

FCC Test Report

Product Name	Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
Model No	GWHDMS52MB - T
FCC ID	QLEGWHDMS52MB

Applicant	ATEN Technology, Inc., dba IOGEAR
Address	19641 Da Vinci Foothill Ranch, CA 92610 United States

Date of Receipt	Feb. 13, 2014
Issued Date	Mar. 11, 2014
Report No.	1420159R-RFUSP06V00
Report Version	V1.0



The test results relate only to the samples tested.

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Test Report Certification

Issued Date: Mar. 11, 2014

Report No.: 1420159R-RFUSP06V00



Product Name	Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
Applicant	ATEN Technology, Inc., dba IOGEAR
Address	19641 Da Vinci Foothill Ranch, CA 92610 United States
Manufacturer	ZINWELL CORPORATION
Model No.	GWHDMS52MB - T
FCC ID.	QLEGWHDMS52MB
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120 V / 60 Hz
Trade Name	IOGEAR / ATEN
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E: 2012 ANSI C63.10: 2009; FCC KDB-789033
Test Result	Complied

The Test Results relate only to the samples tested.

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Documented By :

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(Senior Adm. Specialist / Genie Chang)

Tested By :

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(Engineer / Vincent Chu)

Approved By :

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(Director / Vincent Lin)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
Trade Name	IOGEAR / ATEN
FCC ID.	QLEGWHDMS52MB
Model No.	GWHDMS52MB - T
Frequency Range	5190-5310MHz, 5510-5670MHz
Number of Channels	7
Data Rate	63Mbps
Channel Control	Auto
Type of Modulation	OFDM
Antenna type	PIFA
Antenna Gain	Refer to the table "Antenna List"
IR Blaster Cable	Non-Shielded, 3.0m
USB to mini Cable	Shielded, 0.2m
YPbPr Adapter Cable	Shielded, 0.3m
HDMI Cable	Shielded, 1.5m
Power Adapter	MFR: SINO-AMERICAN, M/N: SA110C-05S-A Input: AC 100-240V, 50-60Hz, 0.3A Output: DC 5V, 2A, 10W Cable Out: Non-Shielded, 1.5m, with one ferrite core bonded.

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	ZINWELL	N/A (2TX, 1RX)	2.1dBi for 5.150~5.250GHz 2.2dBi for 5.250~5.350GHz 2.6dBi for 5.470~5.725GHz

Note: The antenna of EUT is conform to FCC 15.203

Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 38:	5190 MHz	Channel 46:	5230 MHz	Channel 54:	5270 MHz	Channel 62:	5310 MHz
Channel 102:	5510 MHz	Channel 110:	5550 MHz	Channel 134:	5670 MHz		

Note:

1. This device is a Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter with a built-in 5GHz transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart E for Unlicensed National Information Infrastructure devices.

Test Mode	Mode 1: Transmitter
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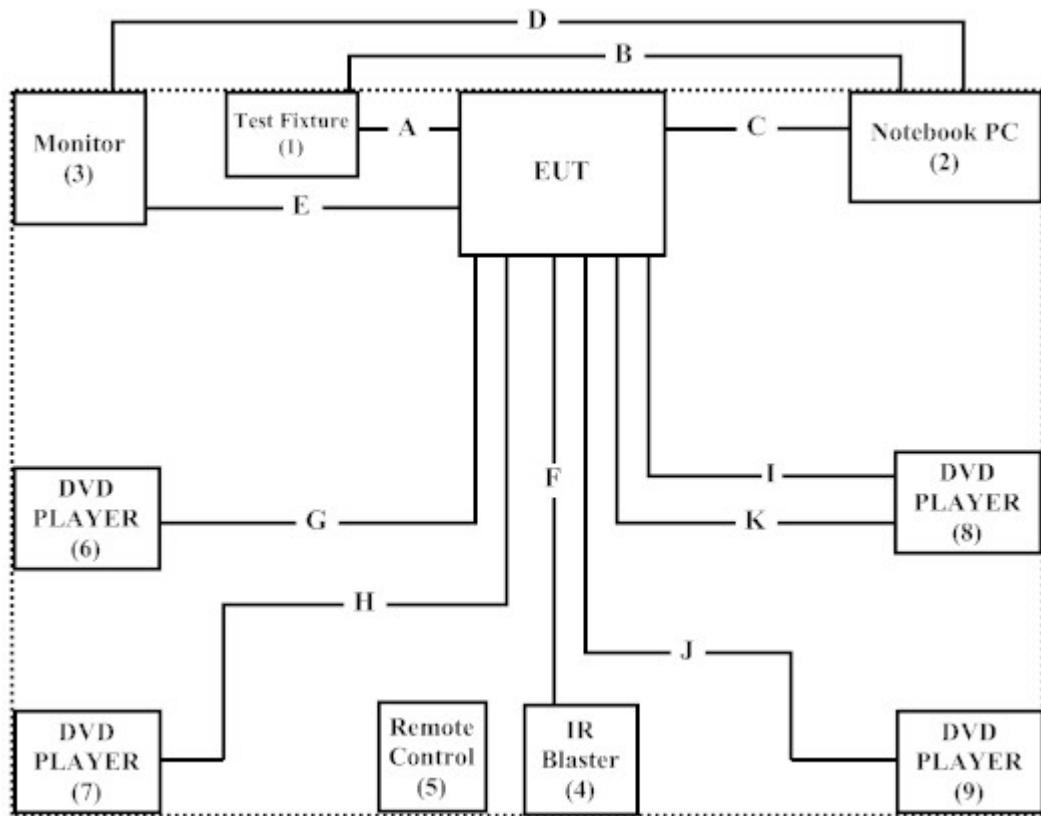
1.3. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Test Fixture	ZINWELL	N/A	N/A	N/A
2	Notebook PC	DELL	PPT	N/A	Non-Shielded, 0.8m
3	Monitor	Dell	2407WFPb	CN-0FC255-46633-638-1 MDS	Non-Shielded, 1.8m
4	IR Blaster	ZINWELL	N/A	N/A	N/A
5	Remote Control	ZINWELL	N/A	N/A	N/A
6	DVD PLAYER	Pioneer	DV-S969Avi	EAMP004399LW	Non-Shielded, 1.8m
7	DVD PLAYER	Pioneer	DV-S969Avi	EAMP004349LW	Non-Shielded, 1.8m
8	DVD PLAYER	Pioneer	DV-S969Avi	EAMP004305LW	Non-Shielded, 1.8m
9	DVD PLAYER	Pioneer	DV-989Avi-G	FEMP000538TA	Non-Shielded, 1.8m

Signal Cable Type		Signal cable Description
A	Test Fixture Cable	Non-Shielded, 0.15m
B	USB to RS-232 Cable	Shielded, 2.0m
C	USB to mini USB Cable	Shielded, 0.2m
D	VGA Cable	Shielded, 1.8m, with two ferrite cores bonded.
E	HDMI Cable	Shielded, 1.5m
F	IR Blaster Cable	Non-Shielded, 3.0m
G	HDMI Cable	Shielded, 1.5m
H	HDMI Cable	Shielded, 1.5m
I	HDMI Cable	Shielded, 1.5m
J	HDMI Cable	Shielded, 1.5m
K	YPbPr Cable	Non-Shielded, 0.3m

1.4. Configuration of tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute program "AppCom v3.0.3.5" on the Notebook PC.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press "OK" to start the continuous transmission.
- (5) Verify that the EUT works properly.

1.6. Test Facility

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : <http://tw.quietek.com/modules/myalbum/>

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

Site Description: File on
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 92195

Site Name: Quietek Corporation
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E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

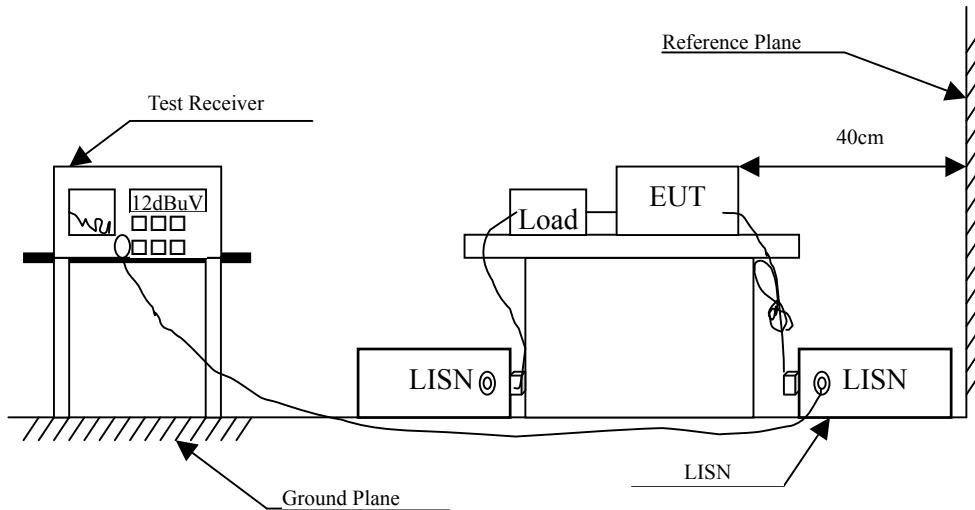
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2013	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2014	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2014	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar., 2013	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2014	
	No.1 Shielded Room				

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2009 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

The EUT was setup to ANSI C63.10: 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 1					
Quasi-Peak					
0.185	9.739	32.070	41.809	-23.191	65.000
0.263	9.742	28.600	38.342	-24.429	62.771
0.314	9.744	21.870	31.614	-29.700	61.314
0.466	9.751	22.210	31.961	-25.010	56.971
0.693	9.761	27.300	37.061	-18.939	56.000
1.685	9.816	16.340	26.156	-29.844	56.000
Average					
0.185	9.739	27.130	36.869	-18.131	55.000
0.263	9.742	21.990	31.732	-21.039	52.771
0.314	9.744	18.400	28.144	-23.170	51.314
0.466	9.751	18.300	28.051	-18.920	46.971
0.693	9.761	11.160	20.921	-25.079	46.000
1.685	9.816	4.150	13.966	-32.034	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter (5190MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV

LINE 2
Quasi-Peak

0.189	9.748	35.510	45.258	-19.628	64.886
0.267	9.752	28.700	38.452	-24.205	62.657
0.439	9.750	22.960	32.710	-25.033	57.743
0.627	9.758	23.320	33.078	-22.922	56.000
0.713	9.767	25.900	35.667	-20.333	56.000
0.802	9.776	22.460	32.236	-23.764	56.000

Average

0.189	9.748	30.960	40.708	-14.178	54.886
0.267	9.752	23.780	33.532	-19.125	52.657
0.439	9.750	19.000	28.750	-18.993	47.743
0.627	9.758	13.450	23.208	-22.792	46.000
0.713	9.767	11.750	21.517	-24.483	46.000
0.802	9.776	5.970	15.746	-30.254	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter (5270MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
LINE 1					
Quasi-Peak					
0.193	9.738	34.480	44.218	-20.553	64.771
0.255	9.741	28.580	38.321	-24.679	63.000
0.439	9.750	21.490	31.240	-26.503	57.743
0.658	9.759	27.290	37.049	-18.951	56.000
0.752	9.764	24.010	33.774	-22.226	56.000
1.619	9.813	15.650	25.463	-30.537	56.000
Average					
0.193	9.738	24.390	34.128	-20.643	54.771
0.255	9.741	22.700	32.441	-20.559	53.000
0.439	9.750	17.660	27.410	-20.333	47.743
0.658	9.759	10.230	19.989	-26.011	46.000
0.752	9.764	11.100	20.864	-25.136	46.000
1.619	9.813	2.720	12.533	-33.467	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter (5270MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 2					
Quasi-Peak					
0.193	9.748	34.820	44.568	-20.203	64.771
0.255	9.751	29.290	39.041	-23.959	63.000
0.443	9.750	23.000	32.750	-24.879	57.629
0.693	9.761	27.340	37.101	-18.899	56.000
0.834	9.777	21.860	31.637	-24.363	56.000
1.716	9.828	15.470	25.298	-30.702	56.000
Average					
0.193	9.748	32.390	42.138	-12.633	54.771
0.255	9.751	26.760	36.511	-16.489	53.000
0.443	9.750	19.630	29.380	-18.249	47.629
0.693	9.761	12.710	22.471	-23.529	46.000
0.834	9.777	5.400	15.177	-30.823	46.000
1.716	9.828	1.400	11.228	-34.772	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “■” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter (5550MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 1					
Quasi-Peak					
0.193	9.738	34.460	44.198	-20.573	64.771
0.267	9.742	28.270	38.012	-24.645	62.657
0.443	9.750	22.180	31.930	-25.699	57.629
0.705	9.762	26.330	36.092	-19.908	56.000
0.818	9.767	22.220	31.987	-24.013	56.000
1.548	9.810	12.410	22.220	-33.780	56.000
Average					
0.193	9.738	29.410	39.148	-15.623	54.771
0.267	9.742	25.200	34.942	-17.715	52.657
0.443	9.750	18.480	28.230	-19.399	47.629
0.705	9.762	7.580	17.342	-28.658	46.000
0.818	9.767	6.330	16.097	-29.903	46.000
1.548	9.810	4.480	14.290	-31.710	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “ ” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter (5550MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 2					
Quasi-Peak					
0.189	9.748	34.620	44.368	-20.518	64.886
0.252	9.751	28.460	38.211	-24.875	63.086
0.443	9.750	22.900	32.650	-24.979	57.629
0.666	9.760	27.710	37.470	-18.530	56.000
0.775	9.775	23.410	33.185	-22.815	56.000
1.697	9.827	16.170	25.997	-30.003	56.000
Average					
0.189	9.748	21.710	31.458	-23.428	54.886
0.252	9.751	25.870	35.621	-17.465	53.086
0.443	9.750	19.780	29.530	-18.099	47.629
0.666	9.760	8.090	17.850	-28.150	46.000
0.775	9.775	9.430	19.205	-26.795	46.000
1.697	9.827	7.590	17.417	-28.583	46.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. “■” means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

3. Maximum conducted output power

3.1. Test Equipment

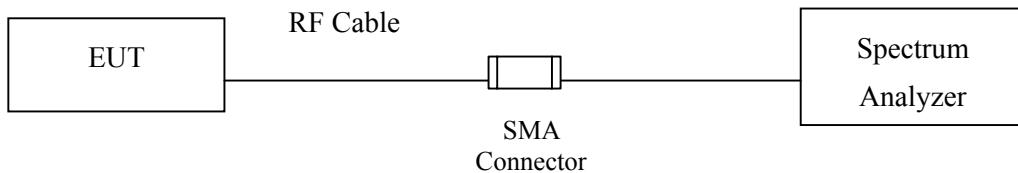
Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Power Meter	Anritsu	ML2495A/6K00003357	May, 2013
X Power Sensor	Anritsu	MA2411B/0738448	Jun., 2013
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

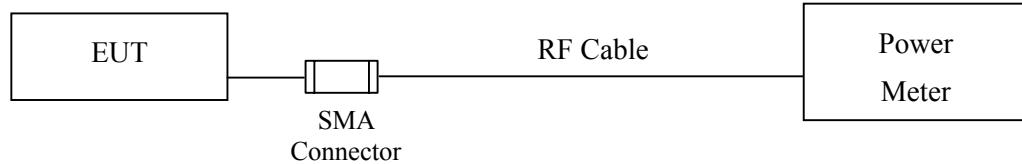
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

26dBc Occupied Bandwidth



Conduction Power Measurement



3.3. Limits

- (1) For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10\log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the Maximum conducted output power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (2) For the band 5.25-5.35 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10\log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the Maximum conducted output power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.825 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1W or $17 \text{ dBm} + 10\log B$, where B is the 26-dB emission bandwidth in MHz. If transmitting antenna of directional gain greater than 6 dBi are used, the Maximum conducted output power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

3.4. Test Procedure

As an alternative to FCC KDB-789033, the EUT maximum conducted output power was measured with an average power meter employing a video bandwidth greater than 6dB BW of the emission under test. Maximum conducted output power was read directly from the meter across all data rates, and across three channels within each sub-band. Special care was used to make sure that the EUT was transmitting in continuous mode. This method exceeds the limitations of FCC KDB-789033, and provides more accurate measurements.

3.5. Uncertainty

$\pm 1.27 \text{ dB}$

3.6. Test Result of Maximum conducted output power

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Maximum conducted output power
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

CHAIN A

Cable loss=1dB		Maximum conducted output power		
Channel No.	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit
38	5190	63	13.94	<17dBm
46	5230	63	13.95	<17dBm
54	5270	63	15.13	<24dBm
62	5310	63	15.21	<24dBm
102	5510	63	15.03	<24dBm
110	5550	63	15.07	<24dBm
134	5670	63	15.03	<24dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

CHAIN B

Cable loss=1dB		Maximum conducted output power		
Channel No.	Frequency (MHz)	Data Rata (Mbps)	Measurement Level (dBm)	Required Limit
38	5190	63	13.96	<17dBm
46	5230	63	13.95	<17dBm
54	5270	63	15.11	<24dBm
62	5310	63	15.12	<24dBm
102	5510	63	15.11	<24dBm
110	5550	63	15.12	<24dBm
134	5670	63	15.07	<24dBm

Note: Maximum conducted output power Value =Reading value on average power meter + cable loss

Maximum conducted output power Measurement:**(CHAIN A+ B)**

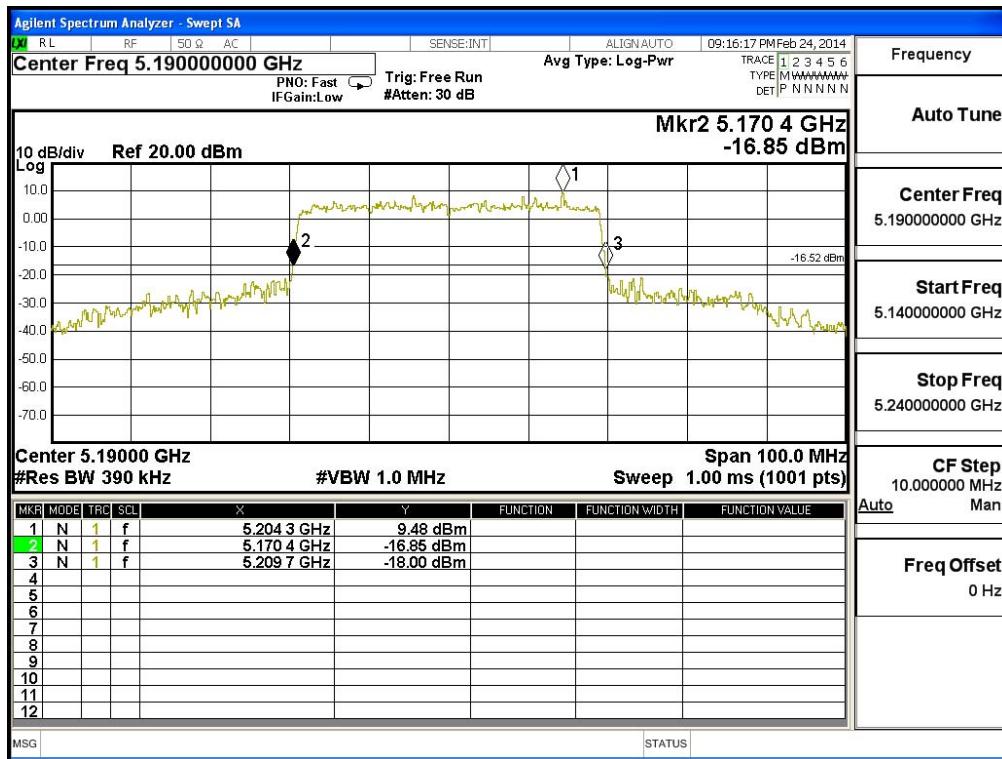
Channel Number	Frequency (MHz)	26dB Bandwidth (MHz)	Chain A Power (dBm)	Chain B Power (dBm)	Output Power (dBm)	Output Power Limit	
						(dBm)	(dBm+10log(BW))
38	5190	39.100	13.94	13.96	16.96	17	19.94
46	5230	39.000	13.95	13.95	16.96	17	19.94
54	5270	39.000	15.13	15.11	18.13	24	26.97
62	5310	39.200	15.21	15.12	18.18	24	26.97
102	5510	39.100	15.03	15.11	18.08	24	26.95
110	5550	39.100	15.07	15.12	18.11	24	26.97
134	5670	39.100	15.03	15.07	18.06	24	27.93

Note:

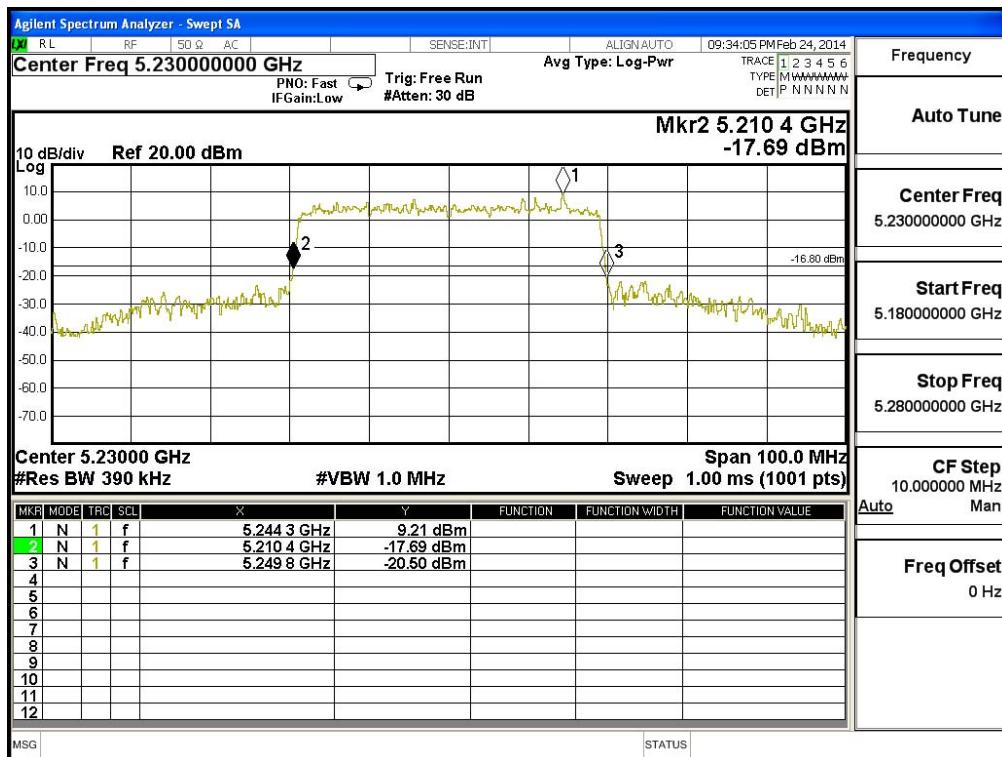
1. Power Output Value =Reading value on average power meter + cable loss
2. Output Power (dBm) = $10\log$ (Chain A Power (mW)+ Chain B Power (mW)).
3. 26 dB Bandwidth is the bandwidth of chain A or chain B whichever is less bandwidth, output power limitation is more stringent.

26dBc Occupied Bandwidth:

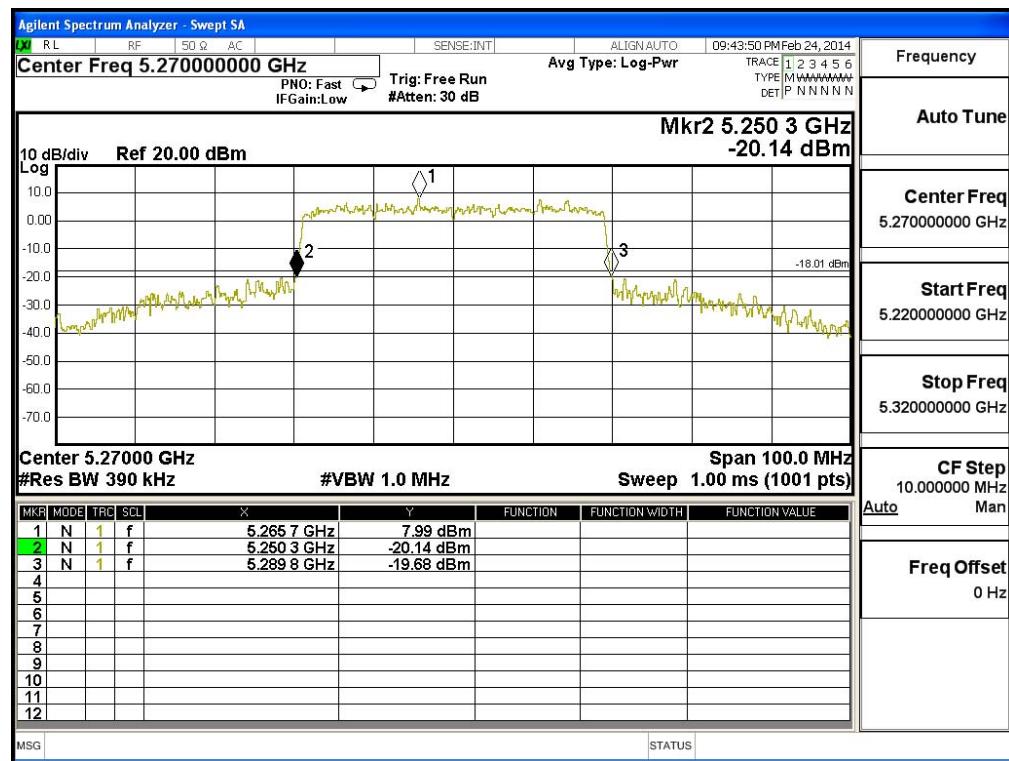
Channel 38 – Chain A



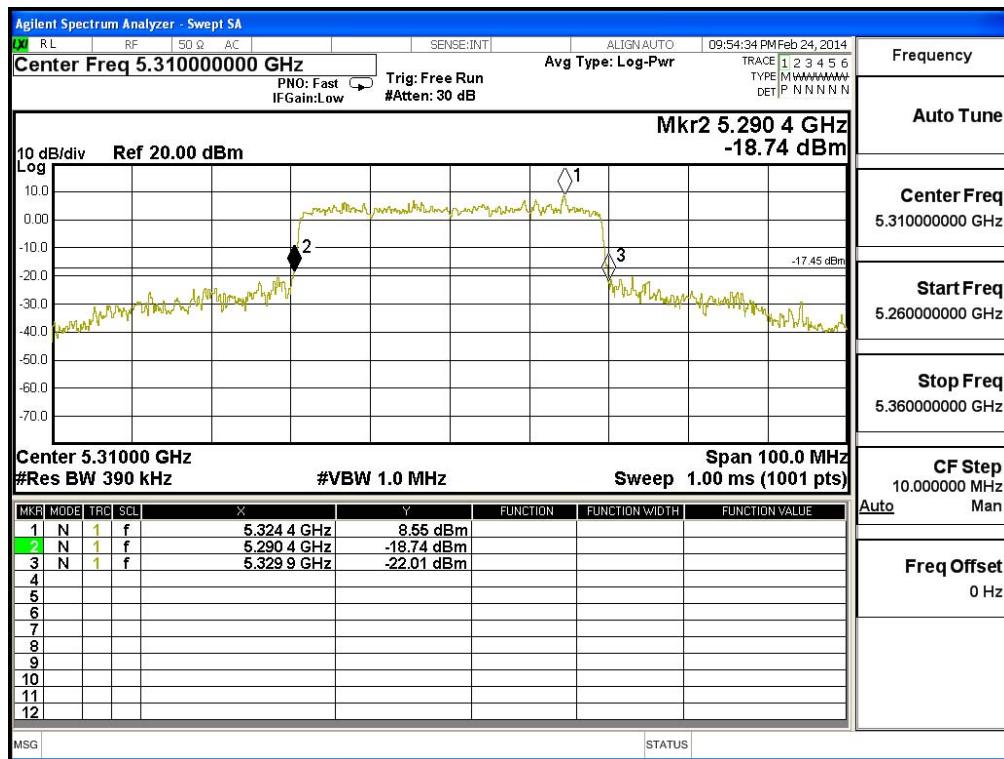
Channel 46 – Chain A



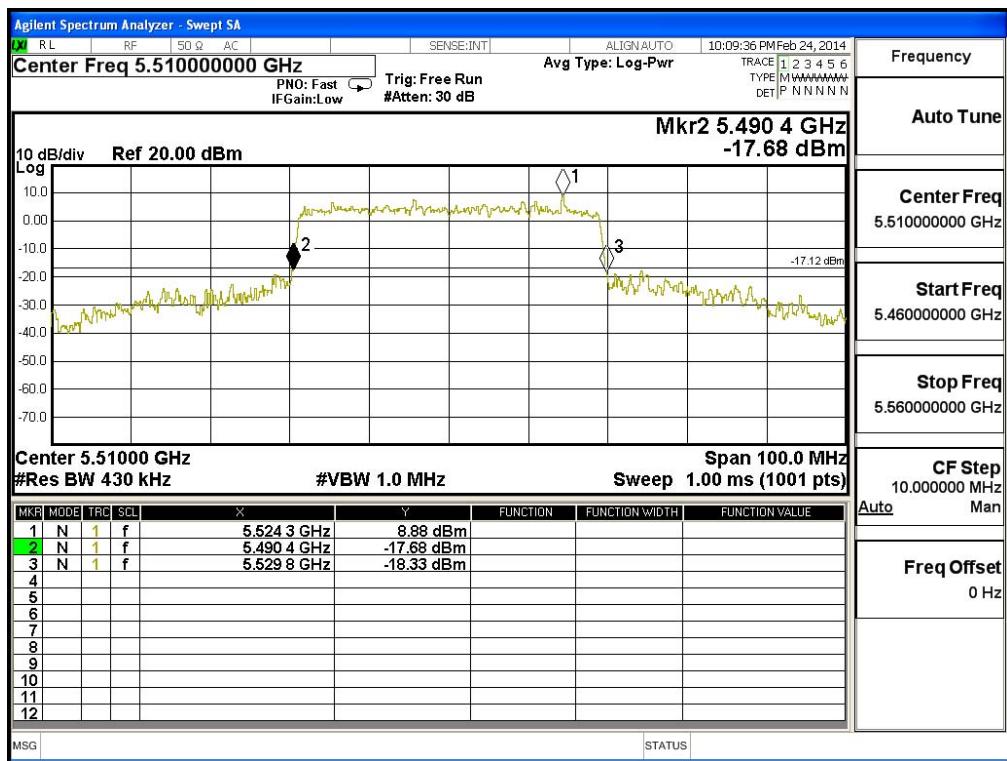
Channel 54 – Chain A



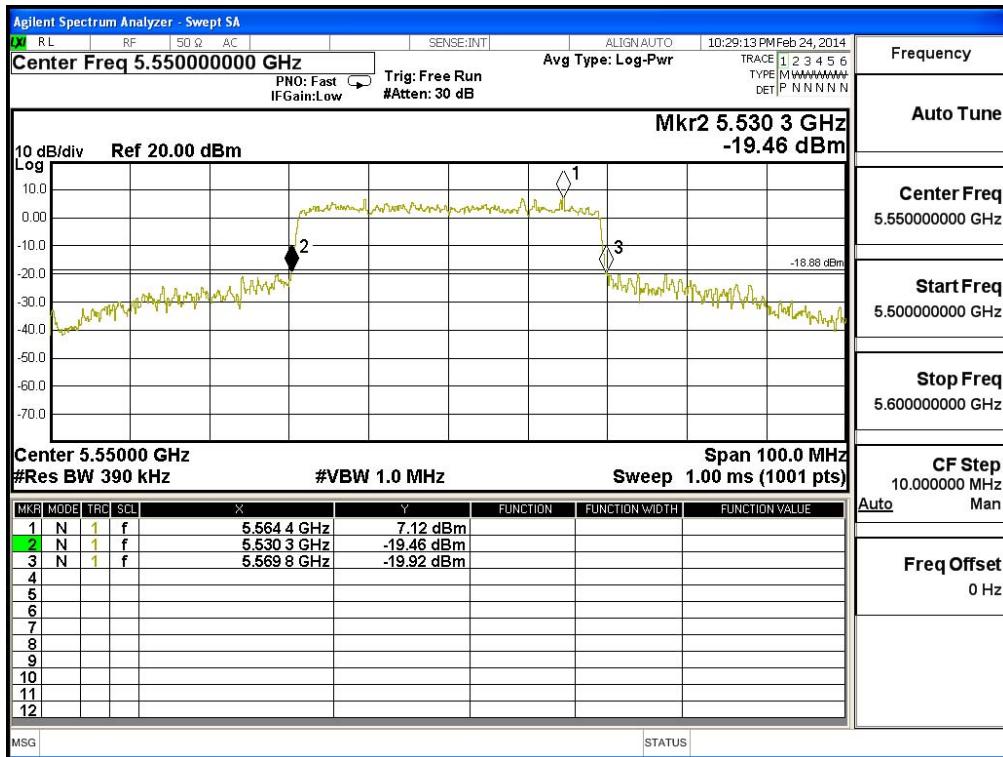
Channel 62 – Chain A



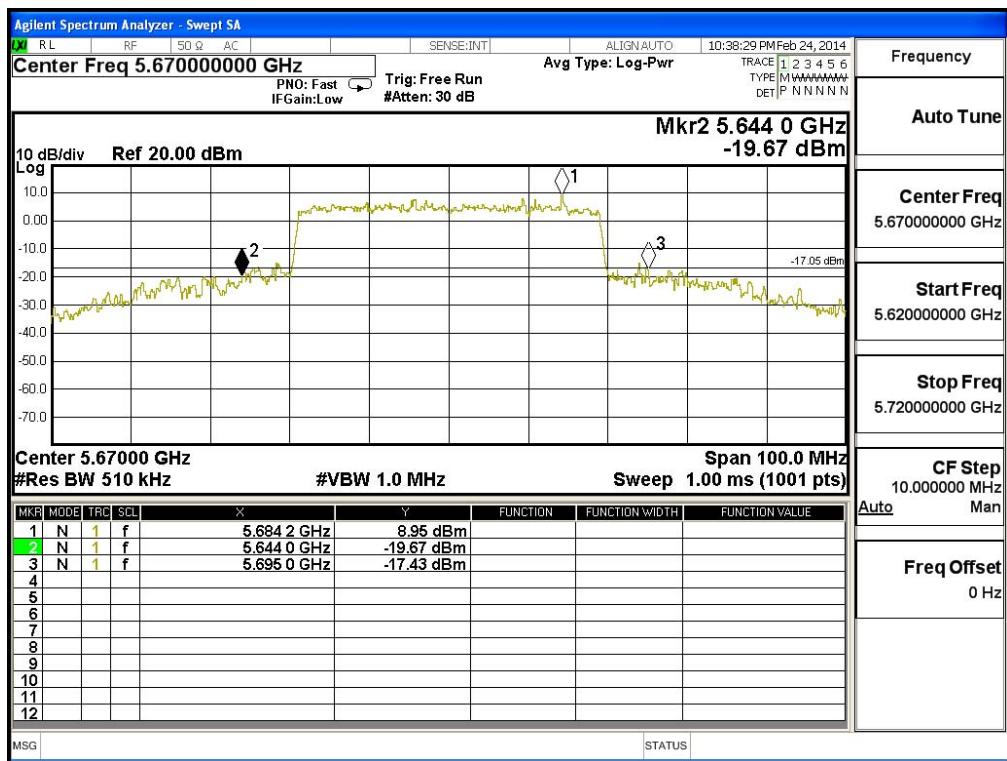
Channel 102 – Chain A



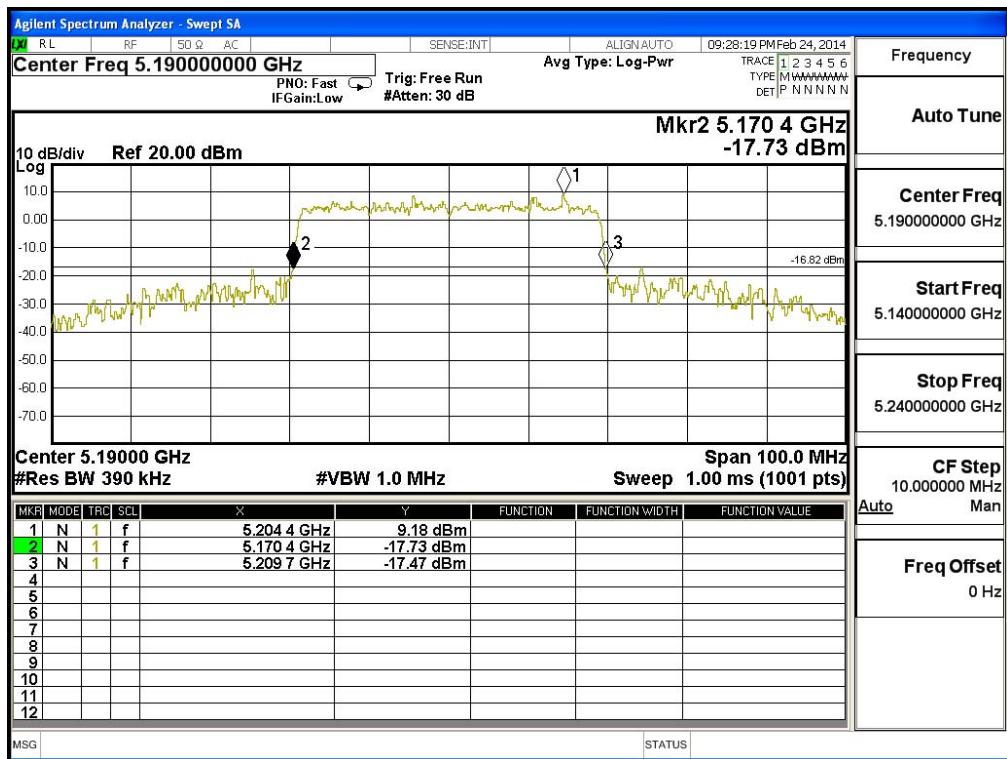
Channel 110 – Chain A



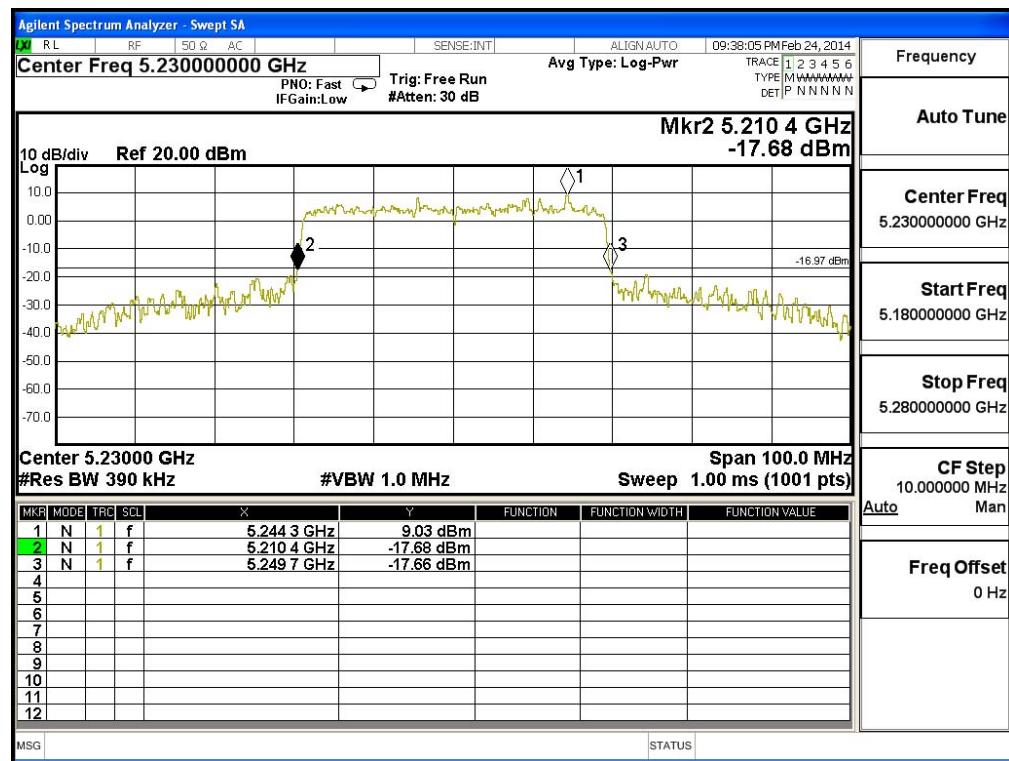
Channel 134 – Chain A



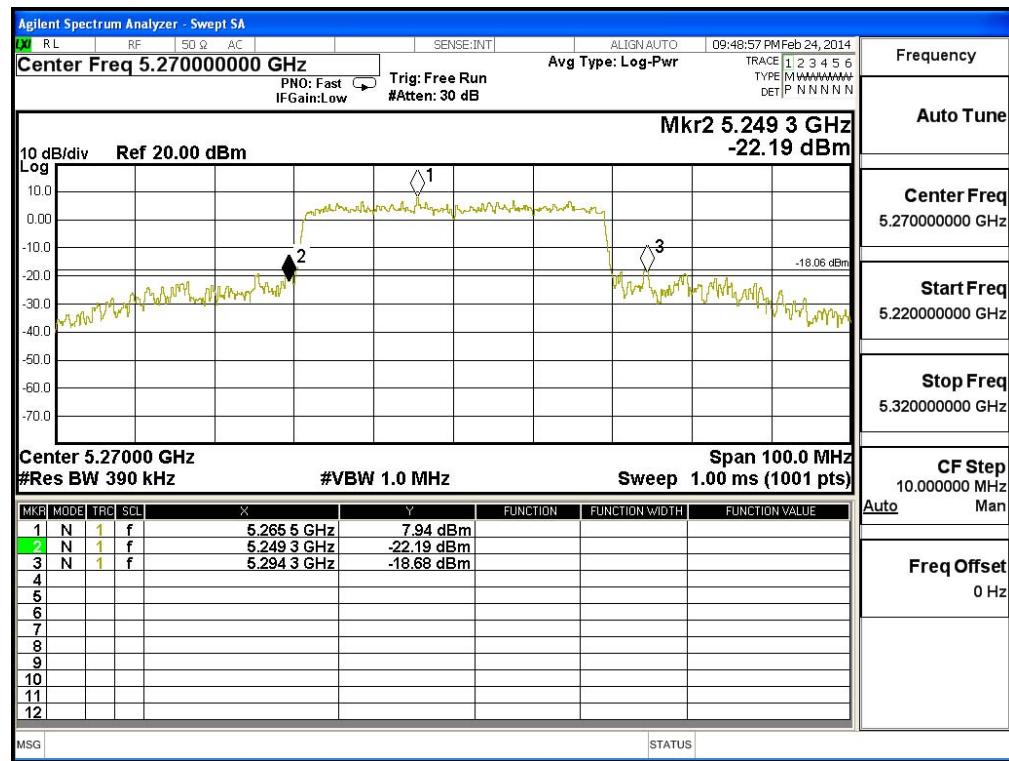
Channel 38 – Chain B



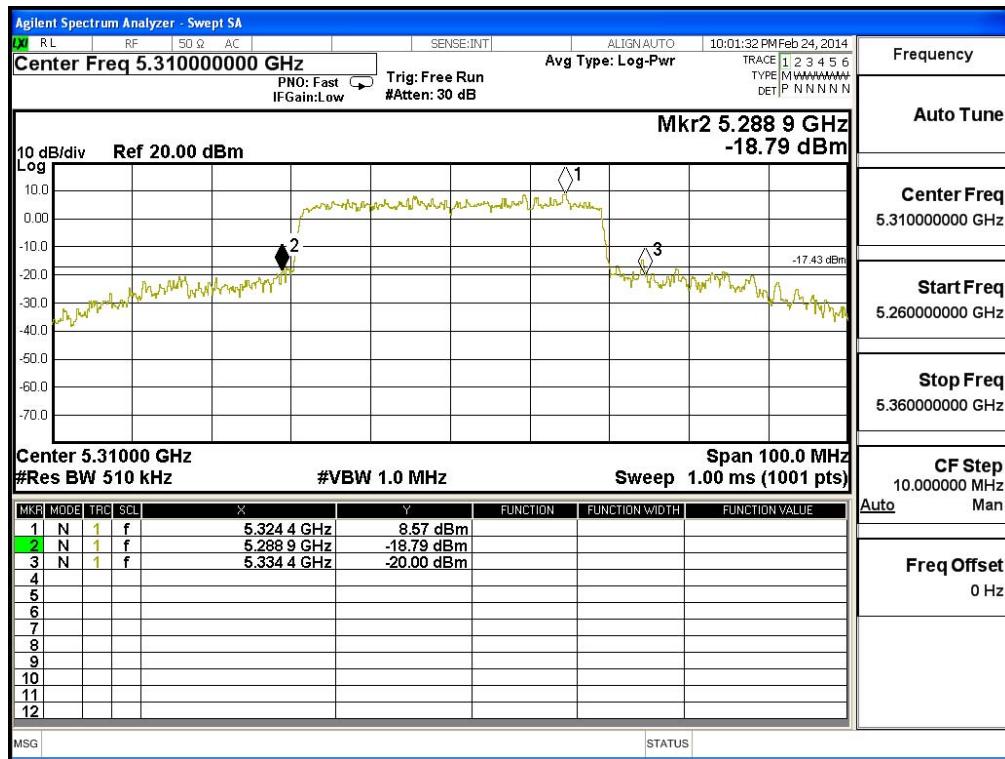
Channel 46 – Chain B



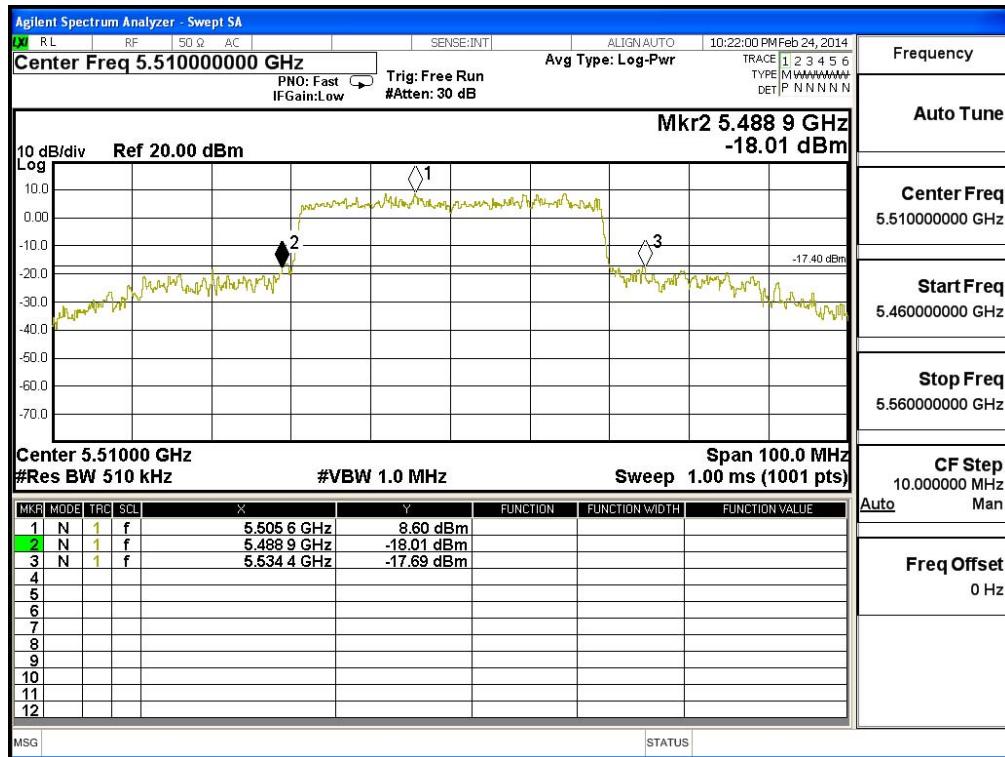
Channel 54 – Chain B



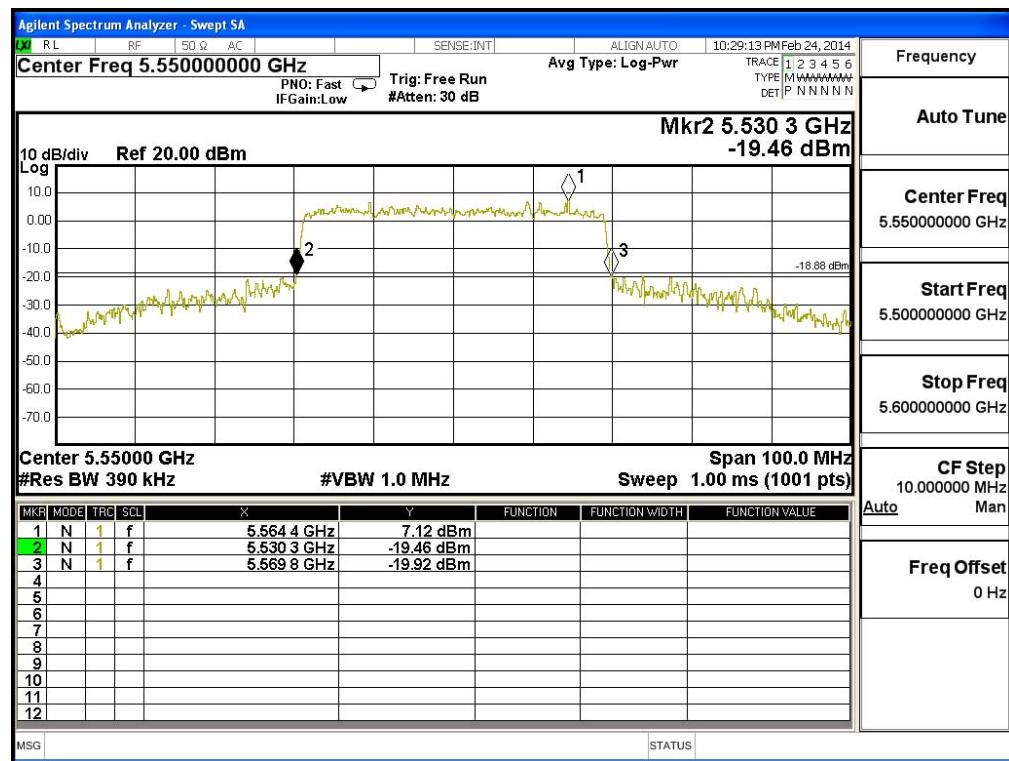
Channel 62 – Chain B



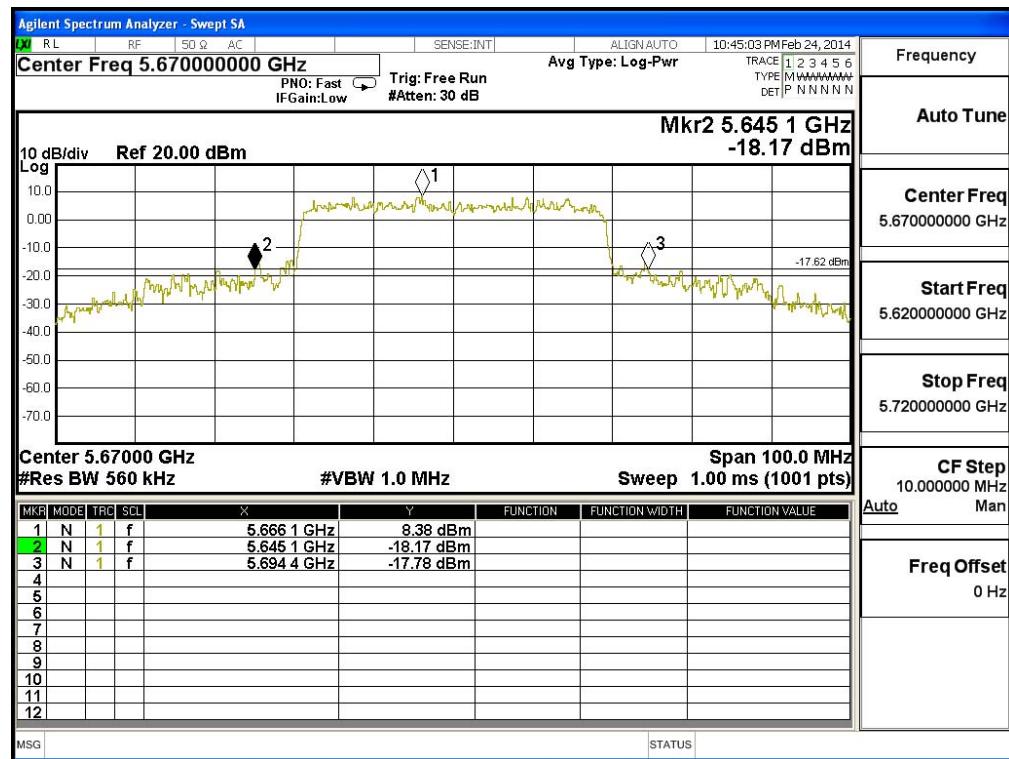
Channel 102 – Chain B



Channel 110 – Chain B



Channel 134 – Chain B



4. Peak Power Spectral Density

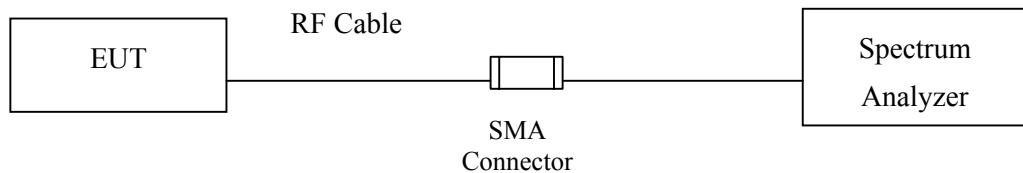
4.1. Test Equipment

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2013
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2013
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

4.2. Test Setup



4.3. Limits

- (1) For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (2) For the band 5.25-5.35 GHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.
- (3) For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band. If transmitting antenna of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

4.4. Test Procedure

The EUT was setup to ANSI C63.10: 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

4.5. Uncertainty

± 1.27 dB

4.6. Test Result of Peak Power Spectral Density

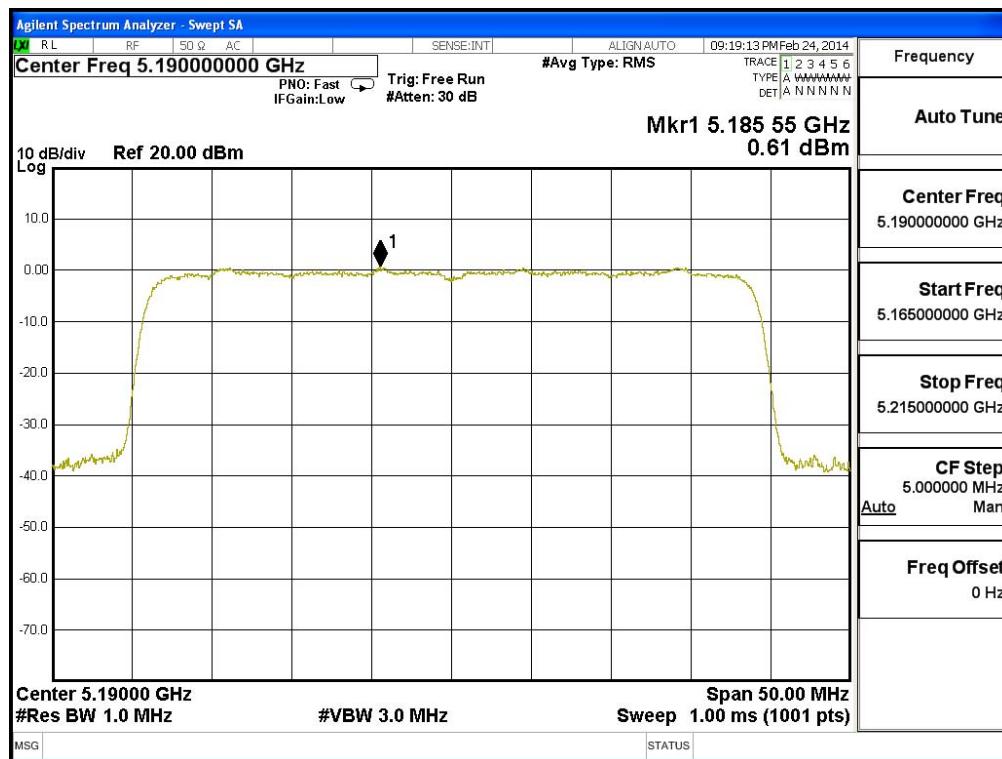
Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Peak Power Spectral Density
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

5190MHz

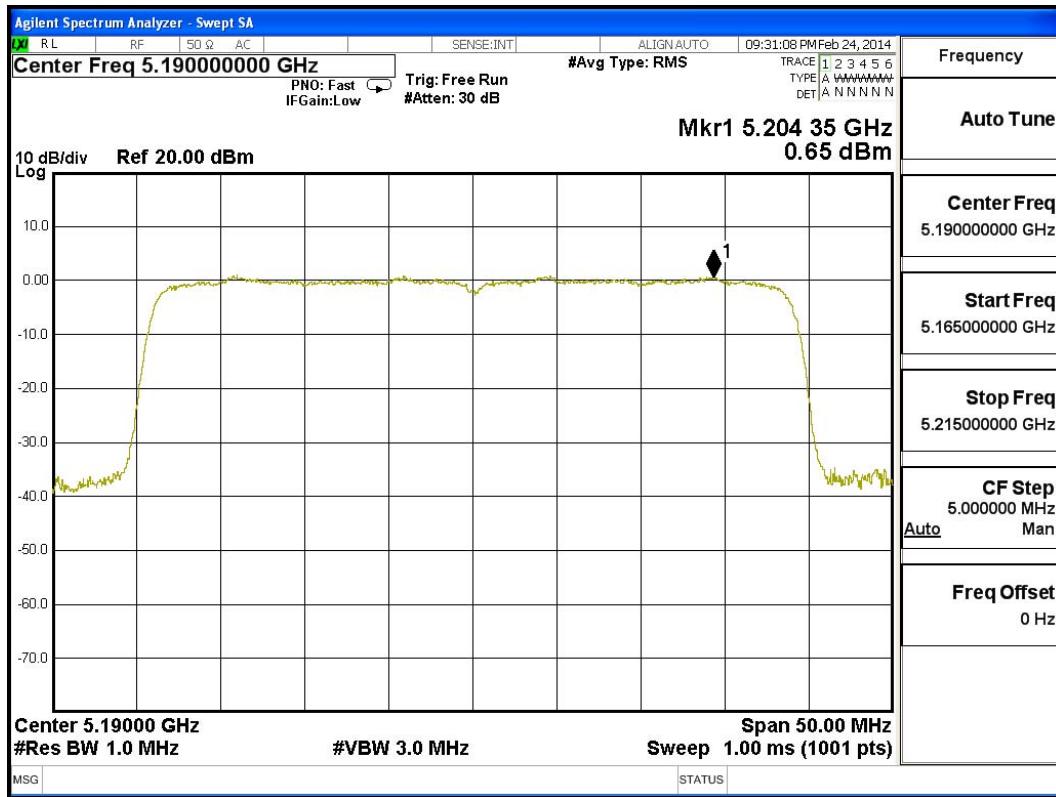
CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)1	Limit	Result
A	0.610	3.620	< 4dBm	Pass
B	1.370	3.660	< 4dBm	Pass

Note 1: The quantity $10 \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Channel 38 – Chain A



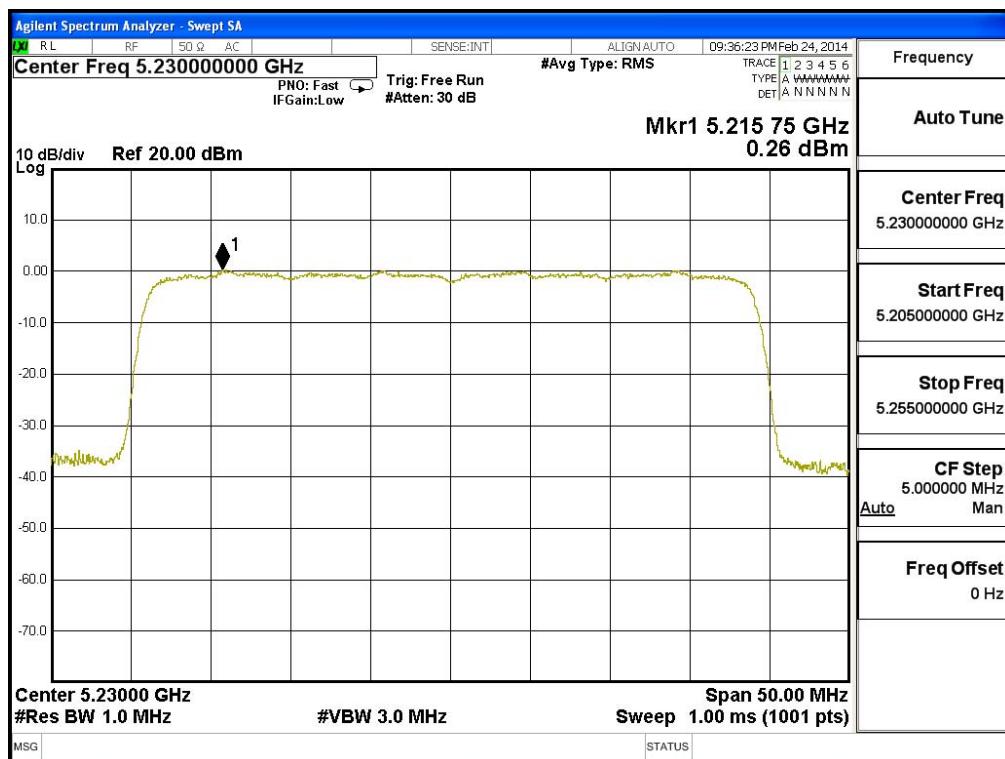
Channel 38 – Chain B



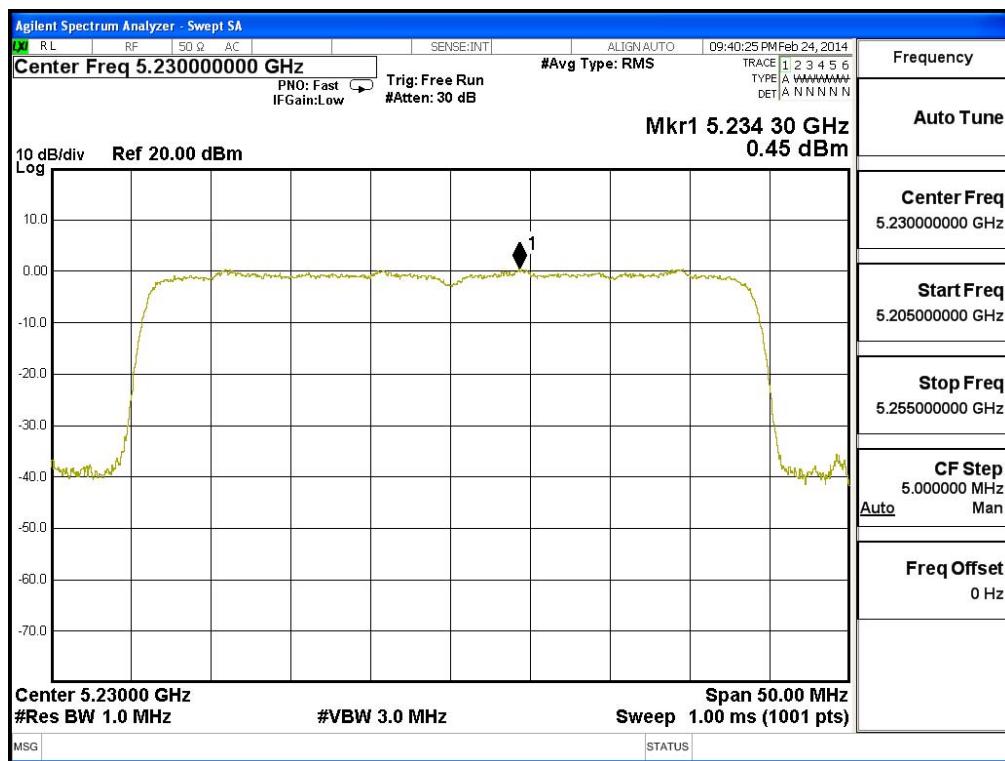
5230MHz

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm) ¹	Limit	Result
A	0.260	3.270	< 4dBm	Pass
B	0.450	3.460	< 4dBm	Pass

Note 1: The quantity $10 \times \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Channel 46 – Chain A


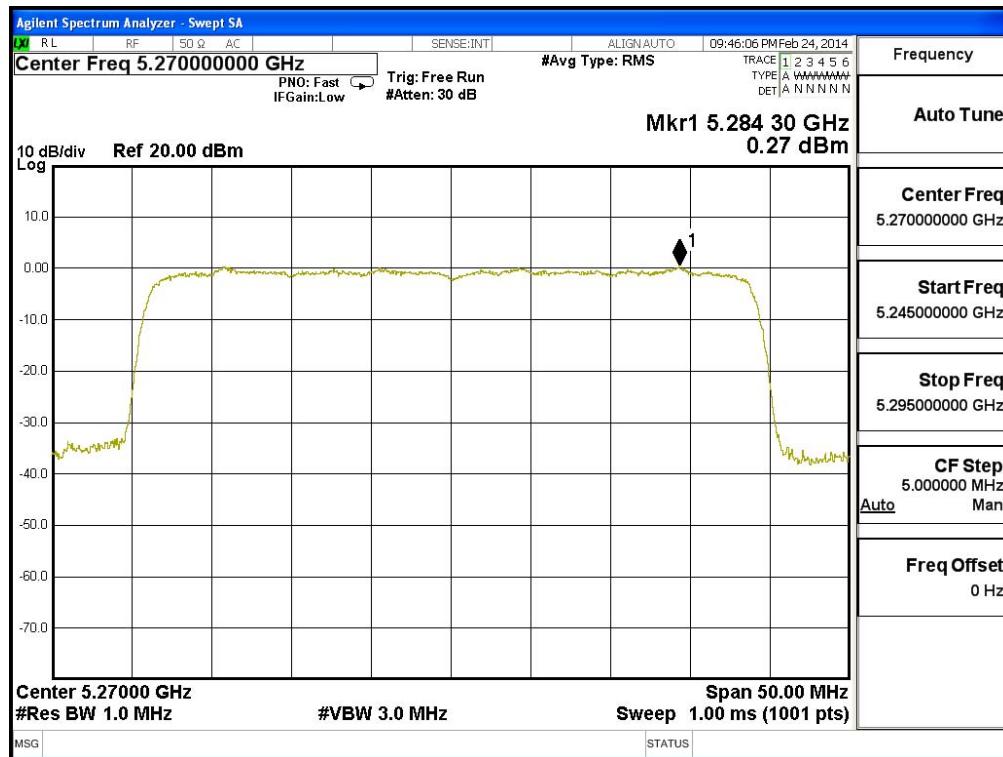
Channel 46 – Chain B



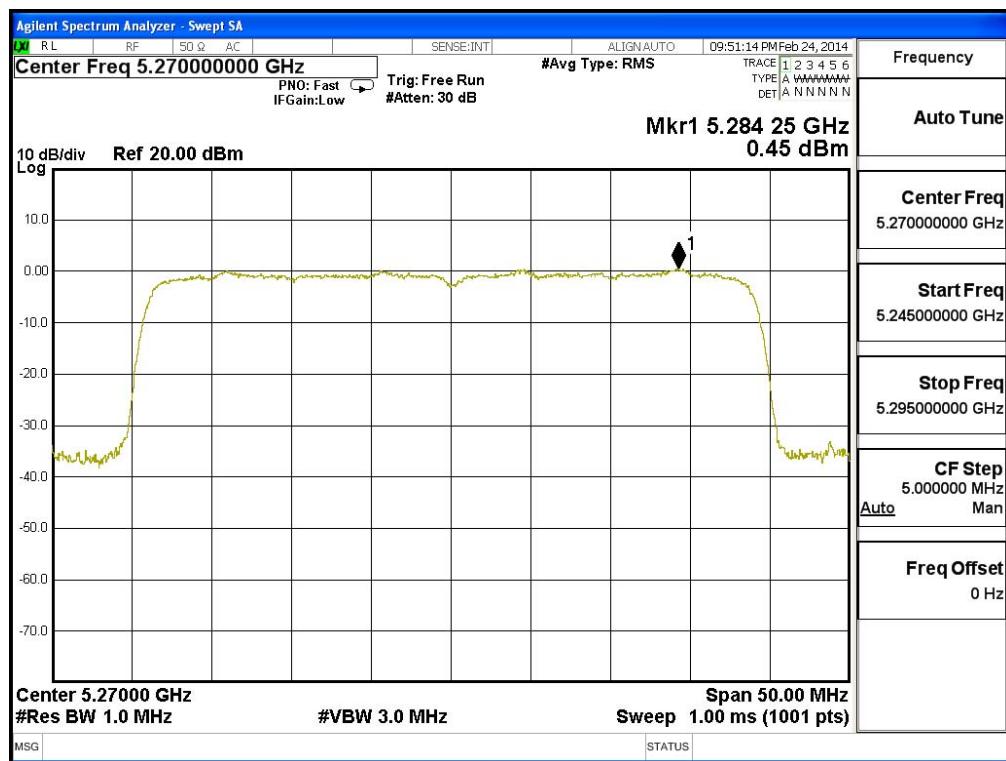
5270MHz

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm) ¹	Limit	Result
A	0.270	3.280	< 11dBm	Pass
B	0.450	3.460	< 11dBm	Pass

Note 1: The quantity $10 \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Channel 54 – Chain A


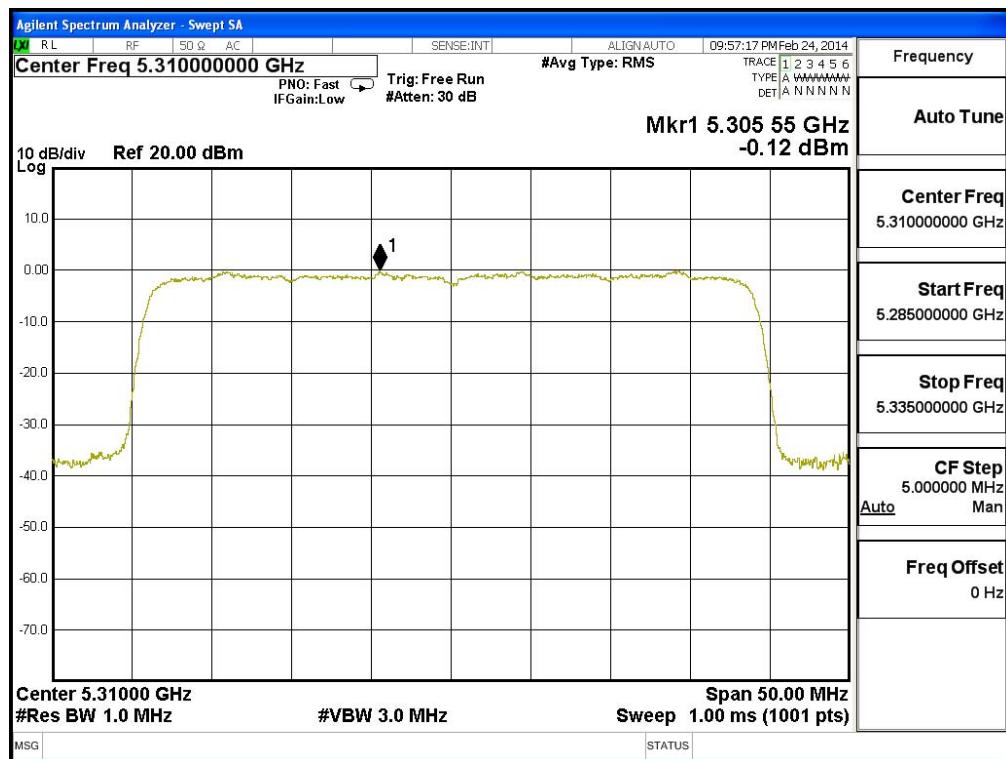
Channel 54 – Chain B



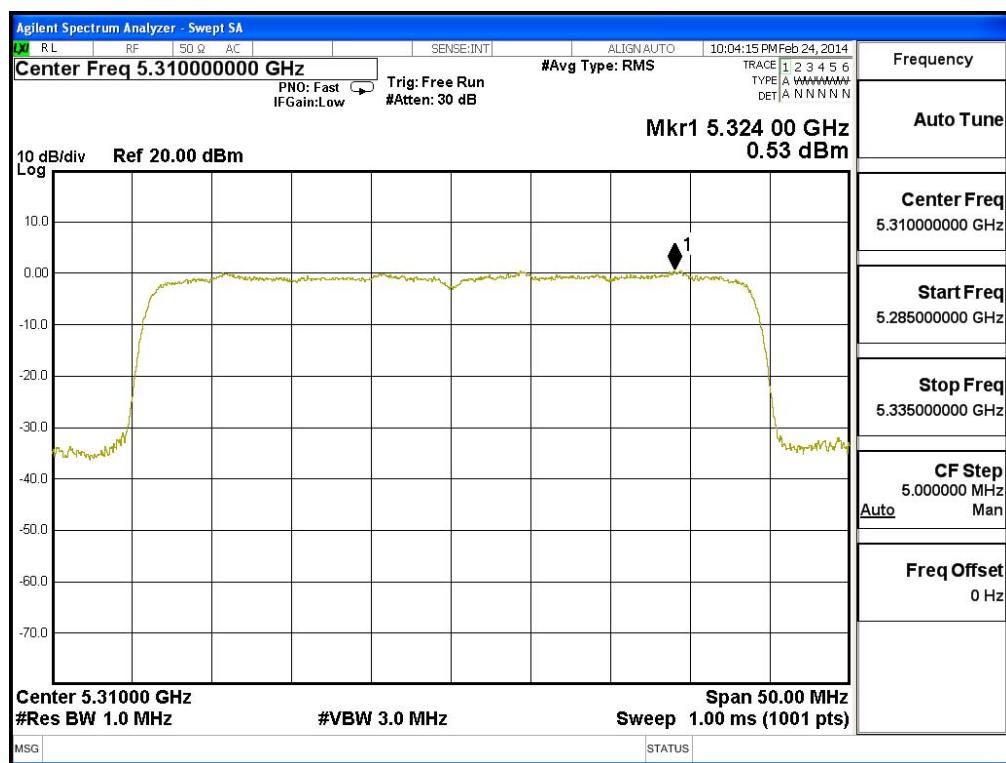
5310MHz

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm) ¹	Limit	Result
A	-0.120	2.890	< 11dBm	Pass
B	0.530	3.540	< 11dBm	Pass

Note 1: The quantity $10 \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Channel 62 – Chain A


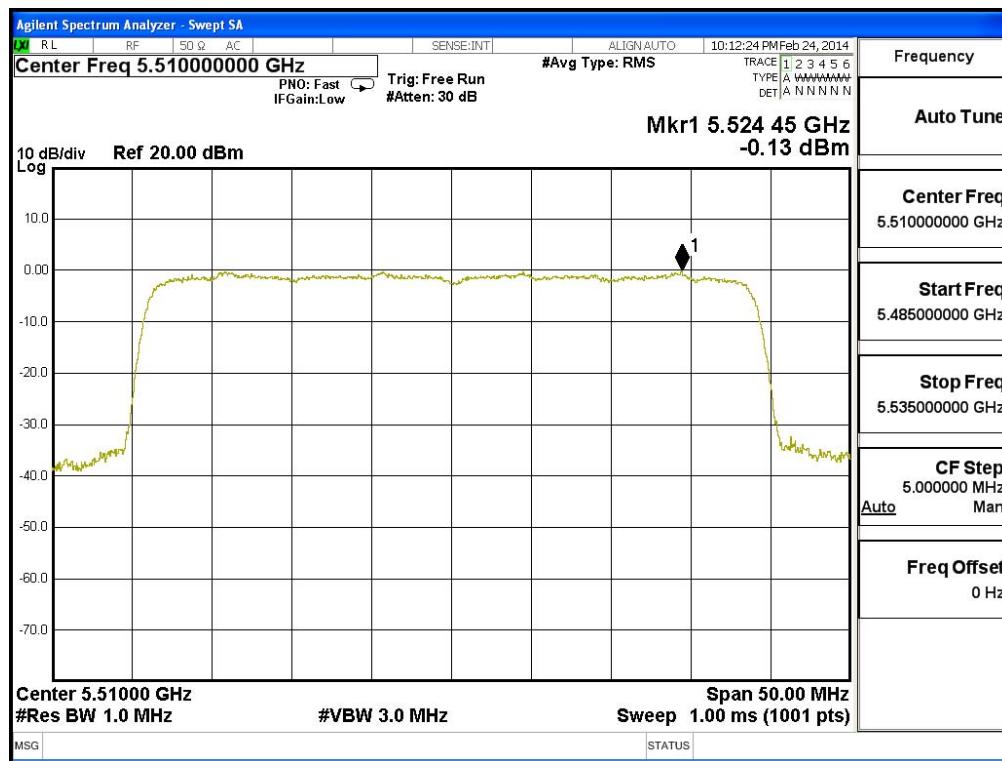
Channel 62 – Chain B



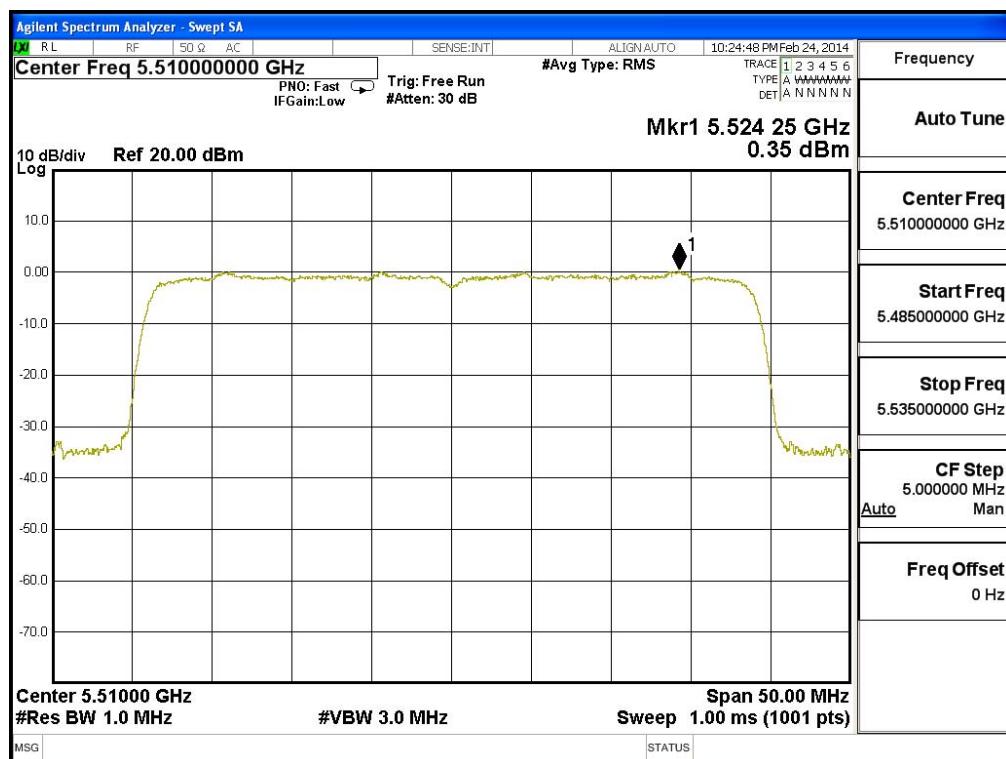
5510MHz

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm) ₁	Limit	Result
A	-0.130	2.880	< 11dBm	Pass
B	0.350	3.360	< 11dBm	Pass

Note 1: The quantity $10 * \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Channel 102 – Chain A


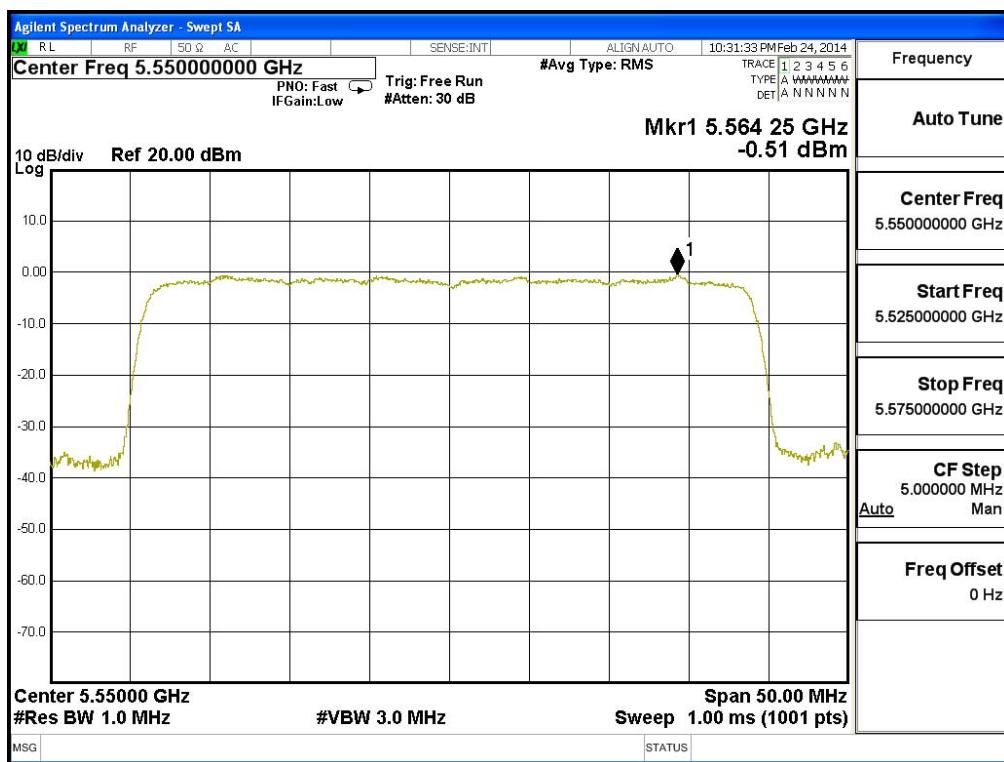
Channel 102 – Chain B



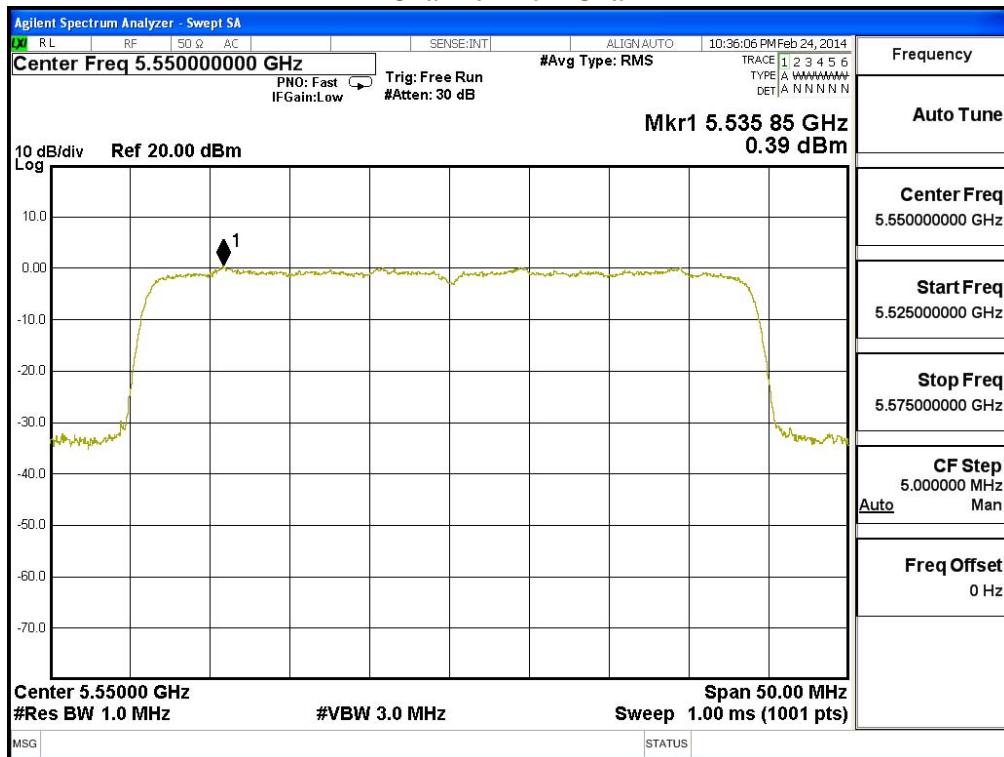
5550MHz

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm) ¹	Limit	Result
A	-0.510	2.500	< 11dBm	Pass
B	0.390	3.400	< 11dBm	Pass

Note 1: The quantity $10 \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Channel 110 – Chain A


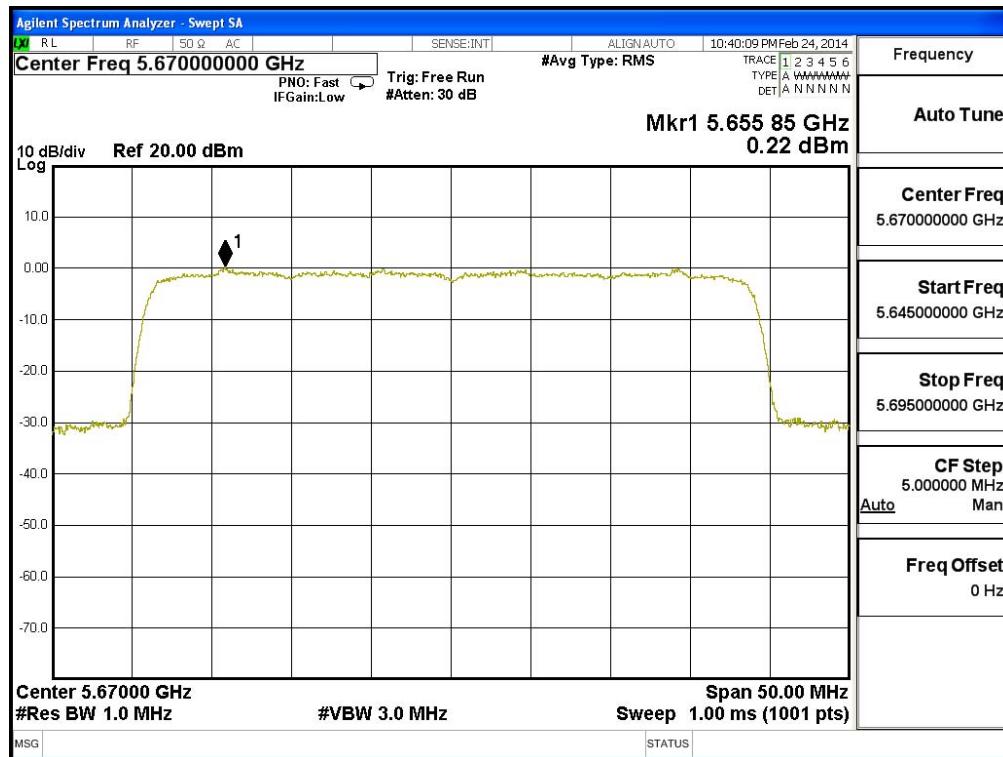
Channel 110 – Chain B



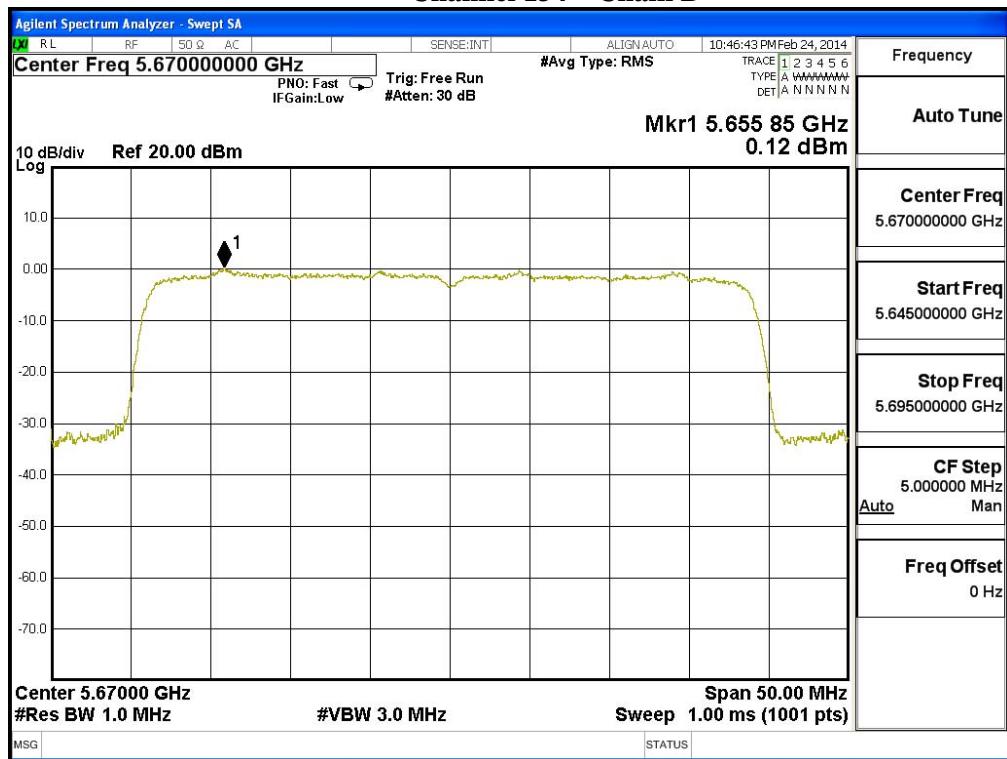
5670MHz

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm) ¹	Limit	Result
A	0.220	3.230	< 11dBm	Pass
B	0.120	3.130	< 11dBm	Pass

Note 1: The quantity $10 \log 2$ (two antennas) is added to the spectrum peak value according to document 662911 D01.

Channel 134 – Chain A


Channel 134 – Chain B



5. Peak Excursion

5.1. Test Equipment

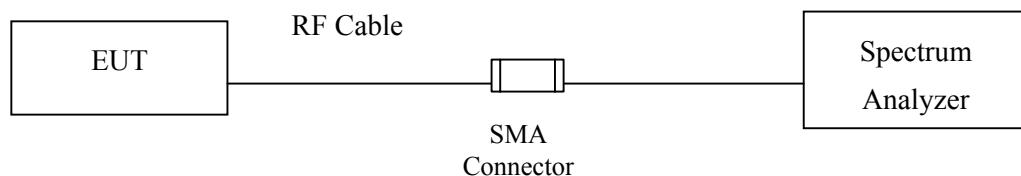
Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2013
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2013
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

5.2. Test Setup

Conduction Power Measurement



5.3. Limits

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the Maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

5.4. Test Procedure

The EUT was setup to ANSI C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

Step 1: Set the spectrum analyzer or EMI receiver span to view the entire emission bandwidth.

Step 2: Find the maximum of the peak-max-hold spectrum.

(Set RBW = 1 MHz, VBW \geq 3 MHz, Detector = peak, Trace mode = max-hold,

Allow the sweeps to continue until the trace stabilizes, Use the peak search function to find the peak of the spectrum.)

Step 3: Use the procedure found under KDB-789033 F) to measure the PPSD.

Step 4: Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

5.5. Uncertainty

\pm 1.27 dB

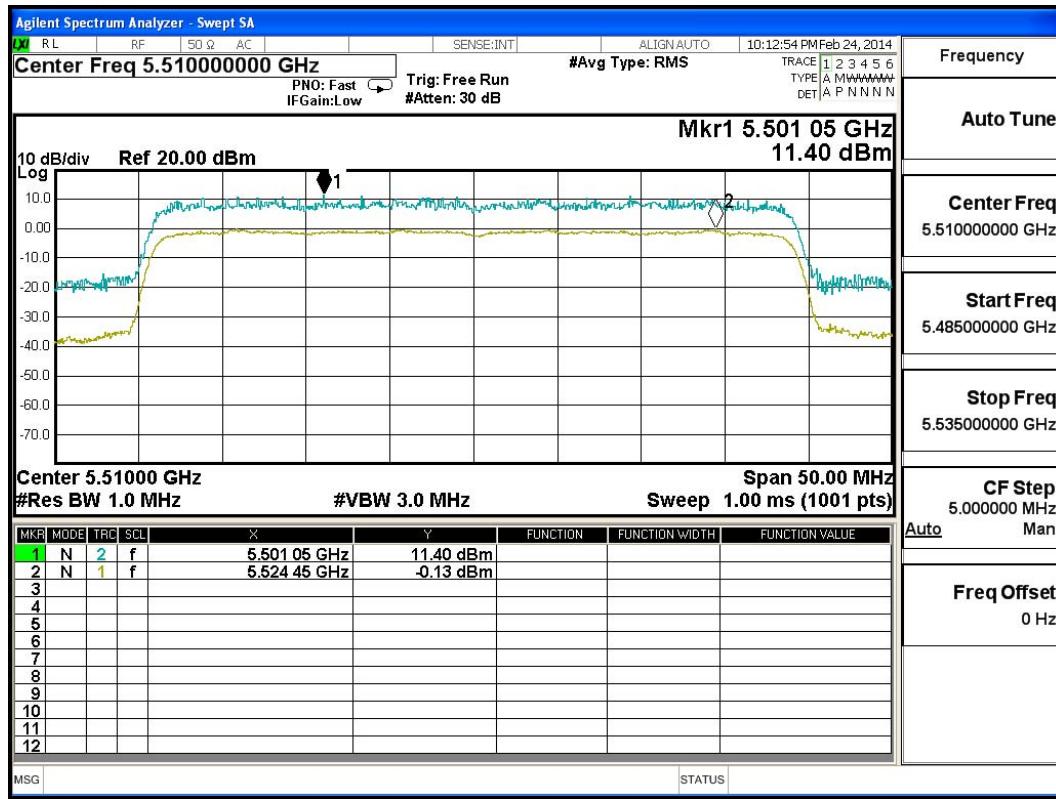
5.6. Test Result of Peak Excursion

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Peak Excursion
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter

Chain A

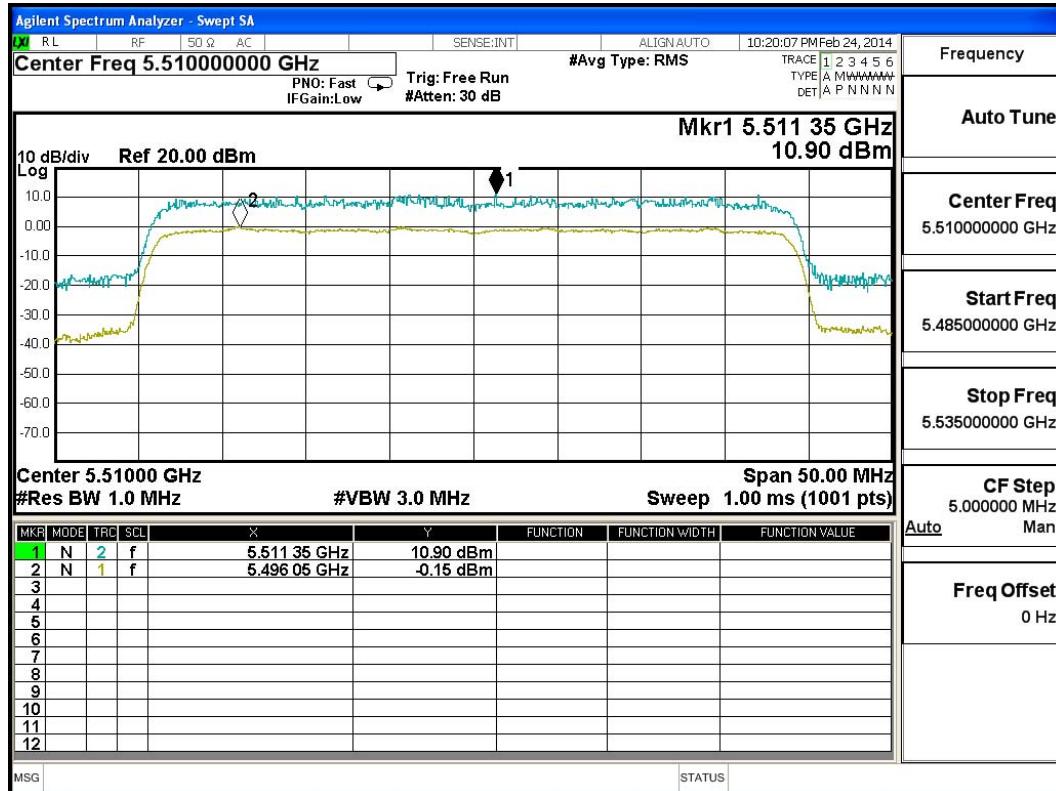
Channel No.	Frequency (MHz)	Data Rate (Mbps)	Measurement Level (dB)	Required Limit (dB)	Result
102	5510	63	11.530	<13	Pass

Channel 102:



Chain B

Channel No.	Frequency (MHz)	Data Rate (Mbps)	Measurement Level (dB)	Required Limit (dB)	Result
102	5510	63	11.050	<13	Pass

Channel 102:


6. Radiated Emission

6.1. Test Equipment

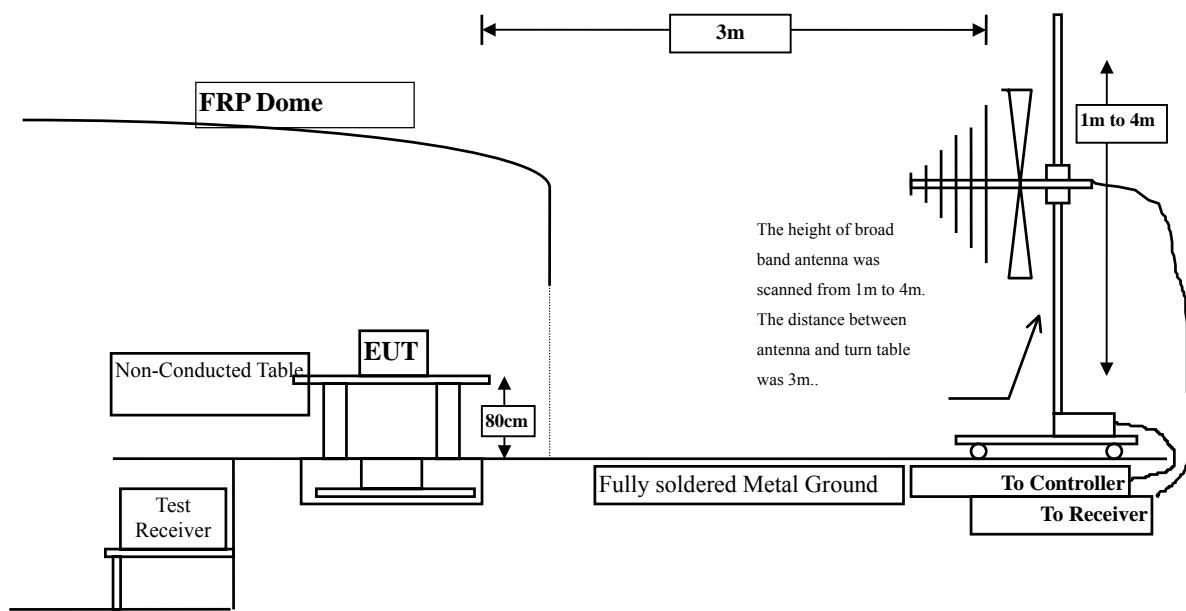
The following test equipments are used during the radiated emission test:

Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Loop Antenna	Teseq	HLA6120 / 26739	Jul., 2013
	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2013
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2013
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2013
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2013
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2013
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/925975	Mar., 2014
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2013
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2014
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

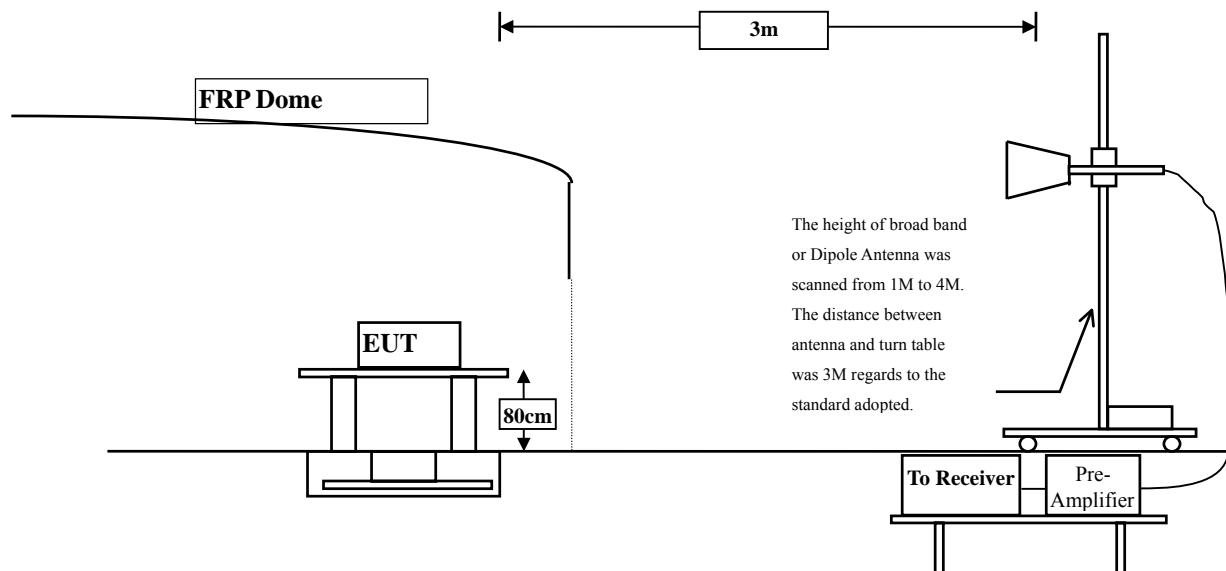
Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

6.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency MHz	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

6.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009 and tested according to FCC KDB-789033 test procedure for compliance to FCC 47CFR 15. 407 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10:2009 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured in the Open Area Test Site on the Final Measurement.

The measurement frequency range from 9kHz - 10th Harmonic of fundamental was investigated.

6.5. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

6.6. Test Result of Radiated Emission

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
10380.000	12.939	37.650	50.589	-23.411	74.000
15570.000	*	*	*	*	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
31140.000	*	*	*	*	74.000
36330.000	*	*	*	*	74.000
Average Detector:					
--	*	*	*	*	54.000
15570.000	*	*	*	*	54.000
20760.000	*	*	*	*	54.000
25950.000	*	*	*	*	54.000
31140.000	*	*	*	*	54.000
36330.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
10380.000	13.796	40.450	54.246	-19.754	74.000
15570.000	*	*	*	*	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
31140.000	*	*	*	*	74.000
36330.000	*	*	*	*	74.000
Average Detector:					
10380.000	13.796	32.150	45.946	-8.054	54.000
15570.000	*	*	*	*	54.000
20760.000	*	*	*	*	54.000
25950.000	*	*	*	*	54.000
31140.000	*	*	*	*	54.000
36330.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5230MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
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Horizontal

Peak Detector:

10460.000	13.508	36.590	50.098	-23.902	74.000
15690.000	*	*	*	*	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
31380.000	*	*	*	*	74.000
36610.000	*	*	*	*	74.000

Average

Detector:

--	*	*	*	*	54.000
15690.000	*	*	*	*	54.000
20920.000	*	*	*	*	54.000
26150.000	*	*	*	*	54.000
31380.000	*	*	*	*	54.000
36610.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5230MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
10460.000	14.433	40.290	54.723	-19.277	74.000
15690.000	*	*	*	*	74.000
20920.000	*	*	*	*	74.000
26150.000	*	*	*	*	74.000
31380.000	*	*	*	*	74.000
36610.000	*	*	*	*	74.000
Average Detector:					
10460.000	14.433	33.090	47.523	-6.477	54.000
15690.000	*	*	*	*	54.000
20920.000	*	*	*	*	54.000
26150.000	*	*	*	*	54.000
31380.000	*	*	*	*	54.000
36610.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5270MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
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Horizontal

Peak Detector:

10540.000	14.151	37.050	51.200	-22.800	74.000
15810.000	*	*	*	*	74.000
21080.000	*	*	*	*	74.000
26350.000	*	*	*	*	74.000
31620.000	*	*	*	*	74.000
36890.000	*	*	*	*	74.000

Average

Detector:

--	*	*	*	*	54.000
15810.000	*	*	*	*	54.000
21080.000	*	*	*	*	54.000
26350.000	*	*	*	*	54.000
31620.000	*	*	*	*	54.000
36890.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5270MHz)

Frequency MHz	Correct Factor	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
10540.000	14.829	40.590	55.418	-18.582	74.000
15810.000	*	*	*	*	74.000
21080.000	*	*	*	*	74.000
26350.000	*	*	*	*	74.000
31620.000	*	*	*	*	74.000
36890.000	*	*	*	*	74.000
Average Detector:					
10540.000	14.829	33.590	48.418	-5.582	54.000
15810.000	*	*	*	*	54.000
21080.000	*	*	*	*	54.000
26350.000	*	*	*	*	54.000
31620.000	*	*	*	*	54.000
36890.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5310MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
------------------	-------------------------	--------------------------	--------------------------------	--------------	-----------------

Horizontal

Peak Detector:

10620.000	14.623	37.140	51.763	-22.237	74.000
15930.000	*	*	*	*	74.000
21240.000	*	*	*	*	74.000
26550.000	*	*	*	*	74.000
31860.000	*	*	*	*	74.000
37170.000	*	*	*	*	74.000

Average

Detector:

--	*	*	*	*	54.000
15930.000	*	*	*	*	54.000
21240.000	*	*	*	*	54.000
26550.000	*	*	*	*	54.000
31860.000	*	*	*	*	54.000
37170.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5310MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
10620.000	14.970	41.150	56.120	-17.880	74.000
15930.000	*	*	*	*	74.000
21240.000	*	*	*	*	74.000
26550.000	*	*	*	*	74.000
31860.000	*	*	*	*	74.000
37170.000	*	*	*	*	74.000
Average Detector:					
10620.000	14.970	33.540	48.510	-5.490	54.000
15930.000	*	*	*	*	54.000
21240.000	*	*	*	*	54.000
26550.000	*	*	*	*	54.000
31860.000	*	*	*	*	54.000
37170.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5510MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

11020.000	16.474	37.190	53.663	-20.337	74.000
16530.000	*	*	*	*	74.000
22040.000	*	*	*	*	74.000
27550.000	*	*	*	*	74.000
33060.000	*	*	*	*	74.000
38570.000	*	*	*	*	74.000

Average

Detector:

--	*	*	*	*	54.000
16530.000	*	*	*	*	54.000
22040.000	*	*	*	*	54.000
27550.000	*	*	*	*	54.000
33060.000	*	*	*	*	54.000
38570.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5510MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
11020.000	17.224	42.150	59.374	-14.626	74.000
16530.000	*	*	*	*	74.000
22040.000	*	*	*	*	74.000
27550.000	*	*	*	*	74.000
33060.000	*	*	*	*	74.000
38570.000	*	*	*	*	74.000
Average Detector:					
11020.000	17.224	33.450	50.674	-3.326	54.000
16530.000	*	*	*	*	54.000
22040.000	*	*	*	*	54.000
27550.000	*	*	*	*	54.000
33060.000	*	*	*	*	54.000
38570.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5550MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

11100.000	16.681	36.590	53.271	-20.729	74.000
16650.000	*	*	*	*	74.000
22200.000	*	*	*	*	74.000
27750.000	*	*	*	*	74.000
33300.000	*	*	*	*	74.000
38850.000	*	*	*	*	74.000

Average

Detector:

--	*	*	*	*	54.000
16650.000	*	*	*	*	54.000
22200.000	*	*	*	*	54.000
27750.000	*	*	*	*	54.000
33300.000	*	*	*	*	54.000
38850.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5550MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
11100.000	17.523	41.190	58.713	-15.287	74.000
16650.000	*	*	*	*	74.000
22200.000	*	*	*	*	74.000
27750.000	*	*	*	*	74.000
33300.000	*	*	*	*	74.000
38850.000	*	*	*	*	74.000
Average Detector:					
11100.000	17.523	33.150	50.673	-3.327	54.000
16650.000	*	*	*	*	54.000
22200.000	*	*	*	*	54.000
27750.000	*	*	*	*	54.000
33300.000	*	*	*	*	54.000
38850.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5670MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector:

11340.000	16.408	36.590	52.997	-21.003	74.000
17010.000	*	*	*	*	74.000
22680.000	*	*	*	*	74.000
28350.000	*	*	*	*	74.000
34020.000	*	*	*	*	74.000
39690.000	*	*	*	*	74.000

Average

Detector:

--	*	*	*	*	74.000
17010.000	*	*	*	*	54.000
22680.000	*	*	*	*	54.000
28350.000	*	*	*	*	54.000
34020.000	*	*	*	*	54.000
39690.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5670MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
11340.000	17.167	41.130	58.297	-15.703	74.000
17010.000	*	*	*	*	74.000
22680.000	*	*	*	*	74.000
28350.000	*	*	*	*	74.000
34020.000	*	*	*	*	74.000
39690.000	*	*	*	*	74.000
Average Detector:					
11340.000	17.167	32.590	49.757	-4.243	54.000
17010.000	*	*	*	*	54.000
22680.000	*	*	*	*	54.000
28350.000	*	*	*	*	54.000
34020.000	*	*	*	*	54.000
39690.000	*	*	*	*	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5190MHz)

Frequency MHz	Correct Factor	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector					
247.280	-6.192	33.034	26.841	-19.159	46.000
365.620	-1.329	32.948	31.619	-14.381	46.000
470.380	1.226	32.965	34.191	-11.809	46.000
596.480	4.017	33.451	37.468	-8.532	46.000
743.920	3.326	33.367	36.693	-9.307	46.000
883.600	6.146	33.340	39.485	-6.515	46.000
Vertical					
Peak Detector					
109.540	-0.418	33.464	33.046	-10.454	43.500
344.280	-3.171	33.223	30.053	-15.947	46.000
538.280	0.020	33.951	33.971	-12.029	46.000
683.780	1.968	33.477	35.445	-10.555	46.000
774.960	2.337	33.498	35.835	-10.165	46.000
968.960	8.191	33.664	41.855	-12.145	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5270MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector					
103.720	-6.751	33.588	26.836	-16.664	43.500
305.480	-2.929	33.858	30.929	-15.071	46.000
458.740	0.833	33.350	34.183	-11.817	46.000
606.180	4.666	33.953	38.619	-7.381	46.000
794.360	5.181	33.337	38.518	-7.482	46.000
986.420	7.773	34.599	42.372	-11.628	54.000
Vertical					
Peak Detector					
99.840	-0.021	33.321	33.300	-10.200	43.500
218.180	-8.589	34.438	25.848	-20.152	46.000
355.920	-3.488	34.166	30.678	-15.322	46.000
538.280	0.020	33.951	33.971	-12.029	46.000
753.620	3.187	33.575	36.762	-9.238	46.000
920.460	5.517	33.466	38.983	-7.017	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter (5550MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m

Horizontal

Peak Detector

103.720	-6.751	33.588	26.836	-16.664	43.500
297.720	-3.633	34.727	31.095	-14.905	46.000
466.500	0.794	34.461	35.254	-10.746	46.000
606.180	4.666	33.953	38.619	-7.381	46.000
771.080	4.215	34.135	38.350	-7.650	46.000
937.920	6.406	35.313	41.719	-4.281	46.000

Vertical

Peak Detector

99.840	-0.021	33.321	33.300	-10.200	43.500
381.140	-1.558	33.877	32.319	-13.681	46.000
538.280	0.020	33.951	33.971	-12.029	46.000
749.740	2.510	33.675	36.185	-9.815	46.000
844.800	3.181	34.391	37.572	-8.428	46.000
937.920	6.076	35.313	41.389	-4.611	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss -Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.
8. No emission found between lowest internal used/generated frequency to 30MHz.

7. Band Edge

7.1. Test Equipment

RF Conducted Measurement

The following test equipments are used during the band edge tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2013
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2013
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

RF Radiated Measurement:

The following test equipments are used during the band edge tests:

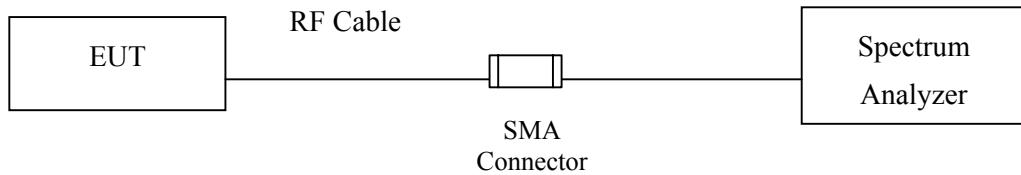
Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2013
	X Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2013
	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2013
	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2013
	X Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2013
	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/925975	Mar., 2014
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2013
	X Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2014
	X Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note:

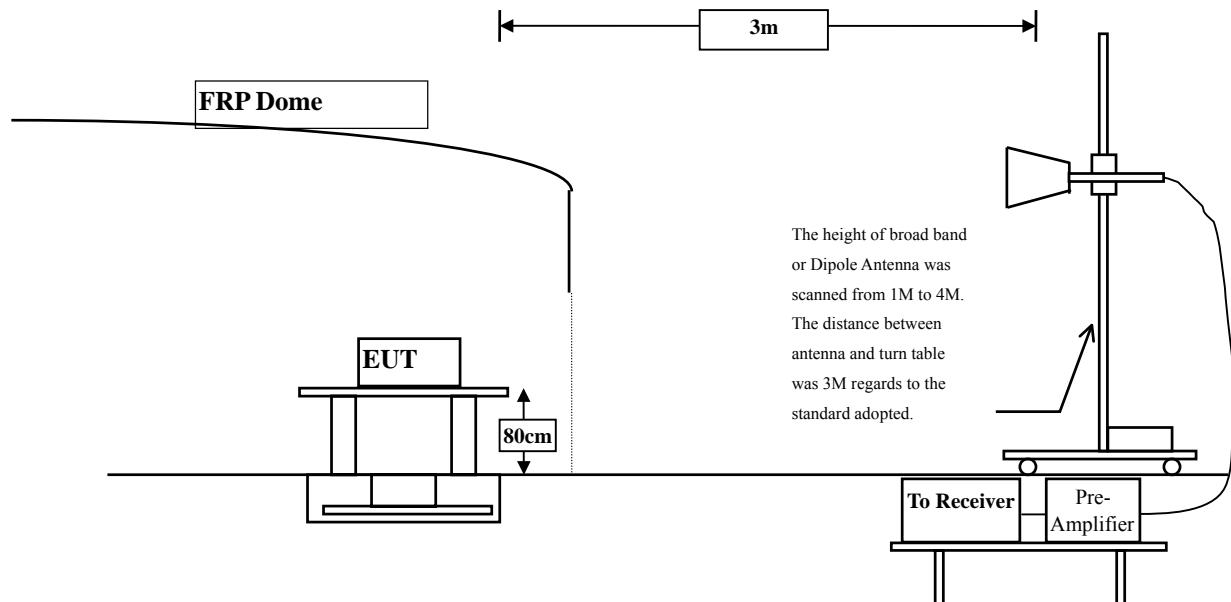
1. All instruments are calibrated every one year.
2. The test instruments marked by “X” are used to measure the final test results.

7.2. Test Setup

RF Conducted Measurement



RF Radiated Measurement:



7.3. Limits

The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

Radiated emissions which fall in the restricted bands, as defined in Section 15.205, must also comply with the radiated emission limits specified in Section 15.209:

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks : 1. RF Voltage (dBuV) = $20 \log \text{RF Voltage (uV)}$
2. In the Above Table, the tighter limit applies at the band edges.
3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

7.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4: 2009 on radiated measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

The EUT was setup to ANSI C63.10, 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

7.5. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

7.6. Test Result of Band Edge

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -Channel 38

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
38 (Peak)	5150.000	7.045	65.680	72.726	74.00	54.00	Pass
38 (Peak)	5199.840	7.320	104.929	112.249	--	--	Pass
38 (Average)	5150.000	7.045	42.479	49.525	74.00	54.00	Pass
38 (Average)	5175.801	7.144	89.615	96.760	--	--	Pass

Figure Channel 38:

Horizontal (Peak)

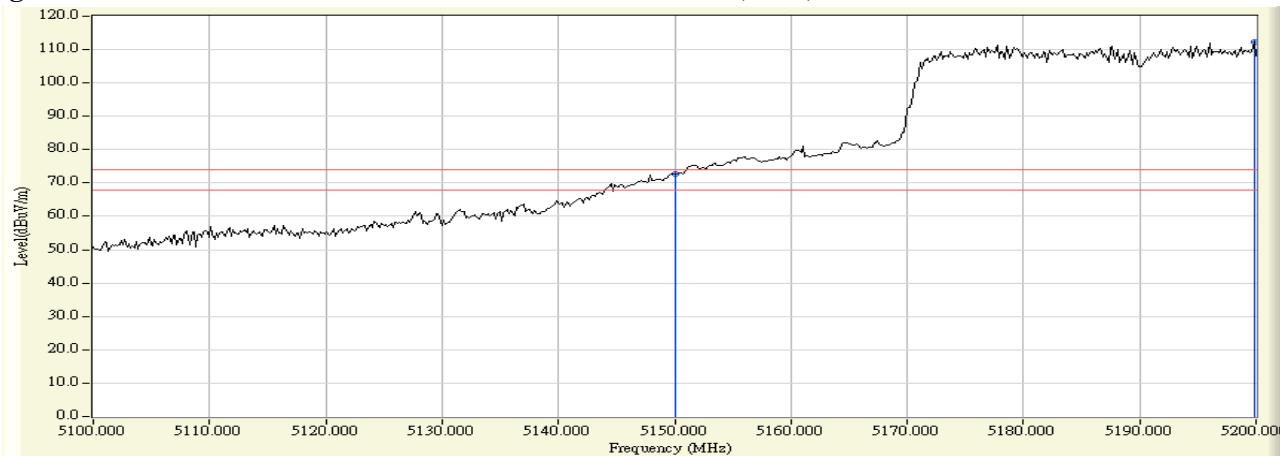
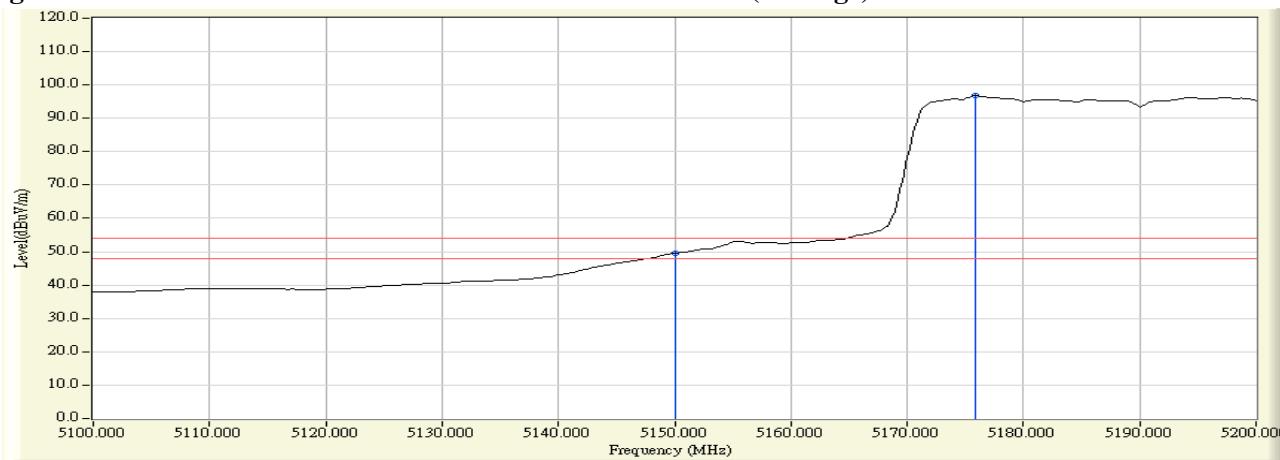


Figure Channel 38:

Horizontal (Average)



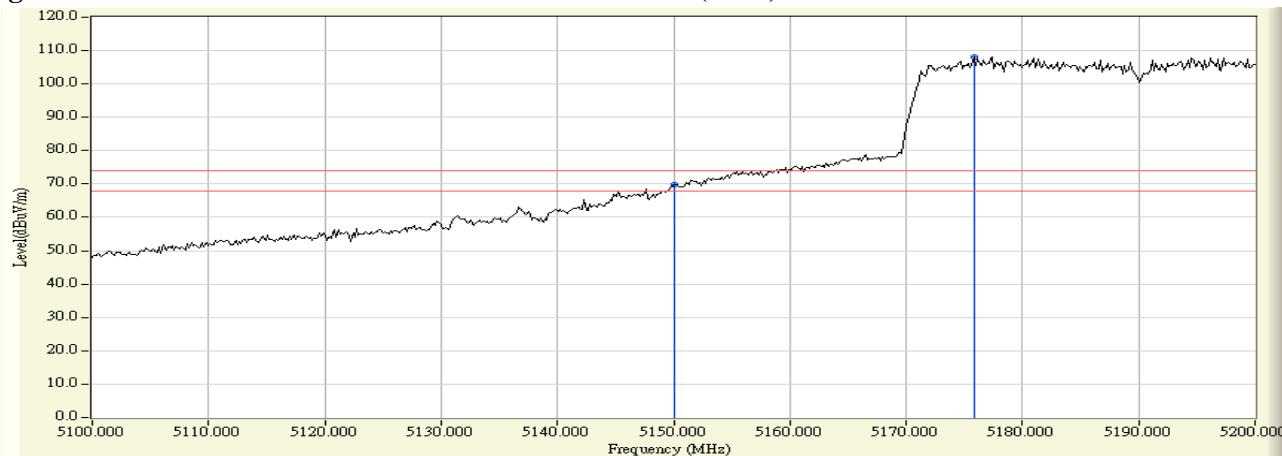
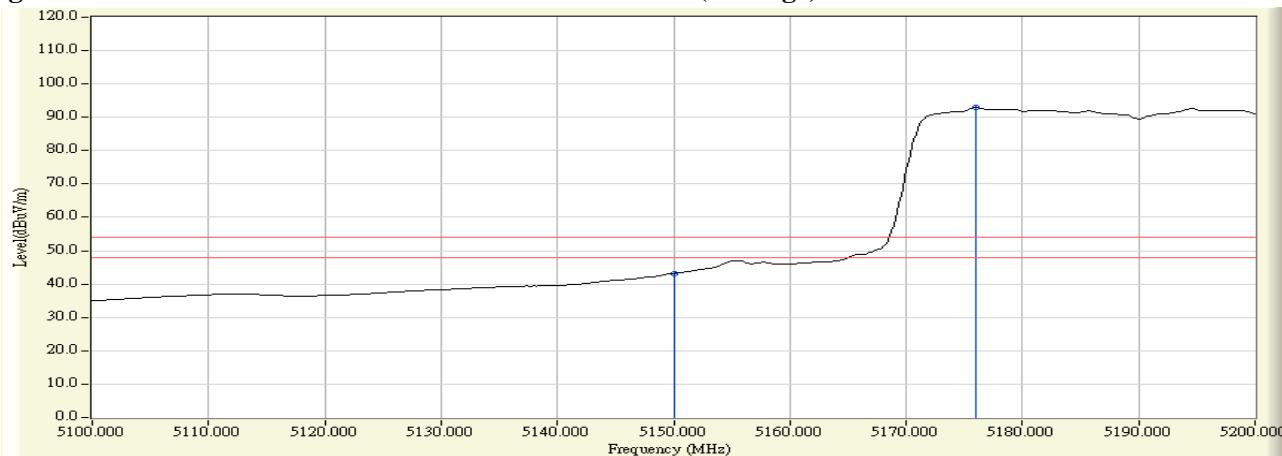
Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -Channel 38

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
38 (Peak)	5150.000	7.045	62.787	69.833	74.00	54.00	Pass
38 (Peak)	5175.801	7.144	101.550	108.695	--	--	Pass
38 (Average)	5150.000	7.045	36.209	43.255	74.00	54.00	Pass
38 (Average)	5175.962	7.148	85.731	92.879	--	--	Pass

Figure Channel 38:
Vertical (Peak)

Figure Channel 38:
Vertical (Average)


Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -Channel 62

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
62 (Peak)	5322.756	7.399	100.035	107.434	--	--	Pass
62 (Peak)	5350.000	7.345	63.872	71.217	74.00	54.00	Pass
62 (Peak)	5350.962	7.352	65.599	72.952	74.00	54.00	Pass
62 (Average)	5324.199	7.414	85.820	93.234	--	--	Pass
62 (Average)	5350.000	7.345	40.869	48.214	74.00	54.00	Pass

Figure Channel 62:

Horizontal (Peak)

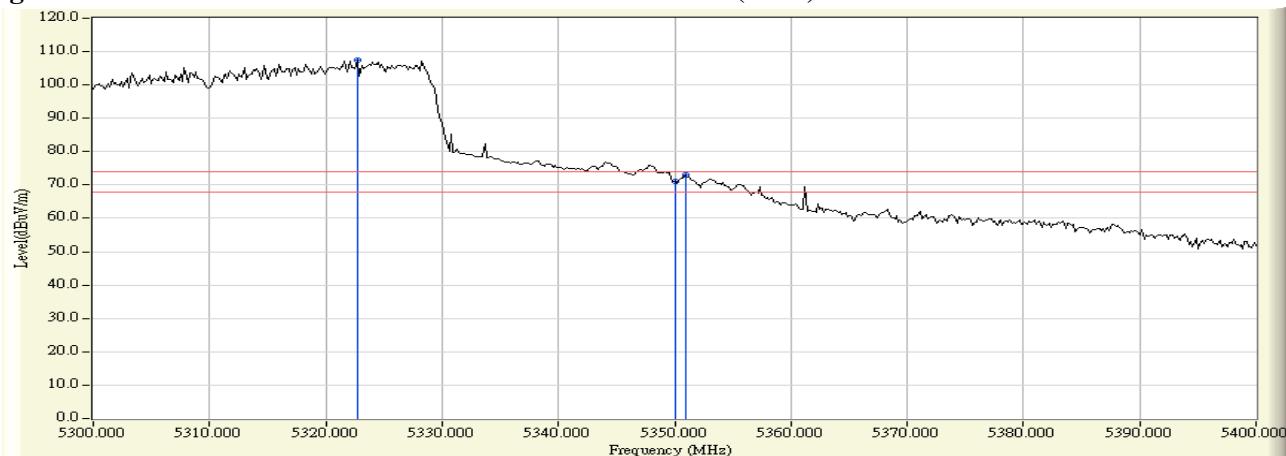
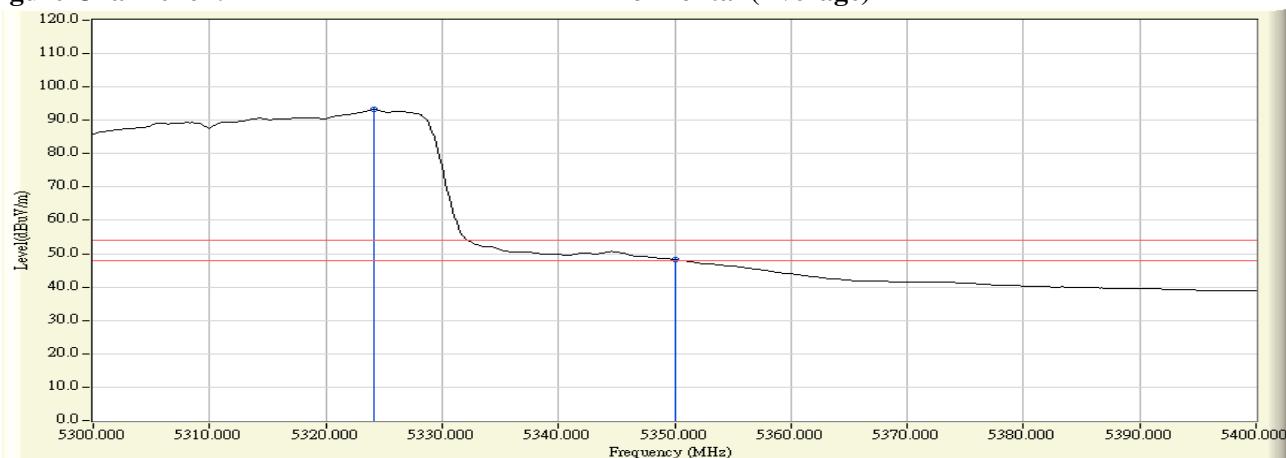


Figure Channel 62:

Horizontal (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -Channel 62

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Arerage Limit (dBuV/m)	Result
62 (Peak)	5324.038	7.413	100.070	107.482	--	--	Pass
62 (Peak)	5350.000	7.345	61.972	69.317	74.00	54.00	Pass
62 (Peak)	5350.962	7.352	64.565	71.918	74.00	54.00	Pass
62 (Average)	5324.199	7.414	85.380	92.794	--	--	Pass
62 (Average)	5350.000	7.345	38.909	46.254	74.00	54.00	Pass

Figure Channel 62:

Vertical (Peak)

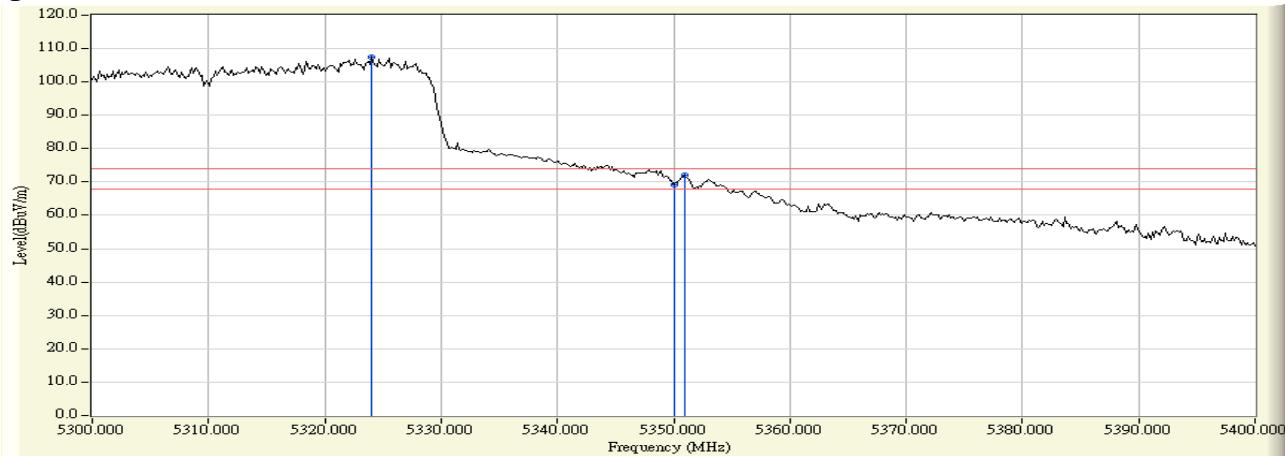
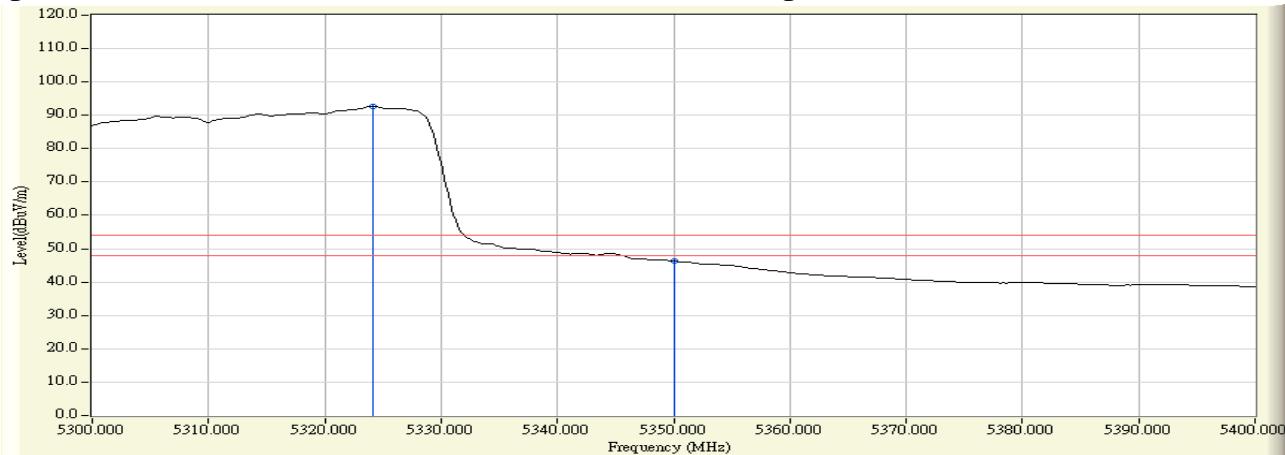


Figure Channel 62:

Vertical (Average)



Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -Channel 102

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
102 (Peak)	5460.000	7.494	60.798	68.292	74.00	54.00	Pass
102 (Peak)	5508.558	7.451	105.344	112.795	--	--	Pass
102 (Average)	5460.000	7.494	45.080	52.574	74.00	54.00	Pass
102 (Average)	5495.897	7.487	90.338	97.826	--	--	Pass

Figure Channel 102:

Horizontal (Peak)

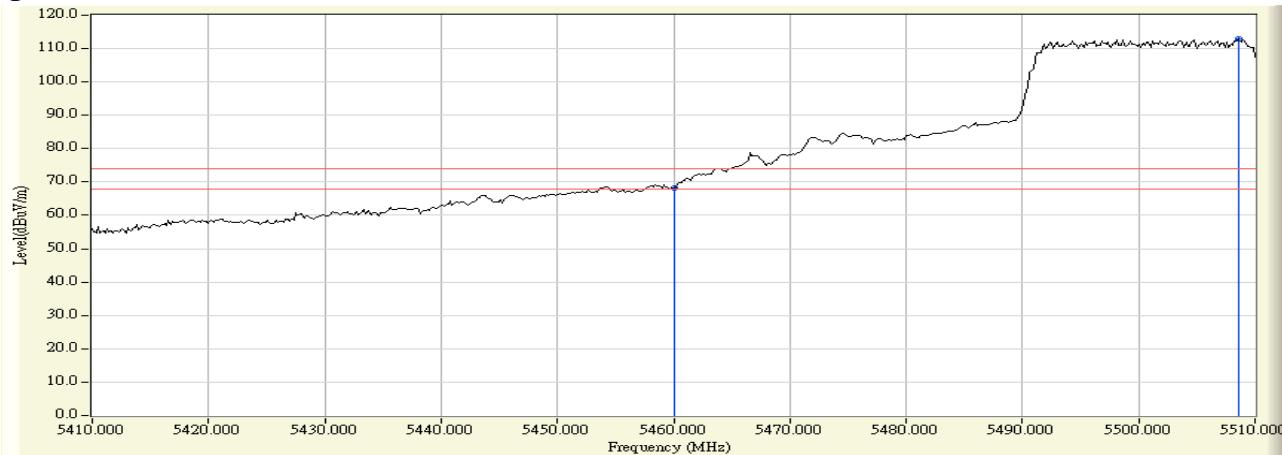
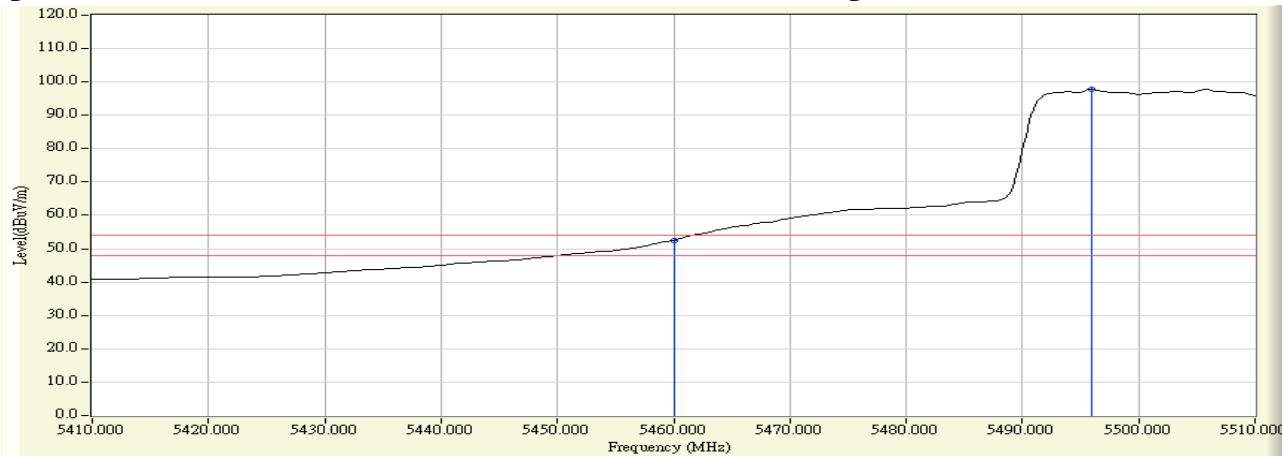


Figure Channel 102:

Horizontal (Average)



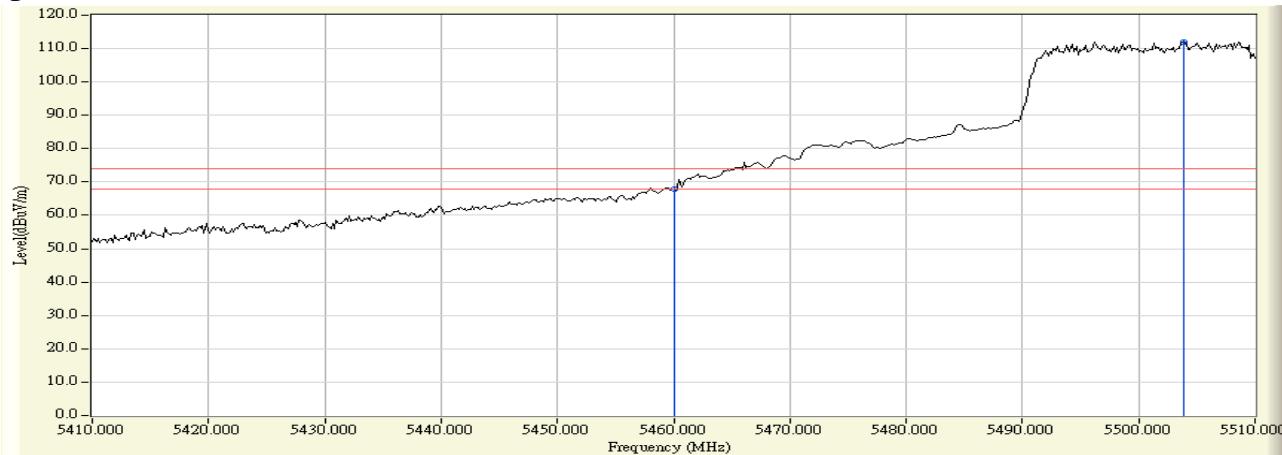
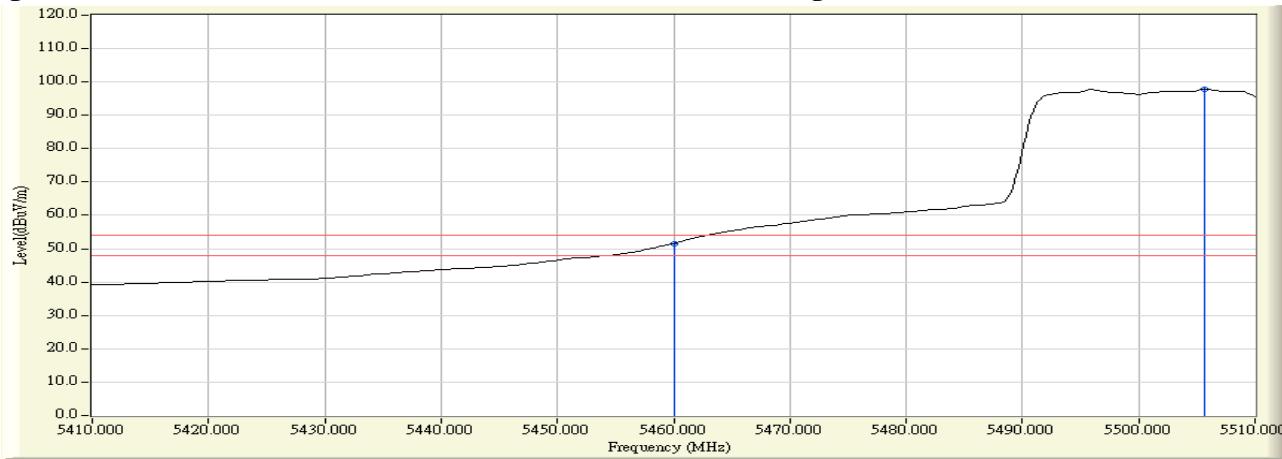
Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -Channel 102

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
102 (Peak)	5460.000	7.494	60.542	68.036	74.00	54.00	Pass
102 (Peak)	5503.910	7.466	104.581	112.047	--	--	Pass
102 (Average)	5460.000	7.494	44.130	51.624	74.00	54.00	Pass
102 (Average)	5505.673	7.460	90.378	97.839	--	--	Pass

Figure Channel 102:
Vertical (Peak)

Figure Channel 102:
Vertical (Average)


Note:

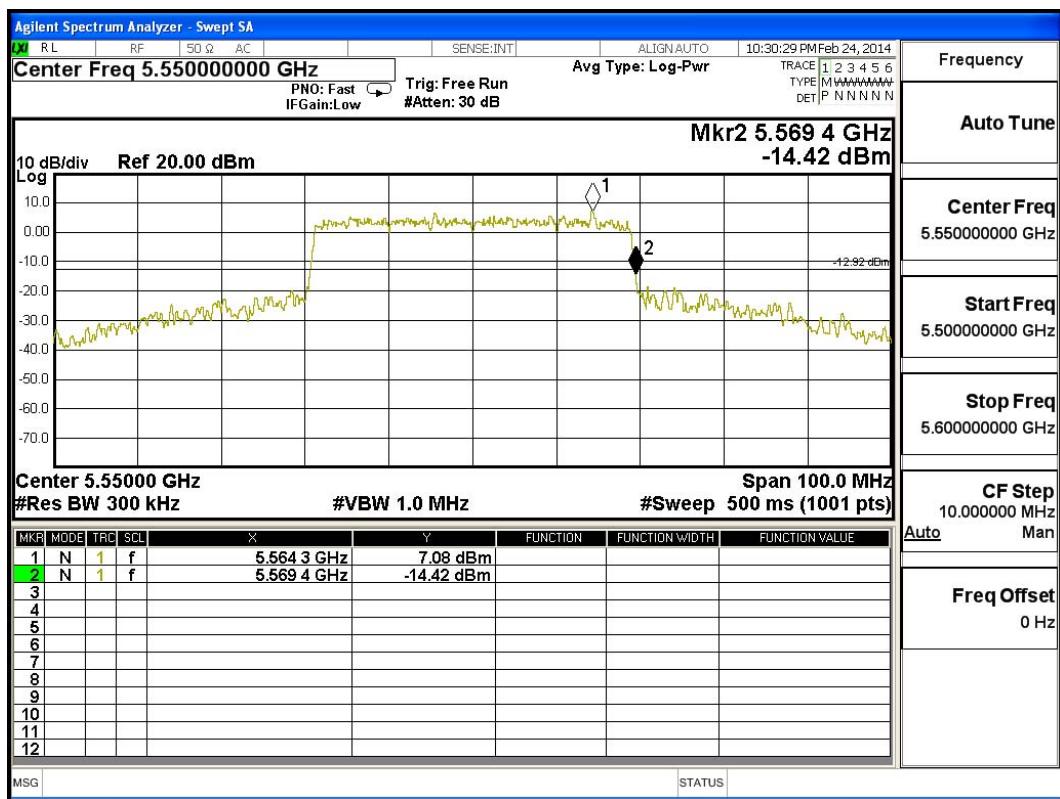
1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter - Channel 110

Chain A

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5550	5569.4	<5600	PASS

NOTE: Accordance with 15.215 requirement.

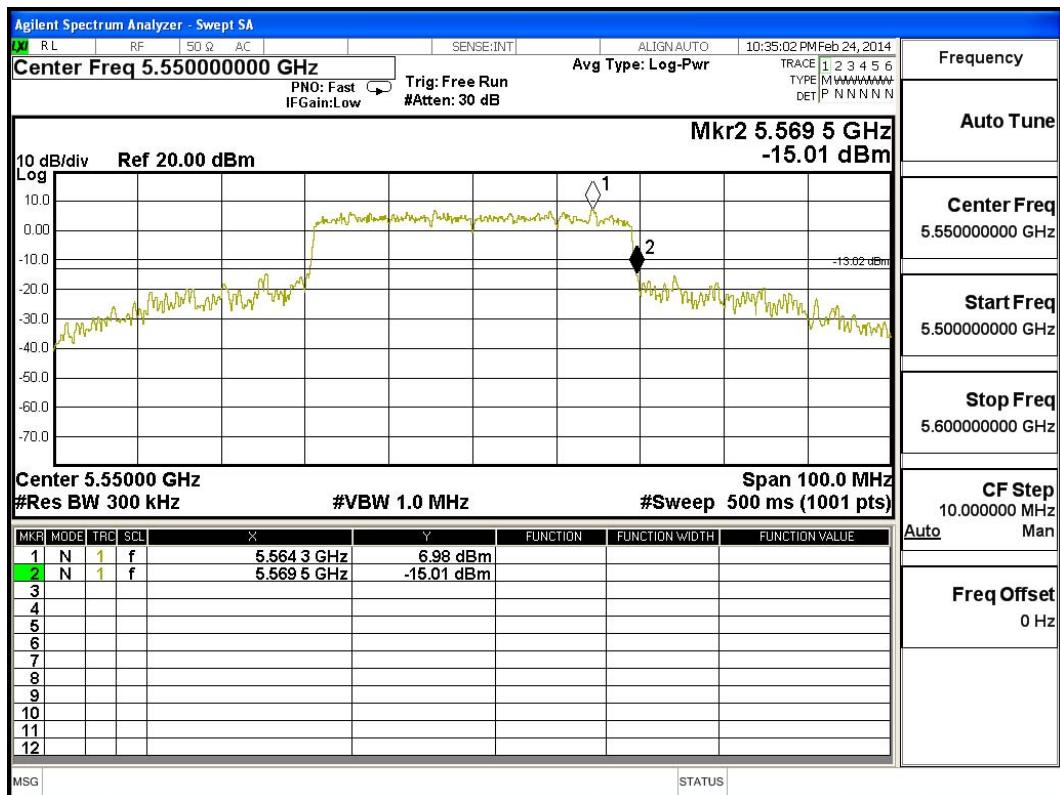


Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter - Channel 110

Chain B

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5550	5569.50	<5600	PASS

NOTE: Accordance with 15.215 requirement.

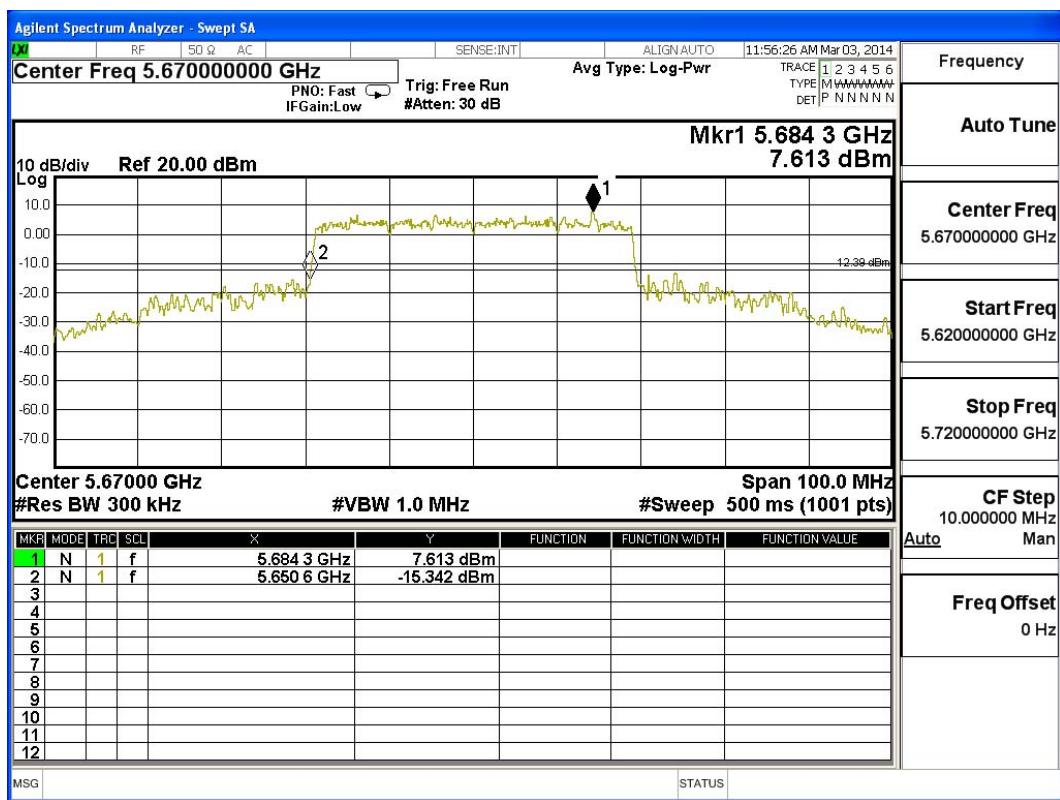


Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter - Channel 134

Chain A

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5670	5650.60	>5650	PASS

NOTE: Accordance with 15.215 requirement.

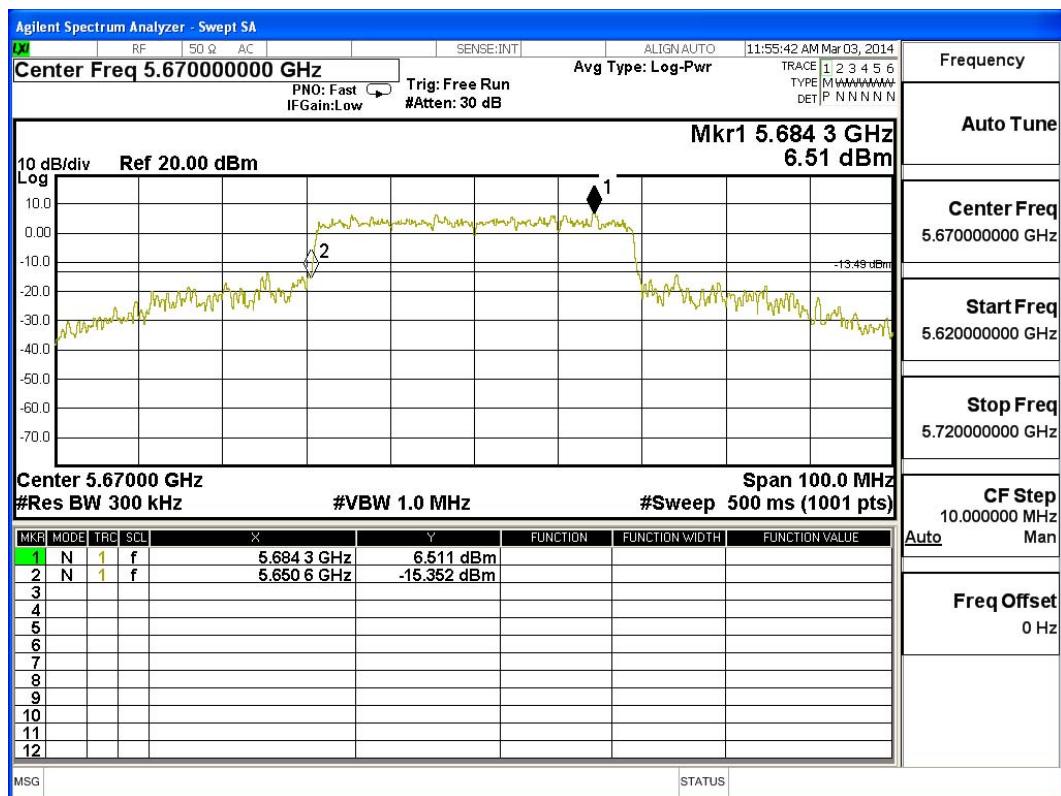


Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter - Channel 134

Chain B

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5670	5650.60	>5650	PASS

NOTE: Accordance with 15.215 requirement.



Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - Channel 102

RF Radiated Measurement:

	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Horizontal	5460.000	18.275	-69.000	-50.725	-23.725	-27.000	Pass

	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Vertical	5460.000	19.288	-68.500	-49.212	-22.212	-27.000	Pass

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
Test Item : Band Edge Data
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter - Channel 134

RF Radiated Measurement:

	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Horizontal	5725.000	18.649	-68.330	-49.681	-22.681	-27.000	Pass

	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm/m)	Margin (dB)	Limit (dBm/m)	Result
Vertical	5725.000	19.372	-68.890	-49.518	-22.518	-27.000	Pass

8. Frequency Stability

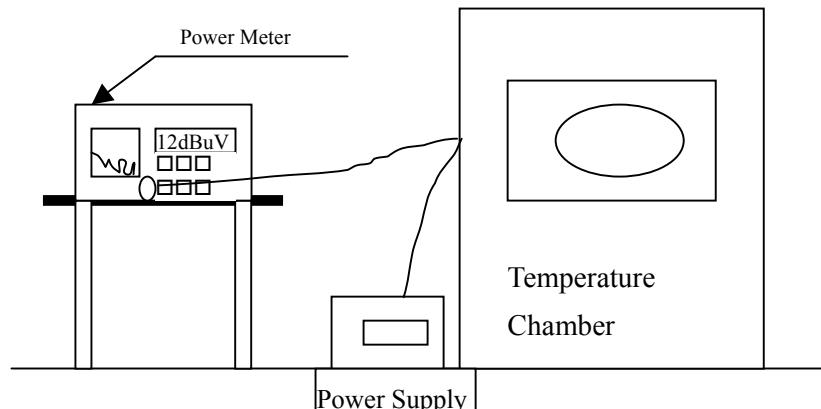
8.1. Test Equipment

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2013
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2013
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr, 2013

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with "X" are used to measure the final test results.

8.2. Test Setup



8.3. Limits

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified

8.4. Test Procedure

The EUT was setup to ANSI C63.10: 2009; tested to DTS test procedure of FCC KDB-789033 for compliance to FCC 47CFR Subpart E requirements.

8.5. Uncertainty

± 150 Hz

8.6. Test Result of Frequency Stability

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Frequency Stability
 Test Site : Temperature Chamber
 Test Mode : Carrier Wave

Chain A

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (20) °C	V _{nom} (120)V	38	5190.0000	5190.0043	-0.0043
		46	5230.0000	5230.0069	-0.0069
		54	5270.0000	5270.0081	-0.0081
		62	5310.0000	5310.0058	-0.0058
		102	5510.0000	5510.0102	-0.0102
		110	5550.0000	5550.0100	-0.0100
		134	5670.0000	5670.0082	-0.0082
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (50) °C	V _{nom} (138)V	38	5190.0000	5190.0040	-0.0040
		46	5230.0000	5230.0070	-0.0070
		54	5270.0000	5270.0079	-0.0079
		62	5310.0000	5310.0088	-0.0088
		102	5510.0000	5510.0069	-0.0069
		110	5550.0000	5550.0100	-0.0100
		134	5670.0000	5670.0081	-0.0081
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (50) °C	V _{nom} (93.5)V	38	5190.0000	5190.0077	-0.0077
		46	5230.0000	5230.0074	-0.0074
		54	5270.0000	5270.0092	-0.0092
		62	5310.0000	5310.0061	-0.0061
		102	5510.0000	5510.0079	-0.0079
		110	5550.0000	5550.0099	-0.0099
		134	5670.0000	5670.0088	-0.0088

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (0) °C	V _{nom} (126.5)V	38	5190.0000	5190.0078	-0.0078
		46	5230.0000	5230.0077	-0.0077
		54	5270.0000	5270.0093	-0.0093
		62	5310.0000	5310.0097	-0.0097
		102	5510.0000	5510.0074	-0.0074
		110	5550.0000	5550.0088	-0.0088
		134	5670.0000	5670.0084	-0.0084
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (0) °C	V _{nom} (102)V	38	5190.0000	5190.0078	-0.0078
		46	5230.0000	5230.0077	-0.0077
		54	5270.0000	5270.0093	-0.0093
		62	5310.0000	5310.0097	-0.0097
		102	5510.0000	5510.0074	-0.0074
		110	5550.0000	5550.0088	-0.0088
		134	5670.0000	5670.0084	-0.0084

Chain B

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (20) °C	V _{nom} (120)V	38	5190.0000	5190.0040	-0.0040
		46	5230.0000	5230.0067	-0.0067
		54	5270.0000	5270.0077	-0.0077
		62	5310.0000	5310.0057	-0.0057
		102	5510.0000	5510.0100	-0.0100
		110	5550.0000	5550.0098	-0.0098
		134	5670.0000	5670.0080	-0.0080
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (50) °C	V _{nom} (138)V	38	5190.0000	5190.0041	-0.0041
		46	5230.0000	5230.0069	-0.0069
		54	5270.0000	5270.0073	-0.0073
		62	5310.0000	5310.0080	-0.0080
		102	5510.0000	5510.0061	-0.0061
		110	5550.0000	5550.0097	-0.0097
		134	5670.0000	5670.0080	-0.0080
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (50) °C	V _{nom} (93.5)V	38	5190.0000	5190.0074	-0.0074
		46	5230.0000	5230.0070	-0.0070
		54	5270.0000	5270.0090	-0.0090
		62	5310.0000	5310.0060	-0.0060
		102	5510.0000	5510.0077	-0.0077
		110	5550.0000	5550.0097	-0.0097
		134	5670.0000	5670.0087	-0.0087

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (0) °C	V _{nom} (126.5)V	38	5190.0000	5190.0077	-0.0077
		46	5230.0000	5230.0077	-0.0077
		54	5270.0000	5270.0090	-0.0090
		62	5310.0000	5310.0094	-0.0094
		102	5510.0000	5510.0071	-0.0071
		110	5550.0000	5550.0087	-0.0087
		134	5670.0000	5670.0083	-0.0083
Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
T _{nom} (0) °C	V _{nom} (102)V	38	5190.0000	5190.0075	-0.0075
		46	5230.0000	5230.0080	-0.0080
		54	5270.0000	5270.0089	-0.0089
		62	5310.0000	5310.0090	-0.0090
		102	5510.0000	5510.0066	-0.0066
		110	5550.0000	5550.0074	-0.0074
		134	5670.0000	5670.0077	-0.0077

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.