

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
Issue Date	Mar. 11, 2014
Report No.	1420159R-RFUSP25V00
Report Version	V1.0



The test results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
This report must not be used to claim product endorsement by TAF any agency of the U.S. Government

Test Report Certification

Issue Date: Mar. 11, 2014

Report No.: 1420159R-RFUSP25V00



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
EUT Rated Voltage	AC 100-240V, 50-60Hz
EUT Test Voltage	AC 120V/60Hz
Trade Name	IOGEAR / ATEN
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2012 ANSI C63.10: 2009, KDB 558074
Test Result	Complied

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of Quietek Corporation.

This report must not be used to claim product endorsement by TAF any agency of the U.S. Government

Documented By : Genie Chang
(Senior Adm. Specialist / Genie Chang)

Tested By : Vincent chu
(Engineer / Vincent Chu)

Approved By : [Signature]
(Director / Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	5
1.1. EUT Description.....	5
1.2. Operational Description	7
1.3. Tested System Details.....	8
1.4. Configuration of Tested System	9
1.5. EUT Exercise Software	9
1.6. Test Facility	10
2. Conducted Emission.....	11
2.1. Test Equipment.....	11
2.2. Test Setup	11
2.3. Limits	12
2.4. Test Procedure	12
2.5. Uncertainty	12
2.6. Test Result of Conducted Emission.....	13
3. Peak Power Output	15
3.1. Test Equipment.....	15
3.2. Test Setup	15
3.3. Limits	15
3.4. Test Procedure	15
3.5. Uncertainty	15
3.6. Test Result of Peak Power Output.....	16
4. Radiated Emission.....	17
4.1. Test Equipment.....	17
4.2. Test Setup	18
4.3. Limits	19
4.4. Test Procedure	20
4.5. Uncertainty	20
4.6. Test Result of Radiated Emission.....	21
5. RF antenna conducted test.....	24
5.1. Test Equipment.....	24
5.2. Test Setup	24
5.3. Limits	24
5.4. Test Procedure	25
5.5. Uncertainty	25
5.6. Test Result of RF antenna conducted test.....	26
6. Band Edge	30
6.1. Test Equipment.....	30
6.2. Test Setup	30
6.3. Limits	31
6.4. Test Procedure	31
6.5. Uncertainty	31
6.6. Test Result of Band Edge	32

7.	Occupied Bandwidth	32
7.1.	Test Equipment	36
7.2.	Test Setup	36
7.3.	Limits	36
7.4.	Test Procedure	36
7.5.	Uncertainty	36
7.6.	Test Result of Occupied Bandwidth	36
8.	Power Density	41
8.1.	Test Equipment	41
8.2.	Test Setup	41
8.3.	Limits	41
8.4.	Test Procedure	41
8.5.	Uncertainty	41
8.6.	Test Result of Power Density	42
9.	EMI Reduction Method During Compliance Testing	46
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
Model No.	GWHDMS52MB - T
FCC ID.	QLEGWHDMS52MB
Frequency Range	5755-5795MHz
Number of Channels	2
Data Speed	63Mbps
Channel separation	40MHz
Type of Modulation	OFDM
Antenna Type	PIFA
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
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)	2.5dBi for 5.725~5.850GHz

Note: The antenna of EUT is conform to FCC 15.203

Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency
Channel 151:	5755 MHz	Channel 159:	5795 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 are conducted on a sample for the purpose of demonstrating compliance of 5GHz transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.

Test Mode	Mode 1: Transmit
-----------	------------------

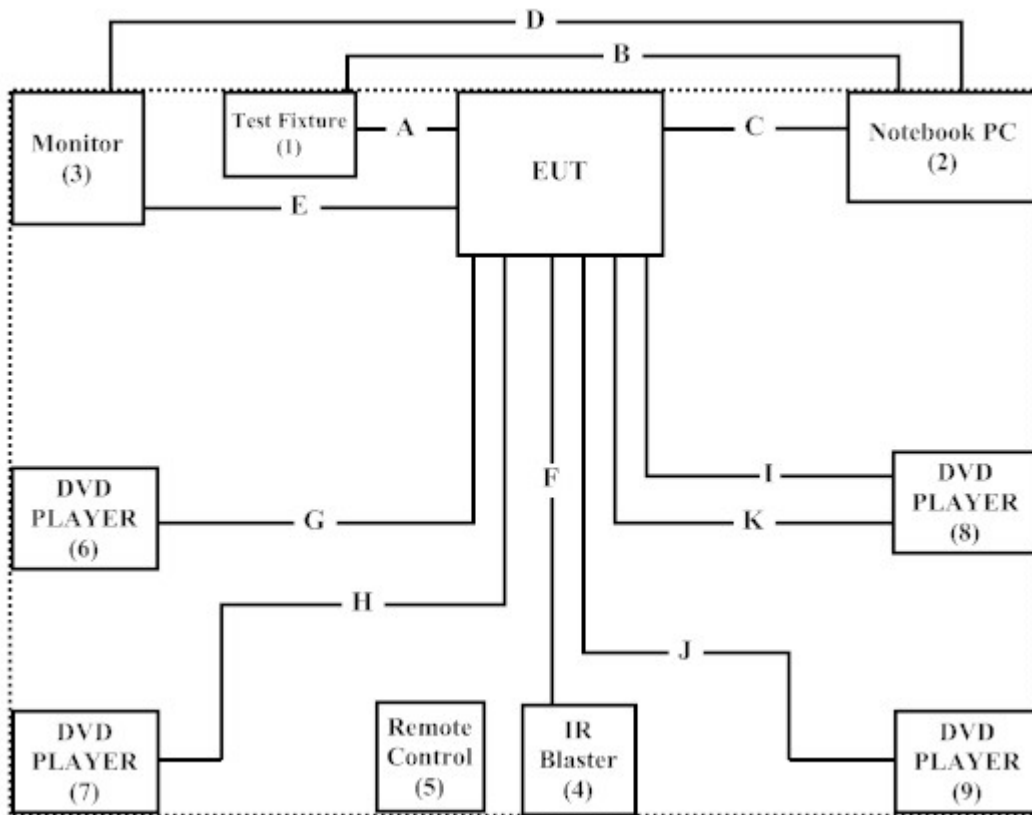
1.3. Tested System Details

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://www.quietek.com/tw/ctg/cts/accreditations.htm>

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
Site Address: No.5-22, Ruishukeng Linkou Dist., New Taipei City
24451, Taiwan, R.O.C.
TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
E-Mail : service@quietek.com

FCC Accreditation Number: TW1014

2. Conducted Emission

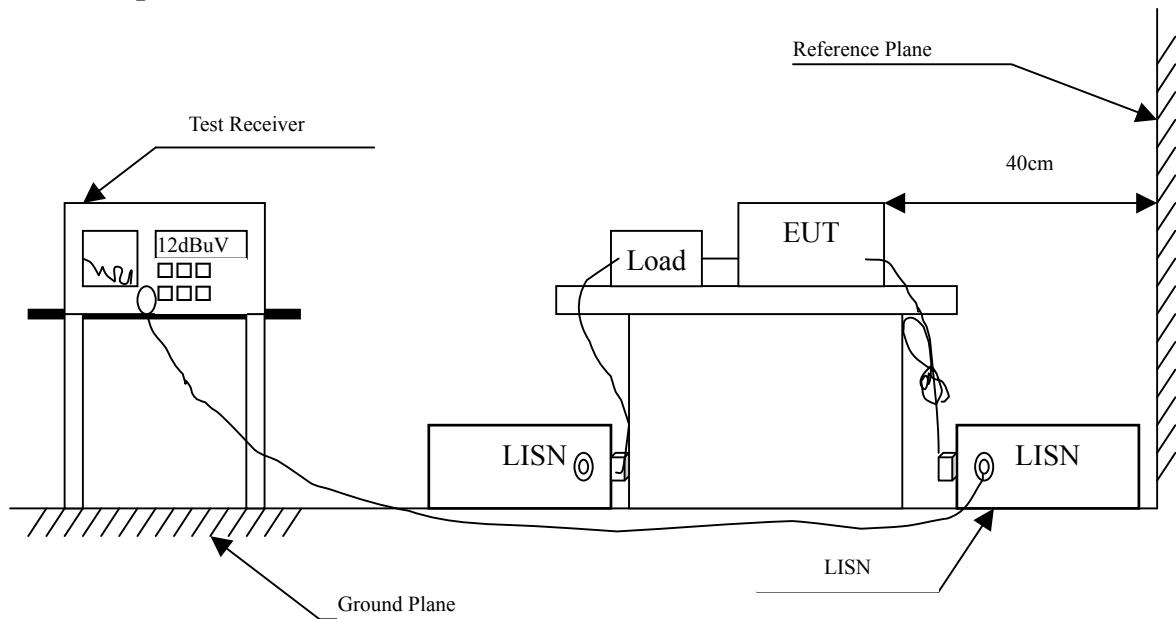
2.1. Test Equipment

	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., 2014	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	AVG
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

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.

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: Transmit (5755MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.189	9.738	34.220	43.958	-20.928	64.886
0.267	9.742	28.310	38.052	-24.605	62.657
0.670	9.760	29.310	39.070	-16.930	56.000
0.763	9.764	25.290	35.054	-20.946	56.000
0.951	9.773	21.460	31.233	-24.767	56.000
1.689	9.816	18.110	27.926	-28.074	56.000
Average					
0.189	9.738	29.010	38.748	-16.138	54.886
0.267	9.742	23.300	33.042	-19.615	52.657
0.670	9.760	13.440	23.200	-22.800	46.000
0.763	9.764	7.380	17.144	-28.856	46.000
0.951	9.773	5.480	15.253	-30.747	46.000
1.689	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: Transmit (5755MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 2					
Quasi-Peak					
0.201	9.749	32.760	42.509	-22.034	64.543
0.255	9.751	29.370	39.121	-23.879	63.000
0.439	9.750	22.120	31.870	-25.873	57.743
0.642	9.759	26.420	36.179	-19.821	56.000
0.795	9.776	24.030	33.806	-22.194	56.000
1.689	9.826	19.860	29.686	-26.314	56.000
Average					
0.201	9.749	23.500	33.249	-21.294	54.543
0.255	9.751	26.230	35.981	-17.019	53.000
0.439	9.750	18.080	27.830	-19.913	47.743
0.642	9.759	12.210	21.969	-24.031	46.000
0.795	9.776	6.150	15.926	-30.074	46.000
1.689	9.826	-0.230	9.596	-36.404	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. Peak Power Output

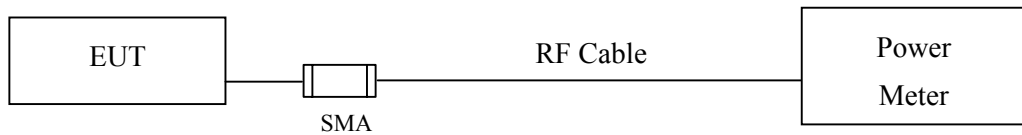
3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2013
X	Power Sensor	Anritsu	MA2411B/0738448	Jun., 2013

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



3.3. Limits

The maximum peak power shall be less 1 Watt.

3.4. Test Procedure

The EUT was tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements. The maximum peak conducted output power using KDB 558074 section 9.1.3 PKPM1 Peak power meter method.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

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

CHAIN A

Channel No	Frequency (MHz)	Data Rata (Mbps)	Average Power	Peak Power
			Measurement Level (dBm)	
151	5755	63	15.01	22.31
159	5795	63	15.16	22.34

Note: Peak Power Output Value = Reading value on power meter + cable loss

CHAIN B

Channel No	Frequency (MHz)	Data Rata (Mbps)	Average Power	Peak Power
			Measurement Level (dBm)	
151	5755	63	15.02	22.33
159	5795	63	15.07	22.41

Note: Peak Power Output Value = Reading value on power meter + cable loss

CHAIN A+B

Channel	Frequency (MHz)	Data Rata (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain A+B Power (dBm)	Limit (dBm)	Result
151	5755	63	22.31	22.33	25.33	<30dBm	Pass
159	5795	63	22.34	22.41	25.39	<30dBm	Pass

Note: Peak Power Output Value (dBm) = 10*LOG (Chain A (mW)+ Chain B (mW)) .

4. Radiated Emission

4.1. Test Equipment

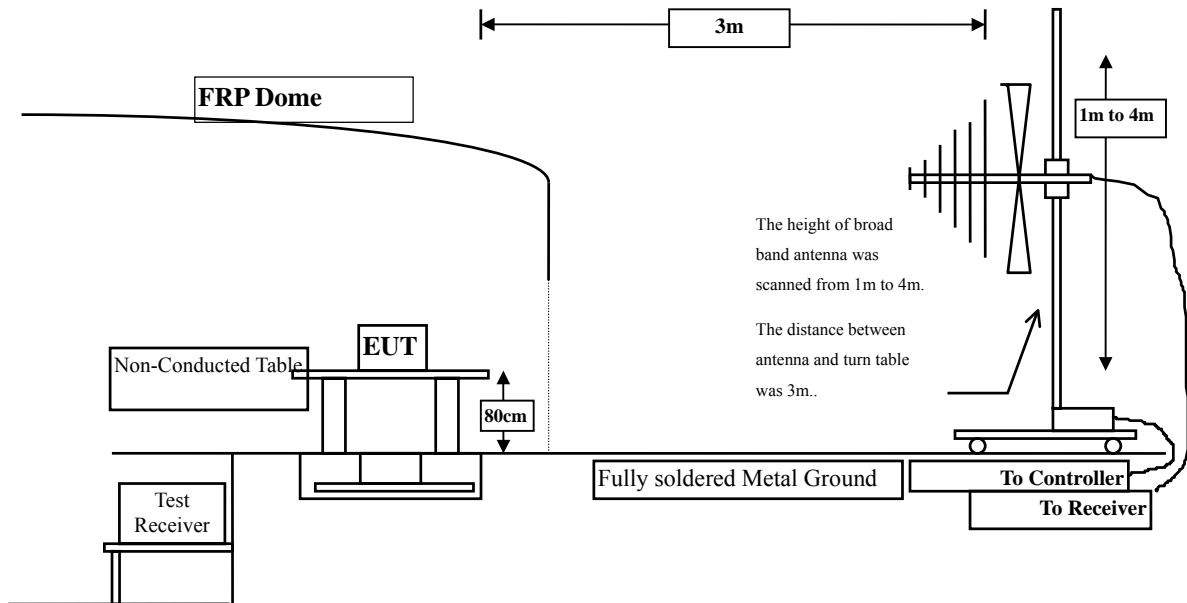
The following test equipment are used during the radiated emission test:

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

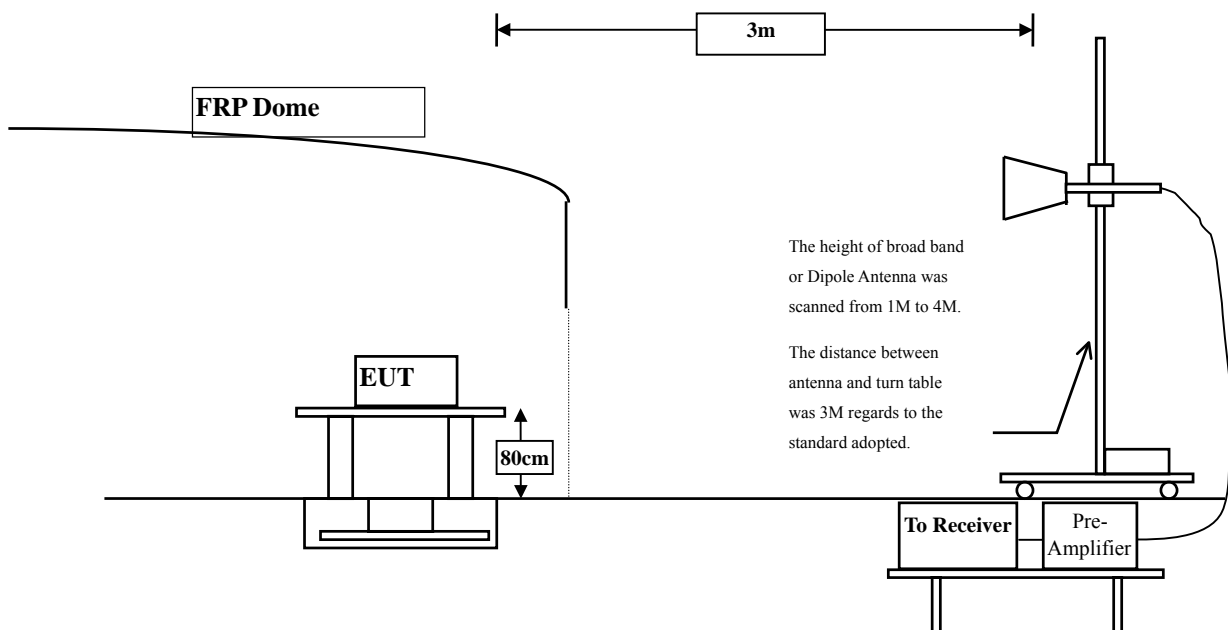
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

4.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



4.3. 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)

4.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009 and tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 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 between 1 meter and 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 form 30MHz - 10th Harmonic of fundamental was investigated.

4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

4.6. 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: Transmit (5755MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
11510.000	17.124	36.690	53.814	-20.186	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11510.000	18.081	39.150	57.231	-16.769	74.000
Average Detector:					
11510.000	18.081	26.150	44.231	-9.769	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: Transmit (5795 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
11590.000	16.701	36.590	53.290	-20.710	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11590.000	17.567	40.050	57.616	-16.384	74.000
Average Detector:					
11590.000	17.567	26.590	44.156	-9.844	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 Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (5755MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
103.720	-6.751	33.588	26.836	-16.664	43.500
297.720	-3.633	34.727	31.095	-14.905	46.000
458.740	0.833	33.417	34.250	-11.750	46.000
604.240	4.770	33.891	38.661	-7.339	46.000
755.560	4.321	33.205	37.526	-8.474	46.000
924.340	6.240	35.236	41.476	-4.524	46.000
Vertical					
99.840	-0.021	33.321	33.300	-10.200	43.500
344.280	-3.171	34.042	30.872	-15.128	46.000
509.180	-0.158	33.875	33.717	-12.283	46.000
606.180	-1.594	33.953	32.359	-13.641	46.000
753.620	3.187	33.916	37.103	-8.897	46.000
924.340	5.550	35.236	40.786	-5.214	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.

5. RF antenna conducted test

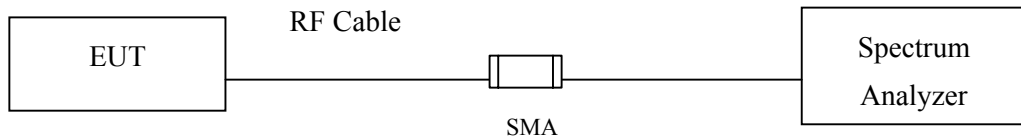
5.1. Test Equipment

	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

RF antenna Conducted Measurement:



5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, 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) (see Section 15.205(c)).

5.4. Test Procedure

The EUT was tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

5.5. Uncertainty

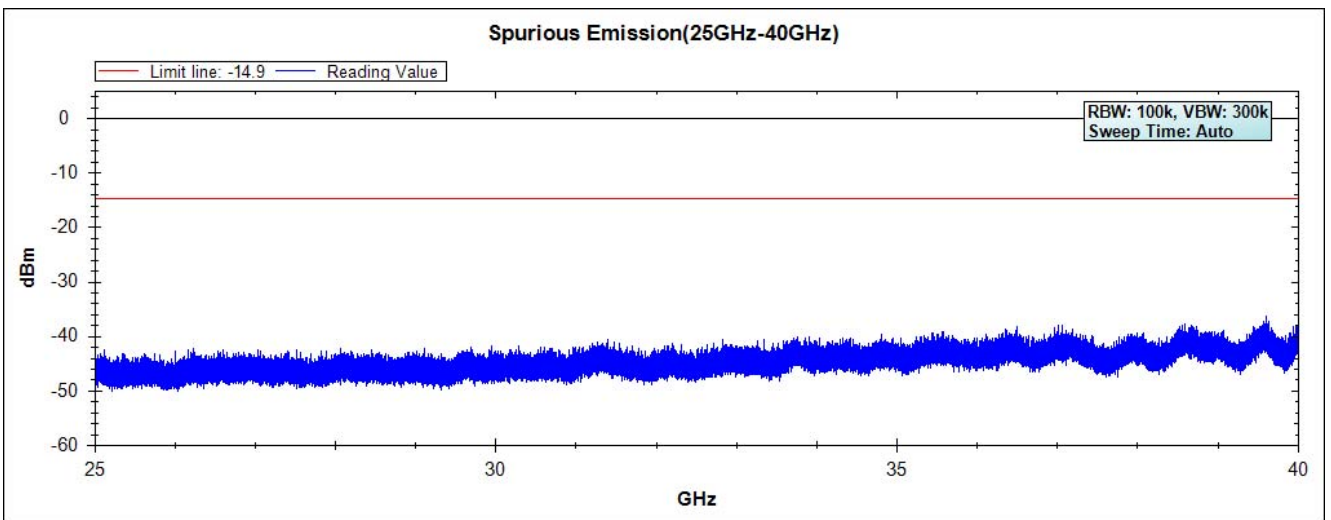
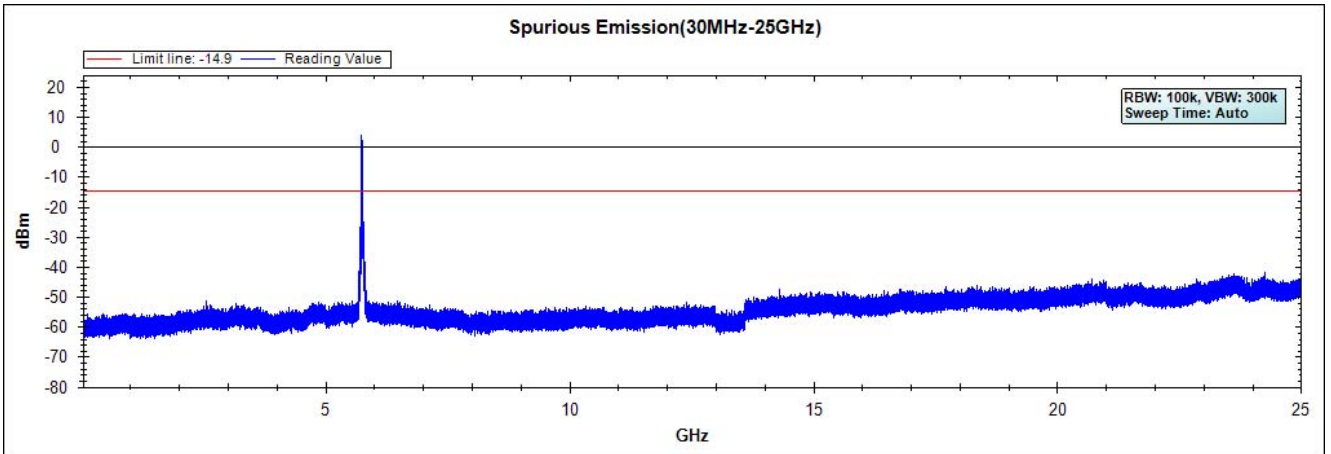
The measurement uncertainty

Conducted is defined as $\pm 1.27\text{dB}$

5.6. Test Result of RF antenna conducted test

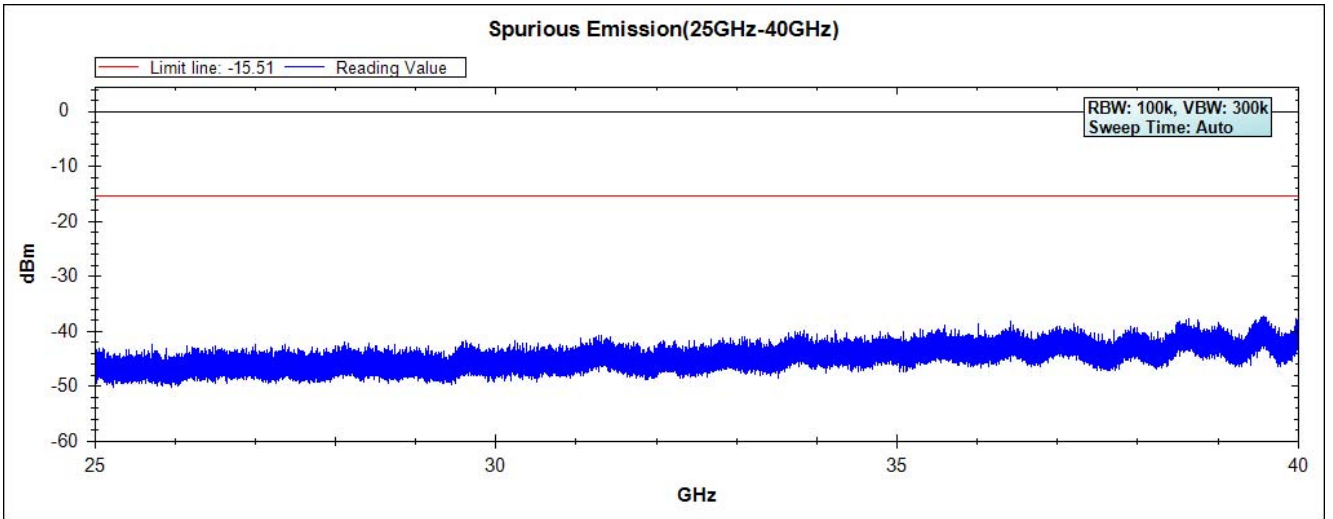
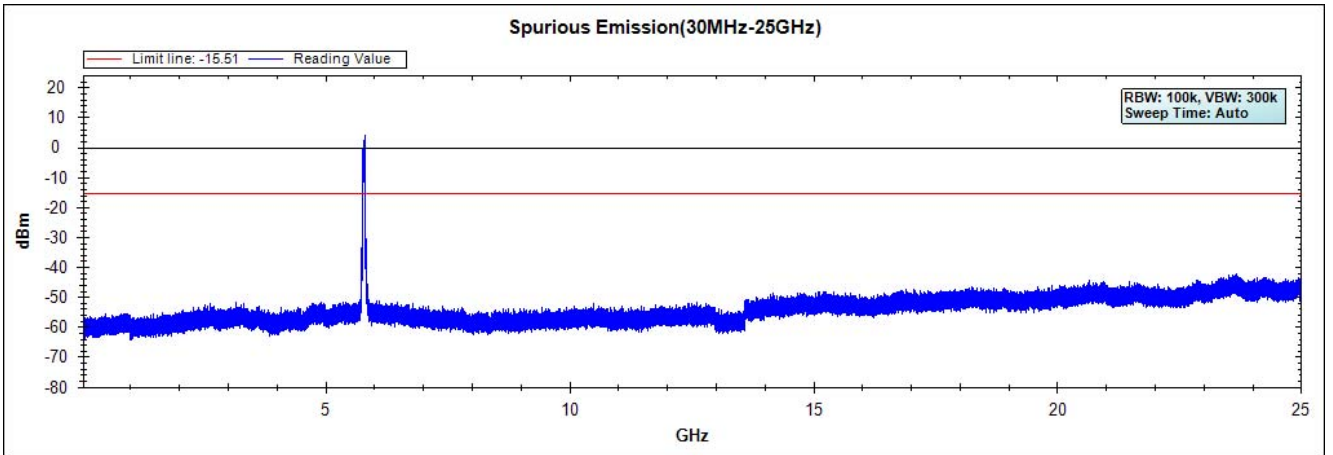
Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
Test Item : RF Antenna Conducted Spurious
Test Site : No.3 OATS
Test Mode : Mode 1: Transmit

Channel 151 (5755MHz) 30MHz -25GHz-Chain A



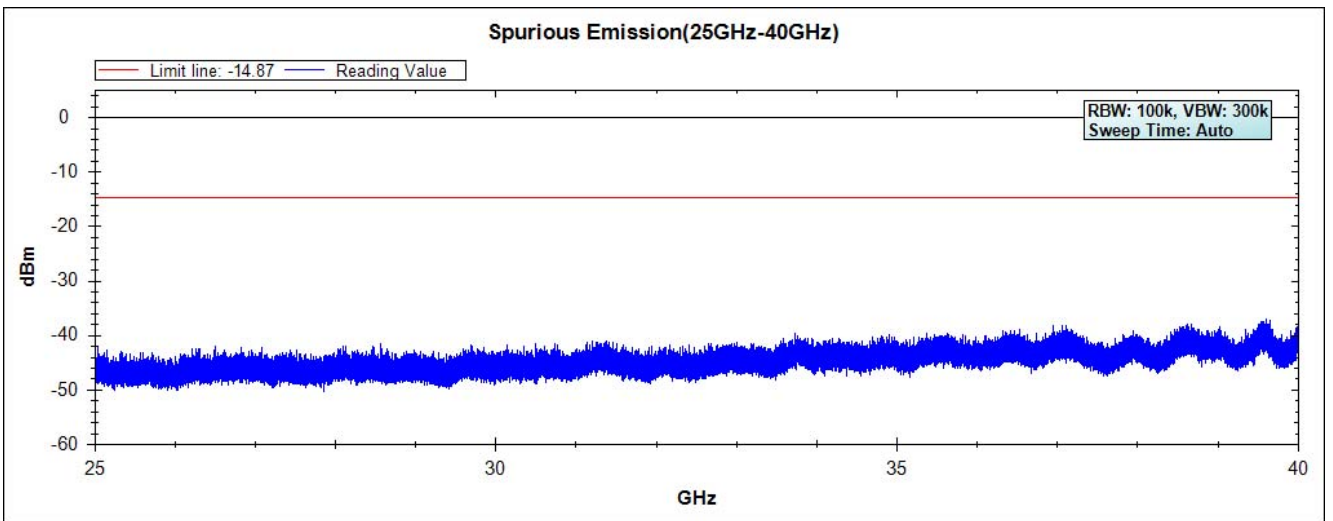
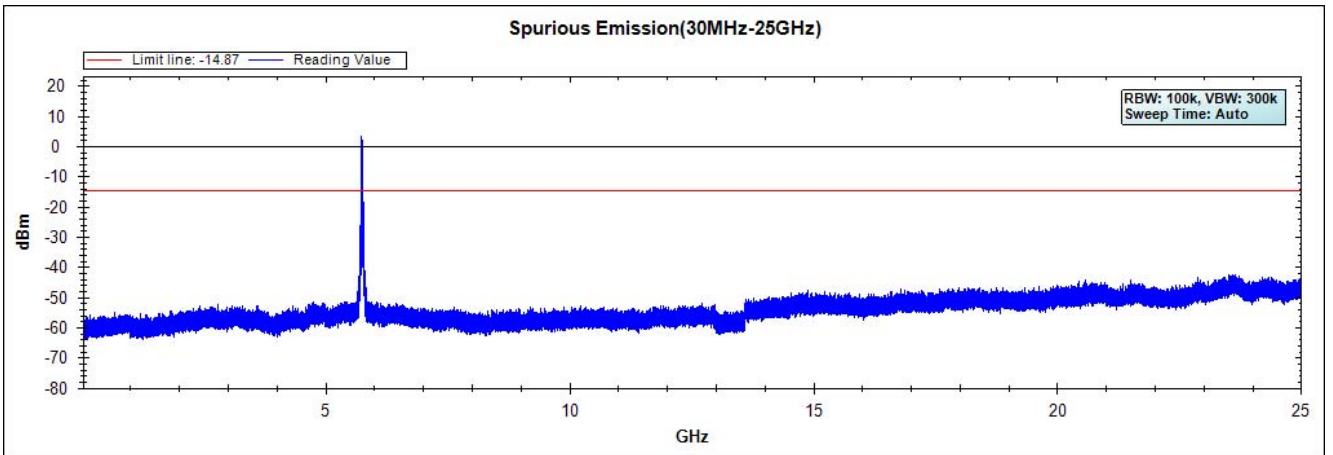
Note: The above test pattern is synthesized by multiple of the frequency range.

Channel 159 (5795MHz) 30MHz -40GHz-Chain A



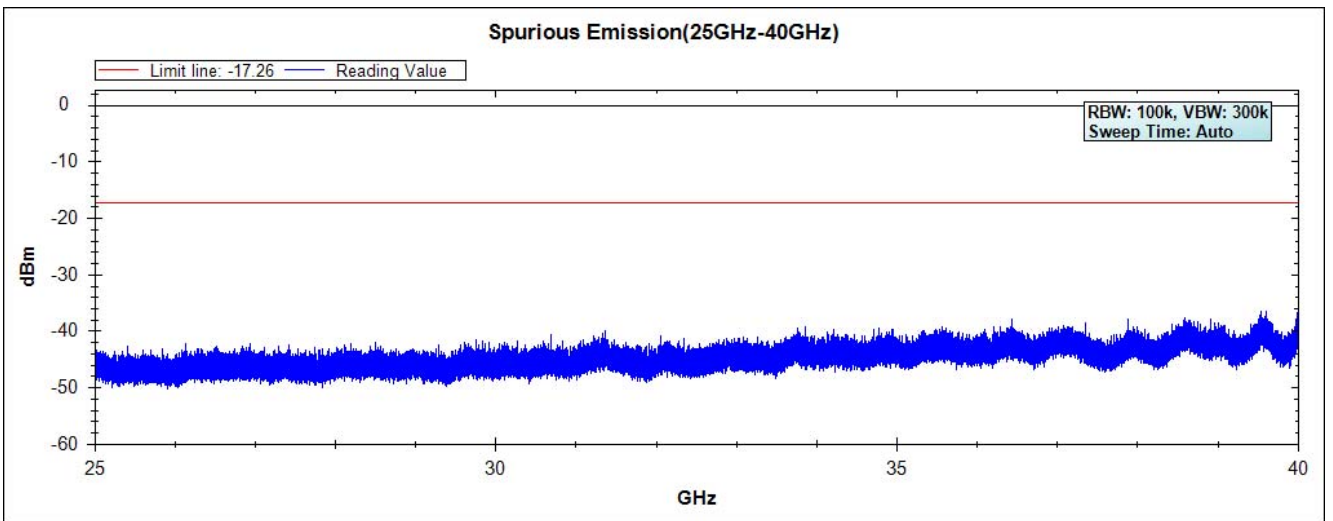
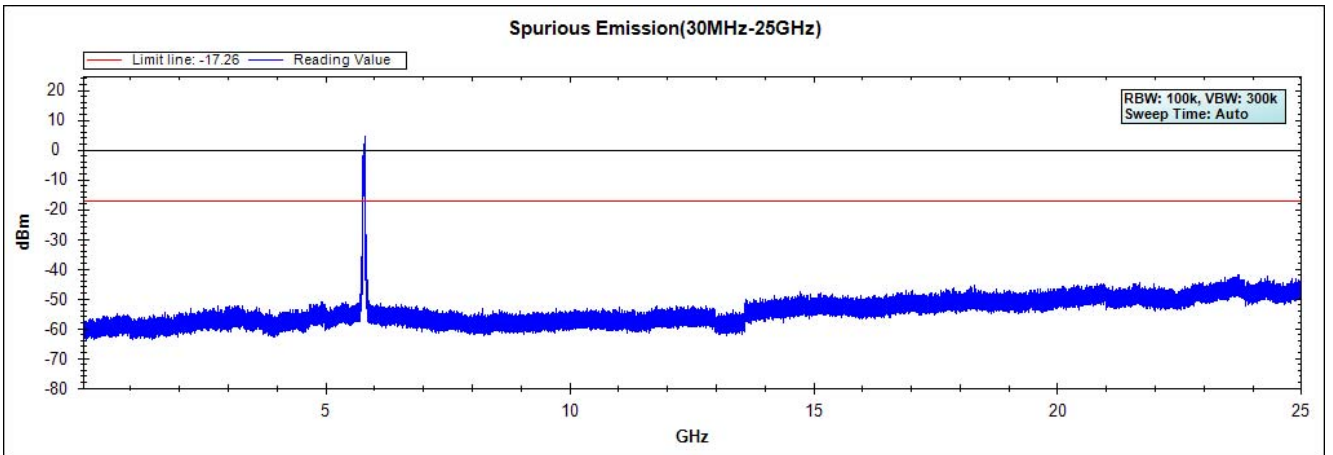
Note: The above test pattern is synthesized by multiple of the frequency range.

Channel 151 (5755MHz) 30MHz -40GHz-Chain B



Note: The above test pattern is synthesized by multiple of the frequency range.

Channel 159 (5795MHz) 30MHz -40GHz-Chain B



Note: The above test pattern is synthesized by multiple of the frequency range.

6. Band Edge

6.1. Test Equipment

RF Conducted Measurement

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

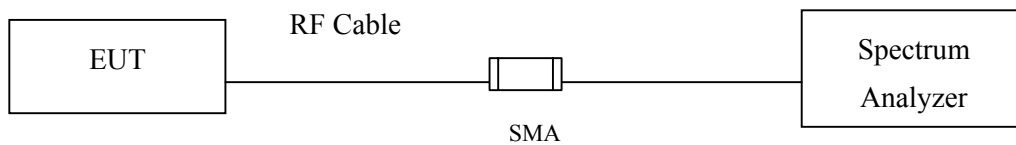
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2013
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2013
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

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.

6.2. Test Setup

RF Conducted Measurement



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.

6.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009 and tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 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.

6.5. Uncertainty

± 3.9 dB above 1GHz

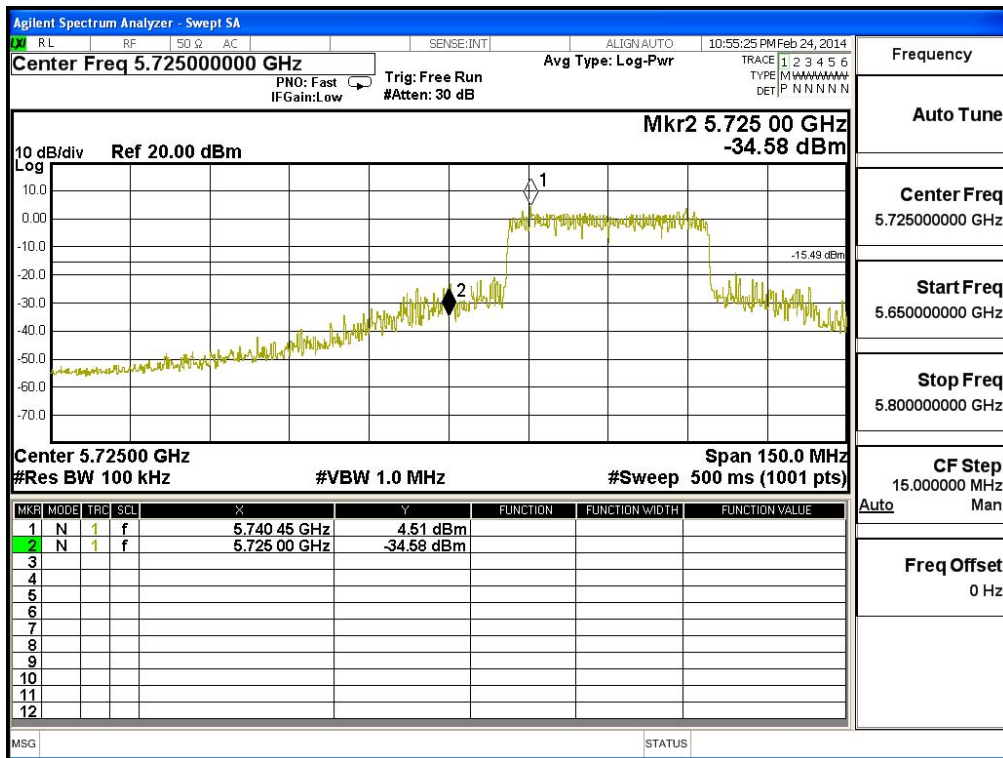
± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

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

Chain A

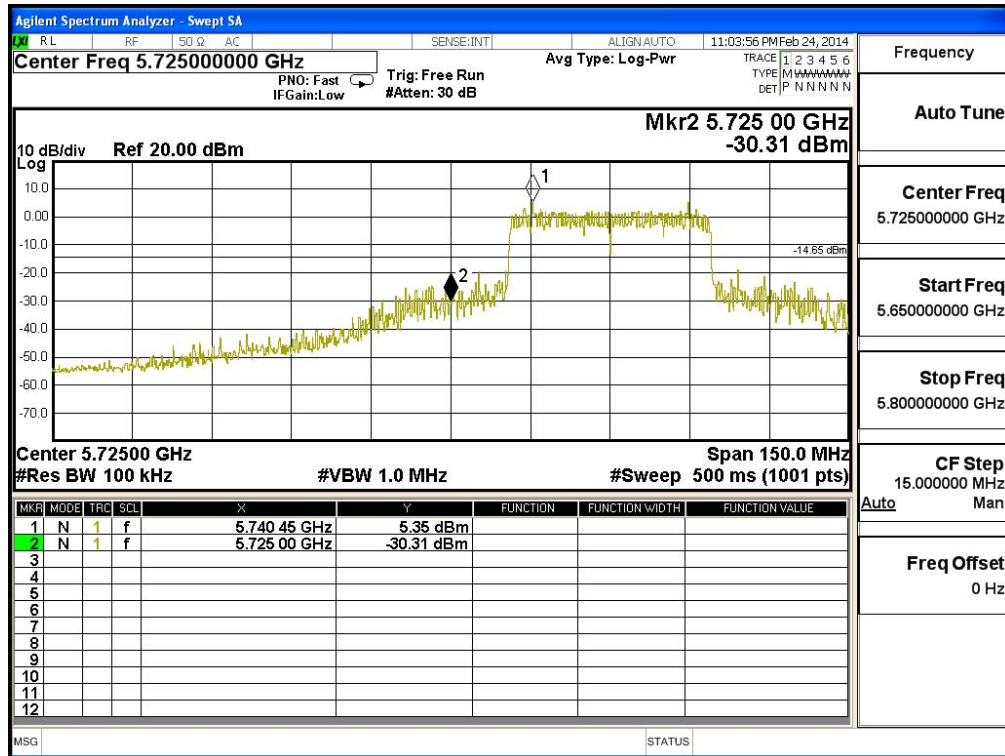
Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5755	39.09	>20	PASS



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

Chain B

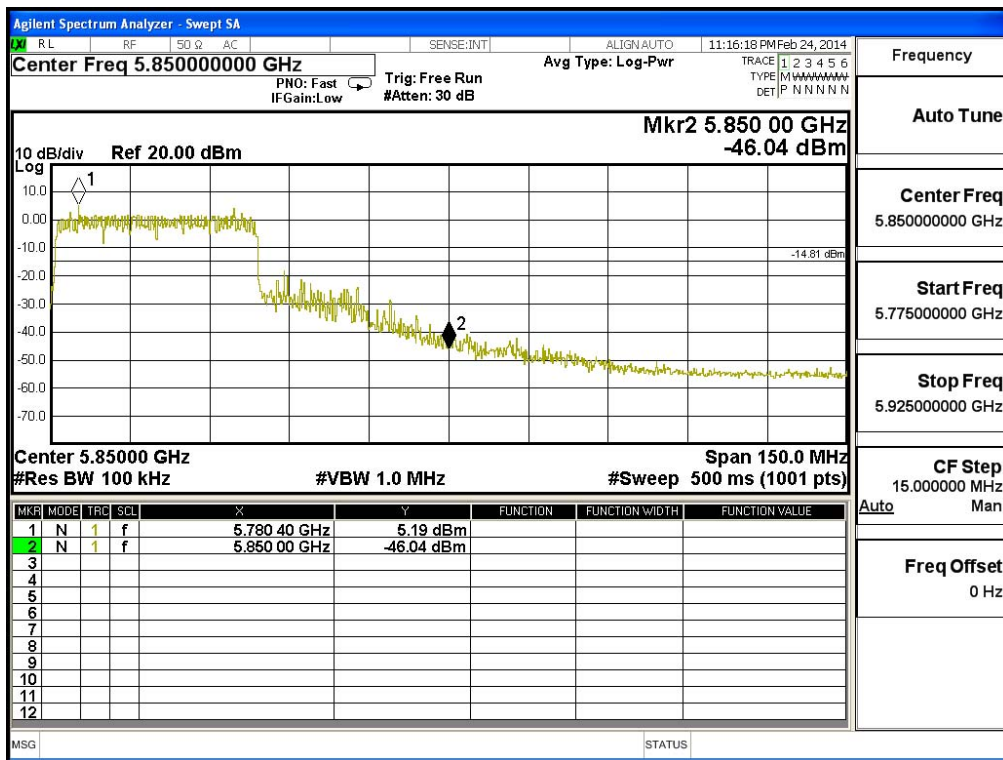
Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5755	35.66	>20	PASS



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

Chain A

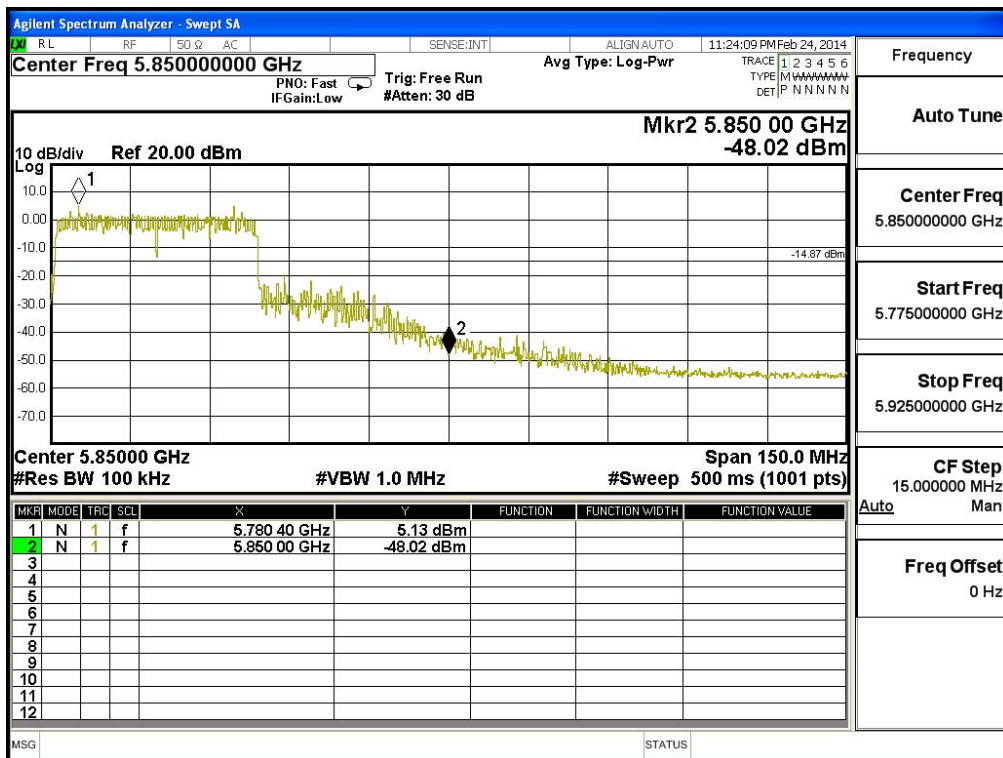
Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5795	51.23	>20	PASS



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

Chain B

Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5795	53.15	>20	PASS



7. Occupied Bandwidth

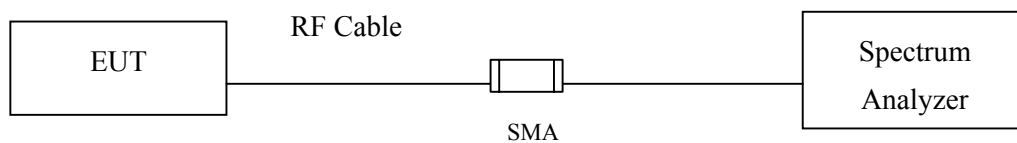
7.1. Test Equipment

	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.

7.2. Test Setup



7.3. Limits

The minimum bandwidth shall be at least 500 kHz.

7.4. Test Procedure

The EUT was setup according to ANSI C63.10: 2009; tested according to DTS test procedure of ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 1-5% of the emission bandwidth, VBW \geq 3*RBW

7.5. Uncertainty

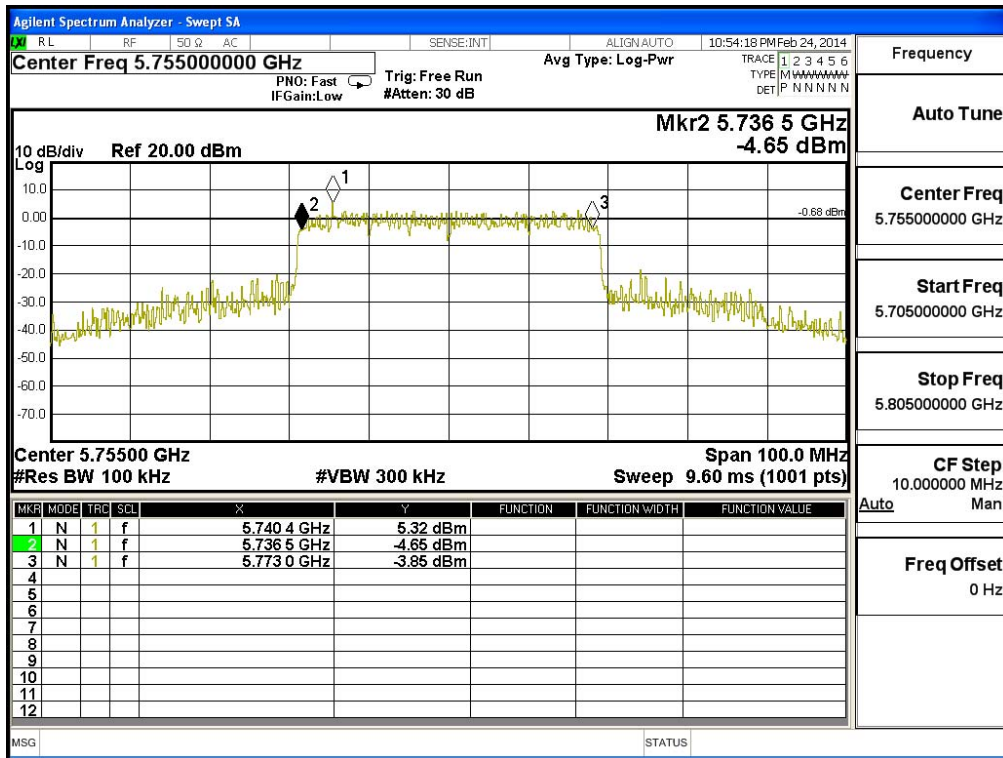
\pm 150Hz

7.6. Test Result of Occupied Bandwidth

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (5755MHz)

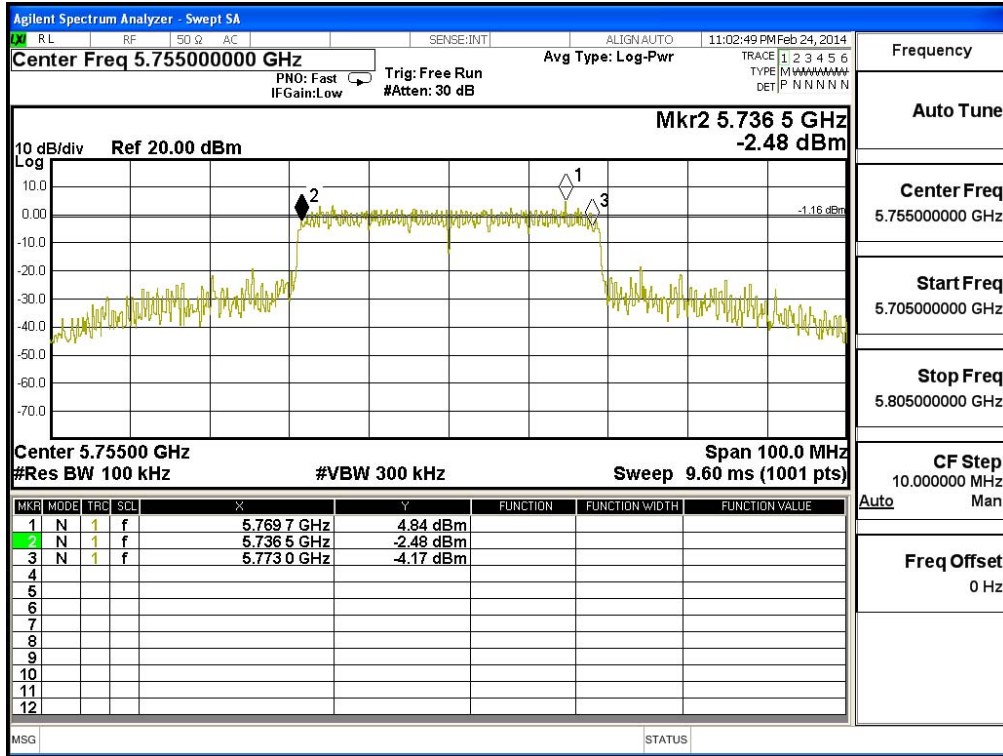
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	36500	>500	Pass

Figure Channel 151: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	36500	>500	Pass

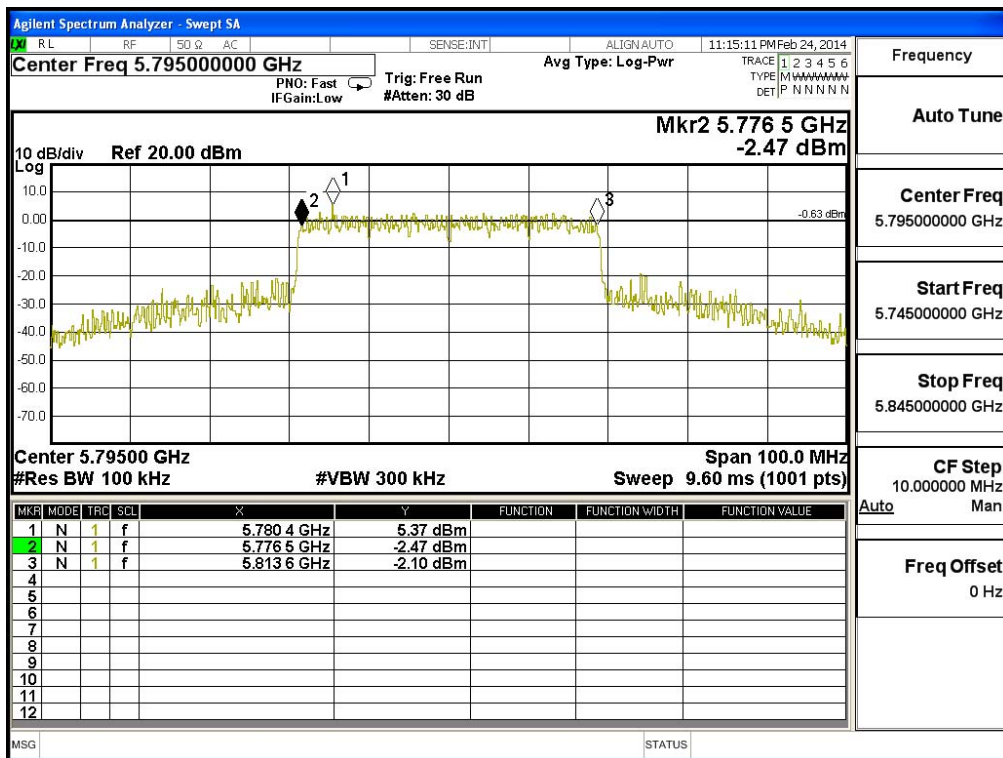
Figure Channel 151: (Chain B)



Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Occupied Bandwidth Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (5795MHz)

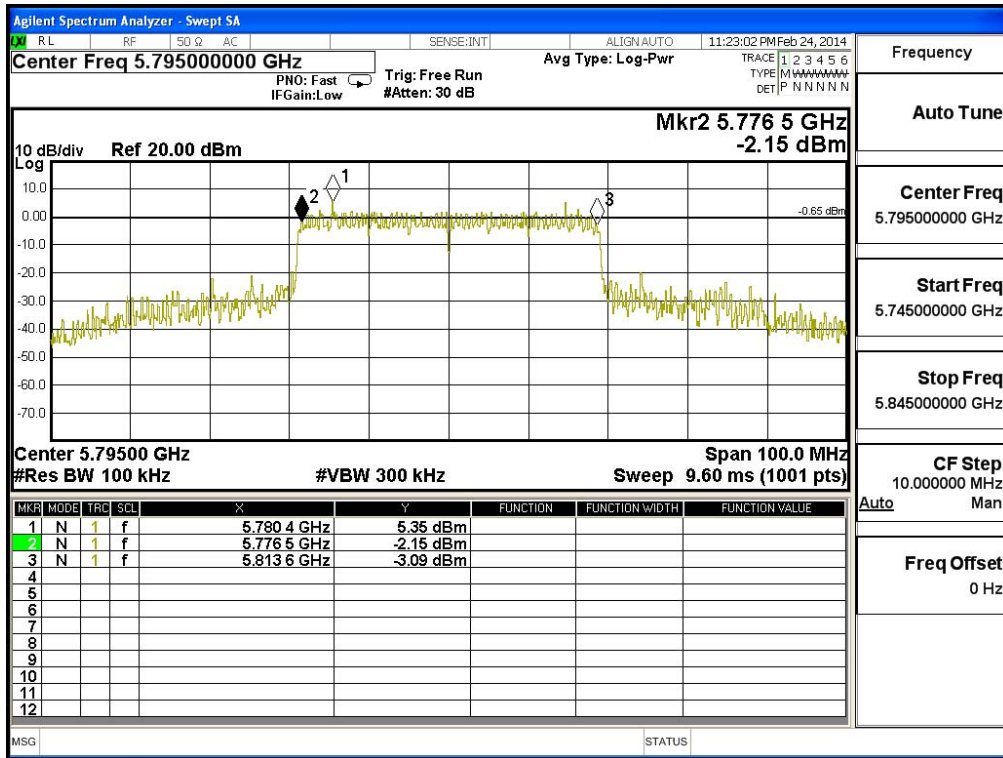
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	37100	>500	Pass

Figure Channel 159: (Chain A)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	37100	>500	Pass

Figure Channel 159: (Chain B)



8. Power Density

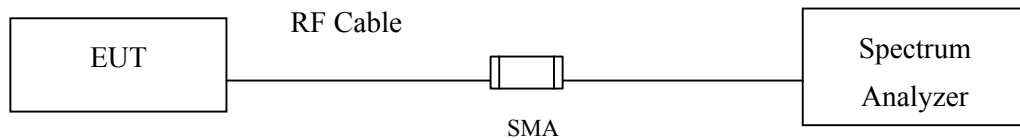
8.1. Test Equipment

	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

The transmitted power density averaged over any 1 second interval shall not be greater +8dBm in any 3kHz bandwidth.

8.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2009; tested according to DTS test procedure of KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

The maximum power spectral density using KDB 558074 section 10.2 PKPSD (peak PSD) method.

8.5. Uncertainty

± 1.27 dB

8.6. Test Result of Power Density

Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Power Density Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (5755MHz)

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm)1	Limit	Result
A	4.700	7.710	< 8dBm	Pass
B	4.730	7.740	< 8dBm	Pass

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

Figure Channel 151: (Chain A)

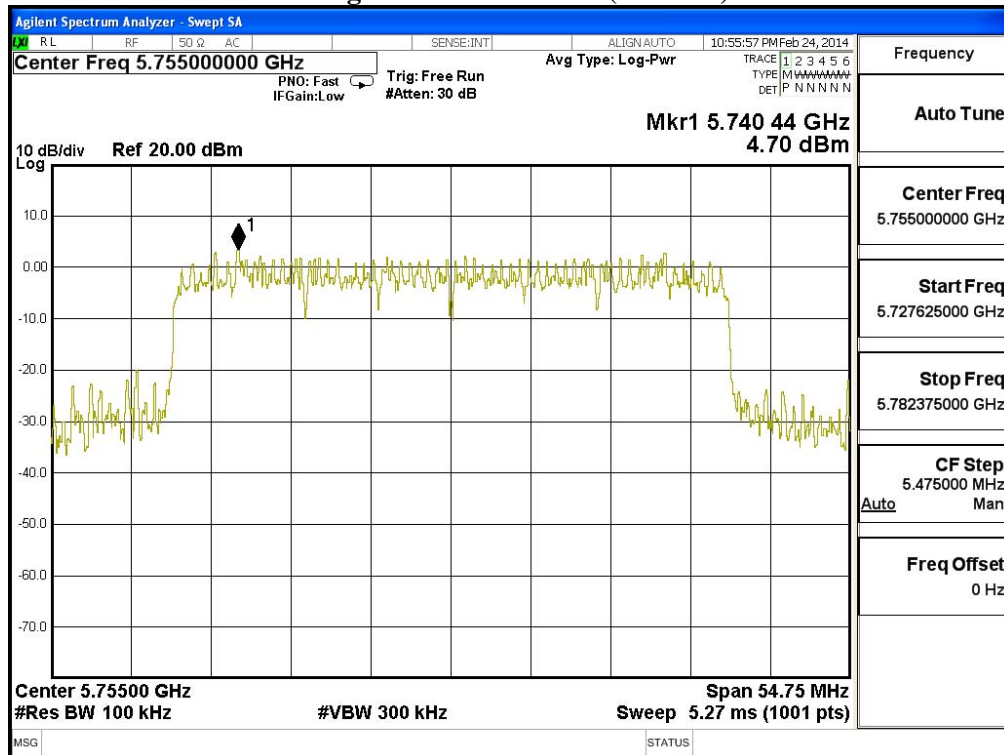
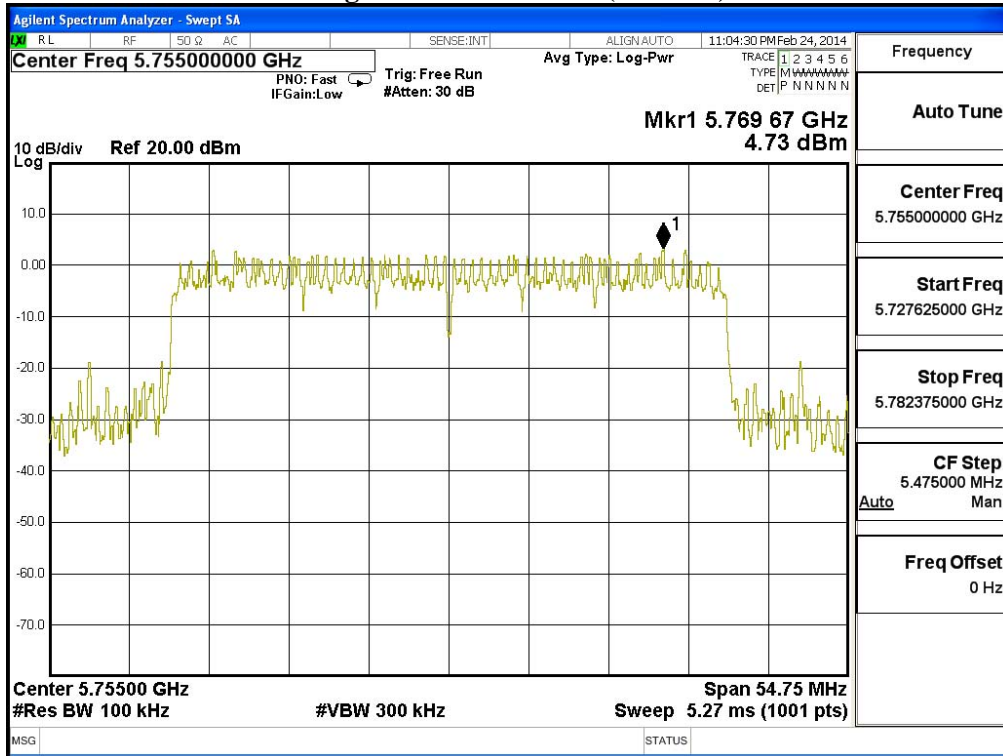


Figure Channel 151: (Chain B)



Product : Long Range Wireless 5 x 2 HD Matrix Pro -Transmitter
 Test Item : Power Density Data
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (5795MHz)

CHAIN	PPSD/MHz (dBm)	Total PPSD/MHz (dBm) ₁	Limit	Result
A	4.490	7.500	< 8dBm	Pass
B	2.740	5.750	< 8dBm	Pass

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

Figure Channel 159: (Chain A)

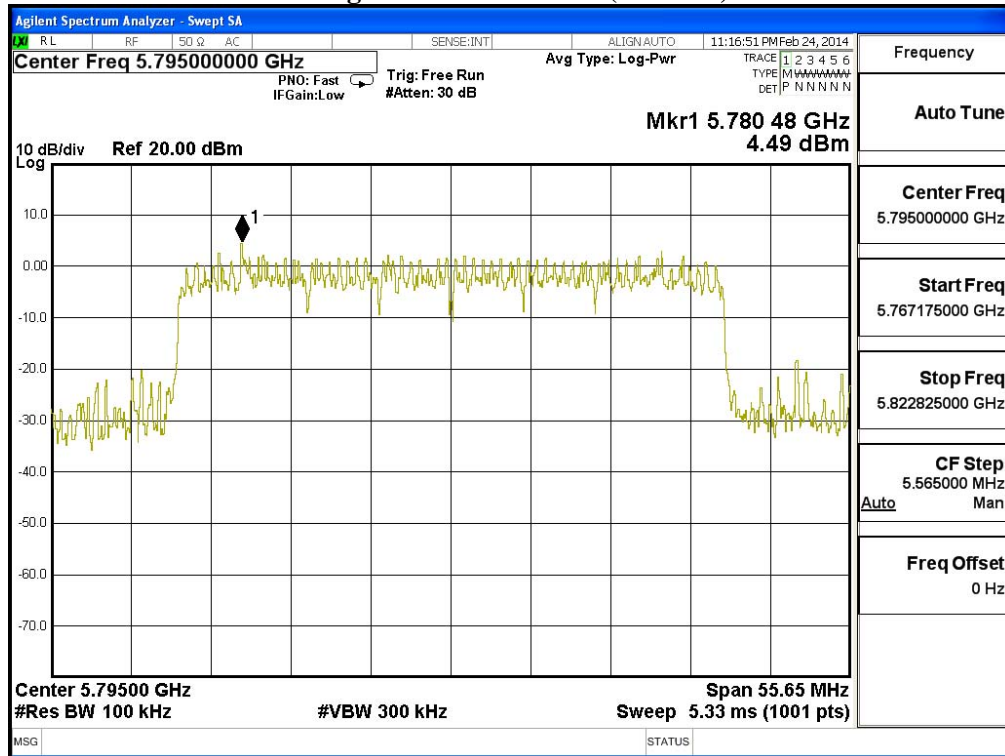
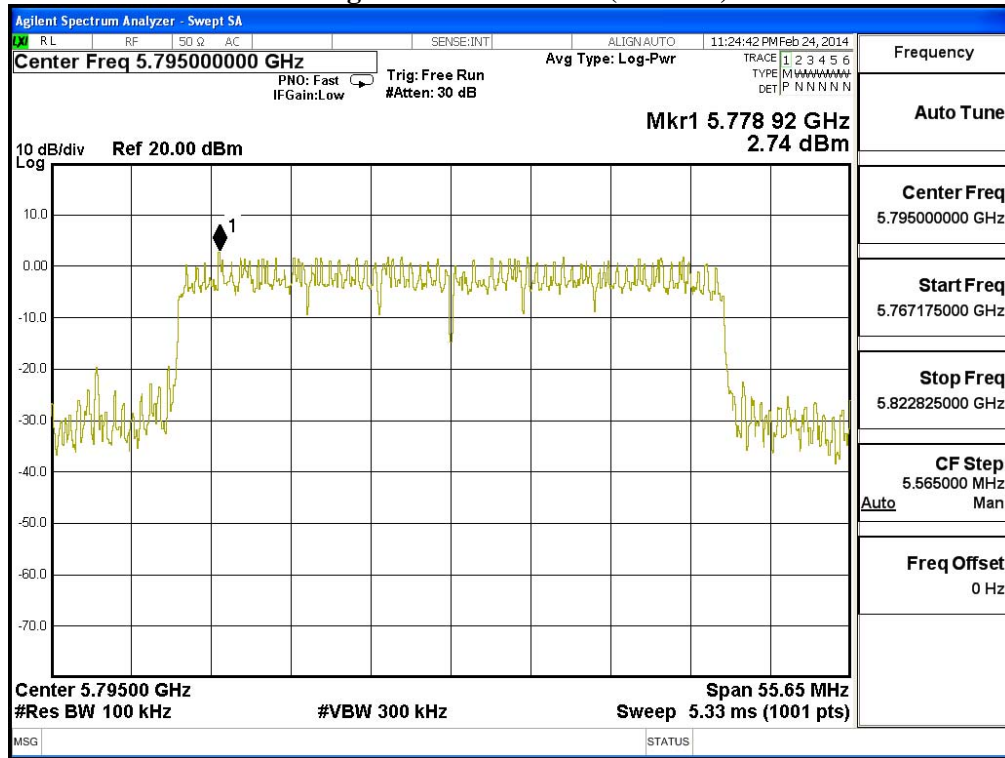


Figure Channel 159: (Chain B)



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.