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FCC RADIO TEST REPORT

Applicant's company	**Linksys LLC**
Applicant Address	121 Theory, Drive Irvine CA 92617, USA
FCC ID	**Q87-WRT3200ACM**
Manufacturer's company	**Wistron NeWeb Corporation**
Manufacturer Address	20 Park Ave. II, Hsinchu Science Park, Hsinchu 308, Taiwan

Product Name	Dual-band gigabit Wi-Fi Router
Brand Name	LINKSYS
Model No.	WRT32X, WRT3200ACM
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	Mar. 23, 2016
Final Test Date	Jan. 10, 2017
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 v01r04, 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.

Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR640850-01AB	Rev. 01	Initial issue of report	May 25, 2017

1. VERIFICATION OF COMPLIANCE

Product Name	:	**Dual-band gigabit Wi-Fi Router**
Brand Name	:	**LINKSYS**
Model No.	:	**WRT32X, WRT3200ACM**
Applicant	:	**Linksys LLC**
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 Mar. 23, 2016 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.

Cliff Chang
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**
4.1	15.207	AC Power Line Conducted Emissions	Complies
4.2	15.407(b)	Radiated Emissions	Complies
4.3	15.203	Antenna Requirements	Complies

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (4TX, 4RX)
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	25 for 20MHz bandwidth ; 12 for 40MHz bandwidth 6 for 80MHz bandwidth ; 2 for 160MHz bandwidth
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Communication Mode	☒ IP Based (Load Based)	☐ Frame Based
TPC Function	☒ With TPC	☐ Without TPC
Weather Band (5600~5650MHz)	☒ With 5600~5650MHz	☐ Without 5600~5650MHz
Beamforming Function	☒ With beamforming	☐ Without beamforming
	The product has beamforming function for 802.11a/g/n/ac in 2.4GHz and 5GHz.	

Note: For non-beamforming function, the EUT supports STBC mode only.

Antenna and Band width

Antenna	Four (TX)			
Band width Mode	20 MHz	40 MHz	80 MHz	160 MHz
IEEE 802.11a	V	X	X	X
IEEE 802.11n	V	V	X	X
IEEE 802.11ac	V	V	V	V

IEEE 11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	4	MCS 0-31
802.11n (HT40)	4	MCS 0-31
802.11ac (VHT20)	4	MCS 0-9/Nss1-4
802.11ac (VHT40)	4	MCS 0-9/Nss1-4
802.11ac (VHT80)	4	MCS 0-9/Nss1-4
802.11ac (VHT160)	4	MCS 0-9/Nss1-4
Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT supports HT20 and HT40. Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT supports VHT20, VHT40 VHT80 and VHT160 for 5GHz. Note 3: Modulation modes consist of below configuration: HT20/HT40: IEEE 802.11n, VHT20/VHT40/VHT80/VHT160: IEEE 802.11ac		

3.2. Accessories

Power	Brand	Model No.	Rating
Adapter 1	LEI	MU42-3120300-A1	INPUT: 100-240Vac, 50/60Hz, 1.5A OUTPUT: 12Vdc, 3A
Adapter 2	CWT	2ABN036F US	INPUT: 100-240Vac, 50/60Hz, 1.0A OUTPUT: 12.0Vdc, 3.0A

3.3. Table for Filed Antenna

Ant.	Brand	Part Number	Type	Connector	Gain (dBi)		Cable Loss (dB)		True Gain (dBi)	
					2.4GHz	5GHz	2.4GHz	5GHz	2.4GHz	5GHz
1	WNC	08.22450.002	Dipole	I-PEX	2.52	3.81	1.10	2.30	1.42	1.51
2	WNC	08.22450.002	Dipole	I-PEX	2.52	3.81	1.50	2.40	1.02	1.41
3	WNC	08.22450.002	Dipole	I-PEX	2.52	3.81	1.60	2.10	0.92	1.71
4	WNC	08.22450.002	Dipole	I-PEX	2.52	3.81	1.60	1.60	0.92	2.21

Ant.	Brand	Model No.	Type	Connector	Gain (dBi)	
					Bluetooth	5GHz
5	WNC	81XKAA15.GAV	PIFA	I-PEX	3.60	5.10

Note: 1. The EUT has five antennas.

2. The EUT has three radios. (Radio 1 supports 2.4GHz WLAN TX/RX function, Radio 2 supports 5GHz WLAN TX/RX function, Radio 3 supports Bluetooth TX/RX function and 5GHz WLAN RX function.)

3. For Radio 1:

For 2.4GHz WLAN function (4TX/4RX):

Chain 1: Connect to Ant. 1, Chain 2: Connect to Ant. 2, Chain 3: Connect to Ant. 3, Chain 4: Connect to Ant. 4.

Chain 1, Chain 2, Chain 3 and Chain 4 could transmit/receive simultaneously.

4. For Radio 2:

For 5GHz WLAN function (4TX/4RX):

Chain 1: Connect to Ant. 1, Chain 2: Connect to Ant. 2, Chain 3: Connect to Ant. 3, Chain 4: Connect to Ant. 4.

Chain 1, Chain 2, Chain 3 and Chain 4 could transmit/receive simultaneously.

4. For Radio 3:

For Bluetooth function (1TX/1RX):

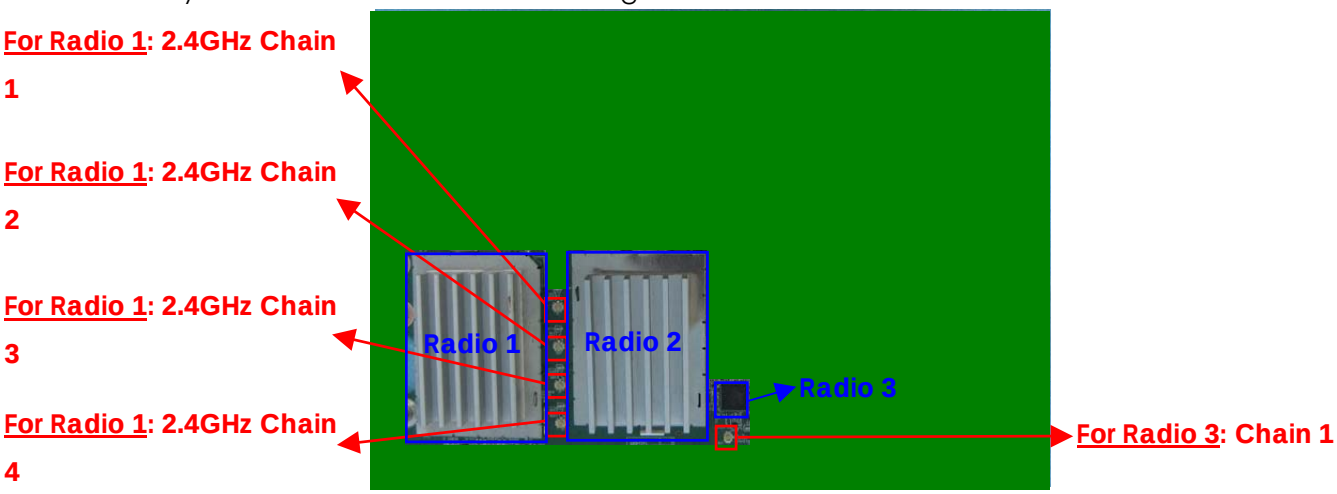
Chain 1: Connect to Ant. 5

Only Chain 1 can be used as transmitting/receiving functions.

For 5GHz WLAN function (1RX):

Chain 1: Connect to Ant. 5

Only Chain 1 can be used as receiving function.



3.4. Table for Carrier Frequencies

There are four bandwidth systems.

For 20MHz bandwidth systems, use Channel 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 144, 149, 153, 157, 161, 165.

For 40MHz bandwidth systems, use Channel 38, 46, 54, 62, 102, 110, 118, 126, 134, 142, 151, 159.

For 80MHz bandwidth systems, use Channel 42, 58, 106, 122, 138, 155.

For 160MHz bandwidth systems, use Channel 50, 114.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5150~5350 MHz Band 1~2	36	5180 MHz	52	5260 MHz
	38	5190 MHz	54	5270 MHz
	40	5200 MHz	56	5280 MHz
	42	5210 MHz	58	5290 MHz
	44	5220 MHz	60	5300 MHz
	46	5230 MHz	62	5310 MHz
	48	5240 MHz	64	5320 MHz
	50	5250 MHz	-	-
5470~5725 MHz Band 3	100	5500 MHz	122	5610 MHz
	102	5510 MHz	124	5620 MHz
	104	5520 MHz	126	5630 MHz
	106	5530 MHz	128	5640 MHz
	108	5540 MHz	132	5660 MHz
	110	5550 MHz	134	5670 MHz
	112	5560 MHz	136	5680 MHz
	114	5570 MHz	138	5690 MHz
	116	5580 MHz	140	5700 MHz
	118	5590 MHz	142	5710 MHz
	120	5600 MHz	144	5720 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	-	-	-

The following test modes were performed for all tests:

AC Power Conducted Emission	
Test Mode	Description
1	EUT 2 + Adapter 1
2	EUT 2 + Adapter 2
Mode 2 generated the worst test result, so it was recorded in this report.	

Radiated Emission Below 1GHz	
Test Mode	Description
1	EUT 2 in Y axis + Adapter 1
2	EUT 2 in Z axis + Adapter 1
Mode 2 has been evaluated to be the worst case among Mode 1~2, thus measurement for Mode 3 will follow this same test mode.	
3	EUT 2 in Z axis + Adapter 2
Mode 2 generated the worst test result, so it was recorded in this report.	

3.6. Table for Multiple Listing

EUT	Model Name	FW version	Enclosure color	Description
1	WRT3200ACM	1.0.0.174361	Black+Blue	The differences between the models are firmware version and enclosure color.
2	WRT32X	0.9.170505.95	Black	

Note: From the above models, model: WRT32X was selected as representative model for the test and its data was recorded in this report.

3.7. Table for Class II Chang

This product is an extension of original one reported under Sporton project number: FR640850AB
Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Adding model name: WRT32X (Change FW)	1. AC Power Line Conducted Emissions 2. Radiated Emissions below 1GHz

3.8. 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).

3.9. Table for Supporting Units

For Test Site No: 03CH01-CB

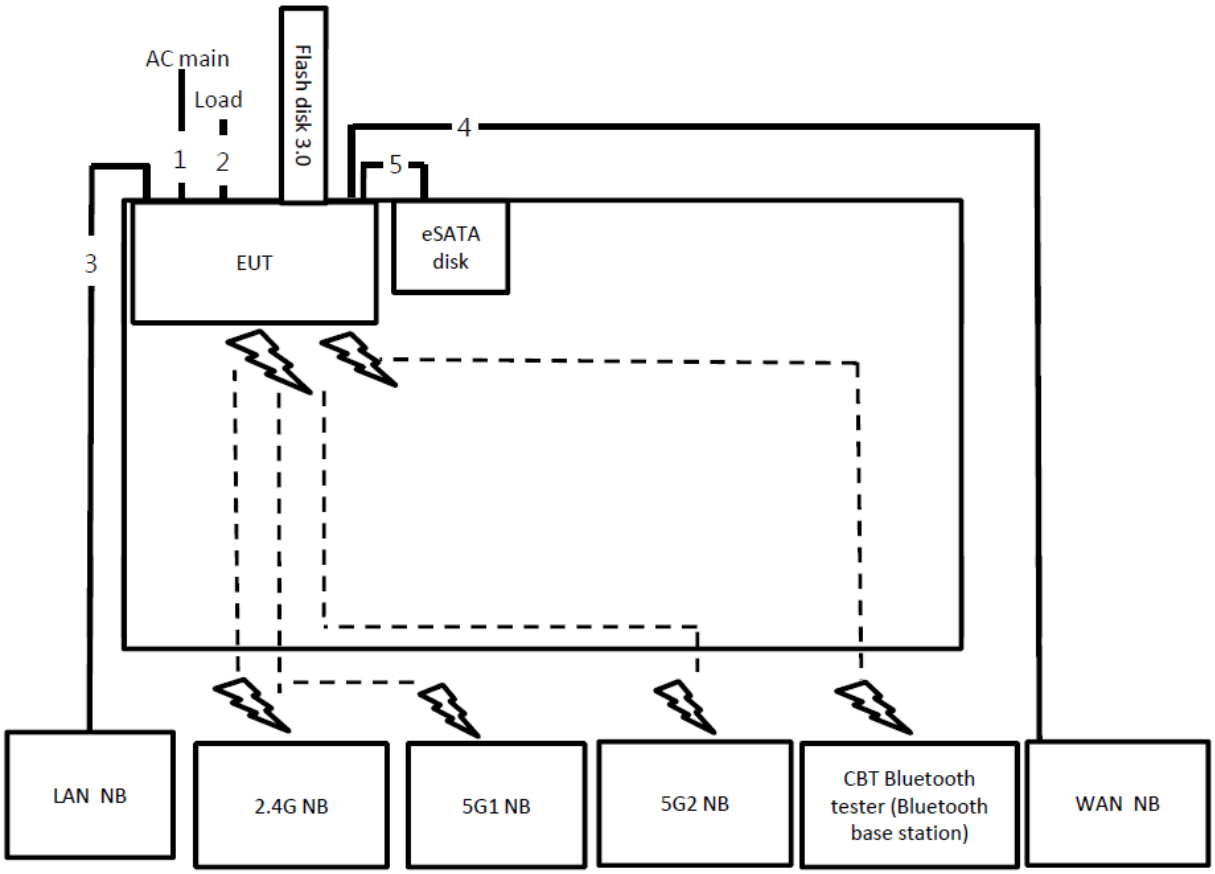
Support Unit	Brand	Model	FCC ID
NB*4	DELL	E4300	DoC
NB	Apple	Mac Book	DoC
Flash disk3.0	Transcend	JETFlash 790	DoC
eSATA disk	Hitachi	HTS54032B9A30	DoC
CBT Bluetooth tester (Bluetooth base station)	Anritsu	MT8852B	DoC

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB*5	DELL	E6430	DoC
CBT Bluetooth tester (Bluetooth base station)	Anritsu	MT8852B	DoC
Flash disk3.0	Transcend	JetFlash 790	DoC
eSATA disk	Hitachi	HTS545032B9A30	DoC

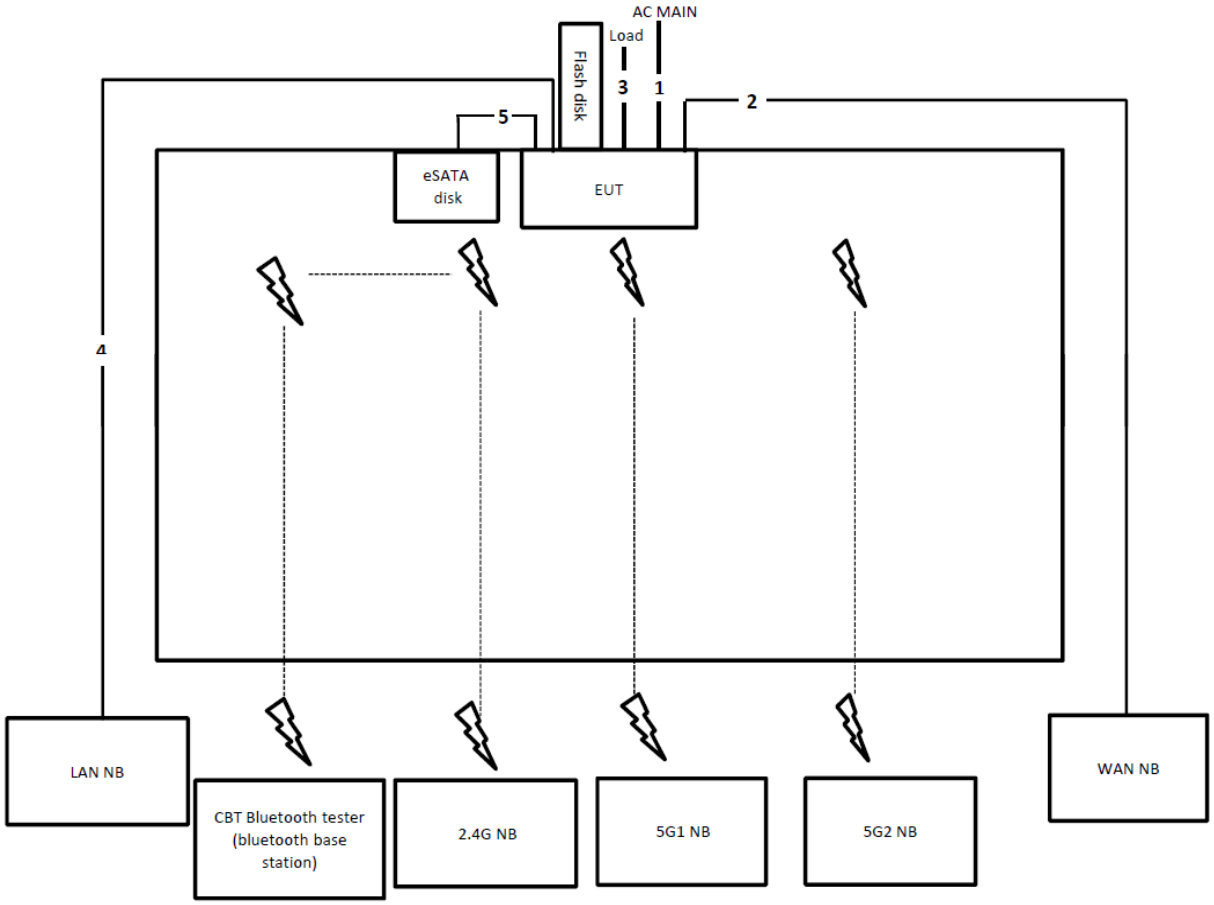
3.10. Test Configurations

3.10.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable*3	No	1.5m
3	RJ-45 cable	No	10m
4	RJ-45 cable	No	10m
5	USB cable	Yes	0.5m

3.10.2. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m
3	RJ-45*3 cable	No	1.5m
4	RJ-45 cable	No	10m
5	USB cable	Yes	0.5m

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

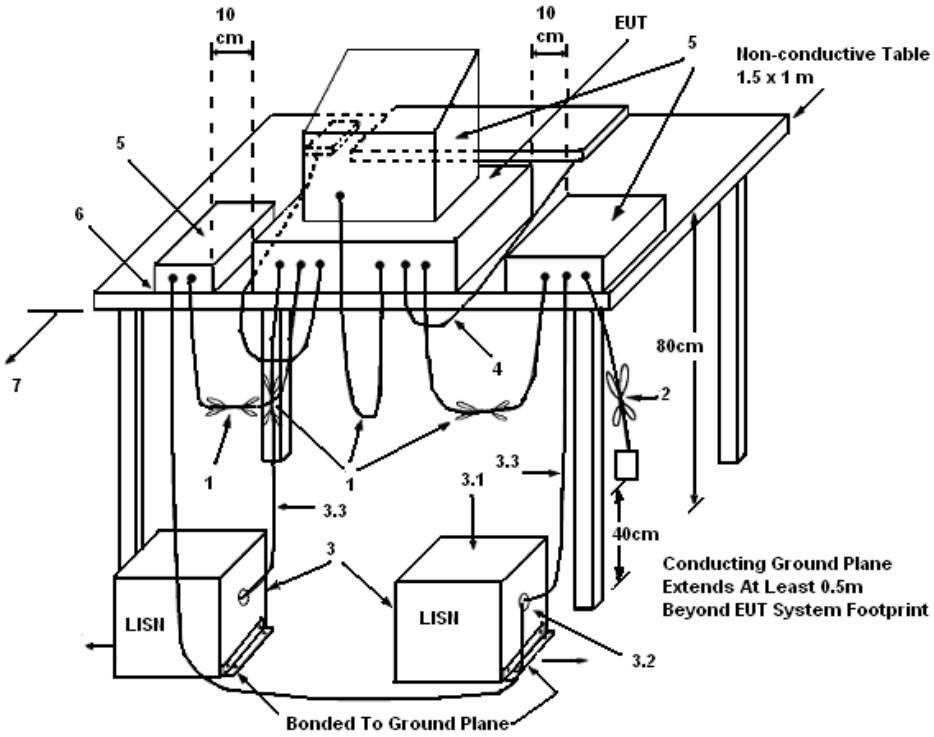
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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 Ω. 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

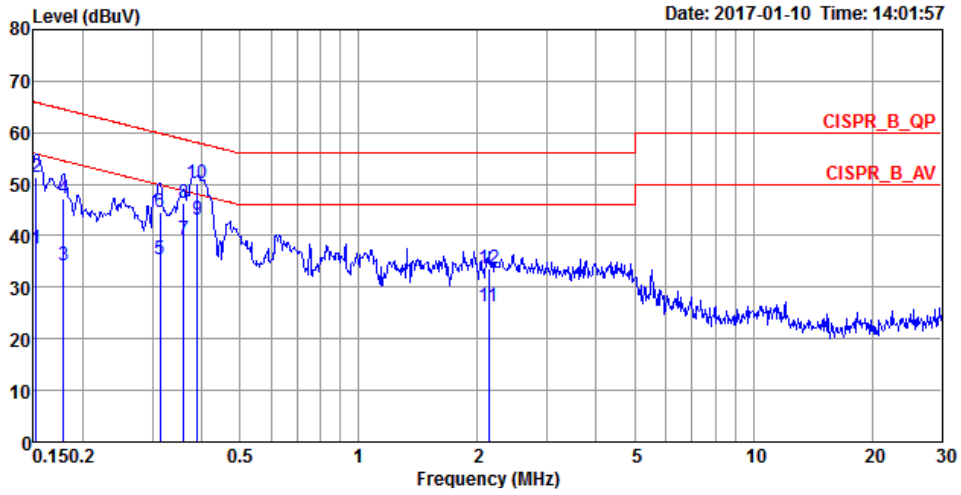
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

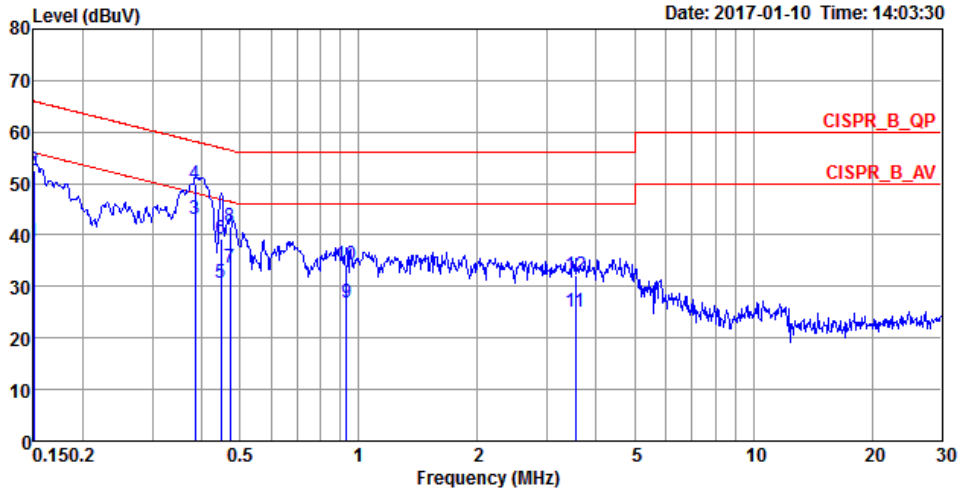
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	20℃	Humidity	60%
Test Engineer	Deven Huang	Phase	Line
Configuration	Normal Link	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1524	37.44	-18.43	55.87	27.45	9.95	0.04	Average	LINE
2	0.1524	51.38	-14.49	65.87	41.39	9.95	0.04	QP	LINE
3	0.1787	34.30	-20.25	54.55	24.31	9.94	0.05	Average	LINE
4	0.1787	47.10	-17.45	64.55	37.11	9.94	0.05	QP	LINE
5	0.3133	35.57	-14.31	49.88	25.63	9.90	0.04	Average	LINE
6	0.3133	44.45	-15.43	59.88	34.51	9.90	0.04	QP	LINE
7	0.3596	39.19	-9.55	48.74	29.25	9.90	0.04	Average	LINE
8	0.3596	46.23	-12.51	58.74	36.29	9.90	0.04	QP	LINE
9	0.3893	43.16	-4.92	48.08	33.23	9.89	0.04	Average	LINE
10	0.3893	50.15	-7.93	58.08	40.22	9.89	0.04	QP	LINE
11	2.1326	26.39	-19.61	46.00	16.30	10.01	0.08	Average	LINE
12	2.1326	33.63	-22.37	56.00	23.54	10.01	0.08	QP	LINE

Temperature	20℃	Humidity	60%
Test Engineer	Deven Huang	Phase	Neutral
Configuration	Normal Link	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark	Pol/Phase
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1500	38.78	-17.22	56.00	28.80	9.94	0.04	Average	NEUTRAL
2	0.1500	52.65	-13.35	66.00	42.67	9.94	0.04	QP	NEUTRAL
3	0.3852	42.96	-5.21	48.17	32.96	9.96	0.04	Average	NEUTRAL
4	0.3852	49.90	-8.27	58.17	39.90	9.96	0.04	QP	NEUTRAL
5	0.4468	30.66	-16.27	46.93	20.66	9.96	0.04	Average	NEUTRAL
6	0.4468	39.33	-17.60	56.93	29.33	9.96	0.04	QP	NEUTRAL
7	0.4711	33.53	-12.96	46.49	23.52	9.97	0.04	Average	NEUTRAL
8	0.4711	41.76	-14.73	56.49	31.75	9.97	0.04	QP	NEUTRAL
9	0.9331	26.90	-19.10	46.00	16.85	9.99	0.06	Average	NEUTRAL
10	0.9331	34.14	-21.86	56.00	24.09	9.99	0.06	QP	NEUTRAL
11	3.5466	25.08	-20.92	46.00	14.90	10.06	0.12	Average	NEUTRAL
12	3.5466	32.07	-23.93	56.00	21.89	10.06	0.12	QP	NEUTRAL

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Radiated Emissions Measurement

4.2.1. Limit

For transmitters operating in the 5.15-5.35 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 5.470-5.725 GHz band: all emissions outside of the 5.47-5.725 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: all emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

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)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for peak

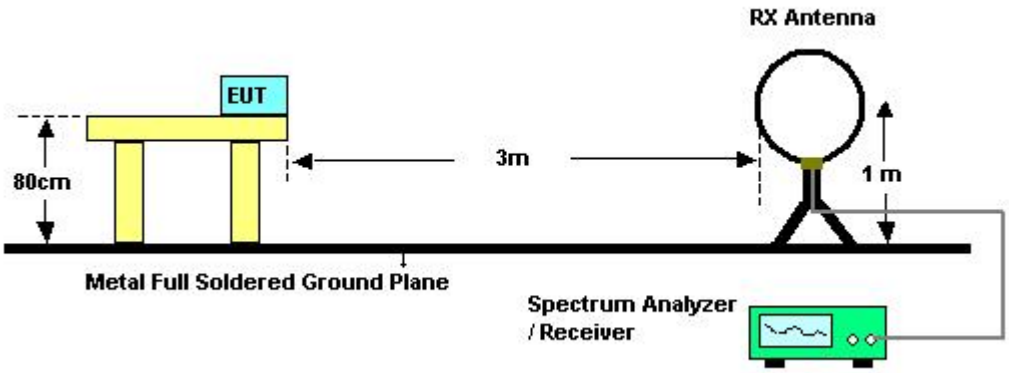
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.2.3. Test Procedures

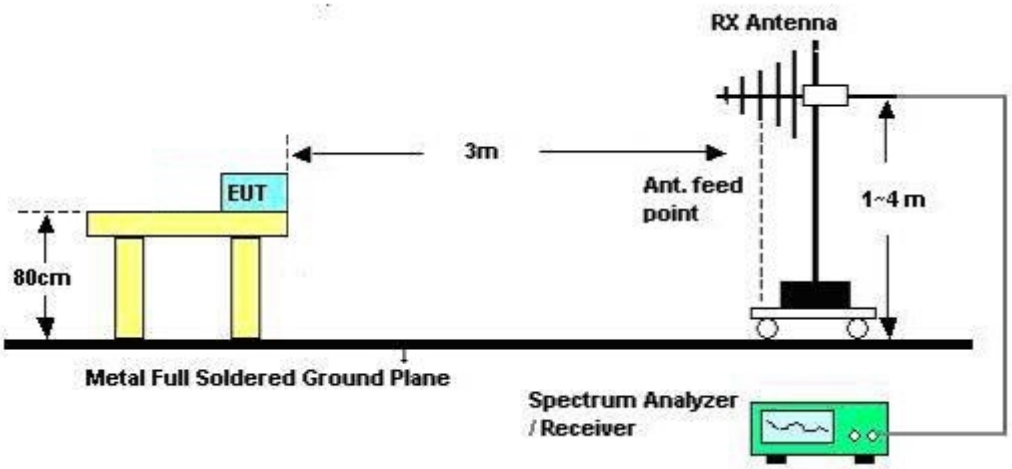
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting 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 continuously transmitting mode.

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

Temperature	20.7℃	Humidity	63%
Test Engineer	DK Chang	Configurations	Normal Link
Test Date	Jan. 06, 2017	Test Mode	Mode 2

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	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.

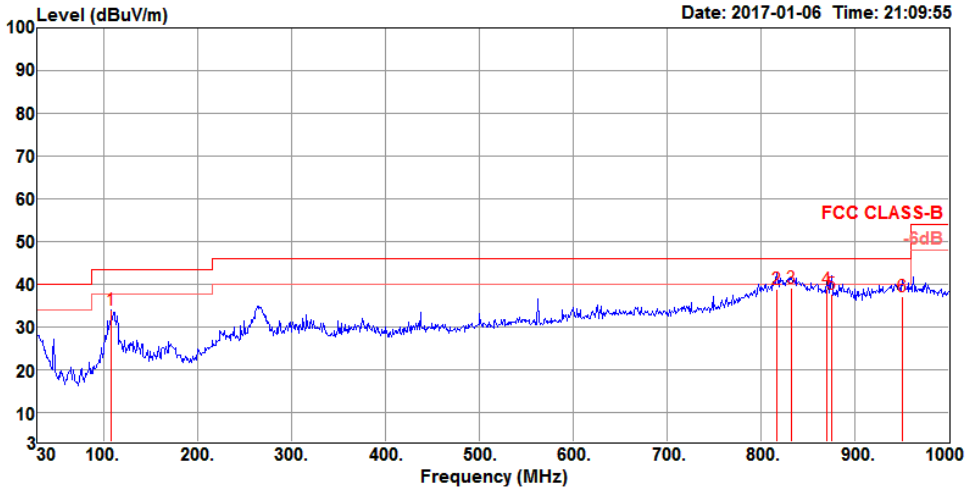
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

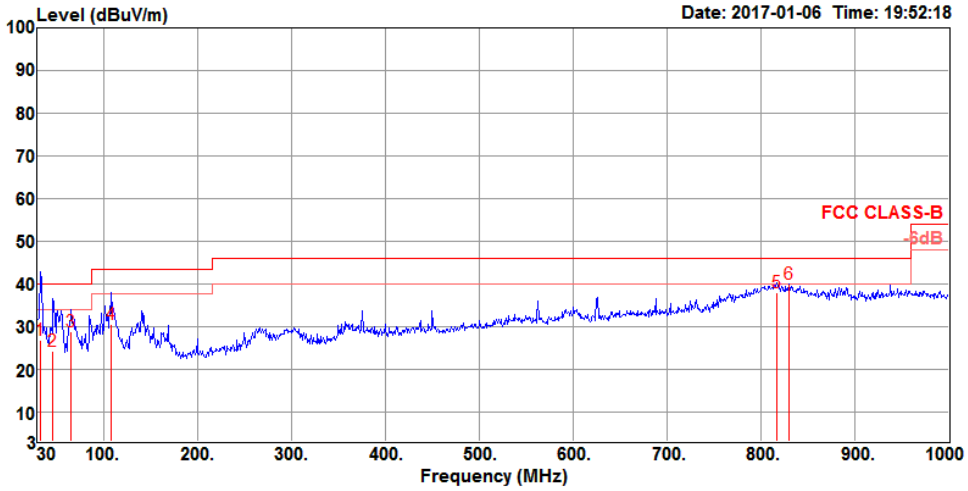
Temperature	20.7℃	Humidity	63%
Test Engineer	DK Chang	Configurations	Normal Link
Test Mode	Mode 2		

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	108.57	34.04	43.50	-9.46	46.73	1.76	17.94	32.39	150	1	Peak	HORIZONTAL
2	816.67	38.81	46.00	-7.19	39.10	5.10	26.73	32.12	100	143	QP	HORIZONTAL
3	832.19	39.18	46.00	-6.82	39.20	5.14	26.87	32.03	100	150	QP	HORIZONTAL
4	870.02	38.90	46.00	-7.10	38.30	5.27	27.15	31.82	100	157	QP	HORIZONTAL
5	874.87	37.50	46.00	-8.50	36.80	5.30	27.20	31.80	100	150	QP	HORIZONTAL
6	950.53	36.93	46.00	-9.07	34.90	5.53	27.71	31.21	100	157	QP	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	32.91	26.65	40.00	-13.35	34.10	0.92	24.03	32.40	100	192	QP	VERTICAL
2	46.49	24.28	40.00	-15.72	39.19	1.12	16.34	32.37	150	149	QP	VERTICAL
3	65.89	28.63	40.00	-11.37	47.10	1.35	12.56	32.38	150	105	QP	VERTICAL
4	108.57	30.61	43.50	-12.89	43.30	1.76	17.94	32.39	100	222	QP	VERTICAL
5	816.67	37.91	46.00	-8.09	38.20	5.10	26.73	32.12	100	295	QP	VERTICAL
6	829.28	40.00	46.00	-6.00	40.07	5.14	26.84	32.05	100	49	Peak	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB 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 Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 27, 2016	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 14, 2016	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 21, 2016	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	May 24, 2016	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA with 6dB Attenator	TESEQ & EMCI	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 30, 2016	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Mar. 15, 2016	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2016*	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 21, 2016	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	May 16, 2016	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 24, 2016	Radiation (03CH01-CB)
Test Software	Audix	E3	6.2009-l0-7	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%