

FCC Test Report

Report No.: RF140311C18B

FCC ID: A8J-ENH900EXTA

Test Model: ENH900EXT

Received Date: Jan. 13, 2016

Test Date: Jan. 20 ~ Feb. 19, 2016

Issued Date: Feb. 24, 2016

Applicant: EnGenius Technologies

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Release Control Record

Issue No.	Description	Date Issued
RF140311C18B	Original release	Feb. 24, 2016

1 Certificate of Conformity

Product: Wireless Access Point

Brand: EnGenius

Test Model: ENH900EXT

Sample Status: Engineering Sample

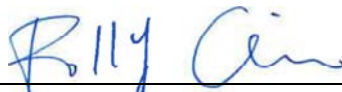
Applicant: EnGenius Technologies

Test Date: Jan. 20 ~ Feb. 19, 2016

Standards: 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 :



Polly Chien / Specialist

Date:

Feb. 24, 2016

Approved by :



Ken Liu / Senior Manager

Date:

Feb. 24, 2016

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.207 15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -17.76dB at 0.35483MHz.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.0dB at 5706.00MHz.
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 N-Type. (The device is professionally installed)

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) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless Access Point
Brand	EnGenius
Test Model	ENH900EXT
Status of EUT	Engineering Sample
Power Supply Rating	48Vdc (PoE)
Modulation Type	64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	OFDM
Transfer Rate	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 450.0Mbps
Operating Frequency	5180 ~ 5240MHz, 5745 ~ 5825MHz
Number of Channel	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40)
Output Power	5180 ~ 5240MHz: 62.044mW 5745 ~ 5825MHz: 611.525mW
Antenna Type	Dipole antenna with 7dBi gain
Antenna Connector	N-Type (The device is professionally installed)
Accessory Device	POE, Adapter for POE used
Data Cable Supplied	0.55m non-shielded RJ45 cable without core

Note:

1. This report is prepared for FCC class II permissive change.
2. This report is issued as a supplementary report to the original BV ADT report no.: RF140311C18. The difference compared with the original report is updating U-NII-1 and U-NII-3 band to new rules. All test data had been re-tested.
3. The EUT incorporates a MIMO function. Physically, the EUT provides 3 completed transmitters and 3 receivers.

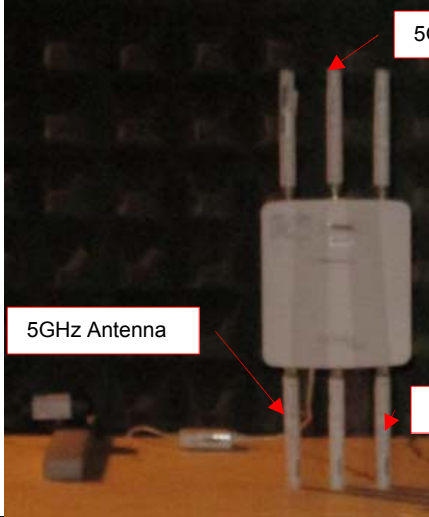
Modulation Mode	TX Function
802.11a	3TX
802.11n (20MHz)	3TX
802.11n (40MHz)	3TX

4. The EUT consumes power from the following adapter & PoE.

Adapter for POE	
Brand:	Powertron Electronics Corp.
Model:	PA1040-480IB080
Input:	100-240Vac, 50-60Hz, 1.5A
Output:	48Vdc, 0.8A, 38.4W Max.
Power Line:	DC 1.6m power cable with one core attached on adapter

POE	
Brand:	EnGenius
Model:	EPE-48GR
Output:	48Vdc, 0.8A, 38.4W Max.

5. The EUT will install at outdoor area, the highest antenna gain from the horizon above 30 degrees as below, for more detail information please refer to antenna specification and user manual

Antenna	Antenna gain	Antenna install degree
Dipole	-3.88 dBi	

3.2 Description of Test Modes

For 5180 ~ 5240MHz

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

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

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 $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

Note: The EUT was positioned on the z-plane during testing.

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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	15.0
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	15.0

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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	157	OFDM	BPSK	6.0
	802.11a	5745-5825	149 to 165		OFDM	BPSK	6.0

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	157	OFDM	BPSK	6.0
	802.11a	5745-5825	149 to 165		OFDM	BPSK	6.0

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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	15.0
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	7.2
-	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	15.0

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (POE)	TESTED BY
RE $\geq$ 1G	16deg. C, 70%RH	48Vdc	Nick Hsu
RE $<$ 1G	16deg. C, 70%RH	48Vdc	Nick Hsu
PLC	16deg. C, 70%RH	48Vdc	Nick Hsu
APCM	25deg. C, 60%RH	48Vdc	Cedric Wu

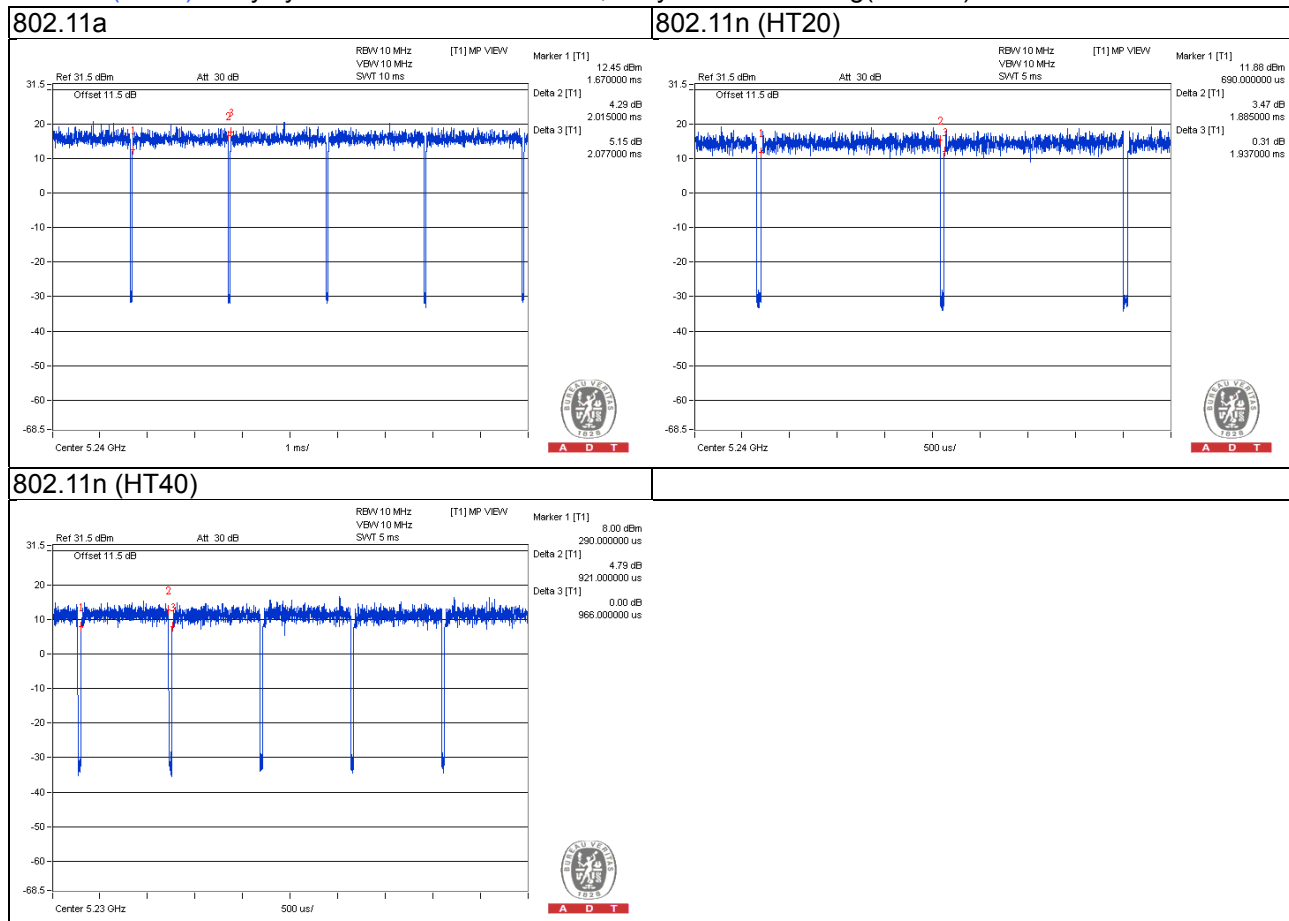
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is < 98 %, duty factor is required.

802.11a: Duty cycle = $2.015/2.077 = 0.970$, Duty factor = $10 * \log(1/0.970) = 0.13$

802.11n (HT20): Duty cycle = $1.885/1.937 = 0.973$, Duty factor = $10 * \log(1/0.973) = 0.12$

802.11n (HT40): Duty cycle = $0.921/0.966 = 0.953$, Duty factor = $10 * \log(1/0.953) = 0.21$



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.

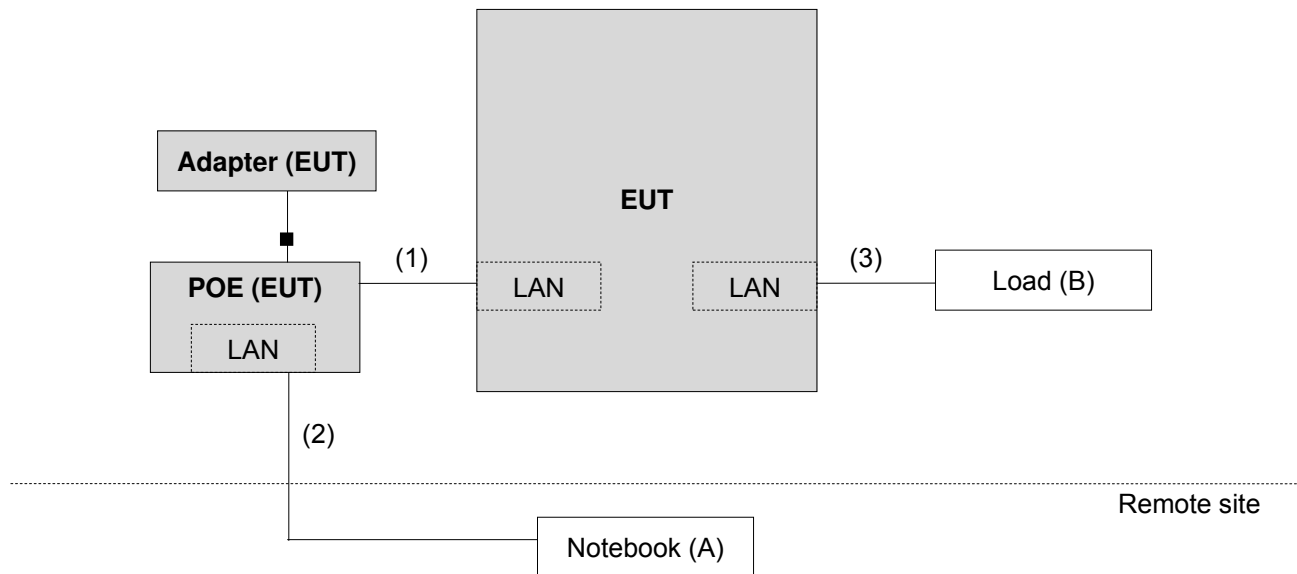
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Items A acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN cable	1	0.55	N	0	Accessory Device
2.	LAN cable	1	5	N	0	-
3.	LAN cable	1	1	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart E (15.407)

789033 D02 General UNII Test Procedures New Rules v01r02

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 is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It 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 Procedures New Rules v01r02	FIELD STRENGTH AT 3m	
	PK:74 (dBuV/m)	AV:54 (dBuV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBuV/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(dBuV/m) ^{*1} PK:78.2 (dBuV/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:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 10, 2015	Apr. 09, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Sep. 02, 2015	Sep. 01, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-151	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	9120D	209	Jan. 20, 2016	Jan. 19, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2015	Oct. 17, 2016
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (214378)	Aug. 22, 2015	Aug. 21, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03 (309224+12738)	Aug. 22, 2015	Aug. 21, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2015	Oct. 17, 2016
High Speed Peak Power Meter	ML2495A	0824011	Jul. 09, 2015	Jul. 08, 2016
Power Sensor	MA2411B	0738171	Jul. 09, 2015	Jul. 08, 2016
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 08, 2015	Jun. 07, 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 HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 988962.
5. The IC Site Registration No. is IC 7450F-3.

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:

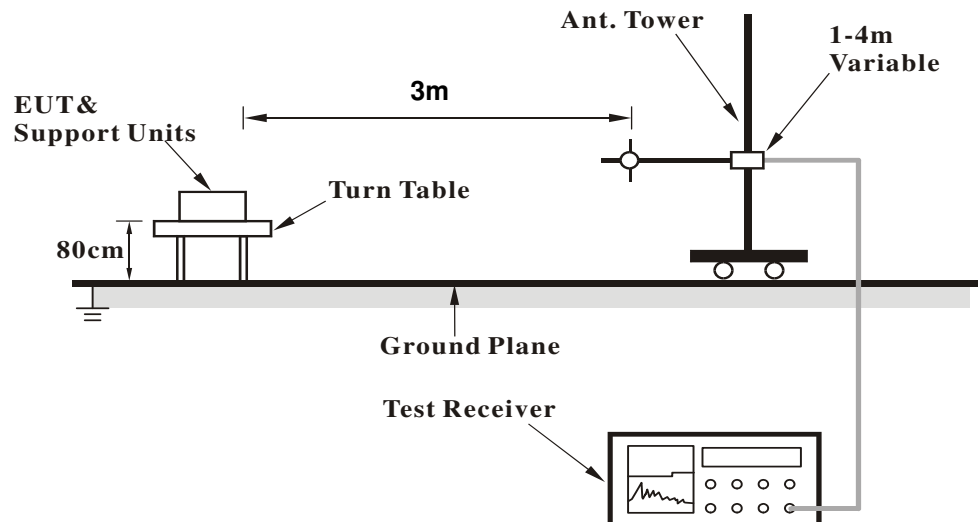
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

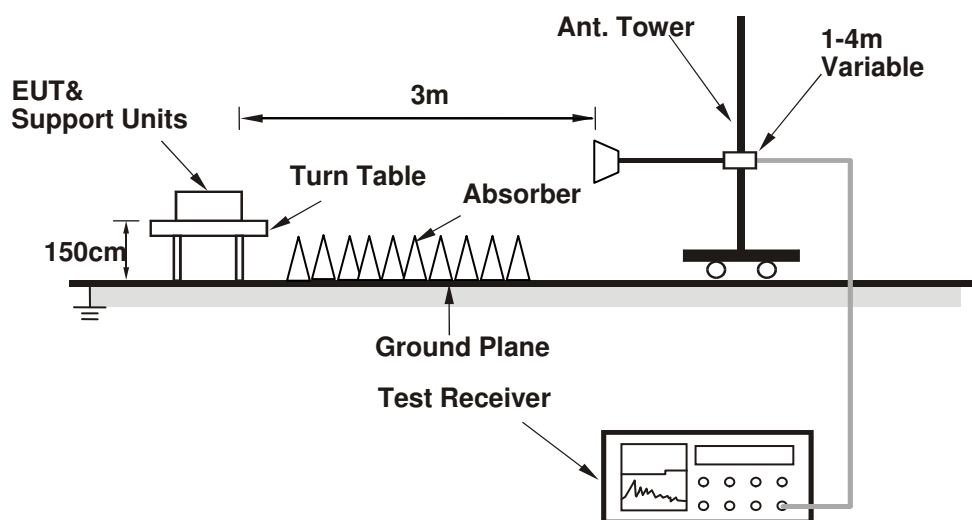
No deviation.

4.1.5 Test Set Up

<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

- Placed the EUT on the testing table.
- Prepared notebook to act as communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

Above 1GHz Worst-Case Data:

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5120.00	56.3 PK	74.0	-17.7	1.23 H	110	50.30	6.00
2	5120.00	43.8 AV	54.0	-10.2	1.23 H	110	37.80	6.00
3	*5180.00	100.0 PK			1.48 H	161	60.60	39.40
4	*5180.00	89.9 AV			1.48 H	161	50.50	39.40
5	5360.00	57.4 PK	74.0	-16.6	1.14 H	264	50.90	6.50
6	5360.00	45.0 AV	54.0	-9.0	1.14 H	264	38.50	6.50
7	#10360.00	58.8 PK	74.0	-15.2	1.08 H	53	41.00	17.80
8	#10360.00	45.7 AV	54.0	-8.3	1.08 H	53	27.90	17.80
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	5120.00	59.6 PK	74.0	-14.4	1.54 V	92	53.60	6.00
2	5120.00	50.5 AV	54.0	-3.5	1.54 V	92	44.50	6.00
3	*5180.00	115.4 PK			2.04 V	79	76.00	39.40
4	*5180.00	105.4 AV			2.04 V	79	66.00	39.40
5	5360.00	61.4 PK	74.0	-12.6	1.51 V	90	54.90	6.50
6	5360.00	52.2 AV	54.0	-1.8	1.51 V	90	45.70	6.50
7	#10360.00	59.5 PK	74.0	-14.5	1.20 V	208	41.70	17.80
8	#10360.00	46.5 AV	54.0	-7.5	1.20 V	208	28.70	17.80

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5120.00	56.9 PK	74.0	-17.1	1.36 H	195	50.90	6.00
2	5120.00	43.3 AV	54.0	-10.7	1.36 H	195	37.30	6.00
3	*5200.00	100.4 PK			1.58 H	0	60.90	39.50
4	*5200.00	90.5 AV			1.58 H	0	51.00	39.50
5	5360.00	56.6 PK	74.0	-17.4	1.28 H	130	50.10	6.50
6	5360.00	44.4 AV	54.0	-9.6	1.28 H	130	37.90	6.50
7	#10400.00	58.3 PK	74.0	-15.7	1.31 H	105	40.60	17.70
8	#10400.00	45.7 AV	54.0	-8.3	1.31 H	105	28.00	17.70
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	5120.00	60.3 PK	74.0	-13.7	1.56 V	88	54.30	6.00
2	5120.00	49.8 AV	54.0	-4.2	1.56 V	88	43.80	6.00
3	*5200.00	115.4 PK			1.59 V	82	75.90	39.50
4	*5200.00	105.7 AV			1.59 V	82	66.20	39.50
5	5360.00	61.2 PK	74.0	-12.8	1.51 V	86	54.70	6.50
6	5360.00	51.8 AV	54.0	-2.2	1.51 V	86	45.30	6.50
7	#10400.00	58.6 PK	74.0	-15.4	1.72 V	154	40.90	17.70
8	#10400.00	45.3 AV	54.0	-8.7	1.72 V	154	27.60	17.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5120.00	55.8 PK	74.0	-18.2	1.42 H	105	49.80	6.00
2	5120.00	43.2 AV	54.0	-10.8	1.42 H	105	37.20	6.00
3	*5240.00	101.2 PK			1.28 H	161	61.60	39.60
4	*5240.00	91.6 AV			1.28 H	161	52.00	39.60
5	5360.00	56.5 PK	74.0	-17.5	1.04 H	99	50.00	6.50
6	5360.00	44.4 AV	54.0	-9.6	1.04 H	99	37.90	6.50
7	#10480.00	58.5 PK	74.0	-15.5	1.43 H	245	39.80	18.70
8	#10480.00	46.5 AV	54.0	-7.5	1.43 H	245	27.80	18.70
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	5120.00	60.1 PK	74.0	-13.9	1.55 V	82	54.10	6.00
2	5120.00	49.1 AV	54.0	-4.9	1.55 V	82	43.10	6.00
3	*5240.00	116.5 PK			2.01 V	86	76.90	39.60
4	*5240.00	106.6 AV			2.01 V	86	67.00	39.60
5	5360.00	61.8 PK	74.0	-12.2	1.53 V	84	55.30	6.50
6	5360.00	52.8 AV	54.0	-1.2	1.53 V	84	46.30	6.50
7	#10480.00	58.7 PK	74.0	-15.3	1.28 V	175	40.00	18.70
8	#10480.00	45.9 AV	54.0	-8.1	1.28 V	175	27.20	18.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.90	57.2 PK	74.0	-16.8	1.12 H	35	50.00	7.20
2	#5714.90	44.8 AV	54.0	-9.2	1.12 H	35	37.60	7.20
3	#5722.90	57.2 PK	78.2	-21.0	1.55 H	78	50.00	7.20
4	#5725.00	46.3 PK	78.2	-31.9	1.21 H	119	39.10	7.20
5	*5745.00	103.1 PK			1.00 H	308	62.70	40.40
6	*5745.00	93.0 AV			1.00 H	308	52.60	40.40
7	11490.00	59.5 PK	74.0	-14.5	1.15 H	7	41.20	18.30
8	11490.00	46.4 AV	54.0	-7.6	1.15 H	7	28.10	18.30
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	#5714.90	70.3 PK	74.0	-3.7	1.00 V	297	63.10	7.20
2	#5714.90	50.7 AV	54.0	-3.3	1.00 V	297	43.50	7.20
3	#5722.90	76.6 PK	78.2	-1.6	1.00 V	294	69.40	7.20
4	#5725.00	59.5 PK	78.2	-18.7	1.00 V	335	52.30	7.20
5	*5745.00	117.3 PK			1.17 V	294	76.90	40.40
6	*5745.00	107.8 AV			1.17 V	294	67.40	40.40
7	11490.00	59.1 PK	74.0	-14.9	1.99 V	41	40.80	18.30
8	11490.00	46.5 AV	54.0	-7.5	1.99 V	41	28.20	18.30

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5706.00	57.3 PK	74.0	-16.7	1.22 H	241	50.10	7.20
2	#5706.00	44.7 AV	54.0	-9.3	1.22 H	241	37.50	7.20
3	*5785.00	108.5 PK			1.00 H	313	68.00	40.50
4	*5785.00	98.4 AV			1.00 H	313	57.90	40.50
5	11570.00	59.5 PK	74.0	-14.5	1.30 H	205	41.30	18.20
6	11570.00	47.6 AV	54.0	-6.4	1.30 H	205	29.40	18.20
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	#5706.00	68.1 PK	74.0	-5.9	1.17 V	298	60.90	7.20
2	#5706.00	53.0 AV	54.0	-1.0	1.17 V	298	45.80	7.20
3	*5785.00	122.2 PK			1.00 V	293	81.70	40.50
4	*5785.00	112.9 AV			1.00 V	293	72.40	40.50
5	11570.00	62.1 PK	74.0	-11.9	1.01 V	22	43.90	18.20
6	11570.00	49.5 AV	54.0	-4.5	1.01 V	22	31.30	18.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	105.1 PK			1.04 H	310	64.60	40.50
2	*5825.00	95.3 AV			1.04 H	310	54.80	40.50
3	#5850.00	47.7 PK	78.2	-30.5	1.07 H	313	40.20	7.50
4	#5852.10	62.3 PK	78.2	-15.9	1.28 H	327	54.70	7.60
5	#5860.10	57.8 PK	74.0	-16.2	1.24 H	314	50.20	7.60
6	#5860.10	44.6 AV	54.0	-9.4	1.24 H	314	37.00	7.60
7	11650.00	59.4 PK	74.0	-14.6	1.00 H	251	40.70	18.70
8	11650.00	47.8 AV	54.0	-6.2	1.00 H	251	29.10	18.70
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	119.9 PK			1.00 V	323	79.40	40.50
2	*5825.00	110.4 AV			1.00 V	323	69.90	40.50
3	#5850.00	62.0 PK	78.2	-16.2	1.07 V	295	54.50	7.50
4	#5852.10	76.5 PK	78.2	-1.7	1.00 V	319	68.90	7.60
5	#5860.10	71.3 PK	74.0	-2.7	1.10 V	294	63.70	7.60
6	#5860.10	51.6 AV	54.0	-2.4	1.10 V	294	44.00	7.60
7	11650.00	61.9 PK	74.0	-12.1	1.02 V	25	43.20	18.70
8	11650.00	49.1 AV	54.0	-4.9	1.02 V	25	30.40	18.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11n (HT20)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5120.00	56.0 PK	74.0	-18.0	1.38 H	211	50.00	6.00
2	5120.00	42.7 AV	54.0	-11.3	1.38 H	211	36.70	6.00
3	*5180.00	99.4 PK			1.18 H	261	60.00	39.40
4	*5180.00	89.8 AV			1.18 H	261	50.40	39.40
5	5360.00	56.7 PK	74.0	-17.3	1.37 H	66	50.20	6.50
6	5360.00	44.2 AV	54.0	-9.8	1.37 H	66	37.70	6.50
7	#10360.00	58.3 PK	74.0	-15.7	1.23 H	45	40.50	17.80
8	#10360.00	45.9 AV	54.0	-8.1	1.23 H	45	28.10	17.80
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	5120.00	58.8 PK	74.0	-15.2	1.56 V	84	52.80	6.00
2	5120.00	49.3 AV	54.0	-4.7	1.56 V	84	43.30	6.00
3	*5180.00	114.3 PK			1.70 V	83	74.90	39.40
4	*5180.00	104.4 AV			1.70 V	83	65.00	39.40
5	5360.00	61.0 PK	74.0	-13.0	1.52 V	80	54.50	6.50
6	5360.00	52.2 AV	54.0	-1.8	1.52 V	80	45.70	6.50
7	#10360.00	58.4 PK	74.0	-15.6	1.48 V	54	40.60	17.80
8	#10360.00	45.6 AV	54.0	-8.4	1.48 V	54	27.80	17.80

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5120.00	55.2 PK	74.0	-18.8	1.33 H	72	49.20	6.00
2	5120.00	43.3 AV	54.0	-10.7	1.33 H	72	37.30	6.00
3	*5200.00	100.1 PK			1.03 H	159	60.60	39.50
4	*5200.00	90.2 AV			1.03 H	159	50.70	39.50
5	5360.00	57.1 PK	74.0	-16.9	1.55 H	52	50.60	6.50
6	5360.00	44.2 AV	54.0	-9.8	1.55 H	52	37.70	6.50
7	#10400.00	58.3 PK	74.0	-15.7	1.21 H	99	40.60	17.70
8	#10400.00	45.6 AV	54.0	-8.4	1.21 H	99	27.90	17.70
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	5120.00	59.5 PK	74.0	-14.5	1.58 V	74	53.50	6.00
2	5120.00	48.2 AV	54.0	-5.8	1.58 V	74	42.20	6.00
3	*5200.00	113.7 PK			1.85 V	159	74.20	39.50
4	*5200.00	103.9 AV			1.85 V	159	64.40	39.50
5	5360.00	61.3 PK	74.0	-12.7	1.49 V	84	54.80	6.50
6	5360.00	52.2 AV	54.0	-1.8	1.49 V	84	45.70	6.50
7	#10400.00	58.7 PK	74.0	-15.3	1.63 V	103	41.00	17.70
8	#10400.00	46.1 AV	54.0	-7.9	1.63 V	103	28.40	17.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5120.00	56.4 PK	74.0	-17.6	1.41 H	59	50.40	6.00
2	5120.00	43.2 AV	54.0	-10.8	1.41 H	59	37.20	6.00
3	*5240.00	102.0 PK			1.06 H	163	62.40	39.60
4	*5240.00	91.8 AV			1.06 H	163	52.20	39.60
5	5360.00	56.5 PK	74.0	-17.5	1.61 H	104	50.00	6.50
6	5360.00	44.3 AV	54.0	-9.7	1.61 H	104	37.80	6.50
7	#10480.00	58.5 PK	74.0	-15.5	1.16 H	218	39.80	18.70
8	#10480.00	46.2 AV	54.0	-7.8	1.16 H	218	27.50	18.70
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	5120.00	60.5 PK	74.0	-13.5	1.54 V	88	54.50	6.00
2	5120.00	50.6 AV	54.0	-3.4	1.54 V	88	44.60	6.00
3	*5240.00	116.4 PK			1.79 V	64	76.80	39.60
4	*5240.00	106.4 AV			1.79 V	64	66.80	39.60
5	5360.00	61.5 PK	74.0	-12.5	1.53 V	91	55.00	6.50
6	5360.00	52.4 AV	54.0	-1.6	1.53 V	91	45.90	6.50
7	#10480.00	58.6 PK	74.0	-15.4	1.70 V	324	39.90	18.70
8	#10480.00	46.3 AV	54.0	-7.7	1.70 V	324	27.60	18.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.90	57.6 PK	74.0	-16.4	1.23 H	342	50.40	7.20
2	#5714.90	44.6 AV	54.0	-9.4	1.23 H	342	37.40	7.20
3	#5722.90	58.8 PK	78.2	-19.4	1.24 H	330	51.60	7.20
4	#5725.00	46.2 PK	78.2	-32.0	1.34 H	344	39.00	7.20
5	*5745.00	102.8 PK			1.00 H	337	62.40	40.40
6	*5745.00	93.4 AV			1.00 H	337	53.00	40.40
7	11490.00	58.7 PK	74.0	-15.3	1.22 H	217	40.40	18.30
8	11490.00	46.0 AV	54.0	-8.0	1.22 H	217	27.70	18.30
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	#5714.90	67.5 PK	74.0	-6.5	1.00 V	332	60.30	7.20
2	#5714.90	49.8 AV	54.0	-4.2	1.00 V	332	42.60	7.20
3	#5722.90	76.4 PK	78.2	-1.8	1.00 V	3	69.20	7.20
4	#5725.00	57.4 PK	78.2	-20.8	1.04 V	309	50.20	7.20
5	*5745.00	118.8 PK			1.28 V	10	78.40	40.40
6	*5745.00	108.3 AV			1.28 V	10	67.90	40.40
7	11490.00	58.8 PK	74.0	-15.2	1.10 V	69	40.50	18.30
8	11490.00	45.9 AV	54.0	-8.1	1.10 V	69	27.60	18.30

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5706.00	57.2 PK	74.0	-16.8	1.11 H	115	50.00	7.20
2	#5706.00	45.0 AV	54.0	-9.0	1.11 H	115	37.80	7.20
3	*5785.00	108.5 PK			1.00 H	313	68.00	40.50
4	*5785.00	99.0 AV			1.00 H	313	58.50	40.50
5	11570.00	59.4 PK	74.0	-14.6	1.31 H	304	41.20	18.20
6	11570.00	47.3 AV	54.0	-6.7	1.31 H	304	29.10	18.20
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	#5706.00	67.7 PK	74.0	-6.3	1.00 V	323	60.50	7.20
2	#5706.00	52.5 AV	54.0	-1.5	1.00 V	323	45.30	7.20
3	*5785.00	122.8 PK			1.02 V	294	82.30	40.50
4	*5785.00	113.1 AV			1.02 V	294	72.60	40.50
5	11570.00	62.4 PK	74.0	-11.6	1.00 V	22	44.20	18.20
6	11570.00	49.8 AV	54.0	-4.2	1.00 V	22	31.60	18.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	104.7 PK			1.12 H	309	64.20	40.50
2	*5825.00	95.2 AV			1.12 H	309	54.70	40.50
3	#5850.00	46.7 PK	78.2	-31.5	1.16 H	322	39.20	7.50
4	#5852.10	60.6 PK	78.2	-17.6	1.15 H	319	53.00	7.60
5	#5860.10	57.6 PK	74.0	-16.4	1.20 H	300	50.00	7.60
6	#5860.10	44.7 AV	54.0	-9.3	1.20 H	300	37.10	7.60
7	11650.00	59.4 PK	74.0	-14.6	1.00 H	202	40.70	18.70
8	11650.00	47.5 AV	54.0	-6.5	1.00 H	202	28.80	18.70
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	118.9 PK			1.00 V	322	78.40	40.50
2	*5825.00	109.0 AV			1.00 V	322	68.50	40.50
3	#5850.00	58.3 PK	78.2	-19.9	1.18 V	316	50.80	7.50
4	#5852.10	76.9 PK	78.2	-1.3	1.00 V	350	69.30	7.60
5	#5860.10	72.4 PK	74.0	-1.6	1.20 V	316	64.80	7.60
6	#5860.10	51.2 AV	54.0	-2.8	1.20 V	316	43.60	7.60
7	11650.00	60.9 PK	74.0	-13.1	1.02 V	26	42.20	18.70
8	11650.00	49.0 AV	54.0	-5.0	1.02 V	26	30.30	18.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11n (HT40)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.7 PK	74.0	-18.3	1.22 H	135	49.70	6.00
2	5150.00	44.0 AV	54.0	-10.0	1.22 H	135	38.00	6.00
3	*5190.00	93.3 PK			1.45 H	164	53.90	39.40
4	*5190.00	84.1 AV			1.45 H	164	44.70	39.40
5	5360.00	56.7 PK	74.0	-17.3	1.35 H	82	50.20	6.50
6	5360.00	44.7 AV	54.0	-9.3	1.35 H	82	38.20	6.50
7	#10380.00	58.3 PK	74.0	-15.7	1.18 H	291	40.60	17.70
8	#10380.00	46.3 AV	54.0	-7.7	1.18 H	291	28.60	17.70
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	5150.00	65.4 PK	74.0	-8.6	2.04 V	74	59.40	6.00
2	5150.00	52.3 AV	54.0	-1.7	2.04 V	74	46.30	6.00
3	*5190.00	109.9 PK			2.06 V	77	70.50	39.40
4	*5190.00	100.1 AV			2.06 V	77	60.70	39.40
5	5360.00	60.7 PK	74.0	-13.3	1.55 V	77	54.20	6.50
6	5360.00	52.2 AV	54.0	-1.8	1.55 V	77	45.70	6.50
7	#10380.00	58.3 PK	74.0	-15.7	1.42 V	85	40.60	17.70
8	#10380.00	46.5 AV	54.0	-7.5	1.42 V	85	28.80	17.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 46	DETECTOR	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz	FUNCTION	Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5080.00	55.5 PK	74.0	-18.5	1.15 H	82	49.70	5.80
2	5080.00	44.0 AV	54.0	-10.0	1.15 H	82	38.20	5.80
3	*5230.00	98.6 PK			1.15 H	253	59.00	39.60
4	*5230.00	89.4 AV			1.15 H	253	49.80	39.60
5	5360.00	56.8 PK	74.0	-17.2	1.17 H	94	50.30	6.50
6	5360.00	44.9 AV	54.0	-9.1	1.17 H	94	38.40	6.50
7	#10460.00	58.6 PK	74.0	-15.4	1.18 H	42	40.10	18.50
8	#10460.00	47.5 AV	54.0	-6.5	1.18 H	42	29.00	18.50
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	5080.00	59.2 PK	74.0	-14.8	1.48 V	100	53.40	5.80
2	5080.00	50.6 AV	54.0	-3.4	1.48 V	100	44.80	5.80
3	*5230.00	112.9 PK			1.65 V	77	73.30	39.60
4	*5230.00	103.6 AV			1.65 V	77	64.00	39.60
5	5360.00	61.2 PK	74.0	-12.8	1.50 V	86	54.70	6.50
6	5360.00	52.2 AV	54.0	-1.8	1.50 V	86	45.70	6.50
7	#10460.00	59.5 PK	74.0	-14.5	1.35 V	57	41.00	18.50
8	#10460.00	46.7 AV	54.0	-7.3	1.35 V	57	28.20	18.50

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5714.90	58.0 PK	74.0	-16.0	1.00 H	314	50.60	7.40
2	#5714.90	45.9 AV	54.0	-8.1	1.00 H	314	38.50	7.40
3	#5722.90	58.4 PK	78.2	-19.8	1.00 H	308	51.00	7.40
4	#5725.00	45.7 PK	78.2	-32.5	1.00 H	296	38.30	7.40
5	*5755.00	95.5 PK			1.04 H	312	54.90	40.60
6	*5755.00	87.0 AV			1.04 H	312	46.40	40.60
7	11510.00	59.2 PK	74.0	-14.8	1.04 H	218	40.50	18.70
8	11510.00	46.3 AV	54.0	-7.7	1.04 H	218	27.60	18.70
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	#5714.90	66.8 PK	74.0	-7.2	1.04 V	145	59.40	7.40
2	#5714.90	52.4 AV	54.0	-1.6	1.04 V	145	45.00	7.40
3	#5722.90	68.1 PK	78.2	-10.1	1.02 V	164	60.70	7.40
4	#5725.00	55.2 PK	78.2	-23.0	1.00 V	166	47.80	7.40
5	*5755.00	111.8 PK			1.33 V	325	71.20	40.60
6	*5755.00	102.3 AV			1.33 V	325	61.70	40.60
7	11510.00	59.5 PK	74.0	-14.5	1.47 V	216	40.80	18.70
8	11510.00	47.5 AV	54.0	-6.5	1.47 V	216	28.80	18.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	102.0 PK			1.06 H	310	61.40	40.60
2	*5795.00	92.5 AV			1.06 H	310	51.90	40.60
3	#5850.00	45.8 PK	78.2	-32.4	1.19 H	305	38.20	7.60
4	#5852.10	60.5 PK	78.2	-17.7	1.27 H	314	52.80	7.70
5	#5860.10	57.9 PK	74.0	-16.1	1.16 H	315	50.20	7.70
6	#5860.10	45.7 AV	54.0	-8.3	1.16 H	315	38.00	7.70
7	11590.00	59.7 PK	74.0	-14.3	1.04 H	202	40.90	18.80
8	11590.00	47.4 AV	54.0	-6.6	1.04 H	202	28.60	18.80
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	*5795.00	116.3 PK			1.00 V	322	75.70	40.60
2	*5795.00	107.4 AV			1.00 V	322	66.80	40.60
3	#5850.00	54.9 PK	78.2	-23.3	1.01 V	27	47.30	7.60
4	#5852.10	72.0 PK	78.2	-6.2	1.00 V	16	64.30	7.70
5	#5860.10	66.9 PK	74.0	-7.1	1.13 V	342	59.20	7.70
6	#5860.10	52.3 AV	54.0	-1.7	1.13 V	342	44.60	7.70
7	11590.00	59.4 PK	74.0	-14.6	1.20 V	311	40.60	18.80
8	11590.00	48.0 AV	54.0	-6.0	1.20 V	311	29.20	18.80

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)
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 Worst-Case 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	57.12	32.3 QP	40.0	-7.7	2.00 H	121	46.90	-14.60
2	90.17	34.0 QP	43.5	-9.5	2.00 H	313	53.60	-19.60
3	164.06	32.4 QP	43.5	-11.1	1.51 H	99	46.30	-13.90
4	249.60	29.9 QP	46.0	-16.1	1.01 H	82	44.10	-14.20
5	311.82	32.8 QP	46.0	-13.2	1.01 H	150	44.50	-11.70
6	374.04	29.6 QP	46.0	-16.4	2.00 H	256	40.20	-10.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	36.33	32.7 QP	40.0	-7.3	1.76 V	34	48.40	-15.70
2	70.73	34.5 QP	40.0	-5.5	1.00 V	248	50.80	-16.30
3	148.50	32.0 QP	43.5	-11.5	1.00 V	325	45.80	-13.80
4	199.05	29.9 QP	43.5	-13.6	1.00 V	260	46.30	-16.40
5	296.27	30.7 QP	46.0	-15.3	1.00 V	278	43.00	-12.30
6	374.04	37.8 QP	46.0	-8.2	1.49 V	238	48.40	-10.60

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

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

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 16, 2015	Nov. 15, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2015	Feb. 25, 2016
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2015	Jul. 23, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

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

2. The test was performed in HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

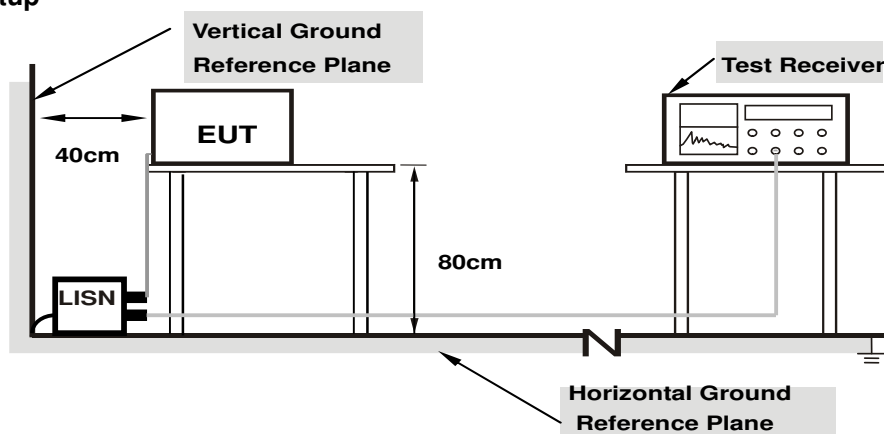
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

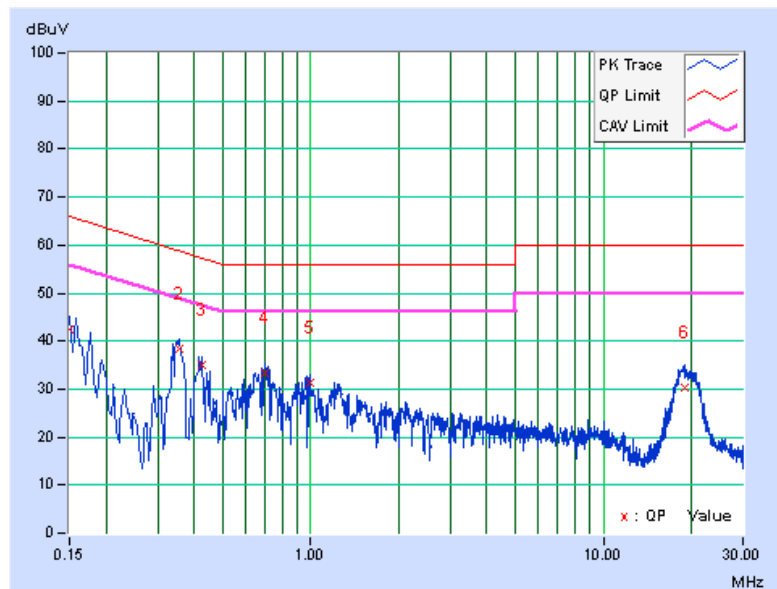
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.01	32.28	24.62	42.29	34.63	66.00	56.00	-23.71	-21.37
2	0.35483	10.13	28.28	20.96	38.41	31.09	58.85	48.85	-20.44	-17.76
3	0.42370	10.14	24.73	18.33	34.87	28.47	57.38	47.38	-22.51	-18.91
4	0.70131	10.21	23.18	16.38	33.39	26.59	56.00	46.00	-22.61	-19.41
5	0.99847	10.29	20.87	14.21	31.16	24.50	56.00	46.00	-24.84	-21.50
6	19.01184	11.13	19.25	13.72	30.38	24.85	60.00	50.00	-29.62	-25.15

Remarks:

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

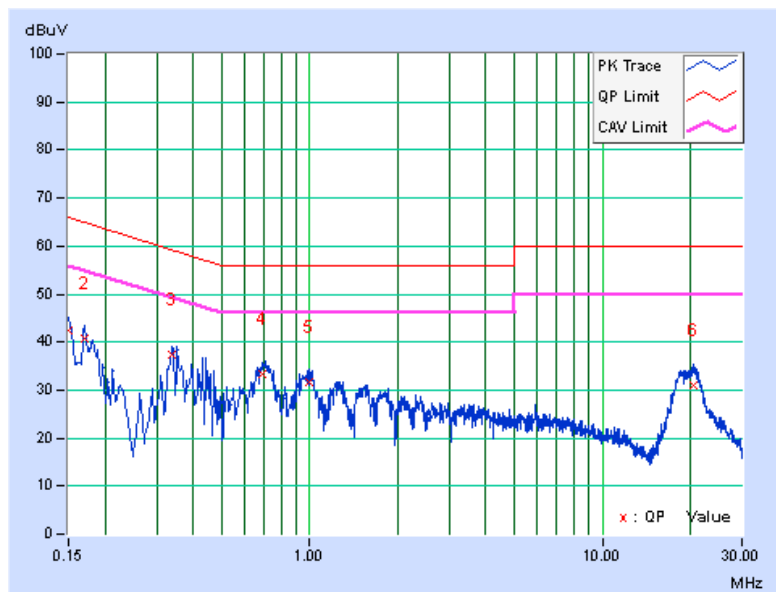


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.00	32.53	24.63	42.53	34.63	66.00	56.00	-23.47	-21.37
2	0.16955	10.02	30.88	20.82	40.90	30.84	64.98	54.98	-24.08	-24.14
3	0.33750	10.12	27.25	20.11	37.37	30.23	59.26	49.26	-21.90	-19.04
4	0.68958	10.19	23.25	15.44	33.44	25.63	56.00	46.00	-22.56	-20.37
5	0.99065	10.23	21.55	14.52	31.78	24.75	56.00	46.00	-24.22	-21.25
6	20.47024	11.01	19.86	15.28	30.87	26.29	60.00	50.00	-29.13	-23.71

Remarks:

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



4.3 Transmit Power Measurement

4.3.1 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 $\leq$ 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,

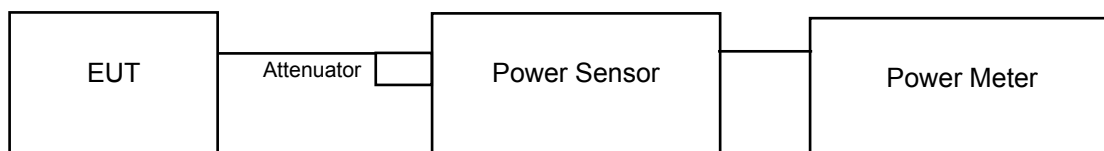
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement

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.

For Occupied Bandwidth:

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 300 kHz RBW and 1MHz VBW. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

Conducted Power:

For U-NII-1 Band (Outdoor Access Point)

802.11a

Chan.	Freq. (MHz)	Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
36	5180	11.61	11.90	10.53	41.274	16.16	29	PASS
40	5200	12.34	12.50	11.64	49.511	16.95	29	PASS
48	5240	13.06	13.58	12.79	62.044	17.93	29	PASS

Note:

Gain = 7 > 6dBi, so the conducted power limit shall be reduced to 30-(7-6) = 29dBm.

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
36	5180	11.51	12.12	10.65	42.065	16.24	29	PASS
40	5200	12.13	12.65	11.69	49.496	16.95	29	PASS
48	5240	13.01	13.65	12.58	61.286	17.87	29	PASS

Note:

Gain = 7 > 6dBi, so the conducted power limit shall be reduced to 30-(7-6) = 29dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
38	5190	9.69	9.40	8.55	25.182	14.01	29	PASS
46	5230	12.96	13.68	12.64	61.470	17.89	29	PASS

Note:

Gain = 7 > 6dBi, so the conducted power limit shall be reduced to 30-(7-6) = 29dBm.

Max. e.i.r.p at any elevation angle above 30 degrees:

For U-NII-1 Band (Outdoor Access Point)

802.11a

Chan.	Freq. (MHz)	Conducted Power (mW)	Conducted Power (dBm)	Antenna Gain above 30 degrees from the horizon (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
36	5180	41.274	16.16	-3.88	12.28	21	PASS
40	5200	49.511	16.95	-3.88	13.07	21	PASS
48	5240	62.044	17.93	-3.88	14.05	21	PASS

Note:

Gain = -3.88dBi (above 30 degrees from the horizon),

EIRP = conducted power + antenna gain (-3.88dBi) + array gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (mW)	Conducted Power (dBm)	Antenna Gain above 30 degrees from the horizon (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
36	5180	42.065	16.24	-3.88	12.36	21	PASS
40	5200	49.496	16.95	-3.88	13.07	21	PASS
48	5240	61.286	17.87	-3.88	13.99	21	PASS

Note:

Gain = -3.88dBi (above 30 degrees from the horizon),

EIRP = conducted power + antenna gain (-3.88dBi) + array gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (mW)	Conducted Power (dBm)	Antenna Gain above 30 degrees from the horizon (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
38	5190	25.182	14.01	-3.88	10.13	21	PASS
46	5230	61.47	17.89	-3.88	14.01	21	PASS

Note:

Gain = -3.88dBi (above 30 degrees from the horizon),

EIRP = conducted power + antenna gain (-3.88dBi) + array gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

For U-NII-3 Band 802.11a

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
149	5745	18.08	17.85	17.25	178.311	22.51	29	PASS
157	5785	23.68	22.66	22.86	611.045	27.86	29	PASS
165	5825	20.81	18.71	19.97	294.118	24.69	29	PASS

Note:

Gain = 7 > 6dBi, so the power limit shall be reduced to 30-(7-6) = 29dBm.

802.11n (HT20)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
149	5745	17.85	17.53	17.08	168.628	22.27	29	PASS
157	5785	23.55	22.84	22.85	611.525	27.86	29	PASS
165	5825	20.08	19.00	19.45	269.397	24.30	29	PASS

Note:

Gain = 7 > 6dBi, so the power limit shall be reduced to 30-(7-6) = 29dBm.

802.11n (HT40)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)			Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
151	5755	13.62	13.65	12.91	65.731	18.18	29	PASS
159	5795	20.19	19.97	19.31	289.094	24.61	29	PASS

Note:

Gain = 7 > 6dBi, so the power limit shall be reduced to 30-(7-6) = 29dBm.

26dB Bandwidth:

802.11a

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
36	5180	23.49	22.00	22.43	Pass
40	5200	23.81	22.53	22.49	Pass
48	5240	22.65	22.60	21.83	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
36	5180	23.92	23.70	24.02	Pass
40	5200	24.06	23.45	23.96	Pass
48	5240	23.76	23.94	23.31	Pass

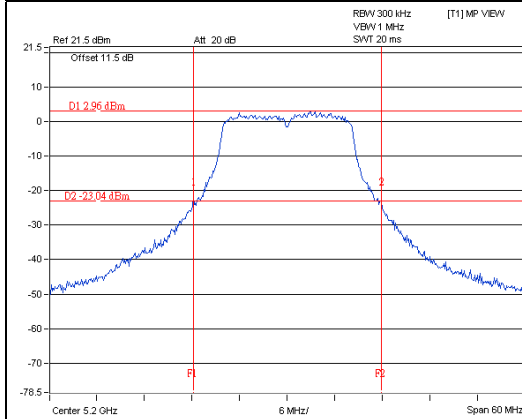
802.11n (HT40)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
38	5190	50.01	47.65	48.36	Pass
46	5230	49.60	48.88	48.10	Pass

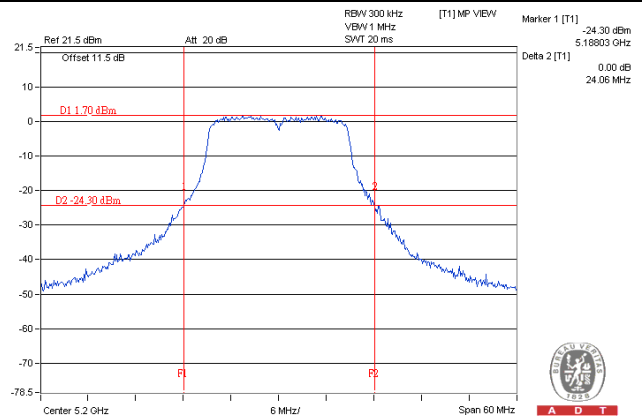
Spectrum Plot of Worst Value

802.11a

802.11n (HT20)

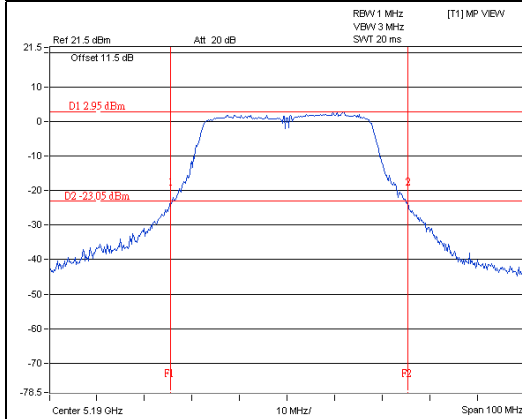


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802.11n (HT40)



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Occupied Bandwidth:

802.11a

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)		
		Chain 0	Chain 1	Chain 2
36	5180	16.92	16.80	16.80
40	5200	16.80	16.68	16.68
48	5240	16.92	16.68	16.68
149	5745	16.96	16.70	16.70
157	5785	18.24	17.16	20.04
165	5825	16.92	16.80	16.92

802.11n (HT20)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)		
		Chain 0	Chain 1	Chain 2
36	5180	18.00	17.88	17.88
40	5200	18.12	18.00	17.88
48	5240	18.00	18.12	18.00
149	5745	18.12	18.00	18.12
157	5785	18.24	18.48	20.64
165	5825	17.88	17.40	18.00

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)		
		Chain 0	Chain 1	Chain 2
38	5190	37.20	37.32	37.08
46	5230	37.44	36.84	37.08
151	5755	36.84	36.72	37.20
159	5795	37.08	36.12	37.08

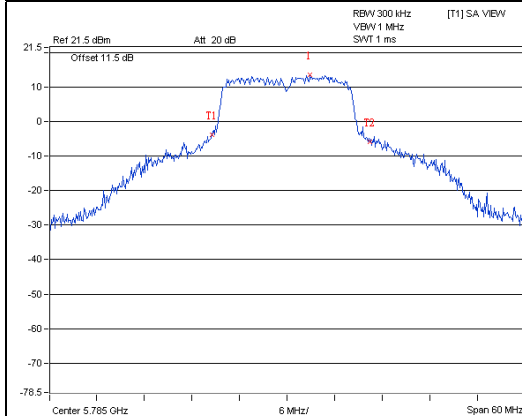


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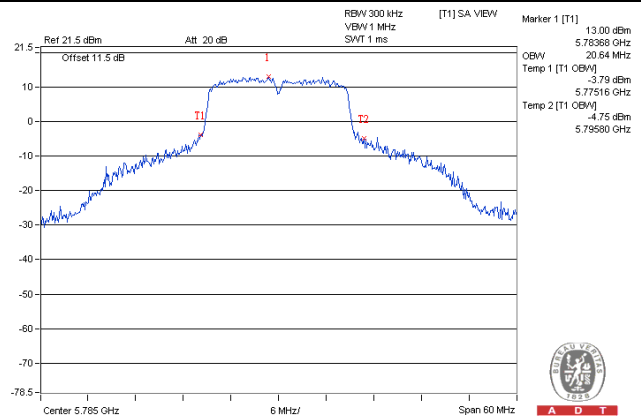
Spectrum Plot of Worst Value

802.11a

802.11n (HT20)

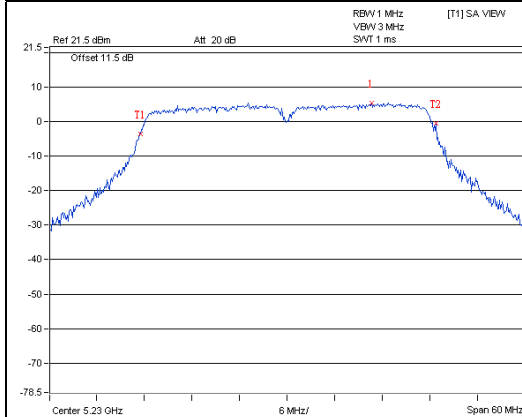


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802.11n (HT40)



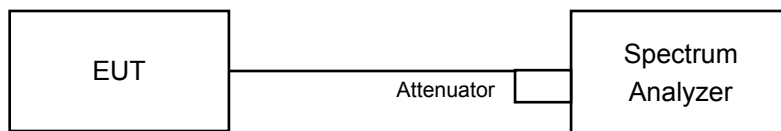
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4.4 Peak Power Spectral Density Measurement

4.4.1 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	11dBm/ MHz
		Mobile and Portable client device	
U-NII-2A	---		11dBm/ MHz
U-NII-2C	---		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

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

For U-NII-1 band:

Using method SA-2

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 1 MHz, Set VBW $\geq$ 3 MHz, Detector = RMS
- Sweep time = auto, trigger set to "free run".
- Trace average at least 100 traces in power averaging mode.
- Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz, Set VBW $\geq$ 1 MHz, Detector = RMS
- Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
- 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 $BWCF = 10\log(500\text{ kHz}/300\text{ kHz})$
- Sweep time = auto, trigger set to "free run".
- Trace average at least 100 traces in power averaging mode.
- Record the max value and add 10 log (1/duty cycle)

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

For U-NII-1 Band

802.11a

Chan.	Freq. (MHz)	PSD (dBm)			Total PSD w/o duty factor (dBm)	Duty factor	Total PSD with duty factor (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2					
36	5180	-3.68	-1.11	-3.82	2.09	0.13	2.22	11.23	Pass
40	5200	-1.81	-1.07	-3.32	2.80	0.13	2.93	11.23	Pass
48	5240	-0.65	0.99	-1.65	4.48	0.13	4.61	11.23	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $7\text{dBi} + 10\log(3) = 11.77\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17 - (11.77 - 6) = 11.23\text{dBm}$.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Chan.	Freq. (MHz)	PSD (dBm)			Total PSD w/o duty factor (dBm)	Duty factor	Total PSD with duty factor (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2					
36	5180	-2.52	-2.11	-3.81	2.02	0.12	2.14	11.23	Pass
40	5200	-2.47	-1.50	-3.41	2.38	0.12	2.50	11.23	Pass
48	5240	-1.13	0.03	-2.53	3.68	0.12	3.80	11.23	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $7\text{dBi} + 10\log(3) = 11.77\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17 - (11.77 - 6) = 11.23\text{dBm}$.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

Chan.	Freq. (MHz)	PSD (dBm)			Total PSD w/o duty factor (dBm)	Duty factor	Total PSD with duty factor (dBm)	Max. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2					
38	5190	-8.04	-6.39	-9.98	-3.12	0.21	-2.91	11.23	Pass
46	5230	-4.81	-2.62	-5.77	0.58	0.21	0.79	11.23	Pass

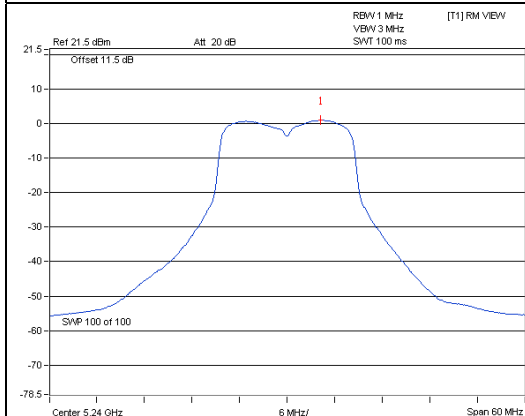
Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = $7\text{dBi} + 10\log(3) = 11.77\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $17 - (11.77 - 6) = 11.23\text{dBm}$.
3. Refer to section 3.3 for duty cycle spectrum plot.

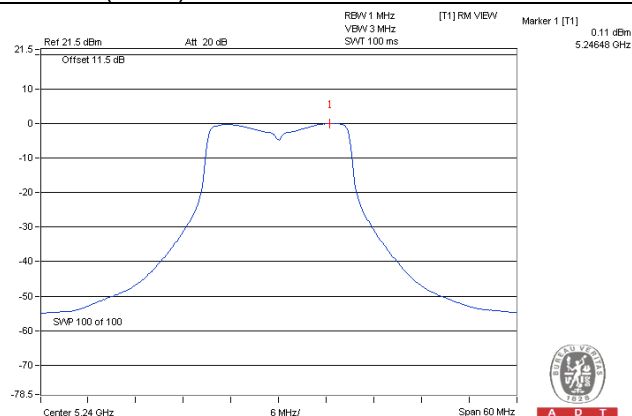
Spectrum Plot of Worst Value

802.11a / Chain 1 / CH 48

802.11n (HT20) / Chain 1 / CH 48

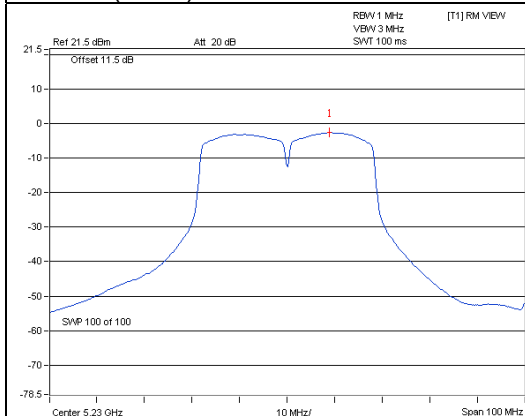


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802.11n (HT40) / Chain 1 / CH 46



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For U-NII-3 Band

802.11a

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=3) dB	Duty factor	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	149	5745	-3.25	-1.03	4.77	0.13	3.87	24.23	Pass
	157	5785	2.73	4.95	4.77	0.13	9.85	24.23	Pass
	165	5825	-0.27	1.95	4.77	0.13	6.85	24.23	Pass
1	149	5745	-1.34	0.88	4.77	0.13	5.78	24.23	Pass
	157	5785	1.95	4.17	4.77	0.13	9.07	24.23	Pass
	165	5825	-0.63	1.59	4.77	0.13	6.49	24.23	Pass
2	149	5745	-4.71	-2.49	4.77	0.13	2.41	24.23	Pass
	157	5785	0.61	2.83	4.77	0.13	7.73	24.23	Pass
	165	5825	-1.37	0.85	4.77	0.13	5.75	24.23	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 7dBi + 10log(3) = 11.77dBi > 6dBi, so the power density limit shall be reduced to 30-(11.77-6) = 24.23dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=3) dB	Duty factor	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	149	5745	-4.19	-1.97	4.77	0.12	2.92	24.23	Pass
	157	5785	2.07	4.29	4.77	0.12	9.18	24.23	Pass
	165	5825	-1.24	0.98	4.77	0.12	5.87	24.23	Pass
1	149	5745	-2.81	-0.59	4.77	0.12	4.30	24.23	Pass
	157	5785	2.58	4.80	4.77	0.12	9.69	24.23	Pass
	165	5825	-1.24	0.98	4.77	0.12	5.87	24.23	Pass
2	149	5745	-5.10	-2.88	4.77	0.12	2.01	24.23	Pass
	157	5785	0.41	2.63	4.77	0.12	7.52	24.23	Pass
	165	5825	-2.35	-0.13	4.77	0.12	4.76	24.23	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 7dBi + 10log(3) = 11.77dBi > 6dBi, so the power density limit shall be reduced to 30-(11.77-6) = 24.23dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=3) dB	Duty factor	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	151	5755	-10.85	-8.63	4.77	0.21	-3.65	24.23	Pass
	159	5795	-3.67	-1.45	4.77	0.21	3.53	24.23	Pass
1	151	5755	-10.25	-8.03	4.77	0.21	-3.05	24.23	Pass
	159	5795	-2.96	-0.74	4.77	0.21	4.24	24.23	Pass
2	151	5755	-12.84	-10.62	4.77	0.21	-5.64	24.23	Pass
	159	5795	-6.08	-3.86	4.77	0.21	1.12	24.23	Pass

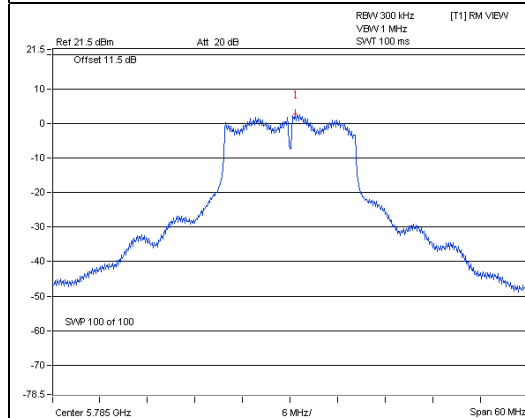
Note:

- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- Directional gain = 7dBi + 10log(3) = 11.77dBi > 6dBi, so the power density limit shall be reduced to 30-(11.77-6) = 24.23dBm.
- Refer to section 3.3 for duty cycle spectrum plot.

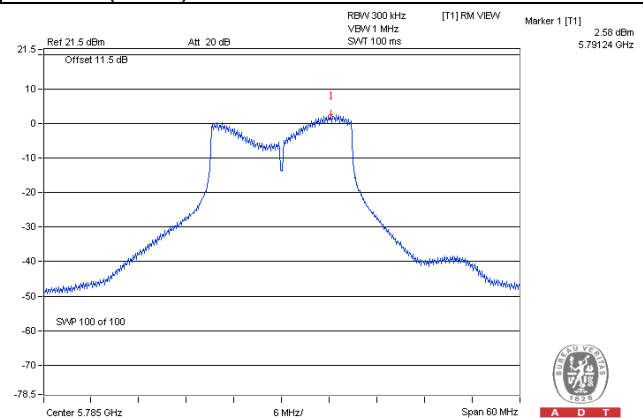
Spectrum Plot of Worst Value

802.11a

802.11n (HT20)

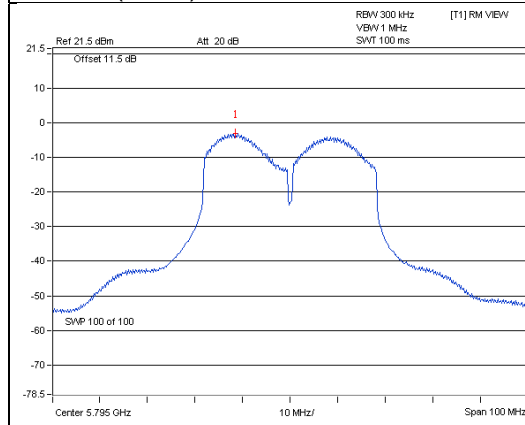


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802.11n (HT40)



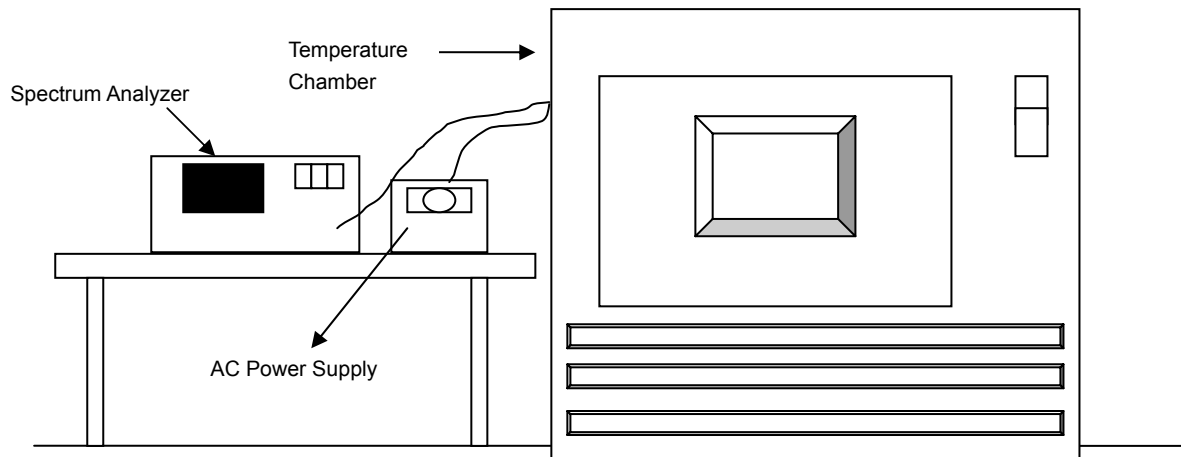
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4.5 Frequency Stability

4.5.1 Limits of Frequency Stability Measurement

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

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

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- 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.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

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

4.5.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (°C)	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	5180.0002	0.00000	5179.9998	0.00000	5180.0012	0.00002	5180.0001	0.00000
40	120	5179.981	-0.00037	5179.9813	-0.00036	5179.9841	-0.00031	5179.9796	-0.00039
30	120	5180.0068	0.00013	5180.0077	0.00015	5180.0049	0.00009	5180.0047	0.00009
20	120	5180.0175	0.00034	5180.0128	0.00025	5180.0134	0.00026	5180.0131	0.00025
10	120	5179.9801	-0.00038	5179.979	-0.00041	5179.9804	-0.00038	5179.9809	-0.00037
0	120	5180.0009	0.00002	5179.9981	-0.00004	5180.0021	0.00004	5179.9981	-0.00004
-10	120	5179.9748	-0.00049	5179.9756	-0.00047	5179.9753	-0.00048	5179.9765	-0.00045
-20	120	5179.9875	-0.00024	5179.9876	-0.00024	5179.9877	-0.00024	5179.9887	-0.00022
-30	120	5180.0208	0.00040	5180.0211	0.00041	5180.0231	0.00045	5180.0225	0.00043

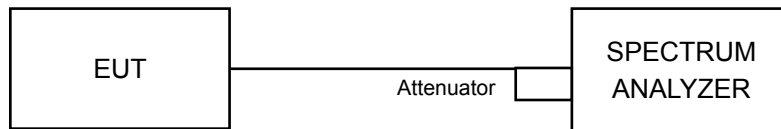
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5180.0182	0.00035	5180.0136	0.00026	5180.013	0.00025	5180.0132	0.00025
	120	5180.0175	0.00034	5180.0128	0.00025	5180.0134	0.00026	5180.0131	0.00025
	102	5180.0181	0.00035	5180.013	0.00025	5180.0138	0.00027	5180.0134	0.00026

4.6 6dB Bandwidth Measurement

4.6.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

802.11a

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
36	5180	16.38	13.22	16.37	Pass
40	5200	15.76	16.37	16.38	Pass
48	5240	15.53	16.07	16.38	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
36	5180	17.19	16.45	17.61	Pass
40	5200	16.01	16.41	17.57	Pass
48	5240	16.09	15.16	17.57	Pass

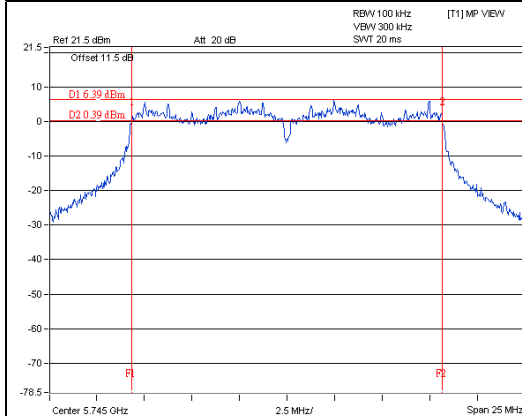
802.11n (HT40)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
38	5190	35.20	35.46	36.43	Pass
46	5230	35.40	34.02	36.36	Pass

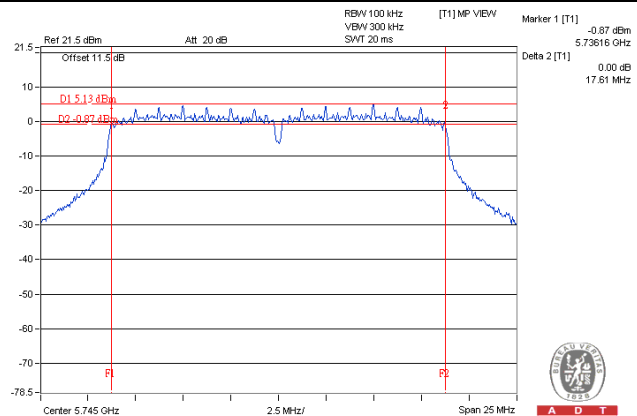
Spectrum Plot of Worst Value

802.11a

802.11n (HT20)

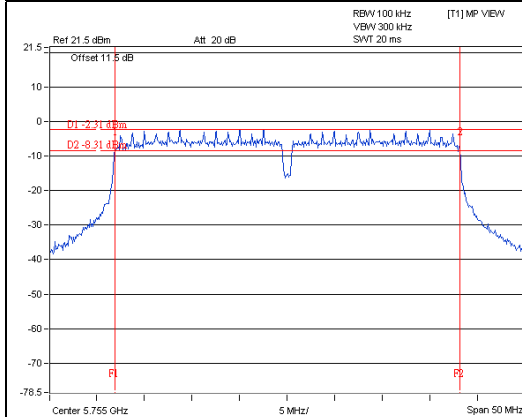


A D T



A D T

802.11n (HT40)



A D T

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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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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