Test Report

Report No	ES2174-1
Client	Powercast Corporation
Address	620 Alpha Dr. Pittsburgh, PA 15238
Phone	412-436-4077
Items tested	Powercaster Transmitter (Model: TX91501B)
FCC ID	YESTX91501B
IC ID	8985A-TX91501B
FRN	0019814789
Equipment Type	Digital Transmission System
Equipment Code	DTS
Emission Designator	1M51G1D
FCC/IC Rule Parts	CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2
Test Dates	August 31, 2018 to September 21, 2018
Results	As detailed within this report
Prepared by	Arik Zwirner - Sr. EMC Engineer
Authorized by	Yunus Faziloglu – Sr. Engineer
Issue Date	0/23/18
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 51 of this report.

Contents

Form Final Report REV 12-07-15

Summary

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

The product is Powercaster Transmitter, Model Number: TX91501B. It is a transmitter that operates at 915MHz.

The CW (low data rate) mode was for testing only. Data will always be included in the transmission.

We found that the product met the above requirements with modification (see *Modifications Required for Compliance* section on page 6). The test sample was received in good condition.

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	October 23, 2018

Test Methodology

All testing was performed according to the following rules/procedures/documents;
CFR Title 47 FCC Part 15.247, ISED Canada RSS-247 Issue 2, ISED Canada RSS-Gen Issue 5, FCC KDB 558074 D01 15.247 Measurement Guidance v05 and ANSI C63.10-2013

Radiated emissions were maximized by rotating the device around three orthogonal axes as well as varying the test antenna's height and polarity. Worst case orientation was found to be in upright position and all radiated emissions tests were performed in this orientation. EUT antenna is internal and therefore it cannot be maximized separately.

EUT operating voltage is 100-240VAC.
For AC line conducted emissions 50Ω/50µH LISN was used.

Environmental conditions are shown on the associated data tables.

Following bandwidths were used during radiated spurious and line conducted emissions tests.

Frequency	RBW	VBW
0.15-30MHz	9kHz	30kHz
30-1000MHz	120kHz	1MHz
1-10GHz	1MHz	3MHz

Product Tested - Configuration Documentation

EUT Configuration			
Work Order:	S2174		
Company:	Powercast Corporation		
Company Address:	620 Alpha Dr		
	Pittsburgh, PA, 15238		
Contact:	Dan Harrist		
	MN	**PN**	**SN**
EUT:	TX91501B		Sample 1
EUT Description:	915MHz Transmitter		
EUT Max Frequency:	915 MHz		
EUT Min Frequency:	915 MHz		

EUT Components	**MN**	**SN**
Radiated Unit	TX91501B	Sample 1
Conducted Unit	TX91501B	Sample 2
Phihong AC/DC Supply	PSAC05R-050L6	Sample 1

Port Label	**Port Type**	**# ports**	**# populated**	**cable type**	**shielded**	**ferrites**	**length (m)**	**in/out**	**under test**	**comment**
AC Mains	Power AC	1	1	Power AC	No	No	1.47	in	yes	

Software Operating Mode Description:
Transmitting at 915MHz in one of three modes: 8.33kbps, 16.67kbps, CW
Performance Criteria:
EMI only

Clock Frequencies	
frequencies (MHz)	915

Statement of Conformity

RSS-GEN	RSP-100	RSS 247	Part 15	Comments
6.4			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.
3.2			15.31	The EUT was tested in accordance with the measurement standards in this section.
6.13.2			15.33	Frequency range was investigated according to this section, unless noted in specific rule section under which the equipment operates.
6.13.1			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.
6.8			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
6.7				Occupied Bandwidth measurements were performed.

Modifications Required for Compliance

The seam between the board level shield fence and the shield cover was sealed using conductive tape.

Test Results

Bandwidth

LIMIT

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

MEASUREMENTS / RESULTS

6dB Bandwidth

Date: 20-Sep-18 **Company:** Powercast **Work Order:** S2174
Engineer: Chris Bramley **EUT:** TX-915-01B **Operating Voltage/Frequency:** 5V DC
Temp: 24.0°C **Humidity:** 47% **Pressure:** 1017mBar
Frequency Range: 915MHz **Measurement Type:** Conducted
Measurement Method: FCC 558074 D01 DTS Meas Guidance v05
Notes:

Data Mode (kbps)	Frequency (MHz)	Reading (kHz)	6dB Bandwidth Limit (kHz)	Margin (kHz)	Result (Pass/Fail)
16.67	915	793.9	≥500	294	Pass
8.33	915	792.6	≥500	293	Pass
CW	915	792.5	≥500	293	Pass

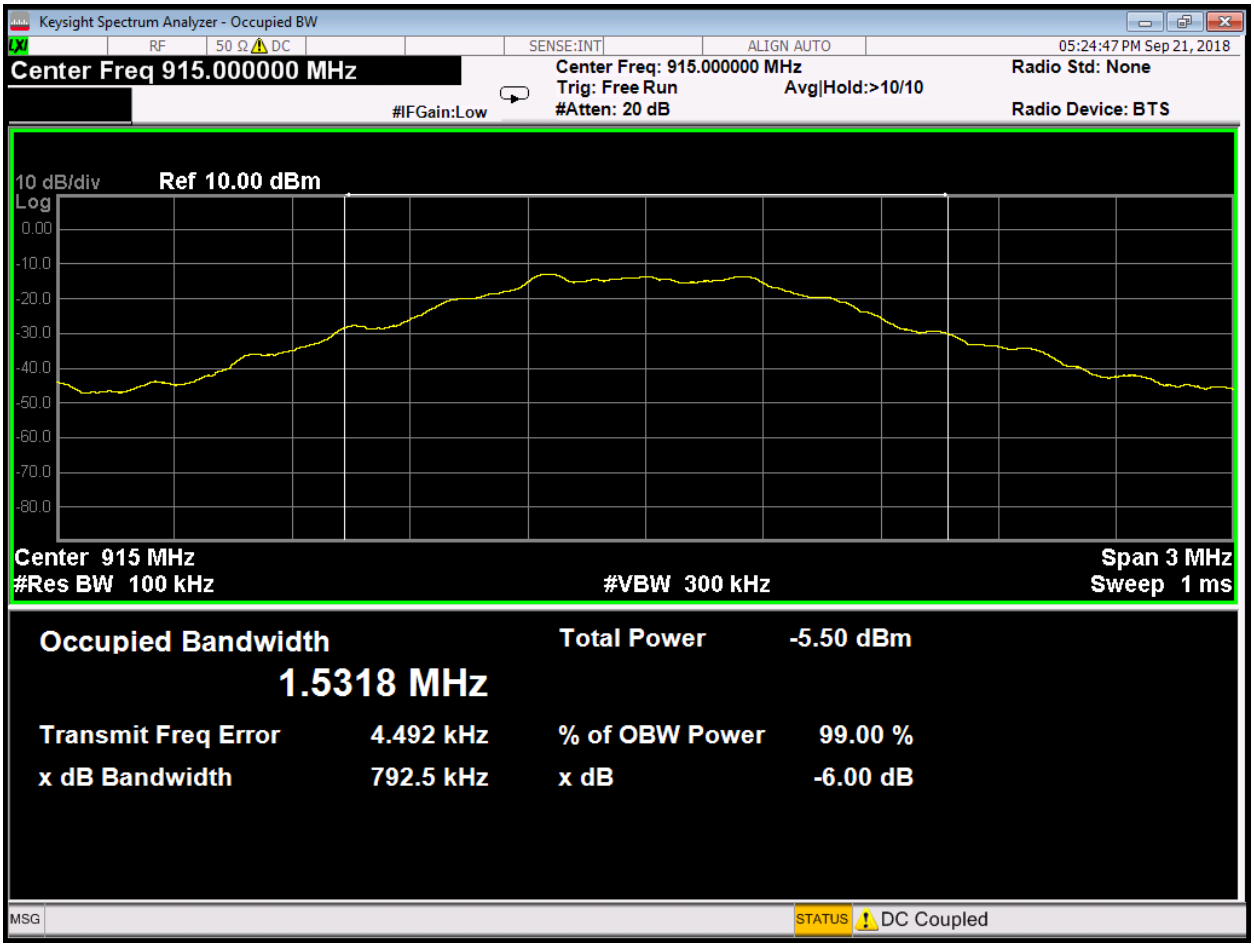
Test Site: CEMI-3 **Cable:** Asset 2289 **40dB Attenuator:** Asset 2096
Analyzer: EXA 1118473

Rev. 9/19/2018

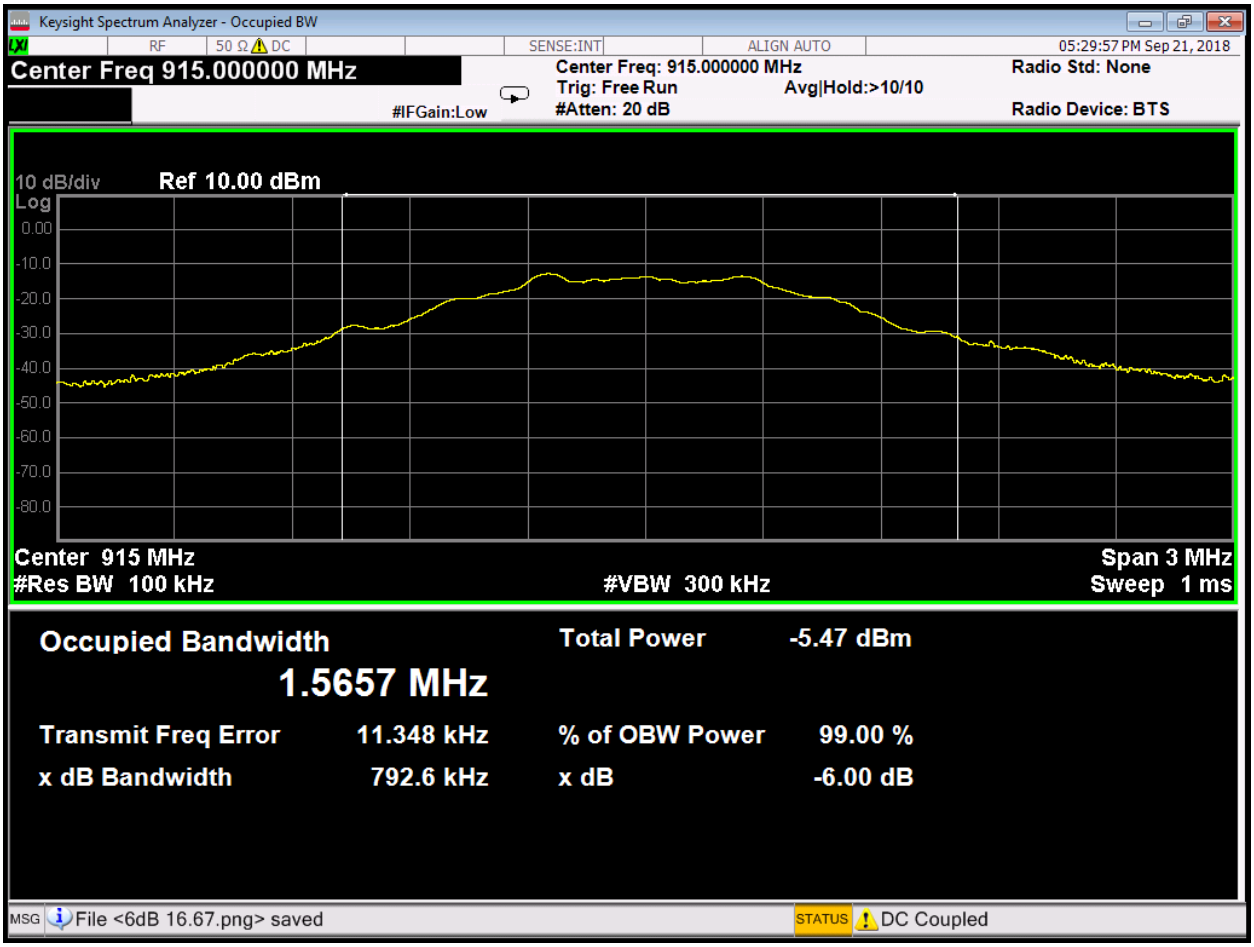
Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Rental EXA Signal Analyzer(1118473)	9KHz-26.5GHz	N9010A-526;N	AT	MY51170076	1118473	I	6/19/2019	6/19/2018
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI 3	719150		A-0015			III	NA	N/A
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	5/15/2018
TH A#2078		HTC-1	HDE		2078	II	3/22/2019	3/22/2018
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2289	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021039		II	1/29/2019	1/29/2018
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
40dB 100W Attenuator	0.009-4000MHz	BW-40N100W+	Mini-Circuits	V N383401508	2096	II	10/2/2018	10/2/2017

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

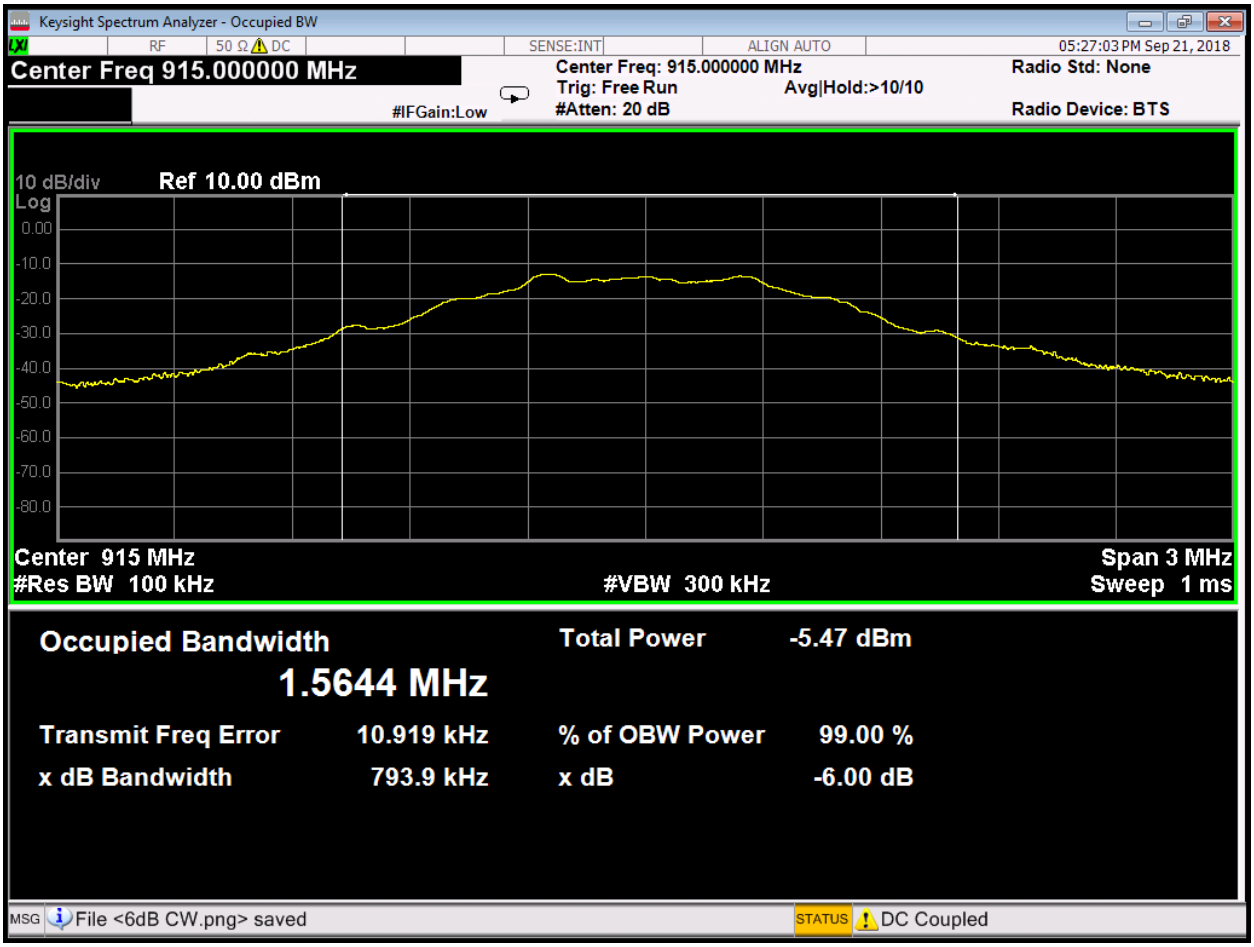
PLOTS



Low Data Rate DTS Bandwidth



Middle Data Rate DTS Bandwidth



High Data Rate DTS Bandwidth

Peak Power

LIMIT

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

MEASUREMENTS / RESULTS

Peak Output Power

Date: 21-Sep-18 **Company:** Powercast **Work Order:** S2174
Engineer: Chris Bramley **EUT:** TX-915-01B **Operating Voltage/Frequency:** 5V DC
Temp: 24.0°C **Humidity:** 47% **Pressure:** 1010mBar
Frequency Range: 915MHz **Measurement Type:** Conducted
Measurement Method: FCC 558074 D01 DTS Meas Guidance v05
Notes: Average Method Used - 8.3.2.2 Method AVGSA-1

Data Mode	Frequency	Peak Reading	Cable Loss	Attenuator Loss	Peak Output Power	Average Limit	Margin	Result
(kbps)	(MHz)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)	(Pass/Fail)
16.67	915.0	-12.39	0.17	38.50	26.28	27.657	-1.38	Pass
8.33	915.0	-12.63	0.17	38.50	26.04	27.657	-1.62	Pass
CW	915.0	-12.17	0.17	38.50	26.50	27.657	-1.16	Pass

Test Site: CEMI-3 **Cable:** Asset 2289 40dB Attenuator: Asset 2096
Analyzer: EXA 1118473
Peak Output Power (dBm)= Peak Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dB)

(Note: the antenna gain is 8.343dBi)

Rev. 9/19/2018

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	6/19/2019	6/19/2018
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI 3	719150		A-0015			III	NA	N/A
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	5/15/2018
TH A#2078		HTC-1	HDE		2078	II	3/22/2019	3/22/2018
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2289	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021039		II	1/29/2019	1/29/2018
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
40dB 100W Attenuator	0.009-4000MHz	BW-40N100W+	Mini-Circuits	V N383401508	2096	II	10/2/2018	10/2/2017

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

PLOTS

Low Data Rate Fundamental Emission Output Power

Middle Data Rate Fundamental Emission Output Power

High Data Rate Fundamental Emission Output Power

Band Edge Measurements

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)]

Conducted Bandedge

Date: 20-Sep-18 **Company:** Powercast **Work Order:** S2174
Engineer: Chris Bramley **EUT:** TX-915-01B **Operating Voltage/Frequency:** 5V DC
Temp: 24.0°C **Humidity:** 47% **Pressure:** 1017mBar

Frequency Range: 902-928 MHz **Measurement Type:** Conducted

Notes:

		Bandedge Delta (dB)	Limit (dB)	Result (Pass/Fail)
16.67kbps Data Mode	Low Bandedge	41.3	≥ 30	Pass
	High Bandedge	39.1	≥ 30	Pass
8.33kbps Data Mode	Low Bandedge	39.6	≥ 30	Pass
	High Bandedge	38.6	≥ 30	Pass
CW	Low Bandedge	46.6	≥ 30	Pass
	High Bandedge	47.2	≥ 30	Pass

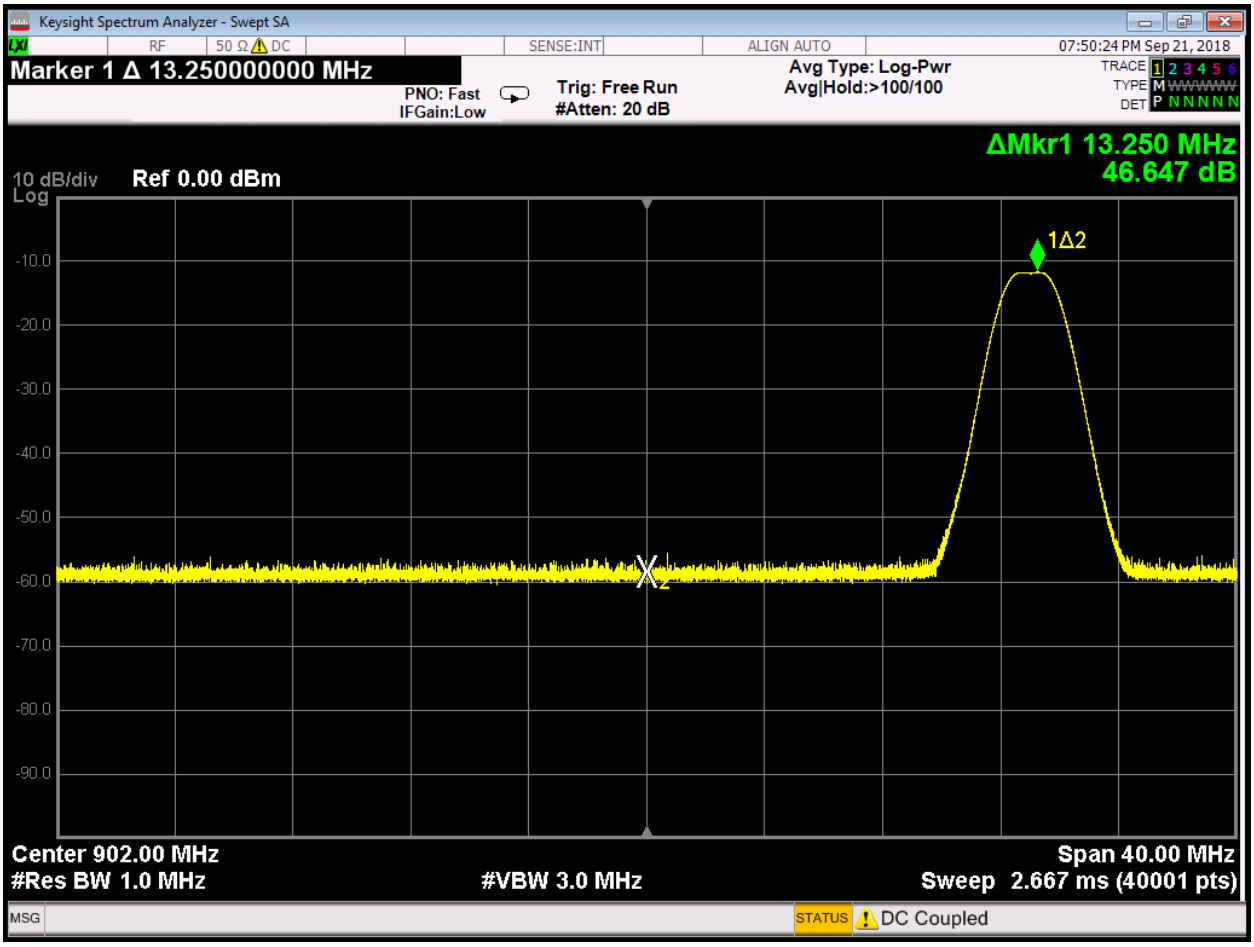
Test Site: CEMI-3 **Cable:** Asset 2289 **40dB Attenuator:** Asset 2096
Analyzer: EXA 1118473

Rev. 9/19/2018

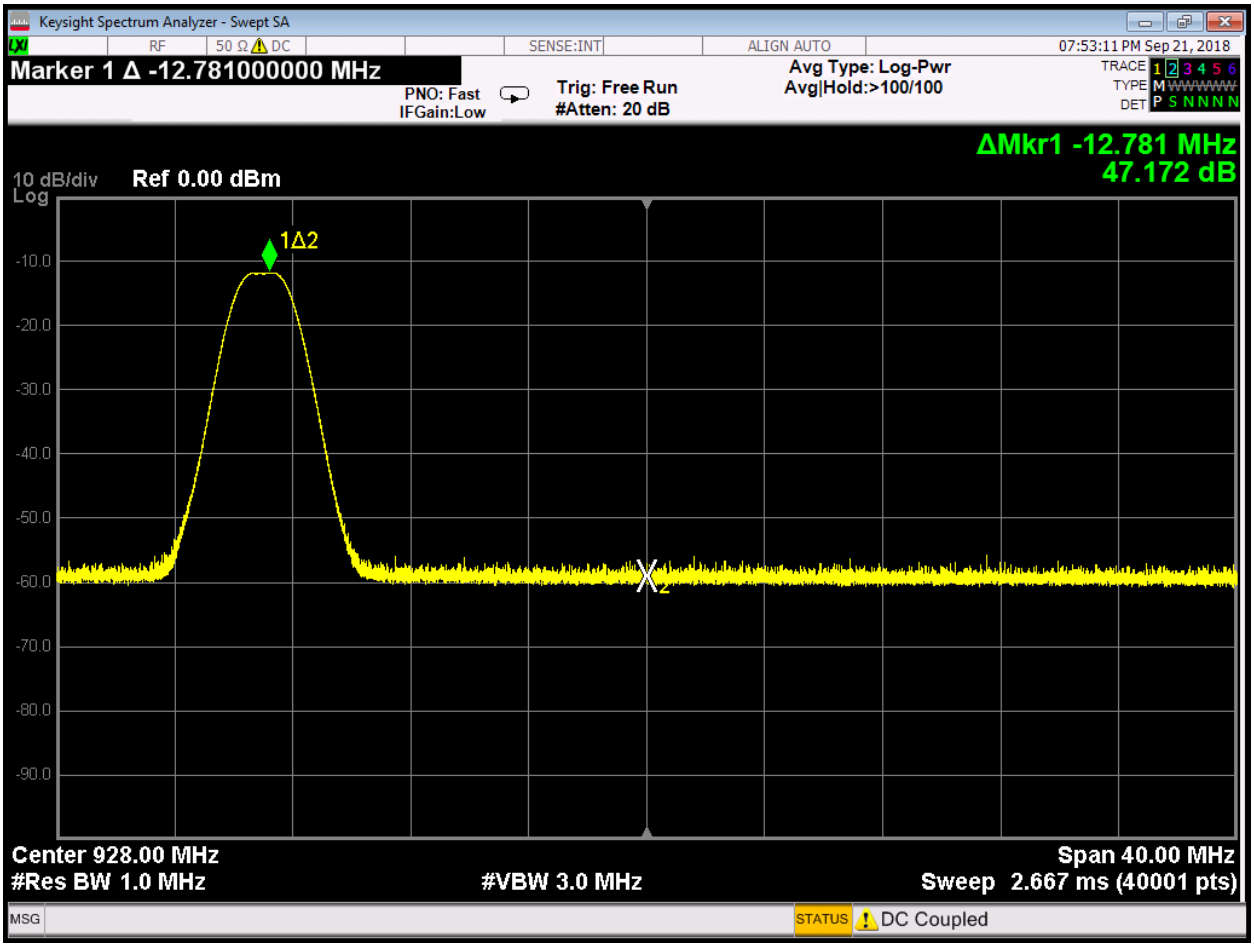
Spectrum Analyzers / Receivers /Preselectors	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Rental EXA Signal Analyzer(1118473)	9KHz-26.5GHz	N9010A-526;N	AT	MY51170076	1118473	I	6/19/2019	6/19/2018
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI 3	719150		A-0015			III	NA	N/A
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	5/15/2018
TH A#2078		HTC-1	HDE		2078	II	3/22/2019	3/22/2018
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2289	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021039		II	1/29/2019	1/29/2018
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
40dB 100W Attenuator	0.009-4000MHz	BW-40N100W+	Mini-Circuits	V N383401508	2096	II	10/2/2018	10/2/2017

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

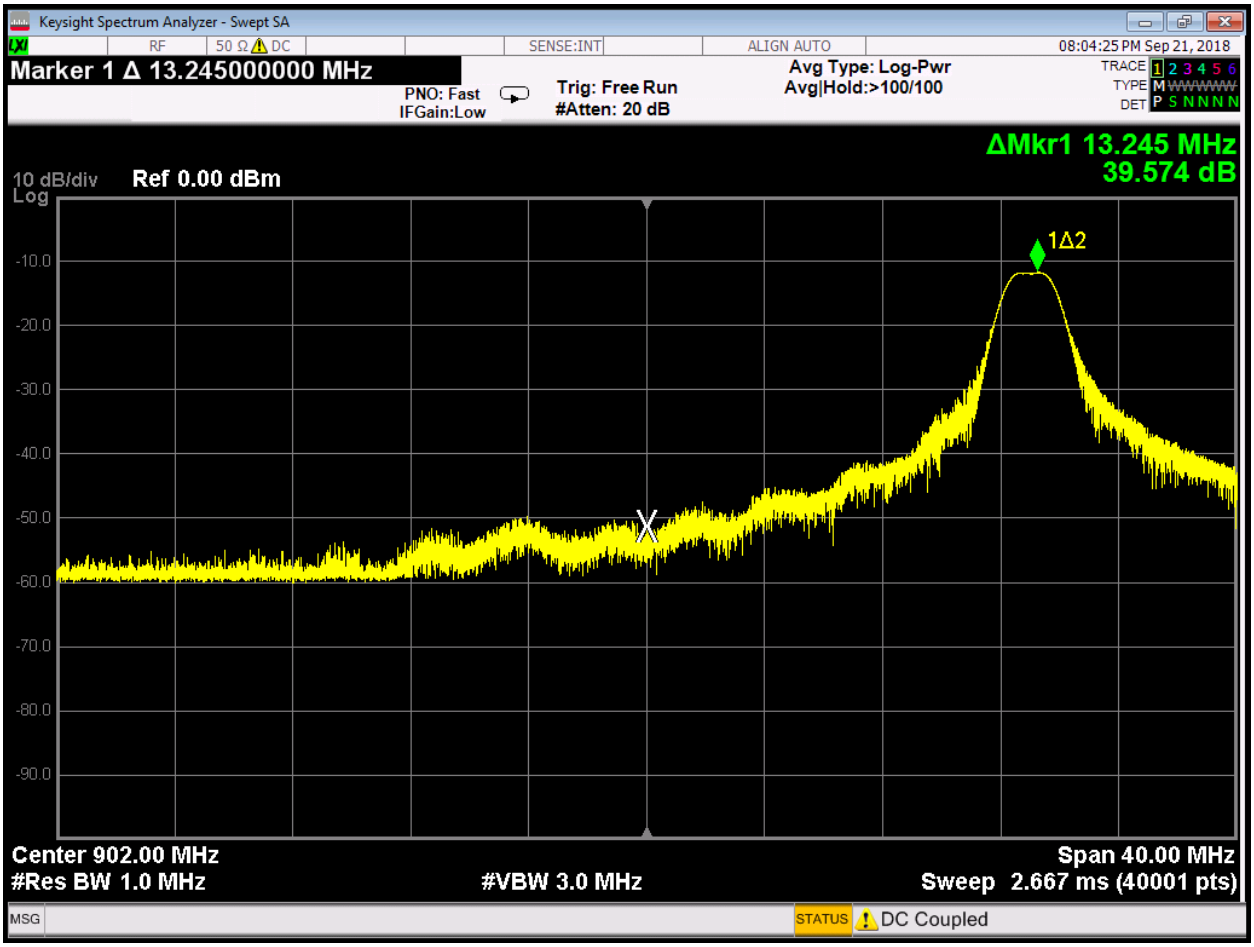
PLOTS



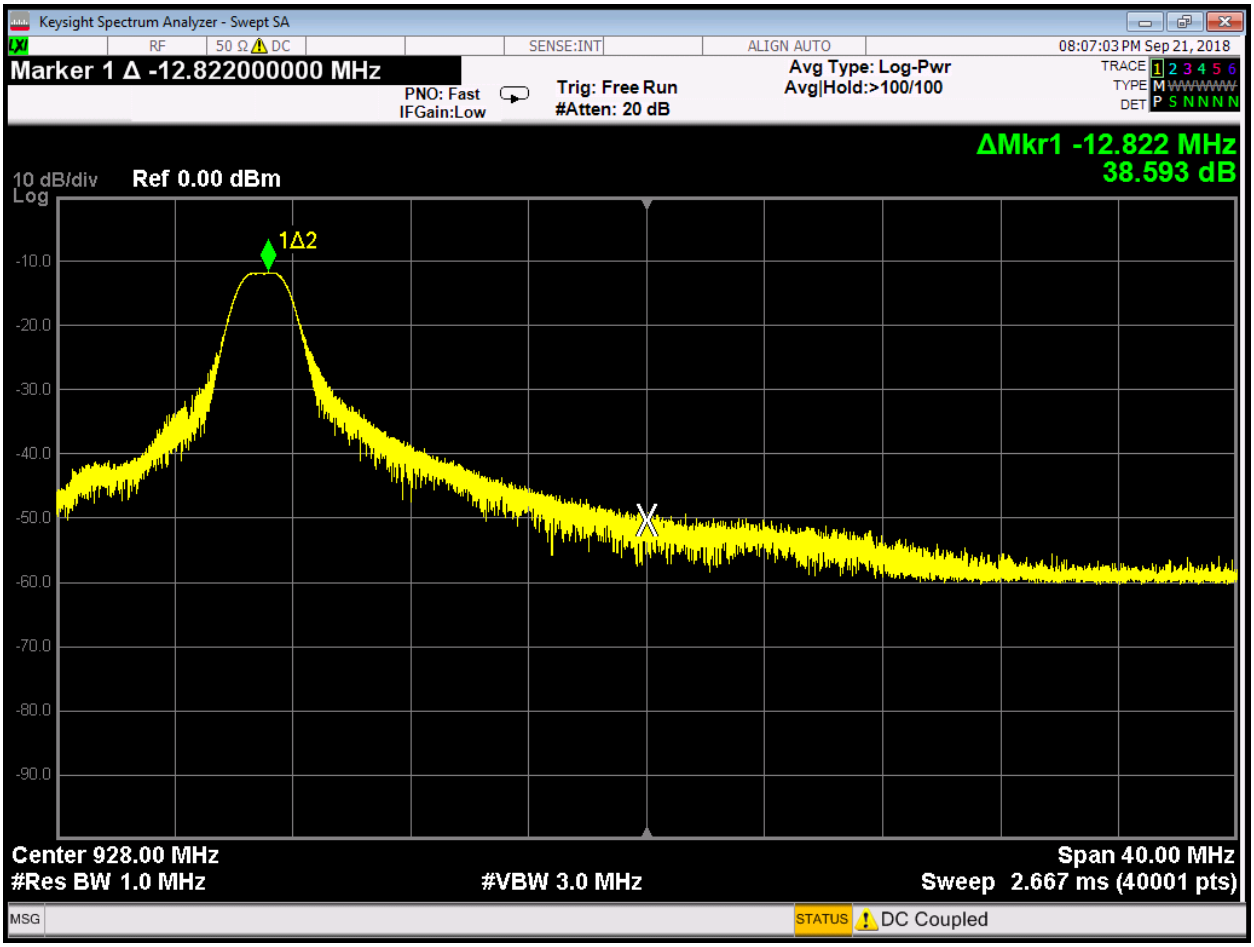
Low Data Rate Lower Band Edge



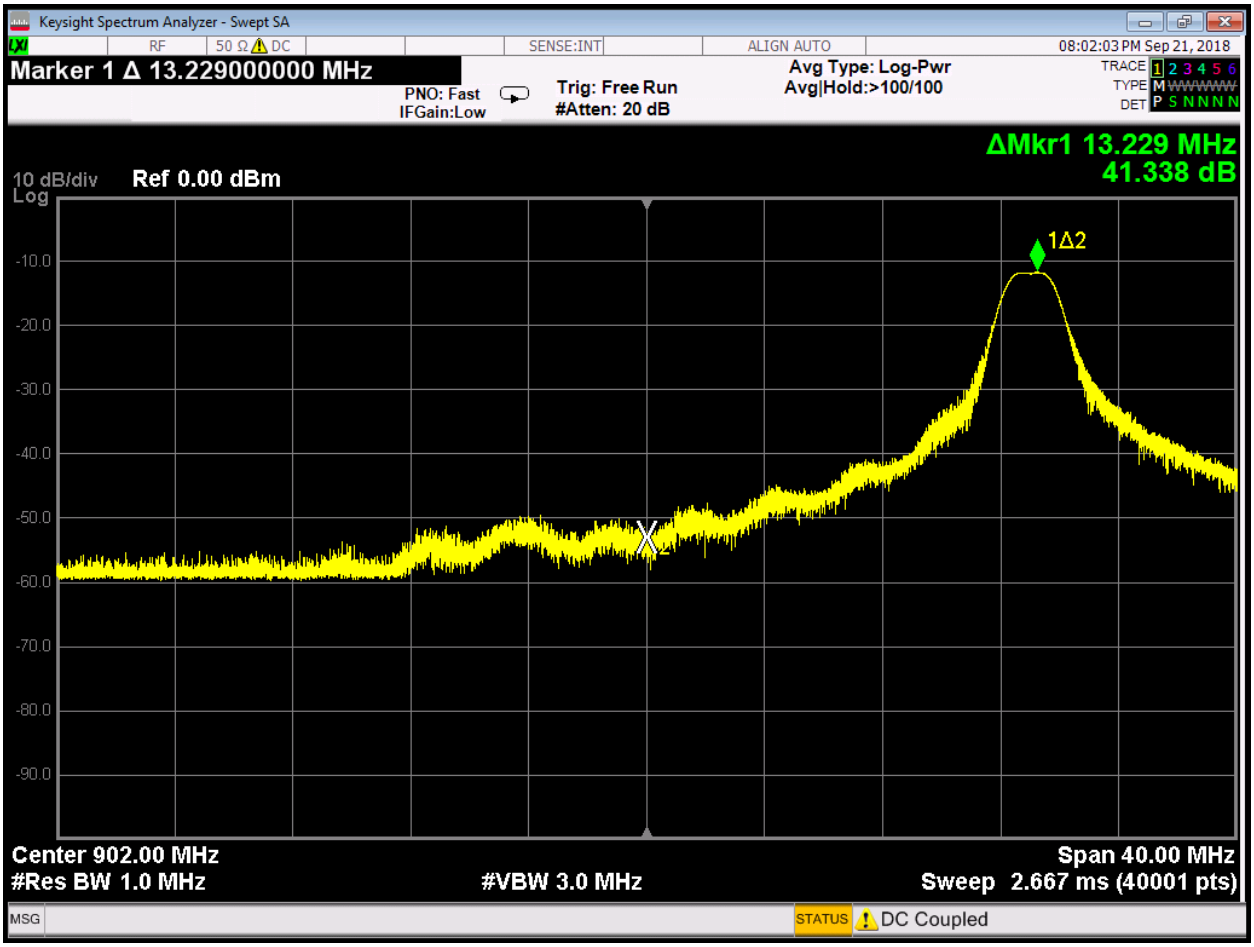
Low Data Rate Upper Band Edge



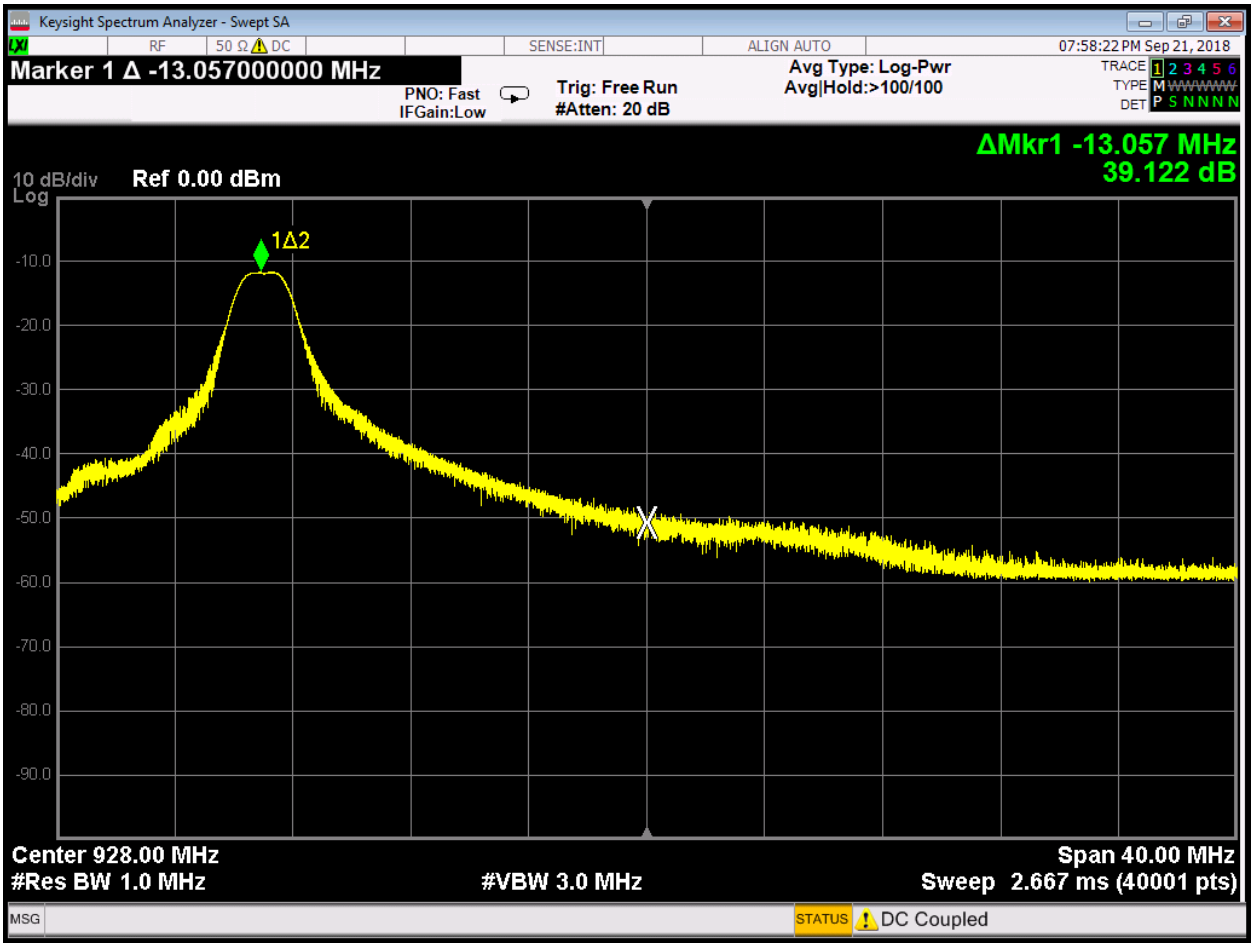
Mid Data Rate Lower Band Edge



Mid Data Rate Upper Band Edge



High Data Rate Lower Band Edge



High Data Rate Upper 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

Low Data Rate:

Curtis Straus - a Bureau Veritas Company	Work Order - S2174
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 120V/60Hz
30-1000MHz Horizontal Data	Test Site - CH-1
Operator: ZJ	Conditions - 23°C; 51%RH; 1013mBar
Notes:	

Data Taken at 07:06:00 PM, Monday, September 17, 2018

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_109_Class_B (dbµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_109_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.116	30.2	-7.8	22.5	40	-17.5	PASS	-17.5	40	-17.5	PASS	-17.5	232	245
55.793	43.9	-21.9	21.9	40	-18.1	PASS		40	-18.1	PASS		252	280
131.785	36.3	-14.7	21.6	43.5	-21.9	PASS		43.5	-21.9	PASS		225	295
490.945	32.1	-9.7	22.4	46	-23.6	PASS		46	-23.6	PASS		100	245
564.565	35.4	-8.3	27.1	46	-19	PASS		46	-19	PASS		194	80
775.156	25.4	-2.9	22.4	46	-23.6	PASS		46	-23.6	PASS		125	62

Curtis Straus - a Bureau Veritas Company	Work Order - S2174
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 120V/60Hz
30-1000MHz Vertical Data	Test Site - CH-1
Operator: ZJ	Conditions - 23°C; 51%RH; 1013mBar
Notes:	

Data Taken at 07:06:00 PM, Monday, September 17, 2018

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_109_Class_B (dBµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_109_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
31.387	43	-8.8	34.2	40	-5.8	PASS	-5.8	40	-5.8	PASS	-5.8	125	160
34.891	43.9	-11.3	32.6	40	-7.4	PASS		40	-7.4	PASS		125	115
35.262	43.8	-11.6	32.2	40	-7.8	PASS		40	-7.8	PASS		109	87
55.844	55.6	-21.9	33.7	40	-6.3	PASS		40	-6.3	PASS		125	29
132.609	37.2	-14.8	22.4	43.5	-21.1	PASS		43.5	-21.1	PASS		125	196
814.548	25.2	-2.6	22.6	46	-23.4	PASS		46	-23.4	PASS		147	96

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Horizontal Data
Operator: AKZ
Notes:
Zero data rate, upright orientation

Work Order - S2174
EUT Power Input - 120Vac/60Hz
Test Site - CH-1
Conditions - 24°C; 55%RH; 1010mBar

Data Taken at 04:12:55 PM, Friday, September 14, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1829.3	49.1	41.1	4.2	53.3	74	-20.7	PASS		45.3	54	-8.7	PASS		196	42
2746.1	44.5	35.6	7.2	51.7	74	-22.3	PASS		42.8	54	-11.2	PASS		225	219
3280.6	34.9	25.9	9.8	44.7	74	-29.3	PASS		35.7	54	-18.3	PASS		225	141
3661.5	46.6	38	10.7	57.3	74	-16.7	PASS	-16.7	48.8	54	-5.2	PASS	-5.2	225	141
4577.3	36.1	28.4	11.5	47.7	74	-26.3	PASS		39.9	54	-14.1	PASS		299	197
5487.2	36.8	27.5	13.8	50.6	74	-23.4	PASS		41.3	54	-12.7	PASS		207	117

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Operator: AKZ
Notes:
Zero data rate, upright orientation

Work Order - S2174
EUT Power Input - 120Vac/60Hz
Test Site - CH-1
Conditions - 24°C; 55%RH; 1010mBar

Data Taken at 04:12:55 PM, Friday, September 14, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1829.6	48.9	41.5	4.2	53.1	74	-20.9	PASS		45.7	54	-8.3	PASS		284	3
2745.9	47.1	39.9	7.2	54.2	74	-19.8	PASS		47.1	54	-6.9	PASS	-6.9	175	0
3296.2	34.4	25.8	9.8	44.2	74	-29.8	PASS		35.6	54	-18.4	PASS		185	179
3661.5	41	31.8	10.7	51.7	74	-22.3	PASS		42.5	54	-11.5	PASS		100	173
4576.8	43.7	34.5	11.5	55.2	74	-18.8	PASS	-18.8	46	54	-8	PASS		175	163
5488.4	38.9	30.2	13.8	52.7	74	-21.3	PASS		43.9	54	-10.1	PASS		113	161

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Horizontal Data
Operator: ZJ
Notes:
CW

Work Order - S2174
EUT Power Input - 120V/60Hz
Test Site - CH-1
Conditions - 23°C; 51%RH; 1013mBar

Data Taken at 11:44:24 PM, Monday, September 17, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
6407.5	50.3	40.3	6.5	56.8	83.5	-26.7	PASS	-26.7	46.8	63.5	-16.7	PASS	-16.7	125	239

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Vertical Data
Operator: ZJ
Notes:
CW

Work Order - S2174
EUT Power Input - 120V/60Hz
Test Site - CH-1
Conditions - 23°C; 51%RH; 1013mBar

Data Taken at 11:39:25 PM, Monday, September 17, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
6402.5	44.3	34.4	6.5	50.8	83.5	-32.7	PASS	-32.7	40.9	63.5	-22.6	PASS	-22.6	100	10

Mid Data Rate:

Curtis Straus - a Bureau Veritas Company	Work Order - S2174
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 120Vac/60Hz
1-6GHz Horizontal Data	Test Site - CH-1
Operator: AKZ	Conditions - 24°C; 55%RH; 1010mBar
Notes:	0
Mid data rate, upright orientation	0

Data Taken at 03:26:50 PM, Friday, September 14, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1829.3	49.1	40.7	4.2	53.3	74	-20.7	PASS		44.9	54	-9.1	PASS	-9.1	175	30
2745.9	43.4	33.6	7.2	50.6	74	-23.4	PASS		40.8	54	-13.2	PASS		183	223
3660.5	43.8	34.1	10.7	54.5	74	-19.5	PASS	-19.5	44.9	54	-9.1	PASS		225	236
4572.9	40.1	31.2	11.5	51.7	74	-22.3	PASS		42.7	54	-11.3	PASS		100	131
5492.4	36.6	28.1	13.7	50.3	74	-23.7	PASS		41.8	54	-12.2	PASS		187	130

Curtis Straus - a Bureau Veritas Company	Work Order - S2174
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 120Vac/60Hz
1-6GHz Vertical Data	Test Site - CH-1
Operator: AKZ	Conditions - 24°C; 55%RH; 1010mBar
Notes:	0
Mid data rate, upright orientation	0

Data Taken at 03:26:50 PM, Friday, September 14, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1829.8	47.2	37.7	4.2	51.4	74	-22.6	PASS		41.9	54	-12.1	PASS		293	25
2743.9	46.9	38.3	7.2	54.1	74	-19.9	PASS		45.4	54	-8.6	PASS	-8.6	175	0
3661.5	41.6	29.4	10.7	52.3	74	-21.7	PASS		40.1	54	-13.9	PASS		125	196
4573	42.6	32.5	11.5	54.1	74	-19.9	PASS	-19.9	44	54	-10	PASS		202	167
5490	37.1	27.9	13.7	50.9	74	-23.1	PASS		41.6	54	-12.4	PASS		175	149

Note: 30-1000MHz and 6-10GHz were scanned for the low data rate and high data rate modes and were found passing. For this reason, these ranges were not tested for the mid data rate.

High Data Rate:

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
30-1000MHz Horizontal Data
Operator: ZJ
Notes:
16.67kbps

Work Order - S2174
EUT Power Input - 120V/60Hz
Test Site - CH-1
Conditions - 23°C; 51%RH; 1013mBar

Data Taken at 08:25:45 PM, Monday, September 17, 2018

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_109_Class_B (dbµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_109_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
30.643	29.7	-8.2	21.4	40	-18.6	PASS		40	-18.6	PASS		117	290
56.584	43.7	-21.9	21.8	40	-18.2	PASS	-18.2	40	-18.2	PASS	-18.2	257	289
133.454	36.3	-14.9	21.5	43.5	-22	PASS		43.5	-22	PASS		225	295
564.462	31.1	-8.3	22.8	46	-23.2	PASS		46	-23.2	PASS		225	250
651.869	27	-5.6	21.4	46	-24.6	PASS		46	-24.6	PASS		229	25
809.849	25.2	-2.8	22.4	46	-23.6	PASS		46	-23.6	PASS		225	155

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
30-1000MHz Vertical Data
Operator: ZJ
Notes:
16.67kbps

Work Order - S2174
EUT Power Input - 120V/60Hz
Test Site - CH-1
Conditions - 23°C; 51%RH; 1013mBar

Data Taken at 08:25:45 PM, Monday, September 17, 2018

Frequency (MHz)	Raw QP Reading (dBµV)	Correction Factor (dB/m)	Adjusted QP Amplitude (dBµV/m)	Lim1: FCC_pt15_109_Class_B (dBµV/m)	Margin to Lim1 (dB)	Test Results Lim1 (Pass/Fail)	Worst Margin Lim1 (dB)	Lim2: FCC_pt15_109_Class_B (dBµV/m)	Margin to Lim2 (dB)	Test Results Lim2 (Pass/Fail)	Worst Margin Lim2 (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
33.242	45.6	-10.2	35.3	40	-4.7	PASS	-4.7	40	-4.7	PASS	-4.7	100	155
35.543	42.6	-11.9	30.7	40	-9.3	PASS		40	-9.3	PASS		125	1
56.708	55.9	-21.9	34	40	-6	PASS		40	-6	PASS		100	25
132.83	38.9	-14.8	24.1	43.5	-19.5	PASS		43.5	-19.5	PASS		101	155
138.481	37.4	-15.3	22.1	43.5	-21.4	PASS		43.5	-21.4	PASS		102	175
791.595	25.3	-3.1	22.2	46	-23.8	PASS		46	-23.8	PASS		155	157

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Horizontal Data
Operator: AKZ
Notes:
Max data rate, upright orientation

Work Order - S2174
EUT Power Input - 120Vac/60Hz
Test Site - CH-1
Conditions - 24°C; 55%RH; 1010mBar

Data Taken at 02:32:13 PM, Friday, September 14, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Average Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1726.1	33.5	24.6	3.4	36.9	74	-37.1	PASS		28	54	-26	PASS		275	214
1829.3	48.9	41.5	4.2	53.1	74	-20.9	PASS	-20.9	45.7	54	-8.3	PASS	-8.3	203	33
2744.1	40.3	31.4	7.2	47.5	74	-26.5	PASS		38.6	54	-15.4	PASS		195	220
3658.7	41.8	33.2	10.7	52.5	74	-21.5	PASS		43.9	54	-10.1	PASS		225	245
4573.1	41.5	29.4	11.5	53.1	74	-20.9	PASS		41	54	-13	PASS		113	148
5491.8	35.1	27.6	13.7	48.9	74	-25.1	PASS		41.3	54	-12.7	PASS		139	132

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Operator: AKZ
Notes:
Max data rate, upright orientation

Work Order - S2174
EUT Power Input - 120Vac/60Hz
Test Site - CH-1
Conditions - 24°C; 55%RH; 1010mBar

Data Taken at 02:32:13 PM, Friday, September 14, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_209_Peak (dBµV/m)	Peak Margin (dB)	Peak Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_209_Average (dBµV/m)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1829.1	47.6	39.7	4.2	51.8	74	-22.2	PASS		43.9	54	-10.1	PASS		275	1
2745.9	46.5	38.3	7.2	53.7	74	-20.3	PASS	-20.3	45.5	54	-8.5	PASS	-8.5	192	5
3240.3	34.3	25.6	9.7	44	74	-30	PASS		35.3	54	-18.7	PASS		275	80
3661.3	39	30.9	10.7	49.7	74	-24.3	PASS		41.7	54	-12.3	PASS		281	175
4573.2	41.5	31.7	11.5	53	74	-21	PASS		43.3	54	-10.7	PASS		175	194
5490.8	36	28.3	13.7	49.8	74	-24.2	PASS		42.1	54	-11.9	PASS		125	198

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Horizontal Data
Operator: ZJ
Notes:
16.67kbps

Work Order - S2174
EUT Power Input - 120V/60Hz
Test Site - CH-1
Conditions - 23°C; 51%RH; 1013mBar

Data Taken at 12:00:29 AM, Tuesday, September 18, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Raw Avg Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_109_ClassB_Peak (dBµV/m)	Peak Margin (dB)	Peak Test Results (Pass/Fail)	Worst Peak Margin (dB)	Adjusted Avg Amplitude (dBµV/m)	Av Lim: FCC_pt15_109_ClassB_AVG (dBµV/m)	Avg Margin (dB)	Avg Test Results (Pass/Fail)	Worst Avg Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
6407.6	56.1	45.6	6.5	62.6	83.5	-20.9	PASS	-20.9	52.1	63.5	-11.4	PASS	-11.4	172	149

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
Top Peaks Vertical 6-18GHz
Operator: ZJ
Notes:
16.67kbps

Work Order - S2174
EUT Power Input - 120V/60Hz
Test Site - CH-1
Conditions - 23°C; 51%RH; 1013mBar

Data Taken at 11:55:57 PM, Monday, September 17, 2018

Frequency (MHz)	Raw Peak Reading (dBµV)	Correction Factor (dB/m)	Adjusted Peak Amplitude (dBµV/m)	Pk Lim: FCC_pt15_109_ClassB_Peak (dBµV/m)	Margin to Peak Limit (dB)	Peak Limit Test Results (Pass/Fail)	Peak Limit Worst Margin (dB)	Av Lim: FCC_pt15_109_ClassB_AVG (dBµV/m)	Margin to Avg Limit (dB)	Avg Limit Test Results (Pass/Fail)	Avg Limit Worst Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
6402.2	50.6	6.5	57.1	83.5	-26.4	PASS	-26.4	63.5	-6.4	PASS	-6.4	150	0
9960.6	43.9	9.4	53.3	83.5	-30.2	PASS		63.5	-10.2	PASS		175	82

Rev. 9/17/2018

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	4/10/2019	4/10/2018

Radiated Emissions Sites	FCC Code	IC Code	VCCI Code	Range	Asset	Cat	Calibration Due	Calibrated on
EMI Chamber 1	719150	2762A-6	A-0015	30-1000MHz	1685	I	12/21/2018	12/21/2016
EMI Chamber 1	719150	2762A-6	A-0015	1-18GHz	1685	I	12/21/2018	12/21/2016

Preamps /Couplers Attenuators / Filters	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2310 PA	1-1000MHz	PAM-103	COM-POWER	441175	2310	II	10/29/2018	10/29/2017
2111 HF Preamp	0.5-18GHz	PAM-118A	COM-POWER	551063	2111	II	11/19/2018	11/19/2017
2130 BRF	9KHz-10GHz	BRM18770	Micro-Tronics	1	2130	II	1/10/2019	1/10/2018

Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Red-Black Bilog	30-2000MHz	JB1	Sunol	A091604-2	1106	I	2/28/2019	2/28/2017
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	2/14/2019	2/14/2017

Meteorological Meters/Chambers		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	5/15/2018
TH A#2077		HTC-1	HDE		2077	II	3/22/2019	3/22/2018

Cables	Range	Mfr	Cat	Calibration Due	Calibrated on
Asset #2456	9KHz-18GHz	MegaPhase	II	10/29/2018	10/29/2017
Asset #2466	9KHz-18GHz	MegaPhase	II	10/29/2018	10/29/2017
Asset #2480	9KHz-18GHz	MegaPhase	II	10/29/2018	10/29/2017

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

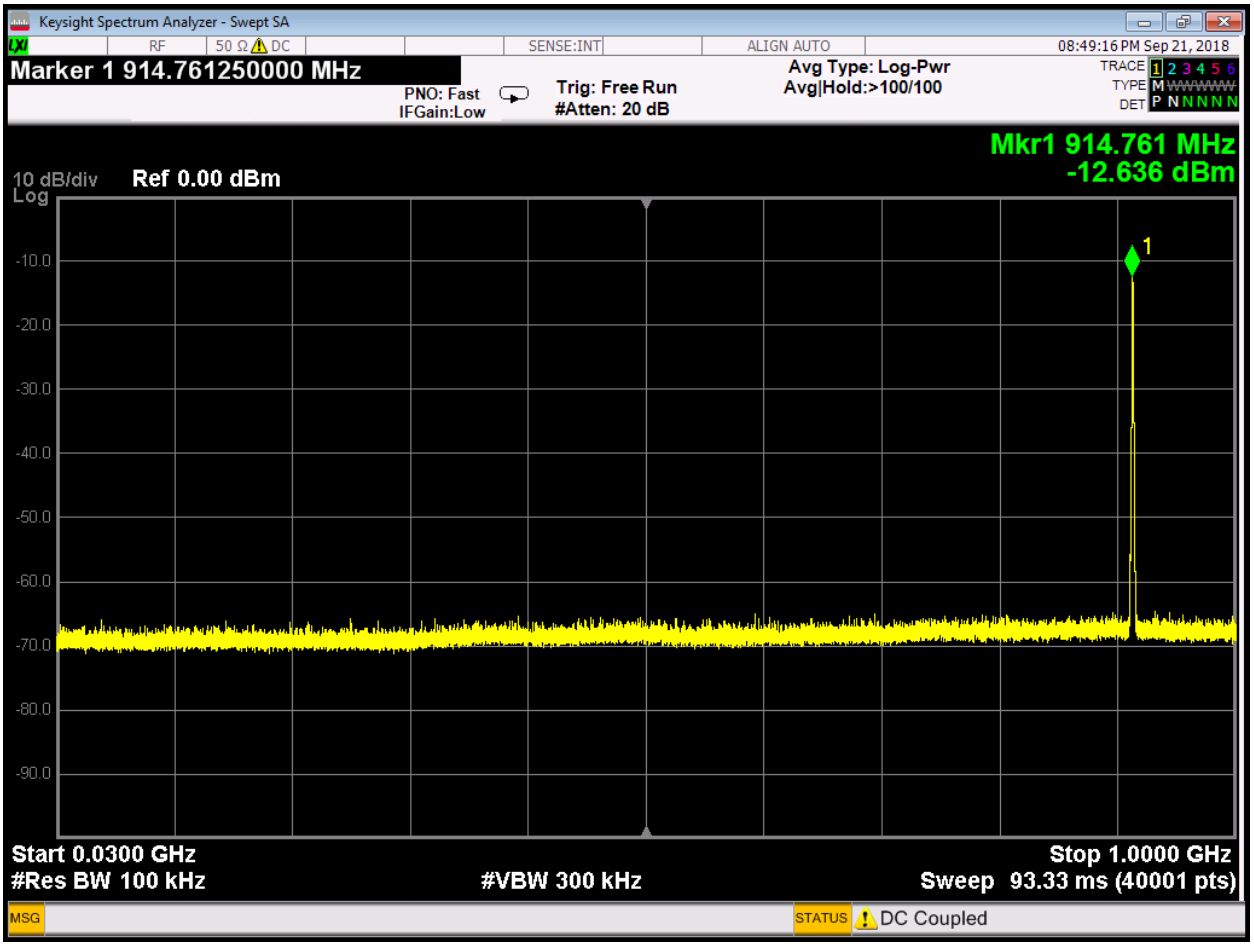
Conducted Spurious Emissions

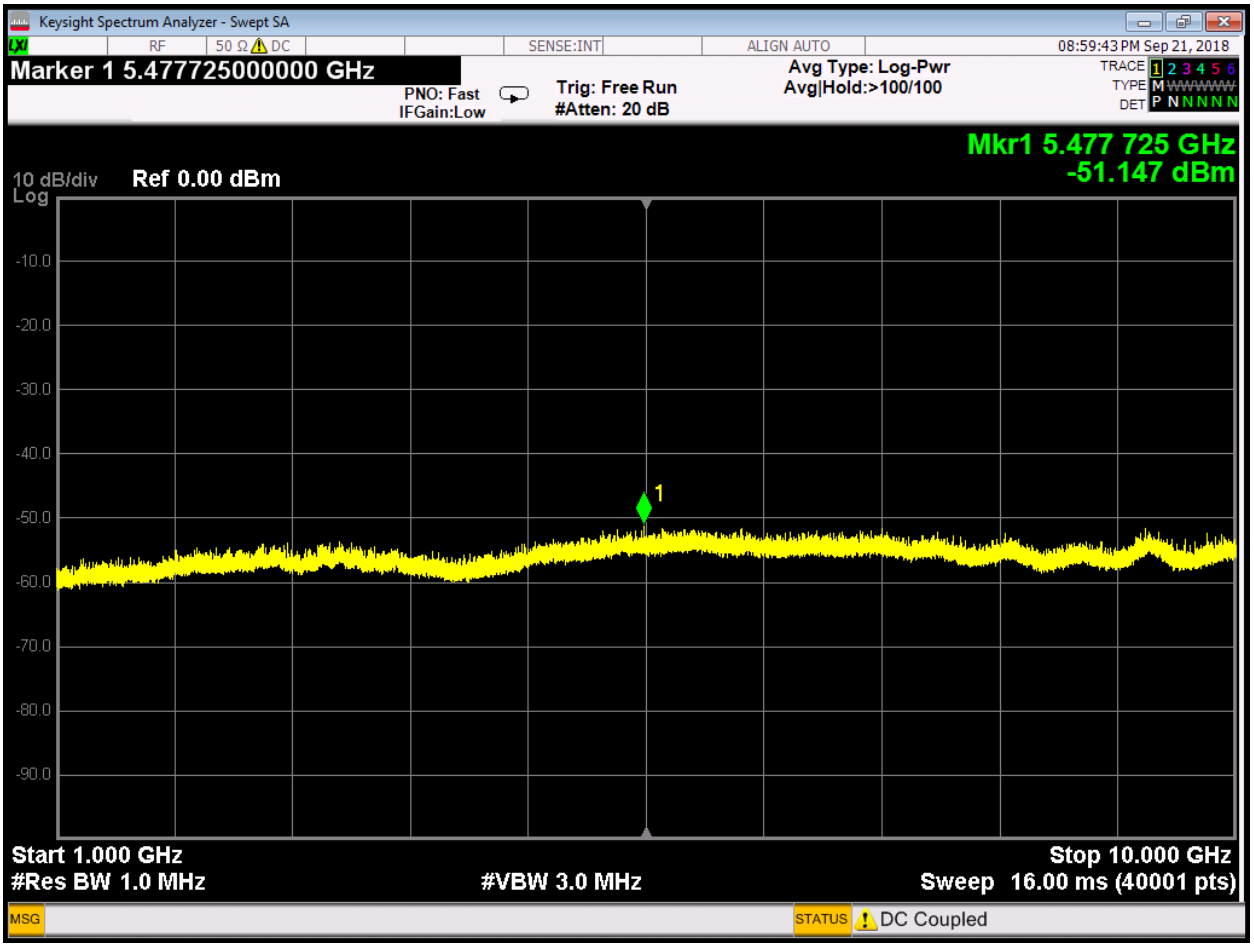
LIMITS

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. [15.247(d)]

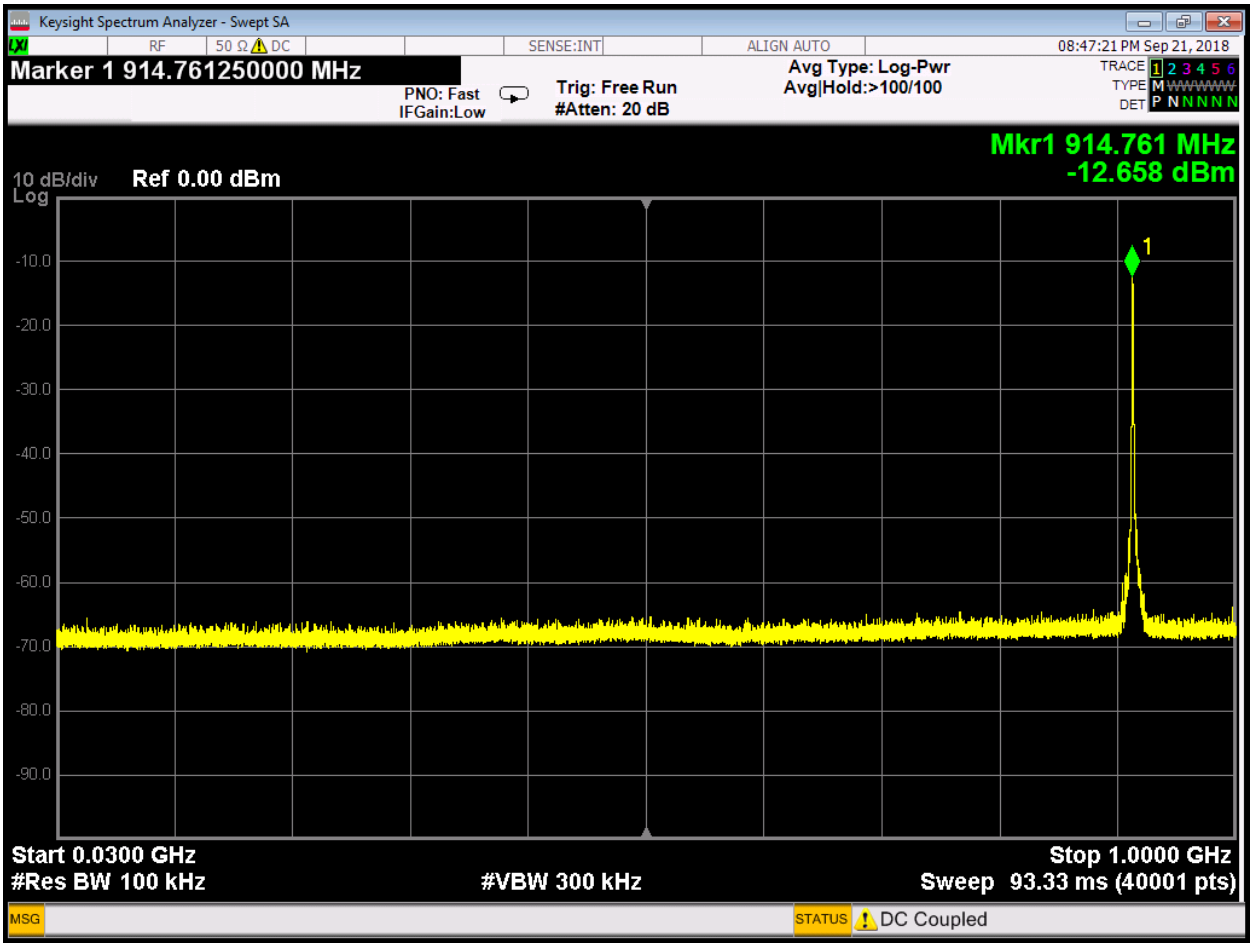
MEASUREMENTS / RESULTS

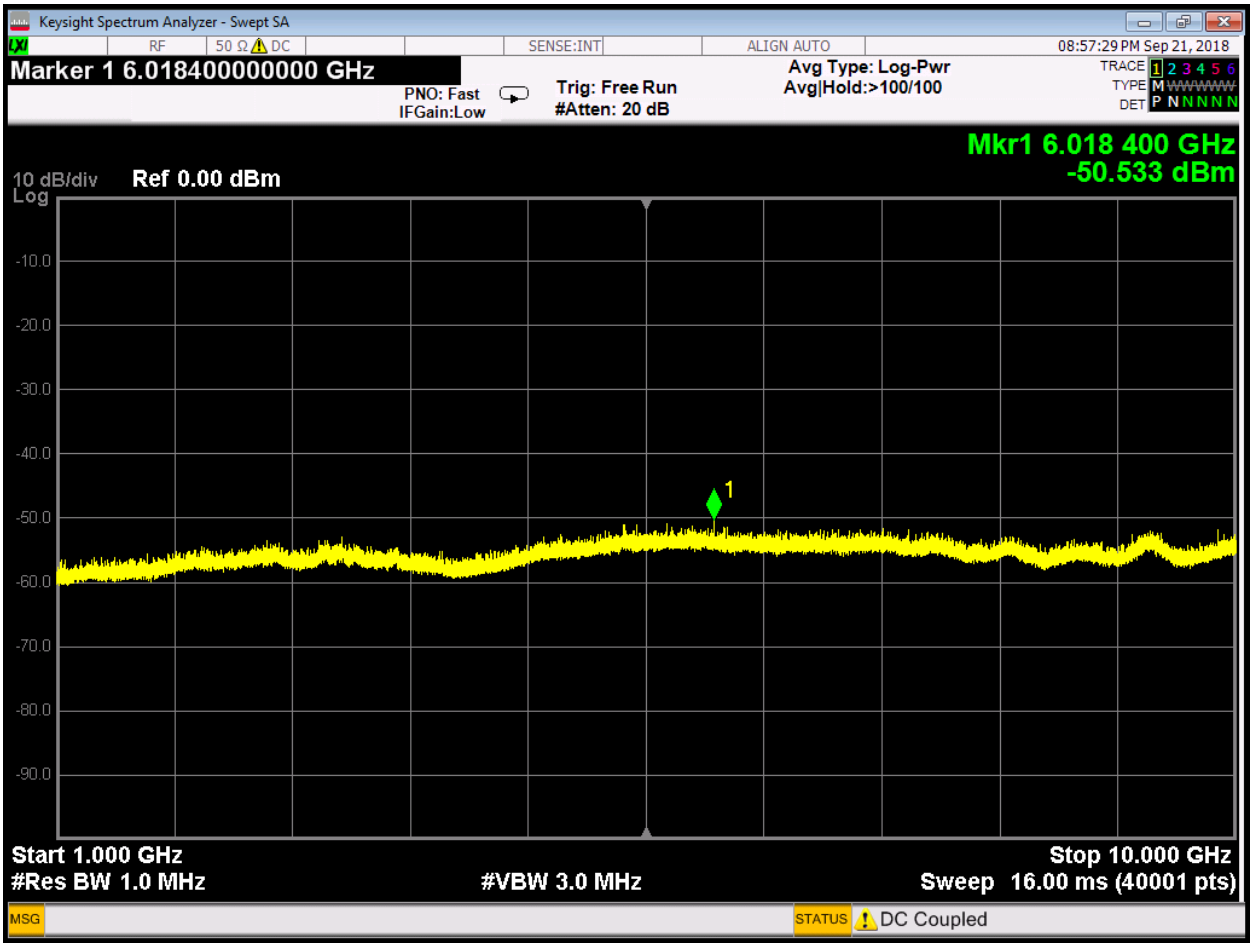
Low Data Rate:



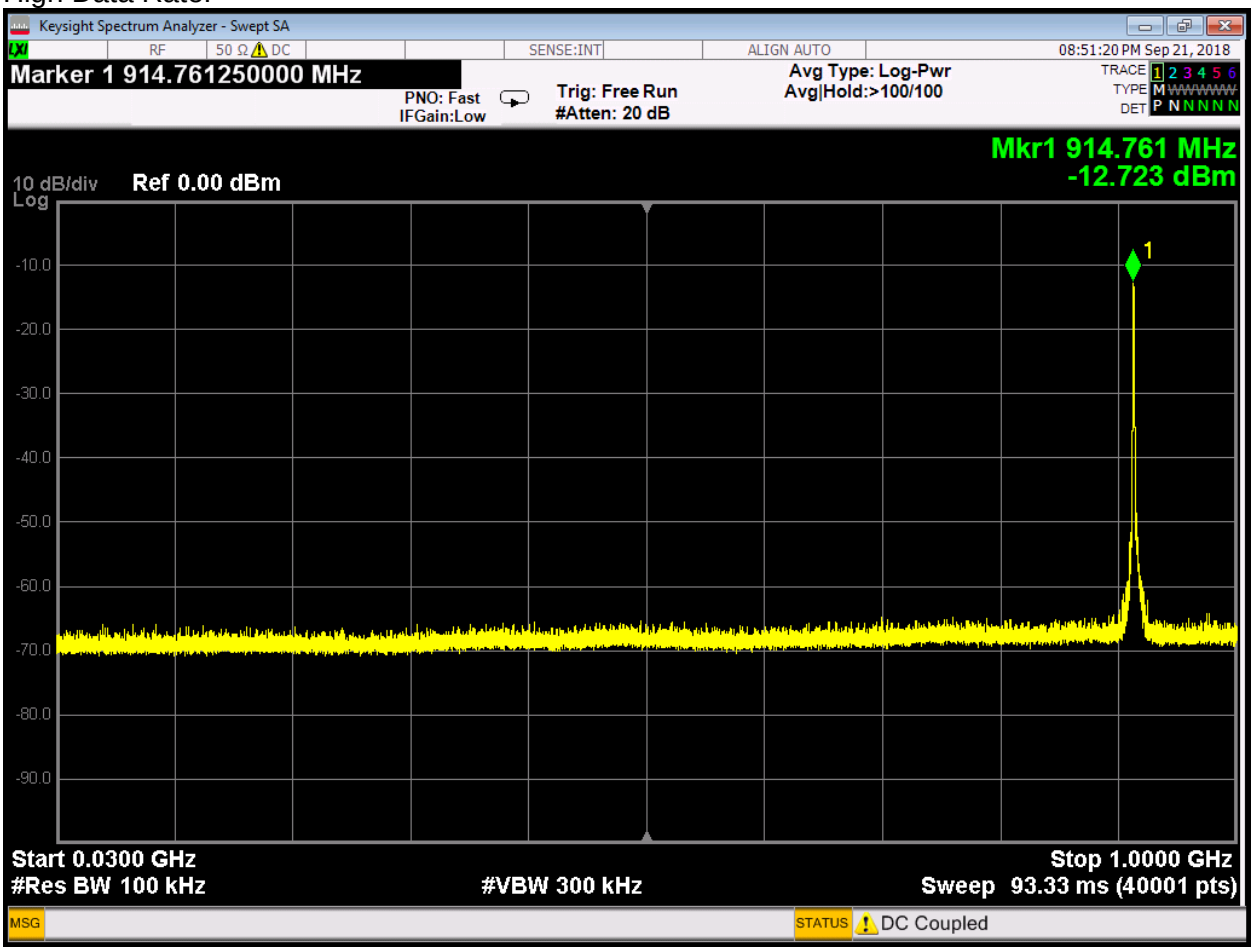

Keysight Spectrum Analyzer - Swept SA
RF
50 Ω DC
SENSE:INT
ALIGN AUTO
08:59:43 PM Sep 21, 2018
Marker 1 5.477725000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr1 5.477 725 GHz
-51.147 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
1
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 10.000 GHz
Sweep 16.00 ms (40001 pts)
MSG
STATUS
DC Coupled

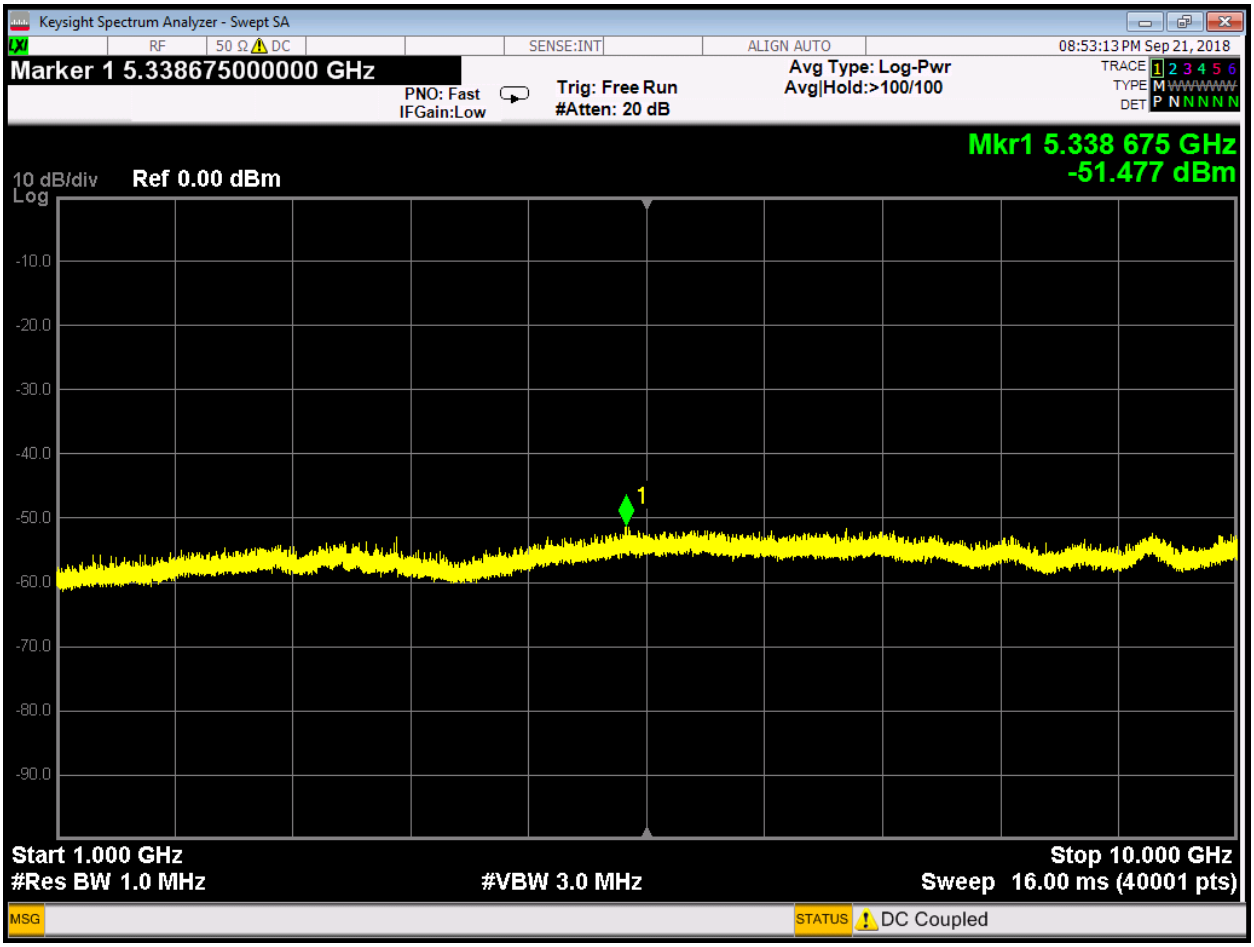
Mid Data Rate:




Keysight Spectrum Analyzer - Swept SA
RF
50 Ω DC
SENSE:INT
ALIGN AUTO
08:57:29 PM Sep 21, 2018
Marker 1 6.018400000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr1 6.018 400 GHz
-50.533 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
1
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 10.000 GHz
Sweep 16.00 ms (40001 pts)
MSG
STATUS
DC Coupled

High Data Rate:




Keysight Spectrum Analyzer - Swept SA
RF
50 Ω DC
SENSE:INT
ALIGN AUTO
08:53:13 PM Sep 21, 2018
Marker 1 5.338675000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M
DET P N N N N N
Mkr1 5.338 675 GHz
-51.477 dBm
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
1
Start 1.000 GHz
#Res BW 1.0 MHz
#VBW 3.0 MHz
Stop 10.000 GHz
Sweep 16.00 ms (40001 pts)
MSG
STATUS
DC Coupled

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: 20-Sep-18 **Company:** Powercast **Work Order:** S2174
Engineer: Chris Bramley **EUT:** TX-915-01B **Operating Voltage/Frequency:** 5V DC
Temp: 24.0°C **Humidity:** 47% **Pressure:** 1017mBar
Frequency Range: 915MHz **Measurement Type:** Conducted
Measurement Method: FCC 558074 D01 DTS Meas Guidance v05
Notes: Average Method Used - 8.4 Method AVGPSD-1

Data Mode	Frequency	Peak Reading	Cable Loss	Attenuator Loss	Peak PSD	Average Limit	Margin	Result
(kbps)	(MHz)	(dBm)	(dB)	(dB)	(dBm)	(dBm)	(dB)	
16.67	915.0	-32.00	0.17	38.5	6.67	8.0	-1.33	Pass
8.33	915.0	-32.21	0.17	38.5	6.46	8.0	-1.54	Pass
CW	915.0	-31.60	0.17	38.5	7.07	8.0	-0.93	Pass

Test Site: CEMI-3 **Cable:** Asset 2289 40dB Attenuator: Asset 2096
Analyzer: EXA 1118473

PSD(dBm) = Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dBm)

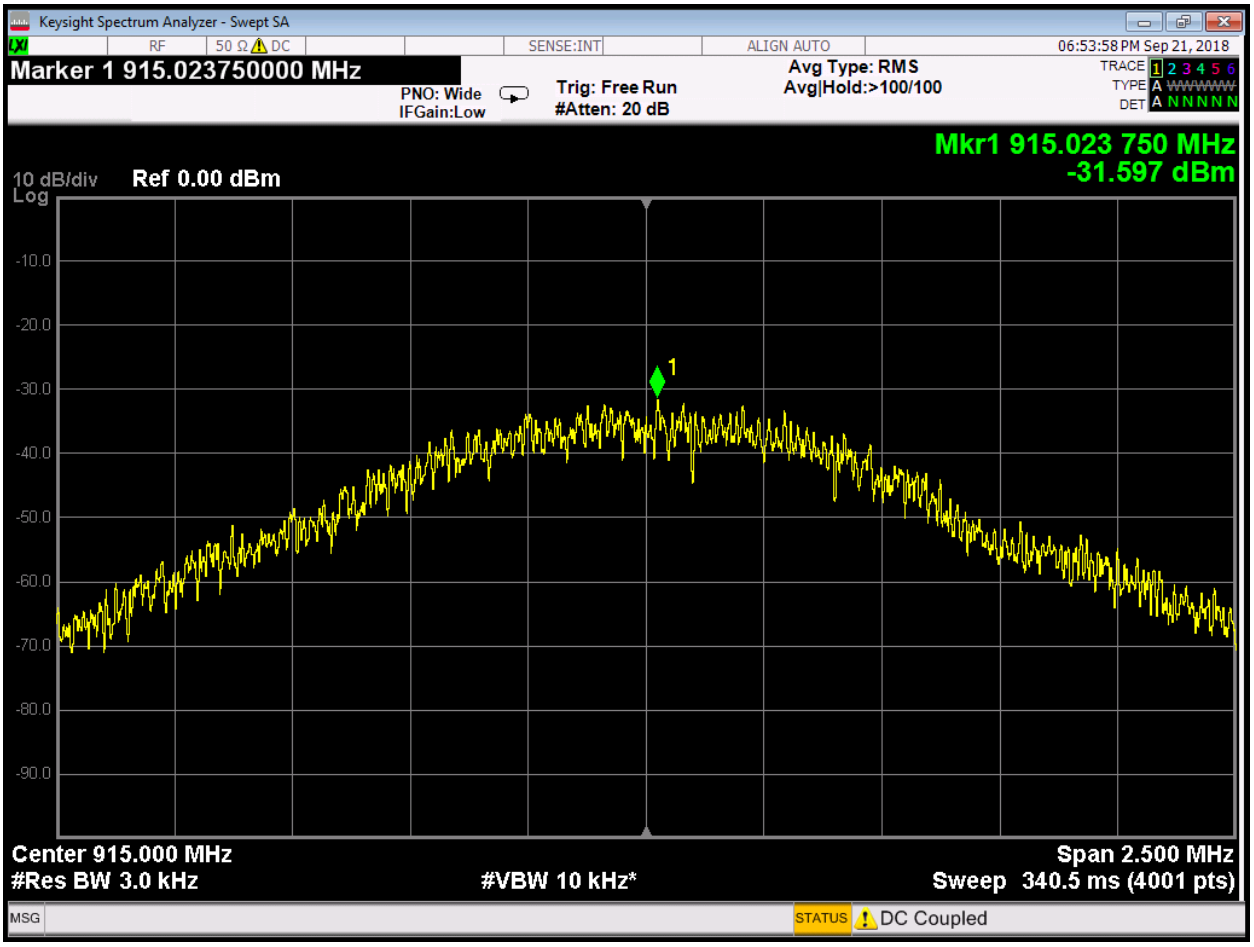
Rev. 9/19/2018

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	6/19/2019	6/19/2018
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI 3	719150		A-0015			III	NA	N/A
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	5/15/2018
TH A#2078		HTC-1	HDE		2078	II	3/22/2019	3/22/2018
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2289	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021039		II	1/29/2019	1/29/2018
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
40dB 100W Attenuator	0.009-4000MHz	BW-40N100W+	Mini-Circuits	V N383401508	2096	II	10/2/2018	10/2/2017

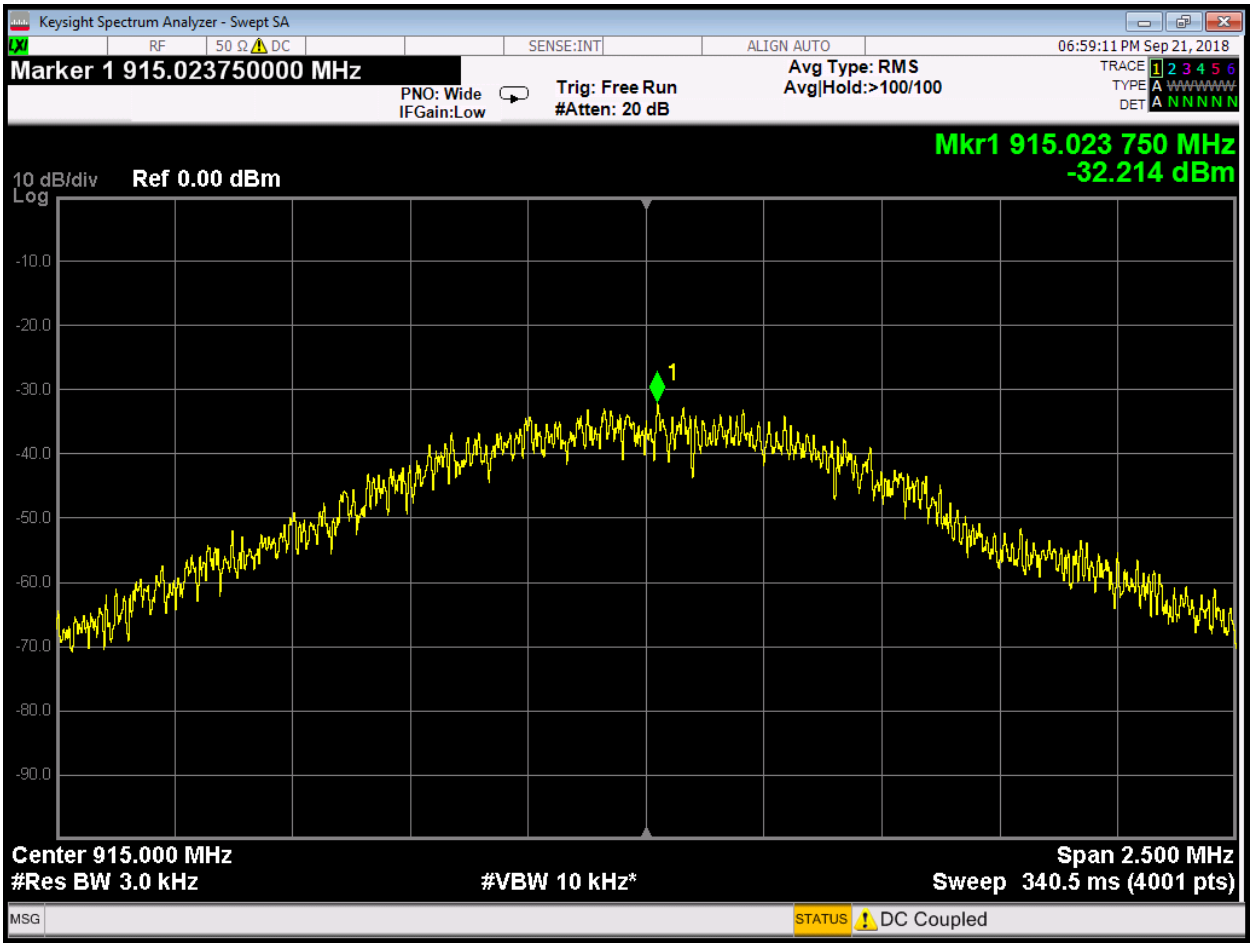
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.

PLOTS

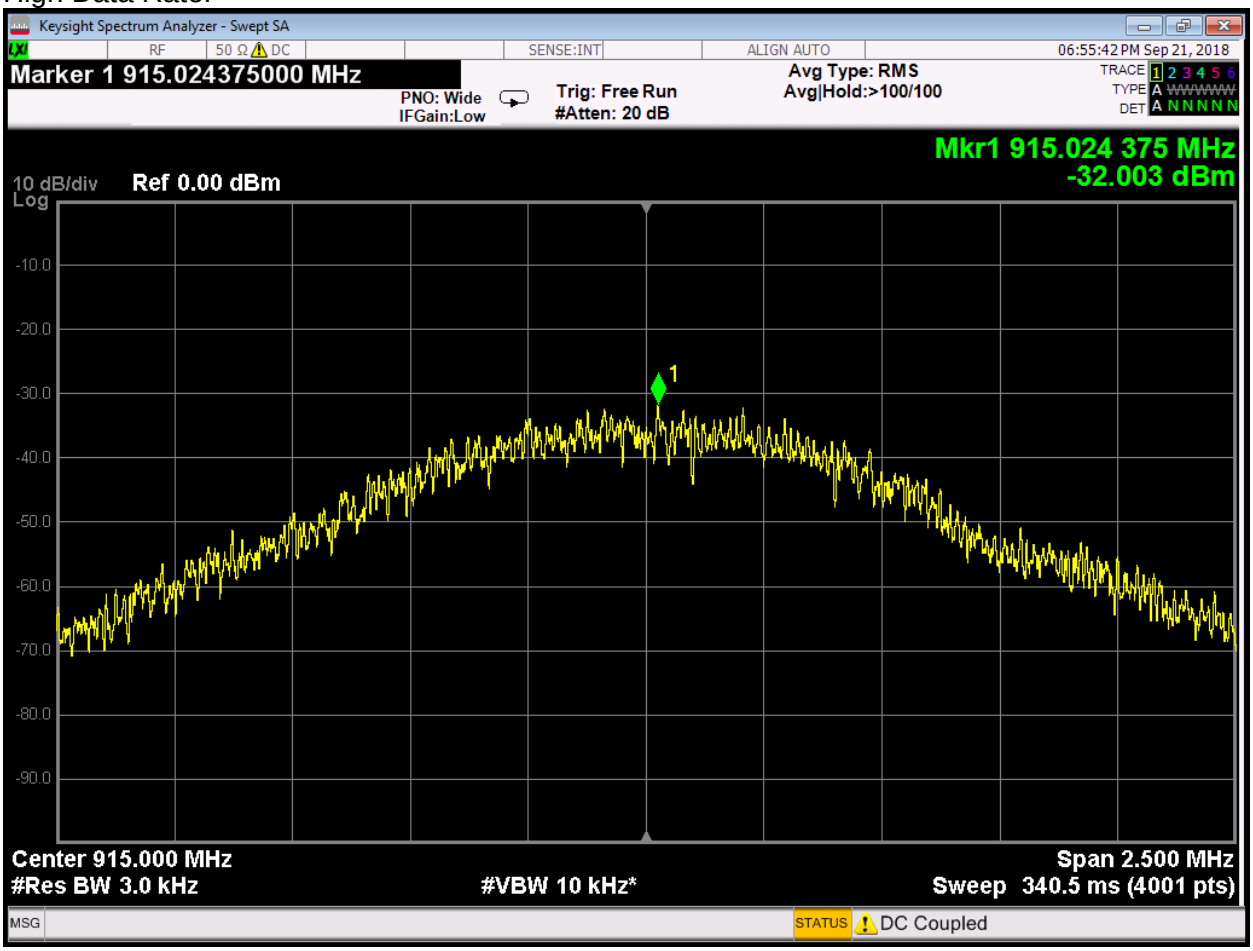
Low Data Rate:



Mid Data Rate:



High Data Rate:



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	Work Order # - S2174
Conducted Emissions per CISPR 16-2-1	EUT Power Input - 120VAC/ 60Hz
Peak Detector Data	Test Site - CEMI-3
Notes:	Conditions: - 23.3°C; 47%RH; 1010mBar
EUT Line tested: 120VAC/60Hz; Neutral	Test Engineer - Chris Bramley
EUT Mode of Operation: CW Mode	Witnessed by - N/A

Data Taken at 06:02:38 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
0.435	26.9	19.8	46.6	57.2	-10.5	PASS	-10.5
17.279	27.2	20.1	47.3	60	-12.7	PASS	
17.754	26.9	20.1	47	60	-13	PASS	
17.867	28.1	20.1	48.3	60	-11.7	PASS	
17.996	27.8	20.1	48	60	-12	PASS	
18.494	27.2	20.2	47.4	60	-12.6	PASS	

Curtis Straus - a Bureau Veritas Company	Work Order # - S2174
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector	EUT Power Input - 120VAC/ 60Hz
Final Average Detector Data	Test Site - CEMI-3
Notes:	Conditions: - 23.3°C; 47%RH; 1010mBar
EUT Line tested: 120VAC/60Hz; Neutral	Test Engineer - Chris Bramley
EUT Mode of Operation: CW Mode	Witnessed by - N/A

Data Taken at 06:11:27 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.436	23.4	19.8	43.1	47.1	-4	PASS	
0.436	24	19.8	43.8	47.1	-3.4	PASS	-3.4
0.436	23.8	19.8	43.6	47.1	-3.6	PASS	
17.856	15.3	20.1	35.5	50	-14.5	PASS	
17.857	16.4	20.1	36.5	50	-13.5	PASS	
18.207	15.9	20.2	36.1	50	-13.9	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1
Peak Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Phase
EUT Mode of Operation: CW Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 06:17:12 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
17.2	26.3	20.1	46.4	60	-13.6	PASS	
17.874	26.2	20.2	46.3	60	-13.7	PASS	
17.959	26.2	20.2	46.3	60	-13.7	PASS	
18.002	26.5	20.2	46.6	60	-13.4	PASS	
18.069	26.6	20.2	46.7	60	-13.3	PASS	-13.3
18.298	26.3	20.2	46.5	60	-13.5	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
Quick Average Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Phase
EUT Mode of Operation: CW Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 06:17:12 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.438	19	19.8	38.8	47.1	-8.3	PASS	-8.3
17.775	19.8	20.2	40	50	-10	PASS	
17.826	20.3	20.2	40.5	50	-9.5	PASS	
17.87	20.6	20.2	40.8	50	-9.2	PASS	
17.921	20.1	20.2	40.3	50	-9.7	PASS	
18.17	20.1	20.2	40.2	50	-9.8	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1
Peak Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Neutral
EUT Mode of Operation: 8.33kbps Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 06:53:16 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
0.44	26.5	19.8	46.3	57.1	-10.8	PASS	
0.467	28	19.8	47.8	56.6	-8.8	PASS	-8.8
17.246	28	20.1	48.1	60	-11.9	PASS	
17.662	27.6	20.1	47.8	60	-12.2	PASS	
17.764	28.3	20.1	48.5	60	-11.5	PASS	
17.832	27.8	20.1	47.9	60	-12.1	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
Final Average Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Neutral
EUT Mode of Operation: 8.33kbps Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 06:53:16 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.434	22.3	19.8	42	47.2	-5.1	PASS	-5.1
0.466	9.7	19.8	29.5	46.6	-17.1	PASS	
0.527	15.2	19.7	35	46	-11	PASS	
17.464	14.3	20.1	34.4	50	-15.6	PASS	
17.946	15.4	20.1	35.6	50	-14.4	PASS	
18.202	15.1	20.2	35.3	50	-14.7	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1
Peak Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Phase
EUT Mode of Operation: 8.33kbps Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 06:23:41 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
17.186	26.5	20.1	46.6	60	-13.4	PASS	
17.282	26.2	20.1	46.3	60	-13.7	PASS	
17.491	26.3	20.1	46.5	60	-13.5	PASS	
17.764	26.8	20.2	46.9	60	-13.1	PASS	
17.812	27.3	20.2	47.5	60	-12.5	PASS	-12.5
17.966	26.7	20.2	46.9	60	-13.1	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
Quick Average Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Phase
EUT Mode of Operation: 8.33kbps Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 06:23:41 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.438	17.5	19.8	37.3	47.1	-9.8	PASS	
17.32	19.5	20.1	39.6	50	-10.4	PASS	
17.421	19.7	20.1	39.9	50	-10.1	PASS	
17.762	20.7	20.2	40.9	50	-9.1	PASS	-9.1
17.802	20.4	20.2	40.5	50	-9.5	PASS	
17.95	20.2	20.2	40.4	50	-9.6	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1
Peak Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Neutral
EUT Mode of Operation: 16.67kbps Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 07:08:48 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
0.437	26.6	19.8	46.3	57.1	-10.8	PASS	-10.8
0.472	25.9	19.8	45.7	56.5	-10.8	PASS	
17.509	27.3	20.1	47.5	60	-12.5	PASS	
17.898	27.1	20.1	47.2	60	-12.8	PASS	
18.103	28.4	20.1	48.6	60	-11.4	PASS	
18.162	27.7	20.1	47.8	60	-12.2	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
Final Average Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Neutral
EUT Mode of Operation: 16.67kbps Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 07:08:48 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.435	22.4	19.8	42.2	47.2	-5	PASS	-5
0.467	6.4	19.8	26.1	46.6	-20.4	PASS	
0.528	16.9	19.7	36.7	46	-9.3	PASS	
17.865	15.9	20.1	36	50	-14	PASS	
17.921	13.4	20.1	33.5	50	-16.5	PASS	
18.007	14.7	20.1	34.9	50	-15.1	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1
Peak Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Phase
EUT Mode of Operation: 16.67kbps Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 07:14:33 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Pk Reading (dBµV)	Correction Factor (dB)	Adjusted Pk Amplitude (dBµV)	QP Lim: Mains_FCC&CISPR_QP_Class_B (dBµV)	Margin to the QP Limit (dB)	Pk to QP Limit Results (Pass/Fail)	Worst Margin (QP Limit) (dB)
16.931	26	20.1	46.1	60	-13.9	PASS	
17.243	25.4	20.1	45.6	60	-14.4	PASS	
17.27	25.3	20.1	45.5	60	-14.5	PASS	
17.608	26	20.1	46.2	60	-13.8	PASS	-13.8
17.77	25.5	20.2	45.7	60	-14.3	PASS	
17.867	25.7	20.2	45.9	60	-14.1	PASS	

Curtis Straus - a Bureau Veritas Company
Conducted Emissions per CISPR 16-2-1, CISPR Average Detector
Quick Average Detector Data
Notes:
EUT Line tested: 120VAC/60Hz; Phase
EUT Mode of Operation: 16.67kbps Mode

Work Order # - S2174
EUT Power Input - 120VAC/ 60Hz
Test Site - CEMI-3
Conditions: - 23.3°C; 47%RH; 1010mBar
Test Engineer - Chris Bramley
Witnessed by - N/A

Data Taken at 07:14:33 PM, Friday, September 21, 2018

Frequency (MHz)	Raw Avg Reading (dBµV)	Correction Factor (dB)	Adjusted Avg Amplitude (dBµV)	Av Lim: Mains_FCC&CISPR_Avg_Class_B (dBµV)	Avg Margin (dB)	Avg Results (Pass/Fail)	Worst Avg Margin (dB)
0.437	17.9	19.8	37.6	47.1	-9.5	PASS	
17.72	19.1	20.1	39.3	50	-10.7	PASS	
17.811	20.4	20.2	40.6	50	-9.4	PASS	
17.859	20.4	20.2	40.5	50	-9.5	PASS	
17.913	21	20.2	41.1	50	-8.9	PASS	-8.9
17.957	19.3	20.2	39.5	50	-10.5	PASS	

Rev. 9/19/2018

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	6/19/2019	6/19/2018
LISNs/Measurement Probes	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
LISN Asset 1791	9KHz-30MHz	NNLK 8121	Schwarzbeck	NNLK 8121-603	1791	I	6/20/2019	6/20/2018
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI 3	719150		A-0015			III	NA	N/A
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	5/15/2018
TH A#2078		HTC-1	HDE		2078	II	3/22/2019	3/22/2018
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI-12	9kHz - 2GHz		C-S			II	11/4/2018	11/4/2017
Attenuators	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
20dB Attenuator-05	9kHz-2GHz	2	Aeroflex/Weinschel	BS9092		II	8/4/2019	8/4/2018

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

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 6.7]

99% Occupied Bandwidth

Date: 20-Sep-18 **Company:** Powercast **Work Order:** S2174
Engineer: Chris Bramley **EUT:** TX-915-01B **Operating Voltage/Frequency:** 5V DC
Temp: 24.0°C **Humidity:** 47% **Pressure:** 1017mBar
Frequency Range: 915MHz **Measurement Type:** Conducted
Measurement Method: FCC 558074 D01 DTS Meas Guidance v05
Notes:

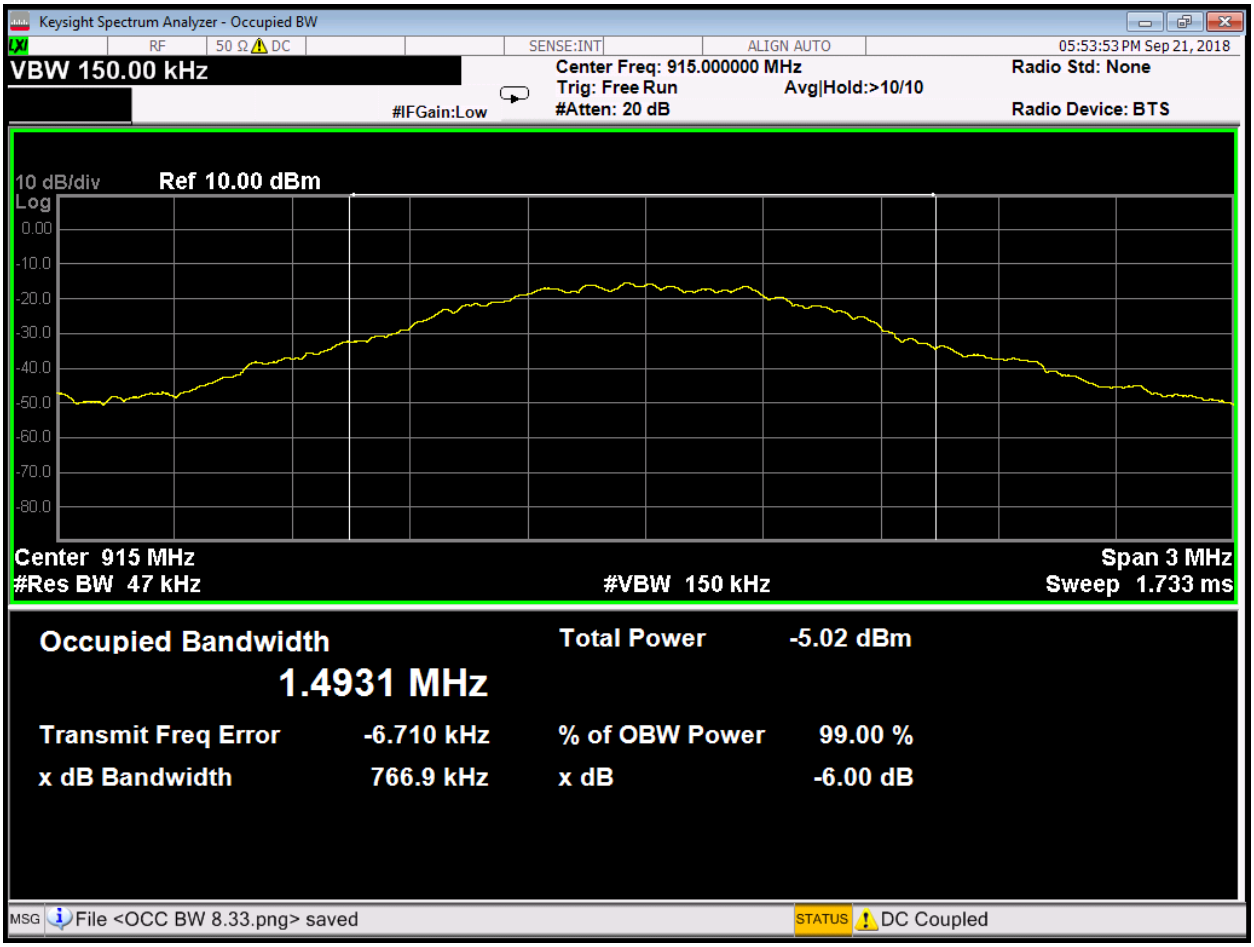
Data Mode (kbps)	Frequency (MHz)	99% OBW (MHz)
16.67	915	1.509
8.33	915	1.508
CW	915	1.493

Test Site: CEMI-3 **Cable:** Asset 2289 **40dB Attenuator:** Asset 2096
Analyzer: EXA 1118473

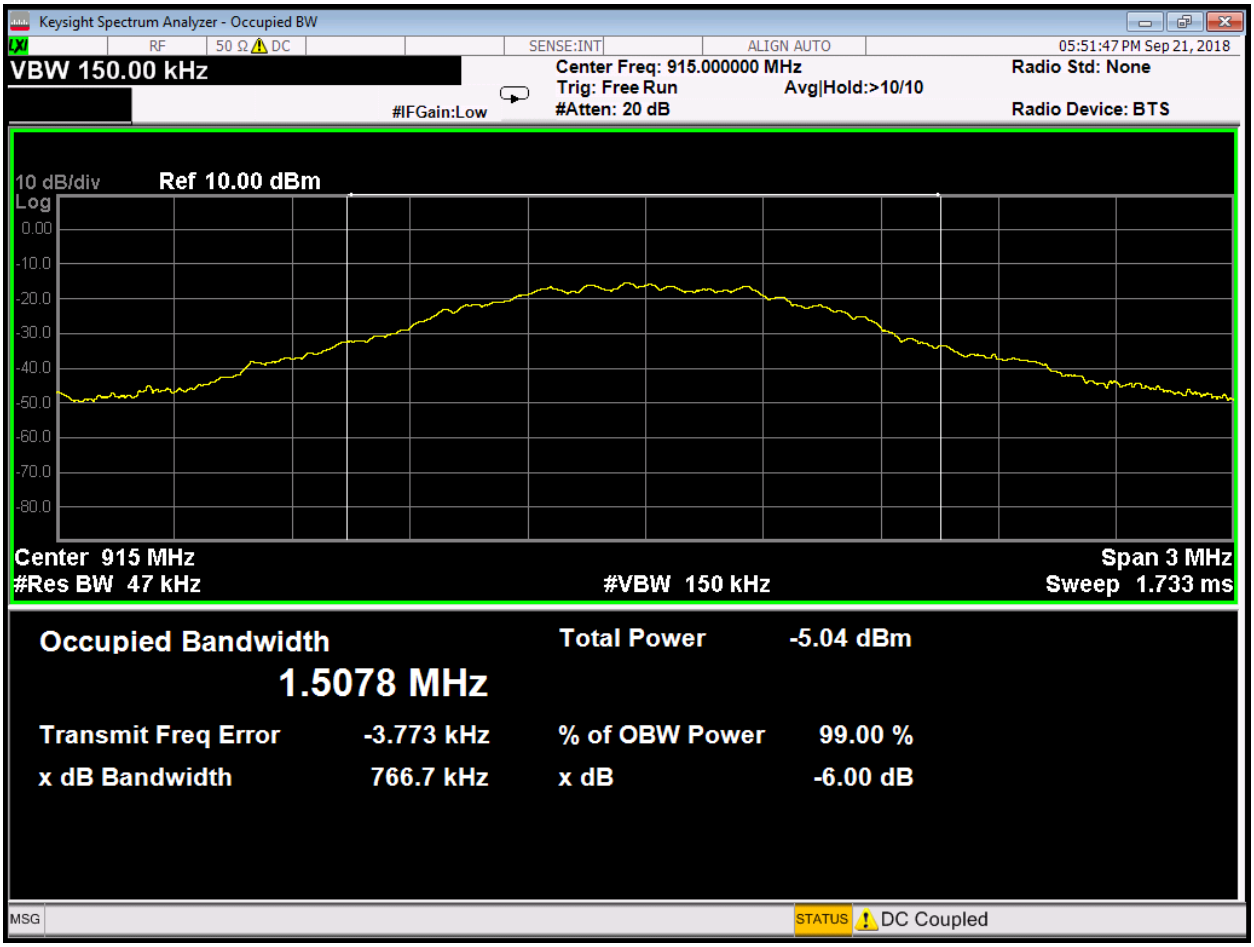
Rev. 9/19/2018

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	6/19/2019	6/19/2018
Conducted Test Sites (Mains / Telco)	**FCC Code**		**VCCI Code**			**Cat**	**Calibration Due**	**Calibrated on**
CEMI 3	719150		A-0015			III	NA	N/A
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	5/15/2020	5/15/2018
TH A#2078		HTC-1	HDE		2078	II	3/22/2019	3/22/2018
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2289	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021039		II	1/29/2019	1/29/2018
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
40dB 100W Attenuator	0.009-4000MHz	BW-40N100W+	Mini-Circuits	V N383401508	2096	II	10/2/2018	10/2/2017

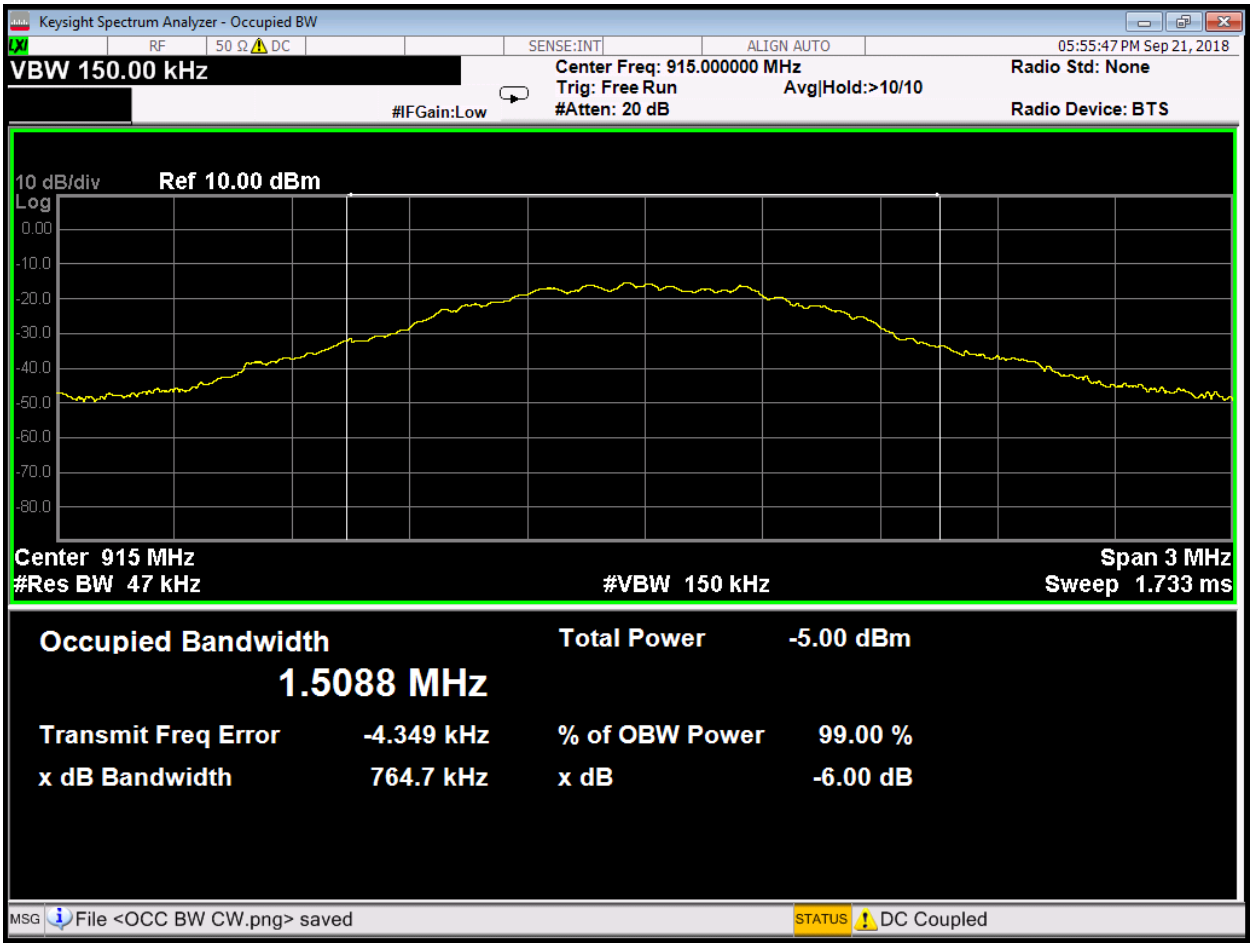
All equipment is calibrated using standards traceable to NIST or other nationally recognized calibration standard.



Occupied Bandwidth Low Data Rate



Occupied Bandwidth Mid Data Rate



Occupied Bandwidth High Data Rate

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 CISPR	 5.6dB 4.6dB	 N/A 5.2dB (Ucispr)
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 CISPR	 3.9dB 3.6dB	 N/A 3.6dB (Ucispr)
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 were 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.

The complete list of the Approved Subcontractors Curtis-Straus may use to delegate the performance of work can be provided upon request.
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