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VERITAS

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

Test Report

Report No	ER2591-1
Client	Ideal Industries, Inc. Tim Tunnell
Address	Becker Place Sycamore IL 60178
Phone	(815) 895-1295
Items tested	SCD1001
FCC ID	2AAMXSCD1001
IC ID	11250A-SCD1001
FRN	0002862225
Equipment Type	Digital Transmission System
Equipment Code	DTS
Emission Designator	767KG1D
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2
Test Dates	8/22/2017-9/11/2017
Results	As detailed within this report
Prepared by	 Zachary Johnson – Test Engineer
Authorized by	 Jason Haley – Sr. EMC Engineer
Issue Date	<u>10/4/2017</u>
Conditions of Issue	This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 25 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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Form Final Report REV 12-07-15



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Summary

This test report supports an application for certification of a transmitter operating pursuant to:
CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2

The SCD1001 operates in the 902-928MHz frequency range and has a wire antenna with 4.55dBi peak gain. It is powered by AC input up to 347V.

We found that the product met the above requirements without modification. Test sample was received in good condition.



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Test Methodology

All testing was performed according to the following rules/procedures/documents:
 CFR Title 47 FCC Part 15.247, RSS-247 Issue 2, RSS-Gen Issue 4, FCC KDB 558074 D01
 DTS Measurement Guidance v04 and ANSI C63.10-2013.

Radiated emissions were maximized by rotating the device around 3 orthogonal planes (X, Y and Z) as well as varying the test antenna's height and polarity. The worst case results were recorded.

RF measurements were performed at the antenna port on 3 channels as follows:

- 902.7MHz: Low Channel
- 915MHz: Mid Channel
- 927.3MHz: High Channel

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

The following bandwidths were used during radiated spurious emissions testing.

Frequency	RBW	VBW
150kHz-30MHz	9kHz	30kHz
30-1000MHz	120kHz	1MHz
1-25GHz	1MHz	3MHz



Product Tested - Configuration Documentation

EUT Configuration										
Work Order:	R2591									
Company:	Ideal Industries Inc.									
Company Address:	Becker Place Sycamore, IL, 60178									
Contact:	Tim Tunnell									
	MN			PN			SN			
EUT:	SCD1001, SCLED1001			--			--			
EUT Description:	Electronic Ballast Controller									
Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	in/out	under test	comment
Power AC IN	Power AC	1	1	Power AC	No	No	0.1	out	yes	EUT has hanging black and white wires for power in
Ballast Control Cables	other	4	4	other	No	No	1	in	yes	Client provided loopback setup for hanging cables, which normally go to a ballast
Software Operating Mode Description:										
DTM mode with 100% duty cycle										



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Statement of Conformity

The SCD1001 has been found to conform to the following parts of 47 CFR and RSS 210 as detailed below:

RSS-GEN	RSP-100	RSS 210	Part 15	Comments
6.3			15.15(b)	There are no controls accessible to the user that varies the output power to operate in violation of the regulatory requirements.
	3.1		15.19	The label is shown in the label exhibit.
	3.2		15.21	Information to the user is shown in the instruction manual exhibit.
			15.27	No special accessories are required for compliance.
3, 6.1, 6.5			15.31	The EUT was tested in accordance with the measurement standards in this section.
6.13			15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
8.1			15.35	The EUT emissions were measured using the measurement detector and bandwidth specified in this section, unless noted in specific rule section under which the equipment operates.
8.3			15.203	The antenna for this device is a permanently installed PCB antenna.
8.10			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 or RSS-Gen as applicable
8.8			15.207	EUT meets the AC Line conducted emissions requirements of this section.
			15.247	The unit complies with the requirements of 15.247
		RSS 210		The unit complies with the requirements of RSS-210
6.6				Occupied Bandwidth measurements were made.

Modifications Required for Compliance

None



Test Results

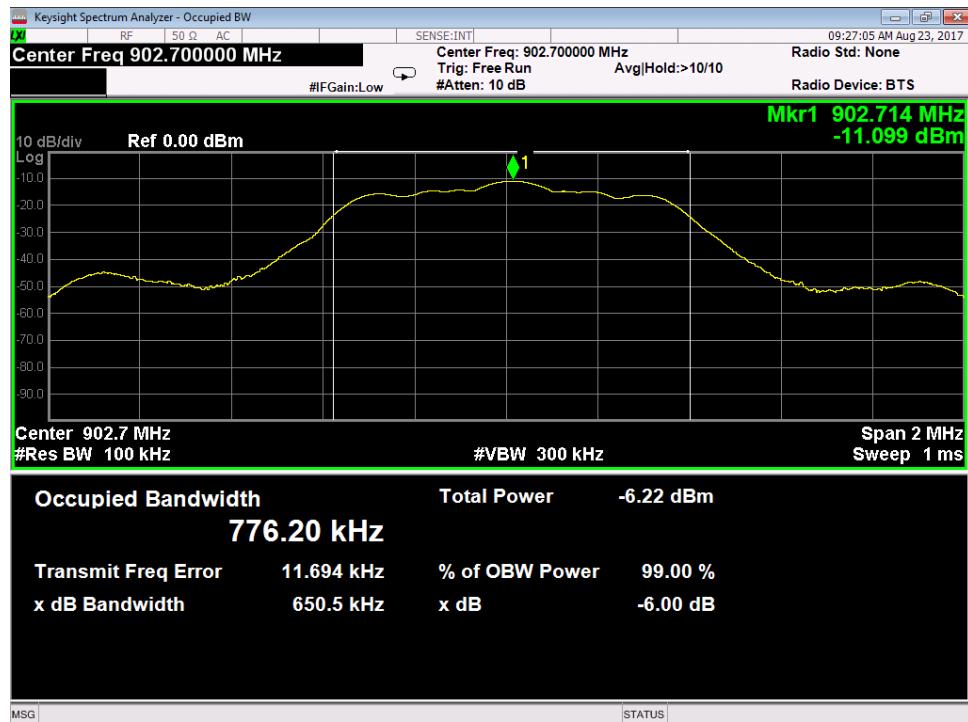
Bandwidth

Limit: The minimum 6 dB bandwidth shall be at least 500 kHz.
[15.247(a) (2)]

MEASUREMENTS / RESULTS

6dB Bandwidth										
Date: 8/22/2017	Company: Ideal Industries			Work Order: R2591						
Engineer: Zac Johnson	EUT: SCD1001			Operating Voltage/Frequency: 120V / 60Hz						
Temp: 24.3°C	Humidity: 50%			Pressure: 1007mBar						
Frequency Range: 902.7-927.3MHz Measurement Type: Conducted Measurement Method: FCC KDB 558074 D01 DTS Meas Guidance V04										
Notes:										
Frequency (MHz)	Reading (kHz)	6dB Bandwidth			Result (Pass/Fail)					
		Limit (kHz)	Margin (kHz)	Result (Pass/Fail)						
902.7	650.5	≥500	151	Pass						
915.0	651.5	≥500	152	Pass						
927.3	652.2	≥500	152	Pass						
Test Site: CEMI 5	Cable: 2286 Cbl	Attenuator: 2121 Pad			Copyright Curtis-Straus LLC 2000					
Analyzer: 1118473 SA										

PLOTS



Low Channel Bandwidth

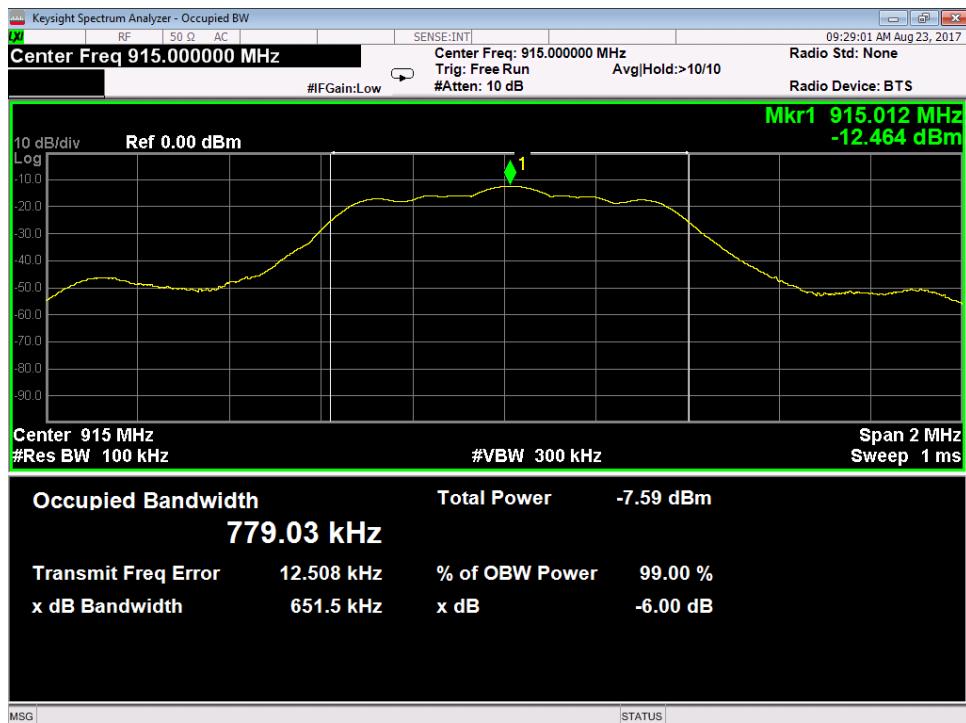


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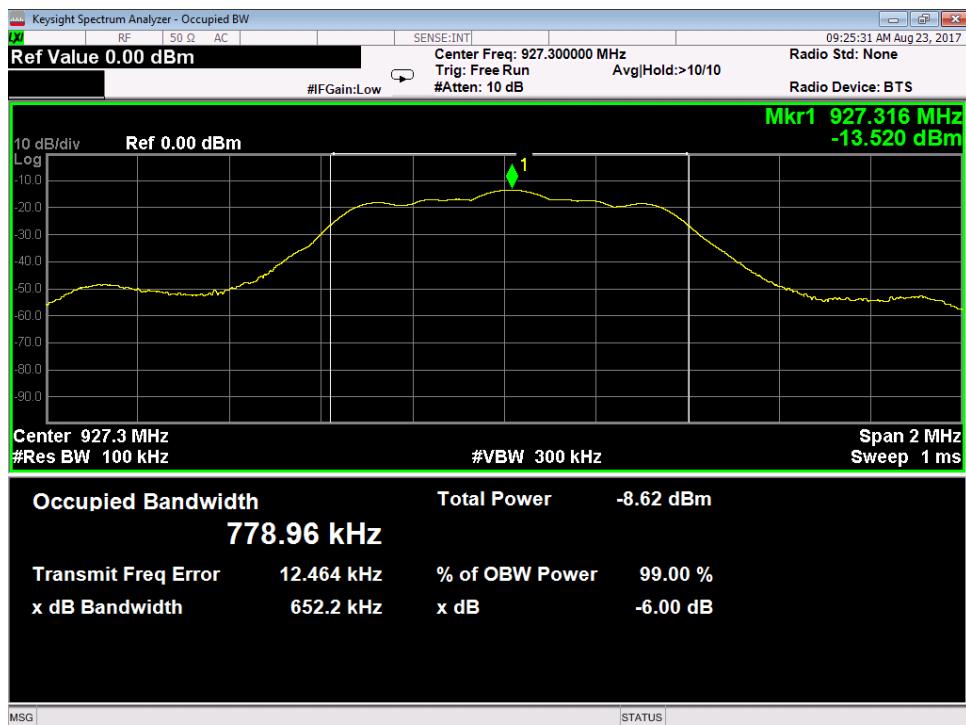


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Middle Channel Bandwidth



High Channel Bandwidth



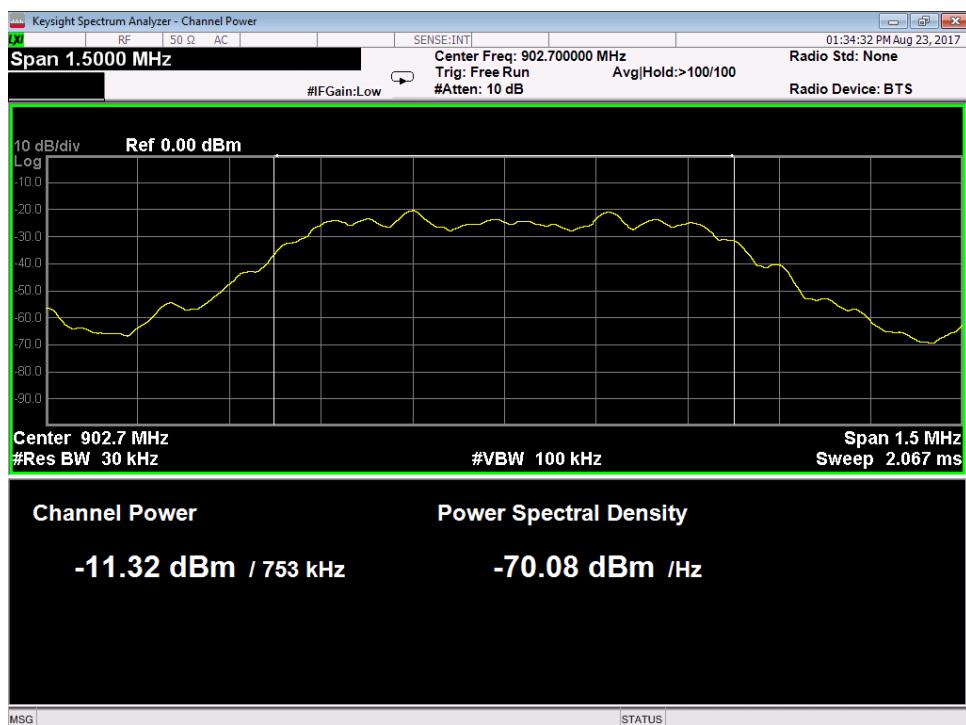
Peak Power

*LIMIT: 1 Watt Conducted Output Power
[15.247(b) (3)]*

MEASUREMENTS / RESULTS

Peak Output Power													
Date: 8/22/2017	Company: Ideal Industries		Work Order: R2591		Operating Voltage/Frequency: 120V / 60Hz								
Engineer: Zac Johnson	EUT: SCD1001												
Temp: 24.3°C	Humidity: 50%		Pressure: 1007mBar										
Frequency Range: 902.7-927.3MHz		Measurement Type: Conducted											
Notes: 558074 D01 v04 Output Power 9.2.2.2 Method Used													
Frequency	Peak Reading	Cable Loss	Attenuator Loss	Peak Output Power	Limit	Margin	Result						
(MHz)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)	(Pass/Fail)						
902.7	-11.32	0.28	29.29	18.25	30.0	-11.75	Pass						
915.0	-12.71	0.28	29.29	16.86	30.0	-13.14	Pass						
927.3	-13.75	0.28	29.29	15.82	30.0	-14.18	Pass						
Test Site: CEMI 5		Cable: 2286 Cbl		Attenuator: 2121 Pad									
Analyzer: 1118473 SA													
Peak Output Power (dBm)= Peak Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dB)													

PLOTS



Low Channel Peak Output Power

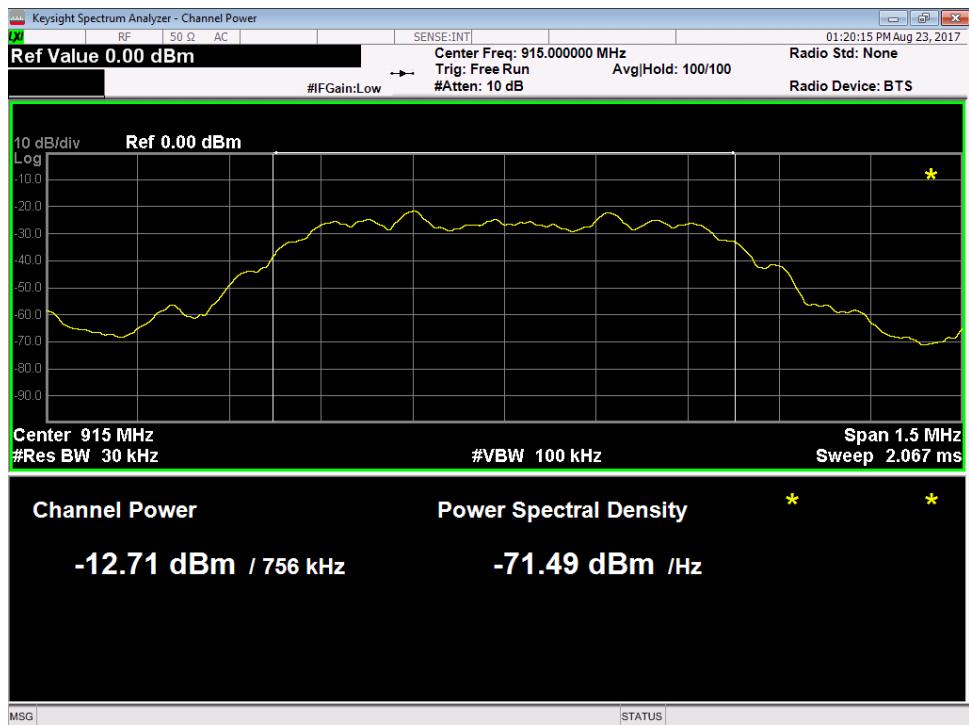


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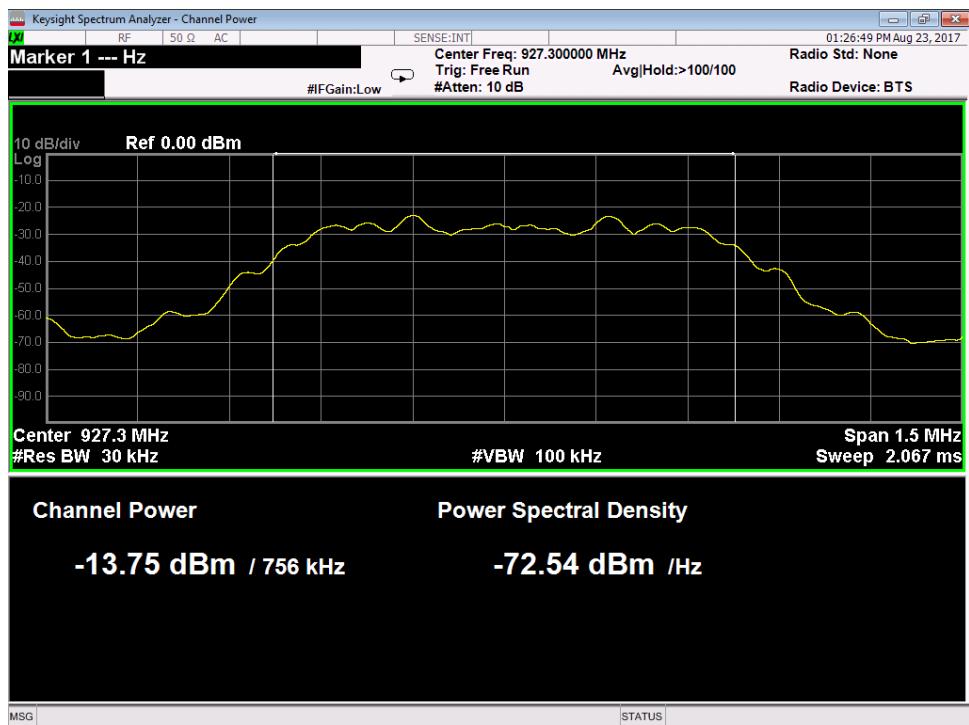


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Middle Channel Peak Output Power



High Channel Peak Output Power



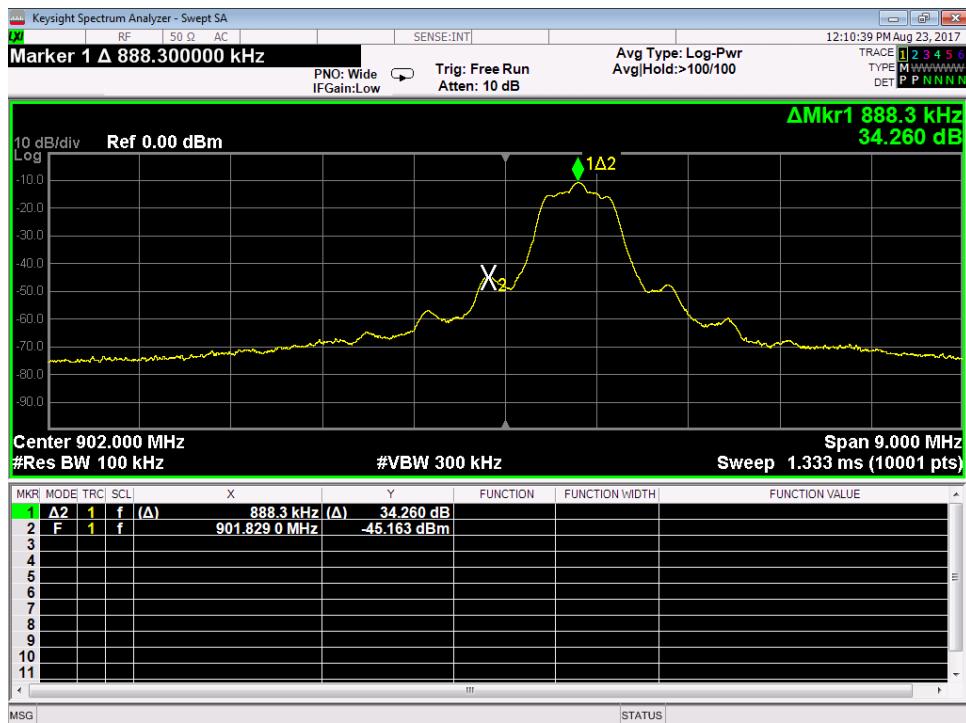
Band Edge Measurements (Conducted and Radiated)

Limits: Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). [15.247(d)]

MEASUREMENTS / RESULTS

Conducted Bandedge			
Date: 8/22/2017	Company: Ideal Industries	Work Order: R2591	
Engineer: Zac Johnson	EUT: SCD1001	Operating Voltage/Frequency: 120V / 60Hz	
Temp: 24.3°C	Humidity: 50%	Pressure: 1007mBar	
Frequency Range: 902.7-927.3MHz	Measurement Type: Conducted	Measurement Method: FCC KDB 558074 D01 DTS Meas Guidance V04	
Notes: 30dB limit since average method was used for peak			
		Delta to Peak (dB)	Limit
		(dB)	(Pass/Fail)
Low Bandedge		34.26	≥ 30 Pass
High Bandedge		40.35	≥ 30 Pass
Test Site: CEMI 5	Cable: 2286 Cbl	Attenuator: 2121 Pad	
Analyzer: 1118473 SA		Copyright Curtis-Straus LLC 2000	

PLOTS



Low Band Edge

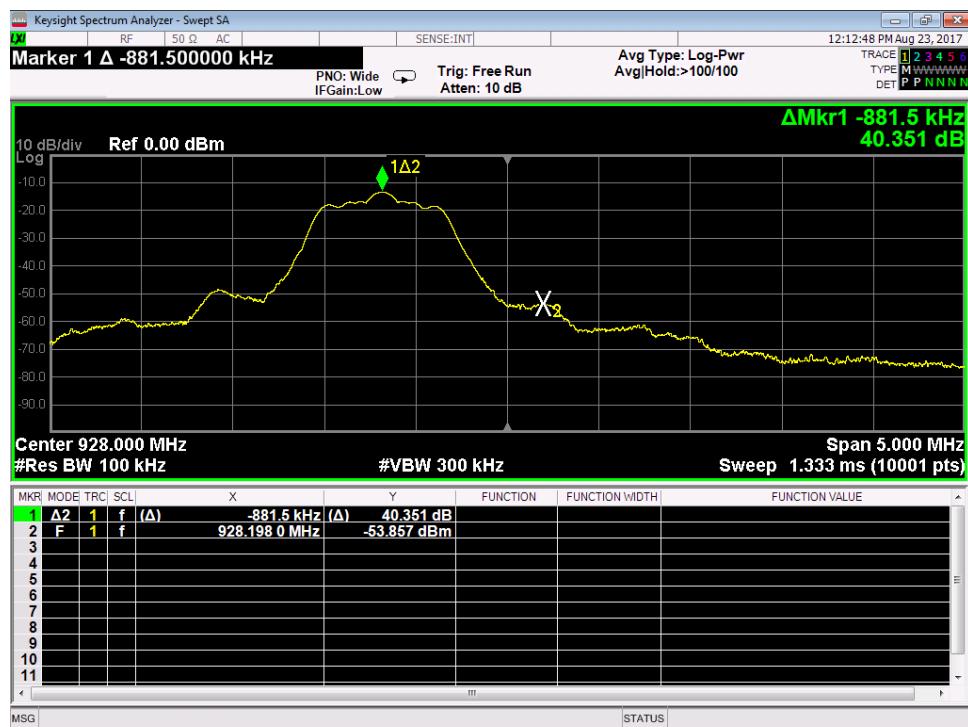


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High Band Edge



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Radiated Spurious Emissions

Limits: Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a). [15.247(d)]

**All readings which indicate use of a notch filter have factor added to raw reading

MEASUREMENTS / RESULTS

Radiated Emissions Table													
Date: 23-Aug-17		Company: Ideal Industries		Work Order: R2591									
Engineer: Zac Johnson		EUT Desc: SCD1001		EUT Operating Voltage/Frequency: 120V / 60Hz									
Temp: 25.4		Humidity: 51%		Pressure: 999mBar									
Frequency Range: 30-1000MHz									Measurement Distance: 3 m				
Notes: Worst Case Orientation Z Used 900-930MHz Notch Filter									EUT Max Freq: 927.3MHz				
Antenna Polarization (H/V)	Frequency (MHz)	Reading (dB _μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dB _μ V/m)	---						
							Limit (dB _μ V/m)	Margin (dB)	Result (Pass/Fail)	Limit (dB _μ V/m)	Margin (dB)	Result (Pass/Fail)	
V	30.0	54.0	25.8	21.5	0.4	50.1	---	---	84.7	-34.6	Pass		
V	52.31	50.0	25.8	6.7	0.4	31.3	---	---	84.7	-53.4	Pass		
V	83.35	52.0	25.8	7.3	0.5	34.0	---	---	84.7	-50.7	Pass		
V	115.2	50.6	25.9	13.6	0.6	38.9	---	---	43.5	-4.6	Pass		
H	115.2	47.5	25.9	13.6	0.6	35.8	---	---	43.5	-7.7	Pass		
V	214.3	56.5	26.0	10.5	0.9	41.9	---	---	84.7	-42.8	Pass		
H	219.15	58.8	26.0	10.7	1.0	44.5	---	---	84.7	-40.2	Pass		
H	331.67	47.7	26.0	13.9	1.2	36.8	---	---	46.0	-9.2	Pass		
V	500.45	48.8	25.9	17.9	1.7	42.5	---	---	84.7	-42.2	Pass		
H	546.04	47.2	25.9	18.2	1.5	41.0	---	---	84.7	-43.7	Pass		
Table Result: Pass		by	-4.6 dB							Worst Freq: 115.2 MHz			
Test Site: EMI Chamber 1			Cable 1: Asset #2051			Cable 2: Asset #2054			Cable 3: ---				
Analyzer: Rental SA#1			Preamp: Green			Antenna: Red-Brown			Preselector: ---				
CSsoft Radiated Emissions Calculator v 1.017.188										Copyright Curtis-Straus LLC 2000			
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor													

30-1000MHz

(Limits adjusted to 30dB below peak fundamental for Non-Restricted Bands)



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Testing Cert. No. 1627-01

Radiated Emissions Table

Date: 23-Aug-17		Company: Ideal Industries								Work Order: R2591										
Engineer: Zac Johnson		EUT Desc: SCD1001								EUT Operating Voltage/Frequency: 120V / 60Hz										
Temp: 25.4		Humidity: 51%								Pressure: 999mBar										
Frequency Range: 1-6GHz											Measurement Distance: 3 m									
Notes: Worst Case Orientation Z Used 900-930MHz Notch Filter											EUT Max Freq: 927.3MHz									
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dB μ V)	Average Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dB μ V/m)	Adjusted Avg Reading (dB μ V/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average								
									Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)						
Low Channel																				
H	1805.0	50.6	38.9	37.5	30.6	3.5	47.2	35.5	74.0	-26.8	Pass	54.0	-18.5	Pass						
V	1805.0	51.4	40.4	37.5	30.6	3.5	48.0	37.0	74.0	-26.0	Pass	54.0	-17.0	Pass						
H	2708.0	50.1	37.3	37.8	32.5	4.4	49.2	36.4	74.0	-24.8	Pass	54.0	-17.6	Pass						
V	2708.0	50.6	40.8	37.8	32.5	4.4	49.7	39.9	74.0	-24.3	Pass	54.0	-14.1	Pass						
H	3611.0	47.8	34.3	37.9	33.5	4.9	48.3	34.8	74.0	-25.7	Pass	54.0	-19.2	Pass						
V	3611.0	47.5	34.5	37.9	33.5	4.9	48.0	35.0	74.0	-26.0	Pass	54.0	-19.0	Pass						
Mid Channel																				
H	1830.0	50.7	38.3	37.5	30.8	3.6	47.6	35.2	74.0	-26.4	Pass	54.0	-18.8	Pass						
V	1830.0	49.9	38.8	37.5	30.8	3.6	46.8	35.7	74.0	-27.2	Pass	54.0	-18.3	Pass						
H	2745.0	49.2	37.7	37.7	32.5	4.3	48.3	36.8	74.0	-25.7	Pass	54.0	-17.2	Pass						
V	2745.0	50.8	38.1	37.7	32.5	4.3	49.9	37.2	74.0	-24.1	Pass	54.0	-16.8	Pass						
H	3660.0	46.9	35.2	37.9	33.6	4.9	47.5	35.8	74.0	-26.5	Pass	54.0	-18.2	Pass						
V	3660.0	46.3	34.5	37.9	33.6	4.9	46.9	35.1	74.0	-27.1	Pass	54.0	-18.9	Pass						
High Channel																				
H	1855.0	49.0	37.8	37.4	31.0	3.6	46.2	35.0	74.0	-27.8	Pass	54.0	-19.0	Pass						
V	1855.0	49.0	36.9	37.4	31.0	3.6	46.2	34.1	74.0	-27.8	Pass	54.0	-19.9	Pass						
H	2782.0	48.5	36.4	37.6	32.6	4.3	47.8	35.7	74.0	-26.2	Pass	54.0	-18.3	Pass						
V	2782.0	49.7	38.9	37.6	32.6	4.3	49.0	38.2	74.0	-25.0	Pass	54.0	-15.8	Pass						
H	3709.0	48.2	34.8	37.9	33.6	4.9	48.8	35.4	74.0	-25.2	Pass	54.0	-18.6	Pass						
V	3709.0	46.8	34.5	37.9	33.6	4.9	47.4	35.1	74.0	-26.6	Pass	54.0	-18.9	Pass						
Table Result:		Pass	by	-14.1	dB									Worst Freq: 2708.0 MHz						
Test Site: EMI Chamber 1		Cable 1: Asset #2051								Cable 2: Asset #2054			Cable 3: Asset #1522							
Analyzer: Rental SA#1		Preamp: Asset #2111								Antenna: Blue Horn			Preselector: ---							
CSsoft Radiated Emissions Calculator v1.017.188									Copyright Curtis-Straus LLC 2000											
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																				

1GHz-6GHz 3 Channels

Radiated Emissions Table

Date: 23-Aug-17		Company: Ideal Industries								Work Order: R2591										
Engineer: Zac Johnson		EUT Desc: SCD1001								EUT Operating Voltage/Frequency: 120V / 60Hz										
Temp: 25.4		Humidity: 51%								Pressure: 999mBar										
Frequency Range: 1-6GHz											Measurement Distance: 3 m									
Notes: Worst Case Orientation Z Used 900-930MHz Notch Filter											EUT Max Freq: 927.3MHz									
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dB μ V)	Average Reading (dB μ V)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dB μ V/m)	Adjusted Avg Reading (dB μ V/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average								
									Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)	Limit (dB μ V/m)	Margin (dB)	Result (Pass/Fail)						
Low Channel																				
No Emissions Found																				
Table Result:		Pass	by	dB									Worst Freq: MHz							
Test Site: EMI Chamber 1		Cable 1: Asset #2051								Cable 2: Asset #2054			Cable 3: Asset #1522							
Analyzer: Rental SA#1		Preamp: Asset #2111								Antenna: Blue Horn			Preselector: ---							
CSsoft Radiated Emissions Calculator v1.017.188									Copyright Curtis-Straus LLC 2000											
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																				

6GHz-10GHz

Rev. 8/21/2017

Spectrum Analyzers / Receivers /Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental MXE EMI Receiver(1170725)		20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	12/22/2017	12/22/2016
Radiated Emissions Sites	EMI Chamber 2	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
		719150	2762A-7	A-0015	30-1000MHz	1686	I	12/21/2018	12/21/2016
Preamps /Couplers Attenuators / Filters	Green	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
		0.009-2000MHz	ZFL-1000-LN	CS	N/A	802	II	9/19/2017	9/19/2016
Antennas	Red-Brown Biolog	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
		30-2000MHz	JB1	Sunol	A0032406	1218	I	1/13/2019	1/13/2017
Meteorological Meters	Weather Clock (Pressure Only)	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
	TH A#2084	BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016	
		HTC-1	HDE		2084	II	3/23/2018	3/23/2017	
Cables	Asset #2051	Range	Mfr			Cat	Calibration Due	Calibrated on	
		9kHz - 18GHz	Florida RF			II	3/5/2018	3/5/2017	
	Asset #2054	9kHz - 18GHz	Florida RF			II	10/30/2017	10/30/2016	

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

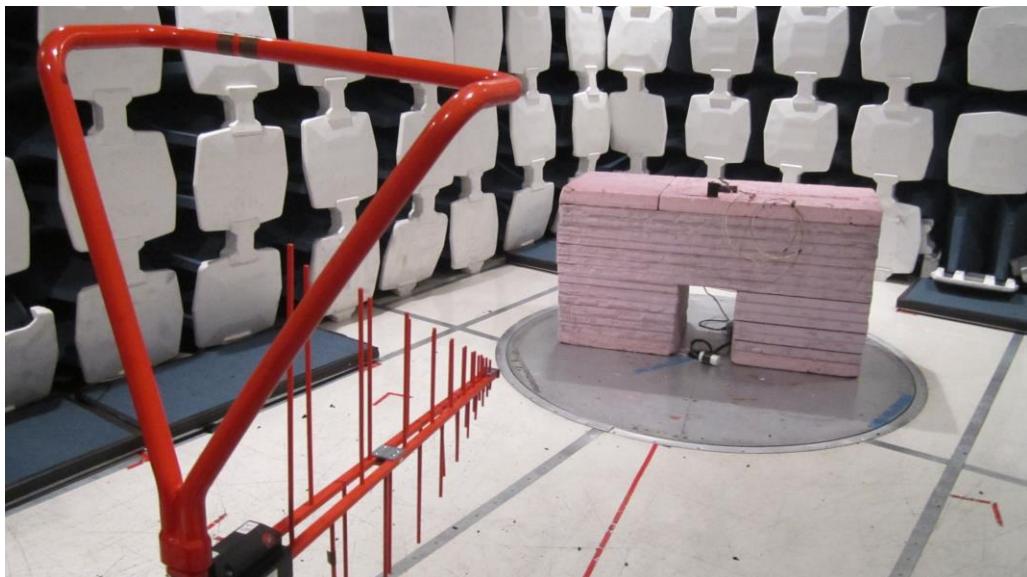
30-1000MHz Radiated Emissions - Test Equipment Used

Rev. 8/21/2017

Spectrum Analyzers / Receivers /Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental MXE EMI Receiver(1170725)		20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	12/22/2017	12/22/2016
Radiated Emissions Sites	EMI Chamber 2	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
		719150	2762A-7	A-0015	1-18GHz	1686	I	12/21/2018	12/21/2016
Preamps /Couplers Attenuators / Filters	2111 HF Preamp	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
	2130 BRF	0.5-18GHz	PAM-118A	COM-POWER	551063	2111	II	11/5/2017	11/5/2016
		0.009-18000MHz	BRM18770	Micro-Tronics	1	2130	II	1/7/2018	1/7/2017
Antennas	Blue Horn	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
		1-18Ghz	3117	ETS	157647	1861	I	2/14/2019	2/14/2017
Meteorological Meters	Weather Clock (Pressure Only)	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
	TH A#2084	BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016	
		HTC-1	HDE		2084	II	3/23/2018	3/23/2017	
Cables	Asset #1522	Range	Mfr			Cat	Calibration Due	Calibrated on	
		9kHz - 18GHz	Florida RF			II	2/11/2018	2/11/2017	
	Asset #2051	9kHz - 18GHz	Florida RF			II	3/5/2018	3/5/2017	
	Asset #2054	9kHz - 18GHz	Florida RF			II	10/30/2017	10/30/2016	

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

1-10GHz Radiated Emissions - Test Equipment Used



30-1000MHz Radiated Emissions Test Setup

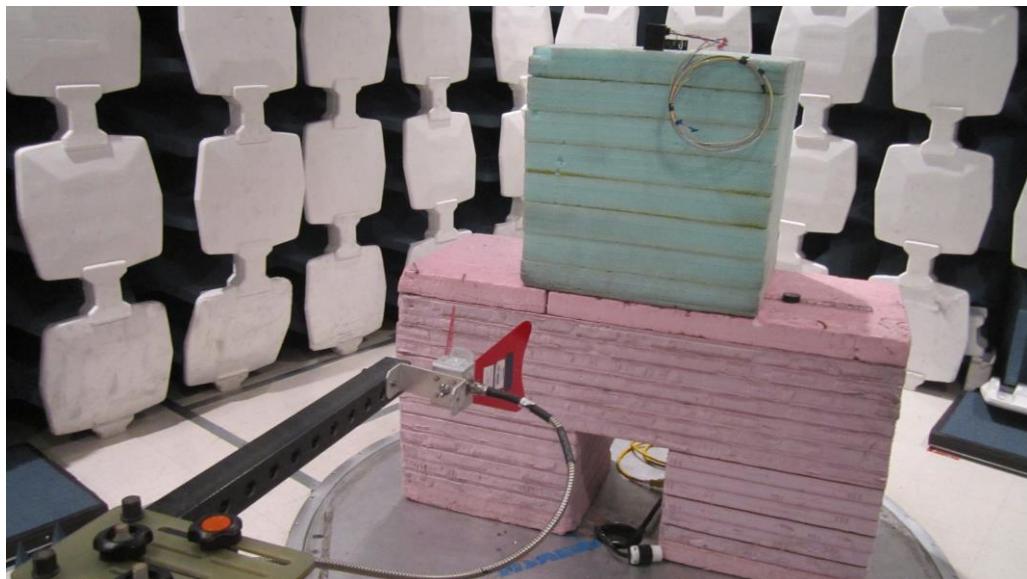


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1-6GHz Radiated Emissions Test Setup



6-10GHz Radiated Emissions Test Setup



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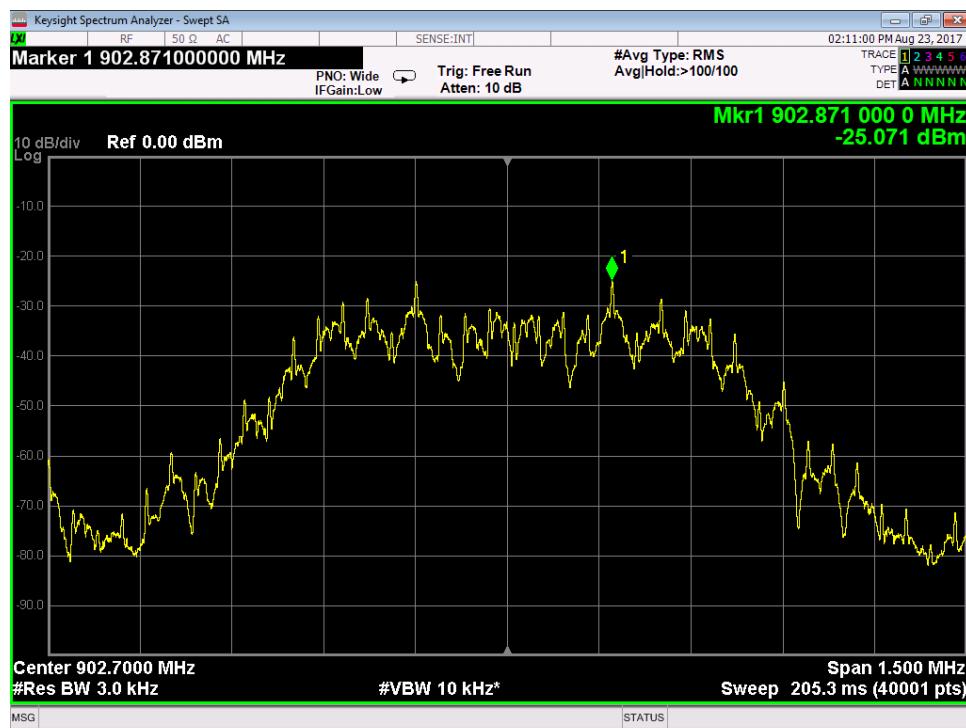
Power Spectral Density

Limit: The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission. [15.247(e)]

MEASUREMENTS / RESULTS

Peak Power Spectral Density												
Date: 8/22/2017	Company: Ideal Industries				Work Order: R2591							
Engineer: Zac Johnson	EUT: SCD1001				Operating Voltage/Frequency: 120V / 60Hz							
Temp: 24.3°C	Humidity: 50% Pressure: 1007mBar											
Frequency Range: 902.7-927.3MHz	Measurement Type: Conducted											
Notes: 558074 D01 v04 PSD 10.3 Method Used												
Frequency	Peak Reading	Cable Loss	Attenuator Loss	Peak PSD	Limit	Margin	Result					
(MHz)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)						
902.7	-25.07	0.28	29.29	4.50	8.0	-3.50	Pass					
915.0	-25.88	0.28	29.29	3.69	8.0	-4.31	Pass					
927.3	-27.51	0.28	29.29	2.06	8.0	-5.94	Pass					
Test Site: CEMI 5	Cable: 2286 Cbl		Attenuator: 2121 Pad									
Analyzer: 1118473 SA												
PSD(dBm) = Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dBm)												

PLOTS



Low Channel PSD

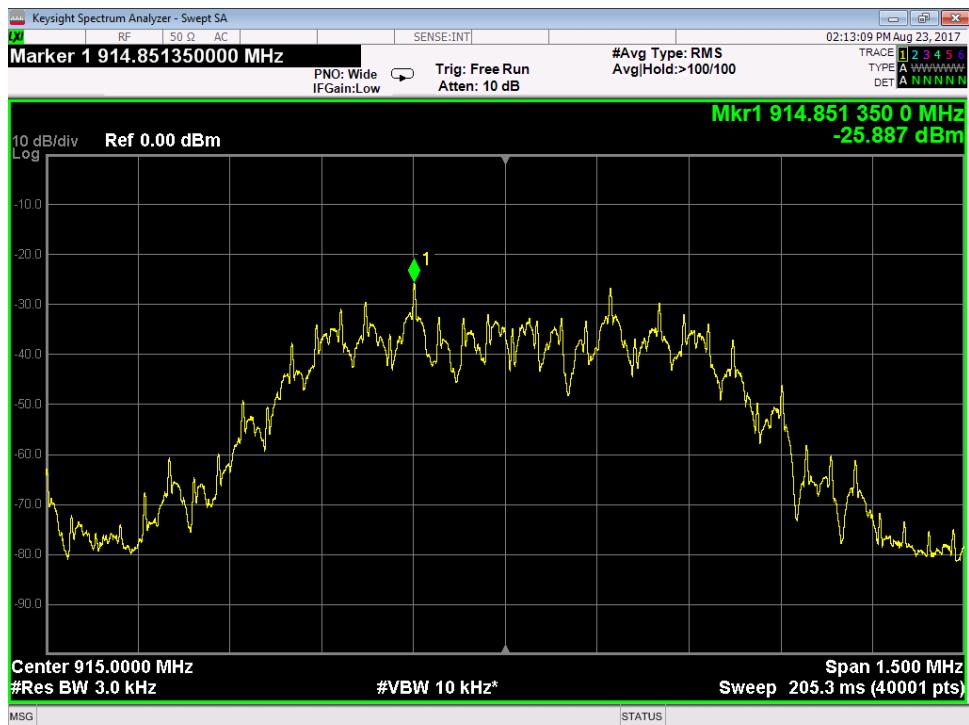


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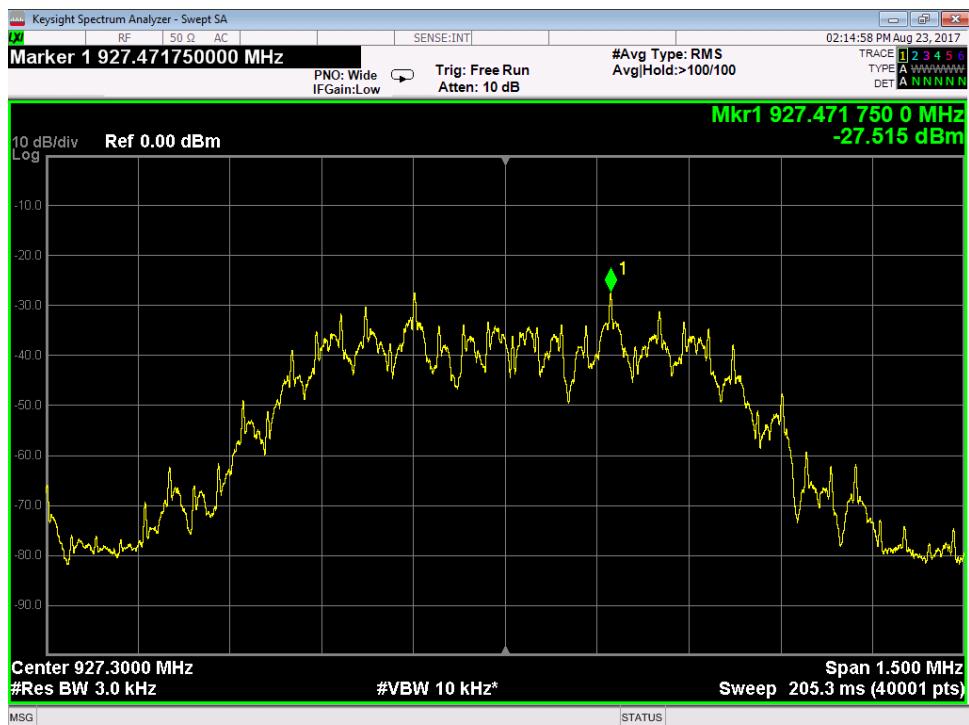


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Testing Cert. No. 1627-01



Middle Channel PSD



High Channel PSD



Occupied Bandwidth

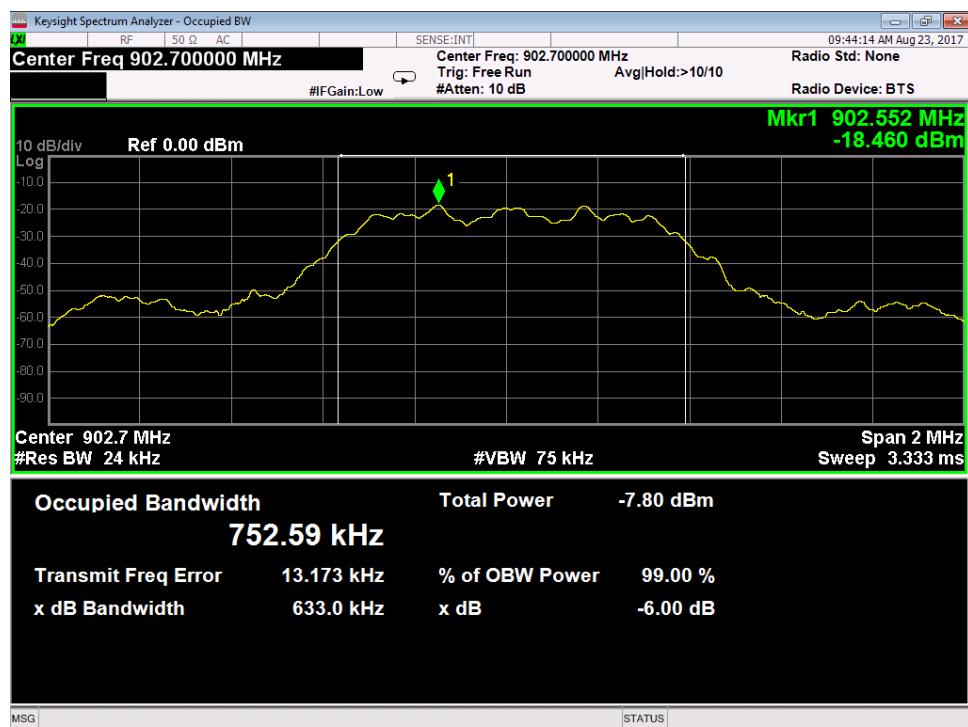
Requirement: When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is its 99% emission bandwidth, as calculated or measured.

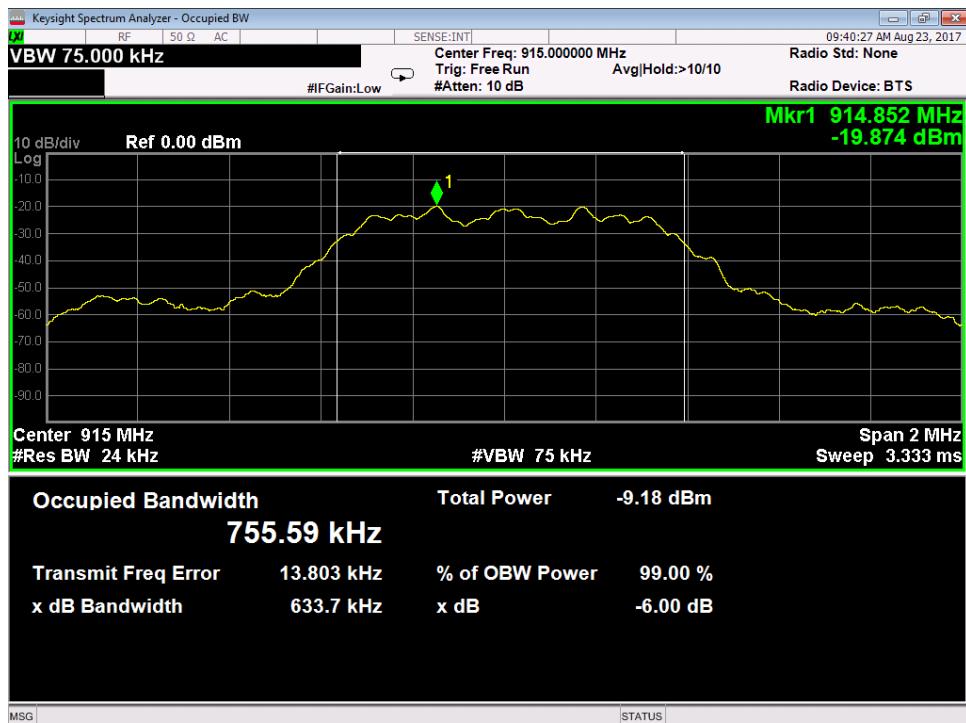
[RSS-GEN 6.6]

MEASUREMENTS / RESULTS

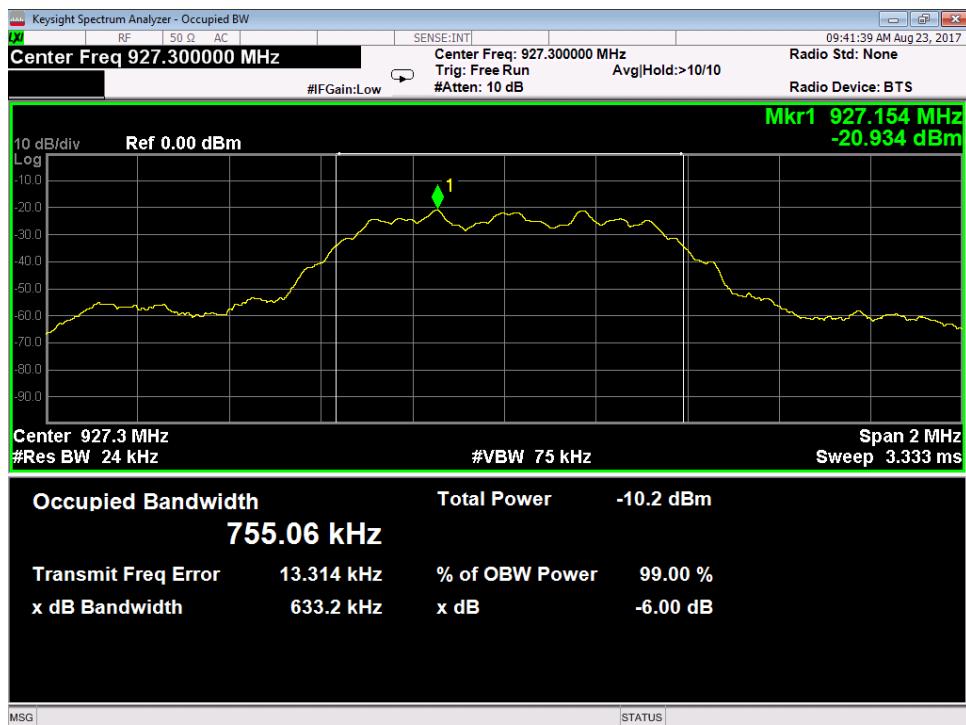
99% Occupied Bandwidth		
Date: 8/22/2017	Company: Ideal Industries	Work Order: R2591
Engineer: Zac Johnson	EUT: SCD1001	Operating Voltage/Frequency: 120V / 60Hz
Temp: 24.3°C	Humidity: 50%	Pressure: 1007mBar
Frequency Range: 902.7-927.3MHz	Measurement Type: Conducted	
Notes:		
Frequency (MHz)	99% OBW (KHz)	
902.7	752.59	
915.0	755.59	
927.3	755.06	
Test Site: CEMI 5	Cable: 2286 Cbl	Attenuator: 2121 Pad
Analyzer: 1118473 SA		Copyright Curtis-Straus LLC 2000

PLOTS





99% Occupied Bandwidth Middle Channel



99% Occupied Bandwidth High Channel



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AC Line Conducted EmissionsLimits:

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.

[47 CFR 15.207(a)]

MEASUREMENTS / RESULTS

Curtis Straus - a Bureau Veritas Company	Work Order # - R2591			
Conducted Emissions per CISPR 16-2-1	EUT Power Input - 120VAC/ 60Hz			
Peak Detector Data	Test Site - CEMI-1			
Operator: ZJ	Temp; Humid; Pres - 24.3°C; 37%RH; 1017mBar			
EUT Line tested: 120VAC/60Hz; Hot Lead				
Frequency	Raw Pk Re Correctior	Adjusted	QP Limit	Margin to Pk to QP L
MHz	dB μ V	dB	dB μ V	dB
0.617	32.2	20.1	52.2	56
0.972	34.9	20.1	55	56
1.231	32.1	20.1	52.1	56
1.323	32.4	20.1	52.5	56
1.587	33.7	20.1	53.8	56
1.678	32.6	20.1	52.6	56

Hot Lead – Peak



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Curtis Straus - a Bureau Veritas Company		Work Order # - R2591					
Conducted	CISPR Average Detector	EUT Power Input - 120VAC/ 60Hz					
Final Average Detector Data		Test Site - CEMI-1					
Operator: ZJ		Temp; Humid; Pres - 24.3°C; 37%RH; 1017mBar					
EUT Line tested: 120VAC/60Hz; Hot Lead							

Frequency	Raw	Avg	Correction	Adjusted		Avg Margin	Avg Results	Worst
	Reading	Factor	Avg Amplitude	Avg Limit	Margin			Avg Margin
MHz	dB μ V	dB		dB μ V	dB μ V	dB	Pass/Fail	dB
0.173	13.7	20.1	33.8	54.8	-21	PASS		
0.174	14.6	20.1	34.7	54.8	-20.1	PASS		
0.174	13.8	20.1	33.9	54.8	-20.9	PASS		
0.526	7.6	20.1	27.7	46	-18.3	PASS		
0.613	8.3	20.1	28.3	46	-17.7	PASS		-17.7
1.312	6.2	20.1	26.3	46	-19.7	PASS		

Hot Lead – Average

Curtis Straus - a Bureau Veritas Company		Work Order # - R2591					
Conducted Emissions per CISPR 16-2-1		EUT Power Input - 120VAC/ 60Hz					
Peak Detector Data		Test Site - CEMI-1					
Operator: ZJ		Temp; Humid; Pres - 24.3°C; 37%RH; 1017mBar					
EUT Line tested: 120VAC/60Hz; Neutral Lead							

Frequency	Raw	Pk	Re	Corrector	Adjusted	QP Limit	Margin to	Pk to QP	L	Worst	Margin (QP Limit)
MHz	dB μ V	dB			dB μ V	dB μ V	dB				
0.524	34.2	20.1	54.2	56	-1.8	PASS				-1.8	
1.049	32.8	20.1	52.9	56	-3.1	PASS					
1.574	31.4	20.1	51.5	56	-4.5	PASS					
1.744	31.9	20.1	52	56	-4	PASS					
2.448	31.2	20.1	51.3	56	-4.7	PASS					
2.795	29.7	20.1	49.8	56	-6.2	PASS					

Neutral Lead – Peak



Curtis Straus - a Bureau Veritas Company		Work Order # - R2591						
Conducted CISPR Average Detector		EUT Power Input - 120VAC/ 60Hz						
Quick Average Detector Data		Test Site - CEMI-1						
Operator: ZJ		Temp; Humid; Pres - 24.3°C; 37%RH; 1017mBar						
EUT Line tested: 120VAC/60Hz; Neutral Lead								
Frequency	Raw Avg	R Correction	Adjusted Avg	Limit	Avg Margin	Avg Result	Worst Avg	Avg Margin
MHz	dB μ V	dB	dB μ V	dB μ V	dB	Pass/Fail	dB	
0.92	18.6	20.1	38.7	46	-7.3	PASS		-7.3
0.957	15.9	20.1	36	46	-10	PASS		
1.308	17	20.1	37	46	-9	PASS		
1.66	17.7	20.1	37.8	46	-8.2	PASS		
1.747	16.2	20.1	36.3	46	-9.7	PASS		
2.01	16.1	20.1	36.2	46	-9.8	PASS		

Neutral Lead – Average

Rev. 9/10/2017									
Spectrum Analyzers / Receivers /Preselectors		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental EXA Signal Analyzer(1118473)		9KHz-26.5GHz	N9010A-526;N	AT	MY51170076	1118473	I	5/19/2018	5/19/2017
LISNs/Measurement Probes		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
LISN Asset 1732		150KHz-30MHz	LI-150A	Com-Power	201094	1732	I	3/8/2018	3/8/2017
LISN Asset 1733		150KHz-30MHz	LI-150A	Com-Power	201095	1733	I	3/8/2018	3/8/2017
Conducted Test Sites (Mains / Telco)		FCC Code	VCCI Code			Cat	Calibration Due	Calibrated on	
CEMI 1		719150	A-0015			III	NA	N/A	
Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on	
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016	
TH A#2078		HTC-1	HDE		2078	II	3/23/2018	3/23/2017	
Cables		Range	Mfr		Cat	Calibration Due	Calibrated on		
CEMI-16		9kHz - 2GHz	C-S		II	11/6/2017	11/6/2016		
Attenuators		Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
20dB Attenuator-02		9kHz-2GHz	N/A		II	10/2/2017	10/2/2016		

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

Conducted AC Emissions - Test Equipment Used



Conducted Emissions Test Setup



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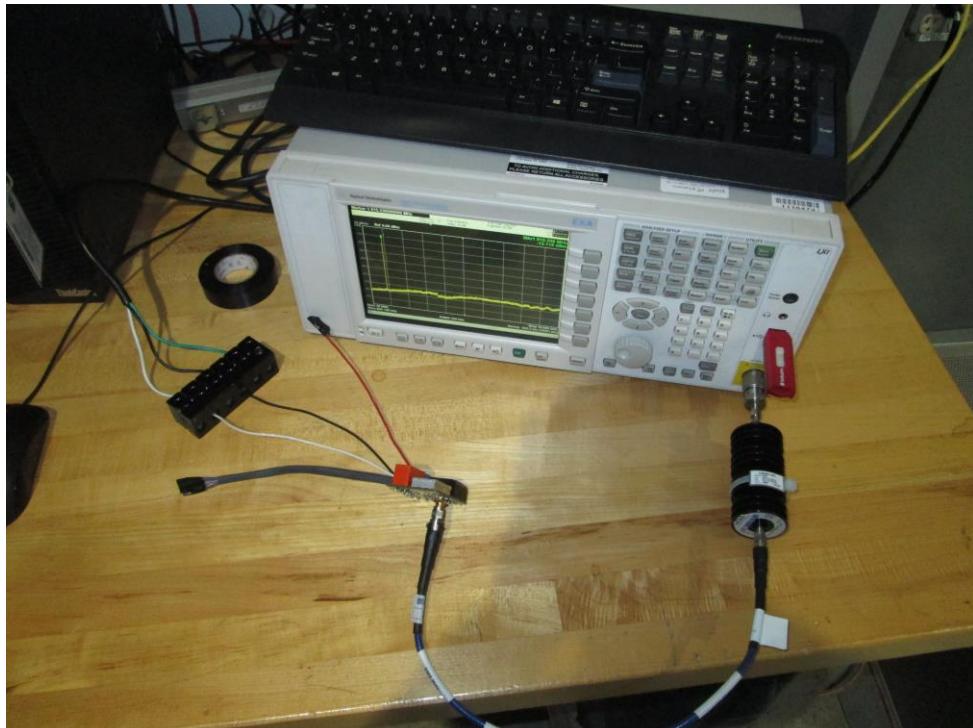
Test Equipment used for all conducted antenna port tests:

Rev. 8/21/2017

	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Spectrum Analyzers / Receivers / Preselectors Rental EXA Signal Analyzer(1118473)	9KHz-26.5GHz	N9010A-526;N	AT	MY51170076	1118473	I	5/19/2018	5/19/2017
Preamps / Couplers Attenuators / Filters API - 30dB 20W Attenuator	9KHz-40GHz	89-30-11	API Weinschel	703	2121	I	3/22/2018	3/22/2017
Meteorological Meters Weather Clock (Pressure Only) TH A#2084		BA928 HTC-1	Oregon Scientific HDE	C3166-1 831 2084		I II	4/28/2018 3/23/2018	4/28/2016 3/23/2017
Cables Asset #2286	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021030		II	1/27/2018	1/27/2017

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

Setup Photos



Conducted Antenna Port Setup



Measurement Uncertainty

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Expanded Uncertainty k=2	Maximum allowable uncertainty
Radiated Emissions (30-1000MHz)		
NIST	5.6dB	N/A
CISPR	4.6dB	5.2dB (Ucispqr)
Radiated Emissions (1-26.5GHz)	4.6dB	N/A
Radiated Emissions (above 26.5GHz)	4.9dB	N/A
Magnetic Radiated Emissions	5.6dB	N/A
Conducted Emissions		
NIST	3.9dB	N/A
CISPR	3.6dB	3.6dB (Ucispqr)
Telco Conducted Emissions (Current)	2.9dB	N/A
Telco Conducted Emissions (Voltage)	4.4dB	N/A
Electrostatic Discharge	11.5%	N/A
Radiated RF Immunity (Uniform Field)	1.6dB	N/A
Electrical Fast Transients	23.1%	N/A
Surge	23.1%	N/A
Conducted RF Immunity	3dB	N/A
Magnetic Immunity	12.8%	N/A
Dips and Interrupts	2.3V	N/A
Harmonics	3.5%	N/A
Flicker	3.5%	N/A
Radio frequency (@ 2.4GHz)	3.23×10^{-8}	1×10^{-7}
RF power, conducted	0.40dB	0.75dB
Maximum frequency deviation:		
• Within 300Hz and 6kHz of audio frequency / Within 6kHz and 25kHz of audio frequency	3.4% 0.3dB	5% 3dB
Adjacent channel power	1.9dB	3dB
Conducted spurious emission of transmitter, valid up to 12.75GHz	2.39dB	3dB
Conducted emission of receivers	1.3dB	3dB
Radiated emission of transmitter, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of transmitter, valid up to 80GHz	3.3dB	6dB
Radiated emission of receiver, valid up to 26.5GHz	3.9dB	6dB
Radiated emission of receiver, valid up to 80GHz	3.3dB	6dB
Humidity	2.37%	5%
Temperature	0.7°C	1.0°C
Time	4.1%	10%
RF Power Density, Conducted	0.4dB	3dB
DC and low frequency voltages	1.3%	3%
Voltage (AC, <10kHz)	1.3%	2%
Voltage (DC)	0.62%	1%
The above reflects a 95% confidence level		



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.



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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 INrecognition 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.

The complete list of the Approved Subcontractors Curtis-Straus may use to delegate the performance of work can be provided upon request. Rev.160009121(2)_#684340 v14CS



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