Mode: Transmitting

6.5.1 Modulation Limit for HL – 1511 – VHF

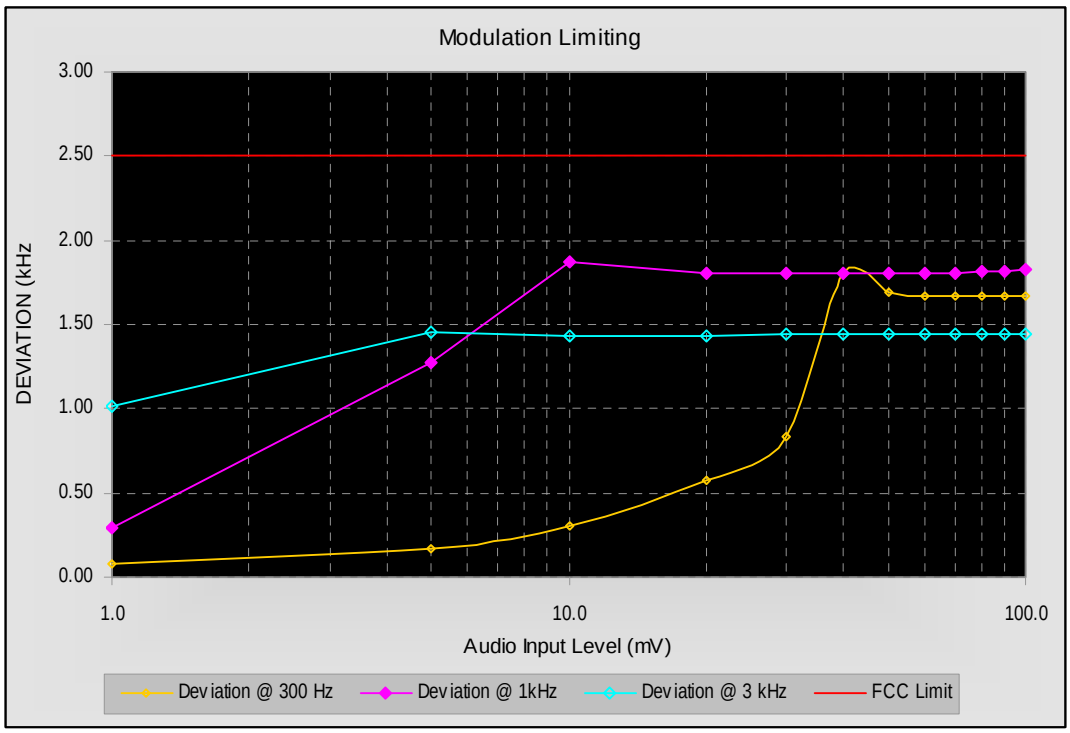
High Power

Channel Spacing 25 kHz



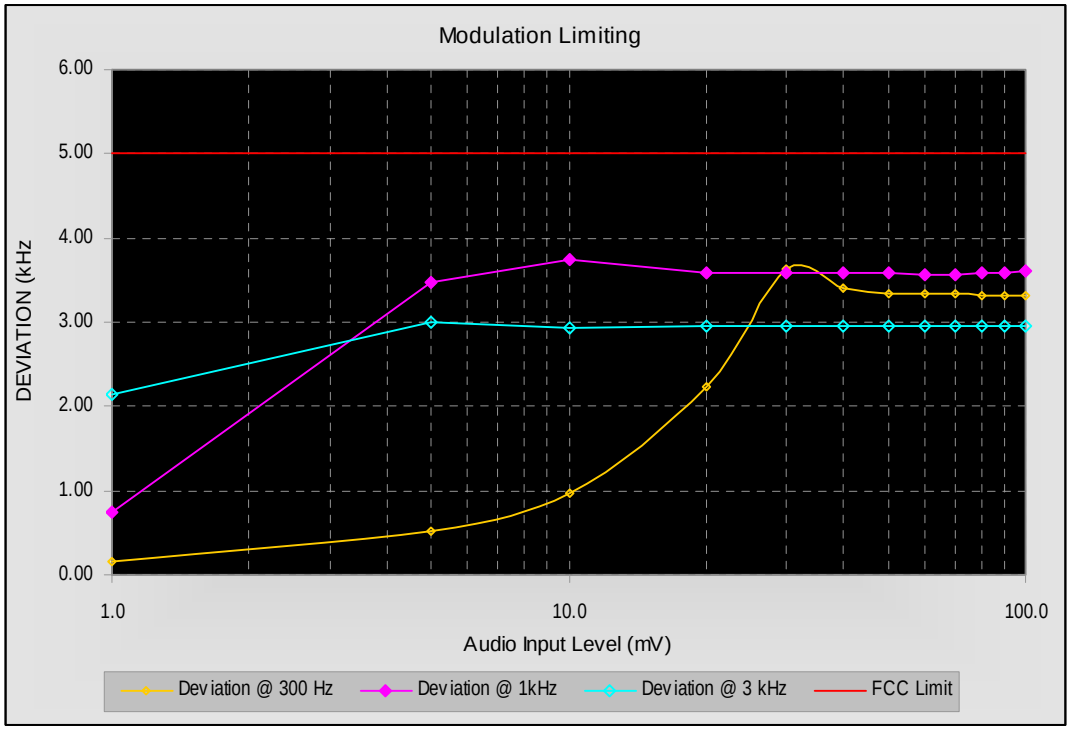
High Power

Channel Spacing 12.5 kHz



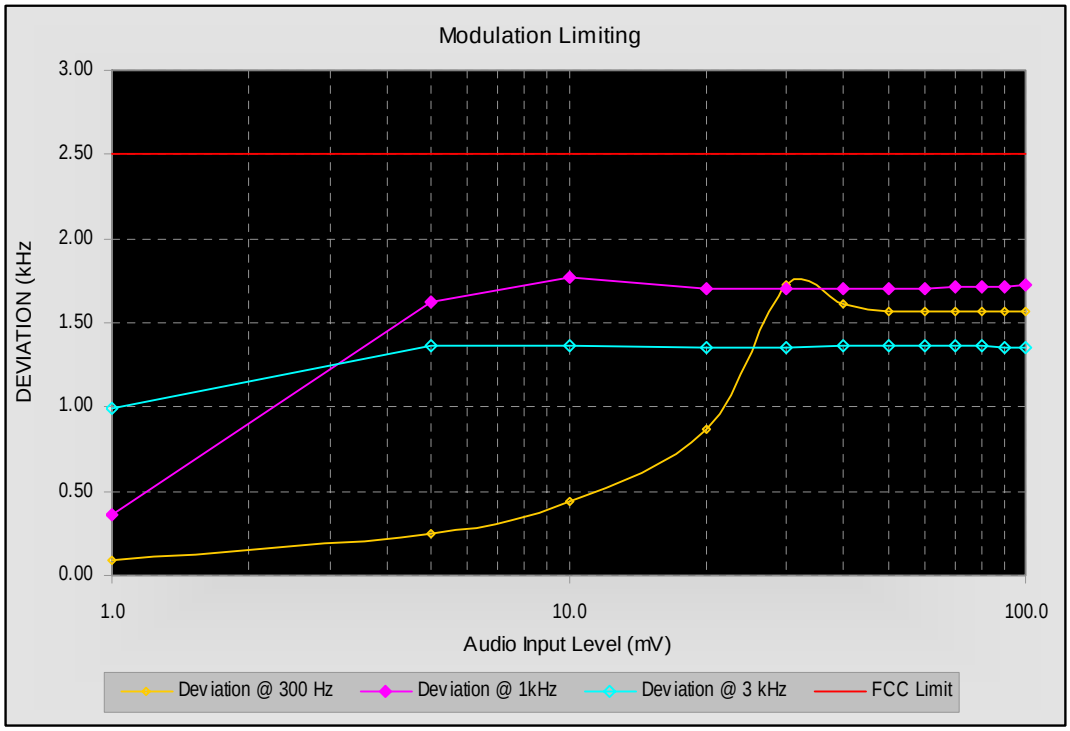
Low Power

Channel Spacing 25 kHz



Low Power

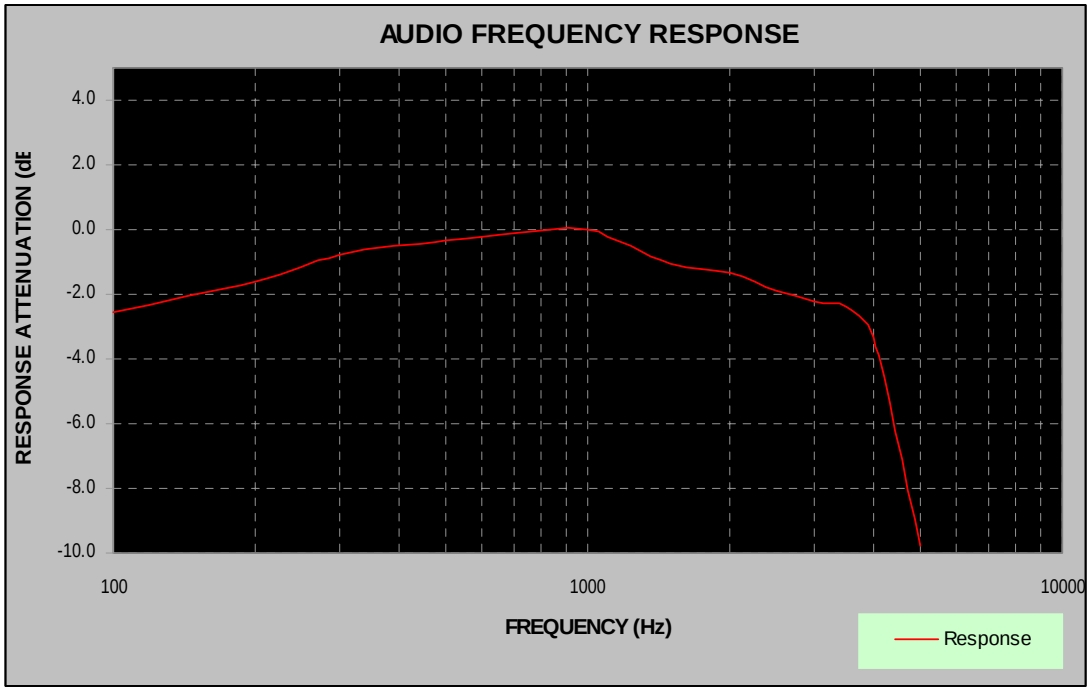
Channel Spacing 12.5 kHz



6.5.2 Audio Frequency Response for HL – 1511 – VHF

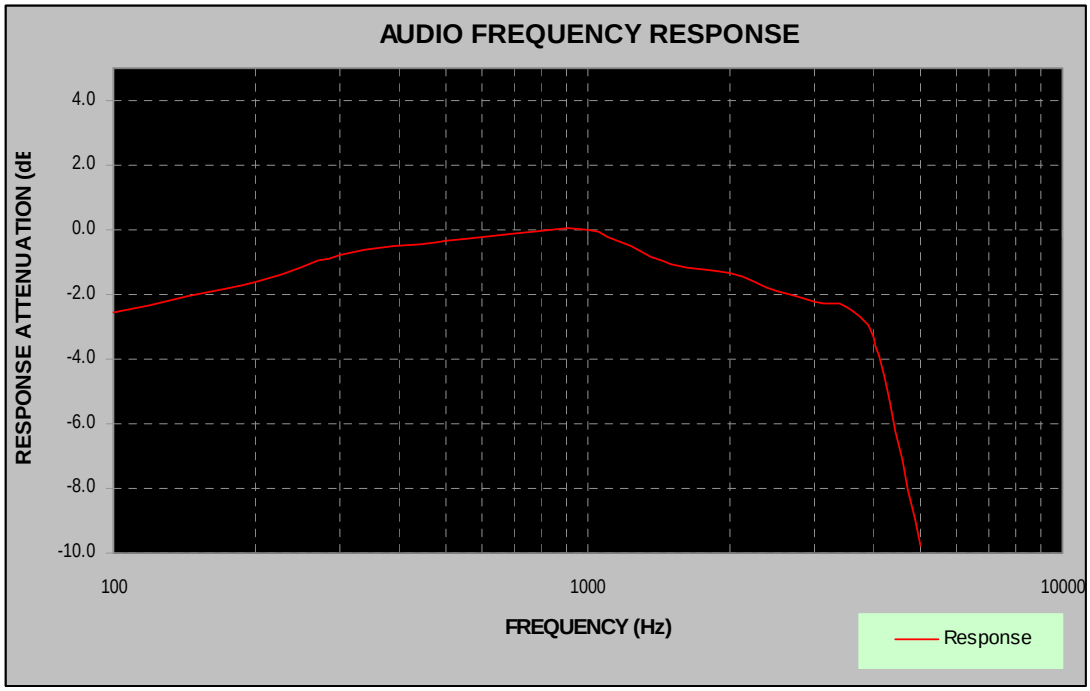
High Power

Channel Spacing 25 kHz



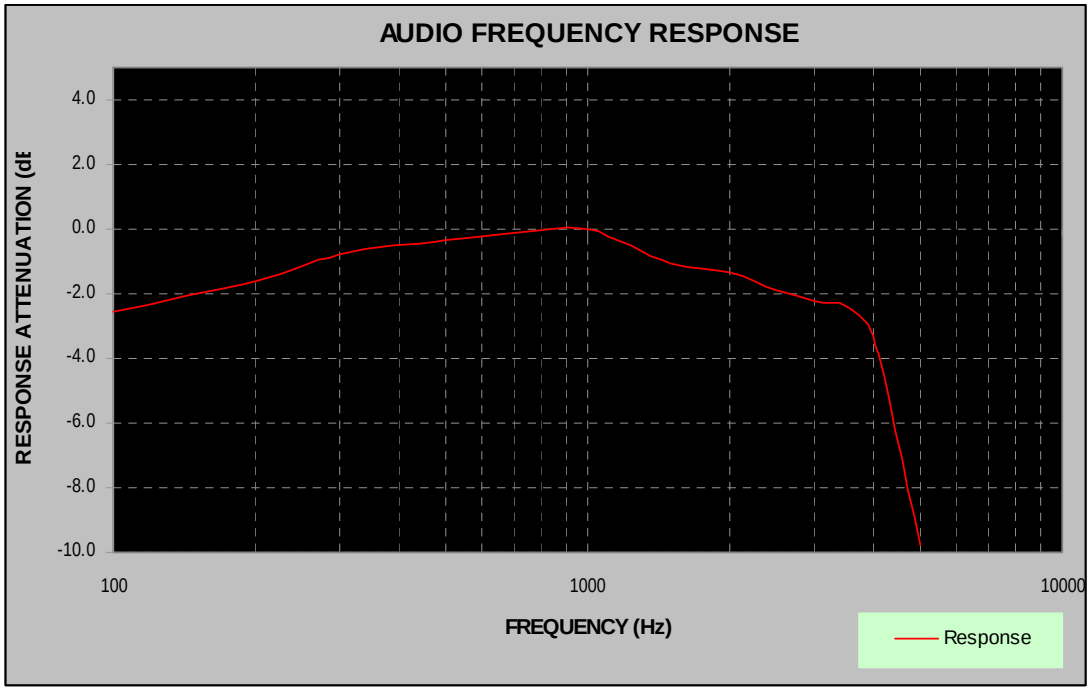
High Power

Channel Spacing 12.5 kHz



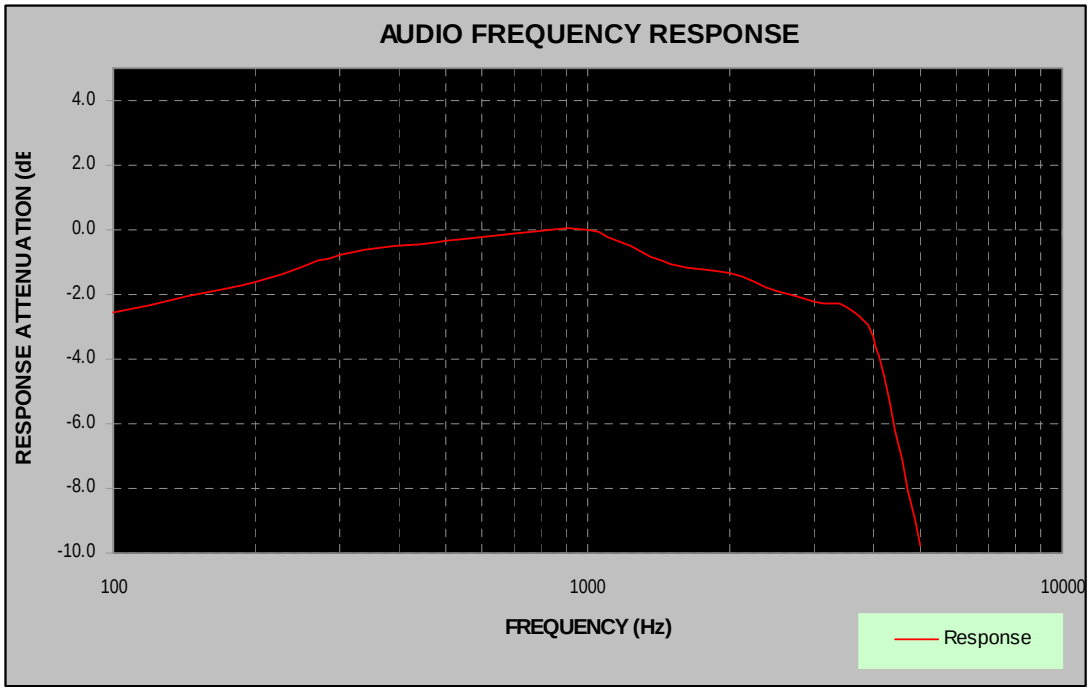
Low Power

Channel Spacing 25 kHz



Low Power

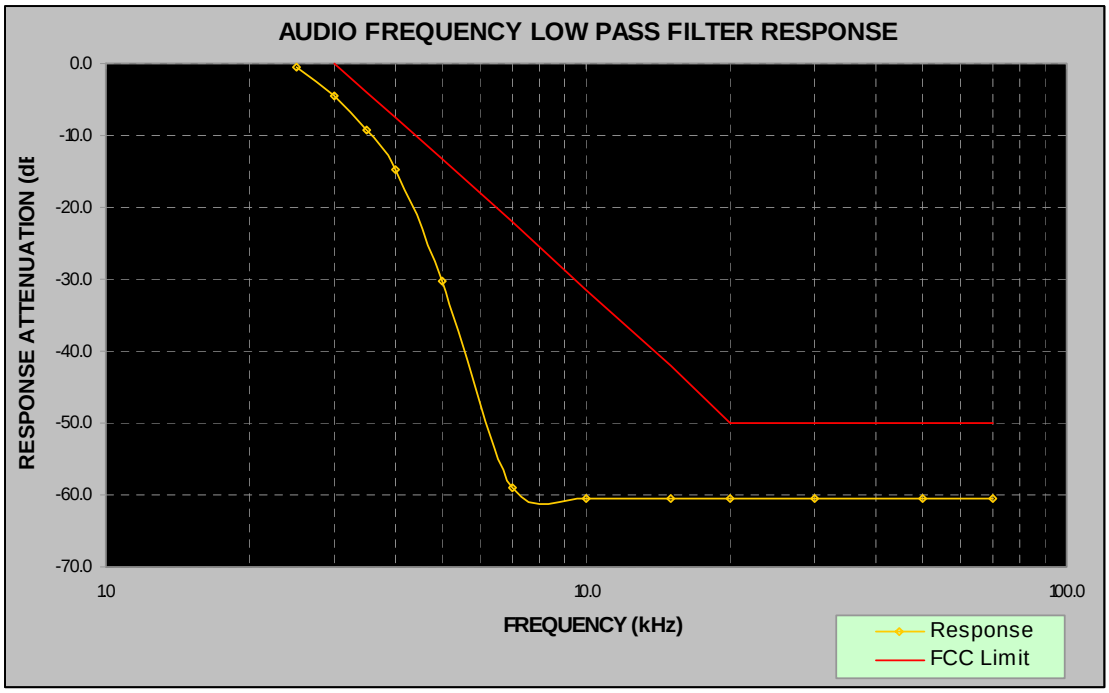
Channel Spacing 12.5 kHz



6.5.3 Audio Filter Response for HL – 1511 - VHF

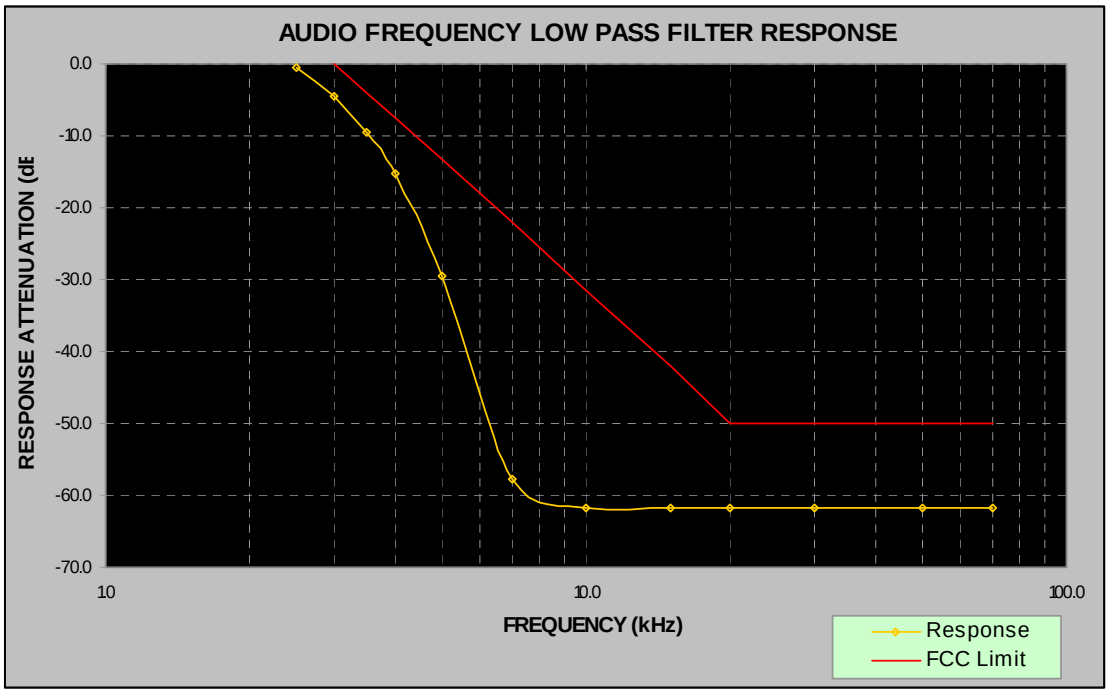
High Power

Channel Spacing 25 kHz



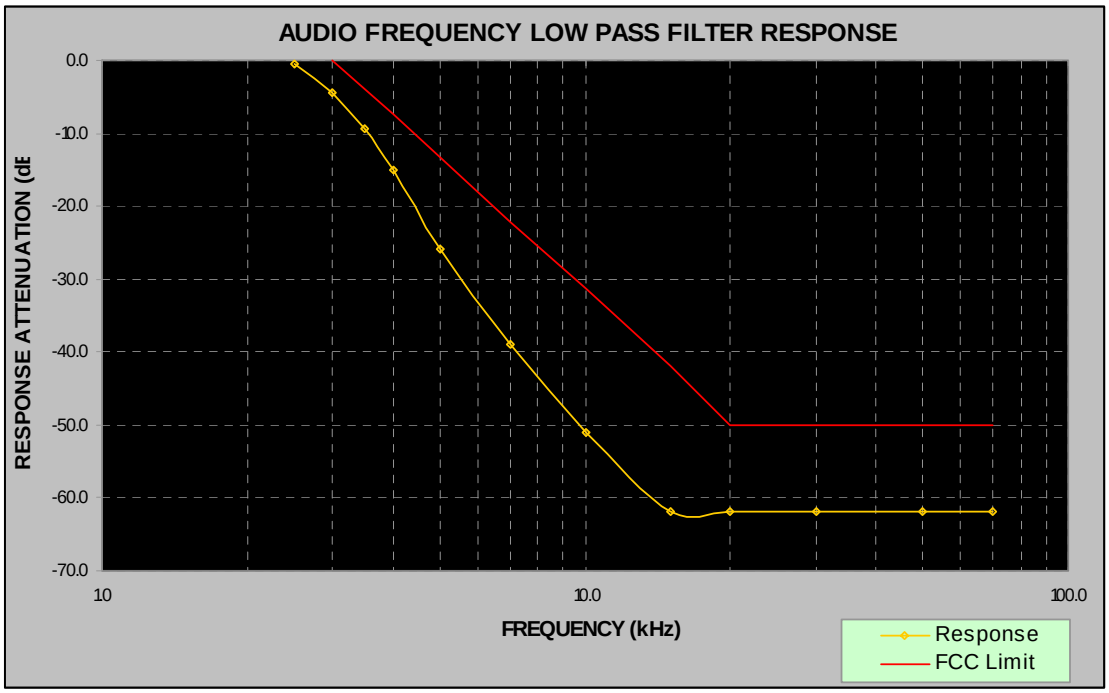
High Power

Channel Spacing 12.5 kHz



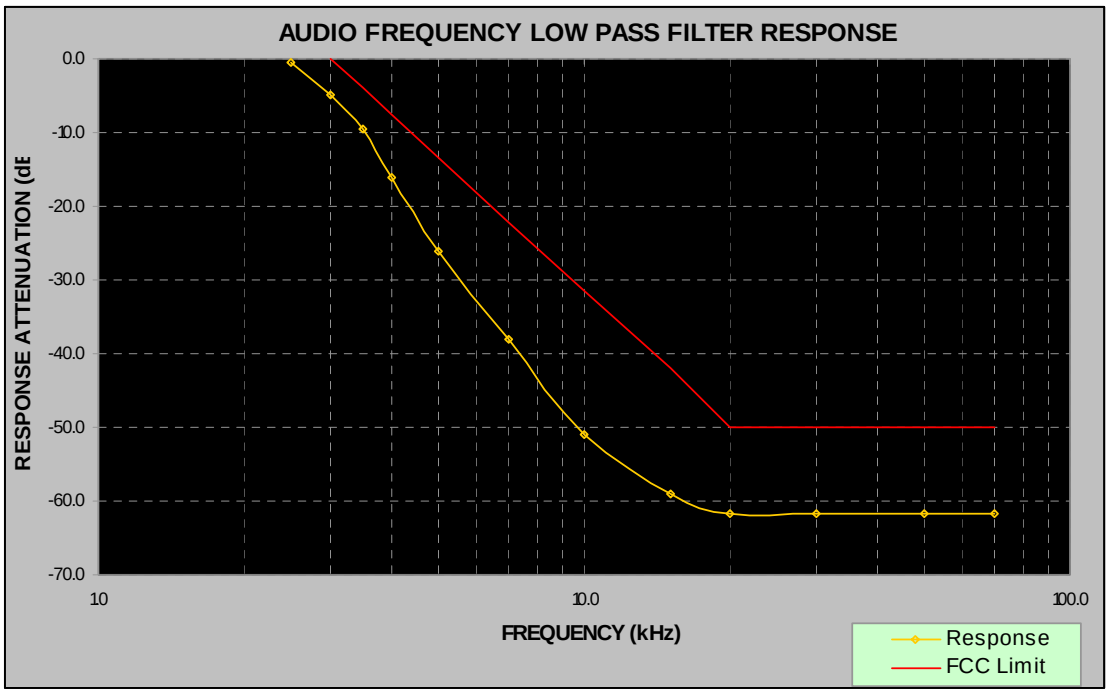
Low Power

Channel Spacing 25 kHz



Low Power

Channel Spacing 12.5 kHz



7 §2.1049, §22.359, §74.1236, and § 90.209/210– OCCUPIED BANDWIDTH & EMISSION MASK

7.1 Applicable Standard

§90.209

Operations using equipment using a 25 kHz bandwidth will be authorized a 20 kHz bandwidth. Operations using equipment designed to operate with a 12.5 kHz channel bandwidth will be authorized an 11.25 kHz bandwidth.

§2.1049, §90.210

Emission Mask D—12.5 kHz channel bandwidth equipment. For transmitters designed to operate with a 12.5 kHz channel bandwidth, any emission must be attenuated below the power (P) of the highest emission contained within the authorized bandwidth as follows:

1) For any frequency removed from the center of the authorized bandwidth f_0 to 5.625kHz removed from f_0, 0dB.

2) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 5.626kHz but no more than 12.5kHz, at least 7.27 (f_d –2.88kHz) dB.

3) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5kHz at least:

50+10logP=50+10log (P) or 70 dB, whichever is the lesser attenuation.

Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + log (P) dB.

The resolution bandwidth was 100Hz or greater for measuring up to 250kHz from the edge of the authorized frequency segment, and 30kHz or greater for measuring more than 250kHz from the authorized frequency segment.

7.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 100 Hz and the spectrum was recorded in the frequency band ±50 KHz from the carrier frequency.

7.3 Environmental Conditions

Temperature:	26 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by Victor Zhang on 2008-04-16.*

7.4 Test Equipment List and Details

Manufacturer	Equipment Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26
Rohde & Schwarz	Receiver, EMI Test	ESCS-30	100176	2007-11-29

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

7.5 Test Result

Emission Designator:

Channel Separation 12.5 kHz
Bn = 2M + 2DK
M = 3000 Hz; D = 2.5 kHz; K = 1
Bn = 2x3000 + 2x2500 = 11 k
Type of Emission: 11K0F3E; 11K0F3D

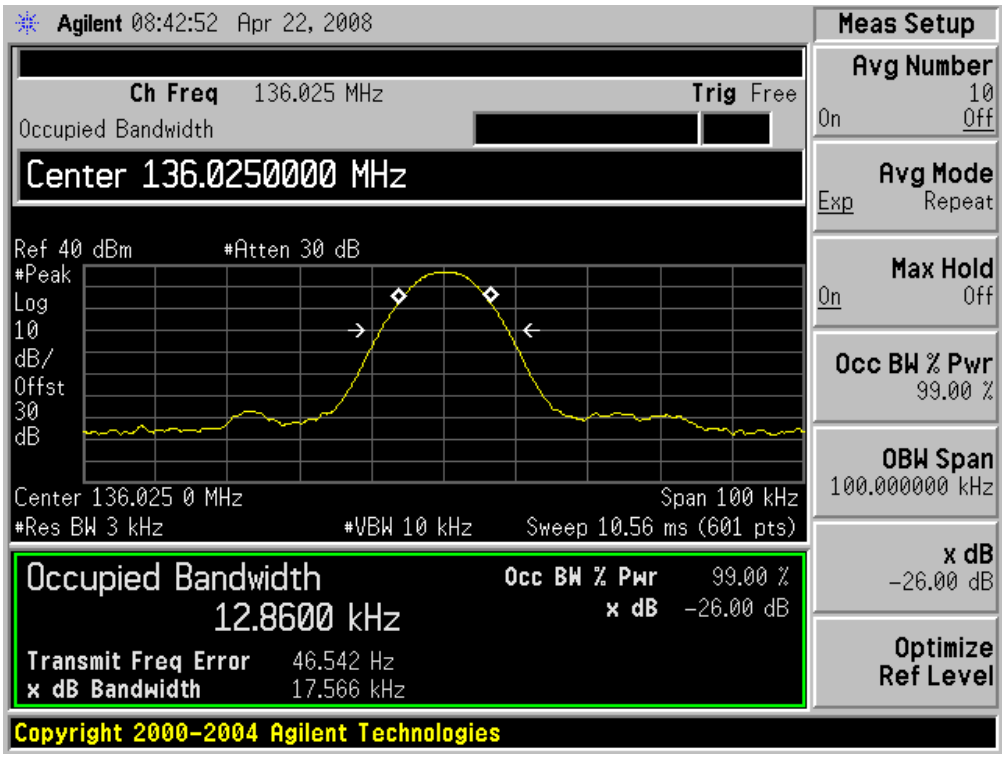
Channel Separation 25 kHz
Bn = 2M + 2DK
M = 3000 Hz; D = 5 kHz; K = 1
Bn = 2x3000 + 2x5000 = 16 k
Type of Emission: 16K0F3E; 11K0F3D

Please refer to the hereinafter plots.

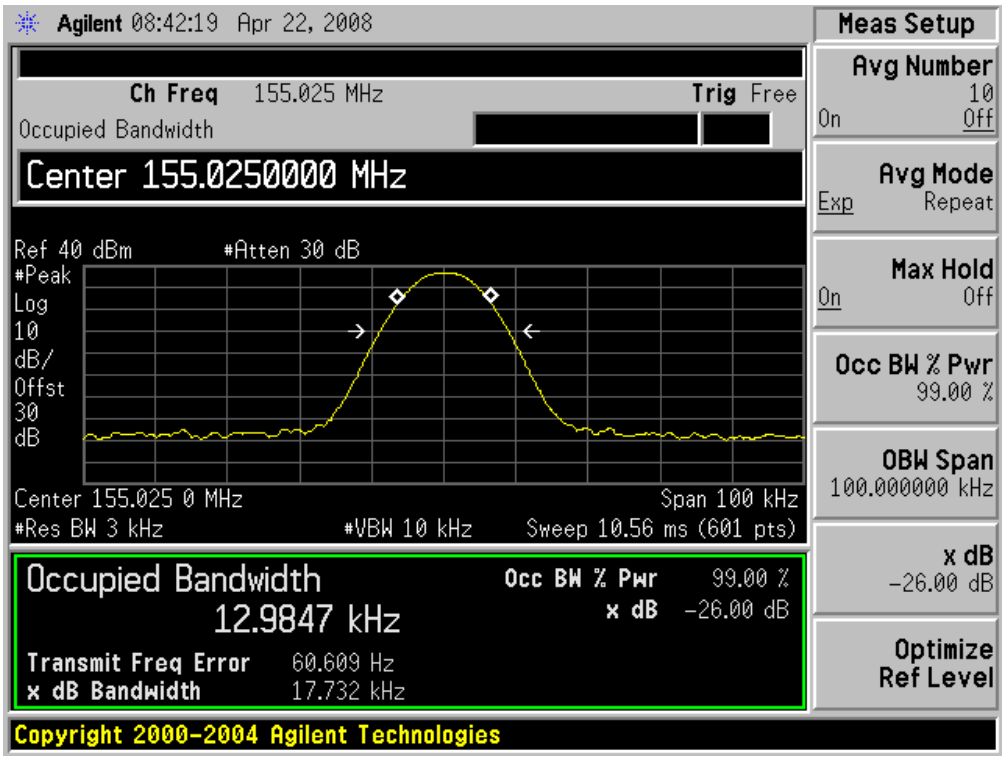
7.5.1 Occupied Bandwidth

High Power (25 kHz)

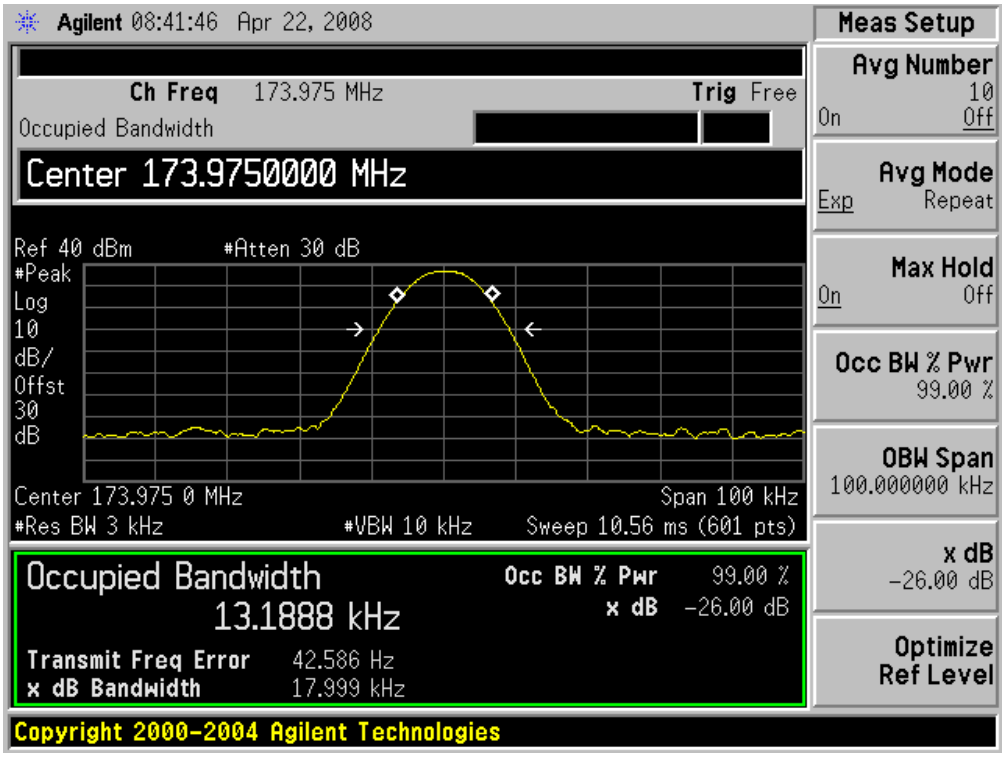
Low Channel



Middle Channel

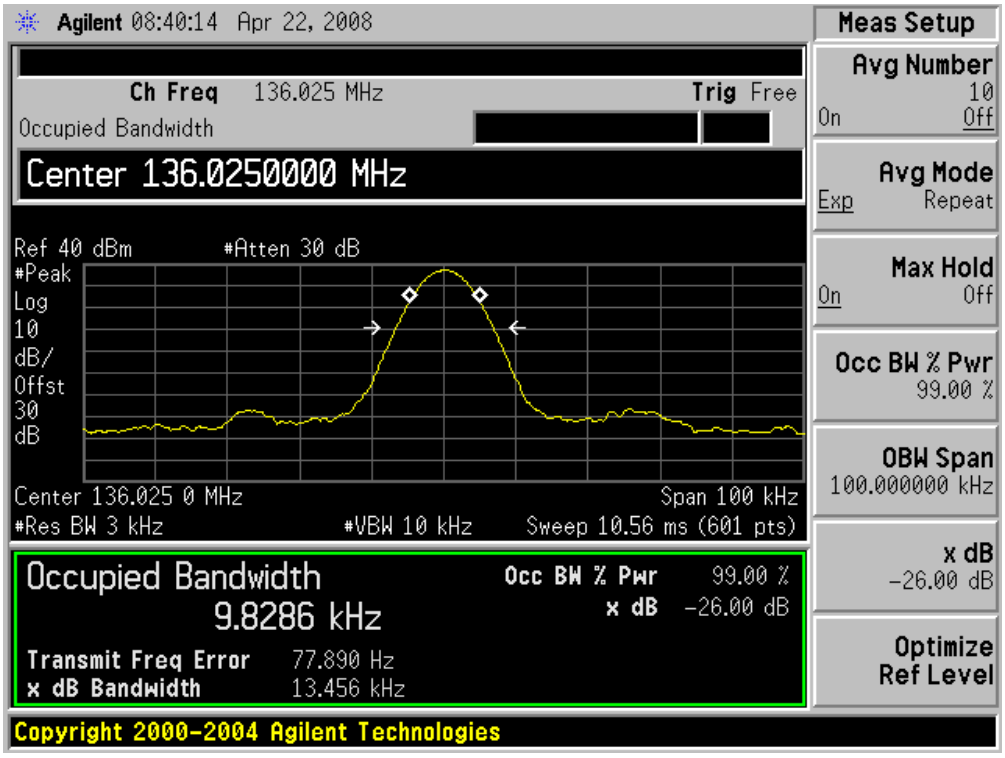


High Channel

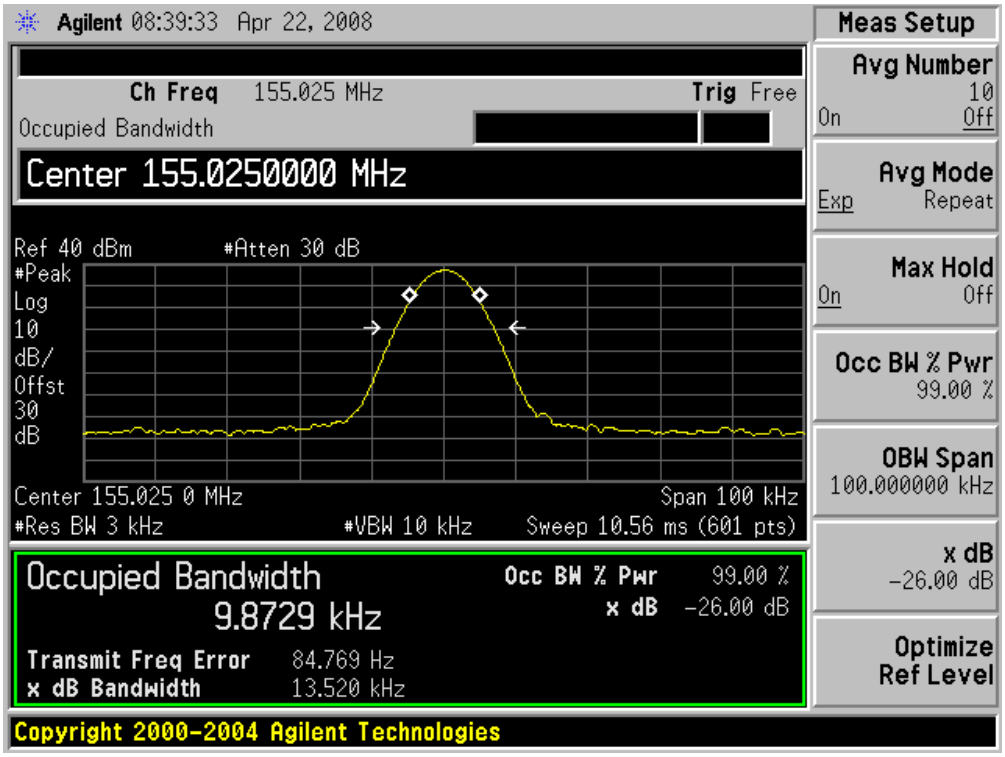


High Power (12.5 kHz)

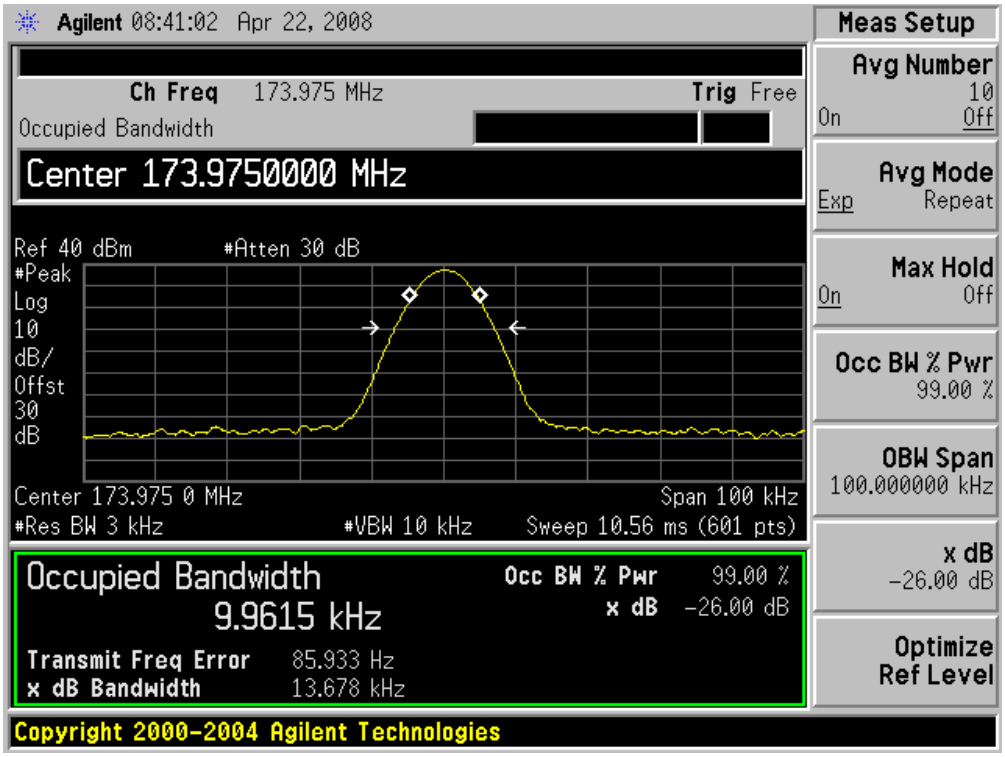
Low Channel



Middle Channel

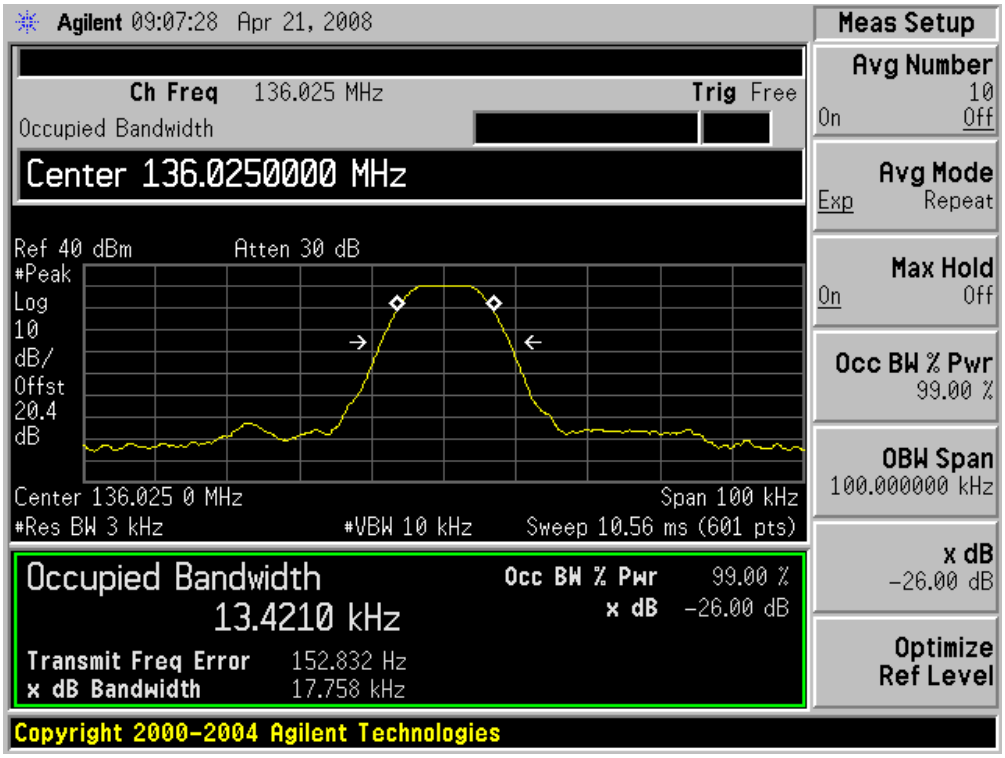


High Channel

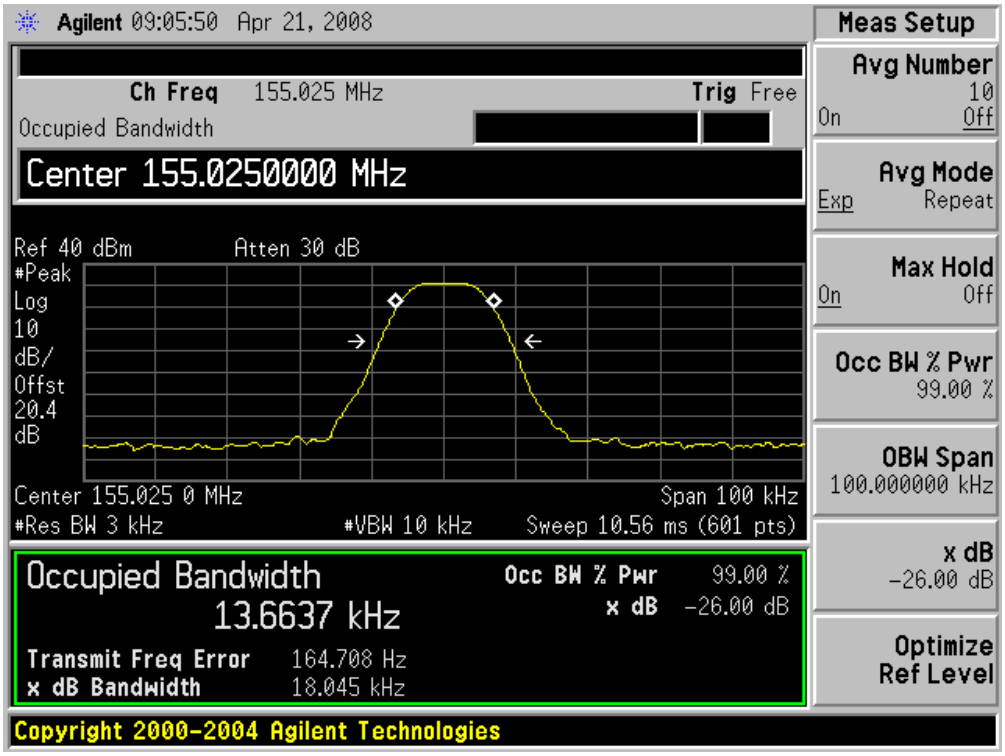


Low Power (25 kHz)

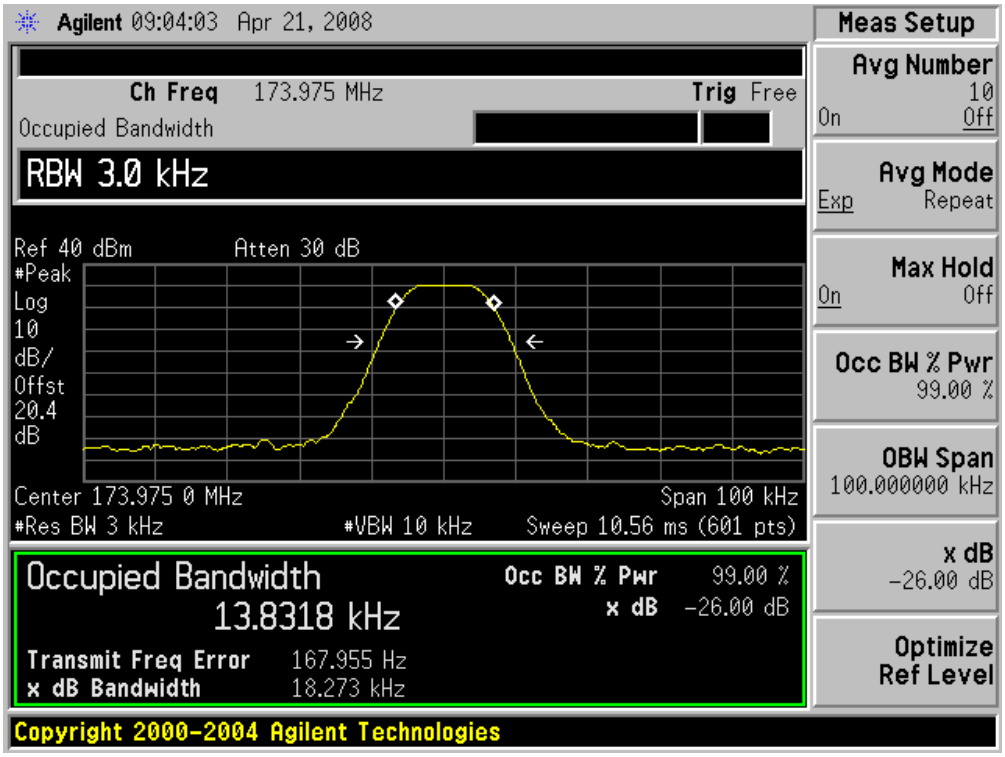
Low Channel



Middle Channel

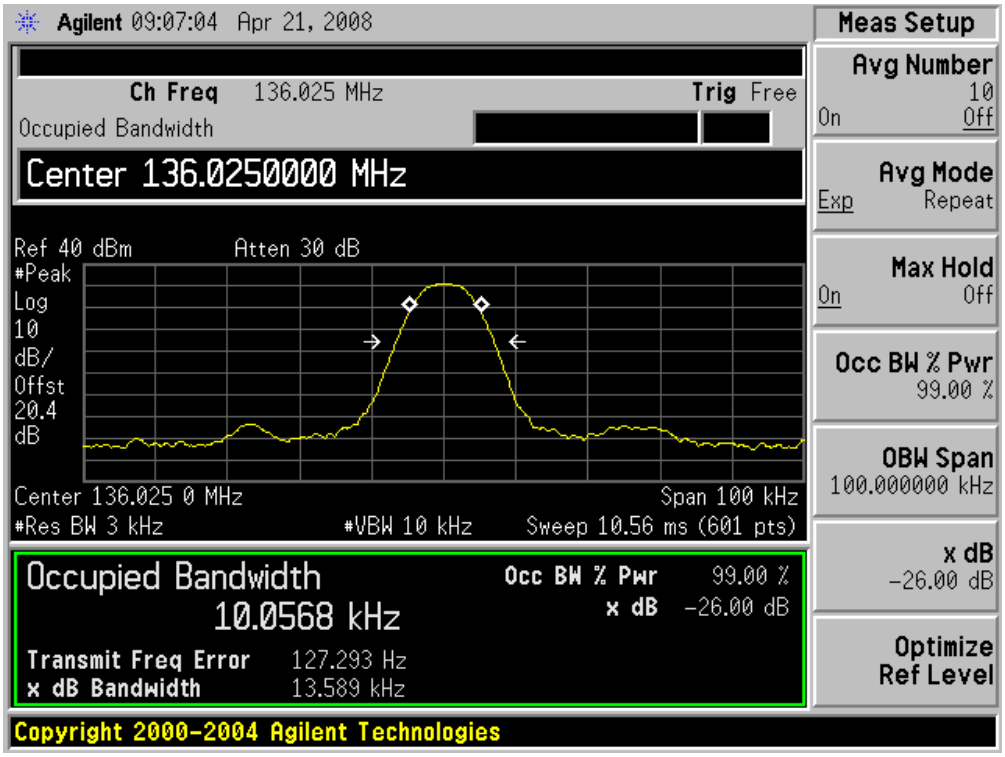


High Channel

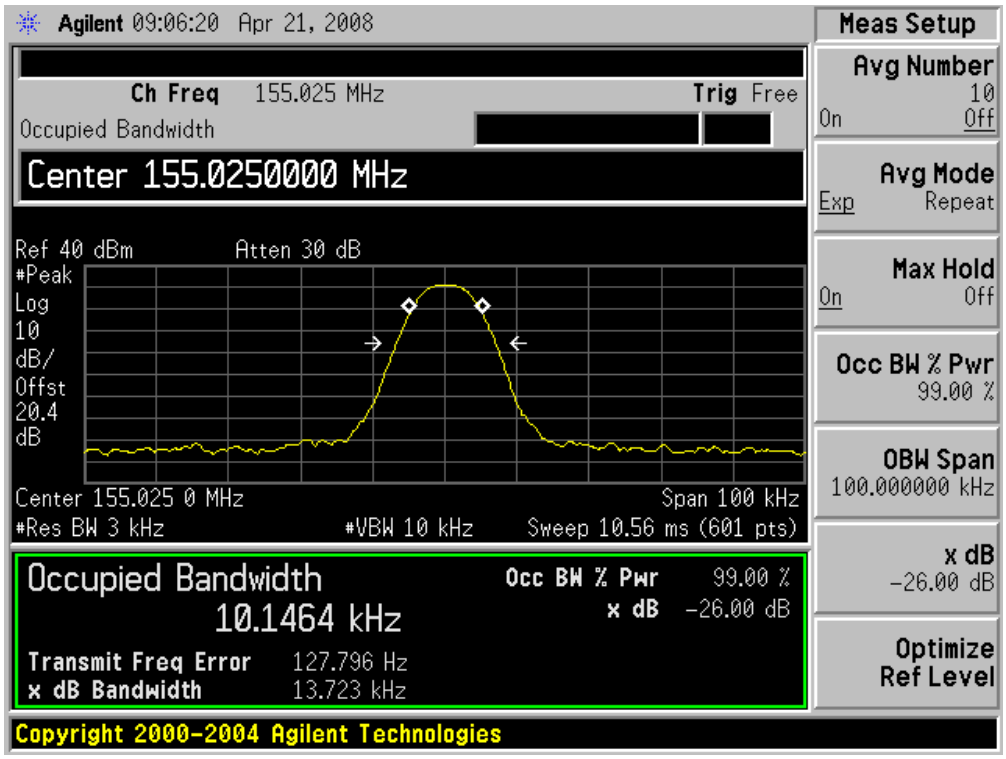


Low Power (12.5 kHz)

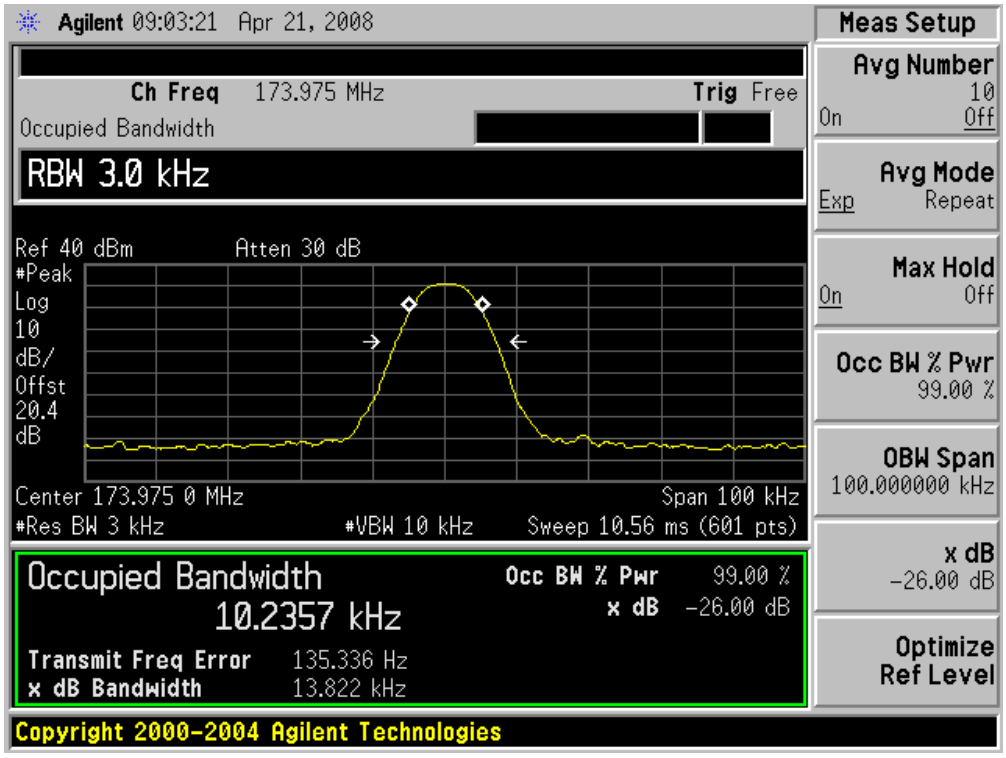
Low Channel



Middle Channel

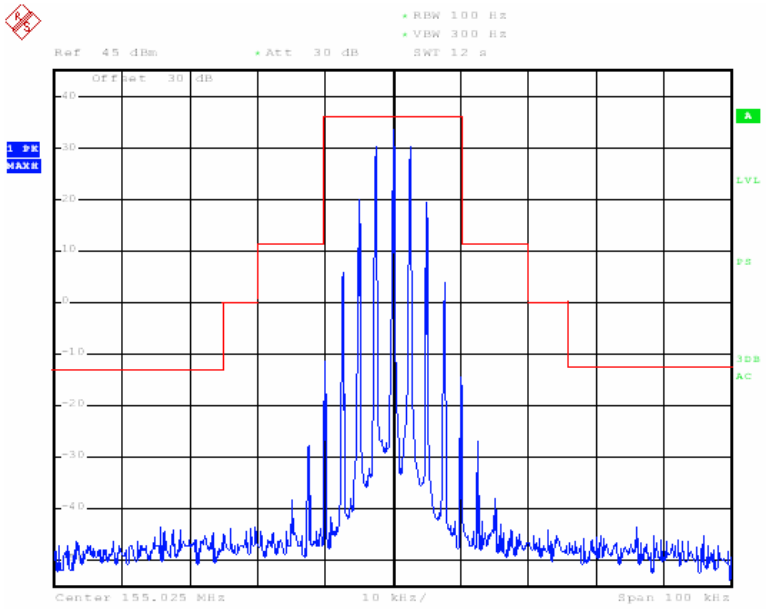


High Channel



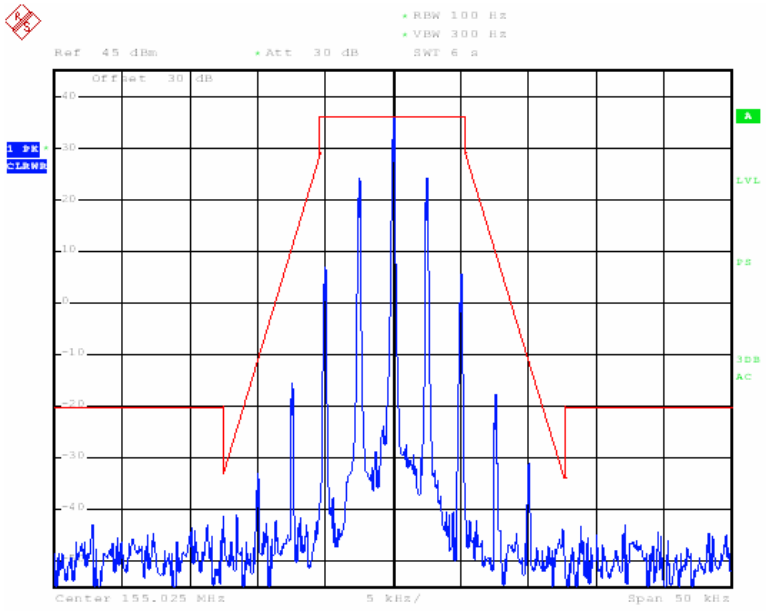
7.5.2 Emission Mask

High Power: Audio; 25 kHz Channel Spacing



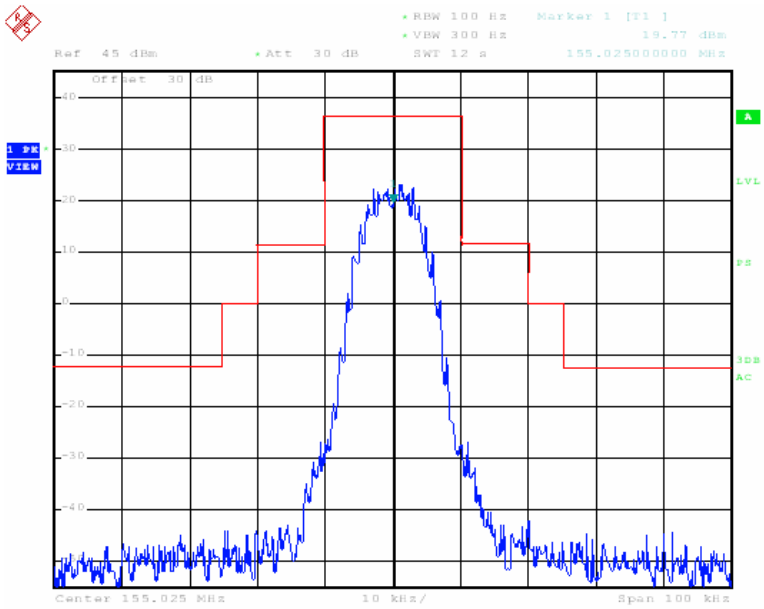
Date: 21.APR.2008 13:06:47

High Power: Audio; 12.5 kHz Channel Spacing



Date: 21.APR.2008 13:05:45

High Power: Data; 25 kHz Channel Spacing



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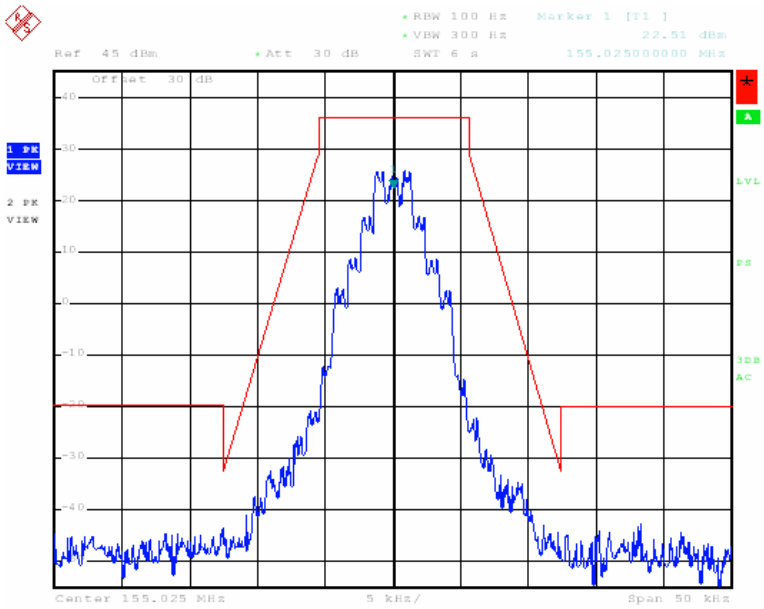
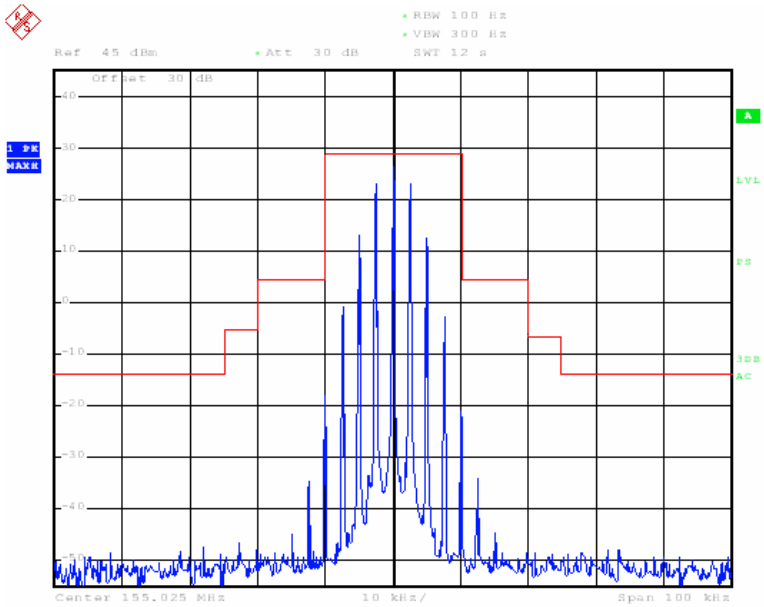
High Power: Data; 12.5 kHz Channel Spacing



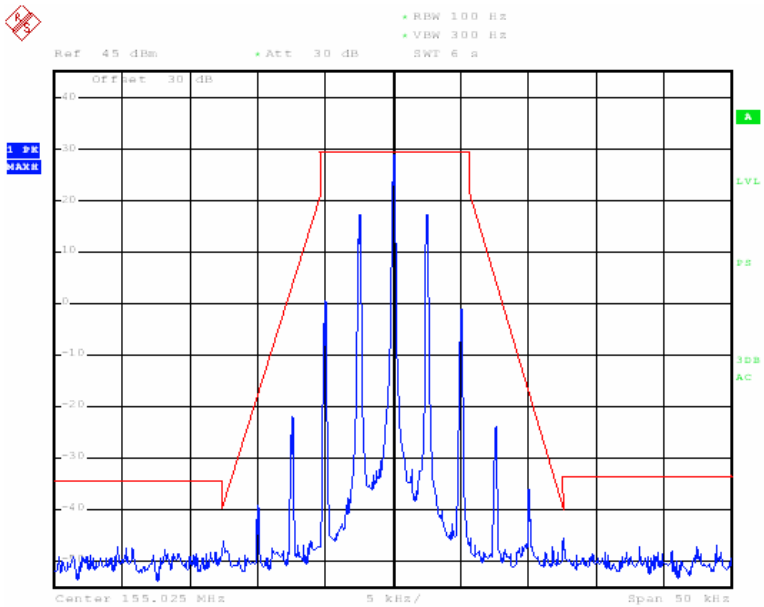
Date: 21.APR.2008 13:12:53

Low Power: Audio; 25 kHz Channel Spacing



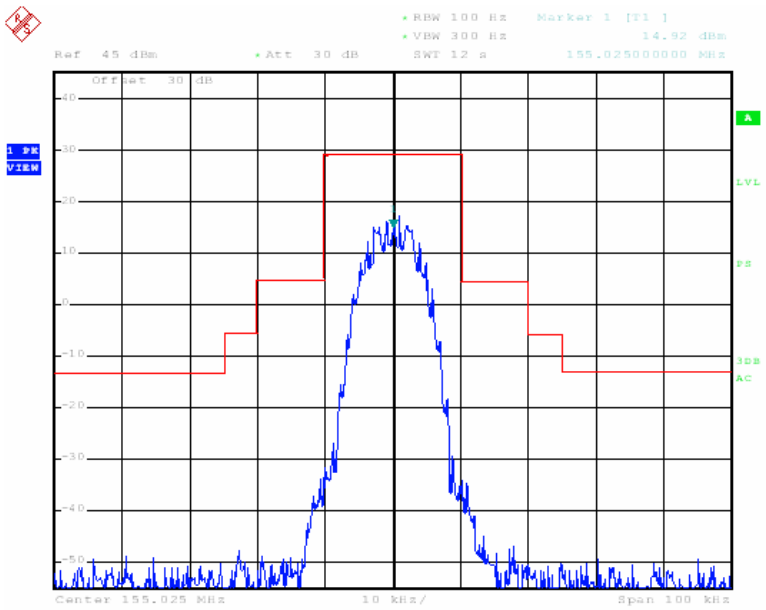
Date: 21.APR.2008 11:55:28

Low Power: Audio; 12.5 kHz Channel Spacing



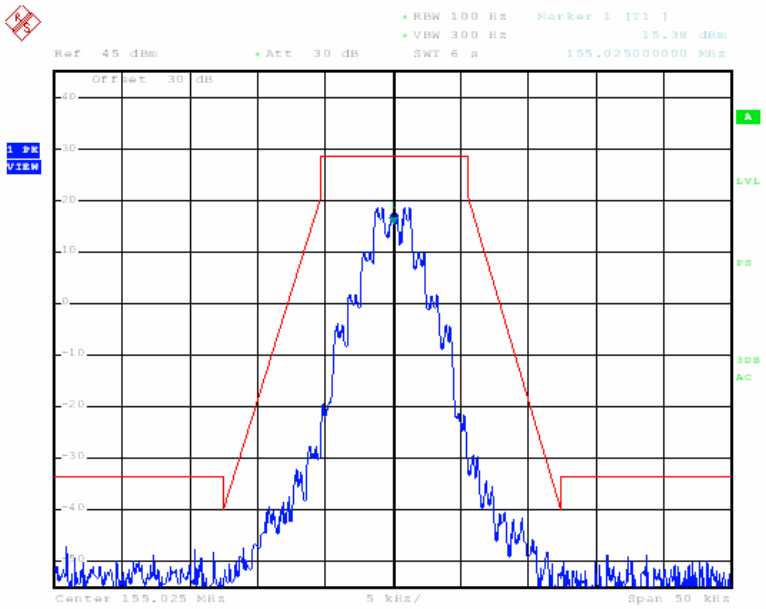
Date: 21.APR.2008 11:53:35

Low Power: Data; 25 kHz Channel Spacing



Date: 21.APR.2008 13:17:54

Low Power: Data; 12.5 kHz Channel Spacing



Date: 21.APR.2008 13:16:51

8 §2.1051 and §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

8.1 Applicable Standard

§90.210 (12.5 kHz bandwidth only)

On any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) of more than 12.5kHz at least:

50+10logP or 70 dB

§2.1051and §90.210 (25 kHz bandwidth and 20 kHz bandwith)

On any frequency removed from the center of the assigned channel by more than 250 percent at least:

43+10log (P)

8.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

8.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by Victor Zhang on 2008-04-21.*

8.4 Test Equipment List and Details

Manufacturer	Equipment Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

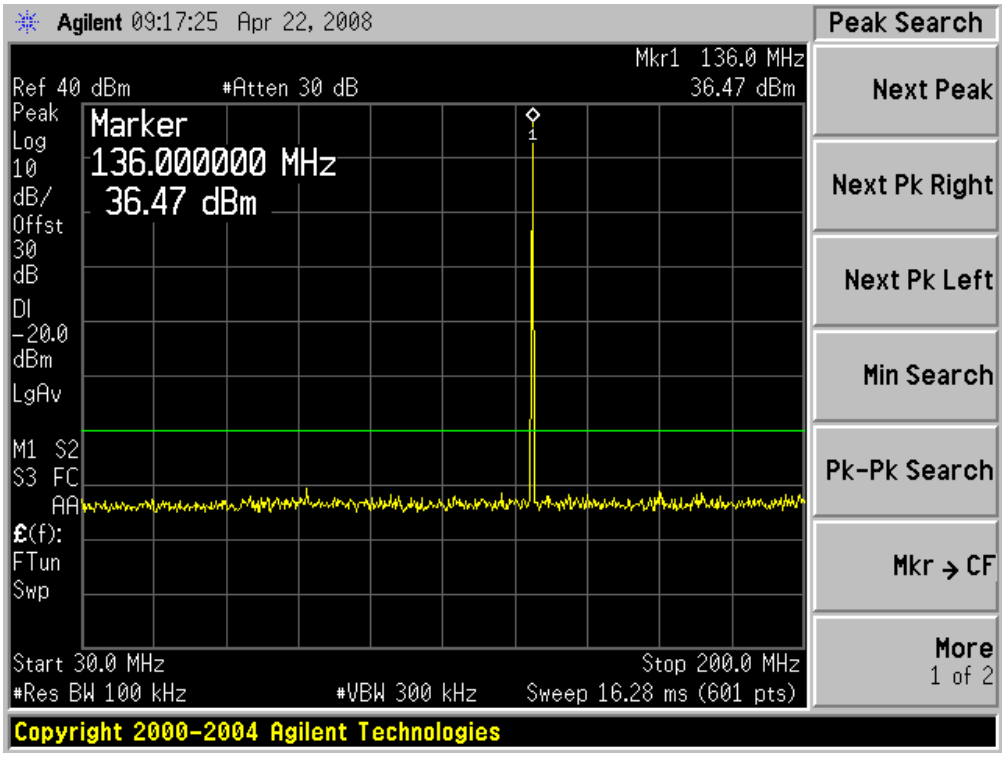
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

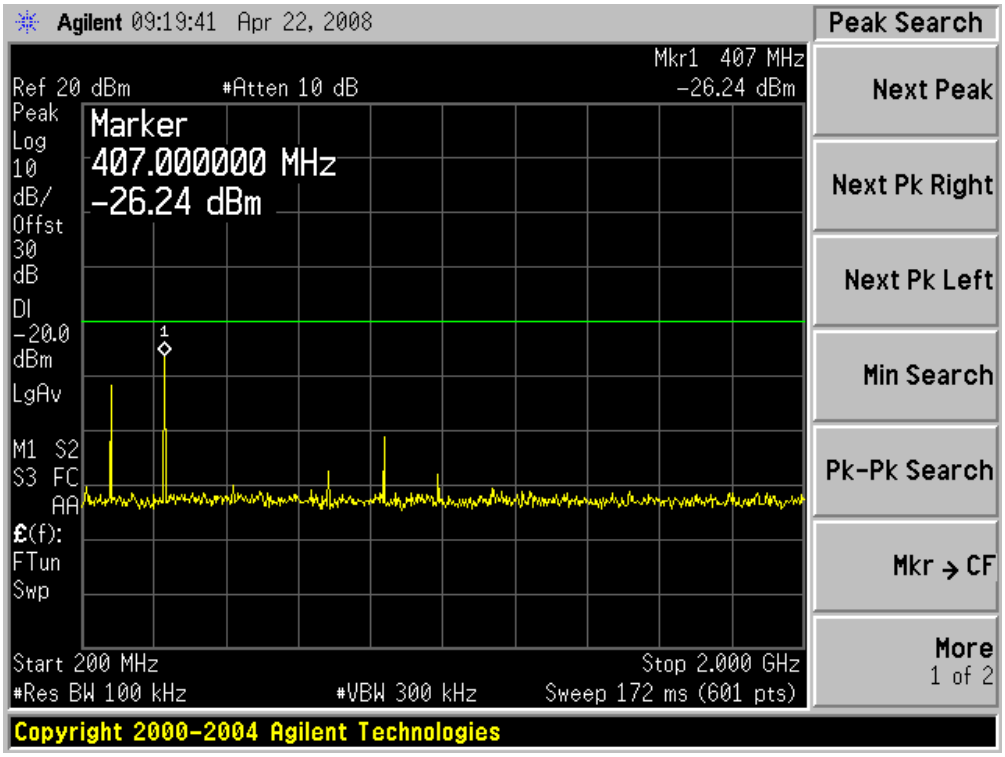
8.5 Test Results

Test Mode: Transmitting Using Conducted measuring method

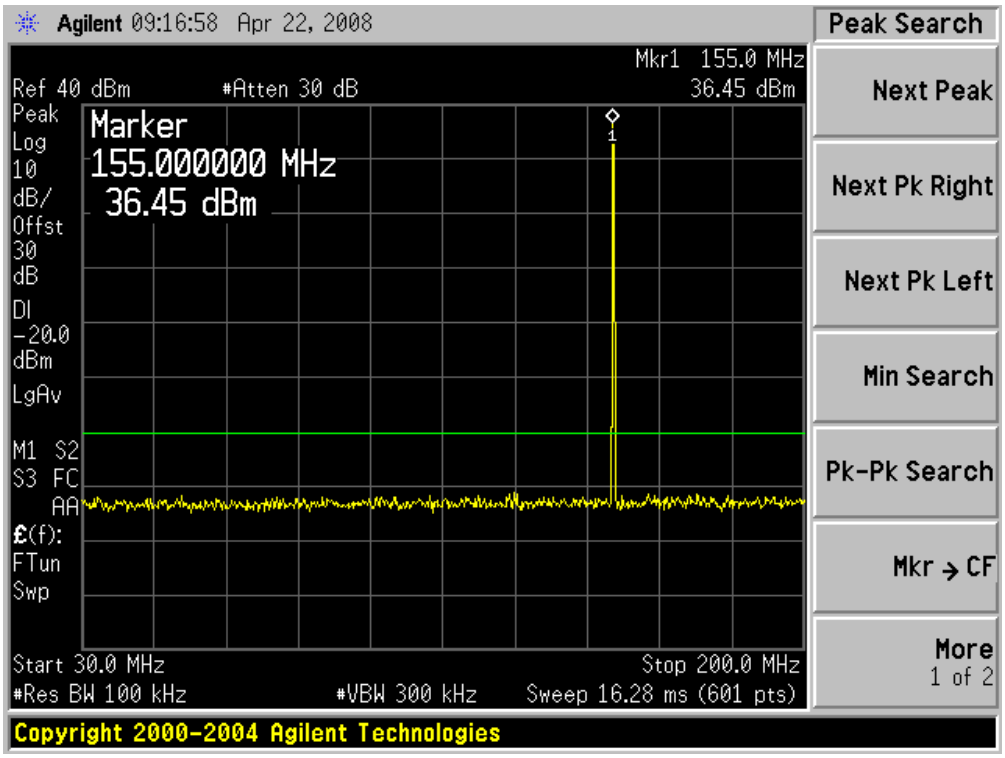
8.5.1 VHF 12.5 kHz Channel Bandwidth, High Power

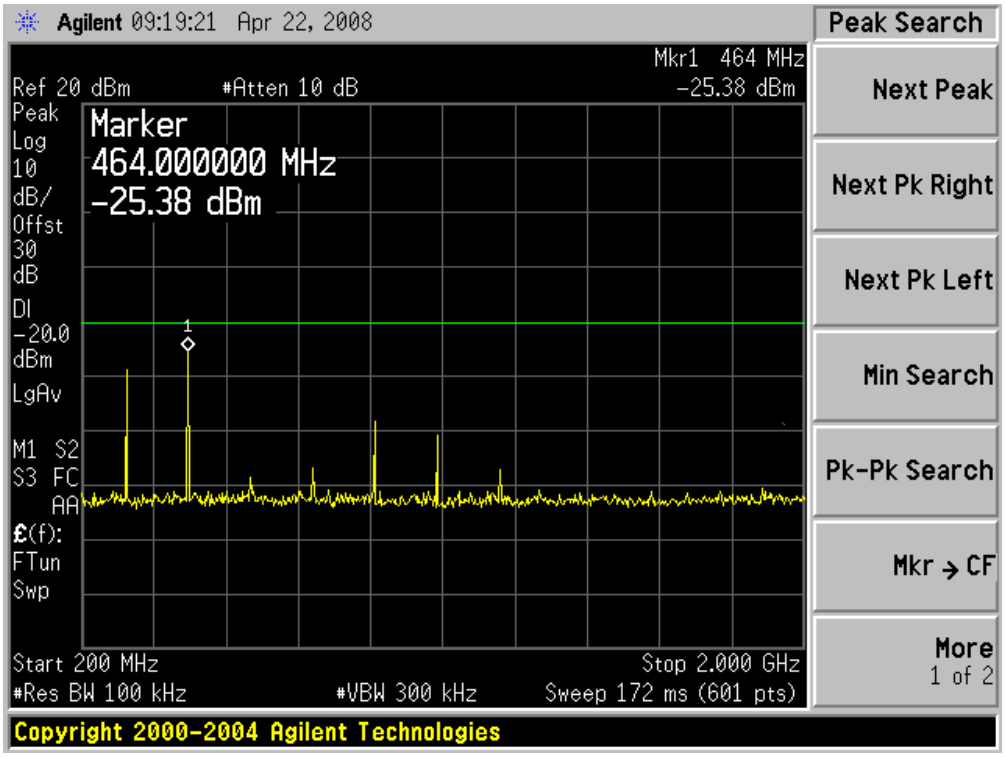
Low Channel



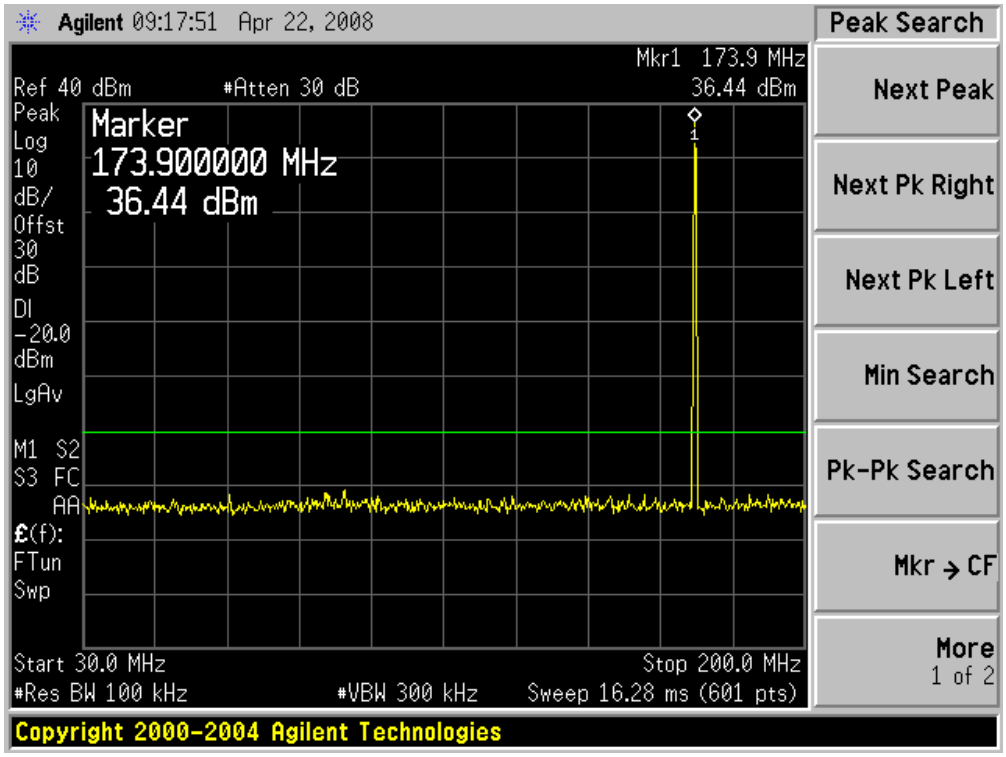


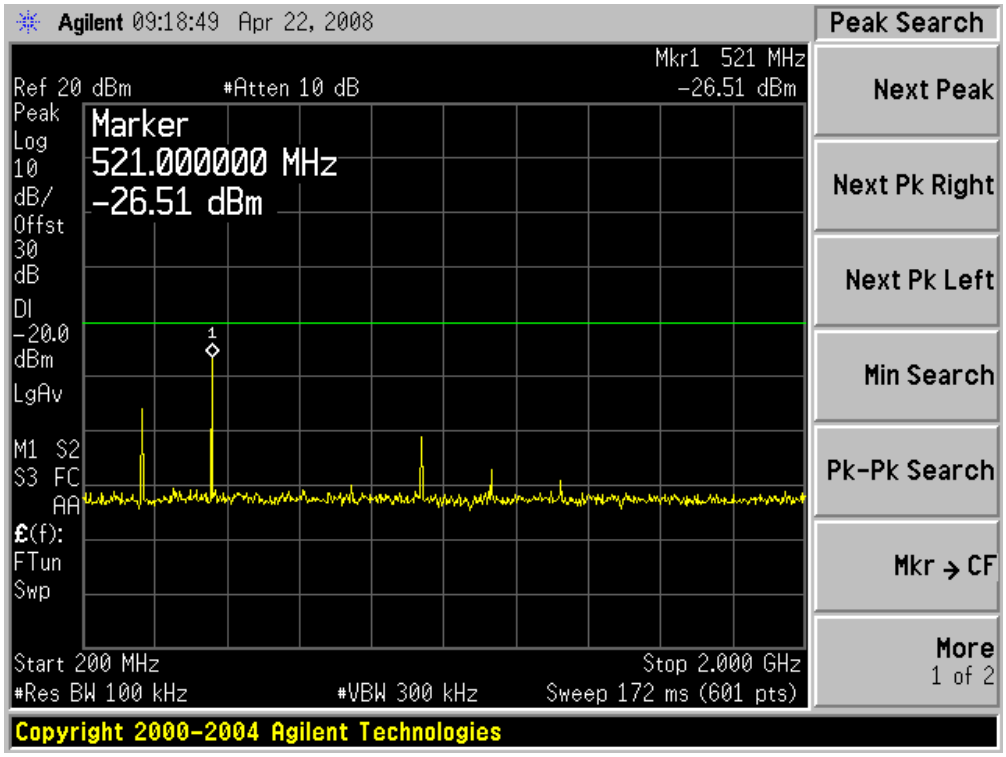
Middle Channel





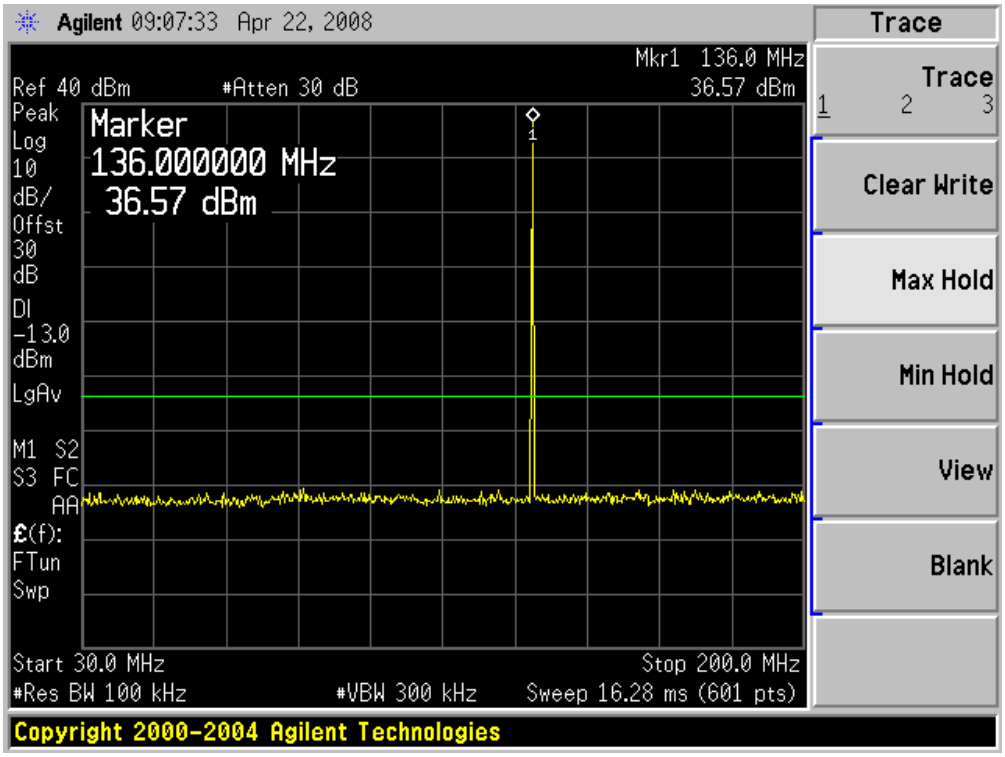
High Channel

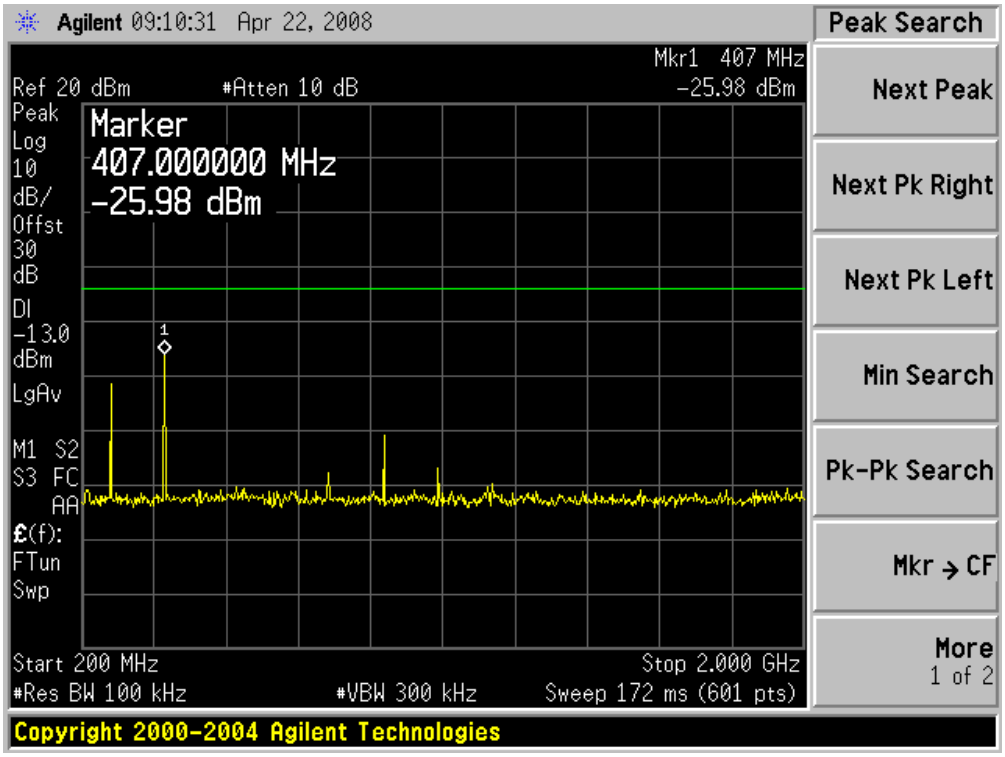




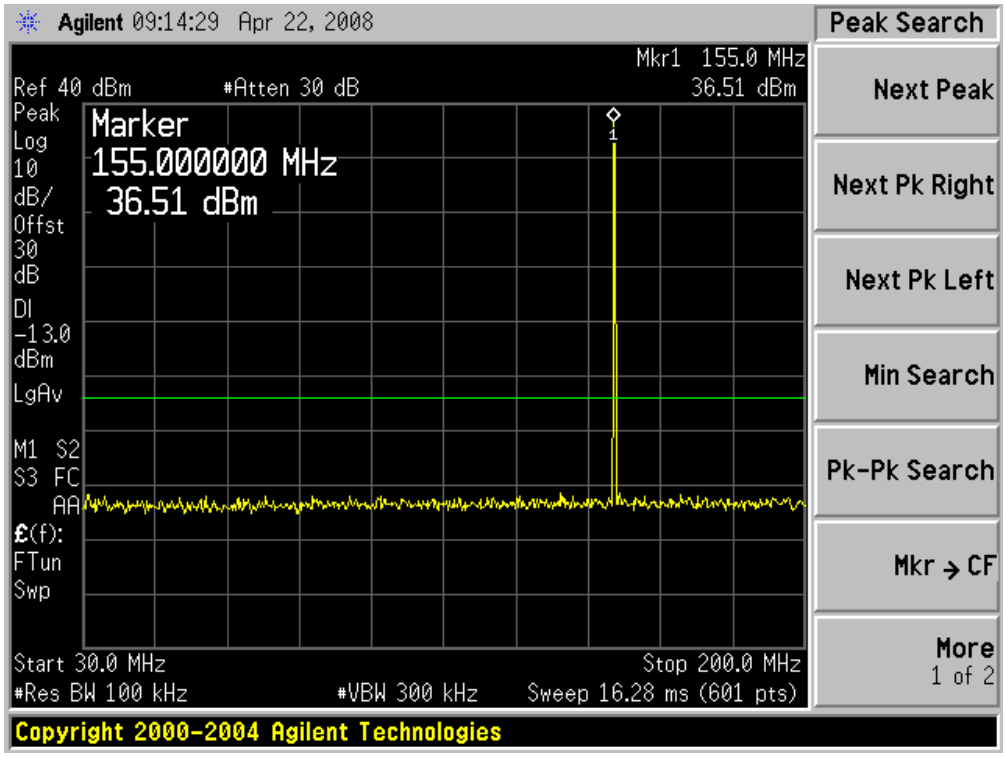
8.5.2 VHF 25 kHz Channel Bandwidth, High Power

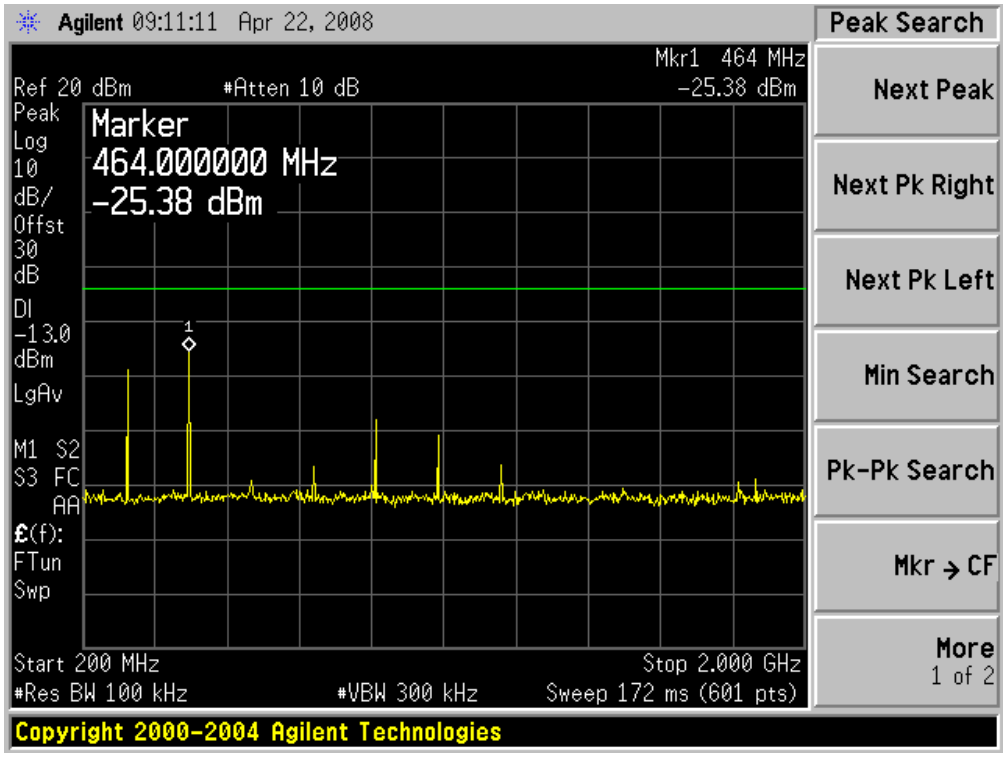
Low Channel



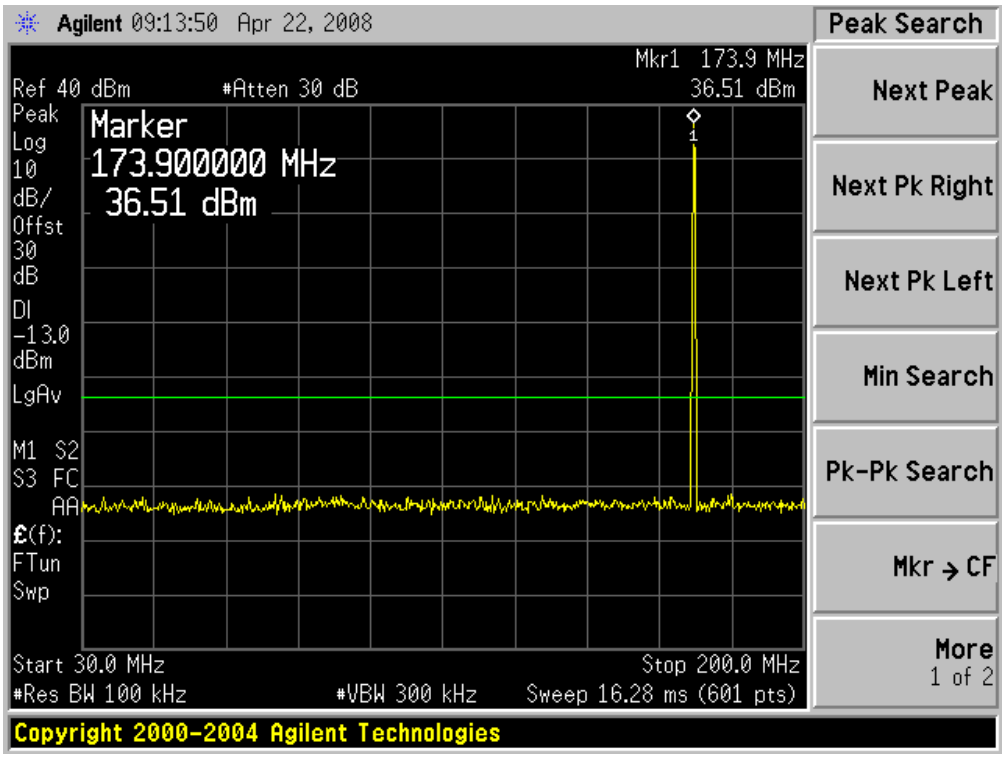


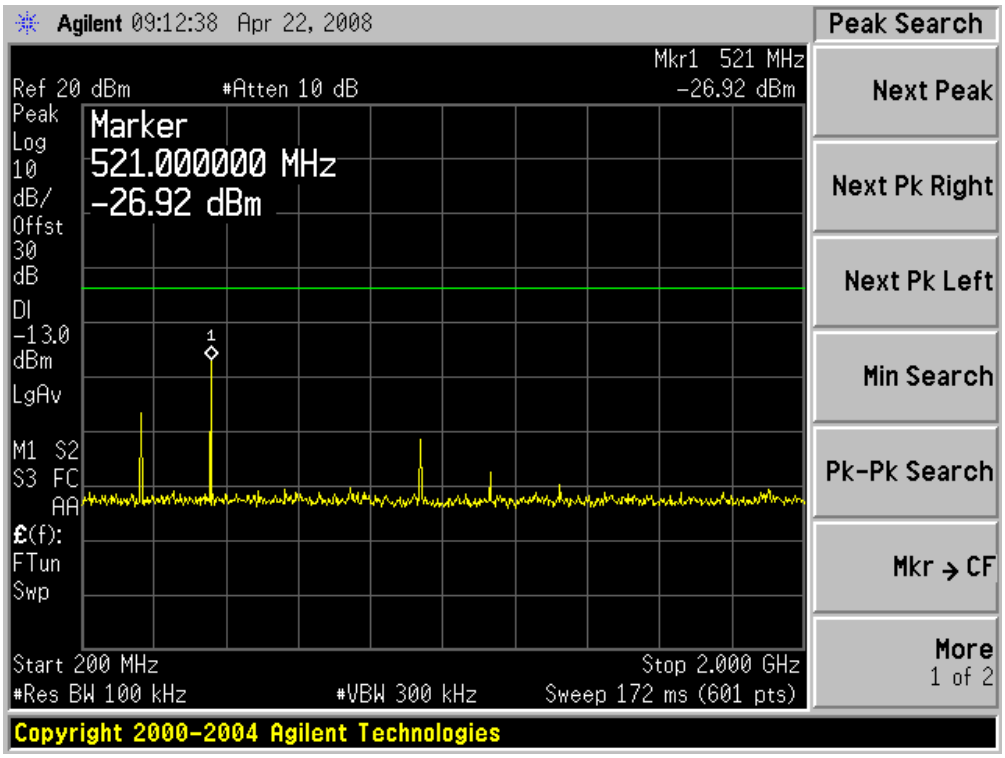
Middle Channel





High Channel





9 §2.1055 (d), §22.355, §74.1261 (b) and §90.213- FREQUENCY STABILITY

9.1 Applicable Standard

§2.1055 (d)

§90.213
For output power > 2 watts, the limit is 5.0 ppm.

9.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to the Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the Spectrum Analyzer.

Frequency Stability vs. Voltage: An external variable DC power supply Source. The voltage was set to 110% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the end point. The output frequency was recorded for each voltage.

9.3 Environmental Conditions

Temperature:	26 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by Victor Zhang on 2008-04-22.*

9.4 Test Equipment List and Details

Manufacturer	Equipment Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26
ESPEC	Oven, Temperature	ESL-4CA	018010	2007-12-12

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

9.5 Test Result

Test Mode: Transmitting

9.5.1 VHF Band 12.5 kHz

Frequency vs. Temperature

Test Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)
Voltage (Vdc)	Temperature (^{o}C)				
7.4	55	155.025	155.0256	3.870343493	5.00
7.4	40	155.025	155.0253	1.935171746	5.00
7.4	30	155.025	155.0253	1.935171746	5.00
7.4	10	155.025	155.0251	0.645057249	5.00
7.4	0	155.025	155.0249	-0.645057249	5.00
7.4	-10	155.025	155.0244	-3.870343493	5.00
7.4	-20	155.025	155.0244	-3.870343493	5.00

Frequency vs. Voltage

Test Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)
Voltage (Vdc)	Temperature (^{o}C)				
8.14	20	155.025	155.0252	1.290114498	5.00
6.66	20	155.025	155.0246	-2.580228995	5.00

9.5.2 VHF Band 25 kHz

Frequency vs. Temperature

Test Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)
Voltage (Vdc)	Temperature (^{o}C)				
7.4	55	155.025	155.0256	3.870343493	5.00
7.4	40	155.025	155.0256	3.870343493	5.00
7.4	30	155.025	155.0256	3.870343493	5.00
7.4	10	155.025	155.0253	1.935171746	5.00
7.4	0	155.025	155.0252	1.290114498	5.00
7.4	-10	155.025	155.0246	-2.580228995	5.00
7.4	-20	155.025	155.0246	-2.580228995	5.00

Frequency vs. Voltage

Test Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (ppm)	Limit (ppm)
Voltage (Vdc)	Temperature (^{o}C)				
8.14	20	155.025	155.0251	0.645057249	5.00
6.66	20	155.025	155.0243	-4.515400742	5.00

10 §2.1053 and §90.210 (b), (d) - FIELD STRENGTH OF SPURIOUS RADIATION, EMISSION MASKS

10.1 Applicable Standard

§2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. and §90.210(b),(d): Except as indicated elsewhere in this part, transmitters used in the radio services governed by this part must comply with the emission masks outlined in this section. Unless otherwise stated, per paragraphs (d)(4), (e)(4), and (m) of this section, measurements of emission power can be expressed in either peak or average values provided that emission powers are expressed with the same parameters used to specify the unmodulated transmitter carrier power. For transmitters that do not produce a full power unmodulated carrier, reference to the unmodulated transmitter carrier power refers to the total power contained in the channel bandwidth. Unless indicated elsewhere in this part, the table in this section specifies the emission masks for equipment operating in the frequency bands governed under this part.

10.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

10.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by Victor Zhang on 2008-04-17.*

10.4 Test Equipment

Manufacturer	Equipment Description	Model	Serial Number	Calibration Date
HP	Generator, Signal	83650B	3614A00276	2007-05-08
Com-Power	Antenna, Loop Active	AL-130	17043	2006-03-14
Agilent	Amplifier, Pre	8449B	3008A01978	2007-06-27
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

10.5 Test Result

-15.7 dB at **310.0483 MHz** for VHF in the **Vertical** polarization

Test Mode: Transmission Using substitution measuring method

Indicated		Azimuth degrees	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Freq. (MHz)	Amp. (dBuV)		Height (m)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Antenna Correction (dBi)	Cable Loss (dB)	Absolute Level (dBm)		
465.072	50.33	83	1.07	H	465.072	-28.3	0.5	0.25	-28.55	-13	-15.55
310.0483	50.67	300	1.80	V	310.0483	-28.5	0.4	0.20	-28.7	-13	-15.70
465.076	47.5	166	1.44	V	465.076	-31.2	0.5	0.25	-31.45	-13	-18.45
930.150	37.5	215	2.29	V	930.15	-32.0	0.7	0.39	-32.31	-13	-19.31
930.152	38.17	257	2.40	H	930.152	-33.0	0.7	0.39	-33.31	-13	-20.31
310.052	49	108	2.92	H	310.052	-37.5	0.4	0.2	-37.7	-13	-24.70

11 §90.214 - TRANSIENT FREQUENCY BEHAVIOR

11.1 Applicable Standard

§90.214: Transmitters designed to operate in the 150–174 MHz and 421–512 MHz frequency bands must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

Time intervals[1,2]	Maximum frequency difference[3]	All equipment
		150 to 174 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels		
t_1[4]	±25.0 kHz	5.0 ms
t_2	±12.5 kHz	20.0 ms
t_3[4]	±25.0 kHz	5.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels		
t_1[4]	±12.5 kHz	5.0 ms
t_2	±6.25 kHz	20.0 ms
t_3[4]	±12.5 kHz	5.0 ms

11.2 Test Procedure

TIA/EIA-603-C 2.2.19

11.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	32 %
ATM Pressure:	100.9 kPa

** The testing was performed by Victor Zhang on 2008-04-21.*

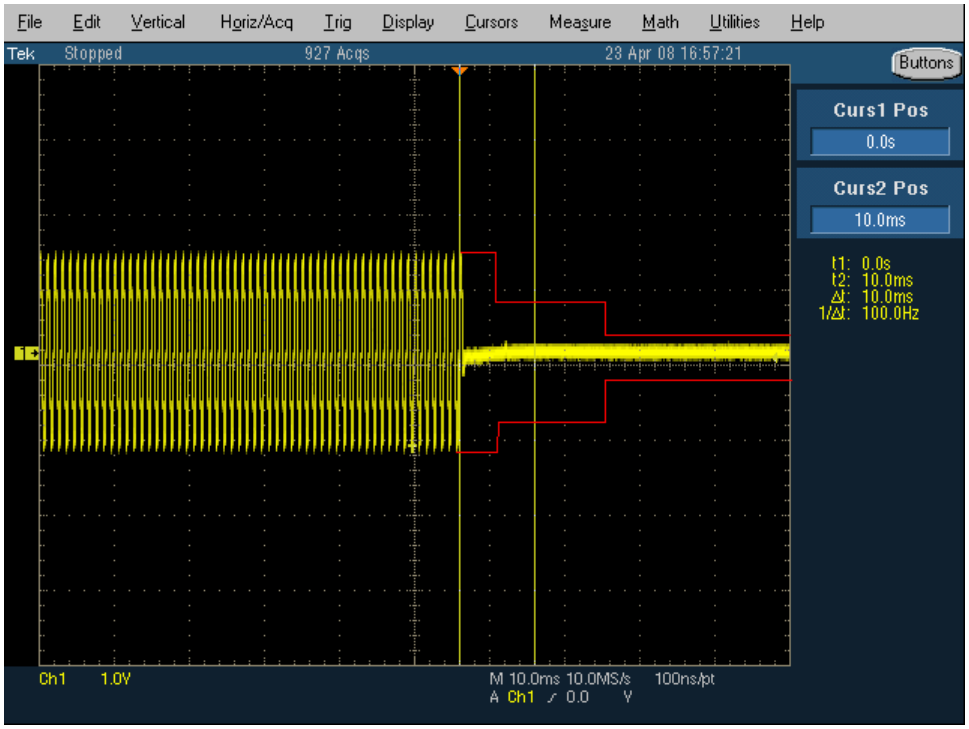
11.4 Test Equipment List and Details

Manufacturer	Equipment Description	Model	Serial Number	Calibration Date
HP	Modulation Analyzer	8901A	2026A00847	2007-04-27
Tektronix	Digital Phosphor Oscilloscope	TDS7104	B020557	2007-02-13
Agilent	Spectrum Analyzer	E4446A	US44300386	2007-04-26
HP	Signal Generator	8648C	3426A01345	2006-10-10

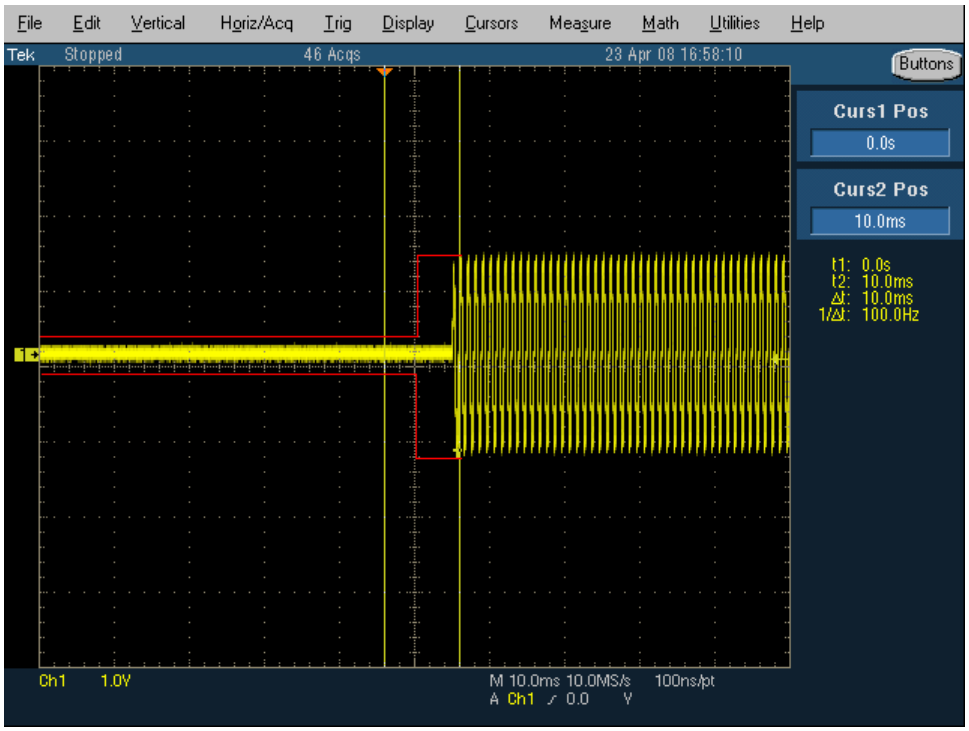
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

11.4.1 VHF 12.5 kHz Channel Spacing

Powering Up

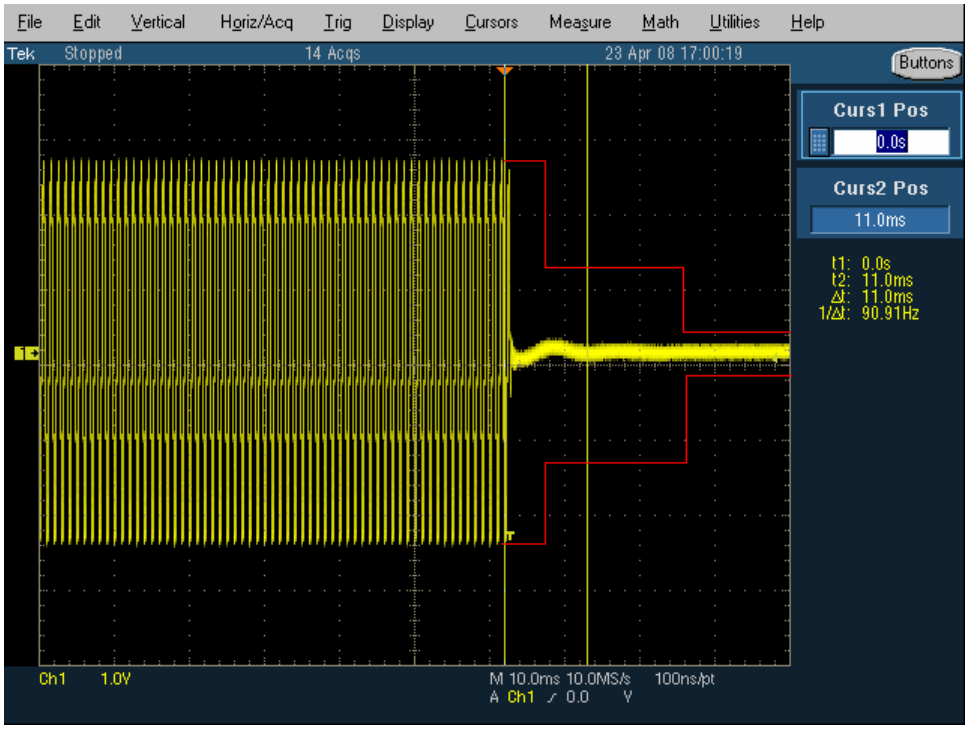


Powering Down



11.4.2 VHF 25 kHz Channel Spacing

Powering Up



Powering Down