





# Test Report

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

Report No	ER2592-1
Client	Ideal Industries, Inc. Tim Tunnell
Address	Becker Place Sycamore, IL 60178
Phone	(815) 895-1295
Items tested	SCD1002
FCC ID	2AAMXSCD1002
IC ID	11250A-SCD1002
FRN	0002862225
Equipment Type	Digital Transmission System
Equipment Code	DTS
Emission Designator	767KG1D
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.247, ISSED Canada RSS-247 Issue 2
Test Dates	8/28/2017 and 9/5/2017
Results	As detailed within this report
Prepared by	 Zachary Johnson - Test Engineer
Authorized by	 Jason Haley - Sr. EMC Engineer
Issue Date	<u>10/19/2017</u>
Conditions of Issue	This Test Report is issued subject to the conditions stated in the 'Conditions of Testing' section on page 28 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.



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS  
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



## Contents

Contents.....	2
Summary.....	3
Test Methodology.....	4
Product Tested - Configuration Documentation .....	5
Statement of Conformity .....	6
Modifications Required for Compliance .....	6
Test Results .....	7
<i>Bandwidth</i> .....	7
<i>Peak Power</i> .....	9
<i>Band Edge Measurements (Conducted and Radiated)</i> .....	11
<i>Radiated Spurious Emissions</i> .....	13
<i>Conducted Spurious Emissions</i> .....	16
<i>Power Spectral Density</i> .....	18
<i>AC Line Conducted Emissions</i> .....	20
<i>Occupied Bandwidth</i> .....	24
Measurement Uncertainty.....	27
Conditions of Testing.....	28

Form Final Report REV 12-07-15



## **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

SCD1002 operates in the 902.7MHz-927.3MHz frequency range and has a 4.55 dBi permanently installed wire antenna. It is powered by AC voltage up to 347V AC.

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

## 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. Antenna of the EUT is swivel type and was therefore maximized in its 2 possible orientations (horizontal and vertical) and worst case results 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 50 $\Omega$ /50 $\mu$ H 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										
<b>Work Order:</b>	R2592									
<b>Company:</b>	Ideal Industries, Inc.									
<b>Company Address:</b>	Becker Place									
	Sycamore, IL 60178									
<b>Contact:</b>	Tim Tunnell									
	MN			PN			SN			
<b>EUT:</b>	SCD1002, SCLED1002			--			--			
<b>EUT Description:</b>	Electronic Ballast Controller									
<b>EUT Max Frequency:</b>	927.3MHz									
<b>EUT Min Frequency:</b>	16MHz									
<b>Port Label</b>	<b>Port Type</b>	<b># ports</b>	<b># populated</b>	<b>cable type</b>	<b>shielded</b>	<b>ferrites</b>	<b>length (m)</b>	<b>in/out</b>	<b>under test</b>	<b>comment</b>
Ballast Control Cables	other	4	4	loopback	other	No	No	1		in
Power AC IN	Power AC	1	1	not terminated	Power AC	No	No	0.1		out
<b>Software Operating Mode Description:</b>										
DTM mode with 100% duty cycle										

## Statement of Conformity

The SCD1002 has been found to conform to the following parts of 47 CFR and RSS 247 as detailed below:

RSS-GEN	RSP-100	RSS 247	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 247		The unit complies with the requirements of RSS-247
6.6				Occupied Bandwidth measurements were made.

## Modifications Required for Compliance

None

## Test Results

### Bandwidth

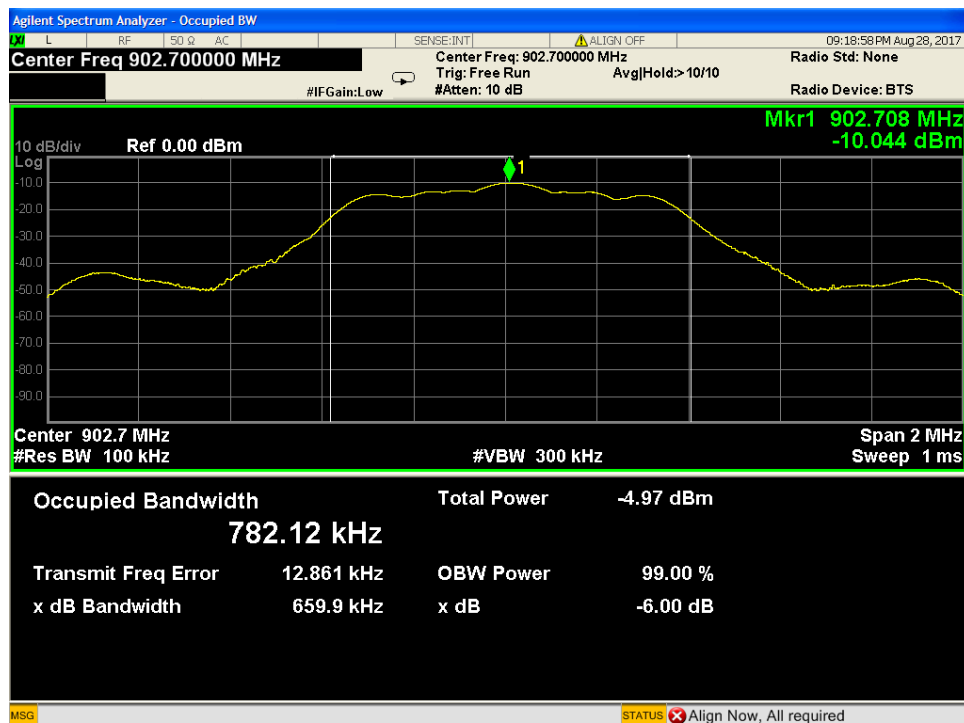
Limit: The minimum 6 dB bandwidth shall be at least 500 kHz.

[15.247(a) (2)]

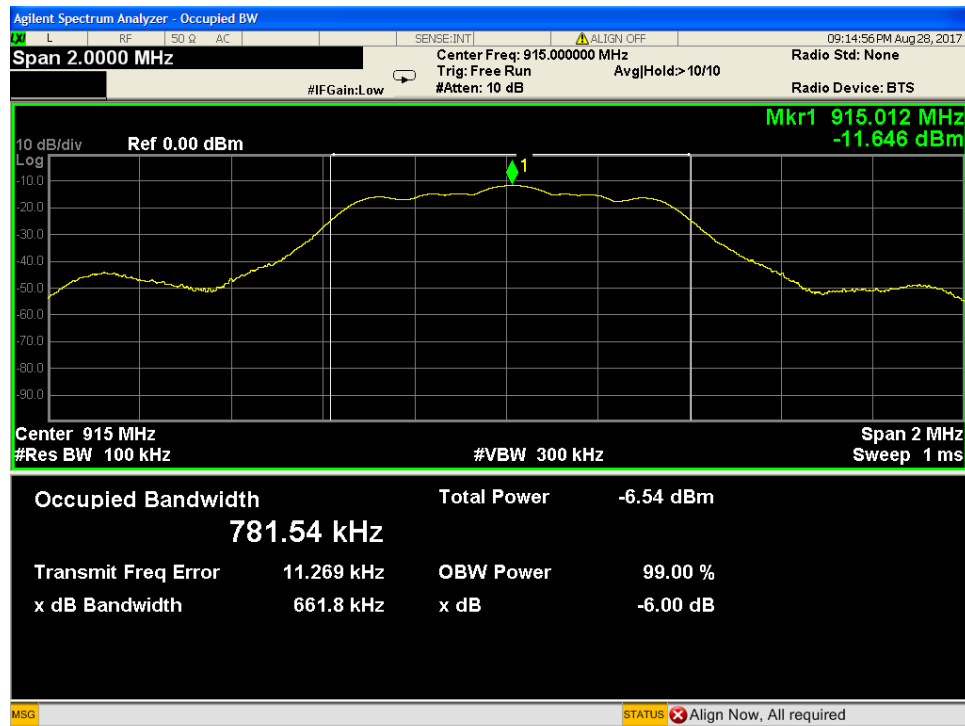
### MEASUREMENTS / RESULTS

6dB Bandwidth				
Date: 8/28/2017		Company: Ideal Industries		Work Order: R2592
Engineer: Zac Johnson		EUT: SCD1002		Operating Voltage/Frequency: 120V / 60Hz
Temp: 23.1°C		Humidity: 36%		Pressure: 994mBar
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		
		Limit (kHz)	Margin (kHz)	Result (Pass/Fail)
902.7	659.9	≥500	160	Pass
915.0	661.8	≥500	162	Pass
927.3	662.6	≥500	163	Pass
Test Site: Chamber 1		Cable: 2286 Cbl		Attenuator: 2121 Pad
Analyzer: 1170725 SA		Copyright Curtis-Straus LLC 2000		

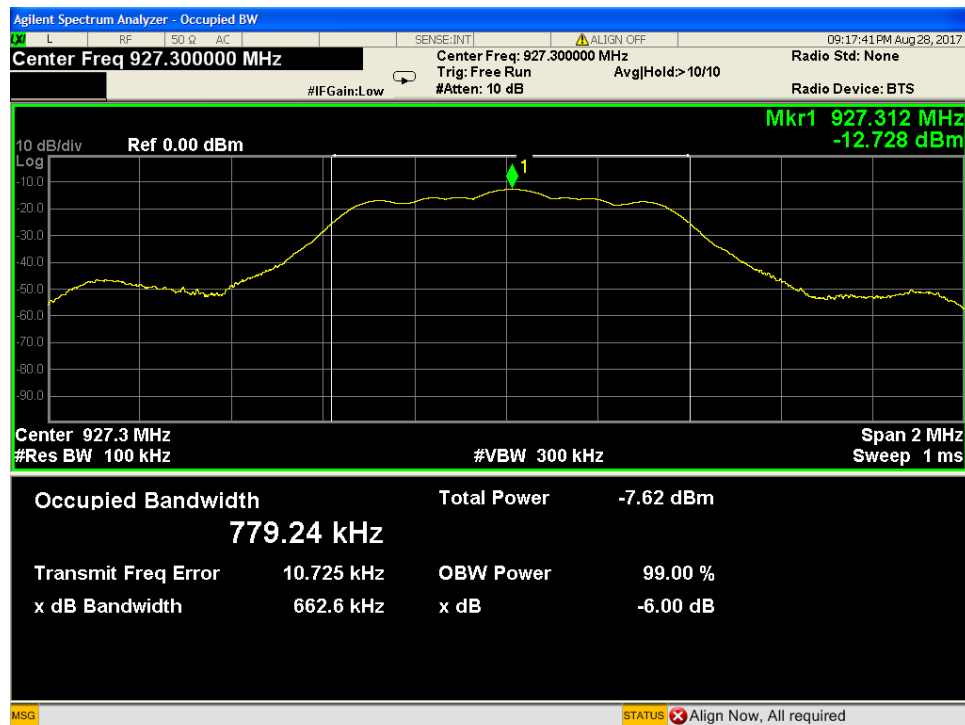
### PLOTS



Low Channel DTS Bandwidth



Middle Channel DTS Bandwidth



High Channel DTS Bandwidth



## Peak Power

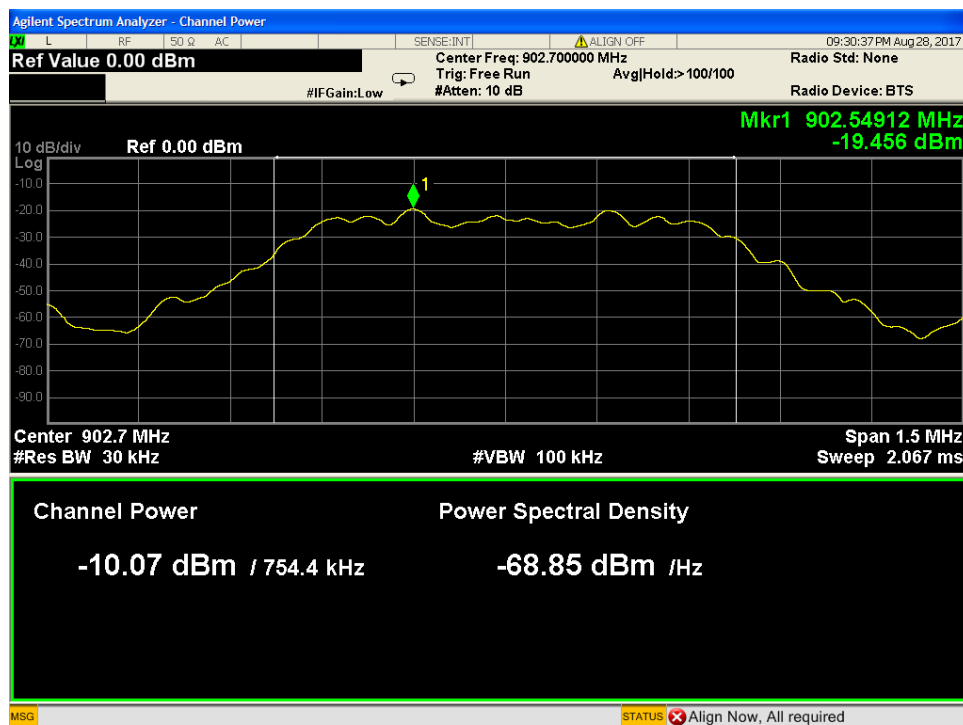
LIMIT: 1 Watt Conducted Output Power

[15.247(b) (3)]

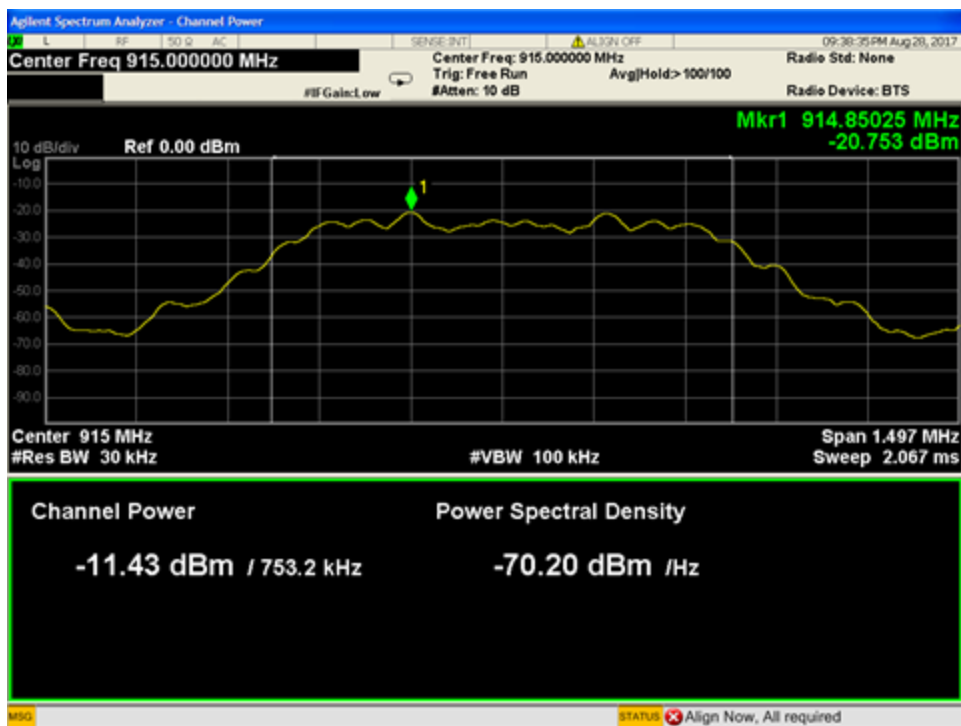
## MEASUREMENTS / RESULTS

Peak Output Power							
Date: 8/28/2017		Company: Ideal Industries			Work Order: R2592		
Engineer: Zac Johnson		EUT: SCD1002			Operating Voltage/Frequency: 120V / 60Hz		
Temp: 23.1°C		Humidity: 36%		Pressure: 994mBar			
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	-10.07	0.28	29.29	19.50	30.0	-10.50	Pass
915.0	-11.43	0.28	29.29	18.14	30.0	-11.86	Pass
927.3	-12.58	0.28	29.29	16.99	30.0	-13.01	Pass
Test Site: Chamber 1		Cable: 2286 Cbl		Attenuator: 2121 Pad			
Analyzer: 1170725 SA							
Peak Output Power (dBm)= Peak Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dB)							

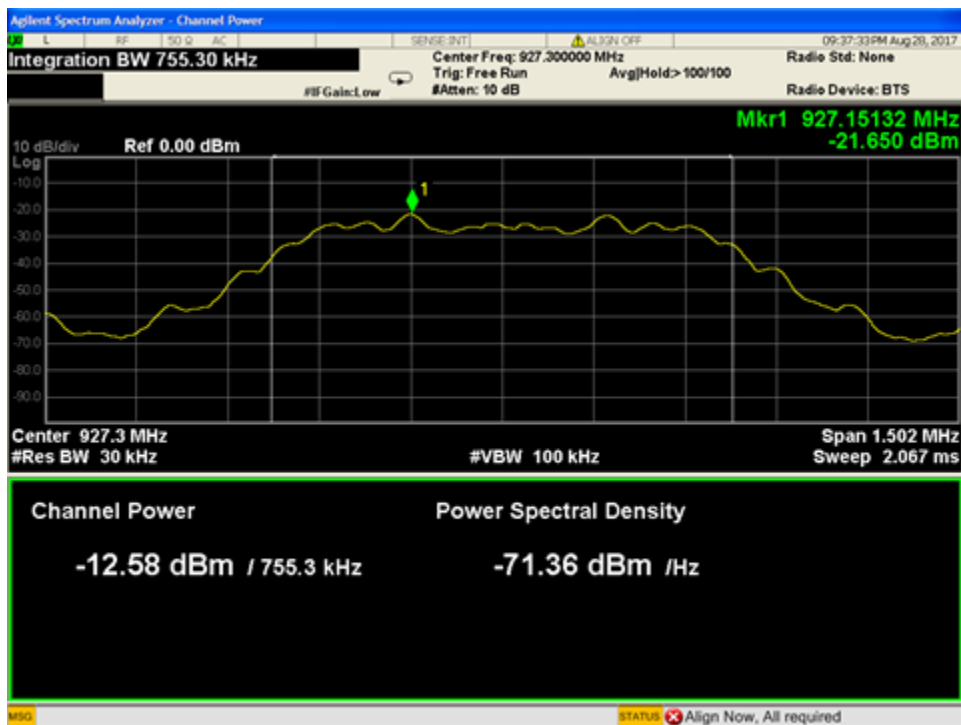
## PLOTS



Low Channel Peak Output Power



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: 8/28/2017		Company: Ideal Industries	
Engineer: Zac Johnson		EUT: SCD1002	
Temp: 23.1°C		Humidity: 36%	
		Pressure: 994mBar	
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	33.54
High Bandedge	37.99	≥ 30	Pass
Test Site: Chamber 1		Cable: 2286 Cbl	
Analyzer: 1170725 SA		Attenuator: 2121 Pad	
Copyright Curtis-Straus LLC 2000			

## PLOTS



Low Band Edge



High Band Edge

## 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)]

## MEASUREMENTS / RESULTS

Radiated Emissions Table												
Date: 23-Aug-17			Company: Ideal Industries						Work Order: R2592			
Engineer: Zac Johnson			EUT Desc: SCD1002						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 (dBuV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBuV/m)	---			FCC 15.247		
							Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBuV/m)	Margin (dB)	Result (Pass/Fail)
V	30.0	54.1	36.2	21.5	0.4	39.8	---	---	---	83.5	-43.7	Pass
V	46.6	57.6	36.1	8.8	0.4	30.7	---	---	---	83.5	-52.8	Pass
V	59.1	61.6	36.1	7.4	0.5	33.4	---	---	---	83.5	-50.1	Pass
H	70.1	63.3	36.1	8.3	0.5	36.0	---	---	---	83.5	-47.5	Pass
H	88.6	56.0	36.1	7.6	0.5	28.0	---	---	---	83.5	-55.5	Pass
H	100.4	58.2	36.0	10.3	0.6	33.1	---	---	---	83.5	-50.4	Pass
H	168.5	59.4	35.9	11.6	0.7	35.8	---	---	---	43.5	-7.7	Pass
V	169.1	59.8	35.9	11.5	0.7	36.1	---	---	---	43.5	-7.4	Pass
V	217.3	62.1	35.8	10.6	1.0	37.9	---	---	---	83.5	-45.6	Pass
H	223.1	64.4	35.8	10.9	1.0	40.5	---	---	---	83.5	-43.0	Pass
Table Result: Pass by -7.4 dB Worst Freq: 169.1 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												
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor												
Copyright Curtis-Straus LLC 2000												

30-1000MHz



## Radiated Emissions Table

Date: 8/23/2017 & 8/28/2017				Company: Ideal Industries				Work Order: R2592						
Engineer: Zac Johnson				EUT Desc: SCD1002				EUT Operating Voltage/Frequency: 120V / 60Hz						
Temp: 25.4 / 23.1				Humidity: 51% / 36%				Pressure: 999mBar / 994mBar						
Frequency Range: 1-6GHz								Measurement Distance: 3 m						
Notes: Worst Case Orientation Z, Used 900-930MHz Notch Filter								EUT Max Freq: 927.3MHz						
Tested mid channel 8/23 and low/high 8/28														
Antenna Polarization (H / V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average		
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
Low Channel														
H	1805.0	50.2	41.3	37.5	30.6	3.5	46.8	37.9	74.0	-27.2	Pass	54.0	-16.1	Pass
V	1805.0	51.5	43.1	37.5	30.6	3.5	48.1	39.7	74.0	-25.9	Pass	54.0	-14.3	Pass
H	2708.0	48.5	36.9	37.8	32.5	4.4	47.6	36.0	74.0	-26.4	Pass	54.0	-18.0	Pass
V	2708.0	49.5	37.4	37.8	32.5	4.4	48.6	36.5	74.0	-25.4	Pass	54.0	-17.5	Pass
H	3611.0	46.0	32.6	37.9	33.5	4.9	46.5	33.1	74.0	-27.5	Pass	54.0	-20.9	Pass
V	3611.0	44.7	32.3	37.9	33.5	4.9	45.2	32.8	74.0	-28.8	Pass	54.0	-21.2	Pass
Mid Channel														
H	1830.0	52.1	42.1	37.5	30.8	3.6	49.0	39.0	74.0	-25.0	Pass	54.0	-15.0	Pass
V	1830.0	51.6	42.0	37.5	30.8	3.6	48.5	38.9	74.0	-25.5	Pass	54.0	-15.1	Pass
H	2745.0	49.6	38.6	37.7	32.5	4.3	48.7	37.7	74.0	-25.3	Pass	54.0	-16.3	Pass
V	2745.0	50.0	38.4	37.7	32.5	4.3	49.1	37.5	74.0	-24.9	Pass	54.0	-16.5	Pass
H	3660.0	47.5	34.4	37.9	33.6	4.9	48.1	35.0	74.0	-25.9	Pass	54.0	-19.0	Pass
V	3660.0	47.8	34.4	37.9	33.6	4.9	48.4	35.0	74.0	-25.6	Pass	54.0	-19.0	Pass
High Channel														
H	1855.0	47.1	35.0	37.4	31.0	3.6	44.3	32.2	74.0	-29.7	Pass	54.0	-21.8	Pass
V	1855.0	46.9	35.1	37.4	31.0	3.6	44.1	32.3	74.0	-29.9	Pass	54.0	-21.7	Pass
H	2782.0	48.9	37.0	37.6	32.6	4.3	48.2	36.3	74.0	-25.8	Pass	54.0	-17.7	Pass
V	2782.0	46.8	33.2	37.6	32.6	4.3	46.1	32.5	74.0	-27.9	Pass	54.0	-21.5	Pass
H	3709.0	45.4	32.3	37.9	33.6	4.9	46.0	32.9	74.0	-28.0	Pass	54.0	-21.1	Pass
V	3709.0	44.8	32.3	37.9	33.6	4.9	45.4	32.9	74.0	-28.6	Pass	54.0	-21.1	Pass
Table Result: Pass by -14.3 dB Worst Freq: 1805.0 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 v 1.017.188 Copyright Curtis-Straus LLC 2000														
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor														

1GHz-6GHz

## Radiated Emissions Table

Date: 28-Aug-17		Company: Ideal Industries				Work Order: R2592															
Engineer: Zac Johnson		EUT Desc: SCD1002				EUT Operating Voltage/Frequency: 120V / 60Hz															
Temp: 23.1		Humidity: 36%				Pressure: 994mBar															
Frequency Range: 6-10GHz						Measurement Distance: 1 m															
Notes: Worst Case Orientation Z, Used 900-930MHz Notch Filter						EUT Max Freq: 927.3MHz															
Antenna Polarization (H/V)	Frequency (MHz)	Peak Reading (dBµV)	Average Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Peak Reading (dBµV/m)	Adjusted Avg Reading (dBµV/m)	FCC Class B High Frequency - Peak			FCC Class B High Frequency - Average									
									Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)							
H/V	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 v 1.017.188																					
Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor																					
Copyright Curtis-Straus LLC 2000																					

6GHz-10GHz



Rev. 8/21/2017

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

### Test Equipment Used 30-1000MHz

Rev. 8/21/2017

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

### Test Equipment Used 1-10GHz



**Curtis-Straus LLC, a wholly owned subsidiary of BV CPS**  
**One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828**



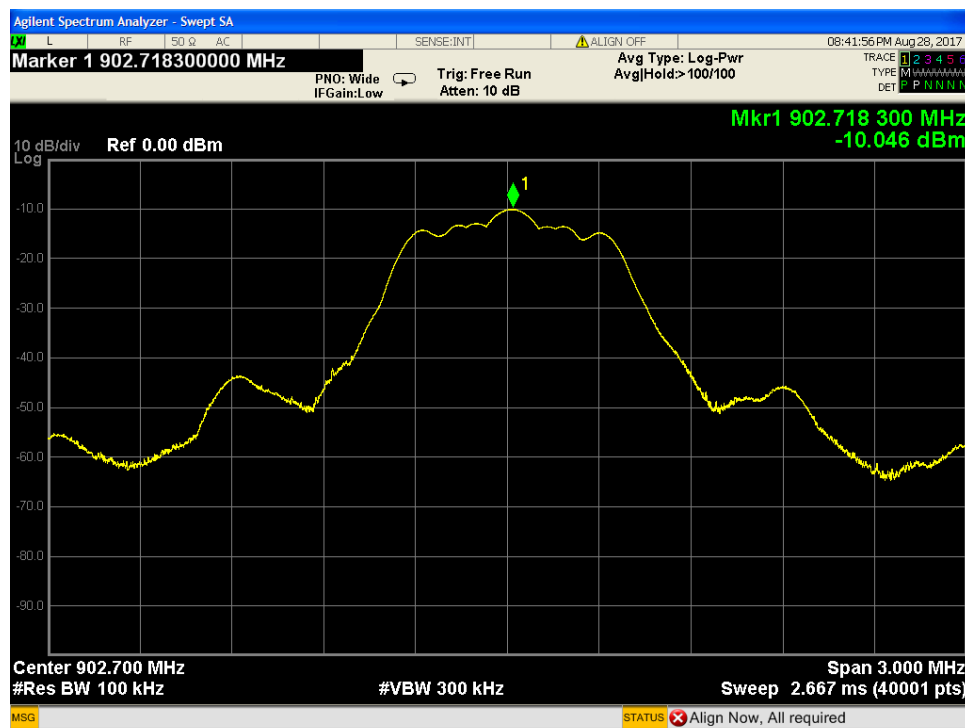
## Conducted Spurious Emissions

*Limits: In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth that contains the highest level of desired power.*

[15.247(d)]

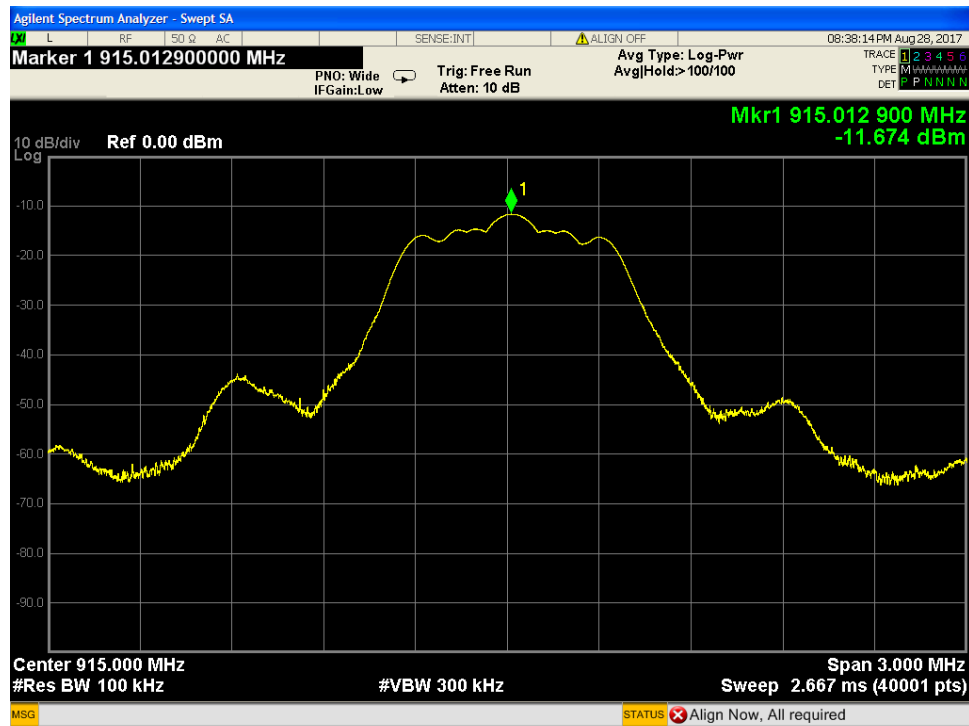
## MEASUREMENTS / RESULTS

9kHz to 25GHz frequency range was investigated for 3 channels (low, middle and high) and no emissions within 20dB of their corresponding fundamentals were observed.

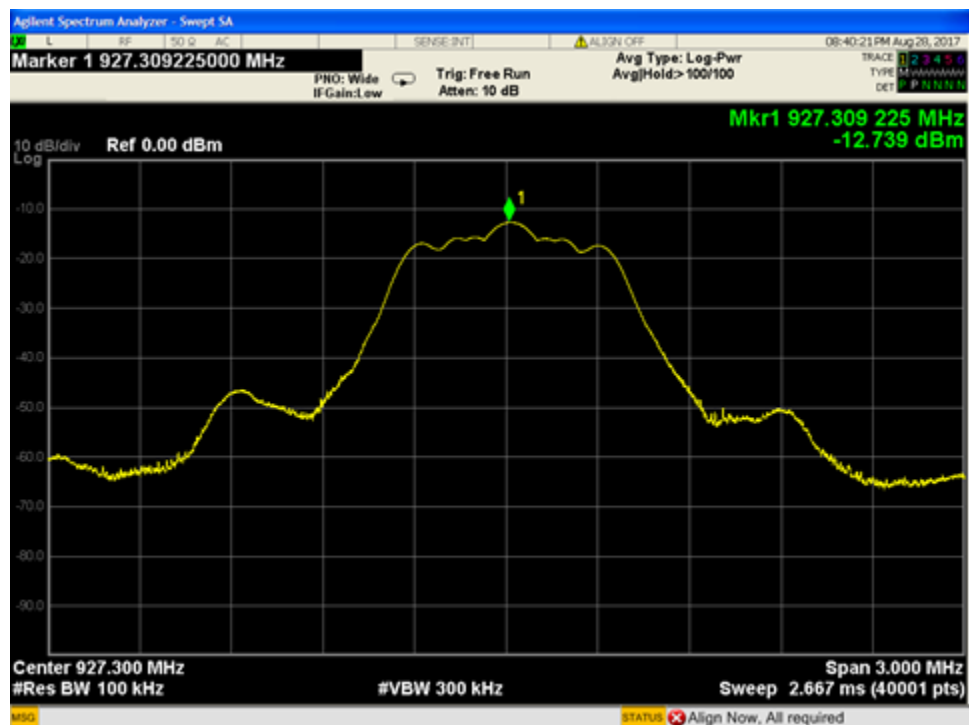


9kHz-25GHz Conducted Spurious (Low channel)





9kHz-25GHz Conducted Spurious (Mid channel)



9kHz-25GHz Conducted Spurious (High channel)

## Power Spectral Density

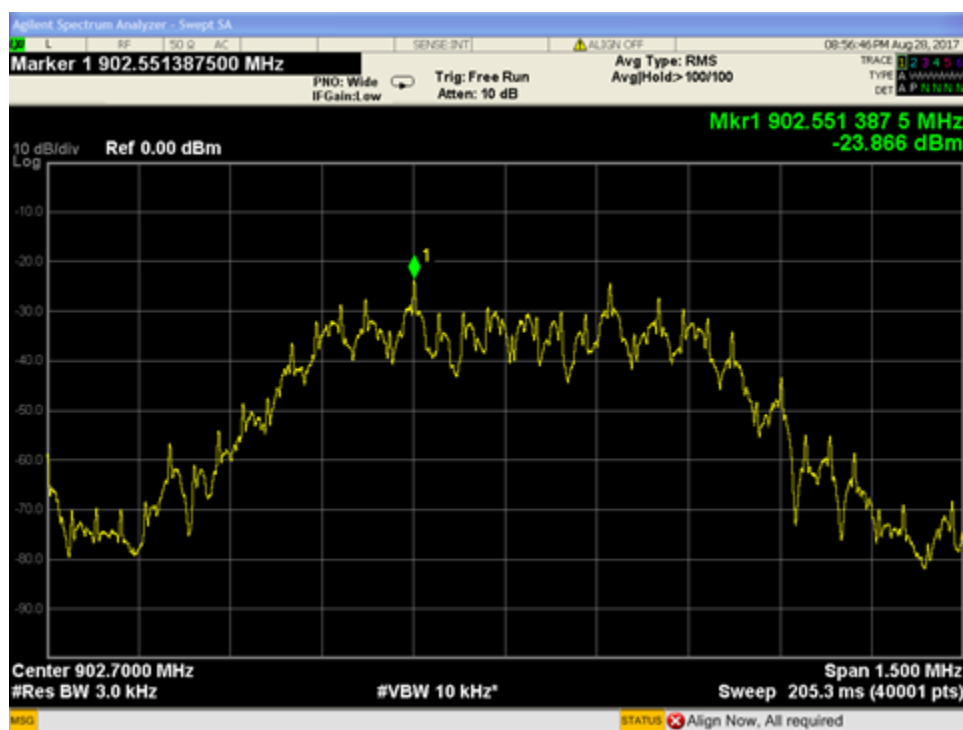
*Limit: The power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission. [15.247(e)]*

## MEASUREMENTS / RESULTS

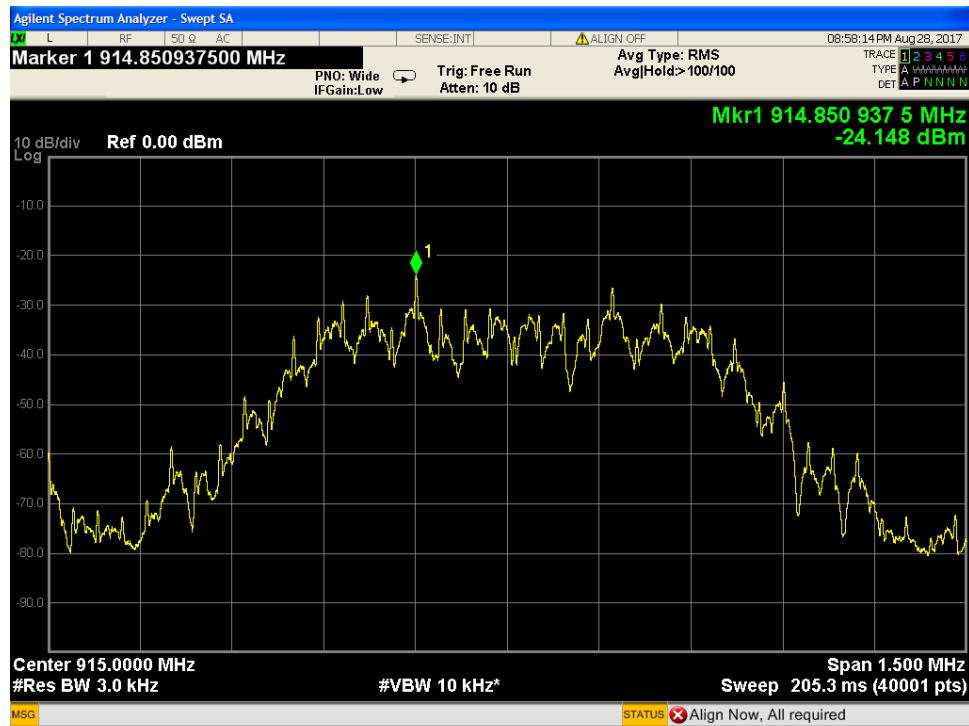
MEASUREMENT REPORT

Peak Power Spectral Density							
Date: 8/28/2017		Company: Ideal Industries			Work Order: R2592		
Engineer: Zac Johnson		EUT: SCD1002			Operating Voltage/Frequency: 120V / 60Hz		
Temp: 23.1°C		Humidity: 36%		Pressure: 994mBar			
Frequency Range: 902.7-927.3MHz				Measurement Type: Conducted			
Notes: 558074 D01 v04 PSD 10.3 Method Used							
Frequency	Reading	Cable Loss	Attenuator Loss	Peak PSD	Limit	Margin	Result
(MHz)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
902.55	-23.87	0.28	29.29	5.70	8.0	-2.30	Pass
914.85	-24.15	0.28	29.29	5.42	8.0	-2.58	Pass
927.15	-27.81	0.28	29.29	1.76	8.0	-6.24	Pass
Test Site: Chamber 1		Cable: 2286 Cbl		Attenuator: 2121 Pad			
Analyzer: 1170725 SA							
PSD(dBm) = Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dB)							

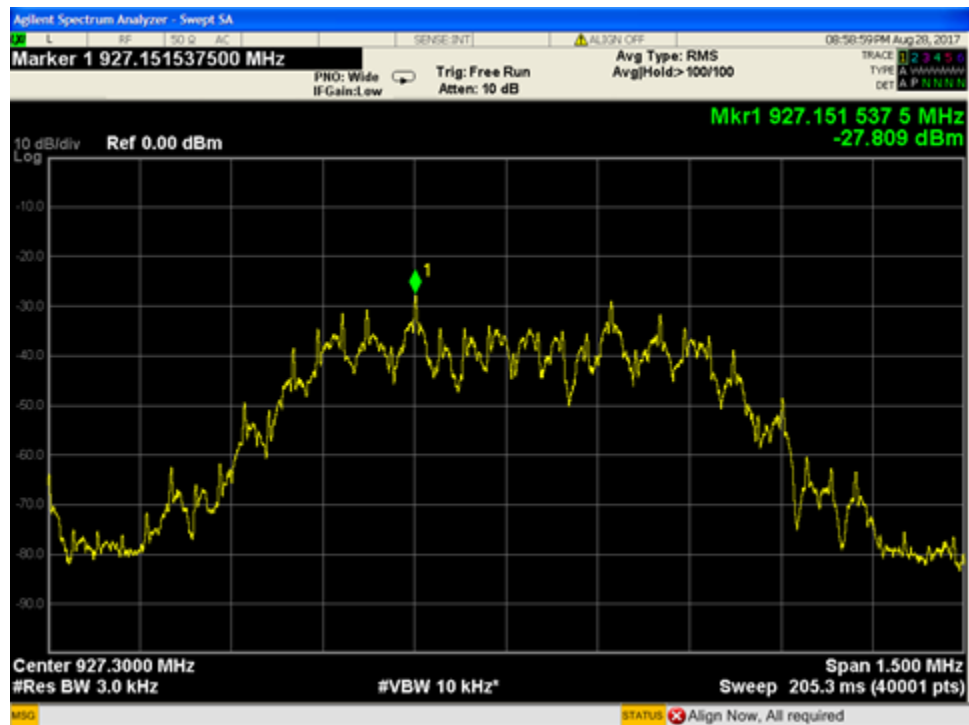
## PLOTS



Low Channel PSD



Middle Channel PSD



High Channel PSD

**AC Line Conducted Emissions**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)]

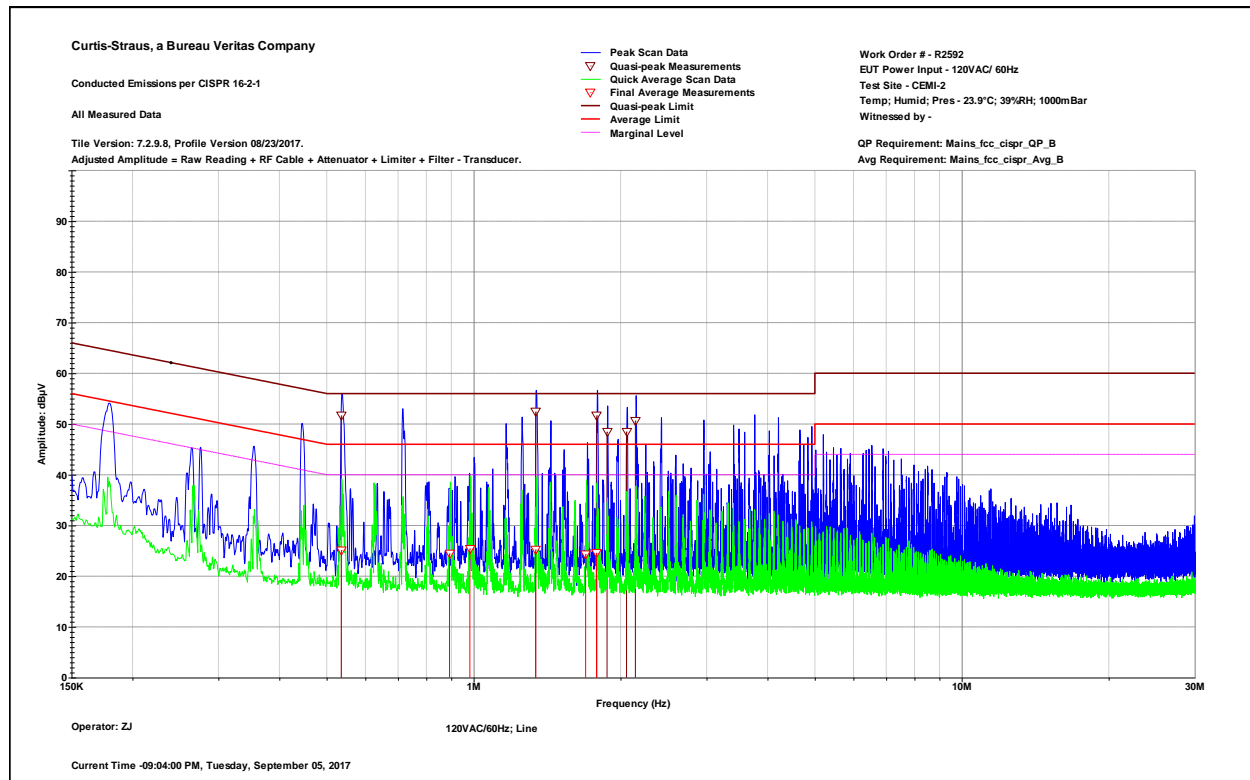
**MEASUREMENTS / RESULTS**

Curtis Straus - a Bureau Veritas Company				120VAC/60Hz; Line			
Conducted Emissions per CISPR 16-2-1							
Quasi-peak Detector Data							
Operator: ZJ				Work Order # - R2592			
				EUT Power Input - 120VAC/ 60Hz			
				Test Site - CEMI-2			
				Temp; Humid; Pres - 23.9°C; 39%RH; 1000mBar			
Frequency	Raw QP R	Correction	Adjusted	QP Limit	Margin to	QP Limit R	Worst Margin (C
MHz	dBμV	dB	dBμV	dBμV	dB	Pass/Fail	dB
0.535	31.535	20.1	51.6	56	-4.4	PASS	
1.34	32.282	20.1	52.4	56	-3.6	PASS	-3.6
1.787	31.529	20.1	51.7	56	-4.3	PASS	
1.876	28.299	20.1	48.4	56	-7.6	PASS	
2.056	28.349	20.1	48.5	56	-7.5	PASS	
2.145	30.509	20.1	50.6	56	-5.4	PASS	

Line Voltage - Quasi Peak Data

Curtis Straus - a Bureau Veritas Company				120VAC/60Hz; Line					
Conducted CISPR Average Detector									
Final Average Detector Data									
Operator: ZJ				Work Order # - R2592					
				EUT Power Input - 120VAC/ 60Hz					
				Test Site - CEMI-2					
				Temp; Humid; Pres - 23.9°C; 39%RH; 1000mBar					
Frequency	Raw Avg	R Correction	Adjusted	Avg Limit	Avg Margi	Avg Result	Worst Avg Margin		
MHz	dBµV	dB	dBµV	dBµV	dB	Pass/Fail	dB		
0.536	5	20.1	25.1	46	-20.9	PASS			
0.892	4.3	20.1	24.4	46	-21.6	PASS			
0.982	5.3	20.1	25.4	46	-20.6	PASS	-20.6		
1.339	5.1	20.1	25.2	46	-20.8	PASS			
1.696	4.2	20.1	24.3	46	-21.7	PASS			
1.785	4.4	20.1	24.6	46	-21.4	PASS			

Line Voltage - Average Data



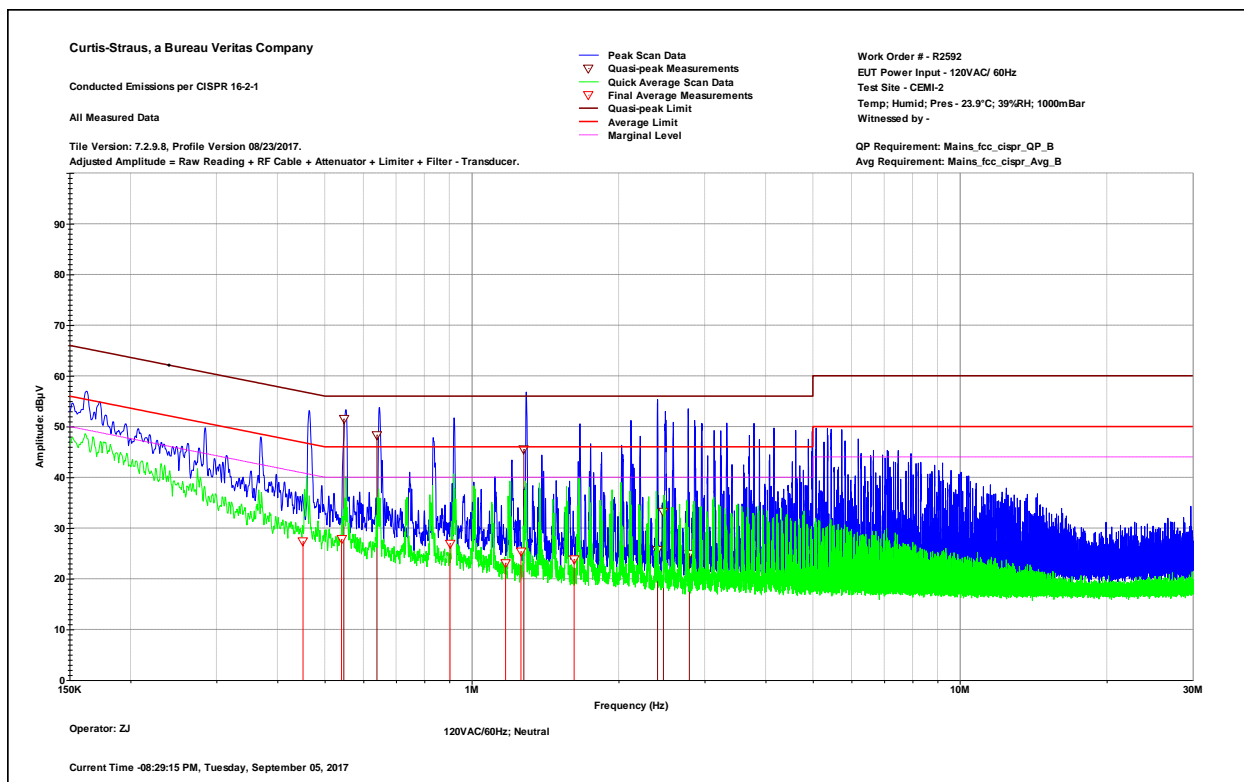
Line Voltage – All Emissions Graph

Curtis Straus - a Bureau Veritas Company				120VAC/60Hz; Neutral			
Conducted Emissions per CISPR 16-2-1							
Quasi-peak Detector Data							
Operator: ZJ				Work Order # - R2592			
				EUT Power Input - 120VAC/ 60Hz			
				Test Site - CEMI-2			
				Temp; Humid; Pres - 23.9°C; 39%RH; 1000mBar			
Frequency	Raw QP R	Correction	Adjusted	QP Limit	Margin to	QP Limit R	Worst Margin (
MHz	dBµV	dB	dBµV	dBµV	dB	Pass/Fail	dB
0.547	31.424	20.1	51.5	56	-4.5	PASS	-4.5
0.64	28.256	20.1	48.4	56	-7.6	PASS	
1.279	25.436	20.1	45.5	56	-10.5	PASS	
2.404	5.592	20.1	25.7	56	-30.3	PASS	
2.47	13.026	20.1	33.2	56	-22.8	PASS	
2.792	4.806	20.1	24.9	56	-31.1	PASS	

Neutral Voltage - Quasi Peak Data

Curtis Straus - a Bureau Veritas Company				120VAC/60Hz; Neutral			
Conducted CISPR Average Detector							
Final Average Detector Data							
Operator: ZJ				Work Order # - R2592			
				EUT Power Input - 120VAC/ 60Hz			
				Test Site - CEMI-2			
				Temp; Humid; Pres - 23.9°C; 39%RH; 1000mBar			
Frequency	Raw Avg R	Correction	Adjusted	Avg Limit	Avg Margi	Avg Resul	Worst Avg Margin
MHz	dBµV	dB	dBµV	dBµV	dB	Pass/Fail	dB
0.451	7.2	20.1	27.3	46.9	-19.5	PASS	
0.541	7.7	20.1	27.8	46	-18.2	PASS	-18.2
0.903	6.9	20.1	27	46	-19	PASS	
1.173	3	20.1	23.1	46	-22.9	PASS	
1.262	5.2	20.1	25.4	46	-20.6	PASS	
1.621	3.7	20.1	23.9	46	-22.1	PASS	

Neutral Voltage - Average Data



Neutral Voltage – All Emissions Graph

Rev. 9/5/2017

**Spectrum Analyzers / Receivers/Preselectors**  
Rental EXA Signal Analyzer(1118473)

Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
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
150kHz-30MHz	LI-150A	Com-Power	201090	1730	I	3/22/2018	3/22/2017
150kHz-30MHz	LI-150A	Com-Power	201091	1731	I	3/22/2018	3/22/2017

**Conducted Test Sites (Mains / Telco)**  
CEMI 2

FCC Code	VCCI Code	Cat	Calibration Due	Calibrated on
719150	A-0015	III	NA	N/A

**Meteorological Meters**

MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
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**

Range	Mfr	Cat	Calibration Due	Calibrated on
9kHz - 2GHz	C-S	II	10/2/2017	1/2/2016

**Attenuators**

Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
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.

**Test Equipment Used - Conducted Emissions**



Curtis-Straus LLC, a wholly owned subsidiary of BV CPS  
One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



## Occupied Bandwidth

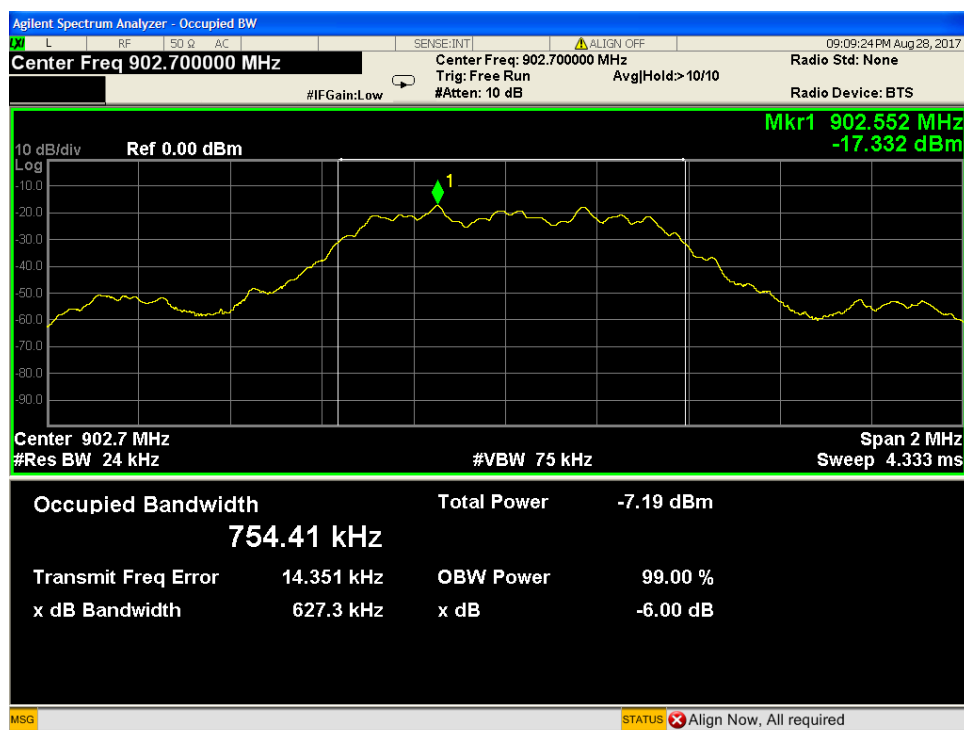
*Requirement: When an occupied bandwidth is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is its 99% emission bandwidth, as calculated or measured.*

[RSS-GEN 6.6]

## MEASUREMENTS / RESULTS

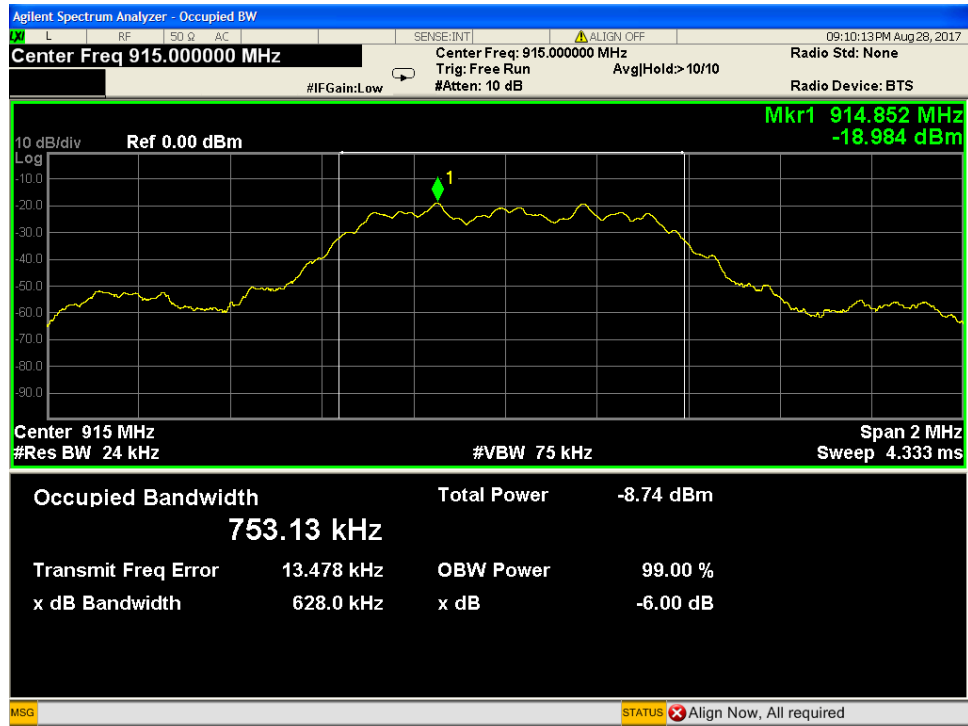
99% Occupied Bandwidth			
Date: 8/28/2017		Company: Ideal Industries	
Engineer: Zac Johnson		EUT: SCD1002	
Temp: 23.1°C		Humidity: 36%	
		Pressure: 994mBar	
Frequency Range: 902.7-927.3MHz		Measurement Type: Conducted	
Notes:			
Frequency (MHz)	99% OBW (KHz)		
902.7	754.41		
915.0	753.13		
927.3	755.33		
Test Site: Chamber 1	Cable: 2286 Cbl	Attenuator: 2121 Pad	
Analyzer: 1170725 SA		Copyright Curtis-Straus LLC 2000	

## PLOTS

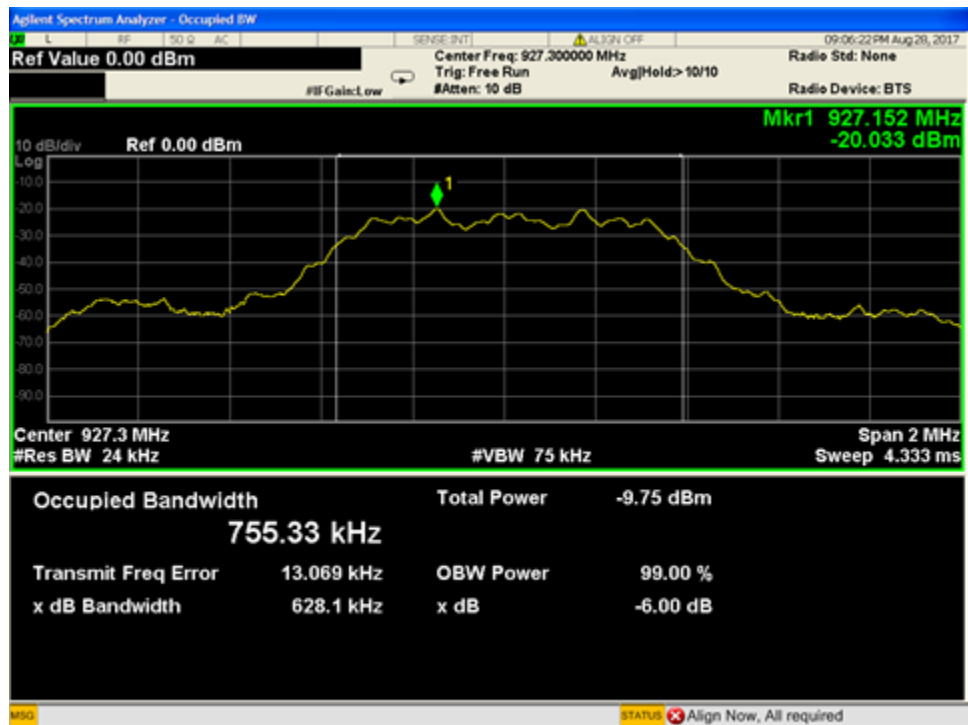


99% Occupied Bandwidth Low Channel





99% Occupied Bandwidth Middle Channel



99% Occupied Bandwidth High Channel

**Test equipment below used for all conducted antenna port measurement tests within this report**

Rev. 8/25/2017

<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>	<b>Calibrated on</b>
Rental MXE EMI Receiver(1170725)	20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	12/22/2017	12/22/2016
<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>	<b>Calibrated on</b>
API - 30dB 20W Attenuator	9KHz-40GHz	89-30-11	API Weinschel	703	2121	I	3/22/2018	3/22/2017
<b>Meteorological Meters</b>		<b>MN</b>	<b>Mfr</b>	<b>SN</b>	<b>Asset</b>	<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2084		HTC-1	HDE		2084	II	3/23/2018	3/23/2017
<b>Cables</b>	<b>Range</b>		<b>Mfr</b>			<b>Cat</b>	<b>Calibration Due</b>	<b>Calibrated on</b>
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.



## 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 (Ucisp)
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 (Ucisp)
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)	$3.23 \times 10^{-8}$	$1 \times 10^{-7}$
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," "BVCPSP," "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.



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

One Distribution Center Circle, #1 • Littleton, MA • TEL (978) 486-8880 • FAX (978) 486-8828



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.

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

