FCC Test Report

Report No.:	RF130523E10B-1
FCC ID:	MCLJ20H076
Test Model:	J20H076
Received Date:	Sep. 14, 2015
Test Date:	Oct. 05 to 06, 2015
Issued Date:	Oct. 21, 2015
Applicant:	HON HAI PRECISION IND. CO., LTD.
Address:	5F-1,5 Hsin-An Road Hsinchu, Science-Based Industrial Park Taiwan, R.O.C.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.
Test Location (1):	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, 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.
Test Location (3):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
RF130523E10B-1	Original release.	Oct. 21, 2015

1 Certificate of Conformity

Product:	802.11abgn wireless module
Brand:	FOXCONN
Test Model:	J20H076
Sample Status:	ENGINEERING SAMPLE
Applicant:	HON HAI PRECISION IND. CO., LTD.
Test Date:	Oct. 05 to 06, 2015
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 : _____ , **Date:** Oct. 21, 2015

Elsie Hsu / Specialist

Approved by : _____ , **Date:** Oct. 21, 2015

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) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5725.00MHz
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 Murata not a standard connector.

NOTE: 1. This report is prepared for FCC Class II change. (Upgrade the standard to section 15.407 under new rule)
2. The DFS report was recorded in another test report<Report No.: RF130523E10B-2>.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.19 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.43 dB
	6GHz ~ 18GHz	3.49 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	802.11abgn wireless module
Brand	FOXCONN
Test Model	J20H076
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V ± 10% from host equipment
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 15.247 2.412GHz ~ 2.462GHz For 15.407 5.18GHz ~ 5.24GHz, 5.26GHz ~ 5.32GHz, 5.50 ~ 5.58GHz, 5.66GHz ~ 5.70GHz, 5.745GHz ~ 5.825GHz
Number of Channel	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) For 15.407 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
Output Power	**5GHz: (U-NII-3)** 802.11a: 87.007mW 802.11n (HT20): 84.647mW 802.11n (HT40): 86.902mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC Class II change. The differences between them are as below information:
   - ◆ Upgrade the standard to section 15.407 under new rule.
2. For U-NII-1, U-NII-2A and 2C Bands: There is no increase in authorized power level, so RF test refer original test report (Report No.: RF130523E10-1).
3. According to above conditions, therefor only U-NII-3 band and DFS need to be performed (except for 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 antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain (dBi)	Connector	Frequency range (MHz to MHz)
Chain (0)	NA	NA	PCB	3.10	Murata	2400~2483.5
				4.51		5150~5350
				4.75		5470~5725
				4.80		5725~5845
Chain (1)	NA	NA	PCB	3.18	Murata	2400~2483.5
				4.54		5150~5350
				4.78		5470~5725
				4.98		5725~5845

6. The EUT incorporates a MIMO function with beamforming.

For 2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
For 5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20) & 802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX

7. 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	PLC	APCM	
-	√	√	-	√	-

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

NOTE:
1. The test mode was reference to the worst case in the original test report.
2. "-" means no effect.

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	6.5
802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	13.5

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	157	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	6.5
802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	13.5

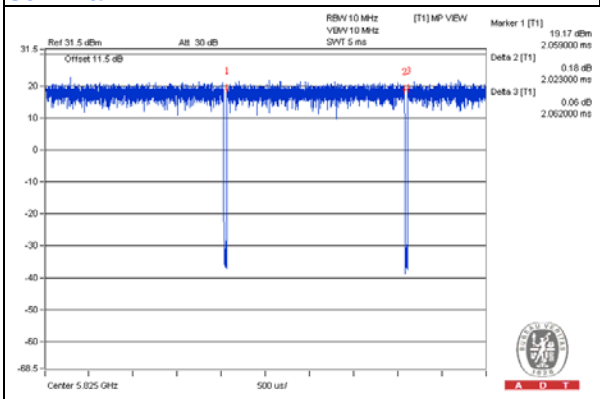
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	22deg. C, 70%RH	120Vac, 60Hz	Alex Ku
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Alex Ku
APCM	25deg. C, 60%RH	120Vac, 60Hz	Gary Cheng

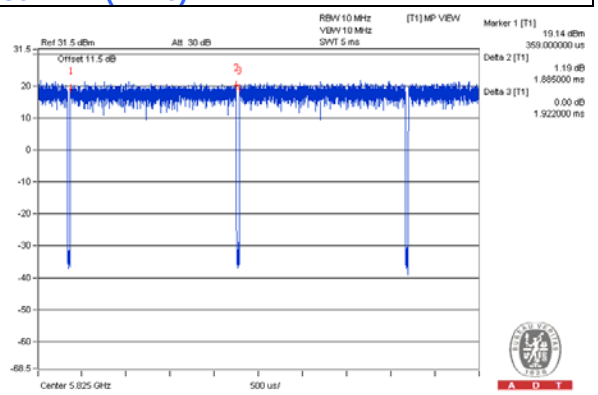
3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.
802.11a: Duty cycle = 2.023 ms/2.062 ms = 0.981
802.11n (HT20): Duty cycle = 1.885 ms/1.922 ms = 0.981
802.11n (HT40): Duty cycle = 0.928 ms/0.963 ms = 0.964, Duty factor = 10 * log(1/0.964) = 0.16

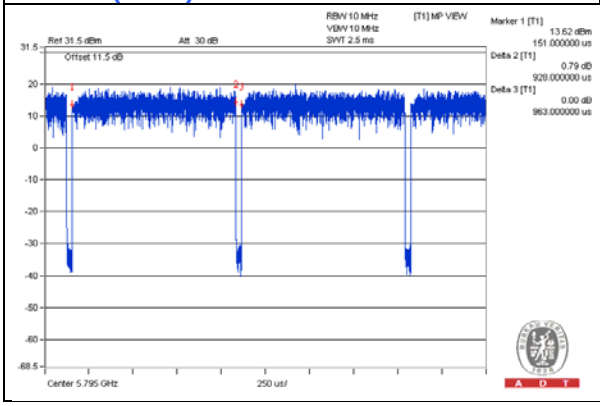
802.11a



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.

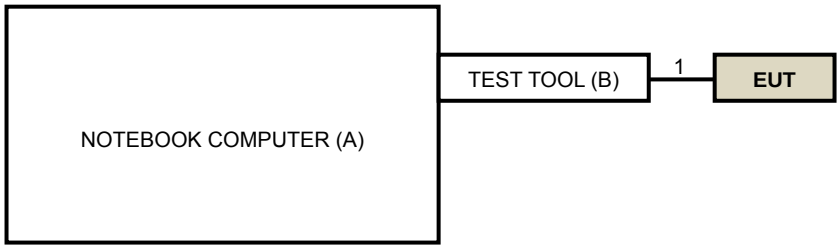
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E6440	H7LYQ32	FCC DoC	Provided by Lab
B	TEST TOOL	FOXCONN	NA	NA	NA	Supplied by Client

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	Data	1	0.1	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)
789033 D02 General UNII Test Procedure New Rules v01
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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

APPLICABLE TO	**LIMIT**	
789033 D02 General UNII Test Procedure New Rules v01	FIELD STRENGTH AT 3m	
	PK:74 (dBμV/m)	AV:54 (dBμV/m)
APPLICABLE TO	**EIRP LIMIT**	**EQUIVALENT FIELD STRENGTH AT 3m**
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) [*1] PK:-17 (dBm/MHz) [*2]	PK:68.2 (dBμV/m) [*1] PK:78.2 (dBμV/m) [*2]

NOTE: [*1] beyond 10MHz of the band edge [*2] within 10 MHz of band edge

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	MY54450088	July 24, 2015	July 23, 2016
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-06	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Feb. 03, 2015	Feb. 02, 2016
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 03, 2015	Apr. 02, 2016
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Feb. 06, 2015	Feb. 05, 2016
Pre-Amplifier Agilent	8449B	3008A01922	Sep. 19, 2015	Sep. 18, 2016
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150318 150323 150324	Mar. 31, 2015	Mar. 30, 2016
Spectrum Analyzer R&S	FSV40	100964	June 26, 2015	June 25, 2016
Pre-Amplifier EMCI	EMC184045	980143	Jan. 16, 2015	Jan. 15, 2016
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Feb. 05, 2015	Feb. 04, 2016
RF Cable	SUCOFLEX 104	329751/4 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Power Meter Anritsu	ML2495A	1014008	Apr. 28, 2015	Apr. 27, 2016
Power Sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016
Spectrum Analyzer R&S	FSP 40	100060	May 08, 2015	May 07, 2016
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-SP-AR	MAA0812-008	Jan. 12, 2015	Jan. 11, 2016

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 966 Chamber No. 4.
3. The FCC Site Registration No. is 292998
4. The CANADA Site Registration No. is 20331-2
5. Tested Date: Oct. 05 to 06, 2015

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

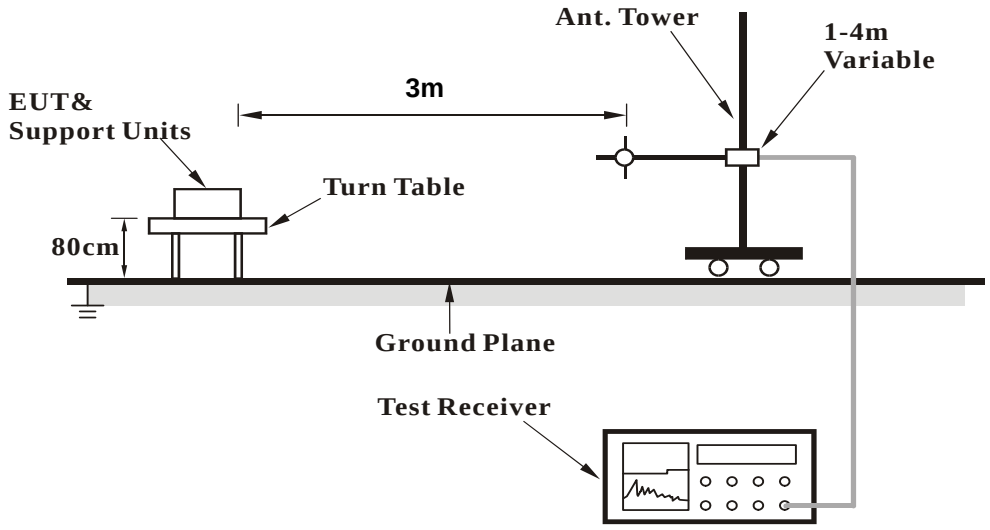
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

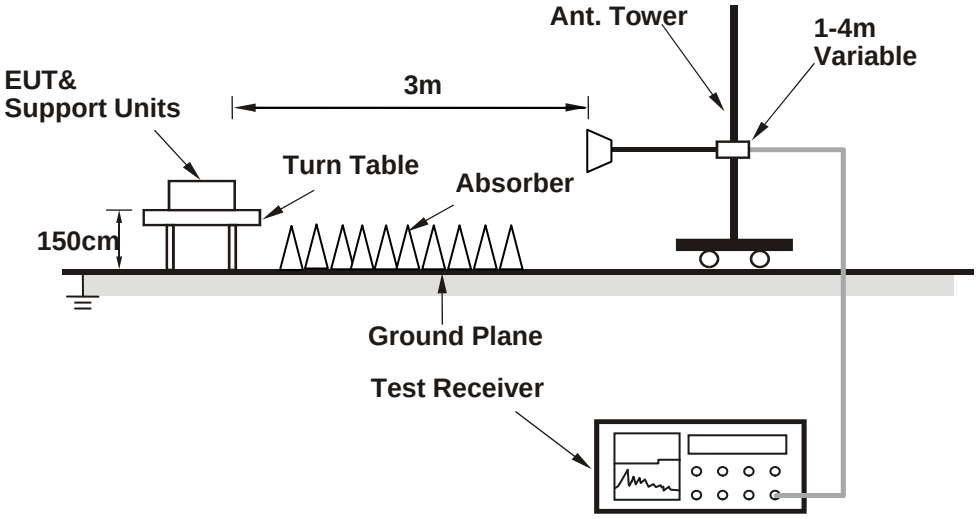
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

1. Turn on the power of EUT.
2. The communication partner run test program “artgui.exe Ver 2.3” 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	#5715.00	55.1 PK	74.0	-18.9	1.65 H	161	53.43	1.67
2	#5715.00	40.1 AV	54.0	-13.9	1.65 H	161	38.43	1.67
3	#5725.00	71.8 PK	78.2	-6.4	1.65 H	161	70.12	1.68
4	*5745.00	102.6 PK			1.65 H	161	100.89	1.71
5	*5745.00	92.1 AV			1.65 H	161	90.39	1.71
6	11490.00	68.6 PK	74.0	-5.4	1.03 H	151	56.00	12.60
7	11490.00	53.5 AV	54.0	-0.5	1.03 H	151	40.90	12.60
8	#17235.00	56.2 PK	74.0	-17.8	1.33 H	110	38.65	17.55
9	#17235.00	43.9 AV	54.0	-10.1	1.33 H	110	26.35	17.55
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	#5715.00	57.3 PK	74.0	-16.7	1.45 V	116	55.63	1.67
2	#5715.00	40.9 AV	54.0	-13.1	1.45 V	116	39.23	1.67
3	**#5725.00**	**78.1 PK**	**78.2**	**-0.1**	**1.45 V**	**116**	**76.42**	**1.68**
4	*5745.00	107.3 PK			1.45 V	116	105.59	1.71
5	*5745.00	96.0 AV			1.45 V	116	94.29	1.71
6	11490.00	64.1 PK	74.0	-9.9	1.05 V	360	51.50	12.60
7	11490.00	49.4 AV	54.0	-4.6	1.05 V	360	36.80	12.60
8	#17235.00	55.8 PK	74.0	-18.2	1.49 V	126	38.25	17.55
9	#17235.00	42.7 AV	54.0	-11.3	1.49 V	126	25.15	17.55

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	*5785.00	102.9 PK			1.67 H	171	101.14	1.76
2	*5785.00	92.8 AV			1.67 H	171	91.04	1.76
3	11570.00	67.5 PK	74.0	-6.5	1.00 H	312	55.16	12.34
4	11570.00	53.6 AV	54.0	-0.4	1.00 H	312	41.26	12.34
5	#17355.00	60.0 PK	74.0	-14.0	1.21 H	148	41.83	18.17
6	#17355.00	47.6 AV	54.0	-6.4	1.21 H	148	29.43	18.17
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	*5785.00	109.6 PK			1.49 V	125	107.84	1.76
2	*5785.00	98.1 AV			1.49 V	125	96.34	1.76
3	11570.00	61.5 PK	74.0	-12.5	1.00 V	349	49.16	12.34
4	11570.00	49.4 AV	54.0	-4.6	1.00 V	349	37.06	12.34
5	#17355.00	59.5 PK	74.0	-14.5	1.00 V	140	41.33	18.17
6	#17355.00	47.4 AV	54.0	-6.6	1.00 V	140	29.23	18.17

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	*5825.00	103.5 PK			1.49 H	28	101.72	1.78
2	*5825.00	93.2 AV			1.49 H	28	91.42	1.78
3	#5850.00	73.0 PK	78.2	-5.2	1.49 H	28	71.23	1.77
4	#5860.00	62.8 PK	74.0	-11.2	1.49 H	28	61.03	1.77
5	#5860.00	43.9 AV	54.0	-10.1	1.49 H	28	42.13	1.77
6	11650.00	68.1 PK	74.0	-5.9	1.09 H	150	55.94	12.16
7	11650.00	53.8 AV	54.0	-0.2	1.09 H	150	41.64	12.16
8	#17475.00	60.2 PK	74.0	-13.8	1.18 H	195	41.46	18.74
9	#17475.00	46.8 AV	54.0	-7.2	1.18 H	195	28.06	18.74
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	*5825.00	108.6 PK			1.33 V	244	106.82	1.78
2	*5825.00	98.2 AV			1.33 V	244	96.42	1.78
3	#5850.00	77.2 PK	78.2	-1.0	1.33 V	244	75.43	1.77
4	#5860.00	66.5 PK	74.0	-7.5	1.33 V	244	64.73	1.77
5	#5860.00	47.3 AV	54.0	-6.7	1.33 V	244	45.53	1.77
6	11650.00	61.4 PK	74.0	-12.6	1.09 V	181	49.24	12.16
7	11650.00	47.6 AV	54.0	-6.4	1.09 V	181	35.44	12.16
8	#17475.00	59.7 PK	74.0	-14.3	1.36 V	18	40.96	18.74
9	#17475.00	46.5 AV	54.0	-7.5	1.36 V	18	27.76	18.74

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	#5715.00	59.8 PK	74.0	-14.2	1.06 H	205	58.13	1.67
2	#5715.00	39.9 AV	54.0	-14.1	1.06 H	205	38.23	1.67
3	#5725.00	75.9 PK	78.2	-2.3	1.06 H	205	74.22	1.68
4	*5745.00	101.9 PK			1.06 H	205	100.19	1.71
5	*5745.00	91.5 AV			1.06 H	205	89.79	1.71
6	11490.00	63.4 PK	74.0	-10.6	1.00 H	307	50.80	12.60
7	11490.00	49.9 AV	54.0	-4.1	1.00 H	307	37.30	12.60
8	#17235.00	55.8 PK	74.0	-18.2	1.38 H	126	38.25	17.55
9	#17235.00	43.6 AV	54.0	-10.4	1.38 H	126	26.05	17.55
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	#5715.00	55.2 PK	74.0	-18.8	1.40 V	125	53.53	1.67
2	#5715.00	40.9 AV	54.0	-13.1	1.40 V	125	39.23	1.67
3	**#5725.00**	**78.1 PK**	**78.2**	**-0.1**	**1.40 V**	**125**	**76.42**	**1.68**
4	*5745.00	106.1 PK			1.40 V	125	104.39	1.71
5	*5745.00	95.6 AV			1.40 V	125	93.89	1.71
6	11490.00	51.9 PK	74.0	-22.1	1.40 V	135	39.30	12.60
7	11490.00	41.2 AV	54.0	-12.8	1.40 V	135	28.60	12.60
8	#17235.00	56.6 PK	74.0	-17.4	1.44 V	123	39.05	17.55
9	#17235.00	43.2 AV	54.0	-10.8	1.44 V	123	25.65	17.55

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	*5785.00	104.3 PK			1.65 H	160	102.54	1.76
2	*5785.00	93.4 AV			1.65 H	160	91.64	1.76
3	11570.00	68.5 PK	74.0	-5.5	1.02 H	312	56.16	12.34
4	11570.00	53.8 AV	54.0	-0.2	1.02 H	312	41.46	12.34
5	#17355.00	59.2 PK	74.0	-14.8	1.26 H	170	41.03	18.17
6	#17355.00	47.2 AV	54.0	-6.8	1.26 H	170	29.03	18.17
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	*5785.00	109.3 PK			1.49 V	112	107.54	1.76
2	*5785.00	98.1 AV			1.49 V	112	96.34	1.76
3	11570.00	61.2 PK	74.0	-12.8	1.05 V	326	48.86	12.34
4	11570.00	48.9 AV	54.0	-5.1	1.05 V	326	36.56	12.34
5	#17355.00	59.0 PK	74.0	-15.0	1.03 V	162	40.83	18.17
6	#17355.00	45.9 AV	54.0	-8.1	1.03 V	162	27.73	18.17

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	*5825.00	103.9 PK			1.00 H	159	102.12	1.78
2	*5825.00	93.2 AV			1.00 H	159	91.42	1.78
3	#5850.00	71.7 PK	78.2	-6.5	1.00 H	159	69.93	1.77
4	#5860.00	57.0 PK	74.0	-17.0	1.00 H	159	55.23	1.77
5	#5860.00	43.9 AV	54.0	-10.1	1.00 H	159	42.13	1.77
6	11650.00	68.1 PK	74.0	-5.9	1.00 H	317	55.94	12.16
7	11650.00	53.6 AV	54.0	-0.4	1.00 H	317	41.44	12.16
8	#17475.00	59.4 PK	74.0	-14.6	1.26 H	140	40.66	18.74
9	#17475.00	46.6 AV	54.0	-7.4	1.26 H	140	27.86	18.74
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	*5825.00	108.6 PK			1.48 V	121	106.82	1.78
2	*5825.00	97.0 AV			1.48 V	121	95.22	1.78
3	#5850.00	77.9 PK	78.2	-0.3	1.48 V	121	76.13	1.77
4	#5860.00	68.0 PK	74.0	-6.0	1.48 V	121	66.23	1.77
5	#5860.00	48.2 AV	54.0	-5.8	1.48 V	121	46.43	1.77
6	11650.00	63.8 PK	74.0	-10.2	1.02 V	360	51.64	12.16
7	11650.00	50.5 AV	54.0	-3.5	1.02 V	360	38.34	12.16
8	#17475.00	58.3 PK	74.0	-15.7	1.03 V	142	39.56	18.74
9	#17475.00	46.3 AV	54.0	-7.7	1.03 V	142	27.56	18.74

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	#5715.00	54.8 PK	74.0	-19.2	1.00 H	158	53.13	1.67
2	#5715.00	40.8 AV	54.0	-13.2	1.00 H	158	39.13	1.67
3	#5725.00	57.1 PK	78.2	-21.1	1.00 H	158	55.42	1.68
4	*5755.00	97.7 PK			1.00 H	158	95.98	1.72
5	*5755.00	86.2 AV			1.00 H	158	84.48	1.72
6	11510.00	63.8 PK	74.0	-10.2	1.00 H	308	51.24	12.56
7	11510.00	50.8 AV	54.0	-3.2	1.00 H	308	38.24	12.56
8	#17265.00	56.1 PK	74.0	-17.9	2.29 H	360	38.46	17.64
9	#17265.00	43.9 AV	54.0	-10.1	2.29 H	360	26.26	17.64
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	#5715.00	69.1 PK	74.0	-4.9	1.69 V	121	67.43	1.67
2	#5715.00	50.9 AV	54.0	-3.1	1.69 V	121	49.23	1.67
3	#5725.00	77.2 PK	78.2	-1.0	1.69 V	121	75.52	1.68
4	*5755.00	101.5 PK			1.69 V	121	99.78	1.72
5	*5755.00	89.6 AV			1.69 V	121	87.88	1.72
6	11510.00	52.2 PK	74.0	-21.8	2.33 V	360	39.64	12.56
7	11510.00	39.9 AV	54.0	-14.1	2.33 V	360	27.34	12.56
8	#17265.00	56.8 PK	74.0	-17.2	2.29 V	360	39.16	17.64
9	#17265.00	43.9 AV	54.0	-10.1	2.29 V	360	26.26	17.64

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	*5795.00	102.8 PK			1.45 H	160	101.03	1.77
2	*5795.00	90.6 AV			1.45 H	160	88.83	1.77
3	#5850.00	57.1 PK	78.2	-21.1	1.45 H	160	55.33	1.77
4	#5860.00	55.8 PK	74.0	-18.2	1.45 H	160	54.03	1.77
5	#5860.00	41.6 AV	54.0	-12.4	1.45 H	160	39.83	1.77
6	11590.00	68.2 PK	74.0	-5.8	1.00 H	309	55.94	12.26
7	11590.00	53.6 AV	54.0	-0.4	1.00 H	309	41.34	12.26
8	#17385.00	58.9 PK	74.0	-15.1	1.25 H	152	40.52	18.38
9	#17385.00	46.3 AV	54.0	-7.7	1.25 H	152	27.92	18.38
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	*5795.00	105.2 PK			1.48 V	130	103.43	1.77
2	*5795.00	92.2 AV			1.48 V	130	90.43	1.77
3	#5850.00	69.0 PK	78.2	-9.2	1.48 V	130	67.23	1.77
4	#5860.00	64.7 PK	74.0	-9.3	1.48 V	130	62.93	1.77
5	#5860.00	46.1 AV	54.0	-7.9	1.48 V	130	44.33	1.77
6	11590.00	63.5 PK	74.0	-10.5	1.05 V	360	51.24	12.26
7	11590.00	50.2 AV	54.0	-3.8	1.05 V	360	37.94	12.26
8	#17385.00	58.2 PK	74.0	-15.8	1.04 V	134	39.82	18.38
9	#17385.00	46.0 AV	54.0	-8.0	1.04 V	134	27.62	18.38

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 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	166.04	28.4 QP	43.5	-15.2	1.50 H	245	48.84	-20.49
2	233.22	39.9 QP	46.0	-6.2	1.00 H	360	61.97	-22.12
3	428.35	29.7 QP	46.0	-16.3	2.00 H	278	45.38	-15.70
4	480.03	38.2 QP	46.0	-7.8	1.50 H	0	52.88	-14.66
5	663.85	32.1 QP	46.0	-13.9	1.00 H	180	43.07	-10.96
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	30.10	31.3 QP	40.0	-8.7	2.00 V	308	52.96	-21.63
2	166.02	31.1 QP	43.5	-12.4	1.00 V	331	51.57	-20.49
3	480.03	34.0 QP	46.0	-12.0	1.50 V	283	48.62	-14.66
4	497.88	27.2 QP	46.0	-18.8	1.00 V	325	41.53	-14.35
5	663.89	33.4 QP	46.0	-12.7	1.50 V	243	44.31	-10.96
6	897.18	41.1 QP	46.0	-4.9	1.50 V	185	48.36	-7.22

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)

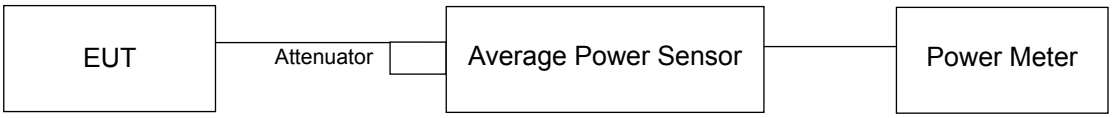
*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 D01 Multiple Transmitter Output v02r01 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 Procedures

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 Conditions

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 Results

802.11a

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	12.92	12.81	38.687	15.88	30	Pass
157	5785	16.34	16.43	87.007	19.40	30	Pass
165	5825	16.26	16.35	85.419	19.32	30	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	12.83	12.81	38.286	15.83	30	Pass
157	5785	15.92	16.06	79.449	19.00	30	Pass
165	5825	16.35	16.18	84.647	19.28	30	Pass

802.11n (HT40)

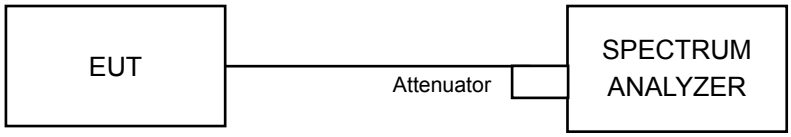
Chan.	Chan. Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	11.08	11.26	26.189	14.18	30	Pass
159	5795	16.37	16.39	86.902	19.39	30	Pass

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 Procedures

For 802.11a, 802.11n (HT20):

Using method SA-1

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

For 802.11n (HT40):

Using method SA-1

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 and add 10 log (1/duty cycle)

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

Same as Item 4.3.6.

4.3.7 Test Results

802.11a

TX chain	Chan.	Chan. Freq. (MHz)	PSD		10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)				
0	149	5745	-7.41	-5.19	3.01	-2.18	28.10	Pass
	157	5785	-4.09	-1.87	3.01	1.14	28.10	Pass
	165	5825	-3.87	-1.65	3.01	1.36	28.10	Pass
1	149	5745	-7.43	-5.21	3.01	-2.20	28.10	Pass
	157	5785	-3.97	-1.75	3.01	1.26	28.10	Pass
	165	5825	-3.87	-1.65	3.01	1.36	28.10	Pass

Note: 2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 7.9dBi > 6dBi , so the power density limit shall be reduced to 30-(7.9-6) = 28.10dBm.

802.11n (HT20)

TX chain	Chan.	Chan. Freq. (MHz)	PSD		10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)				
0	149	5745	-8.39	-6.17	3.01	-3.16	28.10	Pass
	157	5785	-4.61	-2.39	3.01	0.62	28.10	Pass
	165	5825	-4.28	-2.06	3.01	0.95	28.10	Pass
1	149	5745	-7.77	-5.55	3.01	-2.54	28.10	Pass
	157	5785	-4.59	-2.37	3.01	0.64	28.10	Pass
	165	5825	-4.07	-1.85	3.01	1.16	28.10	Pass

Note: 2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 7.9dBi > 6dBi , so the power density limit shall be reduced to 30-(7.9-6) = 28.10dBm.

802.11n (HT40)

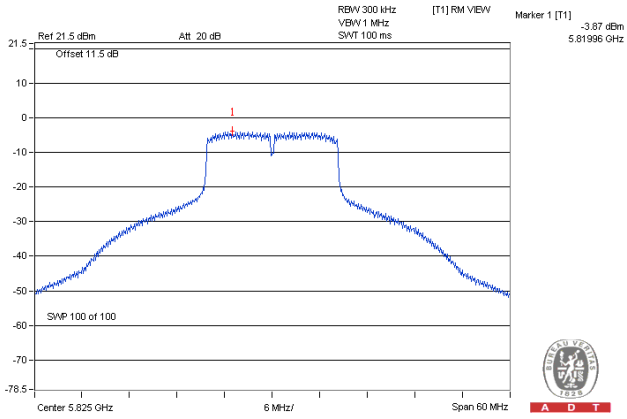
TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5745	-13.26	-11.04	3.01	0.16	-7.87	28.10	Pass
	159	5785	-7.55	-5.33	3.01	0.16	-2.16	28.10	Pass
1	151	5745	-13.27	-11.05	3.01	0.16	-7.88	28.10	Pass
	159	5785	-7.48	-5.26	3.01	0.16	-2.09	28.10	Pass

Note: 2. Directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 7.9dBi > 6dBi , so the power density limit shall be reduced to 30-(7.9-6) = 28.10dBm.

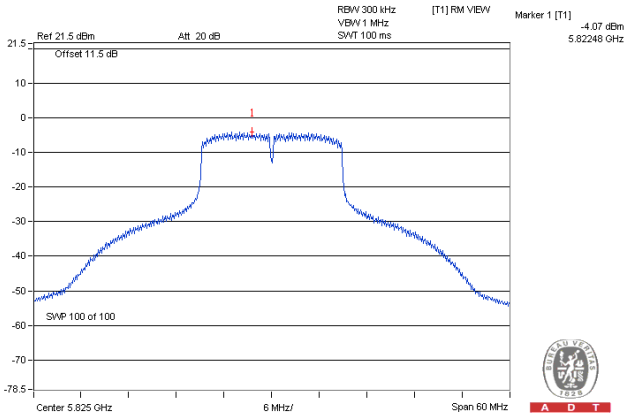
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

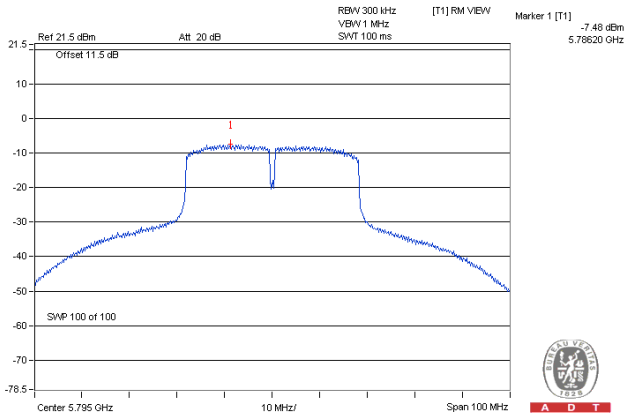
802.11a_Chain 0 / CH165



802.11n (HT20)_Chain 1 / CH165



802.11n (HT40) _Chain 1 / CH159

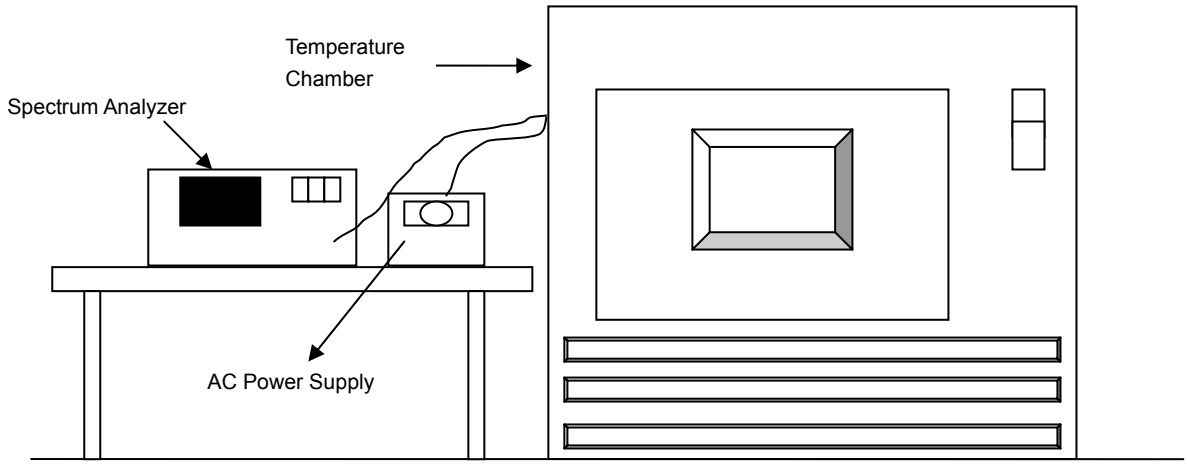


4.4 Frequency Stability Measurement

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 Procedures

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 Conditions

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

4.4.7 Test Results

Frequemcy Stability Versus Temp.									
Operating Frequency: 5825MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5825.0159	0.00027	5825.0137	0.00024	5825.0139	0.00024	5825.0187	0.00032
40	120	5825.0083	0.00014	5825.0099	0.00017	5825.0058	0.00010	5825.0043	0.00007
30	120	5824.9759	-0.00041	5824.9752	-0.00043	5824.9762	-0.00041	5824.9771	-0.00039
20	120	5824.9944	-0.00010	5824.999	-0.00002	5824.9954	-0.00008	5824.9953	-0.00008
10	120	5825.0001	0.00000	5825.0008	0.00001	5824.9956	-0.00008	5824.9956	-0.00008
0	120	5824.9747	-0.00043	5824.9786	-0.00037	5824.9757	-0.00042	5824.9751	-0.00043
-10	120	5825.0013	0.00002	5825.0039	0.00007	5825.0036	0.00006	5825.0012	0.00002
-20	120	5825.0201	0.00035	5825.0242	0.00042	5825.0203	0.00035	5825.0211	0.00036
-30	120	5824.9775	-0.00039	5824.9762	-0.00041	5824.9767	-0.00040	5824.9776	-0.00038

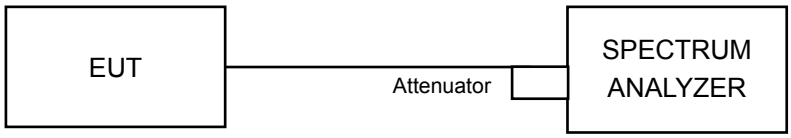
Frequemcy Stability Versus Temp.									
Operating Frequency: 5825MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5824.9933	-0.00012	5824.9995	-0.00001	5824.9957	-0.00007	5824.9961	-0.00007
	120	5824.9944	-0.00010	5824.999	-0.00002	5824.9954	-0.00008	5824.9953	-0.00008
	102	5824.9934	-0.00011	5824.9982	-0.00003	5824.9966	-0.00006	5824.9948	-0.00009

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 Procedures

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 Conditions

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

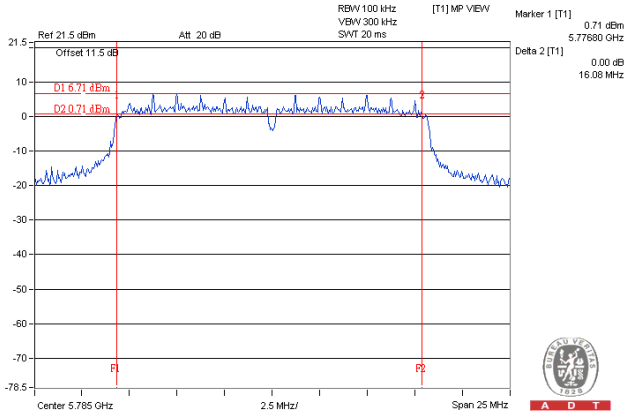
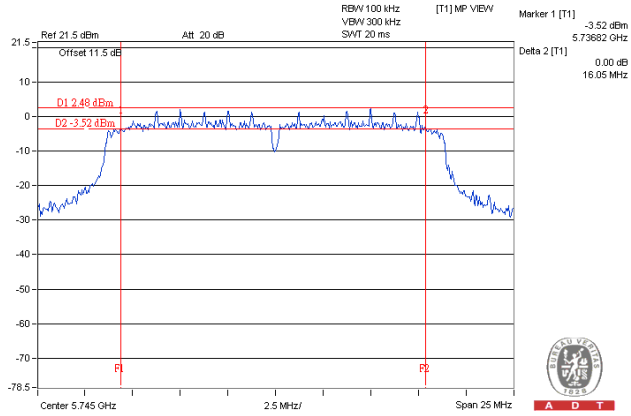
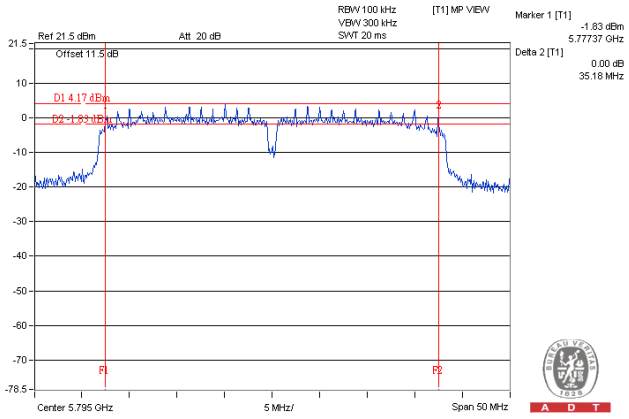
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.36	16.38	0.5	Pass
157	5785	16.28	16.08	0.5	Pass
165	5825	16.39	16.15	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.05	17.03	0.5	Pass
157	5785	16.70	16.91	0.5	Pass
165	5825	16.36	16.82	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.78	35.54	0.5	Pass
159	5795	35.18	35.30	0.5	Pass

Spectrum Plot of Worst Value	
802.11a_Chain 1 / CH157	**802.11n (HT20)_Chain 0 / CH149**
	
802.11n (HT40) _Chain 0 / CH159	
	

5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

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

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