



# Supplemental “Dual Xmit” Test Report

**REPORT NO.:** RF981015H02-4

**MODEL NO.:** MC3090Z

**RECEIVED:** Oct. 15, 2009

**TESTED:** Oct. 22 to 28, 2009

**ISSUED:** Nov. 23, 2009

**APPLICANT:** Motorola Inc.

**ADDRESS:** One Motorola Plaza Holts ville NY 11742-1300 USA

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

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

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## 1. CERTIFICATION

**PRODUCT :** Mobile Computing Terminal  
**BRAND NAME :** MOTOROLA  
**MODEL NO. :** MC3090Z  
**TESTED:** Oct. 22 to 28, 2009  
**APPLICANT :** Motorola Inc.  
**TEST ITEM:** ENGINEERING SAMPLE  
**STANDARDS :** 47 CFR FCC Part 15, Subpart C & E  
ANSI C63.4-2003

**PREPARED BY :** Carol Liao , **DATE:** Nov. 23, 2009  
( Carol Liao, Specialist )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** Nov. 23, 2009  
( Hank Chung, Deputy Manager )

**APPROVED BY :** May Chen , **DATE:** Nov. 23, 2009  
( May Chen, Deputy Manager )

### Note:

Per a request of the FCC, the Mobile Computing Terminal was tested for conducted and radiated emissions in restricted bands while transmitting on WLAN, RFID and bluetooth at simultaneously.



## 2. DUAL XMIT, CONDUCTED EMISSION MEASUREMENT

### 2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB $\mu$ V)	
	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.

### 2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Test Receiver	ESCS 30	100287	Mar. 05, 2009	Mar. 04, 2010
Line-Impedance Stabilization Network (for EUT)	KNW-407	8-1395-12	May 04, 2009	May 03, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100072	June 08, 2009	June 07, 2010
RF Cable (JYEBAO)	5DFB	COACAB-001	Dec 15, 2008	Dec 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. A.
3. The VCCI Con A Registration No. is C-817.



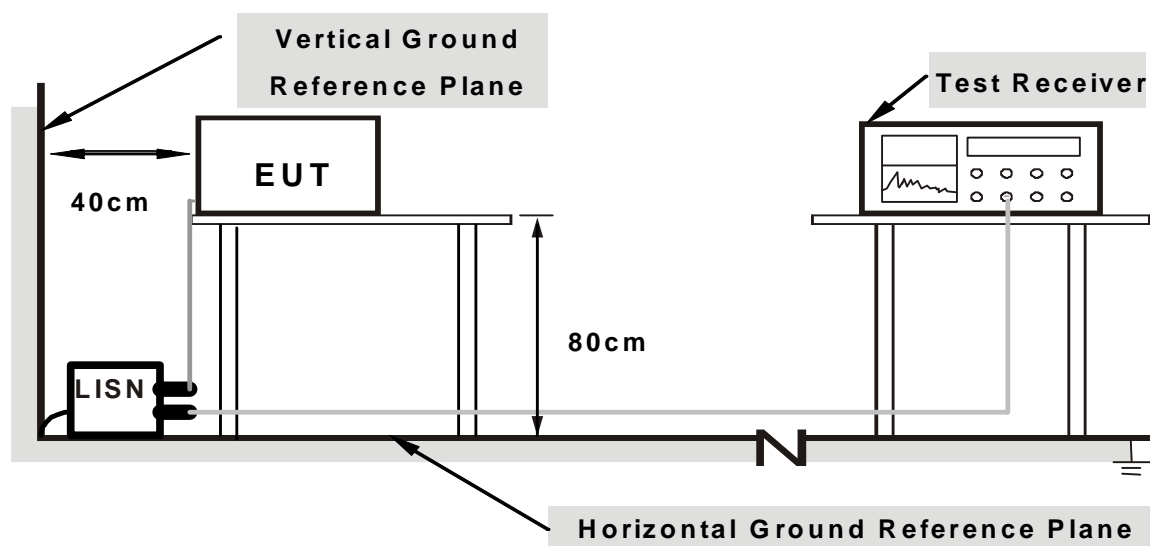
## 2.3 TEST PROCEDURES

- 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.

## 2.4 DEVIATION FROM TEST STANDARD

No deviation

## 2.5 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.



## 2.5 EUT OPERATING CONDITIONS

The EUT was tested with the following test modes:

Test Mode	Description
Mode 1	Scanner + Cradle + adapter

### 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.

#### FCC 15.247: 2.4 GHz

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
WLAN + Bluetooth	1 to 11	1	OFDM	BPSK	6
	0 to 78	0	FHSS	GFSK	DH5

#### FCC 15.247: 5 GHz

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
WLAN + Bluetooth	149 to 165	165	OFDM	BPSK	6
	0 to 78	0	FHSS	GFSK	DH5

#### FCC 15.407

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
WLAN + Bluetooth	36 to 140	64	OFDM	BPSK	6
	0 to 78	0	FHSS	GFSK	DH5

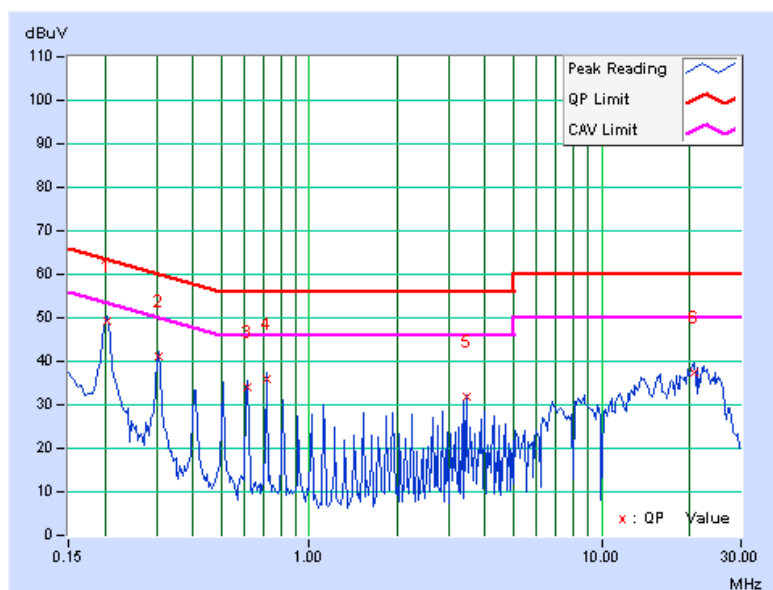
1. Set the EUT under charger condition via cradle.
2. EUT runs the test program "EMI.exe" to transmission/receiving condition continuously with Support unit 1 (Notebook Computer) via one USB cable
3. Turn the Bluetooth function on.
4. EUT plays music and sends "H" messages to printer, and the printer prints them on paper.
5. EUT runs the test program "ICMP Ping.exe" to communicate with Support unit 6 (Access Point) via wireless transmission.
6. The support unit 7 (battery) is charging from cradle continuously.

## 2.6 TEST RESULTS (For 15.247: 2.4 GHz + Bluetooth)

<b>TEST MODE</b>	Dual transmission 802.11g, 2412MHz Bluetooth, 2402MHz	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 965hPa	<b>TESTED BY</b>	Andy Ho

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	0.17	49.01	-	49.18	-	63.42	53.42	-14.24	-
2	0.306	0.12	41.12	-	41.24	-	60.07	50.07	-18.83	-
3	0.612	0.07	33.98	-	34.05	-	56.00	46.00	-21.95	-
4	0.714	0.07	35.79	-	35.86	-	56.00	46.00	-20.14	-
5	3.461	0.12	31.91	-	32.03	-	56.00	46.00	-23.97	-
6	20.869	0.50	37.02	-	37.52	-	60.00	50.00	-22.48	-

- 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.



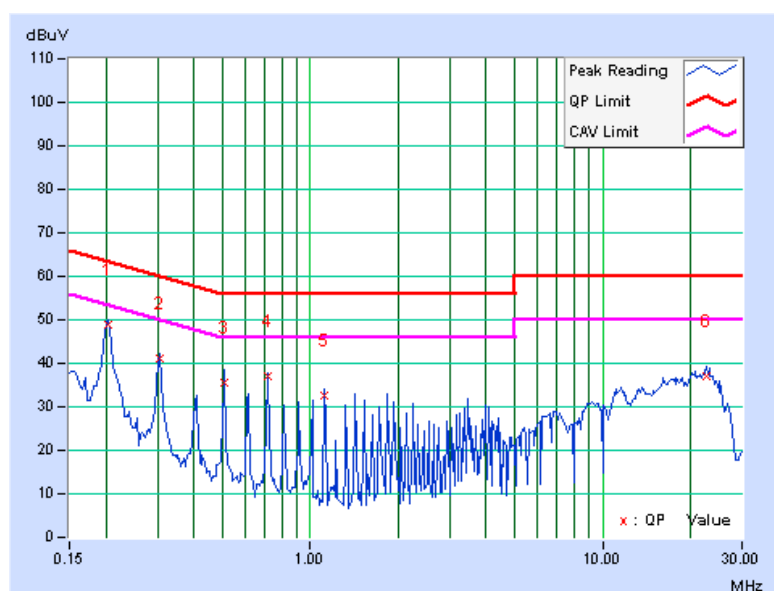




<b>TEST MODE</b>	Dual transmission 802.11g, 2412MHz Bluetooth, 2402MHz	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 60%RH, 965hPa	<b>TESTED BY</b>	Andy Ho

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	0.18	48.54	-	48.72	-	63.42	53.42	-14.70	-
2	0.306	0.13	41.00	-	41.13	-	60.07	50.07	-18.94	-
3	0.509	0.09	35.50	-	35.59	-	56.00	46.00	-20.41	-
4	0.713	0.08	36.83	-	36.91	-	56.00	46.00	-19.09	-
5	1.121	0.08	32.61	-	32.69	-	56.00	46.00	-23.31	-
6	22.594	0.57	36.57	-	37.14	-	60.00	50.00	-22.86	-

- 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.

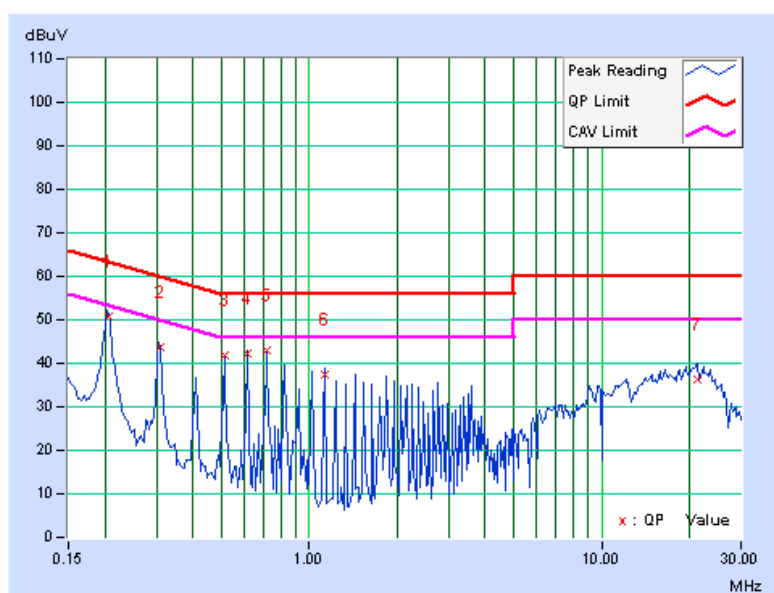


## 2.7 TEST RESULTS (For 15.247: 5 GHz + Bluetooth)

<b>TEST MODE</b>	Dual transmission 802.11a, 5825MHz Bluetooth, 2402MHz	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 68%RH, 965hPa	<b>TESTED BY</b>	Andy Ho

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	0.206	0.17	50.61	-	50.78	-	63.38	53.38	-12.61	-
2	0.308	0.12	43.50	-	43.62	-	60.02	50.02	-16.40	-
3	0.513	0.08	41.67	-	41.75	-	56.00	46.00	-14.25	-
4	0.615	0.07	42.15	-	42.22	-	56.00	46.00	-13.78	-
5	0.718	0.07	42.73	-	42.80	-	56.00	46.00	-13.20	-
6	1.129	0.06	37.44	-	37.50	-	56.00	46.00	-18.50	-
7	21.211	0.51	35.65	-	36.16	-	60.00	50.00	-23.84	-

- 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.

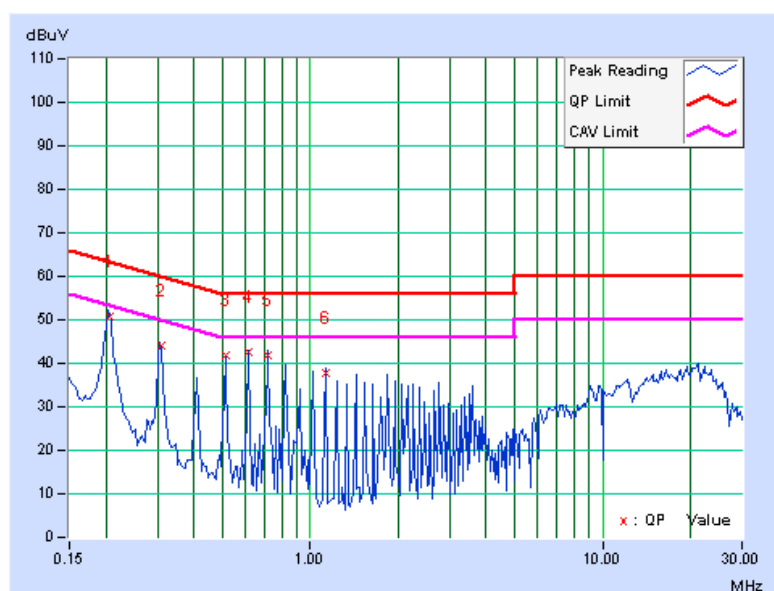




<b>TEST MODE</b>	Dual transmission 802.11a, 5825MHz Bluetooth, 2402MHz	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 68%RH, 965hPa	<b>TESTED BY</b>	Andy Ho

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	0.206	0.18	50.73	-	50.91	-	63.38	53.38	-12.48
2	0.308	0.13	43.88	-	44.01	-	60.02	50.02	-16.01	-
3	0.513	0.09	41.69	-	41.78	-	56.00	46.00	-14.22	-
4	0.615	0.09	42.54	-	42.63	-	56.00	46.00	-13.37	-
5	0.718	0.08	41.70	-	41.78	-	56.00	46.00	-14.22	-
6	1.129	0.08	37.55	-	37.63	-	56.00	46.00	-18.37	-

- 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.

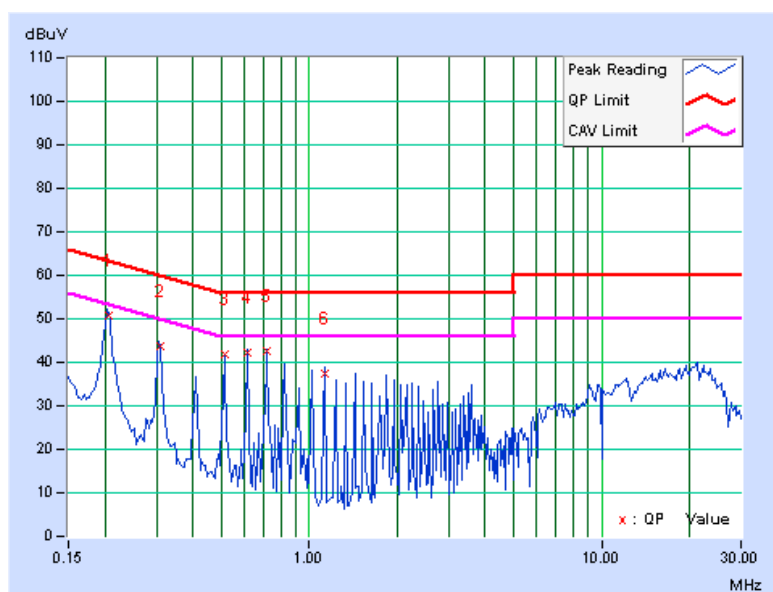


## 2.8 TEST RESULTS (For 15.407 + Bluetooth)

<b>TEST MODE</b>	Dual transmission 802.11a, 5320MHz Bluetooth, 2402MHz	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>PHASE</b>	Line (L)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 68%RH, 965hPa	<b>TESTED BY</b>	Andy Ho

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	0.206	0.17	50.64	-	50.81	-	63.38	53.38	-12.58	-
2	0.308	0.12	43.51	-	43.63	-	60.02	50.02	-16.39	-
3	0.513	0.08	41.59	-	41.67	-	56.00	46.00	-14.33	-
4	0.615	0.07	42.18	-	42.25	-	56.00	46.00	-13.75	-
5	0.718	0.07	42.69	-	42.76	-	56.00	46.00	-13.24	-
6	1.129	0.06	37.53	-	37.59	-	56.00	46.00	-18.41	-

- 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.

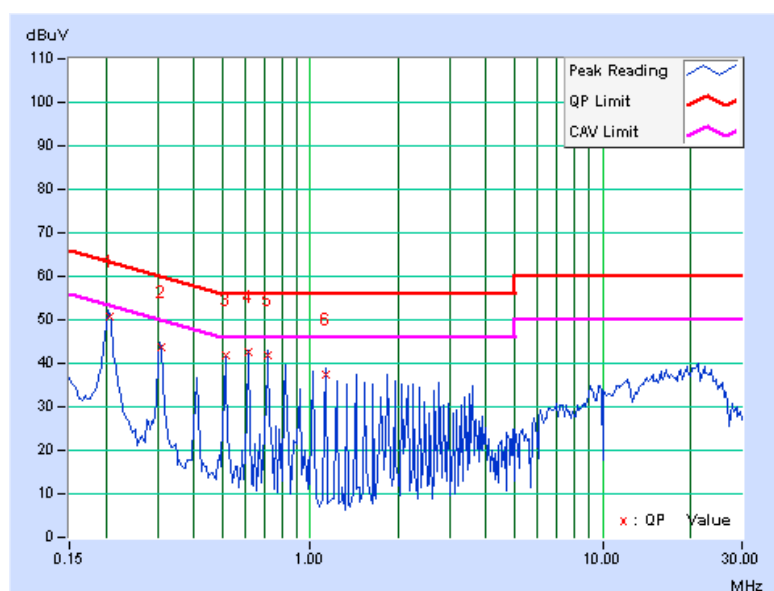




<b>TEST MODE</b>	Dual transmission 802.11a, 5320MHz Bluetooth, 2402MHz	<b>6dB BANDWIDTH</b>	9 kHz
<b>INPUT POWER</b>	120Vac, 60 Hz	<b>PHASE</b>	Neutral (N)
<b>ENVIRONMENTAL CONDITIONS</b>	25deg. C, 68%RH, 965hPa	<b>TESTED BY</b>	Andy Ho

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	0.206	0.18	50.64	-	50.82	-	63.38	53.38	-12.57	-
2	0.308	0.13	43.70	-	43.83	-	60.02	50.02	-16.19	-
3	0.513	0.09	41.68	-	41.77	-	56.00	46.00	-14.23	-
4	0.615	0.09	42.67	-	42.76	-	56.00	46.00	-13.24	-
5	0.718	0.08	41.74	-	41.82	-	56.00	46.00	-14.18	-
6	1.129	0.08	37.50	-	37.58	-	56.00	46.00	-18.42	-

- 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.





### 3. DUAL XMIT, RADIATED EMISSION MEASUREMENT

#### 3.1 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.



### 3.2 TEST INSTRUMENTS

#### For radiated emission test (Below 1 GHz):

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ADVANTEST Spectrum Analyzer	U3751	170100022	Nov. 17, 2008	Nov. 16, 2009
ADVANTEST Spectrum Analyzer	U3772	160100280	July 26, 2009	July 25, 2010
HP Pre_Amplifier	8449B	3008A01922	Sep. 25, 2009	Sep. 24, 2010
ROHDE & SCHWARZ Test Receiver	ESCS 30	100027	May 05, 2009	May 04, 2010
SCHWARZBECK Broadband Antenna	VULB-9168	263	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D123	Sep. 21, 2009	Sep. 20, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 23, 2009	Jan. 22, 2010
RF Switches	EM-H-01-1	1009	Aug. 10, 2009	Aug. 09, 2010
RF Cable	8DFB	STACAB-30M-1GHZ-091	Feb. 19, 2009	Feb. 18, 2010
Software	ADT_Radiated_V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	TT100	ADT01	NA	NA
CORCOM AC Filter	MRI2030	107/108	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: U3772) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. A.
4. The VCCI Site Registration No. is R-782.
5. The FCC Site Registration No. is 91097.
6. The CANADA Site Registration No. is IC 7450G-1.



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**For radiated emission test (Above 1 GHz):**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 09, 2008	Dec. 08, 2009
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	Apr. 24 , 2009	Apr. 23 , 2010
HP Pre_Amplifier	8449B	3008A01923	Nov. 10, 2008	Nov. 09, 2009
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 28, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 29, 2009	Apr. 28, 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	Sep. 26, 2009	Sep. 25, 2010
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2009	Aug. 13, 2010
RF Cable	8D	STCCAB-001	Sep. 26, 2009	Sep. 25, 2010
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.





### 3.3 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).

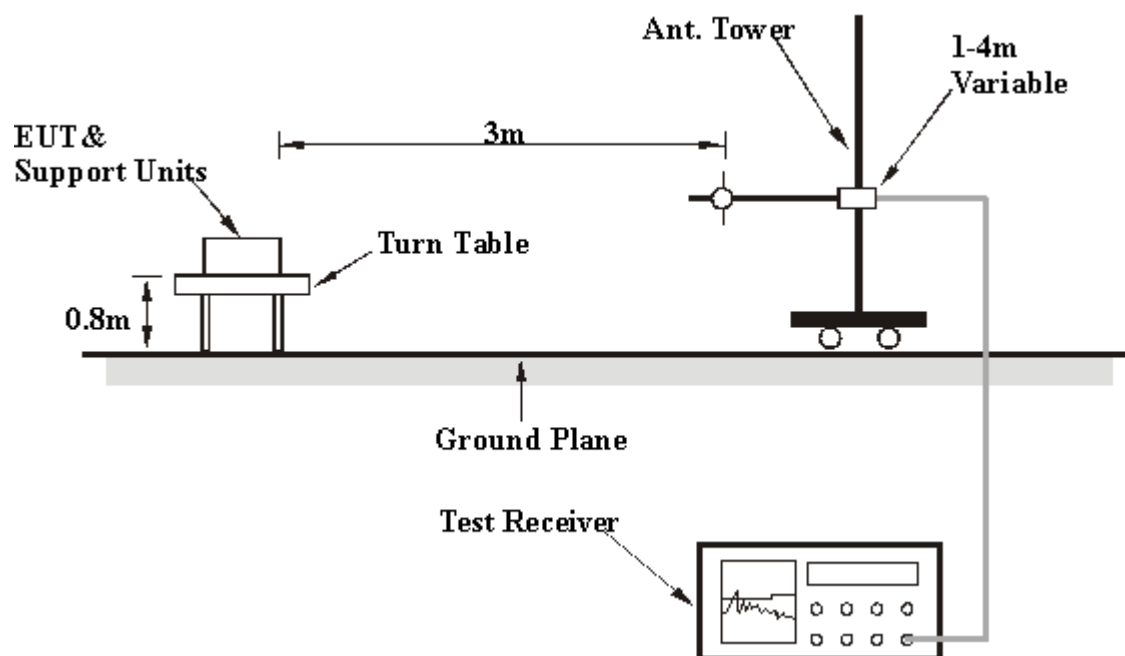
**NOTE:**

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.

### 3.4 DEVIATION FROM TEST STANDARD

No deviation

### 3.5 TEST SETUP





### 3.6 EUT OPERATING CONDITIONS

The EUT was tested with the following test modes:

Test Mode	Description
Mode 1	Scanner Stand-alone

Note:

**For 15.247:**

The EUT was tested for out of band radiated emissions with the unit transmitting on WLAN 802.11g 2412 MHz, RFID 902.75MHz with Bluetooth 2402MHz and WLAN 802.11a 5825 MHz, RFID 902.75MHz with Bluetooth 2402MHz. These frequencies and power levels were chosen because these frequencies produced the worst case radiated emissions during the radiated emissions in restricted bands test performed previously. The unit was set to transmit at the same power level as was used in the initial radiated emissions tests and was transmitting at the same data rate. (Please refer to RF981015H02 test report)

The harmonic of the fundamental signals were recorded in this report.

**For 15.407:**

The EUT was tested for out of band radiated emissions with the unit transmitting on WLAN 802.11a 5320 MHz, RFID 902.75MHz and Bluetooth 2402MHz. These frequencies and power levels were chosen because these frequencies produced the worst case radiated emissions during the radiated emissions in restricted bands test performed previously. The unit was set to transmit at the same power level as was used in the initial radiated emissions tests and was transmitting at the same data rate. (Please refer to RF981015H02-1 test report)

The harmonic of the fundamental signals were recorded in this report.



There are four antennas provided to this EUT, please refer to the following table:

<b>For WLAN (RX has diversity function)</b>					
<b>No.</b>	<b>Model</b>	<b>Antenna Type</b>	<b>Gain (dBi)</b>	<b>Connecter Type</b>	<b>Frequency range (MHz)</b>
1	OZONE WLAN 1	PCB(TX,RX)	2.96 (2.4G) 4.16 (5G)	N/A	2400~2850 4920~5850
2	OZONE WLAN 2	PIFA(RX only)	3.45 (2.4G) 3.32 (5G)	N/A	2400~2850 4920~5850
<b>For Bluetooth</b>					
<b>No.</b>	<b>Model</b>	<b>Antenna Type</b>	<b>Gain (dBi)</b>	<b>Connecter Type</b>	<b>Frequency range (MHz)</b>
1	Mica 2.4GHz	SMD	-0.45	N/A	2400~2500
<b>For RFID</b>					
<b>No.</b>	<b>Model</b>	<b>Antenna Type</b>	<b>Gain (dBi)</b>	<b>Connecter Type</b>	<b>Frequency range (MHz)</b>
1	OZONE RFID	Hor- dipole, outside antenna, Ver- slot, inside antenna	1.7483(Max)	N/A	902~928

1. EUT runs the test program " SymbolCECTxRx", " TNT1.0BTRegulatory" and " RFIDNEWFCCTEST Ver1.1" to transmission/receiving condition continuously.



### 3.7 TEST RESULTS (For 15.247: 2.4 GHz + Bluetooth + RFID)

<b>TEST MODE</b>	Dual transmission WLAN 11g, 2412MHz Bluetooth, 2402MHz RFID, 902.75MHz	<b>FREQUENCY RANGE</b>	30MHz~1000MHz
<b>INPUT POWER</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 68%RH, 965 hPa	<b>TESTED BY</b>	Max Tseng

#### 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	115.53	37.19 QP	43.50	-6.31	2.15 H	251	25.46	11.73
2	128.53	37.24 QP	43.50	-6.26	2.40 H	101	24.12	13.12
3	150.14	35.62 QP	43.50	-7.88	2.27 H	258	20.18	15.44
4	180.06	32.61 QP	43.50	-10.89	2.06 H	55	19.41	13.20
5	208.46	37.37 QP	43.50	-6.13	2.01 H	242	25.44	11.93
6	500.00	32.50 QP	46.00	-13.50	1.58 H	255	11.44	21.06

#### 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	115.54	33.63 QP	43.50	-9.87	1.00 V	116	21.90	11.73
2	121.92	35.85 QP	43.50	-7.65	1.00 V	328	23.44	12.41
3	132.84	36.98 QP	43.50	-6.52	1.00 V	253	23.40	13.58
4	143.55	36.30 QP	43.50	-7.20	1.26 V	46	21.56	14.74
5	210.43	33.97 QP	43.50	-9.53	1.08 V	145	21.97	12.00
6	500.00	36.40 QP	46.00	-9.60	1.00 V	352	15.34	21.06

**NOTE:**

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



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<b>TEST MODE</b>	Dual transmission WLAN 11g, 2412MHz Bluetooth, 2441MHz RFID, 902.75MHz	<b>FREQUENCY RANGE</b>	1000MHz~40000MHz
<b>INPUT POWER</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	28deg. C, 64%RH, 965 hPa	<b>TESTED BY</b>	Rex 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	2390.00	59.16 PK	74.00	-14.84	1.07 H	233	28.88	30.28
2	2390.00	47.31 AV	54.00	-6.69	1.07 H	233	17.03	30.28
3	2708.00	48.15 PK	74.00	-25.85	1.09 H	231	16.74	31.41
4	2708.00	36.63 AV	54.00	-17.37	1.09 H	231	5.22	31.41
5	3610.00	56.13 PK	74.00	-17.87	1.08 H	132	22.89	33.24
6	3610.00	44.87 AV	54.00	-9.13	1.08 H	132	11.63	33.24
7	4824.00	48.61 PK	74.00	-25.39	1.11 H	105	11.82	36.79
8	4824.00	36.30 AV	54.00	-17.70	1.11 H	105	-0.49	36.79
9	4882.00	47.37 PK	74.00	-26.63	1.00 H	317	10.43	36.94
10	4882.00	17.37 AV	54.00	-36.63	1.00 H	317	-19.57	36.94
11	7323.00	51.08 PK	74.00	-22.92	1.00 H	241	7.95	43.13
12	7323.00	21.08 AV	54.00	-32.92	1.00 H	241	-22.05	43.13

**NOTE:**

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



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<b>TEST MODE</b>	Dual transmission WLAN 11g, 2412MHz Bluetooth, 2441MHz RFID, 902.75MHz	<b>FREQUENCY RANGE</b>	1000MHz~40000MHz
<b>INPUT POWER</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	28deg. C, 64%RH, 965 hPa	<b>TESTED BY</b>	Rex Huang

**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	2390.00	55.63 PK	74.00	-18.37	1.23 V	129	25.35	30.28
2	2390.00	42.97 AV	54.00	-11.03	1.23 V	129	12.69	30.28
3	2708.00	49.69 PK	74.00	-24.31	1.11 V	173	18.28	31.41
4	2708.00	38.37 AV	54.00	-15.63	1.11 V	173	6.96	31.41
5	3610.00	57.33 PK	74.00	-16.67	1.41 V	28	24.09	33.24
6	3610.00	45.13 AV	54.00	-8.87	1.41 V	28	11.89	33.24
7	4824.00	48.23 PK	74.00	-25.77	1.00 V	226	11.44	36.79
8	4824.00	36.12 AV	54.00	-17.88	1.00 V	226	-0.67	36.79
9	4882.00	47.71 PK	74.00	-26.29	1.21 V	230	10.77	36.94
10	4882.00	17.71 AV	54.00	-36.29	1.21 V	230	-19.23	36.94
11	7323.00	51.39 PK	74.00	-22.61	1.07 V	108	8.26	43.13
12	7323.00	21.39 AV	54.00	-32.61	1.07 V	108	-21.74	43.13

**NOTE:**

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



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### 3.8 TEST RESULTS (For 15.247: 5 GHz + Bluetooth + RFID)

<b>TEST MODE</b>	Dual transmission WLAN 11a, 5825MHz Bluetooth, 2402MHz RFID, 902.75MHz	<b>FREQUENCY RANGE</b>	30MHz~1000MHz
<b>INPUT POWER</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 68%RH, 965 hPa	<b>TESTED BY</b>	Max Tseng

#### 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	115.53	36.97 QP	43.50	-6.53	2.23 H	287	25.24	11.73
2	128.56	37.46 QP	43.50	-6.04	2.55 H	305	24.34	13.12
3	150.00	35.05 QP	43.50	-8.45	2.14 H	243	19.59	15.46
4	180.57	33.01 QP	43.50	-10.49	2.11 H	187	19.86	13.15
5	208.46	36.74 QP	43.50	-6.76	1.98 H	125	24.81	11.93
6	500.00	31.66 QP	46.00	-14.34	1.61 H	54	10.60	21.06

#### 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	115.54	33.98 QP	43.50	-9.52	1.00 V	81	22.25	11.73
2	122.05	36.23 QP	43.50	-7.27	1.00 V	237	23.81	12.42
3	132.84	36.47 QP	43.50	-7.03	1.00 V	353	22.89	13.58
4	143.52	36.02 QP	43.50	-7.48	1.00 V	294	21.28	14.74
5	210.57	32.89 QP	43.50	-10.61	1.00 V	165	20.88	12.01
6	500.00	37.54 QP	46.00	-8.46	1.00 V	33	16.48	21.06

**NOTE:**

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





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<b>TEST MODE</b>	Dual transmission WLAN 11a, 5825MHz Bluetooth, 2441MHz RFID, 902.75MHz	<b>FREQUENCY RANGE</b>	1000MHz~40000MHz
<b>INPUT POWER</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	28deg. C, 64%RH, 965 hPa	<b>TESTED BY</b>	Rex 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	2708.00	48.71 PK	74.00	-25.29	1.09 H	233	17.30	31.41
2	2708.00	36.31 AV	54.00	-17.69	1.09 H	233	4.90	31.41
3	3610.00	56.68 PK	74.00	-17.32	1.09 H	23	23.44	33.24
4	3610.00	44.71 AV	54.00	-9.29	1.09 H	23	11.47	33.24
5	4882.00	47.67 PK	74.00	-26.33	1.41 H	121	10.73	36.94
6	4882.00	17.67 AV	54.00	-36.33	1.41 H	121	-19.27	36.94
7	7323.00	50.31 PK	74.00	-23.69	1.04 H	48	7.18	43.13
8	7323.00	20.31 AV	54.00	-33.69	1.04 H	48	-22.82	43.13
9	11650.00	55.24 PK	74.00	-18.76	1.00 H	233	8.02	47.22
10	11650.00	42.31 AV	54.00	-11.69	1.00 H	233	-4.91	47.22

**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	2708.00	48.86 PK	74.00	-25.14	1.46 V	291	17.45	31.41
2	2708.00	38.22 AV	54.00	-15.78	1.46 V	291	6.82	31.41
3	3610.00	56.28 PK	74.00	-17.72	1.33 V	241	23.04	33.24
4	3610.00	44.34 AV	54.00	-9.66	1.33 V	241	11.10	33.24
5	4882.00	47.98 PK	74.00	-26.02	1.31 V	331	11.04	36.94
6	4882.00	17.98 AV	54.00	-36.02	1.31 V	331	-18.96	36.94
7	7323.00	51.41 PK	74.00	-22.59	1.00 V	207	8.28	43.13
8	7323.00	21.41 AV	54.00	-32.59	1.00 V	207	-21.72	43.13
9	11650.00	54.81 PK	74.00	-19.19	1.00 V	271	7.59	47.22
10	11650.00	42.17 AV	54.00	-11.83	1.00 V	271	-5.05	47.22

**NOTE:**

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



### 3.9 TEST RESULTS (For 15.407 + Bluetooth + RFID)

<b>TEST MODE</b>	Dual transmission WLAN 11a, 5320MHz Bluetooth, 2402MHz RFID, 902.75MHz	<b>FREQUENCY RANGE</b>	30MHz~1000MHz
<b>INPUT POWER</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	24deg. C, 68%RH, 965 hPa	<b>TESTED BY</b>	Max Tseng

#### 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	115.51	35.90 QP	43.50	-7.60	2.19 H	82	24.17	11.73
2	128.56	36.82 QP	43.50	-6.68	2.42 H	168	23.70	13.12
3	150.01	36.17 QP	43.50	-7.33	2.23 H	304	20.72	15.45
4	180.22	31.87 QP	43.50	-11.63	2.16 H	226	18.69	13.18
5	208.70	36.64 QP	43.50	-6.86	1.96 H	160	24.70	11.94
6	500.00	31.66 QP	46.00	-14.34	1.49 H	105	10.60	21.06

#### 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	115.49	32.82 QP	43.50	-10.68	1.00 V	74	21.09	11.73
2	121.95	34.51 QP	43.50	-8.99	1.00 V	76	22.10	12.41
3	132.74	36.52 QP	43.50	-6.98	1.00 V	194	22.95	13.57
4	141.47	36.36 QP	43.50	-7.14	1.12 V	304	21.85	14.51
5	210.65	34.82 QP	43.50	-8.68	1.24 V	144	22.81	12.01
6	500.00	35.42 QP	46.00	-10.58	1.00 V	64	14.36	21.06

**NOTE:**

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



<b>TEST MODE</b>	Dual transmission WLAN 11a, 5320MHz Bluetooth, 2441MHz RFID, 902.75MHz	<b>FREQUENCY RANGE</b>	1000MHz~40000MHz
<b>INPUT POWER</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	28deg. C, 64%RH, 965 hPa	<b>TESTED BY</b>	Rex 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	2708.00	48.31 PK	74.00	-25.69	1.27 H	296	16.90	31.41
2	2708.00	36.22 AV	54.00	-17.78	1.27 H	296	4.81	31.41
3	3610.00	55.10 PK	74.00	-18.90	1.34 H	38	21.86	33.24
4	3610.00	43.80 AV	54.00	-10.20	1.34 H	38	10.56	33.24
5	4882.00	48.13 PK	74.00	-25.87	1.07 H	204	11.19	36.94
6	4882.00	18.13 AV	54.00	-35.87	1.07 H	204	-18.81	36.94
7	5356.00	54.38 PK	74.00	-19.62	1.40 H	231	17.12	37.26
8	5356.00	43.11 AV	54.00	-10.89	1.40 H	231	5.85	37.26
9	7323.00	50.11 PK	74.00	-23.89	1.21 H	31	6.98	43.13
10	7323.00	20.11 AV	54.00	-33.89	1.21 H	31	-23.02	43.13
11	10640.00	53.17 PK	74.00	-20.83	1.31 H	68	6.31	46.86
12	10640.00	41.08 AV	54.00	-12.92	1.31 H	68	-5.78	46.86

#### NOTE:

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



<b>TEST MODE</b>	Dual transmission WLAN 11a, 5320MHz Bluetooth, 2441MHz RFID, 902.75MHz	<b>FREQUENCY RANGE</b>	1000MHz~40000MHz
<b>INPUT POWER</b>	120Vac, 60Hz	<b>DETECTOR FUNCTION &amp; BANDWIDTH</b>	Peak (PK) Average (AV) 1 MHz
<b>ENVIRONMENTAL CONDITIONS</b>	28deg. C, 64%RH, 965 hPa	<b>TESTED BY</b>	Rex Huang

**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	2708.00	49.22 PK	74.00	-24.78	1.24 V	138	17.81	31.41
2	2708.00	37.01 AV	54.00	-16.99	1.24 V	138	5.60	31.41
3	3610.00	55.43 PK	74.00	-18.57	1.30 V	281	22.19	33.24
4	3610.00	43.18 AV	54.00	-10.82	1.30 V	281	9.94	33.24
5	4882.00	47.69 PK	74.00	-26.31	1.03 V	137	10.75	36.94
6	4882.00	17.69 AV	54.00	-36.31	1.03 V	137	-19.25	36.94
7	5356.00	56.86 PK	74.00	-17.14	1.61 V	301	19.60	37.26
8	5356.00	45.66 AV	54.00	-8.34	1.61 V	301	8.40	37.26
9	7323.00	51.34 PK	74.00	-22.66	1.13 V	38	8.21	43.13
10	7323.00	21.34 AV	54.00	-32.66	1.13 V	38	-21.79	43.13
11	10640.00	53.79 PK	74.00	-20.21	1.29 V	68	6.93	46.86
12	10640.00	41.38 AV	54.00	-12.62	1.29 V	68	-5.48	46.86

**NOTE:**

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



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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 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).

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

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