



# Test Report

**BUREAU  
VERITAS**

Curtis-Straus LLC, a wholly owned subsidiary of BV CPS

Report No EK0183-2

Client Wavemark  
Rich Leitermann

Address 1 Monarch Drive  
Littleton, MA 01460

Phone (978) 431-1633

Item tested 6-Channel Multiplexer

Standards FCC Part 15 Section 15.225  
FCC ID UQY-HF1000A  
FRN 0013630066

Test Dates April 6<sup>th</sup> and 27<sup>th</sup>, 2010

Results As detailed within this report

Prepared by 

Tuyen Truong – Compliance Engineer

Authorized by 

Mairaj Hussain – EMC Supervisor

Issue Date 6/1/10

Conditions of Issue This Test Report is issued subject to the conditions stated in the ‘Conditions of Testing’ section on page 12 of this report.

Curtis-Straus LLC is accredited by the American Association for Laboratory Accreditation for the specific scope of accreditation under Certificate Number 1627-01. This report may contain data which is not covered by the A2LA accreditation.



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## Summary

On April 6<sup>th</sup> and 27<sup>th</sup>, 2010 we tested 6-Channel Multiplexer for compliance with the following requirements:

### EMC Emissions:

- FCC 47 CFR Part 15 for following tests only:
  - Section 15.225 (a), (b), (c) and (d)
  - Section 15.207 - AC Mains Conducted Emission
  - Section 15.209 – Spurious Radiated Emission

Registration numbers for all open area test sites can be found in the *Test Equipment Used* Section starting on page 11.

The purpose of this test report is to support a class II permissive change to a previously approved Limited Module (FCC ID UQY-HF1000A). The 6-Channel Multiplexer assembly contains a Feig RFID Reader.

The class II permissive change is requested because Wavemark intends to change their antenna to remove lead-base solder and add the radio module with limited modular approval.

The HF1500D was tested as representative of the new group of host cabinets.

#### Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	June 1, 2010

**Test Methodology**

Radiated emission testing was performed according to the procedures specified in ANSI C63.4 (2009). Emissions were maximized by rotating the system around its vertical axis as well as varying the test antenna’s height and polarity. The EUT was tested in a representative host device HF1500D. A separate test report has been issued to cover the verification requirement of the digital portion of the product.

Frequency range investigated:	0.009MHz – 150MHz	
Measurement distance:	0.15 - 30MHz	AC Mains Conducted
	0.009 – 30MHz	3m (loop antenna)
	30MHz – 150MHz	3m

AC Line conducted emissions testing was performed with a 50Ω/50μH LISN.

The EUT was tested while installed in the HF1500D host product. Six different EUT antenna heights were represented, and each antenna was continuously adjusted along its full horizontal range of motion. This maximization of the individual antennas was combined with full 360° rotation of the host product. The EUT was only tested in floor standing orientation on a rotating turn table. The testing revealed that the topmost antenna position was worst-case, and the measurements included in this report were taken with the topmost antenna radiating.

The testing performed in the HF1500D host is representative of the EUT being installed in the other possible host products as well. This is the case because all of these products use the same material and construction for their sidewalls. The configurations also do not differ as far as their electrical and/or digital components either.

All readings are peak unless otherwise specified on the respective table.

Rich Leitermann from Wavemark was present during the testing. The test sample was received in good condition.

Release Control Record		
Issue No.	Reason for change	Date Issued
1	Original Release	June 1, 2010



**Product Tested - Configuration Documentation**

EUT Configuration										
Work Order: K0183 Company: Wavemark Company Address: 80 Central Street, Suite 300 Boxborough, MA 01719 Contact: Rich Leitermann Person Present: Rich Leitermann										
			MN			PN			SN	
EUT:			HF1500D			--			HF15001	
SL Power Supply			MW174KB1203F01			--			Sample 1	
GlobeTek Power Supply			GTM21097-5012			TR9CE4000LCE-Y-MED			Sample 1	
EUT Description: Smart Shelf										
EUT Max Frequency: 500 MHz (digital circuitry)										
<b>Support Equipment:</b>			MN			SN				
IBM Laptop			Thinkpad - X61			--				
3Com Ethernet Router			3CNJ100			--				
<b>EUT Ports:</b>										
Port Label	Port Type	No. of ports	No. Populated	Cable Type	Shielded	Ferrites	Length	Max Length	In/Out NEBS Type	Unpopulated Reason
AC Mains	Power Input	1	1	3-wire AC	No	No	3.0 meter	N/A	Indoor	
Ethernet	RJ45	1	1	RJ45, cat. 5	No	No	10.0 meter	100 meter	Indoor	
Serial	RS232	1	0							Service Purpose only
<b>Software / Operating Mode Description:</b>										
Tx is constantly ON scanning tags.										



**Statement of Conformity**

The 6-Channel Multiplexer has been found to conform to the following parts of 47 CFR as detailed below:

Part 15	Comments
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.
15.225(a-d)	The unit complies with these requirements as shown in this test report.

## Test Results

### Fundamental Measurement

#### LIMITS

Frequency Range (MHz)	Limit @ 30m (μV/m)	Limit @ 30m (dBμV/m)
13.553-13.567	15,848	83.9
13.410-13.553 13.567-13.710	334	50.4
13.110-13.410 13.710-14.010	106	40.5

[15.225(a-c)]

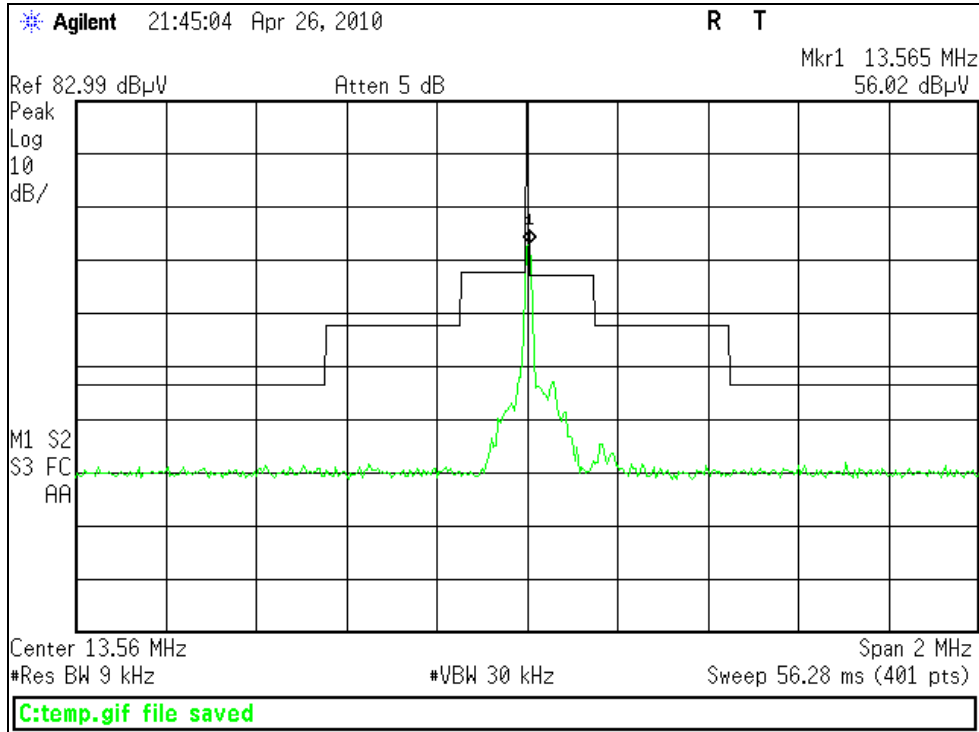
#### MEASUREMENTS

Radiated Emissions Table										
Date: 27-Apr-10		Company: Wavemark				Work Order: K0183				
Engineer: Tuyen Truong		EUT Desc: HF1500				EUT Operating Voltage/Frequency: 120 Vac, 60 Hz				
Temp: 25°C		Humidity: 22%				Pressure: 975 mBar				
Frequency Range: Fundamental Reading						Measurement Distance: 3 m				
Notes: E field						EUT Max Freq: 13.56 MHz				
Antenna Polarization (0° - 90°)	Frequency (MHz)	Reading (dBμV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBμV/m)	47 CFR 15.225(a)			Result (Pass/Fail)
0	13.56	55.0	0.0	39.6	0.2	94.8	Limit (dBμV/m)	Margin (dB)		Pass
90	13.56	56.0	0.0	39.6	0.2	95.8	123.9	-29.1		Pass
<b>Table Result:</b> Pass by -31.3 dB							<b>Worst Freq:</b>		13.56 MHz	
Test Site: EMI Chamber1		Cable 1: Asset #1505			Cable 2: Asset #1507					
Analyzer: Asset #1327		Preamp: none			Antenna: Sm Loop (high)					

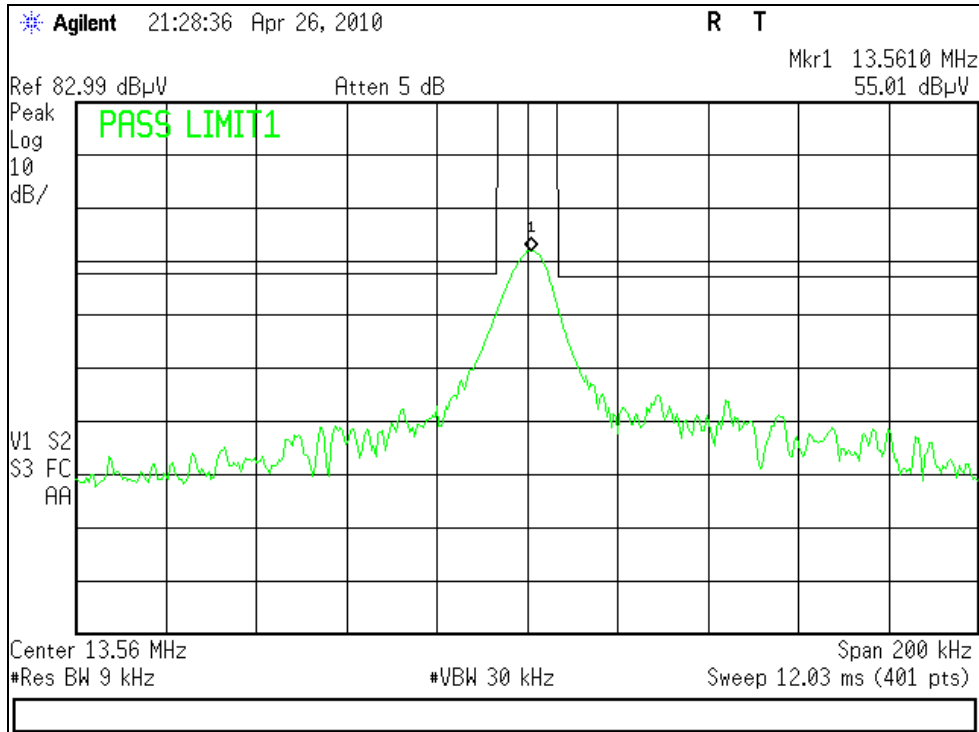
Note: Distance factor: 40\*log(30 meter / 3 meter)



### ANALYZER PLOT



Fundamental Reading at 13.56 MHz - 90 degree



Fundamental Reading at 13.56 MHz - 0 degree





## Radiated Spurious Emissions

### LIMITS

“The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209” [15.225(d)]

### MEASUREMENTS

Radiated Emissions Table											
Date: 27-Apr-10		Company: Wavemark				Work Order: K0183					
Engineer: Tuyen Truong		EUT Desc: HF1500D with SL Power Supply				EUT Operating Voltage/Frequency: 120 Vac, 60 Hz					
Temp: 25°C		Humidity: 22%		Pressure: 975 mBar							
Frequency Range: 0.09 - 30 MHz						Measurement Distance: 3 m					
Notes: Harmonics of fundamental + Spurious EMI are checked at the same time						EUT Max Freq: 13.56 MHz					
Antenna Polarization (0° - 90°)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	47 CFR 15.209(a)			Result (Pass/Fail)	
90	27.12	30.4	25.4	38.0	0.3	43.3	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)		
0	27.12	33.0	25.4	38.0	0.3	45.9	69.5	-26.2	Pass		
<b>Table Result:</b> Pass by -26.2 dB							<b>Worst Freq:</b> 27.12 MHz				
Test Site: EMI Chamber 1		Cable 1: Asset #1505				Cable 2: Asset #1507					
Analyzer: Asset #1328		Preamp: Black				Antenna: Sm Loop (high) and Large Loop					

Radiated Emissions Table											
Date: 27-Apr-10		Company: Wavemark				Work Order: K0183					
Engineer: Tuyen Truong		EUT Desc: HF1500D with SL power				EUT Operating Voltage/Frequency: 120 Vac, 60 Hz					
Temp: 25°C		Humidity: 22%		Pressure: 975 mBar							
Frequency Range: 30 - 150 MHz						Measurement Distance: 3 m					
Notes: Added 3 straight through ferrites (PN: 0461164281) on RG58 cable side; right at the junction of RG58 and RG174						EUT Max Freq: 13.56 MHz					
Added 1 straight through ferrite (PN: 0431164951) on RG174 cable side; right at junction between RG58 and RG174											
Added 1 single looped ferrite (PN: 0431164951) to RG174 cable's end											
Antenna Polarization (H/V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	FCC Class B			Result (Pass/Fail)	
v	40.7	50.6	25.4	13.7	0.4	39.3	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)		
v	54.24	54.0	25.3	7.7	0.4	36.8	40.0	-3.2	Pass		
v	67.8	48.0	25.3	8.3	0.5	31.5	40.0	-8.5	Pass		
v	81.36	48.9	25.3	8.0	0.5	32.1	40.0	-7.9	Pass		
v	94.92	52.9	25.2	9.5	0.6	37.8	43.5	-5.7	Pass		
<b>Table Result:</b> Pass by -0.7 dB							<b>Worst Freq:</b> 40.7 MHz				
Test Site: EMI Chamber 1		Cable 1: Asset #1505				Cable 2: Asset #1507					
Analyzer: Asset #1327		Preamp: Black				Antenna: Red-Brown					



**AC Line Conducted Emission Measurements**  
**LIMITS**

Frequency of emission (MHz)	Quasi-peak limit (dBµV)	Average limit (dBµV)
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.

[47 CFR 15.207(a)]

**MEASUREMENTS**

<b>AC Mains Conducted Emissions</b>										
Date: 27-Apr-10			Company: Wavemark			Work Order: K0183				
Engineer: Tuyen Truong			EUT Desc: HF1500D			Test Site: CEM16				
Temp: 20 °C			Humidity: 32%			Pressure: 975 mBar				
Notes: EUT is powered by SL Power Supply (MN: MW174KB1203F01, SN: not listed)										
Measurement Device: Asset #1492 LISN						EUT Operating Voltage/Frequency: 120 Vac, 60 Hz				
Range: 0.15-30MHz						Spectrum Analyzer: Black				
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	
EUT is powered by SL Power Supply (MN: MW174KB1203F01, SN: not listed)										
0.20	20.3	25.0	14.6	23.2	20.2	63.7	-18.5	53.7	-10.3	Pass
0.45	23.3	25.7	23.1	25.0	20.1	56.9	-11.1	46.9	-1.8	Pass
0.53	25.3	26.6	24.9	25.5	20.1	56.0	-9.3	46.0	-0.4	Pass
0.72	19.5	20.4	18.4	18.6	20.1	56.0	-15.5	46.0	-7.3	Pass
2.35	20.8	20.8	16.4	18.5	20.1	56.0	-15.1	46.0	-7.4	Pass
5.20	22.7	22.4	21.1	21.7	20.1	60.0	-17.2	50.0	-8.2	Pass
9.26	24.8	25.7	22.7	21.9	20.1	60.0	-14.2	50.0	-7.3	Pass
12.15	26.4	26.6	22.4	21.8	20.2	60.0	-13.2	50.0	-7.4	Pass
14.43	22.7	22.3	17.6	16.3	20.2	60.0	-17.1	50.0	-12.2	Pass
20.30	22.6	23.6	15.5	15.7	20.3	60.0	-16.1	50.0	-14.0	Pass
EUT is powered by GlobeTek Power Supply (MN: GTM21097-5012, PN: TR9CE4000LCE-Y-MED)										
0.21	21.8	15.6	10.7	3.8	20.2	63.2	-21.2	53.2	-22.3	Pass
4.52	4.5	2.7	8.1	8.1	20.1	56.0	-31.4	46.0	-17.8	Pass
7.23	8.1	7.8	6.4	5.2	20.1	60.0	-31.8	50.0	-23.5	Pass
13.17	12.7	12.4	10.7	9.9	20.2	60.0	-27.1	50.0	-19.1	Pass
18.30	14.8	16.1	11.4	10.1	20.3	60.0	-23.6	50.0	-18.3	Pass
27.13	19.6	6.4	10.1	4.9	20.5	60.0	-19.9	50.0	-19.4	Pass
<b>Table Result:</b> Pass by -0.40 dB <b>Worst Freq:</b> 0.53 MHz										



### Test Equipment Used

Rev: 12-May-2010

<b>Spectrum Analyzers / Receivers /Preselectors</b>		<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>
Black		9kHz-12.8GHz	8596E	Agilent	3710A00944	337	I	18-Sep-2010
SA EMI Chamber (1328)		9kHz-13.2 GHz	E4405B	Agilent	MY44210241	1328	I	16-Dec-2010
SA EMI Chamber (1327)		9kHz-13.2 GHz	E4405B	Agilent	MY45103416	1327	I	11-Mar-2011
<b>Radiated Emissions Sites</b>		<b>FCC Code</b>	<b>IC Code</b>	<b>VCCI Code</b>			<b>Cat</b>	<b>Calibration Due</b>
EMI Chamber 1		719150	2762A-6	R-3032, G-106			I	15-Feb-2011
<b>Preamps /Couplers Attenuators / Filters</b>		<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>
Black		0.009-2000MHz	ZFL-1000-LN	CS	N/A	799	II	22-Jan-2011
<b>Antennas</b>		<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>
Small Loop		10kHz-30MHz	PLA-130/A	ARA	1024	755	I	26-Mar-2012
Large Loop		20Hz-5MHz	6511	EMCO	9704-1154	67	I	29-Mar-2012
Red-Brown Bilog		30-2000MHz	JB1	Sunol	A0032406	1218	I	11-Aug-2010
<b>Meteorological Meters</b>			<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>
CEMI6 Thermohyrometer			35519-044	Control Company	72457730	1344	II	18-Aug-2011
CHAMBER1 Thermohyrometer			35519-044	Control Company	72457642	1345	II	18-Aug-2011
<b>LISNs/Measurement Probes</b>		<b>Range</b>	<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>
230VAC LISN Asset 1492		10kHz-50MHz	9252-50-R-24-BNC	Solar	84713	1492	I	31-Mar-2010
<b>Conducted Test Sites (Mains / Telco)</b>		<b>FCC Code</b>		<b>VCCI Code</b>			<b>Cat</b>	<b>Calibration Due</b>
CEMI 6		719150		C-3365, T-1580			III	NA

All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



## Conditions Of Testing

[Bureau Veritas Consumer Products Services, Inc., a Massachusetts corporation], and/or its affiliates (collectively, the "Company") will conduct, at the request of the Submitter ("Client"), the tests specified on the submitted Test Request Form or equivalent in accordance with, and subject to, the following terms and conditions (collectively, "Conditions"):

1. All orders for tests are subject to acceptance by the Company, and no order will constitute a binding commitment of the Company unless and until such order is accepted by it, as evidenced by the issuance of a written report ("Test Report") by the Company. The Test Report is issued solely by the Company, is intended for the exclusive use of Client and shall not be published, used for advertising purposes, copied or replicated for distribution to any other person or entity or otherwise publicly disclosed without the prior written consent of the Company. By submitting a request for services to the Company, Client consents to the disclosure to accreditation bodies of those records of Client relevant to the accreditation body's assessment of the Company's competence and compliance with relevant accreditation criteria. The Company shall not be liable for any loss or damage whatsoever resulting from the failure of the Company to provide its services within any time period for completion estimated by the Company. If Client anticipates using the Test Report in any legal proceeding, arbitration, dispute resolution forum or other proceeding, it shall so notify the Company prior to submitting the Test Report in such proceeding. The Company has no obligation to provide a fact or expert witness at such proceeding unless the Company agrees in advance to do so for a separate and additional fee.
2. The Test Report will set forth the findings of the Company solely with respect to the test samples identified therein. Unless specifically and expressly indicated in the Test Report, the results set forth in such Test Report are not intended to be indicative or representative of the quality or characteristics of the lot from which a test sample is taken, and Client shall not rely upon the Test Report as being so indicative or representative of the lot or of the tested product in general. The Test Report will reflect the findings of the Company at the time of testing only, and the Company shall have no obligation to update the Test Report after its issuance. The Test Report will set forth the results of the tests performed by the Company based upon the written information provided to the Company. The Test Report will be based solely on the samples and written information submitted to the Company by Client, and the Company shall not be obligated to conduct any independent investigation or inquiry with respect thereto.
3. The Company may, in its sole discretion, destroy samples which have been furnished to the Company for testing and which have not been destroyed in the course of testing. The Company may delegate the performance of all or a portion of the services contemplated hereunder to an affiliate, agent or subcontractor of the Company, and Client consents to such delegation.
4. These Conditions and the Test Report represent the entire understanding of the parties hereto with respect to the subject matter hereof and of the Test Report, and no modification, variance or extrapolation with respect thereto shall be permitted without the prior written consent of the Company.
5. The names, service marks, trademarks and copyrights of the Company and its affiliates, including the names "BUREAU VERITAS," "BUREAU VERITAS CONSUMER PRODUCTS SERVICES," "BVCPS," "MTL," "ACTS," "MTL-ACTS" and "CURTIS-STRAUS" (collectively, the "Marks") are and shall remain the sole property of the Company or its affiliates and shall not be used by Client except solely to the extent that Client obtains the prior written approval of the Company and then only in the manner prescribed by the Company. Client shall not contest the validity of the Marks or take any action that might impair the value or goodwill associated with the Marks or the image or reputation of the Company or its affiliates.
6. Payment in full shall be due 30 days after the date of invoice. Interest shall be due on overdue amounts from the due date until paid at an interest rate of 1.5% per month or, if less, the maximum rate permitted by law. The Company reserves the right, at any time and from time to time, to revoke any credit extended to Client. Client shall reimburse the Company for any costs it incurs in collecting past due amounts, including court costs and fees and expenses of attorneys and collection agencies. The Test Report may not be used or relied upon by Client if and for so long as Client fails to pay when due any invoice issued by the Company or any affiliate of it to Client or any affiliate or subsidiary of Client together with interest and penalties, if any, accrued thereon.
7. The Company disclaims any and all responsibility or liability arising out of or in connection with e-mail transmissions of such information.
8. Client understands and agrees that the Company is neither an insurer nor a guarantor, that the Company does not take the place of Client or any designer, manufacturer, agent, buyer, distributor or transportation or shipping company, and that the Company disclaims all liability in such capacities. Client further understands that if it seeks assurance against loss or damage, it should obtain appropriate insurance.
9. Client agrees that the Company, by providing the services, does not take the place of Client nor any third party, nor does the Company release them from any of their obligations, nor does the Company otherwise assume, abridge, abrogate or undertake to discharge any duty of any third party to Client or any duty of Client or any third party to any other third party, and Client will not release any third party from its obligations and duties with respect to the tested goods.
10. Client shall, on a timely basis, (a) provide adequate instructions to the Company in order to enable the Company to perform properly its services, (b) provide, or cause Client's suppliers and contractors to provide, the Company with all documents necessary to enable the Company to perform its services, (c) furnish the Company with all relevant information regarding Client's intended use and purposes of the tested goods, (d) advise the Company of essential dates and deadlines relevant to the tested goods and (e) fully exercise all rights and remedies available to Client against third parties in respect of the tested goods.
11. The Company shall undertake due care and ordinary skill in the performance of its services to Client, and the Company shall accept responsibility only where such skill has not been exercised and, even in such event, only to the extent of the limitation of liability set forth herein.
12. If Client desires to assert a claim arising from or relating to (i) the performance, purported performance or non-performance of any services by the Company or (ii) the sale, resale, manufacture, distribution or use of any tested goods, it must submit that claim to the Company in a writing that sets forth with particularity the basis for such claim within 60 days from discovery of the potential claim and not more than six months after the date of issuance of the Test Report to Client. Client waives any and all such claims including, without limitation, claims that the Test Report is inaccurate, incomplete or misleading or that additional or different testing is required, unless and then only to the extent that Client submits a written claim to the Company within both such time periods.
13. CLIENT SHALL, EXCEPT TO THE EXTENT OF COMPANY'S LIABILITY TO CLIENT HEREUNDER (WHICH IN NO EVENT SHALL EXCEED THE LIMITATION OF LIABILITY HEREIN), HOLD HARMLESS AND INDEMNIFY THE COMPANY, ITS AFFILIATES AND THEIR RESPECTIVE DIRECTORS, OFFICERS, EMPLOYEES, AGENTS AND SUBCONTRACTORS AGAINST

ALL ACTUAL OR ALLEGED THIRD PARTY CLAIMS FOR LOSS, DAMAGE OR EXPENSE OF WHATSOEVER NATURE AND HOWSOEVER ARISING FROM OR RELATING TO (i) THE PERFORMANCE, PURPORTED PERFORMANCE OR NON-PERFORMANCE OF ANY SERVICES BY THE COMPANY OR (ii) THE SALE, RESALE, MANUFACTURE, DISTRIBUTION OR USE OF ANY TESTED GOODS.

14. EXCEPT AS MAY OTHERWISE BE EXPRESSLY AGREED TO IN WRITING BY THE COMPANY AND NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN OR IN ANY TEST REPORT, NO WARRANTY OR GUARANTEE, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE, IS MADE.

15. (A) IN NO EVENT WHATSOEVER SHALL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, INCIDENTAL, EXEMPLARY OR PUNITIVE DAMAGES IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE TEST REPORT OR THE SERVICES PROVIDED BY THE COMPANY HEREUNDER, INCLUDING WITHOUT LIMITATION LOSS OF OR DAMAGE TO PROPERTY; LOSS OF INCOME, PROFIT OR USE; OR ANY CLAIMS OR DEMANDS MADE AGAINST CLIENT OR ANY OTHER PERSON BY ANY THIRD PARTY IN CONNECTION WITH, RELATING TO OR ARISING OUT OF THE SERVICES PROVIDED BY THE COMPANY HEREUNDER.

(B) NOTWITHSTANDING ANY PROVISION TO THE CONTRARY CONTAINED HEREIN, AND IN RECOGNITION OF THE RELATIVE RISKS AND BENEFITS TO CLIENT AND THE COMPANY ASSOCIATED WITH THE TESTING SERVICES CONTEMPLATED HEREBY, THE RISKS HAVE BEEN ALLOCATED SUCH THAT UNDER NO CIRCUMSTANCES WHATSOEVER SHALL THE LIABILITY OF THE COMPANY TO CLIENT OR ANY THIRD PARTY IN RESPECT OF ANY CLAIM FOR LOSS, DAMAGE OR EXPENSE, OF WHATSOEVER NATURE OR MAGNITUDE, AND HOWSOEVER ARISING, EXCEED AN AMOUNT EQUAL TO FIVE (5) TIMES THE AMOUNT OF THE FEES PAID TO THE COMPANY FOR THE SPECIFIC SERVICES WHICH GAVE RISE TO SUCH CLAIM OR U.S.\$10,000, WHICHEVER IS THE LESSER AMOUNT.

16. The Company shall not be liable for any loss or damage resulting from any delay or failure in performance of its obligations hereunder resulting directly or indirectly from any event of force majeure or any event outside the control of the Company. If any such event occurs, the Company may immediately cancel or suspend its performance hereunder without incurring any liability whatsoever to Client.

17. Company's services, including these Conditions, shall be governed by, and construed in accordance with, the local laws of the country where the Company performs the tests or, in the case of tests performed in the United States of America, the laws of Massachusetts without regard to conflicts of laws principles. If any aspect(s) of these Conditions is found to be illegal or unenforceable, the validity, legality and enforceability of all remaining aspects of these Conditions shall not in any way be affected or impaired thereby. Any proceeding related to the subject matter hereof shall be brought, if at all, in the courts of the country where the Company performs the tests or, in the case of tests performed in the United States of America, in the courts of Massachusetts. Client waives the right to interpose any counterclaim or setoffs of any nature in any litigation arising hereunder.

Rev.160009121(2)\_#684340 v13CS