

FCC PART 27 TYPE APPROVAL

EMI MEASUREMENT AND TEST REPORT

For

VCom Inc.

150 Cardinal Place
Saskatoon, SK Canada S7L 6H7

FCC ID: OPPPA700

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Amplifier
Test Engineer: Daniel Deng / 	
Report No.: R0410271	
Test Date: 2004-10-29 / 2004-11-01	
Reviewed By: Ming Jing / 	
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Note: This test report is specially limited to the above client company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Vcom Inc.* 's product, Model: FCC ID: OPPPA700, or the "EUT" as referred to in this report is a fixed gain power amplifier for broadcast and fixed wireless applications in the UHF band. The EUT can be factory-configured for operation 470 to 862 MHz band with maximum output power 49.12 dBm. The EUT is measured approximately 18"(L) x 17.25"(W) x 5.25"(H),

** The test data gathered are from typical production sample, serial number: 04150, provided by the manufacturer.*

Objective

This report is prepared on behalf of Vcom Inc. in accordance with Part 2, Subpart J, Part 15, Subparts A and B, and Part 27 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for output power, modulation characteristic, occupied bandwidth, spurious emission at antenna terminal, field strength of spurious radiation, frequency stability, and conducted and radiated margin.

Related Submittal(s)/Grant(s)

No Related Submittals

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, and Part 27.

Applicable Standards: TIA EIA 137-A, TIA EIA 98-C, ANSI 63.4-1992, and TIA/EIA-603A.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp.

Test Facility

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

Test site at 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 and Article 8 of the VCCI regulations. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-1992.

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

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, CISPR 22: 2002, Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C64.3-2003.

The final qualification test was performed with the EUT operating at normal mode.

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

No modifications were made to the EUT.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Arris	Cadant C3 CMTS (modulation equipment)	710623	65000181-001604	DOC
Vcom	Band Pass Filter	DPX700	740-746	N/A

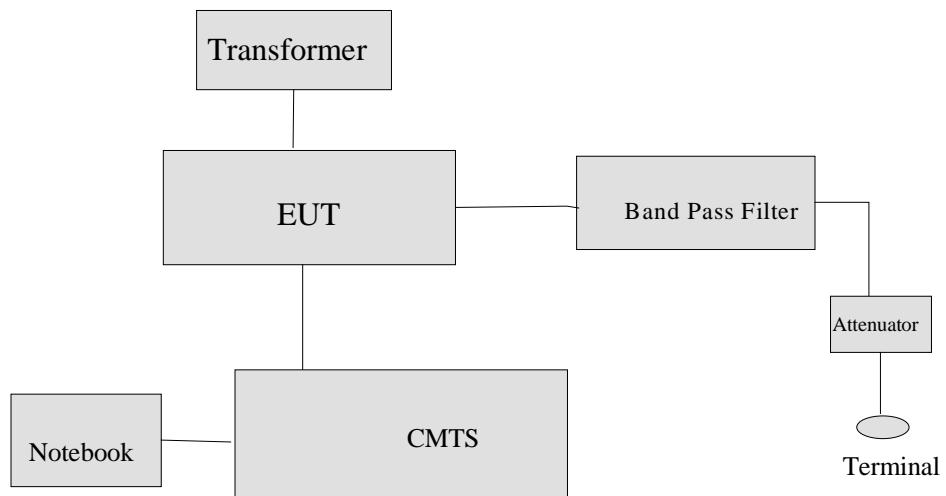
Remote Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
COMPAQ	Notebook	Presario 2100	CNF43403FB	DOC

Interface Ports and Cabling

Cable Description	Length (M)	From	To
RF Cable	1	EUT RF OutPort	Band Pass Filter
RF Cable	1	Band Pass Filter	Load
RF Cable	1	CMTS	EUT RF Input Port

Configuration of Test System



SUMMARY OF TEST RESULTS

Results reported relate only to the product tested, serial number: 04150.

FCC RULE	DESCRIPTION OF TEST	RESULT
§ 2.1046 § 27.50 (c)(1)(i)	Conducted RF Power Output	Compliant
§ 2.1047	Modulation Characteristics	Compliant
§ 2.1049	Authorized Bandwidth Band Edge	Compliant
§ 2.1051 § 27.53(f)	Conducted Spurious Emission Emissions Limits	Compliant
§ 2.1053 § 27.53(f)	Radiated Spurious Emission	Within Measurement Uncertainty
§ 2.1055 § 27.54	Frequency Stability Temperature & Voltage	N/A
§ 27.52	RF Safety	N/A
§ 27.53	Band Edge	Compliant
IS-138A (§3.4.4)	Two-Tone	Compliant

§2.1046, & §24.232 – CONDUCTED RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 & § 27.50 (c)(1)(i). Fix and base Station are limited to 1000 Watts e.i.r.p. Peak Power.

Test Procedure

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01
A.H. Systems	Horn Antenna	SAS200	261	2003-05-31
ETS	Logperiodic Antenna	3148	0004-1155	2003-10-11
EMCO	Biconical Antenna	3110B	9603-2315	2003-10-11

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

Environmental Conditions

Temperature:	17° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

Test Results

Frequency (MHz)	MODE	Input Power (dBm)	Output Power (dBm)	Output Power (W)	Limit in W
743	QPSK	-8.18	48.85	76.74	1000
743	16QAM	-8.02	48.98	79.07	1000
743	64QAM	-8.13	49.12	81.66	1000

§2.1047 - MODULATION CHARACTERISTIC

Applicable Standard

Requirement: FCC § 2.1047.

Test Procedure

GSM digital mode is used by EUT.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01

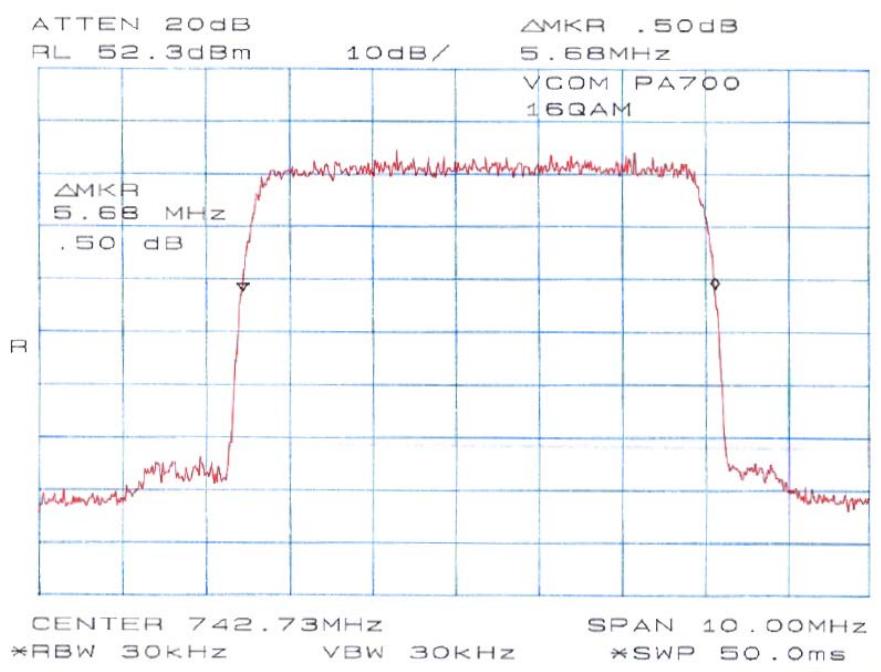
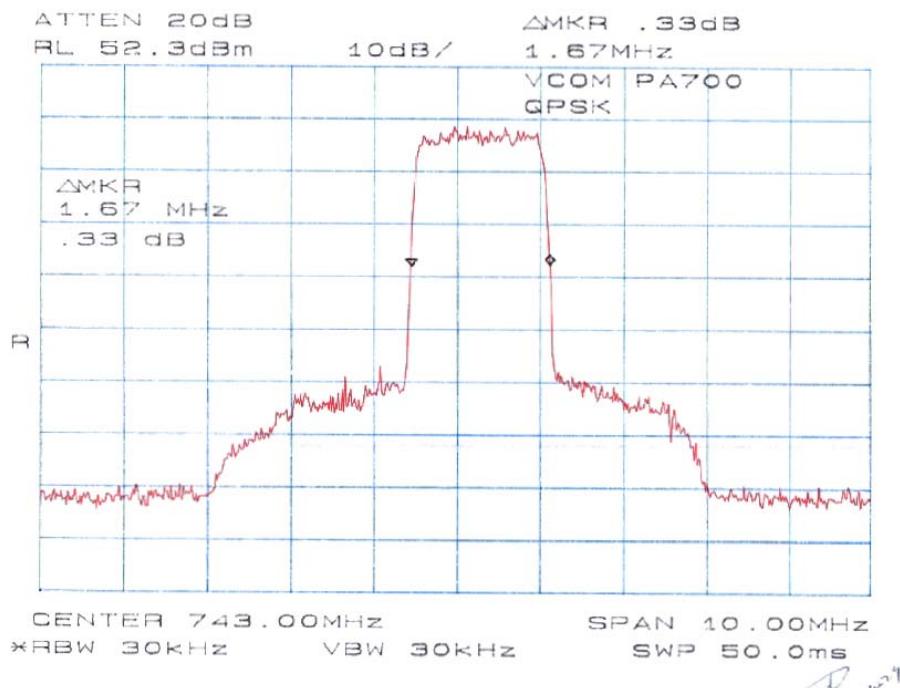
* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	17° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

Test Results

Please refer to the hereinafter plots.





§2.1049 - AUTHORIZED BANDWIDTH

Applicable Standard

Requirements: CFR 47, Section 2.1049.

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 30 KHz and the 26 dB bandwidth was recorded.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01

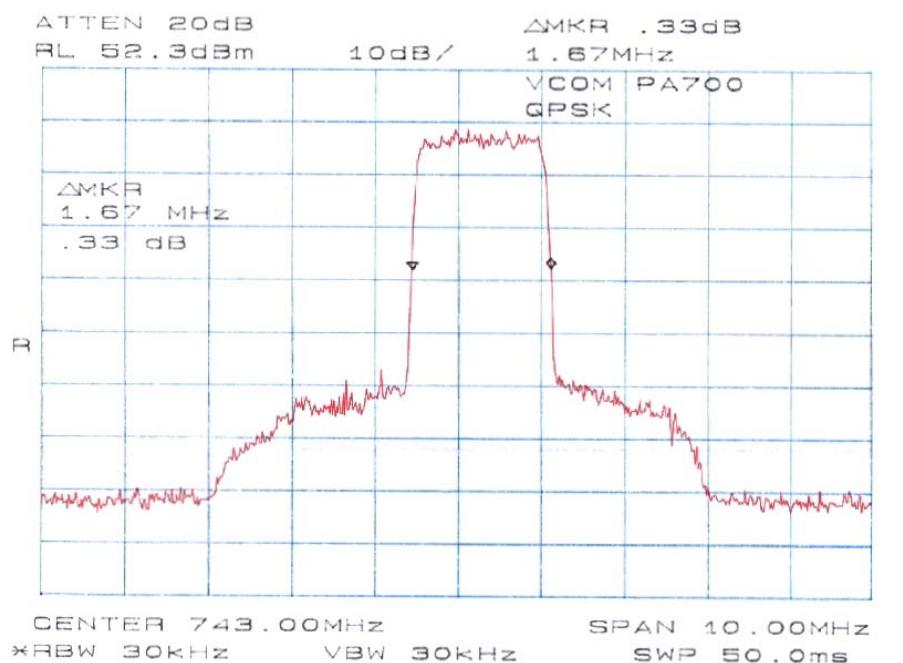
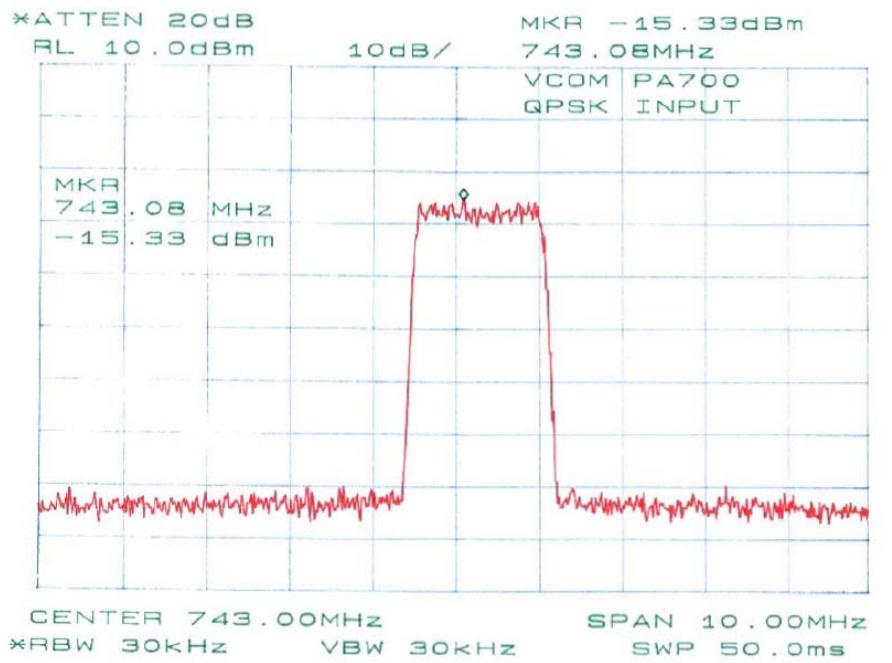
* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

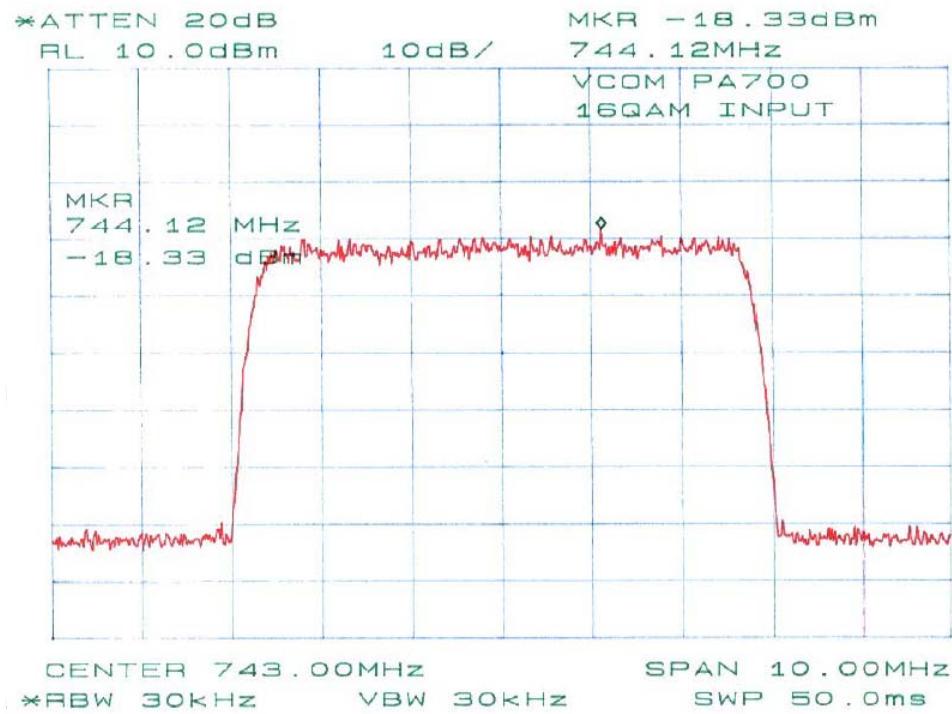
Environmental Conditions

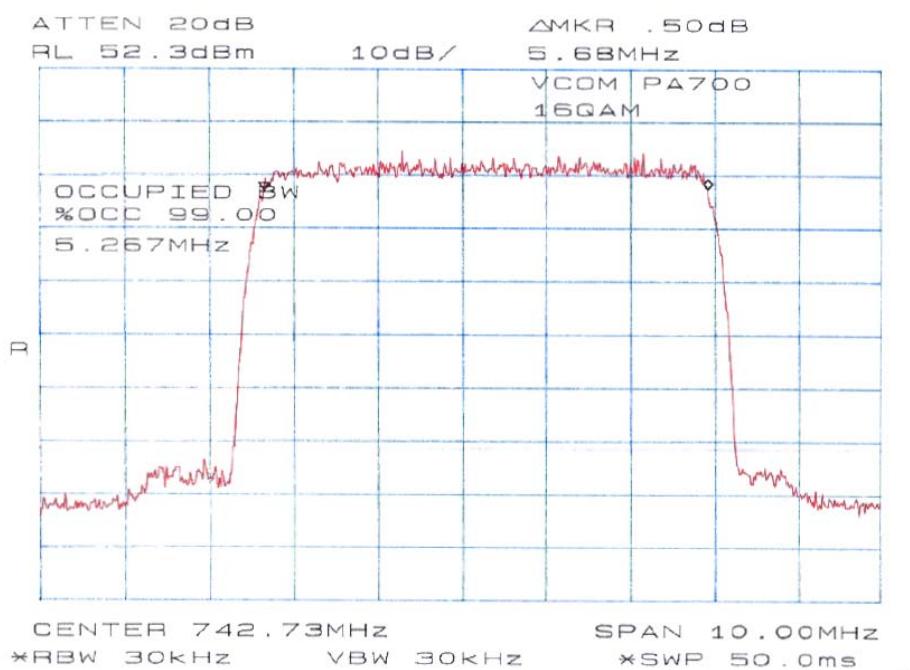
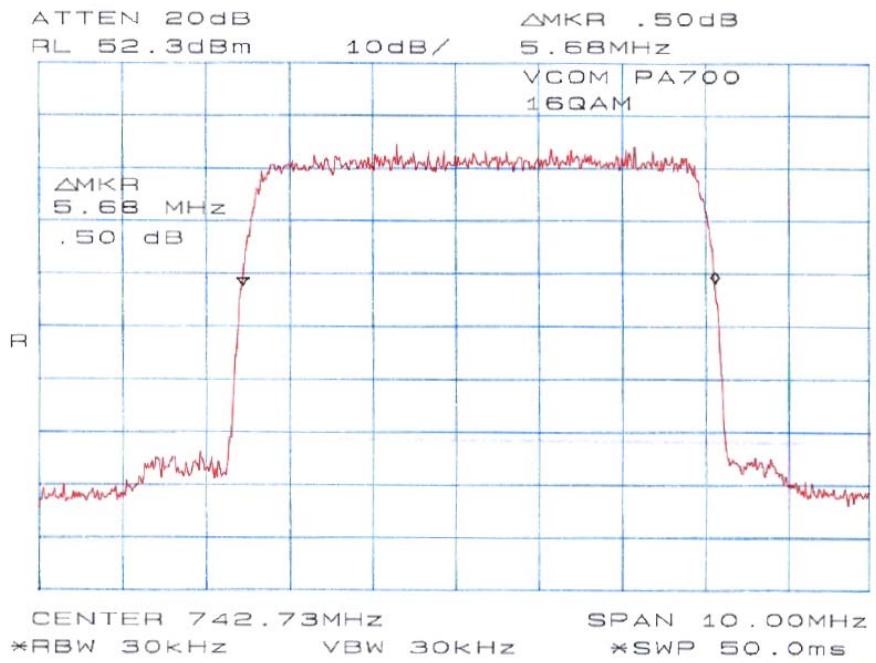
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Relative Humidity:	33%
ATM Pressure:	1017 mbar

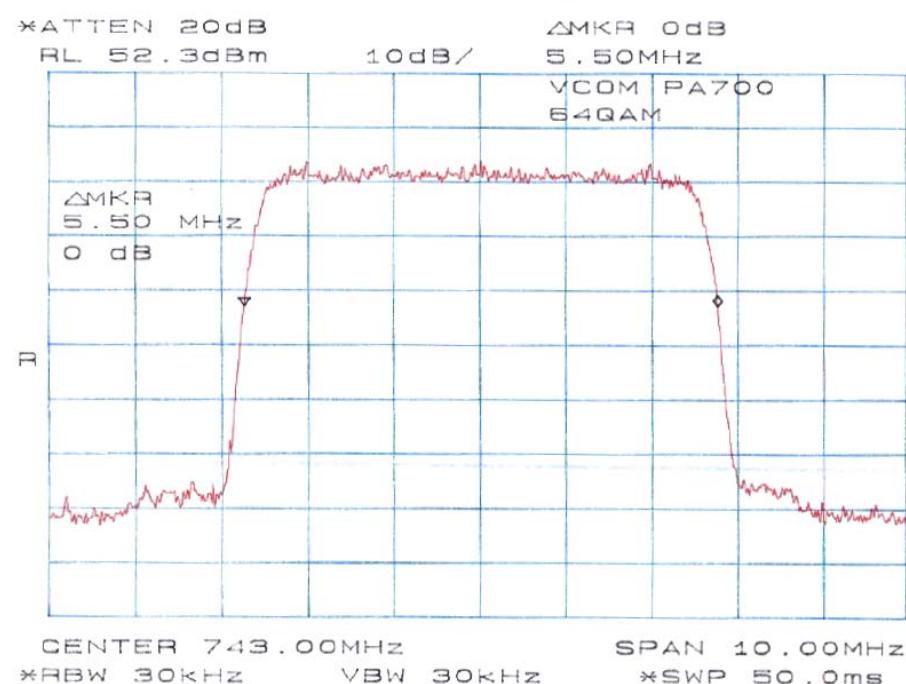
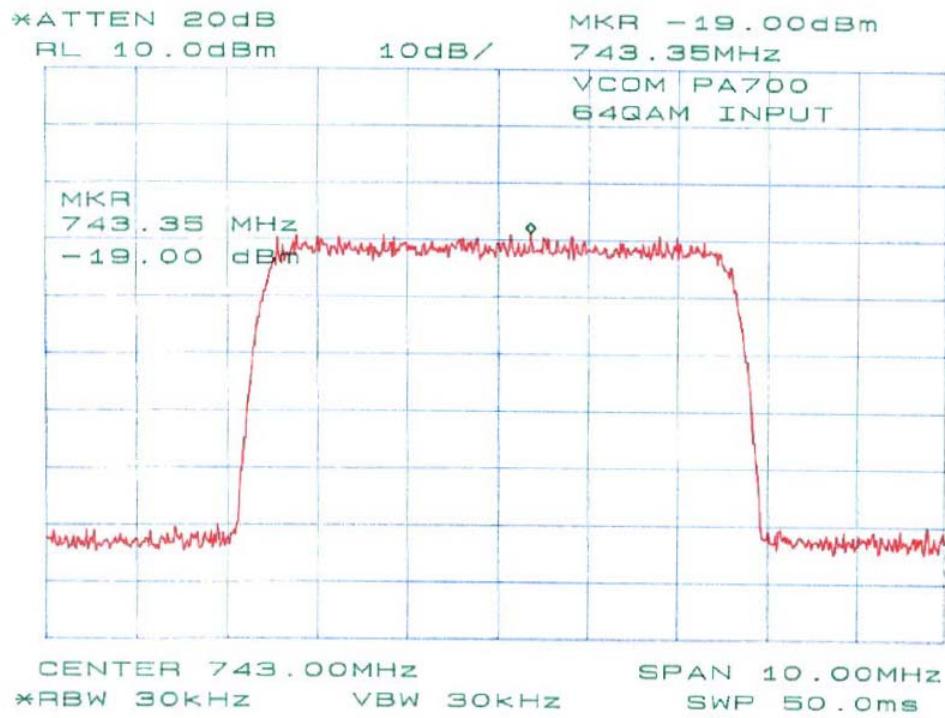
Test Results

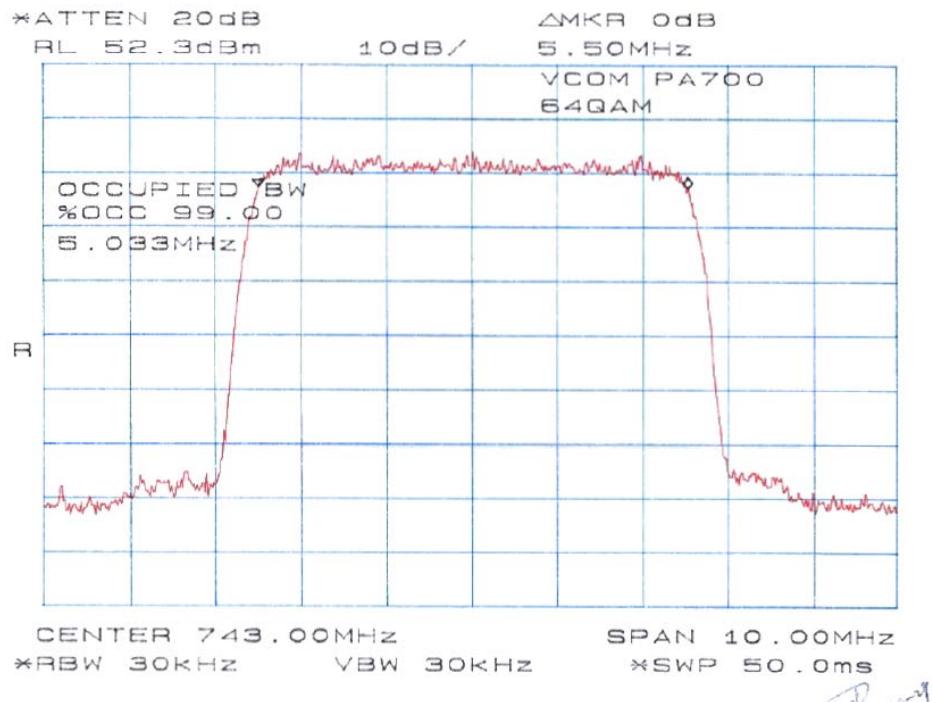
Please refer to the hereinafter plots.











§2.1051, & §27.53(F) – CONDUCTED SPURIOUS EMISSIONS

Applicable Standard

Requirements: CFR 47, § 2.1051 & §27.53(F).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2003-08-01

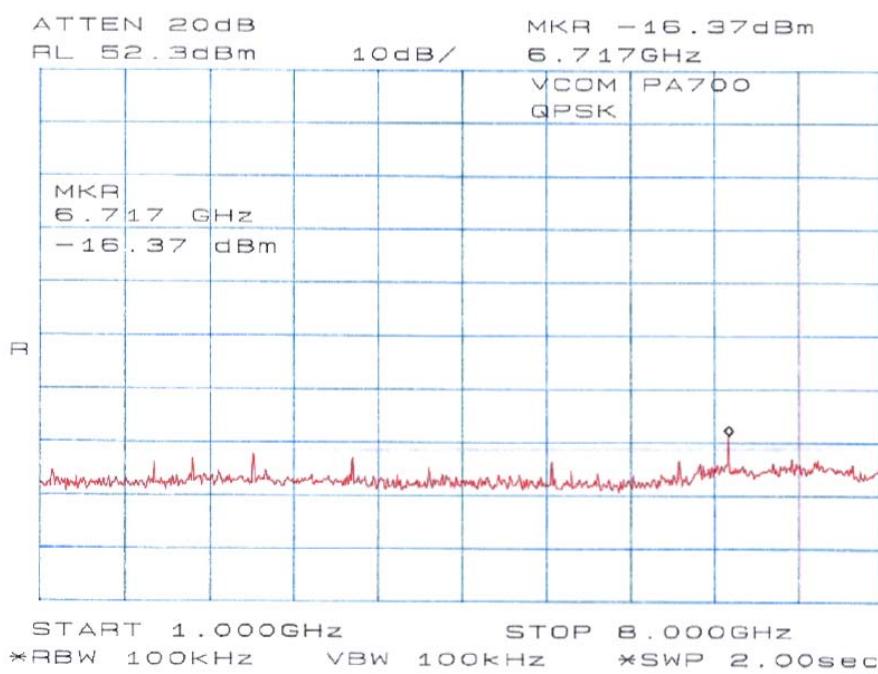
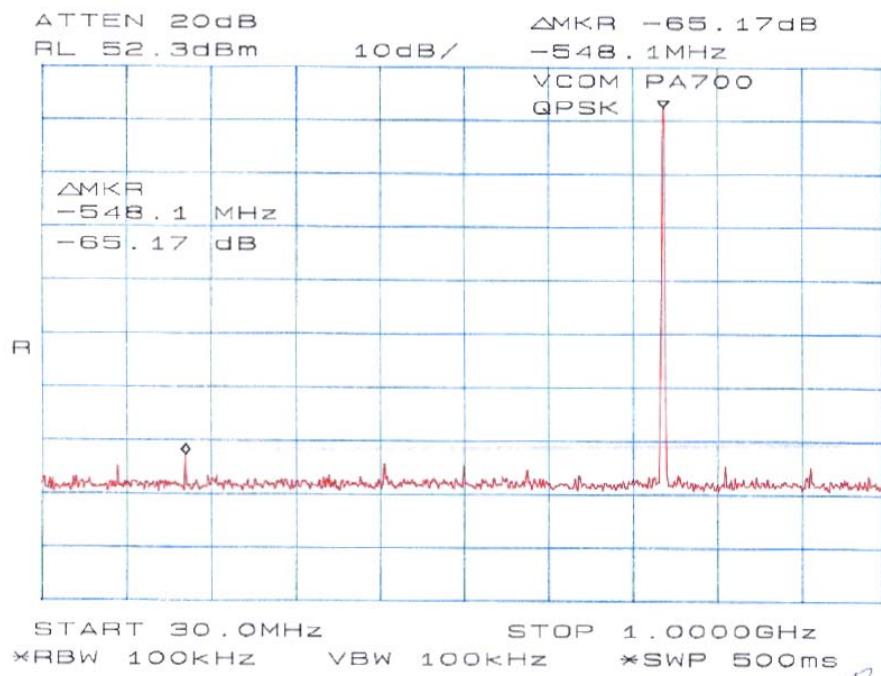
* **Statement of Traceability:** **BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

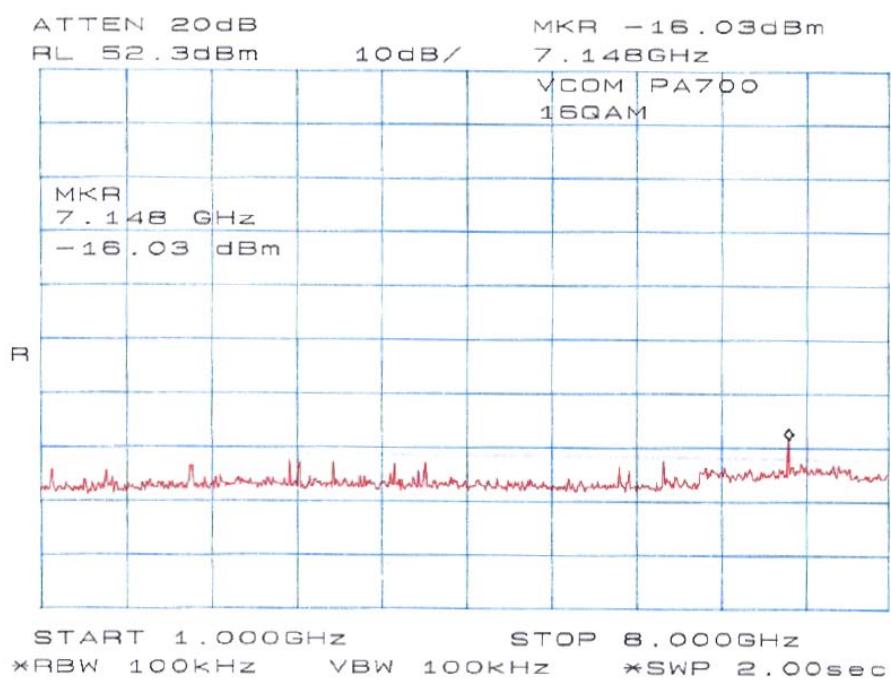
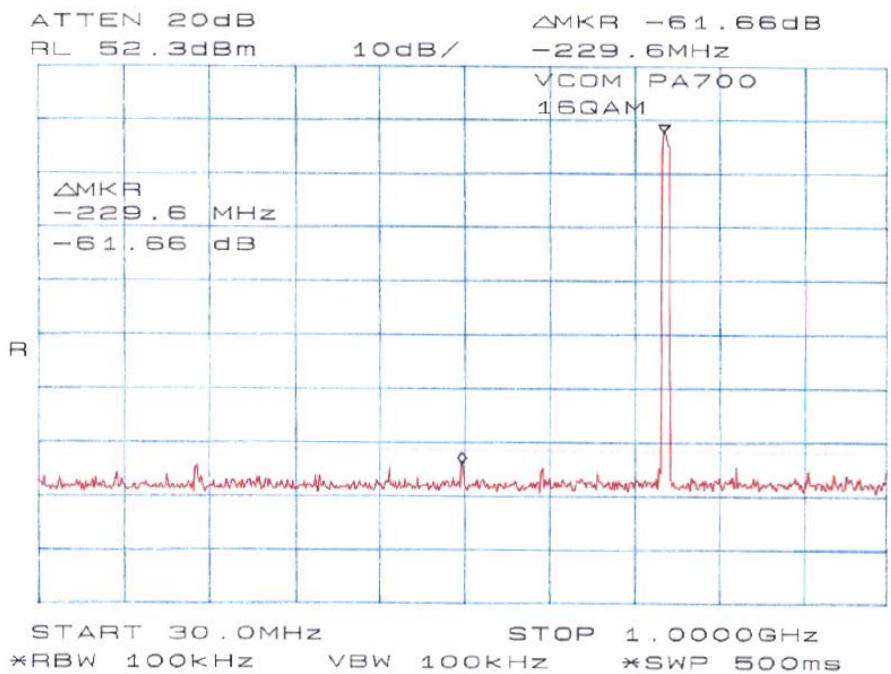
Environmental Conditions

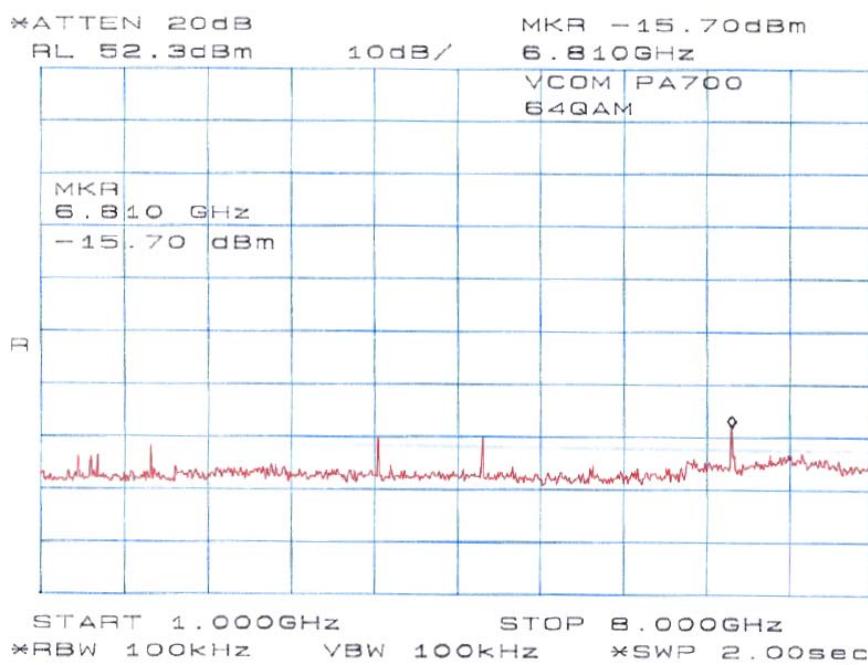
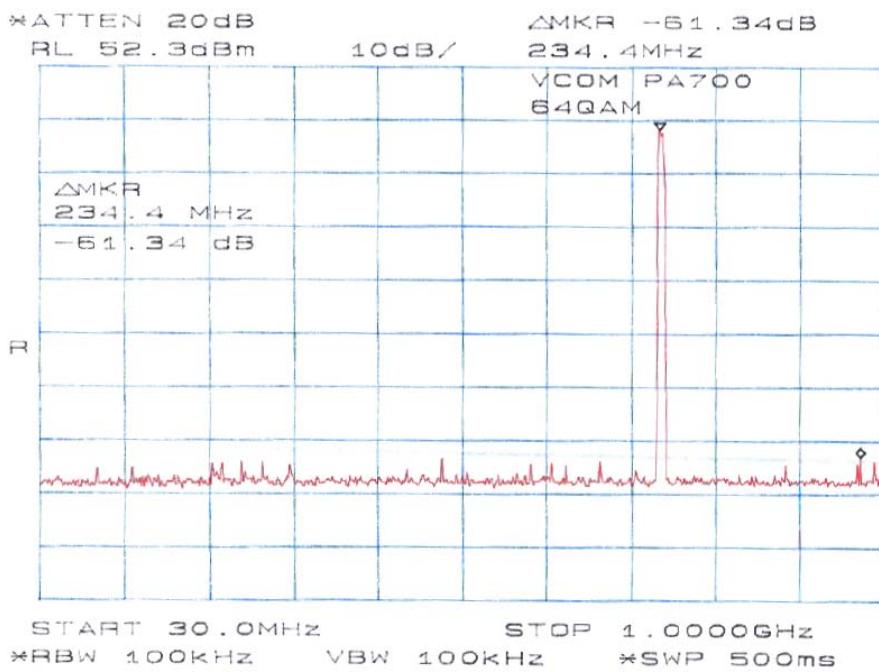
Temperature:	17° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

Test Results

Please refer to the hereinafter plots.







§2.1053 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

Requirements: CFR 47, § 2.1053.

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 = $10 \lg (\text{TXpwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \log_{10} (\text{power out in Watts})$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2004-07-03
HP	Amplifier	8447E	2944A10187	2004-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2004-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2004-10-11
EMCO	Log Periodic Antenna	3146	2101	2004-10-11
AH System	Horn Antenna	SAS-200/511	261	2004-08-02
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01

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

Environmental Conditions

Temperature:	17° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

Summary of Test Result

According to the recorded data in following table, the EUT measured -3.6 dB margin, with the measurement uncertainty of ± 4 dB.

QPSK Mode: -3.6 dB at 1486.82 MHz
 16QAM Mode: -5.9 dB at 1486.00 MHz
 64QAM Mode: -6.5 dB at 1486.10 MHz

Radiated Emissions Test Result Data, 3M

Indicated		EUT		Substitution		Generator		Standard			
Frequency MHz	Ampl. dBuV/m	Table Angle Degree	Test Antenna Height Meter	Polar H/V	Frequency MHz	Level dBm	Antenna Gain Corrected	Cable Loss dB	Absolute Level dBm	FCC Limit dBm	FCC Margin dB
30 MHZ – 8 GHZ, MODE: QPSK											
1486.82	53.80	180	1.7	H	1486.82	-22.6	7.4	1.4	-16.6	-13	-3.6
1486.82	49.85	150	1.4	V	1486.82	-26.6	7.4	1.4	-20.6	-13	-7.6
1250.10	27.68	90	1.5	H	1250.10	-48.3	6.0	1.3	-43.6	-13	-30.6
766.98	28.27	90	1.5	H	766.98	-49.6	2.7	0.8	-47.7	-13	-34.7
1851.35	32.56	120	1.6	V	1851.35	-44.9	6.5	1.4	-39.8	-13	-26.8
1249.52	26.50	180	1.6	H	1249.52	-49.4	6.0	1.3	-44.7	-13	-31.7
2316.35	27.92	120	1.6	V	2316.35	-48.7	8.7	1.6	-41.6	-13	-28.6
1976.33	27.08	30	1.7	H	1976.33	-51.9	6.5	1.4	-46.8	-13	-33.8
30 MHZ – 8 GHZ, MODE: 16QAM											
1486.00	51.48	180	1.4	H	1486.00	-24.9	7.4	1.4	-18.9	-13	-5.9
1486.00	47.20	90	1.6	V	1486.00	-29.1	7.4	1.4	-23.1	-13	-10.1
1854.95	32.37	0	1.3	V	1854.95	-45.0	6.5	1.4	-39.9	-13	-26.9
2316.10	26.96	30	1.6	V	2316.10	-49.7	8.7	1.6	-42.6	-13	-29.6
2316.10	25.78	0	1.3	H	2316.10	-50.5	8.7	1.6	-43.4	-13	-30.4
1249.68	27.12	0	1.5	V	1249.68	-48.7	6.0	1.3	-44.0	-13	-31.0
1249.86	26.22	120	1.5	H	1249.86	-49.8	6.0	1.3	-45.1	-13	-32.1
766.56	29.83	0	1.3	H	766.56	-49.8	2.7	0.8	-47.9	-13	-34.9
766.60	28.81	330	1.5	V	766.60	-50.7	2.7	0.8	-48.8	-13	-35.8
30 MHZ – 8 GHZ, MODE: 64QAM											
1486.10	50.71	180	1.3	H	1486.10	-25.5	7.4	1.4	-19.5	-13	-6.5
1486.10	49.26	270	1.5	V	1486.10	-26.9	7.4	1.4	-20.9	-13	-7.9
1856.83	32.42	270	1.6	V	1856.83	-46.8	6.5	1.4	-41.7	-13	-28.7
2316.17	27.43	200	1.8	V	2316.17	-49.1	8.7	1.6	-42.0	-13	-29.0
1846.60	29.84	300	1.4	H	1846.60	-47.8	6.5	1.4	-42.7	-13	-29.7
1250.00	27.22	180	1.4	V	1250.00	-48.8	6.0	1.3	-44.1	-13	-31.1
750.00	31.98	270	1.4	H	750.00	-47.5	2.7	0.8	-45.6	-13	-32.6
750.03	31.81	90	1.6	V	750.03	-47.6	2.7	0.8	-45.7	-13	-32.7

§27.53(f) – BAND EDGE

Applicable Standard

According to §27.53(f), the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation. Measured in watts, by at least $43 + 10 \log (P)$ dB.

Test Procedure

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

The center of the spectrum analyzer was set to block edge frequency, RBW set to 30KHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	HP8564E	3943A01781	2004-08-01

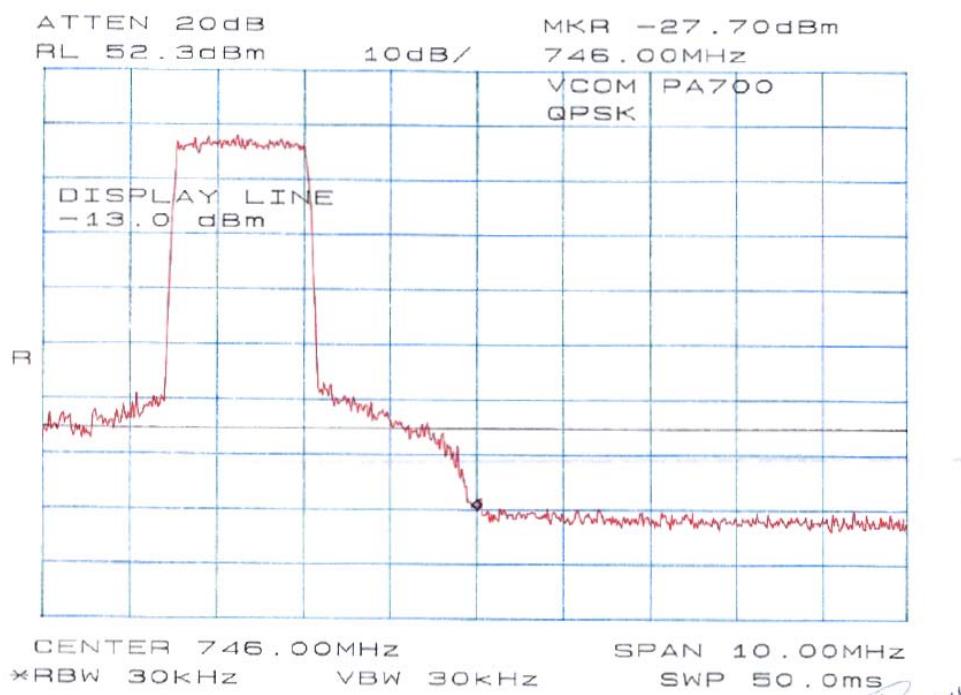
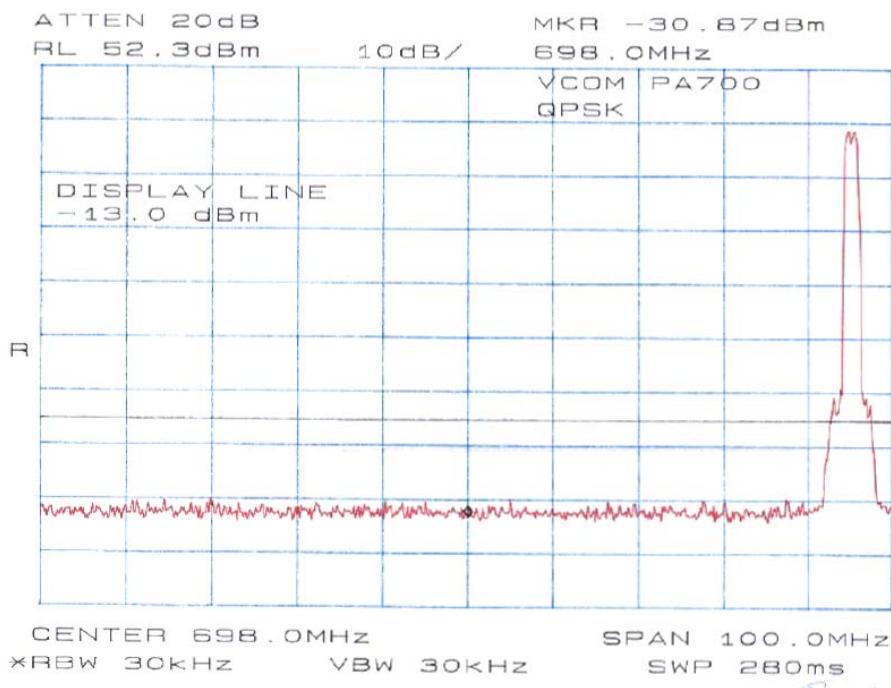
* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

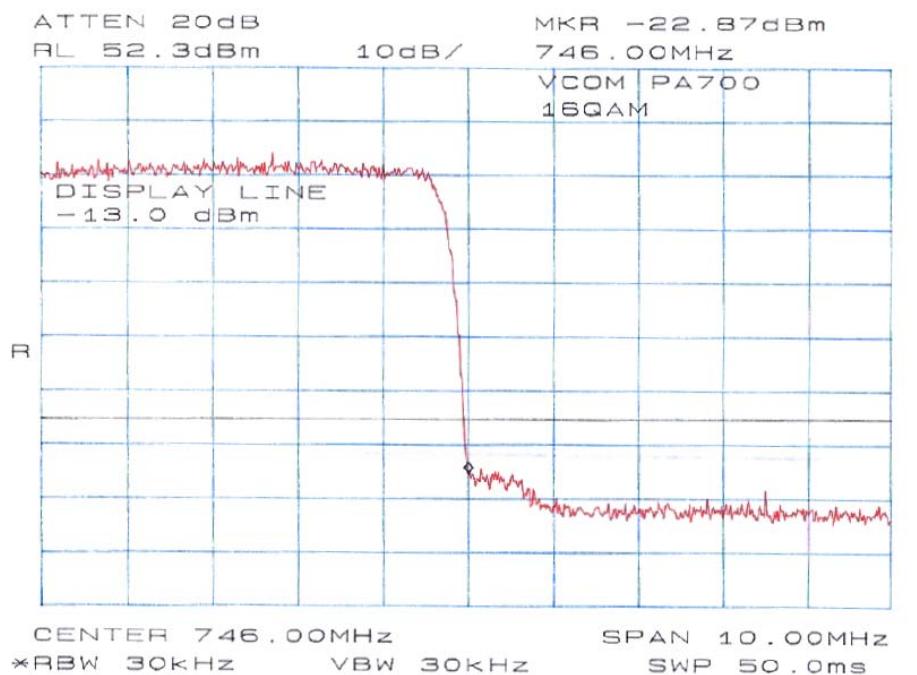
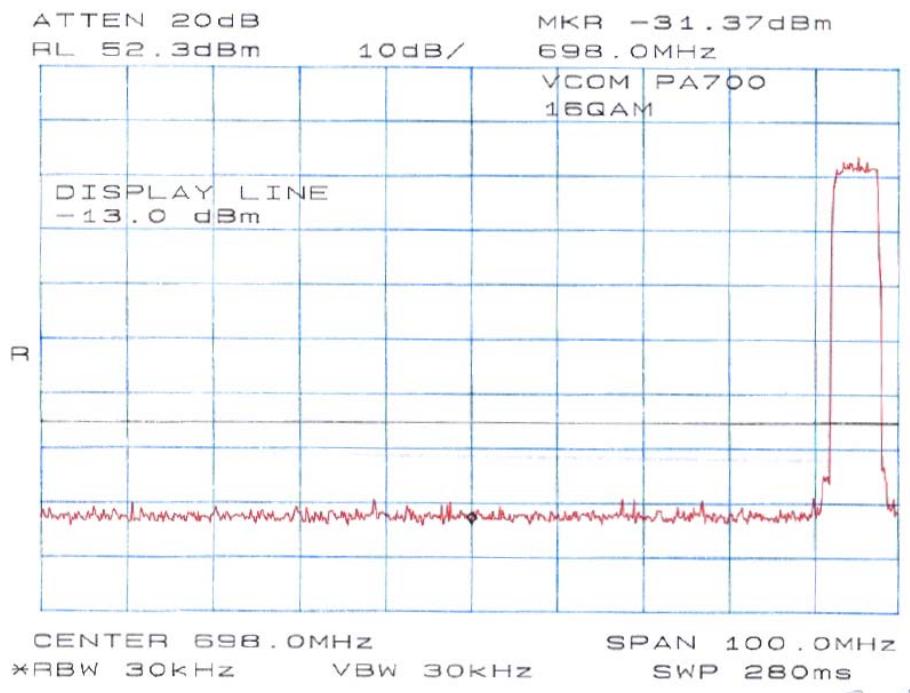
Environmental Conditions

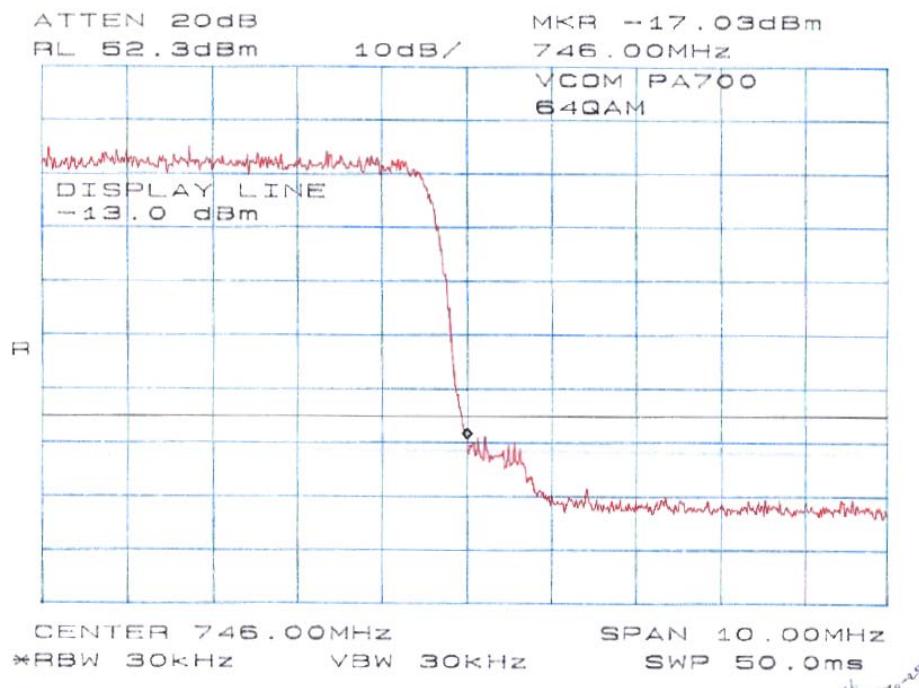
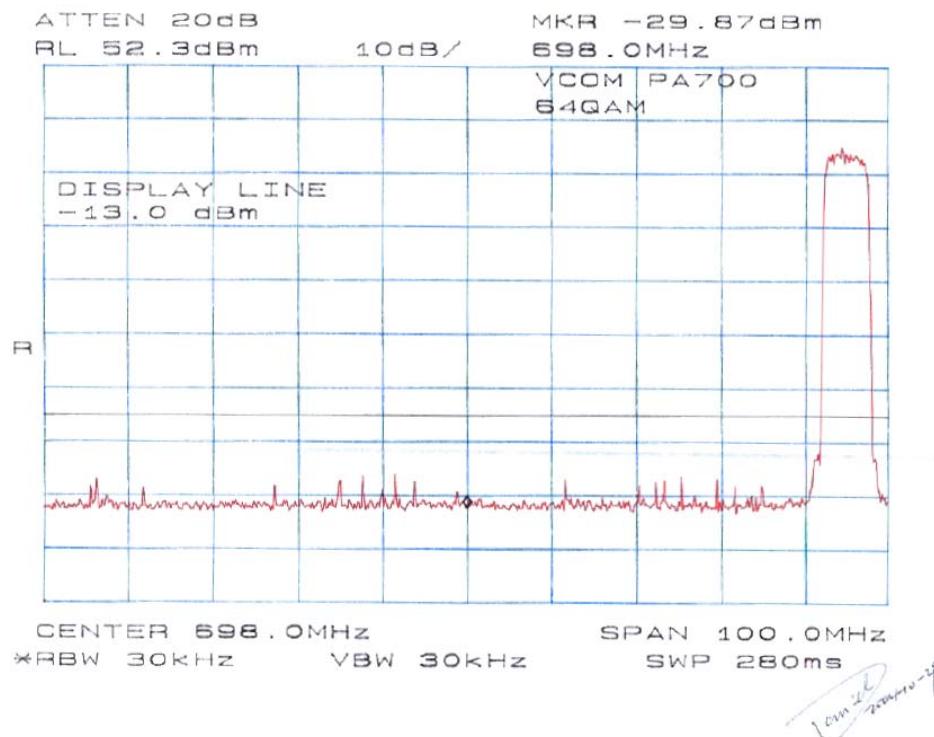
Temperature:	17° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

Test Results

Please refer to the following plots.







IS-138A (§3.4.4) - TWO-TONE TEST

Applicable Standards

According to IS-138A (3.4.4), Intermodulation products must be attenuated below the rated power of the EUT by at least $43 + 10\log(P)$, equivalent to -13 dBm.

Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic. Two input signals are equal in level (and can be raised equally), were send to the EUT.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8565EC	3946A00131	2004-06-30

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

Environmental Conditions

Temperature:	17° C
Relative Humidity:	45%
ATM Pressure:	1015 mbar

Plots of Two-Tone Test Result

Please refer to plots hereinafter.

