



Test Report

Product Name	Full HD Video Wireless Transmitter Module
Model No	RF31100M
FCC ID	YG7RF31100M

Applicant	ZINWELL CORPORATION
Address	7F 512, Yuan Shan Road, Chung Ho City, 235, Taipei Hsien, Taiwan

Date of Receipt	Sep. 09, 2010
Issued Date	Oct. 11, 2010
Report No.	109188R-RFUSP45V01
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 NVLAP any agency of the U.S. Government

Test Report Certification

Issued Date: Oct. 11, 2010

Report No.: 109188R-RFUSP45V01



Product Name	Full HD Video Wireless Transmitter Module	
Applicant	ZINWELL CORPORATION	
Address	7F 512, Yuan Shan Road, Chung Ho City, 235, Taipei Hsien, Taiwan	
Manufacturer	ZINWELL CORPORATION	
Model No.	RF31100M	
FCC ID.	YG7RF31100M	
EUT Rated Voltage	DC 5V/1.5A, 7.5W	
EUT Test Voltage	DC 5V/1.5A, 7.5W	
Trade Name	ZINWELL [®]	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart E: 2009 ANSI C63.4: 2003	 NVLAP Lab Code: 200533-0
Test Result	Complied	

The Test Results relate only to the samples tested.

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Documented By : Jinn Chen
(Adm. Specialist / Jinn Chen)



Tested By : Sabrina Tsai
(Engineer / Sabrina Tsai)



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

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Full HD Video Wireless Transmitter Module
Trade Name	ZINWELL [®]
Model No.	RF31100M
FCC ID.	YG7RF31100M
Frequency Range	5190-5230MHz
Number of Channels	2
Data Rate	63Mbps
Channel separation	40MHz
Channel Control	Auto
Type of Modulation	OFDM
Antenna Type	Chip
Antenna Gain	Refer to the table “Antenna List”

Antenna List

Manufacturer	Model No.	Peak Gain
ACX	AT3216-B5R5HAA	2dBi for 5GHz

Note: The antenna of EUT is conform to FCC 15.203

40MHz Center Working Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	5190 MHz	Channel 2:	5230 MHz				

Note:

1. This device is a Full HD Video Wireless Transmitter Module with a built-in 5GHz transceiver.
2. Regarding to the operation frequency, the lowest and highest frequency are selected to perform the test.
3. The device is applied for modular approval.
4. 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.

1.2. Operational Description

The EUT is a Full HD Video Wireless Transmitter Module with a built-in 5GHz transceiver, together with Full HD Video Wireless Receiver Module. It has a SIMO design of two channel and one slow rate output wireless channel, which generates an upstream channel for data content transmissions, the antenna are use two Chip (2TX, 1RX).

The data modulation is OFDM, using two antennas to support 2(Transmit) * 1(Receive) technology. The device only provided one transmitting speed 63Mbps in 40MHz bandwidth mode.

Presents the ultimate solution for converting any High Definition (HD) system, including Full HD, into a wireless one. These add-on modules enable wireless A/V applications that fit easily into the living room and eliminate traditional A/V wiring. The perfect HD video and audio quality and the high robustness are unmatched by any other wireless technology and present a true alternative to cable. The WHDI system transmits uncompressed video and audio streams wirelessly and thus simplifies and eliminates system issues, such as: lip-sync, large buffers and other burdens like retransmissions or error propagation.

The device can transmit audio and video signal to associate equipment, device will receive signal form associate equipment when associate equipment request change operation frequency.

The AMN2120 WHDI™ baseband transmitter chip is the heart of the RF31100M WHDI transmitter module. The AMN2120 includes an internal microcontroller for controlling the physical level.

The AMN2120 is based on MIMO technology transmitting through up to two output channels. Four digital-to-analog converters and one analog-to-digital converter are embedded within the chip.

The input frequency is multiplied and then used as an internal system clock.

The AMN3110 is a fully integrated direct conversion MIMO transmitter specifically designed for WHDI applications using OFDM modulation in single-band 4.9 GHz to 5.9 GHz. The device consists of:

- Two Complete Downlink Direct Conversion Transmitters.
- One Uplink Receiver.
- Integrated Synthesizer.
- Internal DC Servo Loops.
- RSSI.
- IQ Detector.
- RF and Baseband Control Interface.
- Power Management Unit.
- 3-Wire SPI Interface.

To complete the RF front-end solution, the AMN3110 uses external PA, RF switches, RF Band Pass Filter and Low Pass Filter, RF BALUNs and a few passive components.

This device is slave equipment, another information please refer to users manual.

Test Mode	Mode 1: Transmitter -40BW
-----------	---------------------------

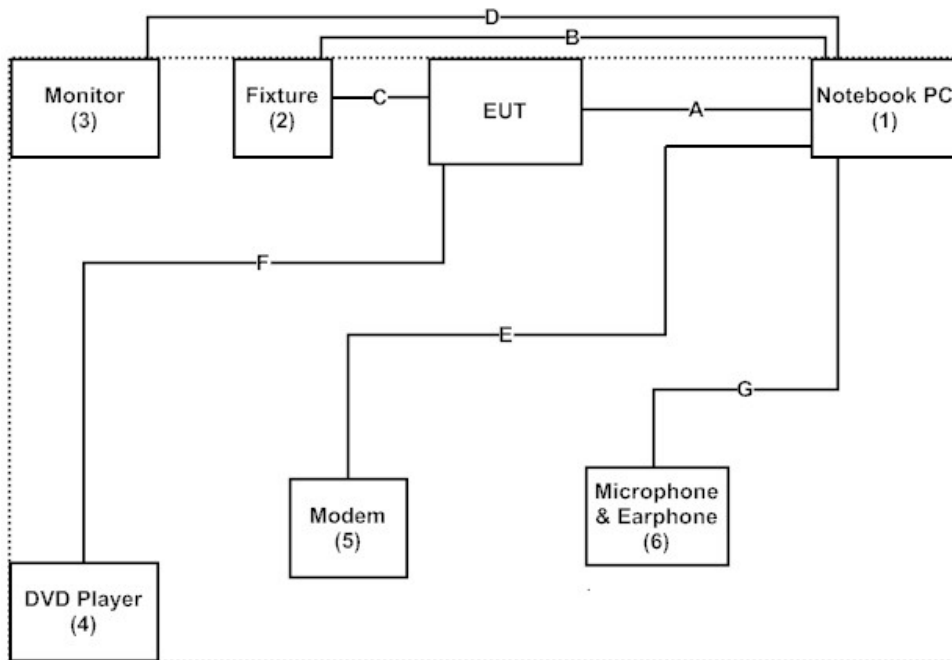
1.3. Tested System Details

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 Notebook PC	DELL	PPT	N/A	Shielded, 1.8m
2 Fixture	Zinwell	N/A	N/A	N/A
3 Monitor	LG	W2261VT	907YHED07299	Shielded, 1.8m
4 DVD PLAYER	PHILIPS	DVD951	KT010046000748	Non-Shielded, 1.5m
5 Modem	ACEEX	DM-1414	0102027553	Non-Shielded, 1.5m
6 Microphone & Earphone	PCHOME	N/A	N/A	N/A

Signal Cable Type	Signal cable Description
A USB Cable	Shielded, 1m
B USB to RS-232 Cable	Shielded, 1m
C Signal Cable	Non-Shielded, 0.5m
D VGA Cable	Shielded, 1.8m, with one ferrite core bonded.
E Modem Cable	Shielded, 1.5m
F HDMI Cable	Shielded, 1m
G Microphone & Earphone Cable	Non-Shielded, 1m

1.4. Configuration of tested System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute the UART program on the EUT.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press “OK” to start the continuous Transmitter.
- (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
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 Taiwan, R.O.C.
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 E-Mail : service@quietek.com

FCC Accreditation Number: TW1014



2. Conducted Emission

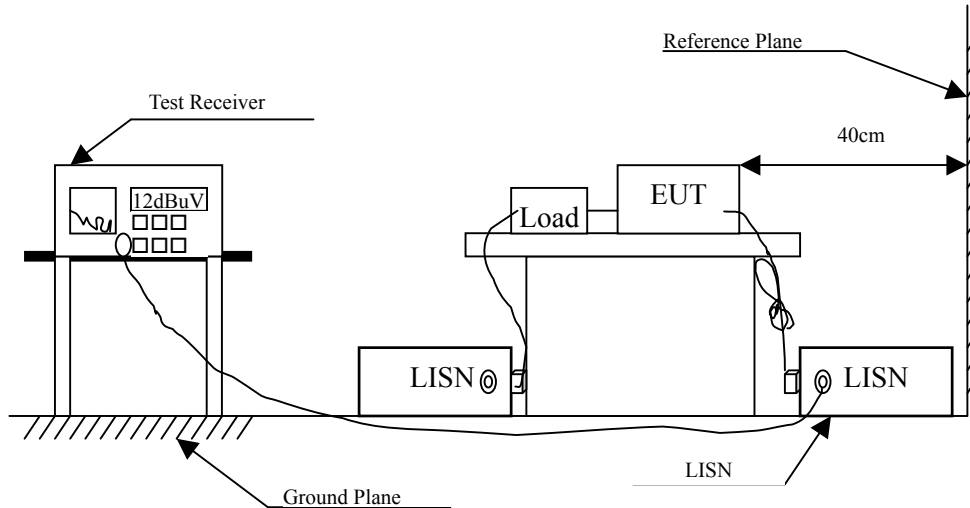
2.1. Test Equipment

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

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2010	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2010	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2010	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2010	
5	No.1 Shielded Room			N/A	

Note: All equipments are calibrated every one year.

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 C63.4: 2003 on conducted measurement.

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

The EUT was setup to ANSI C63.4, 2003; tested to DTS test procedure of Aug 2002 DA 02-2138 for compliance to FCC 47CFR Subpart E requirements.

2.5. Uncertainty

± 2.26 dB

2.6. Test Result of Conducted Emission

Product : Full HD Video Wireless Transmitter Module
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmitter -40BW (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 1					
Quasi-Peak					
0.181	9.724	44.090	53.814	-11.300	65.114
0.216	9.696	28.240	37.936	-26.178	64.114
0.302	9.650	30.560	40.210	-21.447	61.657
4.060	9.700	33.650	43.350	-12.650	56.000
13.763	9.940	27.780	37.720	-22.280	60.000
27.017	10.170	35.680	45.850	-14.150	60.000
Average					
0.181	9.724	37.200	46.924	-8.190	55.114
0.216	9.696	6.170	15.866	-38.248	54.114
0.302	9.650	23.830	33.480	-18.177	51.657
4.060	9.700	22.950	32.650	-13.350	46.000
13.763	9.940	19.500	29.440	-20.560	50.000
27.017	10.170	30.650	40.820	-9.180	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 : Full HD Video Wireless Transmitter Module
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmitter -40BW (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 2					
Quasi-Peak					
0.181	9.732	43.240	52.972	-12.142	65.114
0.240	9.690	33.670	43.360	-20.069	63.429
0.306	9.660	27.390	37.050	-24.493	61.543
3.998	9.700	33.140	42.840	-13.160	56.000
11.025	9.860	29.330	39.190	-20.810	60.000
27.095	10.170	33.360	43.530	-16.470	60.000
Average					
0.181	9.732	36.510	46.242	-8.872	55.114
0.240	9.690	25.120	34.810	-18.619	53.429
0.306	9.660	20.580	30.240	-21.303	51.543
3.998	9.700	22.970	32.670	-13.330	46.000
11.025	9.860	25.740	35.600	-14.400	50.000
27.095	10.170	27.110	37.280	-12.720	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 Transmit Power

3.1. Test Equipment

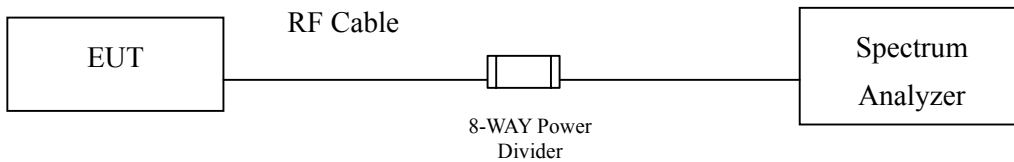
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Power Meter	Anritsu	ML2495A/6K00003357	May, 2010
X	Power Sensor	Anritsu	MA2411B/0738448	Jun, 2010
X	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2010
X	8-WAY Power Divider	JFW	50PD-647 / 526770 0916	Apr., 2010

Note:

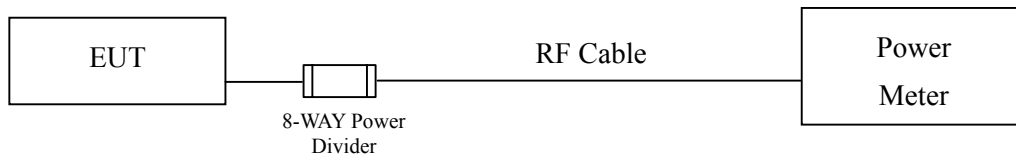
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

3.2. Test Setup

26dBc Occupied Bandwidth



Conducted Power Measurement



3.3. Limits

- (1) For the band 5.15-5.25 GHz, the peak transmit 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 peak transmit 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 peak transmit 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 peak transmit 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 peak transmit 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 peak transmit power shall be reduced by the amount in dB that directional gain of the antenna exceeds 6 dBi.

3.4. Test Procedur

As an alternative to DA 02-2138, the EUT peak power was measured with a peak power meter employing a video bandwidth greater than 6dB BW of the emission under test. Peak 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 DA 02-2138, and provides more accurate measurements.

3.5. Uncertainty

$\pm 1.27 \text{ dB}$

3.6. Test Result of Peak Transmit Power

Product : Full HD Video Wireless Transmitter Module
Test Item : Peak Transmit Power
Test Site : No.3 OATS
Test Mode : Mode 1: Transmitter -40BW

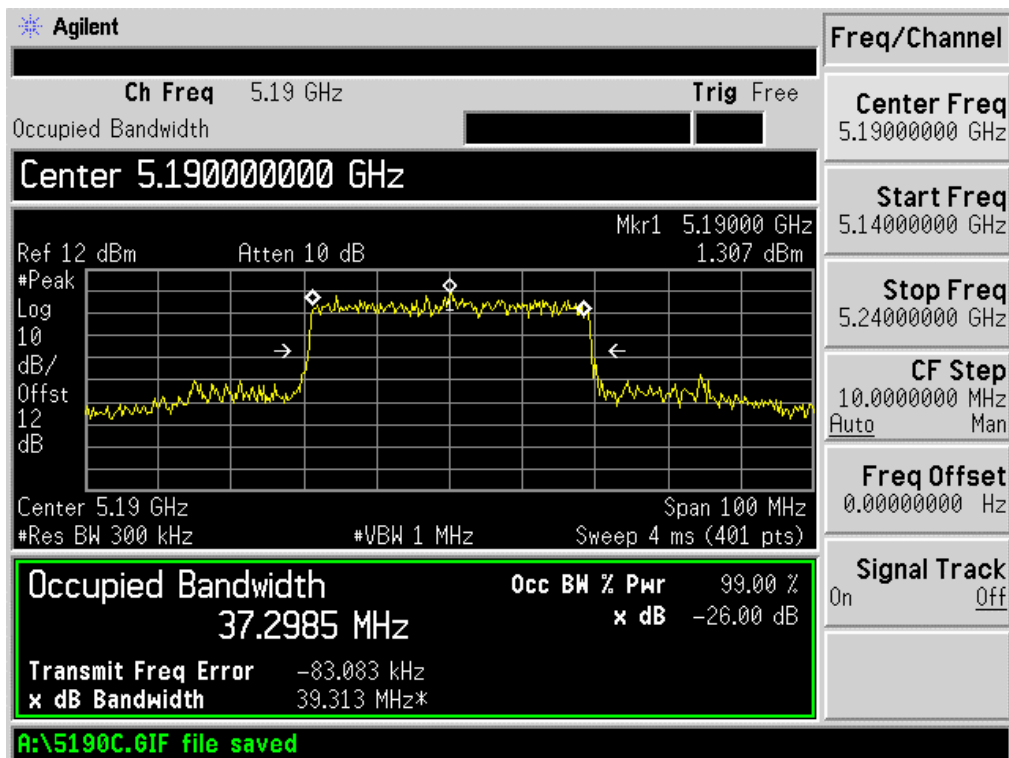
Channel No.	Frequency (MHz)	Measurement (dBm)	Required Limit (dBm)	Result
01	5190	11.68	<17dBm	Pass
02	5230	11.67	<17dBm	Pass

Note: 1. Peak Power Output Value =Reading value on power meter + cable loss.
2. Using 8-Way Power Divider (factor =10dB), to compensate in the spectrum.

Peak Transmit Power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
01	5190	39.313	11.68	17	19.95	Pass

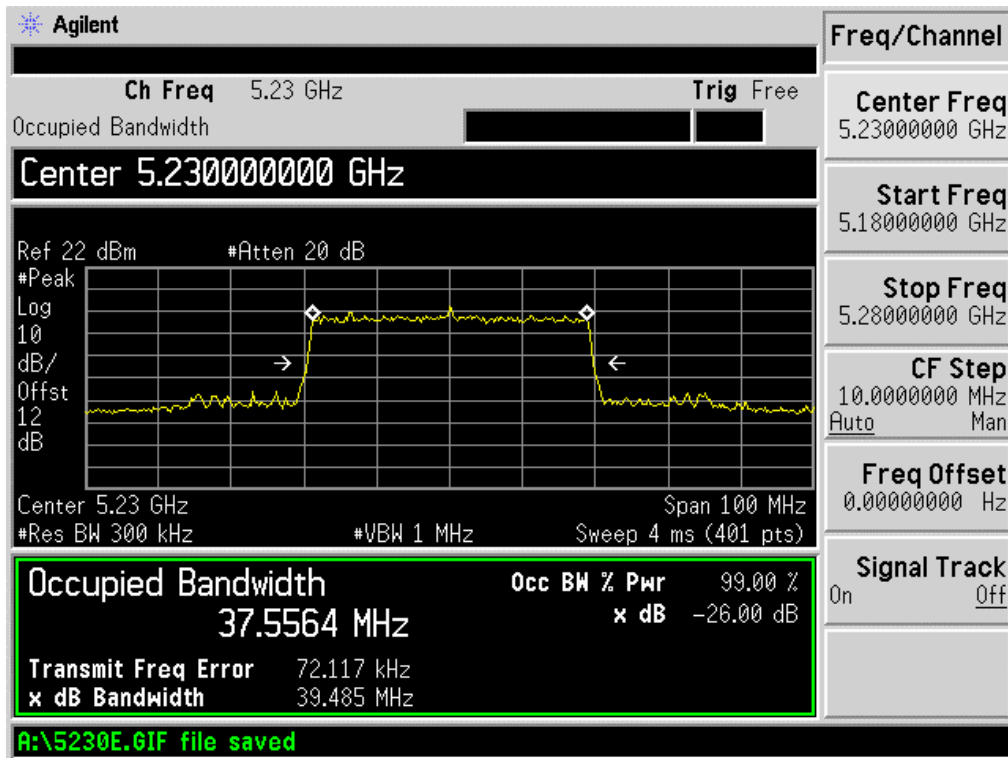
**26dBc Occupied Bandwidth:
Channel 01**



Peak Transmit Power Measurement:

Channel No	Frequency Range (MHz)	26dB Bandwidth (MHz)	Output Power (dBm)	Output Power Limit		Result
				(dBm)	dBm+10log(BW)	
02	5230	39.485	11.67	17	19.96	Pass

**26dBc Occupied Bandwidth:
Channel 02**



4. Peak Power Spectral Density

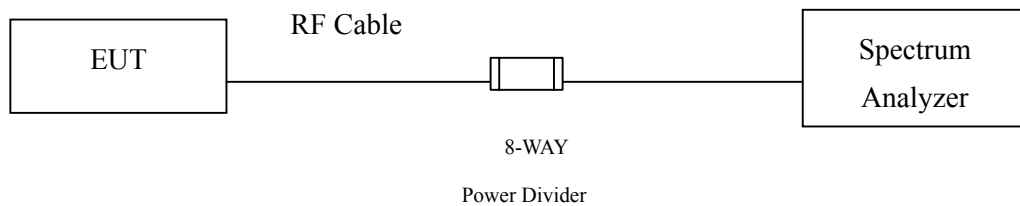
4.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2010
X	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2010
	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2010
X	8-WAY Power Divider	JFW	50PD-647 / 526770 0916	Apr., 2010

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. The power combiner is used for measure 11n mode.

4.2. Test Setup



4.3. Limits

- (4) 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.
- (5) 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.
- (6) 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 C63.4, 2003; tested to DTS test procedure of Aug 2002 DA 02-2138 for compliance to FCC 47CFR Subpart E requirements.

4.5. Uncertainty

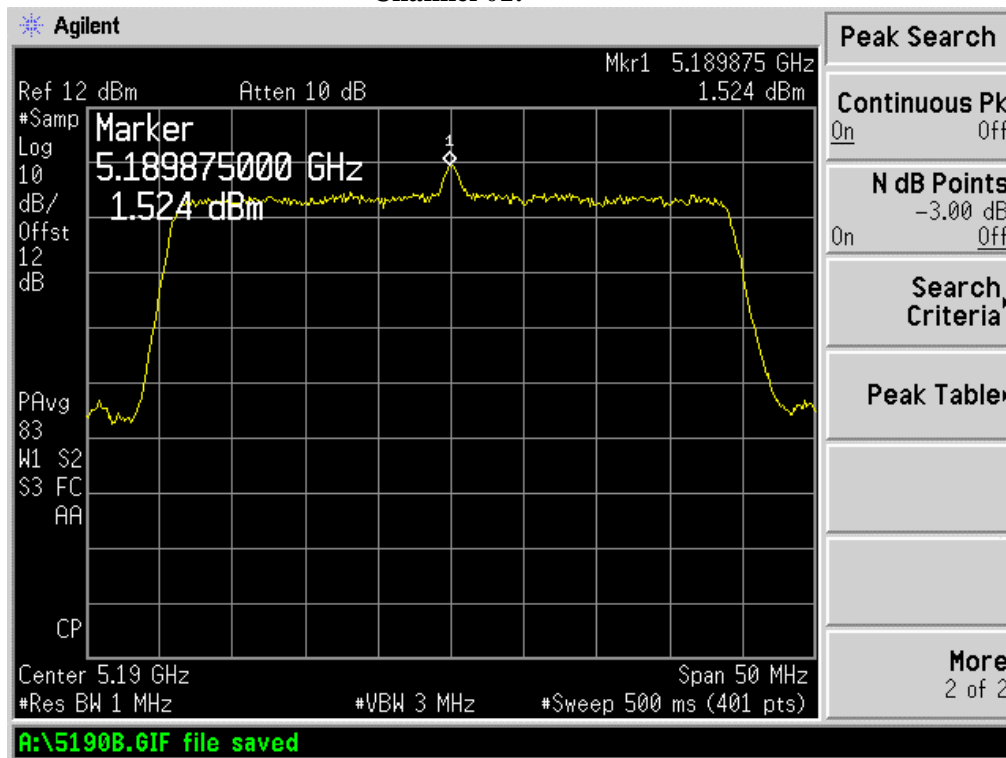
± 1.27 dB

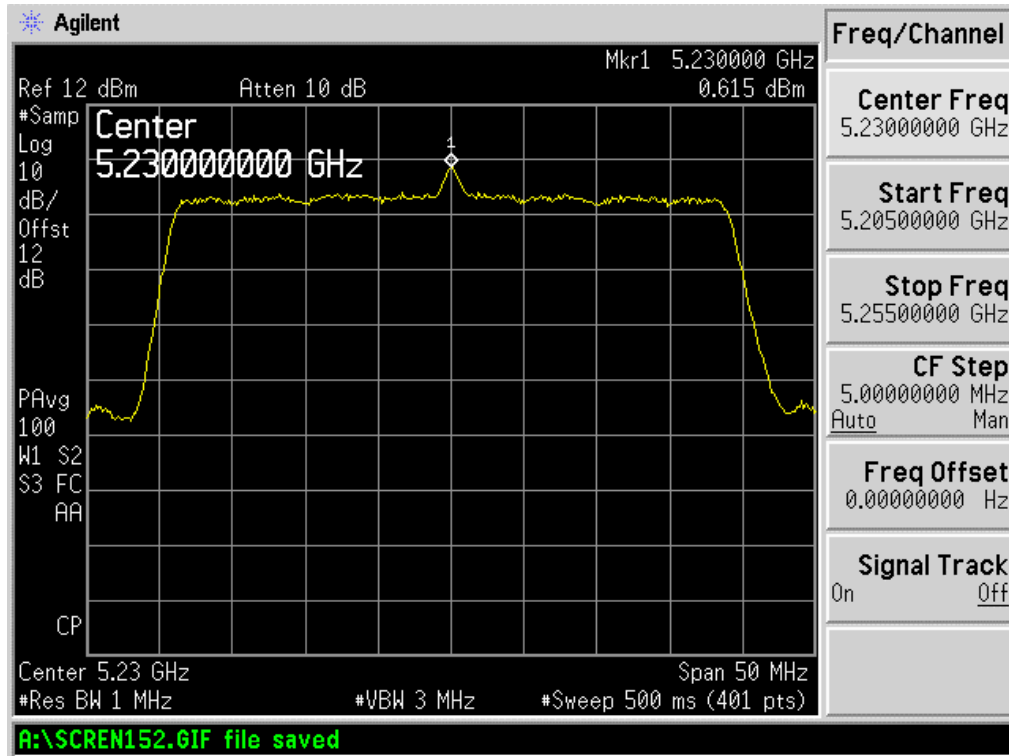
4.6. Test Result of Peak Power Spectral Density

Product : Full HD Video Wireless Transmitter Module
 Test Item : Peak Power Spectral Density
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW

Channel No.	Frequency (MHz)	Measurement Level (dBm)	Required Limit (dBm)	Result
01	5190	1.524	<4	Pass
02	5230	0.615	<4	Pass

Channel 01:





Channel 02:

5. Peak Excursion

5.1. Test Equipment

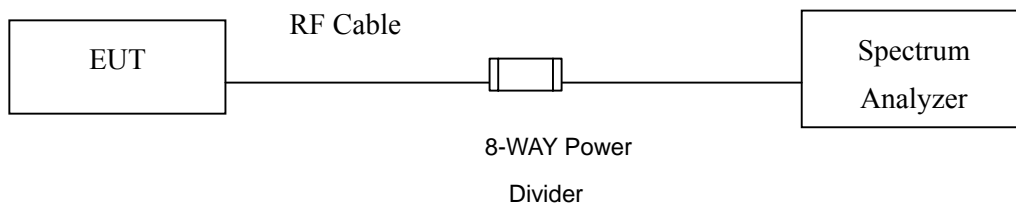
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2010
X	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2010
	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2010
X	8-WAY Power Divider	JFW	50PD-647 / 526770 0916	Apr., 2010

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. The power combiner is used for measure 11n mode.

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 peak transmit 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 C63.4, 2003; tested to DTS test procedure of Aug 2002 DA 02-2138 for compliance to FCC 47CFR Subpart E requirements.

5.5. Uncertainty

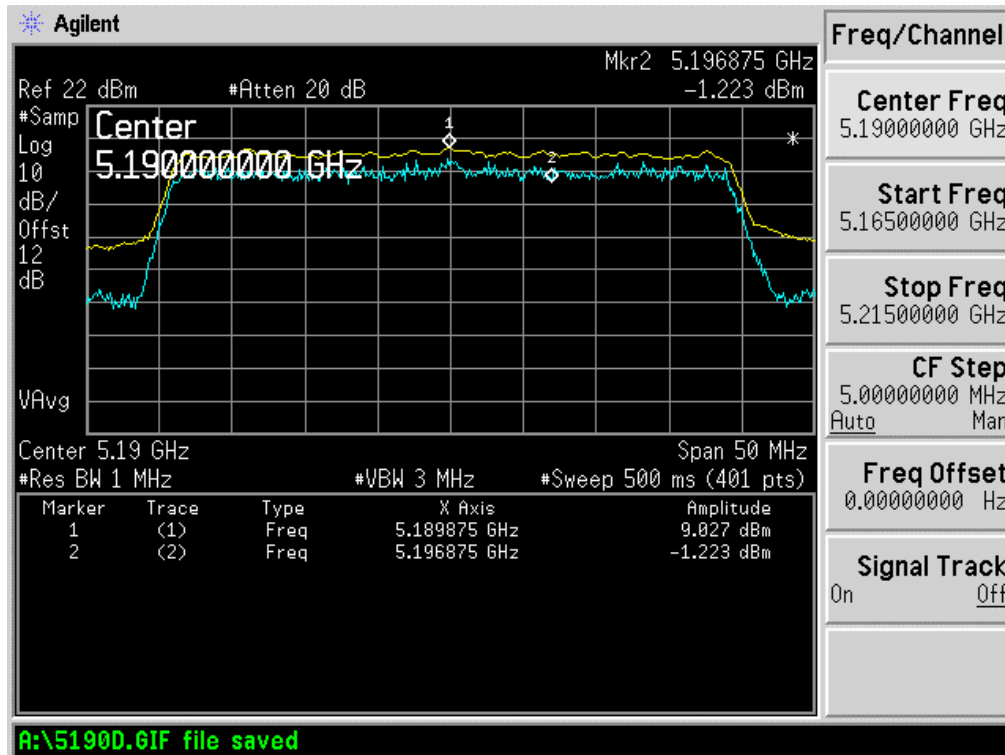
± 1.27 dB

5.6. Test Result of Peak Excursion

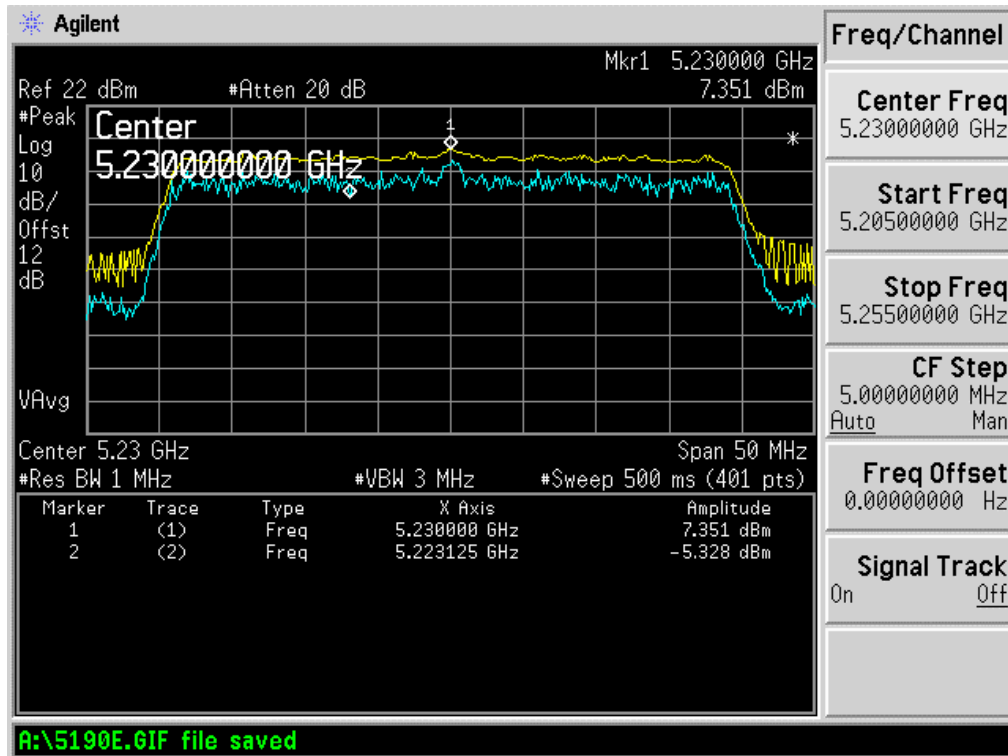
Product : Full HD Video Wireless Transmitter Module
 Test Item : Peak Excursion
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW

Channel No.	Frequency (MHz)	Measurement Level (dB)	Required Limit (dB)	Result
01	5190	10.250	<13	Pass
02	5230	12.679	<13	Pass

Channel 01:



Channel 02:



6. Radiated Emission

6.1. Test Equipment

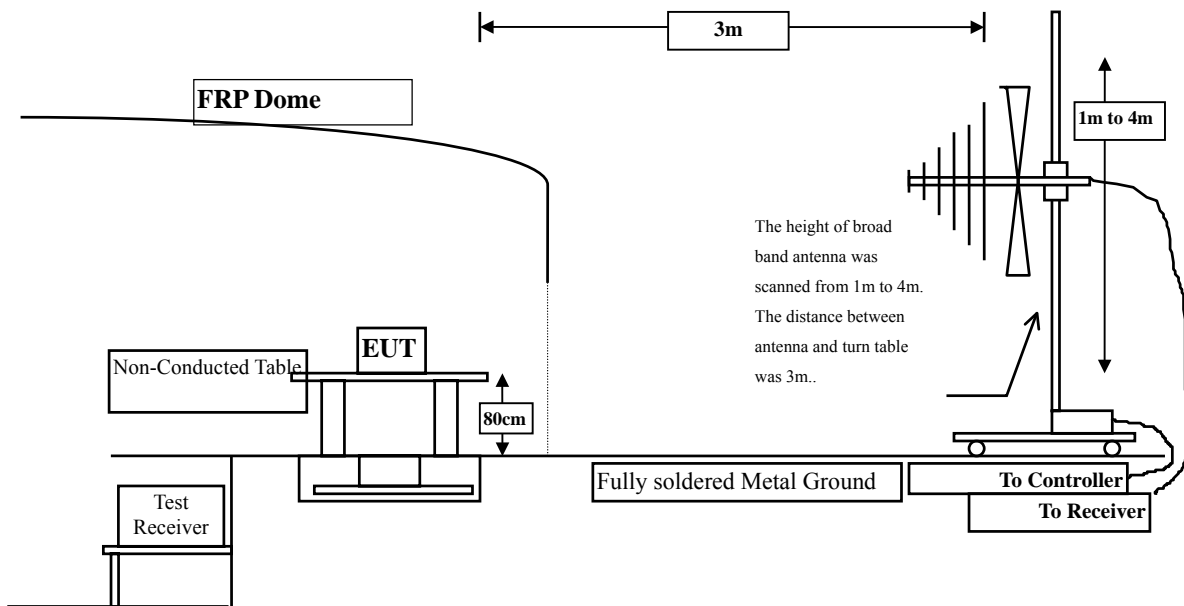
The following test equipments are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2010
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2010
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2010
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2010
	X	Pre-Amplifier	HP	8449B/3008A01123	July., 2010
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2010
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2010
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2010
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

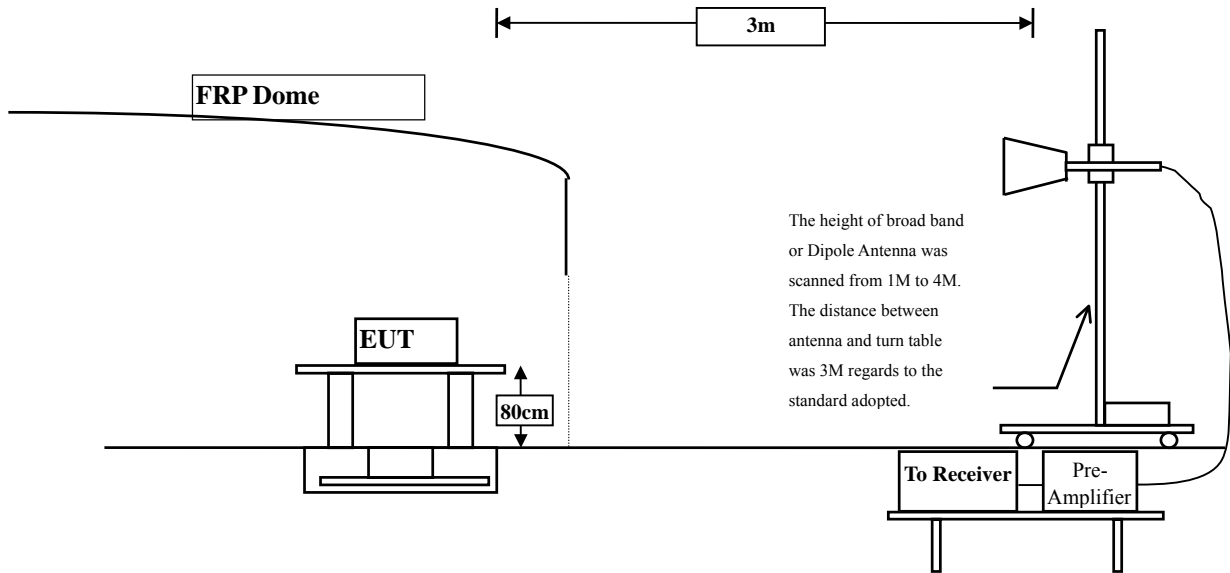
- Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

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	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)

6.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to FCC Public Notice DA 02-2138 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 C63.4:2003 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.

6.5. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

6.6. Test Result of Radiated Emission

Product : Full HD Video Wireless Transmitter Module
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
10380.000	8.400	43.690	52.090	-21.910	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	*	*	*	*	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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
7. The average measurement was not performed when the peak measured data under the limit of average detection.
8. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Full HD Video Wireless Transmitter Module
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
10460.000	9.965	44.600	54.566	-19.434	74.000
20760.000	*	*	*	*	74.000
25950.000	*	*	*	*	74.000
31140.000	*	*	*	*	74.000
36330.000	*	*	*	*	74.000
Average Detector:					
10460.000	9.965	38.740	48.705	-5.295	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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
7. The average measurement was not performed when the peak measured data under the limit of average detection.
8. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Full HD Video Wireless Transmitter Module
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW (5230MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
10460.000	7.932	44.570	52.502	-21.498	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	*	*	*	*	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. “*”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
7. The average measurement was not performed when the peak measured data under the limit of average detection.
8. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Full HD Video Wireless Transmitter Module
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW (5230MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
10460.000	9.390	44.180	53.570	-20.430	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	*	*	*	*	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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
7. The average measurement was not performed when the peak measured data under the limit of average detection.
8. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : Full HD Video Wireless Transmitter Module
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW (5190MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector					
119.240	-9.621	48.987	39.366	-4.134	43.500
159.980	-11.775	43.782	32.007	-11.493	43.500
441.280	-2.294	42.627	40.333	-5.667	46.000
802.120	5.091	32.159	37.250	-8.750	46.000
899.120	5.433	31.087	36.520	-9.480	46.000
1000.000	9.119	37.210	46.329	-7.671	54.000
Vertical					
Peak Detector					
119.240	-3.541	36.912	33.371	-10.129	43.500
222.060	-8.789	45.947	37.158	-8.842	46.000
499.480	-0.852	36.436	35.584	-10.416	46.000
802.120	3.161	32.537	35.698	-10.302	46.000
967.020	8.071	32.939	41.010	-12.990	54.000
1000.000	4.329	41.694	46.023	-7.977	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor
4. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
5. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested.
Only the worst case is shown on the report.

Product : Full HD Video Wireless Transmitter Module
 Test Item : General Radiated Emission
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW (5230MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector					
119.240	-9.621	49.824	40.203	-3.297	43.500
159.980	-11.775	44.521	32.746	-10.754	43.500
441.280	-2.294	47.162	44.868	-1.132	46.000
480.080	-0.329	41.367	41.038	-4.962	46.000
641.100	1.348	34.853	36.201	-9.799	46.000
1000.000	9.119	36.306	45.425	-8.575	54.000
Vertical					
Peak Detector					
119.240	-3.541	38.500	34.959	-8.541	43.500
216.240	-8.317	41.772	33.455	-12.545	46.000
441.280	-8.494	40.332	31.838	-14.162	46.000
528.580	-0.462	35.795	35.333	-10.667	46.000
967.020	8.071	34.533	42.604	-11.396	54.000
1000.000	4.329	44.516	48.845	-5.155	54.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are average value.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor
4. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
5. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested.
Only the worst case is shown on the report.

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, 2010
X	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2010
	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2010
X	8-WAY Power Divider	JFW	50PD-647 / 526770 0916	Apr., 2010

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. The power combiner is used for measure 11n mode.

RF Radiated Measurement:

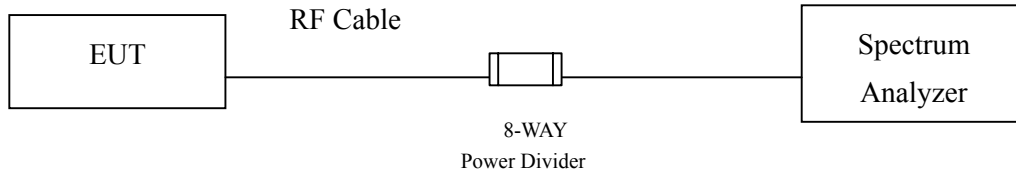
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.	
☒ Site # 3		Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2010
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2010
		Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2010
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2010
	X	Pre-Amplifier	HP	8449B/3008A01123	July., 2010
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2010
		Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2010
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2010
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

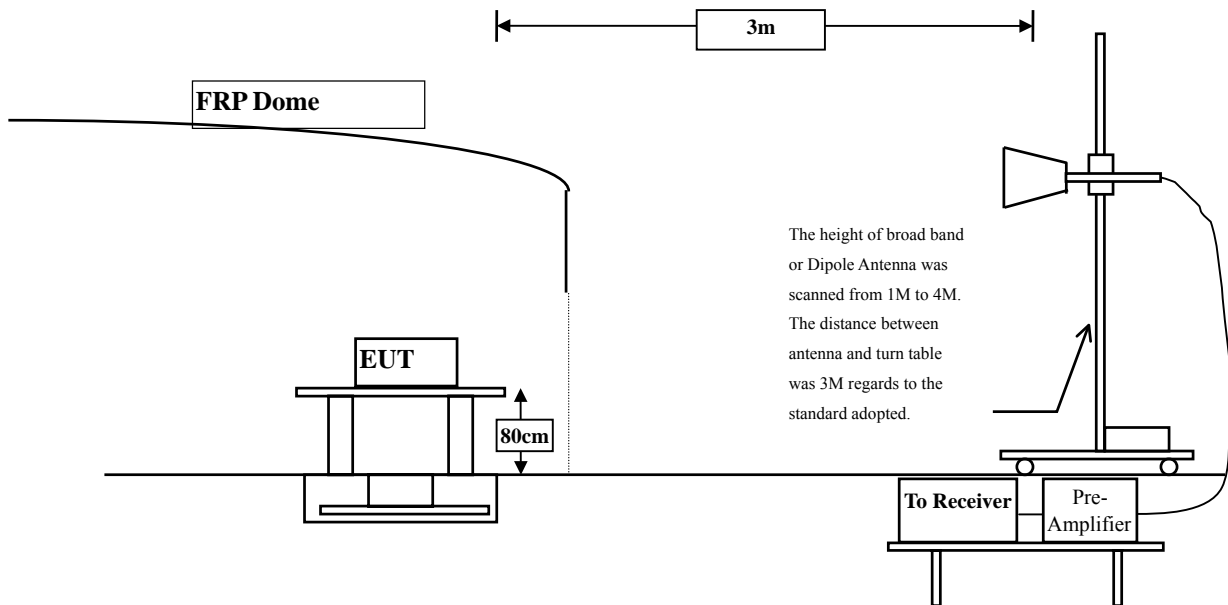
- Note:
1. All instruments are calibrated every one year.
 2. The test instruments marked by “X” are used to measure the final test results.

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 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 C63.4:2003 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 C63.4, 2003; tested to DTS test procedure of Aug 2002 DA 02-2138 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 : Full HD Video Wireless Transmitter Module
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW -Channel 01

Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Reading Level [dBuV]	Correction Factor [dB/m]	Emission Level [dBuV/m]	Detector
Horizontal	5190	34.907	59.35	94.258	Peak
Horizontal	5190	34.907	55.25	90.158	Average
Vertical	5190	37.077	60.17	97.248	Peak
Vertical	5190	37.077	55.38	92.458	Average

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=30Hz

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Requiment Limit (dBuV/m)	Detector
Horizontal	5150	94.258	45.346	48.912	74.000	Peak
Horizontal	5150	90.158	49.73	40.428	54.000	Average
Vertical	5150	97.248	45.346	51.902	74.000	Peak
Vertical	5150	92.458	49.73	42.728	54.000	Average

Note:

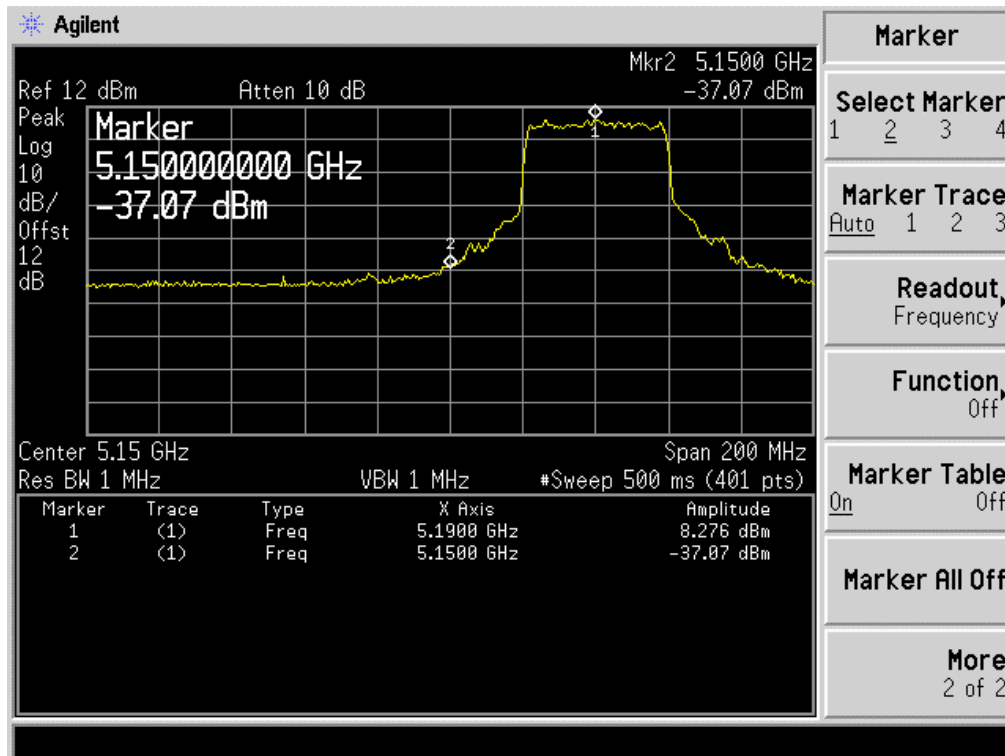
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

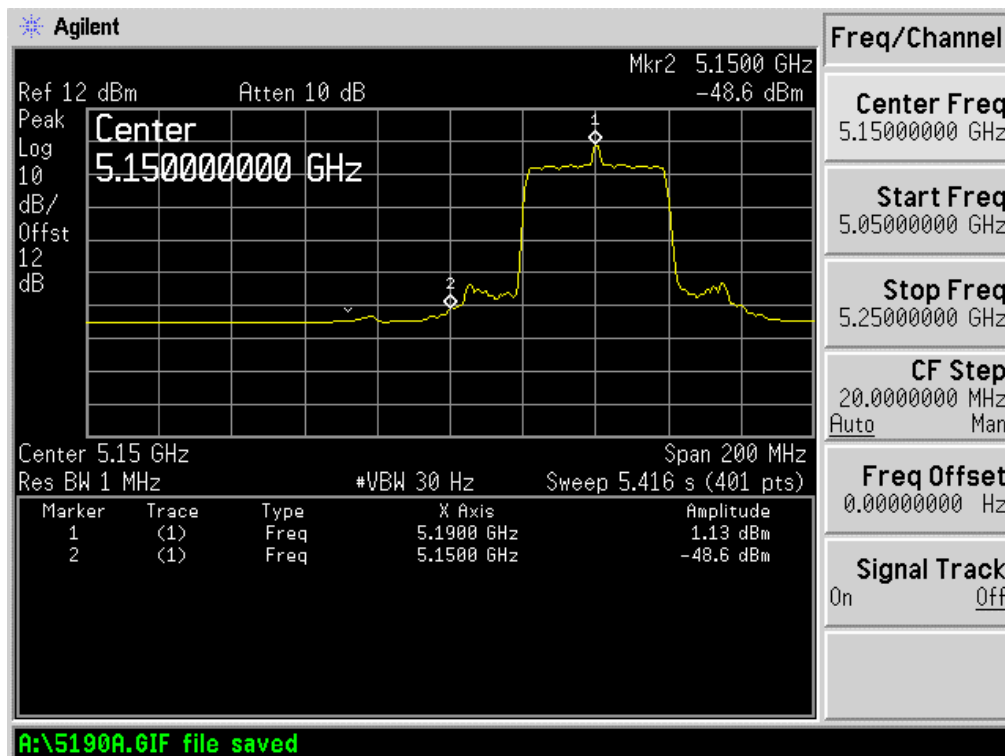
F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



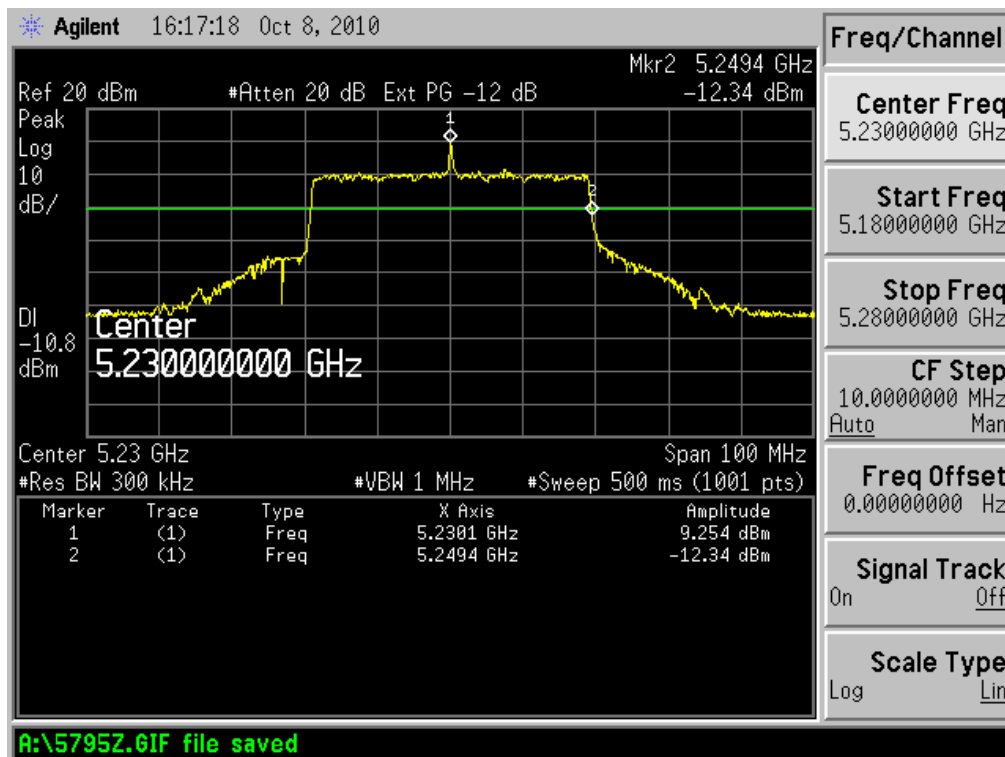
Average Detector of conducted Band Edge Delta



Product : Full HD Video Wireless Transmitter Module
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmitter -40BW -Channel 02

Test Frequency (MHz)	Measurement Level (20dB BW) (MHz)	Limit (MHz)	Result
5230	5249.40	<5250	PASS

NOTE: Accordance with 15.215 requirement.



8. Frequency Stability

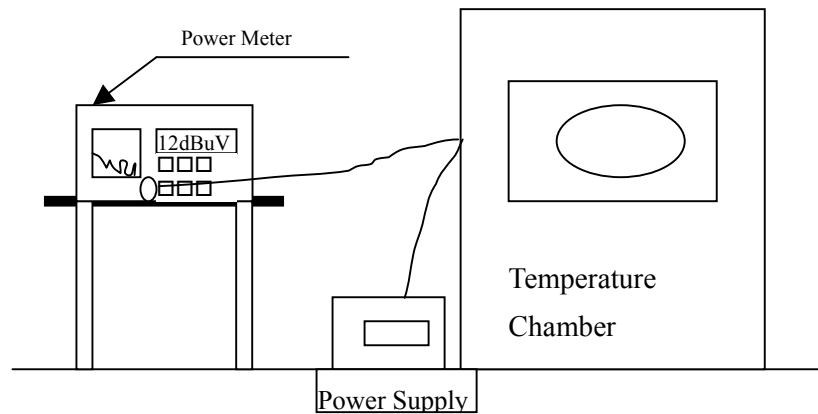
8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
	Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2010
X	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2010
	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2010

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 C63.4, 2003; tested to DTS test procedure of Aug 2002 DA 02-2138 for compliance to FCC 47CFR Subpart E requirements.

8.5. Uncertainty

± 150 Hz

8.6. Test Result of Frequency Stability

Product : Full HD Video Wireless Transmitter Module
 Test Item : Frequency Stability
 Test Site : Temperature Chamber
 Test Mode : Carrier Wave (Beginning)

Test Conditions		Channel	Frequency (MHz)	Frequency (MHz)	ΔF (MHz)
Tnom (20) °C	Vnom (110)V	38	5190.00	5190.0000	0.0000
		46	5230.00	5230.0000	0.0000
Tnom (50) °C	Vnom (126.5)V	38	5190.00	5190.0015	0.0015
		46	5230.00	5230.0100	0.0100
Tnom (50) °C	Vnom (93.5)V	38	5190.00	5190.0018	0.0018
		46	5230.00	5230.0100	0.0100
Tnom (0) °C	Vnom (126.5)V	38	5190.00	5190.0020	0.0020
		46	5230.00	5230.0090	0.0090
Tnom (0) °C	Vnom (93.5)V	38	5190.00	5190.0020	0.0020
		46	5230.00	5230.0015	0.0015

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs