

FCC PART 22, 74, 90 TYPE APPROVALS

MEASUREMENT AND TEST REPORT

For

Broadin Media Co., Ltd.

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

FCC ID: UPXHLD-100U2
Model: HLD-100U2

This Report Concerns: ☒ Original Report		Product type: UHF Transmitter	
Test Engineer:	James Ma		
Report No.:	R0610091		
Report Date:	2006-11-08		
Reviewed By:	Daniel Deng		
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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 or any agency of the U.S. Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

Broadin Media Co., Ltd.'s HLD-100 Series utilizes the latest technology in its design and manufacture. Both the UHF and VHF models are PLL (Phase Lock Loop Synthesizer)/microprocessor controlled and offer one to five Watts of power with 16 channel capability. And it has 1200 to 9600 baud rates, AC and / or DC audio coupling. Both GMSK and FSK modulation are standard in these programmable wide bandwidth RF Link Module units.

The radio is programmed with IBM^R Personal Computer, DOS^R based software, an interface module and a programming cable. This allows the radio to meet the requirements for individual user and the operating system.

FEATURES

- Busy Channel Lockout
- 16 Channels
- TX Time-out
- Power Saving
- 1/5 Watt Programmable Output
- 12.5 / 25 kHz Programmable Channel Spacing

Mechanical Description

The Broadin Media Co., Ltd. Wireless's product, FCC ID: *UPXHLD-100U2* or the "EUT" as referred to in this report is HLD-100U2 - UHF Transmitter which measures approximately 101.6 mm L x 63.5 mmW x 38.1 mmH and weighs 120g.

** The test data gathered are from production sample, serial number: 000001 Revision: Rev 1 provided by the manufacturer.*

EUT Photo



Additional Photo in Exhibit B

Objective

This Type approval report is prepared on behalf of *Broadin Media Co., Ltd.* in accordance with Part 2, Part 74 and Part 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

No related submittal(s).

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 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.

Test Facility

The Test site used by BACL Corp. to collect radiated and conducted emission measurement data is located at 1274 Anvilwood Ave , Sunnyvale, California 94085, USA.

Test site at BACL Corp. 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 test methods and procedures set forth in ANSI C63.4-2003& TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and is listed under FCC registration number: 90464 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, 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 is attached hereinafter and can also be found at

<http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

SYSTEM TEST CONFIGURATION

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.

Equipment Modifications

No modifications were made to the EUT.

Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Sceptre	I.T.E. power supply	AD2512B	0553WSC12

Local Support Equipment

Manufacturer	Description	Model	Serial Number
Sceptre	I.T.E. power supply	AD2512B	0553WSC12

Interface Ports and Cabling

Cable Description	Length (M)	From	To
PT5 Data test cable	0.5	PC Serial Port/Function Generator BNC output port	EUT Serial connector/ BNC
PT5 Audio test cable	0.5	PC Serial Port Function Generator BNC output port	EUT Serial connector/BNC

SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§1.1310, §2.1091	RF Exposure	Compliant
§2.1046	Conducted Output Power	Compliant
§2.1047 §90.207	Modulation Characteristic	Compliant
§2.1049, §22.359, §74.124, §90.209	Occupied Bandwidth	Compliant
§2.1051	Spurious Emissions AT Antenna Terminals	Compliant
§ 2.1055, §22.355, §74.1261, § 90.213	Frequency stability	Compliant
§ 90.214	Transient Frequency Behavior	Compliant
§2.1053	Spurious Emissions	Compliant

§2.1046, and §90.205 - CONDUCTED OUTPUT POWER

Applicable Standard

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

Test Procedure

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

Spectrum Analyzer Setting:

R B/W	Video B/W
100 kHz	300 kHz

Environmental Conditions

Temperature:	23° C
Relative Humidity:	32%
ATM Pressure:	1009mbar

* The testing was performed by James Ma on 2006-10-24.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Aglient	Spectrum Analyzer	E4446A	US44300386	2006-03-06

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

Test Result

Test Mode: Transmitting

High Power

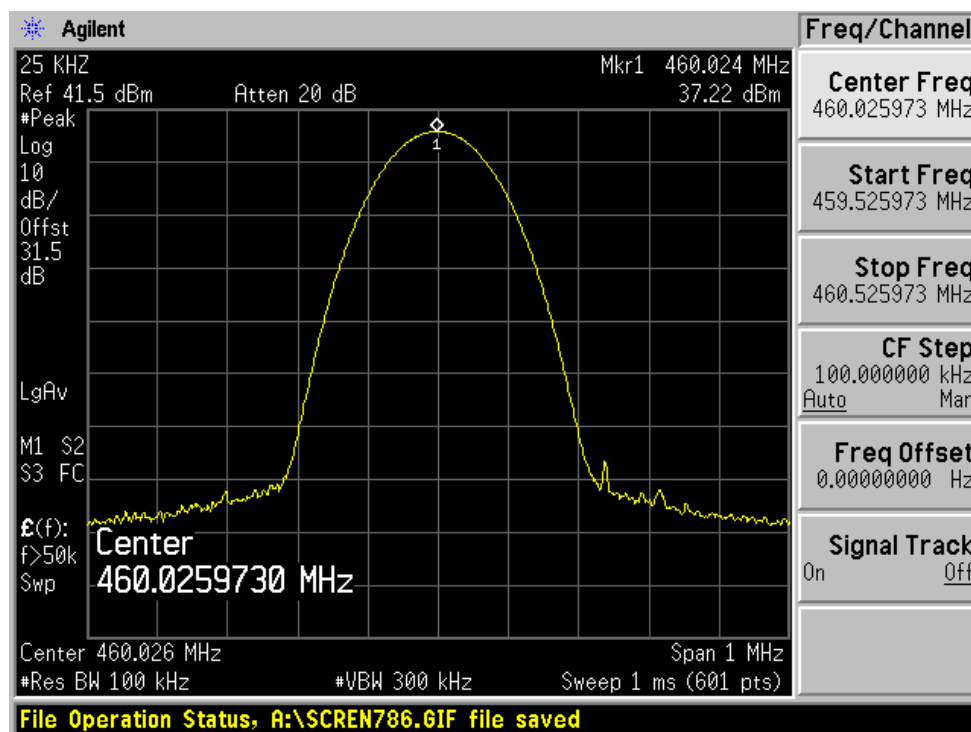
Frequency Spacing (kHz)	Frequency (MHz)	Output Power in dBm	Output Power in W
UHF (25KHz)	460.024	37.22	5.27
UHF (12.5KHz)	460.024	37.45	5.56

Low Power

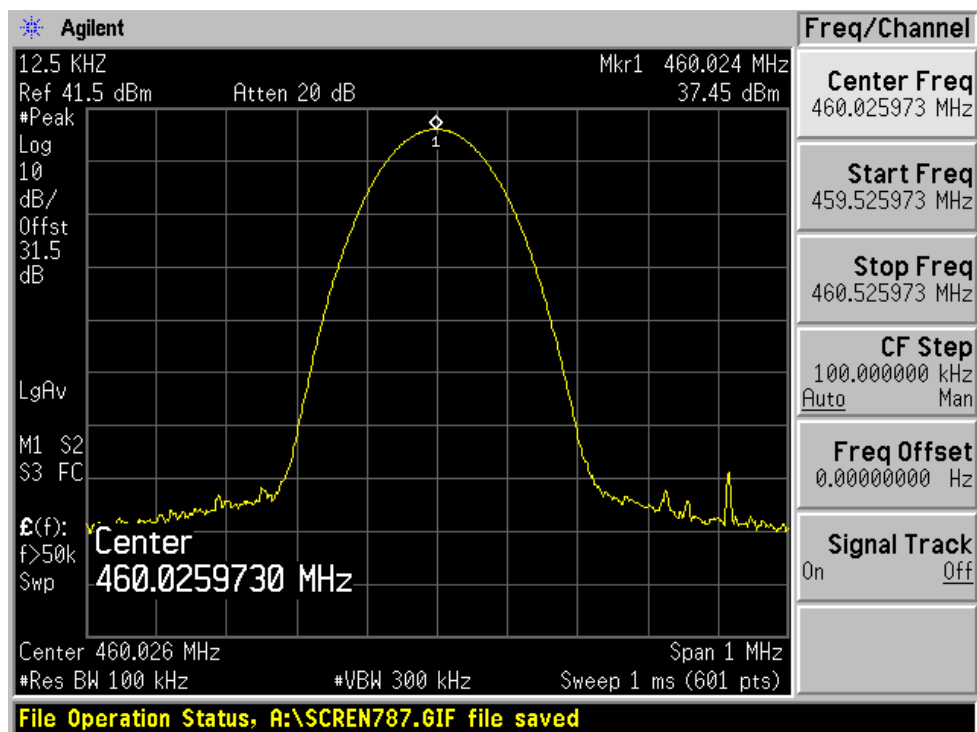
Frequency Spacing (kHz)	Frequency (MHz)	Output Power in dBm	Output Power in W
UHF (25KHz)	460.024	31.45	1.40
UHF (12.5KHz)	460.024	31.35	1.36

Note: The power output may depend on the intended use of the EUT. For all tests, the EUT was set to maximum conditions.

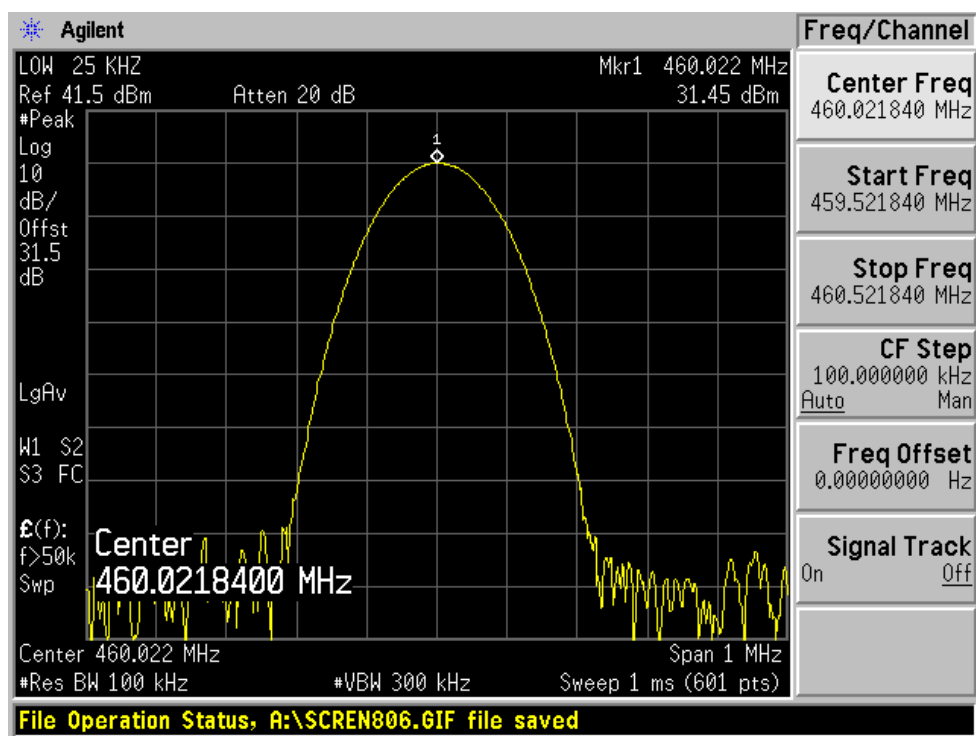
Conducted Output Power for UHF (25 KHz) High Power



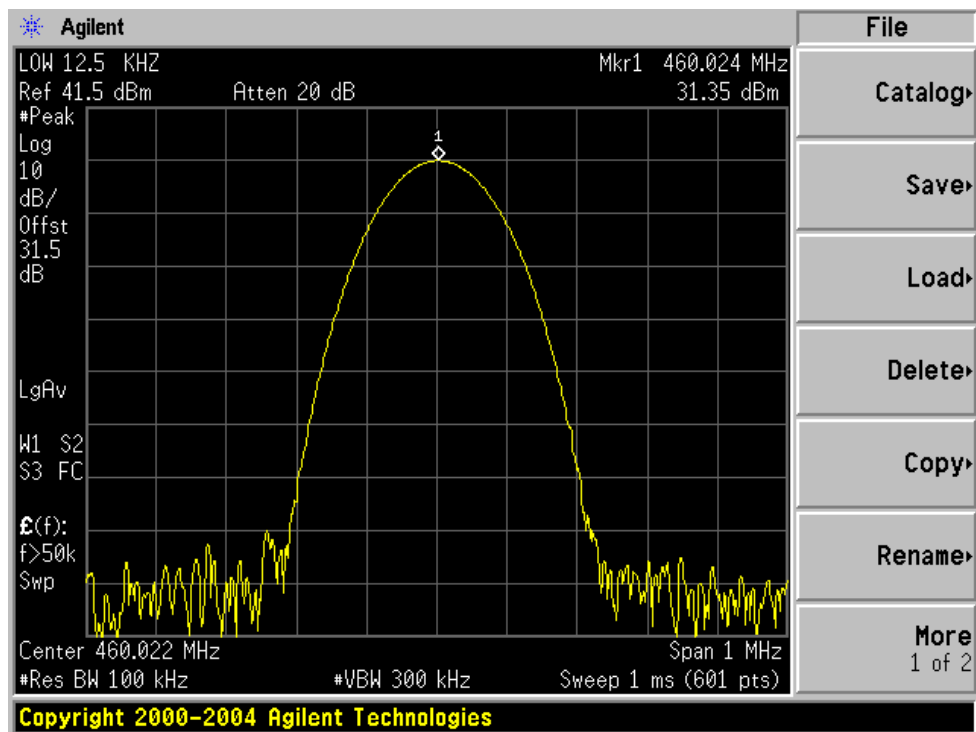
Conducted Output Power for UHF (12.5 KHz) High Power



Conducted Output Power for UHF (25 KHz) Low Power



Conducted Output Power for UHF (12.5 KHz) Low Power



§2.1047, and §90.207 - MODULATION CHARACTERISTIC

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.

Test Procedure

Test Method: TIA/EIA-603-C 2.2.3

Environmental Conditions

Temperature:	23° C
Relative Humidity:	32%
ATM Pressure:	1009mbar

* The testing was performed by James Ma on 2006-10-24.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Function/Arbitrary Waveform Generator	33220A	MY43004878	2005-05-18 (2 yrs)
HP	Modulation Analyzer	8901A	2026A00847	2006-01-17

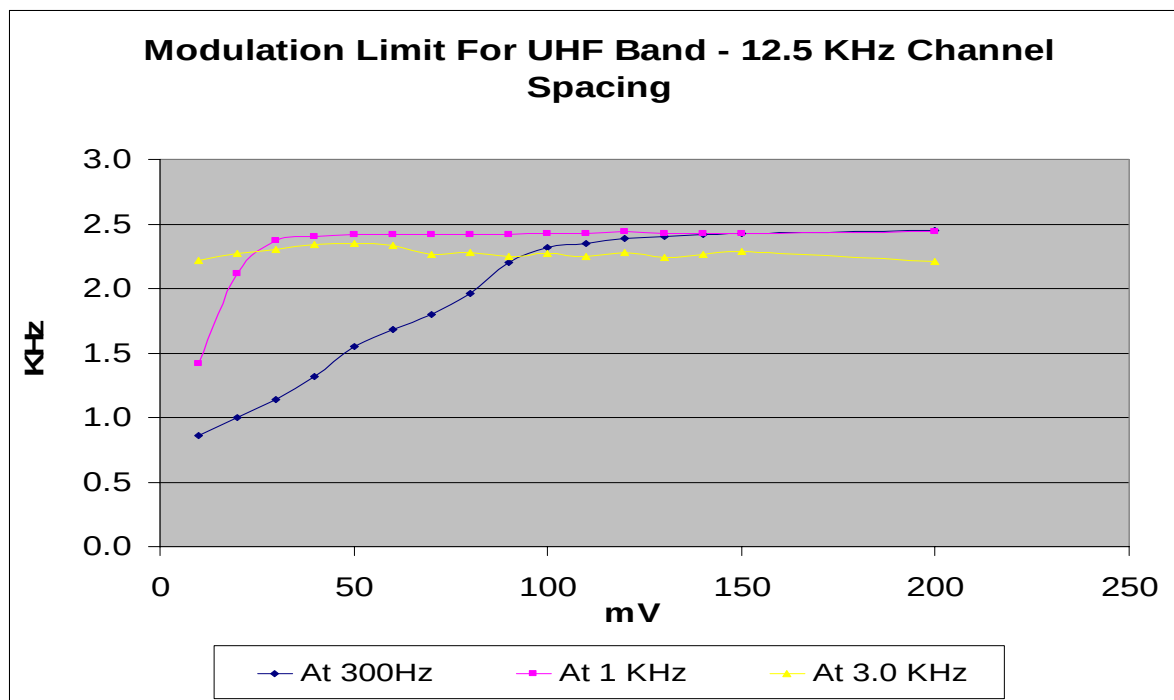
* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Result

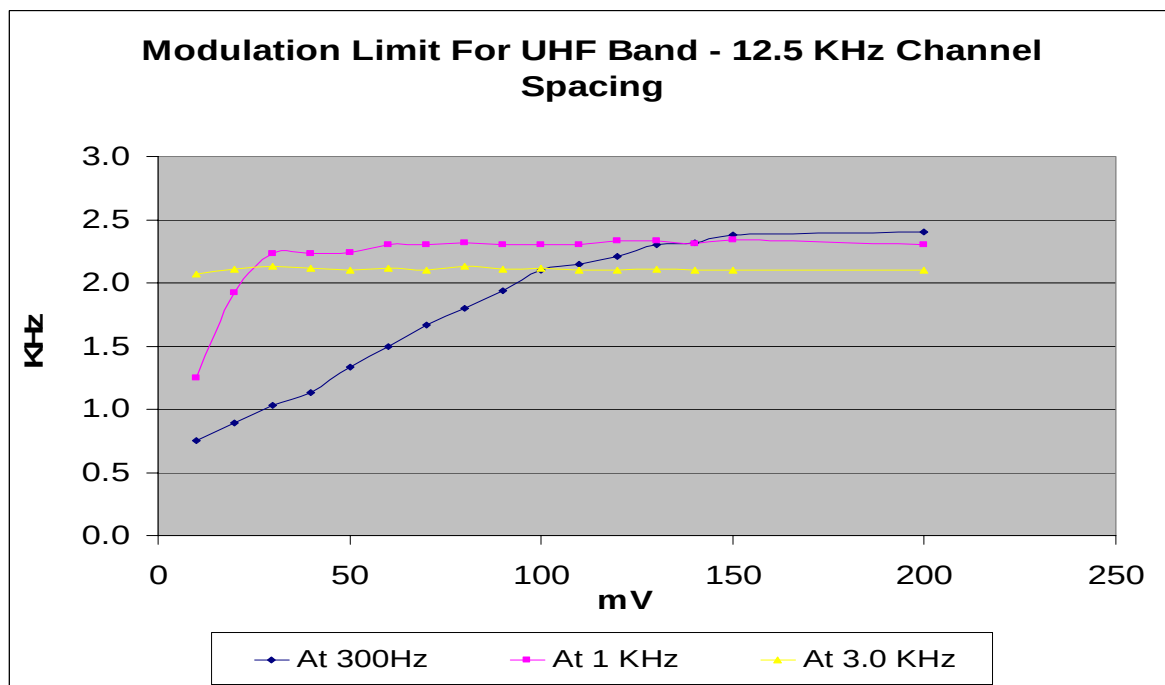
Test Mode: Transmitting

Modulation Limit for *HLD - 100U2 - UHF*

High Power

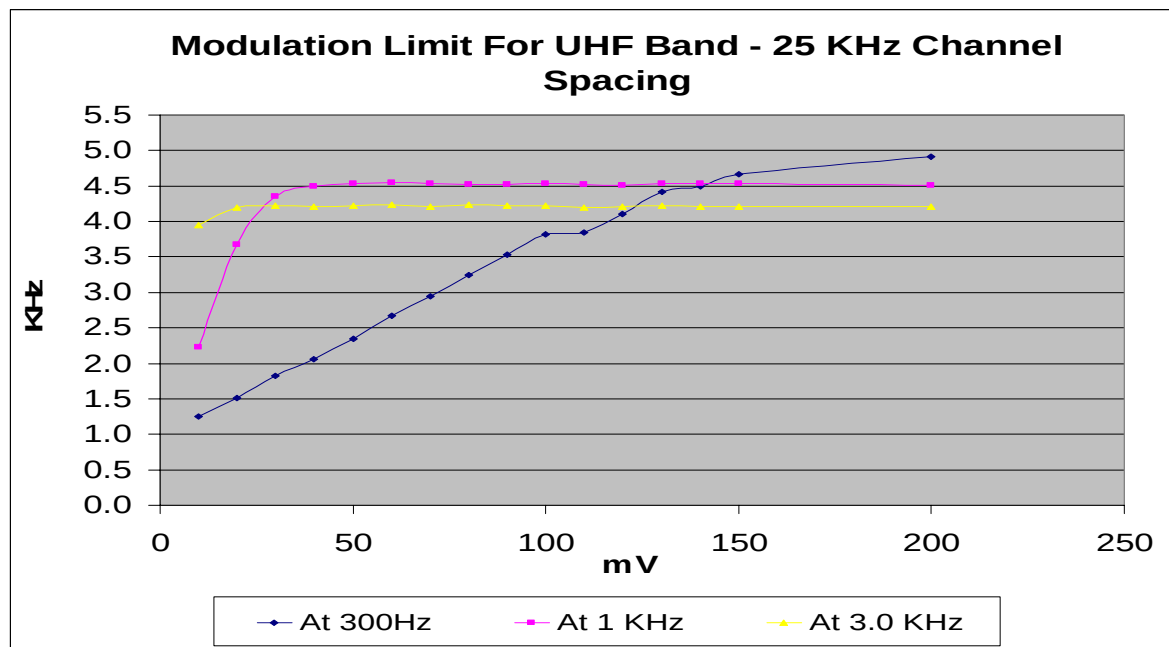


Low Power

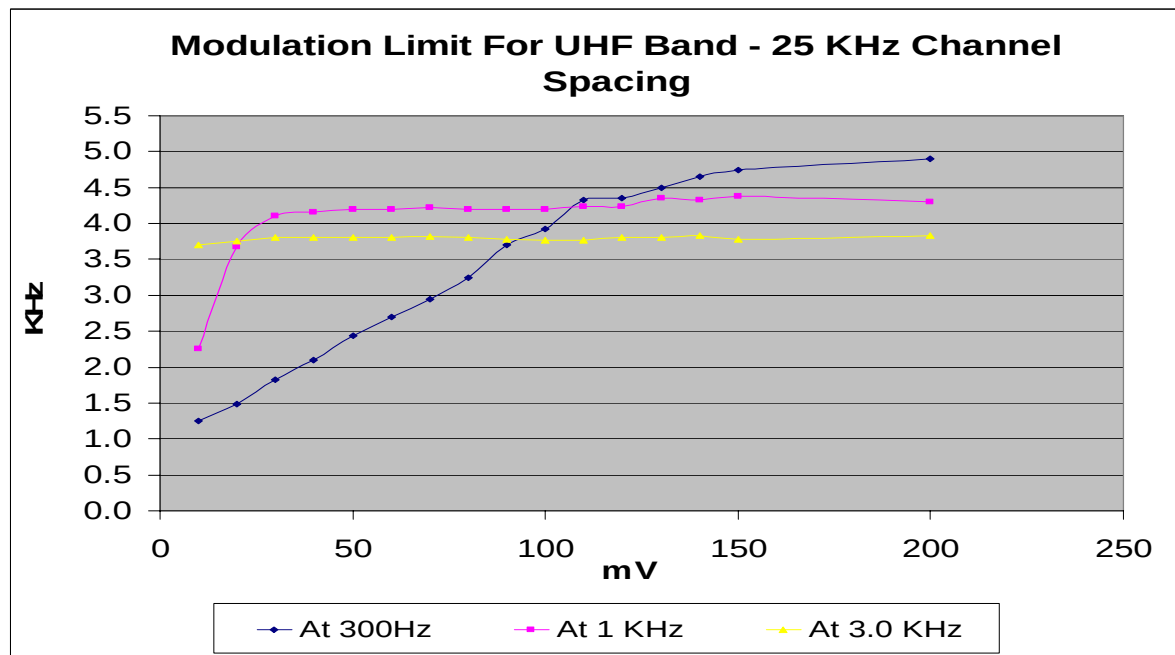


Modulation Limit for *HLD - 100U2 - UHF*

High Power



Low Power



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

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 $7.27 (f_d - 2.88\text{kHz})$ 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:

$50 + 10\log P = 50 + 10\log (P)$ 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 300Hz 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.

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.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	32%
ATM Pressure:	1009mbar

** The testing was performed by James Ma on 2006-10-24.*

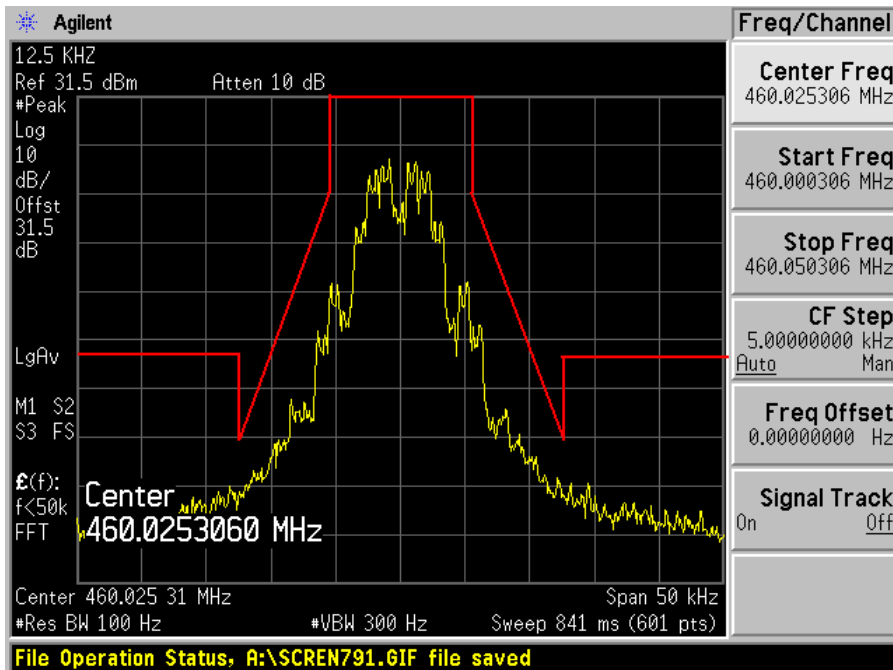
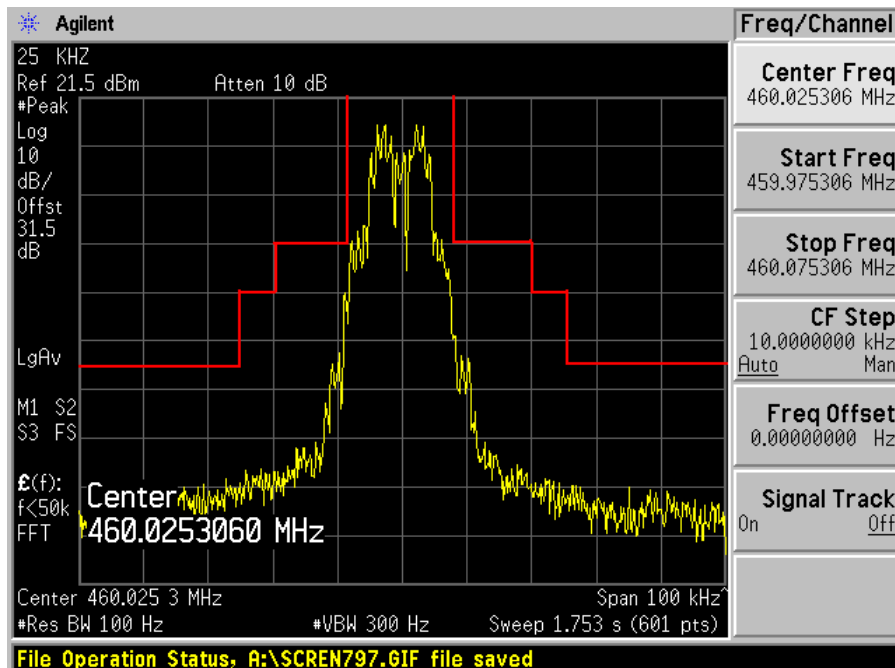
Test Equipment List and Details

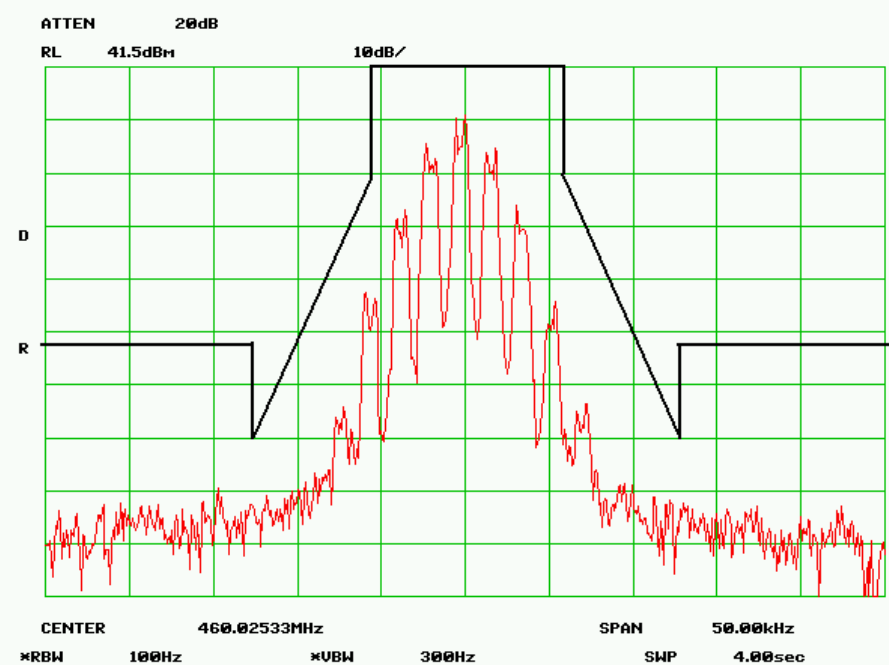
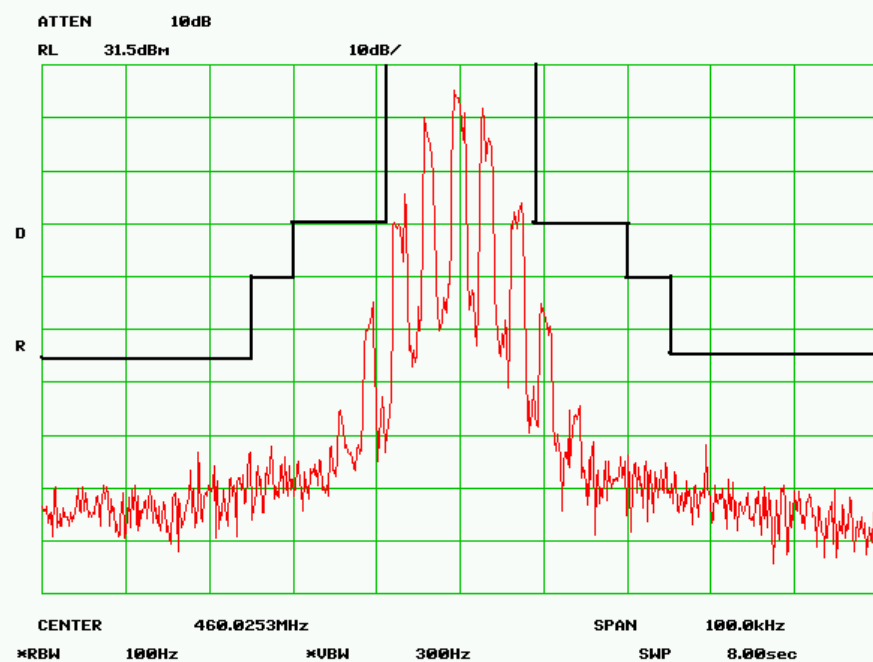
Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06
Agilent	Spectrum Analyzer	8565EC	3946A00131	2006-01-11

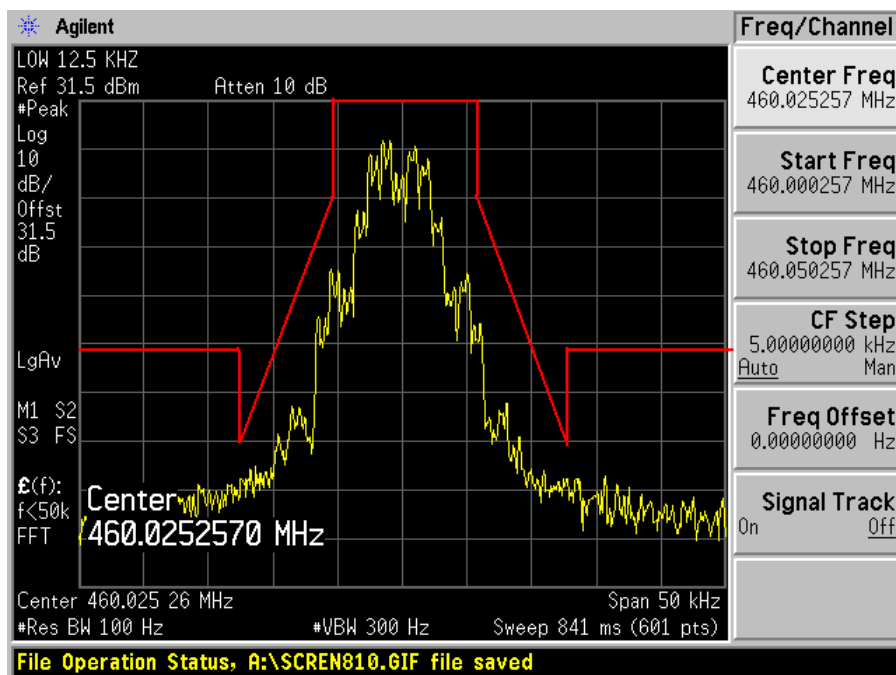
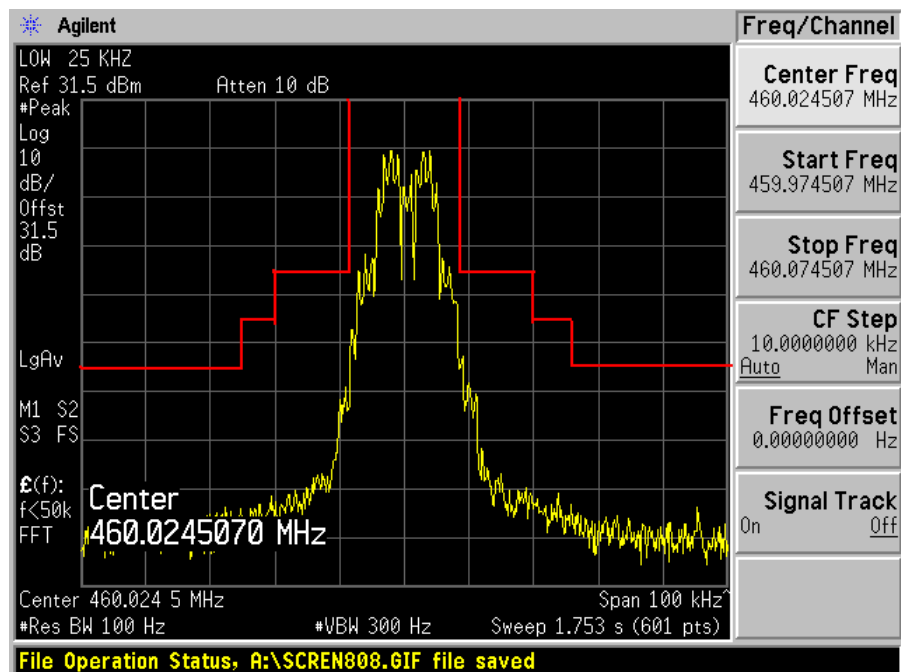
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

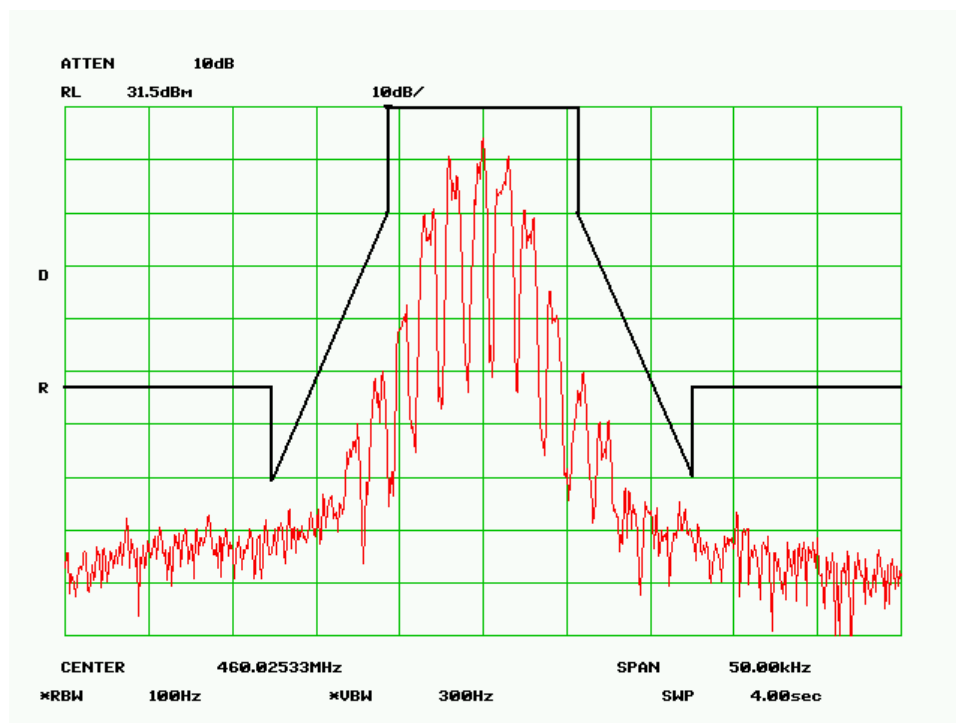
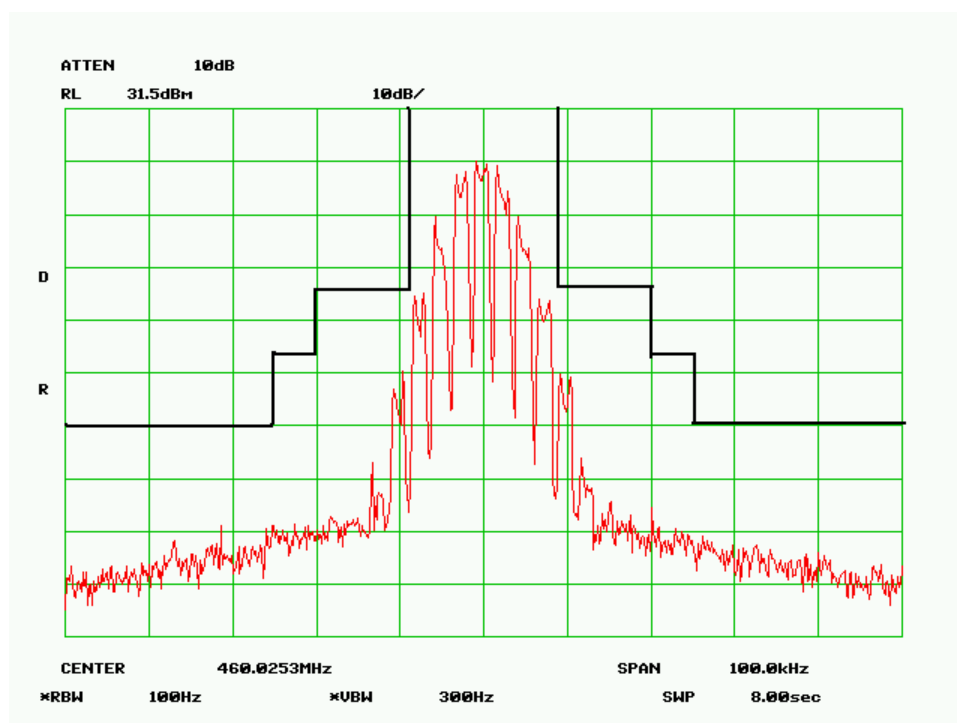
Test Result: Pass

Please refer to the hereinafter plots.

*High Power**Data 12.5 kHz Channel Specing High Power**Data 25 kHz Channel Specing High Power*

Audio 12.5 kHz Channel specing High Power*Audio 25 kHz Channel specing High Power*

Data 12.5 kHz Channel specing Low Power*Data 25 kHz Channel specing Low Power*

Audio 12.5 kHz Channel spacing Low Power*Audio 25 kHz Channel spacing Low Power*

§2.1051 and §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

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

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

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

43+10log(P)

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.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	32%
ATM Pressure:	1009mbar

* The testing was performed by James Ma on 2006-10-24.

Test Equipment List and Details

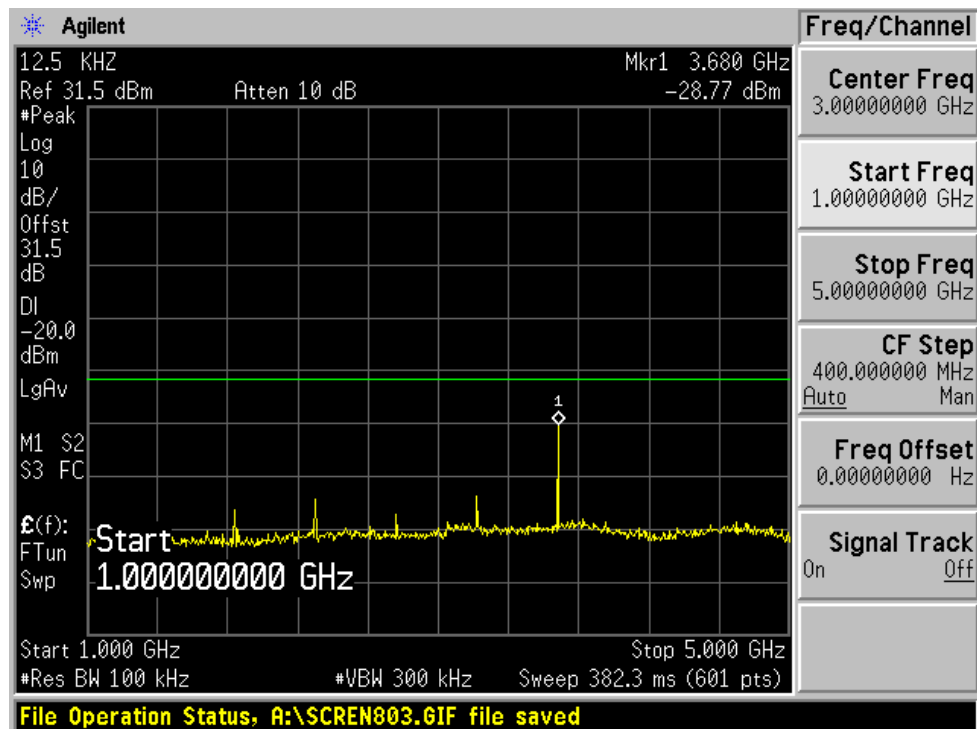
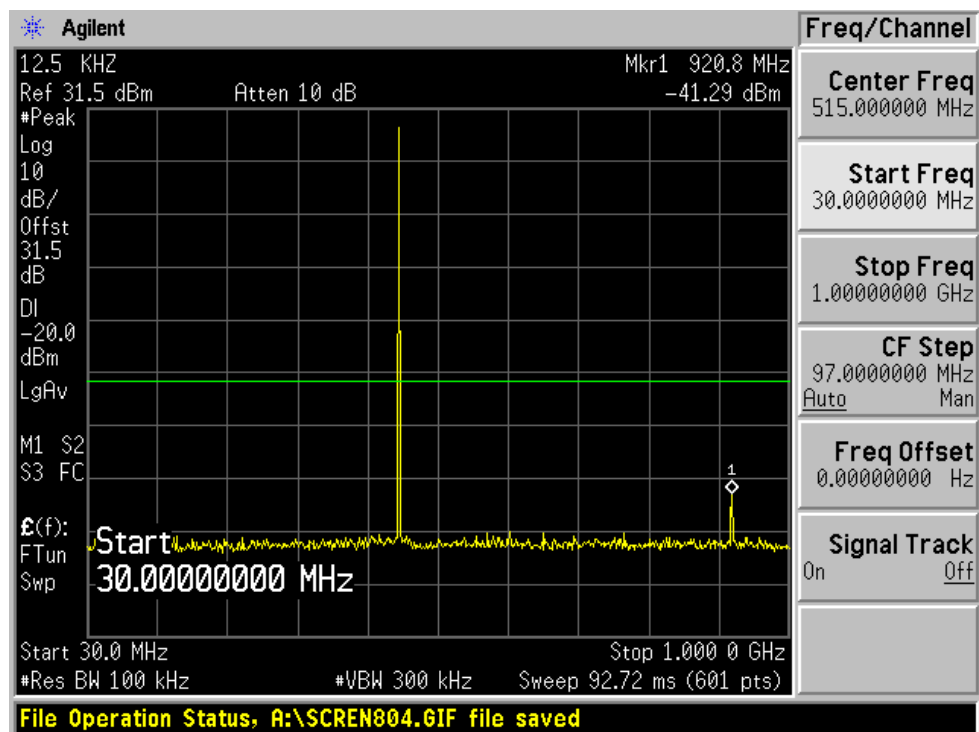
Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06

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

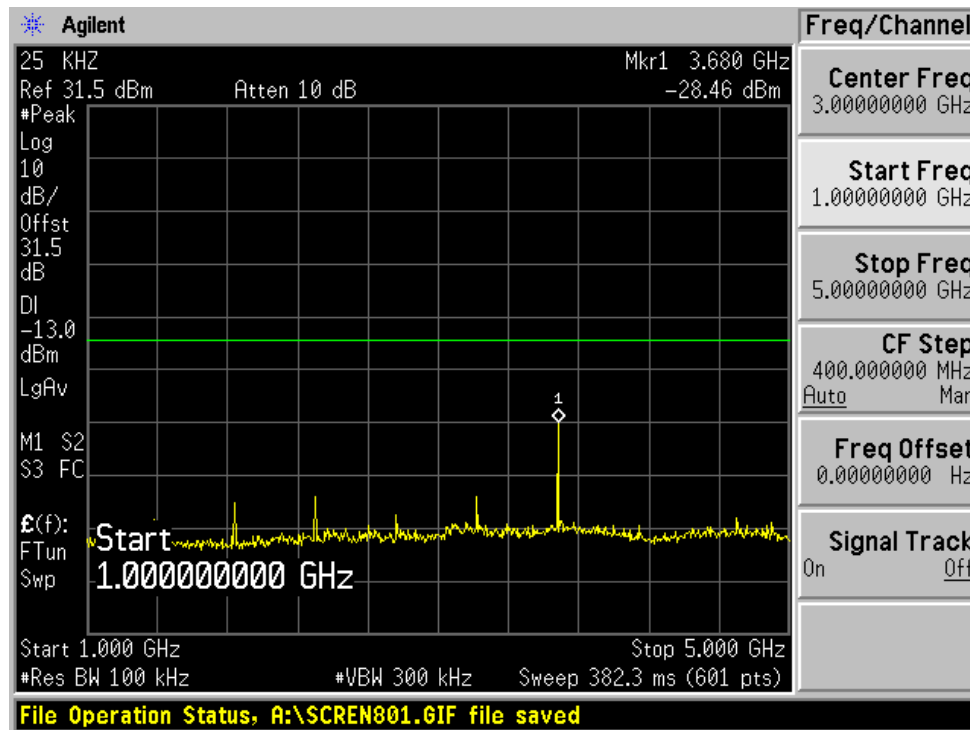
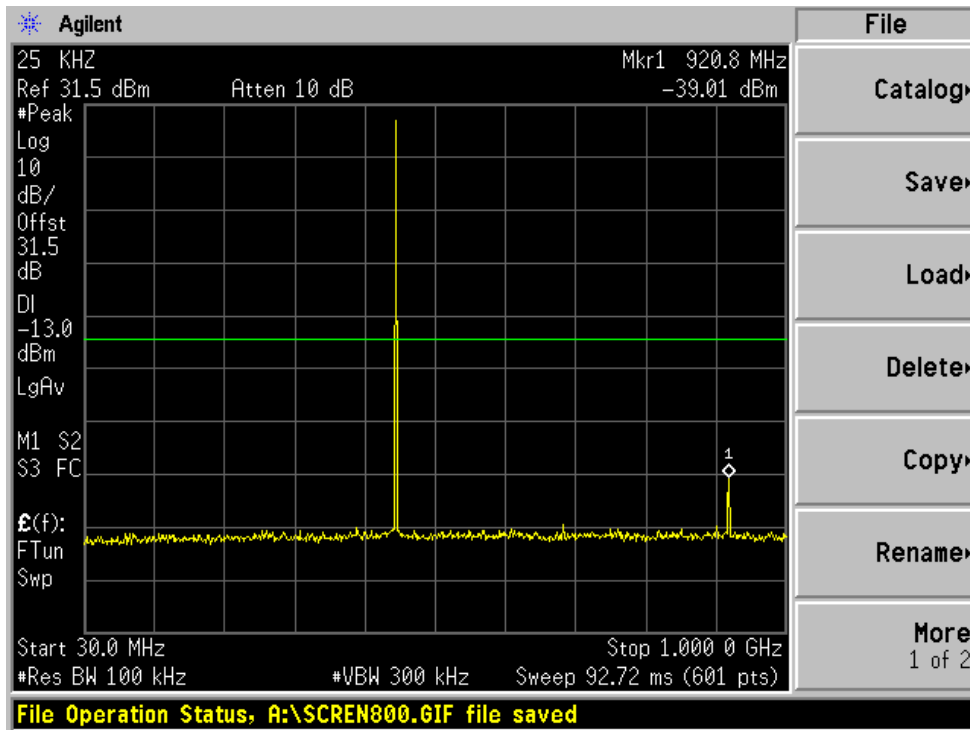
Test Results

Test Mode: Transmitting Using Conducted measuring method

For UHF 12.5 kHz Channel Bandwidth:



For UHF 25 kHz Channel Bandwidth:



§2.1055 (d), §22.355, §74.1261 (b) and §90.213- FREQUENCY STABILITY**Applicable Standard**

§2.1055 (d)

§90.213

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

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.

Environmental Conditions

Temperature:	23° C
Relative Humidity:	32%
ATM Pressure:	1009mbar

* The testing was performed by James Ma on 2006-10-24.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06
Tenney	Oven, Temperature	Versa Tenn	12.431-8	2006-06-27

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

Test Result

Test Mode: Transmitting

*For UHF Band***Frequency Vs. Temperature**

Condition		Ref Frequency	Measured Freq	Frequency Error	Limit
Voltage (Vdc)	Temperature (C)	MHz	MHz	PPM	PPM
12.0	60	460.025000	460.025930	2.0216	5.00
12.0	50	460.025000	460.025870	1.8912	5.00
12.0	40	460.025000	460.025730	1.5869	5.00
12.0	30	460.025000	460.024190	-1.7608	5.00
12.0	10	460.025000	460.024390	-1.3260	5.00
12.0	0	460.025000	460.023970	-2.2390	5.00
12.0	-10	460.025000	460.023945	-2.2934	5.00
12.0	-20	460.025000	460.023821	-2.5629	5.00
12.0	-30	460.025000	460.023784	-2.6433	5.00

Frequency Vs. Voltage

Condition		Ref Frequency	Measured Freq	Frequency Error	Limit
Voltage (Vdc)	Temperature (C)	MHz	MHz	PPM	PPM
13.2	20	460.025000	460.024550	-0.9782	5.00
10.8	20	460.025000	460.024370	-1.3695	5.00

§90.214 - TRANSIENT FREQUENCY BEHAVIOR

Applicable Standard

§90.214

Test Procedure

TIA/EIA-603-C 2.2.19

Environmental Conditions

Temperature:	23° C
Relative Humidity:	32%
ATM Pressure:	1009mbar

** The testing was performed by James Ma on 2006-10-24.*

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Modulation Analyzer	8901A	2026A00847	2006-01-17
Tektronix	Digital Phosphor Oscilloscope	TDS7104	B020557	2006-02-15
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06
HP	Signal Generator	8648C	3426A01345	2006-08-22

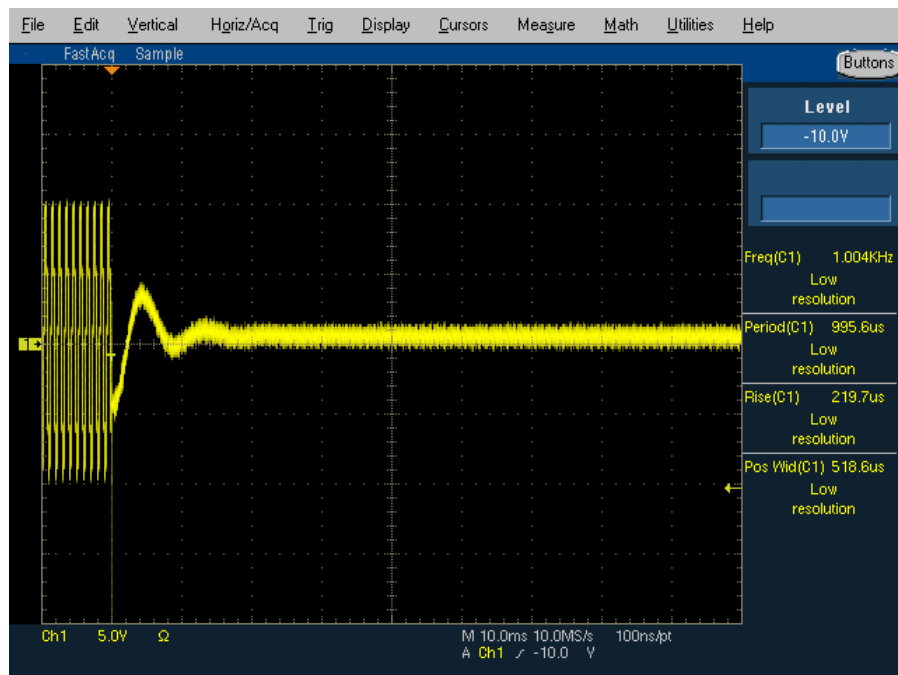
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Result

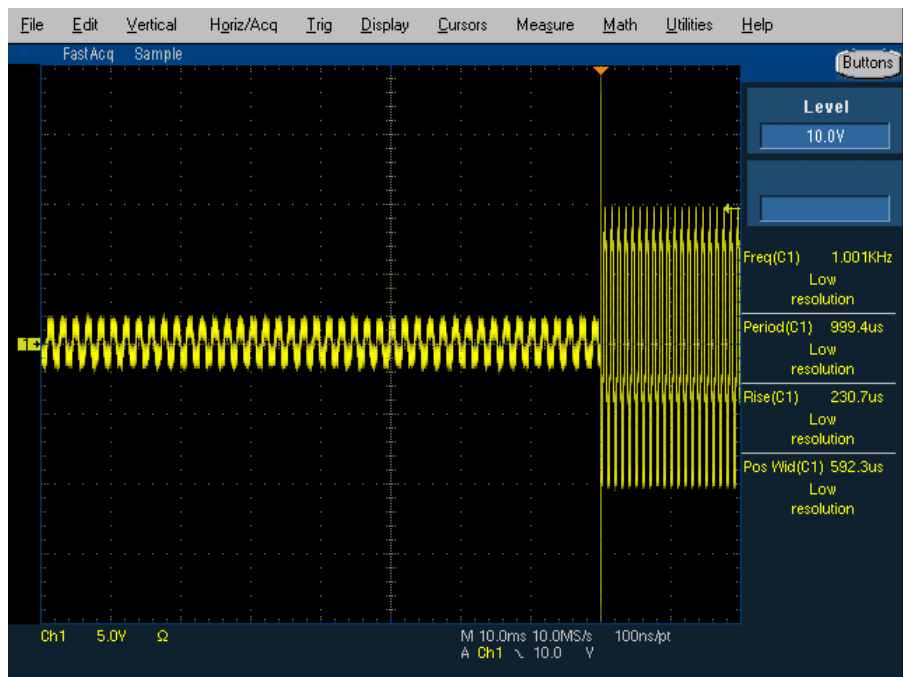
Test Mode: Transmitting

For UHF 12.5 kHz

Turn on

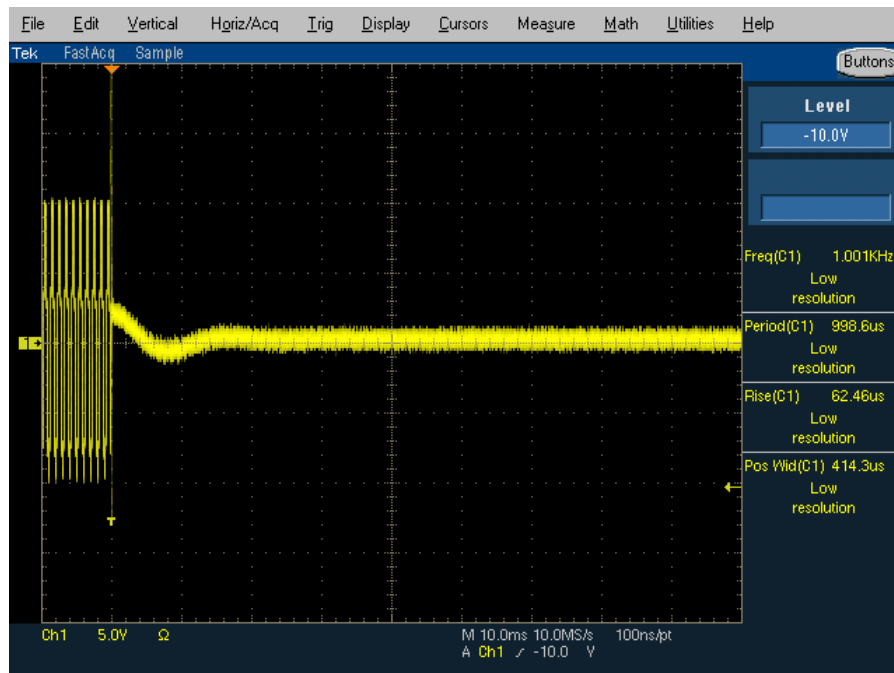


Turn off

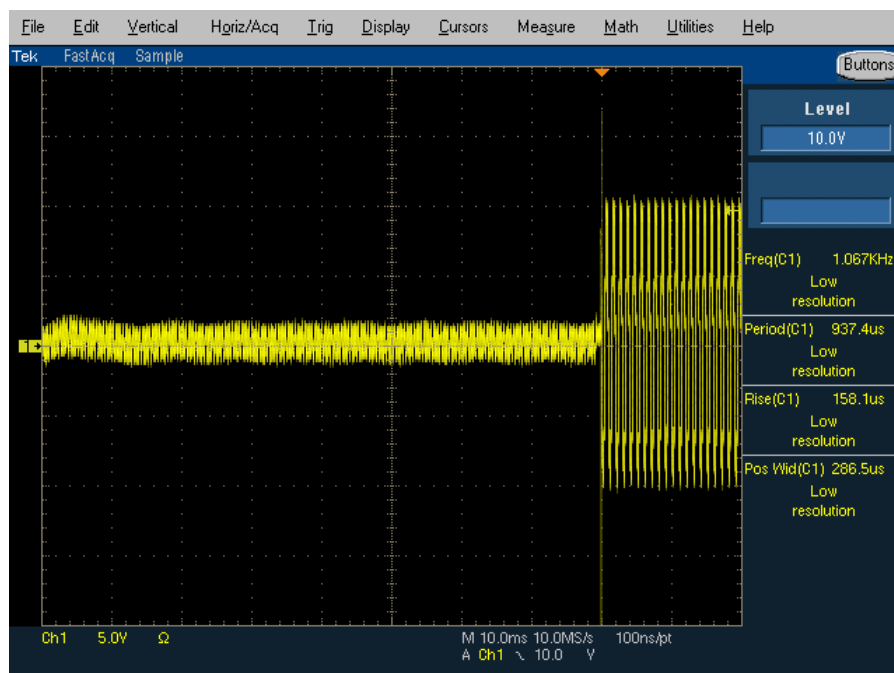


For UHF 25 kHz

Turn on



Turn off



§2.1053 and §90.210 - RADIATED SPURIOUS EMISSION

Applicable Standard

§2.1053 and §90.210(g)

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

Environmental Conditions

Temperature:	23° C
Relative Humidity:	32%
ATM Pressure:	1009mbar

* The testing was performed by James Ma on 2006-3-28.

Test Equipment

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Amplifier, Pre, Microwave	8449B	3147A00400	2006-08-21
HP	Generator, Signal	83650B	3614A00276	2005-05-10
A.R.A.	Antenna, Horn	DRG-118/A	1132	2005-08-17
Sunol Sciences	Antenna	JB1	A013105-3	2006-03-15
A.R.A.	Antenna, Horn	DRG-118/A	1132	2005-08-17
Agilent	Spectrum Analyzer	E4446A	US44300386	2006-03-06

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

Test Result

-21.6 dB at 1380 MHz for UHF on Vertical polarization

Test Mode: Transmission Using substitution measuring method**UHF 460.025 MHZ** Measured at 3 meters

Indicated		Table Angle	Test Ant Height	Substituted			Antenna Gain Correction	Cable Loss	Absolute Level	Limit	Margin
Freq. MHz	Amp. dBuV			Polar	Freq. MHz	Level dBm					
		Degree	Meter	H/V				dB	dBm	dBm	dB
1380.0	67.3	0	1.5	V	1380.0	-40.0	6.3	0.9	-34.6	-13	-21.6
920.0	71.5	0	1.8	V	920.0	-35.5	0	0.8	-36.3	-13	-23.3
1380.0	65.6	55	1.6	H	1380.0	-43.3	6.3	0.9	-37.9	-13	-24.9
920.0	68.1	120	1.5	H	920.0	-38.1	0	0.8	-38.9	-13	-25.9
2760.0	42.4	20	2.5	V	2760.0	-50.7	9.9	1.5	-42.3	-13	-29.3
2300.0	45.2	100	2.3	H	2300.0	-50.4	8.3	1.5	-43.6	-13	-30.6
2760.0	40.1	20	1.7	H	2760.0	-52.3	9.9	1.5	-43.9	-13	-30.9
2300.0	47.5	190	1.1	V	2300.0	-52.5	8.3	1.5	-45.7	-13	-32.7
875.0	40.3	200	2.4	V	875.0	-60.2	0	0.8	-61.0	-13	-48.0
875.0	38.5	70	1.6	H	875.0	-62.7	0	0.8	-63.5	-13	-50.5

END OF REPORT