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# Supplemental “Transmit Simultaneously” Test Report

**REPORT NO.:** RF111031E02-2

**MODEL NO.:** RTL8723AE

**FCC ID:** TX2-RTL8723AE

**RECEIVED:** Oct. 31, 2011

**TESTED:** Nov. 17 to 22, 2011

**ISSUED:** Nov. 29, 2011

**APPLICANT:** Realtek Semiconductor Corp.

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**ISSUED BY:** Bureau Veritas Consumer Products Services  
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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF111031E02-2	Original release	Nov. 29, 2011



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## 1. CERTIFICATION

**PRODUCT :** 802.11b/g/n RTL8723AE Combo miniCard  
**BRAND NAME :** Realtek  
**MODEL NO. :** RTL8723AE  
**TEST ITEM:** ENGINEERING SAMPLE  
**APPLICANT :** Realtek Semiconductor Corp.  
**TESTED:** Nov. 17 to 22, 2011  
**STANDARDS :** FCC Part 15, Subpart C (Section 15.247)  
ANSI C63.4-2003  
ANSI C63.10-2009

The above equipment (Model: RTL8723AE) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Phoenix Huang , **DATE:** Nov. 29, 2011  
( Phoenix Huang, Specialist )

**APPROVED BY :** May Chen , **DATE:** Nov. 29, 2011  
( May Chen, Deputy Manager )



## 2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: 47 CFR Part 15, Subpart C			
Standard Section	Test Type and Limit	Result	Remark
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -7.41dB at 0.189MHz
15.247(d)	Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -1.5 dB at 499.85MHz

### 2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions	2.45 dB
Radiated emissions (30MHz-1GHz)	3.81 dB
Radiated emissions (1GHz -18GHz)	2.19 dB
Radiated emissions (18GHz -40GHz)	2.56 dB



### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	802.11b/g/n RTL8723AE Combo miniCard
<b>MODEL NO.</b>	RTL8723AE
<b>FCC ID</b>	TX2-RTL8723AE
<b>POWER SUPPLY</b>	DC 3.3V from host equipment
<b>MODULATION TYPE</b>	<b>For WLAN</b> CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM <b>For BLUETOOTH</b> GFSK, $\pi/4$ -DQPSK, 8DPSK, GFSK(LE mode)
<b>MODULATION TECHNOLOGY</b>	<b>For WLAN</b> DSSS, OFDM <b>For BLUETOOTH</b> FHSS
<b>TRANSFER RATE</b>	<b>For WLAN</b> 802.11b: Up to 11Mbps 802.11g: Up to 54Mbps 802.11n (20MHz, 800ns GI): Up to 65Mbps 802.11n (20MHz, 400ns GI): Up to 72.2Mbps 802.11n (40MHz, 800ns GI): Up to 135Mbps 802.11n (40MHz, 400ns GI): Up to 150Mbps <b>For BLUETOOTH</b> 1/2/3Mbps
<b>OPERATING FREQUENCY</b>	<b>For WLAN</b> 2412MHz ~ 2462MHz <b>For BLUETOOTH</b> 2402MHz ~ 2480MHz

<b>NUMBER OF CHANNEL</b>	<b>For WLAN</b> 11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz) <b>For BLUETOOTH</b> 79 for Bluetooth 2.1+ EDR 40 (37 hopping + 3 advertising channel) for Bluetooth LE
<b>MAXIMUM OUTPUT POWER</b>	<b>For WLAN</b> 802.11b: 72.4mW 802.11g: 177.8mW 802.11n (20MHz): 190.5mW 802.11n (40MHz): 141.3mW <b>For BLUETOOTH</b> GFSK: 10.7 mW 8DPSK: 13.8 mW GFSK(LE MODE): 4.1mW
<b>ANTENNA TYPE</b>	Please see NOTE
<b>DATA CABLE</b>	NA
<b>I/O PORTS</b>	NA
<b>ASSOCIATED DEVICES</b>	NA

**NOTE:**

1. There are Bluetooth technology and WLAN technology used for the EUT. <the WLAN test data please refer " RF111031E02 ", and the Bluetooth test data please refer " RF111031E02-1".> This report was recorded the co-location test data.
2. The EUT has four different samples could be chosen and please refer the below table:

No.	miniCard Interface	Note
1	HMC module	Diversity
2	HMC module	Fixed
3	Stamp module	Diversity
4	Stamp module	Fixed

Above four samples were pre-tested in chamber, the worse case was found in **No.2**. Therefore only the test data of the model was recorded in this report.



3. The difference between HMC module and stamp module is in form factor, and some NC/reserved/AUX pins in HMC case were removed in stamp case.
4. Both of them are still identical in PCIe interface except pin numbers and form factor. The RF circuits for both are exactly the same, namely identical.
5. The HMC and Stamp will support different form factor for future application, and the form factor of Stamp module is defined by Realtek. There are 172 sets of antennas provided to this EUT, please refer to the following table:

No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
1	JOYMAX	TWF-614XMPXX-500 (Main) TWF-614XMPXX-500 (Aux)	Dipole	3 3	NA	IPEX
2	LYNwave	ALA110-222050-150010 (Main) ALA110-222050-150010 (Aux)	PIFA	3.5 3.5	NA	IPEX
3	ACON	APP8P-700186 (Main) APP8P-700185 (Aux)	PIFA	1.84 0.07	0.81 1.12	IPEX, MHF, U.FL-L(P)
4	ACON	APP8P-700188 (Main) APP8P-700187 (Aux)	PIFA	1.84 0.07	0.81 1.12	IPEX, MHF, U.FL-L(P)
5	WHAYU	C435-520042-A (Main) C435-520045-A (Aux)	PIFA	1.91 1.88	1.11 1.85	Technova
6	WHAYU	C435-520044-A (Main) C435-520043-A (Aux)	PIFA	1.96 1.97	1.11 1.85	Technova
7	WNC	25.90A1E.001 (Main) 25.90A1F.001 (Aux)	PIFA	1.89 -0.90	-1.85 -1.84	IPEX
8	YAGEO	25.90A1E.011 (Main) 25.90A1F.011 (Aux)	PIFA	1.94 1.78	1.95 2.04	U.FL
9	WNC	25.91370.021 (Main) 25.91371.021 (Aux)	PIFA	0.51 0.58	1.40 1.73	IPEX
10	YAGEO	25.91370.011 (Main) 25.91371.011 (Aux)	PIFA	1.06 0.16	1.36 2.00	U.FL
11	Quanta	DQ6GC200100 (Main) DQ6GC200200 (Aux)	PIFA	0.1 -0.4	NA	IPEX
12	Tyco	25.90A4C.021 (Main) 25.90A4D.021 (Aux)	PIFA	0.06 0.18	1.55 1.60	U.FL
13	WNC	25.90A4C.001 (Main) 25.90A4D.001 (Aux)	PIFA	1.52 -0.60	1.83 1.84	U.FL





No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
14	YAGEO	25.90A4C.011 (Main) 25.90A4D.011 (Aux)	PIFA	0.93 -0.17	1.64 1.65	U.FL
15	ACON	25.90929.001 (Main) 25.90930.001 (Aux)	PIFA	-0.04 1.16	NA	IPEX, Hirose, U.FL-L(P)
16	Ethertronics Inc.	25.90934.001 (Main) 25.90935.001 (Aux)	PIFA	0.60 -0.59	NA	U.FL
17	WNC	25.90919.001 (Main) 25.90920.001 (Aux)	PIFA	0.87 -0.93	NA	IPEX
18	Tyco	25.90A2G.021 (Main) 25.90A2H.021 (Aux)	PIFA	-0.38 1.04	1.49 1.59	IPEX
19	WNC	25.90A2G.001 (Main) 25.90A2H.001 (Aux)	PIFA	1.23 0.29	1.65 1.74	IPEX
20	YAGEO	25.90A2G.011 (Main) 25.90A2H.011 (Aux)	PIFA	0.48 -1.37	1.50 1.60	U.FL
21	Amphenol	C-2238-11-000-26 (Main) C-2239-11-000-26 (Aux)	PIFA	-1.31 -3.09	0.92 1.08	U.FL
22	Amphenol	C-1952-11-000-26 (Main) C-1953-11-000-26 (Aux)	PIFA	0.35 -1.20	0.92 1.08	U.FL
23	Foxconn	WDAN-LFNZ3001-DH (Main) WDAN-LFNZ3002-DH (Aux)	PIFA Coupling Type Inverted F	1.14 0.61	1.03 1.12	IPEX
24	Tyco	1556219-1 (Main) 1556220-1 (Aux)	PIFA	0.64 -0.92	1.24 1.98	IPEX
25	ACON	APP8P-700189 (Main) APP8P-700190 (Aux)	PIFA	2.00 0.13	1.36 1.98	IPEX, MHF, U.FL-L(P), Technova
26	ACON	APP8P-700191 (Main) APP8P-700192 (Aux)	PIFA	2.00 0.13	1.36 1.98	IPEX, MHF, U.FL-L(P), Technova
27	Tyco	1556216-1 (Main) 1556215-1 (Aux)	PIFA	0.64 -0.92	1.24 1.98	IPEX
28	Quanta	DQ6GC300100 (Main) DQ6GC300200 (Aux)	PIFA	-1.3 0.7	NA	IPEX
29	Amphenol	C-2381-11-000-26 (Main) C-2382-11-000-26 (Aux)	PIFA	-1.54 -2.93	1.09 1.28	U.FL



No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
30	Foxconn	WDAN-LWSN3001-DH (Main) WDAN-LWSN3002-DH (Aux)	PIFA Coupling Type Inverted F	0.87 0.49	1.40 1.43	IPEX
31	WNC	25.90A1E.001 (Main) 25.90A1F.001 (Aux)	PIFA	1.94 -0.85	-1.85 -1.84	IPEX
32	Quanta	QADC FL8_WL_M (Main) QADC FL8_WL_A (Aux)	PIFA	0.1 -0.3	1.6 1.6	IPEX
33	YAGEO	25.90A4W.001 (Main) 25.90A4V.001 (Aux)	PIFA	0.07 -0.06	-1.25 -1.50	U.FL
34	FOXLINK	25.90A4W.011 (Main) 25.90A4V.011 (Aux)	PIFA	1.98 1.97	-1.39 -1.58	U.FL
35	Quanta	QADC PS3_WL_M (Main) QADC PS3_WL_A (Aux)	PIFA	-0.1 0.0	1.6 1.6	IPEX
36	Quanta	QADCFL3_WL_M (Main) QADCFL3_WL_A (Aux)	PIFA	-0.1 -0.1	NA	IPEX
37	Quanta	QADCGC5_WL_M (Main) QADCGC5_WL_A (Aux)	PIFA	0.4 -1.0	NA	IPEX
38	Quanta	DQ6GC200100 (Main) DQ6GC200200 (Aux)	PIFA	0.1 -0.4	NA	IPEX
39	Quanta	QADCGC6_WL_M (Main) QADCGC6_WL_A (Aux)	PIFA	0.7 1.2	NA	IPEX
40	Quanta	QADCPS1_WL_M (Main) QADCPS1_WL_A (Aux)	PIFA	-0.5 -1.4	NA	IPEX
41	ACON	25.90700.001 (Main) 25.90702.001 (Aux)	PIFA	-1.21 1.27	NA	IPEX
42	ACON	25.90800.001 (Main) 25.90802.001 (Aux)	PIFA	1.37 1.21	NA	U.FL
43	Amphenol	C-1334-11-000-26 (Main) C-1335-11-000-26 (Aux)	PIFA	-0.37 -2.64	NA	U.FL
44	WNC	25.90979.001 (Main) 25.90980.001 (Aux)	PIFA	0.77 0.74	NA	IPEX
45	Mag.Layers	FPA-2423-25GC1-A1 PCA-2111-25GC1-A1	PIFA	1.77 2.17	NA	IPEX
46	WNC	WNC005 (Main) WNC005 (Aux)	PIFA	-2.76 -3.64	1.86 2.54	IPEX
47	WNC	WNC001 (Main) WNC001 (Aux)	PIFA	-1.10 1.76	1.17 1.17	IPEX
48	WNC	WNC001 (Main) WNC001 (Aux)	PIFA	0.31 -0.75	1.98 2.01	IPEX



No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
49	Tyco Holdings (Bermuda) VII Ltd.	TBN003 (Main) TBN003 (Aux)	PIFA	-1.11 -1.11	1.84 2.16	I.P.X
50	WNC	WNC004 (Main) WNC004 (Aux)	PIFA	2.40 1.50	1.53 1.92	IPEX
51	WNC	WNC002 (Tx1) WNC002 (Tx2)	PIFA	1.18 1.75	2.28 2.12	IPEX
52	WNC	WNC003 (Main) WNC003 (Aux)	PIFA	0.52 1.07	1.49 2.13	IPEX
53	Hitachi Cable, Ltd	HFT40 (Tx1) HFT40 (Tx2)	PIFA	0.58 1.12	1.42 2.12	I-PEX-202 78
54	Hitachi Cable, Ltd	HFT60 (Tx1) HFT60 (Tx2)	PIFA	-1.65 -0.92	1.48 2.18	I-PEX-202 78
55	Hitachi Cable, Ltd	HBV07 (Tx1) HBV07 (Tx2)	PIFA	2.19 -0.33	0.95 0.95	I-PEX-202 78
56	Hitachi Cable, Ltd	HBV051 (Tx1) HBV051 (Tx2)	PIFA	2.91 2.82	0.95 0.95	I-PEX-202 78
57	Hitachi Cable, Ltd	HBV052 (Tx1) HBV052 (Tx2)	PIFA	0.27 0.02	0.95 0.95	I-PEX-202 78
58	Hitachi Cable, Ltd	HBV061 (Tx1) HBV061 (Tx2)	PIFA	1.30 2.42	0.95 0.95	I-PEX-202 78
59	Hitachi Cable, Ltd	HBV062 (Tx1) HBV062 (Tx2)	PIFA	-1.04 -1.19	0.95 0.95	I-PEX-202 78
60	Hitachi Cable, Ltd	HFT65 (Tx1) HFT65 (Tx2)	PIFA	-1.74 1.16	0.95 0.95	I-PEX-202 78
61	Hitachi Cable, Ltd	HCT01 (Main) HCT01 (Aux)	PIFA	0.87 1.94	0.89 0.89	IPEX, HRS
62	FOXCONN	WDAN-TQ (Tx1) WDAN-TQ (Tx2)	PIFA	-0.43 -0.7	2.5 2.5	Foxconn SGX0001
63	ethertronics	5002011-1 (Tx1) 5002012-1 (Tx2)	PIFA	0.12 -3.87	NA	Technova
64	ethertronics	5002015-1 (Tx1) 5002016-1 (Tx2)	PIFA	0.76 0.59	NA	Technova
65	ethertronics	5010011-1 (Tx1) 5010012-1 (Tx2)	PIFA	-1.76 -2.61	NA	Technova
66	ethertronics	5010015-1 (Tx1) 5010016-1 (Tx2)	PIFA	-0.84 -2.07	NA	Technova



No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
67	ACON	AMP6P (Tx1) AMP6P (Tx2)	PIFA	0.00 1.89	0.86 0.86	IPEX, Hirose, U.FL-L(P)
68	WNC	81.EJZ15.G52 (Main) 81.EJZ15.G52 (Aux)	PIFA	-1.08 -0.62	2.22 3.03	IPEX
69	WNC	81.EJT15.GJC (Main) 81.EJT15.GJC (Aux)	PIFA	-0.58 -1.26	2.20 3.01	IPEX
70	WNC	81.EJT15.GGW (Tx1) 81.EJT15.GGW (Tx2)	PIFA	0.21 0.77	2.40 3.25	IPEX
71	WNC	81.EJZ15.G53 (Tx1) 81.EJZ15.G53 (Tx2)	PIFA	-0.78 -2.14	2.45 3.24	IPEX
72	QUANTA	AN-070-G(R) AN-070-G(L)	PIFA	-0.7 -1.9	-2.1 -3	IPEX
73	QUANTA	AN-070-G(R) AN-070-G(L)	PIFA	-0.3 -1.9	-2.1 -3	IPEX
74	QUANTA	AN-120-F(R) AN-120-F(L)	PIFA	-0.4 -0.3	-2.1 -3	IPEX
75	QUANTA	AN-120-F(R) AN-120-F(L)	PIFA	-1.8 -4.4	-2.1 -3	IPEX
76	WHAYU	C435-520023-A (Main) C435-520024-A (Aux)	PIFA	1.74 1.56	1.73 2.43	TNOV
77	WNC	81.EJZ (Main) 81.EJZ (Aux)	PIFA	-0.67 -0.35	1.79 1.79	IPEX
78	WNC	81.EJT (Main) 81.EJT (Aux)	PIFA	-0.40 -1.91	1.79 1.79	IPEX
79	JEM	IA-100193 (Main) IA-100194 (Aux)	PIFA	1.27 -1.27	1.56 2.36	IPEX
80	Tyco Holdings (Bermuda) VII Ltd. Taiwan Branch	TBN008 (Tx1) TBN008 (Tx2)	PIFA	-0.10 -0.92	1.85 2.66	Technova
81	Smart Approach Co., Ltd.	03-FR021-026 (Main) 03-FR021-026 (Aux)	PIFA	1.51 1.56	1.26 1.69	IPEX
82	Hitachi Cable	HBV17 (Tx1) HBV17 (Tx2)	PIFA	-0.36 0.97	0.99 0.99	IPEX



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No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
83	Hitachi Cable, Ltd	HFT60 (Tx1) HFT60 (Tx2)	PIFA	2.97 0.90	0.32 0.32	IPEX, HRS
84	Smart Approach Co., Ltd.	03-FR021-020 (Main) 03-FR021-020 (Aux)	PIFA	1.66 1.83	1.27 1.28	IPEX
85	WHAYU INDUSTRIAL CO.,LTD	MSA-00005A (Main) MSA-00005A (Aux)	PIFA	-2.12 -2.49	-1.55 -2.16	Tnov
86	Tyco	TBN008 (Tx1) TBN008 (Tx2)	PIFA	-2.60 -0.26	2.34 2.13	IPEX
87	Tyco	TBN007 (Tx1) TBN007 (Tx2)	PIFA	1.98 1.97	-0.97 -0.97	U.FL
88	Tyco Electronics Japan G.K.	TBN009 (Tx1) TBN009 (Tx2)	PIFA	0.22 0.33	0.96 0.95	U.FL
89	Tyco Electronics Japan G.K.	TBN010 (Tx1) TBN010 (Tx2)	PIFA	1.68 1.45	0.96 0.95	U.FL
90	Smart Approach Co.,Ltd	03-FR021-016 (Tx1) 03-FR021-016 (Tx2)	PIFA	2.32 0.49	1.03 1.11	IPX
91	Foxconn	WDAN-T1WM (Tx1) WDAN-T1WM (Tx2)	PIFA	1.47 1.38	0.909 0.909	IPEX
92	Foxconn	WDAN-T1AM1001-DH (Tx1) WDAN-T1AM1002-DH (Tx2)	PIFA	2.58 1.39	0.909 0.909	Foxconn SGX0008-01
93	WNC	WNC003 (Main) WNC003 (Aux)	PIFA	-0.10 2.30	1.22 1.48	RF
94	TE Connectivity	1556465-1 TBN003 (Tx1) 1556466-1 TBN003 (Tx2)	PIFA	-0.23 -0.49	1.52 1.64	MI-113
95	ACON	APP8P-700341 (Main) APP8P-700342 (Aux)	PIFA	1.10 1.99	1.03 1.21	IPEX, MHF, U.FL-L(P)
96	Smart Approach	SE-ECLA1-001 (Main) SE-ECLA1-002 (Aux)	PIFA	2.53 2.92	1.20 1.39	IPX
97	WNC	81.EK515.G13 (Main) 81.EK515.G14 (Aux)	PIFA	0.30 0.39	1.96 2.67	IPEX



No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
98	Favortron CO.,LTD (FVC)	N01001205001 (Tx1) N01001206001 (Tx2)	PIFA	2.81 1.97	-2.52 -2.13	IPEX
99	Favortron CO.,LTD (FVC)	W270HUQ-WiMAX-1 W270HUQ-WiMAX-2	PIFA	2.85 1.87	NA	I-PEX
100	Favortron CO.,LTD (FVC)	N01001193001 (Tx1) N01001193001 (Tx2)	PIFA	2.97 0.9	-2.13 -2.13	IPEX
101	Favortron CO.,LTD (FVC)	N01001199001 (Tx1) N01001199001 (Tx2)	PIFA	2.73 2.87	-2.61 -2.65	IPEX
102	Well Green	SKW24WMPB01+A (Tx1) SKW24WMPB01+A (Tx2)	PIFA	-1.63 -0.99	1.62 1.79	IPEX
103	Favortron CO.,LTD (FVC)	N01001218001 (Tx1) N01001218001 (Tx2)	PIFA	2.53 2.28	-1.93 -1.93	IPEX
104	Well Green	SKM11WMPB03+A (Tx1) SKM11WMPB02+D (Tx2)	PIFA	-1.84 -2.93	1.17 0.89	IPEX
105	Favortron CO.,LTD (FVC)	E5120-WiMAX-1 E5120-WiMAX-2	PIFA	2.7 2.19	NA	IPEX
106	Favortron CO.,LTD (FVC)	B5100-WiMAX-1 B5100-WiMAX-2	PIFA	1.58 1.75	NA	IPEX
107	Well Green	SKW31WMPB01+A (Tx1) SKW31WMPB01+A (Tx2)	PIFA	-1.07 -0.64	-1.39 -1.53	IPEX
108	WhaYu	C680-520279-A (Tx1) C680-520279-A (Tx2)	PIFA	1.09 -0.55	0.72 1.89	FAF
109	WhaYu	C680-520278-A (Tx1) C680-520277-A (Tx2)	PIFA	1.92 -1.03	0.64 1.72	FAF
110	Wellshine	DQ67KJQUT35 (Tx1) DQ67KJQUT36 (Tx2)	PIFA	2.03 0.05	1.00 1.80	IPEX
111	ZTX	ZTX-A162-Q18000-00 (Tx1) ZTX-A162-Q18000-00 (Tx2)	PIFA	2.014 1.742	NA	IPEX



No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
112	Well Green	SK81WMPB01+A (Tx1) SK81WMPB02+A (Tx2)	PIFA	1.79 0.66	-1.88 -2.95	IPEX
113	Wellshine	DQ67KJQUT33 (Tx1) DQ67KJQUT33 (Tx2)	PIFA	1.17 -0.06	0.77 1.90	IPEX
114	Tyco Holding (Bermuda) VII Ltd.	TBN001 (Main) TBN001 (Aux)	PIFA	3.45 2.41	1.45 2.13	I.P.X
115	tyco	TBN005 TBN006	PIFA	2.09 3.40	NA	IPEX
116	Tyco Electronic AMPKK	TBN004 (Main) TBN004 (Aux)	PIFA	0.28 -0.83	0.98 0.98	U.FL
117	Hitachi	HFS23	PIFA	-0.8	0.89	IPEX or HRS
118	Hitachi	HFS40	PIFA	0.64	0.89	IPEX or HRS
119	Quanta	AS-070-F (Tx1) AS-070-F (Tx2)	PIFA	-0.5 -1.9	-1.6 -3	IPEX
120	ACON	DQ60APM6P02(APM6P-700091) ) (Main) DQ60APM6P02(APM6P-700091) ) (Aux)	PIFA	-0.7 -0.29	1.81 2.52	IPX, Hirose, Technova, MHF
121	ACON	DQ60APM6P03(APM6P-700092) ) (Main) DQ60APM6P03(APM6P-700092) ) (Aux)	PIFA	-0.6 -1.02	2.02 2.73	IPX, Hirose, Technova, MHF
122	Quanta Computer Inc	37LX6AATP00 (Tx1) 37LX6AATP00 (Tx2)	PIFA	1.8 -0.3	-1.40 -2.02	I-PEX
123	Quanta Computer Inc	37LX7AATP00 (Tx1) 37LX7AATP00 (Tx2)	PIFA	0.3 1.7	-1.44 -1.79	I-PEX
124	Quanta Computer Inc	3ASP8AATP20 (Tx1) 3ASP8AATP20 (Tx2)	PIFA	1.0 0.2	-1.36 -1.95	SPD
125	Quanta Computer Inc	35AX6AATP10 (Tx1) 35AX6AATP10 (Tx2)	PIFA	0.7 -1.4	-1.28 -1.96	SGX
126	Foxconn	WDAN-HMCH1401-DH/79010T0 00-600-G (Tx1) WDAN-HMCH1402-DH/79010S Y00-600-G (Tx2)	PIFA	-0.99 -0.09	1.05 1.82	IPEX



No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
127	Yageo	CAN43130WIFO04921/79010S Q00-011-G (Tx1) CAN43130WIFO04922/79010S R00-011-G (Tx2)	PIFA	0.23 1.53	1.08 1.88	Hirose, U.FL-LP, IPEX, MHF
128	WHAYU	C107-520757-A/79010T100-12S -G (Tx1) C107-520756-A/79010SS00-12 S-G (Tx2)	PIFA	-0.18 2.58	1.30 1.30	IPEX
129	Foxconn	WDAN-HMCH1501-DH/79010S W00-600-G (Tx1) WDAN-HMCH1502-DH/79010S V00-600-G (Tx2)	PIFA	-0.35 0.38	1.22 2.03	IPEX
130	ACON	AMP8P-700186 (Main) AMP8P-700187 (Aux)	PIFA	1.96 1.91	1.58 2.29	IPEX, U.FL, MHF
131	Amphenol	FL5202-11-001-C (Tx1) FL5202-11-001-C (Tx2)	PIFA	-1.41 -0.77	1.38 1.88	U.FL
132	Amphenol	IV5233-15-003-C (Tx1) IV5233-15-002-C (Tx2)	PIFA	0.54 -0.53	1.56 2.37	GBE
133	Amphenol	IV5218-11-002-C (Tx1) IV5218-11-001-C (Tx2)	PIFA	0.55 0.31	1.36 2.23	U.FL
134	Amphenol	FX5170-15-004-C (Tx1) FX5170-15-001-C (Tx2)	PIFA	0.76 -2.11	0.80 1.62	IPEX, Technova
135	HON HAI	WDAN-HMEDW005-DH (Tx1) WDAN-HMEDW005-DH (Rx2)	PIFA	-1.85 1.33	0.67 1.34	IPEX
136	WNC	6036B0086802 (Tx1) 6036B0087102 (Tx2)	PIFA	-1.30 -0.49	1.09 1.36	U.FL
137	WNC	6036B0088203 (Main) 6036B0088303 (Aux)	PIFA	0.50 0.12	1.83 2.25	U.FL
138	WNC	6036B0088203 (Main) 6036B0088303 (Aux)	PIFA	1.21 -0.07	1.83 2.25	U.FL
139	WNC	6036B0087303 (Main) 6036B0087203 (Aux)	PIFA	2.34 1.28	1.76 2.45	U.FL
140	WNC	6036B0091201 (Main) 6036B0091401 (Aux)	PIFA	-1.11 -0.95	1.85 2.71	U.FL
141	YAGEO	CAN43130LIIN03863 (Tx1) CAN43130LIIN03864 (Tx2)	PIFA	-2.69 -1.09	1.04 1.78	Technova
142	YAGEO	6036B0091202 (Tx1) 6036B0091402 (Tx2)	PIFA	0.80 0.25	1.30 1.98	Technova





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No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
143	YAGEO	CAN43130LIIN03841 (Tx1) CAN43130LIIN03842 (Tx2)	PIFA	1.46 0.95	1.22 2.03	Technova
144	YAGEO	6036B0088401 (Tx1) 6036B0088501 (Tx2)	PIFA	0.61 0.71	1.90 2.40	Technova
145	ACON	APM8P-700018 (Tx1) APM8P-700019 (Tx2)	PIFA	2.66 2.27	1.72 2.53	IPEX, MHF, U.FL-LP
146	WNC	81.EK515.G15 (Main) 81.EK515.G16 (Aux)	PIFA	2.36 1.13	1.94 2.76	IPEX
147	ACON	APM8P-700016 (Main) APM8P-700017 (Aux)	PIFA	2.79 0.74	1.48 2.09	IPEX, MHF, U.FL-LP
148	NISSEI ELECTRIC CO., LTD	3209970 (Rx) 3210002 (Tx)	PIFA	1.88 1.26	NA	U.FL
149	ACON	25.90598.001 (Rx) 25.90597.001 (Tx)	PIFA	1.17 1.04	NA	I-PEX
150	WNC	25.90587.001 (Rx) 25.90586.001 (Tx)	PIFA	1.94 0.59	NA	I-PEX
151	ACON	25.90653.001 (Rx) 25.90654.001 (Tx)	PIFA	-0.42 -0.13	NA	I-PEX
152	WNC	25.90649.001 (Rx) 25.90650.001 (Tx)	PIFA	-0.52 0.31	NA	I-PEX
153	Foxconn	024-01F0-2242 (Rx) 024-01F0-2243 (Tx)	PIFA	1.16 -0.88	NA	SGX0003-02
154	NISSEI ELECTRIC CO., LTD	3176658 (Rx) 3176674 (Tx)	PIFA	-0.83 -0.61	NA	U.FL
155	Foxconn	WDAN-L1WK1001-DF (Rx) WDAN-L1WK1002-DF (Tx)	PIFA	1.71 1.43	NA	FOXCONN
156	Hitachi	HMT14-MAIN (Rx) HMT14-AUX (Tx)	PIFA	1.82 1.54	NA	U.FL
157	ACON	25.90700.001 (Rx) 25.90702.001 (Tx)	PIFA	-1.21 1.27	NA	I-PEX
158	ACON	25.90800.001 (Rx) 25.90802.001 (Tx)	PIFA	1.37 1.21	NA	U.FL
159	ACON	APM6P-700033 (Rx) APM6P-700034 (Tx)	PIFA	-0.96 -0.86	NA	I-PEX
160	Amphenol Taiwan Corporation	14G152168231LV (Rx) 14G152168131LV (Tx)	PIFA	-1.85 -1.60	NA	I-PEX



No.	Brand	Model	Antenna Type	Peak gain with cable loss	Cable Loss	Connector Type
161	ACON	APM6P-700027 (Rx) APM6P-700029 (Tx)	PIFA	-1.32 -0.23	NA	I-PEX
162	TYCO	2023940-1 (Rx) 2023944-1 (Tx)	PIFA	-2.39 1.52	NA	U.FL
163	ACON	APM6P-700028 (Rx) APM6P-700030 (Tx)	PIFA	-1.16 -0.74	NA	I-PEX
164	Tyco Holding (Bermuda) VII Ltd.	2023946-1 (Rx) 2023950-1 (Tx)	PIFA	-0.58 -0.11	NA	U.FL
165	Amphenol SAA	LX-0980-11-000-R (Rx) LX-0983-11-000-R (Tx)	PIFA	1.61 1.57	NA	20351-111 R-37
166	NISSEI ELECTRIC CO., LTD	3172525 (Rx) 3172566 (Tx)	PIFA	1.35 1.99	NA	U.FL
167	Amphenol	LX0970-11-000-R (Rx) LX0968-11-000-R (Tx)	PIFA	1.47 1.68	NA	U.FL
168	FOXCONN	WDAN-L1ML3001-DF (Rx) WDAN-L1ML3002-DF (Tx)	PIFA	-0.40 1.10	NA	SGX0003-02
169	NISSEI ELECTRIC CO., LTD	3172467 (Rx) 3172509 (Tx)	PIFA	0.54 1.80	NA	U.FL
170	ACON	25.90675.001 (Rx) 25.90676.001 (Tx)	PIFA	-0.39 0.64	NA	U.FL
171	WNC	25.90669.001 (Rx) 25.90670.001 (Tx)	PIFA	-1.53 1.32	NA	I-PEX
172	ACON	AWP6P (Main) AWP6P (Aux)	PIFA	-0.19 -0.99	0.85 0.85	I-PEX, Hirose, U.FL-L(P)

From the above antennas, the worst case was found in No. 1 & 2. Therefore only the test data of the modes were recorded in this report individually.

6. The PIFA antenna was pre-tested under the following test modes for three different axes placements:

Test Mode	Description
Mode A	X plane
Mode B	Y plane
Mode C	Z plane

From the above modes, the worst emission level was found in Mode A. Therefore only the test data of the modes were recorded in this report individually.



7. The EUT is 1 \* 1 spatial SISO (1Tx & 1Rx) without beam forming function.
8. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 7
9. The above EUT information was declared by the manufacturer and for more detailed feature descriptions, please refer to the manufacturer's specifications or User's Manual.



### 3.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to			Description
	PLC	RE<1G	RE≥1G	
1	-	√	√	Dipole Antenna
2	√	√	√	PIFA Antenna

Where PLC: Power Line Conducted Emission RE<1G RE: Radiated Emission below 1GHz  
 RE≥1G: Radiated Emission above 1GHz

Note1: Pre-Scan has been conducted to determine the worst case mode from antenna power.

#### **POWER LINE CONDUCTED EMISSION TEST:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
WLAN 802.11n (20MHz) + BLUETOOTH 8DPSK	1 to 11	6	OFDM	BPSK	6.5
	0 to 78	0	FHSS	8DPSK	-
WLAN 802.11n (20MHz) + BLUETOOTH GFSK(LE MODE)	1 to 11	6	OFDM	BPSK	6.5
	0 to 39	0	FHSS	GFSK (LE MODE)	-



**Radiated Emission Test:**

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
WLAN 802.11n (20MHz) + BLUETOOTH 8DPSK	1 to 11	6	OFDM	BPSK	6.5
	0 to 78	0	FHSS	8DPSK	-
WLAN 802.11n (20MHz) + BLUETOOTH GFSK(LE MODE)	1 to 11	6	OFDM	BPSK	6.5
	0 to 39	0	FHSS	GFSK (LE MODE)	-

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	28deg. C, 64%RH	120Vac, 60Hz	Kent Liu
RE<1G	18deg. C, 70%RH	120Vac, 60Hz	Kent Liu
RE <sup>3</sup> 1G	20deg. C, 67%RH	120Vac, 60Hz	Evan Huang
	18deg. C, 70%RH	120Vac, 60Hz	Evan Huang



### 3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

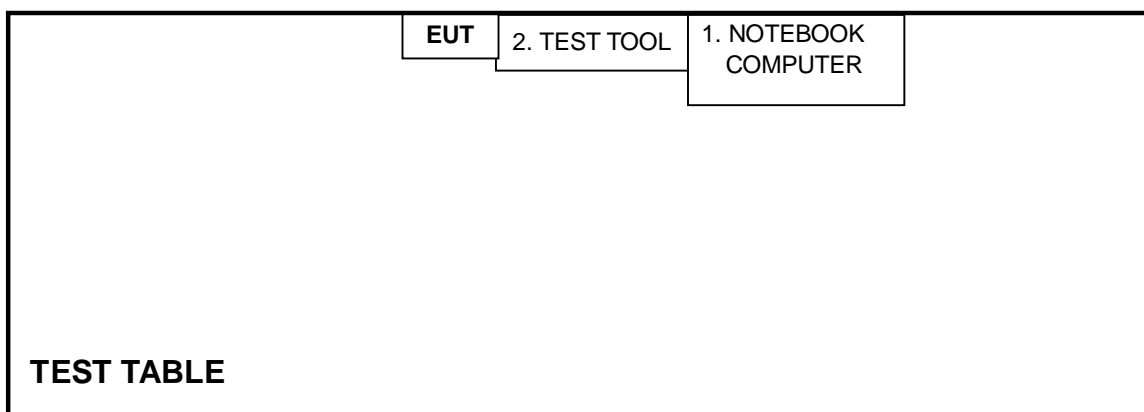
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP19L	CN-OHC416-7016 6-5CA-0448	PIW632500516610
2	TEST TOOL	Realtek	NA	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	NA
2	NA

**NOTE:** All power cords of the above support units are non shielded (1.8m).



### 3.4 CONFIGURATION OF SYSTEM UNDER TEST





## 4. TEST TYPES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

- NOTE:**
1. The lower limit shall apply at the transition frequencies.
  2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
  3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

Test date: Nov. 22, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 09, 2011	Mar. 08, 2012
Line-Impedance Stabilization Network (for EUT)	NSLK8127	8127-522	Sep. 07, 2011	Sep. 06, 2012
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 01, 2011	Oct. 31, 2012
RF Cable (JYEBAO)	5DFB	COCCAB-002	Aug. 29, 2011	Aug. 28, 2012
50 ohms Terminator	50	3	Nov. 02, 2011	Nov. 01, 2012
Software	BV ADT_Cond_V7.3.7	NA	NA	NA

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.





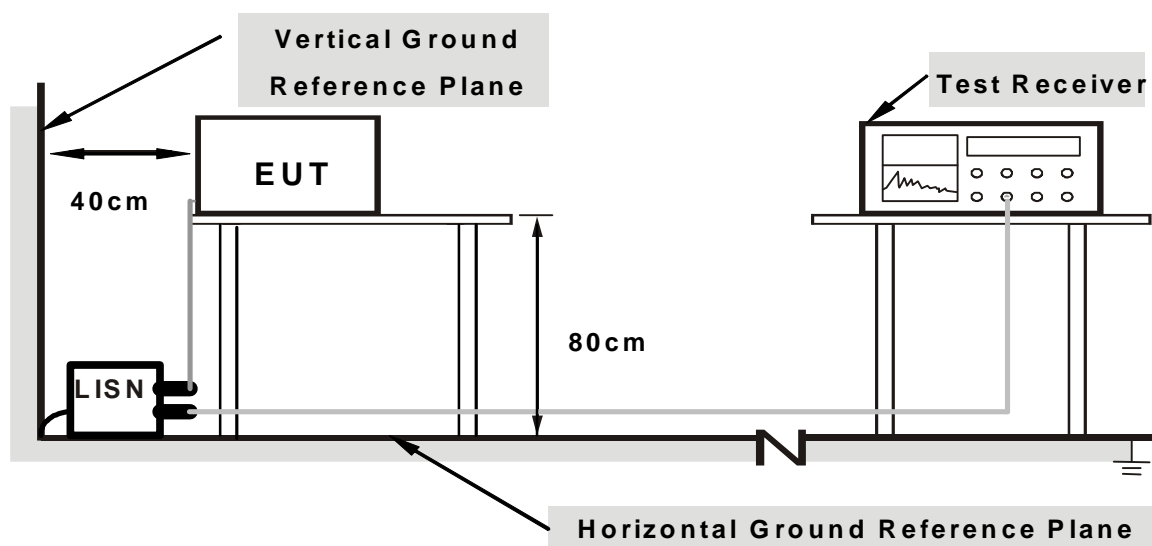
#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



**Note: 1. Support units were connected to second LISN.**

**2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.1.6 EUT OPERATING CONDITIONS

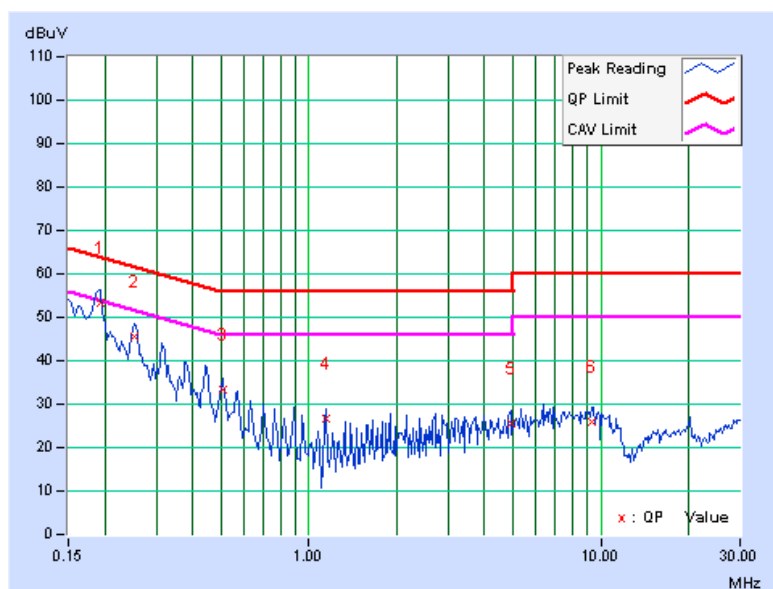
1. Connect the EUT with the support unit 1 (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “setup.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

### 4.1.7 TEST RESULTS

<b>PHASE</b>	Line (L)	<b>6dB BANDWIDTH</b>	9 kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.193	0.10	53.39	45.57	53.49	45.67	63.91	53.91	-10.42	-8.24
2	0.252	0.10	45.35	38.28	45.45	38.38	61.71	51.71	-16.25	-13.32
3	0.505	0.12	33.37	27.41	33.49	27.53	56.00	46.00	-22.51	-18.47
4	1.141	0.16	26.54	24.52	26.70	24.68	56.00	46.00	-29.30	-21.32
5	4.941	0.36	25.27	20.17	25.63	20.53	56.00	46.00	-30.37	-25.47
6	9.320	0.52	25.55	20.31	26.07	20.83	60.00	50.00	-33.93	-29.17

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. The emission levels of other frequencies were very low against the limit.
  3. Margin value = Emission level - Limit value
  4. Correction factor = Insertion loss + Cable loss
  5. Emission Level = Correction Factor + Reading Value.

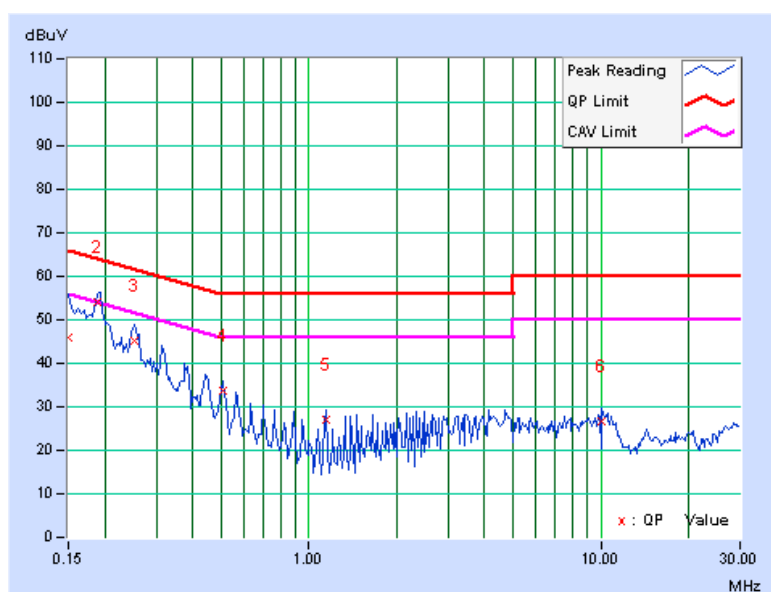




<b>PHASE</b>	Neutral (N)	<b>6dB BANDWIDTH</b>	9 kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.07	45.70	20.75	45.77	20.82	66.00	56.00	-20.23	-35.18
2	<b>0.189</b>	<b>0.09</b>	<b>53.83</b>	<b>46.58</b>	<b>53.92</b>	<b>46.67</b>	<b>64.08</b>	<b>54.08</b>	<b>-10.16</b>	<b>-7.41</b>
3	0.252	0.10	45.26	37.84	45.36	37.94	61.71	51.71	-16.35	-13.77
4	0.505	0.11	33.48	27.61	33.59	27.72	56.00	46.00	-22.41	-18.28
5	1.141	0.14	26.93	24.88	27.07	25.02	56.00	46.00	-28.93	-20.98
6	10.078	0.41	26.15	21.28	26.56	21.69	60.00	50.00	-33.44	-28.31

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. The emission levels of other frequencies were very low against the limit.
  3. Margin value = Emission level - Limit value
  4. Correction factor = Insertion loss + Cable loss
  5. Emission Level = Correction Factor + Reading Value.





## 4.2 RADIATED EMISSION MEASUREMENT

### 4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

Frequencies (MHz)	Field strength (microvolts/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

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
4. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.



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## 4.2.2 TEST INSTRUMENTS

Test date: Nov. 17, 2011

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Agilent Spectrum Analyzer	E4446A	MY48250254	July 12, 2011	July 11, 2012
Agilent Pre-Selector	N9039A	MY46520311	July 12, 2011	July 11, 2012
Agilent Signal Generator	N5181A	MY49060517	July 12, 2011	July 11, 2012
Mini-Circuits Pre-Amplifier	ZFL-1000VH2B	AMP-ZFL-03	Nov. 15, 2011	Nov. 14, 2012
Agilent Pre-Amplifier	8449B	3008A02578	July 04, 2011	July 03, 2012
SPACEK LABS	SLKKa-48-6	9K16	Nov. 15, 2011	Nov. 14, 2012
SCHWARZBECK Trilog Broadband Antenna	VULB 9168	9168-360	Apr. 14, 2011	Apr. 13, 2012
AISI Horn_Antenna	AIH.8018	0000320091110	Nov. 14, 2011	Nov. 13, 2012
SCHWARZBECK Horn_Antenna	BBHA 9170	9170-424	Oct. 07, 2011	Oct. 06, 2012
RF CABLE	NA	RF104-201 RF104-203 RF104-204	Dec. 27, 2010	Dec. 26, 2011
RF Cable	NA	CHGCAB_001	Oct. 07, 2011	Oct. 06, 2012
Software	ADT_Radiated_V8.7.05	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in 966 Chamber No. G.

4. The FCC Site Registration No. is 966073.

5. The VCCI Site Registration No. is G-137.

6. The CANADA Site Registration No. is IC 7450H-2.



#### 4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

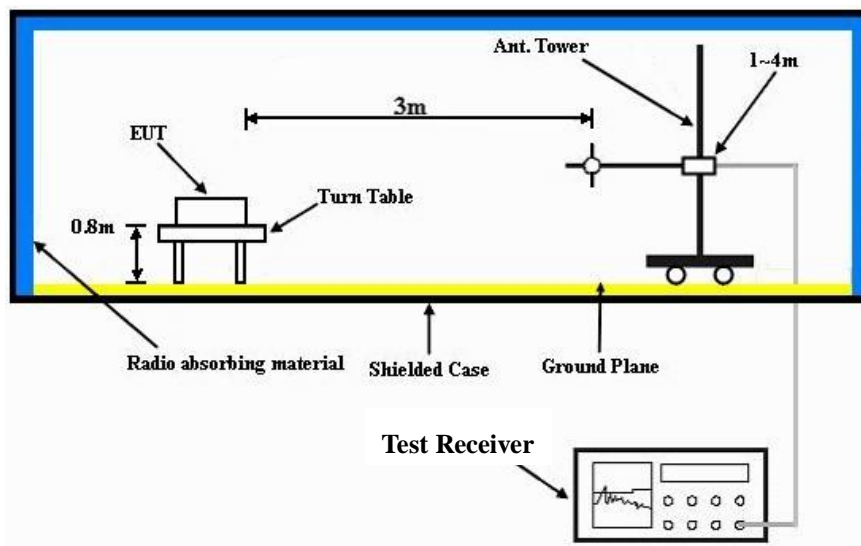
**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.2.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6





### 4.2.7 TEST RESULTS (DIPOLE ANTENNA)

#### BELOW 1GHz DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	802.11n(20MHz):CH6 + BLUETOOTH(8DPSK): CH 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	18deg. C, 70%RH	TESTED BY	Kent Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	167.50	35.3 QP	43.5	-8.2	1.75 H	209	21.15	14.11
2	399.87	39.4 QP	46.0	-6.6	1.00 H	356	21.47	17.93
3	560.11	40.9 QP	46.0	-5.1	1.50 H	261	19.23	21.70
4	700.02	39.9 QP	46.0	-6.1	1.25 H	36	16.85	23.05
5	796.11	37.4 QP	46.0	-8.6	1.00 H	114	11.63	25.76
6	896.79	38.1 QP	46.0	-7.9	1.50 H	291	10.81	27.31
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	36.71	36.2 QP	40.0	-3.8	1.00 V	190	22.65	13.59
2	167.08	33.8 QP	43.5	-9.7	2.00 V	291	19.62	14.14
3	399.99	40.1 QP	46.0	-5.9	1.25 V	354	22.18	17.93
4	499.85	44.2 QP	46.0	-1.8	1.00 V	119	23.87	20.31
5	560.03	40.4 QP	46.0	-5.6	1.00 V	23	18.67	21.70
6	799.94	42.5 QP	46.0	-3.5	1.24 V	224	16.67	25.87

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



ABOVE 1GHz DATA

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	802.11n(20MHz):CH6 + BLUETOOTH(8DPSK): CH 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 67%RH	TESTED BY	Evan Huang

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4804.00	57.3 PK	74.0	-16.7	1.59 H	177	18.00	39.30
2	4804.00	27.3 AV	54.0	-26.7	1.59 H	177	-12.00	39.30
3	4874.00	50.1 PK	74.0	-23.9	1.25 H	65	10.60	39.50
4	4874.00	41.5 AV	54.0	-12.5	1.25 H	65	2.00	39.50
5	7311.00	60.0 PK	74.0	-14.0	1.71 H	212	13.12	46.88
6	7311.00	45.9 AV	54.0	-8.1	1.71 H	212	-0.98	46.88

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4804.00	58.1 PK	74.0	-15.9	1.40 V	115	18.80	39.30
2	4804.00	28.3 AV	54.0	-25.7	1.40 V	115	-11.00	39.30
3	4874.00	50.9 PK	74.0	-23.1	1.17 V	108	11.40	39.50
4	4874.00	41.0 AV	54.0	-13.0	1.17 V	108	1.50	39.50
5	7311.00	62.0 PK	74.0	-12.0	1.39 V	174	15.12	46.88
6	7311.00	46.5 AV	54.0	-7.5	1.39 V	174	-0.38	46.88

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



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**BELOW 1GHz DATA :**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	802.11n(20MHz):CH6 + BLUETOOTH(GFSK(LE MODE)): CH 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	18deg. C, 70%RH	TESTED BY	Kent Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	165.25	36.9 QP	43.5	-6.6	1.75 H	338	22.60	14.27
2	399.87	38.7 QP	46.0	-7.3	1.50 H	68	20.79	17.93
3	558.76	39.5 QP	46.0	-6.5	1.75 H	214	17.79	21.67
4	699.79	38.4 QP	46.0	-7.6	1.25 H	251	15.32	23.05
5	799.55	39.3 QP	46.0	-6.7	1.25 H	114	13.45	25.86
6	898.76	38.5 QP	46.0	-7.5	1.00 H	214	11.17	27.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.42	38.2 QP	40.0	-1.8	1.00 V	74	24.51	13.69
2	172.22	35.7 QP	43.5	-7.8	1.00 V	45	21.92	13.78
3	400.03	38.0 QP	46.0	-8.0	1.25 V	241	20.10	17.93
4	499.88	41.6 QP	46.0	-4.4	1.50 V	232	21.28	20.31
5	560.02	40.4 QP	46.0	-5.6	1.25 V	175	18.69	21.70
6	800.01	39.6 QP	46.0	-6.4	1.75 V	360	13.75	25.87

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



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**ABOVE 1GHz DATA**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	802.11n(20MHz):CH6 + BLUETOOTH(GFSK(LE MODE)): CH 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	16deg. C, 62%RH	TESTED BY	Evan Huang

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4804.00	57.3 PK	74.0	-16.7	1.59 H	177	18.00	39.30
2	4804.00	27.3 AV	54.0	-26.7	1.59 H	177	-12.00	39.30
3	4874.00	50.1 PK	74.0	-23.9	1.25 H	65	10.60	39.50
4	4874.00	41.5 AV	54.0	-12.5	1.25 H	65	2.00	39.50
5	7311.00	60.0 PK	74.0	-14.0	1.71 H	212	13.12	46.88
6	7311.00	45.9 AV	54.0	-8.1	1.71 H	212	-0.98	46.88

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4804.00	58.1 PK	74.0	-15.9	1.40 V	115	18.80	39.30
2	4804.00	28.3 AV	54.0	-25.7	1.40 V	115	-11.00	39.30
3	4874.00	50.9 PK	74.0	-23.1	1.17 V	108	11.40	39.50
4	4874.00	41.0 AV	54.0	-13.0	1.17 V	108	1.50	39.50
5	7311.00	62.0 PK	74.0	-12.0	1.39 V	174	15.12	46.88
6	7311.00	46.5 AV	54.0	-7.5	1.39 V	174	-0.38	46.88

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



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### 4.2.8 TEST RESULTS (PIFA ANTENNA)

#### BELOW 1GHz DATA :

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	802.11n(20MHz):CH6 + BLUETOOTH(8DPSK): CH 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	18deg. C, 70%RH	TESTED BY	Kent Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	167.80	37.0 QP	43.5	-6.5	1.75 H	201	22.92	14.09
2	399.94	38.9 QP	46.0	-7.1	1.00 H	2	20.94	17.93
3	560.04	41.4 QP	46.0	-4.6	1.50 H	236	19.68	21.70
4	699.91	38.7 QP	46.0	-7.3	1.25 H	53	15.69	23.05
5	796.20	39.1 QP	46.0	-6.9	1.00 H	131	13.37	25.76
6	895.30	38.9 QP	46.0	-7.1	1.50 H	271	11.57	27.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	36.76	36.4 QP	40.0	-3.6	1.00 V	196	22.81	13.60
2	167.10	33.6 QP	43.5	-9.9	2.00 V	289	19.44	14.14
3	399.97	40.2 QP	46.0	-5.8	1.25 V	341	22.31	17.93
4	<b>499.85</b>	<b>44.5 QP</b>	<b>46.0</b>	<b>-1.5</b>	<b>1.00 V</b>	<b>126</b>	<b>24.18</b>	<b>20.31</b>
5	560.03	40.7 QP	46.0	-5.3	1.00 V	17	19.04	21.70
6	799.94	42.4 QP	46.0	-3.6	1.24 V	210	16.50	25.87

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



**ABOVE 1GHz DATA**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	802.11n(20MHz):CH6 + BLUETOOTH(8DPSK): CH 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	20deg. C, 67%RH	TESTED BY	Evan Huang

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4804.00	57.3 PK	74.0	-16.7	1.61 H	165	18.00	39.30
2	4804.00	27.0 AV	54.0	-27.0	1.61 H	165	-12.30	39.30
3	4874.00	50.2 PK	74.0	-23.8	1.26 H	81	10.70	39.50
4	4874.00	41.9 AV	54.0	-12.1	1.26 H	81	2.40	39.50
5	7311.00	60.4 PK	74.0	-13.6	1.66 H	213	13.52	46.88
6	7311.00	46.3 AV	54.0	-7.7	1.66 H	213	-0.58	46.88

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4804.00	58.0 PK	74.0	-16.0	1.45 V	125	18.70	39.30
2	4804.00	27.9 AV	54.0	-26.1	1.45 V	125	-11.40	39.30
3	4874.00	51.4 PK	74.0	-22.6	1.15 V	95	11.90	39.50
4	4874.00	41.4 AV	54.0	-12.6	1.15 V	95	1.90	39.50
5	7311.00	61.9 PK	74.0	-12.1	1.34 V	166	15.02	46.88
6	7311.00	46.4 AV	54.0	-7.6	1.34 V	166	-0.48	46.88

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



**BELOW 1GHz DATA :**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	802.11n(20MHz):CH6 + BLUETOOTH(GFSK(LE MODE)): CH 0	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	18deg. C, 70%RH	TESTED BY	Kent Liu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	165.13	37.8 QP	43.5	-5.7	1.50 H	346	23.48	14.28
2	399.88	36.7 QP	46.0	-9.3	1.25 H	0	18.77	17.93
3	558.40	39.6 QP	46.0	-6.4	1.75 H	201	17.97	21.66
4	699.89	39.5 QP	46.0	-6.5	1.00 H	241	16.42	23.05
5	799.30	39.6 QP	46.0	-6.4	1.50 H	235	13.74	25.85
6	898.76	37.6 QP	46.0	-8.4	1.00 H	224	10.26	27.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	36.43	34.8 QP	40.0	-5.2	1.00 V	78	21.24	13.55
2	172.46	34.1 QP	43.5	-9.4	1.25 V	154	20.31	13.77
3	399.98	38.8 QP	46.0	-7.2	1.25 V	281	20.84	17.93
4	499.86	43.5 QP	46.0	-2.5	1.50 V	131	23.19	20.31
5	560.01	40.0 QP	46.0	-6.0	1.00 V	22	18.33	21.70
6	799.98	40.7 QP	46.0	-5.4	1.50 V	98	14.78	25.87

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



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**ABOVE 1GHz DATA**

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	802.11n(20MHz):CH6 + BLUETOOTH(GFSK(LE MODE)): CH 0	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	16deg. C, 62%RH	TESTED BY	Evan Huang

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4804.00	57.1 PK	74.0	-16.9	1.65 H	163	17.80	39.30
2	4804.00	27.1 AV	54.0	-26.9	1.65 H	163	-12.20	39.30
3	4874.00	50.3 PK	74.0	-23.7	1.23 H	72	10.80	39.50
4	4874.00	42.1 AV	54.0	-11.9	1.23 H	72	2.60	39.50
5	7311.00	61.0 PK	74.0	-13.0	1.64 H	219	14.12	46.88
6	7311.00	46.8 AV	54.0	-7.2	1.64 H	219	-0.08	46.88

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4804.00	58.0 PK	74.0	-16.0	1.40 V	139	18.70	39.30
2	4804.00	28.1 AV	54.0	-25.9	1.40 V	139	-11.20	39.30
3	4874.00	51.1 PK	74.0	-22.9	1.17 V	110	11.60	39.50
4	4874.00	41.2 AV	54.0	-12.8	1.17 V	110	1.70	39.50
5	7311.00	61.9 PK	74.0	-12.1	1.29 V	156	15.02	46.88
6	7311.00	46.1 AV	54.0	-7.9	1.29 V	156	-0.78	46.88

- REMARKS:**
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
  2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.





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#### 4. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation and authorization certificates of our laboratories obtained from approval agencies can be downloaded from our web site:

[www.adt.com.tw/index.5.phtml](http://www.adt.com.tw/index.5.phtml).

If you have any comments, please feel free to contact us at the following:

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**Hwa Ya EMC/RF/Safety/Telecom Lab:**

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**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.

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