Supplemental “Transmit Simultaneously” Test Report

Report No.:	RF151022E06-2
FCC ID:	2AD8UFZCWM2A1
Test Model:	WM2A-AC210m
Received Date:	Oct. 22, 2015
Test Date:	Dec. 02 to 16, 2015
Issued Date:	Jan. 21, 2016
Applicant:	Nokia Solutions and Networks.OY
Address:	Karaportti 3, P.O. Box 226, Nokia Group, Finland.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
RF151022E06	Original release.	Jan. 21, 2016

1 Certificate of Conformity

Product:	Wi-Fi AP Module 802.11 ac
Brand:	Nokia
Test Model:	WM2A-AC210m
Sample Status:	MASS-PRODUCTION
Applicant:	Nokia Solutions and Networks.OY
Test Date:	Dec. 02 to 16, 2015
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10: 2013

The above equipment 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 : _____ , **Date:** Jan. 21, 2016

Elsie Hsu / Specialist

Approved by : _____ , **Date:** Jan. 21, 2016

May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)				
FCC Clause	FCC KDB 558074	Test Item	Result	Remarks
15.207	-	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -15.16dB at 0.19297MHz.
15.205 / 15.209 / 15.247(d)	Section 11, 12 &13	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -8.2dB at 39.65MHz.

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:

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.31 dB
Radiated Emissions above 1 GHz	1GHz ~6GHz	3.40 dB
	6GHz ~ 18GHz	3.73 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wi-Fi AP Module 802.11 ac
Brand	Nokia
Test Model	WM2A-AC210m
Test Sample S/N	F3406027
Hardware Version	AM2
Status of EUT	MASS-PRODUCTION
Power Supply Rating	5.1Vdc from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
Number of Channel	**For 15.407** 24 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 11 for 802.11n (HT40), 802.11ac (VHT40) 5 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b/g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	**For 5GHz** **1TX (Chain 0) Mode:** 5.18 ~ 5.24GHz: 802.11a: 182.81mW 802.11ac (VHT20): 180.717mW 802.11ac (VHT40): 159.221mW 802.11ac (VHT80): 96.605mW 5.745 ~ 5.825GHz: 802.11a: 162.93mW 802.11ac (VHT20): 163.682mW 802.11ac (VHT40): 160.694mW 802.11ac (VHT80): 51.523mW **1TX (Chain 1) Mode:** 5.18 ~ 5.24GHz: 802.11a: 195.884mW 802.11ac (VHT20): 196.789mW 802.11ac (VHT40): 190.108mW 802.11ac (VHT80): 63.387mW 5.745 ~ 5.825GHz: 802.11a: 163.305mW 802.11ac (VHT20): 161.065mW 802.11ac (VHT40): 162.181mW 802.11ac (VHT80): 38.282mW **2TX Mode:** 5.18 ~ 5.24GHz: 802.11a: 360.772mW 802.11ac (VHT20): 368.481mW 802.11ac (VHT40): 365.945mW 802.11ac (VHT80): 83.213mW

	5.745 ~ 5.825GHz: 802.11a: 384.025mW 802.11ac (VHT20): 367.675mW 802.11ac (VHT40): 324.995mW 802.11ac (VHT80): 31.311mW **For 2.4GHz** **1TX (Chain 0) Mode:** 802.11b: 89.536mW 802.11g: 85.507mW 802.11n (HT20): 86.696mW 802.11n (HT40): 87.096mW **1TX (Chain 1) Mode:** 802.11b: 89.125mW 802.11g: 86.497mW 802.11n (HT20): 85.704mW 802.11n (HT40): 88.512mW **2TX Mode:** 802.11b: 197.709mW 802.11g: 199.467mW 802.11n (HT20): 179.345mW 802.11n (HT40): 178.996mW
Antenna Type	Refer to note as below
Antenna Connector	Refer to note as below
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. 2.4GHz and 5GHz technology can transmit at same time.
2. The emission of the simultaneous operation (2.4GHz and 5GHz) has been evaluated and no non-compliance was found.
3. The antennas provided to the EUT, please refer to the following table:

Antenna No	PCB Chain No.	Brand	Model	Antenna Type	Gain(dBi)	Frequency (GHz to GHz)
1	U20	Galtronics	NA	PIFA	5.17	2.4~2.4835
					6.03	5.15~5.25
					6.17	5.25~5.35
					5.57	5.47~5.725
					5.18	5.725~5.85
2	U21	Galtronics	NA	PIFA	4.27	2.4~2.4835
					5.1	5.15~5.25
					4.91	5.25~5.35
					5.23	5.47~5.725
					5.73	5.725~5.85

Cable Spec.

Antenna No	Brand	Model	Connector Type	Cable Loss(dB)	Cable Length (cm)
1	NA	NA	MMCX	0	30.6
2	NA	NA	MMCX	0	9.1

4. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS 0~8, Nss=1	2TX	2RX
	MCS 0~8, Nss=2	2TX	2RX
802.11ac (VHT40)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX
802.11ac (VHT80)	MCS 0~9, Nss=1	2TX	2RX
	MCS 0~9, Nss=2	2TX	2RX

5. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.1.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	OB	
-	√	-	√	√	2TX

Where **RE≥1G: Radiated Emission above 1GHz** **RE<1G: Radiated Emission below 1GHz**
PLC: Power Line Conducted Emission **OB: Conducted Out-Band Emission Measurement**

NOTE: 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on Z-plane (for below 1GHz) and Y-plane (for above 1GHz).

Radiated Emission Test (Above 1GHz):

☒ 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)
2.4GHz (802.11g + 5GHz (802.11a)	1 to 11	11	OFDM	BPSK	6
	149 to 165	165	OFDM	BPSK	6

Radiated Emission Test (Below 1GHz):

☒ 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)
2.4GHz (802.11g + 5GHz (802.11a)	1 to 11	11	OFDM	BPSK	6
	149 to 165	165	OFDM	BPSK	6

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	DATA RATE (Mbps)
2.4GHz (802.11g + 5GHz (802.11a)	1 to 11	11	OFDM	BPSK	6
	149 to 165	165	OFDM	BPSK	6

Conducted Out-Band Emission Measurement:

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

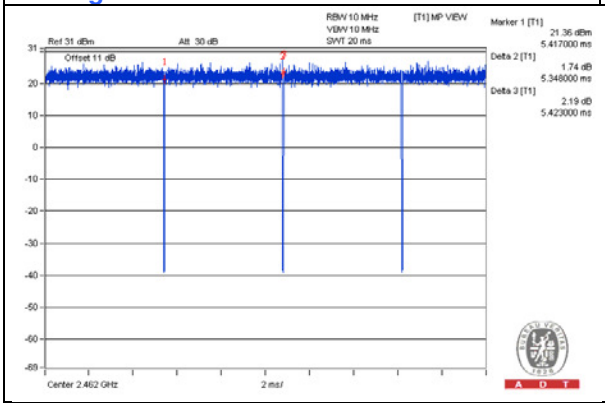
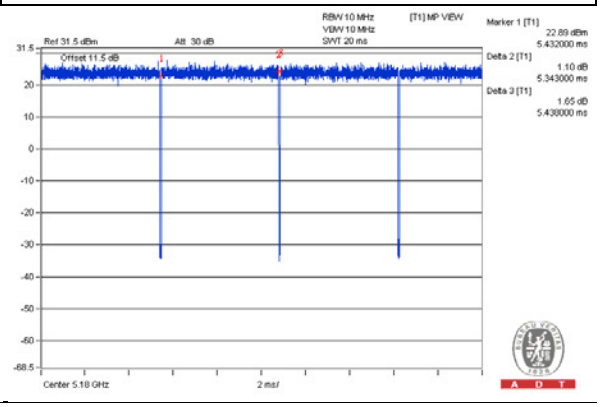
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
2.4GHz (802.11g + 5GHz (802.11a)	1 to 11	11	OFDM	BPSK	6
	149 to 165	165	OFDM	BPSK	6

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 67%RH	120Vac, 60Hz	Gary Cheng
RE<1G	24deg. C, 66%RH	120Vac, 60Hz	Jyunchun Lin
PLC	23deg. C, 67%RH	120Vac, 60Hz	Andy Ho
OB	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

3.2 Duty Cycle of Test Signal

Duty cycle of test signal is ≥ 98 %, duty factor is not required.
2.4GHz: 802.11g: Duty cycle = 5.348 ms/5.423 ms = 0.986
5GHz: 802.11a: Duty cycle = 5.353 ms/5.438 ms = 0.983

802.11g	802.11a
	

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.

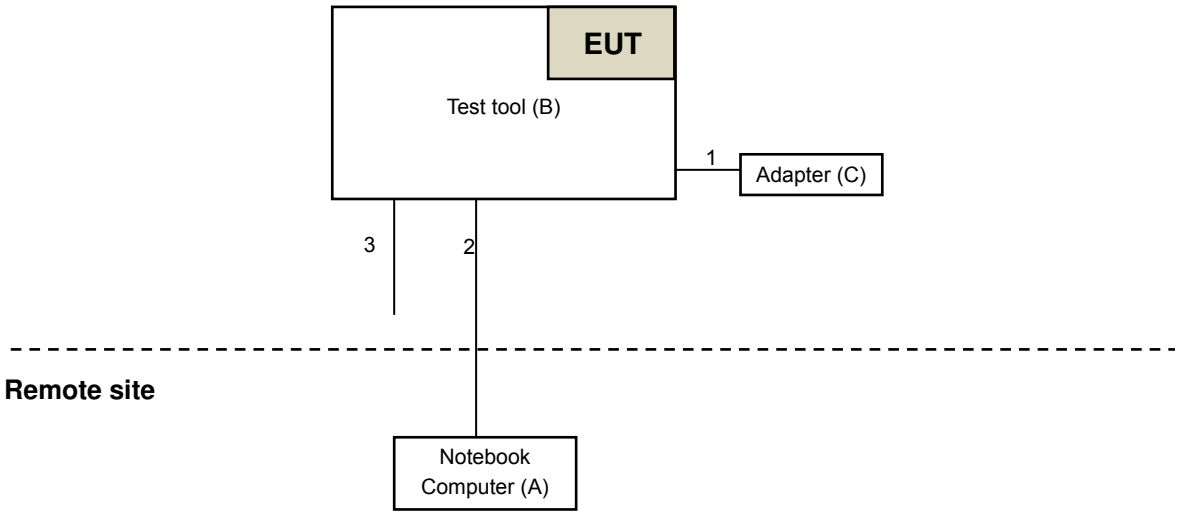
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	Notebook Computer	DELL	E5430	4YV4VY1	FCC DoC	Provided by Lab
B	Test tool	CIG SHANGHAI	NA	NA	NA	Supplied by Client
C	Adapter	HUAWEI	HW-120150C1W	NA	NA	Supplied by Client

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	DC	1	1.5	No	0	Supplied by Client
2	RJ-45	1	10	No	0	Provided by Lab
3	Console	1	0.7	No	0	Provided by Lab

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge 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 30dB 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.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 12, 2015	Aug. 11, 2016
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 13, 2014	Jan. 12, 2016
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2015	Jan. 17, 2016
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-07	May 08, 2015	May 07, 2016
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	138	Feb. 03, 2015	Feb. 02, 2016
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 03, 2015	Apr. 02, 2016
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Feb. 05, 2015	Feb. 04, 2016
Pre-Amplifier Agilent	8449B	3008A02465	Apr. 06, 2015	Apr. 05, 2016
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150317 150321 150322	Mar. 31, 2015	Mar. 30, 2016
Spectrum Analyzer Keysight	N9030A	MY54490520	July 26, 2015	July 25, 2016
Pre-Amplifier EMCI	EMC184045	980143	Jan. 16, 2015	Jan. 15, 2016
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Feb. 05, 2015	Feb. 04, 2016
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 17, 2015	Jan. 16, 2016
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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Loop antenna was used for all emissions below 30 MHz.
4. The test was performed in 966 Chamber No. 3.
5. The FCC Site Registration No. is 147459
6 The CANADA Site Registration No. is 20331-1
7 Tested Date: Dec. 09 to 14, 2015

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) 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:

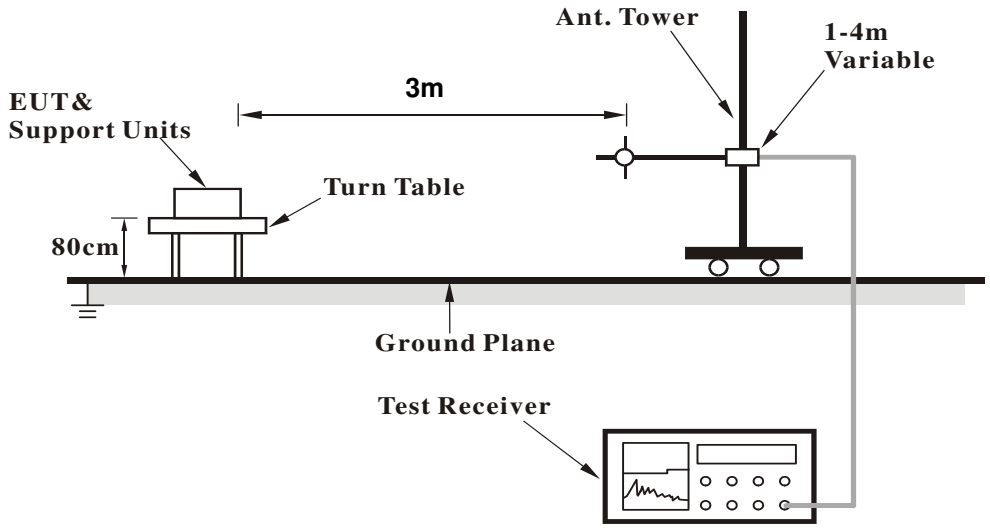
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

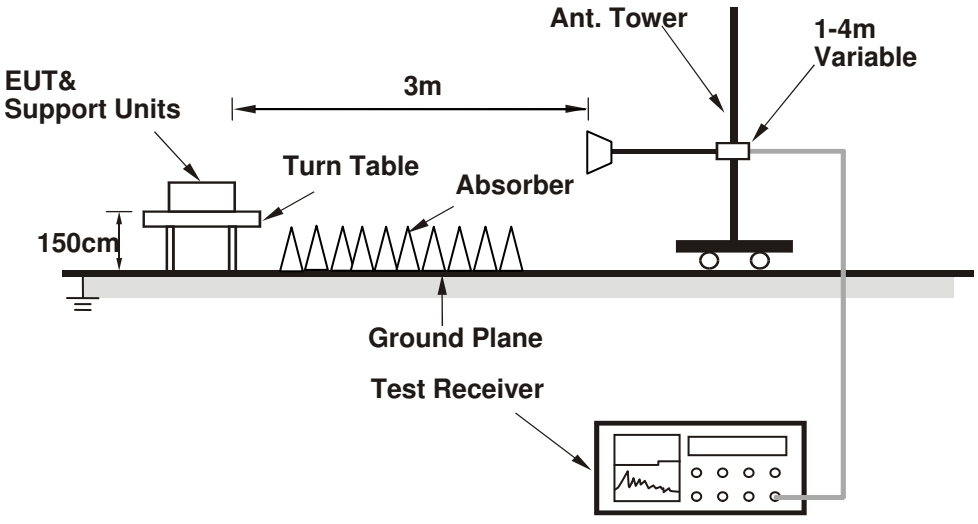
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

1. Connect the EUT with the support unit A (Notebook Computer) which is placed in remote site.
2. The communication partner run test program “art2_v_4_9_815” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results

FREQUENCY RANGE	1GHz ~ 40GHz	DETECTOR FUNCTION	Peak (PK) Average (AV)

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	4924.00	40.8 PK	74.0	-33.2	3.62 H	127	33.35	7.45
2	4924.00	32.5 AV	54.0	-21.5	3.62 H	127	25.05	7.45
3	7386.00	44.9 PK	74.0	-29.1	1.62 H	171	30.38	14.52
4	7386.00	32.4 AV	54.0	-21.6	1.62 H	171	17.88	14.52
5	11650.00	48.3 PK	74.0	-25.7	1.84 H	194	32.90	15.40
6	11650.00	34.1 AV	54.0	-19.9	1.84 H	194	18.70	15.40
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	4924.00	40.8 PK	74.0	-33.2	1.87 V	50	33.35	7.45
2	4924.00	32.8 AV	54.0	-21.2	1.87 V	50	25.35	7.45
3	7386.00	44.9 PK	74.0	-29.1	1.55 V	294	30.38	14.52
4	7386.00	31.3 AV	54.0	-22.7	1.55 V	294	16.78	14.52
5	11650.00	48.8 PK	74.0	-25.2	1.65 V	208	33.40	15.40
6	11650.00	35.2 AV	54.0	-18.8	1.65 V	208	19.80	15.40

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
5. " # ": The radiated frequency is out of the restricted band.

Below 1GHz Data:

FREQUENCY RANGE	Below 1GHz	DETECTOR FUNCTION	Quasi-Peak (QP)

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	**39.65**	**31.8 QP**	**40.0**	**-8.2**	**1.50 H**	**230**	**40.68**	**-8.91**
2	66.50	27.6 QP	40.0	-12.5	1.00 H	197	37.22	-9.67
3	98.30	26.3 QP	43.5	-17.2	1.50 H	206	39.73	-13.39
4	250.00	33.5 QP	46.0	-12.5	1.00 H	262	42.73	-9.27
5	375.00	34.9 QP	46.0	-11.1	1.00 H	58	40.31	-5.44
6	750.01	34.7 QP	46.0	-11.3	1.50 H	333	32.24	2.49
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	70.89	26.3 QP	40.0	-13.7	1.00 V	360	36.47	-10.20
2	98.40	24.4 QP	43.5	-19.1	2.00 V	316	37.77	-13.36
3	196.40	24.5 QP	43.5	-19.0	1.00 V	155	35.86	-11.38
4	250.00	29.6 QP	46.0	-16.5	1.00 V	321	38.82	-9.27
5	375.00	34.5 QP	46.0	-11.5	1.00 V	34	39.92	-5.44
6	644.35	29.9 QP	46.0	-16.1	1.50 V	52	29.15	0.73

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 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	100375	May 06, 2015	May 05, 2016
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 01, 2015	Aug. 31, 2016
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 11, 2015	June 10, 2016
RF Cable	5D-FB	COCCAB-001	Mar. 09, 2015	Mar. 08, 2016
50 ohms Terminator	N/A	EMC-03	Sep. 23, 2015	Sep. 22, 2016
50 ohms Terminator	N/A	EMC-02	Oct. 01, 2015	Sep. 30, 2016
Software BVADT	BVADT_Cond_ V7.3.7.3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 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 Tested Date: Dec. 16, 2015

4.2.3 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.

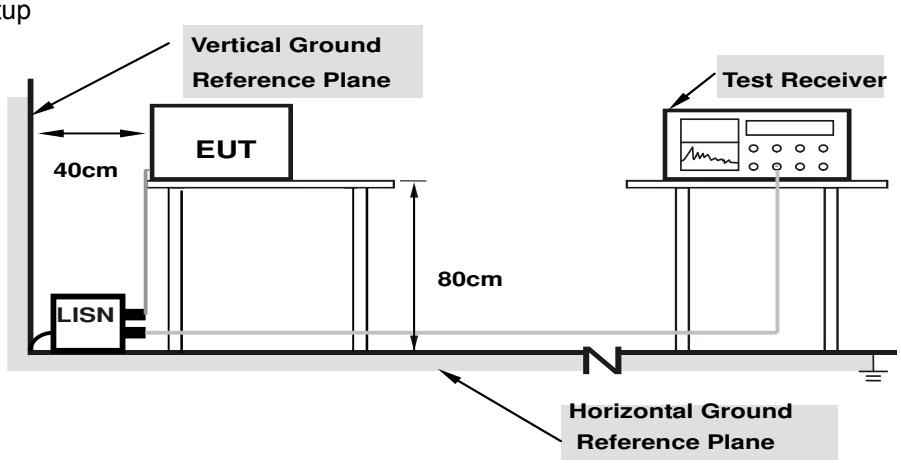
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

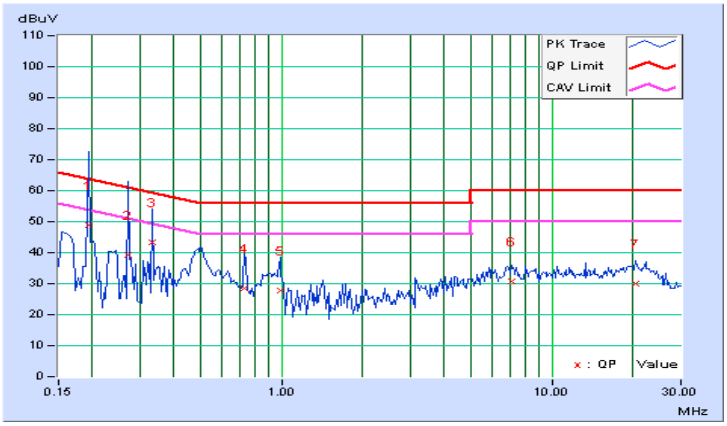
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.19297**	**10.35**	**38.40**	**9.78**	**48.75**	**20.13**	**63.91**	**53.91**	**-15.16**	**-33.78**
2	0.27109	10.35	28.79	5.96	39.14	16.31	61.08	51.08	-21.94	-34.77
3	0.33359	10.36	33.10	8.84	43.46	19.20	59.36	49.36	-15.90	-30.16
4	0.72813	10.34	18.11	5.38	28.45	15.72	56.00	46.00	-27.55	-30.28
5	0.98984	10.32	17.64	6.78	27.96	17.10	56.00	46.00	-28.04	-28.90
6	7.08203	10.74	20.15	13.89	30.89	24.63	60.00	50.00	-29.11	-25.37
7	20.39453	11.47	18.71	12.48	30.18	23.95	60.00	50.00	-29.82	-26.05

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

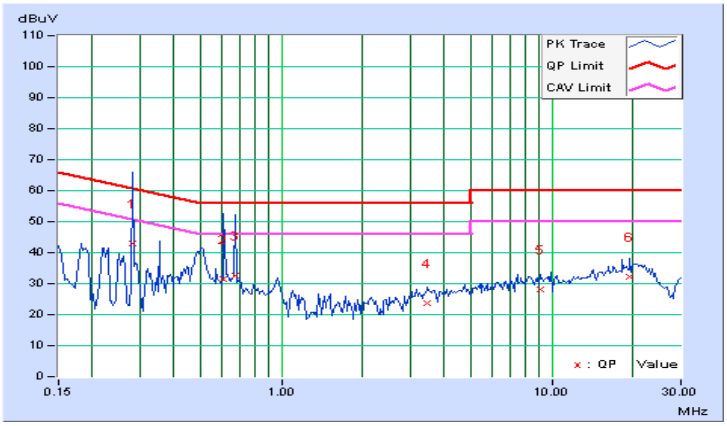


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.28281	10.40	32.71	9.00	43.11	19.40	60.73	50.73	-17.62	-31.33
2	0.61094	10.40	21.20	8.52	31.60	18.92	56.00	46.00	-24.40	-27.08
3	0.67734	10.40	22.22	7.24	32.62	17.64	56.00	46.00	-23.38	-28.36
4	3.46875	10.62	12.90	6.83	23.52	17.45	56.00	46.00	-32.48	-28.55
5	9.07813	10.88	17.12	11.10	28.00	21.98	60.00	50.00	-32.00	-28.02
6	19.46875	11.44	20.91	15.34	32.35	26.78	60.00	50.00	-27.65	-23.22

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

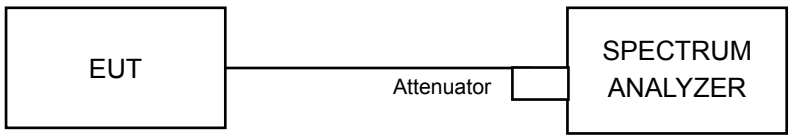


4.3 Conducted Out of Band Emission Measurement

4.3.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.3.5 Deviation from Test Standard

No deviation.

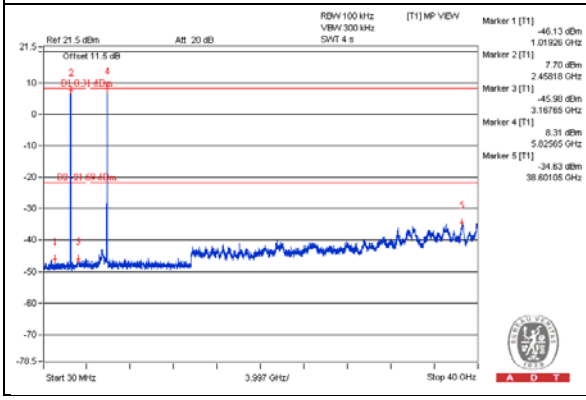
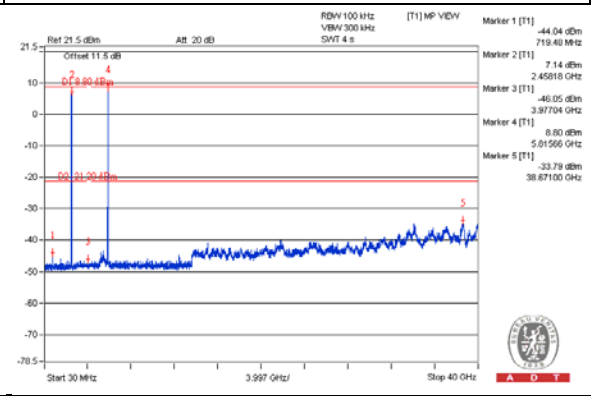
4.3.6 EUT Operating Condition

Same as Item 4.3.6

4.3.7 Test Results (Overall Spurious Emission Test)

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

2.4GHz 802.11g CH 6 + 5GHz 802.11a CH 165

Chain 0	Chain 1
	

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – 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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Email: service.adt@tw.bureauveritas.com
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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