

FCC TEST REPORT

(15.407)

REPORT NO.: RF140421C35-1
MODEL NO.: WAP351
FCC ID: PD5-WAP351
RECEIVED: Apr. 18, 2014
TESTED: May 23 ~ Jun. 18, 2014
ISSUED: Jun. 26, 2014

APPLICANT: Delta Networks, Inc.

ADDRESS: 252, Shang Ying Road, Kuei San Taoyuan Shien
333, Taiwan, R.O.C.

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

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist.,
New Taipei City, Taiwan, R.O.C.

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

TABLE OF CONTENTS

RELEASE CONTROL RECORD	4
1. CERTIFICATION.....	5
2. SUMMARY OF TEST RESULTS	6
2.1 MEASUREMENT UNCERTAINTY	6
3. GENERAL INFORMATION.....	7
3.1 GENERAL DESCRIPTION OF EUT.....	7
3.2 DESCRIPTION OF TEST MODES.....	9
3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	10
3.3 DUTY CYCLE OF TEST SIGNAL	12
3.4 DESCRIPTION OF SUPPORT UNITS.....	14
3.4.1 CONFIGURATION OF SYSTEM UNDER TEST.....	15
3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS.....	17
4. TEST TYPES AND RESULTS	18
4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT	18
4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT	18
4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS	18
4.1.3 TEST INSTRUMENTS	19
4.1.4 TEST PROCEDURES	20
4.1.5 DEVIATION FROM TEST STANDARD	20
4.1.6 TEST SETUP.....	21
4.1.7 EUT OPERATING CONDITION	22
4.1.8 TEST RESULTS	23
4.2 CONDUCTED EMISSION MEASUREMENT.....	41
4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT	41
4.2.2 TEST INSTRUMENTS	41
4.2.3 TEST PROCEDURES	42
4.2.4 DEVIATION FROM TEST STANDARD	42
4.2.5 TEST SETUP.....	42
4.2.6 EUT OPERATING CONDITIONS.....	42
4.2.7 TEST RESULTS	43
4.3 TRANSMIT POWER MEASUREMENT.....	47
4.3.1 LIMITS OF TRANSMIT POWER MEASUREMENT	47
4.3.2 TEST SETUP.....	47
4.3.3 TEST INSTRUMENTS	48
4.3.4 TEST PROCEDURE	48
4.3.5 DEVIATION FROM TEST STANDARD	48
4.3.6 EUT OPERATING CONDITIONS.....	48
4.3.7 TEST RESULTS	49
4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT.....	50
4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT	50
4.4.2 TEST SETUP.....	50
4.4.3 TEST INSTRUMENTS	50
4.4.4 TEST PROCEDURES	50
4.4.5 DEVIATION FROM TEST STANDARD	51
4.4.6 EUT OPERATING CONDITIONS.....	51
4.4.7 TEST RESULTS	52
4.5 FREQUENCY STABILITY	56
4.5.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT	56
4.5.2 TEST SETUP.....	56
4.5.3 TEST INSTRUMENTS	56
4.5.4 TEST PROCEDURE	57
4.5.5 DEVIATION FROM TEST STANDARD	57
4.5.6 EUT OPERATING CONDITION	57
4.5.7 TEST RESULTS	58



A D T

4.6	6dB BANDWIDTH MEASUREMENT	59
4.6.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT.....	59
4.6.2	TEST SETUP.....	59
4.6.3	TEST INSTRUMENTS	59
4.6.4	TEST PROCEDURE	59
4.6.5	DEVIATION FROM TEST STANDARD	59
4.6.6	EUT OPERATING CONDITIONS	59
4.6.7	TEST RESULTS	60
5.	PHOTOGRAPHS OF THE TEST CONFIGURATION	62
6.	INFORMATION ON THE TESTING LABORATORIES	63
7.	APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB	64



RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140421C35-1	Original release	Jun. 26, 2014

1. CERTIFICATION

PRODUCT: Wireless-N Dual Radio Access Point with 5 Ports Switch

MODEL: WAP351

BRAND: CISCO

APPLICANT: Delta Networks, Inc.

TESTED: May 23 ~ Jun. 18, 2014

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: FCC Part 15, Subpart E (Section 15.407)

ANSI C63.10-2009

The above equipment (model: WAP351) 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 :** Jun. 26, 2014

Pettie Chen / Senior Specialist

APPROVED BY :  , **DATE :** Jun. 26, 2014

Ken Liu / Senior Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.407(b)(6)	AC Power Conducted Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -4.78dB at 22.41016MHz.
15.407(b)(1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 5714.90MHz.
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 I-PEX (MHF) not a standard connector.

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	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.19 dB
	200MHz ~ 1000MHz	3.21 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Wireless-N Dual Radio Access Point with 5 Ports Switch
MODEL NO.	WAP351
POWER SUPPLY	48Vdc (Adapter) 56Vdc (PoE)
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK
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 270.0Mbps
OPERATING FREQUENCY	5180 ~ 5240MHz, 5745 ~ 5825MHz
NUMBER OF CHANNEL	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	5180 ~ 5240MHz: Average Power: 38.336mW (15.84dBm) EIRP: 19.14dBm 5745 ~ 5825MHz: Average Power: 39.804mW (16.00dBm) EIRP: 19.30dBm
ANTENNA TYPE	Refer to NOTE
ANTENNA CONNECTOR	Refer to NOTE
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

1. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

MODULATION MODE	TX FUNCTION
802.11a	2TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

*The EUT doesn't support diversity function in transmitter part.
The EUT supports chain 0/1 only.

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

Adapter	
Brand	LEADER ELECTRONICS INC.
Model	NU60-F480125-I1
Input Power	100-240Vac~50/60Hz, 1.4A
Output Power	48.0Vdc, 1.25A
Power Line	1.85m DC cable with 1 core attached on adapter

PoE (Support unit only)	
Brand	PowerDsine
Model	9001G-40/SP
Input Power	100-240Vac, 50-60Hz, 1.5A
Output Power	56V, 0.73A

3. The following antennas were provided to the EUT.

Antenna NO.	Antenna Type	Frequency range	Antenna Gain (dBi) Including cable loss	Connector Type
Left front (HB1) (chain 0)	Dipole	5.15~5.825GHz	3.3 (TX/RX)	I-PEX(MHF)
Front right (HB2) (chain 2)	Dipole	5.15~5.825GHz	5.1 (RX only)	I-PEX(MHF)
Right front (HB3) (chain 1)	Dipole	5.15~5.825GHz	3.2 (TX/RX)	I-PEX(MHF)

4. 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 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (20MHz):

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

FOR 5745 ~ 5825MHz

5 channels are provided for 802.11a, 802.11n (20MHz):

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

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

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	
A	√	√	√	√	Powered by adapter
B	-	√	√	-	Powered by POE

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

NOTE:

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

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	13.5
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
A	802.11n (40MHz)		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.

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B	802.11n (20MHz)	5180-5320, 5745-5825	36 to 48, 149 to 165	40	OFDM	BPSK	6.5

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)
A, B	802.11n (20MHz)	5180-5320, 5745-5825	36 to 48, 149 to 165	40	OFDM	BPSK	6.5

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)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
A	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	13.5
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
A	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
A	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	28deg. C, 64%RH	120Vac, 60Hz	Alan Wu
RE<1G	23deg. C, 63%RH	120Vac, 60Hz	Brad Tung
PLC	22deg. C, 62%RH	120Vac, 60Hz	Leo Tsai
APCM	24deg. C, 64%RH	120Vac, 60Hz	Match Tsui

3.3 DUTY CYCLE OF TEST SIGNAL

For U-NII-1 Band:

802.11a, 802.11n (20MHz): Duty cycle of test signal is > 98 %, duty factor is not required.

802.11a: Duty cycle = $1.9188/1.9488 = 0.985 > 98 \%$, duty factor is not required.

802.11n (20MHz): Duty cycle = $1.9188/1.9488 = 0.985 > 98 \%$, duty factor is not required.

802.11n (40MHz): Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11n (40MHz): Duty cycle = $0.9375/0.97 = 0.966$, Duty factor = $10 * \log(1/0.966) = 0.15$



For U-NII-3 Band:

802.11a: Duty cycle of test signal is > 98 %, duty factor is not required.

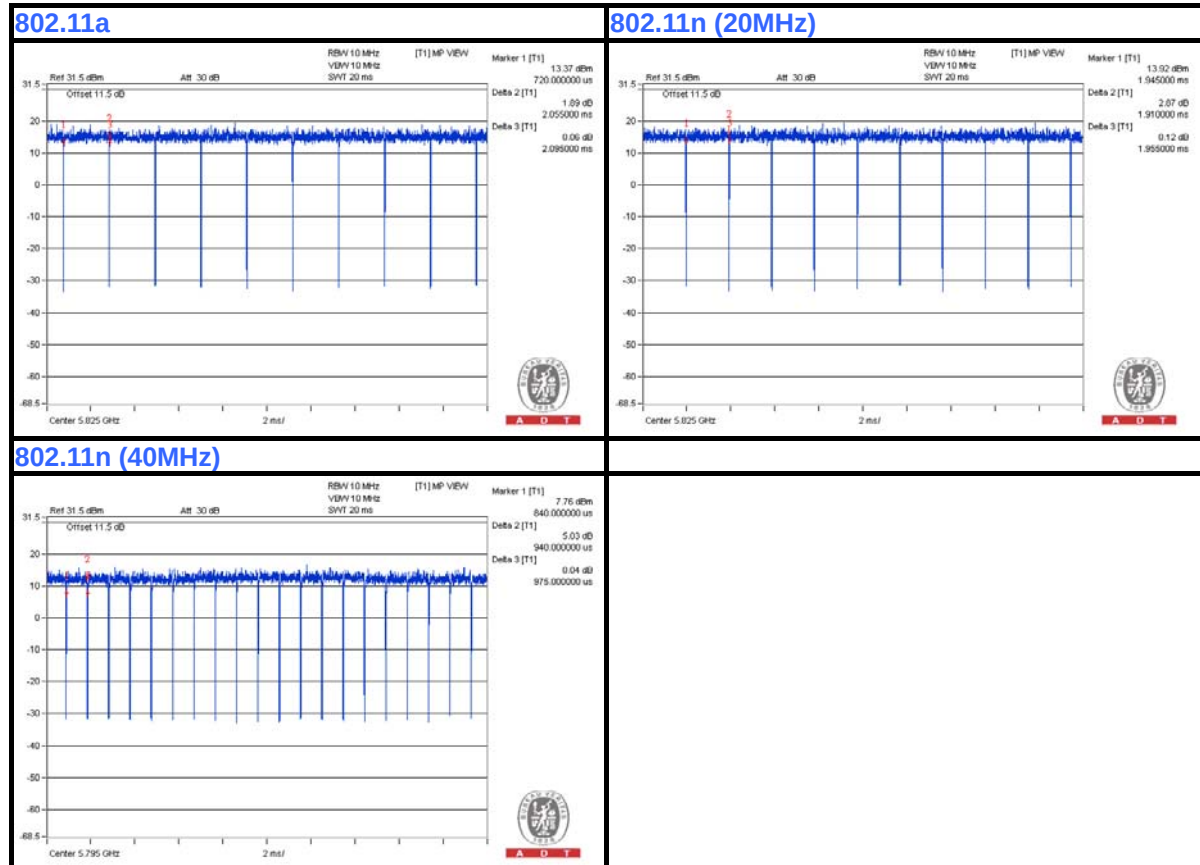
802.11a: Duty cycle = $2.055/2.095 = 0.981 > 98 \%$, duty factor is not required.

802.11n (20MHz), 802.11n (40MHz):

Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11n (20MHz): Duty cycle = $1.91/1.955 = 0.977$, Duty factor = $10 * \log(1/0.977) = 0.10$

802.11n (40MHz): Duty cycle = $0.940/0.975 = 0.964$, Duty factor = $10 * \log(1/0.964) = 0.16$



3.4 DESCRIPTION OF SUPPORT UNITS

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

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	D531	CN-0XM006-48643-8 1U-2786	QDS-BRCM1020
2	PoE	PowerDsine	9001G-40/SP	NA	NA

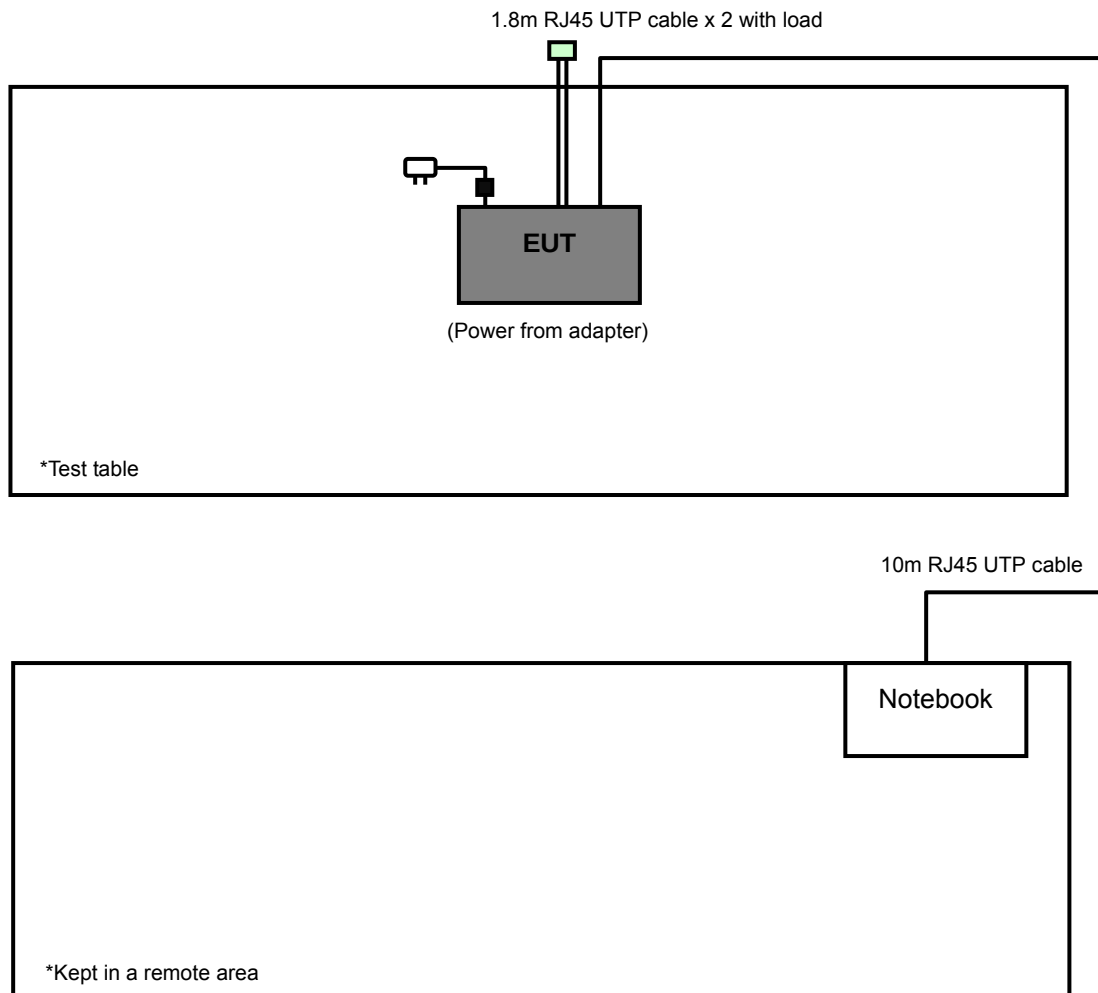
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable (For Test Mode A), 3m RJ45 UTP cable (For Test Mode B)
2	10m RJ45 UTP cable

NOTE:

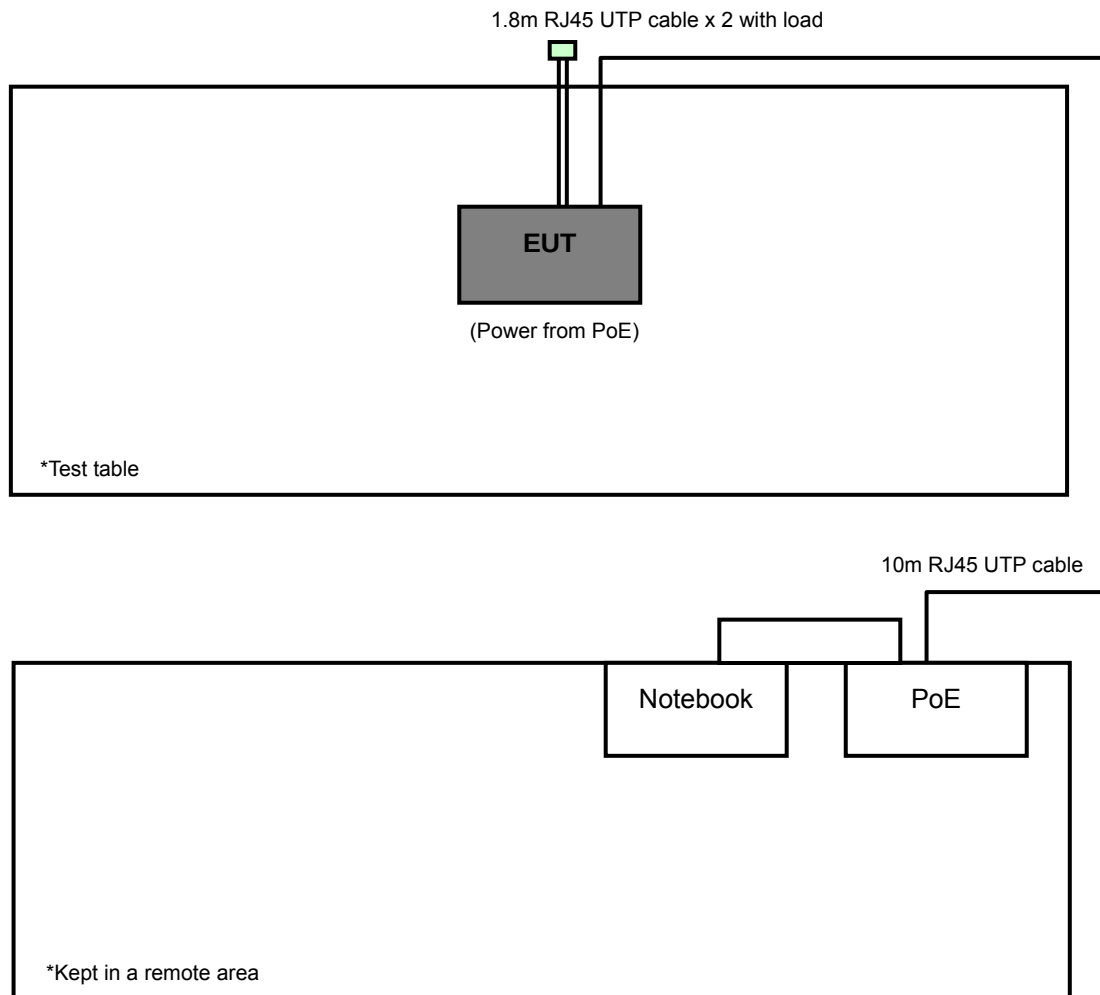
1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1, 2 acted as communication partners to transfer data.
3. Item 2 was provided by client.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST

Test Mode A



Test Mode B



3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specification of the EUT declared by 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 v01

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2009

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.

4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedures New Rules v01	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: 68.3 (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: 68.3 (dBuV/m) ^{*1} PK: 78.3 (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:

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

4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Sep. 09, 2013	Sep. 08, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSU 43	100115	Dec. 18, 2013	Dec. 17, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 26, 2014	Feb. 25, 2015
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Jan. 05, 2014	Jan. 04, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8449B	3008A01961	Oct. 28, 2013	Oct. 27, 2014
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 26, 2013	Aug. 25, 2014
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
High Speed Peak Power Meter	ML2495A	0824011	Jul. 29, 2013	Jul. 28, 2014
Power Sensor	MA2411B	0738171	Jul. 29, 2013	Jul. 28, 2014
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 10, 2013	Jun. 09, 2014
			Jun. 09, 2014	Jun. 08, 2015

- 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 4.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 460141.
 5. The IC Site Registration No. is IC7450F-4.

4.1.4 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

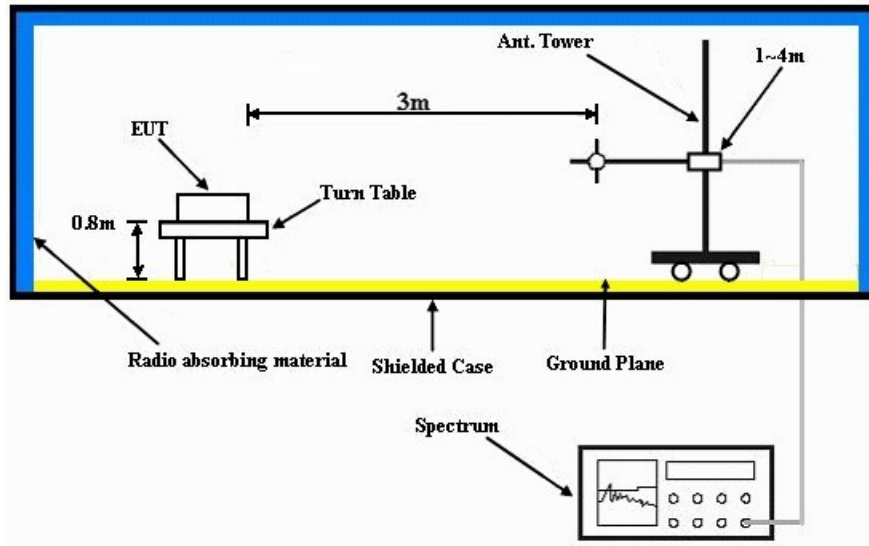
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

4.1.5 DEVIATION FROM TEST STANDARD

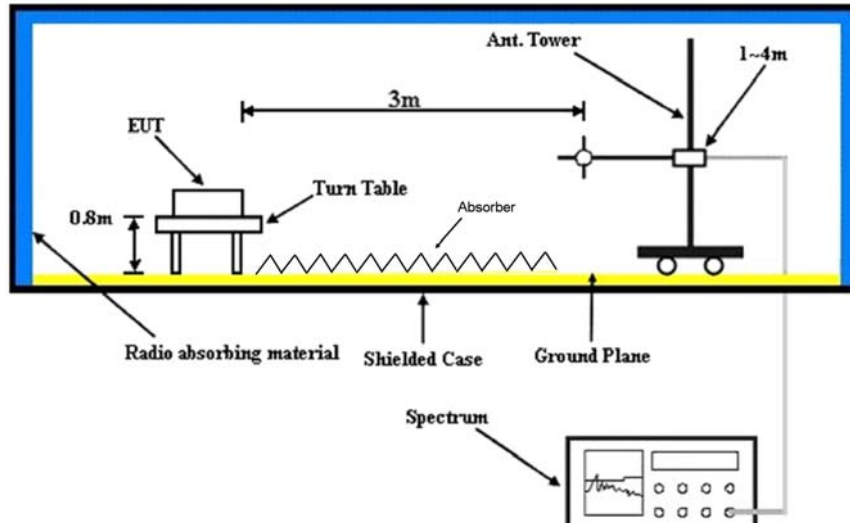
No deviation.

4.1.6 TEST SETUP

Frequency range 30MHz~1GHz



Frequency range above 1GHz



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

4.1.7 EUT OPERATING CONDITION

TEST MODE A

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

TEST MODE B

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

4.1.8 TEST RESULTS

ABOVE 1GHz DATA

For U-NII-1 Band

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	5150.00	57.9 PK	74.0	-16.1	1.05 H	327	52.50	5.40
2	5150.00	43.7 AV	54.0	-10.3	1.05 H	327	38.30	5.40
3	*5180.00	99.9 PK			1.06 H	322	60.60	39.30
4	*5180.00	90.3 AV			1.06 H	322	51.00	39.30
5	#10360.00	57.3 PK	68.3	-11.0	1.00 H	312	41.10	16.20
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	5150.00	68.8 PK	74.0	-5.2	1.00 V	3	63.40	5.40
2	5150.00	50.8 AV	54.0	-3.2	1.00 V	3	45.40	5.40
3	*5180.00	110.2 PK			1.00 V	9	70.90	39.30
4	*5180.00	100.8 AV			1.00 V	9	61.50	39.30
5	#10360.00	58.5 PK	68.3	-9.8	1.00 V	338	42.30	16.20

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 40	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	*5200.00	99.0 PK			1.00 H	341	59.70	39.30
2	*5200.00	89.6 AV			1.00 H	341	50.30	39.30
3	#10400.00	57.8 PK	68.3	-10.5	1.00 H	316	41.40	16.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	110.3 PK			1.00 V	351	71.00	39.30
2	*5200.00	100.8 AV			1.00 V	351	61.50	39.30
3	#10400.00	59.0 PK	68.3	-9.3	1.00 V	330	42.60	16.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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 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	*5240.00	98.9 PK			1.02 H	323	59.60	39.30
2	*5240.00	89.4 AV			1.02 H	323	50.10	39.30
3	5350.00	57.4 PK	74.0	-16.6	1.03 H	329	51.90	5.50
4	5350.00	43.2 AV	54.0	-10.8	1.03 H	329	37.70	5.50
5	#10480.00	57.6 PK	68.3	-10.7	1.00 H	312	40.30	17.30
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	*5240.00	109.2 PK			1.00 V	3	69.90	39.30
2	*5240.00	99.9 AV			1.00 V	3	60.60	39.30
3	5350.00	58.6 PK	74.0	-15.4	1.00 V	10	53.10	5.50
4	5350.00	44.8 AV	54.0	-9.2	1.00 V	10	39.30	5.50
5	#10480.00	58.8 PK	68.3	-9.5	1.00 V	330	41.50	17.30

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.

802.11n (20MHz)

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	5150.00	57.3 PK	74.0	-16.7	1.07 H	329	51.90	5.40
2	5150.00	43.1 AV	54.0	-10.9	1.07 H	329	37.70	5.40
3	*5180.00	99.6 PK			1.05 H	323	60.30	39.30
4	*5180.00	89.4 AV			1.05 H	323	50.10	39.30
5	#10360.00	57.6 PK	68.3	-10.7	1.00 H	316	41.40	16.20
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	5150.00	68.5 PK	74.0	-5.5	1.00 V	10	63.10	5.40
2	5150.00	49.2 AV	54.0	-4.8	1.00 V	10	43.80	5.40
3	*5180.00	109.1 PK			1.00 V	6	69.80	39.30
4	*5180.00	99.5 AV			1.00 V	6	60.20	39.30
5	#10360.00	58.8 PK	68.3	-9.5	1.00 V	336	42.60	16.20

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 40	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	*5200.00	99.7 PK			1.40 H	323	60.40	39.30
2	*5200.00	89.7 AV			1.40 H	323	50.40	39.30
3	#10400.00	58.0 PK	68.3	-10.3	1.00 H	311	41.60	16.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	110.2 PK			1.00 V	359	70.90	39.30
2	*5200.00	99.6 AV			1.00 V	359	60.30	39.30
3	#10400.00	59.0 PK	74.0	-15.0	1.00 V	333	42.60	16.40
4	#10400.00	46.3 AV	54.0	-7.7	1.00 V	333	29.90	16.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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 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	*5240.00	98.4 PK			1.00 H	323	59.10	39.30
2	*5240.00	88.7 AV			1.00 H	323	49.40	39.30
3	5350.00	57.8 PK	74.0	-16.2	1.00 H	326	52.30	5.50
4	5350.00	43.9 AV	54.0	-10.1	1.00 H	326	38.40	5.50
5	#10480.00	57.7 PK	68.3	-10.6	1.00 H	314	40.40	17.30
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	*5240.00	109.3 PK			1.00 V	5	70.00	39.30
2	*5240.00	99.7 AV			1.00 V	5	60.40	39.30
3	5350.00	59.0 PK	74.0	-15.0	1.00 V	355	53.50	5.50
4	5350.00	45.4 AV	54.0	-8.6	1.00 V	355	39.90	5.50
5	#10480.00	58.9 PK	68.3	-9.4	1.00 V	335	41.60	17.30

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.

802.11n (40MHz)

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	58.2 PK	74.0	-15.8	1.08 H	327	52.80	5.40
2	5150.00	44.6 AV	54.0	-9.4	1.08 H	327	39.20	5.40
3	*5190.00	93.2 PK			1.06 H	322	53.90	39.30
4	*5190.00	82.8 AV			1.06 H	322	43.50	39.30
5	#10380.00	57.1 PK	68.3	-11.2	1.00 H	311	40.70	16.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.4 PK	74.0	-5.6	1.00 V	2	63.00	5.40
2	5150.00	52.4 AV	54.0	-1.6	1.00 V	2	47.00	5.40
3	*5190.00	103.7 PK			1.00 V	7	64.40	39.30
4	*5190.00	93.5 AV			1.00 V	7	54.20	39.30
5	#10380.00	58.3 PK	68.3	-10.0	1.00 V	339	41.90	16.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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 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	*5230.00	95.7 PK			1.06 H	321	56.40	39.30
2	*5230.00	85.6 AV			1.06 H	321	46.30	39.30
3	5350.00	58.0 PK	74.0	-16.0	1.01 H	321	52.50	5.50
4	5350.00	44.5 AV	54.0	-9.5	1.01 H	321	39.00	5.50
5	#10460.00	57.5 PK	68.3	-10.8	1.00 H	310	40.50	17.00
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	*5230.00	105.8 PK			1.00 V	6	66.50	39.30
2	*5230.00	96.3 AV			1.00 V	6	57.00	39.30
3	5350.00	59.1 PK	74.0	-14.9	1.00 V	1	53.60	5.50
4	5350.00	46.0 AV	54.0	-8.0	1.00 V	1	40.50	5.50
5	#10460.00	58.7 PK	68.3	-9.6	1.00 V	331	41.70	17.00

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.

For U-NII-3 Band

802.11a

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	58.0 PK	68.3	-10.3	1.55 H	332	51.80	6.20
2	#5722.90	58.0 PK	78.3	-20.3	1.55 H	332	51.80	6.20
3	#5725.00	51.2 PK	78.3	-27.1	1.55 H	332	45.00	6.20
4	*5745.00	99.8 PK			1.54 H	335	59.70	40.10
5	*5745.00	89.9 AV			1.54 H	335	49.80	40.10
6	11490.00	60.0 PK	74.0	-14.0	1.00 H	317	41.20	18.80
7	11490.00	46.5 AV	54.0	-7.5	1.00 H	317	27.70	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	#5714.90	66.4 PK	68.3	-1.9	1.00 V	5	60.20	6.20
2	#5722.90	72.8 PK	78.3	-5.5	1.00 V	5	66.60	6.20
3	#5725.00	53.9 PK	78.3	-24.4	1.00 V	5	47.70	6.20
4	*5745.00	109.8 PK			1.00 V	3	69.70	40.10
5	*5745.00	100.5 AV			1.00 V	3	60.40	40.10
6	11490.00	60.7 PK	74.0	-13.3	1.00 V	172	41.90	18.80
7	11490.00	47.1 AV	54.0	-6.9	1.00 V	172	28.30	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.

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	*5785.00	99.9 PK			1.45 H	337	59.70	40.20
2	*5785.00	90.1 AV			1.45 H	337	49.90	40.20
3	11570.00	61.0 PK	74.0	-13.0	1.00 H	313	42.20	18.80
4	11570.00	47.3 AV	54.0	-6.7	1.00 H	313	28.50	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	*5785.00	111.6 PK			1.00 V	357	71.40	40.20
2	*5785.00	101.1 AV			1.00 V	357	60.90	40.20
3	11570.00	61.8 PK	74.0	-12.2	1.00 V	330	43.00	18.80
4	11570.00	48.5 AV	54.0	-5.5	1.00 V	330	29.70	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.

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	100.0 PK			1.53 H	340	59.70	40.30
2	*5825.00	89.6 AV			1.53 H	340	49.30	40.30
3	#5850.00	43.9 PK	78.3	-34.4	1.55 H	337	37.40	6.50
4	#5852.10	59.5 PK	78.3	-18.8	1.55 H	337	53.00	6.50
5	#5860.10	59.2 PK	68.3	-9.1	1.55 H	337	52.70	6.50
6	11650.00	60.6 PK	74.0	-13.4	1.00 H	312	41.70	18.90
7	11650.00	47.0 AV	54.0	-7.0	1.00 H	312	28.10	18.90
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	110.0 PK			1.00 V	349	103.60	6.40
2	*5825.00	99.7 AV			1.00 V	349	93.30	6.40
3	#5850.00	44.5 PK	78.3	-33.8	1.00 V	14	38.00	6.50
4	#5852.10	67.9 PK	78.3	-10.4	1.00 V	14	61.40	6.50
5	#5860.10	63.9 PK	68.3	-4.4	1.00 V	14	57.40	6.50
6	11650.00	61.5 PK	74.0	-12.5	1.00 V	333	42.60	18.90
7	11650.00	48.0 AV	54.0	-6.0	1.00 V	333	29.10	18.90

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 (20MHz)

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	57.9 PK	68.3	-10.4	1.59 H	338	51.70	6.20
2	#5722.90	58.0 PK	78.3	-20.3	1.59 H	338	51.80	6.20
3	#5725.00	52.9 PK	78.3	-25.4	1.59 H	338	46.70	6.20
4	*5745.00	99.6 PK			1.55 H	336	59.50	40.10
5	*5745.00	90.0 AV			1.55 H	336	49.90	40.10
6	11490.00	60.6 PK	74.0	-13.4	1.00 H	311	41.80	18.80
7	11490.00	46.1 AV	54.0	-7.9	1.00 H	311	27.30	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	#5714.90	67.2 PK	68.3	-1.1	1.00 V	3	61.00	6.20
2	#5722.90	74.6 PK	78.3	-3.7	1.00 V	3	68.40	6.20
3	#5725.00	50.9 PK	78.3	-27.4	1.00 V	3	44.70	6.20
4	*5745.00	109.8 PK			1.00 V	6	69.70	40.10
5	*5745.00	100.5 AV			1.00 V	6	60.40	40.10
6	11490.00	61.5 PK	74.0	-12.5	1.00 V	336	42.70	18.80
7	11490.00	48.0 AV	54.0	-6.0	1.00 V	336	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.

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	*5785.00	99.2 PK			1.46 H	335	59.00	40.20
2	*5785.00	89.5 AV			1.46 H	335	49.30	40.20
3	11570.00	61.4 PK	74.0	-12.6	1.00 H	314	42.60	18.80
4	11570.00	46.6 AV	54.0	-7.4	1.00 H	314	27.80	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	*5785.00	110.5 PK			1.00 V	356	70.30	40.20
2	*5785.00	100.6 AV			1.00 V	356	60.40	40.20
3	11570.00	62.2 PK	74.0	-11.8	1.00 V	333	43.40	18.80
4	11570.00	48.8 AV	54.0	-5.2	1.00 V	333	30.00	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.

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	99.2 PK			1.52 H	338	58.90	40.30
2	*5825.00	89.6 AV			1.52 H	338	49.30	40.30
3	#5850.00	51.6 PK	78.3	-26.7	1.58 H	331	45.10	6.50
4	#5852.10	58.7 PK	78.3	-19.6	1.58 H	331	52.20	6.50
5	#5860.10	58.3 PK	68.3	-10.0	1.58 H	331	51.80	6.50
6	11650.00	61.3 PK	74.0	-12.7	1.00 H	317	42.40	18.90
7	11650.00	46.2 AV	54.0	-7.8	1.00 H	317	27.30	18.90
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	110.4 PK			1.00 V	350	70.10	40.30
2	*5825.00	99.8 AV			1.00 V	350	59.50	40.30
3	#5850.00	53.3 PK	78.3	-25.0	1.00 V	7	46.80	6.50
4	#5852.10	69.8 PK	78.3	-8.5	1.00 V	7	63.30	6.50
5	#5860.10	66.7 PK	68.3	-1.6	1.00 V	7	60.20	6.50
6	11650.00	62.1 PK	74.0	-11.9	1.00 V	331	43.20	18.90
7	11650.00	48.2 AV	54.0	-5.8	1.00 V	331	29.30	18.90

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 (40MHz)

CHANNEL	TX Channel 151	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	58.8 PK	68.3	-9.5	1.58 H	330	52.60	6.20
2	#5722.90	58.3 PK	78.3	-20.0	1.58 H	330	52.10	6.20
3	#5725.00	53.5 PK	78.3	-24.8	1.58 H	330	47.30	6.20
4	*5755.00	93.3 PK			1.53 H	333	53.10	40.20
5	*5755.00	83.4 AV			1.53 H	333	43.20	40.20
6	11510.00	59.6 PK	74.0	-14.4	1.00 H	318	40.80	18.80
7	11510.00	45.0 AV	54.0	-9.0	1.00 H	318	26.20	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	#5714.90	67.1 PK	68.3	-1.2	1.00 V	4	60.90	6.20
2	#5722.90	70.3 PK	78.3	-8.0	1.00 V	4	64.10	6.20
3	#5725.00	54.1 PK	78.3	-24.2	1.00 V	4	47.90	6.20
4	*5755.00	103.8 PK			1.00 V	13	63.60	40.20
5	*5755.00	94.1 AV			1.00 V	13	53.90	40.20
6	11510.00	60.6 PK	74.0	-13.4	1.00 V	332	41.80	18.80
7	11510.00	46.5 AV	54.0	-7.5	1.00 V	332	27.70	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.

CHANNEL	TX Channel 159	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	*5795.00	96.9 PK			1.37 H	336	56.70	40.20
2	*5795.00	87.5 AV			1.37 H	336	47.30	40.20
3	#5850.00	46.1 PK	78.3	-32.2	1.32 H	337	39.60	6.50
4	#5852.10	59.2 PK	78.3	-19.1	1.37 H	336	52.70	6.50
5	#5860.10	59.1 PK	68.3	-9.2	1.37 H	336	52.60	6.50
6	11590.00	59.8 PK	74.0	-14.2	1.00 H	315	40.90	18.90
7	11590.00	45.0 AV	54.0	-9.0	1.00 H	315	26.10	18.90
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	107.1 PK			1.00 V	337	66.90	40.20
2	*5795.00	97.4 AV			1.00 V	337	57.20	40.20
3	#5850.00	46.6 PK	78.3	-31.7	1.00 V	7	40.10	6.50
4	#5852.10	64.0 PK	78.3	-14.3	1.00 V	7	57.50	6.50
5	#5860.10	60.3 PK	68.3	-8.0	1.00 V	7	53.80	6.50
6	11590.00	60.6 PK	74.0	-13.4	1.00 V	344	41.70	18.90
7	11590.00	47.3 AV	54.0	-6.7	1.00 V	344	28.40	18.90

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

802.11n (20MHz)

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		
TEST MODE	A		

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	189.33	36.1 QP	43.5	-7.4	1.50 H	67	52.20	-16.10
2	282.66	36.6 QP	46.0	-9.4	1.00 H	9	49.40	-12.80
3	624.85	35.5 QP	46.0	-10.5	1.50 H	150	41.70	-6.20
4	751.23	37.4 QP	46.0	-8.6	1.25 H	174	41.00	-3.60
5	916.50	37.9 QP	46.0	-8.1	1.50 H	34	38.90	-1.00
6	999.99	41.2 QP	54.0	-12.8	1.50 H	277	41.40	-0.20
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	189.33	34.5 QP	43.5	-9.0	1.00 V	332	50.60	-16.10
2	261.27	30.9 QP	46.0	-15.1	1.00 V	55	44.80	-13.90
3	475.14	30.8 QP	46.0	-15.2	1.25 V	202	40.00	-9.20
4	624.85	33.2 QP	46.0	-12.8	1.49 V	165	39.40	-6.20
5	751.23	33.3 QP	46.0	-12.7	2.00 V	47	36.90	-3.60
6	900.94	33.6 QP	46.0	-12.4	1.00 V	162	35.00	-1.40

REMARKS:

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

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		
TEST MODE	B		

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	190.95	38.5 QP	43.5	-5.0	2.00 H	189	54.80	-16.30
2	270.51	35.6 QP	46.0	-10.4	1.00 H	13	48.90	-13.30
3	293.79	34.0 QP	46.0	-12.0	1.00 H	263	46.60	-12.60
4	499.48	34.9 QP	46.0	-11.1	2.00 H	8	43.80	-8.90
5	751.73	35.2 QP	46.0	-10.8	1.25 H	207	38.80	-3.60
6	875.91	33.2 QP	46.0	-12.8	1.00 H	203	35.20	-2.00
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	55.13	37.5 QP	40.0	-2.5	1.00 V	20	51.60	-14.10
2	190.95	35.0 QP	43.5	-8.5	1.00 V	33	51.30	-16.30
3	499.48	38.5 QP	46.0	-7.5	1.00 V	355	47.40	-8.90
4	625.60	33.5 QP	46.0	-12.5	1.24 V	8	39.60	-6.10
5	751.73	36.2 QP	46.0	-9.8	1.24 V	245	39.80	-3.60
6	875.91	36.5 QP	46.0	-9.5	1.75 V	264	38.50	-2.00

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 OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
 3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Apr. 24, 2014	Apr. 23, 2015
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 23, 2013	Dec. 22, 2014
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 08, 2013	Jul. 07, 2014
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 2.
 3. The VCCI Site Registration No. is C-2047.

4.2.3 TEST PROCEDURES

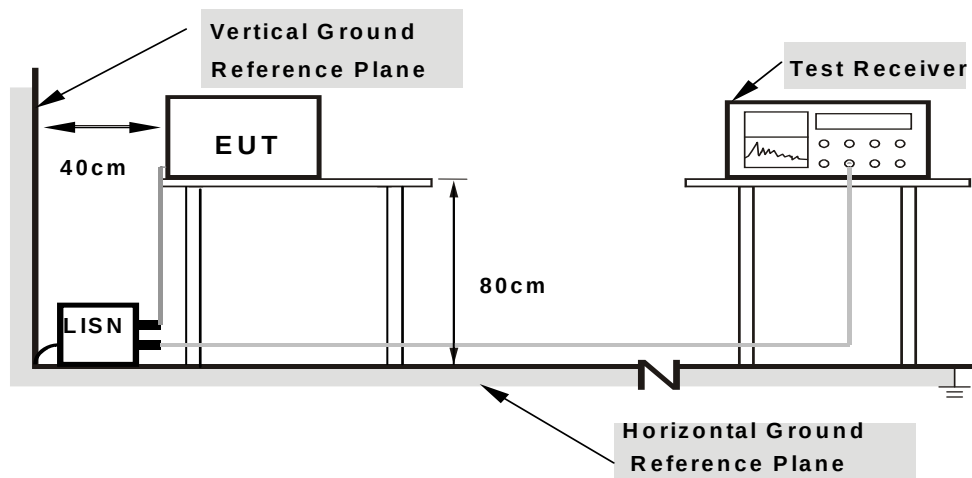
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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) were not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



- Note:**
- Support units were connected to second LISN.
 - Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.7.

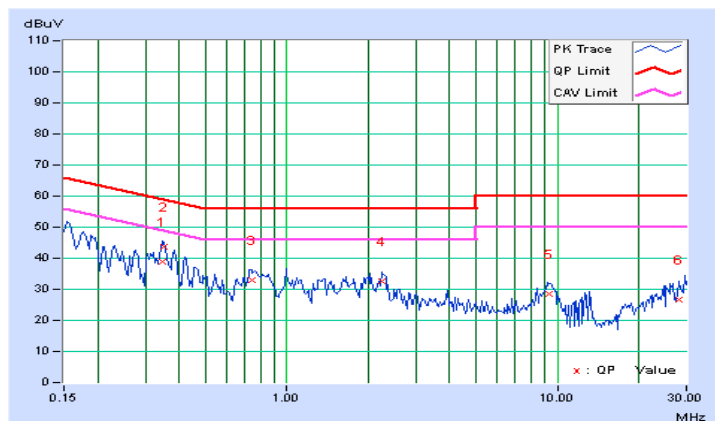
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA : 802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.34531	0.29	38.65	36.27	38.94	36.56	59.07	49.07	-20.13	-12.51
2	0.34922	0.29	43.49	41.95	43.78	42.24	58.98	48.98	-15.20	-6.74
3	0.73984	0.32	32.54	25.77	32.86	26.09	56.00	46.00	-23.14	-19.91
4	2.23828	0.37	32.22	25.77	32.59	26.14	56.00	46.00	-23.41	-19.86
5	9.37109	0.49	28.10	23.71	28.59	24.20	60.00	50.00	-31.41	-25.80
6	28.01953	0.48	26.17	13.87	26.65	14.35	60.00	50.00	-33.35	-35.65

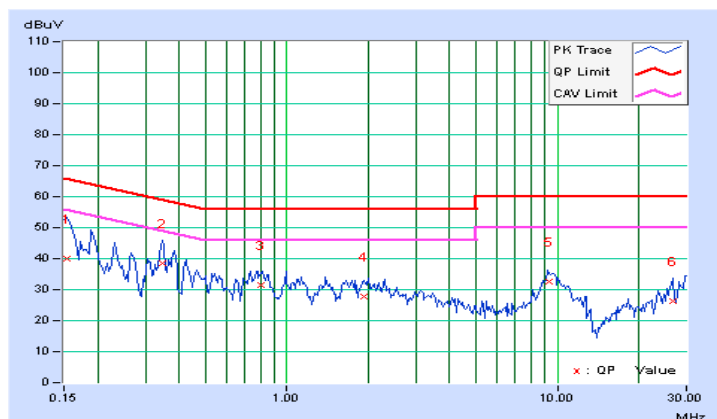
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor +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



PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.27	39.73	38.21	40.00	38.48	65.79	55.79	-25.79	-17.31
2	0.34531	0.29	38.29	36.34	38.58	36.63	59.07	49.07	-20.49	-12.44
3	0.80234	0.33	31.20	27.00	31.53	27.33	56.00	46.00	-24.47	-18.67
4	1.92578	0.37	27.23	20.98	27.60	21.35	56.00	46.00	-28.40	-24.65
5	9.27734	0.51	31.90	27.15	32.41	27.66	60.00	50.00	-27.59	-22.34
6	26.71875	0.53	25.61	22.65	26.14	23.18	60.00	50.00	-33.86	-26.82

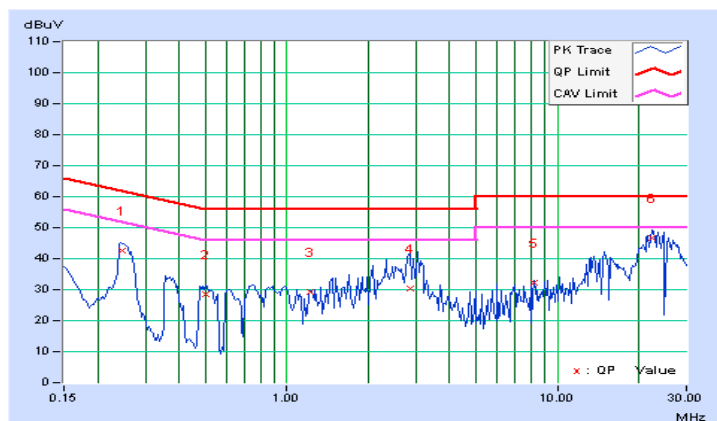
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor +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



PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.24766	0.28	42.21	31.52	42.49	31.80	61.84	51.84	-19.34	-20.03
2	0.50156	0.31	28.34	22.49	28.65	22.80	56.00	46.00	-27.35	-23.20
3	1.22656	0.34	28.88	6.24	29.22	6.58	56.00	46.00	-26.78	-39.42
4	2.87500	0.39	30.13	17.83	30.52	18.22	56.00	46.00	-25.48	-27.78
5	8.21875	0.48	31.67	27.76	32.15	28.24	60.00	50.00	-27.85	-21.76
6	22.41016	0.56	46.04	44.66	46.60	45.22	60.00	50.00	-13.40	-4.78

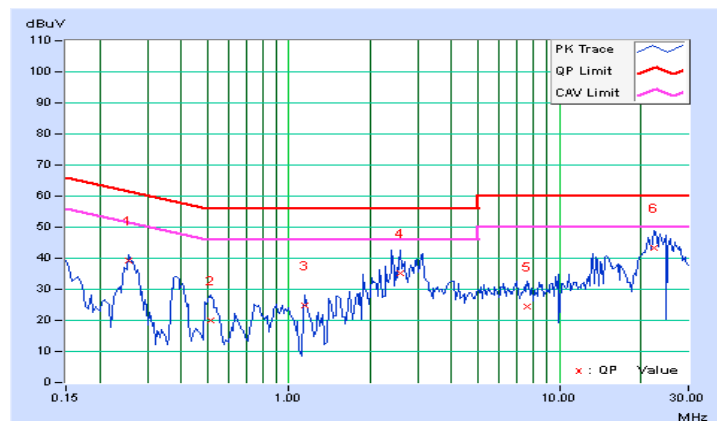
- REMARKS:** 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor +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



PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.25547	0.29	38.95	32.67	39.24	32.96	61.58	51.58	-22.34	-18.62
2	0.51328	0.31	19.63	19.01	19.94	19.32	56.00	46.00	-36.06	-26.68
3	1.14844	0.34	24.63	4.29	24.97	4.63	56.00	46.00	-31.03	-41.37
4	2.58203	0.39	34.86	25.27	35.25	25.66	56.00	46.00	-20.75	-20.34
5	7.58984	0.49	23.99	14.45	24.48	14.94	60.00	50.00	-35.52	-35.06
6	22.40234	0.60	42.61	42.14	43.21	42.74	60.00	50.00	-16.79	-7.26

- 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 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

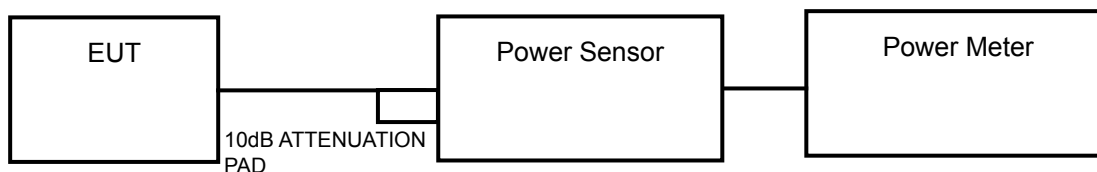
Array Gain = 0 dB (i.e., no array gain) for NANT $\leq$ 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths $\geq$ 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT $\geq$ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.3.4 TEST PROCEDURE

FOR AVERAGE POWER MEASUREMENT

For 802.11a, 802.11n (20MHz), 802.11n (40MHz)

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.

4.3.5 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 specific channel frequencies individually.

4.3.7 TEST RESULTS

POWER OUTPUT:

802.11a

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	EIRP (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1					
36	5180	11.63	12.08	30.699	14.87	18.17	30	PASS
40	5200	11.65	12.03	30.581	14.85	18.15	30	PASS
48	5240	11.61	11.89	29.941	14.76	18.06	30	PASS
149	5745	11.87	12.42	32.840	15.16	18.46	30	PASS
157	5785	12.86	13.10	39.737	15.99	19.29	30	PASS
165	5825	12.82	13.10	39.560	15.97	19.27	30	PASS

802.11n (20MHz)

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	EIRP (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1					
36	5180	11.56	12.00	30.171	14.80	18.10	30	PASS
40	5200	11.62	12.09	30.702	14.87	18.17	30	PASS
48	5240	11.63	11.83	29.796	14.74	18.04	30	PASS
149	5745	12.80	13.16	39.756	15.99	19.29	30	PASS
157	5785	12.80	13.17	39.804	16.00	19.30	30	PASS
165	5825	12.85	13.11	39.739	15.99	19.29	30	PASS

802.11n (40MHz)

CHAN.	FREQ. (MHz)	MAXIMUM CONDUCTED POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	EIRP (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1					
38	5190	9.73	10.55	20.747	13.17	16.47	30	PASS
46	5230	12.74	12.91	38.336	15.84	19.14	30	PASS
151	5755	9.96	10.48	21.077	13.24	16.54	30	PASS
159	5795	12.78	13.07	39.244	15.94	19.24	30	PASS

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

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.4.4 TEST PROCEDURES

For U-NII-1 band:

802.11a, 802.11n (20MHz):

Using method SA-1

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 30 kHz, Set VBW $\geq$ 1 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value

802.11n (40MHz):

Using method SA-2

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 30 kHz, Set VBW $\geq$ 1 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to “free run”.
- 5) Trace average at least 100 traces in power averaging mode.
- 6) Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 500 kHz, Set VBW $\geq$ 3 RBW, Detector = RMS
- 3) Sweep time = auto, trigger set to “free run”.
- 4) Trace average at least 100 traces in power averaging mode.
- 5) 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 4.3.6.

4.4.7 TEST RESULTS

802.11a

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
36	5180	-0.05	0.27	3.12	16.74	PASS
40	5200	0.02	0.36	3.20	16.74	PASS
48	5240	0.14	0.24	3.20	16.74	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. For U-NII-1 Band:

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2] = 6.26 > 6\text{dBi}$, so the power density limit shall be reduced to $17-(6.26-6) = 16.74\text{dBm}$.

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
36	5180	0.10	0.60	3.37	16.74	PASS
40	5200	0.33	0.49	3.42	16.74	PASS
48	5240	0.18	0.33	3.27	16.74	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. For U-NII-1 Band:

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2] = 6.26 > 6\text{dBi}$, so the power density limit shall be reduced to $17-(6.26-6) = 16.74\text{dBm}$.

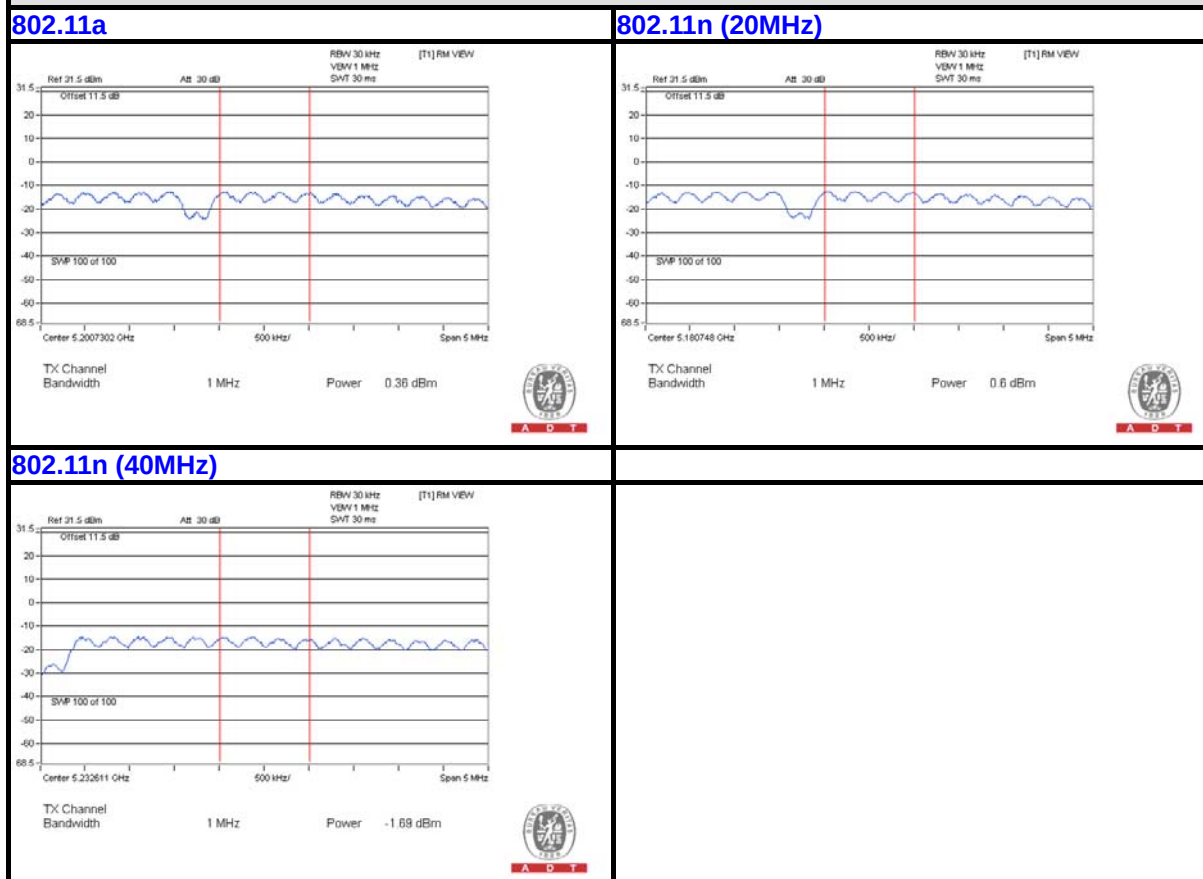
802.11n (40MHz)

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					
38	5190	-4.85	-4.68	-1.75	0.15	-1.60	16.74	PASS
46	5230	-1.90	-1.69	1.22	0.15	1.37	16.74	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.
- For U-NII-1 Band:**
Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2] = 6.26 > 6\text{dBi}$, so the power density limit shall be reduced to $17-(6.26-6) = 16.74\text{dBm}$.
- Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE



802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	4.27	3.01	7.28	29.74	PASS
	157	5785	4.63	3.01	7.64	29.74	PASS
	165	5825	4.82	3.01	7.83	29.74	PASS
1	149	5745	6.04	3.01	9.05	29.74	PASS
	157	5785	7.07	3.01	10.08	29.74	PASS
	165	5825	7.01	3.01	10.02	29.74	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2] = 6.26 > 6\text{dBi}$, so the power density limit shall be reduced to $30-(6.26-6) = 29.74\text{dBm}$.

802.11n (20MHz)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	DUTY FACTOR	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	4.78	3.01	0.10	7.89	29.74	PASS
	157	5785	4.75	3.01	0.10	7.86	29.74	PASS
	165	5825	4.72	3.01	0.10	7.83	29.74	PASS
1	149	5745	7.75	3.01	0.10	10.86	29.74	PASS
	157	5785	6.80	3.01	0.10	9.91	29.74	PASS
	165	5825	7.90	3.01	0.10	11.01	29.74	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2] = 6.26 > 6\text{dBi}$, so the power density limit shall be reduced to $30-(6.26-6) = 29.74\text{dBm}$.

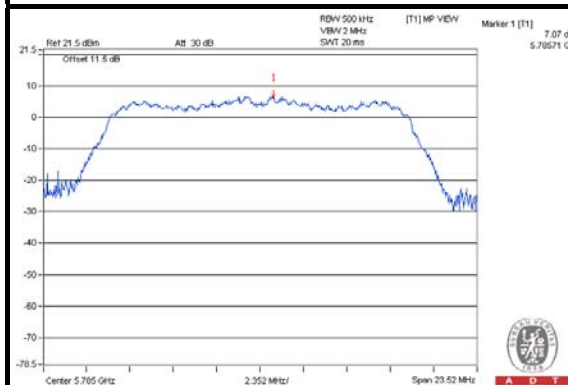
802.11n (40MHz)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	DUTY FACTOR	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	151	5755	-2.14	3.01	0.16	1.03	29.74	PASS
	159	5795	1.46	3.01	0.16	4.63	29.74	PASS
1	151	5755	0.66	3.01	0.16	3.83	29.74	PASS
	159	5795	3.50	3.01	0.16	6.67	29.74	PASS

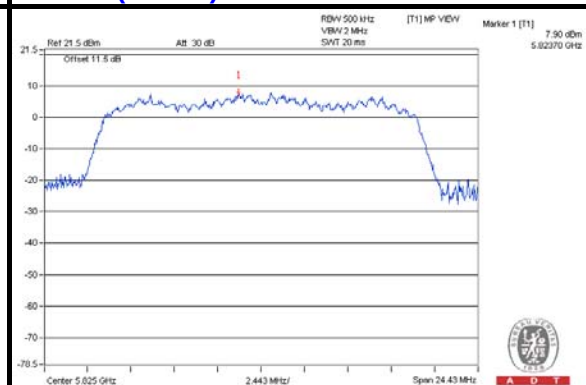
NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2] = 6.26 > 6\text{dBi}$, so the power density limit shall be reduced to $30-(6.26-6) = 29.74\text{dBm}$.

SPECTRUM PLOT OF WORST VALUE

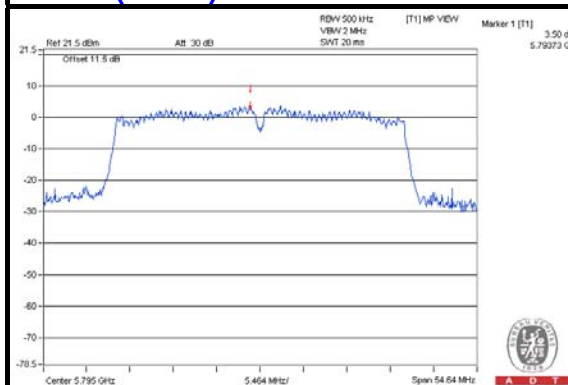
802.11a



802.11n (20MHz)



802.11n (40MHz)

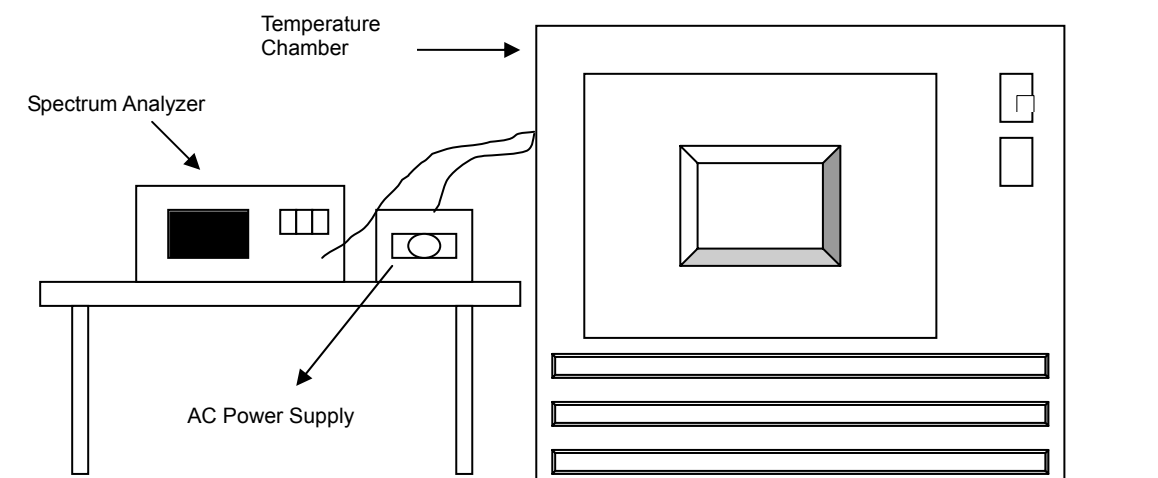


4.5 FREQUENCY STABILITY

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 4.1.3 to get information of above instrument.

4.5.4 TEST PROCEDURE

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

4.5.5 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: 5240MHz									
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	5240.0218	0.00042	5240.0157	0.00030	5240.0177	0.00034	5240.0187	0.00036
40	120	5239.9959	-0.00008	5239.9937	-0.00012	5239.9966	-0.00006	5239.9943	-0.00011
30	120	5240.0112	0.00021	5240.0158	0.00030	5240.0107	0.00020	5240.0091	0.00017
20	120	5240.0010	0.00002	5240.0003	0.00001	5239.9926	-0.00014	5239.9949	-0.00010
10	120	5239.9793	-0.00040	5239.9792	-0.00040	5239.9713	-0.00055	5239.9751	-0.00048
0	120	5240.0158	0.00030	5240.0128	0.00024	5240.0133	0.00025	5240.0095	0.00018
-10	120	5239.9952	-0.00009	5240.0032	0.00006	5240.0007	0.00001	5239.9951	-0.00009
-20	120	5240.0126	0.00024	5240.0117	0.00022	5240.0116	0.00022	5240.0170	0.00032
-30	120	5240.0260	0.00050	5240.0249	0.00048	5240.0257	0.00049	5240.0228	0.00044

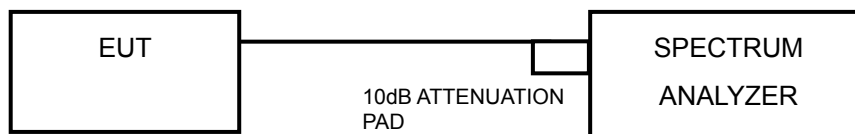
FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5240.0000	0.00000	5240.0002	0.00000	5239.9934	-0.00013	5239.9942	-0.00011
	120	5240.0010	0.00002	5240.0003	0.00001	5239.9926	-0.00014	5239.9949	-0.00010
	102	5240.0009	0.00002	5239.9996	-0.00001	5239.9925	-0.00014	5239.9949	-0.00010

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

- 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 CONDITIONS

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

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	15.34	15.51	0.5	PASS
157	5785	15.47	15.68	0.5	PASS
165	5825	15.18	15.68	0.5	PASS

802.11n (20MHz)

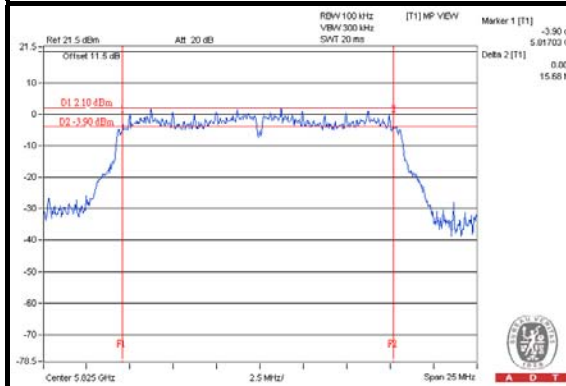
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
149	5745	15.20	15.45	0.5	PASS
157	5785	15.18	15.72	0.5	PASS
165	5825	15.33	16.29	0.5	PASS

802.11n (40MHz)

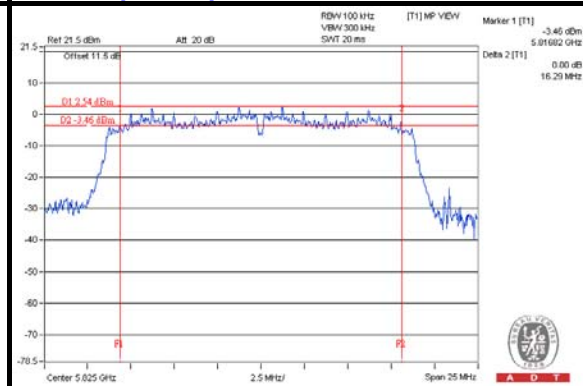
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
151	5755	36.11	36.34	0.5	PASS
159	5795	35.82	36.43	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

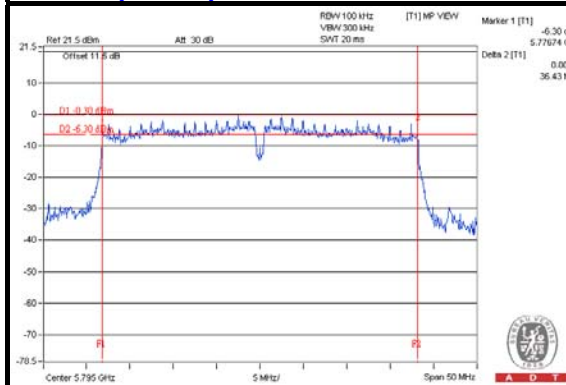
802.11a



802.11n (20MHz)



802.11n (40MHz)



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. INFORMATION ON THE TESTING LABORATORIES

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

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

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

7. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---