FCC Test Report

Report No.:	RF140128E04E
FCC ID:	PQRFXE2000-DG
Test Model:	FXE2000-DG
Received Date:	Apr. 20,2016
Test Date:	Apr. 29 to May 03, 2016
Issued Date:	May 25, 2016
Applicant:	Contec Co., Ltd.
Address:	3-9-31, Himesato, Nishiyodogawa-ku Osaka Japan 555-0025
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
RF140128E04E	Original release.	May 25, 2016

1 Certificate of Conformity

Product:	Wireless LAN Adapter
Brand:	CONTEC
Test Model:	FXE2000-DG
Sample Status:	ENGINEERING SAMPLE
Applicant:	Contec Co., Ltd.
Test Date:	Apr. 29 to May. 03, 2016
Standard:	47 CFR FCC Part 15, Subpart E (Section 15.407) 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 : Wendy Wu. , **Date:** May 25, 2016

Wendy Wu / Specialist

Approved by : , **Date:** May 25, 2016

May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (SECTION 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -5.3dB at 106.7MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is U.FL not a standard connector.

*For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOBE test plots were recorded in Annex A.

NOTE: 1. This report is prepared for FCC Class II change. (Upgraded the standard to section 15.407 under new rule for UNII-3 band)

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	Expanded Uncertainty (k=2) (±)
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	Wireless LAN Adapter
Brand	CONTEC
Test Model	FXE2000-DG
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 5V from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps
Operating Frequency	**For 15.407:** 5.18GHz ~ 5.24GHz, 5.26GHz ~ 5.32GHz, 5.50GHz ~ 5.70GHz, 5.745GHz ~ 5.825GHz
	For 15.247: 2.412 ~ 2.462GHz
Number of Channel	**For 15.407:** 802.11a, 802.11n (HT20): 24 802.11n (HT40): 11
	For 15.247: 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7
Output Power	**For 15.407:** 5.18GHz ~ 5.24GHz 27.593mW 5.26GHz ~ 5.32GHz 22.719mW 5.50GHz ~ 5.70GHz 55.700mW 5.745GHz ~ 5.825GHz 70.136mW
	For 15.247: 835.103mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RF140128E04 design is as the following information:

   ◆ Upgrade the standard to section 15.407 under new rule for U-NII-3 band.

2. For U-NII-1, UNII-2A and UNII-2C Band: There is no increase in authorized power level, so RF test data refer to the original test report (RF140128E04-1).
3. According to above conditions, all test items of U-NII-3 band test item need to be performed, except for AC power conducted emission test item. And all data was verified to meet the requirements.
4. 2.4GHz and 5GHz technology cannot transmit at same time.
5. The EUT need to be supplied with a power adapter as following table:

Brand	Model No.	Spec.
Sino-American	SA115B-05U	Input: 100-240V, 0.4A, 50-60Hz AC input cable: 1.8m, unshielded Output: 5V, 2.0A, 10W DC output cable: 1.9m, unshielded

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

Transmitter Circuit	Brand	Model	Gain (dBi) (Exclude cable loss)	Cable Loss (dB)	Net Gain (dBi) (Include cable loss)	Antenna Type	Connecter Type	Frequency range (GHz to GHz)	Cable Length (cm)
Chain (0)	FDK	A3001	2	1	1	Chip	U.FL	2.4~2.4835	6
			1	2	-1			5.15~5.85	
Chain (1)	FDK	A3001	2	1.5	0.5	Chip	U.FL	2.4~2.4835	16
			1	2.5	-1.5			5.15~5.85	

7. The EUT incorporates a MIMO function.

MODULATION MODE	Data Rate (MCS)	Tx/Rx FUNCTION
802.11a	6 ~ 54Mbps	2TX / 2RX
802.11b	1 ~ 11Mbps	2TX / 2RX
802.11g	6 ~ 54Mbps	2TX / 2RX
802.11n (HT20)	MCS 0~7	1TX / 1RX
	MCS 8~15	2TX / 2RX
802.11n (HT40)	MCS 0~7	1TX / 1RX
	MCS 8~15	2TX / 2RX

8. When the EUT operating in 802.11n, the software operation, which is defined by manufacturer, MCS (Modulation and Coding Schemes) from 0 to 15.
9. 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.

3.2 Description of Test Modes

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To			Description
	RE≥1G	RE<1G	APCM	
-	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
APCM: Antenna Port Conducted Measurement

NOTE:
1. In original report, the EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

Radiated Emission Test (Above 1GHz):

☒ 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	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	13
802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	27

Radiated Emission Test (Below 1GHz):

☒ 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	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5745-5825	149 to 165	165	OFDM	BPSK	6

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

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	13
802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	27

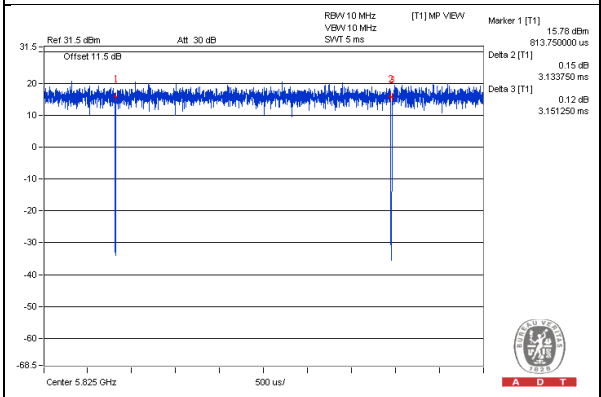
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By	Test Location
RE≥1G	22deg. C, 70%RH	120Vac, 60Hz	Andy Ho	1
RE<1G	23deg. C, 69%RH	120Vac, 60Hz	Andy Ho	1
APCM	24deg. C, 64%RH	120Vac, 60Hz	Anderson Chen	1

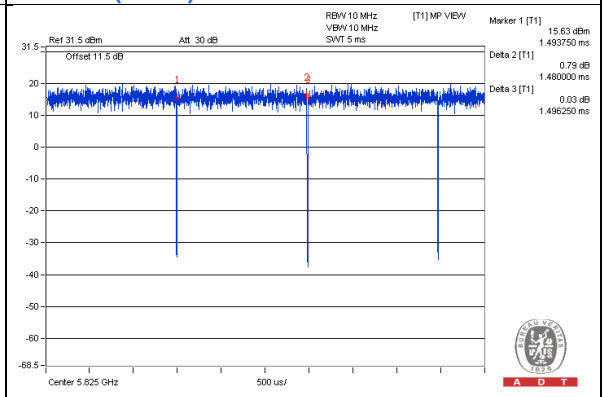
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is ≥ 98 %, duty factor is not required.
802.11a: Duty cycle = 3.13375/3.15125 = 0.994
802.11n (HT20): Duty cycle = 1.48/1.49625 = 0.989
802.11n (HT40): Duty cycle = 0.735/0.75025 = 0.98

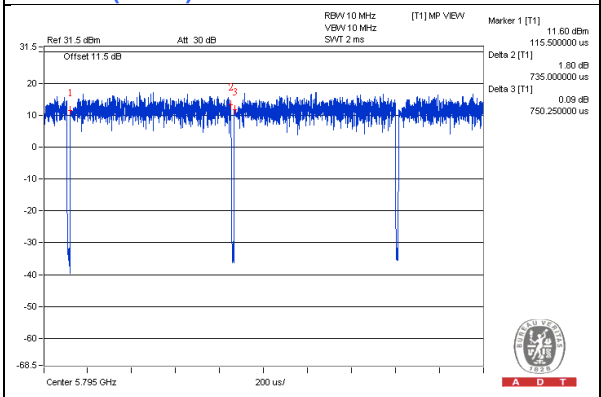
802.11a



802.11n (HT20)



802.11n (HT40)



3.4 Description of Support Units

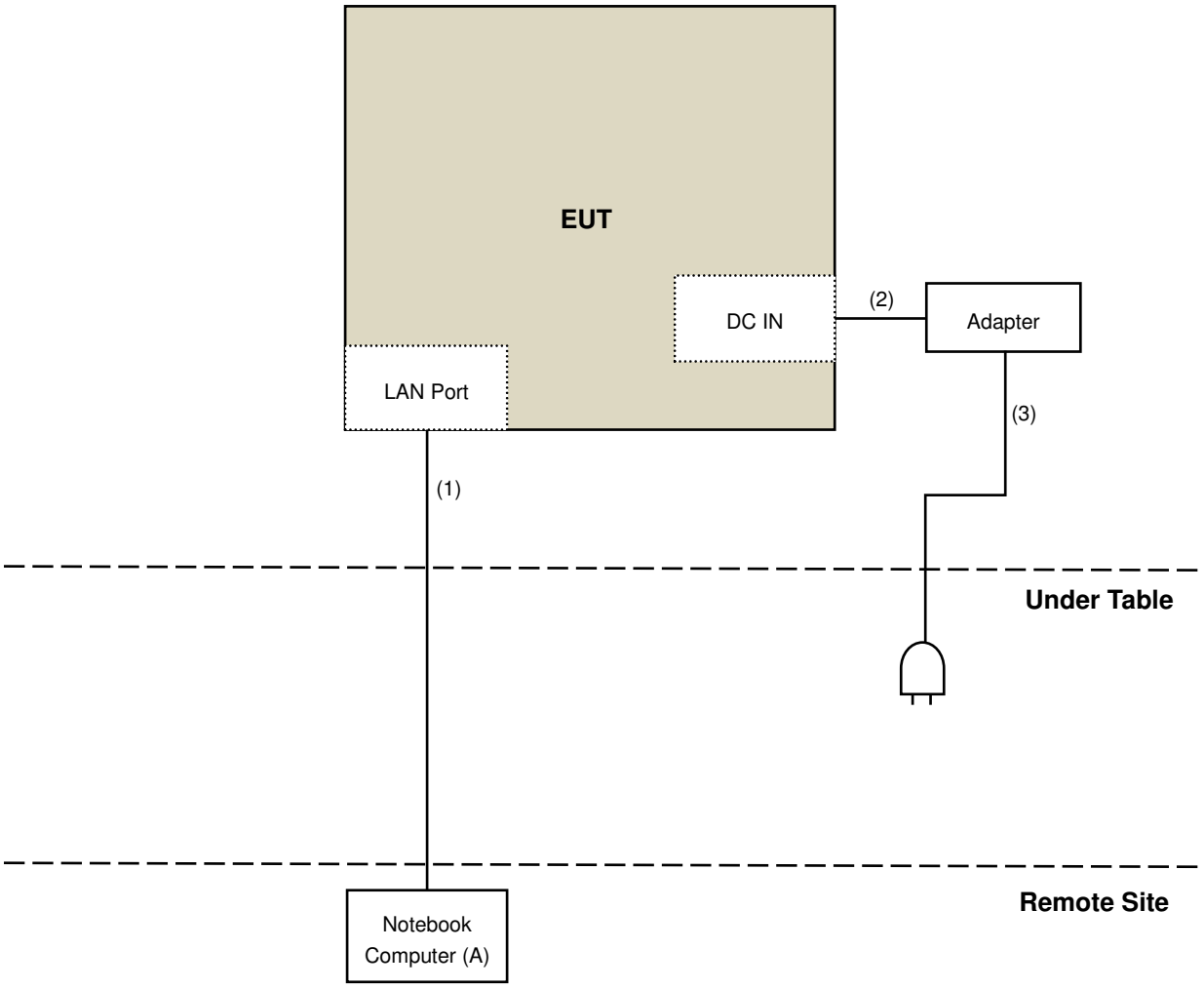
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook Computer	HP	Pavilion 14-ab023TU	5CD5340WXZ	NA	Provided by Lab

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45 cable	1	10	No	0	Provided by Lab
2.	DC cable	1	1.9	No	0	Supplied by Client
3.	AC cable	1	1.8	No	0	Supplied by Client

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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 E (15.407)
KDB 789033 D02 General UNII Test Procedure New Rules v01r02
KDB 662911 D01 Multiple Transmitter Output v02r01
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.

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.

LimitS OF UNWANTED EMISSION OUT OF THE RESTRICTED BandS

<table>
<tr><td>Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td rowspan="2">789033 D02 General UNII Test Procedure New Rules v01r02</td><td colspan="2">FIELD STRENGTH at 3m</td></tr>
<tr><td>PK:74 (dBµV/m)</td><td>AV:54 (dBµV/m)</td></tr>
<tr><td>Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></tr>
<tr><td>15.407(b)(1)</td><td rowspan="3">PK:-27 (dBm/MHz)</td><td rowspan="3">PK:68.2(dBµV/m)</td></tr>
<tr><td>15.407(b)(2)</td></tr>
<tr><td>15.407(b)(3)</td></tr>
<tr><td>15.407(b)(4)(i)</td><td>PK:-27 (dBm/MHz) *1
PK:10 (dBm/MHz) *2
PK:15.6 (dBm/MHz) *3
PK:27 (dBm/MHz) *4</td><td>PK: 68.2(dBµV/m) *1
PK:105.2 (dBµV/m) *2
PK: 110.8(dBµV/m) *3
PK:122.2 (dBµV/m) *4</td></tr>
<tr><td rowspan="2">15.407(b)(4)(ii)</td><td colspan="2">FIELD STRENGTH at 3m / § 15.247(d),</td></tr>
<tr><td>PK:74 (dBµV/m)</td><td>AV:54 (dBµV/m)</td></tr>
<tr><td colspan="3">*1 beyond 75 MHz or more above of the band edge.
*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.
*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.
*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
</table>

NOTE:

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

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. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2014	Dec. 15, 2016
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-07	May 07, 2016	May 06, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-156	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-3-1 966-3-2 966-3-3	Apr. 02, 2016	Apr. 01, 2017
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Jan. 20, 2016	Jan. 19, 2017
Pre-Amplifier Agilent	8449B	3008A02465	Apr. 05, 2016	Apr. 04, 2017
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150317 150321 150322	Mar. 30, 2016	Mar. 29, 2017
Spectrum Analyzer Keysight	N9030A	MY54490520	July 26, 2015	July 25, 2016
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Boresight Antenna Fixture	NA	NA	NA	NA
Spectrum Analyzer R&S	FSP40	100060	May 11, 2016	May 10, 2017
Power meter Anritsu	ML2495A	1014008	May 5, 2016	May 4, 2017
Power sensor Anritsu	MA2411B	0917122	May 5, 2016	May 4, 2017
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 15, 2016	Jan. 14, 2017

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: Apr. 29 to May. 03, 2016

4.1.3 Test Procedure

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:

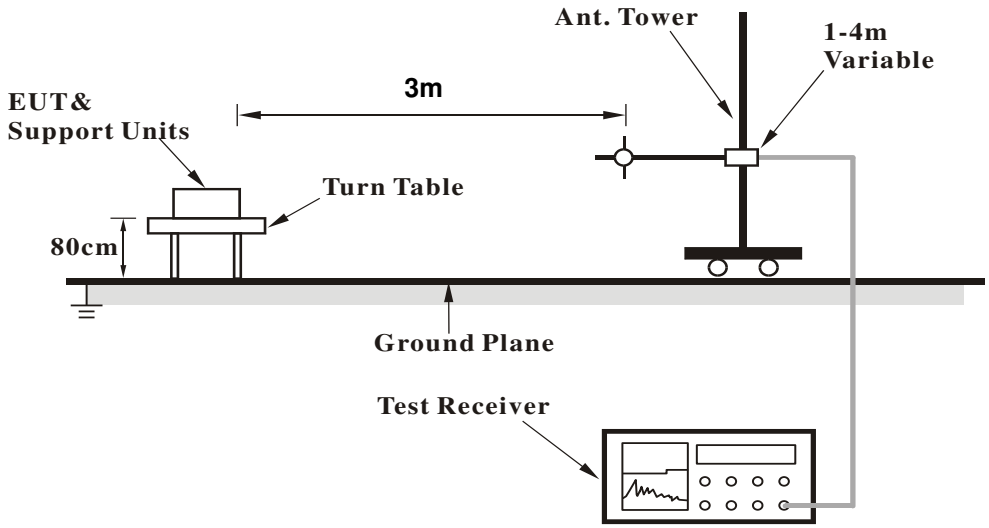
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

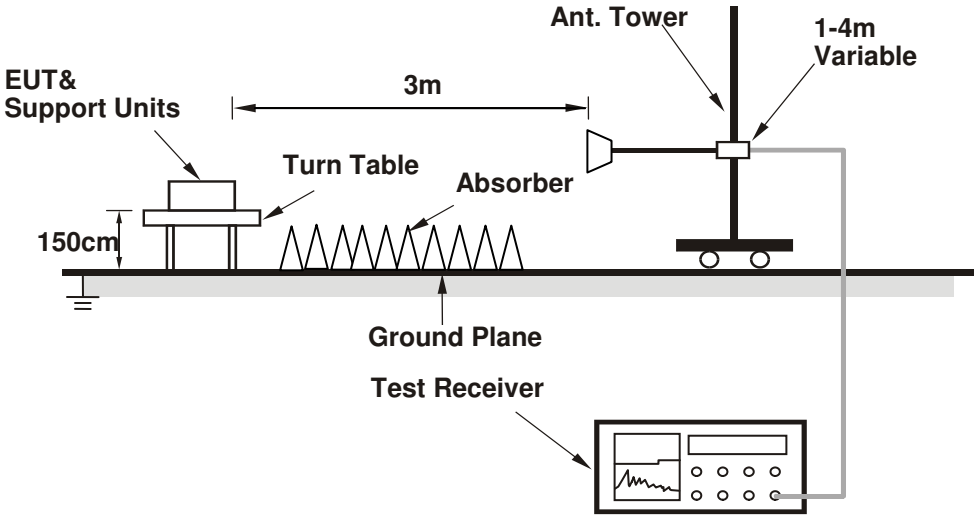
No deviation.

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 Condition

1. Place the EUT on testing table.
2. The communication partner runs test program “art.exe V0.9” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5654.98	55.9 PK	71.9	-16.0	1.84 H	360	51.80	4.08
2	*5745.00	105.3 PK			1.84 H	360	103.56	1.74
3	*5745.00	96.2 AV			1.84 H	360	94.46	1.74
4	#5924.30	54.8 PK	68.7	-13.9	1.84 H	360	50.47	4.34
5	11490.00	41.7 PK	74.0	-32.3	1.51 H	145	29.29	12.41
6	11490.00	29.7 AV	54.0	-24.3	1.51 H	145	17.29	12.41
7	#17235.00	40.3 PK	74.0	-33.7	1.43 H	281	23.58	16.72
8	#17235.00	30.1 AV	54.0	-23.9	1.43 H	281	13.38	16.72
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	#5673.02	59.6 PK	85.3	-25.6	2.04 V	295	55.52	4.12
2	*5745.00	106.3 PK			2.04 V	295	104.56	1.74
3	*5745.00	97.4 AV			2.04 V	295	95.66	1.74
4	#5903.87	57.0 PK	83.8	-26.8	2.04 V	295	52.71	4.31
5	11490.00	41.2 PK	74.0	-32.8	1.64 V	221	28.79	12.41
6	11490.00	28.8 AV	54.0	-25.2	1.64 V	221	16.39	12.41
7	#17235.00	41.6 PK	74.0	-32.4	1.55 V	142	24.88	16.72
8	#17235.00	30.4 AV	54.0	-23.6	1.55 V	142	13.68	16.72

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5661.15	58.9 PK	76.5	-17.6	1.31 H	6	54.80	4.09
2	*5785.00	104.1 PK			1.31 H	6	102.30	1.80
3	*5785.00	94.8 AV			1.31 H	6	93.00	1.80
4	#5909.10	56.7 PK	79.9	-23.2	1.31 H	6	52.38	4.32
5	11570.00	41.8 PK	74.0	-32.2	1.48 H	142	29.62	12.18
6	11570.00	29.6 AV	54.0	-24.4	1.48 H	142	17.42	12.18
7	#17355.00	40.7 PK	74.0	-33.3	1.47 H	267	23.43	17.27
8	#17355.00	30.5 AV	54.0	-23.5	1.47 H	267	13.23	17.27
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	#5654.50	57.7 PK	71.5	-13.9	2.10 V	260	53.58	4.08
2	*5785.00	106.1 PK			2.10 V	260	104.30	1.80
3	*5785.00	96.1 AV			2.10 V	260	94.30	1.80
4	#5900.07	58.5 PK	86.6	-28.1	2.10 V	260	54.16	4.31
5	11570.00	41.3 PK	74.0	-32.7	1.62 V	207	29.12	12.18
6	11570.00	29.0 AV	54.0	-25.0	1.62 V	207	16.82	12.18
7	#17355.00	41.6 PK	74.0	-32.4	1.60 V	150	24.33	17.27
8	#17355.00	30.3 AV	54.0	-23.7	1.60 V	150	13.03	17.27

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5663.05	58.8 PK	77.9	-19.1	1.34 H	2	54.72	4.09
2	*5825.00	105.1 PK			1.34 H	2	103.27	1.83
3	*5825.00	94.8 AV			1.34 H	2	92.97	1.83
4	#5905.30	57.8 PK	82.7	-25.0	1.34 H	2	53.44	4.31
5	11650.00	41.7 PK	74.0	-32.3	1.53 H	161	29.67	12.03
6	11650.00	29.9 AV	54.0	-24.1	1.53 H	161	17.87	12.03
7	#17475.00	40.1 PK	74.0	-33.9	1.43 H	287	22.34	17.76
8	#17475.00	29.7 AV	54.0	-24.3	1.43 H	287	11.94	17.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5665.90	57.8 PK	80.0	-22.2	2.14 V	263	53.70	4.11
2	*5825.00	106.1 PK			2.14 V	263	104.27	1.83
3	*5825.00	96.0 AV			2.14 V	263	94.17	1.83
4	#5905.30	56.9 PK	82.7	-25.9	2.14 V	263	52.54	4.31
5	11650.00	41.3 PK	74.0	-32.7	1.63 V	217	29.27	12.03
6	11650.00	28.7 AV	54.0	-25.3	1.63 V	217	16.67	12.03
7	#17475.00	42.1 PK	74.0	-31.9	1.62 V	158	24.34	17.76
8	#17475.00	30.6 AV	54.0	-23.4	1.62 V	158	12.84	17.76

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

802.11n (HT20)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5652.12	57.6 PK	69.8	-12.2	1.29 H	5	53.50	4.07
2	*5745.00	106.9 PK			1.29 H	5	105.16	1.74
3	*5745.00	95.8 AV			1.29 H	5	94.06	1.74
4	#5921.45	58.0 PK	70.8	-12.8	1.29 H	5	53.65	4.34
5	11490.00	42.0 PK	74.0	-32.0	1.54 H	141	29.59	12.41
6	11490.00	30.0 AV	54.0	-24.0	1.54 H	141	17.59	12.41
7	#17235.00	39.9 PK	74.0	-34.1	1.41 H	271	23.18	16.72
8	#17235.00	29.8 AV	54.0	-24.2	1.41 H	271	13.08	16.72
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	#5652.60	59.4 PK	70.1	-10.8	1.00 V	260	55.28	4.07
2	*5745.00	107.9 PK			1.00 V	260	106.16	1.74
3	*5745.00	97.0 AV			1.00 V	260	95.26	1.74
4	#5917.65	57.6 PK	73.6	-16.0	1.00 V	260	53.28	4.33
5	11490.00	41.2 PK	74.0	-32.8	1.63 V	204	28.79	12.41
6	11490.00	29.1 AV	54.0	-24.9	1.63 V	204	16.69	12.41
7	#17235.00	41.5 PK	74.0	-32.5	1.58 V	157	24.78	16.72
8	#17235.00	30.2 AV	54.0	-23.8	1.58 V	157	13.48	16.72

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5659.25	58.2 PK	75.1	-16.9	1.26 H	10	54.13	4.08
2	*5785.00	105.7 PK			1.26 H	10	103.90	1.80
3	*5785.00	94.5 AV			1.26 H	10	92.70	1.80
4	#5922.40	57.2 PK	70.1	-12.9	1.26 H	10	52.86	4.34
5	11570.00	41.9 PK	74.0	-32.1	1.50 H	141	29.72	12.18
6	11570.00	29.6 AV	54.0	-24.4	1.50 H	141	17.42	12.18
7	#17355.00	40.0 PK	74.0	-34.0	1.46 H	281	22.73	17.27
8	#17355.00	29.7 AV	54.0	-24.3	1.46 H	281	12.43	17.27
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	#5657.82	57.9 PK	74.0	-16.1	3.84 V	283	53.84	4.08
2	*5785.00	106.7 PK			3.84 V	283	104.90	1.80
3	*5785.00	95.7 AV			3.84 V	283	93.90	1.80
4	#5899.60	56.6 PK	87.0	-30.3	3.84 V	283	52.31	4.31
5	11570.00	40.8 PK	74.0	-33.2	1.61 V	211	28.62	12.18
6	11570.00	28.8 AV	54.0	-25.2	1.61 V	211	16.62	12.18
7	#17355.00	41.8 PK	74.0	-32.2	1.55 V	145	24.53	17.27
8	#17355.00	30.5 AV	54.0	-23.5	1.55 V	145	13.23	17.27

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5674.45	57.5 PK	86.3	-28.8	1.28 H	9	53.37	4.12
2	*5825.00	104.8 PK			1.28 H	9	102.97	1.83
3	*5825.00	95.3 AV			1.28 H	9	93.47	1.83
4	#5924.77	56.1 PK	68.4	-12.3	1.28 H	9	51.78	4.34
5	11650.00	41.7 PK	74.0	-32.3	1.57 H	160	29.67	12.03
6	11650.00	29.8 AV	54.0	-24.2	1.57 H	160	17.77	12.03
7	#17475.00	40.1 PK	74.0	-33.9	1.40 H	295	22.34	17.76
8	#17475.00	29.9 AV	54.0	-24.1	1.40 H	295	12.14	17.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5653.07	59.0 PK	70.5	-11.5	1.04 V	263	54.92	4.07
2	*5825.00	105.8 PK			1.04 V	263	103.97	1.83
3	*5825.00	96.5 AV			1.04 V	263	94.67	1.83
4	#5907.68	57.4 PK	81.0	-23.6	1.04 V	263	53.08	4.32
5	11650.00	41.2 PK	74.0	-32.8	1.57 V	203	29.17	12.03
6	11650.00	29.1 AV	54.0	-24.9	1.57 V	203	17.07	12.03
7	#17475.00	41.5 PK	74.0	-32.5	1.60 V	163	23.74	17.76
8	#17475.00	30.5 AV	54.0	-23.5	1.60 V	163	12.74	17.76

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

802.11n (HT40)

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5654.50	58.4 PK	71.5	-13.1	2.67 H	11	54.32	4.08
2	*5755.00	103.4 PK			2.67 H	11	101.64	1.76
3	*5755.00	91.4 AV			2.67 H	11	89.64	1.76
4	#5920.02	55.6 PK	71.9	-16.3	2.67 H	11	51.24	4.33
5	11510.00	41.3 PK	74.0	-32.7	1.45 H	152	28.92	12.38
6	11510.00	29.5 AV	54.0	-24.5	1.45 H	152	17.12	12.38
7	#17265.00	40.5 PK	74.0	-33.5	1.46 H	286	23.70	16.80
8	#17265.00	30.5 AV	54.0	-23.5	1.46 H	286	13.70	16.80
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	#5655.93	58.5 PK	72.6	-14.2	1.97 V	296	54.38	4.08
2	*5755.00	104.4 PK			1.97 V	296	102.64	1.76
3	*5755.00	92.6 AV			1.97 V	296	90.84	1.76
4	#5903.40	57.4 PK	84.2	-26.8	1.97 V	296	53.09	4.31
5	11510.00	41.8 PK	74.0	-32.2	1.62 V	196	29.42	12.38
6	11510.00	29.3 AV	54.0	-24.7	1.62 V	196	16.92	12.38
7	#17265.00	41.8 PK	74.0	-32.2	1.64 V	139	25.00	16.80
8	#17265.00	30.5 AV	54.0	-23.5	1.64 V	139	13.70	16.80

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

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	#5657.35	60.1 PK	73.7	-13.5	2.68 H	24	56.06	4.08
2	*5795.00	102.9 PK			2.68 H	24	101.08	1.82
3	*5795.00	91.4 AV			2.68 H	24	89.58	1.82
4	#5908.15	58.3 PK	80.6	-22.3	2.68 H	24	53.99	4.32
5	11590.00	41.4 PK	74.0	-32.6	1.49 H	135	29.29	12.11
6	11590.00	29.2 AV	54.0	-24.8	1.49 H	135	17.09	12.11
7	#17385.00	40.5 PK	74.0	-33.5	1.47 H	279	23.04	17.46
8	#17385.00	30.2 AV	54.0	-23.8	1.47 H	279	12.74	17.46
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	#5654.50	58.9 PK	71.5	-12.6	1.22 V	264	54.86	4.08
2	*5795.00	103.6 PK			1.22 V	264	101.78	1.82
3	*5795.00	92.6 AV			1.22 V	264	90.78	1.82
4	#5920.98	57.2 PK	71.2	-13.9	1.22 V	264	52.90	4.33
5	11590.00	41.4 PK	74.0	-32.6	1.62 V	212	29.29	12.11
6	11590.00	29.2 AV	54.0	-24.8	1.62 V	212	17.09	12.11
7	#17385.00	42.0 PK	74.0	-32.0	1.61 V	163	24.54	17.46
8	#17385.00	30.8 AV	54.0	-23.2	1.61 V	163	13.34	17.46

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

Below 1GHz Data:

802.11a

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	below 1GHz		

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	43.48	33.2 QP	40.0	-6.8	1.50 H	240	32.38	0.85
2	**106.70**	**38.2 QP**	**43.5**	**-5.3**	**1.81 H**	**100**	**40.80**	**-2.64**
3	250.00	36.0 QP	46.0	-10.0	1.50 H	247	36.14	-0.17
4	339.99	39.6 QP	46.0	-6.4	1.00 H	311	36.88	2.72
5	680.02	40.5 QP	46.0	-5.5	1.00 H	328	30.95	9.52
6	874.99	39.6 QP	46.0	-6.4	1.00 H	156	26.96	12.64
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	74.53	33.3 QP	40.0	-6.7	1.50 V	187	35.19	-1.86
2	157.56	30.7 QP	43.5	-12.8	1.00 V	310	29.67	1.02
3	340.01	36.4 QP	46.0	-9.6	1.50 V	358	33.65	2.72
4	510.03	36.7 QP	46.0	-9.3	1.50 V	280	29.96	6.75
5	680.00	40.6 QP	46.0	-5.4	1.50 V	348	31.07	9.52
6	875.04	38.5 QP	46.0	-7.5	1.00 V	34	25.83	12.65

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 Transmit Power Measurment

4.2.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
		Mobile and Portable client device	250mW (24 dBm)
U-NII-2A			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C			250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.2.2 Test Setup

4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.2.7 Test Result

Power Output:

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
149	5745	15.43	14.43	62.647	17.97	30	Pass
157	5785	15.48	14.66	64.56	18.10	30	Pass
165	5825	15.57	14.90	66.961	18.26	30	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
149	5745	15.53	14.27	62.457	17.96	30	Pass
157	5785	15.44	14.34	62.159	17.94	30	Pass
165	5825	15.96	14.87	70.136	18.46	30	Pass

802.11n (HT40)

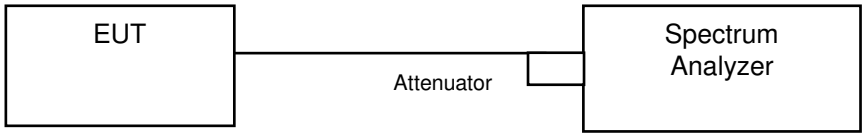
Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
151	5755	15.24	14.16	59.482	17.74	30	Pass
159	5795	15.55	14.57	64.534	18.10	30	Pass

4.3 Peak Power Spectral Density Measurement

4.3.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
		Mobile and Portable client device	11dBm/ MHz
U-NII-2A			11dBm/ MHz
U-NII-2C			11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

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

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)
5. Sweep time = auto, trigger set to “free run”.
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

Same as Item 4.2.6.

4.3.7 Test Results

802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-7.58	-5.36	3.01	-2.35	30.00	Pass
	157	5785	-7.64	-5.42	3.01	-2.41	30.00	Pass
	165	5825	-6.71	-4.49	3.01	-1.48	30.00	Pass
1	149	5745	-7.18	-4.96	3.01	-1.95	30.00	Pass
	157	5785	-6.79	-4.57	3.01	-1.56	30.00	Pass
	165	5825	-6.83	-4.61	3.01	-1.60	30.00	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 1.76dBi < 6dBi , so the power density limit shall not be reduced.

802.11n (HT20)

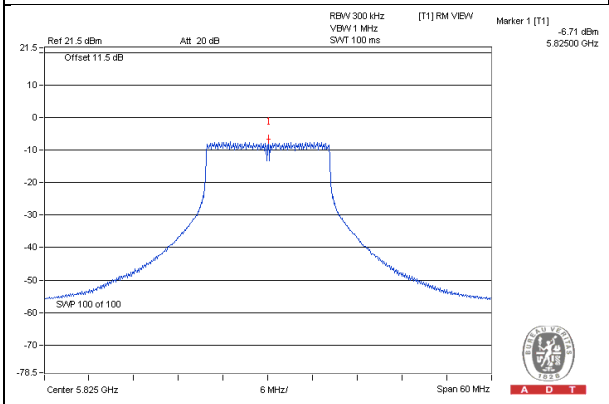
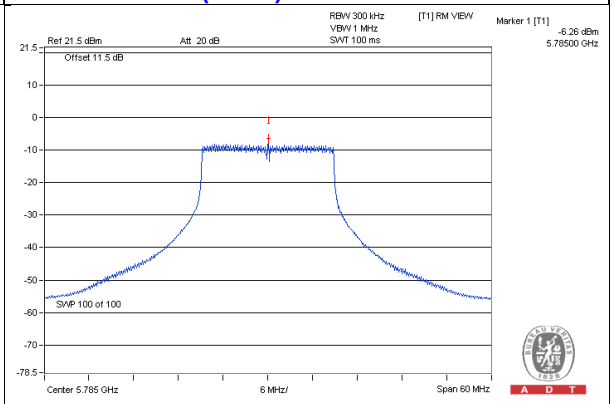
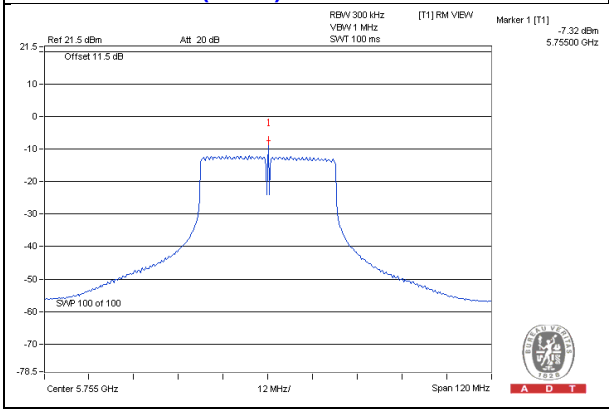
TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-7.98	-5.76	3.01	-2.75	30.00	Pass
	157	5785	-6.26	-4.04	3.01	-1.03	30.00	Pass
	165	5825	-7.48	-5.26	3.01	-2.25	30.00	Pass
1	149	5745	-7.49	-5.27	3.01	-2.26	30.00	Pass
	157	5785	-7.18	-4.96	3.01	-1.95	30.00	Pass
	165	5825	-7.22	-5.00	3.01	-1.99	30.00	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 1.76dBi < 6dBi , so the power density limit shall not be reduced.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	151	5755	-7.32	-5.10	3.01	-2.09	30.00	Pass
	159	5795	-10.74	-8.52	3.01	-5.51	30.00	Pass
1	151	5755	-10.74	-8.52	3.01	-5.51	30.00	Pass
	159	5795	-10.89	-8.67	3.01	-5.66	30.00	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 1.76dBi < 6dBi , so the power density limit shall not be reduced.

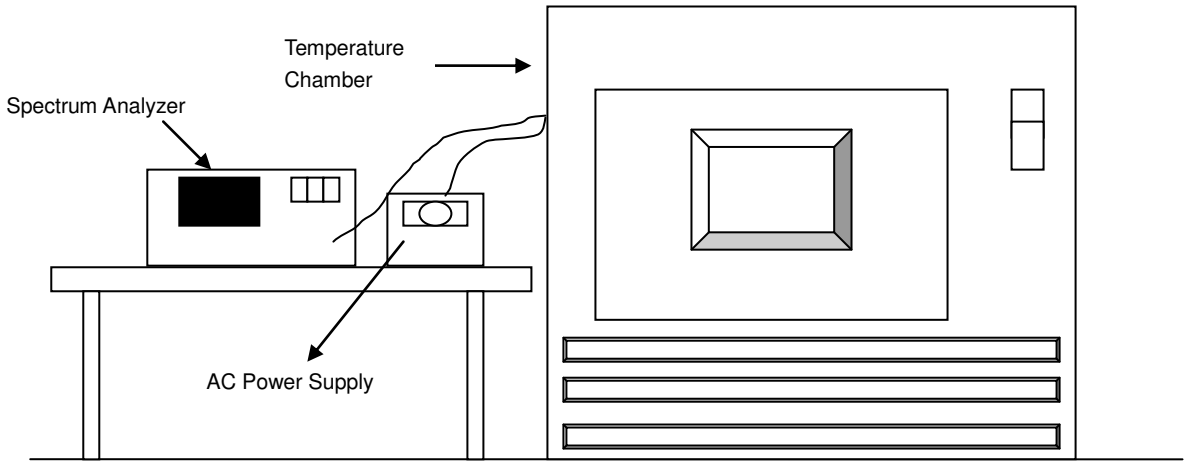
Spectrum Plot of Worst Value	
802.11a – Chain 0: CH 165	**802.11n (HT20) – Chain 0: CH 157**
	
802.11n (HT40) – Chain 0: CH 151	
	

4.4 Frequency Stability Measurement

4.4.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. 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.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. 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.
.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.4.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5825 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	120	5824.9939	Pass	5824.994	Pass	5824.9972	Pass	5824.9987	Pass
40	120	5825	Pass	5824.9981	Pass	5824.9982	Pass	5825.0026	Pass
30	120	5824.9919	Pass	5824.9895	Pass	5824.9911	Pass	5824.9869	Pass
20	120	5824.9905	Pass	5824.9888	Pass	5824.989	Pass	5824.9875	Pass
10	120	5824.99	Pass	5824.9948	Pass	5824.993	Pass	5824.9939	Pass
0	120	5824.9995	Pass	5825.0007	Pass	5824.9996	Pass	5825.0009	Pass
-10	120	5825.006	Pass	5825.0019	Pass	5825.005	Pass	5825.0006	Pass
-20	120	5824.9829	Pass	5824.9773	Pass	5824.9815	Pass	5824.9797	Pass
-30	120	5825.0025	Pass	5825.0036	Pass	5825.0008	Pass	5824.9995	Pass

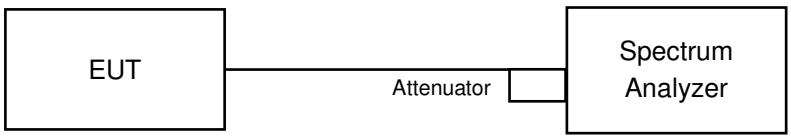
Frequency Stability Versus Voltage									
Operating Frequency: 5825 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5824.9907	Pass	5824.9899	Pass	5824.9886	Pass	5824.9873	Pass
	120	5824.9905	Pass	5824.9888	Pass	5824.989	Pass	5824.9875	Pass
	102	5824.9897	Pass	5824.9895	Pass	5824.988	Pass	5824.9869	Pass

4.5 6dB Bandwidth Measurment

4.5.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.5.7 Test Results

802.11a

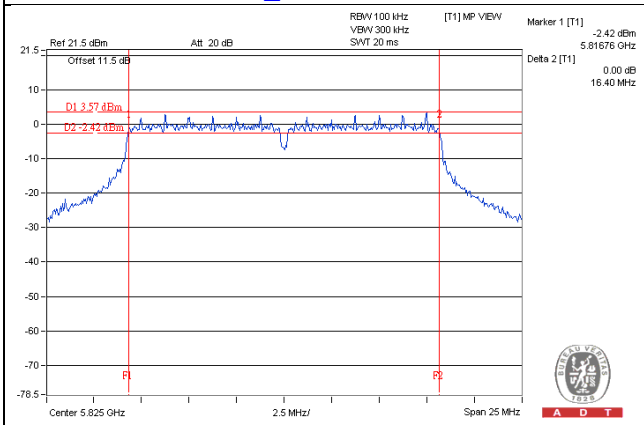
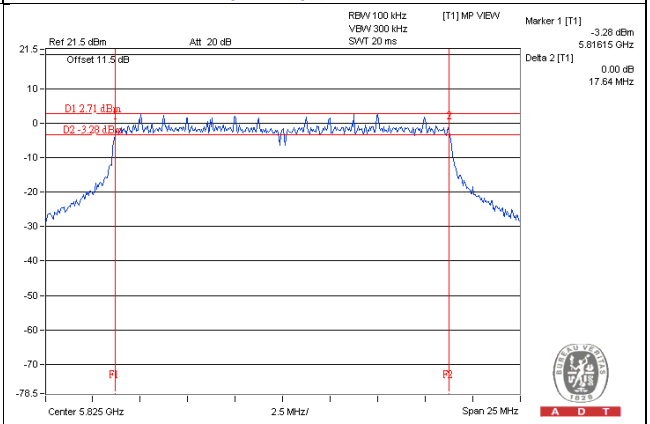
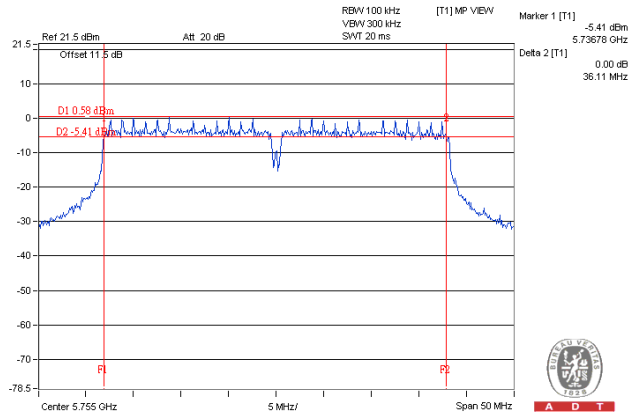
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.41	16.41	0.5	PASS
157	5785	16.46	16.42	0.5	PASS
165	5825	16.42	16.40	0.5	PASS

802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.67	17.72	0.5	PASS
157	5785	17.66	17.70	0.5	PASS
165	5825	17.64	17.69	0.5	PASS

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	36.12	36.11	0.5	PASS
159	5795	36.42	36.44	0.5	PASS

Spectrum Plot of Worst Value	
802.11a_Chain 1 / CH165	**802.11n (HT20)_Chain 0 / CH165**
	
802.11n (HT40)_Chain 1 / CH151	
	

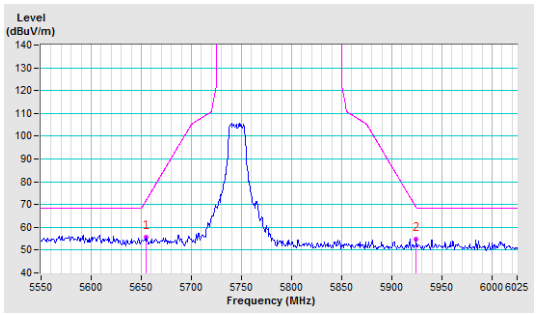
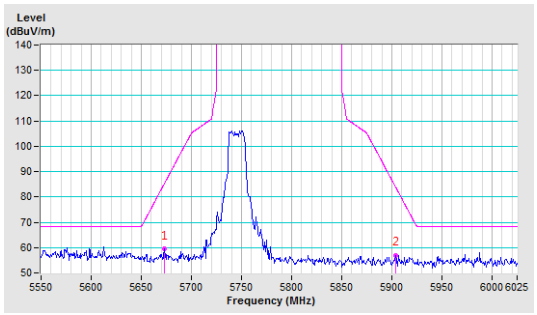
5 Pictures of Test Arrangements

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

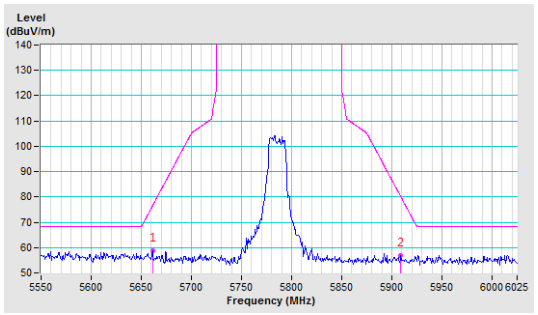
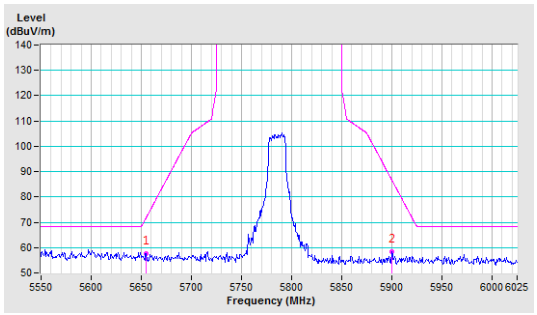
Annex A- Radiated Out of Band Emisison (OOBE) Measurement (For U-NII-3 band)

802.11a

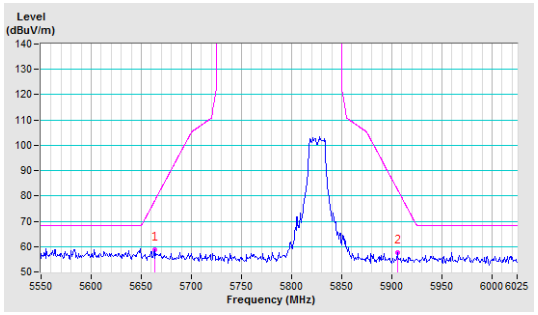
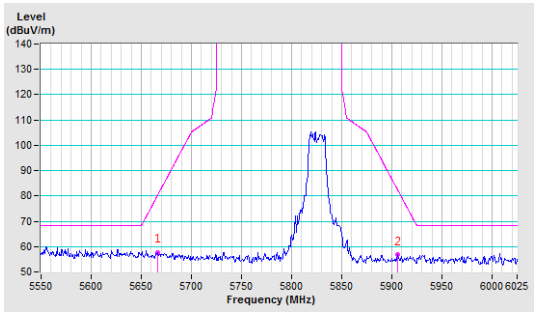
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

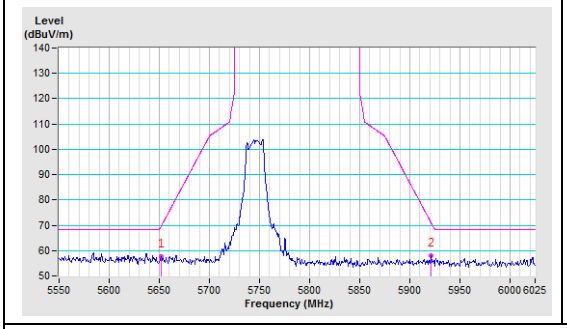
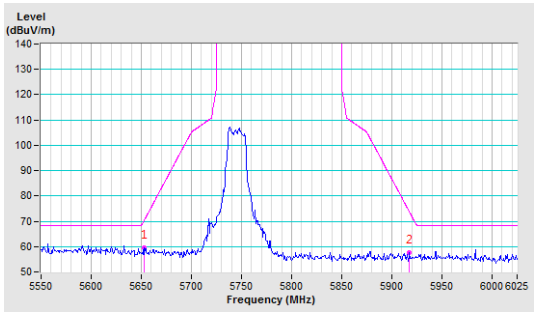
Horizontal	Vertical
	

CH 165 5825 MHz

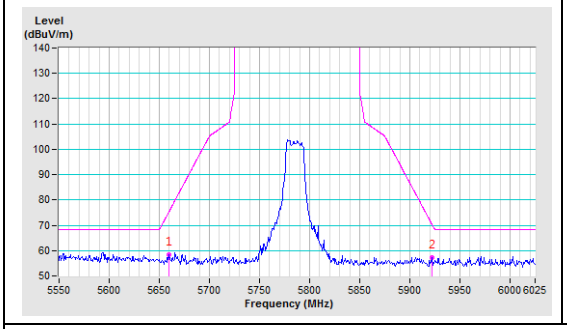
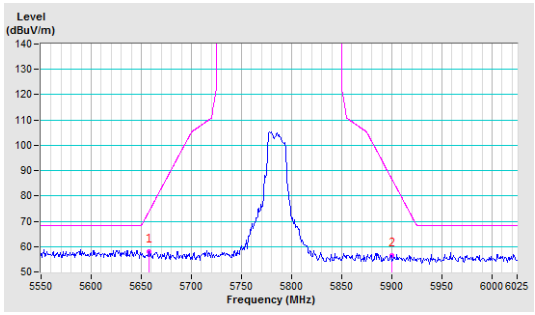
Horizontal	Vertical
	

802.11n (HT20)

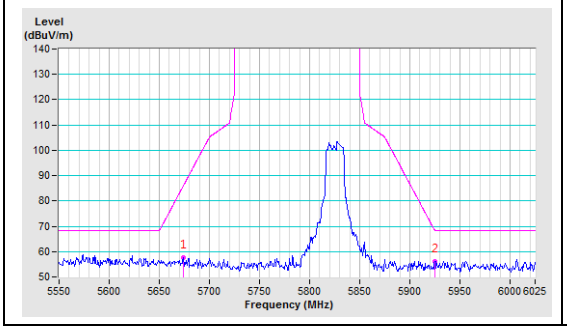
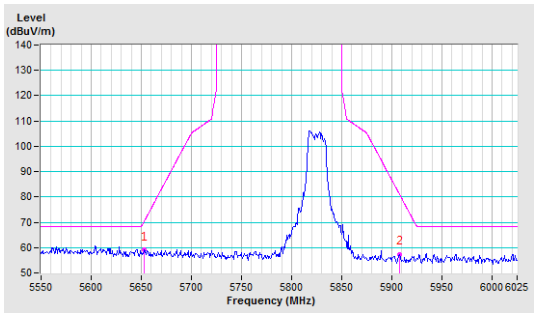
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

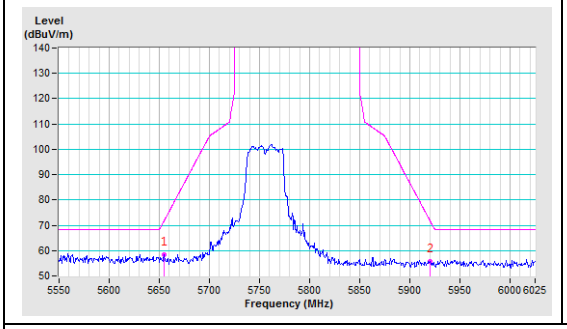
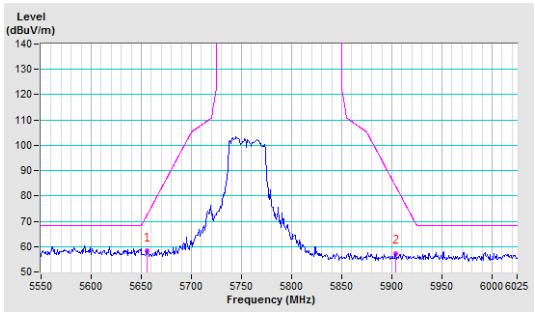
Horizontal	Vertical
	

CH 165 5825 MHz

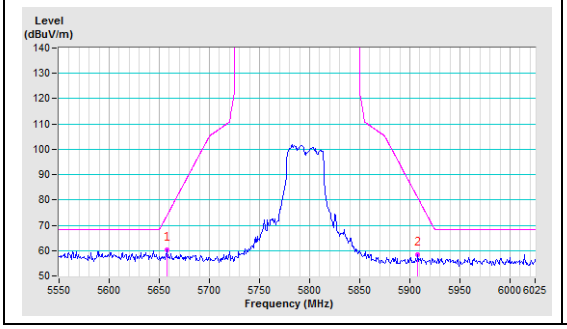
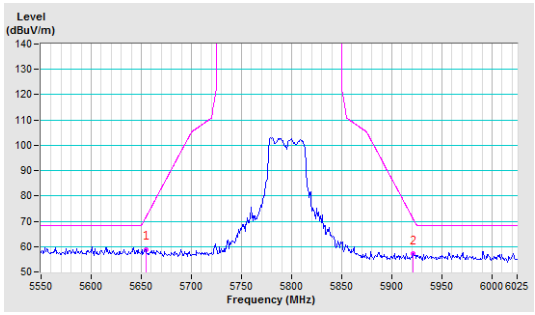
Horizontal	Vertical
	

802.11n (HT40)

CH 151 5755 MHz

Horizontal	Vertical
	

CH 159 5795 MHz

Horizontal	Vertical
	

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:

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

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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