

FCC PART 22, 90 TYPE APPROVALS
 MEASUREMENT AND TEST REPORT

For

Daniels Electronics Ltd.

43 Erie, St.
 Victoria, BC V8V 1P8, Canada

FCC ID: H4JUT-4E500

This Report Concerns: <input checked="" type="checkbox"/> Original Report		Product type: UHF FM Transmitter	
Test Engineer:	James Ma	<i>James Ma</i>	
Report Number:	R0703072		
Report Date:	2007-04-04		
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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, NIST, or any agency of the Federal Government

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The report has been prepared on behalf of Daniels Electronics Ltd. and their product FCC ID: H4JUT-4E500, or the EUT as referred to in the rest of this report. The EUT is a UHF FM Transmitter capable of P25 digital or analog operation in 12.5 kHz (narrowband) or 25 kHz (wideband) channels that operates under FCC Parts 22, and 90.

Technical Specifications	
Frequency Band	470 - 512 MHz
Modulation Type	F3E, F1E, F1D
RF Output Power	0.5 – 8 Watts
Channel Spacing	25 kHz / 12.5 kHz
Number of Channels	16
Power Supply	13.8 VDC
Antenna Type	Standard Male Connection Type for External Antenna

Mechanical Description

The Daniels Electronics Ltd. product is a UHF FM Transmitter of metallic construction, which measures approximately 128 mm L x 190 mmW x 71 mmH and weighs 140 g.

* The test data gathered are from production sample, serial number: 071098 provided by the manufacturer.

EUT Photo



Additional Photo in Exhibit C

Objective

This Type approval report is prepared on behalf of *Daniels Electronics Ltd.* in accordance with Part 22, 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 22 – Public Mobile Services, Part and Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA-603-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 Number: 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-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
KEPCO	Power Supply	JQE 25- 10 M	H134525

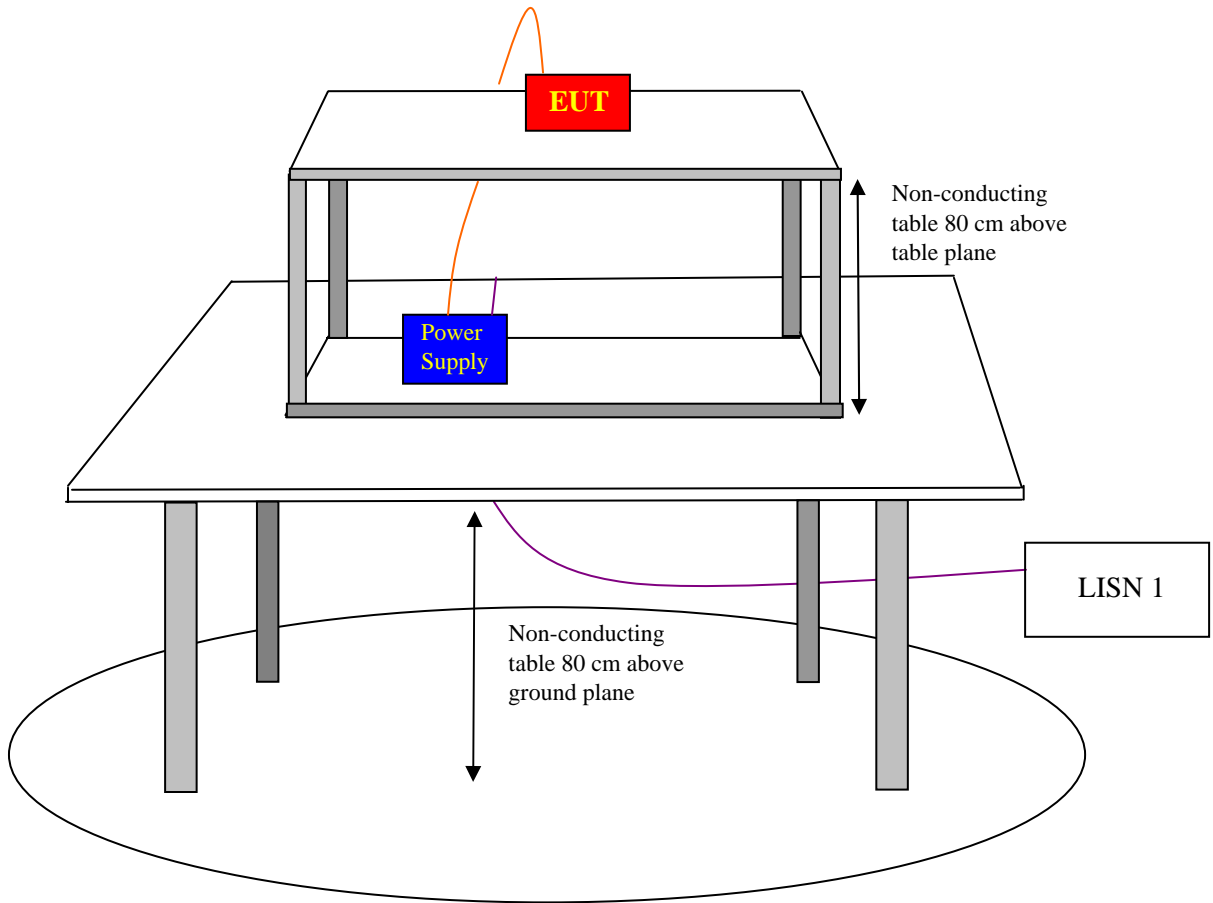
Local Support Equipment

Manufacturer	Description	Model	Serial Number
/	/	/	/
/	/	/	/

Host Configuration

Manufacturer	Description	Model	Serial Number
/	/	/	/
/	/	/	/

Radiated Emission Test Setup Block Diagram



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
47 CFR §1.1310, 47 CFR §2.1091	RF Exposure	Please refer to User manual *
47 CFR §2.1046	RF Output Power	Compliant
47 CFR §2.1047 47 CFR §90.207	Modulation Characteristic Audio Frequency Response	Compliant
47 CFR §2.1049, 47 CFR §22.359, 47 CFR §90.209 47 CFR §90.210	Occupied Bandwidth, Emission Masks and Emission Limitation	Compliant
47 CFR §2.1051	Spurious Emissions at Antenna Terminals	Compliant
47 CFR §2.1055, 47 CFR §22.355, 47 CFR §90.213	Frequency stability	Compliant
47 CFR §2.1053, 47 CFR § 90.210	Field strength of spurious radiation,	Compliant
47 CFR § 90.214	Transient Frequency Behavior	Compliant

**EUT is for fixed use only*

§2.1046, and §90.205 - RF 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:

<u>RBW</u>	<u>Video BW</u>
100 kHz	300 kHz

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	40 %
ATM Pressure:	102 kPa

* The testing was performed by James Ma on 2007-03-31.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-04-06

* **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

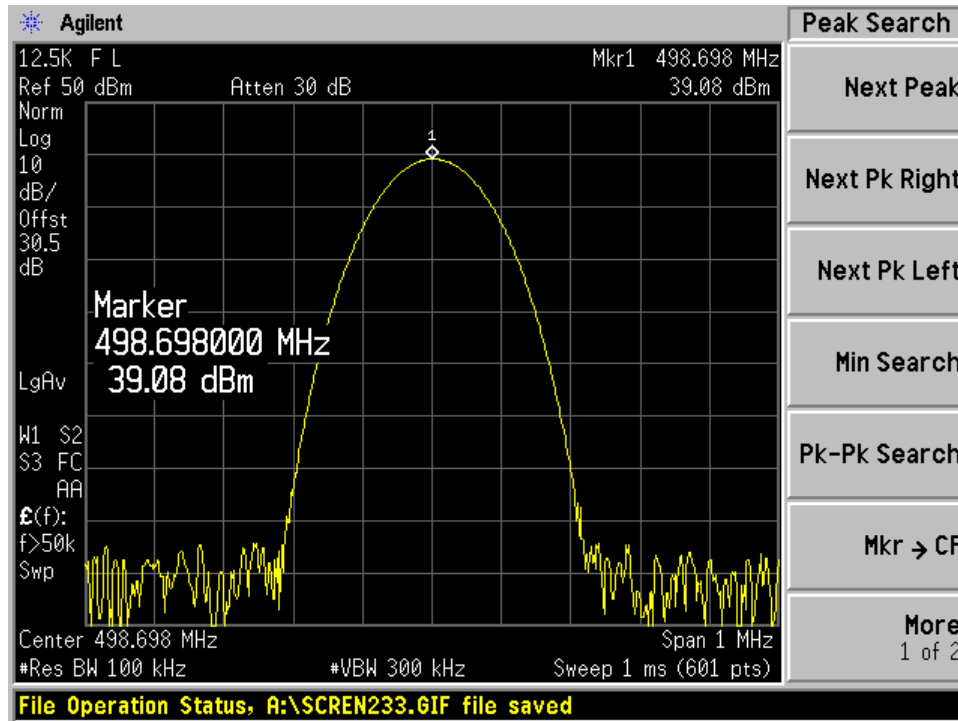
Mode	Frequency Spacing (kHz)	Frequency (MHz)	Output Power (dBm)	Output Power (Watt)
Analog: Flat	25kHz	498.698	39.08	8.09
	12.5kHz	498.700	39.07	8.07
Analog: Pre-Emphasis	25kHz	498.698	39.08	8.09
	12.5kHz	498.698	39.08	8.09
Digital	-	498.701	39.09	8.11

Low Power

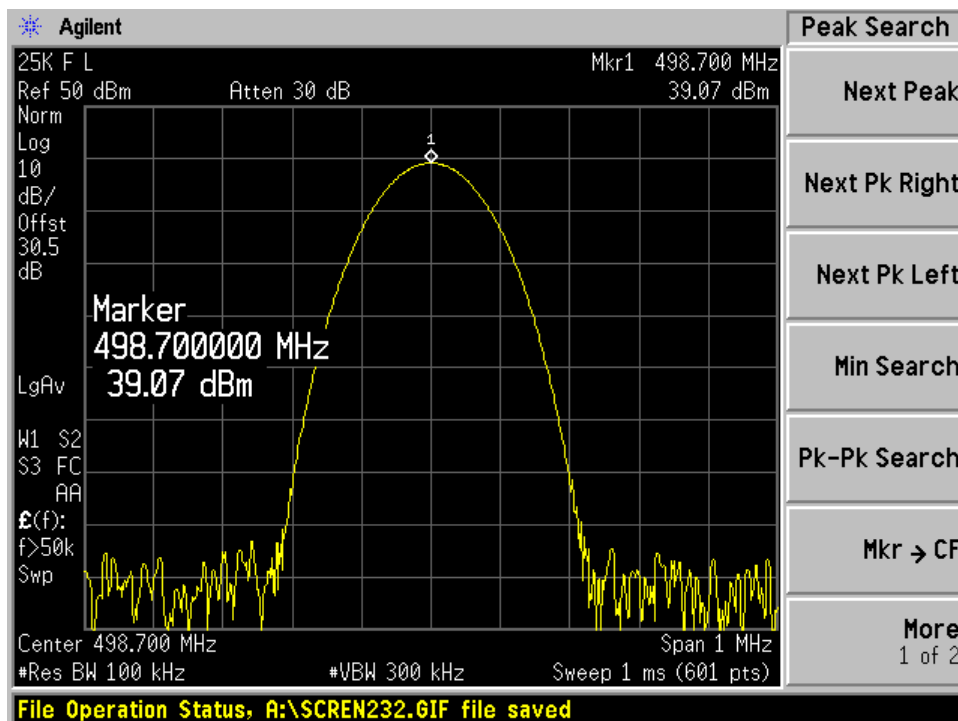
Mode	Frequency Spacing (kHz)	Frequency (MHz)	Output Power (dBm)	Output Power (Watt)
Analog: Flat	25kHz	498.699	27.57	0.57
	12.5kHz	498.699	27.57	0.57
Analog: Pre-Emphasis	25kHz	498.699	27.56	0.57
	12.5kHz	498.699	27.62	0.58
Digital	-	498.697	27.61	0.58

High Power

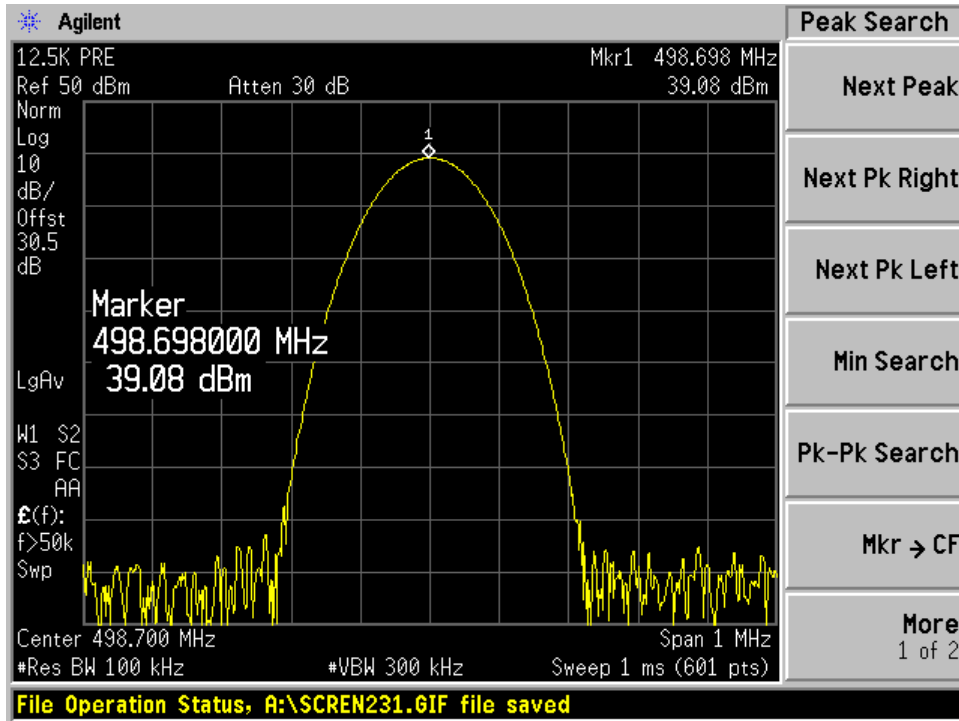
Analog: Flat: 12.5 kHz



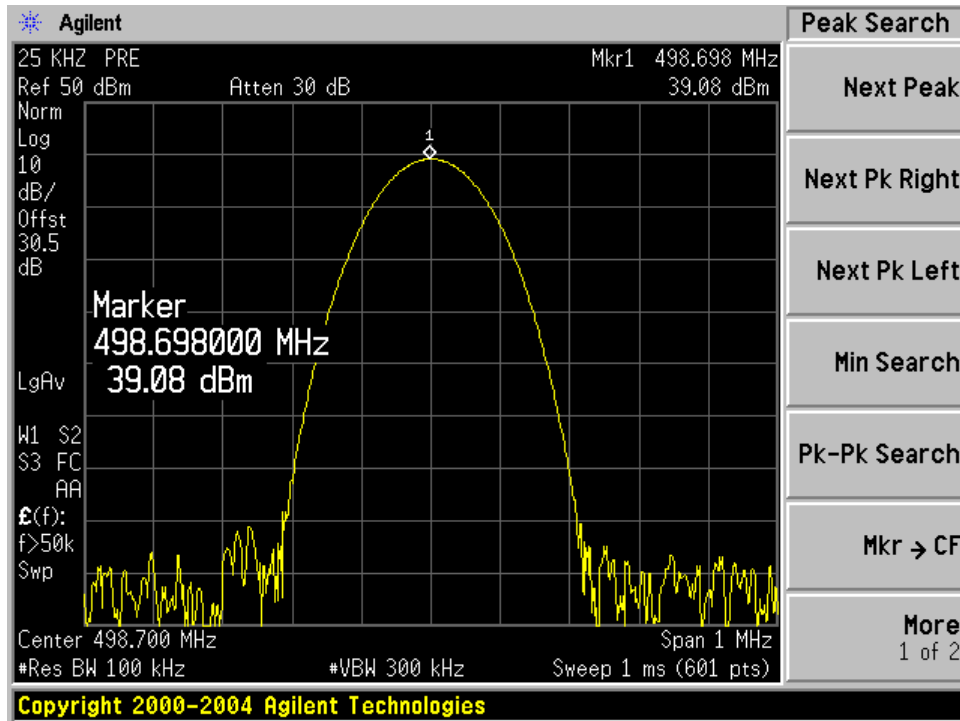
Analog: Flat: 25.0 kHz



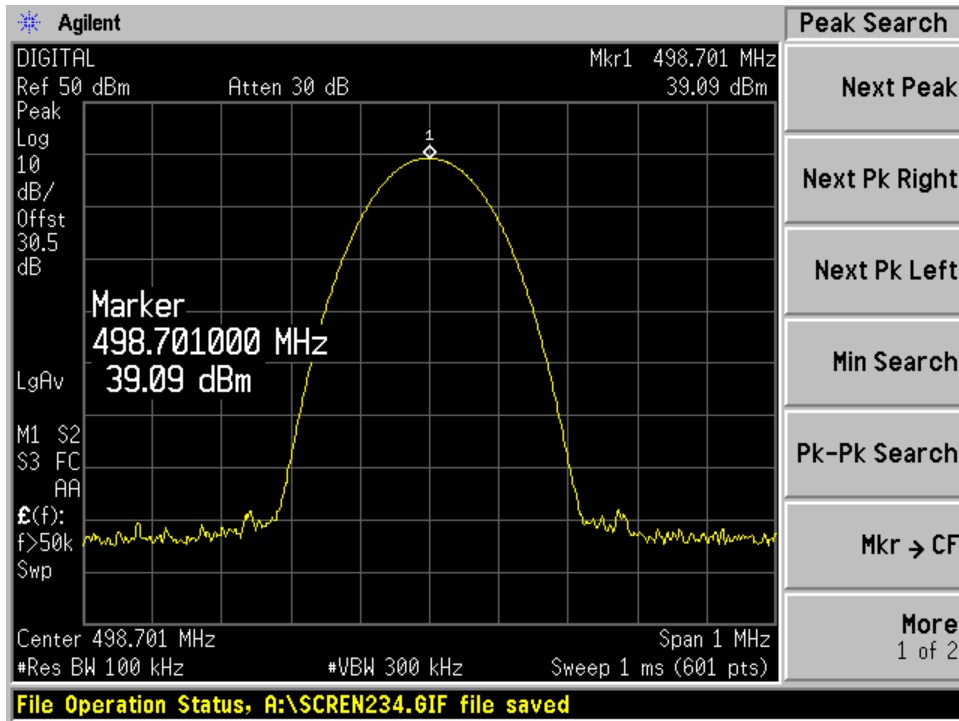
Analog: Pre-Emphasis: 12.5 kHz



Analog: Pre-Emphasis: 25.0 kHz

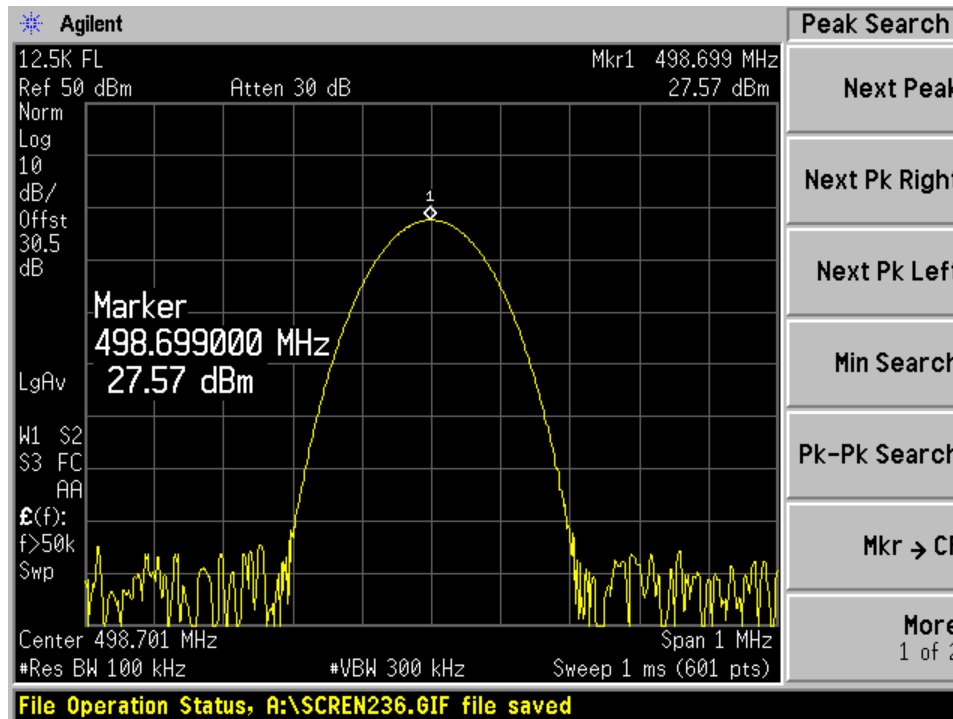


Digital

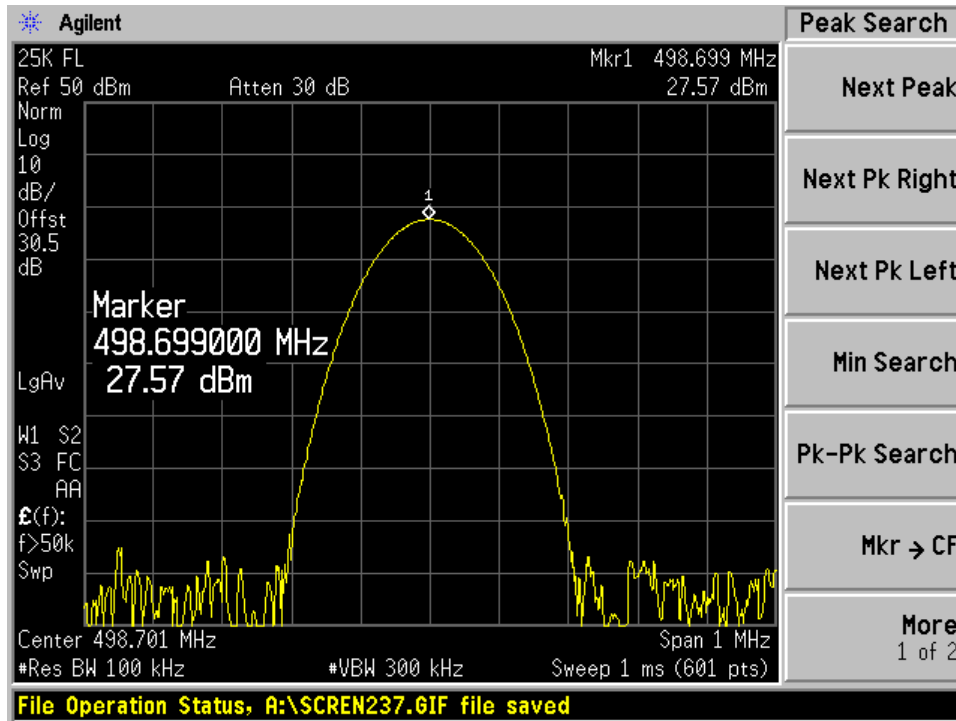


Low Power

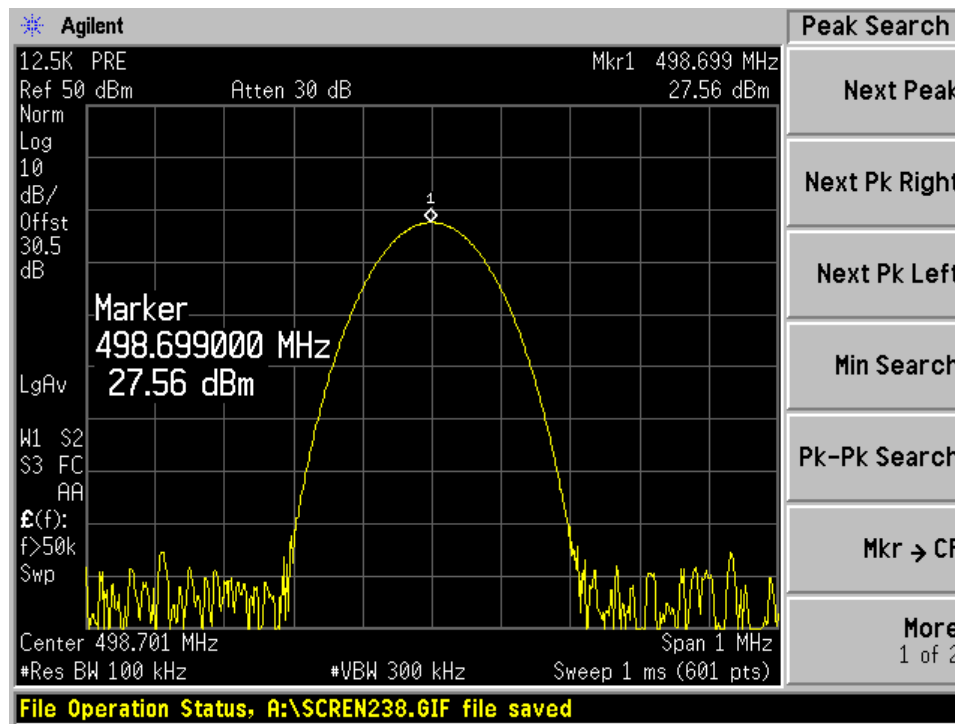
Analog: Flat: 12.5 kHz



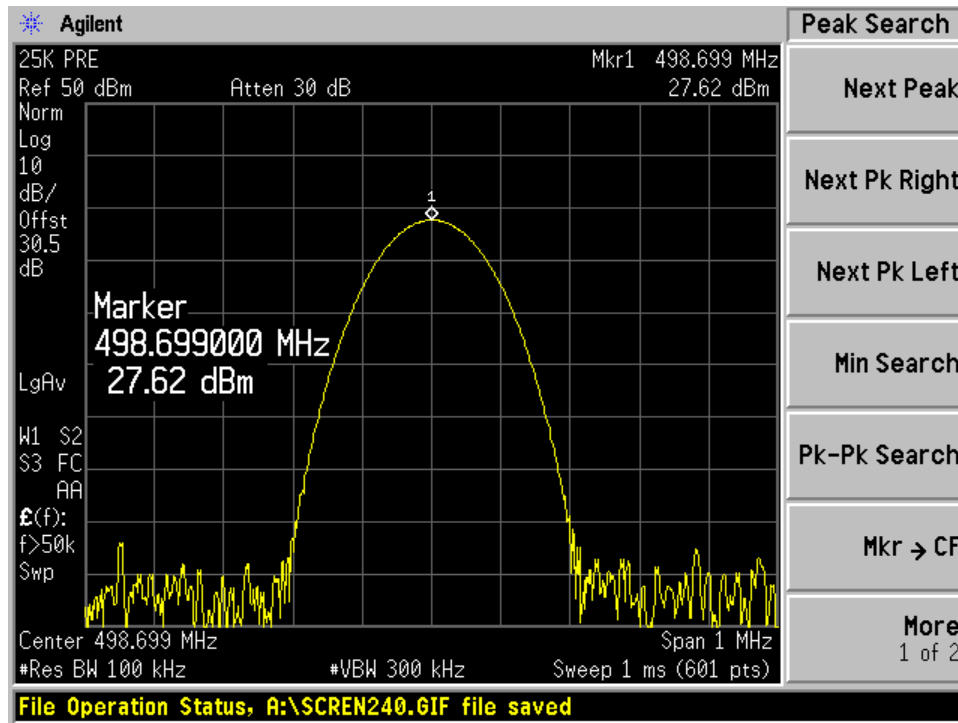
Analog: Flat: 25.0 kHz



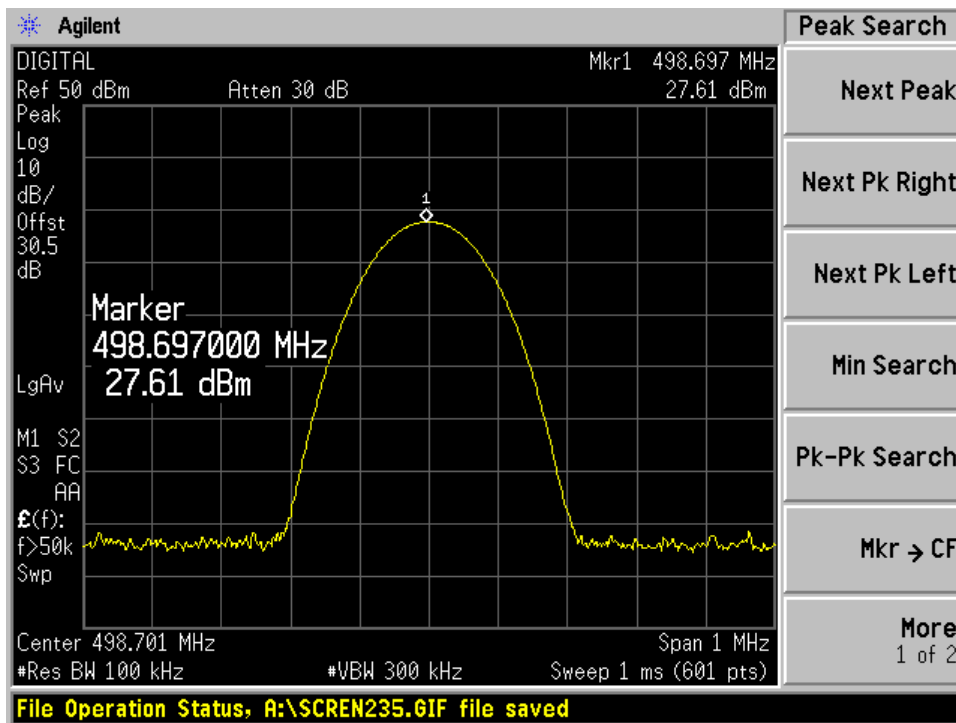
Analog: Pre-Emphasis: 12.5 kHz



Analog: Pre-Emphasis: 25.0 kHz



Digital



§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:	25° C
Relative Humidity:	40 %
ATM Pressure:	102 kPa

** The testing was performed by James Ma on 2007-03-31.*

Test Equipment List and Details

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

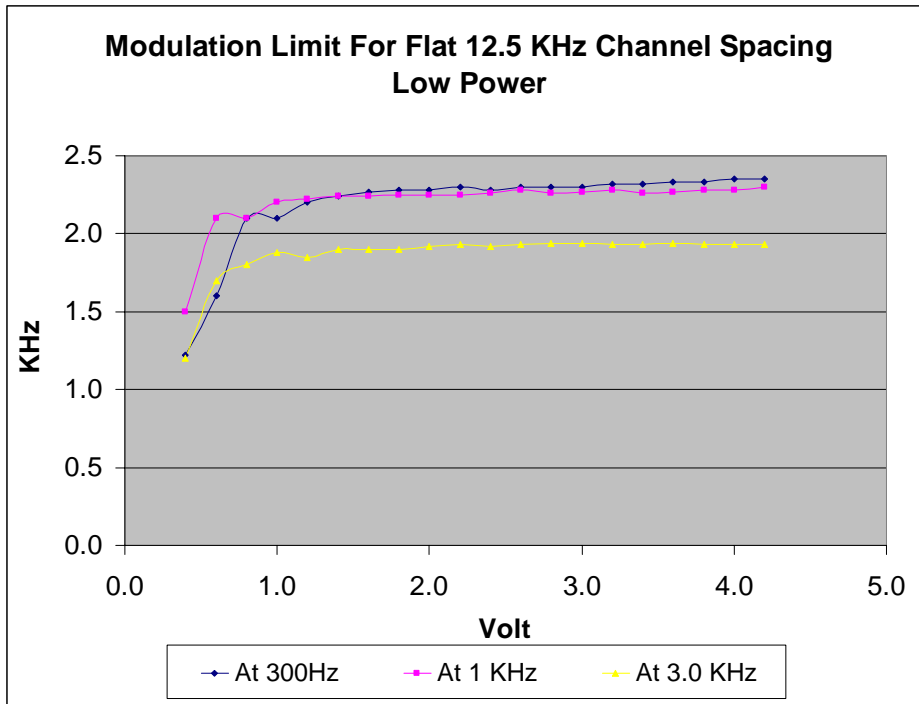
*** Statement of Traceability: BAEL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Result

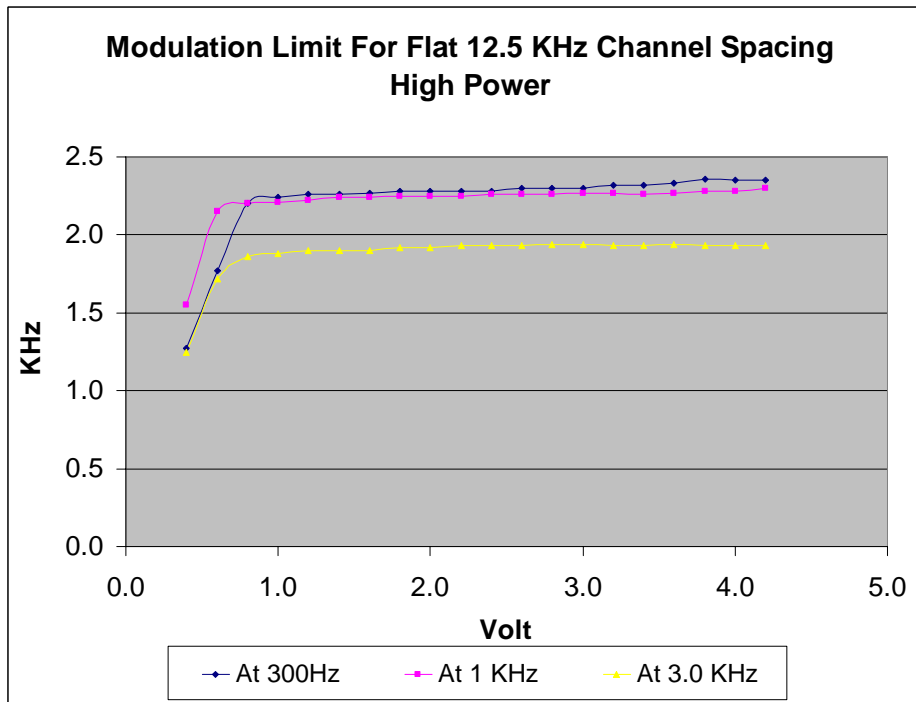
Test Mode: Transmitting

Modulation Limit: Flat 12.5 kHz Channel Spacing

Low Power

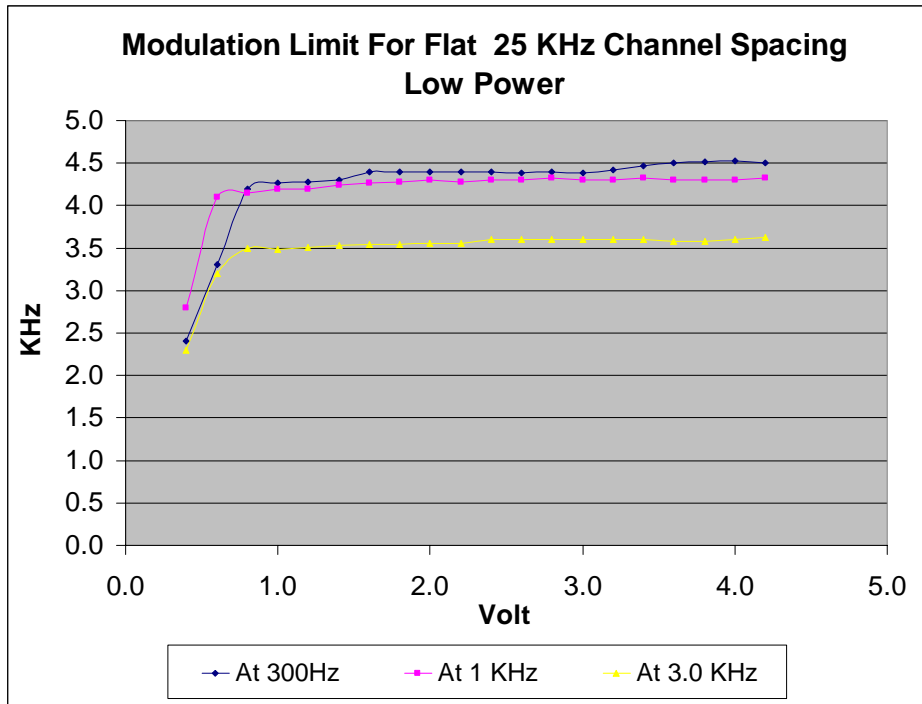


High Power

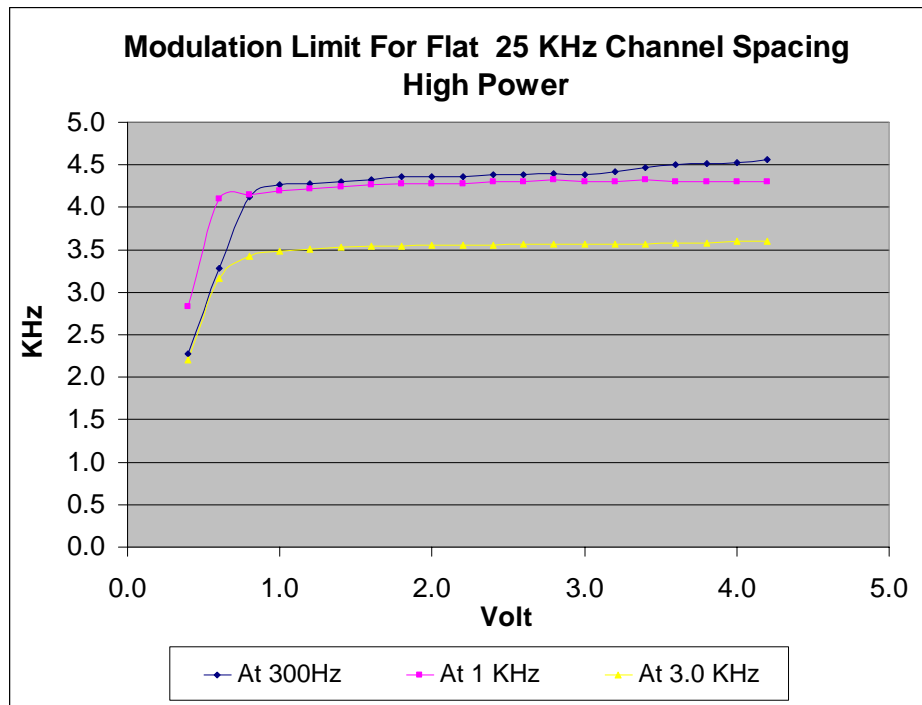


Modulation Limit: Flat 25.0 kHz Channel Spacing

Low Power

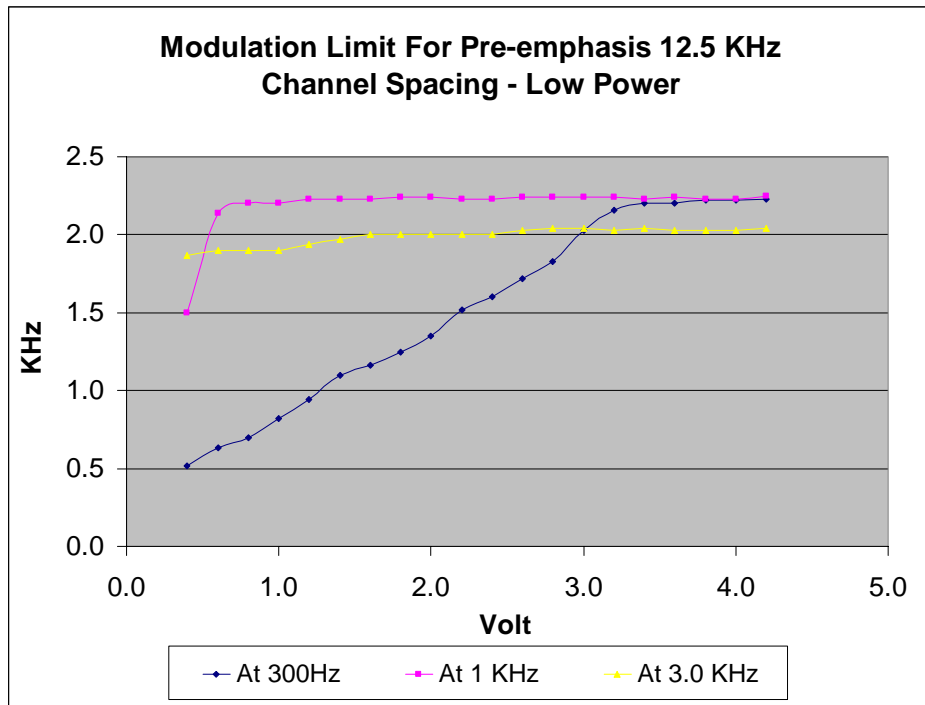


High Power

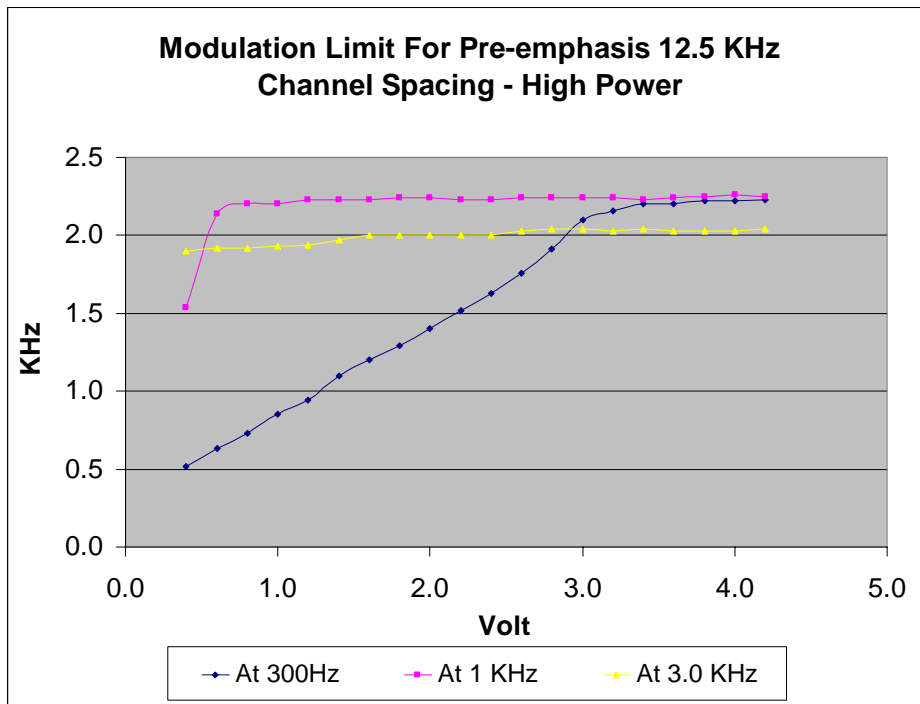


Modulation Limit: Pre-Emphasis 12.5 kHz Channel Spacing

Low Power

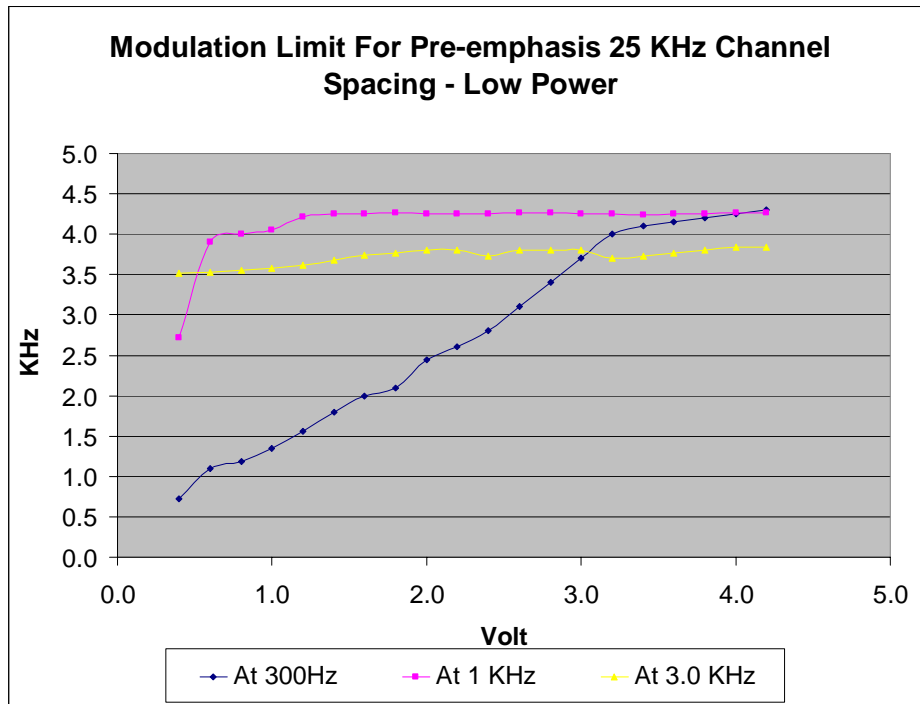


High Power

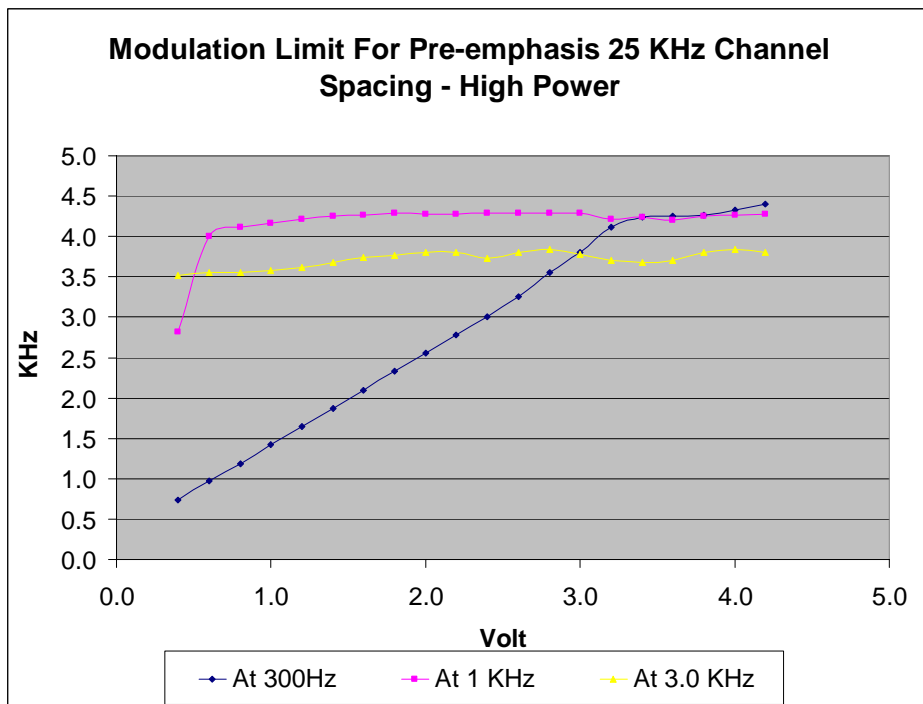


Modulation Limit: Pre-Emphasis 25.0 kHz Channel Spacing

Low Power

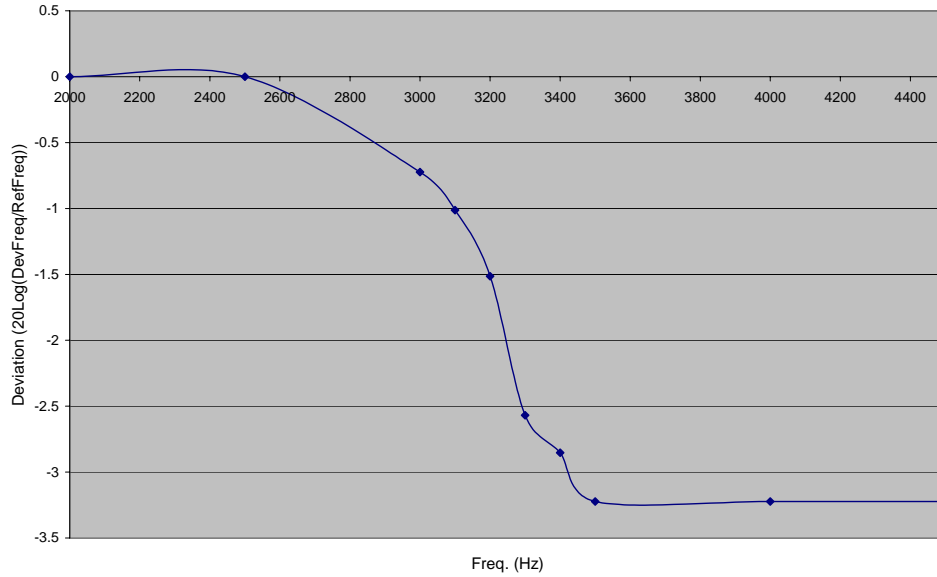


High Power

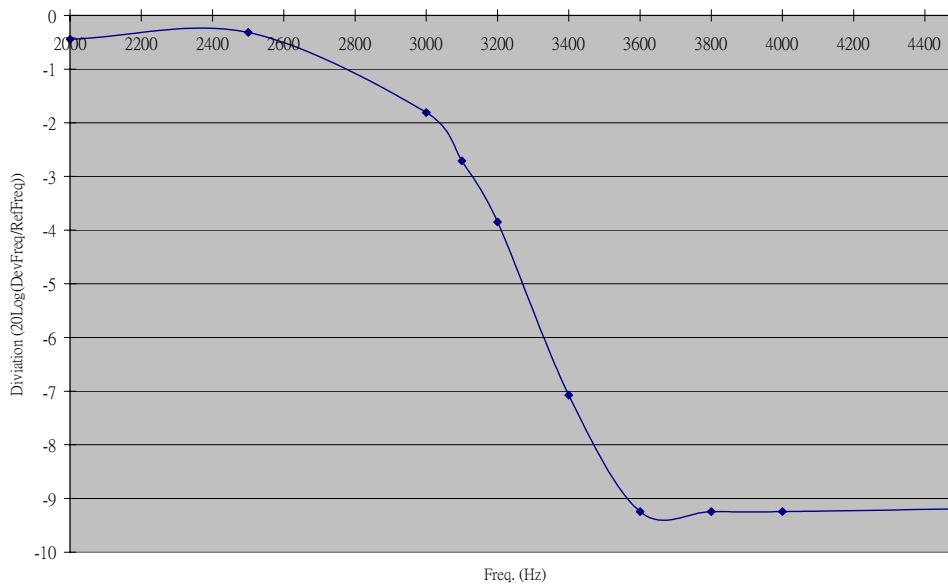


Audio LPF Response: Flat Channel Spacing

Audio LPF Frequency Response for Flat 12.5 KHz

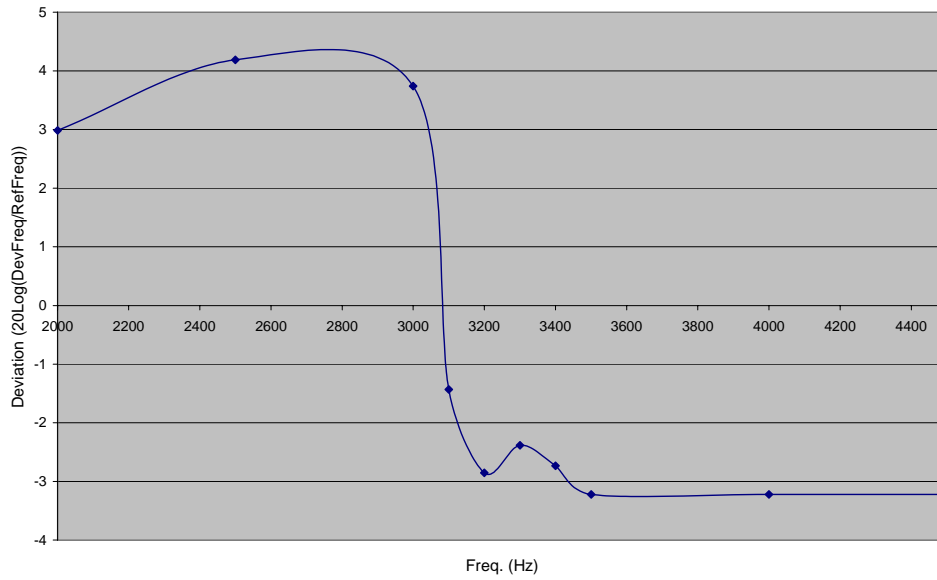


Audio LPF Frequency Response for Flat 25 KHz

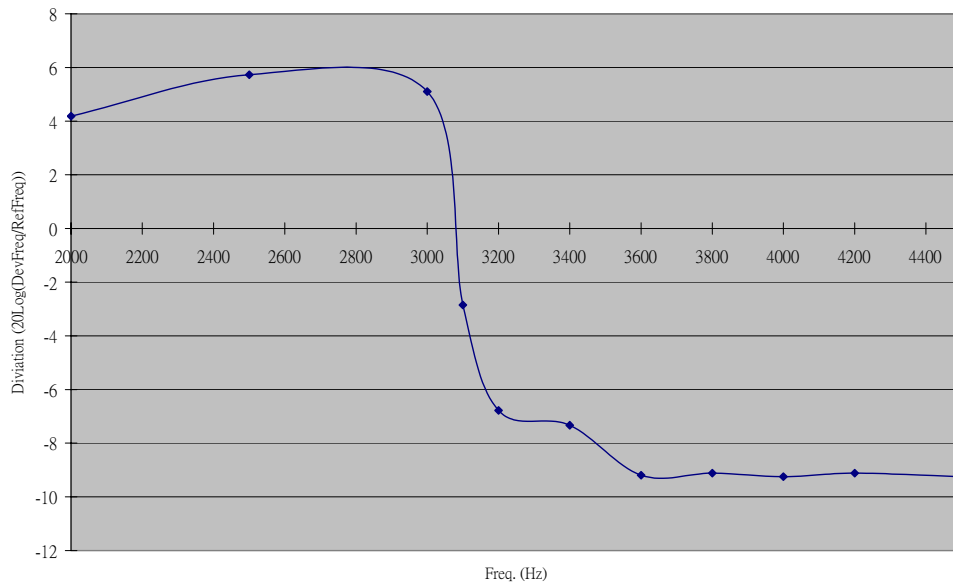


Audio LPF Response: Pre-Emphasis Channel Spacing

Audio LPF Frequency Response for Pre-emphasis 12.5 KHz

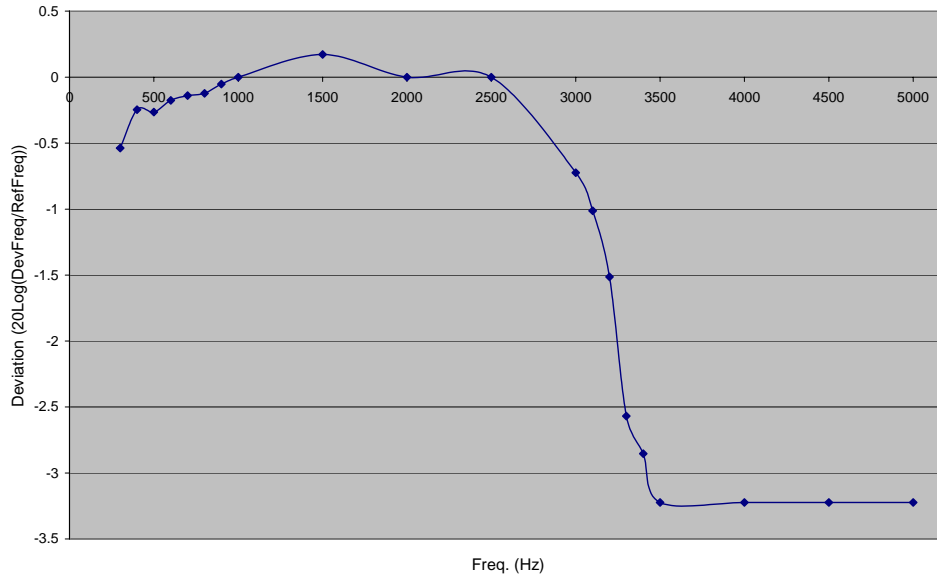


Audio LPF Frequency Response for Pre-emphasis 25 KHz

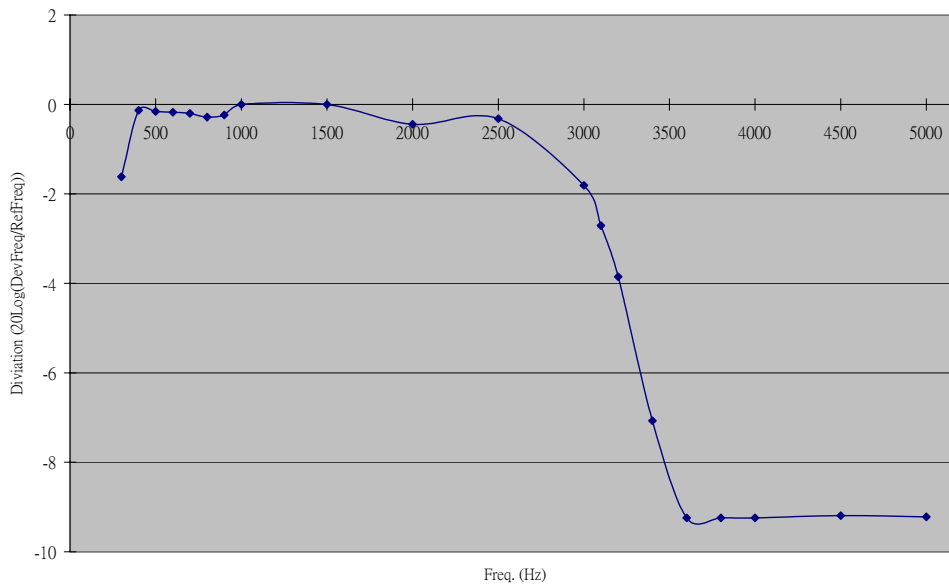


Audio Frequency Response: Flat Channel Spacing

Audio Frequency Response for Flat 12.5 KHz

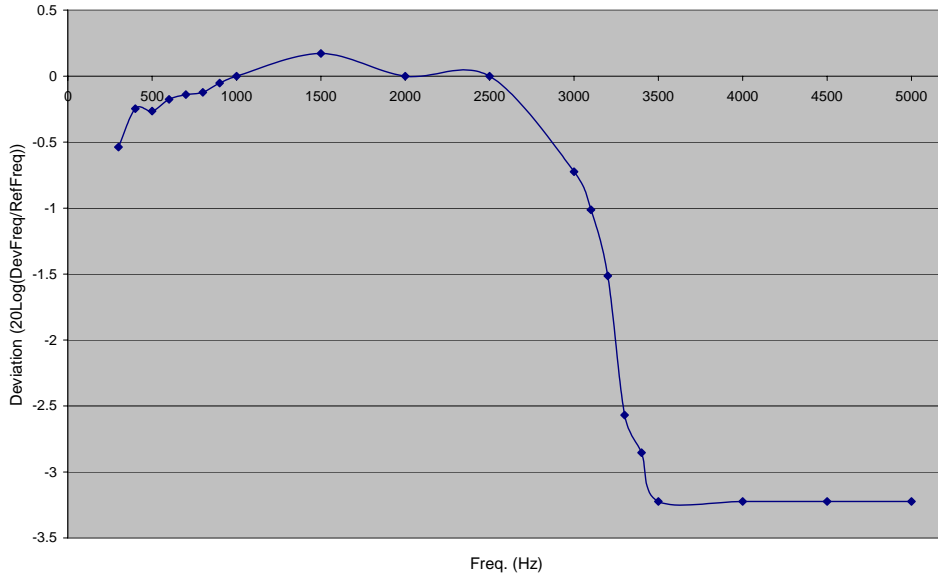


Audio Frequency Response for Flat 25 KHz

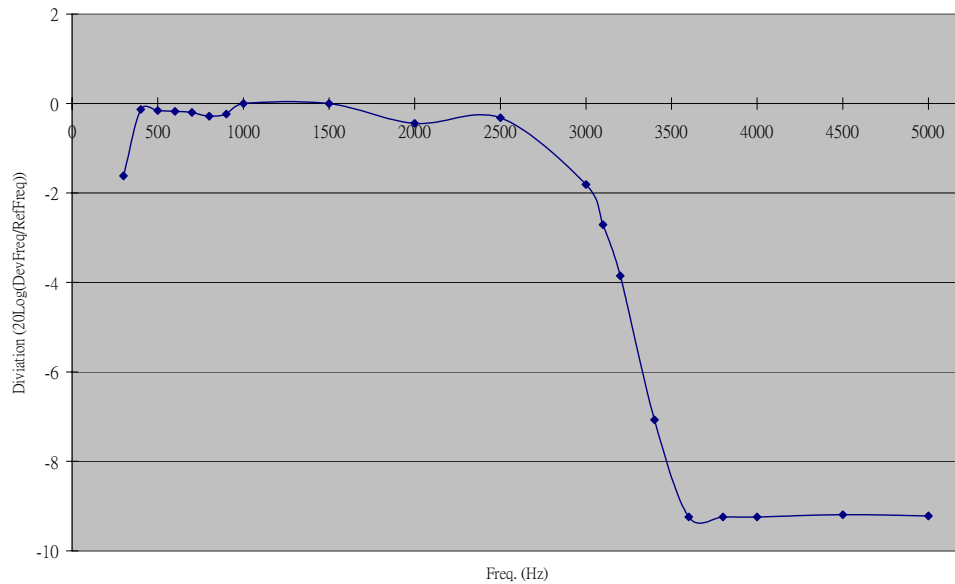


Audio Frequency Response: Pre-Emphasis Channel Spacing

Audio Frequency Response for Flat 12.5 KHz



Audio Frequency Response for Flat 25 KHz



§2.1049, §22.359, 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 5.625 kHz 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 5.625kHz 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 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.

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:	25° C
Relative Humidity:	40 %
ATM Pressure:	102 kPa

** The testing was performed by James Ma on 2007-03-31.*

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-04-06

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

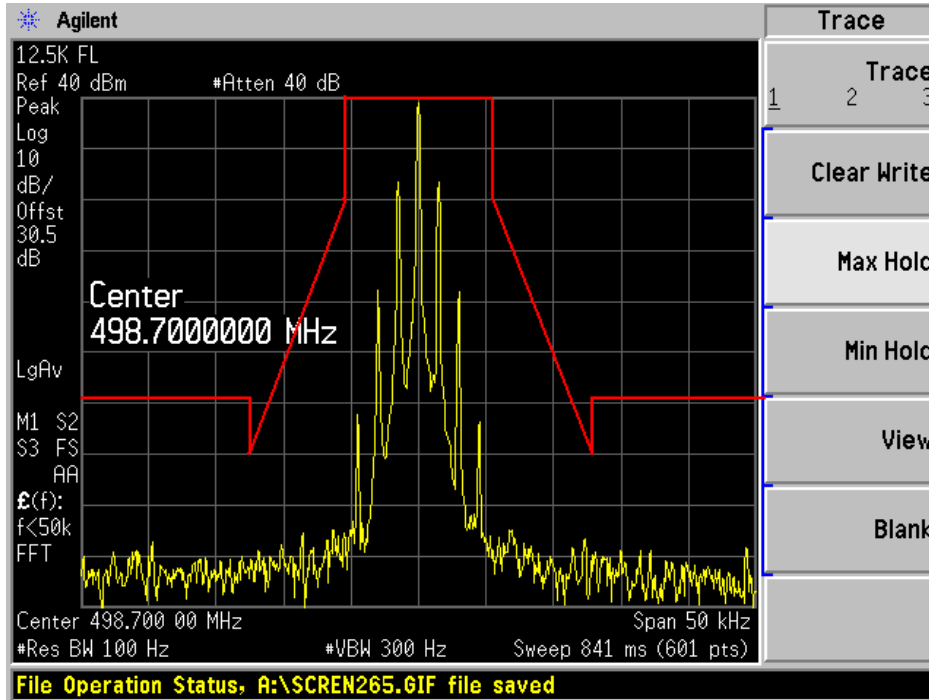
Test Result

Please refer to the hereinafter plots.

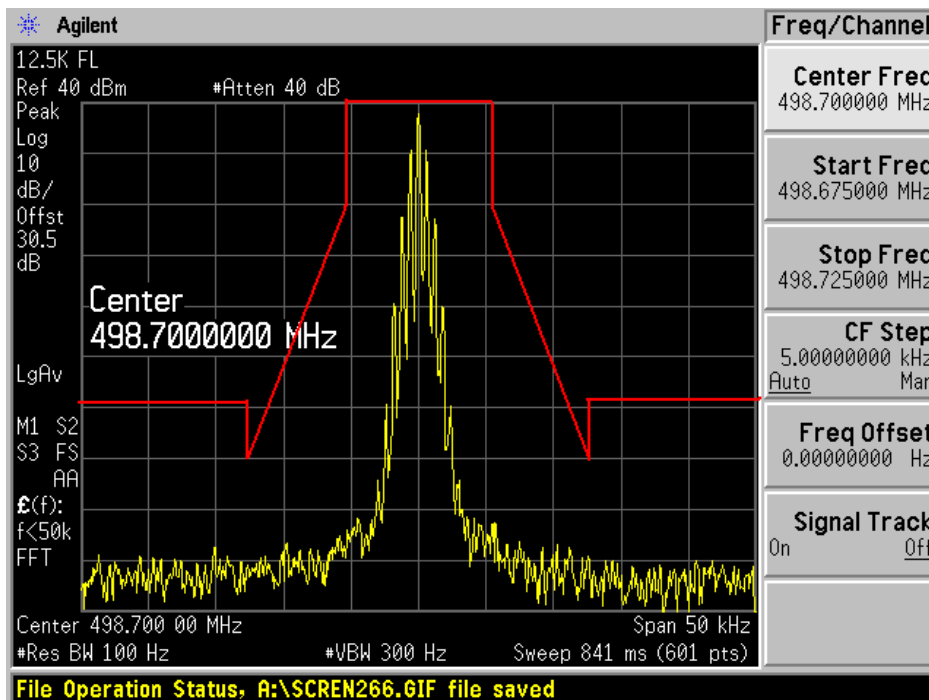
High Power

Flat Channel Spacing 12.5 kHz

Audio

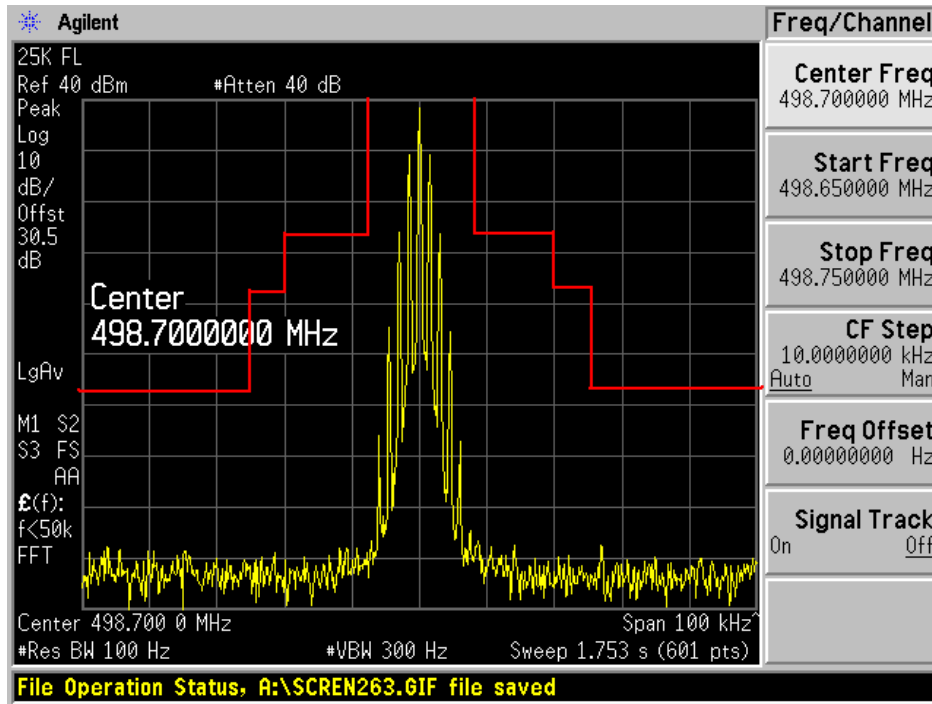


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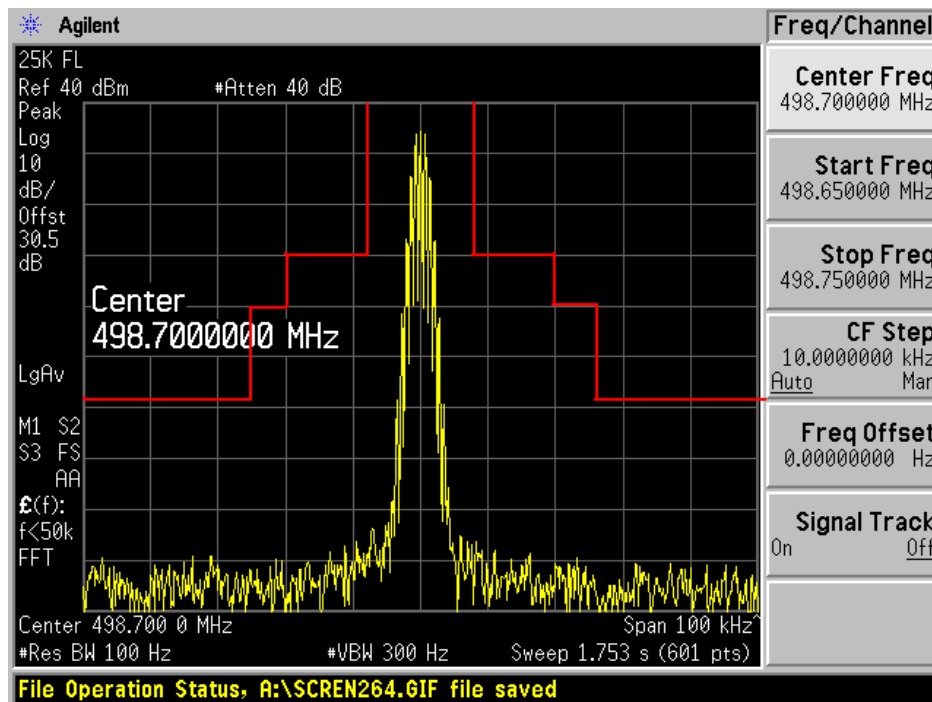


Flat Channel Spacing 25.0 kHz

Audio

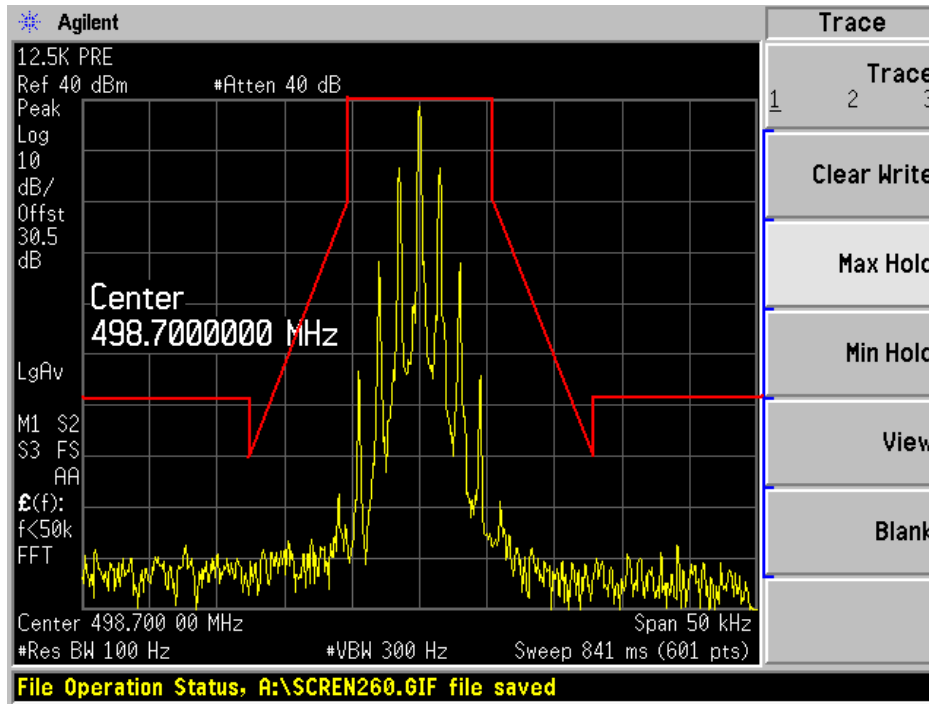


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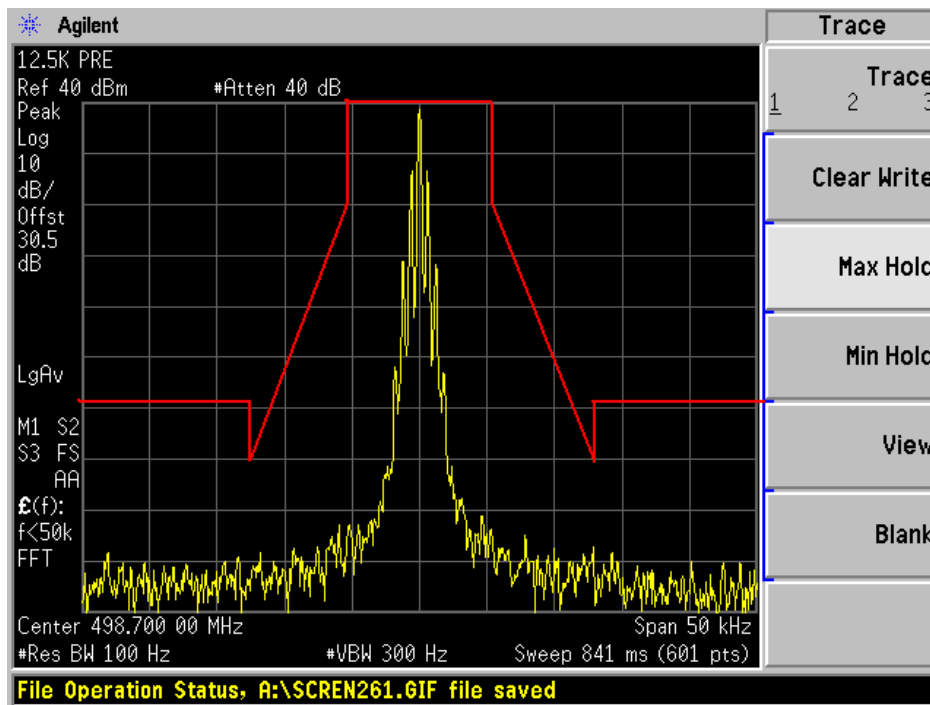


Pre-Emphasis Channel Spacing 12.5 kHz

Audio

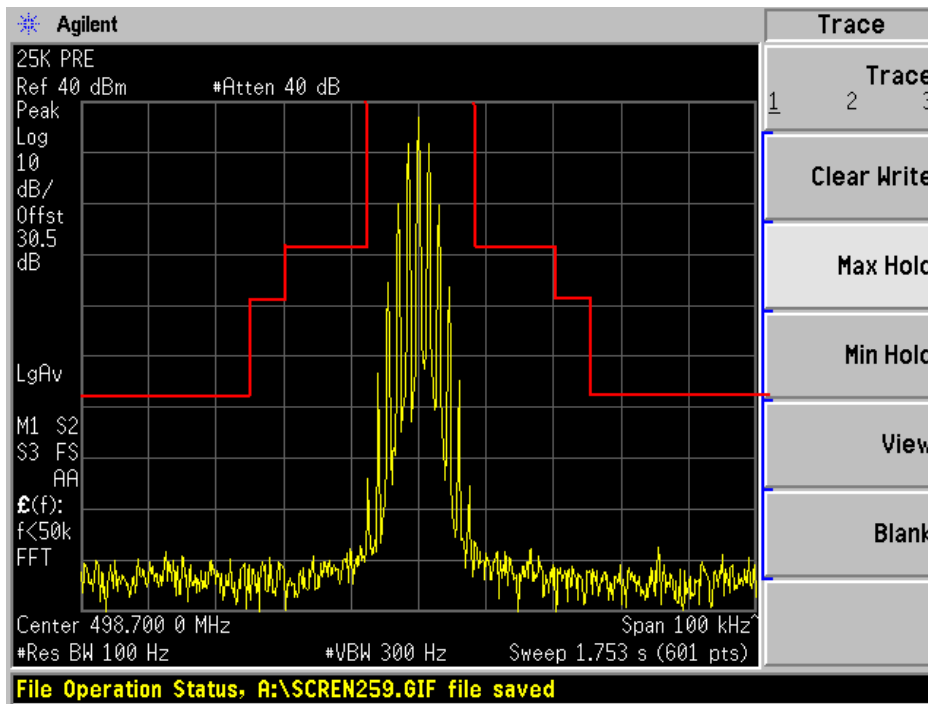


Data

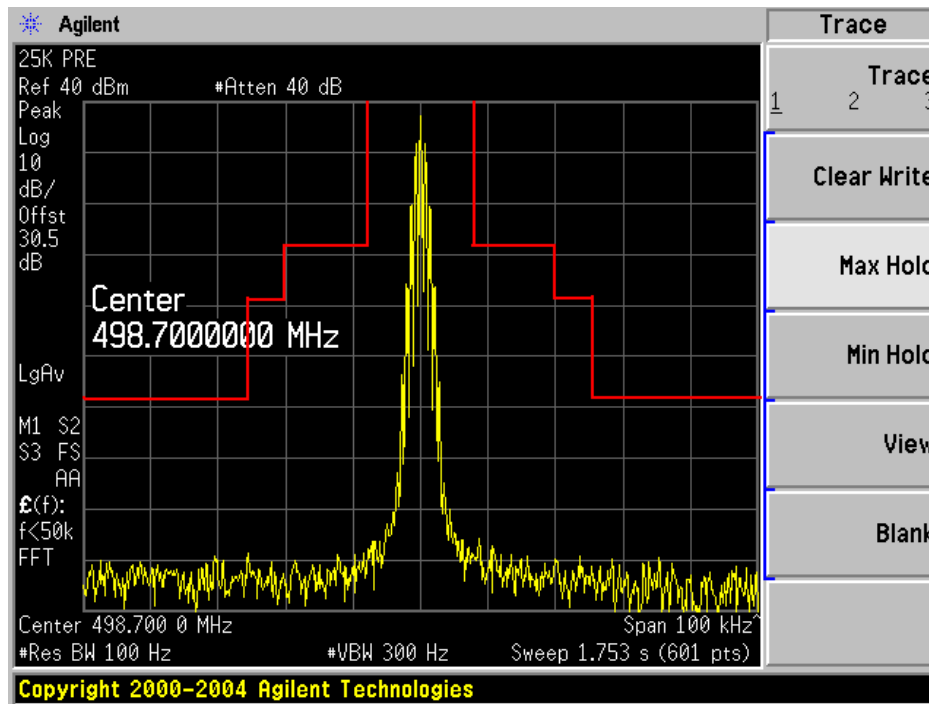


Pre-Emphasis Channel Spacing 25.0 kHz

Audio



Data



§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

§2.1051and §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:	25° C
Relative Humidity:	40 %
ATM Pressure:	102 kPa

* The testing was performed by James Ma on 2007-03-31.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-04-06

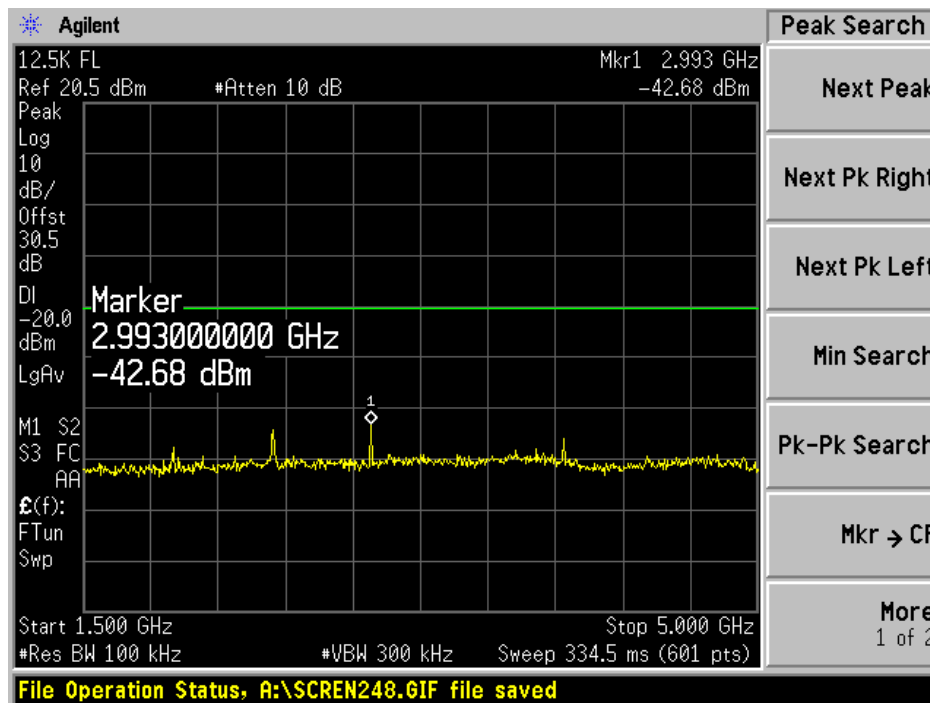
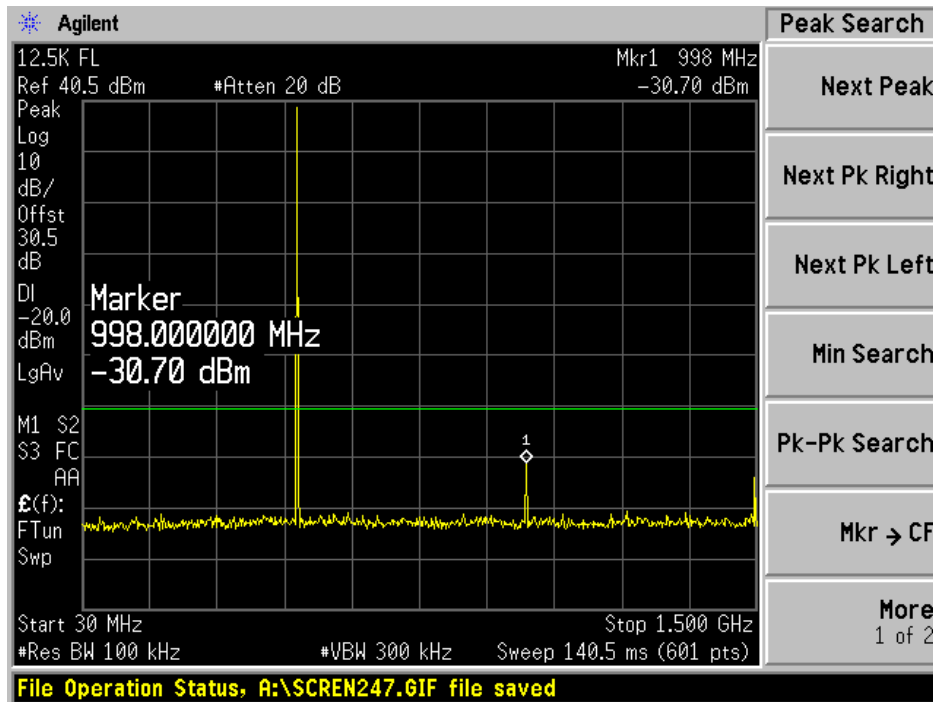
* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Results

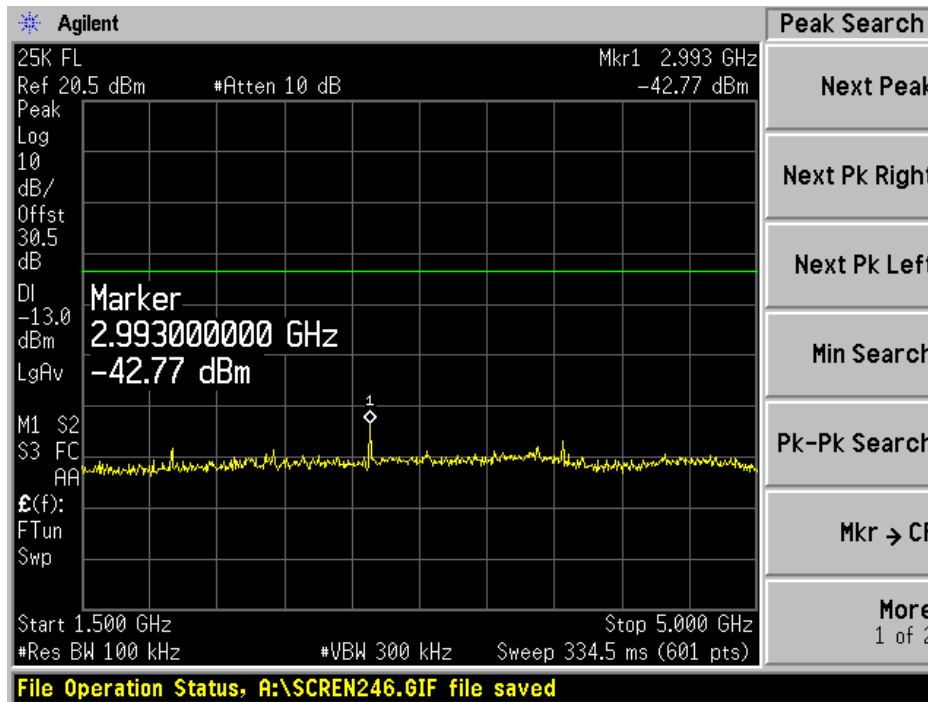
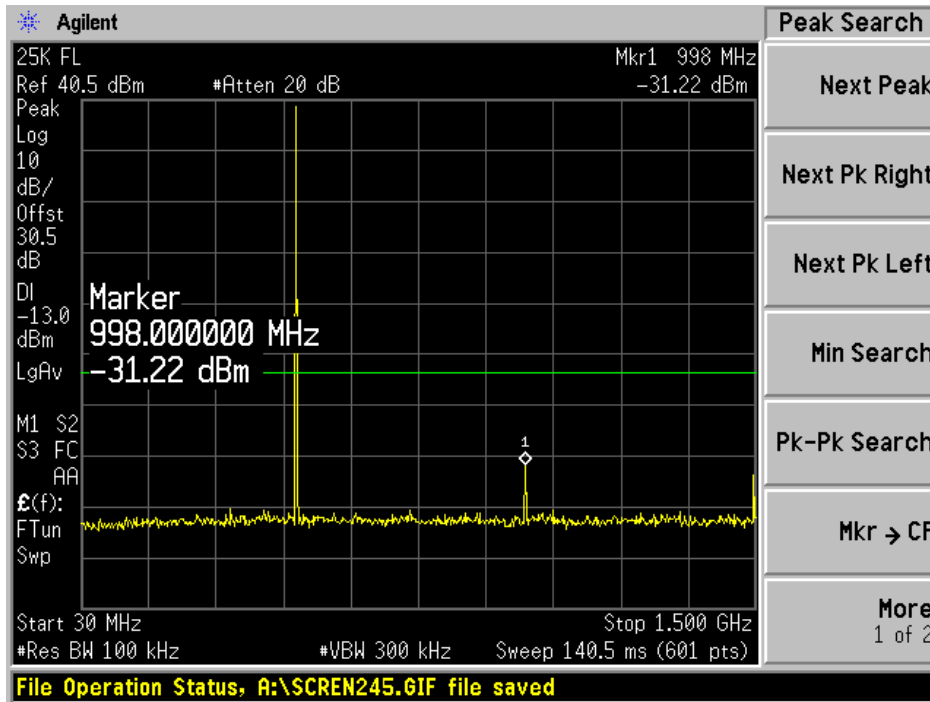
Test Mode: Transmitting Using Conducted measuring method

Analog

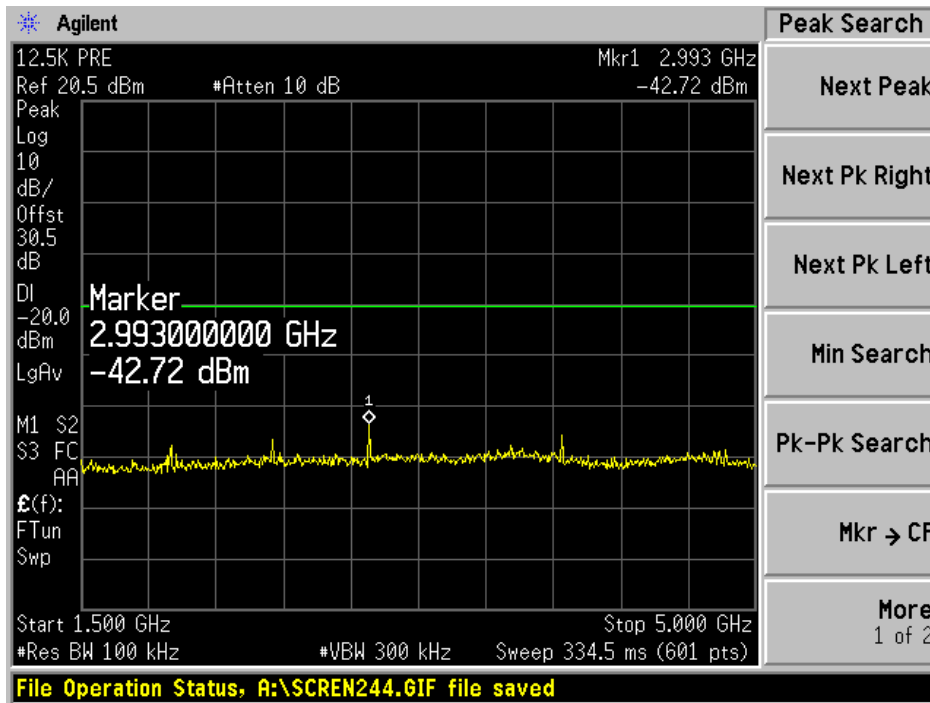
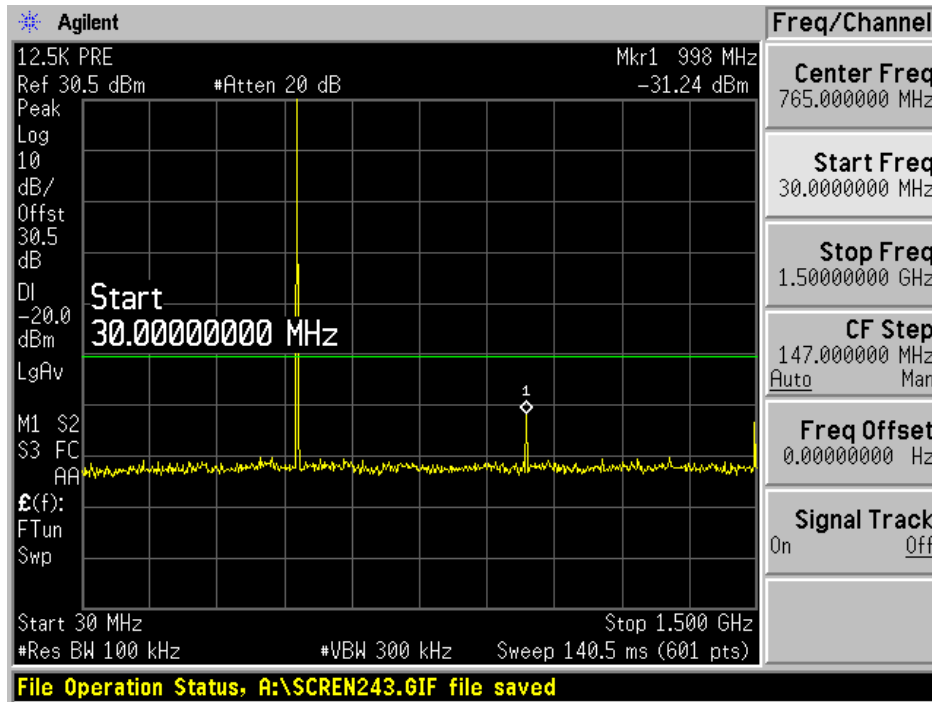
12.5 kHz Flat Channel Bandwidth:



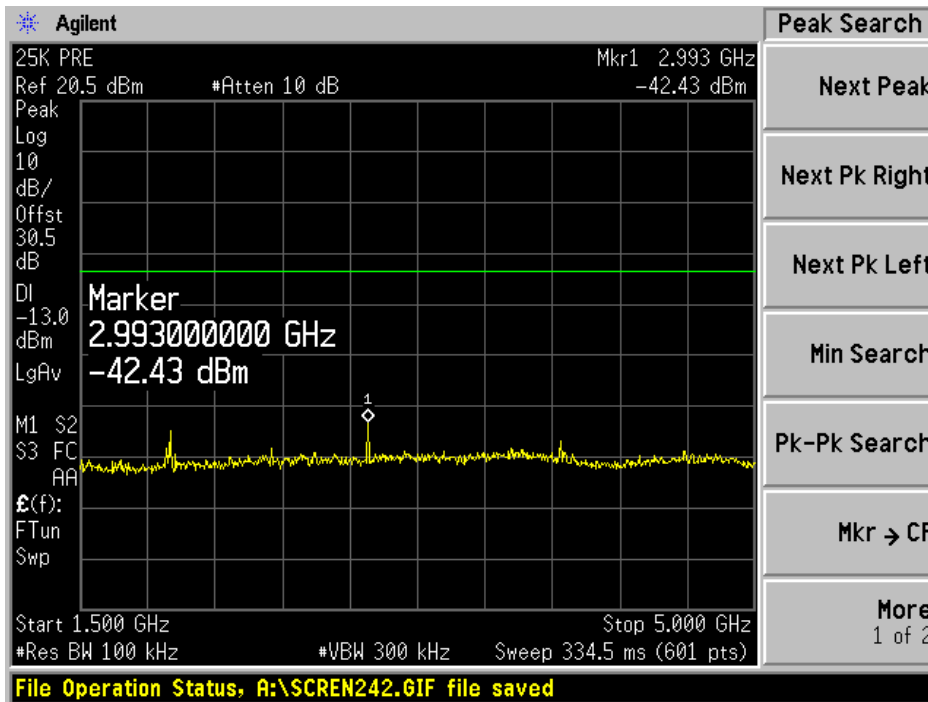
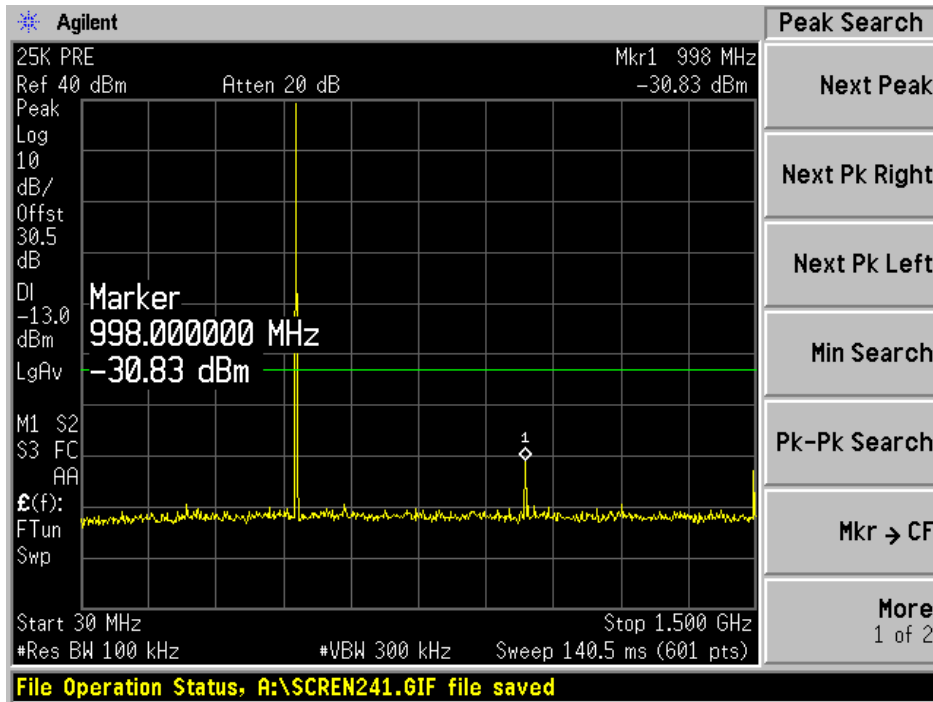
25.0 kHz Flat Channel Bandwidth:



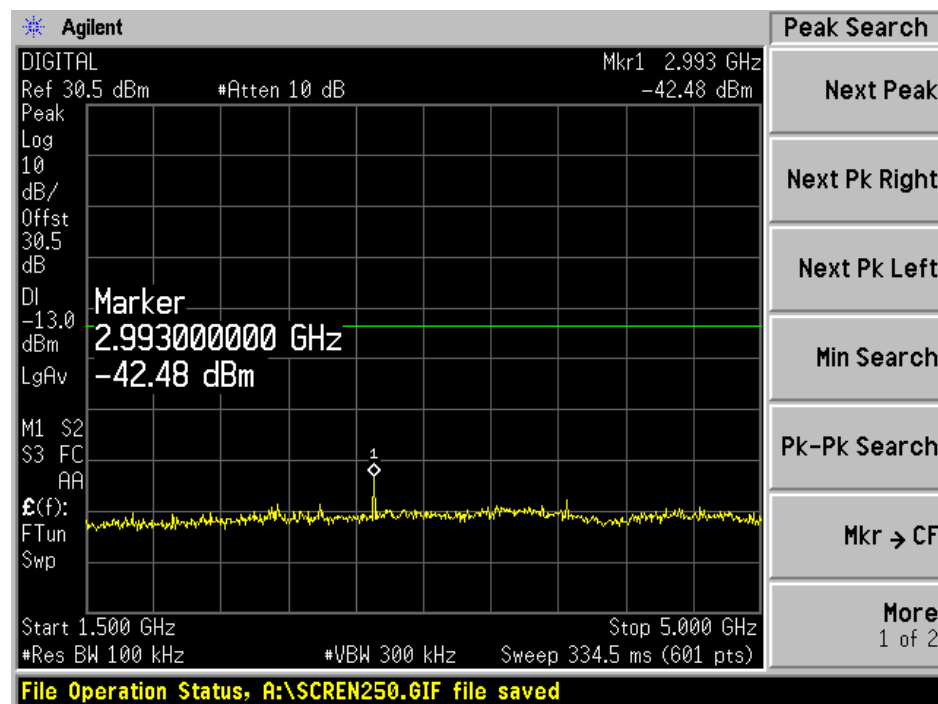
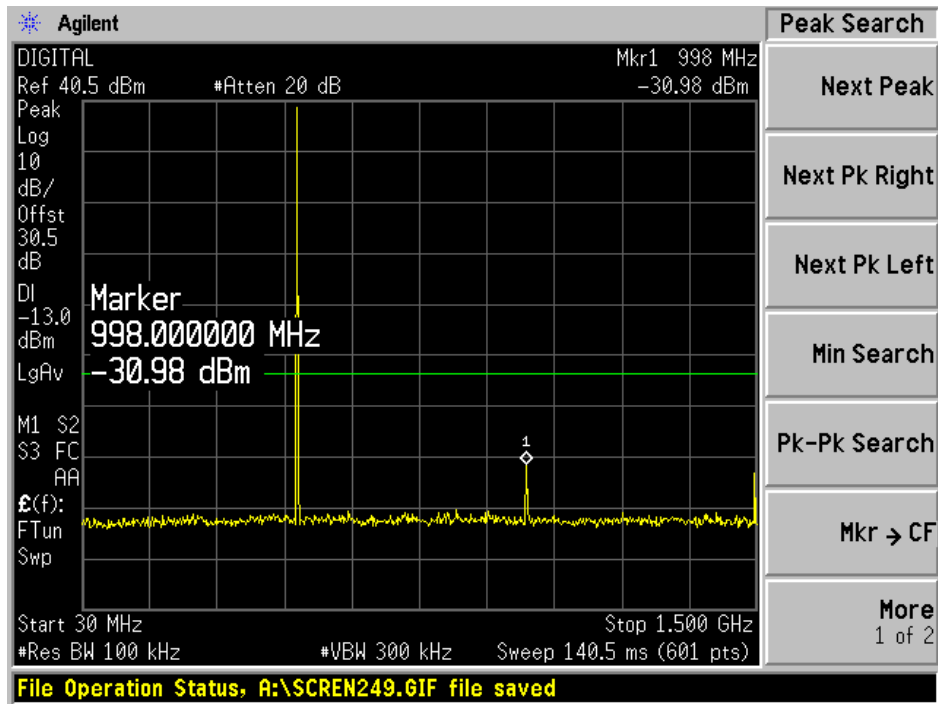
12.5 kHz Pre-Emphasis Channel Bandwidth:



25.0 kHz Pre-Emphasis Channel Bandwidth:



Digital



§2.1055 (d), §22.355, 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:	25° C
Relative Humidity:	40 %
ATM Pressure:	102 kPa

** The testing was performed by James Ma on 2007-03-31.*

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Generator, Signal (100 kHz - 3200 MHz)	8648C	3347M00143	2006-09-13
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-04-06
Tektronix	Oscilloscope	TDS7104	B020557	2007-02-13

*** 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

Analog 498.7MHz (High Power 25 kHz)

Frequency vs. Temperature

Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (PPM)	Limit (PPM)
Voltage (VDC)	Temperature (°C)				
13.8	60	498.70000	498.70107	2.1456	2.50
13.8	50	498.70000	498.70089	1.7846	2.50
13.8	40	498.70000	498.70072	1.4438	2.50
13.8	30	498.70000	498.70005	0.0922	2.50
13.8	10	498.70000	498.69993	-0.1404	2.50
13.8	0	498.70000	498.69923	-1.5440	2.50
13.8	-10	498.70000	498.69920	-1.6042	2.50
13.8	-20	498.70000	498.69903	-1.9451	2.50
13.8	-30	498.70000	498.69890	-2.2057	2.50

Frequency vs. Voltage

Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (PPM)	Limit (PPM)
Voltage (VDC)	Temperature (°C)				
15.18	20	498.70000	498.70017	0.3409	2.50
12.42	20	498.70000	498.70022	0.4411	2.50

Digital 498.7MHz (High Power)

Frequency vs. Temperature

Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (PPM)	Limit (PPM)
Voltage (VDC)	Temperature (°C)				
13.8	60	498.70000	498.70095	1.8949	2.50
13.8	50	498.70000	498.70082	1.6342	2.50
13.8	40	498.70000	498.70057	1.1430	2.50
13.8	30	498.70000	498.70011	0.2105	2.50
13.8	10	498.70000	498.69970	-0.6016	2.50
13.8	0	498.70000	498.69946	-1.0868	2.50
13.8	-10	498.70000	498.69937	-1.2633	2.50
13.8	-20	498.70000	498.69925	-1.5039	2.50
13.8	-30	498.70000	498.69910	-1.8047	2.50

Frequency vs. Voltage

Condition		Reference Frequency (MHz)	Measured Frequency (MHz)	Frequency Error (PPM)	Limit (PPM)
Voltage (VDC)	Temperature (°C)				
15.18	20	498.70000	498.70018	0.3609	2.50
12.42	20	498.70000	498.70024	0.4813	2.50

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

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.

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:	25° C
Relative Humidity:	40 %
ATM Pressure:	102 kPa

** The testing was performed by James Ma on 2007-03-31.*

Test Equipment

Manufacturer	Description	Model	Serial Number	Calibration Date
Sunol Sciences	30 - 3000 MHz	JB3	A020106-3 / S006628	2007-03-05
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-04-06
Sonoma Instrument	Pre-amplifier	317	260407	2006-04-20
Com-Power	Antenna, Dipole	AD-100	2219	2006-04-26
ARA	Antenna Horn	DRG-118/A	1132	2005-08-17 (2yrs)
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2006-10-18

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

Test Result

Pre-Emphasis Channel Spacing

-28.6 dB at 1994.8 MHz in the Horizontal polarization

Flat Channel Spacing

-29.8 dB at 1994.8 MHz in the Vertical polarization

Digital

-34.0 dB at 1994.8 MHz in the Vertical polarization

Test Mode: Measured at 3 meters, 30 MHz – 5 GHz Tx

Middle Channel at High Power

Analog 498.7 MHz (25 kHz Pre-emphasis)

Indicated		Azimuth degrees	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amplitude (dBuV)		Height (m)	Polar H/V	Freq. (MHz)	Level (dBm)	Antenna Correction	Cable Loss (dB)	Absolute Level (dBm)		
1994.8	45.3	190	1.1	V	1994.8	-56.2	8.8	1.1	-48.5	-13	-35.5
1994.8	44.2	80	2.1	H	1994.8	-58.4	8.8	1.1	-50.7	-13	-37.7
997.4	49.2	120	1.5	H	997.4	-56.5	0	0.9	-57.4	-13	-44.4
1496.1	42.2	55	1.6	H	1496.1	-62.8	6.3	0.9	-57.4	-13	-44.4
1496.1	38.7	0	1.5	V	1496.1	-66.7	6.3	0.9	-61.3	-13	-48.3
997.4	42.7	280	2.5	V	997.4	-62.9	0	0.9	-63.8	-13	-50.8

Analog 498.7 MHz (12.5 kHz Pre-emphasis)

Indicated		Azimuth degrees	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amplitude (dBuV)		Height (m)	Polar H/V	Freq. (MHz)	Level (dBm)	Antenna Correction	Cable Loss (dB)	Absolute Level (dBm)		
1994.8	46.2	0	1.8	H	1994.8	-56.3	8.8	1.1	-48.6	-20	-28.6
1994.8	45.1	10	2.0	V	1994.8	-56.4	8.8	1.1	-48.7	-20	-28.7
1496.1	42.0	240	1.3	H	1496.1	-63.0	6.3	0.9	-57.6	-20	-37.6
1496.1	42.3	0	1.7	V	1496.1	-63.1	6.3	0.9	-57.7	-20	-37.7
997.4	48.2	320	1.8	H	997.4	-57.4	0	0.9	-58.3	-20	-38.3
997.4	43.5	300	2.3	V	997.4	-62.1	0	0.9	-63.0	-20	-43.0

Middle Channel at High Power

Analog 498.7 MHz (25 kHz Flat)

Indicated		Azimuth degrees	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amplitude (dBuV)		Height (m)	Polar H/V	Freq. (MHz)	Level (dBm)	Antenna Correction	Cable Loss (dB)	Absolute Level (dBm)		
1994.8	44.3	300	1.1	V	1994.8	-57.1	8.8	1.1	-49.4	-13	-36.4
1994.8	44.1	300	1.0	H	1994.8	-58.3	8.8	1.1	-50.6	-13	-37.6
1496.1	42.2	220	1.0	H	1496.1	-62.8	6.3	0.9	-57.4	-13	-44.4
1496.1	40.0	230	2.2	V	1496.1	-65.5	6.3	0.9	-60.1	-13	-47.1
997.4	44.7	120	1.5	H	997.4	-60.8	0	0.9	-61.7	-13	-48.7
997.4	40.4	0	1.8	V	997.4	-65.0	0	0.9	-65.9	-13	-52.9

Analog 498.7 MHz (12.5 kHz Flat)

Indicated		Azimuth degrees	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amplitude (dBuV)		Height (m)	Polar H/V	Freq. (MHz)	Level (dBm)	Antenna Correction	Cable Loss (dB)	Absolute Level (dBm)		
1994.8	44.0	300	1.1	V	1994.8	-57.5	8.8	1.1	-49.8	-20	-29.8
1994.8	43.8	300	1.2	H	1994.8	-58.6	8.8	1.1	-50.9	-20	-30.9
1496.1	42.6	70	1.6	H	1496.1	-62.3	6.3	0.9	-56.9	-20	-36.9
1496.1	40.8	200	1.5	V	1496.1	-64.7	6.3	0.9	-59.3	-20	-39.3
997.4	42.7	100	1.5	H	997.4	-62.8	0	0.9	-63.7	-20	-43.7
997.4	40.3	0	1.8	V	997.4	-65.0	0	0.9	-65.9	-20	-45.9

Middle Channel at High Power

Digital

Indicated		Azimuth degrees	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amplitude (dBuV)		Height (m)	Polar H/V	Freq. (MHz)	Level (dBm)	Antenna Correction	Cable Loss (dB)	Absolute Level (dBm)		
1994.8	46.8	220	1.8	V	1994.8	-54.7	8.8	1.1	-47.0	-13	-34.0
1994.8	45.2	0	1.2	H	1994.8	-57.2	8.8	1.1	-49.5	-13	-36.5
1496.1	43.7	0	2.3	V	1496.1	-61.7	6.3	0.9	-56.3	-13	-43.3
1496.1	42.5	10	1.3	H	1496.1	-62.3	6.3	0.9	-56.9	-13	-43.9
997.4	47.8	300	1.3	H	997.4	-57.7	0	0.9	-58.6	-13	-45.6
997.4	44.2	340	2.2	V	997.4	-61.1	0	0.9	-62.0	-13	-49.0

§90.214 - TRANSIENT FREQUENCY BEHAVIOR

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
		421 to 512 MHz
Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels		
t_1^4	±25.0 kHz	10.0 ms
t_2	±12.5 kHz	25.0 ms
t_3^4	±25.0 kHz	10.0 ms
Transient Frequency Behavior for Equipment Designed to Operate on 12.5 kHz Channels		
t_1^4	±12.5 kHz	10.0 ms
t_2	±6.25 kHz	25.0 ms
t_3^4	±12.5 kHz	10.0 ms

Test Procedure

TIA/EIA-603-C 2.2.19

Environmental Conditions

Temperature:	25° C
Relative Humidity:	40 %
ATM Pressure:	102 kPa

* The testing was performed by James Ma on 2007-03-31.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Generator, Signal (100 kHz - 3200 MHz)	8648C	3347M00143	2006-09-13
Agilent	Analyzer, Spectrum	E4446A	US44300386	2006-04-06
HP	Modulation Analyzer	8901A	2026A00847	2006-01-17 (2 yrs)
Tektronix	Oscilloscope	TDS7104	B020557	2007-02-13

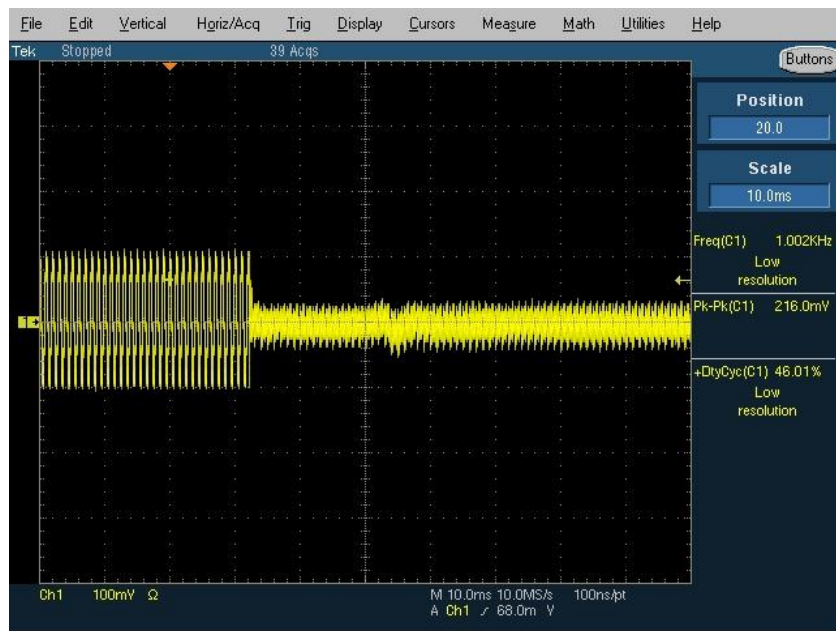
* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Test Result

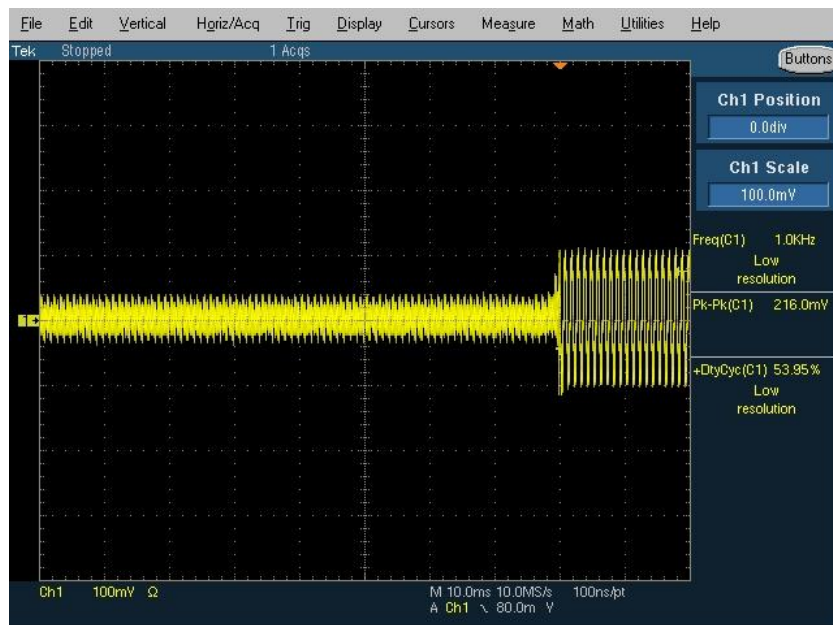
Please refer to the following plots

High Power: 12.5 kHz Flat Channel Spacing

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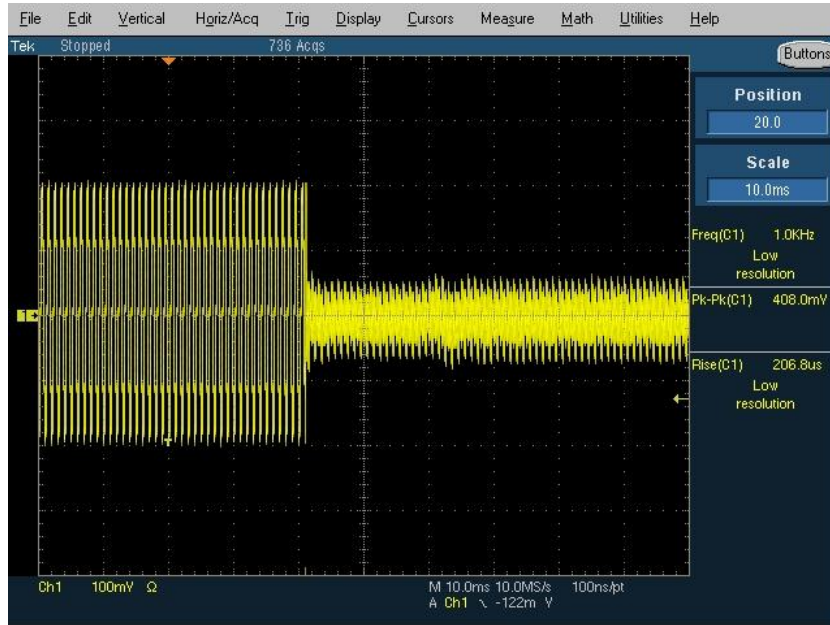


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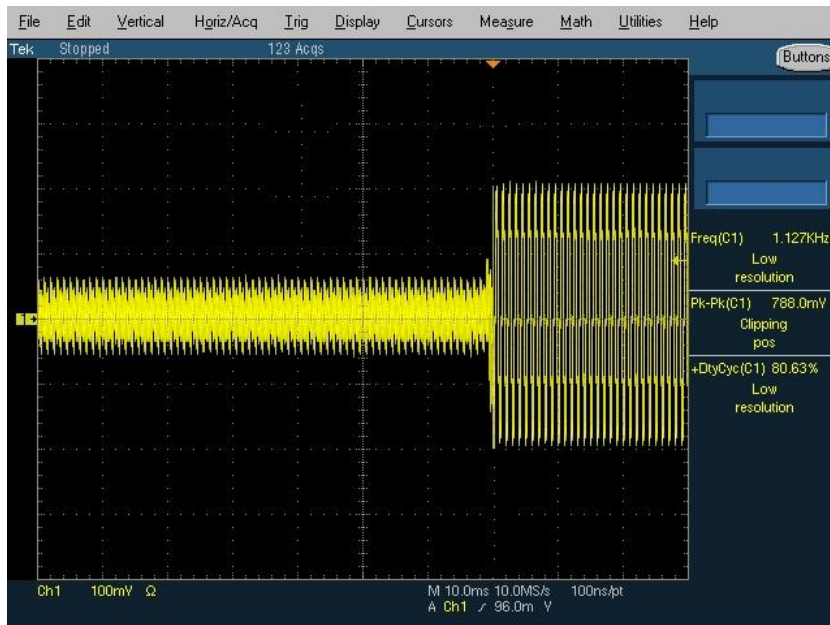


High Power: 25.0 kHz Flat Channel Spacing

On:

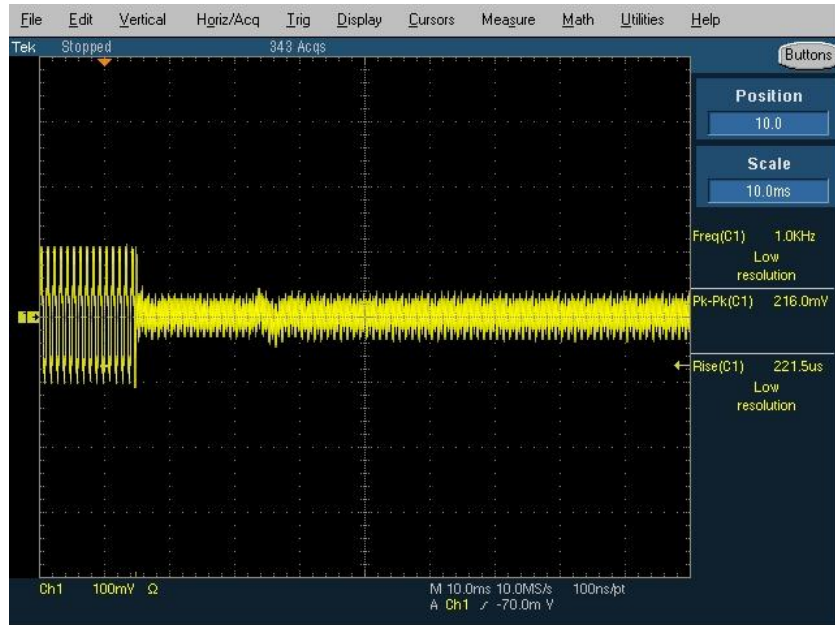


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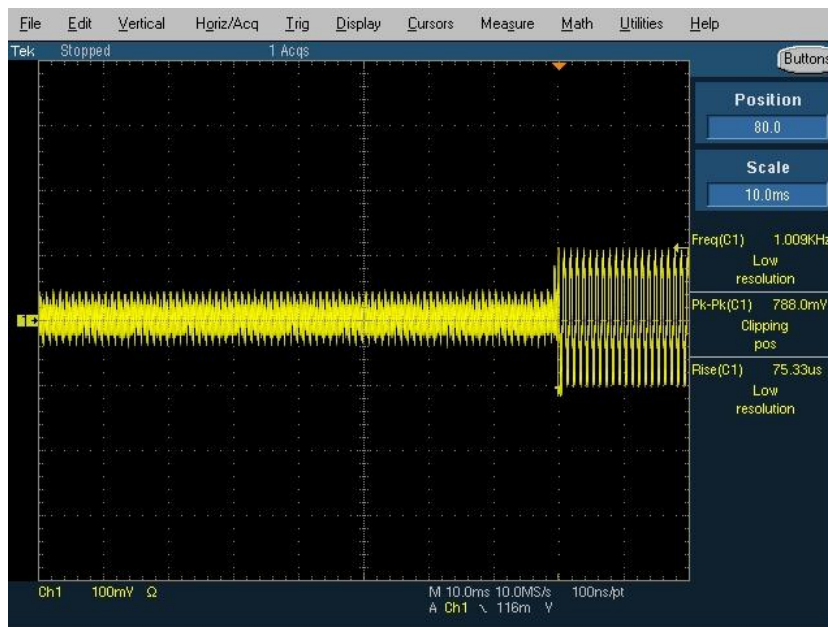


High Power: 12.5 kHz Pre-Emphasis Channel Spacing

On:

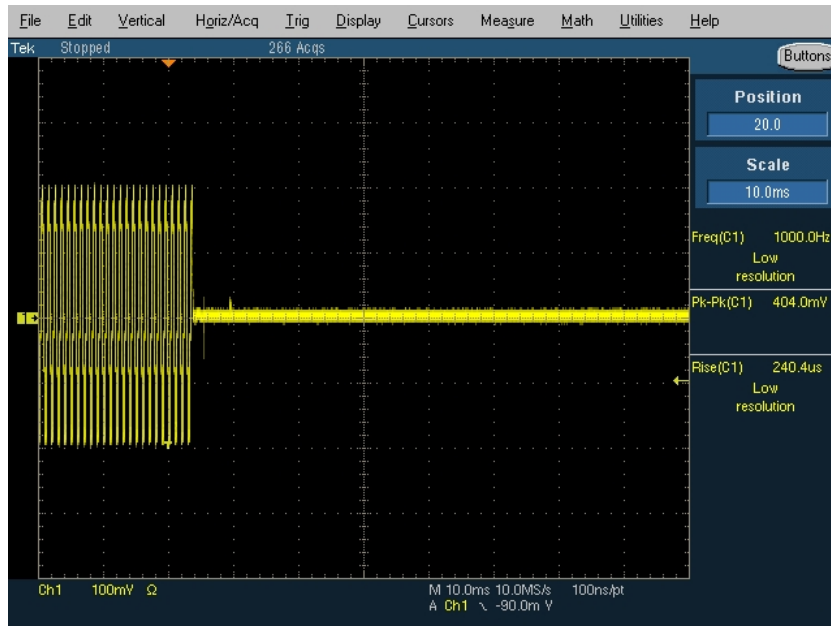


Off:



High Power: 25.0 kHz Pre-Emphasis Channel Spacing

On:



Off:

