

FCC TEST REPORT (15.407)

REPORT NO.: RF981020H04-1

MODEL NO.: WMP-ND03B

RECEIVED: Oct. 20, 2009

TESTED: Nov. 12 to Dec. 16, 2009

ISSUED: Dec. 23, 2009

APPLICANT: Alpha Networks Inc.

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

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1. CERTIFICATION

PRODUCT:	Mini-PCI Card
BRAND NAME:	Alpha
MODEL NO.:	WMP-ND03B
TEST SAMPLE:	MASS-PRODUCTION
TESTED:	Nov. 12 to Dec. 16, 2009
APPLICANT:	Alpha Networks Inc.
STANDARDS:	FCC Part 15, Subpart E (Section 15.407), ANSI C63.4-2003

The above equipment (Model: WMP-ND03B) 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

: <u>Sunny Wen</u>, DATE: <u>Dec. 23, 2009</u> (Sunny Wen, Specialist)

DATE: Dec. 23, 2009

TECHNICAL ACCEPTANCE

(Hank Chung, Deputy Manager)

APPROVED BY

(May Chen, Deputy Manager)

DATE: *Dec. 23, 2009*



2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications: For 802.11a

APPLIED STANDARD: FCC Part 15, Subpart E (Section 15.407)						
Standard Section	Test Type	Result	Remark			
15.407(b)(5)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -13.78dB at 0.158MHz			
15.407(b/1/2/3) (b)(5)	Electric Field Strength Spurious Emissions, 30MHz ~ 40000MHz	PASS	Meet the requirement of limit. Minimum passing margin is -1.3dB at 5150.00MHz			
15.407(a/1/2/3)	Peak Transmit Power	PASS	Meet the requirement of limit.			
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.			
15.407(a/1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.			
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.			
15.203	Antenna Requirement	PASS	Antenna connector is SMA Straight Plug Reverse not a standard connector.			

NOTE:

1. The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 5.15~5.25GHz. For the 2400 ~ 2483.5MHz and 5.725~5.850GHz RF parameters was recorded in another test report.



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	2.44 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	Mini-PCI Card			
MODEL NO.	WMP-ND03B			
FCC ID	RRK-WMPND03B			
POWER SUPPLY	DC 3.3V±10% from host equipment			
	CCK, DQPSK, DBPSK for DSSS			
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK for OFDM			
MODULATION TECHNOLOGY	DSSS, OFDM			
	802.11a/g: 54/48/36/24/18/12/9/6Mbps			
	802.11b:11/5.5/2/1Mbps			
	HT20 MCS0~7 (800ns GI): 6.5Mbps, 13Mbps, 19.5Mbps, 26Mbps, 39Mbps, 52Mbps, 58.5Mbps, 65Mbps,			
	HT20 MCS8~15 (800ns GI): 13Mbps, 26Mbps, 39Mbps, 52Mbps, 78Mbps, 104Mbps, 117Mbps, 130Mbps.			
	HT40 MCS0~7 (800ns GI): 13.5Mbps, 27Mbps, 40.5Mbps, 54Mbps, 81Mbps, 108Mbps, 121.5Mbps, 135Mbps.			
TRANSFER RATE	HT40 MCS8~15 (800ns GI): 27Mbps, 54Mbps, 81Mbps, 108Mbps, 162Mbps, 216Mbps, 243Mbps, 270Mbps.			
	HT20 MCS0~7 (400ns GI): 7.2Mbps, 14.4Mbps, 21.7Mbps, 28.9Mbps, 43.3Mbps, 57.8Mbps, 65.0Mbps, 72.2Mbps,			
	HT20 MCS8~15 (400ns GI): 14.444Mbps, 28.889Mbps, 43.333Mbps, 57.778Mbps, 86.667Mbps, 115.556Mbps, 130.000Mbps, 144.444Mbps.			
	HT40 MCS0~7 (400ns GI): 15.0Mbps, 30.0Mbps, 45.0Mbps, 60.0Mbps, 90.0Mbps, 120.0Mbps, 135.0Mbps, 150.0Mbps,			
	HT40 MCS8~15 (400ns GI): 30.0Mbps, 60.0Mbps, 90.0Mbps, 120.0Mbps, 180.0Mbps, 240.0Mbps, 270.0Mbps, 300.0Mbps.			
	For 15.407			
	802.11a: 5.18 ~ 5.24GHz			
FREQUENCY RANGE	For 15.247			
	802.11b & 802.11g: 2412 ~ 2462MHz			
	802.11a: 5.745 ~ 5.825GHz			



	For 15.407				
	4 for 802.11a, 802.11n (20MHz)				
	2 for 802.11n (40MHz)				
	For 15.247(2.4GHz)				
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz)				
	7 for 802.11n (40MHz)				
	For 15.247(5GHz)				
	5 for 802.11a, 802.11n (20MHz)				
	2 for 802.11n (40MHz)				
	For 15.407				
	802.11a: 28.6mW				
	802.11n (20MHz): 29.2mW				
	802.11n (40MHz): 49.2mW				
	For 15.247(2.4GHz)				
	802.11b: 409.3mW				
	802.11g: 611.0mW				
FOWER	802.11n (20MHz): 583.5mW				
	802.11n (40MHz): 463.5mW				
	For 15.247(5GHz)				
	802.11a: 386.8mW				
	802.11n (20MHz): 386.8mW				
	802.11n (40MHz): 360.0mW				
ANTENNA TYPE	Please see note 1				
ANTENNA CONNECTOR	Please see note 1				
DATA CABLE	NA				
I/O PORTS	NA				
ASSOCIATED DEVICES	NA				



NOTE:

1. There are four antennas provided to this EUT, please refer to the following table: 2.4GHz

Chain	Manufacture	Model No.	Antenna Type	Connector	Antenna Gain (dBi)	Cable loss (dB)	Net Gain (dBi)	Cable length (cm)
Chain (0) Antenna (1)	WHA YU GROUP	C037-510987-A (SSR-91251)	Dipole	SMA Straight	Л	03	37	95
Chain (1) Antenna (2)	WHA YU GROUP	C037-510987-A (SSR-91251)	Dipole	Plug Reverse	4	0.5	5.7	9.0
5GHz								
Chain	Manufacture	Model No.	Antenna Type	Connector	Antenna Gain (dBi)	Cable loss (dB)	Net Gain (dBi)	Cable length (cm)
Chain (0) Antenna (1)	WHA YU GROUP	C037-510988-A (SSR-91252)	Dipolo	SMA Straight	Band 1: 5.18 Band 2: 5.52	0.6	Band 1: 4.58 Band 2: 4.92	0.5
Chain (1) Antenna (2)	WHA YU GROUP	C037-510988-A (SSR-91252)	ырые	Plug Reverse	Band 3: 6.63 Band 4: 6.14	0.0	Band 3: 6.03 Band 4: 5.54	9.0

2. The EUT incorporates a MIMO function with 802.11n. Physically, the EUT provides two completed transmitters and two completed receivers.

- 3. The EUT is 2 * 2 spatial MIMO (2Tx & 2Rx) without beam forming function. The antenna configurations are two transmitter antennas and two receiver antennas, as there are 2 Dipole antennas. Spatial multiplexing modes for simultaneous transmission using 2 antennas, and for simultaneous receiver using 2 antennas.
- 4. The EUT complies with 802.11n standards and backwards compatible with 802. 11a, 802.11b, 802.11g products.
- 5. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.



3.2 DESCRIPTION OF TEST MODES

Operated in 5150MHz ~ 5250MHz bands:

Four channels are provided for 802.11a and 802.11n (20MHz):

CHANNEL	FREQUENCY
36	5180 MHz
40	5200 MHz
44	5220 MHz
48	5240 MHz

Two channels are provided for 802.11n (40MHz):

CHANNEL	FREQUENCY
38	5190 MHz
46	5230 MHz



3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

EUT	APPLICABLE TO				DESCRIPTION
CONFIGURE MODE	PLC	RE < 1G	RE ³ 1G	АРСМ	DESCRIPTION
-	\checkmark	\checkmark	\checkmark	\checkmark	-

Where **PLC:** Power Line Conducted Emission

RE < 1G: Radiated Emission below 1GHz

RE ³ 1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

ANTENNA COMBINATION MODE:

COMBINATION MODE	OPERATION MODE	TX CHAIN(0)	TX CHAIN(1)
А	802.11 a	\checkmark	\checkmark
В	802.11n(20MHz) for MCS0~7, 800nsGI	\checkmark	\checkmark
С	802.11n(20MHz) for MCS8~15, 800nsGl	\checkmark	\checkmark
D	802.11n(40MHz) for MCS0~7, 800nsGI	\checkmark	\checkmark
E	802.11n(40MHz) for MCS8~15, 800nsGl	\checkmark	\checkmark
F	802.11n(20MHz) for MCS0~7, 400nsGI	\checkmark	\checkmark
G	802.11n(20MHz) for MCS8~15, 400nsGl	\checkmark	\checkmark
Н	802.11n(40MHz) for MCS0~7, 400nsGI	\checkmark	\checkmark
I	802.11n(40MHz) for MCS8~15, 400nsGl	\checkmark	\checkmark
Note:			

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

2. Mode A, B and D the worst modes, were selected as representative mode for the report.

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	TESTED	MODULATION	MODULATION	DATA RATE	TX
	CHANNEL	CHANNEL	TECHNOLOGY	TYPE	(Mbps)	COMBINATION
802.11n (40MHz)	38 to 46	38	OFDM	BPSK	13.5	D



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	TESTED	MODULATION	MODULATION	DATA RATE	TX
	CHANNEL	CHANNEL	TECHNOLOGY	TYPE	(Mbps)	COMBINATION
802.11n (40MHz)	38 to 48	38	OFDM	BPSK	13.5	D

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)	TX COMBINATION
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6	А
802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5	В
802.11n (40MHz)	38 to 46	38,46	OFDM	BPSK	13.5	D

ANTENNA PORT OUTPUT SPECTRUM PLOTS :

- 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	MODULATIO N TYPE	DATA RATE (Mbps)	TX COMBINATION
802.11a	36 to 48	36, 48	OFDM	BPSK	6	А
802.11n (20MHz)	36 to 48	36, 48	OFDM	BPSK	6.5	В
802.11n (40MHz)	38 to 46	38,46	OFDM	BPSK	13.5	D

X After verification, conducted out band emission as show worst chain in report by investigations.



ANTENNA PORT CONDUCTED MEASUREMENT:

- This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- 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).

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IXL	FOIIOWING	channells) was (were	e) selected tor the	- inai iesi as	lisied below.
			,			

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	TX COMBINATION
802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6	А
802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	6.5	В
802.11n (40MHz)	38 to 46	38,46	OFDM	BPSK	13.5	D

X After verification, bandwidth as show worst chain in report by investigations.

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE ³ 1G	20deg. C, 78%RH, 1024 hPa	120Vac, 60Hz	Moris Lin
RE<1G	26deg. C, 62%RH, 1024 hPa	120Vac, 60Hz	Frank Liu
PLC	23deg. C, 66%RH, 1024 hPa	120Vac, 60Hz	Wen Yu
APCM	25deg. C, 60%RH, 1024 hPa	120Vac, 60Hz	Phoenix Huang



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a Mini-PCI Card. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407) ANSI C63.4-2003

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



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.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	NOTEBOOK COMPUTER	DELL	PP17L	CN-ONF743-48643-7A V-0124	FCC DoC
2	TEST TOOL	Alpha	NA	NA	NA

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

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

3.5 CONFIGURATION OF SYSTEM UNDER TEST





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	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver	ESCS 30	100375	Mar. 23, 2009	Mar. 22, 2010
Line-Impedance Stabilization Network (for Peripheral)	ENV-216	100071	Nov. 30, 2009	Nov. 29, 2010
Line-Impedance Stabilization Network (for EUT)	ESH3-Z5	848773/004	Oct. 26, 2009	Oct. 25, 2010
RF Cable (JYEBAO)	5DFB	COBCAB-001	Aug. 14, 2009	Aug. 13, 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. B.

3 The VCCI Con B Registration No. is C-2193.



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
- b. 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 level under (Limit 20dB) was not recorded.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation





4.1.7 TEST RESULTS

802.11a OFDM MODULATION:

PHA	SE	Lir	ne (L)			6dB BA	NDWID)TH 9 kHz		
	Freq.	Corr.	Rea Va	ding lue	Emis Le	ssion vel	Lir	nit	Mar	gin
No		Factor	[dB	[dB (uV)]		(uV)]	[dB	(uV)]	(d	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.158	9.75	42.05	28.04	51.80	37.79	65.58	55.5	8 -13.78	-17.79
2	0.177	9.76	34.74	27.26	44.50	37.02	64.61	54.6	1 -20.11	-17.59
3	0.213	9.76	29.58	19.11	39.34	28.87	63.11	53.1	1 -23.77	-24.24
4	0.259	9.76	29.43	10.60	39.19	20.36	61.45	51.4	5 -22.26	-31.09
5	0.306	9.76	25.48	16.90	35.24	26.66	60.07	50.0	7 -24.83	-23.41
6	3.262	9.91	16.11	3.91	26.02	13.82	56.00	46.0	0 -29.98	-32.18

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.	Rea Va	ding lue	Emis Le	sion vel	Liı	nit	Mar	gin
No		Factor	[dB	(uV)]	[dB	(uV)]	[dB	(uV)]	(d	B)
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.158	9.74	41.28	31.12	51.02	40.86	65.58	55.58	-14.56	-14.72
2	0.173	9.74	31.26	28.75	41.00	38.49	64.79	54.79	-23.79	-16.30
3	0.220	9.74	28.80	18.07	38.54	27.81	62.81	52.81	-24.27	-25.00
4	0.261	9.74	28.58	19.47	38.32	29.21	61.39	51.39	-23.06	-22.17
5	0.301	9.75	20.22	8.47	29.97	18.22	60.22	50.22	-30.25	-32.00
6	3.852	9.89	20.80	10.46	30.69	20.35	56.00	46.00	-25.31	-25.65

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.





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.



4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

Frequencies (MHz)	EIRP Limit (dBm)	Equivalent Field Strength at 3m (dBµV/m) *note 3
5150~5250	-27	68.3
5250~5350	-27	68.3
5470~5725	-27	68.3
5725~5825	-27 *note 1	68.3
5725-5625	-17 *note 2	78.3

NOTE:

- 1. For frequencies 10MHz or greater above or below the band edge.
- 2. All emissions within the frequency range from the band edge to 10MHz above or below the band edge.
- 3. The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength

 $E = \frac{1000000\sqrt{30P}}{3} \quad \mu V/m, \text{ where P is the eirp (Watts)}$



4.2.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ Spectrum Analyzer	FSP40	100036	Dec. 09, 2009	Dec. 08, 2010
Agilent PSA Spectrum Analyzer	E4446A	MY46180622	Apr. 24 , 2009	Apr. 23 , 2010
HP Pre_Amplifier	8449B	3008A01923	Nov. 02, 2009	Nov. 01, 2010
ROHDE & SCHWARZ Test Receiver	ESCS30	847124/029	Aug. 28, 2009	Aug. 28, 2010
SCHWARZBECK TRILOG Broadband Antenna	VULB 9168	138	April 29, 2009	April 28, 2010
Schwarzbeck Horn_Antenna	BBHA9120	D124	Dec. 09, 2009	Dec. 08, 2010
Schwarzbeck Horn_Antenna	BBHA 9170	BBHA9170153	Jan. 22, 2009	Jan. 21, 2010
RF Switches	EMH-011	08009	Sep. 26, 2009	Sep. 25, 2010
RF CABLE (Chaintek)	Sucoflex 106	28077	Aug. 14, 2009	Aug. 13, 2010
RF Cable	8D	STCCAB-001	Sep. 26, 2009	Sep. 25, 2010
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
CT Antenna Tower & Turn Table	NA	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, HP preamplifier (model: 8449B) and Spectrum Analyzer (model: FSP40) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Open Site No. C.
4. The FCC Site Registration No. is 656396.
5. The VCCI Site Registration No. is R-1626.
6. The CANADA Site Registration No. is IC 7450G-3.



4.2.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB 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 10dB 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 Peak detection (PK) and 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 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

4.2.5 DEVIATION FROM TEST STANDARD

No deviation



4.2.6 TEST SETUP



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

4.2.7 EUT OPERATING CONDITION

Same as 4.1.6



4.2.8 TEST RESULTS

BELOW 1GHz WORST-CASE DATA: 802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION				
CHANNEL	Channel 38	FREQUENCY RANGE	Below 1000MHz	
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak	
ENVIRONMENTAL CONDITIONS	20deg. C, 78%RH 1024 hPa	TESTED BY	Moris Lin	

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	131.77	28.3 QP	43.5	-15.2	1.43 H	66	15.13	13.20
2	165.13	40.2 QP	43.5	-3.3	1.05 H	29	25.51	14.69
3	205.42	35.3 QP	43.5	-8.2	1.01 H	123	23.27	12.06
4	263.83	42.7 QP	46.0	-3.3	1.00 H	64	28.33	14.35
5	329.36	32.2 QP	46.0	-13.8	1.00 H	357	15.48	16.75
6	627.33	31.8 QP	46.0	-14.2	1.33 H	243	7.70	24.14
		ANTENNA	A POLARITY	Y & TEST DI	STANCE: V	ERTICAL A	Т 3 М	
NO.	FREQ. (MHz)	ANTENNA EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	Y & TEST DI	STANCE: V ANTENNA HEIGHT (m)	ERTICAL A TABLE ANGLE (Degree)	T 3 M RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
NO.	FREQ. (MHz)	ANTENNA EMISSION LEVEL (dBuV/m) 35.1 QP	A POLARITY LIMIT (dBuV/m) 40.0	Y & TEST DI MARGIN (dB) -4.9	STANCE: V ANTENNA HEIGHT (m) 1.04 V	ERTICAL A TABLE ANGLE (Degree) 29	T 3 M RAW VALUE (dBuV) 21.85	CORRECTION FACTOR (dB/m) 13.28
NO. 1 2	FREQ. (MHz) 55.71 164.90	ANTENNA EMISSION LEVEL (dBuV/m) 35.1 QP 30.6 QP	A POLARITY LIMIT (dBuV/m) 40.0 43.5	Y & TEST DI MARGIN (dB) -4.9 -12.9	STANCE: V ANTENNA HEIGHT (m) 1.04 V 1.01 V	ERTICAL A TABLE ANGLE (Degree) 29 113	T 3 M RAW VALUE (dBuV) 21.85 15.94	CORRECTION FACTOR (dB/m) 13.28 14.70
NO.	FREQ. (MHz) 55.71 164.90 197.93	ANTENNA EMISSION LEVEL (dBuV/m) 35.1 QP 30.6 QP 31.7 QP	A POLARITY LIMIT (dBuV/m) 40.0 43.5 43.5	MARGIN (dB) -4.9 -12.9 -11.8	STANCE: V ANTENNA HEIGHT (m) 1.04 V 1.01 V 1.00 V	ERTICAL A TABLE ANGLE (Degree) 29 113 269	T 3 M RAW VALUE (dBuV) 21.85 15.94 19.67	CORRECTION FACTOR (dB/m) 13.28 14.70 11.99
NO. 1 2 3 4	FREQ. (MHz) 55.71 164.90 197.93 197.93	ANTENNA EMISSION LEVEL (dBuV/m) 35.1 QP 30.6 QP 31.7 QP 31.7 QP	A POLARITY LIMIT (dBuV/m) 40.0 43.5 43.5 43.5	MARGIN (dB) -4.9 -12.9 -11.8 -11.8	STANCE: V ANTENNA HEIGHT (m) 1.04 V 1.01 V 1.00 V 1.00 V	ERTICAL A TABLE ANGLE (Degree) 29 1113 269 272	T 3 M RAW VALUE (dBuV) 21.85 15.94 19.67 19.67	CORRECTION FACTOR (dB/m) 13.28 14.70 11.99 11.99
NO. 1 2 3 4 5	FREQ. (MHz) 55.71 164.90 197.93 197.93 295.33	ANTENNA EMISSION LEVEL (dBuV/m) 35.1 QP 30.6 QP 31.7 QP 31.7 QP 28.4 QP	A POLARITY LIMIT (dBuV/m) 40.0 43.5 43.5 43.5 43.5 43.5	MARGIN (dB) -4.9 -12.9 -11.8 -11.8 -17.6	STANCE: V ANTENNA HEIGHT (m) 1.04 V 1.01 V 1.00 V 1.00 V 1.00 V	ERTICAL A TABLE ANGLE (Degree) 29 113 269 272 341	T 3 M RAW VALUE (dBuV) 21.85 15.94 19.67 19.67 12.65	CORRECTION FACTOR (dB/m) 13.28 14.70 11.99 11.99 15.79

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

802.11a OFDM MODULATION

EUT TEST CONDITION				
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz	
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH 1024 hPa	TESTED BY	Frank Liu	

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	5150.00	52.7 PK	74.0	-21.4	1.51 H	24	16.65	36.00
2	5150.00	41.2 AV	54.0	-12.8	1.51 H	24	5.20	36.00
3	*5180.00	100.4 PK			1.50 H	27	64.38	36.05
4	*5180.00	88.8 AV			1.50 H	27	52.75	36.05
5	#10360.00	50.4 PK	68.3	-17.9	1.27 H	184	4.48	45.92
	ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M							
		ANTENNA	A POLARITY	Y & TEST DI	STANCE: V	ERTICAL A	Т 3 М	
NO.	FREQ. (MHz)	ANTENNA EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	Y & TEST DI	STANCE: V ANTENNA HEIGHT (m)	ERTICAL A TABLE ANGLE (Degree)	T 3 M RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
NO.	FREQ. (MHz)	ANTENNA EMISSION LEVEL (dBuV/m) 68.9 PK	LIMIT (dBuV/m)	Y & TEST DI MARGIN (dB) -5.1	STANCE: V ANTENNA HEIGHT (m) 1.00 V	ERTICAL A TABLE ANGLE (Degree) 28	T 3 M RAW VALUE (dBuV) 32.93	CORRECTION FACTOR (dB/m) 36.00
NO.	FREQ. (MHz) 5150.00 5150.00	ANTENNA EMISSION LEVEL (dBuV/m) 68.9 PK 52.8 AV	A POLARIT LIMIT (dBuV/m) 74.0 54.0	Y & TEST DI MARGIN (dB) -5.1 -1.3	STANCE: V ANTENNA HEIGHT (m) 1.00 V 1.00 V	ERTICAL A TABLE ANGLE (Degree) 28 28 28	T 3 M RAW VALUE (dBuV) 32.93 16.75	CORRECTION FACTOR (dB/m) 36.00 36.00
NO. 1 2 3	FREQ. (MHz) 5150.00 5150.00 *5180.00	ANTENNA EMISSION LEVEL (dBuV/m) 68.9 PK 52.8 AV 110.6 PK	A POLARIT LIMIT (dBuV/m) 74.0 54.0	Y & TEST DI MARGIN (dB) -5.1 -1.3	STANCE: V ANTENNA HEIGHT (m) 1.00 V 1.00 V 1.00 V	ERTICAL A TABLE ANGLE (Degree) 28 28 28 28 26	T 3 M RAW VALUE (dBuV) 32.93 16.75 74.55	CORRECTION FACTOR (dB/m) 36.00 36.00 36.05
NO. 1 2 3 4	FREQ. (MHz) 5150.00 5150.00 *5180.00 *5180.00	ANTENNA EMISSION LEVEL (dBuV/m) 68.9 PK 52.8 AV 110.6 PK 99.4 AV	A POLARIT LIMIT (dBuV/m) 74.0 54.0	Y & TEST DI MARGIN (dB) -5.1 -1.3	STANCE: V ANTENNA HEIGHT (m) 1.00 V 1.00 V 1.00 V	ERTICAL A TABLE ANGLE (Degree) 28 28 28 28 26 26 26	T 3 M RAW VALUE (dBuV) 32.93 16.75 74.55 63.35	CORRECTION FACTOR (dB/m) 36.00 36.05 36.05

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.

5. " * ": Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz	
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH 1024 hPa	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	*5200.00	100.3 PK			1.45 H	39	64.23	36.08	
2	*5200.00	88.4 AV			1.45 H	39	52.34	36.08	
3	#10400.00	50.9 PK	68.3	-17.4	1.05 H	166	4.91	45.99	
		ANTENNA	POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*5200.00	110.3 PK			1.00 V	35	74.22	36.08	
2	*5200.00	99.5 AV			1.00 V	35	63.42	36.08	
3	#10400.00	50.4 PK	68.3	-17.9	1.29 V	137	4.41	45.99	

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.

5. " * ": Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz	
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH 1024 hPa	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	*5240.00	101.0 PK			1.49 H	26	64.82	36.14	
2	*5240.00	89.1 AV			1.49 H	26	52.96	36.14	
3	5350.00	53.4 PK	74.0	-20.6	1.44 H	32	17.08	36.32	
4	5350.00	41.4 AV	54.0	-12.7	1.44 H	32	5.03	36.32	
5	#10480.00	50.3 PK	68.3	-18.0	1.04 H	137	4.18	46.12	
		ANTENNA	A POLARITY	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*5240.00	110.9 PK			1.00 V	32	74.76	36.14	
2	*5240.00	99.8 AV			1.00 V	32	63.66	36.14	
3	5350.00	55.9 PK	74.0	-18.1	1.00 V	64	19.56	36.32	
4	5350.00	43.9 AV	54.0	-10.1	1.00 V	64	7.60	36.32	
5	#10480.00	50.6 PK	68.3	-17.7	1.28 V	124	4.48	46.12	

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.

5. " * ": Fundamental frequency.



🔆 Agilent 16:57:01	Nov 27, 2009		RT	Marker 🗲			
Pof 107 dBuU	#Atton 0 dB	Mkr1	5.150 0 GHz				
#EmiPk			32.03 QD P V	riki y cr			
Log 10							
dB/				Mkr → CF Step			
Offst 10							
dĚ				Mkr→Start			
DI							
dBµV				Mkr > Stop			
LgAv		how when have not been a proper have been an	how water	11K1 - 3100			
V1 S2	of Subscription and the state of the second s	an a tai dh'a tafta ast, a ca dh'a ll oft da	<u></u>				
\$3 FC				Mkr $\Delta \rightarrow$ Span			
f (f): L			· · · · · · · · · · · · · · · · · · ·				
FTun Marker				Mkr $\Delta \rightarrow CF$			
	שששו UHZ						
52.05 dl		Cton	5150 0 CU-	Mkr.s.Ref.Lvl			
#Res BW (CISPR) 1 M	IHz #VB⊮	11 MHz Sweep 1.52 i	ms (601 pts)				
Copyright 2000-20	Copyright 2000–2009 Agilent Technologies						

RESTRICTED BANDEDGE (802.11a MODE, CH36, HORIZONTAL)





🔆 Agilent 00:06:54 Nov 6,	2009		RT	Peak Search
Ref 117 dB µ V #Atten : #EmiPk	10 dB	Mkr1 5.1 68	L48 9 GHz .93 dBµV	Next Peak
Log 10 dB/ 				Next Pk Right
10 dB				Next Pk Left
LgAv				Min Search
V1 S2 S3 FC A	prostand for the source of the second	ng ng pang ng pang ng pang pang pang pan		Pk-Pk Search
£(f): FTun Swp 5.148900000	GHz			Mkr→CF
68.93_dBµV	#VBW 1 MHz	Stop 5.1 Sweep 1.52 ms (50 0 GHz (601 pts)	More 1 of 2
Allowable span for currer	it center frequei	ncy exceeded		

RESTRICTED BANDEDGE (802.11a MODE, CH36, VERTICAL)





🔆 Agilent 21:51:46 Nov 23	7,2009	RT	Peak Search				
Ref 117 dB µ V #Atten #EmiPk	10 dB	Mkr1 5.350 00 GHz 53.40 dBµV	Next Peak				
Log 10 dB/ Offst			Next Pk Right				
10 dB			Next Pk Left				
LgAv			Min Search				
V1 S2 ² a-wasanga-shamlada S3 FC A	harronne maaraada dadaanna ay	ann an	Pk-Pk Search				
£(f): FTun Swp 5.350000000 53.40 dBuV	GHz		Mkr) CF				
Start 5.350 00 GHz #Res BW (CISPR) 1 MHz	#VBW 1 MHz	Stop 5.460 00 GHz Sweep 1 ms (601 pts)	More 1 of 2				
Copyright 2000–2009 Agilent Technologies							

RESTRICTED BANDEDGE (802.11a MODE, CH48, HORIZONTAL)

Mkr1 5.350 00 GHz Ref 117 dBµV #Atten 10 41.35 dBµV Log * * 10 * * Next Pk Next Next Pk Next Pk Next Next Pk Next Next
Log 10 dB/ Offst IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
dB Next Pk Le
LgAv Min Sear
V1 \$2 \$3 FC A 4
€(f): FTun Marker Mkr → Swp -5.350000000 GHz Mkr →
Start 5.350 00 GHz Stop 5.460 00 GHz Mo #Res BW (CISPR) 1 MHz #VBW 10 Hz Sweep 12.61 s (601 pts) 1 o



🔆 Agilent 22:25:08 Nov 27	7,2009		RT	Trace
Ref 117 dB µ V #Atten : #EmiPL	10 dB	Mkr1	5.350 18 GHz 55.88 dBµV	Trace 1 2 3
Log 10 dB/				Clear Write
10 dB				Max Hold
LgAv 1				Min Hold
V1 S2 <mark>W/mmmymymmymmymmymmymmymmymmymmymmymmymmy</mark>	Annapphanappath	montality	or and a star of the set	View
£(f): FTun Swp 5.350180000 55.88 dBuV	GHz			Blank
Start 5.350 00 GHz #Res BW (CISPR) 1 MHz	#VBW 1 MHz	Stop Sweep 1	5.460 00 GHz ms (601 pts)	More 1 of 2
Copyright 2000-2009 Ag	ilent Technologie	S		

RESTRICTED BANDEDGE (802.11a MODE, CH48, VERTICAL)

🔆 👫 Aç	gilent 22:28:54 Nov	27,2009			RT	Peak Search
Ref 11 #EmiPk	.7 dBµV #Atte	n 10 dB		Mkr1 5. 4	350 00 GHz 3.92 dBµV	Next Peak
Log 10 dB/ Offst					*	Next Pk Right
10 dB						Next Pk Left
LgAv						Min Search
V1 S2 S3 FC A	1 •					Pk-Pk Search
£(f): F⊤un Swp	Marker 5.350000000 43.92 dBuU) GHz				Mkr → CF
Start 5 #Res B	5.350 00 GHz SW (CISPR) 1 MHz	#VBW 1	0 Hz Sw	Stop 5.4 Veep 12.61 s	60 00 GHzî (601 pts)	More 1 of 2



802.11n (20MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 36 FREQUENCY RANGE		1 ~ 40GHz	
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH 1024 hPa	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	5150.00	53.2 PK	74.0	-20.8	1.24 H	313	17.16	36.00	
2	5150.00	41.9 AV	54.0	-12.1	1.24 H	313	5.91	36.00	
3	*5180.00	100.1 PK			1.28 H	311	64.05	36.05	
4	*5180.00	87.8 AV			1.28 H	311	51.75	36.05	
5	#10360.00	51.6 PK	68.3	-16.7	1.41 H	106	5.68	45.92	
		ANTENNA	POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	5150.00	66.2 PK	74.0	-7.8	1.00 V	307	30.16	36.00	
2	5150.00	50.2 AV	54.0	-3.8	1.00 V	307	14.20	36.00	
3	*5180.00	109.8 PK			1.00 V	134	73.75	36.05	
4	*5180.00	99.3 AV			1.00 V	134	63.25	36.05	
5	#10360.00	50.4 PK	68.3	-17.9	1.32 V	137	4.48	45.92	

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.

5. " * ": Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz	
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH 1024 hPa	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	*5200.00	100.6 PK			1.24 H	316	64.52	36.08	
2	*5200.00	88.2 AV			1.24 H	316	52.12	36.08	
3	#10400.00	50.3 PK	68.3	-18.0	1.45 H	108	4.31	45.99	
		ANTENNA	A POLARITY	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*5200.00	110.2 PK			1.00 V	127	74.12	36.08	
2	*5200.00	99.5 AV			1.00 V	127	63.42	36.08	
3	#10400.00	50.9 PK	68.3	-17.4	1.26 V	131	4.91	45.99	

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.

5. " * ": Fundamental frequency.



EUT TEST CONDITION		MEASUREMENT DETAIL			
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz		
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)		
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH 1024 hPa	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	*5240.00	100.7 PK			1.26 H	315	64.56	36.14		
2	*5240.00	88.9 AV			1.26 H	315	52.76	36.14		
3	5350.00	53.8 PK	74.0	-20.2	1.27 H	311	17.47	36.32		
4	5350.00	41.5 AV	54.0	-12.5	1.27 H	311	5.17	36.32		
5	#10480.00	51.5 PK	68.3	-16.8	1.42 H	107	5.38	46.12		
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	*5240.00	110.4 PK			1.00 V	129	74.26	36.14		
2	*5240.00	99.6 AV			1.00 V	129	63.46	36.14		
3	5350.00	54.6 PK	74.0	-19.4	1.00 V	124	18.31	36.32		
4	5350.00	44.0 AV	54.0	-10.0	1.00 V	124	7.66	36.32		
5	#10480.00	51.2 PK	68.3	-17.1	1.25 V	129	5.08	46.12		

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.

5. " * ": Fundamental frequency.


🔆 Agilent 20:56:37 Nov 2	7,2009		RT	Trace
Ref 117 dB µ V #Atten #EmiPk	10 dB	۸	1kr1 5.148 9 GH 53.16 dB µ \	Trace
Log 10 dB/ Offst				Clear Write
10 dB				Max Hold
LgAv				Min Hold
V1 S2 S3 FC A	waterstand	adan mar an	mitriminghilythe whichter	S View
£(f): FTun Swp 5.148900000	GHz			Blank
53.16 dBµV Start 4.500 0 GHz #Res BW (CISPR) 1 MHz	#VBW 1 M	Hz Sweep 1	Stop 5.150 0 GH .52 ms (601 pts)	Z More 1 of 2
Copyright 2000-2009 Ag	ilent Technol	ogies		

RESTRICTED BANDEDGE (802.11n (20MHz) MODE,CH36, HORIZONTAL)

🔆 Agilent 20:57:22 Nov 27, 2009		RT	Peak Search
Ref 117 dBµV #Atten 10 dB	Mkr1	5.150 0 GHz 41.91 dBµV	Next Peak
*Elliff K Log 10 dR /		*	Next Pk Right
007 0ffst 10 dB			Nevt Pk Left
LgAv			Min Search
V1 52 \$3 FC A		1	Pk-Pk Search
£(f): FTun Swp 5.150000000 GHz_			Mkr → CF
41.91 dBµV Start 4.500 0 GHz #Res BW (CISPR) 1 MHz #W	Stop 3W 10 Hz Sween 74.53) 5.150 0 GHz [°] 3 s (601 pts)	More 1 of 2
Copyright 2000–2009 Agilent T	echnologies		



🔆 Ag	ilent 01:04:06	i Nov 1	3,2009					R	T	Peak Search
Ref 11 #EmiPk	7 dBµV	#Atten	10 dB				Mkr1	5.150 66.16	0 GHz dB µ V	Next Peak
Log 10 dB/ Offst										Next Pk Right
10 dB										Next Pk Left
LgAv										Min Search
V1 S2 S3 FC A	non yayan fan an a	NAA-A-MA	p-wymymy	Munu	utronauglitur	babby / charlos by	uluturrut	uhilphirm	www.w	Pk-Pk Search
€(f): FTun Swp	Marker 5.15000 66.16 c	0000 IBu V	GHz-							Mkr → CF
Start 4 ≢Res B	4.500 0 GHz W (CISPR) 1	MHz	#V	BW 1 M	IHz	Swee	Stop p 1.52	5.150 ms (60	0 GHz 1 pts)	More 1 of 2
Copyri	ight 2000-2	009 Ag	ilent T	echnol	ogies					

RESTRICTED BANDEDGE (802.11n (20MHz) MODE, CH36, VERTICAL)





🔆 Agilent 21:53:11 Nov 27	, 2009	R T Trace	
Ref 117 dB µ V #Atten 1 #Emi ^{Pk}	Mkr1 0 dB	1 5.351 28 GHz 53.79 dBµV <u>1</u> 2	ace 3
Log 10 dB/ Offst		Clear Wr	ite
10 dB		Max Ho	old
LgAv		Min He	old
V1 S2 S3 FC A	หล่างทางอุติสระหงสาขทางสาของอาจจากรายเหตุสาของอาจจ	hlondjevniket vi	iew
£(f): FTun Swp 5.351280000 (GHz	Bla	ank
53./9 dBµV Start 5.350 00 GHz #Res BW (CISPR) 1 MHz	Stop #VBW 1 MHz Sweep	p 5.460 00 GHz Mo 1 ms (601 pts)	ore of 2
Copyright 2000-2009 Agi	lent Technologies		

RESTRICTED BANDEDGE (802.11n (20MHz) MODE, CH48, HORIZONTAL)

🔆 Aç	gilent 21:37:48	Nov 2	7,2009	I				R	: T	Peak Search
Ref 11 #EmiPk	.7 dBµV	#Atten	10 dB				Mkr1	5.350 41.49	00 GHz dB µ V	Next Peak
Log 10 dB/ Offst									*	Next Pk Right
10 dB										Next Pk Left
LgAv										Min Search
V1 S2 S3 FC A 4	1 \$									Pk-Pk Search
€(f): FTun Swp	Marker 5.350000)000	GHz_							Mkr → CF
Start 5 #Res B	41.45 U 5.350 00 GHz 3W (CISPR) 1 M	вро IHz	#V	BW 10	Hz	Swee	Stop p 12.6	5.460 0 1 s (60	00 GHzî 1 pts)	More 1 of 2



🔆 Agilent 22:26:41 Nov 2	7,2009	R	T Marker
Ref 117 dB µ V #Atten	10 dB	Mkr1 5.350 55 54.63 dB	GHZ Select Marker
Log			
10 dB/ Offet			Normal
10 dB			Delta
LgAv			Delta Pair (Tracking Ref) Ref
V1 S2 <mark>byplannywybrawyk</mark> S3 FC	manana Manhanananana	non-hangen frankriger	✓✓✓● Span Pair Span Center
n £(f): FTun Swp 5.350550000	GHz		Off
54.63 dBµV Start 5.350 00 GHz		Stop 5.460 00 (GHz 1 of 2
#Res BW (CISPR) 1 MHz Copyright 2000-2009 Ag	#VBW 1 MHz ilent Technologies	Sweep 1 ms (601 p	ts)

RESTRICTED BANDEDGE (802.11n (20MHz) MODE, CH48, VERTICAL)





802.11n (40MHz) OFDM MODULATION

EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 38 FREQUENCY RANGE		1 ~ 40GHz	
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH 1024 hPa	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	5150.00	56.2 PK	74.0	-17.8	1.24 H	310	20.24	36.00			
2	5150.00	44.3 AV	54.0	-9.7	1.24 H	310	8.28	36.00			
3	*5190.00	96.1 PK			1.26 H	305	60.04	36.06			
4	*5190.00	84.1 AV			1.26 H	305	48.04	36.06			
5	#10380.00	54.5 PK	68.3	-13.8	1.21 H	315	8.54	45.96			
		ANTENNA		Y & TEST DI	STANCE: V	ERTICAL A	T 3 M				
	NO. FREQ. (MHz) EMISSION LEVEL (dBuV/m) LIMIT (dBuV/m) MARGIN (dB) ANTENNA HEIGHT (m) (Degree) RAW VALUE (dBuV) (dBuV) (dB/m)										
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	ANGLE (Degree)	RAW VALUE (dBuV)	FACTOR (dB/m)			
NO.	FREQ. (MHz) 5150.00	EMISSION LEVEL (dBuV/m) 68.7 PK	LIMIT (dBuV/m) 74.0	MARGIN (dB) -5.3	ANTENNA HEIGHT (m)	ANGLE (Degree) 337	RAW VALUE (dBuV) 32.71	FACTOR (dB/m) 36.00			
NO. 1 2	FREQ. (MHz) 5150.00 5150.00	EMISSION LEVEL (dBuV/m) 68.7 PK 52.6 AV	LIMIT (dBuV/m) 74.0 54.0	MARGIN (dB) -5.3 -1.4	ANTENNA HEIGHT (m) 1.07 V 1.07 V	ANGLE (Degree) 337 337	RAW VALUE (dBuV) 32.71 16.59	CORRECTION FACTOR (dB/m) 36.00 36.00			
NO. 1 2 3	FREQ. (MHz) 5150.00 5150.00 *5190.00	EMISSION LEVEL (dBuV/m) 68.7 PK 52.6 AV 108.4 PK	LIMIT (dBuV/m) 74.0 54.0	MARGIN (dB) -5.3 -1.4	ANTENNA HEIGHT (m) 1.07 V 1.07 V	TABLE ANGLE (Degree) 337 337 337 3337	RAW VALUE (dBuV) 32.71 16.59 72.35	CORRECTION FACTOR (dB/m) 36.00 36.00 36.06			
NO. 1 2 3 4	FREQ. (MHz) 5150.00 5150.00 *5190.00 *5190.00	EMISSION LEVEL (dBuV/m) 68.7 PK 52.6 AV 108.4 PK 96.3 AV	LIMIT (dBuV/m) 74.0 54.0	MARGIN (dB) -5.3 -1.4	ANTENNA HEIGHT (m) 1.07 V 1.07 V 1.07 V	TABLE ANGLE (Degree) 337 337 336 336	RAW VALUE (dBuV) 32.71 16.59 72.35 60.27	CORRECTION FACTOR (dB/m) 36.00 36.00 36.06 36.06			

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.

5. " * ": Fundamental frequency.

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



EUT TEST CONDITION		MEASUREMENT DETAIL		
CHANNEL	Channel 46	146 FREQUENCY RANGE		
INPUT POWER (SYSTEM)	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)	
ENVIRONMENTAL CONDITIONS	26deg. C, 62%RH 1024 hPa	TESTED BY	Frank Liu	

		ANTENNA	POLARITY	& TEST DIS	TANCE: HO	RIZONTAL	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	*5230.00	96.5 PK			1.24 H	307	60.37	36.13
2	*5230.00	84.3 AV			1.24 H	307	48.17	36.13
3	5350.00	53.3 PK	74.0	-20.7	1.21 H	305	17.02	36.32
4	5350.00	41.3 AV	54.0	-12.7	1.21 H	305	4.99	36.32
5	#10460.00	54.6 PK	68.3	-13.7	1.26 H	311	8.51	46.09
		ANTENNA	A POLARIT	Y & TEST DI	STANCE: V	ERTICAL A	T 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	*5230.00	108.2 PK			1.09 V	336	72.08	36.13
2	*5230.00	96.0 AV			1.09 V	336	59.90	36.13
3	5350.00	58.6 PK	74.0	-15.4	1.04 V	335	22.31	36.32
4	5350.00	48.8 AV	54.0	-5.2	1.04 V	335	12.51	36.32
5	#10460.00	51.7 PK	68.3	-16.6	1.21 V	136	5.64	46.09

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.

5. " * ": Fundamental frequency.

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



🔆 Agilent 21:59:28 Nov 2	7,2009	R	T Peak Search
Ref 117 dB µ V #Atten #EmiPk	10 dB	Mkr1 5.147 56.24	8 GHz dBµV NextPeak
Log 10 dB/ 0ffst			Next Pk Right
10 dB			Next Pk Left
LgAv			Min Search
V1 S2 S3 FC A	ahon and a lot for Andrew Marcon all have an	ntapping her her all you to point phy	Pk-Pk Search
£(f): FTun Swp 5.147800000 56.24 dBull	GHz		Mkr → CF
Start 4.500 0 GHz #Res BW (CISPR) 1 MHz	#VBW 1 MHz	Stop 5.150 (Sweep 1.52 ms (601	0 GHz More pts) 1 of 2
Copyright 2000-2009 Ag	ilent Technologies		

RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH38, HORIZONTAL)





* Agilent 13:24:54	Nov 13, 2009			RT	Trace
Ref 100 dB µ V #EmiPk	#Atten 0 dB		Mkr1	5.148 9 GHz 68.71 dB µ V	Trace <u>1</u> 2 3
Log 10 dB/ Offst					Clear Write
10 dB DI					Max Hold
74.0 dB µ V LgAv	han yana ka	men mutater and the second	yan an a	who water your and	Min Hold
V1 S2 S3 FC A					View
£(f): Marker FTun 5.148900	000 GHz				Blank
68./1 d Start 4.500 0 GHz #Res BW (CISPR) 1 M	IHz VE	W 1 MHz Sw	Stop veep 1.52 v	5.150 0 GHz ns (601 pts)	More 1 of 2
Copyright 2000-20	09 Agilent To	echnologies			

RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH38, VERTICAL)





🔆 Agilent 21:55:57 Nov 21	7,2009		RT	Trace
Ref 117 dB µ V #Atten #EmiPk	10 dB	Mkr1 5.	351 65 GHz 3.34 dB y V	Trace <u>1</u> 2 3
Log 10 dB/ 0ffst				Clear Write
10 dB				Max Hold
LgAv				Min Hold
V1 S2 \$3 FC А	ananan mananalandara	n manager and the second s	humuna	View
£(f): FTun Swp 5.351650000	GHz			Blank
53.34 dBµV Start 5.350 00 GHz #Res BW (CISPR) 1 MHz	#VBW 1 MHz	Stop 5.4 Sweep 1 ms	460 00 GHz 5 (601 pts)	More 1 of 2
Copyright 2000-2009 Ag	ilent Technologies			

RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH46, HORIZONTAL)





🔆 Agilent 22:21:35 Nov 27	, 2009	R	T Trace
Ref 117 dBµV #Atten 1 #EmiPk	0 dB	Mkr1 5.372 73	BGHz HBPV <u>1</u> 23
Log 10 dB/ Offst			Clear Write
10 dB			Max Hold
LgAv t			Min Hold
V1 S2 <mark>MM/MMMM/WW/MM^{MMMMMM}MM</mark> S3 FC A	hallanghagaan Minternan ha	tertherstangestandblechails to interference	vy View
£(f): FTun Swp 116.99 dBµV			Blank
Start 5.350 00 GHz #Res BW (CISPR) 1 MHz	#VBW 1 MHz	Stop 5.460 00 Sweep 1 ms (601	GHz More pts)
Copyright 2000-2009 Agil	ent Technologies		

RESTRICTED BANDEDGE (802.11n (40MHz) MODE, CH46, VERTICAL)





4.3 PEAK TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF PEAK TRANSMIT POWER MEASUREMENT

Frequency Band	Limit
5.15 – 5.25GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB
5.25 – 5.35GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.47 – 5.725GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.725 – 5.825GHz	The lesser of 1W (30dBm) or 17dBm + 10logB

NOTE: Where B is the 26dB emission bandwidth in MHz.

4.3.2 TEST INSTRUMENTS

DESCRIPTION &		SERIAL	CALIBRATED	CALIBRATED
MANUFACTURER	WODEL NO.	NO.	DATE	UNTIL
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	Sep. 21, 2009	Sep. 20, 2010

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.



4.3.3 TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer.
- 2. Set span to encompass the entire emission bandwidth of the signal.
- 3. Set RBW to 1MHz, VBW to 3MHz.
- 4. Using the spectrum analyzer's channel power measurement function to measure the output power.

NOTE:

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



4.3.7 TEST RESULTS

802.11a OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK F OUT (de Chain 0	POWER PUT 3m) Chain 1	TOTAL PEAK POWER (dBm)	TOTAL PEAK POWER (mW)	PEAK POWER LIMIT (DBM)	26dBc Occupied Bandwidth (MHz)	PASS/ FAIL
36	5180	11.5	11.6	14.6	28.6	17.0	23.25	PASS
40	5200	11.3	11.6	14.5	27.9	17.0	23.58	PASS
48	5240	11.4	11.1	14.3	26.7	17.0	23.58	PASS

NOTE: The 26dBc Occupied Bandwidth plot, please refer to the following pages.



Peak Power Output: For Chain (0): CH40



26dB Occupied Bandwidth: CH40





802.11n (20MHz) OFDM modulation:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK F OUT (dE Chain 0	POWER PUT 3m) Chain 1	TOTAL PEAK POWER (dBm)	TOTAL PEAK POWER (mW)	PEAK POWER LIMIT (DBM)	26dBc Occupied Bandwidth (MHz)	PASS/ FAIL
36	5180	11.5	11.5	14.5	28.3	17.0	24.25	PASS
40	5200	11.3	11.5	14.4	27.6	17.0	24.08	PASS
48	5240	11.7	11.6	14.7	29.2	17.0	24.25	PASS

NOTE: The 26dBc Occupied Bandwidth plot, please refer to the following pages.



Peak Power Output: For Chain (0) :CH48



26dB Occupied Bandwidth: CH48





802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK F OUT (dE Chain 0	POWER PUT Sm) Chain 1	TOTAL PEAK POWER (dBm)	TOTAL PEAK POWER (mW)	PEAK POWER LIMIT (dBm)	26dBc Occupied Bandwidth (MHz)	PASS/ FAIL
38	5190	14.2	13.6	16.9	49.2	17.0	46.67	PASS
46	5230	14.0	13.7	16.9	48.6	17.0	45.50	PASS

NOTE: The 26dBc Occupied Bandwidth plot, please refer to the following pages.



Peak Power Output: For Chain (0) :CH38



26dB Occupied Bandwidth: CH38





4.4 PEAK POWER EXCURSION MEASUREMENT

4.4.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Frequency Band	Limit
5.15 – 5.25 GHz	13dB
5.25 – 5.35 GHz	13dB
5.47 – 5.725GHz	13dB
5.725 – 5.825 GHz	13dB

4.4.2 TEST INSTRUMENTS

DESCRIPTION &	MODEL NO.	SERIAL	CALIBRATED	CALIBRATED
MANUFACTURER		NO.	DATE	UNTIL
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	Sep. 21, 2009	Sep. 20, 2010

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer.
- 2. Set the spectrum bandwidth span to view the entire spectrum.
- 3. Using peak detector and Max-hold function for Trace 1 (RB=1MHz, VB=3MHz) and 2 (RB=1MHz, VB=300KHz).
- 4. The largest difference between Trace 1 and Trace 2 in any 1MHz band on any frequency was recorded.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



4.4.7 TEST RESULTS 802.11a OFDM modulation

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)	PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
36	5180	9.68	13	PASS
40	5200	9.23	13	PASS
48	5240	9.08	13	PASS





802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)	PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
36	5180	8.65	13	PASS
40	5200	8.49	13	PASS
48	5240	8.41	13	PASS





802.11n (40MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER EXCURSION (dB)	PEAK to AVERAGE EXCURSION LIMIT (dB)	PASS/FAIL
38	5190	9.36	13	PASS
46	5230	9.26	13	PASS





4.5 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

Frequency Band	Limit
5.15 ~ 5.25GHz	4dBm
5.25 ~ 5.35GHz	11dBm
5.47 – 5.725GHz	11dBm
5.725 ~ 5.825GHz	17dBm

4.5.2 TEST INSTRUMENTS

DESCRIPTION &	MODEL NO.	SERIAL	CALIBRATED	CALIBRATED
MANUFACTURER		NO.	DATE	UNTIL
ADVANTEST SPECTRUM ANALYZER	U3772	160100280	Sep. 21, 2009	Sep. 20, 2010

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.5.3 TEST PROCEDURES

- 1. The transmitter output was connected to the spectrum analyzer.
- 2. Set RBW=1MHz, VBW=3MHz. The PPSD is the highest level found across the emission in any 1MHz band.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITIONS

Same as 4.3.6



4.5.7 TEST RESULTS

802.11a OFDM modulation

CHANNEL	CHANNEL FREQUENCY	RF POWER LEVEL IN 1MHz BW (dBm)		TOTAL OUTPUT POWER	MAXIMUM LIMIT	PASS/FAIL
	(MHz)	Chain (0)	ain (0) Chain(1) DENSITY (dBm)			
36	5180	0.4	0.4	3.4	4	PASS
40	5200	0.3	0.5	3.4	4	PASS
48	5240	0.3	0.02	3.2	4	PASS

For Chain (0): CH40





802.11n (20MHz) OFDM MODULATION:

CHANNEL	CHANNEL FREQUENCY	ANNEL QUENCY RF POWER LEVEL IN 1MHz BW (dBm)		TOTAL OUTPUT POWER	MAXIMUM LIMIT	PASS/FAIL
	(MHz)	Chain (0) Chain(1) DENSITY (0 (dBm)		(dBm)		
36	5180	0.2	0.1	3.2	4	PASS
40	5200	0.1	0.1	3.0	4	PASS
48	5240	0.3	0.3	3.2	4	PASS

For Chain (0) : CH48





802.11n (40MHz) OFDM modulation:

CHANNEL RF F CHANNEL FREQUENCY		RF POWER 1MHz B	R LEVEL IN N (dBm)	TOTAL OUTPUT POWER	MAXIMUM LIMIT	PASS/FAIL
	(MHz)	Chain (0)	Chain(1)	DENSITY (dBm)	(dBm)	
38	5190	-0.4	-1.0	2.3	4	PASS
46	5230	-0.5	-0.9	2.3	4	PASS

For Chain (0) : CH38





4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

The frequency tolerance of the carrier signal shall be maintained within +/- 0.02% of the operating frequency over a temperature variation of -30 degrees to 50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C.

4.6.2 TEST INSTRUMENTS

DESCRIPTION &	MODEL NO.	SERIAL	CALIBRATED	CALIBRATED
MANUFACTURER		NO.	DATE	UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.6.3 TEST PROCEDURE

- 1. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
- 2. Turn the EUT on and couple its output to a spectrum analyzer.
- 3. Turn the EUT off and set the chamber to the highest temperature specified.
- 4. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
- 5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.



4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



4.6.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.



4.6.7 TEST RESULTS

	Operatin	g frequency	: 5180MHz	Limit : ± 0.02%			
Temp.	Power	2 mi	nute	5 mi	nute	10 m	inute
(°C)	(VAC)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
	138	5180.0243	0.000469	5180.0274	0.000529	5180.0254	0.000490
50	120	5180.0258	0.000498	5180.0294	0.000568	5180.0274	0.000529
	102	5180.0268	0.000517	5180.0264	0.000510	5180.0254	0.000490
	138	5180.0355	0.000685	5180.0363	0.000701	5180.0370	0.000714
40	120	5180.0366	0.000707	5180.0358	0.000691	5180.0360	0.000695
	102	5180.0687	0.001326	5180.0368	0.000710	5180.0380	0.000734
	138	5180.024	0.000463	5180.0095	0.000183	5180.0072	0.000139
30	120	5180.025	0.000483	5180.0097	0.000187	5180.0075	0.000145
	102	5180.037	0.000714	5180.0095	0.000183	5180.0072	0.000139
	138	5179.989	0.000212	5179.9897	0.000199	5179.9864	0.000263
20	120	5179.988	0.000232	5179.9895	0.000203	5179.9865	0.000261
	102	5179.987	0.000251	5179.9883	0.000226	5179.9862	0.000266
	138	5180.0265	0.000512	5180.0234	0.000452	5180.0245	0.000473
10	120	5180.0266	0.000514	5180.0244	0.000471	5180.0274	0.000529
	102	5180.0272	0.000525	5180.0224	0.000432	5180.0274	0.000529
	138	5180.0178	0.000344	5180.0106	0.000205	5180.0103	0.000199
0	120	5180.0168	0.000324	5180.0107	0.000207	5180.0105	0.000203
	102	5180.0188	0.000363	5180.0105	0.000203	5180.0102	0.000197
	138	5180.0155	0.000299	5180.0045	0.000087	5180.0159	0.000307
-10	120	5180.0156	0.000301	5180.0065	0.000125	5180.0163	0.000315
	102	5180.0165	0.000319	5180.0078	0.000151	5180.0159	0.000307
	138	5180.0234	0.000452	5180.0164	0.000317	5180.0174	0.000336
-20	120	5180.0244	0.000471	5180.0194	0.000375	5180.0184	0.000355
	102	5180.0234	0.000452	5180.0164	0.000317	5180.0174	0.000336
	138	5179.9755	0.000473	5179.995	0.000097	5179.9986	0.000027
-30	120	5179.9956	0.000085	5179.996	0.000077	5179.9987	0.000025
	102	5179.9855	0.000280	5179.9941	0.000114	5179.9989	0.000021



4.7 ANTENNA PORT OUTPUT SPECTRUM PLOTS

4.7.1 TEST INSTRUMENTS

DESCRIPTION &	MODEL NO.	SERIAL	CALIBRATED	CALIBRATED
MANUFACTURER		NO.	DATE	UNTIL
R&S SPECTRUM ANALYZER	FSP40	100037	Aug. 03, 2009	Aug. 02, 2010

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.7.2 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set RBW of spectrum analyzer to 1MHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

4.7.3 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.7.4 TEST RESULTS

For 5.15 to 5.35GHz band:

The spectrum plots (Peak RBW=1MHz, VBW=3MHz) are attached on the following pages.



802.11a OFDM modulation CH 36







CH 36







802.11n (20MHz) OFDM MODULATION:

CH36







CH36 Marker 1 [T1] 10.52 dBm 5.146160 GHz RBW 1 MHz VBW 3 MHz [T1] MK VIEW 21 ______Ref 21 dBm Att 20 dB SWT 800 ms Marker 2 [T1] -30.33 dBm 39.760180 GHz Offset 1 dB <u>D1 11.91 dBm</u> 10 Marker 3 [T1] -35.37 dBm 39.040720 GHz 39.0-0 Marker 4 [T1] -35.40 dBm -200 GHz 0 D2 -8.09 (-10 38.321260 GHz -20 -30 mmmmmmmmmmmmm -40 -50 -60 -70 -79 Stop 40 GHz Start 30 MHz 3.997 GHz/ CH48 Marker 1 [T1] 11.12 dBm RBW 1 MHz VBW 3 MHz SWT 800 ms [T1] MK VIEW 21 _ Ref 21 dBm Att 20 dB 5.226100 GHz Marker 2 [T1] -30.45 dBm 39.760180 GHz Offset 1 dB <u>D1 12.53 đBm</u>





802.11n (40MHz) OFDM MODULATION:







CH38






5.INFORMATION ON THE TESTING LABORATORIES

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

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

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: <u>www.adt.com.tw/index.5/phtml</u>. 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

Web Site: www.adt.com.tw

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



6.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 ---