

Report No	ED0372-1
Client	VTech Telecommunications Ltd. Suite 200 – 7671 Alderbridge Way Richmond, BC, Canada V6X 1Z9
Phone	(604) 273-5131 Ext. 257
Fax	(604) 276-9137
FRN	0006-0955-82
Model	VTech 2406
FCC ID	EW780-5298-B00
Equipment Type Equipment Code	Cordless Telephone Base Transceiver ETB
Results	As detailed within this report
Prepared by	 Evan Gould – Test Engineer
Authorized by	 Michael Buchholz – EMC Manager
Issue Date	6/4/03
Conditions of issue	This Test Report is issued subject to the conditions stated in ‘terms and conditions’ section of this report.

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Summary

This test report supports an application for certification of a transmitter operating pursuant to 47 CFR 15.249. The product is the VTech 2406 Cordless phone base, which operates in the range 2400-2483.5MHz as defined by 15.249. The actual center frequencies in which the product operates are 30 channels, in the range 2410.2-2418.9MHz with a channel separation of 300kHz.

Test Methodology

Radiated emissions testing is performed according to the procedures specified in ANSI C63.4 (2000).

Frequency range investigated: 150kHz – 26.5GHz

Measurement distance:	0.15-30MHz	Conducted
	30-4000MHz	3m
	4-18GHz	1m
	18-26.5GHz	0.1m

AC Line conducted emissions testing was performed with a 50 Ohm / 50 microhenry LISN.

EUT Configuration

EUT Configuration				
Work Order: D0372				
Company: Vtech Engineering Canada				
Company Address: Suite 200 - 7671 Alderbridge Way Richmond, BC, Canada V6X 1Z9				
Contact: Joseph Poon				
MN		SN	FCC ID	
EUT: Vtech 2406		PA 3/03	EW780-5298-B00	
EUT Description: 2.4 GHz Cordless Phone Base				
EUT Max Frequency: 2418.9MHz				
Support Equipment:		MN	SN	
Component Telephone				
Power Supply Class 2		350903003CT	0302	
EUT Cables:	Qty	Shielded?	Length	Ferrites
DC Power Cable	1	No	1.7m (1m bundled)	No
RJ11 Telephone Cable	1	No	1.8m (1m bundled)	No
Unpopulated EUT Ports:		Qty	Reason	
none				
Operating Mode Description:				
Base unit manually set to transmit at various channels with and without modulation, as well as being able to be set to Rx mode.				

Statement of Conformity

The VTech 2406 Cordless Phone base has been found to conform with the following parts of the 47 CFR as detailed below:

Part 2	Part 15	Comments
	15.15(b)	The product contains no user accessible controls that increase transmission power above allowable levels.
2.925	15.19	The label is shown in the label exhibit.
	15.21	Information to the user is shown in the instruction manual exhibit.
	15.27	No special accessories are required for compliance.
	15.203	The antenna is soldered to the transmitter board, and there is no external antenna connection.
	15.205 15.209	The fundamental is not in a Restricted band and the spurious and harmonic emissions in the Restricted bands comply with the general emission limits of 15.209.
	15.207	The unit meets the AC conducted emissions requirements of 15.207.
	15.249	The unit complies with the field strength limits of 15.249

Fundamental Frequency Measurement

LIMIT

Average: 50mV/m = 93.9dBμV/m @ 3m [15.249(a), (b), and (d)]

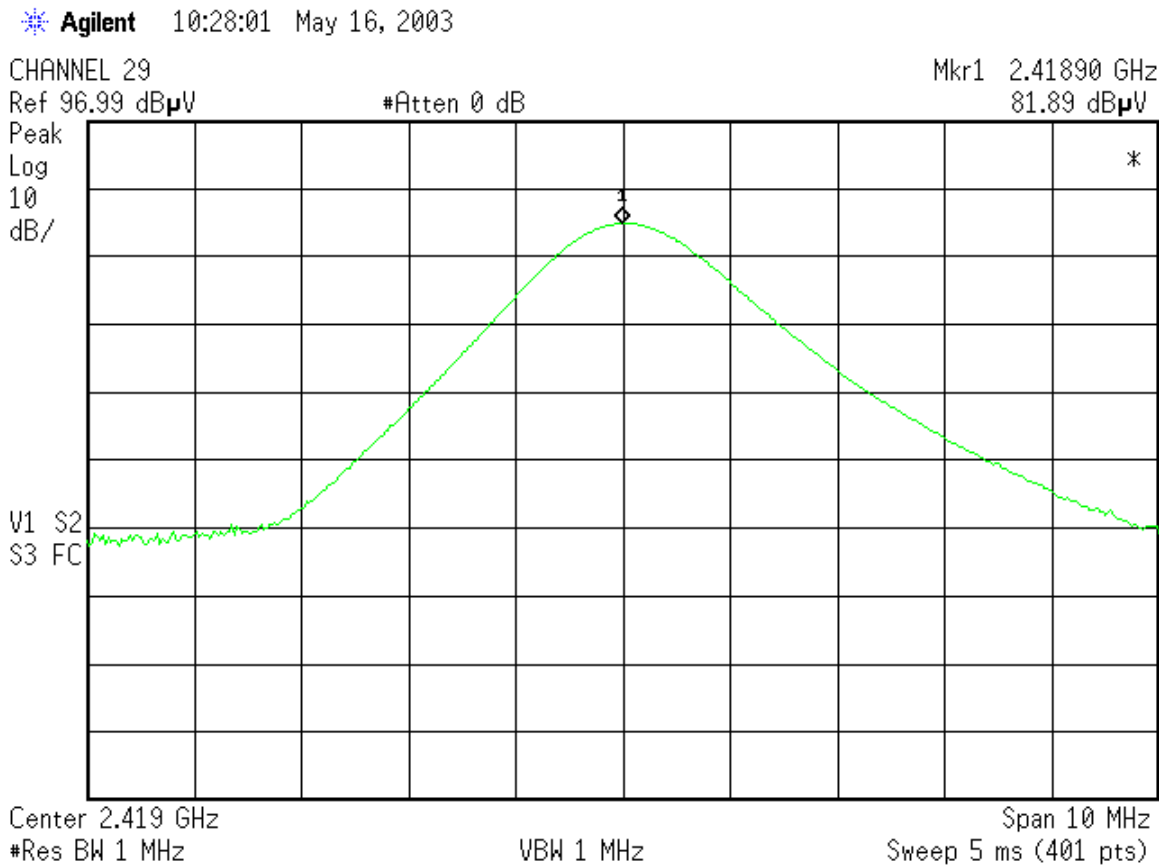
Peak: 93.9dBμV/m + 20dB = 123.9dBμV @ 3m [15.249(d)]

Note: If Peak measurements meet Average limits, then Average measurements are not required.

MEASUREMENTS

Fundamental Frequency										Curtis-Straus LLC		
Date: 16-May-03			Engineer: Evan Gould					Work Order: D0372				
Company: VTech			EUT: VTech 2406 (Base)					Fundamental Frequencies: 2.4102-2.4189GHz				
Test Site: "A"			Cable: 142LL #4					Pre-amp: Orange-Blk				
Antenna: Orange Horn			Filter/Attenuator: N/A					Analyzer: Orange				
Measurement Distance: 3m					Resolution BW: 1MHz							
Detector Type: Peak					Video BW: 1MHz							
Notes: Channels 0, 14, and 29 Unmodulated												
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Filter/Attenuator Factor (dB)	Duty Cycle Factor (dB)	Distance Factor (dB)	Adjusted Reading (dBμV/m)	47 CFR 15.249		
										Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
V	2410.2	81.1	24.1	30.3	2.1	0.0	0.0	0.0	89.4	93.9	-4.5	Pass
V	2414.4	81.7	24.1	30.3	2.1	0.0	0.0	0.0	90.0	93.9	-3.9	Pass
V	2418.9	81.9	24.1	30.4	2.1	0.0	0.0	0.0	90.3	93.9	-3.6	Pass

SAMPLE ANALYZER PLOT



Band Edges

LIMITS

Average: 50dB below level of Fundamental OR

General radiated emission limits of 15.209

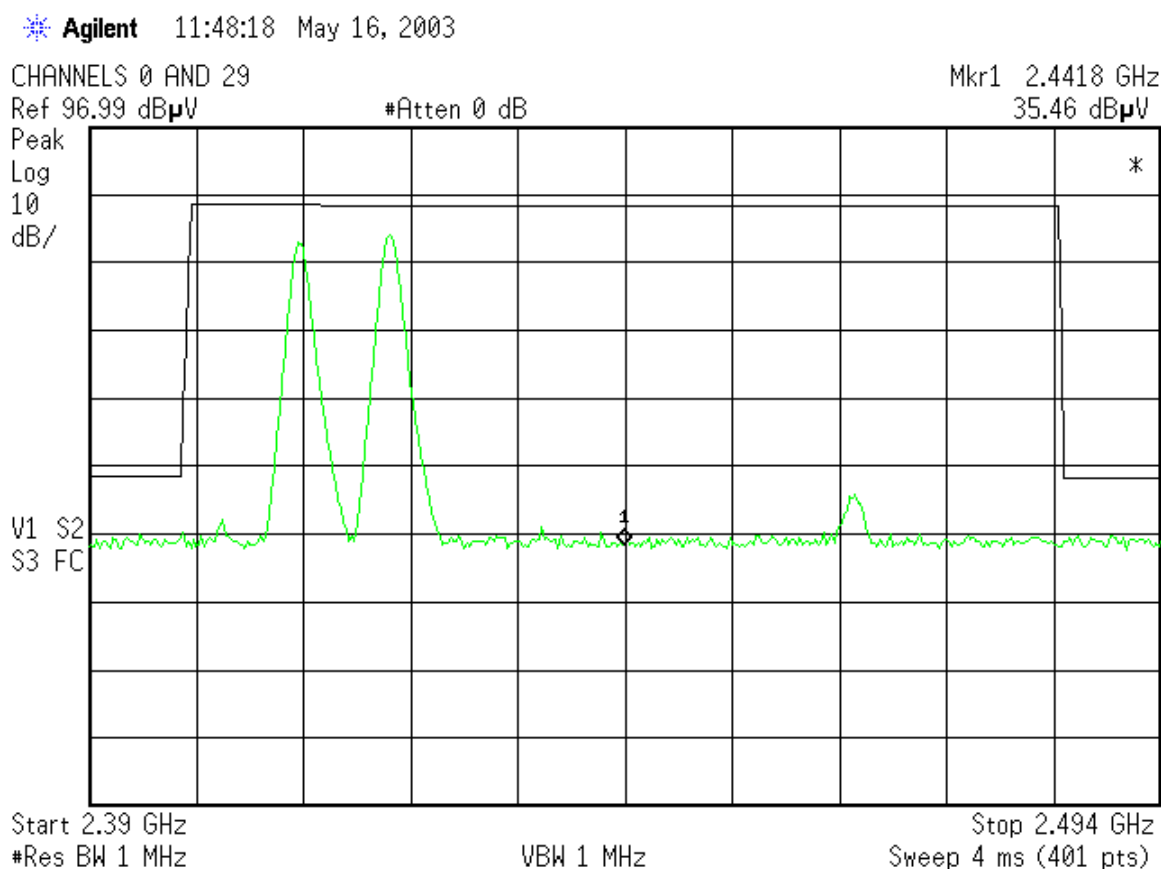
"...whichever is the lesser attenuation." [15.249(c)]

Peak: (Average limit) + 20dB [15.249(d)]

Note: If Peak measurements meet Average limits, then Average measurements are not required.

ANALYZER PLOT

Max-hold traces of the lowest and highest channels are shown below in relation to the average limit line.



Harmonic Frequency Measurements

LIMITS

Average: $500\mu\text{V/m} = 53.9\text{dB}\mu\text{V/m}$ @ 3m [15.249(a), (b), and (d)]

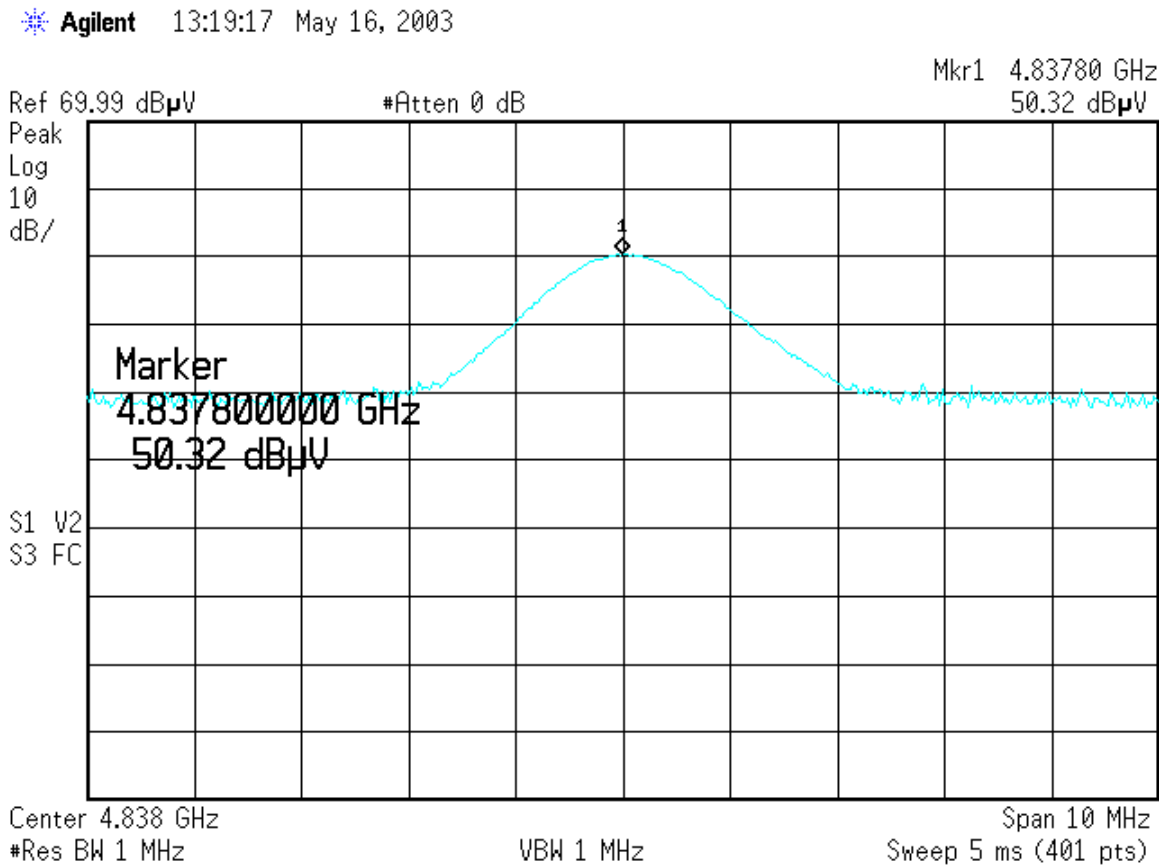
Peak: $53.9\text{dB}\mu\text{V/m} + 20\text{dB} = 73.9\text{dB}\mu\text{V}$ @ 3m [15.249(d)]

Note: If Peak measurements meet Average limits, then Average measurements are not required.

MEASUREMENTS

Harmonics										Curtis-Straus LLC		
Date: 16-May-02			Engineer: Evan Gould				Work Order: D0372					
Company: Vtech			EUT: Vtech 2406 (Base)				Fundamental Frequency: 2418.9MHz					
Test Site: "A"			Cable: 142LL #4				Pre-amp: Orange-Blk					
Antenna: Orange Horn			Filter/Attenuator: N/A				Analyzer: Orange					
Measurement Distance: 1m							Resolution BW: 1MHz					
Detector Type: Peak							Video BW: 1MHz					
Notes: Harmonics of worst-case fundamental: 2418.9MHz (Channel 29)												
Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Filter/Attenuator Factor (dB)	Duty Cycle Factor (dB)	Distance Factor (dB)	Adjusted Reading (dBμV/m)	47 CFR 15.249		
										Limit (dBμV/m)	Margin (dB)	Result (Pass/Fail)
V	4837.8	50.3	23.2	32.8	2.9	0.0	0.0	9.5	53.3	53.9	-0.6	Pass
V	7256.8	36.7	21.3	36.6	4.2	0.0	0.0	9.5	46.7	53.9	-7.2	Pass

ANALYZER PLOT



Spurious Emissions

LIMITS

Average: 50dB below level of Fundamental *OR*

General radiated emission limits of 15.209

"...whichever is the lesser attenuation." [15.249(c)]

Peak: (Average limit) + 20dB [15.249(d)]

Note: If Peak measurements meet Average limits, then Average measurements are not required.

MEASUREMENTS

No spurious emissions were detected aside from the two harmonic emissions shown in the previous section. The EUT was also scanned for spurious emissions with the Combo set to Rx mode. None were detected.

AC Line Conducted Emission Measurements

LIMITS

Frequency of emission (MHz)	Quasi-peak limit (dB μ V)	Average limit (dB μ V)
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

[15.207(a)]

MEASUREMENTS

AC Mains Conducted Emissions										Curtis-Straus LLC	
Date: 15-May-03				Company: VTech				Table No: 3			
Engineer: Evan Gould				EUT Desc: VTech 2406 (Base)				Work Order: D0372			
Notes: EUT transmitting data								Test Site: EMI 1			
LISN(s): Orange											
Range: 0.15-30Mhz											
Spectrum Analyzer: Blue											
Frequency (MHz)	Q.P. Readings		Ave. Readings		Impedance Factor (dB)	FCC/CISPR B		FCC/CISPR B		Overall Result (Pass/Fail)	
	QP1 (dBµV)	QP2 (dBµV)	AV1 (dBµV)	AV2 (dBµV)		qp Limit (dBµV)	qp Margin dB	AVE Limit (dBµV)	AVE Margin dB		
	0.15	14.8	16.9				20.0	66.0	-29.1		56.0
2.76	12.5	7.4			20.0	56.0	-23.5	46.0	-13.5	Pass Pass	
Table Result: Pass by -13.50 dB Worst Freq: 2.76 MHz											

In addition to the operating mode in which the EUT is transmitting data, the range 0.15-30MHz was also observed with the EUT charging the handset battery. No emissions were detected.

Voltage Variation

REQUIREMENT

"For intentional radiators, measurements of the variation of the...radiated signal level of the fundamental frequency component of the emission...shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage." [15.31(e)]

MEASUREMENTS

Voltage Variation						Curtis-Straus LLC		
Date: 16-May-03			Engineer: Evan Gould			Work Order: D0372		
Company: VTech			EUT: Vtech 2406			Fundamental Frequency: 2418.9MHz		
Test Site: "A"			Cable: 142LL #4			Pre-amp: Orange-Blk		
Antenna: Orange Horn			Filter/Attenuator: N/A			Analyzer: Orange		
Measurement Distance: 3m			Resolution BW: 1MHz					
Detector Type: Peak			Video BW: 1MHz					
Notes: These readings were not maximized.								
Supply Voltage	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Filter/Attenuator Factor (dB)	Duty Cycle Factor (dB)	Adjusted Reading (dBμV/m)
99.5V (85%)	2418.9	72.0	24.1	30.4	2.1	0.0	0.0	80.4
117V (nominal)	2418.9	72.0	24.1	30.4	2.1	0.0	0.0	80.4
134.5V (115%)	2418.9	72.0	24.1	30.4	2.1	0.0	0.0	80.4

Test Equipment Used

REV. 5/11/03

SPECTRUM ANALYZERS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
WHITE	9kHz-22GHz	8593E	HP	3547U01252	00022	25-FEB-2004
BLUE	9kHz-1.8GHz	8591E	HP	3223A00227	00070	04-SEP-2003
ORANGE	9kHz-26.5GHz	E4407B	HP	US39440975	00394	07-JUN-2003
LISN	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
ORANGE	10kHz-30MHz	8012-50-R-24-BNC	SOLAR	903707	00754	24-OCT-2003
OPEN AREA TEST SITE (OATS)		FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE	
SITE A		93448	IC 2762-A	R-903	04-FEB-2004	
LINE CONDUCTED TEST SITE		FCC CODE	IC CODE	VCCI CODE	CALIBRATION DUE	
EMI 1		93448	N/A	C-480	01-MAY-2006	
ANTENNAS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
GREEN-BLACK BILOG	30MHz-2GHz	CBL6112B	CHASE	2412	00127	17-MAR-2005
ORANGE HORN	1-18GHz	3115	EMCO	0004-6123	00390	27-MAY-2003
WHITE HORN	18-26.5GHz	3160-09	EMCO	9610-1068	00758	26-JUN-2003
PREAMPS	RANGE	MN	MFR	SN	ASSET	CALIBRATION DUE
BLACK	0.01-2000MHz	ZFL-1000-LN	C-S	N/A	00799	17-MAR-2004
ORANGE-BLACK	1-20GHz	SMC-12A	C-S	637367	00761	04-MAR-2004
YELLOW	18-26.5GHz	AFS4-18002650-60-8P-4	C-S	467559	00758	27-AUG-2003

Unless otherwise noted the calibration interval is one year. All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

Terms And Conditions

Paragraph 1. SERVICES. LABORATORY will:

- 1.1 Use the degree of care and skill ordinarily exercised by and consistent with the standards of the profession.
- 1.2 Perform all technical services in substantial accordance with the generally accepted laboratory principles and practices.
- 1.3 Retain all pertinent records relating to the services performed for a period of three (3) years following submission of the report describing such services, during which period the records will be made available to CLIENT upon reasonable request.

Paragraph 2. CLIENT'S RESPONSIBILITIES. CLIENT or his authorized representative will:

- 2.1 Provide LABORATORY with all plans, schematics, specifications, addenda, change orders, drawings and other information for the proper performance of technical services.
- 2.2 Designate a person to act as CLIENT's representative with respect to LABORATORY's services to be performed on behalf of the CLIENT; such person or firm to have complete authority to transmit instructions, receive information and data, interpret and define CLIENT's policies and decisions with respect to the LABORATORY's work on behalf of the CLIENT and to order, at CLIENT's expense, such technical services as may be required.
- 2.3 Designate a person who is authorized to receive copies of LABORATORY's reports.
- 2.4 Undertake the following:
 - (a) Secure and deliver to LABORATORY, without cost to LABORATORY, preliminary representative samples of the equipment proposed to require technical services, together with any relevant data.
 - (b) Furnish such labor and equipment needed by LABORATORY to handle samples at the LABORATORY and to facilitate the specified technical services.

Paragraph 3. GENERAL CONDITIONS:

- 3.1 LABORATORY, by the performance of services covered hereunder, does not in any way assume any of those duties or responsibilities customarily vested in the CLIENT, its employees, or any other party, agency or authority.
- 3.2 LABORATORY shall not be responsible for acts of omissions of any other party or parties involved in the design, manufacture or maintenance of the equipment or the failure of any employee, contractor or subcontractor to undertake any aspect of equipment's design, manufacture or maintenance.
- 3.3 LABORATORY is not authorized to revoke, alter, release, enlarge or release any requirement of the equipment's design, manufacture or maintenance unless specifically authorized by CLIENT or his authorized representative.
- 3.4 THE ONLY WARRANTY MADE BY LABORATORY IN CONNECTION WITH ITS SERVICE PERFORMED HEREUNDER IS THAT IT WILL USE THAT DEGREE OF CARE AND SKILL AS SET FORTH IN PARAGRAPH 1 ABOVE. NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE OR INTENDED FOR SERVICES PROVIDED HEREUNDER.
- 3.5 Where the LABORATORY indicates that additional testing is advisable to obtain more valid or useful data, and where such testing has not been authorized, CLIENT agrees to view such test reports as inconclusive and preliminary.
- 3.6 The LABORATORY will supply technical service and prepare a report based solely on the sample submitted to the LABORATORY by the CLIENT. The CLIENT understands that application of the data to other devices is highly speculative and should be applied with extreme caution.
- 3.7 The LABORATORY agrees to exercise ordinary care in receiving, preserving and shipping (F.O.B. Littleton, MA) any sample to be tested, but assumes no responsibility for damages, either direct or consequential, which arise from loss, damage or destruction of the samples due to the act of examination, modification or testing, or technical services or circumstances beyond LABORATORY's control.
- 3.8 The LABORATORY will hold samples for thirty (30) days after tests are completed, or until the CLIENT's outstanding debts to the LABORATORY are satisfied, whichever is later.
- 3.9 The CLIENT recognizes that generally accepted error variances apply and agrees to consider such error variances in its use of test data.
- 3.10 It is agreed between LABORATORY and CLIENT that no distribution of any tests, reports or analysis other than that described below shall be made to any third party without the prior written consent of both parties unless such distribution is mandated by operation of law. It is agreed that tests, reports, or analysis results may be disclosed to third party auditors of the laboratory at the laboratory facility in the course of accreditation maintenance audits. No reference to reports or technical services of the LABORATORY shall be made in any advertising or promotional literature without the express written permission of the LABORATORY.
- 3.11 The CLIENT acknowledges that all employees of LABORATORY operate under employment contracts with the LABORATORY and CLIENT agrees not to solicit employment of such employees or to solicit information related to other clients from said employees.
- 3.12 In recognition of the relative risks and benefits of the project to both CLIENT and LABORATORY, the risks have been allocated such that the CLIENT agrees, to the fullest extent permitted by law, to limit the liability of the LABORATORY to the CLIENT for any and all claims, losses, costs, damages of any nature whatsoever or claims expenses from any cause or causes, including attorneys' fees and costs and expert witness fees and costs, so that the total aggregate liability of the LABORATORY to the CLIENT shall not exceed \$100,000, or the LABORATORY'S total fee for services rendered on this project, whichever is greater. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

Paragraph 4. INSURANCE:

- 4.1 LABORATORY shall secure and maintain throughout the full period of the services provided to the CLIENT adequate insurance to protect it from claims under applicable Workmen's Compensation Acts and also shall maintain one million dollars of general liability coverage to cover claims for bodily injury, death or property damage as may arise from the performance of its services.
- 4.2 The CLIENT hereby warrants that it has sufficient insurance to protect its employees adequately under applicable Workmen's Compensation Acts and for bodily injury, death, or property damage.

- 4.3 No insurance of whatever kind or type, which may be carried by either party is to be considered as in any way limiting any other party's responsibility for damages resulting from their operations or for furnishing work and materials.

Paragraph 5. PAYMENT:

- 5.1 CLIENT shall pay to LABORATORY such fees for services as previously agreed, orally or in writing, within 30 days of presentment of a bill for such services performed. In the event CLIENT ordered, orally or in writing, services but such services were not assigned a rate for billing, such services shall be billed at the LABORATORY's reasonable and customary rate.
- 5.2 CLIENT shall be responsible for all shipping, customs and other expenses related to services provided by LABORATORY to the CLIENT, and shall fully insure any test sample or other equipment provided to LABORATORY by the CLIENT.
- 5.3 Amounts overdue from CLIENT to LABORATORY shall be charged interest at a rate of 1½% per month.

Paragraph 6. ISO/IEC GUIDE 17025 ADDITIONS:

- 6.1 CLIENT agrees that this test report will not be reproduced except in full, without written approval from the LABORATORY.
- 6.2 CLIENT agrees that this test report shall not be used to claim product endorsement by A2LA or ANSI or any agency of the U.S. Government.
- 6.3 CLIENT agrees that test results presented herein relate only to the sample tested by the LABORATORY.