Test Report

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

Report No	ER1589-3
Client	Fishman Vlad Kratik
Address	3 Riverside Drive Andover, MA 01810
Phone	(978) 253-5455
Items tested	Loudbox Mini Charge Model # 494-000-582
FCC ID	RMU-494000582
IC	10812A-494000582
FRN	0022326151
Equipment Type	Part 15 Spread Spectrum Transmitter
Equipment Code	DSS
FCC/IC Rule Parts	CFR Title 47 FCC 15.247, ISED Canada RSS-247 Issue 2
Test Dates	June 12 to 14 to July 5 to 12, 2017
Results	As detailed within this report
Prepared by	Zachary Johnson – EMC Engineer
Authorized by	Jason Haley – Sr. EMC Engineer
Issue Date	11/08/2017
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 26 of this report.

Contents

Form Final Report REV 7-20-07 (DW)

Summary

This test report supports an application for certification of a transmitter operating pursuant to:

CFR Title 47 FCC 15.247, ISED Canada RSS-247 Issue 2

The Loudbox Mini Charge Model # 494-000-582 is a frequency hopping transmitter that operates in the frequency range of 2402-2480MHz . It has an antenna with -3.76 dBi peak gain. It is powered by an external 12V AC adapter or from an internal 12V Sealed Lead Acid battery.

We found that the product met the above requirements with modification (see *Modifications Required for Compliance* section on page 5). Vlad Kratik from Fishman was present during the testing. The test sample was received in good condition. The sample was received on June 9, 2017.

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	November 8, 2017

Test Methodology

All the testing was performed according to the following rules/procedures/documents;

CFR Title 47 FCC 15.247, ISED Canada RSS-247 Issue 2, RSS-Gen Issue 4 and ANSI C63.10-2013.

Radiated emissions were maximized around 3 orthogonal planes. EUT antenna is integral and therefore could not be maximized separately.

Conducted emissions testing at the antenna port was performed.

3 channels were tested as follows:

Low channel = 2402 MHz

Middle channel = 2441 MHz

High channel = 2480 MHz

Following bandwidths were used during radiated spurious emissions testing.

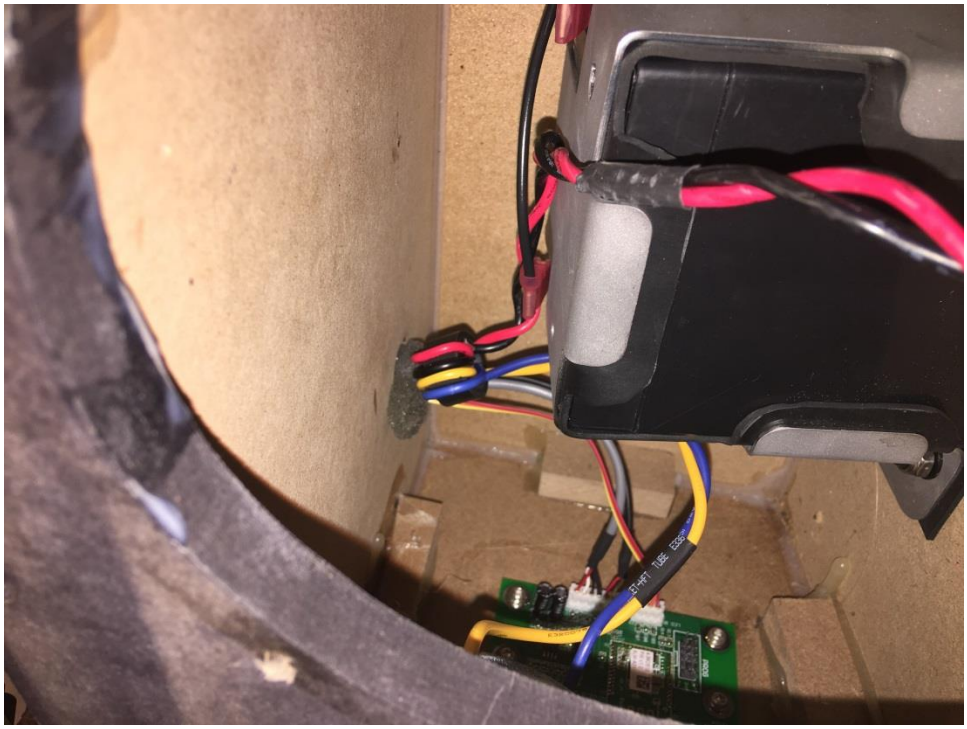
Frequency	RBW	VBW
30-1000MHz	120kHz	1MHz
1-13GHz	1MHz	3MHz

Modifications Required for Compliance

Modifications were required for the following tests:

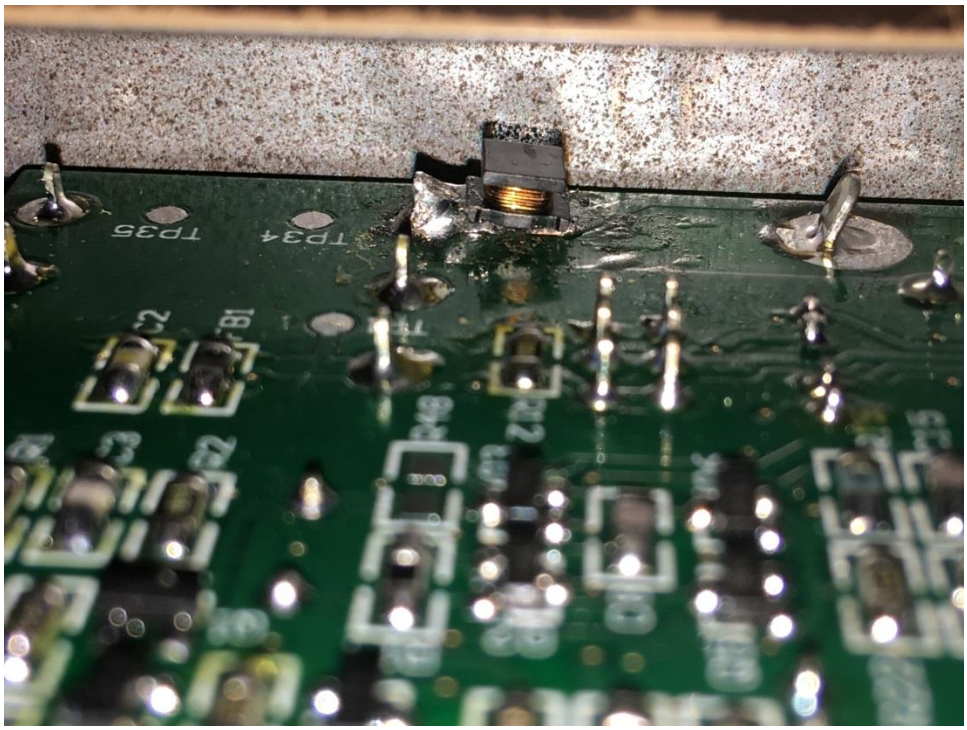
- Radiated Emissions

1. Cable from speaker to power amplifier - Add Fair-rite 2643800502 Ferrite with 3 turns.



2. Power Amplifier Board changes:
a. Isolate PGNF Net from chasis ground stand-off
b. Change R356 to 62k = change LTC4020 frequency to 400kHz
c. Change R312 to 47k, Change LM3478 (U3) frequency to 350khz

3. Preamp Board Changes:
a. Remove JP2 (Mic Input XLR) connection between SGND and Chassis
b. Cut Track between JP1 and POTs chassis ground and add Murata LQH43CN220K03L inductor between SGND and chassis connection.



4. Cable from DC jack to power amplifier board, added Laird 28B0773-050 ferrite with 2 turns

5. Signal cable from power amplifier board to preamp board, added Laird 28B0773-050 ferrite with 3 turns

6. Cable from battery to power amp board, added Fair-Rite 2643800502 ferrite with 3 turns

7. Added 0.1uF cap 0805 to D300 Anode

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Product Tested - Configuration Documentation

EUT Configuration			
Work Order:	R1589		
Company:	Fishman		
Company Address:	3 Riverside Drive		
	Andover, MA, 01810		
Contact:	Vlad Kratik		
	MN	**PN**	**SN**
EUT:	494-000-582	--	Sample 1
EUT Description:	Audio Amplifier		
EUT Max Frequency:	1 MHz		
EUT TX Frequency:	2481 MHz		

EUT Components	**MN**	**SN**
Loudbox Mini Charge	494-000-582	--
AC/DC 12V adapter	XY-1205000UA	--

Support Equipment	**MN**	**SN**
BV Tablet	--	--
Wide Band Communication Tester	CMW500	--
Laptop	Dell Precision	--

Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	in/out	under test	comment
AC Adapter	Power AC	1	1	Power AC	No	No	1	in	yes	
Aux	other	1	1	other	No	No	1	in	yes	
input of DC supply	Power DC	1	1	Power DC	Yes	Yes	1.5	in	yes	
Instrument	other	1	1	Coaxial	Yes	Yes	8	in	yes	
MIC	other	1	1	other	Yes	No	4	in	yes	
MIX DI Output	-	1	1	other	Yes	No	3.5	in	yes	

Software Operating Mode Description:

For Blue Tooth Mode, Tablet sends out 1kHz tone sine wave through air to the Blue Tooth Receiver of EUT.
Output is adjusted to get 4.2Vrms on Tablet volume.

Clock Frequencies	
frequencies (MHz)	1, 0.536973, 0.4, 0.032768

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Statement of Conformity

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.
	4		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			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 internal and has max -3.76dBi gain.
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	The unit complies with the requirements of 15.207
			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.

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Test Results

20dB Bandwidth

REQUIREMENT

15.247(a)(1)(i): The minimum allowed 20dB bandwidth of the hopping channel is 500kHz RSS-247 Issue 2 Section 5.1.

MEASUREMENTS / RESULTS

20dB Bandwidth

Date: 6/16/2017 **Company:** Fishman **Work Order:** R1589
Engineer: YF **EUT:** LoudBox **Operating Voltage/Frequency:** 12V DC
Temp: 24.°C **Humidity:** 39% **Pressure:** 1009mBar
Frequency Range: 2402-2480 MHz **Measurement Type:** Conducted
Measurement Method: FCC KDB 558074 D01 DTS Meas Guidance V04
Notes: Worst case 3DH5

Frequency (MHz)	Reading (kHz)	6dB Bandwidth Limit (kHz)	Margin (kHz)	Result (Pass/Fail)
2402	1282	≥500	782	Pass
2440	1283	≥500	783	Pass
2480	1286	≥500	786	Pass

Test Site: Wireless Test Room **Cable:** 2286
Analyzer: 1199509

99% Occupied Bandwidth

Date: 16-Jun-17 **Company:** Fishman **Work Order:** R1589
Engineer: YF **EUT:** Loudbox Mini Charge **EUT Operating Voltage/Frequency:** 12VDC
Temp: 24.2°C **Humidity:** 39% **Pressure:** 1009mbar AC/DC Supply

Frequency Range: 2402-2480 MHz **Measurement Type:** Conducted
Measurement Method: 99% OBW: RSS-Gen Section 6.6, 20dB Bandwidth: ANSI C63.10-2013 Section 6.9.2

Frequency (MHz)	Packet Type	99% OBW (kHz)	20dB Bandwidth (kHz)
2402.0	DH1	844.6	899.3
	DH3	877.9	954.5
	DH5	877.3	957.2
	2-DH1	1165.5	1247.0
	2-DH3	1177.7	1273.0
	2-DH5	1169.4	1267.0
	3-DH1	1149.9	1222.0
	3-DH3	1186.9	1281.0
	3-DH5	1187.4	1282.0
2441.0	DH1	839.1	896.9
	DH3	872.2	949.5
	DH5	870.9	950.0
	2-DH1	1173.7	1241.0
	2-DH3	1190.9	1273.0
	2-DH5	1181.9	1271.0
	3-DH1	1163.7	1223.0
	3-DH3	1204.1	1282.0
	3-DH5	1203.2	1283.0
2480.0	DH1	838.1	895.7
	DH3	871.7	947.5
	DH5	869.3	949.9
	2-DH1	1176.4	1243.0
	2-DH3	1195.2	1273.0
	2-DH5	1185.4	1271.0
	3-DH1	1166.6	1224.0
	3-DH3	1205.9	1281.0
	3-DH5	1207.2	1286.0

Test Site: Wireless Test Room **Cables** 2286, 2288, 2289 **Spectrum Analyzer** 1199509
Coupler ZHDC-16-63-S+ **CMW500** 1201.0002K.50 153026

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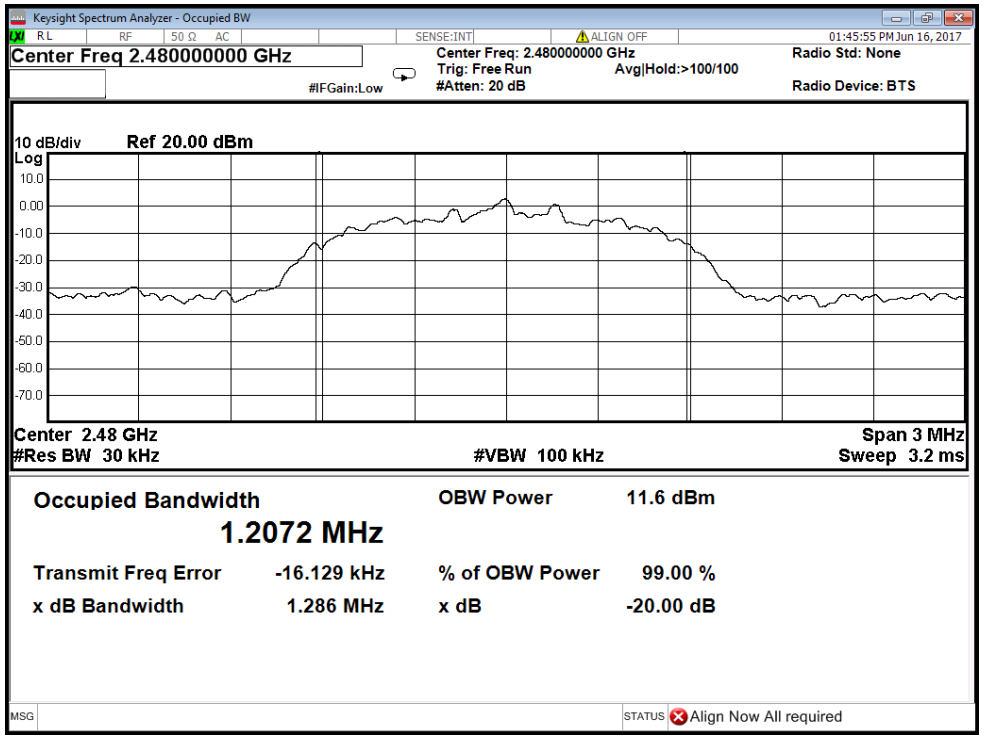
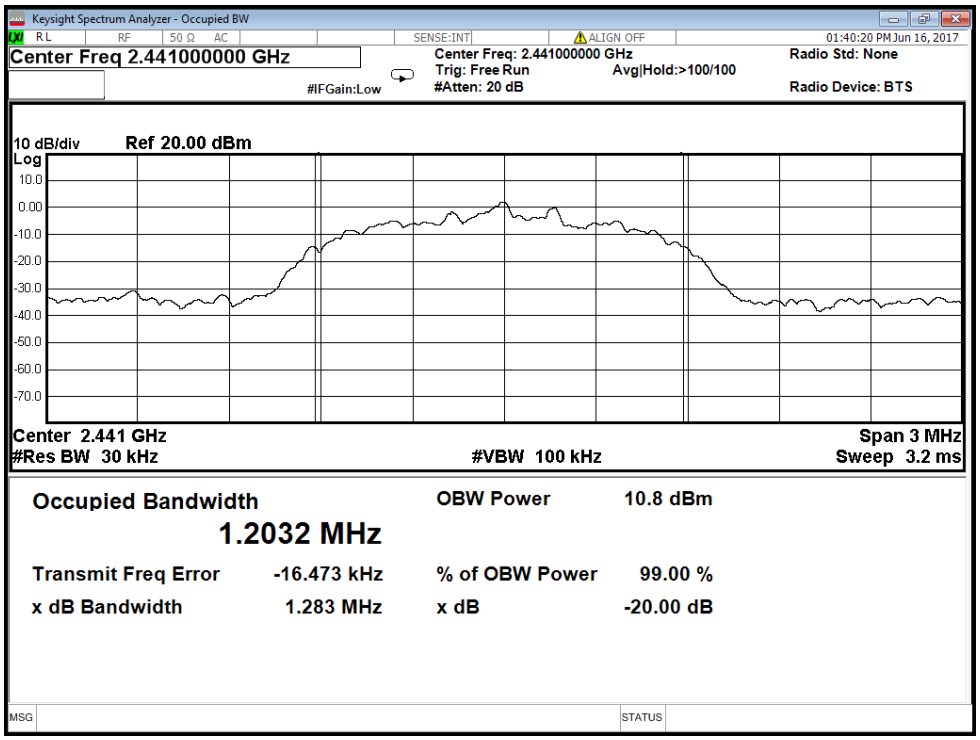
PLOTS



2480MHz High Channel – Worst Case 3DH5



2441MHz Mid Channel – Worst Case 3DH5

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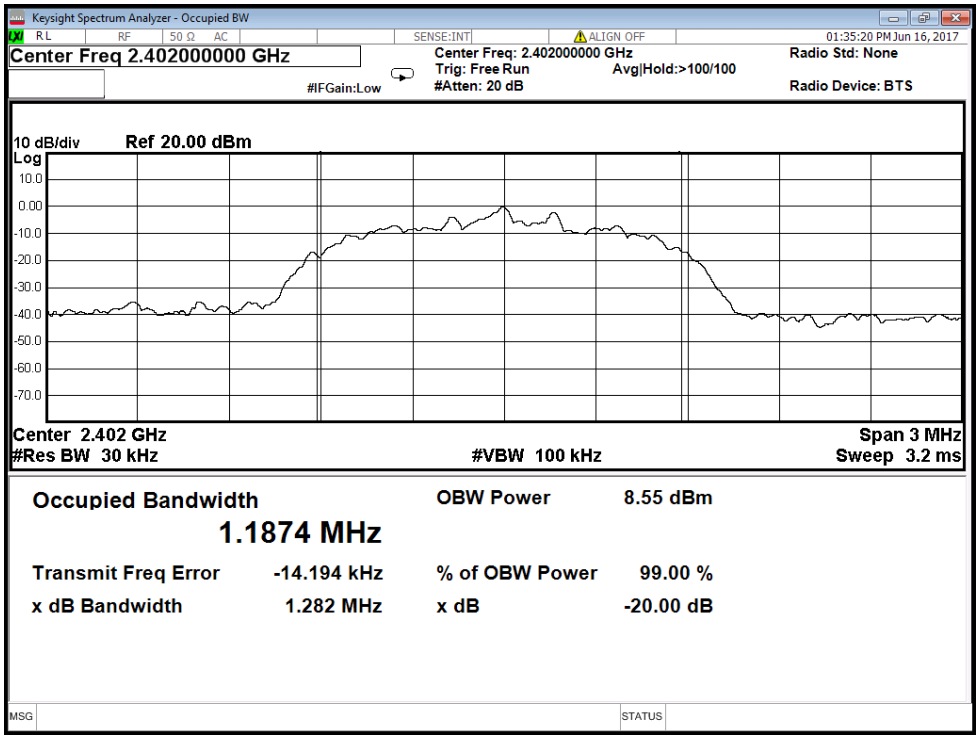


2402MHz Low Channel– Worst Case 3DH5

Channel Separation

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. [15.247 (a) (1)]

MEASUREMENTS / RESULTS

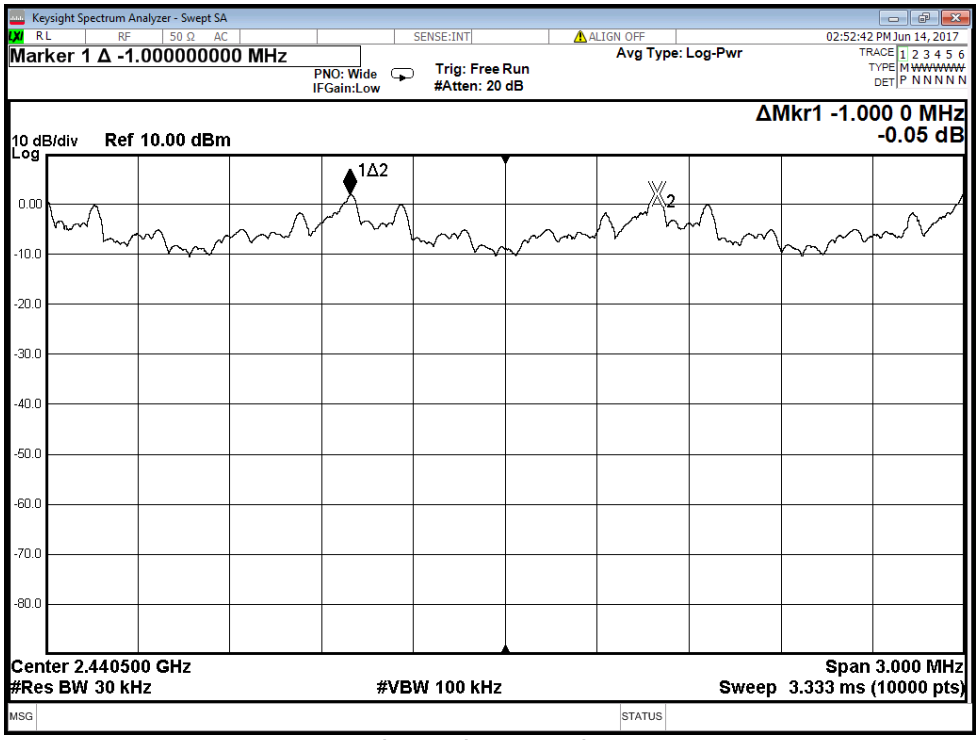
Hopping Frequency Separation

Date: 16-Jun-17 **Company:** Fishman **Work Order:** R1589
Engineer: YF **EUT:** Loudbox Mini Charge **EUT Operating Voltage/Frequency:** 12VDC
Temp: 24.2°C **Humidity:** 39% **Pressure:** 1009mbar AC/DC Supply
Frequency Range: 2402-2480 MHz **Measurement Type:** Conducted
Measurement Method: ANSI C63.10-2013 Section 7.8.2

	Packet Type	Hopping Frequency Separation (kHz)	Limit (2/3 of highest 20dB BW) (kHz)	Margin (kHz)	Verdict (Pass/Fail)
Separation Between Channels 38 and 39	DH1	1000	> 857.33	142.67	Pass
	DH3	1000	> 857.33	142.67	Pass
	DH5	1000	> 857.33	142.67	Pass
	2-DH1	1000	> 857.33	142.67	Pass
	2-DH3	1000	> 857.33	142.67	Pass
	2-DH5	1000	> 857.33	142.67	Pass
	3-DH1	1000	> 857.33	142.67	Pass
	3-DH3	1000	> 857.33	142.67	Pass
	3-DH5	1000	> 857.33	142.67	Pass

Test Site: Wireless Test Room **Cables** 2286, 2288, 2289 **Spectrum Analyzer** 1199509
Coupler ZHDC-16-63-S+ **CMW500** 1201.0002K.50 153026

Plots



Channel Separation

Number of Channels

For frequency hopping systems operating in the 2400-2483.5MHz band: if the 20dB bandwidth of the hopping channel is less than 250kHz, the system shall use at least 50 hopping frequencies
[15.247 (a) (1) (i)]

MEASUREMENTS / RESULTS

Number of Hopping Channels

Date: 16-Jun-17	**Company:** Fishman		**Work Order:** R1589
Engineer: YF	**EUT:** Loudbox Mini Charge		**EUT Operating Voltage/Frequency:** 12VDC
Temp: 24.2°C	**Humidity:** 39%	**Pressure:** 1009mbar	AC/DC Supply
Frequency Range: 2402-2480 MHz		**Measurement Type:** Conducted	
Notes: ANSI C63.10-2013 Section 7.8.3. Number of hopping channels is same for all packet types.			

Packet Type	Number of Hopping Channels	Limit	Verdict (Pass/Fail)
DH1	79	> 50	Pass

Test Site: Wireless Test Room **Cables** 2286, 2288, 2289 **Spectrum Analyzer** 1199509
Coupler ZHDC-16-63-S+ **CMW500** 1201.0002K.50 153026

PLOTS

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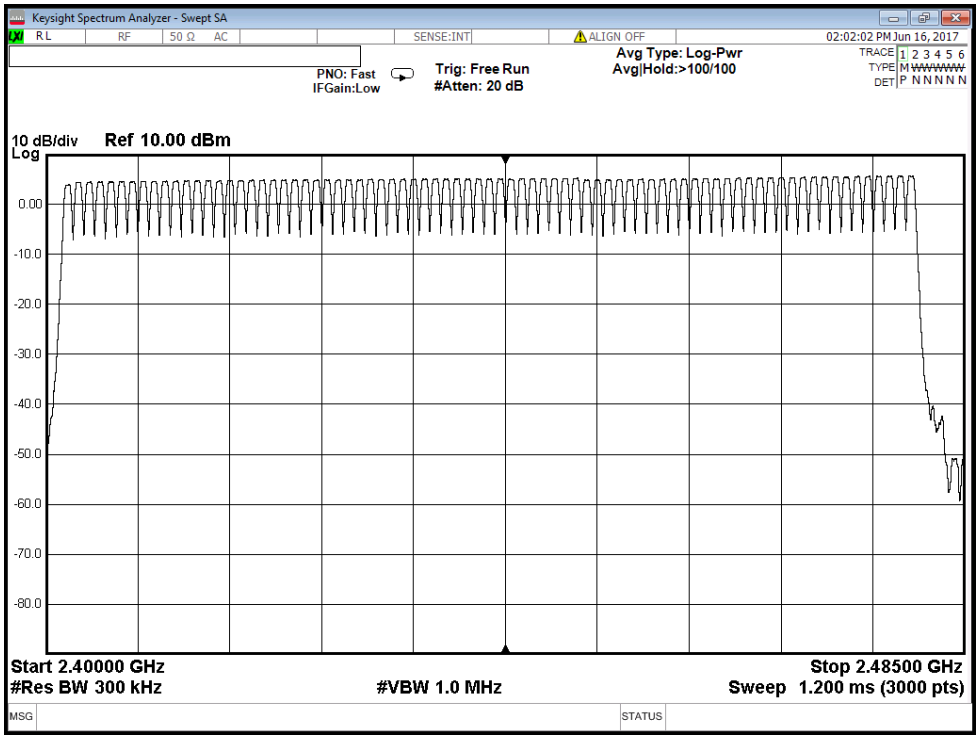

Number of Hopping Channels

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Dwell Time

For frequency hopping systems operating in the 2400-2483.5MHz band: if the 20dB bandwidth of the hopping channel is less than 250 kHz …the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period;

[15.247 (a) (1) (i)]

MEASUREMENTS / RESULTS

Plots

Time of Occupancy

Date:	16-Jun-17	**Company:**	Fishman			**Work Order:**	R1589
Engineer:	YF	**EUT:**	Loudbox Mini Charge		**EUT Operating Voltage/Frequency:**		12VDC
Temp:	24.2°C	**Humidity:**	39%	**Pressure:**	1009mbar		AC/DC Supply
Frequency Range:	2402-2480 MHz			**Measurement Type:**	Conducted		
Measurement Method:	ANSI C63.10-2013 Section 7.8.4						

Frequency (MHz)	Packet Type	Single Hop (ms)	Number of Hops in 3.16s	Extrapolated to 31.6s (ms)	Total Time of Occupancy (ms)	Limit (ms)	Result (Pass/Fail)
2441.0	DH1	0.4533	32	320	145.06	400.00	Pass
	DH3	1.8170	15.00	150.00	272.55	400.00	Pass
	DH5	3.0330	10.00	100.00	303.30	400.00	Pass
	2-DH1	0.5067	32.00	320.00	162.14	400.00	Pass
	2-DH3	1.7130	18.00	180.00	308.34	400.00	Pass
	2-DH5	3.0130	12.00	120.00	361.56	400.00	Pass
	3-DH1	0.4700	32.00	320.00	150.40	400.00	Pass
	3-DH3	1.7500	14.00	140.00	245.00	400.00	Pass
	3-DH5	2.9830	10.00	100.00	298.30	400.00	Pass

Table Result: Pass by 0.00

Test Site: Wireless Test Room **Cables** 2286, 2288, 2289 **Spectrum Analyzer** 1199509
Coupler ZHDC-16-63-S+ **CMW500** 1201.0002K.50 153026

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Peak Output Power

LIMIT

Conducted Output Power: 1 Watt [15.247(b) (2)]

MEASUREMENTS / RESULTS

Peak Output Power

Date: 16-Jun-17		**Company:** Fishman				**Work Order:**	R1589
Engineer: YF		**EUT:** Loudbox Mini Charge				**EUT Operating Voltage/Frequency:**	12VDC
Temp: 24.2°C		**Humidity:** 39%		**Pressure:** 1009mbar			AC/DC Supply
Frequency Range: 2402-2480 MHz				**Measurement Type:** Conducted			
Measurement Method: ANSI C63.10-2013 Section 7.8.5							

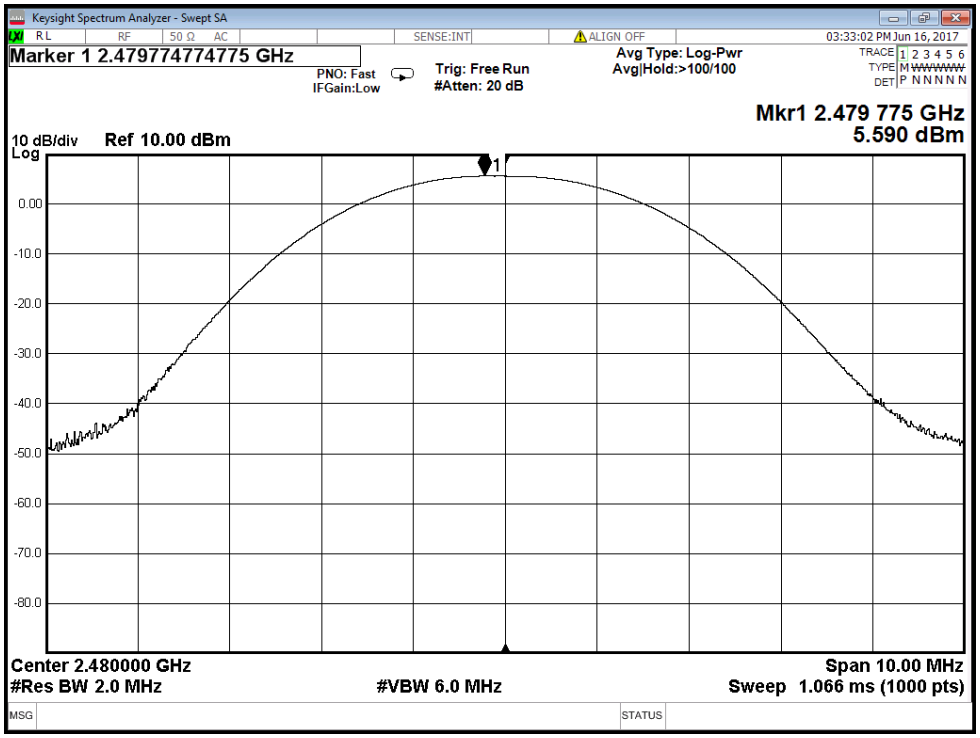
Frequency (MHz)	Packet Type	Raw Reading (dBm)	Insertion Loss (dB)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
2402.0	DH1	3.84	4.05	7.89	30.0	-22.12	Pass
	DH3	3.81	4.05	7.86	30.0	-22.14	Pass
	DH5	3.81	4.05	7.86	30.0	-22.14	Pass
	2-DH1	1.86	4.05	5.91	30.0	-24.09	Pass
	2-DH3	1.93	4.05	5.98	30.0	-24.02	Pass
	2-DH5	1.96	4.05	6.01	30.0	-24.00	Pass
	3-DH1	2.16	4.05	6.21	30.0	-23.79	Pass
	3-DH3	2.25	4.05	6.30	30.0	-23.70	Pass
	3-DH5	2.26	4.05	6.31	30.0	-23.70	Pass
2441.0	DH1	5.00	4.05	9.05	30.0	-20.95	Pass
	DH3	4.99	4.05	9.04	30.0	-20.96	Pass
	DH5	4.98	4.05	9.03	30.0	-20.97	Pass
	2-DH1	3.83	4.05	7.88	30.0	-22.12	Pass
	2-DH3	3.86	4.05	7.91	30.0	-22.09	Pass
	2-DH5	3.88	4.05	7.93	30.0	-22.07	Pass
	3-DH1	4.06	4.05	8.11	30.0	-21.89	Pass
	3-DH3	4.12	4.05	8.17	30.0	-21.83	Pass
	3-DH5	4.11	4.05	8.16	30.0	-21.84	Pass
2480.0	DH1	5.59	4.05	9.64	30.0	-20.36	Pass
	DH3	5.58	4.05	9.63	30.0	-20.37	Pass
	DH5	5.57	4.05	9.62	30.0	-20.38	Pass
	2-DH1	4.43	4.05	8.48	30.0	-21.52	Pass
	2-DH3	4.45	4.05	8.50	30.0	-21.50	Pass
	2-DH5	4.46	4.05	8.51	30.0	-21.49	Pass
	3-DH1	4.62	4.05	8.67	30.0	-21.33	Pass
	3-DH3	4.68	4.05	8.73	30.0	-21.27	Pass
	3-DH5	4.68	4.05	8.73	30.0	-21.27	Pass

Table Result: Pass by -20.36

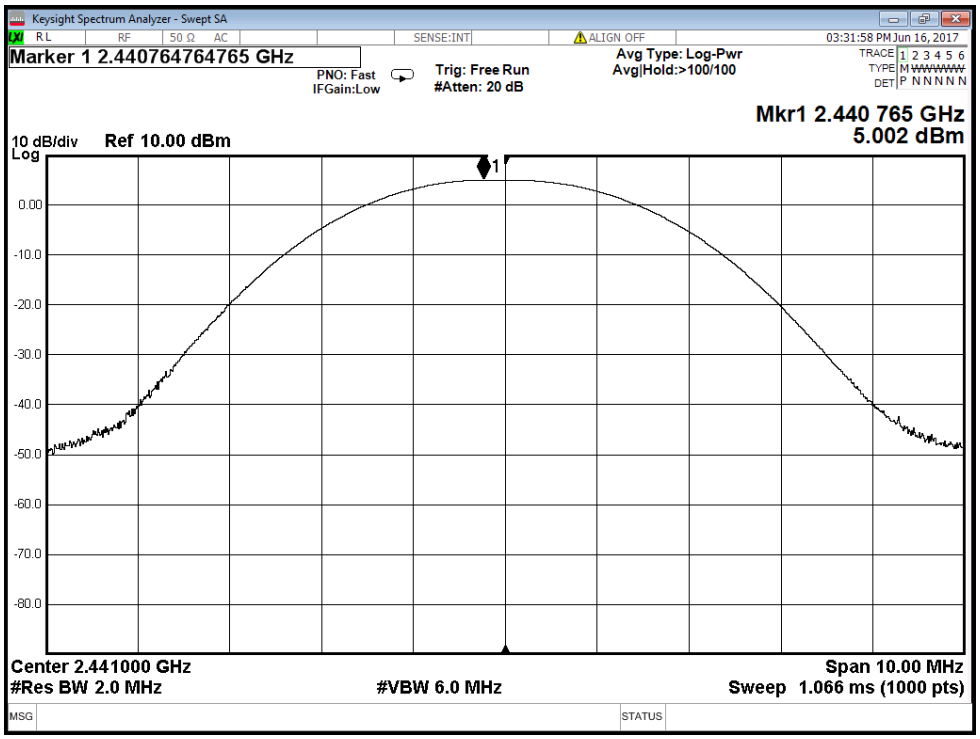
Test Site: Wireless Test Room **Cables** 2286, 2288, 2289 **Power Sensor** 2158
Coupler ZHDC-16-63-S+ **CMW500** 1201.0002K.50 153026

EIRP (dBm)= Raw Reading (dBm) + Insertion Loss (dB) + EUT Antenna Gain (dBi)

PLOTS



2480MHz High Channel – Worst Case DH1



2441MHz Mid Channel – Worst Case DH1

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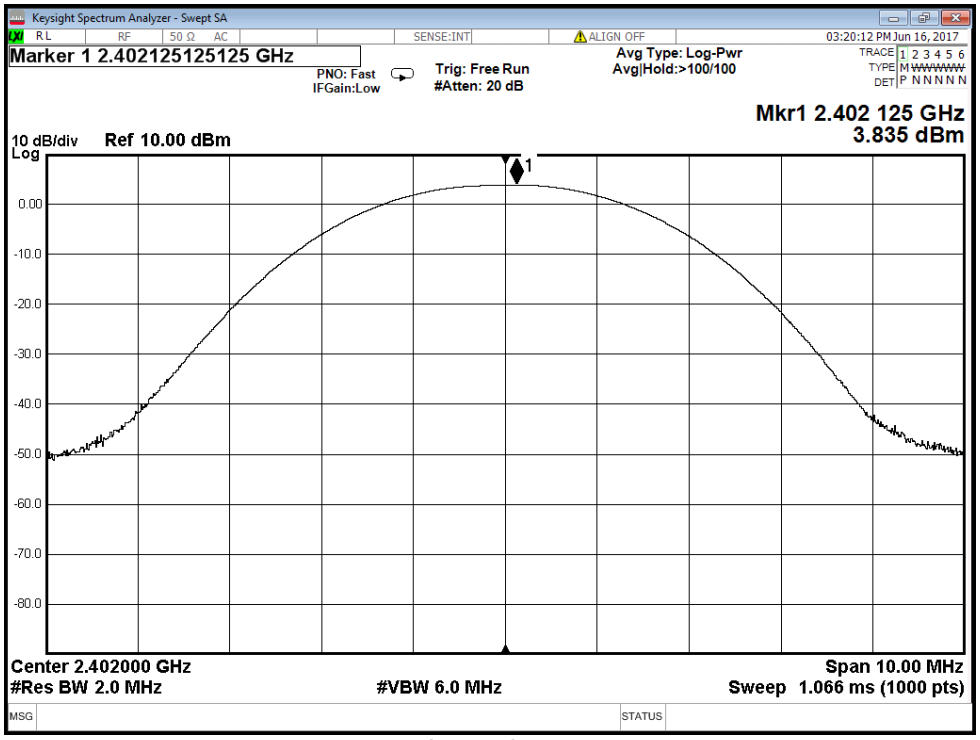

2402MHz Low Channel – Worst Case DH1

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Radiated Bandedges

All band edges over 20dB from peak

Radiated Emissions Table

Date: 21-Jul-17 **Company:** Fishman **Work Order:** R1585
Engineer: JH **EUT Desc:** LoudBox Mini **EUT Operating Voltage/Frequency:** 115VAC/60Hz
Temp: 23 **Humidity:** 45% **Pressure:** 1003
Frequency Range: 2.39 to 2.484GHz **Measurement Distance:** 3 m
Notes: Peak Readings. 120kHz RBW **EUT Max Freq:** 2480

Antenna Polarization (H / V)	Frequency (MHz)	Reading (dBµV)	Preamp Factor (dB)	Antenna Factor (dB/m)	Cable Factor (dB)	Adjusted Reading (dBµV/m)	--- Limit (dBµV/m)	--- Margin (dB)	--- Result (Pass/Fail)	FCC Class B Limit (dBµV/m)	FCC Class B Margin (dB)	FCC Class B Result (Pass/Fail)
H, hopping	2400.0	16.6	0.0	32.2	4.2	53.0	---	---	---	54.0	-1.0	Pass
H, low channel	2390.0	16.4	0.0	32.2	4.2	52.8	---	---	---	54.0	-1.2	Pass
V, low channel	2390.0	16.0	0.0	32.2	4.2	52.4	---	---	---	54.0	-1.6	Pass
V, hopping	2400.0	15.3	0.0	32.2	4.2	51.7	---	---	---	54.0	-2.3	Pass
H, hopping	2390.0	13.5	0.0	32.2	4.2	49.9	---	---	---	54.0	-4.1	Pass
V, high channel	2483.5	13.0	0.0	32.4	4.0	49.4	---	---	---	54.0	-4.6	Pass
H, high channel	2483.5	13.0	0.0	32.4	4.0	49.4	---	---	---	54.0	-4.6	Pass
V, hopping	2483.5	12.9	0.0	32.4	4.0	49.3	---	---	---	54.0	-4.7	Pass
V, hopping	2390.0	12.4	0.0	32.2	4.2	48.8	---	---	---	54.0	-5.2	Pass
H, hopping	2483.5	12.2	0.0	32.4	4.0	48.6	---	---	---	54.0	-5.4	Pass
H, low channel	2400.0	11.8	0.0	32.2	4.2	48.2	---	---	---	54.0	-5.8	Pass
V, low channel	2400.0	11.6	0.0	32.2	4.2	48.0	---	---	---	54.0	-6.0	Pass

Table Result: Pass by -1.0 dB ***Worst Freq:*** 2400.0 MHz

Test Site: EMI Chamber 1 **Cable 1:** Asset #1509 **Cable 2:** Asset #2051 **Cable 3:** Asset #2054
Analyzer: --- **Preamp:** none **Antenna:** Blue Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.188

Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

Rev. 7/16/2017

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental MXE EMI Receiver(1170725)	20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	12/22/2017	12/22/2016

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

Antennas	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	2/14/2019	2/14/2017

Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2080		HTC-1	HDE		2080	II	3/23/2018	3/23/2017

Cables	Range	Mfr	Cat	Calibration Due	Calibrated on
Asset #1509	9kHz - 18GHz	Florida RF	II	10/2/2017	10/2/2016
Asset #2051	9kHz - 18GHz	Florida RF	II	3/5/2018	3/5/2017
Asset #2054	9kHz - 18GHz	Florida RF	II	10/30/3017	10/30/2016

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

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

Equipment used for the following tests:

20dB Bandwidth
Channel Separation
Number of Hopping Channels
Dwell Time
Peak Output Power

Rev. 6/1/2017

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental EXA Signal Analyzer(1199509)	9KHz-26.5GHz	N9010A-526;R	AT	SG53470118	1199509	I	1/27/2018	1/27/2017
Wideband Radio Communication Tested		CMW500	ROHDE & SCHWARZ	201.0002H50-132056-LR		I	Verify before use	Verify before use

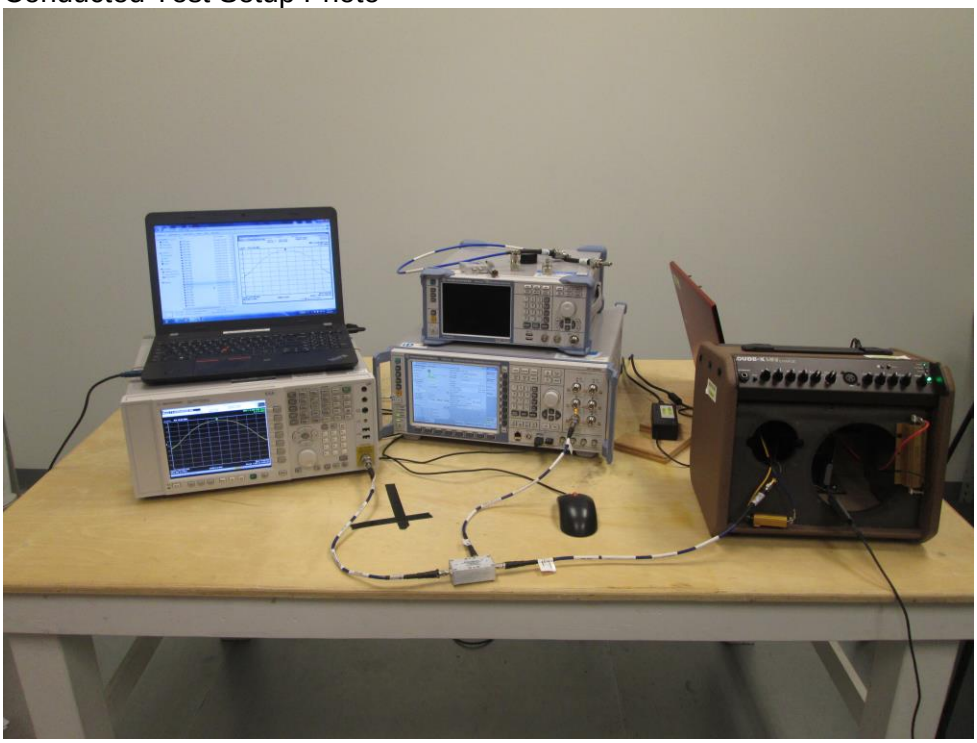
Coupler	Range	MN	Mfr		Asset	Cat	Calibration Due	Calibrated on
Splitter	1.8GHz-6GHz	ZNZPD-63-S+	Mini-Circuits		II		Verify before use	Verify before use

Cables	Range		Mfr	SN		Cat	Calibration Due	Calibrated on
Asset #2286	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021030		II	1/27/2018	1/27/2017
Asset #2287	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021040		II	1/27/2018	1/27/2017
Asset #2288	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021029		II	1/27/2018	1/27/2017

Meteorological Meters		MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2079		HTC-1	HDE		2079	II	3/23/2018	3/23/2017
TH A#2085		HTC-1	HDE		2085	II	3/23/2018	3/23/2017

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

Conducted Test Setup Photo



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

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
30-1000MHz Horizontal Tabular Data

Frequency	QP Reading	Preamplifier Gain	Antenna Factor	Cable Loss	QP Amplitude	Limit Req. 1	Margin Req. 1	Results Req. 1	Antenna Height	Turntable Azimuth	Worst Margin Limit 1
MHz	dBµV	dB	dB/m	dB	dBµV/m	dbµV/m	dB	pass/fail	centimete	degrees	dB
196.571	40.1	25.5	12.1	1	27.7	43.5	-15.8	PASS	125	146	
198.695	44.6	25.5	12.5	0.9	32.6	43.5	-10.9	PASS	125	117	
208.093	47.2	25.5	10.5	0.9	33	43.5	-10.5	PASS	100	2	-10.5
222.891	47.9	25.5	10.9	1.1	34.4	46	-11.6	PASS	125	245	
223.549	47.5	25.5	11	1.1	34.1	46	-12	PASS	102	249	
226.078	48	25.5	11	1.1	34.6	46	-11.4	PASS	140	250	

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
30-1000MHz Vertical Tabular Data

Frequency	QP Reading	Preamplifier Gain	Antenna Factor	Cable Loss	QP Amplitude	Limit Req. 1	Margin Req. 1	Results Req. 1	Antenna Height	Turntable Azimuth	Worst Margin Limit 1
MHz	dBµV	dB	dB/m	dB	dBµV/m	dBµV/m	dB	pass/fail	centimete	degrees	dB
183.125	46.4	25.4	11.1	0.9	33	43.5	-10.6	PASS	100	311	
183.093	46.2	25.4	11.1	0.9	32.8	43.5	-10.7	PASS	111	326	
185.347	47.4	25.4	11.1	1	34.1	43.5	-9.4	PASS	100	340	
185.368	46.9	25.4	11.1	1	33.6	43.5	-9.9	PASS	113	340	
187.086	43.6	25.4	11.2	1	30.4	43.5	-13.1	PASS	114	290	
188.566	47.5	25.4	11.3	1	34.3	43.5	-9.2	PASS	100	4	-9.2

30-1000MHz - 2441MHz Mid Channel

Curtis Straus - a Bureau Veritas Company					Work Order - R1589												
Radiated Emissions Electric Field 3m Distance					EUT Power Input - 120V/60Hz												
1-6GHz Vertical Tabular Data					Test Site - Chamber 2												
Operator: Chris Bramley					Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar												
EUT Tx at 2480MHz					Witnessed by - Vlad Kratik												
					EUT Maximum Frequency - 2480MHz												
					Req. 1; Req. 2 - FCC Class B												
Frequency	Raw Peak Reading	Raw Average Reading	Preamp Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	Turntable Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB/m	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	centimeters	degrees	dB	dB
2583.6	30.1	29.6	21	32.6	3.6	45.4	44.8	74	-28.6	PASS	54	-9.1	PASS	100	280		
4960.2	36.7	31.2	18.6	34	5	57.1	51.6	74	-16.8	PASS	54	-2.3	PASS	102	276	-16.8	-2.3

Curtis Straus - a Bureau Veritas Company					Work Order - R1589												
Radiated Emissions Electric Field 3m Distance					EUT Power Input - 120V/60Hz												
1-6GHz Horizontal Tabular Data					Test Site - Chamber 2												
Operator: Chris Bramley					Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar												
EUT Tx at 2480MHz					Witnessed by - Vlad Kratik												
					EUT Maximum Frequency - 2480MHz												
					Req. 1; Req. 2 - FCC Class B												
Frequency	Raw Peak Reading	Raw Average Reading	Preamp Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	Turntable Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB/m	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	centimeters	degrees	dB	dB
2459.5	32.9	20.1	21	32.4	3.5	47.7	34.9	74	-26.2	PASS	54	-19	PASS	175	2		
2584.1	36	27.3	21	32.6	3.6	51.2	42.6	74	-22.8	PASS	54	-11.4	PASS	275	263		
4960.3	37.7	32.7	18.6	34	5	58.1	53.2	74	-15.9	PASS	54	-0.8	PASS	180	245	-15.9	-0.8

1GHz-6GHz - 2480MHz High Channel

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 3m Distance						EUT Power Input - 120V/60Hz											
1-6GHz Vertical Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2441MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamp Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	Turntable Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB/m	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	centimeters	degrees	dB	dB
2466.2	27.7	19.3	21	32.4	3.5	42.5	34.2	74	-31.4	PASS	54	-19.8	PASS	116	284		
2544.6	28.3	26.7	21	32.5	3.6	43.4	41.7	74	-30.6	PASS	54	-12.2	PASS	216	280		
4882.2	37.8	31.5	18.7	34	5	58.2	51.9	74	-15.8	PASS	54	-2.1	PASS	100	272	-15.8	-2.1

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 3m Distance						EUT Power Input - 120V/60Hz											
1-6GHz Horizontal Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2441MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamp Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	Turntable Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB/m	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	centimeter	degrees	dB	dB
2461.8	26.9	18.6	21	32.4	3.5	41.7	33.5	74	-32.2	PASS	54	-20.5	PASS	111	150		
2544.8	35.2	29.8	21	32.5	3.6	50.3	44.9	74	-23.7	PASS	54	-9.1	PASS	275	283	-23.7	
2597	30.6	22.7	21	32.7	3.6	45.8	37.9	74	-28.1	PASS	54	-16.1	PASS	225	287		
4882.6	24.3	31.1	18.7	34	5	44.7	51.4	74	-29.3	PASS	54	-2.6	PASS	225	245		-2.6

1GHz-6GHz – 2441MHz Mid Channel

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 3m Distance						EUT Power Input - 120V/60Hz											
1-6GHz Vertical Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2402MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamp Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	Turntable Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB/m	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	centimeter	degrees	dB	dB
2297.5	30.6	25.7	20.8	31.8	3.4	44.9	40	74	-29	PASS	54	-14	PASS	100	274		
2506.5	33.4	29.8	21.1	32.5	3.5	48.3	44.8	74	-25.7	PASS	54	-9.2	PASS	125	213		
2531.8	33.7	28.1	21.1	32.5	3.6	48.7	43.2	74	-25.3	PASS	54	-10.8	PASS	100	273		
2557.9	32.7	26.2	21	32.6	3.6	47.8	41.3	74	-26.2	PASS	54	-12.6	PASS	182	2		
4803.7	36.7	30.5	18.6	34.1	5.2	57.4	51.2	74	-16.6	PASS	54	-2.8	PASS	100	2	-16.6	-2.8

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 3m Distance						EUT Power Input - 120V/60Hz											
1-6GHz Horizontal Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2402MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamp Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	Turntable Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB/m	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	centimeter	degrees	dB	dB
2453.4	29.6	26.4	21	32.3	3.5	44.4	41.3	74	-29.5	PASS	54	-12.7	PASS	175	282		
2506.6	33.6	33.2	21.1	32.5	3.5	48.5	48.2	74	-25.5	PASS	54	-5.8	PASS	225	264		
2558.2	35.2	30.3	21	32.6	3.6	50.3	45.4	74	-23.7	PASS	54	-8.6	PASS	205	284		
4803.3	34.3	31.1	18.6	34.1	5.2	55	51.8	74	-19	PASS	54	-2.2	PASS	184	300	-19	-2.2

1GHz-6GHz – 2402MHz Low Channel

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 1m Distance						EUT Power Input - 120V/60Hz											
6-18GHz Vertical Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2480MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamplifier Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Req. 1 Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	EUT Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	cm	degrees	dB	dB
7439.8	35.6	27.1	17.9	36.2	6.1	60.4	51.8	83.5	-23.1	PASS	63.5	-11.7	PASS	200	272		
17940.3	24.3	15.9	16.9	42.1	10.1	60.4	52	83.5	-23.1	PASS	63.5	-11.5	PASS	200	234	-23.1	-11.5

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 1m Distance						EUT Power Input - 120V/60Hz											
6-18GHz Horizontal Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2480MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamplifier Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	EUT Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	cm	degrees	dB	dB
7439.3	40.9	32.9	17.9	36.2	6.1	65.7	57.7	83.5	-17.8	PASS	63.5	-5.8	PASS	172	280	-17.8	-5.8
17965.5	24.1	15.8	16.9	42.1	10.1	60.4	52	83.5	-23.1	PASS	63.5	-11.5	PASS	185	114		

6GHz-18GHz - 2480MHz High Channel

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 1m Distance						EUT Power Input - 120V/60Hz											
6-18GHz Vertical Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2441MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamplifier Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Req. 1 Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	EUT Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	cm	degrees	dB	dB
7323.8	30.9	25.1	17.9	36.2	6.2	55.8	50	83.5	-27.7	PASS	63.5	-13.5	PASS	100	25		
17980.1	24.8	15.8	16.9	42.2	10	61.1	52.2	83.5	-22.4	PASS	63.5	-11.3	PASS	156	161	-22.4	-11.3

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 1m Distance						EUT Power Input - 120V/60Hz											
6-18GHz Horizontal Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2441MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamplifier Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	EUT Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	cm	degrees	dB	dB
7322.5	38.5	29.9	17.9	36.2	6.2	63.4	54.8	83.5	-20.1	PASS	63.5	-8.7	PASS	147	37	-20.1	-8.7
17762.1	24.8	15.8	17	41.6	10	60.3	51.2	83.5	-23.2	PASS	63.5	-12.3	PASS	125	311		

6GHz-18GHz - 2441MHz Mid Channel

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 1m Distance						EUT Power Input - 120V/60Hz											
6-18GHz Vertical Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2402MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamplifier Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Req. 1 Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	EUT Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	cm	degrees	dB	dB
7206.3	29	22.3	17.6	36.1	6.2	53.9	47.3	83.5	-29.6	PASS	63.5	-16.2	PASS	100	20		
17892.2	23.7	15.5	17	41.9	10.2	59.7	51.5	83.5	-23.8	PASS	63.5	-12	PASS	100	81	-23.8	-12

Curtis Straus - a Bureau Veritas Company						Work Order - R1589											
Radiated Emissions Electric Field 1m Distance						EUT Power Input - 120V/60Hz											
6-18GHz Horizontal Tabular Data						Test Site - Chamber 2											
Operator: Chris Bramley						Temp; Humid; Pres - 25.5°C; 43%RH; 999mBar											
EUT Tx at 2402MHz						Witnessed by - Vlad Kratik											
						EUT Maximum Frequency - 2480MHz											
						Req. 1; Req. 2 - FCC Class B											
Frequency	Raw Peak Reading	Raw Average Reading	Preamplifier Factor	Antenna Factor	Cable Factor	Adjusted Peak Amplitude	Adjusted Average Amplitude	Peak Limit	Peak Margin	Peak Results	Average Limit	Average Margin	Average Results	Antenna Height	EUT Azimuth	Worst Peak Margin	Worst Average Margin
MHz	dBµV	dBµV	dB	dB	dB	dBµV/m	dBµV/m	dBµV/m	dB	Pass/Fail	dBµV/m	dB	Pass/Fail	cm	degrees	dB	dB
7206.5	35.9	28.7	17.6	36.1	6.2	60.8	53.6	83.5	-22.7	PASS	63.5	-9.9	PASS	170	30	-22.7	-9.9
17992.3	24.1	15.8	16.8	42.2	10	60.5	52.2	83.5	-23	PASS	63.5	-11.3	PASS	124	153		

6GHz-18GHz - 2402MHz Low Channel

Radiated Emissions Table

Date: 07-Jul-17 **Company:** Fishman **Work Order:** R1589
Engineer: Zachary Johnson **EUT Desc:** LoudBox **EUT Operating Voltage/Frequency:** 230V / 50Hz
Temp: 23.8 **Humidity:** 44% **Pressure:** 1004
Frequency Range: 18-25GHz **Measurement Distance:** 0.1 m
Notes: **EUT Max Freq:** 2481MHz

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: Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)	FCC Class B High Frequency - Average: Limit (dBµV/m)	Margin (dB)	Result (Pass/Fail)
No Emissions Found				---	---	---	---	---	---	---	---	---	---	---

Table Result: --- by --- dB ***Worst Freq:*** --- MHz

Test Site: EMI Chamber 2 **Cable 1:** Asset #2329 **Cable 2:** --- **Cable 3:** ---
Analyzer: Gold **Preamp:** 18-26.5GHz **Antenna:** 18-26.5GHz Horn **Preselector:** ---
CSsoft Radiated Emissions Calculator v 1.017.188

Adjusted Reading = Reading - Preamp Factor + Antenna Factor + Cable Factor

18-25GHz -2441MHz Center Channel

Test Equipment Used for 30-1000MHz:

Rev. 6/24/2017

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/28/2018	2/28/2017
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
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Green	0.009-2000MHz	ZFL-1000-LN	CS	N/A	802	II	9/19/2017	9/19/2016
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Red-White Bilog	30-2000MHz	JB1	Sunol	A091604-1	1105	I	8/12/2017	8/12/2015
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2084		HTC-1	HDE		2084	II	3/23/2018	3/23/2017
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2051	9kHz - 18GHz		Florida RF			II	3/5/2018	3/5/2017
Asset #2054	9kHz - 18GHz		Florida RF			II	10/30/3017	10/30/2016

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

Test Equipment Used for 1-18GHz:

Rev. 7/3/2017

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Rental MXE EMI Receiver(1170725)	20Hz-26.5GHz	N9038A	Agilent	MY51210151	1170725	I	12/22/2017	12/22/2016
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	I	12/21/2018	12/21/2016
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
1517 HF Preamp	1-20GHz	CS	CS	N/A	1517	II	8/14/2017	8/14/2016
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Blue Horn	1-18Ghz	3117	ETS	157647	1861	I	2/14/2019	2/14/2017
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2078		HTC-1	HDE		2078	II	3/23/2018	3/23/2017
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2052	9kHz - 18GHz		Florida RF			II	3/5/2018	3/5/2017
Asset #2053	9kHz - 18GHz		Florida RF			II	10/30/3017	10/30/2016

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

Test Equipment Used for 18-25GHz:

Rev. 6/24/2017

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
Gold	100Hz-26.5 GHz	E4407B	Agilent	MY45113816	1284	I	2/28/2018	2/28/2017
Radiated Emissions Sites	**FCC Code**	**IC Code**	**VCCI Code**	**Range**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
EMI Chamber 2	719150	2762A-7	A-0015	1-18GHz	1686	I	12/21/2018	12/21/2016
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
HF (Yellow)	18-26.5GHz	AFS4-18002650-60-8P-4	CS	467559	1266	II	9/16/2017	9/16/2016
Antennas	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
HF (White) Horn	18-26.5GHz	801-WLM	Waveline	758	758	III	Verify before Use	date of test
Meteorological Meters		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
Weather Clock (Pressure Only)		BA928	Oregon Scientific	C3166-1	831	I	4/28/2018	4/28/2016
TH A#2078		HTC-1	HDE		2078	II	3/23/2018	3/23/2017
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2329	1 - 26.5GHz	PE350-120	Pasternack	1545		II	2/6/2018	2/6/2017

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 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		

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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.
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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

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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.

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