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Supplemental “Transmit Simultaneously” Test Report

REPORT NO.: RF131028E08-5

MODEL NO.: MC32N0

FCC ID: UZ7MC32N0

RECEIVED: Oct. 28, 2013

TESTED: Dec. 11, 2013 to Jan. 10, 2014

ISSUED: Feb. 07, 2014

APPLICANT: Motorola Solutions, 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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF131028E08-5	Original release	Feb. 07, 2014



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1. CERTIFICATION

PRODUCT : Mobile Computer
BRAND NAME : MOTOROLA
MODEL NO. : MC32N0
TEST ITEM: ENGINEERING SAMPLE
APPLICANT : Motorola Solutions, Inc.
TESTED: Dec. 11, 2013 to Jan. 10, 2014
STANDARDS : FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10-2009

The above equipment (Model: MC32N0) 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 : Midoli Peng , **DATE:** Feb. 07, 2014
(Midoli Peng, Specialist)

APPROVED BY : May Chen , **DATE:** Feb. 07, 2014
(May Chen, Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

For WLAN 2.4GHz & BT

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -8.32dB at 0.150MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -7.5dB at 37.61MHz

For WLAN 5GHz & BT

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -11.49dB at 0.150MHz
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -8.1dB at 37.61MHz

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	2.98 dB
Radiated emissions (30MHz-1GHz)	5.37 dB
Radiated emissions (1GHz -6GHz)	3.65 dB
Radiated emissions (6GHz -18GHz)	3.88 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Mobile Computer
MODEL NO.	MC32N0
POWER SUPPLY	DC 5.4V from power adapter or DC 3.7V from battery
MODULATION TYPE	For WLAN CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM For BT GFSK, $\pi/4$ -DQPSK, 8DPSK
MODULATION TECHNOLOGY	For WLAN : DSSS, OFDM For BT : FHSS
TRANSFER RATE	For WLAN 802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 72.2Mbps For BT Up to 3Mbps
OPERATING FREQUENCY	For WLAN(15.407) 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.5~5.58GHz & 5.66~5.7GHz For WLAN(15.247) 2.4GHz: 2.412 ~ 2.472GHz 5GHz: 5.745 ~ 5.825GHz For BT 2402MHz ~ 2480MHz
NUMBER OF CHANNEL	For WLAN(15.407) 16 for 802.11a, 802.11n (HT20) For WLAN(15.247, 2.4GHz) 13 for 802.11b, 802.11g, 802.11n (HT20) For WLAN(15.247, 5GHz) 5 for 802.11a, 802.11n (HT20) For BT 79

MAXIMUM OUTPUT POWER	For 15.407 802.11a: 86.099mW 802.11n (HT20): 73.451mW For 15.247 (2.4GHz) 802.11b: 161.065mW 802.11g: 196.789mW 802.11n (HT20): 199.986mW For 15.247 (5GHz) 802.11a: 123.027mW 802.11n (HT20): 123.027mW
	For BT 1.892 mW
ANTENNA TYPE	Please see NOTE
DATA CABLE	Please see NOTE
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	Please see NOTE

NOTE:

1. There are Bluetooth 2.1 + EDR technology and WLAN 802.11 a/b/g/n technology.
2. For WLAN: 2.4GHz and 5GHz technology cannot transmit at same time.
3. WLAN & BT technology can transmit at same time.

4. EUT Configuration list:

	Feature	Straight	Rotate	Gun
OS	WIN CE 7.0	V	V	V
	Android	V	V	V
Display	Size 3", Resolution: 320x320	V	V	V
Flash/RAM	512M/2G	V	V	V
	1G/4G	V	V	V
Scanner	2D Imager SE4750	V		V
	2D Imager SE4500			V
	1D SE965	V	V	V
Keypad	28 keys	V	V	V
	38 keys	V	V	V
	48 keys	V	V	V
Battery	1X	V	V	
	2X	V	V	V
RF	WLAN 802.11 a/b/g/n (HT20)	V	V	V
	BT 2.1 EDR	V	V	V
Accessories	USB1.1 Full speed host/client	V	V	V
	Holster	V	V	V
	Headset	V	V	V

5. The associated devices(optional) of EUT information are as below:

Product	Brand	Model
Headset	MOTOROLA	RCH51
Cable (RCH51 adapter cable to MC32N0) (Part No. : 25-124411-02R)		

6.The Version of EUT information are as below:

WinCE System		
Mobile Computer	OS Version	07.00.2824
	OEM Name	Motorola MC32N0
	OEM Version	00.40.02
Wireless(Fusion)	Part Number	31-FUSION-X2.01
	Version	X_2.01.0.0.062R
	WLAN Firmware	X_2.01.0.0.166
XW2DMT	Version	X_2.01.0.0.3
	Motorola version	X_2.01.0.0.166
BTRegTest Ver4.1	Version	3.00.2.0.031R

Android System		
Android	Version	4.1.1
EA	Version	2.53
Kernal version	Version	3.0.31

7.The EUT could be supplied with the a power adapter and/or Li-ion battery as below:

Power Adapter	
Brand:	MOTOROLA
Part No.:	PWRS-14000-249R
Input power:	100~240V, 50~60Hz, 0.6A
Output power:	5.4V, 3A
US AC line cord, un-grounded and unshielded, 1.85m (Part No.: 50-16000-182R)	
USB Client Communication and Charging Cable	
Brand:	MOTOROLA
Part No.:	25-67868-03R
Associated Devices:	AC cable*1 (Part No.: 50-16000-182R) Adapter * 1 (Part No.: PWRS-14000-249R)
Li-ion Battery 1	
Brand:	MOTOROLA
Model No.:	82-000011-01
RATING:	3.7V, 2740mAh, 10.2Wh
Li-ion Battery 2	
Brand:	MOTOROLA
Model No.:	82-000012-01
RATING:	3.7V, 4800mAh, 17.8Wh

8. The antennas provided to the EUT, please refer to the following table:

For WLAN								
No.	Brand	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)	Cable Loss(dB)	Cable Length(mm)
1	Laird	Rot - Main	PIFA	0.95 (2.4G) 5.5 (5G)	Hirose U.FL	2400~2500 4900~5850	0.1~0.15	61 +2/-1
2	Laird	Rot - Aux	PIFA	0.61 (2.4G) 5.89 (5G)	Hirose U.FL	2400~2500 4900~5850	0.1~0.15	23 +2.5/0
3	Laird	Str - Main	PIFA	1.09 (2.4G) 4.65 (5G)	Hirose U.FL	2400~2500 4900~5850	0.1~0.15	61 +2/-1
4	Laird	Str - Aux	PIFA	0.66 (2.4G) 4.19 (5G)	Hirose U.FL	2400~2500 4900~5850	0.1~0.15	23 +2.5/0
5	Laird	Gun - Main	PIFA	1.77 (2.4G) 4.82 (5G)	Hirose U.FL	2400~2500 4900~5850	0.1~0.15	61 +2/-1
6	Laird	Gun - Aux	PIFA	1.61 (2.4G) 5.82 (5G)	Hirose U.FL	2400~2500 4900~5850	0.1~0.15	23 +2.5/0

Note :

1. For 2.4G: The antenna 5 was selected as representative antenna for the test.
2. For 5G: The antenna 2 was selected as representative antenna for the test.

For Bluetooth

No.	Brand	Model	Antenna Type	Gain (dBi)	Connector Type	Frequency range (MHz)	Cable Loss(dB)	Cable Length(mm)
7	Aristotle	Rot	PIFA	2.6	IPEX	2400~2480	0.1~0.15	26 ± 0.5
8	Aristotle	Str	PIFA	2.71	IPEX	2400~2480	0.1~0.15	26 ± 0.5
9	Aristotle	Gun	PIFA	3.74	IPEX	2400~2480	0.1~0.15	26 ± 0.5

Note :

1. The antenna 9 was selected as representative antenna for the test.

9. The EUT incorporates a SISO function. Both, main and diversity (aux.) antennas path can transmit but only one can transmit at given time while the other is RX only.

MODULATION MODE	TX/RX FUNCTION
802.11b	1TX/1RX(Diversity)
802.11g	1TX/1RX(Diversity)
802.11a	1TX/1RX(Diversity)
802.11n (HT20)	1TX/1RX(Diversity)

10. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 7.

11. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

Simultaneously Transmission Mode (WLAN 2.4GHz + BT)

EUT configure mode	Applicable to			Description
	PLC	RE<1G	RE ³ 1G	
-	√	√	√	Gun

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

Simultaneously Transmission Mode (WLAN 5GHz + BT)

EUT configure mode	Applicable to			Description
	PLC	RE<1G	RE ³ 1G	
-	√	√	√	Rotate

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

POWER LINE CONDUCTED EMISSION TEST:

☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type
2.4 GHz (802.11n (HT20)) + Bluetooth	1 to 13	6	OFDM	BPSK
	0 to 78	78	FHSS	8DPSK
5 GHz (802.11n (HT20)) + Bluetooth	149 to 165	149	OFDM	BPSK
	0 to 78	78	FHSS	8DPSK

RADIATED EMISSION TEST:

☒ Following channel(s) was (were) selected for the final test as listed below.

Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type
2.4 GHz (802.11n (HT20)) + Bluetooth	1 to 13	6	OFDM	BPSK
	0 to 78	78	FHSS	8DPSK
5 GHz (802.11n (HT20)) + Bluetooth	149 to 165	149	OFDM	BPSK
	0 to 78	78	FHSS	8DPSK

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	24deg. C, 58%RH	120Vac, 60Hz	Jyunchun Lin
RE<1G	24deg. C, 73%RH	120Vac, 60Hz	Jason Huang
RE ³ 1G	24deg. C, 67%RH	120Vac, 60Hz	Tim Ho

3.3 DESCRIPTION OF SUPPORT UNITS

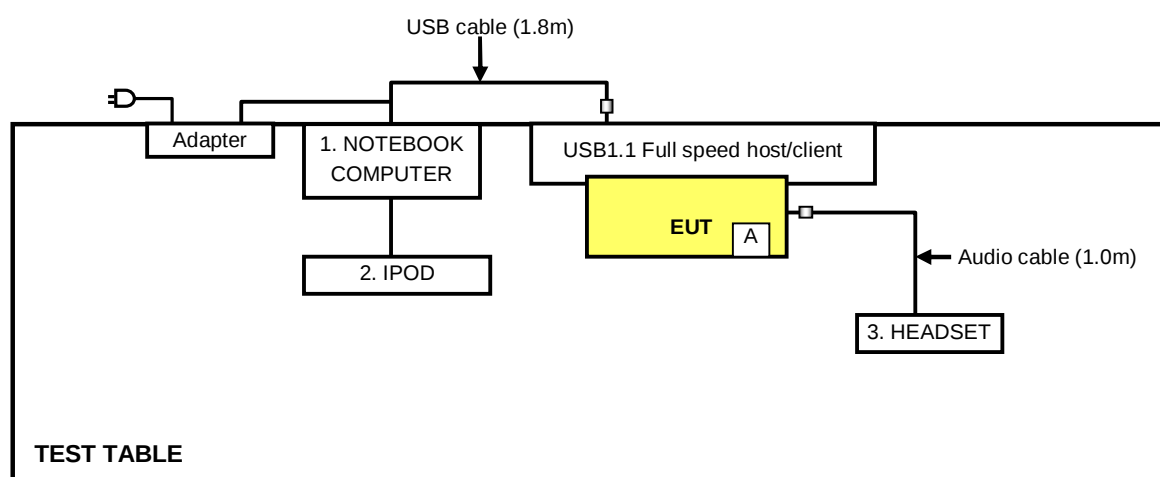
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP32LA	FSLB32S	FCC DoC
2	iPod shuffle	Apple	MC749TA/A	CC4DN25WDFDM	NA
3	HEADSET	MOTOROLA	RCH51	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB cable (1.8m with 1 core)
2	USB cable (0.1m)
3	Audio cable (1.0m with 1 core)

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

3.4 CONFIGURATION OF SYSTEM UNDER TEST



NOTE: 1. Item A is the Micro 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 (dB μ 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.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100287	Feb. 28, 2013	Feb. 27, 2014
Line-Impedance Stabilization Network (for EUT) ROHDE & SCHWARZ	NSLK-8127	5127-523	Oct. 02, 2013	Oct. 01, 2014
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 13, 2013	Nov. 12, 2014
RF Cable (JYEBAO)	5DFB	COACAB-001	May 27, 2013	May 26, 2014
50 ohms Terminator	50	3	Oct. 17, 2013	Oct. 16, 2014
50 ohms Terminator	N/A	EMC-04	Oct. 17, 2013	Oct. 16, 2014
Software ADT	BV ADT_Cond_V7.3.7 .3	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.
4. Tested Date: Dec. 13 to 16, 2013

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.
- b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- c. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- d. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

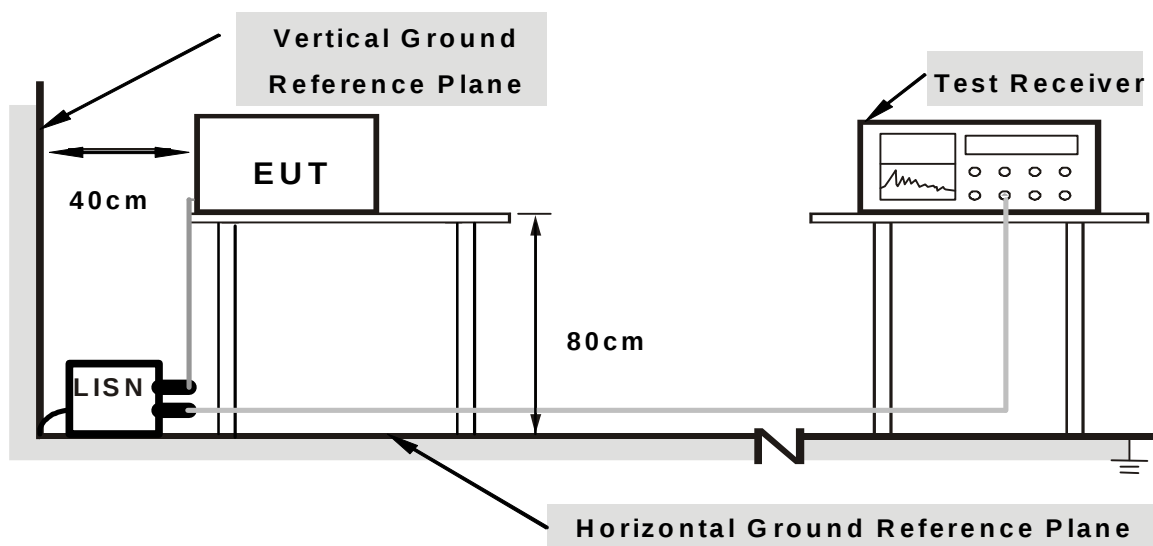
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

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 communication partner run test program “XW2DMT.exe” & “BTRegTestVer4.1.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

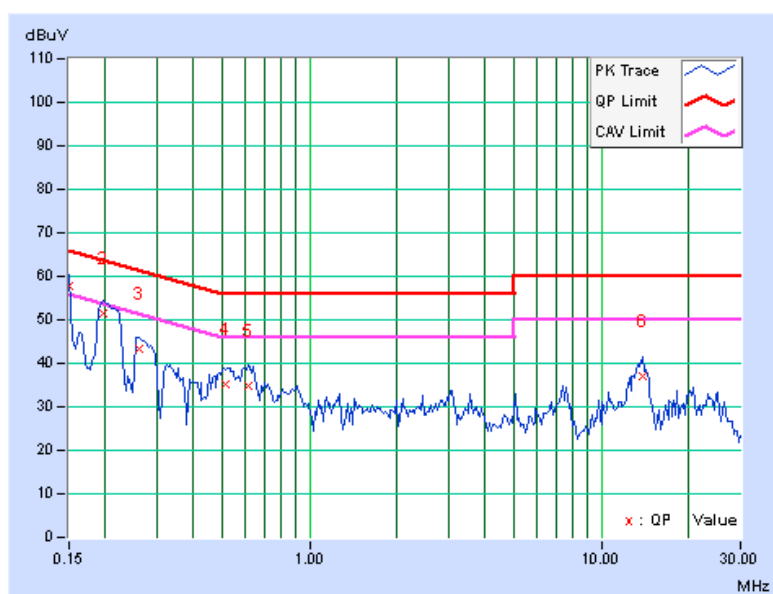
4.1.7 TEST RESULTS (WLAN 2.4GHz + BT)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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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	0.15000	0.05	57.63	25.92	57.68	25.97	66.00	56.00	-8.32	-30.03
2	0.19687	0.06	51.58	36.37	51.64	36.43	63.74	53.74	-12.10	-17.31
3	0.25938	0.07	43.15	26.14	43.22	26.21	61.45	51.45	-18.23	-25.24
4	0.51538	0.11	35.06	20.90	35.17	21.01	56.00	46.00	-20.83	-24.99
5	0.61484	0.12	34.88	22.86	35.00	22.98	56.00	46.00	-21.00	-23.02
6	13.87500	0.60	36.35	29.66	36.95	30.26	60.00	50.00	-23.05	-19.74

REMARKS:

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

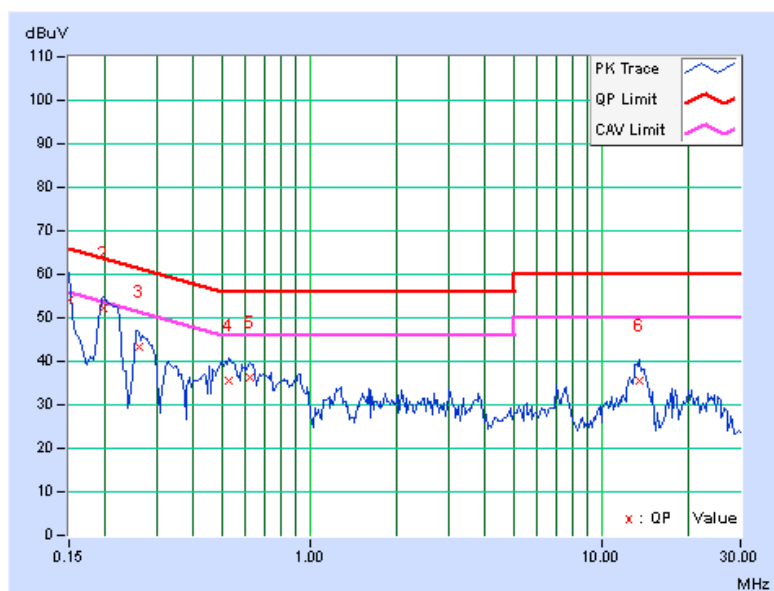


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	53.92	37.61	53.97	37.66	66.00	56.00	-12.03	-18.34
2	0.19687	0.05	52.32	36.67	52.37	36.72	63.74	53.74	-11.37	-17.02
3	0.25938	0.07	43.27	27.92	43.34	27.99	61.45	51.45	-18.11	-23.46
4	0.52891	0.12	35.38	24.80	35.50	24.92	56.00	46.00	-20.50	-21.08
5	0.62266	0.12	36.34	24.62	36.46	24.74	56.00	46.00	-19.54	-21.26
6	13.54688	0.57	35.00	28.79	35.57	29.36	60.00	50.00	-24.43	-20.64

REMARKS:

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



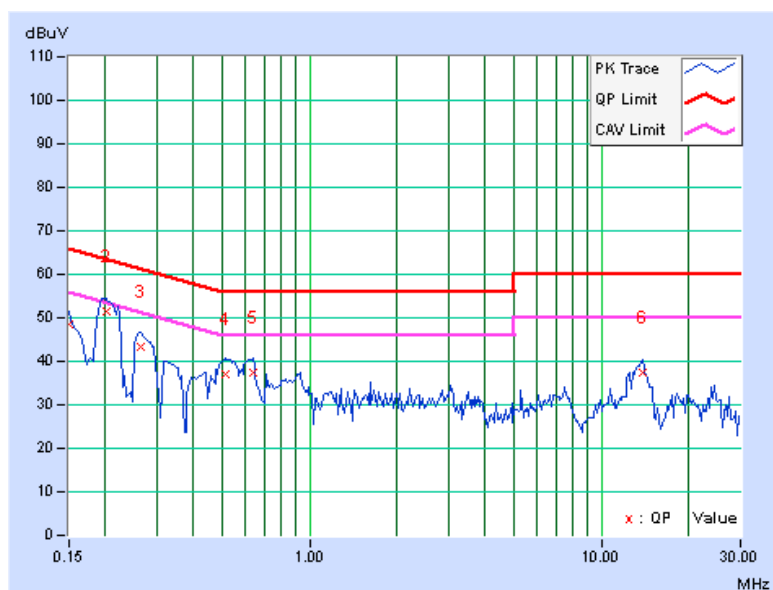
4.1.8 TEST RESULTS (WLAN 5GHz + BT)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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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	0.15000	0.05	48.55	34.19	48.60	34.24	66.00	56.00	-17.40	-21.76
2	0.20078	0.06	51.44	38.03	51.50	38.09	63.58	53.58	-12.08	-15.49
3	0.26328	0.08	43.43	28.38	43.51	28.46	61.33	51.33	-17.82	-22.87
4	0.51719	0.11	37.10	22.98	37.21	23.09	56.00	46.00	-18.79	-22.91
5	0.63828	0.12	37.18	23.34	37.30	23.46	56.00	46.00	-18.70	-22.54
6	13.86328	0.60	36.73	31.51	37.33	32.11	60.00	50.00	-22.67	-17.89

REMARKS:

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

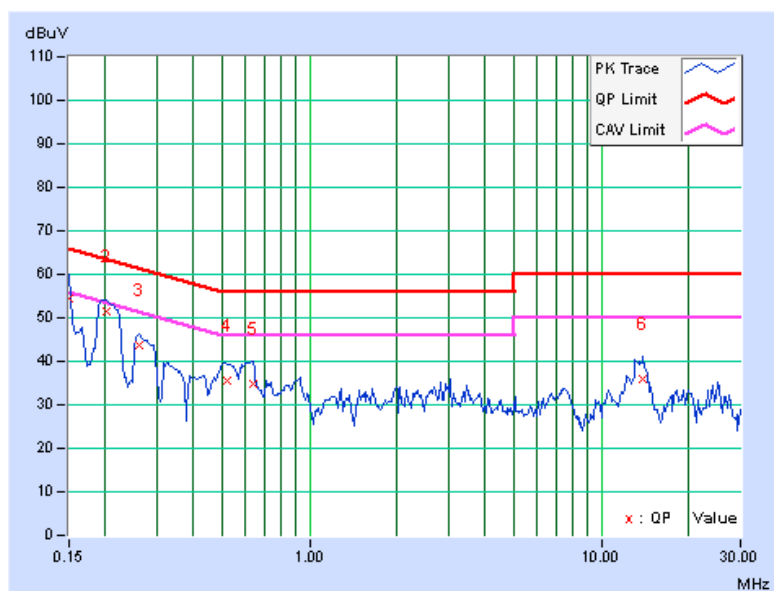


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.05	54.46	31.99	54.51	32.04	66.00	56.00	-11.49	-23.96
2	0.20078	0.05	51.30	36.83	51.35	36.88	63.58	53.58	-12.23	-16.70
3	0.25938	0.07	43.58	25.70	43.65	25.77	61.45	51.45	-17.80	-25.68
4	0.52103	0.12	35.56	22.84	35.68	22.96	56.00	46.00	-20.32	-23.04
5	0.63828	0.12	34.80	24.64	34.92	24.76	56.00	46.00	-21.08	-21.24
6	13.92578	0.58	35.21	29.62	35.79	30.20	60.00	50.00	-24.21	-19.80

REMARKS:

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



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

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. 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.



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4.2.2 TEST INSTRUMENTS

Below 1GHz test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29, 2013	Jan. 28, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 18, 2013	Nov. 17, 2014
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: Dec. 11, 2013



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Above 1GHz test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29, 2013	Jan. 28, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
Horn_Antenna AISI	AIH.8018	000032009111 0	Nov. 18, 2013	Nov. 17, 2014
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 12, 2013	Dec. 11, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: Jan. 10, 2014

4.2.3 TEST PROCEDURES

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

NOTE:

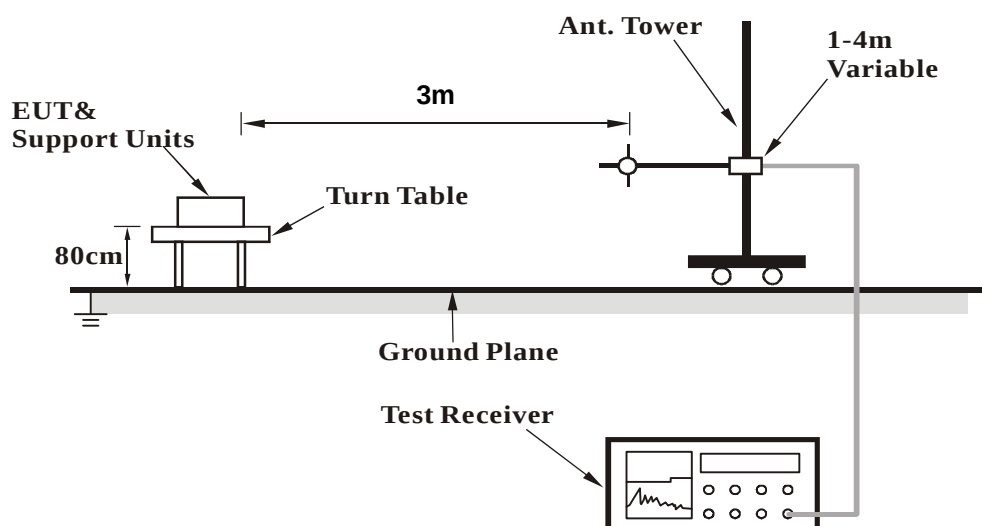
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

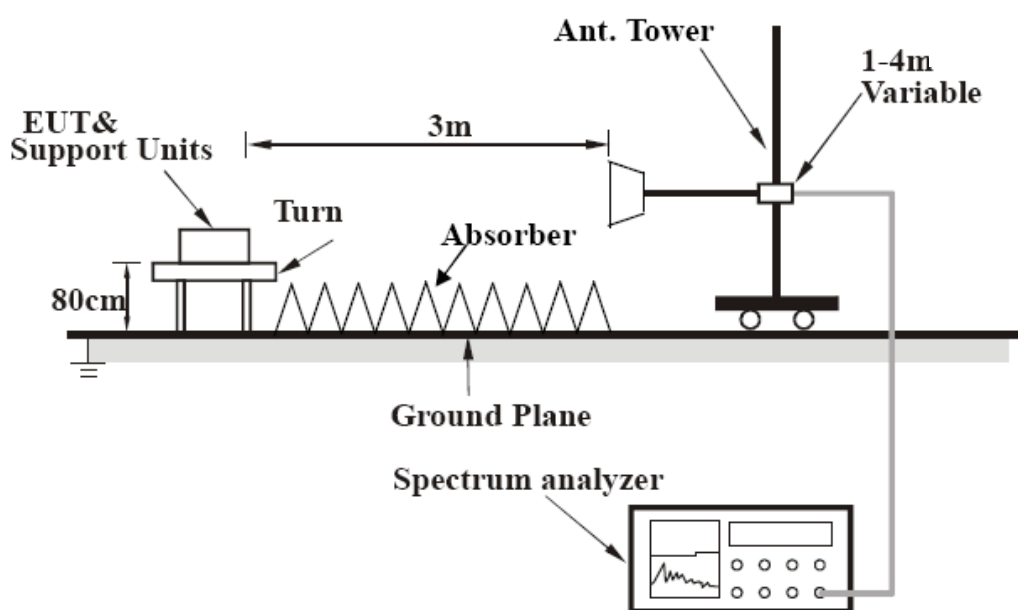
No deviation

4.2.5 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6

4.2.7 TEST RESULTS (WLAN 2.4GHz +BT)

BELOW 1GHz WORST-CASE DATA :

FREQUENCY RANGE	Below 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
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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	110.56	30.2 QP	43.5	-13.3	2.00 H	220	46.16	-16.00
2	128.65	31.0 QP	43.5	-12.6	1.56 H	187	45.60	-14.65
3	150.00	32.7 QP	43.5	-10.8	1.50 H	220	46.07	-13.33
4	166.38	33.1 QP	43.5	-10.4	1.00 H	203	47.01	-13.92
5	240.01	30.6 QP	46.0	-15.4	1.00 H	166	45.34	-14.76
6	322.07	27.1 QP	46.0	-18.9	1.00 H	117	38.79	-11.71
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.61	32.5 QP	40.0	-7.5	1.10 V	284	46.49	-13.96
2	126.08	32.5 QP	43.5	-11.0	1.00 V	302	47.06	-14.58
3	133.16	35.0 QP	43.5	-8.5	1.00 V	112	49.19	-14.19
4	150.09	33.6 QP	43.5	-10.0	1.00 V	303	46.86	-13.31
5	161.63	34.5 QP	43.5	-9.0	1.50 V	248	47.64	-13.11
6	306.94	32.2 QP	46.0	-13.8	2.00 V	118	44.55	-12.31

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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ABOVE 1GHz WORST-CASE DATA

FREQUENCY RANGE	1GHz ~ 25GHz	DETECTOR FUNCTION	Peak (PK) Average (AV)
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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	4874.00	52.4 PK	74.0	-21.6	1.32 H	272	45.10	7.30
2	4874.00	46.2 AV	54.0	-7.8	1.32 H	272	38.90	7.30
3	4960.00	47.1 PK	74.0	-26.9	1.06 H	110	39.60	7.50
4	4960.00	16.9 AV	54.0	-37.1	1.06 H	110	9.40	7.50
5	7311.00	50.2 PK	74.0	-23.8	1.00 H	332	35.20	15.00
6	7311.00	39.0 AV	54.0	-15.0	1.00 H	332	24.00	15.00
7	7440.00	54.0 PK	74.0	-20.0	1.00 H	259	39.20	14.80
8	7440.00	23.9 AV	54.0	-30.1	1.00 H	259	9.10	14.80
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	4874.00	49.6 PK	74.0	-24.4	1.00 V	267	42.30	7.30
2	4874.00	38.0 AV	54.0	-16.0	1.00 V	267	30.70	7.30
3	4960.00	46.8 PK	74.0	-27.2	1.00 V	288	39.30	7.50
4	4960.00	16.8 AV	54.0	-37.2	1.00 V	288	9.30	7.50
5	7311.00	52.7 PK	74.0	-21.3	1.03 V	249	37.70	15.00
6	7311.00	41.7 AV	54.0	-12.3	1.03 V	249	26.70	15.00
7	7440.00	52.3 PK	74.0	-21.7	1.06 V	113	37.50	14.80
8	7440.00	22.2 AV	54.0	-31.8	1.06 V	113	7.40	14.80

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2.8 TEST RESULTS (WLAN 5Hz +BT)

BELOW 1GHz WORST-CASE DATA :

FREQUENCY RANGE	Below 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)
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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	110.56	30.2 QP	43.5	-13.3	2.00 H	220	46.16	-16.00
2	128.65	31.0 QP	43.5	-12.6	1.56 H	187	45.60	-14.65
3	150.00	32.7 QP	43.5	-10.8	1.50 H	220	46.07	-13.33
4	166.38	33.1 QP	43.5	-10.4	1.00 H	203	47.01	-13.92
5	240.01	30.6 QP	46.0	-15.4	1.00 H	166	45.34	-14.76
6	322.07	27.1 QP	46.0	-18.9	1.00 H	117	38.79	-11.71
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.61	32.0 QP	40.0	-8.1	1.00 V	23	45.91	-13.96
2	126.08	32.7 QP	43.5	-10.8	1.00 V	307	47.31	-14.58
3	133.16	34.9 QP	43.5	-8.6	1.00 V	326	49.10	-14.19
4	150.09	33.6 QP	43.5	-10.0	1.00 V	231	46.86	-13.31
5	161.63	34.4 QP	43.5	-9.2	1.50 V	360	47.46	-13.11
6	306.94	32.2 QP	46.0	-13.8	2.00 V	23	44.52	-12.31

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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ABOVE 1GHz WORST-CASE DATA

FREQUENCY RANGE	1GHz ~ 40GHz	DETECTOR FUNCTION	Peak (PK) Average (AV)
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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	4960.00	47.4 PK	74.0	-26.6	1.00 H	138	39.90	7.50
2	4960.00	17.5 AV	54.0	-36.5	1.00 H	138	10.00	7.50
3	7440.00	54.1 PK	74.0	-19.9	1.02 H	223	39.30	14.80
4	7440.00	24.0 AV	54.0	-30.0	1.02 H	223	9.20	14.80
5	11490.00	51.6 PK	74.0	-22.4	1.00 H	212	35.00	16.60
6	11490.00	40.4 AV	54.0	-13.6	1.00 H	212	23.80	16.60
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	4960.00	47.4 PK	74.0	-26.6	1.01 V	308	39.90	7.50
2	4960.00	17.1 AV	54.0	-36.9	1.01 V	308	9.60	7.50
3	7440.00	52.7 PK	74.0	-21.3	1.00 V	111	37.90	14.80
4	7440.00	22.9 AV	54.0	-31.1	1.00 V	111	8.10	14.80
5	11490.00	53.9 PK	74.0	-20.1	1.05 V	198	37.30	16.60
6	11490.00	41.7 AV	54.0	-12.3	1.05 V	198	25.10	16.60

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



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4. INFORMATION ON THE TESTING LABORATORIES

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

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

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Web Site: www.bureauveritas-adt.com

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

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