Test Report

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

Report No	ES0565-1
Client	Signal Fire Telemetry
Address	140 Locke Drive Suite B Marlborough, MA 01752
Phone	978-212-2869
Items tested	TILTScout
FCC ID	W8V-TS
IC	8373A-TS
FRN	0018614347
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	March 6 through April 24, 2018
Results	As detailed within this report
Prepared by	Zachary Johnson – EMC Engineer
Authorized by	Yunus Faziloglu - Sr. Engineer
Issue Date	6/7/2018
Conditions of Issue	This Test Report is issued subject to the conditions stated in the '*Conditions of Testing*' section on page 32 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 Tilt Scout is a frequency hopping transmitter that operates in the frequency range of 905-924.8MHz. It has an internal coil antenna. It is powered by 3.6V DC Battery.

We found that the product met the above requirements with modification. The test sample was received in good condition.

Modification: Output power was reduced to 12dBm

Release Control Record

Issue No.	Reason for change	Date Issued
1	Original Release	January 29, 2018

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.

AC mains conducted emissions testing was not performed since the device is battery powered only.

3 channels were tested as follows:
Low channel = 905 MHz
Middle channel = 915 MHz
High channel = 924.8 MHz

When hopping, the product was configured for the transmission to be either in the range of 905-914.8MHz (Low Band), or 915-924.8MHz (High Band).

Following bandwidths were used during radiated spurious emissions testing.

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

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Product Tested - Configuration Documentation

EUT Configuration			
Work Order:	S0565		
Company:	Signal Fire Telemetry		
Company Address:	140 Locke Drive Suite B		
	Marlborough, MA 01752		
Contact:	Josh Schadel		
	MN	**PN**	**SN**
EUT:	Tilt Scout	--	Sample 1
EUT Description:	Wireless Theft Monitor		
EUT Max Frequency:	924.8 MHz		
EUT Min Frequency:	905 MHz		

Support Equipment	**MN**	**SN**
IBM Thinkpad		

Port Label	Port Type	# ports	# populated	cable type	shielded	ferrites	length (m)	in/out	under test	comment
Battery DC IN	Power DC	1	1	Power DC	No	No	0.1	in	yes	
Config Port (setup only)	other	1	0	other	No	No		in	no	

Software Operating Mode Description:
Test Firmware

Clock Frequencies	
frequencies (MHz)	924.8, 915, 905

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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 an internal coil 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	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 maximum allowed 20dB bandwidth of the hopping channel is 500kHz
RSS-247 Issue 2 Section 5.1: The maximum 20 dB bandwidth of the hopping channel shall be 500 kHz.

MEASUREMENTS / RESULTS

20dB Bandwidth

Date: 3/6/2018 **Company:** Signal Fire Telemetry **Work Order:** S0565
Engineer: Zac Johnson **EUT:** Tilt Scout **Operating Voltage/Frequency:** 3.6V DC
Temp: 20.1.°C **Humidity:** 22% **Pressure:** 1011mBar

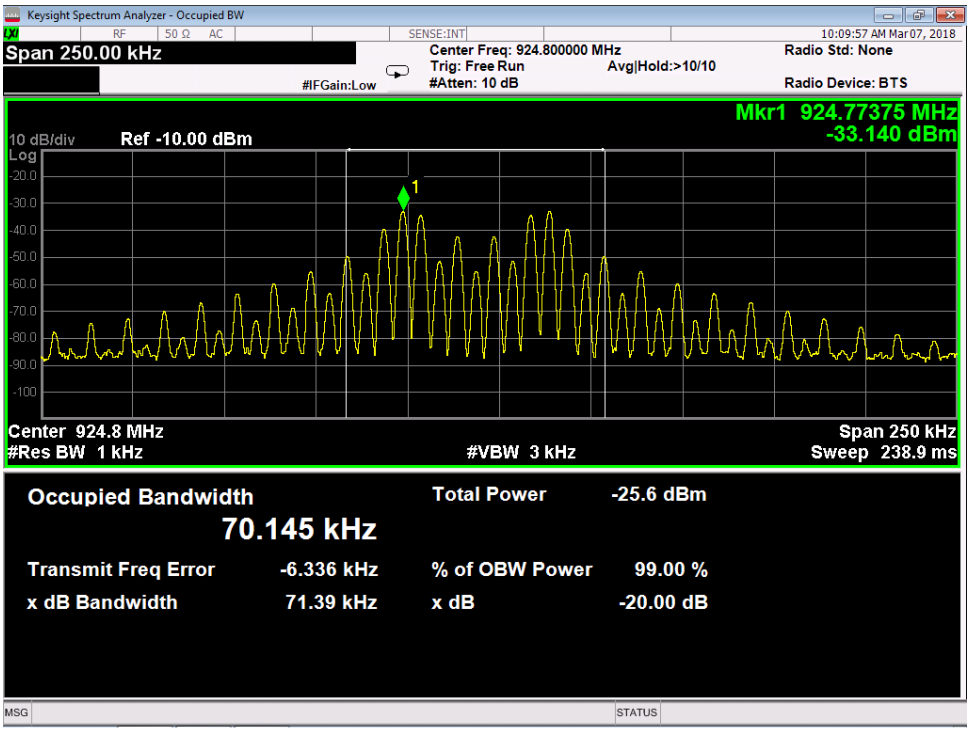
Frequency Range: 905-924.8 MHz **Measurement Type:** Conducted

Notes:

Frequency (MHz)	Reading (kHz)	20dB Bandwidth Limit (kHz)	Margin (kHz)	Result (Pass/Fail)
905	71.6	<500	-428.4	Pass
915	71.4	<500	-428.6	Pass
924.8	71.4	<500	-428.6	Pass

Test Site: EMC-5 **Cable:** 2288 Cbl **Attenuator:** 2107 Pad
Analyzer: 118473 SA

PLOTS



924.8MHz High Channel

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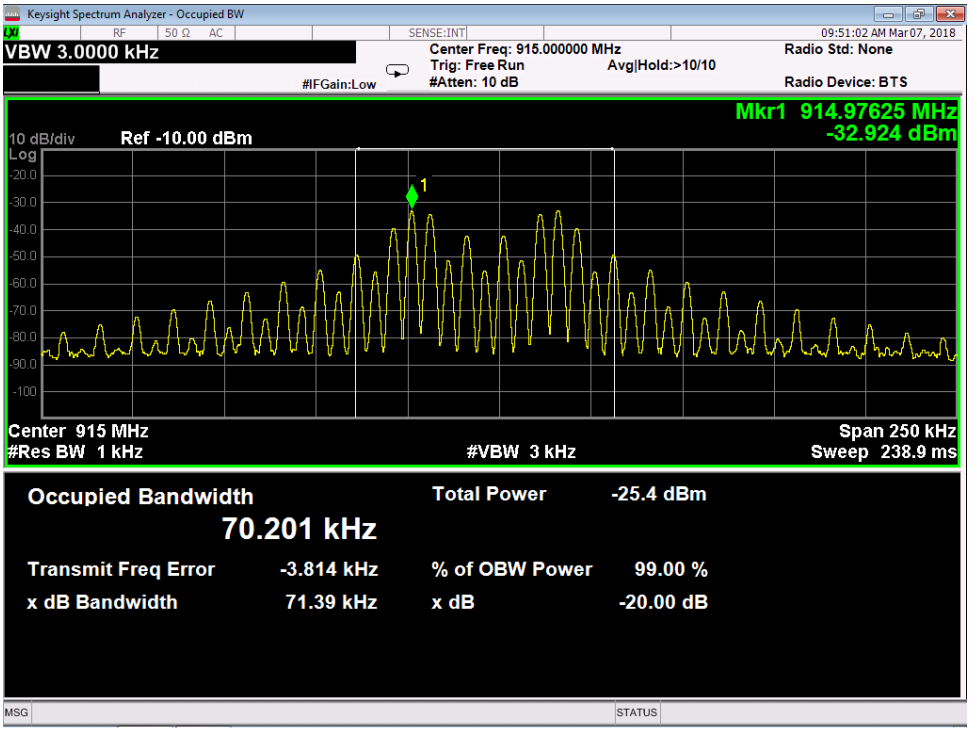
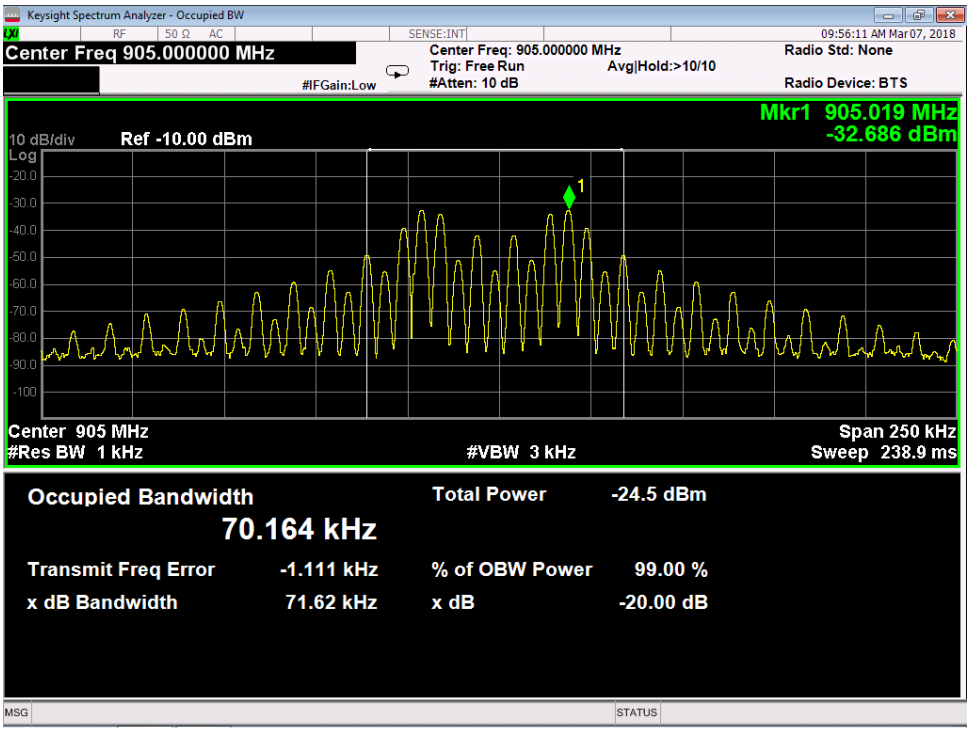


915MHz Mid Channel



905MHz Low Channel

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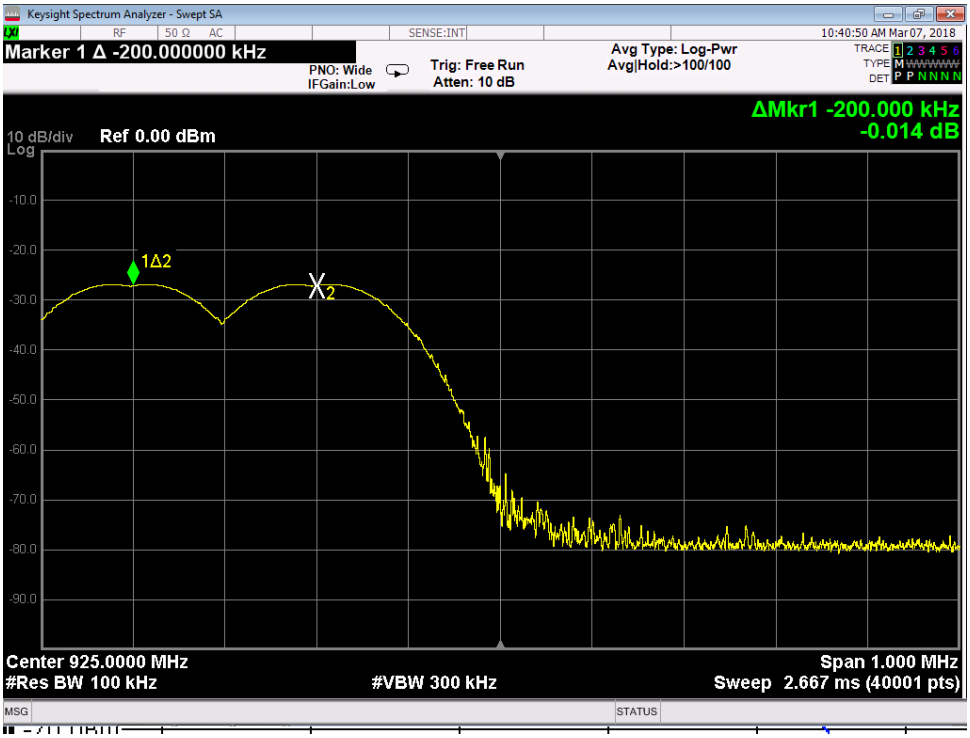
Channel Separation

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)]

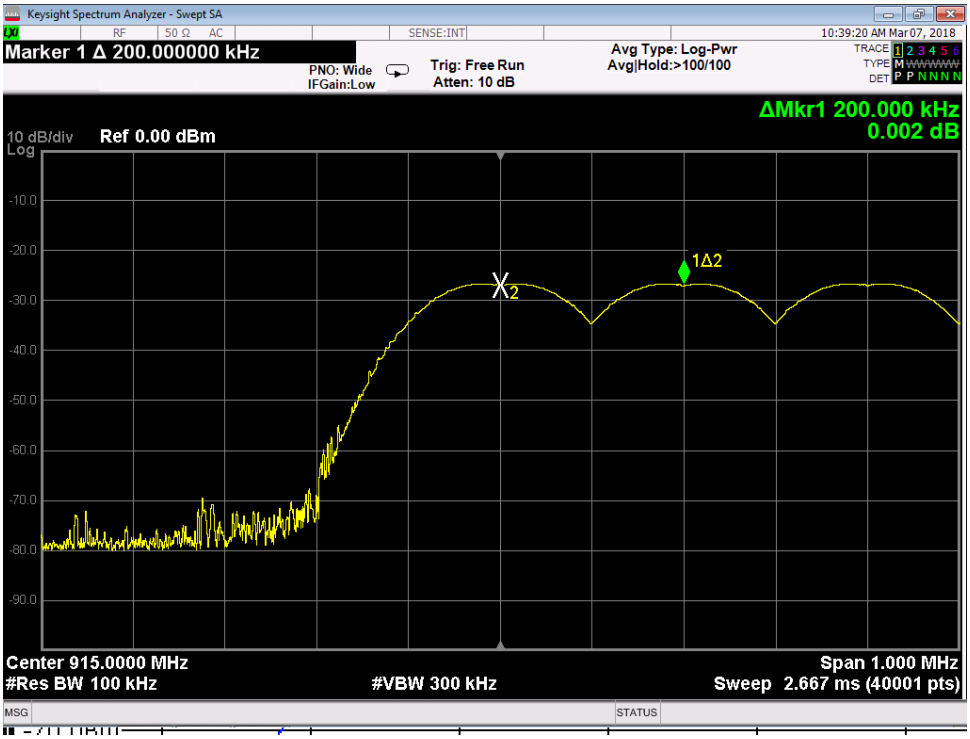
MEASUREMENTS / RESULTS

Channels are spaced by 200kHz as seen in the following plots. This is higher than both 25kHz and the 20dB bandwidth of the product.

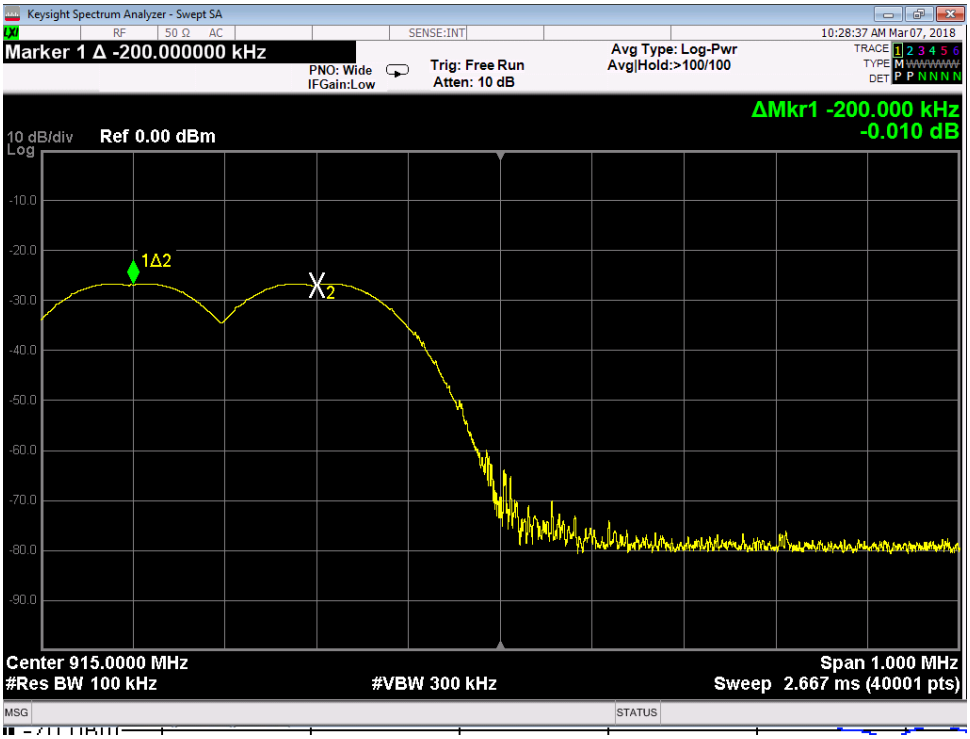
Plots



High Band



Mid Band I



Mid Band II

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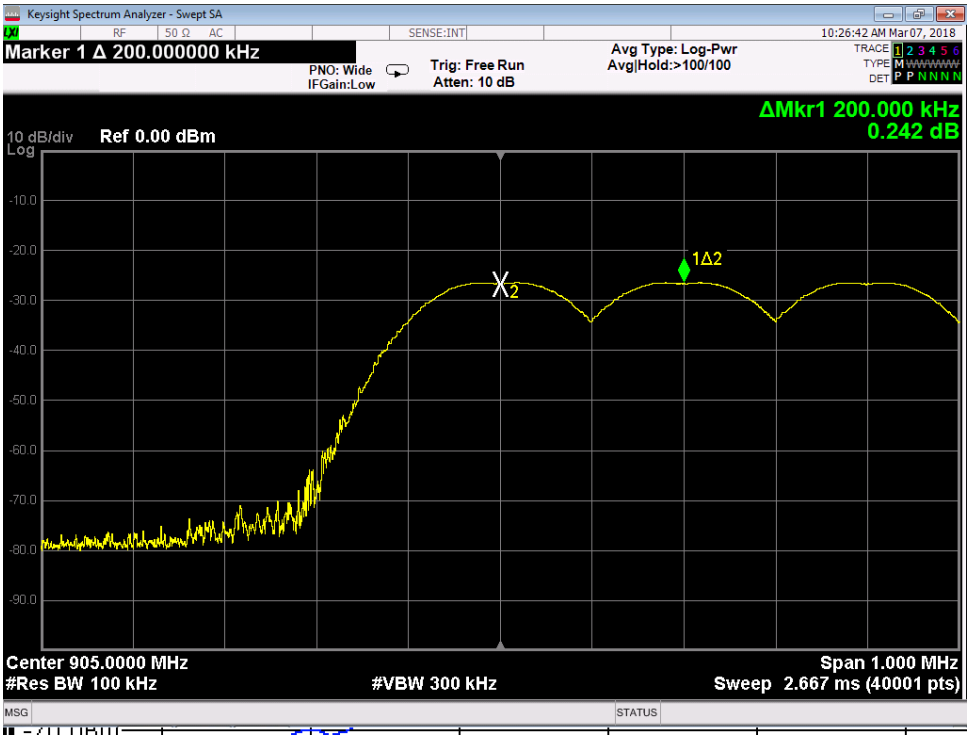

Keysight Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
10:26:42 AM Mar 07, 2018
Marker 1 Δ 200.000000 kHz
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 10 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWW
DET P P N N N N
ΔMkr1 200.000 kHz
0.242 dB
10 dB/div
Log
Ref 0.00 dBm
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
-80.0
-90.0
1Δ2
X2
Center 905.0000 MHz
#Res BW 100 kHz
#VBW 300 kHz
Span 1.000 MHz
Sweep 2.667 ms (40001 pts)
MSG
STATUS

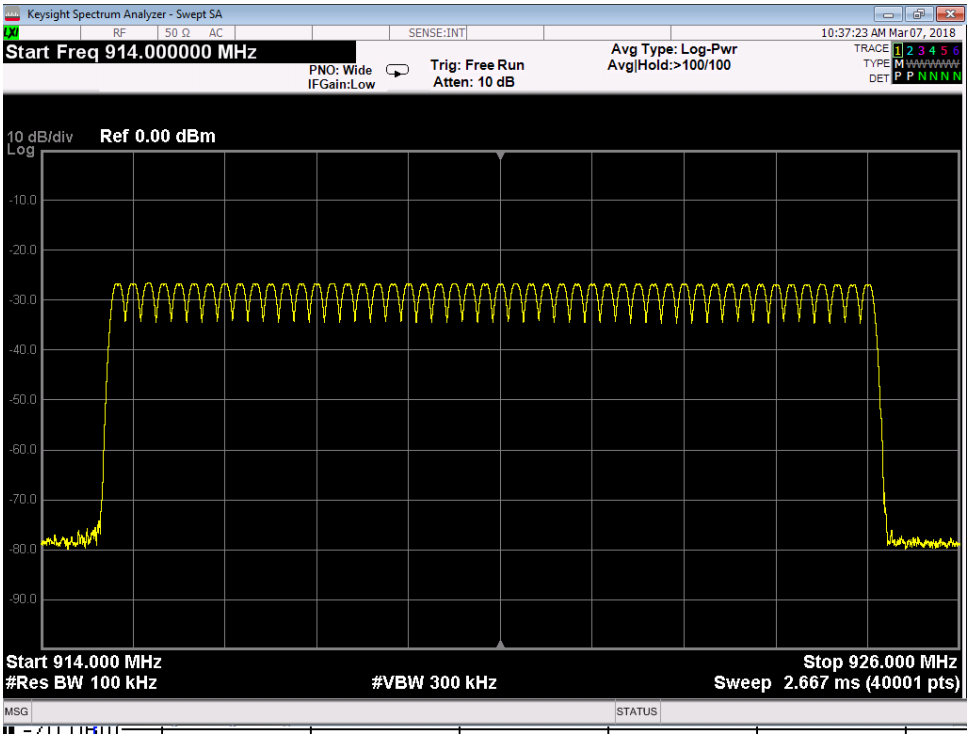
Low Band

Number of Channels

For frequency hopping systems operating in the 902-928MHz 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

PLOTS



50 Channels – High Band

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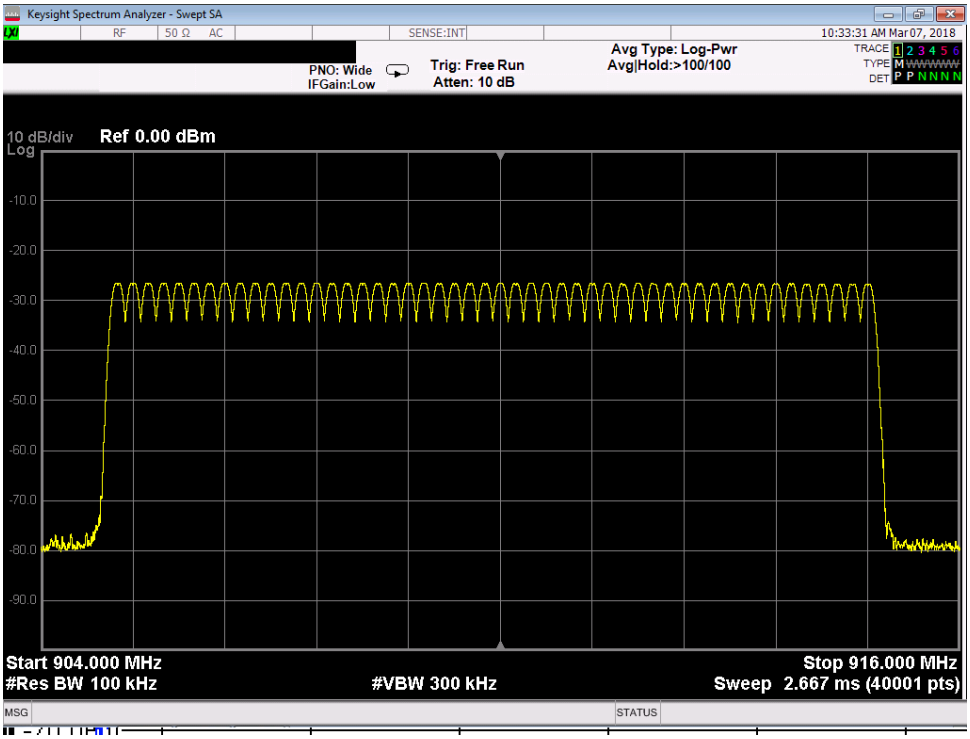


50 Channels – Low Band

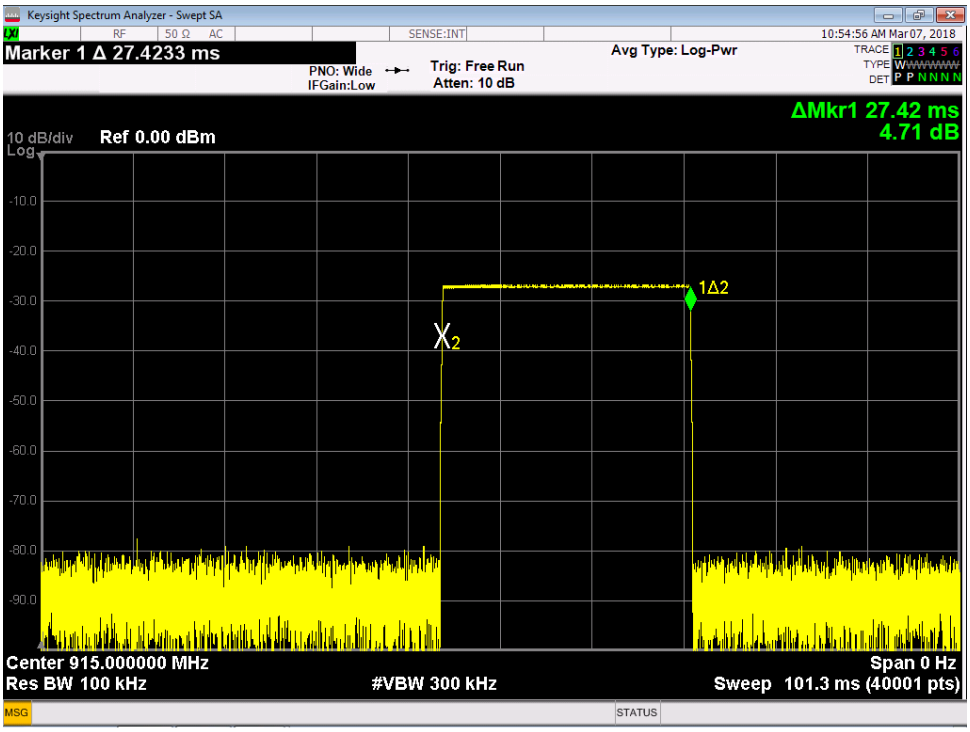
Dwell Time

For frequency hopping systems operating in the 902-928MHz 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



Single Hop = 27.42ms

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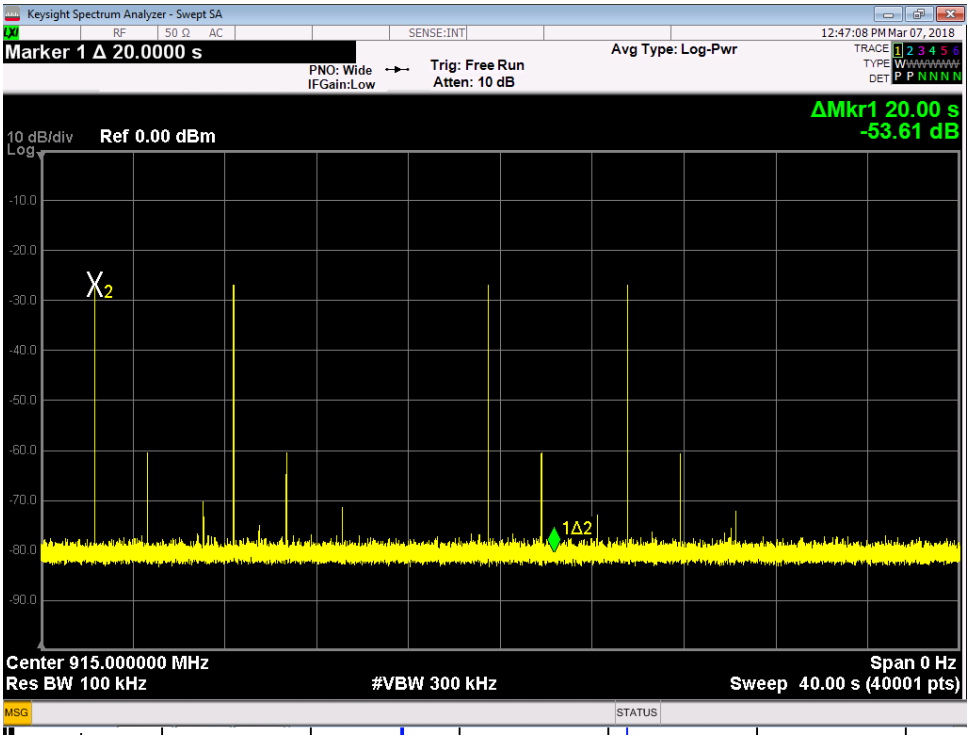


Number of Pulses

*Dwell time in a 20sec period = 3*27.42ms = 82.26ms. Limit (maximum) = 400ms*

Duty-Cycle Correction Factor:

Only 1 pulse is possible within any 100ms window

DCCF = 20*log(27.42/100) = -11.2dB

Peak Output Power

LIMIT

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

MEASUREMENTS / RESULTS

Peak Output Power

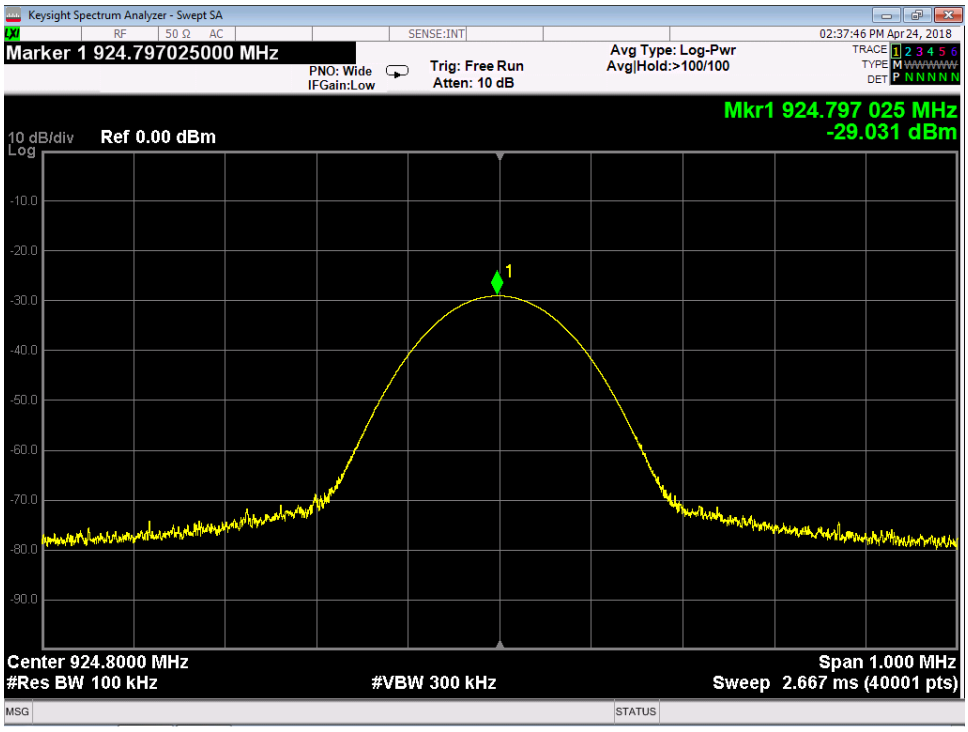
Date: 4/24/2018 **Company:** Signal Fire Telemetry **Work Order:** S0565
Engineer: Zac Johnson **EUT:** Tilt Scout **Operating Voltage/Frequency:** 3.6V DC
Temp: 21.4°C **Humidity:** 31% **Pressure:** 1002mBar
Frequency Range: 905-924.8 MHz **Measurement Type:** Conducted

Notes:

Frequency (MHz)	Peak Reading (dBm)	Cable Loss (dB)	Attenuator Loss (dB)	Peak Output Power (dBm)	Limit (dBm)	Margin (dB)	Result (Pass/Fail)
905	-28.48	0.20	40.0	11.72	30.0	-18.28	Pass
915	-28.75	0.20	40.0	11.45	30.0	-18.55	Pass
924.8	-29.03	0.20	40.0	11.17	30.0	-18.83	Pass

Test Site: EMC-5 **Cable:** 2288 Cbl **Attenuator:** 2107 Pad
Analyzer: 118473 SA
Peak Output Power (dBm)= Peak Reading (dBm) + Cable Loss (dB) + Attenuator Loss (dB)

PLOTS



924.8MHz High Channel

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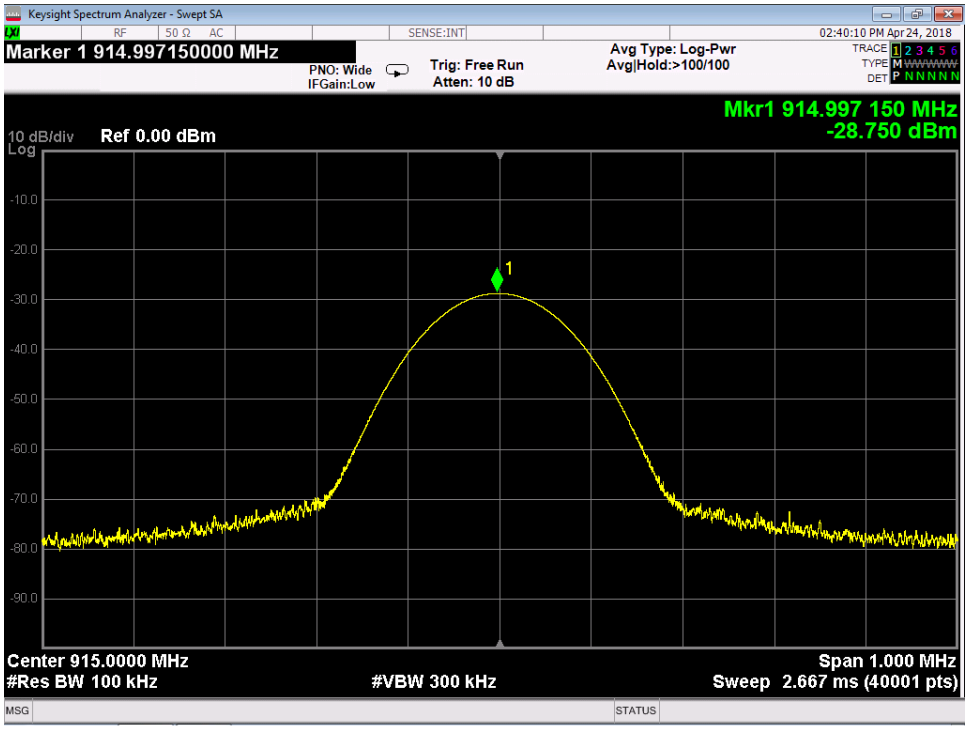
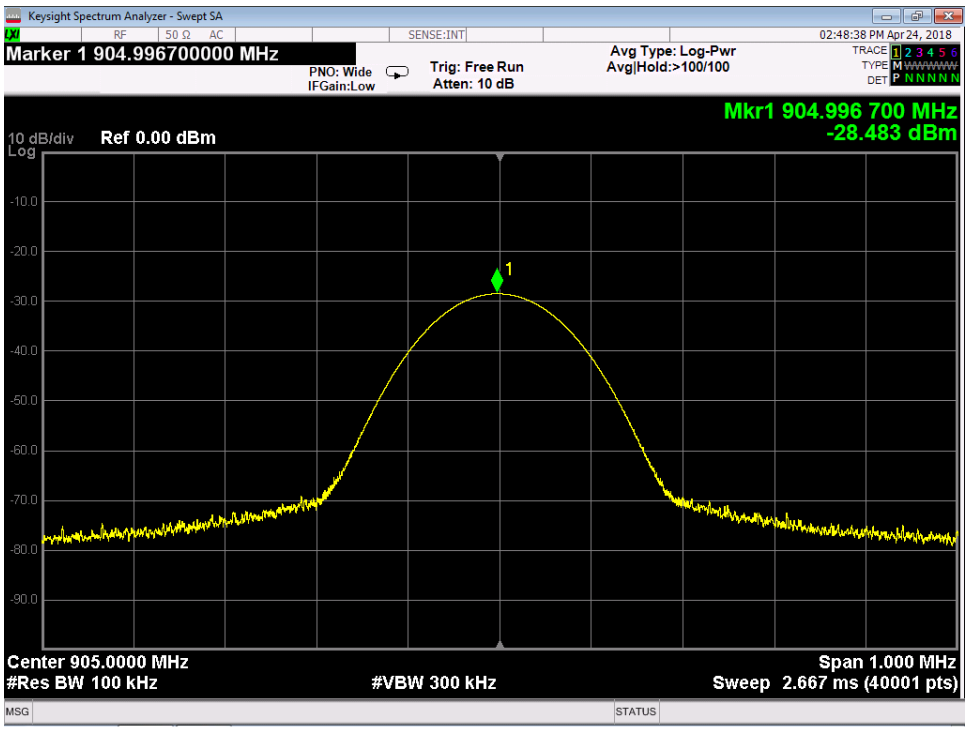


915MHz Mid Channel



905MHz Low Channel

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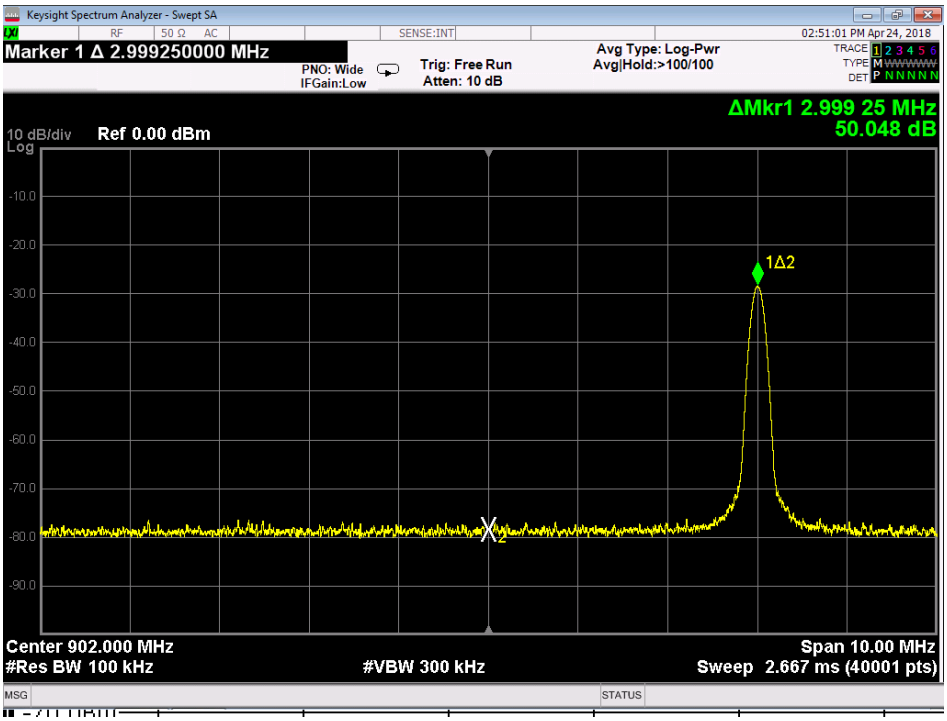
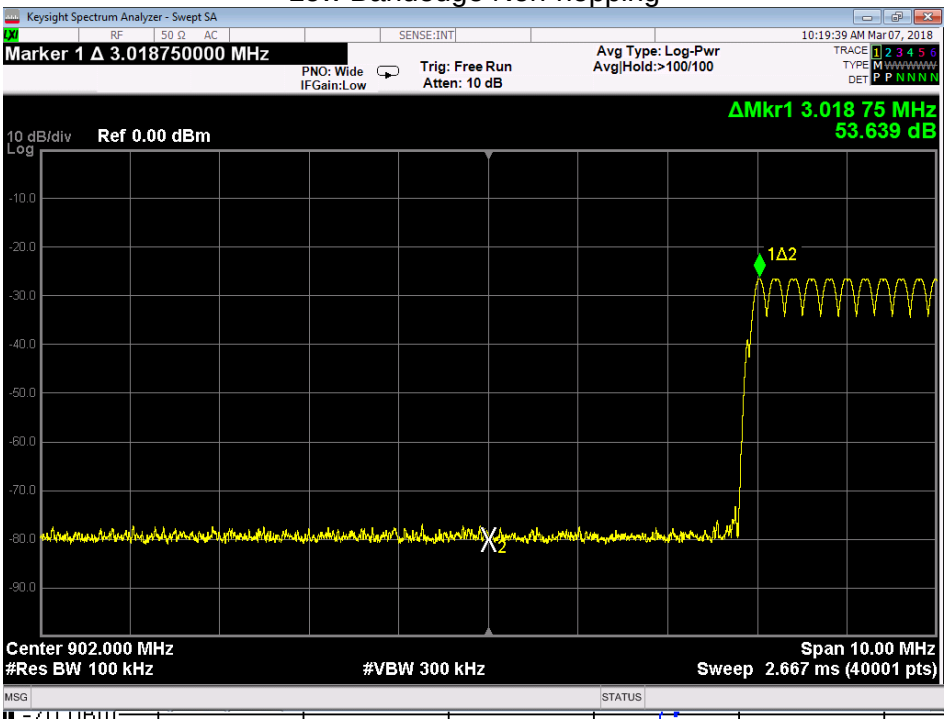
Conducted Bandedges

All band edges more than 20dB from peak



Low Bandedge Non-hopping



Low Bandedge Hopping

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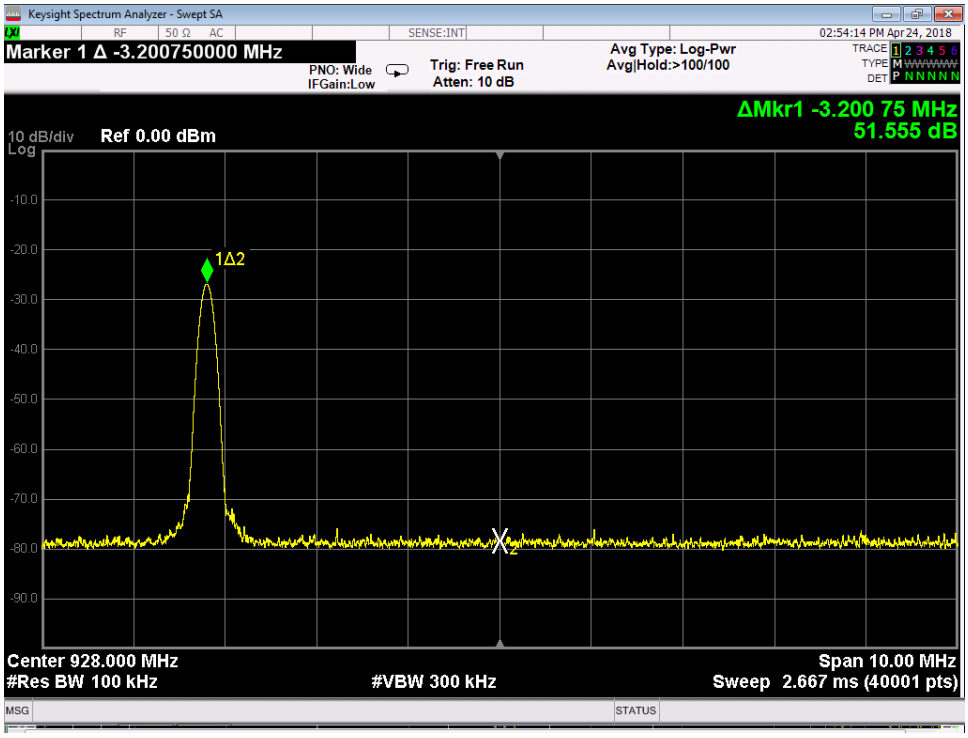
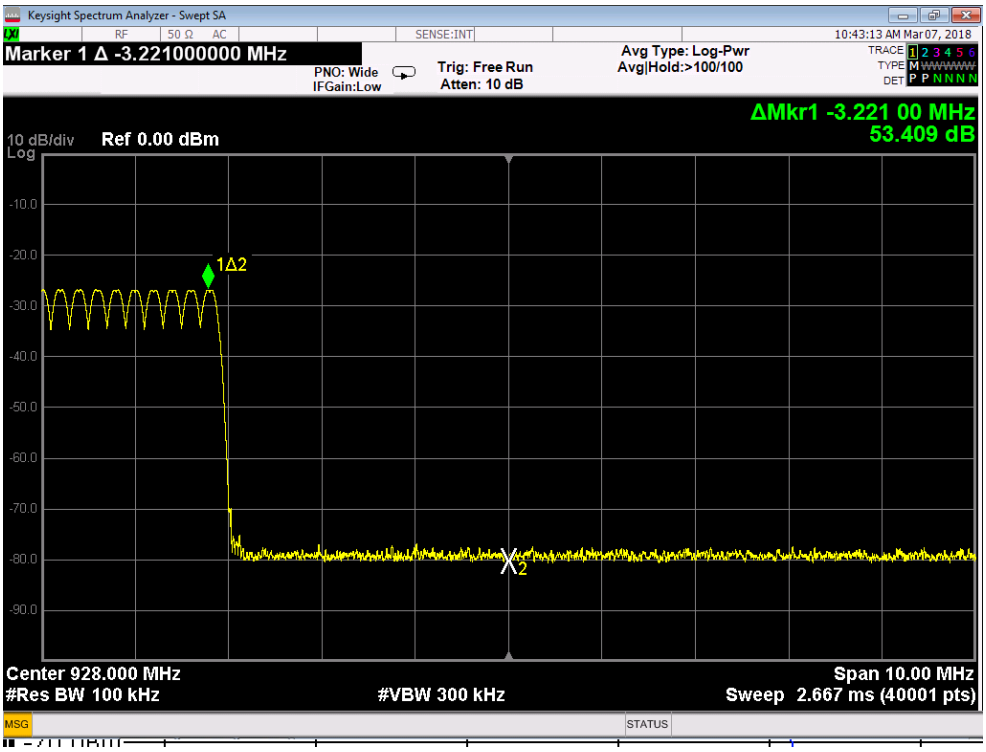


High Bandedge Non-hopping



High Bandedge Hopping

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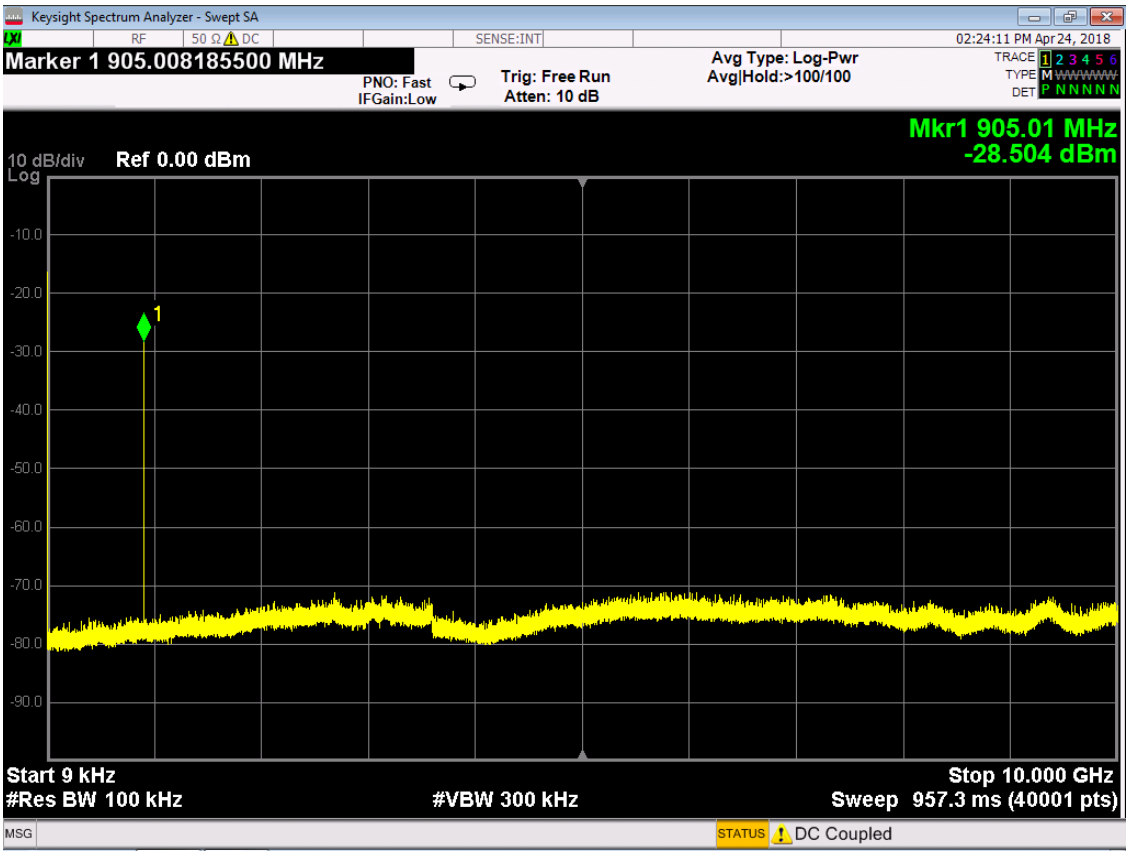
Conducted Spurious Emissions

No emissions found within 20dB of the fundamental on low, mid and high channels.



Low Channel (905MHz)

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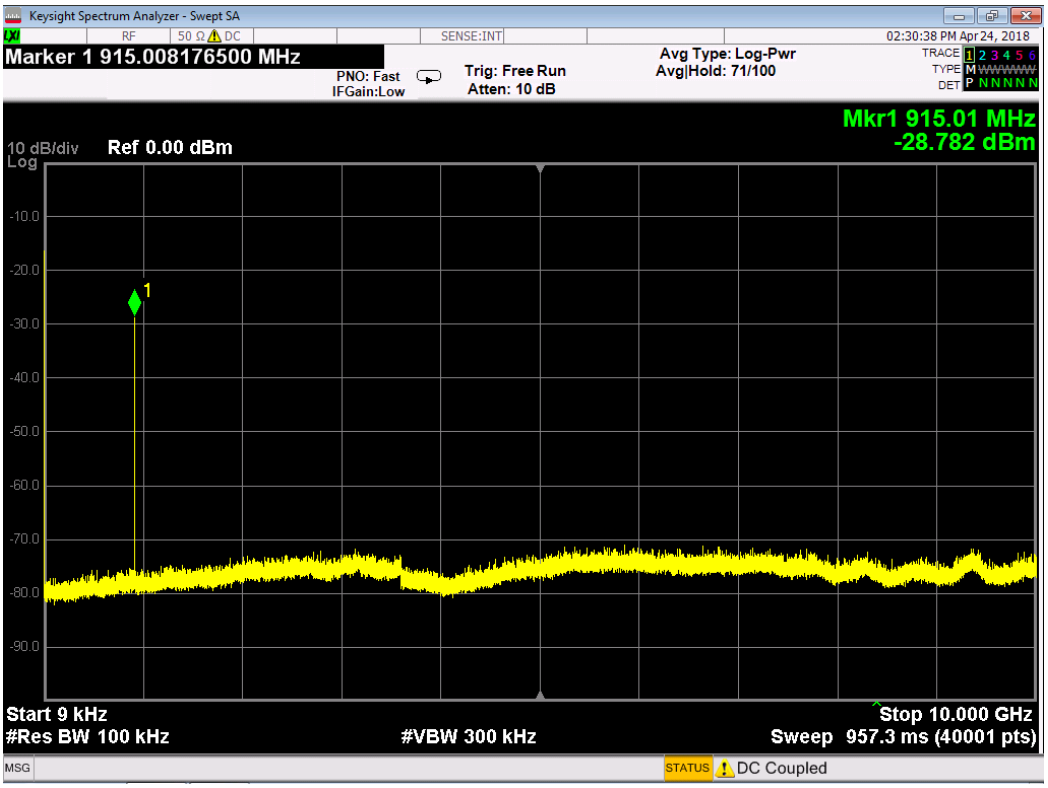
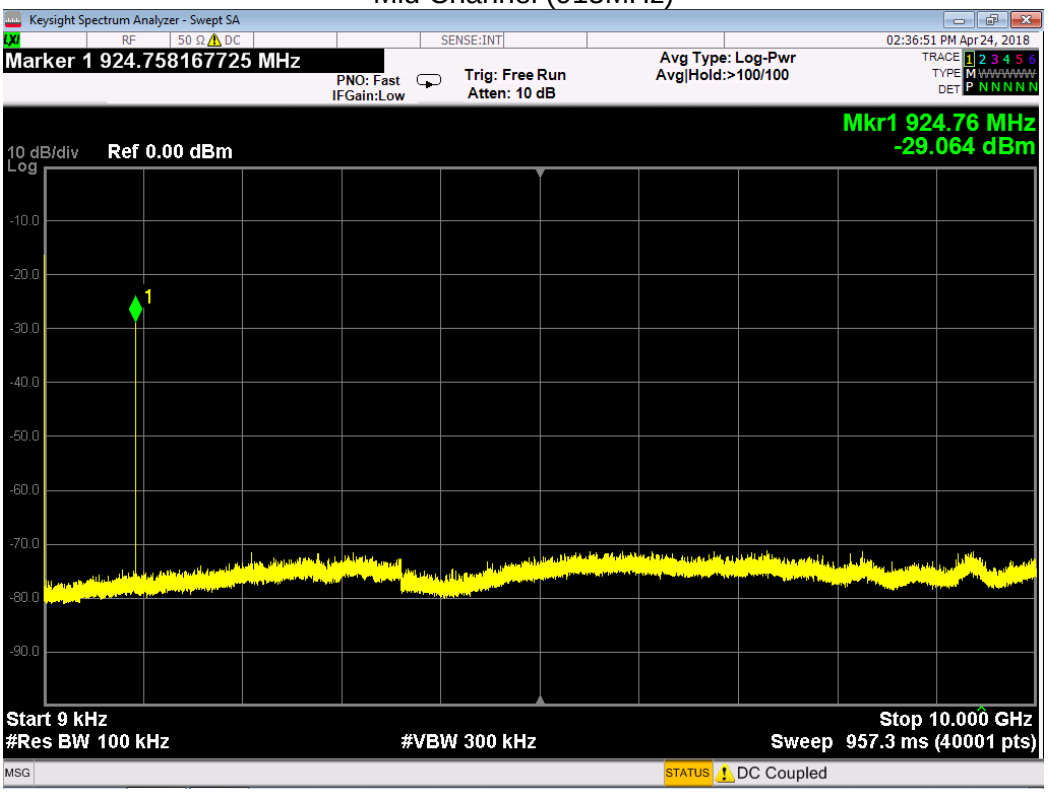


Mid Channel (915MHz)



High Channel (924.8MHz)

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Test equipment used:

For all testing before 4/24/18

Rev. 2/20/2018

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	5/19/2018	5/19/2017
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
API - 40dB 100W Attenuator	0.009-18GHz	48-40-34	API Weinschel	CG7990	2107	II	10/4/2018	10/4/2017
Meteorological Meters/Chambers		**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 #2288	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021029		II	1/29/2019	1/29/2018

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

For Testing on 4/24/18

Rev. 4/19/2018

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	5/19/2018	5/19/2017
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2288	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021029		II	1/29/2019	1/29/2018
Meteorological Meters/Chambers		**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
TH A#2078		HTC-1	HDE		2078	II	3/22/2019	3/22/2018
Barometric A#2160		5396-0321	Monarch Instruments	4000060	2160	I	4/13/2019	4/13/2017
Preamps /Couplers Attenuators / Filters	**Range**	**MN**	**Mfr**	**SN**	**Asset**	**Cat**	**Calibration Due**	**Calibrated on**
API - 40dB 100W Attenuator	0.009-18GHz	48-40-34	API Weinschel	CG7990	2107	II	10/4/2018	10/4/2017

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

Above equipment used for the following tests:

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

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	Work Order - S0565
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.8V DC Battery
30-1000MHz Vertical Data	Test Site - CH-2
Operator: ZJ	Conditions - 21.4°C; 31%RH; 1002mBar
Notes:	
Low channel, power reduced to 12dBm	EUT Maximum Frequency - 924.8MHz

Data Taken at 10:47:32 AM, Monday, April 23, 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)
30.793	22.6	-2	20.6	40	-19.4	PASS	-19.4	40	-19.4	PASS	-19.4	125	79
73.871	22.8	-14.3	8.5	40	-31.5	PASS		40	-31.5	PASS		175	240
132.088	22.4	-8.5	13.8	43.5	-29.7	PASS		43.5	-29.7	PASS		199	160
196.37	28.3	-10.4	17.9	43.5	-25.6	PASS		43.5	-25.6	PASS		206	70
814.429	22.8	1.9	24.6	46	-21.4	PASS		46	-21.4	PASS		200	290
822.418	31.6	-14.9	16.7	46	-29.3	PASS		46	-29.3	PASS		104	187

Curtis Straus - a Bureau Veritas Company	Work Order - S0565
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.8V DC Battery
30-1000MHz Horizontal Data	Test Site - CH-2
Operator: ZJ	Conditions - 21.4°C; 31%RH; 1002mBar
Notes:	
Low channel, power reduced to 12dBm	EUT Maximum Frequency - 924.8MHz

Data Taken at 10:47:32 AM, Monday, April 23, 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)
30.684	22.6	-1.9	20.7	40	-19.3	PASS	-19.3	40	-19.3	PASS	-19.3	192	110
133.158	22.4	-8.6	13.7	43.5	-29.8	PASS		43.5	-29.8	PASS		236	160
183.79	24.4	-11.3	13.1	43.5	-30.4	PASS		43.5	-30.4	PASS		163	250
785.332	22.5	1.3	23.9	46	-22.2	PASS		46	-22.2	PASS		175	290

30-1000MHz Low Channel

Curtis Straus - a Bureau Veritas Company	Work Order - S0565
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.8V DC Battery
30-1000MHz Vertical Data	Test Site - CH-2
Operator: ZJ	Conditions - 21.4°C; 31%RH; 1002mBar
Notes:	0
Mid channel, power reduced to 12dBm	EUT Maximum Frequency - 924.8MHz

Data Taken at 11:49:53 AM, Monday, April 23, 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)
32.102	22.6	-3	19.5	40	-20.5	PASS	-20.5	40	-20.5	PASS	-20.5	211	170
121.977	22.4	-8.7	13.7	43.5	-29.8	PASS		43.5	-29.8	PASS		125	52
196.381	28.7	-10.4	18.2	43.5	-25.3	PASS		43.5	-25.3	PASS		100	47
466.411	24.4	-4.2	20.2	46	-25.9	PASS		46	-25.9	PASS		118	329
490.466	22.3	-3.6	18.7	46	-27.4	PASS		46	-27.4	PASS		203	340
816.301	22.6	1.9	24.5	46	-21.5	PASS		46	-21.5	PASS		175	184

Curtis Straus - a Bureau Veritas Company	Work Order - S0565
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.8V DC Battery
30-1000MHz Horizontal Data	Test Site - CH-2
Operator: ZJ	Conditions - 21.4°C; 31%RH; 1002mBar
Notes:	0
Mid channel, power reduced to 12dBm	EUT Maximum Frequency - 924.8MHz

Data Taken at 11:49:53 AM, Monday, April 23, 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)
30.456	22.6	-1.7	20.8	40	-19.2	PASS	-19.2	40	-19.2	PASS	-19.2	234	158
125.654	22.3	-8.5	13.9	43.5	-29.7	PASS		43.5	-29.7	PASS		208	25
769.344	22.6	1.2	23.8	46	-22.2	PASS		46	-22.2	PASS		145	235
819.032	23.4	-4.7	18.7	46	-27.3	PASS		46	-27.3	PASS		244	98

30-1000MHz Mid Channel

Curtis Straus - a Bureau Veritas Company	Work Order - S0565
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.8V DC Battery
30-1000MHz Vertical Data	Test Site - CH-2
Operator: ZJ	Conditions - 21.4°C; 31%RH; 1002mBar
Notes:	0
High channel, power reduced to 12dBm	EUT Maximum Frequency - 924.8MHz

Data Taken at 01:51:31 PM, Monday, April 23, 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)
30.065	22.5	-1.4	21.1	40	-18.9	PASS	-18.9	40	-18.9	PASS	-18.9	183	83
122.419	22.4	-8.7	13.8	43.5	-29.8	PASS		43.5	-29.8	PASS		220	295
196.38	28.7	-10.4	18.2	43.5	-25.3	PASS		43.5	-25.3	PASS		100	218
800.327	23.1	1.2	24.3	46	-21.7	PASS		46	-21.7	PASS		125	25

Curtis Straus - a Bureau Veritas Company	Work Order - S0565
Radiated Emissions Electric Field 3m Distance	EUT Power Input - 3.8V DC Battery
30-1000MHz Horizontal Data	Test Site - CH-2
Operator: ZJ	Conditions - 21.4°C; 31%RH; 1002mBar
Notes:	0
High channel, power reduced to 12dBm	EUT Maximum Frequency - 924.8MHz

Data Taken at 01:51:31 PM, Monday, April 23, 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)
30.322	22.5	-1.6	20.9	40	-19.1	PASS	-19.1	40	-19.1	PASS	-19.1	125	170
128.428	22.4	-8.5	13.9	43.5	-29.6	PASS		43.5	-29.6	PASS		225	295
184.104	28.3	-11.3	17	43.5	-26.5	PASS		43.5	-26.5	PASS		262	179
804.172	22.5	1.4	23.9	46	-22.1	PASS		46	-22.1	PASS		125	4

30-1000MHz High Channel

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Operator: ZJ
Notes:
Low channel, power reduced to 12dBm
DCCF applied to harmonics

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar

Data Taken at 02:02:14 PM, Tuesday, April 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)
1865.6	36.2	29.1	7.8	44	74	-29.9	PASS		36.9	54	-17.1	PASS		220	15
2454.1	35.1	26.2	10.5	45.6	74	-28.4	PASS		36.6	54	-17.3	PASS		224	104
2714.7	39.7	28.5	10.8	50.5	74	-23.5	PASS		39.3	54	-14.7	PASS		175	45
3619.9	46.4	35.2	12	58.4	74	-15.6	PASS	-15.6	47.2	54	-6.8	PASS	-6.8	195	46
5293.6	34.1	24.8	13.7	47.8	74	-26.1	PASS		38.5	54	-15.5	PASS		125	57
5319.8	33.5	24.8	13.8	47.4	74	-26.6	PASS		38.6	54	-15.4	PASS		107	47

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Horizontal Data
Operator: ZJ
Notes:
Low channel, power reduced to 12dBm
DCCF applied to harmonics

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar

Data Taken at 02:02:14 PM, Tuesday, April 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 Average Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1810.1	42.9	31.7	7.2	50.1	74	-23.9	PASS		38.9	54	-15.1	PASS		100	258
2715.2	42	30.8	10.8	52.8	74	-21.2	PASS		41.6	54	-12.4	PASS		211	0
3620	48.6	37.4	12	60.6	74	-13.4	PASS	-13.4	49.4	54	-4.6	PASS	-4.6	212	340
4107.7	34.3	25	12.1	46.4	74	-27.6	PASS		37.1	54	-16.9	PASS		204	57
4524.9	39.3	28.1	12.5	51.8	74	-22.2	PASS		40.6	54	-13.4	PASS		175	331
5258.3	33.1	24.8	13.6	46.7	74	-27.3	PASS		38.4	54	-15.6	PASS		300	6

1GHz-6GHz – Low Channel

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Operator: ZJ
Notes:
Mid channel, power reduced to 12dBm
DCCF applied to harmonics

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar

Data Taken at 11:11:13 AM, Tuesday, April 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)
1735.6	33.4	24.2	6.4	39.8	74	-34.2	PASS		30.6	54	-23.4	PASS		125	88
2429	38.5	25.5	10.3	48.8	74	-25.2	PASS		35.8	54	-18.2	PASS		275	0
2460.2	35.8	25.3	10.5	46.3	74	-27.7	PASS		35.8	54	-18.2	PASS		212	41
2744.9	42.2	31	10.8	53	74	-21	PASS		41.8	54	-12.2	PASS		225	41
3660	47	35.8	12.3	59.3	74	-14.7	PASS	-14.7	48.1	54	-5.9	PASS	-5.9	202	41
5848.3	34.3	24.8	14.7	49	74	-25	PASS		39.5	54	-14.5	PASS		125	142

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Horizontal Data
Operator: ZJ
Notes:
Mid channel, power reduced to 12dBm
DCCF applied to harmonics

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar

Data Taken at 11:11:13 AM, Tuesday, April 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 Average Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1829.9	43.2	32	7.4	50.6	74	-23.4	PASS		39.4	54	-14.6	PASS		125	0
2430.3	35	25.8	10.3	45.3	74	-28.7	PASS		36.1	54	-17.9	PASS		193	216
2744.8	42.5	31.3	10.8	53.3	74	-20.7	PASS		42.1	54	-11.9	PASS		192	316
3659.9	48.6	37.4	12.3	60.9	74	-13.1	PASS	-13.1	49.7	54	-4.3	PASS	-4.3	175	312
4575.1	38.6	27.4	12.8	51.4	74	-22.6	PASS		40.2	54	-13.8	PASS		125	303
5933.8	34.1	25.1	14.9	49	74	-25	PASS		40	54	-14	PASS		113	41

1GHz-6GHz – Mid Channel

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Vertical Data
Operator: ZJ
Notes:
High channel, power reduced to 12dBm
DCCF applied to harmonics

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar

Data Taken at 11:58:35 AM, Tuesday, April 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)
2462.3	34.3	25.3	10.5	44.8	74	-29.2	PASS		35.8	54	-18.2	PASS		285	322
2774.3	43.8	32.6	10.8	54.6	74	-19.4	PASS		43.4	54	-10.6	PASS		202	52
3699.2	43.5	32.3	12.3	55.8	74	-18.2	PASS	-18.2	44.6	54	-9.4	PASS	-9.4	186	56
5260.5	33.8	24.8	13.6	47.4	74	-26.6	PASS		38.4	54	-15.6	PASS		275	209
5318.7	33.8	24.8	13.8	47.6	74	-26.4	PASS		38.6	54	-15.4	PASS		203	78
5581.8	33.8	25.7	13.9	47.7	74	-26.3	PASS		39.6	54	-14.4	PASS		100	233

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 3m Distance
1-6GHz Horizontal Data
Operator: ZJ
Notes:
High channel, power reduced to 12dBm
DCCF applied to harmonics

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar

Data Taken at 11:58:35 AM, Tuesday, April 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 Average Margin (dB)	Antenna Height (cm)	EUT Azimuth (degrees)
1849.4	41.4	30.2	7.6	49	74	-25	PASS		37.8	54	-16.2	PASS		125	194
2459.3	33.3	25.3	10.5	43.8	74	-30.2	PASS		35.8	54	-18.2	PASS		175	301
2774.4	45.9	34.7	10.8	56.7	74	-17.3	PASS		45.5	54	-8.5	PASS		196	336
3699.2	46.5	35.3	12.3	58.8	74	-15.2	PASS	-15.2	47.6	54	-6.4	PASS	-6.4	203	307
4623.7	36.1	24.9	13	49.1	74	-24.9	PASS		37.9	54	-16.1	PASS		205	303
5430.5	33.1	24.9	14.6	47.7	74	-26.3	PASS		39.5	54	-14.5	PASS		225	151

1GHz-6GHz – High Channel

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Vertical Data
Operator: ZJ
Notes:
Low channel, power reduced to 12dBm

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar
0
0

Data Taken at 02:32:54 PM, Tuesday, April 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)
9952.1	39.9	30.8	9.9	49.8	83.5	-33.7	PASS	-33.7	40.7	63.5	-22.8	PASS	-22.8	200	340

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Horizontal Data
Operator: ZJ
Notes:
Low channel, power reduced to 12dBm

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar
0
0

Data Taken at 02:32:54 PM, Tuesday, April 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)
9886.1	39.6	31	9.6	49.2	83.5	-34.3	PASS	-34.3	40.6	63.5	-22.9	PASS	-22.9	164	317

6GHz-10GHz - Low Channel

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Vertical Data
Operator: ZJ
Notes:
Mid channel, power reduced to 12dBm

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar
0
0

Data Taken at 03:02:41 PM, Tuesday, April 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)
6849.7	40	30.9	7	46.9	83.5	-36.6	PASS		37.9	63.5	-25.6	PASS		100	46
9625.6	41.4	31.1	9.6	51	83.5	-32.5	PASS	-32.5	40.7	63.5	-22.8	PASS	-22.8	100	7

Curtis Straus - a Bureau Veritas Company
Radiated Emissions Electric Field 1m Distance
6-18GHz Horizontal Data
Operator: ZJ
Notes:
Mid channel, power reduced to 12dBm

Work Order - S0565
EUT Power Input - 120V / 60HZ
Test Site - CH-2
Conditions - 24°C; 25%RH; 991mBar
0
0

Data Taken at 03:02:41 PM, Tuesday, April 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)
9963.6	40.5	30.9	10	50.5	83.5	-33	PASS	-33	40.9	63.5	-22.6	PASS	-22.6	184	306

6GHz-10GHz - Mid Channel

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Curtis Straus - a Bureau Veritas Company	Work Order - S0565
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 120V / 60HZ
6-18GHz Vertical Data	Test Site - CH-2
Operator: ZJ	Conditions - 24°C; 25%RH; 991mBar
Notes:	0
High channel, power reduced to 12dBm	0

Data Taken at 03:25:59 PM, Tuesday, April 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)
9990.3	40.1	30.9	10	50.2	83.5	-33.3	PASS	-33.3	40.9	63.5	-22.6	PASS	-22.6	146	120

Curtis Straus - a Bureau Veritas Company	Work Order - S0565
Radiated Emissions Electric Field 1m Distance	EUT Power Input - 120V / 60HZ
6-18GHz Horizontal Data	Test Site - CH-2
Operator: ZJ	Conditions - 24°C; 25%RH; 991mBar
Notes:	0
High channel, power reduced to 12dBm	0

Data Taken at 03:25:59 PM, Tuesday, April 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)
9942.7	40.7	30.6	9.9	50.6	83.5	-32.9	PASS	-32.9	40.5	63.5	-23	PASS	-23	183	290

6GHz-10GHz – High Channel

Test Equipment Used:

Rev. 4/17/2018

Spectrum Analyzers / Receivers /Preselectors	Range	MN	Mfr	SN	Asset	Cat	Calibration Due	Calibrated on
2093 MXE EMI Receiver	20Hz-26.5GHz	N9038A	Agilent	MY51210181	2093	I	11/16/2018	11/16/2017
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
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**
2444 PA	9KHz-6GHz	BBV9744	SCWARZBECK	67	2444	I	2/5/2019	2/5/2018
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
Black Horn	1-18GHz	3115	EMCO	9703-5148	56	I	8/29/2018	8/29/2016
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	4/28/2018	4/28/2016
TH A#2084		HTC-1	HDE		2084	II	3/22/2019	3/22/2018
TH A#2086		HTC-1	HDE		2086	II	3/22/2019	3/22/2018
Cables	**Range**		**Mfr**			**Cat**	**Calibration Due**	**Calibrated on**
Asset #2458	9KHz-18GHz		MegaPhase			II	10/29/2018	10/29/2017
Asset #2459	9KHz-18GHz		MegaPhase			II	10/29/2018	10/29/2017
Asset #2288	9KHz-26.5GHz	FLC-1.5FT-SMSM+	Mini-Circuits	16021029		II	1/29/2019	1/29/2018

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.
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

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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.

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