

FCC Test Report

Product Name	Wireless 5 x 2 HD Matrix Transmitter
Model No	GWHDMS52 - T, GWHDMS52W6 - T, VE819 - T, VE829 - T
FCC ID.	QLEGWHDMS52

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

Date of Receipt	Mar. 07, 2013
Issue Date	Apr. 18, 2013
Report No.	133165R-RFUSP42V01
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.
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Test Report Certification

Issue Date: Apr. 18, 2013

Report No.: 133165R-RFUSP42V01





Product Name	Wireless 5 x 2 HD Matrix Transmitter
Applicant	ATEN Technology, Inc. dba IOGEAR
Address	19641 Da Vinci Foothill Ranch, CA 92610 United States
Manufacturer	ZINWELL CORPORATION
Model No.	GWHDM52 - T, GWHDM52W6 - T, VE819 - T, VE829 - 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 C63.4: 2003, ANSI C63.10: 2009
Test Result	Complied

The test results relate only to the samples tested.

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless 5 x 2 HD Matrix Transmitter
Trade Name	IOGEAR / ATEN
Model No.	GWHDMS52 - T, GWHDMS52W6 - T, VE819 - T, VE829 - T
FCC ID.	QLEGWHDMS52
Frequency Range	5755-5795MHz
Number of Channels	2
Data Speed	63Mbps
Channel separation	40MHz
Type of Modulation	OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	PIFA
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto
USB to mini Cable	Shielded, 0.2m
YPbPr Adapter Cable	Shielded, 0.3m
IR Blaster Cable	Non-Shielded, 3.0m
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 (4TX, 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 Wireless 5 x 2 HD Matrix 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. The EUT is including four models for different marketing requirement.
4. 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
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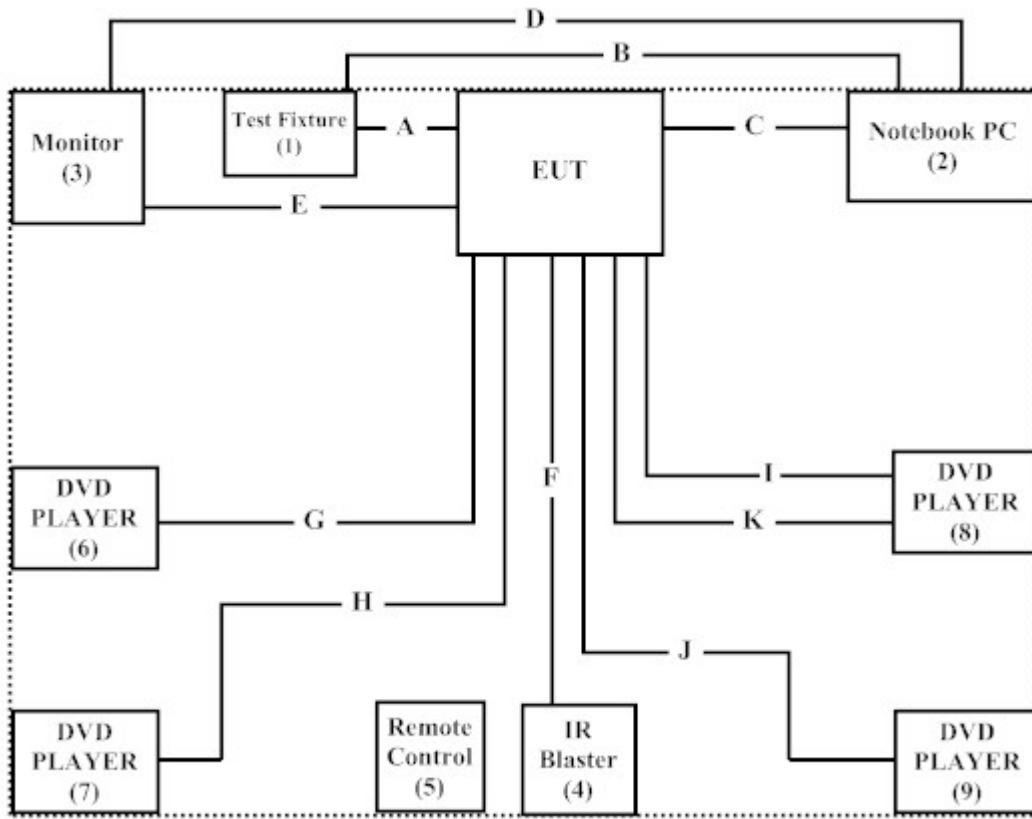
1.3. Tested System Details

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://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

Accreditation on NVLAP
 NVLAP Lab Code: 200533-0

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

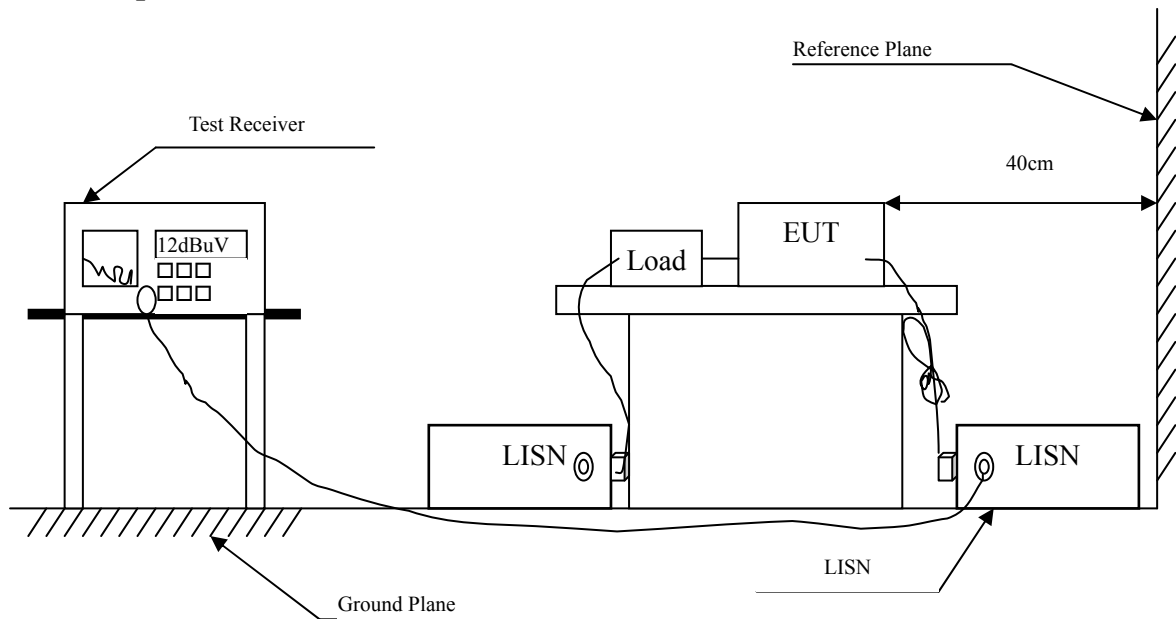
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2012	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2013	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2013	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar., 2013	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2013	
	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 C63.4: 2003 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 : Wireless 5 x 2 HD Matrix 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					
0.201	9.790	29.470	39.260	-25.283	64.543
0.259	9.790	29.690	39.480	-23.406	62.886
0.478	9.790	30.820	40.610	-16.019	56.629
0.791	9.790	21.530	31.320	-24.680	56.000
10.595	9.992	37.180	47.172	-12.828	60.000
14.443	10.072	41.810	51.882	-8.118	60.000
Average					
0.201	9.790	27.060	36.850	-17.693	54.543
0.259	9.790	25.730	35.520	-17.366	52.886
0.478	9.790	28.040	37.830	-8.799	46.629
0.791	9.790	16.310	26.100	-19.900	46.000
10.595	9.992	30.880	40.872	-9.128	50.000
14.443	10.072	35.680	45.752	-4.248	50.000

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 : Wireless 5 x 2 HD Matrix 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					
0.271	9.770	29.470	39.240	-23.303	62.543
0.584	9.770	30.280	40.050	-15.950	56.000
1.920	9.790	23.590	33.380	-22.620	56.000
9.548	9.973	34.270	44.243	-15.757	60.000
14.447	10.133	40.780	50.913	-9.087	60.000
18.705	10.200	33.130	43.330	-16.670	60.000
Average					
0.271	9.770	27.060	36.830	-15.713	52.543
0.584	9.770	27.630	37.400	-8.600	46.000
1.920	9.790	18.870	28.660	-17.340	46.000
9.548	9.973	25.540	35.513	-14.487	50.000
14.447	10.133	34.220	44.353	-5.647	50.000
18.705	10.200	27.530	37.730	-12.270	50.000

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, 2012
X	Power Sensor	Anritsu	MA2411B/0738448	Jun., 2012

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 ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

3.5. Uncertainty

± 1.27 dB

3.6. Test Result of Peak Power Output

Product : Wireless 5 x 2 HD Matrix 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	10.51	22.08
159	5795	63	10.53	21.63

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	10.50	22.44
159	5795	63	10.61	21.34

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

CHAIN C

Channel No	Frequency (MHz)	Data Rata (Mbps)	Average Power	Peak Power
			Measurement Level (dBm)	
151	5755	63	10.55	21.51
159	5795	63	10.73	21.41

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

CHAIN D

Channel No	Frequency (MHz)	Data Rata (Mbps)	Average Power	Peak Power
			Measurement Level (dBm)	
151	5755	63	10.62	22.53
159	5795	63	10.53	21.88

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

CHAIN A+B+C+D

Channel	Frequency (MHz)	Data Rate (Mbps)	Chain A Power (dBm)	Chain B Power (dBm)	Chain C Power (dBm)	Chain D Power (dBm)	Chain A+B+C+D Power (dBm)	Limit (dBm)	Result
151	5755	63	22.08	22.44	21.51	22.53	28.18	<30dBm	Pass
159	5795	63	21.63	21.34	21.41	21.88	27.59	<30dBm	Pass

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

4. Radiated Emission

4.1. Test Equipment

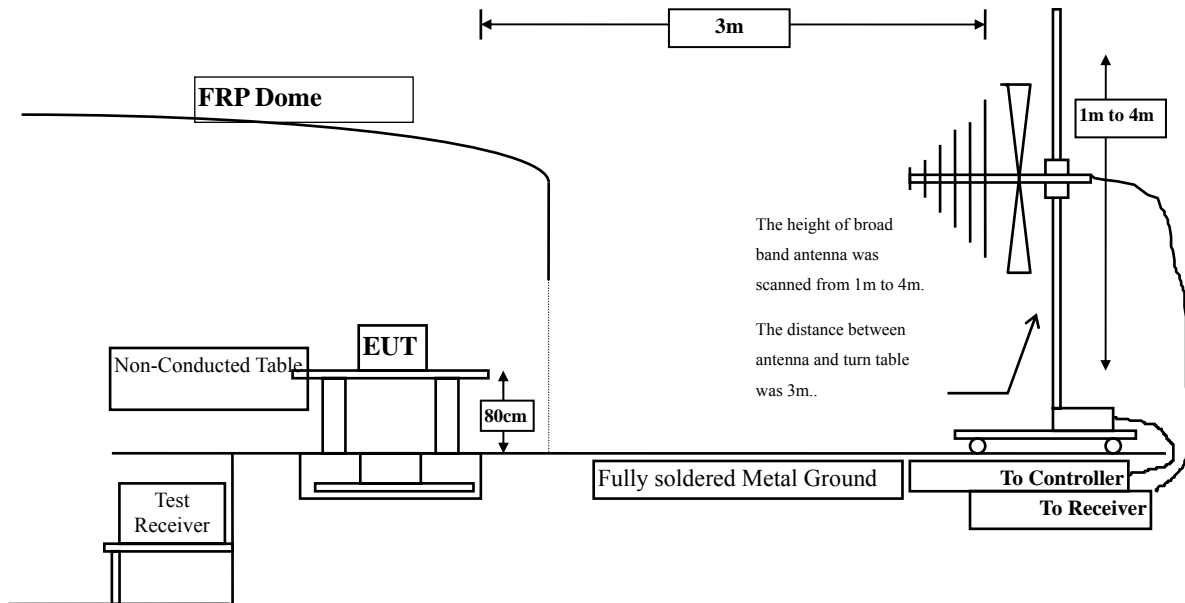
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2012
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar., 2013
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2013
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

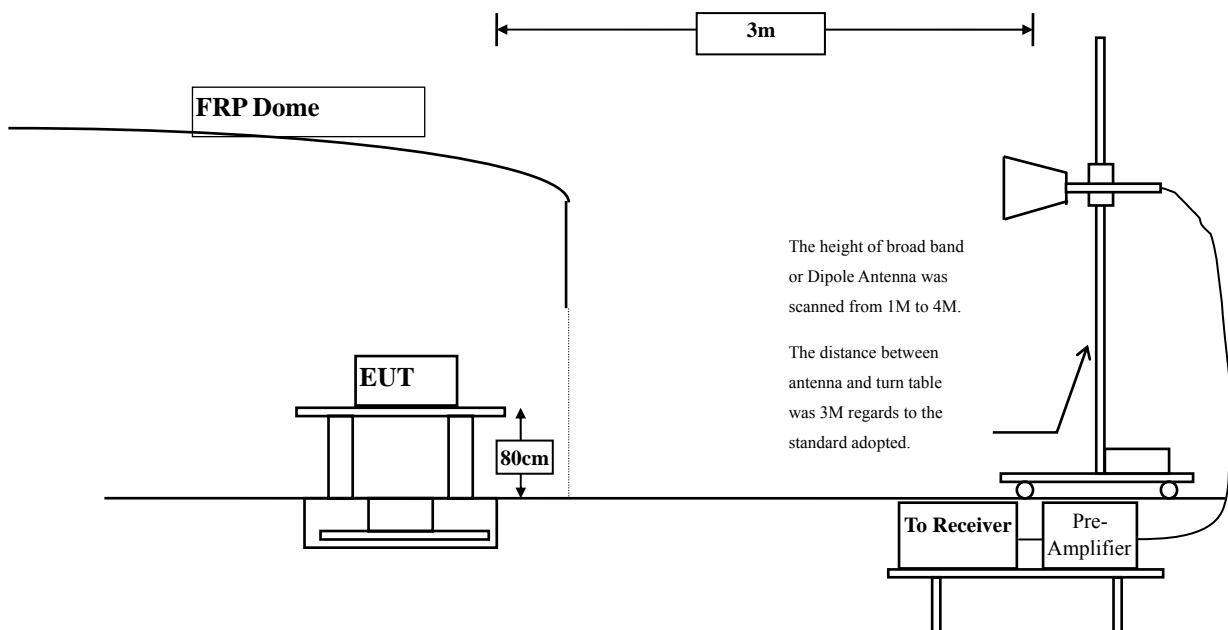
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

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	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

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 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 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 : Wireless 5 x 2 HD Matrix 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	35.390	52.514	-21.486	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11510.000	18.081	35.710	53.791	-20.209	74.000
Average Detector:					
--					

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 : Wireless 5 x 2 HD Matrix 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	35.180	51.880	-22.120	74.000
Average Detector:					
--					
Vertical					
Peak Detector:					
11590.000	17.567	35.510	53.076	-20.924	74.000
Average Detector:					
--					

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 : Wireless 5 x 2 HD Matrix 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					
191.020	-10.040	48.997	38.957	-4.543	43.500
462.620	1.172	39.736	40.908	-5.092	46.000
575.140	2.923	39.113	42.036	-3.964	46.000
800.180	5.141	28.228	33.369	-12.631	46.000
881.660	6.307	25.555	31.862	-14.138	46.000
949.560	6.695	25.128	31.823	-14.177	46.000
Vertical					
204.600	-7.666	38.070	30.403	-13.097	43.500
398.600	-4.678	38.992	34.314	-11.686	46.000
532.460	-0.563	30.281	29.718	-16.282	46.000
687.660	2.444	26.359	28.803	-17.197	46.000
798.240	2.808	27.251	30.059	-15.941	46.000
928.220	6.203	31.233	37.436	-8.564	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.

5. RF antenna conducted test

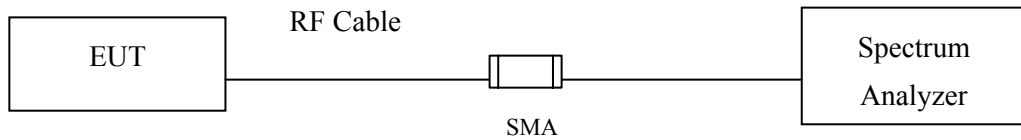
5.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2012
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

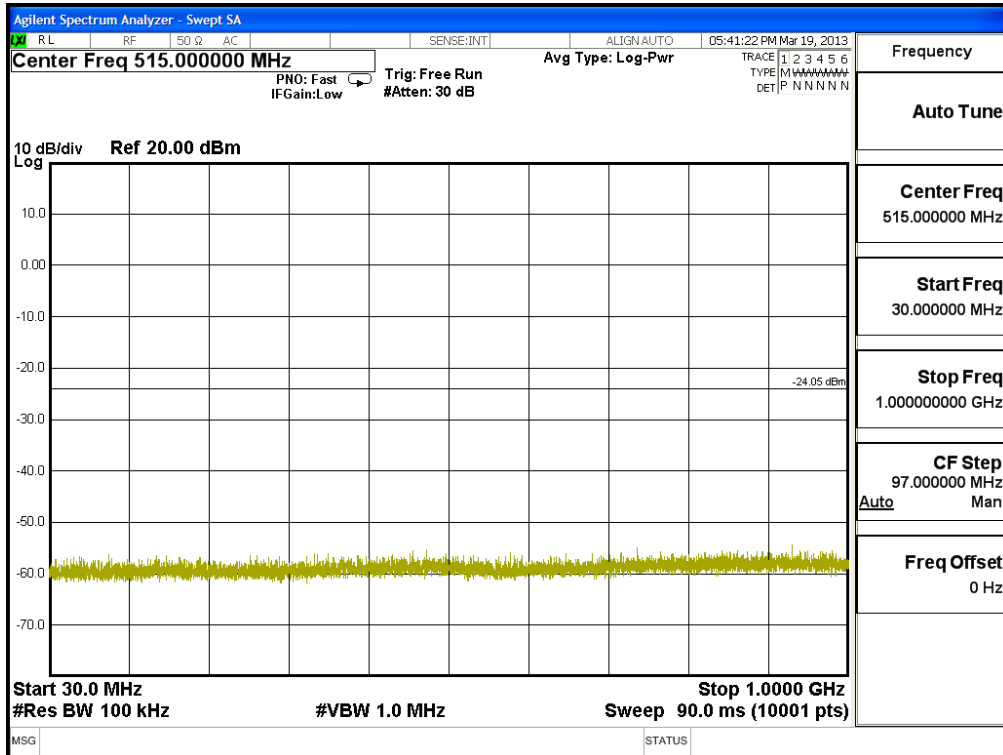
The measurement uncertainty

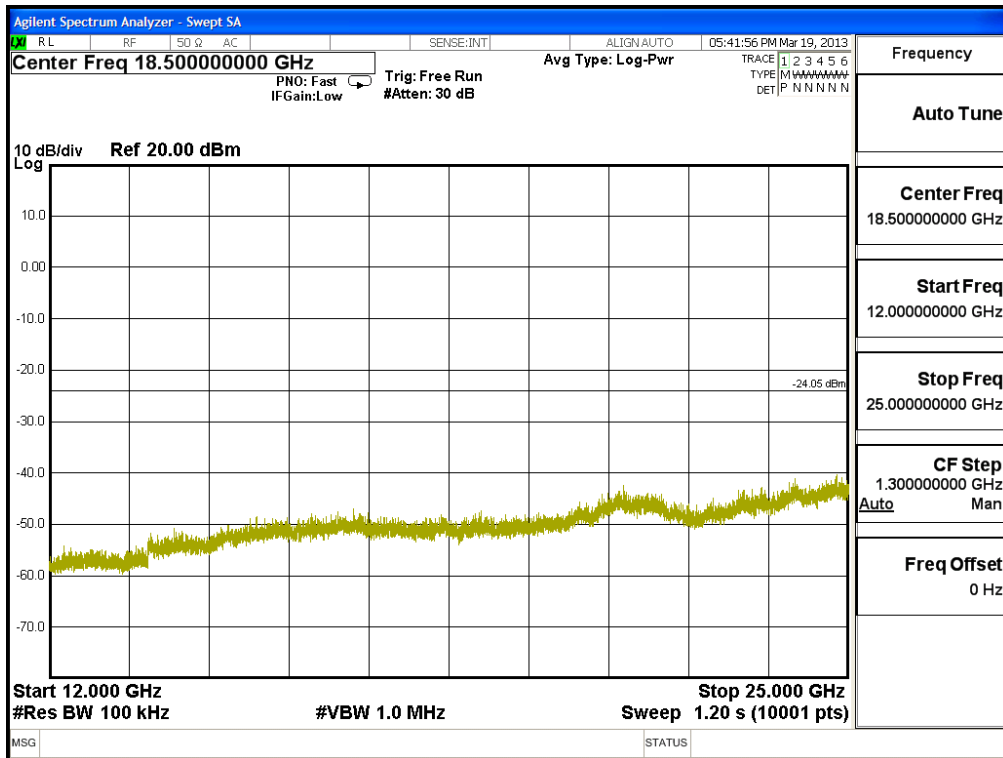
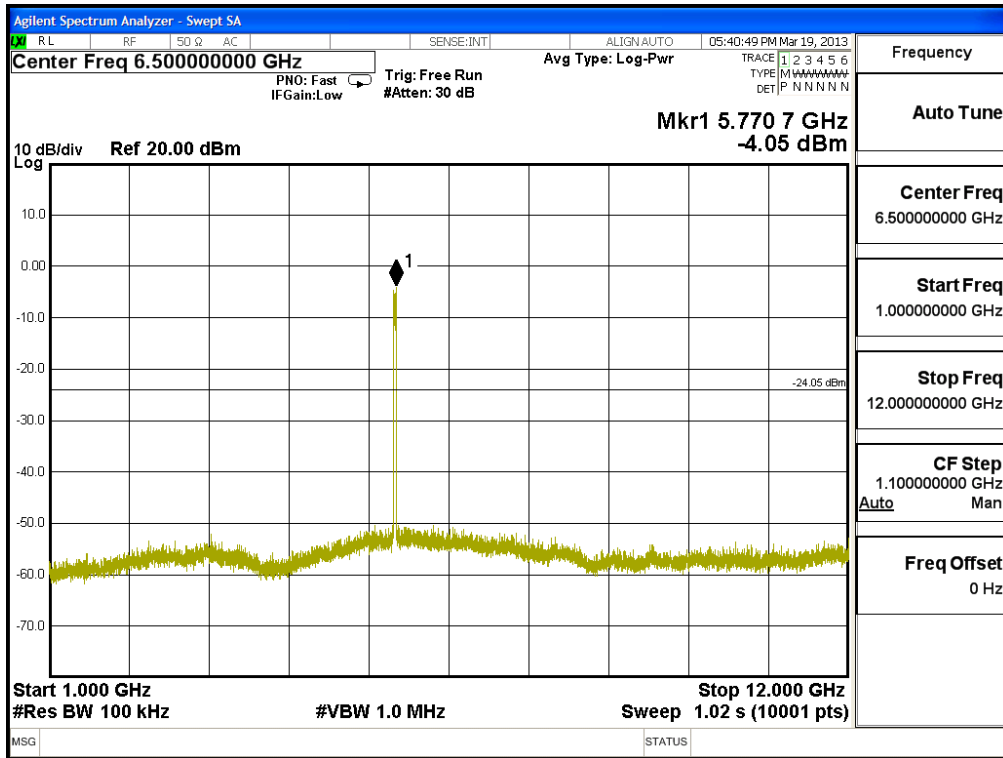
Conducted is defined as $\pm 1.27\text{dB}$

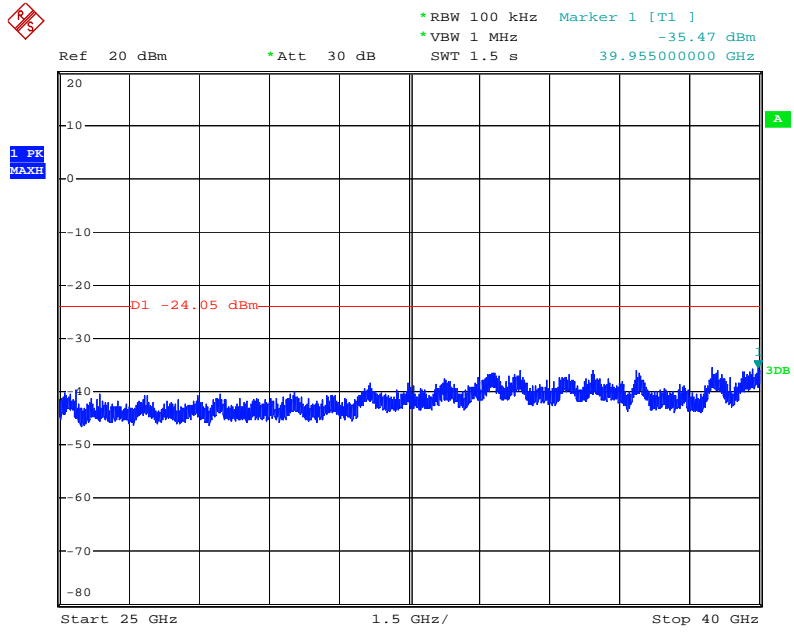
5.6. Test Result of RF antenna conducted test

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

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

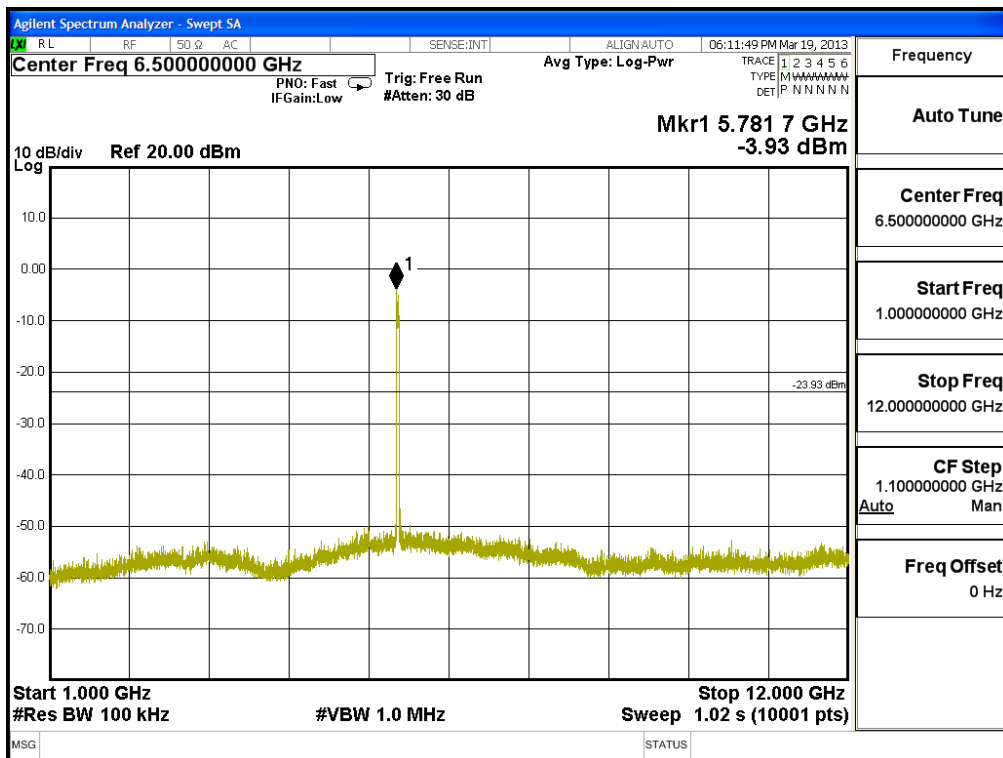
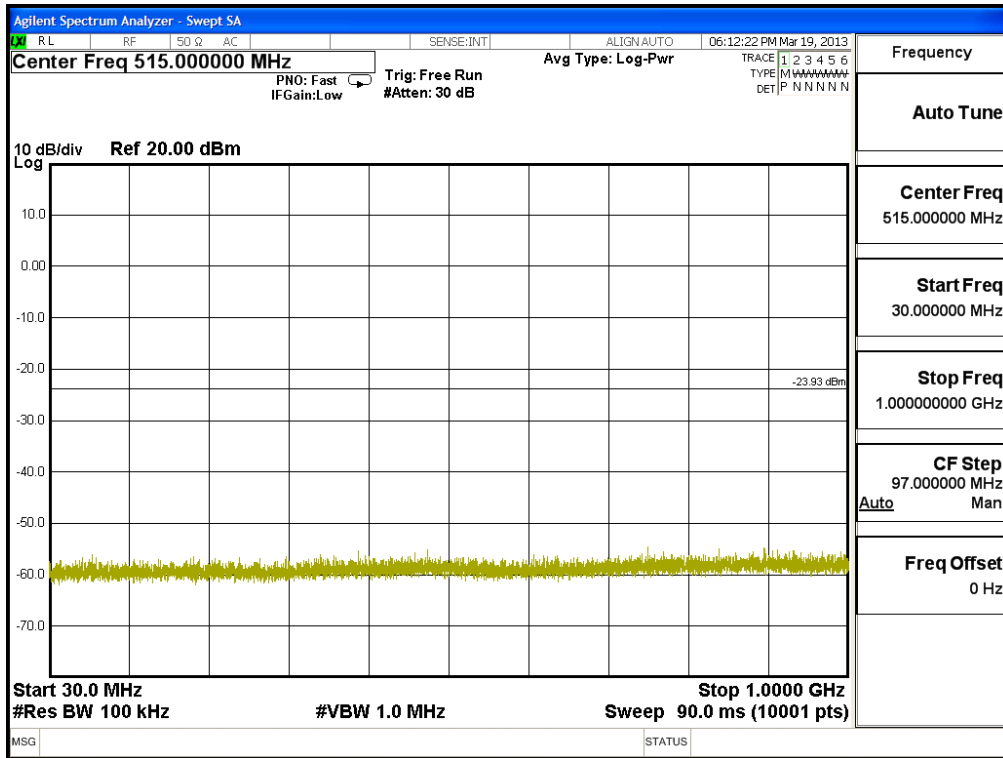


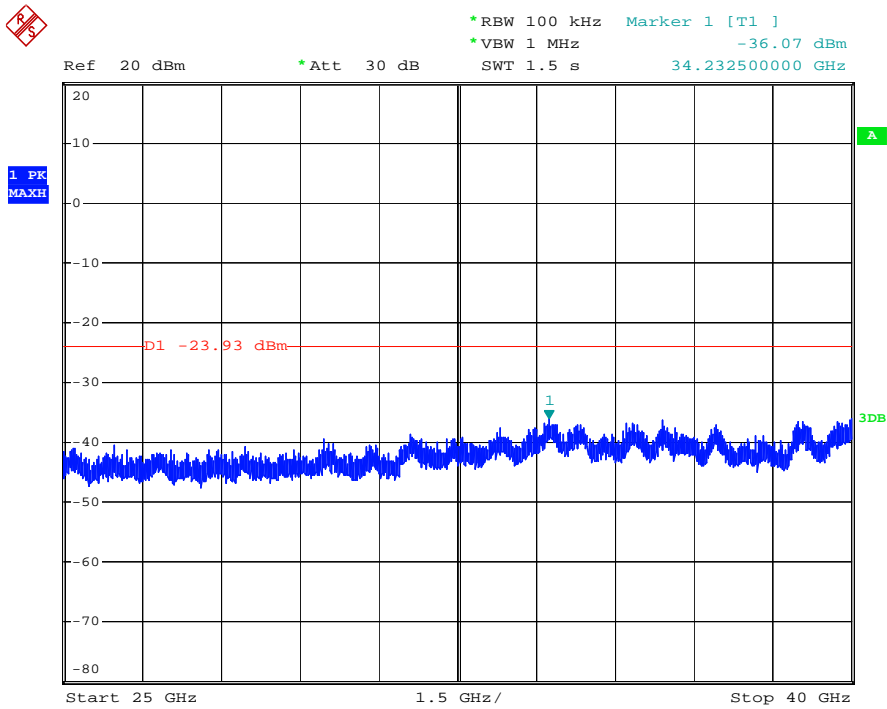
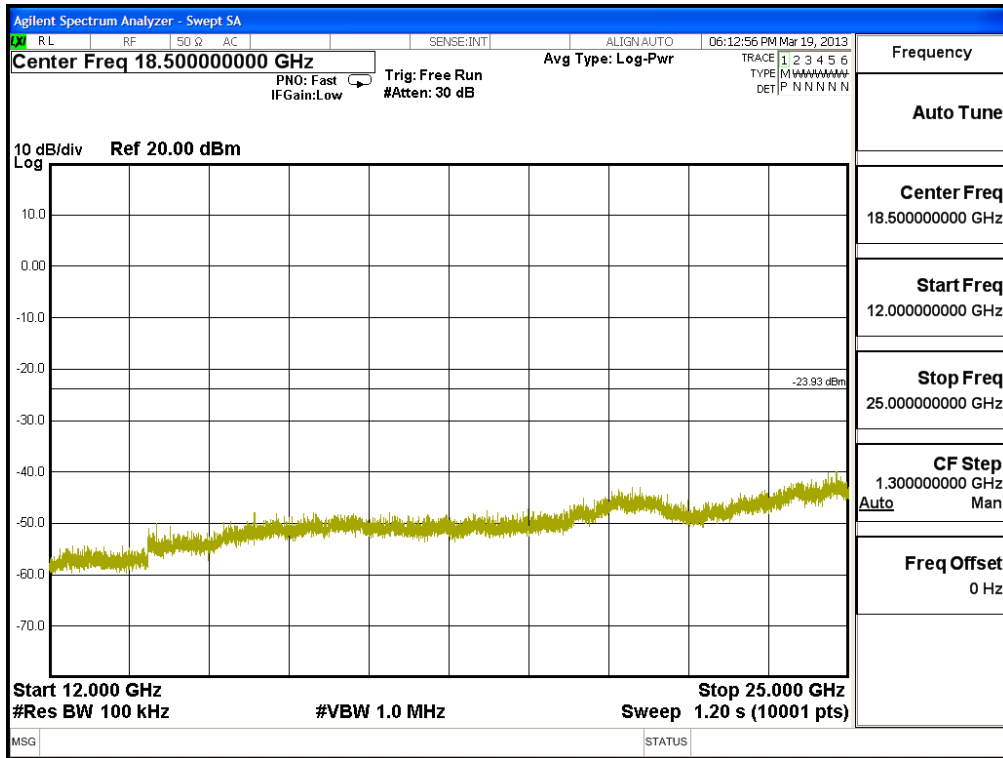




Date: 20.MAR.2013 01:19:47

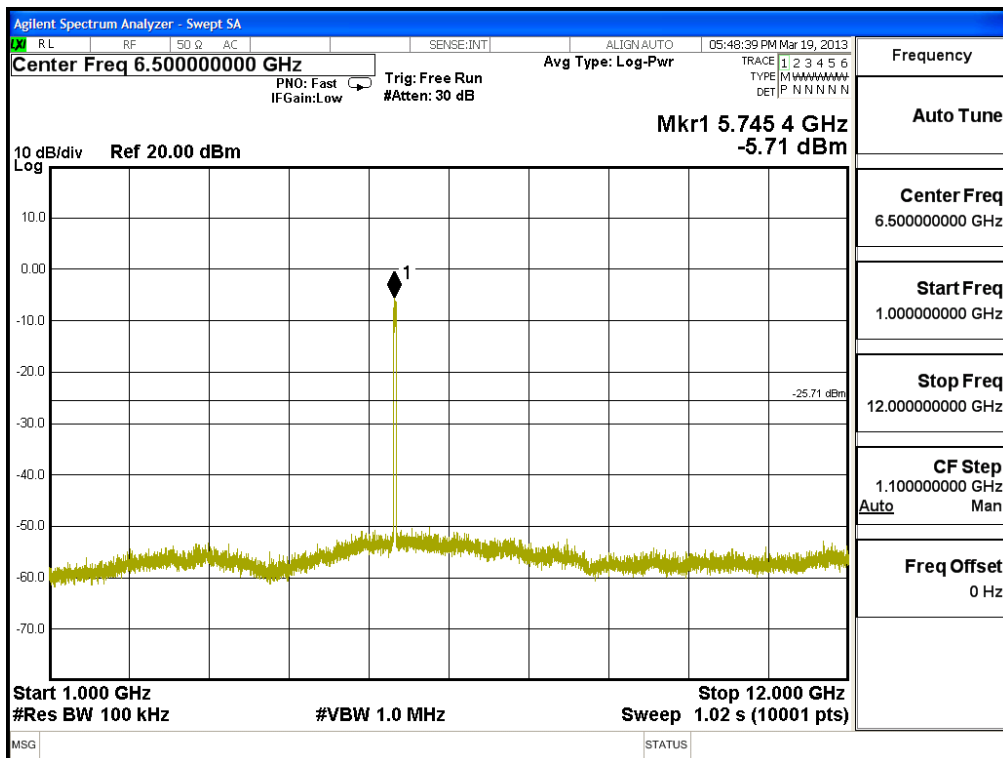
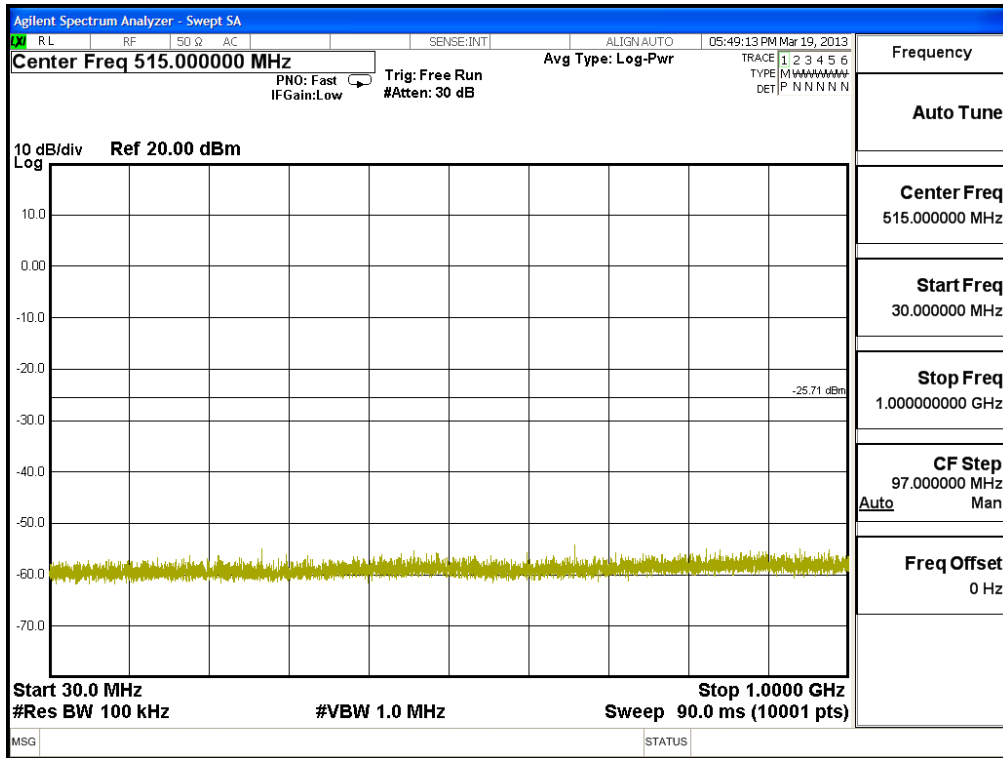
Channel 159 (5795MHz) 30MHz -40GHz-Chain A



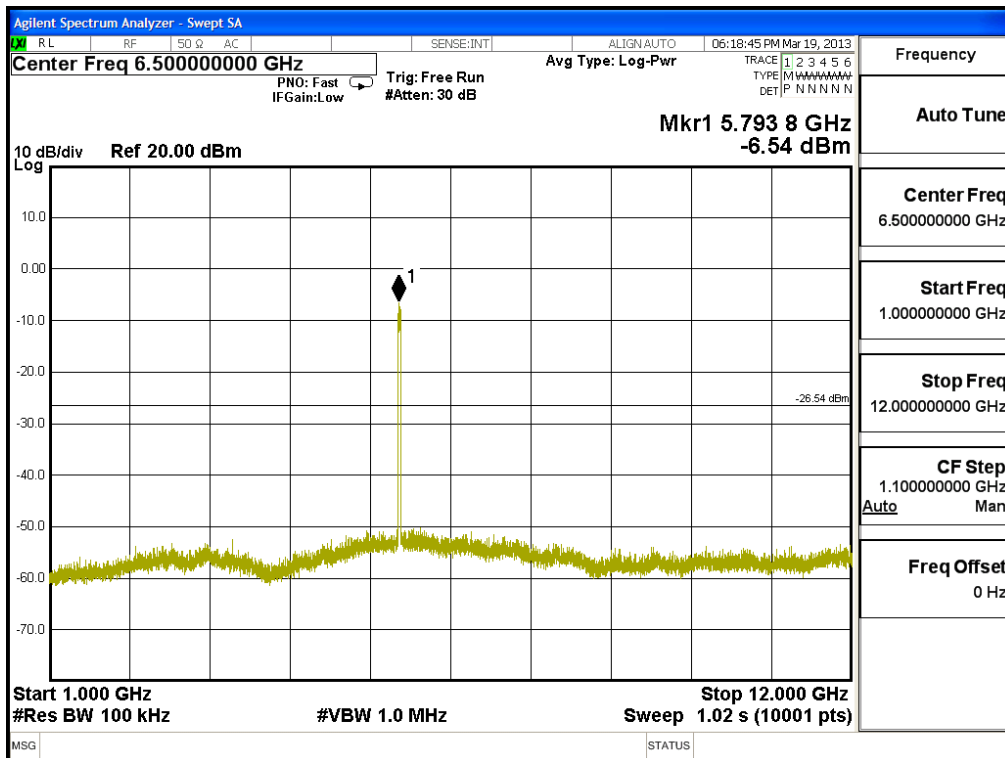
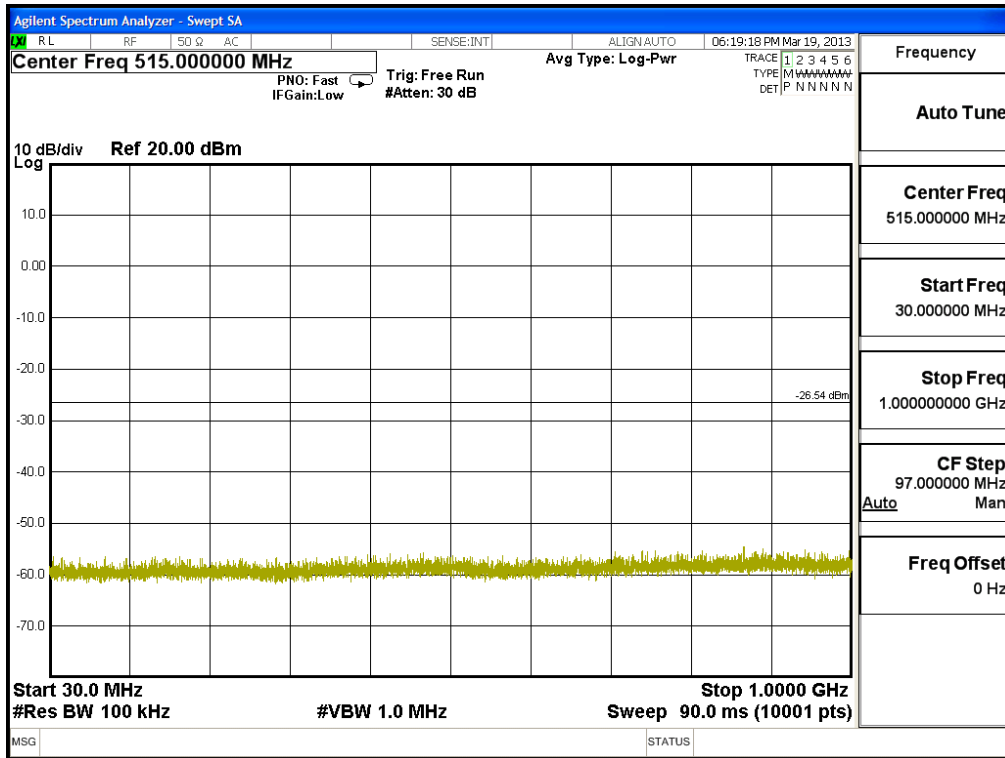


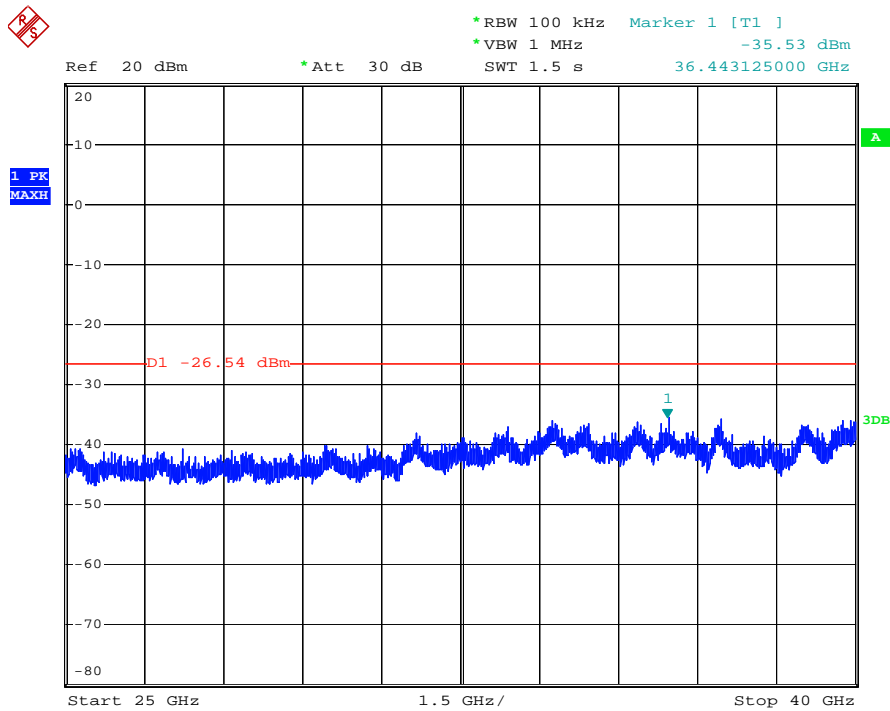
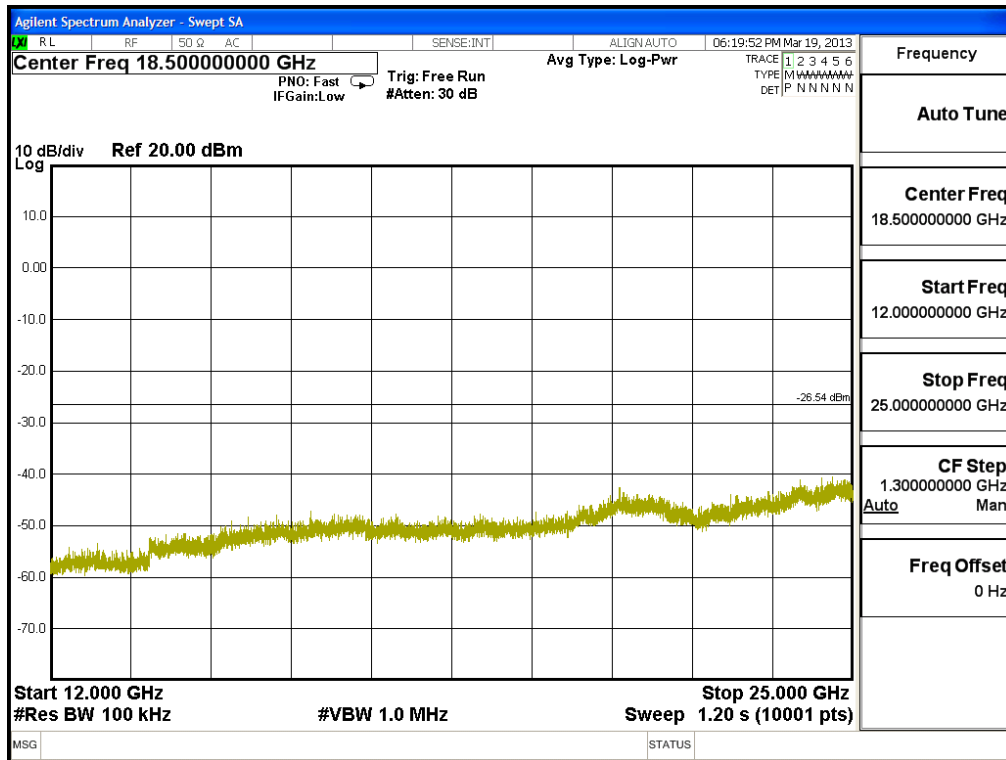
Date: 20.MAR.2013 01:20:33

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



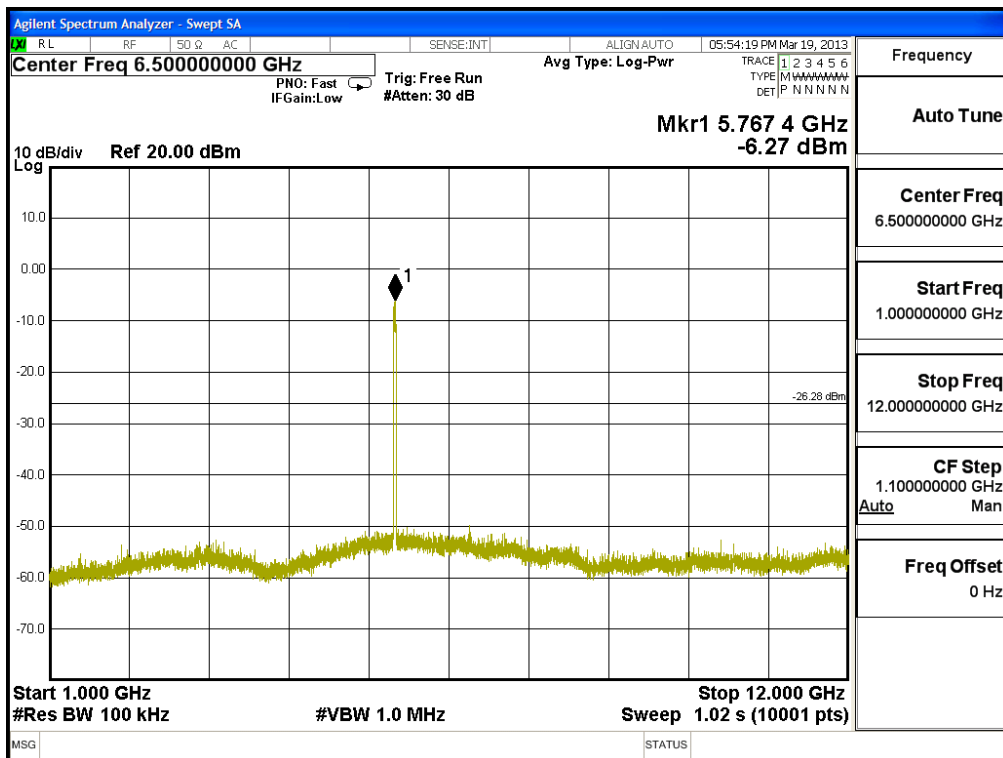
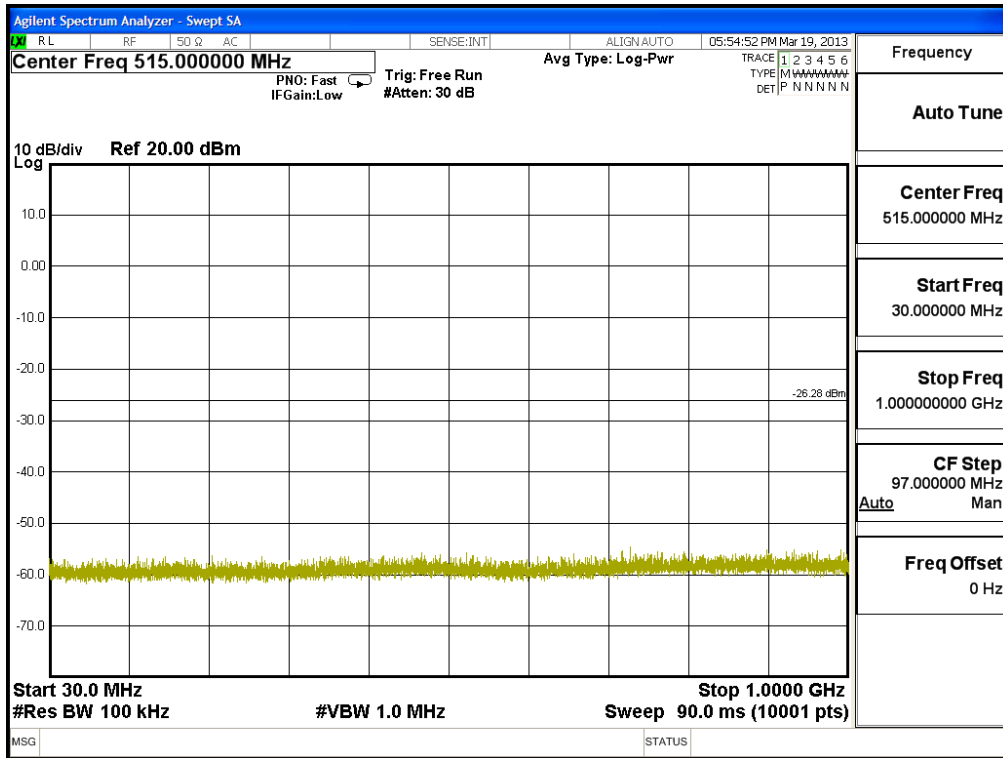
Channel 159 (5795MHz) 30MHz -40GHz-Chain B

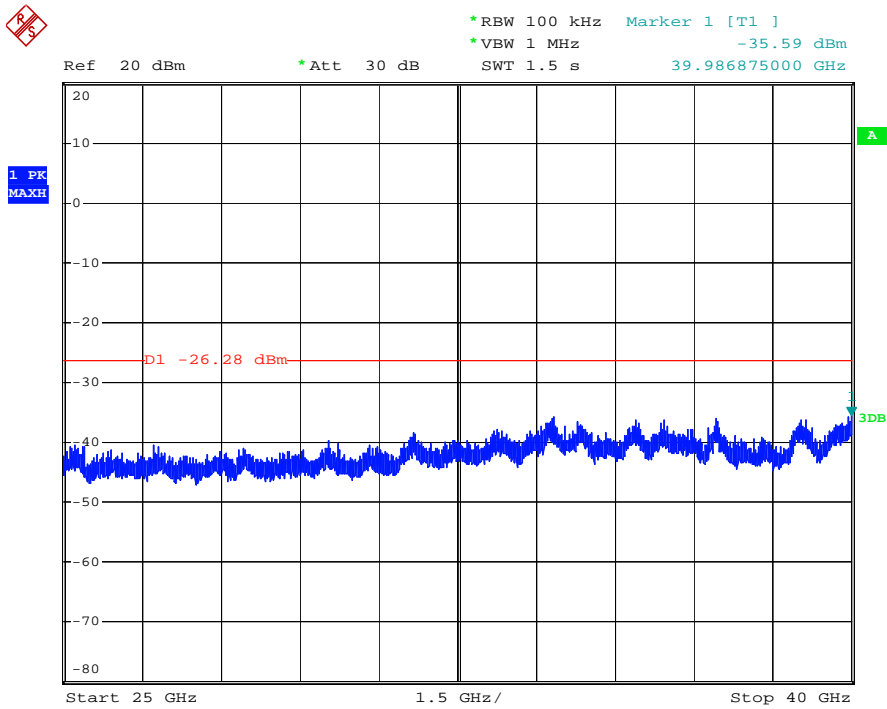
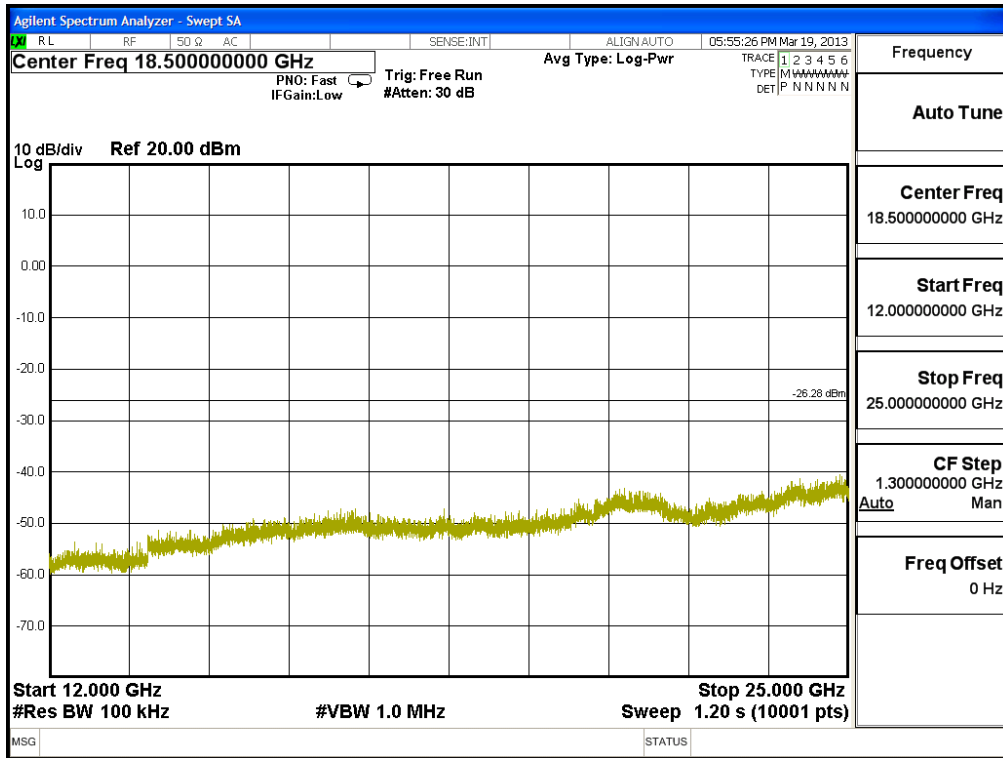




Date: 20.MAR.2013 01:21:17

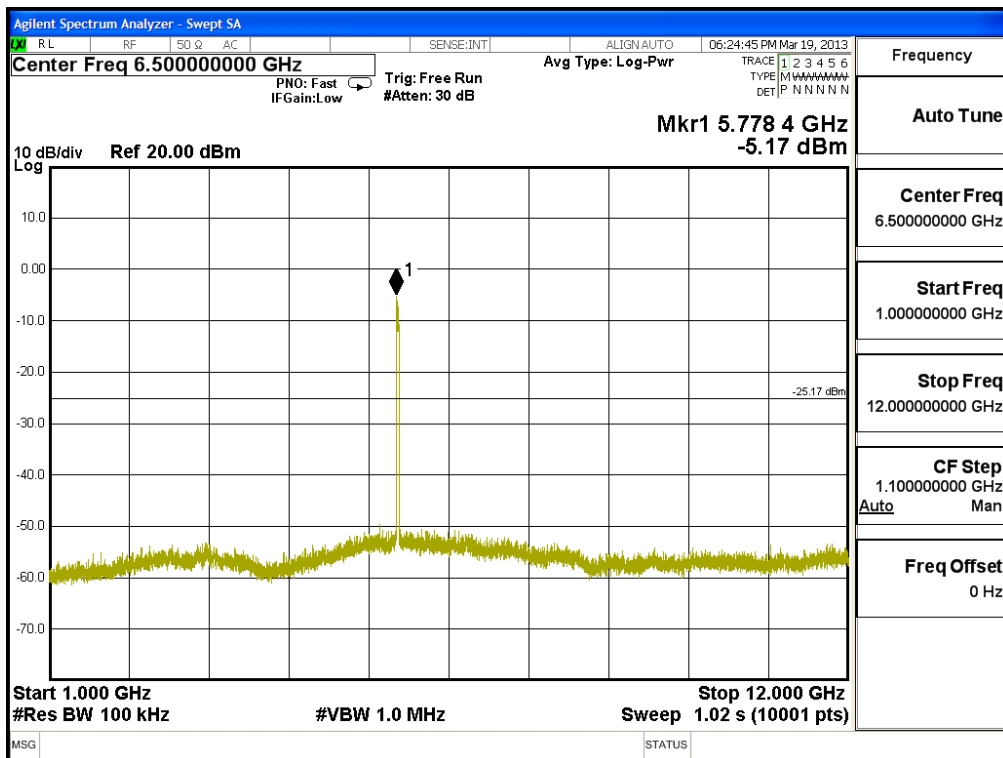
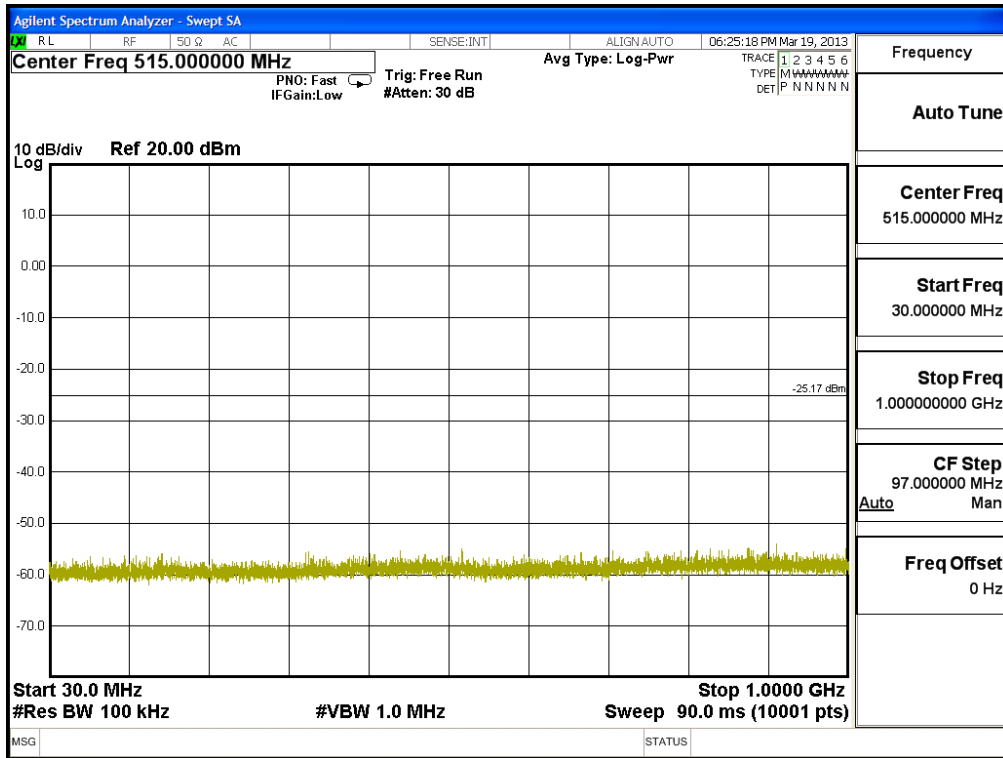
Channel 151 (5755MHz) 30MHz -40GHz-Chain C

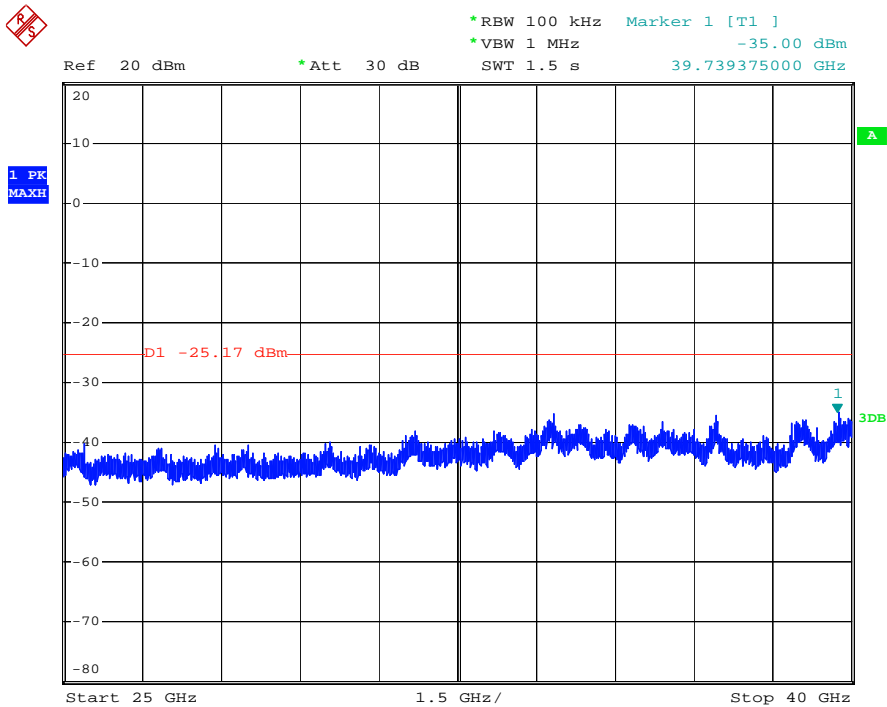
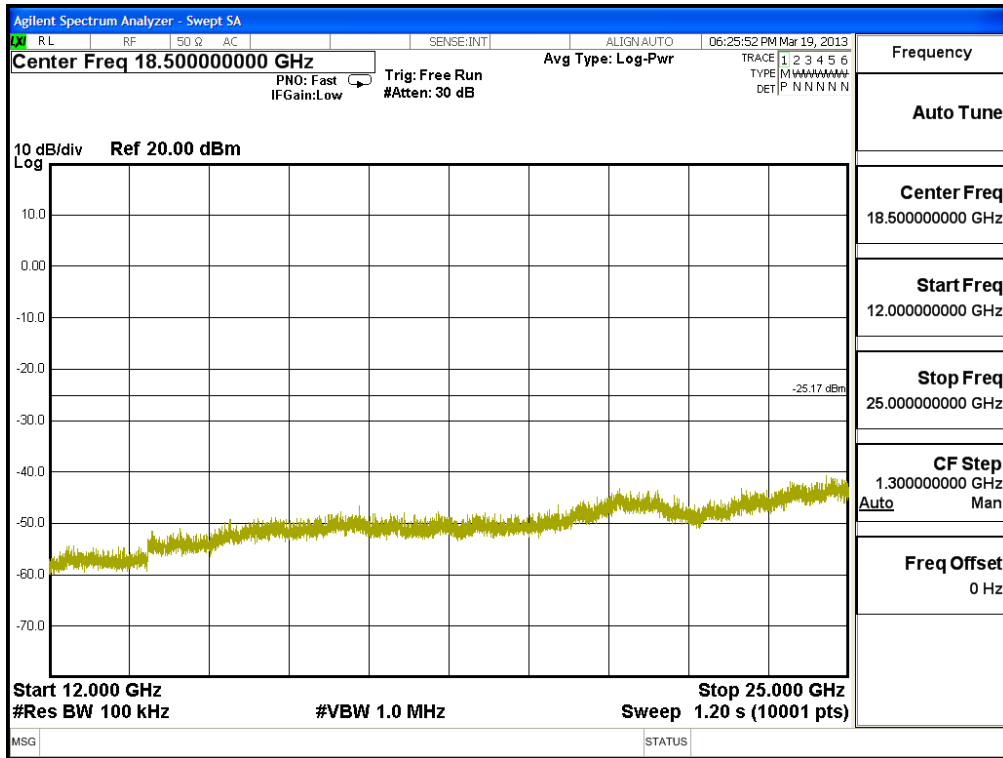




Date: 20.MAR.2013 01:18:05

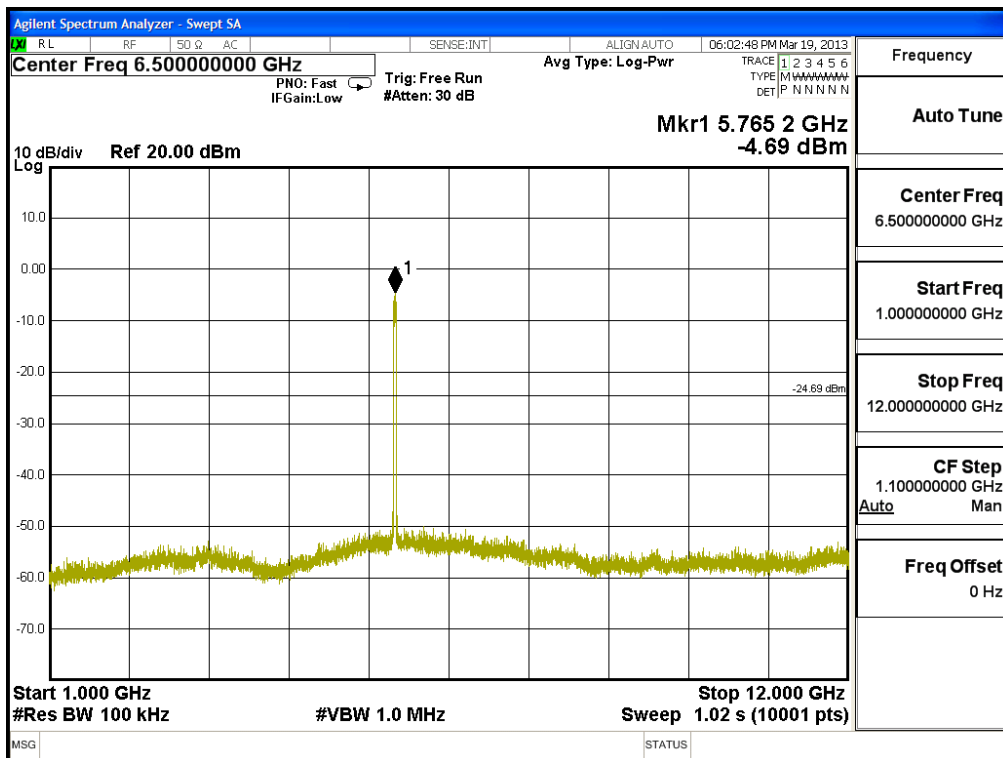
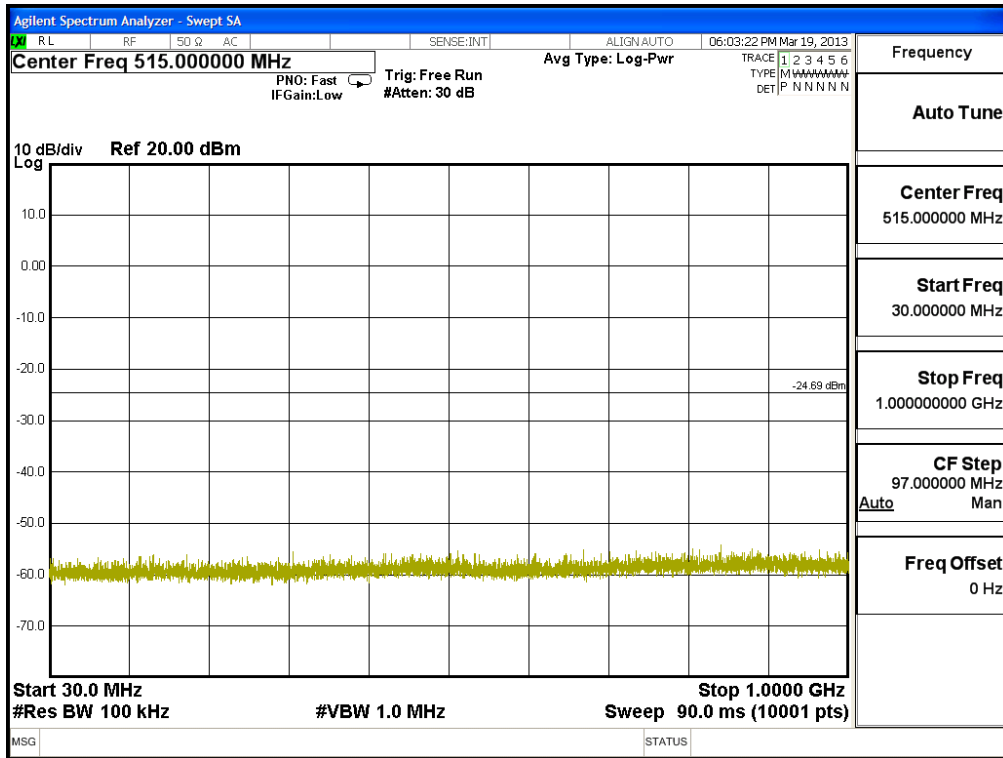
Channel 159 (5795MHz) 30MHz -40GHz-Chain C

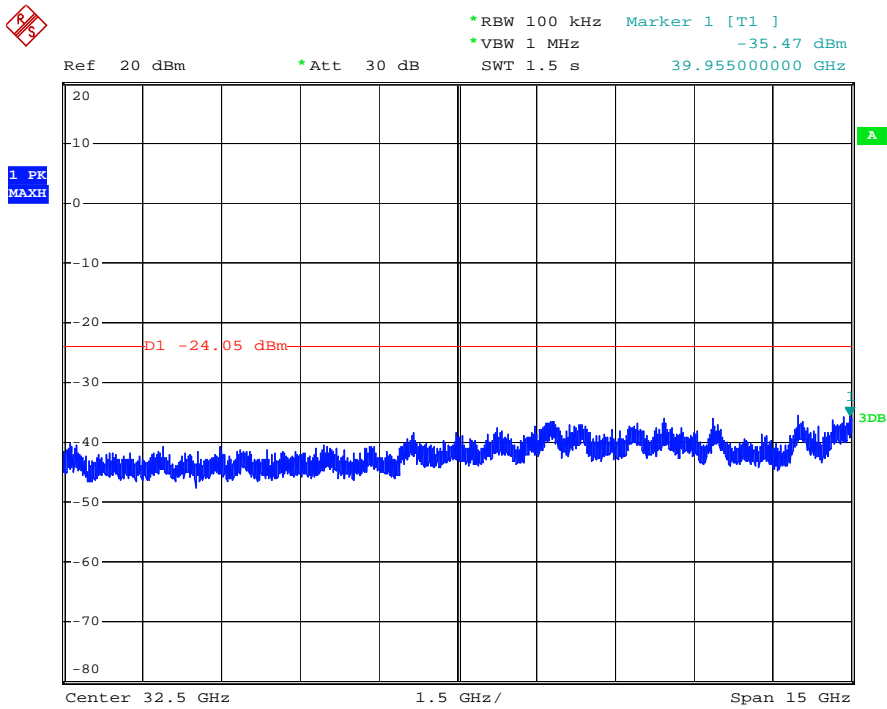
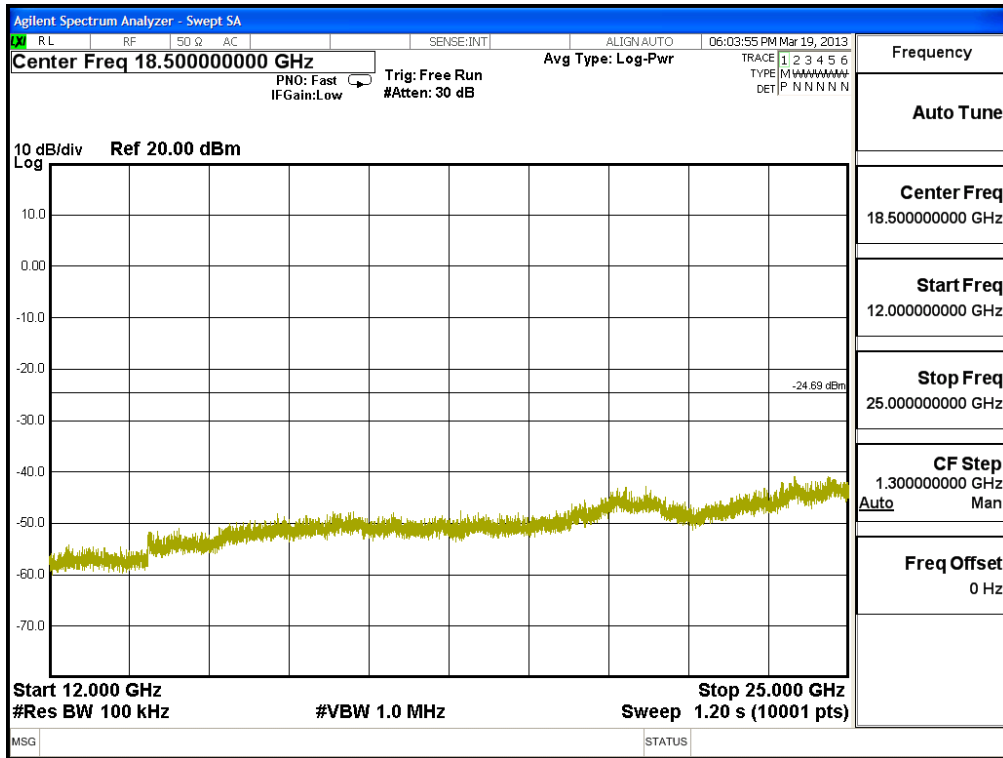




Date: 20.MAR.2013 01:22:08

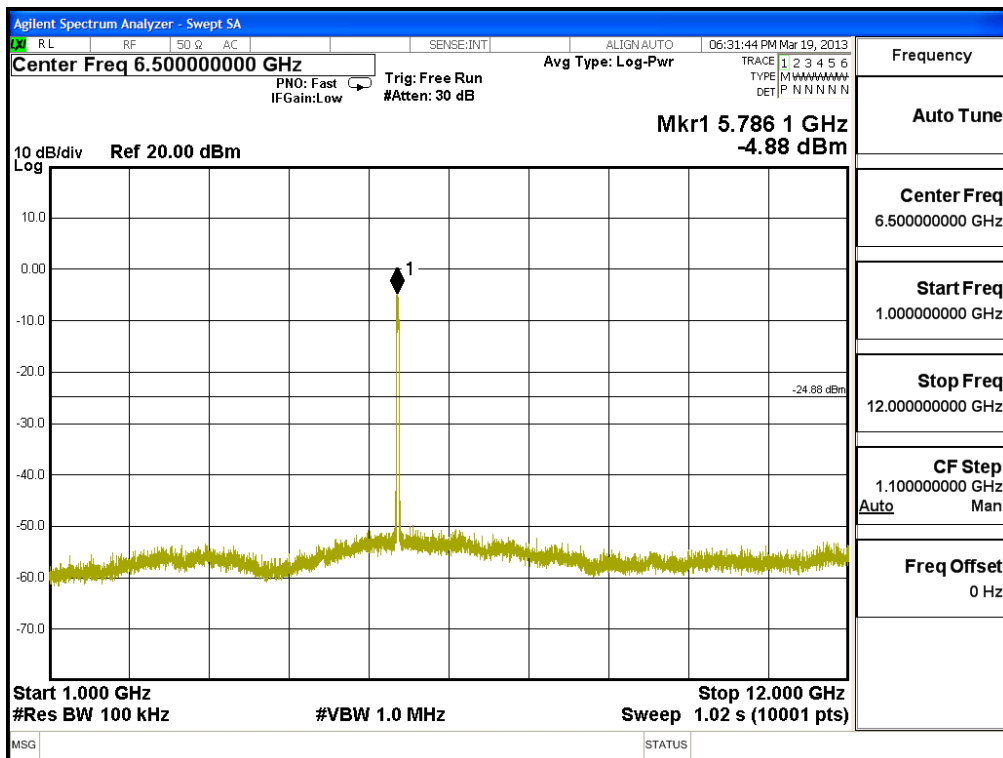
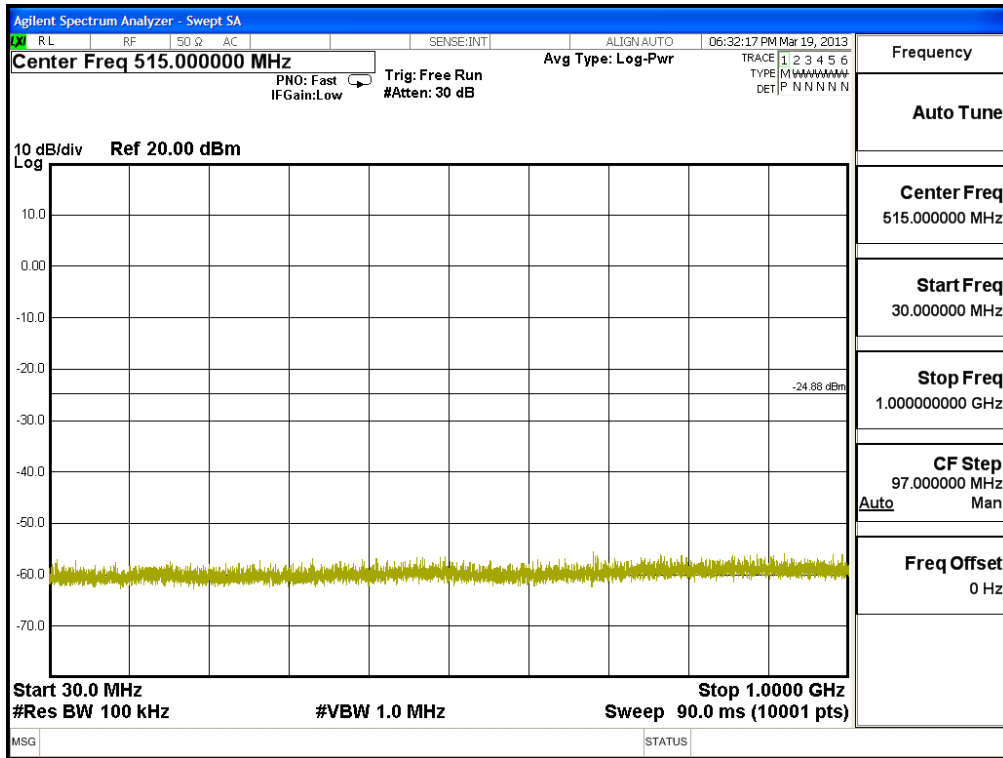
Channel 151 (5755MHz) 30MHz -40GHz-Chain D

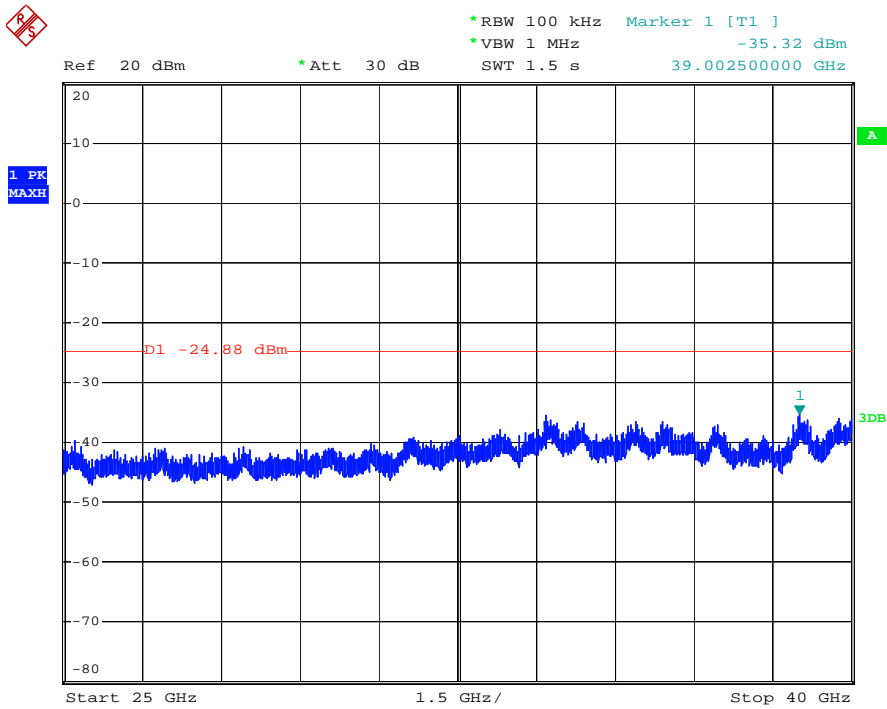
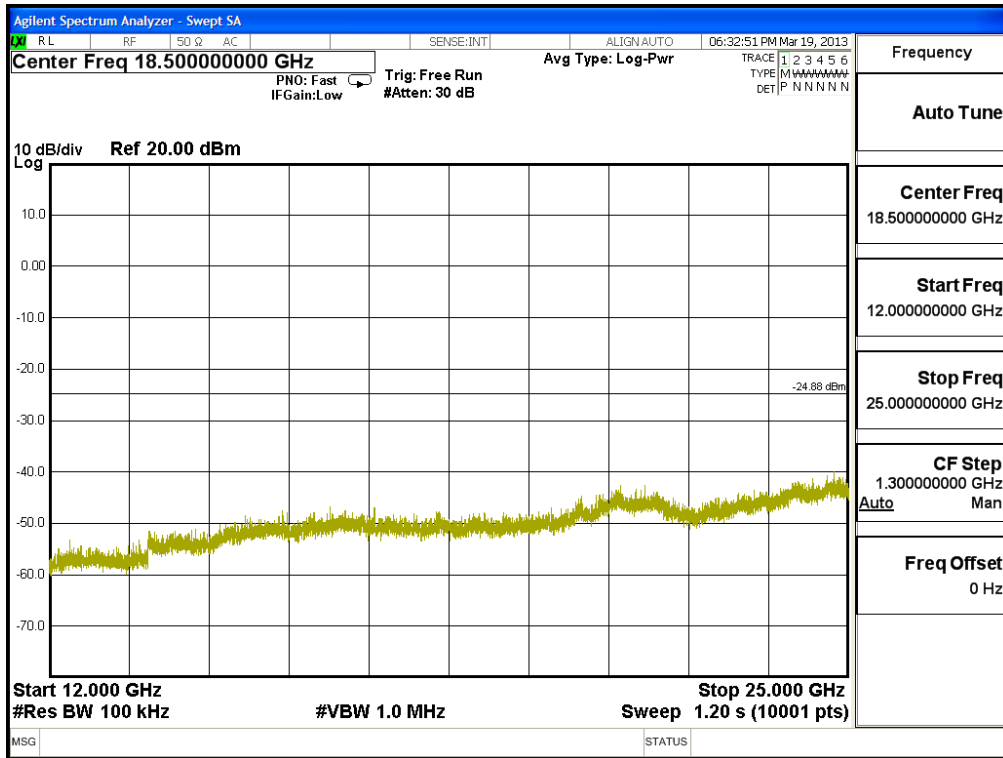




Date: 20.MAR.2013 01:19:36

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





Date: 20.MAR.2013 01:22:54

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., 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2012
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:

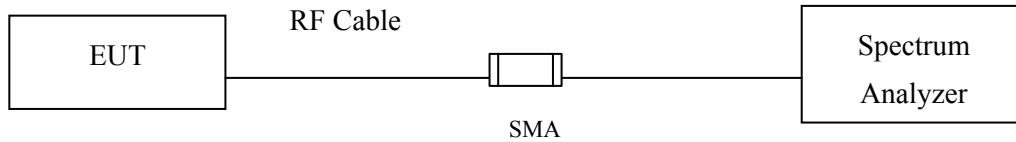
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	
☒ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
		Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2012
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
		Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar., 2013
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2012
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2013
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

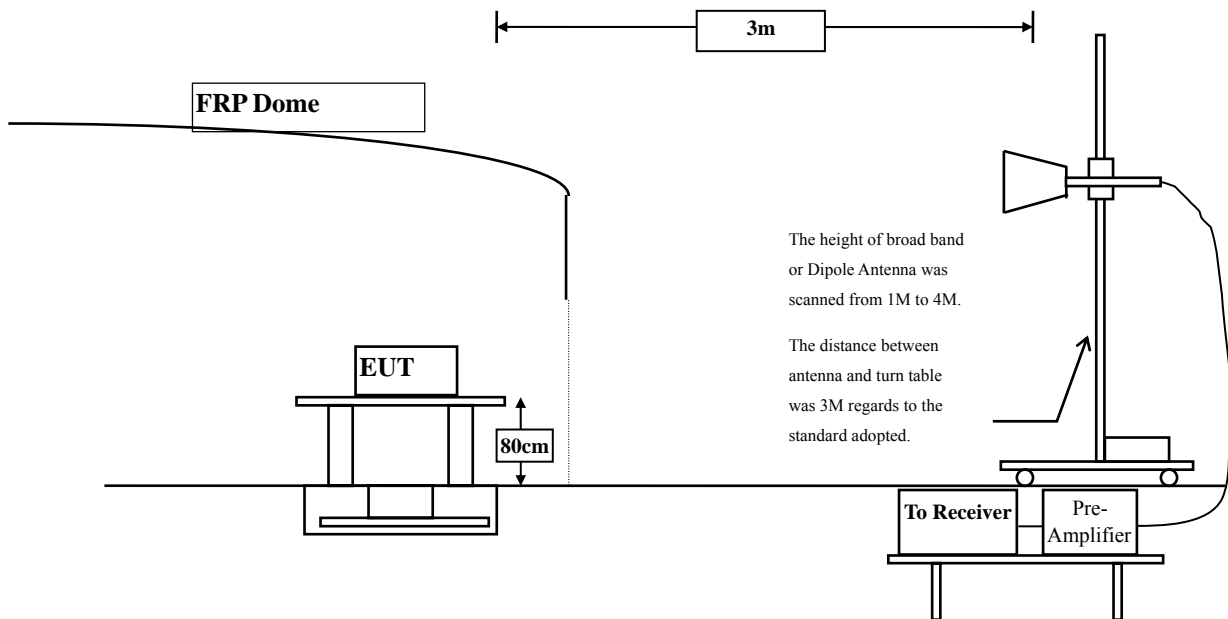
- Note:
1. All instruments are calibrated every one year.
 2. The test instruments marked by "X" are used to measure the final test results.

6.2. Test Setup

RF Conducted Measurement



RF Radiated 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 C63.4:2003 on radiated measurement.

6.5. Uncertainty

± 3.9 dB above 1GHz

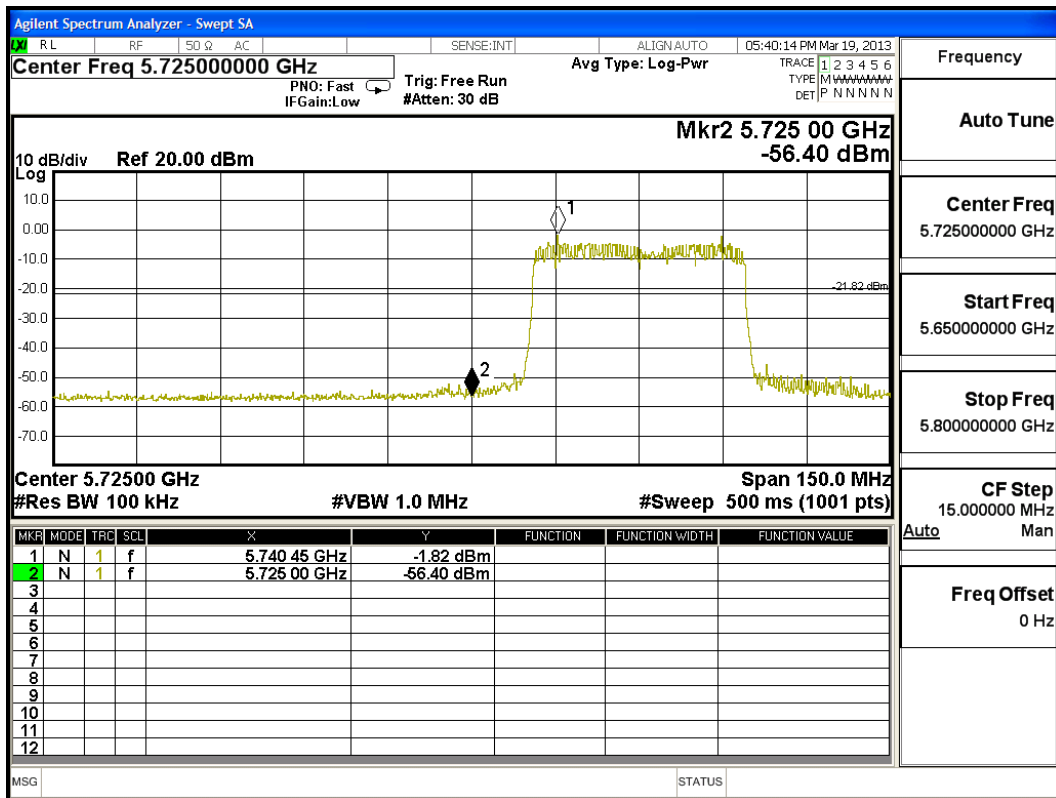
± 3.8 dB below 1GHz

6.6. Test Result of Band Edge

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

Chain A

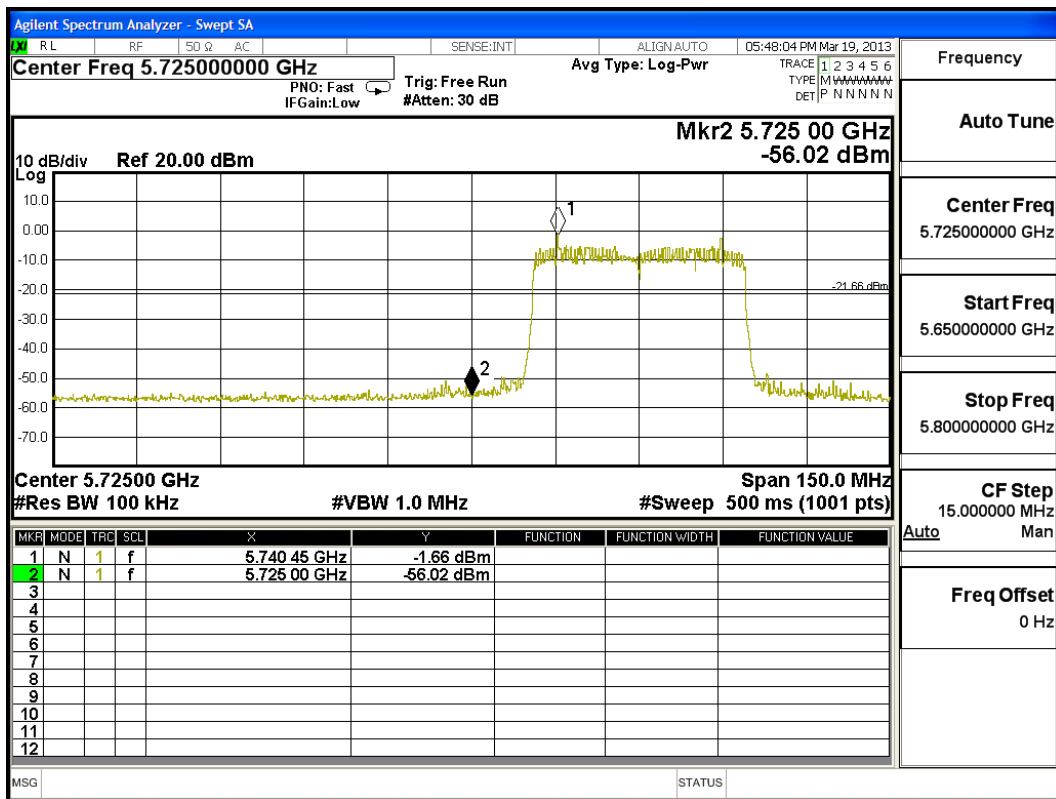
Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5755	54.58	>20	PASS



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

Chain B

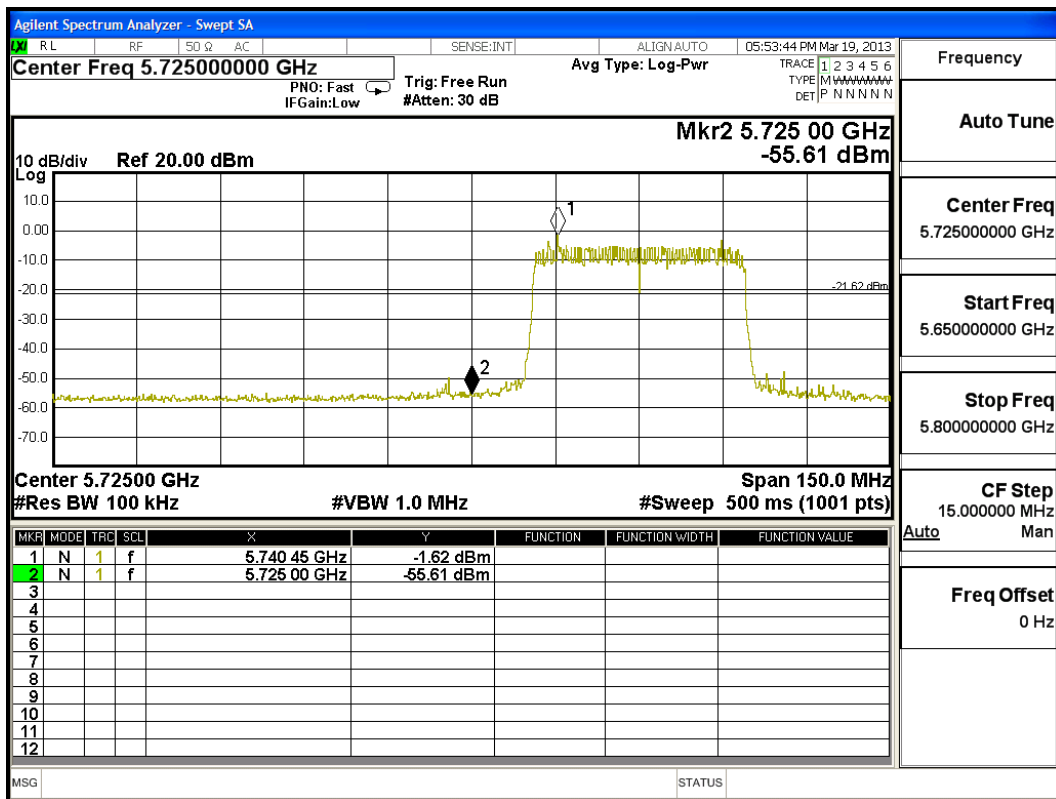
Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5755	54.36	>20	PASS



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

Chain C

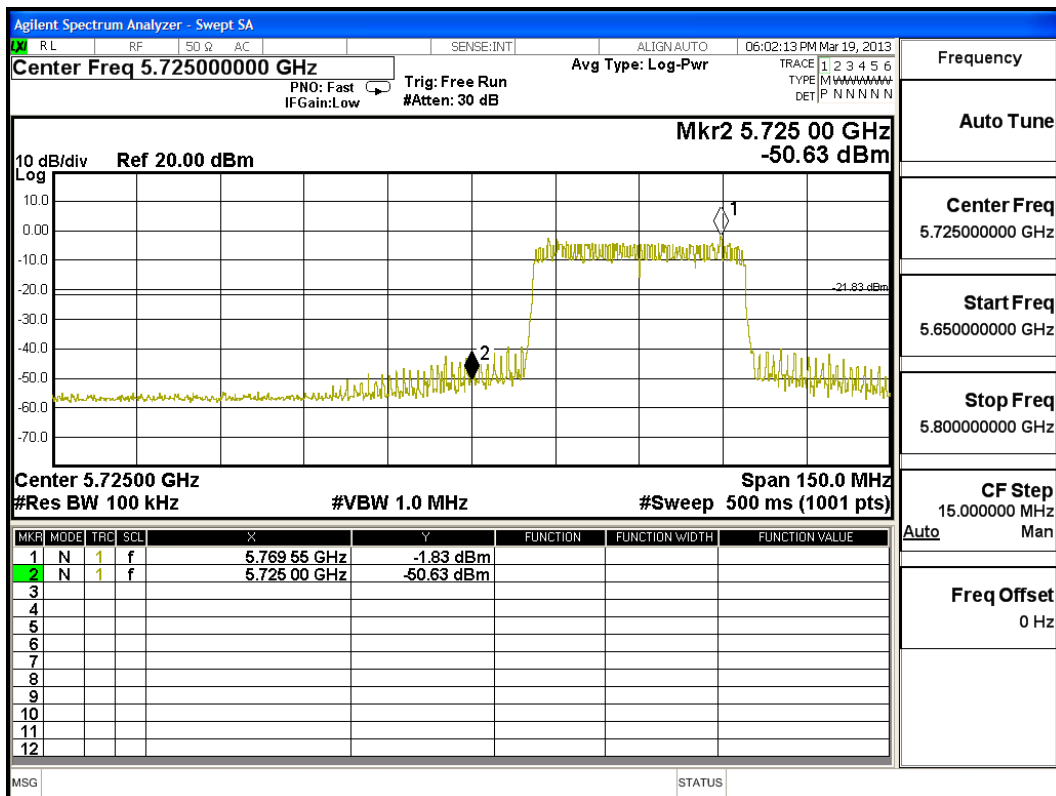
Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5755	53.99	>20	PASS



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

Chain D

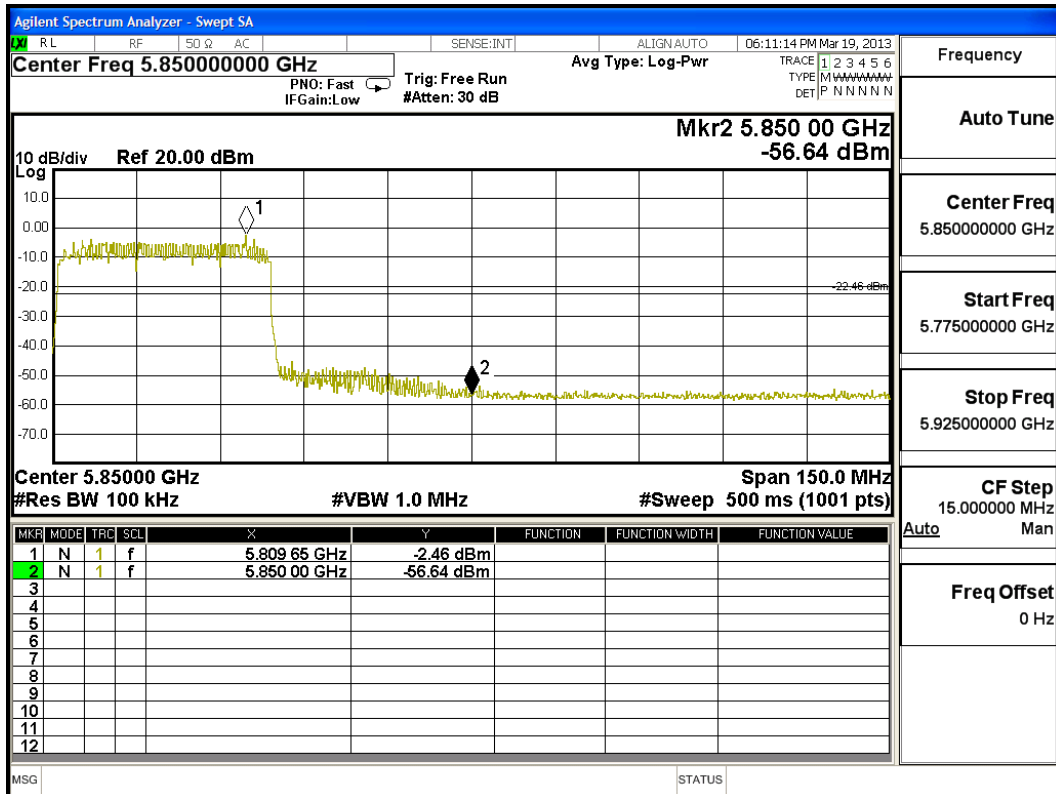
Test Frequency (MHz)	Measurement Level Δ (Db)	Limit Δ (Db)	Result
5755	48.80	>20	PASS



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

Chain A

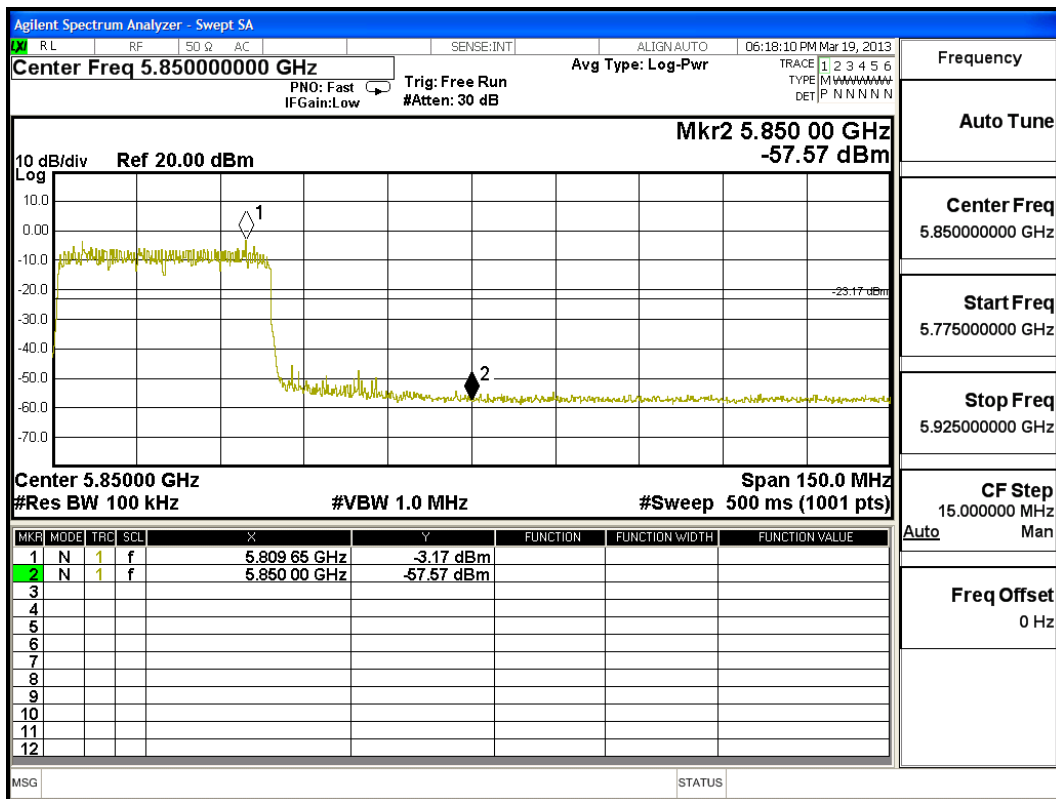
Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5795	54.18	>20	PASS



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

Chain B

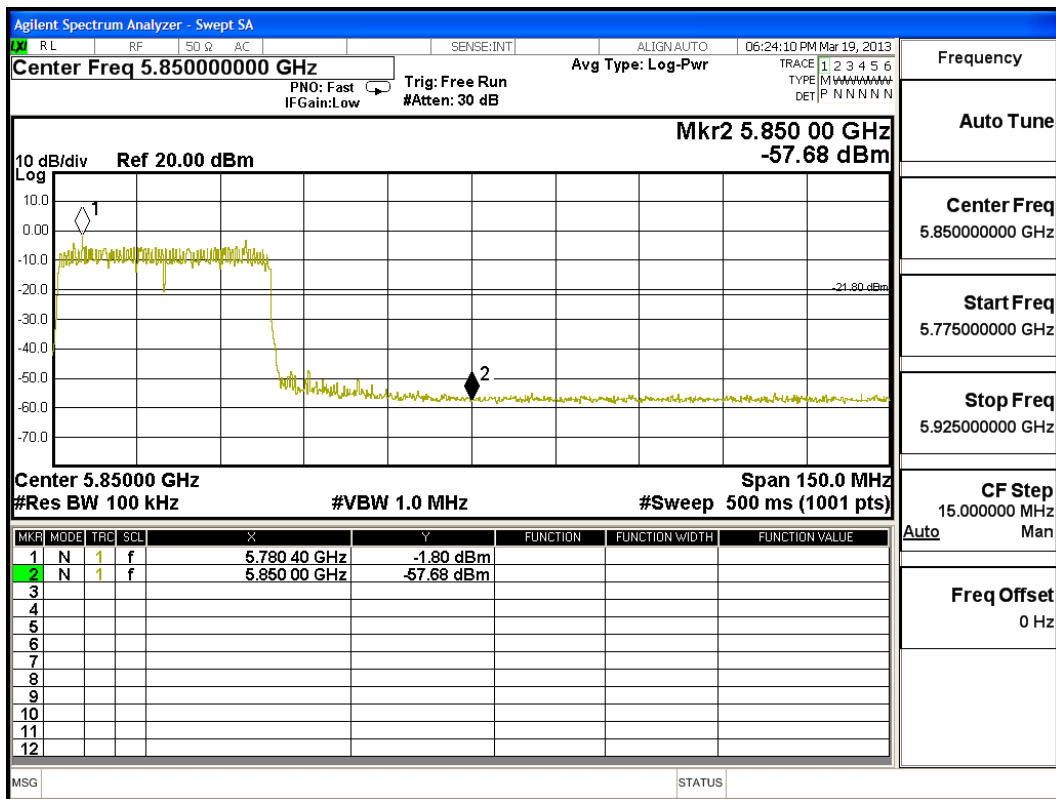
Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5795	54.40	>20	PASS



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

Chain C

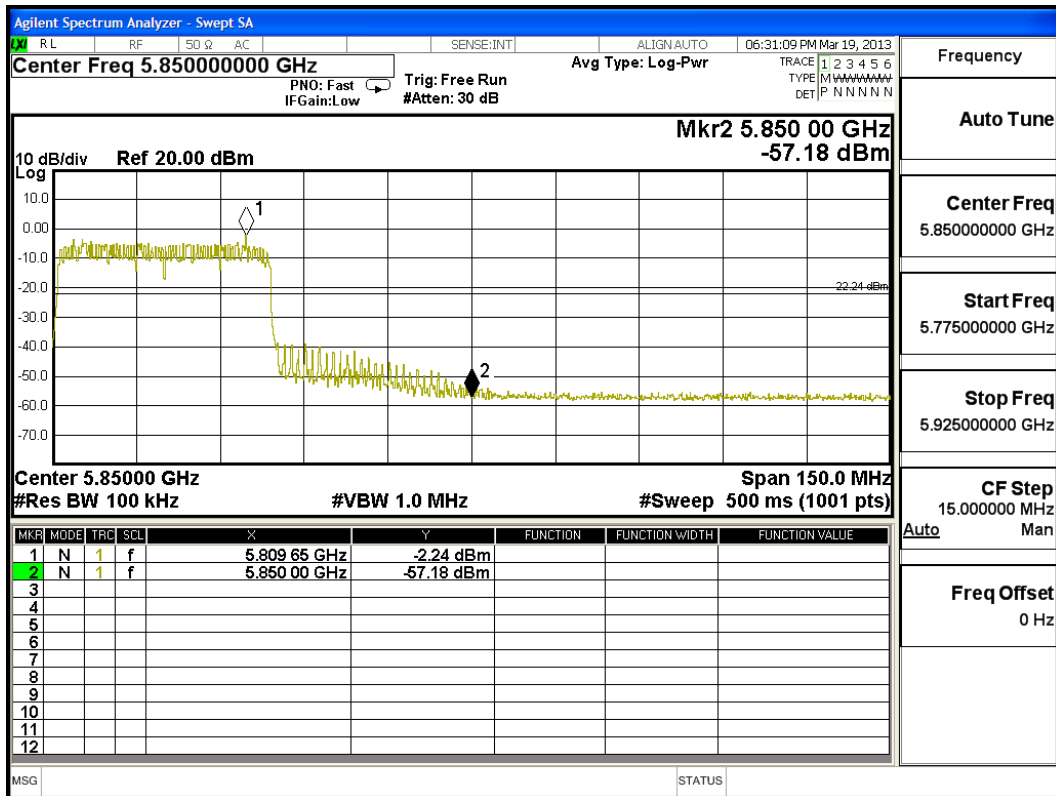
Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5795	55.88	>20	PASS



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

Chain D

Test Frequency (MHz)	Measurement Level Δ (dB)	Limit Δ (dB)	Result
5795	54.94	>20	PASS



7. Occupied Bandwidth

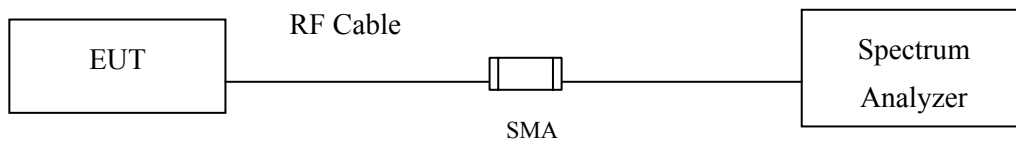
7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2012
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 ≥ 3*RBW

7.5. Uncertainty

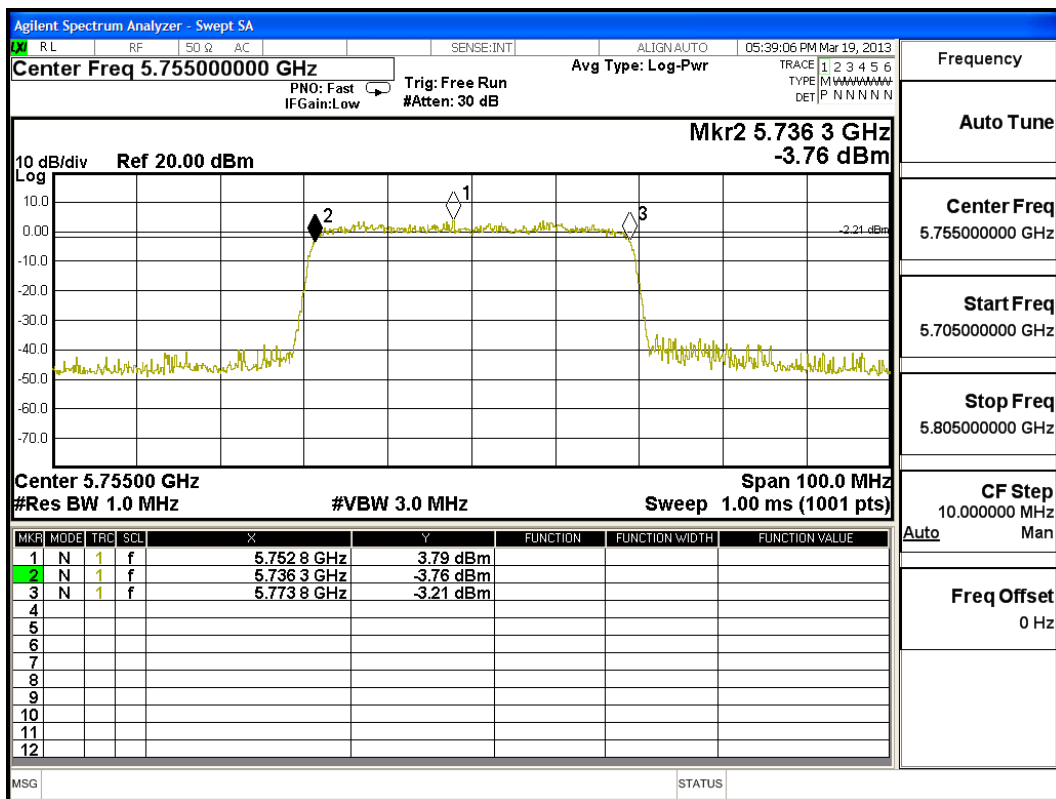
± 150Hz

7.6. Test Result of Occupied Bandwidth

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

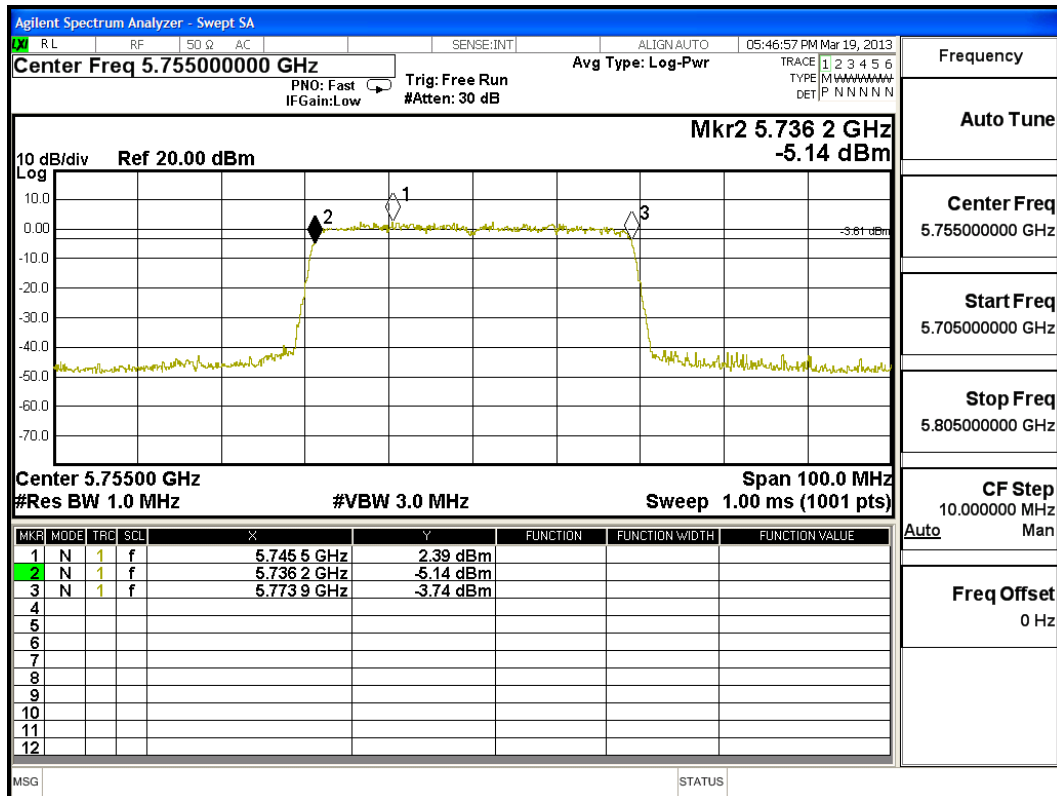
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	37500	>500	Pass

Figure Channel 151: (Chain A)



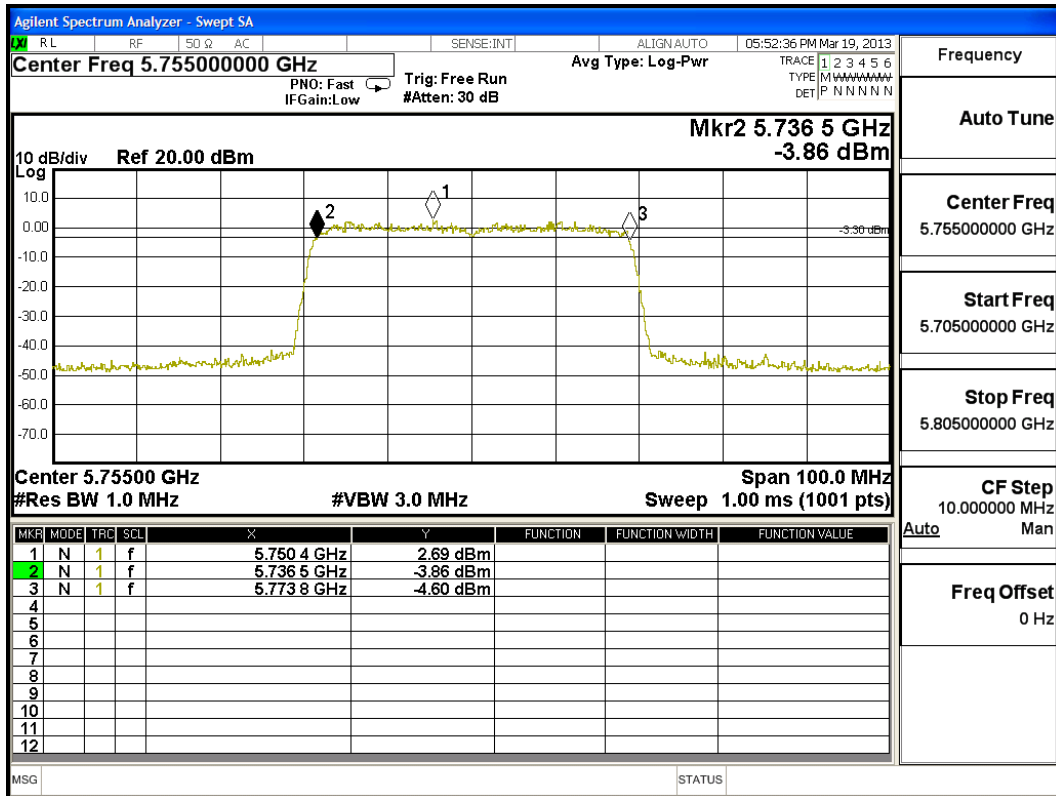
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	37700	>500	Pass

Figure Channel 151: (Chain B)



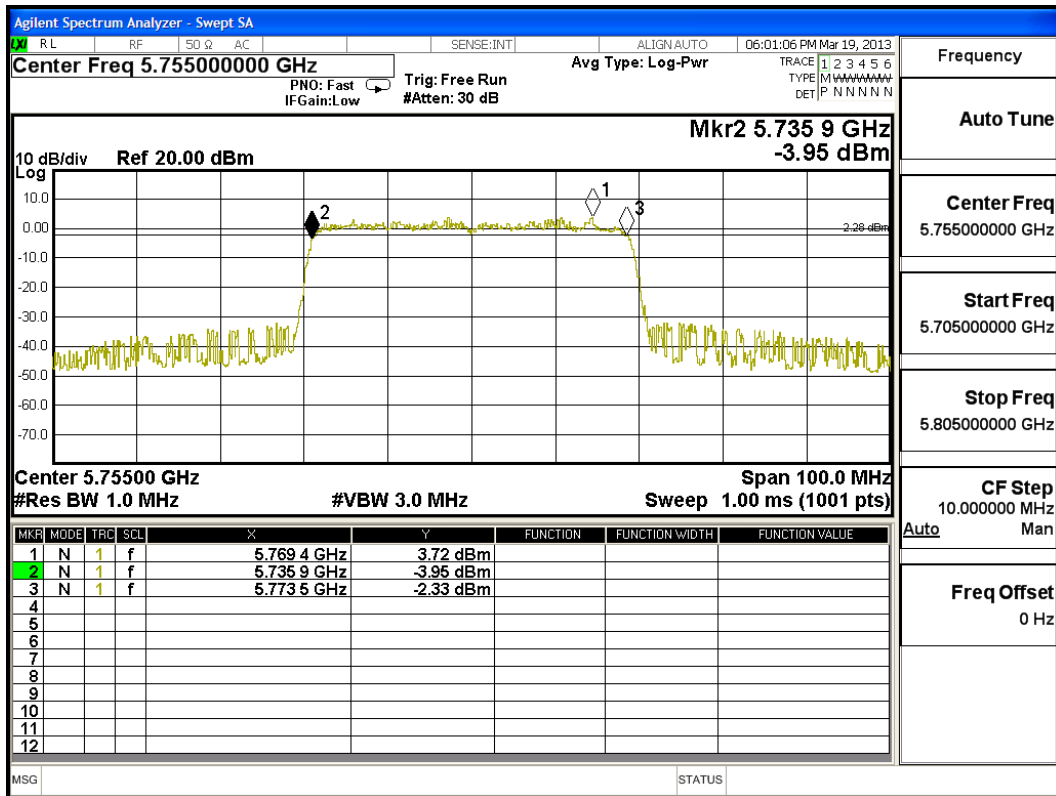
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	37300	>500	Pass

Figure Channel 151: (Chain C)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
151	5755.00	37600	>500	Pass

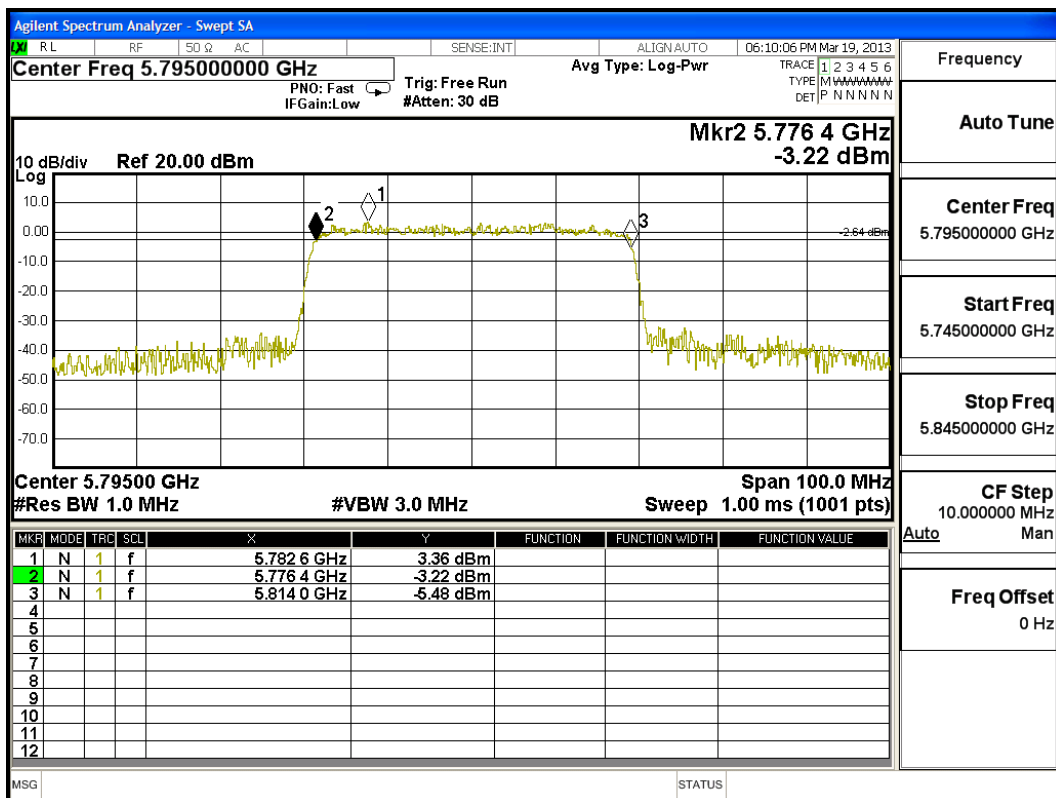
Figure Channel 151: (Chain D)



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

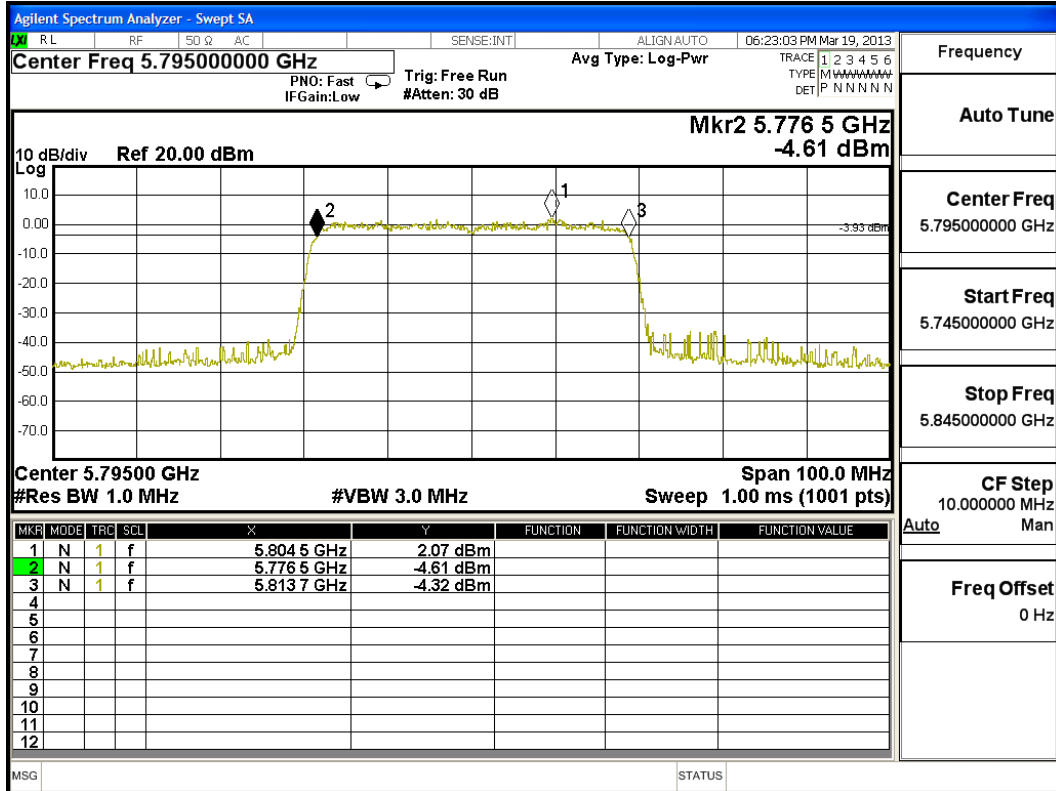
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	37600	>500	Pass

Figure Channel 159: (Chain A)



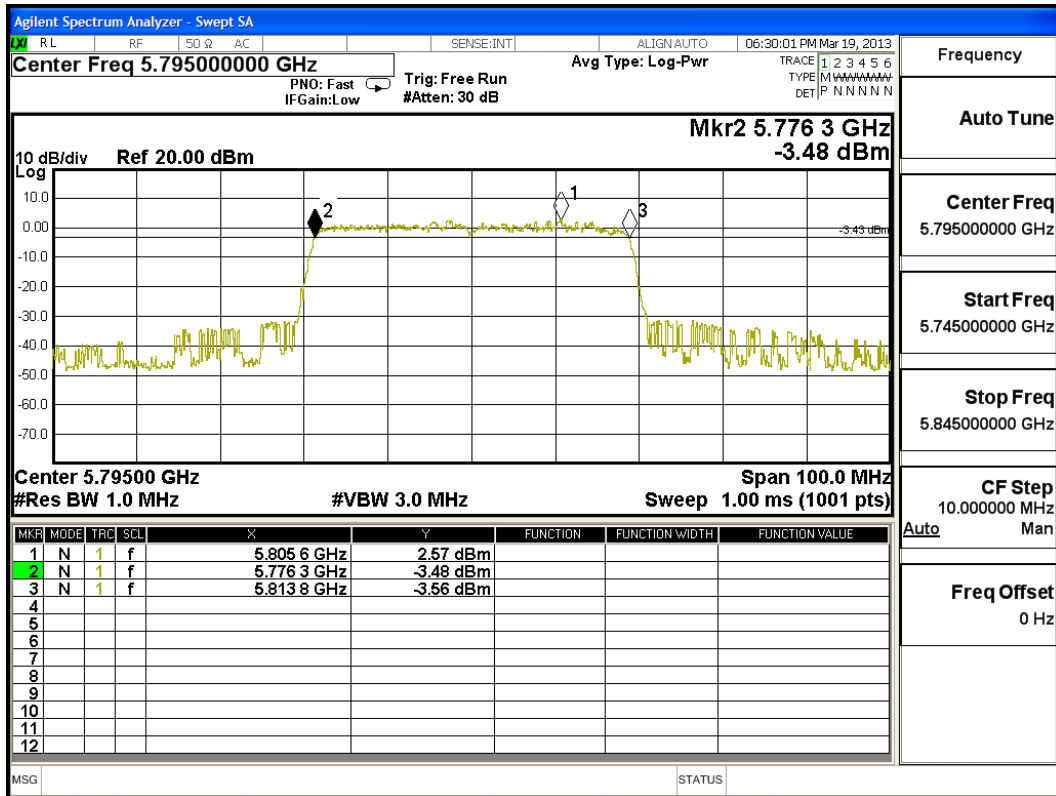
Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	37200	>500	Pass

Figure Channel 159: (Chain C)



Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
159	5795.00	37500	>500	Pass

Figure Channel 159: (Chain D)



8. Power Density

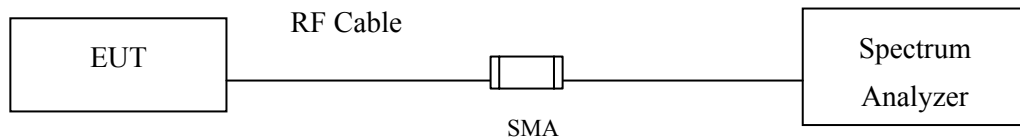
8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun., 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun., 2012
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 ANSI C63.10: 2009 for compliance to FCC 47CFR 15.247 requirements.

Set RBW= 100 kHz, VBW \geq 300KHz, SPAN to 5-30 % greater than the EBW,

Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where $BWCF = 10\log(3\text{ kHz}/100\text{ kHz}) = -15.2\text{ dB}$.

8.5. Uncertainty

$\pm 1.27\text{ dB}$

8.6. Test Result of Power Density

Product : Wireless 5 x 2 HD Matrix 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	-17.383	-11.383	< 8dBm	Pass
B	-17.219	-11.219	< 8dBm	Pass
C	-16.926	-10.926	< 8dBm	Pass
D	-17.856	-11.856	< 8dBm	Pass

Note 1: The quantity 10*log 4 (four antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 151: (Chain A)

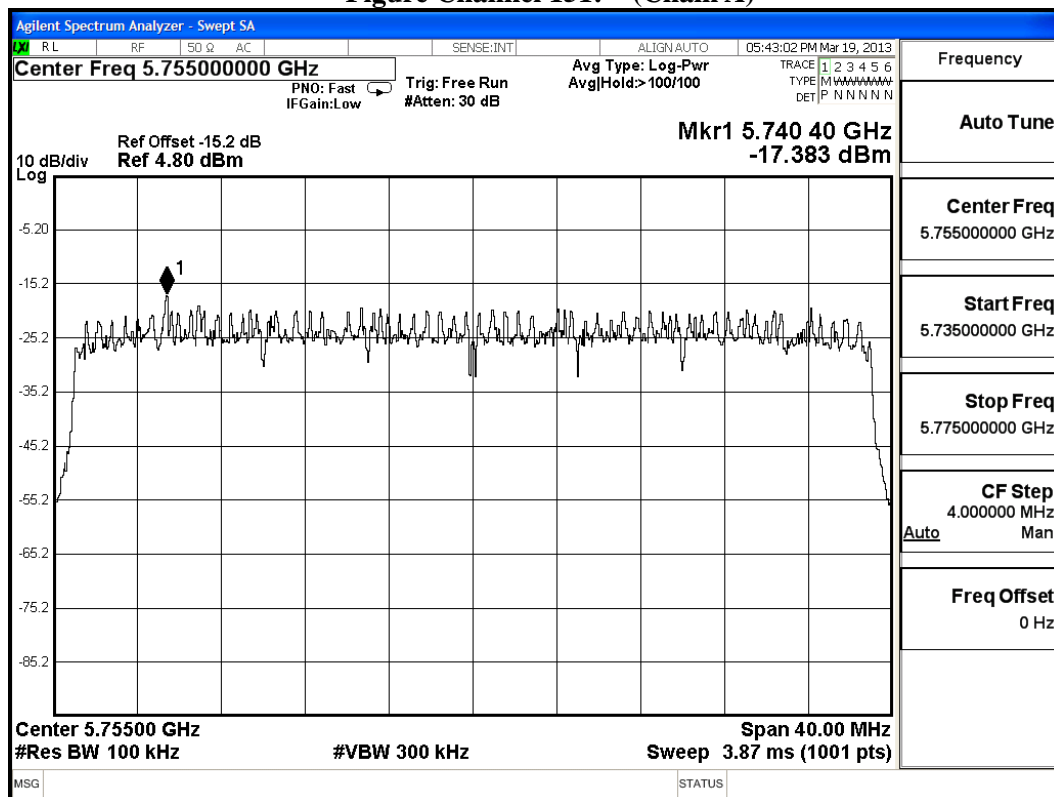


Figure Channel 151: (Chain B)

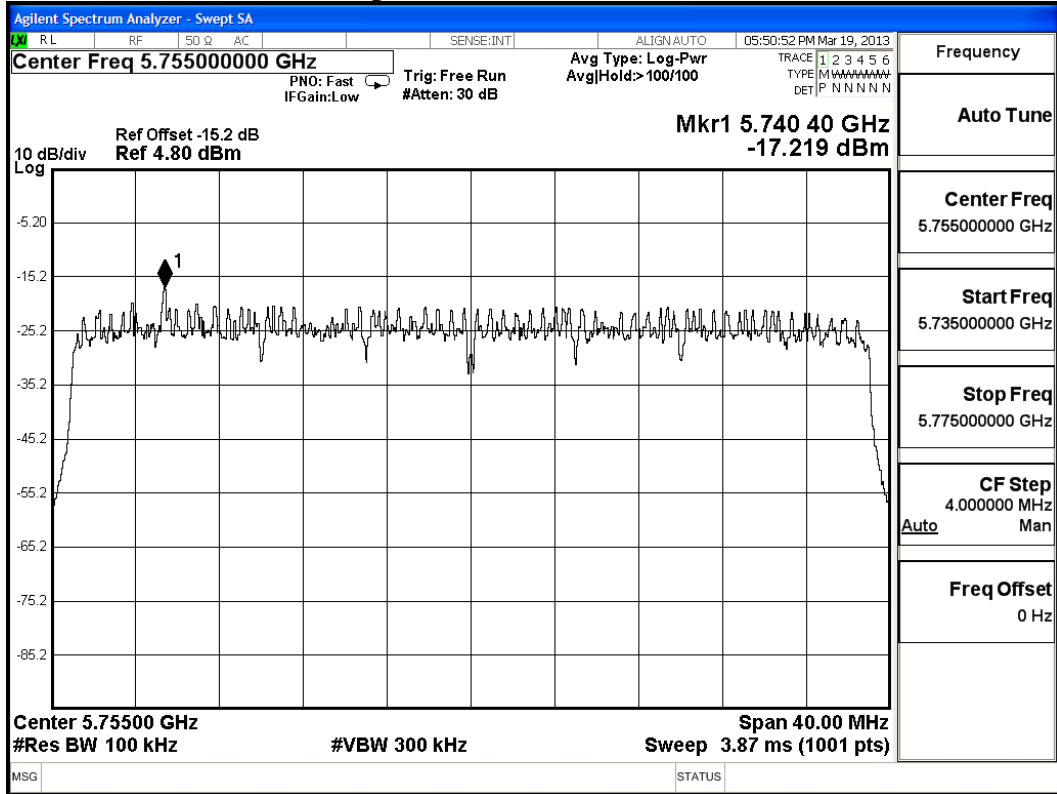
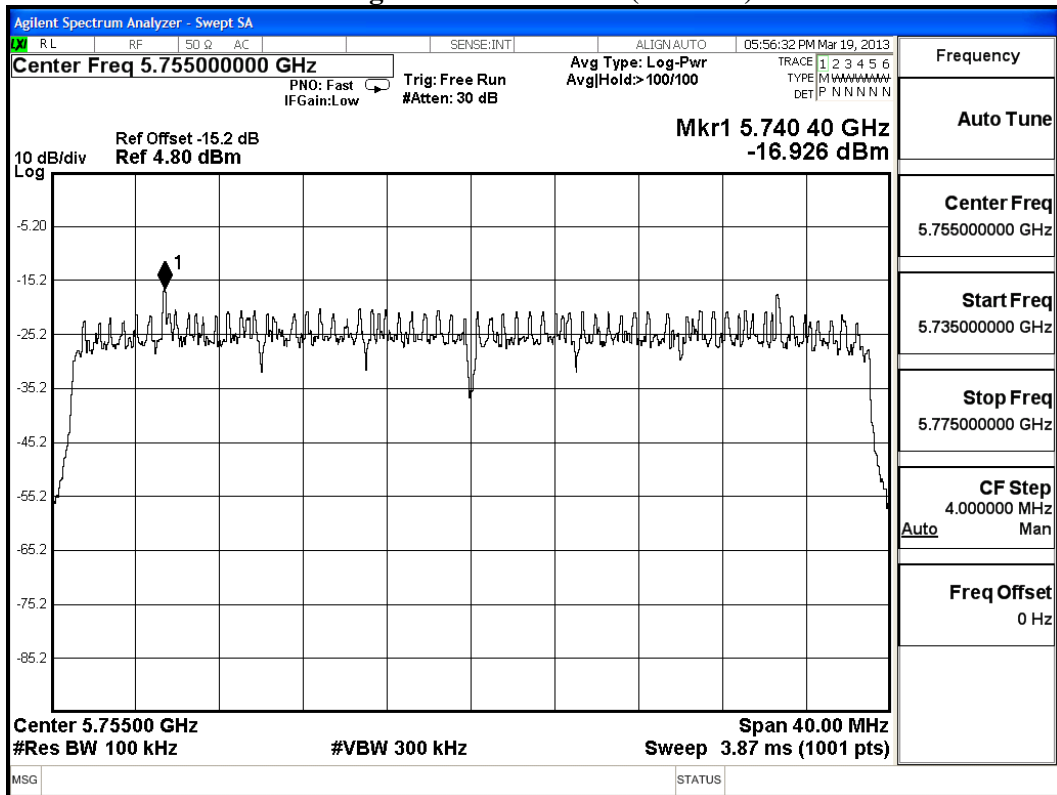


Figure Channel 151: (Chain C)



Product : Wireless 5 x 2 HD Matrix 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	-17.487	-11.487	< 8dBm	Pass
B	-17.798	-11.798	< 8dBm	Pass
C	-17.146	-11.146	< 8dBm	Pass
D	-17.441	-11.441	< 8dBm	Pass

Note 1: The quantity 10*log 4 (four antennas) is added to the spectrum peak value according to document 662911 D01.

Figure Channel 159: (Chain A)

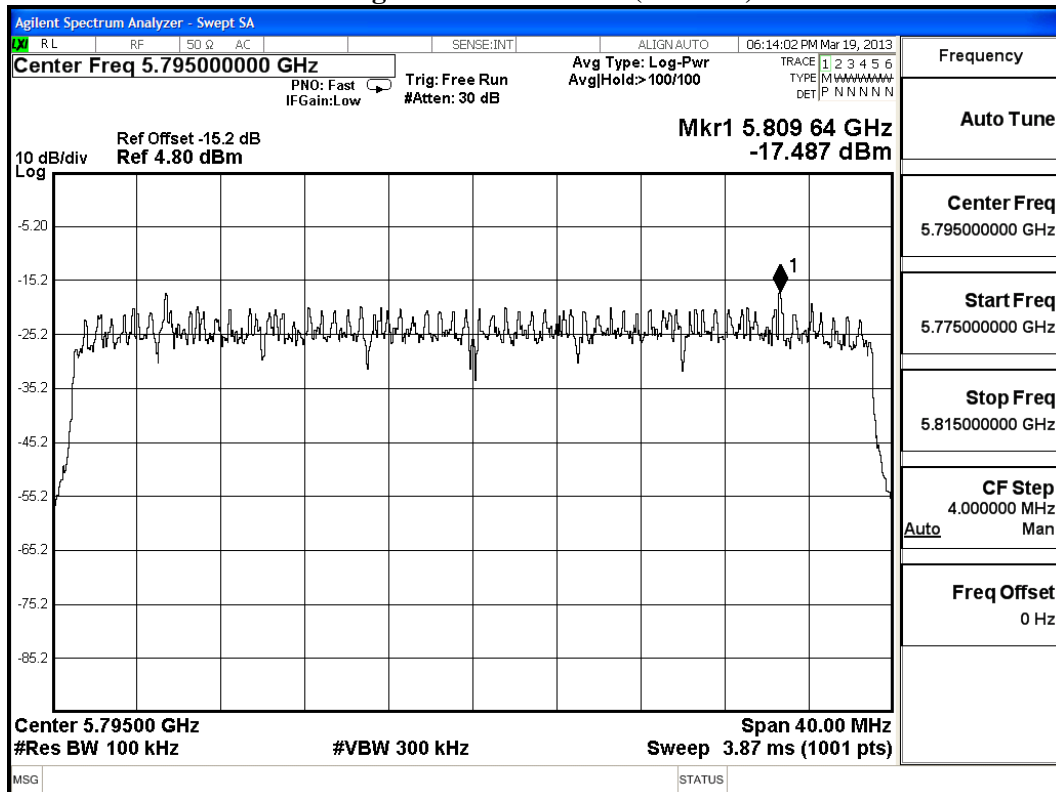


Figure Channel 159: (Chain B)

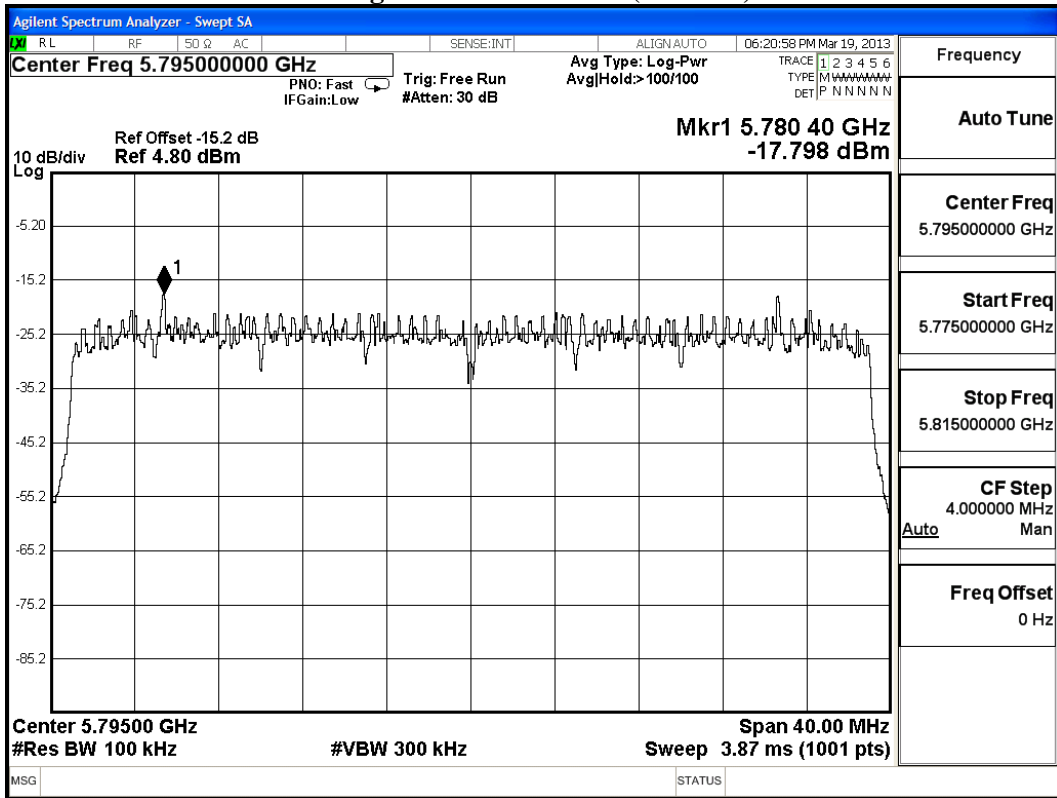


Figure Channel 159: (Chain C)

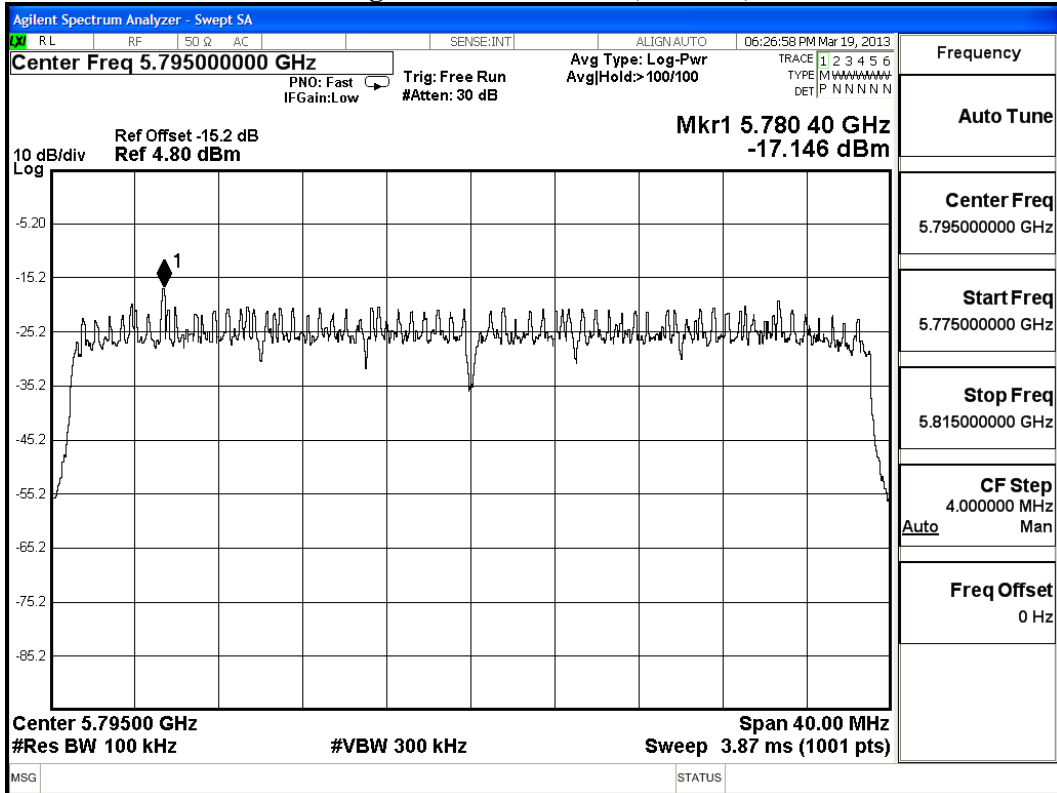
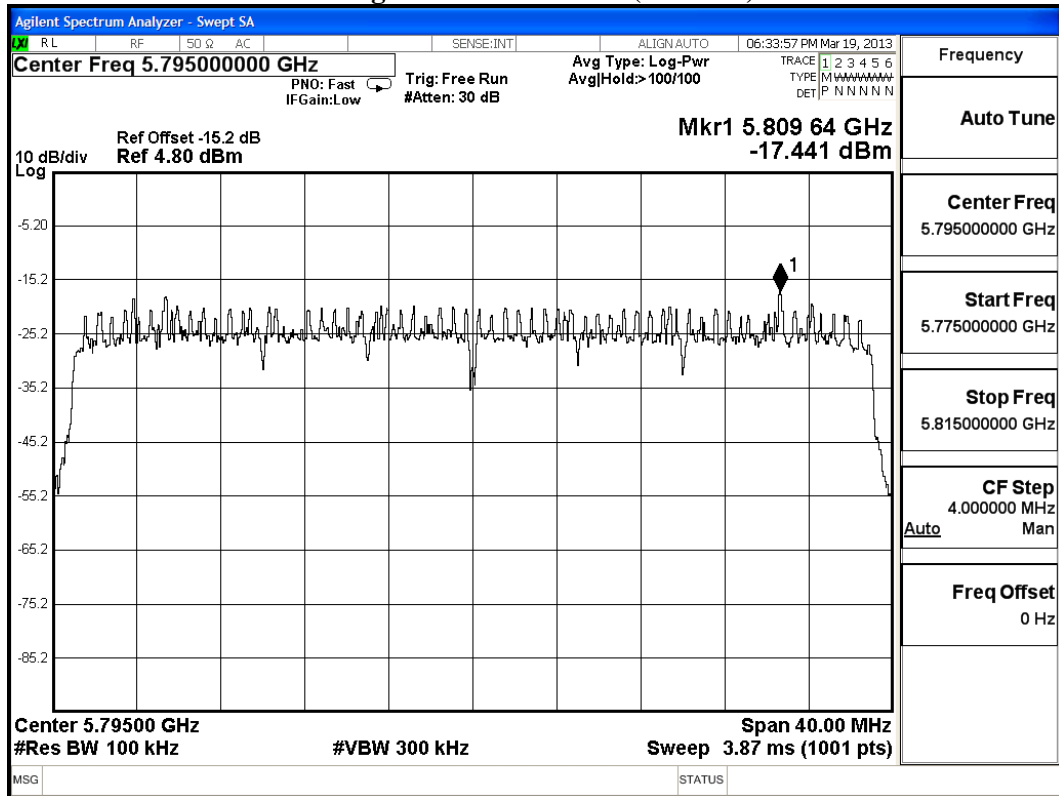


Figure Channel 159: (Chain D)



9. EMI Reduction Method During Compliance Testing

No modification was made during testing.