



# SPORTON International Inc.

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## FCC RADIO TEST REPORT

Applicant's company	Arcadyan Technology Corporation
Applicant Address	No.8, Sec.2, Guangfu Rd., Hsinchu, 30071 Taiwan
FCC ID	RAXWA8001AAC
Manufacturer's company	Arcadyan Technology Corporation
Manufacturer Address	No.8, Sec.2, Guangfu Rd., Hsinchu, 30071 Taiwan

Product Name	Wireless Joey Access Point
Brand Name	EchoStar
Model No.	Wireless Joey Access Point
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5350MHz / 5470 ~ 5725MHz / 5725 ~ 5850 MHz
Received Date	Dec. 10, 2013
Final Test Date	Oct. 26, 2016
Submission Type	Class II Change

### Statement

**Test result included is for the IEEE 802.11n and IEEE 802.11a/ac of the product.**

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2013, 47 CFR FCC Part 15 Subpart E, KDB789033 D02 v01r02, KDB662911 D01 v02r01, KDB644545 D03 v01, ET Docket No. 13-49; FCC 16-24.**

The test equipment used to perform the test is calibrated and traceable to NML/ROC.



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### History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3D1013-04	Rev. 01	Initial issue of report	May 16, 2016

## 1. VERIFICATION OF COMPLIANCE

Product Name : Wireless Joey Access Point  
Brand Name : EchoStar  
Model No. : Wireless Joey Access Point  
Applicant : Arcadyan Technology Corporation  
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Dec. 10, 2013 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



Sam Chen

SPORTON INTERNATIONAL INC.

## 2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	Rule Section	Description of Test	Result	Under Limit
4.1	15.207	AC Power Line Conducted Emissions	Complies	5.97 dB
4.2	15.407(b)	Radiated Emissions	Complies	3.09 dB
4.3	15.203	Antenna Requirements	Complies	-

### 3. GENERAL INFORMATION

#### 3.1. Product Details

Items	Description
Product Type	WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	IEEE 802.11a: OFDM IEEE 802.11n/ac: see the below table
Data Modulation	IEEE 802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) IEEE 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	IEEE 802.11a: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n/ac: see the below table
Frequency Range	5150 ~ 5350MHz / 5470 ~ 5725MHz / 5725 ~ 5850 MHz
Channel Number	21 for 20MHz bandwidth ; 9 for 40MHz bandwidth 4 for 80MHz bandwidth
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description			
Communication Mode	<input checked="" type="checkbox"/>	IP Based (Load Based)	<input type="checkbox"/>	Frame Based
TPC Function	<input checked="" type="checkbox"/>	With TPC	<input type="checkbox"/>	Without TPC
Weather Band (5600~5650MHz)	<input type="checkbox"/>	With 5600~5650MHz	<input checked="" type="checkbox"/>	Without 5600~5650MHz
Beamforming Function	<input checked="" type="checkbox"/>	With beamforming	<input type="checkbox"/>	Without beamforming
Operate Condition	<input checked="" type="checkbox"/>	Indoor	<input type="checkbox"/>	Outdoor

Note : The product has beamforming function for 802.11n/ac mode.

**Antenna and Band width**

Antenna	Three (TX)		
	20 MHz	40 MHz	80 MHz
Band width Mode			
IEEE 802.11a	V	X	X
IEEE 802.11n	V	V	X
IEEE 802.11ac	V	V	V

**IEEE 11n/ac Spec.**

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	3	MCS 0-23
802.11n (HT40)	3	MCS 0-23
802.11ac (VHT20)	3	MCS 0-9/Nss1-3
802.11ac (VHT40)	3	MCS 0-9/Nss1-3
802.11ac (VHT80)	3	MCS 0-9/Nss1-3

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput).  
Then EUT support HT20 and HT40.

Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT support VHT20, VHT40 and VHT80.

Note 3: Modulation modes consist of below configuration:  
HT20/HT40: IEEE 802.11n, VHT20/VHT40/VHT80: IEEE 802.11ac

**3.2. Accessories**

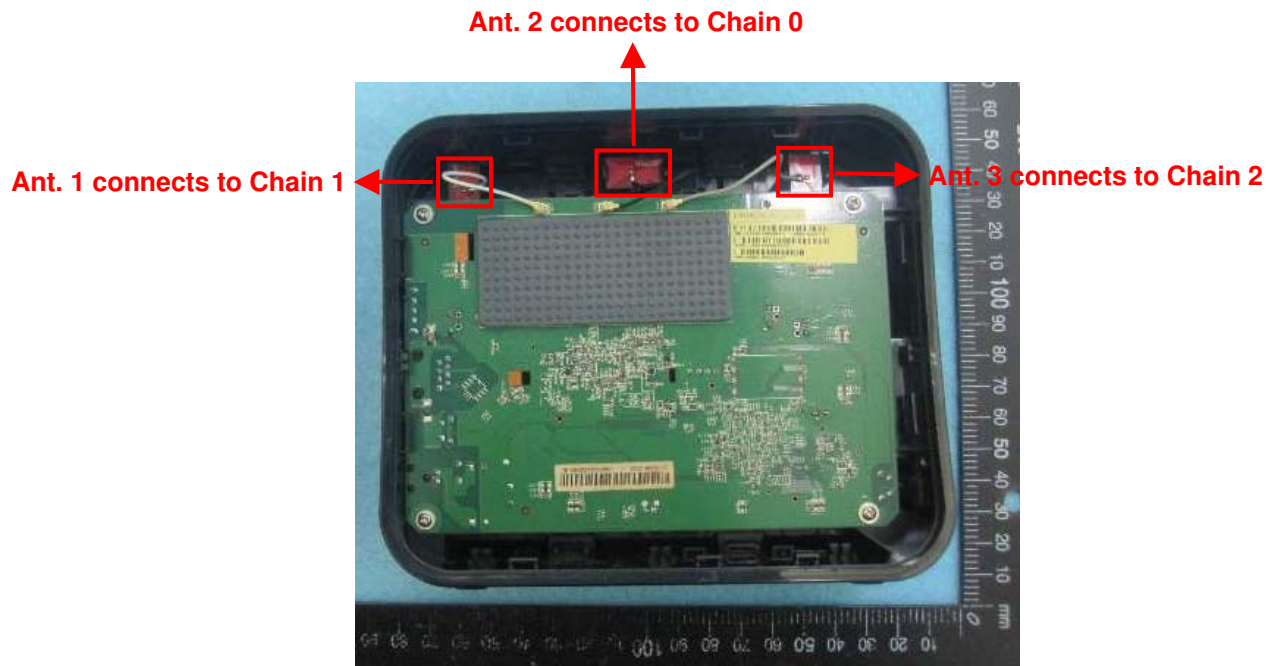
Power	Brand	Model No.	Rating
Adapter 1	DELTA	ADP-18DW BA	Input: 100-120V~ 0.5A 60Hz Output: 12V, 1.46A
Adapter 2	DELTA	ADP-18DW BB	Input: 100-120V~ 0.5A 60Hz Output: 12V, 1.46A
Adapter 3	LITEON	PB-1180-6ES1	Input: 100-120V~ 0.5A, 60Hz Output: 12V, 1.46A, 18W
Other			
RJ-45 Cable*1: Non-shielded, 3m			

### 3.3. Table for Filed Antenna

Ant.	Brand	Model No.	Antenna Type	Connector	Gain (dBi)
1	Airgain	N5x20B	PCB Antenna	I-PEX	1.7
2	Airgain	N5x20B	PCB Antenna	I-PEX	1.7
3	Airgain	N5x20B	PCB Antenna	I-PEX	1.7

Note: The EUT has three antennas. (3TX/3RX)

Ant. 1, Ant. 2 and Ant. 3 could transmit/receive simultaneously.





### 3.4. Table for Carrier Frequencies

There are three bandwidth systems.

For 20MHz bandwidth systems, use Channel 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 132, 136, 140, 149, 153, 157, 161, 165.

For 40MHz bandwidth systems, use Channel 38, 46, 54, 62, 102, 110, 134, 151, 159.

For 80MHz bandwidth systems, use Channel 42, 58, 106, 155.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5150~5250 MHz Band 1	36	5180 MHz	44	5220 MHz
	38	5190 MHz	46	5230 MHz
	40	5200 MHz	48	5240 MHz
	42	5210 MHz	-	-
5250~5350 MHz Band 2	52	5260 MHz	60	5300 MHz
	54	5270 MHz	62	5310 MHz
	56	5280 MHz	64	5320 MHz
	58	5290 MHz	-	-
5470~5725 MHz Band 3	100	5500 MHz	112	5560 MHz
	102	5510 MHz	116	5580 MHz
	104	5520 MHz	132	5660 MHz
	106	5530 MHz	134	5670 MHz
	108	5540 MHz	136	5680 MHz
	110	5550 MHz	140	5700 MHz
5725~5850 MHz Band 4	149	5745 MHz	157	5785 MHz
	151	5755 MHz	159	5795 MHz
	153	5765 MHz	161	5805 MHz
	155	5775 MHz	165	5825 MHz

### 3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode	Data Rate	Channel	Chain
AC Power Conducted Emission	Normal Link	-	-	-
Radiated Emission Below 1GHz	Normal Link	-	-	-

Note: The EUT is used for standing only.

The following test modes were performed for all tests:

#### For AC Power Line Conducted Emissions test:

Mode 1: AP function + Adapter 2

Mode 2: Client function + Adapter 2

Mode 3: AP function + Adapter 3

Mode 4: Client function + Adapter 3

Mode 3 generated the worst test result, so it was recorded in this report.

#### For Radiated Emission Below 1GHz Test:

Mode 1: AP function + Adapter 2

Mode 2: Client function + Adapter 2

Mode 3: AP function + Adapter 3

Mode 4: Client function + Adapter 3

Mode 1 generated the worst test result, so it was recorded in this report.

### 3.6. Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	Site Category	Location	FCC Designation No.	IC File No.	VCCI Reg. No
03CH01-CB	SAC	Hsin Chu	TW0006	IC 4086D	-
CO01-CB	Conduction	Hsin Chu	TW0006	IC 4086D	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

### 3.7. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR3D1013AA, AB and FR3D1013-02

Below is the table for the change of the product with respect to the original one.

Modifications	
1. Changing the address from "4F, No.9, Park Avenue II, Science-based Industrial Park Hsinchu 300, Taiwan" to "No.8, Sec.2, Guangfu Rd., Hsinchu, 30071 Taiwan"	
Modifications	Performance Checking
2. Adding two adapter (Model: ADP-18DW BB and PB-1180-6ES1)	1. AC Power Line Conducted Emissions 2. Radiated Emissions (below 1GHz)
3. Updating 5GHz Band 1 to "New Rules" from "Old Rules".	After evaluating, it's not necessary to re-test all test items for 5GHz Band 1 updating to "New Rules" due to the same power as original filing.
4. Updating test rule of 5GHz band 4 to "15.407 (b)(4)(ii) of New Rules (ET Docket No. 13-49; FCC 16-24)" from "Old Rules".	After evaluating, it's not necessary to re-test all test items for 5GHz Band 4 updating to "New Rules" due to the same power as original filing.

### 3.8. Table for Supporting Units

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB*2	DELL	E6430	DoC
Wireless Bridge(Device)	Arcadyan	WA8001AAC33-ES	N/A

For Test Site No: 03CH01-CB (Below 1GHz)

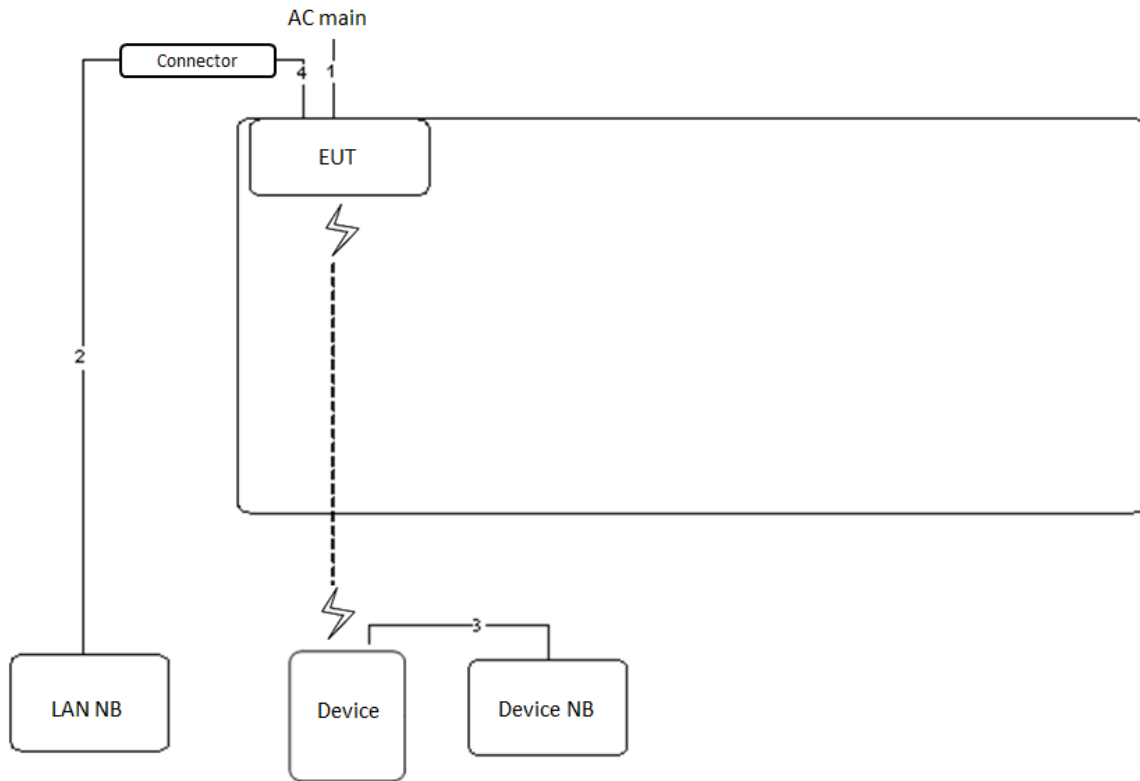
Support Unit	Brand	Model	FCC ID
Wireless Joey Access Point	EchoStar	Wireless Joey Access Point	RAXWA8001AAC
Notebook	DELL	E4300	DoC
Notebook	DELL	E4300	DoC

### 3.9. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

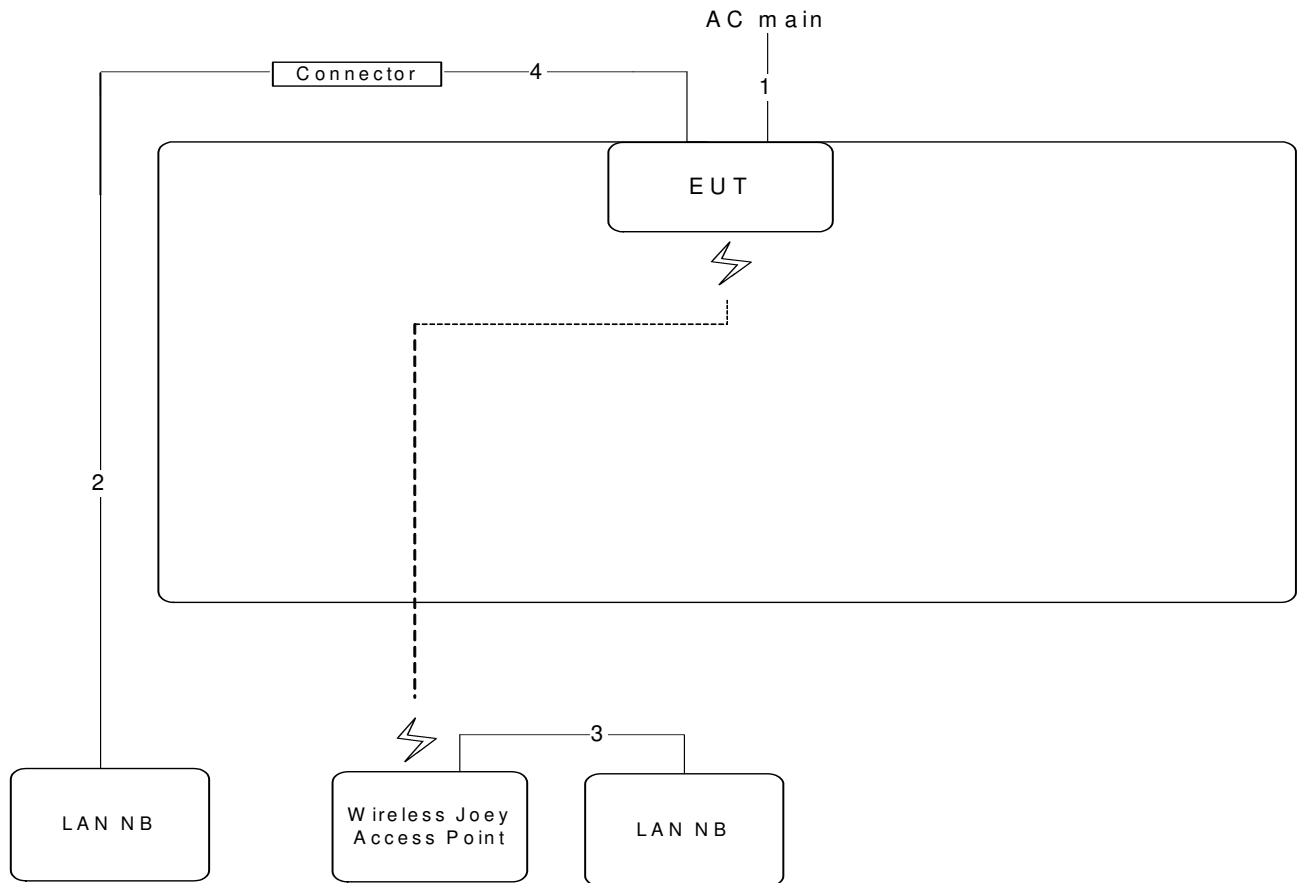
### 3.10. Test Configurations

#### 3.10.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	1.9m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	1.5m
4	RJ-45 cable	No	3m

### 3.10.2. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length(m)
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m
3	RJ-45 cable	No	1.5m
4	RJ-45 cable	No	3m

## 4. TEST RESULT

### 4.1. AC Power Line Conducted Emissions Measurement

#### 4.1.1. Limit

For this product that is designed to connect to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

#### 4.1.2. Measuring Instruments and Setting

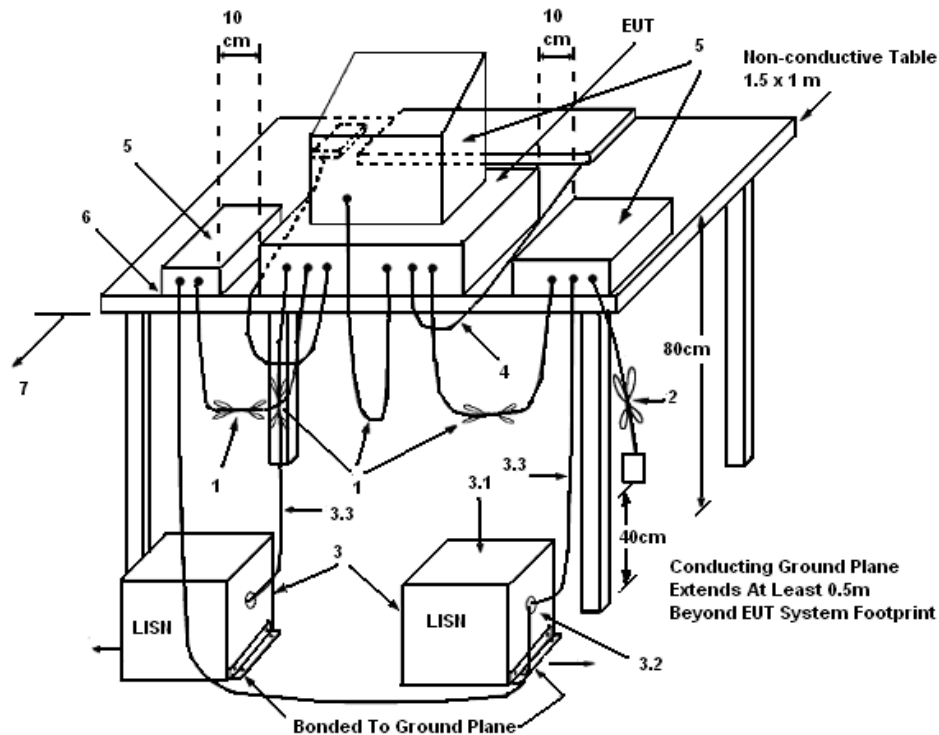
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

#### 4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

#### 4.1.4. Test Setup Layout



#### LEGEND:

- (1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- (2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- (3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50  $\Omega$ . LISN can be placed on top of, or immediately beneath, reference ground plane.
  - (3.1) All other equipment powered from additional LISN(s).
  - (3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.
  - (3.3) LISN at least 80 cm from nearest part of EUT chassis.
- (4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.
- (5) Non-EUT components of EUT system being tested.
- (6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- (7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

#### 4.1.5. Test Deviation

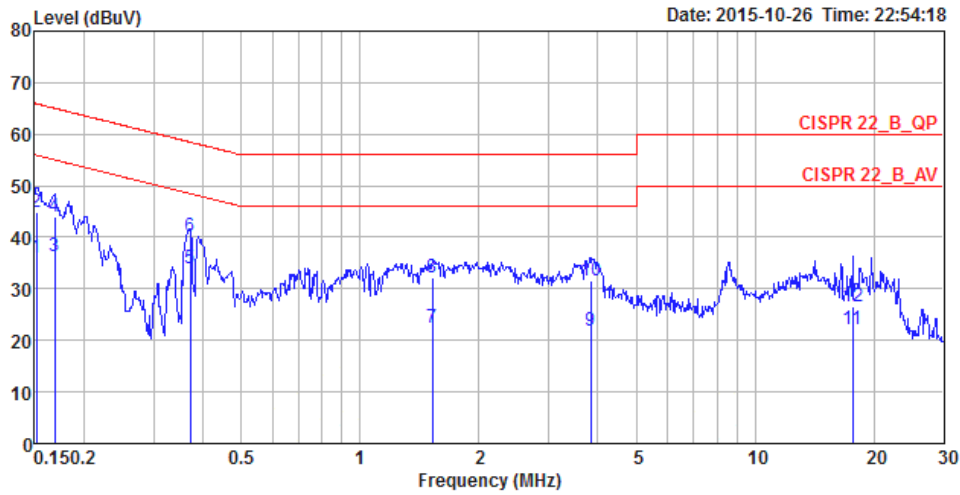
There is no deviation with the original standard.

#### 4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

4.1.7. Results of AC Power Line Conducted Emissions Measurement

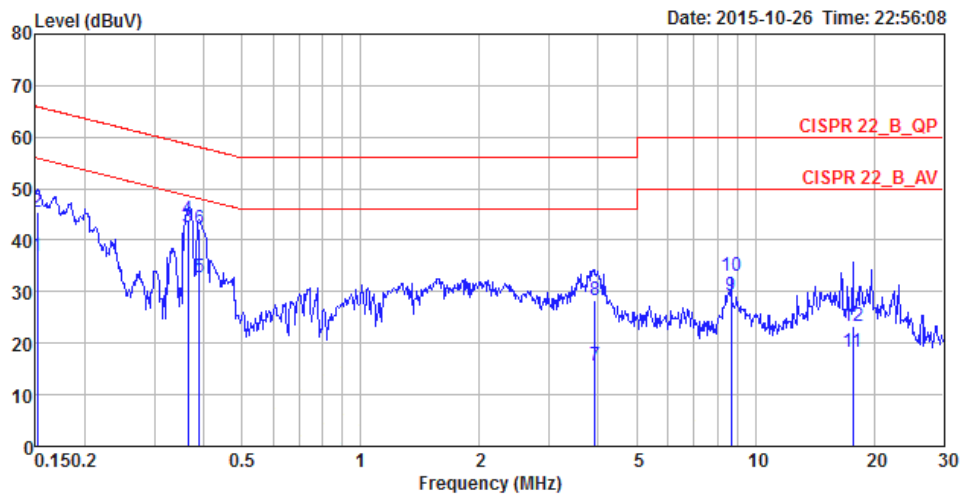
Temperature	24°C	Humidity	60%
Test Engineer	Deven Huang	Phase	Line
Configuration	Normal Link	Test Mode	Mode 3



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1516	36.13	-19.78	55.91	26.18	9.93	0.02	LINE	Average
2	0.1516	44.89	-21.02	65.91	34.94	9.93	0.02	LINE	QP
3	0.1685	36.40	-18.63	55.03	26.45	9.93	0.02	LINE	Average
4	0.1685	44.08	-20.95	65.03	34.13	9.93	0.02	LINE	QP
5	0.3712	33.89	-14.58	48.47	23.92	9.93	0.04	LINE	Average
6	0.3712	40.13	-18.34	58.47	30.16	9.93	0.04	LINE	QP
7	1.5274	22.30	-23.70	46.00	12.26	9.98	0.06	LINE	Average
8	1.5274	32.23	-23.77	56.00	22.19	9.98	0.06	LINE	QP
9	3.8399	21.89	-24.11	46.00	11.80	10.02	0.07	LINE	Average
10	3.8399	31.61	-24.39	56.00	21.52	10.02	0.07	LINE	QP
11	17.6611	22.08	-27.92	50.00	11.43	10.39	0.26	LINE	Average
12	17.6611	26.55	-33.45	60.00	15.90	10.39	0.26	LINE	QP



Temperature	24°C	Humidity	60%
Test Engineer	Deven Huang	Phase	Neutral
Configuration	Normal Link	Test Mode	Mode 3



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1516	36.81	-19.10	55.91	27.01	9.78	0.02	NEUTRAL	Average
2	0.1516	45.41	-20.50	65.91	35.61	9.78	0.02	NEUTRAL	QP
3	0.3653	42.64	-5.97	48.61	32.81	9.79	0.04	NEUTRAL	Average
4	0.3653	44.08	-14.53	58.61	34.25	9.79	0.04	NEUTRAL	QP
5	0.3893	32.76	-15.32	48.08	22.93	9.79	0.04	NEUTRAL	Average
6	0.3893	42.18	-15.90	58.08	32.35	9.79	0.04	NEUTRAL	QP
7	3.9222	15.71	-30.29	46.00	5.77	9.87	0.07	NEUTRAL	Average
8	3.9222	28.35	-27.65	56.00	18.41	9.87	0.07	NEUTRAL	QP
9	8.6832	29.25	-20.75	50.00	19.06	9.99	0.20	NEUTRAL	Average
10	8.6832	32.96	-27.04	60.00	22.77	9.99	0.20	NEUTRAL	QP
11	17.6611	18.42	-31.58	50.00	8.01	10.15	0.26	NEUTRAL	Average
12	17.6611	23.29	-36.71	60.00	12.88	10.15	0.26	NEUTRAL	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

## 4.2. Radiated Emissions Measurement

### 4.2.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of  $-27$  dBm/MHz.

For transmitters operating in the 5.725-5.85 GHz band: Follow 15.407(b)(4)(ii), the emission limits in § 15.247(d), 30dBc in any 100 kHz bandwidth outside the operating frequency band.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

### 4.2.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RBW / VBW (Emission in restricted band)	1 MHz / 3MHz for Peak, 1 MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1 MHz / 3MHz for peak

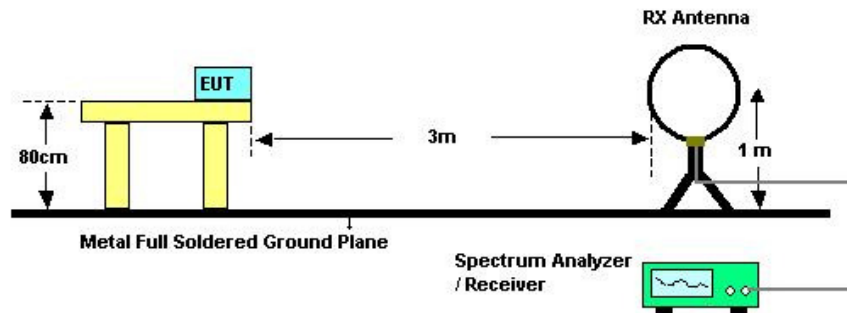
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

#### 4.2.3. Test Procedures

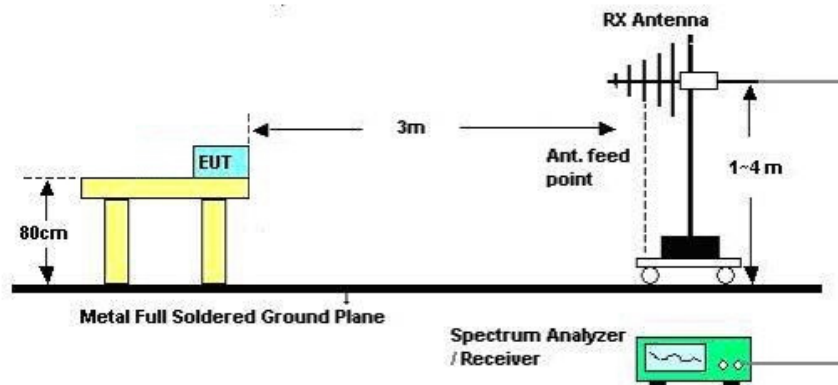
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 1/T VBW for average reading in spectrum analyzer.
7. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
8. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

#### 4.2.4. Test Setup Layout

For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



#### 4.2.5. Test Deviation

There is no deviation with the original standard.

#### 4.2.6. EUT Operation during Test

The EUT was programmed to be in beamforming transmitting mode.

#### 4.2.7. Results of Radiated Emissions (9kHz~30MHz)

<b>Temperature</b>	23°C	<b>Humidity</b>	61%
<b>Test Engineer</b>	Andy Tsai	<b>Configurations</b>	Normal Link
<b>Test Date</b>	Jun. 17, 2015	<b>Test Mode</b>	Mode 1

<b>Freq. (MHz)</b>	<b>Level (dBuV)</b>	<b>Over Limit (dB)</b>	<b>Limit Line (dBuV)</b>	<b>Remark</b>
-	-	-	-	See Note

Note:

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

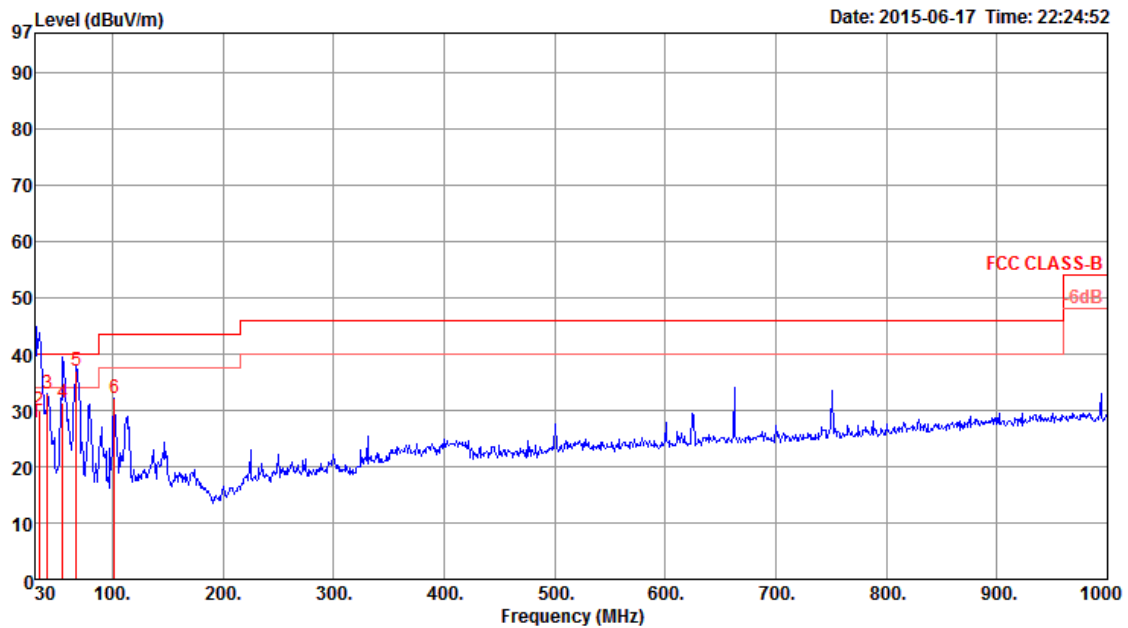
Distance extrapolation factor =  $40 \log(\text{specific distance} / \text{test distance})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

4.2.8. Results of Radiated Emissions (30MHz~1GHz)

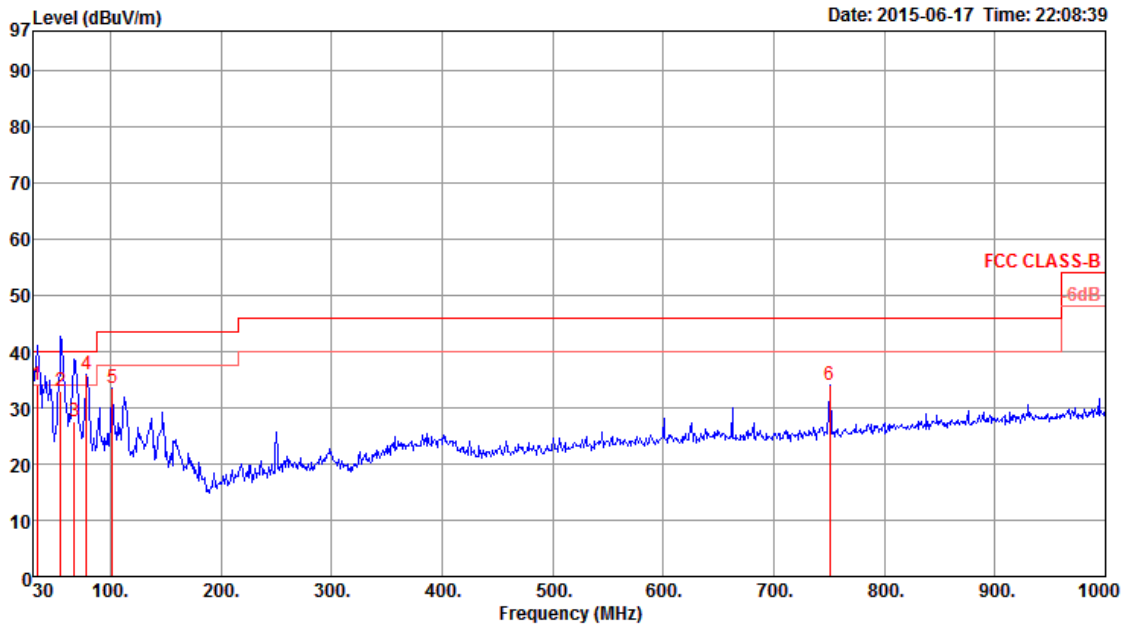
Temperature	23°C	Humidity	61%
Test Engineer	Andy Tsai	Configurations	Normal Link
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	Pol/Phase
1	30.00	27.74	40.00	-12.26	34.08	0.61	20.10	27.05	123	54	HORIZONTAL
2	33.88	29.86	40.00	-10.14	38.74	0.68	17.78	27.34	127	62	HORIZONTAL
3	41.64	33.10	40.00	-6.90	47.13	0.69	13.18	27.90	100	0	HORIZONTAL
4	55.22	31.35	40.00	-8.65	50.91	0.84	8.05	28.45	120	21	HORIZONTAL
5	67.83	36.91	40.00	-3.09	57.53	0.97	6.82	28.41	122	54	HORIZONTAL
6	101.78	32.14	43.50	-11.36	47.82	1.18	11.42	28.28	100	0	HORIZONTAL

**Vertical**



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	33.88	34.10	40.00	-5.90	42.98	0.68	17.78	27.34	QP	100	352	VERTICAL
2	55.22	33.02	40.00	-6.98	52.58	0.84	8.05	28.45	QP	100	360	VERTICAL
3	67.83	27.54	40.00	-12.46	48.16	0.97	6.82	28.41	QP	100	89	VERTICAL
4	78.50	35.99	40.00	-4.01	55.95	0.96	7.45	28.37	Peak	400	0	VERTICAL
5	101.78	33.41	43.50	-10.09	49.09	1.18	11.42	28.28	Peak	400	0	VERTICAL
6	750.71	34.17	46.00	-11.83	39.23	3.20	20.21	28.47	Peak	400	0	VERTICAL

**Note:**

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

### **4.3. Antenna Requirements**

#### **4.3.1. Limit**

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

#### **4.3.2. Antenna Connector Construction**

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.



## 5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 22, 2015	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 02, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 02, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 03, 2014	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 06, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 06, 2014	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Test Software	Audix	E3	6.2009-10-7	N/A	N/A	Radiation (03CH01-CB)

Note: Calibration Interval of instruments listed above is one year.

“\*” Calibration Interval of instruments listed above is two years.

N.C.R means Non-Calibration required.

## 6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%