



A D T

## Supplemental “Dual Xmit” Test Report

**REPORT NO.:** RF971001H06F

**MODEL NO.:** RTL8192E

**RECEIVED:** Apr. 14, 2009

**TESTED:** Apr. 29 to May 07, 2009

**ISSUED:** May 12, 2009

**APPLICANT:** Realtek Semiconductor Corp.

**ADDRESS:** No. 2, Innovation Road II, Hsinchu Science Park,  
Hsinchu 300, Taiwan

**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.)  
Ltd., Taoyuan Branch

**LAB LOCATION:** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen,  
Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

This test report consists of 17 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.





A D T

## Table of Contents

1	CERTIFICATION .....	3
2	DESCRIPTION OF SUPPORT UNITS .....	5
3	CONFIGURATION OF SYSTEM UNDER TEST.....	5
4	DUAL XMIT, CONDUCTED EMISSION MEASUREMENT.....	6
4.1	LIMITS OF CONDUCTED EMISSION MEASUREMENT.....	6
4.2	TEST INSTRUMENTS.....	6
4.3	TEST PROCEDURES .....	7
4.4	DEVIATION FROM TEST STANDARD.....	7
4.5	TEST SETUP .....	7
4.6	EUT OPERATING CONDITIONS.....	8
4.7	TEST RESULTS .....	9
5	DUAL XMIT, RADIATED EMISSION MEASUREMENT.....	11
5.1	LIMITS OF RADIATED EMISSION MEASUREMENT.....	11
5.2	TEST INSTRUMENTS.....	12
5.3	TEST PROCEDURES .....	13
5.4	DEVIATION FROM TEST STANDARD.....	13
5.5	TEST SETUP .....	14
5.6	EUT OPERATING CONDITIONS.....	14
5.7	TEST RESULTS .....	15
6.	INFORMATION ON THE TESTING LABORATORIES.....	17



A D T

## 1 CERTIFICATION

**PRODUCT :** 802.11 b/g/n RTL8192E half miniCard  
**BRAND NAME :** Realtek  
**MODEL NO. :** RTL8192E  
**TESTED :** Apr. 29 to May 07, 2009  
**APPLICANT :** Realtek Semiconductor Corp.  
**TEST SAMPLE :** ENGINEERING SAMPLE  
**STANDARDS :** 47 CFR FCC Part 15, Subpart C  
ANSI C63.4-2003

**PREPARED BY :** Sunny Wen , **DATE:** May 12, 2009  
( Sunny Wen, Specialist )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** May 12, 2009  
Responsible for RF ( Hank Chung, Deputy Manager )

**APPROVED BY :** May Chen , **DATE:** May 12, 2009  
( May Chen, Deputy Manager )

### Note:

1. This report is based on ADT report with Report No.: RF971001H06. The original report was issued by Advance Data Technology Corp. (ADT Corp.) on Oct. 28, 2008. ADT Corp. is one of Bureau Veritas family and she has fully transferred all its test facilities, staffs & service system to Bureau Veritas Consumer Products Services (Hong Kong) Limited, Taoyuan Branch in 2008.
2. This module will install to Notebook which trade name and model number is SAMSUNG and NP-N120.



A D T

3. This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RF971001H06 design is as the following:

u NP-N120 Notebook with other transmitter which is Bluetooth module.

PRODUCT	BRAND	MODEL NO.	FCC ID
Bluetooth module	Broadcom	BCM92045NMD	QDS-BRCM1018

4. Per a request of the FCC, the 802.11 b/g/n RTL8192E half miniCard was tested for conducted and radiated emissions in restricted bands while transmitting on both 2.4 GHz and bluetooth at simultaneously.

5. The antennas used in this EUT are listed below table :

No.	Type		Brand	Model No.	Peak Gain (dBi)	Connector Type
1	PIFA	Main	WNC	81.EHD15.005	0.95	IPEX
2	PIFA	Aux.	HON HA	WDAN-M1WC1001-DF	-0.28	IPEX
3	PIFA	Aux.	WNC	81.EHD15.004	-1.51	IPEX
4	PIFA	Main	HON HA	WDAN-M1WC1002-DF	0.18	IPEX

\* Antenna 1 & 2 was chosen as the representative for testing.



A D T

## 2 DESCRIPTION OF SUPPORT UNITS

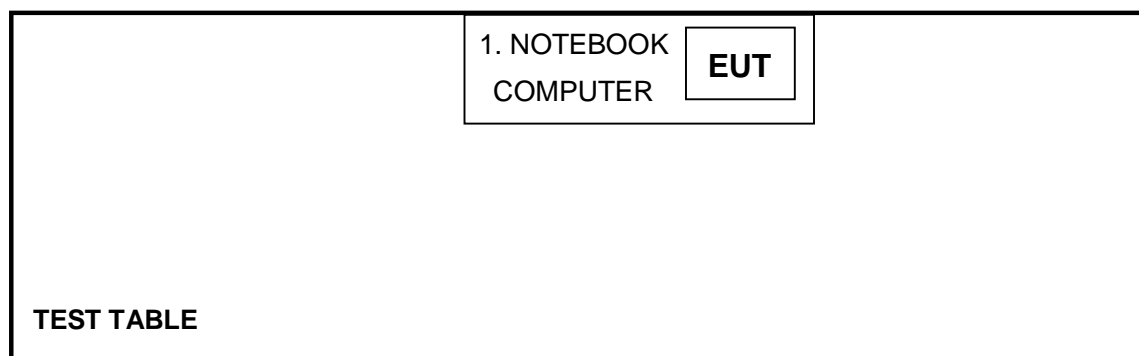
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	SAMSUNG	NP-N120	Z9R393LS200045	NA

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

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

## 3 CONFIGURATION OF SYSTEM UNDER TEST





A D T

## 4 DUAL XMIT, CONDUCTED EMISSION MEASUREMENT

### 4.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

### 4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 23, 2009	Mar. 22, 2010
Line-Impedance Stabilization Network (for EUT)	ENV-216	100071	Nov. 26, 2008	Nov. 25, 2009
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Nov. 05, 2008	Nov. 04, 2009
RF Cable (JYBAO)	5DFB	COBCAB-001	Aug. 15, 2008	Aug. 14, 2009
50 ohms Terminator	50	3	Nov. 05, 2008	Nov. 04, 2009
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. B.
3. The VCCI Con B Registration No. is C-2193.

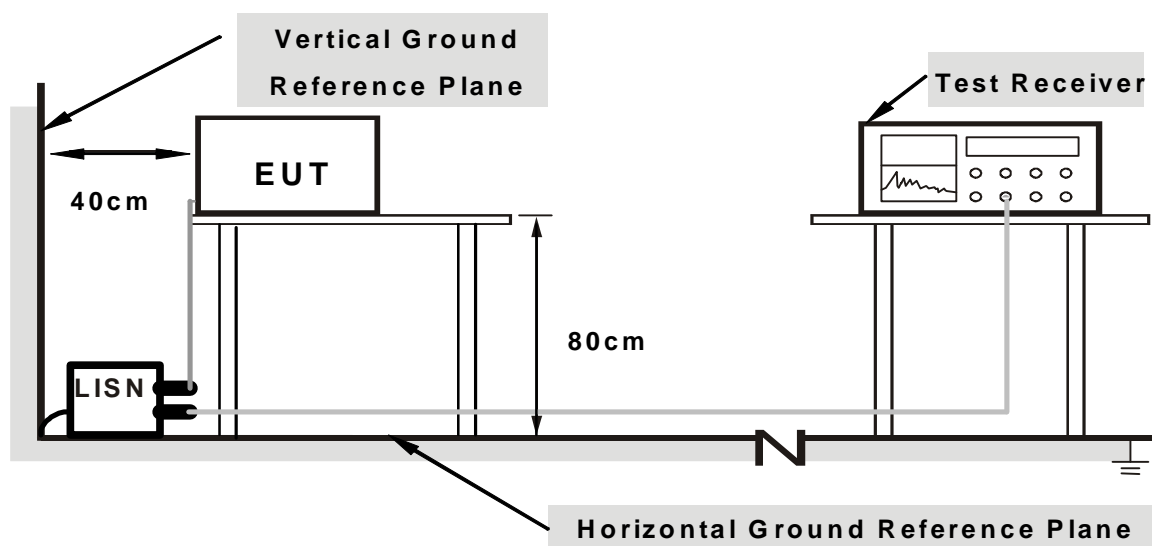
### 4.3 TEST PROCEDURES

- 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.

### 4.4 DEVIATION FROM TEST STANDARD

No deviation

### 4.5 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.



A D T

## 4.6 EUT OPERATING CONDITIONS

Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

### Note:

- 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.

#### **Power Line Conducted Emission Test:**

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
WLAN + Bluetooth	1 to 11	06	DSSS	DBPSK	1
	0 to 78	0	FHSS	GFSK	-

#### **Radiated Emission Test:**

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
WLAN + Bluetooth	1 to 11	06	DSSS	DBPSK	1
	0 to 78	0	FHSS	GFSK	-

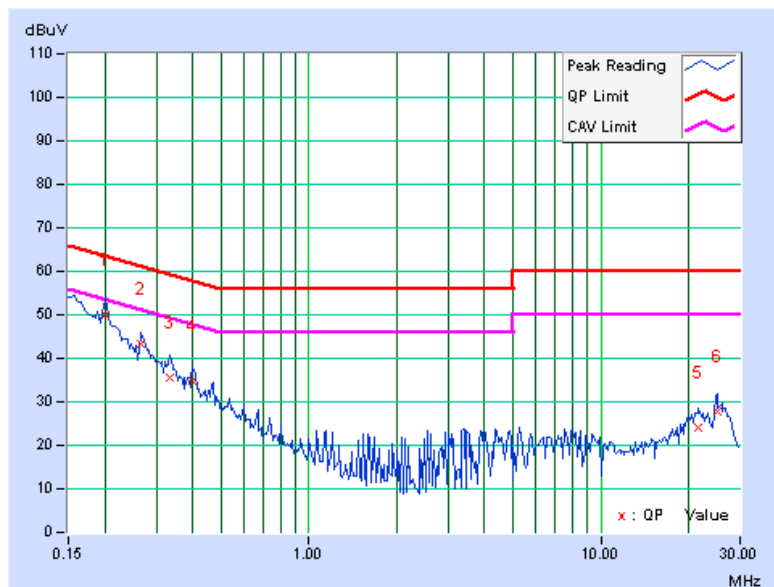


### 4.7 TEST RESULTS

<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>6dB BANDWIDTH</b>	9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	30deg. C, 65%RH, 963hPa	<b>PHASE</b>	Line (L)
<b>TESTED BY</b>	Eric Lee		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.201	0.22	49.84	-	50.06	-	63.58
2	0.267	0.30	43.02	-	43.32	-	61.20	51.20	-17.88	-
3	0.334	0.38	35.27	-	35.65	-	59.36	49.36	-23.71	-
4	0.400	0.46	34.30	-	34.76	-	57.85	47.85	-23.09	-
5	21.672	1.57	22.34	-	23.91	-	60.00	50.00	-36.09	-
6	25.090	1.71	25.97	-	27.68	-	60.00	50.00	-32.32	-

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



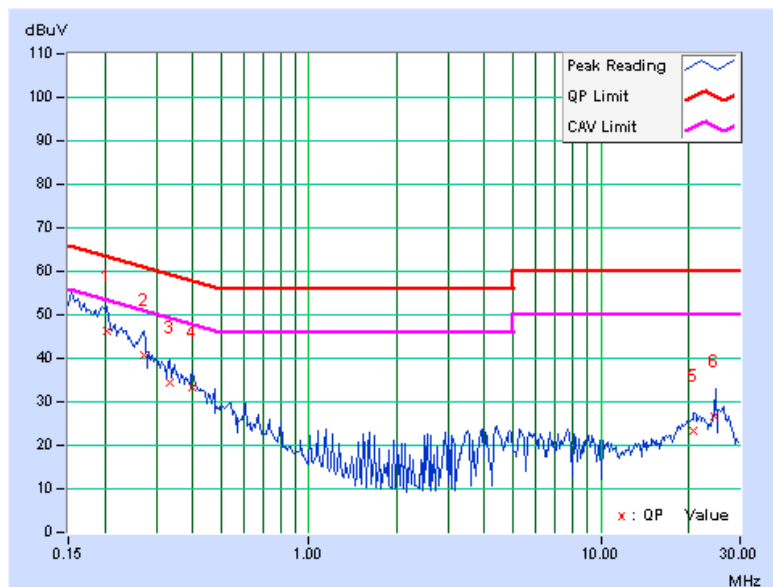


A D T

<b>INPUT POWER (SYSTEM)</b>	120Vac, 60 Hz	<b>6dB BANDWIDTH</b>	9 kHz
<b>ENVIRONMENTAL CONDITIONS</b>	30deg. C, 65%RH, 963hPa	<b>PHASE</b>	Neutral (N)
<b>TESTED BY</b>	Eric Lee		

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	0.205	0.16	46.06	-	46.22	-	63.42	53.42	-17.20	-
2	0.271	0.24	40.48	-	40.72	-	61.08	51.08	-20.37	-
3	0.334	0.32	34.00	-	34.32	-	59.36	49.36	-25.04	-
4	0.400	0.40	32.93	-	33.33	-	57.85	47.85	-24.52	-
5	20.705	1.25	22.22	-	23.47	-	60.00	50.00	-36.53	-
6	24.594	1.39	25.38	-	26.77	-	60.00	50.00	-33.23	-

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





A D T

## 5 DUAL XMIT, RADIATED EMISSION MEASUREMENT

### 5.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Field strength limits are at the distance of 3 meters, 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.



A D T

## 5.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 09, 2008	Dec. 08, 2009
HP Pre_Amplifier	8449B	3008A01923	Nov. 10, 2008	Nov. 09, 2009
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Sep. 09, 2008	Sep. 08, 2009
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	April 30, 2009	April 29, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 09, 2008	Dec. 08, 2009
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2009	Jan. 21, 2010
RF Switches	EMH-011	08009	Oct. 07, 2008	Oct. 06, 2009
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 15, 2008	Aug. 14, 2009
RF Cable	8DFB	STCCAB-30M-1GHz	Oct. 07, 2008	Oct. 06, 2009
Software	ADT_Radiated_V7.6.15.9.2	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, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in Open Site No. C.

4. The FCC Site Registration No. is 656396.

5. The VCCI Site Registration No. is R-1626.

6. The CANADA Site Registration No. is IC 7450G-3.



A D T

### 5.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. 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 antenna is a broadband antenna, and its height 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using the quasi-peak method or average method as specified and then reported in Data sheet peak mode and QP mode.
- g. The emissions up to 40 GHz were examined. Those emission falling within a restricted band were evaluated against the “restricted band emission limit” ( 54 dB $\mu$ V / 74 dB $\mu$ V).

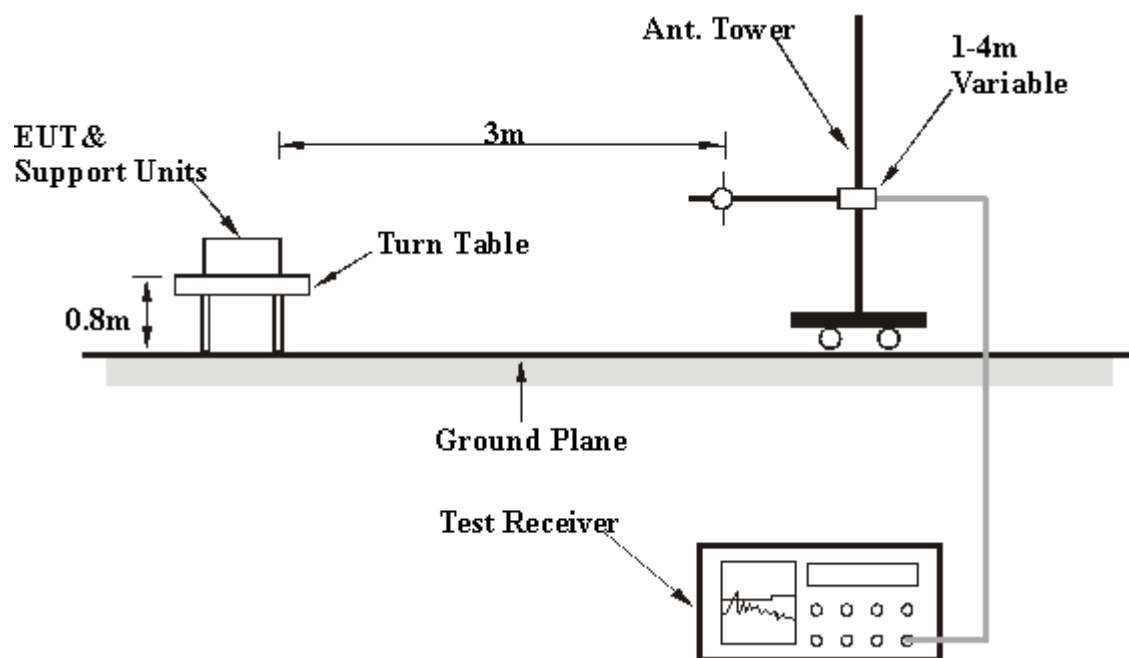
#### NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 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 300 Hz for Average detection (AV) at frequency above 1GHz.

### 5.4 DEVIATION FROM TEST STANDARD

No deviation

### 5.5 TEST SETUP



### 5.6 EUT OPERATING CONDITIONS

Same as 4.6



A D T

## 5.7 TEST RESULTS

<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>FREQUENCY RANGE</b>	30MHz~1000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	29deg. C, 57%RH, 963 hPa	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>TESTED BY</b>	Wen Yu		

### 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	171.63	28.21 QP	43.50	-15.29	1.58 H	103	13.32	14.89
2	240.01	27.98 QP	46.00	-18.02	1.25 H	351	13.05	14.93
3	282.04	32.02 QP	46.00	-13.98	1.00 H	103	15.55	16.47
4	312.01	28.40 QP	46.00	-17.60	1.00 H	163	10.89	17.51
5	432.02	33.65 QP	46.00	-12.35	1.82 H	0	12.03	21.62
6	624.02	36.11 QP	46.00	-9.89	1.45 H	74	10.79	25.32
7	816.03	37.97 QP	46.00	-8.03	1.00 H	37	7.87	30.10

### 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	192.00	22.89 QP	43.50	-20.61	1.00 V	159	9.29	13.60
2	240.00	25.64 QP	46.00	-20.36	1.00 V	20	10.71	14.93
3	267.06	27.66 QP	46.00	-18.34	1.00 V	0	11.67	15.99
4	339.11	33.54 QP	46.00	-12.46	1.31 V	357	14.92	18.62
5	624.02	35.53 QP	46.00	-10.47	1.62 V	0	10.21	25.32
6	816.03	38.59 QP	46.00	-7.41	1.44 V	124	8.49	30.10
7	988.00	35.85 QP	54.00	-18.15	1.00 V	339	3.37	32.48

- 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.



A D T

<b>INPUT POWER (SYSTEM)</b>	120Vac, 60Hz	<b>FREQUENCY RANGE</b>	1000MHz~25000MHz
<b>ENVIRONMENTAL CONDITIONS</b>	26deg. C, 60%RH, 963 hPa	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>TESTED BY</b>	Wen Yu		

**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	49.35 PK	74.00	-24.65	1.85 H	65	12.62	36.73
2	4804.00	19.35 AV	54.00	-34.65	1.85 H	65	-17.38	36.73
3	4924.00	48.24 PK	74.00	-25.76	1.57 H	192	11.18	37.06
4	4924.00	35.99 AV	54.00	-18.01	1.57 H	192	-1.07	37.06
5	7206.00	55.95 PK	74.00	-18.05	1.42 H	11	12.81	43.14
6	7206.00	25.95 AV	54.00	-28.05	1.42 H	11	-17.19	43.14
7	7386.00	60.14 PK	74.00	-13.86	1.72 H	148	17.01	43.13
8	7386.00	49.60 AV	54.00	-4.40	1.72 H	148	6.47	43.13

**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	49.87 PK	74.00	-24.13	1.67 V	261	13.14	36.73
2	4804.00	19.87 AV	54.00	-34.13	1.67 V	261	-16.86	36.73
3	4924.00	49.63 PK	74.00	-24.37	1.21 V	134	12.57	37.06
4	4924.00	38.42 AV	54.00	-15.58	1.21 V	134	1.36	37.06
5	7206.00	54.14 PK	74.00	-19.86	1.59 V	131	11.00	43.14
6	7206.00	24.14 AV	54.00	-29.86	1.59 V	131	-19.00	43.14
7	7386.00	59.87 PK	74.00	-14.13	1.40 V	73	16.74	43.13
8	7386.00	51.94 AV	54.00	-2.06	1.40 V	73	8.81	43.13

- 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.





A D T

## 6. 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 by the following approval agencies according to ISO/IEC 17025.

<b>USA</b>	FCC, NVLAP
<b>Germany</b>	TUV Rheinland
<b>Japan</b>	VCCI
<b>Norway</b>	NEMKO
<b>Canada</b>	INDUSTRY CANADA, CSA
<b>R.O.C.</b>	TAF, BSMI, NCC
<b>Netherlands</b>	Telefication
<b>Singapore</b>	GOST-ASIA (MOU)
<b>Russia</b>	CERTIS (MOU)

Copies of accreditation 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:

**Linko EMC/RF Lab:**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF Lab:**

Tel: 886-3-5935343

Fax: 886-3-5935342

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

Tel: 886-3-3183232

Fax: 886-3-3185050

**Email:** [service@adt.com.tw](mailto:service@adt.com.tw)

**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.

--- END ---