Supplemental "Transmit Simultaneously" Test Report

REPORT NO.:	RF990809E03-4
MODEL NO.:	MC9190
FCC ID:	UZ7MC9190
IC ID:	109AN-MC9190
RECEIVED:	Aug. 09, 2010
TESTED:	Aug. 26, 2010 & Sep. 30 to Nov. 19, 2010
ISSUED:	Dec. 01, 2010
APPLICANT:	Motorola Inc.
ADDRESS:	One Motorola Plaza Holtsville NY 11742-1300 USA
ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS:	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan

Table of Contents

1 CERTIFICATION

PRODUCT :	Mobile Computer
BRAND NAME :	MOTOROLA
MODEL NO. :	MC9190
TESTED :	Aug. 26, 2010 & Sep. 30 to Nov. 19, 2010
APPLICANT :	Motorola Inc.
TEST SAMPLE :	ENGINEERING SAMPLE
STANDARDS :	FCC Part 15, Subpart C
	FCC Part 15, Subpart E
	ANSI C63.4-2003
	Canada RSS-210 issue 7
	Canada RSS-Gen issue 2

The above equipment (Model: MC9190) 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 : Sunny Wen , **DATE:** *Dec. 01, 2010*
(Sunny Wen, Specialist)

TECHNICAL ACCEPTANCE : , **DATE:** *Dec. 01, 2010*
(Hank Chung, Deputy Manager)

APPROVED BY : , **DATE:** *Dec. 01, 2010*
(May Chen, Deputy Manager)

Note:

Per a request of the FCC, the Mobile Computer was tested for conducted emissions and radiated emissions in restricted bands while transmitting on both WLAN and Bluetooth at simultaneously.

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC 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 -13.91dB at 0.201MHz
15.247(d)	Transmitter Radiated Emissions Limit: Table 15.209	PASS	Meet the requirement of limit Minimum passing margin is -3.02 dB at 74.60 MHz

For this report the EUT was tested under WLAN and Bluetooth transmit simultaneously.
For WLAN function both the 5GHz and 2.4GHz Bands were considered, for 5GHz the highest output power channel (802.11a frequency: 5785MHz) was chosen and for 2.4GHz the highest output power channel (802.11g frequency: 2437MHz) also was chosen.

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)	3.94 dB
Radiated emissions (1GHz -18GHz)	2.49 dB
Radiated emissions (18GHz -40GHz)	2.70 dB

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile Computer
MODEL NO.	MC9190
FCC ID	UZ7MC9190
IC ID	109AN-MC9190
POWER SUPPLY	DC 7.4V from battery, DC 12V to cradle or DC 12V to connection adapter
MODULATION TYPE	for WLAN : CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
	for Bluetooth : GFSK,π/4-DQPSK, 8DPSK
MODULATION TECHNOLOGY	for WLAN :DSSS, OFDM
	for Bluetooth : FHSS
TRANSFER RATE	for WLAN : 802.11b: 11 / 5.5 / 2 / 1Mbps 802.11a/g: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6Mbps
	for Bluetooth : DH 1, DH 3, DH 5 +EDR
FREQUENCY RANGE	for WLAN 15.407: 802.11a: 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz,5.50 ~ 5.7GHz
	for WLAN 15.247: 802.11b & 802.11g: 2.412 ~ 2.472GHz 802.11a: 5.745 ~ 5.825GHz
	for Bluetooth : 2.402GHz ~ 2.48GHz
NUMBER OF CHANNEL	for WLAN 15.407: 19 for 802.11a,
	for WLAN 15.247(2.4GHz) 13 for 802.11b, 802.11g, for WLAN 15.247(5GHz) 5 for 802.11a
	for Bluetooth : 79

CHANNEL SPACING	for WLAN : 802.11b/g: 5MHz 802.11a: 20MHz
	for Bluetooth : 1 MHz
MAXIMUM OUTPUT POWER	for WLAN 15.407 802.11a: 27.5mW
	for WLAN 15.247(2.4GHz) 802.11b: 41.7mW 802.11g: 147.9mW for WLAN 15.247(5GHz) 802.11a: 131.8mW
	for Bluetooth : GFSK: 3.7 mW π /4 – DQPSK: 2.2 mW 8DPSK: 2.5 mW
ANTENNA TYPE	Please see note 2
ANTENNA CONNECTOR	Please see note 2
DATA CABLE	RS232 cable x 1 (Part No.: 25-62164-01R) USB cable x 1 (Part No.: 25-62166-01R)
I/O PORTS	Audio port x 1, SD slot port x 1
ASSOCIATED DEVICES	Battery x 1 (Part No.: 21-65587-03) Cable adapters (Part No.: ADP9000-100R, ADP9000-110R) Holster (Part No.: SG-MC9121112-01R) Heated boot (Part No.: SG-MC9024242-01R) Snap on Mag Stripe Reader (Part No.: MSR9001-100R) Modem Module - Dongle (Part No.: MDM9000-100R) Headsets (Part No.:50-11300-050R, RCH50)

Note :

1. There are Bluetooth technology (BT2.1+EDR) and WLAN technology used for the EUT.

2. There are three antennas provided to this EUT, please refer to the following table:

WLAN								
No.	**Brand**	**Model No.**	**Antenna Type**	**Gain (dBi)**	**Connecter Type**	**Frequency range (MHz)**	**Cable Loss (dB)**	**Cable Length**
1	WhaYu	Main (Tx & Rx)	PIFA	4.34 (2.4G) 5.54 (5G)	IPX	2400~2500 4900~5850	0.1	35mm
2	WhaYu	Aux (Rx only)	PIFA	3.83 (2.4G) 5.51 (5G)	IPX	2400~2500 4900~5850	0.24	85mm

Bluetooth						
No.	**Brand**	**Model**	**Antenna Type**	**Gain (dBi)**	**Connecter Type**	**Frequency range (MHz)**
1	TY	AH104F2650S1-T	Chip	-3.73	SMT	2400~2500

3. The EUT configuration list:

	EUT_1	EUT_2	**EUT_3**	EUT_4	EUT_5	EUT_6
OS	WM6.5	WM6.5	**WM6.5**	WM6.5	WM6.5	WM6.5
CPU	806MHz	806MHz	**806MHz**	806MHz	806MHz	806MHz
RAM	256MB	256MB	**256MB**	256MB	256MB	256MB
Flash	1G	1G	**1G**	1G	1G	1G
Keypad	28/43/53keys	28/43/53keys	**28/43/53keys**	28/43/53keys	28/43/53keys	28/43/53keys
Battery	SYMBOL	SYMBOL	**SYMBOL**	SYMBOL	SYMBOL	SYMBOL
Scan	SE960	-	**SE1524**	-	-	-
Imager	-	SE4500-STD	**-**	SE4600-LR	SE4500-DL	SE4500-DPM
WLAN (a/b/g)	V	V	**V**	V	V	V
BT	V	V	**V**	V	V	V
The above configurations are available also with CR (Condensation Resistant).						

The worst case is determined to be as **EUT_3** (53keys), base on the investigation by measuring radiation emission and its data was recorded in this report.

4. The EUT could be supplied with a Cradle, power adapter and battery as below table:

Cradle 1 (1-slot, not for sale together)	
Brand:	SYMBOL
Model No.:	CRD9000-1000
Part No.:	CRD9000-1001SR
Input power :	+12V ------ 9A
I/O Ports:	USB Port x 1 RS232 Port x 1
Associated Devices	USB cable (Part No.:25-64396-01R) RS232 cable (Part No.:25-63852-01R) Adapter x 2 (Adapter 1: Part No.: 50-14000-148R) (Adapter 2: Part No.: PWRS-14000-148R)
Cradle 2 (4-slot, not for sale together)	
Brand:	SYMBOL
Model No.	CHS9000-4000C
Part No.:	CHS9000-4001CR
Input power :	+12V ------ 4A
Associated Devices	US AC line cord (Part No.: 23844-00-00R) DC Line Cord for Four Slot Cradles (Part No.: 50-16002-029) Adapter x 2 (Adapter 3: Part No.: 50-14000-241R) (Adapter 4: Part No.: PWRS-14000-241R)
Cradle 3 (4-slot, not for sale together)	
Brand:	SYMBOL
Model No.:	CRD9000-4000E
Part No.:	CRD9000-4001ER
Input power :	+12V ------ 4A
I/O Ports:	Ethernet Port x 1
Associated Devices	US AC line cord (Part No.: 23844-00-00R) DC Line Cord for Four Slot Cradles (Part No.: 50-16002-029) Adapter x 2 (Adapter 3: Part No.: 50-14000-241R) (Adapter 4: Part No.: PWRS-14000-241R)

Adapter 1 (not for sale together)	
Brand:	HIPRO
Model No.:	HP-O2040D43
Part No.:	50-14000-148R
Input power :	100-240V, 50-60Hz, 1.5A
Output power :	+12V ------ 3.33A DC output cable (unshielded, 1.8m with one core)
Adapter 2 (not for sale together)	
Brand:	HIPRO
Model No.:	HP-A0502R3D
Part No.:	PWRS-14000-148R
Input power :	100-240V, 50-60Hz, 2.4A
Output power	+12V ------ 4.16A DC output cable (unshielded, 1.8m with one core)
Adapter 3 (only for Cradle 2, 3 use, not for sale together)	
Brand:	Motorola
Model No.:	50-14000-241R ver1 (level IV)
Input power :	100-240V, 50-60Hz, 3A
Output power :	+12V ------ 9A DC output cable (Part No.: 25-72614-01R)
Adapter 4 (only for Cradle 2, 3 use, not for sale together)	
Brand:	MOTOROLA
Model No.	50-14000-241R ver2 (level V, p/n PWRS-14000-241R)
Input power :	100-240V, 50-60Hz, 3A
Output power	+12V ------ 9A DC output cable (Part No.: 25-72614-01R)
Battery	
Brand:	SYMBOL
Part No.:	21-65587-03
Rating:	7.4V, 2200mAh, 16.3Wh

5. The EUT operates in both the 5GHz and 2.4GHz Bands and compatibility with 802.11a, 802.11b, 802.11g and Bluetooth technology.

6. 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 DESCRIPTION OF TEST MODES

For WLAN :

Operated in 2400 ~ 2483.5MHz band:

Thirteen channels are provided for 802.11b, 802.11g:

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
1	2412MHz	8	2447MHz
2	2417MHz	9	2452MHz
3	2422MHz	10	2457MHz
4	2427MHz	11	2462MHz
5	2432MHz	12	2467MHz
6	2437MHz	13	2472MHz
7	2442MHz		

Operated in 5725 ~ 5850MHz band:

Five channels are provided for 802.11a:

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz		

Operated in 5150MHz ~ 5350MHz bands:

Eight channels are provided for 802.11a:

CHANNEL	FREQUENCY
36	5180 MHz
40	5200 MHz
44	5220 MHz
48	5240 MHz
52	5260 MHz
56	5280 MHz
60	5300 MHz
64	5320 MHz

Operated in 5470MHz ~ 5725MHz bands:

Eleven channels are provided for 802.11a:

CHANNEL	FREQUENCY
100	5500 MHz
104	5520 MHz
108	5540 MHz
112	5560 MHz
116	5580 MHz
120	5600 MHz
124	5620 MHz
128	5640 MHz
132	5660 MHz
136	5680 MHz
140	5700 MHz

For Bluetooth:

Seventy-nine channels are provided to this EUT.

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

3.3 TEST MODE APPLICABLITY AND TESTED CHANNEL DETAIL:

EUT configure mode	Applicable to			Description
	PLC	RE<1G	RE≥1G	
A	√		√	Y-Z plane: EUT_3 + Battery (21-65587-03) + Keypad: 53keys + ADP9000-100R connection adapter + 50-14000-148R PSU with its DC cord
B	√			Y-Z plane: EUT_3 + Battery (21-65587-03) + Keypad: 53keys + ADP9000-100R connection adapter + PWRS-14000-148R PSU with its DC cord
C		√		EUT_3 + Battery (21-65587-03) + Keypad: 53keys + CRD9000-4001ER + PWRS-14000-241R PSU with its DC cord

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

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)	CONFIGURE MODE
WLAN + Bluetooth	WORSE CHANNEL	-	-	-	-	A ~ B

Radiated Emission Test (Below 1 GHz):

☒ 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)	CONFIGURE MODE
WLAN (2.4GHz 802.11g) + Bluetooth	1 to 13	6	OFDM	BPSK	6	C
	0 to 78	0	FHSS	GFSK	DH5	
WLAN (5GHz 802.11a) + Bluetooth	149 to 165	157	OFDM	BPSK	6	
	0 to 78	0	FHSS	GFSK	DH5	

Radiated Emission Test (Above 1 GHz):

☒ 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)	CONFIGURE MODE
WLAN (2.4GHz 802.11g) + Bluetooth	1 to 13	6	OFDM	BPSK	6	A
	0 to 78	0	FHSS	GFSK	DH5	
WLAN (5GHz 802.11a) + Bluetooth	149 to 165	157	OFDM	BPSK	6	
	0 to 78	0	FHSS	GFSK	DH5	

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	25deg. C, 68%RH, 1013 hPa	120Vac, 60Hz	Frank Liu
RE<1G	20deg. C, 63%RH, 1013 hPa	120Vac, 60Hz	Wen Yu
PLC	22deg. C, 62%RH, 1015 hPa	120Vac, 60Hz	Timmy Hu

3.4 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.

Conducted test mode A~B / Radiated emission (above 1GHz) test					
No.	Product	Brand	Model No.	Serial No.	FCC ID
1	HEADSET	MOTOROLA	RCH50	NA	NA
2	CONNECTION 1	SYMBOL	P/N:ADP9000-100R	NA	NA
3	NOTEBOOK COMPUTER (for conducted test)	DELL	PP27L	7YLB32S	FCC DOC
	NOTEBOOK COMPUTER (for other test items)	DELL	D531	CN-0XM006-48643-86L-4472	QDS-BRCM1019
4	iPod	APPLE	A1199	YM712NHUVQ5	FCC DoC

No.	Signal cable description
1	0.9 m wrapped unshielded wire, terminated via drain wire, with 3.5 mm phone plug, w/o core.
2	NA
3	1.8 m foil shielded wire, RS232 to USB connector, w/o core.
4	1.0 m shielded cable, terminated with USB connector, w/o core.

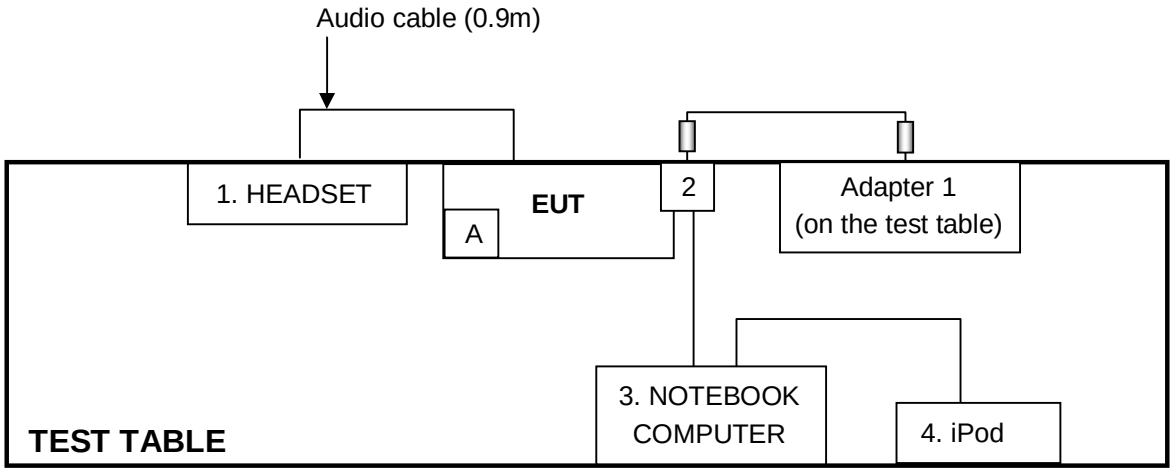
Radiated emission test mode C (below 1GHz)					
No.	Product	Brand	Model No.	Serial No.	FCC ID
5	DSL Wireless Router	ABOCOM	WR224GR	060500749P	FCC
6	NOTEBOOK COMPUTER	DELL	PP21L	CN-0GD366-70166-5B3-09ZX	QDS-BRCM1016

No.	Signal cable description
5	10 m UTP cable.
6	3.0 m UTP cable.

Note: 1. All power cords of the above support units are unshielded (1.8m).

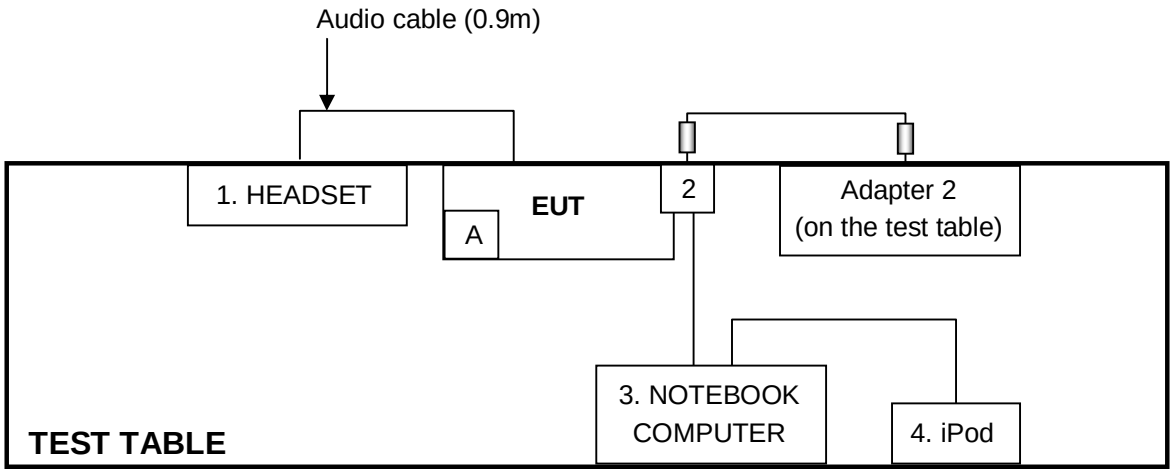
3.5 CONFIGURATION OF SYSTEM UNDER TEST

For conducted test mode A / radiated emission (above 1GHz) test:



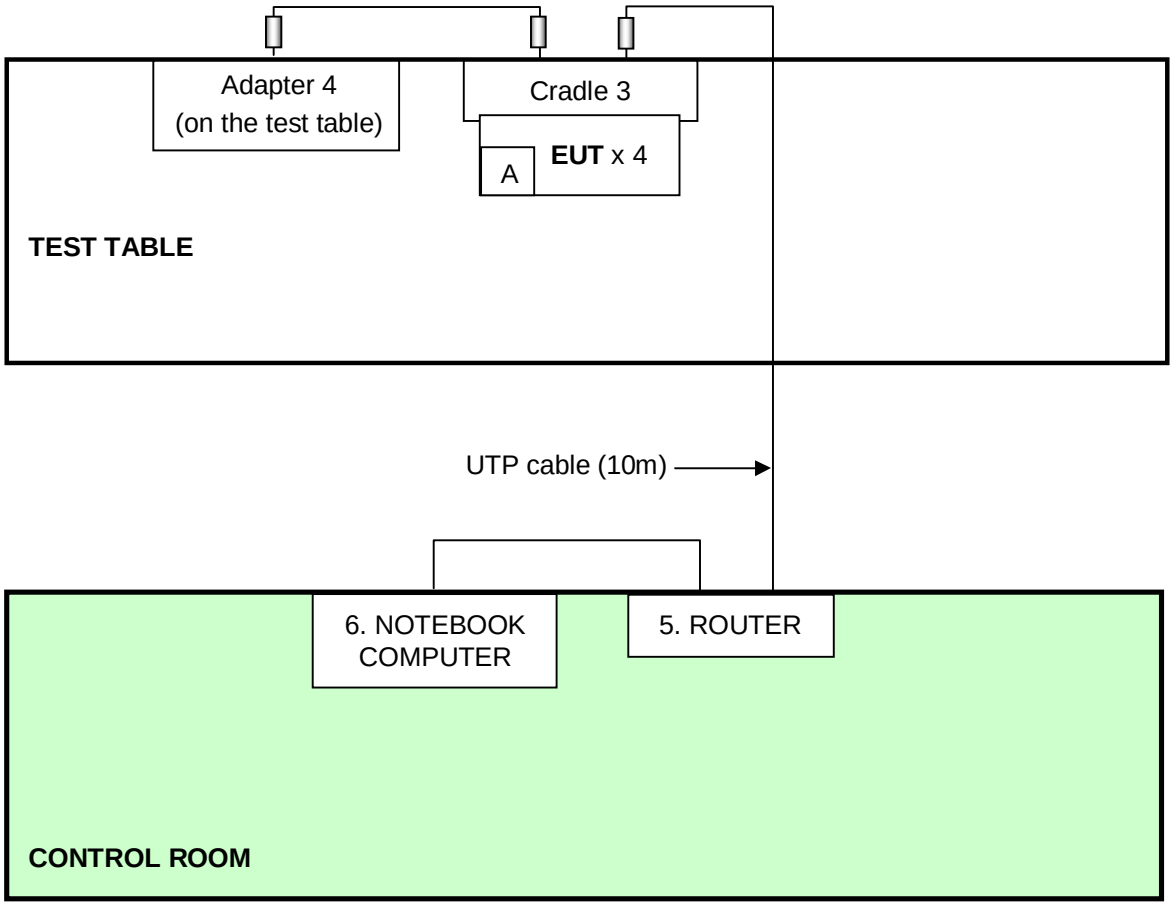
NOTE: 1. Item A is the SD Card.
2. Item 2 is the Connection 1.

For conducted test mode B:



NOTE: 1. Item A is the SD Card.
2. Item 2 is the Connection 1.

For radiated emission test mode C (below 1GHz):



NOTE: 1. Item A is the SD Card.

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 0.5-5 5-30	66 to 56 56 60	56 to 46 46 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

For test mode A, tested data: Aug. 26

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 09, 2010	Mar. 08, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-522	Sep. 23, 2009	Sep. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Oct. 26, 2009	Oct. 25, 2010
RF Cable (JYEBAO)	5DFB	COBCAB-001	Nov. 24, 2009	Nov. 23, 2010
50 ohms Terminator	50	3	Oct. 28, 2009	Oct. 27, 2010
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.

For test mode B, tested data: Sep. 30

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 09, 2010	Mar. 08, 2011
Line-Impedance Stabilization Network (for EUT)	NSLK 8127	8127-522	Sep. 08, 2010	Sep. 07, 2011
Line-Impedance Stabilization Network (for Peripheral)	ESH3-Z5	848773/004	Oct. 26, 2009	Oct. 25, 2010
RF Cable (JYEBAO)	5DFB	COCCAB-002	Aug. 30, 2010	Aug. 29, 2011
50 ohms Terminator	50	3	Oct. 28, 2009	Oct. 27, 2010
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.

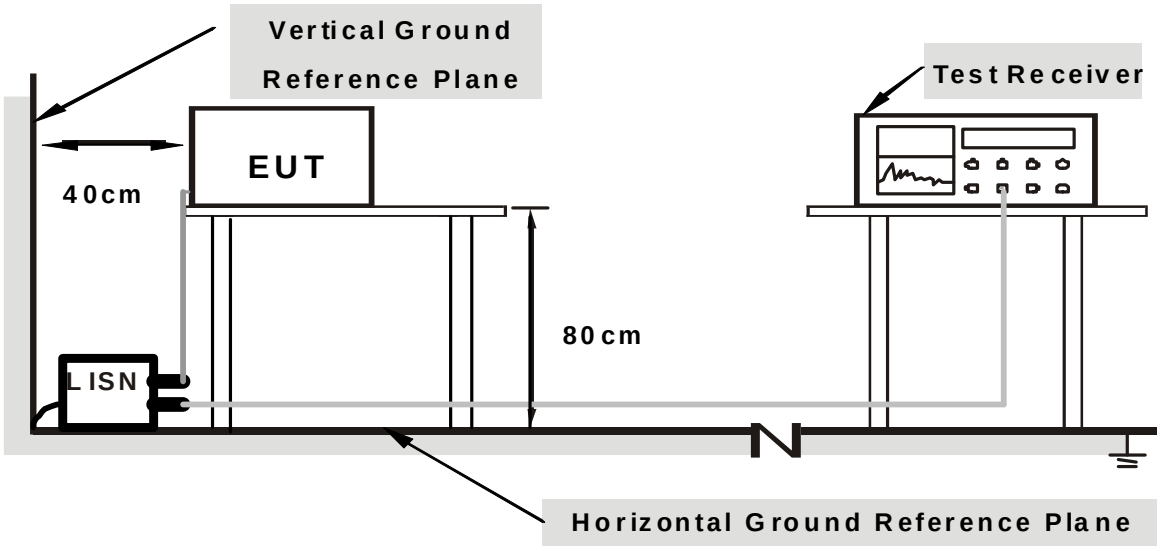
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

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 cm 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

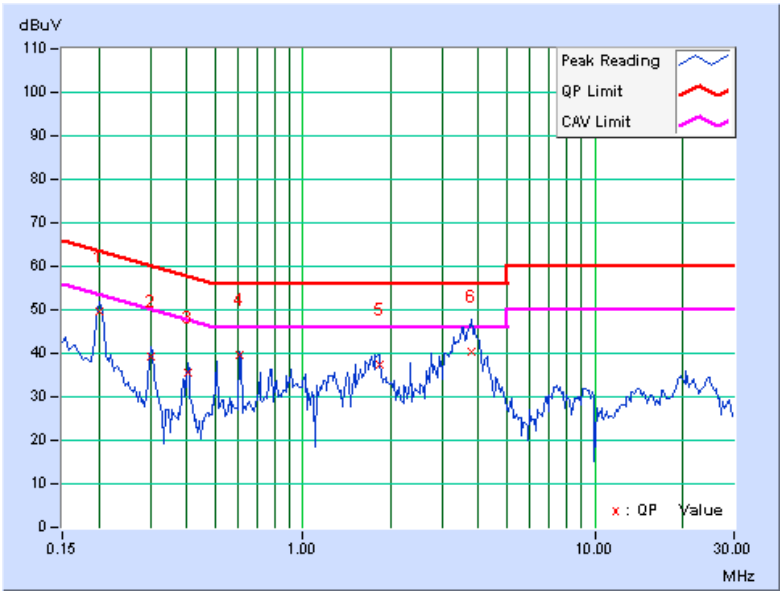
1. Turn on the power of EUT.
2. The EUT run test program “CEcTxRx.exe” & “BTRegTest_ver3.5” to enable EUT under transmission / receiver condition continuously at specific channel frequency.

4.1.7 TEST RESULTS (MODE A)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.201**	**0.05**	**49.62**	**-**	**49.67**	**-**	**63.58**	**53.58**	**-13.91**	**-**
2	0.302	0.06	39.13	-	39.19	-	60.18	50.18	-20.99	-
3	0.404	0.06	35.34	-	35.40	-	57.77	47.77	-22.37	-
4	0.607	0.07	39.47	-	39.54	-	56.00	46.00	-16.46	-
5	1.824	0.12	37.27	-	37.39	-	56.00	46.00	-18.61	-
6	3.770	0.18	40.17	-	40.35	-	56.00	46.00	-15.65	-

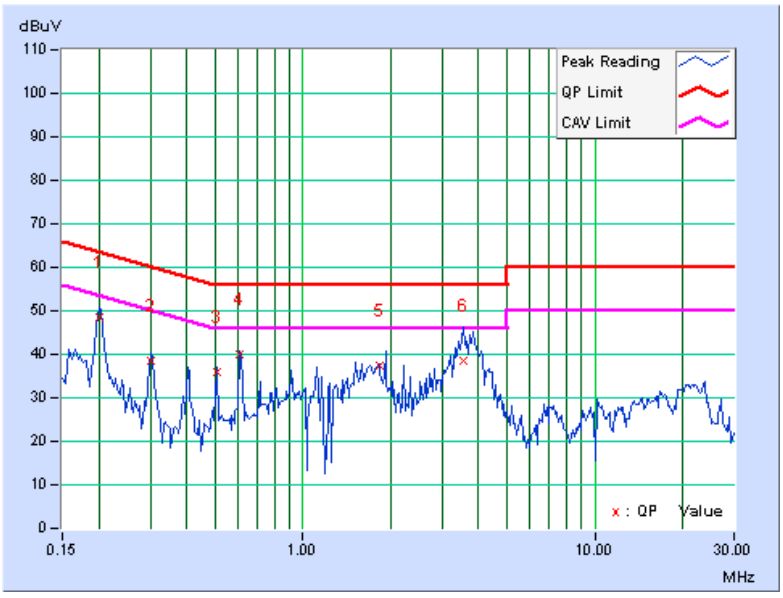
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.201	0.06	48.63	-	48.64	-	63.58	53.58	-14.94	-
2	0.302	0.07	38.64	-	38.54	-	60.18	50.18	-21.64	-
3	0.505	0.08	35.72	-	35.75	-	56.00	46.00	-20.25	-
4	0.607	0.08	39.90	-	39.88	-	56.00	46.00	-16.12	-
5	1.824	0.13	37.29	-	37.41	-	56.00	46.00	-18.59	-
6	3.540	0.19	38.58	-	38.63	-	56.00	46.00	-17.37	-

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.

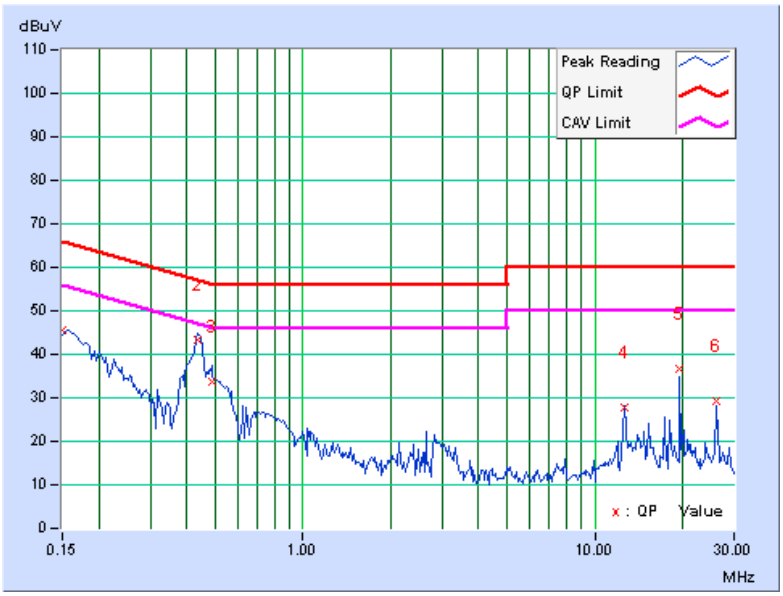


4.1.8 TEST RESULTS (MODE B)

PHASE	Line (L)	6dB BANDWIDTH	9 kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.04	45.63	-	45.67	-	66.00	56.00	-20.33	-
2	0.435	0.05	43.15	-	43.20	-	57.15	47.15	-13.95	-
3	0.486	0.06	33.54	-	33.60	-	56.24	46.24	-22.64	-
4	12.629	0.40	27.34	-	27.74	-	60.00	50.00	-32.26	-
5	19.500	0.54	35.98	-	36.52	-	60.00	50.00	-23.48	-
6	26.000	0.80	28.55	-	29.35	-	60.00	50.00	-30.65	-

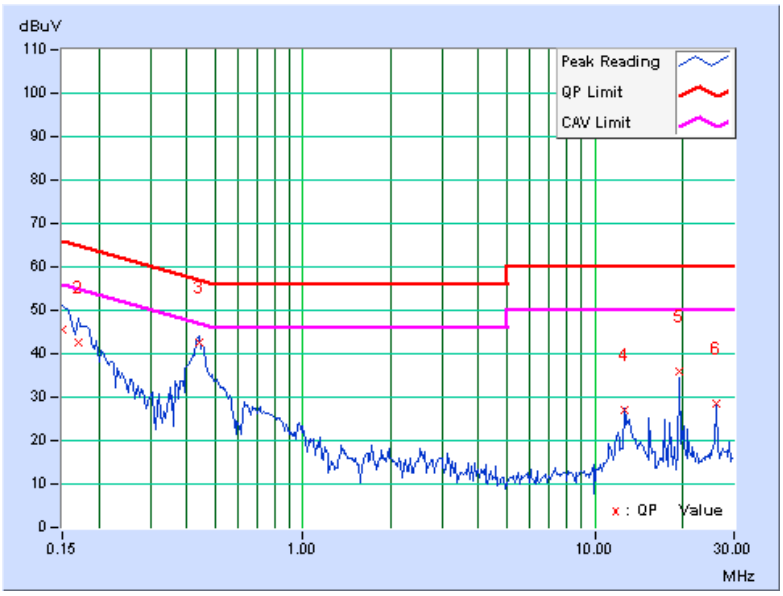
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission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



PHASE	Neutral (N)	6dB BANDWIDTH	9 kHz

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.150	0.05	45.67	-	45.72	-	66.00	56.00	-20.28	-
2	0.170	0.05	42.65	-	42.70	-	64.98	54.98	-22.28	-
3	0.443	0.06	42.37	-	42.43	-	57.01	47.01	-14.57	-
4	12.629	0.41	26.66	-	27.07	-	60.00	50.00	-32.93	-
5	19.500	0.55	35.37	-	35.92	-	60.00	50.00	-24.08	-
6	26.000	0.81	27.89	-	28.70	-	60.00	50.00	-31.30	-

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.



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.

4.2.2 TEST INSTRUMENTS

For below 1GHz test, tested data: Nov. 17~19

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	May 12 , 2010	May 11 , 2011
HP Pre_Amplifier	8449B	300801923	Nov. 01, 2010	Oct. 31, 2011
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Sep. 03, 2010	Sep. 02, 2011
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 28, 2010	Apr. 27, 2011
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 18, 2009	Dec. 17, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2010	Jan. 21, 2011
R&S Loop Antenna	HFH2-Z2	100070	Feb. 03, 2010	Feb. 02, 2012
RF Switches	EMH-011	1001	NA	NA
RF CABLE (Chaintek)	Sucoflex 104+ Sucoflex 106	RF104-101+RF106-101	Aug. 24, 2010	Aug. 23, 2011
RF Cable	8DFB	STCCAB-30M-1GHz	NA	NA
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, 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.

For above 1GHz test, tested data: Aug. 26

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 18, 2009	Dec. 17, 2010
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	May 12 , 2010	May 11 , 2011
HP Pre_Amplifier	8449B	300801923	Nov. 02, 2009	Nov. 01, 2010
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 27, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	Apr. 28, 2010	Apr. 27, 2011
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 18, 2009	Dec. 17, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2010	Jan. 21, 2011
R&S Loop Antenna	HFH2-Z2	100070	Feb. 03, 2010	Feb. 02, 2011
RF Switches	EMH-011	1001	NA	NA
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2010	Aug. 13, 2011
RF Cable	8DFB	STCCAB-30M-1GHz	NA	NA
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, 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.

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 10 meter open area test site for below 1GHz test and at a 3 meters chamber room for above 1GHz test. 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.

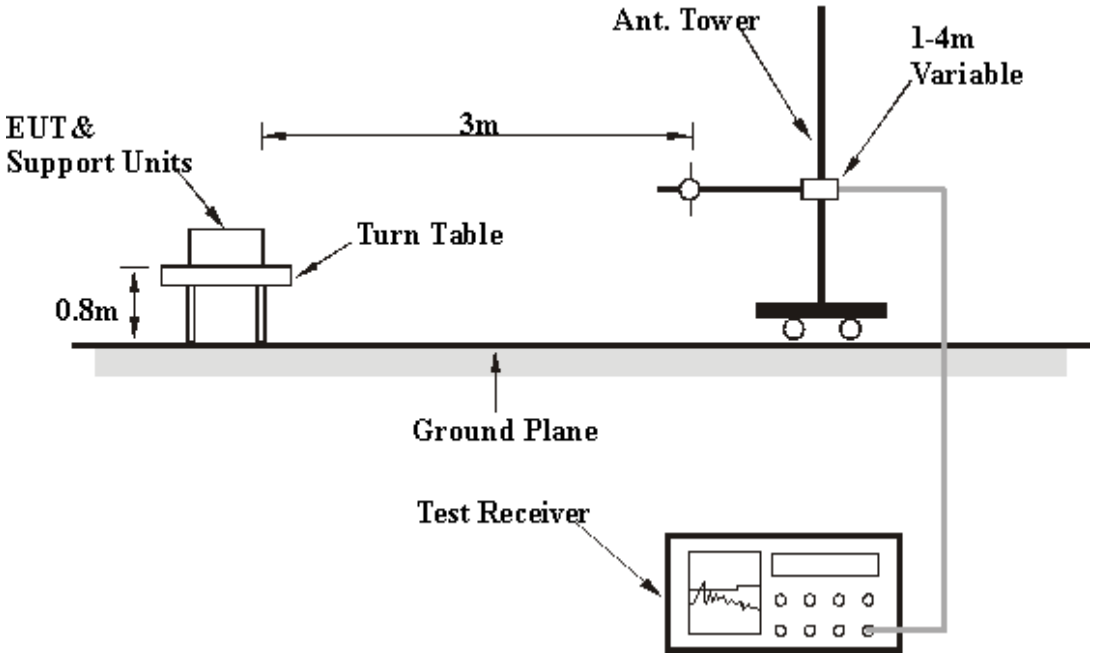
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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 peak, quasi-peak or average method as specified and then reported in a data sheet.

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 and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection 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 TEST SETUP



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

4.2.5 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.6 TEST RESULTS (WLAN <2.4GHz> + Bluetooth)

BELOW 1GHz WORST-CASE DATA：11g: 2437MHz + Bluetooth: 2402MHz

EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120Vac, 60 Hz	**FREQUENCY RANGE**	30-1000 MHz
ENVIRONMENTAL CONDITIONS	22deg. C, 63%RH 1013hPa	**DETECTOR FUNCTION**	Quasi-Peak
TESTED BY	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	125.03	36.79 QP	43.50	-6.71	1.54 H	223	23.92	12.87
2	144.00	37.93 QP	43.50	-5.57	1.46 H	122	23.39	14.54
3	223.35	36.79 QP	46.00	-9.21	1.34 H	259	24.62	12.17
4	250.00	41.67 QP	46.00	-4.33	1.13 H	315	28.10	13.57
5	375.00	40.47 QP	46.00	-5.53	1.14 H	162	22.92	17.55
6	500.00	40.96 QP	46.00	-5.04	1.00 H	57	20.20	20.76
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	**74.60**	**36.98 QP**	**40.00**	**-3.02**	**1.00 V**	**51**	**26.06**	**10.92**
2	113.11	34.78 QP	43.50	-8.72	1.00 V	271	23.64	11.14
3	143.24	36.38 QP	43.50	-7.12	1.00 V	268	21.78	14.60
4	250.00	40.39 QP	46.00	-5.61	1.00 V	174	26.82	13.57
5	600.00	42.78 QP	46.00	-3.22	1.33 V	26	19.51	23.27
6	1000.00	42.41 QP	54.00	-11.59	1.51 V	33	13.80	28.61

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 WORST-CASE DATA : 11g: 2437MHz + Bluetooth: 2402MHz

EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 25GHz
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 1013hPa	DETECTOR FUNCTION	Peak (PK) Average (AV)
TESTED BY	Frank 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	2390.00	54.30 PK	74.00	-19.70	1.06 H	211	28.35	25.95
2	2390.00	24.20 AV	54.00	-29.80	1.06 H	211	-1.75	25.95
3	4804.00	35.10 PK	74.00	-38.90	1.09 H	266	9.15	25.95
4	4804.00	5.00 AV	54.00	-49.00	1.09 H	266	-20.95	25.95
5	4874.00	54.20 PK	74.00	-19.80	1.00 H	124	28.25	25.95
6	4874.00	40.30 AV	54.00	-13.70	1.00 H	124	14.35	25.95
7	7206.00	46.30 PK	74.00	-27.70	1.02 H	211	20.35	25.95
8	7206.00	16.20 AV	54.00	-37.80	1.02 H	211	-9.75	25.95
9	7311.00	50.90 PK	74.00	-23.10	1.03 H	53	24.95	25.95
10	7311.00	38.10 AV	54.00	-15.90	1.03 H	53	12.15	25.95
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	55.40 PK	74.00	-18.60	1.44 V	235	29.45	25.95
2	2390.00	25.30 AV	54.00	-28.70	1.44 V	235	-0.65	25.95
3	4804.00	36.20 PK	74.00	-37.80	1.09 V	231	10.25	25.95
4	4804.00	6.10 AV	54.00	-47.90	1.09 V	231	-19.85	25.95
5	4874.00	57.40 PK	74.00	-16.60	1.09 V	258	31.45	25.95
6	4874.00	42.30 AV	54.00	-11.70	1.09 V	258	16.35	25.95
7	7206.00	44.70 PK	74.00	-29.30	1.06 V	211	18.75	25.95
8	7206.00	14.60 AV	54.00	-39.40	1.06 V	211	-11.35	25.95
9	7311.00	51.90 PK	74.00	-22.10	1.09 V	64	25.95	25.95
10	7311.00	38.60 AV	54.00	-15.40	1.09 V	64	12.65	25.95

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.

4.2.7 TEST RESULTS (WLAN <5GHz> + Bluetooth)

BELOW 1GHz WORST-CASE DATA：11a: 5785MHz + Bluetooth: 2402MHz

EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	30-1000 MHz
ENVIRONMENTAL CONDITIONS	22deg. C, 63%RH 1013hPa	DETECTOR FUNCTION	Quasi-Peak
TESTED BY	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	125.03	36.68 QP	43.50	-6.82	1.53 H	221	23.81	12.87
2	144.00	37.87 QP	43.50	-5.63	1.44 H	121	23.33	14.54
3	223.35	36.69 QP	46.00	-9.31	1.35 H	258	24.52	12.17
4	250.00	41.73 QP	46.00	-4.27	1.14 H	321	28.16	13.57
5	375.00	40.53 QP	46.00	-5.47	1.16 H	164	22.98	17.55
6	500.00	40.85 QP	46.00	-5.15	1.00 H	55	20.09	20.76
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	74.60	36.86 QP	40.00	-3.14	1.00 V	53	25.94	10.92
2	113.11	34.85 QP	43.50	-8.65	1.00 V	272	23.71	11.14
3	143.24	36.46 QP	43.50	-7.04	1.00 V	267	21.86	14.60
4	250.00	40.52 QP	46.00	-5.48	1.00 V	172	26.95	13.57
5	600.00	42.69 QP	46.00	-3.31	1.31 V	24	19.42	23.27
6	1000.00	42.52 QP	54.00	-11.48	1.50 V	32	13.91	28.61

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 WORST-CASE DATA : 11a: 5785MHz + Bluetooth: 2402MHz

EUT TEST CONDITION		MEASUREMENT DETAIL	
INPUT POWER	120Vac, 60 Hz	FREQUENCY RANGE	1 ~ 40GHz
ENVIRONMENTAL CONDITIONS	25deg. C, 68%RH 1013hPa	DETECTOR FUNCTION	Peak (PK) Average (AV)
TESTED BY	Frank 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	4804.00	35.30 PK	74.00	-38.70	1.09 H	260	9.35	25.95
2	4804.00	5.20 AV	54.00	-48.80	1.09 H	260	-20.75	25.95
3	7206.00	46.50 PK	74.00	-27.50	1.02 H	201	20.55	25.95
4	7206.00	16.40 AV	54.00	-37.60	1.02 H	201	-9.55	25.95
5	11570.00	58.40 PK	74.00	-15.60	1.27 H	29	32.45	25.95
6	11570.00	46.30 AV	54.00	-7.70	1.27 H	29	20.35	25.95
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	36.10 PK	74.00	-37.90	1.10 V	231	10.15	25.95
2	4804.00	6.00 AV	54.00	-48.00	1.10 V	231	-19.95	25.95
3	7206.00	44.50 PK	74.00	-29.50	1.07 V	201	18.55	25.95
4	7206.00	14.40 AV	54.00	-39.60	1.07 V	201	-11.55	25.95
5	11570.00	56.90 PK	74.00	-17.10	1.00 V	231	30.95	25.95
6	11570.00	44.10 AV	54.00	-9.90	1.00 V	231	18.15	25.95

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.

3.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 certificates of our laboratories obtained from approval agencies can be downloaded from our web site: 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: 886-2-26052943

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
Web Site: www.adt.com.tw

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

4.APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

--- END ---